MMIC SURFACE MOUNT

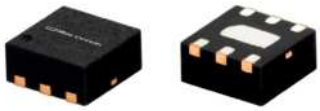
Monolithic Amplifier

LEE2-6+

50Ω DC to 7 GHz

THE BIG DEAL

- Frequency Range, DC to 7 GHz
- Internally Matched to 50Ω
- Noise Figure, 2.3 dB at 2 GHz
- Low Current, 16 mA



Generic photo used for illustration purposes only

CASE STYLE: MC1630-1

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

APPLICATIONS

- Cellular
- PCN Instrumentation
- VHF/UHF Receivers/Transmitters

PRODUCT OVERVIEW

LEE2-6+ (RoHS compliant) is wideband current driven amplifier fabricated using HBT technology. In addition, the LEE2-6+ has good input and output return loss over a broad frequency range without the need for external matching components. Lead finish is Tin Silver over Nickel. It has repeatable performance from lot to lot and is enclosed in a 2 mm x 2 mm x 0.89 mm 6-lead MCLP package for very good electrical performance.

KEY FEATURES

Feature	Advantages
Broadband, DC* to 7 GHz	A single amplifier covering DC* to C band. • Reduced component inventory • Ideal for wideband applications such as instrumentation and military
Low Noise Figure: 2.3 dB at 2 GHz	Low noise figure and low current (16 mA) is ideal for use as an LNA in receivers.
High Gain, 18.9 dB at 2 GHz	Minimizes the effect of NF of succeeding stages.
MCLP Package	Low inductance, repeatable transitions, excellent thermal pad.

* Low frequency cut off determined by external coupling capacitors.

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ELECTRICAL SPECIFICATIONS[1] AT +25°C AND 16 mA UNLESS NOTED OTHERWISE

Parameter	Conditions (GHz)	Min.	Typ.	Max.	Units
Frequency Range		DC[2]		7	GHz
Gain	0.01	17.1	21.5	21.1	dB
	1		20.6		
	2		18.9		
	4		15.3		
	6		12.2		
	7		10.8		
Isolation	2		22.5		dB
Input Return Loss	0.01		29.9		dB
	1		21.3		
	2		16.0		
	4		11.7		
	6		9.3		
	7		8.4		
Output Return Loss	0.01		36.6		dB
	1		17.0		
	2		13.4		
	4		11.6		
	6		11.0		
	7		10.4		
Output Power @ 1 dB Compression	0.01		+4.3		dBm
	1		+2.9		
	2		+2.8		
	4		+3.1		
	6		+2.2		
	7		+1.2		
Output IP3	0.01		+18.9		dBm
	1		+16.5		
	2		+17.6		
	4		+17.8		
	6		+15.3		
	7		+14.5		
Noise Figure	0.01		2.4		dB
	1		2.2		
	2		2.3		
	4		2.5		
	6		2.9		
	7		3.1		
Device Operating Current (I_{BIAS})			16		mA
Device Voltage (V_D)			+3.6		V
Device Voltage Variation vs. Temperature at 16 mA			-3		mV/°C
Device Voltage Variation vs. Current at +25°C			10.6		mV/mA
Thermal Resistance, Junction-to-Case[3]			95		°C/W

1. Measured on Mini-Circuits Characterization test board TB-621+. See characterization test circuit. (Fig. 1).
2. Low frequency cut off determined by external coupling capacitor.
3. Case is defined as ground leads.

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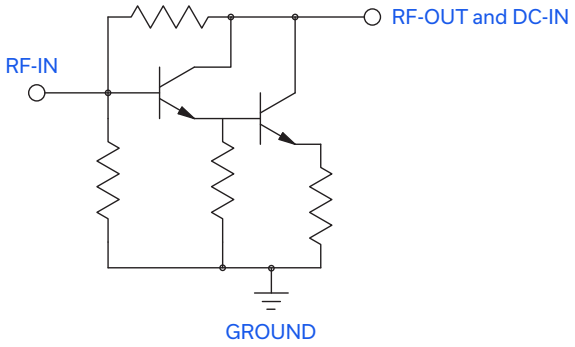
50Ω DC to 7 GHz

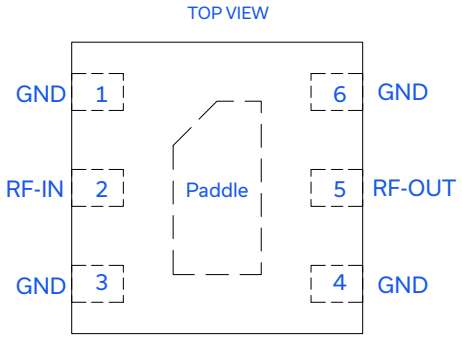
ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-45°C to +85°C
Storage Temperature	-65°C to +150°C
Operating Current	50 mA
Power Dissipation	200 mW
Input Power (Continuous Operation)	+25 dBm

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

SIMPLIFIED SCHEMATIC AND PIN DESCRIPTION





Function	Pin Number	Description
RF-IN	2	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	5	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	1,3,4,6	Connections to ground.

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CHARACTERIZATION TEST CIRCUIT

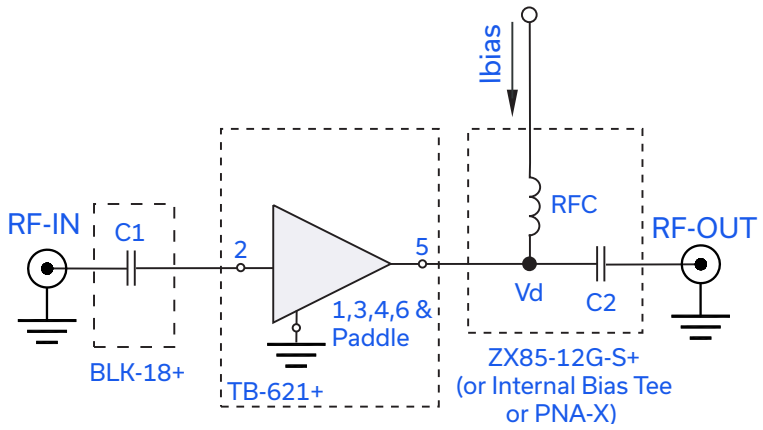
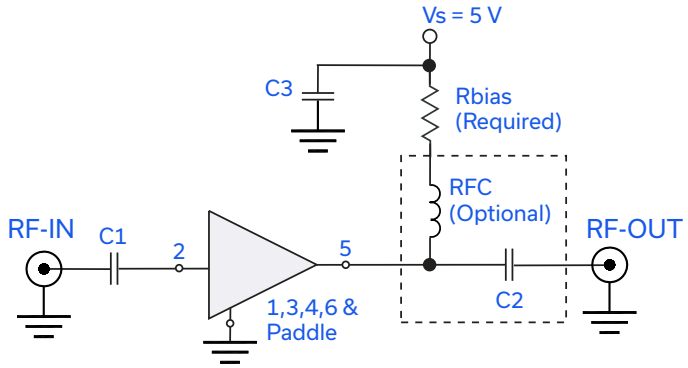


Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Test Board TB-621+. Gain, Return Loss, Output Power at 1 dB Compression (P1dB), Output IP3 (OIP3) and Noise Figure measured using key signal N5242A, PNA-X microwave network analyzer.

Conditions:
1. I_{BIAS}=16 mA
2. Gain and Return Loss: -25 dBm
3. Output IP3: Two tones, spaced 1 MHz apart, -8 dBm/tone at output.

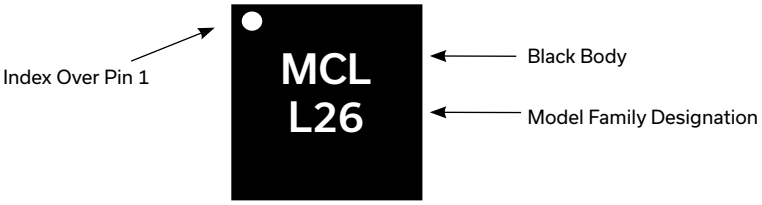
RECOMMENDED APPLICATION CIRCUIT



Component	Value	Size	Part Number	Manufacturer
C1, C2	2400 pF	0805		Various
RF C		0.15"X0.15"	TCCH-80+	Mini-Circuits
Rbias	93.1Ω	0402		Various
C3	0.1 µF	0805		Various

Fig 2. Evaluation Board TB-899+ includes case, connectors and components soldered to PCB.

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	MC1630-1 Plastic package, exposed paddle, lead finish: Matte-Tin
Tape & Reel **Standard Quantities Available on Reel**	F66 7" Reels with 20, 50, 100, 200, 500 or 2K devices
Suggested Layout for PCB Design	PL-349
Evaluation Board	TB-899+
Environmental Ratings	ENV08T1

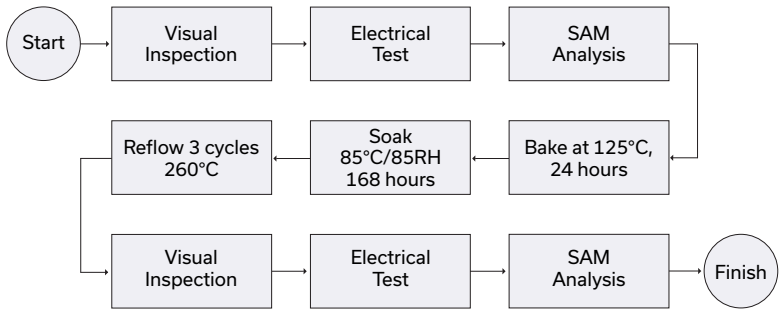
ESD RATING

Human Body Model (HBM): Class 1C (1000 V to <2000 V) in accordance with ANSI/ESD STM 5.1 - 2001
Machine Model (MM): Class M2 (100 V) in accordance with ANSI/ESD STM5.2-1999

MSL RATING

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

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