

GNSS L1/L2/L5/L6 SMD SAW FILTER



AFII-SW-0094-Q

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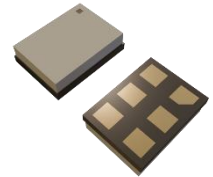
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1.5 x 1.1 x 0.38 mm
RoHS Compliant
MSL Level = 1

Description

This AEC-Q200 compliant SAW filter delivers comprehensive multi-band GNSS coverage for next-generation positioning systems. Supporting L1 alongside combined L2/L5/L6 bands in an ultra-compact 1.5 x 1.1 x 0.38 mm package, it features low insertion loss of 1.5 dB (L1) and 2.3 dB (L2/L5/L6) with out-of-band rejection exceeding 21 dB. Rated for high-power +25 dBm operation across -40 to +105 °C, this RoHS-compliant MSL Level 1 component enables centimeter-level accuracy for automotive telematics, RTK systems, autonomous vehicles, and precision agriculture where robust multi-frequency performance in harsh environments is essential.



Features

- AEC-Q200 GNSS L1/L2/L5/L6 SAW Filter
- Compact Size: 1.5 x 1.1 x 0.38 mm
- Insertion Loss: 1.5 dB (L1) / 2.3 dB (L2/L5/L6)
- Out-of-Band Rejection: > 21 dB
- Maximum Input Power: +25 dBm
- Extended Temperature -40 to +105 °C
- [RoHS Compliant](#) | [MSL Level 1](#)

Applications

- High-Precision GNSS Modules
- RTK Systems
- Automotive Transportation & Telematics
- Asset Tracking / Fleet Management
- UAVs, Robotics & Autonomous Vehicles
- Micro-Mobility Solutions
- Precision Agriculture

Ordering Information

Part Number	Description
AFII-SW-0094-Q	GNSS L1/L2/L5/L6 SMD SAW FILTER on Cut Tape
AFII-SW-0094-Q-T	GNSS L1/L2/L5/L6 SMD SAW FILTER on Tape & Reel
AFII-SW-0094-Q -EVB	GNSS L1/L2/L5/L6 SMD SAW FILTER EVB

Note: Other options not listed may be available upon request via [Abracon online support](#)



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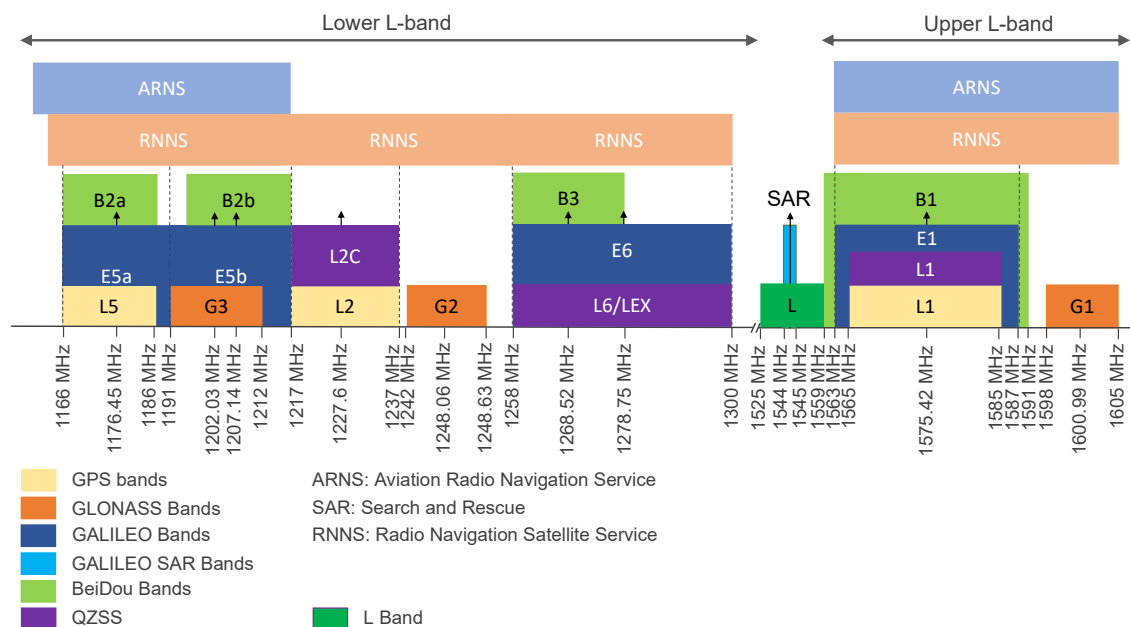
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GNSS Frequency Bands Covered

GPS	L1 1575.42MHz	L2 1227.6MHz	L5 1176.45MHz	
	■	■	■	
GLONASS	G1 1598.06-1609.31MHz	G2 1242.93-1251.68MHz	G3 1202.025MHz	
	■	■	■	
Galileo	E1 1575.42MHz	E5a 1176.45MHz	E5b 1201.5MHz	E6 1278.75MHz
	■	■	■	■
BeiDou	B1 1561MHz	B2 1207.14MHz	B3 1268.52MHz	
	■	■	■	
QZSS	L1 1575.42MHz	L2 1227.6MHz	L5 1176.45MHz	L6 1278.75MHz
	■	■	■	■
IRNSS/NAVIC			L5 1176.45MHz	
			■	
SBAS	L1/E1/B1 1575.42MHz		L5/B2a/E5a 1176.45MHz	
	■		■	



Frequency allocation: GNSS systems, upper L bands and lower L bands

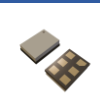


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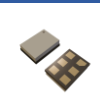


1.5 x 1.1 x 0.38 mm
RoHS Compliant
MSL Level = 1

Electrical Specification

Parameters	Minimum	Typical	Maximum	Units	Notes
Frequency	1525		1610.485	MHz	
VSWR	-	1.5	2.0		1525 ~ 1610.485 MHz
Insertion Loss ⁽¹⁾ (L)	-	1.9	2.2	dB	1525 ~ 1559 MHz
Insertion Loss ⁽¹⁾ (B1)	-	1.4	2.1		1559.052 ~ 1563.144 MHz
Insertion Loss ⁽¹⁾ (L1)	-	1.5	2.0		1565.19 ~ 1585.65 MHz
Insertion Loss ⁽¹⁾ (G1)	-	1.7	2.2		1592.953 ~ 1610.485 MHz
Amplitude Ripple ⁽¹⁾	-	0.6	2.0		1525 ~ 1610.485 MHz
Group Delay Ripple ⁽¹⁾ (L)	-	9	16	ns	1525 ~ 1559 MHz
Group Delay Ripple ⁽¹⁾ (B1)	-	3	7		1559.052 ~ 1563.144MHz
Group Delay Ripple ⁽¹⁾ (L1)	-	3	5		1565.19 ~ 1585.65MHz
Group Delay Ripple ⁽¹⁾ (G1)	-	5.4	10		1592.953 ~ 1610.485MHz
Frequency	1164.45	-	1299	MHz	
VSWR	-	1.9	2.0	:1	1164.45 ~ 1299 MHz
Insertion Loss (1) (L5)	-	2.3	2.6	dB	1164.45 ~ 1188.45 MHz
Insertion Loss (1) (B2b/E5b)	-	1.7	2.0		1196.91 ~ 1217.37 MHz
Insertion Loss (1) (L2)	-	1.7	2.0		1217.37 ~ 1237.83 MHz
Insertion Loss (1) (L6)	-	2.3	2.6		1237.83 ~ 1299 MHz
Amplitude Ripple	-	0.7	2.0	dB	11164 ~ 1299 MHz
Group Delay Ripple (1) (L5)	-	17	28	ns	1164.45 ~ 1188.45 MHz
Group Delay Ripple (1) (B2b/E5b)	-	3	5		1196.91 ~ 1217.37 MHz
Group Delay Ripple (1) (L2)	-	5	8		1217.37 ~ 1237.83 MHz
Group Delay Ripple (1) (L6)	-	26	42		1237.83 ~ 1299 MHz

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1.5 x 1.1 x 0.38 mm

RoHS Compliant

MSL Level = 1

Attenuation (Reference level from 0 dB)	30	42	-	dB	100 ~ 885 MHz
	25	34	-		885 ~ 1100 MHz
	15	28	-		1100 ~ 1125 MHz
	27	28	-		1325 ~ 1462.9 MHz
	15	21	-		1660 ~ 1680 MHz
	20	29	-		1680 ~ 2400 MHz
	23	27	-		2400 ~ 2700 MHz
	25	27	-		2700 ~ 3300 MHz
	24	25	-		3300 ~ 4200 MHz
	23	24	-		4200 ~ 5000 MHz
	20	22	-		5000 ~ 5925 MHz
	15	21	-		5925 ~ 7125 MHz
Source Impedance ⁽³⁾ (single ended)	-	50	-	Ω	-
Load Impedance ⁽³⁾ (single ended)	-	50	-	Ω	-
RF Power Dissipation	-	25	-	dBm	

Notes: (1) Averaged values of linear S-Parameters at +25°C

(2) Averaged values of linear S-Parameters at +25°C

(3) A matching network is necessary (refer to the Measurement Circuits section)

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1.5 x 1.1 x 0.38 mm

RoHS Compliant

MSL Level = 1

Mechanical Specification

Parameters	Specifications
Filter Dimension	1.5 x 1.1 x 0.38 mm
Mounting Type	Surface Mount
Additional Resources	Download STEP File, Package Drawing, 3D PDF

Environmental Specification

Parameters	Specifications
Operating Temperature Range	-40°C ~ +105°C
Storage Temperature Range	-40°C ~ +105°C
ESD Voltage (HBM)	> 100 V
ESD Voltage (MM)	> 50 V
MSL level	1
RoHS Compliant	Yes

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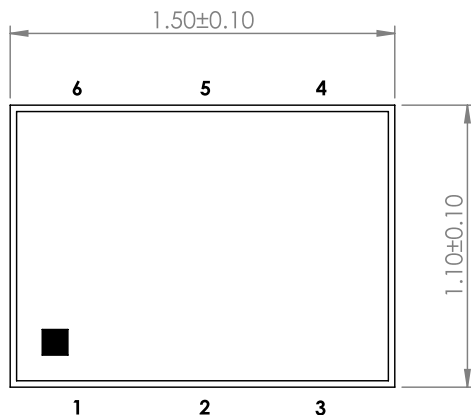


1.5 x 1.1 x 0.38 mm

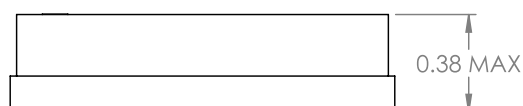
RoHS Compliant

MSL Level = 1

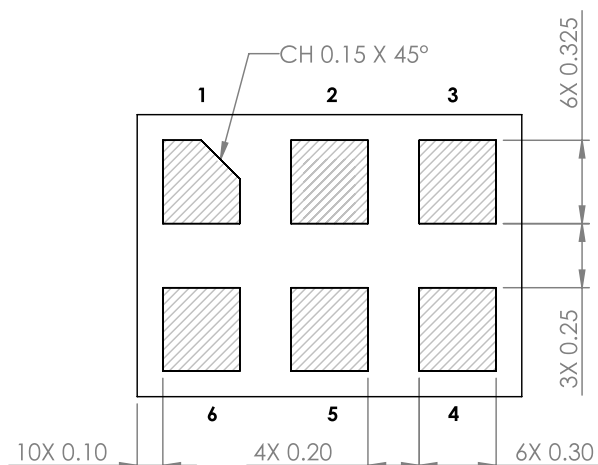
Product Dimensions



TOP VIEW

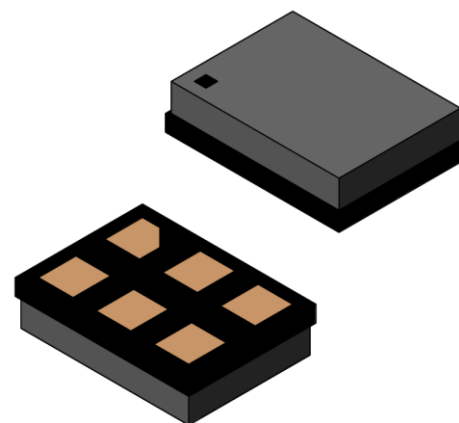
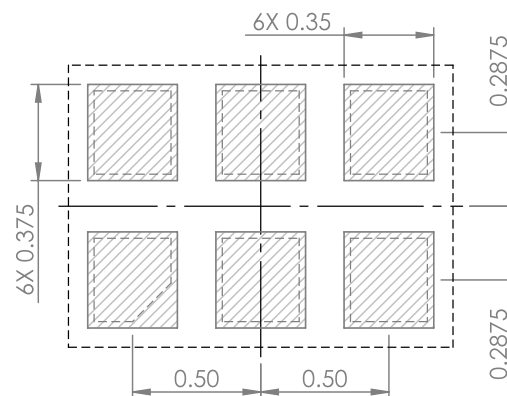


FRONT VIEW



BOTTOM VIEW

RECOMMENDED LAND PATTERN



Unit : mm

Pin No.	Description
2	Common Input
5	Common Output
1, 3, 4, 6	Ground

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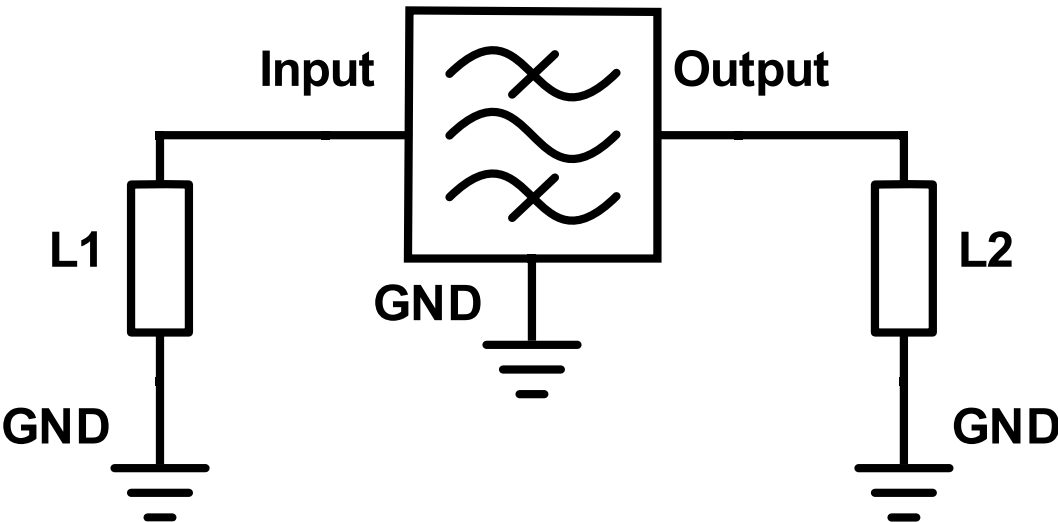


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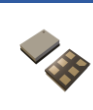
1.5 x 1.1 x 0.38 mm
RoHS Compliant
MSL Level = 1

Measurement Circuit



Port	Matching Component
Input (Pin 2)	L1: 3.6 nH
Output (Pin 5)	L2: 3.0 nH
GND (Pin 1,3,4,6)	Ground

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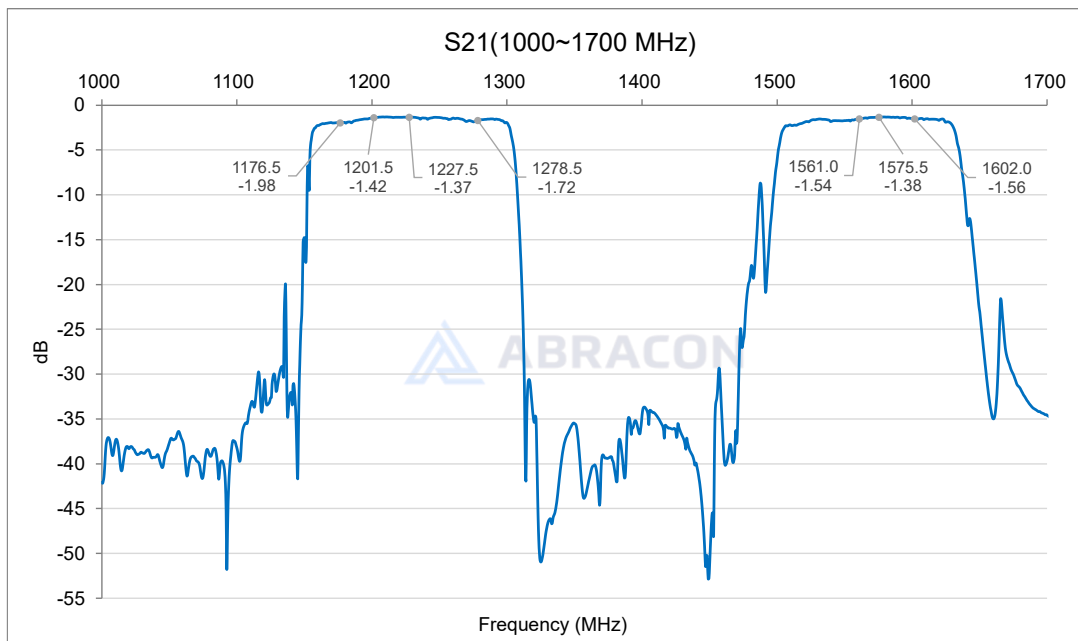
1.5 x 1.1 x 0.38 mm

RoHS Compliant

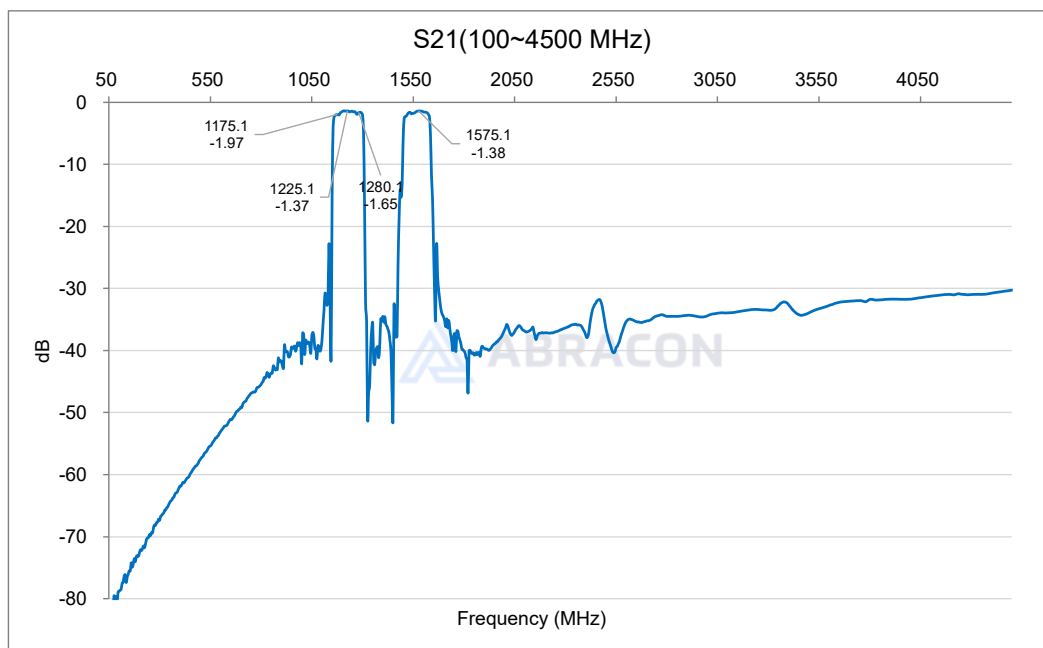
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Frequency Characteristics

S21 narrow band



S21 wide band



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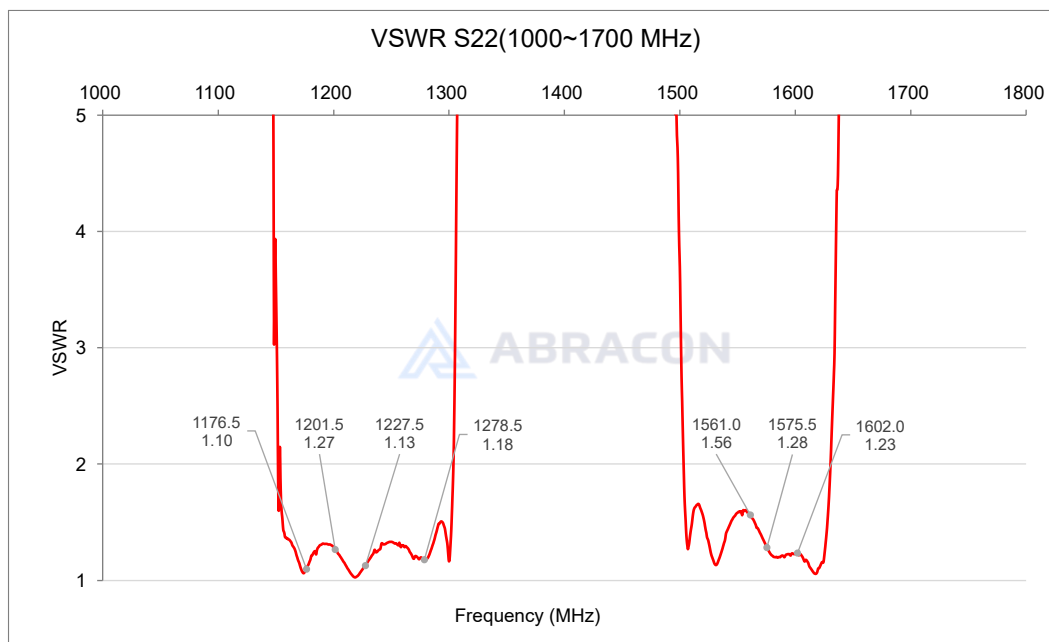
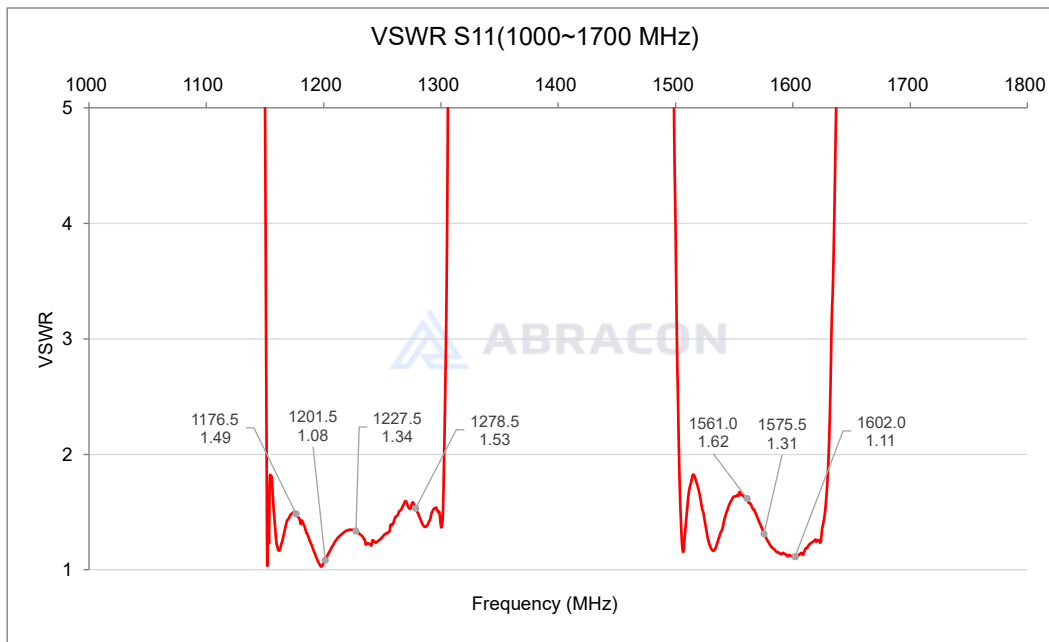


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RoHS Compliant

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VSWR (S11 & S22)



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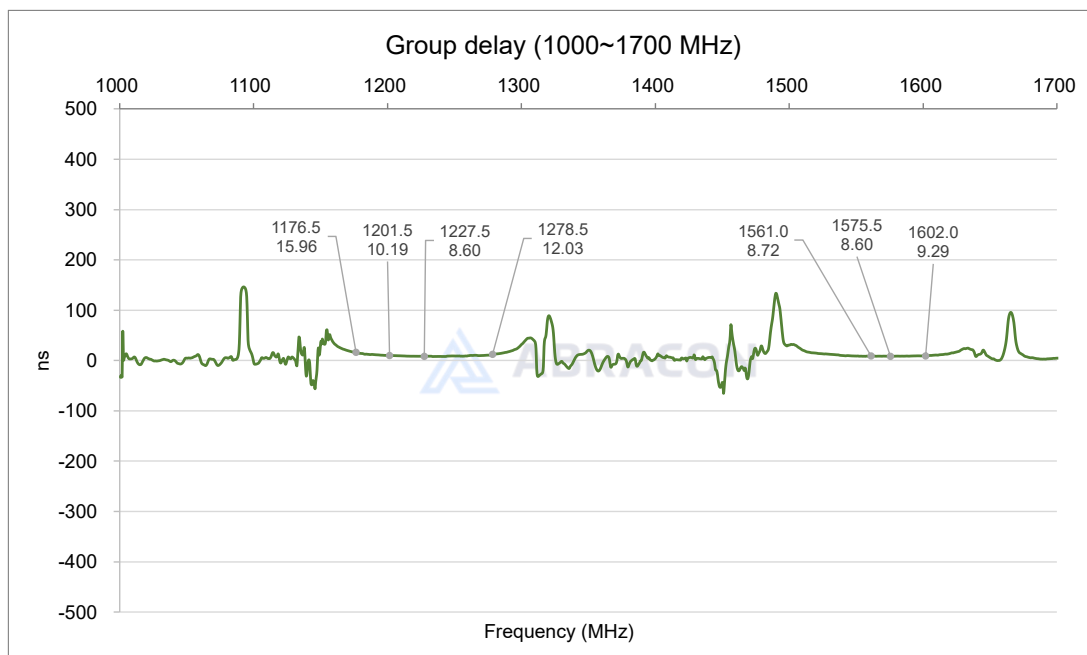


1.5 x 1.1 x 0.38 mm

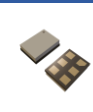
RoHS Compliant

MSL Level = 1

Group Delay



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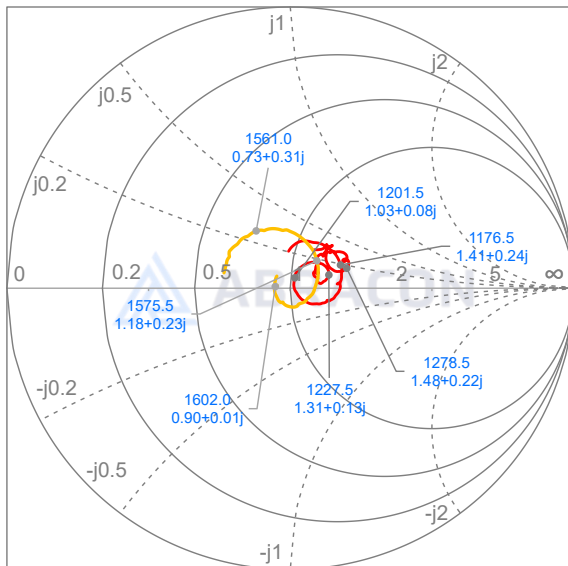
1.5 x 1.1 x 0.38 mm

RoHS Compliant

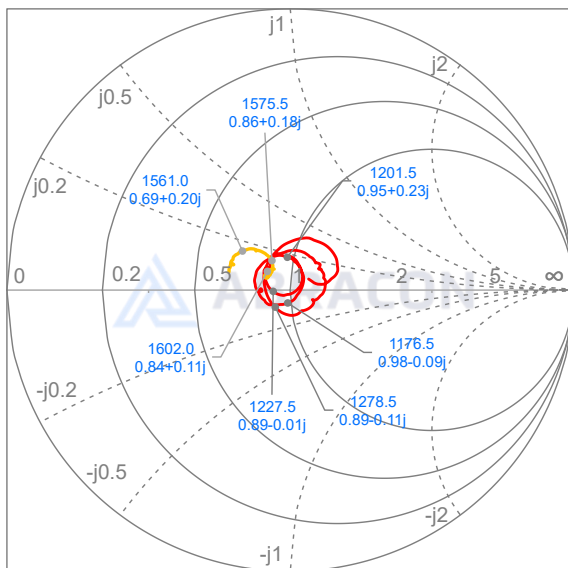
MSL Level = 1

Smith Chart (S11 & S22)

Smith chart S11 (1166~1606MHz)



Smith chart S22 (1166~1606MHz)



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Reflow Profile [JEDEC J-STD-020]

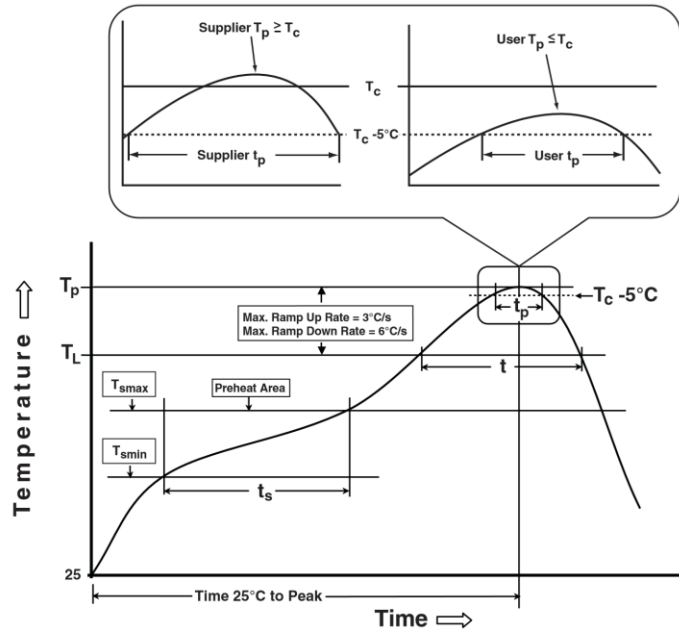


Table 1

SnPb Eutectic Process

Classification Temperatures (T_c)

Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5mm	235°C	220°C
≥2.5mm	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
<1.6mm	260°C	260°C	260°C
1.6mm - 2.5mm	260°C	250°C	245°C
>2.5mm	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	180°C
Time (T_{smin} to T_{smax}) (t_s)	60 – 120 sec.	60 – 90 sec.
Average ramp-up rate (T_{smax} to T_p)	3°C/sec. max	3°C/sec. max
Liquidous temperature (T_L)	183°C	220°C
Time at Liquidous (T_L)	60 – 150 sec.	50 – 80 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 a supplier minimum and a user maximum.

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