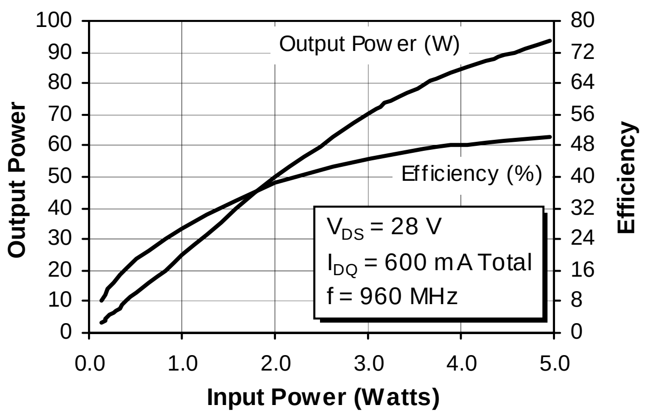
PTF 10009
85 Watts, 1.0 GHz
GOLDMOS Field Effect Transistor

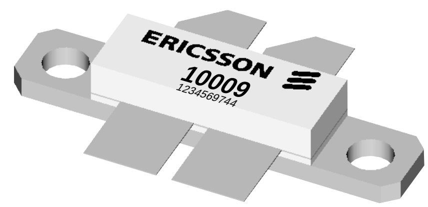
Description

The PTF 10009 is an 85–watt *GOLDMOS* FET intended for large signal amplifier applications to 1.0 GHz. This device operates at 50% efficiency with 13 dB gain. Nitride surface passivation and full gold metallization 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**

Typical Output Power and Efficiency vs. Input Power





Package 20230

RF Specifications (100% Tested)

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

All published data at T_{CASE} = 25°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 V, I_D = 25 mA	$V_{(BR)DSS}$	65	—	—	Volts
Drain-Source Leakage Current	V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	mA
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 75 mA	$V_{GS(th)}$	3.0	—	5.0	Volts
Forward Transconductance	V_{DS} = 10 V, I_D = 3 A	g_{fs}	—	2.8	—	Siemens

Dynamic Characteristics

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

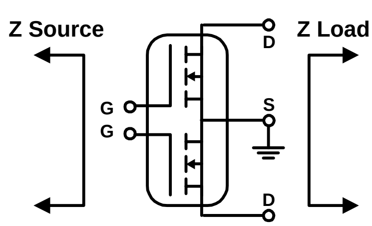
Maximum Ratings

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°C)	$R_{\theta JC}$	0.65	°C/W

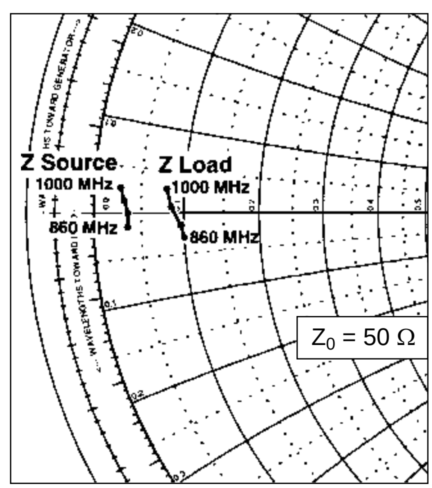
(1)per side

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

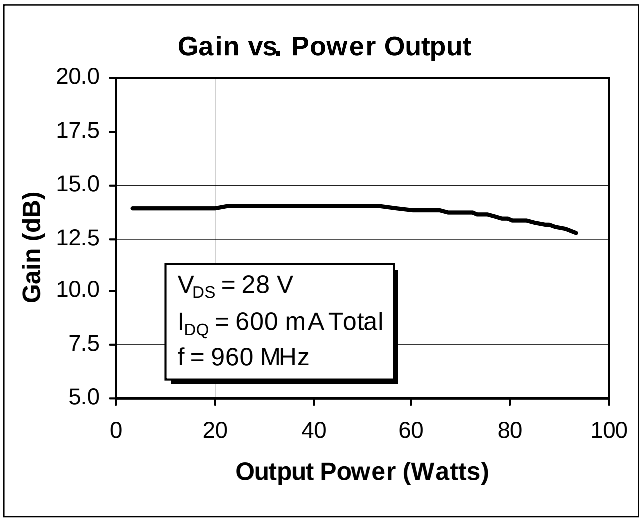
(V_{DD} = 28 V, P_{out} = 85 W, I_{DQ} = 600 mA)

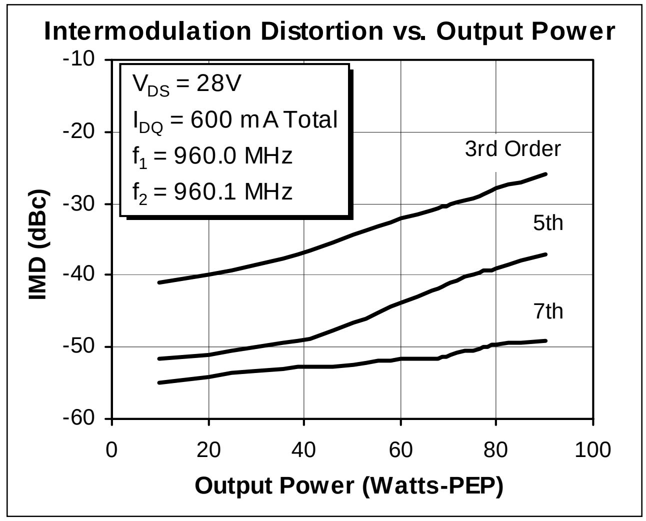


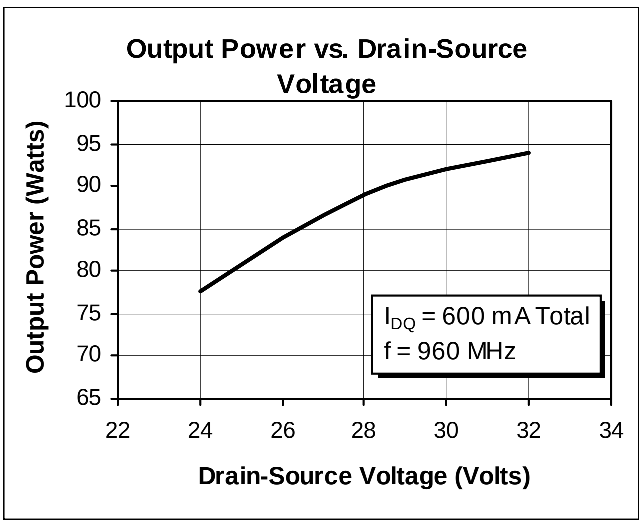
Frequency	**Z Source Ω**		**Z Load Ω**	
MHz	**R**	**jX**	**R**	**jX**
860	1.76	-0.78	5.00	-1.50
900	1.80	-0.05	4.80	-0.78
960	1.58	0.69	4.24	0.36
1000	1.39	1.35	3.95	1.41

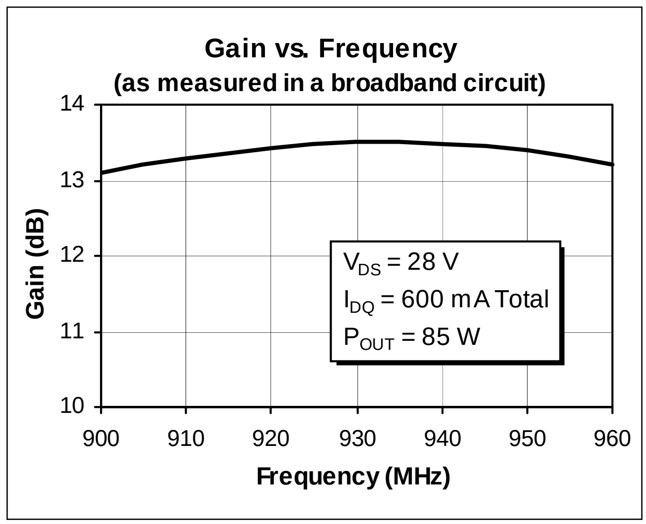


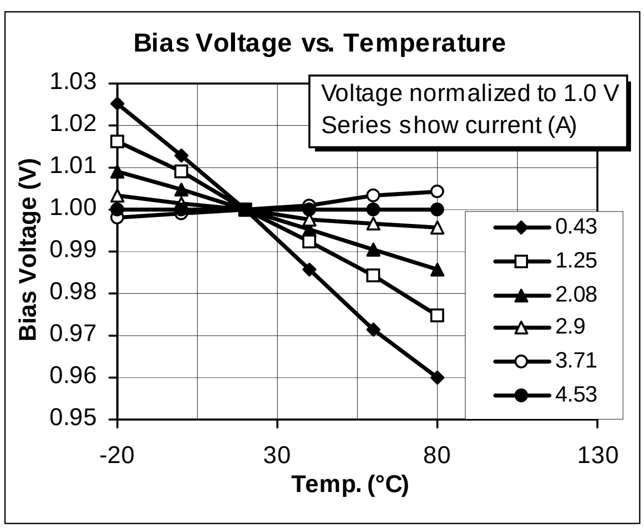
Typical Performance











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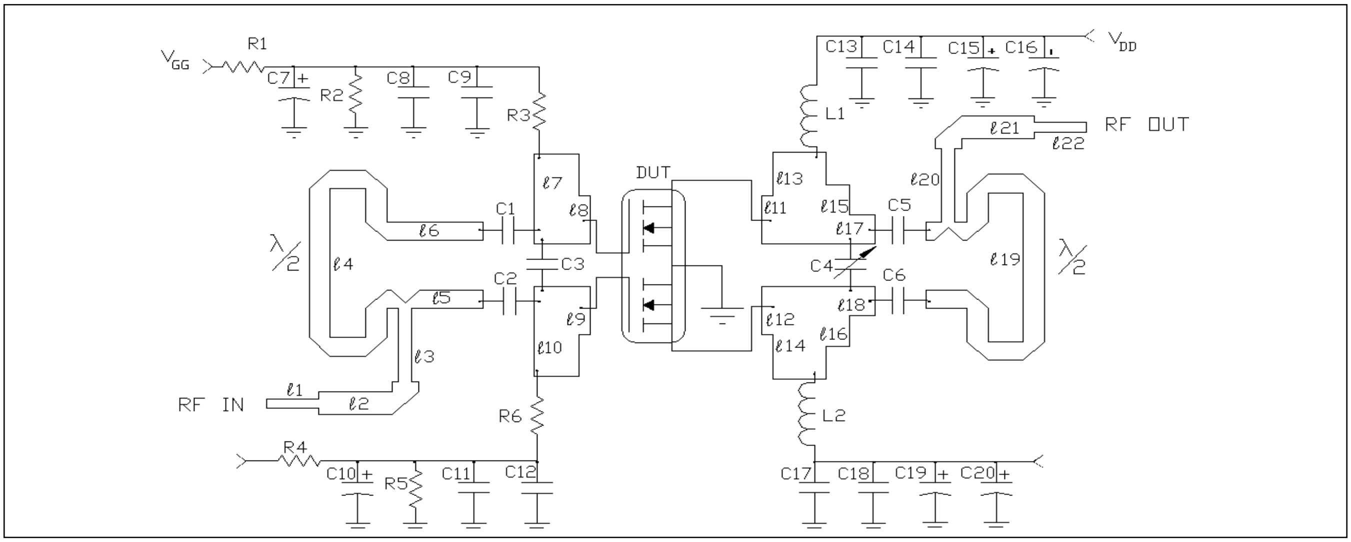
Typical Scattering Parameters

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

f	S11		S21		S12		S22	
(MHz)	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

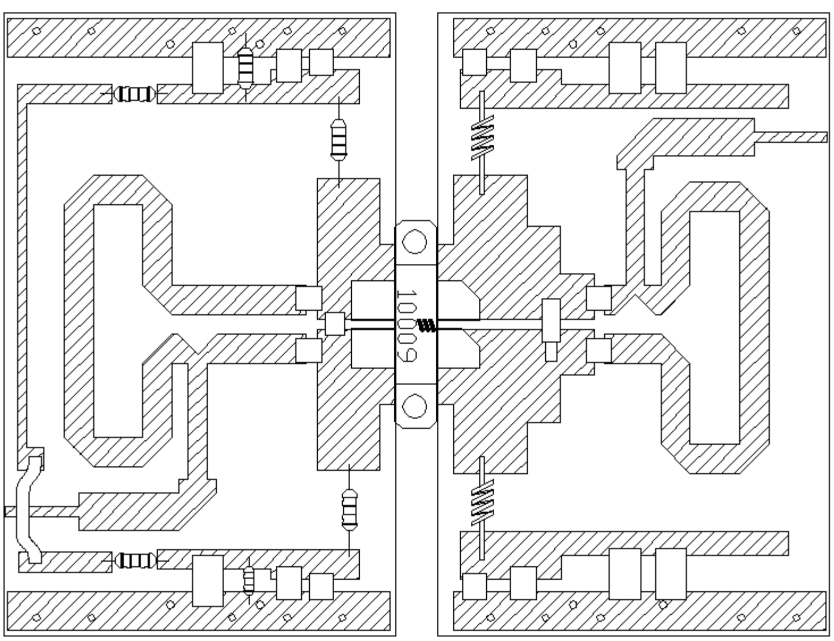
Test Circuit



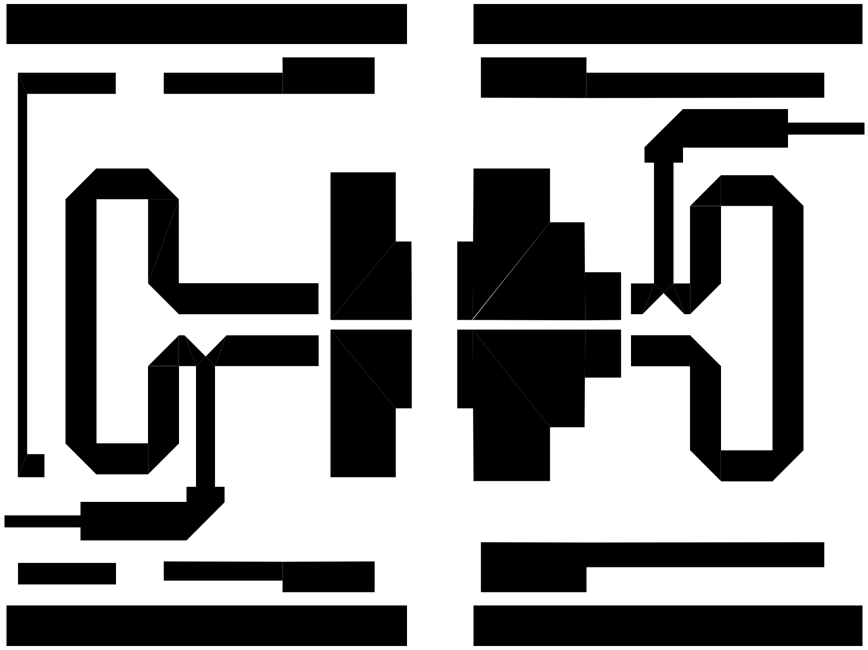
Schematic for f = 960 MHz

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 µF, +10 V Electrolytic Capacitor
C8, C11, C14, C18	0.01 µF, Capacitor ATC 100 B
C15, C16, C19, C20	10 µF, +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, ε_r = 4.0, AlliedSignal, G200, 2 oz. copper



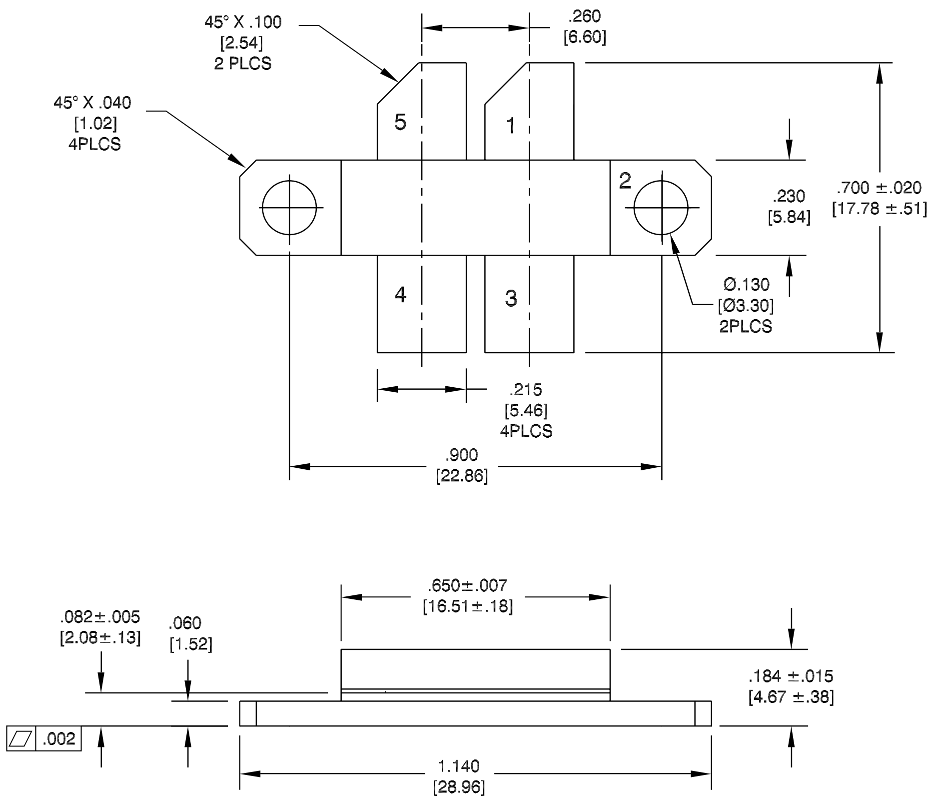
Parts Layout (not to scale)



Artwork (not to scale)

Case Outline Specifications

Package 20230



Unless Otherwise Specified
all tolerance ±0.005" [0.13mm]

Pins: 1,5 Drain 2. Source 3,4 Gate
Lead Thickness: 0.004 +0.002/-0.001"
[0.10 +0.05/-0.03mm]

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