DWM-800A
HW User Guide

CONTENT

1.Introduction

1.1. Overview

The HSPA+ Mini PCIe module DWM-800A , powered by MT6280 chipset, can be integrated into any devices for 3G mobile applications. It provides SMS, MMS, Call as well as high speed internet access to HSPA+and UMTS networks worldwide. Main features of DWM-800A is listed in table 1-1

Table 1-1 Main Features of DWM-800A

Item	**Description**
Air Interface	HSPA+/UMTS/EDGE/GPRS/GSM/WCDMA
Transmit speed	DL 21 Mbps, UL 11 Mbps
Frequency	GSM Band : 850/900/1800/1900MHz UMTS Band: 2100/1900/850 MHz
Operating temperature range	Normal Operation: 0℃ to +45℃ Storage: -20℃ to +65℃
Size	51mm*30mm*4.7mm
Voltage range	Power Supply: 3.3V-3.6V

1.2. Application Type

The application type of the module is shown as bellow:

All instructions relating to the integration of the module described on the FCC Grant notes must be followed.

1.3. Installation Guidelines

Careful planning and preparation of any installation will always benefit the end result, always read and follow all installation instructions. Follow ESD precautions and prepare an SD safe workspace for installation. Turn the power to the host off and ground yourself to dissipate static charge.

Mount only in sockets and locations intended for Mini PCIe cards consult manufacturer on thermal management recommendations for the module mounted within the host.

1.4. Application scenario

The HSPA module DWM-800A supports Voice Call, SMS, MMS and internet access functions. The block diagram of DWM-800A is as follows:

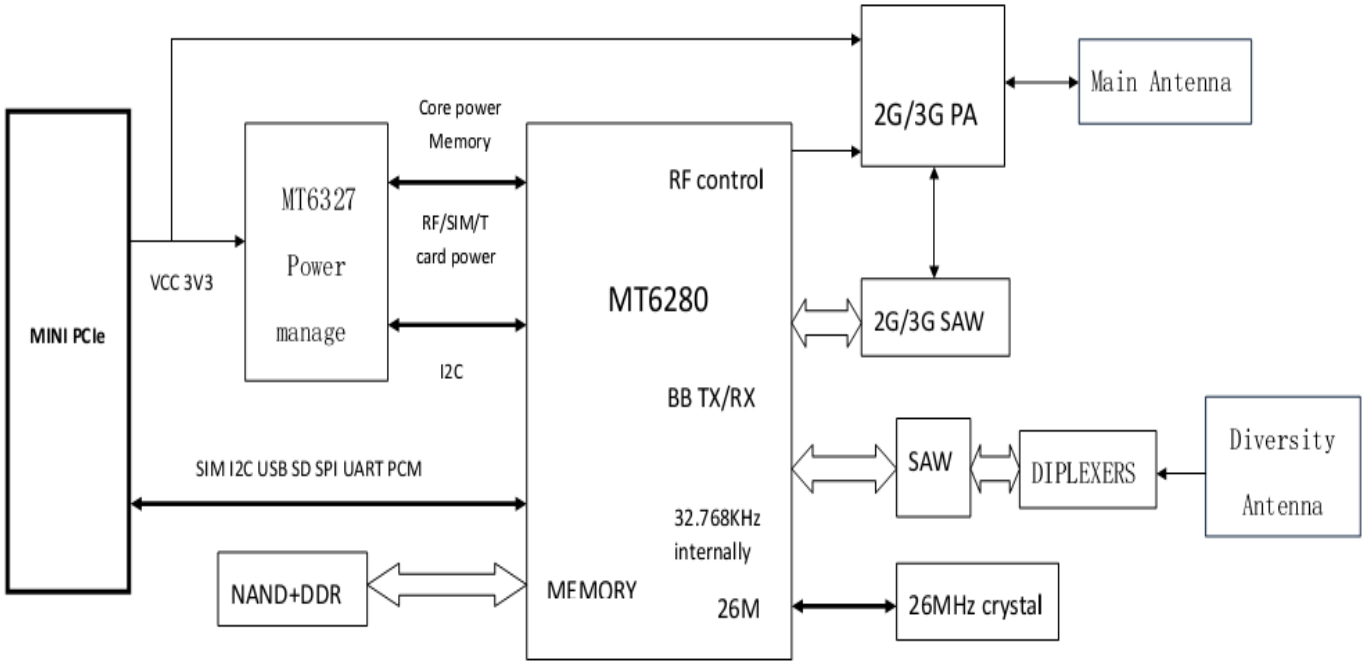


Figure1-1 **DWM-800A** block diagram

2. DWM-800A interfaces

2.1. DWM-800A interface summary

The module DWM-800A supports multimode operation: HSPA+, UMTS (850/1900/2100 MHz) and quad-band GSM (850/900/1800/1900 MHz). The size of DWM-800A is 51mm*30mm*4.7mm. The appearance is shown in Figure 2-1 and Figure 2-2.

Figure 2-1 The front view of DWM-800A

Figure 2-2 The rear view of DWM-800A

The MINI PCI-E is shown as in Figure , which is the main interface for application. RF antenna pad connector is shown as in Figure 2-1 .

2.1.1. RF interface

The DWM-800A module provides an interface for RF antenna by Connector: DWM-800A uses HRS's U.FL-R-SMT RF connector on the rear side.

Solder pad mode: The antenna can also be soldered to the pad on the module which has a ground pad close to the antenna pad.

The ground impedance of RF antenna is 50Ω. The RF connector is shown in Figure 2-3.

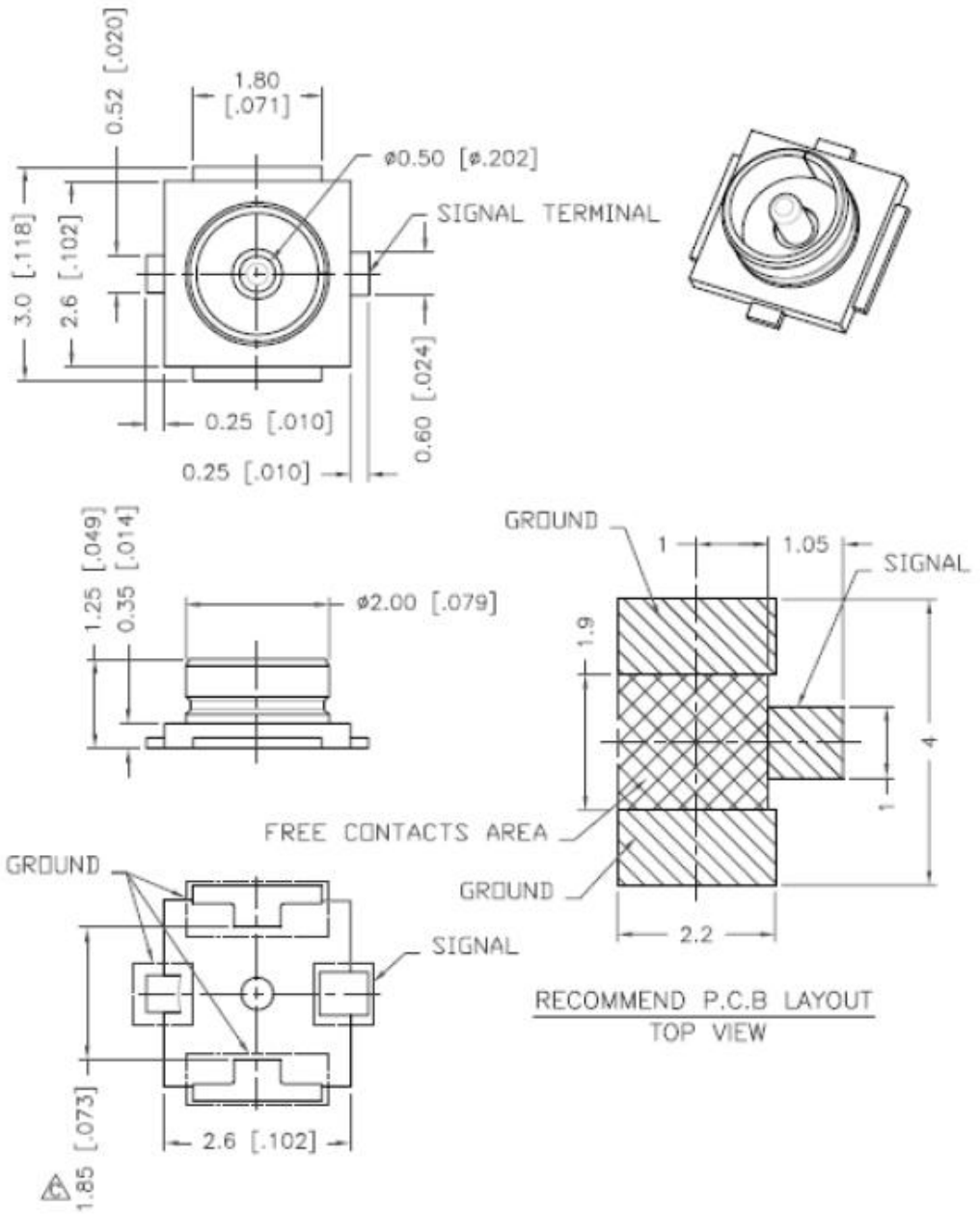


Figure 2-3 The sketch map of RF connector

It's required to use RF cable of which the insertion loss should comply with:

• GSM850/900<1dB

• DCS1800/PCS1900<1.5dB

• UMTS2100/ UMTS1900/ UMTS850<1.5Db

There are two RF connectors in DWM-800A ,the description of them is shown in **Figure 2-4** below:

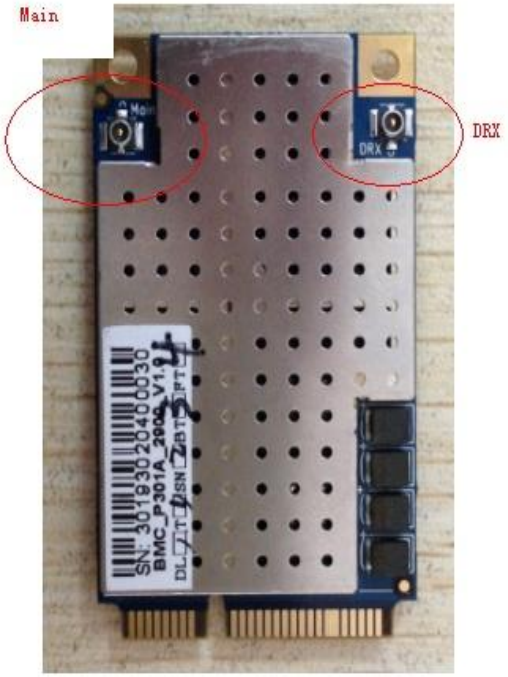


Figure 2-4 description of DWM-800A RF connectors

2.2. Application note of DWM-800A interfaces

DWM-800A provides rich interfaces for secondary development by the MINI PCI-E, such as USIM card interface, USB interface, UART interface, PCM（Pulse Code Modulation) interface, I2C interface, power supply interface and so on. The detailed information will be described in the following sections.

2.2.1. Power supply and Ground

The power supply input for DWM-800A module is listed as follows: DC +3.3V～+3.6V, for DWM-800A working voltage;

The description of DWM-800A Power supply and GND pins is shown in Table 2-1 below.

Table 2-1 The description of DWM-800A Power supply and GND pins

Power input	The correlative pins in MINI PCI-E	SN. of the MINI
DC: +3.3V～+3.6V input	VDD3V3	2,24,39,41,52
GND	GND	4,9,15,18,21,26,27,29,34,35,37,43,50

2.2.2. USB interface

2.2.2.1.Description

DWM-800A provides a high-speed USB interface by MINI PCI-E, which supports USB 2.0 protocol. The detailed information is given in **Table 2-2**.

Table 2-2 DWM-800A USB interface description

Signals of	The correlative pins in MINI PCI-E	SN. of MINI PCI-E	Description
DM	USB_HS_DM	36	USB Data-
DP	USB_HS_DP	38	USB Data+
GND	GND	4,9,15,18,21,26,27,29,34,35,37,43,50	GND

2.2.2.2.Reference circuit

The reference circuit of USB interface is shown in **Figure 2-5** below.

1) To get the reliable USB power supply, it is recommended to use a 10uF（C406) filter capacitor and a 22pF（C407) filter capacitor which need to be grounded.

2) To reduce the reflection caused by the high frequency alternating signal in the transmission, it is recommended to add a resistor with value below 10Ω to the DM and DP in USB interface to ensure correct transmission for USB data. Just like the resistors R408 and R409 in **Figure 2-5**.

3) To avoid static electricity in USB interface, it is recommended to use the ESD protection device. Just like the varistor RV406, RV407 and RV408 with capacitor values below 3pF.

4) To ensure USB working reliably, it is recommended to use additional protection device.

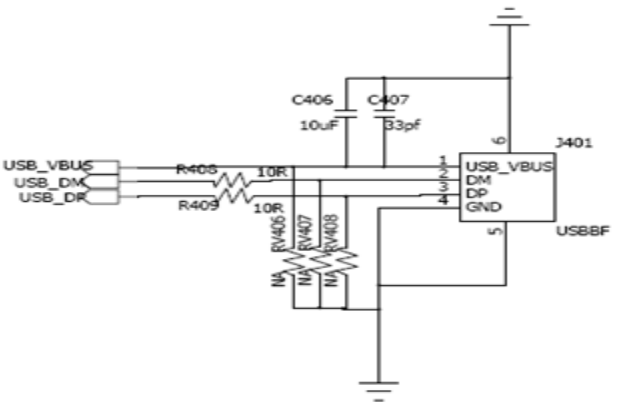


Figure 2-5 The reference circuit of USB interface

2.2.3. USIM interface

DWM-800A supports USIM card in UMTS mode as well as SIM card in GSM/GPRS/EDGE mode， and UIM card in WCDMA mode.

2.2.3.1.Description

DWM-800A provides USIM card interface by MINI PCI-E which can be used in both UMTS and GSM/GPRS/EDGE networks. The Table 2-3 gives more detailed information.

Table 2-3 DWM-800A USIM card interface description

Signals offered by USIM interface	The name of the correlative pins in MINI PCI-E	SN. of the MINI PCI-E	Description
DATA	USIM_DATA	10	USIM card data
CLK	USIM_CLK	12	USIM card CLK
RST	USIM_RESET	14	Reset signal
VCC	VREG_EXTUSIM	8	USIM card power
GND	GND	4,9,15,18,21,26,27,29,34,35,37,43,50	GND

2.2.3.2.Reference circuit

The reference circuit of USIM interface is shown in **Figure 2-6** below.

1) The DATA line of USIM is connected to SIM power supply by a pull-up resistor with reference value 15KΩ.

2) To avoid the instantaneous voltage overflowing, the resistor with reference value 22Ω can be used for the DATA, CLK and RST line. Just like the resistors R307, R308 and R309 in **Figure 2-6**.

3) To avoid the static electricity in USIM socket, it is recommended to use the ESD protection device for the DATA， CLK and VCC line. Just like the varistors RV301, RV302, RV303 and RV304 in **Figure 2-6** this should be close to the USIM socket as possible.

4) To get more flat USIM power supply, it is recommended to use the filter capacitors. Just like C311 and C312 in **Figure 2-6**with reference value 33pF and 100nF.

5) To eliminate the peak interference and high frequency interference signal on RST and CLK line, the filter capacities (C310, C309) can be placed in RST and CLK line, the reference value is 33pF.

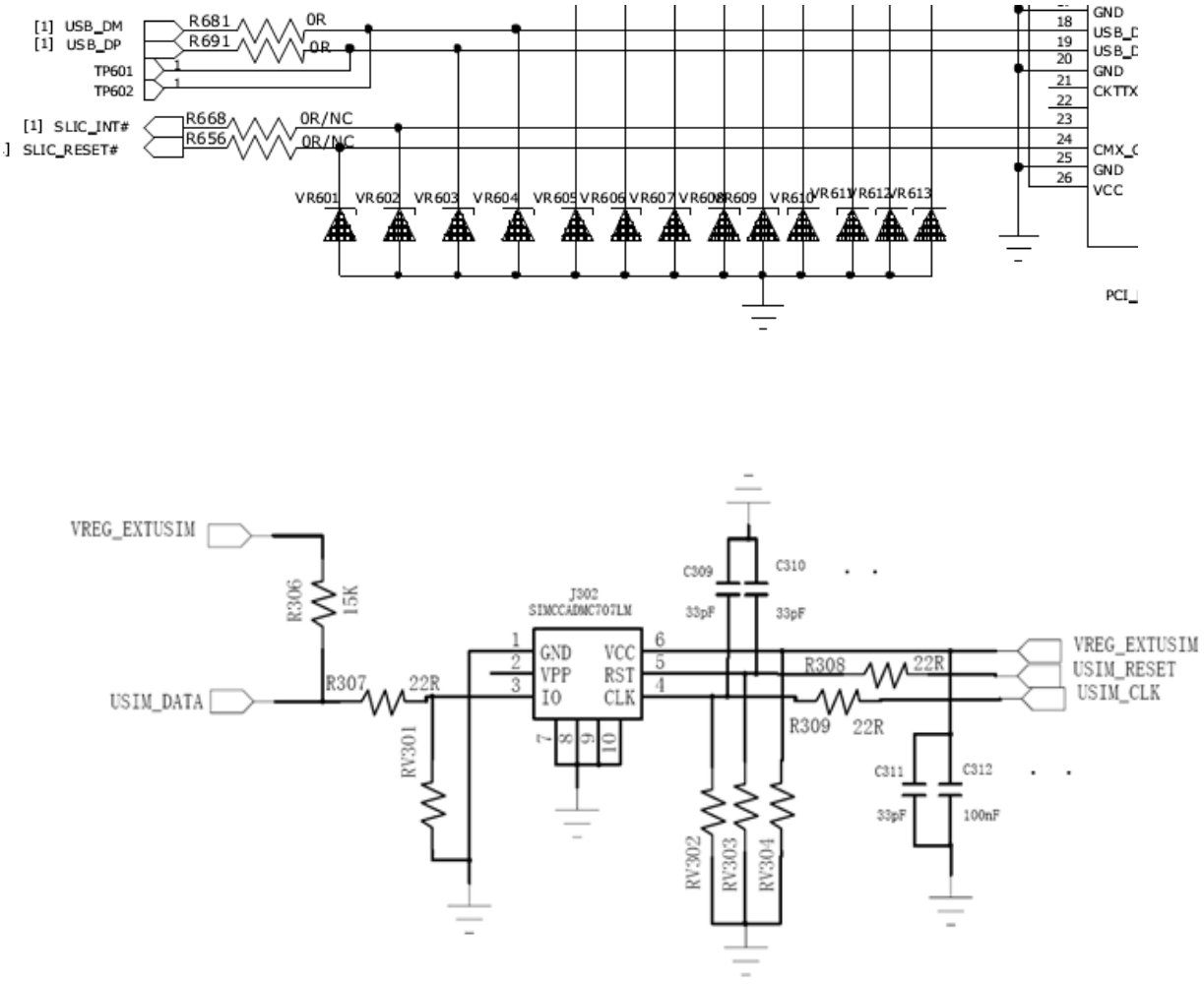


Figure 2-6 The reference circuit of USIM interface

2.2.4. PCM interface

It can just support PCM(Optional). It can provide voice call by PCM， using external audio codec . **DWM-800A** provides a UART interface by MINI PCI-E for debug.

2.2.4.1. Description

PCM interfaces on the DWM-800A have been designed to be compatible with others so as to meet different needs. And we can make corresponding configuration for interfaces on the DWM-800A according to customer's requirements. The information about UART and PCM interfaces provided by DWM-800A is described in **Table 2-4**

Table 2-4 The connection between phone handle and the MINI PCI-E

SN. of MINI PCI-E	Compatible definition
45	PCM_CLK

47	PCM_SYNC/PCM_IN
49	PCM_OUT/PCM_IN
51	PCM_IN/PCM_SYNC

2.2.5. SD card tntreface

2.2.5.1.Description

There are seven pins for SD card in the MINI PCI-E. And the detailed information is given in Table 2-5 below.

Table 2-5 DWM-800A SD card interface description

pcie Pin.NO	Signal name	Description
13	SDC1_CMD	SD Command/Response
17	SDC1_DATA0	SD Data 0
19	SDC1_DATA1	SD Data 1
23	SDC1_DATA2	SD Data 2
25	SDC1_DATA3	SD Data 3
31	SDC1_CLK	SD Clock
32	VREG_SD	SD Supply voltage

2.2.6. Others

DWM-800A also provides some other interfaces listed in **Table 2-7**.

Table 2-7

pins in	SN. of the MINI PCI-E	Volt	Description
W_DISABLE_N	20	2.6	The W_DISABLE# signal is an active low signal that when asserted (driven low) by the system shall disable radio operation.
WAKE_N	1	2.6	The WAKE# signal is an open drain, active low signal that is driven low by a PCI Express Mini Card function to reactivate the PCI Express Link hierarchy's main power rails and reference clocks.
I2C_SCL	30	2.6	I2C Interface

I2C_SDA	32	2.6	I2C Interface
SPI_SDI	3		Serial port control data input
SPI_SDO	5	2.6	Serial port control data output
SPI_CS#	6	2.6	Serial port control Chip Select
SPI_SCLK	7	2.6	Serial Port Bit Clock

3. Electrical Characteristics and Safety Information

3.1. Absolute Maximum Ratings

Absolute maximum rating for power supply and voltage on I/O pins of **DWM-800A** are list in table1 as follows.

Table 3-1 Absolute maximum ratings

Symbol	Description	Min	Max	Units
VIO	Voltage on any input or output pin	-0.5	VPAD*+0.5	V
VBAT	POWER SUPPLY	3.3	3.9	V

*VPAD=1.8V

2.7.1.1 Absolute Maximum Ratings

Parameter	Conditions	Min	Max	Unit	notes
Supply VTCXO28		-0.3	3.3	V	
Supply VIO18		-0.3	3.3	V	
Supply VRF18		-0.3	2.0	V	
Junction Temperature			125	ºC	
Maximum receiver input level at RX1,RX1B etc	differential at RX1,RX1B etc (Z=100Ohm)	+3		dBm	Maximum in-band signal
Maximum Power Detector input Power	Z=50Ohm	+7		dBm	

3.2. Power-Up and Power-Down Sequence

DWM-800A is Auto Power On when VBAT is ready. The system would be turned on. The pmic(MT6327) power on sequence is as below:

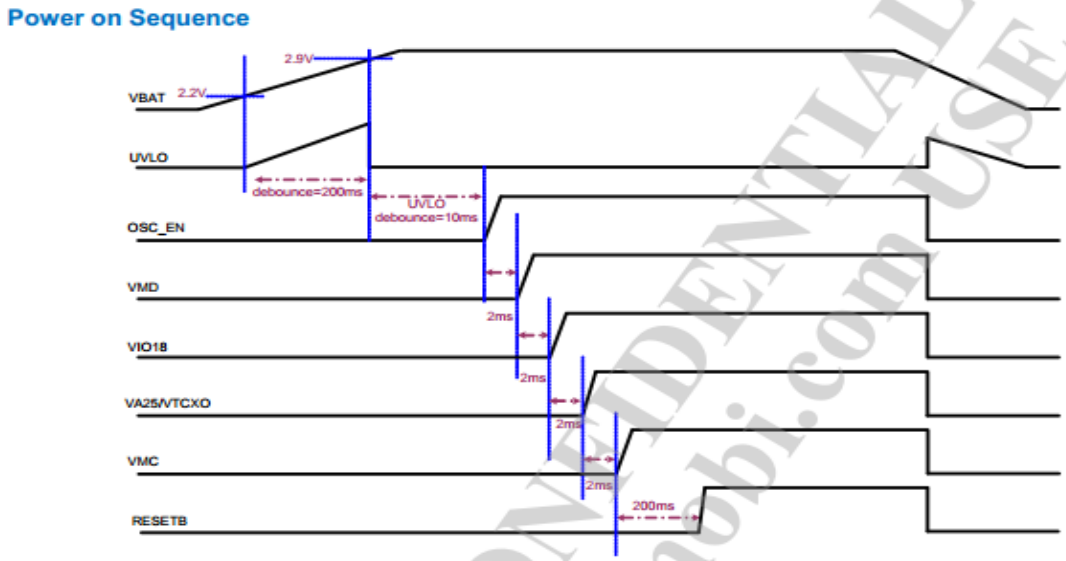
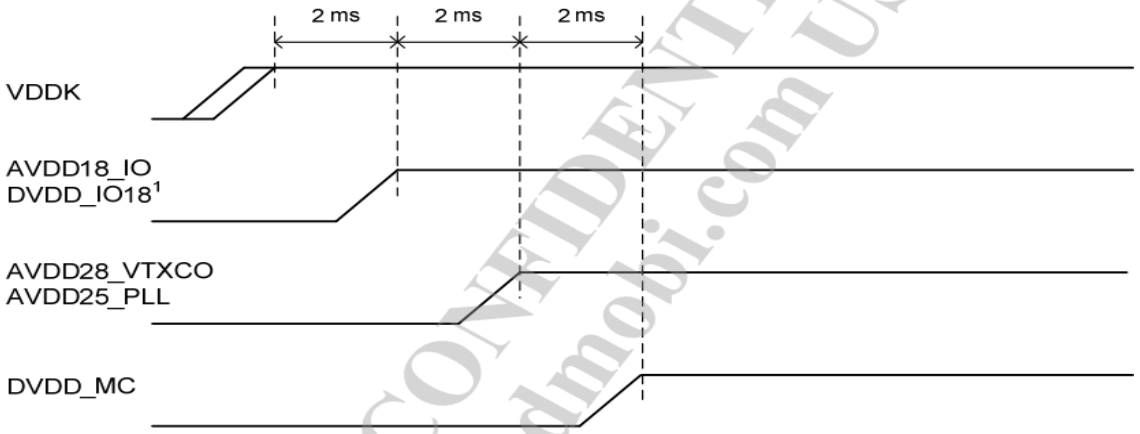


Figure 3. Power-on/off control sequence

The CPU(MT6280) power on sequence is as below:



Note 1: The DVDD_IO18 includes the digital 1.8 volt IO power, except the DVDD_MC and DVDD_EMI.

Figure 9 Power on/off control sequence

3.3. Operating conditions

2.7.1.2 Operating conditions

Within the operating range the IC operates as per the functional description.

Parameter	Conditions	Min	Nom	Max	Unit
Supply VIO18	see section [4] – normal functional modes	1.7	1.8	1.9	V
SMPS Supply VRF18	see section [4]	1.75	1.825	1.9	V
Linear Supply VTCXO28		2.7	2.8	2.9	V
Receiver Front End					
RX input frequency range	See Receiver Section for detailed frequency ranges				
Rx required amplitude balance	All Rx input pairs	-1		+1	dB
Transmitter					
Tx Frequency Range	See Transmitter Section for detailed frequency ranges				
Tx O/P VSWR	All Phases ZL = 50Ω			2:1	

3.4. RF Exposure Compliance

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or Transmitter.

This device is intended only for OEM integrators under the following conditions:

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and

2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling:

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may bemaintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains

FCC ID: **KA2WM800AA1**”. The grantee's FCC ID can be used only when all FCC compliance requirements are met.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

4. Pins description of mini PCIE connector

SN	Definition	Description	Volt	Remark
1	WAKE_N	OUTPUT	1.8	The WAKE# signal is an open drain, active low signal that is driven low by a PCI Express Mini Card function to reactivate the PCI Express Link hierarchy's main power rails and reference clocks.
3	SPI_SDI	Serial port control data input	1.8	
5	SPI_SDO	Serial port control data output	1.8	
7	SPI_SCLK	Serial Port Bit Clock	1.8	
9	GND	Ground		
11	Reserved	Reserved		Reserved For Future Use
13	SDC1_CMD	SD Command/Response	1.8	
15	GND	Ground		
17	SDC1_DATA0	SD Data 0	1.8	
19	SDC1_DATA1	SD Data 1	1.8	
21	GND	Ground		
23*	SDC1_DATA2	SD Data 2	1.8	
25*	SDC1_DATA3	SD Data 3	1.8	
27	GND	Ground		
29	GND	Ground		
31*	SDC1_CLK	SD Clock	1.8	
33*	Reserved	Reserved		Reserved For Future Use
35	GND	Ground		
37	GND	Ground		
39	VDD3V3	POWER	3.3	Power Supply
41	VDD3V3	POWER	3.3	Power Supply
43	GND	Ground		
45*	PCM_CLK	PCM Clock	1.8	
47*	PCM_SYNC	PCM data strobe	1.8	
49*	PCM_OUT	PCM data output	1.8	
51*	PCM_IN	PCM data input	1.8	
2	VDD3V3	POWER	3.3	Power Supply
4	GND	Ground		
6	SPI_CS#	Serial port control Chip Select	1.8	
8	VREG_USIM	USIM Power	1.8	USIM Interface, USIM power
10	USIM_DATA	USIM_DATA	1.8	USIM Interface
12	USIM_CLK	USIM CLK	1.8	USIM Interface
14	USIM_RESET	USIM_RESET	1.8	USIM Interface
16	Reserved	Reserved		Reserved For Future Use
18	GND	Ground		

20	W_DISABLE_N		2.6	The W_DISABLE# signal is an active low signal that when asserted (driven low) by the system shall disable radio
22	EXT_RST_IN	Reset	2.6	Reset module
24	VDD3V3	POWER	3.3	Power Supply
26	GND	Ground		
28	Reserved	Reserved		Reserved For Future Use
30	I2C_SCL	I2C Clock	2.6	I2C Interface
32*	I2C_SDA/VMC_PMU	I2C Data/VMC_PMU	2.6	I2C Interface and SD power combine
34	GND	Ground		
36	USB_HS_DP	USB Data+		USB Interface
38	USB_HS_DM	USB Data-		USB Interface
40	GND	Ground		
42*	Reserved	Reserved		Reserved For Future Use
44*	Reserved	Reserved		Reserved For Future Use
46*	SLIC_INT#	SLIC_RESET#		SLIC INT
48	SLIC_RESET#	SLIC_RESET#		SLIC RESET
50	GND	Ground		
52	VDD3V3	POWER	3.3	Power Supply

***** UART and PCM interfaces on the DWM-800A have been designed to be compatible with others so as to meet different needs.

And we can make corresponding configuration for interfaces on the DWM-800A according to customer's requirements.

***** Please contact us to make sure if this pins could be used.

Federal Communication Commission Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.