

PTF 10043

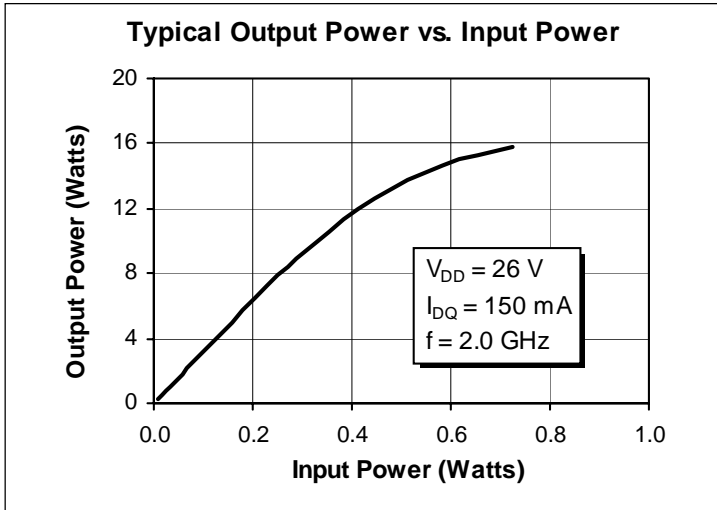
12 Watts, 1.9–2.0 GHz

GOLDMOS® Field Effect Transistor

Description

The PTF 10043 is an internally matched GOLDMOS FET intended for large signal amplifier applications from 1.9 to 2.0 GHz. Rated at 12 watts, it operates at 45% efficiency with 12 dB gain. Nitride surface passivation and full gold metallization ensure excellent device lifetime and reliability.

- **INTERNALLY MATCHED**
- **Performance at 2.0 GHz, 26 Volts**
 - Output Power = 12 Watts Min
 - Power Gain = 12 dB Typ at 3 Watts
 - Efficiency = 45% Typ
- **Full Gold Metallization**
- **Silicon Nitride Passivated**
- **Back Side Common Source**
- **Excellent Thermal Stability**
- **100% Lot Traceability**



Package 20222

RF Specifications (100% Tested)

| Characteristic | Symbol | Min | Typ | Max | Units |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----|-----|------|-------|
| Gain ($V_{DD} = 26\text{ V}$, $P_{OUT} = 3\text{ W}$, $I_{DQ} = 150\text{ mA}$, $f = 1.93, 2.0\text{ GHz}$) | G_{ps} | 11 | 12 | — | dB |
| Power Output at 1 dB Compressed ($V_{DD} = 26\text{ V}$, $P_{OUT} = 12\text{ W}$, $I_{DQ} = 150\text{ mA}$, $f = 2.0\text{ GHz}$) | p-1dB | 12 | 14 | — | Watts |
| Drain Efficiency ($V_{DD} = 26\text{ V}$, $P_{OUT} = 12\text{ W}$, $I_{DQ} = 150\text{ mA}$, $f = 2.0\text{ GHz}$) | η_D | 40 | 45 | — | % |
| Load Mismatch Tolerance ($V_{DD} = 26\text{ V}$, $P_{OUT} = 12\text{ W}$, $I_{DQ} = 150\text{ mA}$, $f = 2.0\text{ GHz}$ —all phase angles at frequency of test) | Ψ | — | — | 10:1 | — |

All published data at $T_{CASE} = 25^\circ\text{C}$ unless otherwise indicated.

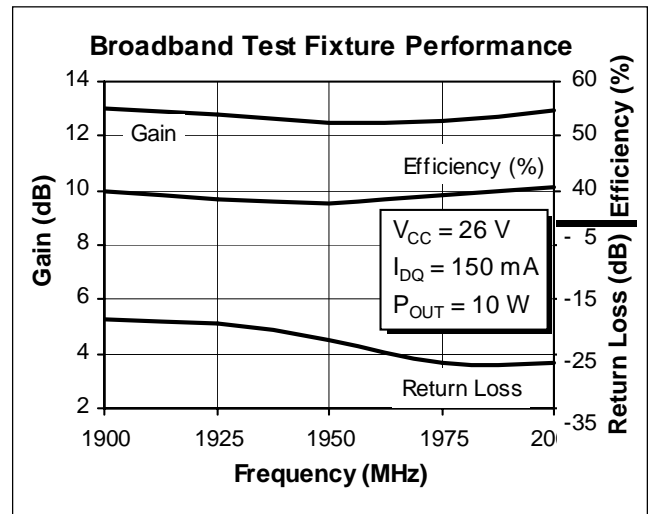
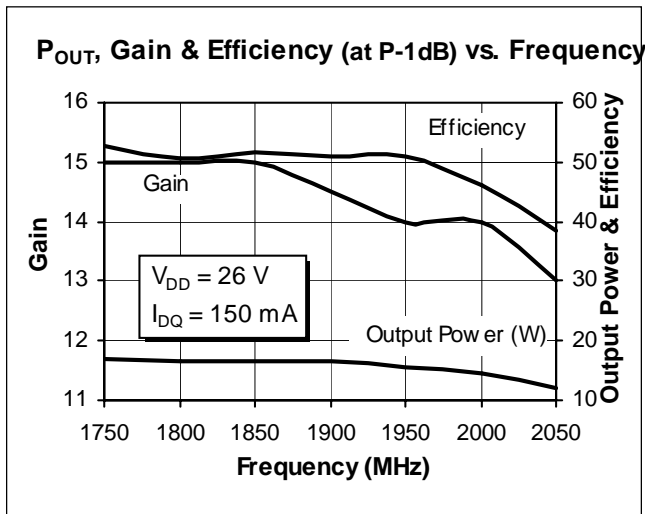
Electrical Characteristics (100% Tested)

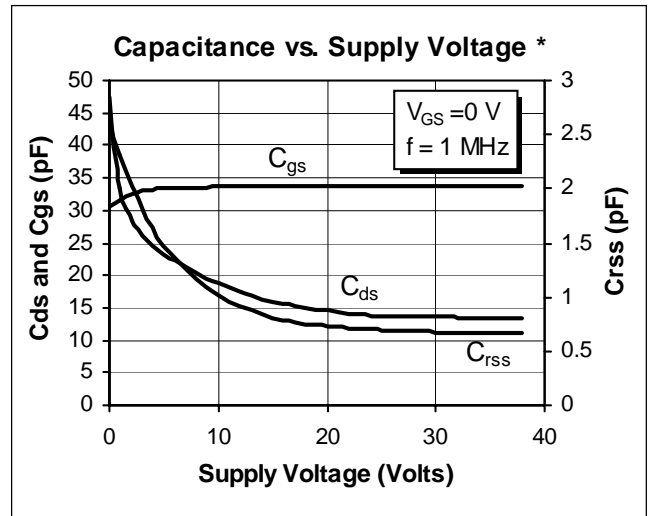
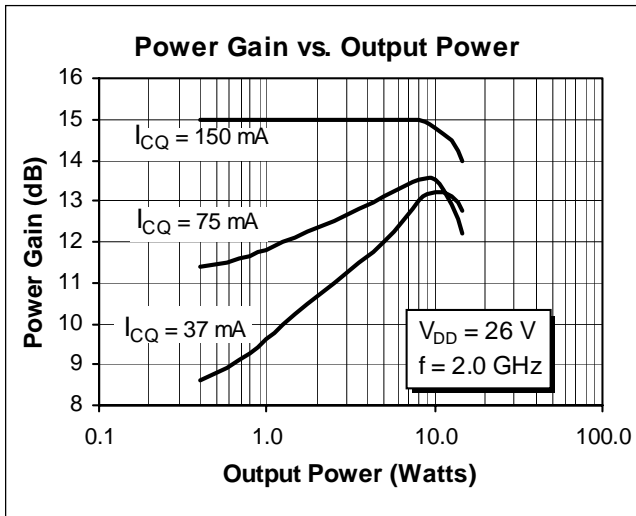
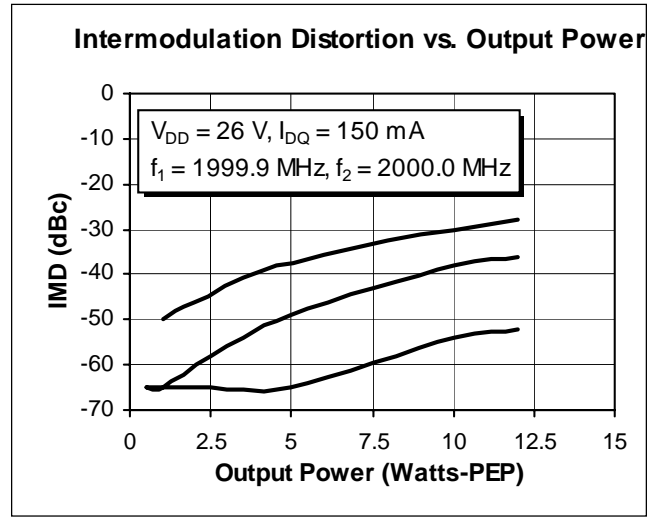
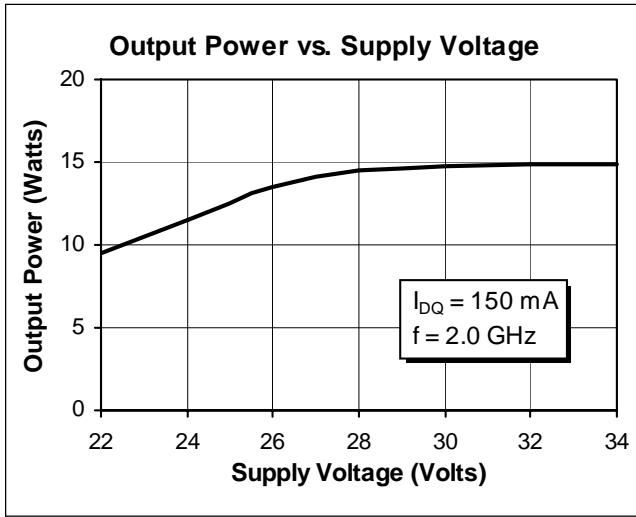
| Characteristic | Conditions | Symbol | Min | Typ | Max | Units |
|---------------------------------|---------------------------------------------|---------------|-----|-----|-----|---------|
| Drain-Source Breakdown Voltage | $V_{GS} = 0\text{ V}, I_D = 5\text{ mA}$ | $V_{(BR)DSS}$ | 65 | — | — | Volts |
| Zero Gate Voltage Drain Current | $V_{DS} = 26\text{ V}, V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 1.0 | mA |
| Gate Threshold Voltage | $V_{DS} = 10\text{ V}, I_D = 75\text{ mA}$ | $V_{GS(th)}$ | 3.0 | — | 5.0 | Volts |
| Forward Transconductance | $V_{DS} = 10\text{ V}, I_D = 2\text{ A}$ | g_{fs} | — | 0.8 | — | Siemens |

Maximum Ratings

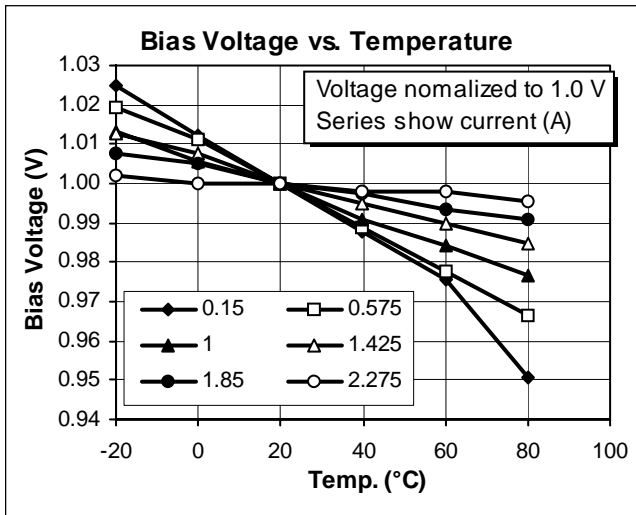
| Parameter | Symbol | Value | Unit |
|------------------------------------------------------------------|-----------------|-------------|--------------------------------------|
| Drain-Source Voltage | V_{DSS} | 65 | Vdc |
| Gate-Source Voltage | V_{GS} | ± 20 | Vdc |
| Operating Junction Temperature | T_J | 200 | $^{\circ}\text{C}$ |
| Total Device Dissipation Above 25°C derate by | P_D | 55 0.31 | Watts $\text{W}/^{\circ}\text{C}$ |
| Storage Temperature Range | T_{STG} | -40 to +150 | $^{\circ}\text{C}$ |
| Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$) | $R_{\theta JC}$ | 3.2 | $^{\circ}\text{C}/\text{W}$ |

Typical Performance



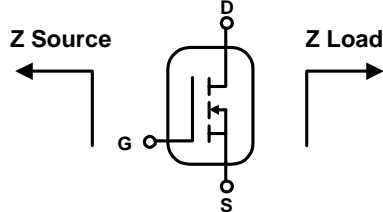


*This part is internally matched. Measurements of the finished product will not yield these figures.

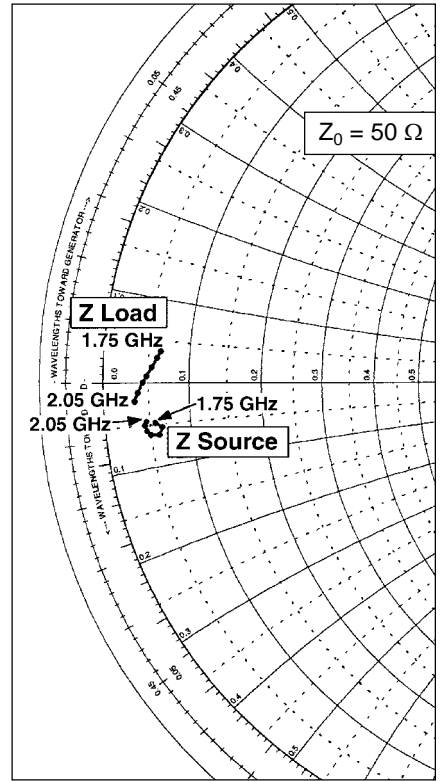


Impedance Data

$V_{DS} = 26\text{ V}$, $P_{OUT} = 12\text{ W}$, $I_{DQ} = 150\text{ mA}$



| Frequency GHz | Z Source Ω | | Z Load Ω | |
|------------------|-------------------|------|-----------------|------|
| | R | jX | R | jX |
| 1.75 | 2.8 | -2.4 | 3.2 | 1.9 |
| 1.80 | 3.2 | -2.7 | 3.0 | 1.5 |
| 1.85 | 3.0 | -3.2 | 2.7 | 0.9 |
| 1.90 | 2.5 | -3.1 | 2.4 | 0.4 |
| 1.95 | 2.3 | -2.8 | 2.2 | 0.0 |
| 2.00 | 2.2 | -2.5 | 1.9 | -0.6 |
| 2.05 | 2.3 | -2.3 | 1.7 | -1.1 |

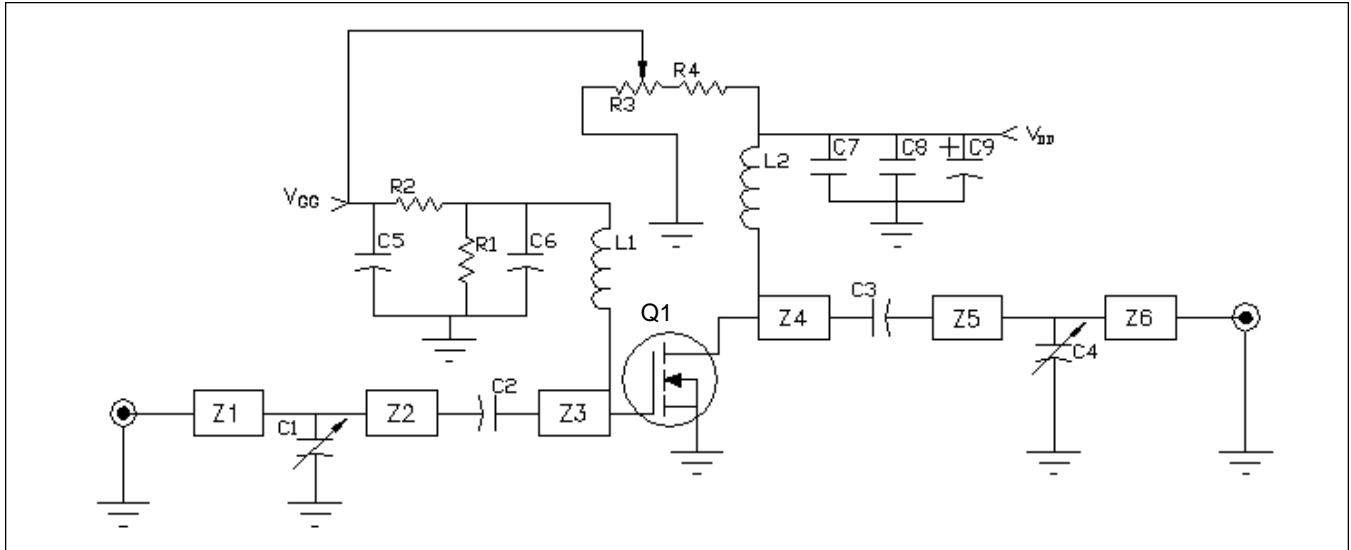


Typical Scattering Parameters

$(V_{DS} = 28\text{ V}$, $I_D = 500\text{ mA})$

| f (MHz) | S11 | | S21 | | S12 | | S22 | |
|------------|-------|------|-------|------|-------|-----|-------|------|
| | Mag | Ang | Mag | Ang | Mag | Ang | Mag | Ang |
| 100 | 0.912 | -143 | 14.7 | 86 | 0.007 | 0 | 0.641 | -70 |
| 200 | 0.917 | -150 | 11.5 | 80 | 0.006 | -5 | 0.650 | -82 |
| 300 | 0.951 | -163 | 5.83 | 53 | 0.004 | -16 | 0.750 | -107 |
| 400 | 0.964 | -168 | 3.71 | 39 | 0.002 | 0 | 0.824 | -122 |
| 500 | 0.971 | -171 | 2.63 | 28 | 0.002 | 65 | 0.881 | -132 |
| 600 | 0.974 | -174 | 1.99 | 20 | 0.003 | 94 | 0.931 | -139 |
| 700 | 0.975 | -175 | 1.56 | 12 | 0.006 | 98 | 0.952 | -146 |
| 800 | 0.975 | -177 | 1.26 | 6 | 0.008 | 95 | 0.950 | -151 |
| 900 | 0.980 | -178 | 1.07 | 0 | 0.010 | 93 | 0.951 | -155 |
| 1000 | 0.979 | -179 | 0.932 | -5 | 0.012 | 92 | 0.948 | -158 |
| 1100 | 0.981 | 180 | 0.846 | -11 | 0.014 | 89 | 0.959 | -160 |
| 1200 | 0.977 | 179 | 0.790 | -16 | 0.015 | 86 | 0.965 | -162 |
| 1300 | 0.975 | 177 | 0.763 | -23 | 0.017 | 83 | 0.970 | -164 |
| 1400 | 0.965 | 176 | 0.759 | -30 | 0.019 | 82 | 0.972 | -166 |
| 1500 | 0.951 | 175 | 0.782 | -39 | 0.021 | 80 | 0.974 | -168 |
| 1600 | 0.929 | 174 | 0.828 | -51 | 0.023 | 78 | 0.975 | -169 |
| 1700 | 0.904 | 174 | 0.880 | -68 | 0.025 | 74 | 0.986 | -170 |
| 1800 | 0.885 | 175 | 0.884 | -89 | 0.027 | 70 | 1.00 | -171 |
| 1900 | 0.892 | 177 | 0.802 | -113 | 0.029 | 67 | 1.02 | -173 |
| 2000 | 0.918 | 177 | 0.650 | -134 | 0.030 | 61 | 1.02 | -175 |
| 2100 | 0.942 | 177 | 0.489 | -151 | 0.028 | 54 | 1.01 | -177 |
| 2200 | 0.964 | 176 | 0.366 | -162 | 0.025 | 56 | 1.01 | -178 |

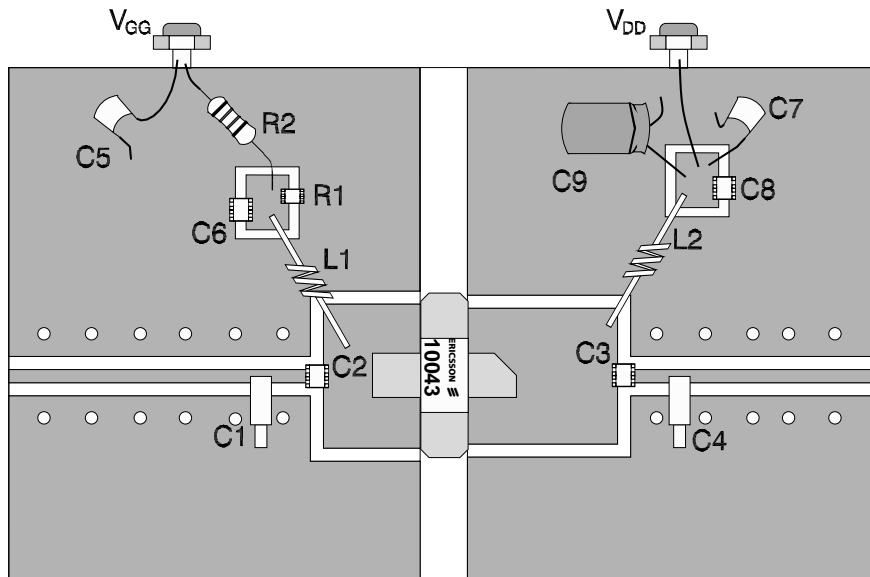
Test Circuit



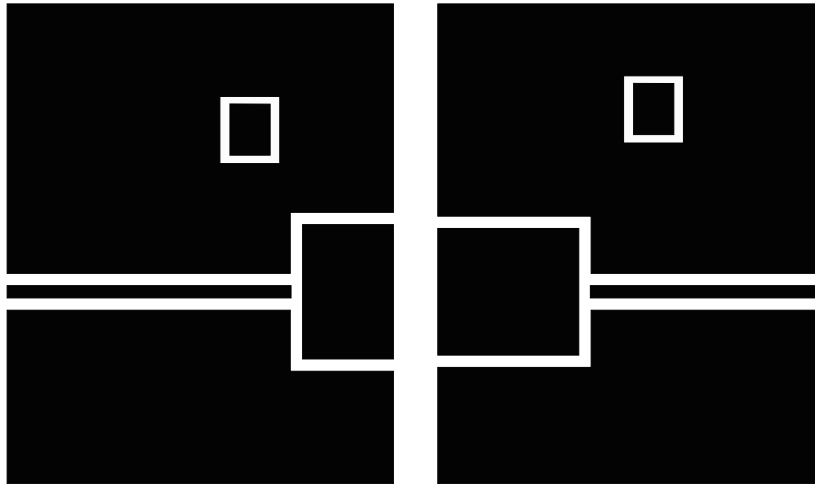
Block Diagram for $f = 2.0$ GHz

| | | |
|----------------|--------------------------------------------------------------------|---------------------------------------|
| Q1 | PTF 10043 | RF LDMOS FET |
| Z1, Z6 | 50 Ω | Microstrip |
| Z2, Z5 | 50 Ω , 0.085 λ | Microstrip |
| Z3 | 7.5 Ω , 0.154 λ | Microstrip |
| Z4 | 7.9 Ω , 0.238 λ | Microstrip |
| C1, C4 | 0.3–3.5 | Trim Capacitor |
| C2, C3, C6, C8 | 33 pF | Capacitor ATCB |
| C5, C7 | 0.1 μ F, 50 V | Capacitor Digi-Key P4917-ND |
| C9 | 100 μ F, 50V | Electrolytic Capacitor Digi-Key P5276 |
| L1, L2 | #20 AWG | 3 Turn, 0.12" I.D. |
| R1, R2 | 500 Ω | Resistor |
| Circuit Board | .031" thick, $\epsilon_r = 4.0$, G200, AlliedSignal, 2 oz. copper | |

| | | |
|-----------------------------------------|-------------|---------------|
| <i>Bias Parts (not shown on layout)</i> | | |
| R3 | 2 K | Potentiometer |
| R4 | 10 Ω | Resistor |



Parts Layout (not to scale)



Artwork (not to scale)

Package Mechanical Specifications

