Fastrack Xtend User Guide

AirLink FXT Series

SIERRA WIRELESS

WA_DEV_FEX20_UGD_002
004
March 08, 2011

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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.

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Document History

Version	Date	Updates
001	November 23, 2009	Creation
002	April 26, 2010	Updated Charging Specification to specify which charging method takes precedence when both options are available.
		Added section 16 Reliability Compliance and Recommended Standards .
		Removed Appendix C and moved its former contents to section 17 Certification Compliance and Recommended Standards.
		Updated Figure 4 Fastrack Xtend Mechanical Drawing.
		Updated terminologies from: • IESM to Expansion Card • inSIM to Embedded SIM • Wireless CPU to Intelligent Embedded Module/embedded module • Open AT® Software Suite to *Sierra Wireless Software Suite*
		Updated Table 76 Power Consumption of FXT003 in Connected Mode (Typical) and Table 78 Power Consumption of FXT003 in Non-Connected Mode (Typical)
		Updated the Power Consumption values in Table 72 Initial Power Consumption (Typical)*.
		Added section 7.3 Expansion Card Design Suggestion
		Updated Appendix A: Packaging and Appendix B: Product Labeling
003	October 12, 2010	Updated product pictures throughout the document
		Added a note after Figure 22 Fastrack Xtend Back Interface to indicate which interfaces are available in which Fastrack Xtend variant.
		Removed irrelevant AirPrime reference documents from section 19.5 Other Related Documentation
		Added information for FXT009 and FXT010 throughout the document; Removed information for FXT006, FXT007 and FXT008 throughout the document.
		Added warning information about the use of the battery accessory in section 15 Recommendations when Using the Battery Accessory.
		Updated the Fastrack Supreme 20 column in Table 1 Fastrack Xtend versus Fastrack Supreme.
		Updated 5.1.1.1 General Purpose Input/Output.
		Added a note for entering Sleep Mode in section 12 Power Consumption.
		Updated the Vocoder features for FXT004 in Table 5 Fastrack Xtend Basic Features by Variant.
		Changed instances of 6-wire power supply cable to 6-wire cable accessory.
004	March 08, 2011	Updated product images throughout the document (from blue to red plate).
		Added a footnote after Table 3 Fastrack Xtend Variants stating that FXT001 and FXT002 are being replaced by FXT009.
		Added information and notes specific to FXT004 throughout the document which includes but are not limited to: • Added Table 100 Standards Conformity for FXT004 • Updated Table 2 Fastrack Xtend Physical Dimensions, Table 8 Power Supply Connector Pin Description • Added section 5.2.3.3 RF Performances (For FXT004) • Added section 5.2.3.4 Antenna Specifications for FXT004
		Updated Figure 4 Fastrack Xtend Mechanical Drawing.

Version	Date	Updates
		Added information about the EC0020 expansion card in section 7.4.3 RS485 + Isolated Digital Inputs and throughout the document.
		Power Consumption tables: • Updated Table 75 Power Consumption of FXT009 in Connected Mode (Typical) and Table 77 Power Consumption of FXT009 in Non-Connected Mode (Typical) from FXT002 power consumption to FXT009 power consumption • Added Table 79 Power Consumption of FXT004 (Typical).
		Updated Table 83 List of Recommended Accessories.
		Updated Figure 52 Fastrack Xtend Product Labeling.
		Changed small MS to normal MS in Table 4 Fastrack Xtend Basic Features.

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1. Overview

The Fastrack Xtend series is a range of self-contained programmable gateways supporting EGSM/GPRS/EGDE 850/900/1800/1900 quad band, HSPA 850/1900/2100 and CDMA2000 1XRTT (IS-2000) that is especially designed for M2M systems. For the 3G versions of the Fastrack Xtend, UMTS and HSxPA connectivity are also available for users.

The Fastrack Xtend also offers an Expansion Card interface accessible for customer use. Expanding application features is easy by simply plugging in an Expansion Card.

Fully certified, the Fastrack Xtend offers quad band 850/900/1800/1900 MHz GPRS and EGPRS Class 10 (12*) capabilities, Tri Band HSPA/FDD (850/1900/2100) (Band I, II, V) UMTS / HSxPA; and it also supports the Sierra Wireless Software Suite. The Sierra Wireless Software Suite is the world's most comprehensive cellular development environment, which allows embedded standard ANSI C applications to be natively executed directly on the Intelligent Embedded Module. For more information about Sierra Wireless Software Suite, refer to the documents listed in section 19 Reference Documents.

Note: ** EGPRS Class 12 capabilities are only available for 3G versions of the Fastrack Xtend.*

Only the 3G version of the Fastrack Xtend supports HSPA. The CDMA version only supports CDMA2000 1xRTT.

This document does not cover the programmable capabilities available through the Sierra Wireless Software Suite.

1.1. Comparison with the Fastrack Supreme

The following table lists the main feature differences between the various Fastrack Xtend variants and the Fastrack Supreme (10 and 20).

Table 1. Fastrack Xtend versus Fastrack Supreme

Feature	FXT001	FXT002	FXT003	FXT004	FXT009	FXT010	Fastrack Supreme 10	Fastrack Supreme 20
GSM	☒900 ☒1800 ☒850 ☒1900	☒900 ☒1800 ☒850 ☒1900	☒900 ☒1800 ☒850 ☒1900	☐900 ☐1800 ☐850 ☐1900	☒900 ☒1800 ☒850 ☒1900	☒900 ☒1800 ☒850 ☒1900	☒900 ☒1800 ☒850 ☒1900	☒900 ☒1800 ☒850 ☒1900
HSPA	☐850 ☐1900 ☐2100	☐850 ☐1900 ☐2100	☒850 ☒1900 ☒2100	☐850 ☐1900 ☐2100	☐850 ☐1900 ☐2100	☐850 ☐1900 ☐2100	☐850 ☐1900 ☐2100	☐850 ☐1900 ☐2100
CDMA 2000 1xRTT	☐800 ☐1900	☐800 ☐1900	☐800 ☐1900	☒800 ☒1900	☐800 ☐1900	☐800 ☐1900	☐800 ☐1900	☐800 ☐1900
GPRS	☒Class10 ☐Class12 ☐No	☒Class10 ☐Class12 ☐No	☐Class10 ☒Class12 ☐No	☐Class10 ☐Class12 ☒No	☒Class10 ☐Class12 ☐No	☒Class10 ☐Class12 ☐No	☒Class10 ☐Class12 ☐No	☒Class10 ☐Class12 ☐No
EDGE	☐Yes ☒No	☒Yes ☐No	☒Yes ☐No	☐Yes ☒No	☒Yes ☐No	☒Yes ☐No	☐Yes ☒No	☒Yes ☐No
Expansion Card Flexibility	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☐Yes ☒No	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No
Micro-Fit Connector	☐4-pin ☒10-pin	☐4-pin ☒10-pin	☐4-pin ☒10-pin	☐4-pin ☒10-pin	☐4-pin ☒10-pin	☐4-pin ☒10-pin	☒4-pin ☐10-pin	☒4-pin ☐10-pin
Secondary RF Interface	☐Yes ☒No	☐Yes ☒No	☒Yes ☐No	☒Yes ☐No	☐Yes ☒No	☐Yes ☒No	☐Yes ☒No	☐Yes ☒No
USB Interface	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☐Yes ☒No	☐Yes ☒No

Feature	FXT001	FXT002	FXT003	FXT004	FXT009	FXT010	Fastrack Supreme 10	Fastrack Supreme 20
Serial Port Auto Shut Down	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☐Yes ☒No	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No
RTC Back Up Battery	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No
Battery Accessory	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☒Yes ☐No	☐Yes ☒No	☐Yes ☒No

For more information on the features available on the various Fastrack Xtend variants, refer to Table 4 Fastrack Xtend Basic Features and Table 5 Fastrack Xtend Basic Features by Variant.

1.2. Overall Dimensions

Figure 1. Fastrack Xtend

Table 2. Fastrack Xtend Physical Dimensions

Length	89 mm
Width	60 mm
Thickness	30 mm
Weight	100g for FXT001, FXT004, and FXT009; 120g for FXT003

1.3. Fastrack Xtend Variants

Table 3. Fastrack Xtend Variants

Part Number	Fastrack Xtend Variant Description
FXT001*	EGSM Quad Band + CL10 GPRS
FXT002*	EGSM Quad Band + CL 10 GPRS + EDGE
FXT003	EGSM Quad Band + CL 12 GPRS + EDGE + HSxPA + Tri Band HSPA
FXT004	CDMA2000 1XRTT Dual Band with GPS L1 supported
FXT009	EGSM Quad Band + CL 10 GPRS + EDGE
FXT010	EGSM Quad Band + CL 10 GPRS + EDGE + Embedded SIM

* FXT001 and FXT002 will be replaced with FXT009.

Note: Available wireless interfaces will vary depending on the Fastrack Xtend variant. Refer to Table 5 Fastrack Xtend Basic Features for more details on the basic features available on each Fastrack Xtend variant.

1.4. Connections

- One 10-pin Micro-Fit Power Supply Connector
- USB 2.0
- One 15-pin Sub-D Serial Interface
- SIM Interface (not available in FXT004)
- Antenna Interface
  - SMA Main
  - SMA Diversity (3G-HSxPA version) for FXT003; or SMA GPS-One (1xRTT version)

1.5. Interfaces

1.5.1. Fastrack Xtend

- Power Supply
- 3V/1V8 SIM Interface
- USB Slave Interface
- Serial Link (UART1)
- ON/OFF
- Boot
- Reset
- Audio Interface
- 2 GPIOs
- LED Status Indicator
- Battery Accessory Interface (Optional)

1.5.2. Internal Expansion Card

- 1 – Secondary Serial Link (UART2)
- 6 – GPIOs
- 2 – SPI Bus
- 1 – ADC
- 1 – DAC
- 1 – PCM
- 1 – Interrupt
- Reset access to the embedded module
- Boot access to the embedded module
- 2.8V supply from the Fastrack Xtend
- 4V supply from the Fastrack Xtend
- 2.8V Digital supply from the embedded module
- 1.8V Digital supply from the embedded module
- Access to 4.75 to 32V DC-IN

Note: The Internal Expansion Card is not available in FXT004.

1.6. Environmental Compliance

1.6.1. RoHS Directive Compliant

The Fastrack Xtend is compliant with RoHS Directive 2002/95/EC which sets limits for the use of certain restricted hazardous substances. This directive states that “from 1st July 2006, new electrical and electronic equipment put on the market does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE)”.

1.6.2. Disposing of the Product

This electronic product is subject to the EU Directive 2002/96/EC for Waste Electrical and Electronic Equipment (WEEE). As such, this product must not be disposed off at a municipal waste collection point. Please refer to local regulations for directions on how to dispose of this product in an environmental friendly manner.

2. Features and Services

This section enumerates the features and services available on the Fastrack Xtend series.

2.1. Features and Services

Refer to the table below for the list of basic features available on the Fastrack Xtend.

Table 4. Fastrack Xtend Basic Features

Features	Description	
Sierra Wireless Software Suite (does not apply to FXT004)	• Sierra Wireless Software Suite programmable: ▪ Native execution of embedded standard ANSI C applications ▪ Custom AT command creation ▪ Custom application library creation ▪ Standalone operation • Interface for embedded applications (does not apply to FXT004) • Plug-In compatible (does not apply to FXT004)	
Standard (does not apply to FXT004)	• 850MHz / 900 MHz • E-GSM compliant • Output power: class 4 (2W) • Fully compliant with ETSI GSM phase 2 + normal MS	• 1800 MHz / 1900MHz • Output power: class 1 (1W) • Fully compliant with ETSI GSM phase 2 + normal MS
GPRS (does not apply to FXT004)	• Class 10 (FXT001, FXT002, FXT003, FXT009 and FXT010) • Up to Class 12 (FXT003 only) • PBCCH support • Coding schemes: CS1 to CS4 • Compliant with SMG31bis • Embedded TCP/IP stack	
EGPRS (for FXT002, FXT003, FXT009 and FXT010 only)	• Class 10 (FXT002, FXT003, FXT009 and FXT010) • Up to Class 12 (FXT003 only) • PBCCH support • Coding schemes: MCS1 to MCS9 • Compliant with SMG31bis • Embedded TCP/IP stack	
Interface	• RS232 (V.24/V.28) Serial interface supporting: ▪ Baud rate (bits/s): 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800 and 921600 ▪ Autobauding (bits/s): from 1200 to 921600. ▪ 2 General Purpose Input/Output gates (GPIOs) available. • 1.8 V / 3 V SIM interface. (Does not apply to FXT004) • AT command set based on V.25ter and GSM 07.05 & 07.07	
SMS	• Text & PDU • POINT TO POINT (MT/MO) • Cell broadcast	

Features	Description
Data (for FXT001, FXT002, FXT009 and FXT010)	• Data circuit asynchronous • Transparent and Non Transparent modes • Up to 14.400 bits/s • MNP Class 2 error correction • V42.bis data compression
CDMA2000 (for FXT004)	• Band Class 0 and Class 1 • Data rates up to 153 kbps forward and reverse
UMTS Data Transfer (for FXT003)	BAND I, II, IV (850/1900,2100)up to 384kbits/s
HSXPA (for FXT003)	• BAND I, II, IV (850/1900,2100) • HSDPA Cat 8 up to 7.2Mbits/s • HSUPA Cat 5 up to 2Mbits/s
FAX (for FXT001, FXT002, FXT009, and FXT010)	Automatic fax group 3 (class 1 and class 2)
Audio	• Echo cancellation • Noise reduction • Full Rate, Enhanced Full Rate, Half Rate operation and Adaptive Multi-Rate (FR/EFR/HR/AMR); #EVRC/QCELP/4GV for FXT004 • Dual Tone Multi Frequency function (DTMF)

Refer to the following table for the comparison list between the different Fastrack Xtend variants.

Table 5. Fastrack Xtend Basic Features by Variant

Feature	FXT001	FXT002	FXT003	FXT004	FXT009	FXT010
GSM	☒ 900 ☒ 1800 ☒ 850 ☒ 1900	☒ 900 ☒ 1800 ☒ 850 ☒ 1900	☒ 900 ☒ 1800 ☒ 850 ☒ 1900	☐ 900 ☐ 1800 ☐ 850 ☐ 1900	☒ 900 ☒ 1800 ☒ 850 ☒ 1900	☒ 900 ☒ 1800 ☒ 850 ☒ 1900
HSPA	☐ 850 ☐ 1900 ☐ 2100	☐ 850 ☐ 1900 ☐ 2100	☒ 850 ☒ 1900 ☒ 2100	☐ 850 ☐ 1900 ☐ 2100	☐ 850 ☐ 1900 ☐ 2100	☐ 850 ☐ 1900 ☐ 2100
CDMA 2000 1xRTT	☐ 800 ☐ 1900	☐ 800 ☐ 1900	☐ 800 ☐ 1900	☒ 800 ☒ 1900	☐ 800 ☐ 1900	☐ 800 ☐ 1900
GPRS	☒ Class10 ☐ Class12 ☐ No	☒ Class10 ☐ Class12 ☐ No	☐ Class10 ☒ Class12 ☐ No	☐ Class10 ☐ Class12 ☒ No	☒ Class10 ☐ Class12 ☐ No	☒ Class10 ☐ Class12 ☐ No
EDGE	☐ Yes ☒ No	☒ Yes ☐ No	☒ Yes ☐ No	☐ Yes ☒ No	☒ Yes ☐ No	☒ Yes ☐ No
Voice	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
Data	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
Fax	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
SIM Interface	☐ 3V ☐ 5V ☐ 3/5V ☒ 1.8/3V	☐ 3V ☐ 5V ☐ 3/5V ☒ 1.8/3V	☐ 3V ☐ 5V ☐ 3/5V ☒ 1.8/3V	☐ 3V ☐ 5V ☐ 3/5V ☐ 1.8/3V	☐ 3V ☐ 5V ☐ 3/5V ☒ 1.8/3V	☐ 3V ☐ 5V ☐ 3/5V ☒ 1.8/3V
Embedded SIM	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No
RUIM	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No

Feature	FXT001	FXT002	FXT003	FXT004	FXT009	FXT010
Vocoder	☒ HR ☒ FR ☒ EFR ☒ AMR	☒ HR ☒ FR ☒ EFR ☒ AMR	☒ HR ☒ FR ☒ EFR ☒ AMR	☒ QCELP ☒ EVRC ☒ EVRC-B	☒ HR ☒ FR ☒ EFR ☒ AMR	☒ HR ☒ FR ☒ EFR ☒ AMR
GPS One	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No	☐ Yes ☒ No	☐ Yes ☒ No
SMA Main Antenna	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
SMA Diversity	☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No	☒ Yes (for GPS) ☐ No	☐ Yes ☒ No	☐ Yes ☒ No
Sierra Wireless Software Suite Compliant	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☐ Yes ☒ No	☒ Yes ☐ No	☒ Yes ☐ No
Expansion Card Compatible	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☐ Yes ☒ No	☒ Yes ☐ No	☒ Yes ☐ No

2.2. Supported Bands

The Fastrack Xtend comes in several variants, supporting various bearers and bands. The FXT001, FXT002, FXT009 and FXT010 are quad band programmable gateways that support either EU bands (EGSM900/DCS1800) or US bands (GSM850/PCS1900). Users may switch from one supported band to another by using AT commands.

The FXT003 is also a quad band EGSM900/DCS1800/GSM850/PCS1900 that also supports Tri Band HSPA/FDD (850/1900/2100) (Band I, II, V) UMTS/HSxPA. Band selection is done automatically without having to switch manually using AT commands. FXT004 is the CDMA version, which supports dual band (800/1900 MHz) mode.

Refer to sections 9.4 Checking the Band Selection and 9.5 Switching Bands for more information regarding switching bands.

2.3. Expansion Card Interface

The Fastrack Xtend offers a 50-pin Expansion Card Interface accessible to customers. It is an additional interface for customers to expand their application features by simply plugging in an Expansion Card through the mating connector of the Expansion Card interface.

The Fastrack Xtend with an Ethernet Expansion Card, an IO+GPS Expansion Card, or an RS485 Expansion Card plugged-in is run by the Plug-Ins of the Sierra Wireless Software Suite, which is based on the firmware inside the Fastrack Xtend.

The Fastrack Xtend supports the following types of Expansion Cards:

- IO+GPS (FXTE01)
- Ethernet (FXTE02)
- RS485+Isolated Digital Inputs (EC0020)

Refer to section 7.3 Expansion Card Design Suggestion for more information about the Expansion Cards supported by the Fastrack Xtend.

Note: The Internal Expansion Card is not available in FXT004.

2.4. Protection

2.4.1. Power Supply

The Fastrack Xtend is protected from continuous over-voltage by a 2A/250V slow break fuse directly bonded on the 6-wire cable accessory; and it is also protected against transient voltage peaks over +32V. When the input voltage exceeds 32V, the supply voltage is automatically disconnected in order to protect the internal electronic components from overvoltage.

2.4.2. Electrostatic Discharge

The Fastrack Xtend withstands ESD according to IEC 1000-4-2 requirements for all accessible parts, except for the RF connector which withstands ESD as follows:

- +/- 8kV of air discharge
- +/- 4kV of contact discharge

2.4.3. Main Serial Link

The Fastrack Xtend's RS232 serial link connection is internally protected against electrostatic surges on its lines by ESD protection and it also has the following filtering guarantees:

- EMI/RFI protection on both input and output
- Signal smoothing

3. Functional Specifications

This section discusses the functional specifications of the Fastrack Xtend series.

3.1. Functional Architecture

The global architecture of the Fastrack Xtend series is shown in the figure below.

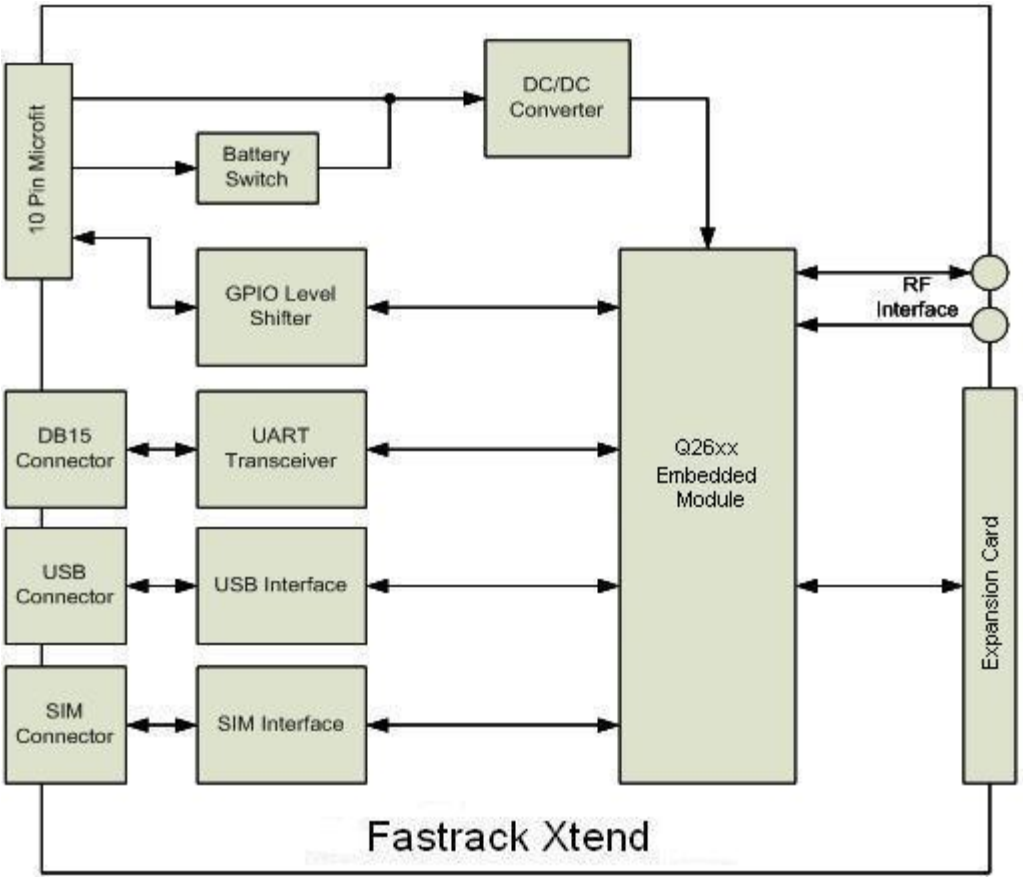


Figure 2. Functional Architecture

3.2. RF Functionalities

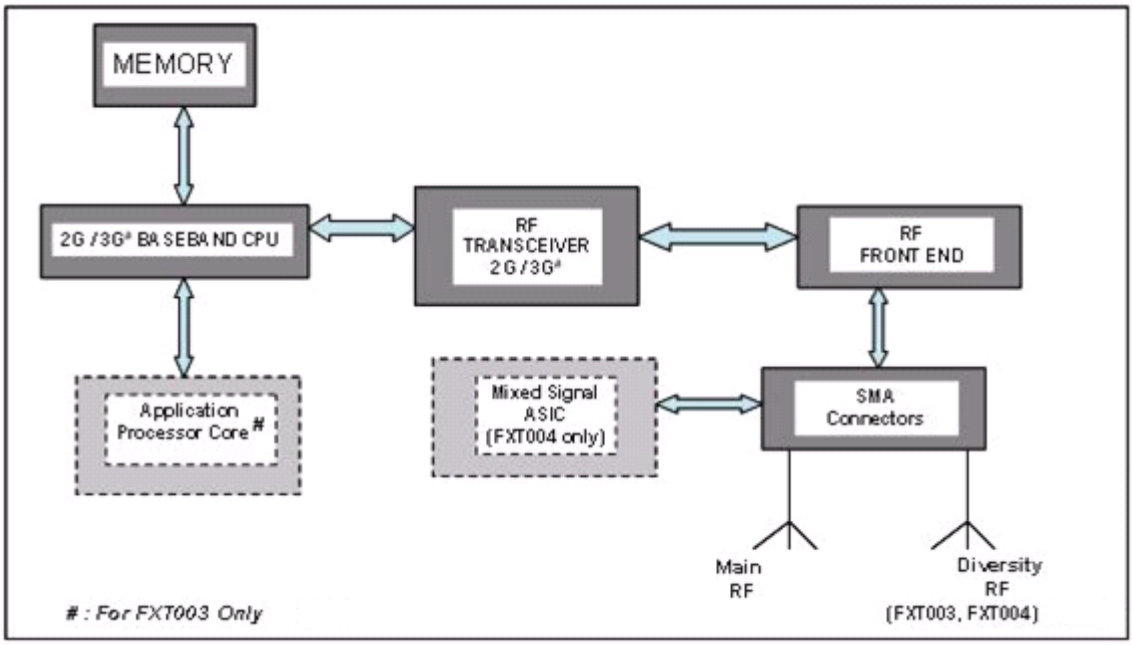


Figure 3. Fastrack Xtend RF Architecture

Refer to the table below for the list of Fastrack Xtend variants and their corresponding supported bands.

Table 6. Fastrack Xtend Variants with Corresponding Supported Bands

Fastrack Xtend Variant	Supported Bands
FXT001, FXT002, FXT009, FXT010	Quad band (850/900/1800/1900 MHz)
FXT003	Quad band (850/900/1800/1900 MHz) Tri band UMTS/HSXPA (850/1900/2100 MHz)
FXT004	Dual band CDMA2000 (800/1900 MHz)

Refer to section 1.3 Fastrack Xtend Variants for a more detailed description of the Fastrack Xtend Variants.

3.3. Operating System

The Fastrack Xtend is Sierra Wireless Software Suite compliant. With the Sierra Wireless Software Suite, customers can embed their own applications with the Fastrack Xtend and turn the Fastrack Xtend into a solution for their specific market need. The operating system of the Fastrack Xtend is also responsible for the following functions:

- AT Command processing
- Real Time Clock (RTC) with calendar

4. Technical Specifications

4.1. Power Supply

The Fastrack Xtend is supplied by an external DC voltage, DC-IN, with a voltage range of +4.75V ~ +32V.

The main regulation is made with an internal DC/DC converter in order to supply all the internal functions with a DC voltage. The correct operation of the Fastrack Xtend in Communication mode is not guaranteed if the input voltage falls below 4.75V.

Refer to the following table for the Fastrack Xtend's operating voltage range and maximum current.

Table 7. Power Supply Electrical Characteristics

Operating Voltage Range	4.75V to 32V DC, nominal at 13.2V
Maximum Current (Typical)	600mA, average at 4.75V; 3A Peak at 4.75V on FXT002, FXT009 and FXT010 950mA, average at 4.75V; 3.7A Peak at 4.75 on FXT003

The Fastrack Xtend is permanently powered once the power supply is connected. In the case of Alarm mode (Low Power mode), the user can set the Fastrack Xtend "Turn-on" time. Refer to section 6.1 Alarm Mode for more information.

Caution: *The minimum input voltage specified here is the Fastrack Xtend input. Be mindful of the input voltage decrease caused by the power cable. When using the 6-wire cable accessory that comes with the Fastrack Xtend package, this input drop is at around 800mV at 4.75V and 220mV at 32V (EDGE 4TX).*

*The Fastrack Xtend is designed for use with the original power cable, and the fuse that came with the original cable is a 2A/250V Slow Break fuse 5.2mm*20mm.*

4.2. Mechanical Specifications

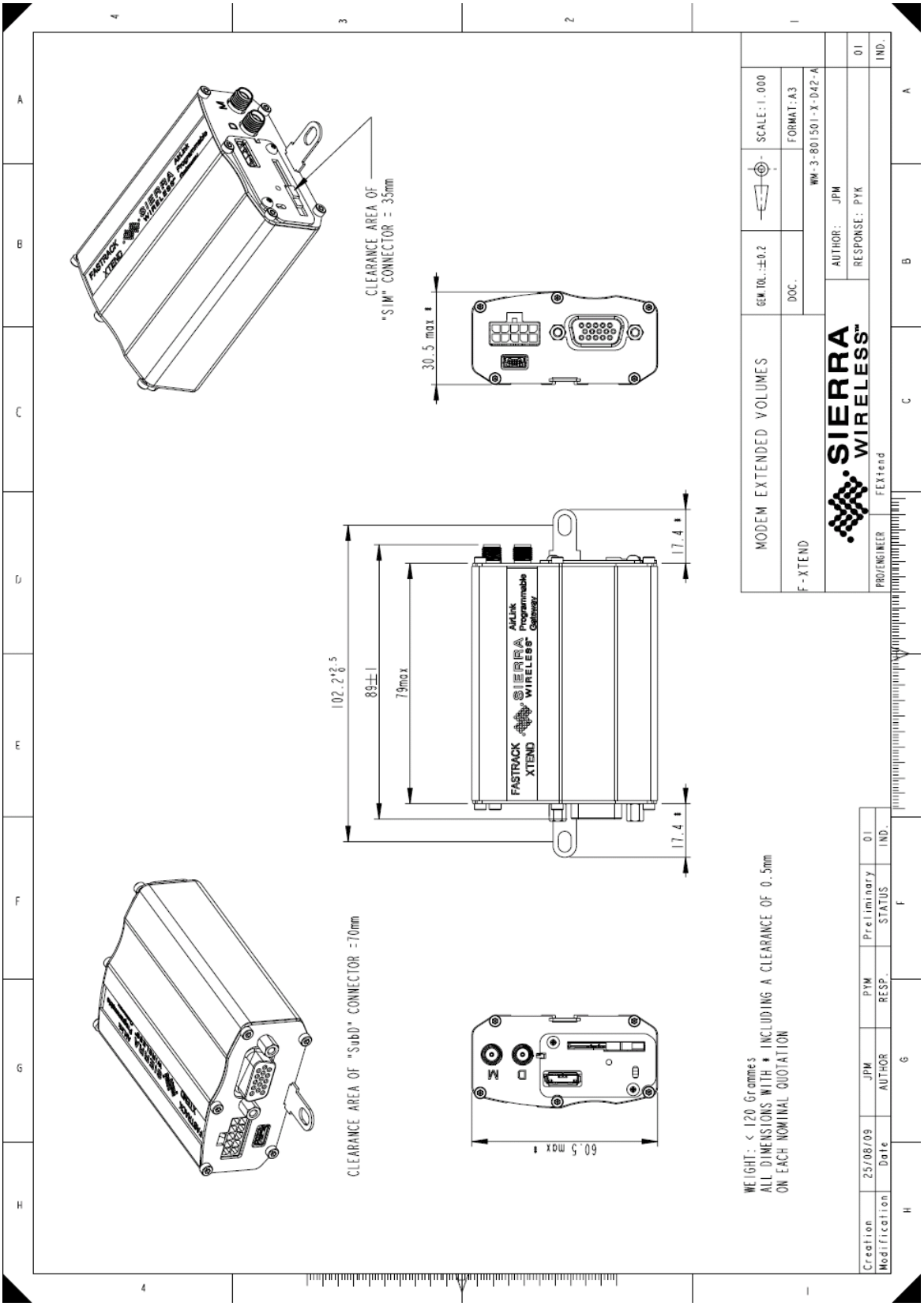


Figure 4. Fastrack Xtend Mechanical Drawing

5. Interfaces

This section describes the different interfaces that connect with the Fastrack Xtend. The Fastrack Xtend comes with the following interfaces:

- 10-pin Micro-Fit Connector
- USB Interface
- 15-pin Sub-D Serial Interface
- Main RF Interface
- Secondary RF Interface (for FXT003 and FXT004 only)
- SIM Interface (not available for FXT004)
- LED Status Indicator

5.1. Front Interface

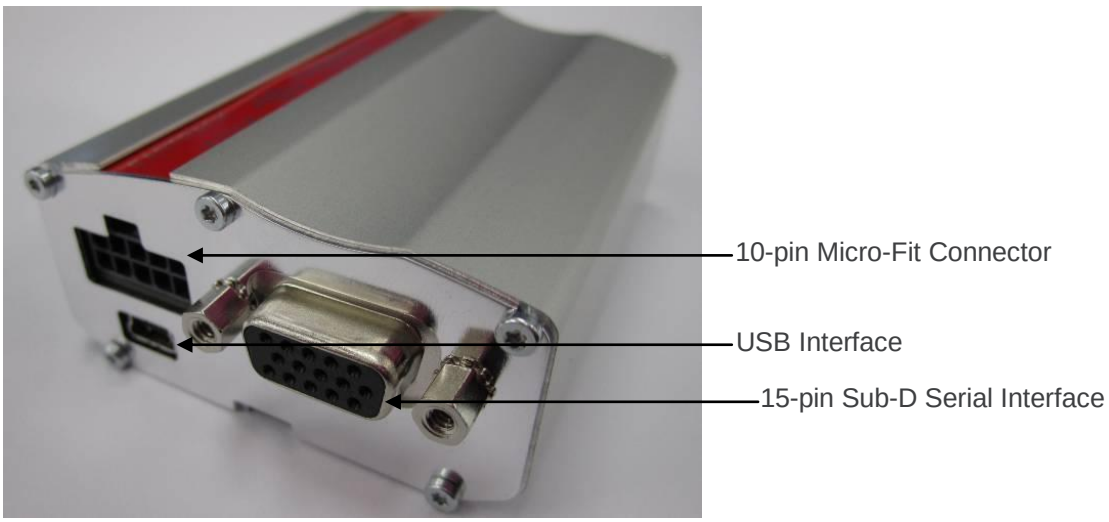


Figure 5. Fastrack Xtend Front Interface

5.1.1. Power Supply Connector

The power supply connector is a 10-pin Micro-Fit connector that is used for:

- External DC Power Supply connection with voltage from +4.75V* to +32V at 3A
- GPIOs connection and GPIO voltage reference
- External Optional battery interface
- ON/OFF pin to power OFF the Fastrack Xtend

*Note: * 4.75V/3A is the minimum operating voltage/current condition on FXT002, FXT009 and FXT010.*

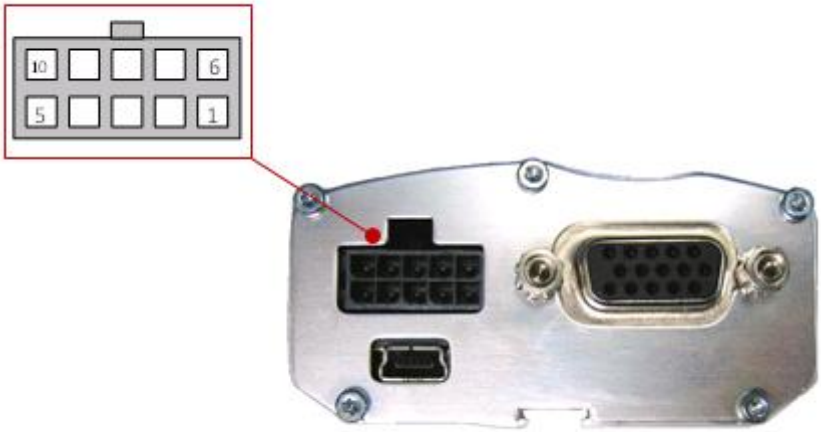


Figure 6. Power Supply Connector

Refer to the following table for the pin description of the power supply connector.

Table 8. Power Supply Connector Pin Description

Pin #	Signal in FXT001/ FXT002/ FXT003/ FXT009/ FXT010	Signal in FXT004	Description
1	GPIO25	GPIO44	General purpose input/output
2	GPIO21	GPIO42	General purpose input/output
3	**Vref**	**Vref**	Voltage reference for the GPIOs
4	Reserved	Reserved	Reserved for battery accessory
5	Reserved	Reserved	Reserved for battery accessory
6	GND	GND	Ground
7	DC-IN	DC-IN	Input Supply for the Fastrack Xtend (4.75V to 32V)
8	ON/OFF	ON/OFF	Control pin to power OFF the Fastrack Xtend
9	Reserved	Reserved	Reserved for battery accessory
10	Reserved	Reserved	Reserved for battery accessory

The input voltage range (DC-IN) is from 4.75V to 32V, with a typical operating voltage of 13.2V.

The power cable is provided as part of the Fastrack Xtend package.

Caution: *Pins 1, 2, 3, 4, 5, 8, 9 and 10 are low voltage interfaces. It is strictly prohibited to connect these pins to any power supply as there is a risk of damaging the Fastrack Xtend.*

5.1.1.1. General Purpose Input/Output

The Fastrack Xtend has two external GPIO ports, GPIO21 and GPIO25; as well as a voltage reference line, **Vref**.

Note: For FXT004, GPIO42 and GPIO44 refers to the two external GPIO ports available on the Power supply connector. Refer to Table 8 Power Supply Connector Pin Description for more information.

Vref sets the reference voltage of the input or output of the two GPIOs. Leaving it unconnected sets the GPIO level at 2.3V – 2.6V by default. It is **strongly** recommended to connect to the required GPIOs' output voltage (2.8V ~ 15V).

Refer to the following table for the pin description of the GPIOs.

Table 9. GPIO Pin Description

Pin #	Signal	I/O	I/O Voltage	Description
1	GPIO21	I/O	**Vref**	General purpose input/output
2	GPIO25	I/O	**Vref**	General purpose input/output
3	**Vref**	I	2.8V ~ 15V	Voltage reference for the GPIOs

*Note: It is recommended to use a **6-wire cable accessory** for easy access to these three lines. Please refer to section 14.1 Standard Accessories for more information about the 6-wire cable accessory.*

*When the voltage reference, **Vref**, is not connected, if one of the GPIO output is in High state while the other is in Low state, the GPIO in high level voltage will be at 2.3V.To avoid this voltage drop, it is recommended to use **Vref** to the desired output voltage.*

With **Vref** connected to 2.8V, both GPIO21 and GPIO25 may be interfaced with a component that complies with the following levels.

Table 10. GPIO Pin Operating Conditions when Vref is at 2.8V

Parameter	Mininum	Typical	Maximum	Condition
V_{IL}			0.84V	Please refer to Figure 7.
V_{IH}	1.96V			Please refer to Figure 8.
V_{OL}			0.4*	Please refer to Figure 9.
V_{OH}	2.8*			FXT Zout = 100K Pull-up to **Vref**, please refer to Figure 10.

* Value without external load.

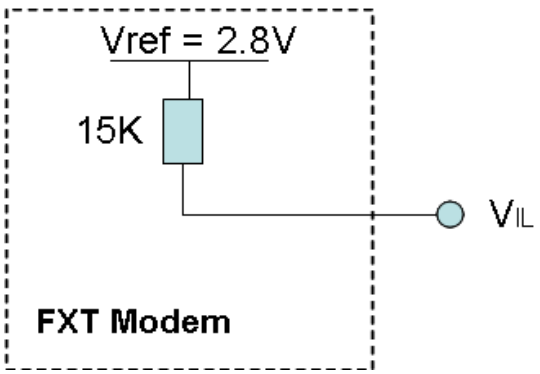


*Figure 7. Equivalent Circuit of V_{IL}, **Vref** = 2.8V*

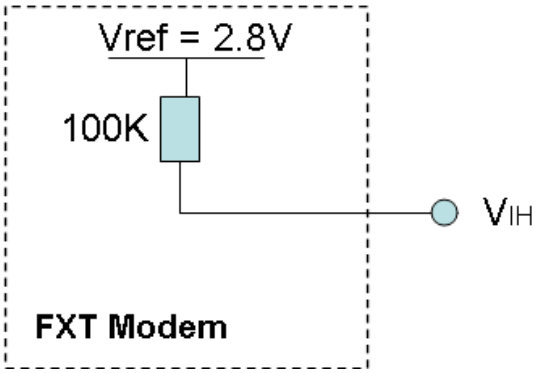


*Figure 8. Equivalent Circuit of V_{IH}, **Vref** = 2.8V*

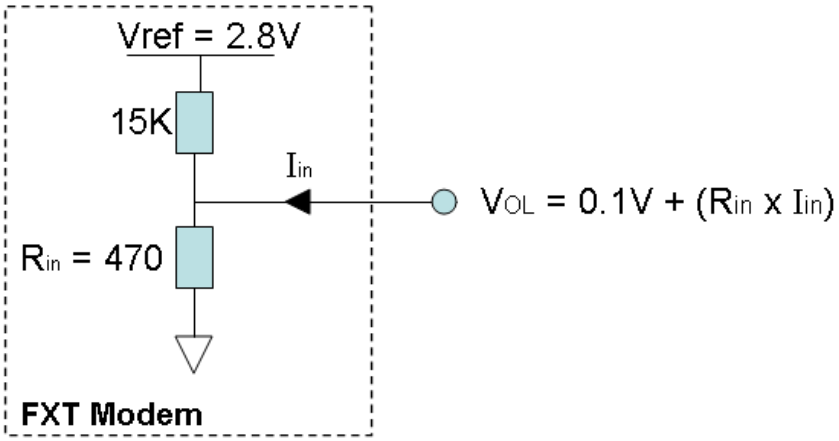


*Figure 9. Equivalent Circuit of V_{OL}, **Vref** = 2.8V*

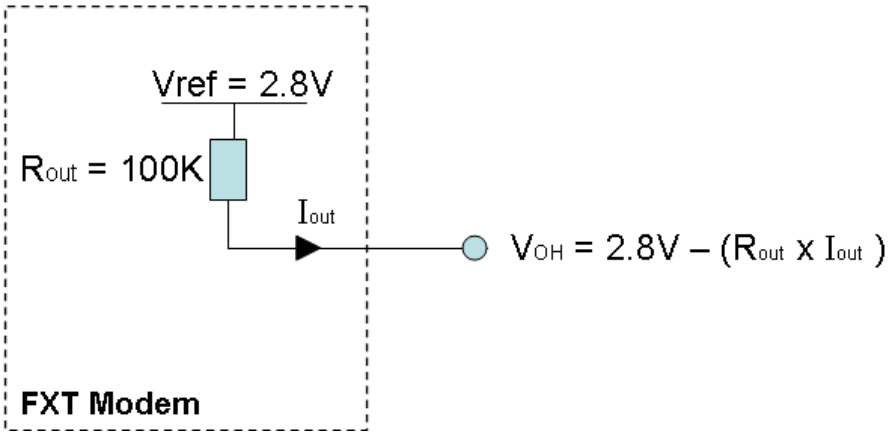


*Figure 10. Equivalent Circuit of V_{OH}, **Vref** = 2.8V*

With **Vref** > 2.8V, both GPIO21 and GPIO25 may be interfaced with a component that complies with the following levels.

Table 11. GPIO Pin Operating Conditions when Vref > 2.8V

Parameter	Min	Typ	Max	Condition
V_{IL}			0.84V	Please refer to Figure 11.
V_{IH}	1.96V			Please refer to Figure 12.

Parameter	Min	Typ	Max	Condition
V_{OL}			$\frac{Vref}{110} + 0.058^{*}$	Please refer to Figure 13.
V_{OH}	**Vref***			FXT Zout = 100K Pull-up to **Vref**, please refer to Figure 14.

* Value without external load.

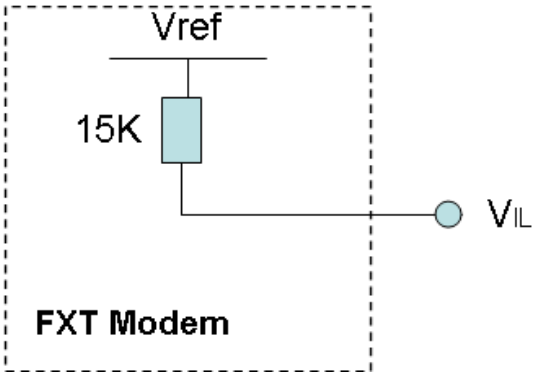


*Figure 11. Equivalent Circuit of V_{IL}, **Vref** > 2.8V*

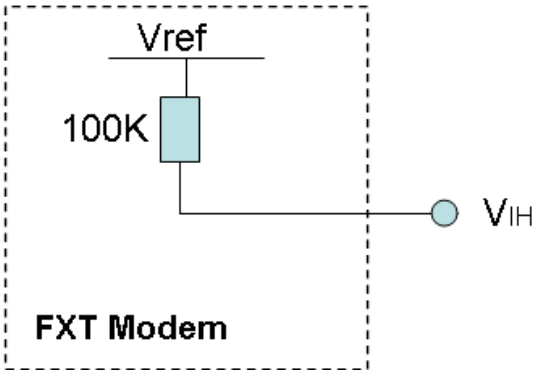


*Figure 12. Equivalent circuit of V_{IH}, **Vref** > 2.8V*

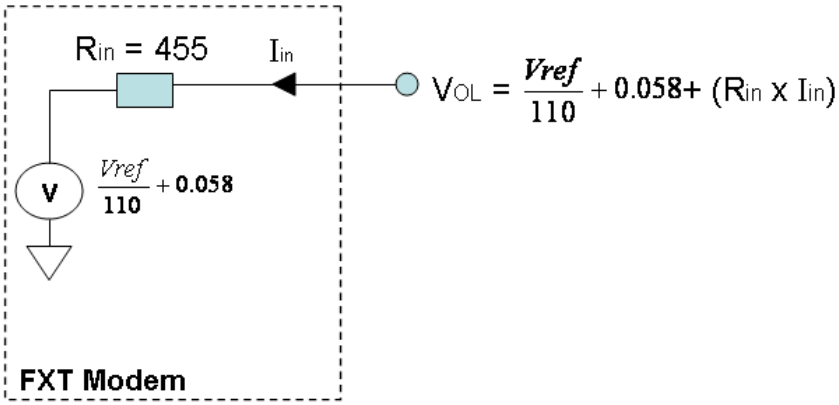


*Figure 13. Equivalent circuit of V_{OL}, **Vref** > 2.8V*

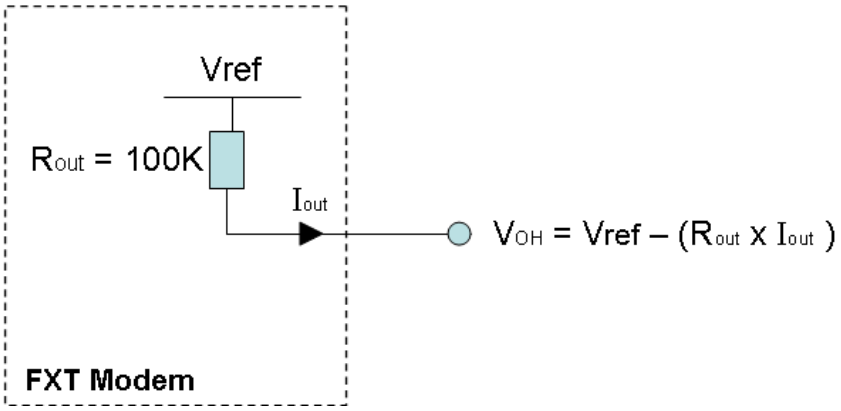


*Figure 14. Equivalent circuit of V_{OH}, **Vref** > 2.8V*

The GPIO pin is mainly used to:

- Act as a switch for a transistor when the GPIO is configured as output.
- Act as a status reading when the GPIO is configured as input.

The GPIOs may be controlled with the following AT commands:

- **AT+WIOW** for write access to the GPIO value, when the GPIO is used as an output
- **AT+WIOR** for read access to the GPIO value, when the GPIO is used as an input

By default, and when the Fastrack Xtend has been reset, both GPIOs are configured as inputs. The AT command **AT+WIOM** must be used to change this configuration. Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information regarding this AT command.

5.1.1.1.1. Setting the GPIO as an Output

Refer to the following example for how to configure the GPIO as an output.

- Enter the following commands:
  - **AT+WIOM=1,"GPIO21",1,0** → this command activates GPIO21 as an output and sets it at a low level.
  - **AT+WIOW="GPIO21",1** → this command sets the output level of GPIO21 to HIGH.

5.1.1.1.2. Setting the GPIO as an Input

Refer to the following example for how to configure the GPIO as an input.

- Enter the following commands:
  - **AT+WIOM=1,"GPIO21",0** → this command activates GPIO21 as an input.
  - **AT+WIOR="GPIO21"** → this command reads the GPIO21 level and returns the value "1" which represents a HIGH level.
- Pull the GPIO21 pin to GND, and read again. The return value should now be "0" which represents a LOW level.

Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information regarding AT commands.

Note: *The **AT+WIOM** command is not required for FXT004. The **AT+WIOW** and **AT+WIOR** commands will automatically set the GPIO to the desired mode. For example, **AT+WIOW=42,1** will set GPIO42 to output mode and in High state.*

Caution: *Some AT commands and features in this section are not available in FXT004. Refer to section 2 Features and Services and document [10] AirPrime Q26 Elite Software User Guide and AT Commands Interface Specification for more information on which AT commands and features are available in FXT004.*

5.1.1.2. ON/OFF Pin

The Fastrack Xtend has an external ON/OFF pin which is used to turn the device ON or OFF. The following table describes the operation of this pin.

Table 12. ON/OFF Pin Operation

Condition	State	Power Supply	Operation
1	Open	When 4.75V to 32V supply is applied.	The Fastrack Xtend is turned ON.
2	Pulled to GND	When 4.75V to 32V supply is applied.	The Fastrack Xtend remains OFF.
3	Left open when turning ON the Fastrack Xtend, then pulled to GND	4.75V to 32V supply is initially applied.	The Fastrack Xtend remains ON and will remain ON until **AT+CPOF** is sent to turn the device OFF.

To enable the low power mode, the user may simply pull the ON/OFF pin to GND and send **AT+CPOF** to the Fastrack Xtend using a communication software such as a HyperTerminal.

Note: *The **AT+CPOF** command is not supported in FXT004. The **AT+CFUN=0** command is used instead.*

Table 13. ON/OFF Pin Description

Pin #	Signal	I/O	I/O Voltage	Description
8	ON/OFF	I	4V	Pin to turn the Fastrack Xtend ON/OFF.

Refer to the power consumption tables in section 12 Power Consumption for the power consumption values when the Fastrack Xtend is in Alarm mode (Low Power mode).

5.1.2. Serial Interface

A SUB-D 15-pin connector is available as a serial interface to directly communicate with the Fastrack Xtend. This serial interface is used for:

- RS232 serial link connection
- Audio lines connection (microphone and speaker)
- BOOT signal connection
- RESET signal connection

Figure 15. 15-Pin Serial Connector

Refer to the following table for the pin description of the 15-pin serial connector.

Table 14. Serial Connector Pin Description

Pin #	Signal	I/O	I/O Type	Reset State	Description
1	CT109/DCD	O	+/- 5.5V	Undefined	Data Carrier Detect
2	CT103/TXD	I	+/- 5.5V	Z	Transmit Serial Data
3	BOOT	I	1V8		BOOT. This signal must not be connected. Its use is strictly reserved for Sierra Wireless or competent retailers.
4	CMIC2P	I	Analog		Microphone positive input
5	CMIC2N	I	Analog		Microphone negative input
6	CT104/RXD	O	+/- 5.5V	1	Receive Serial Data
7	CT107/DSR	O	+/- 5.5V	Z	Data Set Ready
8	CT108-2/DTR	I	+/- 5.5V	Z	Data Terminal Ready
9	GND		GND		Ground
10	CSPK2P	O	Analog		Speaker positive input
11	CT106/CTS	O	+/- 5.5V	Z	Clear To Send
12	CT105/RTS	I	+/- 5.5V	Z	Request To Send
13	CT125/RI	O	+/- 5.5V	Undefined	Ring Indicator
14	RESET	I/O	1V8		Fastrack Xtend Reset
15	CSPK2N	O	Analog		Speaker negative input

5.1.2.1. RS232 Serial Link Connection

Also known as the main serial link, the RS232 interface performs the voltage level adaptation (V24/CMOS ⇔ V24/V28) between the internal Fastrack Xtend (DCE) and external applications (DTE).

The signals available on the RS232 serial link are as follows:

- TX data (CT103/TXD)
- RX data (CT104/RXD)
- Request To Send (CT105/RTS)
- Clear To Send (CT106/CTS)
- Data Terminal Ready (CT108-2/DTR)
- Data Set Ready (CT107/DSR)
- Data Carrier Detect (CT109/DCD)
- Ring Indicator (CT125/RI)

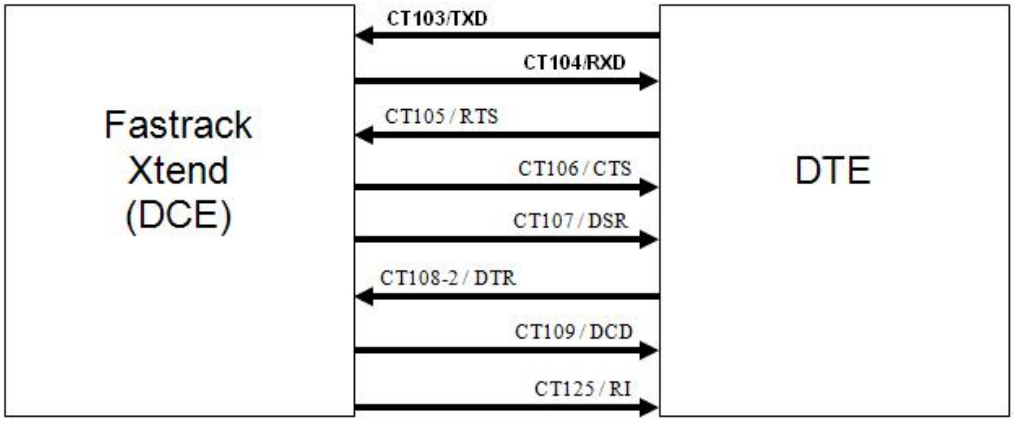


Figure 16. RS232 Serial Link Signals

The RS232 interface has been designed to allow flexibility in the use of the serial interface signals. However, the use of TXD, RXD, CTS and RTS signals are mandatory; while the use of DTR, DSR, DCD and RI signals are optional.

Tip: *The Fastrack Xtend is designed to operate using all serial interface signals and it is recommended to use CT105/RTS and CT106/CTS for hardware flow control in order to avoid data corruption during transmission.*

The Fastrack Xtend also implements the Serial Port Auto Shut Down feature with the DTR signal. It is recommended to use the CT108-2/DTR signal to benefit from the current consumption improvement performed by this feature.

5.1.2.1.1. RS232 Implementation

The following subsections describe how the RS232 serial link can be implemented to suit different designs.

5.1.2.1.1.1. 5-wire Serial Interface RS232 Implementation

The signals used in this interface are as follows:

- CT103/TXD
- CT104/RXD
- CT105/RTS
- CT106/CTS
- CT108-2/DTR

Note: The CT108-2/DTR signal must be managed following the V24 protocol signaling if the Sleep Idle Mode and Serial Port Auto Shut Down feature are to be used.

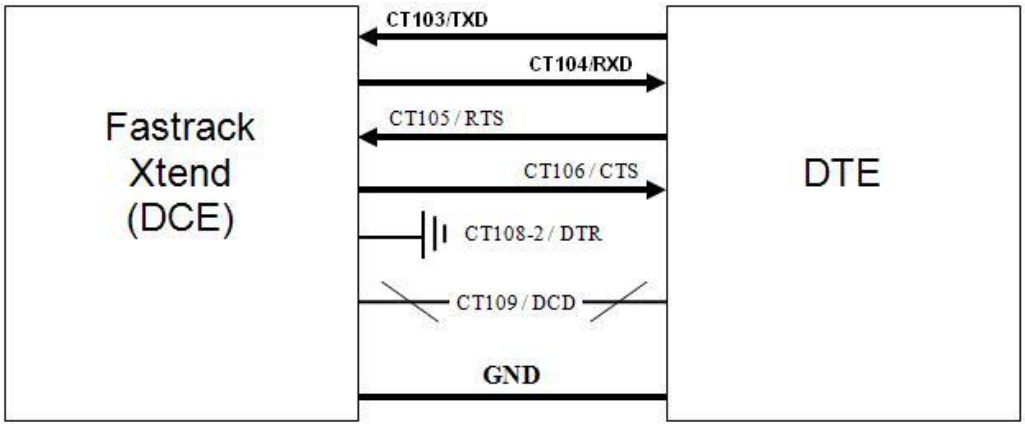


Figure 17. V24 Serial Link Implementation for a 5-wire UART

5.1.2.1.1.2. 4-wire Serial Interface RS232 Implementation

The signals used in this interface are as follows:

- CT103/TXD
- CT104/RXD
- CT105/RTS
- CT106/CTS

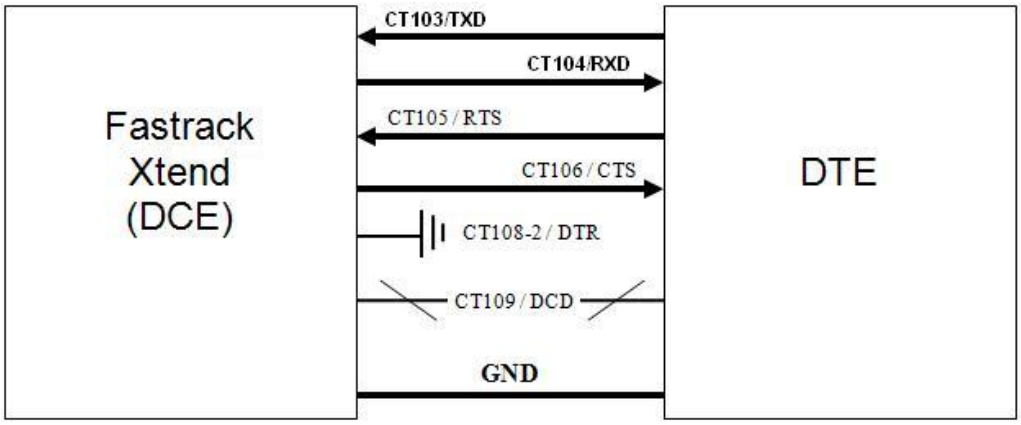


Figure 18. V24 Serial Link Implementation for a 4-wire UART

5.1.2.1.1.3. 2-wire Serial Interface RS232 Implementation

The signals used in this interface are as follows:

- CT103/TXD
- CT104/RXD

Note: Although this case is possible, it is not recommended.

The flow control mechanism must be managed from the customer end.

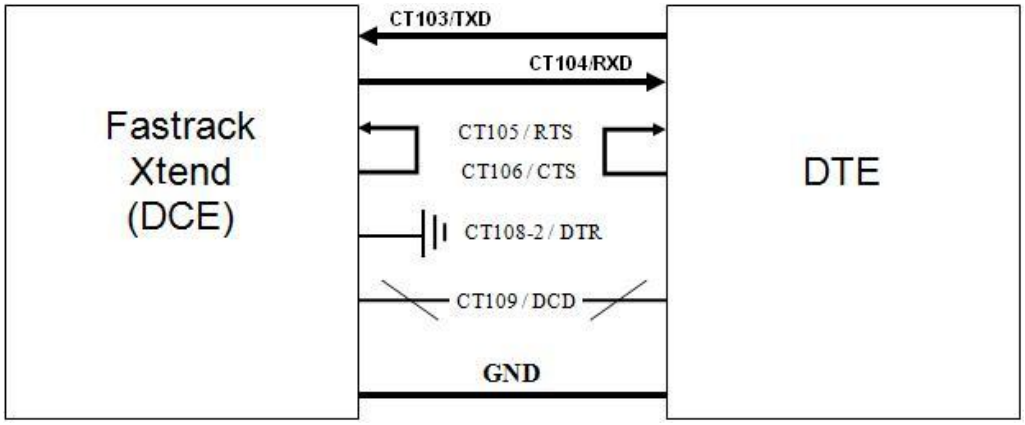


Figure 19. V24 Serial Link Implementation for a 2-wire UART

The CT105/RTS and the CT106/CTS signals are not used in this configuration. Configure the AT command **AT+IFC=0,0** to disable the flow control function. Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information regarding AT Commands.

For more information on how to use the RS232 serial link to communicate with the Fastrack Xtend, refer to section 5.1.2.1 RS232 Serial Link Connection.

5.1.2.2. Autobauding Mode

The autobauding mode allows the Fastrack Xtend to detect the baud rate used by the DTE connected to the RS232 serial link. The autobauding mode is controlled by AT commands. Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information.

Note: This feature is not supported in FXT004.

5.1.2.3. Serial Port Auto Shut Down Feature

The RS232 serial link can be shut down when there is no activity between the DTE and the Fastrack Xtend. This can help improve the power consumption performance.

The Serial Port Auto Shut Down feature is controlled by the AT command **AT+WASR**. Enter:

- **AT+WASR=1** to enter the serial port auto shut down mode
- **AT+WASR=0** to exit the serial port auto shut down mode

Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information on AT commands.

Note: This feature is not supported in FXT004.

Caution: *GPIO24 is reserved for serial port auto shut down feature. It is prohibited for customer use. Improper access to GPIO24 by customers may lead to unexpected behavior on serial port performance.*

It is prohibited to use the serial port auto shut down feature when the CT108-2/DTR is not used in the application. Otherwise, there will be data lost from the DTE side to the Fastrack Xtend.

5.1.2.4. Audio Lines Connection

The Fastrack Xtend supports one microphone input and one speaker output.

5.1.2.4.1. Microphone

The microphone inputs are connected in differential mode to reject common mode noise and TDMA noise. The microphone inputs have already included biasing for an electrets microphone (0.5mA and 2V) and are ESD protected. This electrets microphone may be directly connected to these inputs allowing an easy connection to a headset.

The microphone gain can be adjusted by **AT+VGT** and the transmit digital gain can be adjusted by **AT+WDGT**. Refer to [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information about these AT commands.

Table 15. Microphone Pin Description

(Sub D 15-pin) Pin #	Signal	I/O	I/O Type	Description
4	CMIC2P	I	Analog	Microphone positive input
5	CMIC2N	I	Analog	Microphone negative input

Table 16. Equivalent Circuits of CMIC2

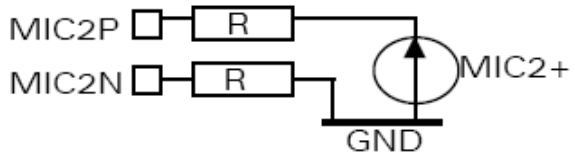
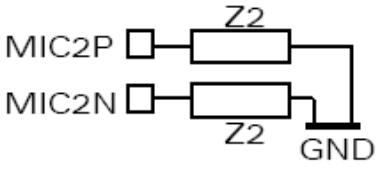
DC Equivalent Circuit	AC Equivalent Circuit
	

Table 17. Electrical Characteristics of CMIC2

Parameters		Min	Typ	Max	Unit
Internal biasing DC Characteristics	MIC2+	2	2.1	2.2	V
	Output current		0.5	1.5	mA
	R2	1650	1900	2150	Ω
AC Characteristics 200 Hz<F<4 kHz	Z2 CMIC2P (CMIC2N=Open)	1.1	1.3	1.6	kΩ
	Z2 CMIC2N (CMIC2P=Open)				
	Z2 CMIC2P (CMIC2N=GND)	0.9	1.1	1.4	
	Z2 CMIC2N (CMIC2P=GND)				
	Impedance between MIC2P and MIC2N	1.3	1.6	2	
Working voltage (MIC2P-MIC2N)	AT+VGT*=3500dB		13.8		mVrms
	AT+VGT*=2000dB		77.5		
	AT+VGT*=700dB		346		
Maximum rating voltage (MIC2P or MIC2N)	Positive			+7.35**	V
	Negative	-0.9			

* The input voltage depends of the input micro gain set by AT command. Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30).

** Because MIC2P is internally biased, it is necessary to use a coupling capacitor to connect an audio signal provided by an active generator. Only a passive microphone can be directly connected to the MIC2P and MIC2N inputs.

Refer to the following table for the list of recommended microphone characteristics.

Table 18. Recommended Microphone Characteristics

Feature	Values
Type	Electret 2V/0.5 mA
Impedance	Z = 2kΩ
Sensitivity	-40dB to -50dB
SNR	> 50dB
Frequency response	Compatible with GSM specifications

5.1.2.4.2. Speaker

The speaker outputs are connected in differential mode to reject common mode noise and TDMA noise.

Speaker outputs are connected to internal push-pull amplifiers and may be loaded down with components between 32 ~ 150Ω and up to 1nF. These outputs may be directly connected to a speaker.

The output power may be adjusted by 2dB steps. The gain of the speaker outputs is internally adjusted and may be tuned using the **AT+VGR** command. Furthermore, the digital gain can be adjusted using **AT+WDGR**. Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information about these AT commands.

The following table shows the pin assignments of the speaker outputs.

Table 19. Speaker Outputs Pin Description

(Sub D 15-pin) Pin #	Signal	I/O	I/O Type	Description
10	CSPK2P	O	Analog	Speaker positive output
15	CSPK2N	O	Analog	Speaker negative output

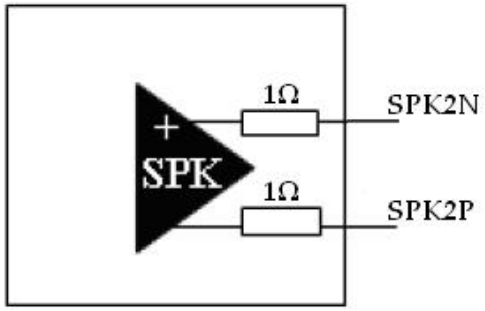


Figure 20. Equivalent Circuit of CSPK2 Speaker Outputs

Table 20. Electrical Characteristics of CSPK2

Parameters		Min	Typ	Max	Unit
Biasing voltage	CSPK2P and CSPK2N		1.30		V
Output swing voltage					
	RL=8Ω: AT+VGR=-1000*; differential	-	-	4	Vpp
	RL=32Ω: AT+VGR=-1000*; differential	-	-	5	Vpp
RL	Load resistance	6	8	-	Ω
IOUT	Output current; peak value; RL=8Ω	-	-	180	mA
POUT	RL=8Ω; AT+VGR=-1000*;	-	-	250	mW
RPD	Output pull-down resistance at power-down	28	40	52	kΩ
VPD	Output DC voltage at power-down	-	-	100	mV

* The output voltage depends of the output speaker gain set by AT command. Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30). This value is given in dB, but it's possible to toggle this to index value.

Refer to the following table for the list of recommended speaker characteristics.

Table 21. Recommended Speaker Characteristics

Feature	Values
Type	10mW, electro-magnetic
Impedance	Z = 30 to 50Ω
Sensitivity	110dB SPL min. (0dB = 20µPa)
Frequency response	Compatible with GSM specifications

5.1.3. USB Interface

Aside from the serial interface, the mini-USB interface (USB Slave) may also be used to directly communicate with the Fastrack Xtend.

This USB slave feature is also used for USB charging feature if the optional battery accessory is available. When plugged-in through the mini-USB interface, it will start the charging circuit.

When using with the optional battery accessory, ensure that the current limit of the USB slave is greater than 100mA.

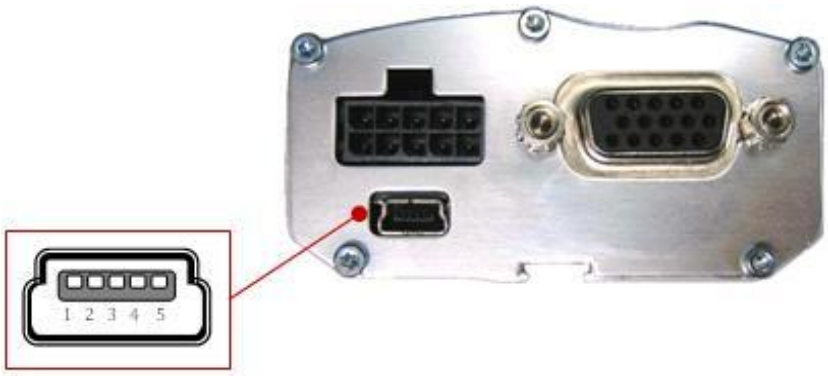


Figure 21. Mini-USB Connector

Refer to the following table for the pin description of the mini-USB connector.

Table 22. Mini-USB Pin Description

Pin #	Signal	Description
1	VBUS	+5V Power supply
2	D-	Differential data interface positive
3	D+	Differential data interface negative
4	ID	Not connected
5	GND	Ground

The USB slave interface complies with USB 2.0 protocol signaling and electrical interface.

The USB interface features:

- 12Mbit/s full speed transfer rate
- 3.3V type compatible
- USB Soft-connect feature

- Download feature is not supported by USB
- CDC 1.1 – ACM compliant

Table 23. USB Electrical Characteristics

Parameter	I/O	Min	Typ	Max	Unit
VBUS	I	4.75	5		V
D-, D+	I/O	3	3.3	3.6	V
VBUS Input current consumption*				100	mA

* Fastrack Xtend without battery accessory

The USB feature can be activated by using the **AT+WMFM=0,1,3** AT command. Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information regarding this AT command.

5.2. Back Interface

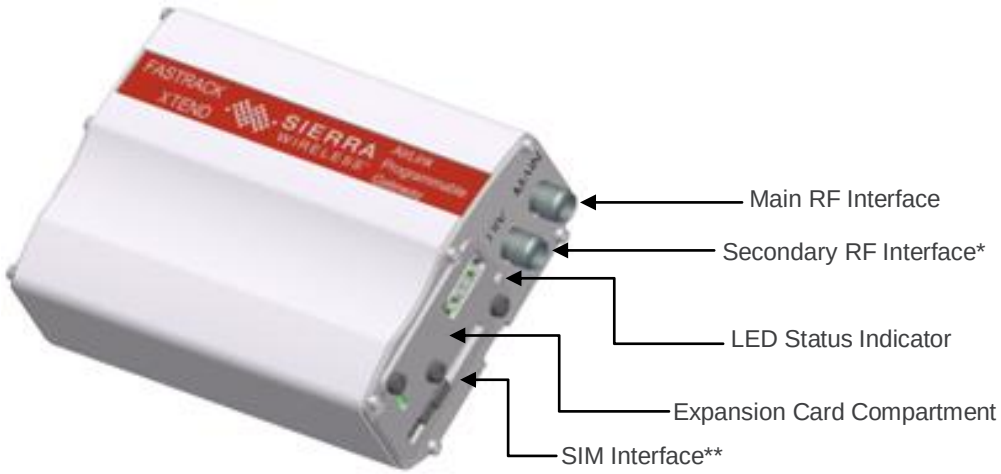


Figure 22. Fastrack Xtend Back Interface

*Note: * The secondary RF interface is only available for FXT003 and FXT004.*

*** The SIM interface is not available in FXT004.*

5.2.1. SIM Interface

A SIM card can be directly connected to the Fastrack Xtend through the embedded SIM socket. This interface controls 3V / 1V8 SIM cards and it is fully compliant with GSM 11.11 recommendations concerning SIM functions.

The SIM interface of the Fastrack Xtend is ESD protected. Transient overvoltage protections in ESD are internally added on the signals connected to the SIM interface in order to prevent any damage from electrostatic discharge.

The SIM interface uses 5 SIM signals, namely:

- SIM-VCC: SIM Power supply
- ~SIM-RST: Reset
- SIM-CLK: Clock
- SIM-IO: I/O Port
- SIMPRES: SIM card detection

5.2.1.1. SIM Socket Pin Description

Refer to the following table for the pin description of the SIM socket.

Table 24. SIM Socket Pin Description

Pin #	Signal	I/O	I/O Type	Reset State	Description
1	SIMVCC	O	2V9 / 1V8		SIM Power Supply
2	SIMRST	O	2V9 / 1V8	O	SIM RESET
3	SIMCLK	O	2V9 / 1V8	O	SIM Clock
7	SIMDATA	I/O	2V9 / 1V8	Pull up*	SIM DATA
8	SIMPRES	I	1V8	Pull low**	SIM Card Detect

* SIM-IO pull up is about 10KΩ.

** SIMPRES pull low is about 100KΩ.

5.2.2. Main RF Interface

The Fastrack Xtend's main antenna connector allows the transmission of radio frequency (RF) signals from the device to an external customer supplied antenna. This interface is an SMA type connector and its nominal impedance is 50Ω.

Figure 23. Main RF Connector for the FXT001, FXT002, FXT009 and FXT010

Refer to the following table for the transmission and reception frequency range based on band.

Table 25. Tx and Rx Frequency Range

	GSM 850	E-GSM 900	DCS 1800	PCS 1900
Transmission Frequency Range	824 to 849 MHz	880 to 915 MHz	1710 to 1785 MHz	1850 to 1910 MHz
Reception Frequency Range	869 to 894 MHz	925 to 960 MHz	1805 to 1880 MHz	1930 to 1990 MHz

Refer to section 14.4 Component Recommendations for the list of recommended antenna connectors.

5.2.2.1. RF Performances (For FXT001, FXT002, FXT009 and FXT010)

RF performances are compliant with ETSI recommendation GSM 05.05. Refer to the tables below for the main parameters used for both the Receiver and the Transmitter.

Table 26. Main Receiver Parameters for FXT001, FXT002, FXT009 and FXT010

Parameters	Values
GSM850 Reference Sensitivity	>-106dBm typical (Static & TUHigh)
E-GSM900 Reference Sensitivity	>-106dBm typical (Static & TUHigh)
DCS1800 Reference Sensitivity	>-106dBm typical (Static & TUHigh)
PCS1900 Reference Sensitivity	>-106dBm typical (Static & TUHigh)
Selectivity @ 200 kHz	> +9dBc
Selectivity @ 400 kHz	> +41dBc
Linear dynamic range	63dB
Co-channel rejection	>= 9dBc

Table 27. Main Transmitter Parameters for FXT001, FXT002, FXT009 and FXT010

Parameters	Values
Maximum output power (EGSM & GSM850)	33dBm +/- 2dB at ambient temperature
Maximum output power (GSM1800 & PCS1900)	30dBm +/- 2dB at ambient temperature
Minimum output power (EGSM & GSM850)	5dBm +/- 5dB at ambient temperature
Minimum output power (GSM1800 & PCS1900)	0dBm +/- 5dB at ambient temperature

5.2.2.2. Antenna Specifications

The antenna must meet the requirements specified in the table below.

The optimum operating frequency depends on the application. A dual-band or quad-band antenna should operate in these frequency bands and have the following characteristics.

Table 28. Antenna Specifications for FXT001, FXT002, FXT009 and FXT010

Characteristic		E-GSM 900	DCS 1800	GSM 850	PCS 1900
TX Frequency		880 to 915 MHz	1710 to 1785 MHz	824 to 849 MHz	1850 to 1910 MHz
RX Frequency		925 to 960 MHz	1805 to 1880 MHz	869 to 894 MHz	1930 to 1990 MHz
Impedance		50Ω			
VSWR	**Rx max**	1.5:1			
	Tx max	1.5:1			
Typical radiated gain		0dBi in one direction at least			

5.2.3. Secondary RF Interface

The Secondary RF interface is used in the FXT003 for 3G diversity antenna connection and in the FXT004 for GPS-L1 antenna connection. It is an SMA type connector and its nominal impedance is 50Ω.

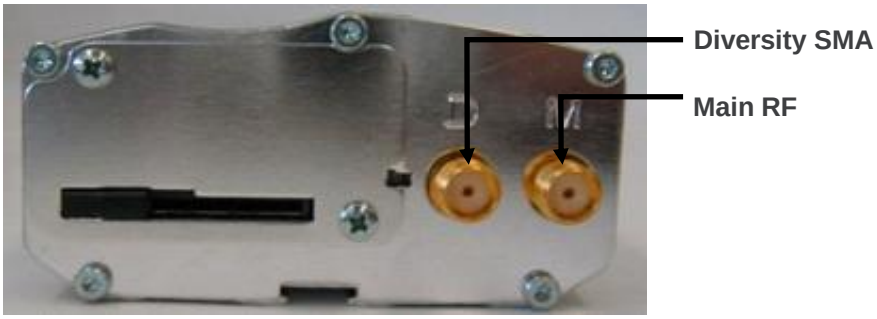


Figure 24. Secondary (Diversity) RF connector in FXT003 and FXT004

5.2.3.1. RF Performances (FXT003)

RF performances are compliant with ETSI recommendation GSM 05.05. Refer to the tables below for the main parameters used for both the Receiver and the Transmitter.

Table 29. Main Receiver Parameters for FXT003

Parameters	Values
GSM850 Reference Sensitivity	>-106dBm typical (Static & TUHigh)
E-GSM900 Reference Sensitivity	>-106dBm typical (Static & TUHigh)
DCS1800 Reference Sensitivity	>-106dBm typical (Static & TUHigh)
PCS1900 Reference Sensitivity	>-106dBm typical (Static & TUHigh)
3G Band I 2100 Reference Sensitivity	-106.7dBm typical (Static & TUHigh)
3G Band II 1900 Reference Sensitivity	-106.7dBm typical (Static & TUHigh)
3G Band V 850 Reference Sensitivity	-106.7dBm typical (Static & TUHigh)
Selectivity @ 200 kHz	> +9dBc
Selectivity @ 400 kHz	> +41dBc
Linear dynamic range	63dB
Co-channel rejection	>= 9dBc

Table 30. Main Transmitter Parameters for FXT003

Parameters	Values
Maximum output power (EGSM & GSM850)	33dBm +/- 2dB at ambient temperature
Maximum output power (GSM1800 & PCS1900)	30dBm +/- 2dB at ambient temperature
Minimum output power (EGSM & GSM850)	5dBm +/- 5dB at ambient temperature
Minimum output power (GSM1800 & PCS1900)	0dBm +/- 5dB at ambient temperature
Maximum output power (3G all band)	24dBm +1/ -3 dB at ambient temperature

5.2.3.2. Antenna Specifications

The antenna must meet the requirements specified in the table below.

The optimum operating frequency depends on the application. The antenna should operate in these frequency bands and should have the following characteristics.

Table 31. Antenna Specifications for FXT003

Characteristic		E-GSM 900	DCS 1800	GSM 850 and HSPA band V	PCS 1900 and HSPA band II	HSPA band I
TX Frequency		880 to 915 MHz	1710 to 1785 MHz	824 to 849 MHz	1850 to 1910 MHz	1920 to 1980 MHz
RX Frequency		925 to 960 MHz	1805 to 1880 MHz	869 to 894 MHz	1930 to 1990 MHz	2110 to 2170 MHz
Impedance		50Ω				
VSWR	**Rx max**	1.5:1				
	Tx max	1.5:1				
Typical radiated gain		0dBi in one direction at least				

5.2.3.3. RF Performances (For FXT004)

Refer to the tables below for the main parameters used for both the Receiver and the Transmitter.

Table 32. Main Receiver Parameters for FXT004

Parameters	Values
Band Class 0 Receive Sensitivity	-106.6dBm minimum at all temperatures
Band Class 1 Receive Sensitivity	-106.1dBm minimum at all temperatures

Table 33. Main Transmitter Parameters for FXT004

Parameters	Values
Maximum output power (Band Class 0)	24dBm + 2dB/-1dB at all operating temperature
Maximum output power (Band Class 1)	24dBm + 2dB/-1dB at all operating temperature

5.2.3.4. Antenna Specifications for FXT004

The antenna must meet the requirements specified in the table below.

The optimum operating frequency depends on the application. A dual-band antenna should operate in these frequency bands and have the following characteristics.

Table 34. Antenna Specifications for FXT004

Characteristic		US Cellular (BC0)	US PCS (BC1)
TX Frequency		824 to 849 MHz	1850 to 1910 MHz
RX Frequency		869 to 894 MHz	1930 to 1990 MHz
Impedance		RF 50Ω	
		DC 10KΩ	
VSWR	Rx max	1.5:1	
	Tx max	1.5:1	
Polarization		Linear, vertical	
Typical radiated gain		0dBi in one direction at least	

5.2.3.5. GPS Antenna Specifications for FXT004

The GPS antenna must meet the requirements specified in the table below.

Table 35. GPS Antenna Specifications for FXT004

Characteristic		GPS L1
RX Frequency		1575.42 MHz
Impedance		RF 50Ω
VSWR max	Rx	1.5:1
LNA Bias Voltage		5V
LNA Current Consumption		40mA MAX
Polarization		Linear, vertical
Typical radiated gain		0dBi in one direction at least

6. Signals and Indicators

6.1. Alarm Mode

Note: *This feature is not supported in FXT004.*

The Fastrack Xtend can be turned on using the Alarm mode when power supply is applied. The Fastrack Xtend will remain in Low Power mode until the alarm is triggered to start the Fastrack Xtend up.

Note: *Refer to section 5.1.1.2 ON/OFF Pin for more information on how to turn the Fastrack Xtend ON or OFF using the ON/OFF pin.*

Table 36. Alarm Mode (Low Power Mode)

Steps	State	Power Supply	Operation
1	**AT+CALA="YY/MM/DD,HH:MM"**	4.75V to 32V supply is applied.	The alarm is set. The Fastrack Xtend remains ON.
2	Pulled ON/OFF PIN to GND	4.75V to 32V supply is applied.	The Fastrack Xtend remains ON.
3	**AT+CPOF**	4.75V to 32V supply is applied. (The ON/OFF signal remains at GND.)	The Fastrack Xtend turns OFF and will remain OFF until the Alarm mode is activated to turn the device ON.

Note: *The Fastrack Xtend's clock must be set before Alarm mode is activated. To set the clock, refer to the **AT+CCLK** command of document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30).*

6.2. BOOT Signal Connection

A specific control pin, BOOT, is available to download to the Fastrack Xtend. Specific PC software, provided by Sierra Wireless, is needed to perform this download, specifically for the first download of the Flash memory.

Caution: *This signal must not be connected. Its use is strictly reserved for Sierra Wireless or competent retailers.*

6.3. RESET Signal Connection

This signal is used to force a reset procedure by providing the Fastrack Xtend with a LOW level that lasts at least 200µs (when the power supply is already stabilized). It is activated by either an external Reset signal or by an internal signal (from the Reset generator); and is automatically driven by an internal hardware during the power ON sequence.

Note: *The Fastrack Xtend remains in Reset mode for as long as the Reset signal is held LOW.*

A software reset is always preferred to a hardware reset. Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information regarding software resets.

This signal may also be used to provide a reset to an external device when the pin is configured as an output. If no external reset is necessary, this input may be left open.

When used (as an emergency reset), it has to be driven by either an open collector or an open drain output.

Caution: *This signal is for emergency resets only.*

Table 37. Fastrack Xtend Reset Status

(Serial Port) Pin #	Signal	I/O	I/O Type	Voltage	Description
14	Reset	I/O	Open drain	1V8	Fastrack Xtend Reset

Table 38. Reset Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Input Impedance (R)*		100.3		kΩ
Input Impedance (C)		40		nF

* Internal pull-up

Table 39. Reset Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
~Reset time (Rt)[1]	200			µs
~Reset time (Rt)[2] (at power up only)	20	40	100	ms
Cancellation time (Ct)		34		ms
V_H*	0.57			V
V_{IL}	0		0.57	V
V_{IH}	1.33			V

* V_H = Hysterisis Voltage

1: This reset time is the minimum to be carried out on the ~Reset signal when the power supply is stabilized.

2: This reset time is internally carried out by the embedded module power supply supervisor only when the embedded module power supplies are powered ON.

6.3.1. Reset Sequence

To activate the Reset sequence, the Reset signal has to be set to LOW for a minimum of 200µs. As soon as the reset is done, the application can send the command **AT↵** and the AT interface will send an “OK” back to the application. If the application manages hardware flow control, the AT command may be sent during the initialization phase.

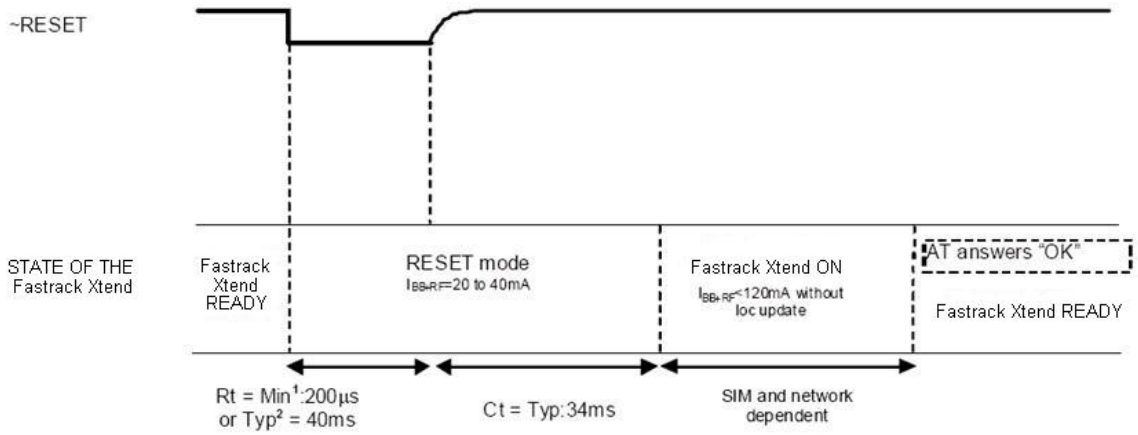


Figure 25. Reset Sequence Diagram

Another solution is to use the **AT+WIND** command to get an unsolicited status from the Fastrack Xtend. Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information regarding AT commands.

6.4. LED Status Indicator

The Fastrack Xtend has a red LED that indicates the current operational status of the device.

Table 40. Fastrack Xtend LED Status

Fastrack Xtend State	LED Status	Fastrack Xtend Status
ON	Permanently lighted	The Fastrack Xtend is switched ON, but not registered in the network.
	Flashing slowly LED is ON for 200ms, OFF for 2s	The Fastrack Xtend is switched ON and is registered in a network (Idle mode).
	Flashing rapidly LED is ON for 200ms, OFF for 600ms	The Fastrack Xtend is switched ON and is registered in a network (Non-Connected mode).
	Very quick flash LED is ON for 100ms, OFF for 200ns	The Fastrack Xtend is switched on, and the software downloaded is either corrupted or non-compatible (“BAD SOFTWARE”).
OFF	OFF	The Fastrack Xtend is either switched OFF, or the Flash LED has been disabled by the user*.

* The Flash LED can be disabled by the user when in Sleep mode in order to save power consumption. Refer to section 10.1 Enabling/Disabling the Flash LED and document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information on how to disable the Flash LED using an AT command.

6.5. Real Time Clock (RTC)

The Fastrack Xtend has implemented Real Time Clock for saving date and time when the Fastrack Xtend is unplugged from the DC power supply through the DC power cable.

Table 41. Real Time Clock Specifications

Item		Minimum	Typical	Maximum
Charging Time start from fully discharged to fully charged			15 Hours	
RTC Time Period*	Guaranteed		30 Hours	
	Not guaranteed		60 Hours	

* This RTC time period is measured when the RTC battery is fully charged before the Fastrack Xtend is unplugged from the DC power source.

* This RTC time period is for temperature from -20°C to +60°C. Once the operating/storage temperature is beyond this range, this time period is not guaranteed..

Caution: *When the Fastrack Xtend is shipped out, the charging voltage of the RTC battery is not guaranteed. Once the Fastrack Xtend is on power, the RTC battery will start charging and the RTC feature can then be resumed.*

7. Expansion Card

7.1. Expansion Card Compartment

The Expansion Card compartment allows users to easily expand the Fastrack Xtend's features (IO+GPS, Ethernet expander) for their own applications.

7.1.1. Back Plate Screws

Unscrew the two back plate screws to remove the back plate and open the Expansion Card compartment.

Figure 26. Fastrack Xtend Expansion Card Compartment

7.1.2. 50-pin Expansion Card Connector

The high density 50-pin Expansion Card connector is used for interfacing the Expansion Card with the Fastrack Xtend motherboard.

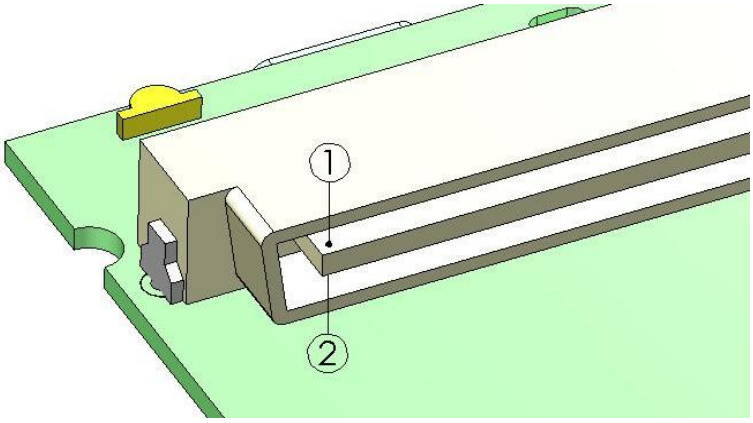


Figure 27. 50-pin Expansion Card Connector

Table 42. 50-pin Expansion Card Connector Description

Pin #	Pin Description	Pin #	Pin Description
1	GND	26	RTS2

Pin #	Pin Description	Pin #	Pin Description
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 Fastrack Xtend
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 Fastrack Xtend
22	SPI2-I	47	4V supply from the Fastrack Xtend
23	RXD2	48	GND
24	TXD2	49	GND
25	CTS2	50	GND

7.2. Expansion Card Physical Description

Refer to the figure below for the physical dimensions of the Expansion Card.

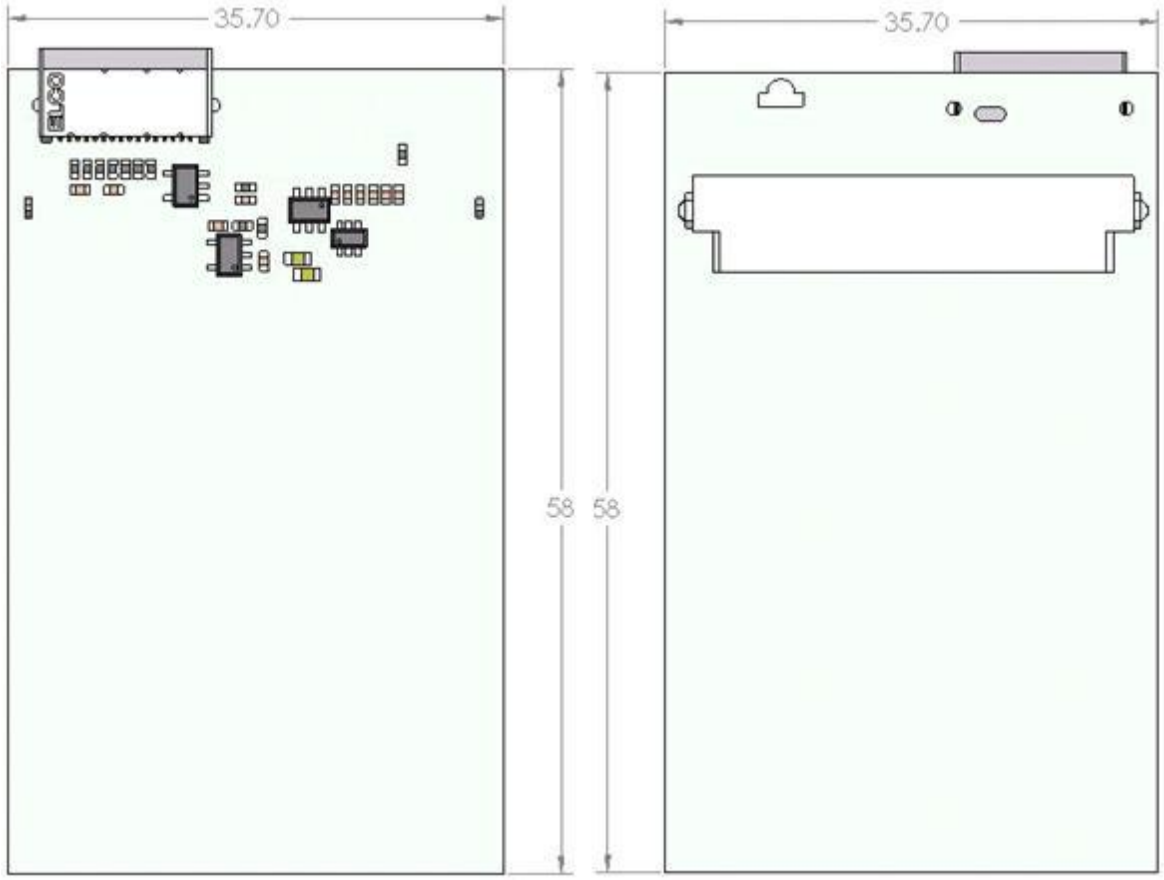


Figure 28. Expansion Card Size

7.3. Expansion Card Design Suggestion

Refer to the following diagram for suggested dimensions when using a customized expansion card.

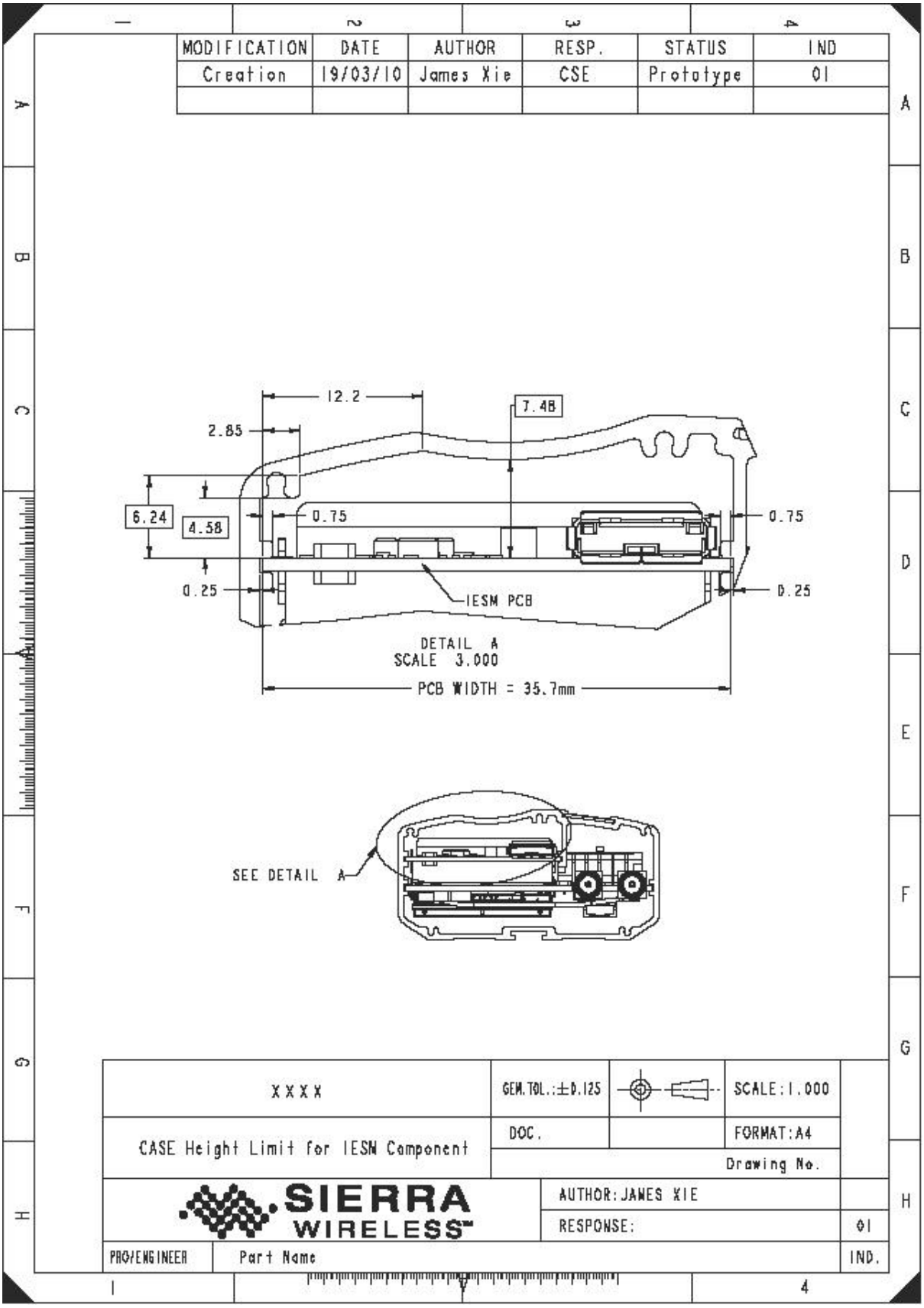


Figure 29. Suggested Expansion Card Dimension

7.4. Supported Expansion Cards

The Fastrack Xtend supports two types of Expansion Cards.

Table 43. Expansion Card Types for the Fastrack Xtend

Part Number	Function	Supplier
FXTE01	IO+GPS Expansion Card	Sierra Wireless
FXTE02	ETHERNET Expansion Card	Sierra Wireless
EC0020	RS485 + Isolated Digital Inputs	Sierra Wireless

7.4.1. Ethernet

The basic features of the Ethernet Expansion Card are summarized in the table below.

Table 44. Basic Features of the Ethernet Expansion Card

Features	Description
Sierra Wireless Software Suite	Sierra Wireless Software Suite programmable: • Native execution of embedded standard ANSI C applications • Custom AT command creation • Custom application library creation • Standalone operation
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
Interfaces	• AT command set based on V.25 or later and GSM 07.05 & 07.07 • Interface for embedded application

7.4.1.1. Ethernet Expansion Card Installation

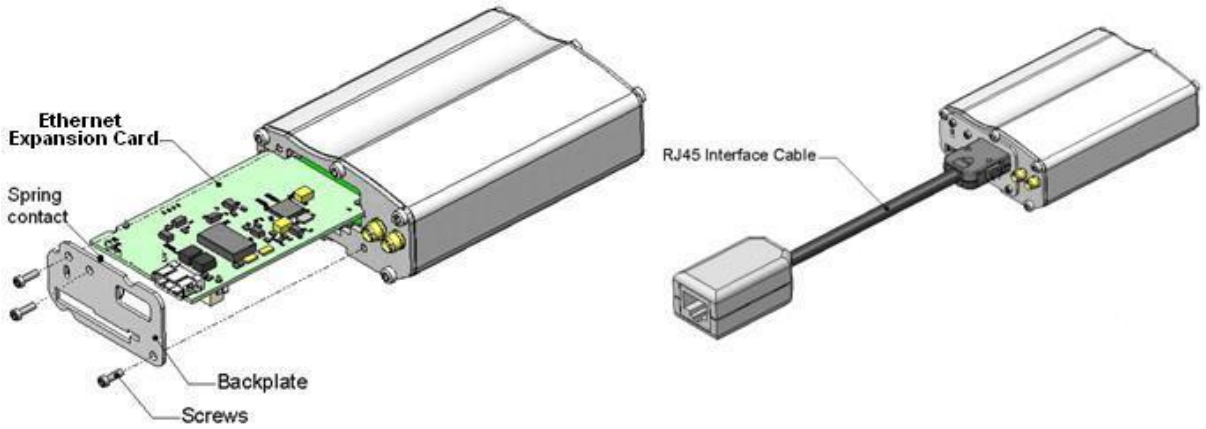


Figure 30. Installation of Ethernet Expansion Card on the Fastrack Xtend

7.4.1.2. Board Architecture

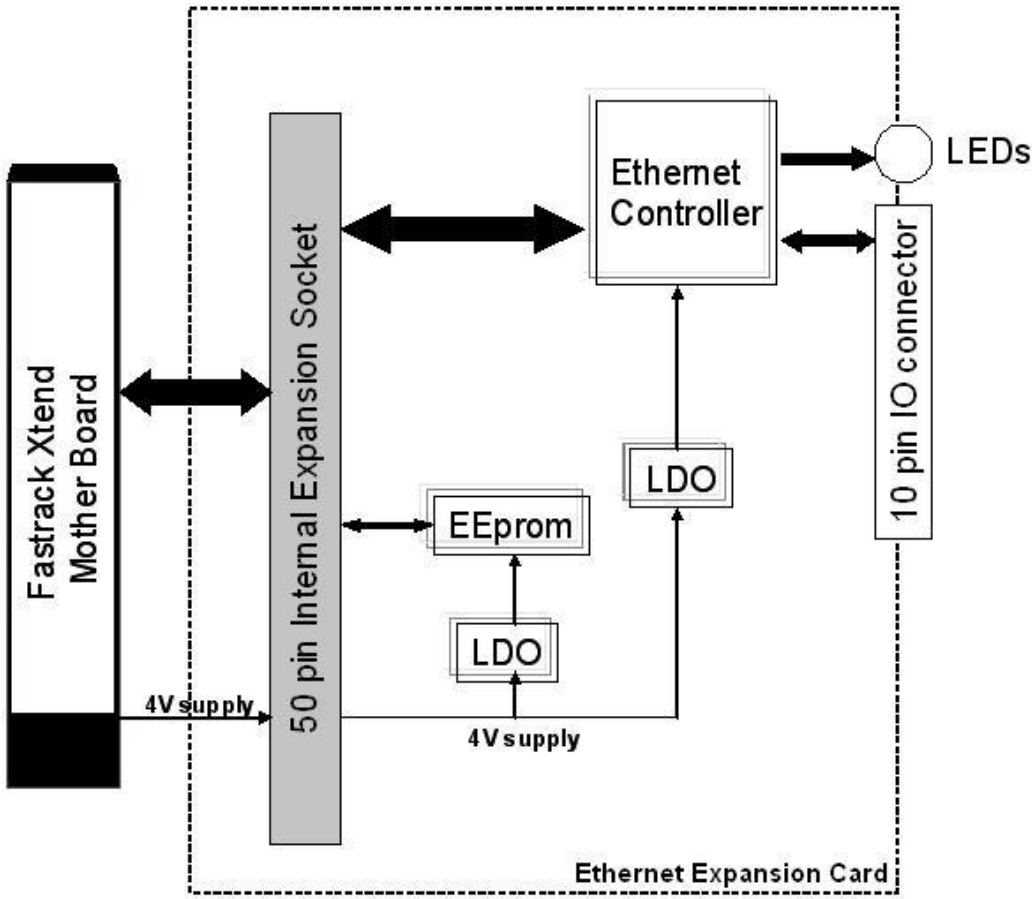


Figure 31. Ethernet Expansion Card Architecture

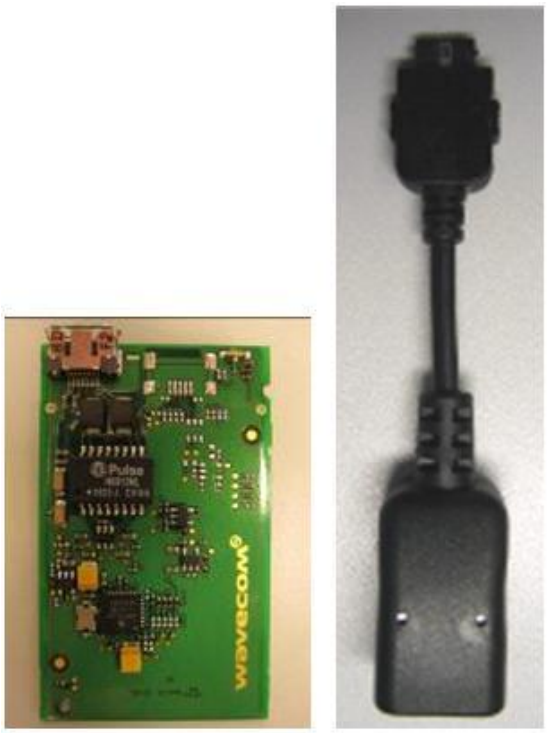


Figure 32. Ethernet Expansion Card with RJ-45 Interface Cable

The 10-Pin Interface Socket is an external interface for the RJ-45 cable.

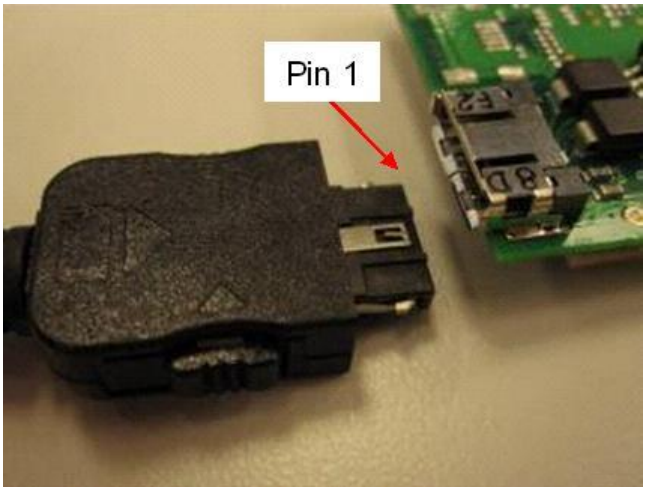


Figure 33. 10-Pin Interface Socket

Table 45. 10-Pin Interface Socket Description

Pin #	Description Name
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

7.4.1.3. Mechanical Characteristics

Table 46. Mechanical Characteristics

PCB Dimensions	58mm x 35.7mm x 1mm
Overall Dimension	59.5 x 35.7 x 10.01mm (including connectors)
Weight	< 10 grams

7.4.1.4. Power Supply

Table 47. Electrical Characteristics

Operating Voltage	4V DC

Note: The Ethernet Expansion Card is powered once the enable pins are activated by the Sierra Wireless Software Suite.

7.4.1.5. Extra Current Consumption from the DC-IN Source

Depending on various DC-IN voltages of the Fastrack Xtend, the extra current consumption drawn by the Ethernet Expansion Card will also vary.

Table 48. Extra Current Consumption from DC-IN Source (Typical)

Condition		Extra Current Consumption for Additional Feature (mA)		
Fastrack Xtend 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
	On Communication	185mA	52.9mA	24.2mA

7.4.2. IO+GPS

The IO+GPS Expansion Card is interfaced with the Fastrack Xtend motherboard through the 50-pin connector. All DC supplies are applied through this connector so no external supply is necessary.

With the Sierra Wireless Software Suite running, the Fastrack Xtend motherboard communicates with the IO+GPS Expansion Card on UART2. The GPS module communicates on UART2 using the following configuration:

- Baud rate: 57600 bps
- Character framing: 8 Data bits
- Parity: 1 Stop bit and Odd Parity
- Flow Control: No Flow Control

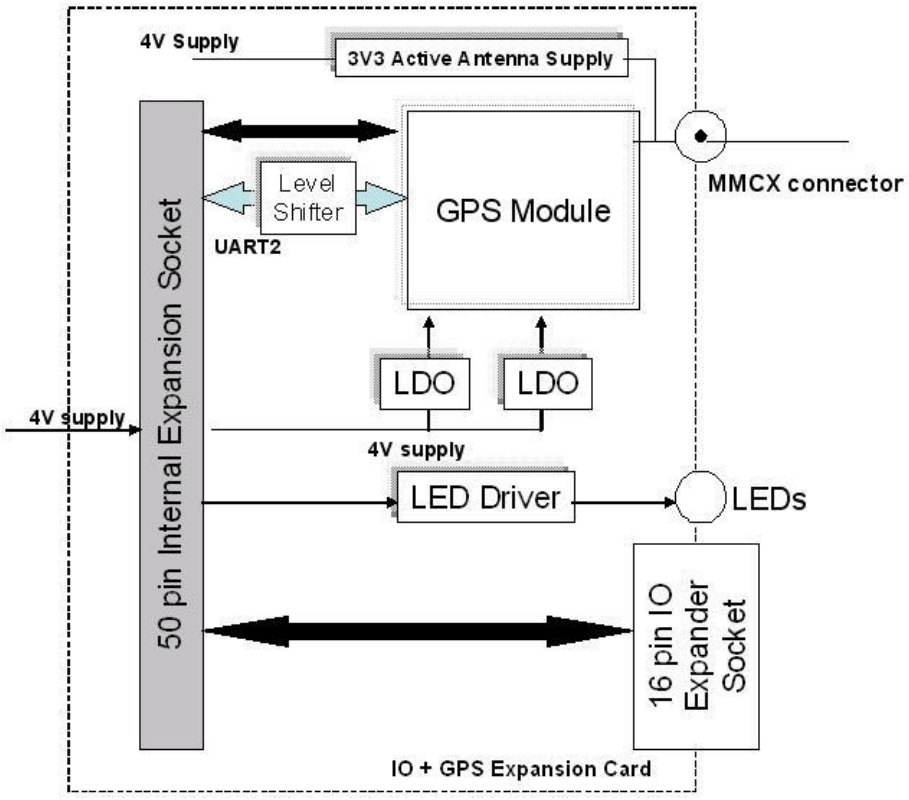


Figure 34. IO+GPS Expansion Card Architecture

The Sierra Wireless Software Suite controls the following:

- Enables/disables the internal LDOs of the Expansion Card to power-up the GPS
- Enables/disables the RF block of the GPS
- Enables a trigger to reset the GPS module
- GPS status indicator output which is connected to an LED driver
- Enables/disable the GPS antenna bias voltage at 3.3V

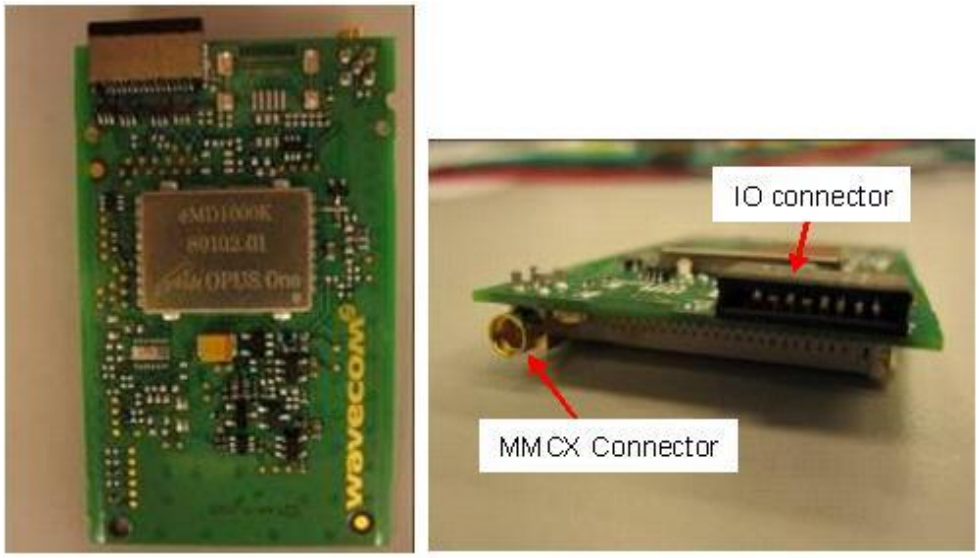


Figure 35. IO+GPS Expansion Card

7.4.2.1. IO+GPS Expansion Card Installation

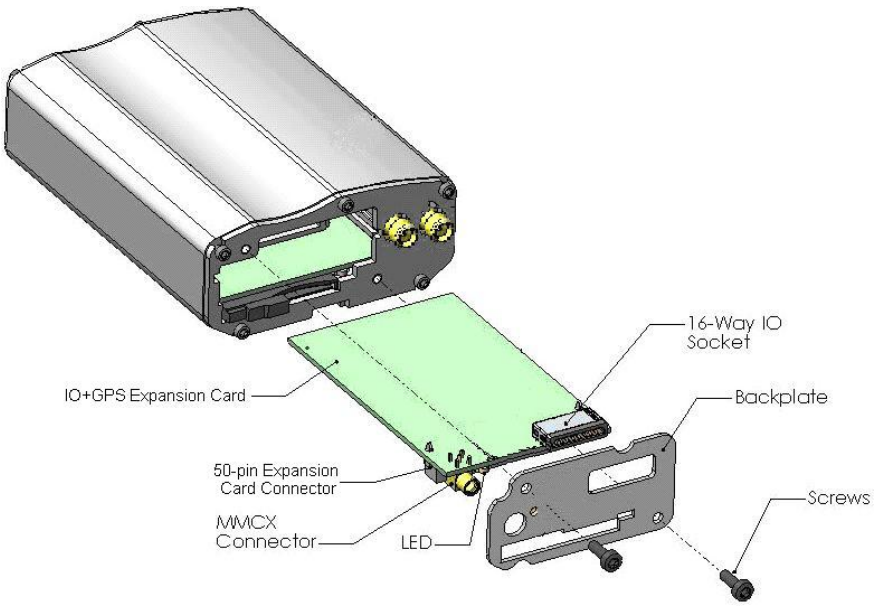


Figure 36. Installation of IO+GPS Expansion Card on the Fastrack Xtend

7.4.2.2. Mechanical Characteristics

Table 49. Mechanical Characteristics

PCB Dimensions	58mm x 35.7mm x 1mm
Overall Dimension	59.5 x 35.7 x 10.01mm (including connectors)
Weight	< 10 grams

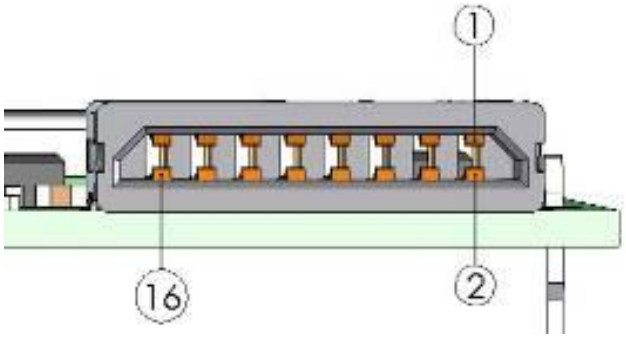


Figure 37. 16-Way IO Expander Socket

Table 50. 16-Way IO Expander Description

Pin #	Pin Description	Pin #	Pin Description
1	Not Connected	9	GPIO26
2	Not Connected	10	AUX-DAC
3	Not Connected	11	AUX-ADC
4	Not Connected	12	SPI1-IO
5	Not Connected	13	SPI1-I
6	GPS Status Indicator	14	SPI1-CLK
7	GPIO27	15	SPI1-CS
8	Not Connected	16	GND

7.4.2.3. General Purpose Input/Output

The IO+GPS Expansion Card provide a total of 6 General Purpose I/Os and is only available if the multiplexed counterpart is not used. These GPIOs can be used to control any external device such as GPS, Bluetooth, LCD or other external customer applications.

Table 51. GPIOs Pin Description

Pin #	Signal	I/O	I/O Type	Reset State	Multiplexed With
7	GPIO27	I/O	Open Drain	Z	SDA
9	GPIO26	I/O	Open Drain	Z	SCL
12	GPIO29	I/O	2V8	Z	SPI1-IO
13	GPIO30	I/O	2V8	Z	SP1-I
14	GPIO28	I/O	2V8	Z	SPI1-CLK
15	GPIO31	I/O	2V8	Z	~SPI1-CS

7.4.2.4. Power Supply

Table 52. Electrical Characteristics

Operating Voltage	4V DC

Note: The IO+GPS Expansion Card is powered once the enable pins are activated by the Sierra Wireless Software Suite.

7.4.2.5. Extra Current Consumption from the DC-IN Source

Depending on various DC-IN voltage of Fastrack Xtend, the extra current consumption drawn by the GPS feature and the GPS active antenna will be different.

Table 53. Extra Current Consumption from DC-IN Source (Typical)

Condition		**Extra Current Consumption for Additional Feature (mA)**		
Mode	**GPS Feature**	**@ 4.75VDC**	**@ 13.2VDC**	**@ 32VDC**
Connected	GPS Enable with GPS antenna bias ON	137	42	22
Non-Connected	GPS Enable with GPS antenna bias ON	134	46.3	22.6
	GPS Enable with GPS antenna bias OFF	111	37.8	18.7
	GPS antenna bias ON	27	8.5	3.8

7.4.2.6. GPS Receiver Frequency

Table 54. GPS Receiver Frequency

Characteristic	**GPS**
Frequency RX	1575.42 MHz

7.4.2.7. External Antenna

The external antenna is connected to the Expansion Card's GPS via the MMCX connector.

The external antenna must fulfill the characteristics listed in the table below.

Table 55. External Antenna Characteristics

Antenna Frequency Range	1.57542GHz ± 1.023MHz (L1-Band)
Impedance	50Ω nominal
Voltage Supply	3.3V ± 0.5VDC
Gain (antenna + cable)	2dBi

7.4.2.8. GPS RF Performance

The GPS RF performance for receiver is given in the table below.

Table 56. Receiver Performances

SDK 4.11	Conditions	Notes	Value	Remarks
Accuracy	-130 dBm (outdoor) In dynamic mode	50% percentile	3.7 m CEP	
	-130 dBm (outdoor) In dynamic mode	95% percentile	6.8 m CEP	
	-140 dBm In dynamic mode	50% percentile	6.1 m CEP	
	-145 dBm In dynamic mode	50% percentile	13.9 m CEP	
Velocity Accuracy	Static mode	First fix only	0.1 m/s	Typ
	Static mode	Continuous fixes	0 m/s	Typ
TTFF Hot Start	-	Mean	3.5 s	Typ
TTFF Warm Start	-	Mean	30 s	Typ
TTFF Cold Start	Clear Sky conditions	Mean	38 s	Typ
	Clear Sky conditions	95% percentile	45 s	Typ
Update Rate	-130 dBm	Continuous fixes	1 Hz	Typ

7.4.3. RS485 + Isolated Digital Inputs

The basic features of the RS485 Expansion Card are summarized in the table below.

Table 57. Basic Features of the RS485 Expansion Card

Features	Description
Sierra Wireless Software Suite	Sierra Wireless Software Suite programmable: • Native execution of embedded standard ANSI C applications • Custom AT command creation • Custom application library creation • Standalone operation
Fastrack Xtend Interfaces	• AT command set based on V.25 or later and GSM 07.05 & 07.07 • Interface for embedded application
RS485 Communication Interface	• Surge protection • No external isolated voltage supply • UART supportable • Half-duplex • 300 to 115200bps Baud rate when integrating with the Fastrack Xtend
4 Isolated Digital Inputs	• Surge protection • 3 to 12V continuous D.C. input • 3 to 32V pulse input • 5300V_{RMS} isolation for 1s (typical) • 50µs digital input processed by interrupt input (typical) • 25µs max. turn-on time by10Hz pulse input • 60µs max. turn-off time by 10Hz pulse input

7.4.3.1. RS485 Expansion Card Installation

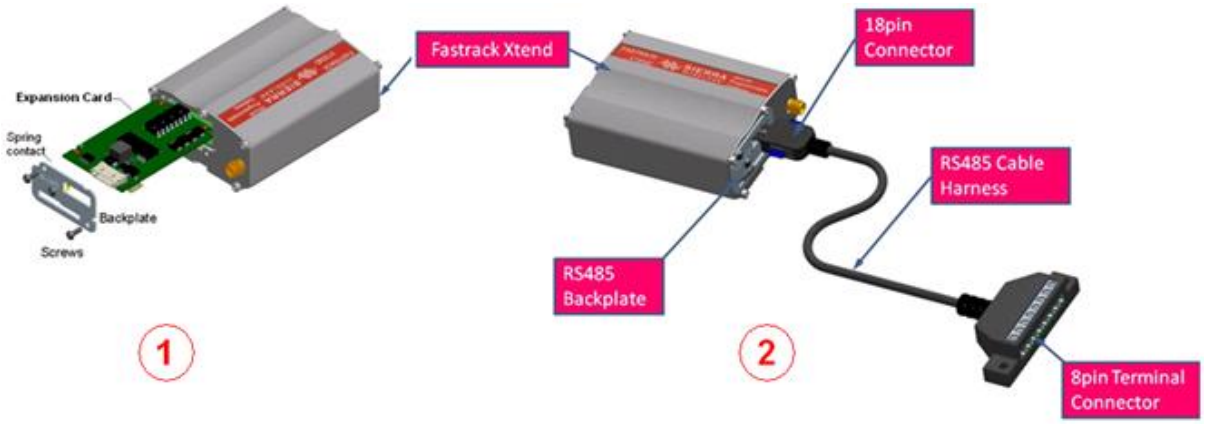


Figure 38. Installation of RS485 Expansion Card on the Fastrack Xtend

7.4.3.2. Board Architecture

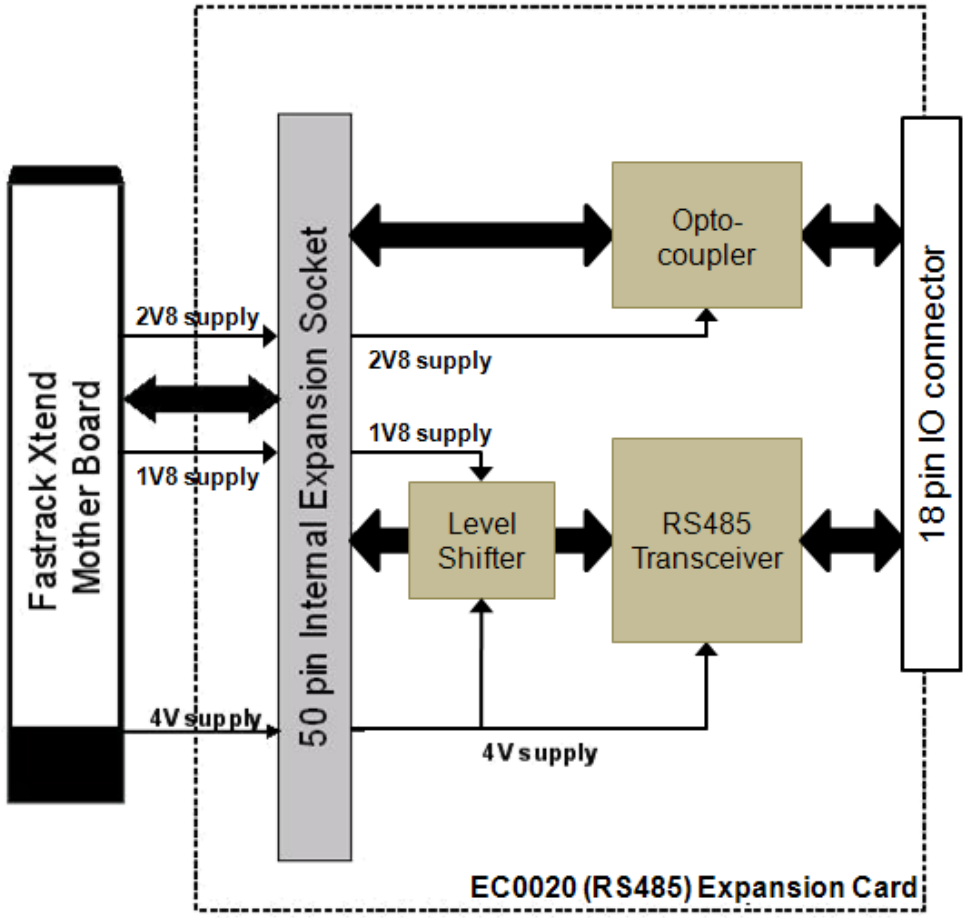


Figure 39. RS485 Expansion Card Architecture

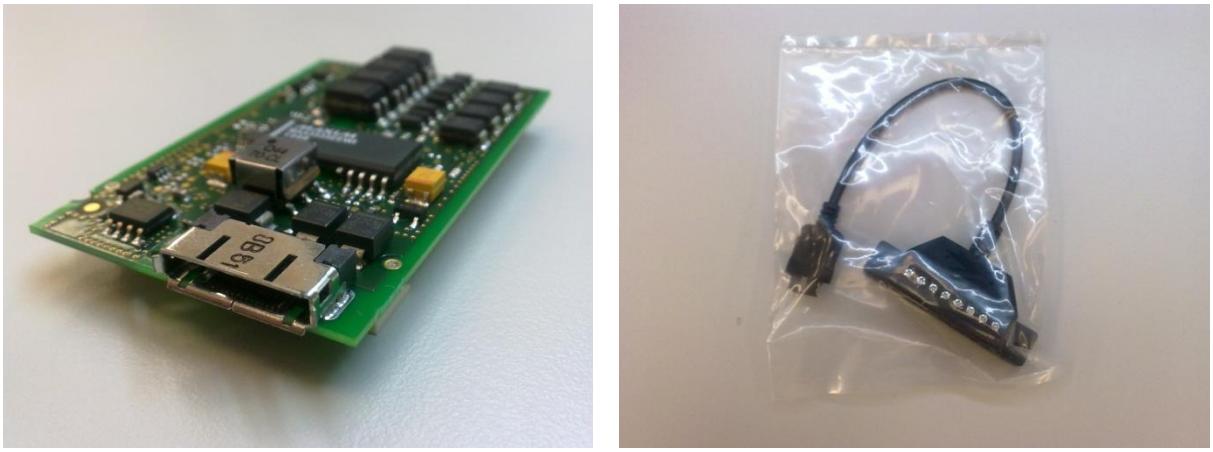


Figure 40. An RS485 Expansion Card and a Cable Harness

The 18-Pin Interface Socket is an external interface for the RS485 cable harness.

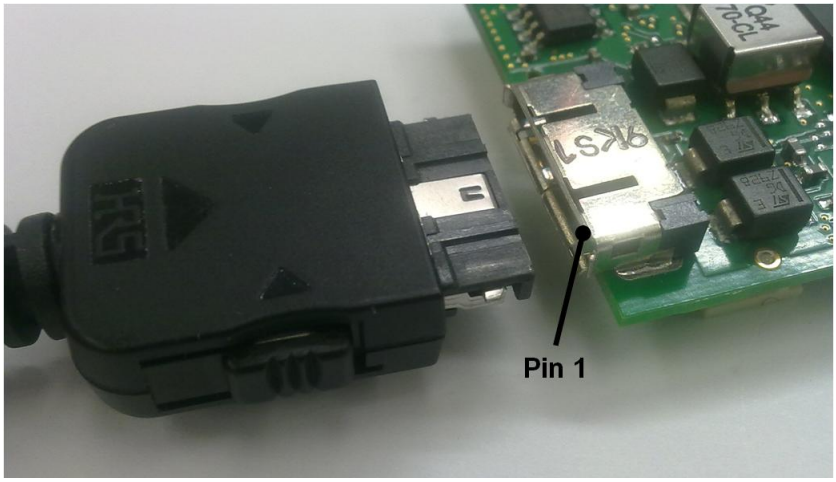


Figure 41. 18-Pin Interface Socket

Table 58. 18-Pin Interface Socket Description

Pin #	Description Name
1	GRND
2	GRND
3	CUST_IN 4
4	CUST_IN 3
5	CUST_IN 2
6	CUST_IN 1
7	TX/RX+
8	TX/RX-
9	SHIELD
10	SHIELD
11	NC
12	NC
13	NC
14	NC
15	NC

Pin #	Description Name
16	NC
17	NC
18	NC

7.4.3.3. Mechanical Characteristics

Table 59. Mechanical Characteristics

PCB Board Dimension	58mm x 35.7mm x 1mm (typical)
PCBA Dimension (including components)	59.5mm x 35.7mm x 10.8mm (typical)
Weight	10 grams (typical)

7.4.3.4. Power Supply

Table 60. Electrical Characteristics

Operating Voltage	4V DC

Note: The RS485 Expansion Card is powered once the enable pins are activated by the Sierra Wireless Software Suite.

7.4.3.5. Current Consumption from the DC-IN Source

A normal running RS485 Expansion Card will have the following current consumption values given a temperature of 25°C and DC-IN = 13.2V from the Fastrack Xtend.

Table 61. Non-Connected Current Consumption in FXT009 at DC-IN =13.2V

Average Current Consumption (Typical Values)	SIM Lock Open	Serial Cable Connected	Open AT Application ON	Open AT Application OFF
~35mA	Yes	Yes	-	Yes
~50mA	Yes	Yes	Yes	-

7.5. Expansion Card Removal

To remove the Expansion Card from the Fastrack Xtend, insert the extraction tool hook into the Expansion Card extraction hole located under the PCB. Once in place, pull the extraction tool to extract the Expansion Card from the Fastrack Xtend.

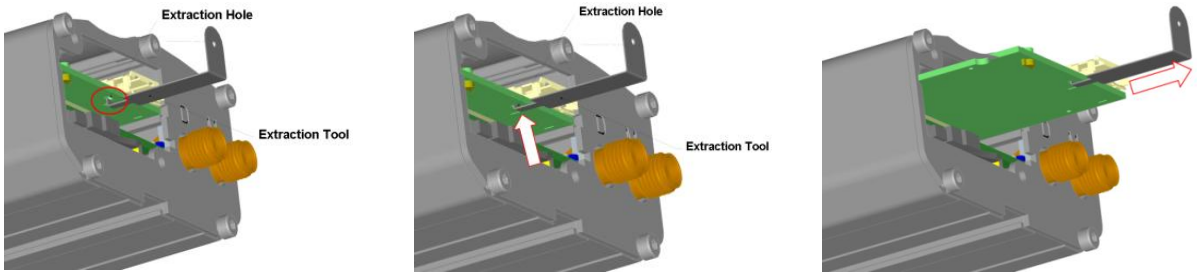


Figure 42. Expansion Card Removal Procedure

8. Using the Fastrack Xtend

8.1. Mounting the Fastrack Xtend

The holding bridles help hold and secure the Fastrack Xtend on a support.

Figure 43. Fastrack Xtend Holding Bridles

To mount the Fastrack Xtend on its support, bind it using the holding bridles as shown in the figure below.

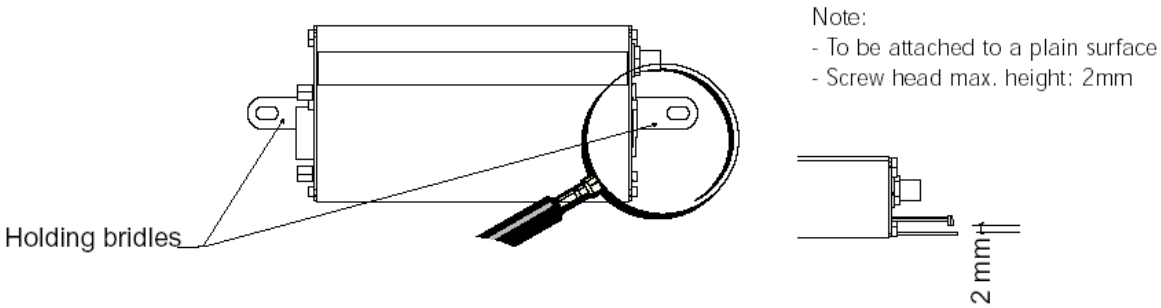


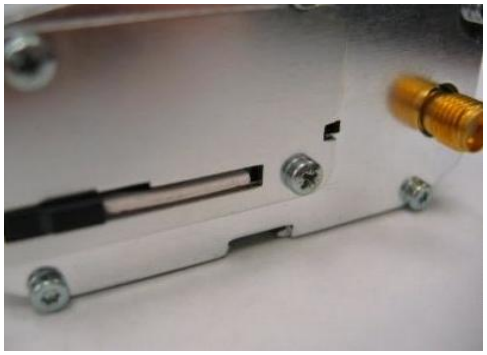
Figure 44. Mounting the Fastrack Xtend

For more information on the drill template, refer to section 4.2 Mechanical Specifications.

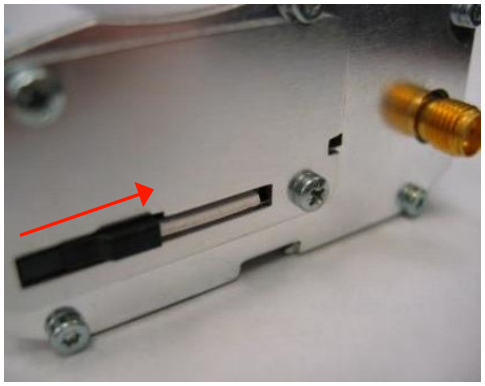
8.2. Getting Started

To set up the Fastrack Xtend, follow the procedures below.

1. Insert the SIM card into the SIM card socket. (Refer to Inserting the SIM Card and Extracting the SIM Card for more details on how to insert and extract the SIM card from the Fastrack Xtend.)

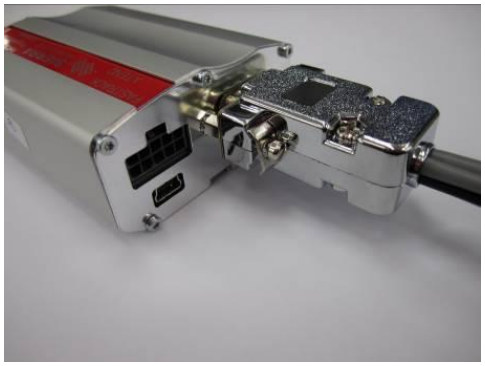


2. Slide the SIM lock switch to lock the SIM card in the Fastrack Xtend.



3. Connect the antenna to the main RF connector.

4. Connect the serial cable and screw both sides.



5. Plug the 6-wire cable accessory into the Fastrack Xtend and switch on the external power supply source.

Refer to section 9.7 Main AT Commands for the Fastrack Xtend for the list of main AT Commands used to configure the Fastrack Xtend.

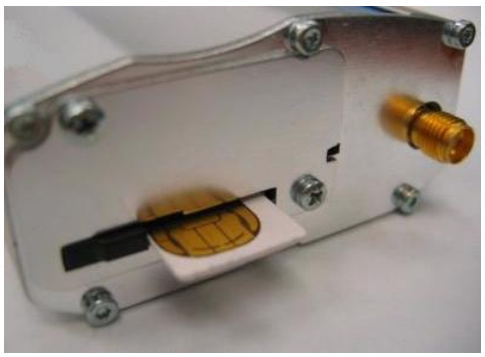
Note: For automotive applications, it is recommended to connect the DC-IN line of the Fastrack Xtend directly to the positive terminal of the battery.

8.2.1. Inserting the SIM Card

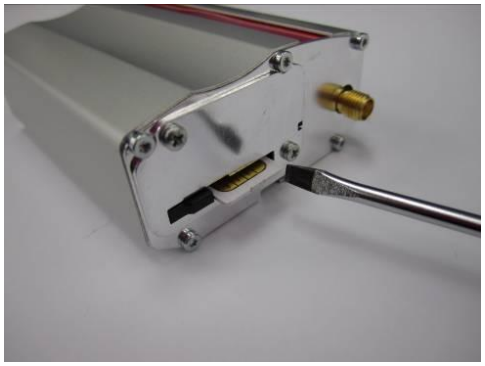
In order to insert the SIM card into the Fastrack Xtend, follow the procedures below:

1. Prepare the SIM card in the correct position as shown in the figure.

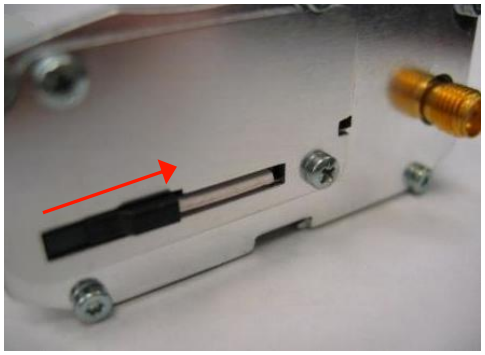
2. Slide the SIM card into the SIM holder.



3. Use a tool to help push the SIM card into the SIM holder. Push the SIM card all the way in until you hear a clicking sound.



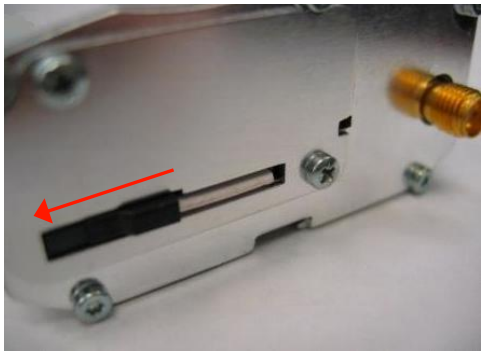
4. Slide the SIM lock switch to lock the SIM card in the Fastrack Xtend.



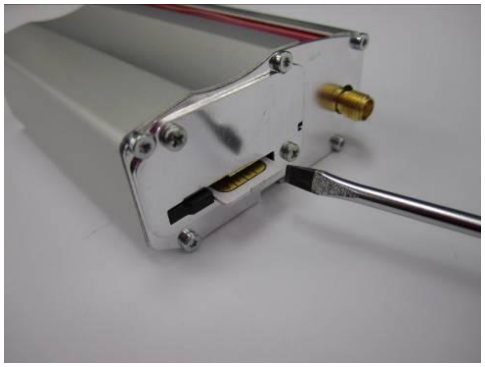
8.2.2. Extracting the SIM Card

In order to extract the SIM card from the Fastrack Xtend, follow the procedures below:

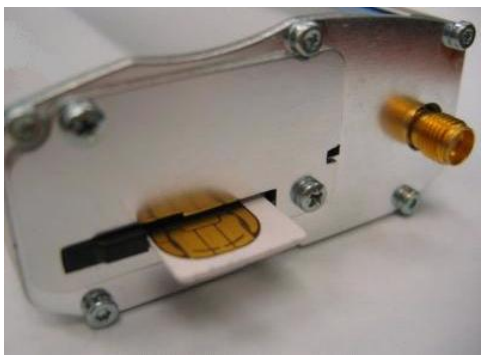
1. Open the SIM lock switch by sliding it to the left.



2. Use a tool to further push the SIM card into the SIM holder. Push until you hear a clicking sound.



3. The SIM card should spring out a little bit after the clicking sound.



4. Extract the SIM card from the Fastrack Xtend.

8.3. Using the Fastrack Xtend with an Expansion Card

Refer to section 7 Expansion Card for more information about using the Fastrack Xtend with an Expansion Card.

Refer to section 19.3 Expansion Card Documentation for the list of documents containing additional information on how to use different Expansion Cards with the Fastrack Xtend.

8.4. Operational Status

The Fastrack Xtend's operational status is defined by a red LED, which is located between the back plate and the secondary RF interface. Refer to section 6.4 LED Status Indicator for more information about the LED status indicator.

9. Communicating with the Fastrack Xtend

After setting up the Fastrack Xtend, communications can be established by directly sending AT commands to the device using terminal software such as HyperTerminal for MS Windows. The following subsections describe how this is done.

Caution: *Some AT commands and features in this section are not available in FXT004. Refer to section 2 Features and Services and document [10] AirPrime Q26 Elite Software User Guide and AT Commands Interface Specification for more information on which AT commands and features are available in FXT004.*

9.1. Communications Testing

To perform a communications test after the Fastrack Xtend has been setup using the RS232 serial link connection, do the following:

- Connect the RS232 link between the external application COM port (DTE) and the Fastrack Xtend (DCE).
- Configure the RS232 port of the DTE as follows:
  - COM port: 1 (commonly used port for PC serial)
  - Bits per second: 115200 bps
  - Data bits: 8
  - Parity: None
  - Stop bits: 1
  - Flow control: Hardware
- Using a communication software such as HyperTerminal, enter:

  AT↵
- When communications have been established, the Fastrack Xtend will respond with an “OK”, which is displayed in the HyperTerminal window.

If communications cannot be established with the Fastrack Xtend, do the following:

- Check the RS232 connection between the application (DTE) and the Fastrack Xtend (DCE).
- Check the configuration of the COM port used on the DTE.

Refer to the table below for other AT commands that can be used after getting the Fastrack Xtend started.

Table 62. Basic AT Commands to Use with the Fastrack Xtend

AT Command	Description
AT+CGMI*	To check if the serial link is OK. The Fastrack Xtend will respond with "WAVECOM WIRELESS CPU" when it is OK.
AT+CPIN=xxxx	To enter a PIN code, xxxx (if activated).
AT+CSQ	To verify the received signal strength.
AT+CREG?	To verify the registration of the Fastrack Xtend on the network.
ATD<phone number>	To initiate a voice call.

AT Command	Description
ATH	To hang up (end of call)**.**

* When using Firmware version R7.44 or later, this command will respond with "SIERRA WIRELESS EMBEDDED MODULE" when the serial link is OK.

For more information about these AT Commands and their associated parameters, refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30).

9.2. Verifying the Received Signal Strength

The Fastrack Xtend only establishes a call if the received signal strength is strong enough. Using a communication software such as HyperTerminal, enter **AT+CSQ** to check the received signal strength. The response returned will follow the format ***+CSQ: <rssi>, <ber>***

where: <rssi> = received signal strength indication, and <ber> = channel bit error rate.

Refer to the table below for the description of the <rssi> values returned.

Table 63. <rssi> Value Description

<rssi> Value	Description
0 – 10	Received signal strength is insufficient.
11 – 31	Received signal strength is sufficient.
32 – 98	Not defined.
99	No measure available.

9.3. Verifying the Network Registration

Using a communication software such as HyperTerminal, enter **AT+CREG?** to verify the network registration of the Fastrack Xtend. Refer to the table below for the list of main responses returned.

Table 64. AT+CREG Main Reponses

AT+CREG Response	Description
+CREG: 0, 0	Not registered.
+ CREG: 0, 1	Registered on the home network.
+ CREG: 0, 5	Registered on a roaming network.

If the Fastrack Xtend is not registered on the network, do the following:

- Check the connection between the Fastrack Xtend and the antenna.
- Verify the signal strength to determine the received signal strength (Refer to section 9.2 Verifying the Received Signal Strength).

Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information regarding the **AT+CREG** AT Command, and other AT commands relating to network registration in GPRS mode.

9.4. Checking the Band Selection

Using a communication software such as HyperTerminal, enter **AT+WMBS?** to check the band selection of the Fastrack Xtend. Refer to the table below for the list of main responses returned.

Table 65. AT+WMBS Main Reponses

AT+WMBS Response	Description
+WMBS: 0, x	Mono band mode 850MHz is selected.
+WMBS: 1, x	Mono band mode extended 900MHz is selected.
+WMBS: 2, x	Mono band mode 1800MHz is selected.
+WMBS: 3, x	Mono band mode 1900MHz is selected.
+WMBS: 4, x	Dual band mode 850MHz/1900MHz is selected.
+WMBS: 5, x	Dual band mode extended 900MHz/1800MHz is selected.
+WMBS: 6, x	Dual band mode extended 900MHz/1900MHz is selected.
+WMBS: 7,x	Quad-band mode 850/900E (extended)/1800/1900MHz

Where:

When x = 0, the band has not been modified since the last boot of the Fastrack Xtend;

When x = 1, the band has been modified since the last boot of the Fastrack Xtend, and will have to be reset in order to take the previous modification(s) into account.

Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information regarding the **AT+WMBS** AT Command.

9.5. Switching Bands

Use the **AT+WMBS** AT Command to change the band setting of the Fastrack Xtend and switch between EU and US bands and vice versa. Refer to the following table for the list of **AT+WMBS** parameters that can be used and their corresponding description.

Table 66. AT+WMBS Band Selection

AT+WMBS Command	Description
AT+WMBS=0,x	Switch to mono band mode 850MHz.
AT+WMBS=1,x	Switch to mono band mode extended 900MHz.
AT+WMBS=2,x	Switch to mono band mode 1800MHz.
AT+WMBS=3,x	Switch to mono band mode 1900MHz.
AT+WMBS=4,x	Switch to dual band mode 850/1900MHz.
AT+WMBS=5,x	Switch to dual band mode extended 900MHz/1800MHz.
AT+WMBS=6,x	Switch to dual band mode extended 900MHz/1900MHz.

Where:

When x = 0, the Fastrack Xtend will have to be reset to start on the specified band(s);

When x = 1, the band switch is effective immediately. However, this mode is forbidden while in Communication mode and during the Fastrack Xtend's initialization.

Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information regarding the **AT+WMBS** AT Command.

Note: FXT003 has an automated quad-band mode; band selection is not relevant.

FXT004 operates in Dual-Band (Band Class 0 & 1) mode only; band selection is not relevant.

9.6. Checking the PIN Code Status

Using a communication software such as HyperTerminal, enter **AT+CPIN?** to check the PIN code status. Refer to the table below for the list of main responses returned.

Table 67. AT+CPIN Main Responses

AT+CPIN Response	Description
+CPIN: READY	The PIN code has been entered.
+CPIN: SIM PIN	The PIN code has not been entered.

Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information regarding the **AT+CPIN** AT Command.

9.7. Main AT Commands for the Fastrack Xtend

The table below lists the main AT Commands required for starting the Fastrack Xtend. For other available AT Commands, refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30).

Table 68. Main AT Commands used for the Fastrack Xtend

Feature/Function	AT Command	Response	Description
Check network registration	AT+CREG?	+CREG: 0,1	The Fastrack Xtend is registered on the network.
		+CREG: 0,2	The Fastrack Xtend is not registered on the network; registration attempt is ongoing.
		+CREG: 0,0	The Fastrack Xtend is not registered on the network; no registration attempt has been made.
Enter PIN code	AT+CPIN=xxxx (xxxx = PIN code)	OK	PIN code accepted.
		+CME ERROR: 16	Incorrect PIN code (with +CMEE = 1 mode*).
		+CME ERROR: 3	PIN code already entered (with +CMEE = 1 mode*).
Check the selected band	AT+WMBS?	+WMBS: <Band>,<ResetFlag> OK	The currently selected band mode is returned.
Switch bands	AT+WMBS=<Band>	OK	Band switch is accepted; the Fastrack Xtend has to be reset for the change to be effective.

Feature/Function	AT Command	Response	Description
	AT+WMBS=<Band>,0	OK	Band switch is accepted; the Fastrack Xtend has to be reset for the change to be effective.
	AT+WMBS=<Band>,1	OK	Band switch is accepted and the GSMS stack has been restarted.
	AT+WMBS=<Band>	+CME ERROR: 3	Band selected is not allowed.
Receive a call	ATA	OK	Answer the call.
Initiate a call	ATD<phone number>; (Do not forget the « ; » at the end for « voice » call)	OK	Communication established.
		+CME ERROR: 11	PIN code not entered (with +CMEE = 1 mode).
		+CME ERROR: 3	AOC credit exceeded or communications is already established.
Initiate an emergency call	ATD112; (Do not forget the « ; » at the end for « voice » call)	OK	Communications established.
Hang up	ATH	OK	
Communication has been loss		NO CARRIER	
Store the parameters in EEPROM	AT&W	OK	The configuration settings are stored in EEPROM (non-volatile memory).

* The command AT+CMEE=1 switches to a mode that enables a more complete error diagnostic.

9.8. Echo Function

If no echo is displayed when entering an AT Command, it could mean either of the following:

- The “local echo” parameter of your communication software (HyperTerminal) is disabled.
- The Fastrack Xtend echo function is disabled.

To enable the Fastrack Xtend’s echo function, enter the AT Command **ATE1**.

When sending AT Commands to the Fastrack Xtend using a communication software such as HyperTerminal, it is recommended to:

- Disable the “local echo” parameter of your communication software.
- Enable the Fastrack Xtend’s echo function (use the **ATE1** command).

In a machine-to-machine communication with the Fastrack Xtend, it is recommended to disable the Fastrack Xtend’s echo function (using the **ATE0** AT command) in order to avoid useless embedded module processing.

Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information about the **ATE0** and **ATE1** AT Commands.

9.9. DC-IN Detection

Refer to section 15.5 DC-IN Detection for more information on how DC-IN detection is done using AT commands.

10. Other Maintenance Options

10.1. Enabling/Disabling the Flash LED

The Fastrack Xtend has a red LED indicator that shows the status of the GSM network. It is possible to disable this LED during Sleep mode in order to reduce power consumption. Using a communication software such as HyperTerminal, enter:

- **AT+WHCNF=1,0** to deactivate Flash LED
- **AT+WHCNF=1,1** to activate Flash LED

Note: You will need to restart the Fastrack Xtend for the new setting to take effect. Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information about enabling/disabling Flash LED.

10.2. Firmware Upgrade Procedure

The firmware upgrade procedure is used to update the firmware embedded in the Fastrack Xtend. This procedure consists of downloading the firmware into internal memories through the RS232 serial link available on the 15-pin SUB-D serial connector.

Refer to document [15] Firmware Upgrade Procedure document for more information regarding this procedure.

11. Troubleshooting the Fastrack Xtend

This section of the document describes possible problems that might be encountered when using the Fastrack Xtend and their corresponding solutions.

To read about other troubleshooting information, refer to the Knowledge Base page at http://www.sierrawireless.com/en/Support/knowledgebase.aspx.

11.1. No Communications with the Fastrack Xtend through the Serial Link

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

Table 69. No Communications with the Fastrack Xtend Through the Serial Link

If the Fastrack Xtend returns	Then ask	Action
Nothing	Is the Fastrack Xtend powered correctly?	Make sure that the external power supply is connected to the Fastrack Xtend and provides a voltage within the range of 4.75V to 32V.
	Is the serial cable connected at both sides?	Check the serial cable connection.
	Does the serial cable correctly follow the pin assignments? Refer to section 5.1.2 Serial Interface for more information about the serial cable pin assignments.	Connect the cable by following the pin assignments as given in Table 14 Serial Connector Pin Description.
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 Fastrack Xtend. The Fastrack Xtend 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.

11.2. Receiving “ERROR”

The Fastrack Xtend returns an “ERROR” message (in reply to an AT command) in the following cases:

- The AT command syntax is incorrect. In this case, check the command syntax (refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information).
- The AT command syntax is correct, but was transmitted using the wrong parameters

Enable the verbose error report method to see the error codes associated with the command syntax.

- Enter the **AT+CMEE=1** command in order to change the error report method to the verbose method, which includes the error codes.
- Re-enter the AT command which previously caused the reception of an “ERROR” message in order to get the Mobile Equipment error code.

When the verbose error report method is enabled, the response of the Fastrack Xtend in case of error is either:

- +CME ERROR: <error result code>

  or

- +CMS ERROR: <error result code>

Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information on the error result code description and further details on the **AT+CMEE** command.

Caution: *It is strongly recommended to always enable the verbose error report method to get the Mobile Equipment error code (enter the **AT +CMEE=1** command).*

11.3. Receiving “NO CARRIER”

If the Fastrack Xtend returns a “NO CARRIER” message upon an attempted call (voice or data), refer to the following table for possible causes and their corresponding solutions.

Table 70. Receiving a “No Carrier” Message

If the Fastrack Xtend returns	Then ask	Action
“NO CARRIER”	Is the received signal strong enough?	Refer to Verifying the Received Signal Strength to verify the strength of the received signal.
	Is the Fastrack Xtend registered on the network?	Refer to Verifying the Network Registration to verify the network registration.
	Is the antenna properly connected?	Refer to section 5.2.2.2 Antenna Specifications for more information about the Fastrack Xtend’s antenna requirements.
	Is the band selection correct?	Refer to Switching Bands for more information about switching between bands.

If the Fastrack Xtend returns	Then ask	Action
"NO CARRIER" (when trying to issue a voice communication)	Is the semicolon (;) entered immediately after the phone number in the AT command?	Ensure that the semicolon (;) is entered immediately after the phone number in the AT command. e.g. ATD######**;**
"NO CARRIER" (when trying to issue a data communication)	Is the SIM card configured for data/fax calls?	Configure the SIM card for data/fax calls. (Ask your network provider if necessary).
	Is the selected bearer type supported by the called party?	Ensure that the selected bearer type is supported by the called party.
	Is the selected bearer type supported by the network?	Ensure that the selected bearer type is supported by the network. If still unsuccessful, try selecting the bearer type using the AT command: **AT+CBST=0,0,3**

If the Fastrack Xtend returns a “NO CARRIER” message, you may retrieve the extended error code by using the AT Command **AT+CEER**. Refer to the following table for the interpretation of extended error codes.

Table 71. Extended Error Codes

Error Code	Diagnosis	Hint
1	Unallocated phone number	
16	Normal call clearing	
17	User busy	
18	No user responding	
19	User alerting, no answer	
21	Call rejected	
22	Number changed	
31	Normal, unspecified	
50	Requested facility not subscribed	Check your subscription. (Is data subscription available?)
68	ACM equal or greater than ACMmax	The credit of your pre-paid SIM card has expired.
252	Call barring on outgoing calls	
253	Call barring on incoming calls	
3, 6, 8, 29, 34, 38, 41, 42, 43, 44, 47, 49, 57, 58, 63, 65, 69, 70, 79, 254	Network causes	Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for further details or call your network provider.

For all other codes and/or details, refer to the documents listed in section 19.2 Firmware Documentation.

12. Power Consumption

The following sub-sections details out the power consumption values of the Fastrack Xtend for various modes and RF bands. These consumption values were obtained by performing measurements on Fastrack Xtend samples at a temperature of 25°C using a 3V SIM card.

Note: *For FXT002 power consumption, the software version used is R74.*

For FXT003 power consumption, the software version used is R74a.

For FXT004 power consumption, the software version used is R5A.

Refer to document [15] Firmware Upgrade Procedure for details on how to upgrade Fastrack Xtend firmware.

Table 72. Initial Power Consumption (Typical)*

Configuration	Power Consumption
With DC-IN	10mA @ 13.2V
With Battery Accessory	35mA @ 3.6V

* Measurement based on FXT002

The table above lists the power consumption of the Fastrack Xtend when power supply (DC-IN or battery accessory) is initially applied to it with no serial port, LED ON nor SIM card.

12.1. Various Operating Modes

The power consumption levels of the Fastrack Xtend vary depending on the operating mode used. Refer to the table below for the different kinds of operating modes available. Refer to Appendix 3.1 of document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for the working mode description.

Table 73. Fastrack Xtend Operating Modes

Operating Mode	Description
GSM Connected Mode	The Fastrack Xtend is connected to a live GSM network, during circuit switch voice or data call.
Transfer Mode	The Fastrack Xtend has GPRS data transfer connection with a live network, during packet data transmission.
Active mode with GSM stack in Idle	When the RF function is active and the Fastrack Xtend is synchronized with the network, but there is currently no communication.
Sleep mode with GSM stack in Idle	When the RF function is disabled but is regularly activated to remain synchronized with the network. This mode only works when the DTE sends an AT command to shut the serial link down (DTE turns DTR to inactive state).
Active Mode	When the RF function is disabled and there is no synchronization with the network but the UART is available.
Sleep Mode	When the RF function is disabled, and there is no synchronization with the network and the UART is not available.

Operating Mode	Description
Alarm Mode	Low power consumption mode, the only feature which is available in this mode is the alarm wake up. When the alarm clock is set for the Fastrack Xtend with **ALL** of the following conditions: • before the alarm time is up • with the ON/OFF signal pulled to GND • with **AT+CPOF** entered from a computer that is connected to the Fastrack Xtend
Serial Port Auto Shut Down Feature	The serial link can be shut down when there is no activity between the DTE and the Fastrack Xtend. This auto shut down feature can be enabled by AT command. Refer to section 5.1.2.3 Serial Port Auto Shut Down Feature for more information on this feature.
FLASH LED Activated/Deactivated	The Fastrack Xtend Flash LED can be enabled or disabled by AT command. Refer to section 10.1 Enabling/Disabling the Flash LED for more information on this feature.

Note: For FXT004 operating modes, please refer to Table 79 Power Consumption of FXT004 (Typical).

12.2. Working Mode Features

The table below sums up the feature availability in each mode.

Note: For FXT004 operating modes, please refer to Table 79 Power Consumption of FXT004 (Typical).

Table 74. Fastrack Xtend Operating Modes Feature Availability

Features	Alarm Mode	ACTIVE Mode with GSM Stack in Idle	SLEEP Mode with GSM Stack in Idle	ACTIVE Mode	SLEEP Mode	Connected Mode	Transfer Mode
Alarm	✓	✓	✓	✓	✓	✓	✓
Wake-up Sierra Wireless Software Suite on timer events	-	✓	✓	✓	✓	✓	✓
GSM/GPRS paging (alert from the network for incoming call, incoming SMS or incoming GPRS data)	-	✓	✓	-	-	✓	✓
SIM	-	✓	-	-	-	✓	✓
UARTs	-	✓	-	✓	-	✓	✓
USB	-	✓	-	✓	-	✓	✓
SPIs	-	✓	-	✓	-	✓	✓
I^2C	-	✓	-	✓	-	✓	✓
GPIO	-	✓	-	✓	-	✓	✓
ADCs	-	✓	-	✓	-	✓	✓

Features	Alarm Mode	ACTIVE Mode with GSM Stack in Idle	SLEEP Mode with GSM Stack in Idle	ACTIVE Mode	SLEEP Mode	Connected Mode	Transfer Mode
Buzzer	-	✓	-	✓	-	✓	✓
Keypad	-	✓	✓	✓	✓	✓	✓
External IT	-	✓	✓	✓	✓	✓	✓
Flash LED	-	✓	✓	✓	✓	✓	✓

12.3. Power Consumption in Connected Mode (FXT009)

Table 75. Power Consumption of FXT009 in Connected Mode (Typical)

Power Consumption (Serial Port ON, Flash LED activated)				GSM 850 (mA)	E-GSM 900 (mA)	DCS 1800 (mA)	PCS 1900 (mA)
GSM	I_{peak}	GSM850 / E-GSM900: During TX bursts @ PCL5 / PCL19 DCS1800 / PCS1900 : During TX bursts @ PCL0 / PCL15	@ 4.75V	2465 / 400	2655 / 411	1612 / 352	1915 / 358
			@ 13.2V	1193 / 127	1222 / 130	1068/ 118	1113 / 116
	I_{avg}	GSM850 / E-GSM900: Average @ PCL5 / PCL19 DCS1800 / PCS1900 : Average @ PCL0 / PCL15	@ 4.75V	311 / 132	319 / 136	245 / 129	253 / 129
			@ 13.2V	100 / 47	102 / 48	82 / 46	85 / 46
			@ 32V	43 / 21	44 / 21	36 / 20	37 / 20
GPRS Class 8	I_{peak}	GSM850 / E-GSM900: During 1TX bursts @ PCL5(Gamma 3) / PCL19(Gamma 17) DCS1800 / PCS1900 : During 1TX bursts @ PCL0(Gamma 3) / PCL15(Gamma 18)	@ 4.75V	2476 / 369	2588 / 374	1560 / 325	1773 / 324
			@ 13.2V	1208 / 120	1222 / 121	1072 / 108	1090 / 108
	I_{avg}	GSM850 / E-GSM900 : Average 1TX/4RX @PCL5(Gamma 3) / PCL19(Gamma 17) DCS1800 / PCS1900: Average 1TX/4RX @PCL0(Gamma 3) / PCL15(Gamma 18)	@ 4.75V	297 / 125	304 / 127	234 / 123	241 / 122
			@ 13.2V	95 / 44	97 / 45	79 / 44	81 / 43
			@ 32V	42 / 20	42 / 20	34 / 19	35 / 19
	I_{peak}	GSM850 / E-GSM900: During 2TX bursts @ PCL5(Gamma 3) / PCL19(Gamma 17) DCS1800 / PCS1900:	@ 4.75V	2503 / 384	2725 / 389	1592 / 337	1836 / 338

Power Consumption (Serial Port ON, Flash LED activated)				GSM 850 (mA)	E-GSM 900 (mA)	DCS 1800 (mA)	PCS 1900 (mA)
GPRS Class 10		During 2TX bursts @ PCL0(Gamma 3) / PCL15(Gamma 18)	@ 13.2V	1162 / 125	1211 / 127	1092 / 115	1136 / 115
	I_{avg}	GSM850 / E-GSM900 : Average 2TX/3RX @ PCL5 (Gamma 3) / PCL19(Gamma 17) DCS1800 / PCS1900: Average 2TX/3RX @ PCL0 (Gamma 3) / PCL15(Gamma 18)	@ 4.75V	521 / 167	533 / 169	389 / 161	406 / 160
			@ 13.2V	163 / 59	166 / 60	129 / 57	134 / 57
			@ 32V	71 / 24	72 / 26	56 / 25	58 / 25
EGPRS Class 8	I_{peak}	GSM850 / E-GSM900: During 1TX bursts @ PCL8 (Gamma 6) / PCL19(Gamma 17) DCS1800 / PCS1900: During 1TX bursts @ PCL2 (Gamma 5) / PCL15(Gamma 18)	@ 4.75V	1796 / 648	2032 / 653	1563 / 563	1442 / 565
			@ 13.2V	1087 / 198	1108 / 199	1052 / 173	1024 / 175
	I_{avg}	GSM850 / E-GSM900 : Average 1TX/4RX @ PCL8 (Gamma 6) / PCL 19(Gamma 17) DCS1800 / PCS1900: Average 1TX/4RX @ PCL2 (Gamma 5) / PCL 15(Gamma 18)	@ 4.75V	276 / 183	281 / 184	243 / 175	250 / 176
			@ 13.2V	93 / 65	95 / 65	84 / 62	86 / 62
			@ 32V	41 / 28	41 / 28	36 / 27	37 / 27
EGPRS Class 10	I_{peak}	GSM850 / E-GSM900: During 2TX bursts @ PCL8 (Gamma 6) / PCL 19(Gamma 17) DCS1800 / PCS1900: During 2TX bursts @ PCL2 (Gamma 5) / PCL 15(Gamma 18)	@ 4.75V	1806 / 649	2016 / 649	1436 / 566	1480 / 563
			@ 13.2V	1102 / 201	1126 / 201	1052 / 175	1076 / 176
	I_{avg}	GSM 850 / E-GSM900 : Average 2TX/3RX @ PCL8 (Gamma 6) / PCL 19(Gamma 17) DCS1800 / PCS1900: Average 2TX/3RX @ PCL2 (Gamma 5) / PCL 15(Gamma 18)	@ 4.75V	435 / 243	445 / 245	367 / 228	380 / 229
			@ 13.2V	143 / 86	146 / 86	124 / 81	128 / 81
			@ 32V	62 / 37	63 / 37	54 / 35	56 / 35

12.4. Power Consumption in Connected Mode (FXT003)

Table 76. Power Consumption of FXT003 in Connected Mode (Typical)

Power Consumption for FXT003 (Serial Port ON, Flash LED activated)				GSM 850	E-GSM 900	DCS 1800	PCS 1900
GSM	peak	GSM850 / E-GSM900: During TX bursts @ PCL5 / PCL19 DCS1800 / PCS1900 : During TX bursts @ PCL0 / PCL15	@ 4.75V	3600 / 690	3700 / 686	2177 / 673	2652 / 642
			@ 13.2V	787 / 217	811 / 216	571 / 205	675 / 204
	avg	GSM850 / E-GSM900: Average @ PCL5 / PCL19 DCS1800 / PCS1900 : Average @ PCL0 / PCL15	@ 4.75V	515 / 290	526 / 291	433 / 288	474 / 289
			@ 13.2V	163 / 102	166 / 102	144 / 101	153 / 101
			@ 32V	70 / 43	71 / 43	62 / 43	66 / 44
GPRS Class 8	peak	GSM850 / E-GSM900: During 1TX bursts @ PCL5(Gamma 3) DCS1800 / PCS1900 : During 1TX bursts @ PCL0(Gamma 3)	@ 4.75V	3500	3600	2159	2760
			@ 13.2V	785	804	621	694
	avg	GSM850 / E-GSM900 : Average 1TX/4RX @PCL5(Gamma 3) DCS1800 / PCS1900: Average 1TX/4RX @PCL0(Gamma 3)	@ 4.75V	494	502	416	454
			@ 13.2V	158	157	139	148
			@ 32V	68	69	60	64
GPRS Class 10	peak	GSM850 / E-GSM900: During 2TX bursts @ PCL5(Gamma 3) DCS1800 / PCS1900: During 2TX bursts @ PCL0(Gamma 3)	@ 4.75V	2215	2264	1632	1951
			@ 13.2V	622	624	564	618
	avg	GSM850 / E-GSM900 : Average 2TX/3RX @ PCL5 (Gamma 3) DCS1800 / PCS1900: Average 2TX/3RX @ PCL0 (Gamma 3)	@ 4.75V	599	611	506	550
			@ 13.2V	195	199	171	184
			@ 32V	84	86	74	79
GPRS Class 12	peak	GSM850 / E-GSM900: During 4TX bursts @ PCL5(Gamma 3) DCS1800 / PCS1900: During 4TX bursts @ PCL0(Gamma 3)	@ 4.75V	1581	1658	1256	1466
			@ 13.2V	566	584	441	514

Power Consumption for FXT003 (Serial Port ON, Flash LED activated)				GSM 850	E-GSM 900	DCS 1800	PCS 1900
	I_{avg}	GSM850 / E-GSM900 : Average 4TX/1RX @ PCL5 (Gamma 3) DCS1800 / PCS1900: Average 4TX/1RX @ PCL0 (Gamma 3)	@ 4.75V	741	755	621	681
			@ 13.2V	246	251	212	230
			@ 32V	107	109	91	99
EGPRS Class 8	I_{peak}	GSM850 / E-GSM900: During 1TX bursts @ PCL8 (Gamma 6) DCS1800 / PCS1900: During 1TX bursts @ PCL2 (Gamma 5)	@ 4.75V	2128	2148	1812	2107
			@ 13.2V	606	614	588	609
	I_{avg}	GSM850 / E-GSM900 : Average 1TX/4RX @ PCL8 (Gamma 6) DCS1800 / PCS1900: Average 1TX/4RX @ PCL2 (Gamma 5)	@ 4.75V	402	406	382	402
			@ 13.2V	134	135	130	135
			@ 32V	58	58	55	58
EGPRS Class 10	I_{peak}	GSM850 / E-GSM900: During 2TX bursts @ PCL8 (Gamma 6) DCS1800 / PCS1900: During 2TX bursts @ PCL2 (Gamma 5)	@ 4.75V	1732	1756	1520	1682
			@ 13.2V	567	591	536	569
	I_{avg}	GSM 850 / E-GSM900 : Average 2TX/3RX @ PCL8 (Gamma 6) DCS1800 / PCS1900: Average 2TX/3RX @ PCL2 (Gamma 5)	@ 4.75V	519	525	487	511
			@ 13.2V	173	176	165	171
			@ 32V	74	75	71	74
EGPRS Class 12	I_{peak}	GSM850 / E-GSM900: During 4TX bursts @ PCL8 (Gamma 6) DCS1800 / PCS1900: During 4TX bursts @ PCL2 (Gamma 5)	@ 4.75V	1488	1456	1316	1394
			@ 13.2V	499	516	447	483
	I_{avg}	GSM 850 / E-GSM900 : Average 4TX/1RX @ PCL8 (Gamma 6) DCS1800 / PCS1900: Average 4TX/1RX @ PCL2 (Gamma 5)	@ 4.75V	710	713	654	678
			@ 13.2V	237	238	221	228
			@ 32V	102	103	95	98

Power Consumption (Serial Port ON, Flash LED activated)				UMTS 850 (BAND I)	UMTS 1900 (BAND II)	UMTS 2100 (BAND V)
UMTS Connected Mode (VOICE)	I_{peak}	@ +22dBm	@4.75	878	924	825
			@13.2	313	327	295
		@ +10dBm	@4.75	737	722	674
			@13.2	246	248	215
	I_{avg}	@ +22dBm	@4.75	734	787	687
			@13.2	253	273	238
			@32V	108	116	103
		@ +10dBm	@4.75	541	556	452
			@13.2	189	195	159
			@32V	83	85	68
UMTS (Data Transfer2) 384kbit/s	I_{peak}	@ +22dBm	@4.75	898	943	831
			@13.2	315	330	296
		@ +10dBm	@4.75	727	712	710
			@13.2	246	249	216
	I_{avg}	@ +22dBm	@4.75	741	793	696
			@13.2	255	272	240
			@32V	109	117	103
		@ +10dBm	@4.75	546	562	460
			@13.2	191	197	161
			@32V	84	86	69
HSDPA Data Transfer2 Cat.8 7.2Mbit/s	I_{peak}	@ +22dBm	@4.75	996	1040	926
			@13.2	348	363	326
		@ +10dBm	@4.75	764	789	736
			@13.2	275	282	249
	I_{avg}	@ +22dBm	@4.75	866	911	796
			@13.2	295	310	273
			@32V	125	132	117
			@4.75	644	666	586

Power Consumption (Serial Port ON, Flash LED activated)				UMTS 850 (BAND I)	UMTS 1900 (BAND II)	UMTS 2100 (BAND V)
		@ +10dBm	@13.2	224	231	205
			@32V	98	101	89
HSUPA Data Transfer2 Cat.5 2Mbit/s	I_{peak}	@ +22dBm	@4.75	955	1003	903
			@13.2	330	352	318
		@ +10dBm	@4.75	810	874	773
			@13.2	278	293	264
	I_{avg}	@ +22dBm	@4.75	790	852	753
			@13.2	271	291	259
			@32V	117	126	112
		@ +10dBm	@4.75	614	631	555
			@13.2	214	220	194
			@32V	93	96	85

12.5. Power Consumption in Non-Connected Mode (FXT009)

Table 77. Power Consumption of FXT009 in Non-Connected Mode (Typical)

Non-connected mode	Serial Port Status	Voltage	Current (mA)
I_{avg} in Active mode (4*)	In this mode, serial port remains active	@ 4.75V	80.3
		@ 13.2V	28.4
		@ 32V	12.5
I_{avg} in SLEEP mode (with FLASH LED activated) (4*)	ON	@ 4.75V	34.6
		@ 13.2V	12.2
		@ 32V	5.6
	OFF	@ 4.75V	5.3
		@ 13.2V	2.1
		@ 32V	1.2
I_{avg} in SLEEP mode (with FLASH LED deactivated) (4*)	ON	@ 4.75V	29.8
		@ 13.2V	10.8
		@ 32V	5
	OFF	@ 4.75V	1.3

		@ 13.2V	0.6
		@ 32V	0.5

Non-connected mode	Serial Port Status	Voltage	Current (mA)
I_{avg} in ACTIVE Idle mode Page 9 (2*)	ON	@ 4.75V	53.6
		@ 13.2V	18.7
		@ 32V	8.5
	OFF	@ 4.75V	23.5
		@ 13.2V	8.5
		@ 32V	4.1
I_{avg} in SLEEP Idle mode Page 9 (3*)	ON	@ 4.75V	28.6
		@ 13.2V	10.4
		@ 32V	5
	OFF	@ 4.75V	4.7
		@ 13.2V	1.9
		@ 32V	1.2
I_{avg} in Alarm mode	OFF	@ 4.75V	0.4
		@ 13.2V	0.4
		@ 32V	0.4

Note: The USB port must be deactivated to enter Sleep Mode.

12.6. Power Consumption in Non-Connected Mode (FXT003)

Table 78. Power Consumption of FXT003 in Non-Connected Mode (Typical)

Non-Connected Mode	Serial Port Status	Voltage	Current (mA)
I_{avg} in ACTIVE Idle mode HSPA Page 9	ON	@ 4.75V	56.1
		@ 13.2V	26.1
		@ 32V	8.8
	OFF	@ 4.75V	31.5
		@ 13.2V	16.7
		@ 32V	5.3
I_{avg} in SLEEP Idle mode HSPA Page 9	ON	@ 4.75V	27.9
		@ 13.2V	11.5
		@ 32V	4.9

Non-Connected Mode	Serial Port Status	Voltage	Current (mA)
	OFF	@ 4.75V	5.5
		@ 13.2V	3.1
		@ 32V	1.2
I_{avg} in Alarm mode	OFF	@ 4.75V	0.4
		@ 13.2V	0.4
		@ 32V	0.5

Non-Connected Mode	Serial Port Status	Voltage	Current (mA)
I_{avg} in ACTIVE Idle mode 2G Page 9	ON	@ 4.75V	54.8
		@ 13.2V	19.2
		@ 32V	8.7
	OFF	@ 4.75V	30.7
		@ 13.2V	11.3
		@ 32V	5.2
I_{avg} in SLEEP Idle mode 2G Page 9	ON	@ 4.75V	26.9
		@ 13.2V	9.8
		@ 32V	4.5
	OFF	@ 4.75V	4.7
		@ 13.2V	1.8
		@ 32V	1.03

Non-Connected Mode	Serial Port Status	Voltage	Current (mA)
I_{avg} in ACTIVE Idle mode 2G Page 2	ON	@ 4.75V	57.8
		@ 13.2V	20.1
		@ 32V	9.1
	OFF	@ 4.75V	33.4
		@ 13.2V	13.9
		@ 32V	5.5
I_{avg} in SLEEP Idle mode 2G Page 2	ON	@ 4.75V	29.7
		@ 13.2V	10.8
		@ 32V	4.9
	OFF	@ 4.75V	7.6
		@ 13.2V	2.8
		@ 32V	1.5

Note: The USB port must be deactivated to enter Sleep Mode.

12.7. Power Consumption with FXT004

Table 79. Power Consumption of FXT004 (Typical)

Parameter		Voltage	Current (mA)	Peak (mA)
On Call	Maximum TX Output	@ **4.75V**	579	1220
		@ **13.2V**	202	-
		@ **32V**	87	-
	+0dBm TX Output	@ **4.75V**	218	264
		@ **13.2V**	76	-
		@ **32V**	33	-
Idle	Registered	@ **4.75V**	95	-
		@ **13.2V**	33	-
		@ **32V**	15	-
	Searching	@ **4.75V**	138	-
		@ **13.2V**	48	-
		@ **32V**	21	-
Sleep Mode	Average current, SCI=2	@ **4.75V**	70	-
		@ **13.2V**	24	-
		@ **32V**	11	-
OFF Mode		@ **4.75V**	0.34	-
		@ **13.2V**	0.28	-
		@ **32V**	0.37	-

12.8. Consumption Measurement Procedure

This chapter describes the procedure for consumption measurement which is used to obtain the Fastrack Xtend consumption specifications.

The Fastrack Xtend consumption specification values are measured for all operating modes available. For more information about switching between the operating modes, refer to the appendix of document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30).

Consumption results are highly dependent on the hardware configuration used during measurement and the following chapter describes the hardware configuration settings that should be used to obtain optimum consumption measurements.

12.8.1. Hardware Configuration

The following hardware configuration includes both the measurement equipment and the Fastrack Xtend.

12.8.1.1. Equipment

Three devices are used to perform consumption measurement:

- A communication tester
- A current measuring power supply
- A computer, to control the Fastrack Xtend and to save measurement data

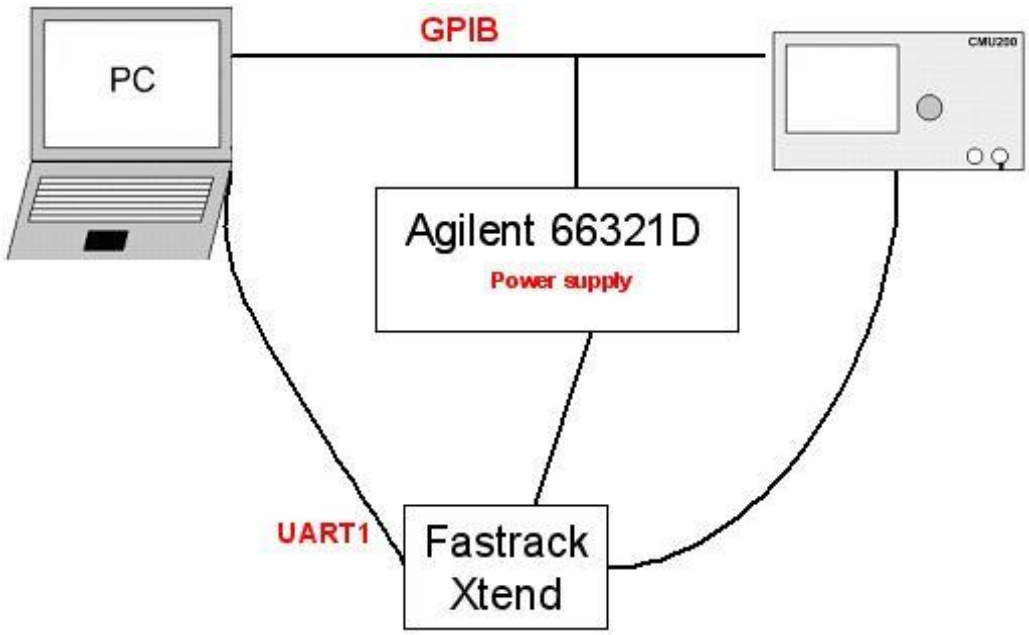


Figure 45. Typical Hardware Configuration for Power Consumption Measurement

The communication tester is a **CMU 200** from **Rhode & Schwartz**. This tester offers all required GSM/GPRS/EGPRS/CDMA/WCDMA network configurations and allows a wide range of network configurations to be set.

The **66321D** power supply is used to supply the Fastrack Xtend, and it could also be used to measure the total current drain by the device. The current measurement data is read through the GPIB connection. **Rhode & Schwartz NGSM 32/10** is used when measuring with 32V input voltage.

Note that a SIM card must be inserted during all consumption measurements.

The following table lists the recommended equipments to use for the consumption measurement.

Table 80. List of Recommended Equipments

Device	Manufacturer	Part Number	Notes/Description
Communication Tester	Rhode & Schwartz	CMU 200	Quad Band GSM/DCS/GPRS/EGPRS, CDMA, WCDMA
Current measuring power supply	Agilent	66321D	Used for DC-IN

12.8.1.2. SIM Cards Used

Consumption measurement may be performed with either 3-Volt or 1.8-Volt SIM cards. However, all specified consumption values are for a 3-Volt SIM card.

Caution: *The SIM card's voltage is supplied by the Fastrack Xtend power supply. Consumption measurement results may vary depending on the SIM card.*

12.8.2. Software Configuration

This section defines the software configuration for the equipment(s) used and the Fastrack Xtend settings.

12.8.2.1. Fastrack Xtend Configuration

The Fastrack Xtend software configuration is performed by selecting the operating mode to use in performing the measurement.

A description of the operating modes and the procedures used to change operating modes are given in the appendix of document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30).

Refer to the following list for the available operating modes of the Fastrack Xtend:

- Active Idle Mode
- Sleep Idle Mode
- Active Mode
- Sleep Mode**
- Connected Mode
- Transfer Mode class 8 (4Rx/1Tx) (in GPRS mode)
- Transfer Mode class 10 (3Rx/2Tx) (in GPRS mode)
- Transfer Mode class 12 (1Rx/4Tx) (in GPRS mode)*
- Transfer Mode class 8 (4Rx/1Tx) (in EDGE mode)
- Transfer Mode class 10 (3Rx/2Tx) (in EDGE mode)
- Transfer Mode class 12 (1Rx/4Tx) (in EDGE mode)*
- Connected Mode (in UMTS mode)*
- Data Transfer (in UMTS mode and HSxPA mode)*

Note: * *For FXT003 only.*

** *The USB port must be deactivated to enter Sleep Mode.*

For FXT004 operating modes, please refer to Table 79 Power Consumption of FXT004 (Typical).

12.8.2.2. Equipment Configuration

The communication tester is set according to the Fastrack Xtend operating mode. Paging during idle modes, Tx burst power, RF band and GSM/DCS/GPRS may be selected on the communication tester.

Refer to the following table for the network analyzer configuration according to operating mode.

Table 81. Operating Mode Information

Operating Mode		Communication Tester Configuration	
Alarm Mode		N/A	
Active Mode with GSM stack in Idle		Paging 9 (Rx burst occurrence ~2s)	
		Paging 2 (Rx burst occurrence ~0,5s)	
Sleep Mode with GSM stack in Idle		Paging 9 (Rx burst occurrence ~2s)	
		Paging 2 (Rx burst occurrence ~0,5s)	
Active Mode		N/A	
Sleep Mode		N/A	
Connected Mode		850/900 MHz	PCL5 (TX power 33dBm)
			PCL19 (TX power 5dBm)
		1800/1900 MHz	PCL0 (TX power 30dBm)
			PCL15 (TX power 0dBm)
GPRS	Transfer Mode class 8 (4Rx/1Tx)	850/900 MHz	Gam.3 (TX power 33dBm)
			Gam.17 (TX power 5dBm)
		1800/1900 MHz	Gam.3 (TX power 30dBm)
			Gam.18 (TX power 0dBm)
	Transfer Mode class 10 (3Rx/2Tx)	850/900 MHz	Gam.3 (TX power 33dBm)
			Gam.17 (TX power 5dBm)
		1800/1900 MHz	Gam.3 (TX power 30dBm)
			Gam.18 (TX power 0dBm)
	Transfer Mode class 12 (1Rx/4Tx)	850/900 MHz	Gam.3 (TX power 33dBm)
			Gam.17 (TX power 5dBm)
		1800/1900 MHz	Gam.3 (TX power 30dBm)
			Gam.18 (TX power 0dBm)
EGPRS	Transfer Mode class 2 (1Rx/1Tx)	850/900 MHz	Gam.6 (TX power 27dBm)
			Gam.17 (TX power 5dBm)
		1800/1900 MHz	Gam.5 (TX power 26dBm)
			Gam.18 (TX power 0dBm)
	Transfer Mode class 10 (3Rx/2Tx)	850/900 MHz	Gam.6 (TX power 27dBm)
			Gam.17 (TX power 5dBm)
		1800/1900 MHz	Gam.5 (TX power 26dBm)
			Gam.18 (TX power 0dBm)
	Transfer Mode class 12 (1Rx/4Tx)	850/900 MHz	Gam.6 (TX power 27dBm)
			Gam.17 (TX power 5dBm)
		1800/1900 MHz	Gam.5 (TX power 26dBm)
			Gam.18 (TX power 0dBm)
UMTS Connected Mode (VOICE)	UMTS 850 (BAND I)		+22dBm
			+10dBm
	UMTS 1900 (BAND II)		+22dBm
			+10dBm
	UMTS 2100 (BAND V)		+22dBm
			+10dBm
UMTS (Data	UMTS 850 (BAND I)		+22dBm

Operating Mode	Communication Tester Configuration	
Transfer) 384kbit/s		+10dBm
	UMTS 1900 (BAND II)	+22dBm
		+10dBm
	UMTS 2100 (BAND V)	+22dBm
		+10dBm
HSDPA Data Transfer Cat.8 7.2Mbit/s	UMTS 850 (BAND I)	+22dBm
		+10dBm
	UMTS 1900 (BAND II)	+22dBm
		+10dBm
	UMTS 2100 (BAND V)	+22dBm
		+10dBm
HSUPA Data Transfer CAT.5 2Mbit/s	UMTS 850 (BAND I)	+22dBm
		+10dBm
	UMTS 1900 (BAND II)	+22dBm
		+10dBm
	UMTS 2100 (BAND V)	+22dBm
		+10dBm

13. Recommendations when Using the Fastrack Xtend on Trucks

Caution: *The power supply connection of the Fastrack Xtend must **never** be directly connected to the truck battery.*

13.1. Recommended Power Supply Connection on Trucks

All trucks have a circuit breaker on the exterior of the cabin. The circuit breaker is used for safety reasons: if a fire blazes in the trucks, (for example, on the wiring trunk) the driver may cut the current source to avoid any damage (explosion). The circuit breaker is connected to the truck ground, most often associated with the fuse box.

Most truck circuit breakers do not cut the Positive Supply line of the battery, but cut the ground line of the latter.

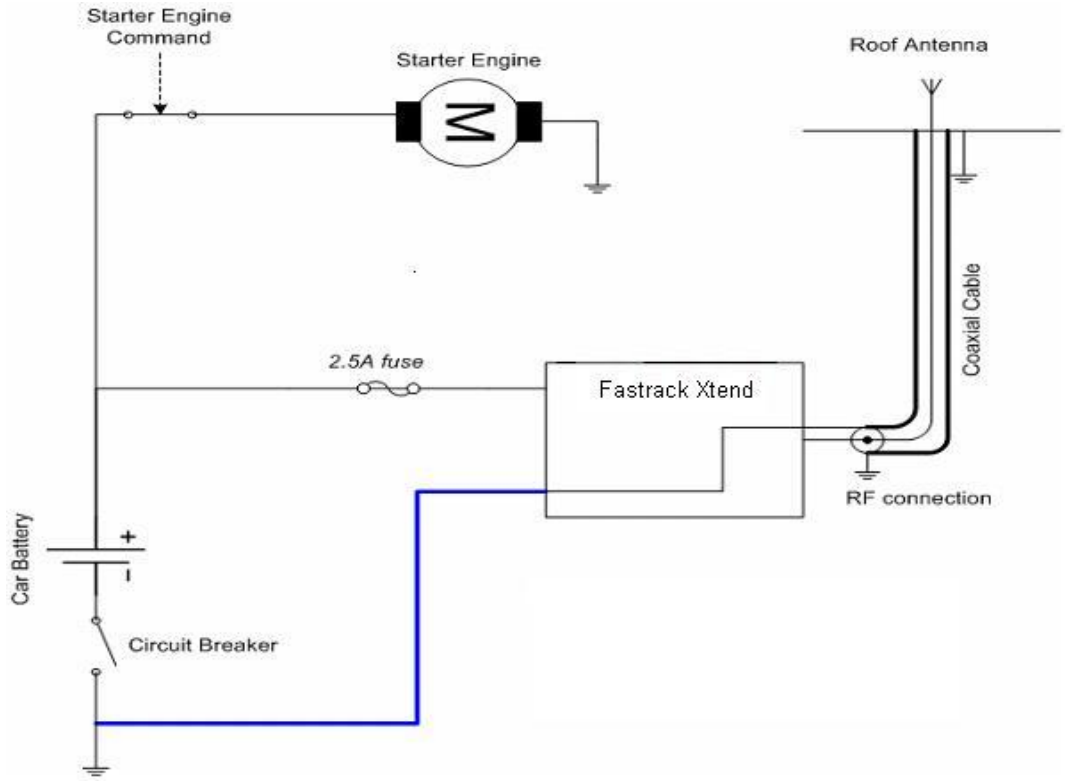


Figure 46. Recommended Power Supply Connection on Trucks

The figure above shows the recommended power supply connection where the ground connection of the Fastrack Xtend is not directly connected to the battery but is connected after the Circuit Breaker (on the truck ground or the fuse box).

13.2. Technical Constraints on Trucks

It is highly recommended to directly connect the power supply on the circuit breaker rather than on the battery. The Fastrack Xtend may be damaged when starting the truck if the circuit breaker is switched OFF (in this case, the truck ground and the battery ground will be connected through the Fastrack Xtend as shown in the following figure).

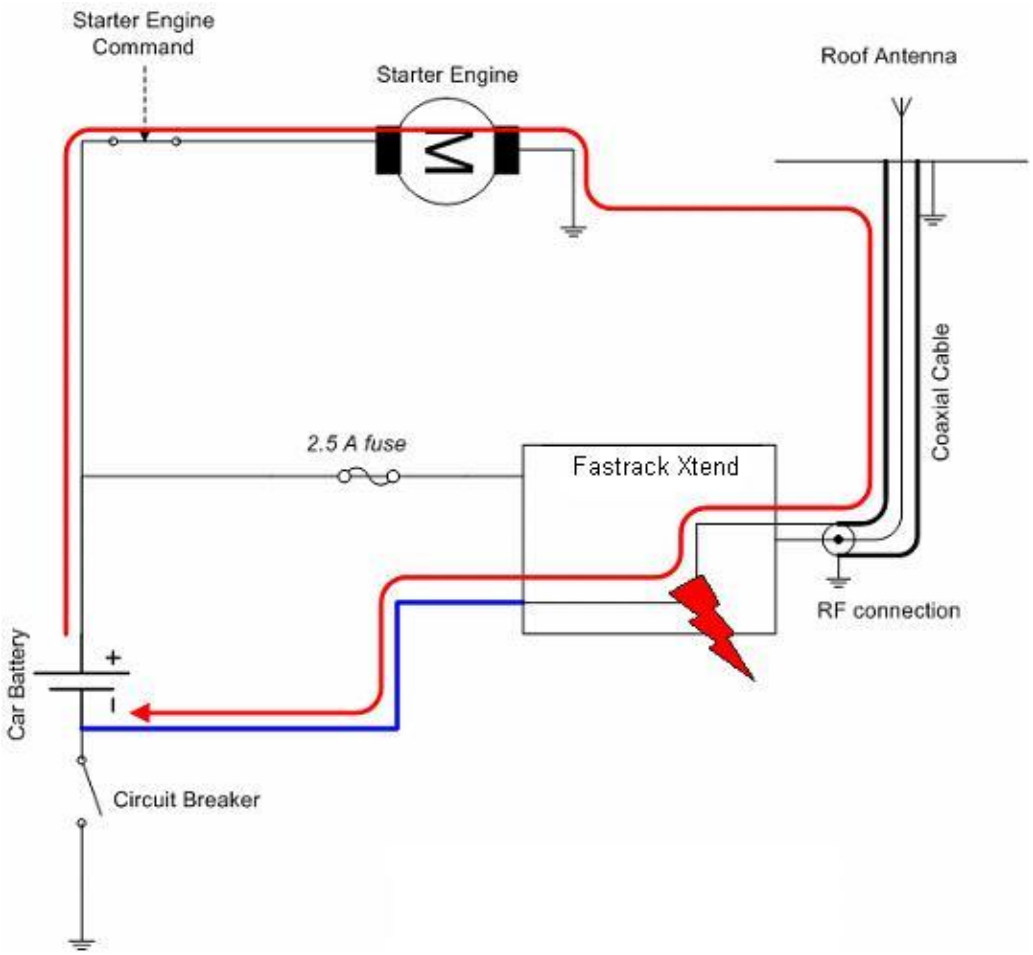


Figure 47. Example of an Electrical Connection That May Damage the Fastrack Xtend

The figure above gives an example of an electrical connection which may dramatically damage the Fastrack Xtend when its ground connection is directly connected to the battery ground.

In this example, when the circuit breaker is switched OFF, the current flows through the Fastrack Xtend and powers the electrical circuit of the truck (for example, the dashboard). Furthermore, when the Starter Engine command is used, it will destroy the cables or the Fastrack Xtend.

Since the internal tracks of the Fastrack Xtend are not designed to support high currents (up to 60A when starting the truck), they will be destroyed.

14. Fastrack Xtend Accessories

14.1. Standard Accessories

The Fastrack Xtend has the following standard accessories:

- 6-wire cable accessory with IO (DC IN, GND, **Vref**, GPIO25, GPIO21, ON/OFF)

  (Refer to the following table for the color-coding of the 6-wire cable accessory.)
- Mounting bridle
- USB Cable wire

Table 82. 6-Wire Cable Accessory Color Coding

IO	Cable Accessory Color
DC-IN	RED
GND	BLACK
VREF	GREEN
GPIO21	ORANGE
ON/OFF	YELLOW
GPIO25	BROWN

Note: For FXT004, GPIO42 and GPIO44 are the two external GPIO ports available on the Power supply connector. Refer to Table 8 Power Supply Connector Pin Description for more information.

14.2. Additional Optional Accessories

- 2-wire Power supply cable (DC-IN and GND)
- RS232 serial link cable
- RS232 serial link and audio cable
- AC/DC Power supply
- Battery Accessory – NiMH with built-in slow charger
- GSM and GPS antennas
- Expansion Cards: Ethernet or IO+GPS (Refer to section 7 Expansion Card for more information about these expansion cards.)

Note: The above items are ONLY considered as accessories of the Fastrack Xtend. They are NOT considered as part of the Fastrack Xtend.

14.3. Optional Battery

Refer to section 15 Recommendations when Using the Battery Accessory for more information regarding the optional battery accessory of the Fastrack Xtend.

14.4. Component Recommendations

The following tables list the recommended components/parts to use with the Fastrack Xtend.

Table 83. List of Recommended Accessories

Component	Part/Reference Number	Supplier
Quad-band antenna	W1900	PULSE
Power adaptor	GS-2034 (RE) 25W (MAX) Out: 12V -2A In: 100 to 240V – 47/63 Hz – 550mA Mounted with micro-fit connector	GlobTeK
6-wire cable accessory + Fuse	Cable: K96975060049A FUSE: T2AL250V VDE Slow Break	Grand-TEK Technology
IO+GPS Expansion Card	FXTE01	Sierra Wireless
GPS antenna	GC-GAACZ-A55	GIGA-Concept
IO cable for Expansion Card	58-9257-000-000-012S	AVX
Ethernet Expansion Card + Ethernet cable included	FXTE02 (Cable: K95DM2080002A-01)	Sierra Wireless (Grand-TEK Technology)
Battery accessory with built-in slow charger	FXBAT	Sierra Wireless
Data cable (RS-232)	HDM15/DB9F/DD/1.5M	GIGA-Concept
USB cable	88732-8700	MOLEX France
RS485 Expansion Card + cable harness included	EC0020 (Cable: KG9962080007M-01)	Sierra Wireless (Grand-TEK Technology)

15. Recommendations when Using the Battery Accessory

Warning: *The use of this accessory is strictly limited to Fastrack Xtend products. It is prohibited to use this accessory with devices other than the AirLink FXT Series programmable gateways.*

The figure below displays the battery accessory with its interface connector plug. The battery accessory consists of an internal battery with a built-in slow charger; while the interface connector is used to connect the battery accessory with the Fastrack Xtend series.

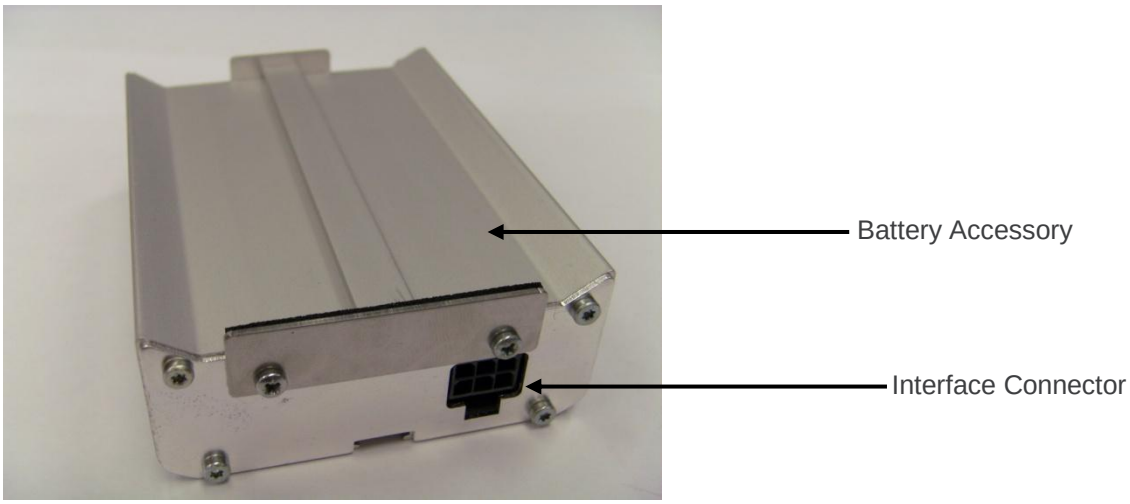


Figure 48. Fastrack Xtend Optional Battery Accessory

The following figure displays the block diagram of the optional battery with charger.

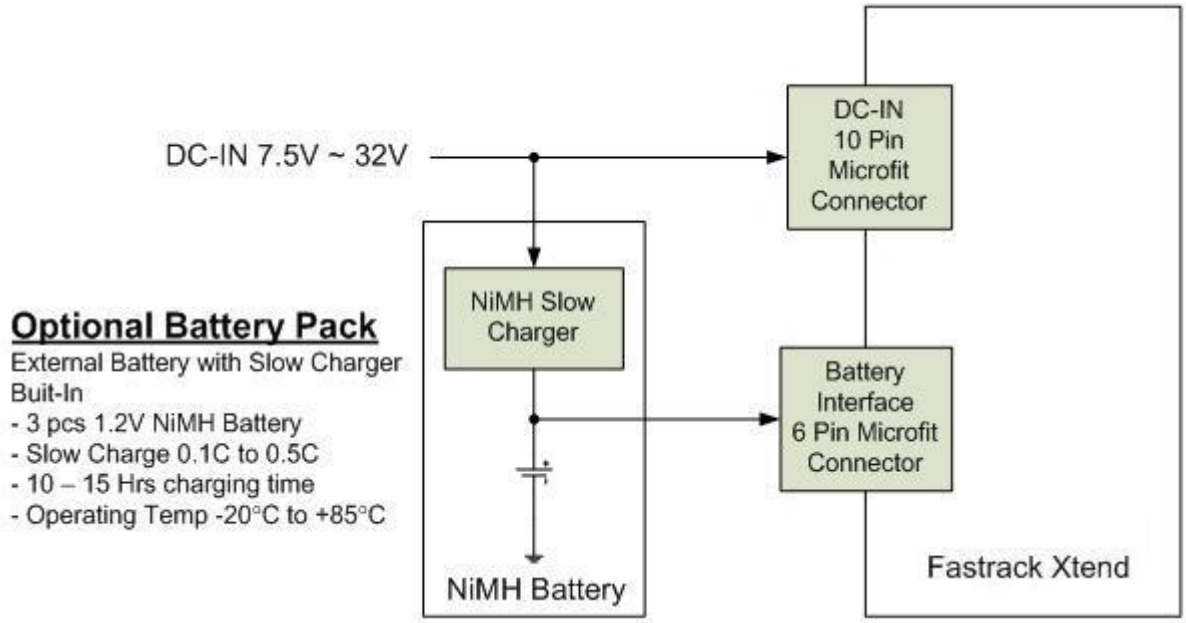


Figure 49. Battery with Charger Block Diagram

Refer to the battery specification table below for the battery temperature range.

Table 84. Battery Specifications

Specification	Value
Battery Cell Type	Nickel Metal hydride (Ni-MH)
Capacity	500mAH
Storage (Less than 30 days)	-40°C to +85°C
Discharge Temperature	-20°C to +85°C
Charging Temperature	0°C to +85°C
Input Voltage	7.5V ~ 32V
Output Voltage	3.6V
Life Expectancy (typical)	At least 1 year
Usage Time	In maximum power condition, typical usage time can be up to 0.5 hours*.

* More information about usage time will be available in future revisions.

15.1. Using the Battery Accessory

Assemble the battery accessory with the Fastrack Xtend as shown in the figure below.

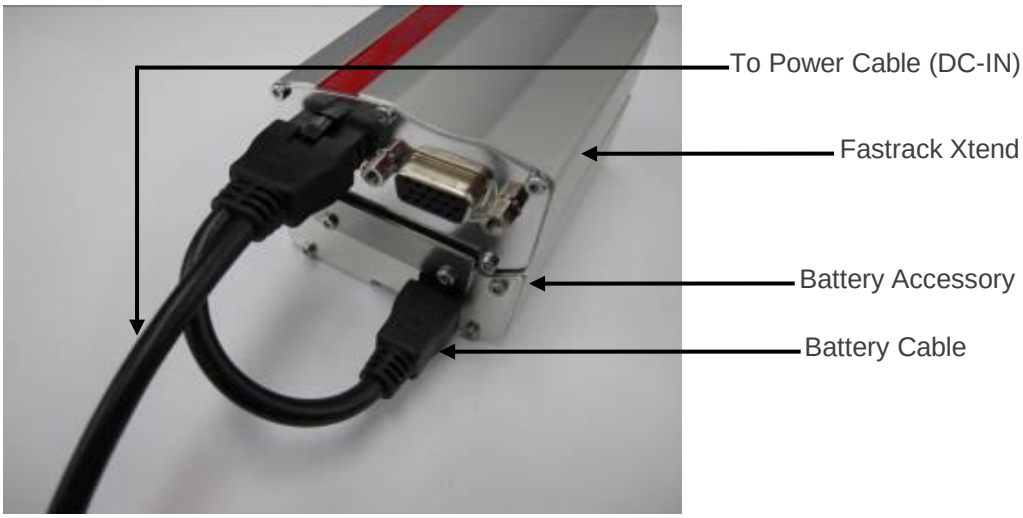


Figure 50. Fastrack Xtend with Battery Accessory Attached

Note: The item above is ONLY considered as an accessory of the Fastrack Xtend; and NOT considered a part of the Fastrack Xtend.

For more information about the battery accessory and how to use it with the Fastrack Xtend, refer to document [16] AirLink Fastrack Xtend Battery Accessory Product Technical Specification.

15.2. LED Indicator

The charger operation status is defined by the bi-color LED indicator. Refer to the following table for the operational details of the LED indicator.

Table 85. LED Indicator Status

LED Light Activity	Charger Status
Red LED ON	Battery level is below 3.6V
Green LED ON	Battery level is above 3.7V
LED OFF	DC-IN or USB is NOT connected

15.3. Charging Time

Refer to the table below for the charging times of the battery accessory.

Table 86. Battery Accessory Charging Time

Battery Type	Battery Capacity	Power Source	Charging Time
Ni-MH	500mAH	DC-IN	~14Hrs
		USB	~16Hrs

15.3.1. Charging Specification

Charging can be done using either DC-IN or USB.

When using DC-IN charging, simply plug in the cable accessory with DC-IN (7.5V to 32V) to the battery cable while attached to the battery accessory (see Figure 49 Battery with Charger Block Diagram).

For USB charging, connect a USB cable to the Fastrack Xtend while connecting the battery accessory via the battery cable.

If both the DC-IN and USB power source are connected, charging through DC-IN takes precedence if the input USB voltage is 5V or below. Otherwise, charging via USB takes precedence.

Refer to the following table for charging specifications.

Table 87. Charging Specifications (Typical)

Power Source	Input Voltage	Maximum Charging Voltage	Charging Current	
			Maximum	Continuous
DC-IN	DC 7.5 – 32V	4.9V	128mA	20mA
USB	DC 5V	4.8V	118mA	14mA

15.4. Ni-MH Battery Level Reading

ADC1 is an internal signal of the Fastrack Xtend and is dedicated for measuring the battery accessory voltage. From the ADC1value, a specific conversion is necessary to get the battery voltage.

The formula of the battery level to ADC1 reading (expressed in mV) is:

Battery voltage (Vbat) = 3.212 x ADC1 reading

For example, if ADC1 reading by AT command is 1218, then Vbat level = 3.212 x 1218 = 3912mV.

To read the battery level, use a communication software such as HyperTerminal and do the following:

- Enter **AT+ADC?**
- Press Enter

The Fastrack Xtend will respond with the following:

+ADC: XXXX,ADC1,XXX,XXX

OK

Refer to document [16] AirLink Fastrack Xtend Battery Accessory Product Technical Specification for more information about reading the battery level status.

Note: This feature is not available in FXT004.

15.5. DC-IN Detection

GPIO1 is an internal signal of the Fastrack Xtend and is dedicated for DC-IN status monitoring. To monitor the GPIO1 level, use a communication software such as HyperTerminal, and enter:

- **AT+WIOM=1,"GPIO1",0** to initially set GPIO1 as input
- **AT+WIOR="GPIO1"** to read the status of GPIO1

Table 88. AT+WIOR in GPIO1 Responses

AT+WIOR Response	Description
+WIOR: 0	DC-IN is applied
+WIOR: 1	No DC-IN detected (using battery as power supply)

Refer to document [7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30) for more information regarding the **AT+WIOR** AT Command.

Refer to document [16] AirLink Fastrack Xtend Battery Accessory Product Technical Specification for more information regarding the battery accessory.

Note: This feature is not available in FXT004.

15.6. Battery Accessory Recommendations and Other Information

- When used for the first time, or after a long time (more than a month) of storage, 2 to 3 times of charging and discharging cycles are required to optimize the battery performance (capacity).
- When the battery has not been used for a long period of time, recharge it before use.
  - Do not use the battery accessory when it is fully discharged.
  - It is recommended to disconnect the battery accessory from the Fastrack Xtend if the battery accessory is not used for a long time.
- Disconnect the DC-IN or the USB cable from the Fastrack Xtend if the device is not to be used for a long time.
- It is normal for the battery accessory to increase in temperature by up to 10°C during charging.
- The charging temperature of the battery accessory is from 0°C to 85°C.
- Do not open or modify the battery accessory, this may cause a short circuit. The battery accessory is designed using NiMH and modifying the product by using other types of battery cells (e.g. NiCd, Alkaline etc.) with different capacities may lead to a burst, causing personal injury.
- Battery storage temperature is from -40°C to 85°C.
- Do not wet, incinerate or disassemble the battery accessory.
- Do not short circuit the battery accessory.
- For indoor and dry location use only. Do not expose the battery accessory to rain, snow or extreme conditions.

Refer to section 18.2 Battery Safety for more information on battery safety.

16. Reliability Compliance and Recommended Standards

16.1. Reliability Compliance

The Fastrack Xtend is compliant with the following requirements.

Table 89. Standards Conformity for the Fastrack Xtend Series

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

16.2. Applicable Standards Listing

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

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

Table 90. Applicable Standards and Requirements for the Fastrack Xtend

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).

16.3. Environmental Specifications

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

Table 91. Operating Class Temperature Range

Conditions	Temperature Range
Operating / Class A	-20 °C to +55°C
Operating / Class B*	-30 °C to +75°C
Operating / Class C*	-30 °C to +85°C
Storage*	-40 °C to +85°C

* Refer to the Footnotes of Table 41 Real Time Clock Specifications for RTC battery related issues.

16.3.1. 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 Fastrack Xtend.

Table 92. ISO Failure Mode Severity Classification

Class	Definition
CLASS A	All equipment/system functions are fulfilled normally (100% functional) during and after the constraint. The Fastrack Xtend shall exhibit normal function during and after environmental exposure. The Fastrack Xtend 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 Fastrack Xtend 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.
CLASS C	No functional requirement will be fulfilled during the application of the constraint; however, full functionality will automatically be returned after the constraint has been removed.

16.3.2. Reliability Prediction Model

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

16.3.2.1. Life Stress Test

The following tests the Fastrack Xtend's product performance.

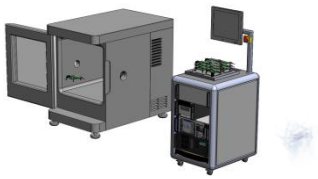
Table 93. Life Stress Test

Designation	Condition
Performance Test PT3T° & PT 	Standard: N/A
	Special conditions: • Temperature: ▪ Class A: -20 °C to +55°C ▪ Class B: -30 °C to +75°C • Rate of temperature change: ± 3°C/min • Recovery time: 3 hours
	Operating conditions: Powered
	Duration: 10 days

16.3.2.2. Environmental Resistance Stress Test

The following tests the Fastrack Xtend's resistance to extreme temperature.

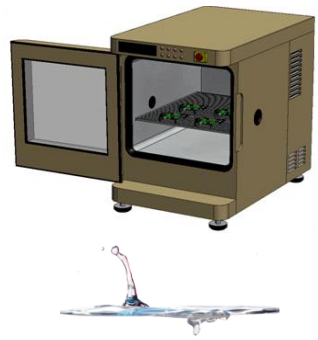
Table 94. Environmental Resistance Stress Test

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

16.3.2.3. Corrosive Resistance Stress Test

The following tests the Fastrack Xtend's resistance to corrosive atmosphere.

Table 95. Corrosive Resistance Stress Test

Designation	Condition
Moist Heat Cyclic Test MHCT 	Standard: IEC 60068-2-30, Test Db
	Special conditions: • Upper temperature: +55 ± 2°C • Lower temperature: +25 ± 2°C • RH: ▪ Upper temperature: 93% ▪ Lower temperature: 95% • Number of cycles: 21 (1 cycle/24 hours) • Rate of temperature change: dT/dt >= ± 3°C/min • Recovery time: 3 hours
	Operating conditions: Un-powered
	Duration: 21 days

16.3.2.4. Thermal Resistance Cycle Stress Test

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

Table 96. Thermal Resistance Cycle Stress Test

Designation	Condition
Thermal Shock Test TSKT 	Standard: IEC 60068-2-14
	Special conditions: • Upper temperature: +90°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

16.3.2.5. Mechanical Resistance Stress Tests

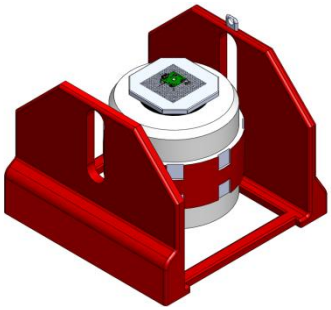
The following tests the Fastrack Xtend's resistance to vibrations and mechanical shocks.

Table 97. Mechanical Resistance Stress Tests

Designation	Condition
Sinusoidal Vibration Test SVT1 	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

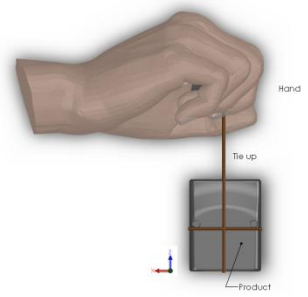
	Operating conditions: Un-powered
	Duration: 72 hours
Random Vibration Test	Standard: IEC 60068-2-64

Designation	Condition
RVT 	Special conditions: • Density spectrum: 0.96m²/s3 • Frequency range: ▪ 0.1 g²/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: • Shock Test 1: ▪ Wave form: Half sine ▪ Peak acceleration: 30G ▪ Duration: 11ms ▪ Number of shocks: 8 per direction ▪ Number of directions: 6 (±X, ±Y, ±Z) • Shock Test 2: ▪ Wave form: Half sine ▪ Peak acceleration: 200G ▪ Duration: 3ms ▪ Number of shocks: 3 per direction ▪ Number of directions: 6 (±X, ±Y, ±Z) • Shock Test 3: ▪ Wave form: Half sine ▪ Peak acceleration: 100G ▪ Duration: 6ms ▪ Number of shocks: 3 per direction ▪ Number of directions: 6 (±X, ±Y, ±Z)
	Operating conditions: Un-powered
	Duration: 72 hours

16.3.2.6. Handling Resistance Stress Tests

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

Table 98. Handling Resistance Stress Tests

Designation	Condition
ESD Test 	Standard: IEC 1000-4-2
	Special conditions: • Contact discharges: 10 positive and 10 negative applied • Voltage: ±2kV, ±4kV, ±6kV
	Operating conditions: Powered
	Duration: 24 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

17. Certification Compliance and Recommended Standards

17.1. Certification Compliance

Refer to the following tables for the requirements compliance of the Fastrack Xtend.

Table 99. Standards Conformity for FXT001, FXT002, FXT003, FXT009 and FXT010

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
International Standard for Battery	IEC 61951-2

Table 100. Standards Conformity for FXT004

Domain	Applicable Standard
FCC	FCC Part 15 FCC Part 22, 24
IC	RSS-132 Issue 2 RSS-133 Issue 5

17.2. Applicable Standards Listing

The table hereafter gives the basic list of standards applicable for 2G and 3G (HSPA).

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

Table 101. Applicable Standards and Requirements for the Fastrack Xtend Series

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

Document	Current Version	Title
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
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

18. Safety Recommendations

18.1. General Safety

It is important to follow any special regulations regarding the use of radio equipment due in particular to the possibility of radio frequency (RF) interference. Please follow the safety advice given carefully.

Switch OFF your Intelligent Embedded Module:

- When in an aircraft. The use of cellular telephones in an aircraft may endanger the operation of the aircraft, disrupt the cellular network and is illegal. Failure to observe this instruction may lead to suspension or denial of cellular telephone services to the offender, or legal action or both,
- When at a refueling point,
- When in any area with a potentially explosive atmosphere which could cause an explosion or fire,
- In hospitals and any other place where medical equipment may be in use.

Respect restrictions on the use of radio equipment in:

- Fuel depots,
- Chemical plants,
- Places where blasting operations are in progress,
- Any other area where signalization reminds that the use of cellular telephone is forbidden or dangerous.
- Any other area where you would normally be advised to turn off your vehicle engine.

There may be a hazard associated with the operation of your Fastrack Xtend close to inadequately protected personal medical devices such as hearing aids and pacemakers. Consult the manufacturers of the medical device to determine if it is adequately protected.

Operation of your Fastrack Xtend close to other electronic equipment may also cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.

The Fastrack Xtend is designed for and intended to be used in "***fixed***" and "***mobile***" applications:

"*Fixed*" means that the device is physically secured at one location and is not able to be easily moved to another location.

"*Mobile*" means that the device is designed to be used in other than fixed locations and generally in such a way that a separation distance of at least 20 cm (8 inches) is normally maintained between the transmitter's antenna and the body of the user or nearby persons.

The Fastrack Xtend is not designed for and intended to be used in portable applications (within 20 cm or 8 inches of the body of the user) and such uses are strictly prohibited.

18.2. Battery Safety

Storage Temperature (< 30 days):	-40°C to 85°C
Charging Temperature:	-20°C to 85°C
Discharging Temperature:	0°C to 85°C

Do not use batteries not specified for this product.

Do not recharge non-rechargeable batteries. Charge only NiMH 3x1.2V rechargeable batteries. Charging other types of batteries (e.g. NiCd, Alkaline etc.) may lead to a burst, causing personal injury.

Do not throw batteries into fire, expose them to excessive heat, or short-circuit them. BATTERIES MAY LEAK, GENERATE HEAT, IGNITE, OR EXPLODE.

Do not place the batteries with the terminals facing the wrong direction.

Keep batteries out of the reach of children. CHILDREN MAY SWALLOW BATTERIES. If a child swallows a battery, contact a doctor immediately.

Do not wet, incinerate or disassemble the charger and the batteries.

For indoor and dry location use only. Do not expose the charger to rain, snow or extreme conditions

18.3. Vehicle Safety

Do not use your Fastrack Xtend while driving, unless equipped with a correctly installed vehicle kit allowing ‘Hands-Free’ Operation.

Respect national regulations on the use of cellular telephones in vehicles. Road safety always comes first.

If incorrectly installed in a vehicle, the operation of the Fastrack Xtend series could interfere with the correct functioning of vehicle electronics. To avoid such problems, make sure that the installation has been performed by qualified personnel. Verification of the protection of vehicle electronics should form part of the installation.

The use of an alert device to operate a vehicle’s lights or horn on public roads is not permitted.

18.4. Care and Maintenance

Your Fastrack Xtend is the product of advanced engineering, design and craftsmanship and should be treated with care. The suggestion below will help you to enjoy this product for many years.

Do not expose the Fastrack Xtend to any extreme environment where the temperature or humidity is high.

Do not use or store the Fastrack Xtend in dusty or dirty areas. Its moving parts can be damaged.

Do not attempt to disassemble the embedded module. There are no user serviceable parts inside.

Do not expose the Fastrack Xtend to water, rain or spilt beverages. It is not waterproof.

Do not abuse your Fastrack Xtend by dropping, knocking, or violently shaking it. Rough handling can damage it.

Do not place the Fastrack Xtend alongside computer discs, credit or travel cards or other magnetic media. The information contained on discs or cards may be affected by the embedded module.

The use of third party equipment or accessories, not made or authorized by Sierra Wireless may invalidate the warranty of the embedded module.

Do contact an authorized Service Center in the unlikely event of a fault in the embedded module.

18.5. Your Responsibility

This Fastrack Xtend is under your responsibility. Please treat it with care, respecting all local regulations. It is not a toy. Therefore, keep it in a safe place at all times and out of the reach of children.

Try to remember your Unlock and PIN codes. Become familiar with and use the security features to block unauthorized use and theft.

19. 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.

19.1. Sierra Wireless Software Documentation

[1] Getting started with SDK 4.22b

Reference: WM_DEV_OAT_UGD_048

[2] Tutorial for IDE 1.08 (if using IDE; obsolete if using Developer Studio)

Reference: WM_DEV_OAT_UGD_044

[3] Tools Manual for IDE 1.08 (if using IDE; obsolete if using Developer Studio)

Reference: WM_DEV_OAT_UGD_045

[4] Basic Development Guide for SDK 4.22 (if using IDE; obsolete if using Developer Studio)

Reference: WM_DEV_OAT_UGD_050

[5] ADL User Guide for SDK 4.22 (if using IDE; obsolete if using Developer Studio)

Reference: WM_DEV_OAT_UGD_051

[6] SDK 4.22 Official Release Note

Reference: WM_DEV_OAT_DVD_338

19.2. Firmware Documentation

[7] Firmware 7.4a AT Commands Manual (Sierra Wireless Software Suite 2.31)/Firmware 7.4 AT Commands Manual (Sierra Wireless Software Suite 2.30)

Reference: WM_DEV_OAT_UGD_079 (Version 12 and 11)

[8] Firmware 7.4 Customer Release Note

Reference: TBC

[9] AT Commands Interface Guide

Reference: WM_ASW_OAT_UGD_00004

[10] AirPrime Q26 Elite Software User Guide and AT Commands Interface Specification

Reference: WI_DEV_Q26EL_UGD_001

19.3. Expansion Card Documentation

[11] Expansion Card Product Technical Specification
Reference: WA_DEV_FEX20_PTS_004

[12] FXTE01 and FXTE02 User Guide
Reference: WA_DEV_FEX20_UGD_008

[13] FXTE01, FXTE02 and EC0020 Installation Guide
Reference: WA_DEV_FEX20_UGD_009

[14] Ethernet Expansion Card Plug-in User Guide
Reference: TBC

19.4. Firmware Upgrade Documentation

[15] Firmware Upgrade Procedure
Reference: WM_SW_GEN_UGD_001

19.5. Other Related Documentation

[16] AirLink Fastrack Xtend Battery Accessory Product Technical Specification
Reference: WA_DEV_FEX20_PTS_003

20. List of Abbreviations

Abbreviation	Definition
AC	Alternating Current
ACM	Accumulated Call Meter
AMR	Adaptive Multi-Rate
AT	ATtention (prefix for Wireless CPU® 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
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
MIC	MICrophone
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	SubMiniature version A RF connector
SMS	Short Message Service
SNR	Signal-to-Noise Ratio
SPL	Sound Pressure Level
SPK	SpeaKer
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
VSWR	Voltage Stationary Wave Ratio

21. Appendix A: Packaging

21.1. Contents

The different Fastrack Xtend variants are available in nine different package configurations.

The table below summarizes the list of accessories delivered in each package and shows the designation used in the Sierra Wireless catalog to help you select the proper configuration set.

Table 102. Configuration Availability for the Fastrack Xtend Series

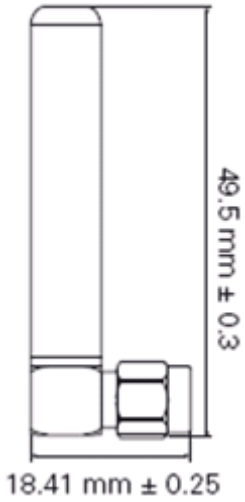
Package Name catalog designation	Ethernet Expansion Card	Ethernet cable for Ethernet Expansion Card	GPS Expansion Card	16-wires IO Cable for GPS Expansion Card	RS485 Expansion Card	RS485 cable for RS485 Expansion Card	GSM Antenna	GPS Antenna	Serial Data Cable	USB Cable	6-wires Cable Accessory for Fastrack Xtend	Battery cable for battery accessory	Battery Accessory Pack	Power supply for Fastrack Xtend	Unitary Small	Unitary Large	Two Holding bridles	FXT003 (HSPA)	FXT004 (CDMA)	FXT009 (EDGE)
Standard STD										☑	☑				☑		☑	☒	☒	☒
Standard + Battery STD; BATT										☑	☑	☑	☑		☑		☑	☒	☒	☒
Ready to Use STD; PSU; DATA CBL; GSM ANT							☑		☑	☑	☑			☑		☑	☑	☒		☒
Ready to Use + Battery STD; PSU; DATA CBL; GSM ANT; BATT							☑		☑	☑	☑	☑	☑	☑		☑	☑	☒		☒
Ethernet ETHERNET; PSU; DATA CBL; GSM ANT	☑	☑					☑		☑	☑	☑			☑		☑	☑			☒
GPS GPS;GPS ANT; DATA CBL; IO CBL; GSM ANT			☑	☑			☑		☑	☑	☑					☑	☑			☒
RS485 RS485; PSU; DATA CBL; GSM ANT					☑	☑	☑		☑	☑	☑			☑		☑	☑			☒
Ready to Use (CDMA) STD; PSU; DATA CBL									☑	☑	☑			☑		☑	☑		☒	
Ready to Use + Battery (CDMA) STD; PSU; DATA CBL; BATT									☑	☑	☑	☑	☑	☑		☑	☑		☒	

21.2. Accessories Description

This section describes the accessories used with the Fastrack Xtend Series.

21.2.1. GSM Antenna

Table 103. GSM Antenna Description

	• Antenna Size W x L x H (18.4 x 8.0 x 49.5mm) • Frequency Range supported: 850 / 900 / 1800 / 1900 / 2100 MH • Connector SMA (Male)

Refer to Table 83 List of Recommended Accessories for more information regarding the recommended accessories.

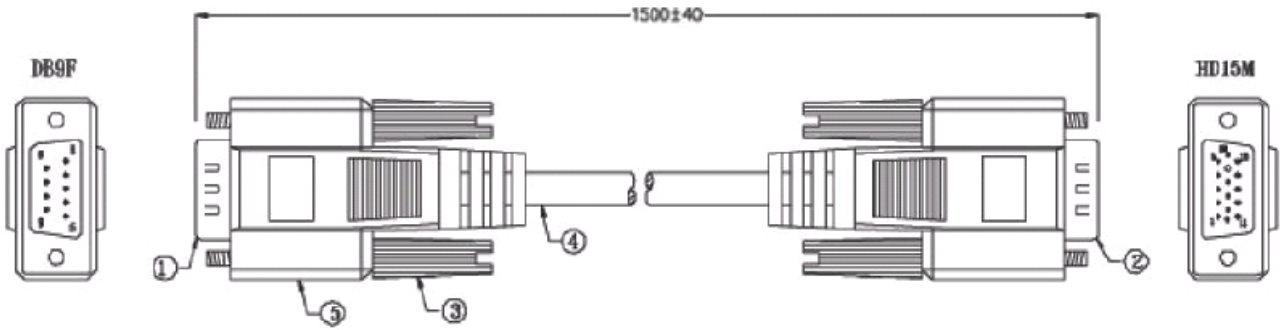
21.2.2. GPS Antenna

Table 104. GPS Antenna Description

Mechanical	Weight	< 110 grams
	Size	49x39x14mm
	Cable	RG174/U 3meters
	Connector	MMCx m. right angle
	Mounting	Magnetic base
	Housing	Black
Dielectric Antenna	Centre Frequency	1575.42MHz ± 3 MHz
	V.S.W.R	1.5 : 1
	Band Width	±5 MHz
	Impedance	50Ω
	Peak Gain	> 3dBic Based on 7x7cm ground plane
	Gain Coverage	> -4dBic at –90°< 0 < +90°(over 75% Volume)
	Polarization	RHCP
LNA / Filter	LNA Gain (without cable)	28dB (typical)
	Noise Figure	1.5dB
	Filter Out Band Attenuation (f0=1575.42 MHZ)	7dB Min f0+/-20MHZ 20dB Min f0+/-50MHZ 30dB Min f0+/-100MHZ
	V.S.W.R	< 2.0
	DC Voltage	3.0V to 5.0V
	DC Current	10mA Max

21.2.3. Serial Data Cable

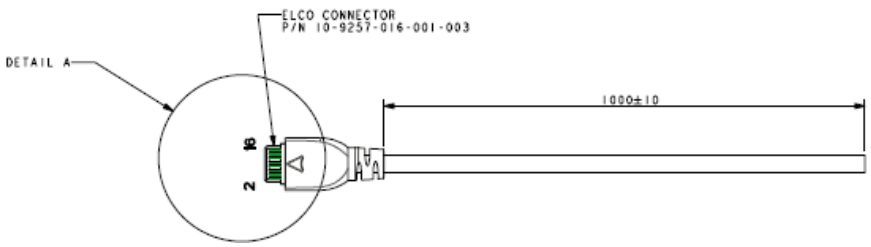
Table 105. Serial Data Cable Description

	• Length: 1.5M • Connection: DB9F (PC) to HD15M (Fastrack Xtend Series)

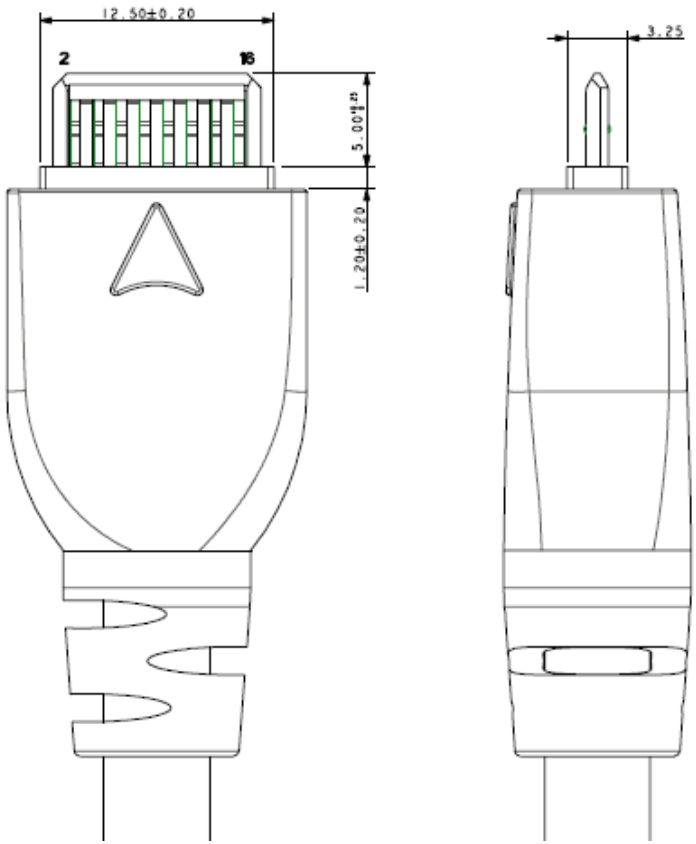
Please refer to section 5.1.2 Serial Interface for more information regarding the pin description.

21.2.4. 16-wire IO Cable used with the GPS Expansion Card

Table 106. 16-wire IO Cable Description



- Length: 1M
- Connection: 16-wire IO



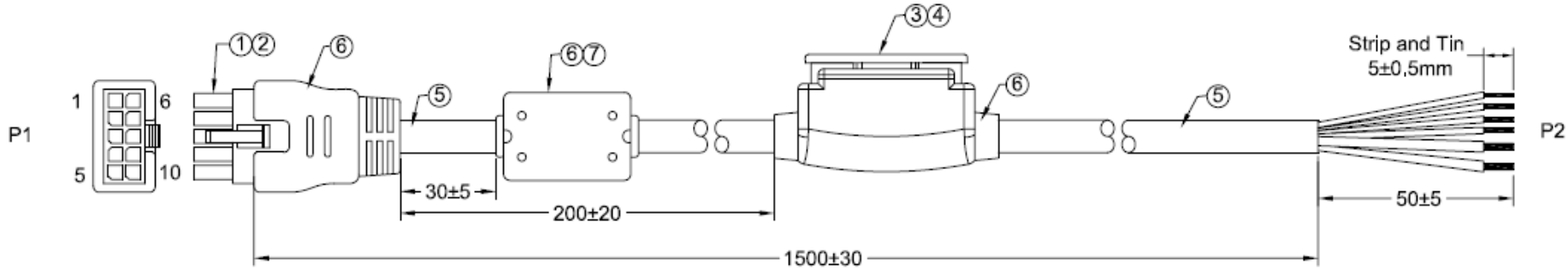
Please refer to Table 50 16-Way IO Expander Description for more information regarding the pin description.

21.2.5. USB Cable

- Connector to connector USB Type A to Mini-B
- Length 1.5M

21.2.6. 6-wire Cable Accessory used with the Fastrack Xtend

Table 107. 6-wire Cable Accessory Description



- Length 1.5M
- Connection 10-pin Microfit female connector to 6-wire open ends
- Fuse 2A/250V slow break fuse

Please refer to Table 82 6-Wire Cable Accessory Color Coding for more information regarding the pin description.

21.2.7. Package

Two packaging boxes are available depending on the Fastrack Xtend configuration.

Table 108. Packaging Description

Packaging Box 1	Packaging Box 2
Dimensions: 155 x 116 x 77 mm	Dimensions: 221 x 155 x 79 mm

21.2.8. Two Holding Bridles

Please refer to section 8.1 Mounting the Fastrack Xtend for more information regarding the holding bridles.

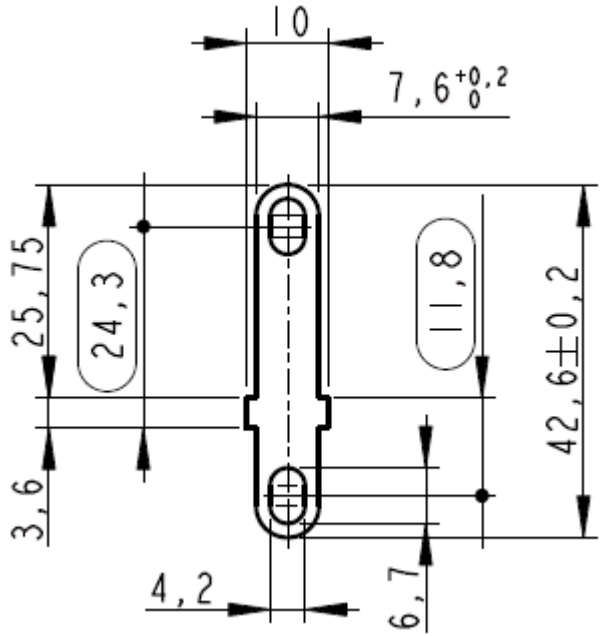
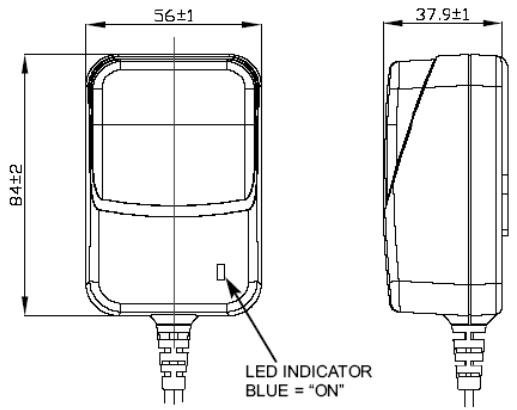
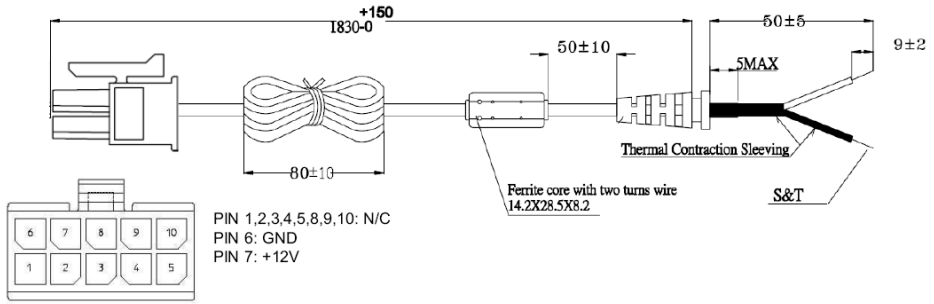


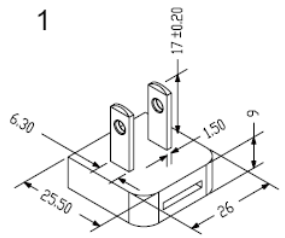
Figure 51. Holding Bridle Description

21.2.9. Power Supply used with the Fastrack Xtend

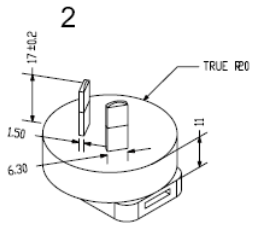
Table 109. Power Supply Description



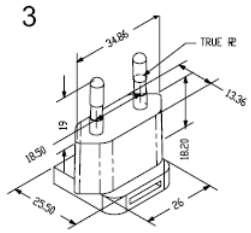




P/N: Q-NA (R)
NORTH AMERICA
JAPAN



P/N: Q-SAA(R)
AUSTRALIA
CHINA



P/N: Q-EU(R)
EUROPE
SOUTH AMERICA

- Input Voltage 100-240VAC
- Output Voltage 12VDC
- Output Current required 2.08A, No Minimum Load
- Output Power (Rated) 25W MAX

22. Appendix B: Product Labeling

A product label located at the back of the Fastrack Xtend gives the following information:

- Product Reference (Fastrack Xtend FXTXXX for example)
- Part number
- CE marking
- 15-digit Serial Number
- Open AT® Logo
- FCC ID
- IC ID
- 15-digit IMEI code

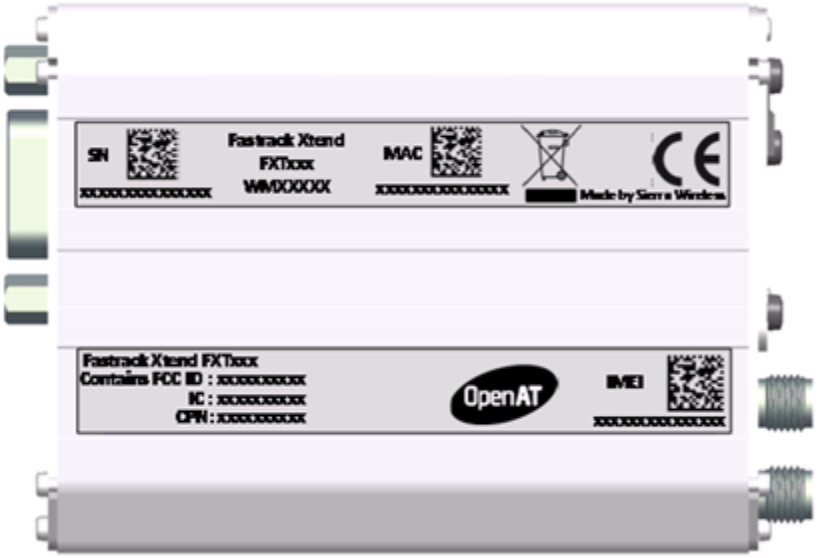


Figure 52. Fastrack Xtend Product Labeling

23. Appendix C: Safety Recommendations (For Information Only)

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

23.1. RF Safety

23.1.1. 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.

23.1.2. 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.

23.1.3. 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.

23.1.4. 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 Fastrack Xtend, 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.

23.2. General Safety

23.2.1. 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.

23.2.2. 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.

23.2.3. Vehicle Electronic Equipment

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

23.2.4. 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.

23.2.5. 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.

23.2.6. 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.

23.2.7. 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.

23.2.8. 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.

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