

3.83GHz Bandpass BAW Filter

AKF-1938

Description

Akoustis' AKF-1938 is a high-performance, ultra-small band pass BAW Filter targeting 5G infrastructure, radar, and general-purpose applications. AKF-1938 utilizes Akoustis' XBAW™ technology which provides leading RF filter performance. This BAW filter provides 100 MHz bandwidth, low insertion loss at 3.8GHz and high out of band attenuation. AKF-1938 uses standard ceramic packaging and is compatible with high volume, lead-free SMT soldering processes.

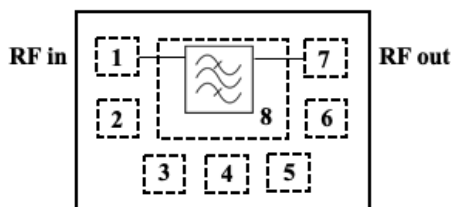
Features

- 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 +27dBm
- Low insertion loss 100 MHz band pass filter
- Performance -40 C to +85°C
- RoHS Compliant

Applications

- 5G Wireless Infrastructure
- Commercial and military radar
- General Purpose

Functional Block Diagram



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-1938EVB	Evaluation board
AKF-1938SP	(5) Loose pcs
AKF-1938SR	(100) Short Reel (7" Reel)
AKF-1938TR1	(1000) Tape & Reel (7" Reel)
AKF-1938TR2	(2500) Tape & Reel (7" Reel)

Absolute Maximum Rating

Parameter	Conditions	Rating
Storage Temperature		-40 to 125 °C
Input Power	Signal: 5G NR, 100 MHz, PAR 7.8dB Temp: 80°C	+28 dBm

A combination of AMR conditions may result in damage to the device.

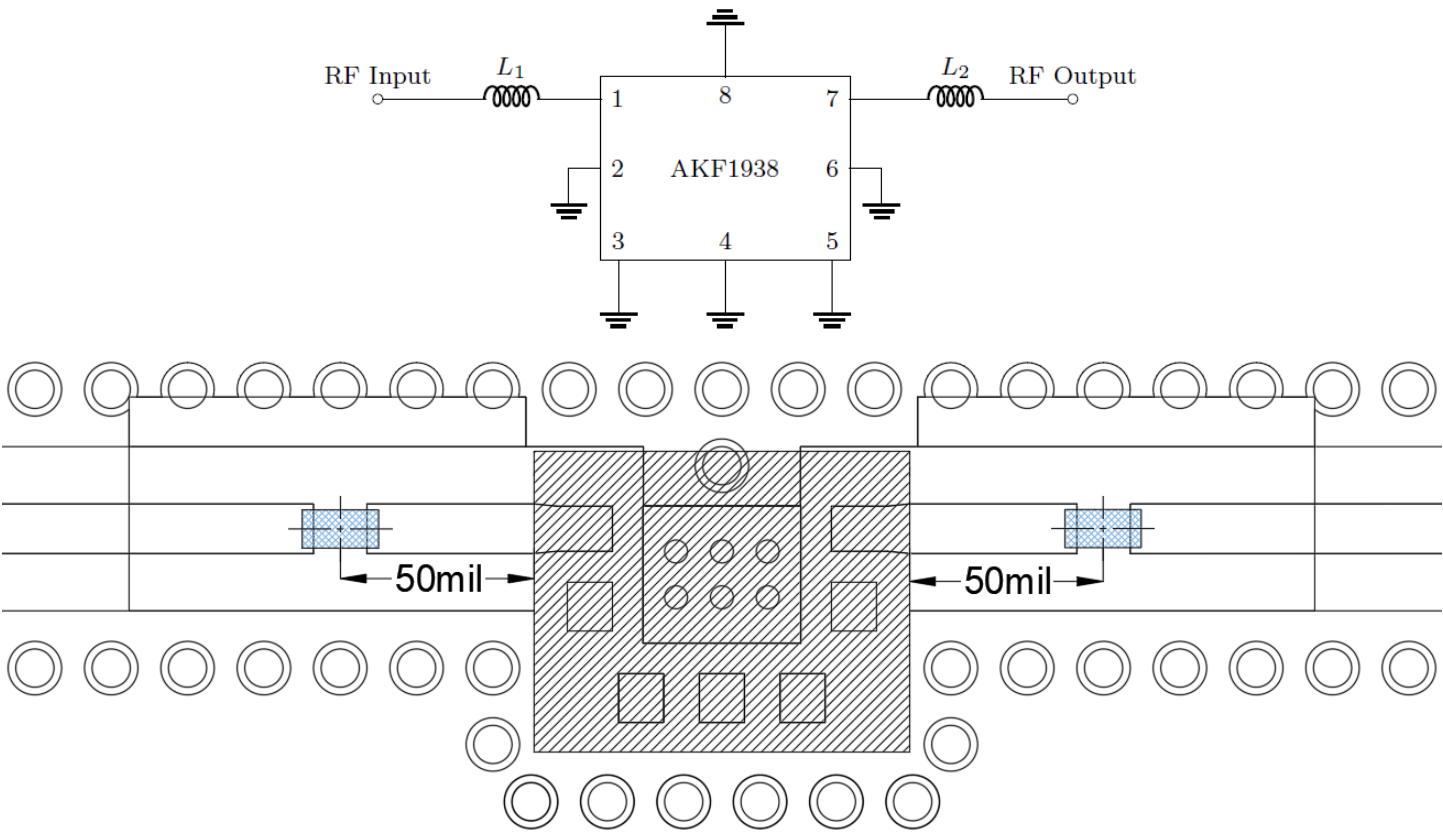
Operating Parameters(Temp = -40°C to +85°C unless otherwise noted)

Parameter	Conditions	Units	Min.	Typ.	Max.
Center Frequency (Fc)		MHz		3830	
Pass Bandwidth		MHz	90	100	
Insertion Loss	3780 – 3880 MHz	dB		1.8 ⁽¹⁾	3
Amplitude Variation ⁽²⁾	3780 - 3880 MHz	dB		1.0	1.5
Attenuation	0 – 2880 MHz	dB	40	42	
	2880 – 3720 MHz	dB	45	50	
	3960 – 4000 MHz	dB	45	50	
	4000 – 4800 MHz	dB	45	50	
	4800 – 7640 MHz	dB	40	45	
	7640 – 9500 MHz	dB	40	45	
Return Loss	3780 – 3880 MHz	dB	11	16 ⁽¹⁾	
Load Impedance		Ω		50	
Power Handling	5G NR, 100 MHz, PAR 7.8dB	dBm			27
2 nd Harmonic	Po=28dBm (25°C)	dBm/MHz		-38	

Note:

1. Averaged over specified frequency at room temperature
2. Amplitude ripple defined peak-to-valley difference over specified pass band

EVB Schematic & Layout



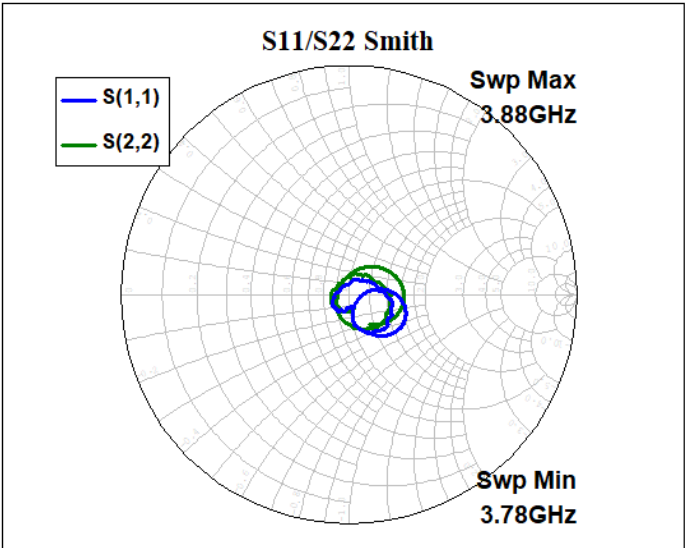
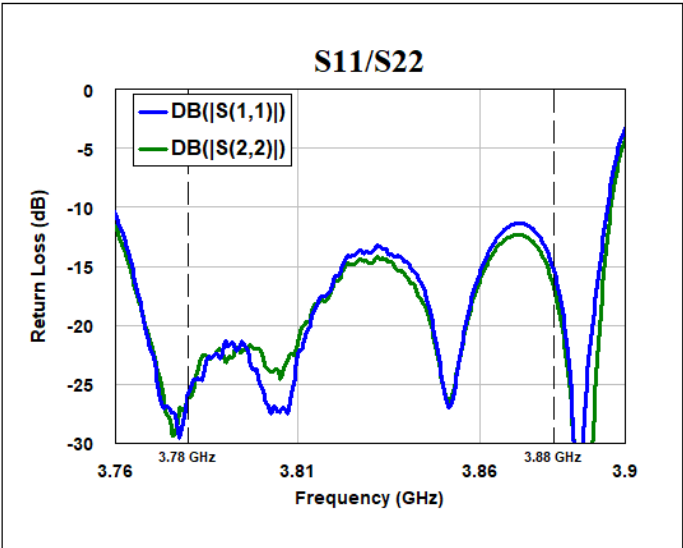
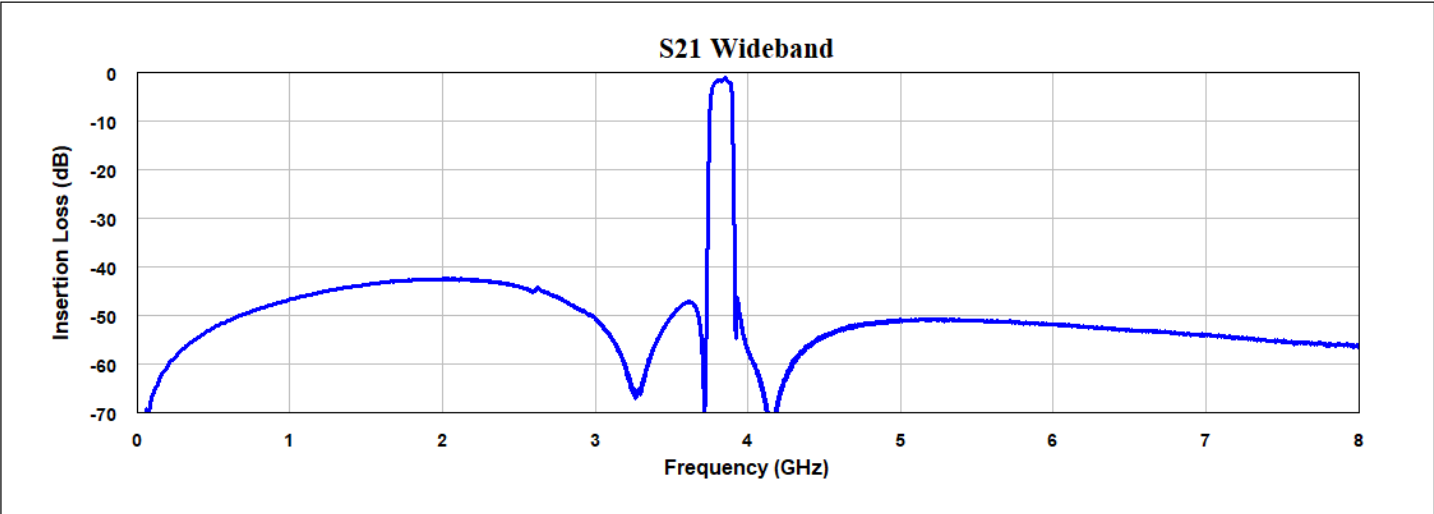
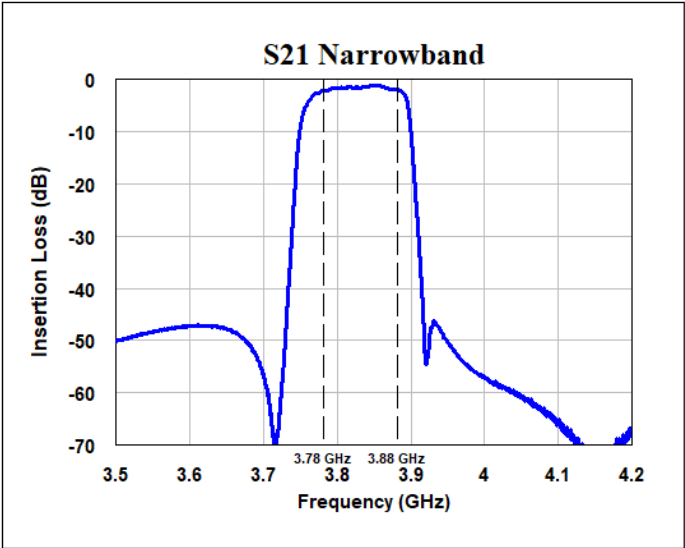
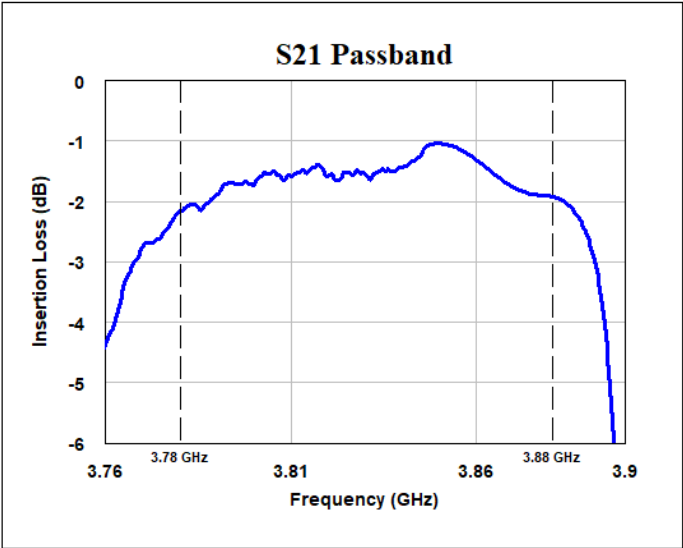
Note:

- 1) Center ground pad vias 6mil diameter
- 2) RF ground vias 10mil diameter

Bill of Materials

Reference Des.	Value	Description	Manufacturer	Part Number
PCB	N/A	3 layer	Multiple	
U1	N/A	3.8 GHz BAW Filter	Akoustis	AKF-1938
L1	2.4nH	Chip inductor, 0201,	Murata	LQP03HQ2N4B02D
L2	2.4nH	Chip inductor, 0201,	Murata	LQP03HQ2N4B02D

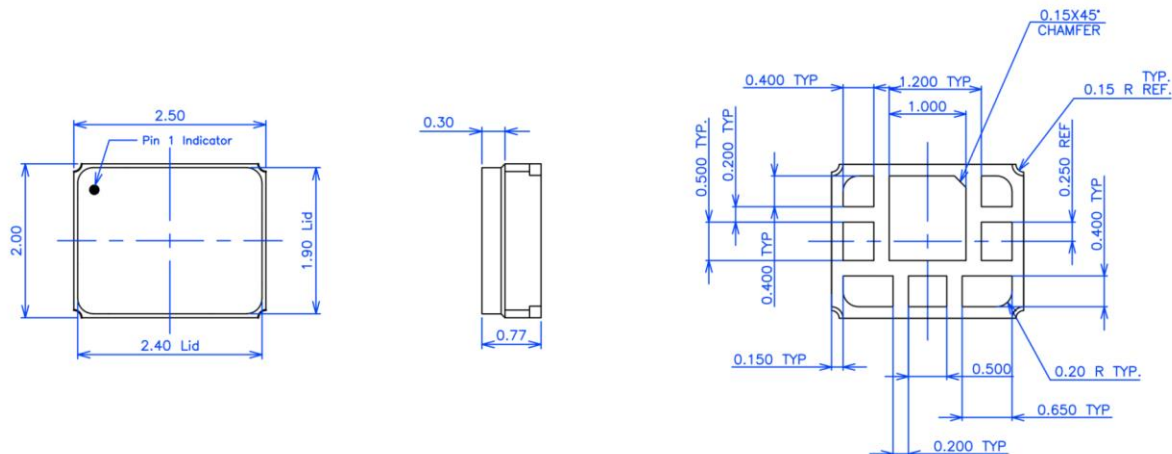
Performance Plots (Temp = 25°C unless otherwise noted)



Package Dimensions & Pin Descriptions

Notes:

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



NOTES:

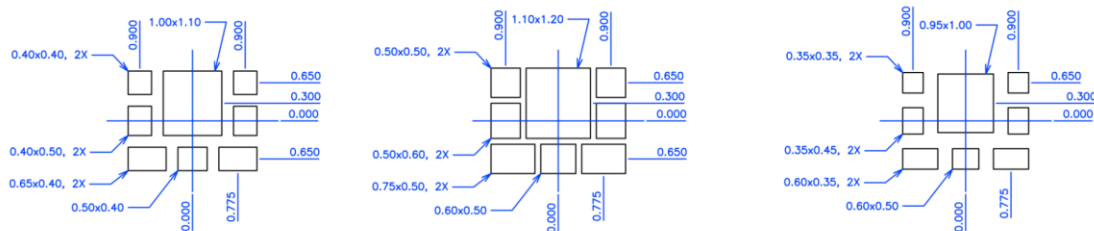
1. PLATING THICKNESS

ELECTRO Ni : 1.27~8.89 μm (S/P)
ELECTRO Au : 0.30~1.00 μm (S/P)

PCB Mounting Pattern

Notes:

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

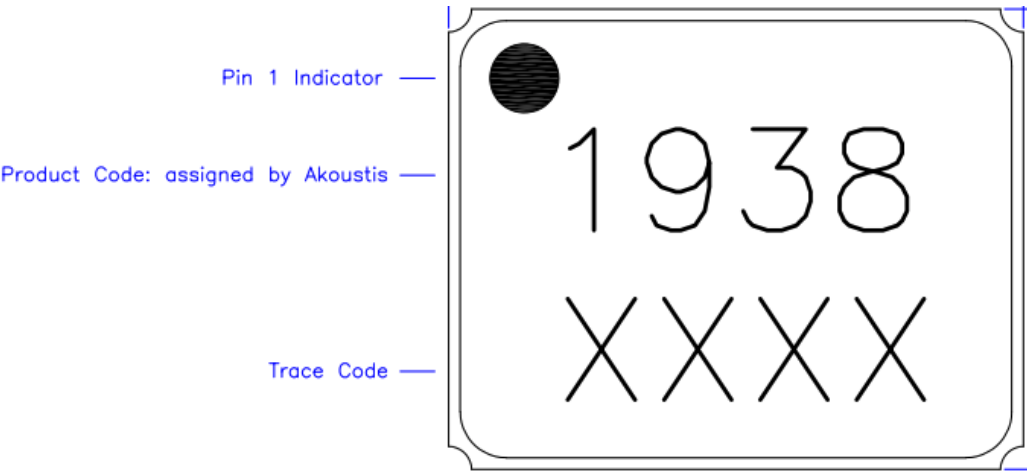


PCB Metal Top View

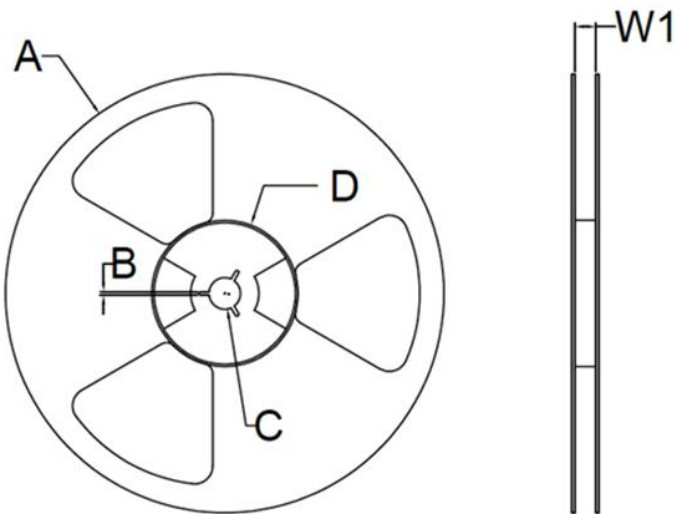
Solder Mask Opening
Top View

Stencil Pattern Top View

Typical Part Marking



Reel Dimension

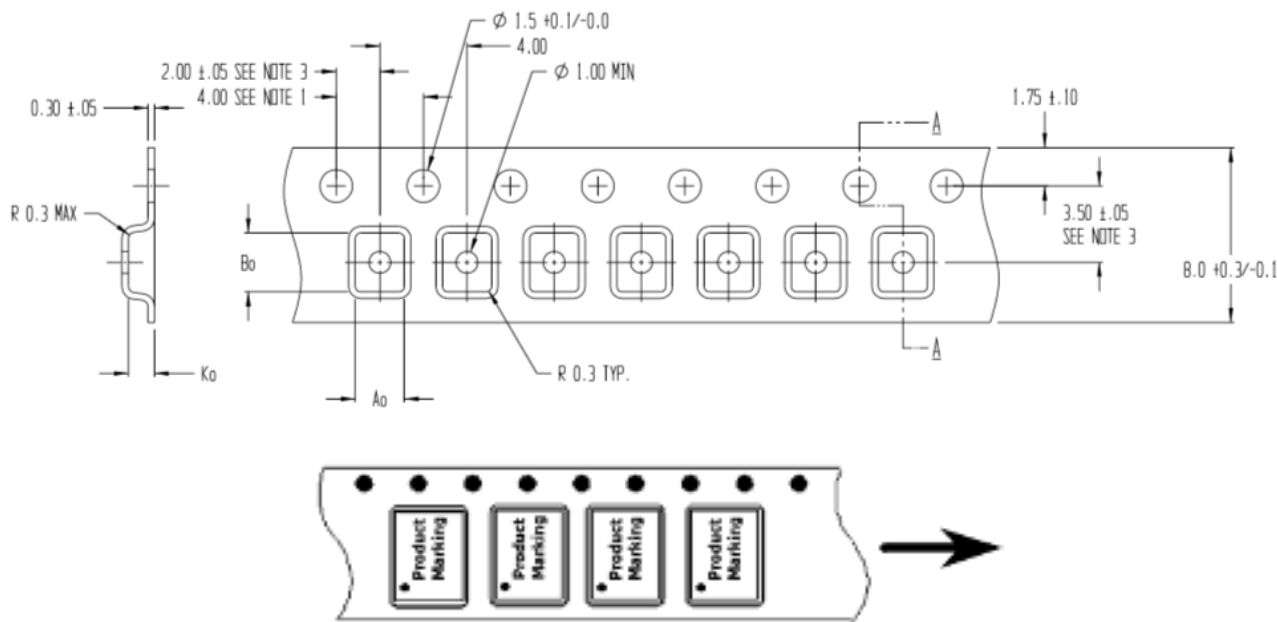


Reel Dimensiones						
Reel Size	Tape Width	A	B	C	D	W1 *measured at hub
7 Inch	8 mm	180 +0/-2.0 mm	2.0mm +/-0.5	13.0 +0.5 / -0 mm	60.0 +/- 2.0 mm	8.40 + 1.5 / -0 mm
	12 mm	180 +0/-2.0 mm	2.0mm +/-0.5	13.0 +0.5 / -0 mm	60.0 +/- 2.0 mm	12.40 + 2.0 / -0 mm
	16 mm	180 +0/-2.0 mm	2.0mm +/-0.5	13.0 +0.5 / -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

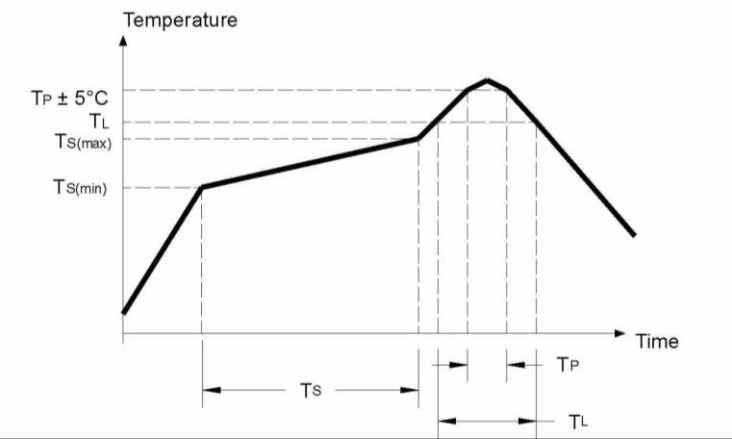
Tape Dimension

A₀ = 2.25
B₀ = 2.70
K₀ = 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 (min) - T _s (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: 500V

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

Charged Device Model (CDM)

Rating: 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 datasheet are subject to change. Please contact Akoustis for the latest on our products and company information.

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