

# 33.0-36.0 GHz GaAs MMIC Power Amplifier

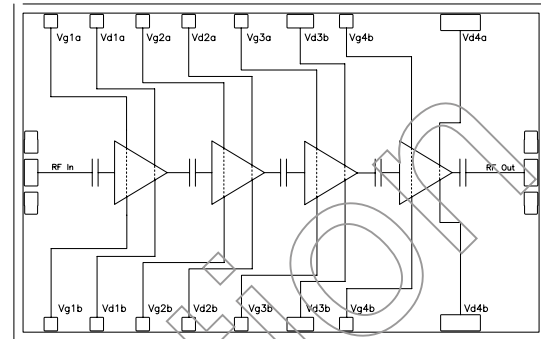
## Features

- ✕ 3W Power Amplifier
- ✕ Dual Sided Bias Architecture
- ✕ 20 dB Small Signal Gain
- ✕ +33.5 dBm P1dB Compression Point
- ✕ +34.5 dBm Saturated Output Power
- ✕ 100% On-Wafer DC, RF and Output Power Testing
- ✕ 100% Visual Inspection to MIL-STD-883 Method 2010

## General Description

Mimix Broadband's four stage 33.0-36.0 GHz GaAs MMIC power amplifier has a small signal gain of 20.0 dB with +34.5 dBm saturated output power. This MMIC uses Mimix Broadband's GaAs PHEMT device model technology, and is based upon electron beam lithography to ensure high repeatability 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 Military and Space applications.

## Chip Device Functional Diagram



## Absolute Maximum Ratings<sup>1</sup>

Supply Voltage (Vd)	+6.5 VDC
Supply Current (Id1,2,3,4)	175,350,700,1400 mA
Gate Bias Voltage (Vg)	+0.3 VDC
Input Power (Pin)	+27.0 dBm
Storage Temperature (Tstg)	-65 to +165 °C
Operating Temperature (Ta)	-55 to MTTF Graph <sup>1</sup>
Channel Temperature (Tch)	MTTF Graph <sup>1</sup>

(1) Channel 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	Typ	Max
Frequency Range (f)	GHz	33.0	-	36.0
Input Return Loss (S11)	dB	-	10.0	-
Output Return Loss (S22)	dB	-	10.0	-
Small Signal Gain (S21)	dB	-	20.0	-
Gain Flatness (delta S21)	dB	-	+/-1.0	-
Reverse Isolation (S12)	dB	-	40.0	-
Output Power for 1dB Compression Point (P1dB)	dBm	-	+33.5	-
Output Third Order Intermods (OIP3)	dBm	-	+39.0	-
Saturated Output Power (Psat)	dBm	-	+34.5	-
Drain Bias Voltage (Vd1,2,3,4)	VDC	-	+5.5	+6.0
Gate Bias Voltage (Vg1,2,3,4)	VDC	-1.0	-0.6	0.0
Supply Current (Id1) (Vd=5.5V, Vg=-0.6V Typical)	mA	-	125	150
Supply Current (Id2) (Vd=5.5V, Vg=-0.6V Typical)	mA	-	250	300
Supply Current (Id3) (Vd=5.5V, Vg=-0.6V Typical)	mA	-	500	600
Supply Current (Id4) (Vd=5.5V, Vg=-0.6V Typical)	mA	-	1000	1200

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## 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 anti-static 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 0.001 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.

## Ordering Information

### Part Number for Ordering

XP1054-BD-000V  
XP1054-BD-EV1

### Description

RoHS compliant die packed in vacuum release gel packs  
XP1054-BD evaluation module



**Caution: ESD Sensitive**  
Appropriate precautions in handling, packaging  
and testing devices must be observed.

Proper ESD procedures should be followed when handling this device.

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