
Modem G2 Specifications



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Document history

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AUTONUMLGLIntroduction

1.1.Objective of the document

This document specifies the second generation of Wavecom's GSM modem. The Modem product is referenced as: WMO2-GXXXX according to standards (WMO2-G900: GSM ; WMO2-G1800: DCS ; WMO2-G1900: PCS). All these modem products are based on WISMO concept. That means that each modem includes a WISMO1B-Gxxxx module .

This document describes both the basic Modem offer, and its accessories.

1.2.Related documents

ETS 300 019	Environmental conditions and environmental tests for telecommunications equipment
WAVE 1.1	Wavecom Internal Qualification Plan Version 1.1
SAE J1113	Transients Voltage Suppression in Automotive Vehicle

2.Basic offer and accessories

2.1. Basic offer

2.1.1. Containts

The Basic offer includes the following elements:

- Modem
- Mechanical fixing (holding bridle)
- Power supply cable + fuse
- User manual

2.1.2. Packaging

A single packaging made of a slight fluted cardboard box covered by a thin film of white glazed paper is offered. Its external dimensions are closed to the following :

70mm (width) x 60mm (height) x135mm (length).

2.1.3. User's manual

The user's manual contains 22 pages. Its size is closed to the following :

105mm (width) x 148,5 mm (height) (1/2 A5).

2.2. Accessories

2.2.1. Cables

A serial link and audio cable (Y cord) for low power audio solution (for example : head set, phone receiver, ...) is proposed.

2.2.2. Headset

The headset allows an audio hand free function. It integrates a weak power speaker phone and a microphone. The length of its cable has to be higher than 1 meter (1.1 yards)

2.2.3. Antenna

A standard deported cellular phone antenna is proposed.

Please note the WM02-G1900 is a GSM (PCS-1900) terminal, similar to a handset, except

that it is intended only for fixed and mobile applications; portable uses are strictly prohibited. The following operating conditions and restrictions are specified for this device, as stated in the manual:

- * The WM02-G1900 is designed and intended for fixed and mobile applications only.
- * A minimum of 20 cm (8 inches) separation between the antenna and body of the user and nearby persons is required.
- * Portable uses are prohibited.
- * Antenna gain is limited to 3 dBi for mobile applications.
- * Antenna gain is limited to 7 dBi for fixed applications. (*refer to chapter 7. RF exposure instructions*)

The following antenna reference includes the forementioned specifications for mobile specifications :

- ANTENNA ref : N148/9806 (provided by Allgon)

2.2.4. Power supply

An AC(220V~)/DC(12V/2A) converter allows a power network connection

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3. Product management

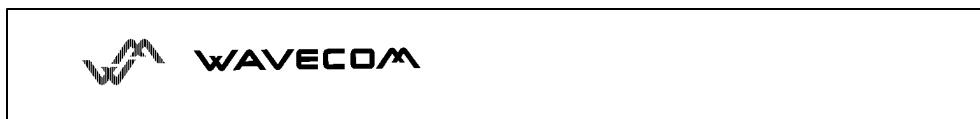
3.1. Wavecom reference

WMO2-GXXXX (WMO2-G900, WMO2-G1800 , WMO2-G1900).

3.2. Markings by labels

3.2.1. Product label

This label is made of anodise aluminium. The label has been processed with a blue silk screen (marking : aluminium colour) and is placed on the upper convex mechanical part. It supports the WAVECOM logo. Dimension: 96 x10 mm.



3.2.2. Production sticker

This label is placed on the back of the product and contains CE marking (in order to improve the productivity on assembly line, this marking will be printed matter or silk screened in the laser). Dimension : 60 x 9.5 mm.



3.2.3. CE and IMEI sticker

This label is placed on the back of the product and shows the following information : REF PROD (WMO-GXXX), REF WISMO WM1B-GXXX, the full PN (WMXXXXXX) and IMEI barred code number . This includes the product serial number. Dimensions : 60 x 9.5 mm.



4. Context specifications

4.1. Normative specifications

Product is fully compliant with the ETSI Phase II specification.

4.2. Environment specifications

4.2.1. Climatic and mechanics environment

The following figures show the standard environment constraints:

WM02_Gxxx		ENVIRONMENTAL CLASSES				
TYPE OF TEST	STANDARDS	STORAGE Class 1.2	TRANSPORTATION Class 2.3	OPERATING (PORT USE) Class 7.3		
Cold	IEC 68-21 Ab test	-25°C 72h	40°C 72h	-20°C 16h		
Dy heat	IEC 68-22 Bb test	+70°C 72h	+70°C 72h	+55°C 16h		
Change of temperature	IEC 68-214 NaNb test		-40°/+30°C 5 cycles t1=3h	-20°/+30°C 3 cycles t1=3h		
Dampheat cyclic	IEC 68-230 Db test	+30°C 90%-100% RH variant 1 2 cycles	+40°C 90%-100% RH variant 1 2 cycles	+40°C 90%-100% RH variant 1 2 cycles		
Dampheat	IEC 68-256 Cb test	+30°C 4 days	+40°C 4 days	+40°C 4 days		
Sinusoidal vibration	IEC 68-26 Fc test	5-62Hz : 5mm/s 62-200Hz: 2m/s ² 3x5sweep cycles				
Randomvibration wideband	IEC 68-336 Fb test		5-20Hz : 0.96m ² /s ³ 20-500Hz: -3dB/oct 3x10min	10-12Hz : 0.96m ² /s ³ 12-150Hz: -3dB/oct 3x30min		

4.2.1.1. Electric environment

The following figures sum up the electrical constraints in an automotive environment:

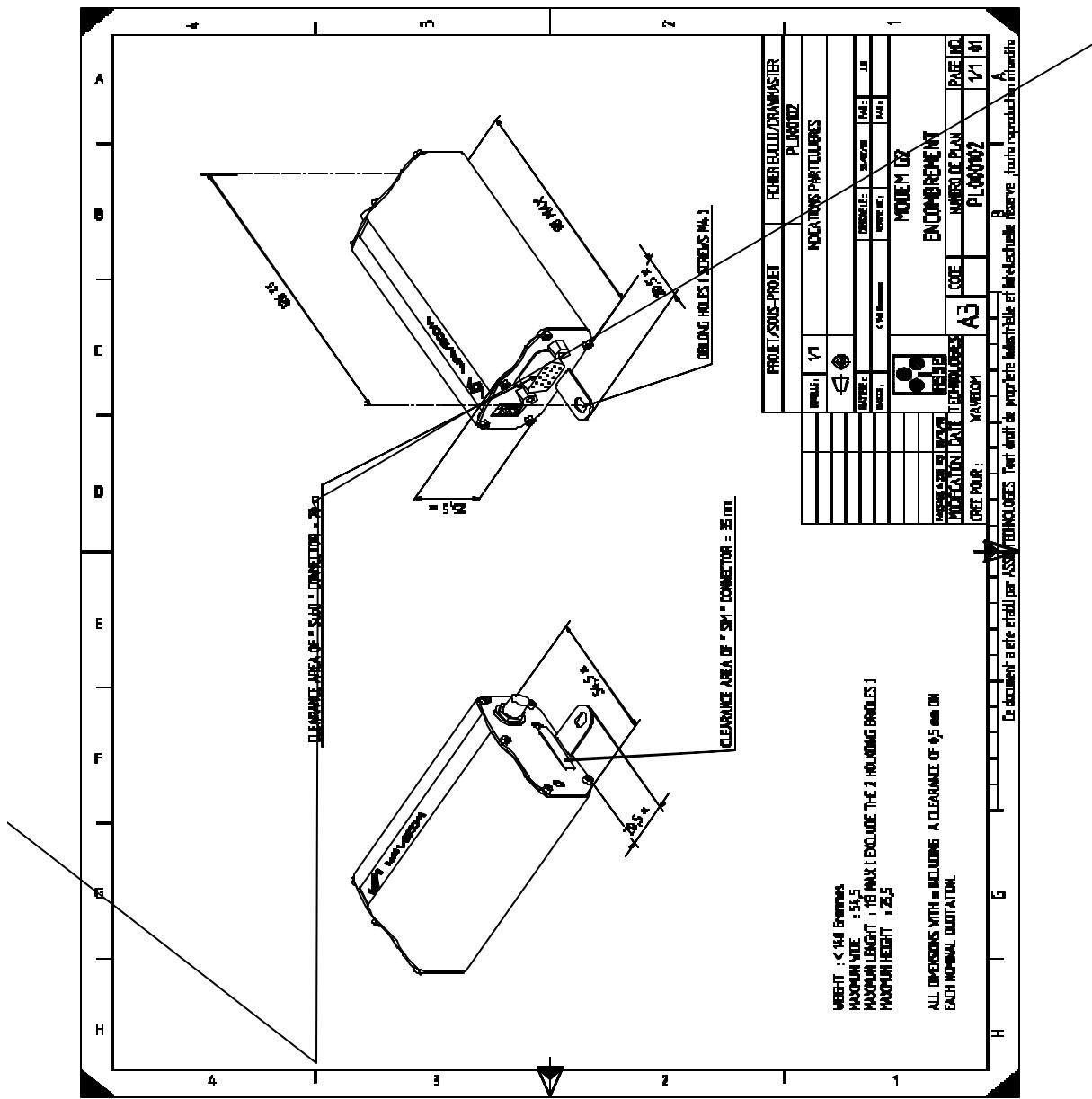
Length of transient	Cause	Energy capability Voltage Amplitude	Possible frequency of application
Steady state	Failed Voltage Regulator	oo + 18 V	Infrequent
3 - 5 minutes	Jump start with 24 V battery	oo +/- 24 V	Infrequent
200ms to 400ms	Load dump - i.e., disconnection of battery while at high charging rates	$\geq 10 \text{ J}$ $\leq 125 \text{ V}$	Infrequent
< 0.32 s	Inductive Load Switching Transient	<1 J -300V to +80V	Often
< 0.20 s	Alternator Field Decay	<1 J -100V to -40V	Each Turn-Off
90ms	Ignition Pulse, Battery Disconnected	<0.5 J $\leq 75 \text{ V}$	<500Hz Several Times in vehicle Life
1ms	Mutual Coupling in Harness (Note)	<1 J $< 200 \text{ V}$	Often
15 μ s	Ignition Pulse, Normal	<0.001 J $< 3 \text{ V}$	<500Hz Continuous
	Accessory Noise	<1.5V	50 Hz to 10 KHz
	Transceiver Feedback	20mV	R.F.

Note : These transients may be present on any wire in the vehicle.

4.3. Physical characteristics

The physical characteristics are the following ones:

Physical characteristic	Qualification	Comments
Dimension Absolute maximum dimension	98x54x25 mm 110x54x25 mm	Without the connectors quotations .
Weight	< 140 g	
Volume	13.23 cm ³	
Case		Aluminium profile



4.4. Basic services

The functions of this modem are the following ones:

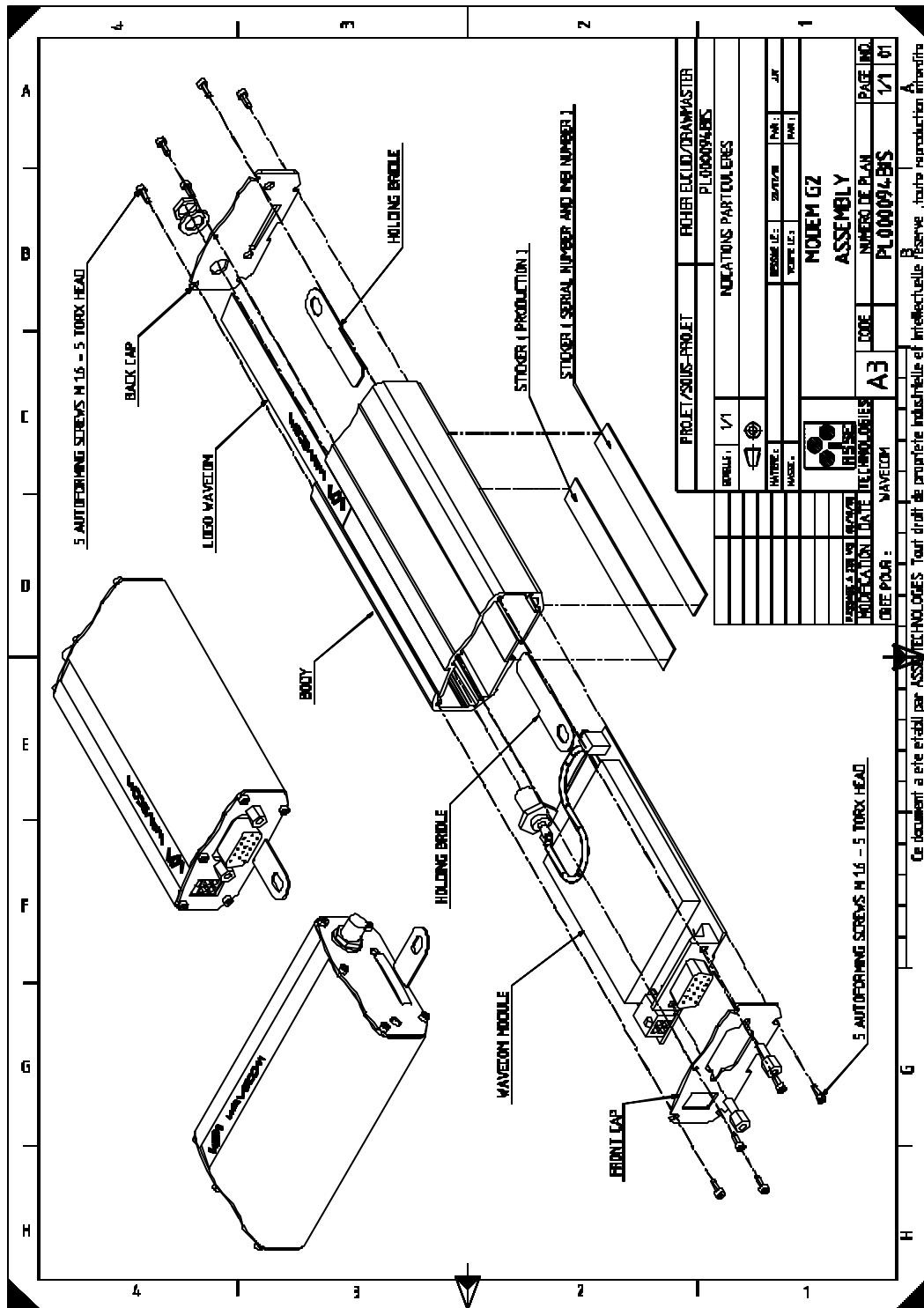
	GSM	DCS/PCS
Standard	900 MHz. Class 4 (2W). GSM phase 2.	1800 MHz or 1900 MHz Class 5 (1W) GSM phase 2.
Interface	Serial interface RS232 V.24/V.28 AT command set based on V.25ter and GSM 07.05 & 07.07. Auto-bauding function between 2400 bits/s and 19200 bits/s	Serial interface RS232 V.24/V.28 AT command set based on V.25ter and GSM 07.05 & 07.07. Auto-bauding function between 2400 bits/s and 19200 bits/s
SMS	No auto-framing available Mobile Originated (MO) and Mobile Terminated (MT). Mode Text & PDU point to point. Cell broad cast.	No auto-framing available Mobile Originated (MO) and Mobile Terminated (MT). Mode Text & PDU point to point. Cell broad cast.
Data	In accordance with GSM 07.05 Asynchronous 2400, 4800, 9600 bits/s. Transparent and Non Transparent mode In Non Transparent Mode: 300, 1200, 1200/75 bauds.	In accordance with GSM 07.05 Asynchronous 2400, 4800, 9600 bits/s. Transparent and Non Transparent mode In Non Transparent Mode: 300, 1200, 1200/75 bauds.
Fax	Mode 3.1 KHz (PSTN) and V110 (ISDN) 2400/4800/7200/9600 bits/s, GSM teleservice 62 in Transparent Mode. Class 1.	Mode 3.1 KHz (PSTN) and V110 (ISDN) 2400/4800/7200/9600 bits/s, GSM teleservice 62 in Transparent Mode. Class 1.
Audio	Group 3 compatible. FR et EFR operation 1 : Head Set	Group 3 compatible. FR et EFR operation 1 : Head Set

5. General description

5.1. Presentation

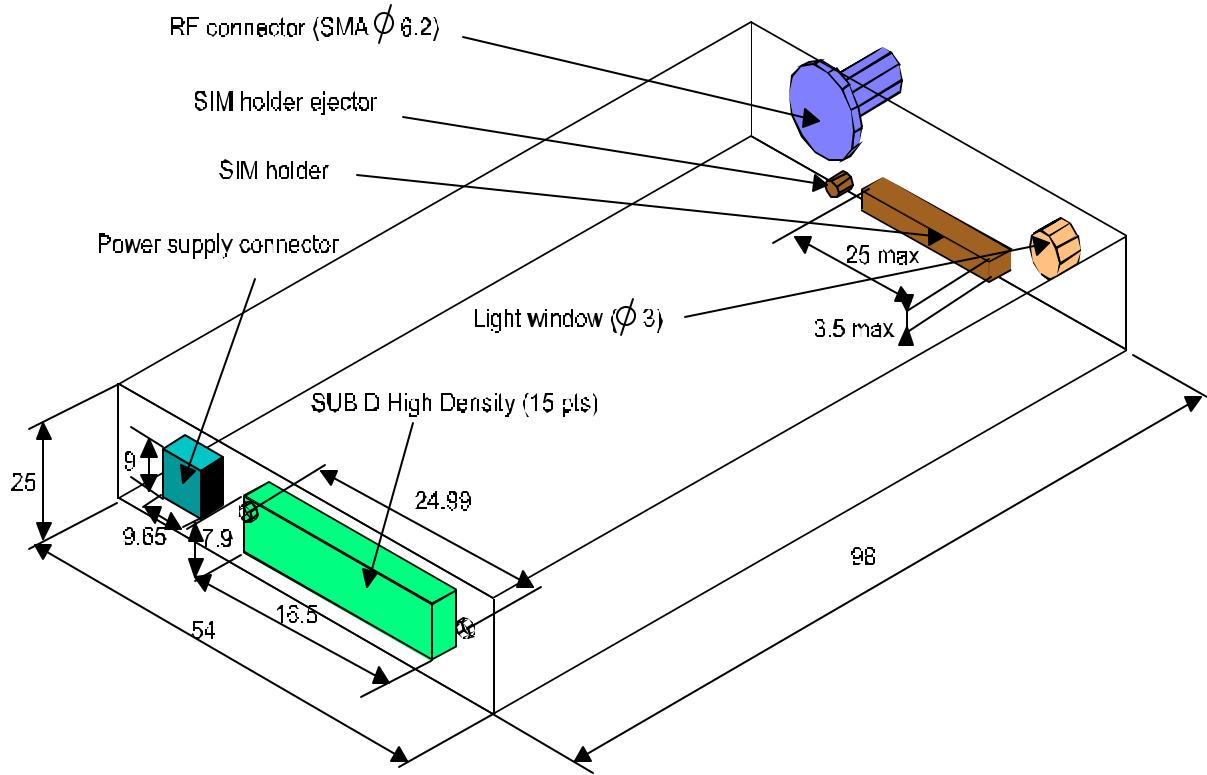
Modem mechanical case is made of an aluminium profile ended by two stoppers at these extremities. All input/output links are established by three connectors placed on the two extremities of the profile. No cord is fixed to the case. The SIM card (micro-SIM) is put on an extract drawer. A red indicator specifies the functioning mode of the product.

5.2. Mechanical philosophy retained



5.3. Connectors definition

5.3.1. Connector location

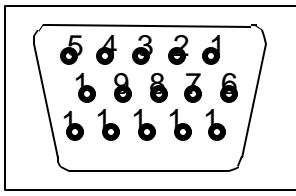
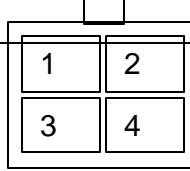
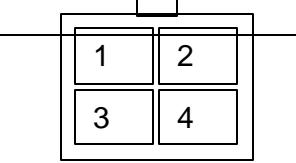
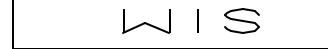


5.3.2. Connectors description

We apply the following constraints in the connector choice:

- size
- mechanical
- electrical performances
- Industrialisation (surface assembly choice)

In order to extract or insert the Micro SIM card, each user has to press with a sharp element (a pen for example) the SIM holder ejector. If this procedure is not respected, the SIM holder can be damaged.

Function connector	Type	Pining	Drawing	Ref. supplier	opposite connector examples
RF connector	SMA			<u>RADIALL</u> : R284310085	<u>RADIALL</u> : R125073
Serial link AUDIO link BOOT RESET	SUB D High Density (15 pts)	1 DCD (CT109) 2 TX (CT103) 6 RX (CT104) 7 DSR (CT107) 8 DTR (CT108/2) 9 GND 11 CTS (CT106) 12 RTS (CT105) 13 RI (CT125) 4 MICROPHONE (+) 5 MICROPHONE (-) 10 SPEAKER (+) 15 SPEAKER (-) 3 BOOT 14 RESET	 	<u>JST</u> : KSEY-15S-3B6L18-13	<u>ITT CANNON</u> : ZDEA-15P-SB or <u>JST</u> : KEC-15P with contact JK-SP2143
Power Supply connector	Micro-Fit (4pts)	1 V+BATTERY 2 GROUND 3-4 AUXI		<u>MOLEX</u> : 43045-0409	<u>MOLEX</u> : 43025-0400
SIM holder				<u>MOLEX</u> : 52828-0611	MICRO SIM

5.4. Electrical characteristics

The following figures sum up the electrical characteristics defined in input/output for all the external connections.

Parameters	MIN	TYP	MAX	UNIT	Comments
<u>Power supply :</u>					
Input supply voltage	5*/6**	13,5	32	V	GSM or DCS/PCS
Input supply voltage with Car Kit option		13,5	18	V	
Input peak supply current @5V*/6V**			2,5*/0,9**	A	GSM or DCS/PCS
Input average supply current @5V*/6V** in communication mode			450*/200**	mA	GSM or DCS/PCS
Input average supply current @5V*/6V** in idle mode (paging period 480ms)			35	mA	
Input average supply current @5V* in idle mode with auto-shutdown function***			10	mA	
<u>Serial link :</u>					
RS232					standard
<u>Audio (head set) :</u>					
Microphone input current @2V/2KΩ		0,5		mA	
absolute microphone input voltage			100	mVpp	
speaker output current 150Ω //1nF		16		mA	
absolute speaker impedance			32	Ω	
SIM	3		5	V	

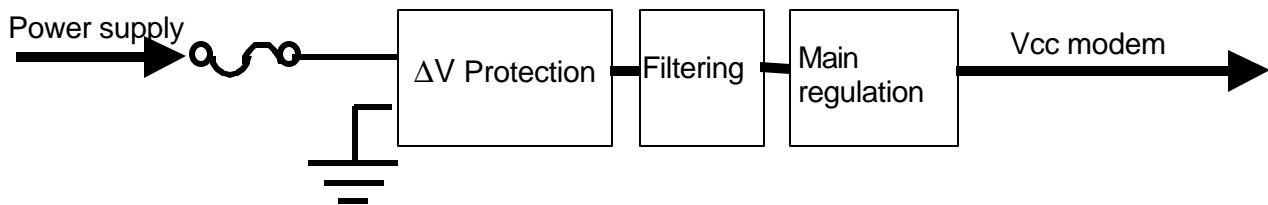
* only GSM

** only DCS/PCS

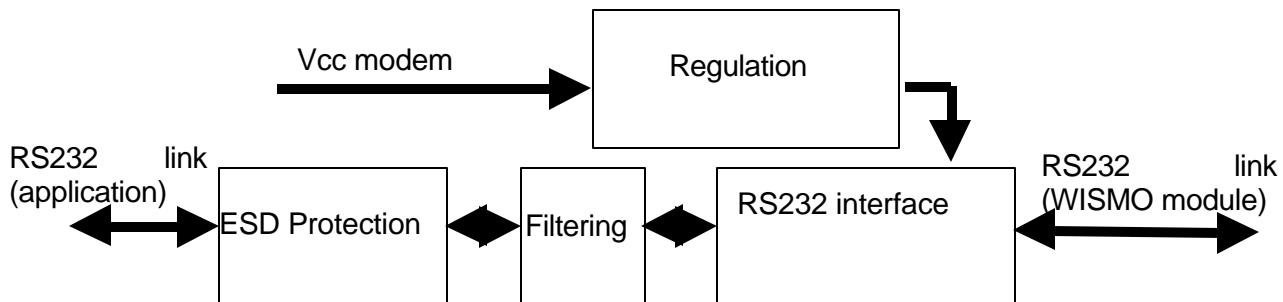
*** auto shutdown function could be activated if the serial link leads a non hardware flux (CTS/RTS non used). This hardware function will not be available with the first products.

5.5. Electrical functions

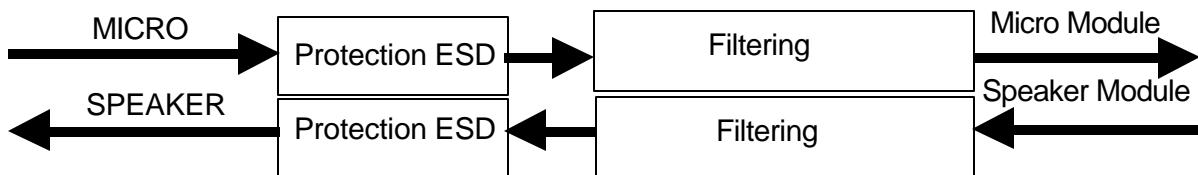
5.5.1. Functionnal schematic



RS232 INTERFACE



AUDIO INTERFACE : Head Set



5.5.2. Filtering

Filtering guarantees:

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

Components retained are :

- Low Pass Filter (LC filter architecture)
- power inductor.

5.5.3. ESD protection

This function protects all input/output against the electrostatic surges.

Components which compose this function will be sized according to the power of the electrostatic surges apply on the connectors and the normal functioning voltage scale. Components retained are TRANZIL diodes (TVS diode : Transient Voltage Suppression diode).

5.5.4. Voltage surge protection

This function allows a protection against the voltage surges, the reverse polarity and the electrostatics surges on the power supply line.

5.5.5. Regulation

Main regulation is made with a DC/DC converter in order to supply power at all functions (STEP-DOWN CONVERTER is the name of assembly).

5.5.6. RS232 Interface

This function adapts voltage levels between the WISMO module and outside.

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5.5.8.Other function

Red indicator. This function shows three operating modes:

- the red indicator blinks quickly in transmission mode
- the red indicator blinks slowly in idle mode
- the red indicator is continuously lightened while in network search

6. Accessories description

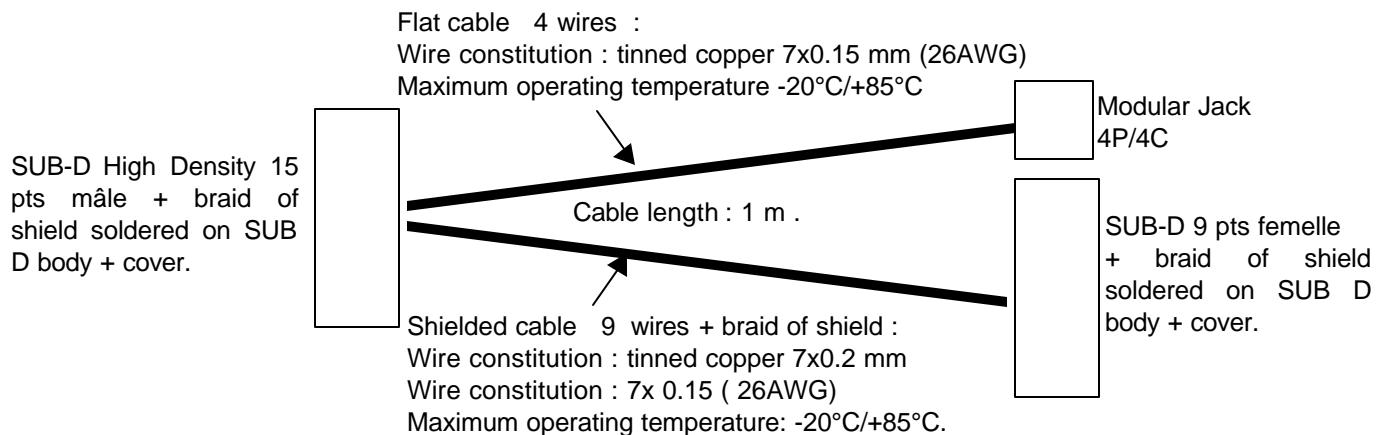
6.1. Headset

The references of this kit have to be specified.

Caution : cable length has to be higher than a meter (1.1 yards)

6.2. Cordon examples

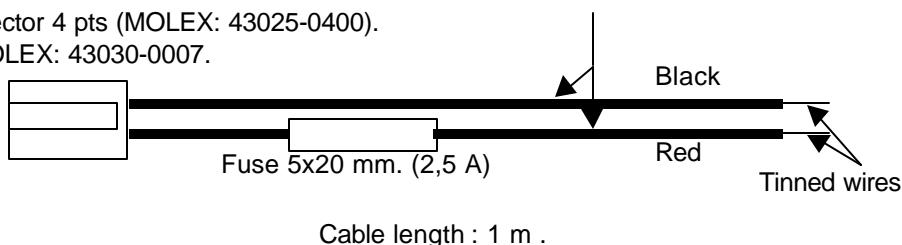
6.2.1. Cordon RS232/AUDIO(head set) :



AUTONUMGL6.2.3. Power supply cordon

Cable : 1 wire.
Ame : tinned copper 24x0.2 mm
Section : 0.75 mm²
Maximum operating temperature: -20°C/+85°C.

MICRO FIT connector 4 pts (MOLEX: 43025-0400).
Contacts (x2) (MOLEX: 43030-0007).

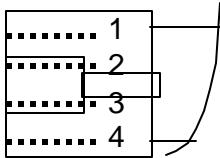


6.2.4.Cordons construction (RS232/Audio head set):

Assembly example

<u>SUB-D 9CTS</u>	<u>Connection</u>	<u>SUB D 15CTS (RS232)</u>	<u>Signal name</u>
1 (White)	◎	1 (White)	DCD (CT109)
2 (Grey)	◎	6 (Grey)	RX (CT104)
3 (Violet)	◎	2 (Violet)	TX (CT103)
4 (Bleu)	◎	8 (Bleu)	DTR (CT108/2)
5 (Black)	◎	9 (Black)	GND
6 (Orange)	◎	7 (Orange)	DSR (CT107)
7 (Yellow)	◎	12 (Yellow)	RTS (CT105)
8 (Brown)	◎	11 (Brown)	CTS (CT106)
9 (Green)	◎	13 (Green)	RI (CT125)
<u>Modular Jack 4P/4C</u>	<u>Connection</u>	<u>SUB D 15CTS (AUDIO)</u>	
1 (Yellow/White)	◎	4 (Yellow/White)	microphone(+)
2 (Red/White)	◎	10 (Red/ White)	speaker(+)
3 (Green/White)	◎	15 (Green/White)	speaker(-)
4 (Black/White)	◎	5 (Black/White)	microphone(-)
<u>Flying wires</u>	<u>Connection</u>	<u>SUB D 15CTS</u> <u>(Boot/Reset/GND)</u>	
(Pink)	◎	3 (Pink)	BOOT
(Bleu/White)	◎	14 (Bleu/White)	RESET
(Black)	◎	9 (Black)	GND

Top view



7. RF exposure instructions

Pursuant to 47 CFR § 24.52 of the FCC Rules and Regulations, personal communications services (PCS) equipment is subject to the radiofrequency radiation exposure requirements specified in § 1.1307(b), § 2.1091 and § 2.1093, as appropriate.

The Wavecom WMO2-G1900 Modem is a GSM (PCS-1900) terminal which operates in the US licensed PCS frequency spectrum. The device transmits over the 1850-1910 MHz band and receives over the 1930-1990 MHz band.

Wavecom, Inc. certifies that it has determined that the Modem complies with the RF hazard requirements applicable to broadband PCS equipment operating under the authority of 47 CFR Part 24, Subpart E of the FCC Rules and Regulations. This determination is dependent upon installation, operation and use of the equipment in accordance with all instructions provided.

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

To ensure that the DTSA complies with current FCC regulations limiting both maximum RF output power and human exposure to radiofrequency radiation, a separation distance of at least 20 cm must be maintained between the unit's antenna and the body of the user and any nearby persons at all times and in all applications and uses. Additionally, in mobile applications, maximum antenna gain must not exceed 3 dBi (to comply with Section 24.232(b)) and is limited to 7dBi for fixed applications. Finally, the tune-up procedure for the WMO2-G1900 ensures that the maximum RF output power of the devices does not exceed 30.0dBm within the variations that can be expected due to quantity production and testing on a statistical basis.

8. Instructions to OEM

Wavecom User's manual includes specific warnings and cautions in order to ensure that OEM are aware of their responsibilities, with regard to RF exposure compliance, for products into which the Modem is integrated. With this guidance, the OEM will be able to incorporate into their documentation the necessary operating conditions and warnings.

OEM need to provide a manual with the "final" product that clearly states the operating requirements and conditions and that these must be observed to ensure compliance with current FCC RF exposure requirements / MPE limits (*refer to chapter 7. RF exposure instructions*). This will enable the OEM to generate (and provide the end-user with) the appropriate operating instructions, warnings and cautions, and/or markings for their product.