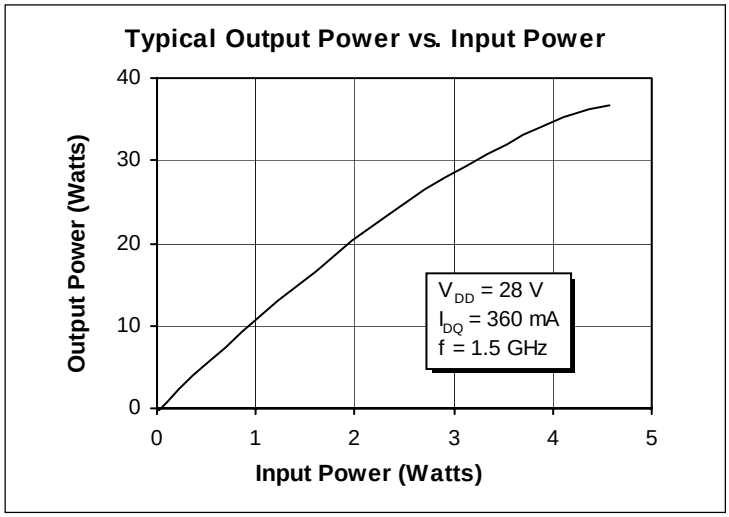
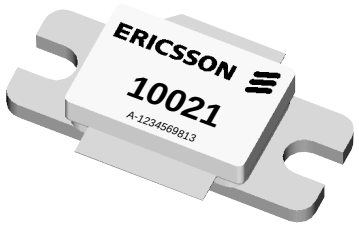
PTF 10021
GOLDMOS® Field Effect Transistor
30 Watts, 1.4–1.6 GHz

Description

The PTF 10021 is an internally matched, 30–watt *GOLDMOS* FET intended for linear driver and final applications in the 1.4 to 1.6 GHz range such as DAB/DAR. This device operates at 48% efficiency with 13 dB gain. Nitride surface passivation and full gold metallization ensure excellent device lifetime and reliability.

- ***INTERNALLY MATCHED***
- **Performance at 1.5 GHz, 28 Volts**
  - **Output Power = 30 Watts Min**
  - **Power Gain = 13 dB Typ**
  - **Efficiency = 48% Typ**
- **Full Gold Metallization**
- **Silicon Nitride Passivated**
- **Excellent Thermal Stability**
- **100% Lot Traceability**





Package 20237

RF Specifications (100% Tested)

Characteristic	Symbol	Min	Typ	Max	Units
Gain (V_{DD} = 28 V, P_{OUT} = 10 W, I_{DQ} = 360 mA, f = 1.5 GHz)	G_{ps}	11.0	13.0	—	dB
Power Output at 1 dB Compressed (V_{DD} = 28 V, P_{OUT} = 30 W, I_{DQ} = 360 mA, f = 1.5 GHz)	P-1dB	30	—	—	Watts
Drain Efficiency (V_{DD} = 28 V, P_{OUT} = 30 W, I_{DQ} = 360 mA, f = 1.5 GHz)	η	45	48	—	%
Load Mismatch Tolerance (V_{DD} = 28 V, P_{OUT} = 30 W(PEP), I_{DQ} = 360 mA, f = 1.5 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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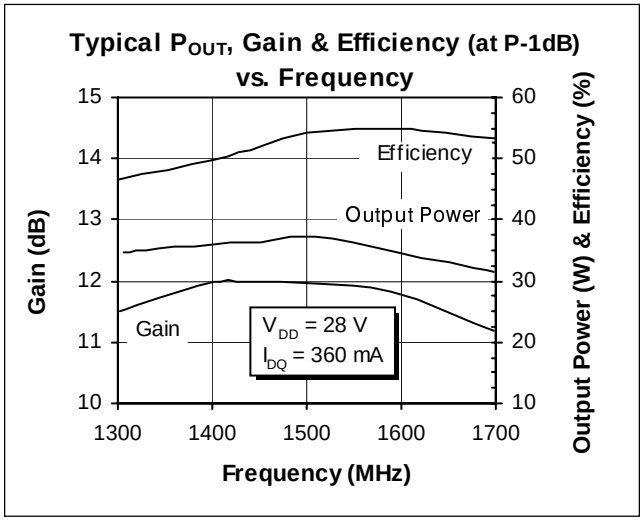
Electrical Characteristics (100% Tested)

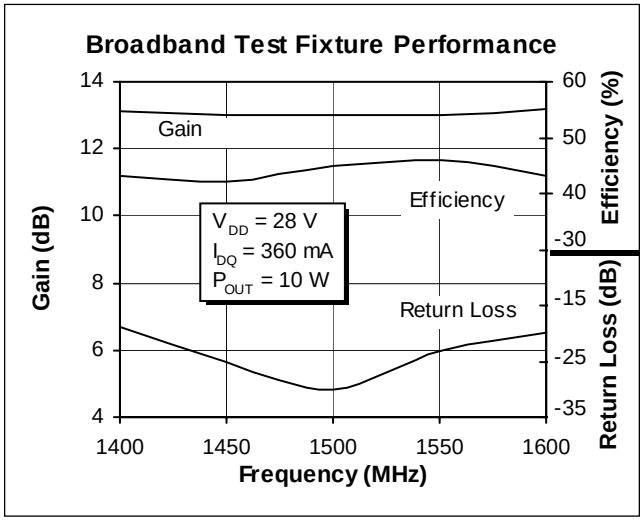
Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 25 mA	$V_{(BR)DSS}$	65	—	—	Volts
Drain-Source Leakage Current	V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	µA
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 75 mA	$V_{GS(th)}$	3.0	—	5.0	Volts
Forward Transconductance	V_{DS} = 10 V, I_D = 3 A	g_{fs}	—	2.2	—	Siemens

Maximum Ratings

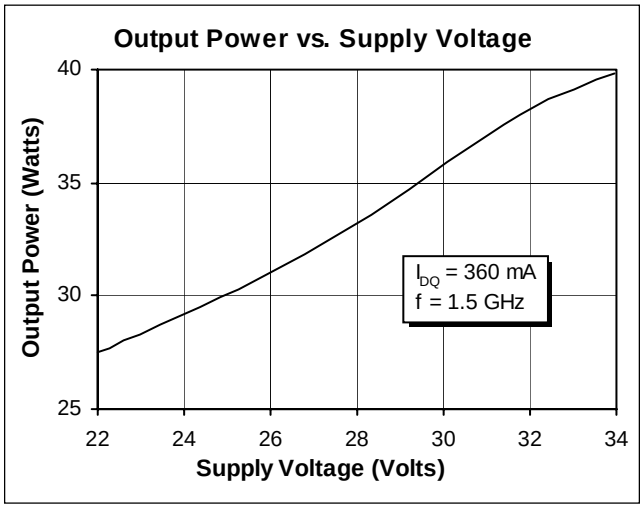
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	Vdc
Gate-Source Voltage	V_{GS}	±20	Vdc
Operating Junction Temperature	T_J	200	°C
Total Device Dissipation at Above 25°C derate by	P_D	105 0.6	Watts W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C)	$R_{\theta JC}$	1.65	°C/W

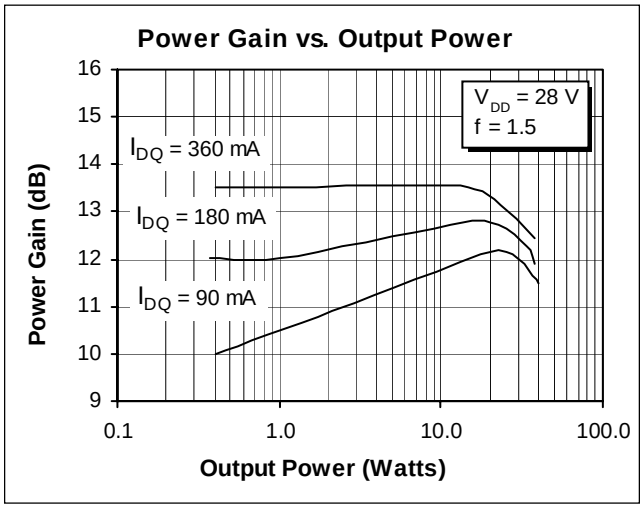
Typical Performance

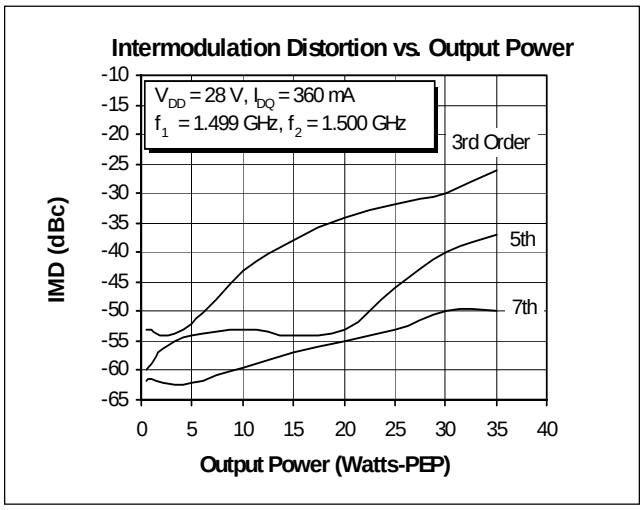


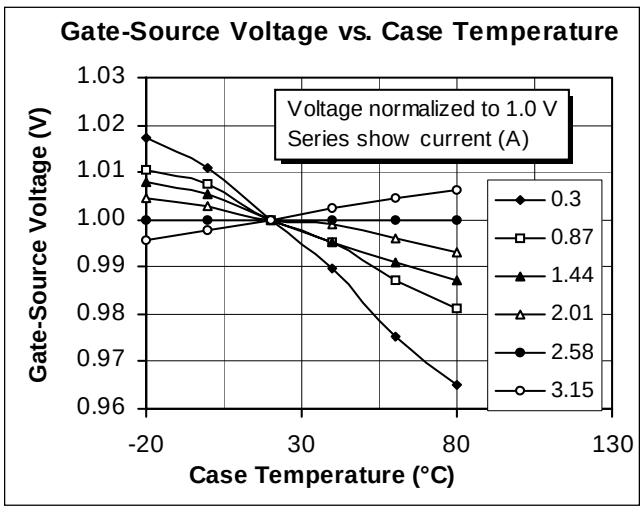


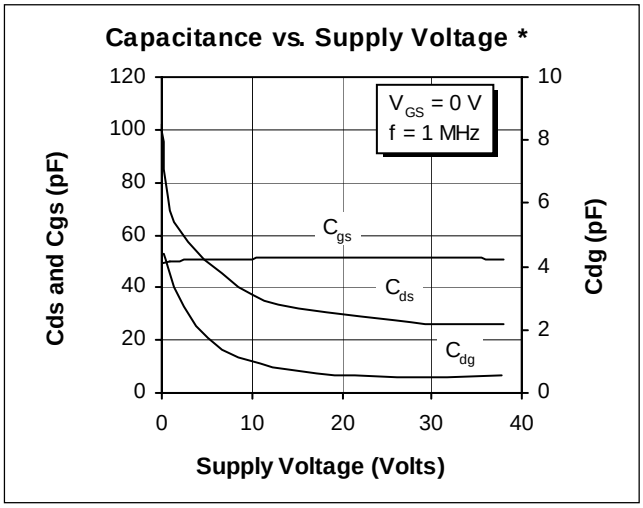
Typical Performance (cont.)











*This part is internally matched. Measurements of the finished product will not yield these figures.

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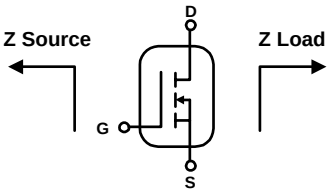
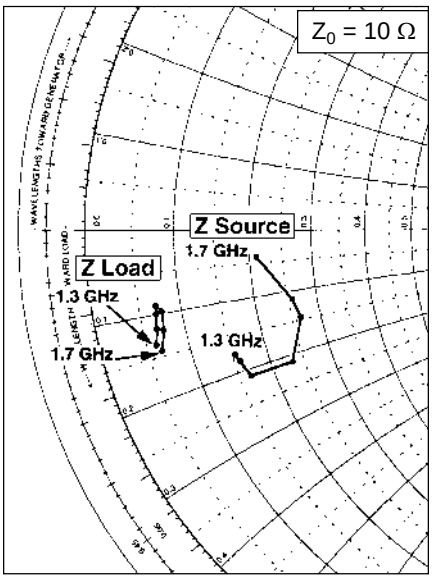
Impedance Data

V_{DD} = 28 V, P_{OUT} = 30 W, I_{DQ} = 360 mA





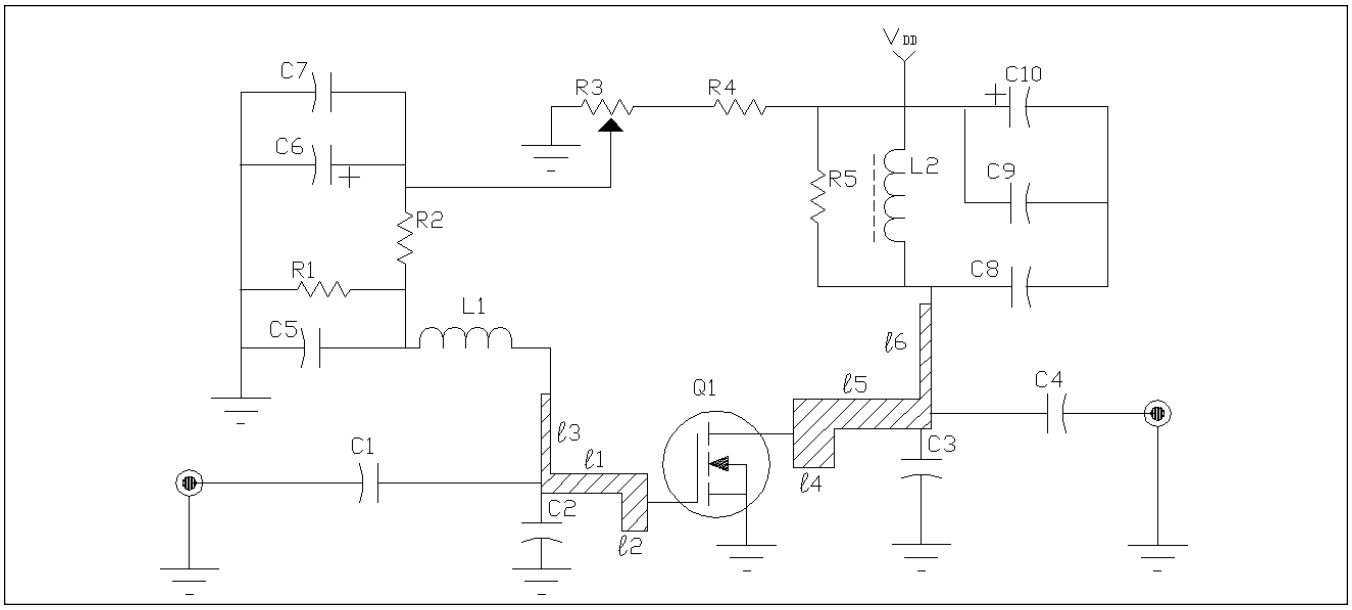
Frequency	Z Source Ω		Z Load Ω	
GHz	R	jX	R	jX
1.30	7.70	-8.77	3.08	-6.77
1.40	7.90	-9.30	3.32	-5.89
1.45	8.30	-10.52	3.45	-5.00
1.50	11.60	-10.60	3.50	-4.50
1.55	13.30	-7.30	3.80	-4.90
1.60	12.90	-5.70	3.70	-6.00
1.70	10.50	-2.07	3.30	-7.16

Typical Scattering Parameters

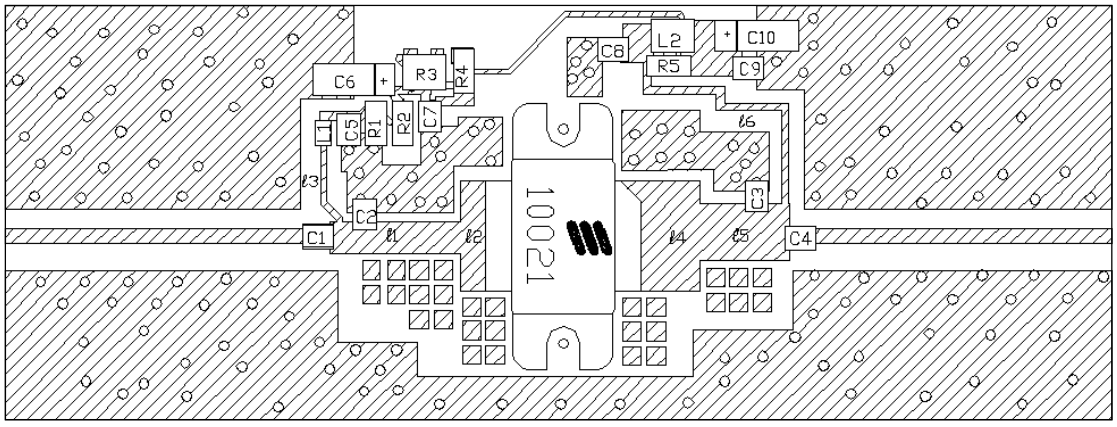
(V_{DS} = 28 V, I_D = 900 mA)

f	S11		S21		S12		S22	
(MHz)	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
100	0.938	-151	4.53	35.0	0.0012	84.1	0.813	-162
200	0.949	-157	3.20	31.9	0.0021	92.3	0.839	-166
300	0.988	-169	0.825	12.0	0.0046	95.2	0.893	-172
400	0.993	-175	0.325	5.8	0.0068	92.8	0.929	-176
500	0.993	-178	0.108	9.3	0.0093	90.5	0.943	-179
600	0.991	179	0.047	128	0.0123	86.2	0.981	178
700	0.990	177	0.154	151	0.0150	81.9	1.00	172
800	0.993	174	0.262	149	0.0177	77.9	0.947	168
900	0.998	172	0.393	146	0.0212	74.6	0.915	165
1000	0.999	169	0.586	141	0.0257	69.1	0.883	163
1100	1.000	165	0.927	133	0.0312	61.2	0.874	160
1200	0.996	159	1.66	120	0.0383	51.9	0.846	152
1300	0.898	146	3.50	84.7	0.0521	27.0	0.632	136
1400	0.590	145	4.35	30.7	0.0454	-12.0	0.259	160
1500	0.443	172	4.86	-15.9	0.0316	-57.1	0.472	-156
1600	0.655	-175	3.88	-68.4	0.0090	-146	0.817	-170
1700	0.747	-177	2.73	-103	0.0119	113	0.853	180
1800	0.831	-178	1.93	-132	0.0190	88.8	0.855	175
1900	0.904	178	1.32	-156	0.0263	74.8	0.859	172
2000	0.944	174	0.897	-173	0.0303	60.6	0.861	169
2100	0.966	171	0.641	175	0.0299	49.6	0.860	166
2200	0.990	167	0.491	166	0.0283	50.1	0.877	164

Test Circuit



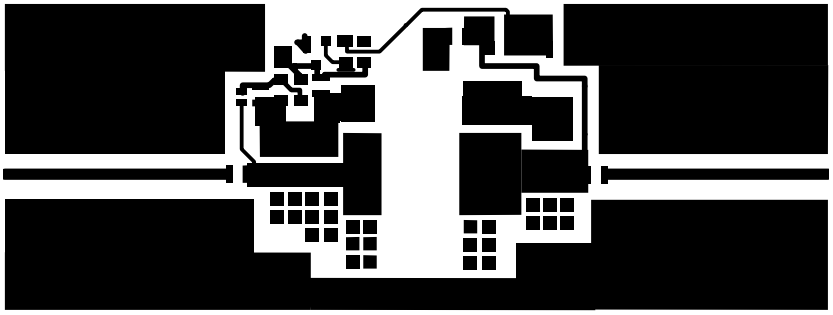
Schematic for f = 1.5 GHz



Assembly Drawing (not to scale)

Q1	PTF 10021	Field Effect Transistor
ℓ1	0.11 λ 1.5 GHz	Microstrip 30.21 Ω
ℓ2	0.0483 λ 1.5 GHz	Microstrip 11.69 Ω
ℓ3	0.07 λ 1.5 GHz	Microstrip 70 Ω
ℓ4	0.0853 λ 1.5 GHz	Microstrip 11.69 Ω
ℓ5	0.07 λ 1.5 GHz	Microstrip 21 Ω
ℓ6	0.25 λ 1.5 GHz	Microstrip 70 Ω
C1	33 pF	Chip Cap ATC 100 B
C2	1.3 pF	Chip Cap ATC 100 B
C3	0.7 pF	Chip Cap ATC 100 B
C4, C5	33 pF	Chip Cap ATC 100 B
C6	10 uF	SMT Tantalum
C7	0.1 uF	Chip Cap
C8	33 pF	Chip Cap ATC 100 B
C9	0.1 uF	Chip Cap
C10	10 uF	SMT Tantalum
L1	2.7 nH	SMT Coil
L2		4mm Ferrite Bead
R1	220 Ω	K 1206 SMT
R2	220 Ω	K 1206 SMT
R3	2 KΩ	SMT Pot
R4	470 Ω	K 1206 SMT
R5	2.2 Ω	K 1206 SMt
Circuit Board	.031" thick, ε_r = 4.0, G200, AlliedSignal, 2 oz. copper	

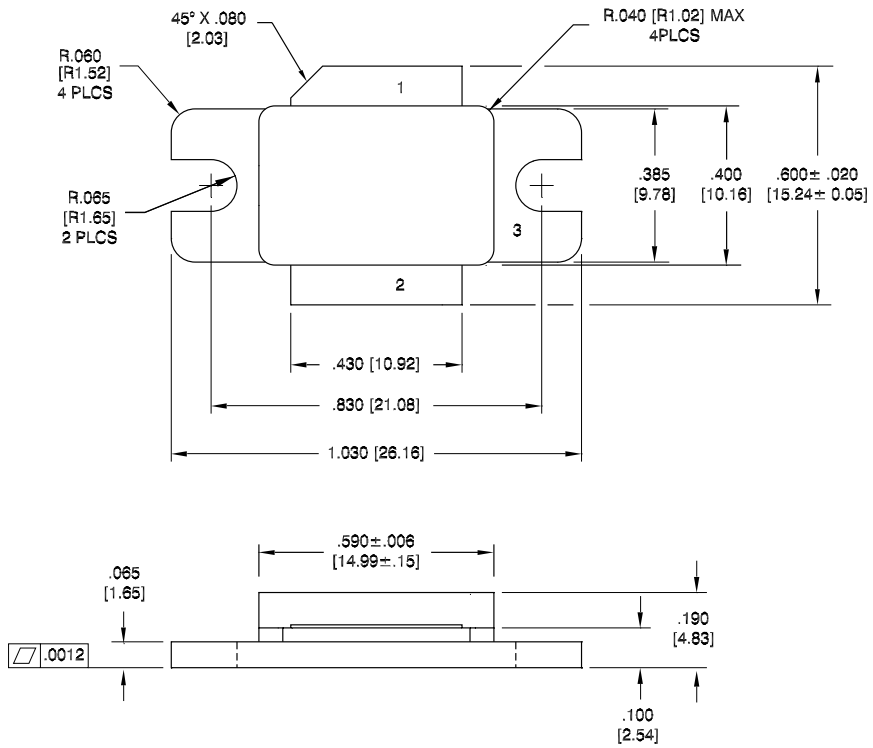
Test Circuit (cont.)



Artwork (not to scale)

Case Outline Specifications

Case 20237



Unless otherwise specified
all tolerances ±0.005" [0.13mm]

Pins: 1.Drain 2.Gate 3.Source
Lead Thickness: 0.005 +0.002/-0.001"
[0.13 +0.05/-0.03mm]

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