

# Monolithic Amplifier

**ERA-4+** 

50Ω DC to 4 GHz

#### **FEATURES**

- DC to 4 GHz
- Single Voltage Supply
- · Internally Matched to 50 Ohms
- Unconditionally Stable
- Low Performance Variation Over Temperature
- Transient Protected
- Aqueous Washable
- Protected By US Patent 6,943,629



Generic photo used for illustration purposes only

CASE STYLE: VV105

# +RoHS Compliant The +Suffix identifies RoHS Compliance.

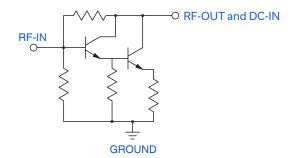
#### **APPLICATIONS**

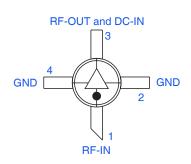
- · Cellular/ PCS/ 3G Base Station
- CATV, Cable Modem & DBS
- Fixed Wireless & WLAN
- · Microwave Radio & Test Equipment

#### **PRODUCT OVERVIEW**

ERA-4+ (RoHS compliant) is a wideband amplifier offering high dynamic range. It has repeatable performance from lot to lot. It is enclosed in a Micro-X package. ERA-4+ uses Darlington configuration and is fabricated using InGaP HBT technology. Expected MTTF is 9100 years at 85°C case temperature.

#### 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.	

REV. S ECO-024740 ERA-4+ MCL NY 250304





# Monolithic Amplifier

**ERA-4+** 

50Ω DC to 4 GHz

#### **ELECTRICAL SPECIFICATIONS AT +25°C AND 65 mA UNLESS NOTED OTHERWISE**

Parameter	Condition (GHz)	Min.	Тур.	Max.	Units
Frequency Range <sup>1</sup>		DC		4	GHz
	0.1	13.7	14.4	15	
	1.0		14.2		
Gain	2.0	12.5	13.0	13.6	dB
	3.0		12.0		
	4.0	10.8	11.3	12.1	
	0.1		.003	.006	
	1.0		.0025	.006	
Magnitude of Gain Variation versus Temperature (values are negative)	2.0		.0031	.006	dB/°C
(	3.0		.0042	.008	
	4.0		.0051	.01	
	0.1		35		
Innuit Deturn Loop	2.0		30		4D
Input Return Loss	3.0		21		dB
	4.0		21		
	0.1		35		
O Lord Balance Lord	2.0		21		.ID
Output Return Loss	3.0		21		dB
	4.0		16		
Reverse Isolation	2.0	18	23		dB
	0.1		+17.5		
	1.0	+15	+17.3		
Output Power @ 1 dB compression	2.0		+16.1		dBm
	3.0		+14		
	4.0		+11.7		
Saturated Output Power	0.1		+17.8		AD.:
(at 3dB compression)	2.0		+16.5		dBm
	0.1	+32	+36.1		
O. da. at ID2	1.0	+31	+35		dD
Output IP3	2.0	+27	+30.4		dBm
	4.0		+25		
	0.1		4	5	
Noice Figure	1.0		4.2	5.2	
Noise Figure	2.0		4.2	5.2	dB
	4.0		4.5	5.5	
Group Delay	2.0		80		psec
Recommended Device Operating Current			65		mA
Device Operating Voltage		+4.3	+4.6	+4.9	V
Device Voltage Variation vs. Temperature at 65mA			-2.9		mV/°C
Device Voltage Variation vs. Current at +25°C			10.4		mV/mA
Thermal Resistance, junction-to-case <sup>3</sup>			196		°C/W

<sup>1.</sup> Guaranteed specification DC-4 GHz. Low frequency cut off determined by external coupling capacitors.



<sup>2.</sup> Measured on Mini-Circuits characterization test board TB-289

<sup>3.</sup> Case is defined as ground leads.

# Monolithic Amplifier

**ERA-4+** 

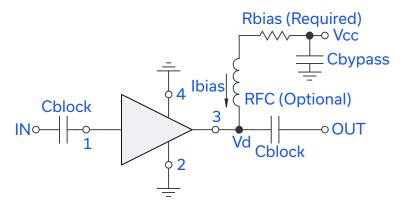
50Ω DC to 4 GHz

#### **ABSOLUTE MAXIMUM RATINGS**

Parameter	Ratings	
Operating Temperature <sup>4</sup>	-45°C to +85°C	
Storage Temperature	-65°C to +150°C	
Operating Current	85 mA	
Power Dissipation	417 mW	
Input Power	+20 dBm	

Permanent damage may occur if any of these limits are exceeded. These ratings are not intended for continuous normal operation.

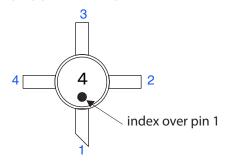
#### **RECOMMENDED APPLICATION CIRCUIT**



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

R BIAS			
Vcc	"1%" Res. Values (ohms) for Optimum Biasing		
7	38.3		
8	52.3		
9	66.5		
10	80.6		
11	95.3		
12	115		
13	127		
14	143		
15	158		
16	174		
17	187		
18	205		
19	221		
20	237		

#### **PRODUCT MARKING**



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

<sup>4.</sup> Based on typical case temperature rise 5°C above ambient.



# Monolithic Amplifier

**ERA-4**+

50Ω DC to 4 GHz

### ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD.

ADDITIONAL DETAILED TECHNICAL INFORMATIO	N IS AVAILABLE ON OUR DASHBOARD.
	Data Table
Performance Data & Graphs	Swept Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
Case Style	VV105 Plastic micro-x package, lead finish: Matte-tin
Tape & Reel Standard quantities available on reel	F4 7" reels with 20, 50, 100, 200, 500 or 1K devices
Suggested Layout for PCB Design	PL261
Evaluation Board	TB-431-4+
Environmental Ratings	ENV08T2

#### **ESD RATING**

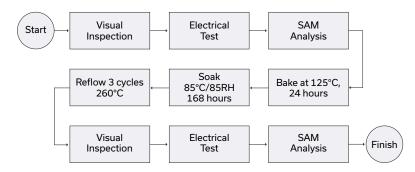
Human Body Model (HBM): Class 1A (250 V to < 500 V) in accordance with ANSI/ESD STM 5.1 - 2001 Machine Model (MM): Class M1 (< 100 V) in accordance with ANSI/ESD STM 5.2 - 1999

#### **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 <a href="https://www.minicircuits.com/terms/viewterm.html">www.minicircuits.com/terms/viewterm.html</a>

