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Product Specifications & Manual

P31ASUS ac2x2+BT5.0 USB2.0

Version: 1.4

Manufacturer	CC&C Technologies, Inc.
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Revision History

Version	Date	Change Description
1.0	09/23, 2019	Initial release
1.1	10/02,2019	Add power consumption mA
1.2	03/02,2020	Modify Storage Temperature
1.3	12/11,2020	Modify Pin outs
1.4	03/04,2021	Modify Factory options

Overview

P31ASUS is a WLAN 11ac and Bluetooth combo Module, provides a single USB interface to host, which fully supports the features and functional compliance of IEEE 802.11b/g/n/a/ac standards. Bluetooth v2.1 and v5.0 standards. It supports up to 866.7Mbps high-speed WLAN network connections and Bluetooth protocol stack.

It is designed to provide excellent performance with low power consumption and enhance the advantages of robust system and cost-effective.

P31ASUS provides a complete solution for a high throughput performance integrated wireless LAN and Bluetooth module, and is targeted at competitive superior performance, better power management applications.

Features

- 802.11ac MIMO solution for 5G band
- Support 802.11ac 2T2R, wave-2 compliant with MU-MIMO
- Complies with USB Specification Revision 2.0
- Operate at ISM frequency bands (2.4GHz and 5GHz)
- IEEE standards support: IEEE 802.11b/ g/ n/ a/ ac/
- 2x2 MIMO technology for extended reception robustness and exceptional throughput
- 5MHz / 10MHz / 20MHz / 40MHz / 80MHz bandwidth transmission
- OFDM with BPSK, QPSK, 16QAM, 64QAM and 256QAM modulation.
Convolutional Coding Rate: 1/2, 2/3, 3/4, and 5/6
- Maximum PHY data rate up to 173.3 Mbps using 20MHz bandwidth, 400Mbps using 40MHz bandwidth, and 866.7Mbps using 80MHz bandwidth
- Backward compatible with 802.11a/b/g devices while operating at 802.11n data rate
- Compatible with Bluetooth v2.1
- Support Bluetooth v5.0 system
- Support Low Power Mode(Sniff/Sniff Sub-rating)
- Enhanced BT/WIFI Coexistence Control to improve transmission quality in different profiles
- Dual Mode supports Simultaneous LE and BR/EDR
- Supports multiple Low Energy states
- RoHS compliance
- Low Halogen compliance
- Transmit Beamforming
- Build-in both 2.4GHz PA
- Build-in both 2.4GHz LNA

General Specification

Model Name	P31ASUS
Product Name	ac2x2+BT5.0 USB2.0
Standard	IEEE 802.11b/g/n/a/ac/ Bluetooth v2.1/v5.0
Data Transfer Rate	WLAN: 802.11b: 11, 5.5, 2, 1 Mbps 802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps 802.11n: MCS0 to 7 for HT20MHz, MCS0 to 7 for HT40MHz 802.11ac: MCS0 to 8 for HT20MHz, MCS0 to 9 for HT40MHz, NSS1 MCS0 to 9 for VHT80MH Bluetooth: Basic rate: 1Mbps Enhanced data rate: 2, 3 Mbps Low Energy: LE_1Mbps, LE_125kbps, LE_500kbps, LE_2Mbps
Modulation Method	WLAN: CCK, DQPSK, DBPSK, BPSK, QPSK, 16QAM, 64QAM, 256QAM Bluetooth: 8DPSK, $\pi/4$ DQPSK, GFSK
Frequency Band	2.4GHz and 5GHz ISM Band
Spread Spectrum	IEEE 802.11b: CCK (Complementary Code Keying) IEEE 802.11g/n/a/ac: OFDM (Orthogonal Frequency Division Multiplexing) Bluetooth: FHSS (Frequency Hopping Spread Spectrum)
RF Output Power (tolerance $\pm 1.5/-2$ dBm)	WLAN: 18dBm, EVM < 8% – 802.11b@CCK 11Mbps 17dBm, EVM < -25dB – 802.11g@OFDM 54Mbps 16dBm, EVM < -28dB – 802.11n@MCS7_HT20 16dBm, EVM < -28dB – 802.11n@MCS7_HT40 16dBm, EVM < -25dB – 802.11a@OFDM 54Mbps 14dBm, EVM < -32dB – 802.11ac@NSS1 MCS9_BW80 Bluetooth: 8dBm
Receiver Sensitivity	WLAN: <-76dBm – 802.11b@11Mbps <-65dBm – 802.11g@54Mbps <-64dBm – 802.11n@MCS7_BW20 <-61dBm – 802.11n@MCS7_BW40 <-51dBm – 802.11ac@NSS1_MCS9_BW80 Bluetooth: <-85dBm, BER < 0.01% – Basic rate @1Mbps <-80dBm, BER < 0.1% – Enhanced data rate @2,3Mbps <-85dBm, BER < = -30.8% – Low Energy @1Mbps, 125kbps, 500kbps, 2Mbps,
Antenna	IPEX Antenna x2
Power supply	USB / DC 3.3V
Operating Temperature	0 – 50° C ambient temperature
Storage Temperature	-40 ~ 85°C ambient temperature

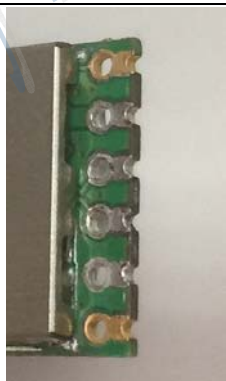
Humidity	5 to 90 % maximum (non-condensing)
Size	25 x 12 x 1.9mm (L x W x H)

DC power input Characteristics

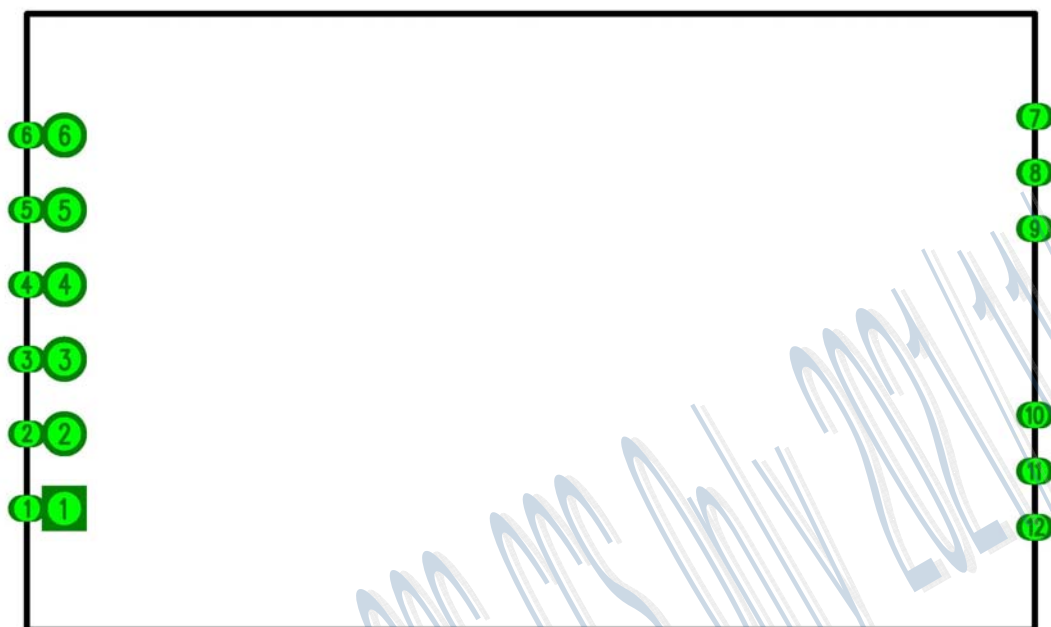
Module	Minimum	Typical	Maximum	Unit
DC input voltage	3.135	3.3	3.465	V
DC power consumption	1.2	1.5	1.9	W
	360	450	580	mA

Factory options

- RF output by RF connector(type-1), Half Hole(type-2)
- With or without Pin Header(4 Pin or 6 Pin)

RF type-1	RF type-2	With Pin Header	Without Pin Header
			

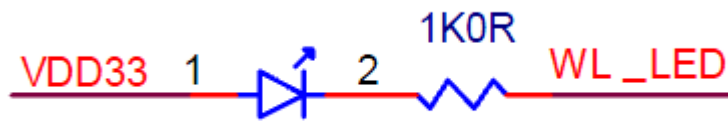
Pin outs:



Pin	Signal	Input /Output	Description
1	WPS	Input	WPS Pin(Active High), shared with GPIO3 General Purpose Input/ Output Pin. When this function is not required, external pull-down resistor is required.
2	VDD	Power	DC 3.3V
3	HS DM	I/O	USB 2.0 Transceiver Differential Pair
4	HS DP	I/O	USB 2.0 Transceiver Differential Pair
5	GND	-	Ground
6	WL_LED	I/O	WL LED Pin(Active Low), shared with GPIO8 General Purpose Input/ Output Pin
7	GND	-	Ground
8	RF_S0	RF	WLAN RF port (if don't using IPEX connector)
9	GND	-	Ground
10	GND	-	Ground
11	RF_S1	RF	WLAN /BT RF port (if don't using IPEX connector)
12	GND	-	Ground

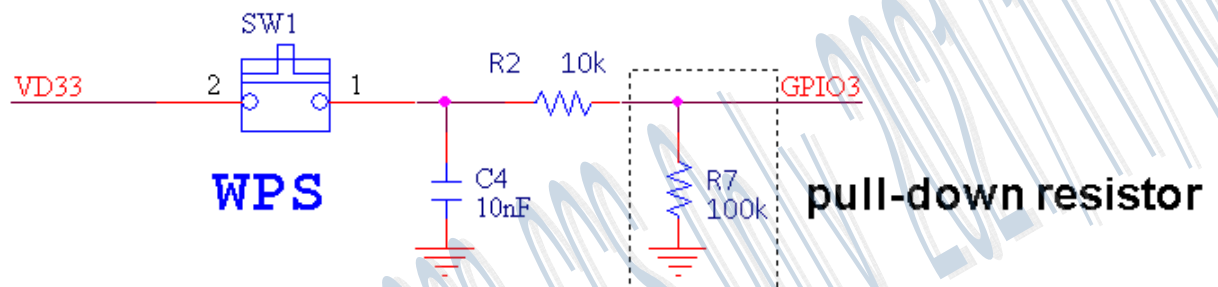
Note: Please do not connect Pin7~Pin12 of P31ASUS when using RF type-1

The external circuit for WiFi activity LED display

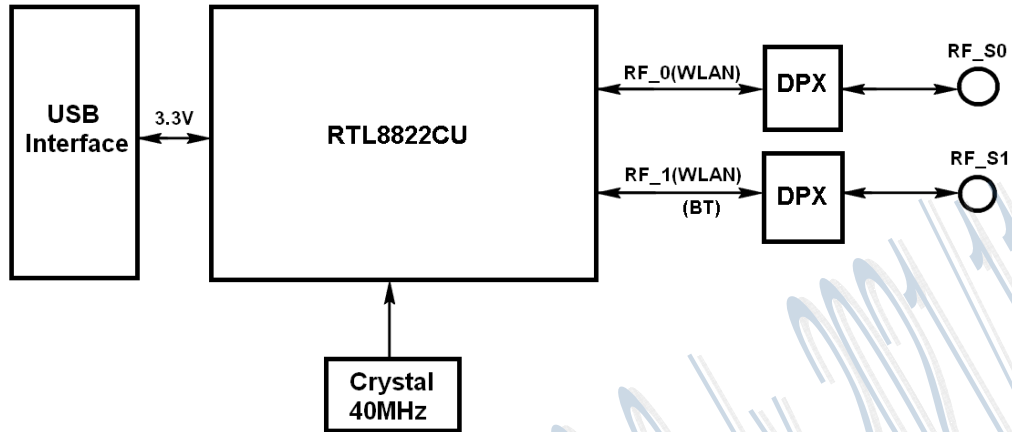


The external circuit for WiFi activity WPS display

(When this function is not required, external pull-down resistor is required.)

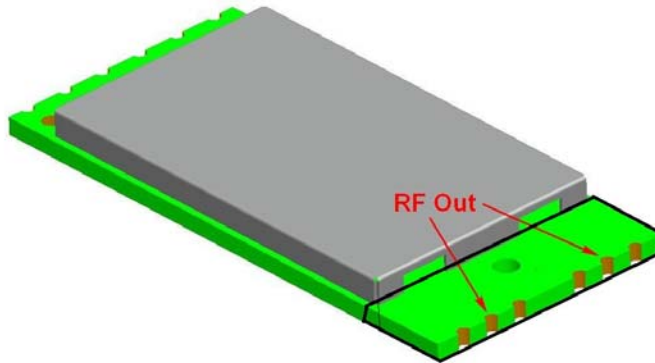


Block Diagram



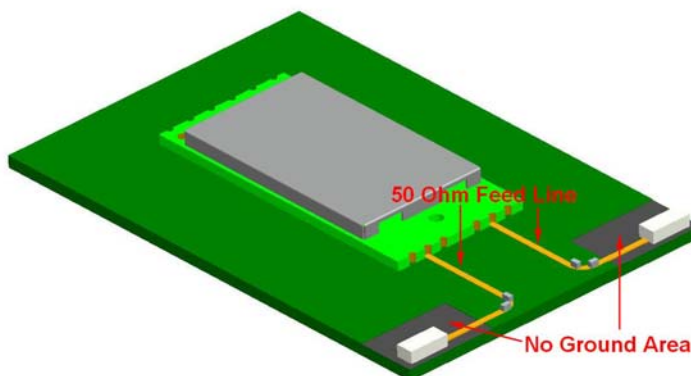
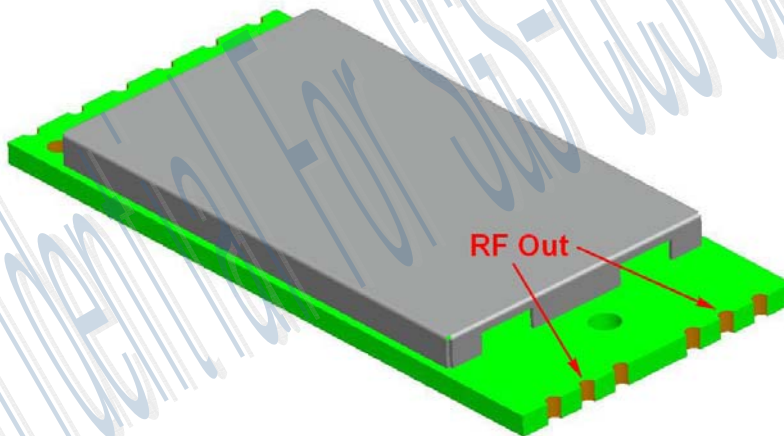
Placement Notice

- In order to get a better RF performance, please don't put any trace or copper plane under Black frame of the module.

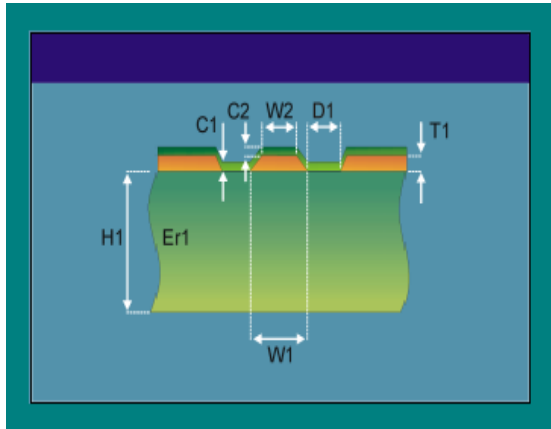


- **RF out**

Please have the impedance of feed lines to be 50 ohms from RF output pin to Antenna.



50 Ohm Feed line:



H1: 20 ~ 60 mil

Er1: 4.2

W1: 20 mil

W2: 20 mil

D1: 5 mil

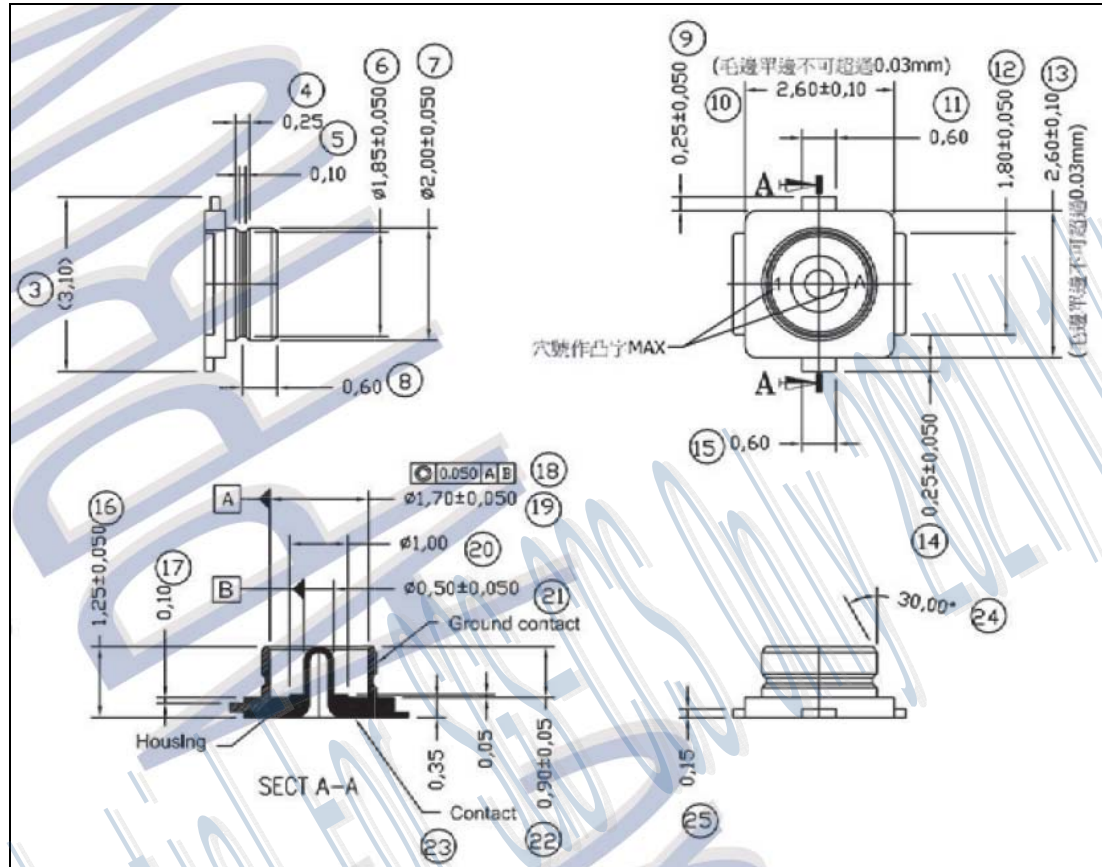
C1: 0.7 mil

C2: 0.7 mil

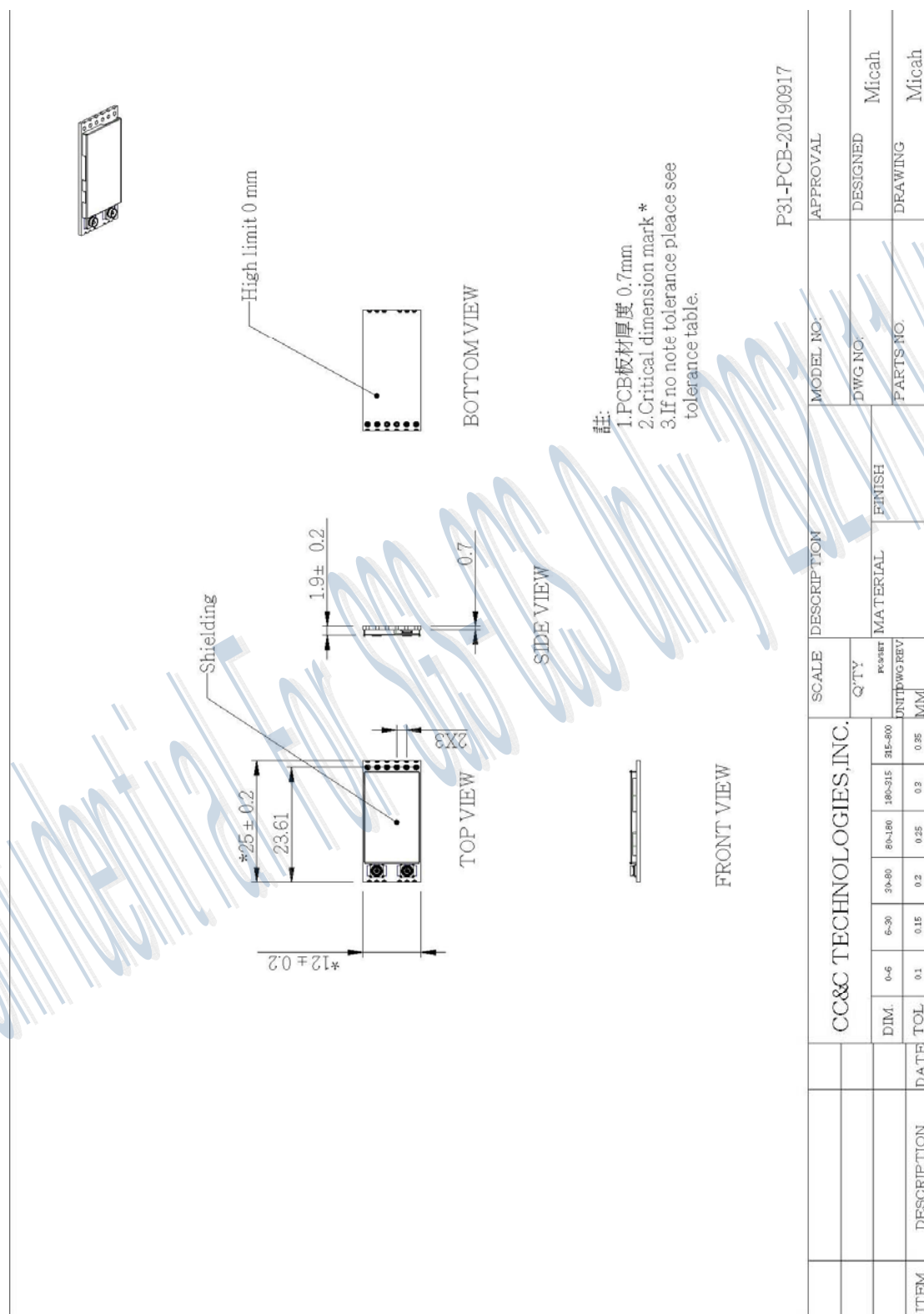
T1: 1.4 mil (1 oz)

Impedance: 51 ~ 53 Ohm

RF connector dimensions (unit: mm)



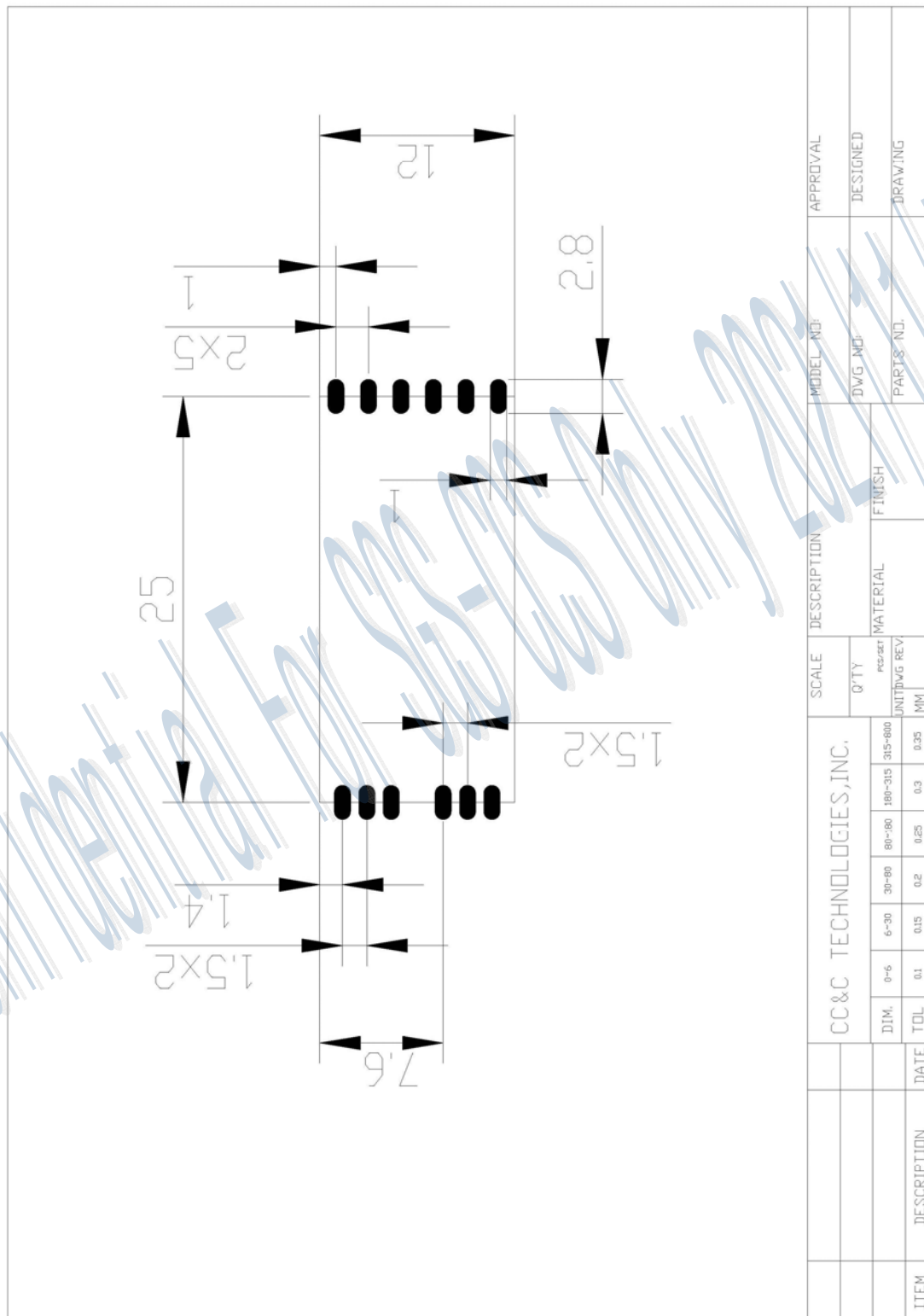
Dimension



Subject to change without notice

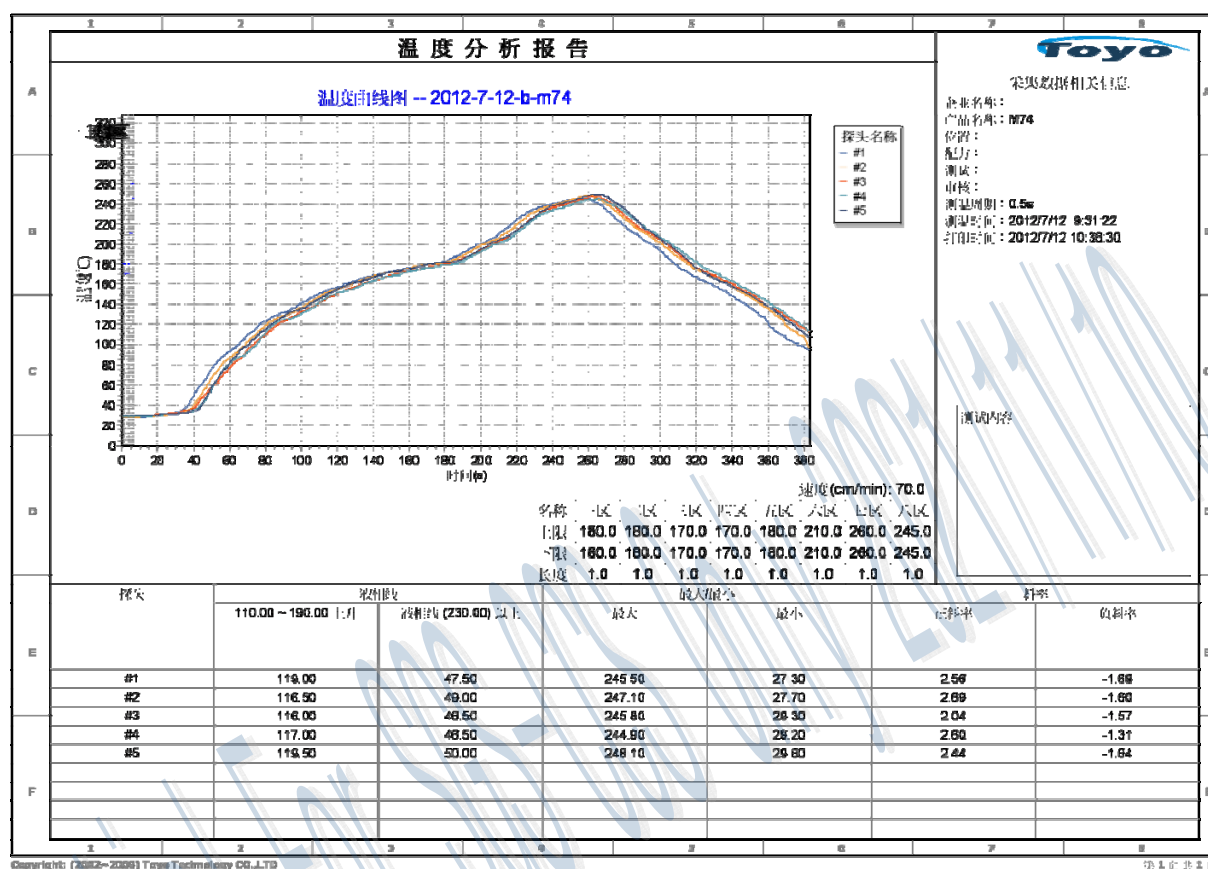
PCB Layout footprint

The recommended layout pads for P31ASUS module are shown below. (Module top view)



All dimensions are in millimeters.
Tolerance: +- 0.2mm

Reference Temperature Reflow Chart



Note:

1. If the system PCBA is double side design please reflow the side without this module first.
2. Don't let the solder machine temperature over 250°C or follow solder paste vender's recommended temperature.
3. The Ramp-up temperature speed is 1~4 °C per second, the Ramp-down temperature speed is 1~4 °C per second.
4. This temperature reflow chart is for reference only, it depends on the manufacturing machine's characters requirement.

This module is surface mount device; please refer below conditions for drying before solder reflow processes. (extracted from IPC/JEDEC J-STD-033B.1)

Bake @ 125 °C		Bake @ 90 °C		Bake @ 40 °C	
Exceeding floor Life By > 72h	Exceeding floor Life By ≤ 72h	Exceeding floor Life By > 72h	Exceeding floor Life By ≤ 72h	Exceeding floor Life By > 72h	Exceeding floor Life By ≤ 72h
9 hours	7 hours	33 hours	23 hours	13 days	9 days



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 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 or more 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.**

To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example- use only shielded interface cables when connecting to computer or peripheral devices).

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

LP0002 低功率射頻器材技術規範_章節 3.8.2 取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

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 a 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.

IC Warning

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Cet appareil et son antenne (s) ne doivent pas être situés ou fonctionner en conjonction avec une autre antenne ou émetteur.

Ce module est destiné aux intégrateurs OEM. L'intégrateur OEM est toujours responsable de l'exigence de conformité IC du produit final, qui intègre ce module. Une distance minimale de 20 cm doit pouvoir être maintenue entre l'antenne et les utilisateurs pour l'hôte dans lequel ce module est intégré. Dans une telle configuration, les limites d'exposition aux rayonnements de la IC définies pour une population/un environnement non contrôlé peuvent être satisfaites.

Tout changement ou modification non expressément approuvé par le fabricant pourrait annuler le droit de l'utilisateur à utiliser cet équipement.

Module Contains ID

If the FCC & IC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: PANP31ASUS & IC: 6225A-P31ASUS" or "Contains FCC ID: PANP31ASUS & IC: 6225A-P31ASUS."

si le numéro d'identification FCC n'est pas visible lorsque le module est installé à l'intérieur d'un autre appareil, l'extérieur de l'appareil dans lequel le module est installé doit également afficher une étiquette faisant référence au module fourni. Cette étiquette extérieure peut utiliser des termes tels que les suivants : « Contient l'ID FCC du module émetteur : PANP31ASUS & IC : 6225A-P31ASUS » ou « Contient l'ID FCC : PANP31ASUS & IC : 6225A-P31ASUS ».

Modular Approval OEM INTEGRATION INSTRUCTIONS:

This device is intended only for OEM integrators under the following conditions:

- 1) The module must be installed in the host equipment such that 20 cm is maintained between the antenna and users, and
 - 2) the transmitter module may not be co-located with any other transmitter or antenna.
- As long as conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.). Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

Cet appareil est destiné uniquement aux intégrateurs OEM dans les conditions suivantes :

- 1) Le module doit être installé dans l'équipement hôte de telle sorte que 20 cm soit maintenu entre l'antenne et les utilisateurs, et
- 2) le module émetteur ne doit pas être co-localisé avec un autre émetteur ou antenne.

Tant que les conditions ci-dessus sont remplies, un test supplémentaire de l'émetteur ne sera pas nécessaire. Cependant, l'intégrateur OEM est toujours responsable de tester son produit final pour toute exigence de conformité supplémentaire requise avec ce module installé (par exemple, les émissions des appareils numériques, les exigences des périphériques PC, etc.). Tout changement ou modification non expressément approuvé par le fabricant pourrait annuler le droit de l'utilisateur à utiliser cet équipement.

IMPORTANT NOTE:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot be used on the final product. In these circumstances, the

OEM integrator will be responsible for re-evaluating the End Product (including the transmitter) and obtaining a separate FCC authorization.

Dans le cas où ces conditions ne peuvent pas être remplies (par exemple certaines configurations d'ordinateurs portables ou la colocalisation avec un autre émetteur), alors l'autorisation FCC pour ce module en combinaison avec l'équipement hôte n'est plus considérée comme valide et l'ID FCC du module ne peut être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et d'obtenir une autorisation FCC distincte.

USERS MANUAL OF THE END PRODUCT:

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

L'intégrateur OEM doit être conscient de ne pas fournir d'informations à l'utilisateur final concernant la façon d'installer ou de retirer ce module RF dans le manuel d'utilisation du produit final qui intègre ce module. Le manuel de l'utilisateur final doit inclure toutes les informations/avertissements réglementaires requis, comme indiqué dans ce manuel.