

# SKW92A 2x2 MIMO WLAN

## Module Datasheet

Name: 802.11b/g/n 2x2 MIMO WiFi AP/Router Module

Model No.: SKW92A

Revision: V1.04

### Revision History

Revision	Description	Approved	Date
V1.01	Initial Release	Sunny Pan	20151228
V1.02	Update Pin Description	George He	20160315
V1.03	Update Power Consumption	George He	20170413
V1.04	Update Ordering Information	George He	20171016

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## 1. General Description

The SKW92A module includes an 802.11n MAC and baseband, a 2.4GHz radio and FEM, a 580MHz MIPS CPU, a 5-port 10/100 fast Ethernet switch. Solution for low power, low-cost, and highly integrated AP router and consumer electronic devices, the module requires only an external 3.3V power supply. It supports 802.11n operating up to 144 Mbps for 20 MHz and 300 Mbps for 40 MHz channel respectively, and IEEE 802.11b/g data rates. The module supports bridge mode and AP Client mode and Gateway mode. The high performance Module can process advanced applications effortlessly, such as routing, security and VoIP. It also includes a selection of interface to support a variety of applications, such as a USB port for accessing external storage and 3G/TLE modem. Especially in the IOT, a wide range of applications.

## 2. Applications

- ◆ USB WiFi Camera
- ◆ IOT (internet of things)
- ◆ WiFi AP
- ◆ 3G/4G Wi-Fi Router
- ◆ WiFi Repeater
- ◆ Building Automation
- ◆ Home Automation
- ◆ Smart Home Gateway
- ◆ Industry Control



Figure 1: SKW92A Top View

## 3. Features

- ◆ Compliant to IEEE 802.11b/g/n.
- ◆ 2T2R mode with support for a 300Mbps PHY data rate.
- ◆ DDR2 memory up to 1024Mb.
- ◆ Flash memory up to 256Mb.
- ◆ 4 LAN ports and 1 WAN port.
- ◆ Support USB 2.0 slave device for USB disk and USB 3G/4G dongle and USB camera.
- ◆ Support SD card.
- ◆ Support interface: I2C, PCM, I2S(192K/24bits), PWM, SPI slave, UART lite, GPIO.
- ◆ Security: WEP64/128, TKIP, AES, WPA, WPA2, WAPI.
- ◆ Support AP/Client/Router mode.
- ◆ RoHS compliance meets environment-friendly requirement.
- ◆ Conform to FCC/CE/IC/RoHS certification standards.
- ◆ 40.5mm(L) x 25mm(W) x 3.0mm(H) dimension.

## 4. Application Block Diagram

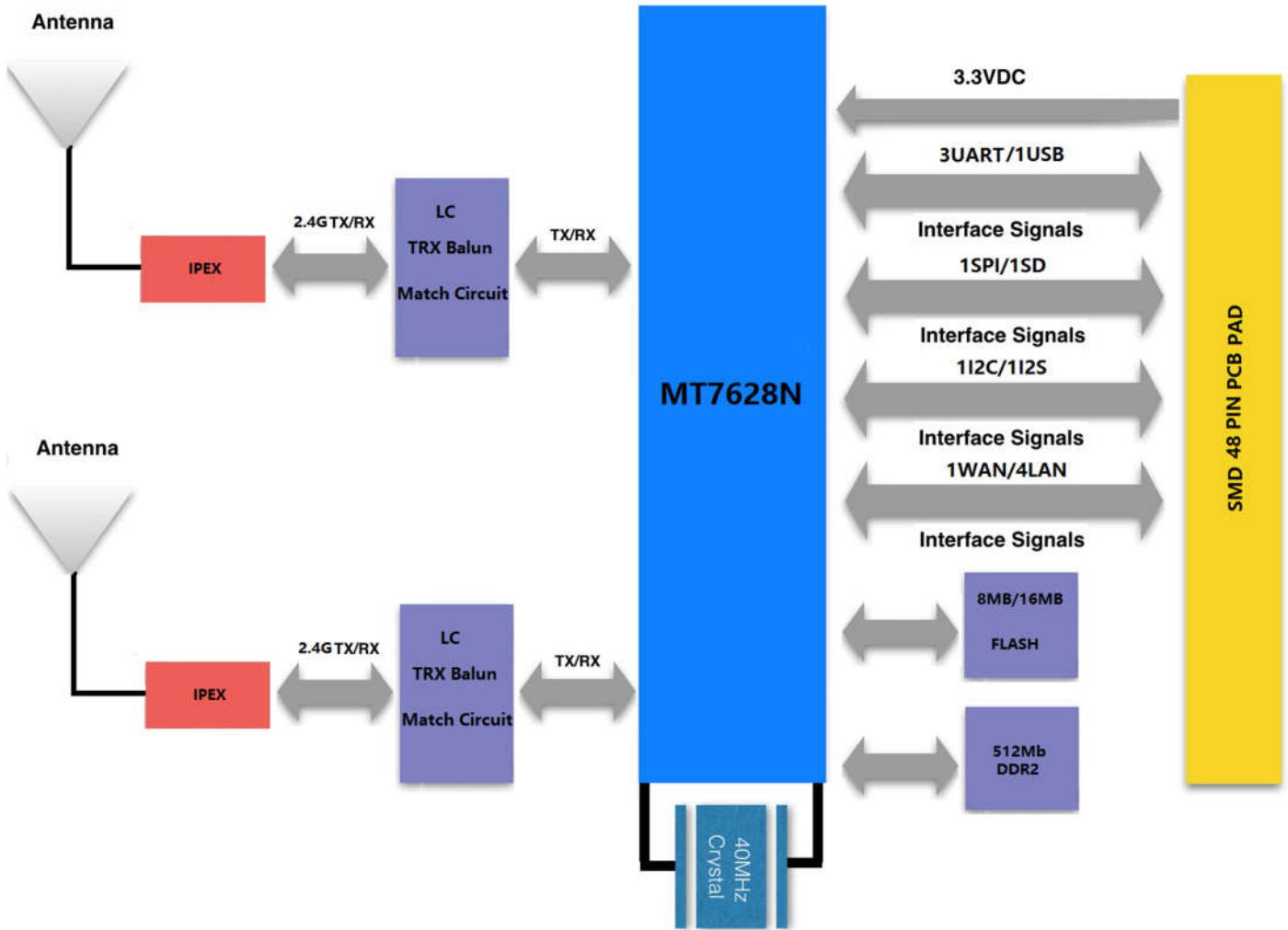


Figure 2: SKW92A Block Diagram

## 5. Interfaces

### USB

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

## I2C

SKW92A 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

SKW92A Pin Number	Pin Name(4'b0000)	GPIO(2'b01)	SD(2'b00)
24	LAN_PORT4_TX-	GPIO#29	SD_D2
23	LAN_PORT4_TX+	GPIO#28	SD_D3
22	LAN_PORT4_RX-	GPIO#27	SD_CMD
21	LAN_PORT4_RX+	GPIO#26	SD_CLK
16	LAN_PORT3_RX-	GPIO#25	SD_D0
15	LAN_PORT3_RX+	GPIO#24	SD_D1
14	LAN_PORT3_TX-	GPIO#23	SD_CD
13	LAN_PORT3_TX+	GPIO#22	SD_WP

**Table5-2: SD pin share scheme**

**Note:** Controlled by the EPHY\_APGIO\_AIO\_EN[4:1] and SD\_MODE register

## I2S(192K/24bits)

SKW92A 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

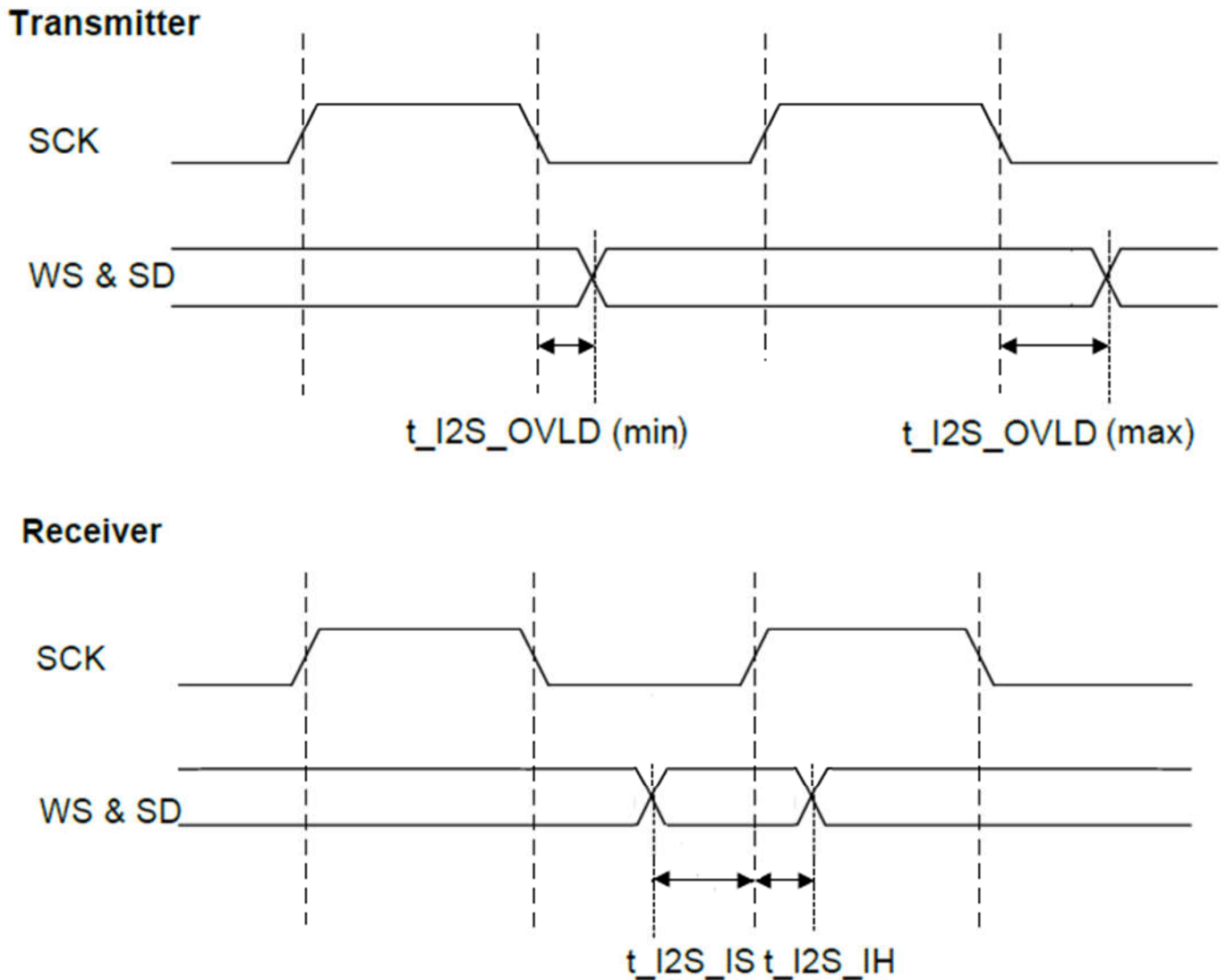
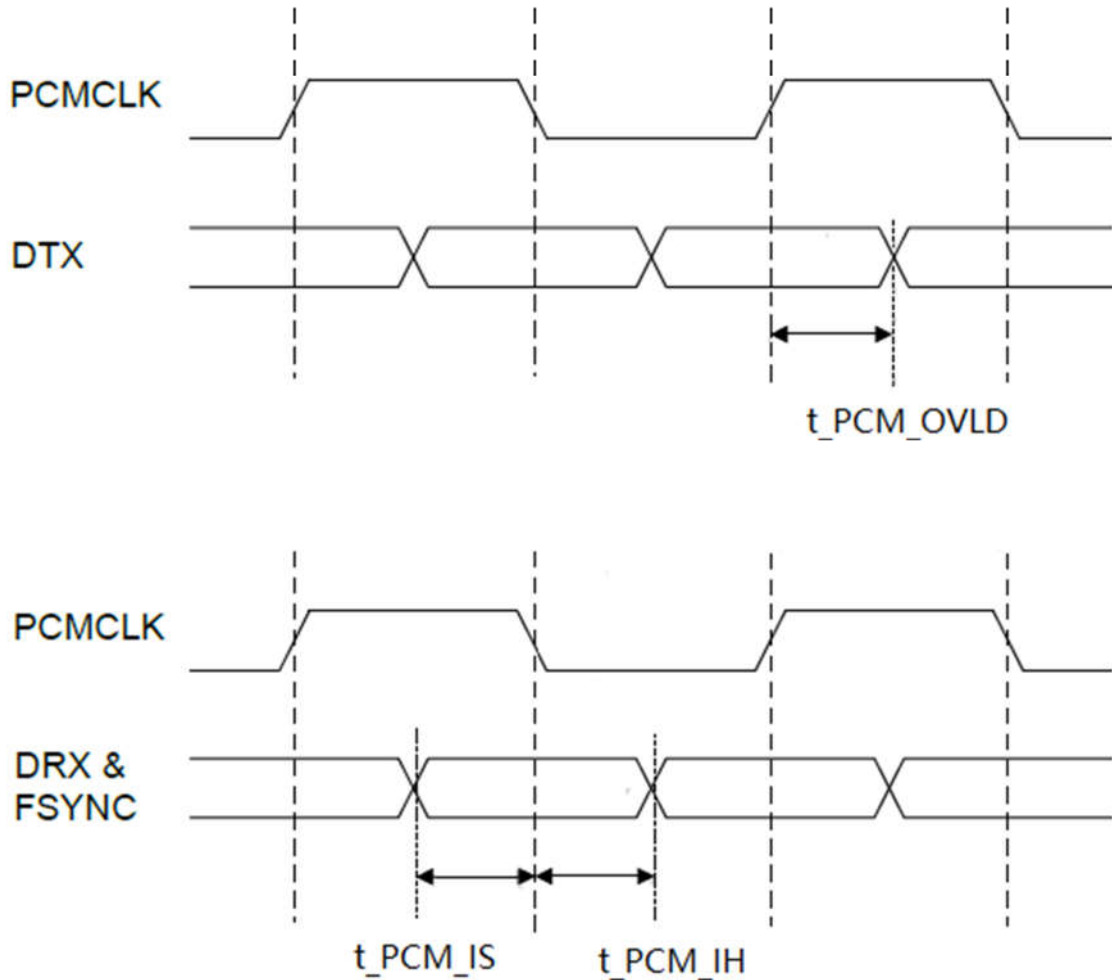


Figure 3: I2S Timing

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**

SKW92A 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

SKW92A 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:

SKW92A 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

SKW92A 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
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

The SKW92A module integrates 5-port 10/100Mbps fast Ethernet switch.

## 6. Module Specifications

Hardware Features	
Model	SKW92A
Antenna Type	IPEX
Chipset solution	
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	2412GHz---2484MHz
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
<b>Work Mode</b>	Bridge/Gateway/AP Client
<b>Others</b>	
<b>Certification</b>	RoHS
<b>Environment</b>	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. Module Pinout and Pin Description

### Module Pinout:

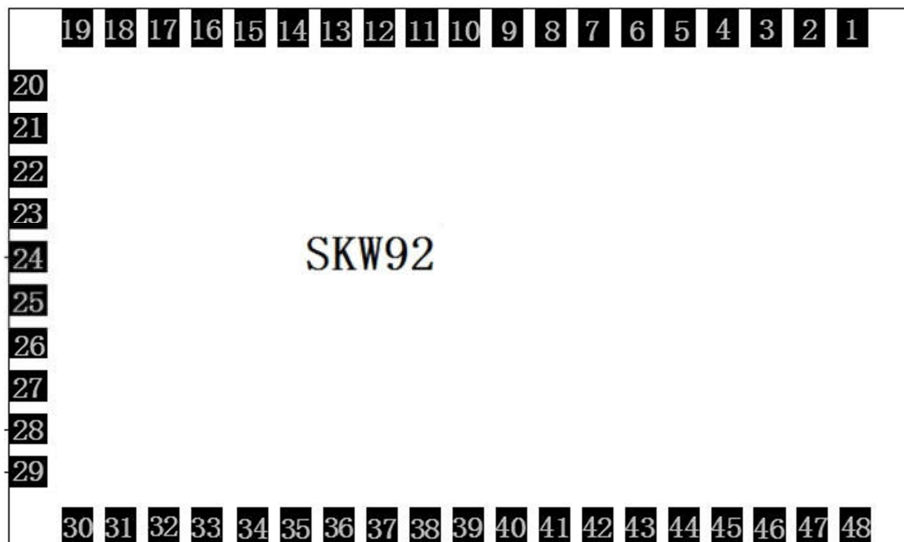


Figure 5: SKW92A Pin Package

**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 /
8	LAN_PORT1_RX-	Ethernet port1	SPIS_MOSI / GPIO#17 /
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 /
12	LAN_PORT2_TX-	Ethernet port2	GPIO#21 / PWM3 /
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,
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	UART1_TXD / GPIO#45 / O,
38	UART_RXD1	UART 1 Serial Data	UART1_RXD / GPIO#46
39	WDT_RST_N	WPS/Factory	WDT_RST_N / I2S_MCLK /
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
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

## 8. PCB Footprint and Dimensions

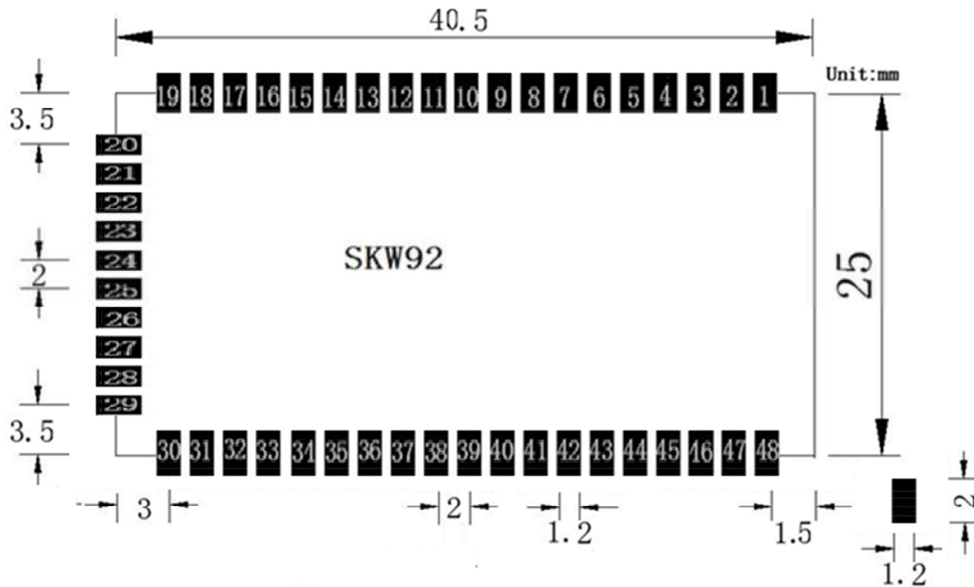


Figure 6: SKW92A Recommend PCB Footprint

## 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

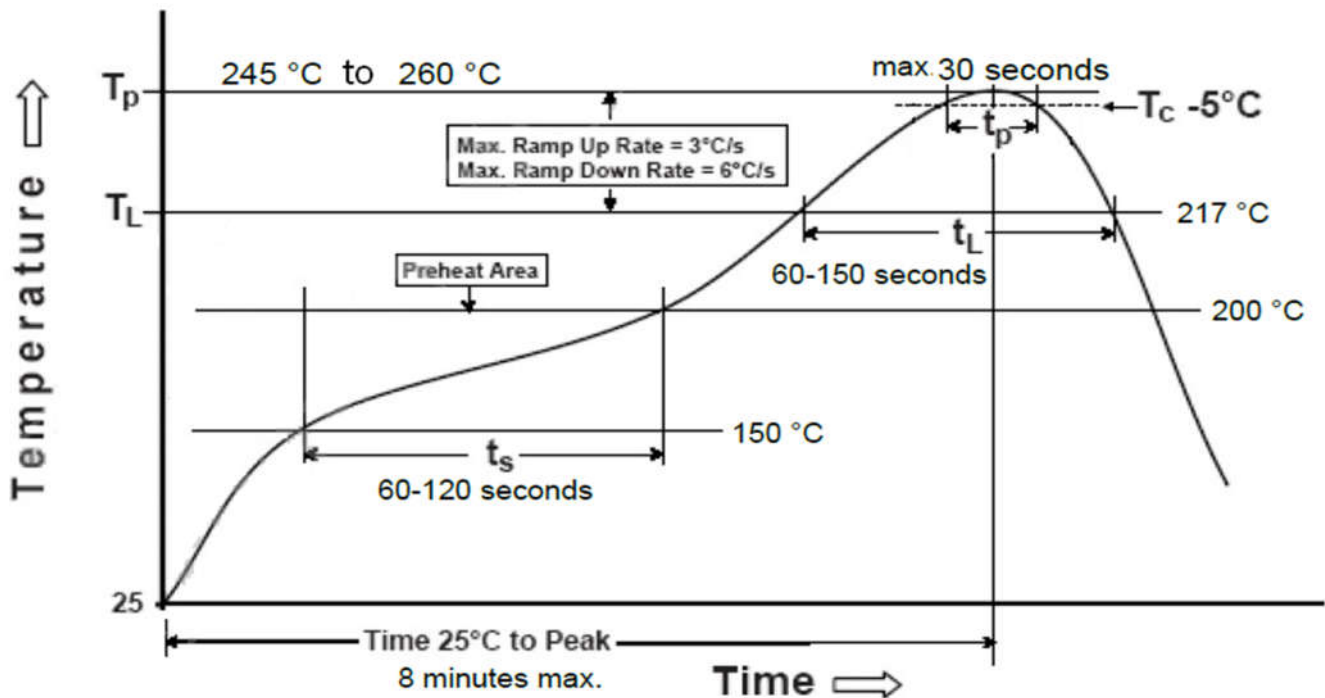
Table9-2: Operating Conditions

**c) Measurement Conditions**

System state	Current (Typ.)@3.3V	Current (Max.)@3.3V
Standby	180 mA	210 mA
Transmit (2.4g; +15 dBm @ TX HT20)	400 mA	
Transmit (2.4g; +18 dBm @ 11b 11Mbps.)	650 mA	850 mA

**Table9-3: Power Consumption in Different States**

**10. Manufacturing Process Recommendations**



**Figure 7: SKW92ATypical 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.

## 11. Ordering Information

Module No.	SPI Flash Size	DDR2 Size
SKW92A_E8	8M Bytes	512M bits
SKW92A_E16	16M Bytes	512M bits
SKW92A_E325	32M Bytes	512M bits
SKW92A_E321	32M Bytes	1024M bits

## 12. Contact Information

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