

M23

GSM / GPRS Wireless Module

DATASHEET

Rev. 0.1

December/10/ 2005

BenQ

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HISTORY

Version	Date	Notes
VER: 0.1	10-DEC-2005	FIRST RELEASE

BenQ

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1. INTRODUCTION

1.1. DESCRIPTION

Overview

The document describes all the functions, features, and interfaces of the GSM/GPRS Tri band Module M23 from BenQ. The M23 GSM/GPRS module can provide wireless communication solution for any product that has requirement of voice communication and data transmission through state of the art cellular technology.

With the BENQ M23 GSM/GPRS module, devices are enhanced in both functionality and usability based on state of the art wireless technology.

1.2. APPLICATION DEVICE

This module is designed to satisfy manufacturers, which also have a physical dimension concern of embedded GSM/GPRS features built into their products. Some main application devices of this module are:

- Wireless PSTN
- Mobile Trunk
- Car Phone/Telematics
- Wireless Terminal
- Alarm/Securities System
- Remote control

— SIM	SIM Function
— VBAT	Battery Voltage Input
— Audio	Earphone/MIC/Hand free
— Keypad Interrupt	Keypad Interrupt
— BGND	GND
— ANT	Antenna

1 Pad for RTC (Real Time Clock) backup battery connection.

Note: For RTC backup battery design, please refer to RTC Backup Battery Circuit for M23 application notes.

- Software Interface:

GSM Rec. 27.07

- General
- Call Control
- Network Service
- ME Control and Status
- ME Errors
- TIA IS-101

GSM Rec. 27.05

- SMS related services
- General Configuration
- Message Configuration
- Message Receiving and Reading
- Message Sending and Writing

ITU-T Rec. V25ter

- General TA Control
- Call Control and Command Response
- Data Compression

ITU-T Rec. T.32

- Action Command
- DCE Response
- Service Command

Note: For software AT commands, please refer to the M23 AT Command List.

2.2. Voice/Data Service

Tele Service

- Speech Service With EFR (Enhance Full Rate)/FR (Full Rate)/HR (Half Rate) Codec.
- Emergency Call
- DTMF Tone Generation

Short Message Service

- SMS with MT (Mobile Terminate)/PP, MO (Mobile Originated)/PP
- Delivery Report
- Cell Broadcast

FAX Service

- Direction: MOC (Mobile originated call) & MTC (Mobile terminated call)
- Fax GSM TS 3.45 fax transparent mode
- TS 61, 62
- TIA/EIA 578, Fax class 1, Interface to PC for GSM & PSTN
- TIA/EIA 592, Fax class 2, Interface to PC for PSTN
- ITU-T V.17 (14400 bps), V29 (9600bps), V27ter (2400/4800 bps)
- Transmission speed rate: 2400, 4800, 7200, 9600bps

Circuit Switch

- Data GSM TS 4.21 transparent mode
- Data GSM TS4.22 transparent mode
- Data transmission mode: asynchronous (normal)
- Radio channel: full rate
- Transmission speed rate: 2400, 4800, 9600 bps with data compression max 14400bps

Packet Switch

- GPRS Class B device
- Multi-Slot Transmission up to Class 8, 1 uplink slot, 4 downlink slot
- Coding Scheme CS1 – CS4 Supported

TCP/IP (M2M)

- TCP/IP client to a specific TCP/UDP server
- Machine-to-machine connection over GPRS

STK Parsing

- Parse STK raw data to specific data fields

2.3. Supplementary Service

Number identification

- Calling line identification presentation (CLIP)
- Calling line identification restriction (CLIR)
- Connected line identification presentation (CoLP)
- Connected line identification restriction (CoLR)

Call Offering

- Call forwarding unconditional (CFU)
- Call forwarding on mobile subscriber busy (CFB)
- Call forwarding on no reply (CFNRy)
- Call forwarding on mobile subscriber not reachable (CFNRc)

Call Completion

- Call waiting (CW)
- Call hold (HOLD)

Multi-Party

- MPTY Supported

Call-barring

1. Barring of all outgoing calls (BAOC)
2. Barring of outgoing international calls (BOIC)
3. Barring of outgoing international calls (BOIC- xHC)
4. Barring of all incoming calls (BAIC)
5. Barring of incoming calls when roaming (BIC-Roam)

2.4. RF Functionalities

Maximum TX Power

The performance of the transmitter meets test requirement GSM 11.10 Chapter 13.

Band	Max	Min
EGSM	33 dBm \pm 2dBm	5 dBm \pm 5dBm
DCS	30 dBm \pm 2dBm	0 dBm \pm 5dBm
PCS	30 dBm \pm 2dBm	0 dBm \pm 5dBm

Parametric Performance

Tests carried out at -20°C, 25°C and 60°C for each voltage 3.6V, 3.8V and 4.0V. The Measure Peak Phase, RMS Phase, frequency error, power level, and static sensitivity meets GSM 11.10 specifications

Band	Peak Phase Error	RMS Phase Error
EGSM	<20°	<5°
DCS	<20°	<5°
PCS	<20°	<5°

Sensitivity

The performance of the receiver meets test requirement GSM 11.10 Chapter 14.

Band	Typical	Min
EGSM	-106 dBm	-104 dBm
DCS	-105 dBm	-103 dBm
PCS	-105 dBm	-103 dBm

Radio Frequency

Radio Frequency (900 MHz EGSM)	
Frequency Range	TX 880-915 MHz; RX 925-960 MHz
Channel Spacing	200 KHz
Number of Channels	124 Carriers x 8 (TDMA)
Modulation	GMSK
Duplex Spacing	45 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	33 dBm Class 8 (2 W peak) – 5 dBm
Output Impedance	50 Ohm
Spurious Emission	-36 dBm up to 1 GHz (< -30 dBm > 1 GHz)
Radio Frequency (1800 MHz)	
Frequency Range	TX 1710-1785 MHz; RX 1805-1880 MHz
Channel Spacing	200 KHz
Number of Channels	374 Carriers x 8 (TDMA)
Modulation	GMSK
Duplex Spacing	95 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	30 dBm – 0 dBm
Output Impedance	50 Ohm
Spurious Emission	-36 dBm up to 1 GHz (< -30 dBm > 1 GHz) Compatible with phase 2 feature
Radio Frequency (1900 MHz)	
Frequency Range	TX: 1850~1910MHz; RX: 1930~1990MHz
Channel Spacing	200KHz
Number of Channels	299 Carriers x 8 (TDMA)
Modulation	GMSK
Duplex Spacing	80 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	30 dBm – 0 dBm
Output Impedance	50 Ohm

Spurious Emission	-36 dBm up to 1 GHz (< -30 dBm > 1 GHz) Compatible with phase 2 feature
-------------------	--

3. Hardware Description

3.1. INTERFACE

The function description of the M23 module is illustrated as the following table. The pins of the M23 module support functions like UART, GPIO, AUDIO, SIM ... etc. These features can meet customer design requirement for Car Phone.

44 Pins female connector interface

Group	Pin no.	Description
UART/RS232	6	RS232 transmit Interface
UART2	2	Software Debug
BU	1	Buzzer Output
GPIO	6	General Purpose I/O
Power On	1	Power On Pin
LED Driver	1	LED Driver, Paging
SIM	4	SIM Function
VBATRF	3	Power input for RF
VBATBB	1	Power input for BB
Audio	7	Earphone/MIC/Hand Free
Keypad Interrupt	1	Keypad Interrupt
BGND	10	GND
NC	1	NC

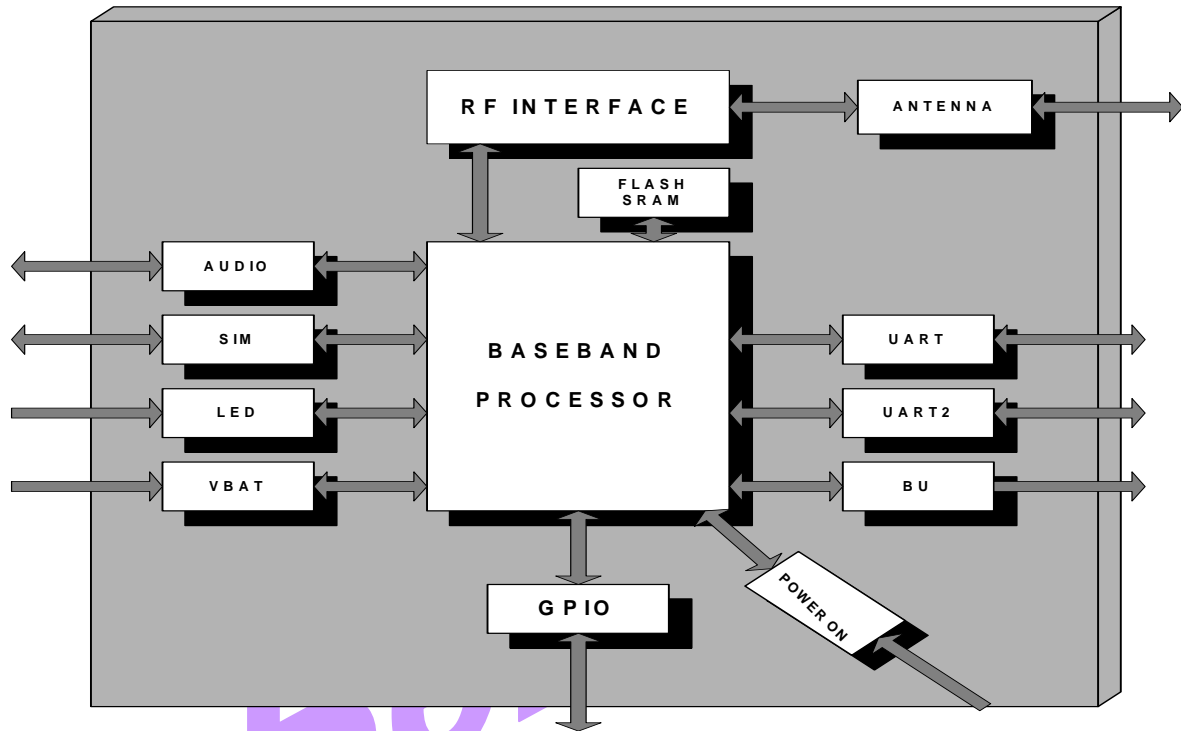
1 Pad for backup battery connection

Group	Description
Vbackup	RTC backup battery connection

Antenna interface (MMCX connector)

Group	Pin no.	Description
ANT	1	Antenna interface

3.2. Functional Diagram



3.3. Pin Description

Description Table

Pin	Description	I/O	PU	Reset	Config			
BGND		Ground						
IO 10	M23 wake up External device	O			Output / 0			
ROW4	Keypad Interrupt (Ext. device wake up of M23)	I	PU	Input	Input			
PWON	Power On	I	PU	Input	Input			
TXD2	UART2-Transmit Data	O		Output / 1	1			
RXD2	UART2-Receive Data	I	PU	Input	Input			
BU	Buzzer Output	O		0	0			
IO 12 / DCD	GPIO 12	O		Input	Output / 0			
VBATRF	RF PA Power Voltage Input	power			min	Typ	max	
					3.3	3.7	5.0	V
TXD	UART1-Transmit Data	O		Output / 1	1			
RXD	UART1-Receive Data	I	PU	Input	Input			
RTS	UART1-Request To Send	O		Output / 1	1			
CTS	UART1-Clear To Send	I	PD	Input	Input			
DSR	UART1-Data Set Ready	I	PU	Input	Input			
IO8/DTR	GPIO 8/ Data Terminal Ready	O		1	Output / 0			
TDI	JTAG-Data Input	I	LPU	Input	Input			
IO 13	GPIO 13	I		Output / 1	Input			
IO1 / RI	GPIO 1	O		Input	Output / 0			
IO 6	Re-download Data path and audio path switch	O		Input	Output / 1			
IO 11	Power off mode switch control signal to open or link the connection between system (Host) and module (client). <i>Low :; Connect</i> <i>High: Disconnect</i> <i>Default = Connect (Low)</i>	O		Input	Output / 0			
AUXI	Auxiliary hands free amplifier negative input(-)	I			Input			
MICIN	Microphone amplifier negative input(-)	I			Input			
MICIP	Microphone amplifier positive input(+)	I			Input			
MICBIAS	Microphone bias supply	power			Output(2v/2.5v)			
EARP	Earphone amplifier positive output(+)	O			Output			
EARN	Earphone amplifier negative output(-)	O			Output			
AUXOP	Auxiliary hands free amplifier positive Output(+)	O			Output			
SIM_RST	SIM Reset	O		0	Output			
SIM_IO	SIM Input / Output	I/O		0	Input / Output			
SIM_CLK	SIM Clock	O		0	Output			
VRSIM	Regulator SIM Output	O			Output			
LEDA	LED Driver, Paging Indicator	I			Input			
VBATBB	System Power Voltage Input	power			min	Typ	max	
					3.3	3.7	4.5	V

UART/RS232

The UART includes the following additional features

- Hardware flow control (DSR, RTS/CTS)
- Auto-baud rate with the possibility of baud-rates ranging from 1200 to 115.2K bits.

Pin Name	Pin Out	Pull	Reset	Config	Description
TXD	34		1	Output/1	Transmit Data
RXD	33	PU	Input	Input	Receive Data
RTS	32		Output / 1	Output/1	Request to Send
CTS	31	PD	Input	Input	Clear to Send
DSR	30	PU	Input	Input	Data Set Ready
IO 8/DTR	29		1	Output/1	Data Terminal Ready

Note: The difference between Reset and Config is in the pin definition table
 Pin IO 1 / IO 12 / IO 8 is dedicated to UART functions.

UART 2

Used for software debug.

Pin Name	Pin Out	Pull	Reset	Config	Description
TXD2	8		1	Output/1	Transmit Data
RXD2	37	PU	Input	Input	Receive Data

BU

When there is an incoming call, the Buzzer will generate a pulse.

Pin Name	Pin Out	Pull	Reset	Config	Description
BU	36		0	Output/0	Buzzer Output Pin

GPIO

The module provides 6 GPIO pins configurable in read or write mode.

Pin Name	Pin Out	Pull	Reset	Config	Description
IO 10	39		Input	Output/0	Module wake up external device
IO 13	28		1	Input	GPIO13
IO 6	25		Input	Output/1	Re-download data path and audio path switch
IO 11	27		Input	Output / 0	M23 Power off, connection between M23 and system (Host) open or short switch signal
IO 12/ DCD	9		Input	Output/0	GPIO12/Data Carrier Detect
IO 1/ RI	24		Input	Output/0	GPIO1/Ring Indicator

Note: 1) IO 10 timing sequence is defined in design guide.

2) IO 1 and IO 12 dedicate for UART feature (RI / DCD).

LED Driver

LEDA is dedicated for paging identification.

The initial status is listed as follows:

- i. In the initial mode (no voltage input), this pin will be in HIGH status.
- ii. In standby mode it will be pulled low for **500 ms** and then pulled high for **500 ms**, alternately.
- iii. In active mode (Incoming call) it will be pulled low **125 ms** and pull high **125 ms**.

Pin Name	Pin Out	Pull	Reset	Config	Description
LEDA	6			Input	LED DRIVER, paging Indicator

Note: 1) The maximum current is 10 mA.

2) The LEDA voltage range is 0.4 V ~ VBATBB

SIM Function

The SIM Card digital interface in ABB insures the translation of logic levels between DBB and SIM Card for the transmission of 3 different signals: a clock signal, derived from a clock elaborated in DBB, to SIM Card (SIM_CLK); a reset signal, from DBB to the SIM Card (SIM_RST); and serial data from DBB to SIM Card (SIM_IO) and vice-versa.

Pin Name	Pin Out	Pull	Reset	Config	Description
SIM_CLK	11		0	Output	SIM Clock
SIM_RST	13		0	Output	SIM Reset
SIM_IO	12		0	Input /Output	SIM Input / Output
VRSIM (3V)	23			Output	Regulator SIM Output

VBAT

The maximum and minimum voltage will be defined in the [Electrical Characteristics Table](#).

Pin Name	Pin Out	Pull	Reset	Config	Description
VBATRF	41			Input	RF PA Power Voltage input
VBATRF	42			Input	RF PA Power Voltage input
VBATRF	43			Input	RF PA Power Voltage input
VBATBB	1			Input	System Power Voltage input

Audio Function

There is a choice of differential EAR Phone output and differential Microphone input depending on customers' use. In addition, auxiliary pins can be used for hands-free.

Pin Name	Pin Out	Pull	Reset	Config	Description
EARP	20			Output	Earphone amplifier positive output(+)
EARN	21			Output	Earphone amplifier negative output(-)
MICP	16			Input	Microphone amplifier positive input(+)
MICN	17			Input	Microphone amplifier negative input(-)
AUXOP	22			Output	Auxiliary hands free amplifier positive output(+)
AUXI	18			Input	Auxiliary hands free amplifier negative input(-)
MICBIAS	15			Output	Microphone bias supply

BGND

Pin Name	Pin Out	Pull	Reset	Config	Description
BGND	2				GND
BGND	3				GND
BGND	4				GND
BGND	5				GND
BGND	10				GND
BGND	19				GND
BGND	26				GND
BGND	35				GND
BGND	40				GND
BGND	44				GND

Interrupt

For dual processor use, an interrupt signal from the external processor can be sent to the module when needed.

Pin Name	Pin Out	Pull	Reset	Config	Description
IO10	39		Input	Output/0	Module wakes up host system
ROW 4	7	PU	Input	Input	External Device interrupt M23

Note: Detailed interrupt sequences between the host and module is given in the M23 design guide.

Power ON

The Power On Pin needs to be pulled low for at least **120ms** to operate

Pin Name	Pin Out	Pull	Reset	Config	Description
PWON	38	PU		Input	Power On

RTC Backup Battery Connection

Pin Name	Pin Out	Pull	Reset	Config	Description
Vbackup	PCB Pad				RTC backup battery connection pad

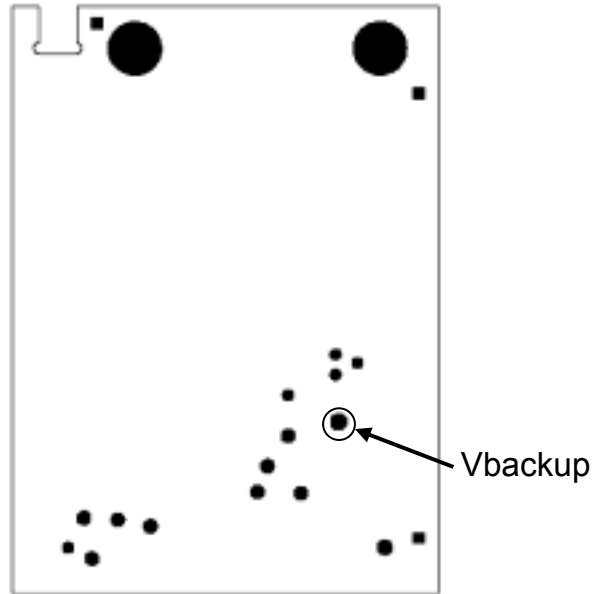
Note: By placing R508, pin14 can be programmed to be Vbackup. Detailed graph is shown below.

Antenna

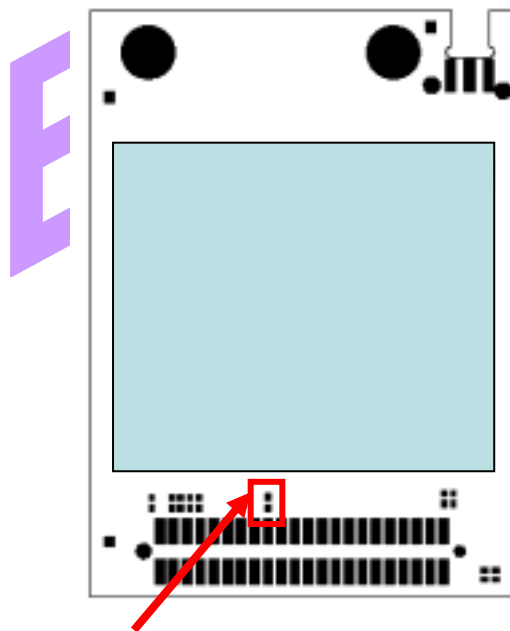
Pin Name	Pin Out	Pull	Reset	Config	Description
Ant	MMCX connector				Antenna interface (50 Ohm)

3.4. M23 Terminal Definition

VBATBB	1	44	GND
GND	2	43	VBATRF
GND	3	42	VBATRF
GND	4	41	VBATRF
GND	5	40	GND
LEDA	6	39	IO10
ROW4	7	38	PWON
TXD2	8	37	RXD2
IO12 / DCD	9	36	BU
GND	10	35	GND
SIM_CLK	11	34	TXD
SIM_IO	12	33	RXD
SIM_RST	13	32	RTS
NC / VBACKUP	14	31	CTS
MICBIAS	15	30	DSR
MICIP	16	29	IO8
MICIN	17	28	IO13
AUXI	18	27	IO11
GND	19	26	GND
EARP	20	25	IO6
EARN	21	24	IO1 / RI
AUXOP	22	23	VRSIM



Vbackup pad on the PCB bottom side is for RTC backup battery connection.



By placing R508, pin14 can be programmed to be Vbackup.

3.5. Electrical Characteristics

Pin	Function /Name	Description	PARAMETER	Min	Typ	Max	Unit	
2	GND	Ground						
1	VBATBB	System power input		3.3	3.7	4.5	V	
6	LEDA	LED driver, paging	DIGOUT	Current		10	mA	
				Supply voltage			VBATBB	V
23	VRSIM	Regulator SIM output		Active mode		10	mA	
				Sleep mode		1	mA	
				SIMSEL='0'	1.65	1.8	1.95	V
				SIMSEL='1' (Default)	2.7	2.85	3	V
11	SIM_CLK	SIM_clock	CLKOUT		1MHz@3V	5MHz@3V		
				(Voh)	0.7*VRSIM		V	
				(Vol)		0.2*VRSIM	V	
				Rated Current		2	mA	
13	SIM_RST	SIM_reset	DIGOUT	(Voh)	0.7*VRSIM		V	
				(Vol)		0.2*VRSIM	V	
				Rated Current		2	mA	
				(Vol)		0.4	V	
				Rated Current		2	mA	
10	GND	Ground						
22	AUXOP	Auxiliary hands free amplifier output(+)	Min. output resistive load	Min. output resistive load	1	1.2	Kohms	
				Max. output capacitive load			100	pF
				Common mode min. resistive load at AUXOP or AUXON		200k		Ohms
				Common mode max. capacitive load at AUXOP or AUXON			10	pF
19	GND	Ground						
21	EARN	Earphone amplifier output(-)	1.5 Vpp/Output swing 3.9 Vpp		33/120		ohms	
20	EARP	Earphone amplifier output(+)	1.5 Vpp/Output swing 3.9 Vpp		33/120		ohms	
15	MICBIAS	Microphone bias supply	DC-Power	MICBIAS=0		2	V	
				MICBIAS=1		2.5	V	
16	MICIP	Microphone amplifier input(+)			32.5		mVrms	
17	MICIN	Microphone amplifier input(-)		Nominal Ref. Level (MICIP-MICIN)		-10	dBm0	
				Differential input resistance (MICIP-MICIN)		100	dBm0	
18	AUXI	Auxiliary microphone amplifier input: single ended			365		mVrms	
3	GND	Ground						
27	IO11	GPIO:Input/Output11	DIGOUT	(Voh)	2.24		V	
				(Vol)		0.616	V	
				Rated current		2	mA	
25	IO 6	GPIO: Input/Output 6	DIGOUT	(Voh)	2.24		V	
				(Vol)		0.616	V	
				Rated current		2	mA	
24	IO 1/RI	GPIO: Input/Output 1	DIGOUT	(Voh)	2.24		V	
				(Vol)		0.616	V	
				Rated current		2mA		
26	GND	Ground						
4	GND	Ground						
28	IO13	GPIO:Input/Output13	DIGIN/OUT	(Vih)	1.96	3.3	V	
				(Vil)	-0.5	0.84	V	

Pin	Function /Name	Description	PARAMETER	Min	Typ	Max	Unit	
29	IO 8/DTR	Data Terminal Ready	DIGOUT	(Voh)	2.24		V	
				(Vol)			0.616	V
				Rated current		2		mA
30	DSR	RS232: Data set ready	DIGIN	(Vih)	1.96	3.3	V	
				(Vil)	-0.5	0.84		
31	CTS	RS232: Clear to send	DIGIN	(Vih)	1.96	3.3	V	
				(Vil)	-0.5	0.84		
32	RTS	RS232: request to send	DIGOUT	(Voh)	2.24		V	
				(Vol)			0.616	V
				Rated current		4		mA
33	RXD	RS232: receive data	DIGIN	(Vih)	1.96	3.3	V	
				(Vil)	-0.5	0.84		
				Rated current		1		
34	TXD	RS232: transmit data	DIGOUT	(Voh)	2.24		V	
				(Vol)			0.616	V
				Rated current		4		mA
35	GND	Ground						
41	VBATRF	Battery voltage input		3.3	3.7	5.0	V	
42	VBATRF	Battery voltage input		3.3	3.7	5.0		
43	VBATRF	Battery voltage input		3.3	3.7	5.0		
40	GND	Ground						
44	GND	Ground						
9	IO12 / DCD	GPIO:Input/Output12	DIGOUT	(Voh)	2.24		V	
				(Vol)			0.616	V
				Rated current		2		mA
36	BU	Pulse width modulated signal for buzzer (OUTPUT)	PWM Signal OUT	(Voh)	345	5275	Hz	
				(Vol)			0.616	V
				Rated current		4		mA
37	RXD2	UART-IRDA: receive data	DIGIN	(Vih)	1.96	3.3	V	
				(Vil)	-0.5	0.84		
8	TXD2	UART-IRDA: transmit data	DIGOUT	(Voh)	2.24		V	
				(Vol)			0.616	V
				Rated current		4		mA
38	PWON	POWER ON pin	Power On input	(Vih)	0.7*VBATBB			
				(Vil)				0.3*VBATBB
7	ROW4	Keyboard matrix 5*5 row access	Interrupt (Input)	(Vih)	1.96	3.3	V	
				(Vil)	-0.5	0.84		
				Rated current		1		
39	IO10	GPIO :Input/Output 10	DIGI/O	(Voh)	2.24		V	
				(Vol)			0.616	V
				Rated current		2		mA
5	GND	Ground						

Operating Voltage/Current Characteristics

Parameter	Description	Min	Typ	Max	Unit
Supply Voltage range	VBATRF	3.3	3.7	5.0	V

Parameter	Description	Min	Typ	Max	Unit
Peak VBATRF Current			1.8		A
Average VBATRF Current		230		260	mA
Average Standby mode VBATRF current	Paging Rate 9		3		mA
Vih	High-level input voltage	1.96		3.3	V
Vil	Low-level input voltage	-0.5		0.84	V
Voh	High-level output voltage	2.24			V
Vol	Low-level output voltage			0.616	V
SIM_CLK	Output frequency	1.625		3.25	MHz
VRSIM	SIMSEL=1	2.7	2.85	3.0	V
Vbackup	RTC backup battery voltage		3.1	3.3	V
Backup battery charging current		400	500	1200	uA

Audio Uplink Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Maximum Input Range (MICIP-MICIN)	Inputs 3 dBm0 (Maximum digital sample amplitude with PGA gain set to 0 dB)		32.5		mVrms
Nominal Ref. Level (MICIP-MICIN)			-10		dBm0
Differential Input Resistance			36		KΩ
Micro amplifier gain (MIC)			25.6		dB
Maximum Input Range (AUXI)	Input 3 dBm0 (Maximum digital sample amplitude with PGA gain set to 0dB)		365		mVrms
Nominal Ref. Level (AUXI)			-10		dBm0
Micro amplifier gain (AUXI)	VBDFAUXG=0		4.6		dB
	VBDFAUXG=1		28.2		dB
Input Resistance at AUXI	VBDFAUXG=0	100	170	24.5	KΩ
DC Level at MICBIAS	MICBIAS=0		2.0		Volt
Current Capability at MICBIAS		0		2	mA

Note:

(1) MICIP/MICIN and AUXI inputs are multiplexed, only one is available at the same time interval.

Audio Downlink Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Differential Minimum Resistive load at EARP-EARN	Output swing 3.9 Vpp		120		Ω
	Output swing 1.5 Vpp		33		Ω
Differential Maximum Resistive load at EARP-EARN				100	pF
Common Mode Minimum Resistive load at EARP-EARN			200		KΩ
Common Mode Maximum Resistive load at EARP-EARN				10	pF
Differential Minimum output resistive load at AUXOP		1	1.2		KΩ
Differential Minimum capacitor load at AUXOP				100	pF
Common Mode Minimum resistive load at AUXOP			200		KΩ
Common Mode Maximum Capacitor load at AUXOP				10	pF

Global Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Maximum Output Swing	5% distortion and 120Ω	3.1	3.92		Vpp
EARP – EARN	5% distortion and 33Ω	1.2	1.5		Vpp
Earphone amplifier gain			1		dB
Earphone amplifier state in power down			Hi-Z		
Maximum Output swing at AUXOP	5% distortion maximum, load = 1k Ω	1.6	1.96		Vpp
Auxiliary amplifier gain (AUXO)			-5		dB
AUXO amplifier state in power down			Hi-Z		
Power Supply Rejection			40		dB

3.6. Environmental

Operational temperature : -20 ~ +60

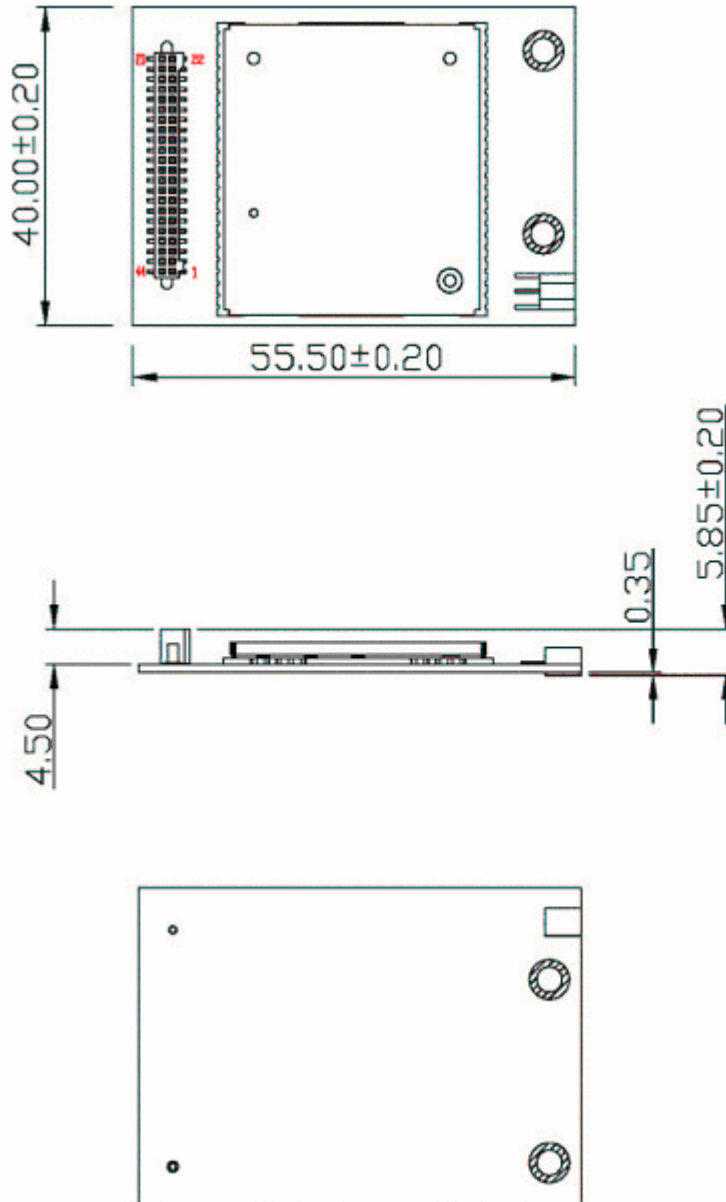
Functional temperature : -20 ~ +70

Storage temperature : -40 ~ +85

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3.7. Physical Package

Top View



4. Software Characteristics

4.1. Introduction

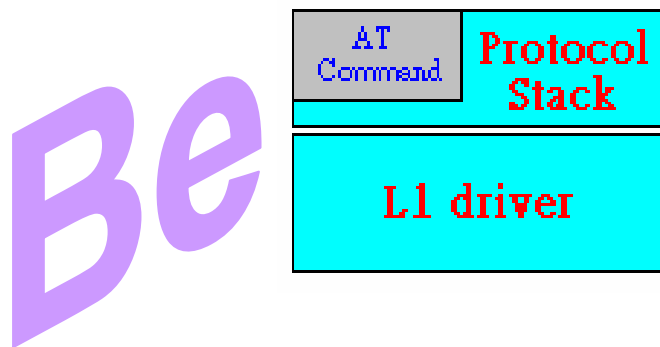
The following descriptions define the BenQ M23 module software architecture. For wireless PSTN customers, BenQ provides the supporting AT Commands. For telematics application, the following is needed: Address book, PC sync, Grouping by Ring Tones, and FAX.

4.2. Software Architecture

BenQ provides the Layer 1 driver and AT command. Based on different customer needs, different software architectures will be supported. This will be defined in the next section.

Architecture:

- Layer 1 Driver
- Protocol Stack/AT Command
- Basic interface



4.3. Software Architecture of Wireless PSTN

Due to the fact that there are both processors in BenQ's Module and the wireless PSTN, the common interface uses the AT Command. The software architecture was showed as the following diagram. Customers can use BenQ provided AT Commands to access the GSM/GPRS network on their platform.

