

PTF 10009

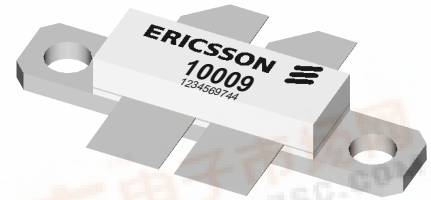
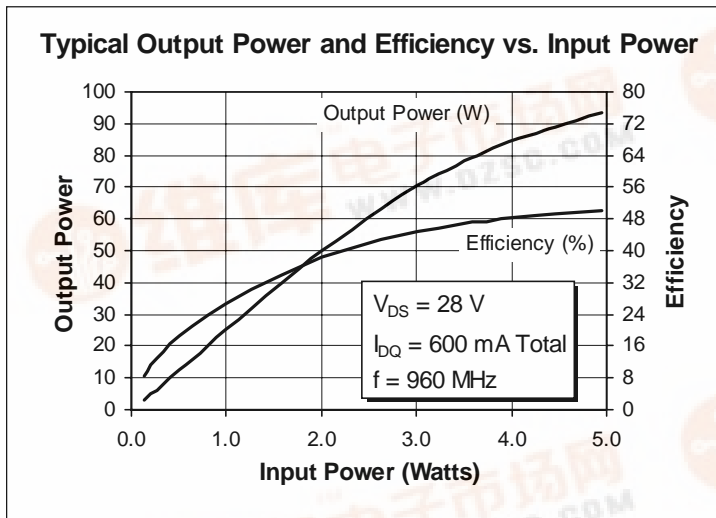
85 Watts, 1.0 GHz

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

⁽¹⁾per side

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

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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

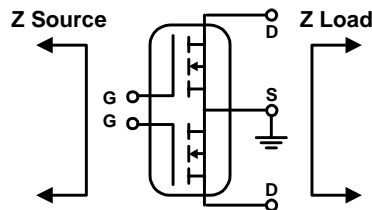
Characteristic (per side)	Symbol	Min	Typ	Max	Units
Input Capacitance ($V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$)	C_{iss}	—	90	—	pF
Output Capacitance ($V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$)	C_{oss}	—	36	—	pF
Reverse Transfer Capacitance ($V_{DS} = 28\text{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

RF Specifications (100% Tested)

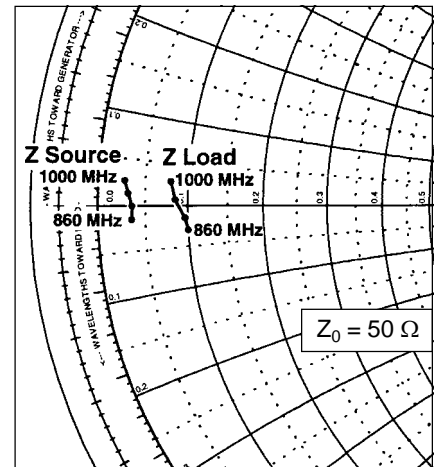
Characteristic	Symbol	Min	Typ	Max	Units
Gain ($V_{DD} = 28\text{ V}, P_{out} = 85\text{ W}, I_{DQ} = 600\text{ mA}, f = 960\text{ MHz}$)	G_{ps}	12.0	13.0	—	dB
Drain Efficiency ($V_{DD} = 28\text{ V}, P_{out} = 85\text{ W}, I_{DQ} = 600\text{ mA}, f = 960\text{ MHz}$)	η	47	50	—	%
Load Mismatch Tolerance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

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

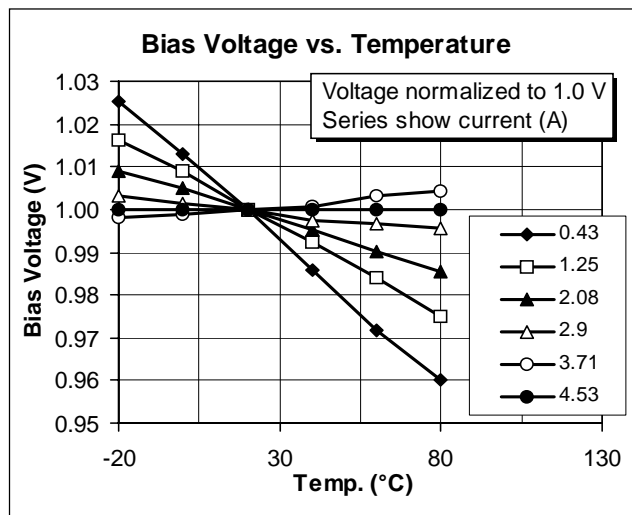
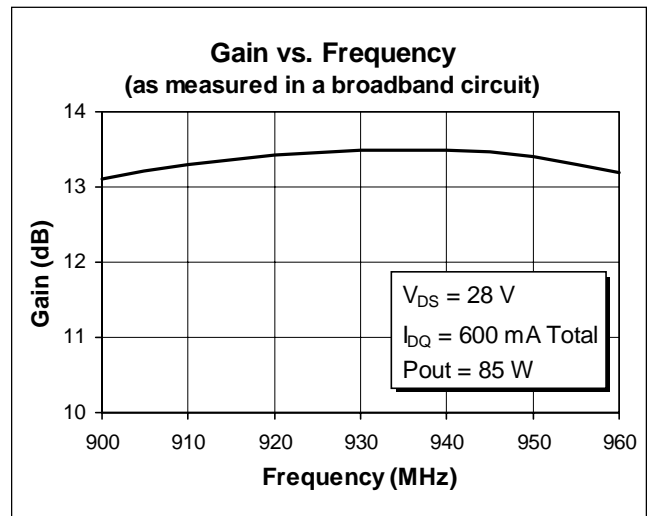
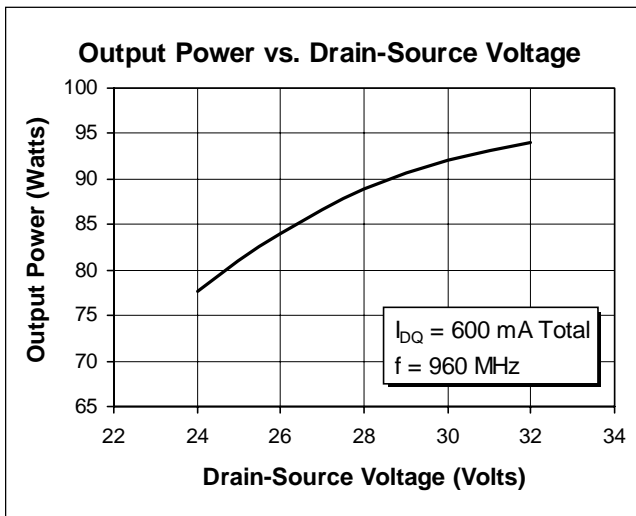
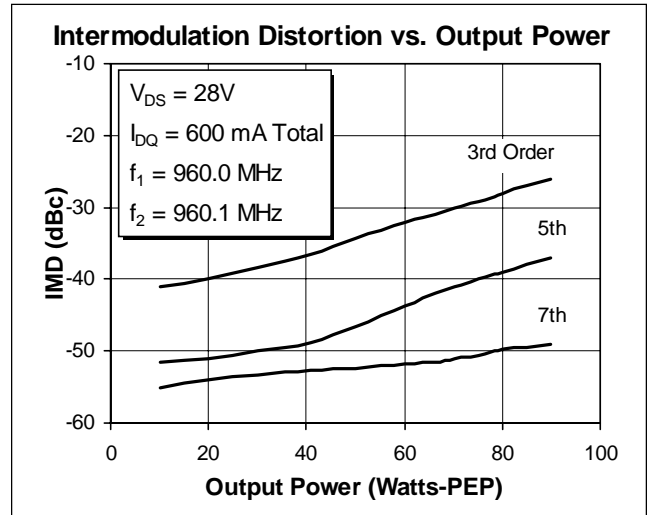
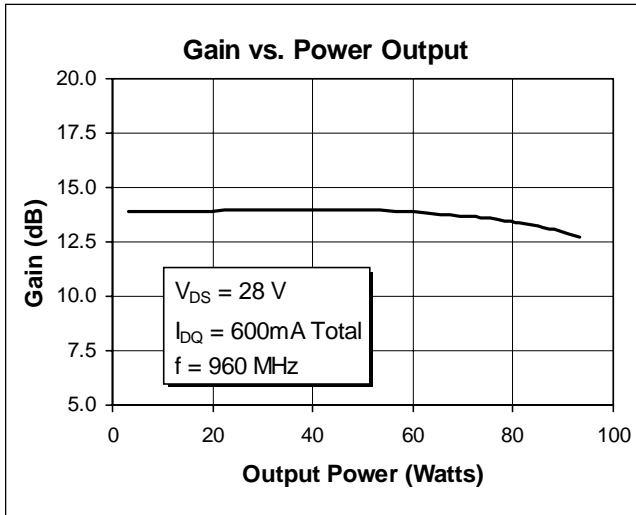
($V_{DD} = 28\text{ V}, P_{out} = 85\text{ W}, I_{DQ} = 600\text{ mA}$)



Frequency MHz	Z Source Ω		Z Load Ω	
	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



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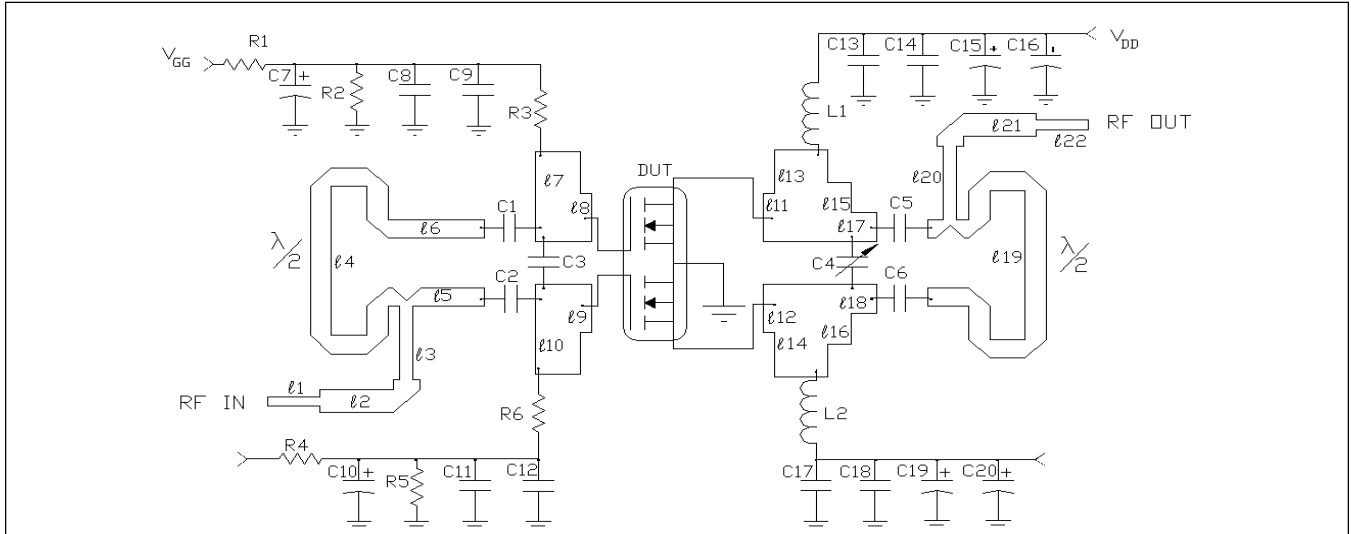


Typical Scattering Parameters

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

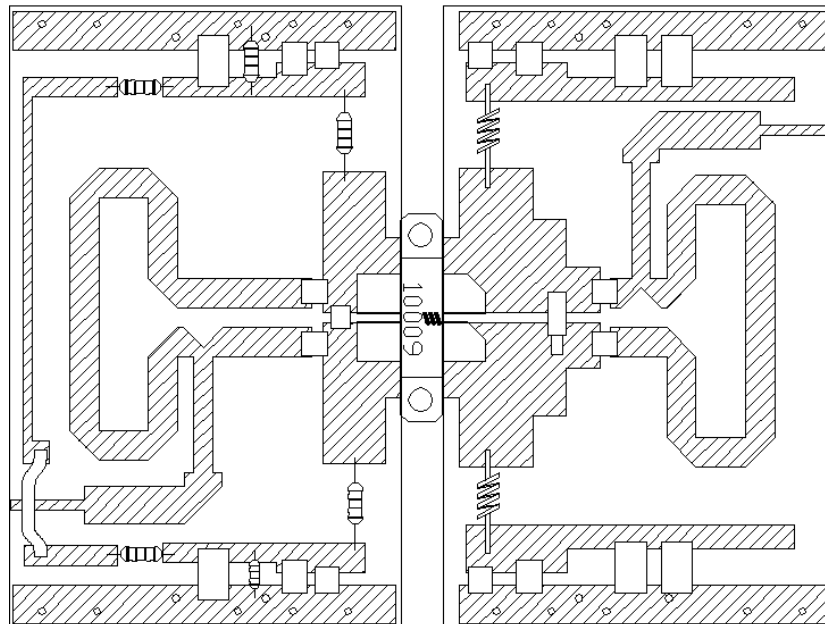
Test Circuit



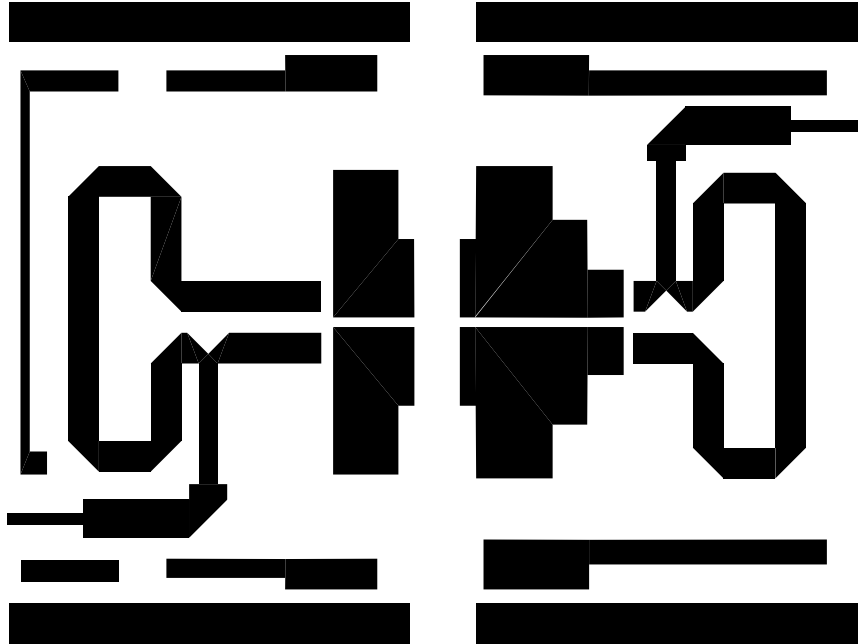
Schematic for $f = 960$ MHz

- DUT 10009
- C1-2, C5-6, C9, C12-13, C17 33 pF, Capacitor ATC 100 B
- C3 11 pF, Capacitor ATC 100 B
- C4 6.0 pF, Variable Capacitor, JMC 5701
- C7, C10 10 μ F, +10 V Electrolytic Capacitor
- C8, C11, C14, C18 0.01 μ F, Capacitor ATC 100 B
- C15, C16, C19, C20 10 μ F, +30 V Electrolytic Capacitor
- L1, L2 4 Turn, #20 AWG, .120" I.D.
- R1, R2, R4, R5 1.0 K, Ω Resistor
- R3, R6 5.1 K, 1/4 Ω Resistor
- l1, l22 50 Ω , .030 λ

- l2, l21 20 Ω , .080 λ
- l3, l20 32 Ω , .191 λ
- l4, l19 25 Ω , .500 λ
- l5, l6 25 Ω , .091 λ
- l7, l10 7 Ω , .056 λ
- l8, l9 13.0 Ω , .017 λ
- l11, l12 13.0 Ω , .017 λ
- l13, l14 7.0 Ω , .064 λ
- l15, l16 10.0 Ω , .029 λ
- l17, l18 19.0 Ω , .028 λ
- Circuit Board .031" Dielectric Thickness, $\epsilon_r = 4.0$, AlliedSignal, G200, 2 oz. copper



Parts Layout (not to scale)



Artwork (1 inch )