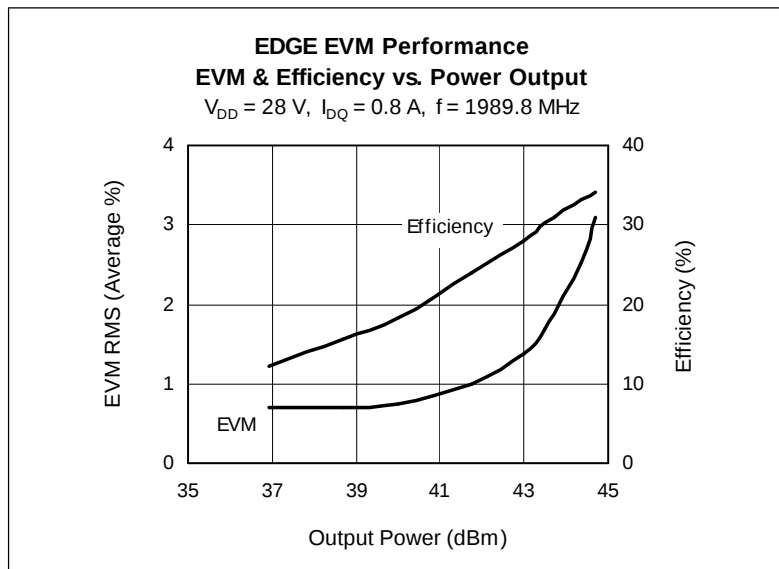


LDMOS Field Effect Transistor 60 W, DCS/PCS Band 1805–1880 MHz, 1930–1990 MHz

Description

The PTF180601 is a 60 W, internally matched *GOLDMOS* FET intended for EDGE applications in the DCS/PCS Band. Full gold metallization ensures excellent device lifetime and reliability.



Features

- Broadband internal matching
- Typical two-tone performance
 - Average output power = 30 W
 - Gain = 16.5 dB
 - Efficiency = 35%
- Typical CW performance
 - Output power at P-1dB = 75 W
 - Gain = 15.5 dB
 - Efficiency = 47%
- Integrated ESD protection: Human Body Model, Class 1 (minimum)
- Excellent thermal stability
- Low HCI Drift
- Capable of handling 10:1 VSWR @ 28 V, 60 W (CW) output power

PTF180601C
Package 21248



PTF180601E
Package 30248



ESD: Electrostatic discharge sensitive device — observe handling precautions!

RF Characteristics at $T_{CASE} = 25^{\circ}\text{C}$ unless otherwise indicated

EDGE Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 800\text{ mA}$, $P_{OUT} = 22\text{ W}$, $f = 1989.8\text{ MHz}$

Characteristic	Symbol	Min	Typ	Max	Units
Error Vector Magnitude	EVM (RMS)	—	1.7	—	%
Modulation Spectrum @ 400 KHz	ACPR	—	-60	—	dBc
Modulation Spectrum @ 600 KHz	ACPR	—	-73	—	dBc
Gain	G_{ps}	—	16.5	—	dB
Drain Efficiency	η_D	—	32	—	%

Two-Tone Measurements (tested in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 800\text{ mA}$, $P_{OUT} = 60\text{ W PEP}$, $f = 1930\text{ MHz}$, Tone Spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Units
Gain	G_{ps}	15	16.5	—	dB
Drain Efficiency	η_D	30	35	—	%
Intermodulation Distortion	IMD	—	-30	-28	dBc

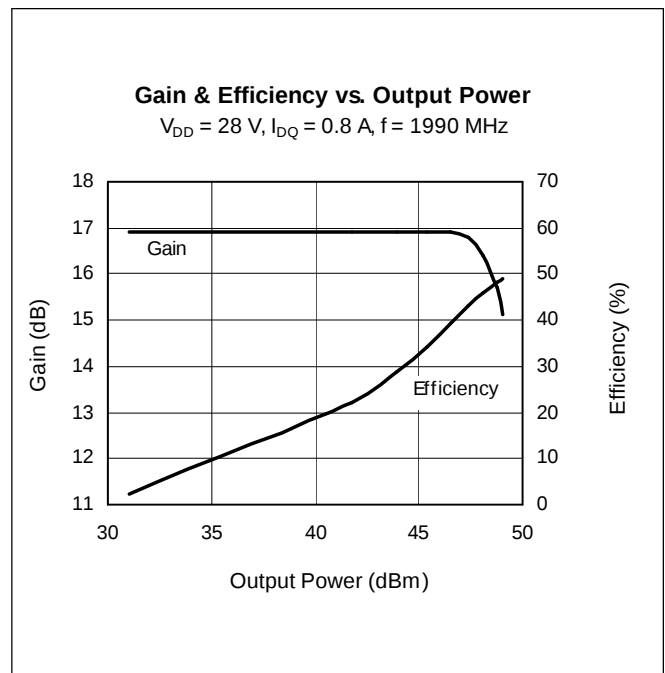
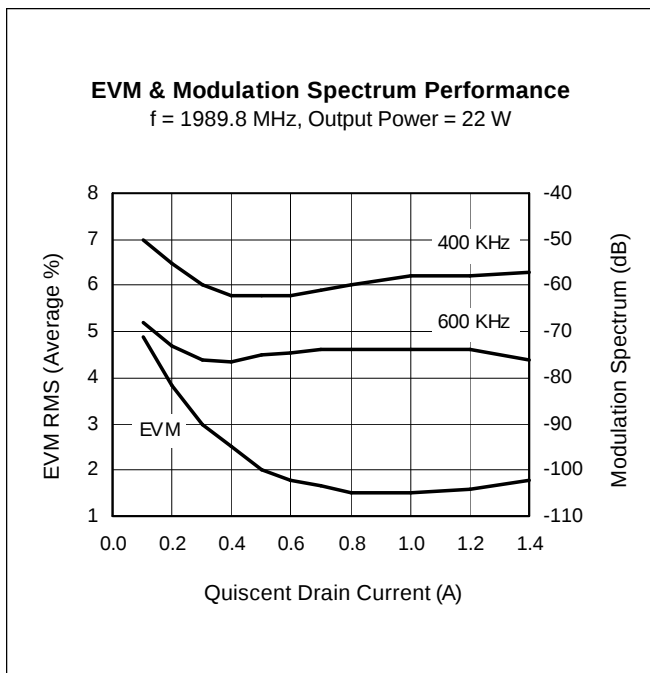
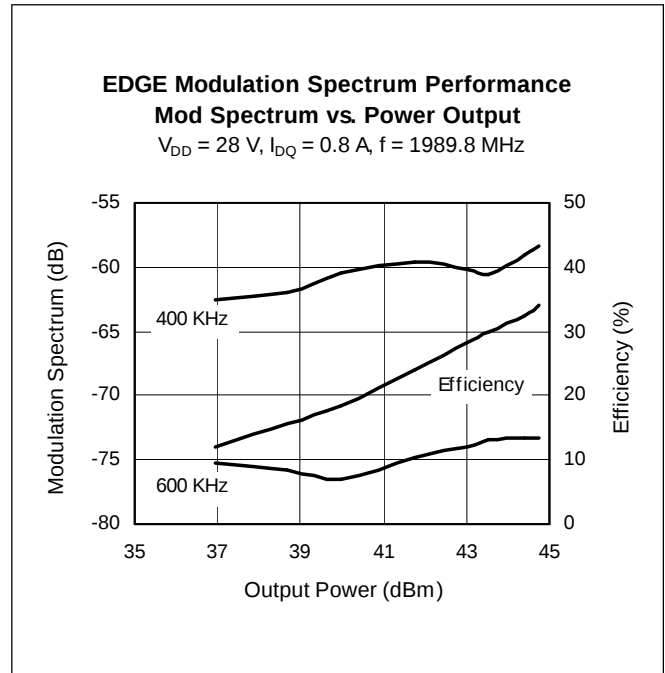
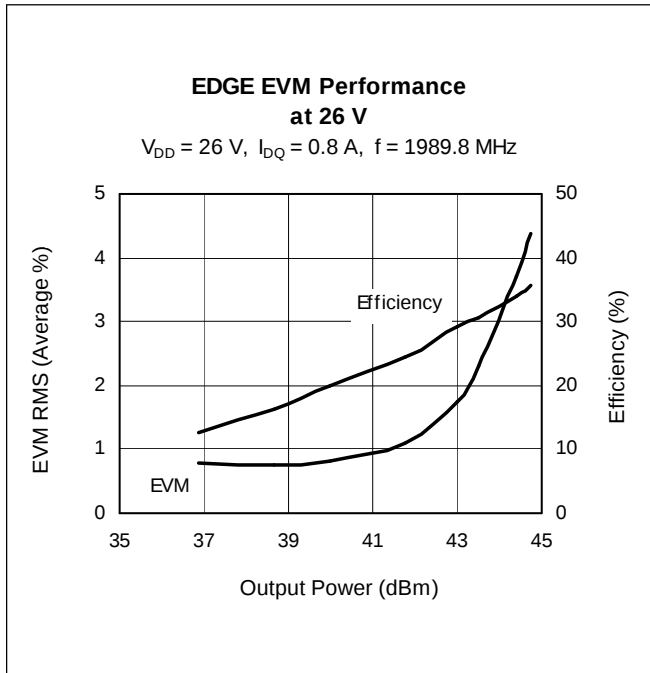
Electrical Characteristics at $T_{CASE} = 25^{\circ}\text{C}$ unless otherwise indicated

Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Drain–Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_{DS} = 10\text{ }\mu\text{A}$	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	$V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}$	I_{DSS}	—	—	1.0	μA
On–State Resistance	$V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.135	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}, I_{DQ} = 800\text{ mA}$	V_{GS}	2.5	3.2	4.0	V
Gate Leakage Current	$V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V}$	I_{GSS}	—	0.01	1.0	μA

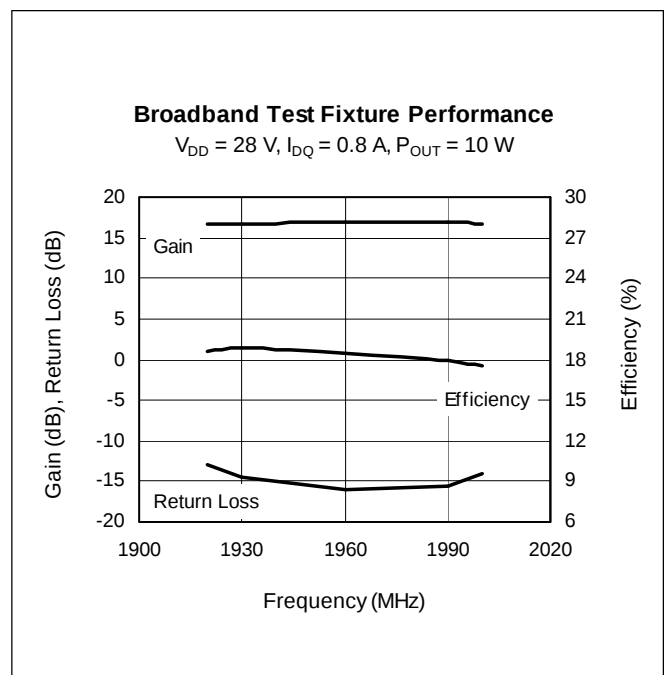
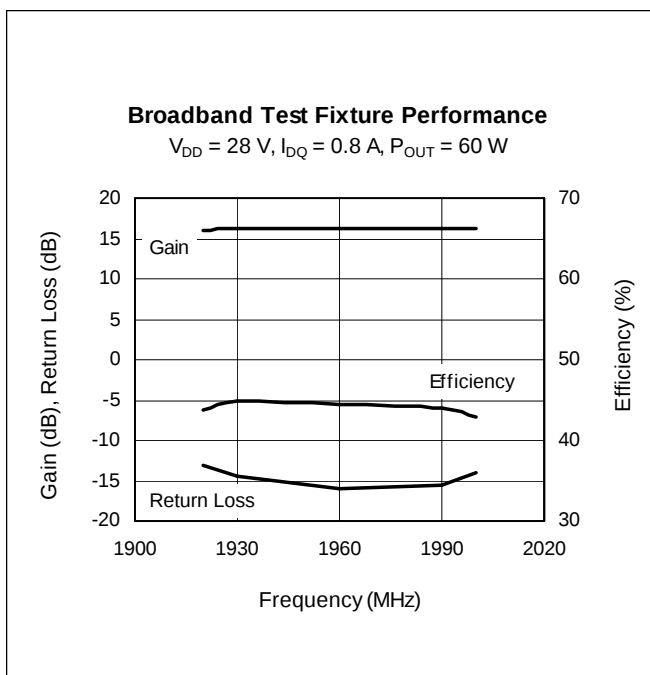
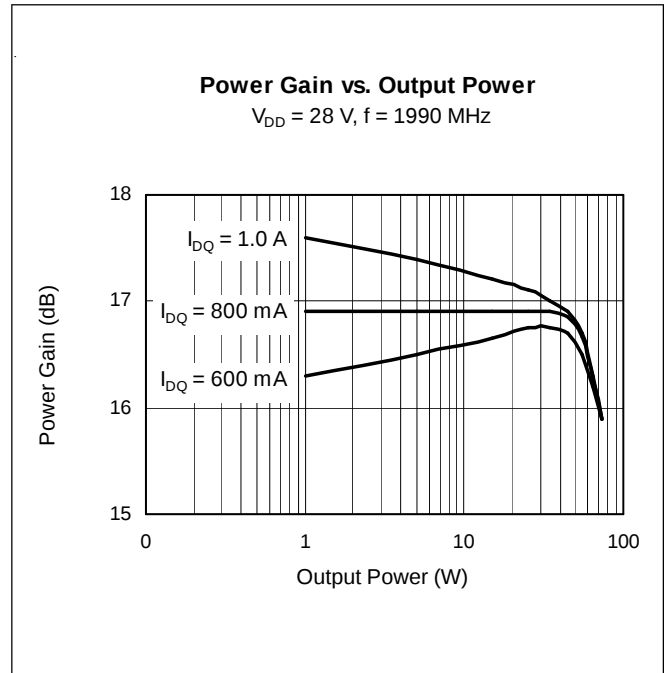
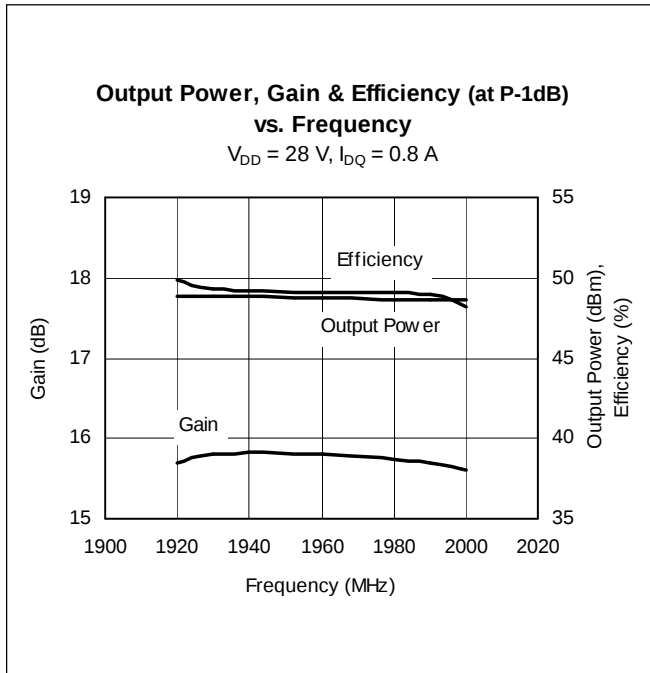
Maximum Ratings

Parameter		Symbol	Value	Unit
Drain–Source Voltage		V_{DSS}	65	V
Gate–Source Voltage		V_{GS}	–0.5 to +12	V
Junction Temperature		T_J	200	$^{\circ}\text{C}$
Total Device Dissipation	PTF180601C	P_D	159	W
Above 25°C derate by			0.91	$\text{W}/^{\circ}\text{C}$
Total Device Dissipation	PTF180601E	P_D	180	W
Above 25°C derate by			1.03	$\text{W}/^{\circ}\text{C}$
Storage Temperature Range		T_{STG}	–40 to +150	$^{\circ}\text{C}$
Thermal Resistance	PTF180601C	$R_{\theta JC}$	1.1	$^{\circ}\text{C}/\text{W}$
($T_{CASE} = 70^{\circ}\text{C}$, 60 W CW)	PTF180601E		0.97	$^{\circ}\text{C}/\text{W}$

Typical Performance (measurements taken in production test fixture, at $T_{CASE} = 25^{\circ}C$ unless otherwise indicated)



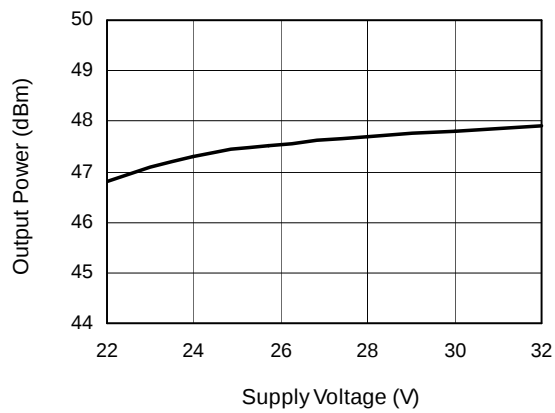
Typical Performance (cont.)



Typical Performance (cont.)

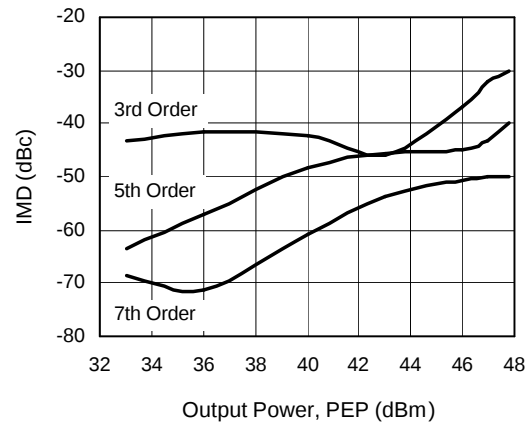
Output Power vs. Supply Voltage

$I_{DQ} = 0.8 \text{ A}$, $f = 1990 \text{ MHz}$



Intermodulation Distortion vs. Output Power

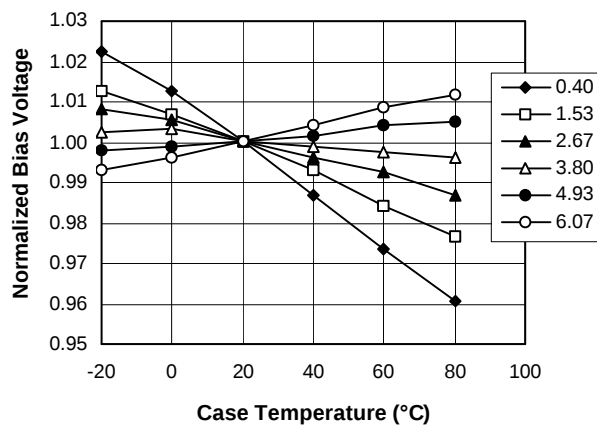
$V_{DD} = 28 \text{ V}$, $I_{DQ} = 0.8 \text{ A}$, $F_1 = 1990 \text{ MHz}$, $F_2 = 1991 \text{ MHz}$



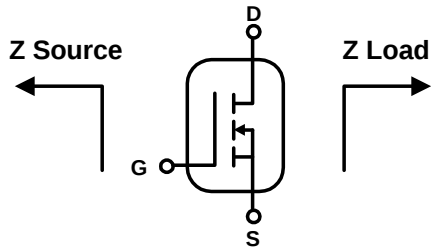
Gate-Source Voltage vs. Case Temperature

Voltage normalized to typical gate voltage.

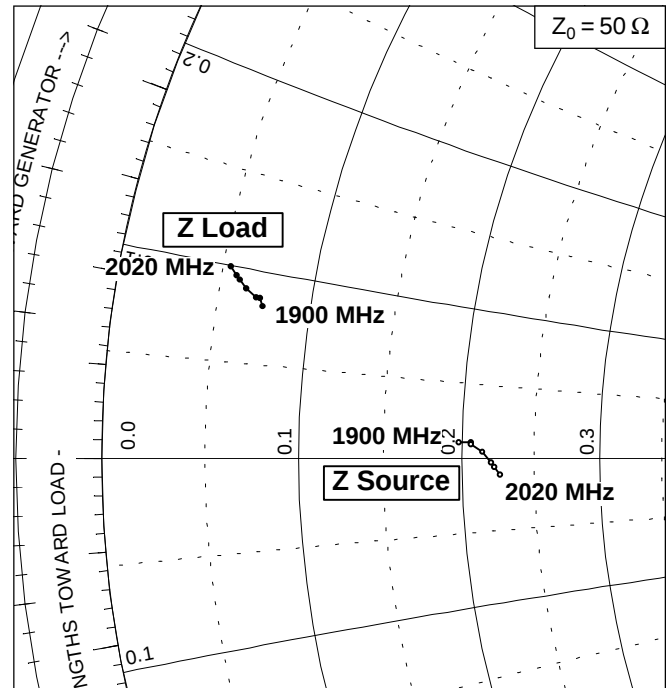
Series show current.



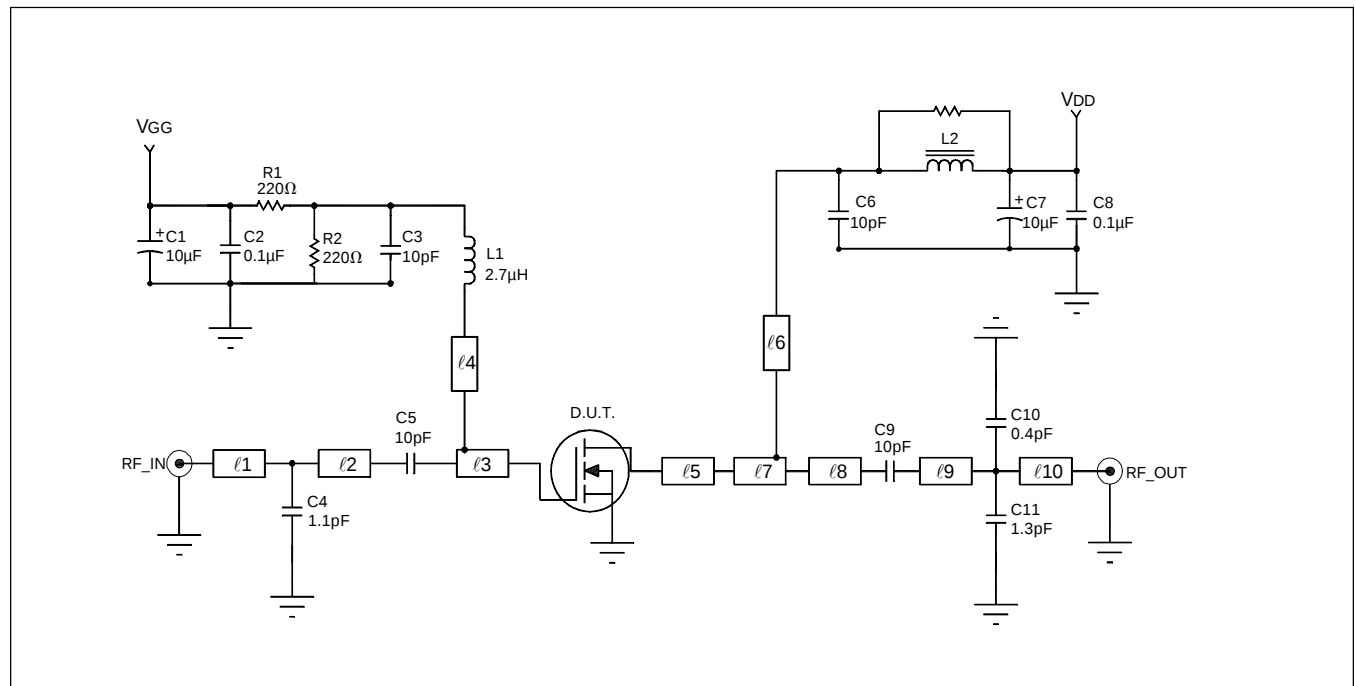
Broadband Circuit Impedance Data



Frequency MHz	Z Source Ω		Z Load Ω	
	R	jX	R	jX
1900	9.9	0.55	3.7	4.1
1920	10.3	0.56	3.6	4.3
1930	10.3	0.50	3.5	4.3
1960	10.7	0.23	3.2	4.5
1990	11.0	-0.15	3.0	4.7
2000	11.1	-0.30	2.9	4.8
2020	11.3	-0.58	2.7	5.0

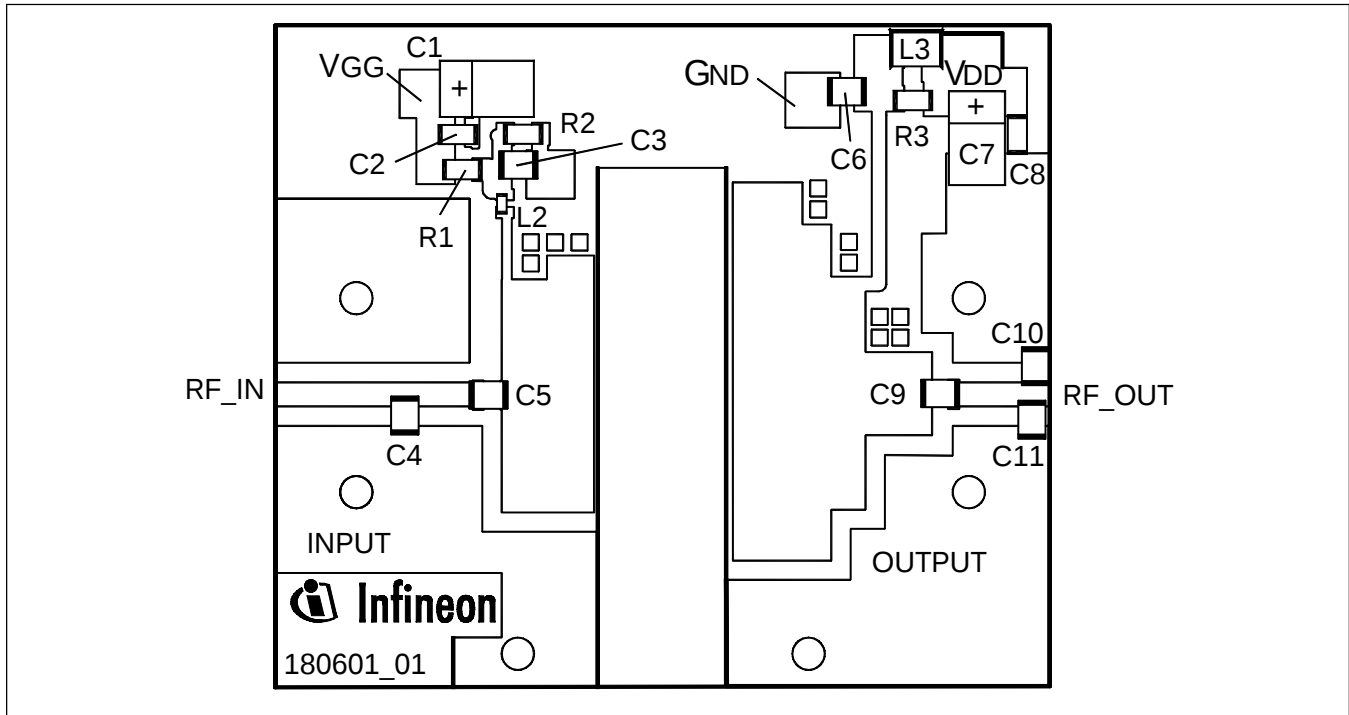


Reference Circuit



Reference Circuit Schematic for 1990 MHz

Reference Circuit (cont.)



Reference circuit¹ (not to scale)

Circuit Assembly Information

DUT	PTF180601	LDMOS Transistor	
PCB	1.27 mm [0.050"] thick, $\epsilon_r = 6.0$	TMM6	2 oz. copper, both sides

Microstrip	Electrical Characteristics at 1990 MHz	Dimensions: L x W (mm.)	Dimensions: L x W (in.)
ℓ_1	0.140λ , 50Ω	10.16×1.88	0.400×0.074
ℓ_2	0.068λ , 50Ω	4.95×1.88	0.195×0.074
ℓ_3	0.112λ , 9.24Ω	7.14×18.31	0.281×0.721
ℓ_4	0.064λ , 78Ω	4.83×0.76	0.190×0.030
ℓ_5	0.127λ , 6.64Ω	8.13×26.42	0.320×1.040
ℓ_6	0.206λ , 65Ω	15.24×1.14	0.600×0.045
ℓ_7	0.035λ , 9Ω	2.54×18.16	0.100×0.715
ℓ_8	0.077λ , 21.87Ω	5.26×6.53	0.207×0.257
ℓ_9	0.075λ , 50Ω	5.46×1.88	0.215×0.074
ℓ_{10}	0.023λ , 50Ω	1.65×1.88	0.065×0.074

¹ Gerber files for this circuit are available on request.

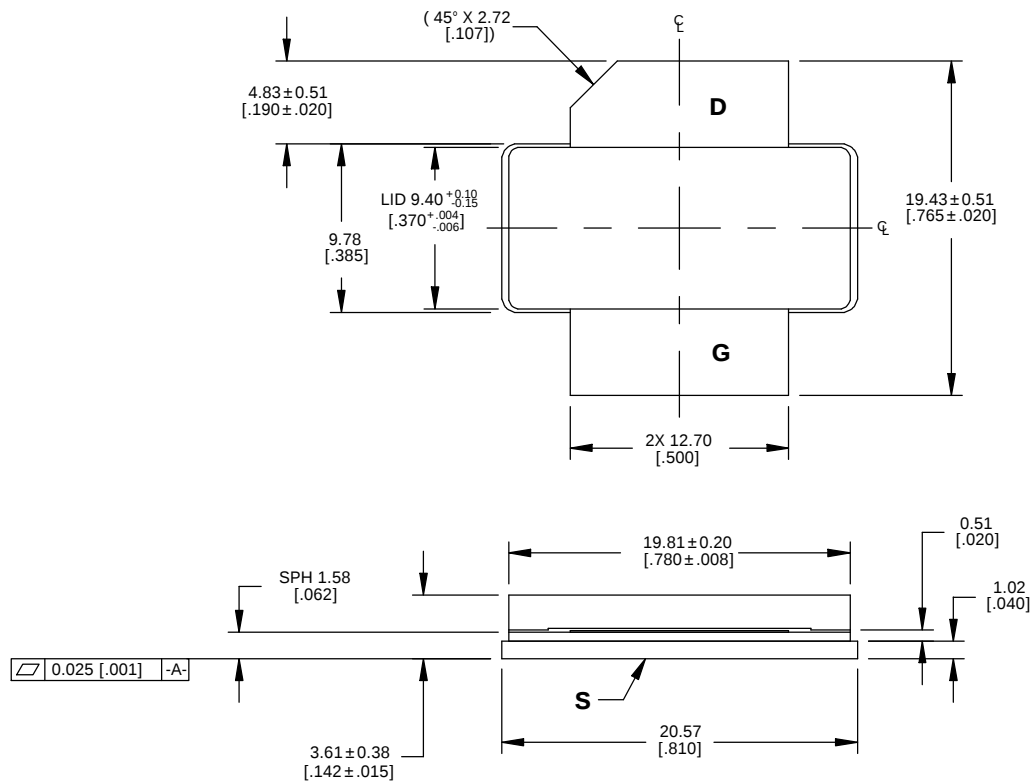
Reference Circuit (cont.)

Component	Description	Manufacturer	P/N or Comment
C1, C7	Capacitor, 10 μ F, 35 V, SMD	Digi-Key	PCS6106TR-ND Tantalum TE Series
C2, C8	Capacitor, 0.1 μ F, 50 V	Digi-Key	PCC103BCT-ND
C3, C5, C6, C9	Capacitor, 10 pF	ATC	100B 100
C4	Capacitor, 1.1 pF	ATC	100B 1R1
C10	Capacitor, 0.4 pF	ATC	100B 0R4
C11	Capacitor, 1.3 pF	ATC	100B 1R3
L1	Chip Inductor, 2.7 μ H	Digi-Key	PCD1287CT-ND
L2	Ferrite, 6 mm	Philips	53/3/4.6-452
R1, R2	Resistor, 220 Ω	Digi-Key	P220ECT
R3	Resistor, 1.0 Ω	Digi-Key	1.0 PCT

Package Outline Specifications

Type	Package Outline	Package Description	Marking
PTF180601C	21248	Earless ceramic	PTF180601C
PTF180601E	30248	Thermally enhanced, flange mount	PTF180601E

Package 21248

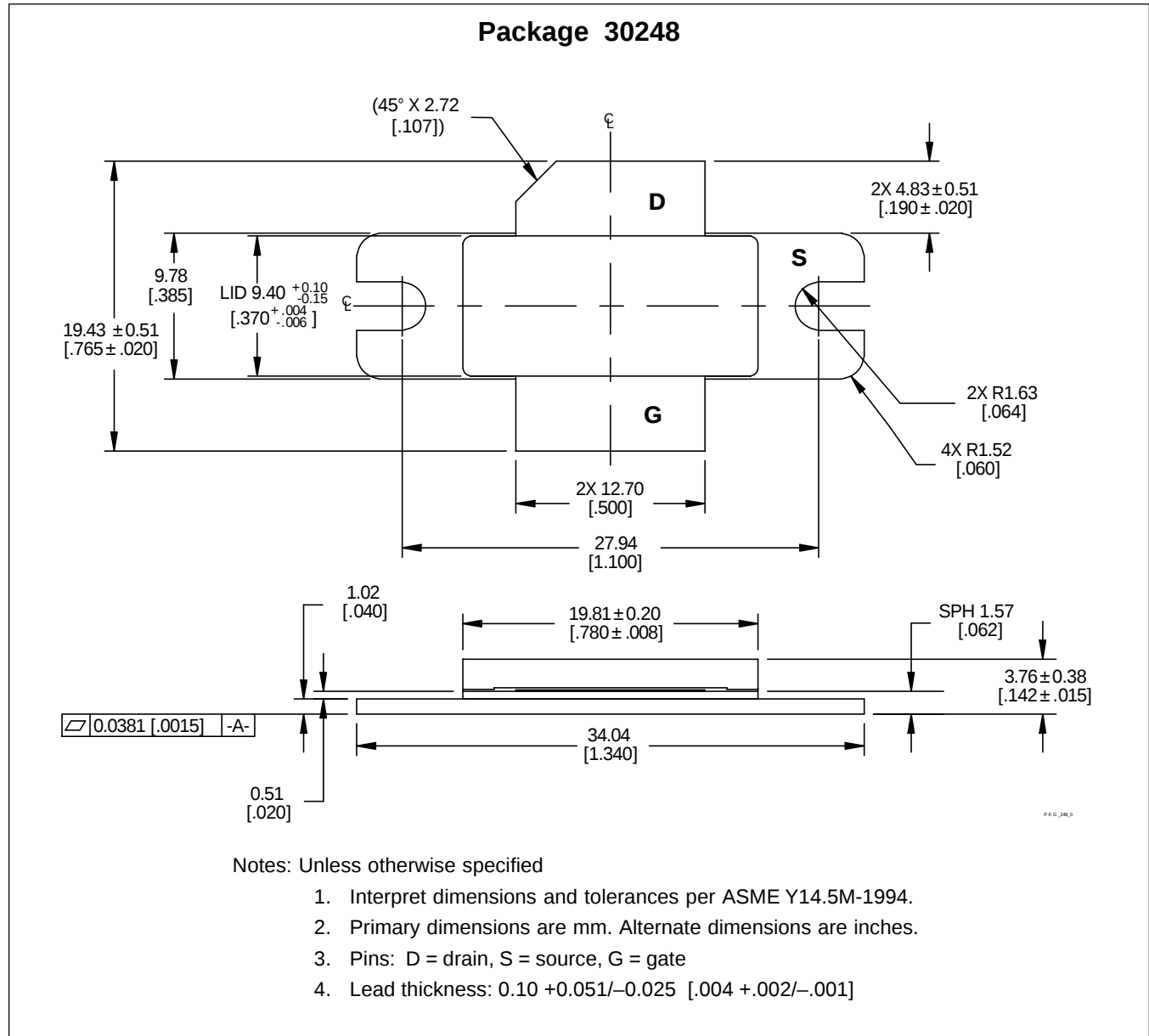


Notes: Unless otherwise specified

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
3. Pins: D = drain, S = source, G = gate
4. Lead thickness: $0.10^{+0.051}_{-0.025}$ [$.004^{+.002}_{-.001}$]

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Package Outline Specifications (cont.)



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PTF180601

Revision History: 2004-05-03

Previous Version: 2003-12-22, Data Sheet

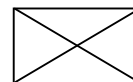
Page	Subjects (major changes since last revision)
	PTF180601E added.

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