MMIC WIDEBAND

Bias Tee Die

MBT-283-D+

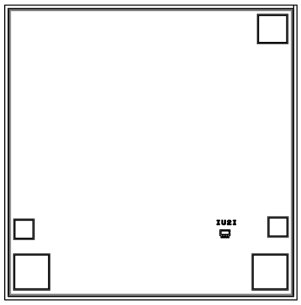
50Ω 1.5 to 20 GHz

THE BIG DEAL

- Extremely Wideband, 1.5 to 20 GHz, Usable up to 28 GHz
- Very low insertion loss, 0.7 dB typ.
- Good return loss, 19 dB typ.
- Excellent Isolation, 48 dB typ.

APPLICATIONS

- Biasing Amplifiers
- Biasing laser diodes
- Biasing of active antennas



+RoHS Compliant
The +Suffix identifies RoHS Compliance.
See our website for methodologies and qualifications

SEE ORDERING INFORMATION ON THE LAST PAGE

PRODUCT OVERVIEW

Mini-Circuits' MBT-283-D+ is an ultra-wideband MMIC surface mount bias tee die covering applications from 1.5 GHz to 20 GHz with low insertion loss, excellent return loss, and high DC-RF isolation over its entire frequency range. This model is capable of handling up to +30 dBm (1W) RF input power and DC input current up to 500mA.

KEY FEATURES

Feature	Advantages
Ultra-wideband, 1.5 to 20 GHz	Supports a wide range of applications with a single device, including biasing broadband amplifier, laser diodes, active antennas and more.
Low insertion loss, 0.7 dB	Preserves signal strength from input to output and minimizes overall system loss
Excellent return loss, 20 dB typ.	Provides excellent matching for 50Ω systems with minimal signal reflection.
RF power handling up to 1W	This model supports applications with a variety of power requirements.
Excellent DC-RF isolation • 50 dB, 1.5 to 10 GHz • 48 dB, 10 to 20 GHz	Minimizes RF leakage and interference with other elements in the system.
Unpackaged Die	Enables users to integrate it directly into hybrids.

ELECTRICAL SPECIFICATIONS[1] AT +25°C, UNLESS NOTED OTHERWISE

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Frequency Range		1500		20000	MHz
Insertion Loss	1500 - 10000		0.7		dB
	10000 - 20000		0.7		
	20000 - 28000		2.1		
Isolation (RF Port to DC Port)	1500 - 10000		50		dB
	10000 - 20000		48		
	20000 - 28000		47		
Return Loss	1500 - 10000		19		dB
	10000 - 20000		18		
	20000 - 28000		8		
DC resistance from DC to RF & DC port			1.9		Ohm

1. Electrical specifications are measured Die Characterization Test Board

ABSOLUTE MAXIMUM RATINGS[2]

Parameter	Ratings
Operating Temperature	-40°C to +85°C
RF Power	+30 dBm
Voltage at DC Port[3]	+35 V
Current at DC Port[3]	500 mA

2. Permanent damage may occur if any of these limits are exceeded.
3. Die is packaged in 3.5 x 2.5mm, 16-lead MCLP package.

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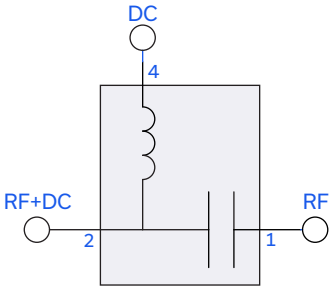
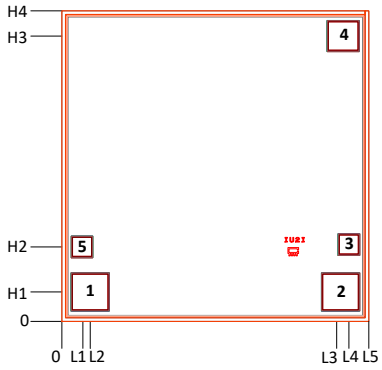
SIMPLIFIED SCHEMATIC



PAD CONNECTIONS

Pad Number	Description
1	RF PORT
2	RF+DC PORT
3,5 & Bottom of Die	GROUND
4	DC PORT

BONDING PAD POSITION

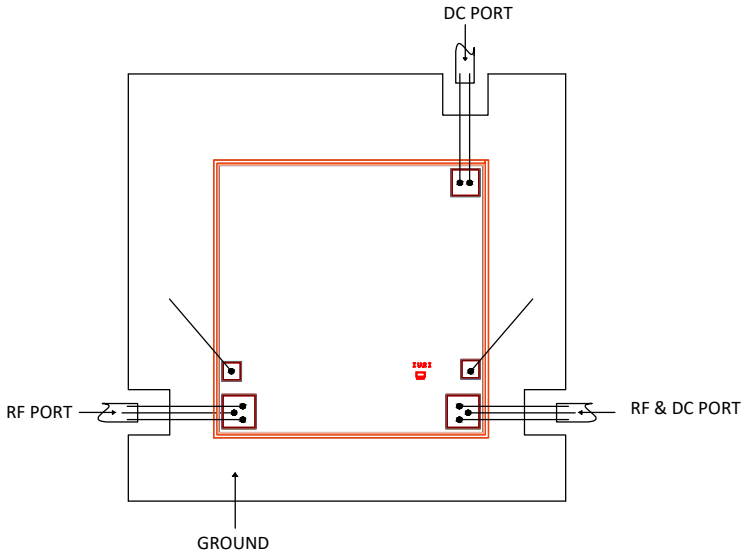


Dimensions in µm, Typical

L1	L2	L3	L4	L5	H1	H2	H3	H4
85	119	1176	1211	1295	124	314	1204	1310

Thickness	Die size	Pad size 1&2	Pad size 3&5	Pad size 4
100	1295 x 1310	150 x 150	80 x 80	125 x 120

ASSEMBLY DIAGRAM



ASSEMBLY PROCEDURE

1. Storage
   Dice should be stored in a dry nitrogen purged desiccators or equivalent.
2. ESD
   MMIC bias-tee dice are susceptible to electrostatic and mechanical damage. Die are supplied in antistatic protected material, which should be opened in clean room conditions at an appropriately grounded anti-static workstation. Devices need careful handling using correctly designed collets, vacuum pickup tips or sharp antistatic tweezers to deter ESD damage to dice.
3. Die Attach
   The die mounting surface must be clean and flat. Using conductive silver filled epoxy, recommended epoxies are Ablestik 84-1LMISR4. Apply sufficient epoxy to meet required epoxy bond line thickness, epoxy fillet height and epoxy coverage around total die periphery. Parts shall be cured in a nitrogen filled atmosphere per manufacturer's cure condition. It is recommended to use antistatic die pick up tools only.
4. Wire Bonding
   Bond pad openings in the surface passivation above the bond pads are provided to allow wire bonding to the dice gold bond pads. Thermo-sonic bonding is used with minimized ultrasonic content. Bond force, time, ultrasonic power and temperature are all critical parameters. Suggested wire is pure gold, 1mil diameter. Bonds must be made from the bond pads on the die to the packaged or substrate. All bond wires should be kept as short as low as reasonable to minimize performance degradation due to undesirable series inductance.

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ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD.

Performance Data	Data Table Swept Graphs S-Parameter (S3P Files) Data Set with port extension (.zip file)	
Case Style	Die	
Die Ordering and packaging information	Quantity, Package Small, Gel - Pak: 5,10,50,100 KGD* Medium†, Partial wafer: KGD*<1024 †Available upon request contact sales representative Refer to AN-60-067	Model No. MBT-283-DG+ MBT-283-DP+
Environmental Ratings	ENV80	

*Known Good Die ("KGD") means that the dice in question have been subjected to Mini-Circuits DC test performance criteria and measurement instructions and that the parametric data of such dice fall within a predefined range. While DC testing is not definitive, it does provide a higher degree of confidence that die are capable of meeting typical RF electrical parameters specified by Mini-Circuits.

ESD RATING**

Human Body Model (HBM): Class 1B (500 V) in accordance with ANSI/ESD STM 5.1 - 2001

** Tested in 3.5x2.5mm, 16-lead MCLP package.

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.

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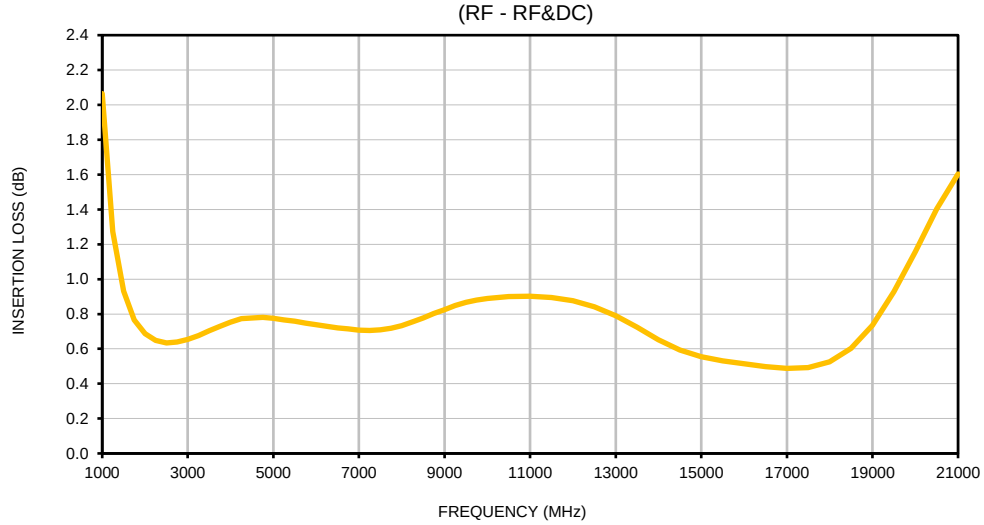
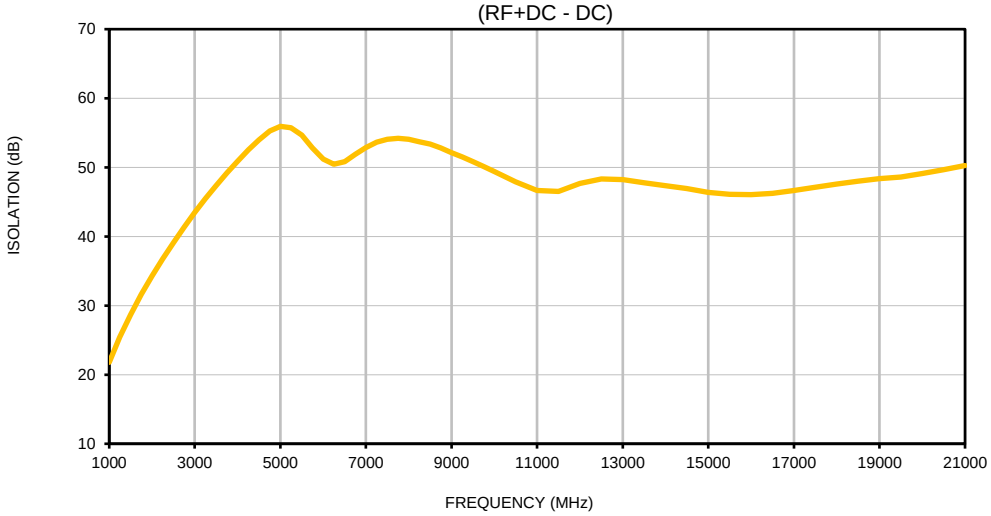
FREQ.	INSERTION LOSS RF - RF&DC	ISOLATION RF&DC - DC	VSWR RF&DC
(MHz)	(dB)	(dB)	(:1)
1000	2.06	21.78	2.63
1250	1.27	25.46	1.95
1500	0.93	28.70	1.62
1750	0.77	31.61	1.45
2000	0.69	34.27	1.35
2250	0.65	36.76	1.31
2500	0.63	39.09	1.30
2750	0.64	41.33	1.32
3000	0.65	43.46	1.35
3250	0.68	45.48	1.38
3500	0.70	47.37	1.41
3750	0.73	49.20	1.43
4000	0.75	50.87	1.44
4250	0.77	52.54	1.45
4500	0.78	53.97	1.43
4750	0.78	55.25	1.41
5000	0.77	55.94	1.37
5250	0.77	55.73	1.32
5500	0.76	54.67	1.27
5750	0.75	52.84	1.23
6000	0.74	51.22	1.18
6250	0.73	50.47	1.14
6500	0.72	50.83	1.12
6750	0.71	51.89	1.10
7000	0.71	52.84	1.09
7250	0.71	53.66	1.10
7500	0.71	54.09	1.11
7750	0.72	54.20	1.13
8000	0.73	54.07	1.16
8250	0.75	53.72	1.20
8500	0.78	53.36	1.23
8750	0.80	52.79	1.26
9000	0.83	52.12	1.28
9250	0.85	51.50	1.29
9500	0.87	50.84	1.30
9750	0.88	50.14	1.30
10000	0.89	49.37	1.29
10500	0.90	47.91	1.25
11000	0.90	46.64	1.20
11500	0.90	46.50	1.15
12000	0.88	47.70	1.11
12500	0.84	48.31	1.07
13000	0.79	48.23	1.04
13500	0.72	47.79	1.01
14000	0.65	47.33	1.03
14500	0.59	46.93	1.09
15000	0.55	46.40	1.15
15500	0.53	46.08	1.20
16000	0.51	46.04	1.23
16500	0.50	46.25	1.24
17000	0.49	46.64	1.25
17500	0.49	47.11	1.25
18000	0.52	47.58	1.29
18500	0.60	47.98	1.38
19000	0.74	48.37	1.51
19500	0.93	48.61	1.70
20000	1.16	49.09	1.91
20500	1.40	49.67	2.11
21000	1.60	50.26	2.25

Typical Performance Curves

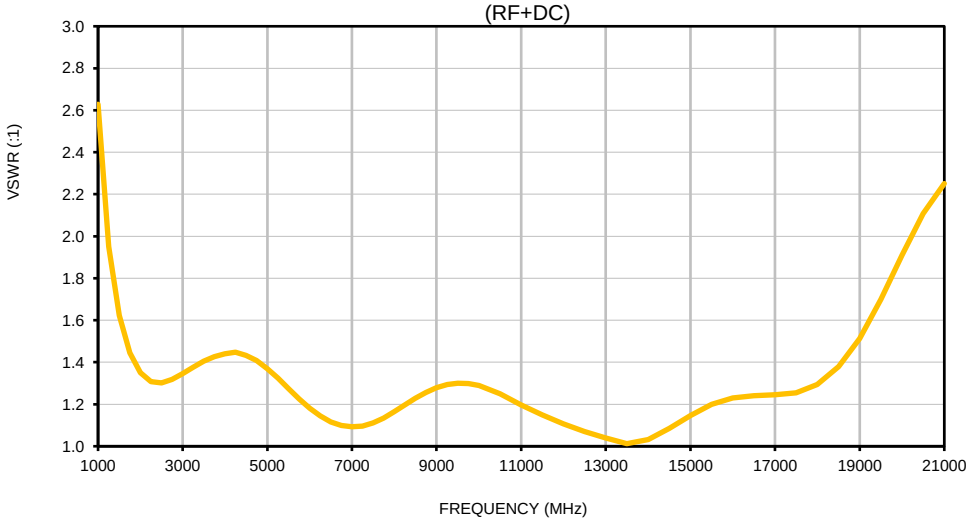
INSERTION LOSS
(RF - RF&DC)



ISOLATION
(RF+DC - DC)



VSWR
(RF+DC)



Mini-Circuits

Environmental Specifications ENV80

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 -40° to 105° C or -55° to 105° C or -45° to 105° C Ambient Environment	Refer to Individual Model Data Sheet
Storage Environment (Die)	-65° to 150°C	Individual Model Data Sheet
Storage Environment(Packaging)	-40° to 70°C and 40 to 60% humidity (In Factory Shipped Package)	

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