



# Fastrack Xtend User Guide

## Fastrack Xtend Plug & Play

WA\_DEV\_FEX20\_UGD\_002  
001  
November 23, 2009

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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

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## >> | 1. Overview

The Fastrack Xtend Plug & Play series is a range of self-contained modems supporting EGSM/GPRS/EGDE 850/900/1800/1900 quad band, WCDMA 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 Internal Expansion Socket (IES) interface accessible for customer use. Expanding application features is easy by simply plugging in an Internal Expansion Socket Module (IESM) board.

Fully certified, the Fastrack Xtend offers quad band 850/900/1800/1900 MHz GPRS and EGPRS Class 10 (12\*) capabilities, Tri Band WCDMA/FDD (850/1900/2100) (Band I, II, V) UMTS / HSxPA; and it also supports a powerful open software platform (Open AT®). Open AT® is the world's most comprehensive cellular development environment, which allows embedded standard ANSI C applications to be natively executed directly on the Wireless CPU®. For more information about Open AT®, refer to the documents listed in the [Open AT® Software Documentation](#) section.

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

*Note:* Only the 3G version of the Fastrack Xtend supports WCDMA. The CDMA version only supports CDMA2000 1xRTT.

*Note:* This document does not cover the programmable capabilities available through the Open AT® Software Suite.

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## 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	FXT006	FXT007	FXT008	Fastrack Supreme 10	Fastrack Supreme 20	
<b>GSM</b>	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900	<input type="checkbox"/> 900 <input type="checkbox"/> 1800 <input type="checkbox"/> 850 <input type="checkbox"/> 1900	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900
<b>WCDMA</b>	<input type="checkbox"/> 850 <input type="checkbox"/> 1900 <input type="checkbox"/> 2100	<input type="checkbox"/> 850 <input type="checkbox"/> 1900 <input type="checkbox"/> 2100	<input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900 <input checked="" type="checkbox"/> 2100	<input type="checkbox"/> 850 <input type="checkbox"/> 1900 <input type="checkbox"/> 2100	<input type="checkbox"/> 850 <input type="checkbox"/> 1900 <input type="checkbox"/> 2100	<input type="checkbox"/> 850 <input type="checkbox"/> 1900 <input type="checkbox"/> 2100	<input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900 <input checked="" type="checkbox"/> 2100	<input type="checkbox"/> 850 <input type="checkbox"/> 1900 <input type="checkbox"/> 2100	<input type="checkbox"/> 850 <input type="checkbox"/> 1900 <input type="checkbox"/> 2100	
<b>CDMA 2000 1xRTT</b>	<input type="checkbox"/> 800 <input type="checkbox"/> 1900	<input type="checkbox"/> 800 <input type="checkbox"/> 1900	<input type="checkbox"/> 800 <input type="checkbox"/> 1900	<input checked="" type="checkbox"/> 800 <input checked="" type="checkbox"/> 1900	<input type="checkbox"/> 800 <input type="checkbox"/> 1900	<input type="checkbox"/> 800 <input type="checkbox"/> 1900	<input type="checkbox"/> 800 <input type="checkbox"/> 1900	<input type="checkbox"/> 800 <input type="checkbox"/> 1900	<input type="checkbox"/> 800 <input type="checkbox"/> 1900	
<b>GPRS</b>	<input checked="" type="checkbox"/> Class10 <input type="checkbox"/> Class12 <input type="checkbox"/> No	<input checked="" type="checkbox"/> Class10 <input type="checkbox"/> Class12 <input type="checkbox"/> No	<input type="checkbox"/> Class10 <input checked="" type="checkbox"/> Class12 <input type="checkbox"/> No	<input type="checkbox"/> Class10 <input type="checkbox"/> Class12 <input type="checkbox"/> No	<input checked="" type="checkbox"/> Class10 <input type="checkbox"/> Class12 <input type="checkbox"/> No	<input checked="" type="checkbox"/> Class10 <input type="checkbox"/> Class12 <input type="checkbox"/> No	<input type="checkbox"/> Class10 <input checked="" type="checkbox"/> Class12 <input type="checkbox"/> No	<input type="checkbox"/> Class10 <input type="checkbox"/> Class12 <input type="checkbox"/> No	<input checked="" type="checkbox"/> Class10 <input type="checkbox"/> Class12 <input type="checkbox"/> No	
<b>EDGE</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
<b>IESM Flexibility</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Micro-Fit Connector</b>	<input type="checkbox"/> 4-pin <input checked="" type="checkbox"/> 10-pin	<input type="checkbox"/> 4-pin <input checked="" type="checkbox"/> 10-pin	<input type="checkbox"/> 4-pin <input checked="" type="checkbox"/> 10-pin	<input type="checkbox"/> 4-pin <input checked="" type="checkbox"/> 10-pin	<input type="checkbox"/> 4-pin <input checked="" type="checkbox"/> 10-pin	<input type="checkbox"/> 4-pin <input checked="" type="checkbox"/> 10-pin	<input type="checkbox"/> 4-pin <input checked="" type="checkbox"/> 10-pin	<input checked="" type="checkbox"/> 4-pin <input type="checkbox"/> 10-pin	<input checked="" type="checkbox"/> 4-pin <input type="checkbox"/> 10-pin	



Feature	FXT001	FXT002	FXT003	FXT004	FXT006	FXT007	FXT008	Fastrack Supreme 10	Fastrack Supreme 20
<b>Secondary RF Interface</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>USB Interface</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>Serial Port Auto Shut Down</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>RTC Back Up Battery</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>Battery Accessory</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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.

## Overall Dimensions



Figure 1. Fastrack Xtend

Table 2. Fastrack Xtend Physical Dimensions

<b>Length</b>	89 mm
<b>Width</b>	60 mm
<b>Thickness</b>	30 mm
<b>Weight</b>	97g for FXT001 and FXT002; 120g for FXT003 and FXT008

## 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 WCDMA
FXT004	CDMA2000 1XRTT Dual Band with GPS L1 supported
FXT006	EGSM Quad Band + CL10 GPRS + inSIM
FXT007	EGSM Quad Band + CL 10 GPRS + EDGE + inSIM
FXT008	EGSM Quad Band + CL 12 GPRS + EDGE + HSxPA + Tri Band WCDMA + inSIM

*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.

## Connections

- One 10-pin Micro-Fit Power Supply Connector
- USB 2.0
- One 15-pin Sub-D Serial Interface
- SIM Interface
- Antenna Interface
  - SMA Main
  - SMA Diversity (3G-HSxPA version) for FXT003 and FXT008; or SMA GPS-One (1xRTT version) for FXT004

## Interfaces

### Modem

- 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)

### Internal IESM

- 1 – Secondary Serial Link (UART2)
- 6 – GPIOs
- 2 – SPI Bus
- 1 – ADC
- 1 – DAC
- 1 – PCM
- 1 – Interrupt
- Reset access to the Wireless CPU®
- Boot access to the Wireless CPU®
- 2.8V supply from the Fastrack Xtend
- 4V supply from the Fastrack Xtend

- 2.8V Digital supply from the Wireless CPU®
- 1.8V Digital supply from the Wireless CPU®
- Access to 4.75 to 32V DC-IN

## Environmental Compliance

### 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)”.



### 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 Plug & Play series.

### 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
<b>Open AT®</b> (does not apply to FXT004)	Open AT® programmable: <ul style="list-style-type: none"> <li>• Native execution of embedded standard ANSI C applications</li> <li>• Custom AT command creation</li> <li>• Custom application library creation</li> <li>• Standalone operation</li> </ul>
<b>Standard</b> (does not apply to FXT004)	<ul style="list-style-type: none"> <li>• 850MHz / 900 MHz</li> <li>• E-GSM compliant</li> <li>• Output power: class 4 (2W)</li> <li>• Fully compliant with ETSI GSM phase 2 + small MS</li> <li>• 1800 MHz / 1900MHz</li> <li>• Output power: class 1 (1W)</li> <li>• Fully compliant with ETSI GSM phase 2 + small MS</li> </ul>
<b>GPRS</b> (does not apply to FXT004)	<ul style="list-style-type: none"> <li>• Class 10 (FXT001, FXT002, FXT003, FXT006, FXT007, FXT008)</li> <li>• Up to Class 12 (FXT003 and FXT008 only)</li> <li>• PBCCH support</li> <li>• Coding schemes: CS1 to CS4</li> <li>• Compliant with SMG31bis</li> <li>• Embedded TCP/IP stack</li> </ul>
<b>EGPRS</b> (for FXT002, FXT003, FXT007, FXT008 only)	<ul style="list-style-type: none"> <li>• Class 10 ( FXT002, FXT003, FXT007, FXT008)</li> <li>• Up to Class 12 (FXT003 and FXT008 only)</li> <li>• PBCCH support</li> <li>• Coding schemes: MCS1 to MCS9</li> <li>• Compliant with SMG31bis</li> <li>• Embedded TCP/IP stack</li> </ul>
<b>Interface</b>	<ul style="list-style-type: none"> <li>• RS232 (V.24/V.28) Serial interface supporting:               <ul style="list-style-type: none"> <li>▪ Baud rate (bits/s): 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800 and 921600</li> <li>▪ Autobauding (bits/s): from 1200 to 921600.</li> <li>▪ 2 General Purpose Input/Output gates (GPIOs) available.</li> </ul> </li> <li>• 1.8 V / 3 V SIM interface. (Does not apply to FXT004)</li> <li>• AT command set based on V.25ter and GSM 07.05 &amp; 07.07</li> </ul>
<b>Open AT®</b>	<ul style="list-style-type: none"> <li>• Open AT® interface for embedded applications (does not apply to FXT004)</li> <li>• Open AT® Plug-In Compatible (does not apply to FXT004)</li> </ul>

Features	Description
<b>SMS</b>	<ul style="list-style-type: none"> <li>• Text &amp; PDU</li> <li>• POINT TO POINT (MT/MO)</li> <li>• Cell broadcast</li> </ul>
<b>Data</b> (for FXT001, FXT002, FXT006, FXT007)	<ul style="list-style-type: none"> <li>• Data circuit asynchronous</li> <li>• Transparent and Non Transparent modes</li> <li>• Up to 14.400 bits/s</li> <li>• MNP Class 2 error correction</li> <li>• V42.bis data compression</li> </ul>
<b>CDMA2000</b> (for FXT004)	<ul style="list-style-type: none"> <li>• Band Class 0 and Class 1</li> <li>• Data rates up to 153 kbps forward and reverse</li> </ul>
<b>UMTS Data Transfer</b> (for FXT003, FXT008)	BAND I, II, IV (850/1900,2100)up to 384kbits/s
<b>HSXPA</b> (for FXT003, FXT008)	<ul style="list-style-type: none"> <li>• BAND I, II, IV (850/1900,2100)</li> <li>• HSDPA Cat 8 up to 7.2Mbits/s</li> <li>• HSUPA Cat 5 up to 2Mbits/s</li> </ul>
<b>FAX</b> (for FXT001, FXT002, FXT006, FXT007)	Automatic fax group 3 (class 1 and class 2)
<b>Audio</b>	<ul style="list-style-type: none"> <li>• Echo cancellation</li> <li>• Noise reduction</li> <li>• Full Rate, Enhanced Full Rate, Half Rate operation and Adaptive Multi-Rate (FR/EFR/HR/AMR); #EVRC/QCELP/4GV for FXT004</li> <li>• Dual Tone Multi Frequency function (DTMF)</li> </ul>

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	FXT006	FXT007	FXT008	
<b>GSM</b>	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900	<input type="checkbox"/> 900 <input type="checkbox"/> 1800 <input type="checkbox"/> 850 <input type="checkbox"/> 1900	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900	<input checked="" type="checkbox"/> 900 <input checked="" type="checkbox"/> 1800 <input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900
<b>WCDMA</b>	<input type="checkbox"/> 850 <input type="checkbox"/> 1900 <input type="checkbox"/> 2100	<input type="checkbox"/> 850 <input type="checkbox"/> 1900 <input type="checkbox"/> 2100	<input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900 <input checked="" type="checkbox"/> 2100	<input type="checkbox"/> 850 <input type="checkbox"/> 1900 <input type="checkbox"/> 2100	<input type="checkbox"/> 850 <input type="checkbox"/> 1900 <input type="checkbox"/> 2100	<input type="checkbox"/> 850 <input type="checkbox"/> 1900 <input type="checkbox"/> 2100	<input checked="" type="checkbox"/> 850 <input checked="" type="checkbox"/> 1900 <input checked="" type="checkbox"/> 2100	
<b>CDMA 2000 1xRTT</b>	<input type="checkbox"/> 800 <input type="checkbox"/> 1900	<input type="checkbox"/> 800 <input type="checkbox"/> 1900	<input type="checkbox"/> 800 <input type="checkbox"/> 1900	<input checked="" type="checkbox"/> 800 <input checked="" type="checkbox"/> 1900	<input type="checkbox"/> 800 <input type="checkbox"/> 1900	<input type="checkbox"/> 800 <input type="checkbox"/> 1900	<input type="checkbox"/> 800 <input type="checkbox"/> 1900	
<b>GPRS</b>	<input checked="" type="checkbox"/> Yes, Class10 <input type="checkbox"/> Yes, Class12 <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes, Class10 <input type="checkbox"/> Yes, Class12 <input type="checkbox"/> No	<input type="checkbox"/> Yes, Class10 <input checked="" type="checkbox"/> Yes, Class12 <input type="checkbox"/> No	<input type="checkbox"/> Yes, Class10 <input type="checkbox"/> Yes, Class12 <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes, Class10 <input type="checkbox"/> Yes, Class12 <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes, Class10 <input type="checkbox"/> Yes, Class12 <input type="checkbox"/> No	<input type="checkbox"/> Yes, Class10 <input checked="" type="checkbox"/> Yes, Class12 <input type="checkbox"/> No	
<b>EDGE</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Voice</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Data</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Fax</b>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<b>SIM Interface</b>	<input type="checkbox"/> 3V <input type="checkbox"/> 5V <input type="checkbox"/> 3/5V <input checked="" type="checkbox"/> 1.8/3V	<input type="checkbox"/> 3V <input type="checkbox"/> 5V <input type="checkbox"/> 3/5V <input checked="" type="checkbox"/> 1.8/3V	<input type="checkbox"/> 3V <input type="checkbox"/> 5V <input type="checkbox"/> 3/5V <input checked="" type="checkbox"/> 1.8/3V	<input type="checkbox"/> 3V <input type="checkbox"/> 5V <input type="checkbox"/> 3/5V <input type="checkbox"/> 1.8/3V	<input type="checkbox"/> 3V <input type="checkbox"/> 5V <input type="checkbox"/> 3/5V <input checked="" type="checkbox"/> 1.8/3V	<input type="checkbox"/> 3V <input type="checkbox"/> 5V <input type="checkbox"/> 3/5V <input checked="" type="checkbox"/> 1.8/3V	<input type="checkbox"/> 3V <input type="checkbox"/> 5V <input type="checkbox"/> 3/5V <input checked="" type="checkbox"/> 1.8/3V	
<b>InSIM</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Feature	FXT001	FXT002	FXT003	FXT004	FXT006	FXT007	FXT008
<b>RUIM</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>Vocoder</b>	<input checked="" type="checkbox"/> HR <input checked="" type="checkbox"/> FR <input checked="" type="checkbox"/> EFR <input checked="" type="checkbox"/> AMR	<input checked="" type="checkbox"/> HR <input checked="" type="checkbox"/> FR <input checked="" type="checkbox"/> EFR <input checked="" type="checkbox"/> AMR	<input checked="" type="checkbox"/> HR <input checked="" type="checkbox"/> FR <input checked="" type="checkbox"/> EFR <input checked="" type="checkbox"/> AMR	<input type="checkbox"/> HR <input type="checkbox"/> FR <input type="checkbox"/> EFR <input type="checkbox"/> AMR	<input checked="" type="checkbox"/> HR <input checked="" type="checkbox"/> FR <input checked="" type="checkbox"/> EFR <input checked="" type="checkbox"/> AMR	<input checked="" type="checkbox"/> HR <input checked="" type="checkbox"/> FR <input checked="" type="checkbox"/> EFR <input checked="" type="checkbox"/> AMR	<input checked="" type="checkbox"/> HR <input checked="" type="checkbox"/> FR <input checked="" type="checkbox"/> EFR <input checked="" type="checkbox"/> AMR
<b>GPS One</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No



## Supported Bands

The Fastrack Xtend comes in several variants, supporting various bearers and bands. The FXT001, FXT002, FXT006 and FXT007 are quad band Plug & Play modems 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 and FXT008 are also quad band EGSM900/DCS1800/GSM850/PCS1900 that also supports Tri Band WCDMA/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 the [Checking the Band Selection](#) and [Switching Bands](#) sub-sections of section 9 Communicating with the Fastrack Xtend for more information regarding switching bands.

## IES Interface

The Fastrack Xtend offers a 50-pin Internal Expansion Socket (IES) Interface accessible to customers. It is an additional interface for customers to expand their application features by simply plugging in an Internal Expansion Socket Module (IESM) board through the mating connector of the IES interface.

The Fastrack Xtend with an IESM Ethernet or an IESM IO+GPS plugged in is run by the AT Plug-Ins of the Open AT® software suite, which is based on the firmware inside the Fastrack Xtend.

The Fastrack Xtend supports the following types of IESM boards:

- IO + GPS (FXTE01)
- Ethernet (FXTE02)

Refer to the [Supported IESM Boards](#) sub-section of section 7 IESM Compartment and Boards for more information about the IESM boards supported by the Fastrack Xtend.

## Protection

### Power Supply

The Fastrack Xtend is protected from continuous over-voltage by a 2A/250V slow break fuse directly bonded on the power supply cable; 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.

### 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

### 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 Plug & Play series.

### Functional Architecture

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

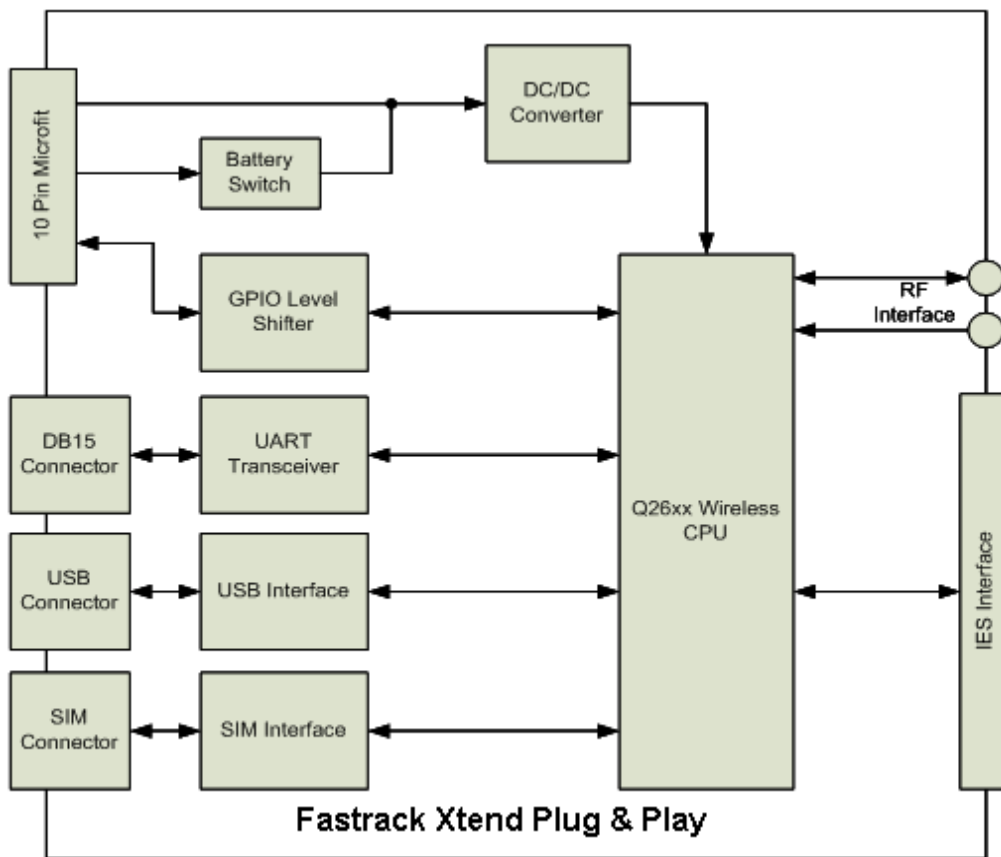


Figure 2. Functional Architecture

## RF Functionalities

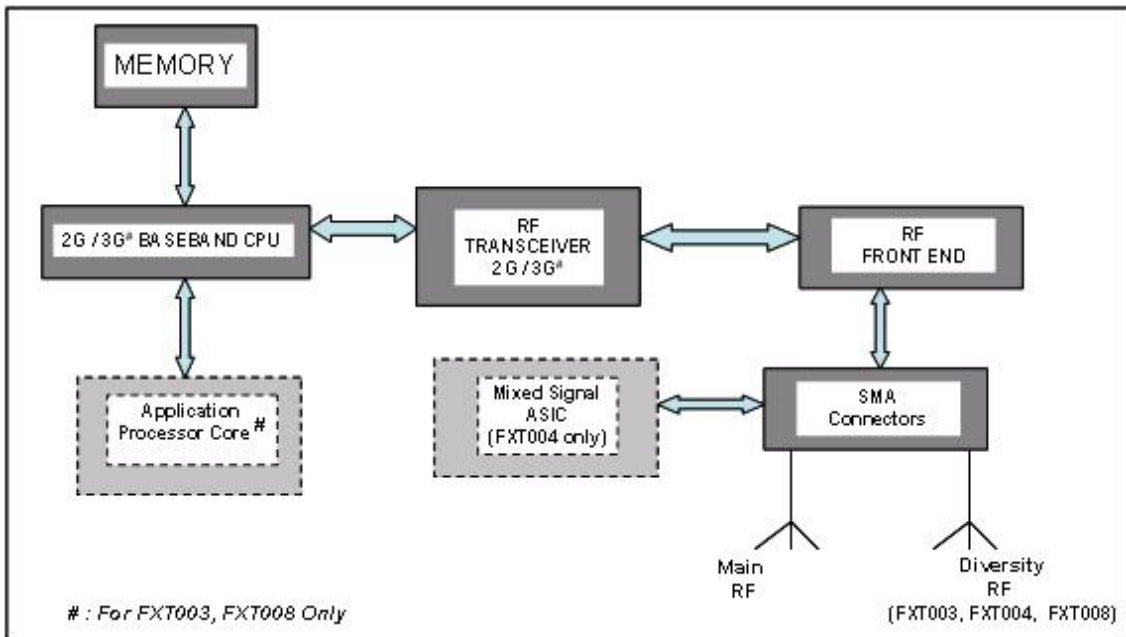


Figure 3. Fastrack Xtend RF Architecture

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, FXT006, FXT007	Quad band (850/900/1800/1900 MHz)
FXT003, FXT008	Quad band (850/900/1800/1900 MHz) Tri band UMTS/HSPA (850/1900/2100 MHz).
FXT004	Dual band CDMA2000 (800/1900 MHz)

Refer to the [Fastrack Xtend Variants](#) sub-section of section 1 Overview for a more detailed description of the Fastrack Xtend Variants.

## Operating System

The Fastrack Xtend is Open AT® compliant. With Open AT® and the Fastrack Xtend, 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

## Environmental Specifications

The Fastrack Xtend Plug & Play series is compliant with the operating classes listed below. The following table lists the ideal temperature range of the environment for each operating class.

Table 7. 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 37 Real Time Clock Specifications (on page 56) for RTC battery related issues.

## Function Status Classification

### Class A

The Fastrack Xtend Plug & Play series remains fully functional, meeting GSM performance criteria in accordance with ETSI requirements, across the specified temperature range.

### Class B

The Fastrack Xtend Plug & Play series remains fully functional across the specified temperature range. Some GSM parameters may occasionally deviate from the ETSI specified requirements but this deviation does not affect the ability of the Fastrack Xtend to connect to the cellular network and to be fully functional, as it does within the Class A range.

### Class C

The functional requirements will not be fulfilled while in the presence of an external influence, but will return to full functionality automatically after the external influence has been removed.

## Environmental Standard Constraints

The detailed climatic and mechanics standard environmental constraints applicable to the Fastrack Xtend Plug & Play series are listed in the table below.

Table 8. Environmental Classes and Constraints

Environmental Tests (IEC TR 60721-4)		Environmental Classes (IEC 60721-3)			
Tests	Standards	Storage	Transportation	Operation	
		(IEC 60721-3-1) Class IE13	(IEC 60721-3-2) Class IE23	Stationary (IEC 60721-3-3) Class IE35	Non-Stationary (IEC 60721-3-7) Class IE73
Cold	IEC 60068-2-1 : Ab/Ad	-25°C, 16 h	-40°C, 16 h	-5°C, 16 h	-5°C, 16 h
Dry heat	IEC 60068-2-2 : Bb/Bd	+70°C, 16 h	+70°C, 16 h	+55°C, 16 h	+55°C, 16 h
Change of temperature	IEC 60068-2-14 : Na/Nb	-33°C to ambient 2 cycles, t1=3 h 1 °C.min <sup>-1</sup>	-40°C to ambient 5 cycles, t1=3 h t2<3 min	-5°C to ambient 2 cycles, t1=3 h 0,5 °C.min <sup>-1</sup>	-5°C to ambient 5 cycles, t1=3 h t2<3 min
Damp heat	IEC 60068-2-56 : Cb	+30°C, 93% RH 96 h	+40°C, 93% RH 96 h minimum	+30°C, 93% RH, 96 h	+30°C, 93% RH, 96 h
Damp heat, cyclic	60068-2-30 : Db Variant 1 or 2	+40°C, 90% to 100% RH One cycle Variant 2	+55°C, 90% to 100% RH Two cycles Variant 2	+30°C, 90% to 100% RH Two cycles Variant 2	+40°C, 90% to 100% RH Two cycles Variant 1
Vibration (sinusoidal)	IEC 60068-2-6 : Fc	1-200 Hz 2 m.s <sup>-2</sup> 0,75 mm 3 axes 10 sweep cycles	1-500 Hz 10 m.s <sup>-2</sup> 3,5 mm 3 axes 10 sweep cycles	1-150 Hz 2 m.s <sup>-2</sup> 0,75 mm 3 axes 5 sweep cycles	1-500 Hz 10 m.s <sup>-2</sup> 3,5 mm 3 axes 10 sweep cycles
Vibration (random)	IEC 60068-2-64 : Fh	-	10-100 Hz / 1,0 m <sup>2</sup> .s <sup>-3</sup> 100-200 Hz / -3 dB.octave <sup>-1</sup> 200-2000 Hz / 0,5 m <sup>2</sup> .s <sup>-3</sup> 3 axes 30 min	-	-
Shock (half-sine)	IEC 60068-2-27 : Ea	-	-	50 m.s <sup>-2</sup> 6 ms 3 shocks 6 directions	150 m.s <sup>-2</sup> 11 ms 3 shocks 6 directions
Bump	IEC 60068-2-29 : Eb	-	250 m.s <sup>-2</sup> 6 ms 50 bumps vertical direction	-	-
Free fall	ISO 4180-2	-	Two falls in each specified attitude	-	2 falls in each specified attitude 0,025 m (<1kg)
Drop and topple	IEC 60068-2-31 : Ec	-	One drop on relevant corner One topple about each bottom edge	-	One drop on each relevant corner One topple on each of 4 bottom edges

## Notes

### Short description of Class IE13 (For more information see standard IEC 60721-3-1)

"Locations without controlled temperature and humidity, where heating may be used to raise low temperatures, locations in buildings providing minimal protection against daily variations of external climate, prone to receiving rainfall from carrying wind".

### Short description of Class IE23 (For more information, see standard IEC 60721-3-2)

"Transportation in unventilated compartments and in conditions without protection against bad weather, in all sorts of trucks and trailers in areas of well developed road network, in trains equipped with buffers specially designed to reduce shocks and by boat".

### Short description of Class IE35 (For more information see standard IEC 60721-3-3)

"Locations with no control on heat or humidity where heating may be used to raise low temperatures, to places inside a building to avoid extremely high temperatures, to places such as hallways, building staircases, cellars, certain workshops, equipment stations without surveillance".

### Short description of Class IE73 (For more information see standard IEC 60721-3-7)

"Transfer to places where neither temperature nor humidity are controlled but where heating may be used to raise low temperatures, to places exposed to water droplets, products can be subjected to ice formation, these conditions are found in hallways and building staircases, garages, certain workshops, factory building and places for industrial processes and hardware stations without surveillance".

---

**Caution:** *The specification in the table above only applies to the Fastrack Xtend. Customers are advised to verify that the environmental specification of the SIM Card used is compliant with the Fastrack Xtend environmental specifications. Any application must be qualified by the customer with the SIM Card in storage, transportation and operation.*

---

The use of standard SIM cards may drastically reduce the environmental conditions in which the Product can be used. These cards are particularly sensible to humidity and temperature changes. These conditions may produce oxidation of the SIM card metallic layers and cause, in the long term, electrical discontinuities. This is particularly true in left alone applications, where no frequent extraction/insertion of the SIM card is performed.

In case of mobility when the application is moved through different environments with temperature variations, some condensation may appear. These events have a negative impact on the SIM and may favor oxidation.

If the use of standard SIM card, with exposition to the environmental conditions described above, can not be avoided, special care must be taken in the integration of the final application in order to minimize the impact of these conditions. The solutions that may be proposed are:

- Lubrication of the SIM card to protect the SIM Contact from oxidation.
- Putting the Fastrack Xtend Plug & Play in a waterproof enclosure with desiccant bags.

Lubrication of the SIM card had been tested by Sierra Wireless (using Tutela Fluid 43EM from MOLYDUVAL) and gives very good results.

If waterproof enclosure with a desiccant solution is used, check with your desiccant retailer the quantity that must be used according to the enclosure dimensions. Ensure humidity has been removed before sealing the enclosure.

Any solution selected must be qualified by the customer on the final application.

To minimize oxidation problem on the SIM card, its manipulation must be done with the greatest precautions. In particular, the metallic contacts of the card must never be touched with bare fingers or any matter which may contain polluted materials liable to produce oxidation (such as, e.g. substances including chlorine). In case a cleaning of the Card is necessary, a dry cloth must be used (never use any chemical substance).



## >> 4. Technical Specifications

### 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 9. Power Supply Electrical Characteristics

<b>Operating Voltage Range</b>	4.75V to 32V DC, nominal at 13.2V
<b>Maximum Current</b>	600mA, average at 4.75V; 3A Peak at 4.75V on FXT002

**Note:** 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 the [Alarm Mode](#) sub-section of section 6 Signals and Indicators (on page 53) 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 cable 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.

## Mechanical Specifications

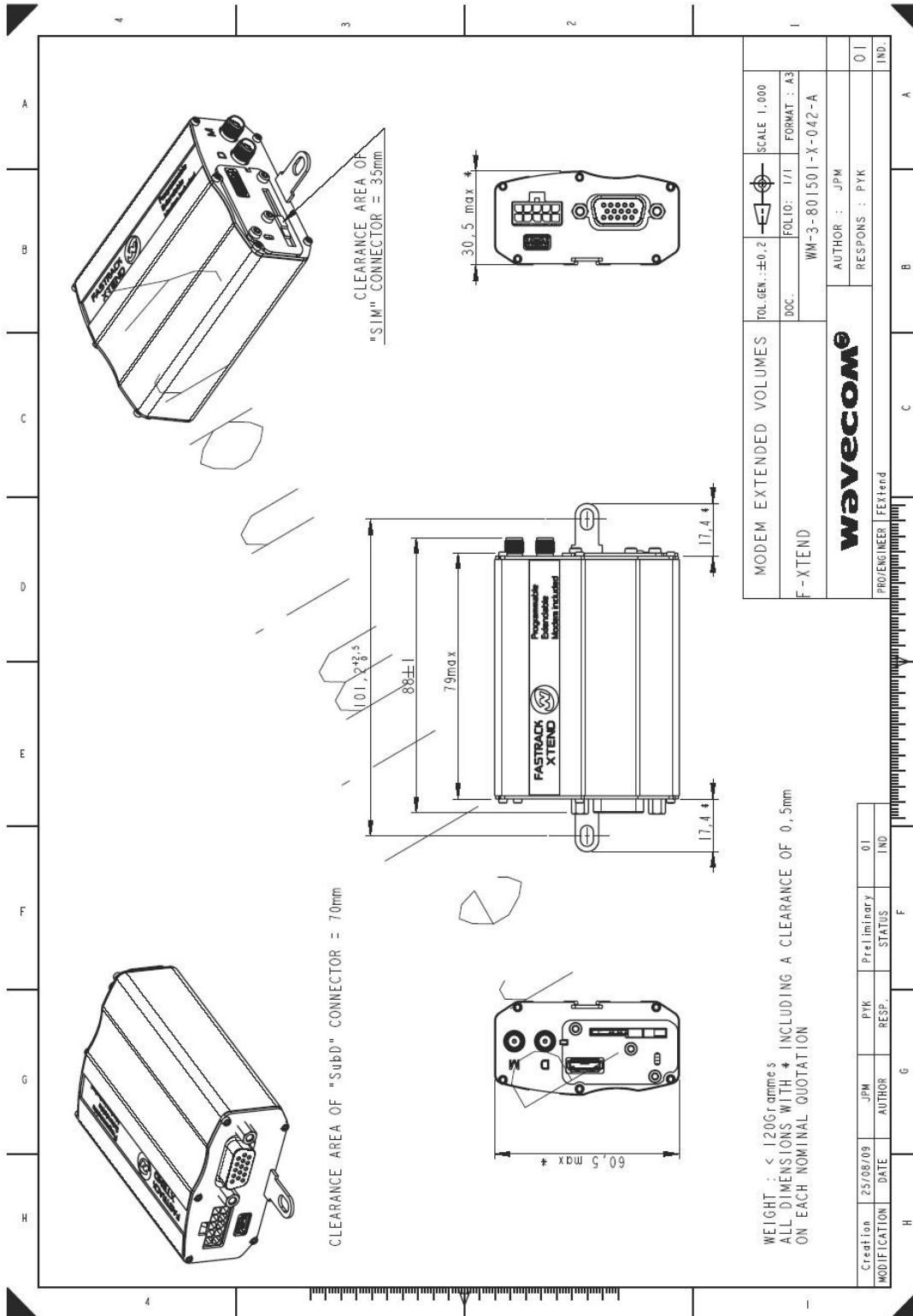


Figure 4. Fastrack Xtend Mechanical Drawing

## >> 5. Interfaces

This section describes the different interfaces that connect with the Fastrack Xtend Plug & Play series. The Fastrack Xtend Plug & Play series 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, FXT004 and FXT008 only)
- SIM Interface
- LED Status Indicator

### Front Interface

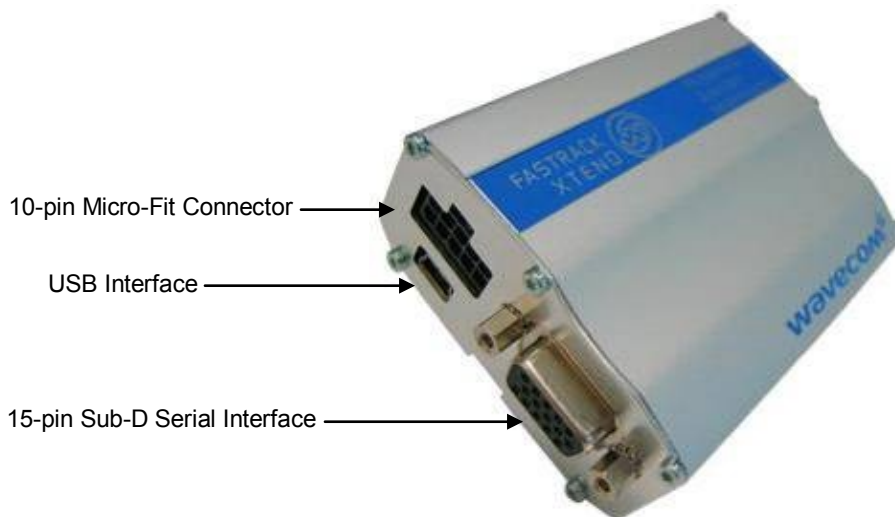


Figure 5. Fastrack Xtend Front Interface

### 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 modem

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**Note:** \* 4.75V/3A is the minimum operating voltage/current condition.

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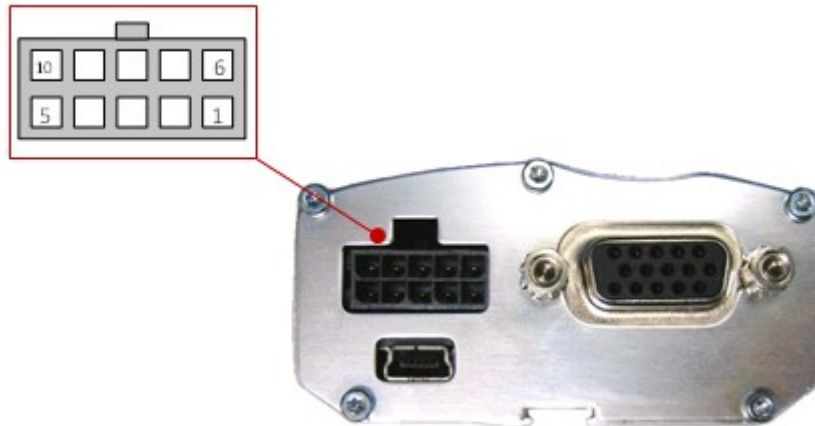


Figure 6. Power Supply Connector

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

Table 10. Power Supply Connector Pin Description

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

*Note:* 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.

### General Purpose Input/Output

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

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 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 11. 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	2.6V ~ 15V	Voltage reference for the GPIOs

*Note:* It is recommended to use a six wire power supply cable for easy access to these three lines.

*Note:* 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 only be at 2.3V. To avoid this voltage drop, it is recommended to use Vref to the desired output voltage.

The GPIOs may be controlled by the following AT commands:

- **AT+WIOV** 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for more information regarding this AT command.

### 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+WIOV="GPIO21",1** → this command sets the output level of GPIO21 to HIGH.

### 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for more information regarding AT commands.

### 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 <b>AT+CPOF</b> 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.

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 Plug & Play 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).

### 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 7. 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

### RS232 Serial Link Connection

Also known as the main serial link, the RS232 interface performs the voltage level adaptation (V24/CMOS  $\Leftrightarrow$  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)

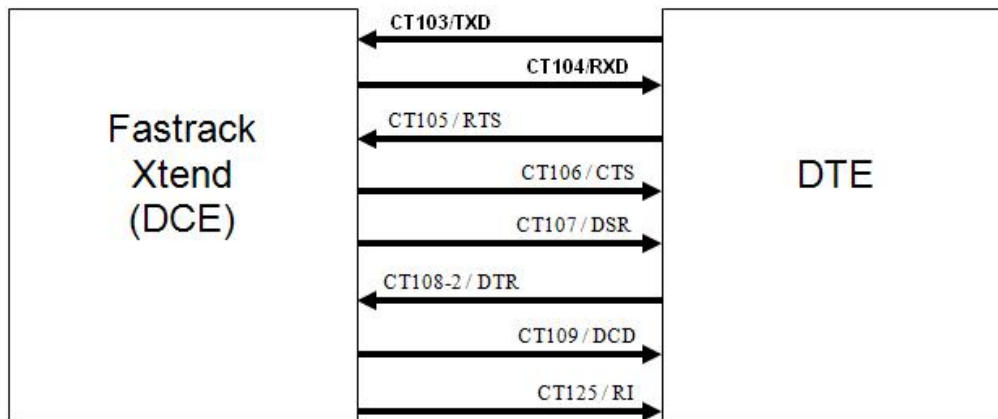


Figure 8. RS232 Serial Link Signals

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.

**Caution:** *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.*

## RS232 Implementation

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

### 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.*



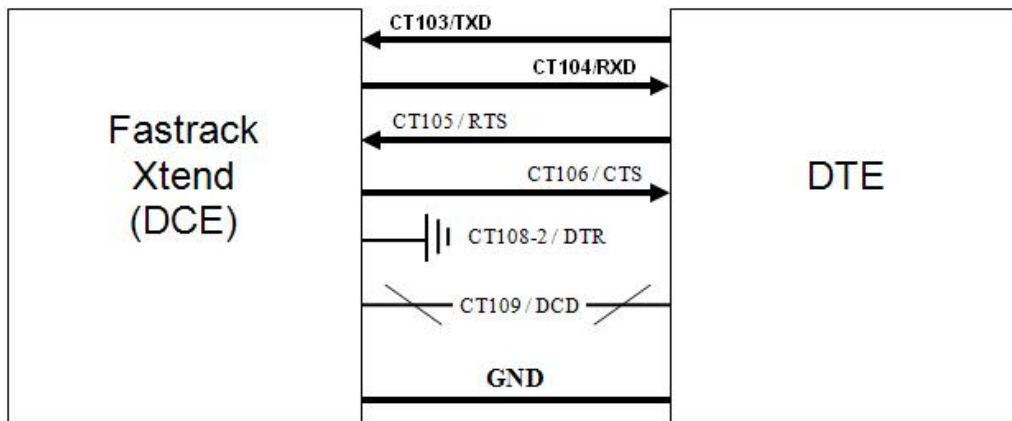


Figure 9. V24 Serial Link Implementation for a 5-wire UART

#### 4-wire Serial Interface RS232 Implementation

The signals used in this interface are as follows:

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

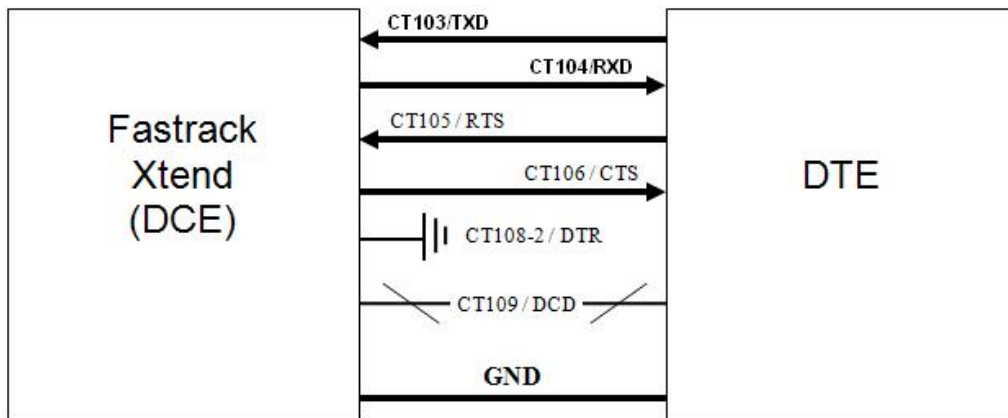


Figure 10. V24 Serial Link Implementation for a 4-wire UART

#### 2-wire Serial Interface RS232 Implementation

The signals used in this interface are as follows:

- CT103/TXD
- CT104/RXD

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

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

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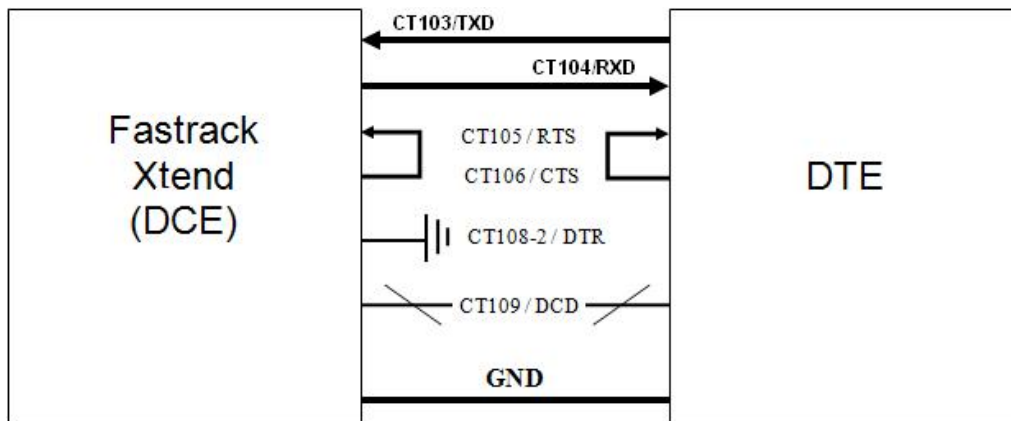


Figure 11. V24 Serial Link Implementation for a 2-wire UART

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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) 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 the [RS232 Serial Link Connection](#) sub-section of section 5 Interfaces.

### 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for more information.

### 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for more information on AT commands.

**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.*

### Audio Lines Connection

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

**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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) 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

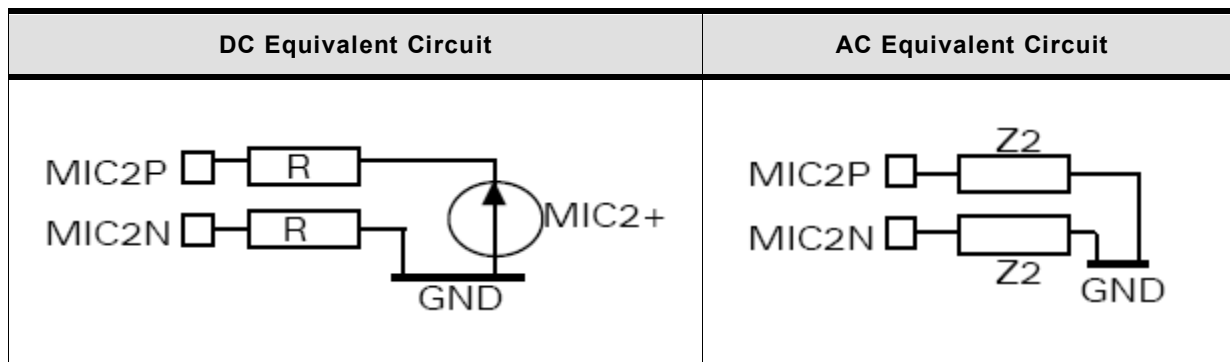


Table 17. Electrical Characteristics of CMIC2

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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30).

\*\* 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

## 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) 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

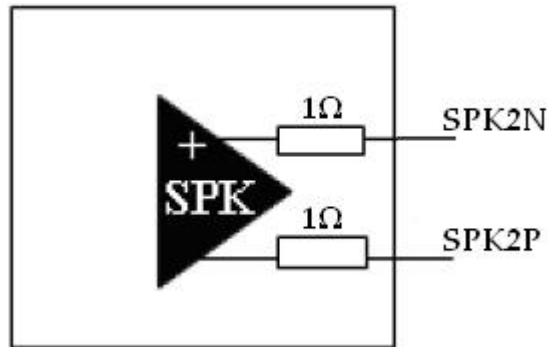


Figure 12. Equivalent Circuit of CSPK2 Speaker Outputs

Table 20. Electrical Characteristics of CSPK2

Parameters		Min	Typ	Max	Unit
Biassing 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30). 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

## 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.

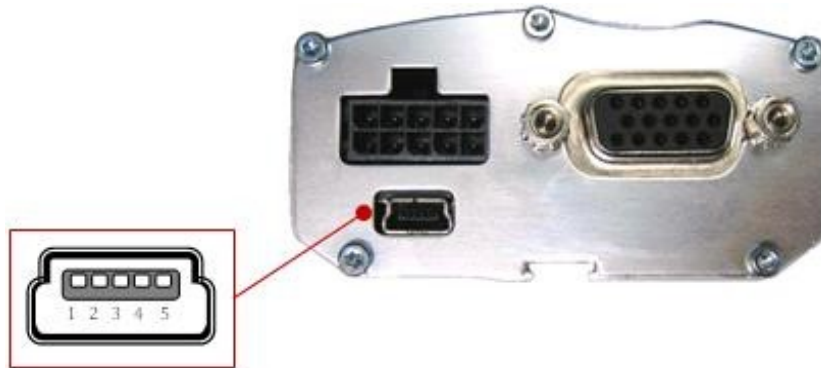


Figure 13. Mini-USB Connector

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

Parameter	I/O	Min	Typ	Max	Unit
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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for more information regarding this AT command.

## Back Interface

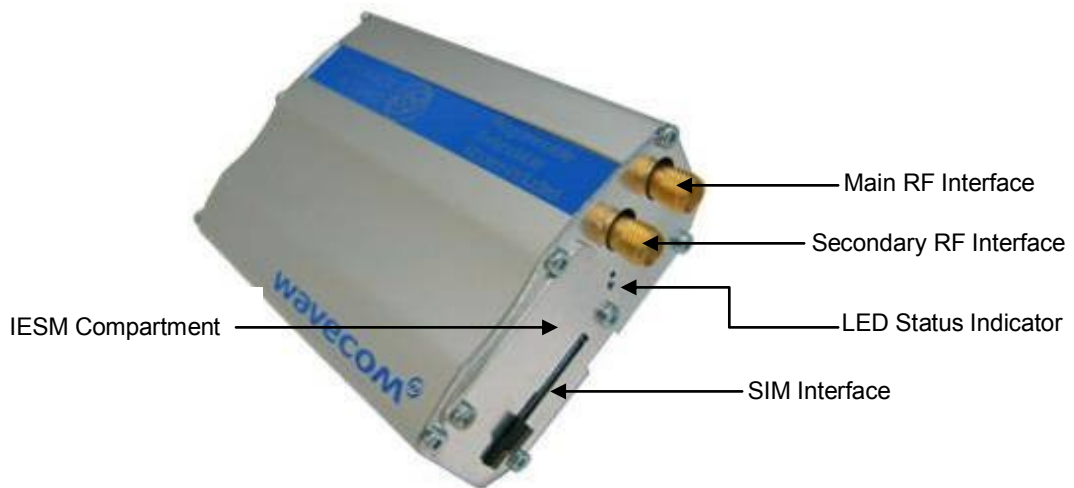


Figure 14. Fastrack Xtend Back Interface

## 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

### 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.

### 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 15. Main RF Connector for the FXT001, FXT002, FXT00, and FXT007

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 the [Component Recommendations](#) sub-section of section 14 Fastrack Xtend Accessories for the list of recommended antenna connectors.



**RF Performances (For FXT001, FXT002, FXT006 and FXT007)**

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, FXT006, and FXT007

Parameters	Values
GSM850 Reference Sensitivity	>-106dBm Static & TUHigh
E-GSM900 Reference Sensitivity	>-106dBm Static & TUHigh
DCS1800 Reference Sensitivity	>-106dBm Static & TUHigh
PCS1900 Reference Sensitivity	>-106dBm 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, FXT006, and FXT007

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

### 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, FXT006, and FXT007

Characteristic	FXT001, FXT002, FXT006 and FXT007			
	E-GSM 900	DCS 1800	GSM 850	PCS 1900
<b>TX Frequency</b>	880 to 915 MHz	1710 to 1785 MHz	824 to 849 MHz	1850 to 1910 MHz
<b>RX Frequency</b>	925 to 960 MHz	1805 to 1880 MHz	869 to 894 MHz	1930 to 1990 MHz
<b>Impedance</b>	50Ω			
<b>VSWR</b>	<b>Rx max</b>	1.5:1		
	<b>Tx max</b>	1.5:1		
<b>Typical radiated gain</b>	0dBi in one direction at least			

### Secondary RF Interface

The Secondary RF interface is used in both the FXT003 and FXT008 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.

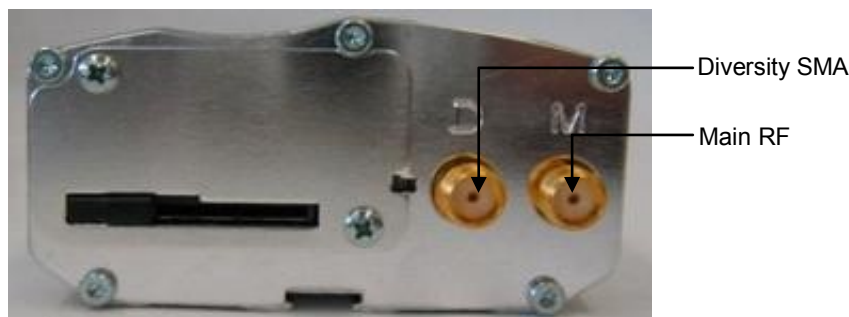


Figure 16. Secondary (Diversity) RF connector in FXT003, FXT008, and FXT004

### RF Performances (FXT003 and FXT008)

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 and FXT008

Parameters	Values
GSM850 Reference Sensitivity	>-106dBm Static & TUHigh
E-GSM900 Reference Sensitivity	>-106dBm Static & TUHigh
DCS1800 Reference Sensitivity	>-106dBm Static & TUHigh
PCS1900 Reference Sensitivity	>-106dBm Static & TUHigh
3G Band I 2100 Reference Sensitivity	-106.7dBm Static & TUHigh
3G Band II 1900 Reference Sensitivity	-106.7dBm Static & TUHigh
3G Band V 850 Reference Sensitivity	-106.7dBm 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 and FXT008

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

**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 and FXT008

Characteristic	FXT003 and FXT008				
	E-GSM 900	DCS 1800	GSM 850 and WCDMA band V	PCS 1900 and WCDMA band II	WCDMA band I
<b>TX Frequency</b>	880 to 915 MHz	1710 to 1785 MHz	824 to 849 MHz	1850 to 1910 MHz	1920 to 1980 MHz
<b>RX Frequency</b>	925 to 960 MHz	1805 to 1880 MHz	869 to 894 MHz	1930 to 1990 MHz	2110 to 2170 MHz
<b>Impedance</b>	50Ω				
<b>VSWR</b>	<b>Rx max</b>	1.5:1			
	<b>Tx max</b>	1.5:1			
<b>Typical radiated gain</b>	0dBi in one direction at least				

## >> 6. Signals and Indicators

### Alarm Mode

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 the [ON/OFF Pin](#) sub-section of section 5 Interfaces for more information on how to turn the Fastrack Xtend ON or OFF using the ON/OFF pin.

Table 32. Alarm Mode (Low Power Mode)

Steps	State	Power Supply	Operation
1	<b>AT+CALA="YY/MM/DD,H H:MM"</b>	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	<b>AT+CPOF</b>	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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30).

### 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.

### 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) 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 33. 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 34. Reset Electrical Characteristics

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

\* Internal pull-up

Table 35. Reset Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
~Reset time (Rt) <sup>1</sup>	200			μs
~Reset time (Rt) <sup>2</sup> (at power up only)	20	40	100	ms
Cancellation time (Ct)		34		ms
VH*	0.57			V
VIL	0		0.57	V
VIH	1.33			V

\* V<sub>H</sub> = 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 Wireless CPU® power supply supervisor only when the Wireless CPU® power supplies are powered ON.

## 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+J** 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.

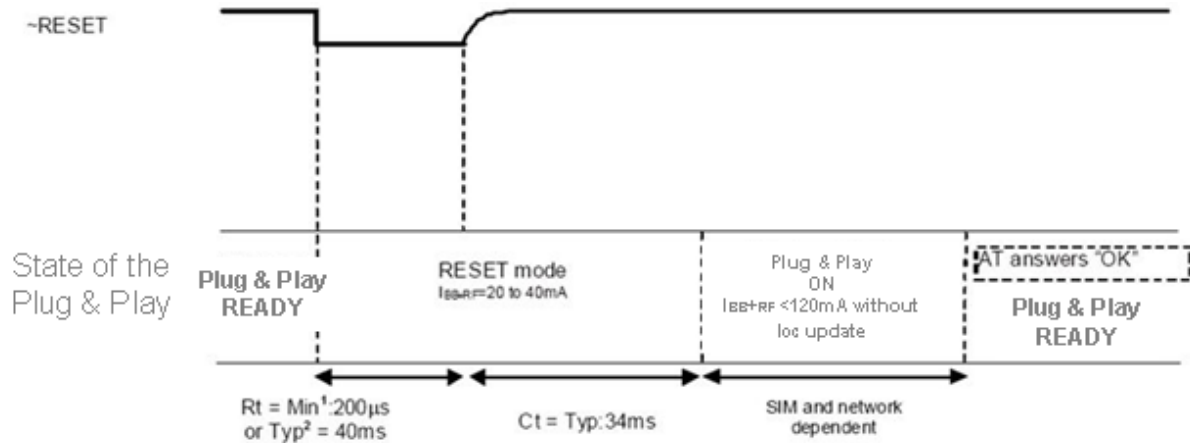


Figure 17. Reset Sequence Diagram

Another solution is to use the **AT+WIND** command to get an unsolicited status from the Fastrack Xtend. Refer to document [7] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for more information regarding AT commands.

## LED Status Indicator

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

Table 36. Fastrack Xtend LED Status

Fastrack Xtend	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 the [Enabling/Disabling the Flash LED](#) sub-section of section 10 Other Maintenance Options and document [7] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for more information on how to disable the Flash LED using an AT command.

## Real Time Clock (RTC)

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

Table 37. 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.*

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## >> 7. IESM Compartment and Boards

### IESM Compartment

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

### Back Plate Screws

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

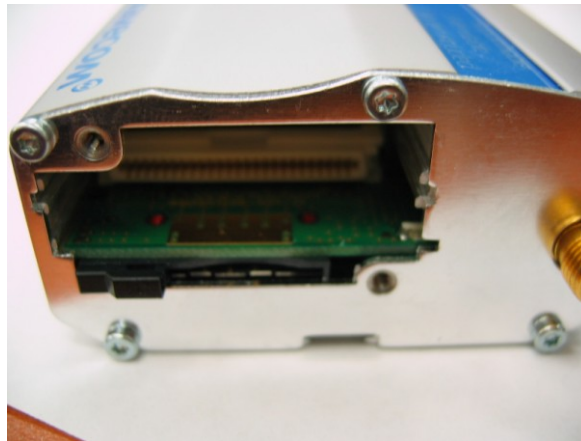


Figure 18. Fastrack Xtend IESM Compartment

### Holding Bridles

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



Figure 19. Fastrack Xtend Holding Bridles

## IESM 50-pin Connector

The IESM high density 50-pin connector is used for IESM Interface with the Fastrack Xtend motherboard.

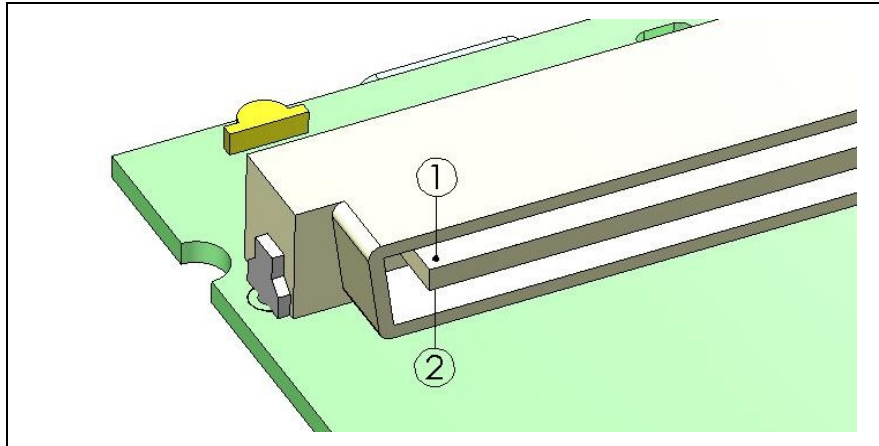


Figure 20. IESM 50-pin Connector

Table 38. IESM 50-pin Connector Description

Pin #	Pin Description	Pin #	Pin Description
1	GND	26	RTS2
2	GND	27	Reserved
3	Reserved	28	GPIO26
4	Reserved	29	GPIO19
5	Reserved	30	GPIO27
6	Reserved	31	GPIO20
7	NC	32	INT0/GPIO3
8	NC	33	GPIO23
9	NC	34	GPIO22
10	1.8V Digital supply from the Wireless CPU®	35	DTR1-CT108/2
11	2.8V Digital supply from the Wireless CPU®	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 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 Fastrack Xtend
22	SPI2-I	47	4V supply from Fastrack Xtend

Pin #	Pin Description	Pin #	Pin Description
23	RXD2	48	GND
24	TXD2	49	GND
25	CTS2	50	GND

## IESM Board Physical Description

Refer to the figure below for the physical dimensions of the IESM Board.

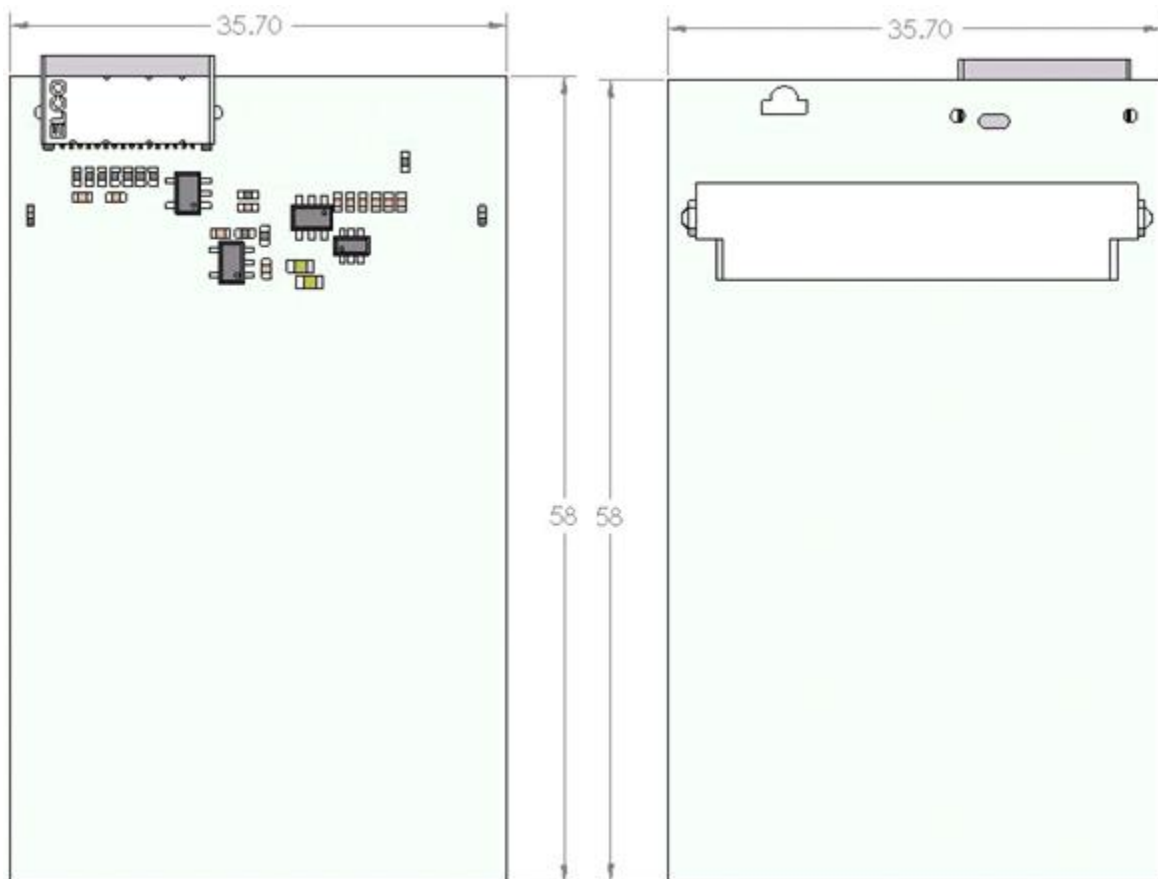


Figure 21. IESM Board Size

## Supported IESM Boards

The Fastrack Xtend supports two types of IESM boards.

Table 39. IESM Types for Fastrack Xtend

Part Number	Function	Supplier
FXTE01	IESM IO + GPS	Sierra Wireless
FXTE02	IESM ETHERNET	Sierra Wireless

## Ethernet

The basic features of the IESM-Ethernet are summarized in the table below.

Table 40. Basic Features of IESM-Ethernet

Features	Description
Open AT®	Open AT® programmable: <ul style="list-style-type: none"> <li>• Native execution of embedded standard ANSI C applications</li> <li>• Custom AT command creation</li> <li>• Custom application library creation</li> <li>• Standalone operation</li> </ul>
LAN	<ul style="list-style-type: none"> <li>• IEEE 802.3 Compatible</li> <li>• Integrated MAC and 10 BASE-T PHY</li> <li>• Receiver and collision squelch circuit</li> <li>• Supports one 10BASE-T port</li> <li>• Supports Full and Half-Duplex modes</li> <li>• Shielded RJ-45</li> </ul>
Interfaces	<ul style="list-style-type: none"> <li>• AT command set based on V.25 or later and GSM 07.05 &amp; 07.07</li> <li>• Open AT® interface for embedded application</li> </ul>

**IESM Ethernet Installation**

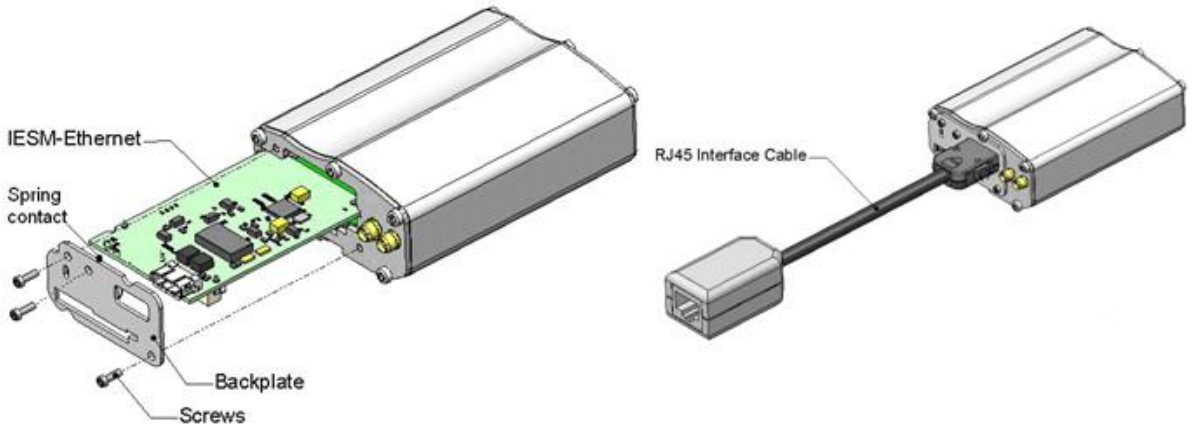


Figure 22. Installation of IESM Ethernet on the Fastrack Xtend

**Board Architecture**

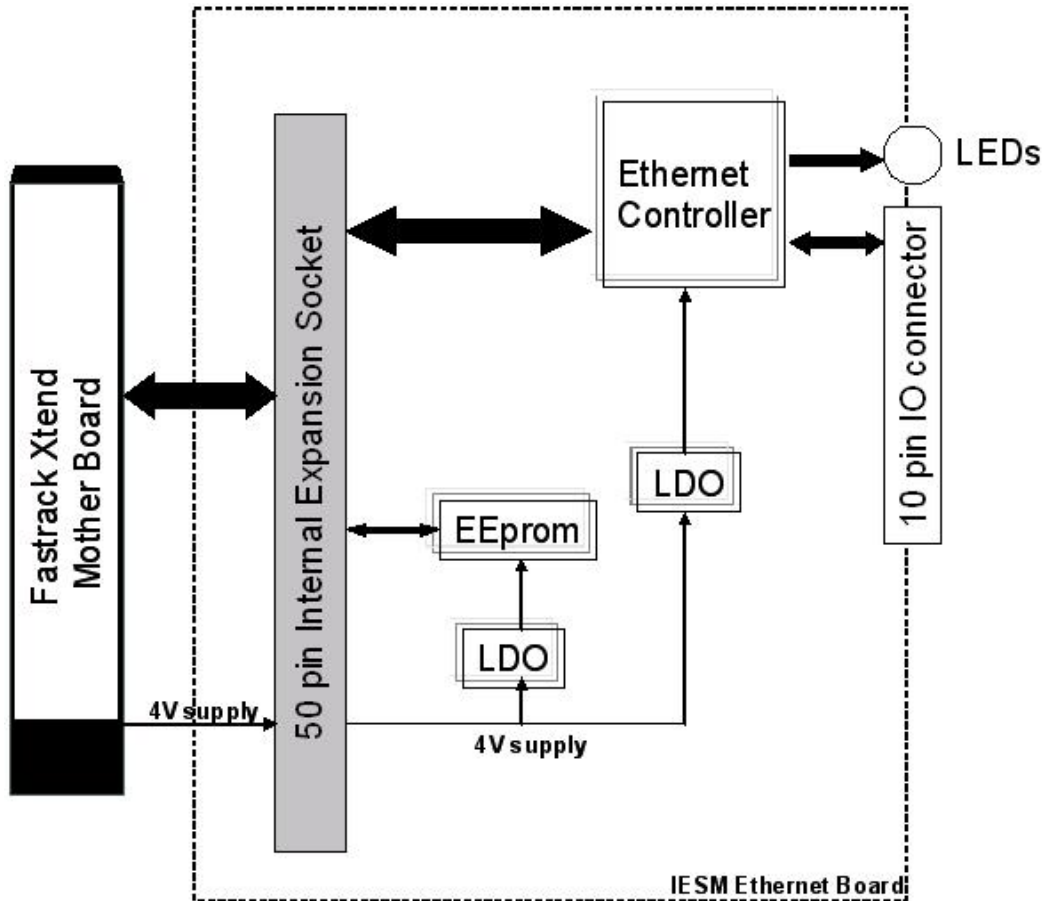


Figure 23. IESM Ethernet Board Architecture

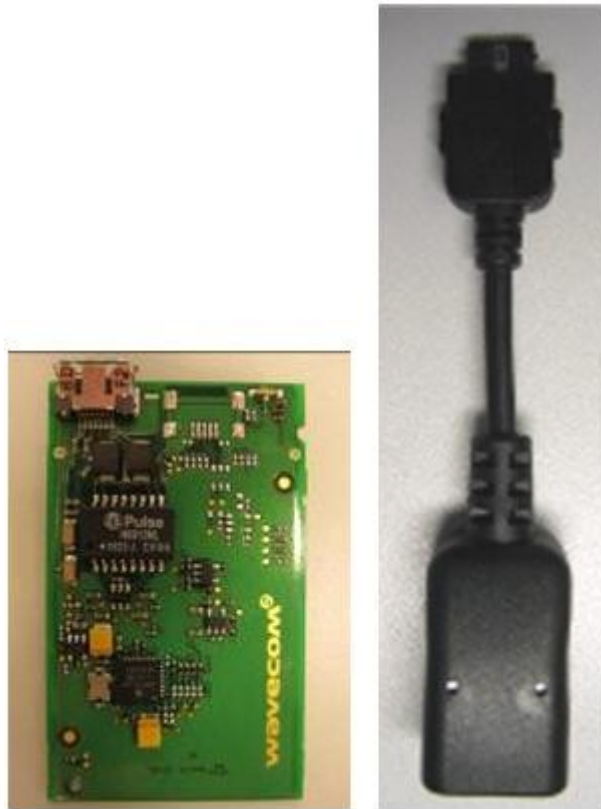


Figure 24. Ethernet IESM Board with RJ-45 Interface Cable

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

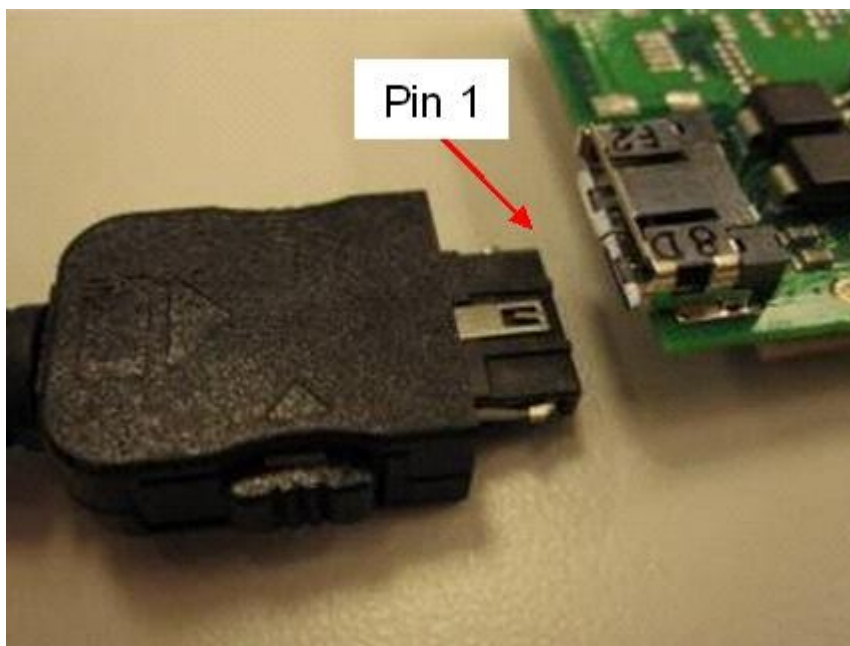


Figure 25. 10-Pin Interface Socket

Table 41. 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

### Mechanical Characteristics

Table 42. Mechanical Characteristics

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

### Power Supply

Table 43. Electrical Characteristics

<b>Operating Voltage</b>	4V DC
--------------------------	-------

Note: The IESM-Ethernet board is powered once the enable pins are activated by the Open AT® application.

The following table describes the consumption at the IES interface based on operating conditions.

**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 will also vary.

Table 44. Extra Current Consumption from DC-IN Source

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
	On Communication	185mA	52.9mA	24.2mA
Non-Connected	Enabled Idle	171.7mA	49.6mA	24.0mA
	On Communication	185mA	52.9mA	24.2mA



## IO + GPS

The IESM IO+GPS 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 Open AT® application running, the Fastrack Xtend motherboard communicates with the IESM IO+GPS 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

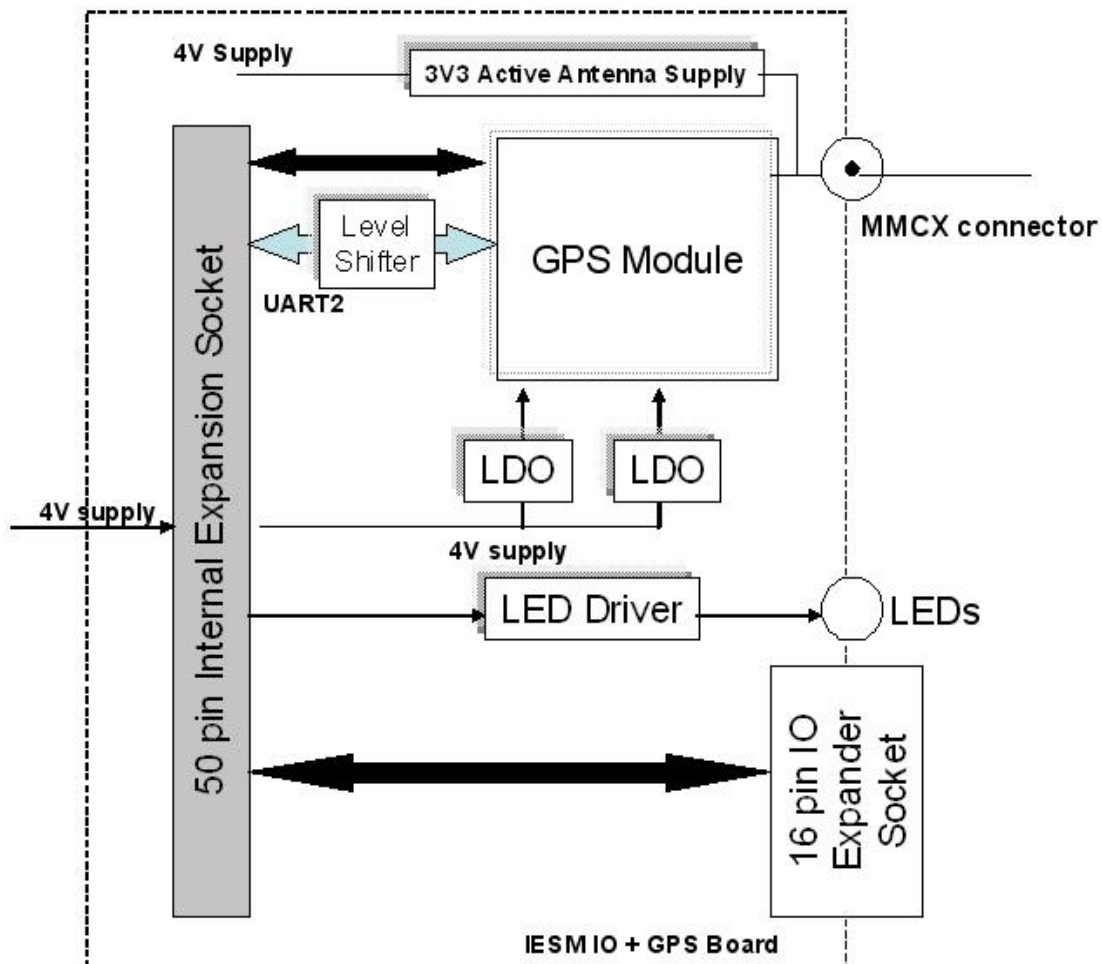


Figure 26. IESM IO + GPS Board Architecture

The Open AT® application controls the following:

- Enables/disables the internal LDOs of the IESM 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

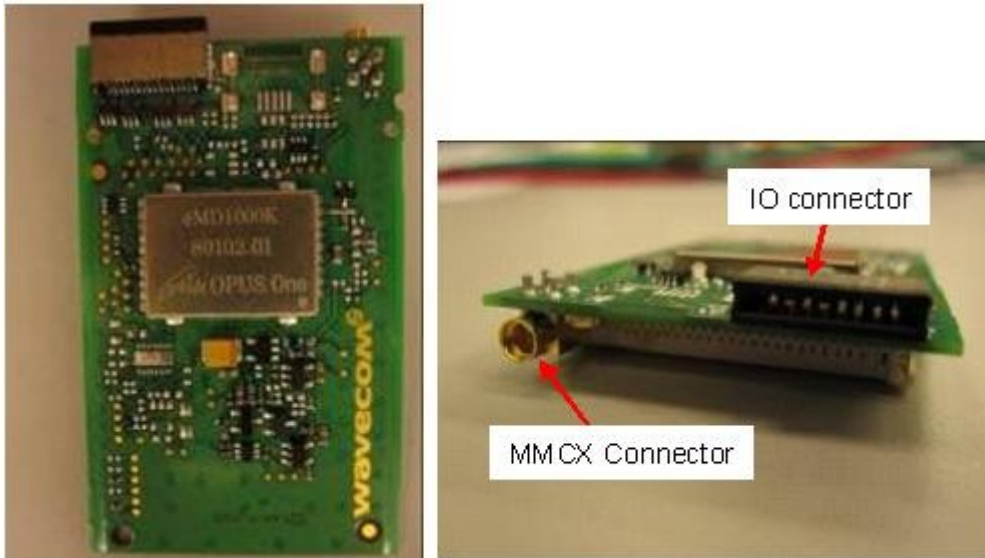


Figure 27. IESM IO + GPS Board

### IESM IO+GPS Installation

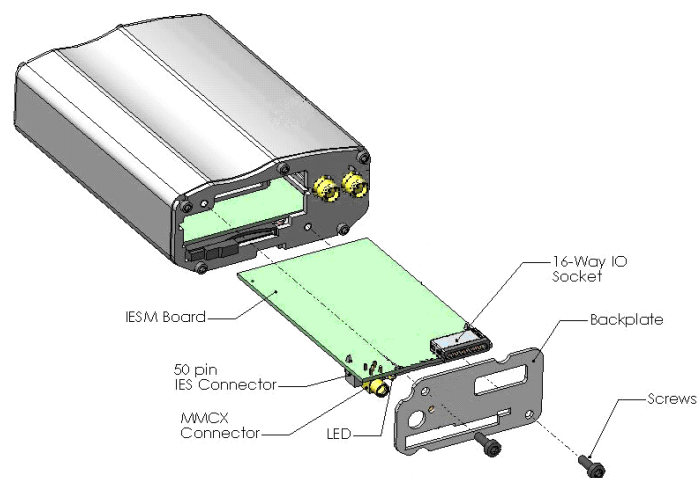


Figure 28. Installation of IESM IO+GPS on the Fastrack Xtend

**Mechanical Characteristics**

Table 45. Mechanical Characteristics

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

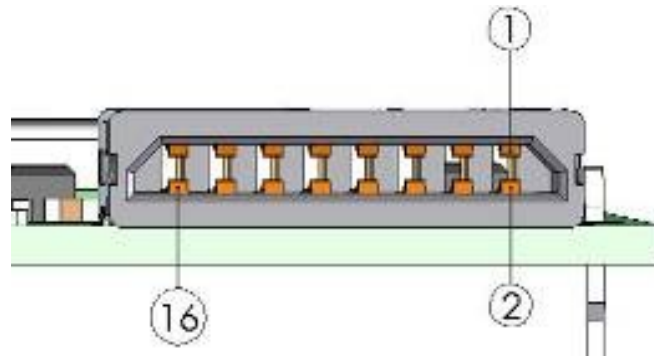


Figure 29. 16-Way IO Expander Socket

Table 46. 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

### General Purpose Input/Output

The IESM IO+GPS provides a total of 6 General Purpose I/O 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 47. 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

### Power Supply

Table 48. Electrical Characteristics

<b>Operating Voltage</b>	4V DC
--------------------------	-------

Note: The IESM-IO + GPS board is powered once the enable pins are activated by the Open AT® application.

The following table describes the consumption at the IES interface based on operating conditions.

### 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 49. Extra Current Consumption from DC-IN Source

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

Condition		Extra Current Consumption for Additional Feature (mA)		
	GPS Enable with GPS antenna bias OFF	111	37.8	18.7
	GPS antenna bias ON	27	8.5	3.8

### GPS Receiver Frequency

Table 50. GPS Receiver Frequency

Characteristic	GPS
Frequency RX	1575.42 MHz

### External Antenna

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

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

Table 51. External Antenna Characteristics

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

### GPS RF Performance

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

Table 52. Receiver Performances

Open AT® SDK v4.11	Conditions	Notes	Value	Remarks
<b>Accuracy</b>	-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	
<b>Velocity</b>	Static mode	First fix only	0.1 m/s	Typ

Open AT® SDK v4.11	Conditions	Notes	Value	Remarks
<b>Accuracy</b>	Static mode	Continuous fixes	0 m/s	Typ
<b>TTFF Hot Start</b>	-	Mean	3.5 s	Typ
<b>TTFF Warm Start</b>	-	Mean	30s	Typ
<b>TTFF Cold Start</b>	Clear Sky conditions	Mean	38 s	Typ
	Clear Sky conditions	95% percentile	45 s	Typ
<b>Update Rate</b>	-130 dBm	Continuous fixes	1 Hz	Typ

## IESM Board Removal

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

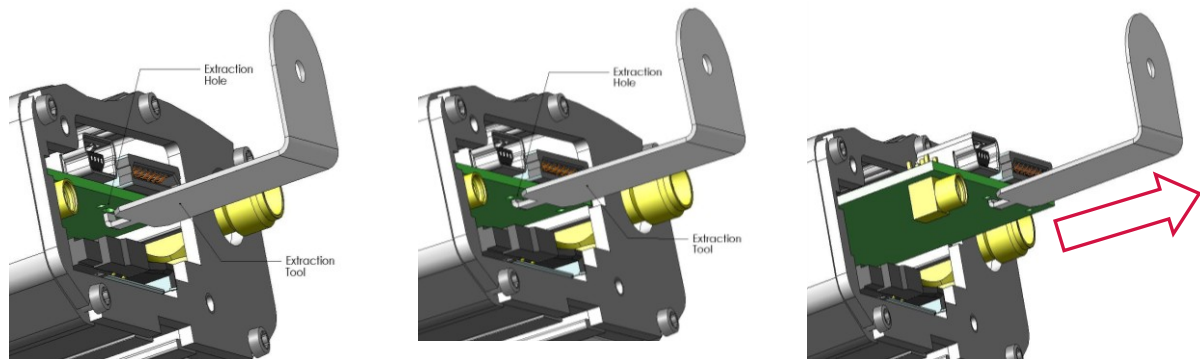


Figure 30. IESM Board Removal Procedure

## 8. Using the Fastrack Xtend

### Mounting the Fastrack Xtend

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



Figure 31. Fastrack Xtend Holding Bridles

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

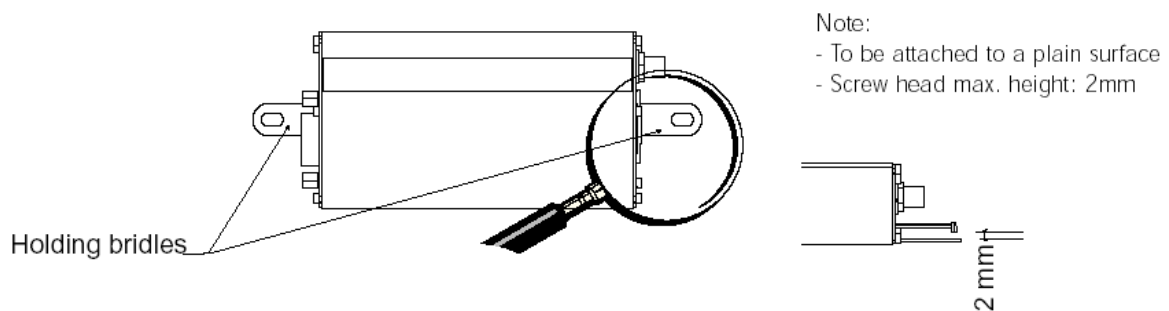


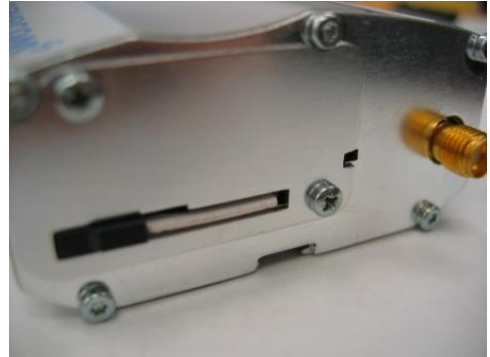
Figure 32. Mounting the Fastrack Xtend

For more information on the drill template, refer to the [Mechanical Specifications](#) sub-section of section 4 Technical Specifications.

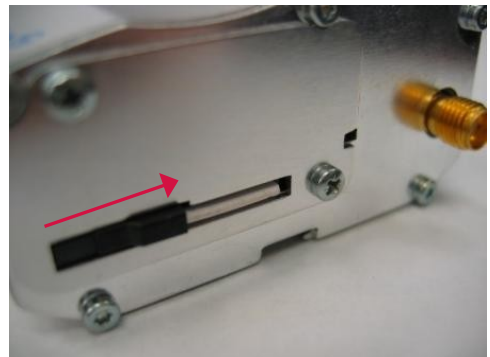
## Getting Started

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 power supply cable into the Fastrack Xtend and switch on the external power supply source.



Refer to [Main AT Commands for the Fastrack Xtend](#) for the list of main AT Commands used to configure the Fastrack Xtend.

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**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.

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## Inserting the SIM Card

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

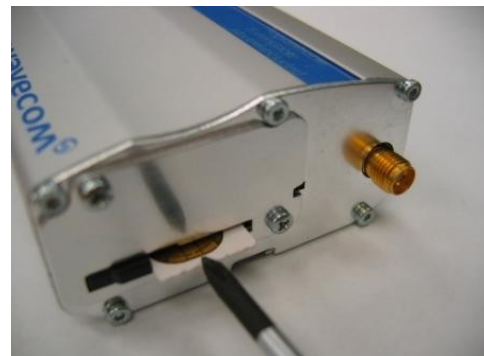
1. Prepare the SIM card in the correct position as shown in the figure.



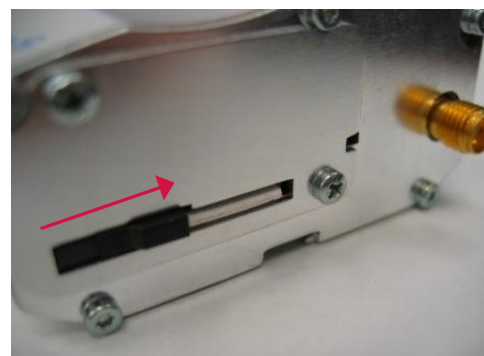
2. Slide the SIM card into the SIM holder.



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.



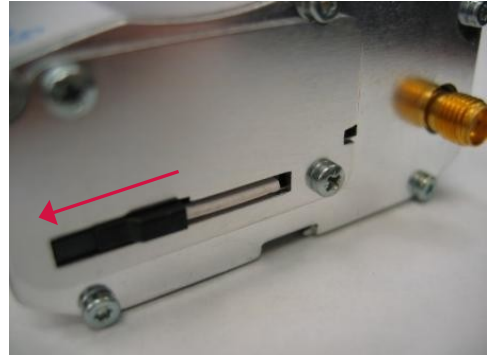
4. Slide the SIM lock switch to lock the SIM card in the Fastrack Xtend.



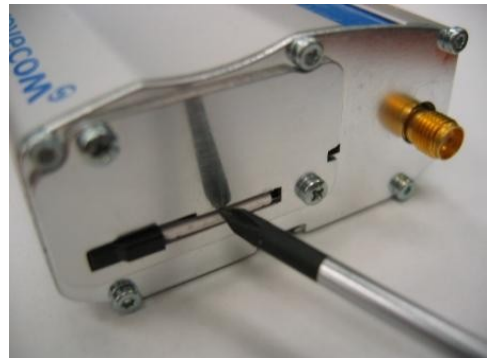
## Extracting the SIM Card

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

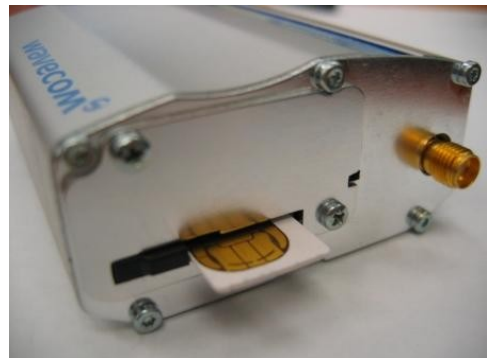
1. Open the SIM lock switch by sliding it to the left.



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.



## Using the Fastrack Xtend with an IESM Board

Refer to section 7 IESM Compartment and Boards for more information about using the Fastrack Xtend with an IESM Board.

Refer to the [IESM Related Documentation](#) section for the list of documents containing additional information on how to use different IESM boards with the Fastrack Xtend.

## 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 the [LED Status Indicator](#) sub-section of section 6 Signals and Indicators 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] Q26 Elite Software User Guide and AT Commands Interface Specification for more information on which AT commands and features are available in FXT004.

### 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 53. 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 Command	Description
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.
ATH	To hang up (end of call).

For more information about these AT Commands and their associated parameters, refer to document [7] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30).

## 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: <rss>, <ber>**

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

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

Table 54. <rss> Value Description

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

## 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 55. AT+CREG Main Responses

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 [Verifying the Received Signal Strength](#)).

Refer to document [7] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for more information regarding the **AT+CREG** AT Command, and other AT commands relating to network registration in GPRS mode.

## 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 56. AT+WMBS Main Responses

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 are selected.
+WMBS: 5, x	Dual band mode extended 900MHz/1800MHz are selected.
+WMBS: 6, x	Dual band mode extended 900MHz/1900MHz are 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for more information regarding the **AT+WMBS** AT Command.

## 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 57. 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 Command	Description
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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for more information regarding the **AT+WMBS** AT Command.

*Note:* FXT003 and FXT008 have automated quad-band mode; band selection is not relevant.

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

## 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 58. 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for more information regarding the **AT+CPIN** AT Command.

## 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30).

Table 59. 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	OK	PIN code accepted.



Feature/Function	AT Command	Response	Description
	(xxxx = PIN code)	+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.
	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>;	OK	Communication established.
	(Do not forget the « ; » at the end for « voice » call)	+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.

## 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 CPU processing.

Refer to document [7] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for more information about the **ATE0** and **ATE1** AT Commands.

## DC-IN Detection

Refer to the [DC-IN Detection](#) sub-section for more information on how DC-IN detection is done using AT commands.

## »» | 10. Other Maintenance Options

### 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] *Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30)* for more information about enabling/disabling Flash LED.

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### 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 [16] 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 FAQs (Frequently Asked Questions) page at <http://www.wavecom.com/fastrackxtend>.

### 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 60. 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 the <a href="#">Serial Interface</a> sub-section of section 5 Interfaces 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: <ul style="list-style-type: none"> <li>• Data bits = 8</li> <li>• Parity = none</li> <li>• Stop bits = 1</li> <li>• Baud = 115200 bps</li> <li>• Flow control = hardware</li> </ul>
	Is there another program interfering with the communication program (i.e. conflict on communication port access)?	Close the interfering program.

## 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for more information on the error result code description and further details on the **AT+CMEE** command.

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**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).*

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## 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 61. Receiving a “No Carrier” Message

If the Fastrack Xtend returns	Then ask	Action
“NO CARRIER”	Is the received signal strong enough?	Refer to <a href="#">Verifying the Received Signal Strength</a> to verify the strength of the received signal.
	Is the Fastrack Xtend registered on the network?	Refer to <a href="#">Verifying the Network Registration</a> to verify the network registration.

If the Fastrack Xtend returns	Then ask	Action
	Is the antenna properly connected?	Refer to the <a href="#">Antenna</a> Specifications sub-section of section 5 Interfaces for more information about the Fastrack Xtend's antenna requirements.
	Is the band selection correct?	Refer to <a href="#">Switching Bands</a> for more information about switching between bands.
"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:  <b>AT+CBST=0,0,3</b>

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 62. 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	

Error Code	Diagnosis	Hint
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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for further details or call your network provider.

For all other codes and/or details, refer to the [AT Software Documentation](#) list.

## >> 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.

Refer to document [16] Firmware Upgrade Procedure for details on how to upgrade Fastrack Xtend firmware.

Table 63. Initial Power Consumption

Configuration	Power Consumption
With DC-IN	9.4mA @ 13.2V
With Battery Accessory	32.9mA @ 3.6V

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.

## 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for the working mode description.

Table 64. 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	<p>Low power consumption mode, the only feature which is available in this mode is the alarm wake up.</p> <p>When the alarm clock is set for the Fastrack Xtend with <b>ALL</b> of the following conditions:</p> <ul style="list-style-type: none"> <li>• before the alarm time is up</li> <li>• with the ON/OFF signal pulled to GND</li> <li>• with <b>AT+CPOF</b> entered from a computer that is connected to the Fastrack Xtend</li> </ul>
Serial Port Auto Shut Down Feature	<p>The serial link can be shut down when there is no activity between the DTE and the Fastrack Xtend.</p> <p>This auto shut down feature can be enabled by AT command. Refer to the <a href="#">Serial Port Auto Shut Down Feature</a> sub-section for more information on this feature.</p>
FLASH LED Activated/Deactivated	<p>The Fastrack Xtend Flash LED can be enabled or disabled by AT command. Refer to the <a href="#">Enabling/Disabling the Flash LED</a> sub-section for more information on this feature.</p>

## Working Mode Features

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

Table 65. 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 Open AT® application on timer events	-	√	√	√	√	√	√
GSM/GPRS paging (alert from the network for incoming call, incoming SMS or incoming GPRS data)	-	√	√	-	-	√	√
SIM	-	√	-	-	-	√	√
UARTs	-	√	-	√	-	√	√
USB	-	√	-	√	-	√	√
SPIs	-	√	-	√	-	√	√
I2C	-	√	-	√	-	√	√
GPIO	-	√	-	√	-	√	√
ADCs	-	√	-	√	-	√	√
Buzzer	-	√	-	√	-	√	√
Keypad	-	√	√	√	√	√	√
External IT	-	√	√	√	√	√	√
Flash led	-	√	√	√	√	√	√

## Power Consumption in Connected Mode (FXT002)

Table 66. Power Consumption of FXT002 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	peak	GSM850 / E-GSM900: During TX bursts @ PCL5 / PCL19	@ 4.75V	2930 / 660	2504 / 466	2326 / 624	2300 / 671
		DCS1800 / PCS1900 : During TX bursts @ PCL0 / PCL15	@ 13.2V	1191 / 632	1118 / 631	1109 / 633	1152 / 631
	avg	GSM850 / E-GSM900: Average @ PCL5 / PCL19 DCS1800 / PCS1900 : Average @ PCL0 / PCL15	@ 4.75V	337 / 132	318 / 134	310 / 138	310 / 138
			@ 13.2V	104 / 47	101 / 47	100 / 48	100 / 48
			@ 32V	46 / 21	45 / 21	44 / 22	44 / 22
	GPRS Class 8	peak	GSM850 / E-GSM900: During 1TX bursts @ PCL5(Gamma 3) / PCL19(Gamma 17)	@ 4.75V	2666 / 655	2481 / 614	2292 / 644
DCS1800 / PCS1900 : During 1TX bursts @ PCL0(Gamma 3) / PCL15(Gamma 18)			@ 13.2V	1111 / 659	1099 / 661	1100 / 662	1109 / 652
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	317 / 124	302 / 126	295 / 129	295 / 130
			@ 13.2V	99 / 43	97 / 46	95 / 45	94 / 45
			@ 32V	44 / 20	42 / 20	41 / 20	42 / 20
GPRS Class 10		peak	GSM850 / E-GSM900: During 2TX bursts @ PCL5(Gamma 3) / PCL19(Gamma 17) DCS1800 / PCS1900: During 2TX bursts @ PCL0(Gamma 3) / PCL15(Gamma 18)	@ 4.75V	2672 / 604	2565 / 584	2378 / 644
	@ 13.2V			1115 / 653	1122 / 635	1114 / 626	1115 / 643
	avg	GSM850 / E-GSM900 :	@ 4.75V	558 / 166	536 / 169	518 / 175	509 / 177

Power Consumption (Serial Port ON, Flash LED activated)		GSM 850 (mA)	E-GSM 900 (mA)	DCS 1800 (mA)	PCS 1900 (mA)			
	Average 2TX/3RX @ PCL5 (Gamma 3) / PCL19(Gamma 17)	@ 13.2V	170 / 58	164 / 59	160 / 62	159 / 62		
	DCS1800 / PCS1900: Average 2TX/3RX @ PCL0 (Gamma 3) / PCL15(Gamma 18)	@ 32V	74.3 / 26	72 / 26	70 / 27	70 / 28		
EGPRS Class 8	I <sub>peak</sub>	GSM850 / E-GSM900: During 1TX bursts @ PCL8 (Gamma 6) / PCL19(Gamma 17)	@ 4.75V	1549 / 682	1553 / 634	1745 / 588	1872 / 618	
		DCS1800 / PCS1900: During 1TX bursts @ PCL2 (Gamma 5) / PCL15(Gamma 18)	@ 13.2V	1122 / 673	1101 / 667	1118 / 606	1112 / 621	
	I <sub>avg</sub>	GSM850 / E-GSM900 : Average 1TX/4RX @ PCL8 (Gamma 6) / PCL 19(Gamma 17)	@ 4.75V	213 / 132	214 / 135	223 / 136	229 / 136	
			DCS1800 / PCS1900: Average 1TX/4RX @ PCL2 (Gamma 5) / PCL 15(Gamma 18)	@ 13.2V	73 / 46	74 / 47	76 / 48	78 / 48
			@ 32V	32 / 21	32 / 21	33 / 22	34 / 22	
	EGPRS Class 10	I <sub>peak</sub>	GSM850 / E-GSM900: During 2TX bursts @ PCL8 (Gamma 6) / PCL 19(Gamma 17)	@ 4.75V	1561 / 624	1552 / 637	1667 / 628	1875 / 622
DCS1800 / PCS1900: During 2TX bursts @ PCL2 (Gamma 5) / PCL 15(Gamma 18)			@ 13.2V	1146 / 627	1111 / 626	1114 / 624	1123 / 630	
I <sub>avg</sub>		GSM 850 / E-GSM900 : Average 2TX/3RX @ PCL8 (Gamma 6) / PCL 19(Gamma 17)	@ 4.75V	347 / 181	348 / 185	367 / 189	379 / 190	
			DCS1800 / PCS1900: Average 2TX/3RX @ PCL2 (Gamma 5) / PCL 15(Gamma 18)	@ 13.2V	117 / 63	118 / 65	123 / 66	126 / 67
			@ 32V	51 / 28	51 / 29	54 / 30	55 / 30	

## Power Consumption in Connected Mode (FXT003)

Table 67. Power Consumption of FXT003 in Connected Mode

<Table TBC>

## Power Consumption in Non-Connected Mode (FXT002)

Table 68. Power Consumption of FXT002 in Non-Connected Mode (Typical)

Non-connected mode	Serial Port Status	Voltage	Current (mA)
<b>I<sub>avg</sub> in Active mode</b>	In this mode, serial port remains active	@ 4.75V	76
		@ 13.2V	27
		@ 32V	12
<b>I<sub>avg</sub> in SLEEP mode (with FLASH LED activated)</b>	ON	@ 4.75V	33.1
		@ 13.2V	11.7
		@ 32V	5.8
	OFF	@ 4.75V	5.4
		@ 13.2V	2.2
		@ 32V	1.2
<b>I<sub>avg</sub> in SLEEP mode (with FLASH LED deactivated)</b>	ON	@ 4.75V	28.7
		@ 13.2V	10.5
		@ 32V	5.1
	OFF	@ 4.75V	1.4
		@ 13.2V	0.7
		@ 32V	0.6

Non-connected mode	Serial Port Status	Voltage	Current (mA)
<b>I<sub>avg</sub> in ACTIVE mode with GSM stack in Idle Page 9</b>	ON	@ 4.75V	52.5
		@ 13.2V	18.7
		@ 32V	8.2
	OFF	@ 4.75V	21.1
		@ 13.2V	7.8
		@ 32V	3.8
<b>I<sub>avg</sub> in SLEEP mode with GSM stack in Idle Page 9</b>	ON	@ 4.75V	31
		@ 13.2V	12.2
		@ 32V	5.6
	OFF	@ 4.75V	4.9
		@ 13.2V	2.5
		@ 32V	1.1
<b>I<sub>avg</sub> in Alarm mode</b>	OFF	@ 4.75V	0.4
		@ 13.2V	0.4
		@ 32V	0.5

## Power Consumption in Non-Connected Mode (FXT003)

Table 69. Power Consumption of FXT003 in Non-Connected Mode

<Table TBC>

## 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30).

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.

## Hardware Configuration

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

### 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

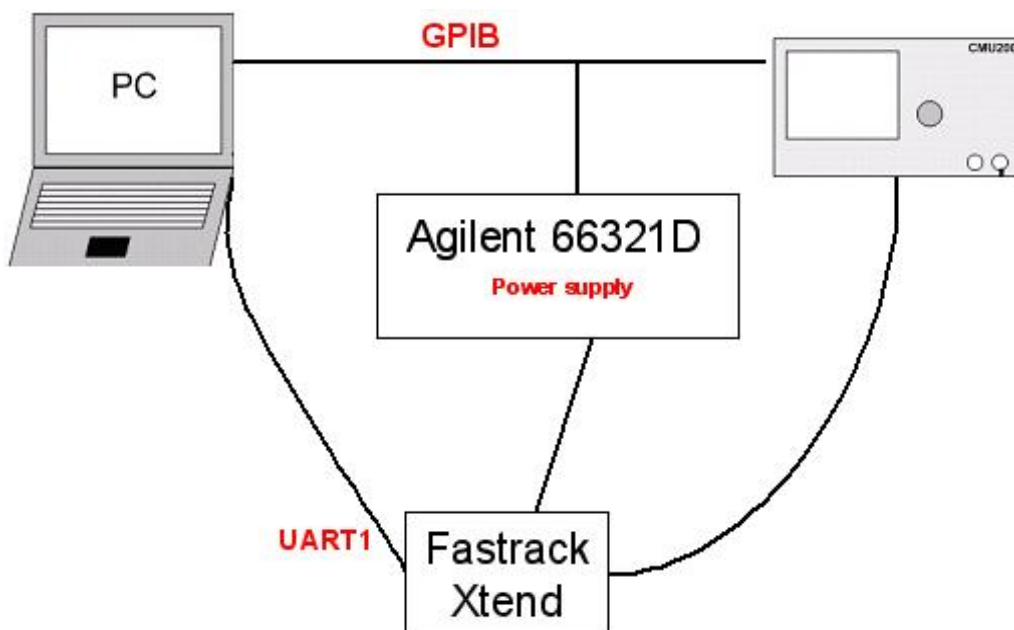


Figure 33. Typical Hardware Configuration for Power Consumption Measurement

The communication tester is a **CMU 200** from **Rhode & Schwartz**. This tester offers all required GSM/GPRS 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 70. List of Recommended Equipments

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

### 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.*

---

## Software Configuration

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

### Fastrack Xtend Configuration

The Fastrack Xtend software configuration is simply 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30).

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, FXT008

### 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 71. 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)
		850/900 MHz	Gam.17 (TX power 5dBm)

Operating Mode		Communication Tester Configuration	
	Transfer Mode class 10 (3Rx/2Tx)	1800/1900 MHz	Gam.5 (TX power 26dBm)
			Gam.18 (TX power 0dBm)
		850/900 MHz	Gam.6 (TX power 27dBm)
			Gam.17 (TX power 5dBm)
	Transfer Mode class 12 (1Rx/4Tx)	1800/1900 MHz	Gam.5 (TX power 26dBm)
			Gam.18 (TX power 0dBm)
		850/900 MHz	Gam.6 (TX power 27dBm)
			Gam.17 (TX power 5dBm)
UMTS Connected Mode (VOICE)	UMTS 850 (BAND I)	+22dBm	
		+10dBm	
	UMTS 1900 (BAND II)	+22dBm	
		+10dBm	
	UMTS 2100 (BAND V)	+22dBm	
		+10dBm	
UMTS (Data Transfer) 384kbit/s	UMTS 850 (BAND I)	+22dBm	
		+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.

### 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.

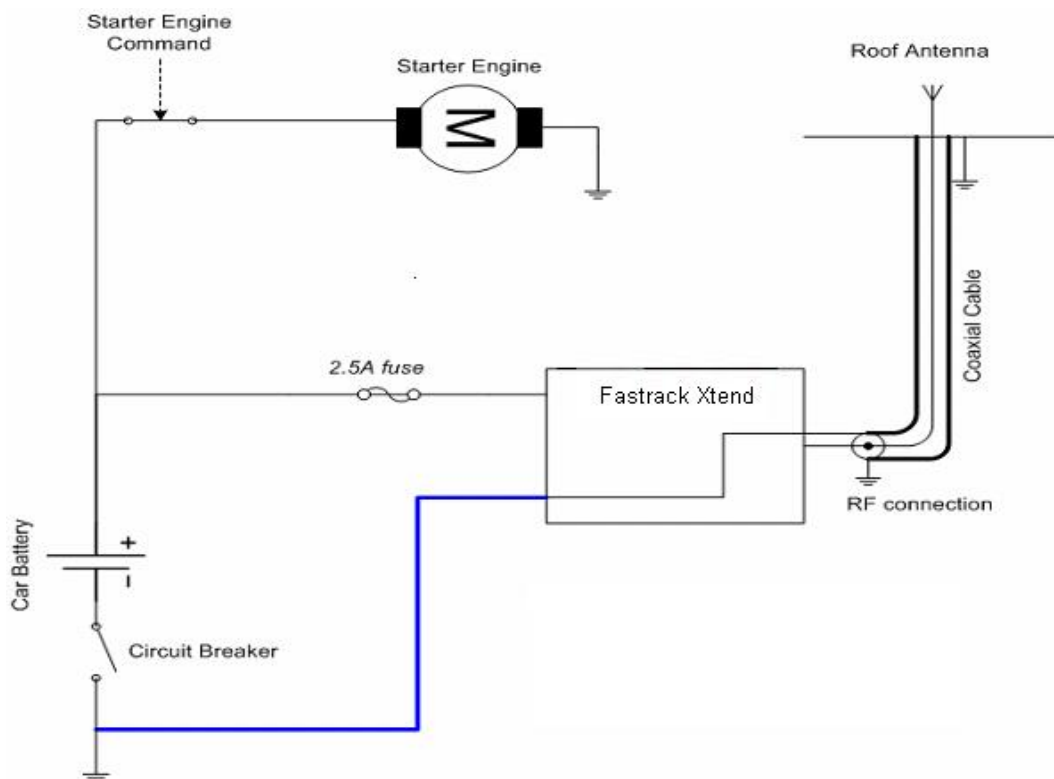


Figure 34. Recommended Power Supply Connection on Trucks

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).

## 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).

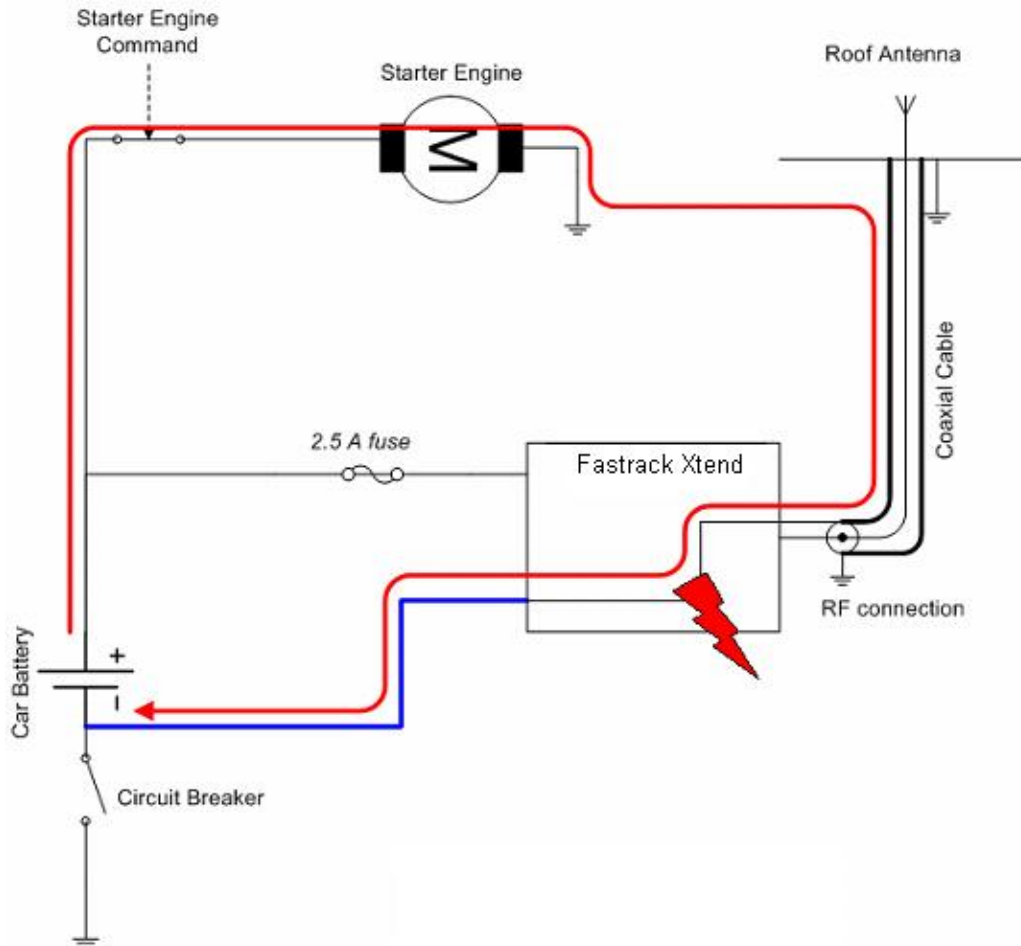


Figure 35. Example of an Electrical Connection That May Damage the Fastrack Xtend

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

### Standard Accessories

- Six-wire power supply cable with IO (DC IN, GND, VRef, GPIO25, GPIO21, ON/OFF)  
(Refer to the following table for the color-coding of the 6-wire power cable.)
- Mounting bridle
- USB Cable wire

Table 72. 6-Wire Power Cable Color Coding

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

### 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
- IESM boards: Ethernet or IO + GPS (Refer to section 7 IESM Compartment and Boards for more information about these boards.)

---

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

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### Optional Battery

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

## Component Recommendations

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

Table 73. List of Recommended Accessories

Component	Part/Reference Number	Supplier
Quad-band antenna	GC-RUB09A	GIGA-Concept
	607010515	HIRSCHMANN
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 Power cable + Fuse	Cable: K96975060049A FUSE: T2AL250V VDE Slow Break	Grand-TEK Technology
IESM IO + GPS	FXTE01	Sierra Wireless
GPS antenna	GC-GAACZ-A55	GIGA-Concept
IO cable for IESM	58-9257-000-000-012S	AVX
IESM Ethernet + 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

## 15. Recommendations when Using the Battery Accessory

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 Plug & Play.



Figure 36. Fastrack Xtend Optional Battery Accessory

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

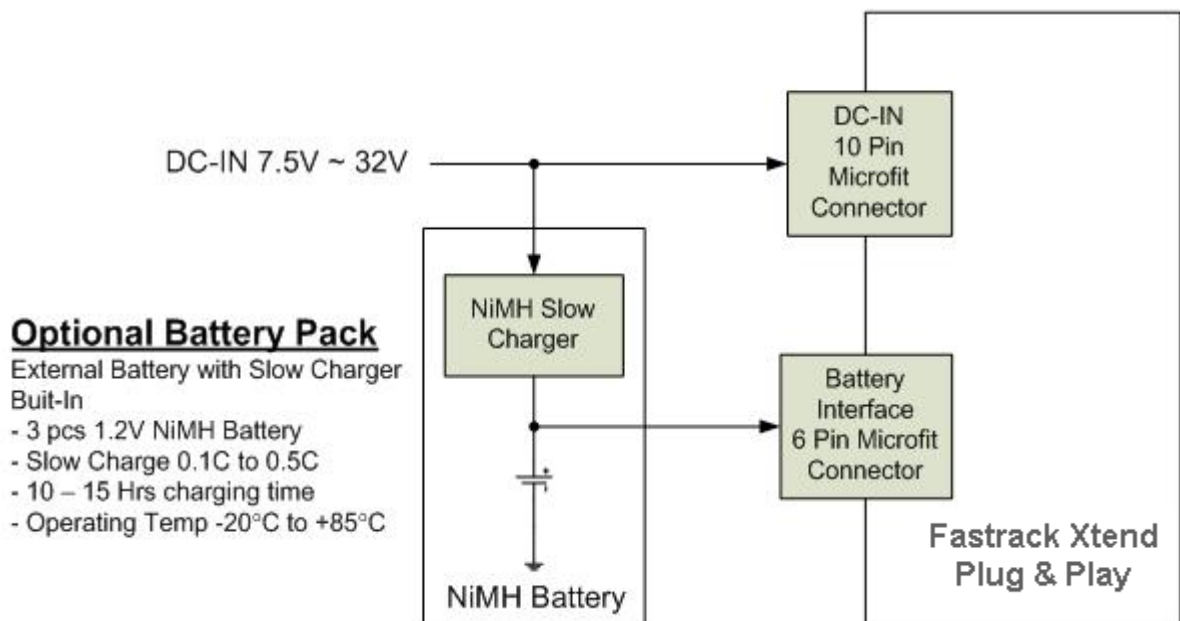


Figure 37. Battery with Charger Block Diagram

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

Table 74. 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.

## Using the Battery Accessory

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

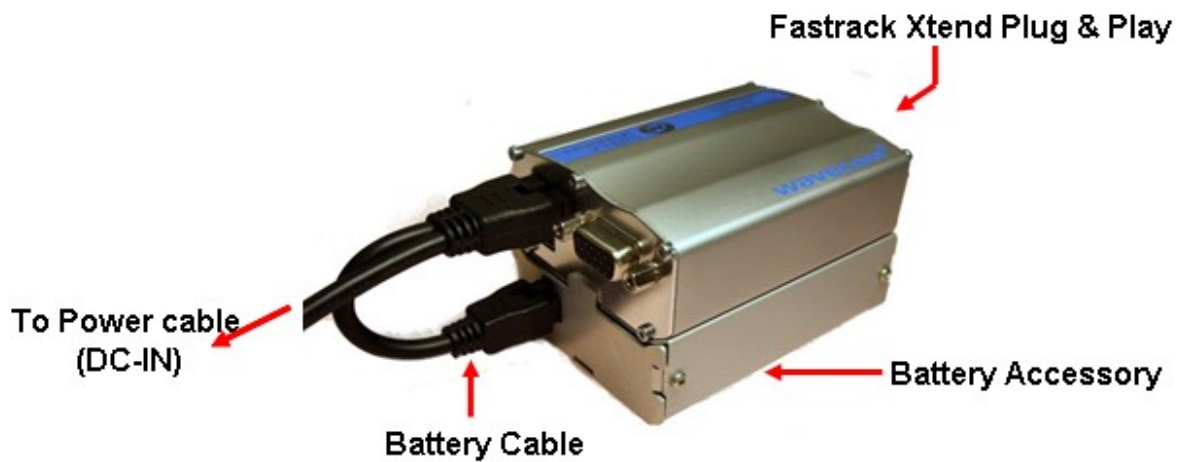


Figure 38. Fastrack Xtend with Battery Accessory Attached

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



## 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 75. 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

## Charging Time

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

Table 76. Battery Accessory Charging Time

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

## Charging Specification

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

When using DC-IN charging, simply plug in the power cable with DC-IN (7.5V to 32V) to the battery cable while attached to the battery accessory (see Figure 37 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.

Refer to the following table for charging specifications.

Table 77. Charging Specifications

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

## 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 ADC1 value, a specific conversion is necessary to get the battery voltage.

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

$$\text{Battery voltage (Vbat)} = 3.212 \times \text{ADC1 reading}$$

For example, if ADC1 reading by AT command is 1218, then Vbat level =  $3.212 \times 1218 = 3912\text{mV}$ .

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 [19] Fastrack Xtend Battery Accessory Product Technical Specification for more information about reading the battery level status.

## 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 78. 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] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30) for more information regarding the **AT+WIOR** AT Command.

Refer to document [19] Fastrack Xtend Battery Accessory Product Technical Specification for more information regarding the battery accessory.

## 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.
- Disconnect the DC-IN or the USB cable from the Fastrack Xtend modem 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 the [Battery Safety](#) sub-section of section 17 Safety Recommendations for more information on battery safety.

## >> 16. Standards Compliance

The Fastrack Xtend complies with the essential requirements of article 3 of the R&TTE 1999/5/EC Directive and satisfies the following standards.

Table 79. Standards Conformity

Domain	Applicable Standard
Safety standard	EN 60950 (ed.2005)
Efficient use of the radio frequency spectrum	EN 301 419-(v 4.1.1) EN 301 511 (V 9.0.2)
EMC	EN 301 489-1 EN 301 489-7
Global Certification Forum – Certification Criteria	GCF-CC V3.26.0
PTCRB	NAPRD.03 V3.11.0
FCC	FCC Part 15 FCC Part 22, 24
IC	RSS-132 Issue 2 RSS-133 Issue 3
International Standard for Battery	IEC 61951-2

## >> 17. Safety Recommendations

### 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 Wireless CPU®:

- 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.

## 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

## 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 Fastrack Xtend Plug & Play 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.

## 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 Wireless CPU®. 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 Wireless CPU®.

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

Do contact an authorized Service Center in the unlikely event of a fault in the Wireless CPU®.

## 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.

## >> | 18. 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.

### Open AT® Software Documentation

- [1] Getting started with Open AT® SDK v4.22b  
Reference: WM\_DEV\_OAT\_UGD\_048
- [2] Tutorial for Open AT® IDE V1.08  
Reference: WM\_DEV\_OAT\_UGD\_044
- [3] Tools Manual for Open AT® IDE V1.08  
Reference: WM\_DEV\_OAT\_UGD\_045
- [4] Basic Development Guide for Open AT®V4.22  
Reference: WM\_DEV\_OAT\_UGD\_050
- [5] ADL User Guide for Open AT®V4.22  
Reference: WM\_DEV\_OAT\_UGD\_051
- [6] Open AT® v4.22 Official Release Note  
Reference: WM\_DEV\_OAT\_DVD\_338

### AT Software Documentation

- [7] Open AT® FW v7.4a AT Commands Manual (OASiS v2.31) / Open AT® FW v7.4 AT Commands Manual (OASiS v2.30)  
Reference: WM\_DEV\_OAT\_UGD\_079 (Version 12 and 11)
- [8] Open AT® Firmware v7.4 Customer Release Note  
Reference: TBC
- [9] AT Commands Interface Guide  
Reference: WM\_ASW\_OAT\_UGD\_00004
- [10] Q26 Elite Software User Guide and AT Commands Interface Specification  
Reference: WI\_DEV\_Q26EL\_UGD\_001



## IESM Related Documentation

- [11] IESM Product Technical Specification  
Reference: TBC
- [12] IESM-IO+GPS User Guide  
Reference: TBC
- [13] IESM-Ethernet User Guide  
Reference: TBC
- [14] IESM-Ethernet Installation Guide  
Reference: TBC
- [15] IESM Ethernet Plug-in User Guide  
Reference: TBC

## Firmware Documentation

- [16] Firmware Upgrade Procedure  
Reference: WM\_SW\_GEN\_UGD\_001

## Other Related Documentation

- [17] Q2686 Product Technical Specification  
Reference: WM\_PRJ\_Q2686\_PTS\_001
- [18] Q26 Extreme Customer Design Guide and Product Technical Specification  
Reference: WM\_DEV\_Q26EX\_PTS\_002
- [19] Fastrack Xtend Battery Accessory Product Technical Specification  
Reference: WA\_DEV\_FEX20\_PTS\_003
- [20] Q2867 Classic Product Technical Specification  
Reference: WM\_DEV\_Q2687\_PTS\_001
- [21] Q26 Elite Wireless CPU® Product Technical Specification/Customer Design Guidelines  
Reference: WI\_DEV\_Q26EL\_PTS\_001

## >> 19. 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
dB <sub>i</sub>	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

Abbreviation	Definition
IEC	International Electrotechnical Commission
IES	Internal Expansion Socket
IESM	Internal Expansion Socket Module
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

Abbreviation	Definition
TUHigh	Typical Urban, High speed fading profile
TX	Transmit
TYP	TYPical
VSWR	Voltage Stationary Wave Ratio

## >> 20. Appendix A: Packaging

### Contents

### Physical Characteristics

## >> 21. Appendix B: Product Labeling

## >> 22. Appendix C: Standards and Recommendations

GSM ETSI, 3GPP, GCF and NAPRD03 recommendations for Phase II.

Specification Reference	Title
3GPP TS 45.005 v5.5.0 (2002-08) Release 5	Technical Specification Group GSM/EDGE. Radio Access Network; Radio transmission and reception
GSM 02.07 V8.0.0 (1999-07)	Digital cellular telecommunications system (Phase 2+); Mobile Stations (MS) features (GSM 02.07 version 8.0.0 Release 1999)
GSM 02.60 V8.1.0 (1999-07)	Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Service description, Stage 1 (GSM 02.60 version 8.1.0 Release 1999)
GSM 03.60 V7.9.0 (2002-09)	Technical Specification Group Services and System Aspects; Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Service description; Stage 2 (Release 1998)
3GPP TS 43.064 V5.0.0 (2002-04)	Technical Specification Group GERAN; Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Overall description of the GPRS radio interface; Stage 2 (Release 5)
3GPP TS 03.22 V8.7.0 (2002-08)	Technical Specification Group GSM/EDGE. Radio Access Network; Functions related to Mobile Station (MS) in idle mode and group receive mode; (Release 1999)
3GPP TS 03.40 V7.5.0 (2001-12)	Technical Specification Group Terminals; Technical realization of the Short Message Service (SMS) (Release 1998)
3GPP TS 03.41 V7.4.0 (2000-09)	Technical Specification Group Terminals; Technical realization of Cell Broadcast Service (CBS) (Release 1998)
ETSI EN 300 903 V8.1.1 (2000-11)	Digital cellular telecommunications system (Phase 2+); Transmission planning aspects of the speech service in the GSM Public Land Mobile Network (PLMN) system (GSM 03.50 version 8.1.1 Release 1999)
3GPP TS 04.06 V8.2.1 (2002-05)	Technical Specification Group GSM/EDGE Radio Access Network; Mobile Station - Base Station System (MS - BSS) interface; Data Link (DL) layer specification (Release 1999)
3GPP TS 04.08 V7.18.0 (2002-09)	Technical Specification Group Core Network; Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification (Release 1998)
3GPP TS 04.10 V7.1.0 (2001-12)	Technical Specification Group Core Networks; Mobile radio interface layer 3 Supplementary services specification; General aspects (Release 1998)
3GPP TS 04.11 V7.1.0 (2000-09)	Technical Specification Group Core Network; Digital cellular telecommunications system (Phase 2+); Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface (Release 1998)
3GPP TS 45.005 v5.5.0 (2002-08)	Technical Specification Group GSM/EDGE. Radio Access Network; Radio transmission and reception (Release 5)
3GPP TS 45.008 V5.8.0 (2002-08)	Technical Specification Group GSM/EDGE

Specification Reference	Title
	Radio Access Network; Radio subsystem link control (Release 5)
3GPP TS 45.010 V5.1.0 (2002-08)	Technical Specification Group GSM/EDGE Radio Access Network; Radio subsystem synchronization (Release 5)
3GPP TS 46.010 V5.0.0 (2002-06)	Technical Specification Group Services and System Aspects; Full rate speech; Transcoding (Release 5)
3GPP TS 46.011 V5.0.0 (2002-06)	Technical Specification Group Services and System Aspects; Full rate speech; Substitution and muting of lost frames for full rate speech channels (Release 5)
3GPP TS 46.012 V5.0.0 (2002-06)	Technical Specification Group Services and System Aspects; Full rate speech; Comfort noise aspect for full rate speech traffic channels (Release 5)
3GPP TS 46.031 V5.0.0 (2002-06)	Technical Specification Group Services and System Aspects; Full rate speech; Discontinuous Transmission (DTX) for full rate speech traffic channels (Release 5)
3GPP TS 46.032 V5.0.0 (2002-06)	Technical Specification Group Services and System Aspects; Full rate speech; Voice Activity Detector (VAD) for full rate speech traffic channels (Release 5)
TS 100 913V8.0.0 (1999-08)	Digital cellular telecommunications system (Phase 2+); General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS) (GSM 07.01 version 8.0.0 Release 1999)
GSM 09.07 V8.0.0zz (1999-08)	Digital cellular telecommunications system (Phase 2+); General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) (GSM 09.07 version 8.0.0 Release 1999)
3GPP TS 51.010-1 v5.0.0 (2002-09)	Technical Specification Group GSM/EDGE; Radio Access Network ;Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformance specification; Part 1: Conformance specification (Release 5)
3GPP TS 51.011 V5.0.0 (2001-12)	Technical Specification Group Terminals; Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface (Release 5)
ETS 300 641 (1998-03)	Digital cellular telecommunications system (Phase 2); Specification of the 3 Volt Subscriber Identity Module - Mobile Equipment (SIM-ME) interface (GSM 11.12 version 4.3.1)
GCF-CC V3.7.1 (2002-08)	Global Certification Forum – Certification criteria
NAPRD03 V2.6.0 (2002-06)	North America Permanent Reference Document for PTCRB tests



## >> 23. Appendix D: Safety Recommendations (For Information Only)

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

### RF Safety

#### 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.

#### 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.

#### 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.

## 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.

## General Safety

### 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.

### 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.

### Vehicle Electronic Equipment

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

### 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.

## 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.

## 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.

## 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.

## 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.

