

### Features

- Noise 4.5 +/-1K and gain 36 +/-2dB from 10 MHz to 2GHz
- Less than 8K noise and >25 dB gain to 5 GHz.
- Usable over a wide range of DC power from 2mW to 50mW
- Single power supply voltage in the 1.10V to 3.0V range
- Good input and output match from 10 MHz to 5GHz.
- Operates from below 4K to 350K



### Description

The CITLF3 a SiGe low noise amplifier intended for extremely low noise cryogenic applications. The amplifier utilizes resistive feedback to achieve good input match (S11) and high gain stability. The amplifier is optimum for the frequency range 0.01 to 2 GHz but is useable to 5 GHz.

It is powered from a single positive DC supply usually 2V but can be changed to tradeoff power dissipation and performance as shown in the table and graph on a following page. . Application of up to 5V will not damage the amplifier. It is recommended that the power supply for the amplifier be current limited to 100mA. A series resistor may be used. For example 220 ohms to a +5V supply will provide 2.0V, 13.4mA when the amplifier is at 23K. The maximum RF input power to be applied to the amplifiers without damage is +10dBm.

The amplifier is 20.7mm x 15.9mm x 8.7mm excluding connectors with input SMA at left and output SMA at right as shown above.

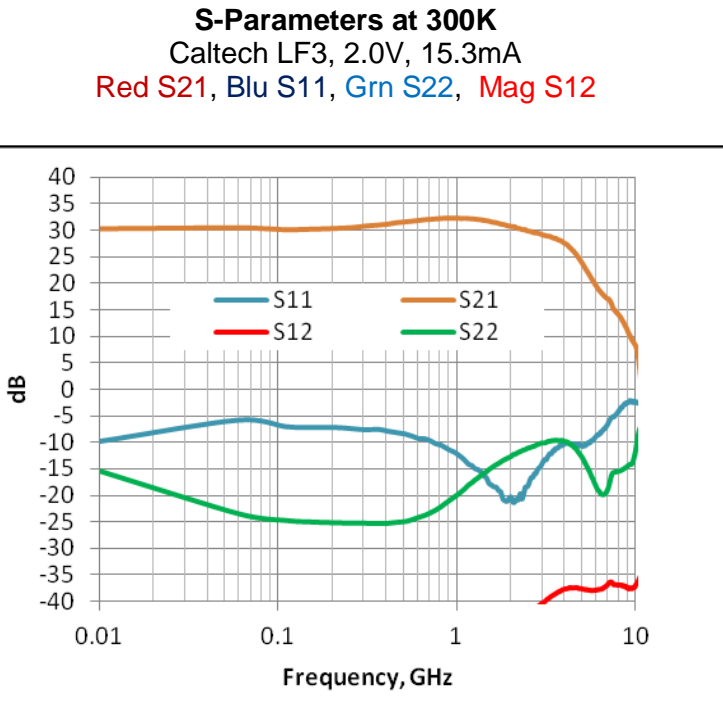
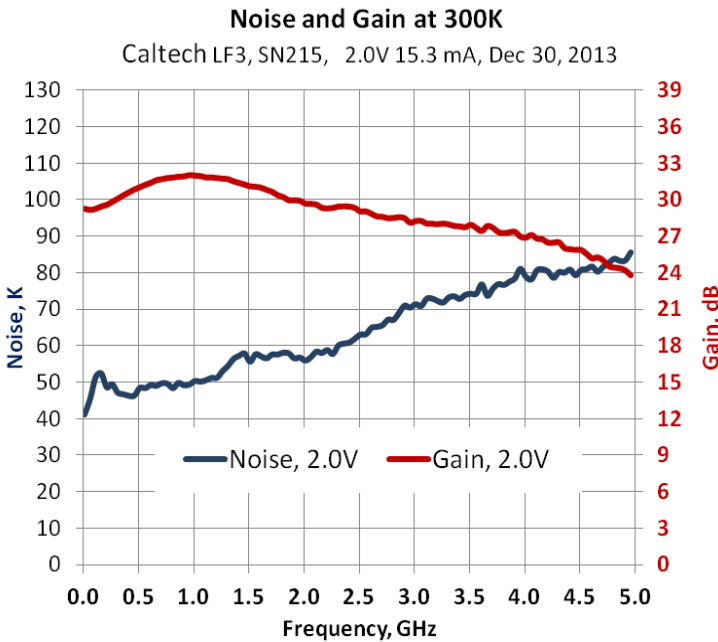
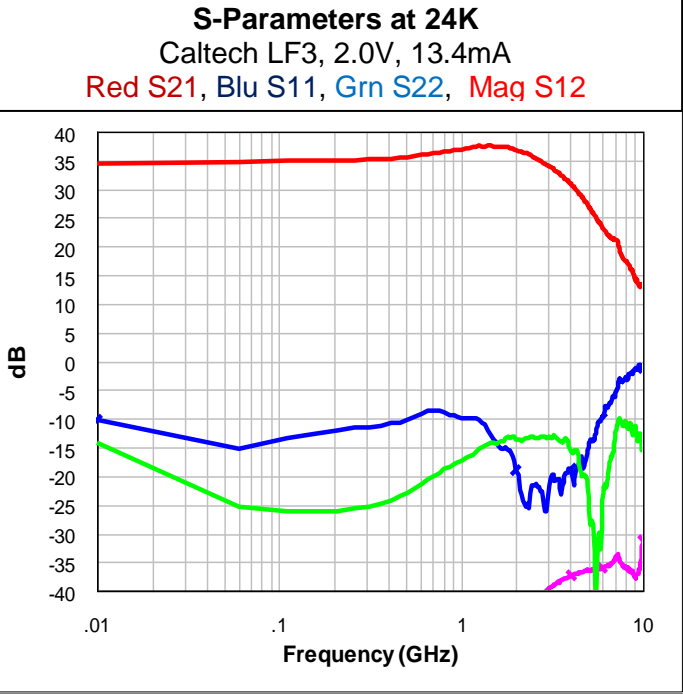
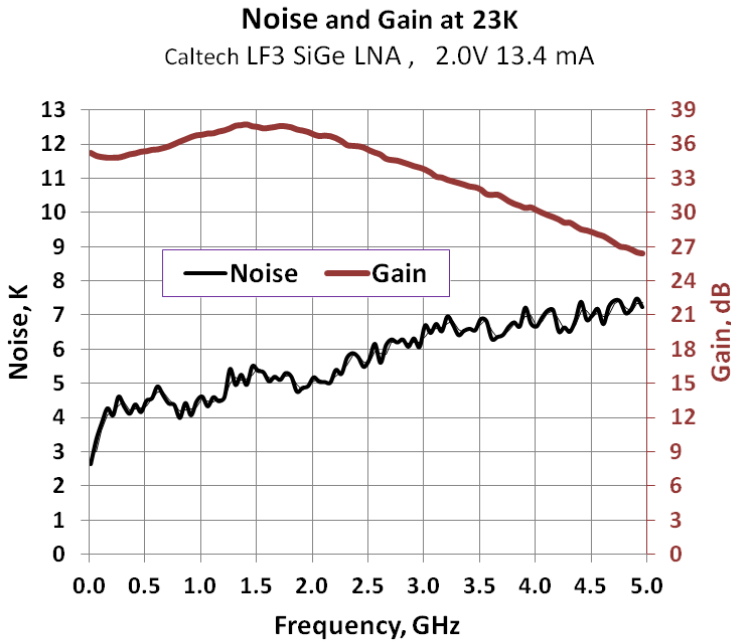
The amplifier offers an optional bias tee of 5K or 20K.

### Performance Summary

.01 to 2 GHz, 2V Bias

Parameter	At 24K	At 300K
Noise Temperature	<5.5 K	<60K
Gain =20log S21	36 +/-2 dB	31+/-2 dB
IRL=-20log S11	>10	>5
ORL=-20log S22	>14	>12
Gain Compression, Output P1dB	-5 dBm	-4 dBm
Gain Compression, Input P1dB	-41 dBm	-35 dBm
Input P1dB at 2.5V Supply	-39 dBm	-34 dBm
Maximum Power Output	+3 dBm = .002W	+3 dBm = .002W

Noise, Gain, and S-Parameters vs Frequency at 24K and 300K



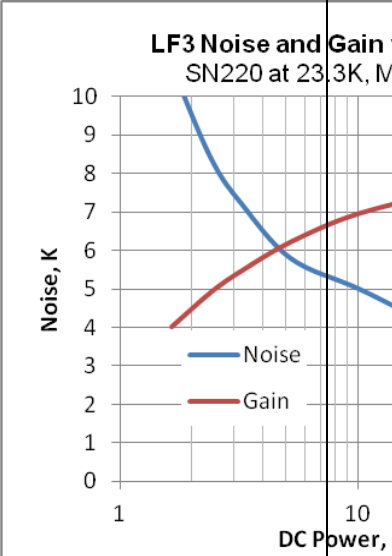
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Performance vs Bias Voltage

At 23K and 1 GHz

Note the sensitivity of gain to DC bias voltage. At 2.0V bias the slope is 0.4 dB per 0.1 volt bias change. This is a  $\Delta G/\Delta V$  of 1.9% per 1%. A .01% power supply gives a gain stability of .02% or .001 dB.

Vs	Is, mA	P, mW	T, K	G, dB
1.10	1.50	1.7	10.8	20.1
1.15	2.10	2.4	8.4	24.6
1.20	2.72	3.3	7.2	27.4
1.30	4.02	5.2	5.8	31.1
1.50	6.77	10.2	5.0	34.8
2.00	13.42	26.8	3.8	37.9
2.50	20.22	50.6	3.8	39.0
3.00	27.00	81.0	3.9	39.6

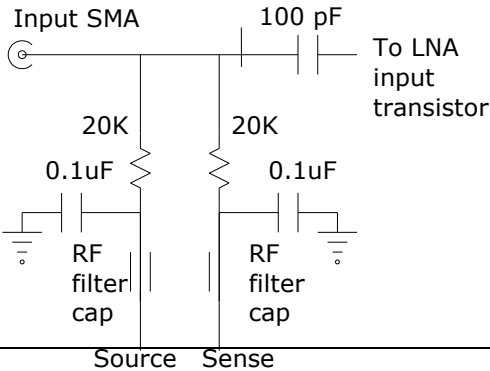


Optional Input Bias Tee

As an option the amplifier can be supplied with a DC bias tee for an external device connected to the amplifier input. The bias tee is formed by two resistors connected to the input; as shown in the circuit below. One resistor can be used as a source of current and the other senses the voltage across the external device. Voltages applied to the bias tee have a small effect on amplifier operation. At 20 Kelvin 20,000 ohm resistors increase noise by 0.08 K; 5,000 ohm increases noise by 0.5K.

To order an amplifier with internal bias resistors, add the the resistance to the part number. For example, CITLF3-20K. The price is increased by \$300.

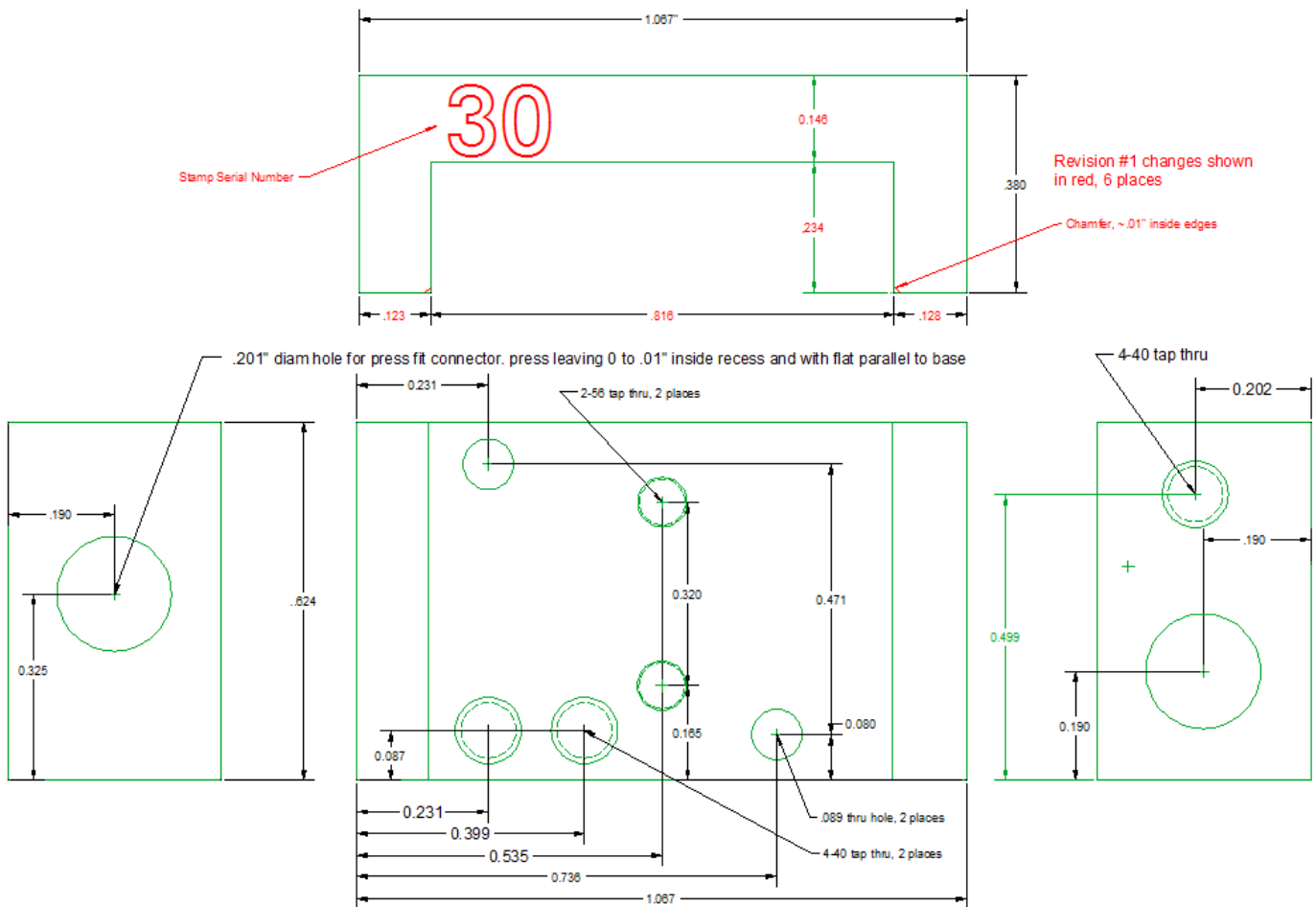
**Bias Schematic** at right. To order an amplifier with 5000 ohm bias resistors add -5K to model number. This will increase noise temperature by 0.5K.



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## Chassis Drawing

Dimensions in inches



Material: Nickel-plated brass

0.1uF

**Use care to not bend (and break) the DC bias pin when tightening the output SMA connector.**

### Contact Information

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