SAM3Gplus
User Guide

Revision History

Version	Modified By	Date	Description
1.0		18/05/2007	Initial version
1.1		12/06/2007	Updated SAM3G pictures
1.2		18/10/2007	Updated section 5 and section 8
1.3		26/10/2007	Updated section 8.2.a
1.4		26/10/2007	Updated section 1,5,7 and 8
2.0		24/03/2009	Updated for SAM3G plus
2.1		27/04/2012	Updated for LED indicator
2.2		18/04/2013	Updated serial cable
2.3		17/05/2013	Updated bands
2.4		15/07/2013	Updated Intercel logo and phone number
2.5		08/10/2013	Updated new packaging

Contents

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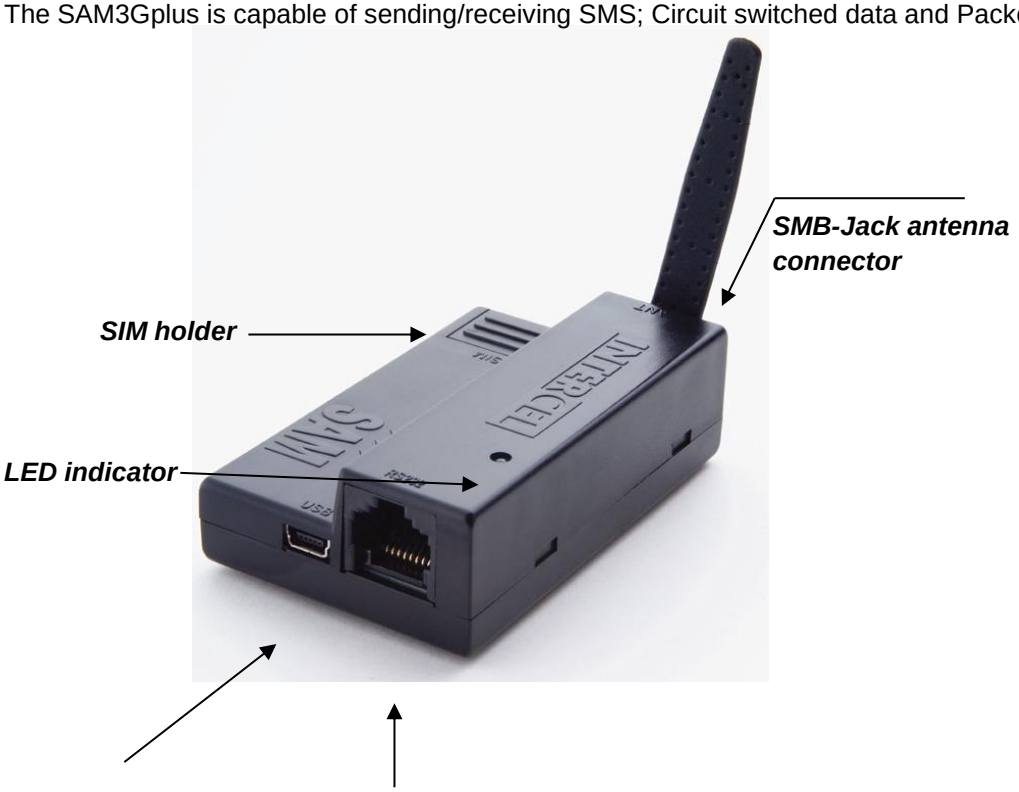
1 Introduction

The SAM3Gplus is a compact, light-weight, UMTS, HSPA based modem. It provides GSM, GPRS, EDGE and WCDMA connectivity. The SAM3Gplus is a quad-band GSM/GPRS/EDGE 850MHz, 900MHz, 1800MHz, 1900MHz and a quad-band WCDMA/HSDPA : 850MHz, 900MHz,1900MHz, 2100MHz

The SAM3Gplus is designed for both mobile and fixed M2M applications. It has an RJ45 socket for both input voltage and serial RS232 signals, a MiniB USB connector, a SMB-Jack for antenna connection, a SIM holder and an LED indicator.

WARNING: You should never connect the USB and the RS232 at the same time.

The SAM3Gplus is capable of sending/receiving SMS; Circuit switched data and Packet-switched data.



Type Approval	GCF full type approval
Mobile station modem Version	Qualcomm's MSM6290
TA code	35362602
EU approval	CE-0682

2 Safety Precautions

The following safety precautions must be observed whenever the SAM3Gplus 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 SAM3Gplus modem :

- In hospitals or places where medical equipment may be in use.
- In an aircraft
- Refueling points
- Explosive areas

- Restricted use of the SAM3Gplus 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 SAM3Gplus modem receives and transmits radio frequency energy while switched on, therefore interference can occur if the SAM3Gplus is near TVs, radios, PCs or any inadequately shielded equipment.

3 Radio Frequency Exposure - SAR

The SAM3Gplus 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.

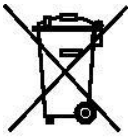
There are different guidelines and standards around the world that govern the permitted levels of radio frequency exposure for general population. The levels include a safety margin to a human body.

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 SAM3Gplus 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 the natural resources.

The SAM3Gplus product is RoHS compliant

5 Packaging

5.1 Contents

The SAM3Gplus package consists of:

- A SAM3Gplus modem
- A data cable/dc power cable
- A SAM3Gplus User Guide
- A mounting bracket
- An RF adaptor to allow connection to an FME antenna connector, if required

5.2 The Packaging Box

The carton box dimensions are 230mm x 155mm x 70mm
The data cable is 2m long
The label size is 50mm x 30mm

A Power supply is available on request. It is recommended that the SAM3Gplus is powered using a 12Vdc/1A power supply.

Various antennas are also available on request. Please make sure the correct antenna is used to get optimised performance from the SAM3Gplus (see section 7.e. Main Antenna specifications).

5.3 The Production Label

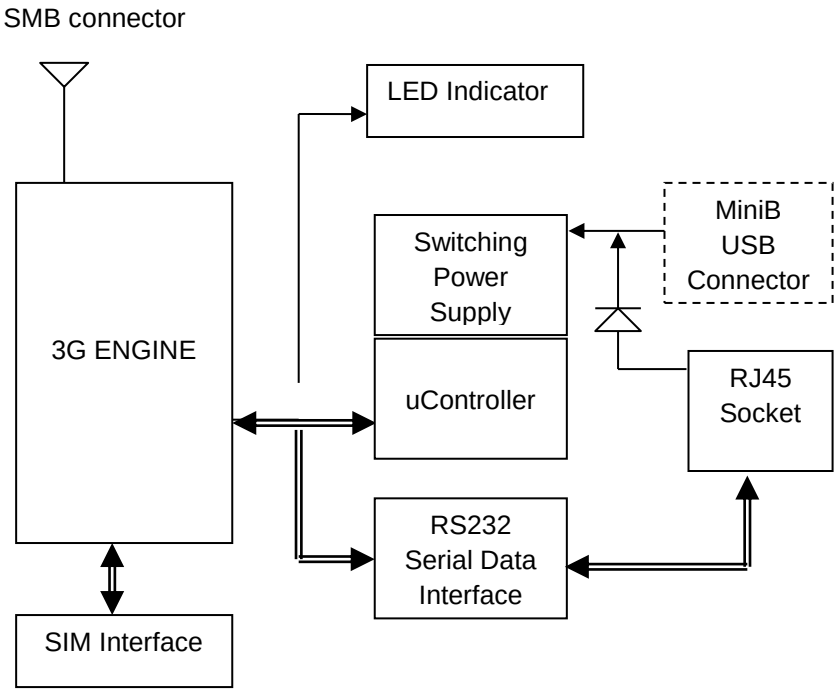
The production part number is located at the back of the SAM3Gplus, which includes:

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

6 Functionality

6.1 General

The SAM3Gplus modem consists of an RJ45 connector for serial port and input power, a miniB USB connector, an SMB Jack antenna connector and a SIM holder. The LED indicator, located on top, indicates the SAM operating status.



The SAM3Gplus Functional Block Diagram

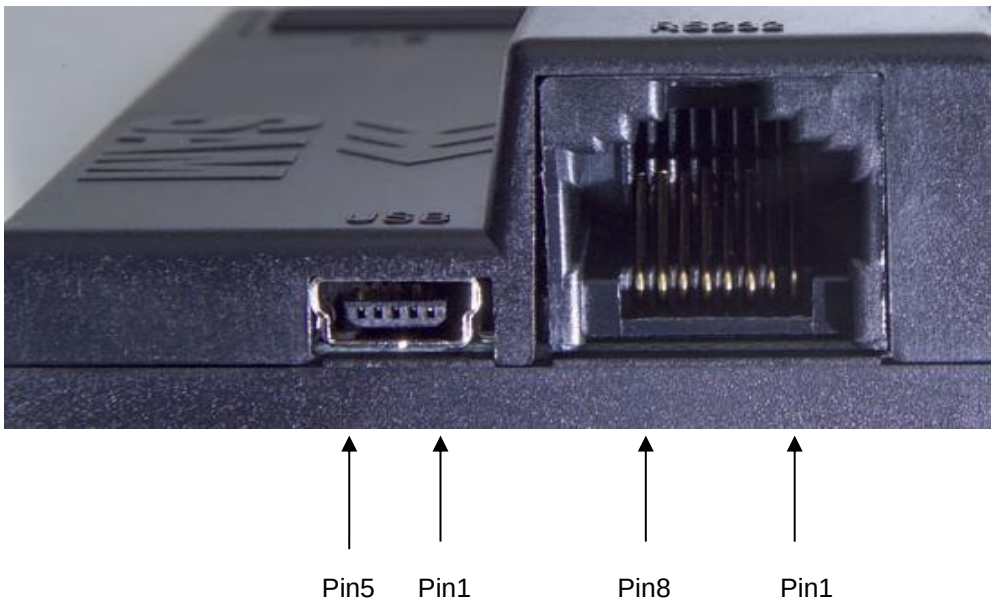
6.2 RJ45 Socket

Pin	*Signals*	*Description*
1	VIN	Input voltage 5Vdc - 30Vdc
2	DCD	Data Carrier Detect
3	DTR	Data terminal Ready
4	GND	Common Ground
5	RXD	Serial Data out of the SAM
6	TXD	Serial Data into the SAM
7	CTS	Clear to Send
8	RTS	Ready to Send

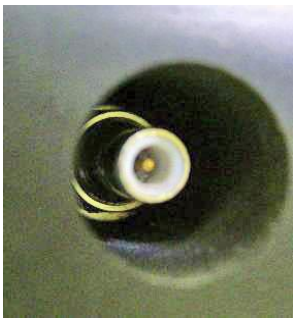
6.3 MiniB USB Connector

Pin	*Signal*
1	VIN
2	D-
3	Dplus
4	N/C
5	GND

Important Note : RS232 and USB ports must not be connected/operated simultaneously



6.4 SMB-Jack 50Ω Antenna Connector



6.5 USIM Holder

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 USIM interface complies with 3GPP standards

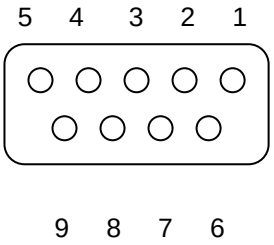
6.6 LED Status

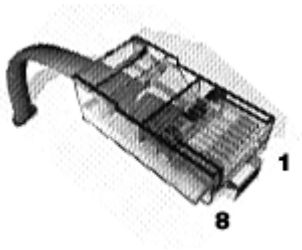
The LED indication has the following status:

- LED on steady: The SAM3Gplus is searching for network.
- LED flashes very slowly: No SIM card inserted.
- LED flashes regularly: The SAM3Gplus is on and connected to the network, but not transmitting or receiving data.
- LED flashes at fast rate : The SAM3Gplus is in use (transmit/receive data)
- LED is off : No power

6.7 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 SAM3Gplus
3	TXD	⟷	6	Serial Data into the SAM3Gplus
4	DTR		3	Not Used
5	GND	⟷	4	Common Ground
6	DSR			
8	CTS	⟷	7	Clear to Send
7	RTS	⟷	8	Ready 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

Vin = 12Vdc	HSDPA/WCDMA	GSM/GPRS/EDGE
Idle mode	31mA	31mA
Standby mode	105mA	80mA
Average In-Use:		
2Mbps@10dBm Tx	158mA HSUPA	-
7.2Mbps Rx	158mA HSDPA	-
384Kbps@10dBm Tx	137mA WCDMA	-
GSM CSD (9600bps)	-	87mA
GPRS PSD	-	110mA
EDGE	-	137mA

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
UMTS2100 :	Tx = 1920MHz - 1980MHz,	Rx = 2110MHz - 2170MHz
UMTS1900 :	Tx = 1850MHz - 1910MHz,	Rx = 1930MHz - 1990MHz
UMTS900 :	Tx = 880MHz - 915MHz,	Rx = 925MHz - 960MHz
UMTS850 :	Tx = 824MHz - 849MHz,	Rx = 869MHz - 894MHz

7.3 Receive Sensitivity

Band	Typical Rx Sensitivity (dBm)	Maximum Rx Sensitivity (dBm)
GSM850 (2% ber) CS	-107.5	-106
EGSM900 (2% ber) CS	-107.5	-106
DCS1800 (2% ber) CS	-106.5	-105
PCS1900 (2% ber) CS	-106.5	-105
UMTS2100(.1% ber) 12.2Kbps	-110.5	-109
UMTS1900(.1% ber) 12.2Kbps	-110.5	-109
UMTS900(.1% ber) 12.2Kbps	-110.5	-109
UMTS850(.1% ber) 12.2Kbps	-111.5	-110

Notes :

- BER : bit error rate
- CS : Circuit-switched

7.4 Conducted Transmit Power Tolerances

Parameter	Conducted Tx Power	Note
GSM850 & GSM900 CS	plus32dBm ±1dBm plus27dBm ±1dBm	GMSK mode, connectorized (Cl.4) 8PSK mode, connectorized (Cl.E2)
DCS1800 & PCS1900 CS	plus29dBm ±1dBm plus26dBm ±1dBm	GMSK mode, connectorized (Cl.1) 8PSK mode, connectorized (Cl.E2)
UMTS1900,900&850 12.2Kbps	plus23dBm ±1dBm	connectorized (Cl.3)
UMTS2100 12.2Kbps	plus23dBm ±1dBm	connectorized (Cl.3)

7.5 Main Antenna Specifications

Max cable loss	0.5dBm
Impedance	50Ω
Max allowed VSWR	3:1

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	-25°C to 60°C full RF performance 60°C to 75°C reduced RF performance
Storage temperature	-40°C to 85°C
Humidity	85% relative humidity (non-condensing)

8 Operation

The SAM3Gplus can support ***either*** the USB port ***or*** the Serial RS232 port. The port configuration is done at the point of sale. ***Do not operate these 2 ports at the same time !***

8.1 Using The USB Port

8.1.1 Installing The USB Driver

Note : If the old driver version has been installed, it must be removed, before installing the latest driver. To uninstall the old driver, follow these steps:

- Open the ***Control Panel***
- Double click ***System***, System Properties window appears
- Select the ***Hardware*** tab
- Select the ***Device Manager***
- Expand the ***Universal Serial Bus Controllers*** to show the installed devices.
- Right click the ***Sierra Wireless MC87xx device*** entry and choose ***Uninstall.***
- Click ***OK*** to confirm.

Step1: Locate and run the DriverInstaller.exe . Note that there is no feedback; just wait a few moments for the program to run.

Step2: Connect the SAM3Gplus to the PC, using the supplied USB cable. Several ***Found New Hardware*** balloons appear above the tool tray as the system detects the new devices. After the devices are detected, the Device Manager will show, in the following categories:

- Network Adapters: Sierra Wireless HSDPA Network adapter.
- Port (COM&LPT) :
  - Sierra Wireless AT Command port (UMTS)
  - Sierra Wireless CNS port (UMTS)
  - Sierra Wireless Data Port (UMTS)
  - Sierra Wireless DM Port (UMTS)

- Universal Serial Bus Controllers : Sierra Wireless MC87xx device

8.1.2 Firmware Upgrade

The USB port is used for firmware upgrade. Refer to the SAM3Gplus Firmware Upgrade document for further details.

8.2 Using The Serial RS232 Port

The RS232 default configuration is:

- Terminal speed : 115200bps (+IPR=115200)
- Data format : 8 data bits 1 stop bit (+ICF=3,3)
- Hardware RTS, CTS flow control (+IFC=2,2)
- No auto-answer (S0=0)

There are 6 serial data signals available at the RJ45 connector, namely DCD, DTR, RXD, TXD, RTS and CTS. There is an option for RI (Ring Indicator) signal instead of DTR signal.

This configuration allows any external controller to communicate with the SAM3Gplus at 115200bps over the serial port. The external device can set up the SAM3Gplus modem using AT commands, can transfer Circuit-switched data or Packet-switched data.

With packet-switched data, the external device must be capable of communicating using PPP, TCP/IP or UDP/IP.

Setup Example: Serial port connection to a PC

8.2.1 AT Commands:

The SAM3Gplus modem supports ***most*** of the AT commands specified in the following standards:

- 3GPP TS 27.005 : Control SMS functions for devices on GSM/WCDMA networks
- 3GPP TS27.007 : Control devices operating on GSM/WCDMA networks
- ITU-T V.250 : Control serial communications over an asynchronous interface

For details of the AT commands, refer to the "***Supported AT Command***" and "***Extended AT Commands***" manuals.

Notes

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