

AW313A Datasheet

Zhuhai Jieli Technology Co.,LTD

Version 1.0

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Revision History

| Date | Revision | Description |
|------------|----------|-----------------|
| 2024.04.12 | V1.0 | Initial Release |
| | | |
| | | |



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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

- BLE5.4 +2.4GHz-Proprietary (QDID 223418)
- 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 I²C 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

- QFN20(3mm*3mm)

Temperature

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

Applications

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

1 Block Diagram

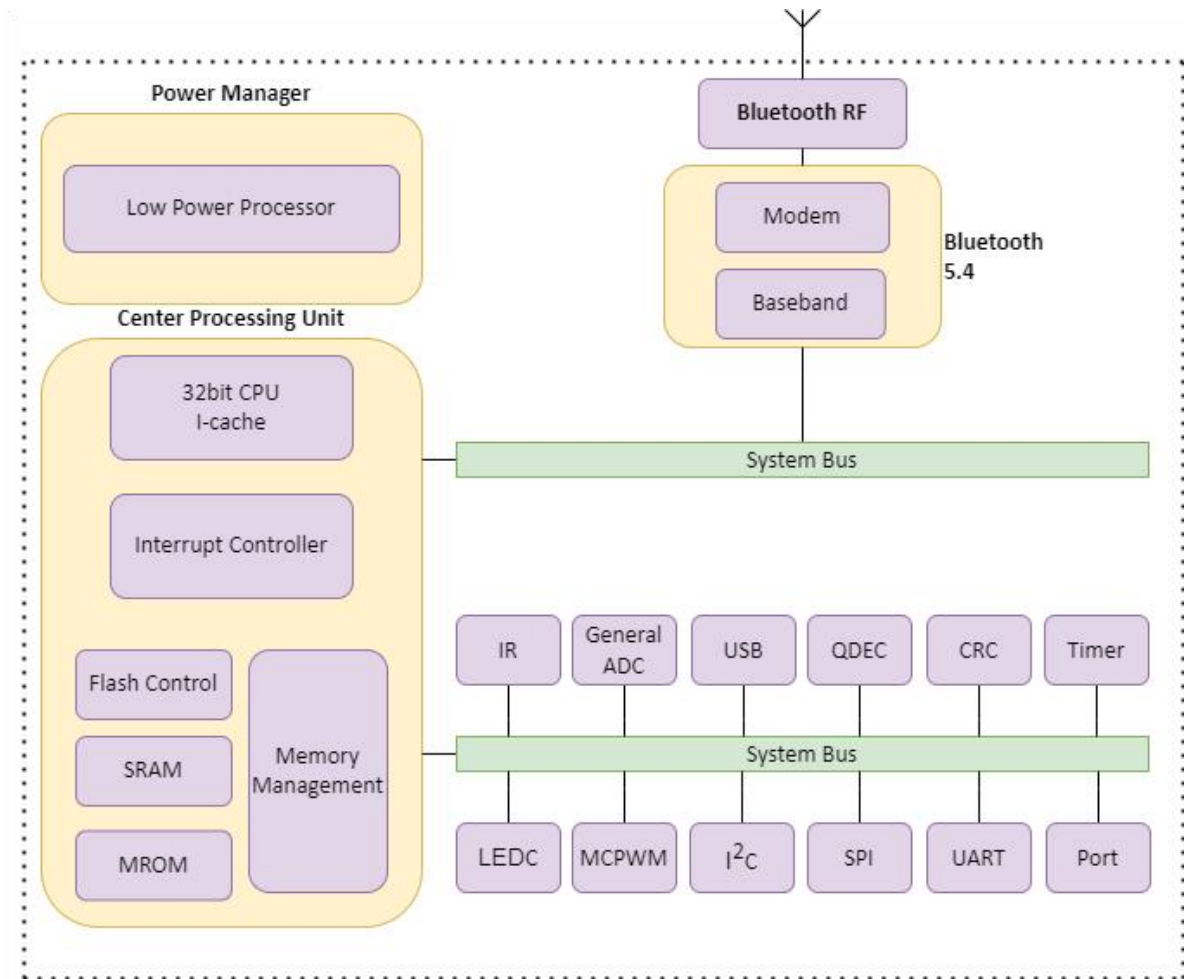


Figure 1-1 AW313A Block Diagram

2 Pin Definition

2.1 Pin Assignment

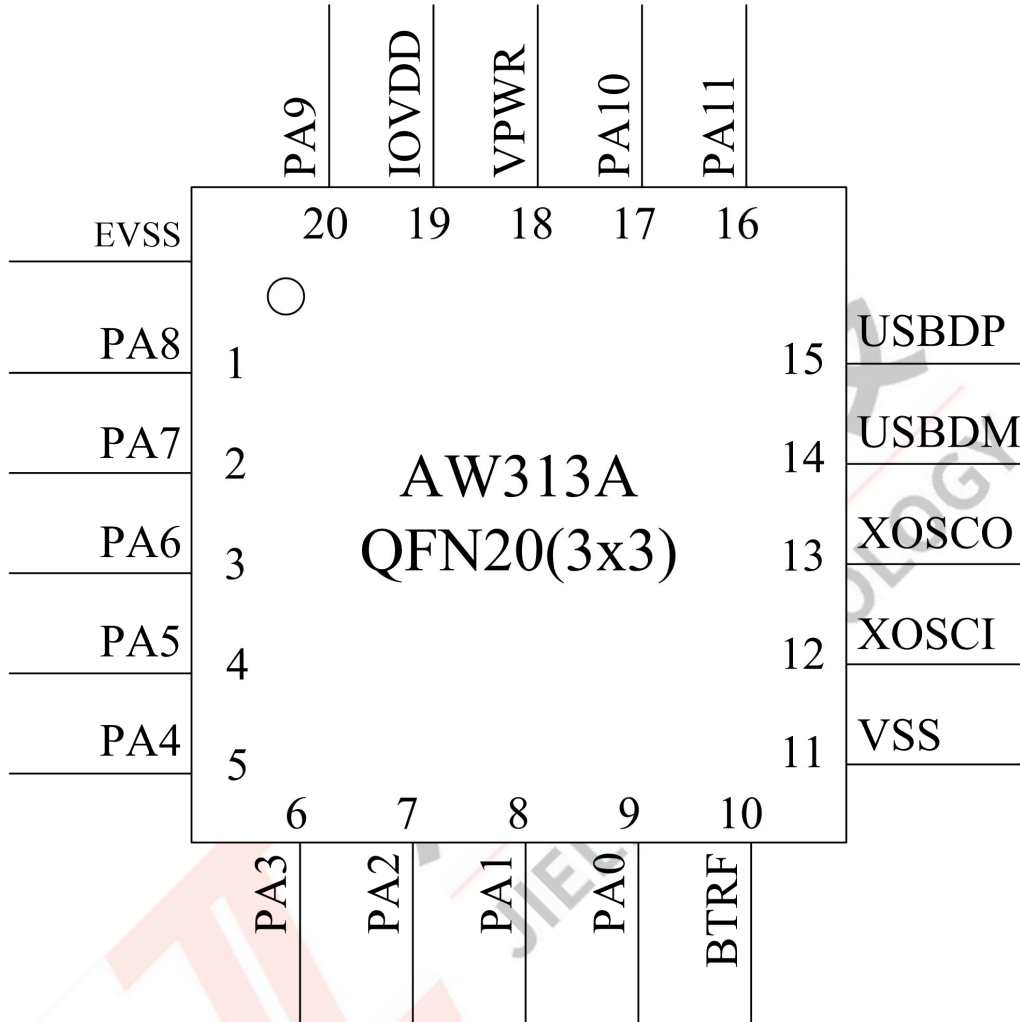


Figure 2-1 AW313A Pin Assignment

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 | VSS | G | -- | Ground |
| 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, I²C, 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 |
|--------|------------------------------------|------|------|------|
| Topt | Operating temperature | -20 | +85 | °C |
| Tstg | 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_{IL} | Low-Level Input Voltage | IOVDD = 3.0V | PA0~PA11 | -0.3 | 1.4 | V |
| V_{IH} | High-Level Input Voltage | IOVDD = 3.0V | PA0~PA6 PA8~PA11 USB DP USB DM | 1.7 | 3.3 | V |
| | | IOVDD = 3.0V | PA7 | 1.7 | 5.5 | V |
| Output Characteristics | | | | | | |
| Symbol | Parameter | Conditions | IO | Typ | Unit | |
| $ I_{OL} $ | 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 USB DP USB DM | 8 | mA | |
| $ I_{OH} $ | 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 USB DP USB DM | 8 | mA | |
| Internal Resistance Characteristics | | | | | | |
| Symbol | Parameter | Conditions | IO | Typ | Unit | |
| R_{pu} | Pull-up Resistance | IOVDD = 3.0V | PA0~PA11 | 10k(PU=1) 100k(PU=2) 1M(PU=3) | Ω | |
| | | IOVDD = 3.0V | USB DP | 1.5k | Ω | |
| | | IOVDD = 3.0V | USB DM | 180k | Ω | |
| R_{pd} | Pull-down Resistance | IOVDD = 3.0V | PA0~PA11 | 10k(PD=1) 100k(PD=2) 1M(PD=3) | Ω | |
| | | IOVDD = 3.0V | USB DP USB DM | 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 |

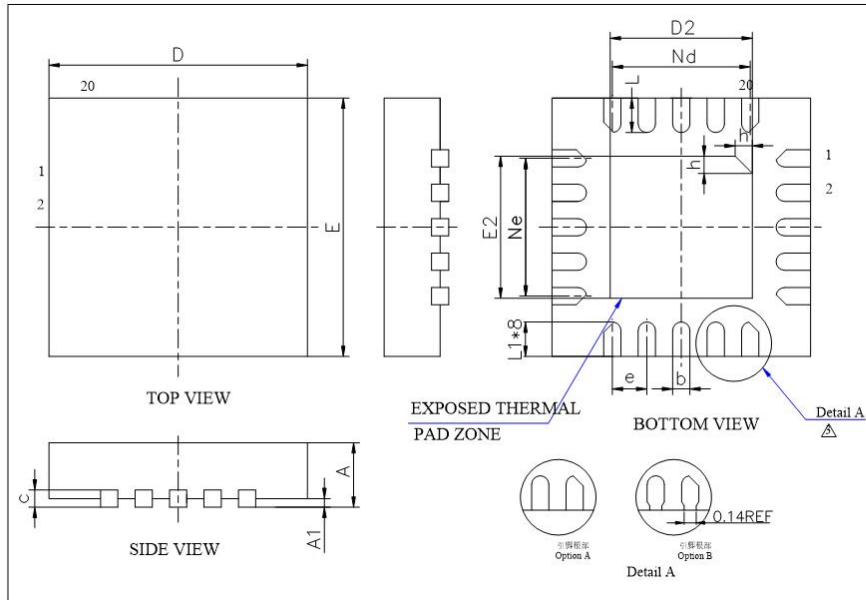
3.5.2 Receiver

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 QFN20_3×3mm



| SYMBOL | MILLIMETER | | |
|--------|------------|------|------|
| | MIN | NOM | MAX |
| A | 0.70 | 0.75 | 0.80 |
| A1 | -- | 0.02 | 0.05 |
| b | 0.15 | 0.20 | 0.25 |
| c | 0.18 | 0.20 | 0.25 |
| D | 2.90 | 3.00 | 3.10 |
| D2 | 1.40 | 1.60 | 1.80 |
| e | 0.40BSC | | |
| Ne | 1.60BSC | | |
| Nd | 1.60BSC | | |
| E | 2.90 | 3.00 | 3.10 |
| E2 | 1.40 | 1.60 | 1.80 |
| L | 0.35 | 0.40 | 0.45 |
| L1 | 0.30 | 0.40 | 0.50 |
| h | 0.20 | 0.25 | 0.30 |

Figure 4-1 AW313A Package

5 IC Marking Information

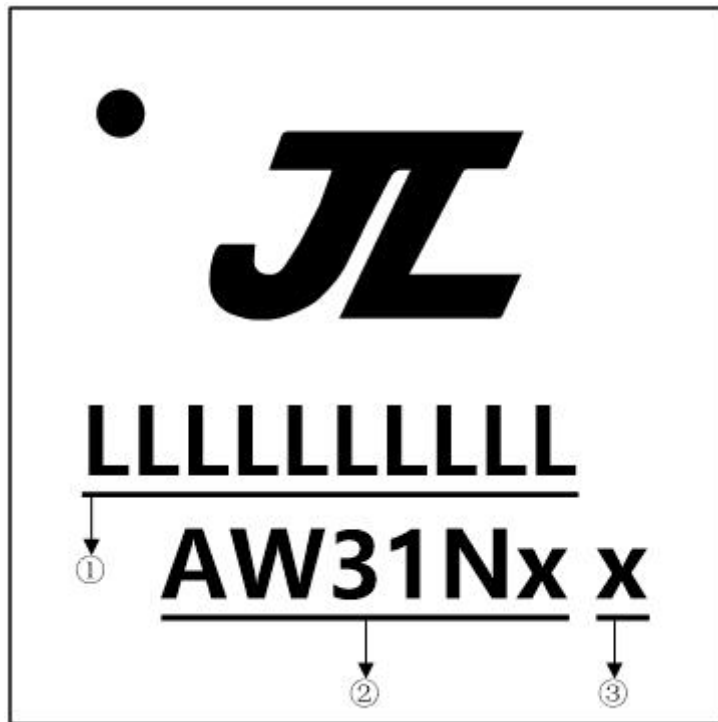


Figure 5-1 AW313A Package Outline

- ① LLLLLLLLLL Production Batch
- ② AW31Nx Chip Model
- ③ x Built-in flash size
 - 0 No Flash Memory
 - 2 2Mbit Flash
 - 4 4Mbit Flash

6 Solder-Reflow Condition

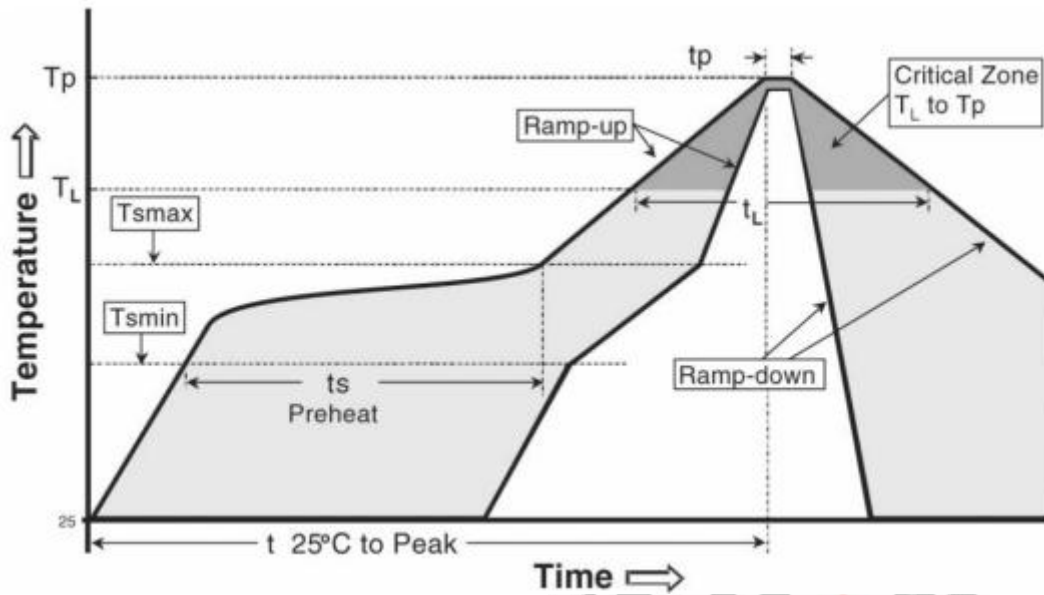


Figure 6-1 Classification Reflow Profile

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) ² | | 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 ³ | Volume mm ³ |
|-------------------|------------------------|------------------------|
| | < 350 | ≥ 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 ³ < 350 | Volume mm ³ 350 - 2000 | Volume mm ³ > 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.

