05010TX

Product Specification

WLAN 11b/g/n SDIO MODULE

1. General Description

BL-R8782MS1 product Accord with FCC CE and   is a SDIO wireless module with smaller size, high performance and high linearity output power consumption, specifically designed to support high throughput data rates for next generation WLAN products. It is designed to supports IEEE 802.11g/b and 802.11n payload data rates. It provides the combined functions of DSSS and OFDM baseband modulation, MAC, CPU, memory, host interfaces, and direct conversion WLAN RF radio on a single integrated chip. For security, It supports 802.11i security standards through implementation of the AES /CCMP, WEP with TKIP, AES/CMAC, and WAPI security mechanisms. For video, voice, and multimedia applications, 802.11e QOS and 802.11h DFS are supported .It is also equipped with a coexistence interface for external, co-located 2.4GHz radios, also supported a SDIO interface for connecting WLAN activity to the host processor.

2.The range of applying

◆ Digital products (Printer, Digital camera, Digital photo frame)

◆ Game player

◆ Consumer electronic device and intelligent appliances (such as TV, DVD player, media player, etc)

◆ Table computer, notebook, E book

◆ Smart phone and other mobile applications

3.Features

Feature	Implementation
Power supply	VCC_3.3V +-0.2V
Clock source	40MHz
Temperature range	Work temperature: -20ºC---70ºC Storage temperature -55°C ~ +125°C
Package	SMT 14 pins
WLAN features	
General features	■single-chip integration of 802.11 wireless radio baseband, MAC, CPU, memory, host interface ■CMOS and low-swing sinewave input clock ■19.2,26,38,4,and 40MHz crystal clock support with auto-frequency detection if external sleep clock is available

	■ Low power operation supporting deep sleep and standby modes ■ Power management with external sleep clock support for near zero deep sleep power ■ Option to power directly from battery or to use 3.3v/1.8v/1.2v pre-regulated supplies ■ One time programmable (OTP) memory to eliminate need for external EEPROM ■ Fully compatible with Marvell Power Management device(s)
Host Interface	SDIO device interface(SPI,1-bit SDIO,4bit SDIO transfer modes at full clock range up to 50MHZ)
Standards Supported	■ IEEE 802.11 data rates of 1 and 2 Mbps ■ IEEE 802.11b data rates of 5.5 and 11 Mbps ■ IEEE 802.11a/g data rates of 6,9,12,18,24,36,48 and54 Mbps for multimedia content transmission ■ 802.11g/b performance enhancements ■ 802.11n compliant, with maximum data rates up to 72Mbps (20MHz channel) and 150Mbps (40MHz channel) ■ 802.11d international roaming ■ 802.11e Qos block acknowledgement (with support for 802.11n extension) ■ 802.11h transmit power control ■ 802.11h DFS radar pulse detection ■ 802.11i enhanced security ■ 802.11k radio resource measurement ■ 802.11r fast hand-off for AP roaming ■ 802.11w protected management frames ■ Fully supports clients (stations) implementing IEEE Power Save mode ■ Wi-Fi Direct connectivity
WLAN MAC Features	■ RTS/CTS for operation under DCF ■ Hardware filtering of 32 multicast addresses and duplicate frame detection for up to 32 unicast addresses ■ On-chip Tx and Rx FIFO for maximum throughput ■ Open System and Shared Key Authentication services ■ A-MPDU Rx (de-aggregation) and Tx (aggregation) ■ 20/40MHz coexistence ■ Reduced inter-Frame Spacing (RIFS) bursting

	■ Management information based counters ■ Radio resource measurement counters ■ Block acknowledgement with 802.11n extension ■ Dynamic frequency selection(DFS) ■ Transmit beamformee support ■ Transmit rate adaptation ■ Transmit power control ■ Long and short preamble generation on a frame-by-frame basis for 802.11b frames ■ Marvell Mobile Hotspot
WLAN Radio	■ Integrated direct conversion radio ■ 20/40MHZ channel bandwidths ■ Integrated T/R switch ,PA, and LNA for 2.4GHz path ■ Integrated PA and LNA for 5GHz path
WLAN Rx Path	■ Direct conversion architecture eliminates need for external SAW filter ■ On-chip gain selectable LNAS with optimized noise figure and power consumption ■ High dynamic range AGC function in receive mode
WLAN Tx Path	■ Integrated power amplifiers with power control ■ Closed/open loop power control (0.5dB increments) ■ Optimized Tx gain distribution for linearity and noise performance
WLAN Encryption	■ WEP 64-and 128 bit encryption with hardware TKIP processing(WPA) ■ AES-CCMP hardware implementation as part of 802.11i security standard(WPA2) ■ Enhanced AES engine performance ■ AES-Cipher-based Message Authentication Code (CMAC) as part of the 802.11w security standard ■ WLAN Authentication and Privacy Infrastructure (WAPI)

4. DCCharacteristics

Symbol	Parameter	Condition	Min	Typ	Max	Units
VDD12	1.2V digital power supply	--	1.14	1.2	1.32	V
VIO	1.8V/2.6V/3.3V digital power supply	--	1.62	1.8	1.98	V
		--	2.5	2.6	2.7	V
		--	2.97	3.3	3.63	V
VDD33	3.0V digital power supply	--	2.7	3.0	3.15	V
	3.3V digital power supply	--	2.97	3.3	3.63	V
AVDD18	1.8V analog power supply	--	1.71	1.8	1.89	V
AVDD33	3.3V analog power supply	--	2.97	3.3	3.63	V
AVDD33_USB	3.3V USB 2.0 power supply	--	2.97	3.3	3.63	V
LVLDO_VIN	1.8V LV LDO input voltage supply	--	1.62	1.8	1.98	V
VBLDO_VIN	3.3V VBAT LDO input voltage supply	--	3.0	3.3	4.8	V
VBLDO33_VIN	3.6V VBAT LDO33 input voltage supply	--	3.3	3.6	4.8	V
T_A	Ambient operating temperature	Commercial	0	--	70	°C
T_J	Maximum junction temperature	--	--	--	125	°C

5.The main performance of product

Item	Description
The supported protocol and standard	IEEE 802.11n, IEEE 802.11g,IEEE 802.11b
Interface type	SDIO
The range of frequency	2.4-2.484GHZ
The amount of working Channel	1-11（America, Canada）;1-13（Europe）;1-14（Japan）
Data Modulation	OFDM/DBPSK/DQPSK/CCK
Working Mode	Infrastructure
The transmitting rate	135/54/48/36/24/18/12/9/6 /1M（self-adapting）
Spread spectrum	DSSS
Sensitivity @PER	54/135M:-74dBm@10%PER, 11M:-85dBm@8%PER 6M: -88dBm@10%PER , 1M: -90dBm@8%PER
RF Power	135M:15dBM,

|	54M:15dBM, 11M:19dBM
Throughput	90Mbps(external 2dbi antenna ,damping 40dbm in Shielding box)
The connect type of Antenna	Connect to the external antenna through the half hole
The transmit distance	Indoor 100M, Outdoor 300M, according the local environment
Working Power consumption	600MW
MENS(L*W*H)	13.5mm*13mm *1.5 mm
The chipset model	Marvell 88W8782

6. DC/RF characteristics

Terms	Contents			
Specification : IEEE802.11b				
Mode	DSSS / CCK			
Frequency	2412 – 2484MHz			
Data rate	1, 2, 5.5, 11Mbps			
DC Characteristics	min	Typ.	max.	Unit
TX mode	305	309	311	MA
Rx mode	175	180	181	MA
standby mode	180	185	186	UA
Specification : IEEE802.11g				
Mode	OFDM			
Frequency	2412 - 2484MHz			
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps			
DC Characteristics	min	Typ.	max.	Unit
TX mode	244	245	245	MA
Rx mode	182	185	186	MA
standby mode	183	185	186	UA
Specification : IEEE802.11n				
Mode	OFDM			
Frequency	2412 - 2484MHz			
Data rate	6.5, 13, 19.5, 26, 39, 52, 58.5, 65Mbps			
DC Characteristics	min	Typ.	max.	Unit
TX mode	240	242	244	MA
Rx mode	189	190	191	MA
standby mode	184	185	186	UA

8.The supported platform

Operating System	CPU Framework	Driver
WIN2000/XP/VISTA/WIN7	X86 Platform	Enable
LINUX2.4/2.6	ARM, MIPSII	Enable
WINCE5.0/6.0	ARM ,MIPSII	Enable

Pin No：	TYPE	Description
1	SD-DATA2	SDIO Data Cable
2	SD-DATA3	SDIO Data Cable
3	SD-CMD	SDIO Control Line
4	GND	GND（Negative）
5	SD-CLK	SDIO Clock request signal
6	SD-DATA0	SDIO Data Cable
7	SD-DATA1	SDIO Data Cable
8	SD-POWER	3.3V Power supply
9	PDN-Full Power down	Low power consumption
10	GND	GND（Negative）
11	ANT	Antenna connection
12	GND	GND（Negative）
13	GPIO-WAKEUP-INPUT	Wake/Suspend input control
14	GPIO-WAKEUP-OUTPUT	Wake/Suspend output control

10.The Structure and Size of product
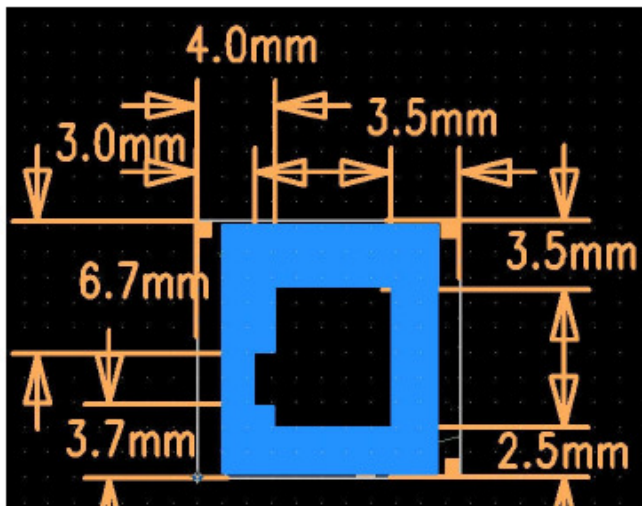
## 11: The 14th Pin connect to antenna, please refer to design demand

RT8782 peripheral
circuit design re

a) The current of 3.3V power supply must be >300mA, its ripple wave must be <30mV. The GND pins of module and external antenna need to be an incorporated part. The ground plane should be larger, module and antenna should keep far away from interference source.

b) The sixth pin is 2.4G high frequency output, coplanar impedance of layout line between this pin to antenna interface should be 50 Ω , we suggest use arc line or straight line, and beside the line there will be ground plane that its length as shout as possible, the longest length is no more than 50mm.

c) L1, C1, C2 constitute a π-type network that we preset, please make it close to antenna interface, this π-type network is used to match the antenna parameters and control the radiation. It should be adjusted according to the real condition when being used. Normally you can only mount L1 that its parameters are: 2.7nH, NP0 material. No need C3 and C4 .

12.Tpical Solder Reflow Profile
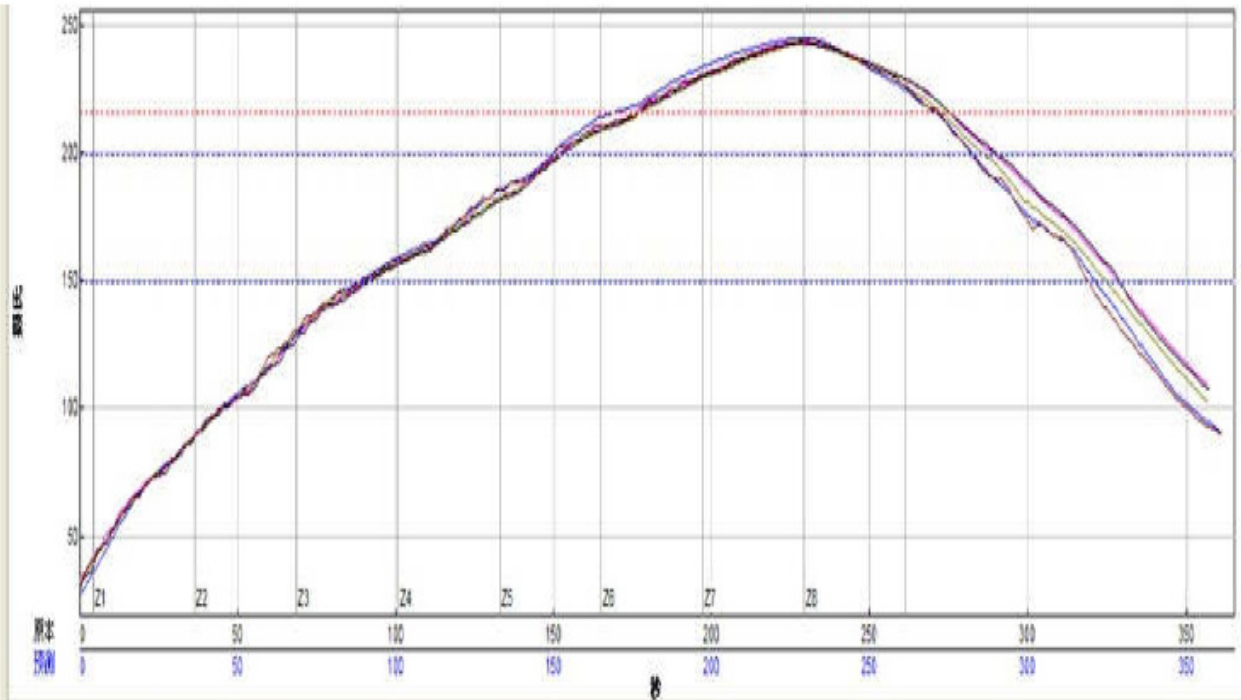
TCs	最高上升斜率		恒温时间 150至200C		回流时间 /217C		最高温度	
	1.82	-39%	60.59	-99%	98.85	-35%	244.39	-25%
	2.05	-32%	61.59	-97%	100.78	-32%	246.34	-9%
	1.79	-40%	62.84	-95%	94.44	-43%	243.73	-30%
	1.90	-37%	60.54	-99%	97.66	-37%	243.95	-29%
	1.98	-34%	61.43	-98%	95.19	-41%	245.17	-19%
温差	0.25		2.31		6.35		2.61	
P.	1.82	-39%	60.59	-99%	98.85	-35%	244.39	-25%
P.	2.05	-32%	61.59	-97%	100.78	-32%	246.34	-9%
P.	1.79	-40%	62.84	-95%	94.44	-43%	243.73	-30%
P.	1.90	-37%	60.54	-99%	97.66	-37%	243.95	-29%
P.	1.98	-34%	61.43	-98%	95.19	-41%	245.17	-19%
温差	0.25		2.31		6.35		2.61	

	P.WL	公分分	温区 1	温区 2	温区 3	温区 4	温区 5	温区 6	温区 7	温区 8
原本上温区	99%	70.00	120.0	140.0	190.0	190.0	220.0	255.0	265.0	260.0
原本下温区			120.0	140.0	190.0	190.0	220.0	255.0	265.0	260.0
预测上温区	99%	70.00	120.0	140.0	190.0	190.0	220.0	255.0	265.0	260.0
预测下温区			120.0	140.0	190.0	190.0	220.0	255.0	265.0	260.0

☑ 上与下温区温度设定一至

13. SDIO Interface Characteristics

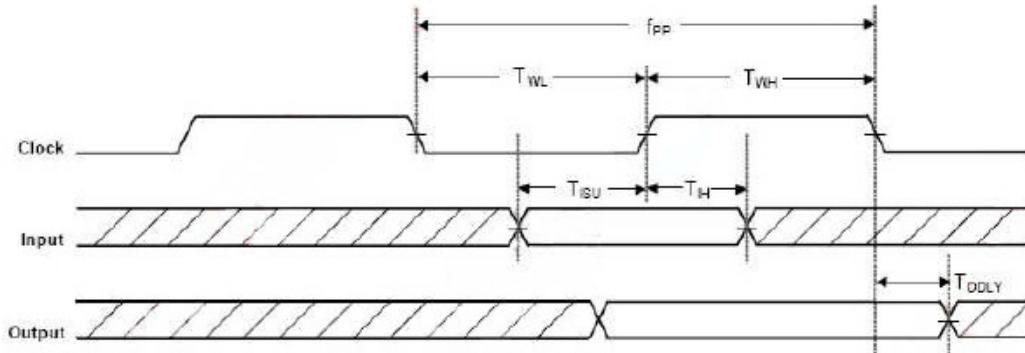**Figure 39: SDIO Protocol Timing Diagram—Normal Mode**

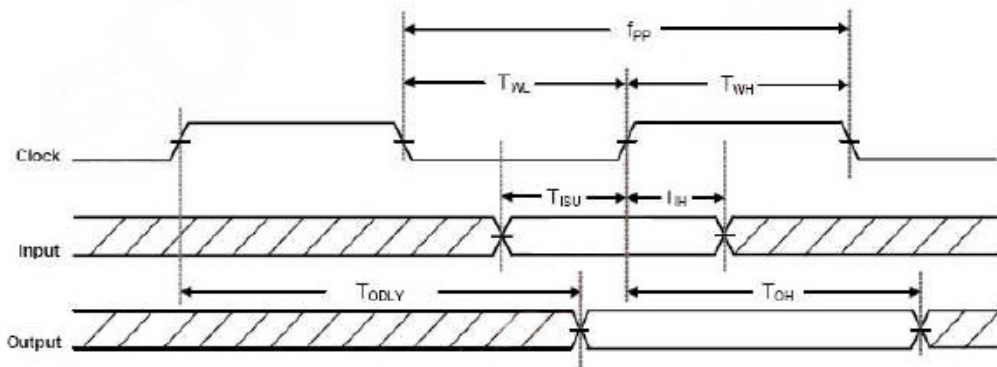

Figure 40: SDIO Protocol Timing Diagram—High Speed Mode

Table 44: SDIO Timing Data[1]
NOTE: Over full range of values specified in the Recommended Operating Conditions unless otherwise specified.

Symbol	Parameter	Condition	Min	Typ	Max	Units
f_{PP}	Clock Frequency	Normal	0	--	25	MHz
		High Speed	0	--	50	MHz
T_{WL}	Clock Low Time	Normal	10	--	--	ns
		High Speed	7	--	--	ns
T_{WH}	Clock High Time	Normal	10	--	--	ns
		High Speed	7	--	--	ns
T_{ISU}	Input Setup Time	Normal	5	--	--	ns
		High Speed	6	--	--	ns
T_{IH}	Input Hold Time	Normal	5	--	--	ns
		High Speed	2	--	--	ns
T_{ODLY}	Output Delay Time	--	--	--	7.33	ns
T_{OH}	Output Hold Time	High Speed	2.5	--	--	ns

1. The SDIO-SPI CS signal timing is identical to all other SDIO inputs.

Appendix A: FCC Statement

Federal Communication Commission Interference Statement

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 RF Radiation Exposure Statement:

1. The equipment complies with RF exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and 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 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 module is intended for OEM integrator. The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module.20cm minimum distance has to be able to be maintained between the antenna and the users for the host this module is integrated into. Under such configuration, the FCC radiation exposure limits set forth for an population/uncontrolled environment can be satisfied.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of 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.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains TX FCC ID: PJF-O5010TX ". If the size of the end product is larger than 8x10cm, then the following FCC

part 15.19 statement has to also be available on the label:　This device complies with Part 15 of 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.