

# **AW313A Datasheet**

**Zhuhai Jieli Technology Co.,LTD**

**Version 1.2**

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## Revision History

Date	Revision	Description
2024.04.12	V1.0	Initial Release
2024.07.08	V1.1	Update Pin Assignment Update Package Information Update IC Marking Information
2025.01.17	V1.2	Update Features_Bluetooth

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# AW313A Features

## SYSTEM

- 32bit CPU 160MHz
- Support MATH/AES128
- I-cache
- Support EMU
- On-chip SRAM 32kbyte
- Support MPU
- Support UDMA
- Built-In Flash
- 24MHz crystal oscillator
- Internal low jitter low power RC oscillator
- Internal PLL

## Bluetooth

- BLE6.0 +2.4GHz-Proprietary (DN Q334307)
- Support AoA Transmitter
- Support long range BLE
- Maximum transmitting power 9dBm
- Receiver sensitivity
  - ❖ -96dBm @BLE-1Mbps
  - ❖ -93dBm @BLE-2Mbps
  - ❖ -99dBm @BLE-S2
  - ❖ -103.5dBm @BLE-S8

## Peripherals

- 1 x Full speed USB
- 4 x Multi-function 32bit timer
- 1 x IR RX/TX
- 3 x UART interface
- 1 x I<sup>2</sup>C Master/Slave interface
- 2 x SPI Master/Slave interface
- 1 x QDEC
- 4 x MCPWM
- 2 x LEDC
- 1 x 10bit ADC(13 Channel)
- 12 x GPIO Support function remapping

## PMU

- Support temperature sensor
- VPWR range 2.7V to 5.5V
- IOVDD range 1.8V to 3.6V
- Deep sleep mode (IOVDD @3.0V)
  - ❖ 170nA (External wakeup)
  - ❖ 1.37uA (32kHz RC OSC+wakeup)
  - ❖ 2.9uA (32kHz RC OSC+wakeup+16k retention SRAM)

## Packages

- QFN20L(3mm\*3mm)

## Temperature

- Operating temperature
  - TC = -20℃ to +85℃ (standard range)
  - TC = -40℃ to +105℃ (extended range)
- Storage temperature -65℃ to +150℃

## Applications

- Mouse devices
- Non-audio remote controller
- Selfie stick
- Page turner
- Adaptive USB
- Bluetooth module
- Price tag and other diversified IOT product

## 1 Block Diagram

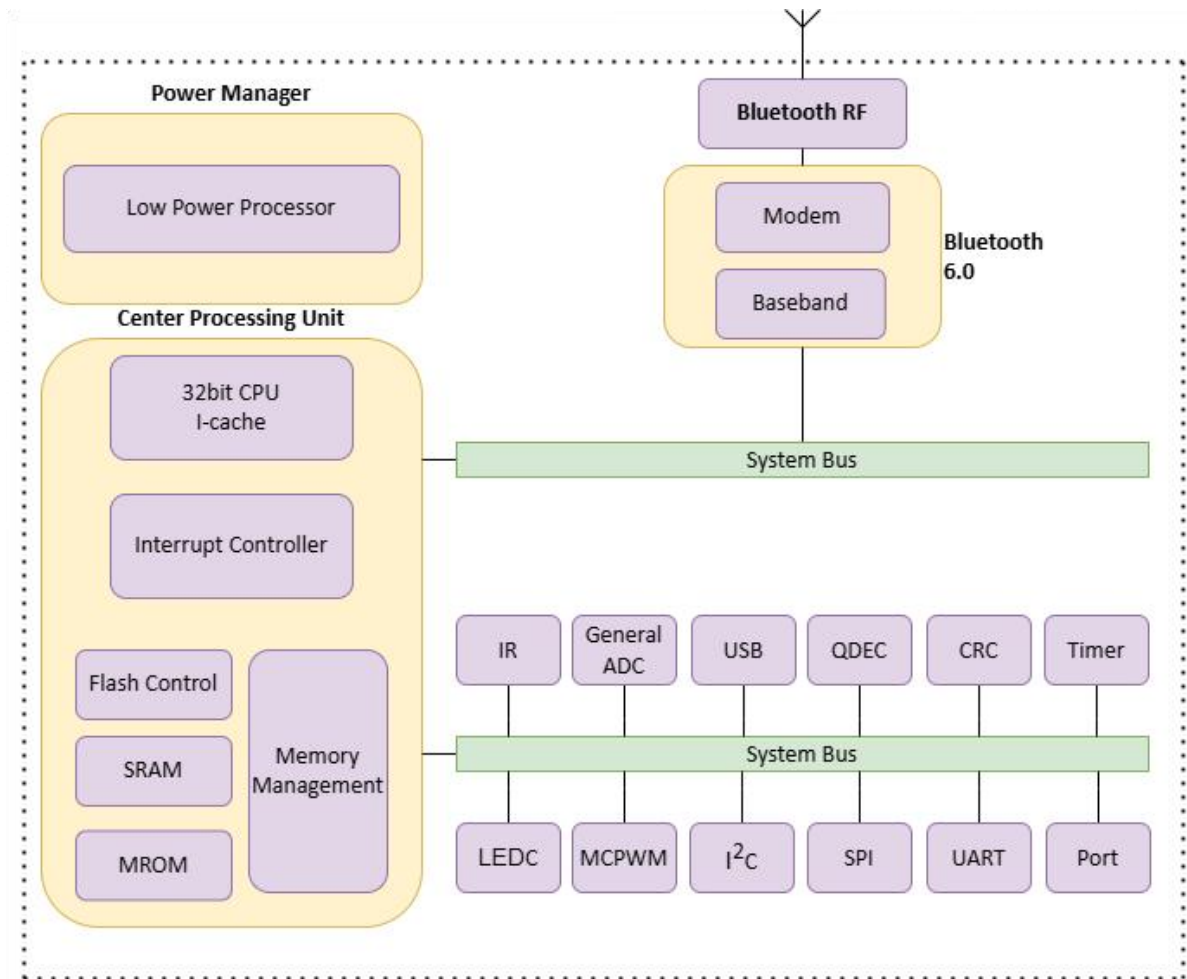


Figure 1-1 AW313A Block Diagram

## 2 Pin Definition

### 2.1 Pin Assignment

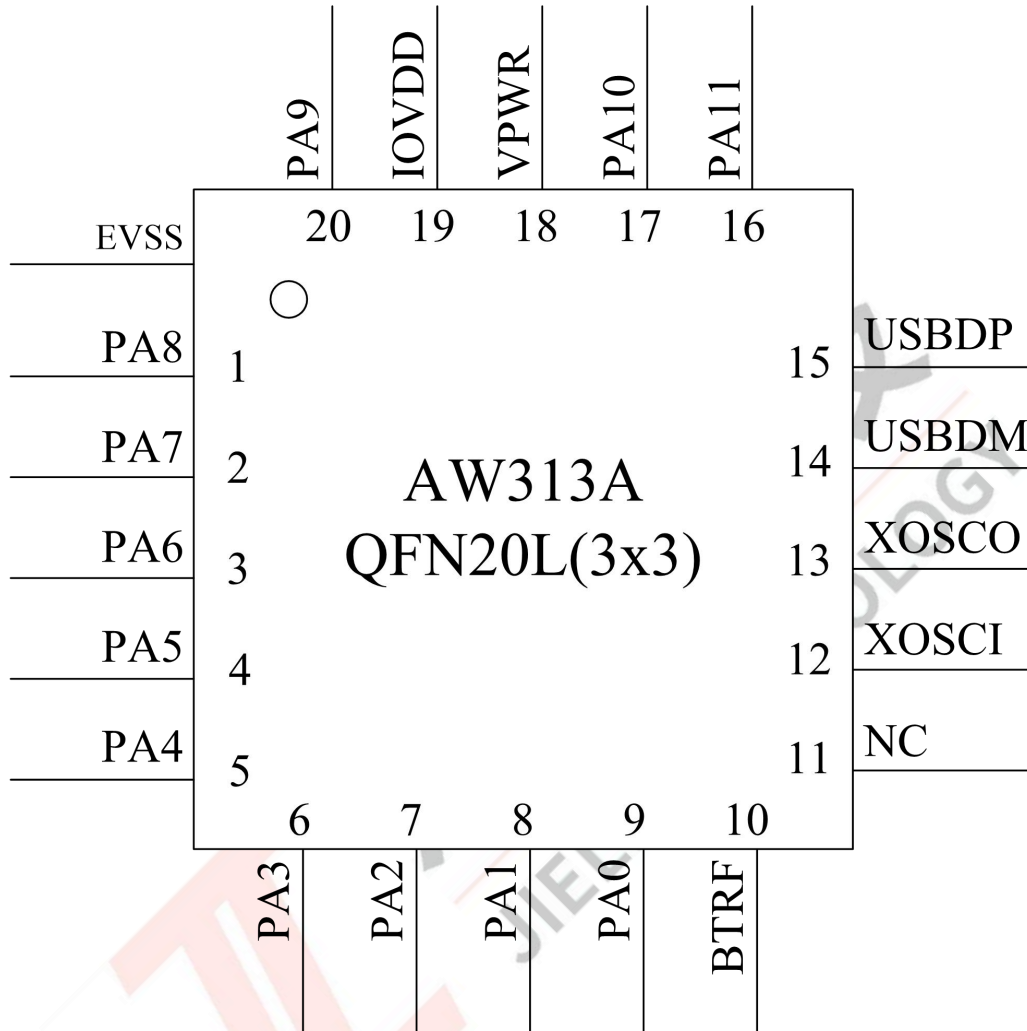


Figure 2-1 AW313A Pin Assignment

## 2.2 Pin Description

Table 2-2-1 AW313A Pin Description

Pin No.	Name	Type	IO Initial State	Description
1	PA8	I/O	Z	ADC8(ADC Input Channel 8) SPI0_DAT2B
2	PA7	I/O	Z	--
3	PA6	I/O	Z	ADC6(ADC Input Channel 6)
4	PA5	I/O	Z	ADC5(ADC Input Channel 5)
5	PA4	I/O	10kΩ Pull-up	ADC4(ADC Input Channel 4) MCLR(Device Reset)
6	PA3	I/O	Z	ADC3(ADC Input Channel 3) SPI0_DIB(1)
7	PA2	I/O	Z	ADC2(ADC Input Channel 2) SPI0_DOB(0)
8	PA1	I/O	Z	ADC1(ADC Input Channel 1) SPI0_CLKB
9	PA0	I/O	Z	ADC0(ADC Input Channel 0)
10	BTRF	RF	--	Bluetooth RF Antenna
11	NC	--	--	No Connection
12	XOSCI	I	--	Crystal Oscillator Input
13	XOSCO	O	--	Crystal Oscillator Output
14	USBDM	I/O	15kΩ Pull-down	ADC13(ADC Input Channel 13)
15	USBDP	I/O	15kΩ Pull-down	ADC14(ADC Input Channel 14)
16	PA11	I/O	10kΩ Pull-up	ADC11(ADC Input Channel 11) Hold down 0 to reset
17	PA10	I/O	Z	ADC10(ADC Input Channel 10)
18	VPWR	P	--	Battery Input
19	IOVDD	P	--	IO Power
20	PA9	I/O	Z	LVD(External Low Voltage Detection Input) ADC9(ADC Input Channel 9) SPI0_DAT3B

### Note

- 1.IO initial state abbreviations Z--High resistance, H--High level, L--Low level, X--May be changed during power on.
- 2.Timer, IR,MCPWM, QDEC, UART, LEDC, I<sup>2</sup>C, SPI1 functions can be remapped to any I/O.

Table 2-2-2 Pin Types Description

Pin Type	Description	Pin Type	Description
P	Power	I/O	Input or Output
G	Ground	I	Input

Pin Type	Description	Pin Type	Description
RF	RF antenna	O	Output



## 3 Electrical Characteristics

### 3.1 Absolute Maximum Ratings

Table 3-1 Absolute Maximum Ratings

Symbol	Parameter	Min	Max	Unit
T <sub>opt</sub>	Operating temperature	-20	+85	°C
T <sub>stg</sub>	Storage temperature	-65	+150	°C
VPWR	Supply Voltage	-0.3	6.0	V
IOVDD		-0.3	3.6	V
GPIO	Input voltage of GPIO (except PA7)	-0.3	3.6	V
HVTIO	Input voltage of HVT-IO (PA7)	-0.3	6.0	V

#### Note

1.Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device.

### 3.2 ESD Ratings

Table 3-2 ESD Ratings

Parameter	Typ	Test pin	Reference standard
Human Body Mode	±8kV	All pins	JEDEC EIA/JESD22-A114
Machine Mode	±400V	All pins	JEDEC EIA/JESD22-A115
Charge Device Model	±2kV	All pins	ANSI/ESDA/JEDEC JS-002-2022

### 3.3 PMU Characteristics

Table 3-3-1 PMU Characteristics under VPWR supply

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
VPWR	Power supply	--	2.7	--	5.5	V
Operating mode						
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
IOVDD	Voltage output	--	--	3.0	--	V
	Loading current	IOVDD=3.0V@VPWR = 3.7V	--	--	60	mA
Low Power mode						
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
IOVDD	Loading current	IOVDD=3.0V@VPWR = 3.7V	--	--	8	mA

Table 3-3-2 PMU Characteristics under IOVDD supply

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
IOVDD	Power supply	--	1.8	--	3.6	V

### 3.4 IO Characteristics

Table 3-4 IO Characteristics

Input Characteristics						
Symbol	Parameter	Conditions	IO	Min	Max	Unit
V <sub>IL</sub>	Low-Level Input Voltage	IOVDD = 3.0V	PA0~PA11	-0.3	1.4	V
V <sub>IH</sub>	High-Level Input Voltage	IOVDD = 3.0V	PA0~PA6 PA8~PA11 USBDP USBDM	1.7	3.3	V
		IOVDD = 3.0V	PA7	1.7	5.5	V
Output Characteristics						
Symbol	Parameter	Conditions	IO	Typ	Unit	
I <sub>OL</sub>	Output Current	IOVDD = 3.0V Voutput = 0.3V	PA0~PA6 PA8~PA11	3(HD=0) 9(HD=1) 21(HD=2) 54(HD=3)	mA	
		IOVDD = 3.0V Voutput = 0.3V	PA7 USBDP USBDM	8	mA	
I <sub>OH</sub>	Output Current	IOVDD = 3.0V Voutput = 2.7V	PA0~PA6 PA8~PA11	3(HD=0) 9(HD=1) 21(HD=2) 54(HD=3)	mA	
		IOVDD = 3.0V Voutput = 2.7V	PA7 USBDP USBDM	8	mA	
Internal Resistance Characteristics						
Symbol	Parameter	Conditions	IO	Typ	Unit	
R <sub>pu</sub>	Pull-up Resistance	IOVDD = 3.0V	PA0~PA11	10k(PU=1) 100k(PU=2) 1M(PU=3)	Ω	
		IOVDD = 3.0V	USBDP	1.5k	Ω	
		IOVDD = 3.0V	USBDM	180k	Ω	
R <sub>pd</sub>	Pull-down Resistance	IOVDD = 3.0V	PA0~PA11	10k(PD=1) 100k(PD=2) 1M(PD=3)	Ω	
		IOVDD = 3.0V	USBDP USBDM	15k	Ω	

**Note**

1.Internal pull-up/pull-down resistance accuracy  $\pm 20\%$ .

## 3.5 BT Characteristics

### 3.5.1 Transmitter

Table 3-5-1 Transmitter characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Maximum RF Transmit Power	BLE-1Mbps	--	8	9	dBm

### 3.5.2 Receiver

Table 3-5-2 Receiver characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Sensitivity	BLE-1Mbps	--	-96	--	dBm
	BLE-2Mbps	--	-93	--	dBm
	BLE-S2	--	-99	--	dBm
	BLE-S8	--	-103.5	--	dBm

## 4 Package Information

### 4.1 QFN20L\_3×3mm

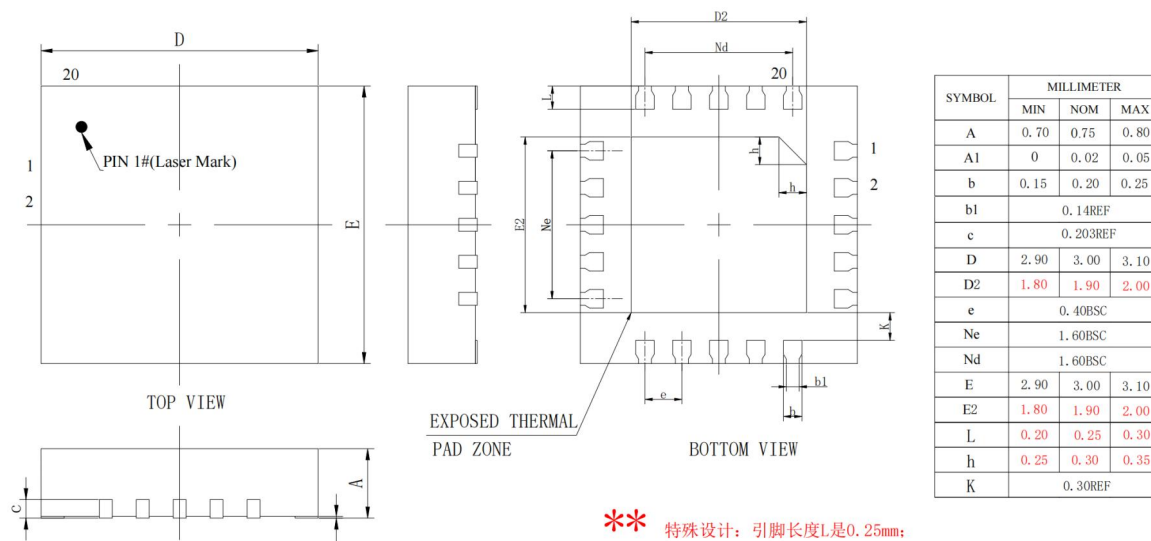


Figure 4-1 AW313A Package

## 5 IC Marking Information

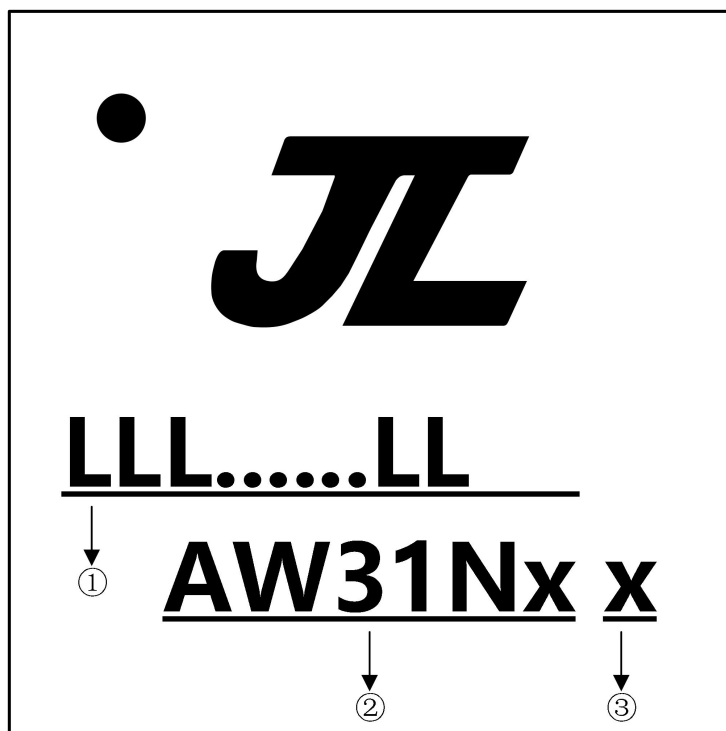


Figure 5-1 AW313A Package Outline

- ① LLL.....LL LOT No. , It contains 7 to 18 alphanumerics
- ② AW31Nx Chip Model
- ③ x Built-in flash size
  - 0 No Flash Memory
  - 2 2Mbit Flash
  - 4 4Mbit Flash

## 6 Solder-Reflow Condition

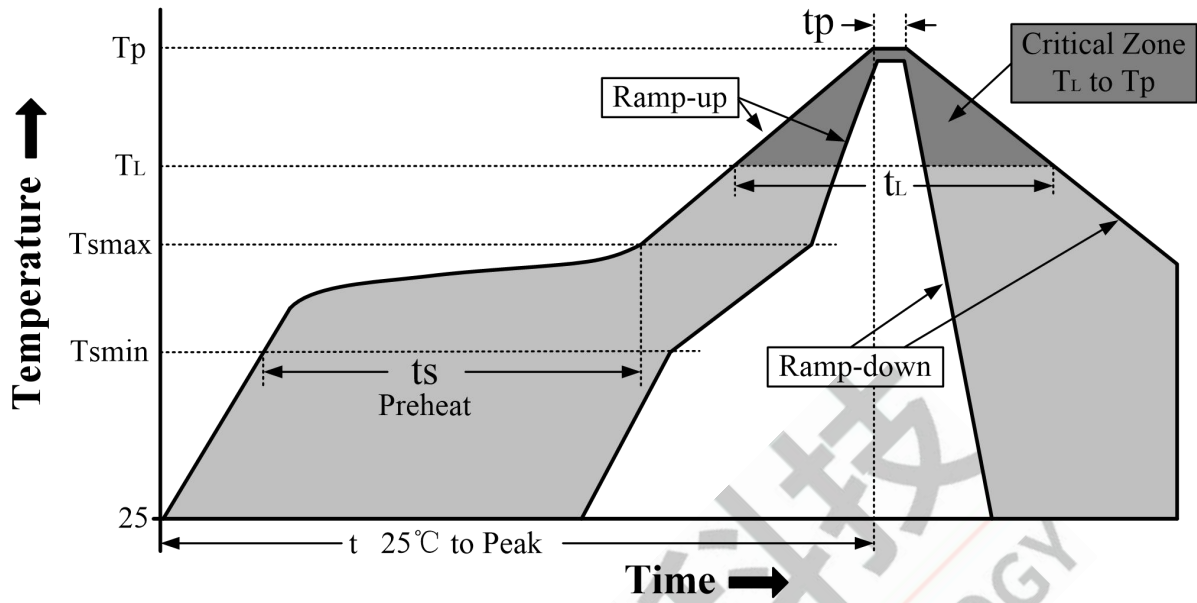


Figure 6-1 Classification Reflow Profile

Table 6-1 Classification Profiles

Profile Feature		Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat/Soak	Temperature Min ( $T_{smin}$ )	100°C	150°C
	Temperature Max ( $T_{smax}$ )	150°C	200°C
	Time ( $t_s$ ) from ( $T_{smin}$ to $T_{smax}$ )	60-120 seconds	60-180 seconds
Average ramp-up rate ( $T_{smax}$ to $T_p$ )		3°C/second max	3°C/second max
Liquidus temperature ( $T_L$ )		183°C	217°C
Time ( $t_L$ ) maintained above $T_L$		60-150 seconds	60-150 seconds
Peak package body temperature ( $T_p$ )		See Table 6-2	See Table 6-3
Time within 5°C of actual Peak Temperature ( $t_p$ ) <sup>2</sup>		10-30 seconds	20-40 seconds
Ramp-down rate ( $T_p$ to $T_L$ )		6°C/second max	6°C/second max
Time 25°C to peak temperature		6 minutes max	8 minutes max

**Note**

- 1.All temperatures refer to topside of the package, measured on the package body surface
- 2.Time within 5°C of actual peak temperature ( $t_p$ ) specified for the reflow profiles is a "supplier" and "user" maximum.

Table 6-2 SnPb Classification Temperature

Package Thickness	Volume mm <sup>3</sup> < 350	Volume mm <sup>3</sup> ≥ 350
<2.5 mm	240 +0/-5°C	225 +0/-5°C
≥2.5 mm	225 +0/-5°C	225 +0/-5°C

**Table 6-3 Pb-free - Classification Temperature**

Package Thickness	Volume mm <sup>3</sup> < 350	Volume mm <sup>3</sup> 350 - 2000	Volume mm <sup>3</sup> > 2000
< 1.6mm	260°C	260°C	260°C
1.6 mm - 2.5mm	260°C	250°C	245°C
> 2.5mm	250°C	245°C	245°C

**Note**

1.\*Tolerance The device manufacturer/supplier shall assure process compatibility up to and including the stated classification temperature (this means Peak reflow temperature +0°C.For example 260°C+0°C)at the rated MSL level.