April 2007 - Rev 17-Apr-07

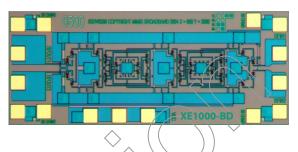
Features

- X Divide-by-Four
- 🗙 +5.0 dBm Output Power
- X -30 dBc Fundamental Leakage
- X Single-ended or Differential Input & Output
- X 100% On-Wafer, DC and Output Power Testing
- ★ 100% Visual Inspection to MIL-STD-883 Method 2010

General Description

Mimix Broadband's 2.0-16.0 GHz GaAs MMIC freqency divider is an ECL (Emitter Coupled Logic) static frequency divider (divide-by-four) consisting of two cascaded divide-by-two circuits. Even-order harmonic levels are minimized by driving the inputs with a balanced input signal, and by taking the output differentially, but the circuit can be operated in a single-ended fashion with unused inputs & outputs open circuit. This MMIC uses Mimix Broadband's 2 um GaAs HBT device model technology to ensure high reliability and uniformity. The chip has surface passivation to protect and provide a rugged part with backside via holes and gold metallization to allow either a conductive epoxy or eutectic solder die attach process. This device is well suited for Millimeter-wave Point-to-Point Radio, LMDS, SATCOM and VSAT applications.

Chip Device Layout



Mimix

BROADBAND™

XE1000-BD

Absolute Maximum Ratings

	Supply Voltage (Vec)	+7.0 VDC
<	Supply Current (Icc)	150 mA
/	Input Power (Pin)	+15 dBm
/	Storage Temperature (Tstg)	-65 to +165 ⁰ C
	Operating Temperature (Ta)	-55 to MTTF Table ¹
/	Junction Temperature (Tch)	MTTF Table ¹

(1) Junction temperature affects a device's MTTF. It is recommended to keep channel temperature as low as possible for maximum life.

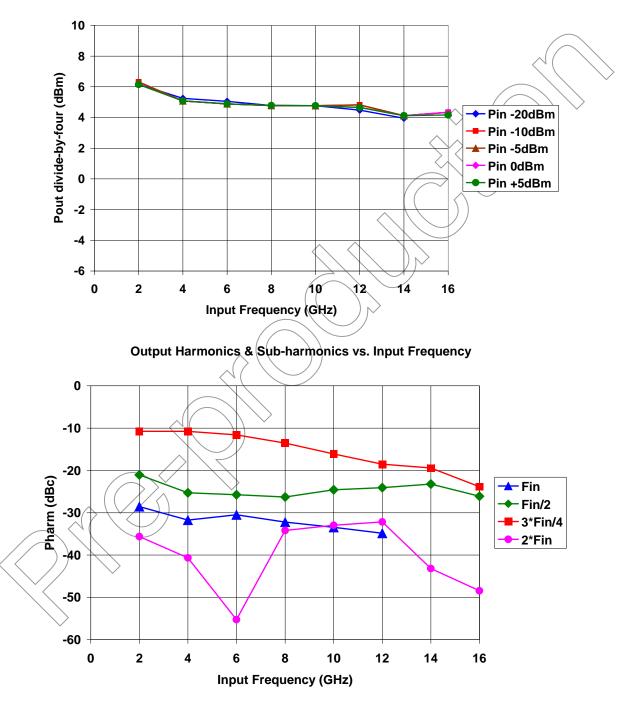
Electrical Characteristics (Ambient Temperature T = 25 °C)

Parameter	Units	Min.	Тур.	Max.
Input Frequency Range (f)	GHz	2.0	-	16.0
Output Frequency Range (f)	GHz	0.5	-	4.0
Input Power (Pin)	dBm	-20.0	-	+5.0
Output Rower (Pout)	dBm	-	+5.0	-
Fin Suppression	dBc	-	-30.0	-
Fin/2 Suppression	dBc	-	-25.0	-
3*Fin/4 Suppression	dBc	-	-15.0	-
2*Fin Suppression	dBc	-	-35.0	-
Supply Voltage (Vcc)	VDC	+4.0	+5.0	+6.0
Supply Current (Icc) (Vcc=5.0V Typical)	mA	-	110	130

April 2007 - Rev 17-Apr-07

Divider Measurements

Output Power vs. Input Frequency

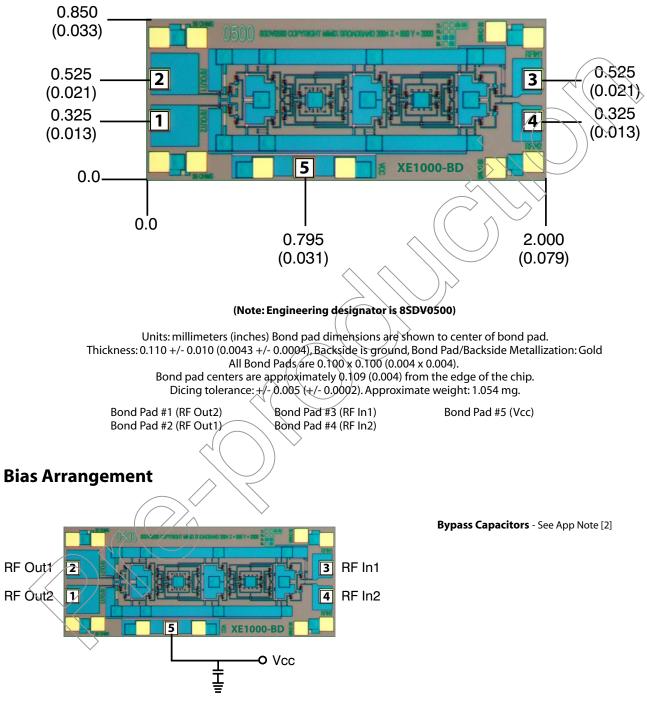


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April 2007 - Rev 17-Apr-07



Mechanical Drawing



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April 2007 - Rev 17-Apr-07

XEI000-BD

App Note [1] Biasing - As shown in the bonding diagram, this device is operated by biasing Vcc with Vcc=5.0 V and lcc=100 mA.

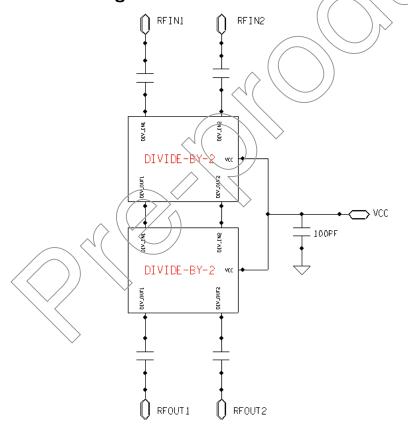
App Note [2] Bias Arrangement - Each DC pad (Vcc) needs to have DC bypass capacitance. (~100 - 200 pF) as close to the device as possible. RF In and RF Out can be single-ended or differential, as required.

MTTF Table

These numbers were calculated based on accelerated life test information and thermal model analysis received from the fabricating foundry.

Backplate Temperature	MTTF Hours	FITs
55 deg Celsius	2.21E+09	4.52E-01
75 deg Celsius	1.46E+08	8.50E-01
95 deg Celsius	1.33E+07	7.51E+01

Functional Diagram



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April 2007 - Rev 17-Apr-07

Handling and Assembly Information

CAUTION! - Mimix Broadband MMIC Products contain gallium arsenide (GaAs) which can be hazardous to the human body and the environment. For safety, observe the following procedures:

- Do not ingest.
- Do not alter the form of this product into a gas, powder, or liquid through burning, crushing, or chemical processing as these by-products are dangerous to the human body if inhaled, ingested, or swallowed.
- Observe government laws and company regulations when discarding this product. This product must be discarded in accordance with methods specified by applicable hazardous waste procedures.

Life Support Policy - Mimix Broadband's products are not authorized for use as critical components in life support devices or systems without the express written approval of the President and General Counsel of Mimix Broadband. As used herein: (1) Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user. (2) A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

ESD - Gallium Arsenide (GaAs) devices are susceptible to electrostatic and mechanical damage. Die are supplied in antistatic containers, which should be opened in cleanroom conditions at an appropriately grounded antistatic workstation. Devices need careful handling using correctly designed collets, vacuum pickups or, with care, sharp tweezers.

Die Attachment - GaAs Products from Mimix Broadband are 0,100 mm (0.004") thick and have vias through to the backside to enable grounding to the circuit. Microstrip substrates should be brought as close to the die as possible. The mounting surface should be clean and flat. If using conductive epoxy, recommended epoxies are Tanaka TS3332LD, Die Mat DM6030HK or DM6030HK-Pt cured in a nitrogen atmosphere per manufacturer's cure schedule. Apply epoxy sparingly to avoid getting any on to the top surface of the die. An epoxy fillet should be visible around the total die periphery. For additional information please see the Mimix "Epoxy Specifications for Bare Die" application note. If eutectic mounting is preferred, then a fluxless gold-tin (AuSn) preform, approximately 0.001² thick, placed between the die and the attachment surface should be used. A die bonder that utilizes a heated collet and provides scrubbing action to ensure total wetting to prevent void formation in a nitrogen atmosphere is recommended. The gold-tin eutectic (80% Au 20% Sn) has a melting point of approximately 280 °C (Note: Gold Germanium should be avoided). The work station temperature should be 310 °C +/-10 °C. Exposure to these extreme temperatures should be kept to minimum. The collet should be heated, and the die pre-heated to avoid excessive thermal shock. Avoidance of air bridges and force impact are critical during placement.

Wire Bonding - Windows in the surface passivation above the bond pads are provided to allow wire bonding to the die's gold bond pads. The recommended wire bonding procedure uses 0.076 mm x 0.013 mm (0.003" x 0.0005") 99.99% pure gold ribbon with 0.5-2% elongation to minimize RF port bond inductance. Gold 0.025 mm (0.001") diameter wedge or ball bonds are acceptable for DC Bias connections. Aluminum wire should be avoided. Thermo-compression bonding is recommended though thermosonic bonding may be used providing the ultrasonic content of the bond is minimized. Bond force, time and ultrasonics are all critical parameters. Bonds should be made from the bond pads on the die to the package or substrate. All bonds should be as short as possible.

Part Number for Ordering	Description	
XE1000-BD-000V	Where "V" is RoHS compliant die packed in vacuum release gel paks	
XE1000-BD-EV1	XE1000 die evaluation module	
	Mimix Broadband, Inc. 10795 Bockley Bd. Houston Texas 77099	Page

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