FMA3067SOT89

LOW NOISE HIGH LINEARITY PACKAGED MMIC

API Datasheet v0.2

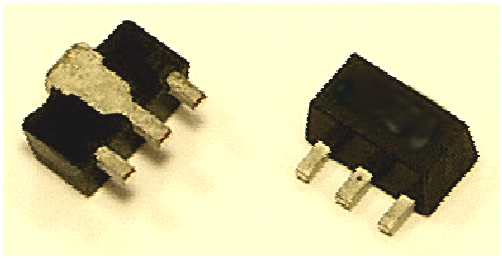
FEATURES

- 1.8 – 2.1 GHz
- 23 dBm P1dB @ 6V
- 16.5 dB Gain @ 1.9 GHz
- 38 dBm OIP3 @ 6V
- 3.2 dB Noise Figure @ 1.9GHz
- Single Supply +6V, 175mA

GENERAL DESCRIPTION:

The FMA3067SOT89 is a low cost packaged MMIC amplifier. The broadband amplifier is targeted for applications where high linearity is required. The FMA3067SOT89 is RoHS compliant (Directive 2002/95/EC).

PACKAGE:



TYPICAL APPLICATIONS:

- High Linearity and High Gain LNAs
- GSM, CDMA, W-CDMA and WiMax systems, and other types of wireless infrastructure systems.

TYPICAL ELECTRICAL PERFORMANCE:

RF PARAMETER	SYMBOL	CONDITIONS	1.8 – 2.1 GHZ	UNITS
Output P1dB	P1dB	VS = 6 V , Is = 175mA	24	dBm
Small Signal Gain	SSG	VS = 6 V , Is = 175mA	15.5	dB
Output IP3	OIP3	VS = 6 V , Is = 175mA	38	dBm
Input Return Loss	S11	VS = 6 V , Is = 175mA	-20	dB
Output Return Loss	S22	VS = 6 V , Is = 175mA	-20	dB
Minimum Noise Figure	NFmin	VS = 6 V , Is = 175mA	3.2	dB

Note: $T_{AMBIENT}$ = 25°C

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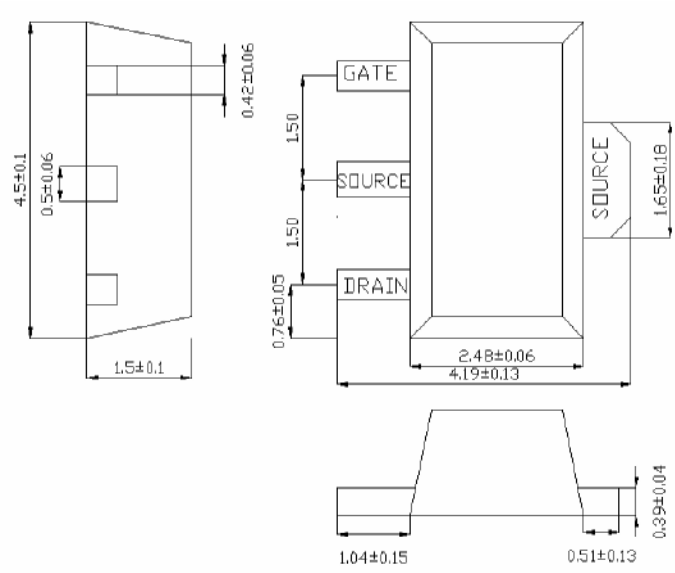
ABSOLUTE MAXIMUM RATING[1]:

PARAMETER	SYMBOL	ABSOLUTE MAXIMUM
Supply Voltage	VS	12V
RF Input Power	PIN	20dBm
Channel Operating Temperature	TCH	175°C
Operating Temperature	Top	-45°C to 85°C
Storage Temperature	TSTG	-55°C to 150°C
Total Power Dissipation[2]	PTOT	3.9W

Notes:
[1] $T_{Ambient}$ = 22°C unless otherwise noted; exceeding any one of these absolute maximum ratings may cause permanent damage to the device
[2] Total Power Dissipation defined as: $P_{TOT} \equiv (P_{DC} + P_{IN}) - P_{OUT}$,
where P_{DC}: DC Bias Power, P_{IN}: RF Input Power, P_{OUT}: RF Output Power
Total Power Dissipation to be de-rated as follows above 22°C:
P_{TOT}= 1.8 - (0.025W/°C) x T_{PACK}
where T_{PACK}= source tab lead temperature above 22°C
(coefficient of de-rating formula is the Thermal Conductivity)
Example: For a 65°C carrier temperature: P_{TOT} = 3.9W – (0 .025 x (65 – 22)) = 2.825W

PACKAGE OUTLINE:
(dimensions in millimeters – mm)



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TYPICAL PERFORMANCE: (VD = +6V, Id = 175mA, T = 25°C unmatched device in a 50 Ohm system)

Freq (GHz)	S11m	S11a	S21m	S21a	S12m	S12a	S22m	S22a
0.70	0.321	-59.6	8.94	135.4	0.055	-11.8	0.1	-34.7
1.00	0.334	-81	8.279	119.3	0.053	-16.4	0.14	-48.9
1.30	0.346	-99.6	7.632	104.3	0.05	-20.2	0.176	-60.4
1.60	0.355	-116.1	7.043	90.3	0.048	-23.2	0.211	-71.6
1.90	0.363	-131.4	6.521	77	0.045	-25.3	0.243	-81.4
2.20	0.37	-146.4	6.076	64.3	0.042	-26.3	0.27	-91.4
2.50	0.374	-160.9	5.696	51.9	0.04	-26.6	0.295	-101.8
2.80	0.382	-175.1	5.371	39.7	0.038	-25.5	0.317	-112.8
3.10	0.39	170.7	5.085	27.4	0.037	-23.5	0.342	-124.8
3.40	0.402	156.4	4.834	14.9	0.037	-20.6	0.375	-137.9
3.70	0.413	144.3	4.595	2.3	0.039	-17.8	0.422	-153.2
4.00	0.448	133.1	4.353	-10.9	0.042	-16.5	0.464	-170.3
4.30	0.485	120.7	4.098	-24.3	0.047	-16.8	0.516	175.2
4.60	0.521	110	3.816	-38	0.052	-19.8	0.577	159.3
4.90	0.555	99.3	3.51	-51.6	0.057	-24.5	0.642	145.1
5.20	0.587	88.8	3.203	-65.1	0.061	-30	0.702	132.2
5.50	0.608	81	2.883	-78.2	0.065	-36.4	0.764	118.3
5.80	0.646	71.7	2.576	-90.9	0.068	-43.4	0.791	106.8
6.10	0.664	63.2	2.294	-103.3	0.071	-50.9	0.826	95.4

The S-Parameters were taken with de-embedding up to the package leads using precision fixturing and calibration standards. The device can be used with no matching or as shown in the reference designs with matching to improve input and output return loss in the application frequency band.

For applications not included in the reference designs the S-Parameters can be used for simulation to optimise input and output return loss.

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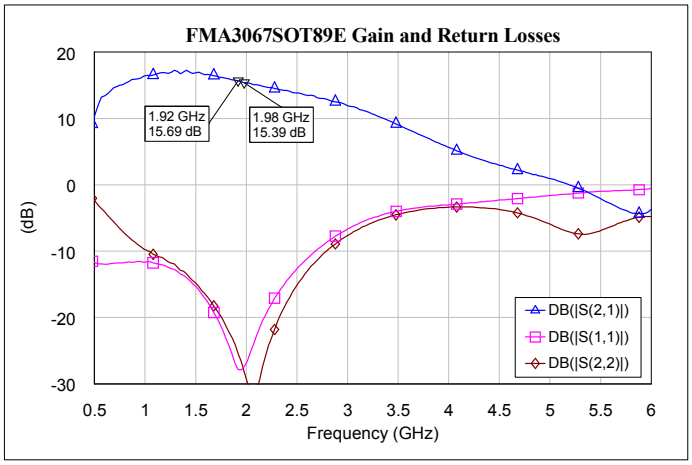
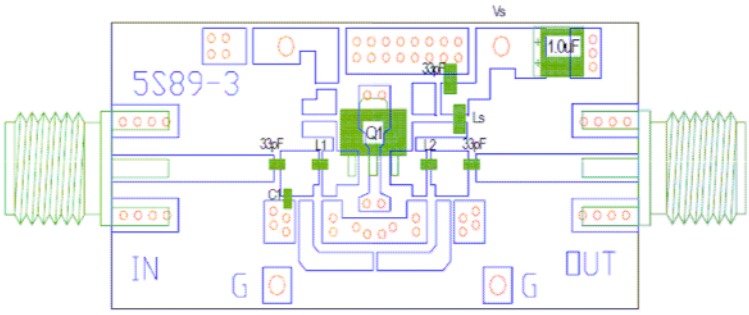
REFERENCE DESIGN AT 1.9GHZ

Parameter	Typical Value
Frequency (GHz)	1.92 - 1.98
S21 (dB)	15.5
P1dB (dBm)	23
OIP3 (dBm)	38
S11 (dB)	-20
S22 (dB)	-20
Supply Voltage (V)	6
Supply Current (mA)	175



The evaluation board is a single ended single supply amplifier. The RF connectors are SMA jacks soldered to a 30mil thick FR-4 type PC board. Biasing is applied using a test clip at Vs where Vs = 5V. The holes marked "G" are provided for a ground clip. Typical bias current is 150mA.

The board is flexible and can cause components to crack if flexed. Caution should be used when connecting it to coaxial cables.



Comp:	Description
C1	Cap. 0402 0.5pF ATC 600S
33pF	Cap. 0402 ATC 600S
1.0uF	SMD-B Tantallum
L1	Inductor LL1005-FH 1.8nH TOKO
L2	Inductor LL1005-FH 1.8nH TOKO
Ls	Inductor LL1608-FH 27nH TOKO
Q1	FMA3067SOT89

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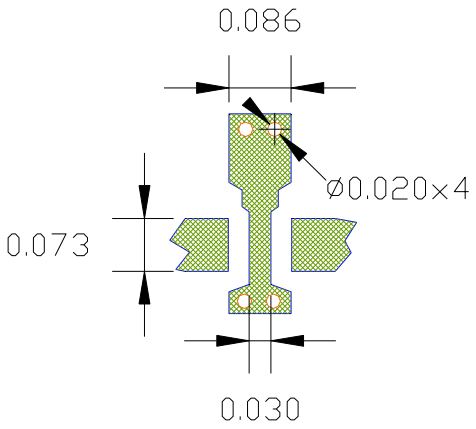
Device Foot Print:



Units in inches

Preferred Assembly Instructions:

This package is compatible with both lead free and leaded solder reflow processes as defined within IPC/JEDEC J-STD-020C. The maximum package temperature should not exceed 260°C.

Handling Precautions:

To avoid damage to the devices care should be exercised during handling. Proper Electrostatic Discharge (ESD) precautions should be observed at all stages of storage, handling, assembly, and testing.

ESD/MSL Rating:

These devices should be treated as Class 1A (250-500 V) using the human body model as defined in JEDEC Standard No. 22-A114.

The device has a MSL rating of Level 2. To determine this rating, preconditioning was performed to the device per, the Pb-free solder profile defined within IPC/JEDEC J-STD-020C, Moisture / Reflow sensitivity classification for non-hermatic solid state surface mount devices

Reliability:

A MTTF of $1x10^6$ hours at a channel temperature of 150°C is achieved for the process used to manufacture this device.

Application Notes & Design Data:

Application Notes and design data including S-parameters are available; please contact Filtronic Compound Semiconductors Ltd.

Disclaimers:

This product is not designed for use in any space based or life sustaining/supporting equipment.

Ordering Information:

Part Number	Description
FMA3067SOT89	RoHs Compliant Packaged pHEMT
FMA3067SOT89(E)-BA	1.9 GHz evaluation board

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