

## B48 CBRS 3.6GHz Bandpass BAW Filter

AKF-1336

### Description

Akoustis' AKF-1336 is a high performance, ultra-small bandpass BAW Filter targeting 5G B48 Citizen Broadcast Radio Solutions (CBRS) infrastructure applications. AKF-1336 utilizes Akoustis' XBAW<sup>®</sup> technology which provides leading RF filter performance. This BAW filter provides 150 MHz bandwidth, low insertion loss at 3.6 GHz and high out of band attenuation. AKF-1336 uses standard ceramic packaging and is compatible with high volume, lead-free SMT soldering processes.

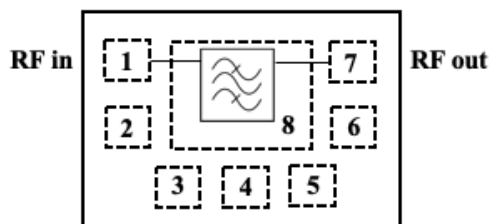
### Features

- Ultra small form factor 2.5mm x 2.0mm x 0.8mm
- Single-ended 50Ω Ant, Tx/Rx ports
- High out of band attenuation
- High power handling, maximum +30dBm
- Low insertion loss 150 MHz passband filter
- Performance -40 C to +85°C
- RoHS Compliant

### Applications

- 5G Infrastructure
- B48 CBRS
- General Purpose Wireless

### Functional Block



| Pin # | Description |
|-------|-------------|
| 1     | RF Input    |
| 2     | Ground      |
| 3     | Ground      |
| 4     | Ground      |
| 5     | Ground      |
| 6     | Ground      |
| 7     | RF Output   |
| 8     | Ground      |

### Ordering Information

| Part Number | Description                  |
|-------------|------------------------------|
| AKF-1336EVB | Evaluation board             |
| AKF-1336SP  | (5) Loose pcs                |
| AKF-1336SR  | (100) Short Reel (7" Reel)   |
| AKF-1336TR1 | (1000) Tape & Reel (7" Reel) |
| AKF-1336TR2 | (2500) Tape & Reel (7" Reel) |

## Absolute Maximum Rating

| Parameter           |                                  | Rating        |
|---------------------|----------------------------------|---------------|
| Storage Temperature |                                  | -40 to 125 °C |
| Max Input Power     | Signal: 5G/LTE E-UTRA 10MHz 50RB | +32 dBm       |
| Max Temperature     |                                  | -40 to 105 °C |

Exceeding any one limit or a combination of AMR conditions may result in damage to the device

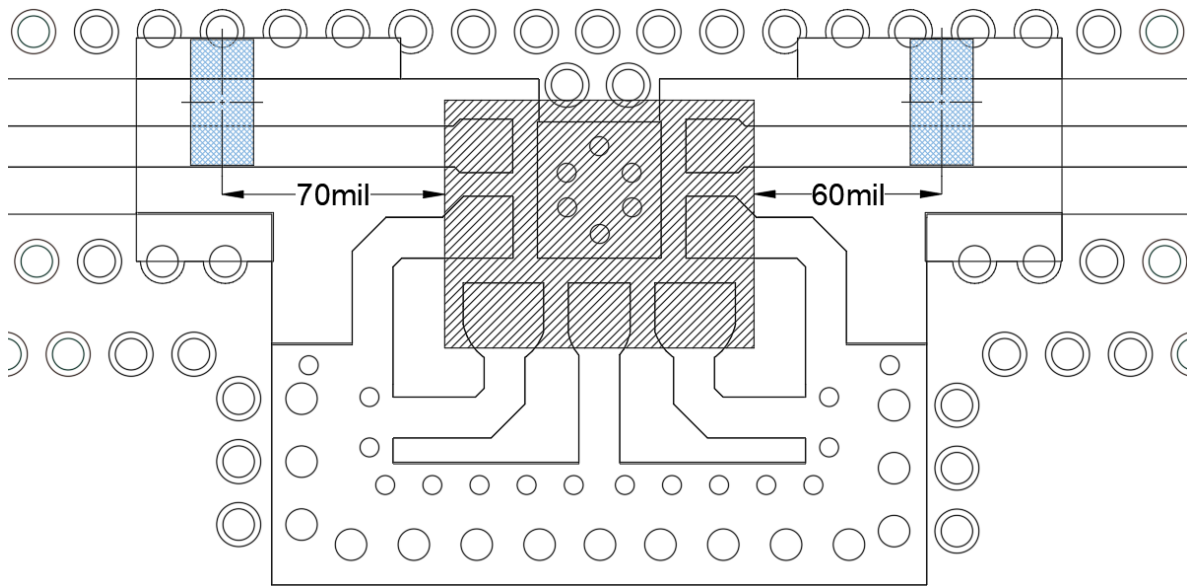
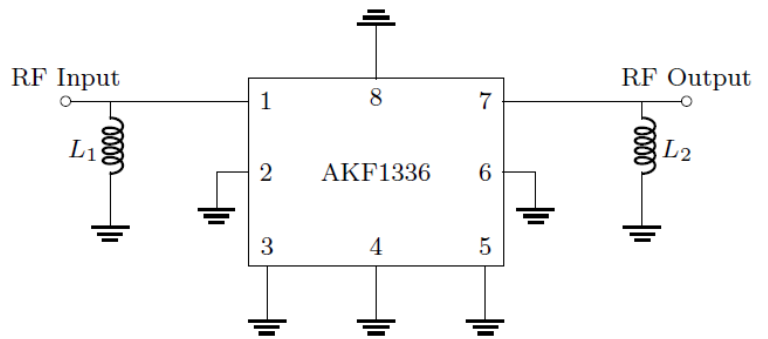
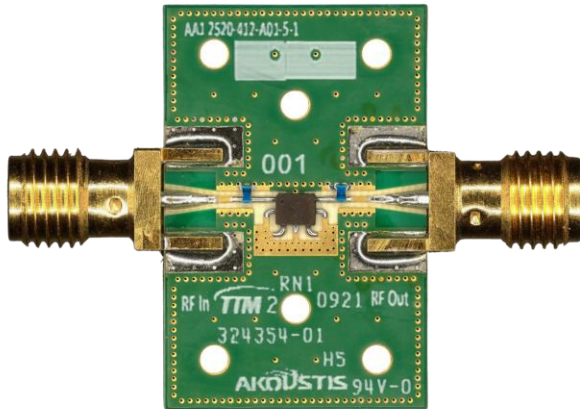
## Operating Parameters (Temp=-40°C to +85°C unless otherwise noted)

| Parameter                | Conditions                     | Units   | Min. | Typ.               | Max. |
|--------------------------|--------------------------------|---------|------|--------------------|------|
| Passband                 |                                | MHz     | 3550 | 3625               | 3700 |
| Insertion Loss           | 3550 – 3700 MHz                | dB      |      | 1.5 <sup>(1)</sup> | 2.7  |
| Amplitude Variation      | 3550 – 3700 MHz                | dB      |      | 1                  | 1.5  |
| Attenuation              | 10 – 1000 MHz                  | dB      | 50   | 55                 |      |
|                          | 1700 - 2690 MHz                | dB      | 22   | 25                 |      |
|                          | 2690 - 3450 MHz                | dB      | 22   | 25                 |      |
|                          | 3450 - 3530 MHz <sup>(2)</sup> | dB      | 10   | 15                 |      |
|                          | 3720 – 3800 MHz <sup>(2)</sup> | dB      | 9    | 15                 |      |
|                          | 3800 - 6000 MHz                | dB      | 14   | 25                 |      |
|                          | 6000 - 8000 MHz                | dB      | 15   | 18                 |      |
| Return Loss              | 3550 - 3700MHz                 | dB      | 10   | 16 <sup>(1)</sup>  |      |
| Load Impedance           |                                | Ω       |      | 50                 |      |
| Power Handling           | 5G/LTE E-UTRA<br>10MHz 50RB    | dBm     |      |                    | 30   |
| 2 <sup>nd</sup> Harmonic | Po=27dBm (25°C)                | dBm/MHz |      | -28                |      |
| 3 <sup>rd</sup> Harmonic | Po=27dBm (25°C)                | dBm/MHz |      | -73                |      |

Note:

1. Averaged over specified frequency at room temperature
2. S-parameter averaged over 5MHz

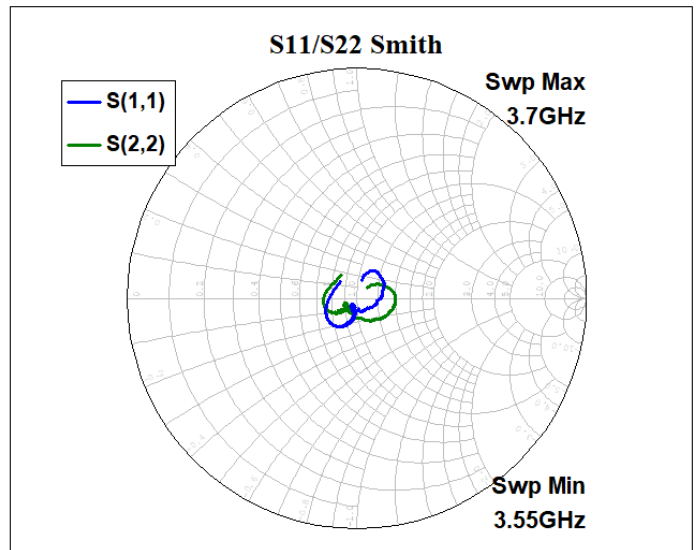
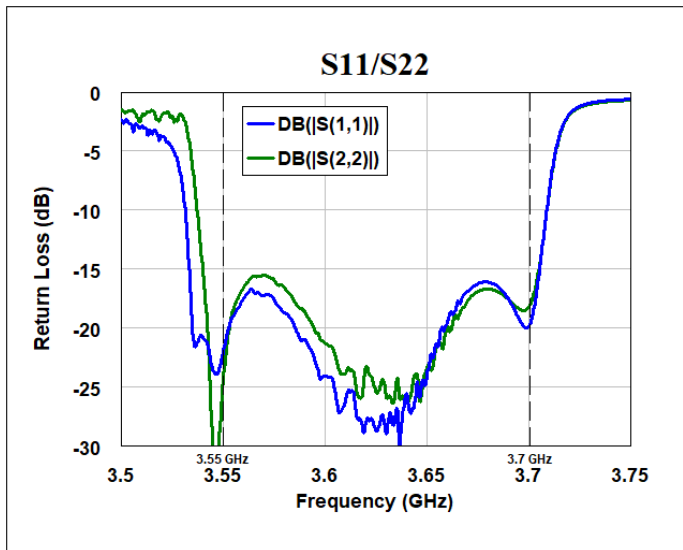
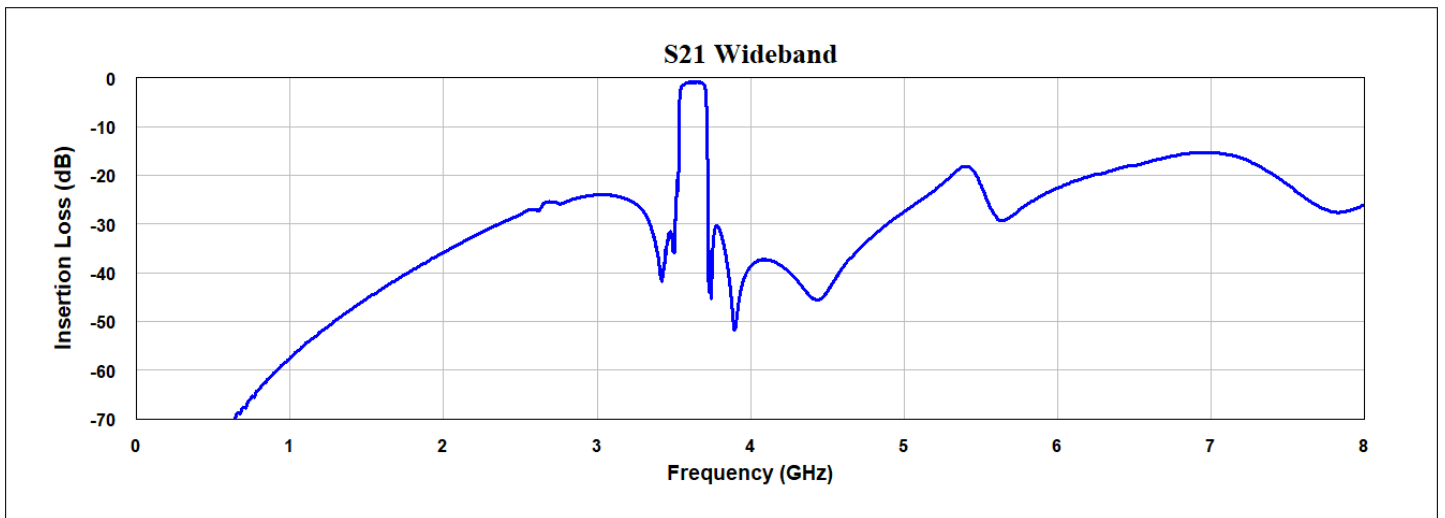
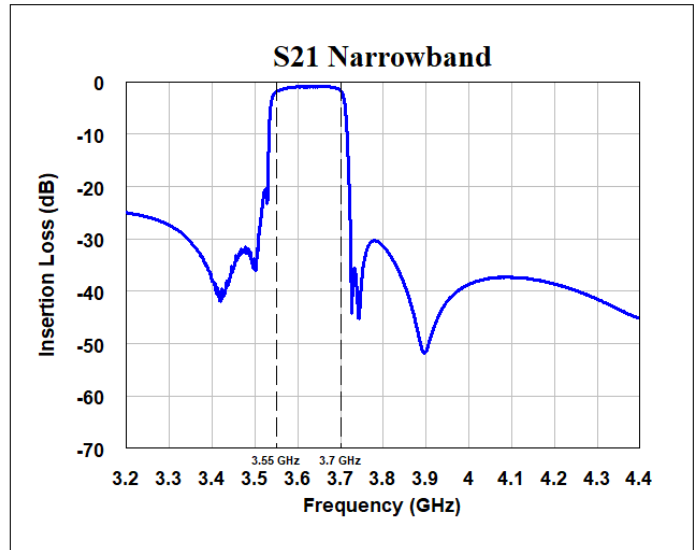
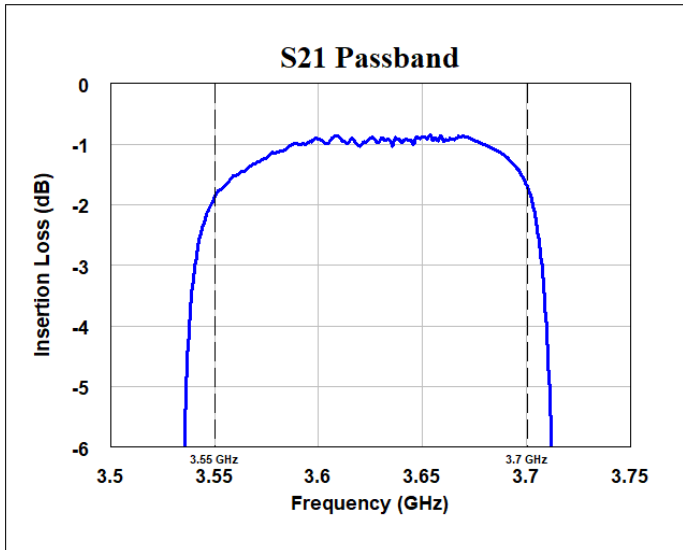
## EVB Schematic & Layout



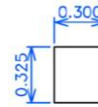
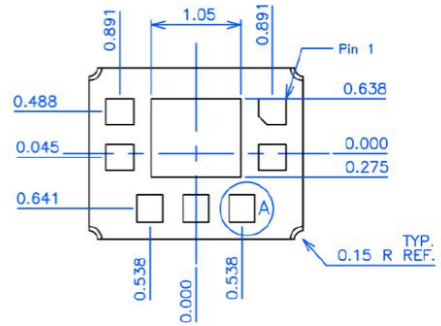
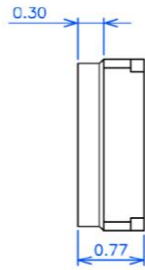
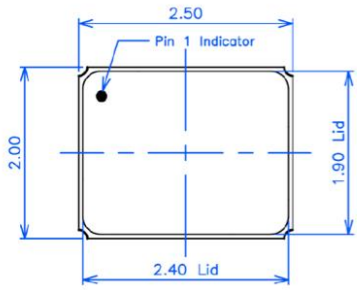
## Bill of Materials

| Reference Des. | Value | Description                 | Manufacturer | Part Number          |
|----------------|-------|-----------------------------|--------------|----------------------|
| PCB            | N/A   | 4 layer                     | Multiple     | AA1 2520-412-A01-5-1 |
| U1             | N/A   | 3.6 GHz BAW Filter          | Akoustis     | AKF-1336             |
| L1             | 2.6nH | Chip inductor, 0402, ±0.1nH | Murata       | LQW15AN2N6G8ZD       |
| L2             | 3.0nH | Chip inductor, 0402, ±0.1nH | Murata       | LQW15AN3N0C10D       |

Performance Plots (Temp = 25°C unless otherwise noted)



## Package Dimensions & Pin Descriptions



DETAIL A  
 PAD  
 SCALE: 2x  
 3X THIS ROTATION  
 4X ROTATED 90°  
 PIN 1 CHAMFER 0.150 X 45°

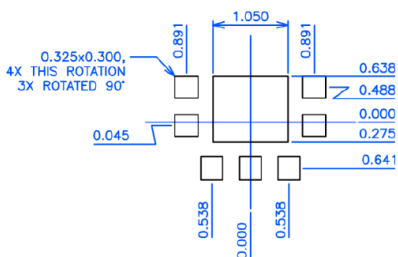
NOTES:

- PLATING THICKNESS  
 ELECTRO Ni : 1.27~8.89 $\mu$ m(S/P)  
 ELECTRO Au : 0.30~1.00 $\mu$ m(S/P)

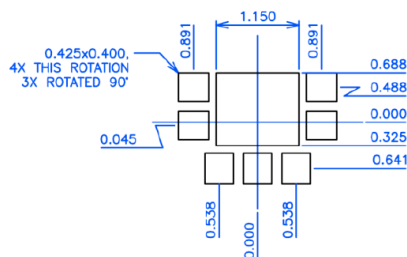
Notes:

- All Units are in mm unless otherwise stated
- General Tolerance:  
 Linear X.XXX =  $\pm 0.050$ mm  
 X.XX =  $\pm 0.10$ mm

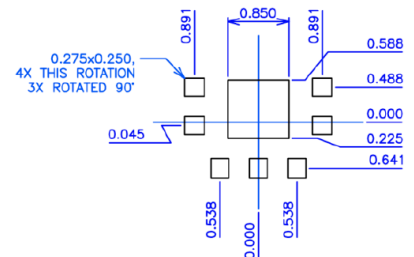
## PCB Mounting Pattern



Recommended PCB  
 Metal Top View

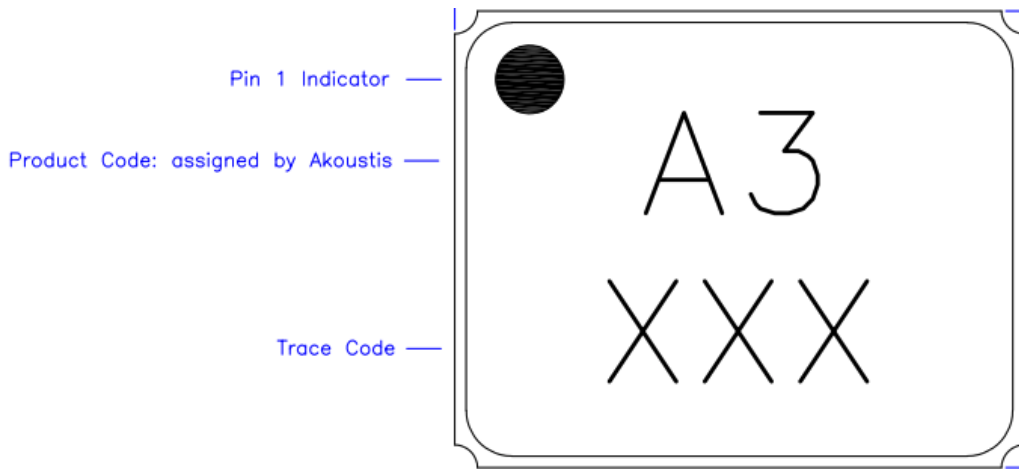


Recommended  
 Solder Mask Opening  
 Top View

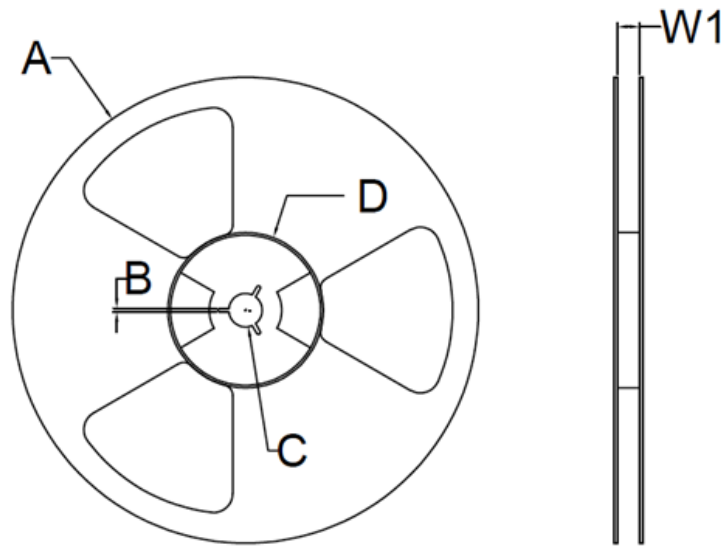


Recommended Stencil  
 Pattern Top View

### Typical Part Marking



### Reel Dimensions

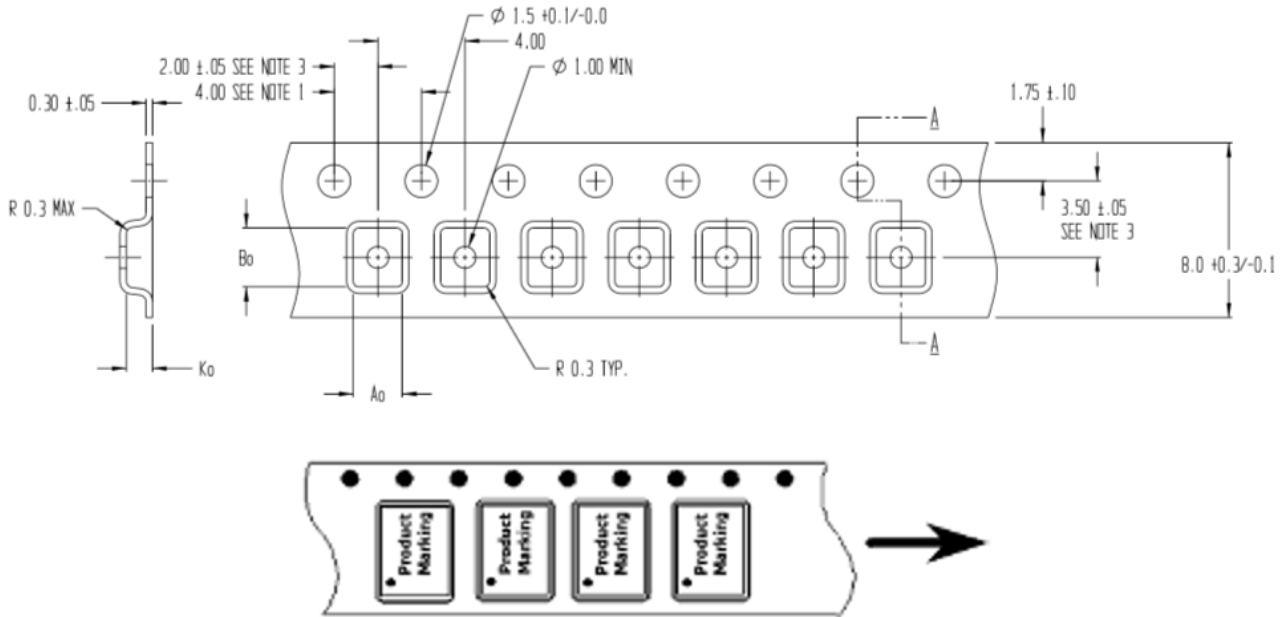


| Reel Dimensions |            |                |              |                    |                 |                     |
|-----------------|------------|----------------|--------------|--------------------|-----------------|---------------------|
| Reel Size       | Tape Width | A              | B            | C                  | D               | W1 *measured at hub |
| 7 Inch          | 8 mm       | 180 +0/-2.0 mm | 2.0mm +/-0.5 | 13.0+0.5 / -0 mm   | 60.0 +/- 2.0 mm | 8.40 +1.5 / -0 mm   |
|                 | 12 mm      | 180 +0/-2.0 mm | 2.0mm +/-0.5 | 13.0+0.5 / -0 mm   | 60.0 +/- 2.0 mm | 12.40 +2.0 / -0 mm  |
|                 | 16 mm      | 180 +0/-2.0 mm | 2.0mm +/-0.5 | 13.0+0.5 / -0 mm   | 60.0 +/- 2.0 mm | 16.40 +2.0 / -0 mm  |
| 13 Inch         | 8 mm       | 330 +/- 2.0 mm | 2.0mm +/-0.5 | 13.0+0.5 / -0.2 mm | 102 +/- 2.0 mm  | 8.8 +2.0 / -0 mm    |
|                 | 12 mm      | 330 +/- 2.0 mm | 2.0mm +/-0.5 | 13.0+0.5 / -0.2 mm | 102 +/- 2.0 mm  | 12.8 +2.0 / -0 mm   |
|                 | 16 mm      | 330 +/- 2.0 mm | 2.0mm +/-0.5 | 13.0+0.5 / -0.2 mm | 102 +/- 2.0 mm  | 16.8 +2.0 / -0 mm   |

Note: 7 Inch Reel Only Has One Opening

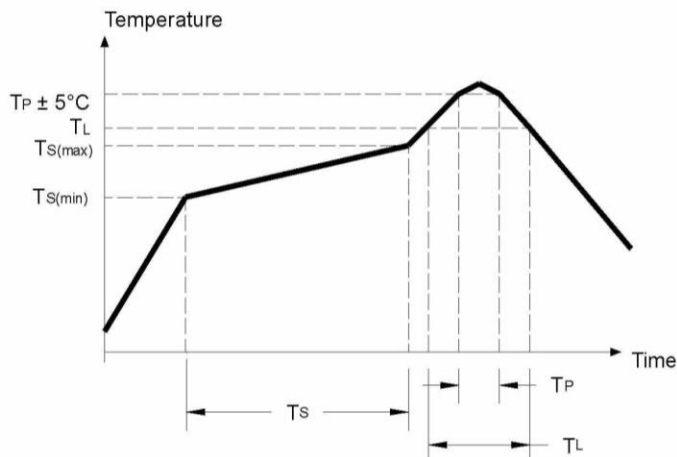
## Tape Dimension

$A_0 = 2.25$   
 $B_0 = 2.70$   
 $K_0 = 1.20$



## Recommended Solder Profile

| Parameter  | Eutectic Sn/Pb  | Pb Free         |
|--|-----------------|-----------------|
| Max Ramp Up Rate                                   | 6 Deg C/Second  | 6 Deg C/Second  |
| Soak Temp Time $T_S(\text{min}) - T_S(\text{max})$ | 135 - 155 Deg C | 150-200 Deg C   |
| Max Soak Time $T_S$                                | 2 minutes       | 3 minutes       |
| Liquidous Temp $T_L$                               | 183 Deg C       | 220 Deg C       |
| Max Time Above $T_L$                               | 150 Seconds     | 150 Seconds     |
| Max Peak Temperature $T_P$                         | 225 Deg C       | 260 Deg C       |
| Max Time at Peak $T_P$                             | 30 Seconds      | 30 Seconds      |
| Max Ramp Down Rate                                 | 10 Deg C/Second | 10 Deg C/Second |



## Product Compliance Information

### ESD Sensitivity Ratings

Human Body Model (HBM) Test

Rating: Class 1C 1000V

Standard: ANSI/ESDA/JEDEC JS-001-2017

Charged Device Model (CDM)

Rating: Class C3 1000V

Standard: ANSI/ESDA/JEDEC JS-002-2018

### MSL Rating

MSL1

### RoHS

This part is compliant with the 2011/65EU RoHS directive on the restrictions of the use of certain hazardous substances in electrical and electronic equipment as amended by Directive (EU) 2015/863

## Contact Information

All contents specified in the datasheet are subject to change. Please contact Akoustis for the latest on our products and company information.

Email: [sales@akoustis.com](mailto:sales@akoustis.com)

Website: [www.akoustis.com](http://www.akoustis.com)

Telephone: +1 704.997.5735

Fax: +1 704.997.5734