QPQ1035Q
Band 25/66 Multiplexer

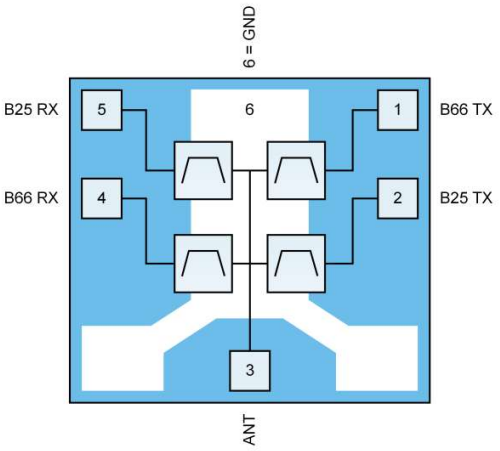
Product Description

The QPQ1035Q is a compact, high-performance quadplexer module built upon a patented LowDrift™ BAW technology with performance optimized to enable carrier aggregation of bands 25 & 66.

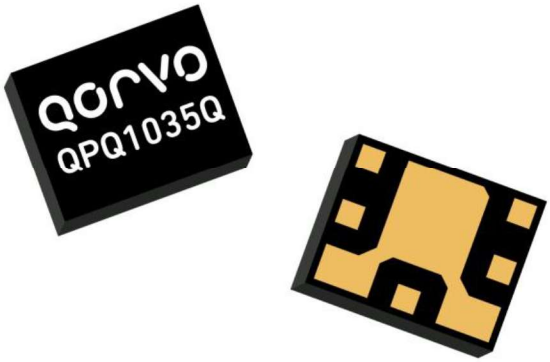
The QPQ1035Q leverages the high-Q properties of the LowDrift™ BAW technology to ensure good transmit insertion loss in all bands being multiplexed without loading each other. The QPQ1035Q module has also been designed with high cross-isolation which is critical to ensure good receive performance.

The QPQ1035Q uses unique Wafer Level Packaging (WLP) techniques to enable a compact 2.6 mm x 2.1 mm package.

Functional Block Diagram



Bottom View



6 Pin 2.6 x 2.1 x0.735mm leadless SMT Package

Feature Overview

- Qualified to AEC-Q 200 grade 3
- Performance over −40 to +85° C
- 2.6 mm x 2.1 mm package with a 2.5 mm x 2.0 mm footprint
- Full B25 and B66 coverage
- Minimizes PA current drain and improved Rx sensitivity with excellent IL performance
- Single-Ended (SE) Ant, TRx Ports
- RoHS Compliant, Pb-Free Module Package

Applications

- LTE Telematics Units
- Carrier Aggregation

Ordering Information

PART NUMBER	DESCRIPTION
QPQ1035QSB	5 Piece Sample Bag
QPQ1035QSQ	25 piece sample bag
QPQ1035QSR	7” Reel with 100 pieces
QPQ1035QTR13	13” Reel with 2500 pieces
QPQ1035QEVB	Evaluation board

Absolute Maximum Ratings

Parameter	Conditions	Rating
Storage Temperature		–40 to +100°C
Peak RF Input Power on Pin 1 (B66)	Maximum duration 500 msec	37.5 dBm
Peak RF Input Power on Pin 2 (B25)	Maximum duration 500 msec	39 dBm

Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions(1)

PARAMETER	MIN.	TYP.	MAX.	UNITS
Tambient(2)	-40		+85	°C

[1] Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

[2] Case temperature allows 10°C max rise over Ambient

Minimum Lifetime Ratings

Conditions	Rating
CW, 30dBm, +55C, Pin1 B66UL RF Input Power Pin 1 (1710 - 1780 MHz)	87.6KHrs
CW, 29dBm, +55C, Pin 2 B25UL RF Input Power Pin 2 (1850 - 1915 MHz)	87.6KHrs

Electrical Specifications[1] Band 25 (B2) Uplink-Antenna

Unless Otherwise Noted: Operating Temp = −40 °C to +85 °C

PARAMETER	CONDITIONS		MIN	TYP[2]	MAX	UNITS
Frequency			1850		1915 (B25) 1910 (B2)	MHz
Insertion Loss	1882.5MHz			1.8		dB
Insertion Loss[3]	B25	1850.25 MHz–1911 MHz		2.5	3.5	
		1911 MHz-1914.75 MHz		3.1	4.5	
	B2	1850.25 MHz–1909.75 MHz		2.4	3.3	
VSWR (ANT Port)	B25	1850.25 MHz–1914.75 MHz		1.4	1.8	Ratio
	B2	1850.25 MHz–1909.75 MHz				
VSWR (Uplink Port)	B25	1850.25 MHz–1914.75 MHz		1.7	2.1	
	B2	1850.25 MHz–1909.75 MHz		1.4	2.0	
Absolute Attenuation [4]	728 MHz–768 MHz		52	55		dB
	869 MHz–894 MHz		50	53		
	1226 MHz–1250 MHz		45	49		
	1559 MHz–1563 MHz		47	52		
	1565.4 MHz–1573.4 MHz		42	50		
	1573.4 MHz–1577.5 MHz		42	49		
	1577.5 MHz–1585.4 MHz		42	47		
	1597.6 MHz–1605.9 MHz		42	47		
	1930.25 MHz–1933.5 MHz		38	59		
	1933.5 MHz–1994.75 MHz		51	57		
	2110 MHz–2200 MHz		48	53		
	2350 MHz–2360 MHz		45	49		
	2400 MHz–2700 MHz		45	49		
	3700 MHz–3830 MHz		42	60		
	5520 MHz–5845 MHz		41	50		

Notes:
1. Recommended EVB schematic/layout/BOM/PCB should be followed in order to achieve specified performance.
2. Data at 25 °C
3. Maximum Insertion Loss of the linear s-parameter across specified frequency range
4. Absolute Attenuation referenced to 0 dB between specified frequency range

Electrical Specifications[1] Band 25 (B2) Antenna-Downlink

Unless Otherwise Noted: Operating Temp = –40 °C to +85 °C

PARAMETER	CONDITIONS		MIN	TYP[2]	MAX	UNITS
Frequency			1930		1995 (B25) 1990(B2)	MHz
Insertion Loss	1962.5MHz			2.0		dB
Insertion Loss[3]	B25	1930.25 MHz–1933.5 MHz		2.8	4.1	
		1933.5 MHz–1994.75 MHz		2.6	3.8	
	B2	1930.25 MHz–1933.5 MHz		2.8	4.1	
		1933.5 MHz-1989.75 MHz		2.8	3.6	
VSWR (Downlink Port)	B25	1930.25 MHz–1994.75 MHz		1.6	2.1	Ratio
	B2	1930.25 MHz–1989.75 MHz		1.6	2.1	
VSWR (ANT Port)	B25	1930.25 MHz–1935 MHz		1.3	1.6	
		1935 MHz –1994.75 MHz		1.4	1.9	
	B2	1930.25 MHz–1935 MHz		1.3	1.6	
		1935 MHz–1989.75 MHz		1.3	1.7	
Absolute Attenuation[4]	699 MHz–716 MHz		51	54		dB
	777 MHz–787 MHz		50	52		
	814 MHz–849 MHz		48	51		
	1850.25 MHz–1911 MHz		56	60		
	1911 MHz–1914.75 MHz		39	63		
	2055 MHz–2080 MHz		51	59		
	2305 MHz–2315 MHz		56	70		
	2400 MHz–2500 MHz		54	63		
	4900 MHz–5950 MHz		31	38		
	5610 MHz–5845 MHz		32	46		
	5790 MHz–5985 MHz		40	53		

Notes:
1. Recommended EVB schematic/layout/BOM/PCB should be followed in order to achieve specified performance.
2. Data at 25 °C
3. Maximum Insertion Loss of the linear s-parameter across specified frequency range
4. Absolute Attenuation referenced to 0 dB between specified frequency range

Electrical Specifications[1] Band 66 (B4) Uplink-Antenna

Unless Otherwise Noted: Operating Temp = –40 °C to +85 °C

PARAMETER	CONDITIONS		MIN	TYP[2]	MAX	UNITS
Frequency			1710		1780 (B66) 1755 (B4)	MHz
Insertion Loss	1745 MHz			2.2		dB
Insertion Loss[3]	B66	1710 –1780 MHz		2.6	3.4	
	B4	1710–1755 MHz		2.6	3.1	
VSWR (Uplink Port)	B66	1710 –1780 MHz		1.7	2.0	Ratio
	B4	1710–1755 MHz		1.7	2.0	
VSWR (ANT Port)	B66	1710 –1780 MHz		1.3	1.7	
	B4	1710–1755 MHz		1.3	1.7	
Attenuation[4]	699–716 MHz		61	65		dB
	777–787 MHz		60	64		
	824–849 MHz		58	62		
	1226–1250 MHz		52	56		
	1559–1563 MHz		53	61		
	1565.42–1573.374 MHz		51	60		
	1573.374–1577.466 MHz		51	59		
	1577.466–1585.42 MHz		51	59		
	1597.5515–1605.886 MHz		53	64		
	1805–1880 MHz		38	40		
	2350–2360 MHz		48	56		
	2400–2500 MHz		50	55		
	2500–2570 MHz		50	55		
	3410–3520 MHz		51	55		
	4900–5950 MHz		51	56		

Notes:

1. Recommended EVB schematic/layout/BOM/PCB should be followed in order to achieve specified performance.
2. Data at 25 °C
3. Maximum Insertion Loss of the linear s-parameter across specified frequency range
4. Absolute Attenuation referenced to 0 dB between specified frequency range

Electrical Specifications[1] Band 66 (B4) Antenna-Downlink

Unless Otherwise Noted: Operating Temp = –40 °C to +85 °C

PARAMETER	CONDITIONS		MIN	TYP[2]	MAX	UNITS
Frequency			2110		2200 (B66) 2155 (B4)	MHz
Insertion Loss	2155 MHz			2.0		dB
Insertion Loss[3]	B66	2110–2200 MHz		2.4	3.1	
	B4	2110–2155 MHz		2.4	2.8	
VSWR (Downlink Port)	B66	2110–2200 MHz		1.6	2.0	Ratio
	B4	2110–2155 MHz		1.4	1.9	
VSWR (ANT Port)	B66	2110–2200 MHz		1.4	1.7	
	B4	2110–2155 MHz		1.4	1.7	
Attenuation [4]	699–716 MHz		52	57		dB
	777–787 MHz		50	55		
	824–849 MHz		49	54		
	1310–1355 MHz		42	48		
	1710–1755 MHz		47	54		
	1910–1955 MHz		47	52		
	2305–2315 MHz		42	51		
	2400–2500 MHz		40	46		
	4900–5950 MHz		23	29		

Notes:

1. Recommended EVB schematic/layout/BOM/PCB should be followed in order to achieve specified performance.
2. Data at 25 °C
3. Maximum Insertion Loss of the linear s-parameter across specified frequency range
4. Absolute Attenuation referenced to 0 dB between specified frequency range

Electrical Specifications[1] TX-RX Isolation

Unless Otherwise Noted: Operating Temp = –40 °C to +85 °C

PARAMETER	CONDITIONS	MIN	TYP[2]	MAX	UNITS
B25 Uplink to B66 Downlink Cross-Isolation	1850.25 – 1914.75 MHz	51	57		dB
	2110 – 2200 MHz	52	57		
B2 Uplink to B4 Downlink Cross-Isolation	1850.25 – 1909.75 MHz	51	57		
	2110 – 2155 MHz	52	59		
B66 Uplink to B25 Downlink Cross-Isolation	1710 – 1780 MHz	53	57		
	1930.25 – 1994.75 MHz	52	57		
B4 Uplink to B2 Downlink Cross-Isolation	1710 – 1755 MHz	53	57		
	1930.25 – 1989.75 MHz	52	57		
B25 Uplink/Downlink Isolation	1850.25 – 1911.75 MHz	56	61		
	1911.75 MHz – 1914.75 MHz [3]	52	72		
	1930.25 – 1933.25 MHz [4]	54	62		
	1933.25 – 1994.75 MHz	54	59		
B2 Uplink/Downlink Isolation	1850.25 – 1909.75 MHz	56	61		
	1930.25 – 1933.25 MHz [4]	46	62		
	1933.25– 1989.75 MHz	54	59		
B66 Uplink/Downlink Isolation	1710 – 1780 MHz	52	59		
	2110 – 2200 MHz	57	63		
B4 Uplink/Downlink Isolation	1710 – 1755 MHz	52	59		
	2110 – 2155 MHz	60	67		

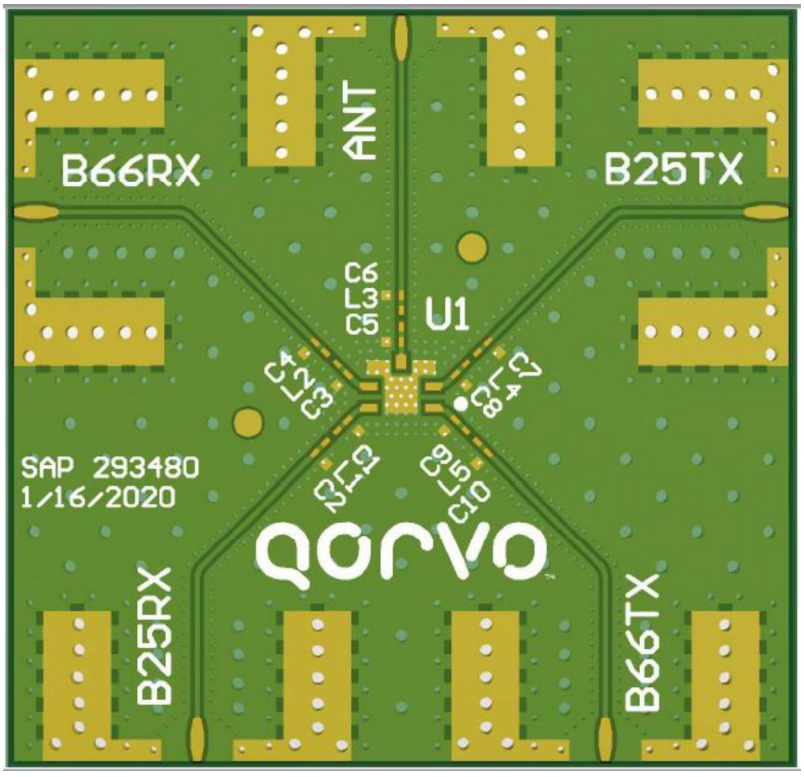
Notes:
1. Recommended EVB schematic/layout/BOM/PCB should be followed in order to achieve specified performance.
2. Data at 25 °C
3. Integrated over 2.7MHz. Valid for operating temp -40 °C to +25 °C only.
4. Integrated over 2.7MHz. Valid for operating temp +25 °C to +85 °C only.

Evaluation Board PCB Information

Layer	Name	Material	Thickness	Constant	Board Layer Stack
	Top Overlay				
	Top Solder	Solder Resist	0.010mm	3.5	
1	Top Layer	Copper	0.036mm		
	Dielectric1	Isola 408HR	0.100mm	3.64	
2	Signal Layer 1	Copper	0.036mm		
	Dielectric 2	Isola 408HR	0.686mm	3.64	
3	Signal Layer 2	Copper	0.036mm		
	Dielectric 3	Isola 408HR	0.100mm	3.64	
4	Bottom Layer	Copper	0.036mm		
	Bottom Solder	Solder Resist	0.010mm	3.5	
	Bottom Overlay				

Total board thickness: 1.049mm

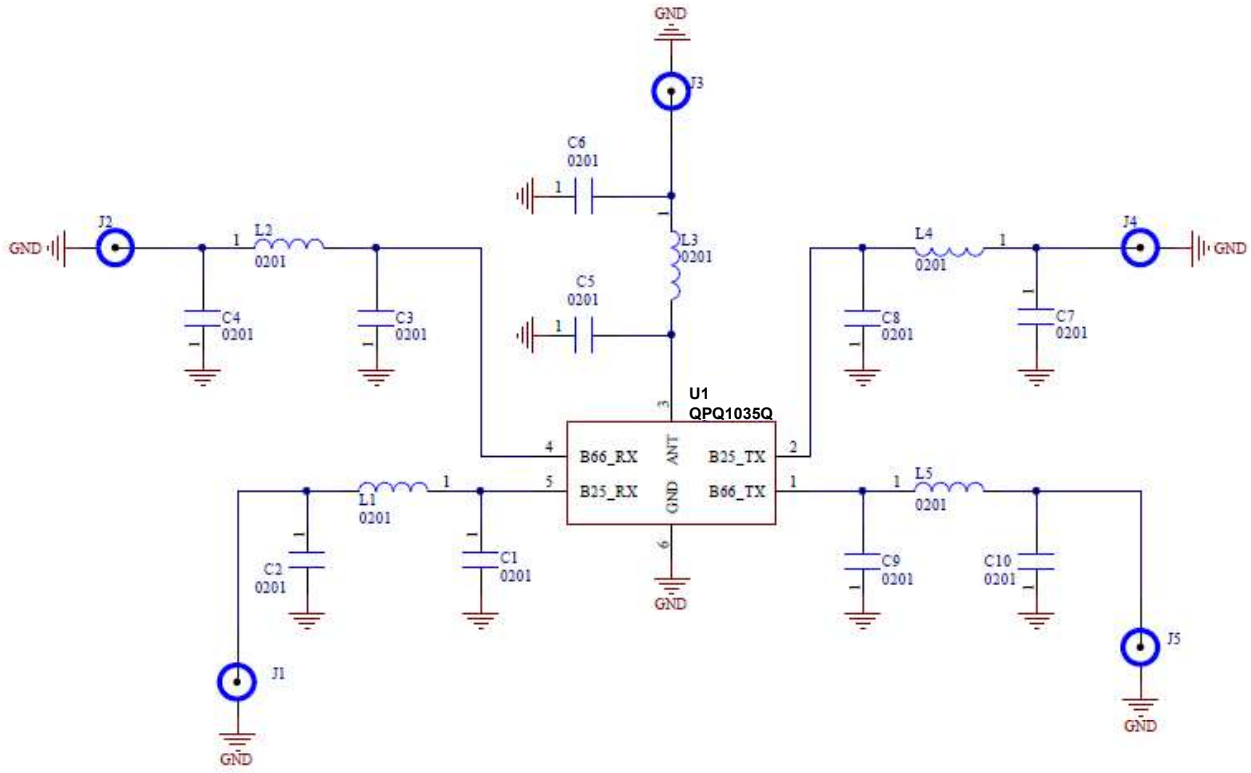
Evaluation Board



Evaluation Board BOM

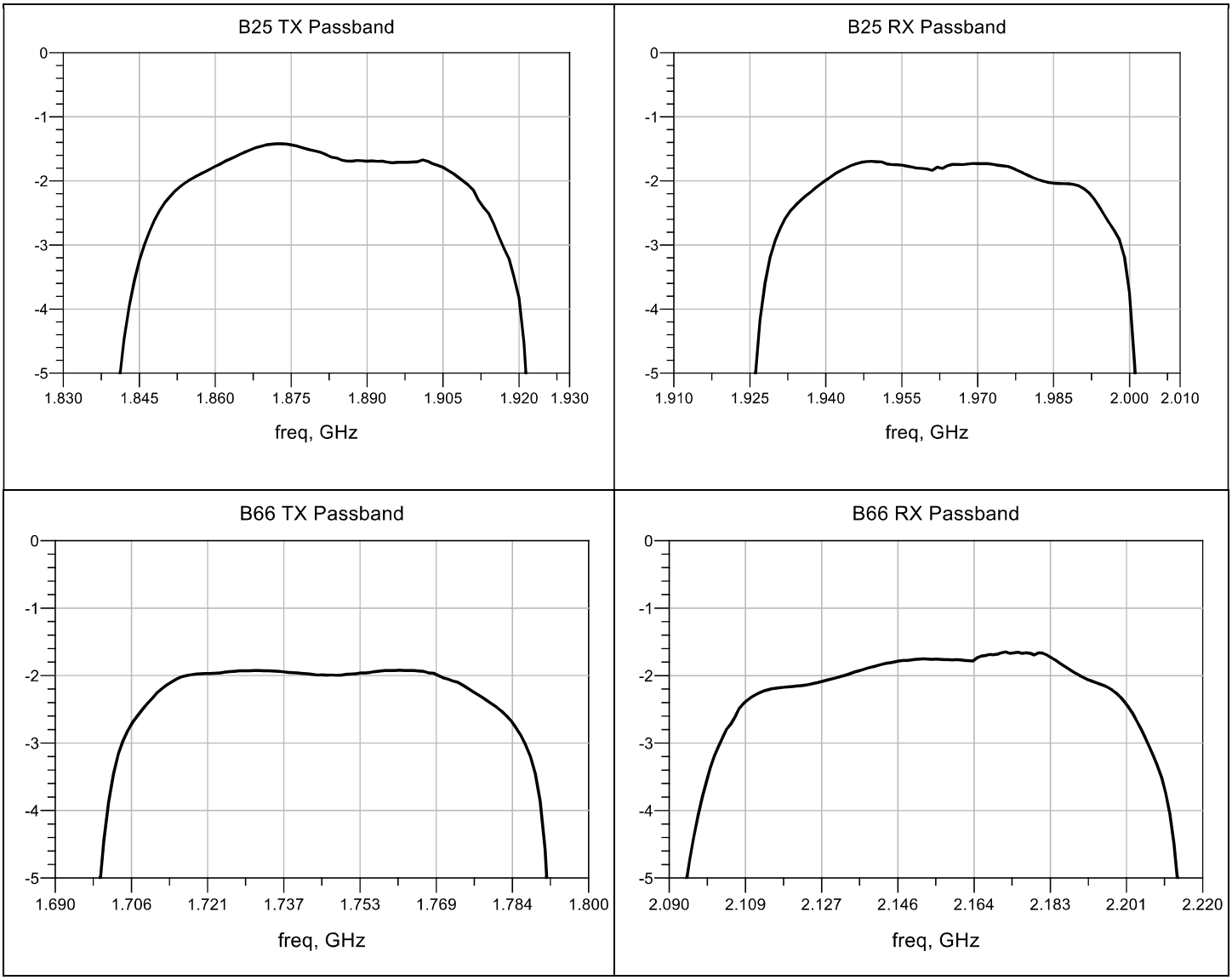
Material#	Rev	Qty	Ref Des	Description	UOM	Mfg Part #
QPQ1035QSB	A	1	U1	Band 25/66 Multiplexer	EA	
293480	A	1	PCB	PCB, QPQ1035Q	EA	QPQ1035Q-4000(A)
262282		1	C7	CAP, 0.9pF, +/-0.05pF, 25V, Hi-Q, 0201	EA	GJM0335C1ER90WB01D
263980		1	C10	CAP, 1.6pF, +/- 0.1pF, 25V, HI-Q, 0201	EA	GJM0335C1E1R6BB01D
21253		3	L1,L2,L3	RES, 0 OHM, 5%, 1/20W, 0201	EA	RMC1/20JPPA15
278525	A	1	L4	IND, 3.8nH, +/-0.1nH, T/F, ULTRA-Q, 0201	EA	LQP03HQ3N8B02D
279469	A	1	L5	IND, 5.1nH, 3%, T/F, ULTRA-Q, 0201	EA	LQP03HQ5N1H02D
281934	A	5	J1,J2,J3,J4,J5	CONN, RF COAXIAL, EDGE MNT, SMA	EA	142-0781-851
4XXX1		8	C1,C2,C3,C4,C5,C6,C8,C9	NOT POPULATED ITEM-1	EA	DUMMY PART

Evaluation Board Schematic



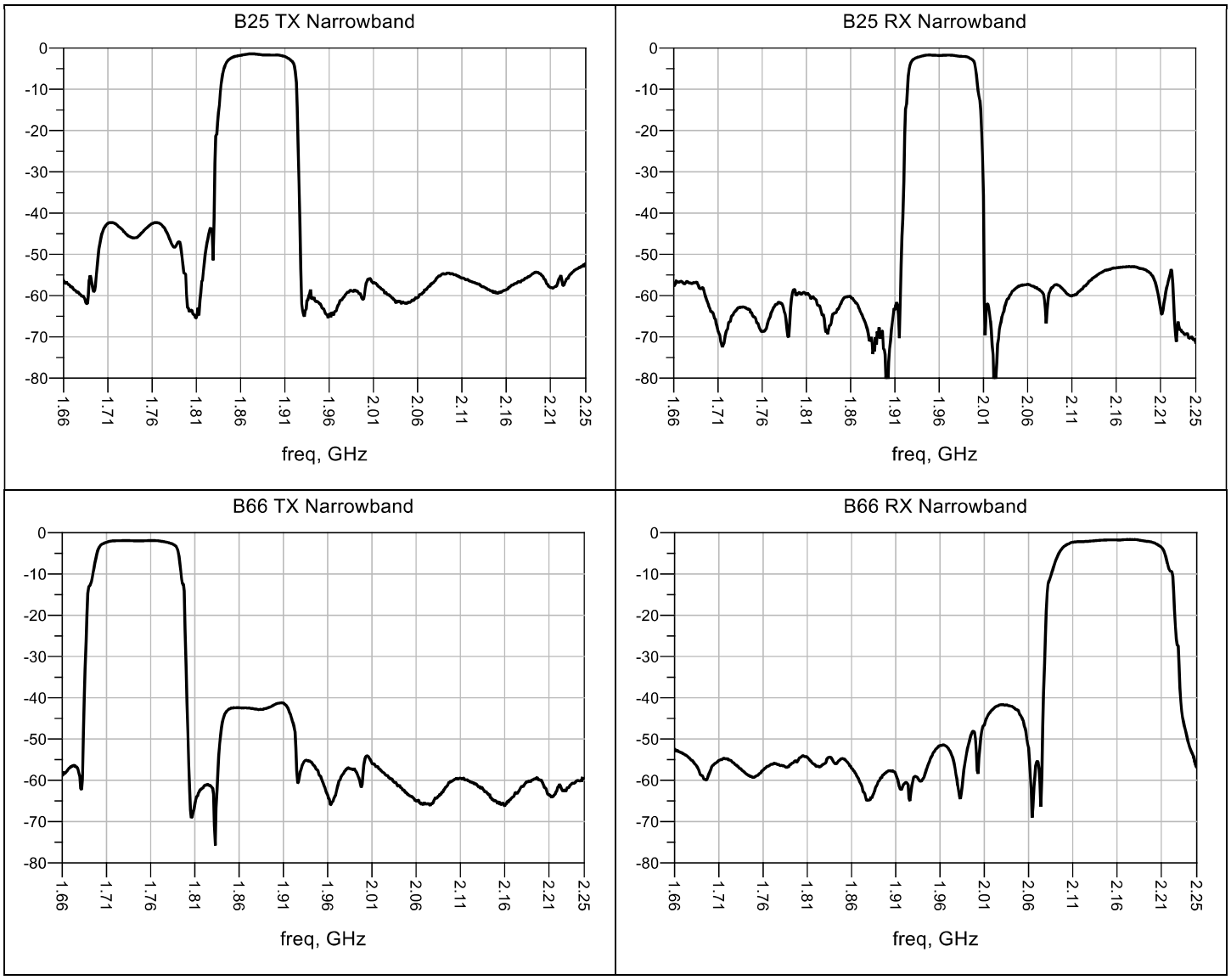
Performance Plots – Passband

Test conditions unless otherwise noted: Temp. = +25 °C



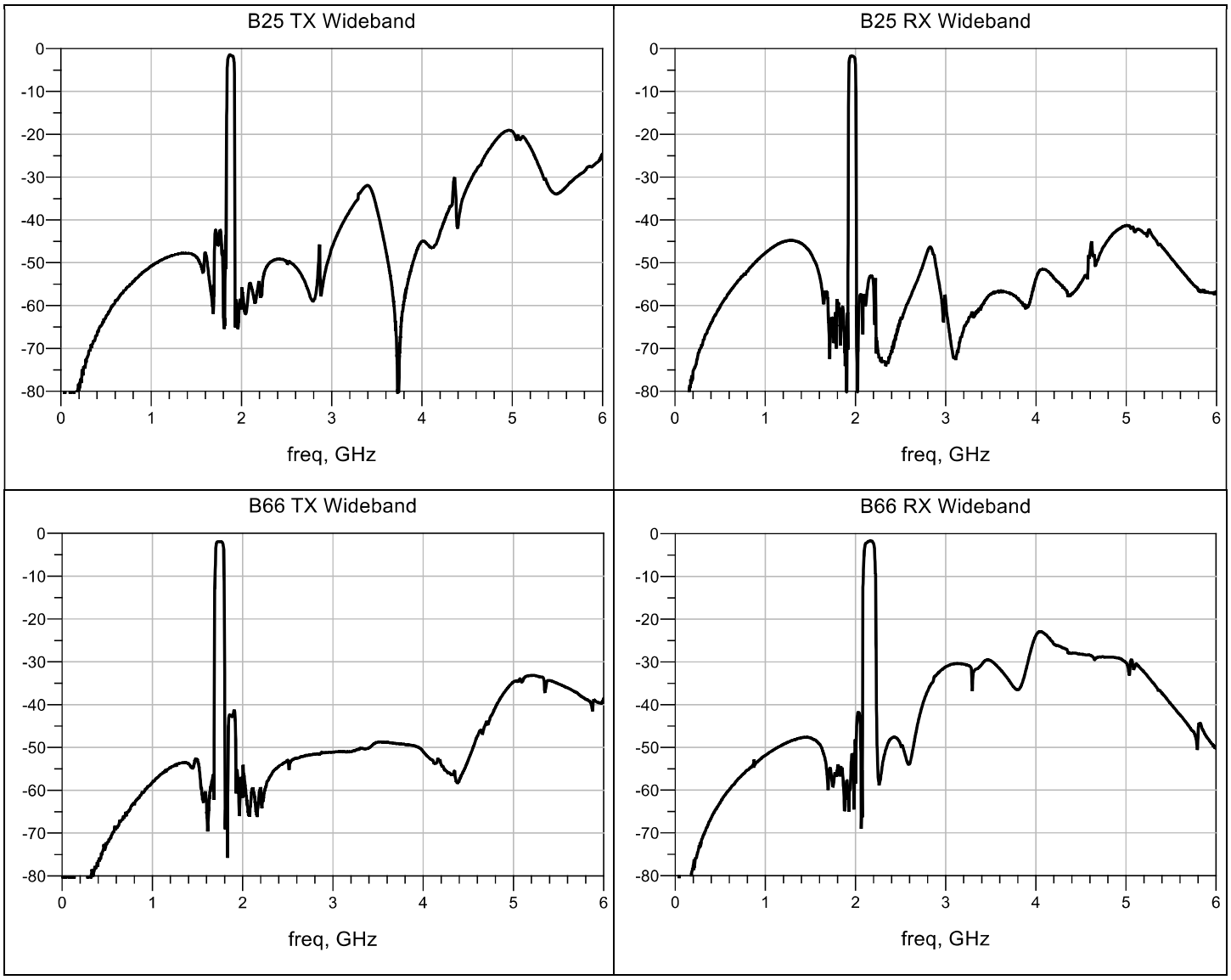
Performance Plots – Narrowband

Test conditions unless otherwise noted: Temp. = +25 °C



Performance Plots – Wideband

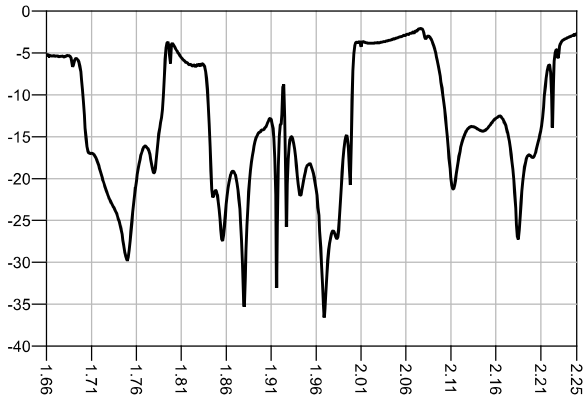
Test conditions unless otherwise noted: Temp. = +25 °C



Performance Plots – Return Loss/Impedance ANT Port

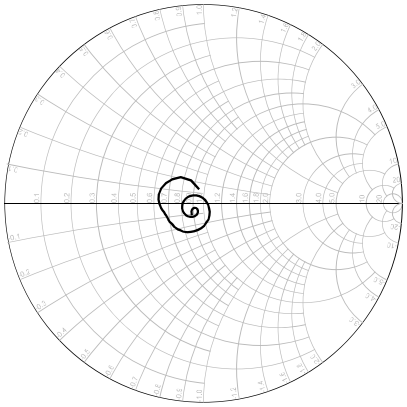
Test conditions unless otherwise noted: Temp. = +25 °C

Return Loss at ANT port (pin 3)



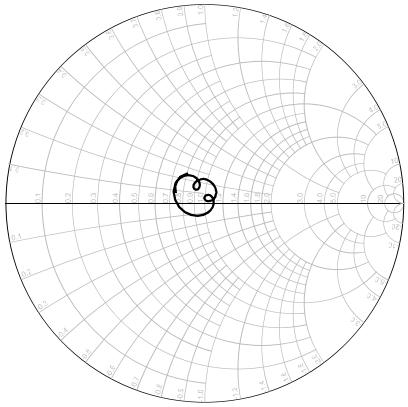
freq, GHz

B25 TX Impedance at ANT Port



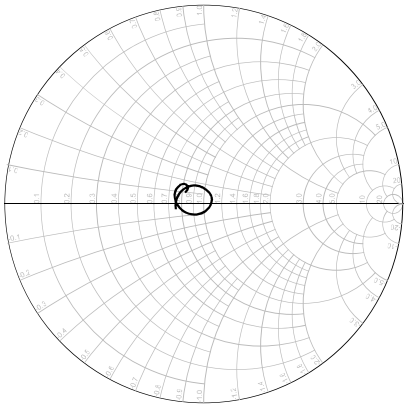
freq (1.850GHz to 1.915GHz)

B25 RX Impedance at ANT Port



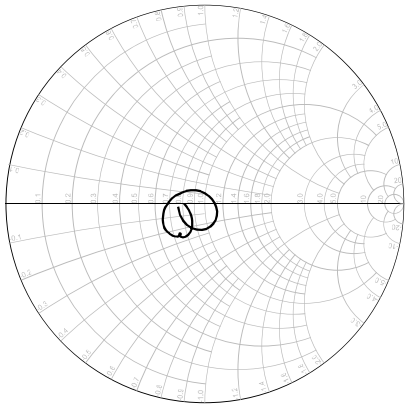
freq (1.930GHz to 1.995GHz)

B66 TX Impedance at ANT Port



freq (1.710GHz to 1.780GHz)

B66 RX Impedance at ANT Port

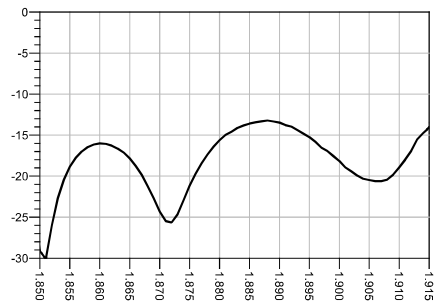


freq (2.110GHz to 2.200GHz)

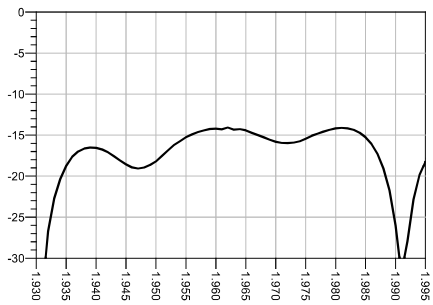
Performance Plots – Return Loss and Impedance TX/RX Port

Test conditions unless otherwise noted: Temp. = +25 °C

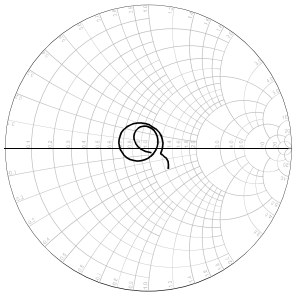
B25 TX Port Return Loss



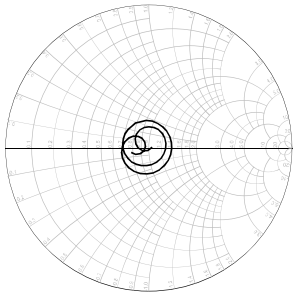
B25 RX Port Return Loss



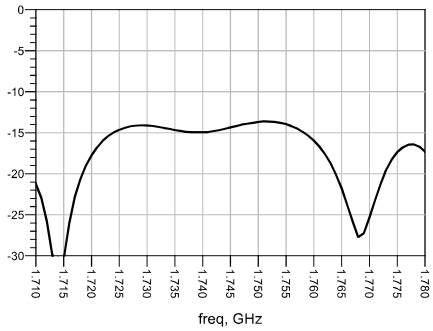
B25 TX Port Impedance



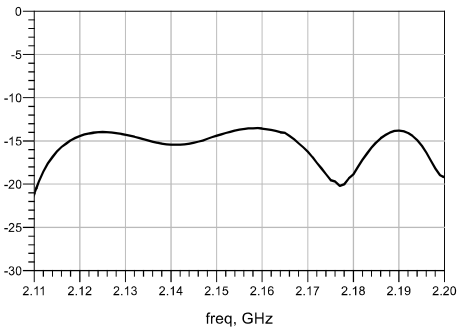
B25 RX Port Impedance



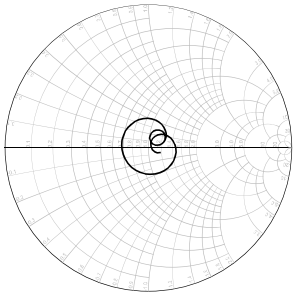
B66 TX Port Return Loss



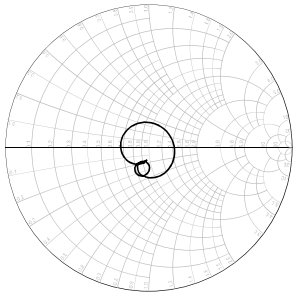
B66 RX Port Return Loss



B66 TX Port Impedance



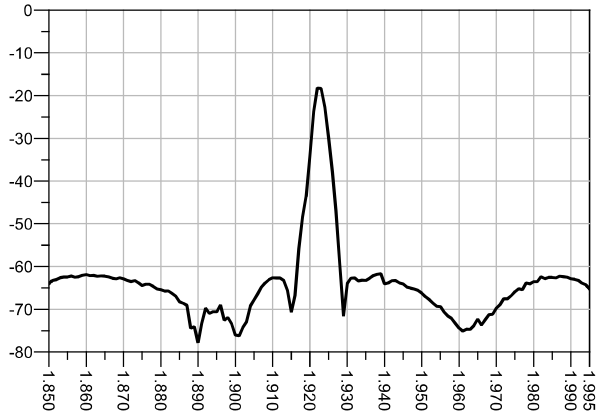
B66 RX Port Impedance



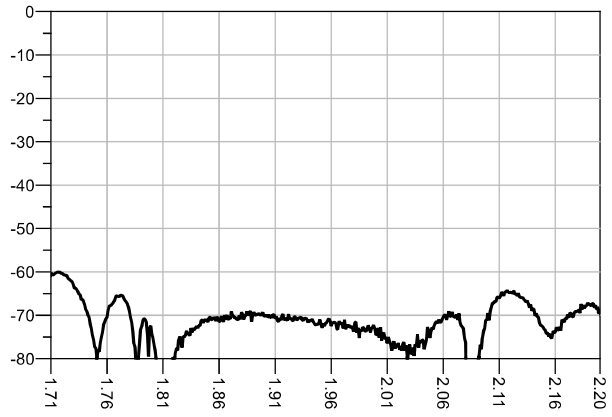
Performance Plots – Isolation and Cross-Isolation

Test conditions unless otherwise noted: Temp. = +25 °C

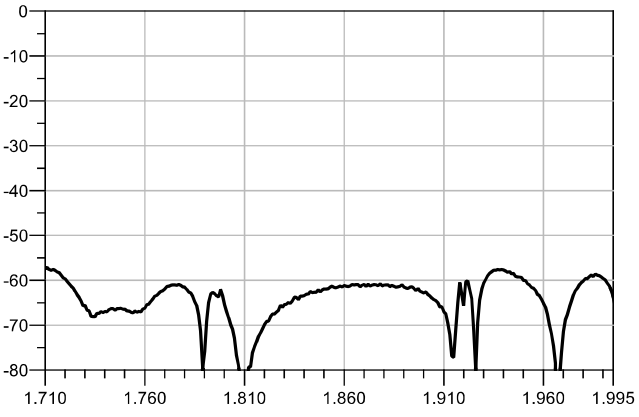
B25 TX - B25 RX Isolation



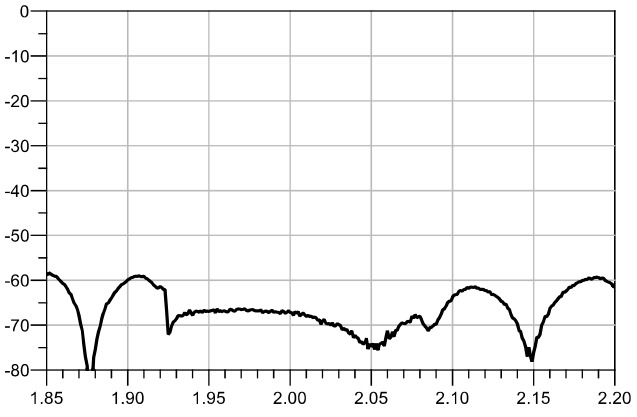
B66 TX - B66 RX Isolation



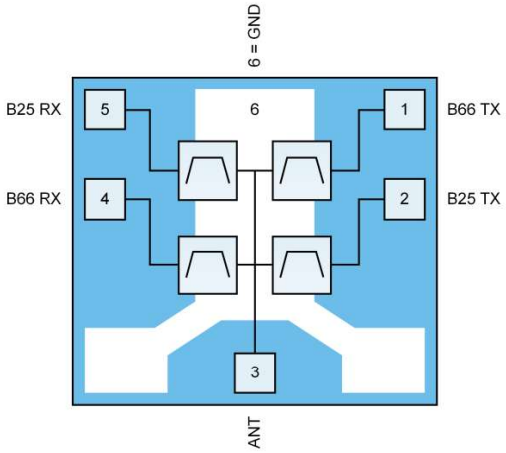
B66 TX - B25 RX Cross-Isolation



B25 TX - B66 RX Cross-Isolation



Pin Configuration and Description



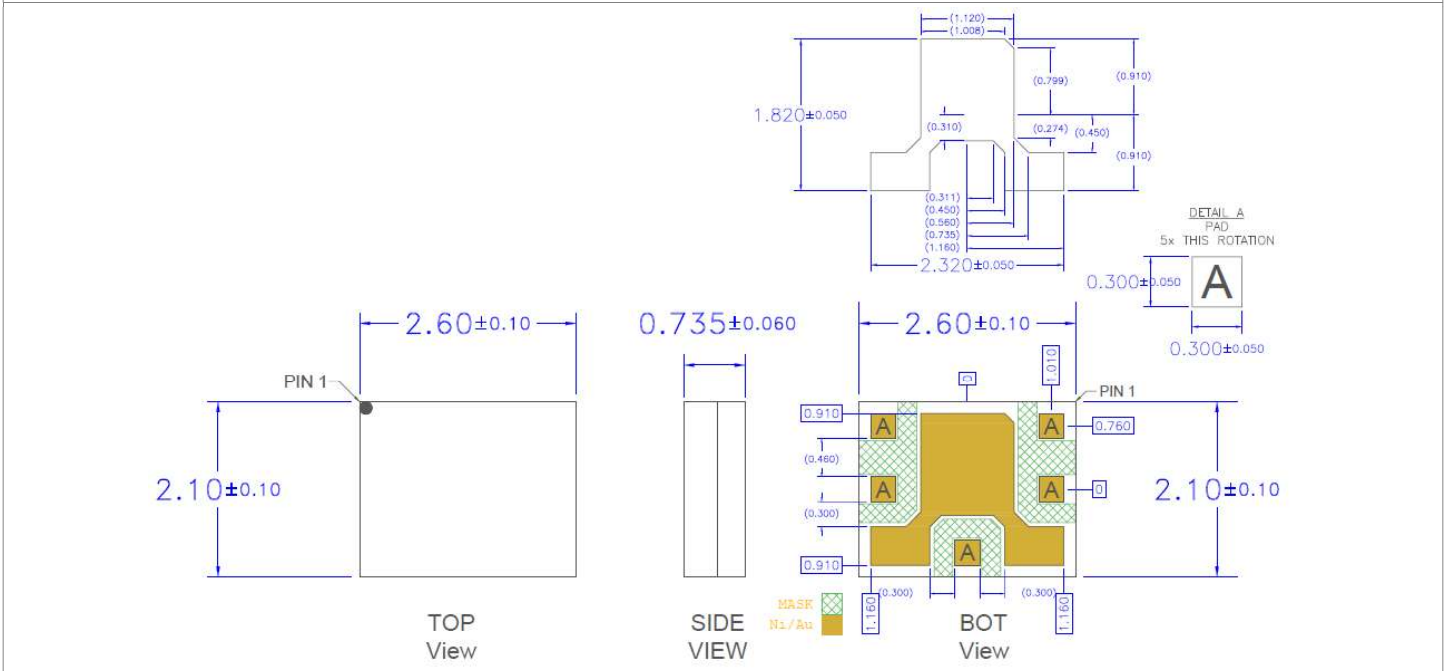
Bottom View

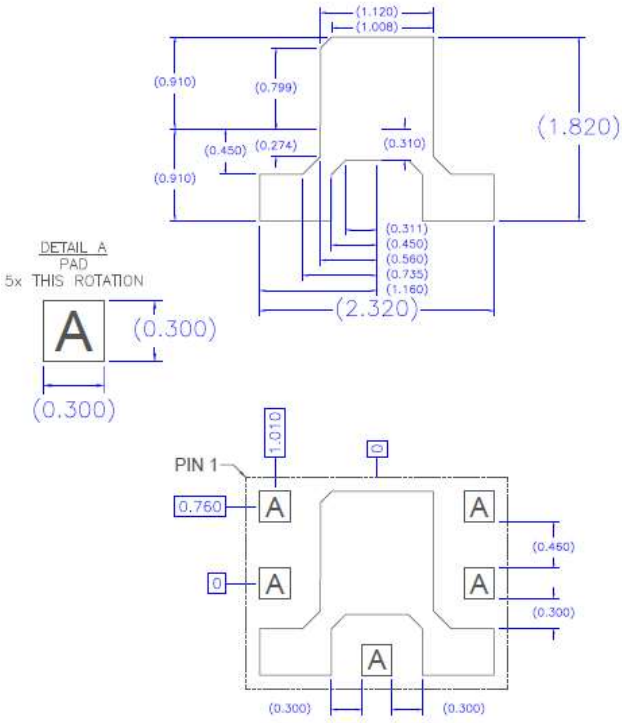
PIN NUMBER	LABEL	DESCRIPTION
1	B66TX	Band 66 TX RF Port
2	B25TX	Band 25 TX RF Port
3	ANT	Antenna RF Port
4	B66RX	Band 66 RX RF Port
5	B25RX	Band 25 RX RF Port
6	GND	Package Ground

Marking Diagram

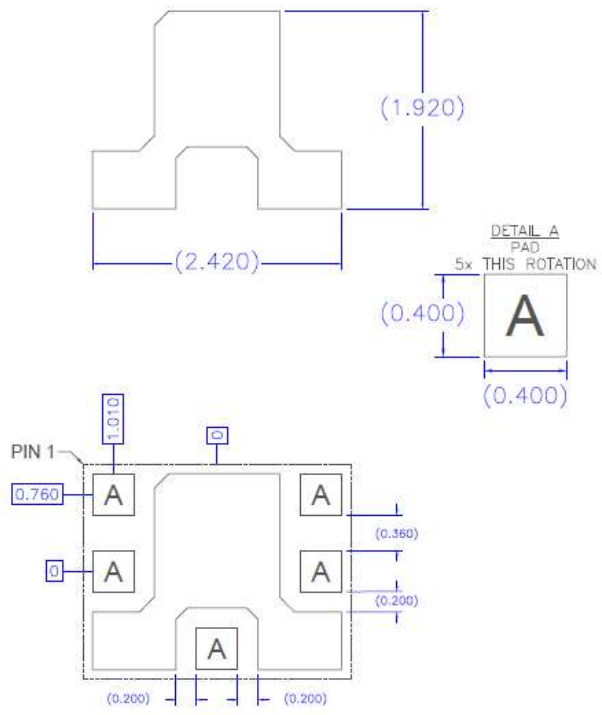
Package Outline Drawings

Package Outline Dimension Drawing





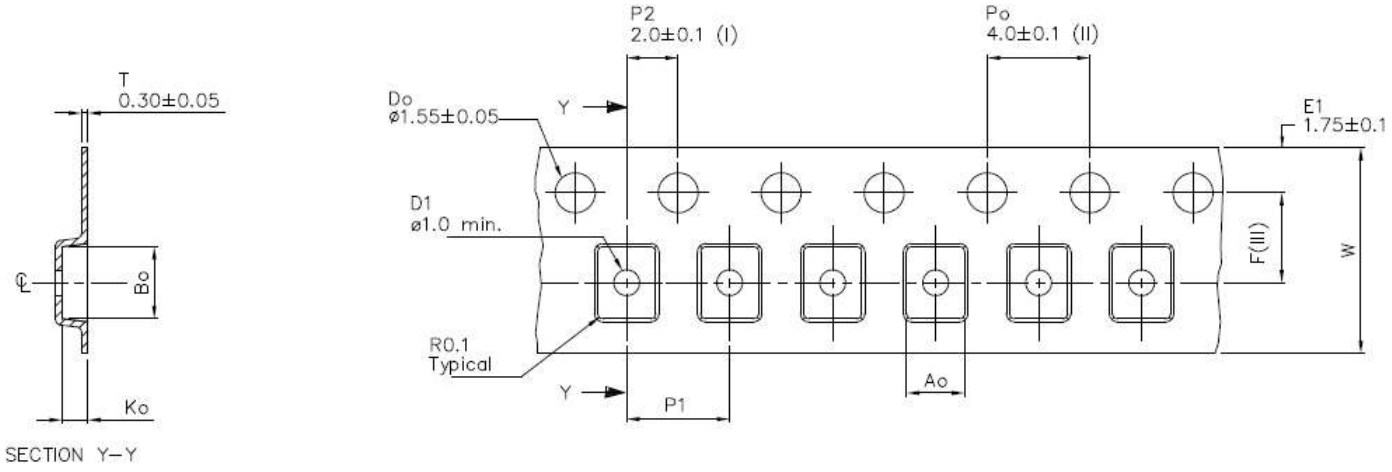
Recommended Land Pattern



Recommended Land Pattern Mask

Notes:
1. All dimensions are in millimeters. Angles are in degrees.
2. Dimension and tolerance formats conform to ASME Y14.4M-1994.
3. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.

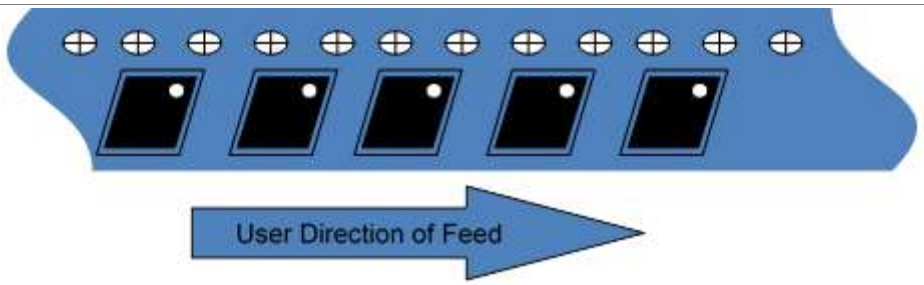
Tape and Reel Information



Ao	2.25 +/−0.05
Bo	2.80 +/−0.05
Ko	1.10 +/−0.1
F	3.50 +/−0.05
P1	4.00 +/−0.1
W	8.00 +0.3/−0.1

(I) Measured from centreline of sprocket hole to centreline of pocket.
(II) Cumulative tolerance of 10 sprocket holes is ± 0.20 .
(III) Measured from centreline of sprocket hole to centreline of pocket.
(IV) Other material available.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.



Handling Precautions

PARAMETER	RATING	STANDARD
ESD – Human Body Model (HBM)	Class 1C	ESDA/JEDEC JS-001
ESD – Charged Device Model (CDM)	Class C3	ESDA/JEDEC JS-002
MSL – Moisture Sensitivity Level	MSL 3	IPC/JEDEC J-STD-020

Caution!

ESD sensitive device

Solderability

Compatible with both lead-free (260 °C max. reflow temperature) and tin/lead (245 °C max. reflow temperature) soldering processes.

Package lead plating: Electrolytic plated Au over Ni

RoHS Compliance

This part is compliant with the 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment), as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead-free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A ($C_{15}H_{12}Br_4O_2$) Free
- SVHC Free
- PFOS Free

REVISION HISTORY

Revision	Description	DATE
A	• Initial preliminary datasheet	
	• Updated spec table, plots and EVB information	
B	• Update Spec, EVB BOM, ESD and package drawing	Aug 17, 2020
C	• Remove disclaimer on 1st page	Aug 19, 2020
D	• Updated Reel size to 2500 for TR13; updated some min/max specs slightly from production run data.	11/4/2020

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:
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