

# PTF 10009

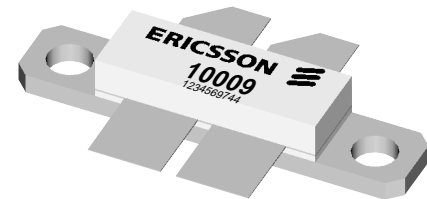
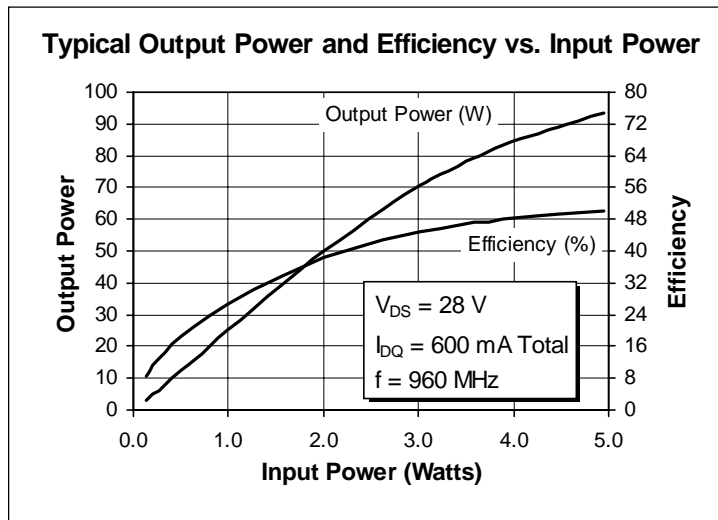
## 85 Watts, 1.0 GHz

### GOLDMOS™ Field Effect Transistor

#### Description

The PTF 10009 is an 85 Watt LDMOS FET intended for large signal amplifier applications to 1.0 GHz. It operates at 50% efficiency and 13.0 dB of gain. Nitride surface passivation and full gold metallization are used to ensure excellent device lifetime and reliability.

- Performance at 960 MHz, 28 Volts
  - Output Power = 85 Watts
  - Power Gain = 13.0 dB Typ
  - Efficiency = 50% Typ
- Full Gold Metallization
- Silicon Nitride Passivated
- Excellent Thermal Stability
- 100% lot traceability



Package 20230

#### Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage <sup>(1)</sup>	$V_{DSS}$	65	Vdc
Gate-Source Voltage <sup>(1)</sup>	$V_{GS}$	$\pm 20$	Vdc
Operating Junction Temperature	$T_J$	200	$^{\circ}\text{C}$
Total Device Dissipation Above 25 $^{\circ}\text{C}$ derate by	$P_D$	270 1.54	Watts W/ $^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-65 to 150	$^{\circ}\text{C}$
Thermal Resistance ( $T_{CASE} = 70^{\circ}\text{C}$ )	$R_{\theta JC}$	0.65	$^{\circ}\text{C}/\text{W}$

<sup>(1)</sup>per side

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

## Electrical Characteristics (100% Tested—characteristics, conditions and limits shown per side)

Characteristic (per side)	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	$V_{DS} = 10\text{ V}, I_D = 3\text{ A}$	$g_{fs}$	—	2.8	—	Siemens

## Dynamic Characteristics

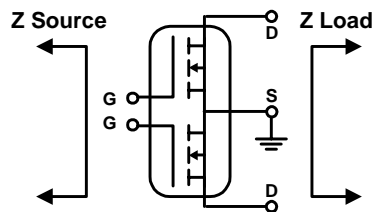
Characteristic (per side)	Symbol	Min	Typ	Max	Units
<b>Input Capacitance</b> ( $V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ )	$C_{iss}$	—	90	—	pF
<b>Output Capacitance</b> ( $V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ )	$C_{oss}$	—	36	—	pF
<b>Reverse Transfer Capacitance</b> ( $V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ )	$C_{rss}$	—	1.9	—	pF

## RF Specifications (100% Tested)

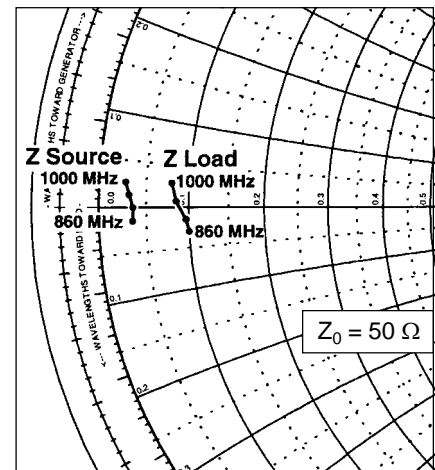
Characteristic	Symbol	Min	Typ	Max	Units
<b>Gain</b> ( $V_{DD} = 28\text{ V}, P_{out} = 85\text{ W}, I_{DQ} = 600\text{ mA}, f = 960\text{ MHz}$ )	$G_{ps}$	12.0	13.0	—	dB
<b>Drain Efficiency</b> ( $V_{DD} = 28\text{ V}, P_{out} = 85\text{ W}, I_{DQ} = 600\text{ mA}, f = 960\text{ MHz}$ )	$\eta$	47	50	—	%
<b>Load Mismatch Tolerance</b> ( $V_{DD} = 28\text{ V}, P_{out} = 85\text{ W}, I_{DQ} = 600\text{ mA}, f = 960\text{ MHz}$ — all phase angles at frequency of test)	$\Psi$	—	—	5:1	—

## Impedance Data (data shown for fixed-tuned broadband circuit)

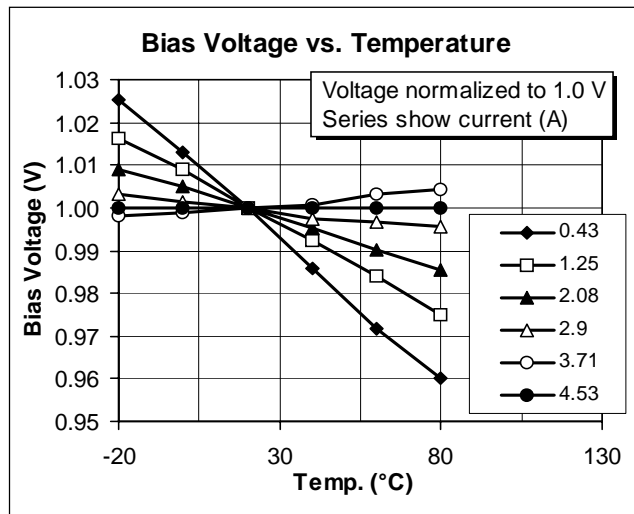
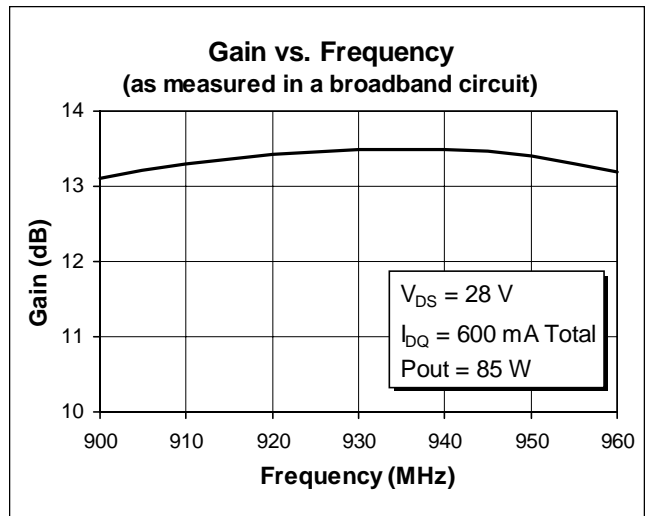
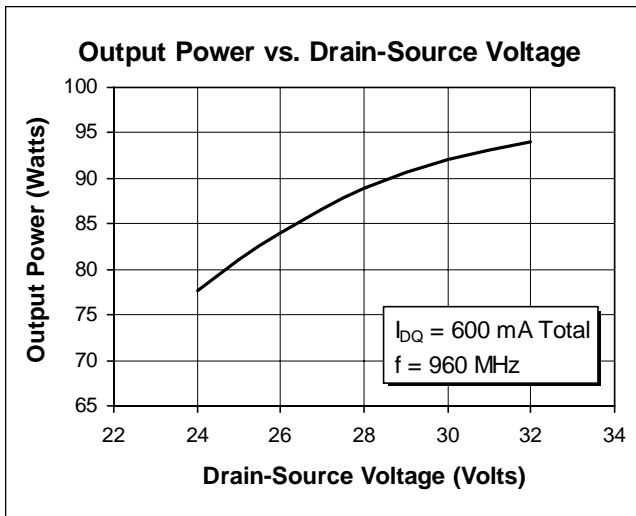
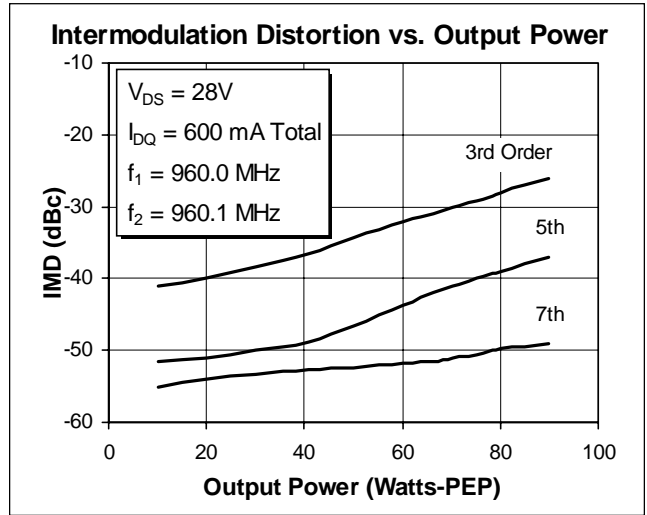
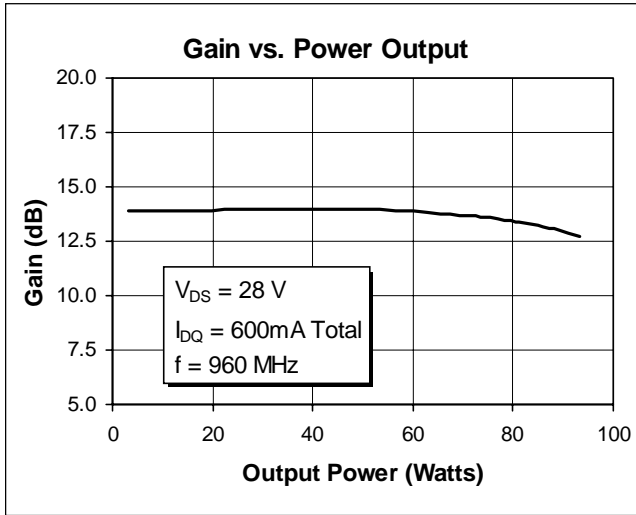
( $V_{DD} = 28\text{ V}, P_{out} = 85\text{ W}, I_{DQ} = 600\text{ mA}$ )



Frequency MHz	Z Source $\Omega$		Z Load $\Omega$	
	R	$jX$	R	$jX$
860	1.76	-0.78	5.00	-1.50
900	1.80	-0.05	4.80	-0.78
960	1.58	0.69	4.24	0.36
1000	1.39	1.35	3.95	1.41



**Typical Performance**

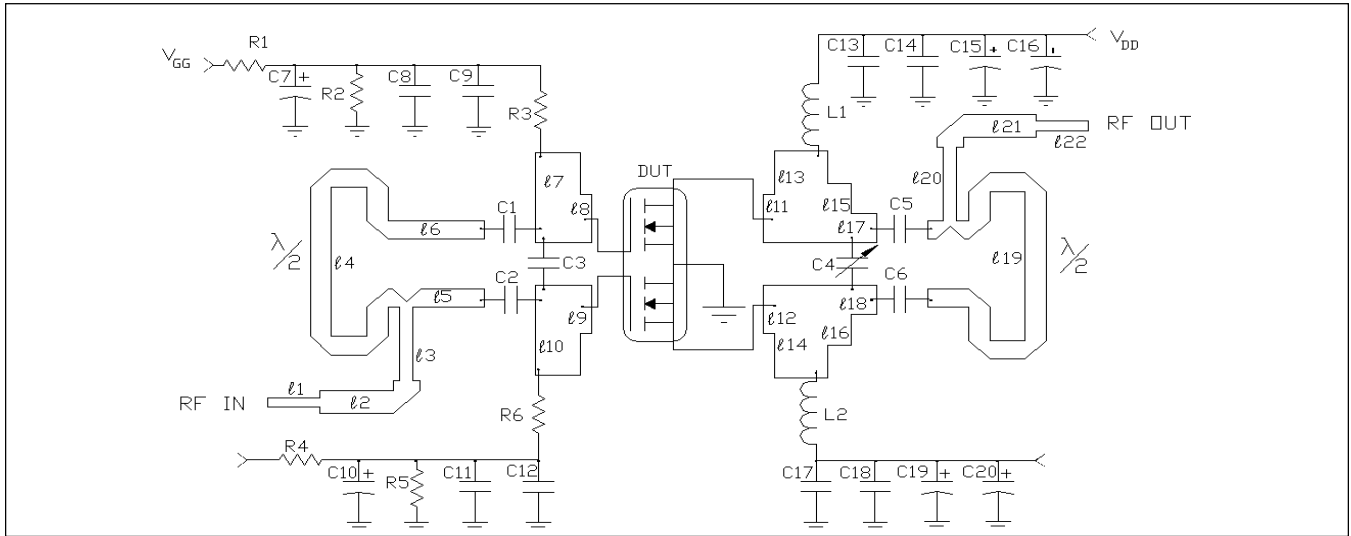


## Typical Scattering Parameters

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

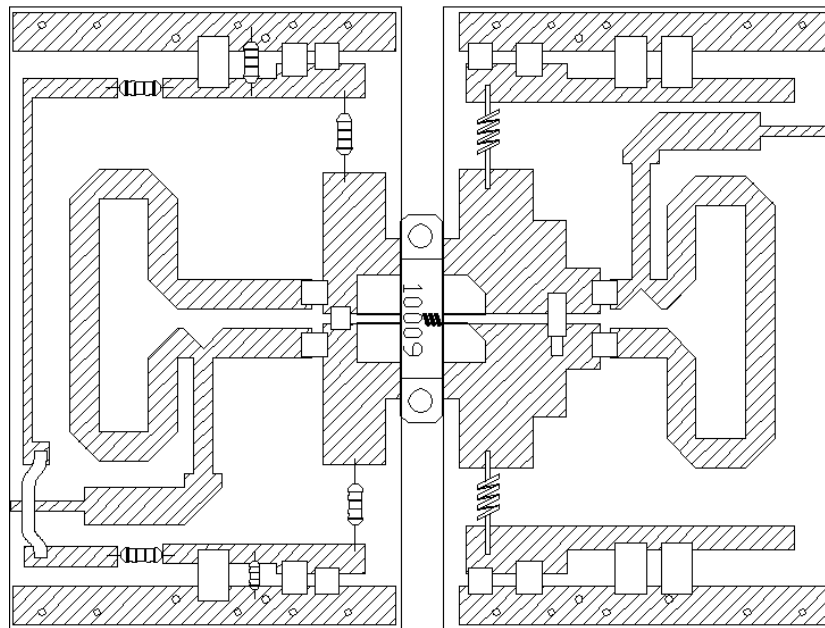
f (MHz)	S11		S21		S12		S22	
	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
40	0.883	-153	33.0	93	0.014	3	0.527	-143
60	0.878	-160	21.8	85	0.013	1	0.533	-148
80	0.876	-163	16.1	80	0.012	-6	0.553	-150
100	0.884	-164	12.8	76	0.012	-13	0.574	-148
150	0.904	-165	8.21	65	0.011	-18	0.638	-148
200	0.915	-165	5.67	58	0.010	-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**

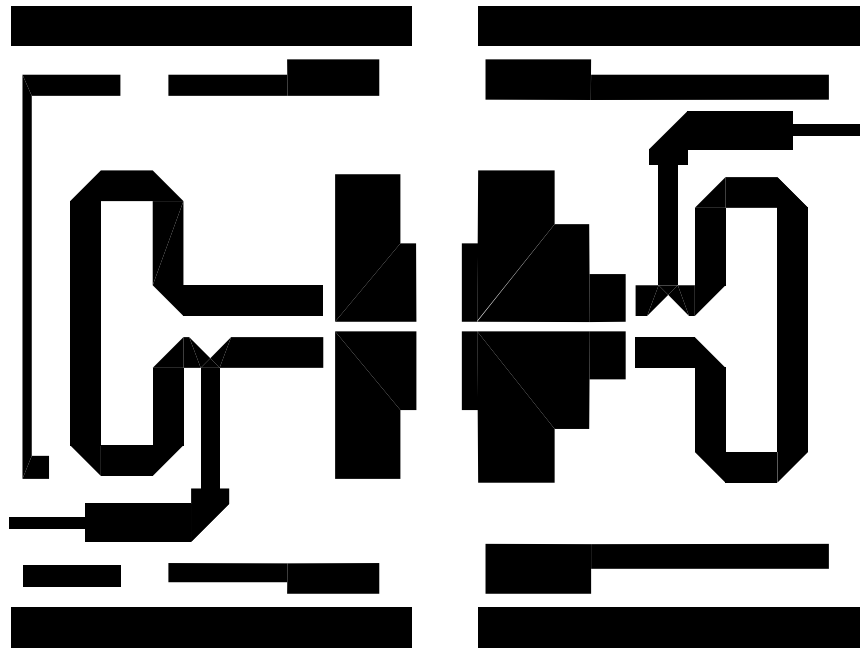


Schematic for  $f = 960 \text{ MHz}$

DUT	10009	$l2, l21$	$20 \Omega, .080 \lambda$
C1-2, C5-6, C9, C12-13, C17	33 pF, Capacitor ATC 100 B	$l3, l20$	$32 \Omega, .191 \lambda$
C3	11 pF, Capacitor ATC 100 B	$l4, l19$	$25 \Omega, .500 \lambda$
C4	6.0 pF, Variable Capacitor, JMC 5701	$l5, l6$	$25 \Omega, .091 \lambda$
C7, C10	10 $\mu\text{F}$ , +10 V Electrolytic Capacitor	$l7, l10$	$7 \Omega, .056 \lambda$
C8, C11, C14, C18	0.01 $\mu\text{F}$ , Capacitor ATC 100 B	$l8, l9$	$13.0 \Omega, .017 \lambda$
C15, C16, C19, C20	10 $\mu\text{F}$ , +30 V Electrolytic Capacitor	$l11, l12$	$13.0 \Omega, .017 \lambda$
L1, L2	4 Turn, #20 AWG, .120" I.D.	$l13, l14$	$7.0 \Omega, .064 \lambda$
R1, R2, R4, R5	1.0 K, $\Omega$ Resistor	$l15, l16$	$10.0 \Omega, .029 \lambda$
R3, R6	5.1 K, $1/4 \Omega$ Resistor	$l17, l18$	$19.0 \Omega, .028 \lambda$
$l1, l22$	$50 \Omega, .030 \lambda$	Circuit Board	.031" Dielectric Thickness, $\epsilon_r = 4.0$ , AlliedSignal, G200, 2 oz. copper



Parts Layout (not to scale)



Artwork (1 inch )