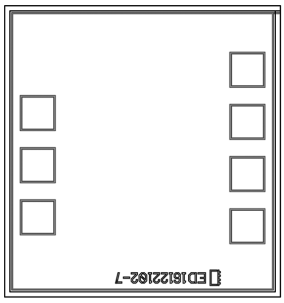
MMIC Balun

RF Transformer Die

MTY2-243-D+

50Ω 10 to 24 GHz



The Big Deal

- Wideband, 10 to 24 GHz
- Low insertion loss, 1.0 dB to 20 GHz
- Low unbalance, 0.7 dB, 6°
- Power handling up to +31 dBm

Product Overview

Mini-Circuits' MTY2-243-D+ is a wideband MMIC balun transformer GaAs with an impedance ratio of 2:1 covering a wide range of applications from 10 to 24 GHz. Fabricated using HBT process technology, this model provides outstanding repeatability with low insertion loss, low amplitude unbalance, low phase unbalance, and RF input power handling up to +31 dBm (1.25W).

Key Features

Feature	Advantages
Wideband, 10 to 24 GHz	MTY2-243-D+ supports a broad variety of applications including instrumentation, radar, SATCOM and more.
Low insertion loss • 1.0 dB, 10 to 20 GHz • 1.5 dB, 20 to 24 GHz	Enables excellent signal power transmission from input to output.
Low unbalance • 0.7 dB amplitude unbalance • 6° phase unbalance	Low unbalance can improve a system's electromagnetic compatibility by rejecting unwanted common-mode noise.
Unpackaged Die	Enables the user to integrate the balun directly into hybrids.

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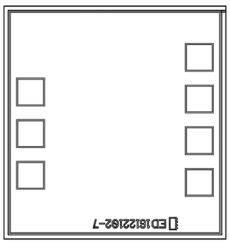


Product Features

- Wideband, 10 to 24 GHz
- Low insertion loss, 1.0 dB to 20 GHz
- Low unbalance, 0.7 dB, 6°
- Power handling up to +31 dBm

Typical Applications

- Instrumentation
- Test and Measurements
- Radar
- Satcom

+RoHS Compliant

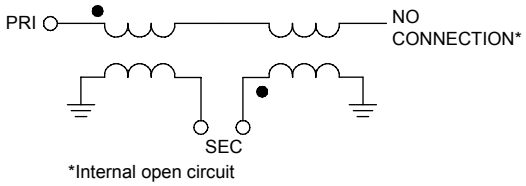
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Ordering Information: Refer to Last Page

General Description

Mini-Circuits MTY2-243-D+ is a wideband MMIC balun transformer GaAs with an impedance ratio of 2:1 covering a wide range of applications from 10 to 24 GHz. Fabricated using HBT process technology, this model provides outstanding repeatability with low insertion loss, low amplitude unbalance, low phase unbalance, and RF input power handling up to +31 dBm (1.25W).

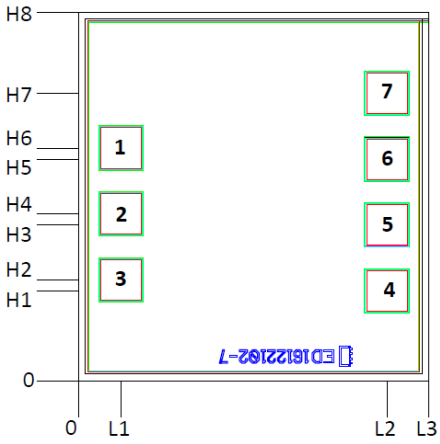
Simplified Schematic and Pad description



*Internal open circuit

Pad Number	Description
2	PRIMARY DOT
5	SECONDARY
6	SECONDARY DOT
1,3 & Bottom of Die	GND
4,7	NO CONNECTION

Bonding Pad Position



Die dimensions in µm

L1	L2	L3	H1	H2	H3	H4	H5	H6
95	699	794	204	229	354	379	504	529
H7	H8	Thickness		Die size		Pad Size 1,2,3,4,5,6 & 7		
654	838	100		794 x 838		92 x 92		

Electrical Specifications[1] at 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Impedance Ratio			2		
Frequency Range		10		24	GHz
Insertion Loss[2]	10-12		1.0		dB
	12-15		1.0		
	15-20		1.0		
	20-24		1.5		
Amplitude Unbalance	10-12		0.7		dB
	12-15		0.3		
	15-20		0.7		
	20-24		0.4		
Phase Unbalance[3]	10-12		5.8		Degree
	12-15		6.4		
	15-20		5.5		
	20-24		2.9		

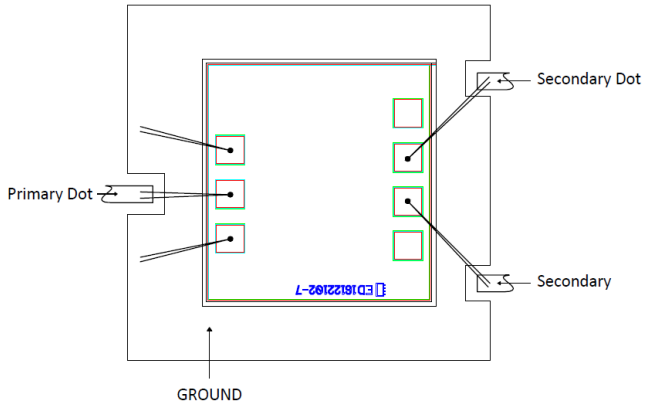
1. Measured on Mini-Circuits Characterization test board. Die is packaged in 2x2 mm, 6-lead MCL package and soldered on TB-MTY2-243+.
2. Above 3 dB theoretical
3. Relative to 180°

Absolute Maximum Ratings[4]

Operating Case Temperature	-40°C to 85°C
RF Input Power	31 dBm

4. Permanent damage may occur if any of these limits are exceeded.

Assembly Diagram



Assembly and Handling Procedure

1. Storage
   Dice should be stored in a dry nitrogen purged desiccators or equivalent.
2. ESD
   MMIC Balun Transformer 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 DieMat DM6030HK-PT/H579 or 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. Thermosonic bonding is used with minimized ultrasonic content. Bond force, time, ultrasonic power and temperature are all critical parameters. Suggested wire is pure gold, 1 mil diameter. Bonds must be made from the bond pads on the die to the package or substrate. All bond wires should be kept as short as low as reasonable to minimize performance degradation due to undesirable series inductance.

Additional Detailed Technical Information

additional information is available on our dash board.

Performance Data	Data Table	
	Swept Graphs	
	S-Parameter (S3P Files) Data Set with and without port extension(.zip file)	
Case Style	Die	
Die Ordering and packaging information	Quantity, Package	Model No.
	Small, Gel - Pak: 5,10,50,100 KGD*	MTY2-243-DG+
	Medium†, Partial wafer: KGD*<1892	MTY2-243-DP+
	Large†, Full Wafer	MTY2-243-DF+
	†*Available upon request contact sales representative*	
	Refer to AN-60-067	
Environmental Ratings	ENV80	

*Known Good Dice ("KGD") means that the dice are taken from PCM good wafer and visually inspected. While this is not definitive, it does help to provide a higher degree of confidence that dice are capable of meeting typical RF electrical parameters specified by Mini-Circuits.

ESD Rating**

Human Body Model (HBM): Class 1A (Pass 250V) in accordance with ANSI/ESD STM 5.1 - 2001

** Tested in industry standard 2x2mm, 6-lead MCLP package

Additional 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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RF Transformer Die MTY2-243-D+

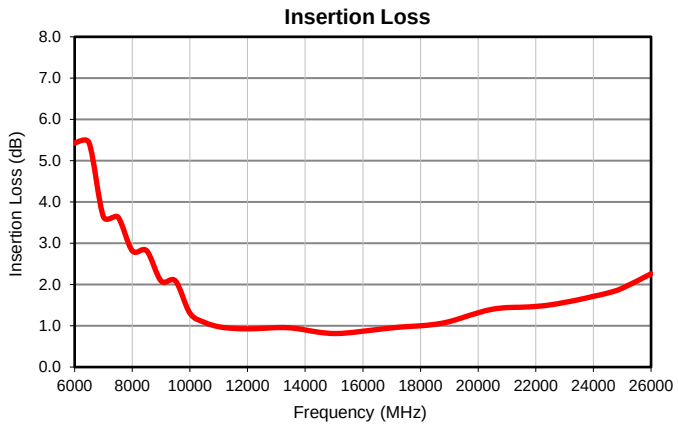
Typical Performance Data

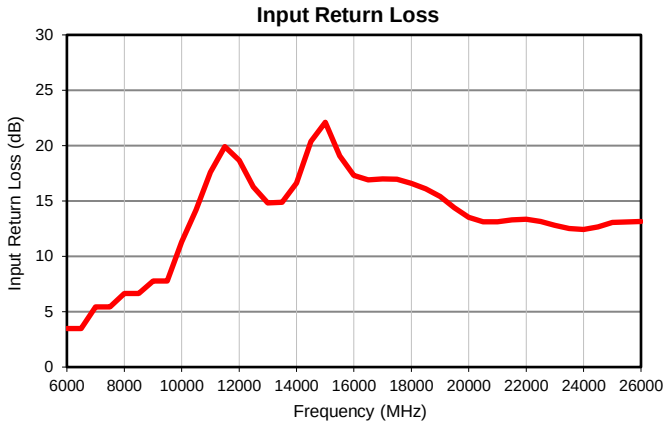
FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE[1] (deg.)
6000	5.43	3.48	2.88	0.68
6500	5.43	3.48	2.88	0.68
7000	3.64	5.43	2.50	0.33
7500	3.64	5.43	2.50	0.33
8000	2.82	6.64	1.96	0.83
8500	2.82	6.64	1.96	0.83
9000	2.08	7.78	1.34	2.12
9500	2.08	7.78	1.34	2.12
10000	1.31	11.29	0.80	4.57
10500	1.08	14.19	0.66	6.02
11000	0.98	17.59	0.62	7.07
11500	0.94	19.91	0.63	7.26
12000	0.93	18.68	0.58	6.76
12500	0.94	16.26	0.43	6.05
13000	0.96	14.84	0.22	5.60
13500	0.95	14.87	0.01	5.46
14000	0.90	16.63	0.25	5.51
14500	0.84	20.36	0.44	5.88
15000	0.81	22.11	0.59	6.74
15500	0.83	19.07	0.62	7.25
16000	0.87	17.32	0.61	7.18
16500	0.91	16.92	0.61	6.87
17000	0.95	16.99	0.66	6.42
17500	0.98	16.96	0.68	5.94
18000	1.00	16.60	0.71	5.15
18500	1.04	16.10	0.77	4.58
19000	1.10	15.42	0.84	4.12
19500	1.21	14.39	0.84	3.94
20000	1.32	13.53	0.75	3.49
20500	1.40	13.12	0.67	2.59
21000	1.44	13.13	0.63	1.66
21500	1.45	13.29	0.53	0.74
22000	1.47	13.35	0.44	0.38
22500	1.51	13.14	0.32	1.37
23000	1.57	12.81	0.19	2.39
23500	1.63	12.51	0.06	2.98
24000	1.71	12.43	0.43	4.28
24500	1.79	12.66	0.89	6.49
25000	1.91	13.08	1.40	9.46
26000	2.26	13.16	2.31	18.40

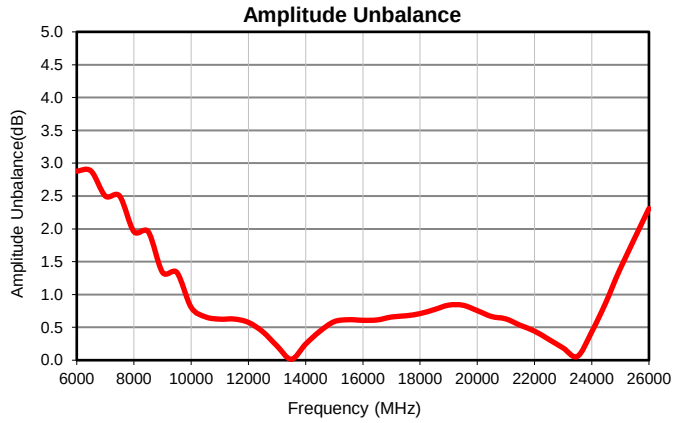
[1] Relative to 180°

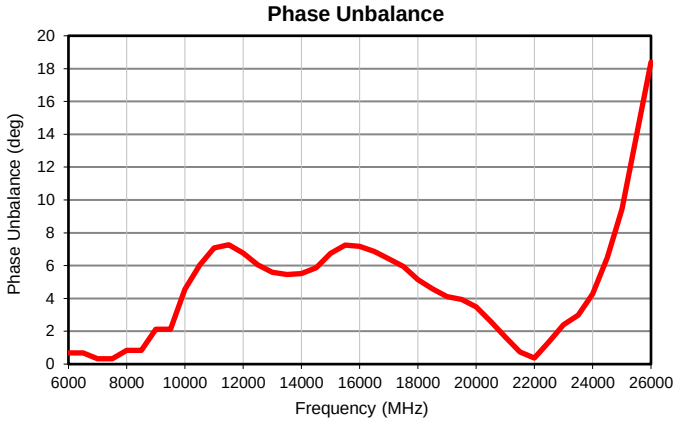
Note: Testdata of Die packaged in 2x2 mm, 6-lead MCL package

Typical Performance Data









Note: Testdata of Die packaged in 2x2 mm, 6-lead MCL package

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)	