MMIC Balun

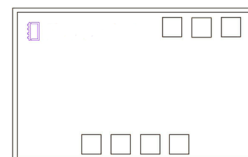
RF Transformer Die

MTX2-143-D+

50Ω 5500 to 13500 MHz

The Big Deal

• Wideband, 5500 to 13500 MHz
• Low insertion loss, 0.8 dB to 11200 MHz
• Low unbalance, 1.0 dB, 4°
• Power handling up to +34 dBm



Product Overview

Mini-Circuits MTX2-143-D+ is a wideband MMIC balun transformer die with an impedance ratio of 2:1 covering a wide range of applications from 5500 to 13500 MHz. Fabricated using GaAs 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 +34 dBm (2.5W).

Key Features

Feature	Advantages
Wideband, 5500 to 13500 MHz	MTX2-143-D+ supports a broad variety of applications including WLAN, WiMAX, WiBRO, ISM, radar and more.
Low insertion loss • 0.8 dB, 5500 to 11200 MHz • 1.9 dB, 11200 to 13500 MHz	Enables excellent signal power transmission from input to output.
Low unbalance • 1.0 dB amplitude unbalance • 8° 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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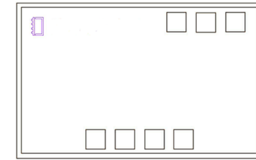

Product Features

- Wideband, 5500 to 13500 MHz
- Low phase unbalance, 8° typ.
- Low amplitude unbalance, 1 dB typ.

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

Ordering Information: Refer to Last Page

Typical Applications

- WiMAX/WIBRO
- ISM
- RADAR
- Satcom

General Description

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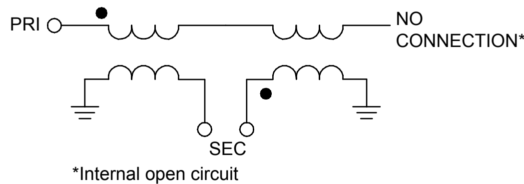
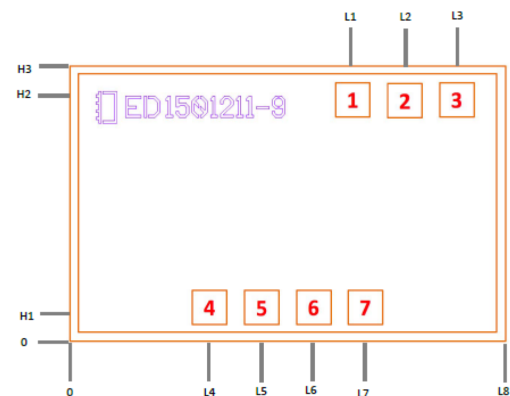
Simplified Schematic and Pad description



*Internal open circuit

Pad Number	Description
1,3,4,7	Ground
2	Primary Dot (Unbalanced)
5	Secondary DOT (Balanced)
6	Secondary (Balanced)

Bonding Pad Position



Die dimensions in µm

L1	L2	L3	L4	L5	L6	L7	L8	H1
815	965	1115	402	552	702	852	1254	96
H2	H3	Thickness		Die size		Bond pad #1 to #9 Size		
694	790	100		1254 x 790		92 x 92		

Electrical Specifications[1] at 25°C, 50Ω, unless otherwise noted.

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Impedance Ratio (secondary / primary)			2		
Frequency Range		5500		13500	MHz
Insertion Loss[2]	5500 - 11200		0.8		dB
	11200 - 13500		1.3		
Amplitude Unbalance	5500 - 13500		1.0		dB
Phase Unbalance[3]	5500 - 13500		8		Degree

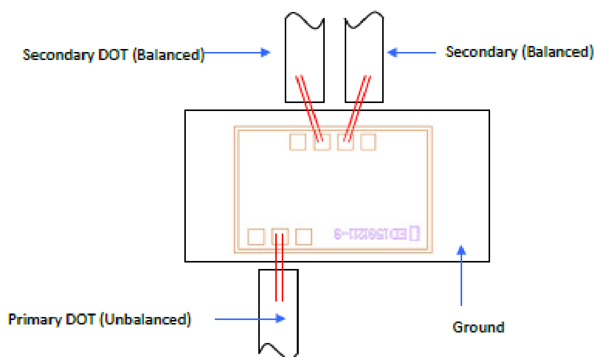
1. Measured on Mini-Circuits Characterization test board. Die is packaged in 3x3 mm, 12-lead MCL package and soldered on TB-900+.
2. Insertion loss is referenced to mid-band loss, 1.5 dB.
3. Relative to 180°

Absolute Maximum Ratings[2]

Operating Case Temperature	-40°C to 85°C
RF Input Power	34 dBm at 25°C

2. 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 GaAs HBT RF 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 worksta tion. 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* — MTX2-143-DG+ Medium†, Partial wafer: KGD*<1452 — MTX2-143-DP+ Large†, Full Wafer — MTX2-143-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 1B (Pass 500V) in accordance with ANSI/ESD STM 5.1 - 2001

** Tested in industry standard 3 x 3mm, 12-lead MCLP package

Additional Notes
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