# TRANSCOM

TC2101

Jan. 2006

## Plastic Packaged Low Noise PHEMT GaAs FETs

### FEATURES

- 1.5 dB Typical Noise Figure at 12 GHz
- High Associated Gain:
  Ga = 8 dB Typical at 12 GHz
- 17.5 dBm Typical Power at 12 GHz
- 9 dB Typical Linear Power Gain at 12 GHz
- Lg = 0.25 μm, Wg = 160 μm
- 100 % DC Tested
- Low Cost Plastic Micro-X Package
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### PHOTO ENLARGEMENT

### ELECTRICAL SPECIFICATIONS ($T_A$=25 °C)

| Symbol | CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| NF | Noise Figure at $V_{DS}$ = 2 V, $I_{DS}$ = 10 mA, $f$ = 12GHz (2.5 GHz) | | 1.5 (0.35) | 1.8 | dB |
| $G_a$ | Associated Gain at $V_{DS}$ = 2 V, $I_{DS}$ = 10 mA, $f$ = 12GHz (2.5 GHz) | 7 | 8 (17) | | dB |
| $P_{1dB}$ | Output Power at 1dB Gain Compression Point, $f$ = 12GHz (2.5 GHz)<br>$V_{DS}$ = 4 V, $I_{DS}$ = 25 mA | 16.5 | 17.5 (17.5) | | dBm |
| $G_L$ | Linear Power Gain, $f$ = 12GHz (2.5 GHz)<br>$V_{DS}$ = 4 V, $I_{DS}$ = 25 mA | 8 | 9 (22) | | dB |
| $I_{DSS}$ | Saturated Drain-Source Current at $V_{DS}$ = 2 V, $V_{GS}$ = 0 V | | 40 | | mA |
| $g_m$ | Transconductance at $V_{DS}$ = 2 V, $V_{GS}$ = 0 V | | 55 | | mS |
| $V_P$ | Pinch-off Voltage at $V_{DS}$ = 2 V, $I_D$ = 0.32mA | | -1.0 | | Volts |
| $BV_{DGO}$ | Drain-Gate Breakdown Voltage at $I_{DGO}$ = 0.08mA | 9 | 12 | | Volts |
| $R_{th}$ | Thermal Resistance | | 130 | | °C/W |

### ABSOLUTE MAXIMUM RATINGS ($T_A$=25 °C)

| Symbol | Parameter | Rating |
|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 7.0 V |
| $V_{GS}$ | Gate-Source Voltage | -3.0 V |
| $I_{DS}$ | Drain Current | $I_{DSS}$ |
| $I_{GS}$ | Gate Current | 160 μA |
| $P_{in}$ | RF Input Power, CW | 14 dBm |
| $P_T$ | Continuous Dissipation | 150 mW |
| $T_{CH}$ | Channel Temperature | 175 °C |
| $T_{STG}$ | Storage Temperature | - 65 °C to +175 °C |

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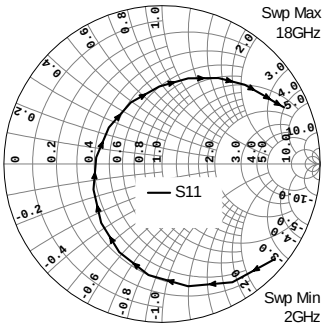
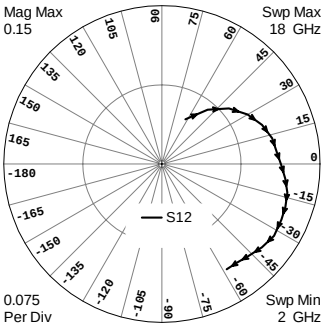
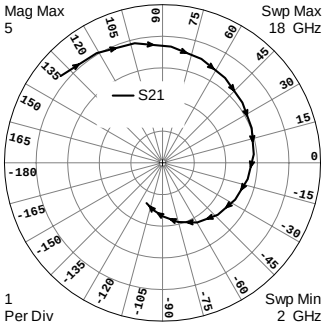
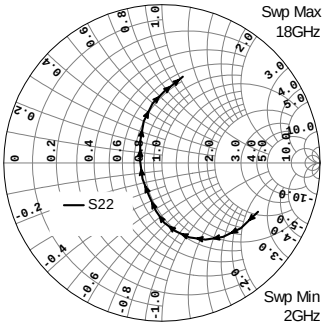
## TYPICAL SCATTERING PARAMETERS ($T_A$=25°C)

$V_{DS}$ = 2 V, $I_{DS}$ = 10 mA



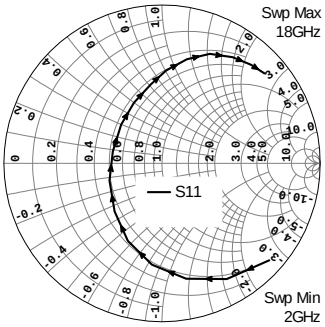



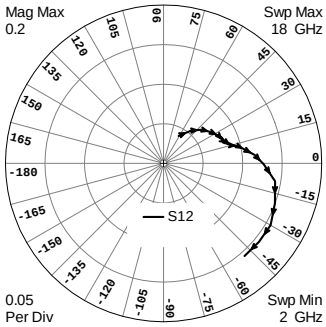



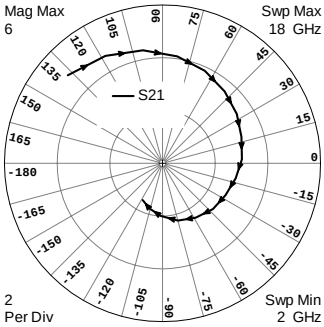

| FREQUENCY | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| (GHz) | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 2 | 0.9332 | -39.94 | 4.2345 | 139.60 | 0.0479 | 62.17 | 0.6820 | -26.91 |
| 3 | 0.8691 | -59.20 | 4.0461 | 121.08 | 0.0673 | 49.85 | 0.6478 | -39.62 |
| 4 | 0.7888 | -77.97 | 3.8790 | 103.08 | 0.0825 | 39.64 | 0.6063 | -50.42 |
| 5 | 0.7071 | -96.96 | 3.6815 | 85.82 | 0.0939 | 30.01 | 0.5571 | -60.39 |
| 6 | 0.6190 | -115.86 | 3.5050 | 69.45 | 0.1020 | 21.24 | 0.5019 | -69.72 |
| 7 | 0.5355 | -135.99 | 3.3332 | 53.51 | 0.1074 | 13.13 | 0.4395 | -78.87 |
| 8 | 0.4622 | -159.62 | 3.1635 | 36.99 | 0.1095 | 5.90 | 0.3760 | -87.99 |
| 9 | 0.4177 | 174.21 | 3.0225 | 21.25 | 0.1133 | -0.54 | 0.3060 | -97.16 |
| 10 | 0.4071 | 145.51 | 2.8979 | 5.35 | 0.1178 | -6.78 | 0.2197 | -112.27 |
| 11 | 0.4350 | 116.89 | 2.7425 | -10.82 | 0.1220 | -12.84 | 0.1591 | -140.60 |
| 12 | 0.4897 | 92.02 | 2.5755 | -26.77 | 0.1239 | -19.07 | 0.1388 | 174.36 |
| 13 | 0.5663 | 73.01 | 2.3953 | -43.25 | 0.1250 | -24.94 | 0.1954 | 134.41 |
| 14 | 0.6489 | 56.74 | 2.1736 | -59.86 | 0.1262 | -32.65 | 0.2872 | 113.57 |
| 15 | 0.7239 | 43.74 | 1.9317 | -75.28 | 0.1235 | -39.78 | 0.3803 | 98.86 |
| 16 | 0.7723 | 34.48 | 1.6923 | -89.48 | 0.1197 | -46.96 | 0.4525 | 87.96 |
| 17 | 0.8179 | 28.19 | 1.5142 | -101.69 | 0.1176 | -52.45 | 0.5088 | 80.94 |
| 18 | 0.8508 | 24.95 | 1.3686 | -111.73 | 0.1172 | -58.32 | 0.5605 | 76.32 |

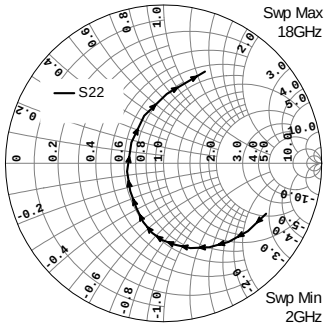
## TYPICAL SCATTERING PARAMETERS ($T_A$=25°C)

$V_{DS}$ = 4 V, $I_{DS}$ = 25 mA



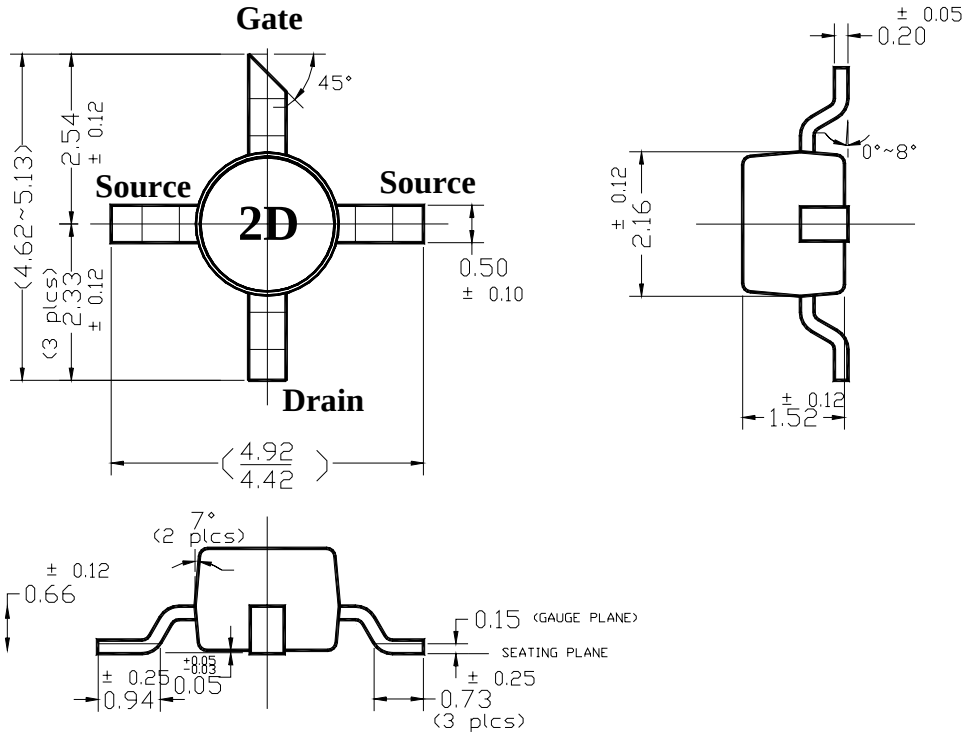




| FREQUENCY | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| (GHz) | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 2 | 0.9137 | -42.10 | 4.8979 | 137.16 | 0.0395 | 61.31 | 0.7226 | -26.17 |
| 3 | 0.8372 | -60.74 | 4.6138 | 118.07 | 0.0538 | 50.15 | 0.6839 | -38.73 |
| 4 | 0.7444 | -78.16 | 4.3408 | 99.83 | 0.0646 | 41.21 | 0.6443 | -50.28 |
| 5 | 0.6434 | -95.71 | 4.0863 | 82.16 | 0.0722 | 32.98 | 0.6035 | -61.47 |
| 6 | 0.5349 | -113.81 | 3.8526 | 65.37 | 0.0780 | 26.66 | 0.5620 | -72.40 |
| 7 | 0.4270 | -134.68 | 3.6029 | 49.11 | 0.0809 | 20.57 | 0.5177 | -82.56 |
| 8 | 0.3489 | -161.89 | 3.3774 | 33.53 | 0.0842 | 18.01 | 0.4839 | -91.18 |
| 9 | 0.3204 | 166.16 | 3.1571 | 18.44 | 0.0875 | 15.03 | 0.4454 | -99.22 |
| 10 | 0.3560 | 136.66 | 3.0157 | 2.95 | 0.0964 | 13.24 | 0.3926 | -109.15 |
| 11 | 0.4227 | 114.81 | 2.8309 | -11.55 | 0.1039 | 9.70 | 0.3318 | -121.05 |
| 12 | 0.5039 | 98.08 | 2.6800 | -26.98 | 0.1158 | 5.26 | 0.2746 | -140.16 |
| 13 | 0.5866 | 87.43 | 2.5836 | -42.21 | 0.1267 | -0.50 | 0.2362 | -167.47 |
| 14 | 0.6763 | 76.55 | 2.4145 | -58.58 | 0.1429 | -9.10 | 0.2419 | 147.12 |
| 15 | 0.7546 | 66.32 | 2.2489 | -74.91 | 0.1496 | -19.76 | 0.3244 | 112.28 |
| 16 | 0.8058 | 56.26 | 1.9984 | -91.95 | 0.1563 | -29.92 | 0.4388 | 87.46 |
| 17 | 0.8394 | 47.89 | 1.7802 | -106.24 | 0.1562 | -39.48 | 0.5392 | 73.40 |
| 18 | 0.8609 | 41.28 | 1.5852 | -118.37 | 0.1555 | -48.81 | 0.6361 | 65.72 |

**OUTLINE DIMENSIONS (in mm)**

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