FXTE02 User Guide

AirLink FX Series

SIERRA WIRELESS®

4112217
4.0
May 26, 2014

Important Notice

Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the Sierra Wireless modem are used in a normal manner with a well-constructed network, the Sierra Wireless modem should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Sierra Wireless accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the Sierra Wireless modem, or for failure of the Sierra Wireless modem to transmit or receive such data.

Safety and Hazards

Do not operate the Sierra Wireless modem in areas where cellular modems are not advised without proper device certifications. These areas include environments where cellular radio can interfere such as explosive atmospheres, medical equipment, or any other equipment which may be susceptible to any form of radio interference. The Sierra Wireless modem can transmit signals that could interfere with this equipment. Do not operate the Sierra Wireless modem in any aircraft, whether the aircraft is on the ground or in flight. In aircraft, the Sierra Wireless modem **MUST BE POWERED OFF**. When operating, the Sierra Wireless modem can transmit signals that could interfere with various onboard systems.

Note: *Some airlines may permit the use of cellular phones while the aircraft is on the ground and the door is open. Sierra Wireless modems may be used at this time.*

The driver or operator of any vehicle should not operate the Sierra Wireless modem while in control of a vehicle. Doing so will detract from the driver or operator's control and operation of that vehicle. In some states and provinces, operating such communications devices while in control of a vehicle is an offence.

Limitations of Liability

This manual is provided "as is". Sierra Wireless makes no warranties of any kind, either expressed or implied, including any implied warranties of merchantability, fitness for a particular purpose, or noninfringement. The recipient of the manual shall endorse all risks arising from its use.

The information in this manual is subject to change without notice and does not represent a commitment on the part of Sierra Wireless. SIERRA WIRELESS AND ITS AFFILIATES SPECIFICALLY DISCLAIM LIABILITY FOR ANY AND ALL DIRECT, INDIRECT, SPECIAL, GENERAL, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR EXEMPLARY DAMAGES INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS OR REVENUE OR ANTICIPATED PROFITS OR REVENUE ARISING OUT OF THE USE OR INABILITY TO USE ANY SIERRA WIRELESS PRODUCT, EVEN IF SIERRA WIRELESS AND/OR ITS AFFILIATES HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES OR THEY ARE FORESEEABLE OR FOR CLAIMS BY ANY THIRD PARTY.

Notwithstanding the foregoing, in no event shall Sierra Wireless and/or its affiliates aggregate liability arising under or in connection with the Sierra Wireless product, regardless of the number of events, occurrences, or claims giving rise to liability, be in excess of the price paid by the purchaser for the Sierra Wireless product.

Customer understands that Sierra Wireless is not providing cellular or GPS (including A-GPS) services. These services are provided by a third party and should be purchased directly by the Customer.

SPECIFIC DISCLAIMERS OF LIABILITY: CUSTOMER RECOGNIZES AND ACKNOWLEDGES SIERRA WIRELESS IS NOT RESPONSIBLE FOR AND SHALL NOT BE HELD LIABLE FOR ANY DEFECT OR DEFICIENCY OF ANY KIND OF CELLULAR OR GPS (INCLUDING A-GPS) SERVICES.

Patents

This product may contain technology developed by or for Sierra Wireless Inc.

This product includes technology licensed from QUALCOMM®.

This product is manufactured or sold by Sierra Wireless Inc. or its affiliates under one or more patents licensed from InterDigital Group and MMP Portfolio Licensing.

Copyright

Trademarks

Sierra Wireless®, AirPrime®, AirLink®, AirVantage®, WISMO® and the Sierra Wireless and Open AT logos are registered trademarks of Sierra Wireless, Inc. or one of its subsidiaries.

Watcher® is a registered trademark of NETGEAR, Inc., used under license.

Windows® and Windows Vista® are registered trademarks of Microsoft Corporation.

Macintosh® and Mac OS X® are registered trademarks of Apple Inc., registered in the U.S. and other countries.

QUALCOMM® is a registered trademark of QUALCOMM Incorporated. Used under license.

Other trademarks are the property of their respective owners.

Contact Information

Sales Desk:	Phone:	1-604-232-1488
	Hours:	8:00 AM to 5:00 PM Pacific Time
	Contact:	http://www.sierrawireless.com/sales
Post:	Sierra Wireless 13811 Wireless Way Richmond, BC Canada V6V 3A4	
Technical Support:	support@sierrawireless.com	
RMA Support:	repairs@sierrawireless.com	
Fax:	1-604-231-1109	
Web:	http://www.sierrawireless.com/	

Consult our website for up-to-date product descriptions, documentation, application notes, firmware upgrades, troubleshooting tips, and press releases: www.sierrawireless.com

Document History

Version	Date	Updates
001	July 02, 2010	Creation
2.0	April 27, 2012	Added Figure: 16-way IO cable (with color-coded wires); updated Table: 16-way IO Expander Socket Pin Description
3.0	June 18, 2013	Removed FXTE01 information
3.1	June 19, 2013	Updated Table 4 Mechanical Characteristics
3.2	July 19, 2013	Updated sections: • 5.1 Installation • 5.2 FXTE02 Installation Check
		Removed section 5.3 Ethernet Check
	September 11, 2013	Updated section 5.2 FXTE02 Installation Check
4.0	May 26, 2014	Updated Table 11 Operating Class Temperature Range

Contents

List of Figures

List of Tables

1. Overview

The FXTE02 is an Ethernet Expansion Card (X-card) that expands the functionality of a standard FX Series programmable modem into a state of the art device for machine to machine applications. With the FXTE02, it is possible to utilize the Internal Expansion Socket (IES) which allows the FX Series to have a bigger application potential.

The FX Series with an FXTE02 plugged-in may utilize one or more Libraries of the Open AT Application Framework, which is the world's most comprehensive cellular development environment that allows embedded standard ANSI C applications to be natively executed directly on intelligent embedded modules.

Note that this document only covers functionalities of FXTE02 and does not include discussions on the programmable capabilities provided via the use of the Open AT Application Framework nor development guides for expanding the application feature through the IES interface. For more information about the Open AT Application Framework, refer to the documents listed in section 10 Reference Documents.

1.1. Parts and Interfaces

The following figure shows the top and bottom views of the FXTE02, and identifies its different parts and connectors.

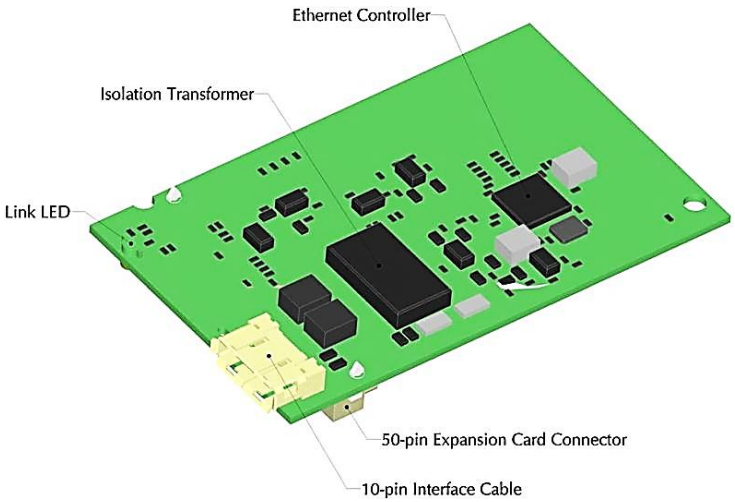


Figure 1. FXTE02 – Top Side

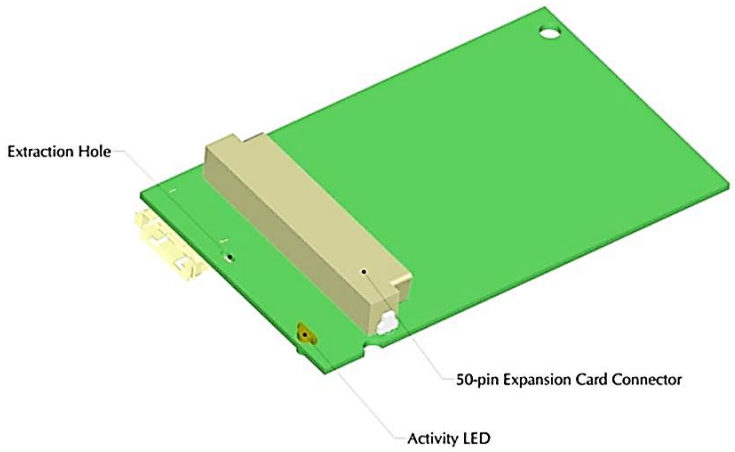


Figure 2. FXTE02 – Bottom Side

1.2. External Connection

The FXTE02 has a 10-pin socket, which is used as the external interface for the RJ-45 Ethernet cable.

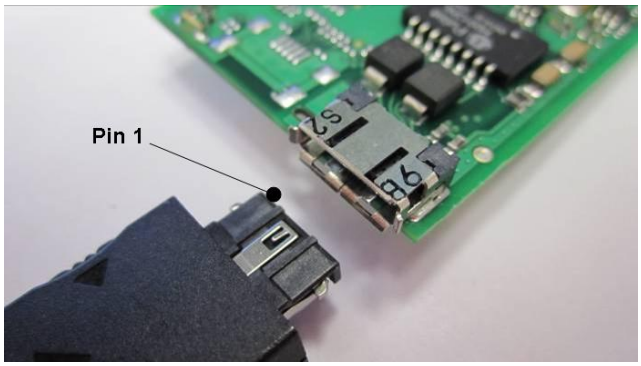


Figure 3. 10-pin Interface Socket

Refer to the following table for the pin description of the 10-pin interface socket.

Table 1. 10-pin Interface Socket Pin Description

Pin Number	Description
1	DGND
2	TX_D1-
3	TX_D1+
4	RX_D2-
5	RX_D2+
6	BI_D3+
7	BI_D3-
8	BI_D4+
9	BI_D4-
10	DGND

1.3. 50-pin X-card Connector

The FXTE02 has a high-density 50-pin X-card connector which is used for interfacing it with the FX Series motherboard.

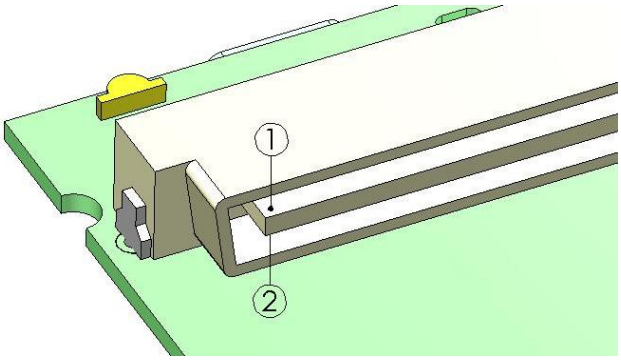


Figure 4. 50-pin X-card Connector

The following table lists the pin description of the 50-pin X-card connector.

Table 2. 50-pin X-card Connector Pin Description

Pin Number	Description	Pin Number	Description
1	GND	26	RTS2
2	GND	27	Reserved
3	Reserved	28	GPIO26
4	Reserved	29	GPIO19
5	Reserved	30	GPIO27
6	Reserved	31	GPIO20
7	NC	32	INT0/GPIO3
8	NC	33	GPIO23
9	NC	34	GPIO22
10	1.8V Digital supply from the embedded module	35	DTR1-CT108/2
11	2.8V Digital supply from the embedded module	36	PCM-SYNC
12	BOOT	37	PCM-IN
13	RESET	38	PCM-CLK
14	AUX-ADC	39	PCM-OUT
15	SPI1-CS	40	AUX-DAC
16	SPI1-CLK	41	2.8V supply from the FX Series
17	SPI1-I	42	GND
18	SPI1-IO	43	DC-IN
19	SPI2-CLK	44	DC-IN
20	SPI2-IO	45	GND
21	SPI2-CS	46	4V supply from the FX Series
22	SPI2-I	47	4V supply from the FX Series
23	RXD2	48	GND
24	TXD2	49	GND
25	CTS2	50	GND

2. Features and Services

This section enumerates the features and services available on the FXTE02.

Table 3. Basic Features

Features	Description
Open AT Application Framework	Open AT Application Framework programmable: • Native execution of embedded standard ANSI C applications • Custom AT command creation • Custom application library creation • Standalone operation
Interfaces	• AT command set based on V.25 or later and GSM 07.05 & 07.07 • Interface for embedded application
LAN	• IEEE 802.3 Compatible • Integrated MAC and 10 BASE-T PHY • Receiver and collision squelch circuit • Supports one 10BASE-T port • Supports Full and Half-Duplex modes • Shielded RJ-45

3. Mechanical Characteristics

The following table lists the mechanical characteristics of the FXTE02.

Table 4. Mechanical Characteristics

PCB Dimension	58mm x 35.7mm x 1mm (typical)
Overall Dimension (including connectors)	59.5 x 35.7 x 10.01mm (typical)
Weight	8.5 grams (typical)

Refer to the figure below for the physical dimensions of the FXTE02.

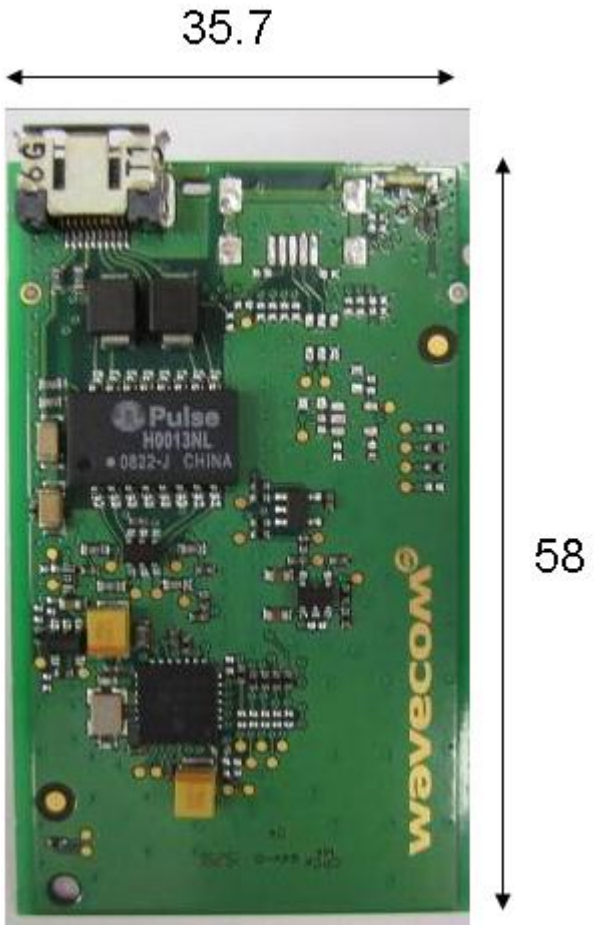


Figure 5. Physical Dimensions

4. Functional Specifications

4.1. Architecture

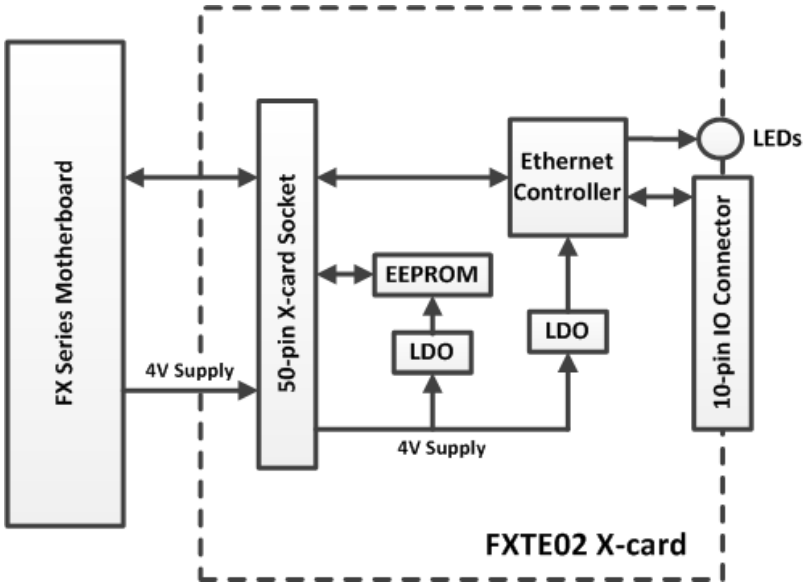


Figure 6. Architecture

4.2. External Supply

The FXTE02 is interfaced to the FX Series motherboard through the 50-pin X-card connector. All DC supplies are applied through this connector so no external supply is necessary.

4.3. Power Supply

The FXTE02's operating voltage is 4V DC.

Note: The FXTE02 is powered once the enable pins are activated by the Open AT Application Framework.

4.4. Communication with the FX Series

With the Open AT Application Framework running, the FX Series motherboard communicates with the FXTE02 though SPI2.

The Open AT Application Framework controls the following:

- Data flow on the SPI2 bus between the Ethernet controller and the FX Series.
- Enables/disables the internal LDOs of the Ethernet controller and EEPROM chip.
- Data access to the EEPROM through I^2C.

4.5. Extra Current Consumption from the DC-IN Source

Depending on various DC-IN voltages of the FX Series, the extra current consumption drawn by the FXTE02 will also vary. The following table describes the current consumption at the FXTE02 interface based on operating conditions.

Table 5. Extra Current Consumption from DC-IN Source for the FXTE02 (Typical Values)

Condition		Extra Current Consumption for Additional Feature (mA)		
FX Series Mode	**Ethernet Feature**	**@4.75VDC**	**@13.2VDC**	**@32VDC**
Connected	Enabled Idle	163mA	53.7mA	20.8mA
Non-Connected	Enabled Idle	171.7mA	49.6mA	24.0mA

4.6. RJ45 Ethernet Interface Socket

The RJ45 Ethernet interface socket is a standard 10BASE-T interface that complies with IEEE 802.3 specifications. Refer to the table below for the RJ45 interface cable pin description.

Table 6. RJ45 Pin Description

RJ45 Socket Pin Number	Signal	I/O	Description
1	TD+	O	Differential data transmit positive
2	TD-	O	Differential data transmit negative
3	RD+	I	Differential data receive positive
4	Not used by 10BASE-T	-	
5	Not used by 10BASE-T	-	
6	RD-	I	Differential data receive positive
7	Not used by 10BASE-T		
8	Not used by 10BASE-T		

4.7. Basic Functional Requirements

Note that for FXTE02 to function properly, the following requirements must be met:

- Open AT Application Framework must be installed on the FX Series. Consult your distributor for more information.
- The Sierra Wireless Ethernet application or a customer's own developed application must be running on the FX Series.

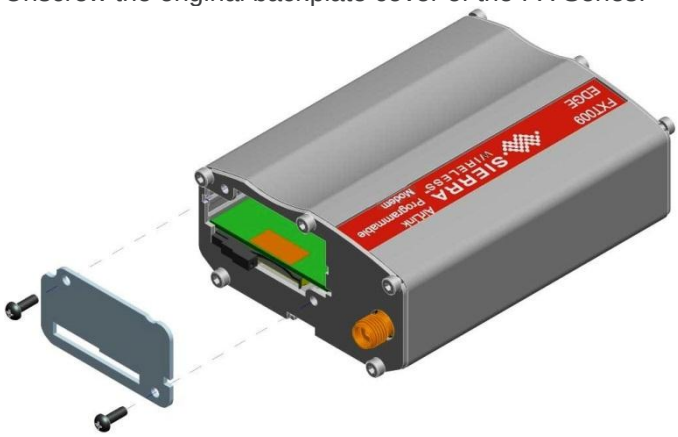
5. Using the FXTE02

5.1. Installation

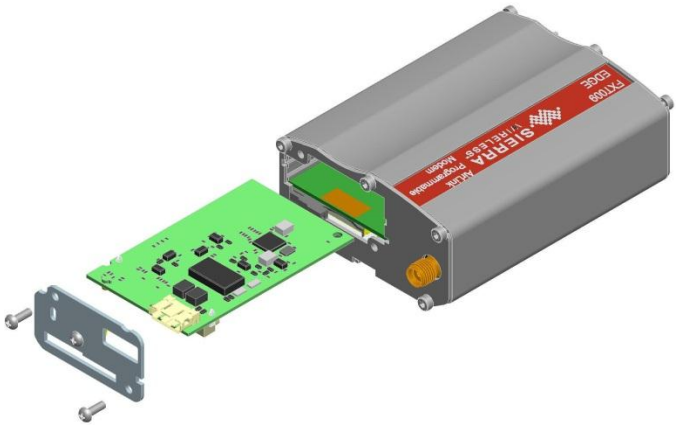
To install FXTE02 into the FX Series, follow the procedures listed below.

Caution: *Remove the power from the FX Series when installing the FXTE02.*

1. Unscrew the original backplate cover of the FX Series.



2. Align the FXTE02 on the guide rail inside the FX Series. Slide the board until the 50-pin X-card connector mates with the FX Series.



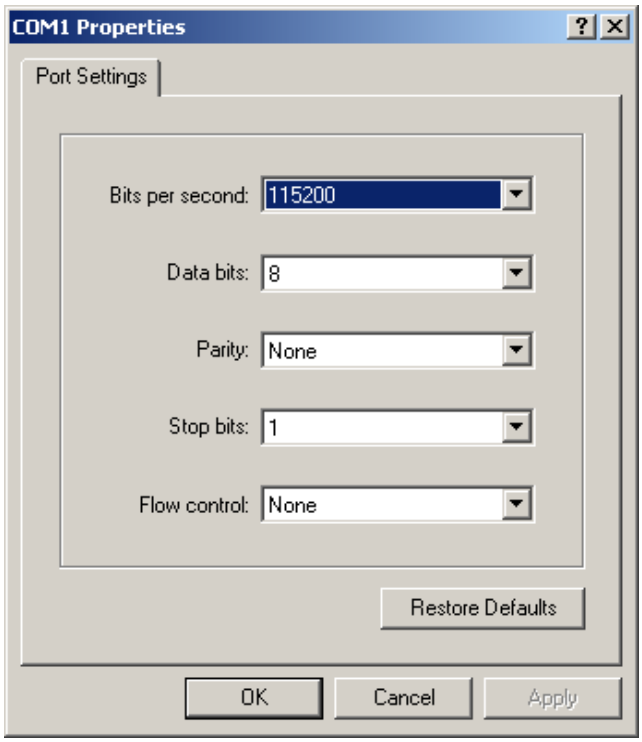
3. Replace the original backplate with the new X-card backplate and screw it in place.

5.2. FXTE02 Installation Check

To check if FXTE02 was properly installed in the FX Series, perform the following test.

Note: The following example was based on an FXT009 modem.

1. Connect a serial cable between the FX Series and the PC COM port.
2. Connect the RJ45 Ethernet cable between the FX Series and an Ethernet network with a DHCP server.
3. Apply power on the FX Series.
4. Open a communication software (for example, HyperTerminal); if the COM port isn't configured yet, configure it as follows:
   - Bits per second: 115200
   - Data bits: 8
   - Parity: None
   - Stop bits: 1
   - Flow control: None



5. Ensure that the Extended AT application (loaded at the factory) is installed in the FX Series modem by entering **`ATI9`** from HyperTerminal. The modem will respond with:

   "DWL","V08b13","","Sierra Wireless",55344,"111611 18:03","dda36757","00010000"

   "FW","FW_SRC_747_8_F4_3.Q2687RDG","R7.47.4.201208311102.FXT009", "Sierra Wireless",2221264,"083112 11:02","6aa633a2","00020000"

   "OAT","v1.11","Extended AT Application","Sierra Wireless",1150680,"090412 12:06","d9dd8bac","00260000"

   -"Developer Studio","2.2.1.201206182209-R9667"

   -"Open AT OS Package","6.37.0.201202060950"

   -"Firmware Package","7.47.4.201208311102"

-"Internet Library Package","5.43.1.201206250935"

-"Location Library Package","1.3.0.201202061130"

-"eCall-InBandModem Library Package","1.2.2.201202010558"

-"ExtendedATApplication Library Package","1.11.0.201209041201"

"ROM","800000"

"RAM","200000"

"DWLNAME","FXT009"

6. Enable the Extended AT application the HyperTerminal window by entering **AT+WOPEN=1**. The modem should respond with "**OK**".
7. Configure the Ethernet using the commands specified in the following table.

Step/Description	Command	Response
Start IP stack	AT+WIPCFG=1	OK
Open Ethernet bearer (bearer number 4)	AT+WIPBR=1,4	OK +MAC: "0021C9001178" The system displays the FXTE02's MAC address. This indicates that the FXTE02 is correctly connected to the modem's main board.
Check Ethernet bearer status	AT+WIPBR?	+WIPBR: 4,0 OK This means that the Ethernet bearer is opened, but not started.
Start Ethernet bearer as a client (this process may take some time)	AT+WIPBR=4,4,0	OK
Check Ethernet bearer status	AT+WIPBR?	+WIPBR: 4,1 OK This means that the Ethernet bearer is opened and started. The FXTE02's green LED should be lit and the yellow LED should be blinking.
Ping www.sierrawwireless.com 5 times, every 2 seconds with 1 second timeout	AT+WIPPING="www.sierrawireless.com",5,2000,1000	OK +WIPPING: 0,0,355 +WIPPING: 0,1,275 +WIPPING: 0,2,245 +WIPPING: 0,3,339 +WIPPING: 0,4,269

If the IP cannot be pinged, use the AT commands below to reset the DHCP and try again.

```
AT+WIPBR=2,4,23,"1"
AT+CFUN=1
```

Note: For more information on AT commands, refer to documents [1] AT Commands Interface Guide for Open AT Application Framework and [2] AirPrime SL808xT and Q2698 Open AT Framework Commands Interface Guide.

5.3. Operational Status

The operational status is indicated by the green and yellow LEDs located at the front end of the FXTE02.

The following table describes the operational status of the FXTE02.

Table 7. Operational Status

LED Description	LED Status	FXTE02 Status
Link LED (Green)	ON	The Ethernet is in synch with the LAN/router.
	OFF	The Ethernet is not in synch with the LAN/router; or Open AT is not running.
Activity LED (Yellow)	ON – Blinking	The Ethernet is linked to the network.
	OFF	The Ethernet is not in synch with the LAN/router; or Open AT is not running.

6. Troubleshooting the FXTE02

This section describes the possible problems that might be encountered when using FXTE02 and their corresponding solutions.

6.1. No Communications with the FXTE02 through the Serial Link

If the FXTE02 does not respond to AT commands through the serial link, refer to the table below for possible causes and their corresponding solutions.

Table 8. No Communications with the FXTE02 through the Serial Link

If FXTE02 returns	Then ask	Action
Nothing	Is the FX Series powered correctly?	Make sure that the external power supply is connected to the FX Series and provides a voltage within the range of 4.75V to 32V.
	Is the FXTE02 powered properly?	Make sure that the FXTE02 is properly plugged in to the FX Series.
	Is the serial cable connected at both sides?	Check the serial cable connection.
	Does the serial cable correctly follow the pin assignments? Refer to document [3] AirLink FX Series User Guide for more information about the serial cable pin assignments.	Connect the cable by following the pin assignments as given in document [3] AirLink FX Series User Guide.
	Is the RJ45 Ethernet cable properly connected at both sides?	Check the RJ45 Ethernet cable connection.
Nothing or non-significant characters	Is the communication program properly configured on the PC?	Ensure that the settings of the communication program are compatible with the settings of the FX Series. The FX Series factory settings are: • Data bits = 8 • Parity = none • Stop bits = 1 • Baud = 115200 bps • Flow control = hardware
	Is there another program interfering with the communication program (i.e. conflict on communication port access)?	Close the interfering program.

7. Reliability Compliance and Recommended Standards

7.1. Reliability Compliance

The FXTE02 is compliant with the following requirements.

Table 9. Standards Conformity for FXTE02

Abbreviation	Definition
IEC	International Electro technical Commission
ISO	International Organization for Standardization

7.2. Applicable Standards Listing

The table hereafter gives the basic list of standards applicable to the FXTE02.

Note: References to any features can be found from these standards.

Table 10. Applicable Standards and Requirements for FXTE02

Document	Current Version	Title
IEC6006826	7.0	Environmental testing - Part 2.6: Test FC: Sinusoidal Vibration.
IEC60068234	73	Basic environmental testing procedures part 2: Test FD: random vibration wide band - general requirements. Cancelled and replaced by **IEC60068-2-64**. For reference only.
IEC60068264	2.0	Environmental testing - part 2-64: Test FH: vibration, broadband random and guidance.
IEC60068232	2.0	Basic environmental testing procedures - part 2: Test ED: (procedure 1) Withdrawn & replaced by **IEC60068-2-31**. For reference only.
IEC60068231	2.0	Environmental testing part 2-31: Test EC: rough handling shocks, primarily for equipment-type specimens.
IEC60068229	2.0	Basic environmental testing procedures - part 2: Test EB and guidance: bump. Withdrawn and replaced by **IEC60068-2-27**. For reference only.
IEC60068227	4.0	Environmental testing - part 2-27: Test EA and guidance: shock.
IEC60068214	6.0	Environmental testing - part 2-14: Test N: change of temperature.
IEC6006822	5.0	Environmental testing - part 2-2: Test B: dry heat.
IEC6006821	6.0	Environmental testing - part 2-1: Test A: cold.
IEC60068230	3.0	Environmental testing - part 2-30: Test DB: damp heat, cyclic (12 h + 12 h cycle).
IEC6006823	69 w/A1	Basic environmental testing procedures part 2: Test CA: damp heat, steady State. Withdrawn and replaced by **IEC60068-2-78**. For reference only.
IEC60068278	1.0	Environmental testing part 2-78: Test CAB: damp heat, steady state.

Document	Current Version	Title
IEC60068238	2.0	Environmental testing - part 2-38: Test Z/AD: composite temperature/humidity cyclic test.
IEC60068240	1.0 w/A1	Basic environmental testing procedures - part 2: Test Z/AM combined cold/low air pressure tests.
ISO167501	2ND	Road vehicles - environmental conditions and testing for electrical and electronic equipment - part 1: general.
ISO167502	2ND	Road vehicles - environmental conditions and testing for electrical and electronic equipment - part 2: electrical loads.
ISO167503	2ND	Road vehicles - environmental conditions and testing for electrical and electronic equipment - part 3: mechanical loads.
ISO167504	2ND	Road vehicles - environmental conditions and testing for electrical and electronic equipment - part 4: climatic loads.
IEC60529	2.1 w/COR2	Degrees of protection provided by enclosures (IP code).
IEC60068217	4.0	Basic environmental testing procedures - part 2: Test Q: sealing.
IEC60068218	2.0	Environmental testing - part 2-18: Tests - R and guidance: water.
IEC60068270	1.0	Environmental testing - part 2: tests - test XB: abrasion of markings and letterings caused by rubbing of fingers and hands.
IEC60068268	1.0	Environmental testing - part 2: tests - test l: dust and sand.
IEC60068211	3.0	Basic environmental testing procedures, part 2: test KA: salt mist.
IEC60068260	2.0	Environmental testing - part 2: Test KE: flowing mixed gas corrosion test.
IEC60068252	2.0 w/COR	Environmental testing - part 2: Test KB: salt mist, cyclic (sodium chloride solution).

7.3. Environmental Specifications

FXTE02 is compliant with the operating classes listed below. The ideal temperature range of the environment for each operating class is also specified.

Table 11. Operating Class Temperature Range

Conditions	Temperature Range
Operating / Class A	-20°C to +55°C
Operating / Class B*	-30°C to +65°C
Storage	-40°C to +85°C

7.3.1. Function Status Classification

The classes reported below comply with the Annex “ISO Failure Mode Severity Classification”, ISO Standard 7637, and Section 1.

Note: The word “function” used here only concerns the function performed by the X-card.

Table 12. ISO Failure Mode Severity Classification

Class	Definition
CLASS A	All equipment/system functions are fulfilled normally (100% functional) during and after the constraint. The FXTE02 shall exhibit normal function during and after environmental exposure. The FXTE02 performance shall meet the minimum requirements of 3GPP or appropriate wireless standards.
CLASS B	All equipment/system functions are fulfilled normally during application of the constraint; however, one or several of them may be out of the specified tolerances. After application of the constraint, all functions automatically return within standard limits. The memories shall remain in compliance with Class A. The FXTE02 shall exhibit the possibility at all times to establish a voice, SMS or DATA call. Unless otherwise stated, full performance should return to normal after the external influence has been removed.

7.3.2. Reliability Prediction Model

The following tables enumerate the different tests performed on the FXTE02 and their corresponding conditions and results.

7.3.2.1. Life Stress Test

The following tests the FXTE02’s product performance.

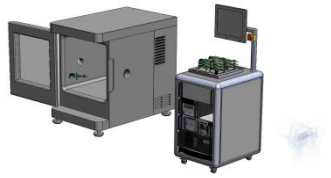
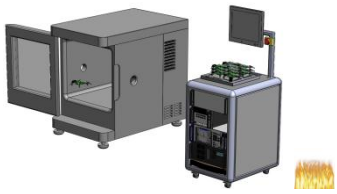
Table 13. Life Stress Test

Designation	Condition
Performance Test PT3T° & PT 	Standard: N/A
	Special conditions: • Temperature: ▪ Class A: 0°C to +55°C ▪ Class B: 0°C to +65°C • Rate of temperature change: ± 3°C/min • Recovery time: 3 hours
	Operating conditions: Powered
	Duration: 14 days

7.3.2.2. Environmental Resistance Stress Tests

The following tests the FXTE02's resistance to extreme temperature.

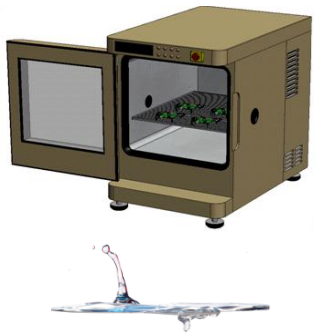
Table 14. Environmental Resistance Stress Tests

Designation	Condition
Cold Test **COT** 	Standard: IEC 680068-2-1, Test Ab
	Special conditions: • Temperature: -40°C • Rate of temperature change: dT/dt >= ± 3°C/min • Recovery time: 3 hours
	Operating conditions: Un-powered
	Duration: 72 hours
Resistance to Heat Test **RH** 	Standard: IEC 680068-2-2, Test Bb
	Special conditions: • Temperature: +85°C • Rate of temperature change: dT/dt >= ± 3°C/min • Recovery time: 3 hours
	Operating conditions: The DUT is switched ON for 1 minute and then OFF for 1 minute
	Duration: 60 days
Dry Heat Test **DHT** 	Standard: IEC 680068-2-2, Test Bb
	Special conditions: • Temperature: +85°C • Rate of temperature change: dT/dt >= ± 3°C/min • Recovery time: 3 hours
	Operating conditions: Un-powered
	Duration: 72 hours

7.3.2.3. Corrosive Resistance Stress Test

The following tests the FXTE02's resistance to corrosive atmosphere.

Table 15. Corrosive Resistance Stress Test

Designation	Condition
Humidity Test **HT** 	Standard: IEC 60068-2-3
	Special conditions: • Temperature: +65°C • RH: 95% • Rate of temperature change: dT/dt >= ± 3°C/min • Recovery time: 3 hours
	Operating conditions: The DUT is switched ON for 5 minutes and then OFF for 15 minutes
	Duration: 10 days

7.3.2.4. Thermal Resistance Cycle Stress Test

The following tests the FXTE02's resistance to extreme temperature cycling.

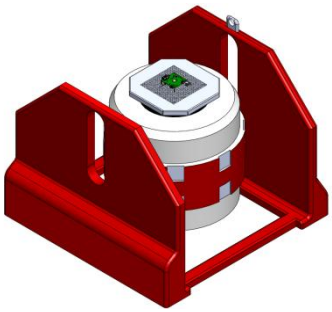
Table 16. Thermal Resistance Cycle Stress Test

Designation	Condition
Thermal Shock Test **TSKT** 	Standard: IEC 60068-2-14
	Special conditions: • Upper temperature: +85°C • Lower temperature: -40°C • Rate of temperature change: 30s • Number of cycles: 200 • Duration of exposure: 30 minutes • Recovery time: 3 hours
	Operating conditions: Un-powered
	Duration: 72 hours

7.3.2.5. Mechanical Resistance Stress Tests

The following tests the FXTE02's resistance to vibrations and mechanical shocks.

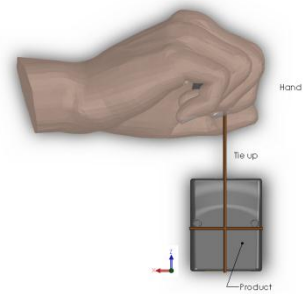
Table 17. Mechanical Resistance Stress Tests

Designation	Condition
Sinusoidal Vibration Test SVT 	Standard: IEC 60068-2-6, Test Fc
	Special conditions: • Frequency range: 10Hz to 1000Hz ▪ Displacement: ±5mm (peak) • Frequency range: 16Hz to 62Hz ▪ Acceleration: 5G • Frequency range: 62Hz to 200Hz ▪ Acceleration: 3G • Frequency range: 200Hz to 1000Hz ▪ Acceleration: 1G • Sweep rate: 1 oct/min. • Test duration: 20 cycles • Sweep directions: X, Y and Z
	Operating conditions: Un-powered
	Duration: 72 hours
Random Vibration Test RVT 	Standard: IEC 60068-2-64
	Special conditions: • Density spectrum: 0.96m²/s3 • Frequency range: ▪ 0.1 g^2/Hz at 10Hz ▪ 0.01 g2/Hz at 250Hz ▪ 0.0005 g2/Hz at 1000Hz ▪ 0.0005 g2/Hz at 2000Hz • Slope: -3dB/octave • Acceleration: 0.9gRMS • Number of axis: 3
	Operating conditions: Un-powered
	Duration: 16 hours
Mechanical Shock Test MST 	Standard: IEC 60068-2-27, Test Ea
	Special conditions: • Wave form: Half sine • Peak acceleration: 50G • Duration: 11ms • Number of shocks: 3 per direction • Number of directions: 6 (±X, ±Y, ±Z)
	Operating conditions: Un-powered
	Duration: 12 hours

7.3.2.6. Handling Resistance Stress Tests

The following tests the FXTE02's resistance to handling malfunctions and damage.

Table 18. Handling Resistance Stress Tests

Designation	Condition
ESD Test 	Standard: IEC 1000-4-2
	Special conditions: • Contact discharges: 10 positive and 10 negative applied • Voltage: ±1kV, ±2kV
	Operating conditions: Powered
	Duration: 12 hours
Operational Durability OD	Standard: N/A
	Special conditions: • SIM Connector: ▪ Cycles: 40 ▪ Repetition Rate: 3s per cycle ▪ Objective: Mating and de-mating • System Connector: ▪ Cycles: 40 ▪ Repetition Rate: 3s per cycle ▪ Objective: Mating and de-mating • RF Connector: ▪ Cycles: 20 ▪ Repetition Rate: 5s per cycle ▪ Objective: Mating and de-mating
	Operating conditions: Un-powered
	Duration: 24 hours
Free Fall Test FFT 	Standard : IEC 60068-2-32, Test Ed
	Special conditions: • Drop: 2 samples for each direction • Equivalent drop height: 1.5m • Number of directions: 6 (±X, ±Y, ±Z) • Number of drops/face: 2
	Operating conditions: Un-powered
	Duration: 24 hours

8. Certification Compliance and Recommended Standards

8.1. Certification Compliance

FXTE02 is compliant with the following requirements.

Table 19. Standards Conformity for the FXTE02

Domain	Applicable Standard
Safety standard	EN 60950-1 (ed.2006)
Health standard (EMF Exposure Evaluation)	EN 62311 (ed. 2008)
Efficient use of the radio frequency spectrum	EN 301 511 (V 9.0.2)
EMC	EN 301 489-1 (v1.8.1) EN 301 489-7 (v1.3.1) EN 301 489-24 (v1.4.1)
FCC	FCC Part 15 FCC Part 22, 24
IC	RSS-132 Issue 2 RSS-133 Issue 5

8.2. Applicable Standards Listing

The table hereafter gives the basic list of standards applicable for 2G and WCDMA (Rel. 5 to 7).

Note: References to any features can be found from these standards.

Table 20. Applicable Standards and Requirements for the FXTE02

Document	Current Version	Title
GCF	3.7.1	GSM Certification Forum - Certification Criteria
NAPRD.03	2.6.0	Overview of PCS Type certification review board (PTCRB) Mobile Equipment Type Certification and IMEI control
TS 51.010-1	8.3.0	3rd Generation Partnership Project; Technical Specification Group GSM/EDGE Radio Access Network; Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformance specification; Part 1: Conformance specification
TS 51.010-2	8.3.0	3rd Generation Partnership Project; Technical Specification Group GSM/EDGE Radio Access Network; Mobile Station (MS) conformance specification; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification
TS 51.010-4	4.14.1	3rd Generation Partnership Project; Technical Specification Group GSM/EDGE Radio Access Network; Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformance specification; Part 4: SIM Application Toolkit Conformance specification

Document	Current Version	Title
EN 301 511	9.0.2	Global System for Mobile Communications (GSM); Harmonised standard for mobile stations in the GSM 900 and DCS 1800 bands covering essential requirements under article 3.2 of the R&TTE directive (1999/5/EC)
TS 34.121-1	8.5.0	3rd Generation Partnership Project; Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); Part 1: Conformance specification
TS 34.121-2	8.5.0	3rd Generation Partnership Project; Technical Specification Group Radio Access Network User Equipment (UE) conformance specification; Radio transmission and reception (FDD); Part 2: Implementation Conformance Statement (ICS)
TS 34.123-1	8.5.0	3rd Generation Partnership Project; Technical Specification Group Terminals; User Equipment (UE) conformance specification; Part 1: Protocol conformance specification

9. Connector and Peripheral Devices References

This section contains a list of recommended manufacturers or suppliers for the peripheral devices to be used with the FXTE02.

For more information, refer to the following websites:

- Kyocera Elco: http://www.kyocera-elco.com/
- Hirose: http://www.hirose.com/
- AVX Corp: http://www.avx.com/

9.1. 50-pin X-card Connector

The X-card connector is a 50-pin plug connector with 0.5mm pitch from Kyocera Elco with reference **14 5078 050 515 861+**.

9.2. 10-pin Socket

The 10-pin socket with 0.5mm pitch is from Hirose with reference **ST60-10P**.

10. Reference Documents

For more details, several reference documents can be consulted. The Sierra Wireless documents referenced herein are provided in the Sierra Wireless documentation package; however, the general reference documents which are not Sierra Wireless owned are not provided in the documentation package.

Visit the Sierra Wireless Developer Zone at http://developer.sierrawireless.com/ for the latest documentation available.

10.1. Firmware Documentation

[1] AT Commands Interface Guide for Open AT Application Framework

Reference: 4111843

[2] AirPrime SL808xT and Q2698 Open AT Framework Commands Interface Guide

Reference: 4112152

10.2. AirLink FX Series Documentation

[3] AirLink FX Series User Guide

Reference number: 4112221

10.3. Other X-card Documentation

[4] AirLink FX Series Expansion Card Installation Guide

Reference: 4114312

11. List of Abbreviations

Abbreviation	Definition
AC	Alternating Current
ACM	Accumulated Call Meter
AT	Attention (prefix for embedded module commands)
CLK	Clock
CMOS	Complementary Metal Oxide Semiconductor
CS	Coding Scheme
CTS	Clear To Send
dB	Decibel
dBc	Decibel relative to the Carrier power
dBi	Decibel relative to an Isotropic radiator
dBm	Decibel relative to one milliwatt
DC	Direct Current
DCD	Data Carrier Detect
DCE	Data Communication Equipment
DCS	Digital Cellular System
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi-Frequency
DTR	Data Terminal Ready
EEPROM	Electrically Erasable Programmable Read-Only Memory
EFR	Enhanced Full Rate
E-GSM	Extended GSM
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
ESD	Electrostatic Discharges
ETSI	European Telecommunications Standards Institute
FIT	Series of connectors (micro-FIT)
FR	Full Rate
FTA	Full Type Approval
GCF	Global Certification Forum
GND	Ground
GPIO	General Purpose Input Output
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile communications
HR	Half Rate
I	Input
IEC	International Electrotechnical Commission
IES	Internal Expansion Socket
IESM	Internal Expansion Socket Module

Abbreviation	Definition
IMEI	International Mobile Equipment Identification
I/O	Input / Output
LED	Light Emitting Diode
MAX	Maximum
ME	Mobile Equipment
Micro-Fit	Family of connectors from Molex
MIN	Minimum
MNP	Microcom Networking Protocol
MO	Mobile Originated
MS	Mobile Station
MT	Mobile Terminated
NOM	Nominal
O	Output
Pa	Pascal (for speaker sound pressure measurements)
PBCCH	Packet Broadcast Control Channel
PC	Personal Computer
PCL	Power Control Level
PDP	Packet Data Protocol
PIN	Personal Identity Number
PLMN	Public Land Mobile Network
PUK	Personal Unblocking Key
RF	Radio Frequency
RFI	Radio Frequency Interference
RI	Ring Indicator
RMS	Root Mean Square
RTS	Request To Send
RX	Receive
SIM	Subscriber Identification Module
SMA	Sub-miniature version A RF connector
SMS	Short Message Service
SNR	Signal-to-Noise Ratio
SPL	Sound Pressure Level
SRAM	Static RAM
TCP/IP	Transmission Control Protocol / Internet Protocol
TDMA	Time Division Multiple Access
TU	Typical Urban fading profile
TUHigh	Typical Urban, High speed fading profile
TX	Transmit
TYP	Typical
USB	Universal Serial Bus
VSWR	Voltage Stationary Wave Ratio
X-card	Expansion Card

12. Safety Recommendations (for Information Only)

For the efficient and safe operation of your GSM device, please read the following information carefully.

12.1. RF Safety

12.1.1. General

Your GSM terminal is based on the GSM standard for cellular technology. The GSM standard is spread all over the world. It covers Europe, Asia and some parts of America and Africa. This is the most used telecommunication standard.

Your GSM terminal is actually a low power radio transmitter and receiver. It sends out and receives radio frequency energy. When you use your GSM application, the cellular system which handles your calls controls both the radio frequency and the power level of your cellular modem.

12.1.2. Exposure to RF Energy

There has been some public concern about possible health effects of using GSM terminals. Although research on health effects from RF energy has focused on the current RF technology for many years, scientists have begun research regarding newer radio technologies, such as GSM. After existing research had been reviewed, and after compliance to all applicable safety standards had been tested, it has been concluded that the product was fitted for use.

If you are concerned about exposure to RF energy there are things you can do to minimize exposure. Obviously, limiting the duration of your calls will reduce your exposure to RF energy. In addition, you can reduce RF exposure by operating your cellular terminal efficiently by following the below guidelines.

12.1.3. Efficient Terminal Operation

For your GSM terminal to operate at the lowest power level, consistent with satisfactory call quality:

If your terminal has an extendible antenna, extend it fully. Some models allow you to place a call with the antenna retracted. However your GSM terminal operates more efficiently with the antenna fully extended.

Do not hold the antenna when the terminal is « IN USE ». Holding the antenna affects call quality and may cause the modem to operate at a higher power level than needed.

12.1.4. Antenna Care and Replacement

Do not use the GSM terminal with a damaged antenna. If a damaged antenna comes into contact with the skin, a minor burn may result. Replace a damaged antenna immediately. Consult your manual to see if you may change the antenna yourself. If so, use only a manufacturer-approved antenna. Otherwise, have your antenna repaired by a qualified technician.

Use only the supplied or approved antenna. Unauthorized antennas, modifications or attachments could damage the terminal and may contravene local RF emission regulations or invalidate type approval.

When installing the coaxial cable to the FX Series, it is necessary to ensure that the metal shield is reliably connected to the protective earthing system of the building. The coaxial cable shield shall be connected to the grounded system of the building, as close to the point of cable entry as practical.

12.2. General Safety

12.2.1. Driving

Check the laws and the regulations regarding the use of cellular devices in the area where you have to drive as you always have to comply with them. When using your GSM terminal while driving, please:

- give full attention to driving,
- pull off the road and park before making or answering a call if driving conditions so require.

12.2.2. Electronic Devices

Most electronic equipment, for example in hospitals and motor vehicles is shielded from RF energy. However RF energy may affect some improperly shielded electronic equipment.

12.2.3. Vehicle Electronic Equipment

Check your vehicle manufacturer representative to determine if any on-board electronic equipment is adequately shielded from RF energy.

12.2.4. Medical Electronic Equipment

Consult the manufacturer of any personal medical devices (such as pacemakers, hearing aids, etc...) to determine if they are adequately shielded from external RF energy.

Turn your terminal OFF in health care facilities when any regulations posted in the area instruct you to do so. Hospitals or health care facilities may be using RF monitoring equipment.

12.2.5. Aircraft

Turn your terminal OFF before boarding any aircraft.

- Use it on the ground only with crew permission
- Do not use it in the air

To prevent possible interference with aircraft systems, Federal Aviation Administration (FAA) regulations require you to have permission from a crew member to use your terminal while the aircraft is on the ground. To prevent interference with cellular systems, local RF regulations prohibit using your modem while airborne.

12.2.6. Children

Do not allow children to play with your GSM terminal. It is not a toy. Children could hurt themselves or others (by poking themselves or others in the eye with the antenna, for example). Children could damage the modem, or make calls that increase your modem bills.

12.2.7. Blasting Areas

To avoid interfering with blasting operations, turn your unit OFF when in a « blasting area » or in areas posted : « turn off two-way radio ». Construction crews often use remote control RF devices to set off explosives.

12.2.8. Potentially Explosive Atmospheres

Turn your terminal OFF when in any area with a potentially explosive atmosphere. It is rare, but your modem or its accessories could generate sparks. Sparks in such areas could cause an explosion or fire resulting in bodily injuries or even death.

Areas with a potentially explosive atmosphere are often, but not always, clearly marked. They include fuelling areas such as petrol stations; below decks on boats; fuel or chemical transfer or storage facilities; and areas where the air contains chemicals or particles, such as grain, dust, or metal powders.

Do not transport or store flammable gas, liquid, or explosives, in the compartment of your vehicle which contains your terminal or accessories.

Before using your terminal in a vehicle powered by liquefied petroleum gas (such as propane or butane) ensure that the vehicle complies with the relevant fire and safety regulations of the country in which the vehicle is to be used.

13. Appendix A: Packaging

13.1. Contents

The FXTE02 X-card package contains the following:

- 100 pieces FXTE02 X-cards
- 100 pieces Backplate and Spring Contacts
- 100 pieces RJ45 Interface Cable
- 3 pieces Extraction Tool
- Installation Guide

	
FXTE02 X-card	**Backplate and Spring Contacts**
	
RJ45 Interface Cable	**Extraction Tool**

13.2. Packaging Box

The packaging box of the FXTE02 has the following physical dimensions:

- Width: 295 mm
- Height: 65 mm
- Length: 515 mm

The label on the top of the packaging box indicates the following:

- Sierra Wireless Logo
- Product Reference (FXTE02 X-card)
- CE Mark
- RoHS Logo

13.3. Production Stickers

Production and MAC address stickers (refer to the following figures) are located at the back of the FXTE02, and contains the following information:

- Product Name (IESM Ethernet)
- AirLink logo
- Marketing Name (FXTE02)
- Barcode
- 17-digit Serial Number
- MAC Address

Figure 7. Product Name and Serial Number Sticker

Figure 8. MAC Address Sticker

SIERRA
WIRELESS®