

Plastic Packaged Low Noise PHEMT GaAs FETs

FEATURES

- 1.5 dB Typical Noise Figure at 12 GHz
- High Associated Gain: $G_a = 7$ dB Typical at 12 GHz
- 21.5 dBm Typical Power at 12 GHz
- 8 dB Typical Linear Power Gain at 12 GHz
- $L_g = 0.25 \mu\text{m}$, $W_g = 300 \mu\text{m}$
- Tight V_p ranges control
- High RF input power handling capability
- 100 % DC Tested
- Low Cost Plastic Micro-X Package

PHOTO ENLARGEMENT



DESCRIPTION

The TC2201 is a high performance field effect transistor housed in a plastic package with TC1201 PHEMT Chip. Its low noise figure makes this device suitable for use in low noise amplifiers. All devices are 100 % DC tested to assure consistent quality.

ELECTRICAL SPECIFICATIONS ($T_A=25^\circ\text{C}$)

| Symbol | CONDITIONS | MIN | TYP | MAX | UNIT |
|------------|--|------|-------|-----|--------------------|
| NF | Noise Figure at $V_{DS} = 4 \text{ V}$, $I_{DS} = 25 \text{ mA}$, $f = 12\text{GHz}$ | | 1.5 | 2 | dB |
| G_a | Associated Gain at $V_{DS} = 4 \text{ V}$, $I_{DS} = 25 \text{ mA}$, $f = 12\text{GHz}$ | 6 | 7 | | dB |
| P_{1dB} | Output Power at 1dB Gain Compression Point, $f = 12\text{GHz}$ $V_{DS} = 6 \text{ V}$, $I_{DS} = 40 \text{ mA}$ | 20.5 | 21.5 | | dBm |
| G_L | Linear Power Gain, $f = 12\text{GHz}$ $V_{DS} = 6 \text{ V}$, $I_{DS} = 40 \text{ mA}$ | 7 | 8 | | dB |
| I_{DSS} | Saturated Drain-Source Current at $V_{DS} = 2 \text{ V}$, $V_{GS} = 0 \text{ V}$ | | 90 | | mA |
| g_m | Transconductance at $V_{DS} = 2 \text{ V}$, $V_{GS} = 0 \text{ V}$ | | 100 | | mS |
| V_p | Pinch-off Voltage at $V_{DS} = 2 \text{ V}$, $I_D = 0.6\text{mA}$ | | -1.0* | | Volts |
| BV_{DGO} | Drain-Gate Breakdown Voltage at $I_{DGO} = 0.15\text{mA}$ | 9 | 12 | | Volts |
| R_{th} | Thermal Resistance | | 150 | | $^\circ\text{C/W}$ |

ABSOLUTE MAXIMUM RATINGS ($T_A=25^\circ\text{C}$)

| 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 | 300 μA |
| P_{in} | RF Input Power, CW | 21 dBm |
| P_T | Continuous Dissipation | 400 mW |
| T_{CH} | Channel Temperature | 175 $^\circ\text{C}$ |
| T_{STG} | Storage Temperature | - 65 $^\circ\text{C}$ to +175 $^\circ\text{C}$ |

* For the tight control of the pinch-off voltage range, we divide TC2201 into 3 model numbers to fit customer design requirement

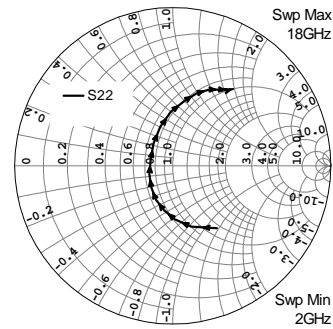
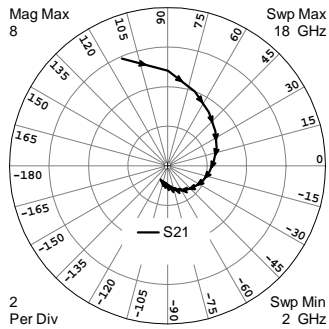
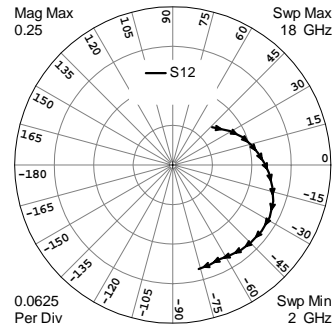
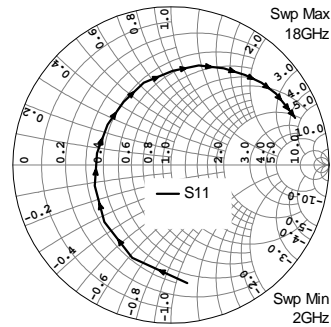
(1) TC2201P0710 : $V_p = -0.7\text{V}$ to -1.0V

(2) TC2201P0811 : $V_p = -0.8\text{V}$ to -1.1V

(3) TC2201P0912 : $V_p = -0.9\text{V}$ to -1.2V

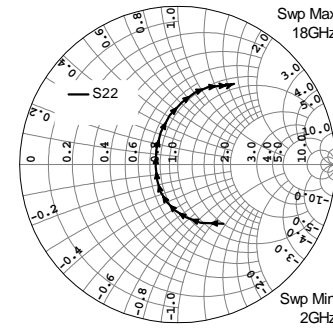
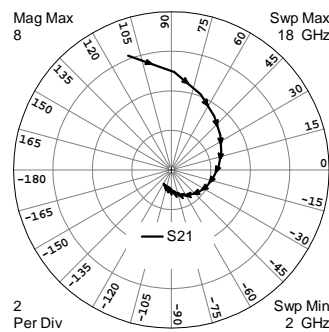
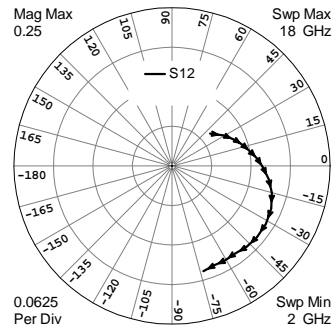
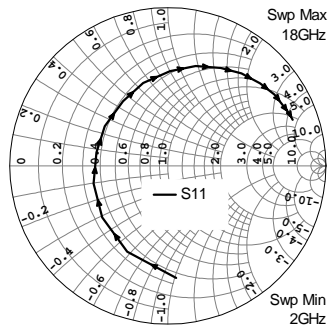
If required, customer can specify the requirement in purchasing document. For special V_p requirement, please contact factory for details.

TYPICAL SCATTERING PARAMETERS (T_A=25 °C)

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


| FREQUENCY (GHz) | S11 | | S21 | | S12 | | S22 | |
|--------------------|--------|---------|--------|---------|--------|--------|--------|---------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 2 | 0.7533 | -82.10 | 5.8916 | 113.12 | 0.0859 | 43.82 | 0.4839 | -54.70 |
| 3 | 0.6364 | -112.71 | 4.8047 | 89.78 | 0.1056 | 30.65 | 0.4017 | -73.14 |
| 4 | 0.5532 | -139.52 | 4.0041 | 69.80 | 0.1186 | 21.68 | 0.3378 | -87.89 |
| 5 | 0.5000 | -164.62 | 3.4244 | 52.15 | 0.1288 | 13.94 | 0.2851 | -101.66 |
| 6 | 0.4738 | 170.81 | 2.9889 | 35.68 | 0.1373 | 7.11 | 0.2373 | -117.05 |
| 7 | 0.4758 | 147.55 | 2.6546 | 20.03 | 0.1457 | 0.62 | 0.1922 | -135.22 |
| 8 | 0.4993 | 127.04 | 2.3605 | 5.53 | 0.1530 | -4.93 | 0.1572 | -159.54 |
| 9 | 0.5470 | 108.29 | 2.1342 | -9.88 | 0.1612 | -12.31 | 0.1453 | 164.90 |
| 10 | 0.5944 | 89.06 | 1.9251 | -24.84 | 0.1688 | -19.81 | 0.1859 | 130.54 |
| 11 | 0.6526 | 74.32 | 1.7184 | -39.43 | 0.1741 | -28.26 | 0.2586 | 107.73 |
| 12 | 0.6960 | 61.35 | 1.5301 | -53.55 | 0.1752 | -36.56 | 0.3416 | 92.13 |
| 13 | 0.7377 | 50.52 | 1.3506 | -66.92 | 0.1737 | -44.72 | 0.4175 | 79.61 |
| 14 | 0.7730 | 42.23 | 1.1924 | -78.45 | 0.1721 | -50.95 | 0.4820 | 71.77 |
| 15 | 0.8017 | 34.20 | 1.0451 | -89.52 | 0.1687 | -57.89 | 0.5343 | 64.55 |
| 16 | 0.8164 | 27.35 | 0.9270 | -99.93 | 0.1662 | -63.83 | 0.5688 | 57.79 |
| 17 | 0.8308 | 23.01 | 0.8452 | -108.84 | 0.1679 | -69.81 | 0.5912 | 53.85 |
| 18 | 0.8402 | 20.69 | 0.7873 | -116.75 | 0.1692 | -75.99 | 0.6171 | 51.95 |

TYPICAL SCATTERING PARAMETERS (T_A=25 °C)

 V_{DS} = 6 V, I_{DS} = 40 mA


| FREQUENCY (GHz) | S11 | | S21 | | S12 | | S22 | |
|--------------------|--------|---------|--------|---------|--------|--------|--------|---------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 2 | 0.7092 | -85.70 | 6.1747 | 110.84 | 0.0793 | 40.30 | 0.4731 | -52.17 |
| 3 | 0.6001 | -115.37 | 4.9530 | 88.24 | 0.0956 | 30.10 | 0.3941 | -68.76 |
| 4 | 0.5269 | -141.91 | 4.0928 | 68.69 | 0.1077 | 22.43 | 0.3361 | -81.69 |
| 5 | 0.4820 | -166.74 | 3.4853 | 51.43 | 0.1175 | 15.94 | 0.2897 | -93.65 |
| 6 | 0.4600 | 169.32 | 3.0355 | 35.32 | 0.1261 | 10.21 | 0.2452 | -106.84 |
| 7 | 0.4702 | 147.81 | 2.6901 | 19.78 | 0.1359 | 4.41 | 0.2032 | -122.75 |
| 8 | 0.4971 | 124.85 | 2.4024 | 4.75 | 0.1444 | -1.24 | 0.1635 | -142.30 |
| 9 | 0.5462 | 106.66 | 2.1605 | -10.35 | 0.1540 | -7.63 | 0.1392 | -175.30 |
| 10 | 0.5999 | 88.59 | 1.9666 | -25.56 | 0.1638 | -15.08 | 0.1639 | 145.59 |
| 11 | 0.6546 | 74.41 | 1.7593 | -39.71 | 0.1711 | -23.34 | 0.2298 | 117.55 |
| 12 | 0.7024 | 61.65 | 1.5634 | -54.17 | 0.1746 | -31.78 | 0.3165 | 99.21 |
| 13 | 0.7466 | 51.47 | 1.3909 | -67.87 | 0.1751 | -39.88 | 0.3953 | 85.80 |
| 14 | 0.7831 | 41.75 | 1.2182 | -80.02 | 0.1743 | -47.33 | 0.4682 | 76.51 |
| 15 | 0.8114 | 33.77 | 1.0667 | -91.60 | 0.1705 | -54.30 | 0.5263 | 68.41 |
| 16 | 0.8244 | 27.17 | 0.9435 | -102.17 | 0.1711 | -61.20 | 0.5666 | 61.49 |
| 17 | 0.8371 | 23.17 | 0.8587 | -111.25 | 0.1708 | -66.78 | 0.5947 | 57.19 |
| 18 | 0.8423 | 20.30 | 0.7991 | -118.61 | 0.1736 | -73.44 | 0.6221 | 55.04 |

OUTLINE DIMENSIONS (Unit: mm)
