MMIC SURFACE MOUNT

Monolithic Amplifier ERA-5SM+

50Ω DC to 4 GHz

FEATURES

- DC to 4 GHz
- Single Voltage Supply
- Internally Matched to 50Ω
- Unconditionally Stable
- Low Performance Variation Over Temperature
- Transient Protected
- Aqueous Washable
- Protected By US Patent 6,943,629
- Low additive phase noise, typically -170 dBc/Hz @10 KHz offset



Generic photo used for illustration purposes only

CASE STYLE: WW107

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

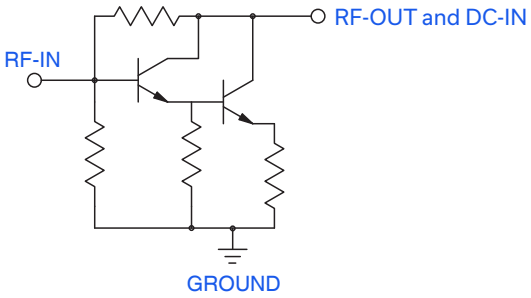
APPLICATIONS

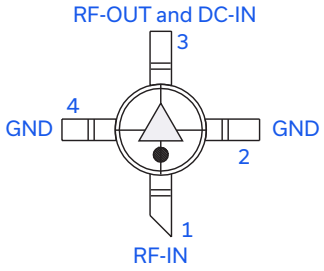
- Cellular/ PCS/ 3G Base Station
- CATV, Cable Modem & DBS
- Fixed Wireless & WLAN
- Microwave Radio & Test Equipment
- Suitable for low phase noise applications

PRODUCT OVERVIEW

ERA-5SM+ (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-5SM+ uses Darlington configuration and is fabricated using InGaP HBT technology. Expected MTTF is 850 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. T
ECO-024491
ERA-5SM+
MCL NY
250211

Monolithic Amplifier ERA-5SM+

50Ω DC to 4 GHz

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

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units	Cpk
Frequency Range[1]		DC		4	GHz	
Gain	0.1	19	20.2	22	dB	>1.5
	1.0		19.5			
	2.0	16	17.6			
	3.0		15.6			
	4.0	12	14			
Magnitude of Gain Variation vs. Temperature (Values Are Negative)	0.1		.0025	.005	dB/°C	
	1.0		.0034	.007		
	2.0		.0043	.0085		
	3.0		.0052	.0105		
	4.0		.0065	.013		
Input Return Loss	0.1		21		dB	
	2.0		23			
	4.0		21			
Output Return Loss	0.1		30		dB	
	2.0		26			
	4.0		17			
Reverse Isolation	2.0	19	22		dB	
Output Power @ 1 dB Compression	0.1	+16.5	+18.4		dBm	>1.5
	1.0	+16.5	+18.4			
	2.0	+15.5	+17			
	4.0		+12.5			
Saturated Output Power (at 3 dB Compression)	0.1		+19.5		dBm	
	1.0		+18.5			
	2.0		+18			
Output IP3	0.1	+30	+33		dBm	>1.5
	1.0	+30	+33			
	2.0	+26	+30			
	4.0		+26			
Noise Figure	0.1		3.5	4.5	dB	>1.5
	2.0		3.5	4.5		
	4.0		3.5	4.5		
Additive Phase Noise	2 GHz, 10 KHz offset		-170		dBc/Hz	
Group Delay	2.0		90		psec	
Recommended Device Operating Current			65		mA	
Device Operating Voltage		+4.5	+4.9	+5.3	V	
Device Voltage Variation vs. Temperature at 65 mA			-3.2		mV/°C	
Device Voltage Variation vs. Current at +25°C			6.9		mV/mA	
Thermal Resistance, Junction-to-Case[2]			133		°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[3]

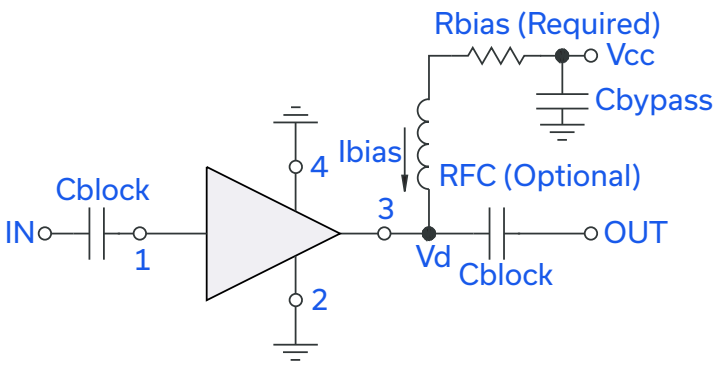
Parameter	Ratings
Operating Temperature[4]	-45°C to +85°C
Storage Temperature	-65°C to +150°C
Operating Current	85 mA
Power Dissipation	451 mW
Input Power	+13 dBm

3. Permanent damage may occur if any of these limits are exceeded. These ratings are not intended for continuous normal operation.
4. Based on typical case temperature rise +10°C above ambient.

Monolithic Amplifier ERA-5SM+

50Ω DC to 4 GHz

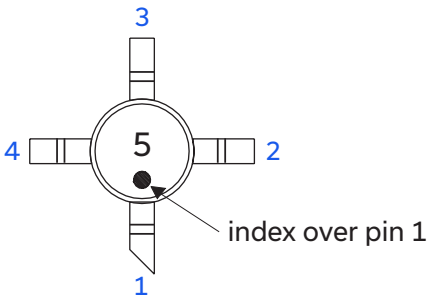
RECOMMENDED APPLICATION CIRCUIT



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

R BIAS	
Vcc	"1%" Res. Values (Ohms) for Optimum Biasing
7	33.2
8	48.7
9	63.4
10	78.7
11	95.3
12	110
13	124
14	140
15	158
16	174
17	187
18	205
19	221
20	232

PRODUCT MARKING



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

Monolithic Amplifier ERA-5SM+

50Ω DC to 4 GHz

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	WW107 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	PL075
Evaluation Board	TB-408-5+
Environmental Ratings	ENV08T2

ESD RATING

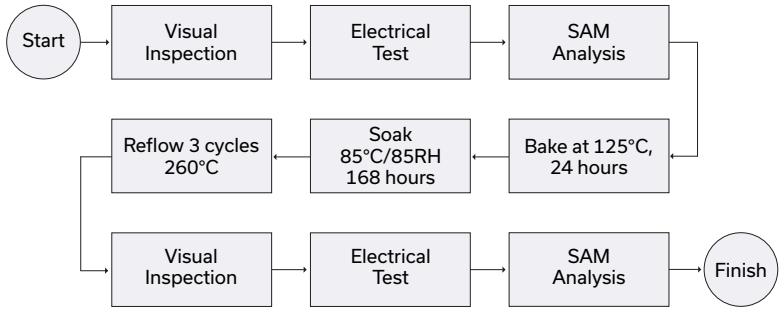
Human Body Model (HBM): Class 1B (500 V to < 1000 V) in accordance with ANSI/ESD STM 5.1 - 2001
Machine Model (MM): Class M1 (< 100 V) in accordance with ANSI/ESD STM 5.2 - 1999

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-Circuit's 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