

# 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                                                                         | 16.0000     |         | 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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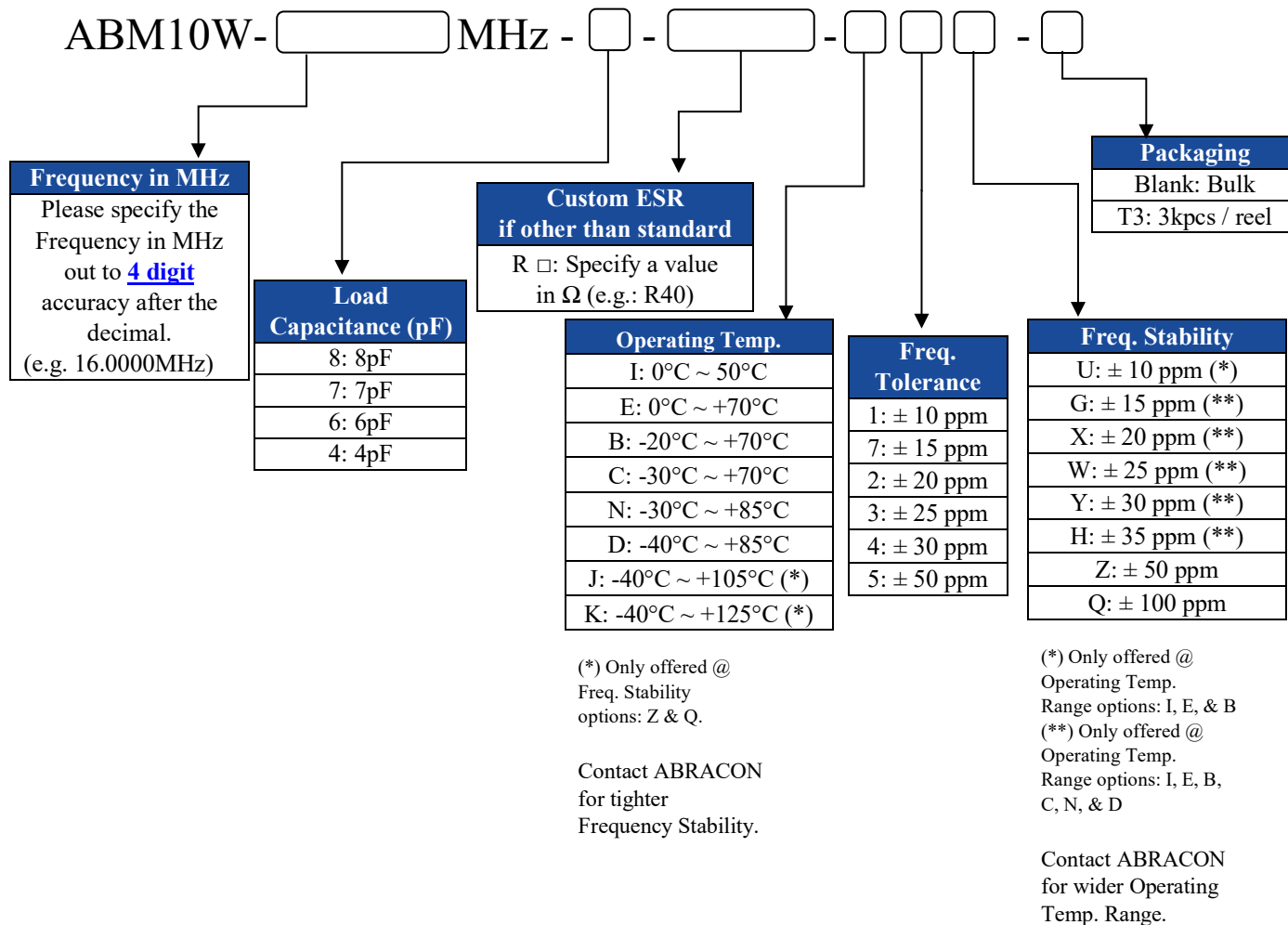


2.5 x 2.0 x 0.6 mm

RoHS/RoHS II Compliant

MSL Level = N/A

### Options and Part Identification <sup>[Note 1]</sup>



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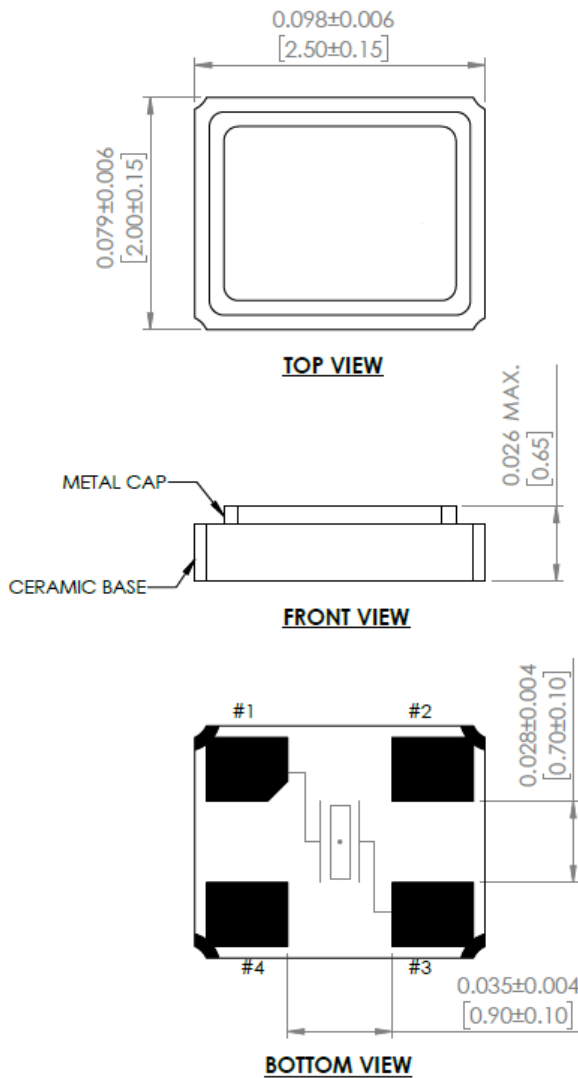
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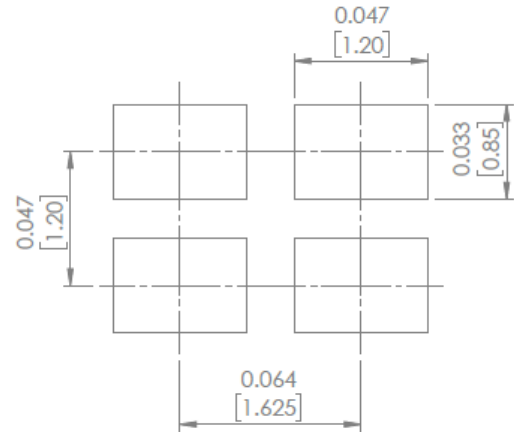
2.5 x 2.0 x 0.6 mm  
RoHS/RoHS II Compliant  
MSL Level = N/A



### 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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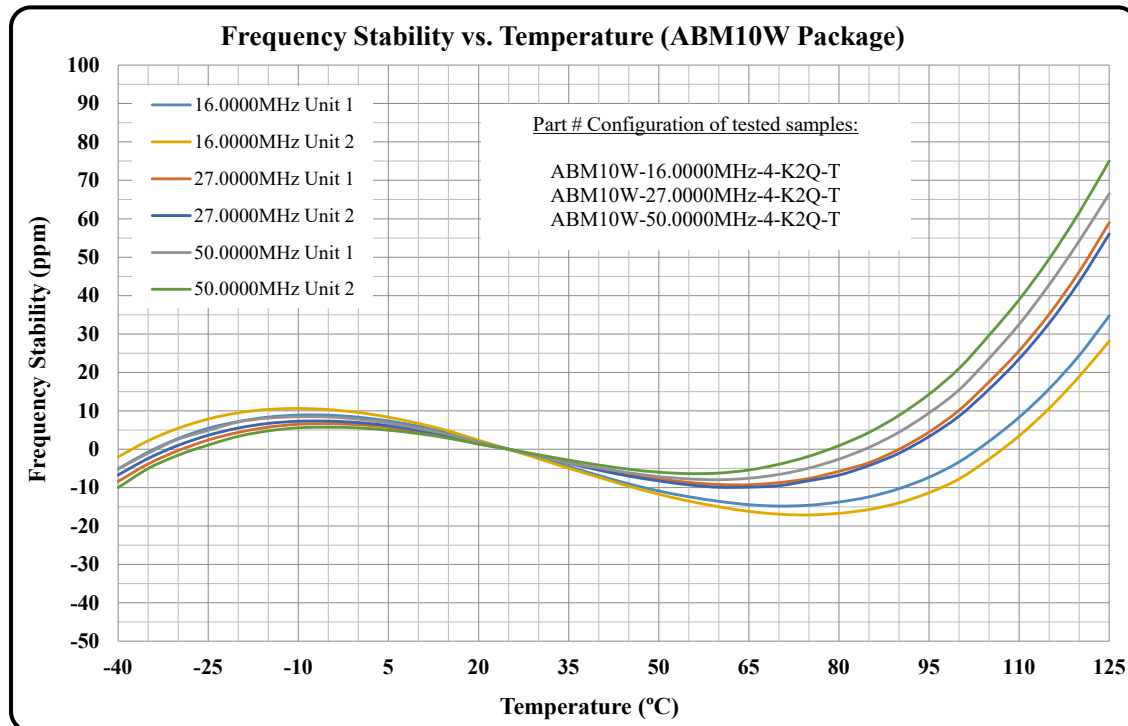
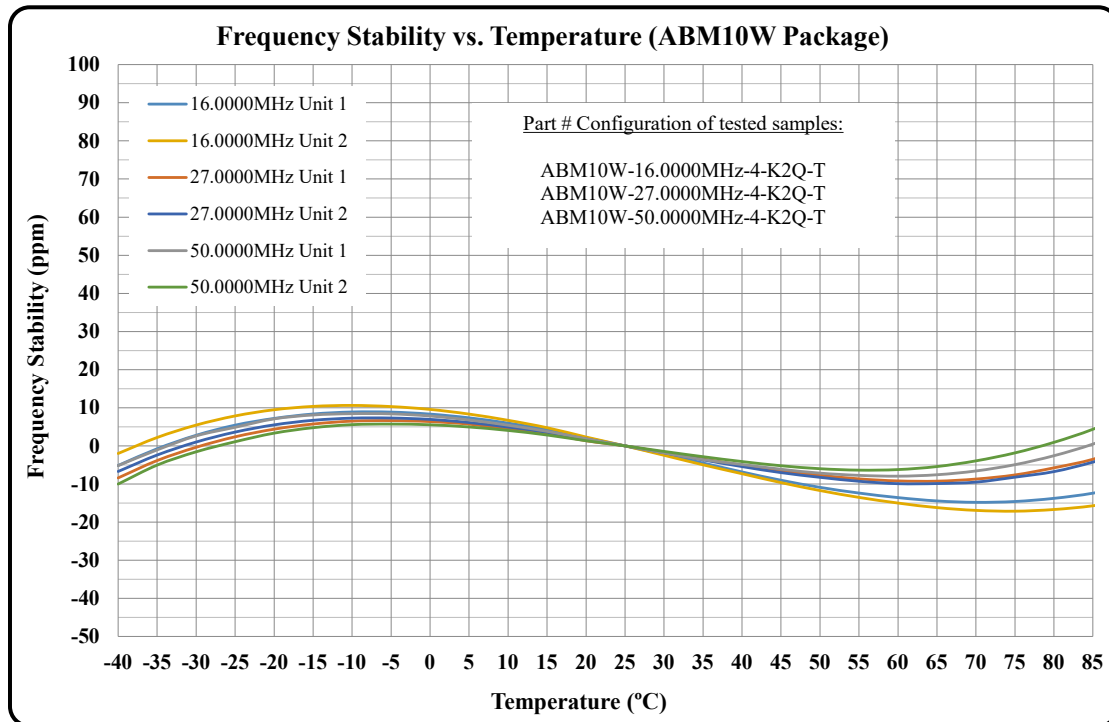
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### Typical Frequency vs. Temperature Characteristics:



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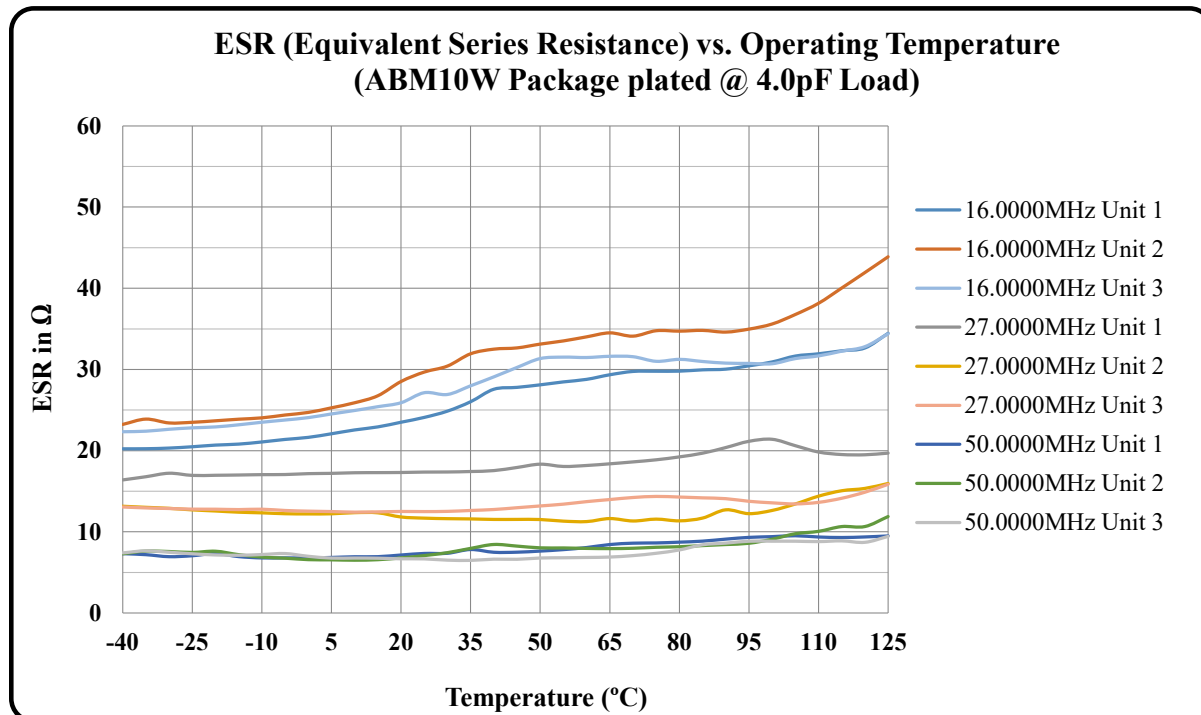
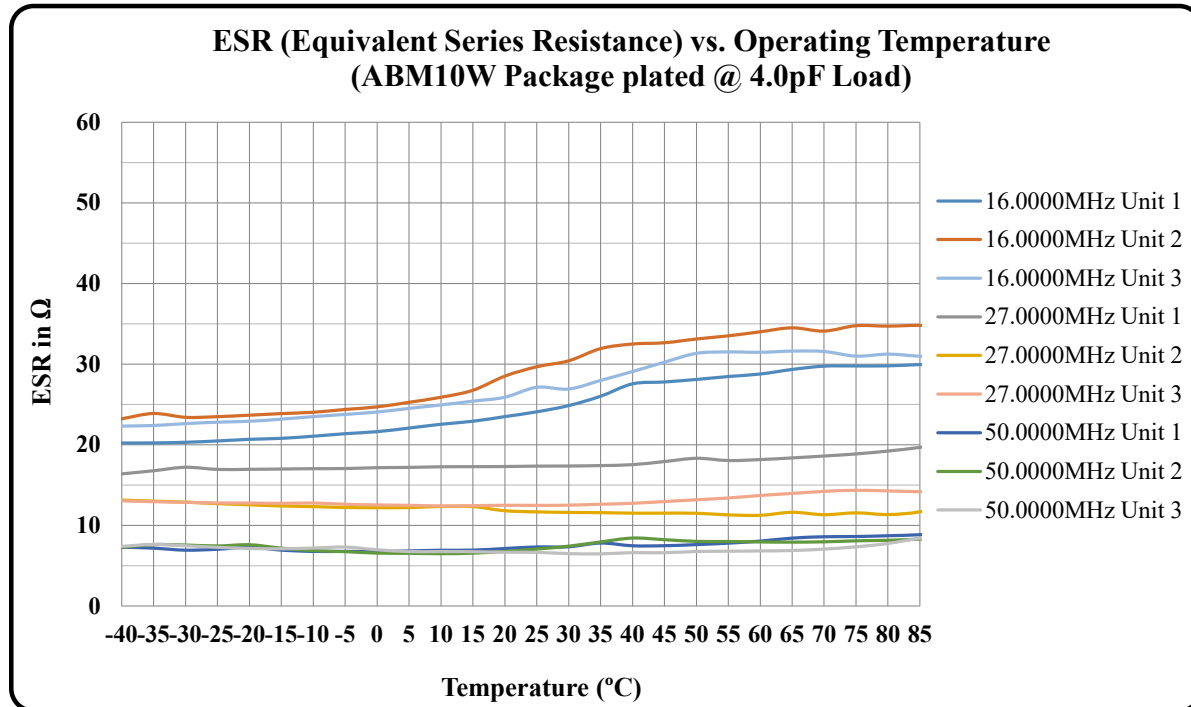
Check Inventory



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



\*Plating Load = Load Capacitance (CL)



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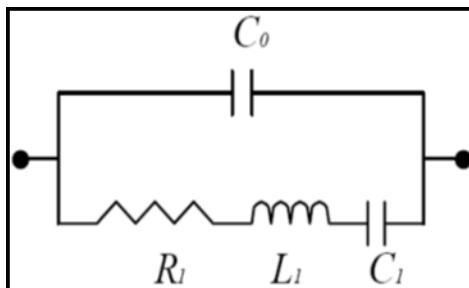


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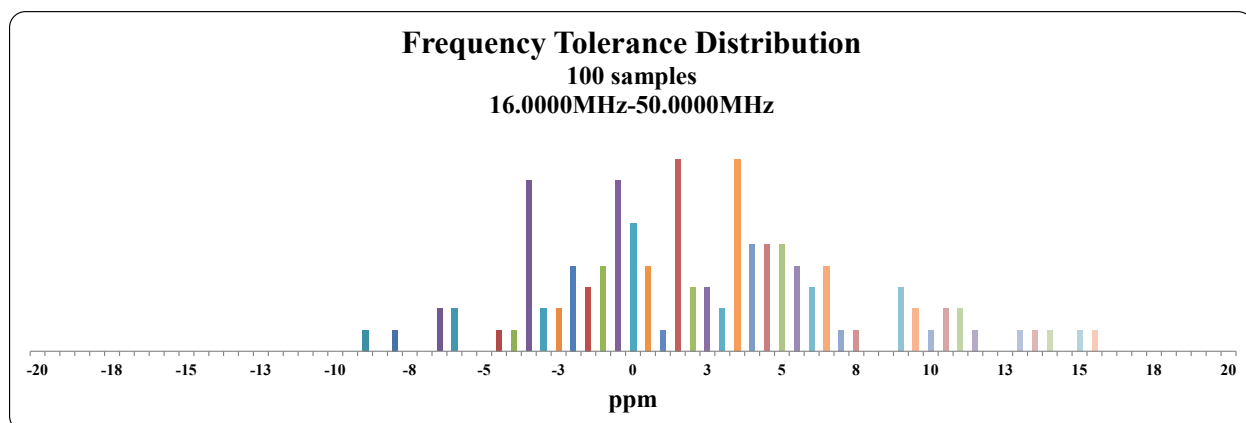
2.5 x 2.0 x 0.6 mm  
RoHS/RoHS II Compliant  
MSL Level = N/A

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



| Frequency: 16.0000MHz<br>Plating Load: 4pF |   |       |    | Frequency: 16.0000MHz<br>Plating Load: 6pF |   |       |    |
|--------------------------------------------|---|-------|----|--------------------------------------------|---|-------|----|
| 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 |
| Frequency: 27.0000MHz<br>Plating Load: 4pF |   |       |    | Frequency: 27.0000MHz<br>Plating Load: 6pF |   |       |    |
| 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 |
| Frequency: 50.0000MHz<br>Plating Load: 4pF |   |       |    | Frequency: 50.0000MHz<br>Plating Load: 6pF |   |       |    |
| 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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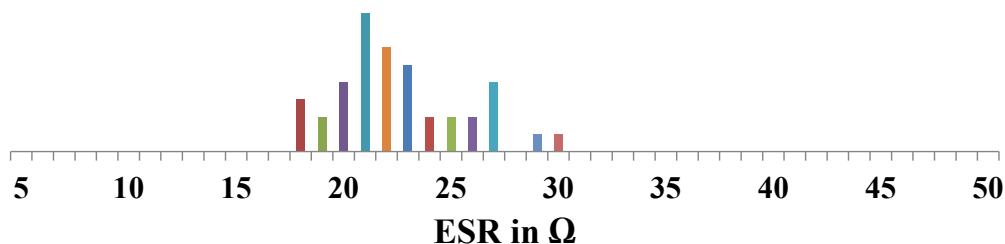


Typical ESR Distribution (at 25°C ± 3°C):

## ESR Distribution @ 16.0000MHz

100 samples

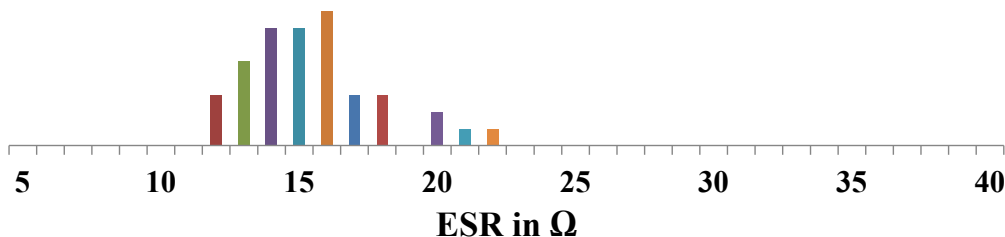
MAX ESR = 29.46 Ω



## ESR Distribution @ 27.0000MHz

100 samples

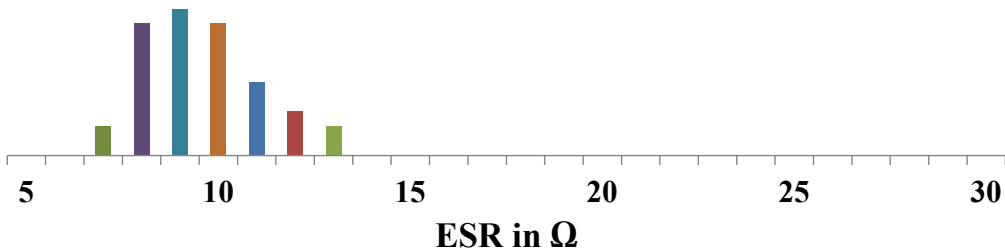
MAX ESR = 21.10 Ω



## ESR Distribution @ 50.0000MHz

100 samples

MAX ESR = 12.60 Ω



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

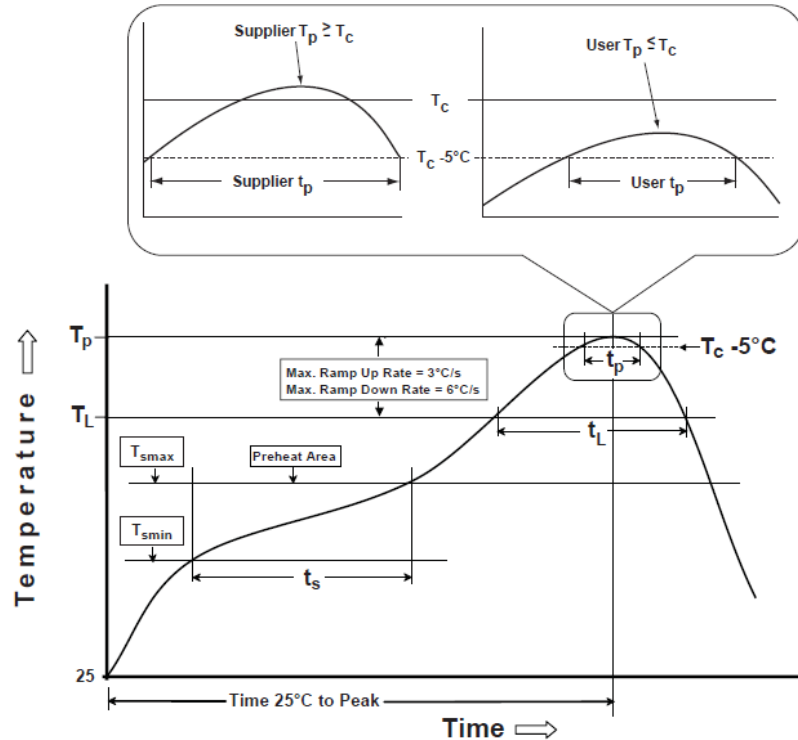


Table 1

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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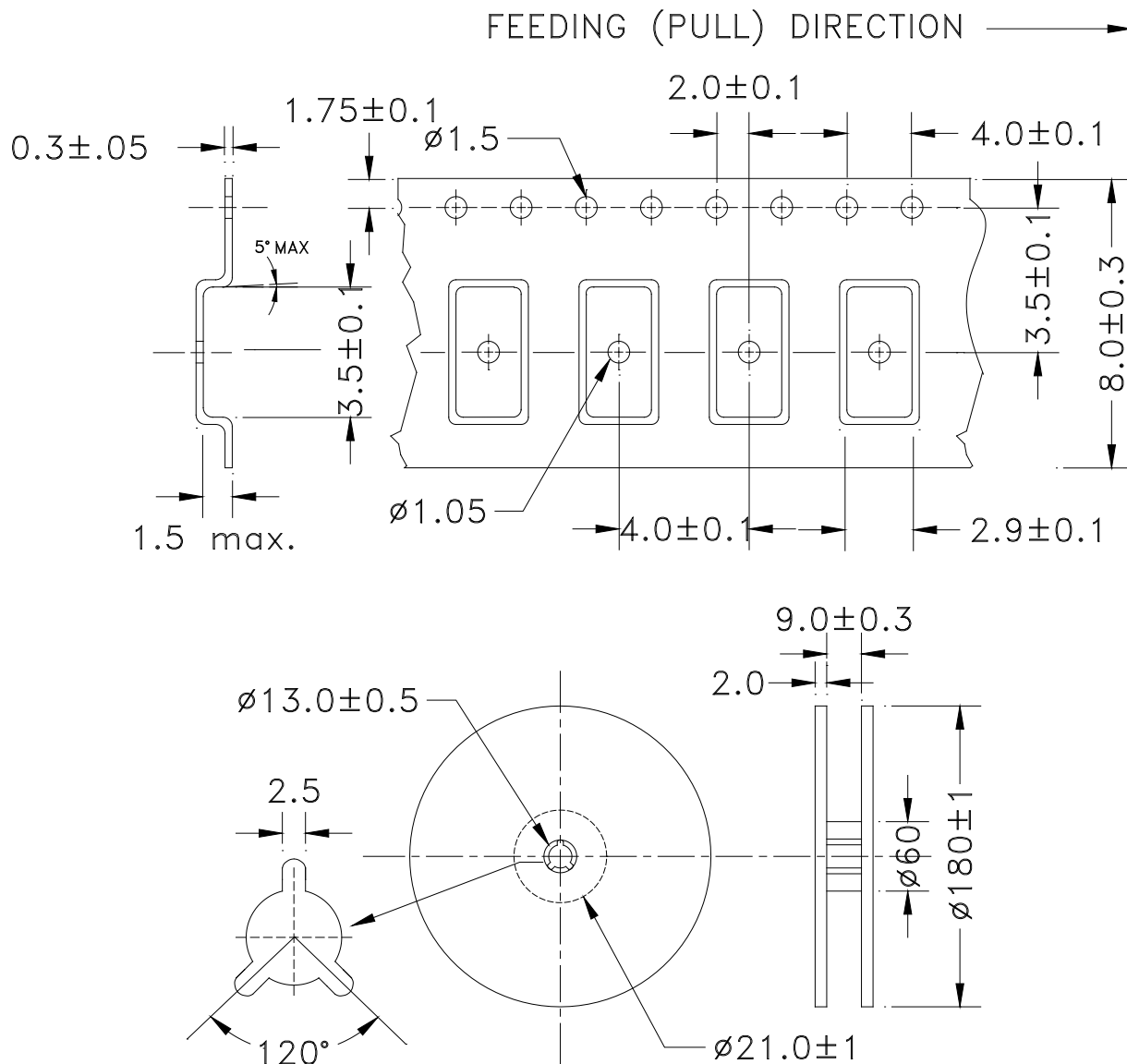


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RoHS/RoHS II Compliant  
MSL Level = N/A



## Packaging

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



Dimensions: mm

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