

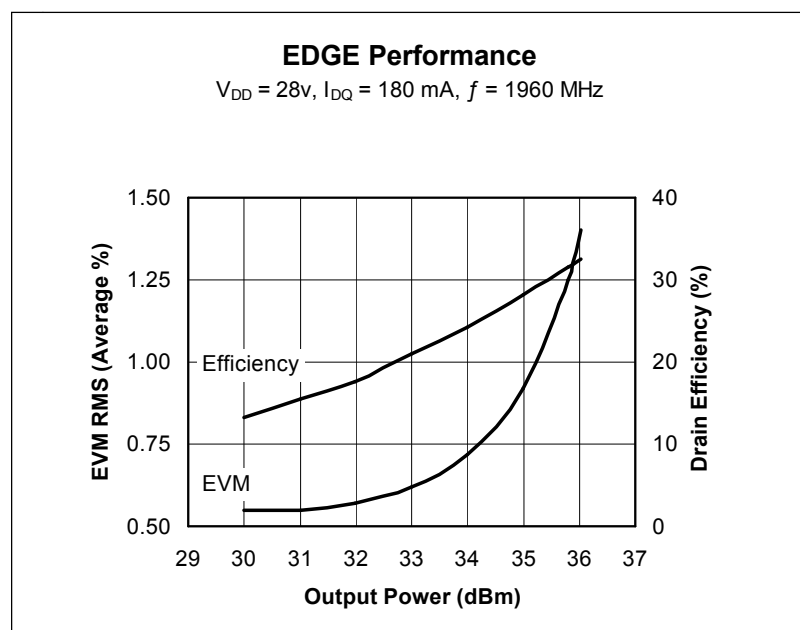
High Power RF LDMOS Field Effect Transistor 10 W, 1.0 – 2.0 GHz

Description

The PTF180101M is an unmatched 10-watt **GOLDMOS**® FET intended for class AB base station applications in the 1 to 2 GHz band. This LDMOS device offers excellent gain, efficiency and linearity performance in a small footprint.



PTF180101M
Package PG-RFP-10



Features

- Typical EDGE performance
 - Average output power = 4.0 W
 - Gain = 17 dB
 - Efficiency = 31%
 - EVM = 1.3 %
- Typical CW performance
 - Output Power at P-1dB = 10 W
 - Gain = 16 dB
 - Efficiency = 50%
- Integrated ESD protection: Human Body Model Class 1 (minimum)
- Excellent thermal stability
- Low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 10 W (CW) output power
- Pb-free and RoHS compliant

RF Characteristics

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

$V_{DD} = 28\text{ V}$, $I_{DQ} = 180\text{ mA}$, $P_{OUT} = 10\text{ W PEP}$, $f = 1990\text{ MHz}$, tone spacing = 1 MHz

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

All published data at $T_{CASE} = 25^\circ\text{C}$ unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
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	$V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ A}$	$R_{DS(on)}$	—	0.83	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}, I_{DQ} = 180\text{ mA}$	V_{GS}	2.5	3.2	4.0	V
Gate Leakage Current	$V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1.0	μA

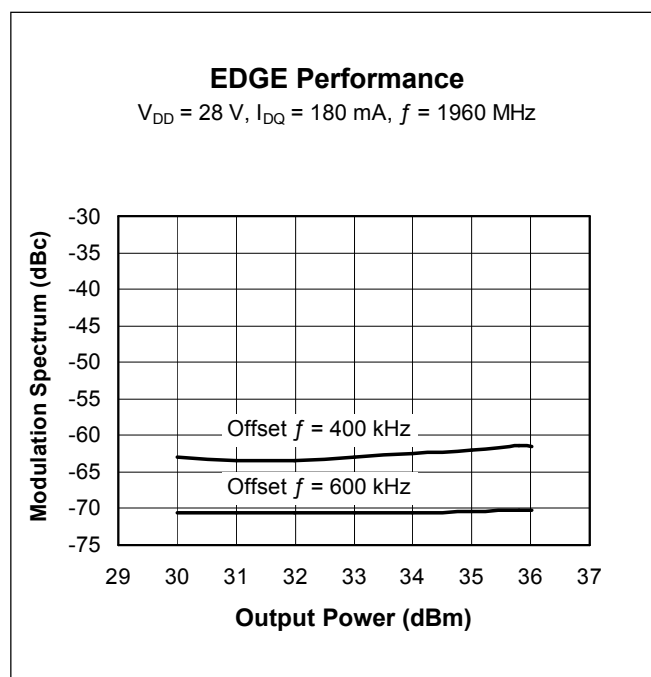
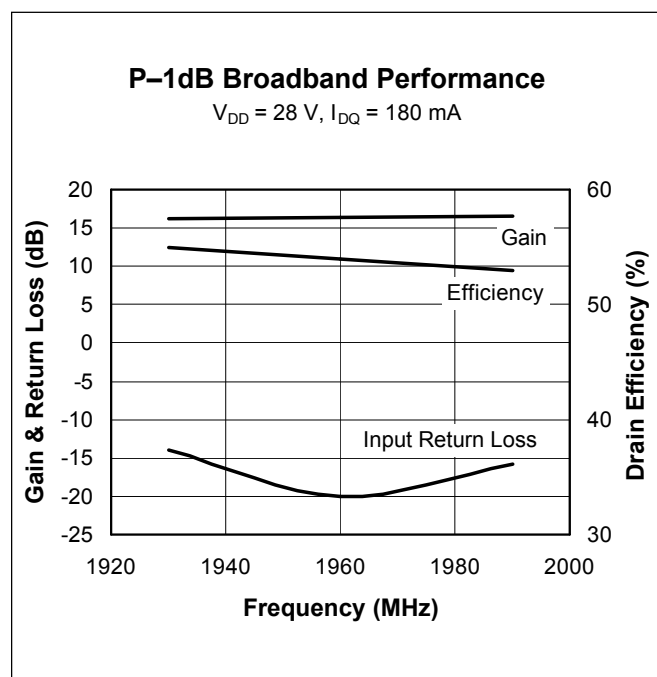
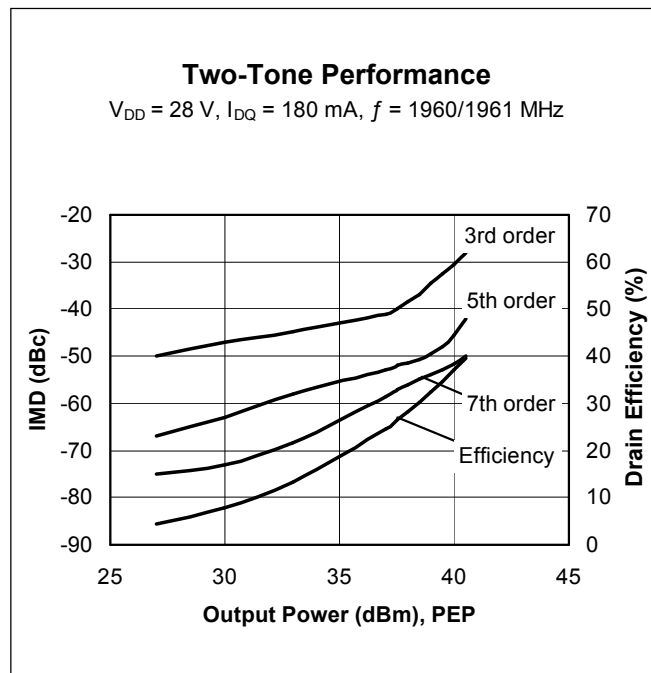
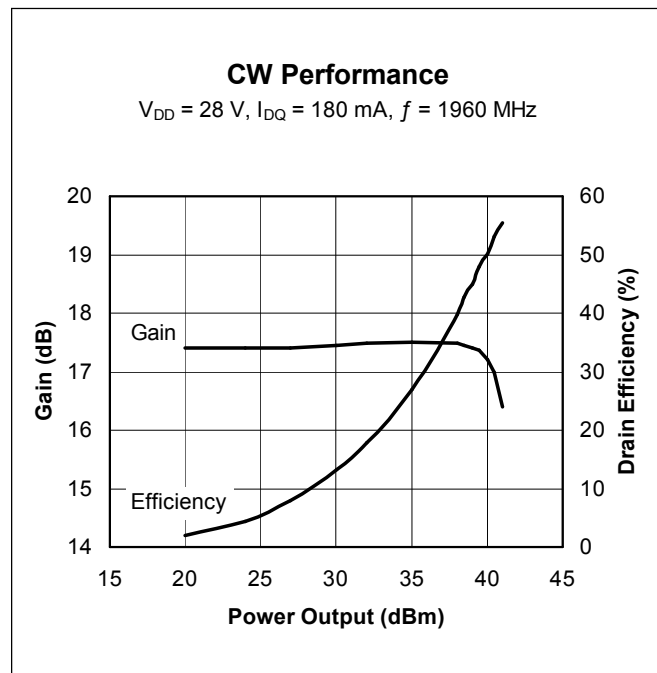
Maximum Ratings

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	150	$^{\circ}\text{C}$
Total Device Dissipation	P_D	18.8	W
Above 25 $^{\circ}\text{C}$ derate by		0.15	W/ $^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	−40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}, 10\text{ W DC}$)	$R_{\theta JC}$	6.5	$^{\circ}\text{C/W}$

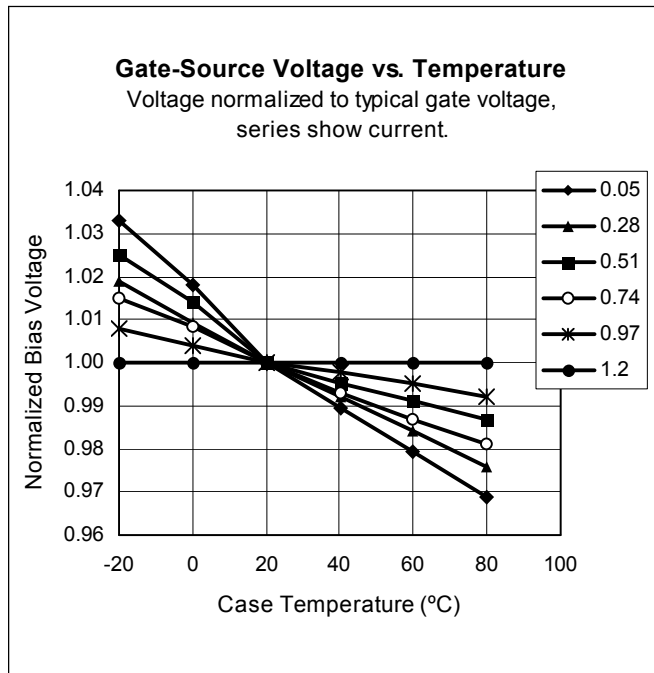
Ordering Information

Type	Package Outline	Package Description	Marking
PTF180101M	PG-RFP-10	Molded plastic, SMD	0181

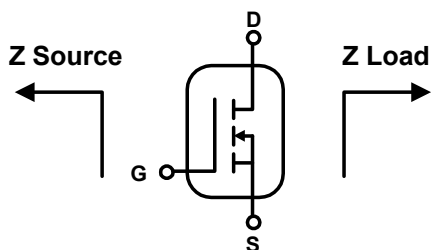
Typical Performance (data taken in production test fixture)



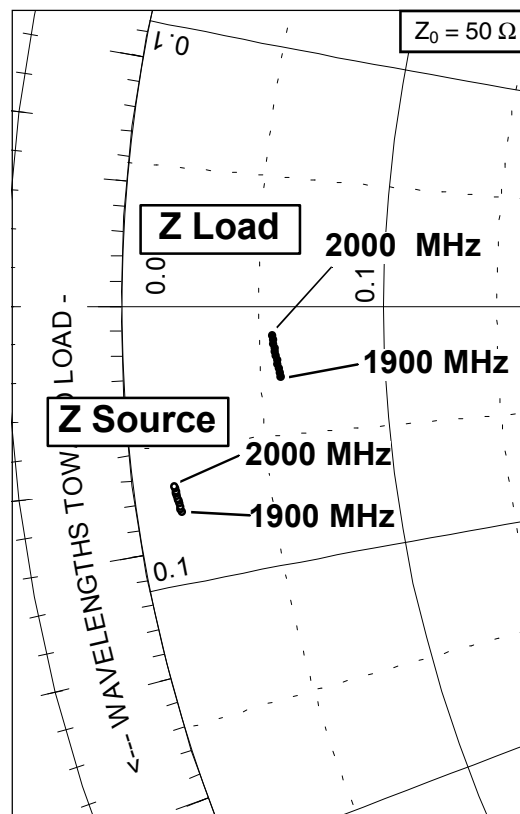
Typical Performance (cont.)



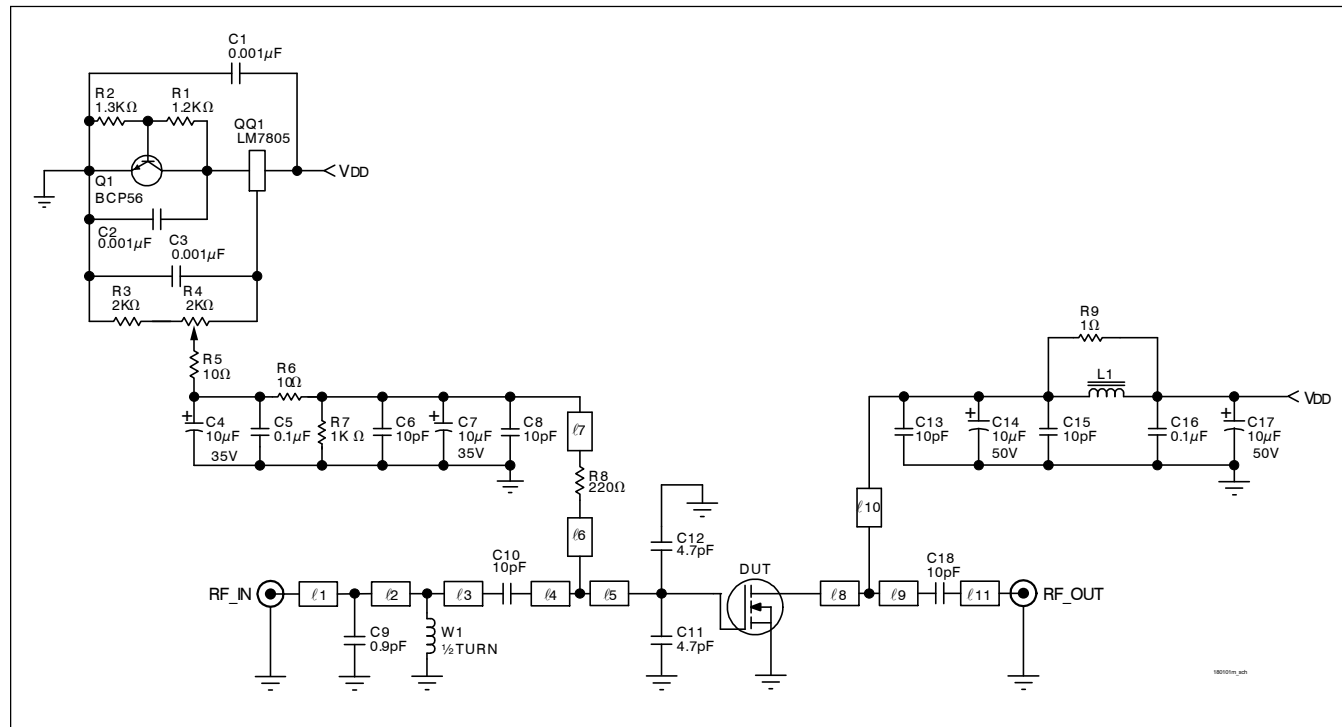
Broadband Circuit Impedance



Frequency MHz	Z Source W		Z Load W	
	R	jX	R	jX
1900	0.80	-3.71	2.89	-1.38
1910	0.79	-3.66	2.88	-1.30
1920	0.79	-3.61	2.87	-1.21
1930	0.78	-3.56	2.85	-1.13
1940	0.77	-3.51	2.84	-1.05
1950	0.77	-3.47	2.82	-0.97
1960	0.76	-3.42	2.81	-0.89
1970	0.75	-3.37	2.80	-0.81
1980	0.75	-3.33	2.78	-0.73
1990	0.74	-3.28	2.77	-0.65
2000	0.74	-3.24	2.76	-0.57



Reference Circuit



Reference circuit schematic for $f = 1990 \text{ MHz}$

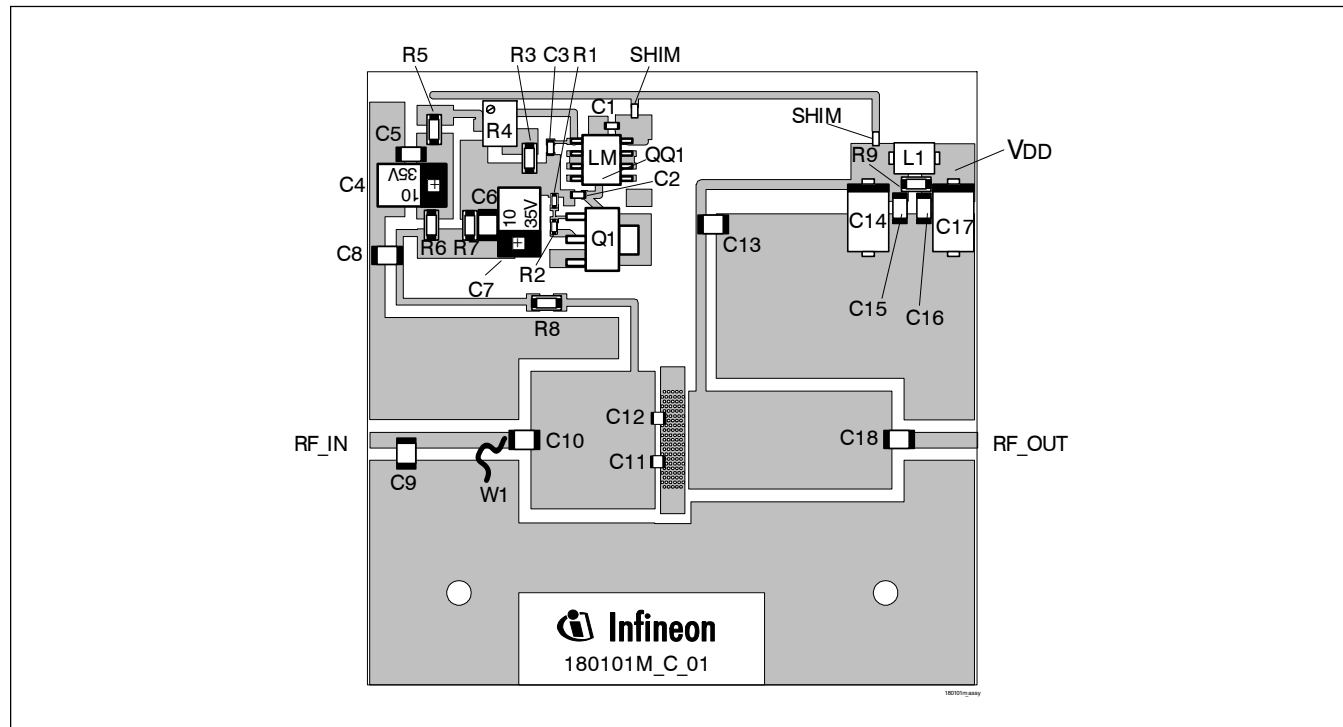
Circuit Assembly Information

DUT	PTF180101M	LDMOS Transistor	
PCB	0.76 mm [0.030"] thick, $\epsilon_r = 4.5$	Rogers RO4320	2 oz. copper

Microstrip	Electrical Characteristics at 1990 MHz ¹	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ_1	0.059 λ , 50.0 Ω	5.69 x 1.60	0.224 x 0.063
ℓ_2	0.093 λ , 50.0 Ω	8.48 x 1.60	0.334 x 0.063
ℓ_3	0.016 λ , 50.0 Ω	1.09 x 1.60	0.043 x 0.063
ℓ_4	0.129 λ , 9.6 Ω	10.77 x 14.22	0.424 x 0.560
ℓ_5	0.026 λ , 9.6 Ω	2.13 x 14.22	0.084 x 0.560
ℓ_6	0.153 λ , 78.0 Ω	14.48 x 0.71	0.570 x 0.028
ℓ_7	0.194 λ , 78.0 Ω	18.39 x 0.71	0.724 x 0.028
ℓ_8	0.014 λ , 12.9 Ω	1.27 x 10.16	0.050 x 0.400
ℓ_9	0.236 λ , 12.9 Ω	19.91 x 10.16	0.784 x 0.400
ℓ_{10}	0.187 λ , 66.0 Ω	17.40 x 0.99	0.685 x 0.039
ℓ_{11}	0.077 λ , 50.0 Ω	6.99 x 1.60	0.275 x 0.063

¹Electrical characteristics are rounded.

Reference Circuit (cont.)



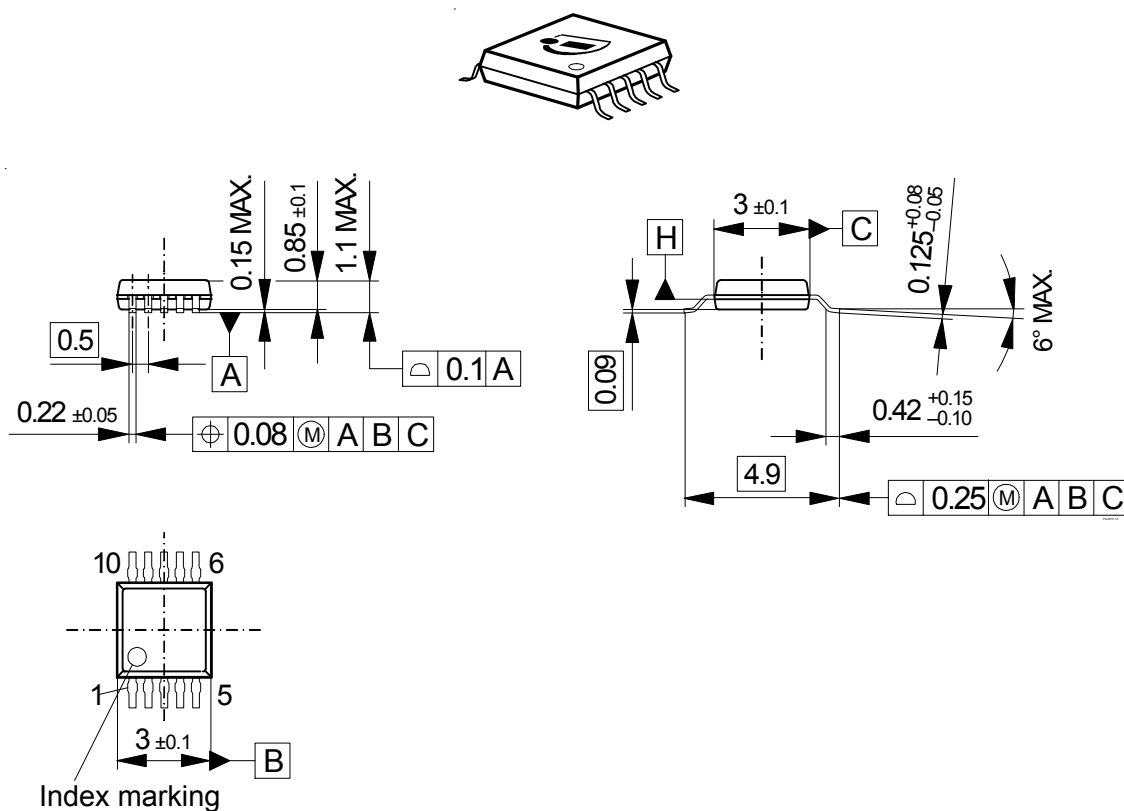
Reference circuit assembly diagram (not to scale)*

Component	Description	Suggested Manufacturer	P/N or Comment
C1, C2, C3	Capacitor, 0.001 μ F	Digi-Key	PCC1772CT-ND
C4, C7	Tantalum capacitor, 10 μ F, 35 V	Digi-Key	PCS6106TR-ND
C5, C16	Capacitor, 0.1 μ F	Digi-Key	PCC104BCT-ND
C6, C8, C10, C13, C15, C18	Ceramic capacitor, 10 pF	ATC	100B 100
C9	Ceramic capacitor, 0.9 pF	ATC	100B 0R9
C11, C12	Ceramic capacitor, 4.7pF	ATC	100B 4R7
C14, C17	Tantalum capacitor, 10 μ F, 50 V	Digi-Key	TPSE106K050R0400
L1	Ferrite, 4mm	Elna Magnetics	BDS3/3/4.6-4S2
Q1	Transistor	Infineon Technologies	BCP56
QQ1	Voltage regulator	National Semiconductor	LM7805
R1	Chip Resistor 1.2 k-ohms	Digi-Key	P1.2KGCT-ND
R2	Chip Resistor 1.3 k-ohms	Digi-Key	P1.3KGCT-ND
R3	Chip Resistor 2 k-ohms	Digi-Key	P2KECT-ND
R4	Potentiometer 2 k-ohms	Digi-Key	3224W-202ETR-ND
R5, R6	Chip Resistor 10 ohms	Digi-Key	P10ECT-ND
R7	Chip Resistor 1 k-ohms	Digi-Key	P1KECT-ND
R8	Chip Resistor 220 ohms	Digi-Key	P221ECT-ND
W1	Wire 0.250"	N/A	AUG22, SOLID

*Gerber Files for this circuit available on request

Package Outline Specifications

Package PG-RFP-10 (TSSOP-10 Outline)



Notes: Unless otherwise specified

1. Dimensions are mm
2. Lead thickness: 0.09
3. Pins: 1 – 5 = gate, underside = source, 6 – 10 = drain

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Revision History: 2009-02-18 Data Sheet**Previous version:** 2005-12-06, Data Sheet

Page	Subjects (major changes since last revision)
all	Remove Preliminary designation
6	Fixed typing error

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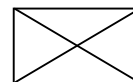
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