

9.50-10.50 GHz 2-Watt Internally-Matched Power FET

Issued Date: 04-27-04

FEATURES

- 9.50-10.50 GHz Bandwidth
- Input/Output Impedance Matched to 50 Ohms
- +33.5 dBm Output Power at 1dB Compression
- 8.0 dB Power Gain at 1dB Compression
- 30% Power Added Efficiency
- -46 dBc IM3 at $P_o = 22.5$ dBm SCL
- Hermetic Metal Flange Package
- 100% Tested for DC, RF, and R_{TH}



DESCRIPTION

The EIC0910-2 is a high power, highly linear, single stage MFET amplifier in a flange mount package. This amplifier features Excelics' unique PHEMT transistor technology.



Caution! ESD sensitive device.

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

| SYMBOL | PARAMETERS/TEST CONDITIONS ¹ | MIN | TYP | MAX | UNITS |
|------------|--|------|------|-----------|--------------------|
| P_{1dB} | Output Power at 1dB Compression $f = 9.50-10.50\text{GHz}$ $V_{DS} = 10\text{ V}$, $I_{DSQ} = 550\text{mA}$ | 32.5 | 33.5 | | dBm |
| G_{1dB} | Gain at 1dB Compression $f = 9.50-10.50\text{GHz}$ $V_{DS} = 10\text{ V}$, $I_{DSQ} = 550\text{mA}$ | 7.0 | 8.0 | | dB |
| ΔG | Gain Flatness $f = 9.50-10.50\text{GHz}$ $V_{DS} = 10\text{ V}$, $I_{DSQ} = 550\text{mA}$ | | | ± 0.6 | dB |
| PAE | Power Added Efficiency at 1dB Compression $V_{DS} = 10\text{ V}$, $I_{DSQ} = 550\text{mA}$ $f = 9.50-10.50\text{GHz}$ | | 30 | | % |
| I_{d1dB} | Drain Current at 1dB Compression $f = 9.50-10.50\text{GHz}$ | | 600 | 700 | mA |
| IM3 | Output 3rd Order Intermodulation Distortion $\Delta f = 10\text{ MHz}$ 2-Tone Test; $P_{out} = 22.5\text{ dBm S.C.L.}^2$ $V_{DS} = 10\text{ V}$, $I_{DSQ} \approx 65\% I_{DSS}$ $f = 10.50\text{GHz}$ | -43 | -46 | | dBc |
| I_{DSS} | Saturated Drain Current $V_{DS} = 3\text{ V}$, $V_{GS} = 0\text{ V}$ | | 1000 | 1250 | mA |
| V_P | Pinch-off Voltage $V_{DS} = 3\text{ V}$, $I_{DS} = 10\text{ mA}$ | | -2.5 | -4.0 | V |
| R_{TH} | Thermal Resistance ³ | | 11 | 12 | $^\circ\text{C/W}$ |

Notes:

1. Tested with 100 Ohm gate resistor.
2. S.C.L. = Single Carrier Level.
3. Overall R_{th} depends on case mounting.

ABSOLUTE MAXIMUM RATINGS FOR CONTINUOUS OPERATION^{1,2}

| SYMBOL | CHARACTERISTIC | VALUE |
|-----------|-------------------------|-------------------|
| V_{DS} | Drain to Source Voltage | 10 V |
| V_{GS} | Gate to Source Voltage | -4.5 V |
| I_{DS} | Drain Current | IDSS |
| I_{GSF} | Forward Gate Current | 20 mA |
| P_{IN} | Input Power | @ 3dB compression |
| P_T | Total Power Dissipation | 10 W |
| T_{CH} | Channel Temperature | 150°C |
| T_{STG} | Storage Temperature | -65/+150°C |

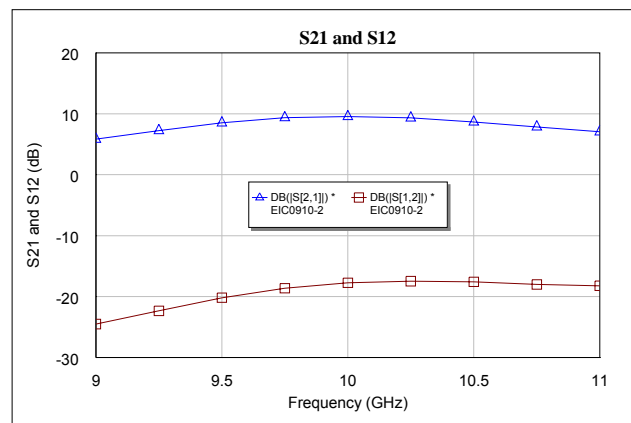
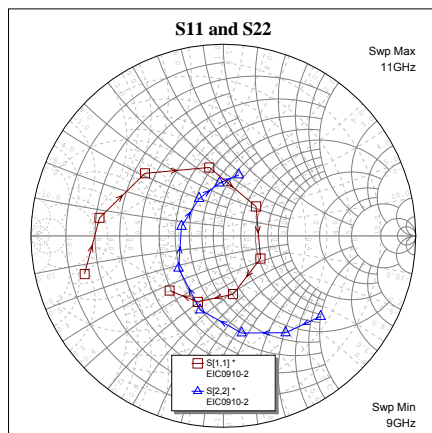
Notes:

- Operating the device beyond any of the above ratings may result in permanent damage or reduction of MTTF.
- Bias conditions must also satisfy the following equation $P_T < (T_{CH} - T_{PKG})/R_{TH}$; where T_{PKG} = temperature of package, and $P_T = (V_{DS} * I_{DS}) - (P_{OUT} - P_{IN})$.

PERFORMANCE DATA

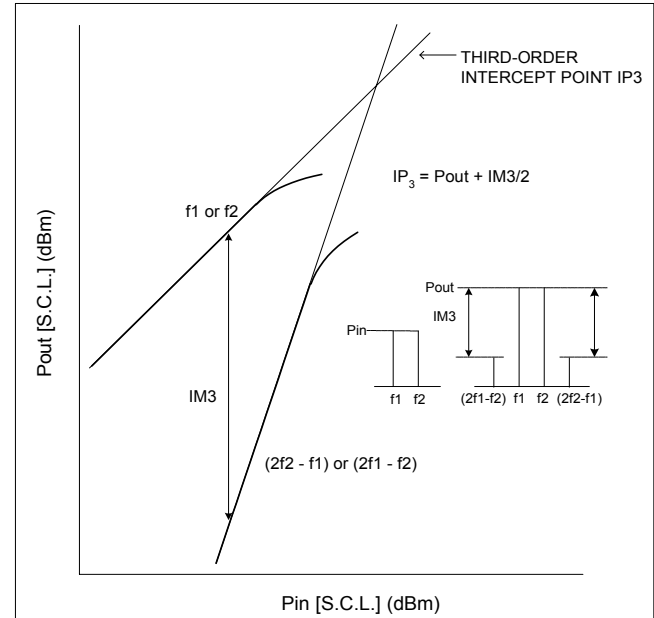
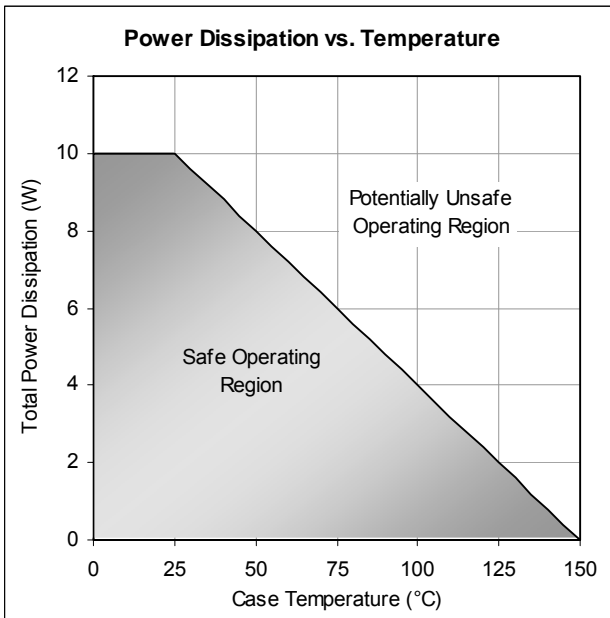
Typical S-Parameters ($T = 25^\circ\text{C}$, 50Ω system, de-embedded to edge of package)

$V_{DS} = 10\text{ V}$, $I_{DSQ} = 550\text{mA}$

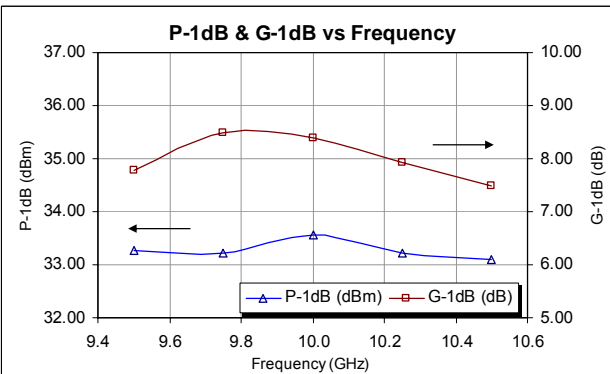


| FREQ (GHz) | --- S11 --- | | --- S21 --- | | --- S12 --- | | --- S22 --- | |
|------------|-------------|----------|-------------|----------|-------------|----------|-------------|----------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 8.75 | 0.801 | -144.750 | 1.666 | 55.890 | 0.045 | 10.590 | 0.698 | -25.380 |
| 9.00 | 0.748 | -164.560 | 1.962 | 36.560 | 0.059 | -9.970 | 0.658 | -39.760 |
| 9.25 | 0.650 | 171.690 | 2.305 | 14.740 | 0.076 | -32.680 | 0.600 | -57.400 |
| 9.50 | 0.522 | 141.280 | 2.669 | -10.520 | 0.098 | -58.510 | 0.516 | -79.320 |
| 9.75 | 0.364 | 101.620 | 2.943 | -38.640 | 0.117 | -86.820 | 0.405 | -107.410 |
| 10.00 | 0.229 | 42.070 | 3.009 | -67.750 | 0.130 | -115.840 | 0.288 | -144.010 |
| 10.25 | 0.227 | -31.690 | 2.929 | -95.780 | 0.134 | -143.460 | 0.223 | 167.180 |
| 10.50 | 0.309 | -80.620 | 2.712 | -122.110 | 0.132 | -168.960 | 0.232 | 122.730 |
| 10.75 | 0.369 | -111.080 | 2.470 | -146.280 | 0.126 | 168.060 | 0.276 | 93.950 |
| 11.00 | 0.399 | -134.340 | 2.254 | -168.390 | 0.123 | 146.710 | 0.329 | 75.830 |
| 11.25 | 0.402 | -154.030 | 2.085 | 170.040 | 0.117 | 126.180 | 0.377 | 62.360 |

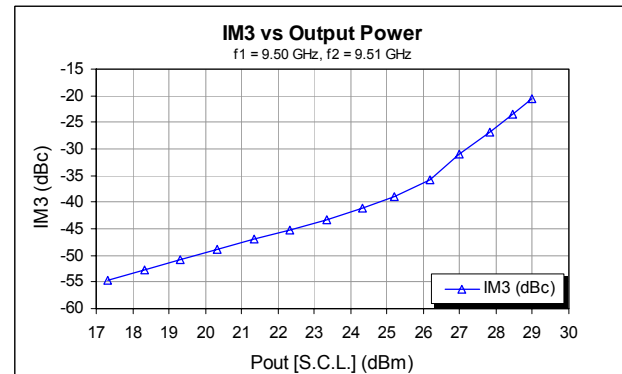
Power De-rating Curve and IM3 Definition



Typical Power Data ($V_{DS} = 10$ V, $I_{DSQ} = 550$ mA)

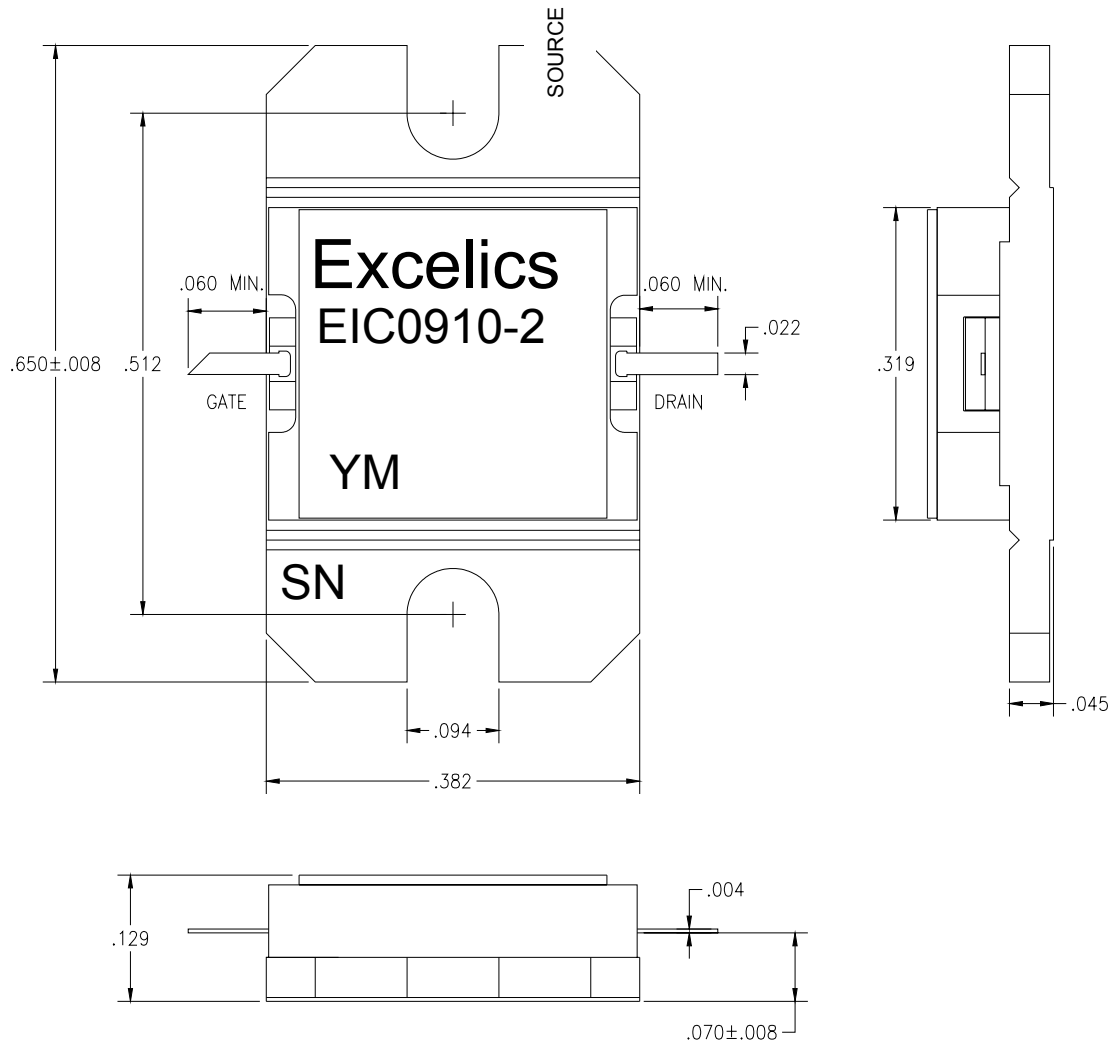


Typical IM3 Data ($V_{DS} = 10$ V, $I_{DSQ} \approx 65\%$ IDSS)



PACKAGE OUTLINE

Dimensions in inches, Tolerance $\pm .005$ unless otherwise specified



ORDERING INFORMATION

| Part Number | Grade ¹ | f _{Test} (GHz) | P _{1dB} (min) | IM ₃ (min) ² |
|-------------|--------------------|-------------------------|------------------------|------------------------------------|
| EIC0910-2 | Industrial | 9.50-10.50 GHz | 32.5 | -43.0 |

Notes: 1. Contact factory for military and hi-rel grades.
2. Exact test conditions are specified in "Electrical Characteristics" table.