

CONTINUOUS VOLTAGE SMD CRYSTAL OSCILLATOR

Description

Abrakon's ASDDVN series is a crystal oscillator designed to operate with supply voltages between 1.6V and 3.63V. This series features low power consumption, a wide frequency range, excellent rms phase jitter, tight stability options, and short lead times for industrial, consumer, and other applications. This series offers a CMOS output with a frequency stability option of ± 25 ppm over an operating temperature range of -40°C to $+85^{\circ}\text{C}$ from within a 2.5 mm x 2.0 mm x 0.95 mm package.



Features

- Continuous Vdd operation from 1.6 V ~ 3.63 V
- Optimized for low current consumption
- Output waveform CMOS/HCMOS/LVCMOS compatible
- Hermetically seam-sealed ceramic package
- REACH/RoHS II Compliant | MSL Level 1

Typical Applications

- Portable & wearable electronics
- Internet of Things (IoT)
- Consumer electronics
- Industrial control & automation
- Mobile communication

Electrical Specifications [Note 1]

Parameters		Min.	Typ.	Max.	Units	Notes
Frequency Range		1		160	MHz	
Operating Temperature Range		-40		+85	$^{\circ}\text{C}$	See options
Storage Temperature Range		-55		+125	$^{\circ}\text{C}$	
Overall Frequency Stability [Note 2]		-25		+25	ppm	See options
Supply Voltage (Vdd)		1.6		3.63	V	
Tri-state function		"1" ($V_{IH} \geq 0.7 \cdot V_{dd}$) or Open: Oscillation; "0" ($V_{IL} < 0.3 \cdot V_{dd}$): No Oscillation/Hi Z			V	
Output Load				15	pF	CMOS
Output Voltage	V_{OH}	$0.9 \cdot V_{dd}$			V	
	V_{OL}			$0.1 \cdot V_{dd}$		
Aging 1 year @ $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$		-3.0		+3.0	ppm	
Aging 5 years @ $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$		-5.0		+5.0	ppm	
Symmetry @ $\frac{1}{2} V_{dd}$		45	50	55	%	
Start-up Time				5.0	ms	
Rise and Fall Time (T_r/T_f) @ $10\% V_{dd}$ - $90\% V_{dd}$, 15pF load	Vdd = 1.8V to 3.63V			8.0	ns	$1\text{MHz} \leq F \leq 19.999\text{MHz}$
				6.0		$20\text{MHz} \leq F \leq 39.999\text{MHz}$
				5.0		$40\text{MHz} \leq F \leq 69.999\text{MHz}$
				5.0		$70\text{MHz} \leq F \leq 99.999\text{MHz}$
				4.0		$100\text{MHz} \leq F \leq 129.999\text{MHz}$
				3.0		$130\text{MHz} \leq F \leq 160\text{MHz}$
	Vdd = 1.6V			10.0		$1\text{MHz} \leq F \leq 19.999\text{MHz}$
				8.0		$20\text{MHz} \leq F \leq 39.999\text{MHz}$
				6.0		$40\text{MHz} \leq F \leq 69.999\text{MHz}$
				6.0		$70\text{MHz} \leq F \leq 99.999\text{MHz}$
				5.0		$100\text{MHz} \leq F \leq 129.999\text{MHz}$
				5.0		$130\text{MHz} \leq F \leq 160\text{MHz}$
RMS Period Jitter @ $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$	Vdd = 3.0V to 3.63V			5.0	ps	
	Vdd = 1.6V to 2.5V			7.0		
RMS Phase Jitter @ $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$				1.0	ps	(10 - 39MHz: 12kHz to 5MHz) (>39MHz: 12kHz to 20MHz)
Disable Current				10.0	μA	

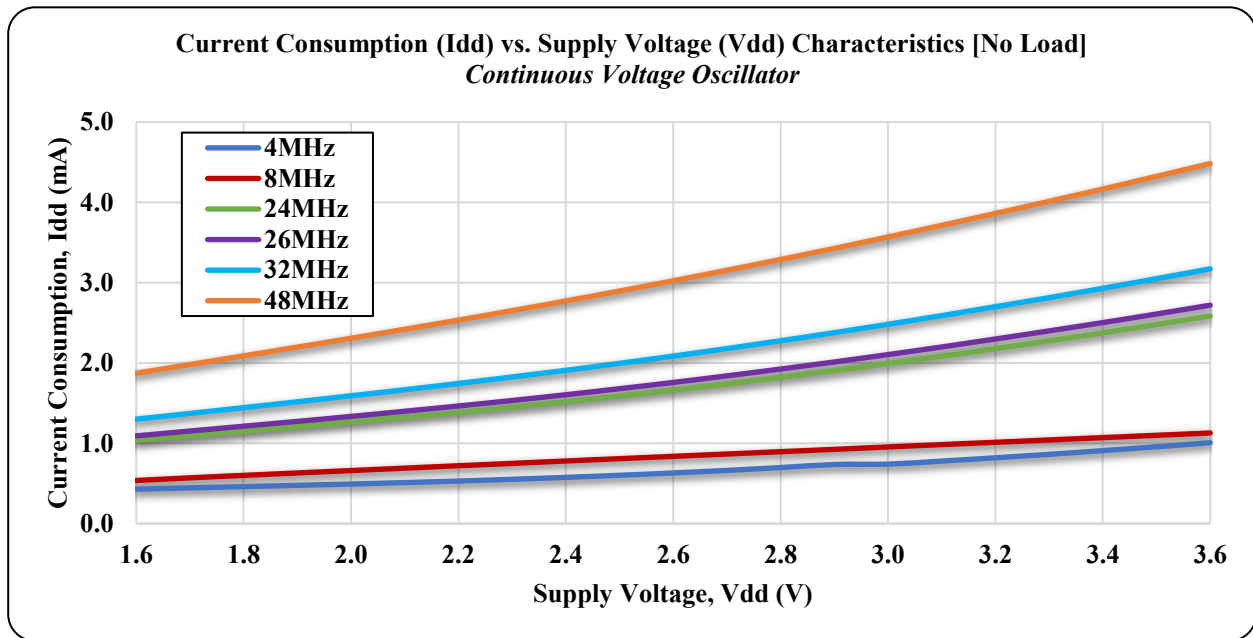
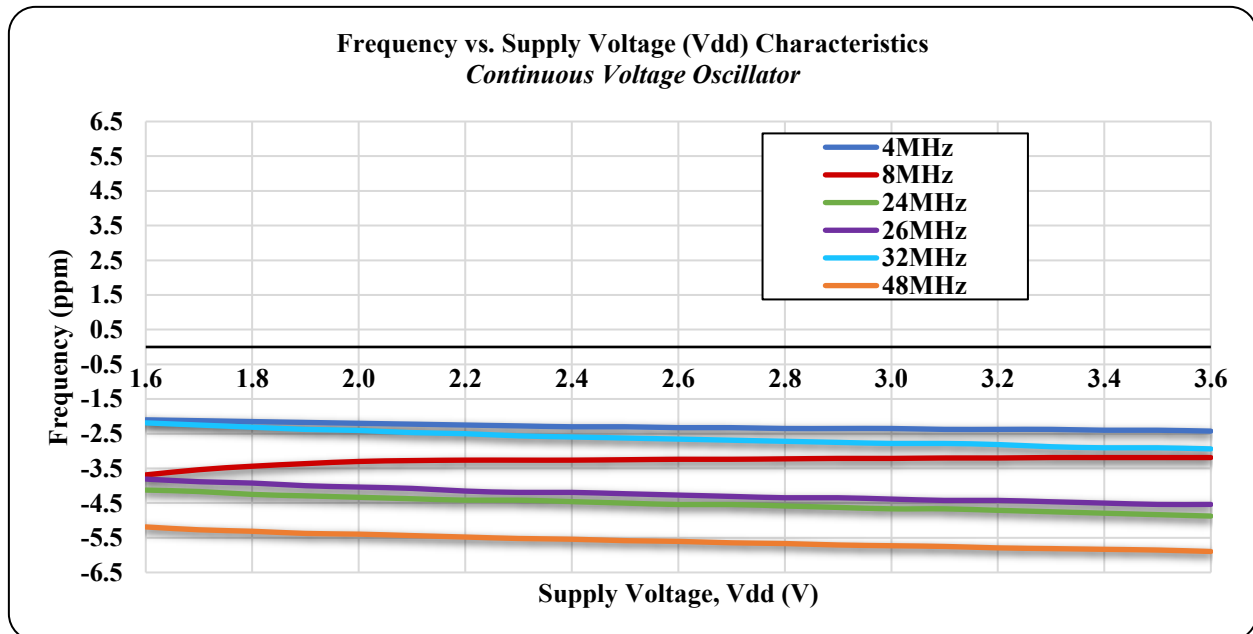
Note 1: All measurements guaranteed at nominal Vdd, nominal load, and at 25°C unless otherwise specified.

Note 2: Overall frequency stability includes initial frequency tolerance @ $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ and stability over the operating temperature range.

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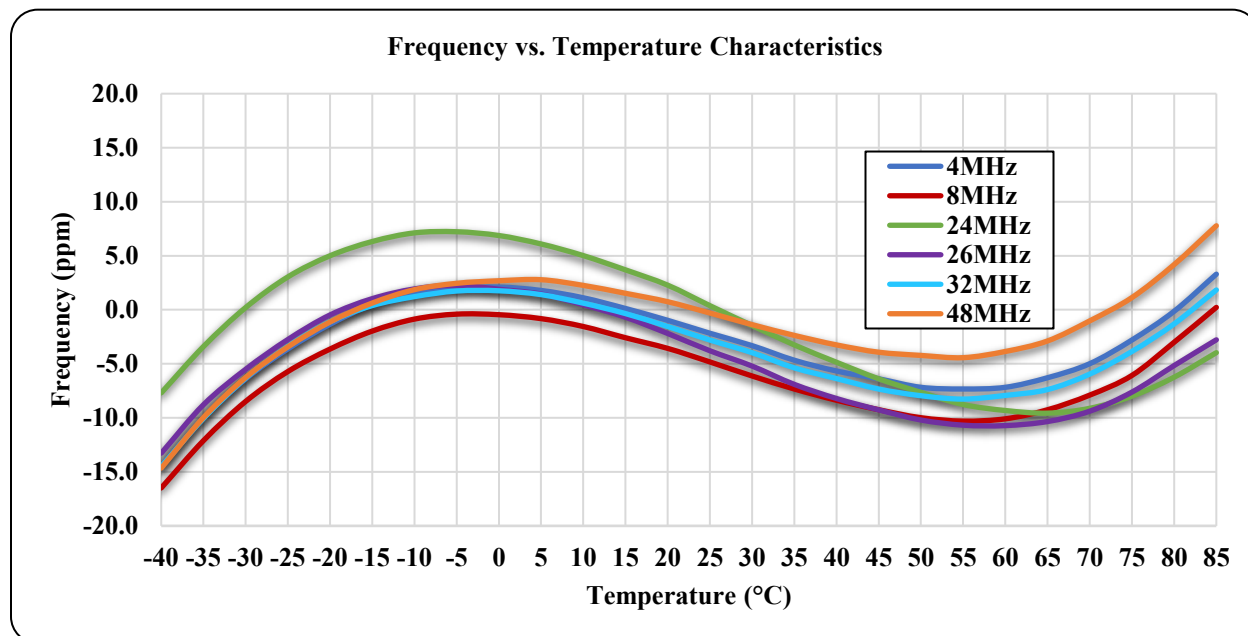
Parameters	Min.	Typ.	Max.	Units	Notes
Supply Current (I _{dd}) @25°C± 3°C, no load @ V_{dd}=3.3V			2.0	mA	1MHz ≤ F ≤ 5.999MHz
			2.0		6MHz ≤ F ≤ 9.999MHz
			3.0		10MHz ≤ F ≤ 19.999MHz
			4.0		20MHz ≤ F ≤ 29.999MHz
			5.0		30MHz ≤ F ≤ 39.999MHz
			5.0		40MHz ≤ F ≤ 45.999MHz
			5.0		46MHz ≤ F ≤ 48.999MHz
			6.0		49MHz ≤ F ≤ 50.999MHz
			8.0		51MHz ≤ F ≤ 54.999MHz
			8.0		55MHz ≤ F ≤ 60.999MHz
			12.5		61MHz ≤ F ≤ 75.999MHz
			14.5		76MHz ≤ F ≤ 80.999MHz
			14.5		81MHz ≤ F ≤ 105.999MHz
			15.5		106MHz ≤ F ≤ 119.999MHz
			15.5		120MHz ≤ F ≤ 130.999MHz
			18.0		131MHz ≤ F ≤ 139.999MHz
			18.0		140MHz ≤ F ≤ 149.999MHz
Supply Current (I _{dd}) @25°C± 3°C, no load @ V_{dd}=2.5V			1.3	mA	1MHz ≤ F ≤ 5.999MHz
			1.3		6MHz ≤ F ≤ 9.999MHz
			2.0		10MHz ≤ F ≤ 19.999MHz
			3.0		20MHz ≤ F ≤ 29.999MHz
			3.5		30MHz ≤ F ≤ 39.999MHz
			4.5		40MHz ≤ F ≤ 45.999MHz
			4.5		46MHz ≤ F ≤ 48.999MHz
			5.0		49MHz ≤ F ≤ 50.999MHz
			6.5		51MHz ≤ F ≤ 54.999MHz
			7.0		55MHz ≤ F ≤ 60.999MHz
			10.0		61MHz ≤ F ≤ 75.999MHz
			11.5		76MHz ≤ F ≤ 80.999MHz
			11.5		81MHz ≤ F ≤ 105.999MHz
			12.5		106MHz ≤ F ≤ 119.999MHz
			12.5		120MHz ≤ F ≤ 130.999MHz
			14.0		131MHz ≤ F ≤ 139.999MHz
			14.0		140MHz ≤ F ≤ 149.999MHz
Supply Current (I _{dd}) @25°C± 3°C, no load @ V_{dd}=1.8V			1.0	mA	1MHz ≤ F ≤ 5.999MHz
			1.0		6MHz ≤ F ≤ 9.999MHz
			1.6		10MHz ≤ F ≤ 19.999MHz
			2.2		20MHz ≤ F ≤ 29.999MHz
			2.5		30MHz ≤ F ≤ 39.999MHz
			3.0		40MHz ≤ F ≤ 45.999MHz
			3.5		46MHz ≤ F ≤ 48.999MHz
			3.5		49MHz ≤ F ≤ 50.999MHz
			3.5		51MHz ≤ F ≤ 54.999MHz
			4.0		55MHz ≤ F ≤ 60.999MHz
			9.0		61MHz ≤ F ≤ 75.999MHz
			9.0		76MHz ≤ F ≤ 80.999MHz
			10.0		81MHz ≤ F ≤ 105.999MHz
			10.0		106MHz ≤ F ≤ 119.999MHz
			10.5		120MHz ≤ F ≤ 130.999MHz
			10.5		131MHz ≤ F ≤ 139.999MHz
			11.5		140MHz ≤ F ≤ 149.999MHz
			11.5		150MHz ≤ F ≤ 156.999MHz
			11.5		157MHz ≤ F ≤ 160MHz

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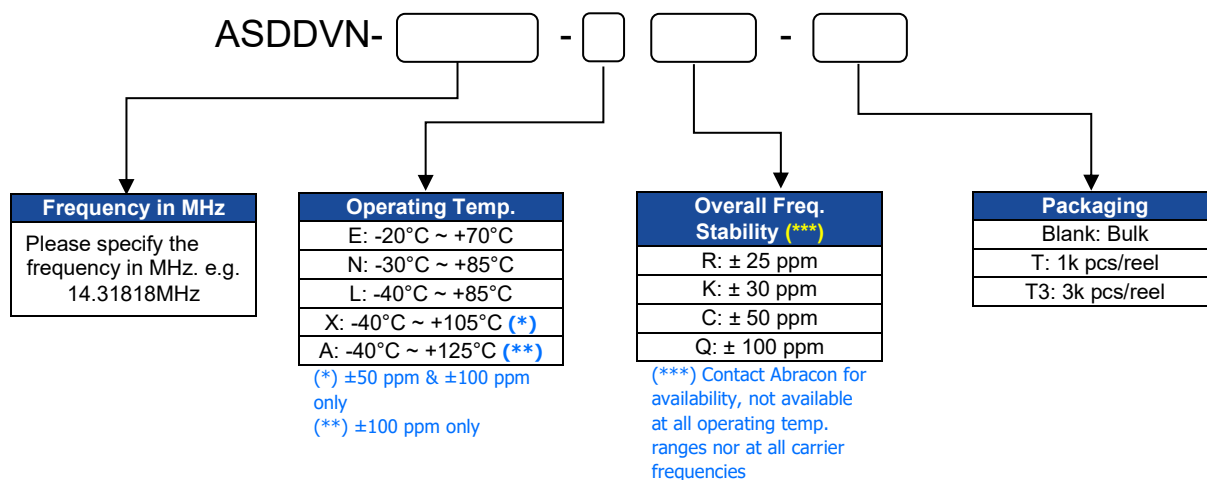
Typical Current Consumption (I_{dd}) vs. Supply Voltage (V_{dd}) Characteristics @25°C±3°CTypical Frequency vs. Supply Voltage (V_{dd}) Characteristics @25°C±3°C, Offset from Nominal Frequency

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Typical Frequency vs. Temperature Characteristics (Vdd = 3.3V)

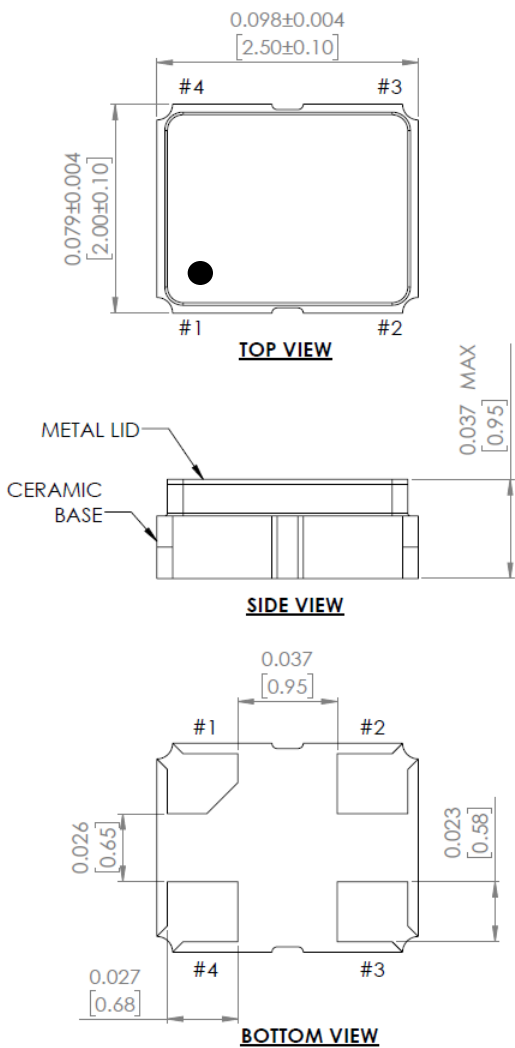


Part Identification

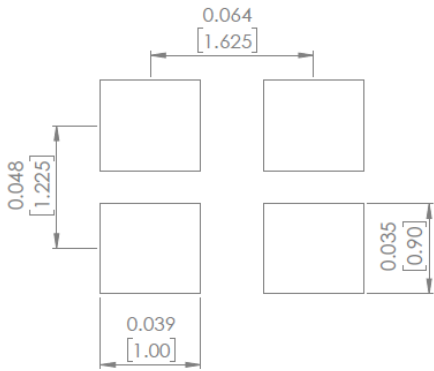


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Mechanical Dimensions



Recommended Land Pattern



Pin #	Function
1	Tri-State
2	GND
3	Output
4	Vdd

Note: Recommended to use approximately 0.01μF bypass capacitor between PIN 2 and PIN 4

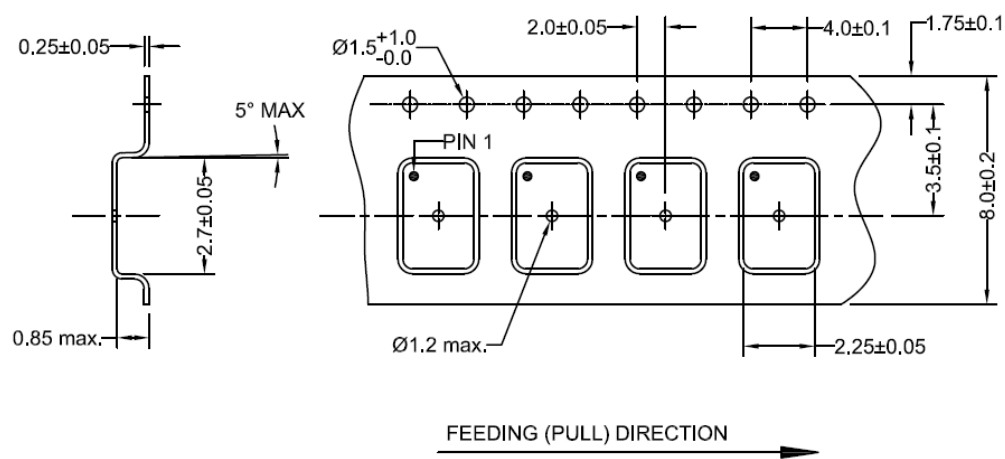
Dimensions: Inches [mm]

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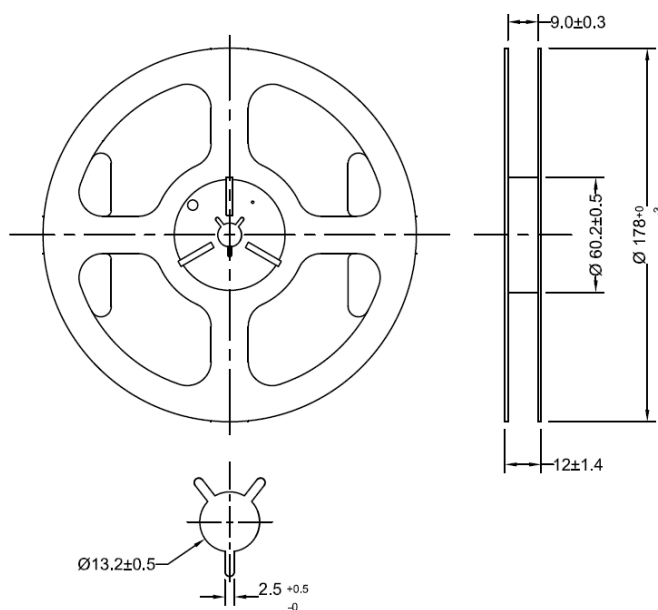
Tape

T: 1,000pcs/reel

T3: 3,000pcs/reel



Reel



Dimensions: Inches [mm]

Revision: IR
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Reflow

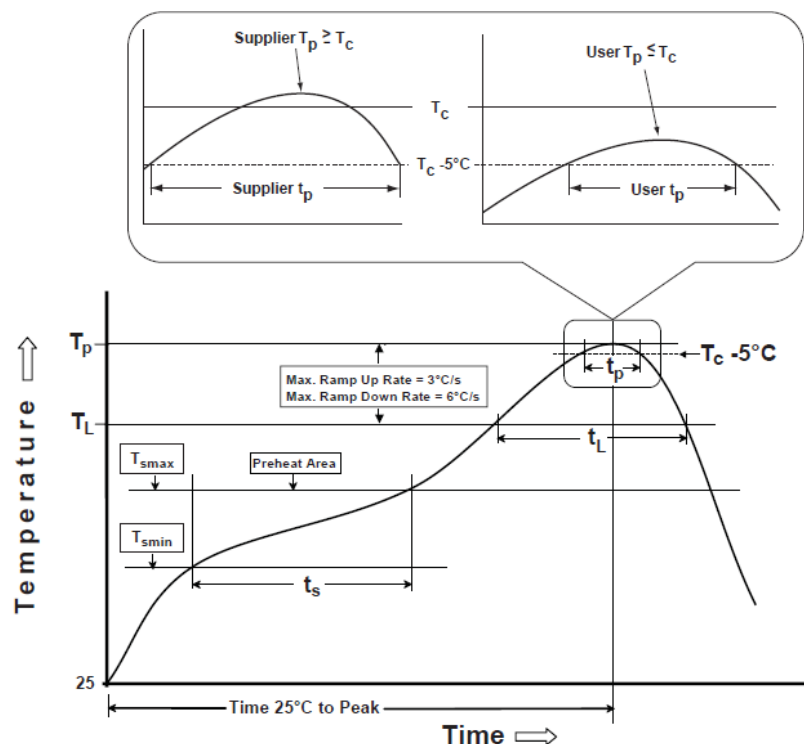


Table 1

SnPb Eutectic Process
Classification Temperatures (T_c)

Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2

Pb-Free Process
Classification Temperatures (T_c)

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

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat / soak		
Temperature minimum (T_{smin})	100°C	150°C
Temperature maximum (T_{smax})	150°C	200°C
Time (T_{smin} to T_{smax}) (t_s)	60 - 120 sec.	60 - 180 sec.
Average ramp-up rate (T_{smax} to T_p)	3°C/sec. max	3°C/sec. max
Liquidous temperature (T_L)	183°C	217°C
Time at liquidous (t_L)	60 - 150 sec.	60 - 150 sec.
Peak package body temperature (T_p)*	see Table 1	see Table 2
Time (t_p)** within 5°C of the specified classification temperature (T_c)	20 sec.	20 - 40 sec.
Ramp-down rate (T_p to T_{smax})	6°C/sec. max	6°C/sec. max
Time 25°C to peak temperature	6 min. max	8 min. max
Reflow cycles	2 max	2 max

*Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.

**Tolerance for time at peak profile temperature (t_p) is defined as supplier minimum and a user maximum.