MMIC SURFACE MOUNT

Monolithic Amplifier

GALI-4F+

50Ω DC to 4 GHz

FEATURES

- Frequency Range, DC to 4 GHz
- InGap HBT Microwave Amplifier
- Miniature SOT-89 Package
- Internally Matched to 50Ω
- Output Power, +15.3 dBm Typ.
- Excellent Package for Heat Dissipation, Exposed Metal Bottom
- Low Thermal Resistance for High Reliability
- Aqueous Washable
- Protected By US Patent 6,943,629



Generic photo used for illustration purposes only

CASE STYLE: DF782

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

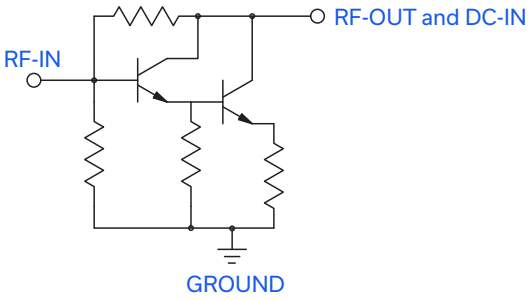
APPLICATIONS

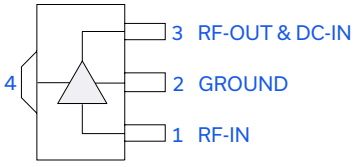
- Cellular
- PCS
- Communication Receivers & Transmitters

PRODUCT OVERVIEW

Gali-4F+ (RoHS compliant) is a wideband amplifier offering high dynamic range. It has repeatable performance from lot to lot, and is enclosed in a SOT-89 package. It uses patented Transient Protected Darlington configuration and is fabricated using InGaP HBT technology. Expected MTTF is 10,000 years at +85°C case temperature. Gali-4F+ is designed to be rugged for ESD and supply switch-on transients.

SIMPLIFIED SCHEMATIC AND PIN DESCRIPTION





Function	Pin Number	Description
RF-IN	1	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
RF-OUT and DC-IN	3	RF output and bias pin. DC voltage is present on this pin; therefore a DC blocking capacitor is necessary for proper operation. An RF choke is needed to feed DC bias without loss of RF signal due to the bias connection, as shown in "Recommended Application Circuit".
GND	2,4	Connections to ground. Use via holes as shown in "Suggested Layout for PCB Design" to reduce ground path inductance for best performance.

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ECO-024667
GALI-4F+
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ELECTRICAL SPECIFICATIONS AT +25°C AND 50 mA UNLESS NOTED OTHERWISE

Parameter	Conditions (GHz)	Min.	Typ.	Max.	Units
Frequency Range[1]		DC		4	GHz
Gain	0.1	11	14.3		dB
	1		14.0		
	2		13.4		
	3		13.0		
	4		12.3		
	6		13.2		
Input Return Loss	DC - 3		21		dB
	3 - 4		21		
Output Return Loss	DC - 3		14		dB
	3 - 4		11		
Output Power @ 1 dB Compression	1	+13.8	+15.3		dBm
Output IP3	1		+34		dBm
Noise Figure	1		4.0		dB
Recommended Device Operating Current			50		mA
Device Operating Voltage		+4.0	+4.4	+5.0	V
Device Voltage Variation vs. Temperature at 50 mA			-3.1		mV/°C
Device Voltage Variation vs. Current at +25°C			10.0		mV/mA
Thermal Resistance, Junction-to-Case[2]			93		°C/W

1. Guaranteed specification DC-4 GHz. Low frequency cut off determined by external coupling capacitors.
2. Case is defined as ground leads.

ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature[3]	-45°C to +85°C
Storage Temperature	-65°C to +150°C
Operating Current	65 mA
Input Power	+20 dBm

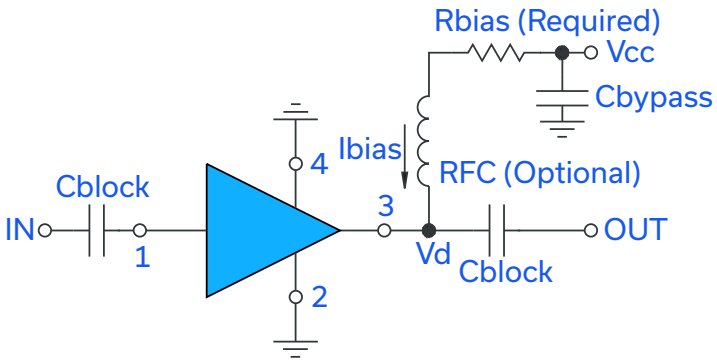
3. Based on typical case temperature rise +3°C above ambient.
Permanent damage may occur if any of these limits are exceeded. These ratings are not intended for continuous normal operation.

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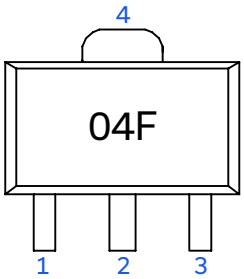
RECOMMENDED APPLICATION CIRCUIT



Test Board includes case, connectors, and components (in bold) soldered to PCB

R BIAS	
Vcc	"1%" Res. Values (Ohms) for Optimum Biasing
7	51.1
8	69.8
9	90.9
10	110
11	130
12	150
13	169
14	191
15	210
16	232
17	249
18	274
19	294
20	316

PRODUCT MARKING



Markings in addition to model number designation may appear for internal quality control purposes.

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ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. CLICK HERE

Performance Data & Graphs	Data Table Swept Graphs S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DF782 Plastic package, Lead Finish: Matte-tin
Tape & Reel **Standard Quantities Available on Reel**	F55 7" Reels with 20, 50, 100, 200, 500 or 1K devices
Suggested Layout for PCB Design	PL019
Evaluation Board	TB-409-4F+
Environmental Ratings	ENV08T2

ESD RATING

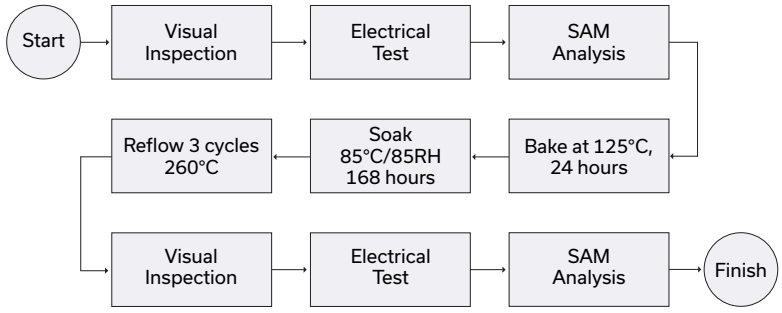
Human Body Model (HBM): Class 1A (250 V to < 500 V) in accordance with ANSI/ESD STM 5.1 - 2001
Machine Model (MM): Class M1 (< 100 V) in accordance with ESD STM 5.2 - 1999

MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDECJ-STD-020C

No.	Test Required	Condition	Standard	Quantity
1	Visual Inspection	Low Power Microscope Magnification 40x	MIP-IN-0003 (MCT spec)	45 units
2	Electrical Test	Room Temperature	SCD (MCL spec)	45 units
3	SAM Analysis	Less than 10% growth in term of delamination	J-Std-020C (Jedec Standard)	45 units
4	Moisture Sensitivity Level 1	Bake at 125°C for 24 hours Soak at 85°C/85%RH for 168 hours Reflow 3 cycles at 260°C peak	J-Std-020C (Jedec Standard)	45 units

MSL TEST FLOW CHART



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-Circuits' applicable established test performance criteria and measurement instructions.
C. The parts covered by this specification document are subject to Mini-Circuits' standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/terms/viewterm.html