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Modules

RC71xx

Migration Guide

June 2024

41114702 Rev. 3

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Contact Information

Sales information and technical support, including warranty and returns	Web: sierrawireless.com/company/contact-us/ Global toll-free number: 1-877-687-7795 6:00 am to 5:00 pm PST
Corporate and product information	Web: sierrawireless.com

Revision History

Revision number	Release date	Changes
1	May 2023	Creation
2	July 2023	Changed headers to reflect Migration Guide and removed Patents section
3	June 2024	Added HL78xx

Contents

1: Introduction

This document provides information for developers planning to migrate from Semtech RC76xx and HL78xx modules to RC71xx modules.

- RC71xx modules are drop-in compatible with RC76xx modules, sharing common characteristics (e.g., nominal dimensions, power supply, environmental specifications, etc.).
- RC71xx modules are CF3 (SMTC Common Form Factor 3) compatible with HL78xx modules, sharing core characteristics (e.g., core functions in hardware interfaces and AT commands, environmental specifications, etc.)

Included in this document are summaries of specific RF, hardware, interface and regulatory differences between these module series.

Module variants covered in this migration guide include:

- HL78xx — HL7800, HL7802, HL7810, HL7812
- RC71xx — RC7110, RC7120
- RC76xx — RC7611, RC7611-1, RC7620, RC7620-1, RC7630, RC7630-1

Note: This document summarizes key differences between modules. For detailed module specifications, including module-specific current consumption and RF sensitivity measurements, refer to [1] RC71xx Product Technical Specification (Doc# 41114670), [4] RC76xx Product Technical Specification (Doc# 41113440), [8] HL780x Product Technical Specification (Doc# 41113770), and [9] HL781x Product Technical Specification (Doc# 41114133).

Table 1-1 lists RC76 series modules and the recommended band/region-compatible RC71xx modules for migration.

Table 1-1: RC76xx to RC71xx Series Compatibility

RC76xx Modules	Compatible RC71xx Modules
RC7611 RC7611-1	RC7110
RC7620 RC7620-1	RC7120
RC7630 RC7630-1	RC7120

2: Features

Table 2-1 summarizes key features available in RC71xx, RC76xx and HL78xx modules.

Table 2-1: Features Comparison

Feature		RC7110 RC7120	RC7611	RC7611-1	RC7620	RC7620-1	RC7630	RC7630-1	HL7800	HL7802	HL7810	HL7812
SIM/USIM												
SIM/USIM Support		Y	Y						Y (1.8V only)			
Dual SIM Single Standby		Y	Y						N			
Protocol Stack (LTE)												
LTE Category		Cat-1bis	Cat-4	Cat-1	Cat-4	Cat-1	Cat-4	Cat-1	Cat-M1 Cat-NB1		Cat-M1 Cat-NB1 Cat-NB2	
Single-mode LTE		Y	Y	Y	N	N	Y	Y	Y	N	Y	N
UMTS		N	N		Y	Y	N		N			
GSM/GPRS/EDGE		N	N		Y	Y	N		N	Y	N	Y
VoLTE		N	Y						N			
Interfaces												
Radio	**Main Antenna**	Y	Y						Y			
	Antenna Control	ANT_CNTL[0:1]	ANT_CNTL[0:3]						N			
	Diversity Antenna	N	Y						N			
	GNSS Antenna	N	Y						Y			
	DR_SYNC	N	Y						N			
	EXT_GPS_LNA_EN	N	Y						N			

Table 2-1: Features Comparison (Continued)

Feature		RC7110 RC7120	RC7611	RC7611-1	RC7620	RC7620-1	RC7630	RC7630-1	HL7800	HL7802	HL7810	HL7812
Power	**VBATT**	5-wire [3.4–4.3V]	5-wire [3.4—4.3V]						3-wire [3.2–4.35V]			
	VGPIO	1.8V / 3.3V	1.8V						1.8V			
Control	**RESET_IN_N**	Y	Y						Y			
	POWER_ON_N	Y	Y						Y			
	TP1 (Boot Pin)	Y	Y						N			
	W_DISABLE_N	Y	Y						N			
Indication	**TX_ON**	N	Y						Y			
	WWAN_LED_N	Y (1.8V / 3.3V))	Y						N			
	WAKE_ON_WWAN	Y	Y						N			
	SAFE_PWR_REMOVE	Y	Y						N			
	Ring Indicator	Y	Y						Y			
	VBAT_PA_EN	N	N						Y			
Communication	**USB 2.0**	Y	Y						Y			
	UART1	8-wire	8-wire						Y			
	UART2	4-wire	4-wire						Y			
	I2C	N	Y						N			
	SPI	N	Y						N			
Debug	**JTAG**	N	9-wire						N			
	Debug	4-wire	N						N			

Table 2-1: Features Comparison (Continued)

Feature		RC7110 RC7120	RC7611	RC7611-1	RC7620	RC7620-1	RC7630	RC7630-1	HL7800	HL7802	HL7810	HL7812
UIM	**UIM1**	1.8V / 3V SIM	1.8V / 3V SIM						Y (1.8v only) Internal eSIM or External USIM			
	UIM2	Y (1.8V)	Y						N			
	eSIM	N	Y						Y (eSIM shares same path with UIM1)			
GPIO		13 x GPIOs (2 x multiplexed)	19 x GPIOs (6 x multiplexed)						12 x GPIOs (8 x multiplexed)			
ADC		2 x ADC [0–1.2V]	2 x ADC [0.1–1.17V]						2 x ADC [0–1.8V]			
Clock	**System Clock**	N	19.2 MHz						26 MHz			
	Sleep Clock	N	32.768 kHz						32.768 kHz			
Digital Audio		N	4-wire PCM / I2S						N			
Mechanical												
Small Form Factor		23mm x 22mm x 2.5mm (nominal)							18mm x 15mm x 2.4mm (nominal)			

3: Regulatory Compliance, Industry Certifications, Carrier Approvals

Table 3-1 lists the regional carrier approvals, regulatory compliance and industry certifications for RC71xx, RC76xx and HL78xx modules. For detailed information, refer to *[1] RC71xx Product Technical Specification (Doc# 41114670), [4] RC76xx Product Technical Specification (Doc# 41113440), [8] HL780x Product Technical Specification (Doc# 41113770) and [9] HL781x Product Technical Specification (Doc# 41114133).*

Table 3-1: Regulatory Compliance, Industry Certifications, Carrier Approvals

		Carrier Approvals[a] (Region-specific)										Regulatory Compliance								Industry Certifications	
Module	Region	ATT	DCM	KDDI	KT	LGU+	SKT	SPR	SWI	TMO	VZW	ANT[b]	FCC	IC	JRA/ JRF	KC	NCC	RCM	RED	GCF	PTCRB
RC7110	Americas	Y	–	–	–	–	–	–	–	–	Y	–	Y	Y	–	–	–	–	–	Y	Y
RC7120	EMEA APAC	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Y	–	Y	Y	–
RC7611 RC7611-1	Americas	Y	–	–	–	–	–	Y	Y	Y	Y	–	Y	Y	–	–	–	–	–	Y	Y
RC7620 RC7620-1	Australia EMEA Brazil	–	–	–	–	–	–	–	Y	–	–	Y	–	–	–	–	Y	Y	Y	Y	–
RC7630 RC7630-1	Korea Japan	–	Y	Y	Y	Y	Y	–	Y[c]	–	–	–	–	–	Y	Y	–	–	–	Y	–
HL7800	Global	Y	Y	Y	–	–	–	Y	Y	–	Y	–	Y	Y	Y	Y	–	Y	Y	Y	Y
HL7802	Global	Y	–	–	–	–	–	–	Y	–	Y	–	Y	Y	–	–	–	Y	Y	Y	Y
HL7810	Global	Y	–	–	–	–	–	–	–	–	Y	–	Y	Y	Y	Y	Y	–	Y	Y	Y
HL7812	Global	Y	–	–	–	–	–	–	–	–	Y	–	Y	Y	Y	–	–	–	Y	Y	Y

a. Carriers: ATT (AT&T); DCM (DOCOMO); KDDI; KT; LGU+; SKT (SK Telecom); SPR (Sprint); SWI (Sierra Wireless); TMO (T-Mobile); VZW (Verizon)
b. ANT (Anatel)
c. Planned carriers

4: Supported RF Bands

Table 4-1 indicates all supported bands for each module.

Table 4-1: Supported Bands

Module	LTE																						UMTS		GSM/GPRS/EDGE			
	B1	B2	B3	B4	B5	B7	B8	B12	B13	B14	B17	B18	B19	B20	B21	B25	B26	B27	B28	B66	B71	B85	B1	B8	GSM 850	E-GSM 900	DCS 1800	PCS 1900
RC7110		Y		Y			Y	Y	Y											Y								
RC7120	Y		Y			Y	Y							Y					Y									
RC7611 RC7611-1		Y		Y	Y			Y	Y	Y						Y	Y			Y	Y							
RC7620 RC7620-1	Y		Y			Y	Y							Y					Y				Y	Y		Y	Y	
RC7630 RC7630-1	Y		Y		Y	Y	Y					Y	Y		Y													
HL7800	Y	Y	Y	Y	Y		Y	Y	Y		Y[a]	Y	Y	Y		Y	Y	Y[b]	Y	Y								
HL7802	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y[a]	Y	Y	Y		Y	Y	Y[b]	Y	Y					Y	Y	Y	Y
HL7810	Y	Y	Y	Y	Y		Y	Y	Y			Y	Y	Y		Y	Y		Y	Y		Y						
HL7812	Y		Y	Y	Y		Y	Y	Y			Y	Y	Y		Y	Y		Y	Y		Y			Y	Y	Y	Y

a. Supported only in Cat-NB1
b. Supported only in Cat-M1

5: Hardware Compatibility

Pinout

Table 5-1 indicates only pins that have naming differences, functional differences or module-specific limitations between RC71xx, RC76xx and HL78xx modules.

For complete pin details, refer to *[1] RC71xx Product Technical Specification (Doc# 41114670)*, *[4] RC76xx Product Technical Specification (Doc# 41113440)*, *[8] HL780x Product Technical Specification (Doc# 41113770)*, and *[9] HL781x Product Technical Specification (Doc# 41114133)*.

Table 5-1: Module Pinout Differences

RC7xxx	RC71xx	RC76xx	HL78xx	
Pin #	Signal Name	Signal Name	Signal Name	Pin #
1	Reserved	I2C1_CLK	GPIO1	C1
21	Reserved	Reserved	BAT_RTC	C21
22	Reserved	SYS_CLK	26M_CLKOUT	C22
23	Reserved	SLEEP_CLK	32K_CLKOUT	C23
24	ADC1 (0–1.2V)	ADC1 (0–1.7V)	ADC1 (0–1.8V)	C24
25	ADC0 (0–1.2V)	ADC0 (0–1.7V)	ADC0 (0–1.8V)	C25
26	UIM1_VCC (1.8V/3V)	UIM1_VCC (1.8V/2.85V)	UIM1_VCC (1.8V only)	C26
27	UIM1_CLK (1.8V/3V)	UIM1_CLK (1.8V/2.85V)	UIM1_CLK (1.8V only)	C27
28	UIM1_DATA (1.8V/3V)	UIM1_DATA (1.8V/2.85V)	UIM1_DATA (1.8V only)	C28
29	UIM1_RESET (1.8V/3V)	UIM1_RESET (1.8V/2.85V)	UIM1_RESET (1.8V only)	C29
30	Reserved	GND	GND	C30
31	Reserved	RF_DIV	NC	C31
32	Reserved	GND	GND	C32
33	Reserved	PCM_OUT/I2S_OUT	Reserved	C33
34	Reserved	PCM_IN/I2S_IN	Reserved	C34
35	Reserved	PCM_SYNC/I2S_WS	Reserved	C35
36	Reserved	PCM_CLK/I2S_CLK	Reserved	C36
37	Reserved	GND	GND	C37
38	Reserved	RF_GNSS	RF_GPS	C38
39	Reserved	GND	GND	C39
42	Reserved	DR_SYNC	NC	C42
43	Reserved	EXT_GPS_LNA_EN	Reserved	C43

Table 5-1: Module Pinout Differences (Continued)

RC7xxx	RC71xx	RC76xx	HL78xx	
Pin #	Signal Name	Signal Name	Signal Name	Pin #
44	Reserved	GPIO13	WAKE_UP	C44
45	VGPIO (1.8V/3.3V)	VGPIO (1.8V)	VGPIO (1.8V)	C45
47	TP1 (Boot pin)	TP1 (Boot pin)	NC	C47
51	Reserved	SPI1_MRDY	GPIO14	C51
52	Reserved	SPI1_MISO	GPIO10	C52
53	Reserved	SPI1_CLK	GPIO11	C53
54	Reserved	SPI1_MOSI	GPIO15	C54
55	Reserved/UIM2_VCC (1.8V only)	Reserved/UIM2_VCC (1.8V/2.85V)	UART0_RX	C55
56	Reserved/UIM2_DATA (1.8V only)	Reserved/UIM2_DAT (1.8V/2.85V)	UART0_TX	C56
57	Reserved/UIM2_RESET_N (1.8V only)	Reserved/UIM2_RESET_N (1.8V/2.85V)	UART0_CTS	C57
58	Reserved/UIM2_CLK (1.8V only)	Reserved/UIM2_CLK (1.8V/2.85V)	UART0_RTS	C58
60	Reserved	TX_ON	TX_ON	C60
64	UIM1_DET	UIM1_SIMA_DET	UIM1_DET/GPIO3	C64
65	GPIO4/UIM2_DET (Input only)	GPIO4/UIM1_SIMB_DET	GPIO4/FAST_SHUTDOWN	C65
66	Reserved	I2C1_Data	GPIO5	C66
67–70	GND	GND	GND	CG1–CG4
101	Reserved	GPIO35	*Note: HL78xx has 66 pins (C1–C66), 4 corner grounds (CG1–CG4), and 16 grounds (G1–G16) in the center that map to RC pins 219–234.*	
104	Reserved	GPIO32		
105	Reserved	GPIO33		
109	GPIO42 (Input only)	GPIO42		
111	Reserved	GND		
113	Reserved	GND		
125	Reserved	GND		
128	Reserved	GND		
145	IO_VOL_SEL	Reserved		
149	GPIO23/SWD0_group	GPIO23		
150	GPIO24/SWD0_group	GPIO24		

Table 5-1: Module Pinout Differences (Continued)

RC7xxx	RC71xx	RC76xx	HL78xx	
Pin #	Signal Name	Signal Name	Signal Name	Pin #
153	ANT_CNTL0 (Output only)	ANT_CNTL0/GPIO28		
154	ANT_CNTL1 (Output only)	ANT_CNTL1/GPIO29		
155	GPIO30	ANT_CNTL2/GPIO30		
156	GPIO31	ANT_CNTL3/GPIO31		
219–234	GND	GND	GND	G1–G16
236	Reserved	J1		
237	Reserved	J2		
238	Reserved	J3		
239	Reserved	J4		
240	Reserved	J5		
241	SWD1_group	J6		
242		J7		
243	Reserved	J8		
244	Reserved	J9		

Pin Functionality

Table 5-2 provides a detailed comparison of specific pin functionality between RC71xx, RC76xx and HL78xx modules.

Table 5-2: Pin Details

	RC71xx	RC76xx	HL78xx
Antenna Interfaces			
Primary Antenna	Yes; 4 x GND pins; W_DISABLE_N	Yes; 4 x GND pins; TX_ON (1.8V); W_DISABLE_N	Yes; 2 x GND pins; TX_ON (1.8V)
Antenna Control	ANT_CNTL[0:1]	ANT_CNTL[0:3]	No
Diversity Antenna	No	Yes; 4 x GND pins	No
GNSS Antenna	No	Yes; 4 x GND pins; DR_SYNC; EXT_GPS_LNA_EN	Yes; 2 x GND pins
Ground / NC / Reserved			
GND	76 x GND pins	84 x GND pins	26 x GND pins
NC	0 x NC pins	0 x NC pins	10 x NC pins
Reserved	106 x Reserved pins	73 x Reserved pins	5 x Reserved pins
Power Supply Interfaces			
Power	5 x Power pins — VBATT: 3.4–4.3V; Imax: 1 A	5 x Power pins — VBATT:3.4–4.3V; UVLO: 2.4V; Imax: 1A	3 x Power pins — VBATT: 3.2—4.35V
Reference Voltage	VGPIO: 1.7–1.85V, 3.2–3.35V; Imax: 50 mA	VGPIO: [1.7–1.9V]; Imax: 50mA	VGPIO: 1.75—1.85V; Imax: 25 mA
Backup Battery	No	No	No
Control and Indication Interfaces			
Control	4 x Control pins	4 x Control pins	3 x Control pins
Indication	4 x Indication pins	5 x Indication pins	3 x Indication pins

Table 5-2: Pin Details (Continued)

	RC71xx	RC76xx	HL78xx
Communication Interfaces			
USB	3 x USB pins — VBUS: 5V or VBAT_BB-compliant USB2.0 HS	3 x USB pins - VBUS: 5V or VBAT_BB-compliant USB2	Yes
I2C	No	2 x I2C pins	No
SPI1	No	4 x SPI1 pins	No
UART1	8 x UART1 pins	8 x UART1 pins	Yes
UART2	4 x UART2 pins	4 x UART2 pins	Yes
UIM Interfaces			
UIM1	Yes; 1.8V / 3V capability	Yes; 1.8V / 3V capability	Yes (1.8V only) Internal eSIM or External SIM
eSIM → No UIM2 (external)	No	Yes	No (eSIM shares the same path with SIM1)
UIM2 (external) → No eSIM	Yes: 1.8V	Yes	No
Wakeup Signals / Events			
Wakeup Interrupt (Sleep State)	8 x signals[a]	6 x signals[b]	2 x signals
Wakeup Events (ULPS)	8 x signals[a]	1 x signal	1 x signal
General Purpose Input / Output			
GPIO	13 x GPIOs (2 x multiplexed)	19 x GPIOs (6 x multiplexed)	12 x GPIOs (8 x multiplexed)
ADC			
ADC	2 x ADC pins	2 x ADC pins	2 x ADC pins [0–1.8V]
Digital Audio Interface			
Digital audio	n/a	4 x Digital audio pins	n/a
Clock			
Clock	n/a	2 x Clock pins	2 x Clock pins

Table 5-2: Pin Details (Continued)

	RC71xx	RC76xx	HL78xx
Debug			
JTAG	n/a	9 x JTAG pins	n/a
Debug	4 x SWD pins	n/a	n/a

a. For detailed RC71xx wakeup source specifications, refer to the "Modem Wakeup Sources (Hardware)" table in *[1] RC71xx Product Technical Specification (Doc# 41114670)*,
b. If a secondary external UIM is enabled, UIM1_SIMB_DET becomes a wakeup pin.

Interfaces

UART

Table 5-3: UART Interface

	RC71xx	RC76xx
Baud rate	UART1 AT: ▪ 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600 UART2 log: ▪ 921600	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 921600

Control Signals

Power_ON

Table 5-4: Power_ON Signal

	RC71xx	RC76xx	Units
POWER_ON_N assertion time (min)	200	200	ms

Reset_IN_N

Table 5-5: RESET_IN_IN

	RC71xx	RC76xx	Units
Reset_IN_N assertion time (min)	450	42	ms

ADC Interface

Table 5-6: ADC Interface

Parameter	RC71xx	RC76xx	Units
Full-scale voltage level	0–1.2	0.1–1.7	V
Resolution	12	15	bit
Clock rate	1.625~6.5 (Typ=3.25)	Not specified	MHz
Sample rate	101~406 KHz (Typ=203 KHz)	2.4 MHz	–
Voltage error	7 (typ), 14 (max)	8 (typ), 16 (max)	mV

6: Software

AT Commands

RC71xx, RC76xx and HL78xx modules may be controlled via AT commands. For command details, including module series-specific variations and unique commands, refer to the following documents:

- *[3] RC71xx AT Command Reference (Doc# 41114675)*
- *[6] RC76xx AT Comand Reference (Doc# 41113566)*
- *[10] HL78xx AT Command Reference Guide (Doc# 41111821)*

Key Features

Table 6-1 provides a summary of available key software features for RC71xx, RC76xx and HL78xx modules:

Table 6-1: Software — Key Features

Feature	RC71xx	RC76xx	HL78xx
MQTT Client	Y	N	Y
Location	N	GNSS location	GNSS location
SIM Tool Kit	N	Y	Y
Multiple PDP	N	Y	Y
AVMS	N	Y	Y
USB Device Mode	Supports AT, Log, RNDIS/ECM, PPP	Supports AT, DM, NMEA, RmNet	Supports AT, PPP, NMEA, LOG
Audio Interfaces	N	(I2S, PCM-Master mode)	N
Audio Tuning	N	Y	Y

7: References

7.1 Sierra Wireless Documents

Sierra Wireless documents are available from source.sierrawireless.com, or on request (subject to license agreements or NDAs) from your Sierra Wireless representative.

Sierra Wireless Documents on the Source

The following documents are available from source.sierrawireless.com:

[1] RC71xx Product Technical Specification (Doc# 41114670)

[2] RC71xx Customer Process Guidelines (Doc# 41114682)

[3] RC71xx AT Command Reference (Doc# 41114675)

[4] RC76xx Product Technical Specification (Doc# 41113440)

[5] RC76 Series Customer Process Guidelines (Doc# 41113573)

[6] RC76xx AT Comand Reference (Doc# 41113566)

[7] RC76xx Scalability Guide (Doc# 41113646)

[8] HL780x Product Technical Specification (Doc# 41113770)

[9] HL781x Product Technical Specification (Doc# 41114133)

[10] HL78xx AT Command Reference Guide (Doc# 41111821)