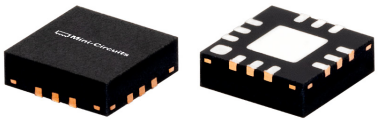
MMIC SURFACE MOUNT

Power Splitter/Combiner WP4G1A+

50Ω 1300 to 2000 MHz

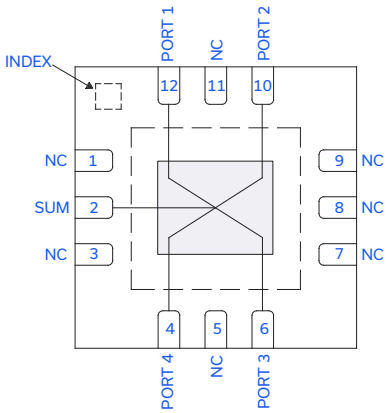
THE BIG DEAL

- Excellent Insertion Loss, Typ. 1.0 dB
- Excellent Isolation, Typ. 28 dB
- Excellent Amplitude Unbalance, Typ. 0.12 dB
- Good Phase Unbalance, Typ. 2.0 Deg
- Power Handling as Splitter, Max 2.5 W
- 3×3 mm 12-Lead QFN-Style Package



Generic photo used for illustration purposes only

FUNCTIONAL DIAGRAM (TOP VIEW)



APPLICATIONS

- Back Haul Radio Systems
- Radar, EW, and ECM Defense Systems
- Satellite Communications
- Test and Measurement Equipment
- 5G Sub6, MIMO Wireless Infrastructure Systems

PRODUCT OVERVIEW

Mini-Circuits' WP4G1A+ is a 50Ω GaAs MMIC 4-way splitter/combiner that operates from 1300 to 2000 MHz. The WP4G1A+ provides typical performance of 1.0 dB insertion loss, 28 dB isolation, 0.12 dB amplitude unbalance, and 2.0 deg phase unbalance at 1600 MHz. In conjunction, it has excellent power handling capabilities of 2.5 W max as a splitter. This combination of characteristics makes it the perfect device for maintaining signal integrity and low signal distortion during signal splits, while also handling high power RF signals.

KEY FEATURES

Features	Advantages
Low Insertion Loss, Typ. 1.0 dB (Above 6.0 dB Splitter Loss)	Low insertion loss ensures minimized signal power loss through the device, limiting the need for compensating power requirements at the respective outputs.
At 1600 MHz: • Excellent Amplitude Unbalance, Typ. 0.12 dB • Good Phase Unbalance, Typ. 2.0 deg.	Strong unbalance characteristics maintain signal integrity and low signal distortion when splitting RF signals between respective outputs.
3×3 mm 12-Lead QFN-Style Package	Small footprint saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB. Industry standard packaging allows for ease of assembly in high volume manufacturing processes.

Power Splitter/Combiner WP4G1A+

50Ω 1300 to 2000 MHz

ELECTRICAL SPECIFICATIONS[1] AT +25°C, & P_{IN} = -10 dBm, UNLESS NOTED OTHERWISE

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		1300		2000	MHz
Insertion Loss (Above 6.0 dB Splitter Loss)	1300		1.4	2.2	dB
	1500		1.0	1.8	
	1600		1.0	1.8	
	1700		1.0	1.8	
	2000		1.2	2.2	
Isolation	1300	19	23		dB
	1500	24	29		
	1600	23	28		
	1700	21	26		
	2000	18	23		
Amplitude Unbalance	1300		0.18	0.7	dB
	1500		0.14	0.6	
	1600		0.12	0.6	
	1700		0.10	0.7	
	2000		0.10	0.8	
Phase Unbalance	1300		1.7	7	Degree
	1500		1.8	7	
	1600		2.0	7	
	1700		2.1	7	
	2000		2.4	8	
Return Loss (Sum Port)	1300		15		dB
	1500		21		
	1600		16		
	1700		13		
	2000		9		
Return Loss (Ports 1, 2, 3, 4)[2]	1300		17		dB
	1500		18		
	1600		17		
	1700		16		
	2000		14		

1. Tested on Mini-Circuits Characterization Test Board TB-WP4G1AC+. See Figure 2. Board loss de-embedded to the device.
2. Typical values displayed are the worst case among Port 1, Port2, Port 3 and Port 4.

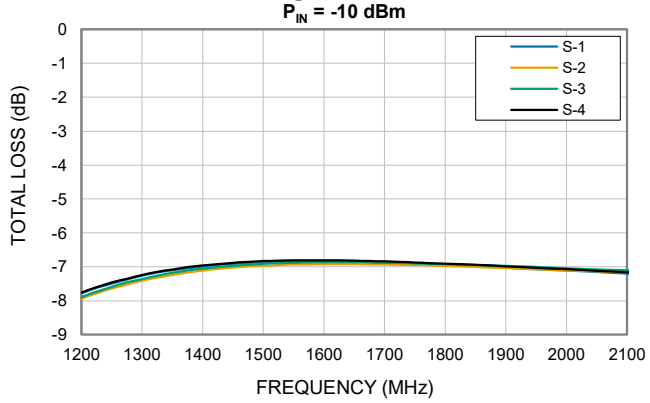
Power Splitter/Combiner WP4G1A+

50Ω 1300 to 2000 MHz

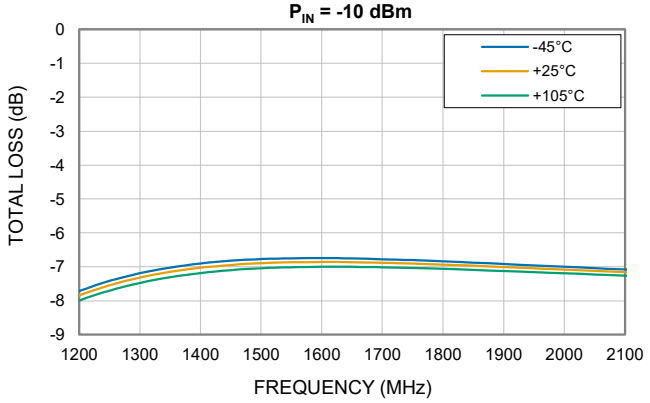
TYPICAL PERFORMANCE GRAPHS

Note: The following data was taken on Mini-Circuits Characterization Test Board TB-WP4G1AC+ (Figure 2).

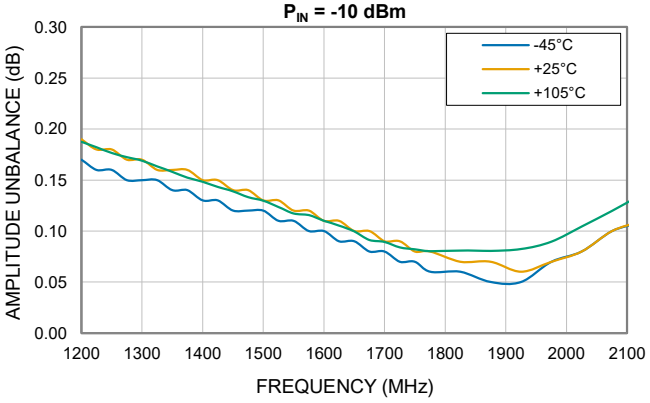
TOTAL LOSS[3] @ TEMPERATURE = +25°C
P_{IN} = -10 dBm



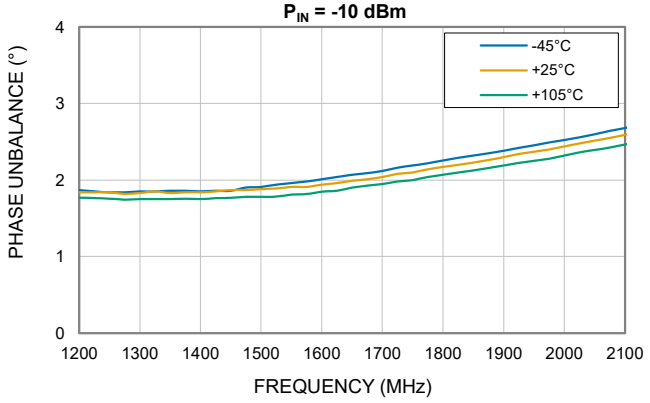
TOTAL LOSS[4] vs TEMPERATURE,
P_{IN} = -10 dBm



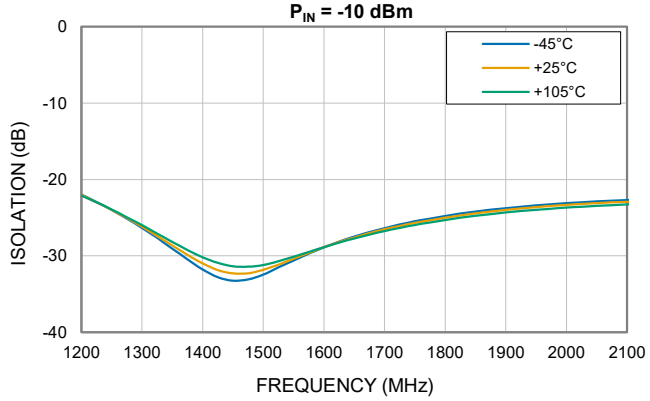
AMPLITUDE UNBALANCE vs TEMPERATURE,
P_{IN} = -10 dBm



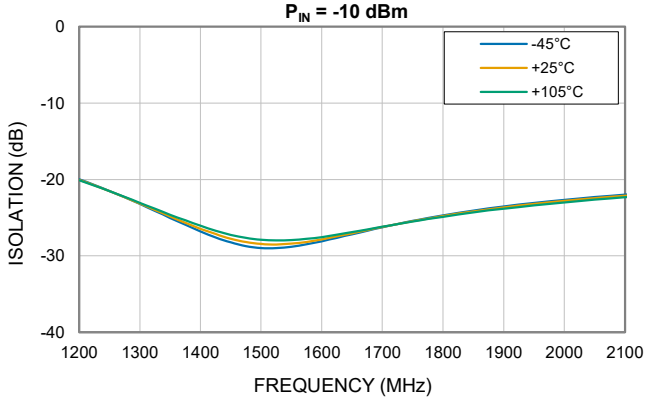
PHASE UNBALANCE vs TEMPERATURE,
P_{IN} = -10 dBm



ISOLATION 1-2 vs TEMPERATURE,
P_{IN} = -10 dBm



ISOLATION 2-3 vs TEMPERATURE,
P_{IN} = -10 dBm



3. Total Loss = Single Path (S-1 or S-2 or S-3 or S-4) Insertion Loss + 6 dB Splitter Loss
4. Average of Four Paths' Total Loss

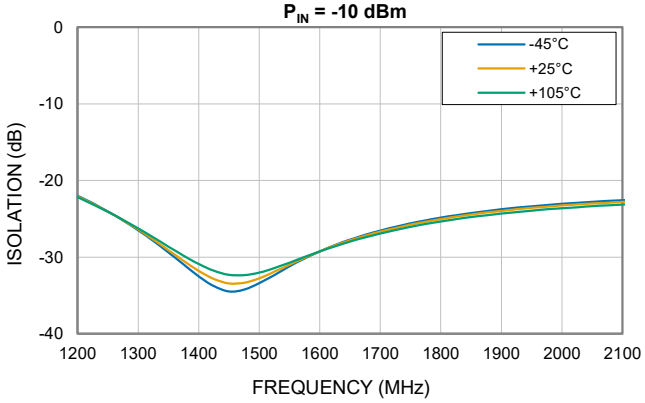
Power Splitter/Combiner WP4G1A+

50Ω 1300 to 2000 MHz

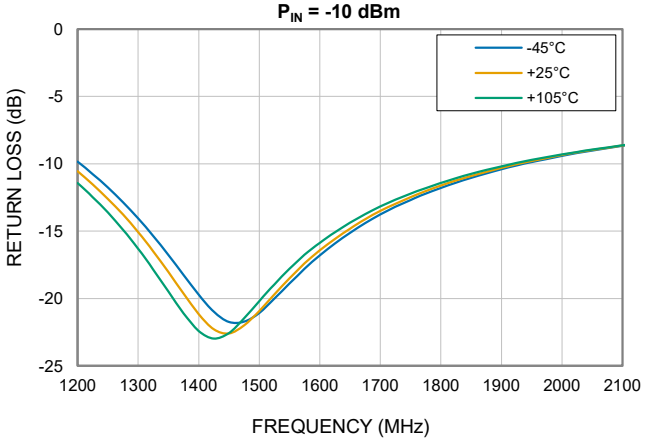
TYPICAL PERFORMANCE GRAPHS

Note: The following data was taken on Mini-Circuits Characterization Test Board TB-WP4G1AC+ (Figure 2).

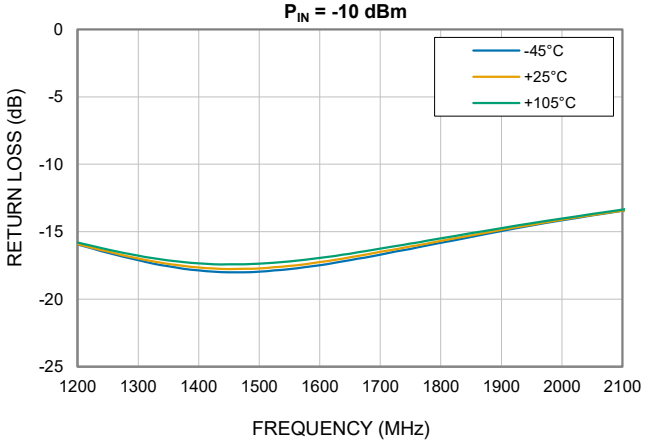
ISOLATION 3-4 vs TEMPERATURE, P_{IN} = -10 dBm



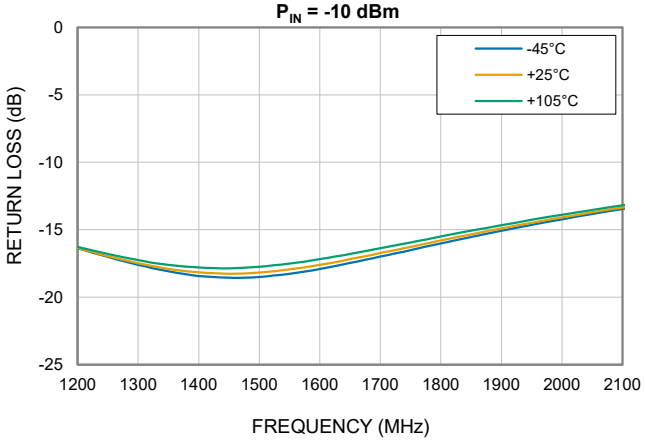
RETURN LOSS PORT S vs TEMPERATURE, P_{IN} = -10 dBm



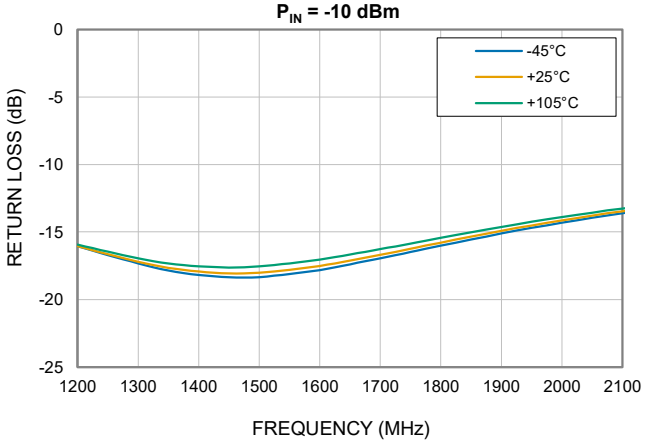
RETURN LOSS PORT 1 vs TEMPERATURE, P_{IN} = -10 dBm



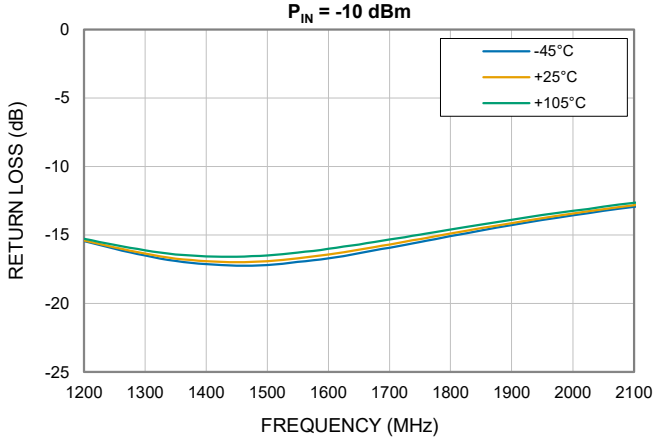
RETURN LOSS PORT 2 vs TEMPERATURE, P_{IN} = -10 dBm



RETURN LOSS PORT 3 vs TEMPERATURE, P_{IN} = -10 dBm



RETURN LOSS PORT 4 vs TEMPERATURE, P_{IN} = -10 dBm



Power Splitter/Combiner WP4G1A+

50Ω 1300 to 2000 MHz

ABSOLUTE MAXIMUM RATINGS[5]

Parameter		Ratings
Operating Case Temperature		-45 °C to +105 °C
Storage Temperature		-65 °C to +150 °C
Junction Temperature[6]		+150 °C
Input Power (CW)	as splitter[7]	+ 34 dBm
	as combiner per port[8]	+ 25 dBm

5. Permanent damage may occur if any of these limits are exceeded. Maximum ratings are not intended for continuous normal operation.
6. Peak temperature on top of Die.
7. Tested by applying input power to Port S, measuring output power at Port 1, and presenting both an Open and 50Ω load at Port 2, Port 3, and Port 4 to determine worst case conditions.
8. Tested by applying input power to Port 2, measuring output power at Port 1, and presenting both an Open and 50Ω load at Port S, Port 3 and Port 4 to determine worst case conditions.

ESD RATING

	Class	Voltage Range	Reference Standard
HBM	1A	250 V to < 500 V	ANSI/ESDA/JEDEC JS-001-2023
CDM	C3	≥ 1000 V	ANSI/ESDA/JEDEC JS-002-2022



ESD HANDLING PRECAUTION: This device is designed to be Class 1A for HBM. Static charges may easily produce potentials higher than this with improper handling and can discharge into DUT and damage it. As a preventive measure Industry standard ESD handling precautions should be used at all times to protect the device from ESD damage.

MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020E /JEDEC J-STD-033C

Power Splitter/Combiner WP4G1A+

50Ω 1300 to 2000 MHz

FUNCTIONAL DIAGRAM (TOP VIEW)

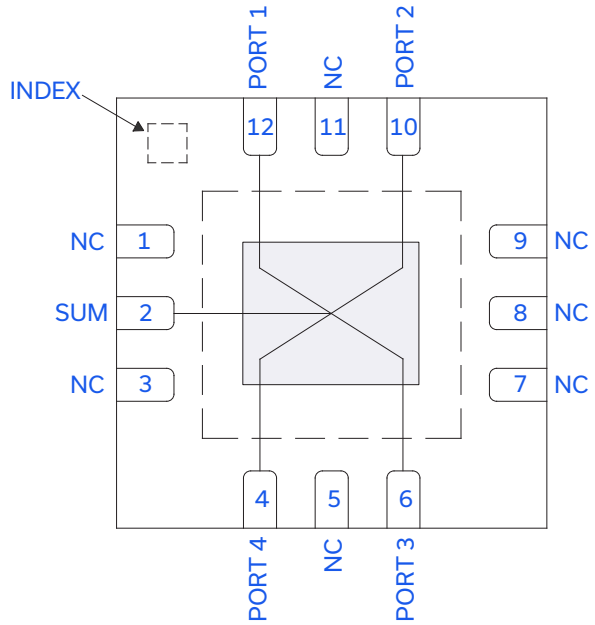


Figure 1. WP4G1A+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	Description (Refer to Figure 2)
SUM	2	SUM Pad connects to Input Sum Port.
PORT 1	12	PORT 1 Pad connects to Output Port 1.
PORT 2	10	PORT 2 Pad connects to Output Port 2.
PORT 3	6	PORT 3 Pad connects to Output Port 3.
PORT 4	4	PORT 4 Pad connects to Output Port 4.
NC	1, 3, 5, 7-9, 11	Connects to ground on the test board.
GND	PADDLE & INDEX	Connects to ground.

CHARACTERIZATION TEST BOARD

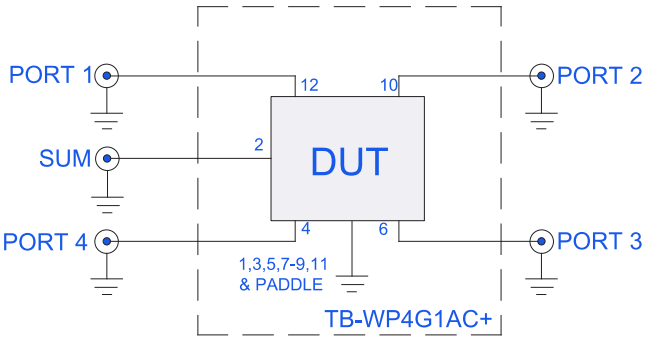


Figure 2. WP4G1A+ Characterization and Application Circuit

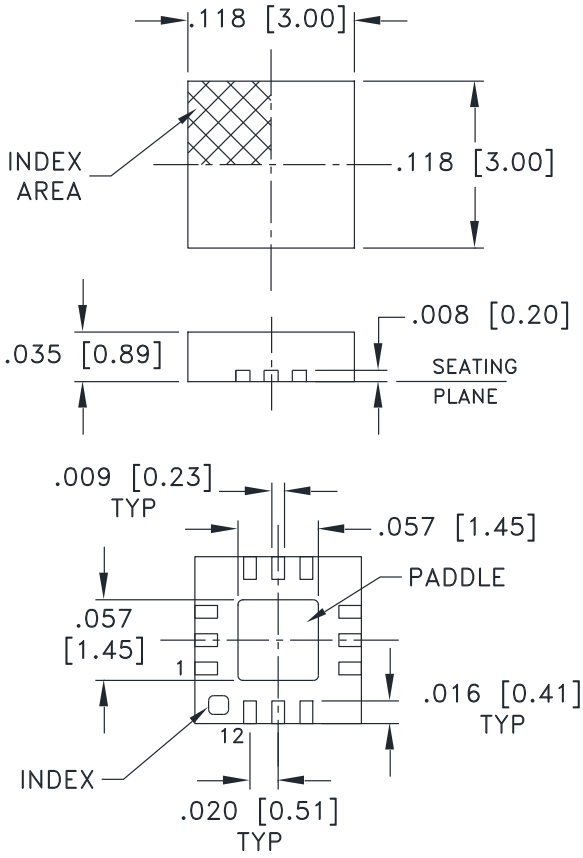
Electrical Parameters and Conditions
Insertion Loss, Isolation, Return Loss, Phase Unbalance, and Amplitude Unbalance measured using N5242A PNA-X microwave network analyzer.

Condition:
1. Insertion Loss, Isolation, Return Loss, Phase Unbalance, and Amplitude Unbalance: P_{IN} = -10 dBm

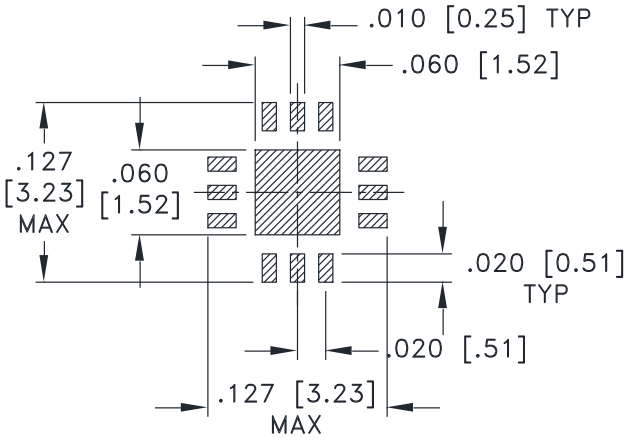
Power Splitter/Combiner WP4G1A+

50Ω 1300 to 2000 MHz

CASE STYLE DRAWING



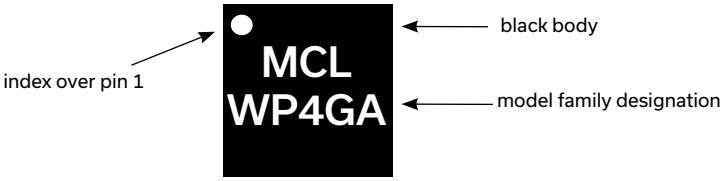
PCB Land Pattern



SUGGESTED LAYOUT,
TOLERANCE TO BE WITHIN ±.002

Weight: .02 Grams
Dimensions are in inches [mm]. Tolerances in inches: 2 Pl. ±.01; 3 Pl.±.004 inches

PRODUCT MARKING



Marking may contain other features or characters for internal lot control

Power Splitter/Combiner WP4G1A+

50Ω 1300 to 2000 MHz

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD CLICK HERE

Performance Data & Graphs	Data Graphs S-Parameter (S5P Files) Data Set (.zip file)
Case Style	DQ1225 Plastic package, exposed paddle, Lead Finish: Matte-Tin
RoHS Status	Compliant
Tape & Reel	F66 7" reels with 20, 50, 100, 200, 500, 1000, 2000, or 3000 devices
Suggested Layout for PCB Design	PL-259
Evaluation Board	TB-WP4G1AC+ Gerber File
Environmental Ratings	ENV08T1

NOTES

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuits' applicable established test performance criteria and measurement instructions.

C. The parts covered by this specification document are subject to Mini-Circuits' standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/terms/viewterm.html

Typical Performance Data

NOTE: Use PDF Bookmarks to view DATA at required conditions

Definitions:
Input Return Loss = -S11 (dB)
Insertion Loss = -S21, -S31, -S41, -S51 (dB)
Isolation = -S24, -S34, -S45 (dB)
Output Return Loss = -S22, -S33, -S44, -S55 (dB)

TEST CONDITIONS: P_{IN} = -10 dBm @ Temperature = **+25°C**

	Total Loss[1]				Amp.	Phase	Isolation			Return Loss				
FREQ	S-1	S-2	S-3	S-4	Unbal.	Unbal.	1-3	2-3	3-4	S	1	2	3	4
(MHz)	(dB)	(dB)	(dB)	(dB)	(dB)	(Deg.)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1200	7.8	7.9	7.9	7.8	0.2	1.8	22.0	20.0	22.1	10.6	15.9	16.4	16.0	15.4
1225	7.6	7.8	7.7	7.6	0.2	1.8	23.0	20.8	23.0	11.5	16.2	16.7	16.4	15.7
1250	7.5	7.6	7.6	7.5	0.2	1.8	24.0	21.5	24.1	12.6	16.5	17.0	16.6	15.9
1275	7.4	7.5	7.5	7.4	0.2	1.8	25.0	22.3	25.2	13.8	16.7	17.2	16.9	16.1
1300	7.3	7.4	7.4	7.2	0.2	1.8	26.2	23.1	26.4	15.1	17.0	17.5	17.2	16.4
1325	7.2	7.3	7.3	7.2	0.2	1.9	27.4	24.0	27.7	16.5	17.2	17.7	17.5	16.6
1350	7.1	7.2	7.2	7.1	0.2	1.8	28.6	24.8	29.1	18.0	17.4	17.9	17.7	16.7
1375	7.0	7.2	7.1	7.0	0.2	1.8	29.9	25.7	30.5	19.6	17.5	18.1	17.8	16.8
1400	7.0	7.1	7.1	7.0	0.2	1.8	31.0	26.4	31.8	21.1	17.7	18.2	17.9	16.9
1425	6.9	7.1	7.0	6.9	0.2	1.9	31.8	27.1	32.8	22.3	17.7	18.2	18.0	17.0
1450	6.9	7.0	7.0	6.9	0.1	1.9	32.3	27.8	33.4	22.6	17.8	18.3	18.1	17.0
1475	6.9	7.0	6.9	6.9	0.1	1.9	32.3	28.2	33.3	22.0	17.7	18.2	18.1	17.0
1500	6.9	7.0	6.9	6.8	0.1	1.9	31.8	28.4	32.8	20.9	17.7	18.2	18.0	16.9
1525	6.9	7.0	6.9	6.8	0.1	1.9	31.1	28.5	31.9	19.7	17.6	18.1	17.9	16.8
1550	6.8	6.9	6.9	6.8	0.1	1.9	30.4	28.4	31.0	18.5	17.5	17.9	17.8	16.7
1575	6.8	6.9	6.9	6.8	0.1	1.9	29.6	28.2	30.1	17.4	17.4	17.8	17.7	16.6
1600	6.8	6.9	6.9	6.8	0.1	1.9	28.9	27.8	29.2	16.4	17.2	17.6	17.5	16.4
1625	6.8	6.9	6.9	6.8	0.1	2.0	28.2	27.4	28.5	15.6	17.1	17.4	17.3	16.3
1650	6.9	6.9	6.9	6.8	0.1	2.0	27.6	27.0	27.8	14.8	16.9	17.2	17.1	16.1
1675	6.9	6.9	6.9	6.8	0.1	2.0	27.0	26.6	27.2	14.1	16.7	17.0	16.9	15.9
1700	6.9	6.9	6.9	6.8	0.1	2.0	26.5	26.2	26.7	13.5	16.5	16.7	16.7	15.7
1725	6.9	6.9	6.9	6.9	0.1	2.1	26.1	25.8	26.2	13.0	16.3	16.5	16.5	15.5
1750	6.9	7.0	6.9	6.9	0.1	2.1	25.7	25.4	25.8	12.5	16.1	16.3	16.2	15.3
1775	6.9	7.0	6.9	6.9	0.1	2.1	25.3	25.1	25.4	12.0	15.9	16.0	16.0	15.1
1825	7.0	7.0	6.9	6.9	0.1	2.2	24.7	24.5	24.7	11.2	15.5	15.6	15.6	14.7
1875	7.0	7.0	7.0	7.0	0.1	2.3	24.2	23.9	24.2	10.6	15.1	15.1	15.1	14.3
1925	7.1	7.1	7.0	7.0	0.1	2.3	23.8	23.4	23.8	10.0	14.7	14.7	14.7	14.0
1975	7.1	7.1	7.0	7.1	0.1	2.4	23.5	23.0	23.4	9.6	14.3	14.3	14.3	13.6
2025	7.1	7.1	7.1	7.1	0.1	2.5	23.2	22.6	23.1	9.1	13.9	13.9	14.0	13.3
2075	7.2	7.2	7.1	7.1	0.1	2.6	23.0	22.3	22.9	8.8	13.6	13.5	13.6	13.0
2125	7.2	7.2	7.1	7.2	0.1	2.6	22.8	22.0	22.7	8.5	13.3	13.2	13.3	12.7
2175	7.3	7.2	7.1	7.2	0.1	2.7	22.7	21.7	22.5	8.2	13.0	12.9	13.0	12.4
2200	7.3	7.2	7.2	7.2	0.1	2.7	22.7	21.6	22.5	8.1	12.8	12.7	12.9	12.3

1. Total Loss = Single Path (S-1 or S-2 or S-3 or S-4) Insertion Loss + 6 dB Splitter Loss

Typical Performance Data

NOTE: Use PDF Bookmarks to view DATA at required conditions

Definitions:
Input Return Loss = -S11 (dB)
Insertion Loss = -S21, -S31, -S41, -S51 (dB)
Isolation = -S24, -S34, -S45 (dB)
Output Return Loss = -S22, -S33, -S44, -S55 (dB)

TEST CONDITIONS: P_{IN} = -10 dBm @ Temperature = **-45°C**

	Total Loss[1]				Amp.	Phase	Isolation			Return Loss				
FREQ	S-1	S-2	S-3	S-4	Unbal.	Unbal.	1-3	2-3	3-4	S	1	2	3	4
(MHz)	(dB)	(dB)	(dB)	(dB)	(dB)	(Deg.)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1200	7.7	7.8	7.8	7.6	0.2	1.9	22.0	20.0	22.0	9.8	15.9	16.4	16.1	15.4
1225	7.5	7.6	7.6	7.5	0.2	1.9	22.9	20.7	23.0	10.8	16.3	16.7	16.4	15.7
1250	7.4	7.5	7.5	7.3	0.2	1.8	24.0	21.5	24.0	11.8	16.6	17.0	16.7	16.0
1275	7.2	7.4	7.3	7.2	0.2	1.8	25.1	22.3	25.2	12.8	16.8	17.3	17.0	16.3
1300	7.1	7.3	7.2	7.1	0.2	1.9	26.3	23.2	26.5	14.0	17.1	17.6	17.3	16.5
1325	7.1	7.2	7.1	7.0	0.2	1.9	27.7	24.1	27.9	15.4	17.4	17.9	17.6	16.7
1350	7.0	7.1	7.1	7.0	0.1	1.9	29.0	25.0	29.4	16.8	17.6	18.1	17.9	16.9
1375	6.9	7.0	7.0	6.9	0.1	1.9	30.5	25.9	30.9	18.2	17.7	18.3	18.1	17.0
1400	6.9	7.0	6.9	6.8	0.1	1.9	31.8	26.8	32.5	19.7	17.9	18.4	18.2	17.1
1425	6.8	6.9	6.9	6.8	0.1	1.9	32.8	27.6	33.8	21.0	18.0	18.5	18.3	17.2
1450	6.8	6.9	6.8	6.8	0.1	1.9	33.3	28.2	34.5	21.7	18.0	18.6	18.4	17.2
1475	6.8	6.9	6.8	6.7	0.1	1.9	33.1	28.7	34.2	21.7	18.0	18.6	18.4	17.2
1500	6.7	6.8	6.8	6.7	0.1	1.9	32.4	29.0	33.4	21.1	18.0	18.5	18.3	17.2
1525	6.7	6.8	6.8	6.7	0.1	1.9	31.5	29.0	32.3	20.0	17.9	18.4	18.2	17.1
1550	6.7	6.8	6.8	6.7	0.1	2.0	30.6	28.8	31.2	18.9	17.8	18.3	18.1	17.0
1575	6.7	6.8	6.8	6.7	0.1	2.0	29.7	28.5	30.2	17.8	17.6	18.1	18.0	16.9
1600	6.7	6.8	6.8	6.7	0.1	2.0	28.9	28.1	29.2	16.8	17.5	17.9	17.8	16.7
1625	6.7	6.8	6.8	6.7	0.1	2.0	28.1	27.6	28.4	15.9	17.3	17.7	17.6	16.5
1650	6.7	6.8	6.8	6.7	0.1	2.1	27.5	27.2	27.7	15.1	17.1	17.5	17.4	16.3
1675	6.8	6.8	6.8	6.7	0.1	2.1	26.9	26.7	27.1	14.4	16.9	17.2	17.2	16.1
1700	6.8	6.8	6.8	6.7	0.1	2.1	26.4	26.2	26.5	13.8	16.7	17.0	16.9	15.9
1725	6.8	6.8	6.8	6.8	0.1	2.2	25.9	25.8	26.0	13.2	16.5	16.8	16.7	15.7
1750	6.8	6.8	6.8	6.8	0.1	2.2	25.5	25.4	25.6	12.7	16.3	16.5	16.5	15.5
1775	6.8	6.9	6.8	6.8	0.1	2.2	25.1	25.1	25.2	12.2	16.0	16.3	16.2	15.3
1825	6.9	6.9	6.8	6.8	0.1	2.3	24.5	24.4	24.5	11.4	15.6	15.8	15.8	14.9
1875	6.9	6.9	6.9	6.9	0.1	2.4	24.0	23.8	24.0	10.7	15.2	15.3	15.3	14.5
1925	7.0	7.0	6.9	6.9	0.1	2.4	23.6	23.3	23.5	10.1	14.7	14.9	14.9	14.1
1975	7.0	7.0	6.9	7.0	0.1	2.5	23.2	22.9	23.2	9.6	14.3	14.4	14.5	13.7
2025	7.1	7.0	7.0	7.0	0.1	2.6	23.0	22.5	22.9	9.2	14.0	14.0	14.1	13.4
2075	7.1	7.1	7.0	7.1	0.1	2.6	22.8	22.1	22.7	8.8	13.6	13.6	13.8	13.1
2125	7.2	7.1	7.0	7.1	0.1	2.7	22.6	21.8	22.5	8.5	13.3	13.3	13.5	12.8
2175	7.2	7.1	7.1	7.2	0.1	2.8	22.5	21.6	22.3	8.2	13.0	13.0	13.1	12.5
2200	7.2	7.2	7.1	7.2	0.1	2.8	22.4	21.4	22.3	8.1	12.8	12.8	13.0	12.4

1. Total Loss = Single Path (S-1 or S-2 or S-3 or S-4) Insertion Loss + 6 dB Splitter Loss

Typical Performance Data

NOTE: Use PDF Bookmarks to view DATA at required conditions

Definitions:
Input Return Loss = -S11 (dB)
Insertion Loss = -S21, -S31, -S41, -S51 (dB)
Isolation = -S24, -S34, -S45 (dB)
Output Return Loss = -S22, -S33, -S44, -S55 (dB)

TEST CONDITIONS: P_{IN} = -10 dBm @ Temperature = **+85°C**

	Total Loss[1]				Amp.	Phase	Isolation			Return Loss				
FREQ	S-1	S-2	S-3	S-4	Unbal.	Unbal.	1-3	2-3	3-4	S	1	2	3	4
(MHz)	(dB)	(dB)	(dB)	(dB)	(dB)	(Deg.)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1200	7.9	8.1	8.0	7.9	0.2	1.6	22.1	20.1	22.2	11.2	15.9	16.3	16.0	15.3
1225	7.8	7.9	7.8	7.7	0.2	1.6	23.0	20.8	23.1	12.3	16.1	16.6	16.2	15.6
1250	7.6	7.8	7.7	7.6	0.2	1.6	23.9	21.5	24.1	13.4	16.4	16.8	16.5	15.8
1275	7.5	7.6	7.6	7.5	0.2	1.6	25.0	22.3	25.1	14.6	16.6	17.1	16.8	16.0
1300	7.4	7.5	7.5	7.4	0.2	1.6	26.0	23.1	26.3	16.0	16.9	17.3	17.0	16.2
1325	7.3	7.4	7.4	7.3	0.2	1.6	27.2	23.9	27.5	17.5	17.1	17.5	17.2	16.4
1350	7.2	7.4	7.3	7.2	0.2	1.6	28.3	24.7	28.7	19.2	17.2	17.7	17.4	16.5
1375	7.2	7.3	7.2	7.1	0.2	1.6	29.4	25.4	30.0	20.8	17.4	17.8	17.6	16.6
1400	7.1	7.2	7.2	7.1	0.2	1.6	30.4	26.2	31.1	22.2	17.5	17.9	17.6	16.7
1425	7.1	7.2	7.1	7.0	0.1	1.6	31.2	26.8	32.0	23.0	17.5	18.0	17.7	16.7
1450	7.0	7.1	7.1	7.0	0.1	1.6	31.6	27.4	32.6	22.7	17.6	18.0	17.7	16.7
1475	7.0	7.1	7.0	7.0	0.1	1.6	31.6	27.8	32.6	21.7	17.5	17.9	17.7	16.7
1500	7.0	7.1	7.0	7.0	0.1	1.7	31.3	28.0	32.2	20.5	17.5	17.9	17.7	16.6
1525	7.0	7.1	7.0	6.9	0.1	1.7	30.8	28.1	31.5	19.2	17.4	17.8	17.6	16.5
1550	7.0	7.1	7.0	6.9	0.1	1.7	30.2	28.1	30.8	18.0	17.3	17.6	17.5	16.4
1575	7.0	7.0	7.0	6.9	0.1	1.7	29.5	27.9	30.0	17.0	17.2	17.5	17.3	16.3
1600	7.0	7.0	7.0	6.9	0.1	1.7	28.9	27.6	29.3	16.0	17.1	17.3	17.2	16.2
1625	7.0	7.0	7.0	6.9	0.1	1.8	28.3	27.3	28.6	15.2	16.9	17.1	17.0	16.0
1650	7.0	7.0	7.0	6.9	0.1	1.8	27.7	26.9	27.9	14.5	16.8	16.9	16.8	15.8
1675	7.0	7.0	7.0	6.9	0.1	1.8	27.2	26.6	27.4	13.9	16.6	16.7	16.6	15.6
1700	7.0	7.0	7.0	7.0	0.1	1.8	26.7	26.2	26.9	13.3	16.4	16.5	16.4	15.5
1725	7.0	7.0	7.0	7.0	0.1	1.9	26.3	25.8	26.4	12.8	16.2	16.3	16.2	15.3
1750	7.0	7.1	7.0	7.0	0.1	1.9	25.9	25.5	26.0	12.3	16.0	16.0	16.0	15.1
1775	7.0	7.1	7.0	7.0	0.1	1.9	25.5	25.2	25.6	11.9	15.8	15.8	15.7	14.9
1825	7.1	7.1	7.0	7.0	0.1	2.0	24.9	24.6	25.0	11.1	15.4	15.4	15.3	14.5
1875	7.1	7.1	7.1	7.1	0.1	2.0	24.4	24.0	24.4	10.5	15.0	14.9	14.9	14.2
1925	7.1	7.1	7.1	7.1	0.1	2.1	24.0	23.6	24.0	10.0	14.6	14.5	14.5	13.8
1975	7.2	7.2	7.1	7.1	0.1	2.2	23.7	23.1	23.7	9.5	14.3	14.1	14.1	13.5
2025	7.2	7.2	7.1	7.2	0.1	2.2	23.5	22.8	23.4	9.1	13.9	13.8	13.8	13.2
2075	7.3	7.2	7.2	7.2	0.1	2.3	23.3	22.4	23.1	8.8	13.6	13.4	13.5	12.9
2125	7.3	7.3	7.2	7.3	0.1	2.4	23.1	22.1	23.0	8.5	13.3	13.1	13.2	12.6
2175	7.4	7.3	7.2	7.3	0.1	2.4	23.0	21.8	22.8	8.2	13.0	12.8	12.9	12.3
2200	7.4	7.3	7.2	7.3	0.2	2.5	22.9	21.7	22.7	8.1	12.8	12.6	12.7	12.2

1. Total Loss = Single Path (S-1 or S-2 or S-3 or S-4) Insertion Loss + 6 dB Splitter Loss

Typical Performance Data

NOTE: Use PDF Bookmarks to view DATA at required conditions

Definitions:
Input Return Loss = -S11 (dB)
Insertion Loss = -S21, -S31, -S41, -S51 (dB)
Isolation = -S24, -S34, -S45 (dB)
Output Return Loss = -S22, -S33, -S44, -S55 (dB)

TEST CONDITIONS: P_{IN} = -10 dBm @ Temperature = **+105°C**

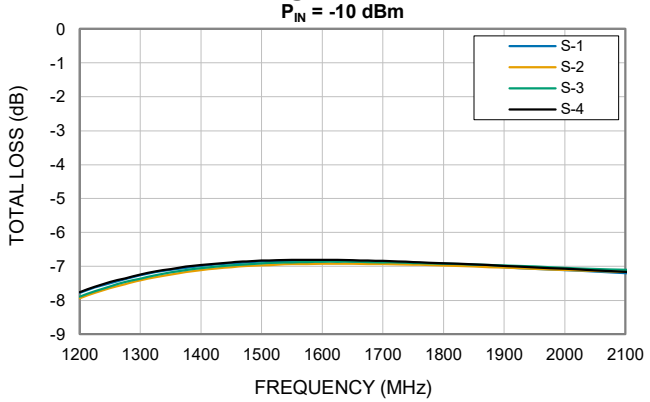
	Total Loss[1]				Amp.	Phase	Isolation			Return Loss				
FREQ	S-1	S-2	S-3	S-4	Unbal.	Unbal.	1-3	2-3	3-4	S	1	2	3	4
(MHz)	(dB)	(dB)	(dB)	(dB)	(dB)	(Deg.)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
1200	7.9	8.1	8.0	7.9	0.2	1.8	22.1	20.1	22.2	11.4	15.8	16.3	15.9	15.3
1225	7.8	7.9	7.9	7.8	0.2	1.8	23.0	20.8	23.1	12.5	16.1	16.5	16.2	15.5
1250	7.6	7.8	7.7	7.6	0.2	1.8	23.9	21.5	24.1	13.6	16.3	16.8	16.5	15.7
1275	7.5	7.7	7.6	7.5	0.2	1.7	24.9	22.3	25.1	14.9	16.6	17.0	16.7	15.9
1300	7.4	7.6	7.5	7.4	0.2	1.8	26.0	23.0	26.2	16.3	16.8	17.2	16.9	16.1
1325	7.3	7.5	7.4	7.3	0.2	1.8	27.1	23.8	27.4	17.8	17.0	17.4	17.2	16.3
1350	7.3	7.4	7.3	7.2	0.2	1.8	28.2	24.6	28.6	19.5	17.1	17.6	17.3	16.4
1375	7.2	7.3	7.3	7.2	0.2	1.8	29.2	25.3	29.8	21.1	17.2	17.7	17.5	16.5
1400	7.1	7.3	7.2	7.1	0.1	1.8	30.2	26.1	30.9	22.4	17.3	17.8	17.5	16.6
1425	7.1	7.2	7.1	7.1	0.1	1.8	30.9	26.7	31.8	23.0	17.4	17.8	17.6	16.6
1450	7.1	7.2	7.1	7.0	0.1	1.8	31.4	27.2	32.3	22.6	17.4	17.8	17.6	16.6
1475	7.0	7.1	7.1	7.0	0.1	1.8	31.4	27.6	32.3	21.5	17.4	17.8	17.6	16.5
1500	7.0	7.1	7.0	7.0	0.1	1.8	31.2	27.9	32.0	20.2	17.4	17.7	17.5	16.5
1525	7.0	7.1	7.0	7.0	0.1	1.8	30.7	28.0	31.4	18.9	17.3	17.6	17.4	16.4
1550	7.0	7.1	7.0	7.0	0.1	1.8	30.1	27.9	30.7	17.8	17.2	17.5	17.3	16.3
1575	7.0	7.1	7.0	7.0	0.1	1.8	29.5	27.8	30.0	16.8	17.1	17.4	17.2	16.2
1600	7.0	7.1	7.0	7.0	0.1	1.8	28.9	27.5	29.3	15.9	16.9	17.2	17.0	16.0
1625	7.0	7.1	7.0	7.0	0.1	1.9	28.3	27.2	28.6	15.1	16.8	17.0	16.9	15.8
1650	7.0	7.1	7.0	7.0	0.1	1.9	27.7	26.9	28.0	14.4	16.6	16.8	16.7	15.7
1675	7.0	7.1	7.0	7.0	0.1	1.9	27.2	26.5	27.4	13.7	16.4	16.6	16.5	15.5
1700	7.0	7.1	7.0	7.0	0.1	1.9	26.7	26.2	26.9	13.2	16.2	16.4	16.3	15.3
1725	7.0	7.1	7.0	7.0	0.1	2.0	26.3	25.8	26.5	12.7	16.1	16.2	16.1	15.2
1750	7.0	7.1	7.0	7.0	0.1	2.0	25.9	25.5	26.1	12.2	15.9	15.9	15.9	15.0
1775	7.1	7.1	7.0	7.0	0.1	2.0	25.6	25.2	25.7	11.8	15.7	15.7	15.6	14.8
1825	7.1	7.1	7.0	7.1	0.1	2.1	25.0	24.6	25.0	11.1	15.3	15.3	15.2	14.4
1875	7.1	7.1	7.1	7.1	0.1	2.2	24.5	24.0	24.5	10.5	14.9	14.9	14.8	14.1
1925	7.2	7.2	7.1	7.1	0.1	2.2	24.1	23.6	24.1	9.9	14.5	14.5	14.4	13.7
1975	7.2	7.2	7.1	7.2	0.1	2.3	23.8	23.2	23.8	9.5	14.2	14.1	14.1	13.4
2025	7.2	7.2	7.1	7.2	0.1	2.4	23.6	22.8	23.5	9.1	13.8	13.7	13.7	13.1
2075	7.3	7.3	7.2	7.2	0.1	2.4	23.3	22.5	23.2	8.8	13.5	13.4	13.4	12.8
2125	7.3	7.3	7.2	7.3	0.1	2.5	23.2	22.2	23.0	8.5	13.2	13.0	13.1	12.5
2175	7.4	7.3	7.2	7.3	0.2	2.6	23.1	21.9	22.9	8.2	12.9	12.7	12.8	12.3
2200	7.4	7.3	7.2	7.3	0.2	2.6	23.0	21.7	22.8	8.1	12.7	12.6	12.7	12.1

1. Total Loss = Single Path (S-1 or S-2 or S-3 or S-4) Insertion Loss + 6 dB Splitter Loss

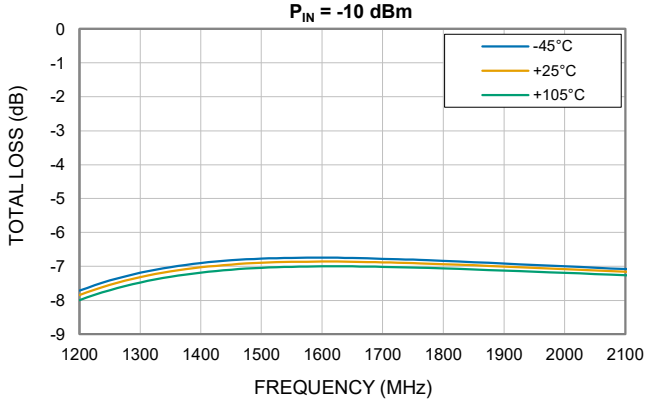
Typical Performance Curves

Note: The following data was taken on Mini-Circuits Characterization Test Board TB-WP4G1AC+ (Figure 2).

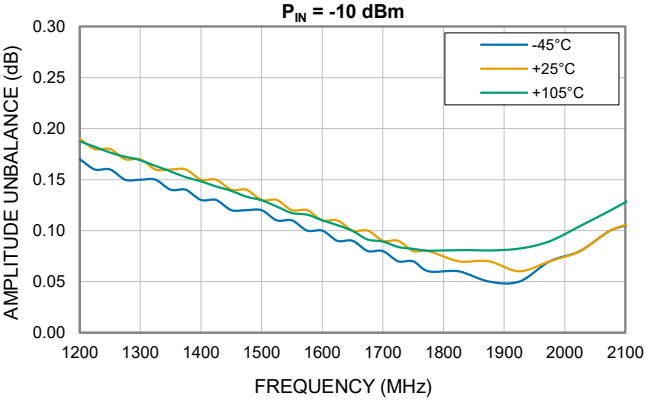
TOTAL LOSS[3] @ TEMPERATURE = +25°C
P_{IN} = -10 dBm



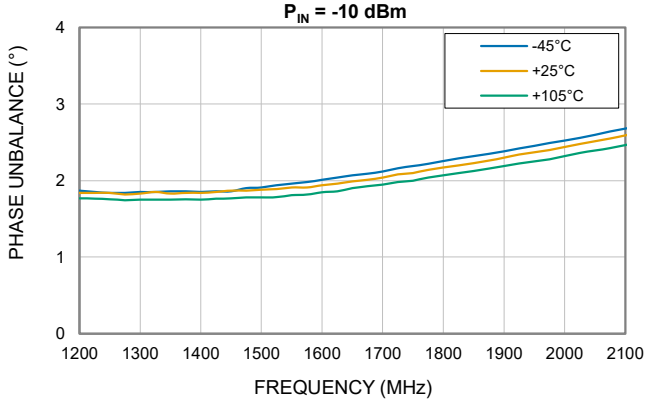
TOTAL LOSS[4] vs TEMPERATURE,
P_{IN} = -10 dBm



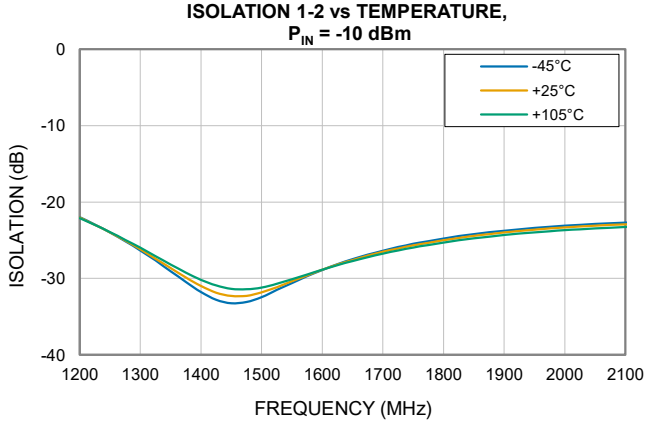
AMPLITUDE UNBALANCE vs TEMPERATURE,
P_{IN} = -10 dBm



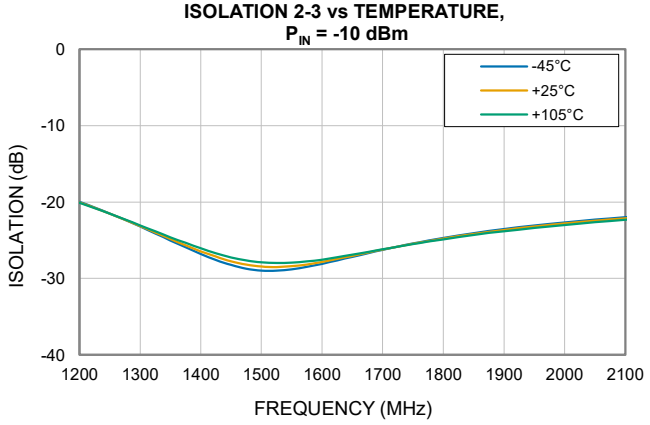
PHASE UNBALANCE vs TEMPERATURE,
P_{IN} = -10 dBm



ISOLATION 1-2 vs TEMPERATURE,
P_{IN} = -10 dBm



ISOLATION 2-3 vs TEMPERATURE,
P_{IN} = -10 dBm

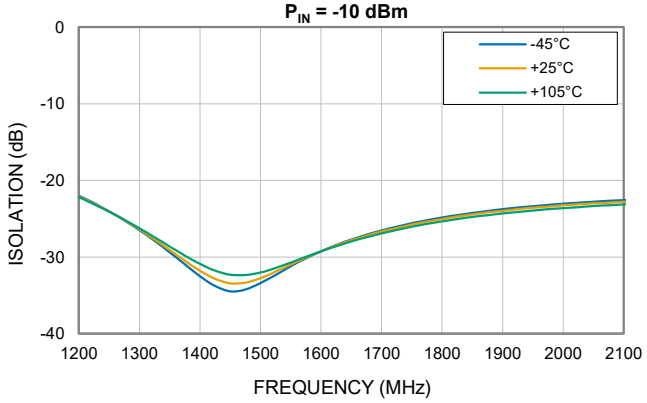


3. Total Loss = Single Path (S-1 or S-2 or S-3 or S-4) Insertion Loss + 6 dB Splitter Loss
4. Average of Four Paths' Total Loss

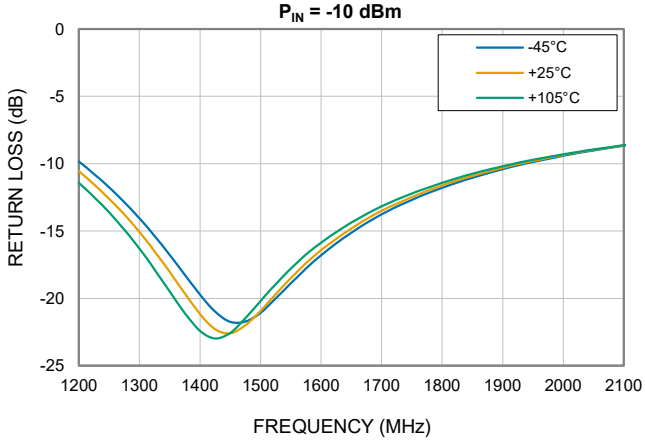
Typical Performance Curves

Note: The following data was taken on Mini-Circuits Characterization Test Board TB-WP4G1AC+ (Figure 2).

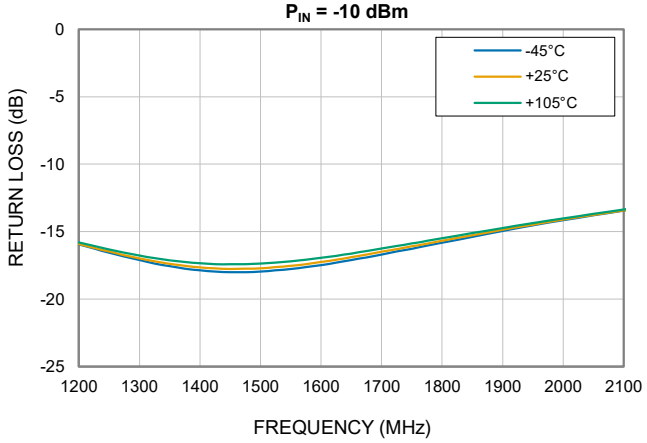
ISOLATION 3-4 vs TEMPERATURE, P_{IN} = -10 dBm



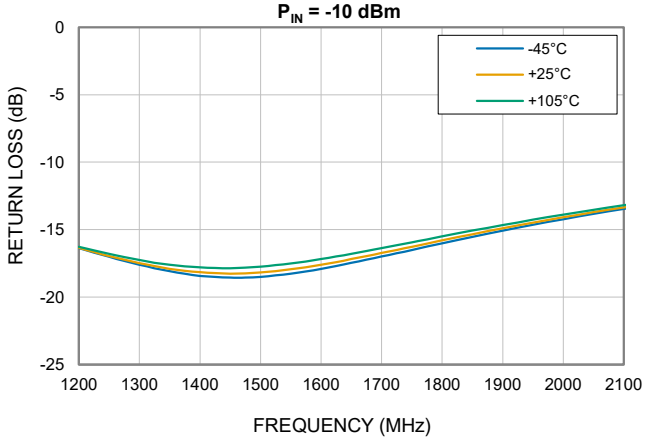
RETURN LOSS PORT S vs TEMPERATURE, P_{IN} = -10 dBm



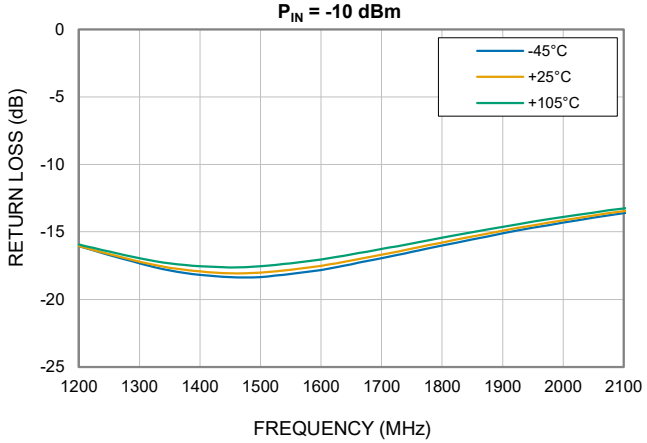
RETURN LOSS PORT 1 vs TEMPERATURE, P_{IN} = -10 dBm



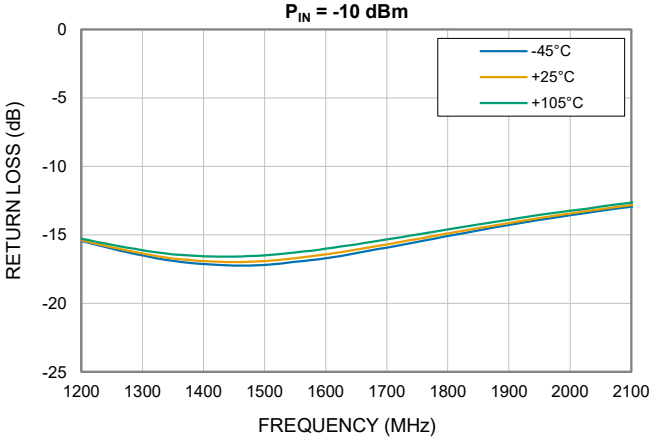
RETURN LOSS PORT 2 vs TEMPERATURE, P_{IN} = -10 dBm



RETURN LOSS PORT 3 vs TEMPERATURE, P_{IN} = -10 dBm



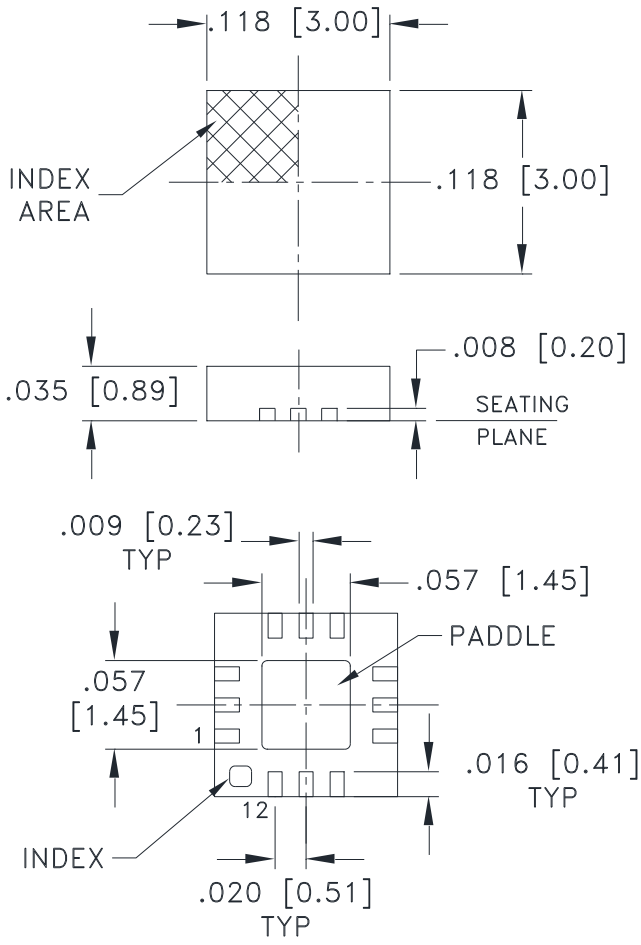
RETURN LOSS PORT 4 vs TEMPERATURE, P_{IN} = -10 dBm



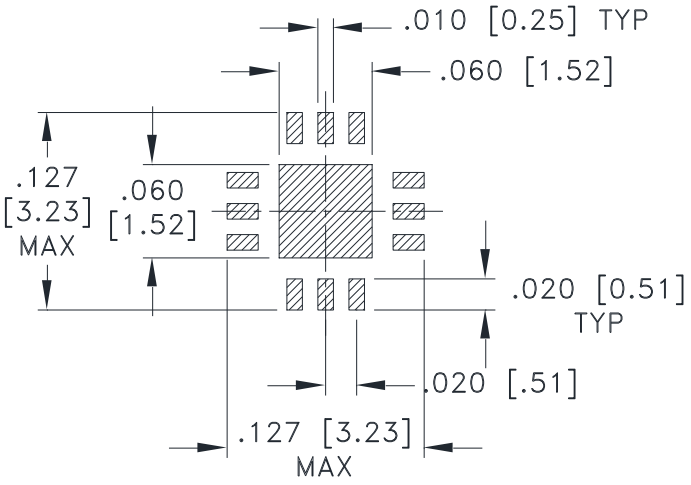
Case Style DQ

DQ1225

Outline Dimensions



PCB Land Pattern



SUGGESTED LAYOUT,
TOLERANCE TO BE WITHIN ±.002

Weight: .02 Grams

Dimensions are in inches (mm). Tolerances: 2Pl. ± .01; 3 Pl. ± .004

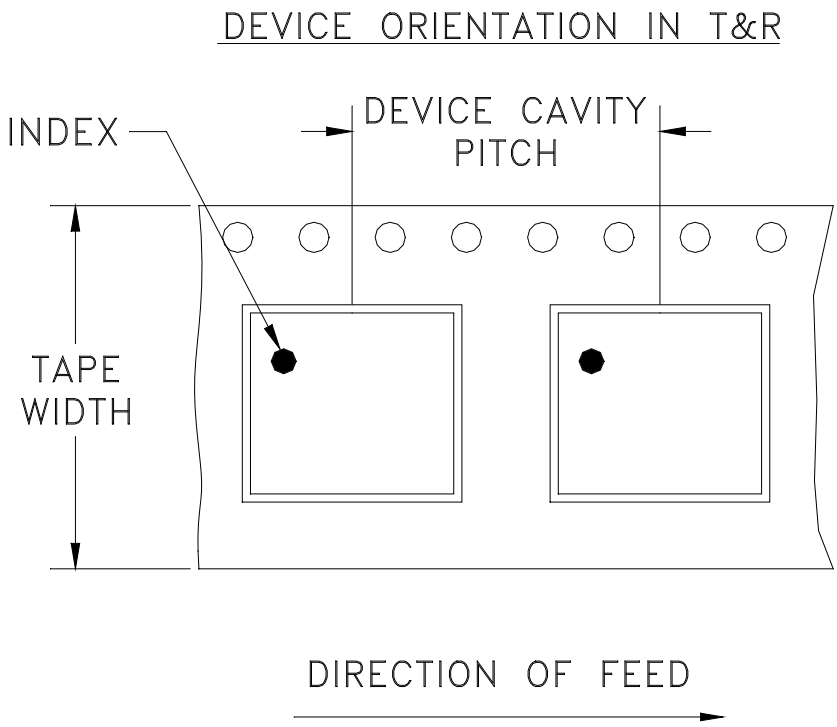
Notes:

1. Case material: Plastic.
2. Termination finish:
   - For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin. All models, (+) suffix. See Data sheet.
   - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

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Tape & Reel Packaging TR-F66



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
8	4	7	Small quantity standard	20
				50
				100
				200
				500
		7	Standard	1000, 2000, 3000

Note: Please consult individual model data sheet to determine device per reel availability.

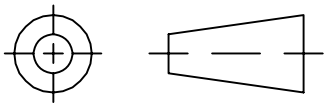
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

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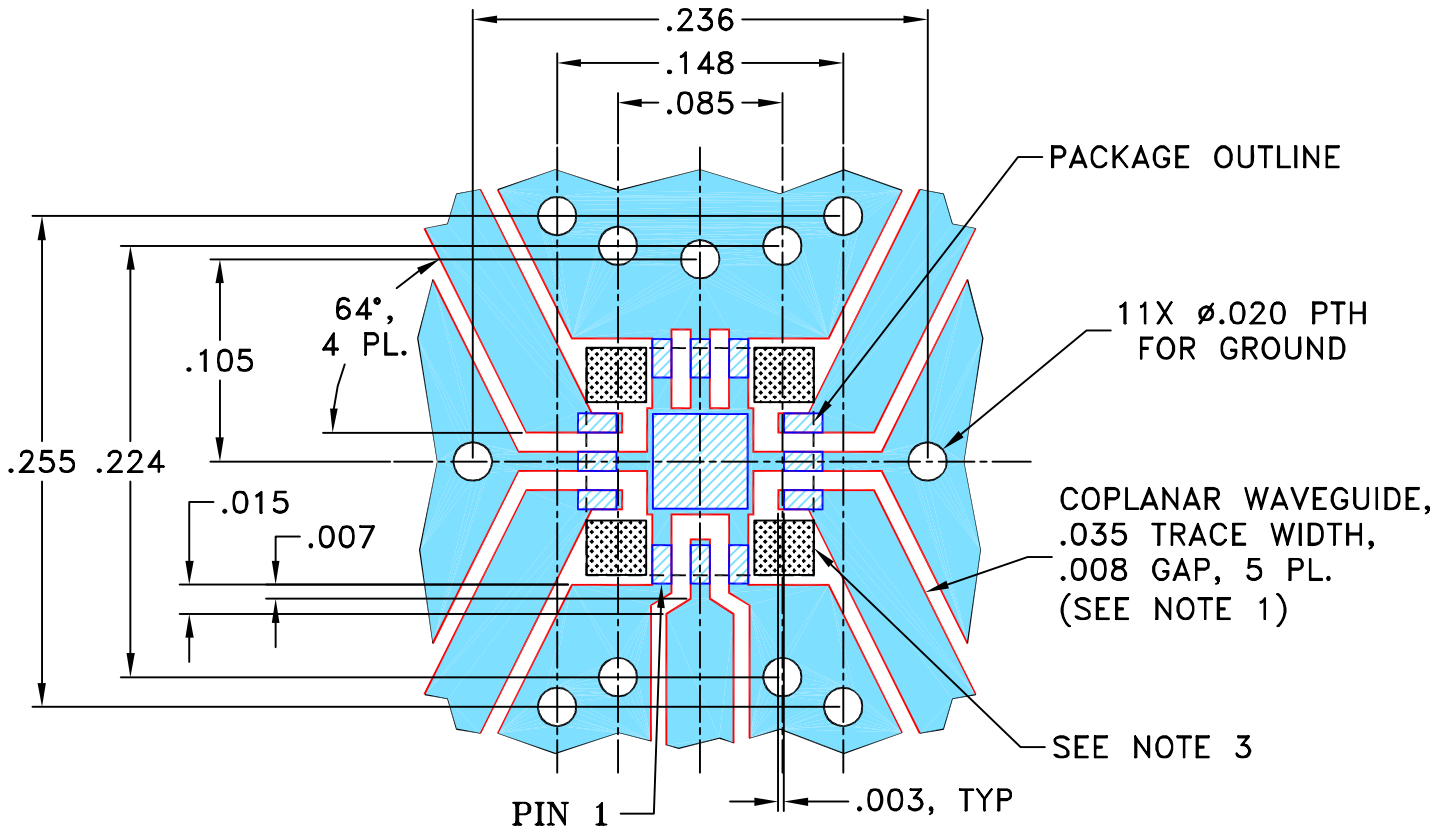
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THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M109251	NEW RELEASE	01/11/07	PW	WP
A	M112849	UPDATED NOTE 3	08/03/07	AV	WP

SUGGESTED MOUNTING CONFIGURATION FOR DQ1225 CASE STYLE, "rx" PIN CONNECTION



NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020" ± .0015"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
3. SIGNAL TRACES ARE NOT ALLOWED INSIDE HATCHED AREAS (APPROX. .030 X .030) AT 4 PLACES AS SHOWN.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	PW	01/10/07
TOLERANCES ON:	CHECKED	IL	01/11/07
2 PL DECIMALS ±	APPROVED	WP	01/11/07
3 PL DECIMALS ± .005			
ANGLES ± 1°			
FRACTIONS ±			

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ASHEETA1.DWG REV:A DATE:01/12/95

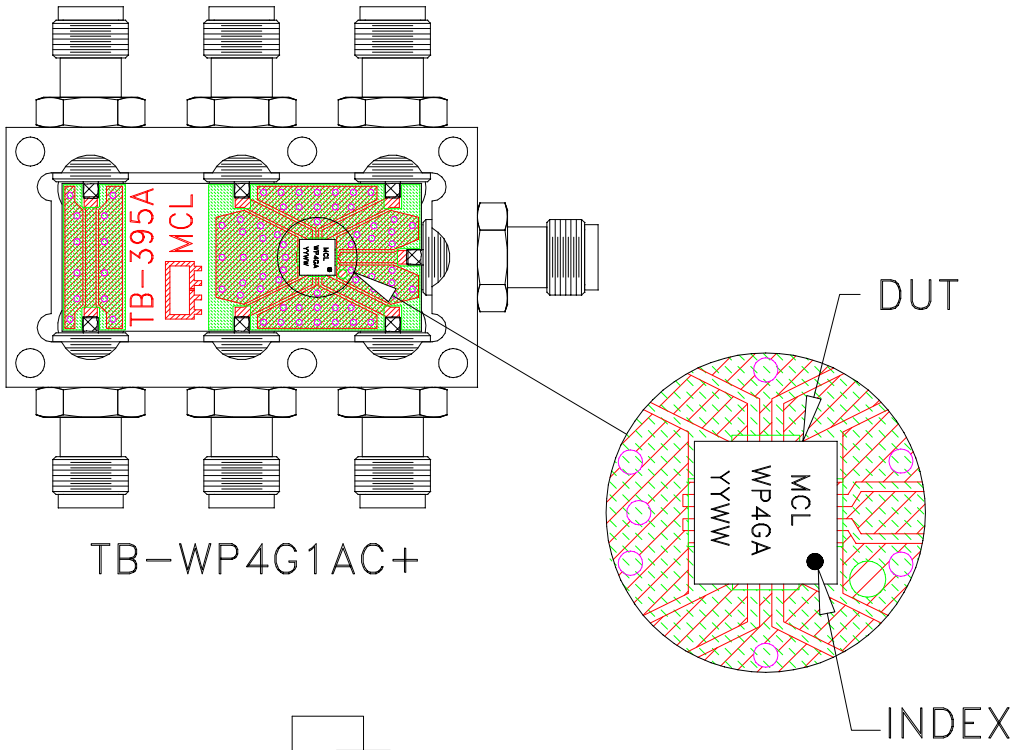
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, rx, DQ1225, WP4, TB-395+

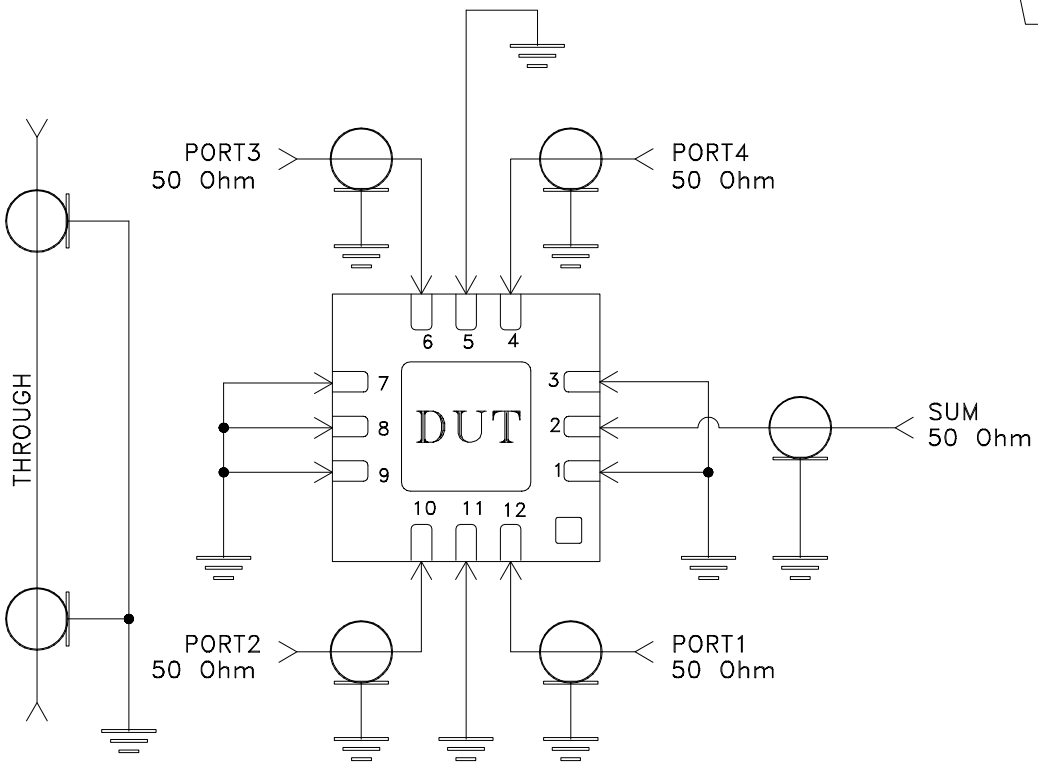
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-259	A

FILE:	SCALE:	SHEET:
98PL259	10:1	1 OF 1

Evaluation Board and Circuit



TB-WP4G1AC+



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.020 inch.

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Environmental Specifications **ENV08T1**

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85° C or -45° to 85° C or -55° to 105° C or -40° to 105° C or -40° to 95° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C or -65° to 150° Ambient Environment	Individual Model Data Sheet
HTOL	1000 hours at 125°C	MIL-STD-883, Method 1005, Condition B
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Mechanical Shock	1.5Kg, 0.5 ms, 5 shock pulses, Y1 direction only	MIL-STD-883, Method 2002, Condition B, except Y1 direction only
Vibration (Variable Frequency)	50g peak	MIL-STD-883, Method 2007, Condition B
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102, Condition C
HAST	130°C, 85% RH, 96 hours	JESD22-A110
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Solder Reflow Heat	Sn-Pb Eutetic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1
Moisture Sensitivity: Level 1	Bake at 125°C for 24 hours Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 260°C peak	J-STD-020

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All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215

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