

# LOW ESR, LOW CL CERAMIC SMD CRYSTAL

## ABM10W Series

Request Samples



Check Inventory



2.5 x 2.0 x 0.6 mm  
RoHS/RoHS II Compliant  
MSL Level = N/A



### Features

- Optimized for energy saving wearables and IoT applications
- Plated at exceptionally low plating capacitance, as low as 4pF, with optimized ESR
- 0.6 mm max height ideally suited for height constrained designs
- Seam sealed for longterm reliability

### Key Electrical Specifications

### Applications

- Wearables
- Internet of Things (IoT)
- Bluetooth/Bluetooth Low Energy (BLE)
- Wireless modules
- Machine-to-machine (M2M) connectivity
- Ultra-low power MCU
- Near Field Communication (NFC)
- ISM Band

Parameters	Minimum	Typical	Maximum	Units	Notes
Frequency Range	16.000		50.0000	MHz	
Operation Mode	Fundamental				
Operating Temperature Range	-40		+125	°C	<i>See options</i>
Storage Temperature	-55		+125	°C	
Frequency Tolerance @ +25°C	-10		+10	ppm	<i>See options</i>
Frequency Stability over the Operating Temperature (ref. to +25°C)	-10		+10	ppm	<i>See options</i>
Equivalent series resistance "R1" (over Operating Temperature Range) (CL=4pF)		< 70	100	Ω	16.0000 – 19.9999MHz
		< 50	80		20.0000 – 29.9999MHz
		< 40	60		30.0000 – 39.9999MHz
		< 25	40		40.0000 – 50.0000MHz
Equivalent series resistance "R1" (over Operating Temperature Range) (CL=6pF, 7pF, 8pF)		< 50	70	Ω	16.0000 – 19.9999MHz
		< 35	50		20.0000 – 29.9999MHz
		< 30	40		30.0000 – 39.9999MHz
		< 25	30		40.0000 – 50.0000MHz
Shunt capacitance (C0)		< 1.0	2.0	pF	
Load capacitance (CL)		4.0		pF	<i>See options</i>
Drive Level		10	100	μW	
Aging (1 year)	-2		+2	ppm	@25°C±3°C
Insulation Resistance	500			MΩ	@ 100Vdc ± 15V

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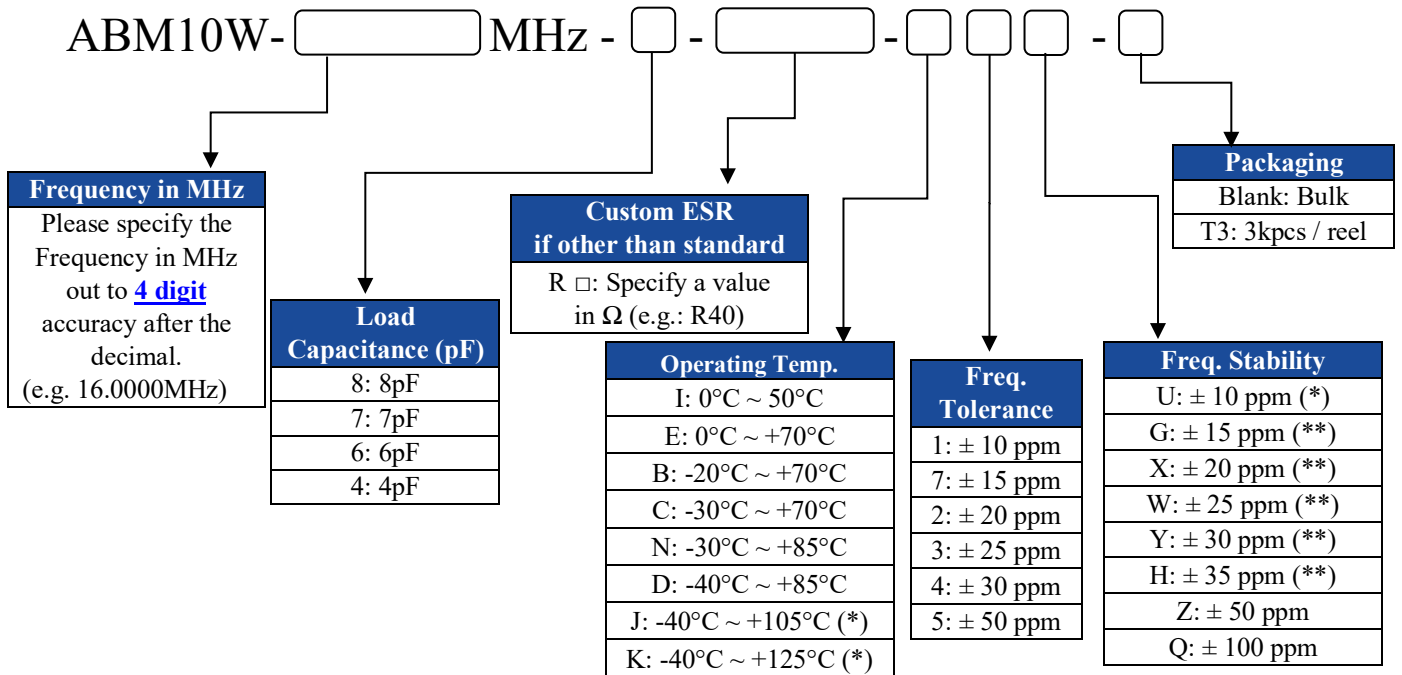
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## Options and Part Identification [Note 1]



(\*) Only offered @  
Freq. Stability  
options: Z & Q.

Contact ABRACON  
for tighter  
Frequency Stability.

(\*) Only offered @  
Operating Temp.  
Range options: I, E, & B  
(\*\*) Only offered @  
Operating Temp.  
Range options: I, E, B,  
C, N, & D

Contact ABRACON  
for wider Operating  
Temp. Range.

### Note 1:

Contact Abracon for part number requests

With carrier frequency callouts up to 5 & 6 digit accuracy after the decimal.



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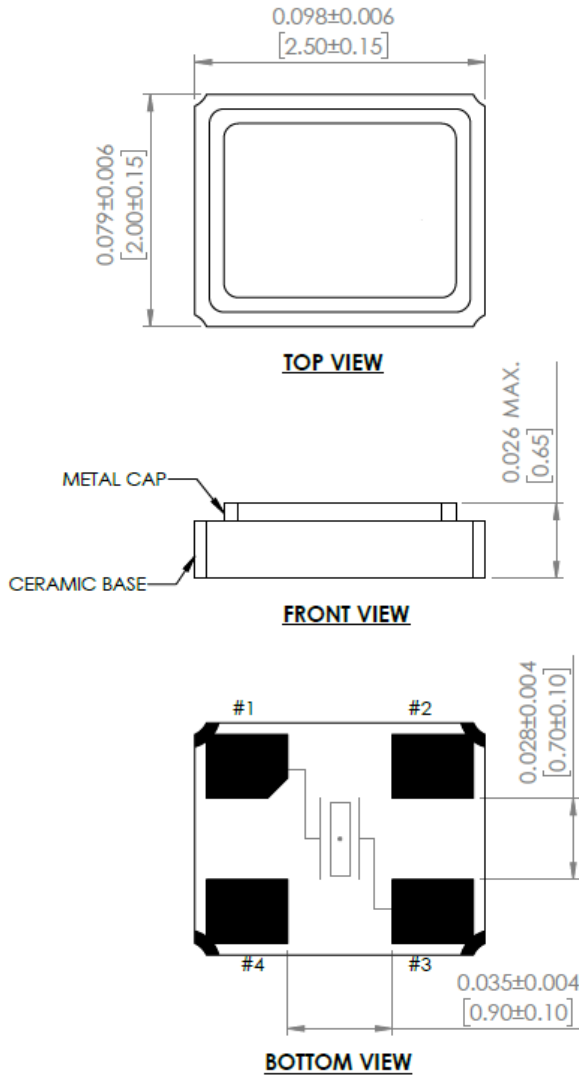
Check Inventory



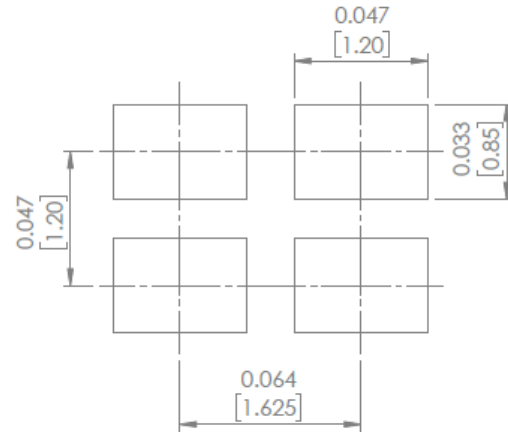
2.5 x 2.0 x 0.6 mm  
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## Mechanical Dimensions



## Recommended Land Pattern



Pin#2: GND  
Pin#4: GND

### Note:

Due to material availability the Chamfer could be located on pin #1, 2 or 4. Be advised that the Chamfer location has no impact on the electrical performance of the device.

Dimensions: inches [mm]

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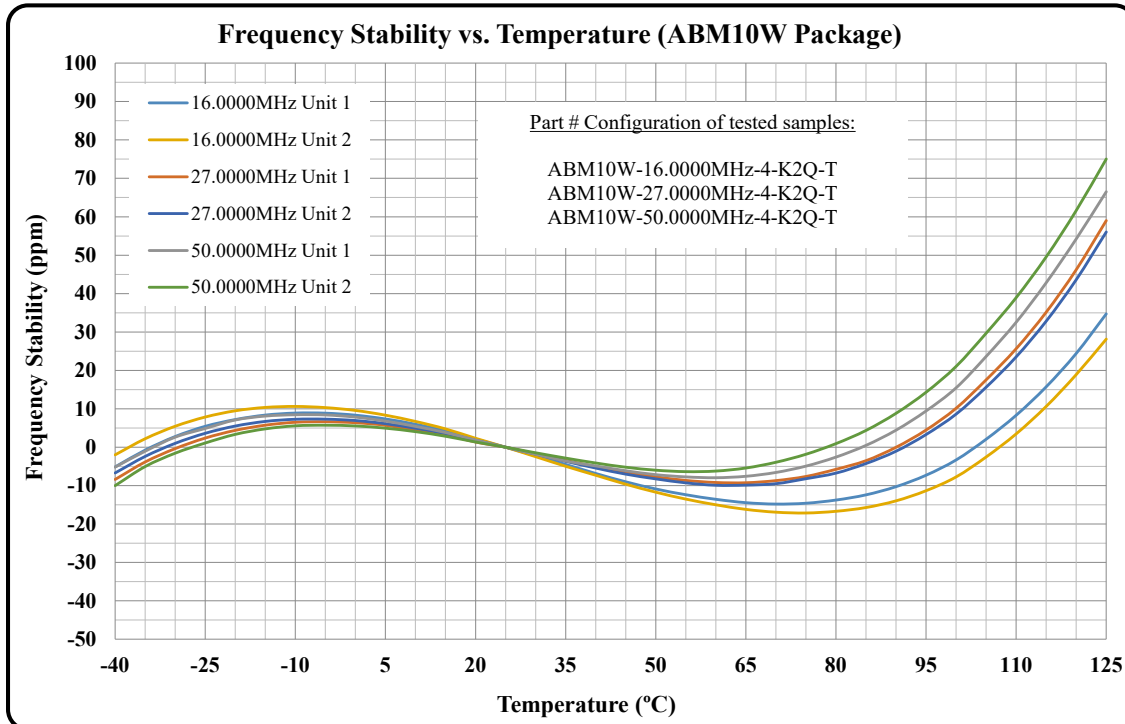
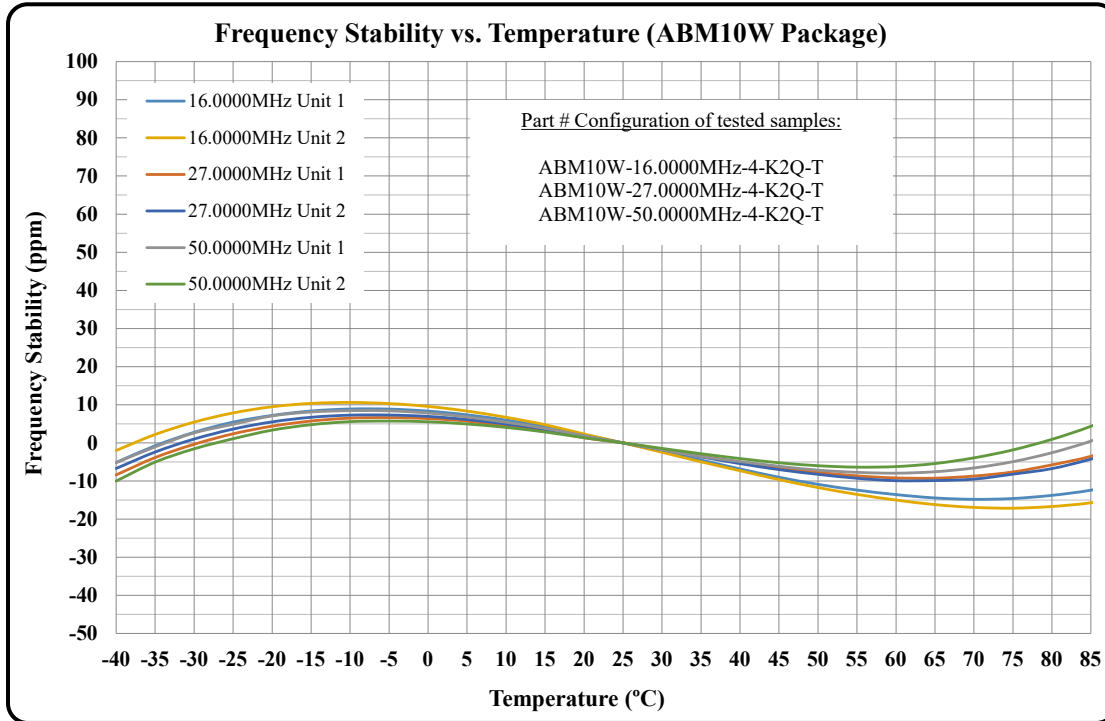
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## Typical Frequency vs. Temperature Characteristics:



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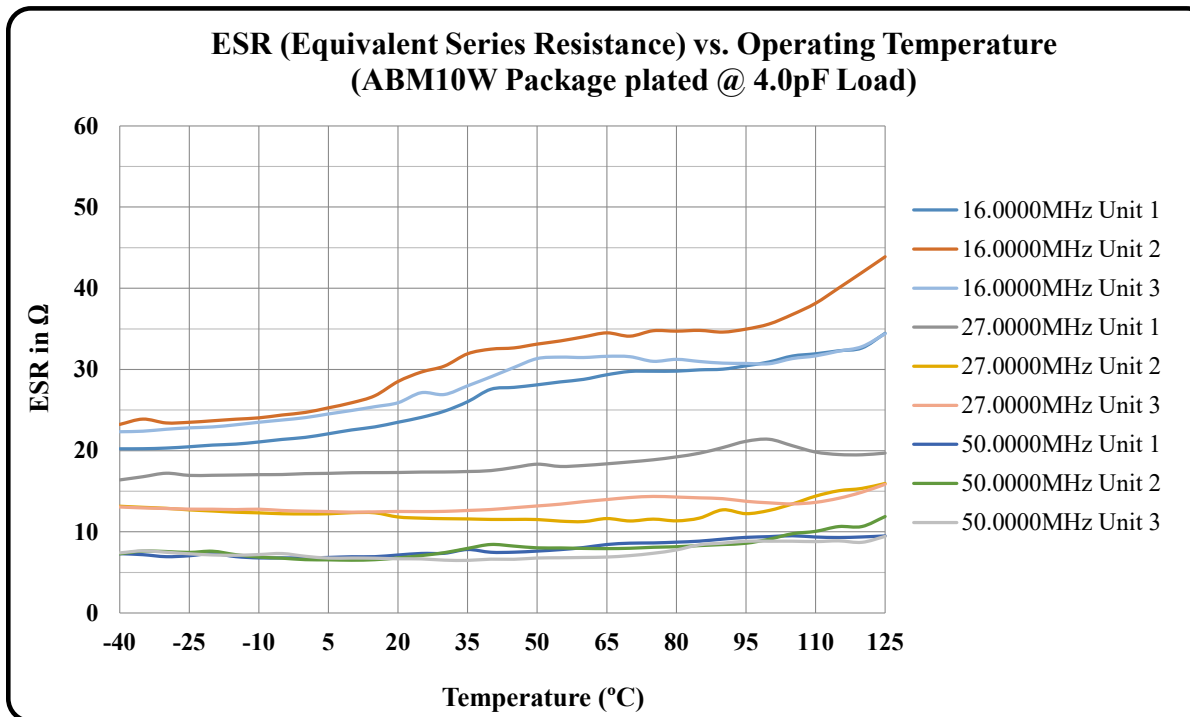
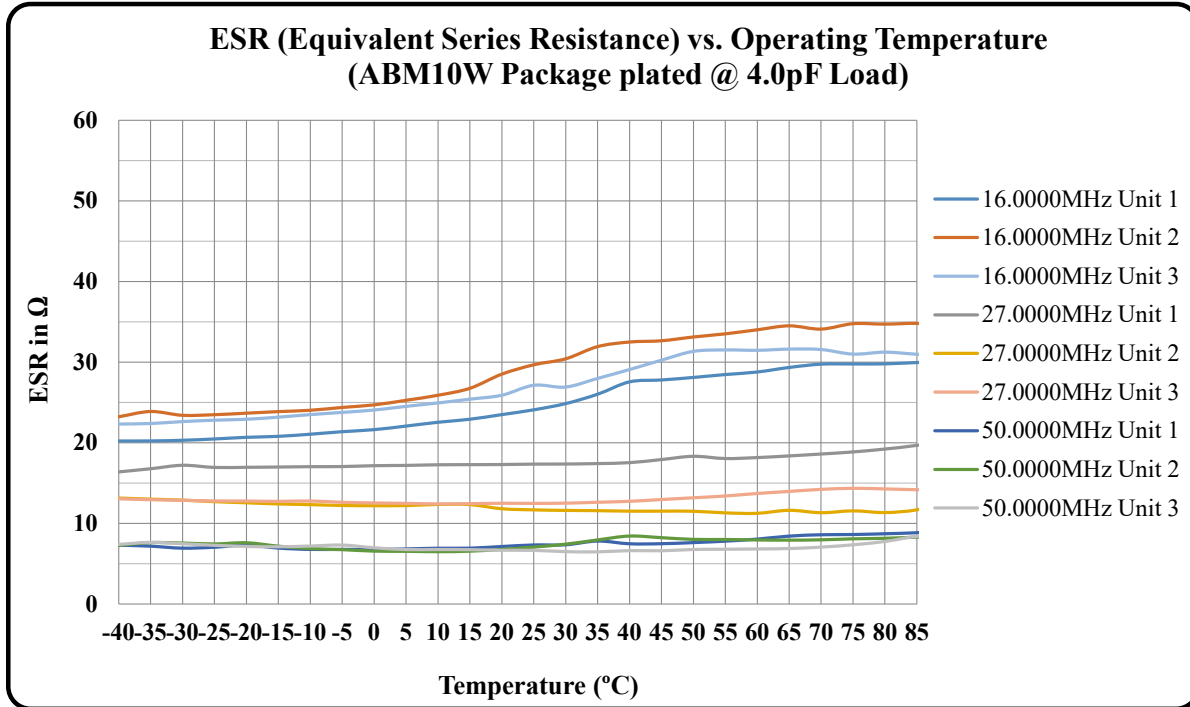
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## Typical ESR (Equivalent Series Resistance) vs. Temperature Characteristics:



\*Plating Load = Load Capacitance (CL)



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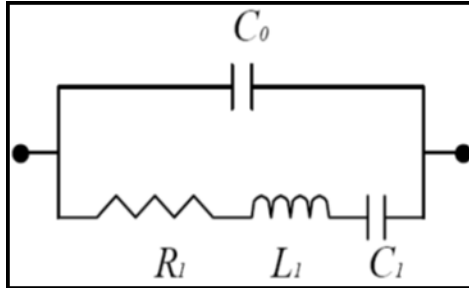
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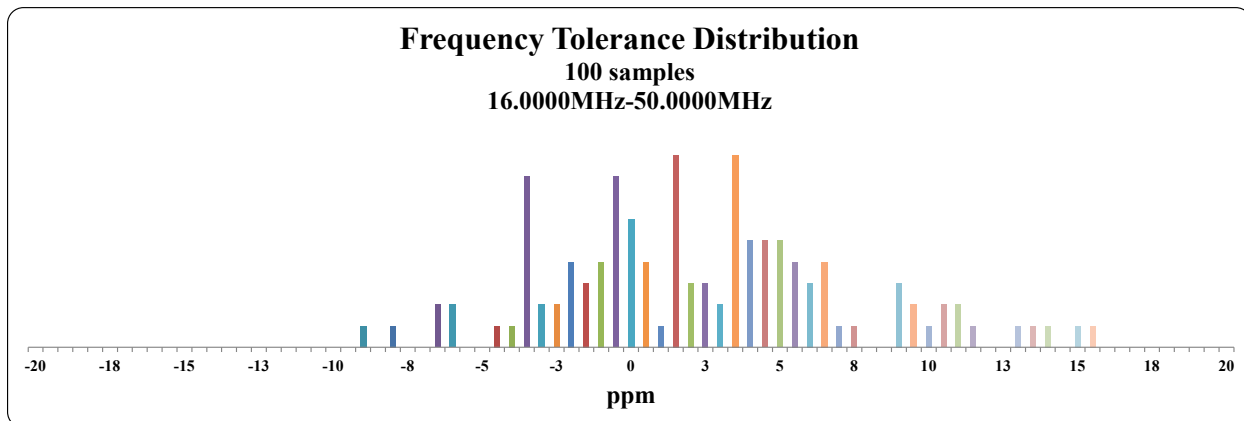


SPICE Models (based on typical values at 25°C ± 3°C):



<b>Frequency: 16.0000MHz</b> <b>Plating Load: 4pF</b>				<b>Frequency: 16.0000MHz</b> <b>Plating Load: 6pF</b>			
C0	=	0.65	pF	C0	=	0.65	pF
R1	=	22.77	Ω	R1	=	21.43	Ω
L1	=	70.34	mH	L1	=	70.13	mH
C1	=	1.41	fF	C1	=	1.41	fF
<b>Frequency: 27.0000MHz</b> <b>Plating Load: 4pF</b>				<b>Frequency: 27.0000MHz</b> <b>Plating Load: 6pF</b>			
C0	=	0.65	pF	C0	=	0.66	pF
R1	=	14.39	Ω	R1	=	17.38	Ω
L1	=	16.51	mH	L1	=	16.56	mH
C1	=	2.11	fF	C1	=	2.10	fF
<b>Frequency: 50.0000MHz</b> <b>Plating Load: 4pF</b>				<b>Frequency: 50.0000MHz</b> <b>Plating Load: 6pF</b>			
C0	=	0.89	pF	C0	=	0.87	pF
R1	=	8.40	Ω	R1	=	8.03	Ω
L1	=	3.24	mH	L1	=	3.19	mH
C1	=	3.13	fF	C1	=	3.18	fF

Typical Frequency Tolerance Distribution (at 25°C ± 3°C)



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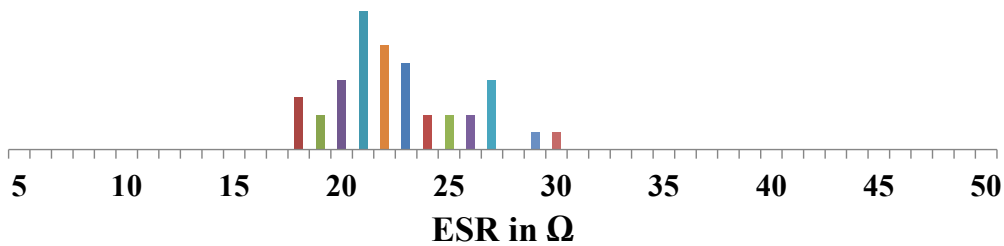


Typical ESR Distribution (at 25°C ± 3°C):

## ESR Distribution @ 16.0000MHz

100 samples

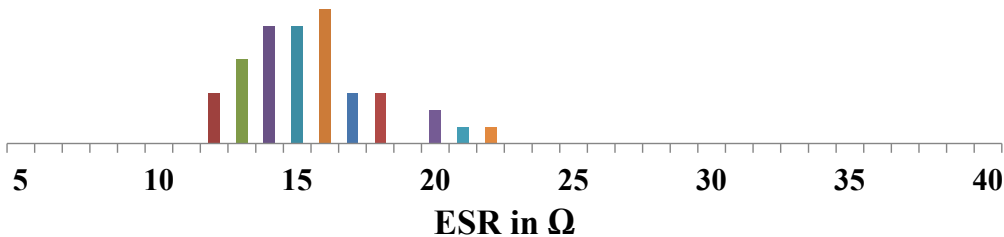
MAX ESR = 29.46 Ω



## ESR Distribution @ 27.0000MHz

100 samples

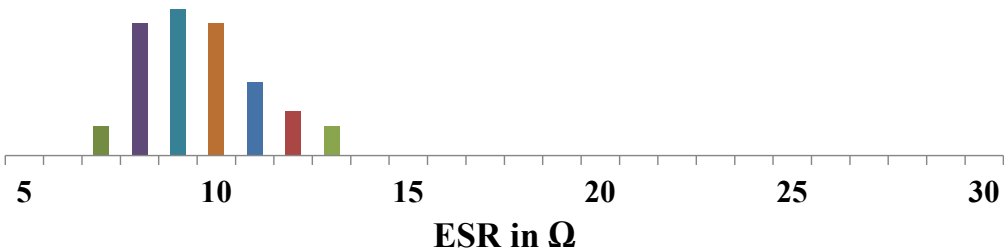
MAX ESR = 21.10 Ω



## ESR Distribution @ 50.0000MHz

100 samples

MAX ESR = 12.60 Ω



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## Reflow Profile [JEDEC J-STD-020]

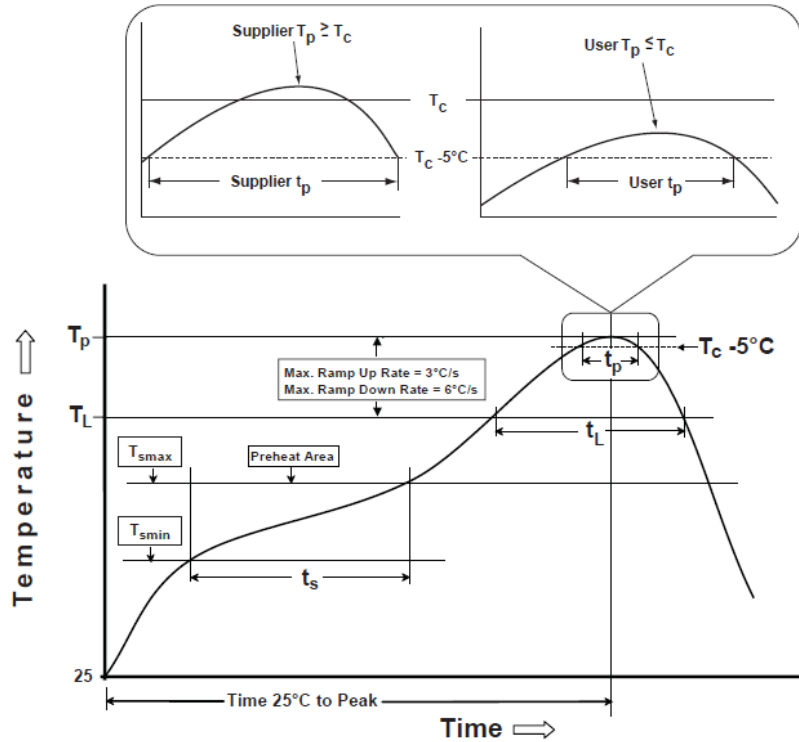


Table 1

SnPb Eutectic Process  
Classification Temperatures ( $T_c$ )

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥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 <sup>3</sup> <350	Volume mm <sup>3</sup> 350-2000	Volume mm <sup>3</sup> >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 - 120 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.	30 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.



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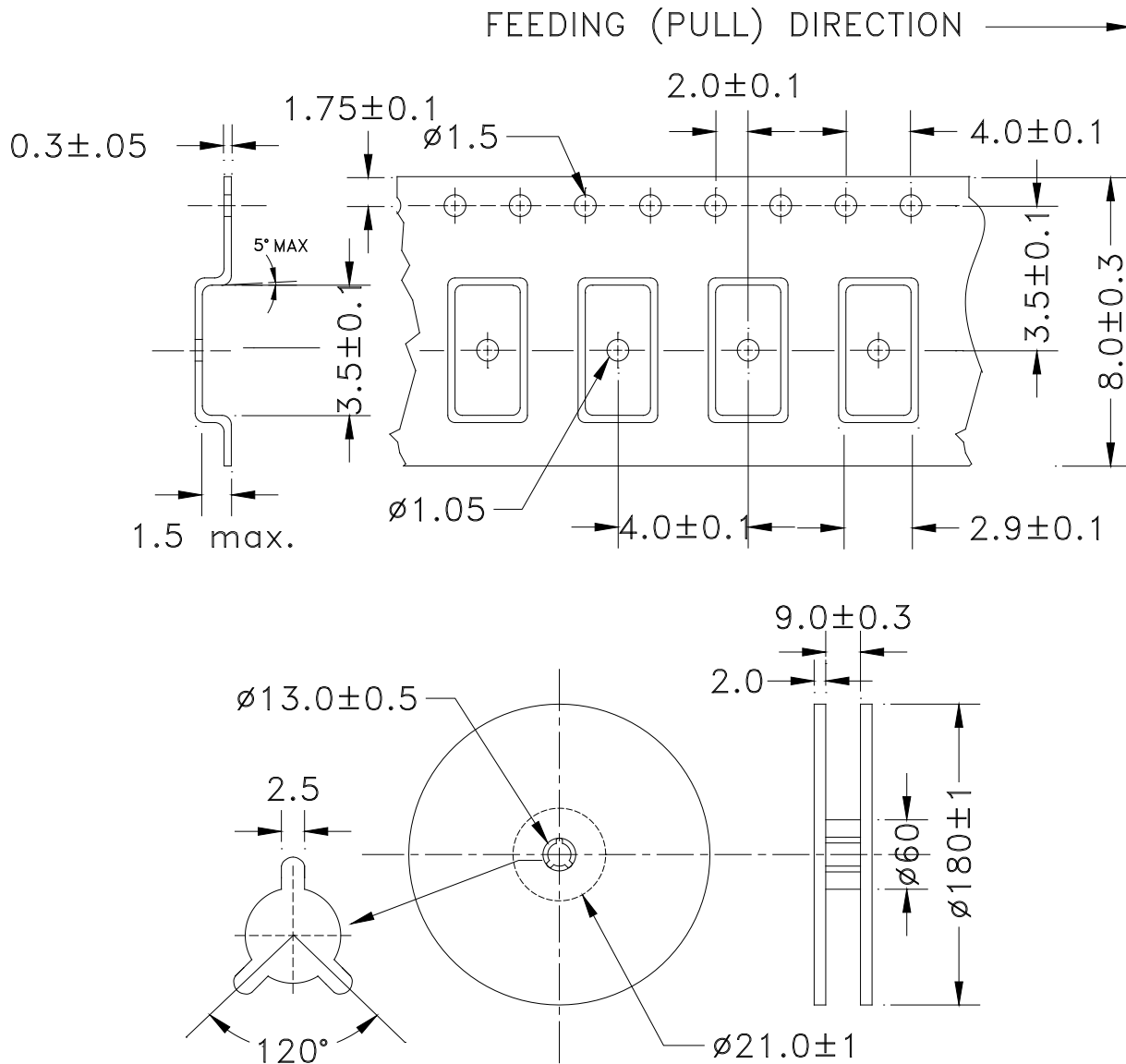


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MSL Level = N/A



## Packaging

T3: Tape and reel (3,000pcs/reel)



Dimensions: mm

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