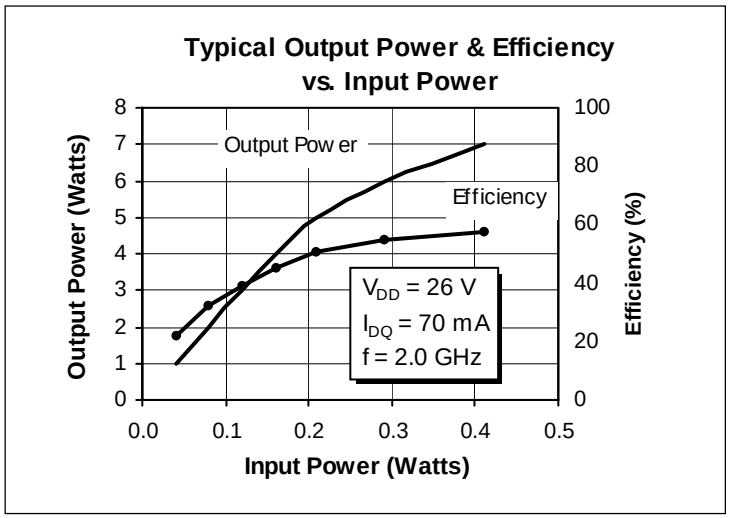
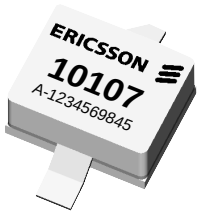
PTF 10107
5 Watts, 2.0 GHz
GOLDMOS® Field Effect Transistor

Description

The PTF 10107 is a 5–watt *GOLDMOS* FET intended for large signal applications from 1.0 to 2.0 GHz. It operates at 40% efficiency with 11 dB gain. Nitride surface passivation and full gold metallization ensure excellent device lifetime and reliability.

- **Guaranteed Performance at 1.99 GHz, 26 V**
  - **Output Power = 5 Watts Min**
  - **Power Gain = 11 dB Min**
- **Full Gold Metallization**
- **Silicon Nitride Passivated**
- **Back Side Common Source**
- **Excellent Thermal Stability**
- **100% Lot Traceability**





Package 20244

RF Specifications (100% Tested)

Characteristic	Symbol	Min	Typ	Max	Units
Gain (V_{DD} = 26 V, P_{OUT} = 1 W, I_{DQ} = 70 mA, f = 1.93, 1.99 GHz)	G_{ps}	11	—	—	dB
Power Output at 1 dB Compression (V_{DD} = 26 V, I_{DQ} = 70 mA, f = 1.99 GHz)	P-1dB	5	6.5	—	Watts
Drain Efficiency (V_{DD} = 26 V, P_{OUT} = 5 W, I_{DQ} = 70 mA, f = 1.99 GHz)	η_D	40	—	—	%
Load Mismatch Tolerance (V_{DD} = 26 V, P_{OUT} = 5 W, I_{DQ} = 70 mA, f = 1.99 GHz —all phase angles at frequency of test)	Ψ	—	—	10:1	—

All published data at T_{CASE} = 25°C unless otherwise indicated.

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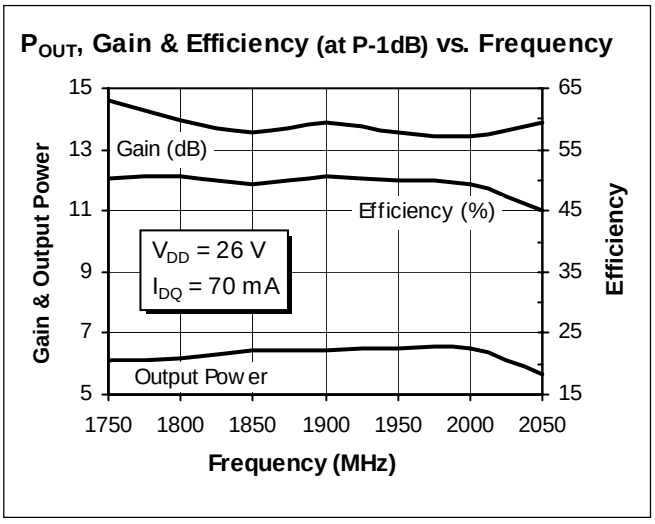
Electrical Characteristics (100% Tested)

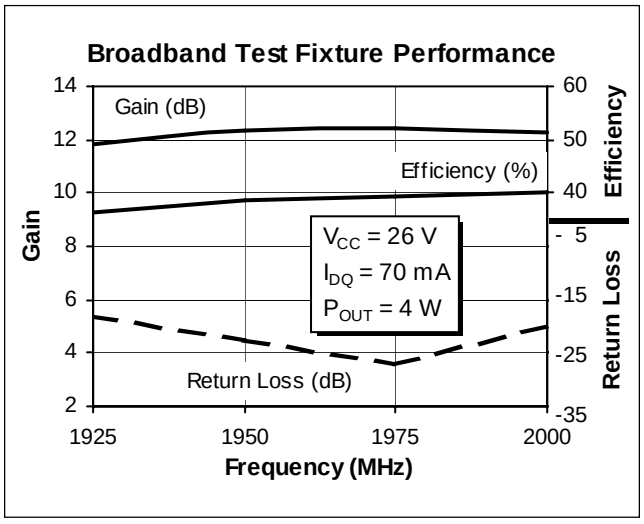
Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 20 mA	$V_{(BR)DSS}$	65	—	—	Volts
Zero Gate Voltage Drain Current	V_{DS} = 26 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	mA
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 75 mA	$V_{GS(th)}$	3.0	—	5.0	Volts
Forward Transconductance	V_{DS} = 10 V, I_D = 2 A	g_{fs}	—	0.8	—	Siemens

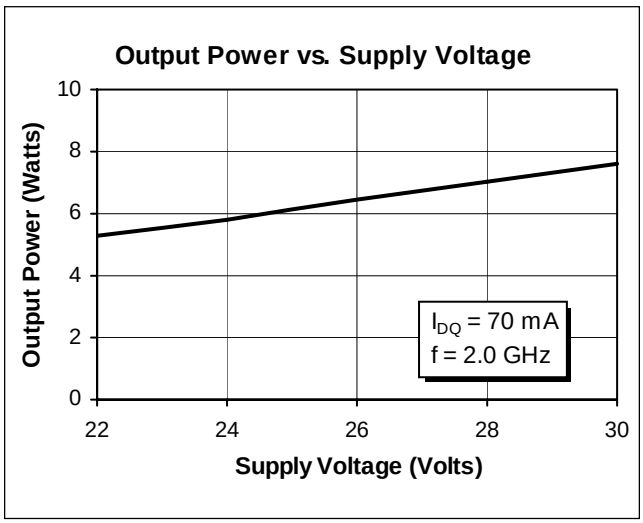
Maximum Ratings

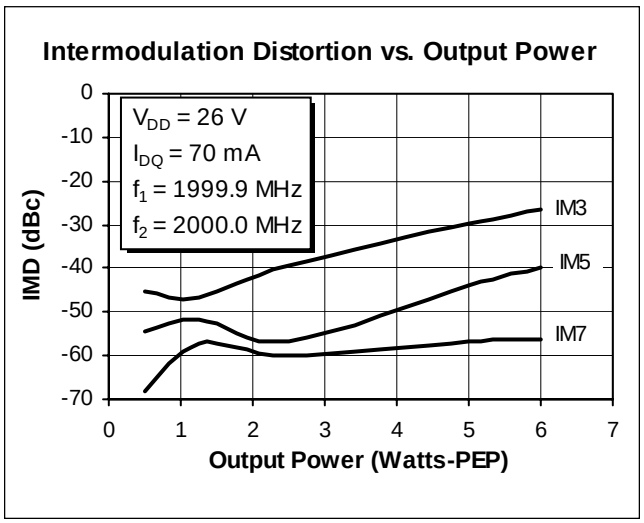
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	Vdc
Gate-Source Voltage	V_{GS}	±20	Vdc
Operating Junction Temperature	T_J	200	°C
Total Device Dissipation at Above 25°C derate by	P_D	39 0.22	Watts W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C)	$R_{\theta JC}$	4.5	°C/W

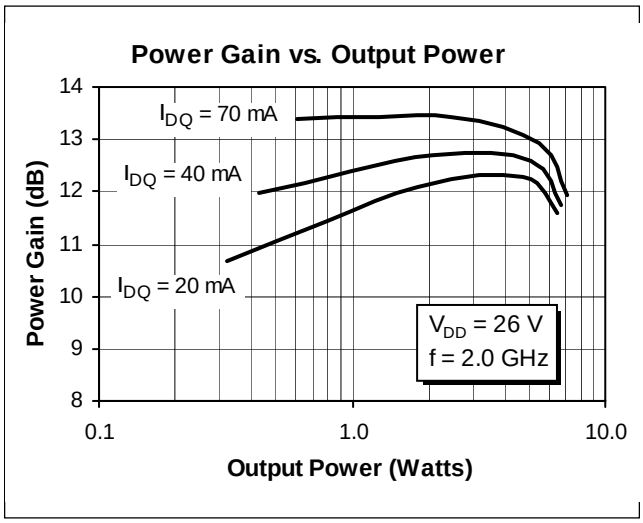
Typical Performance

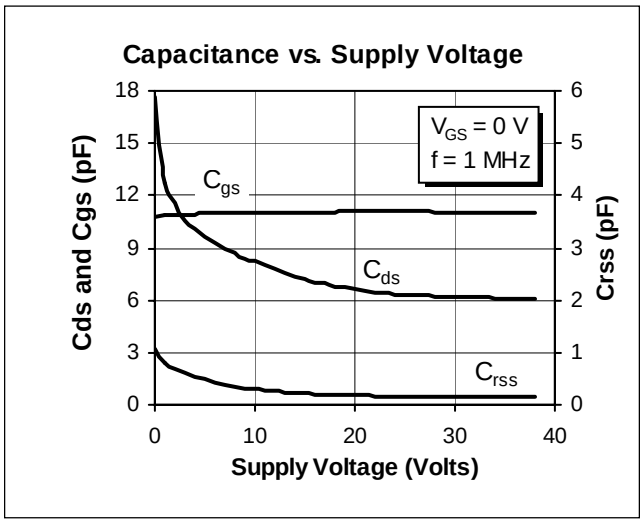


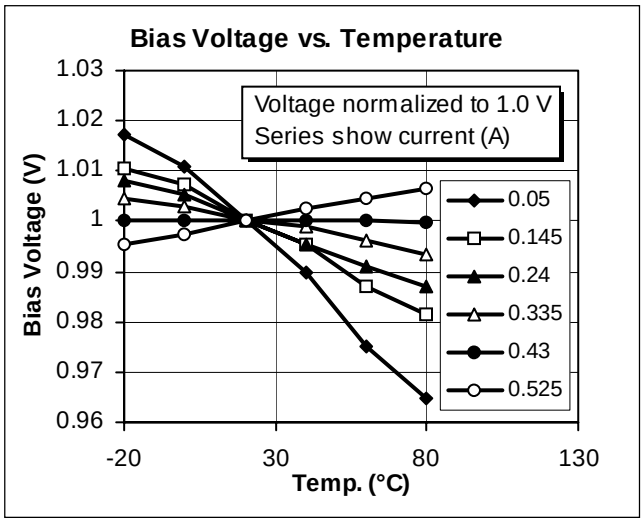



Output Power vs. Supply Voltage
Output Power (Watts)
Supply Voltage (Volts)
I_DQ = 70 mA
f = 2.0 GHz


Intermodulation Distortion vs. Output Power
IMD (dBc)
Output Power (Watts-PEP)
V_DD = 26 V
I_DQ = 70 mA
f_1 = 1999.9 MHz
f_2 = 2000.0 MHz
IM3
IM5
IM7


Power Gain vs. Output Power
Power Gain (dB)
Output Power (Watts)
I_DQ = 70 mA
I_DQ = 40 mA
I_DQ = 20 mA
V_DD = 26 V
f = 2.0 GHz


Capacitance vs. Supply Voltage
Cds and Cgs (pF)
Crss (pF)
Supply Voltage (Volts)
V_GS = 0 V
f = 1 MHz
C_gs
C_ds
C_rss


Bias Voltage vs. Temperature
Bias Voltage (V)
Temp. (°C)
Voltage normalized to 1.0 V
Series show current (A)
0.05
0.145
0.24
0.335
0.43
0.525

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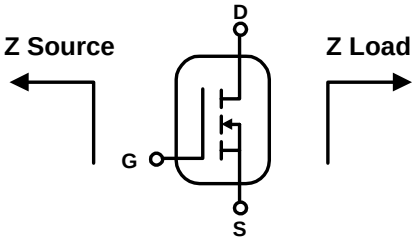
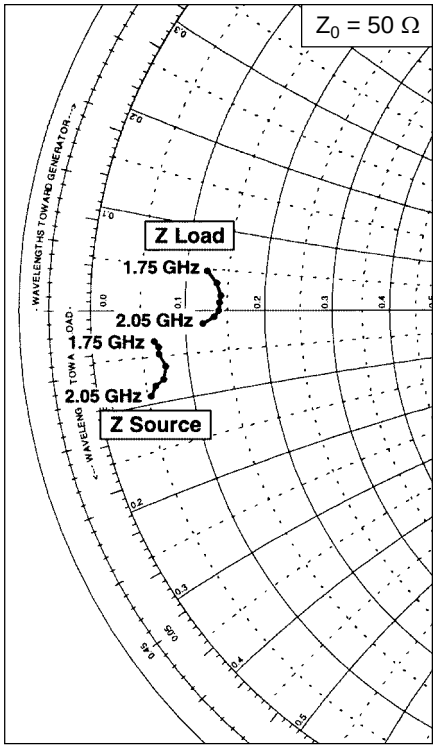
Impedance Data

V_{DD} = 26 V, P_{OUT} = 5 W, I_{DQ} = 70 mA





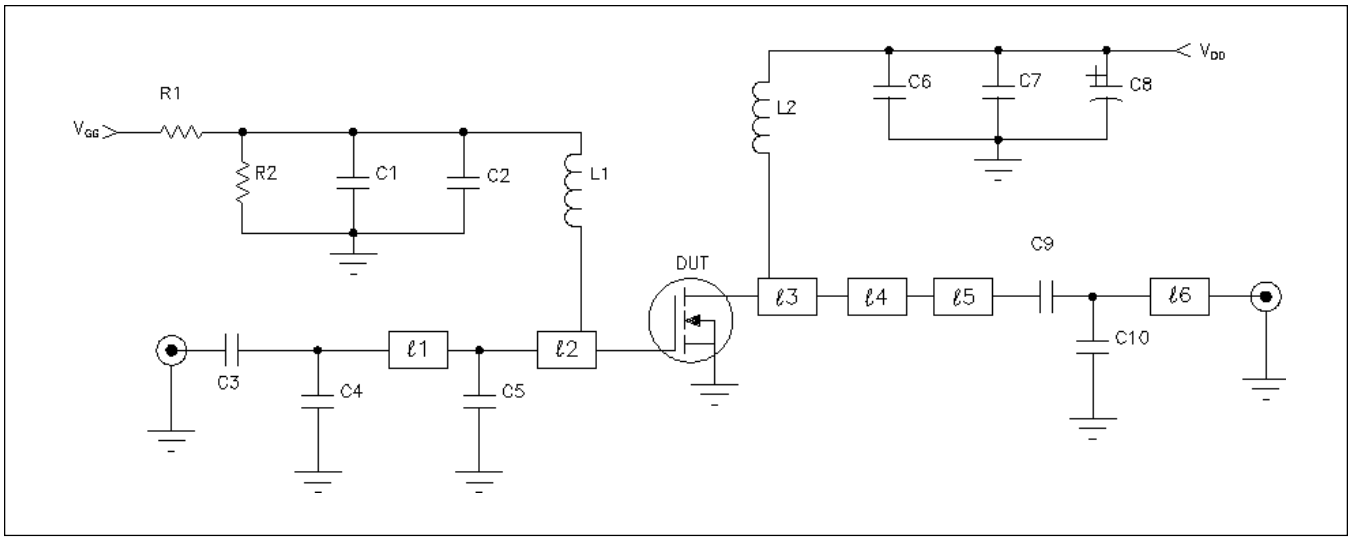
Frequency	Z Source Ω		Z Load Ω	
GHz	R	jX	R	jX
1.75	3.2	-1.7	6.20	2.4
1.80	3.4	-2.0	6.80	1.7
1.85	3.4	-2.4	7.10	0.9
1.90	3.7	-3.1	7.05	0.5
1.95	3.5	-3.8	7.00	0.0
2.00	3.0	-4.1	6.70	-0.4
2.05	2.7	-4.6	6.00	-0.8

Typical Scattering Parameters

(V_{DS} = 26 V, I_D = 300 mA)

f	S11		S21		S12		S22	
(MHz)	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
100	0.874	-58	24.1	137	0.009	46	0.770	-35
200	0.837	-70	21.8	129	0.010	37	0.737	-42
300	0.844	-100	17.5	106	0.012	21	0.710	-62
400	0.850	-118	14.1	89	0.013	9	0.709	-77
500	0.858	-130	11.5	77	0.012	-1	0.723	-88
600	0.864	-139	9.44	66	0.011	-8	0.749	-98
700	0.868	-146	7.86	56	0.009	-13	0.767	-108
800	0.870	-153	6.61	48	0.008	-15	0.782	-116
900	0.879	-158	5.65	40	0.006	-13	0.801	-123
1000	0.887	-162	4.86	33	0.004	-2	0.815	-130
1100	0.898	-167	4.24	26	0.004	19	0.837	-136
1200	0.905	-171	3.73	20	0.004	48	0.854	-141
1300	0.911	-174	3.30	14	0.005	66	0.870	-147
1400	0.914	-178	2.92	8	0.006	74	0.882	-152
1500	0.916	179	2.61	2	0.008	77	0.892	-156
1600	0.918	176	2.35	-3	0.009	79	0.898	-160
1700	0.923	173	2.14	-8	0.011	79	0.907	-164
1800	0.928	171	1.95	-13	0.013	78	0.914	-168
1900	0.933	168	1.79	-18	0.015	76	0.920	-172
2000	0.937	165	1.65	-23	0.017	74	0.925	-176
2100	0.935	162	1.53	-28	0.018	71	0.929	-179
2200	0.934	159	1.43	-33	0.020	68	0.934	178

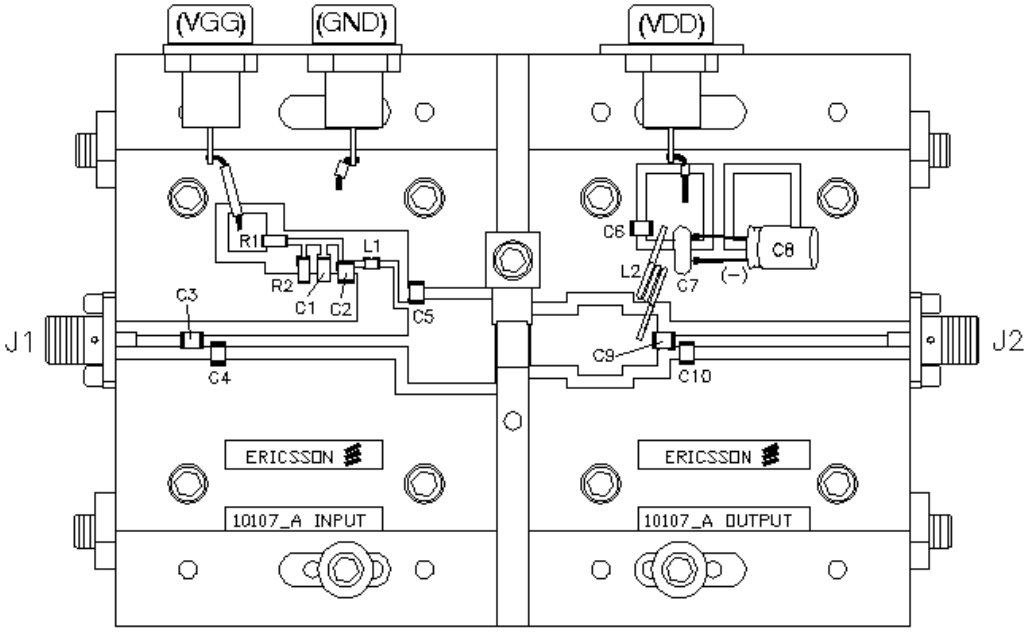
Test Circuit

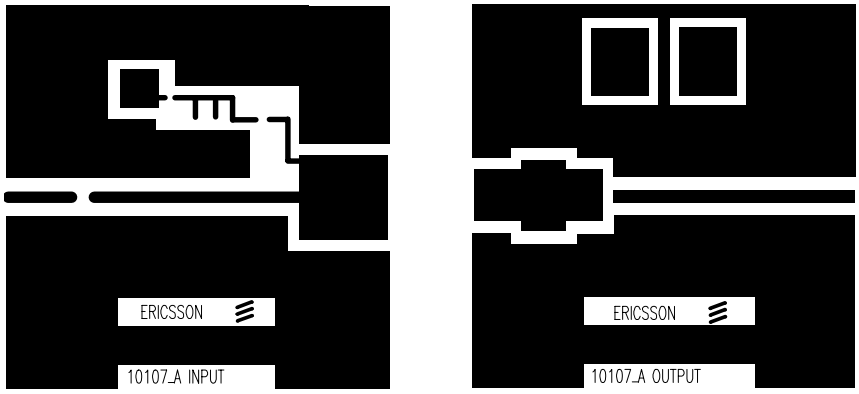


Block Diagram for f = 1.96 GHz

DUT	PTF 10107	LDMOS RF FET
ℓ1	0.303 λ 1.99 GHz	Microstrip 50 Ω
ℓ2	0.146 λ 1.99 GHz	Microstrip 11.6 Ω
ℓ3	0.076 λ 1.99 GHz	Microstrip 17.7 Ω
ℓ4	0.072 λ 1.99 GHz	Microstrip 13.5 Ω
ℓ5	0.060 λ 1.99 GHz	Microstrip 17.7 Ω
ℓ6	0.352 λ 1.99 GHz	Microstrip 50 Ω

C1	Capacitor, 0.1 µF	Digi-Key P4525-ND
C2, C3, C6, C9	Capacitor, 33 pF	ATC 100 B
C4, C10	Capacitor, 0.5 pF	ATC 100 B
C5	Capacitor, 1.1 pF	ATC 100 B
C7	Capacitor, 0.1 µF 50 V	Digi-Key
C8	Capacitor, 100 µF, 50 V	Digi-Key P5182-ND
J1, J2	Connector, SMA, Female, Panel Mount	
L1	Chip Inductor, 2.7 µH	Digi-Key LL2012-F2N7K
L2	3 Turns, 20 AWG, .120 I. D.	N/A
R1, R2	Resistor, 220 ohm, 1/4W	Digi-Key QBK-ND
Circuit Board	0.031" Thick, ε_r = 4.0, 2 0z copper, G200 AlliedSignal	





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