

Module Specification

Module Name	TTIT92B		
Module Description	IEEE 802.11b/g/n (1T1R) IoT WLAN Module		
	1WAN+4LAN		
Reversion	V2.0		
Date			
Nater Approve Field			
Engineer	QC	Sales	
Cruz.Zeng	Mike.Liu	Lingo.Wang 13510620050	
Customer Approve Field			
Engineer	Purchasing	Manufactory	QC

Customer:

Add:

Tel:

Fax:

Attn:

E-mail:

Provider: HK NATER TECH LIMITED

Add: 2F,NO.27,2 Baomin Rd.,Baoan Dist.SZ City,China

Tel: +86-755-85250145/13510620050

Fax: +86-755-61522172

Attn: Lingo

E-mail: hsdgood@163.com

1. General Description

The TTIT92B module integrates a 1T1R 802.11n Wi-Fi radio, a 580MHz MIPS CPU, 1-port fast Ethernet PHY, USB2.0 host, I2C/PCM and multiple slow IOs.

The module provides two operation modes – IoT gateway mode and IoT device mode. In IoT gateway mode, the high performance USB2.0 allows TTIT92B to add 3G/LTE modem support or add a H.264 ISP for wireless IP camera. For the IoT device mode, the module supports eMMC, SD-XC and USB2.0. In IoT device mode, it further supports PWM, SPI slave, 3rd UART and more GPIOs. For IoT gateway, it can connect to touch panel and BLE, Zigbee/Z-wave and sub-1G RF for smart home control.

2. Applications

- ◆ IoT (internet of things)
- ◆ 3G/4G WiFi Router
- ◆ USB WiFi Camera
- ◆ Building Automation
- ◆ Home Automation
- ◆ Smart Home Gateway
- ◆ Smart Lighting
- ◆ Smart Plug
- ◆ Industry Control

3. Features

- ◆ Compliant to IEEE 802.11b/g/n.
- ◆ 1T1R 2.4GHz with support for a 150Mbps PHY data rate.
- ◆ DDR2 memory up to 512Mb.
- ◆ Flash memory up to 128Mb.
- ◆ 4 LAN ports and 1 WAN port.
- ◆ Support USB 2.0 slave device for USB disk and USB 3G/4G dongle and USB camera.
- ◆ 24 STA-Proxy.
- ◆ Support interface: SD-XC, I2C, PCM, I2S(192K/24bits), PWM, SPI slave, UART lite, GPIO.
- ◆ Security: WEP64/128, TKIP, AES, WPA, WPA2, WAPI.
- ◆ Support IoT gateway mode and IoT device mode .
- ◆ RoHS compliance meets environment-friendly requirement.
- ◆ FCC/CE certified.
- ◆ 40.5mm(L) x 25mm(W) x 3.0mm(H) dimension.

4. Application Block Diagram

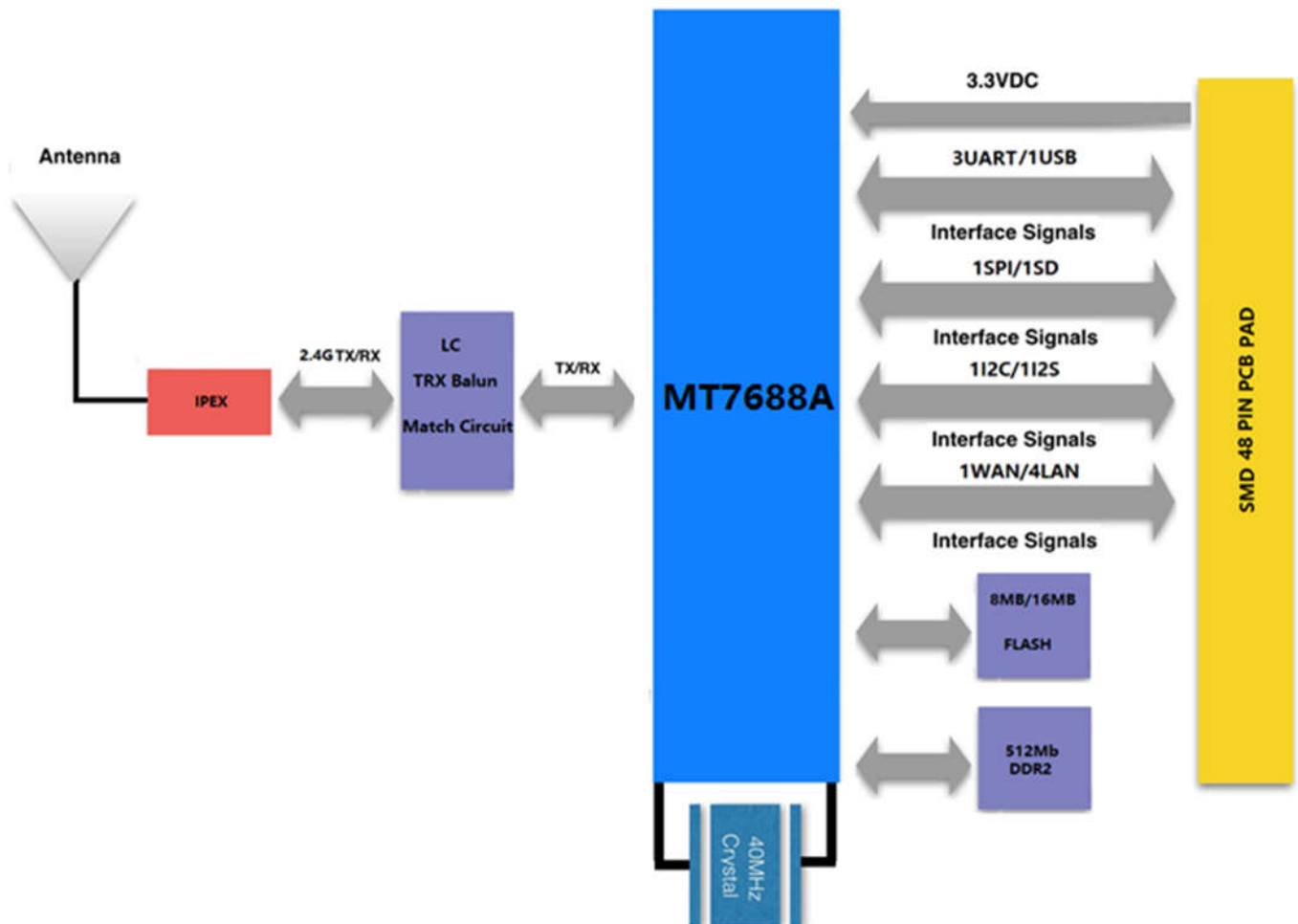


Figure 2: TTIT92B Block Diagram

5. Interfaces

USB

The USB interface support USB slave devices for USB disk and USB 3G/4G dongle and USB camera.

I2C

TTIT92B Pin Number	Pin Name	GPIO(2'b01)	I2C(2'b00)
46	I2C_SD	GPIO#05	I2C_SD
47	I2C_CLK	GPIO#04	I2C_CLK

Table5-1: I2C pin share scheme

Note: Controlled by I2C_MODE register

SD-XC/eMMC

TTIT92B Pin Number	Pin Name(4'b0000)	GPIO(2'b01)	SD(2'b00)	eMMC(2'b00)
24	LAN_PORT4_TX-	GPIO#29	SD_D2	eMMC_D3
23	LAN_PORT4_TX+	GPIO#28	SD_D3	eMMC_CMD
22	LAN_PORT4_RX-	GPIO#27	SD_CMD	eMMC_D2
21	LAN_PORT4_RX+	GPIO#26	SD_CLK	eMMC_CLK
16	LAN_PORT3_RX-	GPIO#25	SD_D0	eMMC_D0
15	LAN_PORT3_RX+	GPIO#24	SD_D1	eMMC_D1
14	LAN_PORT3_TX-	GPIO#23	SD_CD	eMMC_CD
13	LAN_PORT3_TX+	GPIO#22	SD_WP	eMMC_WP

Table5-2: SD-XC/eMMC pin share scheme

Note: Controlled by the EPHY_APGIO_AIO_EN[4:1] and SD_MODE register

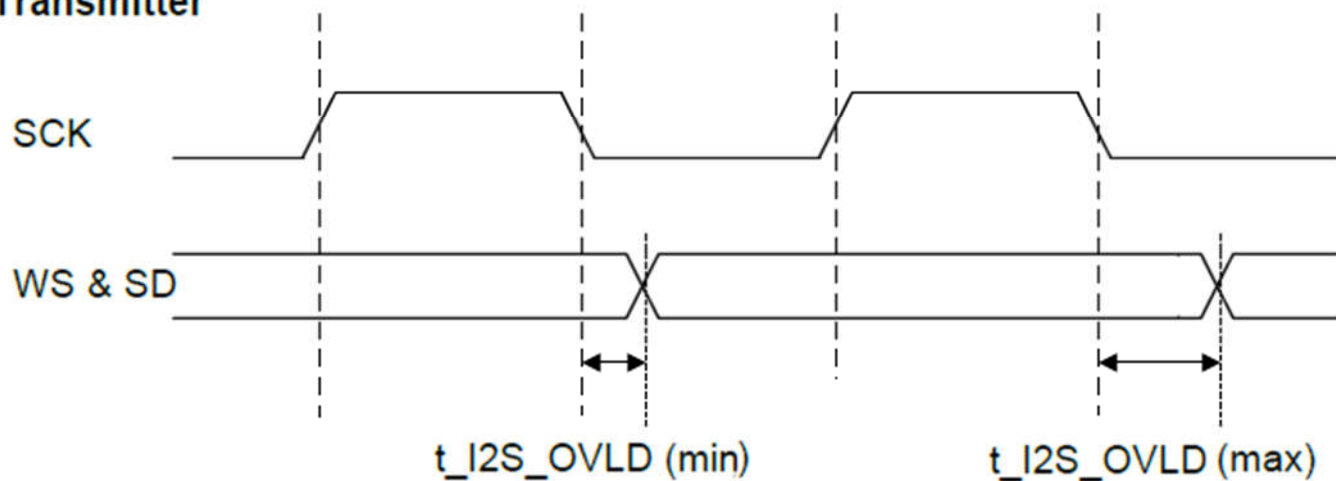
I2S(192K/24bits)

TTIT92B Pin Number	Pin Name	GPIO(2'b01)	I2S(2'b00)	PCM(2'b10)
44	I2S_CLK	GPIO#03	I2S_CLK	PCMFS
42	I2S_WS	GPIO#02	I2S_WS	PCMCLK
43	I2S_SDO	GPIO#01	I2S_SDO	PCMDTX
41	I2S_SDI	GPIO#0	I2S_SDI	PCMDRX

Table5-3: I2S/PCM pin share scheme

Note: Controlled by I2S_MODE register

Transmitter



Receiver

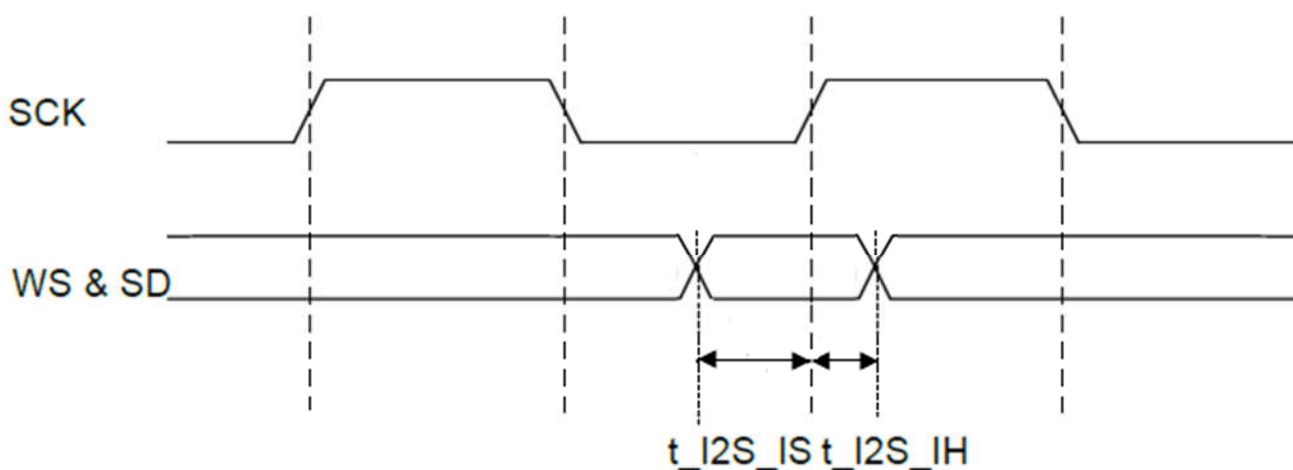


Figure 3: I2S Timing

Symbol	Description	Min	Max	Unit
t_{I2S_IS}	Setup Time for I2S input(data & WS)	3.5		ns
t_{I2S_IH}	Hold Time for I2S input(data & WS)	0.5		ns
t_{I2S_OVLD}	I2S_CLK to I2S output(data & WS) valid	2.5	10	ns

Table5-4: I2S Interface Diagram Key

PCM

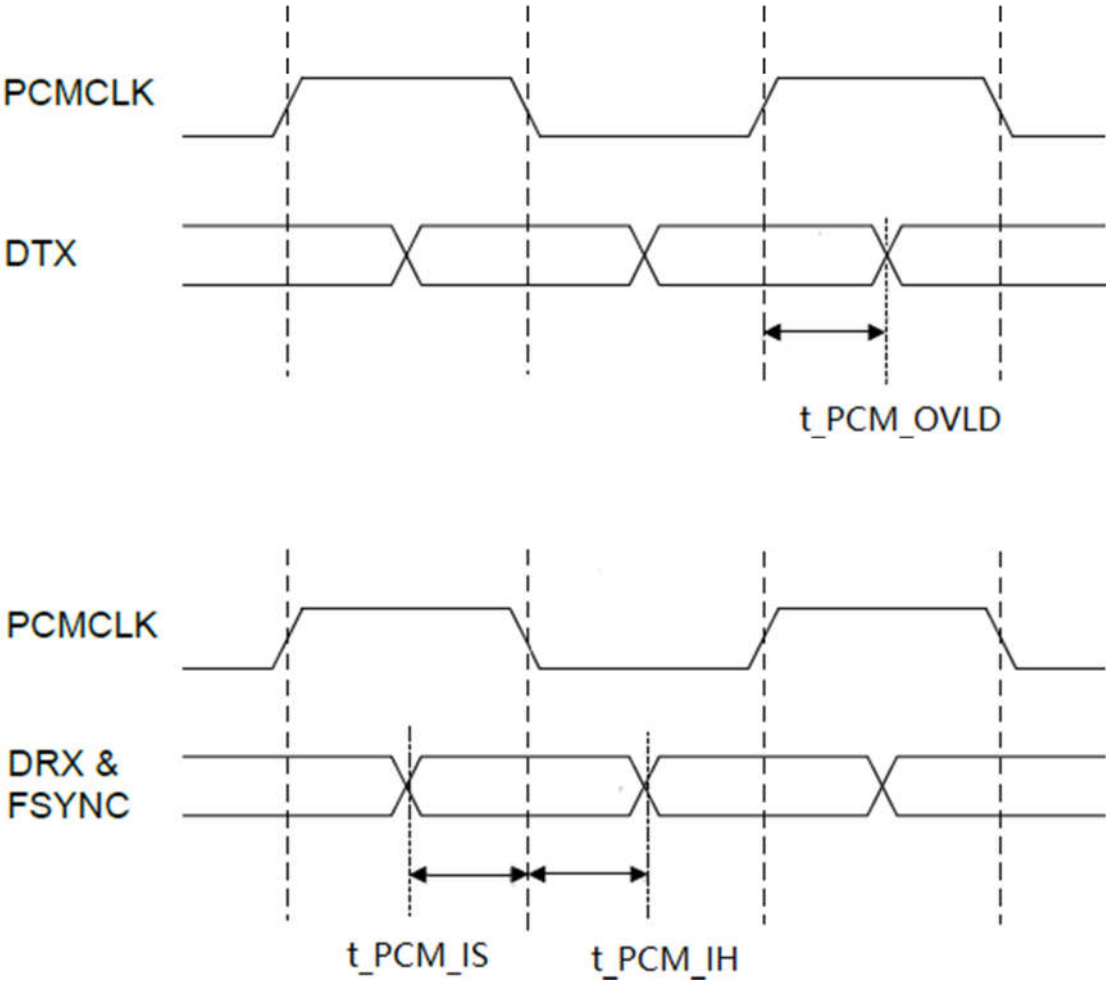


Figure 4: PCM Timing

Symbol	Description	Min	Max	Unit
t_PCM_IS	Setup Time for PCM input to PCM_CLK fall	3.5		ns
t_PCM_IH	Hold Time for PCM input to PCM_CLK fall	1.0		ns
t_PCM_OVLD	PCM_CLK to PCM output valid	10.0	35.0	ns

Table5-5: PCM Interface Diagram Key

PWM

TTIT92B Pin Number	Pin Name	GPIO	PWM	Pin Share
10	LAN_PORT2_RX-	GPIO#19	PWM1	SD_D6
9	LAN_PORT2_RX+	GPIO#18	PWM0	SD_D7

Table5-6: PWM pin share scheme

SPI slave

TTIT92B Pin Number	Pin Name(4'b0000)	GPIO(2'b01)	SPIS(2'b00)	2'b11
8	LAN_PORT1_RX-	GPIO#17	SPIS_MOSI	UART_RXD2
7	LAN_PORT1_RX+	GPIO#16	SPIS_MISO	UART_TXD2
6	LAN_PORT1_TX-	GPIO#15	SPIS_CLK	PWM_CH1
5	LAN_PORT1_TX+	GPIO#14	SPIS_CS	PWM_CH0

Table5-7: SPIS pin share scheme

Note: Controlled by the EPHY_APGIO_AIO_EN[4:1] and SPIS_MODE register

UARTS lite

The module support 3UART:

TTIT92B Pin Number	Pin Name	GPIO	UART	Pin Share
25	UART_RXD0	GPIO#13	UART0_RXD	UART0(For Debug)
26	UART_TXD0	GPIO#12	UART0_TXD	
38	UART_RXD1	GPIO#46	UART1_RXD	PWM_CH1
37	UART_TXD1	GPIO#45	UART1_TXD	PWM_CH0
12	LAN_PORT2_TX-	GPIO#21	UART2_RXD	PWM_CH3/SD_D4
11	LAN_PORT2_TX+	GPIO#20	UART2_TXD	PWM_CH2/SD_D5

Table5-8: UART pin share scheme

GPIO

TTIT92B Pin Number	GPIO	Description	Share function
38	GPIO#46	Uart1_RXD	UART1
37	GPIO#45	Uart1_TXD	
36	GPIO#44	WLED_N	Wireless LED
35	GPIO#43	P0_LED	Port LED

34	GPIO#42	P1_LED	
33	GPIO#41	P2_LED	
32	GPIO#40	P3_LED	
31	GPIO#39	P4_LED	
39	GPIO#38	WDT_RST_N	WPS/Factory Setting
40	GPIO#37	WPS_LED	WPS LED
24	GPIO#29	MDI_TN_P4	SD-XC/eMMC
23	GPIO#28	MDI_TP_P4	
22	GPIO#27	MDI_RN_P4	
21	GPIO#26	MDI_RP_P4	
16	GPIO#25	MDI_RN_P3	
15	GPIO#24	MDI_RP_P3	
14	GPIO#23	MDI_TN_P3	
13	GPIO#22	MDI_TP_P3	
12	GPIO#21	MDI_TN_P2	UART2
11	GPIO#20	MDI_TP_P2	
10	GPIO#19	MDI_RN_P2	PWM1
9	GPIO#18	MDI_RP_P2	PWM0
8	GPIO#17	MDI_RN_P1	SPIS
7	GPIO#16	MDI_RP_P1	
6	GPIO#15	MDI_TN_P1	
5	GPIO#14	MDI_TP_P1	
25	GPIO#13	UART0_RXD	Uart0(For Debug)
26	GPIO#12	UART0_TXD	
48	GPIO#11	GPIO0	GPIO0
46	GPIO#05	I2C_SD	I2C
47	GPIO#04	I2C_CLK	
44	GPIO#03	I2S_CLK/PCMFS	I2S/PCM
42	GPIO#02	I2S_WS/PCMCLK	
43	GPIO#01	I2S_SDO/PCMDTX	
41	GPIO#0	I2S_SDI/PCMDRX	

Table5-9: GPIO pin share scheme

WAN/LAN

In IoT gateway mode, the module integrates 5-port 10/100Mbps fast Ethernet switches; in IoT device mode, the module integrates 1-port 10/100Mbps fast Ethernet switch.

6. Module Specifications

Hardware Features	
Model	TTIT92B
Antenna Type	IPEX
Chipset solution	MT7688A
Voltage	3.3V±5%
Dimension(L×W×H)	40.5mm*25.0mm*3.0mm
Wireless Features	
Wireless Standards	IEEE 802.11b/g/n
Frequency Range	2412MHz---24884MHz
Data Rates	IEEE 802.11b : 1,2,5.5,11Mbps
	IEEE 802.11g : 6,9,12,18,24,36,48,54Mbps
	IEEE 802.11n : MCS0--MCS7 @ HT20
	MCS0--MCS7 @ HT40
Receiver Sensitivity	HT40 MCS7 : -70dBm@10% PER(MCS7)
	HT20 MCS7 : -73dBm@10% PER(MCS7)
	54M: -77dBm@10% PER
	11M: -89dBm@ 8% PER
Modulation Technique	DSSS (DBPSK, DQPSK, CCK)
	OFDM (BPSK, QPSK, 16-QAM, 64-QAM)
Wireless Security	WPA/WPA2, WEP, TKIP and AES, WPS2.0, WAPI
Transmit Power	IEEE 802.11n: 16dBm @HT20/40 MCS7
	IEEE 802.11g: 16dBm @54MHz
	IEEE 802.11b: 18dBm @11MHz
Work Mode	IoT Gateway/IoT Device
Others	
Certification	RoHS
Environment	Operating Temperature: -20°C~55°C
	Storage Temperature: -40°C~125°C
	Operating Humidity: 10%~90% non-condensing
	Storage Humidity: 5%~90% non-condensing

7. PCB Footprint and Dimensions

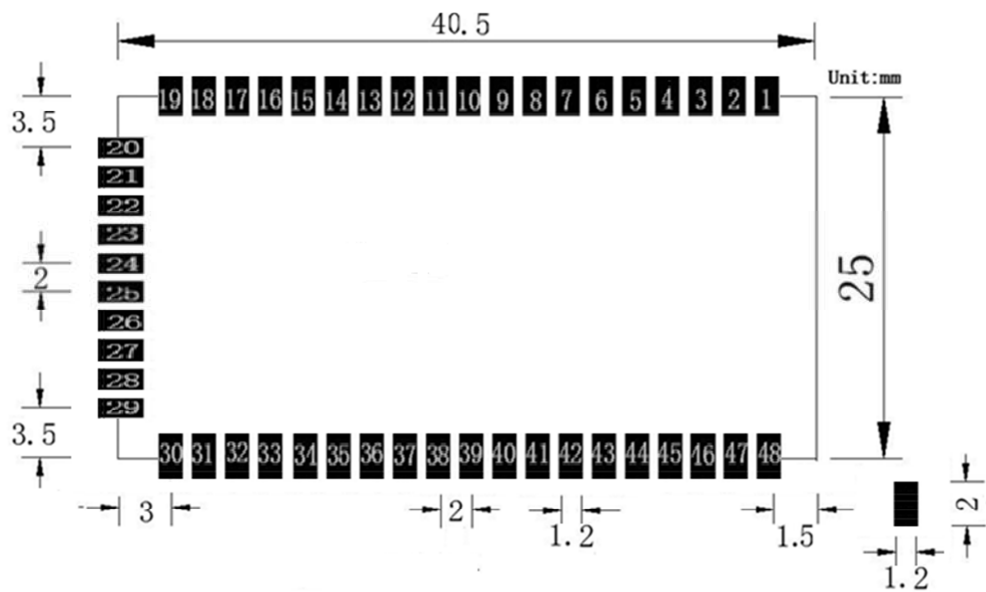


Figure 5: TTIT92B Recommend PCB Footprint

8. Module Pinout and Pin Description

Module Pinout:

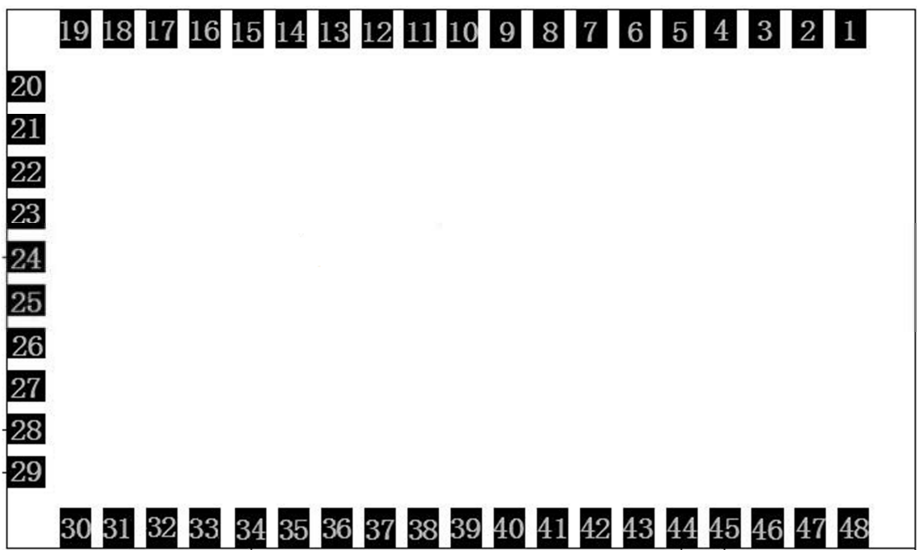


Figure 6: TTIT92B Pin Package

Pin Description:

Pin No.	Pin name	Description	Remark
1	WAN_PORT_RX+	WAN port	WAN_RX+
2	WAN_PORT_RX-	WAN port	WAN_RX-
3	WAN_PORT_TX+	WAN port	WAN_TX+
4	WAN_PORT_TX-	WAN port	WAN_TX-
5	LAN_PORT1_TX+	Ethernet port1	SPIS_CS / GPIO#14 / PWM0
6	LAN_PORT1_TX-	Ethernet port1	SPIS_CLK / GPIO#15 / PWM1
7	LAN_PORT1_RX+	Ethernet port1	SPIS_MISO / GPIO#16 / UART2_TXD
8	LAN_PORT1_RX-	Ethernet port1	SPIS_MOSI / GPIO#17 / UART2_RXD
9	LAN_PORT2_RX+	Ethernet port2	GPIO#18 / PWM0 / SD_D7
10	LAN_PORT2_RX-	Ethernet port2	GPIO#19 / PWM1 / SD_D6
11	LAN_PORT2_TX+	Ethernet port2	GPIO#20 / PWM2 / UART2_TXD / SD_D5
12	LAN_PORT2_TX-	Ethernet port2	GPIO#21 / PWM3 / UART2_RXD / SD_D4
13	LAN_PORT3_TX+	Ethernet port3	SD_WP / GPIO#22
14	LAN_PORT3_TX-	Ethernet port3	SD_CD / GPIO#23
15	LAN_PORT3_RX+	Ethernet port3	SD_D1 / GPIO#24
16	LAN_PORT3_RX-	Ethernet port3	SD_D0 / GPIO#25
17	GND	Ground	GND
18	USB+	USB data pin Data+	USB_D+
19	USB-	USB data pin Data-	USB_D-
20	GND	Ground	GND
21	LAN_PORT4_RX+	Ethernet port4	SD_CLK / GPIO#26
22	LAN_PORT4_RX-	Ethernet port4	SD_CMD/ GPIO#27
23	LAN_PORT4_TX+	Ethernet port4	SD_D3 / GPIO#28
24	LAN_PORT4_TX-	Ethernet port4	SD_D2 / GPIO#29

25	UART_RXD0	UART0 only for debug	UART0_RX / GPIO#13
26	UART_TXD0	UART0 only for debug	UART0_TX / GPIO#12 / O, IPD
27	GND	Ground	GND
28	3.3VD	3.3V input 1000mA	+3.3V
29	3.3VD	3.3V input 1000mA	+3.3V
30	GND	Ground	GND
31	P4_LED	LAN_PORT4_LED	P4_LED_N / GPIO#39
32	P3_LED	LAN_PORT3_LED	P3_LED_N / GPIO#40
33	P2_LED	LAN_PORT2_LED	P2_LED_N / GPIO#41
34	P1_LED	LAN_PORT1_LED	P1_LED_N / GPIO#42
35	P0_LED	WAN_PORT_LED	P0_LED_N / GPIO#43
36	WLED_N	Wireless LED	WLED_N / GPIO#44
37	UART_TXD1	UART1 Serial Data Output	UART1_TXD / GPIO#45 / O, IPU
38	UART_RXD1	UART 1 Serial Data Input	UART1_RXD / GPIO#46
39	WDT_RST_N	WPS/Factory Setting_Button_Key	WDT_RST_N / I2S_MCLK / GPIO#38/O, IPU
40	WPS_LED	WPS_LED	WPS_LED_N / GPIO#37
41	I2S_DI	I2S data input	I2S_SDI/GPIO#0/PCMDRX
42	I2S_WS	I2S word select	I2S_WS/GPIO#2/PCMCLK
43	I2S_DO	I2S data output	I2S_SDO /GPIO#1/PCMDTX/IPD
44	I2S_CLK	I2S clock	I2S_CLK/GPIO#3/PCMFS
45	HW_RESET	Power on reset	HW_RESET_N#
46	I2C_SD	I2C Data	I2C_SDA(PU 2K2) / GPIO#5
47	I2C_SCLK	I2C clock	I2C_SCL(PU 2K2) / GPIO#4
48	GPIO0	General Purpose I/O	POWER_ON# / GPIO#11/IPD

9. Electrical Characteristics

a) Absolute Maximum Ratings

Parameter	Condition	Min	Typ.	Max.	Unit
Storage temperature range		-40		125	°C
ESD Protection	VESD	/		2000	V
Supply voltage	VDD_3.3V	0		3.6	V
Voltage on any I/O pin		-0.3		3.63	V

Table9-1: Absolute Maximum Ratings

b) Recommended Operation Ratings

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Extended temp.	TA	-20		55	°C
Power Supply	VDD_3.3V	3.14	3.3	3.46	V
Input Low Voltage	VIL	-0.3		0.8	V
Input High Voltage	VIH	2		3.63	V

Table9-2: Operating Conditions

c) Measurement Conditions

System state	Current (Typ.)@3.3V
Standby	60 mA
Transmit (2.4g; +15 dBm @ TX HT20 MCS7.)	90 mA
Transmit (2.4g; +18 dBm @ 11b 11Mbps.)	95 mA

Table9-3: Power Consumption in Different States

10. Manufacturing Process Recommendations

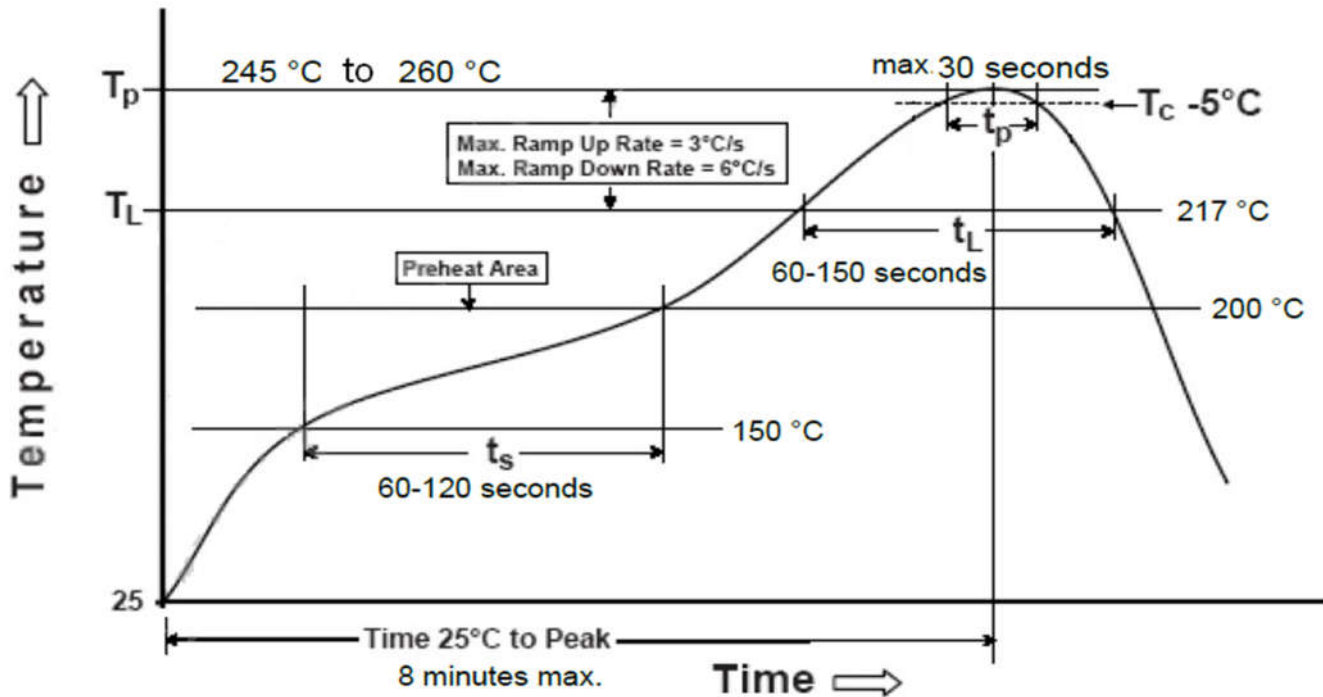


Figure 7: TTIT92B Typical Lead-free Soldering Profile

Note : The final soldering temperature chosen at the factory depends on additional external factors like choice of soldering paste , size , thickness and properties of the baseboard , etc. Exceeding the maximum soldering temperature in the recommended soldering profile may permanently damage the module.