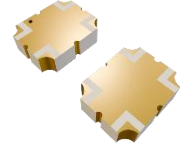


Description

This high-power GNSS L1/L2/L5/L6 90° hybrid 3dB coupler delivers exceptional performance across 1150-1630 MHz for precision positioning applications. Featuring ultra-low insertion loss (0.3 dB max.), tight amplitude balance (± 0.35 dB), high isolation (>20 dB), and low VSWR (<1.2), it ensures signal integrity in demanding environments. Rated for 30 watts average input power with gold plating for oxidation resistance, this RoHS-compliant MSL Level 1 component offers CTE compatibility with common PCB materials. Its optimized design supports UAV navigation, autonomous vehicles, RTK systems, and precision agriculture where reliable power splitting and phase accuracy are critical.



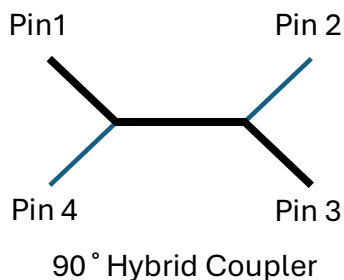
Key Features

- Frequency Range: 1150-1630 MHz
- Supports GNSS L1/L2/L5/L6
- Low Insertion Loss: 0.3 dB Max.
- Tight Amplitude Balance: ± 0.35 dB Max.
- High Isolation: > 20 dB
- Low VSWR: < 1.2
- Avg. Input Power: 30 Watts
- Dimensions: 6.35 x 5.08 x 1.7 mm
- CTE Compatible with FR4, RF-35, RO4350B and Polyimide
- Gold Surface Plated to Prevent Oxidation
- [RoHS Compliant | MSL Level 1](#)

Typical Applications

- UAVs and Drones
- Robotics and Autonomous Driving
- Asset Tracking and Telematics
- Real-Time Kinematic (RTK)
- Intelligent Transportation
- Precision Land Survey Positioning
- Precision Agriculture

Functional Block Diagram



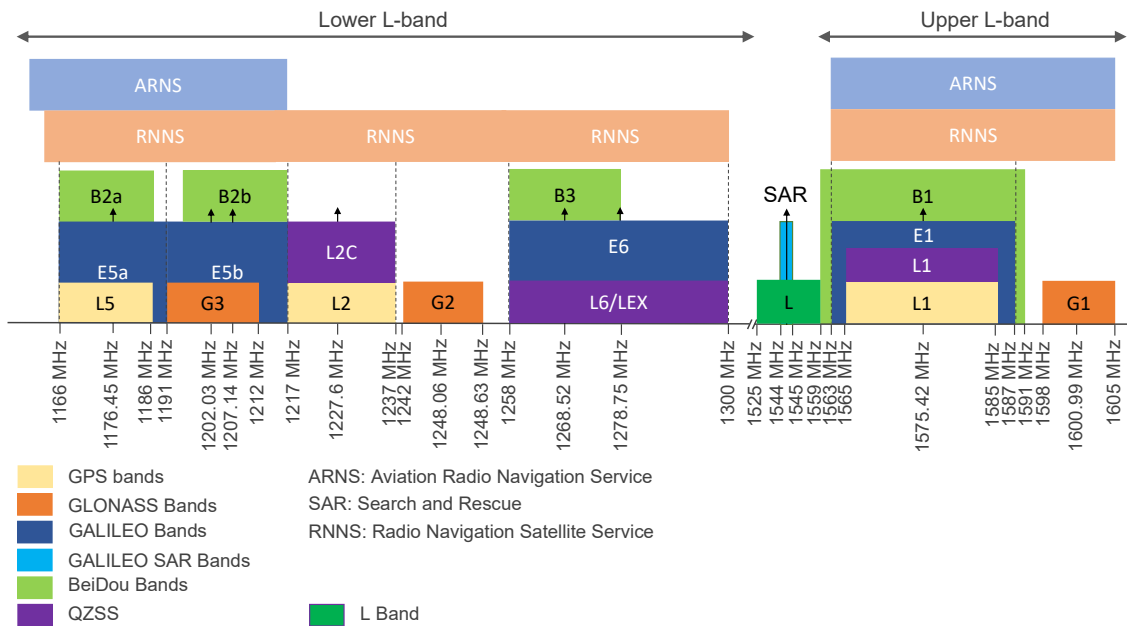
Ordering Information

Part No.	Description
ACPI-WB-0002	GNSS L1/L2/L5/L6 90° Hybrid 3dB Coupler on Cut Tape
ACPI-WB-0002-T	GNSS L1/L2/L5/L6 90° Hybrid 3dB Coupler on Tape & Reel

Additional Resources

- [Download STEP File, Package Drawing, 3D PDF](#)

GNSS Frequency Bands Covered				
GNSS	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

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Dissipation ⁽¹⁾	P _D	-	30	-	W
Operating Temperature	T _{OP}	-55	-	95	°C
Storage Temperature	T _{STG}	-55	-	95	°C

(1): This rating is for a steady, continuous wave RF power.

Mechanical

Parameter	Specification
Dimensions	6.35 x 5.08 x 1.7 mm

Electrical Specifications

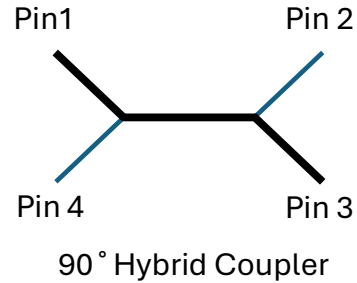
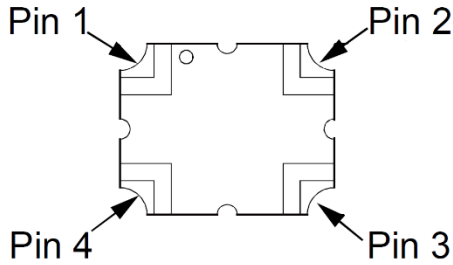
Parameter	Min.	Typ.	Max.	Unit
Frequency	1150	-	1630	MHz
Isolation	22	-	-	dB
Insertion Loss	-	-	0.3	dB
VSWR	-	-	1.2	:1
Amplitude Balance			± 0.35	dB
Phase Balance		90 ± 3.0		Degrees

Electrical specifications are measured at specified test conditions.

RF Electrical Specifications

Frequency (MHz)	Coupling (dB)	Transmission (dB)	Insertion Loss (dB)	Isolation (dB)	Amplitude Balance (dB)	Phase (degree)	Return Loss(dB)			
							S11	S22	S33	S44
1150	-3.27	-3.06	-0.15	-33.46	-0.21	91.90	-32.97	-29.08	-35.22	-30.96
1174	-3.23	-3.11	-0.16	-34.97	-0.12	92.06	-33.44	-29.33	-34.10	-32.00
1198	-3.19	-3.12	-0.14	-36.64	-0.07	92.03	-34.09	-29.71	-33.10	-33.40
1222	-3.18	-3.16	-0.16	-38.85	-0.02	92.09	-34.80	-30.32	-31.94	-34.84
1246	-3.14	-3.19	-0.15	-41.64	0.05	92.18	-35.31	-31.26	-30.72	-36.39
1270	-3.15	-3.23	-0.18	-44.79	0.08	92.25	-35.47	-32.31	-29.61	-38.58
1294	-3.14	-3.26	-0.19	-47.45	0.12	92.42	-35.29	-33.51	-28.71	-41.10
1318	-3.11	-3.25	-0.17	-46.04	0.14	92.46	-34.85	-34.69	-27.90	-43.59
1342	-3.11	-3.29	-0.19	-42.59	0.18	92.50	-34.47	-35.35	-27.28	-43.20
1366	-3.10	-3.28	-0.18	-39.71	0.18	92.43	-34.16	-35.35	-26.71	-40.66
1390	-3.10	-3.30	-0.19	-37.53	0.20	92.50	-33.91	-34.81	-26.20	-37.79
1414	-3.11	-3.32	-0.20	-35.73	0.21	92.58	-33.55	-34.00	-25.62	-35.65
1438	-3.11	-3.29	-0.19	-34.27	0.18	92.66	-33.01	-33.13	-25.07	-33.77
1462	-3.12	-3.30	-0.20	-32.98	0.18	92.71	-32.29	-32.39	-24.47	-32.10
1486	-3.13	-3.29	-0.20	-31.87	0.16	92.78	-31.60	-31.85	-23.93	-30.71
1510	-3.15	-3.30	-0.21	-30.92	0.15	92.84	-31.00	-31.52	-23.51	-29.41
1534	-3.18	-3.29	-0.22	-30.06	0.11	92.96	-30.51	-31.38	-23.18	-28.35
1558	-3.21	-3.28	-0.23	-29.29	0.07	92.89	-30.02	-31.25	-22.88	-27.47
1582	-3.25	-3.27	-0.25	-28.57	0.02	92.97	-29.36	-30.78	-22.63	-26.65
1606	-3.33	-3.27	-0.29	-27.95	-0.06	92.98	-28.73	-29.84	-22.36	-25.93
1630	-3.33	-3.20	-0.25	-27.34	-0.13	92.99	-28.00	-28.67	-21.99	-25.27

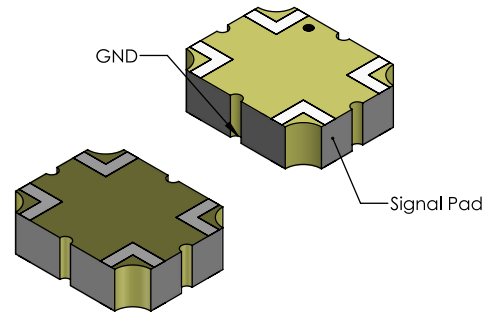
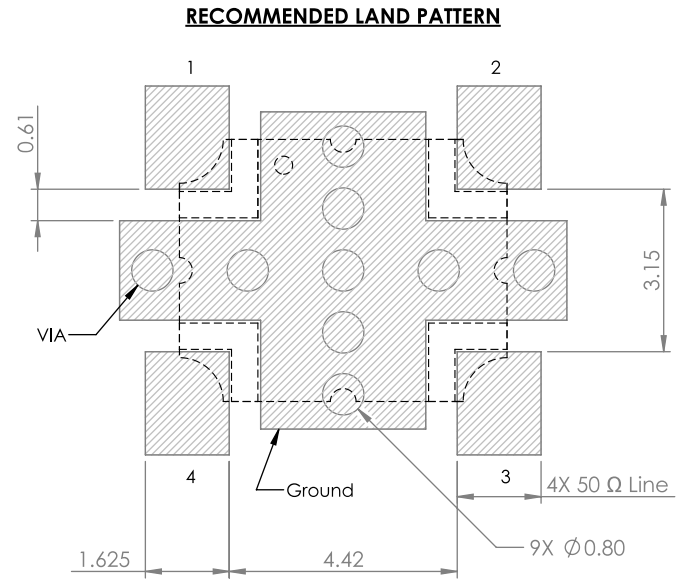
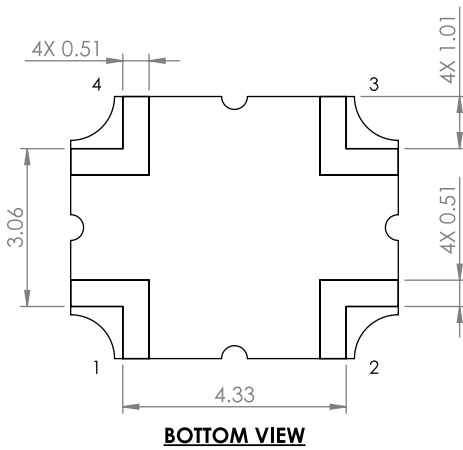
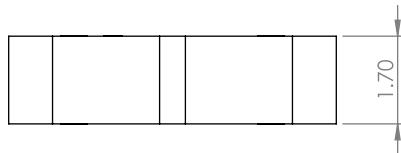
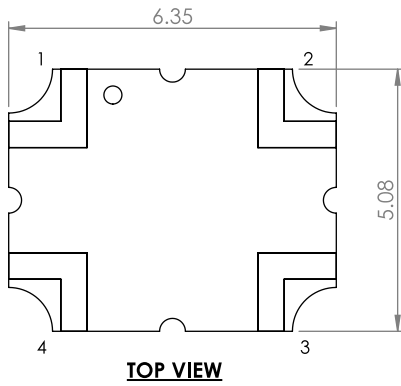
Pin Configuration



Configuration	Pin 1	Pin 2	Pin 3	Pin 4
Splitter	Input	Isolated	-3dB $\angle\theta -90^\circ$	-3dB $\angle\theta$
Splitter	Isolated	Input	-3dB $\angle\theta$	-3dB $\angle\theta -90^\circ$
Splitter	-3dB $\angle\theta -90^\circ$	-3dB $\angle\theta$	Input	Isolated
Splitter	-3dB $\angle\theta$	-3dB $\angle\theta -90^\circ$	Isolated	Input
*Combiner	A $\angle\theta -90^\circ$	A $\angle\theta$	Isolated	Output
*Combiner	A $\angle\theta$	A $\angle\theta -90^\circ$	Output	Isolated
*Combiner	Isolated	Output	A $\angle\theta -90^\circ$	A $\angle\theta$
*Combiner	Output	Isolated	A $\angle\theta$	A $\angle\theta -90^\circ$

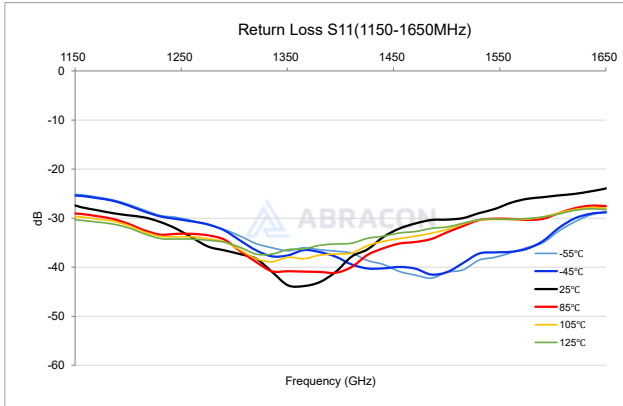
*Note: "A" is the amplitude of the applied signals. When two quadrature signals with equal amplitudes are applied to the coupler as described in the table, they will combine at the output port. If the amplitudes are not equal, some of the applied energy will be directed to the isolated port.

Product Dimensions

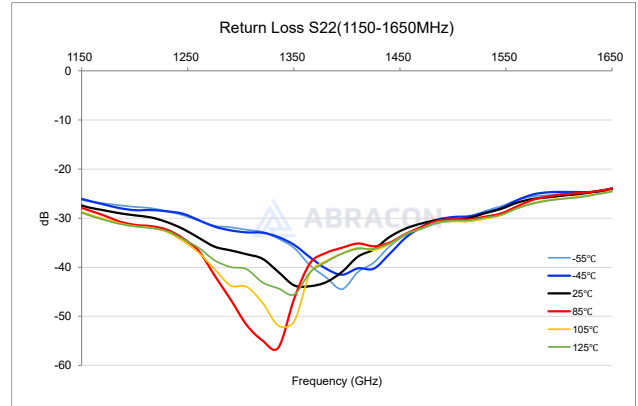


Unit: mm

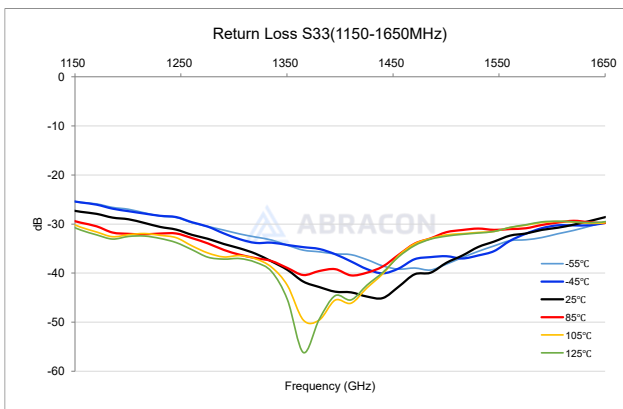
Performance Plots



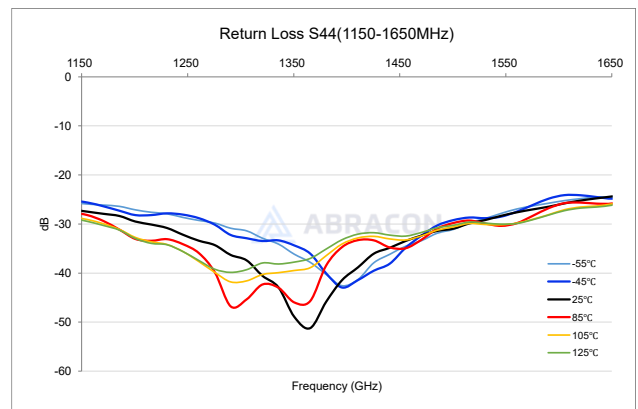
Return Loss (Port 1)



Return Loss (Port 2)

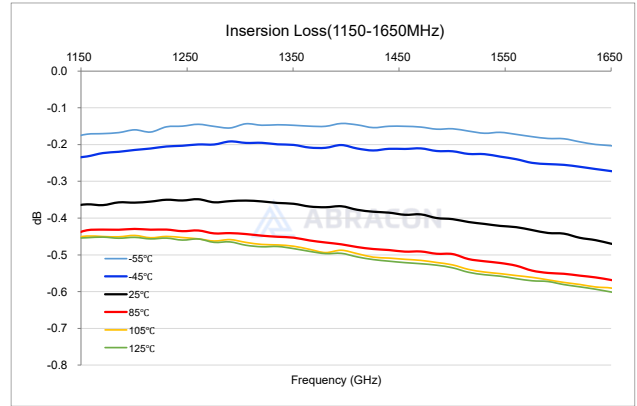
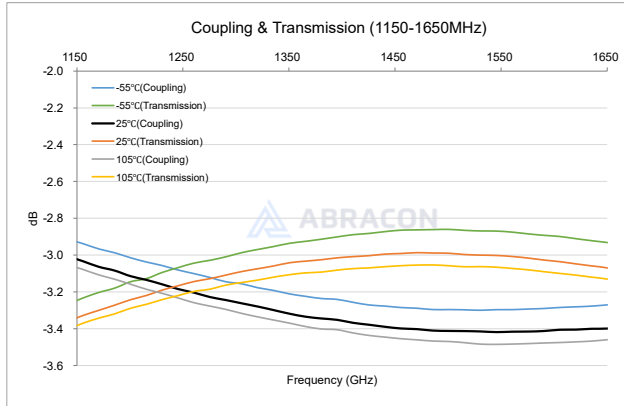


Return Loss (Port 3)



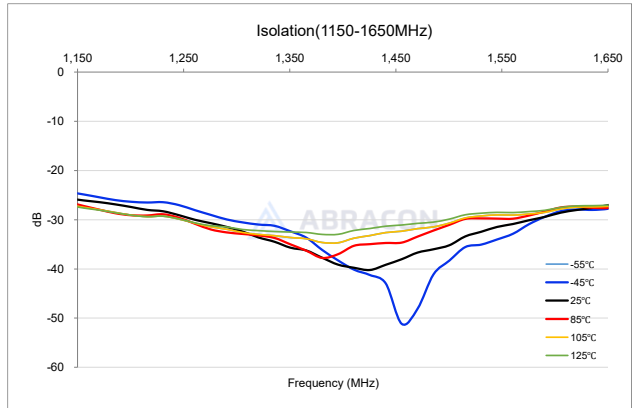
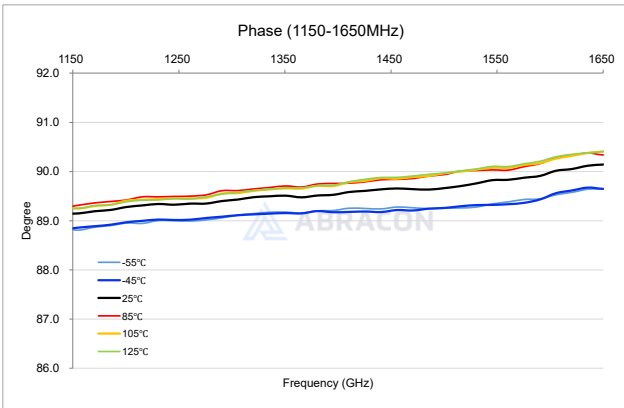
Return Loss (Port 4)

Performance Plots



Coupling & Transmission (Port 1 feeding)

Insertion Loss (Port 1 feeding)



Phase (Port 1 feeding)

Isolation (Port 1 feeding)

Reflow Profile [JEDEC J-STD-020]

Solder paste: Sn/3.0Ag/0.5Cu

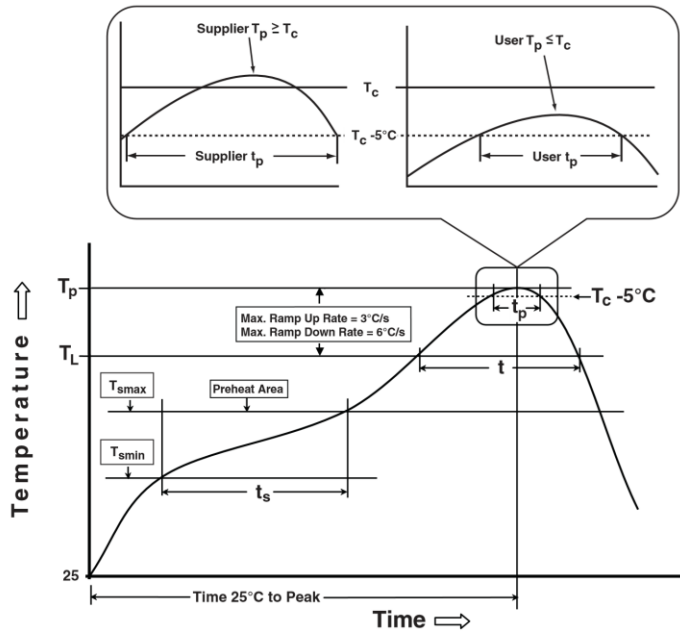


Table 1

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

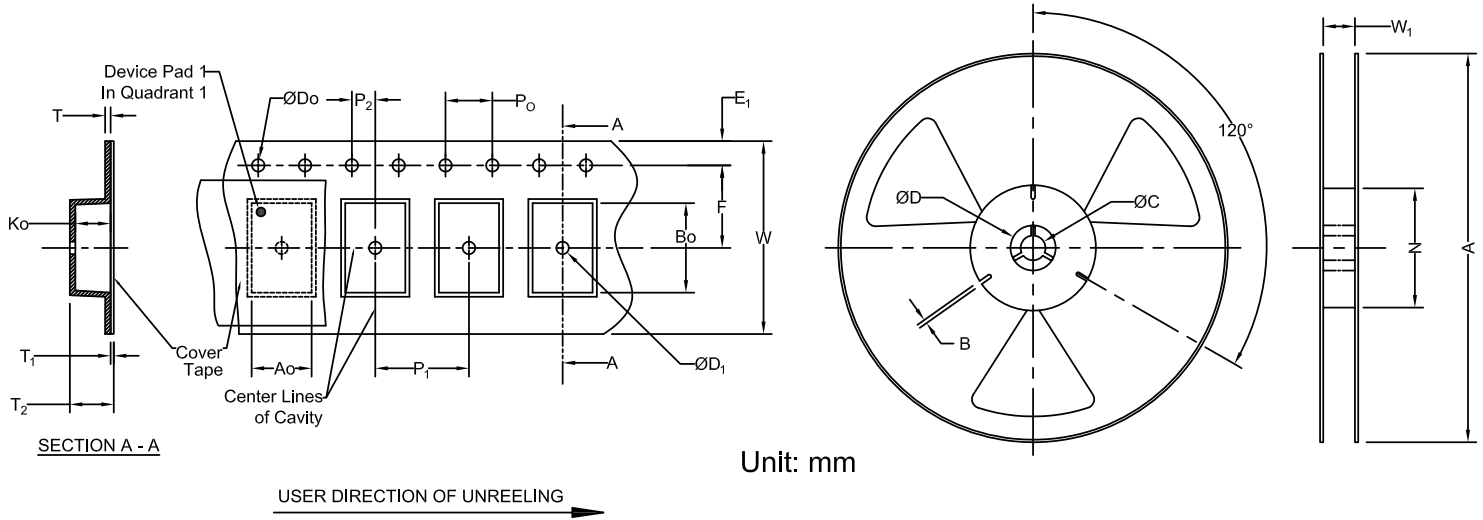
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat / soak		
Temperature minimum (T _{ssmin})	100°C	150°C
Temperature maximum (T _{ssmax})	150°C	200°C
Time (T _{ssmin} to T _{ssmax}) (t _s)	60 – 120 sec.	60 – 120 sec.
Average ramp-up rate (T _{ssmax} to T _p)	3°C/sec. max	3°C/sec. max
Liquidous temperature (T _L)	183°C	217°C
Time at Liquidous (T _L)	60 – 90 sec.	60 – 90 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.	10 sec.
Ramp-down rate (T _p to T _{ssmax})	3°C/sec. max	3°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.

Packaging

Tape & Reel Dimension



Unit: mm

Carrier Tape Specifications (mm)											
E1	D0	D1	P0	P1	P2	F	W	A0	B0	K ₀	Reel Qty
1.75 ± 0.1	1.5 + 0.1/-0	1.5 + 0.1/-0	4.0 ± 0.1	8.0 ± 0.1	2.0 ± 0.1	7.5 ± 0.1	16.0 ± 0.3	5.6 ± 0.1	6.85 ± 0.1	1.9 ± 0.1	1,000

Reel Specifications (mm)				
A	W ₁	N	C	B
177 ± 0.5	16.5 ± 0.4	63 ± 0.3	13.5 + 0.5/-0.2	2.1 ± 0.3