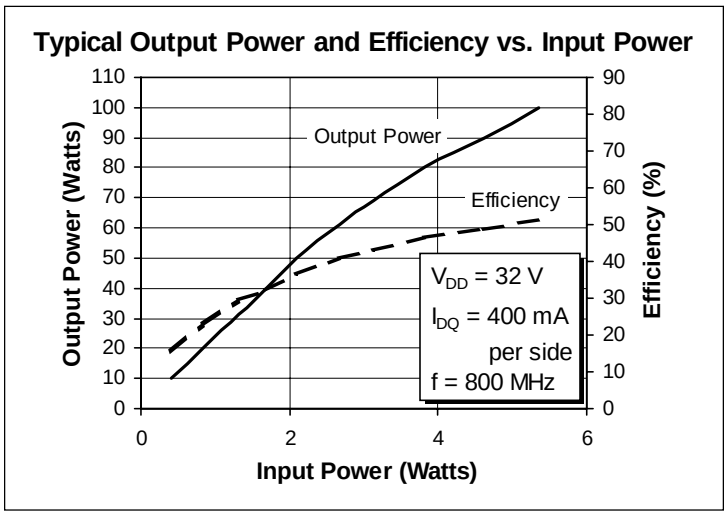
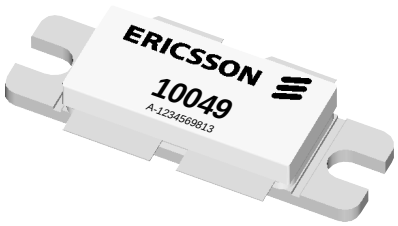
PTF 10049
85 Watts, 470–860 MHz
GOLDMOS™ Field Effect Transistor

Description

The PTF 10049 is an internally matched, common source, N-channel enhancement-mode lateral MOSFET intended for large signal television amplifier applications in the 470 to 860 MHz band. It is rated at 85 watts power output. Nitride surface passivation and full gold metallization ensure excellent device lifetime and reliability.

- ***INTERNALLY MATCHED***
- **Performance at 800 MHz, 32 Volts**
  - Output Power = 85 Watts
  - Power Gain = 13.5 dB Typ
  - Efficiency = 58% Typ
- **Full Gold Metallization**
- **Silicon Nitride Passivated**
- **Excellent Thermal Stability**
- **100% Lot Traceability**





Package 20240

RF Specifications (100% Tested)

Characteristic	Symbol	Min	Typ	Max	Units
Common Source Power Gain (V_{DD} = 32 V, P_{OUT} = 30 W, I_{DQ} = 400 mA per side, f = 800 MHz)	G_{ps}	12.0	13.5	—	dB
Power Output at 1 dB Compression (V_{DD} = 32 V, I_{DQ} = 400 mA per side, f = 800 MHz)	P-1dB	85	100	—	Watts
Drain Efficiency (V_{DD} = 32 V, P_{OUT} = 85 W, I_{DQ} = 400 mA per side, f = 800 MHz)	η_D	52	58	—	%
Distortion (V_{DD} = 32 V, P_{OUT} = 85 W(PEP), I_{DQ} = 400 mA per side, f_1 = 800 MHz, f_2 = 801 MHz)	IMD_3	–30	–35	—	dBc
Load Mismatch Tolerance (V_{DD} = 32 V, P_{OUT} = 42.5 W, I_{DQ} = 400 mA per side, f = 800 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)

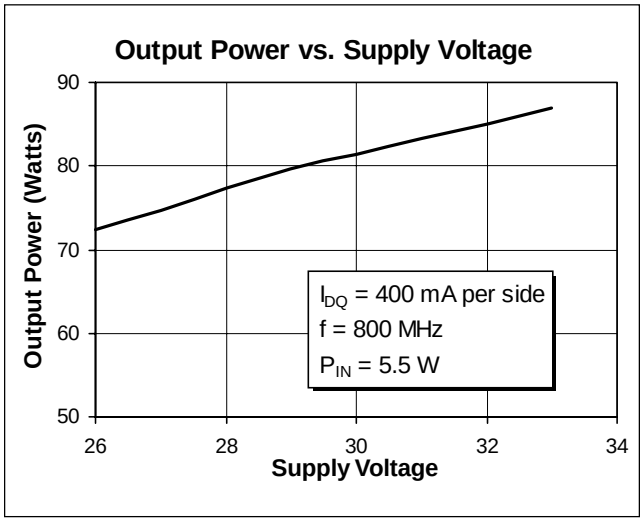
Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 25 mA	$V_{(BR)DSS}$	65	—	—	Volts
Drain-Source Leakage Current	V_{DS} = 32 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	mA
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 75 mA	$V_{GS(th)}$	3.0	—	5.0	Volts
Forward Transconductance	V_{DS} = 10 V, I_D = 3 A	g_{fs}	—	2.8	—	Siemens

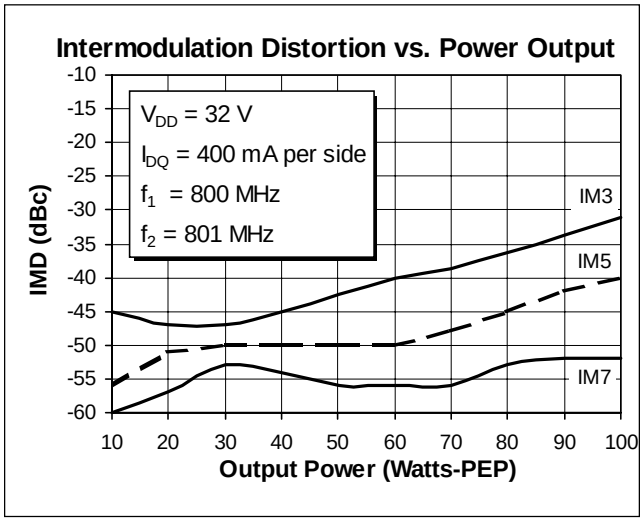
Maximum Ratings

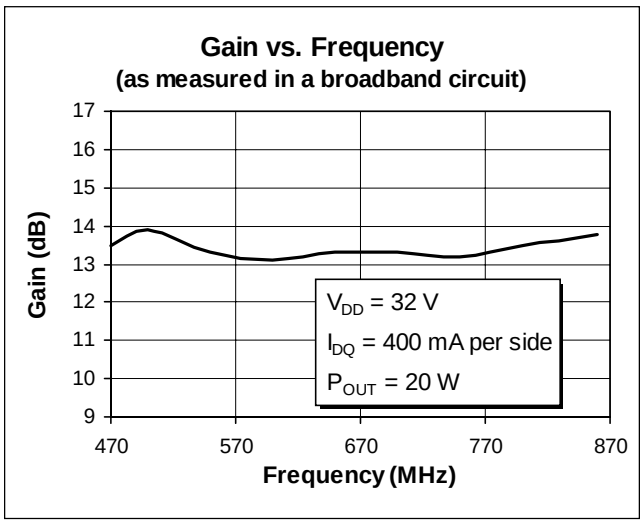
Parameter	Symbol	Value	Unit
Drain-Source Voltage(1)	V_{DSS}	65	Vdc
Gate-Source Voltage(1)	V_{GS}	±20	Vdc
Operating Junction Temperature	T_J	200	°C
Total Device Dissipation at Above 25°C derate by	P_D	225 2.0	Watts W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C)	$R_{\theta JC}$	0.5	°C/W

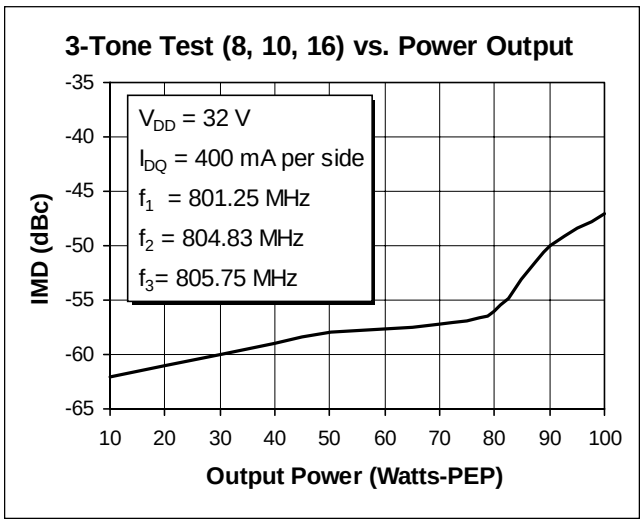
(1) per side

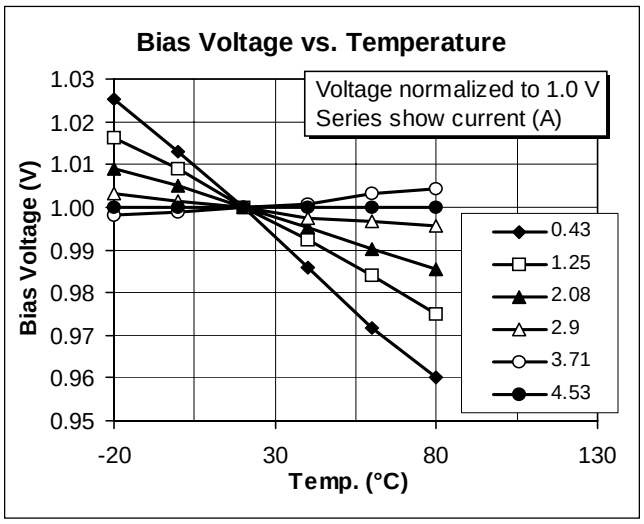
Typical Performance





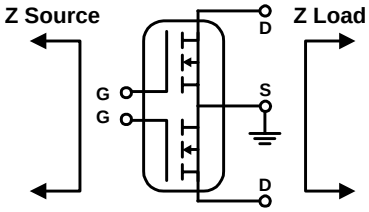

Gain vs. Frequency
(as measured in a broadband circuit)
Gain (dB)
17
16
15
14
13
12
11
10
9
470
570
670
770
870
Frequency (MHz)
V_{DD} = 32 V
I_{DQ} = 400 mA per side
P_{OUT} = 20 W


3-Tone Test (8, 10, 16) vs. Power Output
IMD (dBc)
-35
-40
-45
-50
-55
-60
-65
10
20
30
40
50
60
70
80
90
100
Output Power (Watts-PEP)
V_{DD} = 32 V
I_{DQ} = 400 mA per side
f_1 = 801.25 MHz
f_2 = 804.83 MHz
f_3= 805.75 MHz


Bias Voltage vs. Temperature
Bias Voltage (V)
1.03
1.02
1.01
1.00
0.99
0.98
0.97
0.96
0.95
-20
30
80
130
Temp. (°C)
Voltage normalized to 1.0 V
Series show current (A)
0.43
1.25
2.08
2.9
3.71
4.53

Impedance Data (shown for fixed-tuned broadband circuit)

V_{DD} = 32 V, P_{OUT} = 85 W, I_{DQ} = 400 mA per side



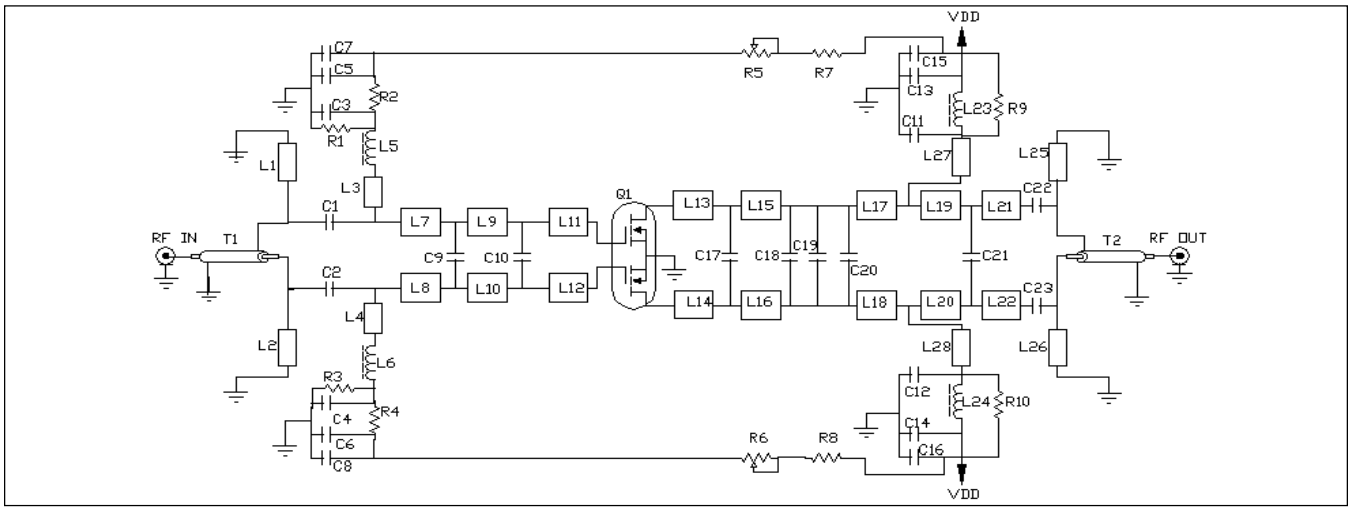
Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
470	2.41	–4.23	8.02	–0.15
500	3.08	–5.08	6.70	–0.84
550	3.88	–5.08	8.42	+1.68
600	5.16	–6.82	7.77	+1.29
650	6.38	–9.00	7.83	+0.48
700	9.85	–12.17	4.82	+0.53
750	13.00	–7.00	4.48	–0.60
800	12.87	+0.00	3.97	–1.79
860	9.33	+5.13	2.75	–3.00

Typical Scattering Parameters (one side)

(V_{DS} = 32 V, I_D = 2 A)

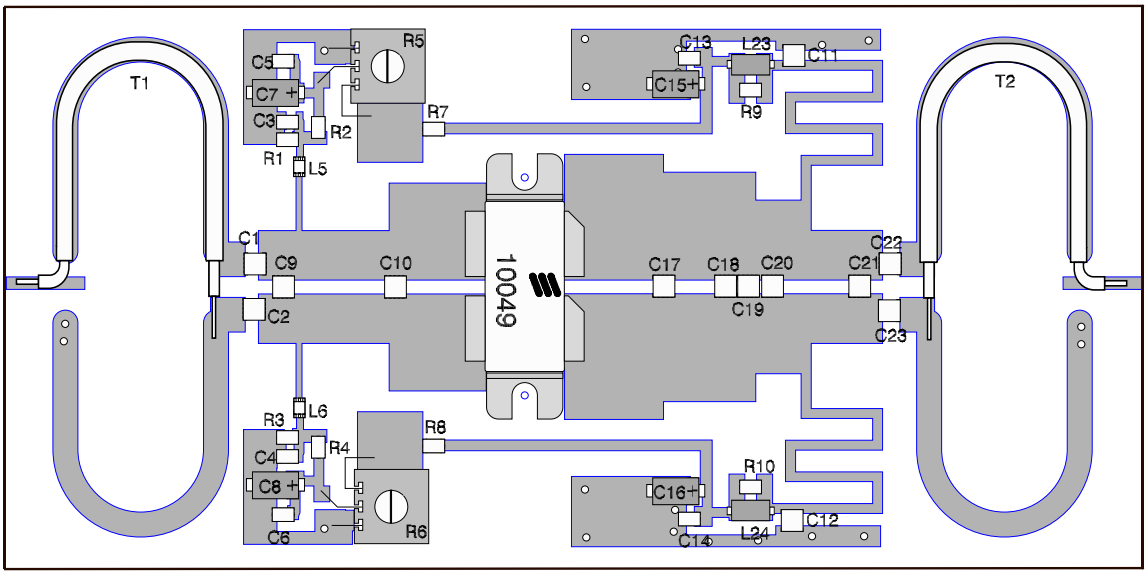
f	S11		S21		S12		S22	
(MHz)	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
400	0.94	176	2.04	9	0.004	–57	0.90	–163
425	0.94	175	1.94	6	0.004	–55	0.90	–164
450	0.94	174	1.86	3	0.004	–57	0.91	–165
475	0.94	173	1.81	0	0.003	–59	0.92	–167
500	0.93	172	1.78	–2	0.003	–59	0.92	–168
525	0.92	171	1.78	–6	0.003	–54	0.93	–169
550	0.91	169	1.80	–10	0.003	–51	0.93	–170
575	0.90	168	1.84	–14	0.003	–49	0.94	–171
600	0.86	166	1.92	–19	0.002	–54	0.94	–172
625	0.85	164	2.04	–25	0.003	–42	0.94	–173
650	0.80	162	2.20	–32	0.003	–43	0.94	–174
675	0.73	160	2.42	–44	0.003	–45	0.95	–176
700	0.63	161	2.64	–57	0.003	–63	0.96	–177
725	0.54	170	2.76	–75	0.003	–65	0.96	–178
750	0.55	–174	2.60	–98	0.003	–69	0.96	–179
775	0.67	–167	2.20	–117	0.002	–101	0.96	180
800	0.78	–168	1.77	–132	0.001	–110	0.96	179
825	0.86	–171	1.35	–144	0.001	–142	0.96	178
850	0.90	–174	1.06	–152	0.001	–137	0.96	177
875	0.93	–177	0.86	–157	0.001	145	0.96	176
900	0.95	–179	0.69	–163	0.001	108	0.96	175
925	0.96	179	0.58	–166	0.001	128	0.96	175
950	0.97	178	0.49	–169	0.001	99	0.96	174
975	0.97	177	0.41	–172	0.001	90	0.96	173
1000	0.97	176	0.36	–175	0.002	84	0.97	172

Test Circuit



Block diagram for f = 470–806 MHz broadband circuit

Q1	PTF 10049	
L1, L2, L25, L26	0.25 λ 680 MHz	Microstrip 25 Ω
L3, L4	0.065 λ 800 MHz	Microstrip 70 Ω
L5, L6	10 nH	SMT Coil
L7, L8	0.010 λ 800 MHz	Microstrip 18.5 Ω
L9, L10	0.07 λ 800 MHz	Microstrip 18.5 Ω
L11, L12	0.060 λ 800 MHz	Microstrip 10.2 Ω
L13, L14	0.0525 λ 800 MHz	Microstrip 8.1 Ω
L15, L16	0.061 λ 800 MHz	Microstrip 9.3 Ω
L17, L18	0.032 λ 800 MHz	Microstrip 12.13 Ω
L19, L20	0.021 λ 800 MHz	Microstrip 22.6 Ω
L21, L22	0.01 λ 800 MHz	Microstrip 22.6 Ω
L23, L24	4x8 mm	Ferrite Bead
L27, L28	0.25 λ 680 MHz	Microstrip 60 Ω
C1, C2, C22, C23	51 pF	Chip Cap ATC 100 B
C3, C4, C11, C12	91 pF	Chip Cap ATC 100 B
C5, C6, C13, C14	0.1 µF	SMT K1206
C7, C8, C15, C16	10 µF	Electrolytic Capacitor
C9, C17	5.6 pF	Chip Cap ATC 100 B
C18	1.3 pF	Chip Cap ATC 100 B
C19, C20	1.7 pF	Chip Cap ATC 100 B
C10, C21	7.5 pF	Chip Cap ATC 100 B
R1, R3	200 Ω	K 1206 SMT Resistor
R2, R4	200 Ω	K 1206 SMT Resistor
R5, R6	1K Ω Pot	
R7, R8	500 Ω	1/4 W Resistor
R9, R10	1.8 Ω	1/4 W Resistor
T1, T2	UT-85-25 Balun Coaxial	
Circuit Board	.028" Dielectric Thickness, ε_r = 4.0, AlliedSignal, G200, 2 oz. copper	



Placement Diagram

Artwork (1 inch)

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