



FHF1

High Dynamic Range FET

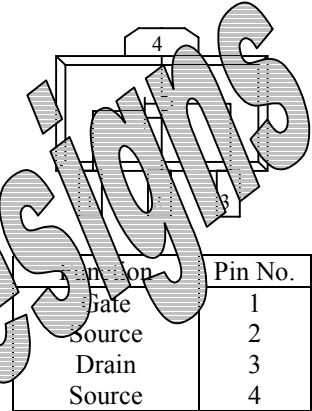
Product Features

- 50 – 3000 MHz
- +39 dBm Output IP3
- 2.4 dB Noise Figure
- +21 dBm P1dB
- Single or Dual Supply Operation
- MTBF>100 Years
- SOT 89 SMT Package

Product Description

The FHF1 is a high dynamic range FET packaged in a low cost surface mount package. The combination of low noise figure and high output IP3 at the same bias point makes it ideal for receiver and transmitter applications. The FHF1 achieves +39 dBm OIP3 at a mounting temperature of 85°C with an associated MTBF of >100 years⁶. The package is SOT-89. All devices are 100% RF and DC tested. The product is targeted applications where high reliability is required.

Functional Diagram



Specifications

DC Parameters	Units	Minimum	Typical	Maximum	Comments
Saturated Drain Current	mA	100	140	170	Vgs = 0 V
Transconductance	S		120		
Pinch Off Voltage, VP	V	3.0	-1.5		Ids = 0.6 mA

RF Parameters	Units	Minimum	Typical	Maximum	Comments
Small Signal Gain, GS	dB	10	12		
Maximum Stable Gain, MSG	dB		17		
Third Order Output Intercept, OIP3	dBm	+37	+39		
1 dB Compression Point, P1dB	dBm		+21		
Noise Figure, NF	dB		2.4		

Test conditions unless otherwise noted

1. DC and RF parameters measured under the following conditions unless otherwise noted. 25°C with Vds = 5.0 V, Vgs = 0 V, test frequency = 3000 MHz, 50 Ω system.
2. OIP3 measured with two tones at an output power of 5 dBm/tone separated by 10 MHz. The suppression on the largest IM3 products is used to calculate the OIP3 using a 2:1 rule.
3. Degradation of OIP3 occurs at low temperatures. Minimum typical OIP3 at -40°C is +36 dBm.
4. Idss is measured with Vgs = 0V.
5. Pinch off voltage is measured when Ids = 0.6 mA.
6. MTBF calculated with channel temperature at 155°C.

Absolute Maximum Rating

Parameters	Rating
Drain to Source Voltage	8.0 V
Gate to Source Voltage	-6.0 V
Gate Current	4.5 mA
Storage Temperature	-55 to +125°C
RF Input Power (continuous)	+10 dBm

Operation of this device above any of these parameters may cause permanent damage

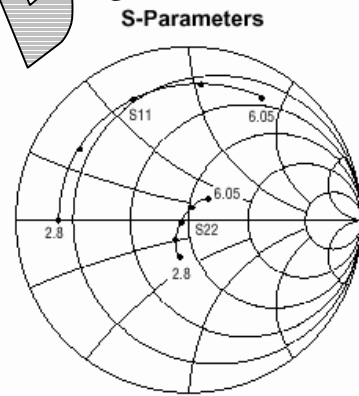
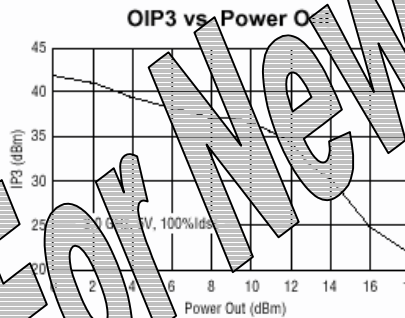
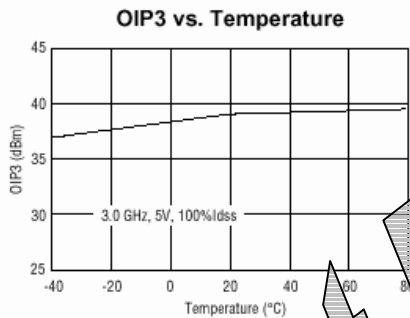
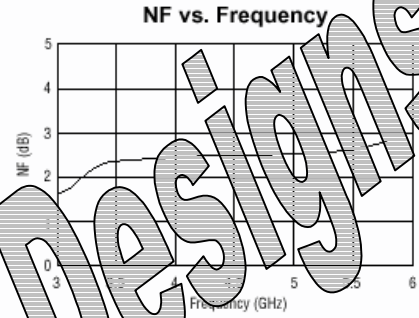
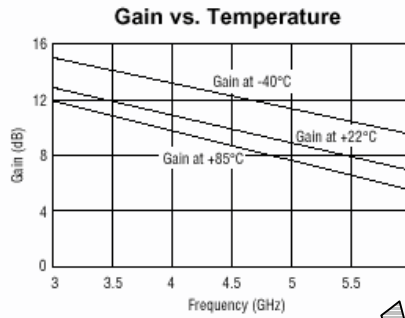
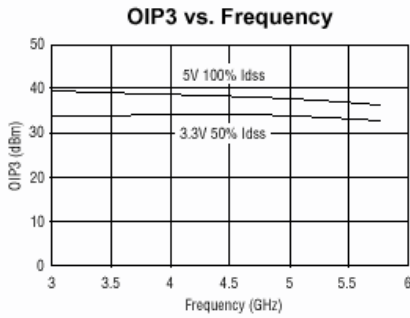
Ordering Information

Part No.	Description
FHF1	High Dynamic Range FET (Available in Tape & Reel)

This document contains information on a new product. Specifications and information are subject to change without notice



Performance Charts (Vds = 5.0 V, Ids = 150 mA, T = 22°C, 50 ohm system)



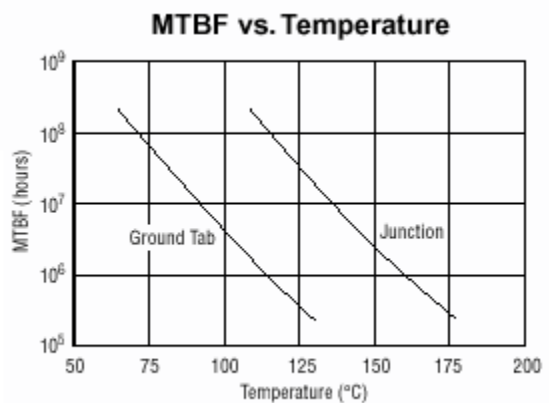
S11 and S22

NOT FOR NEW DESIGNS

Absolute Maximum Rating

Parameters	Rating
Operating Case Temperature	-40 to +85°C
Thermal Resistance (Maximum)	59°C/W
Junction Temperature (Recommended Maximum)	+155°C

- Notes:
1. Thermal Resistance determined at Maximum Tab Temperature and Maximum Power Dissipation.
 2. Recommended Maximum Junction Temperature insures a MTBF of 1 million hours.

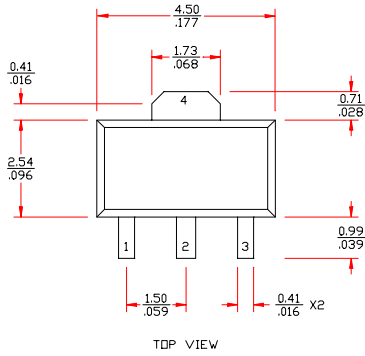




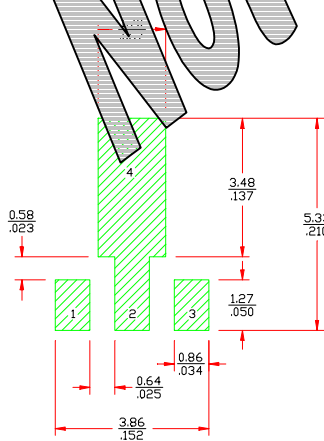
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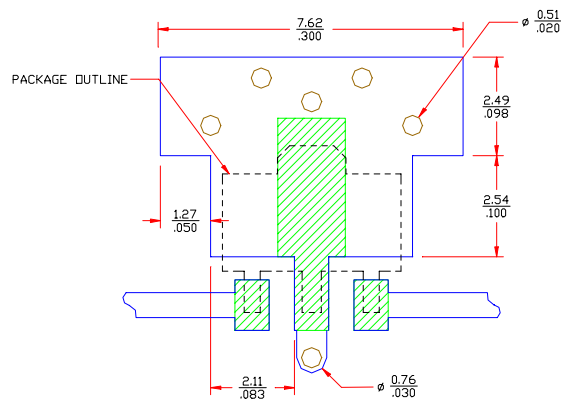
OUTLINE DRAWING



LAND PATTERN



MOUNTING CONFIGURATION



FUNCTION	PIN NO.
INPUT	1
GROUND	2
OUTPUT (BIAS)	3
GROUND	4

- Notes:
1. Ground vias are critical for thermal and RF grounding considerations.
 2. A minimum of 6 ground vias are required for 14 mil and 28 mil FR4 board.
 3. If your PCB design rules allow, ground vias should be placed under the land pattern for better RF and thermal performance. Otherwise ground vias should be placed as close to land pattern as possible.
 4. Trace width depends on PC board.



Typical Test Data

S-Parameters (Vds = +5V, 100% Idss, T = 22°C, unmatched device in a 50 ohm system)

Freq (GHz)	S11 (Mag)	S11 (Ang)	S21 (dB)	S21 (Mag)	S21 (Ang)	S12 (Mag)	S12 (Ang)	S22 (Mag)	S22 (Ang)	K Value
2.80	0.754	-180.000	13.679	4.830	49.600	0.074	-5.810	0.216	-103.000	0.5746
3.05	0.748	169.000	13.103	4.520	41.200	0.075	-12.300	0.191	-110.000	0.6246
3.30	0.749	159.000	12.547	4.240	32.900	0.076	-17.600	0.165	-117.000	0.6753
3.55	0.759	148.000	12.041	4.000	24.500	0.075	-23.300	0.139	-123.000	0.7077
3.80	0.759	139.000	11.527	3.770	16.800	0.077	-27.800	0.113	-127.000	0.7571
4.05	0.757	129.000	11.053	3.570	8.940	0.076	-33.100	0.087	-140.000	0.8773
4.30	0.764	120.000	10.578	3.380	0.975	0.075	-38.100	0.061	-158.000	0.9499
4.55	0.770	110.000	10.103	3.200	-6.850	0.074	-42.000	0.043	-170.000	0.9732
4.80	0.781	101.000	9.629	3.030	-14.700	0.073	-47.000	0.030	-179.000	0.9621
5.05	0.785	91.800	9.097	2.850	-22.700	0.071	-51.600	0.020	-170.000	0.9528
5.30	0.796	82.700	8.627	2.700	-30.500	0.070	-55.900	0.015	-70.100	0.9914
5.55	0.808	73.900	8.097	2.540	-38.100	0.068	-59.900	0.010	60.200	1.0313
5.80	0.817	65.800	7.532	2.380	-45.800	0.068	-63.300	0.008	52.900	1.0687
6.05	0.825	59.800	7.082	2.260	-51.000	0.068	-66.000	0.007	47.500	1.1102

S-Parameters (Vds = +3.3 V, 50% Idss, T = 22°C, unmatched device in a 50 ohm system)

Freq (GHz)	S11 (Mag)	S11 (Ang)	S21 (dB)	S21 (Mag)	S21 (Ang)	S12 (Mag)	S12 (Ang)	S22 (Mag)	S22 (Ang)	K Value
2.80	0.755	-175.000	13.25	4.800	52.000	0.089	-6.810	0.169	-138.000	0.6190
3.05	0.747	170.000	12.54	4.500	43.400	0.090	-13.400	0.150	-152.000	0.6719
3.30	0.745	163.000	11.957	4.230	35.100	0.090	-19.500	0.133	-168.000	0.7133
3.55	0.755	150.000	11.495	3.960	26.000	0.088	-24.700	0.119	-179.000	0.7456
3.80	0.753	140.000	10.934	3.730	18.200	0.088	-30.200	0.102	-156.000	0.7882
4.05	0.753	130.000	10.355	3.530	10.300	0.088	-35.300	0.104	-134.000	0.8550
4.30	0.757	114.000	10.501	3.350	2.490	0.089	-40.900	0.121	-113.000	0.9027
4.55	0.763	104.000	10.021	3.170	-5.310	0.090	-47.800	0.145	96.800	0.9433
4.80	0.773	94.700	9.571	3.010	-13.000	0.090	-53.600	0.174	83.400	0.9851
5.05	0.778	85.300	9.005	2.820	-21.000	0.088	-58.200	0.199	72.500	1.0559
5.30	0.788	76.300	8.498	2.660	-28.900	0.086	-63.000	0.230	63.300	1.0930
5.55	0.800	68.000	7.959	2.500	-36.600	0.083	-68.400	0.262	55.300	1.1350
5.80	0.809	68.000	7.347	2.330	-44.200	0.081	-73.300	0.293	48.500	1.1729
6.05	0.817	61.700	6.888	2.210	-50.200	0.078	-77.400	0.319	43.200	1.2156