

PTF 10015

50 Watts, 300–960 MHz

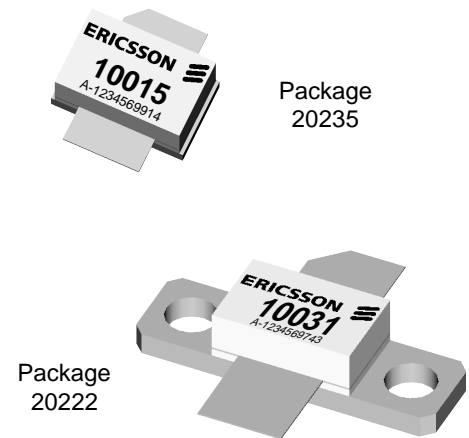
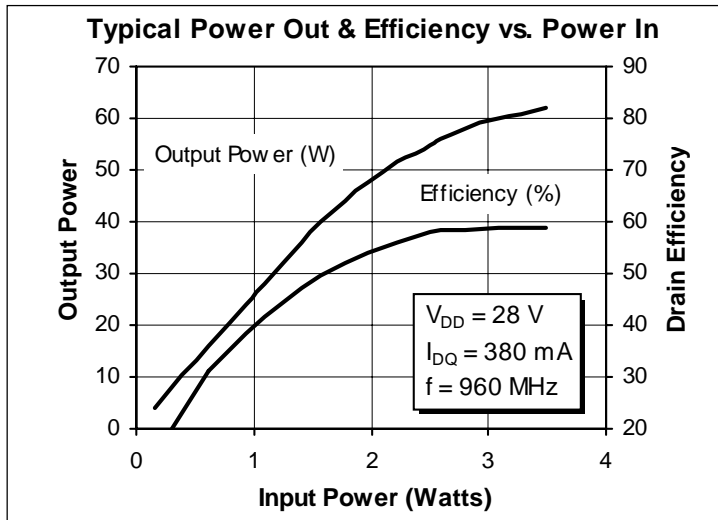
GOLDMOS™ Field Effect Transistor

Description

The PTF 10015 is a 50 Watt LDMOS FET intended for large signal amplifier applications from 300 to 960 MHz. It operates at 55% efficiency and 13.0 dB of gain. Nitride surface passivation and full gold metallization are used to ensure excellent device lifetime and reliability.

Features

- Performance at 960 MHz, 28 Volts
 - Output Power = 50 Watts
 - Power Gain = 13.0 dB Typ, 12.0 dB Min
 - Efficiency = 55% Typ
- Full Gold Metallization
- Silicon Nitride Passivated
- Excellent Thermal Stability
- Back Side Common Source
- 100% lot traceability
- Available in Package 20222 as PTF 10031



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 | $^{\circ}C$ |
| Total Device Dissipation Above 25 $^{\circ}C$ derate by | P_D | 175 1.0 | Watts W/ $^{\circ}C$ |
| Storage Temperature Range | T_{STG} | -65 to +150 | $^{\circ}C$ |
| Thermal Resistance ($T_C = 70^{\circ}C$) | $R_{\theta JC}$ | 1.0 | $^{\circ}C/W$ |

All published data is at $T_C = 25^{\circ}C$ unless otherwise indicated.

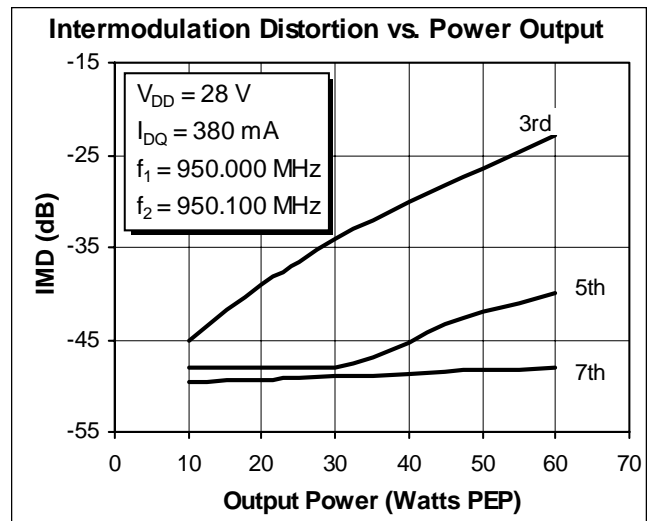
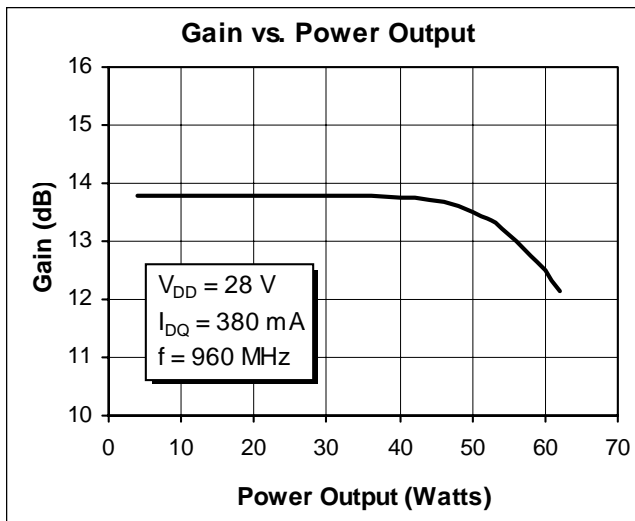
Electrical Characteristics (100% Tested)

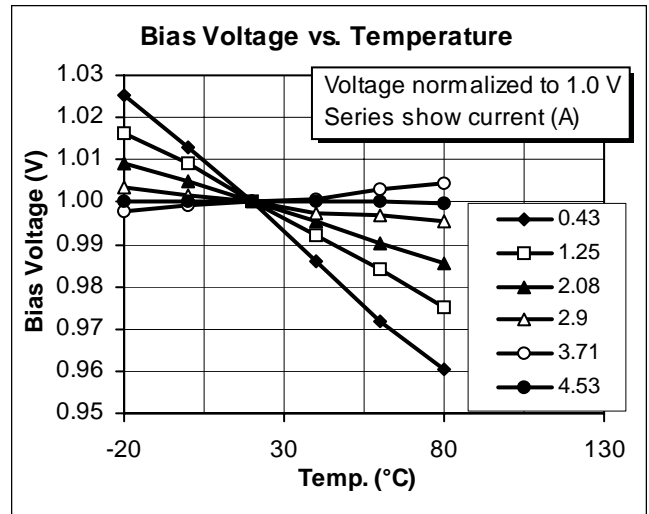
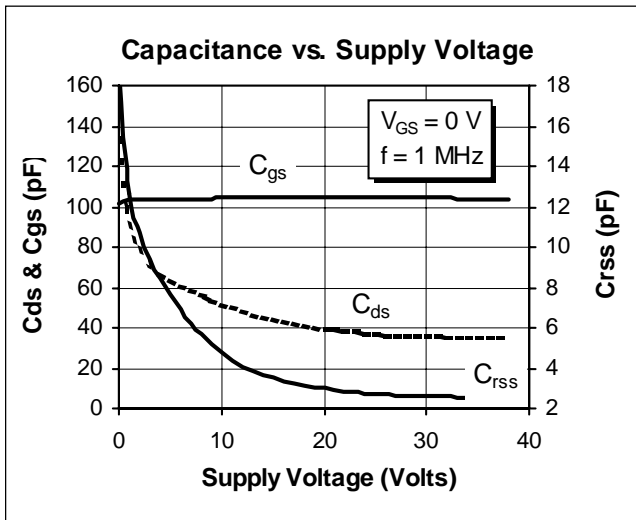
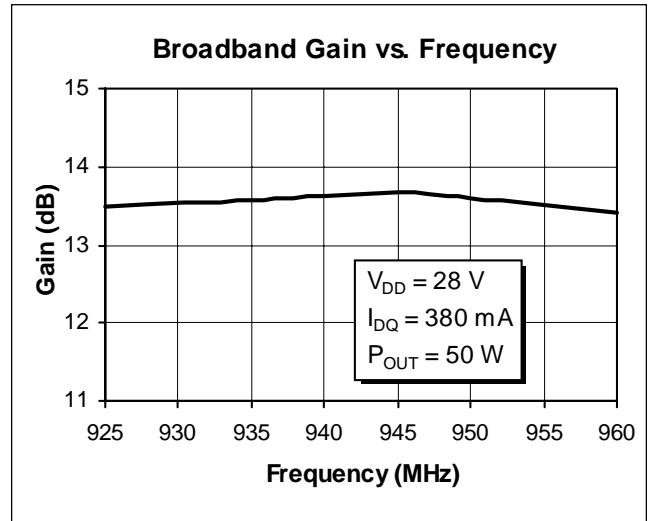
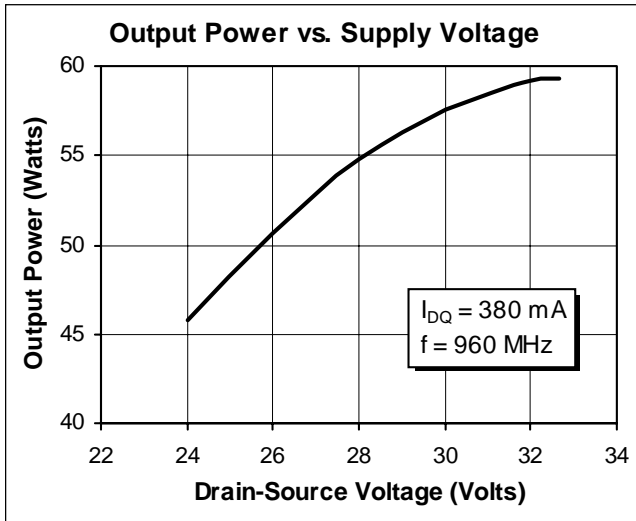
| Characteristic | Conditions | Symbol | Min | Typ | Max | Units |
|--------------------------------|---|---------------|-----|-----|-----|---------|
| Drain-Source Breakdown Voltage | $V_{GS} = 0\text{ V}, I_D = 25\text{ mA}$ | $V_{(BR)DSS}$ | 65 | — | — | Volts |
| Drain-Source Leakage Current | $V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}$ | 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 | $V_{DS} = 10\text{ V}, I_D = 3\text{ A}$ | g_{fs} | 2.0 | 2.8 | — | Siemens |

RF Specifications (100% Tested)

| Characteristic | Symbol | Min | Typ | Max | Units |
|---|----------|------|------|------|-------|
| Common Source Power Gain ($V_{DD} = 28\text{ V}, P_{OUT} = 50\text{ W}, I_{DQ} = 380\text{ mA}, f = 960\text{ MHz}$) | G_{ps} | 12.0 | 13.0 | — | dB |
| Power Output at 1 dB Compression ($V_{DD} = 28\text{ V}, I_{DQ} = 380\text{ mA}, f = 960\text{ MHz}$) | P-1dB | 50 | — | — | Watts |
| Drain Efficiency ($V_{DD} = 28\text{ V}, P_{OUT} = 50\text{ W}, I_{DQ} = 380\text{ mA}, f = 960\text{ MHz}$) | η | 50 | 55 | — | % |
| Load Mismatch Tolerance ($V_{DD} = 28\text{ V}, P_{OUT} = 50\text{ W}, I_{DQ} = 380\text{ mA}, f = 960\text{ MHz}$ — all phase angles at frequency of test) | Ψ | — | — | 10:1 | — |

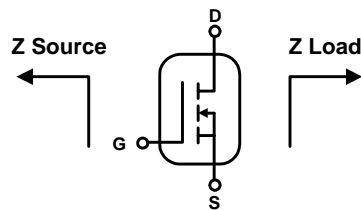
Typical Performance



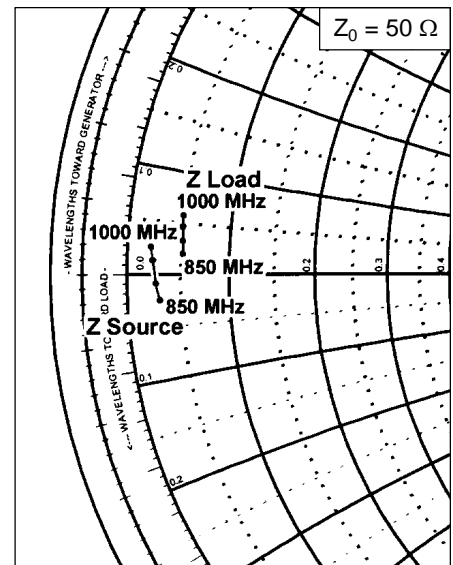


Impedance Data (circuit optimized at 960 MHz)

$V_{DD} = 28 \text{ V}$, $P_{OUT} = 50 \text{ W}$, $I_{DQ} = 380 \text{ mA}$



| Frequency MHz | Z Source Ω | | Z Load Ω | |
|------------------|-------------------|-------|-----------------|------|
| | R | jX | R | jX |
| 850 | 1.38 | -1.22 | 2.50 | 1.00 |
| 900 | 1.20 | -0.44 | 2.45 | 1.65 |
| 950 | 1.08 | +0.67 | 2.40 | 2.33 |
| 1000 | 0.96 | +1.30 | 2.40 | 2.90 |

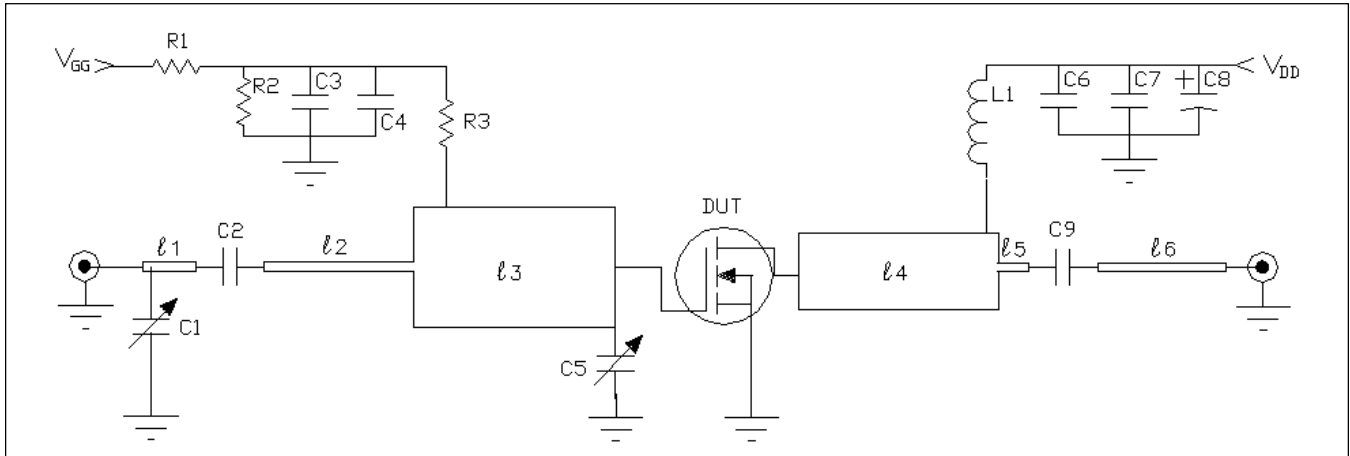


Typical Scattering Parameters

($V_{DS} = 28\text{ V}$, $I_D = 1.0\text{ A}$)

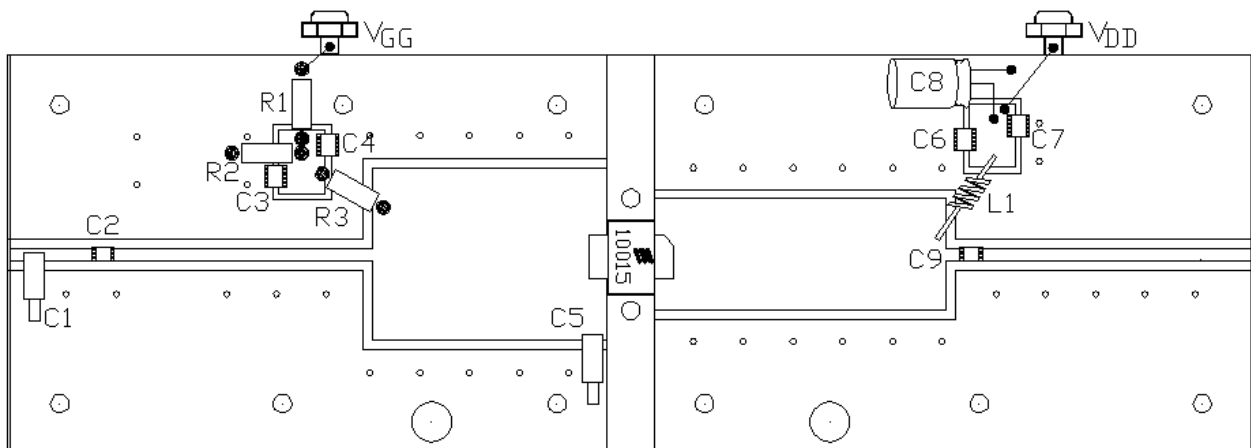
| f (MHz) | S11 | | S21 | | S12 | | S22 | |
|------------|-------|------|-------|-----|-------|-----|-------|------|
| | Mag | Ang | Mag | Ang | Mag | Ang | Mag | Ang |
| 40 | 0.883 | -153 | 33.0 | 93 | 0.014 | 3 | 0.527 | -143 |
| 60 | 0.878 | -160 | 21.8 | 85 | 0.013 | 1 | 0.533 | -148 |
| 80 | 0.876 | -163 | 16.1 | 80 | 0.012 | -6 | 0.553 | -150 |
| 100 | 0.884 | -164 | 12.8 | 76 | 0.012 | -13 | 0.574 | -148 |
| 150 | 0.904 | -165 | 8.21 | 65 | 0.011 | -18 | 0.638 | -148 |
| 200 | 0.915 | -165 | 5.67 | 58 | 0.010 | -23 | 0.694 | -149 |
| 250 | 0.934 | -164 | 4.36 | 51 | 0.010 | -31 | 0.769 | -148 |
| 300 | 0.947 | -164 | 3.41 | 45 | 0.010 | -31 | 0.792 | -149 |
| 350 | 0.962 | -163 | 2.78 | 41 | 0.008 | -28 | 0.837 | -150 |
| 400 | 0.975 | -163 | 2.30 | 36 | 0.008 | -33 | 0.873 | -151 |
| 450 | 0.974 | -163 | 1.90 | 33 | 0.006 | -36 | 0.874 | -151 |
| 500 | 0.977 | -163 | 1.65 | 30 | 0.006 | -52 | 0.912 | -152 |
| 550 | 0.979 | -164 | 1.44 | 27 | 0.005 | -46 | 0.916 | -154 |
| 600 | 0.985 | -164 | 1.28 | 26 | 0.004 | -53 | 0.925 | -154 |
| 650 | 0.981 | -165 | 1.14 | 22 | 0.003 | -27 | 0.933 | -156 |
| 700 | 0.980 | -166 | 1.01 | 21 | 0.004 | -18 | 0.933 | -157 |
| 750 | 0.975 | -167 | 0.924 | 19 | 0.003 | -13 | 0.936 | -158 |
| 800 | 0.973 | -168 | 0.809 | 16 | 0.001 | 14 | 0.946 | -160 |
| 850 | 0.972 | -170 | 0.749 | 14 | 0.003 | -1 | 0.939 | -160 |
| 900 | 0.969 | -171 | 0.656 | 12 | 0.003 | 30 | 0.946 | -162 |
| 950 | 0.966 | -173 | 0.609 | 14 | 0.002 | 53 | 0.948 | -164 |
| 1000 | 0.969 | -174 | 0.564 | 8 | 0.003 | 59 | 0.945 | -164 |
| 1050 | 0.969 | -176 | 0.526 | 3 | 0.004 | 56 | 0.949 | -167 |
| 1100 | 0.970 | -177 | 0.450 | 6 | 0.004 | 69 | 0.955 | -167 |
| 1150 | 0.970 | -178 | 0.405 | 1 | 0.005 | 57 | 0.953 | -168 |
| 1200 | 0.970 | -179 | 0.383 | 4 | 0.005 | 65 | 0.952 | -169 |
| 1250 | 0.971 | 180 | 0.351 | -5 | 0.005 | 56 | 0.959 | -170 |
| 1300 | 0.971 | 179 | 0.330 | -5 | 0.005 | 61 | 0.957 | -170 |
| 1350 | 0.973 | 179 | 0.308 | -5 | 0.005 | 52 | 0.963 | -171 |
| 1400 | 0.973 | 179 | 0.255 | -3 | 0.006 | 59 | 0.965 | -171 |
| 1450 | 0.972 | 179 | 0.219 | 5 | 0.006 | 58 | 0.965 | -171 |
| 1500 | 0.965 | 179 | 0.210 | -8 | 0.006 | 62 | 0.957 | -172 |

Test Circuit



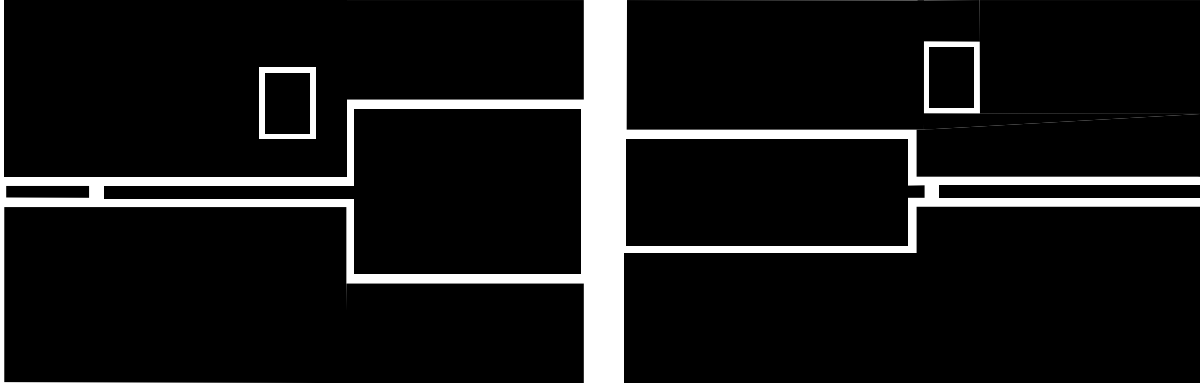
Test Circuit Schematic for $f = 960$ MHz

| | | |
|----------------|---|--------------------------|
| DUT | PTF 10015 | |
| $l1$ | .140 λ 960 MHz | Microstrip 50 Ω |
| $l2$ | .270 λ 960 MHz | Microstrip 50 Ω |
| $l3$ | .185 λ 960 MHz | Microstrip 6.2 Ω |
| $l4$ | .225 λ 960 MHz | Microstrip 11.0 Ω |
| $l5$ | .040 λ 960 MHz | Microstrip 50 Ω |
| $l6$ | .330 λ 960 MHz | Microstrip 50 Ω |
| C1, C5 | 0.3-3.5 pF, Variable Capacitor, Johanson | |
| C2, C4, C6, C9 | 36 pF, Capacitor ATC 100 B | |
| C3 | 0.01 μ F, Capacitor ATC 10,000 B | |
| C7 | 0.1 μ F, 50 V, Capacitor Digi-Key P4917-ND | |
| C8 | 100 μ F, 50 V, Electrolytic Capacitor, Digi-Key P5276 | |
| L1 | 4 Turn, #20 AWG, .120" I.D. | |
| R1, R2, R3 | 220 Ω , 1/4 W Resistor | |
| Circuit Board | .028" Dielectric Thickness, $\epsilon_r = 4.0$, AlliedSignal, G200, 2 oz. copper | |



Placement Diagram (not to scale)

Test Circuit



Artwork (1 inch )