Plug and Play Wireless CPU®

FASTRACK Supreme User Guide

Reference: WA_DEV_Fastrk_UGD_001

Revision: 001a

Date: 23 February, 2007

OPEN AT

Supports Open AT® embedded ANSI C applications

Erreur ! Source du renvoi introuvable.-00

Document History

Revision	Date	List of revisions	
001	9 February, 07	First Issue	
001a	23 February, 2007	Update DC cable GPIO mapping, add AutoShutDown	

Overview

The Fastrack Supreme 10 and Fastrack Supreme 20 are discrete, rugged cellular Plug & Play Wireless CPU® offering state-of-the-art GSM/GPRS (and EGPRS for Supreme 20) connectivity for machine to machine applications.

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

Having comparable size with the previous M1306B generation, and updated with new features, the Fastrack Supreme offers an Internal Expansion Socket (IES) interface accessible for customer use. Expanding application features is easy without voiding the warrantee of the Fastrack Supreme by simply plugging in of an Internal Expansion Socket Module (IESM) board.

Fully certified, the dual-band 900/1800 MHz Fastrack Supreme 10 offers GPRS Class 10 capability and Fastrack Supreme 20 offers GPRS/EGPRS Class 10 capability. Both support 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 Supreme is controlled by firmware through a set of AT commands.

This document describes the Fastrack Supreme and gives information on the following topics:

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

Note:

This document covers the Fastrack Supreme Plug & Play alone and does not include

- The programmable capabilities provided via the use of Open AT® Software Suites.
- The development guide for IESM for expanding the application feature through the IES interface.

For detailed, please refer to the documents shown in the "Reference documents" section.

RoHS Directive

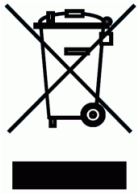
The Fastrack Supreme is now compliant with RoHS Directive 2002/95/EC, which sets limits for the use of certain restricted hazardous substances. This directive states that "from 1st July 2006, new electrical and electronic equipment put on the market does not contain lead, mercury, cadmium, hexavalent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

Plug & Plays which are compliant with this directive are identified by the RoHS logo on their label.

RoHS COMPLIANT 2002/95/EC

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 Supreme Plug & Play.

Trademarks

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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 Supreme Plug & Play Wireless CPU®:	tbc
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 Firmware Upgrade Documents

[9] Firmware upgrade procedure (Ref. WM_SW_GEN_UGD_001)

1.1.4 IESM Related Documents

[10] IESM Development Guideline (Ref. WA_XXX)

[11] IESM User Guide (Ref. WA_XXX)

Note:

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

1.2 Abbreviations

Abbreviation	Definition
AC	**A**lternating **C**urrent
ACM	**A**ccumulated **C**all **M**eter
AT	**AT**tention (prefix for Wireless CPU® commands)
CLK	**CL**oc**K**
CMOS	**C**omplementary **M**etal **O**xide **S**emiconductor
CS	**C**oding **S**cheme
CTS	**C**lear **T**o **S**end
dB	**D**eci**b**el
dBc	**D**eci**b**el relative to the **C**arrier power
dBi	**D**eci**b**el relative to an **I**sotropic radiator
dBm	**D**eci**b**el relative to one **m**illiwatt
DC	**D**irect **C**urrent
DCD	**D**ata **C**arrier **D**etect
DCE	**D**ata **C**ommunication **E**quipment
DCS	**D**igital **C**ellular **S**ystem
DSR	**D**ata **S**et **R**eady
DTE	**D**ata **T**erminal **E**quipment
DTMF	**D**ual **T**one **M**ulti-**F**requency
DTR	**D**ata **T**erminal **R**eady
EEPROM	**E**lectrically **E**rasable **P**rogrammable **R**ead-**O**nly **M**emory
EFR	**E**nhanced **F**ull **R**ate
E-GSM	**E**xtended **GSM**
EMC	**E**lectro**M**agnetic **C**ompatibility
EMI	**E**lectro**M**agnetic **I**nterference
ESD	**E**lectro**S**tatic **D**ischarges
ETSI	**E**uropean **T**elecommunications **S**tandards **I**nstitute
FIT	**Series of connectors (micro-FIT)**
FR	**F**ull **R**ate
FTA	**F**ull **T**ype **A**pproval
GCF	**G**lobal **C**ertification **F**orum
GND	**G**rou**ND**

Abbreviation	Definition
GPIO	**G**eneral **P**urpose **I**nput **O**utput
GPRS	**G**eneral **P**acket **R**adio **S**ervice
GSM	**G**lobal **S**ystem for **M**obile communications
HR	**H**alf **R**ate
I	**I**nput
IEC	**I**nternational **E**lectrotechnical **C**ommission
IES	**I**nternal **E**xpansion **S**ocket
IESM	**I**nternal **E**xpansion **S**ocket **M**odule
IMEI	**I**nternational **M**obile **E**quipment **I**dentification
I/O	**I**nput / **O**utput
LED	**L**ight **E**mitting **D**iode
MAX	**MAX**imum
ME	**M**obile **E**quipment
MIC	**MIC**rophone
Micro-Fit	**Family of connectors from Molex**
MIN	**MIN**imum
MNP	**M**icrocom **N**etworking **P**rotocol
MO	**M**obile **O**riginated
MS	**M**obile **S**tation
MT	**M**obile **T**erminated
NOM	**NOM**inal
O	**O**utput
Pa	**Pa**scal (for speaker sound pressure measurements)
PBCCH	**P**acket **B**roadcast **C**ontrol **CH**annel
PC	**P**ersonal **C**omputer
PCL	**P**ower **C**ontrol **L**evel
PDP	**P**acket **D**ata **P**rotocol
PIN	**P**ersonal **I**dentity **N**umber
PLMN	**P**ublic **L**and **M**obile **N**etwork
PUK	**P**ersonal **U**nblocking **K**ey
RF	**R**adio **F**requency
RFI	**R**adio **F**requency **I**nterference
RI	**R**ing **I**ndicator
RMS	**R**oot **M**ean **S**quare

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** RF connector
SMS	**S**hort **M**essage **S**ervice
SNR	**S**ignal-to-**N**oise **R**atio
SPL	**S**ound **P**ressure **L**evel
SPK	**Sp**ea**K**er
SRAM	**S**tatic **RAM**
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, **High** 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 Supreme consists of (see Figure 1):

- one packaging box (**A**),
- one Fastrack Supreme (**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.

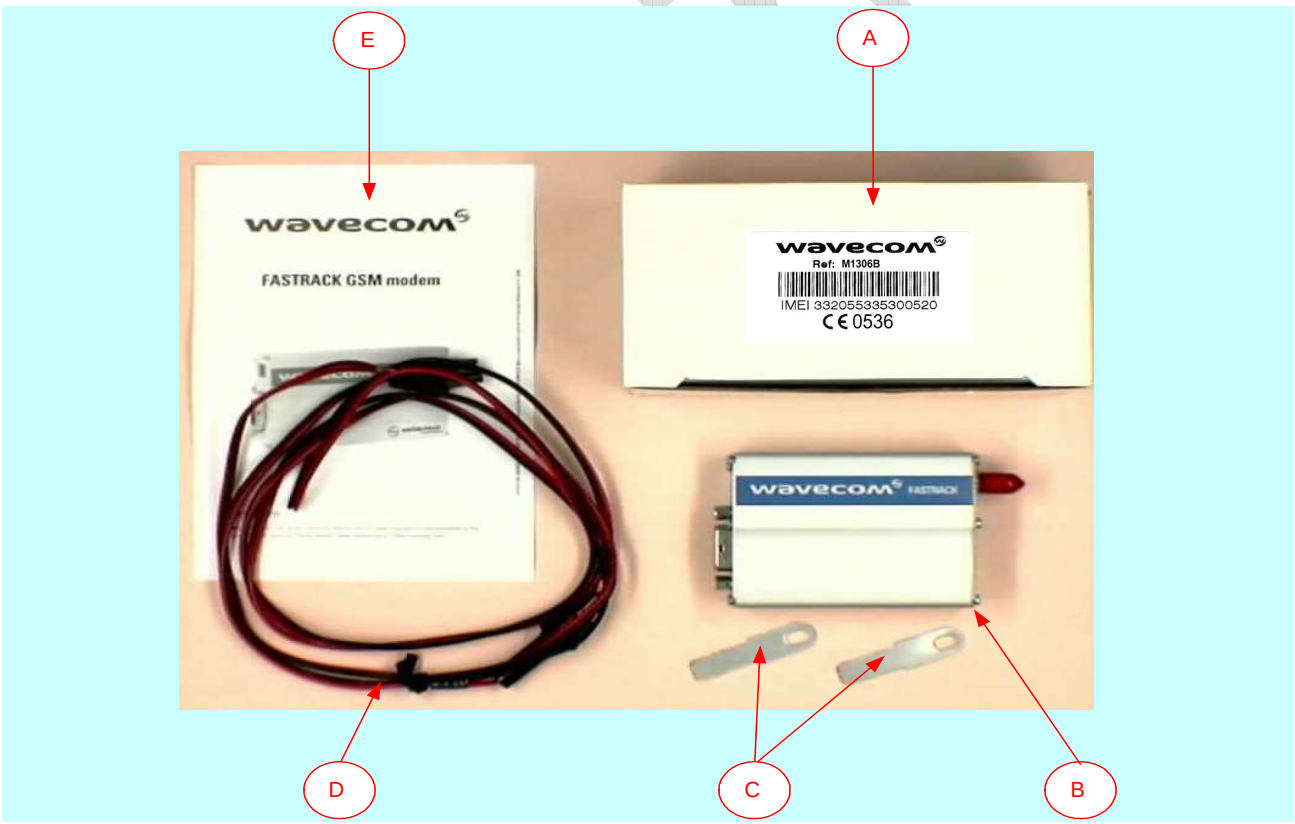

Figure 1: Complete package contents (photo to be updated)

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. (TBC)

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

- WAVECOM logo,
- Product reference (Supreme),
- CE marking (CEXXXX→TBC)
- 15-digit IMEI code
- Open AT® Logo
- RoHS logo
- WEEE logo

Example of label for Fastrack M1306B

Figure 2: Packaging box (photo to be updated)

The packaging label dimensions are:

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

2.3 Production Sticker

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

- product reference (Supreme),
- part number (WMxxxxx),
- CE marking (CEXXXX → TBC),
- 15-digit IMEI code,
- RoHS logo,
- WEEE logo.

Figure 3: Production sticker (photo to be updated)

3 General Presentation

3.1 Description

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

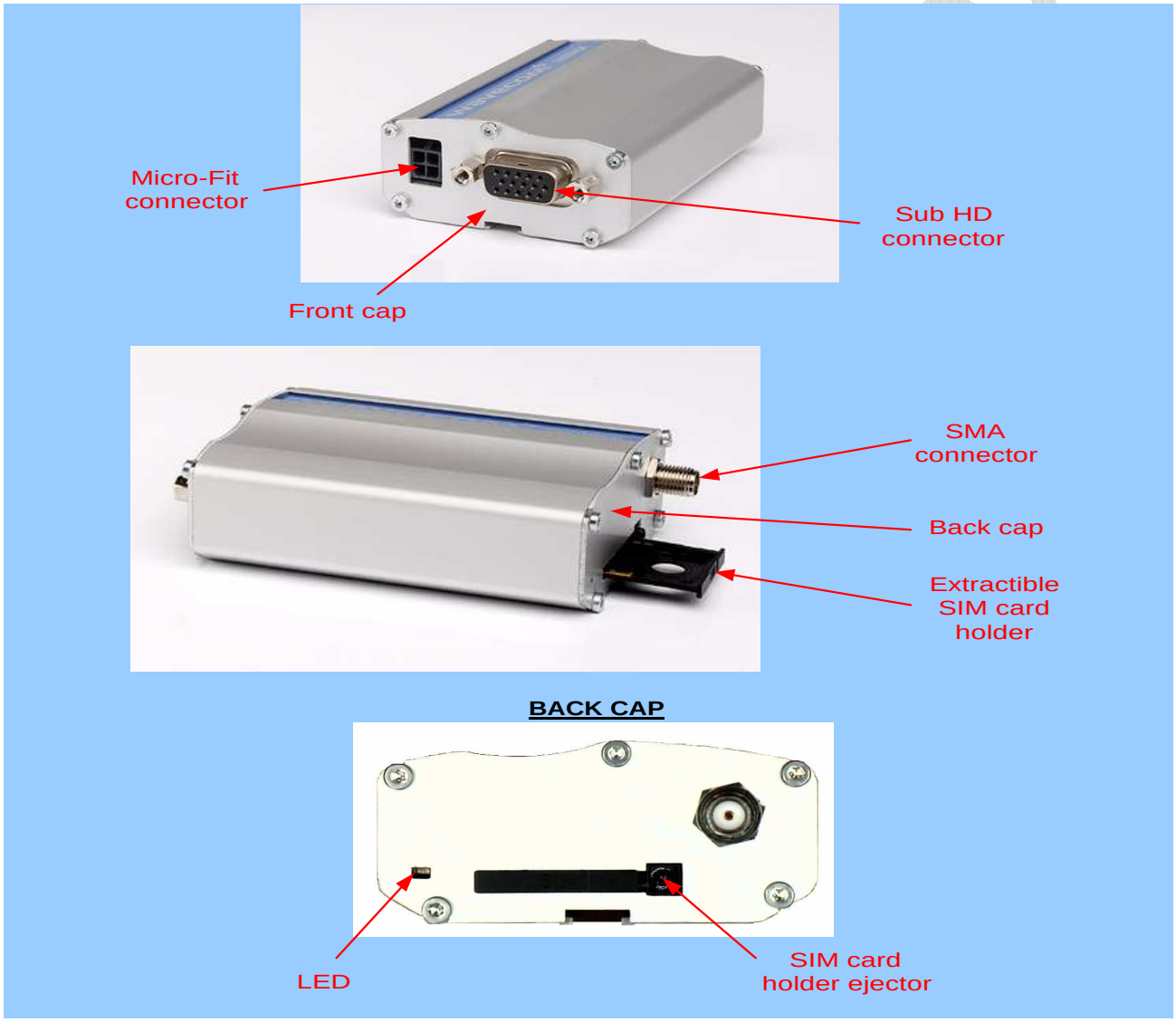

Figure 4: Fastrack Supreme general description (photo to be updated)

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

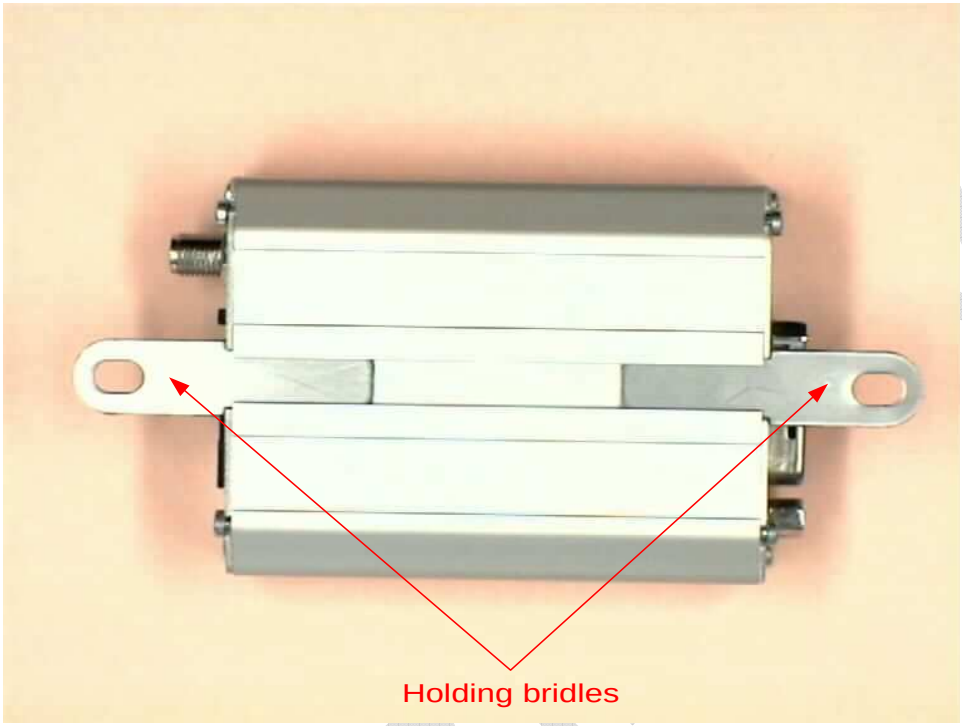

Figure 5: Fastrack Supreme holding bridles

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.

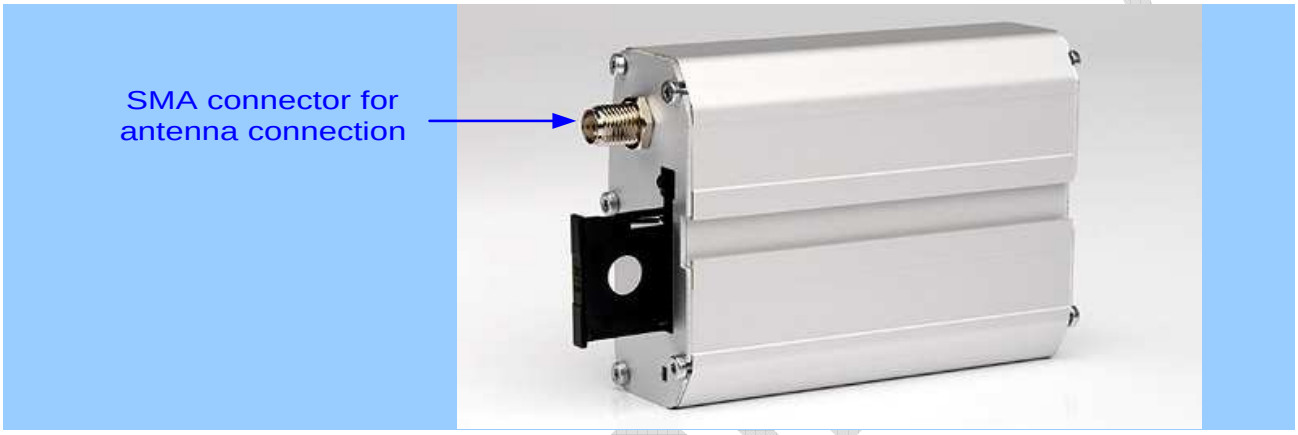

Figure 6: SMA connector for antenna connection (photo to be updated)

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).

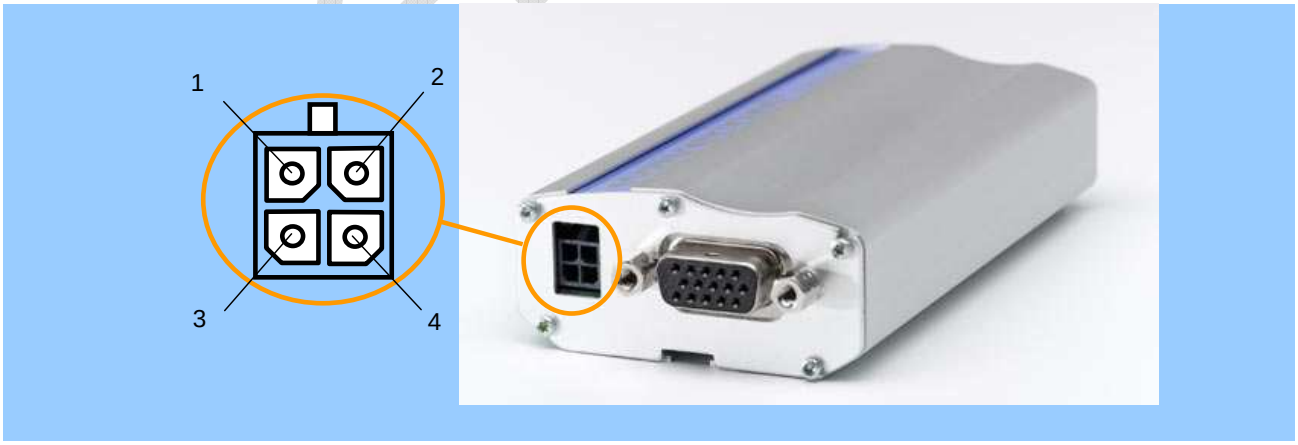

Figure 7: Power supply connector (photo to be update)

Table 1: Power supply connector pin description

Pin #	Signal	I/O	I/O type	Description	Reset State	Comment
1	V+BATTERY	I	Power supply	Battery voltage input: ▪ 5.5 V Min. ▪ 13.2 V Typ. ▪ 32 V Max.		High current
2	GND		Power supply	Ground		
3	GPIO21	I/O	2V8	General Purpose Input/output	Undefined	Not mux
4	GPIO25	I/O	2V8	General Purpose Input/output	Z	Multiplex with INT1

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 Supreme.

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.

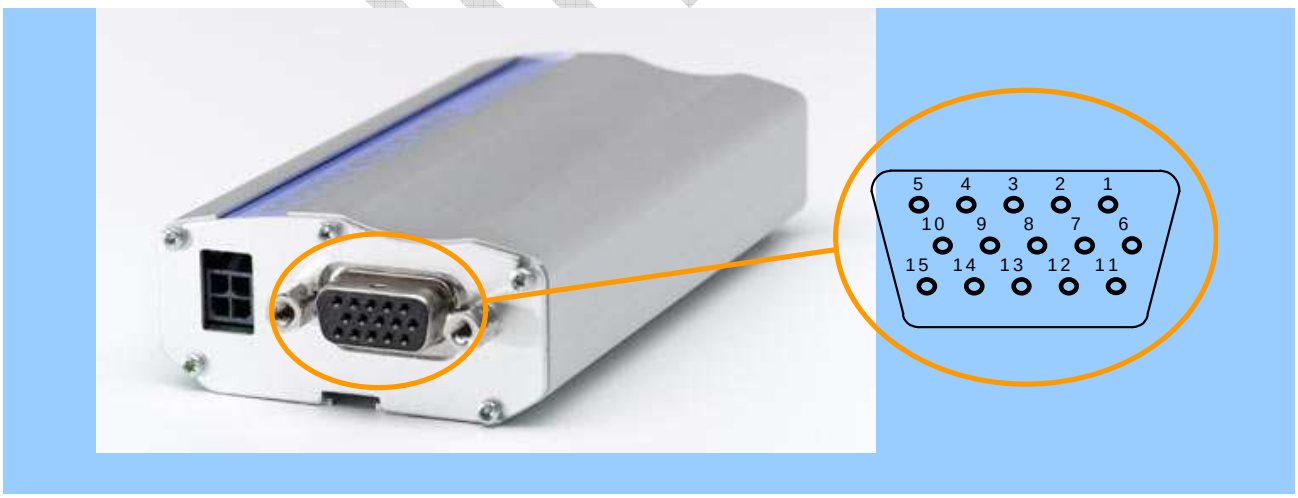

Figure 8: Sub HD 15-pin connector (photo to be updated)

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	Supreme Plug & Play reset	Active low
15	CSPK2N	O	Analog	Speaker negative line	

3.2.2 Power supply cable

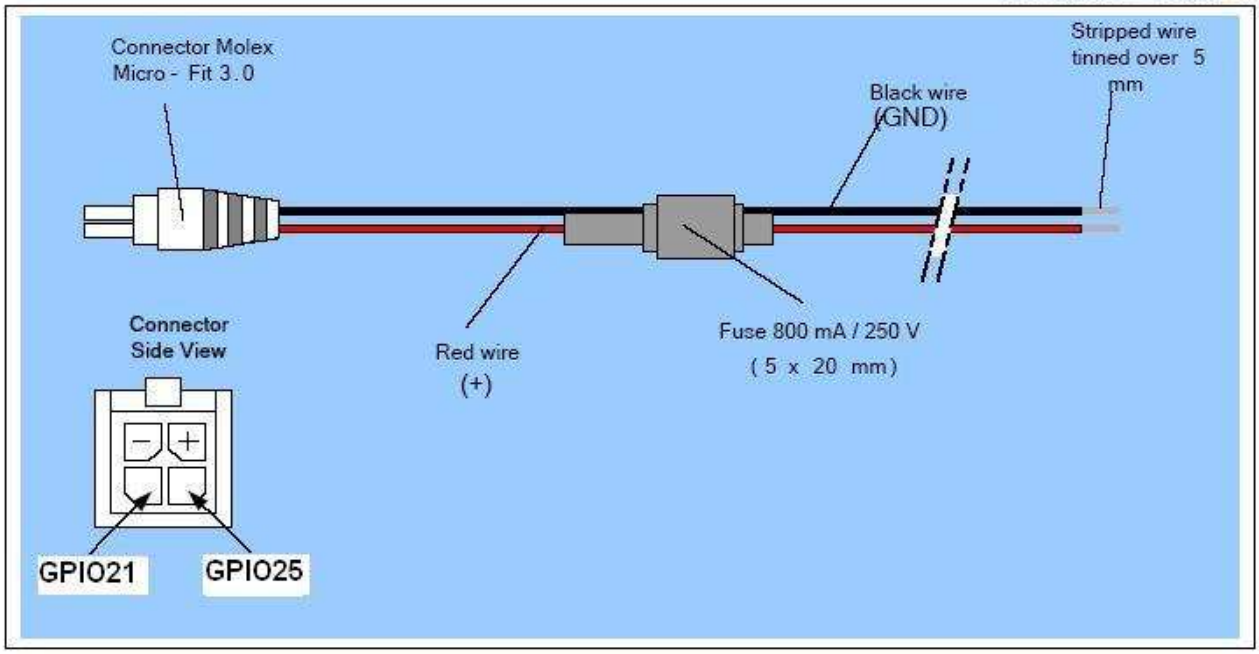

Figure 9: Power supply cable

Component	Characteristics
Micro-Fit connector 4-pin	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 Features and Services

4.1 Basic Features and Services

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

Table 3: Basic features of the Supreme

Features	GSM 900	DCS 1800
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).	
EGPRS **(for Supreme 20 only)**	Class 10. PBCCH support. Coding schemes: MCS1 to MCS9. Compliant with SMG31bis. Embedded TCP/IP stack (optional). → TBC	
Interfaces	RS232 (V.24/V.28) Serial interface supporting: ▪ 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. 1.8 V / 3 V SIM interface. AT command set based on V.25ter and GSM 07.05 & 07.07. Open AT® interface for embedded application.	

Features	GSM 900	DCS 1800
SMS	Text & PDU. Point to point (MT/MO). Cell broadcast.	
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.

4.2 Additional Features

4.2.1 IES Interface

The Supreme Plug & Play offers a 50 pin Internal Expansion Socket (IES) Interface accessible for customer use. It is the additional interface which is easy for customers to expand their application features without voiding the warrantee of the Supreme, by simply plugging in an Internal Expansion Socket Module (IESM) board through the matting connector of the IES interface.

Table 4: IES Interface

Pin #	Pin Description	Pin #	Pin Description
1	GND	26	RTS2
2	GND	27	UART2-EN
3	Reserved	28	GPIO26
4	Reserved	29	GPIO19
5	Reserved	30	GPIO27
6	Reserved	31	GPIO20
7	VPAD-USB	32	INT0/GPIO3
8	USB-DP	33	GPIO23
9	USB-DM	34	GPIO22
10	GSM-1V8	35	DTR1-CT108/2
11	GSM-2V8	36	PCM-SYNC
12	BOOT	37	PCM-IN
13	RESET	38	PCM-CLLK
14	AUX-ADC	39	PCM-OUT
15	SPI1-CS	40	AUX-DAC
16	SPI1-CLK	41	VCC-2V8
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
22	SPI2-I	47	4V
23	RXD2	48	GND
24	TXD2	49	GND
25	CTS2	50	GND

For detail technical information, please refer to document [10] and [11].

Thanks to the flexible IES interface, customers are ready to expand the application features by plugging in the corresponding Internal Expansion Socket Module (IESM) of GPS, I/O expander…, etc. For technical support, please contact your Wavecom distributor or Wavecom FAE.

4.2.2 Serial Port Auto Shut Down

In order to save the current consumption when there is no data communication between the Plug & Play and the DTE, Supreme has now implement the Serial Port Auto Shut Down feature. DTE can activate the Serial Port Auto Shut Down mode by AT-command. And both Plug & Play and the DTE can exit the serial shut down mode.

(detail TBD, and refer to AT-command document WM_XXX…).

(Remark: This feature is not yet ready for PT1 of Supreme Plug & Play)

5 Using the Supreme Plug & Play

5.1 Getting Started

5.1.1 Mount the Supreme

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

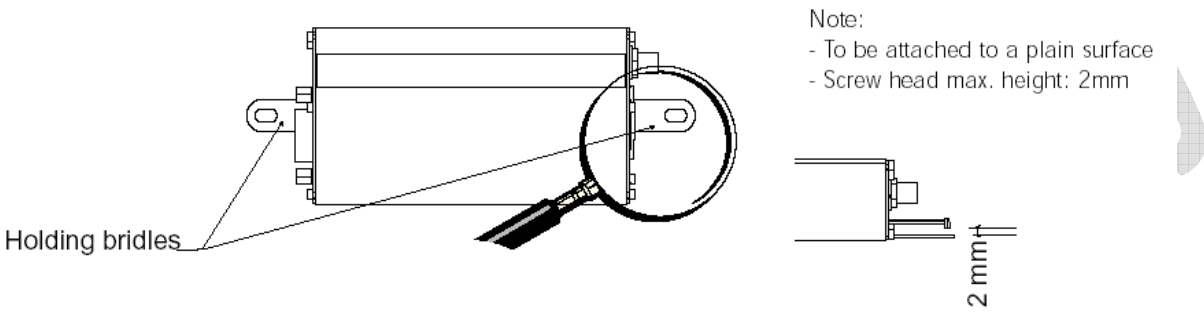

Figure 10: Supreme mounting

For the drill template, refer to Figure 16.

5.1.2 Set up the Supreme

To set up the Supreme, perform the following operations:

- Insert the SIM card into the SIM card holder of the Supreme.
- Lock the SIM card by sliding the lever towards the SIM card.
- Connect the antenna to the SMA connector.
- Connect both sides of the serial and control cable (15-pin Sub HD connector on the Supreme side).
- Connect the power supply cable to the external power supply source.

Note:

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

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

5.1.3 Check the communication with the Supreme

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

- Connect the RS232 link between the DTE (port COM) and the Supreme (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 Supreme must be **OK** displayed in the HyperTerminal window.
- If the communication cannot be established with the Supreme, do the following:
  - Check the RS232 connection between the DTE and the Supreme (DCE),
  - Check the configuration of the port COM used on the DTE.
- Example of AT commands which can be used after getting started the Supreme:
  - **AT+CGMI**: Supreme 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 Supreme Plug & Play 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].

5.1.4 Reset the Supreme

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

The Supreme reset is carried out when this pin is low for at least 200 µs.

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

5.2 Specific Recommendations when Using the Supreme on Trucks

Warning: The power supply connection of the Fastrack Supreme 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.

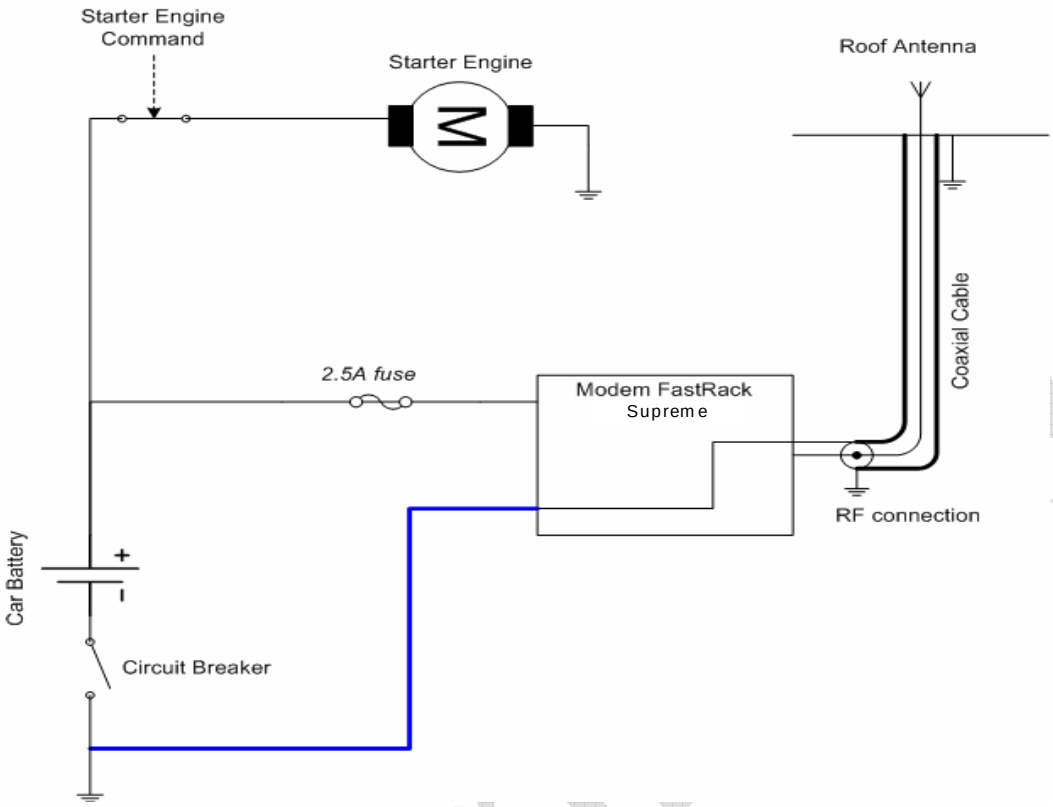

Figure 11: Recommended power supply connection on trucks

Figure 11 gives the recommended power supply connection where the ground connection of the Supreme 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 Supreme 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 Supreme as shown in the figure below).

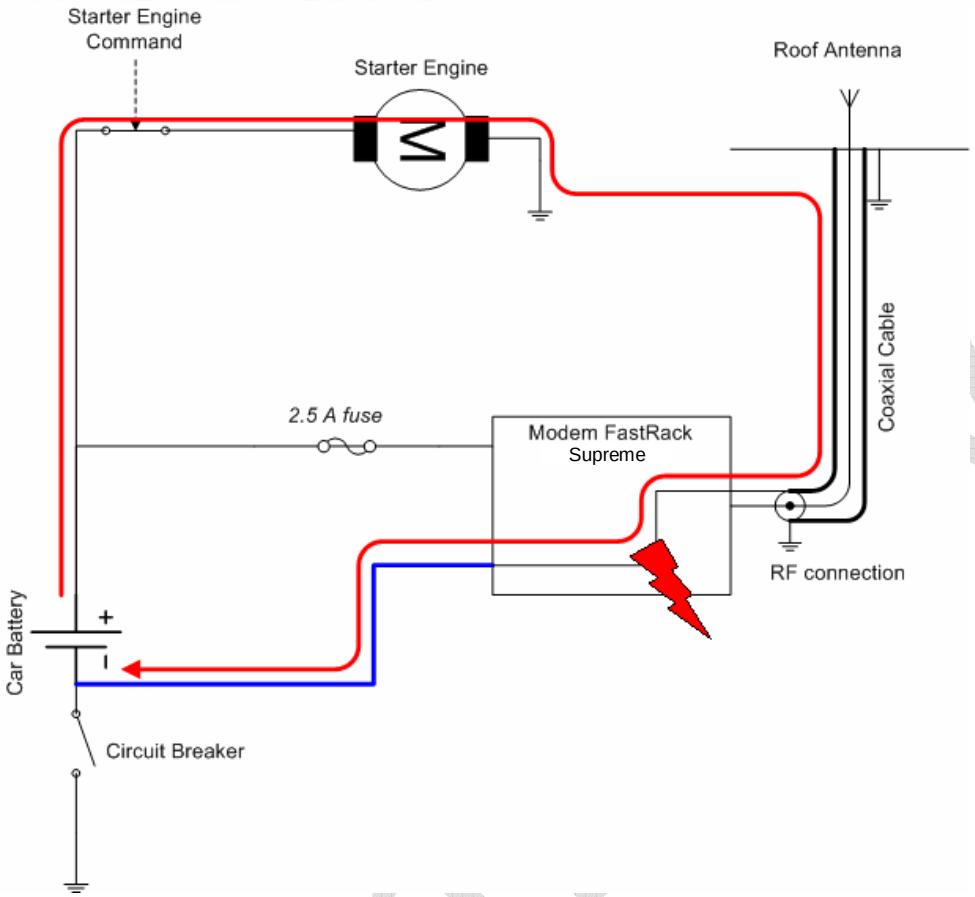

Figure 12: Example of electrical connection which may dramatically damage the Supreme

Figure 12 gives an example of electrical connection which may dramatically damage the Supreme 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 Supreme 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 Supreme.

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 Supreme Operational Status

The Supreme operational status is given by the green LED status located next to the SIM connector on the Supreme panel.

The Table 5 below gives the meaning of the various statuses available.

Table 5: Supreme operational status

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

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

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

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

In a Machine To Machine communication with the Supreme, it is recommended to disable the Supreme 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 Supreme 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: <rssi>,<ber> with:
  - **<rssi>** = received signal strength indication,
  - **<ber>** = channel bit error rate.
- Verify the **<rssi>** value returned using the Table 6 below.

Table 6: Values of received signal strength

Value of received signal strength indication (<rssi>)	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 7: 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 Supreme Network Registration

1. Make sure a valid SIM card has been previously inserted and locked in the Supreme 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 8: 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 Supreme is not registered, perform the following procedure:

- Check the connection between the Supreme 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].

5.8 Main AT Commands for the Plug & Play

The table below lists the main AT commands required for starting the Plug & Play.

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

Table 9: Main usual AT commands for the Plug & Play

Description	AT commands	Supreme Plug & Play 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	Supreme Plug & Play registered on the network.

Description	AT commands	Supreme Plug & Play response	Comment
		+CREG: 0,2	Supreme Plug & Play not registered on the network, registration attempt.
		+CREG: 0,0	Supreme Plug & Play 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	
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 Supreme.

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 Supreme 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 Supreme through the Serial Link

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

Table 10: Solutions for no connection with Supreme through serial link

If the M1306B returns	then ask	Action
Nothing	Is the Supreme powered correctly?	Make sure the external power supply is connected to the Supreme 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 Supreme. Supreme 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 Supreme 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 Supreme 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 Supreme returns a **"NO CARRIER"** message upon an attempted call (voice or data), then refer to the table below for possible causes and solutions.

Table 11: 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 Supreme 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 Supreme 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**.

Table 12: 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

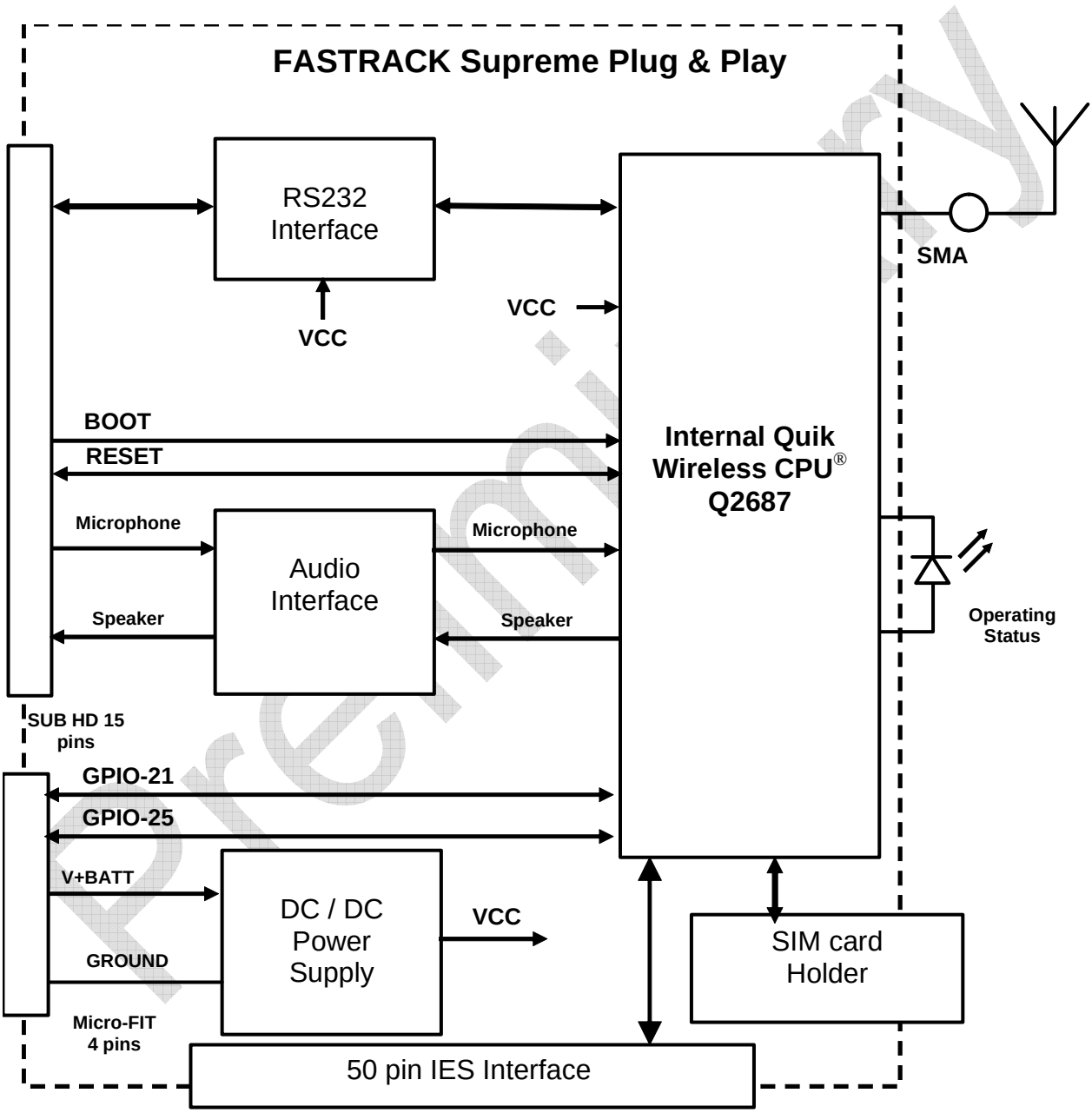

Figure 13: Functional architecture

7.2 Power Supply

7.2.1 General Presentation

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

The Supreme 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 ⇔ V24/V28) between the internal Supreme Plug & Play (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),
- Data Terminal Ready (CT108-2/DTR),
- Data Set Ready (CT107/DSR),
- Data Carrier Detect (CT109/DCD),

- Ring Indicator (CT125/RI).

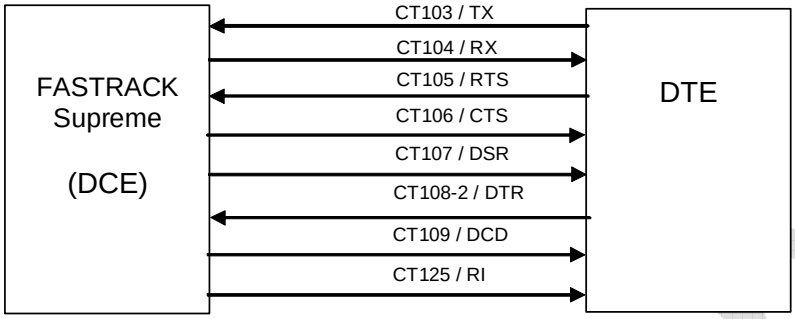

Figure 14: RS232 Serial Link signals

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 Supreme 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.

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 Supreme provides two General Purpose Input / Output lines available for external use: GPIO21 and GPIO25.

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+WIOM** 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 Voltage	Reset state	Description	Mulitplex with
GPIO21	3	I/O	2V8	Undefined	General Purpose I/O	No mux
GPIO25	4	I/O	2V8	Z	General Purpose I/O	INT1

Notes:

- The power supply cable may need to be modified due to the GPIO signals (GPIO21 & GPIO25) available on the 4-pin Micro-FIT connector of the Supreme.
- The previous generation M1306B have GPIO4 and GPIO5 being replaced by GPIO21 and GPIO25 respectively, for which both are of LOW level at reset state.

7.5 BOOT

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

Caution: Previous generation M1306B has BOOT signal of HIGH level at 2.8V. But the Supreme now of 1.8V BOOT instead.

7.6 RESET

7.6.1 General presentation

This signal is used to force a reset procedure by providing low level during at least 200 µs.

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

Pin description

Signal	Sub HD 15-Pin connector Pin number	I/O	I/O type	Voltage	Description
RESET	14	I/O	Open Drain	1V8	Supreme Reset

Caution: Previous generation M1306B has RESET signal of HIGH level at 2.8V. But the Supreme now of 1.8V RESET instead.

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 Supreme 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.

7.6.2 Reset Sequence

To activate the "emergency" reset sequence, the RESET signal has to be set to low for 200 µs minimum.

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

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 Supreme.

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

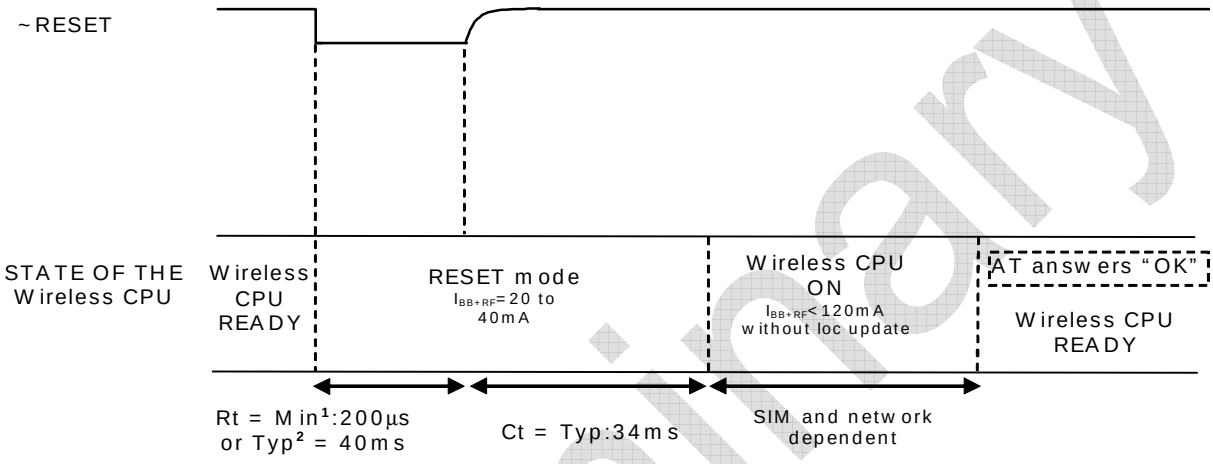

Figure 15: Reset sequence diagram

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.

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

The microphone impedance must be around 2 kΩ.

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 13: 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 (Supreme only) < 120 grams (Supreme + bridles + power supply cable)
Volume	101.5 cm^3
Housing	Aluminum profiled

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

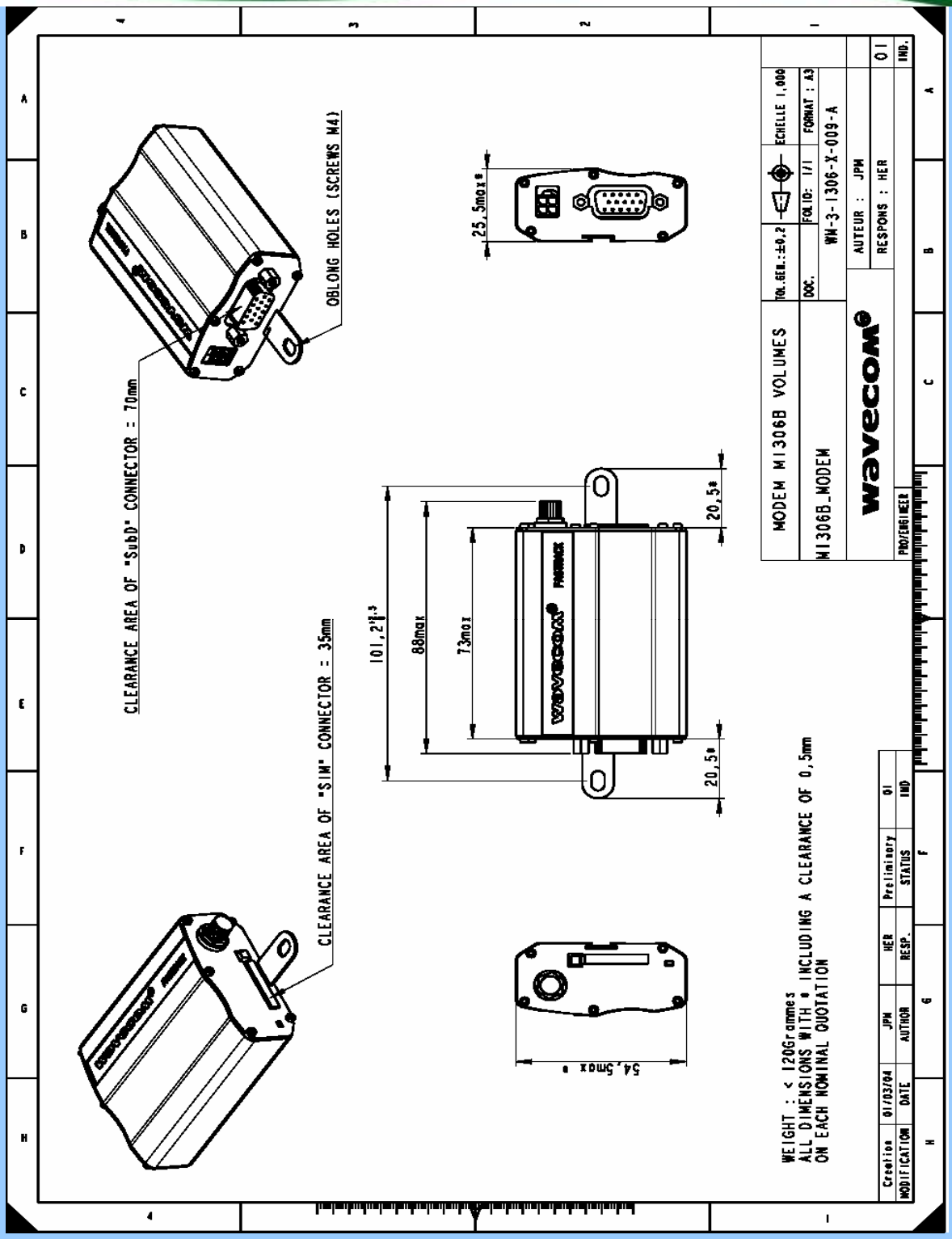

Figure 16: Dimensioning diagram (to be updated_

8.2 Electrical Characteristics

8.2.1 Power Supply

Table 14: Electrical characteristics

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

Note:

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

Warning:

All the input voltages specification described in this chapter are at the Supreme input. While powering the Supreme, 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 15: 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 Supreme guarantees its own protection.
Is over 32 V (continuous overvoltage)	the protection of the Supreme 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 Supreme, assuming an operating temperature of +25 ℃ and using a 3 V SIM card.

Table 16: Power consumption (1*)

Power Consumption in E-GSM 900/DCS 1800 MHz - GPRS class 10				E-GSM 900	DCS 1800
GSM	I_{peak}	**GSM900**: During **TX** bursts @ **PCL5** **DCS1800** : During **TX** bursts @ **PCL0**	@ 5.5V	TBC	TBC
			@ 13.2V	TBC	TBC
			@ 32V	TBC	TBC
	I_{avg}	**GSM900 : Average @ PCL5** **DCS1800 : Average @ PCL0**	@ 5.5V	TBC	TBC
			@ 13.2V	TBC	TBC
			@ 32V	TBC	TBC
GPRS Class 2	I_{peak}	**GSM900**: During **1TX** bursts @ **PCL5** **DCS1800** : During **1TX** bursts @ **PCL0**	@ 5.5V	TBC	TBC
			@ 13.2V	TBC	TBC
			@ 32V	TBC	TBC
	I_{avg}	GSM900 : **Average 1TX/1RX @PCL5** DCS1800 : **Average 1TX/1RX @PCL0**	@ 5.5V	TBC	TBC
			@ 13.2V	TBC	TBC
			@ 32V	TBC	TBC
GPRS Class 10	I_{peak}	**GSM900**: During 2**TX** bursts @ **PCL5 (Gamma 3)** **DCS1800** : During 2**TX** bursts @ **PCL0 (Gamma 2)**	@ 5.5V	TBC	TBC
			@ 13.2V	TBC	TBC
			@ 32V	TBC	TBC
	I_{avg}	GSM900 : **Average 2TX/3RX @ PCL5 (Gamma 3)** DCS1800 : **Average 2TX/3RX @ PCL0 (Gamma 2)**	@ 5.5V	TBC	TBC
			@ 13.2V	TBC	TBC
			@ 32V	TBC	TBC
EGPRS Class 2	I_{peak}	**GSM900**: During **1TX** bursts @ **PCL8 (Gamma 6)** **DCS1800** : During **1TX** bursts @ **PCL2 (Gamma 5)**	@ 5.5V	TBC	TBC
			@ 13.2V	TBC	TBC
			@ 32V	TBC	TBC
	I_{avg}	GSM900 : **Average 1TX/1RX @ PCL8 (Gamma 6)** DCS1800 : **Average 1TX/1RX @ PCL2 (Gamma 5)**	@ 5.5V	TBC	TBC
			@ 13.2V	TBC	TBC
			@ 32V	TBC	TBC
EGPRS Class 10	I_{peak}	**GSM900**: During **2TX** bursts @ **PCL8 (Gamma 6)** **DCS1800** : During 2**TX** bursts @ **PCL2 (Gamma 5)**	@ 5.5V	TBC	TBC
			@ 13.2V	TBC	TBC
			@ 32V	TBC	TBC
	I_{avg}	GSM900 : **Average 2TX/3RX @ PCL8 (Gamma 6)** DCS1800 : **Average 2TX/3RX @ PCL2 (Gamma 5)**	@ 5.5V	TBC	TBC
			@ 13.2V	TBC	TBC
			@ 32V	TBC	TBC
I_{avg} in Idle mode with active RS232 link			@ 5.5V	TBC	TBC

Power Consumption in E-GSM 900/DCS 1800 MHz - GPRS class 10			E-GSM 900	DCS 1800
		@ 13.2V	TBC	TBC
		@ 32V	TBC	TBC
I_{avg} in **Idle mode with under serial port auto shutdown (3*)**	~~disconnection by software~~	@ 5.5V	TBC	TBC
		@ 13.2V	TBC	TBC
		@ 32V	TBC	TBC
	~~physical disconnection~~	~~@ 5.5V~~	TBC	TBC
		~~@ 13.2V~~	TBC	TBC
		~~@ 32V~~	TBC	TBC

(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 Supreme 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 when the DTE send AT command to shut down the serial link by software approach (DTE turns DTR in inactive state). (PT1 sample does not support this feature yet, but will be implemented in next run)

8.2.2 Audio Interface

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

Table 17: Audio parameters caracteristics

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 18: 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 19: 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

Table 20: 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 µPa)
Frequency response	compatible with the GSM specifications

8.2.3 General Purpose Input/Output

Both GPIO21 and GPIO25 may be interfaced with a component that comply with 3 Volts CMOS levels.

Table 21: Operating conditions

Parameter	I/O type	Min	Typ	Max	Condition
V_{IL}	CMOS			0.84 V	
V_{IH}	CMOS	1.96 V			
V_{OL}	CMOS			0.4 V	I_{OL} = -4 mA
V_{OH}	CMOS	2.4 V			I_{OH} = 4 mA
I_{OH}				4mA	
I_{OL}				-4mA	

Clamping diodes are present on I/O pads.

8.2.4 SIM Interface

Table 22: SIM card characteristics

SIM card	1.8V / 3 V

8.2.5 RESET Signal

Table 23: Electrical characteristics

Parameter	Min	Typ	Max	Unit
Input Impedance (R)*		330K		kΩ
Input Impedance (C)		10n		nF

*Internal pull-up

Table 24: Operating conditions

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

* V_H: Hysterisis Voltage

1 This reset time is the minimum to be carried out on the ~RESET signal when the power supply is already 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.

8.2.6 RF Characteristics

8.2.6.1 Frequency Ranges

Table 25: Frequency ranges

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

Warning:
Supreme is not certified for American market for operation band of GSM850 and PCS1900. Customers target to sell Supreme in American region shall be wholly responsible for any certifications and carrier approval required.

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 26: 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

8.2.6.3 External Antenna

The external antenna is connected to the Supreme via the SMA connector.

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

Table 27: **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

The Fastrack Supreme Plug & Play is compliant with the following operating class. To ensure the proper operation of the Supreme, the temperature of the environment must be within a specific range as described in the table below.

Table 28: Ranges of temperature

Conditions	Temperature range
Operating / Class A	-20 °C to +55°C
Operating / Storage / Class B	-40 °C to +85°C

Function Status Classification:

Class A:

The Supreme remains fully functional, meeting GSM performance criteria in accordance with ETSI requirements, across the specified temperature range.

Class B:

The Supreme remains fully functional, across the specified temperature range. Some GSM parameters may occasionally deviate from the ETSI specified requirements and this deviation does not affect the ability of the Supreme to connect to the cellular network and function fully, as it does within the Class A range.

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

Table 29: 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

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 Supreme product only. Customers are advised to verify that the environmental specification of the SIM Card used is compliant with the Supreme 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 Supreme Plug & Play in a waterproof enclosure with desiccant bags.

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 Supreme 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 Supreme 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 Supreme withstands ESD according to IEC 1000-4-2 requirements for all accessible parts of the Supreme 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 Supreme Plug & Play 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 Supreme Plug & Play close to other electronic equipment may also cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.

The Supreme Plug & Play 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 Supreme Plug & Play 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 Supreme Plug & Play 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 Supreme Plug & Play 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 Supreme Plug & Play 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 Supreme Plug & Play to any extreme environment where the temperature or humidity is high.

Do not use or store the Supreme Plug & Play 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 Supreme Plug & Play to water, rain or spilt beverages. It is not waterproof.

Do not abuse your Supreme Plug & Play by dropping, knocking, or violently shaking it. Rough handling can damage it.

Do not place the Supreme Plug & Play 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 Supreme Plug & Play 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 Wavecom for the Fastrack Supreme are given in the table below.

Table 30: 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®
- regulatory certifications
- carrier certifications
- application notes

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