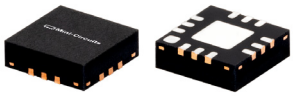
MMIC SURFACE MOUNT

Power Splitter/Combiner WP4NA+

50Ω 1215 to 1900 MHz

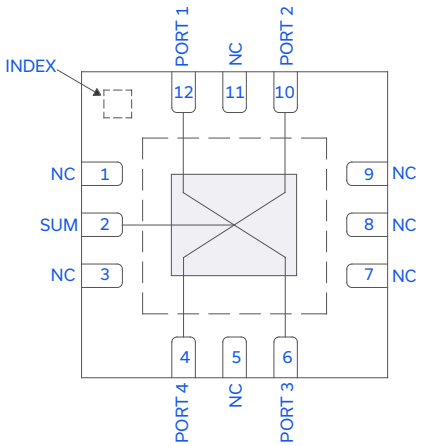
FEATURES

- Wide Bandwidth, 1215 to 1900 MHz
- Excellent Insertion Loss, Typ. 1.0 dB
- Excellent Amplitude Unbalance, Typ. 0.16 dB
- Good Phase Unbalance, Typ. 1.6 Deg
- Power Handling as a Splitter, Max 5 W
- 3x3 mm 12-Lead QFN-Style Package



Generic photo used for illustration purposes only

FUNCTIONAL DIAGRAM



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' WP4NA+ is a 50Ω GaAs MMIC 4-way splitter/combiner that operates from 1215 to 1900 MHz. The WP4NA+ provides typical performance of 1.0 dB insertion loss, 29 dB isolation, 0.16 dB amplitude unbalance, and 1.6 deg phase unbalance. In conjunction, it has excellent power handling capabilities of 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 minimum signal power loss through the device, limiting the need for compensating power requirements at the respective outputs.
Excellent Unbalance • Amplitude Unbalance, Typ. 0.16 dB • Phase Unbalance, Typ. 1.6 deg.	Strong Unbalance characteristics allow for low signal distortion and maintaining signal integrity when splitting RF signals between respective outputs.
3x3 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.

REV. A
ECO-026468
WP4NA
MCL NY
250806

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

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Frequency Range		1215		1900	MHz
Insertion Loss (Above 6.0 dB Splitter Loss)	1215		1.9	2.5	dB
	1500		1.0	1.7	
	1800		1.0	1.8	
	1900		1.1	2.0	
Isolation	1215	16	21		dB
	1500	24	29		
	1800	21	25		
	1900	20	24		
Amplitude Unbalance	1215		0.20	0.7	dB
	1500		0.16	0.6	
	1800		0.13	0.7	
	1900		0.14	0.7	
Phase Unbalance	1215		1.5	7	Degrees
	1500		1.6	7	
	1800		1.9	7	
	1900		2.0	8	
Return Loss (Sum Port)	1215		11		dB
	1500		21		
	1800		12		
	1900		10		
Return Loss (Ports 1, 2, 3, 4)[2]	1215		16		dB
	1500		18		
	1800		15		
	1900		14		

1. Tested on Mini-Circuits Characterization Test Board TB-WP4NAC+. See Figure 2. Board loss de-embedded to the device.
2. Typical values displayed are the worst case among Port 1, Port 2, Port 3, and Port 4.

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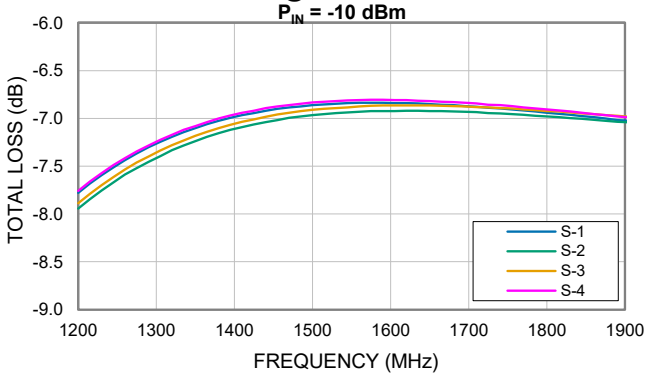
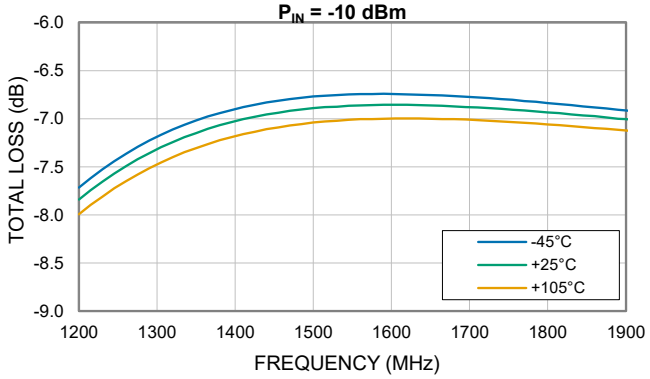
TYPICAL PERFORMANCE GRAPHS

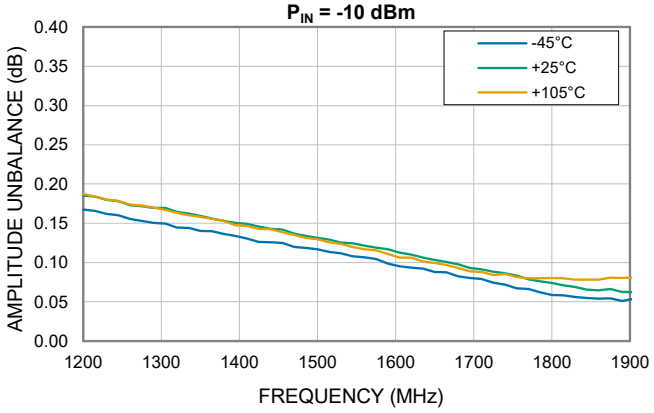
TOTAL LOSS[3] @ TEMPERATURE = +25°C
P_{IN} = -10 dBm



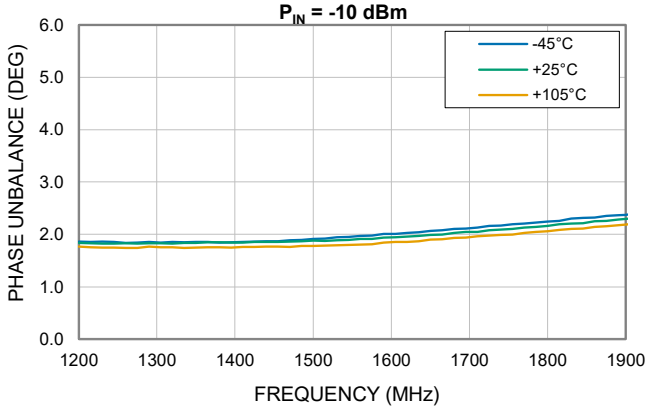
TOTAL LOSS[4] vs TEMPERATURE,
P_{IN} = -10 dBm



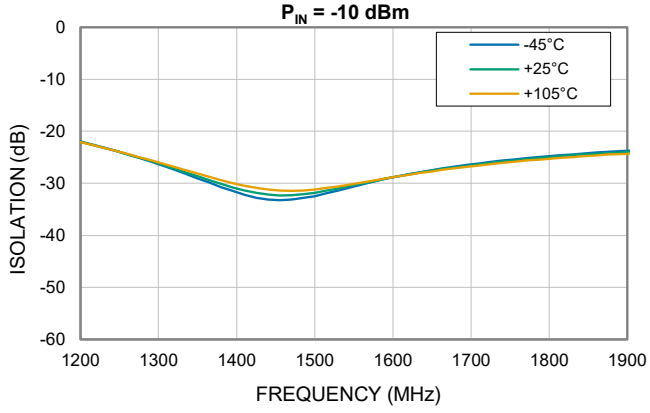
AMPLITUDE UNBALANCE vs TEMPERATURE,
P_{IN} = -10 dBm



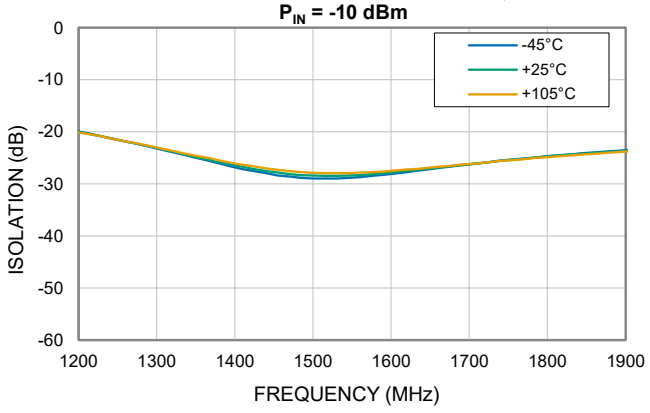
PHASE UNBALANCE vs TEMPERATURE,
P_{IN} = -10 dBm



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

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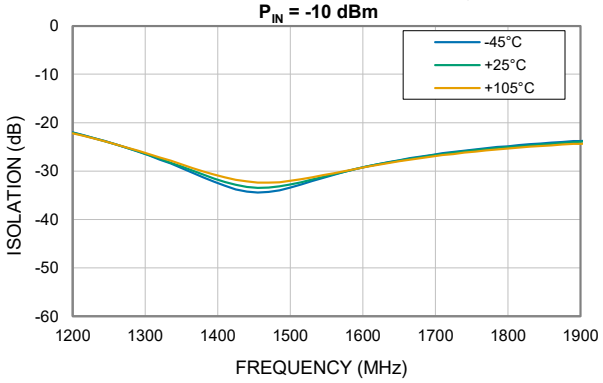
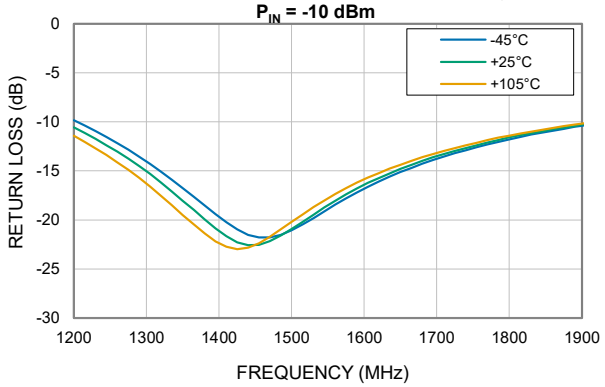
TYPICAL PERFORMANCE GRAPHS

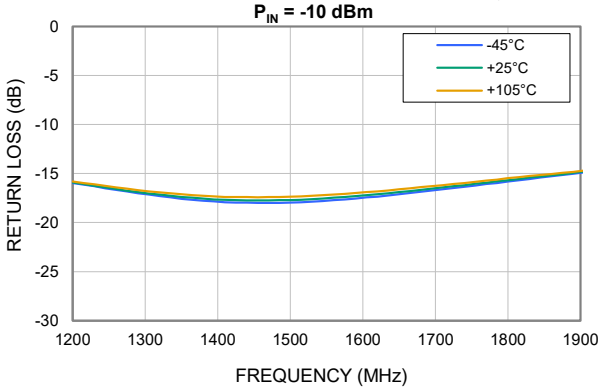
ISOLATION 3-4 vs TEMPERATURE,
P_{IN} = -10 dBm



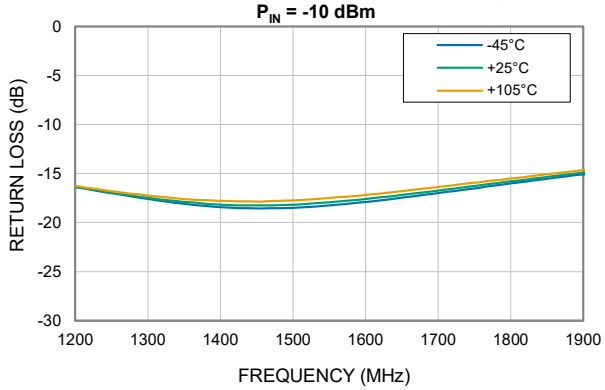
RETURN LOSS PORT S vs TEMPERATURE,
P_{IN} = -10 dBm



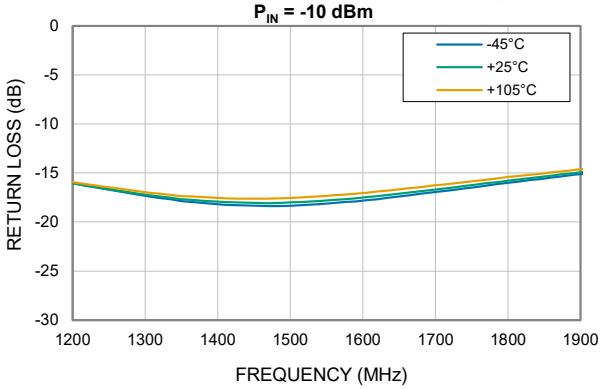
RETURN LOSS PORT 1 vs TEMPERATURE,
P_{IN} = -10 dBm



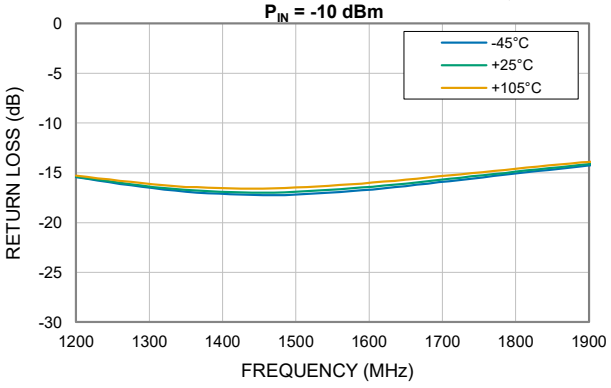
RETURN LOSS PORT 2 vs TEMPERATURE,
P_{IN} = -10 dBm



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



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



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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
Power Input (CW)	As a Splitter[7]	+ 34 dBm
	As a Combiner[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

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FUNCTIONAL DIAGRAM

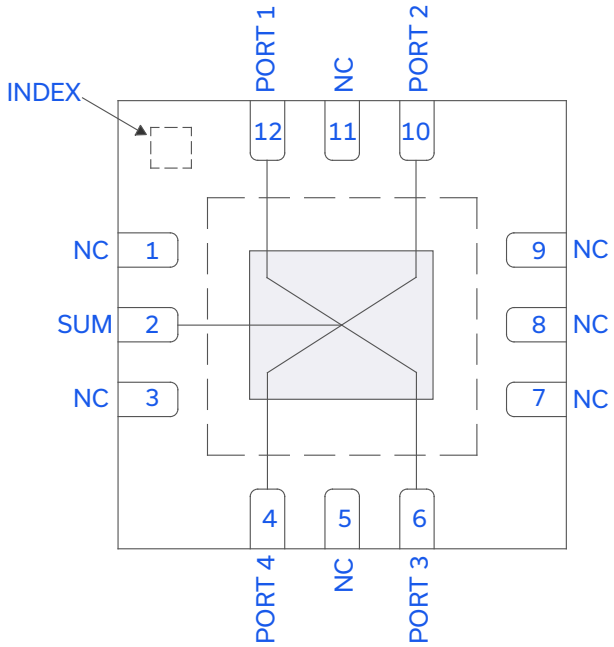

Figure 1. WP4NA+ Functional Diagram

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

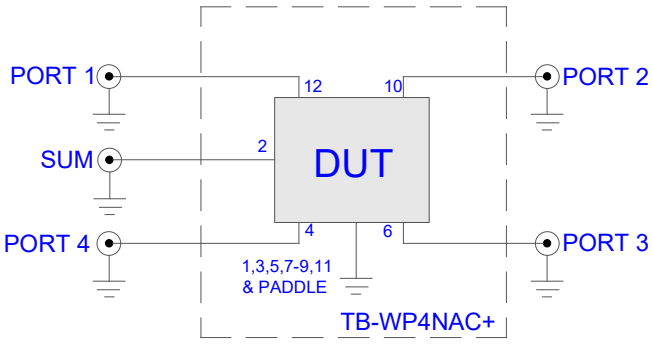

Figure 2. WP4NA+ Characterization and Application Circuit.

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

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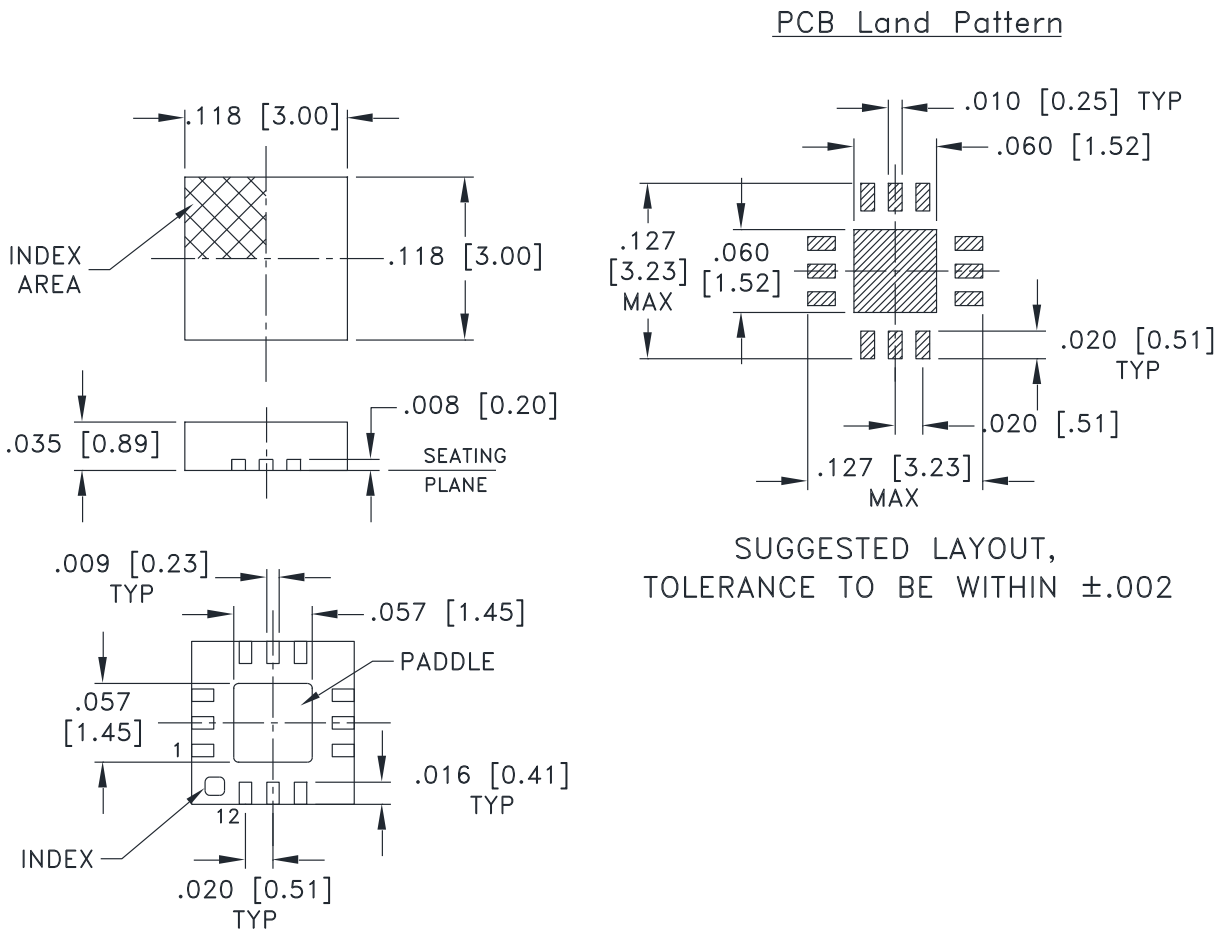
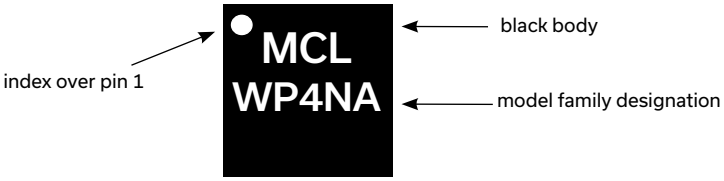
CASE STYLE DRAWING



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

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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-WP4NAC+ 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-Circuit's 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