



# M16

## Quectel Cellular Engine

**EVB User Guide**

M16\_EVB\_UGD\_V1.01



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## 0. Revision history

Revision	Date	Author	Description of change
1.00	2009-10-20	Yong AN	Initial
1.01	2009-11-12	Yong AN	Add some content how to operate module better for customer when module is set to autobauding in default in Chapter 5.3.

## 1. Introduction

This document defines and specifies the usage of M16 EVB.

### 1.1. Related documents

**Table 1: Related documents**

SN	Document name	Remark
[1]	M10_ATC	AT commands set. M16 shares the same ATC as M10.
[2]	GSM_UART_AN	GSM UART port application notes
[3]	M16_HD	Hardware design
[4]	Upgrade_FW_Tools_UGD	User guide of firmware upgrade tools
[5]	GSM_UPGRADE_AN	GSM moduel upgrade design aplication notes

### 1.2. Terms and abbreviations

**Table 2: Terms and abbreviations**

Abbreviation	Description
D/L	Download
EVB	Evaluation Board
FPC/FFC	Flexible Printed Circuit / Flat Flexible Cable
GSM	Global System for Mobile Communications
SIM	Subscriber Identification Module
UART	Universal Asynchronous Receiver & Transmitter
USB	Universal Serial Bus
ZIF	Zero Insertion Force

## 2. EVB kit introduction

### 2.1. EVB top and bottom view

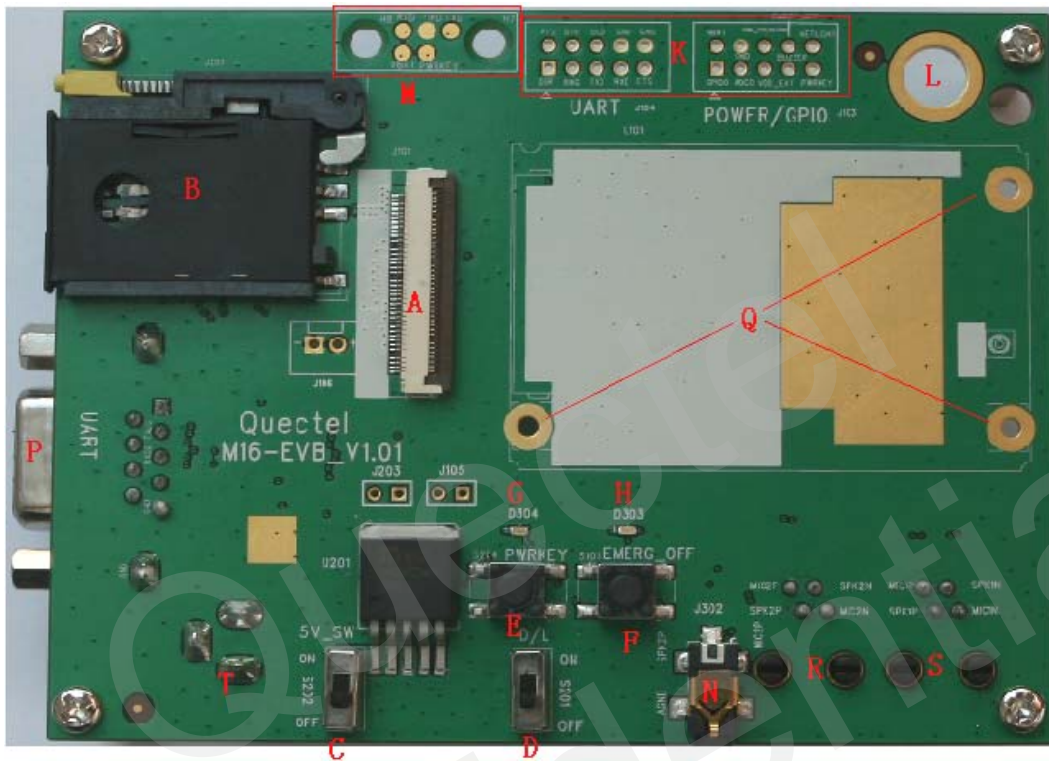


Figure 1: EVB top view

- A: ZIF connector
- B: SIM card socket
- C: 5V switch
- D: Download switch
- E: PWRKEY button
- F: EMERG\_OFF button
- G: Power indication LED
- H: Network status indication LED
- K: Test points
- L: Fixing hole for RF cable connector
- M: Test points for firmware upgrade
- N: Headset socket of audio channel 2
- P: Serial port 0
- Q: Fixing holes for M16 module
- R: Handset socket of audio channel 2
- S: Handset socket of audio channel 1
- T: Power adapter interface



## 2.2. EVB accessory



**Figure 2: Accessory introduction**

- A: 5V DC switching adapter
- B: USB to UART converter cable
- C: Antenna
- D: RF cable
- E: Headset
- F: Bolts and nuts for underpinning EVB
- G: FPC cable and bolts and nuts for fixing module on the EVB

### 3. Interface application

#### 3.1. Power interface

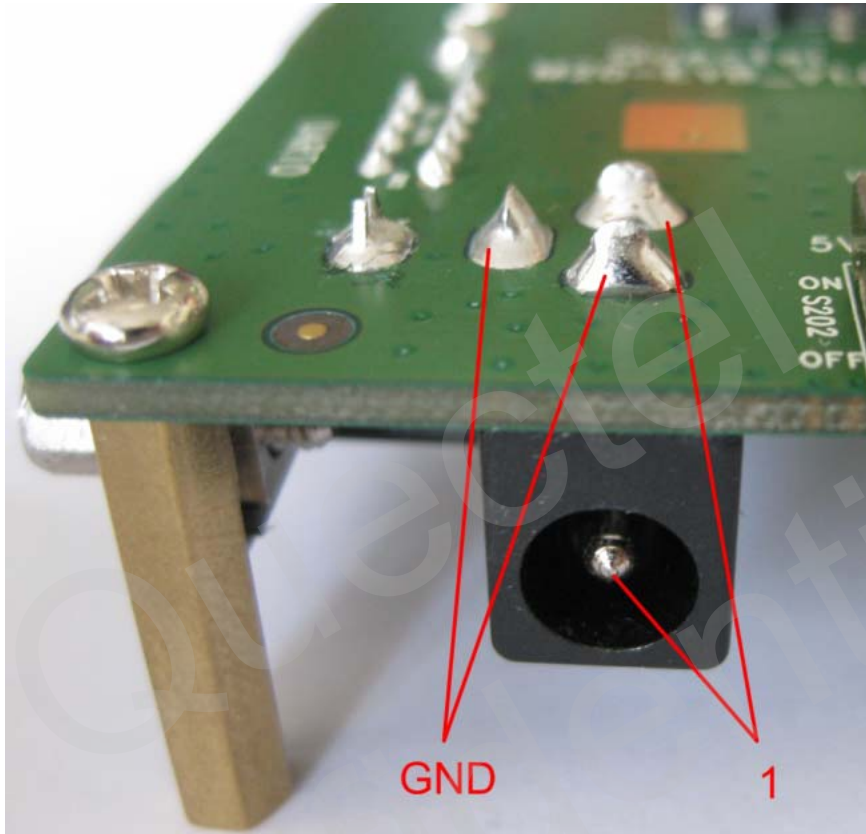


Figure 3: Power interface

Table 3: Pin of power interface

Pin	Signal	I/O	Description
1	Adapter input	I	5V/2A DC source input

The inner pin of the connector of power supply is positive. Customer should use the adapter which is provided by Quectel for testing M16 module.

### 3.2. Audio interface

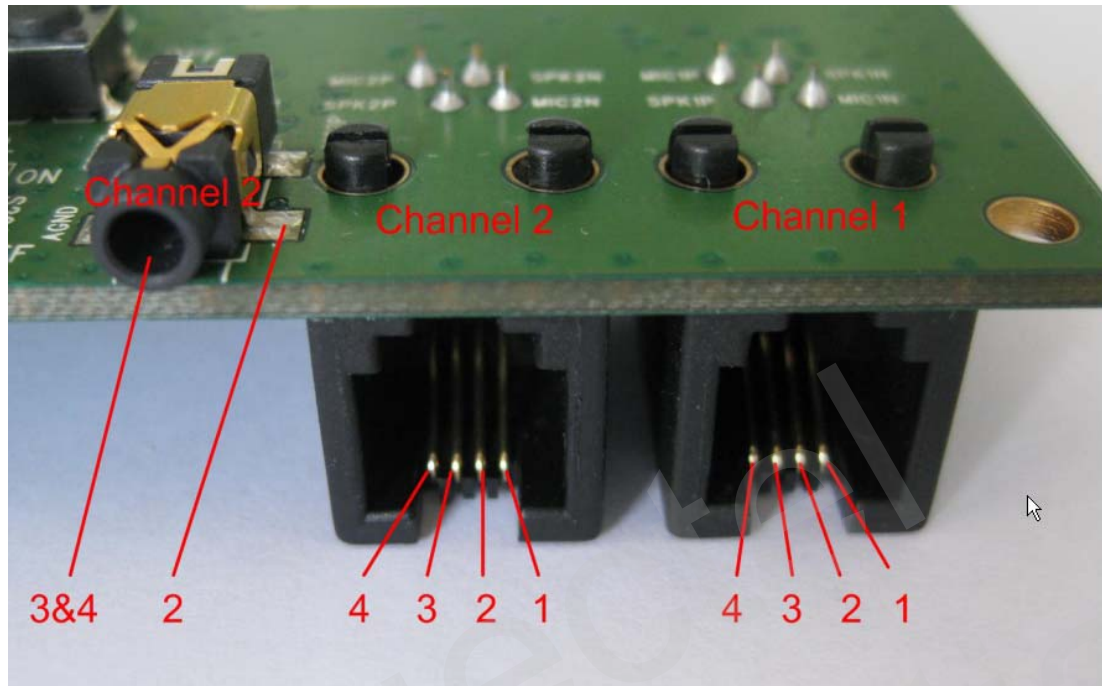


Figure 4: Audio interface

Table 4: Pins of audio channel 1

Pin	Signal	I/O	Description
1	MIC1N	I	Negative microphone input
2	SPK1N	O	Negative receiver output
3	SPK1P	O	Positive receiver output
4	MIC1P	I	Positive microphone input

Table 5: Pins of audio channel 2

Pin	Signal	I/O	Description
1	MIC2N	I	Negative microphone input
2	AGND		AGND of audio circuits
3	SPK2P	O	Positive receiver output
4	MIC2P	I	Positive microphone input

A headset or handset can be used in audio channel 2. The headset is included in the EVB kit from Quectel, while a suitable desktop phone handset can be selected by customer according to the definition of signal in Table 4.

### 3.3. SIM card interface

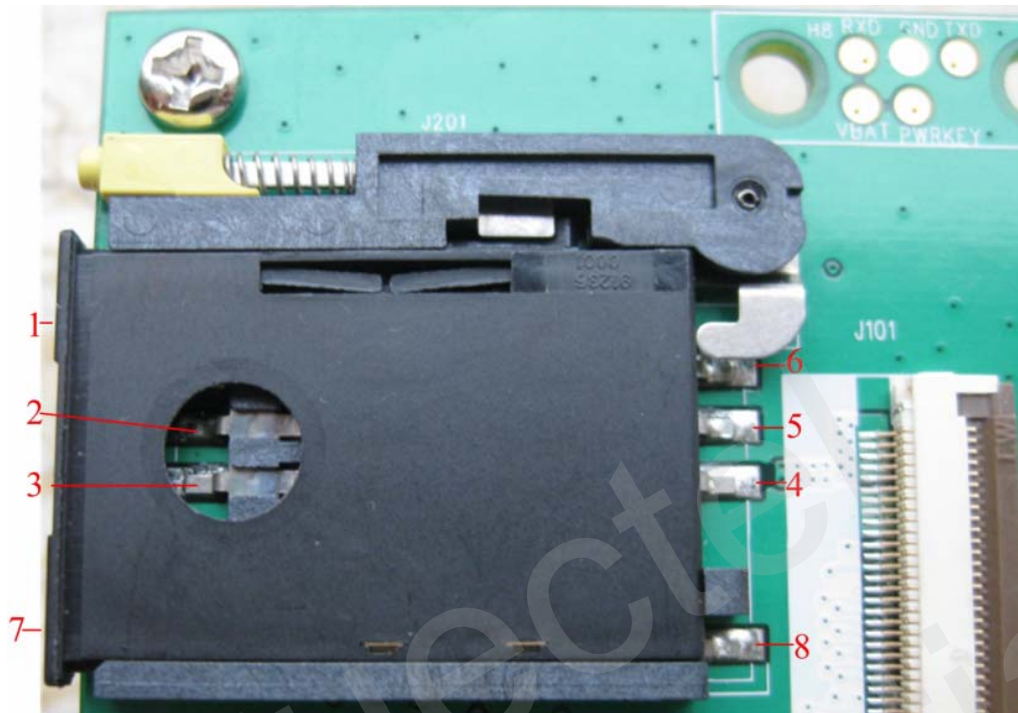


Figure 5: SIM card interface

Table 6: Pins of SIM card interface

Pin	Signal	I/O	Description
1	SIM_GND		Ground
2	VPP		Not connected
3	SIM_DATA	I/O	SIM card data I/O
4	SIM_CLK	O	SIM card clock
5	SIM_RST	O	SIM card reset
6	SIM_VDD	O	SIM card power output
7	SIM_DETECT		Pulled up to VDD_EXT
8	SIM_PRESENCE	I	SIM card detection

In Figure 5, the pin SIM\_PRESENCE is used to detect whether the tray of the Molex SIM socket, which is used for holding SIM card, is present in the card socket. When the tray is inserted in the socket, SIM\_PRESENCE is at high level. For more details, please refer to *Document [3]*.

### 3.4. Serial port

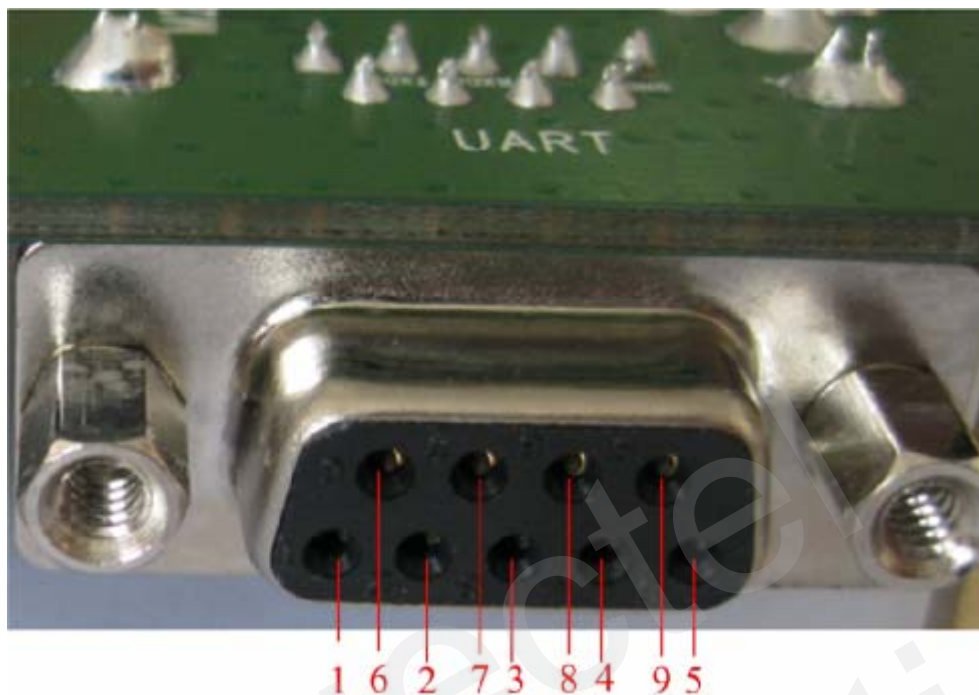


Figure 6: Serial port

Table 7: Pins of Serial Port 0

Pin	Signal	I/O	Description
1	DCD0	O	Data carrier detection
2	TXD0	O	Transmit data
3	RXD0	I	Receive data
4	DTR0	I	Data terminal ready
5	GND		GND
7	RTS0	I	Request to send
8	CTS0	O	Clear to send
9	RI0	O	Ring indicator

The voltage level of these signals has been shifted to RS-232 level, so it can be directly connect to PC by USB to UART converter cable. This port is used for AT command, GPRS data, CSD FAX, multiplexing function and firmware upgrade.

### 3.5. Switches and buttons

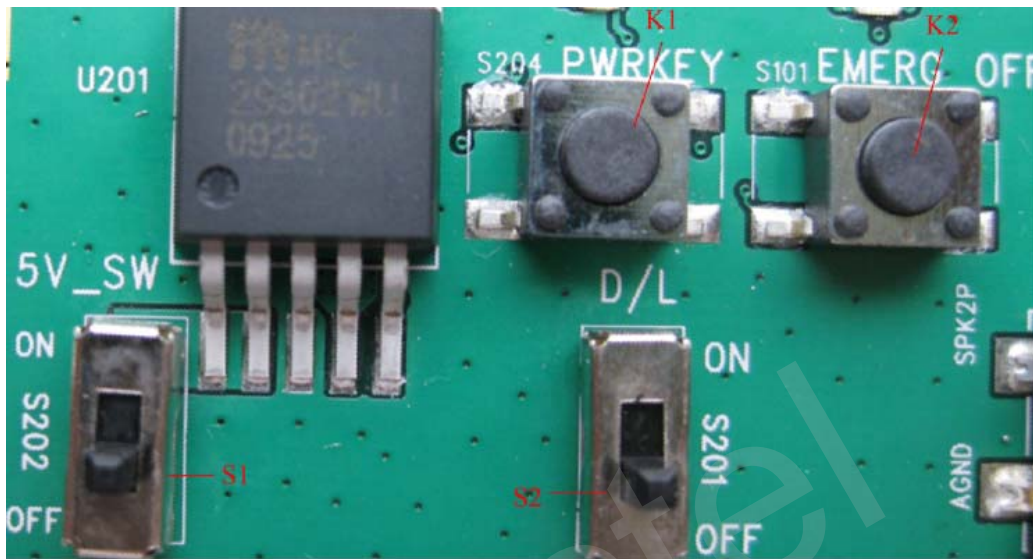


Figure 7: Switches and buttons

Table 8: Switches and buttons

Part	Name	I/O	Description
S1	5V_SW	I	Control power supply from adaptor
S2	D/L	I	Place to ON when downloading firmware
K1	PWRKEY	I	Turn on/off the module
K2	EMERG_OFF	I	Shutdown the module in emergency. Hardware power off operation.

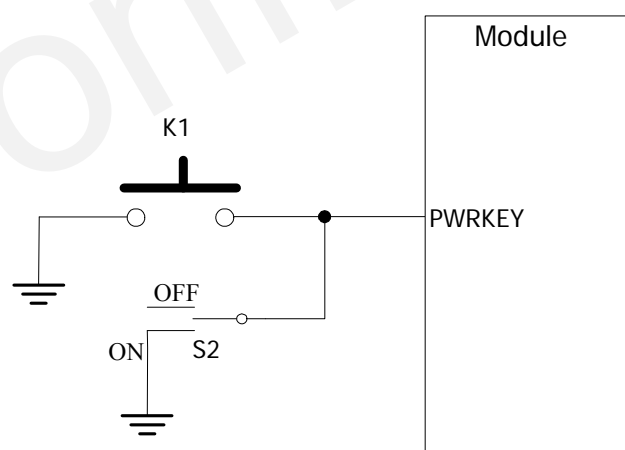


Figure 8: Circuit of PWRKEY

### 3.6. Operating status LED



Figure 9: Operating status indication LED

Table 9: Operating status indication LED

Part	Name	I/O	Description
L1	5V ON/OFF indicator	O	On: VBAT ON Off: VBAT OFF
L2	GSM_NET status indicator	O	Blinking differently to indicate various GSM network status

### 3.7. Test points

#### 3.7.1 J1 test points

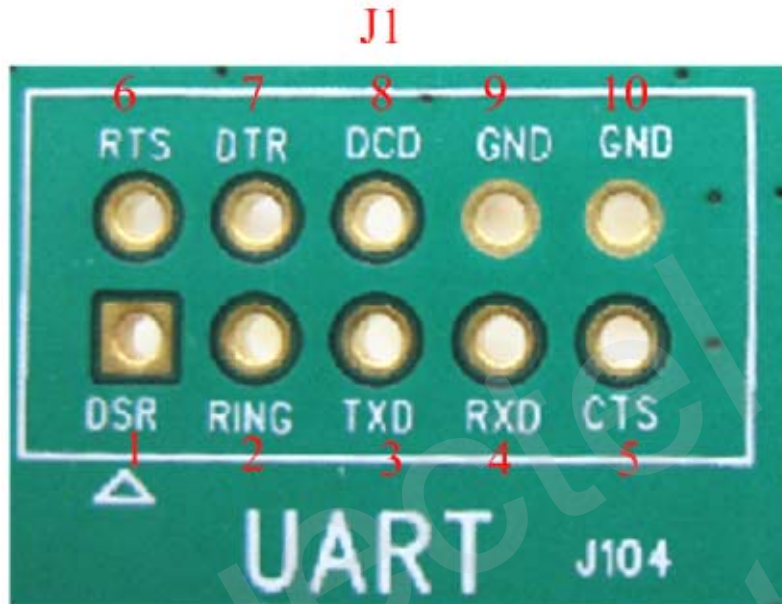


Figure 10: J1 test points

Table 10: Pins of J1

Pin	Signal	I/O	Description
1	Reserve		
2	RI0	O	Ring indicator
3	TXD0	O	Transmit data
4	RXD0	I	Receive data
5	CTS0	O	Clear to send
6	RTS0	I	Request to send
7	DTR0	I	Data terminal ready
8	DCD0	O	Data carrier detection
9	GND		Digital ground
10	GND		



### 3.7.2 J2 test points



Figure 11: J2 test points

Table 11: Pins of J2

Pin	Signal	I/O	Description
1	Reserve		
2	Reserve		
3	VDD_EXT	O	Supply 2.8V voltage for external circuit
4	Reserve		
5	PWRKEY	I	Turn on/off the module
6	VBAT	I	Power supply for GSM module
7	GND		Digital ground
8	SIM_PRESENCE	I	SIM card detection
9	EMERG_OFF	I	Shutdown the power in case of emergency
10	NETLIGHT	O	GSM network status indication

All test points are connected directly to M16 module, and their names defined are the same as those in the M16\_HD document.

### 3.7.3 VDD\_EXT and VBAT test points

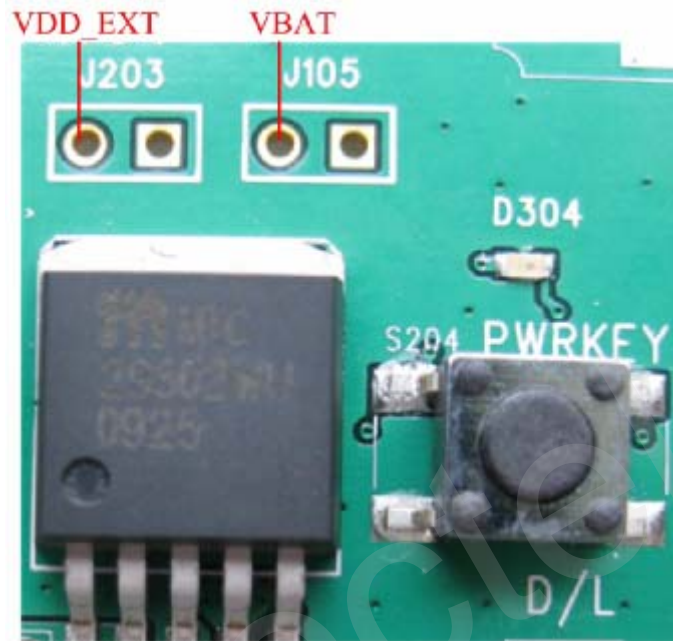


Figure 12: VDD\_EXT and VBAT test points

Customer can test these two test points to judge whether the power supply to the module or the VDD\_EXT voltage from the module is correct or not.

### 3.7.4 Firmware upgrade test points



Figure 13: Upgrade test points

These points are dedicated for upgrading firmware of the module by the customized firmware upgrade cable, and Quectel has provided reference design for customer. For more details, please refer to *document [5]*.

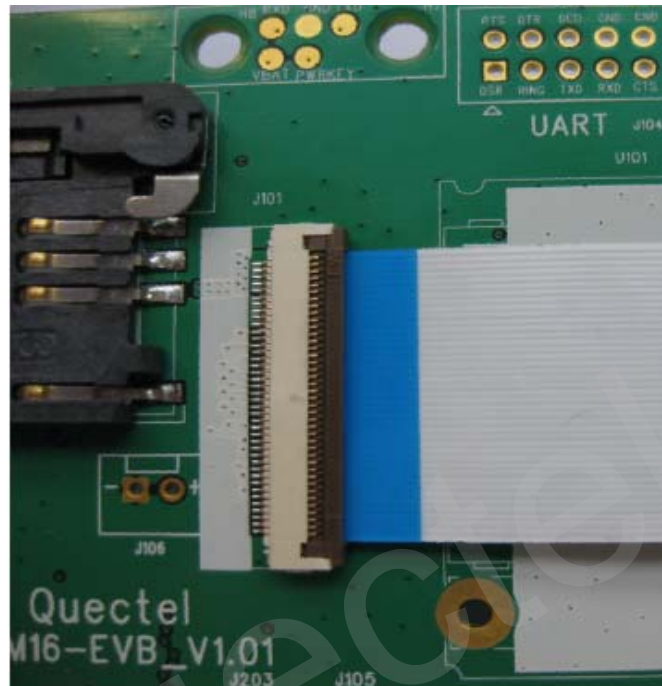
## 4. EVB assembly

The EVB and its accessories are assembled as shown in Figure 14.



**Figure 14: Assembled EVB and accessories**

## 4.1. FPC assembly



**Figure 15: FPC connected to ZIF connector of EVB**



**Figure 16: FPC connected to ZIF connector of module**

Connect the 2 ports of the FPC cable to the ZIF connectors of the EVB and the module separately according to Figure 15 and Figure 16.

## 4.2. Fix module and RF cable



Figure 17: Fix module and RF cable

## 5. Illustration

### 5.1. Power on operations

- (1) In Figure 7, put Switch S1 to **ON** state and Switch S2 to **OFF** state after 5V DC adapter has been plugged. The LED L1 on the EVB will be bright.
- (2) Press K1 (PWRKEY) button for more than 2 seconds, then release, the module will begin to run.

The blinking mode of the LED L2 indicates the status of the module.

### 5.2. Communicate with the module

- (1) Connect the UART port on EVB to PC's USB port with the USB to UART converter cable.
- (2) Open the HyperTerminal (AT command window) on PC. The location of the HyperTerminal in windows XP is START →program →accessory →communication →HyperTerminal. Set appropriate Baud Rate (such as 115200 bps) and COM number which can be checked by the Device Manager on PC.
- (3) Connect an antenna to the M16 with an RF cable.
- (4) Insert SIM card into the SIM card socket.
- (5) Insert earphone or handset into audio interface.
- (6) Power on the module by pressing PWRKEY button.
- (7) After waiting for 2~3 seconds, customer should firstly input "AT" or "at" string once or more until receiving "OK" from the module in the HyperTerminal.

**The module is set to autobauding mode in default configuration.** This operation is to synchronize the baud rate between the computer and the module.

- (8) Input AT command and the module will execute its corresponding function.  
Customer can refer to *document [1]* for details of AT commands. For instance, typing "ATD112;" will make a call to the emergency number 112.

### 5.3. Firmware upgrade

- (1) Start the Firmware Upgrade Tool in the PC.
- (2) Press the START button in the Firmware Upgrade Tool.
- (3) Switch the S2 and S1 in the EVB to ON state as shown in Figure 7.  
After these steps, the firmware refreshing process will be proceeding. For more details, please refer to *document [4]*.

## 5.4. Turn off

Pressing the PWRKEY button for about 1 second will turn off the module.

## 5.5. Emergency off

Pressing the EMERG\_OFF button for more than 0.1 second will shut down the module immediately. After this operation, the module can be restarted by pressing the PWRKEY button. Please note that the operation may be harmful to the whole module system and should only be done in emergency such as failing to turn off the module through the PWRKEY button.

## 6. 40 PIN assignment of ZIF connector

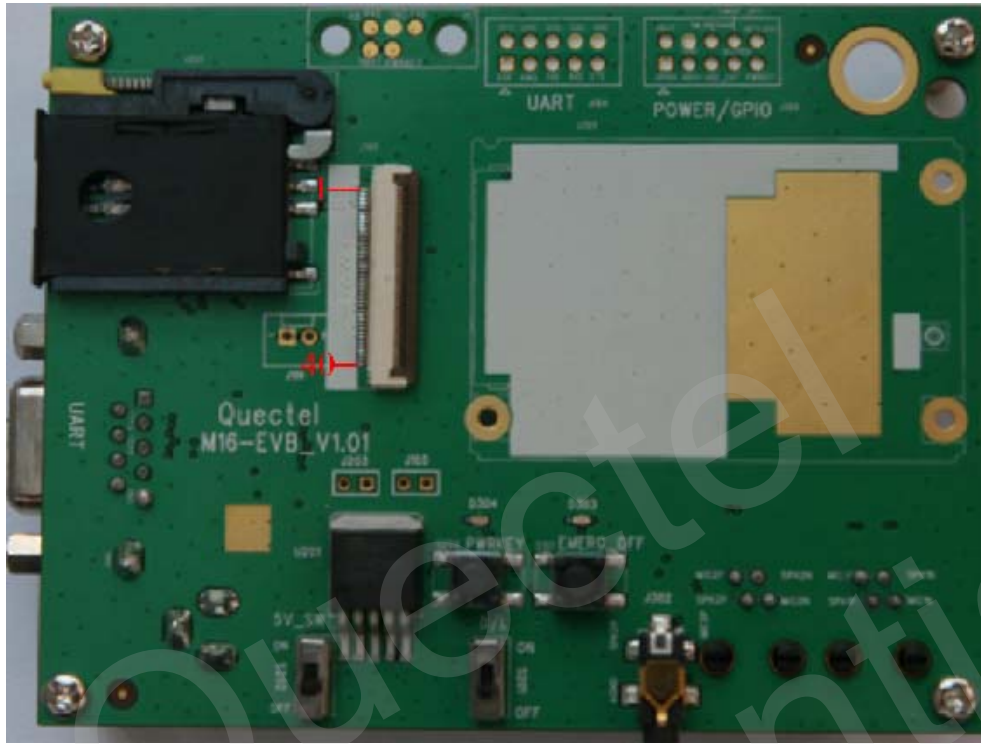


Figure 18: ZIF connector of EVB

Table 12: Pin definition of ZIF connector

PIN NO.	PIN NAME	I/O	PIN NO.	PIN NAME	I/O
1	VBAT	I	21	RTS0	I
2	VBAT		22	DTR0	I
3	VBAT		23	DCD0	O
4	VBAT		24	SIM_PRESENCE	I
5	VBAT		25	SIM_RST	O
6	GND		26	SIM_DATA	I/O
7	GND		27	SIM_CLK	O
8	GND		28	SIM_VDD	O
9	GND		29	SIM_GND	
10	GND		30	VRTC	I/O
11	Reserve		31	EMERG_OFF	I
12	Reserve		32	NETLIGHT	O
13	VDD_EXT	O	33	SPK2P	O
14	Reserve		34	AGND	



15	PWRKEY	I	35	SPK1P	O
16	Reserve		36	SPK1N	O
17	RI0	O	37	MIC1P	I
18	TXD0	O	38	MIC1N	I
19	RXD0	I	39	MIC2P	I
20	CTS0	O	40	MIC2N	I

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