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Modules

EM8695

AT Command Reference

October 2025

41114815 Rev. 5

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Corporate and product information	Web: sierrawireless.com

Revision History

Revision number	Release date	Changes
1	November 2024	Creation
2	February 2025	Added: ▪ !LEDTEST, !PROFILESRESET, !USBPRODUCT Removed: ▪ !CARRIERRESET, !NVENCRYPTIMEI Updated: ▪ !BCRESETTYPE (<source> values), !DAFTMACT (query response format); !DATALOOPBACK (query response format), !DATXCONTROL (<duty_cycle> values), !EROPTION (reset), !USBCOMP (<config_type>,<config_type_desc>) Updated !CUSTOM: ▪ Removed note indicating default value 0 for all customizations ▪ Added !CUSTOM customization details for: BOOTQUIETDISABLE, DIAGENABLE, GPIOSARENABLE, GPSREFLOCK, ICMPINTSRVDIS, IMCONFIG, IMSWITCHHIDE, MBIMMODE, NETWORKNAMEFMT, UIMAUTOSWITCH ▪ Removed customizations: IPV6ENABLE Exposed command details for: ▪ !BCFWUPDATESTATUS, !DACGPSCTON, !DACGPSMASKON, !DACGPSSTANDALONE, !DACGPSTESTMODE, !DAOFFLINE, EFSCOUNTER, !EFSERR, !FWID, !GNSSAPPINFO, !GNSSPERMITTEDSTATE, !GPSMOMETHOD, !GPSMTLRSETTINGS, !GPSNIQOSTIME, !GPSPORTID, !GPSSENDNIRSP, !GPSSUPLNITIMEOUT, !GPSSUPLURL, !GPSSUPLVER, !GPSTRANSSEC, !IMAGE, !IMPREF, !NVBACKUP, !PRIID, !RMARESET, !SCUMMTU, !SECINFO Updated Standard AT Commands tables: ▪ Marked as unsupported: H, +CHUP, +CLCC, D*99#, D*99***<n># ▪ Removed: +CMNA

Revision number	Release date	Changes
3	April 2025	Added: ▪ !GNSSDPOMODE, !PCOFFEN, !REDCAP Updated: ▪ !DAFTMDEACT (query response format), !DARCONFIG (execution format (added parameters); <bw> parameter values), !DATALOOPBACK (added <nr5g_only> parameter), !GNSSCONFIG (reset requirement), !GPSBSAPN (updated <ratmask> details), !GPSMOMETHOD (password requirement), !PATEMPLIMITS (corrected execution format parameter names), !PCTEMPLIMITS (corrected execution format parameter names), !SKU (removed query list format), !TMCONFIG (corrected query response format; updated <tm_device>, <tm_zone> values), !TMDISCONFIG (corrected <cmd> values) Exposed command details for: ▪ !GPSLOCREPORT Removed: ▪ !ANTSEL, !EFSCOUNTER, !EFSERR, !GPSXTRADATAENABLE, !GPSXTRADATAURL, !GPSXTRAINITDNLD, !GPSXTRASTATUS, !GPSXTRATIMEENABLE, !GPSXTRATIMEURL ▪ DM Commands chapter (!DMDEBUG, !DMREAD, !DMREADALL, !DMSESSION, !LWM2M) ▪ !CUSTOM customizations: DIAGENABLE, GPIOSARENABLE Updated Standard AT Commands tables: ▪ Marked as supported: +CSQ
4	July 2025	Updated: ▪ !CUSTOM: Added !CUSTOM customization details for: DIAGENABLE, GPIOSARENABLE ▪ !GPSLBSAPN (updated <IPtype>); !GPSSUPLNITIMEOUT (persistence); !REDCAP (added execution format; updated query format; updated examples); !TMSTATUS (response format); !TMURC (updated <TM device>, <TM level>) Added: ▪ !FGIENABLE; !RFCID; !SARSTATEDFLT Exposed command details for: ▪ !SARINTGPIOMODE; !SARSTATE; !STEFS; !STSTATUS
5	October 2025	Updated: ▪ !DAGFTMRXAGC (corrected response format)

Contents

1: About This Guide

Introduction

This document describes supported standard and proprietary (extended) AT commands available for Semtech EM8695 modules, and provides details where commands vary from the standards. These commands are intended for use by OEMs, and are supplemental to the standard AT commands for WCDMA devices defined by the 3GPP (3rd Generation Partnership Project) in *TS 27.007 AT command set for User Equipment (UE)* and *TS 27.005 Use of Data Terminal Equipment — Data Circuit terminating Equipment (DTE-DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (BSE)*.

When designing applications that use these AT commands, use Semtech applications as functionality templates to ensure proper use of command groups. For questions or concerns relating to command implementation, please contact your supplier.

Semtech also provides a forum for users of EM series modules, at forum.sierrawireless.com/c/modules/mc-em-series.

Command access

Some commands in this reference are password-protected. To enable access to password-protected commands, use !ENTERCND to enter the password. (Access remains enabled until the module is reset or powered off and on.)

Password Recommendation

Important — To prevent unauthorized access of password-protected AT commands, Semtech strongly recommends selecting a unique password (4–10 alphanumeric characters) to replace the module's default password for extended AT commands. (The default password is configured during manufacture.)

Firmware

This document applies to SWIX35C_00.01.16.00 (Release 1 BP2).

Firmware for EM9 modules is available at source.sierrawireless.com/resources/airprime/software/em86/em86-approved-fw-packages/

To determine your current firmware revision, use **AT+GMR** or **ATI**.

Command timing

Interval timing

Some commands require time to process before additional commands are entered. For example, the modem returns OK when it receives **AT!DAFTMACT**. If **AT!DARCONFIG** is received too soon after this, the modem returns an error.

When building automated test scripts, ensure that sufficient delays are embedded, where necessary, to avoid these errors.

Result codes

A result code is typically returned after each AT command (except the !RESET command) has been executed:

- `OK` — Indicates the command has executed successfully.
- `ERROR` — Indicates the command failed for some reason (e.g., parameters missing or out of range, command not permitted due to current state/condition of the modem, unrecognized command, etc.)

Conventions

The following format conventions are used in this reference:

- Unless described otherwise, numeric values are decimal unless prefixed as noted below.
  - Hexadecimal — Prefixed with "0x" (e.g., 0x3D)
  - Binary — Prefixed with "0b" (e.g., 0b00111101)
- In the "Usage" section for each command, the command and response syntaxes are shown using different fonts. For example:
  - Command: **AT!HWID?**
  - Response:
    ```
    Revision: <MajorVer> <CR>
    OK
    ```
- Commands referenced from other command descriptions are shown without the leading "AT" (but the AT is still required).
  For example, **!CUSTOM=<customization>,<value>**.
- Command and response parameters:
  - <n> — Required
  - [<n>] — Optional
  - Factory default values are indicated in parameter descriptions (if applicable).
- Response formats:
  - Responses with 2+ lines are shown with a <CR> to indicate line breaks.
  - Response lines that repeat the same format for more than one line are displayed as "..."
  - For example, the **!CUSTOM** command returns the values of multiple customizations:

    ```
    !CUSTOM:
          <customization>  <value> <CR>
          ...
    OK
    ```
- Firmware release indications for each command — Each command includes an entry indicating when the command was first officially available, and another entry indicating when the command behavior was last updated (if applicable):
  - **"Added F/W:"** — Firmware version where the command was first available.
  - **"Updated F/W:"** — Firmware version where the command was last updated.
  - **"Deprec. F/W:"** — Firmware version where support for the command was removed. (The command may still be available, but behavior is not guaranteed.)
  - **"Removed F/W:"** — Firmware version where the command was removed from the firmware.

  For details concerning changes to command support, refer to *[4] EM8695 Customer Release Notes (Doc# Forthcoming)*.

Document structure

Semtech proprietary commands are grouped into general categories, with each category in a specific chapter. The tables below summarize the commands for each chapter. (Note that as this document is updated, new commands are added in alphabetical order.)

AT Password Commands — Commands used to enable access to password-protected AT commands and to set the AT command password.

Table 1-1: AT password commands

Command	Description	Page
!ENTERCND	Enable access to password-protected commands	17
!SETCND	Set AT command password	18

Modem Status, Customization, and Reset Commands — Commands used to determine modem status, adjust customization settings, and reset the modem.

Table 1-2: Modem status commands

Command	Description	Page
!BAND	Select/return frequency band set	21
!BOOTHOLD	Reset modem and wait in bootloader for firmware download	23
!CUSTOM	Set/return customization settings	24
!DATALOOPBACK	Enable/disable and configure loopback mode	28
!EROPTION	Configure post-crash behavior	29
!FGIENABLE	Enable/disable Feature Group Identifiers (FGI)	30
!FWID	Get Windows Update Firmware ID	31
!GCFEN	Enable/disable GCF test mode	32
!GSTATUS	Return operational status	33
!HWID	Display hardware version	35
!IMAGE	Manage firmware images	36
!IMPREF	Query/set Image Management preferences	38
!LEDPATTERN	Configure LED blink patterns	40
!LEDTEST	Test to switch LED on/off	42
!LTEINFO	Display LTE network information	43
!NRINFO	Display NR information	45
!PATEMP	Return module PA's current temperature information	48
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!PCINFO	Return power control status information	51

Table 1-2: Modem status commands (Continued)

Command	Description	Page
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!PCTEMPLIMITS	Set/report temperature state limit values	55
!PCVOLT	Return current power supply voltage information	57
!PCVOLTLIMITS	Set/report power supply voltage state limit values	58
!PRIID	Report module PRI part number and revision	60
!PROFILESRESET	Restore Carrier Default Profiles	61
!REDCAP	Set/Report RedCap support status of camped network	62
!RESET	Reset modem	63
!RFCID	Query RFC hardware IDs and board IDs	63
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!SCUMMTU	Set/query MTU size	66
!SDPREF	Display enabled RATs and bands	67
!SECINFO	Display module security state	69
!SELRAT	Set/query preferred RAT	71
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Table 1-2: Modem status commands (Continued)

Command	Description	Page
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Diagnostic Commands — Commands used to select frequency bands and diagnose problems.

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Test Commands — Commands required to place the modem in particular modes of operation, test host connectivity, and to configure the transmitters and receivers for test measurements.

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Memory Management Commands — Commands that control the data stored in non-volatile memory of the modem.

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!STSTATUS	Display Smart Transmit status details	168

DM Commands — Commands used to control different DM sessions and get information about LWM2M objects.

Table 1-9: DM commands

Command	Description
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!DMREAD	Get content of specified LWM2M object
!DMREADALL	Get content of all LWM2M objects
!DMSESSION	Control DM session
!LWM2M	Enable/disable LwM2M client

DG Commands — Commands used to manage Dying Gasp SMS messages.

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2: AT Password Commands

Introduction

Many AT commands described in this document are password-protected. This chapter describes how to enter or change the password used to gain access to the protected commands.

Password Recommendation

Important — To prevent unauthorized access of extended AT commands, Semtech strongly recommends selecting a unique password (8–64 alphanumeric characters) to replace the module's default password for extended AT commands.

To change the AT command password:

1. Connect to the module's AT COM port.
2. Enable extended AT command access using the current password, and set a unique password:

```
AT!ENTERCND="<current_password>"
AT!SETCND=”<new_password>”
```

Command summary

Table 2-1 summarizes the commands that are described in detail in Table 2-2 on page 17.

Table 2-1: AT password commands

Command	Description	Page
!ENTERCND	Enable access to password-protected commands	17
!SETCND	Set AT command password	18

Command reference

Table 2-2: AT command password details

Command	
!ENTERCND	**Enable access to password-protected commands**
Description	

Use this command to enable access to password-protected commands.

Once the password has been entered correctly, the password-protected AT commands remain available until the modem is reset or powered off and on.

Important — Semtech strongly recommends changing the default password — see Password Recommendation on page 16.

Warning: ***!ENTERCND*** *does not accept null (blank) passwords. If the password has been cleared (using !SETCND), you will not be able to use password-protected commands, and will have to contact Semtech for help to reset the password.*

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: No (Execution); Yes (Query)

Reset required to apply changes: No

Persistent across power cycles: No

Usage:

- Execution: **AT!ENTERCND=<"key">**
  Response: `OK`
  Purpose: Unlock password-protected commands.
- Query: **AT!ENTERCND?**
  Response: `<key> <CR>`
  `OK`
  Purpose: Display the current password.

Parameters:

<"key"> (Password stored in NV memory)

- Password must be entered with quotation marks (for example, **AT!ENTERCND="ExamplePW"**).
- Password length: 4–10 characters (0–9, A–Z, upper or lower case)

Table 2-2: AT command password details (Continued)

Command	
!SETCND	**Set AT command password**
Description	

Change the password that is used for the !ENTERCND command.
Important — Semtech strongly recommends changing the default password — see Password Recommendation on page 16.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!SETCND=<"key">**
  Response: OK
  Purpose: Set the <"key"> as the new password for accessing protected commands.

Parameters:

<"key"> (New password)

- Password must be entered with quotation marks (for example, **AT!SETCND="NewPW"**).
- Password length: 4–10 characters (0–9, A–Z, upper or lower case)

Warning: *Do NOT enter a null (blank) password (i.e., the <"key"> cannot be "") — you will NOT be able to use password-protected commands, and will have to contact Semtech for help to reset the password.*

3: Modem Status, Customization, and Reset Commands

Introduction

This chapter describes commands used to reset the modem, adjust customization settings, retrieve the hardware version, monitor the temperature, voltage and modem status, etc.

Command summary

Table 3-1 summarizes the commands that are described in detail in Table 3-2 on page 21.

Table 3-1: Modem status commands

Command	Description	Page
!BAND	Select/return frequency band set	21
!BOOTHOLD	Reset modem and wait in bootloader for firmware download	23
!CUSTOM	Set/return customization settings	24
!DATALOOPBACK	Enable/disable and configure loopback mode	28
!EROPTION	Configure post-crash behavior	29
!FGIENABLE	Enable/disable Feature Group Identifiers (FGI)	30
!FWID	Get Windows Update Firmware ID	31
!GCFEN	Enable/disable GCF test mode	32
!GSTATUS	Return operational status	33
!HWID	Display hardware version	35
!IMAGE	Manage firmware images	36
!IMPREF	Query/set Image Management preferences	38
!LEDPATTERN	Configure LED blink patterns	40
!LEDTEST	Test to switch LED on/off	42
!LTEINFO	Display LTE network information	43
!NRINFO	Display NR information	45
!PATEMP	Return module PA's current temperature information	48
!PATEMPLIMITS	Set/report module PA temperature state limit values	49
!PCINFO	Return power control status information	51
!PCOFFEN	Enable/return Low Power Mode control via W_DISABLE_N feature	53
!PCTEMP	Return current temperature information	54
!PCTEMPLIMITS	Set/report temperature state limit values	55

Table 3-1: Modem status commands (Continued)

Command	Description	Page
!PCVOLT	Return current power supply voltage information	57
!PCVOLTLIMITS	Set/report power supply voltage state limit values	58
!PRIID	Report module PRI part number and revision	60
!PROFILESRESET	Restore Carrier Default Profiles	61
!REDCAP	Set/Report RedCap support status of camped network	62
!RESET	Reset modem	63
!RFCID	Query RFC hardware IDs and board IDs	64
!RFDEVSTATUS	Display all RFFE status	65
!SCUMMTU	Set/query MTU size	66
!SDPREF	Display enabled RATs and bands	67
!SECINFO	Display module security state	69
!SELRAT	Set/query preferred RAT	71
!SKU	Display module's SKU	72
!SMSWAKE	Enable/disable SMS host wake-up feature	73
!SMSWAKEWIDTH	Set/read SMS Wake signal width	74
!TMCONFIG	Configure thermal mitigation thresholds	75
!TMDISCONFIG	Enable/disable thermal mitigation	78
!TMSTATUS	Report Thermal Mitigation Status	79
!TMURC	Enable/disable thermal mitigation URCs	81
!USBCOMP	Set/report USB interface configuration	82
!USBINFO	Return information from active USB descriptor	84
!USBINFOEXT	Return extended information from active USB descriptor	85
!USBMANUFACTURER	Get product manufacturer from USB descriptor	86
!USBPID	Get/set product ID in USB descriptor	87
!USBPRODUCT	Get/set product name string in USB descriptor	88
!USBSPEED	Get/set USB speed	89
!USBVERSION	Get USB version number in USB descriptor	90
!USBVID	Set/query USB vendor ID	91
!VERINFO	Display firmware image version	92

Command reference

Table 3-2: Modem status, customization, and reset commands

Command	
!BAND	**Select/return frequency band set**

Description

Use this command to:

- Configure the modem to operate on a defined 'band set' (i.e., a set of frequency bands).
- Create (define) new band sets.
- Return the current configuration (display the configured band set).

Note: The 'Basic' command and response versions described below are used if you have not entered the required password. (See Command access on page 8.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes — Execution (Extended), Query (Extended)
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution (Basic):
  AT!BAND=<Index>
  Response: OK
  Purpose: Select an existing set of bands.
- Execution (Extended):
  AT!BAND=<Index>,<"Name">[, <Lmask>[, <Lmask2>[,<Nmask1>[,<Nmask2>]]]]
  Response: OK
  Purpose: Create a new set of bands.
- Query (Basic):
  AT!BAND?
  Response
  ```
  Index,   Name <CR>
  <Index>, <Name> <CR>
  OK
  ```
  Purpose: Report the current band selection.
- Query (Extended):
  AT!BAND?
  Response
  ```
  Index,   Name,  L Band Mask  L Band Mask 2  NRSA Band Mask
  NRSA Band Mask 2 <CR>
  <Index>, <Name> <Lmask1>     <Lmask2>       <Nmask1>
  <Nmask2> <CR>
  OK
  ```
  or
  (If the current band mask does not match a band set)
  ```
  Unknown band mask. Use AT!BAND to set band. <CR>
  <Index> <CR>
  OK
  ```
  Purpose: Report the current band selection.

(Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

!BAND (continued)	Select / return frequency band set (continued)

- Query List: **AT!BAND=?**
  Purpose: Display valid parameter values.

Parameters:

<Index> (Index of a band set. Use the Query List command format to display all supported sets.)
- Valid range: 0–13 (Hexadecimal; i.e., there are 20 possible values — 0–F, 10-13)

<Name> (Name of the band set)
- Format: ASCII string
- Length: Up to 30 characters

<Lmask1> (LTE bands included in the set)
- Format: 64-bit bitmask
- Example values — This list is an example only and does not show all possible bands. Available bands are device-dependent. To display the list of bands available for your device, use !ENTERCND to enable access to password-protected commands, and then use the extended Query command format.
  - 0000000000000001 — B1
    0000000000000002 — B2
    ...
    0000800000000000 — B48
- Note — The full list of bands in the set is spread across <Lmask1>–<Lmask2>.

<Lmask2> (LTE bands included in the set)
- Format: 64-bit bitmask
- Example values — Available bands are device-dependent. To display the list of bands available for your device, use !ENTERCND to enable access to password-protected commands, and then use the extended Query command format.
  - 0000000000000002 — B66
  - 0000000000000040 — B71
- Note — The full list of bands in the set is spread across <Lmask1>–<Lmask2>.

<Nmask1> (NR SA bands included in the set)
- Format: 64-bit bitmask
- Example values — This list is an example only and does not show all possible bands. Available bands are device-dependent. To display the list of bands available for your device, use !ENTERCND to enable access to password-protected commands, and then use the extended Query command format.
  - 0000000000000001 — n1
    0000000000000002 — n2
    ...
    0000800000000000 — n48
- Note — The full list of bands in the set is spread across <Nmask1>–<Nmask2>.

<Nmask2> (NR SA bands included in the set)
- Format: 64-bit bitmask
- Example values — Available bands are device-dependent. To display the list of bands available for your device, use !ENTERCND to enable access to password-protected commands, and then use the extended Query command format.
  - 0000000000000002 — n66
    ,,,
    0000000000004000 — n79
- Note — The full list of bands in the set is spread across <Nmask1>–<Nmask2>.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!BOOTHOLD	**Reset modem and wait in bootloader for firmware download**
Description	
Prepare for a firmware download by resetting the modem and waiting in “boot and hold” mode. **Supporting EM8695 devices:** All **Added F/W:** EM8695: SWIX35C_00.01.04.00 (Release 0.2) **Password required:** No **Reset required to apply changes:** Automatic **Persistent across power cycles:** Yes **Usage:** ▪ Execution: **AT!BOOTHOLD** Response: OK Purpose: Force the modem to reset and then wait in boot and hold mode for a firmware download.	

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!CUSTOM	**Set / return customization settings**
Description	

Set (configure) or return several customization values.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes (Execute)
No (Query)
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Execution: **AT!CUSTOM=<customization>, <value>**
  Response: `OK`
  Purpose: Assign <value> to a specific <customization> setting.
- Query: **AT!CUSTOM?**
  Response: `(list of enabled <customization>s) <CR>`
  `OK`
  Purpose: Display customizations that are currently enabled.
- Query List: **AT!CUSTOM=?**
  Purpose: Return a list of valid <customization> values.

Parameters:

<value> (Value being assigned to a specific <customization> setting)

- Descriptions are included in each of the customizations described below.
- Numeric value. Valid range depends on the <customization> type.

<customization> (String identifying customization setting.)

- **Note —** For the Execution command format, quotation marks are required around the <customization> string. For example: **!CUSTOM="CSDOFF",0**
- "BANDSELEN" — Enable / disable band selection
  <value>:
  - 0 — Enable (Default)
  - 1 — Disable
- "CFUNPERSISTEN" — Enable / disable persistence of the **+CFUN** setting (across power cycles).
  <value>:
  - 0 — Disable (**+CFUN** setting does not persist across power cycle) (Default)
  - 1 — Enable (**+CFUN** setting persists across power cycle)
  - Note: This customization does not apply to the persistence of the operating mode set via other interfaces. For example, the QMI interface maintains the ability to set the operating mode to LPM as defined in that interface specification, regardless of this customization value.

(Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

!CUSTOM (continued)	Set / return customization settings (continued)

- "DGENABLE" — Enable / disable 'Dying Gasp' feature
  <value>:
  - 0 — Disable the Dying Gasp feature (Default)
  - 1 — Enable. When Dying Gasp is triggered, send an SMS.
  - 2 — Enable. When Dying Gasp is triggered, request a device detach from the network.
  - 3 — Enable. When Dying Gasp is triggered, send an SMS and request a device detach from the network.
  - Note: When Dying Gasp is enabled (i.e., <value>=1–3):
    - The W_DISABLE_N pin is used to trigger the Dying Gasp.
    - The W_DISABLE_N pin cannot be used to control the radio power state, so the W_DISABLE LPM voter status is ignored in the !PCINFO? response.
    - If <value>=2 or 3, the module enters LPM after requesting a device detach from the network. The module stays in LPM until the W_DISABLE_N pin is deasserted, and then the module goes back to online mode.
- "DHCPRELAYENABLE" — Enable / disable DHCP Relay feature
  <value>:
  - 0 — Disable (Default). The modem filters DHCP requests to the internal DHCP server.
  - 1 — Enable. DHCPv4 requests (i.e., packets for UDP port 67 with target IP address as the DHCP server) go out over the network.
- "DIAGENABLE" — Enable / disable diagnostic (DIAG) interface
  <value>:
  - 0 — DIAG logging disabled
  - 1 — DIAG logging enabled (Default)
  - 128 — Dynamic DIAG enable based on debug policy
- "GPIOSARENABLE" — Configure Smart Transmit (ST) Device State Index (DSI — exposure scenario) selection method
  <value>:
  - 0 — Selection controlled by AT command — !SARSTATE
  - 1 — Selection controlled by GPIO — DPR (pin 25). DPR behavior is configured using !SARINTGPIOMODE.
  - Note If GPIOSARENABLE is switched from 0 to 1 (controlled by GPIO), the device must be reset for the change to take effect.
- "GPSENABLE" — Enable / disable the GNSS feature.
  <value>:
  - 0 — GNSS disabled
  - 1 — MO & MT enabled regardless of GPS_DISABLE pin status (Default)
  - 2 — MO enabled regardless of GPS_DISABLE pin status
  - 3 — MT enabled regardless of GPS_DISABLE pin status
  - 4 — MO & MT enabled when the GPS_DISABLE pin is not asserted
  - 5 — MO enabled when the GPS_DISABLE pin is not asserted
  - 6 — MT enabled when the GPS_DISABLE pin is not asserted
  - <value> + 80 — Disable GLONASS
    (For example, 84 = MO & MT narrow-band GPS enabled, but gated by GPS_DISABLE setting.)
- "GPSLPM" — Enable / disable GPS in Low Power Mode.
  <value>:
  - 0 — Enable. GPS engine remains enabled when modem enters LPM (Default)
  - 1 — Disable. GPS engine is disabled when modem enters LPM

(Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

!CUSTOM (continued)	Set / return customization settings (continued)

- "GPSREFLOC" — Enable/disable reference GPS location reporting.
  <value>:
  - 0 — Enable. Report reference location when assisted GPS fix fails, if available (Default).
  - 1 — Disable. Do not report reference location.
  - Note: This customization does not disable incoming ping replies for IPv6.
- "ICMPINTSRVDIS" — Enable / disable incoming ping replies for IPv4.
  <value>:
  - 0 — Enable incoming ping reply (i.e., enable IPv4 ICMP service)
  - 1 — Disable incoming ping reply for IPv4 (Default) (i.e., disable IPv4 ICMP service)
  - Note: The modem is capable of replying to pin requests in an LTE Attached state, without a host or embedded data connection.
  - Note: When a test SIM is used with the module, this customization is ignored, and the module operates as if option 0 (Enable incoming ping reply) is set. (This occurs when the module transitions to online mode.)
- "IMCONFIG" — Configure Image Switch (IM) features (bitmap value)
  <value>:
  - 0x00 — All IM features enabled (Default)
  - 0x01 — Disable device-based IM feature
  - 0xFF — Disable all IM features
- "IMSWITCHHIDE" — Hide / expose Multi-Image Management
  <value>:
  - 0 — Expose Multi-Image Management (Default)
  - 1 — Hide Multi-Image Management. (i.e., Disable writing firmware to slots; disable firmware recovery from slots; disable some QMI DMS multiple-firmware related APIs)
- "MBIMMODE" — Enable / disable MBIM mode for data path initialization.
  <value>:
  - 0 — Disable (Default)
  - 1 — Enable
- "NETWORKNAMEFMT" — Set MBIM provider name format for vanui (roaming).
  <value>:
  - 0 — Display one of SPN, LongName or ShortName, in that order (Default)
    (i.e., Display SPN if available, otherwise display LongName if available, otherwise display ShortName)
  - 1 — Display one of LongName or ShortName, in that order
    (i.e., Display LongName if available, otherwise display ShortName)
  - 2 — [SPN] - [LongName / ShortName] (Note: This may be truncated.)
  - 3 — [LongName / ShortName] - [SPN] (Note: This may be truncated.)
- "PCSCDISABLE" — Configure PCSC / Authentication features (bitmap value)
  <value>:
  - Valid range: 0–7. Set bits to disable functions:
    - Bit 0 — Disable PCSC (Default: 0 — Enabled)
    - Bit 1 — Disable GSM Algorithm and Authenticate commands (Default: 0 — Enabled)
    - Bit 2 — Disable +CIMI from outputting IMSI (Default: 0 — Enabled)
  - Default: 0 (All functions enabled)

(Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

!CUSTOM (continued)	**Set / return customization settings (continued)**

- "SIMHOTSWAPDIS" — Configure the SIM hotswap feature for UIM1 and UIM2.
  Note: If the UIM2ENABLE customization disables UIM2 slot support or enables the eSIM on UIM2, this customization affects only the UIM1 SIM.
  <value>:
  - 0 — Enable hotswap for UIM1 and UIM2 (Default)
  - 1 — Disable hotswap for UIM1, and enable hotswap for UIM2
  - 2 — Enable hotswap for UIM1, and disable hotswap for UIM2
  - 3 — Disable hotswap for UIM1 and UIM2
- "SIMLPM" — Indicate default SIM power state during Low Power Mode.
  <value>:
  - 0 — QCT default behavior (same as <value>=2) (Default)
    Note: The default behavior could change in future revisions. Use <value>=2 if you need to guarantee the described behavior.
  - 1 — SIM remains powered in LPM
  - 2 — Power down SIM with **AT+CFUN=0**; Power up SIM with **AT+CFUN=1**
- "UIM2ENABLE" — Configure UIM2 slot operation.
  <value>:
  - 0 — Disable UIM2
  - 1 — Enable UIM2 (Default)
- "UIMAUTOSWITCH" — Enable / disable automatic SIM switching.
  <value>:
  - 0 — Disable automatic SIM switching (Default)
  - 1 — Enable, UIM1 preferred
  - 2 — Enable, UIM2 preferred
- "USBSERIALENABLE" — Serial number to be used in the USB descriptor (USBD)
  <value>:
  - 0 — Same as <value>=1 (Default)
  - 1 — Use IMEI as the serial number in the USBD.
  - 2 — Use NULL as the serial number in the USBD.
  - 3 — Use hard-coded default (0123456789ABCDEF) in the USBD.
- "WAKEHOSTEN" — Enable / disable host wake-up via SMS or incoming data packet.
  <value>:
  - 0 — Disable — Host will not wake when SMS or incoming data packet is received. (Default)
  - 1 — Wake host when simple SMS is received.
  - 2 — Wake host when incoming data packet is received.
  - 3 — Wake host when simple SMS or incoming data packet is received.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!DATALOOPBACK	**Enable / disable and configure loopback mode**

Description

Enable or disable loopback mode and the loopback multiplier, or display the current settings.

This feature is typically used to test the module↔host interface without requiring an OTA data connection.

When loopback is enabled, the module receives input traffic from the host (i.e., uplink (UL)) and echoes it back to the host as output traffic (i.e., downlink (DL)). The <loopback_multiplier> option controls the number of copies the module sends as output traffic.

For example, to simulate a possible real-world 5G scenario with max UL throughput = 110 Mbps and max DL throughput = 220 Mbps, data loopback mode can be enabled with the multiplier set to 2 (i.e., 2 x 110 Mbps UL = 220 Mbps DL).

Note: The data loopback feature might affect 4G/5G registration or other features — disable it when you don't need it.

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: Yes

Reset required to apply changes: Yes

Persistent across power cycles: Yes

Usage:

- Execution: **AT!DATALOOPBACK=<loopback_mode>[, <loopback_multiplier>[,<sys_mode>][,<nr5g_only>]]**
  Response: `OK`
  Purpose: Enable / disable loopback mode, and set the loopback multiplier, system mode, and 5G NR bearer setup direction.
- Query: **AT!DATALOOPBACK?**
  Response:
  ```
  !DATALOOPBACK: <loopback_mode>,<loopback_multiplier>,<sys_mode>,<nr5g_only>
  <CR>
  OK
  ```
  Purpose: Display the loopback mode state, and loopback multiplier.
- Query List: **AT!DATALOOPBACK=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<loopback_mode> (Loopback mode state)
- 0 — Disable data loopback mode (Default)
- 1 — Enable data loopback mode

<loopback_multiplier> (Number of downlink bytes sent to the host for each uplink byte received by the module — i.e., the replication count)
- Decimal value
- Maximum = 25
- Default (if not specified): 1
- Parameter is used only for <loopback_mode>=1

<sys_mode> (System mode to be tested)
- 4 — LTE (Default)
- 5 — 5G

<nr5g_only> (Bearer setup direction to be tested)
- Leave this parameter blank. (The value defaults to 0 and is ignored.)
- This parameter is included for command format compatibility with other Semtech modules.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!EROPTION	**Configure post-crash behavior**

Description

Configure the action that the modem will perform after a crash.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Execution: **AT!EROPTION=<option>**
  Response: `OK`
  Purpose: Configure the modem to perform the indicated action type (<option>) after a crash occurs.
- Query: **AT!EROPTION?**
  Response:
  ```
  !EROPTION: <CR>
  <option> <CR>
  OK
  ```
  Purpose: Display the current setting.
- Query List: **AT!EROPTION=?**
  Purpose: Display valid values for the <option> parameter.

Parameters:

<option> (Action to take after a crash)

- 0 — Device enters USB download mode
- 1 — Device resets
- 2 — No action

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!FGIENABLE	**Enable / disable Feature Group Identifiers (FGI)**
Description	

Enable or disable feature group identifiers FGI3 and FGI7 (indicating IP Multimedia Subsystem (IMS) support).

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.16.00 (Release 1 BP2)
Password required: No
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Execution: **AT!FGIENABLE=<flag>**
  Response: `OK`
  Purpose: Enable or disable FGI3 and FGI7.
- Query: **AT!FGIENABLE?**
  Response: `<flag> <CR>`
  `OK`
  Purpose: Display the setting for FGI3 and FGI7.
- Query List: **AT!FGIENABLE=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<flag> (Enable / disable FGI3 and FGI7)

- 0 — Disable FGI3 and FGI7. (i.e., disable IMS)
- 1 — Enable FGI3 and FGI7. (i.e., enable IMS)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!FWID	**Get Windows Update Firmware ID**
Description	

Get the Windows Update firmware ID, which uniquely identifies a SKU. The ID enables Windows Update to be used to update firmware or host software.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.10.00 (Release 0.3)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query: **AT!FWID?**
  Response:
  ```
  FWID: <fwid> <CR>
  OK
  ```
  or
  ```
  FWID: Unknown <CR>
  OK
  ```
  Purpose: Display the Windows Update firmware ID.
- Query List: **AT!FWID=?**
  Purpose: Display the command format. Note: The response indicates a command format used to set the FWID. This command format is unavailable.

Parameters:

<fwid> (Windows Update firmware ID)

- Format: Hex ASCII. Exactly 16-bye hex (32 bytes represented by hexascii)
- Example: 1234567890abcdef1234567890abcdef

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!GCFEN	**Enable / disable GCF test mode**
Description	

Place the modem in GCF testing mode or normal operating mode.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes — Execution format only
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!GCFEN=<mode>**
  Response: `OK`
  Purpose: Place the modem in GCF testing mode or normal operating mode.
- Query: **AT!GCFEN?**
  Response:
  ```
  !GCFEN: <CR>
  <mode> <CR>
  OK
  ```
  Purpose: Display the modem's current mode.
- Query List: **AT!GCFEN=?**
  Purpose: Display valid parameter values.

Parameters:

<mode> (Enable / disable GCF testing)

- 0 — Disable GCF test mode (Default). This value is used for normal operations.
- 1 — Enable GCF test mode.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!GSTATUS	**Return operational status**
Description	

Return specific details about the current operational status of the modem. The response details vary depending on the current RAT. Contact Semtech for further details if required.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Notes:

- The thermal mitigation level (<mitlvl>) is the maximum mitigation level from all sources. For detailed mitigation information, use !TMSTATUS.
- The Tx power value (Tx Power for LTE, NR5G Tx Power for NR5G) is indicated by the <txpwr> parameter, which represents the input power to antennas in dBm.
- When the response is for LTE/NR5G, the LTE Tx power is reported as PCC Tx Power, and the NR Tx power is reported as SCC1 NR5G Tx Power.

Usage:

- Query: **AT!GSTATUS?**
  Response: *// Example shown is for LTE; fields will vary depending on RAT*

```
!GSTATUS: <CR>
Current Time:  <ctime>      Temperature: <temp> <CR>
Thermal Mitigation: <maxmitlvl> <CR>
Reset Counter: <rstcount>   Mode:        <mode> <CR>
System mode:   <smode>      PS state:    <PSstate> <CR>
LTE band:      <lband>      LTE bw:      <lbw> <CR>
LTE Rx chan:   <lrchan>     LTE Tx chan: <ltchan> <CR>
EMM state:     <emmstate>  <emmsubstate> <CR>
RRC state:     <rrcconn>  <CR>
PCC RxM RSSI:  <rssi>       PCC RxM RSRP: <rsrp> <CR>
PCC RxD RSSI:  <rssi>       PCC RxD RSRP: <rsrp> <CR>
Tx Power:      <txpwr>      TAC:           <tac> <CR>
RSRQ (dB):     <rsrq>       Cell ID:       <Cell ID> <CR>
OK
```

(Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!GSTATUS (continued)	**Return operational status (continued)**

Example(s):

- LTE response — See example in the Query response format above.
- NR5G response:

```
AT!GSTATUS?

!GSTATUS: <CR>
Current Time       : <ctime>        Temperature        : <temp> <CR>
Thermal Mitigation : <maxmitlvl> <CR>
Reset Counter      : <rstcount>     Mode               : <mode> <CR>
System mode        : <smode>        PS state           : <PSstate> <CR>
MM5G state         : <mm5gstate>  <mm5gsubstate> <CR>
RRC state          : <mm5grrcstate> <CR>
IMS Reg state      : <imsstate>     IMS mode           : <ims mode> <CR>
IMS Srv State      : <imssrvstatus> <CR>
<CR>
TAC                : <tac> <CR>
NR5G Cell ID       : <cell id> <CR>
NR5G Band          : <band> <CR>
NR5G DL BW         : <dl_bw>        NR5G UL BW: <ul_bw> <CR>
NR5G Tx Power      : <TxPower>      NR5G Tx Chan: <TxChan> <CR>
NR5G Rx Chan       : <RxChan> <CR>
NR5G DL MIMO       : <dlMaxMimo>    NR5G UL MIMO       : <ulMaxMimo> <CR>
NR5G Rx0 RSSI (dBm): <rssi>         NR5G Rx1 RSSI (dBm): <rssi> <CR>
NR5G Rx0 RSRP (dBm): <rsrp>         NR5G Rx1 RSRP (dBm): <rsrp> <CR>
NR5G Rx0 RSRQ (dB) : <rsrq>         NR5G Rx1 RSRQ (dB) : <rsrq> <CR>
NR5G Rx0 SINR (dB) : <sinr>         NR5G Rx1 SINR (dB) : <sinr> <CR>
```

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!HWID	**Display hardware version**
Description	

Display the device's hardware version number.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query: **AT!HWID?**
  Response:
  ```
  Revision: <MajorVer>[.<MinorVer>] <CR>
  OK
  ```
  Purpose: Display hardware version number.
- Query List: **AT!HWID=?**
  Purpose: Display the Query command format.

Parameters:

<MajorVer> (Major versioning number)
- 0–9

<MinorVer> (Minor versioning number)
- 0–9

Example(s):

- Display the HWID on a device that does not have a minor version number:
  ```
  AT!HWID?
  Revision: 1
  ```
- Display HWID on a device that has a minor version number:
  ```
  AT!HWID?
  Revision: 1.0
  ```

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!IMAGE	**Manage firmware images**
Description	

List or delete stored firmware and configuration (PRI) images.

Note: This command is intended for use by advanced users who are familiar with the nuances of firmware and PRI image storage requirements and naming conventions.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.10.00 (Release 0.3)
Password required: No
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!IMAGE=<op>[,<type>[,<slot>[,<build_id>,<unique_id>]]]**
  Response: OK
  Purpose: Delete or list stored FW and/or PRI images.
- Query: **AT!IMAGE?**
  Response:!

```
TYPE  SLOT   STATUS   LRU  FAILURES   UNIQUE_ID   BUILD_ID <CR>
<ty> <slot> <status> <lru> <f1> <f2> <unique_id> <build_id> <CR>
... <CR>
Max FW images: <max_fw> <CR>
Active FW image is at slot <slot> <CR>
<CR>
TYPE  SLOT   STATUS   LRU  FAILURES   UNIQUE_ID   BUILD_ID <CR>
<ty> <slot> <status> <lru> <f1> <f2> <unique_id> <build_id> <CR>
... <CR>
Max PRI images: <max_fpri> <CR>
<CR>
OK
```

  Purpose: Display lists of stored firmware and/or PRI images, the maximum number of slots for each image type, and indicate the active firmware image.

Parameters:

<op> (Operation)
- 0 — Delete (Note — Valid only for Execution format.)
- 2 — Display the maximum number of supported FW images or PRI images, depending on <type>.

<type> (Image type)
- 0 — FW (Firmware)
- 1 — PRI (Configuration)
- This is used in the Execution format. It corresponds to <ty> in the Query response.

<slot> (Firmware/PRI image slot ID)
- Valid range: 0–FF
- Field is ignored for PRI images in the execution format

<build_id> (Build ID)
- ASCII string, including double-quotes (e.g. "01.00.04.00_ATT")

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Table 3-2: Modem status, customization, and reset commands (Continued)

!IMAGE (continued)	Manage firmware images (continued)

<unique_id> (Unique ID)
- ASCII string, including double-quotes (e.g. "001.000_000")

<ty> (Image type)
- "FW" — Firmware
- "PRI" — PRI configuration
- This is used in the Query response. It corresponds to <type> in the Execution format.

<status> (Image status)
- EMPTY
- GOOD

<lru> (Least Recently Used count)
- Indicates how recently the image has been used
- Used automatically during slot selection process to determine which image to remove if a new image is being loaded and there are no empty slots.

<f1> (Programming failure count)
- 0–255

<f2> (Switching failure count)
- 0–255

<max_fw> (Maximum number of firmware images that can be stored)
- 3

<max_pri> (Maximum number of PRI images that can be stored)
- 25

Example(s):

- Delete all stored FW and PRI images:
  AT!IMAGE=0
- Delete all stored FW images:
  AT!IMAGE=0,0
- Delete FW at slot 2
  AT!IMAGE=0,0,2
- Delete a particular PRI by build/unique ID:
  AT!IMAGE=0,1,,"01.00.01.00_SWISSCOM","000.001_000"
- Display lists of FW and PRI images:
  AT!IMAGE?

```
TYPE SLOT STATUS LRU FAILURES UNIQUE_ID   BUILD_ID <CR>
FW   1    GOOD   1   0 0      ?_?         01.01.00.00_? <CR>
FW   2    GOOD   2   0 0      ?_?         00.00.05.05_? <CR>
FW   3    EMPTY  0   0 0 <CR>
Max FW images: 3 <CR>
Active FW image is at slot 2 <CR>
<CR>
TYPE SLOT STATUS LRU FAILURES UNIQUE_ID   BUILD_ID <CR>
PRI  FF   GOOD   0   0 0      000.000_000 01.01.00.00_GENERIC <CR>
PRI  FF   GOOD   0   0 0      005.027_000 00.00.05.05_TMO <CR>
Max PRI images: 25 <CR>
<CR>
OK
```

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!IMPREF	**Query / set Image Management preferences**
Description	

Indicate which firmware image (firmware plus carrier configuration) should be selected from those available on the device. Use the Query command format to list the configuration pairs that are currently downloaded and preferred.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.10.00 (Release 0.3)
Password required: No
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!IMPREF=<preference>**
  Response: OK
  Purpose: Indicate the preferred image (i.e., the image that should be used), or enable SIM-based image switching.
- Query: **AT!IMPREF?**
  Response:!

```
!IMPREF: <CR>
preferred fw version: <firmware-ver> <CR>
preferred carrier name: <carrier-name> <CR>
preferred config name: <carrier-config> <CR>
preferred subpri index: <carrier-sub-config> <CR>
current fw version: <firmware-ver> <CR>
current carrier name: <carrier-name> <CR>
current config name: <carrier-config> <CR>
current subpri index: <carrier-sub-config> <CR>
<CR>
[<mismatch information> <CR>]
OK
```

or

```
!IMPREF <CR>
<invalid image> <CR>
OK
```

Purpose: Query (show) the preferred and current images (firmware plus carrier configuration pairs). If they are not set, display the <mismatch_information>.

Parameters:

<preference> (The preferred carrier, or a flag to enable SIM-based image switching)

- ASCII string (quotation marks required, no spaces)
- Valid values:
  - <carrier-name> — Module will search for a matching carrier PRI and the firmware required for that PRI. If found, the new image preference is set.
    e.g., "GENERIC"
  - "AUTO-SIM" — Enable SIM-based switching. (To disable SIM-based switching, select a <carrier-name> instead.

<carrier-name> (Unique code identifying the carrier that the firmware was designed for)

- ASCII string, no spaces
- e.g., GENERIC

(Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

!IMPREF (continued)	**Query / set Image Management preferences (continued)**

<firmware-ver> (Unique firmware version number assigned by Semtech)
- ASCII string

<carrier-config> (Unique code identifying the carrier and configuration details)
- ASCII string
- Format: <carrier-name>_<PRI-version>_<package-version>

<carrier-sub-config> (Reserved — refer to note below)
- Note: This parameter always displays "000" since it is currently unused by EM8695 modules. The parameter remains in the Response format for command compatibility with other Semtech modules.
- ASCII string

<mismatch information> (Message indicating a field mismatch between the current and preferred image settings)
- ASCII string (quotation marks do not appear):
  - "fw version mismatch"
  - "carrier name mismatch"
  - "config name mismatch"

<invalid image> (Message indicating an image does not exist)
- ASCII string (quotation marks do not appear):
  - "preferred image setting does not exist"
  - "current image setting does not exist"

Example(s):

- **`AT!IMPREF="ABC"`** ← *where "ABC" is a carrier name*
- **`AT!IMPREF="AUTO-SIM"`** ← *enable SIM-based switching*

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!LEDPATTERN	**Configure LED blink patterns**

Description

Display or set the module's blink patterns.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!LEDPATTERN = <state>,<total_cycle_time>,<on_percentage>**
  Response: `OK`
  Purpose: Configure the LED blink patterns
- Query: **AT!LEDPATTERN?**
  Response: `<state>,<total_cycle_time>,<on_percentage> <CR>`
  `... <CR>`
  `OK`
  Purpose: Display the blink pattern configurations for all modem states.
- Query List: **AT!LEDPATTERN=?**
  Purpose: Display valid parameter values.

Parameters:

<state> (Modem state)
- 0 — Offline
- 1 — In Service
- 2 — No Service
- 3 — Data Active
- 4 — LPM
- 5 — Roaming

<total_cycle_time> (Cycle duration, in seconds)
- The length of time for one LED blink cycle.
- Valid values: 0.5, 1, 2, 4, 5, 10, 20

<on_percentage> (Percentage of cycle during which the LED is ON)
- Valid values: Multiples of (i.e., 5, 10, 15, ..., 90, 95, 100)

Example(s):

- Set the LED to blink On/Off every 0.25 seconds while data is active:
  - **`AT!LEDPATTERN=3,0.5,50`**
    // The cycle time is 0.5 seconds, and the LED will be on for 50% of that time (i.e., 0.25 seconds).
- Set the LED to be on for 16 seconds and off for 4 seconds while roaming:
  - **`AT!LEDPATTERN=5,20,80`**
    // The cycle time is 20 seconds, and the LED will be on for 80% of that time (i.e., 16 seconds).
- Set the LED to be always on in "In Service" state:
  - **`AT!LEDPATTERN=1,4,100`**
    // The cycle time can be any value, and the LED will be always on (100%).

(Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

!LEDPATTERN (continued)	**Configure LED blink patterns (continued)**
▪ Set the LED to be always off while Offline: ▫ **AT!LEDPATTERN=0,5,0** // The cycle time can be any value, and the LED will be always off (0%).	

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!LEDTEST	**Test to switch LED on/off**
Description	

Switch ON or OFF the LED that is connected to the WWAN_LED pin.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: No
Persistent across power cycles: No

Usage:

- Execution: **AT!LEDTEST = <led no>,<state>**
  Response: OK
  Purpose: Switch the LED on/off.
- Query List: **AT!LEDTEST=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<led no> (LED index number)
- 0 — LED connected WWAN_LED pin

<state> (LED state)
- 0 — OFF
- 1 — ON

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!LTEINFO	**Display LTE network information**

Description

Display LTE network information.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query: **AT!LTEINFO?**

Response:

```
!LTEINFO: <CR>
Serving: EARFCN   MCC   MNC   TAC   CID   Bd   D   U   SNR   PCI   RSRQ
    RSRP   RSSI   RXLV <CR>
        <earfcn> <mcc> <mnc> <tac> <cid> <bd> <d> <u> <snr> <pci> <rsrq>
   <rsrp> <rssi> <rxlv> <CR>
IntraFreq: PCI  RSRQ   RSRP   RSSI RXLV <CR>
          <pci> <rsrq> <rsrp> <rssi> <rxlv>  <CR>
InterFreq: EARFCN   ThresholdLow   ThresholdHi   Priority   PCI   RSRQ
    RSRP   RSSI   RXLV <CR>
          <earfcn> <thresholdlow> <thresholdhi> <priority> <pci> <rsrq>
   <rsrp> <rssi> <rxlv> <CR>
OK
```

or

```
!LTEINFO: <CR>
Unavailable <CR>                    ← Device is in non-LTE service
OK
```

or

```
!LTEINFO: <CR>
ERROR                ← Device has no service
```

Purpose: Display LTE network information for the LTE Serving Cell (including Intra-band and Inter-band).

Parameters:

<earfcn> (LTE RF channel of the serving cell (E-UTRA absolute radio frequency channel number))
- 0–65535

<mcc> (Mobile country code)
- 3-digit code
- i.e., 000–999

<mnc> (Mobile network code)
- 2-digit or 3-digit code
- i.e., 00–99 or 000–999

<tac> (Tracking area code)
- 0–65535

(Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

!LTEINFO (continued)	**Display LTE network information (continued)**
<cid> (LTE Service cell ID) • 16-bit hexadecimal • Valid range: 00000000–FFFFFFFF <bd> (Serving cell operating band) • 1–64 <d> (DL bandwidth) • 0 — 1.4 MHz • 1 — 3 MHz • 2 — 5 MHz • 3 — 10 MHz • 4 — 15 MHz • 5 — 20 MHz <u> (UL bandwidth) • 0 — 1.4 MHz • 1 — 3 MHz • 2 — 5 MHz • 3 — 10 MHz • 4 — 15 MHz • 5 — 20 MHz <snr> (Average reference signal signal-to-noise ratio (RSSNR) of the serving cell over last measurement period, in decibels) • -10 to 30 <pci> (Physical cell ID) • Decimal format • Valid range: 0–503 <rsrq> (Current Reference Signal Receive Quality in dB, as measured by L1) • -3 to -19.5 <rsrp> (Current Reference Signal Receive Power in dBm x10 as measured by L1) • -144 to -40 <rssi> (Current Received Signal Strength Indication in dBm, as measured by L1) • Total received wide-band power • 16-bit decimal <rxlv> (Suitable receive level) • 16-bit decimal <thresholdlow> (Lower receive level threshold for reselection) • 8-bit decimal <thresholdhi> (Higher receive level threshold for reselection) • 8-bit decimal <priority> (Cell reselection priority) • 8-bit decimal	

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!NRINFO	**Display NR information**
Description	

Display the NR 5G Sub-6 information of the device.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query (no 5G): **AT!NRINFO?**

  Response:
```
!NRINFO:  <CR>
NR5G Cell ID:     --- <CR>
NR5G Band:        --- <CR>
NR5G DL BW:       ---             NR5G UL BW:       --- <CR>
NR5G Tx Power:    ---             NR5G Tx Chan:     --- <CR>
NR5G Rx Chan:     --- <CR>
NR5G DL MIMO:     ---             NR5G UL MIMO:     --- <CR>
NR5G Rx0 RSSI (dBm):   ---        NR5G Rx1 RSSI (dBm):   --- <CR>
NR5G Rx0 RSRP (dBm): ---          NR5G Rx1 RSRP (dBm):  --- <CR>
NR5G Rx0 RSRQ (dB) : ---          NR5G Rx1 RSRQ (dB) :  --- <CR>
NR5G Rx0 SINR (dB) :  ---         NR5G Rx1 SINR (dB) :  --- <CR>
OK
```

  Purpose: Display all 5G Sub-6 field labels when there is no available 5G.

- Query (5G Sub-6): **AT!NRINFO?**

  Response:
```
!NRINFO: <CR>
NR5G Cell ID:     <cell id> <CR>
NR5G Band:        <band> <CR>
NR5G DL BW:       <dl_bw>         NR5G UL BW:       <ul_bw> <CR>
NR5G Tx Power:    <TxPower>       NR5G Tx Chan:     <TxChan> <CR>
NR5G Rx Chan:     <RxChan> <CR>
NR5G DL MIMO:     <dlMaxMimo>     NR5G UL MIMO:     <ulMaxMimo> <CR>
NR5G Rx0 RSSI (dBm): <rssi>       NR5G Rx1 RSSI (dBm): <rssi> <CR>
NR5G Rx0 RSRP (dBm): <rsrp>       NR5G Rx1 RSRP (dBm): <rsrp> <CR>
NR5G Rx0 RSRQ (dB) : <rsrq>       NR5G Rx1 RSRQ (dB) : <rsrq> <CR>
NR5G Rx0 SINR (dB) : <sinr>       NR5G Rx1 SINR (dB) : <sinr> <CR>
<CR>
OK
```

  Purpose: Display 5G Sub-6 information.

(Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

!NRINFO (continued)	**Display NR information (continued)**

Parameters:

<mode> (UE connectivity mode)
- "SA" — Standalone

<cell id> (NR5G cell ID)
- Global cell ID:
  - Type: uint64
  - Display format: <cell_id_hex> (<cell_id_decimal>)
  - e.g., "1c8 (456)"; "ef4c717d7 (64236230614)"

<band> (Serving cell operating band)
- Note — Valid values depending on the module's configured band support.
- Valid values: n1, n2, n3, n5, n7, n8, n12, n13, n14, n18, n20, n25, n26, n28, n38, n40, n41, n48, n66, n70, n71, n77, n78, n79

<dl_bw> (Downlink (DL) bandwidth)
- ASCII string
- Valid values:
  - "5 MHz"
  - "10 MHz"
  - "15 MHz"
  - "20 MHz"
  - "Unknown" (Note — This will appear only if the network provides an invalid value.)

<ul_bw> (Uplink (UL) bandwidth)
- ASCII string
- Valid values:
  - "5 MHz"
  - "10 MHz"
  - "15 MHz"
  - "20 MHz"
  - "Unknown" (Note — This will appear only if the network provides an invalid value.)

<TxPower> (Transit power, in dBm)
- Valid range: 0–23

<TxChan> (NR5G Tx channel)
- 32-bit decimal
- NR-ARFCN value (New Radio Absolute Radio Frequency Channel Number)

<RxChan> (NR5G Rx channel)
- 32-bit decimal
- NR-ARFCN value (New Radio Absolute Radio Frequency Channel Number)

<dlMaxMimo> (Maximum number of downlink MIMO layers)
- Valid values:
  - If 5G service is available: 1–2
  - If 5G service is not available: "---"

(Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

!NRINFO (continued)	**Display NR information (continued)**

<ulMaxMimo> (Maximum number of uplink MIMO layers)

- Valid values:
  - If 5G service is available: 1
  - If 5G service is not available: "---"

<rssi> (Current Received Signal Strength Indication, in dBm)

- -120 to 0

<rsrp> (Reference Signal Receive Power, in dBm x 10)

- -140 to -44

<rsrq> (Reference Signal Receive Quality, in dB)

- -20 to -3

<sinr> (Signal to Interference plus Noise)

- -23 to 40

Example(s):

- 5G Sub-6, SA connectivity mode

```
AT!NRINFO?
!NRINFO: <CR>
NR5G Cell ID:  1F4 (500) <CR>
NR5G Band:     n78 <CR>
NR5G DL BW:    20 MHz    NR5G UL BW: 20 MHz <CR>
NR5G Tx Power: -22       NR5G Tx Chan: 636666 <CR>
NR5G Rx Chan:  636666 <CR>
NR5G DL MIMO:  2         NR5G UL MIMO: 1 <CR>
NR5G Rx0 RSSI (dBm): -50   NR5G Rx1 RSSI (dBm): -50 <CR>
NR5G Rx0 RSRP (dBm): -70   NR5G Rx1 RSRP (dBm): -11 <CR>
NR5G Rx0 RSRQ (dB) : -50   NR5G Rx1 RSRQ (dB) : -50 <CR>
NR5G Rx0 SINR (dB) : -70   NR5G Rx1 SINR (dB) : -11 <CR>
<CR>
OK
```

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!PATEMP	**Return module PA's current temperature information**
Description	

Return the module's power amplifier (PA) temperature state and actual temperature.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query: **AT!PATEMP?**
  Response:
  ```
  Temp state: <state> <CR>
  Temperature: <temperature> C <CR>
  OK
  ```
  Purpose: Return the module PA's temperature information.

Parameters:

<state> (Temperature state):

- Valid values:
  - "High Critical"
  - "High Warning"
  - "Normal"
  - "Low Warning"
  - "Low Critical"

<temperature> (Current temperature):

- Current temperature in °C. This is the temperature reported by a thermistor positioned near the power amplifiers.
- Decimal ASCII — Value reported to two decimal places (e.g., "23.00")

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!PATEMPLIMITS	**Set/report module PA temperature state limit values**

Description

Certain modem functionality is affected by the temperature state of the module's power amplifier (PA). The possible states are high critical, high warning, and nominal.

Use this command to report or set the limits that correspond to these temperature states.

To display the current temperature and temperature state, use !PATEMP.

Note: All temperatures are in Celsius.

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: Yes

Reset required to apply changes: No

Persistent across power cycles: Yes

Usage:

- Execution: **AT!PATEMPLIMITS=<high_critical>,<high_warning>,<normal>,<low_warning>,<low_critical>**
  Response: OK
  Purpose: Set the temperature limits for each power control temperature state (all five values must be specified).
- Query: **AT!PATEMPLIMITS?**
  Response:
  ```
  HI CRIT: <high_critical> <CR>
  HI WARN: <high_warning> <CR>
  NORM:    <normal> <CR>
  LO WARN: <low_warning> <CR>
  LO CRIT: <low_critical> <CR>
  <CR>
  OK
  ```
  Purpose: Return the temperature limits for each state.

Parameters:

<high_critical> (High Critical temperature limit, in °C)

- Integer
- For default value refer to the "Power State Transitions" section in *[1] EM8695 Product Technical Specification (Doc# 41114813)*.
- Default: TBD

<high_warning> (High Warning temperature limit, in °C)

- Integer
- For default value refer to the "Power State Transitions" section in *[1] EM8695 Product Technical Specification (Doc# 41114813)*.
- Default: TBD

<normal> (Normal temperature, in °C)

- Integer
- For default value refer to the "Power State Transitions" section in *[1] EM8695 Product Technical Specification (Doc# 41114813)*.
- Default: TBD

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Table 3-2: Modem status, customization, and reset commands (Continued)

!PATEMPLIMITS (continued)	Set/report module PA temperature state limit values (continued)
<low_warning> (Low Warning temperature limit, in °C) • Integer • For default value refer to the "Power State Transitions" section in *[1] EM8695 Product Technical Specification (Doc# 41114813)*. • Default: TBD <low_critical> (Low Critical temperature limit, in °C) • Integer • For default value refer to the "Power State Transitions" section in *[1] EM8695 Product Technical Specification (Doc# 41114813)*. • Default: TBD	

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!PCINFO	**Return power control status information**
Description	

Return the modem's current power control status information — the current power state, the status of all low power mode (LPM) 'voters' (conditions that can cause the module to be in LPM), and the current status of LPM persistence (i.e., whether LPM will persist across resets).

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query: **AT!PCINFO?**
  Response:
  ```
  State: <state> <CR>
  LPM voters - Temp:<vote>, Volt:<vote>, User:<vote>, W_DISABLE: <vote>,
  IMSWITCH:<vote>, LWM2M:<vote> <CR>
  <CR>
  LPM persistence - <userlpm> <CR>
  <CR>
  OK
  ```
  Purpose: Return power control information.

Parameters:

<state> (The modem's current power mode)

- "Low Power Mode"
- "Online"
- "Offline"

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Table 3-2: Modem status, customization, and reset commands (Continued)

!PCINFO (continued)	**Return power control status information (continued)**

<vote> (LPM required flag, for each voter)

- Valid values:
  - 0 — LPM not required by the indicated voter
  - 1 — LPM required by the indicated voter
- **Note:** The module has several 'voters' that when triggered or selected will cause the modem to enter LPM. The list below indicates the voters and the conditions that will cause them to require the modem to enter LPM:
  - Power state voters:
    - "Temp" — PC temperature monitor. Module temperature has reached the low or high "Normal to Low Power" power state transition trigger levels.
    - "Volt" — PC voltage monitor. Module voltage has reached the low or high "Normal to Low Power" power state transition trigger levels.
    - For temperature and voltage trigger levels, refer to *[1] EM8695 Product Technical Specification (Doc# 41114813)*.
  - "User" — User client. Low power (minimum functionality) has been requested. (e.g., via QMI, MBIM, or AT interfaces (such as **AT+CFUN=0**))
  - "W_DISABLE" — Wireless disable client. W_DISABLE_N pin is LOW. (Disables the main RF radio)
    Note: This vote does not apply (and is not updated) when the !CUSTOM "DGENABLE" customization is enabled (i.e., not 0), which uses the W_DISABLE_N pin for the Dying Gasp feature instead of radio power control.
  - "IMSWITCH" — Image switch client. The preferred image is not available.
  - "LWM2M" — LWM2M requests reset. (Note — This will not hold the module in LPM.)

<userlpm> (Current state of user-initiated LPM)

- Valid values:
  - 0 — Host product GUI has not requested LPM
  - 1 — Host product GUI has requested LPM

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!PCOFFEN	**Enable / return Low Power Mode control via W_DISABLE_N feature**

Description

The modem can be configured to enter low power mode when W_DISABLE_N is asserted.

Use this command to indicate or set this feature's state.

Notes:

- This setting is ignored if dying gasp is enabled.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_01.01.12.00 (Release 0.4)
Password required: Yes
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Query: **AT!PCOFFEN?**
  Response: `<state> <CR>`
  `OK`
  Purpose: Report the current LPM control state.

Parameters:

<state> (Current Low Power Mode control state)

- 0 — Modem will enter LPM (low power mode) when W_DISABLE_N is asserted.
- 2 — Ignore changes on W_DISABLE_N.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!PCTEMP	**Return current temperature information**
Description	

Return the module CPU's temperature state and actual temperature.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query: **AT!PCTEMP?**
  Response:
  ```
  Temp state: <state> <CR>
  Temperature: <temperature> C <CR>
  OK
  ```
  Purpose: Return the module's temperature information.

Parameters:

<state> (Temperature state):

- Valid values:
  - "High Critical"
  - "High Warning"
  - "Normal"
  - "Low Warning"
  - "Low Critical"

<temperature> (Current temperature):

- Current temperature in °C. This is the temperature reported by a thermistor positioned near the CPU.
- Decimal ASCII — Value reported to two decimal places (e.g., "23.00")

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!PCTEMPLIMITS	**Set / report temperature state limit values**

Description

Certain modem functionality is affected by the module's CPU temperature state. The possible states are high critical, high warning, normal, low warning, and low critical.

Use this command to report or set the limits that correspond to these temperature states.

To display the current temperature and power control temperature state, use !PCTEMP.

For details of the power state transitions that occur based on these limits, refer to section "Power State Transitions" in *[1] EM8695 Product Technical Specification (Doc# 41114813)*.

Note: All temperatures are in Celsius.

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: Yes

Reset required to apply changes: No

Persistent across power cycles: Yes

Usage:

- Execution: **AT!PCTEMPLIMITS=<high_critical>,<high_warning>,<normal>,<low_warning>,<low_critical>**
  Response: OK
  Purpose: Set the temperature limits for each power control temperature state (all five values must be specified).
- Query: **AT!PCTEMPLIMITS?**
  Response:
  ```
  HI CRIT: <high_critical> <CR>
  HI WARN: <high_warning> <CR>
  NORM:    <normal> <CR>
  LO WARN: <low_warning> <CR>
  LO CRIT: <low_critical> <CR>
  <CR>
  OK
  ```
  Purpose: Return the temperature limits for each state.

Parameters:

<high_critical> (High Critical temperature limit, in °C)

- Integer
- For default value refer to the "Power State Transitions" section in *[1] EM8695 Product Technical Specification (Doc# 41114813)*.
- Default: TBD

<high_warning> (High Warning temperature limit, in °C)

- Integer
- For default value refer to the "Power State Transitions" section in *[1] EM8695 Product Technical Specification (Doc# 41114813)*.
- Default: TBD

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Table 3-2: Modem status, customization, and reset commands (Continued)

!PCTEMPLIMITS (continued)	**Set / report temperature state limit values (continued)**
<normal> (Normal temperature, in °C) • Integer • For default value refer to the "Power State Transitions" section in *[1] EM8695 Product Technical Specification (Doc# 41114813)*. • Default: TBD <low_warning> (Low Warning temperature limit, in °C) • Integer • For default value refer to the "Power State Transitions" section in *[1] EM8695 Product Technical Specification (Doc# 41114813)*. • Default: TBD <low_critical> (Low Critical temperature limit, in °C) • Integer • For default value refer to the "Power State Transitions" section in *[1] EM8695 Product Technical Specification (Doc# 41114813)*. • Default: TBD	

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!PCVOLT	**Return current power supply voltage information**

Description

Return the module's power control supply state and actual voltage.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query: **AT!PCVOLT?**
  Response:
  ```
  Volt state: <state> <CR>
  Power supply voltage: <voltage> mV (ADC: <adc>) <CR>
  OK
  ```
  Purpose: Return the module's voltage information.

Parameters:

<state> (Power supply state):
- Valid values:
  - "High Critical"
  - "High Warning"
  - "Normal"
  - "Low Warning"
  - "Low Critical"

<voltage> (Current voltage, in mV):
- Decimal ASCII

<adc> (ADC (Analog/digital converter) reading):
- Decimal ASCII

Example(s):

- **AT!PCVOLT?**
  ```
  Volt state: Normal <CR>
  Power supply voltage: 3348 mV (ADC: 17201) <CR>
  OK
  ```

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!PCVOLTLIMITS	**Set / report power supply voltage state limit values**

Description

Certain modem functionality is affected by the modem's power supply voltage state. The possible voltage states are high critical, high warning, high normal, low normal, and low critical.

Use this command to report or set the limits that correspond to these voltage states.

For details of the power state transitions that occur based on these limits, refer to section "Power State Transitions" in *[1] EM8695 Product Technical Specification (Doc# 41114813)*.

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: Yes

Reset required to apply changes: No

Persistent across power cycles: Yes

Usage:

- Execution: **AT!PCVOLTLIMITS=<high_critical>,<high_warning>,<high_normal>,<low_normal>,<low_critical>**
  Response: `OK`
  Purpose: Set the voltage limits for each state (all five values must be specified).
- Query: **AT!PCVOLTLIMITS?**
  Response:
  ```
  !PCVOLTLIMITS:
  HI CRIT: <high_critical> <CR>
  HI WARN: <high_warning> <CR>
  NORM:    <normal> <CR>
  LO WARN: <low_warning> <CR>
  LO CRIT: <low_critical> <CR>
  <CR>
  OK
  ```
  Purpose: Return the voltage limits for each state.

Parameters:

<high_critical> (High Critical voltage limit, in mV)

- Integer
- For default value refer to the "Power State Transitions" section in *[1] EM8695 Product Technical Specification (Doc# 41114813)*.
- Default: 4400 TBD

<high_warning> (High Warning voltage limit, in mV)

- Integer
- For default value refer to the "Power State Transitions" section in *[1] EM8695 Product Technical Specification (Doc# 41114813)*.
- Default: 4300 TBD

<normal> (Normal voltage, in mV)

- Integer
- For default value refer to the "Power State Transitions" section in *[1] EM8695 Product Technical Specification (Doc# 41114813)*.
- Default: 3300 TBD

(Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

!PCVOLTLIMITS (continued)	**Set / report power supply voltage state limit values (continued)**
<low_warning> (Low Warning voltage limit, in mV) • Integer • For default value refer to the "Power State Transitions" section in *[1] EM8695 Product Technical Specification (Doc# 41114813)*. • Default: 3200 TBD <low_critical> (Low Critical voltage limit, in mV) • Integer • For default value refer to the "Power State Transitions" section in *[1] EM8695 Product Technical Specification (Doc# 41114813)*. • Default: 3135 TBD	

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!PRIID	**Report module PRI part number and revision**
Description	

Report the module's customer and carrier PRI part numbers and revisions.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35x_##.##.##.## (Release #.#)
Password required: No
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Query: **AT!PRIID?**
  Response:
  ```
  PRI Part Number: <priPn> <CR>
  Revision: <priRevDisplay> <CR>
  Customer: <pri_cust> <CR>
   <CR>
  Carrier PRI: <bcVersion> <CR>
  OK
  ```
  Purpose: Return the module's PRI information for the current image.

Parameters:

<priPn> (PRI part number)
- ASCII string, 7-character alphanumeric
- Example: 999123A

<priRevDisplay> (PRI revision number being read from the module)
- ASCII string
- String format: 999.999_999
- Example: 000.001_000

<pri_cust> (PRI customer name)
- ASCII string
- Example: "Generic Operator"

<bcVersion> (BC version in CWE header of the Carrier PRI NVUP file)
- ASCII string

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!PROFILESRESET	**Restore Carrier Default Profiles**

Description

Restore all carrier profiles to their default PRI configurations, and delete any extra profiles that have been created. (This includes restoring any carrier profiles that were deleted by the user.)

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.10.00 (Release 0.3)
Password required: Yes
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!PROFILESRESET**
  Response: OK
  Purpose: Restore all carrier profiles to default PRI configurations.

Parameters:

None

Example(s):

- Carrier PRI with two default profiles:

```
AT+CGDCONT?
AT+CGDCONT: 1,"IPV4V6","test1_apn","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0
AT+CGDCONT: 2,"IPV4V6","test2_apn","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0

// User changes the APN of profile 2:
AT+CGDCONT= 2,"IPV4V6","random_apn","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0
OK

// User adds profile 3:
AT+CGDCONT= 3,"IPV4V6","sample_apn","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0
OK

AT+CGDCONT?
AT+CGDCONT: 1,"IPV4V6","test1_apn","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0
AT+CGDCONT: 2,"IPV4V6","random_apn","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0
AT+CGDCONT: 3,"IPV4V6","sample_apn","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0
OK

// User restores carrier default profiles (profiles 1 and 2 return to default PRI configurations, and profile 3 is deleted)
AT!PROFILESRESET
OK
AT+CGDCONT?
AT+CGDCONT: 1,"IPV4V6","test1_apn","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0
AT+CGDCONT: 2,"IPV4V6","test2_apn","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0
OK
```

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!REDCAP	**Set / Report RedCap support status of camped network**

Description

Set the module's RedCap support state, or report the RedCap support state of the module and the camped network.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_01.01.12.00 (Release 0.4)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: Yes

Usage:

- Execution: **AT!REDCAP=<supported_redcap>**
  Response: OK
  Purpose: Set the module's RedCap <support>state>.
- Query: **AT!REDCAP?**
  Response:
  ```
  SUPPORTED: <supported_redcap> <CR>
  CURRENT: <current_redcap> <CR>
  OK
  ```
  Purpose: Report the RedCap support state (enabled / disabled) of the module and the camped network.
- Query List: **AT!REDCAP=?**
  Purpose: Display valid parameter values.

Parameters:

<supported_redcap> (Module's RedCap support state)
- 0—Disable (The module's RedCap support is disabled.)
- 1—Enable (The module's RedCap support is enabled.)

<current_redcap> (Current RedCap support state of camped network)
- 0—Disable (The camped network's RedCap support is disabled.)
- 1—Enable (The camped network's RedCap support is enabled.)

Example(s):

- ```
  AT!REDCAP?          ← Check current RedCap support status
  SUPPORTED: 1        ← Module RedCap support is enabled; camped network's RedCap support is disabled.
  CURRENT  : 0
  OK

  AT!REDCAP=?         ← Show valid options
  0-Disable
  1-Enable
  OK

  AT!REDCAP=0         ← Disable the module's RedCap support
  OK

  AT!REDCAP?          ← Check current RedCap support status
  SUPPORTED: 0        ← Module RedCap support is disabled; camped network's RedCap support is disabled.
  CURRENT  : 0
  OK
  ```
  ```

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!RESET	**Reset modem**
Description	
Perform a modem reset. **Supporting EM8695 devices:** All **Added F/W:** EM8695: SWIX35C_00.01.04.00 (Release 0.2) **Password required:** No **Reset required to apply changes:** Automatic **Persistent across power cycles:** n/a **Usage:** ▪ Execution: **AT!RESET** Response: OK Purpose: Reset the modem.	

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!RFCID	**Query RFC hardware IDs and board IDs**
Description	

Query the RFC (Radio Frequency Card) related hardware IDs and board IDs that are used to identify the firmware to be loaded on the module.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.15.00 (Release 1 BP1)
Password required: Yes
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Query: **AT!RFCID?**
  Response:
```
!RFCID: <CR>
CMW_HWID: <cmw_hardware_id> <CR>
CMW_BID: <cmw_board_id> <CR>
MMW_HWID: <mmw_hardware_id> <CR>
MMW_BID: <mmw_board_id> <CR>
CMW_FEATURE_SET_ID: <cmw_feature_set_id> <CR>
<CR>
OK
```
  Purpose: Query the current RFC related hardware IDs and board IDs.

Parameters:

<cmw_hardware_id> (Centimeter wave hardware ID)
- Valid values: 0–4095
- Applies to WCDMA, LTE and 5G Sub-6 GHz

<cmw_board_id> (Centimeter wave board ID)
- Valid values: 0–15
- Applies to WCDMA, LTE and 5G Sub-6 GHz

<mmw_hardware_id> (5G-mmW hardware ID)
- This parameter is unused for EM8695 modules. The row appears as "MMW_HWID: 0") for consistency with other Semtech modules.

<mmw_board_id> (5G mmW board ID)
- This parameter is unused for EM8695 modules. The row appears as "MMW_BID: 0") for consistency with other Semtech modules.

<cmw_feature_set_id> (Centimeter wave feature set ID)
- This option is used to configure custom RFC settings.
- Valid values:
  - 0 — B106 is not supported
  - 1 — B106 is supported
- Applies to WCDMA, LTE and 5G Sub-6 GHz

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!RFDEVSTATUS	**Display all RFFE status**

Description

Display the status of all RFFE (Radio Frequency Front End) components.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query: **AT!RFDEVSTATUS?**
  Response:
  ```
  RFC init failure <CR>
  OK
  ```
  or
  ```
  instance, manufacture id, product id, present <CR>
  <instance>, <manufacture id>, <product id>, <device status> <CR>
  ..... <CR>
  <instance>, <manufacture id>, <product id>, <device status> <CR>
  OK <CR>
  ```
  Purpose: Display all RFC .mbn files.

Parameters:

<instance>
- Each instance indicates one RFFE device.
- Valid range: 0–17

<manufacture id>
- RFFE device manufacture ID

<product id>
- RFFE device product ID

<present>
- TRUE — RFFE device can work well
- FALSE — RFFE device cannot work

Example(s):

- **AT!RFDEVSTATUS?**
```
instance, manufacture id, product id, present <CR>
0  ,0x217 ,0xfed ,TRUE <CR>
1  ,0x217 ,0x35  ,TRUE <CR>
2  ,0x217 ,0x1c3 ,TRUE <CR>
..... <CR>
37 ,0x134 ,0x15  ,TRUE <CR>
0  ,0xff  ,0x526 ,TRUE <CR>
1  ,0x0   ,0x0   ,FALSE <CR>
2  ,0x0   ,0x0   ,FALSE <CR>
..... <CR>
OK
```

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!SCUMMTU	**Set/query MTU size**
Description	

Set or get the maximum transmission unit (MTU) size.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35x_##.##.##.## (Release #.#)
Password required: Yes (Execution)
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!SCUMMTU=<mtu>**
  Response: OK
  Purpose: Set the MTU size.
- Query: **AT!SCUMMTU?**
  Response:
  ```
  !SCUMMTU <CR>
  MTU: <mtu> <CR>
  OK
  ```
  Purpose: Query the current MTU settings.
- Query List: **AT!SCUMMTU=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<mtu> (Maximum transmission unit (MTU))

- Valid values:
  - 0 — Use the default value. (Note — The default is carrier PRI-dependent.)
  - 576–2000 — Other values required by the carrier.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!SDPREF	**Display enabled RATs and bands**

Description

Display the enabled RATs and bands (i.e., the RATs and bands that are available after customer and carrier policies have been applied.)

For example, OEM and carrier PRIs may not allow some bands that are supported by the module's hardware. (To display hardware-level band support use *!BAND*.)

*Note: The !SDPREF listing may include RATs and bands that are not currently **available** due to user configurations via host interfaces (e.g., AT commands such as !SELRAT, etc.)*

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: No

Reset required to apply changes: n/a

Persistent across power cycles: n/a

Usage:

- Query: **AT!SDPREF?**

  Response:
  ```
  !SDPREF: <CR>
  RATs : <rat_list> <CR>
  LTE : <lte_band_list> <CR>
  NRSA : <nrsa_band_list> <CR>
  OK
  ```

  Purpose: Display the currently enabled RATs and bands (LTE, NRSA).
- Query List: **AT!SDPREF=?**

  Response: `OK`

  Purpose: Indicates the query command format is available..

Parameters:

<rat_list> (Currently enabled RATs)
- ASCII string, comma-separated list of enabled RATs
- Valid RATs:
  - LTE
  - NR5G
- e.g., "RATs : LTE,NR5G"

<lte_band_list> (Currently enabled LTE bands)
- ASCII string, comma-separated list of enabled bands
- e.g., "LTE : B1,B2,B3,B4,B5,B7,B8,B12,B13,B14,B17,B18,B19,B20,B25,B26,B28,B34,B38,B39,B40,B41,B42,B43,B48,B66,B71"

<nrsa_band_list> (Currently enabled NR standalone bands)
- ASCII string, comma-separated list of enabled bands
- e.g., "NRSA : n1,n2,n3,n5,n7,n8,n12,n13,n14,n18,n20,n25,n26,n28,n38,n40,n41,n48,n66,n70,n71,n77,n78,n79"

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Table 3-2: Modem status, customization, and reset commands (Continued)

!SDPREF (continued)	Display enabled RATs and bands (continued)

Example(s):

- **AT!SDPREF?**

```
RATs : LTE,NR5G <CR>
LTE  : B1,B2,B3,B4,B5,B7,B8,B12,B13,B14,B17,B18,B19,B20,B25,B26,B28,B34,B38,B39,B40,
B41,B42,B43,B48,B66,B71 <CR>
NRSA : n1,n2,n3,n5,n7,n8,n12,n13,n14,n18,n20,n25,n26,n28,n38,n40,n41,n48,n66,n70,n71,
n77,n78,n79 <CR>
<CR>
OK
```

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!SECINFO	**Display module security state**
Description	

Display the module's current security state.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query: **AT!SECINFO**
  Response:
  ```
  - Secure boot: <secure_boot> <CR>
  - Memory dump: <memory_dump><CR>
  - JTAG access: <jtag_access><CR>
  - Raw state: <raw_state><CR>
  - Debug flags: <apdp_flags><CR>
  - Overall secured state: <overall_state><CR>
  OK
  ```
  Purpose: Display the module's current security state.

Parameters:

<secure_boot> (Secure Boot state)
- 0 — Disabled
- 1 — Enabled

<memory_dump> (Memory dump allowed / not allowed)
- 0 — Not allowed
- 1 — Allowed

<jtag_access> (JTAG access allowed / not allowed)
- 0 — Not allowed
- 1 — Allowed

<raw_state> (Raw value of security state reported by TZ, in hexadecimal)
- 32-bit hex

<apdp_flags> (Raw value of debug policy flags, in hexadecimal)
- 32-bit hex
- If value is not 0, a debug policy is present and must be removed.

<overall_state> (Secured state)
- 0 — Unsecured
- 1 — Secured

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Table 3-2: Modem status, customization, and reset commands (Continued)

!SECINFO (continued)	Display module security state (continued)

Example(s):

- **AT!SECINFO**

```
- Secure boot: 1<CR>
- Memory dump: 0<CR>
- JTAG access: 0<CR>
- Raw state: 00000070<CR>
- Debug flags: 00000000<CR>
- Overall secured state: 1<CR>
<CR>
OK
```

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!SELRAT	**Set/query preferred RAT**

Description

Set the preferred RAT mode(s) for acquisition.

If the module's current band setting is not compatible with the selected RAT, either an appropriate band will be selected automatically and set on the modem, or an ERROR may be returned.

Important: To avoid issues with incompatible RAT/band combinations, if !BAND and !SELRAT are both used, either !BAND must be set to 'All Bands' or !SELRAT must be set to 'Automatic'.

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: No

Reset required to apply changes: No

Persistent across power cycles: Yes

Usage:

- Execution: **AT!SELRAT=<ratInd>**
  Response: `OK`
  Purpose: Set the desired RAT.
- Query: **AT!SELRAT?**
  Response:
  ```
  <ratInd>, <ratName> <CR>
  OK
  ```
  or
  ```
  Unknown RAT mode. Use AT!SELRAT to set mode. <CR>
  <ratInd> <CR>
  OK
  ```
  Purpose: Return the current RAT (<ratInd>) and description. If the <ratInd> is undefined, an error message is returned.
- Query List: **AT!SELRAT=?**
  Purpose: Display valid parameter values.

Parameters:

<ratInd> (RAT index)

- 00 — Automatic
- 06 — LTE only
- 20 — NR 5G only
- 21 — LTE and NR 5G only

<ratName> (Description of RATs covered by <ratInd>)

- <ratInd>=00 — "Automatic"
- <ratInd>=06 — "LTE Only"
- <ratInd>=20 — "5G Only"
- <ratInd>=21 — "LTE and NR 5G only"

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!SKU	**Display module's SKU**
Description	

Display the module's production SKU number.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query: **AT!SKU?**
  Response: `!SKU: <SKU> <CR>`
  `OK`
  Purpose: Display the module's SKU number.

Parameters:

<SKU> (Module's SKU number)

- Valid values:
  - 7-digit integer (e.g., 1101234)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!SMSWAKE	**Enable / disable SMS host wake-up feature**

Description

Enable/disable the SMS host wake-up feature. Using this feature, an SMS message containing a defined 'wake mask' can be used to wake a tethered host processor (e.g. a laptop).

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: Yes

Reset required to apply changes: No

Persistent across power cycles: Yes

Usage:

- Execution: **AT!SMSWAKE=<bEnabled>[,<wakeMask>]**
  Response: `OK`
  or
  `ERROR`
  Purpose: Disable the SMS host wake up feature, or enable the SMS host wake up feature and define the <wakeMask> that can be used to wake the tethered host.
- Query: **AT!SMSWAKE?**
  Response:
  ```
  !SMSWAKE: <CR>
  <bEnabledString> <CR>
  [<wakeMask>] <CR>
  OK
  ```
  Purpose: Report the current state of the SMS host wake-up feature.
- Query List: **AT!SMSWAKE=?**
  Purpose: Display valid parameter values.

Parameters:

<bEnabled> (SMS wake-up feature state)

- 0 — Disabled
- 1 — Enabled

<bEnabledString> (SMS wake-up feature state)

- ASCII string (no quotation marks)
- Valid values:
  - "Enabled"
  - "Disabled"

<wakeMask> (Bitmask)

- 32-bitmask, in Hex format
- Parameter is not used when command is used to disable the feature.
- Example: F27A4BB6

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!SMSWAKEWIDTH	**Set/read SMS Wake signal width**

Description

Set/read the SMS Wake signal width.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!SMSWAKEWIDTH=<width>**
  Response: `OK`
  or
  `ERROR`
  Purpose: Set the wake signal width.
- Query: **AT!SMSWAKEWIDTH?**
  Response:
  ```
  !SMSWAKEWIDTH: <CR>
  <width> <CR>
  OK
  ```
  Purpose: Report the configured wake signal width.
- Query List: **AT!SMSWAKEWIDTH=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<width> (SMS Wake signal width, in milliseconds)

- Integer (uint16)
- Valid range: 1–65535

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!TMCONFIG	**Configure thermal mitigation thresholds**

Description

EM8695 modules are pre-configured with thermal mitigation thresholds for several sensors that are monitored by specific thermal mitigation devices. This command can be used to display and modify the configured thresholds.

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: Yes (Execution format)

Reset required to apply changes: Yes. Changes will appear in the Query response as soon as they are made, but the module must be reset for the changes to take effect.

Persistent across power cycles: Yes

Usage Requirements:

- Before changing any threshold values, make sure to use **!TMCONFIG?** and record the default values. When finished testing, use the execution format to reset the threshold values appropriately.

Usage:

- Execution: **AT!TMCONFIG=<tm_device>,<t1>,<t2>,<t3>,<t1_clr>,<t2_clr>,<t3_clr>**
  Response: `OK`
  Purpose: Set the thresholds for initiating thermal mitigation steps, and for ending the mitigations.
- Query: **AT!TMCONFIG?**
  Response:
  ```
  [<tm_device>] <CR>      ← i.e. '[pa]' or '[modem_tsens]'
  thermal zone <tm_zone> <CR>
  Sampling <t0_sample> <t1_sample> <t2_sample> <t3_sample> <CR>
  thresholds <t1> <t2> <t3> <t_rdonly> <CR>
  thresholds_clr <lt_clr_rdonly> <t1_clr> <t2_clr> <t3_clr> <CR>
  actions <t0_action> <t1_action> <t2_action> <t3_action> <CR>
  action_info <t0_act_info> <t1_act_info> <t2_act_info> <t3_act_info> <CR>
  <CR>
  [...]      ← repeats for each <tm_device>
  <CR>
  OK
  ```
  Purpose: Display configured thermal mitigation thresholds for all thermal mitigation devices.
- Query List: **AT!TMCONFIG=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<tm_device> (Device sensor)

- 0 — pa
- 1 — modem_tsens

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Table 3-2: Modem status, customization, and reset commands (Continued)

!TMCONFIG (continued)	Configure thermal mitigation thresholds (continued)

<tm_zone> (Thermal zone that monitors the <tm_device>s in a thermal region and triggers mitigation)
- ASCII string (no quotation marks)
- Valid values:
  - "pa_lte_sdr0_dsc"
  - "pa_nr_sdr0_dsc"
  - "modem_lte_dsc"
  - "modem_nr_2rx_dsc"
  - "modem_nr_1rx_dsc"

<t0_sample>..<tN-1_sample> (Temperature polling rate, in ms):
- Frequency of thermal sensor polling while the module is operating in the mitigation step
- Valid range: 0–99999

<t1>,<t2>,<t3>,<t_rdonly> (Thermal threshold values in C):
- Mitigation begins when the detected temperature increases to ≥ this value.
- Valid values:
  - <t1>,<t2>,<t3> — 0–527
  - <t_rdonly> — 528. This value cannot be changed since there are no further mitigations possible.

<t_clr_rdonly>,<t1_clr>,<t2_clr>,<t3_clr> (Thermal threshold clear values in °C):
- Mitigation ends when the detected temperature is less than the corresponding <t#> threshold. (e.g. <t1_clr> < <t1>)
- Valid values:
  - <t_clr_rdonly> — -273. This value cannot be changed since there are no further mitigations to clear.
  - <t1>,<t2>,<t3> — 0–527

<t0_action>,<t1_action>,<t2_action>,<t3_action> (Actions associated with the thermal threshold and threshold clear values):
- "mitigate" — Thermal mitigation
- No other values are supported.

<t0_act_info>,<t1_act_info>,<t2_act_info>,<t3_act_info> (Thermal mitigation levels):
- Valid values:
  - 0 — No mitigation
  - 1 — Level 1 mitigation.
  - 2 — Level 2 mitigation.
  - 3 — Level 3 mitigation.

Example(s):

- Change thresholds for device 4 (modem_tsens):

```
AT!TMCONFIG=4,35,40,45,33,38,42
OK
```

(Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

!TMCONFIG (continued)	**Configure thermal mitigation thresholds (continued)**

- Display current configuration:

```
AT!TMCONFIG?
[pa] <CR>
thermal_zone     pa <CR>
sampling         10000        5000         5000         5000 <CR>
thresholds       100          105          115          528 <CR>
thresholds_clr   -273         85           90           85 <CR>
actions          mitigate     mitigate     mitigate     mitigate <CR>
action_info      0            1            2            3 <CR>
<CR>
[pa] <CR>
thermal zone pa_lte_sdr0_dsc <CR>
Sampling 5000 5000 5000 <CR>
thresholds 100 105 528 <CR>
thresholds_clr -273 90 97 <CR>
actions mitigate mitigate mitigate <CR>
action_info 0 11 12 <CR>
<CR>
[pa] <CR>
thermal zone pa_nr_sdr0_dsc <CR>
Sampling 5000 5000 5000 <CR>
thresholds 100 105 528 <CR>
thresholds_clr -273 90 97 <CR>
actions mitigate mitigate mitigate <CR>
action_info 0 11 12 <CR>
<CR>
[modem_tsens] <CR>
thermal zone modem_lte_dsc <CR>
Sampling 5000 5000 <CR>
thresholds 105 528 <CR>
thresholds_clr -273 102 <CR>
actions mitigate mitigate <CR>
action_info 0 1 <CR>
<CR>
[modem_tsens] <CR>
thermal zone modem_nr_2rx_dsc <CR>
Sampling 5000 5000 5000 5000 <CR>
thresholds 105 108 112 528 <CR>
thresholds_clr -273 102 105 110 <CR>
actions mitigate mitigate mitigate mitigate <CR>
action_info 0 1 2 254 <CR>
<CR>
[modem_tsens] <CR>
thermal zone modem_nr_1rx_dsc <CR>
Sampling 5000 5000 5000 <CR>
thresholds 105 112 528 <CR>
thresholds_clr -273 102 110 <CR>
actions mitigate mitigate mitigate <CR>
action_info 0 1 254… <CR>     ← Repeats for each <tm_device> <CR>
<CR>
OK
```

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!TMDISCONFIG	**Enable / disable thermal mitigation**
Description	

Use this command to enable or disable the thermal mitigation feature.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: Yes
Persistent across power cycles: Yes
Usage:

- Execution: **AT!TMDISCONFIG=<cmd>**
  Response: `OK`
  Purpose: Enable or disable the thermal mitigation feature.
- Query: **AT!TMDISCONFIG?**
  Response: `Thermal Management: <status> <CR>`
  `OK`
  Purpose: Display the current state of the thermal mitigation feature.
- Query List: **AT!TMDISCONFIG=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<cmd> (Enable / disable the thermal mitigation feature)
- 0 — Enable
- 1 — Disable

<status> (Current state of the thermal mitigation feature)
- ASCII string (no quotation marks)
- Valid values:
  - "Enable"
  - "Disable"

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!TMSTATUS	**Report Thermal Mitigation Status**

Description

Report the thermal mitigation status of all available Thermal Mitigation Devices (TMD) in the module. To display detailed thermal mitigation details for specific devices, use !TMCONFIG.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query: **AT!TMSTATUS?**
  Response:
  ```
  Device     Level     Temperature <CR>
  <device>   <status>  <temp> <CR>
  ... <CR>
  OK
  ```
  Purpose: Display the thermal mitigation status of the module's TMDs.
- Query List: **AT!TMSTATUS=?**
  Purpose: Display the execution command format and parameter values.
- Notification: **!TMSTATUS: <TM device>, Level <TM level>**
  Purpose: Unsolicited response code (URC) that indicates when the thermal mitigation level has changed for the indicated TMD. To enable/disable this URC, use !TMURC.

Parameters:

<status> (Device thermal mitigation level)

- Valid range: 0–254. 0 indicates no mitigation; higher values indicate stricter mitigations.
- For device "cpuv_restriction_cold":
  - 0 — No mitigation
  - 1 — Voltage is restricted
- For devices "pa_lte_sdr0_dsc" and "pa_nr_sdr0_dsc":
  - 0 — No mitigation (normal service)
  - 11 — UL throttling target rate set to 1 Mbps; 3 dB MTPL backoff applied with 50% duty cycle
  - 12 — UL throttling target rate set to 1 Mbps; 6 dB MTPL backoff applied with 50% duty cycle
- For device "modem_lte_dsc":
  - 0 — No mitigation (normal service)
  - 1 — Mode reduced from 2Rx to 1Rx
- For device "modem_nr_2rx_dsc":
  - 0 — No mitigation (normal service)
  - 1 — DL Throttling 1 applied
  - 2 — DL Throttling 2 applied
  - 254 — FR1 SA mode removed from UE capability (TAU update will be sent and connection transition to idle occurs)

(Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

!TMSTATUS (continued)	Report Thermal Mitigation Status (continued)

- For device "modem_nr_1rx_dsc":
  - 0 — No mitigation (normal service)
  - 1 — DL Throttling 2 applied
  - 254 — FR1 SA mode removed from UE capability (TAU update will be sent and connection transition to idle occurs)

<temp> (Device temperature, in °C)

- Integer value
- Each device reports one or more temperatures, depending on the number of sensors it monitors

Example(s):

- Display a current status of the module's TMDs:

```
at!tmstatus?
Device                  Level     Temperature <CR>
cpuv_restriction_cold   0         NA <CR>
modem_lte_dsc           1         114 <CR>
modem_nr_2rx_dsc        254       114 <CR>
modem_nr_1rx_dsc        254       114 <CR>
pa_lte_sdr0_dsc         12        112 <CR>
pa_nr_sdr0_dsc          12        112 <CR>
OK
```

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!TMURC	**Enable / disable thermal mitigation URCs**
Description	

Use this command to enable or disable !TMSTATUS thermal mitigation unsolicited response code (URC) indications.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: No
Persistent across power cycles: Yes
Usage:

- Execution: **AT!TMURC=<status>**
  Response: `OK`
  Purpose: Enable or disable thermal mitigation URCs.
- Query: **AT!TMURC?**
  Response:
  ```
  !TMURC: <status> <CR>
  OK
  ```
  Purpose: Display the current status of thermal mitigation URCs.
- Query List: **AT!TMURC=?**
  Purpose: Display the execution command format and parameter values.
- Notification: **!TMSTATUS: <TM device>, Level <TM level>**
  Purpose: Unsolicited response code (URC) that indicates when the thermal mitigation level has changed for the indicated TMD.

Parameters:

<cmd> (Enable / disable the thermal mitigation feature)
- 0 — Disable
- 1 — Enable

<status> (Current state of the thermal mitigation feature)
- ASCII string (no quotation marks)
- Valid values:
  - "Enable"
  - "Disable"

<TM device> (Name of a thermal mitigation device)
- ASCII string (no quotation marks)
- Valid values:
  - "cpuv_restriction_cold"
  - "modem_lte_dsc"
  - "modem_nr_1rx_dsc"
  - "modem_nr_2rx_dsc"
  - "pa_lte_sdr0_dsc"
  - "pa_nr_sdr0_dsc"

<TM level> (Thermal mitigation level)
- Valid range: 0–254

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!USBCOMP	**Set/report USB interface configuration**

Description

Set or display the device's USB interface configuration.

By default, devices are typically configured to use a USB composition that presents a minimal set of interfaces from a list of available interfaces. Use this command to add or remove interfaces from the configuration.

Note that the RmNet and MBIM interfaces are mutually exclusive — they cannot both be enabled at the same time.

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: Yes

Reset required to apply changes: Yes

Persistent across power cycles: Yes

Usage Notes:

- The RmNet and MBIM interfaces are mutually exclusive — one must always be enabled, and one must always be disabled. i.e., The USB interface configuration must include either:
  - RmNet enabled and MIBM disabled, or
  - RmNet disabled and MBIM enabled

Usage:

- Execution: **AT!USBCOMP=<config_Index>,<config_type>,<interface_bitmask>**
  Response: `OK`
  Purpose: Set the device's USB interface configuration. For the change to take effect, you must reset the modem.
- Query: **AT!USBCOMP?**
  Response:
  ```
  Config Index: <config_index> <CR>
  Config Type: <config_type> (<config_type_desc>) <CR>
  Interface bitmask: <interface_bitmask> (<bitmask_desc>) <CR>
  OK
  ```
  Purpose: Report the device's current USB interface composition.
- Query List: **AT!USBCOMP=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<config_index> (Configuration index)
- Valid value: 1

<config_type> (Configuration type)
- 1 — Generic
- 2 — USBIF-MBIM

<config_type_desc> (Configuration description)
- ASCII string
- Value depends on <config_type>:
  - For <config_type> = 1: "Generic"
  - For <config_type> = 2: "USBIF-MBIM"

(Continued on next page)

Table 3-2: Modem status, customization, and reset commands (Continued)

!USBCOMP (continued)	**Set/report USB interface configuration (continued)**
<Interface bitmask> (USB composition) • Bitmask representing all enabled interfaces • Format: 32-bit bitmask • Valid values (available interfaces are device-dependent): ▪ 0x00000001 — DIAG ▪ 0x00000008 — MODEM (mandatory) ▪ 0x00000010 — GNSS (Used for Location Sensor in Windows 10/11) ▪ 0x00000100 — RMNET0 (Note — Either RmNet or MBIM must be enabled, and the other must be disabled. See **Usage Notes** above for details.) ▪ 0x00001000 — MBIM (Note — Either RmNet or MBIM must be enabled, and the other must be disabled. See **Usage Notes** above for details.) <bitmask_desc> (Interface bitmask description) • List of interface descriptions corresponding to <Interface bitmask> components • Example: "(diag, modem, mbim)"	

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!USBINFO	**Return information from active USB descriptor**
Description	

Return information from the active USB descriptor.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a
Usage:

- Query: **AT!USBINFO?**
  Response:
```
VID:           <vendor_id> <CR>
APP PID:       <app_product_id> <CR>
BOOT PID:      <boot_product_id> <CR>
Manufacturer: <product_manufacturer> <CR>
Product:       <product_name> <CR>
OK
```
  Purpose: Display USB descriptor information.

Parameters:

<vendor_id> (Vendor ID):
- Valid range: 0000–FFFF

<app_product_id> (Product ID used when modem is in application mode):
- Valid range: 0000–FFFF

<boot_product_id> (Product ID used when modem is in boot loader mode):
- Valid range: 0000–FFFF

<product_manufacturer> (Manufacturer string):
- ASCII string (32 characters maximum)
- Example: “Sierra Wireless, Incorporated”

<product_name> (Product string):
- ASCII string (64 characters maximum)
- Example: “Sierra Wireless EM8695 Mobile Broadband Adapter”

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!USBINFOEXT	**Return extended information from active USB descriptor**

Description

Return additional information from the active USB descriptor that is not included in the other !USB* command responses.

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: No

Reset required to apply changes: n/a

Persistent across power cycles: n/a

Usage:

- Query: **AT!USBINFOEXT?**

  Response:
  ```
  USB Version:            <version_num> <CR>
  Device Release Number:  <release_num> <CR>
  Self Powered:           <self_powered> <CR>
  Remote Wakeup:          <remote_wakeup> <CR>
  Max Power:              <max_power> <CR>
  OK
  ```

  Purpose: Display extended USB descriptor information.

Parameters:

<version_num> (USB specification number):
- Hexadecimal
- Valid values:
  - 0110 — USB 1.1
  - 0200 — USB 2.0

<release_num> (Module release number):
- Hexadecimal
- e.g., 0515

<self_powered> (Module self-power support):
- 0 — Device is self-powered
- 1 — Device is not self-powered

<remote_wakeup> (Module support for remote wakeup):
- 0 — Device supports remote wakeup
- 1 — Device does not support remote wakeup

<max_power> (Module max power supply, in 2 mA units):
- Valid range: 0–256 (i.e., 0–512 mA)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!USBMANUFACTURER	**Get product manufacturer from USB descriptor**
Description	

Get the product manufacturer from the active USB descriptor.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: n/a
Persistent across power cycles: n/a
Usage:

- Query: **AT!USBMANUFACTURER?**
  Response: `<product_manufacturer> <CR>`
  `OK`
  Purpose: Display the product manufacturer string from the active USB descriptor.
- Query List: **AT!USBMANUFACTURER=?**
  Response: `OK`
  Purpose: Indicates the query command format is available.

Parameters:

<product_manufacturer> (Manufacturer string):

- ASCII string (32 characters maximum)
- Example: “Sierra Wireless, Incorporated”

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!USBPID	**Get / set product ID in USB descriptor**

Description

Use this command to get or set the device's product ID in the USB descriptor. (Some devices may support more than one product ID.)

Note: If a custom PID is used for <app product_id>, then the <boot product_id> must be set at the same time.

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: Yes

Reset required to apply changes: Yes

Persistent across power cycles: Yes

Usage:

- Execution: **AT!USBPID=<app product_id>[,<boot product_id>]**
  Response: `OK`
  Purpose: Set the application and boot product IDs in the USB descriptor.
- Query: **AT!USBPID?**
  Response:
  ```
  !USBPID: <CR>
  <app product_id>,<boot product_id> <CR>
  OK
  ```
  Purpose: Get the product ID that is stored in the USB descriptor.
- Query List: **AT!USBPID=?**
  Purpose: Display a list of default (non-custom) product IDs for the device.

Parameters:

<app product_id>
- Hexadecimal ASCII value
- Valid value: 90E5

<boot product_id>
- Hexadecimal ASCII value
- Valid value: 90E4
- In the Execution command format, if the <app product_id> is a custom PID>, then the <boot product_id> must be set at the same time. (To check if the <app product_id> is a custom PID, use AT!USBPID=? to see a list of all available non-custom PIDs.)

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!USBPRODUCT	**Get/set product name string in USB descriptor**
Description	

Use this command to get or set the device's product name string in the USB descriptor.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: Yes
Persistent across power cycles: Yes
Usage:

- Execution: **AT!USBPRODUCT="<product_name>"**
  Response: `OK`
  Purpose: Set the application and boot product IDs in the USB descriptor. (Note: Quotation marks are required around the <product_name> string.)
- Query: **AT!USBPRODUCT?**
  Response: `<product_name> <CR>`
  `OK`
  Purpose: Get the product name string that is stored in the USB descriptor.
- Query List: **AT!USBPRODUCT=?**
  Purpose: Indicates the execution command format is available.

Parameters:

<product_name>

- ASCII string
- Length: 3–80 characters
- Execution format: Quotation marks are required around the <product_name> string.

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!USBSPEED	**Get/set USB speed**
Description	

Get/set the modem's maximum supported USB speed and the current USB speed, or set the maximum supported USB speed.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes (Execution); No (Query)
Reset required to apply changes: Yes
Persistent across power cycles: Yes
Usage:

- Execution: **AT!USBSPEED=<max_supported_speed>**
  Response: `OK`
  Purpose: Set the modem's maximum supported USB speed.
- Query: **AT!USBSPEED?**
  Response:
  ```
  SUPPORTED:<supported_usb_speed> <CR>
  CURRENT  :<current_usb_speed> <CR>
  OK
  ```
  Purpose: Display the maximum supported USB speed, and the current USB speed.
- Query List: **AT!USBSPEED=?**
  Response: `OK`
  Purpose: Display the execution command format and parameter values

Parameters:

<max_supported_speed> (Maximum supported USB speed):
- 0 — High Speed

<supported_usb_speed> (Current maximum supported USB speed):
- ASCII string, (no quotation marks)
  - "High-Speed" — USB 2.0

<current_usb_speed> (Current USB speed):
- ASCII string, (no quotation marks)
  - "High-Speed" — USB 2.0

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!USBVERSION	**Get USB version number in USB descriptor**
Description	

Get/set the USB version number in the active USB descriptor

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: Yes
Persistent across power cycles: Yes
Usage:

- Query: **AT!USBVERSION?**
  Response:
  ```
  !USBVERSION: <CR>
  <version_num> <CR>
  OK
  ```
  Purpose: Display USB version number that is in the USB descriptor.
- Query List: **AT!USBVERSION=?**
  Response:
  ```
  OK
  ```
  Purpose: Display valid parameter values

Parameters:

<version_num> (USB specification version number):

- 0200 — USB 2.0

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!USBVID	**Set/query USB vendor ID**

Description

Use this command to set or query the vendor ID in the USB descriptor.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Execution: **AT!USBVID=<vendor_id>]**
  Response: `OK`
  Purpose: Set the device's USB vendor ID.
- Query: **AT!USBVID?**
  Response:
  ```
  !USBVID: <vendor_id> <CR>
  OK
  ```
  Purpose: Report the device's USB vendor ID.

Parameters:

<vendor_id> (USB vendor ID)

- Hexadecimal ASCII value
- Valid range: 0000–FFFF

Example(s):

- **AT!USBVID**
  ```
  VID: 0x9999 <CR>
  OK
  ```

Table 3-2: Modem status, customization, and reset commands (Continued)

Command	
!VERINFO	**Display firmware image version**
Description	

Display the module firmware version information.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage Notes:

- Because the AT port takes a few seconds to enumerate when the module is reset, the "Apps" component version may not appear if !VERINFO is issued immediately after a reset. After the port has enumerated, the version number for the Apps component will be reported accurately.

Usage:

- Execution: **AT!VERINFO**
  Response:
```
Firmware ID: <version> <CR>
Boot Loader: <version> <CR>
       TAOP: <version> <CR>
      Modem: <version> <CR>
       Apps: <version> <CR>
OK
```
  Purpose: Display image versions.

Parameters:

<version> (Image version information)

- ASCII string
- Format:
  - For Boot Loader, Modem, Apps: Semtech-defined tag
  - For Firmware ID, TAOP: First 6 characters of a hash string calculated over the full component version information

Example(s):

- **at!verinfo**

```
Firmware ID: 6CE998
Boot Loader: SWIX35C_00.01.02.00
       TAOP: 93F895
      Modem: SWIX35C_00.01.02.00
       Apps: SWIX35C_00.01.02.00
```

4: Diagnostic Commands

Introduction

This chapter describes commands used to diagnose modem problems.

Command summary

Table 4-1 summarizes the commands that are described in detail in Table 4-2 on page 94.

Table 4-1: Diagnostic commands

Command	Description	Page
!BCFWUPDATESTATUS	Report or clear status of most recent firmware update attempt	94
!BCRESETTYPE	Get reason for module reset/powerdown	95
!GCCLR	Clear crash dump data	96
!GCDUMP	Display crash dump data	97
!IMSTESTMODE	Enable/disable IMS test mode	98

Command reference

Table 4-2: Diagnostic command details

Command	
!BCFWUPDATESTATUS	**Report or clear status of most recent firmware update attempt**
Description	

Return the status of the most recent firmware update attempt made since the last cold restart, or clear the status (change it to 'UNKNOWN'.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.10.00 (Release 0.3)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: Yes

Usage:

- Execution: **AT!BCFWUPDATESTATUS**
  Response:
  ```
  !BCFWUPDATESTATUS: <result> <CR>
  OK
  ```
  or
  ```
  !BCFWUPDATESTATUS: <result> <CR>
  Failed IMG TYPE <type>, DATA <data>, PART <part>
  OK
  ```
  Purpose: Return the status of the most recent firmware update attempt. The second response format appears only if <result> = "FAILED".

Parameters:

<result> (Status of last firmware update attempt)
- ASCII string:
  - "UNKNOWN" — Status of last attempt is unknown. No other fields appear in response.
  - "SUCCESS" — Last update was successful. No other fields appear in response.
  - "FAILED" — Last update failed. <type>, <data> and <part> appear in the response.

<type> (Firmware image type that failed to update)
- ASCII string
- Note — Parameter appears only if <result> is FAILED.

<data> (Reference data for failed image)
- Location of the reference data as an offset in the CWE image
- Valid range: 0–(2^{32}-1)
- Note — Parameter appears only if <result> is FAILED.

<part> (Partition associated with the failed image)
- ASCII string
- Applies only to configuration updates
- Note — Parameter appears only if <result> is FAILED.

Table 4-2: Diagnostic command details (Continued)

Command	
!BCRESETTYPE	**Get reason for module reset / powerdown**

Description

Return the reason for the most recent module reset or powerdown.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query: **AT!BCRESETTYPE?**
  Response: `!BCRESETTYPE: reset type <type>, source <source> <CR>`
  `OK`
  Purpose: Return the reason for the most recent reset or powerdown.

Parameters:

<type> (Reset type)

- Valid values:
  - 0 — Unknown
  - 1 — Warm
  - 2 — Hard
  - 3 — Crash
  - 4 — Power-down

<source> (Reason for reset)

- Valid values:
  - 0 — Unknown
  - 1 — User-requested
  - 2 — Hardware switch
  - 3 — Temperature critical
  - 4 — Voltage critical
  - 5 — Configuration update (Note: This option will be available in a future firmware release.)
  - 6 — LWM2M (Note: This option will be available in a future firmware release.)
  - 8 — FOTA (Note: This option will be available in a future firmware release.)

Table 4-2: Diagnostic command details (Continued)

Command	
!GCCLR	**Clear crash dump data**
Description	

Clear crash dump data.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!GCCLR**
  Response:
  ```
  Crash data cleared <CR>
  OK
  ```
  Purpose: Clear crash dump data.

Parameters:

None

Table 4-2: Diagnostic command details (Continued)

Command	
!GCDUMP	**Display crash dump data**
Description	

Display crash dump data.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Execution: **AT!GCDUMP**
  Response: `<crash_dump_data> <CR>`
  `OK`
  Purpose: Display crash dump data.

<crash_dump_data> (Crash dump strings)

- ASCII string
  - If crash dump data is present — Crash dump data strings
  - If no crash dump data is present — "No crash data available"

Table 4-2: Diagnostic command details (Continued)

Command	
!IMSTESTMODE	**Enable / disable IMS test mode**

Description

Enable / disable IMS (IP Multimedia Subsystem) test mode.
If IMS test mode is enabled:

- IMS registration attempts will not occur
- SMS over IMS is not supported

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!IMSTESTMODE=<mode>**
  Response: OK
  Purpose: Enable / disable IMS test mode.
- Query: **AT!IMSTESTMODE?**
  Response: <mode_status> <CR>
  OK
  Purpose: Return the current state of IMS Test Mode.

Parameters:

<mode> (IMS Test Mode state)

- 0 — Disable
- 1 — Enable

<mode_status> (Current IMS Test Mode status)

- ASCII string
  - "IMS Test Mode Enabled"
  - "IMS Test Mode Disabled"

5: Test Commands

Introduction

To obtain regulatory approval and carrier approvals for your product, you may be required to perform tests on the radio component of the embedded modem. This chapter describes AT commands used to perform those tests.

For command usage examples:

- Refer to the test procedures described in *[2] EM8695 Production Test Guide (Doc# Forthcoming)*
- See Sample DA* Command Usage on page 115.

Command summary

Table 5-1 summarizes the commands that are described in detail in Table 5-2 on page 100.

Table 5-1: Test commands

Command	Description	Page
!DACGPSCTON	Return GPS CtoN and frequency measurement	100
!DACGPSMASKON	Set CGPS IQ log mask	101
!DACGPSSTANDALONE	Enter/exit StandAlone (SA) RF mode	102
!DACGPSTESTMODE	Start/stop CGPS diagnostic task	103
!DAFTMACT	Put modem into Factory Test Mode	104
!DAFTMDEACT	Put modem into online mode from Factory Test Mode	105
!DAGFTMRXAGC	Get FTM Rx AGC	106
!DAOFFLINE	Place modem offline	107
!DARCONFIG	Configure radio	108
!DARCONFIGDROP	Drop Radio Configurations	110
!DATXCONTROL	Configure Tx Power	111
!RXDEN	Enable/disable LTE/5G Sub-6 receive (Rx) diversity	114

Command reference

Table 5-2: Test command details

Command	
!DACGPSCTON	**Return GPS CtoN and frequency measurement**
Description	

Return the GPS CtoN and frequency measurement.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.10.00 (Release 0.3)
Password required: Yes
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage Requirements:

Before using !DACGPSCTON, enter the following commands:

a. AT!DACGPSTESTMODE=1 *(to start CGPS diagnostic task)*
b. AT!DACGPSSTANDALONE=1 *(to enter SA RF mode)*
c. AT!DACGPSMASKON *(to enable log mask)*

Usage:

- Execution: **AT!DACGPSCTON**
  Response:
  ```
  CtoN=<CtoN>, Freq=<freq> <CR>
  OK
  ```
  Purpose: Return CtoN and frequency measurements.

Parameters:

<CtoN> (Carrier-to-noise density ratio (i.e., received carrier strength relative to the received noise strength) in dBHz, calculated as part of WBIQ test)

- Type: UInt32
- Note: A good connection will have a a <CtoN> of 58±5 dB

<freq> (Frequency in Hz, calculated as part of WBIQ test)

- Int32
- Note: A good connection will have a a <freq> of 100000±5000 Hz

Table 5-2: Test command details (Continued)

Command	
!DACGPSMASKON	**Set CGPS IQ log mask**

Description

Set CGPS IQ (0x138a) log mask.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.10.00 (Release 0.3)
Password required: Yes
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Execution: **AT!DACGPSMASKON**

  Response:

```
730000000300000000000000010000000FF0F
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000400000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
00000000000000000000 <CR>
OK
```

  Purpose: Set log mask.
  Note: The above return value is an example only, and will vary. The returned value does not affect GPS tests and can be ignored.

Table 5-2: Test command details (Continued)

Command	
!DACGPSSTANDALONE	**Enter / exit StandAlone (SA) RF mode**
Description	

Enter / exit Standalone (SA) RF mode.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.10.00 (Release 0.3)
Password required: Yes
Reset required to apply changes: No
Persistent across power cycles: No

Usage Requirements:

1. AT!DACGPSTESTMODE=1 *(to start CGPS diagnostic task)*

Usage:

- Query: **AT!DACGPSSTANDALONE=<state>**
  Response: 4B0D6500140077140000 <CR>
  OK
  or
  ERROR
  Purpose: Enter / exit SA RF mode

Parameters:

<state> (SA RF mode state)
- 0 — Enter SA RF mode
- 1 — Exit SA RF mode

Table 5-2: Test command details (Continued)

Command	
!DACGPSTESTMODE	**Start / stop CGPS diagnostic task**
Description	

Start/stop the CGPS diagnostic task.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.10.00 (Release 0.3)
Password required: Yes
Reset required to apply changes: No
Persistent across power cycles: No

Usage:

- Execution: **AT!DACGPSTESTMODE=<mode>**
  Response: *(for start):*
  `4B0D0800 <CR>`
  `OK`

  (for stop):
  `4B0D0C00 <CR>`
  `OK`

  or

  `ERROR`
  Purpose: Start or stop the CGPS diagnostic test.

Parameters:

<mode> (CGPS diagnostic task mode)

- 0 — Stop
- 1 — Start

Table 5-2: Test command details (Continued)

Command	
!DAFTMACT	**Put modem into Factory Test Mode**
Description	

Place the modem in FTM (Factory Test Mode). FTM is a non-signaling mode that allows the radio component to be manually configured to conduct certain types of tests. (The command !DAFTMDEACT puts the modem into online mode.)

Note: When this command executes successfully, the modem responds with the message shown in the Query response below and then automatically resets and boots in FTM. Any other response indicates an error.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: Automatic (The module resets automatically when the command executes successfully.)
Persistent across power cycles: No

Usage Requirements:

- The device must be in full functionality mode (**AT+CFUN=1**) to use this command.

Usage:

- Query: **AT!DAFTMACT**
  Response: `The module is resetting to FTM in 3 seconds <CR>` ← *Success. Any other response indicates an error.*
  `OK`
  Purpose: Place modem in FTM mode (from online mode).

Table 5-2: Test command details (Continued)

Command	
!DAFTMDEACT	**Put modem into online mode from Factory Test Mode**
Description	

This command takes the modem out of FTM and puts the modem back into online mode. (The command !DAFTMACT puts the modem into FTM.)

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: Automatic (The module resets automatically when the command executes successfully.)
Persistent across power cycles: No

Usage Requirements:
Before using this command:

a. Issue !DARCONFIGDROP to clean up the radio configuration (i.e., remove the radio configuration set by !DARCONFIG).
b. Use this command to put the modem into online mode.

Usage:

- Query: **AT!DAFTMDEACT**
  Response: 290400 <CR>
  OK
  Purpose: Place modem in online mode (from FTM mode).

Table 5-2: Test command details (Continued)

Command	
!DAGFTMRXAGC	**Get FTM Rx AGC**
Description	

Get the FTM Rx AGC on the primary or diversity path.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage Requirements:

Before using this command:

- !DAFTMACT must be issued to put the modem into FTM.
- !DARCONFIG must be issued to set the technology, band, and channel.

Usage:

- Execution: **AT!DAGFTMRXAGC=<carrier>, <technology>, <expected_AGC>, <path>**
  Response: `<rssi> dbm<CR>`
  `OK`
  Purpose: Return the FTM Rx AGC value.

Parameters:

<carrier> (Carrier ID)

- 0 — PCC

<technology> (Radio access technology (RAT))

- RAT support is device-dependent.
- 3 — LTE
- 6 — 5G Sub-6

<expected_AGC> (Expected AGC value, in dBm)

- Valid range: -900 to 230
- Value represents (expected AGC * 10)
- e.g., '-230' indicates -23.0 dBm power

<path> (Rx path)

- 0 — Primary Rx
- 1 — Diversity Rx

<rssi> (RSSI, in dBm)

- Dynamic Rx AGC

Table 5-2: Test command details (Continued)

Command	
!DAOFFLINE	**Place modem offline**
Description	
Put the modem ofline. **Supporting EM8695 devices:** All **Added F/W:** EM8695: SWIX35C_00.01.10.00 (Release 0.3) **Password required:** Yes **Reset required to apply changes:** No **Persistent across power cycles:** No **Usage:** ▪ Execution: **AT!DAOFFLINE** Response: 290100 <CR> OK Purpose: Put the modem offline. **Parameters:** None	

Table 5-2: Test command details (Continued)

Command	
!DARCONFIG	**Configure radio**
Description	

Configure the module's radio to a specific RAT, band, channel, bandwidth, etc.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: No
Persistent across power cycles: No

Usage Requirements:

Before using this command (!DARCONFIG):

- !DAFTMACT must be issued to put the modem into FTM.

After finishing with this command, issue !DARCONFIGDROP to remove the radio configuration.

Usage:

Execution (LTE/5G Sub-6):

AT!DARCONFIG=<carrier>,<technology>,<band>,<tx_channel>, <bw>, <rx_channel>, [,<mimo_mode>[,<beam_id>[,<continuous_mode>]]]

Response: OK

Purpose: Set the selected RAT's band and channel, bandwidth, etc.

Parameters:

<carrier> (Carrier ID)

- 0 — PCC

<technology> (Radio access technology (RAT))

- RAT support is device-dependent
- 3 — LTE
- 6 — 5G Sub-6

<band> (Band number)

- Valid range: Refer to section "Supported RF Bands" of *[1] EM8695 Product Technical Specification (Doc# 41114813).*
- e.g., '1' corresponds to LTE B1 or 5G Sub-6 n1

<tx_channel> (Uplink channel number for selected <band>)

- Integer value
- <band>-dependent, refer to Transmission Path test settings tables in *[2] EM8695 Production Test Guide (Doc# Forthcoming).*

(Continued on next page)

Table 5-2: Test command details (Continued)

!DARCONFIG (continued)	Configure radio (continued)

<bw> (Bandwidth index)

- <band>-dependent, refer to tables "LTE Bandwidth Support" and "NR Bandwidth Support" of document *[1] EM8695 Product Technical Specification (Doc# 41114813)*.
- Valid values:
  - 0 — 1.4 MHz (B106 only)
  - 1 — 3 MHz (B106 only)
  - 2 — 5 MHz
  - 3 — 10 MHz
  - 4 — 15 MHz
  - 5 — 20 MHz

<rx_channel> (Downlink channel number for selected <band>)

- Integer value
- Valid values:
  - <band>-dependent, refer to Transmission Path test settings tables in *[2] EM8695 Production Test Guide (Doc# Forthcoming)*.
  - Note: In LTE mode, set the Rx channel number explicitly, or set '1' and the actual channel will be calculated from the Tx channel.

<mimo_mode> (Reserved)

- Leave this parameter blank. (The value is ignored.)
- This parameter is included for command format compatibility with other Semtech modules.

<beam_id> (Reserved)

- Leave this parameter blank. (The value is ignored.)
- This parameter is included for command format compatibility with other Semtech modules.

<continuous_mode> (Burst or Continuous mode)

- Valid values:
  - 0 — Burst mode
  - 1 — Continuous mode (Default)

Example(s):

- Configure LTE B66 Tx/PRx/DRx
  `AT!DARCONFIG=0,3,66,132322,3,66786`
- Configure LTE B8 Tx/PRx/DRx
  `AT!DARCONFIG=0,3,8,21625,3,3625`
- Configure LTE B41 Tx/PRx/DRx
  `AT!DARCONFIG=0,3,41,39700,3,39700`
- Configure 5G Sub-6 n77 Tx/PRx/DRx
  `AT!DARCONFIG=0,6,77,650000,5,650000`
- Configure 5G Sub-6 n5 Tx/PRx/DRx
  `AT!DARCONFIG=0,6,5,167300,5,176300`
- Configure LTE B41 Tx/PRx/DRx burst mode
  `AT!DARCONFIG=0,3,41,39700,3,39700[,0]`

Table 5-2: Test command details (Continued)

Command	
!DARCONFIGDROP	**Drop Radio Configurations**
Description	

Drop the radio configurations that were previously set using !DARCONFIG.
This command must be used when switching between technologies (RATs).

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: No
Persistent across power cycles: No

Usage Requirements:
Before using this command:

- !DAFTMACT must be issued to put the modem into FTM.

After finishing with this command, issue !DARCONFIG to configure the radio.

Usage:

- Execution: **AT!DARCONFIGDROP=<technology>**
  Response: OK
  Purpose: Drop the current configurations for the selected RAT (<technology>).

Parameters:

<technology> (Radio access technology (RAT))

- RAT support is device-dependent
- 3 — LTE
- 6 — 5G Sub-6

Table 5-2: Test command details (Continued)

Command	
!DATXCONTROL	**Configure Tx Power**
Description	

Configure the Tx power for LTE and 5G Sub-6.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: No
Persistent across power cycles: No

Usage Requirements:

Before using this command:

- !DAFTMACT must be issued to put the modem into FTM.
- !DARCONFIG must be issued to set the technology, band, channel, etc.

Usage:

- Execution: **AT!DATXCONTROL=<carrier>,<technology>,<enable>, <power_dBm10>[,<waveform>,<mod>, <ns_value>,<start_RB>, <num_RB>[,<beam_id>[,<duty_cycle>]]]**
  Response: OK
  Purpose: Set the Tx parameters for LTE and 5G Sub-6.

Parameters:

<carrier> (Carrier ID)

- 0 — PCC

<technology> (Radio access technology (RAT))

- RAT support is device-dependent
- 3 — LTE
- 6 — 5G Sub-6

<enable> (Enable / disable Tx power output)

- 0 — Disable
- 1 — Enable

<power_dBm10> (Desired Tx power in dBm * 10)

- Valid range: -900 to 260 (represents 10 times desired Tx power)
- Value is ignored if <enable>=0
- e.g., -505 represents -50.5 dBm Tx power

(Continued on next page)

Table 5-2: Test command details (Continued)

!DATXCONTROL (continued)	Configure Tx Power (continued)

<waveform> (Waveform for LTE, 5G Sub-6)

- LTE waveform
  - 0 — 1 MHz offset CW (supported only in Continuous mode)
  - 1 — LTE PUSCH
  - 2 — LTE PUCCH
  - 3 — LTE PRACH
  - 4 — LTE SRS
  - 5 — UpPTS
- 5G Sub-6 waveform
  - 1 — CW (supported only in Continuous mode)
  - 2 — Offset CW (supported only in Continuous mode)
  - 9 — Reserved
  - 10 — PUSCH
  - 11 — PUSCH DFT-S

<mod> (Tx modulation)

- 0 — QPSK
- 1 — 16 QAM
- 2 — 64 QAM
- 3 — 256 QAM
- 4 — BPSK (5G Sub-6 only)

<ns_value> (Network signal value)

- Valid range: 1–32
- Affects max output power

<start_RB> (Start resource block index)

- Valid range: 0–99
- **Note —** The actual maximum value depends on the band, bandwidth, and SCS configuration. Refer to Table 5-3 on page 114 for details.

<num_RB> (Number of resource blocks)

- Valid range: 0–100
- Requirement: (<start_RB> + <num_RB> - 1) ≤ actual maximum value from Table 5-3 on page 114)

<beam_id> (Reserved)

- Leave this parameter blank. (The value is ignored.)
- This parameter is included for command format compatibility with other Semtech modules.

(Continued on next page)

Table 5-2: Test command details (Continued)

!DATXCONTROL (continued)	**Configure Tx Power (continued)**
<duty_cycle> (Transmission duty cycle) • Applies to LTE and 5G Sub-6 radio configurations in burst mode. If the radio is in continuous mode, <duty_cycle> will be ignored. • LTE: ▪ 1 — 10% duty cycle ▪ 2 — 20% duty cycle ▪ 3 — 30% duty cycle ▪ 4 — 40% duty cycle ▪ 5 — 50% duty cycle ▪ 6 — 60% duty cycle ▪ 7 — 70% duty cycle ▪ 8 — 80% duty cycle ▪ 9 — 90% duty cycle ▪ 10 — 100% duty cycle (Default) • 5G Sub-6: ▪ 0 — 20% duty cycle ▪ 1 — 25% duty cycle ▪ 2 — 40% duty cycle ▪ 3 — 50% duty cycle (Default)	

Table 5-2: Test command details (Continued)

Command	
!RXDEN	**Enable / disable LTE /** 5G Sub-6 **receive (Rx) diversity**
Description	

Enable or disable LTE / 5G Sub6 receive diversity, or establish receive diversity as the primary path. The new state takes effect the next time the modem is reset.

Note: Due to firmware design, LTE open-loop Tx power should be set to 20 dBm when measuring SISO sensitivity with Rx diversity as the primary path.

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: Yes

Reset required to apply changes: No

Persistent across power cycles: Yes

Usage:

- Execution: **AT!RXDEN=<state>**
  Response: OK
  Purpose: Set the current receive diversity state.
- Query: **AT!RXDEN?**
  Response:
  ```
  !RXDEN: <CR>
  <state> <CR>
  OK
  ```
  Purpose: Query the current receive diversity <state>.
- Query List: **AT!RXDEN=?**
  Purpose: Display valid parameter values.

Parameters:

<mode> (Current / requested receive diversity state)

- 0 — Rx diversity disabled
- 1 — Rx diversity enabled
- 2 — Rx diversity as primary path (See note above for measuring SISO sensitivity.)

Table 5-3: Maximum Transmission Bandwidth Configuration (Number of Resource Blocks)[a]

SCS[b] (kHz)	Number of Resource Blocks (N_{RB}) per Bandwidth											
	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100 MHz
15	25	52	79	106	133	160	216	270	n/a	n/a	n/a	n/a
30	11	24	38	51	65	78	106	133	162	217	245	273
60	n/a	11	18	24	31	38	51	65	79	107	121	135

a. Table source — 3GPP TS 38.521-1 V15.3.0 Table 5.3.2-1.
b. Subcarrier spacing

Sample DA* Command Usage

For suggested Tx and Rx testing instructions for supported RATs, refer to *[2] EM8695 Production Test Guide (Doc# Forthcoming)*.

6: Memory Management Commands

Introduction

The modem uses non-volatile memory to store:

- Factory calibration data
- Settings made in a host application

The commands in this chapter allow you to back up and restore the data in non-volatile memory.

Command summary

Table 6-1 summarizes the commands that are described in detail in Table 6-2 on page 117.

Table 6-1: Memory management commands

Command5	Description	Page
!NVBACKUP	Back up device configuration	117
!RMARESET	Restore device to saved restore point	119

Command reference

Table 6-2: Memory management command details

Command	
!NVBACKUP	**Back up device configuration**
Description	

Save the device's current configuration as a 'restore point'. The restore point can then be restored at a later time if necessary, using !RMARESET on page 119.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!NVBACKUP[=<restore point>[,<name>]]**
  Response:
  ```
  !NVBACKUP: <CR>
  Items Saved: <saved> <CR>
  Items Skipped: <skipped> <CR>
  OK
  ```
  Purpose: Save the current device configuration to the indicated <restore point>.
  Note — The restore point replaces the existing same-numbered restore point (if present), and deletes higher-numbered restore points. (i.e., saving to <restore point>=2 replaces any existing configuration in that restore point, and deletes the configuration in <restore point>=3)
- Query: **AT!NVBACKUP?**
  Response:
  ```
  !NVBACKUP: <CR>
  <restore point> <name> <CR>
  ... <CR>
  OK
  ```
  Purpose: Display all saved restore points.

Usage Notes:

- When saving a restore point:
  - The existing <restore point> is replaced (if present).
  - Higher-numbered restore points are deleted.
- If a <name> is not specified, the file is saved as "unnamed" or "Latest", depending on the <restore point>.

Parameters:

<restore point> (Type of saved restore point)

- 0 — Semtech factory-calibrated configuration (Reserved for internal use)
- 1 — Semtech-provided SKU configuration (Reserved for internal use)
- 2 — Save the current configuration using a specified file <name>. If no <name> is specified, save as "unnamed".
- 3 — Save the current configuration as the 'Latest' restore point.
  Note: The category 3 restore point is also generated automatically after a successful reconfiguration (e.g. after an image switch or firmware update).

(Continued on next page)

Table 6-2: Memory management command details (Continued)

!NVBACKUP (continued)	**Back up device configuration (continued)**
<name> (Name used to store the restore point) • 0–32 ASCII characters ▪ <restore point> = 0 — "Factory" (Semtech factory-calibrated configuration, pre-SKU) ▪ <restore point> = 1 — "Provision" (Semtech-provisioned SKU configuration) ▪ <restore point> = 2 — User-defined name provided when restore point was saved, or "unnamed" if no name was provided ▪ <restore point> = 3 — Customer-defined name provided when restore point was saved, or "Latest" (Latest saved configuration) if no name was provided <saved> (Number of saved items) • 0–(2^{32} - 1) <skipped> (Number of skipped items) • 0–(2^{32} - 1) • Note — Does not display if 0	

Table 6-2: Memory management command details (Continued)

Command	
!RMARESET	**Restore device to saved restore point**
Description	

Restore the device to a previously saved restore point.

Important — Using this command may erase any settings performed by the user. Semtech recommends creating a backup (using the !NVBACKUP command) in restore point 2 after making configuration changes.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage Notes:

- After using the execution format to specify a restore point, restart the module to perform the restore.

Usage:

- Execution: **AT!RMARESET=<restore point>**
  Response:
  ```
  !RMARESET: DEVICE REBOOT REQUIRED <CR>
  Items Restored:  <restored count> <CR>
  Items Deleted:   <deleted count> <CR>
  Items Defaulted: <defaulted count> <CR>
  Items Skipped:   <skipped count> <CR>
  OK
  ```
  Purpose: Restore device to the specified <restore point> (configuration). A reboot is required to take effect.
- Query: **AT!RMARESET?**
  Response:
  ```
  !RMARESET:
  <restore point> <name> <CR>
  ... <CR>
  OK
  ```
  Purpose: Display all available restore points.

Parameters:

<restore_point> (Saved restore point)

- 0 — Semtech factory-calibrated configuration (Note — For information only, cannot be restored.)
- 1 — Semtech-provided SKU configuration
- 2 — Restore to the restore point that was saved earlier using !NVBACKUP.
- 3 — Restore to the latest saved restore point (saved earlier using !NVBACKUP or automatically when the device was successfully reconfigured, e.g. after an image switch or firmware update)

<name> (Descriptive name of <restore_point>)

- ASCII string, varies by <restore point>:
  - <restore point> = 0 — "Factory" (Semtech factory-calibrated configuration, pre-SKU)
  - <restore point> = 1 — "Provision" (Semtech-provisioned SKU configuration)
  - <restore point> = 2 — Customer-defined name provided when using !NVBACKUP to save a configuration, or "unnamed" if no name was provided
  - <restore point> = 3 — Customer-defined name provided when using !NVBACKUP to save a configuration, or "Latest" (Latest saved configuration)

7: GNSS Commands

Introduction

This chapter describes commands used to access GNSS functionality in supporting modules.

When using these commands, the following considerations apply:

- GNSS is typically enabled by default; however, it may be disabled by default for some SKUs. If so, enable GNSS using **!CUSTOM="GPSENABLE"**
- If supported by the modem, gpsOneXTRA is enabled (over the NDIS interface) by default when GNSS is enabled, and it generates data traffic.

Command summary

Table 7-1 summarizes the commands that are described in detail in Table 7-2 on page 122.

Table 7-1: GNSS commands

Command	Description	Page
!GNSSAPPINFO	Configure GPS application	122
!GNSSCONFIG	Configure GNSS Satellite Constellation	123
!GNSSDPOMODE	Enable/disable Dynamic Power Optimization (DPO)	125
!GNSSPERMITTEDSTATE	Query GNSS feature permitted state	126
!GPSAUTOSTART	Configure GPS auto-start features	127
!GPSCLRASSIST	Clear specific GPS assistance data	129
!GPSCOLDSTART	Clear all GNSS assistance data	130
!GPSEND	End an active session	131
!GPSFIX	Initiate GPS position fix	132
!GPSLBSAPN	Set GPS LBS APNs	133
!GPSLOC	Return last known location of the modem	135
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Table 7-1: GNSS commands (Continued)

Command	Description	Page
!GPSSTATUS	Request current status of a position fix session	146
!GPSSUPLNITTIMEOUT	Set SUPL/UMTS_CP timeout	148
!GPSSUPLURL	Set/report SUPL server URL	149
!GPSSUPLVER	Set/report SUPL server version	150
!GPSTRACK	Initiate local tracking (multiple fix) session	151
!GPSTRANSSEC	Configure GPS transport security	153

Command reference

Table 7-2: GNSS command details

Command	
!GNSSAPPINFO	**Configure GPS application**
Description	

Configure the GPS application ID and password used to access Verizon's SUPL server.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.10.00 (Release 0.3)
Password required: Yes
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!GNSSAPPINFO=<enable>[,<app ID>,<Password>]**
  Response: `OK`
  Purpose: Enable and configure the application ID and password to be used to access Verizon's SUPL server.
- Query: **AT!GNSSAPPINFO?**
  Response:
  ```
  Enable:   <enable> <CR>
  AppID:    <app ID> <CR>
  Password: <Password> <CR>
  <CR>
  OK
  ```
  Purpose: Return the current configuration settings.
- Query List: **AT!GNSSAPPINFO=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<enable> (Enable/disable use of application ID and password to access Verizon's SUPL server)
- 0 — Disable
- 1 — Enable

<app ID> (Application ID)
- Integer (uint32)
- Format: Hexadecimal

<Password> (Application password)
- ASCII string (quotation marks required around the string)
- Password length : 8 characters
- Valid characters: '0'–'9', 'A'–'Z', 'a'–'z'
- Password must be entered with quotation marks (for example, **"2X41AZ3F"**).

Table 7-2: GNSS command details (Continued)

Command	
!GNSSCONFIG	**Configure GNSS Satellite Constellation**

Description

Configure the module's GNSS satellite constellation by enabling/disabling specific GNSS satellite systems.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage Notes:

- Disabled systems (except QZSS) are not tracked, so are not used for position fixes, and do not appear in the !GPSSATINFO query response.

  When QZSS is disabled, it is not used for position fixes, but is tracked internally for cross-correlation with other enabled satellite systems. This causes QZSS to appear in the !GPSSATINFO query response, regardless of its !GNSSCONFIG setting.

Usage:

- Execution: **AT!GNSSCONFIG=<GPS>,<GLO>,<BDS>,<GAL>,<QZS>**
  Response: `OK`
  Purpose: Enable or disable tracking for specific GNSS satellite systems.
- Query: **AT!GNSSCONFIG?**
  Response:
  ```
  GPS:     <GPS> <CR>
  GLONASS: <GLO> <CR>
  BDS:     <BDS> <CR>
  GAL:     <GAL> <CR>
  QZSS:    <QZS> <CR>
  OK
  ```
  Purpose: Return the current GNSS satellite constellation configuration.
- Query List: **AT!GNSSCONFIG=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<GPS> (GPS satellite system tracking)
- 1 — Enable
- Note: GPS cannot be disabled

<GLONASS> (GLONASS satellite system tracking)
- 0 — Disable
- 1 — Enable

<BDS> (BeiDou satellite system tracking)
- 0 — Disable
- 1 — Enable worldwide
- 2 — Enable outside of US

<GAL> (Galileo satellite system tracking)
- 0 — Disable
- 1 — Enable worldwide
- 2 — Enable outside of US

(Continued on next page)

Table 7-2: GNSS command details (Continued)

!GNSSCONFIG (continued)	**Configure GNSS Satellite Constellation (continued)**
<QZS> (Quasi-Zenith satellite system (QZSS) tracking) • 0 — Disable • 1 — Enable worldwide • 2 — Enable outside of US	

Table 7-2: GNSS command details (Continued)

Command	
!GNSSDPOMODE	**Enable / disable Dynamic Power Optimization (DPO)**
Description	

Enable or disable GNSS Dynamic Power Optimization (DPO).

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_01.01.12.00 (Release 0.4)
Password required: Yes
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Execution: **AT!GNSSDPOMODE=<enable>**
  Response: `OK`
  Purpose: Enable or disable Dynamic Power Optimization (DPO).
- Query: **AT!GNSSDPOMODE?**
  Response: `!GNSSDPOMODE: <enable><CR>`
  `OK`
  Purpose: Return the current DPO state.
- Query List: **AT!GNSSDPOMODE=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<enable> (Enable / disable DPO)

- 0 — Disable DPO
- 1 — Enable DPO

Table 7-2: GNSS command details (Continued)

Command	
!GNSSPERMITTEDSTATE	**Query GNSS feature permitted state**
Description	

Display the current permitted state of the GNSS feature. The feature is not permitted to be used if any of the following conditions (votes) exist:

- The physical GPS_DISABLE switch is ON.
- The module is in low power mode (LPM) — the !CUSTOM "GPSLPM" customization is set to 1.
- The carrier restricts the use of the feature.
- The !CUSTOM "GPSENABLE" customization is set to 0 (GNSS disabled).

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.10.00 (Release 0.3)

Password required: No

Reset required to apply changes: n/a

Persistent across power cycles: n/a

Usage:

- Query: **AT!GNSSPERMITTEDSTATE?**

  Response:
  ```
  Permitted: <permitted> <CR>
  Disable votes: WDIS_2:<vote>, LPM:<vote>, CARRIER:<vote>,
  GPSENABLECUST:<vote> <CR>
  OK
  ```

  Purpose: Display the current permitted state of the GNSS feature.

Parameters:

<permitted> (Permitted state)

- 0 — Disabled (GNSS is not permitted)
- 1 — Permitted (GNSS is permitted)

<vote> (Current state of each condition (voter) that controls GNSS permitted state)

- Valid values:
  - 0 — GNSS feature is permitted
  - 1 — GNSS feature is not permitted due to this condition
- Voters include:
  - WDIS_2 — Vote is '1' if the physical GPS_DISABLE_N switch is ON.
  - LPM — Vote is '1' if the module is in LPM (the !CUSTOM "GPSLPM" customization is set to 1).
  - CARRIER — Vote is '1' if GNSS is disabled due to carrier restrictions.
  - GPSENABLECUST — Vote is '1' if the !CUSTOM "GPSENABLE" customization is set to 0.

Table 7-2: GNSS command details (Continued)

Command	
!GPSAUTOSTART	**Configure GPS auto-start features**

Description

Configure the GPS auto-start features. Any changes take effect the next time the modem is reset.

Note: If auto-start is enabled, another GPS session cannot be started.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Execution: **AT!GPSAUTOSTART=<function>[, <fixtype>, <maxtime>, <maxdist>, <fixrate>]**
  Response: `OK`
  or
  `ERROR`
  Purpose: Assign start values for various GPS settings.
- Query: **AT!GPSAUTOSTART?**
  Response:
  ```
  !GPSAUTOSTART <CR>
    function: <function> <CR>
    fixtype:  <fixtype> <CR>
    maxtime: <maxtime> seconds <CR>
    maxdist: <maxdist> meters <CR>
    fixrate: <fixrate> seconds <CR>
  OK
  ```
  Purpose: Display the current values for auto-start features
- Query List: **AT!GPSAUTOSTART=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<function> (Enable/disable the feature)
- 0 — Disabled
- 1 — Enabled at boot (GPS tracking session starts automatically when modem is reset)
- 2 — Enabled when NMEA port is opened

<fixtype> (Type of fix to establish)
- 1 — Standalone (not supported by a mobile station)
- 2 — MS-based only
- 3 — MS-assisted only

<maxtime> (Maximum time to wait for a position fix, in seconds)
- Valid range: 1–255

(Continued on next page)

Table 7-2: GNSS command details (Continued)

!GPSAUTOSTART (continued)	**Configure GPS auto-start features (continued)**
<maxdist> (Requested accuracy of fix, in meters) • Entered in decimal format • Valid values: ▪ 1–4294967279 ▪ 4294967280 — No preference <fixrate> (Time to wait between fixes, in seconds) • Valid range: 1–65535	

Table 7-2: GNSS command details (Continued)

Command	
!GPSCLRASSIST	**Clear specific GPS assistance data**

Description

Clear one or more types of assistance data from the modem. This forces a cold start for GPS acquisition the next time a session starts.

The command is only available when there is no active GPS session — the GPS receiver is off and no position fix is being calculated.

(This command is equivalent to !GPSCOLDSTART when all parameters (except <alm>) are set to '1'.)

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: Yes

Reset required to apply changes: No

Persistent across power cycles: Yes

Usage:

- Execution: **AT!GPSCLRASSIST=<eph>, <alm>, <pos>, <time>, <iono>**
  Response: `OK`
  or
  `Command ignored <CR>`
  `OK`
  Purpose: Clear each assistance data type that is flagged as '1'.
- Query List: **AT!GPSCLRASSIST=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<eph> (Ephemeris assistance data)
- 0 — Ignore (Do not clear the ephemeris assistance data)
- 1 — Clear this assistance data type — Clears GPS, GLONASS and SBAS ephemeris assistance data.

<alm> (Almanac assistance data)
- 0 — Ignore (Do not clear the almanac assistance data)
- 1 — Clear this assistance data type — Clears GPS, GLONASS and SBAS almanac assistance data.

<pos> (Position assistance data)
- 0 — Ignore (Do not clear the position assistance data)
- 1 — Clear this assistance data type

<time> (Time reference)
- 0 — Ignore (Do not clear the time reference)
- 1 — Clear the time reference

<iono> (Ionosphere assistance data)
- 0 — Ignore (Do not clear the ionosphere assistance data)
- 1 — Clear this assistance data type

Table 7-2: GNSS command details (Continued)

Command	
!GPSCOLDSTART	**Clear all GNSS assistance data**
Description	

Clear GNSS assistance details from the modem and put the modem into a coldstart state. Data cleared includes Ephemeris, Previous Position, Ionosphere, almanac data, and GPS time. This forces a cold start for GPS acquisition the next time a session starts.

The command is only available when there is no active GPS session—the GPS receiver is off and no position fix is being calculated.

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: Yes

Reset required to apply changes: No

Persistent across power cycles: Yes

Usage Notes:

- Before using this command, end all active GNSS sessions using AT!GPSEND=0,255

Usage:

- Execution: **AT!GPSCOLDSTART**
  Response: OK
  Purpose: Clear the modem's GPS details.

Parameters:

None

Table 7-2: GNSS command details (Continued)

Command	
!GPSEND	**End an active session**
Description	

End an active position fix session.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: No
Persistent across power cycles: No

Usage:

- Execution: **AT!GPSEND=<sessType>[, <sessionID>]**
  Response: `[ErrCode = <value> <CR>]`
  `OK`
  Purpose: End the current session and, if the command fails for any reason, return an error code (<value>).

Parameters:

<sessType> (Type of session to end)
- 0 — Position fix session

<sessionID> (ID of the session to end)
- 0–254 — Reserved
- 255 — End all sessions

<value> (Error code returned when command fails for any reason)
- See Table 7-3 on page 154 for a list of possible error codes.
- N/A — Not available

Table 7-2: GNSS command details (Continued)

Command	
!GPSFIX	**Initiate GPS position fix**

Description

Initiate a GPS position fix.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: No
Persistent across power cycles: No

Usage:

- Execution: **AT!GPSFIX=<fixType>, <maxTime>, <maxDist>**
  Response:
  ```
  Fix initiated <CR>
  OK
  ```
  or
  ```
  ERROR CODE = <value> <CR>
  OK
  ```
  Purpose: Initiate a time-limited position fix with a specified accuracy.
- Query List: **AT!GPSFIX=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<fixType> (Type of fix to establish)
- 1 — Standalone
- 2 — MS-based only
- 3 — MS-assisted only

<maxTime> (Maximum time to wait for a position fix, in seconds)
- Valid range: 1–255

<maxDist> (Requested accuracy of fix, in meters)
- Entered in decimal format
- Valid range:
  - 0–4294967279
  - 4294967280 — No preference

<value> (Error code returned when command fails for any reason)
- See Table 7-3 on page 154 for a list of possible error codes.
- N/A — Not available

Example(s):

- Request a standalone position fix to 10 meters accuracy. The request will fail (timeout) if the modem cannot determine a position fix within 15 seconds.
  ```
  AT!GPSFIX=1,15,10
  Fix initiated <CR>
  OK
  ```

Related commands:

- !GPSSTATUS on page 146 — Use this command while the tracking session is in progress.
- !GPSLOC on page 135 — Use this command after the session completes to obtain the result.

Table 7-2: GNSS command details (Continued)

Command	
!GPSLBSAPN	**Set GPS LBS APNs**
Description	

Set the GPS Location Based Service (LBS) APNs to be used for various RATs (Radio Access Technologies).

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution (Add):
  AT!GPSLBSAPN=<operation>,<ratmask>,<IPtype>,<APN>
  Execution (Delete one):
  AT!GPSLBSAPN=<operation>,<ratmask>
  Execution (Delete all):
  AT!GPSLBSAPN=<operation>
  Response: `OK`
  or
  `ERROR`
  Purpose: Set the APN to be used for the specified <ratmask>, or delete the APN for a single <ratmask> or all RATs.
- Query: **AT!GPSLBSAPN?**
  Response:
  ```
  <ratmask>, <IPType>, <APN> <CR>
  <ratmask>, <IPType>, <APN> <CR>
  ... <CR>
  OK
  ```
  or
  `OK` ← *if no ID has been set*
  Purpose: Display the APNs currently assigned for each RAT.
- Query List: **AT!GPSLBSAPN=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<operation> (Add or delete APNs)

- 1 — Add an APN for a specific <ratmask> and <IPtype>.
  Note — All parameters are required.
- 2 — Delete the APN for a specific <ratmask>
  Note — Only <ratmask> is required.
- 3 — Delete all APNs
  Note — No other parameters are required.

Note: To change an APN that has been set for a RAT, you must first delete the current APN, then add the new APN.

<ratmask> (Radio access technology)

- Valid values (values shown are in hexadecimal format):
  - 10 — LTE / NR

(Continued on next page)

Table 7-2: GNSS command details (Continued)

!GPSLBSAPN (continued)	**Set GPS LBS APNs (continued)**
<IPtype> (Internet Protocol version) • Character string, entered with quotation marks • Valid values: ▪ "IPV4" ▪ "IPV6" ▪ "IPV4V6" <APN> (Access Point Name) • Character string, entered with quotation marks • Examples: "mycompany.mnc987.mcc123.gprs", "ourinternet"	

Table 7-2: GNSS command details (Continued)

Command	
!GPSLOC	**Return last known location of the modem**

Description

Return the details obtained during the most recent position location session, if available.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query: **AT!GPSLOC?**

  Response:
  ```
  Unknown <CR>                ← No information is available
  OK
  ```
  or
  ```
  Not Available  <CR>         ← No information is available
  OK
  ```
  or
  ```
  Lat: <latitude> <CR>
  Lon: <longitude> <CR>
  Time: <time> <CR>
  LocUncAngle: <luAngle> LocUncA: <luA> LocUncP: <luP> HEPE: <hepe> <CR>
  <fixType> <CR>
  Altitude: <altitude> LocUncVe: <luV> <CR>
  heading: <heading> VelHoriz: <vH> VelVert: <vV> <CR>
  OK      ← Altitude and heading only appear if data was collected as part of the most recent fix.
  ```

  Purpose: Return last position location details.

Parameters:

<latitude> (Latitude at last position fix)
- Example: "49 Deg 10 Min 21.49 Sec N (0x008BDE6C)"

<longitude> (Longitude at last position fix)
- Example: "123 Deg 4 Min 14.76 Sec W (0xFEA1EE9A)"

<time> (Time at which last position fix was taken)
- Example: "2009 01 30 4 20:27:18 (GPS)"

<luAngle> (Location uncertainty angle of returned position)
- Example: "11.2 deg"

<luA> (Standard deviation of axis along <luAngle>)
- Example: "6.0 m"

<luP> (Standard deviation of axis perpendicular to <luAngle>)
- Example: "6.0 m"

<hepe> (Horizontal Estimated Positional Error)
- Example: "8.485 m"

<fixType> (2D or 3D fix)
- Example: "2D Fix" or "3D Fix"

(Continued on next page)

Table 7-2: GNSS command details (Continued)

!GPSLOC (continued)	**Return last known location of the modem (continued)**
<altitude> (Altitude in meters at which last position fix was taken) • Only present if <fixType> is 3D • Example: "-1 m" <luV> (Vertical uncertainty in meters) • Only present if <fixType> is 3D • Example: "3.0 m" <heading> (Direction of MS) • Example: "0.0 deg" <vH> (Horizontal velocity) • Example: "0.0 m/s" <vV> (Vertical velocity) • Example: "0.0 m/s"	

Table 7-2: GNSS command details (Continued)

Command	
!GPSLOCREPORT	**Get/set GPS location report timer**
Description	

Use this command to set the GPS location report timer during an active tracking session.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_01.01.12.00 (Release 0.4)
Password required: No
Reset required to apply changes: No
Persistent across power cycles: No

Usage:

- Execution: **AT!GPSLOCREPORT=<timer>**
  Response: `OK`
  Purpose: Set the GPS location report timer value.
- Query: **AT!GPSLOCREPORT?**
  Response: `!GPSLOCREPORT: <timer> <CR>`
  `OK`
  Purpose: Get the current GPS location report timer value.
- Query List: **AT!GPSLOCREPORT=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<timer> (GPS location report timer value, in seconds)

- Integer (uint16)
- Valid range: 0–65535

Table 7-2: GNSS command details (Continued)

Command	
!GPSMOMETHOD	**Set / report GPS MO method**
Description	

Set or report the GPS MO method as CP (control plane) or UP (user protocol).

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35x_##.##.##.## (Release #.#)
Password required: No
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Execution: **AT!GPSMOMETHOD=<MO_method>**
  Response: `OK`
  or
  `ERROR`
  Purpose: Indicate the MO method to use.
- Query: **AT!GPSMOMETHOD?**
  Response: `GPS MO method = <MO_method> <CR>`
  `OK`
  Purpose: Return the current MO method setting.

Parameters:

<MO_method> (MO method)

- 0 — CP (Control Plane)
- 1 — UP (User Plane)

Table 7-2: GNSS command details (Continued)

Command	
!GPSMTLRSETTINGS	**Configure response behavior to network-initiated GPS notifications**
Description	

Configure the module's response behavior to network-initiated GPS notifications.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35x_##.##.##.## (Release #.#)
Password required: Yes
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Execution: **AT!GPSMTLRSETTINGS=<Notification Response>**
  Response: `OK`
  Purpose: Configure the module's response behavior.
- Query: **AT!GPSMTLRSETTINGS?**
  Response: `Notification Response Setting: <Notification Response> <CR>`
  `OK`
  Purpose: Display the currently configured response behavior.
- Query List: **AT!GPSMTLRSETTINGS=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<response> (Response behavior)

- 0 — Default setting specified by network
- 1 — Accept all
- 2 — Reject all
- 3 — Verify all

Table 7-2: GNSS command details (Continued)

Command	
!GPSNIQOSTIME	**Configure GPS Quality of Service timeout**
Description	

Configure the Quality of Service (QOS) timeout for network-initialized fixes.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35x_##.##.##.## (Release #.#)
Password required: Yes
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Execution: **AT!GPSNIQOSTIME=<val>**
  Response: `OK`
  Purpose: Set the GPS QOS timeout (in seconds) for network-initialized fixes.
- Query: **AT!GPSNIQOSTIME?**
  Response:
  ```
  QoS time: <val> <CR>
  OK
  ```
  Purpose: Display the current QOS timeout value.

Parameters:

<val> (QOS timeout, in seconds)

- Format: uint32
- Valid range: 0–4294967295

Table 7-2: GNSS command details (Continued)

Command	
!GPSPORTID	**Set / report port ID to use over TCP/IP**

Description

Set or report the port ID of the SUPL server to use when using TCP/IP as the transport mechanism for SUPL. The command can also be used when the FQDN is auto-generated from the IMSI.

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35x_##.##.##.## (Release #.#)

Password required: Yes

Reset required to apply changes: No

Persistent across power cycles: Yes

Usage:

- Execution: **AT!GPSPORTID=<portid>**
  Response: `OK`
  Purpose: Queue the request to set the port ID.
- Query: **AT!GPSPORTID?**
  Response: `<portid> <CR>`
  `OK`
  Purpose: Return the port ID that is currently being used.

Parameters:

<portid> (Port ID to use over TCP/IP)

- Valid range: 0–65535

Related commands:

- !GPSSUPLURL — Set / return the SUPL server URL used for TCP/IP.

Table 7-2: GNSS command details (Continued)

Command	
!GPSPOSMODE	**Set / report GPS Position Modes Support**

Description

Set or report supported GPS positioning modes.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Execution: **AT!GPSPOSMODE=<mask>**
  Response: OK
  Purpose: Set the supported GPS positioning modes.
- Query: **AT!GPSPOSMODE?**
  Response: MASK: <mask> <CR>
  OK
  Purpose: Display the supported GPS positioning modes.
- Query List: **AT!GPSPOSMODE=?**
  Purpose: Display the execution command format and parameter values

Parameters:

<mask> (GPS positioning modes bitmask)

- Bitmask entered in hex format (leading '0x' is not required)
  Example: AT!GPSPOSMODE=1f
- Each bit enables a supported positioning mode:
  - Bit 0 — Standalone
  - Bit 1 — UP MS-based
  - Bit 2 — UP MS-assisted
  - Bit 3 — Reserved
  - Bit 4 — Reserved
  - Bit 5 — Reserved
  - Bit 6 — Reserved
  - Bit 7 — Reserved
  - Bit 8 — UP MS-based (4G)
  - Bit 9 — UP MS-assisted (4G)
  - Bit 10 — CP MS-based (4G)
  - Bit 11 — CP MS-assisted (4G)
  - Bits 12–15 — Reserved
  - Bit 16 — Enabling of autonomous fallback for SUPL-MSB
  - Bit 17 — Reserved
  - Bit 18 — Reserved
  - Bit 19 — Reserved
  - Bit 20 — Reserved
  - Bit 21 — A-GLONASS UP MS-based (4G)
  - Bit 22 — A-GLONASS UP MS-assisted (4G)
  - Bit 23 — A-GLONASS CP MS-based (4G)
  - Bit 24 — A-GLONASS CP MS-assisted (4G)

Table 7-2: GNSS command details (Continued)

Command	
!GPSSATINFO	**Request satellite information**

Description

Return the following information for satellites in view (including those used in the latest position fix): satellite vehicle number (SV), elevation (ELEV), azimuth (AZI), and signal to noise ratio (SNR).

The information returned is valid regardless of the current fix mode or whether the PDE or the modem performs the fix calculations.

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: No

Reset required to apply changes: n/a

Persistent across power cycles: n/a

Usage Notes:

- Systems (except QZSS) that have been disabled in !GNSSCONFIG are not tracked, so are not used for position fixes, and do not appear in the !GPSSATINFO query response.

  When QZSS is disabled, it is not used for positions fixes, but is tracked internally for cross-correlation with other enabled satellite systems. This causes QZSS to appear in the !GPSSATINFO query response, regardless of its !GNSSCONFIG setting.

Usage:

- Query: **AT!GPSSATINFO?**

  Response:

```
Satellites in view: <numSats>  (Timestamp of sat. info) <CR>
* SV: <SV 1> ELEV:<ELEV 1> AZI:<AZI 1> SNR:<SNR 1> <CR>
  SV: <SV 2> ELEV:<ELEV 2> AZI:<AZI 2> SNR:<SNR 2> <CR>
* SV: <SV 3> ELEV:<ELEV 3> AZI:<AZI 3> SNR:<SNR 3> <CR>
  SV: <SV 4> ELEV:<ELEV 4> AZI:<AZI 4> SNR:<SNR 4> <CR>
... <CR>
* SV: <SV n> ELEV:<ELEV n> AZI:<AZI n> SNR:<SNR n> <CR>
OK
```

  or

```
NO SAT INFO <CR>
OK
```

  Purpose: Return the number of satellites in view (including those used in the latest position fix) and details for each satellite (or return an error message).

  Note: An asterisk (*) at the beginning of a line indicates the satellite was used in the fix location calculation.

Parameters:

<numSats> (Number of satellites in view)

- Integer
- Valid values: ≥1

(Continued on next page)

Table 7-2: GNSS command details (Continued)

!GPSSATINFO (continued)	**Request satellite information (continued)**
<SV n> (Satellite vehicle number for the n^{th} satellite in the list) • Valid ranges: ▪ 1–32 (GPS) ▪ 65–96 (GLONASS) ▪ 193–197 (QZSS) ▪ 201–237 (BeiDou) ▪ 301–336 (Galileo) <ELEV n> (Satellite elevation relative to modem location, in degrees) • Valid range: 0–90 <AZI n> (Satellite azimuth relative to modem location, in degrees) • Valid range: 0–360 <SNR n> (Signal to noise ratio, in dB) • Valid range: 0–99	

Table 7-2: GNSS command details (Continued)

Command	
!GPSSENDNIRSP	**Accept / deny SUPL NI request**
Description	

Use this command to accept or deny a SUPL network-initiated (NI) request. (Note: This command applies to SUPL2.0 GCF.)

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35x_##.##.##.## (Release #.#)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage Notes:

- Before using this command, issue AT!GPSMTLRSETTINGS=0 and reboot the module for the change to take effect.

Usage:

- Execution: **AT!GPSSENDNIRESP=<Resp>**
  Response: OK
  Purpose: Configure the module to accept or deny SUPL NI requests.
- Query List: **AT!GPSSENDNIRESP=?**
  Purpose: Display valid parameter values

Parameters:

<Resp> (Action to take for a SUPL NI request)

- 0 — Accept the NI request
- 1 — Deny the NI request

Table 7-2: GNSS command details (Continued)

Command	
!GPSSTATUS	**Request current status of a position fix session**
Description	

Return the current status of a position fix session.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query: **AT!GPSSTATUS?**
  Response:
  ```
  Current time: <year> <month> <day> <day of week> <time of day> <CR><CR>
  <year> <month> <day> <day of week> <time of day> Last Fix Status =
  <status>[, FAILCODE = <failCode>] <CR>
  <year> <month> <day> <day of week> <time of day> Fix Session Status =
  <status>[, FAILCODE = <failCode>] <CR>
  [TTFF (sec) = <ttff> <CR>]   ← Appears if TTFF is available
  [No TTFF available <CR>]     ← Appears if TTFF is not available
  OK
  ```
  Purpose: Return timestamps and status of a position fix session.

Parameters:

<year>
- Example: "2007"

<month>
- 01–12 (Jan–Dec)

<day>
- 01–31

<day of week>
- 0–6 (0=Monday)

<time of day>
- 24-hour clock format
- Example: "13:25:48"

<status> (Session status)
- "NONE" — No session of this type has occurred since the modem powered up.
  - The timestamp is the current time.
- "ACTIVE" — A session of this type is currently active.
  - The timestamp is the time when the session entered this state.
- "SUCCESS" — The most recent session of this type succeeded.
  - The timestamp is the time when the previous session completed successfully.
- "FAIL" — The most recent session of this type failed.
  - The timestamp is the time when the previous session failed.
  - A <failCode> is displayed with the "FAIL" string. See Table 7-3 for a list of error codes.

(Continued on next page)

Table 7-2: GNSS command details (Continued)

!GPSSTATUS (continued)	**Request current status of a position fix session (continued)**

<failCode> (Error code displayed when <status> = "FAIL")

- See Table 7-3 on page 154 for a list of error codes.

<ttff> (Time To First Fix, in seconds)

- Format: uint32
- Minimum: 1
- The TTFF is calculated on the first fix after the modem powers up, or when !GPSCOLDSTART is called.

Example(s):

```
AT!GPSSTATUS?
Current time: 2007 01 06 6 00:25:00 <CR><CR>
2007 01 06 6 00:25:01 Last Fix Status = SUCCESS <CR>
2007 01 06 6 00:25:02 Fix Session Status = ACTIVE <CR>
TTFF (sec) = 6
```

Table 7-2: GNSS command details (Continued)

Command	
!GPSSUPLNITIMEOUT	**Set SUPL/UMTS_CP timeout**

Description

Use this command to set the timeout value for SUPL notification responses.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Execution: **AT!GPSSUPLNITIMEOUT=<timeout>**
  Response: `OK`
  Purpose: Set the SUPL response timeout value.
- Query: **AT!GPSSUPLNITIMEOUT?**
  Response: `Notification Response Setting: <timeout> <CR>`
  `OK`
  Purpose: Return the current SUPL response timeout setting.

Parameters:

<timeout> (SUPL notification response timeout, in ms)
- Valid range: 1–25000

Table 7-2: GNSS command details (Continued)

Command	
!GPSSUPLURL	**Set / report SUPL server URL**

Description

Set or return the URL of the SUPL server to be used when TCP/IP is used as the transport mechanism for location processing. Use !GPSPORTID to set the port ID.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.10.00 (Release 0.3)
Password required: Yes
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Execution: **AT!GPSSUPLURL="<suplURL>"**
  Response: `OK`
  or
  `ERROR`
  Purpose: Identify the SUPL server URL.
- Query: **AT!GPSSUPLURL?**
  Response: `<suplURL> <CR>`
  `OK`
  Purpose: Return the SUPL server's URL.
- Query List: **AT!GPSSUPLURL=?**
  Purpose: Display the execution command format.

Parameters:

<suplURL> (SUPL server URL)

- Must be a fully qualified domain name (FQDN) or address
- Examples: "supl.url.net", "123.123.123.123"
- The <suplURL> is not checked for correctness — if the string is invalid, the modem will not be able to perform MS-assisted GPS fixes.

Example(s):

- Set the SUPL server using a FQDN:
  AT!GPSSUPLURL="supl.url.net"
- Set the SUPL server using an IP address:
  AT!GPSSUPLURL="123.123.123.123"

Table 7-2: GNSS command details (Continued)

Command	
!GPSSUPLVER	**Set / report SUPL server version**

Description

Set or return the version of the SUPL server.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.10.00 (Release 0.3)
Password required: Yes
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Execution: **AT!GPSSUPLVER=<supl ver>**
  Response: `OK`
  or
  `ERROR`
  Purpose: Identify the SUPL server version.
- Query: **AT!GPSSUPLVER?**
  Response: `<supl ver> <CR>`
  `OK`
  Purpose: Return the SUPL server's version.
- Query List: **AT!GPSSUPLVER=?**
  Purpose: Display the execution command format.

Parameters:

<supl ver> (SUPL server version)

- 1 — SUPL version 1
- 2 — SUPL version 2

Table 7-2: GNSS command details (Continued)

Command	
!GPSTRACK	**Initiate local tracking (multiple fix) session**

Description

Initiate a local tracking session comprising a specific number of position fixes taken at regular time intervals.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: No
Persistent across power cycles: No

Usage:

- Execution: **AT!GPSTRACK = <fixType>, <maxTime>, <maxDist>, <fixCount>, <fixRate>**
  Response:
  ```
  Fix initiated <CR>
  OK
  ```
  or
  ```
  ERROR CODE = <value> <CR>
  OK
  ```
  Purpose: Initiate a series of time-limited position fixes.
  Failure conditions:
  - The request fails if the tracking session fails to initiate.
  - If the request fails, the message ERROR CODE = <value> is returned. See Table 7-3 on page 154 for a list of error codes.
  - **Note —** The 'time to first fix' may require more time than subsequent fixes, if almanac, ephemeris, or location data needs to be updated. (Almanac data is valid for 3–4 days, ephemeris for 30–120 minutes, and location data for 4 minutes). To avoid a timeout error (time spent > <maxtime>), your application could precede the **!GPSTRACK** call with a single position fix (!GPSFIX) with a greater <maxTime> value.
- Query List: **AT!GPSTRACK=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<fixType> (Type of fix to establish)
- 1 — Standalone (not supported by a mobile station)
- 2 — MS-based only
- 3 — MS-assisted only

<maxTime> (Maximum time to wait for satellite information, in seconds)
- Valid range: 1–255

<maxDist> (Requested accuracy of fix, in meters)
- Entered in decimal format
- Valid range:
  - 1–4294967279
  - 4294967280 — No preference

<fixCount> (Number of position fixes requested)
- Valid range: 1–1000 (1000 — Take a continuous series of position fixes)

<fixrate> (Amount of time to wait between fix attempts, in seconds)
- Valid range: 1–65535

(Continued on next page)

Table 7-2: GNSS command details (Continued)

!GPSTRACK (continued)	**Initiate local tracking (multiple fix) session (continued)**

Example(s):

- Request a series of 20 standalone position fixes to 10 meters accuracy—fixes are taken every 60 seconds.

```
AT!GPSTRACK=1, 15, 10, 20, 60
OK
```

Note: The example above was successful (indicated by "OK"). If the request had failed for any reason, the response would be "ERROR CODE = <value>". See Table 7-3 on page 154 for a list of error codes.

Related commands:

- !GPSSTATUS—Use this command while the tracking session is in progress.
- !GPSLOC—Use this command after the session completes to obtain the result.

Table 7-2: GNSS command details (Continued)

Command	
!GPSTRANSSEC	**Configure GPS transport security**
Description	

Set or return the version of the SUPL server.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.10.00 (Release 0.3)
Password required: Yes
Reset required to apply changes: Yes
Persistent across power cycles: Yes

Usage:

- Execution: **AT!GPSTRANSSEC=<val>**
  Response: `OK`
  Purpose: Configure GPS transport security — Disable, or enable using a supported security type.
- Query: **AT!GPSTRANSSEC?**
  Response: `Transport security: <val> <CR>`
  `OK`
  Purpose: Return the current GPS transport security settings.
- Query List: **AT!GPSTRANSSEC=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<val> (GPS transport security method(s))

- Bitmask entered in hex format (leading '0x' is not required)
  - Bit 0 — Disable / enable GPS transport security:
    - 0 — Disabled
    - 1 — Enabled
    - Note: Bits 1–2 are ignored if Bit 0 = 0.
  - Bit 1 — Security type (Note: Ignored if Bit 0=0)
    - 0 — SSL VER TLS 1.1
    - 1 — SSL VER TLS 1.0
  - Bit 2 — Hash (Note: Ignored if Bit 0=0)
    - 0 — SHA256
    - 1 — SHA1

Error codes

Table 7-3 describes error codes that can be returned by !GPSEND on page 131, page 146, and !GPSTRACK on page 151.

Table 7-4 on page 155 describes error codes that can be returned by !GPSFIX on page 132

Table 7-3: AT command error codes (!GPSEND, !GPSSTATUS, !GPSTRACK)

Error code	Description
0	Phone is offline
1	No service
2	No connection with PDE (Position Determining Entity)
3	No data available
4	Session Manager is busy
5	Reserved
6	Phone is GPS-locked
7	Connection failure with PDE
8	Session ended because of error condition
9	User ended the session
10	End key pressed from UI
11	Network session was ended
12	Timeout (for GPS search)
13	Conflicting request for session and level of privacy
14	Could not connect to the network
15	Error in fix
16	Reject from PDE
17	GPS is disabled
18	Ending session due to E911 call
19	Server error
20	Reserved
21	Reserved
22	Unknown system error
23	Unsupported service
24	Subscription violation
25	Desired fix method failed
26	Reserved

Table 7-3: AT command error codes (!GPSEND, !GPSSTATUS, !GPSTRACK) (Continued)

Error code	Description
27	No fix reported because no Tx confirmation was received
28	Network indicated normal end of session
29	No error specified by the network
30	No resources left on the network
31	Position server not available
32	Network reported an unsupported version of protocol

Table 7-4: AT command error codes (!GPSFIX)

Error code	Description
0	No error
1	Invalid client ID
2	Bad service parameter
3	Bad session type parameter
4	Incorrect privacy parameter
5	Incorrect download parameter
6	Incorrect network access parameter
7	Incorrect operation parameter
8	Incorrect number of fixes parameter
9	Incorrect server information parameter
10	Error in timeout parameter
11	Error in QOS accuracy threshold parameter
12	No active session to terminate
13	Session is active
14	Session is busy
15	Phone is offline
16	Phone is CDMA locked
17	GPS is locked
18	Command is invalid in current state
19	Connection failure with PDE
20	PDSM command buffer unavailable to queue command
21	Search communication problem

Table 7-4: AT command error codes (!GPSFIX) (Continued)

Error code	Description
22	Temporary problem reporting position determination results
23	Error mode not supported
24	Periodic NI in progress
25	Unknown error
26	Unknown error

8: SIM Commands

Introduction

This chapter describes commands used to communicate with an installed (U)SIM.

Command summary

Table 8-1 summarizes the commands that are described in detail in Table 8-2 on page 158.

Table 8-1: SIM command passwords

Command	Description	Page
+CCID	Read active SIM ID (ICCID or EID)	158
!ICCID	Read SIM ICCID	159
!IMSIM	Update AUTO-SIM matching list	160
!UIMS	Select active SIM interface	162

Command reference

Table 8-2: SIM command details

Command	
+CCID	**Read active SIM ID (ICCID or EID)**
Description	

Read the ICCID and/or EID from the active SIM or eSIM.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Execution: **AT+CCID**
  Response:
  ```
  +CCID: [<iccid>][,<eid>] <CR>
  OK
  ```
  Purpose: Display the ICCID and/or EID of the active SIM/eSIM.

Parameters:

<iccid> (Integrated Circuit Card ID (ICCID) of the active SIM):
- ASCII string (digits only, i.e. '0'–'9')
- Length: 20 digits

<eid> (Embedded Identity Document (EID) of the eSIM, if the eSIM is the active SIM):
- ASCII string (digits only, i.e. '0'–'9')
- Length: 32 digits

Example(s):

- Active SIM: Regular SIM (only <iccid> appears)
  ```
  AT+CCID
  +CCID: 89860000000000000001
  OK
  ```
- Active SIM: eSIM with no profile (only <eid> appears)
  ```
  AT+CCID
  +CCID: ,89033023426200000000024793236209
  OK
  ```
- Active SIM: eSIM with profile (<iccid> and <eid> both appear)
  ```
  AT+CCID
  +CCID: 89001010001234560637,89033023422140000000000247625523
  OK
  ```
- No SIM inserted (error appears)
  ```
  AT+CCID
  +CME ERROR: SIM failure
  ```

Table 8-2: SIM command details (Continued)

Command	
!ICCID	**Read SIM ICCID**
Description	

Read the ICCID (Integrated Circuit Card ID) from the active SIM.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Execution: **AT!ICCID**
  Response: `ICCID: <iccid> <CR>`
  `OK`
  Purpose: Display the ICCID of the active SIM/eSIM.

Parameters:

<iccid> (Integrated Circuit Card ID (ICCID) of the active SIM):

- ASCII string (digits only, i.e. '0'–'9')
- Length: 20 digits

Table 8-2: SIM command details (Continued)

Command	
!IMSIM	**Update AUTO-SIM matching list**

Description

Update the module's image switching AUTO-SIM matching list, which the module uses to select the correct carrier PRI and firmware to use with the detected SIM.

The module is pre-loaded with a SKU-specific matching list of carrier configurations.

This command can be used to:

- Add SIM entries for any of the carrier configurations in the pre-loaded matching list
- Reset carrier configurations (i.e., remove user-entered SIM entries) to their pre-loaded settings

---

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)

Password required: Yes (Execution)

Reset required to apply changes: n/a

Persistent across power cycles: Yes

Usage notes:

- Each pre-loaded carrier configuration includes one or more SIM entries. Users can add up to 25 additional SIM entries per carrier configuration.

Usage:

- Execution: **AT!IMSIM=<carrier_name>[,<type>,<key>,<rank>]**
  Response: `OK`
  Purpose: Either add a new SIM for the specified carrier (all parameters are required), or reset the specified carrier configuration to its pre-loaded version.
- Query: **AT!IMSIM?[<carrier_name>]**
  Response:
  ```
  !IMSIM: <CR>
  configuration: <configuration>, Firmware: <firmware>, count: <count> <CR>
  Type    Key   Rank   Source <CR>
  <type> <key> <rank> <source> <CR>
  ... <CR>
  OK
  ```
  Purpose: Display the SIM entries associated with each carrier configuration in the matching list (do not include <carrier_name>), or the entries for a single specified carrier (<carrier_name>).
- Query List: **AT!IMSIM=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<configuration> (Carrier PRI ID):

- ASCII string
- e.g., GENERIC_002.023_000

<Firmware> (Firmware version to use for the carrier's SIMs that are included in the carrier's configuration)

- e.g., 01.11.00.00

<carrier_name> (Carrier identifier):

- ASCII string
- e.g., ATT = AT&T, GENERIC = Generic, etc.
- The list of supported carriers is SKU-dependent.

(Continued on next page)

Table 8-2: SIM command details (Continued)

!IMSIM (continued)	Update AUTO-SIM matching list (continued)

<count> (Number of SIM entries in the carrier's configuration):

- 1–50 (See "Usage notes" above for details.)

<type> (Entry type):

- 1 — MCC/MNC (i.e., the SIM's PLMN)
- The numeric value is used in the Execution format, and the string equivalent is displayed by the Query format.

<key> (Entry value):

- Valid formats:
  - MCC/MNC value — The MCC and MNC must be separated by ':', the MCC must be 3 digits, and the MNC must be 2 or 3 digits. (e.g., 313:100, 432:65, etc.)

<rank> (Image switch ranking):

- Used to choose between applicable PRIs when switching images. e.g., if two PRIs are suitable, the PRI with the highest rank is used.
  - Valid values:
    - 0–127
    - 255 (-1) — Lowest rank (indicates the PRI should be used only if no better choice is available). Note — 255 is used in the Execution format and appears as -1 in the Query output format.

<Source> (Entry origin):

- Indicates the source of the SIM entry (i.e., how it was added to the list)
- Valid values:
  - PRI — Included in the pre-loaded list. The entry cannot be deleted.
  - CUST — Added by the customer using !IMSIM. The entry can be deleted.

Table 8-2: SIM command details (Continued)

Command	
!UIMS	**Select active SIM interface**

Description

On a module that supports multiple SIM interfaces (e.g., multiple external UIMs, eSIM), select the active SIM interface.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: No
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage Requirements:

- To enable/disable UIM2 slot support, use the !CUSTOM "UIM2ENABLE" customization on page 27.

Usage:

- Execution: **AT!UIMS=<uim>**
  Response: `OK`
  Purpose: Configure the module to use the selected SIM interface.
- Query: **AT!UIMS?**
  Response: `!UIMS: <uim> <CR>`
  `OK`
  Purpose: Display the currently selected SIM interface.
- Query List: **AT!UIMS=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<uim> (Selected SIM interface):

- 0 — UICC1 — External UIM interface #1
- 1 — UICC2 — External UIM interface #2

9: Smart Transmit Commands

Introduction

This chapter describes:

- Smart Transmit (ST)-related commands — ST commands are used to meet regulatory requirements for the OEM host device by managing the modem's output power. OEMs should carefully evaluate their use of these commands and their impact on device operation.
- For usage details, refer to *[5] EM8695 Smart Transmit (Doc# 2174399)*.

Note: Operators may require OEMs to disclose settings and theory of operation for applicable certifications.

Command summary

Table 9-1 summarizes the commands that are described in detail in Table 9-2 on page 164.

Table 9-1: Smart Transmit commands

Command	Description	Page
!SARINTGPIOMODE	Configure DPR (Dynamic Power Control) GPIO pull mode for Smart Transmit DSI selection	164
!SARSTATE	Set/report Smart Transmit Device State Index (DSI)	165
!SARSTATEDFLT	Set/report default Smart Transmit Device State Index (DSI)	166
!STEFS	Query Smart Transmit files	167
!STSTATUS	Display Smart Transmit status details	168

Command reference

Table 9-2: Smart Transmit command details

Command	
!SARINTGPIOMODE	**Configure DPR (Dynamic Power Control) GPIO pull mode for Smart Transmit DSI selection**

Description

Configure the internal DPR GPIO (pin 25) as a pull-up or pull-down.

When the !CUSTOM "GPIOSARENABLE" customization is set to '1', the DPR GPIO selects the Smart Transmit (ST) exposure scenario (i.e., the Device State Index (DSI)) as either DSI 0 or DSI 1:

!SARINTGPIOMODE value	DPR Internal Pull	DPR PinState
0 (default)	Pull-up (Active Low)	Low (Active) — Selects DSI 0
		High[a] — Selects DS1
1	Pull-down (Active High)	Low — Selects DSI 1
		High (Active) — Selects DSI 0

a. If a 1.8 V-compatible driver is not available, the host can implement an open collector drive for the DPR pin.

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.14.00 (Release 0.5)

Password required: No

Reset required to apply changes: Yes

Persistent across power cycles: Yes

Usage:

- Execution: **AT!SARINTGPIOMODE=<mode>**
  Response: `OK`
  Purpose: Set the pull mode for the DPR GPIO (pin 25).
- Query: **AT!SARINTGPIOMODE?**
  Response: `<mode> <CR>`
  `OK`
  Purpose: Indicate the current pull mode for DPR GPIO (pin 25).
- Query List: **AT!SARINTGPIOMODE=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<mode> (DPR GPIO pull mode)

- 0 — Pull-up (Default)
- 1 — Pull-down

Table 9-2: Smart Transmit command details (Continued)

Command	
!SARSTATE	**Set / report Smart Transmit Device State Index (DSI)**

Description

Set (or report) the current Device State Index (DSI), which indicates the desired Smart Transmit (ST) exposure scenario to use.

Note: This setting is not persistent. To change the default DSI (i.e., make it persistent), use !SARSTATEDFLT.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.14.00 (Release 0.5)
Password required: No
Reset required to apply changes: No
Persistent across power cycles: No

Usage:

- Execution: **AT!SARSTATE=<state>**
  Response: `OK`
  Purpose: Set the DSI.
- Query: **AT!SARSTATE?**
  Response: `!SARSTATE: <state> <CR>`
  `OK`
  Purpose: Indicate the current DSI.
- Query List: **AT!SARSTATE=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<state> (DSI)
- Valid range: 0–8

Table 9-2: Smart Transmit command details (Continued)

Command	
!SARSTATEDFLT	**Set / report default Smart Transmit Device State Index (DSI)**

Description

Set (or report) the default (persistent) Device State Index (DSI), which indicates the desired Smart Transmit (ST) exposure scenario to use.

Note: This setting is persistent. To temporarily change the DSI, use !SARSTATE.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.14.00 (Release 0.5)
Password required: No
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!SARSTATEDFLT=<state>**
  Response: `OK`
  Purpose: Set the default DSI.
- Query: **AT!SARSTATEDFLT?**
  Response: `!SARSTATEDFLT: <state> <CR>`
  `OK`
  Purpose: Indicate the default DSI.
- Query List: **AT!SARSTATEDFLT=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<state> (DSI)
- Valid range: 0–8

Table 9-2: Smart Transmit command details (Continued)

Command	
!STEFS	**Query Smart Transmit files**
Description	

Check if ST (Smart Transmit) files are present and print their SHA-256 hash values.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.14.00 (Release 0.5)
Password required: No
Reset required to apply changes: n/a
Persistent across power cycles: n/a

Usage:

- Query: **AT!STEFS?**
  Response: `rtsar_config <sha256_hash_ID> <CR>`
  `OK`
  or (if the file is missing)
  `File missing <CR>`
  `OK`
  Purpose: Show all the ST EFS file or indicate if the file is missing.

Parameters:

<sha256_hash_ID> (SHA 256 hash value of the ST EFS file)
- e.g., 4866a29a07884445652a203add3d76a67fede8c55590114344c1bcc136d85617

Example(s):

- File is present:

```
AT!STEFS?
rtsar_config     4866a29a07884445652a203add3d76a67fede8c55590114344c1bcc136d85617<CR>
OK
```

- File is missing:

```
AT!STEFS?
File missing<CR>
OK
```

Table 9-2: Smart Transmit command details (Continued)

Command	
!STSTATUS	**Display Smart Transmit status details**

Description

Check if Smart Transmit is enabled, and display ST details. Otherwise, display an appropriate error message and, depending on the error, display firmware ID details.

Important — The ST_MCC_Exposure_mode displayed in the response refers to the current MCC's preferred RF exposure mode as listed in the ST rtsar configuration template's "mcc" tab. It does *not* take into account whether the template's "tech_records" tab has an override. (The configuration template was used to prepare the OEM's ST package.)

Supporting EM8695 devices: All

Added F/W: EM8695: SWIX35C_00.01.14.00 (Release 0.5)

Password required: Yes

Reset required to apply changes: n/a

Persistent across power cycles: n/a

Usage:

- Query: **AT!STSTATUS?**

  Response (No errors):

```
ST_FW_version: <ST_Firmware_Version> <CR>
ST_Config_version: <ST_Configuration_Version> <CR>
ST_OEM_ID: <ST_OEM_ID> (<ST_OEM_ID_decimal) <CR>
ST_Current_MCC: <ST_Current_MCC> <CR>
ST_MCC_Exposure_mode: <ST_MCC_Exposure_Mode> <CR>
<CR>
OK
```

  Response (Error preventing ST from running):

```
<error message> <CR>
ST_FW_version: <ST_Firmware_Version> <CR>
ST_Config_version: <ST_Configuration_Version> <CR>
ST_OEM_ID: <ST_OEM_ID> (ST_OEM_ID_decimal) <CR>
<CR>
OK
```

  Response (Undefined ST status condition preventing ST from running):

```
<error message_invalid> <CR>
<CR>
OK
```

  Purpose: Show the current ST status and basic ST details.

Parameters:

<error message> (ST Error message indicating issue preventing ST from running)

- ASCII string
- Supported values:
  - "ST configuration not present"
  - "ST configuration version disabled"
  - "ST configuration version failsafe"
  - "ST invalid license"

(Continued on next page)

Table 9-2: Smart Transmit command details (Continued)

!STSTATUS (continued)	Display ST status details (continued)

<error message_invalid> (ST Error message indicating undefined issue with ST)
- ASCII string
- Value: "ST unknown status"

<ST_FW_version> (ST firmware version currently in use)
- Integer
- Minimum value: 1

<ST_Config_version> (ST configuration files version)
- Integer
- Minimum value: 0

<ST_OEM_ID> (ST OEM ID in hexadecimal format)
- OEM ID as specified in ST configuration files
- Hexadecimal (8-digits, leading '0x')
- e.g. 0x0000740a

<ST_OEM_ID_decimal> (ST OEM ID in decimal format)
- Decimal equivalent of <ST_OEM_ID>
- e.g. 29706

<ST_Current_MCC> (Current Mobile Country Code (MCC) used by the ST firmware)
- 3-digit code

<ST_MCC_Exposure_mode> (Preferred RF exposure mode of the current MCC, regardless of tech_records override)
- This is the preferred exposure mode that was specified for the MCC in the Smart Transmit configuration file's mcc_list.
  Note — If the current Device State Index (DSI) was configured (in the configuration file's tech_records) as:
  - force peak = 0 — The actual exposure mode is the same as <ST_MCC_Exposure_mode>.
  - force peak = 1 — The actual exposure mode is Force Peak, but <ST_MCC_Exposure_mode> still returns the preferred exposure mode (Time averaging or Force Peak) from the mcc_list.
- Valid values:
  - 0 — Time averaging
  - 1 — Force Peak

Example(s):

- ST running with no errors:

```
AT!STSTATUS?
ST_FW_version: 17 <CR>
ST_Config_version: 17 <CR>
ST_OEM_ID: 0xc0fff5 (12648437) <CR>
ST_Current_MCC: 1665 <CR>
ST_MCC_Exposure_mode: 1 <CR>
<CR>
OK
```

(Continued on next page)

Table 9-2: Smart Transmit command details (Continued)

!STSTATUS (continued)	Display ST status details (continued)
▪ ST not running — Missing ST configuration **AT!STSTATUS?** ST configuration not present <CR> ST_FW_version: 17 <CR> ST_Config_version: 0 <CR> ST_OEM_ID: 0x00000000 <CR> <CR> OK ▪ ST not running — Incompatible configuration file (rtsar_config) **AT!STSTATUS?** ST configuration version disabled <CR> <CR> OK	

10: DG Commands

Introduction

This chapter describes Dying Gasp (DG) related commands.

Command summary

Table 10-1 summarizes the commands that are described in detail in Table 10-2 on page 172.

Table 10-1: DG commands

Command	Description	Page
!DGSMSCONTENT	Set Dying Gasp SMS Message Content	172
!DGSMSDEST	Set Dying Gasp SMS Destination Phone Number	173
!DGSTATS	Set/Clear Dying Gasp SMS Timestamp	174

Command reference

Table 10-2: DG command details

Command	
!DGSMSCONTENT	**Set Dying Gasp SMS Message Content**
Description	

Use this command to display the Dying Gasp SMS message that will be sent when the host platform is about to lose power (if the Dying Gasp feature is enabled using the "DGENABLE" !CUSTOM customization).

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!DGSMSCONTENT="<sms_content>"**
  Response: `OK`
  Purpose: Set the Dying Gasp SMS message content.
- Query: **AT!DGSMSCONTENT?**
  Response:
  ```
  SMS Content: <sms_content> <CR>
  OK
  ```
  Purpose: Display the configured Dying Gasp SMS message content.
- Query List: **AT!DGSMSCONTENT=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<sms_content> (Dying Gasp message content)

- ASCII string, double-quotes required for the Execution format (e.g. "01.00.04.00_ATT")
- Valid characters: 0x20 to 0x7E (except 0x5C ('\')
- String length: 1–160 characters

Table 10-2: DG command details (Continued)

Command	
!DGSMSDEST	**Set Dying Gasp SMS Destination Phone Number**

Description

Use this command to set the destination phone number to use for a 'Dying Gasp' SMS message that will sent when the host platform is about to lose power.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!DGSMSDEST="<phone_num>"**
  Response: `OK`
  Purpose: Set the Dying Gasp SMS destination phone number.
- Query: **AT!DGSMSDEST?**
  Response:
  ```
  SMS Destination: <phone_num> <CR>
  OK
  ```
  Purpose: Display the configured Dying Gasp SMS destination phone number.
- Query List: **AT!DGSMSDEST=?**
  Response:
  ```
  !DGSMSDEST: <phone_num> <CR>
  OK
  ```
  Purpose: Display the execution command format and parameter values.

Parameters:

<phone_num> (SMS destination phone number)

- ASCII string, double-quotes required for the Execution format (e.g. "01.00.04.00_ATT")
- Valid dial characters:
  - '0'–'9', 'A'–'Z', 'a'–'z', ''#'
  - '+' (only as the first character)
- String length: 1–20 characters

Table 10-2: DG command details (Continued)

Command	
!DGSTATS	**Set / Clear Dying Gasp SMS Timestamp**

Description

Use this command to display Dying Gasp statistice including the timestamp of the last Dying Gasp trigger (i.e., the last time the host was losing power) and whether or not the module attempted to send the Dying Gasp SMS, or use the command to clear the Dying Gasp statistics.

Supporting EM8695 devices: All
Added F/W: EM8695: SWIX35C_00.01.04.00 (Release 0.2)
Password required: Yes
Reset required to apply changes: No
Persistent across power cycles: Yes

Usage:

- Execution: **AT!DGSTATS=<op>**
  Response: `OK`
  Purpose: Clear the Dying Gasp statistics.
- Query: **AT!DGSTATS?**
  Response:
  ```
  Timestamp: <timestamp> <CR>
  SMS Attempted: <attempted> <CR>
  OK
  ```
  Purpose: Display the Dying Gasp statistics.
- Query List: **AT!DGSTATS=?**
  Purpose: Display the execution command format and parameter values.

Parameters:

<timestamp> (Time stamp of the last Dying Gasp trigger, UTC time zone)
- ASCII string
- Format:
  - "%Y:%m:%d %H:%M:%S %Z" — Timestamp of the last Dying Gasp Trigger (UTC time zone)
  - "None" — No Dying Gasp has been triggered

<attempted> (Status of the Dying Gasp SMS attempt)
- Valid values:
  - 0 — SMS not attempted
  - 1 — SMS attempted

<op> (Requested execution operation)
- 0 — Clear Dying Gasp statistics

11: Standard AT Commands

This chapter identifies standard AT commands that are supported by most Semtech modules. These commands:

- Control serial communications over an asynchronous interface (*ITU-T Serial Asynchronous Dialling and Control (Recommendation V.250*), available on the International Telecommunication Union web site, www.itu.int).
  See Table 11-1 below.
- Control SMS functions for devices on GSM/WCDMA networks (*3GPP TS 27.005*, available on the 3GPP web site, www.3gpp.org)
  See Table 11-2 on page 177.
- Control devices operating on GSM/WCDMA networks (*3GPP TS 27.007,* available on the 3GPP web site, www.3gpp.org)
  See Table 11-3 on page 178.

The tables below identify whether each command is supported on the EM759X module. An "N/A" in the Supported column of the table indicates that the command is related to a feature (such as voice) that is not available on the modems.

Commands that are partially supported include descriptions identifying any limitations on command usage.

Table 11-1: Supported ITU-T Recommendation V.250 AT commands

Command	Description	Supported
&C	Set Data Carrier Detected (DCD; Received line signal detector) function mode	Y
&D	Set Data Terminal Ready function mode	Y
&F	Set parameters to manufacturer's defaults	Y
&S	Set DSR signal	Y
&T	Auto tests	N
&V	Return operating mode AT configuration parameters	Y
&W	Store current parameter to user-defined profile	N
+DR	V42bis data compression report	N
+DS	V42bis data compression	N
+GCAP	Request complete TA capabilities list **Usage:** ▪ AT+GCAP	Y
+GMI	Request manufacturer identification	Y
+GMM	Request TA model identification	Y
+GMR	Request TA revision identification	Y
+GOI	Request global object identification	N
+GSN	Request TA serial number identification	Y
+ICF	Set TE-TA control character framing	Y

Table 11-1: Supported ITU-T Recommendation V.250 AT commands (Continued)

Command	Description	Supported
+IFC	Set TE-TA local data flow control	Y
+ILRR	Set TE-TA local rate reporting mode	N
+IPR	Set fixed local rate	N
A	Answer incoming call	N
A/	Re-issues last AT command given	Y
D	Dial	N
D><MEM><N>	Originate call to phone number in memory <MEM>	N
D><N>	Originate call to phone number in current memory	N
D><STR>	Originate call to phone number in memory which corresponds to alphanumeric field <STR>	N
DL	Redial last telephone number used	N
E	Set command echo mode	Y
H	Disconnect existing connections	N
I	Display product identification information	Y
L	Set monitor speaker loudness	N
M	Set monitor speaker mode	N
O	Switch from command mode to data mode	Y
P	Select pulse dialing	N
Q	Set Result code presentation mode	Y
S0	Set number of rings before automatically answering the call	N
S10	Set disconnect delay after indicating the absence of data carrier	Y
S3	Set command line termination character	Y
S4	Set response formatting character	Y
S5	Set command line editing character	Y
S6	Set pause before blind dialing	Y
S7	Set number of seconds to wait for connection completion	Y
S8	Set number of seconds to wait when comma dial modifier used	Y
T	Select tone dialing	N
V	Set result code format mode	Y
X	Set connect result code format and call monitoring	Y
Z	Set all current parameters to user-defined profile	Y

Table 11-2: Supported 27.005 AT commands

Command	Description	Supported
+CBM	Cell broadcast message directly displayed	N
+CBMI	Cell broadcast message stored in memory at specified <index> location	N
+CDS	SMS status report after sending a SMS	N
+CDSI	Incoming SMS status report	N
+CMGC	Send command	Y
+CMGD	Delete message	Y
+CMGF	Message format	Y
+CMGL	List messages	Y
+CMGR	Read message	Y
+CMGS	Send message	Y
+CMGW	Write message to memory	Y
+CMMS	More messages to send	Y
+CMS ERROR: <err>	SMS error (mobile or network error)	Y
+CMSS	Send message from storage	Y
+CMT	Incoming message directly displayed	N
+CMTI	Incoming message stored in <mem> (“SM” - (U)SIM message storage) at location <index>	N
+CNMA	New message acknowledgement to mobile equipment	Y
+CNMI	New message indications to TE	Y
+CPMS	Preferred message storage	Y
+CRES	Restore settings	Y
+CSAS	Save settings	Y
+CSCA	Service center address	Y
+CSCB	Select cell broadcast message types	Y
+CSDH	Show text mode parameters	Y
+CSMP	Set text mode parameters	Y
+CSMS	Select message service	Y

Table 11-3: Supported 27.007 AT commands

Command	Description	Supported
C	ITU T V.24 circuit 109 carrier detect signal behavior command	N
+CACM	Accumulated call meter	N
+CACSP	Voice Group or Voice Broadcast Call State Attribute Presentation	N
+CAEMLPP	eMLPP Priority Registration and Interrogation	N
+CAHLD	Leave an ongoing Voice Group or Voice Broadcast Call	N
+CAJOIN	Accept an incoming Voice Group or Voice Broadcast Call	N
+CALA	Alarm	N
+CALCC	List current Voice Group and Voice Broadcast Calls	N
+CALD	Delete alarm	N
+CALM	Alert sound mode	N
+CAMM	Accumulated call meter maximum	N
+CANCHEV	NCH Support Indication	N
+CAOC	Advice of Charge	N
+CAPD	Postpone or dismiss an alarm	N
+CAPTT	Talker Access for Voice Group Call	N
+CAREJ	Reject an incoming Voice Group or Voice Broadcast Call	N
+CAULEV	Voice Group Call Uplink Status Presentation	N
+CBC	Battery charge	N
+CBST	Select bearer service type	N
+CCCM	Current call meter value	N
+CCFC	Call forwarding number and conditions	N
+CCHC	Close logical channel	Y
+CCHO	Open logical channel	Y
+CCLK	Clock	Y
+CCUG	Closed user group	Y
+CCWA	Call waiting	N
+CCWE	Call Meter maximum event	N
+CDIP	Called line identification presentation	N
+CDIS	Display control	N
+CEER	Extended error report	N

Table 11-3: Supported 27.007 AT commands (Continued)

Command	Description	Supported
+CFUN	Set phone functionality	Y
+CGACT	PDP context activate or deactivate	Y
+CGANS	Manual response to a network request for PDP context activation	N
+CGATT	PS attach or detach	Y
+CGAUTH	Define PDP context authentication parameters	Y
+CGAUTO	Automatic response to a network request for PDP context activation	N
+CGCLASS	GPRS mobile station class	N
+CGCLOSP	Configure local octet stream PAD parameters	N
+CGCMOD	PDP Context Modify	N
+CGCONTRDP	PDP Context Read Dynamic Parameters	Y
+CGDATA	Enter data state	N
+CGDCONT	Define PDP Context	Y
+CGDSCONT	Define Secondary PDP Context	N
+CGEQMIN	3G Quality of Service Profile (Minimum acceptable)	N
+CGEQNEG	3G Quality of Service Profile (Negotiated)	N
+CGEQREQ	3G Quality of Service Profile (Requested)	N
+CGEREP	Packet Domain event reporting	Y
+CGEV	GPRS network event indication	N
+CGLA	Generic UICC logical channel access	Y
+CGMI	Request manufacturer identification	Y
+CGMM	Request model identification	Y
+CGMR	Request revision identification	Y
+CGPADDR	Show PDP address	Y
+CGQMIN	Quality of Service Profile (Minimum acceptable)	N
+CGQREQ	Quality of Service Profile (Requested)	N
+CGREG	GPRS network registration status	N
+CGSMS	Select service for MO SMS messages	N
+CGSN	Request product serial number identification	Y
+CGTFT	Traffic Flow Template	N
+CHLD	Call related supplementary services	N

Table 11-3: Supported 27.007 AT commands (Continued)

Command	Description	Supported
+CHSA	HSCSD non-transparent asymmetry configuration	N
+CHSC	HSCSD current call parameters	N
+CHSD	HSCSD device parameters	N
+CHSR	HSCSD parameters report	N
+CHST	HSCSD transparent call configuration	N
+CHSU	HSCSD automatic user initiated upgrading	N
+CHUP	Hangup call	N
+CIEV	Indicator event	N
+CIMI	Request international mobile subscriber identity	Y
+CIND	Indicator control	N
+CKEV	Key press or release event	N
+CKPD	Keypad control	N
+CLAC	List all available AT commands	Y
+CLAE	Language Event	N
+CLAN	Set Language	N
+CLCC	List current calls	N
+CLCK	Facility lock	Y
+CLIP	Calling line identification presentation	N
+CLIR	Calling line identification restriction	N
+CLVL	Set/return internal loudspeaker volume	N
+CMAR	Master Reset	N
+CME ERROR: <err>	Mobile Termination error result code	Y
+CMEC	Mobile Termination control mode	N
+CMEE	Report Mobile Termination error **Usage:** ▪ AT+CMEE= <n>	Y
+CMER	Mobile Termination event reporting	N
+CMOD	Call mode	N
+CMUT	Enable/disable uplink voice muting	N
+CMUX	Multiplexing mode	N
+CNUM	Subscriber number	Y

Table 11-3: Supported 27.007 AT commands (Continued)

Command	Description	Supported
+COLP	Connected line identification presentation	N
+COPN	Read operator names	Y
+COPS	Operator selection	Y
+CPAS	Phone activity status	N
+CPBF	Find phonebook entries	N
+CPBR	Read phonebook entries	N
+CPBS	Select phonebook memory storage	N
+CPBW	Write phonebook entry	N
+CPIN	Enter PIN	Y
+CPINR	Remaining PIN retries	N
+CPLS	Preferred PLMN list selection	Y
+CPOL	Preferred operator list	Y
+CPROT	Enter protocol mode	N
+CPUC	Price per unit and currency table	N
+CPWC	Power class	N
+CPWD	Change password	Y
+CR	Service reporting control	N
+CRC	Cellular result codes	Y
+CREG	Network registration	N
+CRING	Incoming call type	N
+CRLP	Radio link protocol	N
+CRMP	Ring Melody Playback	N
+CRSL	Ringer sound level	N
+CRSM	Restricted SIM access	Y
+CSCC	Secure control command	N
+CSCS	Select TE character set	Y
+CSDF	Settings date format	Y
+CSGT	Set Greeting Text	N
+CSIL	Silence Command	N
+CSIM	Generic SIM access	Y

Table 11-3: Supported 27.007 AT commands (Continued)

Command	Description	Supported
+CSNS	Single numbering scheme	N
+CSQ	Signal quality	Y
+CSSN	Supplementary service notifications	N
+CSTA	Select type of address	N
+CSTF	Settings time format	Y
+CSUPI	Request 5G subscription permanent identifier	Y
+CSVM	Set Voice Mail Number	N
+CTFR	Call deflection	N
+CTZR	Time Zone Reporting	Y
+CTZU	Automatic Time Zone Update	Y
+CUSD	Unstructured supplementary service data	N
+CV120	V.120 rate adaptation protocol	N
+CVHU	Voice Hangup Control	N
+CVIB	Vibrator mode	N
+C5GNSSAI	5GS NSSAI Setting	Y
+C5GNSSAIRDP	5GS NSSAI read dynamic parameters	Y
+C5GREG	5GS Network Registration Status	Y
+C5GSMS	5GS access selection preference for MO SMS	Y
+C5GUSMS	5GS use of SMS over NAS	Y
D	ITU T V.25ter dial command	Y
D*99#	Sets up a packet data call (PDP context) based on profile ID #1	N
D*99*<n>#**	Sets up a packet data call (PDP context) based on profile ID #<n> (<n> is the <cid> in the +CGDCONT command)	N
+VTD	Tone duration	N
+VTS	DTMF and arbitrary tone generation	N
+WS46	PCCA STD 101 select wireless network	N

12: Band Definitions

Some commands described in this document include input and/or output 'band' parameters, which are defined in section "Supported Frequencies" of *[1] EM8695 Product Technical Specification (Doc# 41114813)*.

Table 12-1: 3GPP bands

Band	Type	Frequency bands (MHz) Rx	Tx
1	Mid	1920–1980	2110–2170
2	Mid	1850–1910	1930–1990
3	Mid	1710–1785	1805–1880
4	Mid	1710–1755	2110–2155
5	Low	824–849	869–894
6	Low	830–840	875–885
7	High	2500–2570	2620–2690
8	Low	880–915	925–960
9	Mid	1749.9–1784.9	1844.9–1879.9
10	Mid	1710–1770	2110–2170
11	Mid	1427.9–1447.9	1475.9–1495.9
12	Low	699–716	729–746
13	Low	777–787	746–756
14	Low	788–798	758–768
15	-	Reserved	Reserved
16	-	Reserved	Reserved
17	Low	704–716	734–746
18	Low	815–830	860–875
19	Low	830–845	875–890
20	Low	832–862	791–821
21	Mid	1447.9–1462.9	1495.9–1510.9
22	-	Reserved	Reserved
23	Mid	2000–2020	2180–2200
24	Mid	1626.5–1660.5	1525–1559
25	Mid	1850–1915	1930–1995
26	Low	814–849	859–894
27	-	Reserved	Reserved
28	Low	703–748	758–803
29	Low	N/A	717–728
30	High	2305–2315	2350–2360
31	Low	452.5–457.5	462.5–467.5
32	Mid	N/A	1452–1496
33	-	Reserved	Reserved
34	Mid	2010–2025	
35	-	Reserved	Reserved
36	-	Reserved	Reserved
37	Mid	1910–1930	
38	High	2570–2620	
39	Mid	1880–1920	
40	High	2300–2400	
41	High	2496–2690	
42	High	3400–3600	
43	High	3600–3800	
44	Low	703–803	
45	-	Reserved	Reserved
46	High	5150–5925	
47	High	5855–5925	
48	High	3550–3700	
49	High	3550–3700	
50	Mid	1432–1517	
51	Mid	1427–1432	
52	High	3300–3400	
53	High	2483.5–2495	
54–64	-	Reserved	Reserved
65	Mid	1920–2010	2110–2200
66	Mid	1710–1780	2110–2200
67	Low	N/A	738–758
68	Low	698–728	753–783
69	High	N/A	2570–2620
70	Mid	1695–1710	1995–2020
71	Low	663–698	617–652
72	Low	451–456	461–466
73	Low	450–455	460–465
74	Mid	1427–1470	1475–1518
75	Mid	N/A	1432–1517
76	Mid	N/A	1427–1432
77–84	-	Reserved	Reserved
85	Low	698–716	728–746
86	-	Reserved	Reserved
87	Low	410–415	420–425
88	Low	412–417	422–427
89–93	-	Reserved	Reserved

13: ASCII Table

Table 13-1: ASCII values

Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex
NUL	0	00	SP	32	20	@	64	40	‘	96	60
SOH	1	01	!	33	21	A	65	41	a	97	61
STX	2	02	“	34	22	B	66	42	b	98	62
ETX	3	03	#	35	23	C	67	43	c	99	63
EOT	4	04	$	36	24	D	68	44	d	100	94
ENQ	5	05	%	37	25	E	69	45	e	101	95
ACK	6	06	&	38	26	F	70	46	f	102	96
BEL	7	07	’	39	27	G	71	47	g	103	97
BS	8	08	(	40	28	H	72	48	h	104	98
HT	9	09	)	41	29	I	73	49	i	105	99
LF	10	0A	*	42	2A	J	74	4A	j	106	6A
VT	11	0B	+	43	2B	K	75	4B	k	107	6B
FF	12	0C	,	44	2C	L	76	4C	l	108	6C
CR	13	0D	-	45	2D	M	77	4D	m	109	6D
SO	14	0E	.	46	2E	N	78	4E	n	110	6E
SI	15	0F	/	47	2F	O	79	4F	o	111	6F
DLE	16	10	0	48	30	P	80	50	p	112	70
XON	17	11	1	49	31	Q	81	51	q	113	71
DC2	18	12	2	50	32	R	82	52	r	114	72
XOFF	19	13	3	51	33	S	83	53	s	115	73
DC4	20	14	4	52	34	T	84	54	t	116	74
NAK	21	15	5	53	35	U	85	55	u	117	75
SYN	22	16	6	54	36	V	86	56	v	118	76
ETB	23	17	7	55	37	W	87	57	w	119	77
CAN	24	18	8	56	38	X	88	58	x	120	78
EM	25	19	9	57	39	Y	89	59	y	121	79
SUB	26	1A	:	58	3A	Z	90	5A	z	122	7A
ESC	27	1B	;	59	3B	[	91	5B	{	123	7B
FS	28	1C	<	60	3C	\	92	5C	|	124	7C
GS	29	1D	=	61	3D	]	93	5D	}	125	7D
RS	30	1E	>	62	3E	^	94	5E	~	126	7E
US	31	1F	?	63	3F	_	95	5F	DEL	127	7F

14: References

Semtech Documents

Semtech documents are available from source.sierrawireless.com.

Semtech Documents on the Source

[1] EM8695 Product Technical Specification (Doc# 41114813)

[2] EM8695 Production Test Guide (Doc# Forthcoming)

[3] EM8695 Customer Production Test Guide (Doc# 41114820)

[4] EM8695 Customer Release Notes (Doc# Forthcoming)

[5] EM8695 Smart Transmit (Doc# 2174399)

15: Glossary

Table 15-1: Terms and Definitions

Term	Definition
BeiDou	BeiDou Navigation Satellite System A Chinese system that uses a series of satellites in geostationary and middle earth orbits to provide navigational data.
CGPS	Converged Global Positioning System
CMW	Centimeter Wave
CtoN	Carrier-to-Noise density ratio (a.k.a., C/N_0)
DM	Data Management
ENDC	E-UTRAN New Radio – Dual Connectivity
HDET	High voltage power detector
HLOS	High Level Operating System
MMW	Millimeter Wave
PCC	Primary Component Carrier
QZSS	Quasi-Zenith Satellite System — Japanese system for satellite-based augmentation of GPS.
RFC	Radio Frequency Card An RF hardware configuration file stored on the module, which includes antenna path information, supported band combinations, etc.
SCC	Secondary Component Carrier
SUPL	Secure User Plane Location
TTFF	Time To First Fix

Index (AT commands)

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