



Smart SAM2W User Guide



Revision History

Version	Modified By	Date	Description
1.0		18/04/2012	Initial version
1.1		28/11/2012	Updated to Smart SAM2W
1.2		09/10/2013	New Packaging Information

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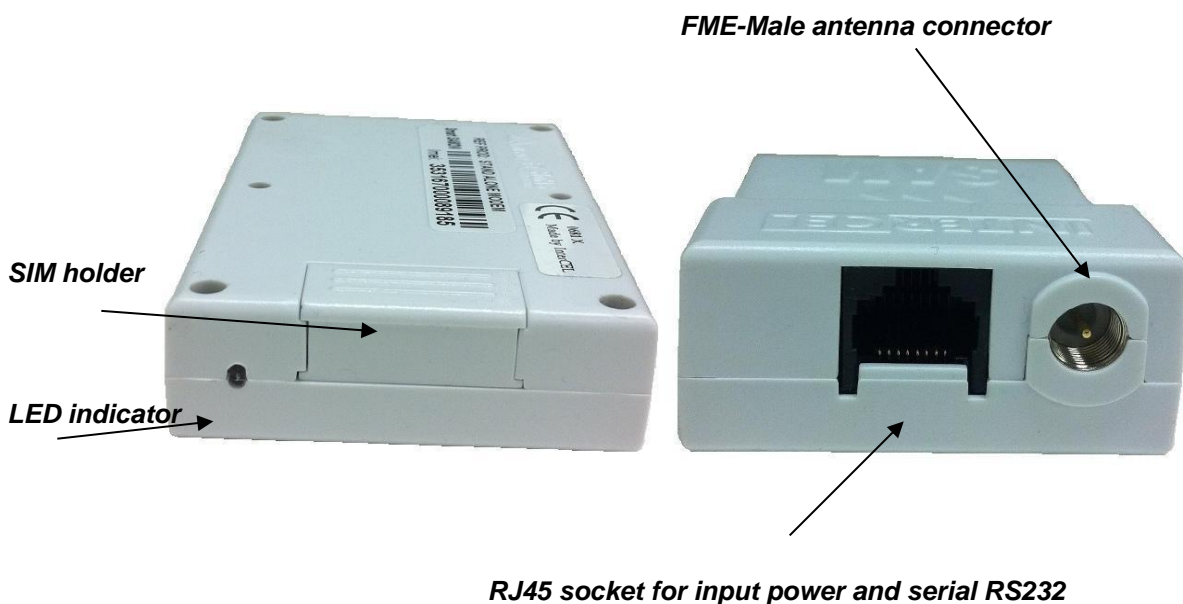
1 Introduction

The Smart SAM2W is a compact, light-weight, GSM/GPRS based modem. It is a quad-band 850/900/1800/1900MHz modem, providing GSM and GPRS connectivity.

The Smart SAM2W also provides Open-AT platform for different applications.

The Smart SAM2W is designed for both mobile and fixed M2M applications. It has an RJ45 socket for input voltage and the serial RS232 signals, an FME-male for antenna connection, a SIM holder and an LED indicator.

The Smart SAM2W is capable of sending/receiving SMS; Circuit switched data and Packet-switched data.



Mobile station engine
EU approval
GCF-CC
A-tick

SL6087
CE-0682
Version 3.27.1

2 Safety Precautions

The following safety precautions must be observed whenever the Smart SAM2W modem is in operation or in service. Failure to comply with these precautions violates the safety standards of the design, manufacture and intended use of the product

- Switch off the Smart SAM2W modem :
 - In hospitals or places where medical equipment may be in use.
 - In an aircraft
 - Refuelling points
 - Explosive areas

- Restricted use of the Smart SAM2W modem
 - Near any chemical plant
 - Near any fuel depot
 - Areas with mobile phone warning signs

Respect national regulations on the use of cellular devices.

The Smart SAM2W modem receives and transmits radio frequency energy while switched on, therefore interference can occur if the Smart SAM2W is near TVs, radios, PCs or any inadequately shielded equipment.

3 Radio Frequency Exposure - SAR

The Smart SAM2W modem is a low-power transceiver, similar to a typical handheld GSM/GPRS/UMTS mobile phone. When it is turned on, it will emit low-level radio frequency energy.

There are different guidelines and standards around the world that govern the permitted levels of radio frequency exposure for general population. The levels include a safety margin to a human body.

The Specific Absorption Rate (SAR) is a measure of the rate at which radio frequency energy is absorbed by the body when exposed to radio frequency electromagnetic field. The SAR value is determined at the highest certified power level in the laboratory conditions, but the actual SAR level of the transceiver while operating can be well below this value. This is because the transceiver is designed to use minimum power to connect to the network.

The Smart SAM2W modem is approved to use in applications where the ***antenna is placed more than 21cm from the body.***

For other applications, the integrator is responsible for the local SAR requirements.

4 WEEE Directive 2002/96/EC, Disposal Of Old Electronic Equipment



This symbol on the product indicates that this product shall not be treated as household waste. It must be placed at an appropriate collection point for the recycling of electrical and electronic equipments.

By ensuring the correct disposal of this equipment, it will help the environment and human health. Recycling will help to conserve natural resources.

The Smart SAM2W product is RoHS compliant



5 Packaging

5.1 Contents

The Smart SAM2W package consists of:

- A Smart SAM2W Modem
- A Data Cable
- A Smart SAM2W Short Specification
- A Smart SAM2W User Guide



5.2 Packaging Box

The carton box dimensions are 230mm x 155mm x 70mm

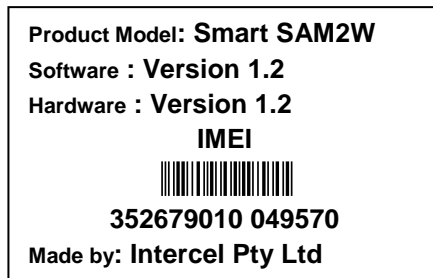
The data cable is 2m long

The label size is 50mm x 33mm

A power supply is available on request. It is recommended that the Smart SAM2W is powered using a 12Vdc/1A power supply.

The antenna is also available on request. Please make sure the correct antenna is used to get optimised performance from the Smart SAM2W.

5.3 Production Label



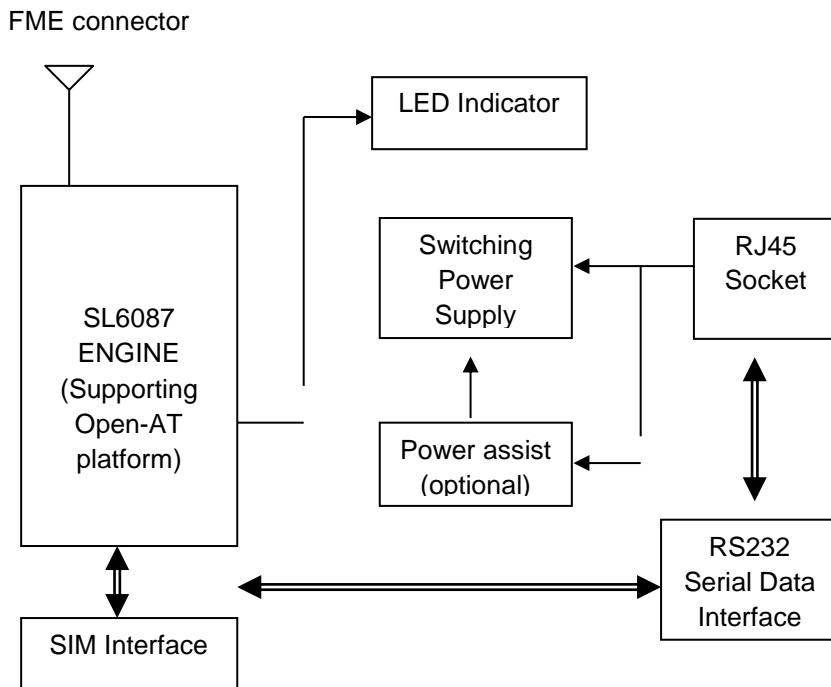
The production part number is located at the back of the Smart SAM2W, which includes:

- The product model
- The software version
- The hardware version
- The IMEI number
- The manufacturer
- The part number

6 Functionality

6.1 General

The Smart SAM2W modem consists of an RJ45 socket for serial port and input power, an FME male antenna connector and a SIM holder. The LED indicator, located next to the SIM holder, indicates the Smart SAM2W operating status.



The Smart SAM2W Functional Block Diagram

The Smart SAM2W also contains the power assist circuitry. This PA circuitry is optionally loaded and activated when the power supply does not have enough power to assist the Smart SAM2W when it is in a CSD call or in a GPRS session. It also helps to send the last-gasp message back to the server when power is cut off to the modem.

6.2 RJ45 Socket

<i>Pin</i>	<i>Signals</i>	<i>Description</i>
1	VIN	Input Voltage 5Vdc - 32Vdc
2	DCD	Data Carrier Detect
3	DTR	Data Terminal Ready
4	GND	Common Ground
5	RXD	Serial Data out of the Smart SAM2W
6	TXD	Serial Data into the Smart SAM2W
7	CTS	Clear to Send
8	RTS	Ready to Send

6.3 FME-Male 50Ω Antenna Connector

The FME male antenna connector is a 50Ω impedance antenna connector. The antenna used for the Smart SAM2W must have 50Ω impedance.

6.4 SIM Holder

The SIM holder is designed to accommodate a mini-SIM card. The SIM card can either be 3V or 1V8 SIM. To insert the SIM card, remove the door by sliding it back toward the end. Make sure the SIM card faces the right way as indicated on the box. Voltage levels over this SIM interface complies with 3GPP standards

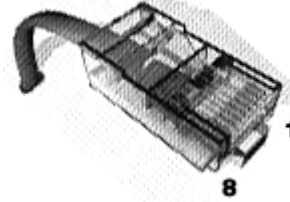
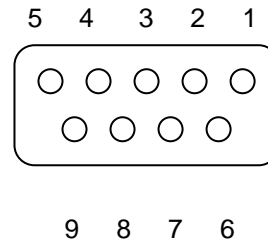
6.5 LED Status

The LED indication has the following status:

- LED on steady: No SIM card or no SIM PIN or Network search in progress.
- 200ms on/ 2sec off: Idle mode, registered to the GSM network.
- 200ms on/600ms off: CSD or PSD data transfer in progress.
- 100ms on/200ms off: The downloaded firmware is either not compatible or corrupted.
- LED is off permanently : No power

6.6 Data Cable

The data cable is 2m long. It consists of an RJ45 plug, a DB9-female connector and a 2-wire input power.



DB9	Signals		RJ45	Description
1	DCD	↔	2	Data Carrier Detect
2	RXD	↔	5	Serial Data out of the Smart SAM2W
3	TXD	↔	6	Serial Data into the Smart SAM2W
4	DTR		3	Not Used
5	GND	↔	4	Common Ground
6	DSR			
7	RTS	↔	8	Ready to Send
8	CTS	↔	7	Clear to Send
9	RI	Not used		
			1	RED wire: Input voltage from 5Vdc to 32Vdc
			4	BLACK wire: Power Ground

7 Electrical Characteristics

7.1 Power Consumption

Network search	65mA @ 12V
Idle mode	40mA @ 12Vdc
Connected mode	90mA @ 12Vdc
GPRS PSD transfer	245mA @ 12Vdc
Peak current during the 577µs transmission pulse	500mA @ 12V

7.2 RF Bands

GSM850	Tx = 824MHz – 849MHz	Rx = 869MHz – 894MHz
EGSM900	Tx = 880MHz - 915MHz,	Rx = 925MHz - 960MHz
DCS1800	Tx = 1710MHz - 1785MHz,	Rx = 1805MHz - 1880MHz
PCS1900	Tx = 1850MHz - 1910MHz,	Rx = 1930MHz - 1990MHz

7.3 Receive Sensitivity

Band	Typical Rx Sensitivity (dBm)
GSM850	-109dBm
EGSM900	-109dBm
DCS1800	-108dBm
PCS1900	-108dBm

7.4 Conducted Transmit Power

Parameter	Min	Max
GSM850 & EGSM900	+5dBm	+33dBm
DCS1800 & PSC1900	+0dBm	+30dBm

7.5 Main Antenna Specifications

Max cable loss	0.5dBm
Impedance	50Ω
VSWR	1.5 : 1

The maximum antenna gain recommended for consideration against RF exposure and ERP/EIRP limits, is:

- In Cellular band : 5dBi
- In PCS band : 4dBi

7.6 Environmental Characteristics

Operating temperature	-30°C to +70°C
Storage temperature	-40°C to +85°C
Humidity	93% relative humidity (non-condensing)

8 The AMR TCP/IP STACK

8.1 Descriptions

The AMR TCP/IP stack allows the Smart SAM2W modem to make/receive GSM data call and at the same time enables the modem to act as a GPRS TCP server/client and UDP server/client. When powered up this stack will automatically activate a GPRS connection then create 3 sockets; one TCP port in server mode for data transfer, TCP port 11111 for remote AT Command and one UDP port for data transfer. The modem can also create a TCP client to a remote TCP server if it is programmed to do so:

Server TCP Data: Socket connection allows transparent data to pass through from host computer to the modem serial port and vice versa. This operation is similar to the GSM data communication. Idle connection is disconnected after 5 minutes.

TCP Command: Socket (port 11111) connection allows a user from the host computer to send AT command to the modem and receive its response. Idle connection is disconnected after 5 minutes.

UDP Data: Socket connection allows transparent data to pass through from host computer to the modem serial port and vice versa. This operation is similar to the GSM data communication. In server mode modem switches serial port from data mode to AT Command mode if there is no data from remote for 2 minutes.

Client TCP Data: Socket connection allows transparent data to pass through from host computer to the modem serial port and vice versa. This operation is similar to the GSM data communication. Connection is permanent.

The software stack also allows remote sending of AT Commands over SMS and GSM data call. Firmware download over the air can be done over GSM data call using 1K XModem protocol or over GPRS using File Transfer Protocol.

GPRS connectivity is maintained by meaning of sending Ping. The modem is also set to reset daily at 11 pm (time feature needs support from GSM/GPRS network provider).

The modem keeps a 250 event log in a cyclical buffer which is stored in flash memory. The events log can be retrieved by means of an AT Command either locally or remotely

8.2 TCP/UDP/IP AT Commands

The TCP/UDP/IP stack provides some AT commands for setting up communication parameters, software upgrade, checking status and more.

AT\$SETGPRS

Use to set up the GPRS parameters required for GPRS connection. This command can be sent from serial port, over SMS, GSM data call and TCP GPRS.

```
AT$SETGPRS=?  
$SETGPRS: APN(100),Username(50),Password(50)  
OK
```

```
AT$SETGPRS?  
$SETGPRS: <ApnServ>,<ApnUn>,<ApnPw>  
OK
```

```
AT$SETGPRS=<ApnServ>,<ApnUn>,<ApnPw>  
OK
```

<ApnServ> : Access Point Name, maximum length allow = 100

<ApnUn> : Username, maximum length allow = 50

<ApnPw> : Password, maximum length allow = 50

```
AT$SETGPRS="mach2","intercel","mach"  
OK
```

```
AT$SETGPRS?  
$SETGPRS: ="mach2","intercel","mach"  
OK
```


AT\$SETTCP

Use to setup parameters for TCP data socket. This command is for serial port entry only.

AT\$SETTCP=?

\$SETTCP: Port(1-65535), TimeOutTrigger(0-65535),Server(120)

OK

AT\$SETTCP?

\$SETFTP: <TCPPort>,<TimeOutTrigger>,<TCPServ>

OK

AT\$SETTCP=<TCPPort>,<TimeOutTrigger>,<TCPServ>

<TCPPort> : From 1 to 65535, is port number for both local TCP server and remote TCP server, **default is 10000**.

<TimeOutTrigger>: This defines a time interval of no data activity in the serial data stream that is used as the trigger to packetize and transmit the collected data. The time is entered in milliseconds and between 0 and 65535 but only affective in multiples of 20, **default is 100ms**.

<TCPServ> : IP address of the remote server, **default is 255.255.255.255**.

AT\$SETTCP=10000,100,"255.255.255.255"

OK

AT\$SETUDP

Use to setup parameters for UDP data socket. This command is for serial port entry only.

```
AT$SETUDP=?  
$SETUDP: Port(1-65535),TimeOutTrigger(0-65535),Server(120)  
OK
```

```
AT$SETUDP?  
$SETUDP: <UDPPort>,<TimeOutTrigger>,<UDPServ>  
OK  
AT$SETUDP=<UDPPort>,<TimeOutTrigger>,<UDPServ>
```

<UDPPort> : From 1 to 65535, is port number for both local UDP server and remote UDP server, **default is 20000**.

<TimeOutTrigger>: This defines a time interval of no data activity in the serial data stream that is used as the trigger to packetize and transmit the collected data. The time is entered in milliseconds and between 0 and 65535 but only affective in multiples of 20, **default is 100ms**.

<UDPServ> : IP address of the remote server, **default is 255.255.255.255**.

```
AT$SETUDP=20000,100,"255.255.255.255"  
OK
```

AT\$SETPING

Use to set up Ping parameters. The software usea Ping to maintain GPRS connection. This command is for serial port entry only.

```
AT$SETPING=?  
$SETPING: PingIP(120),Interval(5-1440)  
OK
```

```
AT$SETPING?  
$SETPING: <PINGRemote>,<PINGPeriod>  
OK
```

```
AT$SETPING=<PINGRemote>,<PINGPeriod>
```

<PINGRemote> : PING IP address, in xxx.xxx.xxx.xxx format.

<PINGPeriod> : PING period in minute, from 5 –1440, **default is 1441 (more than 24 hour so no PING, the modem will be reset every 24 hour instead)**.

```
AT$SETPING= "192.168.80.40",60  
OK
```

AT\$TCPMODE

Set modem TCP mode. This command is for serial port entry only.

AT\$TCPMODE=0

Modem does not make TCP connection to remote TCP server after connected to GPRS.

AT\$TCPMODE=1

Modem makes TCP connection to remote TCP server after connected to GPRS.

Default is 0.

AT\$TCPMODE?

\$TCPMODE: 0

OK

AT\$GSMMODE

Set modem operating mode. This command is for serial port entry only.

AT\$GSMMODE=0

Modem available for both GSM and GPRS. It makes and maintains GPRS connectivity after power on.

AT\$GSMMODE=1

Modem works in GSM mode only. This mode prevents modem from resetting if SIM is not setting up for GPRS connectivity.

Default is 0.

AT\$GSMMODE?

\$GSMMODE: 0

OK

AT\$SMSNUMBER

Set phone number to receive alarm SMS when modem loses power (for Super CAP hardware only), this command is for serial port entry only.

```
AT$SMSNUMBER="0418505361"
```

```
AT$SMSNUMBER?
```

```
$SMSNUMBER: 0418505361
```

```
OK
```

AT\$SERIALMODE

Set modem serial mode. This command is for serial port entry only.

```
AT$SERIALMODE=0
```

Modem stays in AT Command mode when there is no TCP active connection, modem can response to UDP data from remote but is not able to initiate an UDP data session to remote server.

```
AT$SERIALMODE=1
```

Modem go into online data mode after connected to GPRS, modem can initiate an UDP data session to remote server.

Use sequence +++ to escape to AT Command mode and ATO to go back to data mode.

Default is 0.

```
AT$SERIALMODE?
```

```
$SERIALMODE: 0
```

```
OK
```

AT\$PARAMETERS

Remote request and setting of parameters over SMS, TCP GPRS and GSM data call.

AT\$PARAMETERS=<tcpport>,<tcptimeouttrigger>,<tcpserver>,<tcpmode>,<udpport>,<udptimeouttrigger>,<udpserver>,<pingip>,<pinginterval>,<serialmode>,<gsmmode>,<smsnumber>

AT\$PARAMETERS? To request for modem parameters?

AT\$PARAMETERS=10000,100,"255.255.255.255",0,20000,100,"255.255.255.255",
"192.168.80.40",60,0,0,"0418505361"

OK

AT\$FTPDOWN

Use to send FTP (File Transfer Protocol) parameters to modem and request downloading of new firmware from FTP server, this command can be sent from serial port, over SMS and TCP GPRS.

AT\$FTPDOWN=<server name>,<file name>,<path>,<user name>,<password>

AT\$FTPDOWN="123.209.57.242","amr.dwl",".",",username","password"

OK

AT\$PARAMETERS? To request for modem parameters.

AT\$IP

Use to return the allocated IP address of the current GPRS connection, this command can be sent from serial port, over SMS and GSM data call.

AT\$IP

\$IP: 123.209.157.9

OK

AT\$VERSION

This command return the TCP/IP software version, this command can be sent from serial port, over SMS, TCP GPRS and GSM data call.

AT\$VERSION

\$VERSION: AMR 1.0 OpenAT6.51 130912 11:40

OK

AT\$RESET

Use to remotely reset the modem, normally after sending of new parameters, this command can be sent over SMS, TCP GPRS and GSM data call.

AT\$RESET

OK

AT\$UPDATE

Use to remotely update firmware over GSM data call, firmware transfer using 1K XModem protocol.

AT\$UPDATE

OK

AT\$ONLINE

Use in GSM data call to put modem back into data mode from AT command mode (modem was put into AT command using escape sequence <Enter><Enter><Enter>).

AT\$ONLINE

OK

AT\$SHOWALL

Use to show all settings of the modem, this command can only be sent from the serial port.

AT\$SHOWALL

\$VERSION: AMR 1.0 OpenAT6.51 130912 11:40

\$IP: 10.64.24.1

\$SETGPRS: "mach2","intercel","mach"

\$SETTCP: 10000,100,"255.255.255.255"

\$TCPMODE: 0

\$SETUDP: 20000,100,"10.64.24.2"

\$SETPING: "yahoo.com",60

\$SERIALMODE: 0

\$GSMMODE: 0

\$SMSNUMBER: 0413666039

OK

AT\$GETLOG

Use to retrieve log message file from modem, there is a maximum of 250 messages, this command can be sent from serial port, over GSM data call and TCP GPRS.

AT\$GETLOG

OK

001 2011.12.02 17:51:52 17935 - Caller ID: 0395612959

002 2011.12.02 17:51:55 07700 - Modem send ATA to answer data call

003 2011.12.02 17:51:55 14043 - Caller ID: 0395612959

004 2011.12.02 17:51:58 03718 - Modem send ATA to answer data call

.....

.....

.....

248 2011.12.05 17:41:43 19028 - Modem CSQ signal = 21

249 2011.12.05 17:41:46 10423 - Modem NITZ - +WIND: 15,4,"11/12/05,06:41:48+44",6,"1"

250 2011.12.05 17:41:46 19394 - Network service available

9 Remote Escape Sequence

During GSM data call the modem can be switched into AT command mode remotely by sending the sequence <Enter><Enter><Enter> (hex sequence 0x0D 0x0D 0x0D) within one second, a guard or gap time of one second for the first <Enter> and last <Enter> is required.

10 Specific Requirements

-Modem reset when it failed to connected to GPRS, when change setting with AT\$SETGPRS it best to leave the SIM holder open, it give the user 5 minutes to enter new settings before reset.

-It is recommended to remotely reset modem with AT\$RESET after sending updated parameters with AT\$PARAMETERS.

-Application that initiate UDP data session from the modem serial port does require setting AT\$SERIALMODE=1 so that the serial port is always in data mode.

- With setting AT\$SERIALMODE=1 the modem go into online data mode right after connected to GPRS, to go into AT Command mode user need to send escape sequence +++ .

-If modem is only need to work in GSM and SIM is not setup for GPRS then AT\$GSMODE should be set to 1 to stop modem from resetting.

Notes

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