SKWE2625 Datasheet

Wi-Fi 6 Dual-band 2T2R+ Bluetooth 5.2 M.2 Combo Module

Document information	
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目录

1. General Description

The SKWE2625 is a low-cost and low-power consumption module which has all of the Wi-Fi and Bluetooth functionalities. The highly integrated module makes the possibilities of web browsing, VoIP, Bluetooth headsets applications. With seamless roaming capabilities and advanced security, also could interact with different vendors' 802.11a/b/g/n/ac/ax 2x2 Access Points in the wireless LAN.

The wireless module complies with IEEE 802.11 a/b/g/n/ac/ax 2x2 MIMO standard and it can achieve up to a speed of 1774.5Mbps (2x2 80MHz 11ax + 2x2 40MHz 11ax DBS). The integrated module provides PCIe interface for Wi-Fi, UART/PCM interface for Bluetooth.

This compact module is a total solution for a combination of Wi-Fi and Bluetooth V5.2 technology. The module is specifically developed for all portable devices

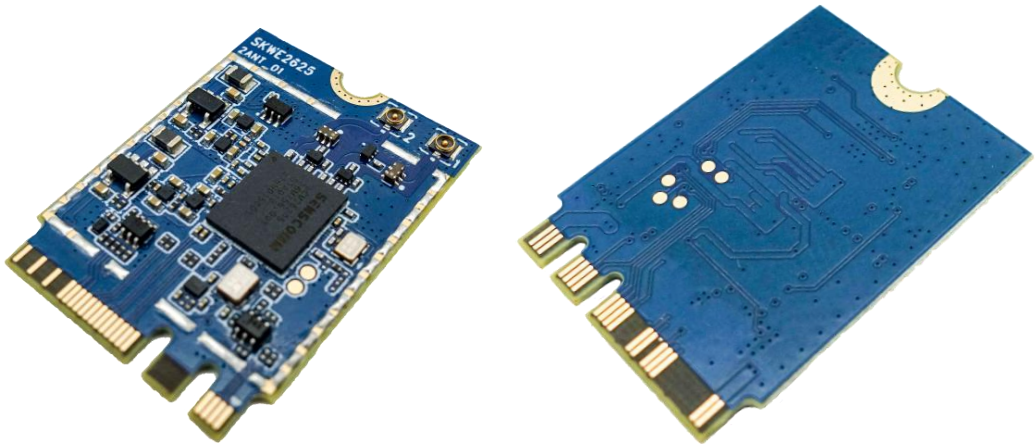


Figure 1. Product picture

2. Features

- Highly integrated wireless local area network (WLAN) system-on-chip (SOC) for 2.4G/5G 802. 11ax WLAN applications.
- Compliant with IEEE 802. 11a/b/g/n/ac/ax.
- Supports 2x2 Multi-User Multiple-Input Multiple-Output (MU-MIMO).
- Dual Band Simultaneous (DBS) with dual MAC, up to 1774.5Mbps data rate (2x2+2x2 11ax DBS) Supports 20/40MHz at 2.4GHz and supports 20/40/80MHz at 5GHz.
- Dynamic Frequency Selection (DFS, radar detection).
- Offloading traffic for minimal host utilization at 11ac/ax speeds.
- Supports low power PCIe (w/L1 sub-state) interface for WLAN and UART/PCM interface for Bluetooth.
- Supports Bluetooth V5.2, BLE, ANT+ and be backwards compatible with Bluetooth 1.2, 2.X+ enhance data rate.
- Supports WLAN-Bluetooth coexistence and LTE-5G/ISM coexistence.
- Supports Bluetooth for class1 and class2 power level transmissions without requiring an external PA.

- BT host digital interface:
  - HCI UART (up to 3.2Mbps)
  - PCM for audio data
- Standard M.2 2230 Key E Golden Finger interface.

3. General Specification

3.1 2.4GHz RF Specification

Feature	Description	
WLAN Standard	IEEE 802.11b/g/n/ac/ax Wi-Fi compliant	
Frequency Range	2.400 GHz~2.4835 GHz (2.4 GHz ISM Band)	
Number of Channels	2.4GHz：Ch1~Ch14	
Test Items	Typical Value	EVM
Output Power	802.11b /11Mbps：19dBm ± 2 dB	EVM ≤ - 10dB
	802.11g /54Mbps：18dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7：17dBm ± 2 dB	EVM ≤ -28dB
	802.11ac VHT20/MCS8：16dBm ± 2 dB	EVM ≤ -30dB
	802.11ac VHT40/MCS9：15dBm ± 2 dB	EVM ≤ -32dB
	802.11ax HE20/MCS11：13dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE40/MCS11：13dBm ± 2 dB	EVM ≤ -35dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	±20ppm	
SISO Receive Sensitivity (11b,20MHz) @8% PER	-1Mbps PER @ -94dBm	≤ -83
	- 11Mbps PER @ -85dBm	≤ -76
SISO Receive Sensitivity (11g,20MHz) @10% PER	-6Mbps PER @ -90dBm	≤ -85
	-54Mbps PER @ -71dBm	≤ -68
SISO Receive Sensitivity (11n,20MHz) @10% PER	-MCS=0, PER @ -90dBm	≤ -85
	-MCS=7, PER @ -69dBm	≤ -67
SISO Receive Sensitivity (11n,40MHz) @10% PER	-MCS=0, PER @ -87dBm	≤ -82
	-MCS=7, PER @ -66dBm	≤ -64
SISO Receive Sensitivity (11ac,20MHz) @10% PER	-MCS=0, PER @ -90dBm	≤ -85
	-MCS=8, PER @ -64dBm	≤ -62
SISO Receive Sensitivity (11ac,40MHz) @10% PER	-MCS=0, PER @ -87dBm	≤ -82
	-MCS=9, PER @ -59dBm	≤ -57
SISO Receive Sensitivity (11ax,20MHz) @10% PER	-MCS=0, PER @ -90dBm	≤ -85
	-MCS=11, PER @ -60dBm	≤ -55
SISO Receive Sensitivity (11ax,40MHz) @10% PER	-MCS=0, PER @ -87dBm	≤ -82
	-MCS=11, PER @ -57dBm	≤ -52

Maximum Input Level	802.11b : -10dBm
	802.11g/n : -20dBm
Antenna Reference	Small antennas with 0~2dBi peak gain

Note: The RF specification will be updated in future version

3.2 5GHz RF Specification

Conditions : VDD=3.3V ; Temp:25° C

Feature	Description	
WLAN Standard	IEEE 802. 11 a/n/ac/ax 2x2, Wi-Fi compliant	
Frequency Range	4.900 GHz ~ 5.845 GHz (5.0 GHz ISM Band)	
Number of Channels	5.0GHz：Please see the table1	
Item	Value	Standard Value
Output Power	802. 11a /6Mbps: 20dBm ± 2 dB	EVM ≤ -5dB
	802. 11a /54Mbps: 16dBm ± 2 dB	EVM < -25dB
	802. 11n HT20 /MCS0: 19dBm ± 2 dB	EVM ≤ -5dB
	802. 11n HT20 /MCS7: 16dBm ± 2 dB	EVM ≤ -28dB
	802. 11n HT40 /MCS0: 18.5dBm ± 2 dB	EVM ≤ -5dB
	802. 11n HT40 /MCS7: 16dBm ± 2 dB	EVM ≤ -28dB
	802. 11ac vHT20/MCS0: 19dBm ± 2 dB	EVM ≤ -5dB
	802. 11ac vHT20/MCS8: 15dBm ± 2 dB	EVM ≤ -30dB
	802. 11ac vHT40/MCS0: 18.5dBm ± 2 dB	EVM ≤ -5dB
	802. 11ac vHT40/MCS9: 15dBm ± 2 dB	EVM ≤ -32dB
	802. 11ac vHT80/MCS0: 18.5dBm ± 2 dB	EVM ≤ -5dB
	802. 11ac vHT80/MCS9: 14dBm ± 2 dB	EVM ≤ -32dB
	802. 11ax HE20/MCS0: 19dBm ± 2 dB	EVM ≤ -5dB
	802. 11ax HE20/MCS11: 14dBm ± 2 dB	EVM ≤ -35dB
	802. 11ax HE40/MCS0: 18dBm ± 2 dB	EVM ≤ -5dB
	802. 11ax HE40/MCS11: 14dBm ± 2 dB	EVM ≤ -35dB
	802. 11ax HE80/MCS0: 18dBm ± 2 dB	EVM ≤ -5dB
	802. 11ax HE80/MCS11: 13dBm ± 2 dB	EVM ≤ -35dB

SISO Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps ≤ -87dBm	≤-85
	- 54Mbps ≤ -71dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 ≤ -86dBm	≤-85
	- MCS=7 ≤ -68dBm	≤-67
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 ≤ -83dBm	≤-82
	- MCS=7 ≤ -65dBm	≤-64
SISO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0, NSS1 ≤ -83dBm	≤-82
	- MCS=8, NSS1 ≤ -63dBm	≤-60
SISO Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0, NSS1 ≤ -82dBm	≤-79
	- MCS=9, NSS1 ≤ -60dBm	≤-55
SISO Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0, NSS1 ≤ -81dBm	≤-79
	- MCS=9, NSS1 ≤ -57dBm	≤-54
SISO Receive Sensitivity (11ax, 20MHz) @10% PER	- MCS=0 ≤ -81dBm	≤-74
	- MCS=11 ≤ -55dBm	≤-52
SISO Receive Sensitivity (11ax,40MHz) @10% PER	- MCS=0 ≤ -74dBm	≤-71
	- MCS=11 ≤ -52dBm	≤-49
SISO Receive Sensitivity (11ax,80MHz) @10% PER	- MCS=0 ≤ -73dBm	≤-68
	- MCS=11 ≤ -51dBm	≤-46
Maximum Input Level	802. 11a/n/ac/ax : - 10dBm	
Antenna Reference	Small antennas with 0~2dBi peak gain	

3.3 Bluetooth Specification

Feature	Description
General Specification	
Bluetooth Standard	Bluetooth V5.2 of 1, 2 and 3Mbps.
Host Interface	UART/PCM
Antenna Reference	Small antennas with 0~2dBi peak gain
Frequency Band	2402 MHz ~ 2480 MHz
Number of Channels	79 channels
Modulation	GFSK, π/4-DQPSK, 8-DPSK
RF Specification	

	Min(dBm)	Typical(dBm)	Max(dBm)
Output Power (Class 1)		7	
Sensitivity @ BER=0. 1% for GFSK (1Mbps)		-92	
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)		-92	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-85	
Maximum Input Level	GFSK (1Mbps)：-10dBm		
	π/4-DQPSK (2Mbps)：-10dBm		
	8DPSK (3Mbps)：-10dBm		

Note: The RF specification will be updated in future version

3.4 Description

Model Name	**SKWE2625**
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L*W*H：22*30*2mm
Weight	1.9g
Wi-Fi Interface	Support PCIe
BT Interface	UART / PCM
OS supported	Android /Linux/ iOS /WIN10
Operating temperature	-10°C to 70°C
Storage temperature	-40°C to 85°C

3.5 5GHz(20MHz) Channel table

Band range	Operating Channel Numbers	Channel center frequencies (MHz)
5180MHz~5240MHz	36	5180
	40	5200
	44	5220
	48	5240
5260MHz~5320MHz	52	5260
	56	5280
	60	5300
	64	5320
	100	5500
	104	5520

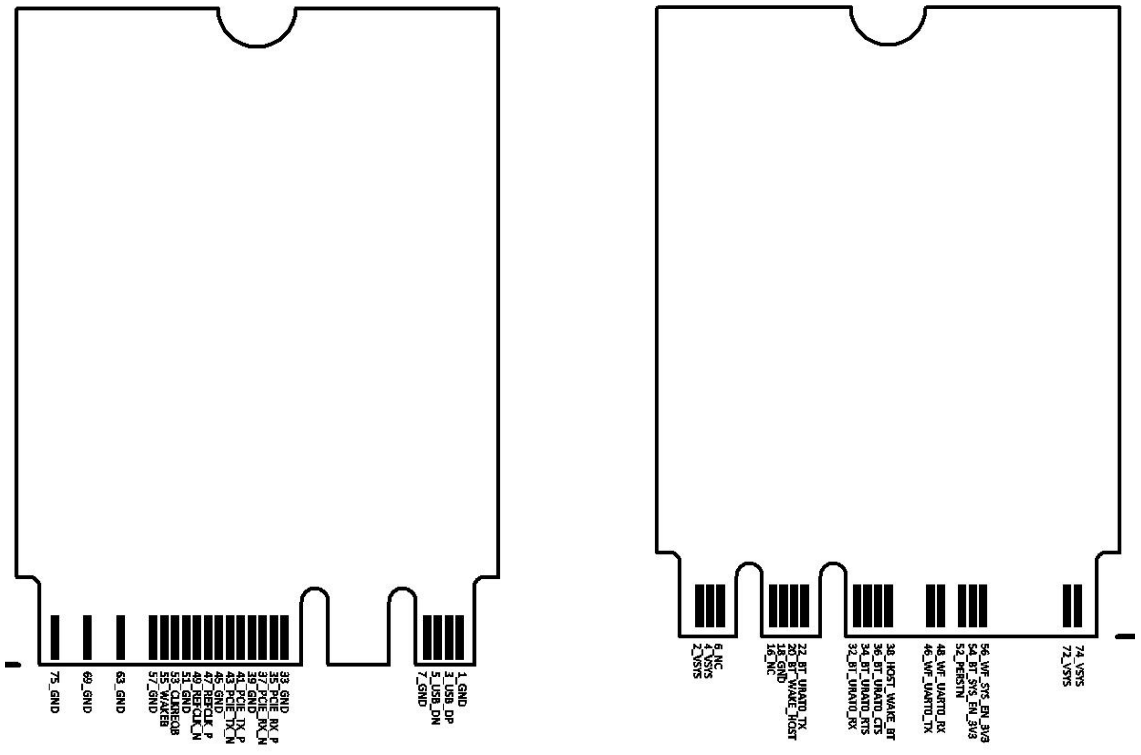
5550MHz~5700MHz	108	5540
	112	5560
	116	5580
	120	5600
	124	5620
	128	5640
	132	5660
	136	5680
	140	5700
5745MHz~5825MHz	149	5745
	153	5765
	157	5785
	161	5805
	165	5825

RF specification will be updated in a future version of this document.

4. Pin Definition

4.1 Pin Outline

< TOP VIEW >



TOP view **BOT view**

4.2 Pin Definition details

NO.	Name	Type	Description	Voltage
1	GND		Ground connections	
3	USB_DP	I/O	USB 2.0 differential signals for WLAN and BT	N2
5	USB_DN		USB 2.0 differential signals for WLAN and BT	N1
7	GND		Ground connections	
33	GND		Ground connections	
35	PCIE_RX_P		WLAN PCIe L0/USB super speed receive input differential signals	U2
37	PCIE_RX_N		WLAN PCIe L0/USB super speed receive input differential signals	U1
39	GND		Ground connections	
41	PCIE_TX_P	I/O	WLAN PCIe L0/USB super speed transmit output differential signals	W3
43	PCIE_TX_N		WLAN PCIe L0/USB super speed transmit output differential signals	V3
45	GND		Ground connections	
47	REFCLK_P		WLAN PCIe reference clock input differential signals	W5
49	REFCLK_N		WLAN PCIe reference clock input differential signals	V5
51	GND		Ground connections	
53	CLKREQB	I	PCIE_EP_CLKREQN；GPIO59	U6
55	WAKEB	O	PCIE_EP_WAKEN；GPIO58	W7
57	GND		Ground connections	
63	GND		Ground connections	
69	GND		Ground connections	
75	GND		Ground connections	
2	VSYS			
4	VSYS			
6	NC		Floating (NC)	
16	NC	I/O	Floating (NC)	
18	GND		Ground connections	
20	BT_WAKE_HOST		BT_HOST_WAKE；GPIO8	V9
22	BT_UART0_TX		BT_UART0_TXD；GPIO4	W15
32	BT_UART0_RX		BT_UART0_RXD；GPIO5	W14

34	BT_UART0_RTS		BT_UART0_RTS；GPIO6	U16
36	BT_UART0_CTS		BT_UART0_CTS；GPIO7	V17
38	HOST_WAKE_BT		The power on strap value of {GPIO9, GPIO8}；GPIO9	U8
46	WF_UART0_TX	I/O	GPIO38	P11
48	WF_UART0_RX	I/O	GPIO39	R12
52	PERSTN		Pull low this pin to reset whole chip	V7
54	BT_SYS_EN_3V3		Pull low this pin to reset BT function	V13
56	WF_SYS_EN_3V3	P	Pull low this pin to reset WLAN function	V14
72	VSYS			
74	VSYS			

4.3 PCIe power up sequence timing

Supports PCIe Gen 2 interface for WLAN.

Compliant to PCIe Gen 2 power up sequence timing.

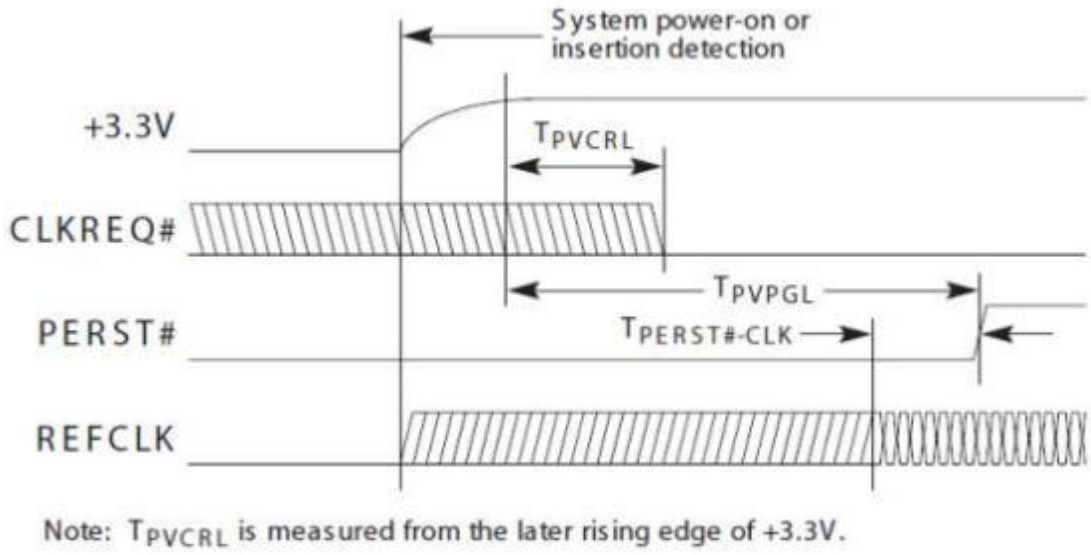


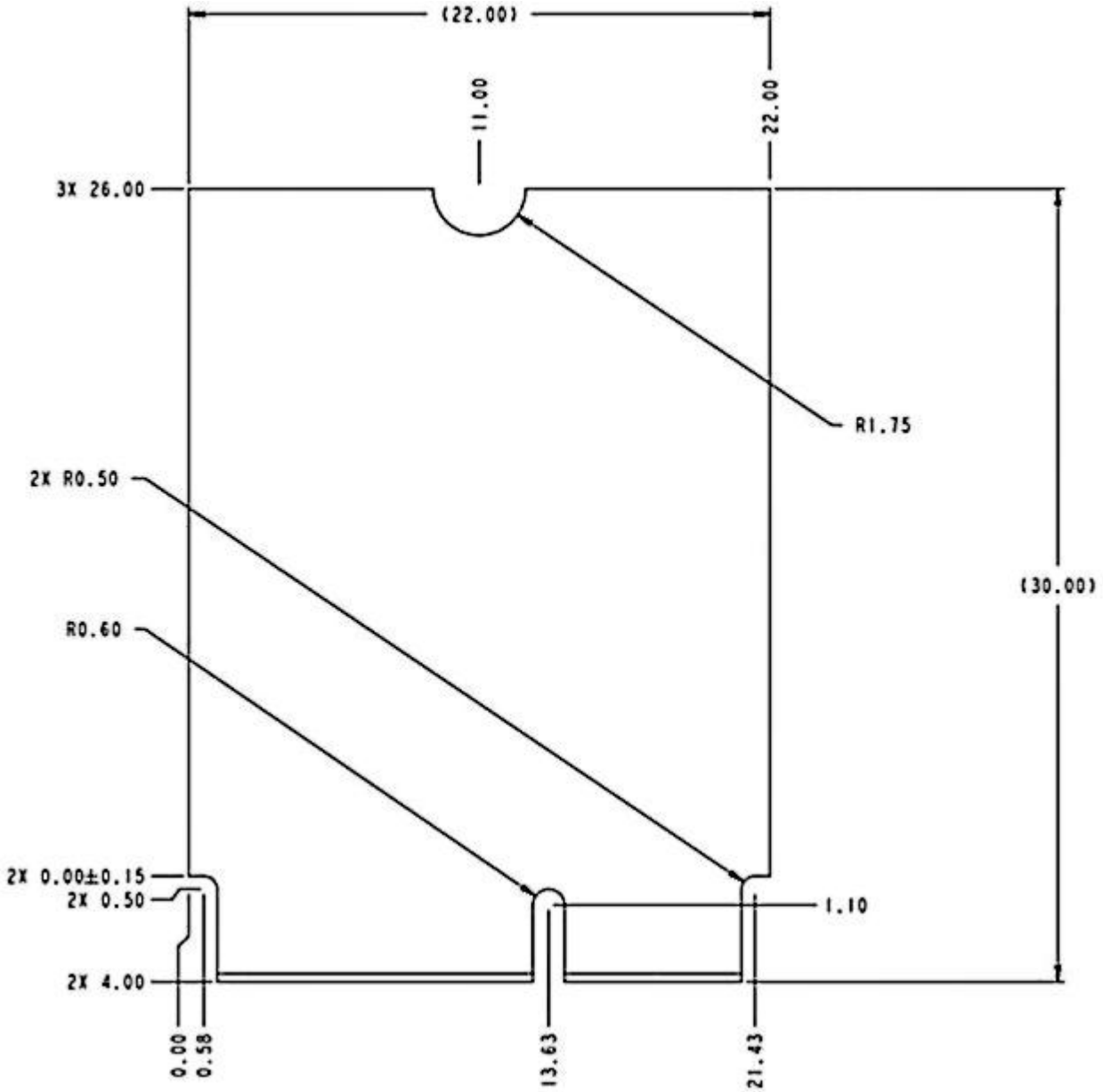
Figure 4-1 Power up timing requrements

Symbol	Parameter	Min	Max	Units
T_{PVCRL}	Power Valid to CLKREQ# Output active		100	µS
T_{PVPGL}	Power Valid to PERST# Input inactive	1		mS
$T_{PERST\#-CLK}$	REFCLK stable before PERST# inactive	100		µS

5. Size reference

5.1 Physical Dimensions

(Unit: mm)

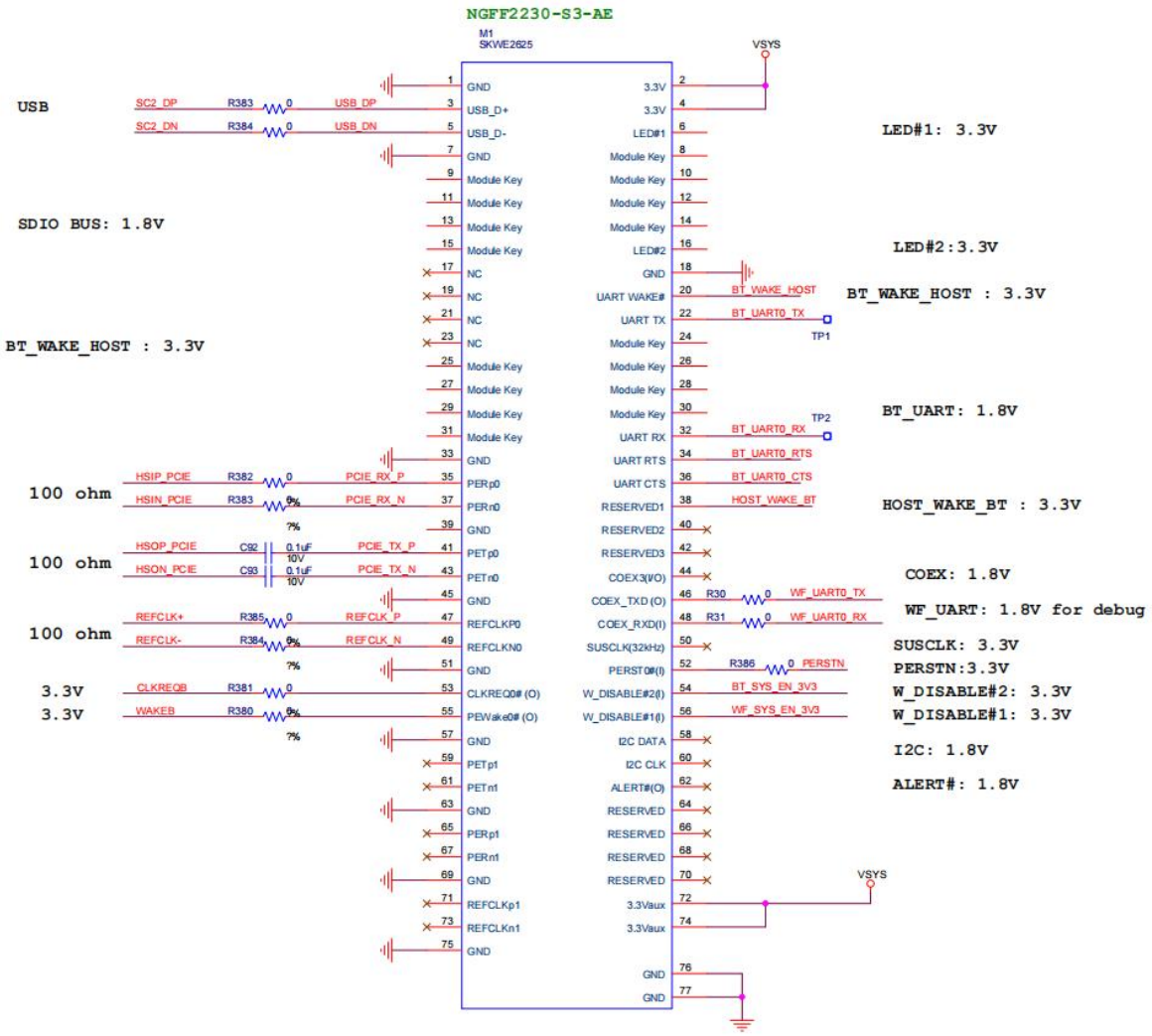


6. The Key Material List

Item	Part Name	Description
1	PCB	SKWE2625 深绿色,4L, 22X30X0.8mm
2	Crystal	2016 80MHz ±10ppm 12pF
3	Chipset	SCM2625A FCCSP 7.8mm x 7.0mm, 246-pin

7. Reference Design

7.1 Reference design schematic



7.2 M.2 connector

The module is standard M.2 2230 Key E double sided module.

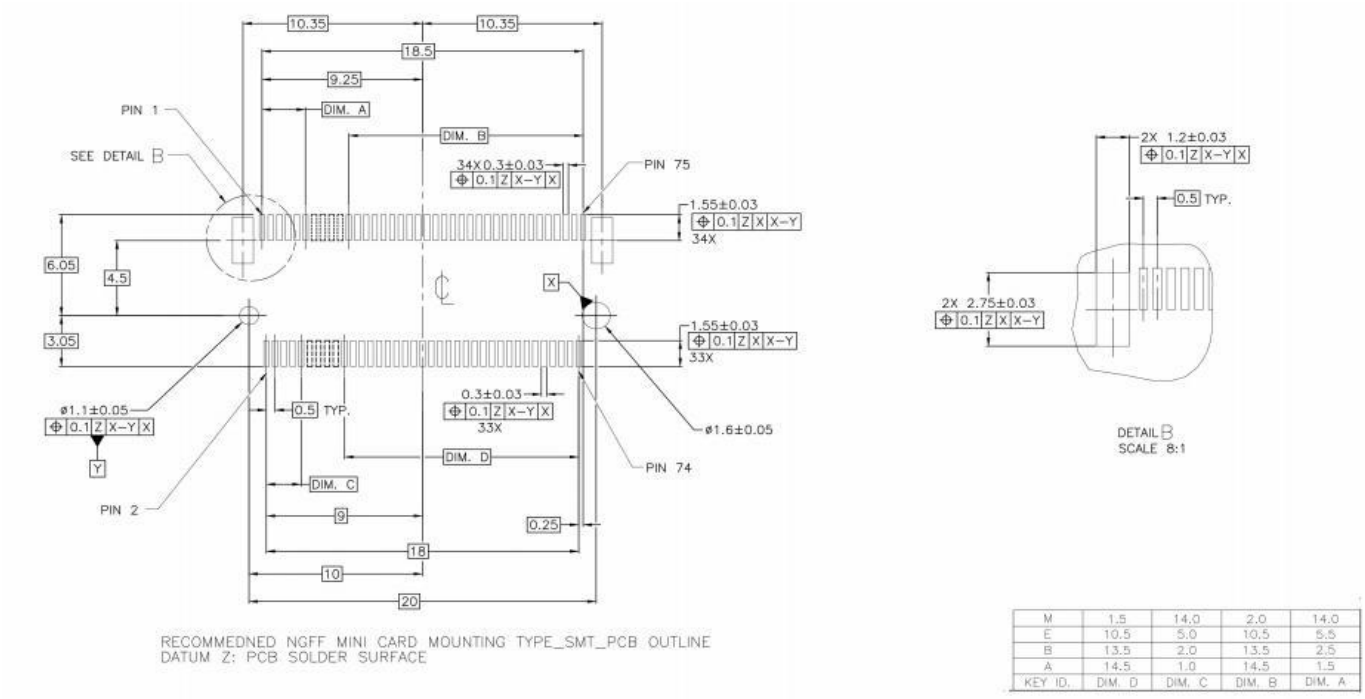
It complies with the standard M.2 2230 Key E slot.

Recommended M.2 connector part number:

2199230-4 (TE connectivity).

AS0BC21-S67BE-LH (Foxconn).

For the mainboard PCB, it should reserve screw hole for fixing the module.



Dimensions unit: mm

Note: Refer Key ID is E

Figure 7-2 Recommended M.2 connector PCB outline

7.3 RF connector of module

There are 2 gen 4 RF receptacle connectors on the module, for external dual band antenna. The RF receptacle connectors are complied with IPEX 4 standard.

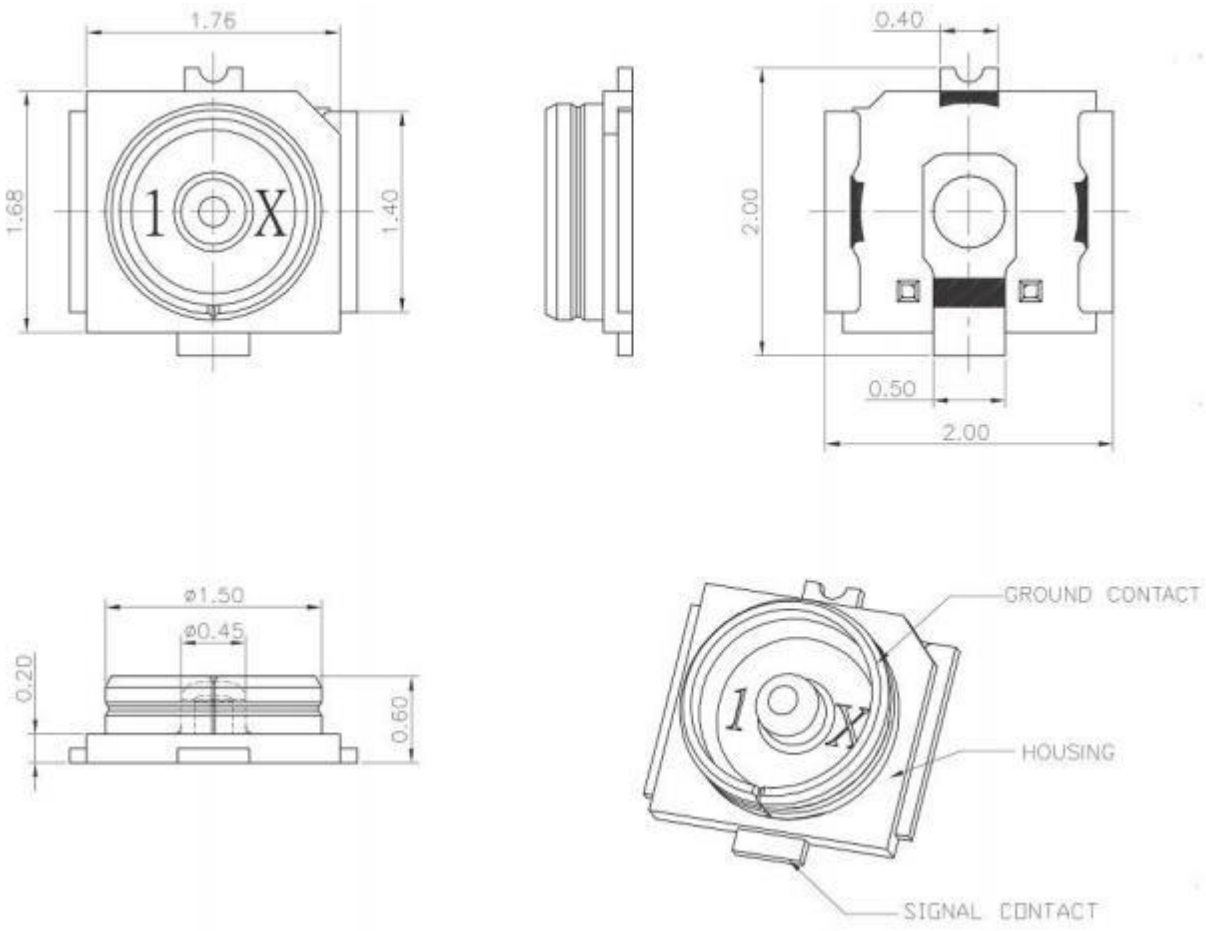


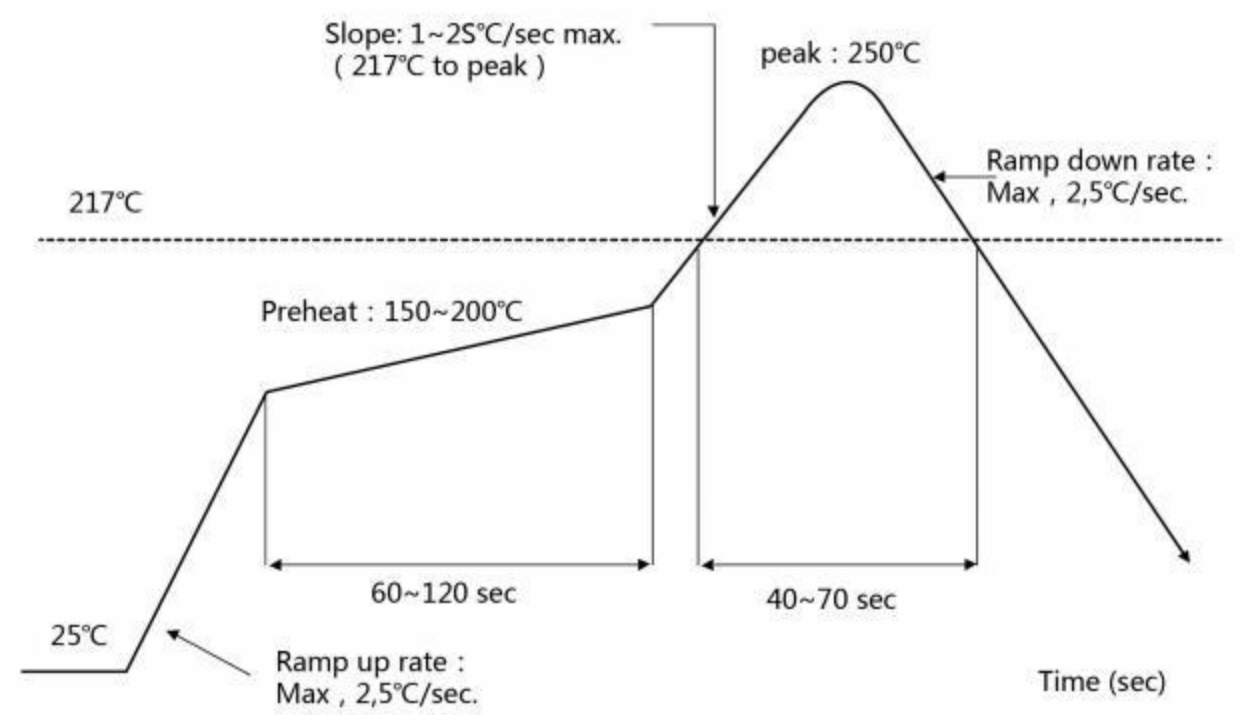
Figure 7-3 RF connector

8. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature： <250°C

Number of Times： ≤2 times



9. Moisture sensitivity

The Modules is a Moisture Sensitive Device level 3, in according with standard IPC/JEDEC J-STD-020, take care.

all the relatives requirements for using this kind of components.

Moreover, the customer has to take care of the following conditions:

a) Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)

b) Environmental condition during the production: 30°C / 60% RH according to IPC/JEDEC J-STD-033A paragraph 5

c) The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition

d) “IPC/JEDEC J-STD-033A paragraph 5.2” is respected

e) Baking is required if conditions b) or c) are not respected

f) Baking is required if the humidity indicator inside the bag indicates 10% RH or more

10. Contact Information

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