WAVECOM

WMO2 Modem Series
GSM 900 / 1800 / 1900

USER MANUAL

SUMMARY

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CAUTION :

To ensure that the Modem 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.

WARNING :

This transmitter, including its antenna, has not been approved to operate as a portable device at less than 20 cm from persons, therefore must not be used in such configuration for complying with FCC RF exposure requirements.

1. PRODUCT DESCRIPTION

The Wavecom WMO2 modem exist under three different references:

- WMO2-G900 : GSM 900 MHz version
- WMO2-G1800 : GSM 1800 MHz version
- WMO2-G1900 : GSM 1900 MHz version

1.1 Package content

The Wavecom WMO2 modem package comprises:

- 1 Modem
- 2 holding bridles
- 1 Power supply cable + fuse
- 1 User manual (this document)

1.2 Product presentation

The Wavecom WMO2 modem is a terminal for fax and data transmission, short message service mobile originated, short message service mobile terminated and voice calls.
The connectors binded to the body guarantee output and input connections.
An extractible holder is used to insert the SIM card (Micro-SIM type). A LED indicates the operating mode.

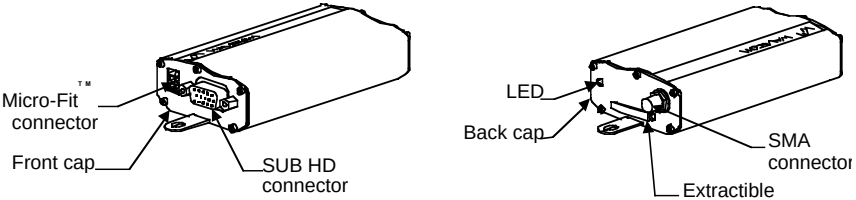


Figure 1
Modem presentation

1.3 Physical characteristics

Dimensions	98x54x25 mm (excluding connectors)
Overall dimensions	110x54x25 mm
Weight	< 140 grams
Volume	13.23 cm3
Housing	Aluminium profiled

1.4 Functions - GSM Modes

Standard	900 MHz Class 4 (2W) - 1800 / 1900 MHz Class 1 (1W) GSM Phase 2
Interface	Serial interface RS232 V.24/V.28 Autobauding function AT command set based on V.25ter and GSM 07.05 & 07.07
SMS	Mobile Originated (MO) and Mobile Terminated (MT). Mode Text & PDU point to point. Cell broadcast. In accordance with GSM 07.05.
Data	Asynchronous 2400, 4800, 9600 bits/s. Transparent and Non Transparent mode . In Non Transparent Mode only: 300, 1200, 1200/75 bauds. Mode 3.1 KHz (PSTN) and V110 (ISDN).
Fax	2400/4800/7200/9600 bits/s GSM teleservice 62 in Transparent Mode. Class 1. Groupe 3 compatible.
Audio	FR + EFR - Accessories: Head set

1.5 Temperature range

Operating conditions : From -20°C to +55°C
Storage conditions : From -25°C to +70°C

2 INSTALLATION/START-UP

2.1 Mounting the modem

For mounting the modem, bind to the body the holding bridles according to the schema below :

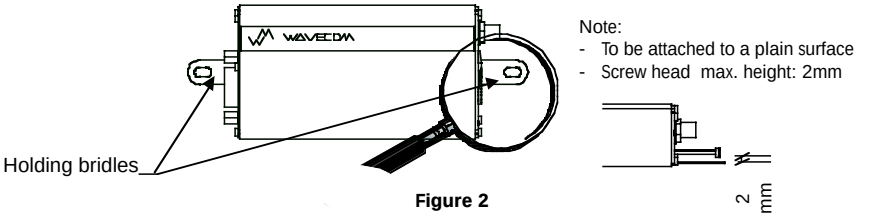


Figure 2
Modem mounting

2.2 Installing the modem

To install the modem, plug the device on a DC power supply (for automotive application, connect the device on the permanent « + » and insert the SIM card in the holder).

Make sure that an antenna is connected.

In order to extract or to insert the Micro SIM card, it is necessary to press the SIM holder ejector with a sharp element (a pen for example).
If this sequence is not respected, the SIM holder could be damaged.

2.3 Electrical characteristics

2.3.1 Switching the GSM modem on/off

The device is permanently powered (when connected to the power supply).

2.3.2 Voltage range

Voltage range	:	5 to 32V DC (GSM 900) - 6 to 32V DC (GSM 1800/1900)
GND	:	0V

2.3.3 Overvoltage/undervoltage

Correct operation of the Wavecom WMO2 modem in communication mode is not guaranteed if input voltage fall below 5V (GSM 900) - 6V (GSM 1800/1900). The modem is protected against voltage over 32V.
When input voltages exceed 32V, the supply voltage is disconnected in order to protect the electronic components from an overvoltage.

TWO CASES ARE POSSIBLE:

- IF THE OVERVOLTAGE IS CONTINUOUS, THE PROTECTION IS GUARANTEED BY THE FUSE.
- IN THE CASE OF TRANSIENT PEAKS, THE MODEM GUARANTEES ITS OWN PROTECTION.

2.3.4 Power supply cable

A cable, included in the package shall be used for power supply connection.

The wires are marked as follows:

Cable	:	1 wire
Ame	:	tinned copper 24x0.2 mm
Section	:	0.75 mm^2

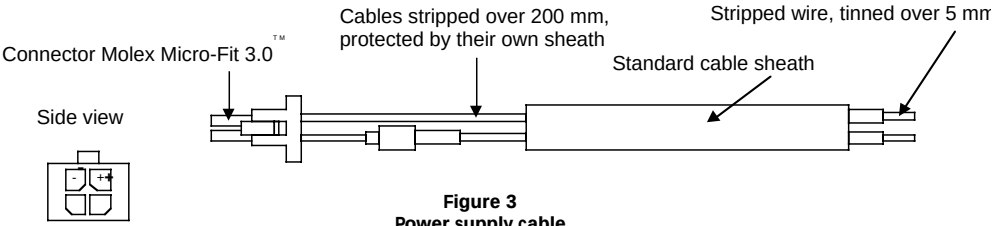


Figure 3
Power supply cable

2.3.5 Input/output electrical characteristics defined for all external connections

Parameters	GSM 900			GSM 1800/1900			Unit
	Min.	Typ.	Max.	Min.	Typ.	Max.	
Power supply :							
- Input supply voltage	5		32	6		32	V
- Input supply voltage with Car Kit option			18			18	V
- Input peak supply current			2.5			1	A
- Input average supply current in communication mode			450			200	mA
- Input average supply current in idle mode			30			35	mA
Serial link : - RS232							
Audio (head set) :							
- Microphone input current @2V/2KΩ		0.5			0.5		mA
- Absolute microphone input voltage			100			100	mVp
- Speaker output current 150Ω/1nF		16			16		mA
- Absolute speaker impedance			32			32	Ω
SIM		3 or 5			3 or 5		V

2.3.6 Protection/on-board network connection

The modem is protected by a fuse directly binded on the power supply cable.

3. DESCRIPTION OF THE INTERFACES

The modem comprises several interfaces:

- LED function indicating operating status
- External antenna (via SMA)
- Serial and control link (via 15 pins SUB D)
- Power supply (via 4 pins Micro-Fit™)
- SIM card holder

3.1 LED Function

- LED off	Device switched off - Not ready
- LED on	Device switched on - Connecting to network
- LED flashing slowly	Device switched on - Idle mode
- LED flashing rapidly	Device switched on - Transmission mode

3.2 Connectors

Connector	Function
SMA	RF antenna connector
15 pins SUB D (high density)	RS232 link AUDIO link BOOT RESET
4 pins Micro-Fit™	Power supply connector
« SIM »connector	SIM card connection

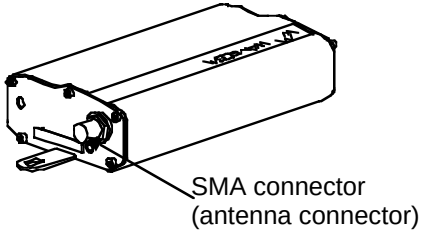


Figure 4
SMA connector

A SIM card is needed to operate on a GSM network.

To install the card:
- Press the yellow button to eject the holder.
- Insert the SIM card.
- Check that it fits into place correctly.

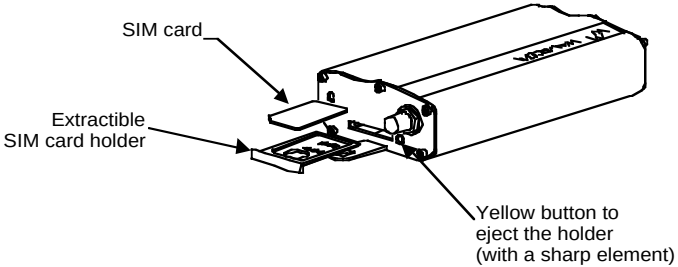
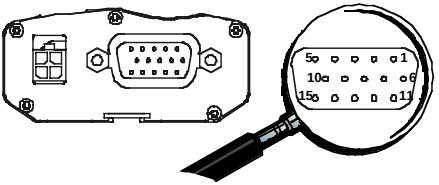


Figure 5
SIM card holder

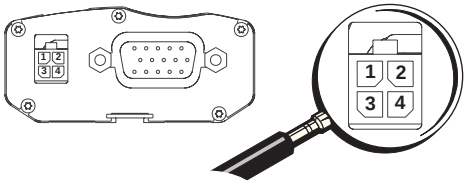
Figure 6
15 pins SUB D connector
(high density)



Pins assignment for
15 pins SUB D Connector

	PIN	EIA	CCIT	Designation
RS 232	1	DCD	109	Data Carrier Detect
	6	RX	104	Receive Data (out)
	2	TX	103	Transmit Data
	8	DTR	108.2	Data Terminal Ready
	9	GND		Signal ground
	7	DSR	107	Data Set Ready
	12	RTS	105	Request to send
	11	CTS	106	Clear to send
	13	RI	125	Ring indicator
Audio	4	MICROPHONE (+)		
	5	MICROPHONE (-)		
	10	SPEAKER (+)		
	15	SPEAKER (-)		
Boot	3	BOOT		
Reset	14	RESET		

Figure 7
4 pins Micro-Fit™ connector



Connector	Pins layout		Comments
4 pins Micro-Fit 3.0™	1 2 3-4	V+ BATTERY GROUND AUXI	Power supply NC

The **4 pins Micro-Fit 3.0™** can be ordered from a supplier called MOLEX.
The address can be obtained on the following internet site: **www.wavecom.com**

4. TECHNICAL DATA

Description	AT commands	Module	Comments
Module synchro checking	AT+CREG ?	CREG=<mode>, 1	Modem synchronized on the network
		CREG=<mode>, 2	Synchronization lost, re-synchronization attempt
		CREG=<mode>, 0	Network synchronization attempt
Receiving an incoming call		RING	
	ATA		Answer the call
		OK	
Initiate a call	ATD1234;		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 loss		NO CARRIER	
Hang up	ATH		
		OK	
Enter PIN Code	AT+CPIN=1234		
		OK	PIN Code accepted
		+CME ERROR : 16	Incorrect PIN Code
		+CME ERROR : 3	PIN already entered (with +CMEE : 1 mode)
Store the parameters in E2P	AT&W		
		OK	The configuration settings are stored in E2P

5. TROUBLESHOOTING: SPECIFIC DEFAULTS POSSIBLY ENCOUNTERED

5.1 The modem does not answer through the serial link

A) Is the modem correctly powered on?

- ❏ If not, the correct power supply is 5 to 32V (GSM 900) - 6 to 32V (GSM 1800/1900).

B) Is the serial cable suitable and adjusted in the modem and PC sockets?

- ❏ A suitable cable must follow pin assignment described on figure 6.
- ❏ Check in particular, that Rx et Tx are properly connected.

C) Check that your communication program is properly configured:

- ❏ Modem factory setting for the character framing are:
  - ➪ Data Bits : 8
  - ➪ Parity : None
  - ➪ Stop Bits : 1
- ❏ The factory setting for baud rate is autobauding mode.

D) Does any other program interfere with your communication program (conflict on communication port access)?

- ❏ If yes, close any application likely to interfere (e.g. mouse or printer driver).

5.2 The modem always returns «Error» when trying to issue a communication

A) Issue AT+CMEE=1 to have extended error cause and retry

Cause value	Diagnostic	Hint
0	Phone failure	Call your technical support
3	Operation not allowed	
4	Operation not supported	
10	SIM not inserted	→ Insert the SIM card in the SIM holder of the modem, → If SIM card is inserted, insure that it is properly inserted.
11	SIM PIN required	Enter PIN code
12	SIM PUK required	Enter PUK code (call your network provider if you don't know this code)
13	SIM Failure	Check validity of your SIM card. If SIM damaged, call your network provider
16	Incorrect password	Check the code you entered
17	SIM PIN2 required	Enter PIN2 code
18	SIM PUK2 required	Enter PUK2 code (call your network provider if you don't know this code)
26	Dial string too long	Check your phone number (max 20 digits)
30	No network service	

For all other codes, and/or details, see AT commands manual.

B) Additional hints

- ❏ Is the modem registered on the network?

  Does the AT-Command AT + CREG? answers 0,1 (registered) or 0,5 (registered roaming)?

  ⇨ If not, check that the received signal is strong enough to synchronize on the Network (use AT+CSQ).

- Is the modem receiving an incoming call or already in communication?
  - ⇨ With some software versions, you must release any incoming or active call (with ATH) before being able to make an outgoing call.

5.3 The modem always returns «No carrier» when trying to issue a communication

A) After a failed attempt ("no carrier"), issue AT+CEER to have extended error cause

Cause value	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 baring on outgoing calls	
253	Call baring 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 manual for further details or call network provider

For all other codes, and/or details, see AT commands manual.

B) Additional hints

- Is the antenna properly connected?
  - For GSM 900 : use a 870 to 960 MHz / 50 Ohms antenna.
  - For GSM 1800 : use a 1710 to 1880 MHz / 50 Ohms antenna.
  - For GSM 1900 : use a 1850 to 1990 MHz / 50 Ohms antenna.

- Is the received signal strong enough?
  - With the AT-Command AT+CSQ check that the received signal (1st parameter of the response) is strong enough to be able to establish a call.

AT+CSQ response (RSSI)		Signal quality
11 to 31	→	Should be sufficient*
0 to 10 and +99	→	Could be insufficient*

* based on general observations.

- The modem always returns «No carrier» when trying to issue a voice communication?
  - Insure the character «semicolon» is present straight after the phone number on the AT-Command ATD######;

- The modem always returns «No carrier» when trying to issue a data communication?
  - Insure the selected bearer type is supported by the called party.
  - Then, insure the selected bearer type is supported by the Network.
  - If no success, try bearer selection type: AT+CBST=0,0,3.
  - Insure the SIM Card is available for Data/Fax calls.

6. NOTES ON SAFETY

6.1 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 GSM Modem 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.
- Switch OFF your GSM Modem when at a refueling point.
- Switch OFF your GSM Modem 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 or where blasting operations are in progress.
- There may be a hazard associated with the operation of your GSM Modem close to in adequately protected personal medical devices such as hearing aids and pacemakers. Consult the manufactures of the medical device to determine if it is adequately protected.
- Operation of your GSM Modem close to other electronic equipment may also cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers recommendations.
- When running your GSM modem, keep a minimum distance of 20 cm (6 inches) between your head and the antenna of your GSM modem either for fixed or mobile installation.

6.2 Vehicle Safety

- ❏ Do not use your GSM Modem 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 GSM Modem telephone could interfere with the correct functioning of vehicle electronics. To avoid such problems, ensure 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.

6.3 Car And Maintenance

Your GSM Modem 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 GSM Modem to any extreme environment where the temperature or humidity is high.
- ❏ Do not attempt to disassemble the GSM Modem. There are no user serviceable parts inside.
- ❏ Do not expose the GSM Modem to water, rain or spilt beverages, It is not waterproof.
- ❏ Do not abuse your GSM Modem by dropping, knocking, or violent shaking. Rough handling can damage it.
- ❏ Do not place the GSM Modem alongside computer discs, credit or travel cards or other magnetic media. The information contained on discs or cards may be affected by the phone.

- The use of third party equipment or accessories, not made or authorized by Wavecom may invalidate the warranty of GSM Modem.
- Do contact an authorized Service Center in the unlikely event of a fault.

6.4 Your Responsibility

This GSM Modem 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.

7. RF EXPOSURE INSTRUCTIONS (WMO2-G1900 ONLY)

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.

8. INSTRUCTIONS TO OEM

This 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.

9. GENERAL INFORMATIONS

GSM reference documents	:	GSM 03.40, GSM 03.45, GSM 04.11, GSM 04.21, GSM 05.08, GSM 07.01, GSM 07.02, GSM 07.05, GSM 07.07.
ETSI contact	:	ETSI Secretariat F-06921 Sophia Antipolis Cedex, France e-mail : secretariat@etsi.fr
Service	:	The AT commands manual is avalable on Wavecom web site: http://www.wavecom.com

Disclaimer

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WAVECOM S.A. - 39 rue du Gouverneur Gal. Eboué, F-92130 Issy-les-Moulineaux - France
Tel: +33 1 46 29 08 00 - Fax: +33 1 46 29 08 08
WAVECOM Inc. - 5405 Morehouse Drive, Suite 330 - San Diego, CA 92121 - USA
Tel: +1 619 450 1778 - Fax: +1 619 450 1636
WAVECOM Asia Pacific Ltd. - 2 nd floor, Shui On Center, 6/8 Harbour Road - Hong Kong
Tel: +852 2824 8973 - Fax: +852 2824 8929