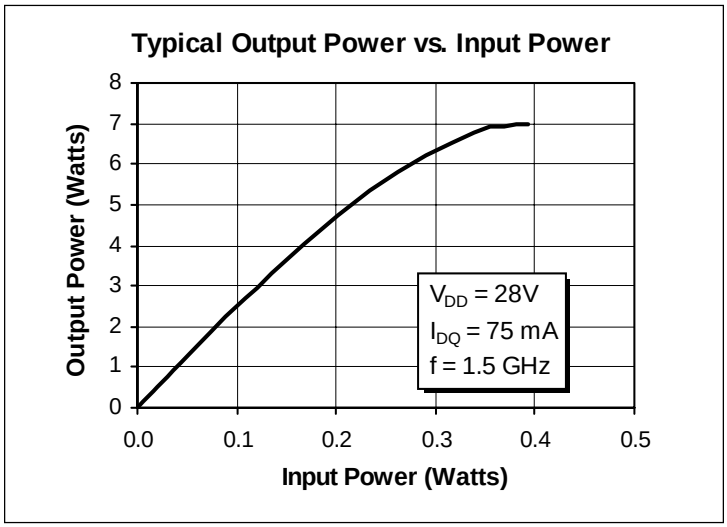
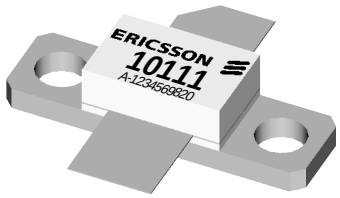
PTF 10111
6 Watts, 1.5 GHz
GOLDMOS™ Field Effect Transistor

Description

The PTF 10111 is a 6 watt LDMOS FET intended for large signal amplifier applications to 1.5 GHz. It operates @ 50% efficiency and 16 dB of gain. Nitride surface passivation and full gold metallization ensure excellent device lifetime and reliability.

- **Performance at 1.5 GHz, 28 Volts**
  - **Output Power = 6 Watts**
  - **Efficiency = 50% Typ**
  - **Power Gain = 16 dB Typ**
- **Full Gold Metallization**
- **Silicon Nitride Passivated**
- **100% Lot Traceability**





Package 20222

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 T_{flange} = 25°C Above 25°C derate by	P_D	36 0.208	Watts W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{flange} = 70°C)	$R_{\theta JC}$	4.8	°C/W

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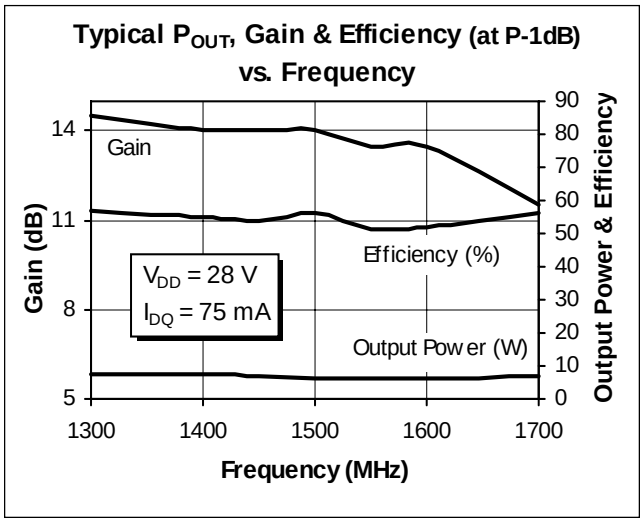
Electrical Characteristics (100% Tested)

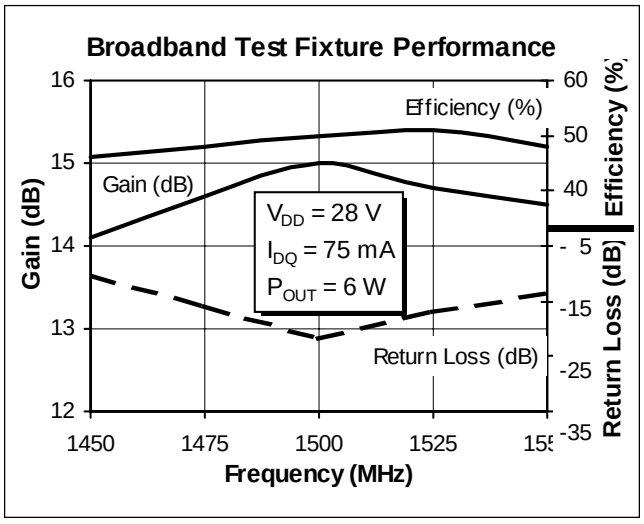
Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 40 mA	$V_{(BR)DSS}$	65	68	—	Volts
Drain-Source Leakage Current	V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1	mA
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 75 mA	$V_{GS(th)}$	3.0	—	5.0	Volts
Forward Transconductance	V_{DS} = 10 V, I_D = 0.5 A	g_{fs}	—	0.2	—	Siemens

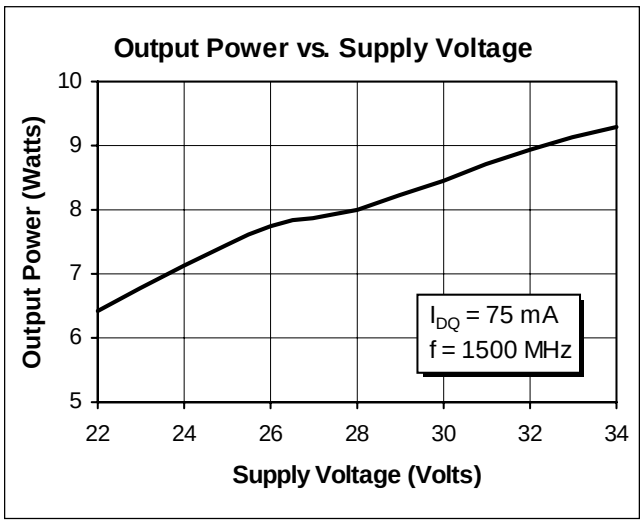
RF Specifications (100% Tested)

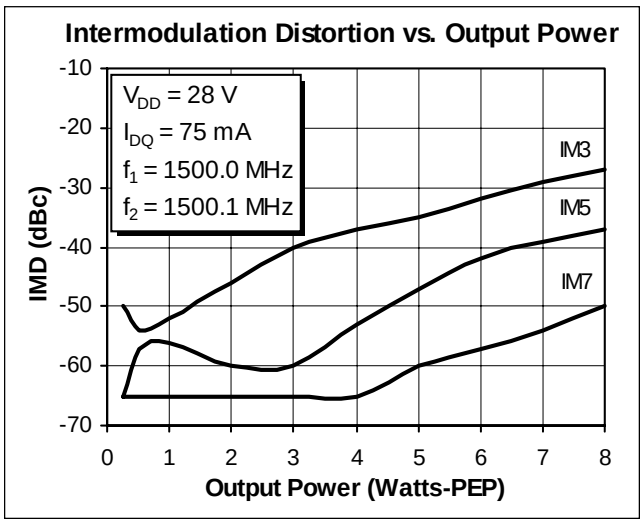
Characteristic	Symbol	Min	Typ	Max	Units
Common Source Power Gain (V_{DD} = 28 V, P_{OUT} = 6 W, I_{DQ} = 75 mA, f = 1.5 GHz)	G_{ps}	15.0	16	—	dB
Power Output at 1 dB Compressed (V_{DD} = 28 V, I_{DQ} = 75 mA, f = 1.5 GHz)	P-1dB	6	7	—	Watts
Drain Efficiency (V_{DD} = 28 V, P_{OUT} = 6 W, I_{DQ} = 75 mA, f = 1.5 GHz)	η_D	45	50	—	%
Load Mismatch Tolerance (V_{DD} = 28 V, P_{OUT} = 6 W, I_{DQ} = 75 mA, f = 1.5 GHz— all phase angles at frequency of test)	Ψ	—	—	30:1	—

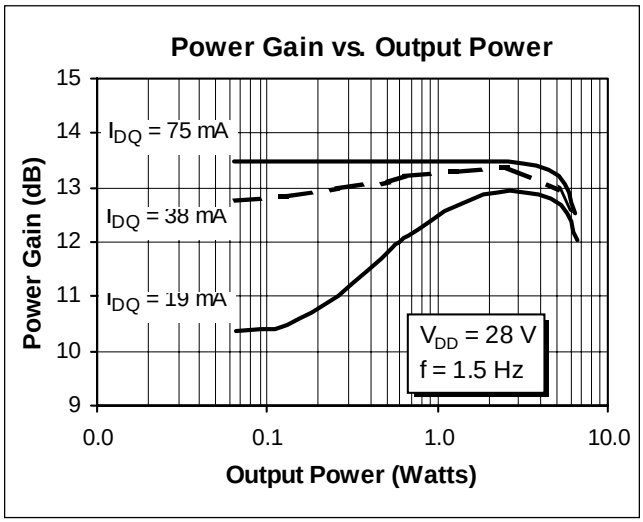
Typical Performance

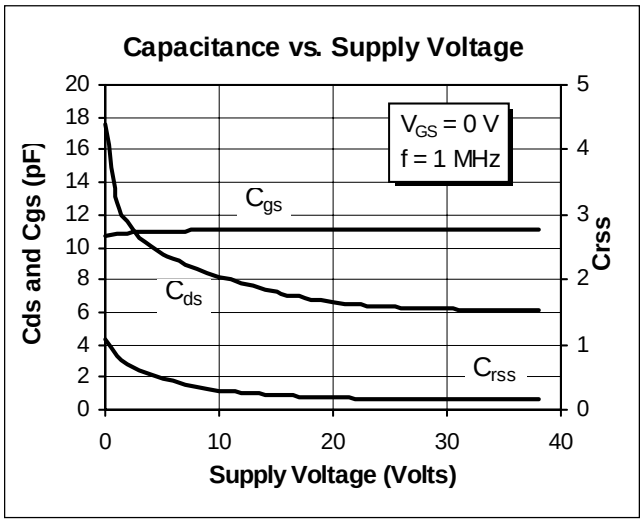


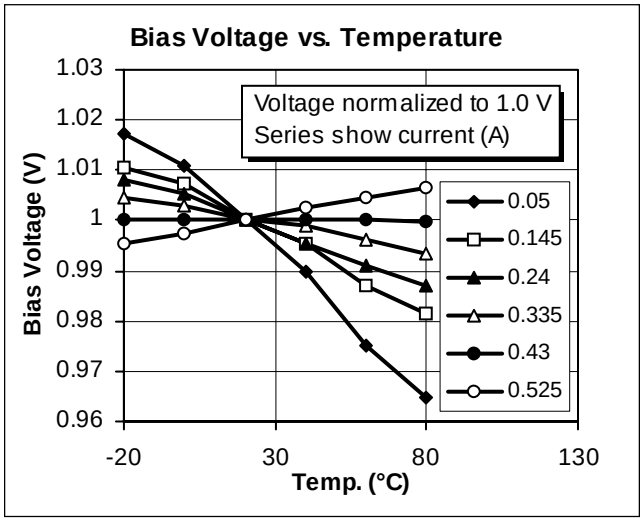



Output Power vs. Supply Voltage
Output Power (Watts)
Supply Voltage (Volts)
I_DQ = 75 mA
f = 1500 MHz


Intermodulation Distortion vs. Output Power
IMD (dBc)
Output Power (Watts-PEP)
V_DD = 28 V
I_DQ = 75 mA
f_1 = 1500.0 MHz
f_2 = 1500.1 MHz
IM3
IM5
IM7


Power Gain vs. Output Power
Power Gain (dB)
Output Power (Watts)
I_DQ = 75 mA
I_DQ = 38 mA
I_DQ = 19 mA
V_DD = 28 V
f = 1.5 Hz


Capacitance vs. Supply Voltage
Cds and Cgs (pF)
Crss
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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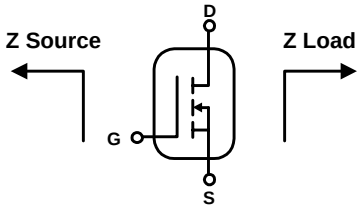
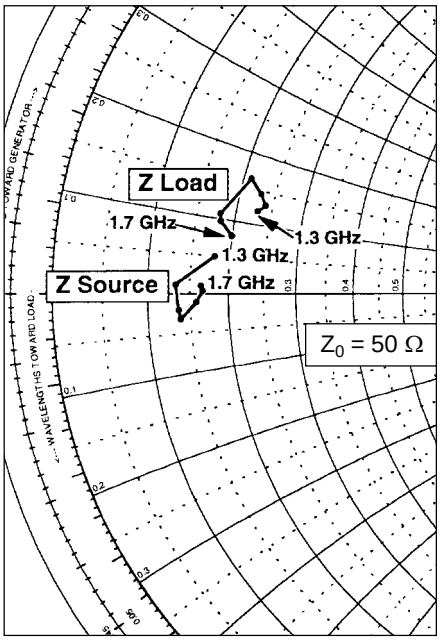
Impedance Data

(V_{DD} = 28 V, I_{DQ} = 75 mA, P_{OUT} = 6 W)





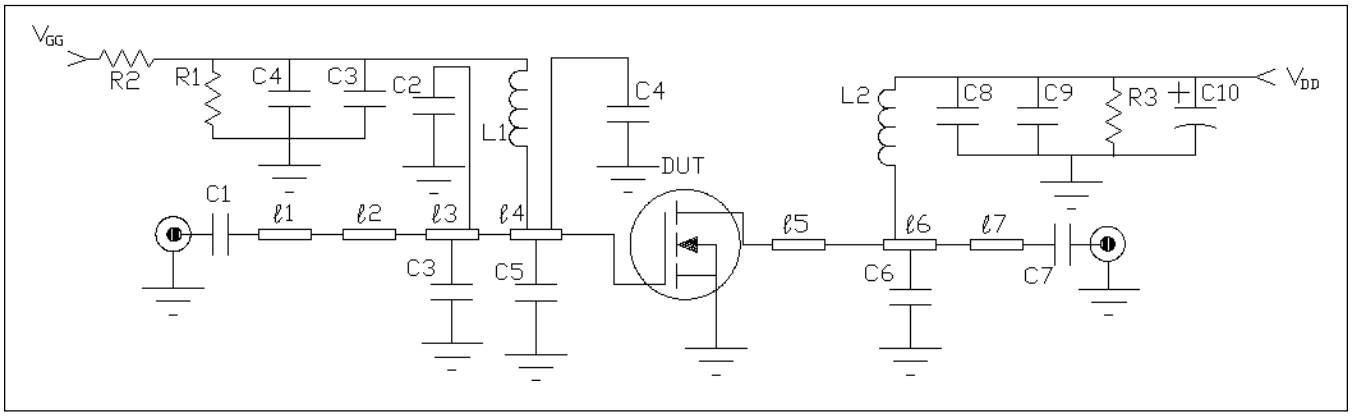
Frequency	Z Source Ω		Z Load Ω	
GHz	R	jX	R	jX
1.3	9.0	2.5	11.5	6.0
1.4	6.6	0.6	12.0	6.5
1.5	6.8	-1.0	11.5	7.3
1.5	6.9	-1.6	10.5	8.2
1.5	7.9	-0.6	9.0	5.4
1.6	8.3	0.2	9.1	4.9
1.7	8.2	0.5	10.0	4.0

Typical Scattering Parameters

(V_{DS} = 28 V, I_D = 300 mA)

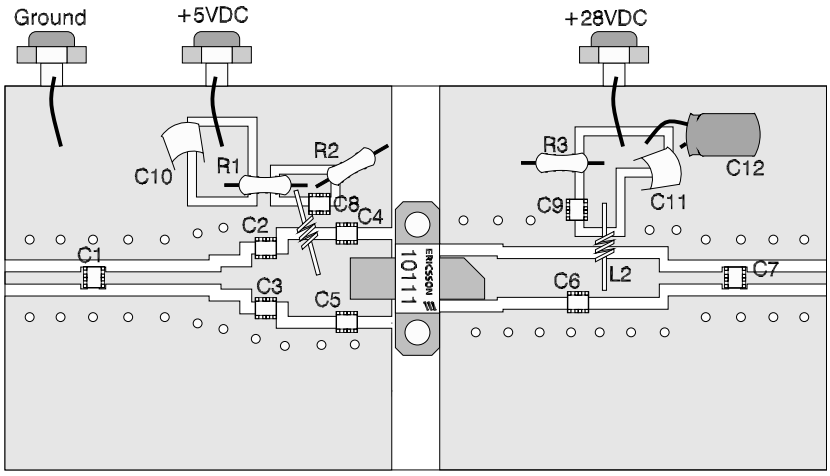
f	S11		S21		S12		S22	
(MHz)	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
100	0.867	-65	21.8	131	0.010	42	0.801	-41
200	0.832	-77	19.2	123	0.011	34	0.765	-50
300	0.843	-106	14.4	97	0.013	18	0.740	-72
400	0.844	-123	11.0	81	0.014	4	0.744	-88
500	0.852	-133	8.71	69	0.013	-7	0.774	-98
600	0.862	-140	7.08	59	0.011	-15	0.815	-107
700	0.868	-146	5.79	50	0.009	-19	0.836	-116
800	0.874	-151	4.80	42	0.007	-19	0.851	-123
900	0.882	-155	4.05	35	0.006	-16	0.861	-129
1000	0.886	-158	3.48	29	0.004	-7	0.869	-133
1100	0.893	-161	3.04	24	0.003	20	0.885	-137
1200	0.899	-164	2.69	19	0.003	57	0.897	-141
1300	0.907	-167	2.43	14	0.005	74	0.912	-145
1400	0.905	-170	2.19	9	0.007	80	0.921	-148
1500	0.903	-173	2.00	4	0.008	83	0.928	-151
1600	0.898	-175	1.83	0	0.011	85	0.929	-154
1700	0.896	-177	1.71	-5	0.013	86	0.933	-157
1800	0.892	-179	1.60	-9	0.016	83	0.934	-159
1900	0.889	178	1.52	-13	0.020	78	0.937	-161
2000	0.885	176	1.45	-17	0.023	69	0.940	-163
2100	0.882	173	1.40	-21	0.023	59	0.944	-165
2200	0.880	171	1.37	-25	0.021	60	0.950	-168

Test Circuit



Test Circuit Block Diagram for f = 1.5 GHz

DUT	PTF 10111	
C1, C7–9	33 pF, Capacitor ATC 100 B	
C2, C3	2.2 pF, Capacitor ATC 200 B	
C10, C11	0.1 μF, 50 V, Capacitor	
C4, C5	1.5 pF, Capacitor ATC 100 A	
C6	2.0 pF, Capacitor ATC 100 A	
C12	100 μF, 50 V, Electrolytic Capacitor	
ℓ1	0.21 λ 1.5 GHz	Microstrip 50 Ω
ℓ2	0.037 λ 1.5 GHz	Microstrip 33.3 Ω
ℓ3	0.045 λ 1.5 GHz	Microstrip 18.5 Ω
ℓ4	0.13 λ 1.5 GHz	Microstrip 12.4 Ω
ℓ5	0.07 λ 1.5 GHz	Microstrip 19.8 Ω
ℓ6	0.20 λ 1.5 GHz	Microstrip 22 Ω
ℓ1	0.18 λ 1.5 GHz	Microstrip 50 Ω
L1, L2	3 Turn, #22 AWG, 0.120" I.D.	
R1, R2, R3	10 K, 1/4 W Resistor	
Circuit Board	.028" Dielectric Thickness, ε_r = 4.0, AlliedSignal, G200, 2 oz. copper	



Placement Diagram (not to scale)

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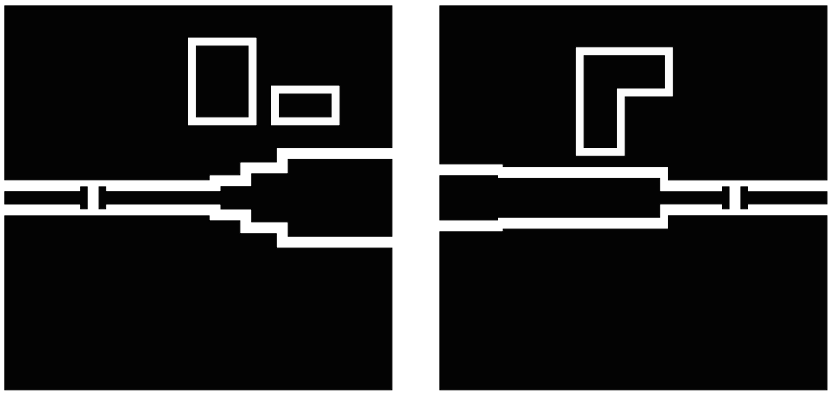

Artwork (1 inch ———)

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