KB2813DB WiFi模组
规格书V1.0

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更改记录 Record of Modification

版本 Version	更改日期 Date	主要更改内容 Main content of modification	确认 Confirm
V1.0	2020/5/26	首次承认	周浩

1. 产品介绍: Product Introduction

KB2813DB系列是基于Mediatek MT7628DA 与MT7613B 设计的一款面向Wireless领域的2T2R AC1200的无线路由模组，便于进行二次开发，软件支持Linux 与 Openwrt。集防火墙、路由器、有线/无线网络连接功能于一身，支持IEEE80211.AC, IEEE802.11N，支持2.4G和5.8G，同时兼容IEEE 802.11b ,IEEE 802.11a和IEEE 802.11g 标准。附带多重加密机制，可以保证数据在无线网络传输中的安全，再配合路由器功能强大的防火墙特性，能为无线通信提供安全性更强的保护，有效防止病毒入侵。大范围的无线覆盖空间提供了自由轻松的网络环境。提供全中文设置界面，设置简单，易于操作。用户可以快速完成网络设置，实现计算机与互联网的高速接，轻松享受文件传输、资源共享、游戏和通信服务。

1.1 协议与接口

WiFi标准	IEEE 802.11a/b/g/n/ac 支持2.4G频率和5.8G频率
Ethernet接口	1-5个10/100M自适应
USB2.0	1路
SDIO	1路
SPI	1路
I2C	1路
I2S	1路
UART	3路
PWM	4路
GPIO	8路及以上

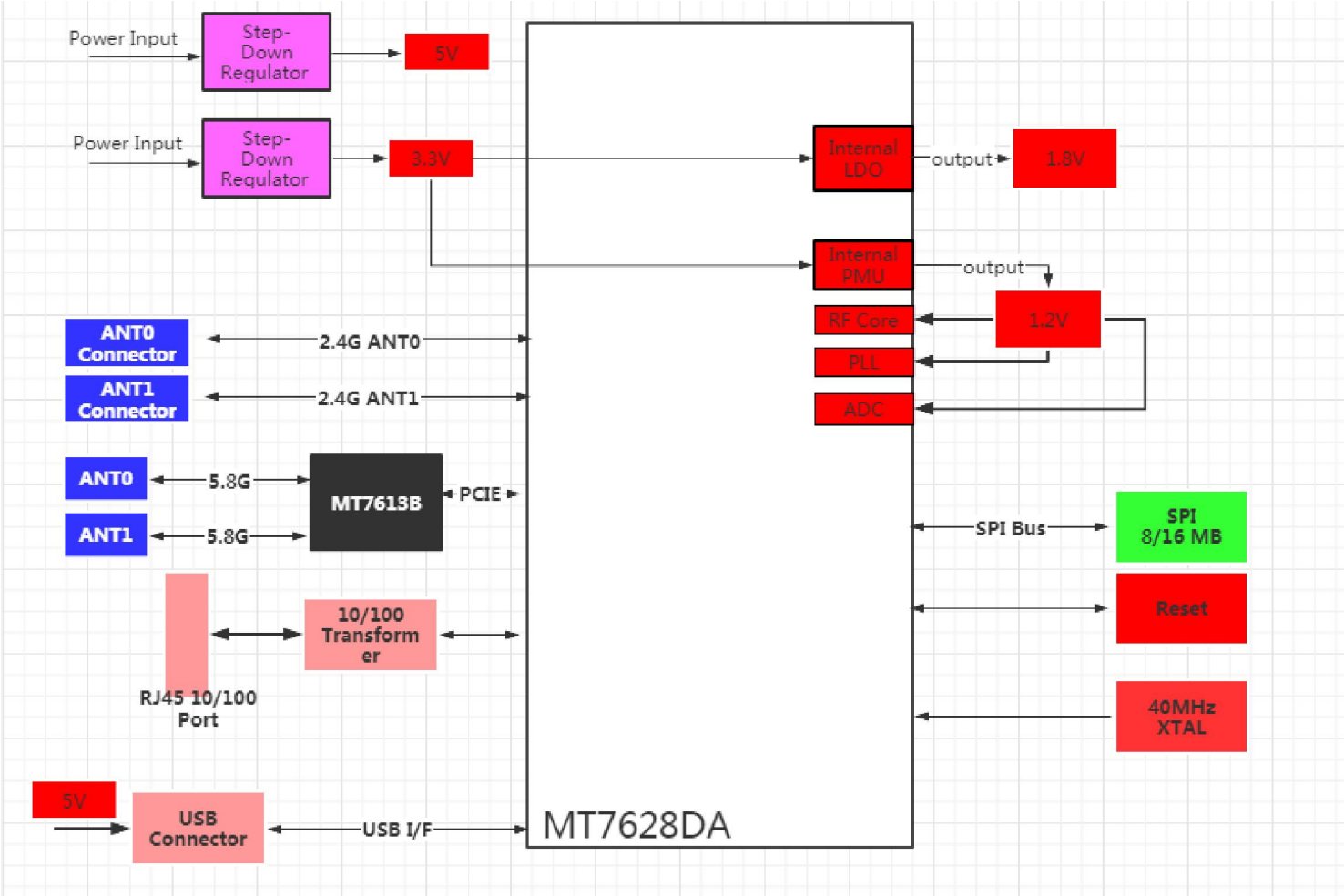
1.2 存储规格

Flash	8MB 、 16MB 、 32MB
DDR2	64MB **Embedded**

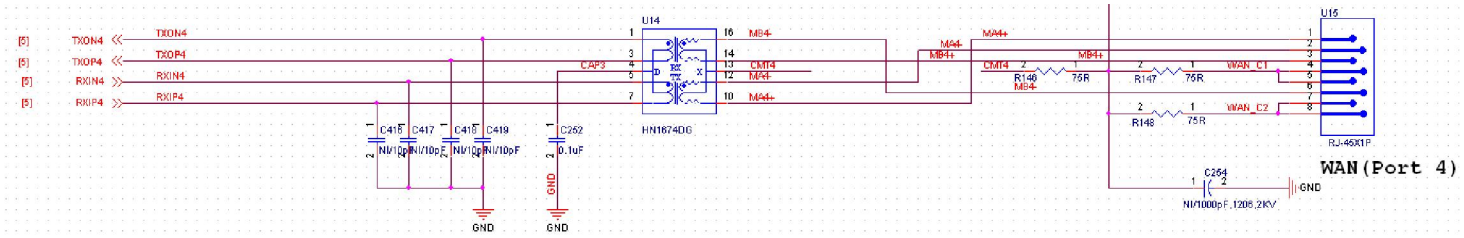
1.3 物理尺寸

尺寸	**63.3*33.8*1.0mm**
封装	**SMD 与 插针兼容设计**

2. 原理图 ：Block Diagram

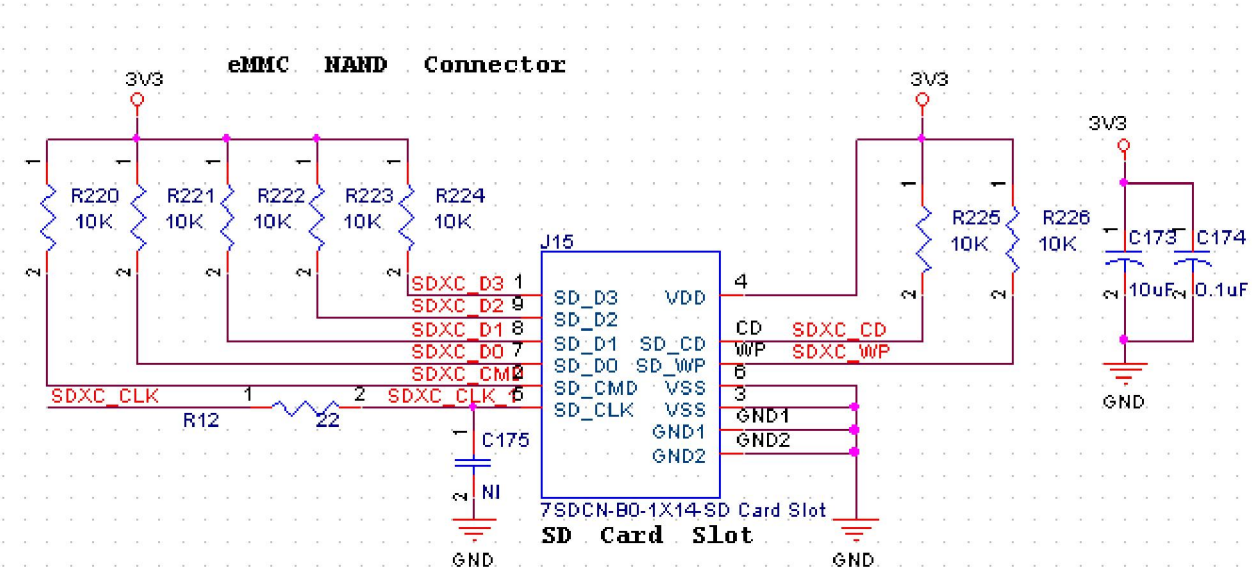


2.1 Ethernet推荐电路

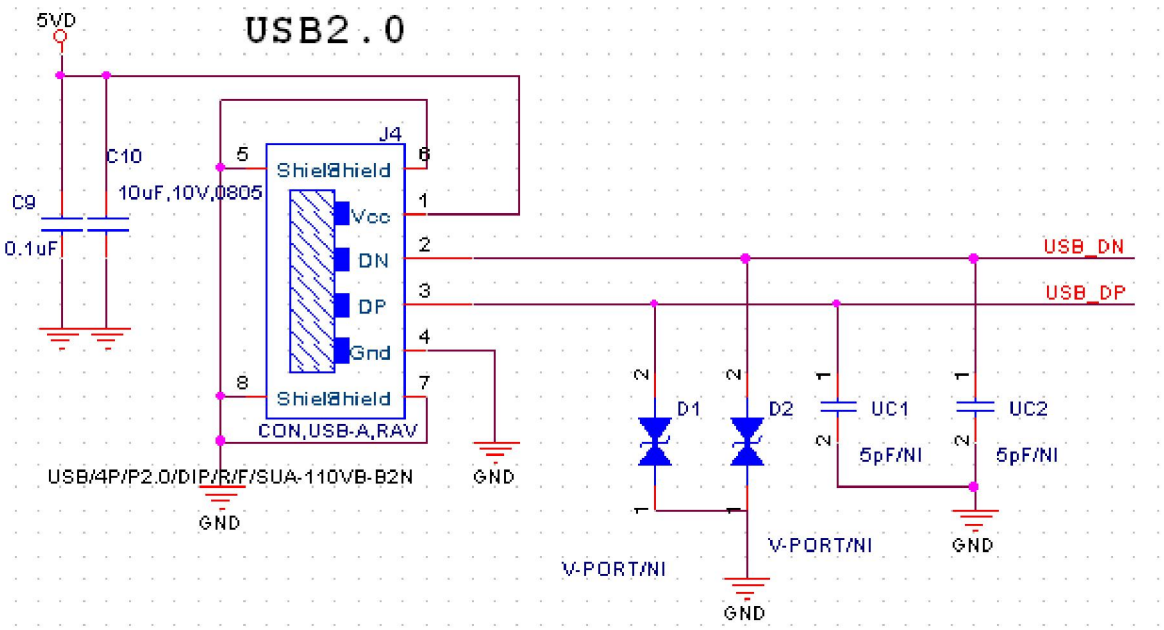


2.2 电源推荐电路

2.3 SD卡外设推荐电路

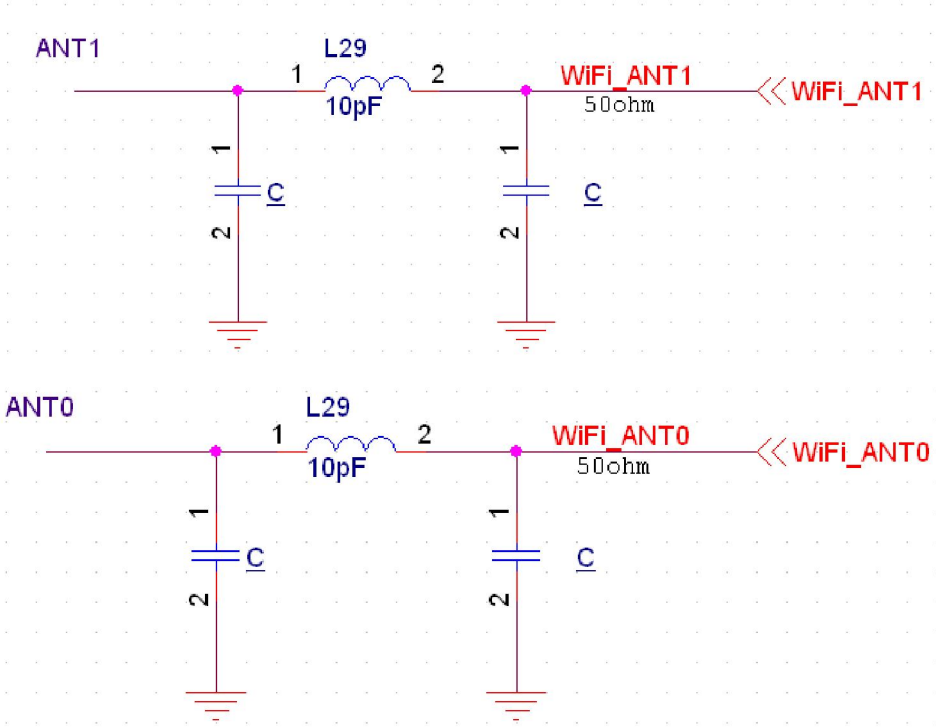


2.4 USB外设推荐电路

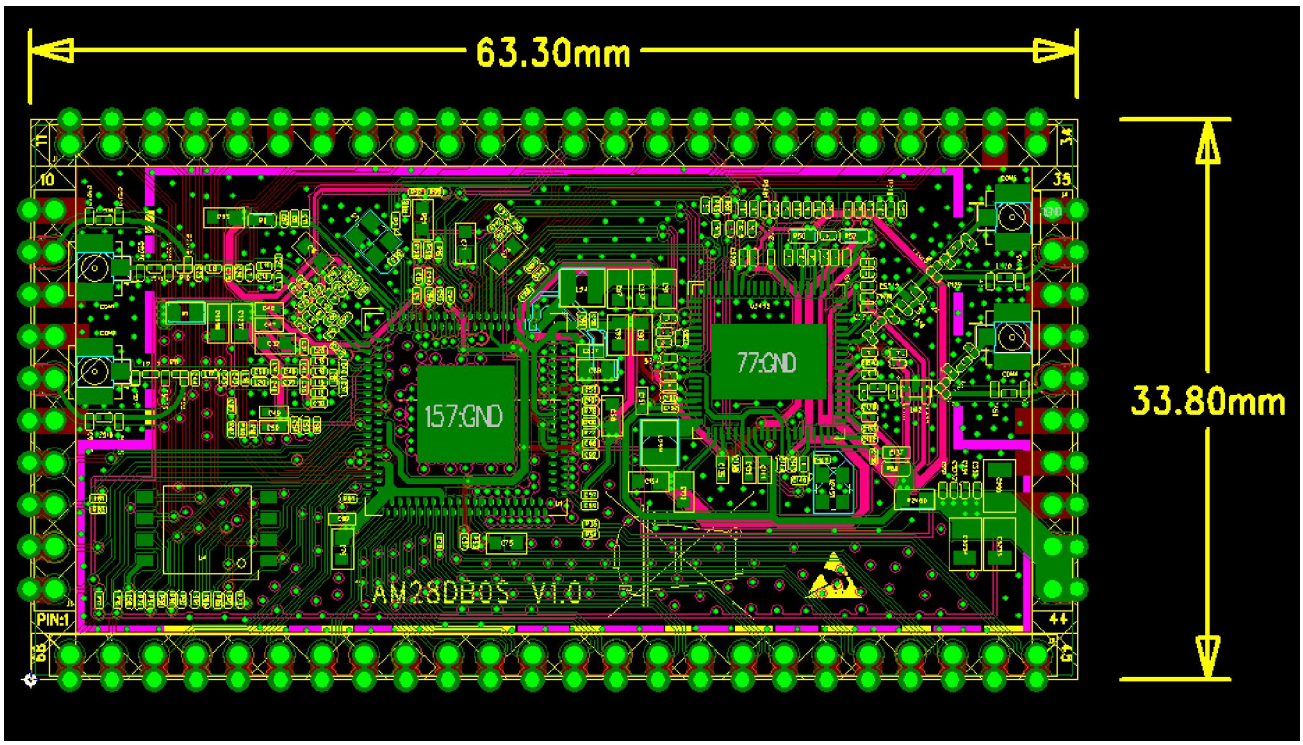

USB2.0
5VD
C10
10uF,10V,0805
C9
0.1uF
J4
Shield
Shield
Vcc
DN
DP
Gnd
Shield
Shield
CON,USB-A,RAV
USB/4P/P2.0/DIP/R/F/SUA-110VB-B2N
GND
GND
USB_DN
USB_DP
D1
D2
UC1
UC2
5pF/NI
5pF/NI
V-PORT/NI
V-PORT/NI
GND
GND

2.5 Antenna Matching 推荐电路

为方便用户extend Antenna，我们模组的Pin 18 与Pin 68设计为extend Antenna 的信号Pin，天线设计电路推荐如下:



3. 外型及安装尺寸: Package outline and Mounting:



4. PIN脚定义： PIN DESCRIPTION

引脚	功能	电气特性	说明
P1	I2S_CLK	O	I2S总线时钟
P2	I2S_WS	I/O	I2S声道选择，0：左声道，1：右声道
P3	I2S_SDO	I/O	I2S数据输出端，核心板已有4.7K下拉
P4	I2S_SDI	I/O	I2S数据输入端
P5	GND	P	电源地
P6	2.4G_RF1	A	2.4G ANT1
P7	GND	P	电源地
P8	GND	P	电源地
P9	2.4G_RF0	A	2.4G ANT0
P10	GND	P	电源地
P11	SPI_CS1	O	SPI总线片选信号1，核心板已有4.7K下拉
P12	SPI_CLK	O	SPI总线时钟信号，核心板已有4.7K上拉
P13	SPI_MISO	I	SPI总线数据主入从出
P14	SPI_MOSI	O	SPI总线数据主出从入，核心板已有4.7K下拉
P15	SPI_CS0	O	SPI总线片选信号0
P16	GND	P	电源地
P17	GND	P	电源地
P18	GPIO0	I/O	通用输入输出口

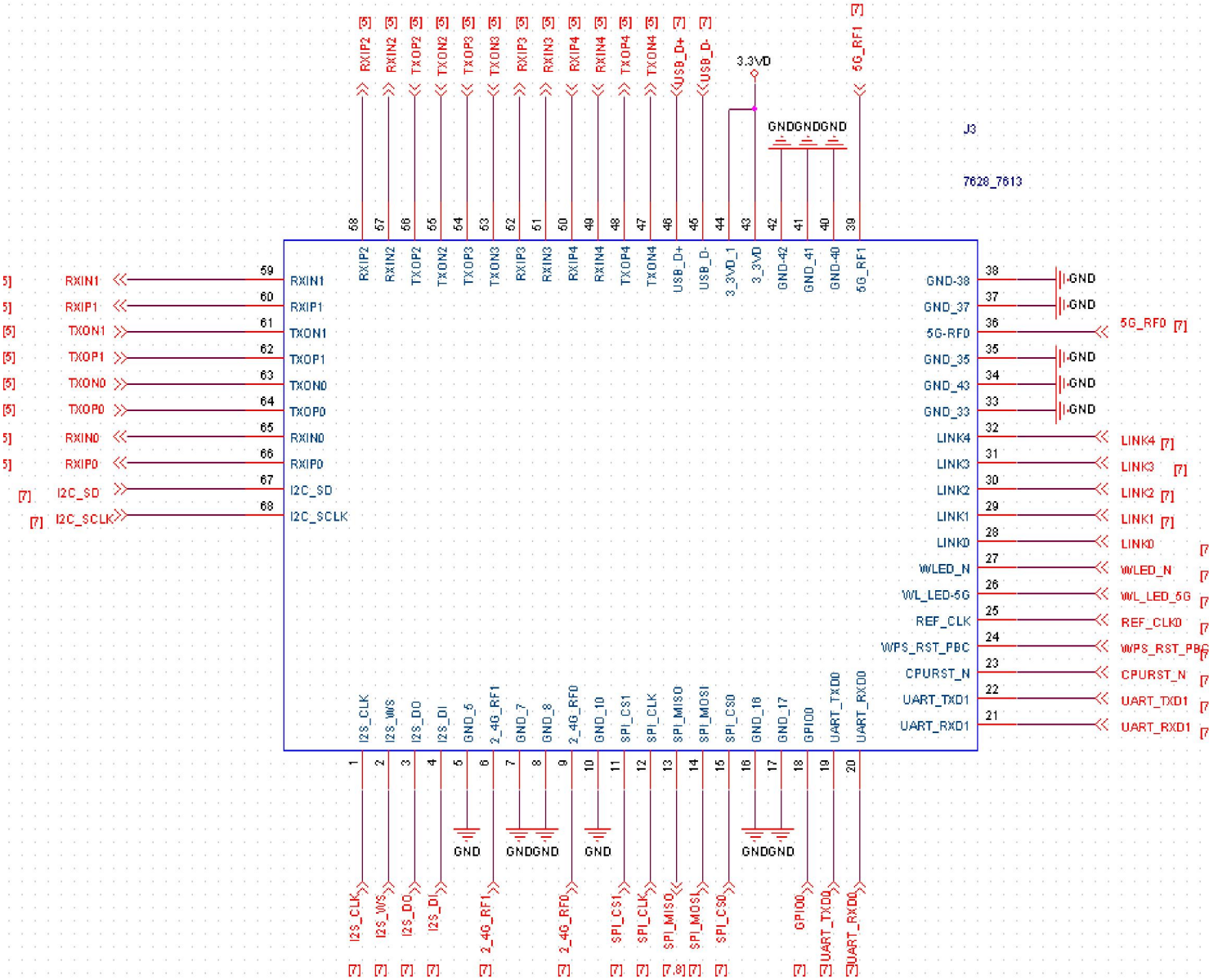
P19	UART_TXD0	O	串口0数据输出，核心板已有4.7K下拉
P20	UART_RXD0	I	串口0数据输入，核心板已接1K下拉
P21	UART_RXD1	I	串口1数据接收
P22	UART_TXD1	O	串口1数据发送，核心板已有4.7K上拉
P23	CPU_RST	I	CPU复位输入，低有效
P24	WPS_RST	I	WPS按键输入/恢复出厂设置
P25	REF_CLK	I/O	Reference Clock output
P26	WLED_N	I/O	WiFi LED 指示灯
P27	WL_LED_5G	I/O	WiFi 5G LED 指示灯
P28	Link0	I/O	Port0 LED指示灯
P29	Link1	I/O	Port1 LED指示灯
P30	Link2	I/O	Port2 LED指示灯
P31	Link3	I/O	Port3 LED指示灯
P32	Link4	I/O	Port4 LED指示灯
P33	GND	P	电源地
P34	GND	P	电源地
P35	GND	P	电源地
P36	5G_RF0	A	5.8G ANT0
P37	GND	P	电源地
P38	GND	P	电源地
P39	5G_RF1	A	5.8G ANT1
P40	GND	P	电源地
P41	GND	P	电源地
P42	GND	P	电源地
P43	3.3VD	P	3.3V 电源
P44	3.3VD_1	P	3.3V 电源
P45	USB_DM	I/O	USB数据负
P46	USB_DP	I/O	USB数据正
P47	LAN_P4_TX-	A	PORT4网络信号发送负
P48	LAN_P4_TX+	A	PORT4网络信号发送正
P49	LAN_P4_RX-	A	PORT4网络信号接收负
P50	LAN_P4_RX+	A	PORT4网络信号接收正
P51	LAN_P3_RX-	A	PORT3网络信号接收负
P52	LAN_P3_RX+	A	PORT3网络信号接收正
P53	LAN_P3_TX-	A	PORT3网络信号发送负
P54	LAN_P3_TX+	A	PORT3网络信号发送正
P55	LAN_P2_TX-	A	PORT2网络信号发送负
P56	LAN_P2_TX+	A	PORT2网络信号发送正
P57	LAN_P2_RX-	A	PORT2网络信号接收负
P58	LAN_P2_RX+	A	PORT2网络信号接收正
P59	LAN_P1_RX-	A	PORT1网络信号接收负
P60	LAN_P1_RX+	A	PORT1网络信号接收正

P61	**LAN_P1_TX-**	**A**	PORT1网络信号发送负
P62	**LAN_P1_TX+**	**A**	PORT1网络信号发送正
P63	**LAN_P0_TX-**	**A**	PORT0网络信号发送负
P64	**LAN_P0_TX+**	**A**	PORT0网络信号发送正
P65	**LAN_P0_RX-**	**A**	PORT0网络信号接收负
P66	**LAN_P0_RX+**	**A**	PORT0网络信号接收正
P67	**I2C_SD**	**I/O**	I2C总线数据
P68	**I2C_SCLK**	**O**	I2C总线时钟

备注：

I：输入
O：输出
A：模拟信号
P：电源或地
红色：和芯片boot up 启动相关，外部电路设计需考虑核心板已有的上下拉电阻情况， 不可与核心板上下拉有电平冲突。

引脚分布



5. 关键物料：Key Materials

序号	关键件名称	型号	规格/材料	供应商	备注
1	集成电路	MT7628DAN	156QFN	MediaTek	
2	集成电路	MT7613B	76QFN	MediaTek	

3	集成电路	W25Q256JVEIQ	WSOP-8	Winband	
4	集成电路	NT5TU64M16HG-AC	84BGA	Nanya	
5	PCB		FR-4，4Layer		
6	晶振		2520;40MHz; 11pF;±7ppm;		

6. 一般要求： General Requirements：

No.	Feature	Description
7-1	Operation Voltage	3.3V (for MT7688AN)
7-2	Current Consumption	Total3.3V @Max 800mA
7-3	Antenna Type	External antenna
7-4	Ambient Operating Temperature	0 ~ +50°C
7-5	Storage Temperature	-20 ~ 70°C

7. 电气特性 Electrical Characteristics:

8-1 IEEE 802.11b Section:

Items	Contents				
Sepcification	IEEE802.11b				
Mode	CCK				
Channel	CH1 to CH13				
Data rate	1, 2, 5.5, 11Mbps				
	Min.	Typ.	Max.	Unit	Remark
TX Characteristics					
1. Power Levels(Calibrated)					
1) For Each antenna port	15.0	17	19.0	dBm	
2. Spectrum Mask @ target power					
1) fc +/-11MHz to +/-22MHz	-	-	-30	dBr	
2) fc > +/-22MHz	-	-	-50	dBr	
3 Constellation Error(EVM)@ target power					
1) 1Mbps	-	-	-10	dB	
2) 2Mbps	-	-	-10	dB	
3) 5.5Mbps	-	-	-10	dB	
4) 11Mbps	-	-20	-10	dB	
4. Frequency Error	-10	-	10	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5 Minimum Input Level Sensitivity(each chain)					

1) 1Mbps (FER ≦8%)	-	-	-83	dBm	
2) 2Mbps (FER ≦8%)	-	-	-80	dBm	
3) 5.5Mbps (FER ≦8%)	-	-	-79	dBm	
4) 11Mbps (FER ≦8%)	-	-	-76	dBm	
6 Maximum Input Level (FER ≦8%)	-10	-	-	dBm	

8-2 IEEE 802.11g /a Section:

Items	Contents				
Specification	IEEE802.11g				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH1 to CH13 @ 11g CH36 to CH165 @ 11a				
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps				
	Min.	Typ.	Max.	Unit	Remark
TX Characteristics					
1. Power Levels					
1) 15dBm Target (For Each antenna port) @ 11g	13	15	17	dBm	
2. Spectrum Mask @ target power					
1) at fc +/-11MHz	-	-	-20	dBr	
2) at fc +/-20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-40	dBr	
3 Constellation Error(EVM)@ target power					
1) 6Mbps	-	-	-5	dB	
2) 9Mbps	-	-	-8	dB	
3) 12Mbps	-	-	-10	dB	
4) 18Mbps	-	-	-13	dB	
5) 24Mbps	-	-	-16	dB	
6) 36Mbps	-	-	-19	dB	
7) 48Mbps	-	-	-22	dB	
8) 54Mbps	-	-28	-25	dB	
4 Frequency Error	-10	-	10	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5 Minimum Input Level Sensitivity(each chain)					
1) 6Mbps (PER ≦10%)	-	-	-85	dBm	
2) 9Mbps (PER ≦10%)	-	-	-84	dBm	
3) 12Mbps (PER ≦10%)	-	-	-82	dBm	
4) 18Mbps (PER ≦10%)	-	-	-80	dBm	
5) 24Mbps (PER ≦10%)	-	-	-77	dBm	
6) 36Mbps (PER ≦10%)	-	-	-73	dBm	
7) 48Mbps (PER ≦10%)	-	-	-69	dBm	
8) 54Mbps (PER ≦10%)	-	-	-65	dBm	
6 Maximum Input Level (PER ≦10%)					

1) IEEE802.11g	-20	-	-	dBm	

8-3 IEEE 802.11n HT20 Section:

Items	Contents				
Specification	IEEE802.11n HT20 @ 2.4GHz				
Mode	OFDM				
Channel	CH1 to CH13				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7				
	Min.	Typ.	Max.	Unit	Remark
TX Characteristics	Min.	Typ.	Max.	Unit	
1. Power Levels					
1) For Each antenna port @2.4G	11	13	15	dBm	
2) For Each antenna port @5G	11	13	15	dBm	
2. Spectrum Mask @14.5dBm					
1) at fc +/-11MHz	-	-	-20	dBr	
2) at fc +/-20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-45	dBr	
3. Constellation Error(EVM)@ target power					
1) MCS0	-	-	-5	dB	
2) MCS1	-	-	-10	dB	
3) MCS2	-	-	-13	dB	
4) MCS3	-	-	-16	dB	
5) MCS4	-	-	-19	dB	
6) MCS5	-	-	-22	dB	
7) MCS6	-	-	-25	dB	
8) MCS7	-	-30	-28	dB	
4. Frequency Error	-10	-	10	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) MCS0 (PER ≦10%)	-	-	-82	dBm	
2) MCS1 (PER ≦10%)	-	-	-79	dBm	
3) MCS2 (PER ≦10%)	-	-	-77	dBm	
4) MCS3 (PER ≦10%)	-	-	-74	dBm	
5) MCS4 (PER ≦10%)	-	-	-70	dBm	
6) MCS5 (PER ≦10%)	-	-	-66	dBm	
7) MCS6 (PER ≦10%)	-	-	-65	dBm	
8) MCS7 (PER ≦10%)	-	-	-64	dBm	
6. Maximum Input Level (PER ≦10%)	-20	-	-	dBm	

8-4 IEEE 802.11n HT40 Section:

Items	Contents				
Specification	IEEE802.11n HT40 @ 2.4GHz				
Mode	OFDM				
Channel	CH3 to CH11				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7				
	Min.	Typ.	Max.	Unit	Remark
TX Characteristics	Min.	Typ.	Max.	Unit	
1. Power Levels					
1) For Each antenna port @2.4G	11	13	15	dBm	
2) For Each antenna port @5G	11	13	15	dBm	
2. Spectrum Mask @14.5dBm					
1) at fc +/-22MHz	-	-	-20	dBr	
2) at fc +/-40MHz	-	-	-28	dBr	
3) at fc > +/-60MHz	-	-	-45	dBr	
3. Constellation Error(EVM)@ target power					
1) MCS0	-	-	-5	dB	
2) MCS1	-	-	-10	dB	
3) MCS2	-	-	-13	dB	
4) MCS3	-	-	-16	dB	
5) MCS4	-	-	-19	dB	
6) MCS5	-	-	-22	dB	
7) MCS6	-	-	-25	dB	
8) MCS7	-	-30	-28	dB	
4. Frequency Error	-10	-	10	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) MCS0 (PER ≦10%)		-	-79	dBm	
2) MCS1 (PER ≦10%)		-	-76	dBm	
3) MCS2 (PER ≦10%)		-	-74	dBm	
4) MCS3 (PER ≦10%)		-	-71	dBm	
5) MCS4 (PER ≦10%)		-	-67	dBm	
6) MCS5 (PER ≦10%)		-	-63	dBm	
7) MCS6 (PER ≦10%)		-	-62	dBm	
8) MCS7 (PER ≦10%)	-	-	-61	dBm	
6. Maximum Input Level(PER ≦10%)	-20	-	-	dBm	

8-5 IEEE 802.11 ac Section:

Items	Contents								
Specification	IEEE802.11ac								
Mode	BPSK, QPSK, 16QAM, 64QAM ,256QAM and OFDM								
Channel	CH36 to CH165 VHT20 CH38 to CH163 VHT40 CH42 to CH157 VHT80								
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7/8/9								
TX Characteristics	Min.	Typ.			Max.			Unit	Remark
1. Power Levels (Calibrated)									
1) 13dBm Target (For Each antenna port) @VHT20/VHT40/VHT80 MCS0~MCS9	11	13			15			dBm	
2. Spectrum Mask @ Target Power									
1) at fc +/-11MHz /20MHz/30MHz	-	-			-20			dBr	
2) at fc +/-21MHz /40MHz/60MHz	-	-			-28			dBr	
3) at fc +/-41MHz /80MHz/120MHz	-	-			-40			dBr	
3. Constellation Error(EVM) @ Target Power									
1) MCS0	-	-			-8			dB	
2) MCS1	-	-			-13			dB	
3) MCS2	-	-			-16			dB	
4) MCS3	-	-			-19			dB	
5) MCS4	-	-			-22			dB	
6) MCS5	-	-			-25			dB	
7) MCS6	-	-			-28			dB	
8) MCS7	-	-			-30			dB	
9) MCS8					-32			dB	
10) MCS9		-36			-33			dB	
4. Frequency Error	-10	-			10			ppm	
RX Characteristics	Min.	Typ.			Max.			Unit	
5. Minimum Input Level Sensitivity(each chain)		VHT 20	VHT 40	VHT 80	VHT 20	VHT 40	VHT 80		
1) MCS0 (PER ≦10%)	-	-92	-90	-87	-89	-87	-84	dBm	
2) MCS1 (PER ≦10%)	-	-	-	-	-84	-85	-79	dBm	
3) MCS2 (PER ≦10%)	-	-	-	-	-82	-79	-77	dBm	
4) MCS3 (PER ≦10%)	-	-	-	-	-78	-76	-73	dBm	
5) MCS4 (PER ≦10%)	-	-	-	-	-75	-72	-69	dBm	
6) MCS5 (PER ≦10%)	-	-	-	-	-70	-70	-65	dBm	

7) MCS6 (PER ≦10%)	-	-	-	-	-69	-68	-64	dBm	
8) MCS7 (PER ≦10%)	-	-	-	-	-68	-66	-63	dBm	
9) MCS8 (PER ≦10%)	-	-	-	-	-67	-63	-61	dBm	
10) MCS9 (PER ≦10%)	-	-69	-64	-61	-66	-61	-58	dBm	
6. Maximum Input Level(PER ≦10%)	-30	-2	-2	-2	-			dBm	