



Plug and Play Wireless CPU®

FASTRACK M1306B User Guide

Revision: 003
Date: November 2006

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Plug and Play Wireless CPU[®]

FASTRACK M1306B User Guide

Reference: WM_PRJ_M13_UGD_001

Revision: 003

Date: November 11, 2006



Supports Open AT[®] embedded ANSI C applications

Document History

Revision	Date	List of revisions	
001	15 Jul 04	First Issue	
002	5 th April 05	Document update	
003	11 th November, 06	Document update: <ul style="list-style-type: none">• Update of "Environmental characteristics" chapter• Integration of RoHS & WEE• Document Format & naming changes• Other minor updates concerning: fuse, voltage drop in cable etc.	

Overview

The Fastrack M1306B is a discrete, rugged cellular Plug & Play Wireless CPU® offering state-of-the-art GSM/GPRS connectivity for machine to machine applications.

Proven for reliable, stable performance on wireless networks worldwide, Wavecom's latest generation of Fastracks -M1306B- continues to deliver rapid time to market and painless integration.

Smaller than the former generation and updated with new features, the M1306B offers two general purpose input/output access.

Fully certified, the dual-band 900/1800 MHz Fastrack M1306B offers GPRS Class 10 capability and 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®.

Fastrack M1306B is controlled by firmware through a set of AT commands.

This document describes the M1306B and gives information on the following topics:

- general presentation,
- functional description,
- basic services available,
- technical characteristics,
- installing and using the M1306B,
- user-level troubleshooting.
- recommended accessories to be used with the product.

Note:

This document covers the Wireless CPU® alone and does not include the programmable capabilities provided via the use of Open AT® Software Suites.

For detailed software programming guides, refer to the documents shown in the "Reference documents" section.

RoHS Directive

The M1306B is now 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), and polybrominated diphenyl ethers (PBDE)".

Modules which are compliant with this directive are identified by the RoHS logo on their label.



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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 off this product in an environmental friendly manner.



Cautions

Information furnished herein by WAVECOM is accurate and reliable. However, no responsibility is assumed for its use. Please read carefully the safety recommendations given in Chapter 9 for an application based on Fastrack M1306B.

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Web Site Support

General information about Wavecom and its range of products:	www.wavecom.com
Specific support is available for the Fastrack M1306B Plug & Play Wireless CPU [®] :	www.wavecom.com/M1306B
Carrier/Operator approvals:	www.wavecom.com/approvals
Open AT [®] Introduction:	www.wavecom.com/OpenAT
Developer support for software and hardware:	www.wavecom.com/forum

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1 References

1.1 Reference Documents

For more details, several reference documents may be consulted. The Wavecom reference documents are provided in the Wavecom documents package contrary to the general reference documents, which are not Wavecom owned.

1.1.1 Open AT® Software Documentation

- [1] Getting started with Open AT® (Ref.WM_ASW_OAT_CTI_001)
- [2] Open AT® Tutorial (Ref.WM_ASW_OAT_UGD_001)
- [3] Tools Manual (Ref. WM_ASW_OAT_UGD_003)
- [4] Open AT® Basic Development Guide (Ref. WM_ASW_OAT_UGD_002)
- [5] Open AT® ADL guide (Ref. WM_ASW_OAT_UGD_006)
- [6] Open AT® Customer Release Note (Ref. WM_ASW_OAT_DVD_00062)

1.1.2 AT Software Documentation

- [7] AT commands interface Guide for X51 (Ref. WM_ASW_OAT_UGD_00016)
- [8] Customer Release Note X51 (Ref. WM_ASW_OAT_DVD_00120)

1.1.3 Other Documents

- [9] Firmware upgrade procedure (Ref. WM_SW_GEN_UGD_001)

Note:

New versions of software may be available. Wavecom recommends to check the web site for the latest documentation.

1.2 Abbreviations

Abbreviation	Definition
AC	Alternating Current
ACM	Accumulated Call Meter
AT	ATtention (prefix for Wireless CPU® commands)
CLK	CLock
CMOS	Complementary Metal Oxide Semiconductor
CS	Coding Scheme
CTS	Clear To Send
dB	Decibel
dBc	Decibel relative to the Carrier power
dBi	Decibel relative to an Isotropic radiator
dBm	Decibel relative to one milliwatt
DC	Direct Current
DCD	Data Carrier Detect
DCE	Data Communication Equipment
DCS	Digital Cellular System
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi-Frequency
DTR	Data Terminal Ready
EEPROM	Electrically Erasable Programmable Read-Only Memory
EFR	Enhanced Full Rate
E-GSM	Extended GSM
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
ESD	ElectroStatic Discharges
ETSI	European Telecommunications Standards Institute
FIT	Series of connectors (micro-FIT)
FR	Full Rate
FTA	Full Type Approval
GCF	Global Certification Forum

Abbreviation	Definition
GND	GrouND
GPIO	General Purpose Input Output
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
HR	Half Rate
I	Input
IEC	International Electrotechnical Commission
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

Abbreviation	Definition
RTS	R equest T o S end
RX	R eceive
SIM	S ubscriber I dentification M odule
SMA	S ub M iniature version A R F connector
SMS	S hort M essage S ervice
SNR	S ignal-to- N oise R atio
SPL	S ound P ressure L evel
SPK	S pea K er
SRAM	S tatic R AM
TCP/IP	T ransmission C ontrol P rotocol / I nternet P rotocol
TDMA	T ime D ivision M ultiple A ccess
TU	T ypical U rban fading profile
TUHigh	T ypical U rban, H igh speed fading profile
TX	T ransmit
TYP	TYP ical
VSWR	V oltage S tationary W ave R atio

2 Packaging

2.1 Contents

The complete package contents of the Fastrack M1306B consists of (see Figure 1):

- one packaging box (A),
- one M1306B (B),
- two holding bridles (C),
- one power supply cable with fuse integrated (D)
- a short notice (E) with:
 - a summary of the main technical features,
 - safety recommendations,
 - EC declaration of conformity.

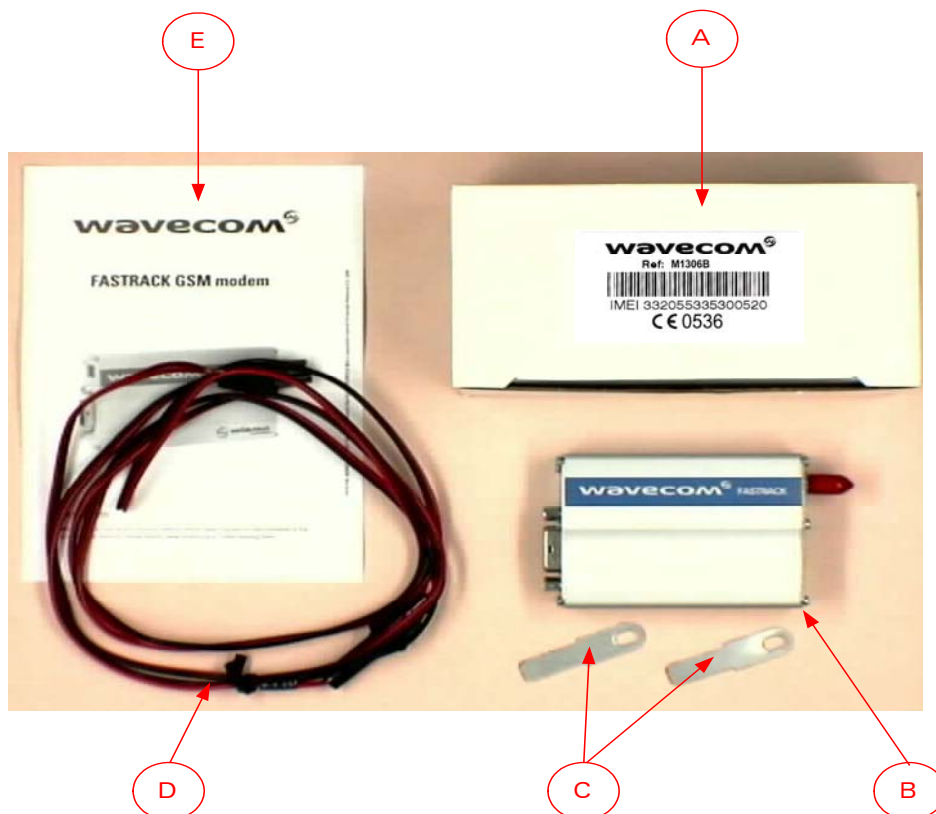


Figure 1: Complete package contents

2.2 Packaging Box

The packaging box is a carton box (see Figure 2) with the following external dimensions:

- width: 54.5 mm,
- height: 68 mm,
- length: 108 mm.

A packaging label is slicked on the packaging box cover and supports the:

- WAVECOM logo,
- Product reference (M1306B),
- CE marking (CE0536),
- 15-digit IMEI code
- Open AT[®] Logo
- RoHS logo
- WEEE logo



Example of label for Fastrack M1306B



Figure 2: Packaging box

The packaging label dimensions are:

- height: 40 mm,
- length: 65 mm.

2.3 Production Sticker

A production sticker (see Figure 3) located at the M1306B back side gives the following information:

- product reference (M1306B),
- part number (WMxxxxx),
- CE marking (CE0536),
- 15-digit IMEI code,
- RoHS logo,
- WEEE logo.



Figure 3: Production sticker

3 General Presentation

3.1 Description

The Fastrack M1306B description is given in the Figure 4 below.

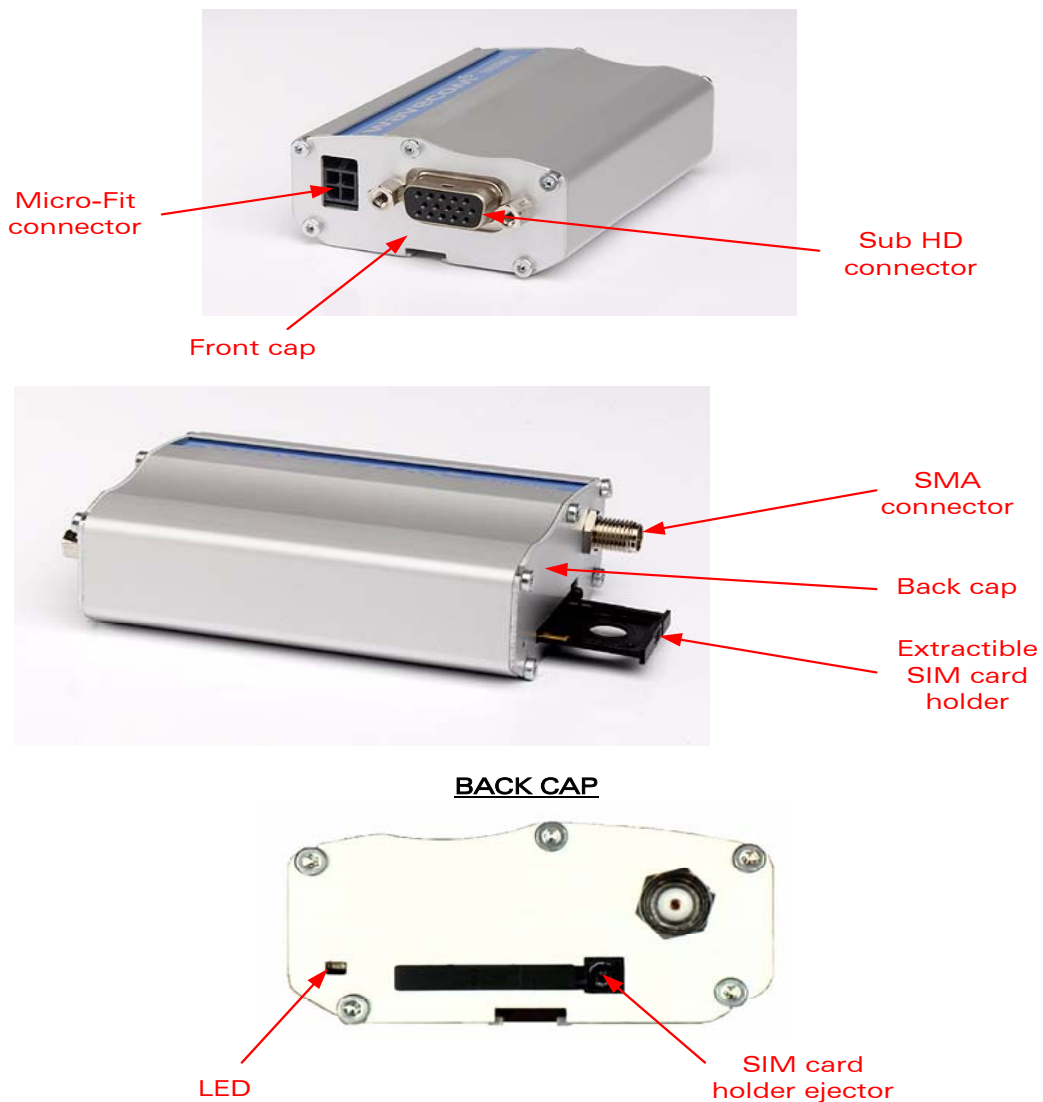


Figure 4: Fastrack M1306B general description

Fastrack M1306B User Guide General Presentation

In addition, two holding bridles are provided to tighten the M1306B on a support.

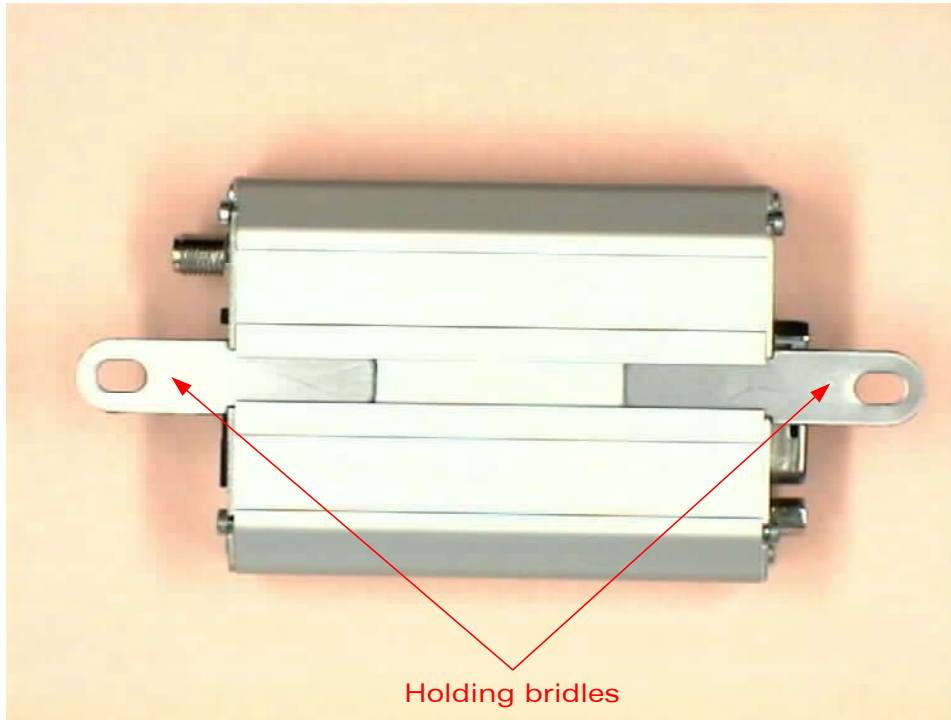


Figure 5: Fastrack M1306B holding bridles

3.2 External Connections

3.2.1 Connectors

3.2.1.1 Antenna Connector

The antenna connector is a SMA type connector for a 50 Ω RF connection.

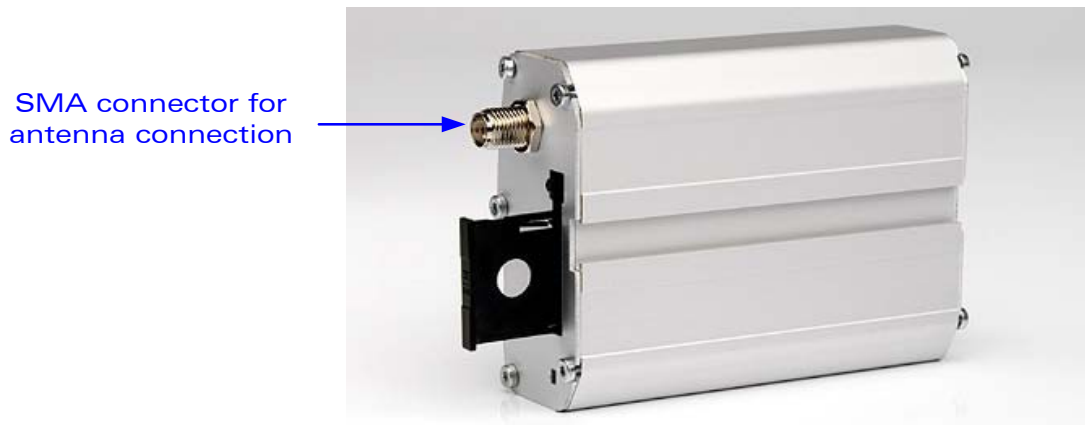


Figure 6: SMA connector for antenna connection

3.2.1.2 Power Supply Connector

The power supply connector is a 4-pin Micro FIT connector for:

- external DC Power Supply connection,
- GPIOs connection (two General Purpose Input/Output signals available).

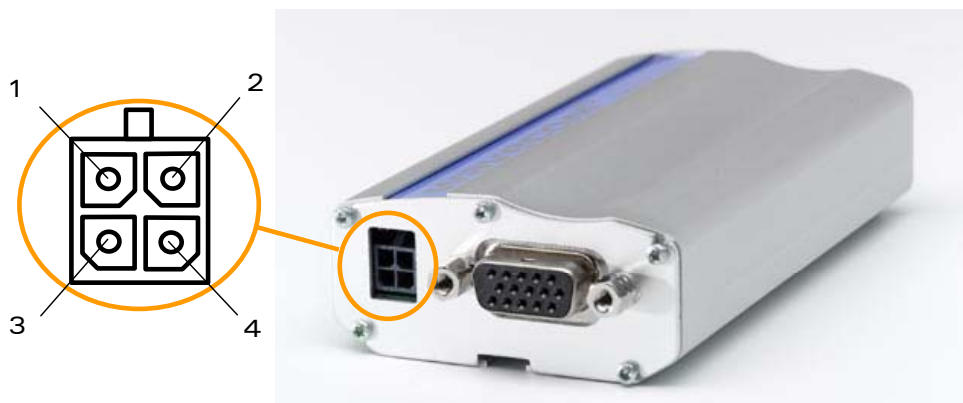


Figure 7: Power supply connector

Fastrack M1306B User Guide
General Presentation

Table 1: Power supply connector pin description

Pin #	Signal	I/O	I/O type	Description	Comment
1	V+BATTERY	I	Power supply	Battery voltage input: <ul style="list-style-type: none"> ▪ 5.5 V Min. ▪ 13.2 V Typ. ▪ 32 V Max. 	High current
2	GND		Power supply	Ground	
3	GPIO4	I/O	CMOS/2X	General Purpose Input/output	
4	GPIO5	I/O	CMOS/2X	General Purpose Input/output	

Warning:

Both pin 3 and pin 4 are used by GPIO interface. It is strictly prohibited to connect them to any power supply at the risk of damage to the M1306B.

3.2.1.3 Sub HD 15-pin Connector

The Sub D high density 15-pin connector is used for:

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



Figure 8: Sub HD 15-pin connector

Fastrack M1306B User Guide
General Presentation

Table 2: Sub HD 15-pin connector description

Pin #	Signal (CCITT / EIA)	I/O	I/O type	Description	Comment
1	CDCD/CT109	O	STANDARD RS232	RS232 Data Carrier Detect	
2	CTXD/CT103	I	STANDARD RS232	RS232 Transmit serial data	
3	BOOT	I	CMOS	Boot	This signal must not be connected. Its use is strictly reserved to Wavecom or competent retailers.
4	CMIC2P	I	Analog	Microphone positive line	
5	CMIC2N	I	Analog	Microphone negative line	
6	CRXD/CT104	O	STANDARD RS232	RS232 Receive serial data	
7	CDSR/CT107	O	STANDARD RS232	RS232 Data Set Ready	
8	CDTR/CT108-2	I	STANDARD RS232	RS232 Data Terminal Ready	
9	GND	-	GND	Ground	
10	CSPK2P	O	Analog	Speaker positive line	
11	CCTS/CT106	O	STANDARD RS232	RS232 Clear To Send	
12	CRTS/CT105	I	STANDARD RS232	RS232 Request To Send	
13	CRI/CT125	O	STANDARD RS232	RS232 Ring Indicator	
14	RESET	I/O	Schmitt	Wireless CPU® reset	Active low
15	CSPK2N	O	Analog	Speaker negative line	

3.2.2 Power supply cable

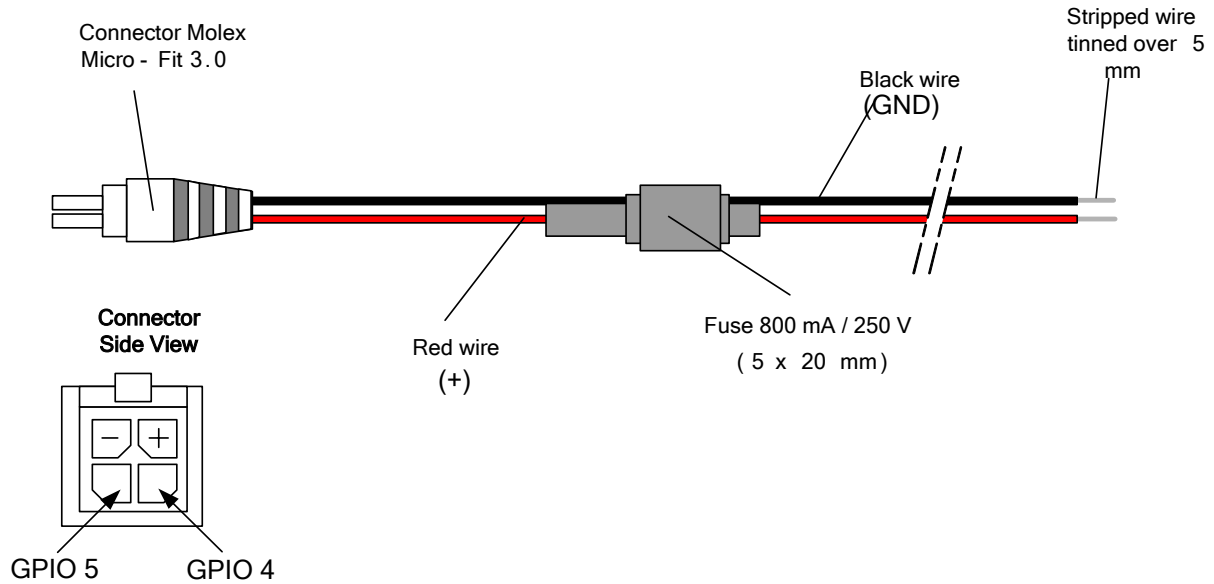


Figure 9: Power supply cable

Component	Characteristics
Micro-Fit 4-pin connector	Part number: MOLEX 43025-0400
Cable	Cable length: ~1.5 m
Wire	Core: tinned copper 24 x 0.2 mm
	Section: 0.75 mm ²

4 Basic Features and Services

Basic features of the M1306B and available services are summarized in the table below.

Table 3: Basic features of the M1306B

Features	GSM	DCS
Open AT®	Open AT® programmable: Native execution of embedded standard ANSI C applications, Custom AT command creation, Custom application library creation, Standalone operation.	
Standard	900 MHz. E-GSM compliant. Output power: class 4 (2W). Fully compliant with ETSI GSM phase 2 + small MS.	1800 MHz Output power: class 1 (1W). Fully compliant with ETSI GSM phase 2 + small MS.
GPRS	Class 10. PBCCH support. Coding schemes: CS1 to CS4. Compliant with SMG31bis. Embedded TCP/IP stack (optional).	
Interfaces	RS232 (V.24/V.28) Serial interface supporting: <ul style="list-style-type: none"> ▪ Baud rate (bits/s): 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, ▪ Autobauding (bits/s): 2400, 4800, 9600, 19200, 38400, 57600. 2 General Purpose Input/Output gates (GPIOs) available. 3 V SIM interface. AT command set based on V.25ter and GSM 07.05 & 07.07. Open AT® interface for embedded application.	
SMS	Text & PDU. Point to point (MT/MO). Cell broadcast.	

Fastrack M1306B User Guide
Basic Features and Services

Features	GSM	DCS
Data	Data circuit asynchronous. Transparent and Non Transparent modes. Up to 14.400 bits/s. MNP Class 2 error correction. V42.bis data compression.	
Fax	Automatic fax group 3 (class 1 and Class 2).	
Audio	Echo cancellation Noise reduction Telephony. Emergency calls. Full Rate, Enhanced Full Rate and Half Rate operation (FR/EFR/HR). Dual Tone Multi Frequency function (DTMF).	
GSM supplement services	Call forwarding. Call barring. Multiparty. Call waiting and call hold. Calling line identity. Advice of charge. USSD	
Other	DC power supply Real Time Clock with calendar Complete shielding	

For other detailed technical characteristics, refer to Chapter 8.

5 Using the M1306B Wireless CPU®

5.1 Getting Started

5.1.1 Mount the M1306B

To mount the M1306B on its support, bind it using the holding bridles as shown in the Figure 10 below.

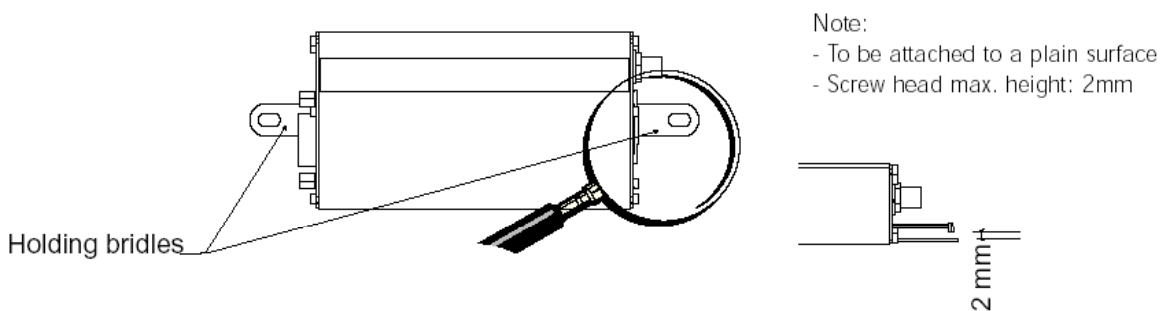


Figure 10: M1306B mounting

For the drill template, refer to Figure 16.

5.1.2 Set up the M1306B

To set up the M1306B, perform the following operations:

- Press SIM card holder ejector with a sharp object (for example, the tip of a pen).
- Insert the SIM card in the holder.
- Verify the SIM card fits in the holder properly.
- Insert the holder in the M1306B.
- Connect the antenna to the SMA connector.
- Connect both sides of the serial and control cable (15-pin Sub HD connector on the M1306B side).
- Connect the power supply cable to the external power supply source.

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Note:

For automotive application, it is recommended to connect the V+BATTERY line of the M1306B directly to the battery positive terminal.

- Plug the power supply cable into the M1306B and switch on the external power supply source.
- The M1306B is ready to work. Refer to section 5.8 for the description of AT commands used to configure the M1306B.

5.1.3 Check the communication with the M1306B

To check the communication with the M1306B, do the following operations:

- Connect the RS232 link between the DTE (port COM) and the M1306B (DCE).
- Configure the RS232 port of the DTE as follows:
 - Bits per second: **115.200 bps**,
 - Data bits: **8**,
 - Parity: **None**,
 - Stop bits: **1**,
 - Flow control: **hardware**.
- Using a communication software such as a Hyperterminal, enter the **AT** command. The response of the M1306B must be **OK** displayed in the Hyperterminal window.
- If the communication cannot be established with the M1306B, do the following:
 - Check the RS232 connection between the DTE and the M1306B (DCE),
 - Check the configuration of the port COM used on the DTE.
- Example of AT commands which can be used after getting started the M1306B:
 - **AT+CGMI**: M1306B answer is "WAVECOM MODEM" when serial link is OK.
 - **AT+CPIN=xxxx**: to enter a PIN code xxxx (if activated).
 - **AT+CSQ**: to verify the received signal strength.
 - **AT+CREG?**: to verify the registration of the Wireless CPU® on the network.
 - **ATD<phone number>;**: to initiate a voice call.
 - **ATH**: to hang up (end of call).

For further information on these AT commands and their associated parameters, refer to "AT Commands Interface Guide" [7].

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5.1.4 Reset the M1306B

To reset the M1306B, a hardware reset signal is available on pin 14 of the Sub HD 15-pin connector (RESET).

The M1306B reset is carried out when this pin is low for at least 500 μ s.

Warning This signal has to be considered as an emergency reset only. For further details on the M1306B reset, refer to section 7.6.

5.2 Specific Recommendations when Using the M1306B on Trucks

Warning: The power supply connection of the Fastrack M1306B must NEVER be directly connected to the truck battery.

5.2.1 Recommended Power Supply Connection on Trucks

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

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

Fastrack M1306B User Guide Using the M1306B Wireless CPU®

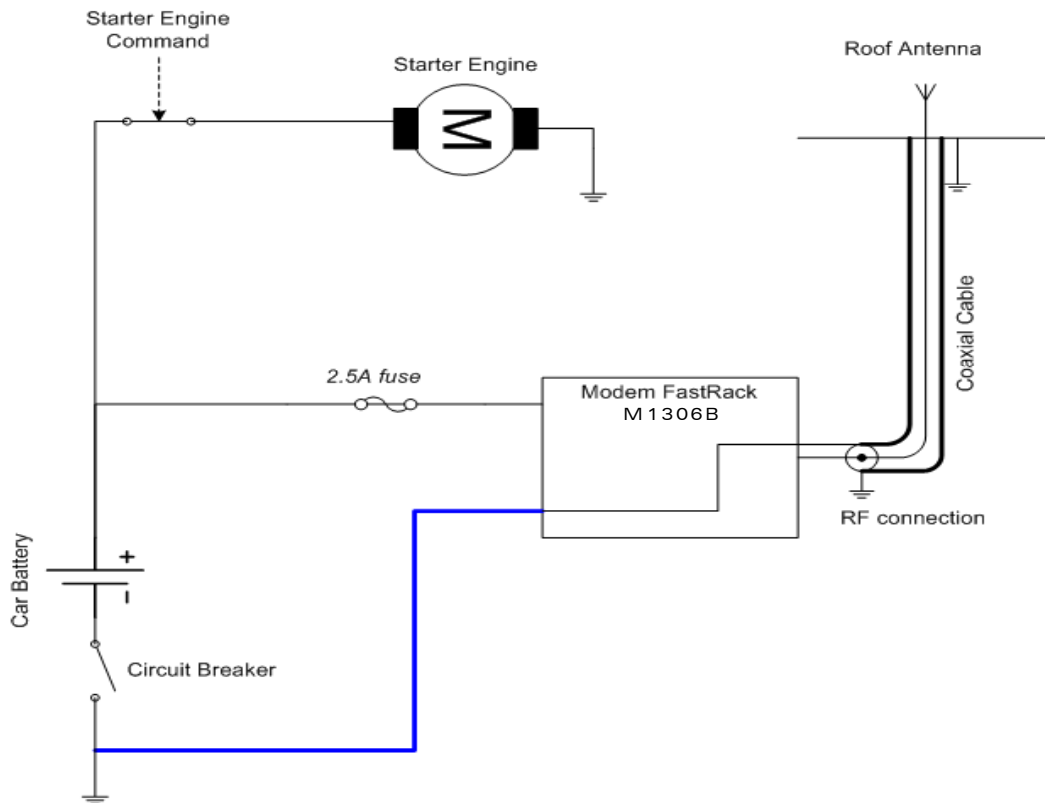


Figure 11: Recommended power supply connection on trucks

Figure 11 gives the recommended power supply connection where the ground connection of the M1306B is not directly connected to the battery but is connected after the Circuit Breaker (on the truck ground or the fuse box).

5.2.2 Technical Constraints on Trucks

It is highly not recommended to connect directly the power supply on the battery rather than on the circuit breaker. The Fastrack M1306B 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 M1306B as shown in the figure below).

Fastrack M1306B User Guide Using the M1306B Wireless CPU®

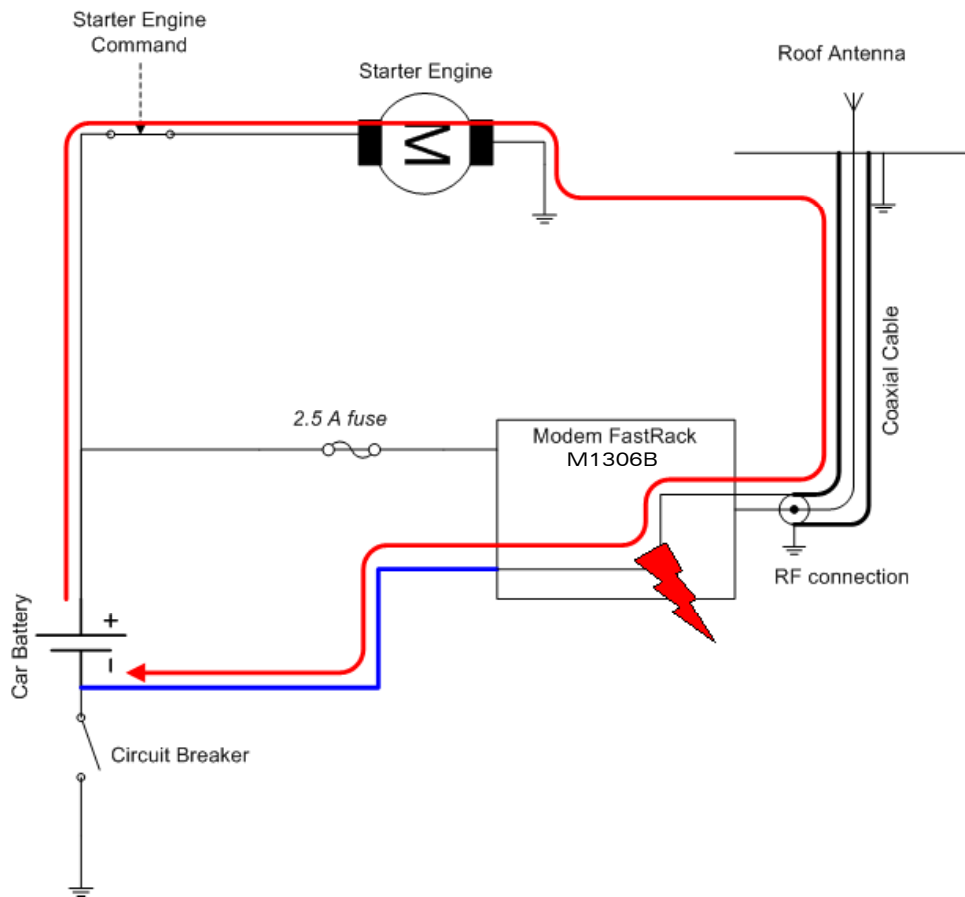


Figure 12: Example of electrical connection which may dramatically damage the M1306B

Figure 12 gives an example of electrical connection which may dramatically damage the M1306B 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 M1306B and powers the electrical circuit of the truck (for example, dashboard).

Furthermore, when the Starter Engine command will be used, it will destroy the cables or the M1306B.

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

5.3 M1306B Operational Status

The M1306B operational status is given by the green LED status located on the M1306B front panel.

The Table 4 below gives the meaning of the various statuses available.

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Using the M1306B Wireless CPU®

Table 4: M1306B operational status

LED Status	LED light activity	M1306B status
ON	LED ON permanent	M1306B is switched ON but not registered on the network
	LED Flashing slowly	M1306B is switched ON and registered on the network, but no communication is in progress (Idle mode)
	LED Flashing rapidly	M1306B is switched ON and registered on the network, and a communication is in progress
OFF	LED OFF	M1306B is switched OFF.

5.4 Echo Function Disabled

If no echo is displayed when entering an AT command, that means:

- The "local echo" parameter of your communication software (such as Hyperterminal) is disabled.
- The M1306B echo function is disabled.

To enable the M1306B echo function, enter the **ATE1**.

When sending AT commands to the M1306B by using a communication software, it is recommended:

- to disable the "local echo" parameter of your communication software (such as Hyperterminal),
- to enable the M1306B echo function (**ATE1** command).

In a Machine To Machine communication with the M1306B, it is recommended to disable the M1306B echo function (**ATE0** command) in order to avoid useless CPU processing.

For further information on **ATE0** and **ATE1** commands, refer to "AT Commands Interface Guide" [7].

5.5 Verify the Received Signal Strength

The Fastrack M1306B establishes a call only if the received signal is sufficiently strong.

To verify the received signal strength, do the following operations:

- Using a communication software such as Hyperterminal, enter the AT command **AT+CSQ**.
The response returned has the following format:
+CSQ: <rsssi>, <ber> with:
 - **<rsssi>** = received signal strength indication,
 - **<ber>** = channel bit error rate.
- Verify the **<rsssi>** value returned using the Table 5 below.

Table 5: Values of received signal strength

Value of received signal strength indication (<rsssi>)	Interpretation of the received signal strength
0 - 10	Insufficient(*)
11 - 31	Sufficient(*)
32 - 98	Not defined
99	No measure available

(*) Based on general observations.

For further information on AT commands, refer to "AT Commands Interface Guide" [7].

5.6 Check the Pin Code Status

To check that the pin code has been entered, use a communication software such as a Hyperterminal, then enter **AT+CPIN?** command.

The table below gives the main responses returned:

Table 6: AT+CPIN Responses

AT+CPIN response (*)	Interpretation
+CPIN: READY	Code PIN has been entered
+CPIN: SIM PIN	Code PIN has not been entered

(*)For further information on the other possible responses and their meaning, refer to "AT Commands Interface Guide" [7].

5.7 Verify the M1306B Network Registration

1. Make sure a valid SIM card has been previously inserted in the M1306B SIM card holder.
2. Using a communication software such as a Hyperterminal, enter the following AT commands:

- a. **AT+CPIN=xxxx** to enter PIN code xxxx.
- b. **AT+CREG?** . To ascertain the registration status.

The format of the returned response is as follows:

+CREG: <mode>,<stat> with:

- **<mode>** = unsolicited registration message configuration,
- **<stat>** = registration state.

3. Verify the state of registration according the returned value given in the table below.

Table 7: Values of network registration

Returned Value (*) <mode>,<stat>	Network registration
+CREG: 0,0	No (not registered)
+CREG: 0,1	Yes (registered, home network)
+CREG: 0,5	Yes (registered, roaming)

(*)For further information on the other returned values and their meaning, refer to "AT Commands Interface Guide" [7].

If the M1306B is not registered, perform the following procedure:

- Check the connection between the M1306B and the antenna.
- Verify the signal strength to determine the received signal strength (refer to section 5.5).

Note: For information on AT command relating to the network registration in GPRS mode, and in particular: CGREG, CGCLASS, CGATT, refer to "AT Commands Interface Guide" [7].

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5.8 Main AT Commands for the Wireless CPU®

The table below lists the main AT commands required for starting the Wireless CPU®. For other AT commands available or further information on the AT commands, refer to "AT Commands Interface Guide" [7].

Table 8: Main usual AT commands for the Wireless CPU®

Description	AT commands	Wireless CPU® response	Comment
Enter PIN Code	AT+CPIN=xxxx (xxxx = PIN code)	OK	PIN Code accepted.
		+CME ERROR: 16	Incorrect PIN Code (with +CMEE = 1 mode) (1*)
		+CME ERROR: 3	PIN code already entered (with +CMEE = 1 mode) (1*)
Network registration checking	AT+CREG?	+CREG: 0,1	Wireless CPU® registered on the network.
		+CREG: 0,2	Wireless CPU® not registered on the network, registration attempt.
		+CREG: 0,0	Wireless CPU® not registered on the network, no registration attempt.
Receiving an incoming call	ATA	OK	Answer the call.
Initiate a call	ATD<phone number>; (Don't forget the « ; » at the end for « voice » call)	OK	Communication established.
		+CME ERROR: 11	PIN code not entered (with +CMEE = 1 mode).
		+CME ERROR: 3	AOC credit exceeded or a communication is already established.
Initiate an emergency call	ATD112; (Don't forget the « ; » at the end for « voice » call)	OK	Communication established.
Communication loss		NO CARRIER	

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Description	AT commands	Wireless CPU® response	Comment
Hang up	ATH	OK	
Store the parameters in EEPROM	AT&W	OK	The configuration settings are stored in EEPROM.

(1*) The command "AT+CMEE=1" switch to a mode enabling more complete error diagnostics.

5.9 Firmware Upgrade Procedure

The firmware upgrade procedure is used to update the firmware embedded into the Fastrack M1306B.

That procedure consists in downloading the firmware into internal memories through the RS232 serial link available on the SUB-D 15-pin connector.

Refer to "Firmware upgrade procedure" [9] for a detailed description of this procedure.

6 Troubleshooting

This section of the document describes possible problems encountered when using the Fastrack M1306B and their solutions.

To review other troubleshooting information, refer the 'FAQs' (Frequently Asked Questions) page at www.wavecom.com or use the following link:
<http://www.wavecom.com/support/faqs.php>

6.1 No Communication with the M1306B through the Serial Link

If the Fastrack M1306B does not answer to AT commands through the serial link, refer to the table below for possible causes and solutions.

Table 9: Solutions for no connection with M1306B through serial link

If the M1306B returns	then ask	Action
Nothing	Is the M1306B powered correctly?	Make sure the external power supply is connected to the M1306B and provides a voltage in the range of 5.5 V to 32 V.
	Is the serial cable connected at both sides?	Check the serial cable connection
	Does the serial cable follow correctly pin assignment shown in paragraph 3.2.1.2.	Connect the cable by following pin assignment given in paragraph 3.2.1.1.
Nothing or non-significant characters	Is the communication program properly configured on PC?	Ensure the setting of the communication program is fit to setting of M1306B. M1306B factory setting is: Data bits = 8 Parity = none Stop bits = 1 Baud = 115 200 bps. Flow control = hardware
	Is there another program interfering with the communication program (i.e. Conflict on communication port access)	Close the interfering program.

6.2 Receiving "ERROR" Message

The M1306B returns an "ERROR" message (in reply to an AT command) in the following cases:

- AT command syntax is incorrect: check the command syntax (refer to "AT Commands Interface Guide" [7]),
- AT command syntax is correct, but transmitted with wrong parameters:
- Enter the **AT+CMEE=1** command in order to change the error report method to the verbose method, which includes the error codes.
- Enter again the AT command which previously caused the reception of "ERROR" message in order to get the Mobile Equipment error code.

When the verbose error report method is enabled, the response of the M1306B in case of error is as follows:

- Either +CME ERROR: <error result code>>,
- Or +CMS ERROR: <error result code>.

Refer to "AT Commands Interface Guide" [7] for error result code description and further details on the **AT +CMEE** command.

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

6.3 Receiving "NO CARRIER" Message

If the M1306B returns a "NO CARRIER" message upon an attempted call (voice or data), then refer to the table below for possible causes and solutions.

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Troubleshooting

Table 10: Solutions for "NO CARRIER" message

If the M1306B returns...	Then ask...	Action...
"NO CARRIER"	Is the received signal strong enough?	Refer to section 5.5 to verify the strength of the received signal.
	Is the M1306B registered on the network?	Refer to section 5.7 to verify the registration.
	Is the antenna properly connected?	Refer to section 8.2.6.3 for antenna requirements.
"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 no success, try bearer selection type by AT command: AT+CBST=0,0,3

If the Fastrack M1306B returns a "NO CARRIER" message , you may have the **extended error code** by using AT command **AT+CEER**. Refer to the table below for interpretation of **extended error code**.

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Table 11: Interpretation of extended error code

Error Code	Diagnostic	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 (data subscription available?).
68	ACM equal or greater than ACMmax	Credit of your pre-paid SIM card expired.
252	Call barring on outgoing calls	
253	Call barring on incoming calls	
3, 6, 8, 29, 34, 38, 41, 42, 43, 44, 47, 49, 57, 58, 63, 65, 69, 70, 79, 254	Network causes	See "AT Commands Interface Guide" [7] for further details or call network provider.

Note: For all other codes, and/or details, see AT commands documentation [7].

7 Functional Description

7.1 Architecture

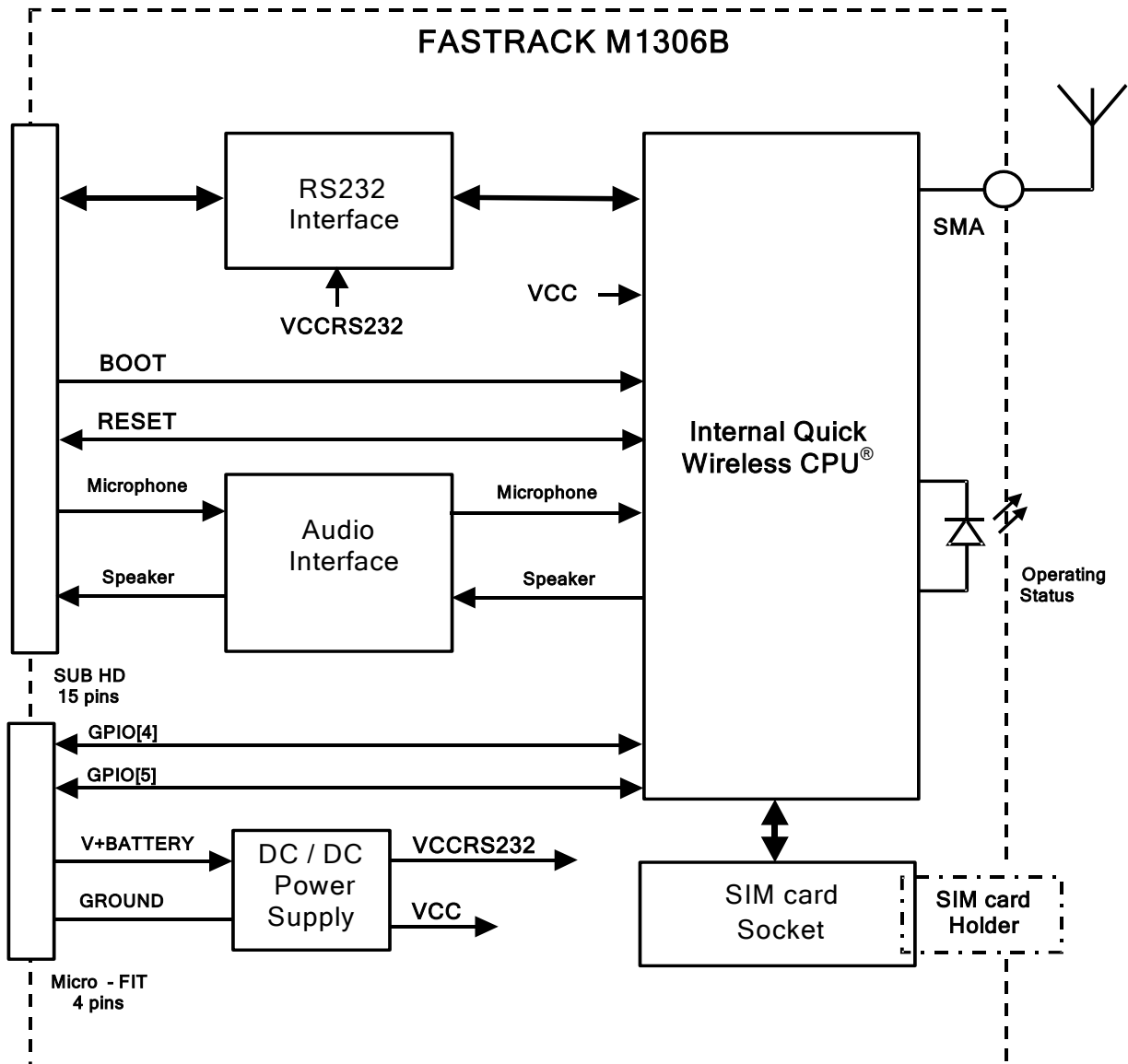


Figure 13: Functional architecture

7.2 Power Supply

7.2.1 General Presentation

The M1306B is supplied by an external DC voltage (V+BATTERY) from +5.5 V to +32 V at 2.2 A.

Main regulation is made with an internal DC/DC converter in order to supply all the internal functions with a DC voltage.

Correct operation of the Fastrack M1306B in communication mode is not guaranteed if input voltage (V+BATTERY) falls below 5.5 V.

Note: The minimum input voltage specified here is at the M1306B input. Be careful of the input voltage decrease caused by the power cable. See paragraph 8.2.1 for more information.

7.2.2 Protections

The M1306B is protected by a 800 mA / 250 V fuse directly bonded on the power supply cable.

The M1306B is also protected against voltage over +32 V.

Filtering guarantees:

- EMI/RFI protection in input and output,
- Signal smoothing.

7.3 RS232 Serial Link

7.3.1 General Presentation

The RS232 interface performs the voltage level adaptation (V24/CMOS \Leftrightarrow V24/V28) between the internal Wireless CPU[®] (DCE) and the external world (DTE).

The RS232 interface is internally protected (by ESD protection) against electrostatic surges on the RS232 lines.

Filtering guarantees:

- EMI/RFI protection in input and output,
- Signal smoothing.

Signals available on the RS232 serial link are:

- TX data (CT103/TX),
- RX data (CT104/RX),
- Request To Send (CT105/RTS),
- Clear To Send (CT106/CTS),

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- Data Terminal Ready (CT108-2/DTR),
- Data Set Ready (CT107/DSR),
- Data Carrier Detect (CT109/DCD),
- Ring Indicator (CT125/RI).

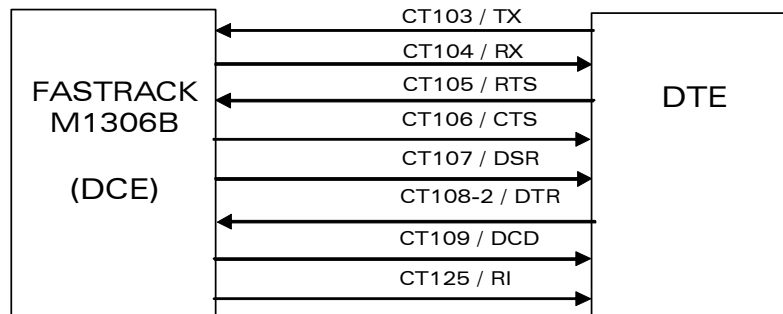


Figure 14: RS232 Serial Link signals

RS232 interface has been designed to allow flexibility in the use of the serial interface signals. However, the use of TX, RX, CTS and RTS signals is mandatory, which is not the case for DTR, DSR, DCD and RI signals which can be not used.

7.3.2 Autobauding Mode

The autobauding mode allows the M1306B to detect the baud rate used by the DTE connected to the RS232 serial link.

Autobauding mode is controlled by AT commands. See "AT Commands Interface Guide" [7] for details on this function.

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7.3.3 Pin Description

Signal	Sub HD connector Pin number	I/O	I/O type RS232 STANDARD	Description
CTXD/CT103	2	I	TX	Transmit serial data
CRXD/CT104	6	O	RX	Receive serial data
CRTS/CT105	12	I	RTS	Request To Send
CCTS/CT106	11	O	CTS	Clear To Send
CDSR/CT107	7	O	DSR	Data Set Ready
CDTR/CT108-2	8	I	DTR	Data Terminal Ready
CDCD/CT109	1	O	DCD	Data Carrier Detect
CRI/CT125	13	O	RI	Ring Indicator
CT102/GND	9		GND	Ground

7.4 General Purpose Input/Output (GPIO)

The Fastrack M1306B provides two General Purpose Input / Output lines available for external use: GPIO4 and GPIO5.

These GPIOs may be controlled by AT commands:

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

Refer to "AT Commands Interface Guide" [7] for further information on AT commands.

After reset, both GPIOs are configured as inputs. The **AT+WIOI** command has to be used to change this configuration (refer to "AT Commands Interface Guide" [7] for further details).

Pin description

Signal	Power Supply connector (4-pin Micro-Fit)	I/O	I/O type	Description
GPIO4	3	I/O	CMOS / 2X	General Purpose I/O
GPIO5	4	I/O	CMOS / 2X	General Purpose I/O

Notes:

- The power supply cable may need to be modified due to the GPIO signals (GPIO4 & GPIO5) available on the 4-pin Micro-FIT connector of the M1306B.

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- See Table 20 in section 8.2.3 for I/O type 2X definition.

7.5 BOOT

This signal must not be connected. It's use is strictly reserved to Wavecom or competent retailers.

7.6 RESET

7.6.1 General presentation

This signal is used to force a reset procedure by providing low level during at least 500 μ s.

This signal must be considered as an emergency reset only. A reset procedure is automatically driven by an internal hardware during the power-up sequence.

This signal may also be used to provide a reset to an external device. It then behaves as an output. If no external reset is necessary, this input may be left open, if used (emergency reset), it has to be driven either by an open collector or an open drain output:

- RESET pin 14 = 0, for M1306B Reset,
- RESET pin 14 = 1, for normal mode.

Pin description

Signal	Sub HD 15-Pin connector Pin number	I/O	I/O type	Description
RESET	14	I/O	SCHMITT	M1306B Reset

Additional comments on RESET:

The RESET process is activated either by the external RESET signal or by an internal signal (coming from a RESET generator). This automatic reset is activated at Power-up.

The M1306B remains in RESET mode as long as the RESET signal is held low.

Caution: This signal should be used only for "emergency" reset.

A software reset is always preferred to a hardware reset.

Note: See "AT Commands Interface Guide" [7] for further information on software reset.

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7.6.2 Reset Sequence

To activate the "emergency" reset sequence, the RESET signal has to be set to low for 500 μ s minimum.

As soon as the reset is done, the AT interface answers "OK" to the application. For this, the application must send **ATJ**.

If the application manages hardware flow control, the AT command may be sent during the initialization phase. Another solution is to use the **AT+WIND** command to get an unsolicited status from the M1306B.

For further details, refer to AT commands "AT Commands Interface Guide" [7].

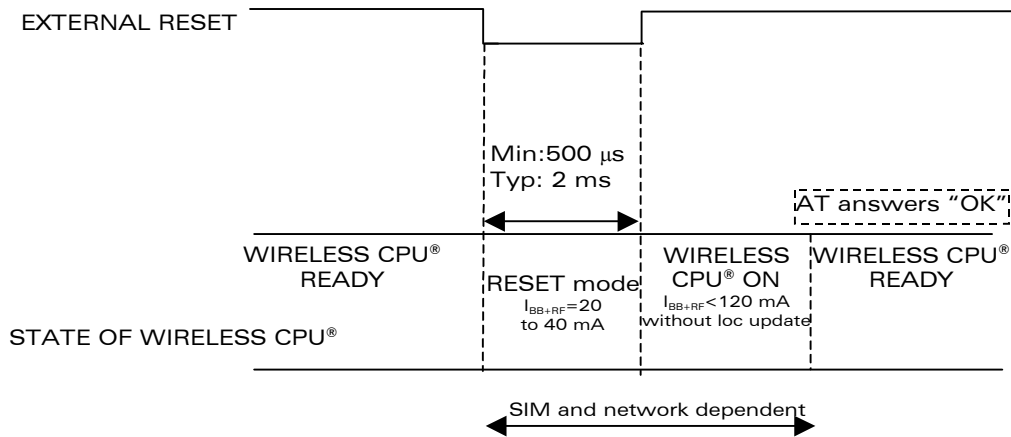


Figure 15: Reset sequence diagram

7.7 Audio

Audio interface is a standard one for connecting a phone handset.

Echo cancellation and noise reduction features are also available to improve the audio quality in case of hand-free application.

7.7.1 Microphone Inputs

The microphone inputs are differential ones in order to reject common mode noise and TDMA noise.

They already include the convenient biasing for an electret microphone (0.5 mA and 2 Volts) and are ESD protected.

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This electret microphone may be directly connected to these inputs allowing an easy connection to a handset.

The microphone impedance must be around 2 k Ω .

AC coupling is already embedded in the Wireless CPU[®].

The gain of the microphone inputs is internally adjusted and may be tuned from 30 dB to 51 dB using an **AT +VGT** command (refer to AT commands documentation [7]).

Pin description

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

7.7.2 Speaker Outputs

This connection is differential to reject common mode noise and TDMA noise.

Speaker outputs are connected to internal push-pull amplifiers and may be loaded down between 32 to 150 Ohms and up to 1 nF (see details in table *Speaker gain vs Max output voltage*, in "AT Commands Interface Guide" [7]). These outputs may be directly connected to a speaker.

The output power may be adjusted by step of 2 dB. The gain of the speaker outputs is internally adjusted and may be tuned using an **AT +VGR** command (refer to AT commands documentation [7]).

Pin description

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

8 Technical Characteristics

8.1 Mechanical Characteristics

Table 12: Mechanical characteristics

Dimensions	73 x 54.5 x 25.5 mm (excluding connectors)
Overall Dimension	88 x 54.5 x 25.5 mm
Weight	≈ 80 grams (M1306B only) < 120 grams (M1306B + bridles + power supply cable)
Volume	101.5 cm ³
Housing	Aluminium profiled

The next page gives the dimensioning diagram of the M1306B including the clearance areas to take into account for the M1306B installation.

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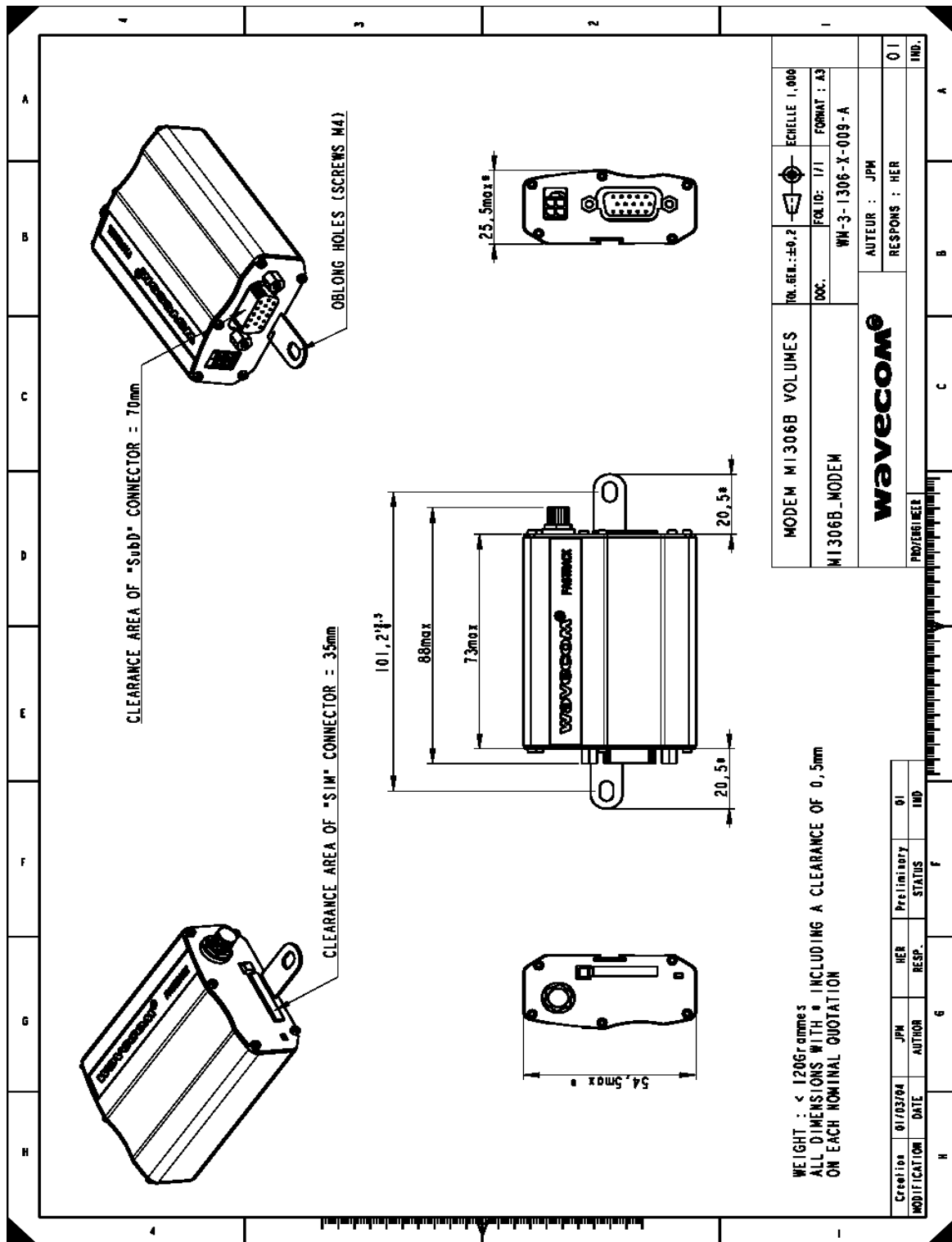


Figure 16: Dimensioning diagram

8.2 Electrical Characteristics

8.2.1 Power Supply

Table 13: Electrical characteristics

Operating Voltage ranges	5.5 V to 32 V DC (GSM or DCS or GPRS).
Maximum current	480 mA Average at 5.5V. 2.1 A Peak at 5.5 V.

Note:

The M1306B is permanently powered once the power supply is connected. The following table describes the consequences of over-voltage and under-voltage with the Fastrack M1306B.

Warning:

All the input voltages specification described in this chapter are at the M1306B input. While powering the M1306B, take into account the input drop caused by the power cable. With the delivered cable, this input drop is around 700 mV at 5.5 V and 220 mV at 32V.

Table 14: Effects of power supply defect

If the voltage	then
falls below 5.5 V,	the GSM communication is not guaranteed.
is over 32 V (Transient peaks),	the M1306B guarantees its own protection.
is over 32 V (continuous overvoltage)	the protection of the M1306B is done by the fuse (the supply voltage is disconnected).

The fuse is a 800 mA / 250 V FAST-ACTING 5*20mm. See Chapter 10 for recommended references.

The following table provides information on power consumption of the Fastrack M1306B, assuming an operating temperature of +25 °C and using a 3 V SIM card.

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Table 15: Power consumption (1*)

Power Consumption in E-GSM 900/DCS 1800 MHz - GPRS class 10		E-GSM 900	DCS 1800	
Input Peak Supply Current Power = 33,10 dBm GSM 900 During 2TX bursts @Pcl5 Power = 30,00 dBm GSM 1800 During 2TX bursts @Pcl0	@ 5.5 V	2.1 A	1,88 A	
	@ 13,2 V	1.4 A	1.1 A	
	@ 32 V	610 mA	390 mA	
Input average supply current in communication mode Power = 33,10 dBm GSM 900 Average 3Rx/2Tx @Pcl5 Power = 30,00 dBm GSM 1800 Average 3Rx/2Tx @Pcl0	@ 5.5 V	500 mA	390 mA	
	@ 13,2 V	500 mA	160 mA	
	@ 32 V	95 mA	80 mA	
Input Peak Supply Current Power = 33,10 dBm GSM 900 During 1TX bursts @Pcl5 Power = 30,00 dBm GSM 1800 During 1TX bursts @Pcl0	@ 5.5 V	2.1 A mA	1,88 A	
	@ 13,2 V	1.4 A	1.1 A	
	@ 32 V	570 mA	380 mA	
Input average supply current in communication mode Power = 33,10 dBm GSM 900 Average 1Rx/1Tx @Pcl5 Power = 30,00 dBm GSM 1800 Average 1Rx/1Tx @Pcl0	@ 5.5 V	300 mA	240 mA	
	@ 13,2 V	125 mA	100 mA	
	@ 32 V	60 mA	50 mA	
Input average supply current in Idle mode with active RS232 link (2*)	@ 5.5 V	34 mA	34 mA	
	@ 13,2 V	18 mA	18 mA	
	@ 32 V	9 mA	9 mA	
Input average supply current in Idle mode with no RS232 link (3*)	disconnection by software	@ 5.5 V	31 mA	31 mA
		@ 13,2 V	16.5 mA	16.5 mA
		@ 32 V	8.9 mA	8.9 mA
	physical disconnection	@ 5.5 V	31 mA	31 mA
		@ 13,2 V	6.5 mA	6.5 mA
		@ 32 V	4.5 mA	4.5 mA

(1*):The power consumption might vary by 5 % over the whole operating temperature range (-20 °C to +55 °C).

(2*): In this Mode, the RF function is active and the M1306B synchronized with the network, but there is no communication.

(3*): In this Mode, the RF function is disabled, but regularly activated to keep the synchronization with the network. This Mode works only if the serial link is disconnected either physically or by the software (DTE turns DTR in inactive state).

8.2.2 Audio Interface

The audio interface is available through the Sub HD 15-pin connector.

Table 16: Audio parameters characteristics

Audio parameters	Min	Typ	Max	Unit	Comments
Microphone input current @2 V/2 kΩ		0.5		mA	
Absolute microphone input voltage			100	mVpp	AC voltage
Speaker output current 150 Ω //1 nF		16		mA	
Absolute speaker impedance	32	50		Ω	
Impedance of the speaker amplifier output in differential mode			1	Ω	+/-10 %

Table 17: Microphone inputs internal audio filter characteristics

Frequency	Gain
0-150 Hz	< -22 dB
150-180 Hz	< -11 dB
180-200 Hz	< -3 dB
200-3700 Hz	0 dB
>4000 Hz	< -60 dB

Table 18: Recommended characteristics for the microphone:

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

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Table 19: Recommended characteristics for the speaker:

Feature	Value
Type	10 mW, electro-magnetic
Impedance	Z = 32 to 50 Ω
Sensitivity	110 dB SPL min. (0 dB = 20 μ Pa)
Frequency response	compatible with the GSM specifications

8.2.3 General Purpose Input/Output

Both GPIO4 and GPIO5 may be interfaced with a component that comply with 3 Volts CMOS levels.

Table 20: Operating conditions

Parameter	I/O type	Min	Max	Condition
V _{IL}	CMOS	-0.5 V	0.8 V	
V _{IH}	CMOS	2.1 V	3.0V	
V _{OL}	2X	0	0.2 V	I _{OL} = -2 mA
V _{OH}	2X	2.6 V	2.8 V	I _{OH} = 2 mA

Clamping diodes are present on I/O pads.

8.2.4 SIM Interface

Table 21: SIM card characteristics

SIM card	3 V only
----------	----------

8.2.5 RESET Signal

Table 22: Electrical characteristics

Parameter	Min	Max	Unit
Input Impedance (R)	4.7		k Ω
Input Impedance (C)		10	nF

Fastrack M1306B User Guide
Technical Characteristics

Table 23: Operating conditions

Parameter	Min	Max	Condition
*V _{T-}	1.1 V	1.2 V	
*V _{T+}	1.7 V	1.9 V	
V _{OL}	0	0.4 V	I _{OL} = -50 μA
V _{OH}	2.0 V	2.8 V	I _{OH} = 50 μA

* V_{T-}, V_{T+} :Hysteresis thresholds

8.2.6 RF Characteristics

8.2.6.1 Frequency Ranges

Table 24: Frequency ranges

Characteristic	E-GSM 900	DCS 1800
Frequency TX	880 to 915 MHz	1710 to 1785 MHz
Frequency RX	925 to 960 MHz	1805 to 1880 MHz

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Technical Characteristics

8.2.6.2 RF Performances

RF performances are compliant with the ETSI recommendation GSM 05.05.
The RF performances for receiver and transmitter are given in the table below.

Table 25: Receiver and transmitter RF performances

Receiver	
E-GSM900 Reference Sensitivity	-104 dBm Static & TUHigh
DCS1800 Reference Sensitivity	-102 dBm Static & TUHigh
Selectivity @ 200 kHz	> +9 dBc
Selectivity @ 400 kHz	> +41 dBc
Linear dynamic range	63 dB
Co-channel rejection	>= 9 dBc
Transmitter	
Maximum output power (E-GSM 900) at ambient temperature	33 dBm +/- 2 dB
Maximum output power (DCS1800) at ambient temperature	30 dBm +/- 2 dB
Minimum output power (E-GSM 900) at ambient temperature	5 dBm +/- 5 dB
Minimum output power (DCS1800) at ambient temperature	0 dBm +/- 5 dB

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8.2.6.3 External Antenna

The external antenna is connected to the M1306B via the SMA connector.
The external antenna must fulfill the characteristics listed in the table below.

Table 26: External antenna characteristics

Antenna frequency range	Dual-band GSM 900/DCS 1800 MHz
Impedance	50 Ohms nominal
DC impedance	0 Ohm
Gain (antenna + cable)	0 dBi
VSWR (antenna + cable)	2

Note: Refer to Chapter 10 for recommended antenna.

8.3 Environmental Characteristics

To ensure the proper operation of the Fastrack M1306B, the temperature of the environment must be within a specific range as described in the table below.

Table 27: Ranges of temperature

Operating temperature range	-20 °C to +55 °C
Transportation temperature range	-40 °C to +70°C
Storage temperature range	-25 °C to +70°C

The detailed climatic and mechanics standard environmental constraints applicable to the M1306B are listed in the table below:

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Table 28: Environmental standard constraints

Environmental Tests (IEC TR 60721-4)		Environmental Classes (IEC 60721-3)			
Tests	Standards	Storage (IEC 60721-3-1) Class IE13	Transportation (IEC 60721-3-2) Class IE23	Operation	
				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 ⁻¹	-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 ⁻¹	-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 ⁻² 0,75 mm 3 axes 10 sweep cycles	1-500 Hz 10 m.s ⁻² 3,5 mm 3 axes 10 sweep cycles	1-150 Hz 2 m.s ⁻² 0,75 mm 3 axes 5 sweep cycles	1-500 Hz 10 m.s ⁻² 3,5 mm 3 axes 10 sweep cycles
Vibration (random)	IEC 60068-2-64 : Fh	-	10-100 Hz / 1,0 m ² .s ⁻³ 100-200 Hz / -3 dB.octave ⁻¹ 200-2000 Hz / 0,5 m ² .s ⁻³ 3 axes 30 min	-	-
Shock (half-sine)	IEC 60068-2-27 : Ea	-	-	50 m.s ⁻² 6 ms 3 shocks 6 directions	150 m.s ⁻² 11 ms 3 shocks 6 directions
Bump	IEC 60068-2-29 : Eb	-	250 m.s ⁻² 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

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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".

Warning: The specification in the above table applies to the M1306B product only. Customers are advised to verify that the environmental specification of the SIM Card used is compliant with the M1306B 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 Wireless CPU® in a waterproof enclosure with desiccant bags.

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Lubrication of the SIM card had been tested by Wavecom (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).

8.4 Conformity

The complete product complies with the essential requirements of article 3 of R&TTE 1999/5/EC Directive and satisfied the following standards:

Domain	Applicable standard
Safety standard	EN 60950 (ed.1999)
Efficient use of the radio frequency spectrum	EN 301 419-(v 4.1.1) EN 301 511 (V 7.0.1)
EMC	EN 301 489-1 (edition 2002) EN 301 489-7 (edition 2002)
Global Certification Forum – Certification Criteria	GCF-CC V3.13.0

8.5 Protections

8.5.1 Power Supply

The M1306B is protected by a 800 mA / 250 V fuse directly bonded on the power supply cable.

The model of fuse used is: **FSD 800 mA / 250 V FAST-ACTING.**

8.5.2 Overvoltage

The M1306B is protected against voltage over +32 V.

When input voltages exceed +32 V, the supply voltage is disconnected in order to protect the internal electronic components from an overvoltage.

8.5.3 ESD

The M1306B withstands ESD according to IEC 1000-4-2 requirements for all accessible parts of the M1306B except the RF part:

- 8 kV of air discharge,
- 4 kV of contact discharge.

8.5.4 Miscellaneous

Filtering guarantees:

- EMI/RFI protection in input and output,
- Signal smoothing.

9 Safety recommendations

9.1 General Safety

It is important to follow any special regulations regarding the use of radio equipment due in particular to the possibility of radio frequency (RF) interference. Please follow the safety advice given below 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 Wireless CPU® 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 Wireless CPU® close to other electronic equipment may also cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.

The Wireless CPU® 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.

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Safety recommendations

The Wireless CPU[®] 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.

9.2 Vehicle Safety

Do not use your Wireless CPU[®] 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 Wireless CPU[®] telephone could interfere with the correct functioning of vehicle electronics. To avoid such problems, make sure that the installation has been performed by a 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.

9.3 Care and Maintenance

Your Wireless CPU[®] 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 Wireless CPU[®] to any extreme environment where the temperature or humidity is high.

Do not use or store the Wireless CPU[®] in dusty or dirty areas. Its moving parts (SIM holder for example) can be damaged.

Do not attempt to disassemble the Wireless CPU[®]. There are no user serviceable parts inside.

Do not expose the Wireless CPU[®] to water, rain or spilt beverages. It is not waterproof.

Do not abuse your Wireless CPU[®] by dropping, knocking, or violently shaking it. Rough handling can damage it.

Do not place the Wireless CPU[®] 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 Wavecom 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[®].

9.4 Your Responsibility

This Wireless CPU[®] 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.

10 Recommended Accessories

Accessories recommended by W for the Fastrack M1306B are given in the table below.

Table 29: List of recommended accessories

Designation	Part number	Supplier
Dual-band antenna	1140.26	ALLGON
SMA/FME Antenna adaptor		PROCOM
Power adaptor (Europe)	EGSTDW P2 EF9W3 24W Out:12 V - 2A In: 100 to 240 V – 50/60 Hz – 550 mA Mounted with micro-fit connector	EGSTDW (for power adaptor) MOLEX (for micro-fit connector)*
Fuse	F800L250V	Shanghai Fullness

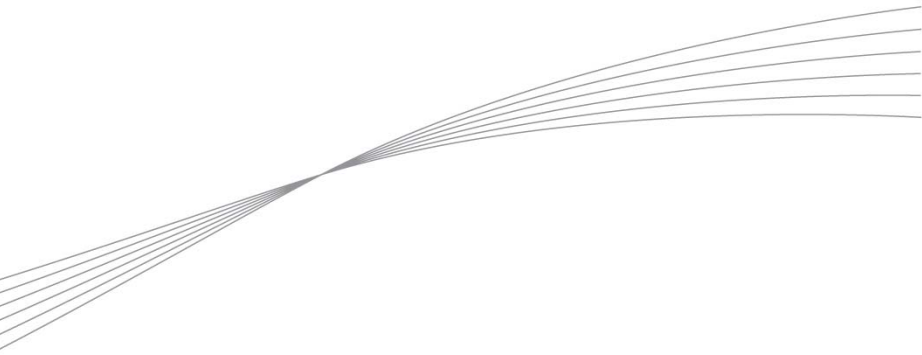
* Information not available for this preliminary version.

11 Online Support

Wavecom provides an extensive range on online support which includes the following areas of Wavecom's wireless expertise:

- the latest version of this document
- new versions of our Operating System user guides
- comprehensive support for Open AT[®]
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