

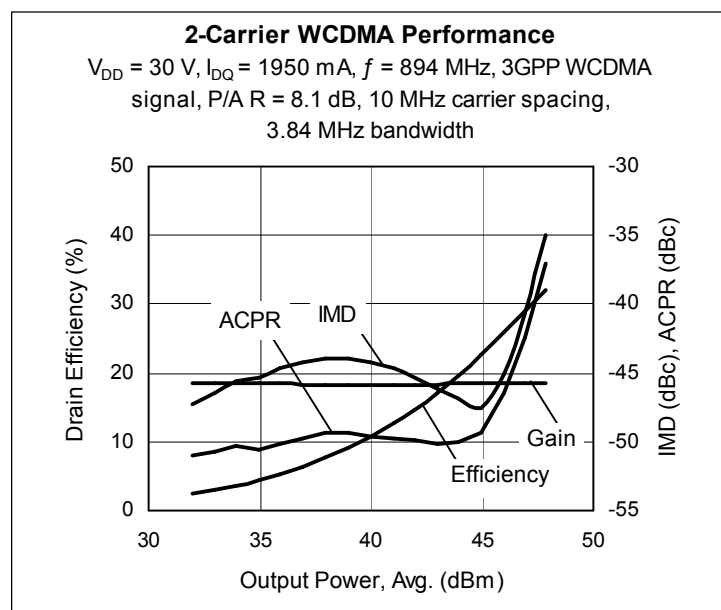
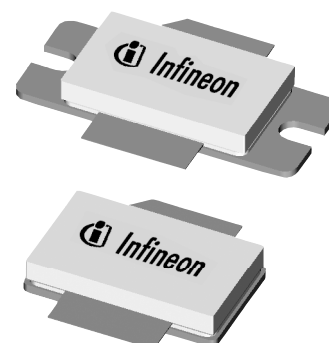
Thermally-Enhanced High Power RF LDMOS FETs 220 W, 869 – 894 MHz

Description

The PTFA082201E and PTFA082201F are 220-watt LDMOS FETs designed for CDMA and WCDMA power amplifier applications in the 869 to 894 MHz band. Features include input and output matching, and thermally-enhanced packages with slotted or earless flanges. Manufactured with Infineon's advanced LDMOS process, these devices provide excellent thermal performance and superior reliability.

PTFA082201E
Package H-36260-2

PTFA082201F
Package H-37260-2



Features

- Thermally-enhanced packages, Pb-free and RoHS compliant
- Broadband internal matching
- Typical two-carrier WCDMA performance at 894 MHz, 30 V
 - Average output power = 55 W
 - Linear Gain = 18.0 dB
 - Efficiency = 30%
 - Intermodulation distortion = -37 dBc
 - Adjacent channel power = -39.5 dBc
- Typical CW performance, 894 MHz, 30 V
 - Output power at P-1dB = 250 W
 - Efficiency = 59%
- Integrated ESD protection: Human Body Model, Class 2 (minimum)
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR at 30 V, 220 W (CW) output power

RF Characteristics

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

$V_{DD} = 30\text{ V}$, $I_{DQ} = 1950\text{ mA}$, $P_{OUT} = 55\text{ W}$ average

$f_1 = 884\text{ MHz}$, $f_2 = 894\text{ MHz}$, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8.1 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	18.0	—	dB
Drain Efficiency	η_D	—	30	—	%
Intermodulation Distortion	IMD	—	-37	—	dBc

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!

RF Characteristics (cont.)

Two-tone Measurements (tested in Infineon test fixture)

$V_{DD} = 30\text{ V}$, $I_{DQ} = 1950\text{ mA}$, $P_{OUT} = 220\text{ W PEP}$, $f = 894\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	17.5	18.0	—	dB
Drain Efficiency	η_D	40	43	—	%
Intermodulation Distortion	IMD	—	—	-29	dBc

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_{DS} = 10\text{ mA}$	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	$V_{DS} = 28\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	1.0	μA
	$V_{DS} = 63\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	10.0	μA
On-State Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.04	—	Ω
Operating Gate Voltage	$V_{DS} = 30\text{ V}$, $I_{DQ} = 1950\text{ mA}$	V_{GS}	2.0	2.5	3.0	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	200	$^{\circ}\text{C}$
Total Device Dissipation Above 25 $^{\circ}\text{C}$ derate by	P_D	700	W
		4.0	W/ $^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$, 220 W CW)	$R_{\theta JC}$	0.25	$^{\circ}\text{C/W}$

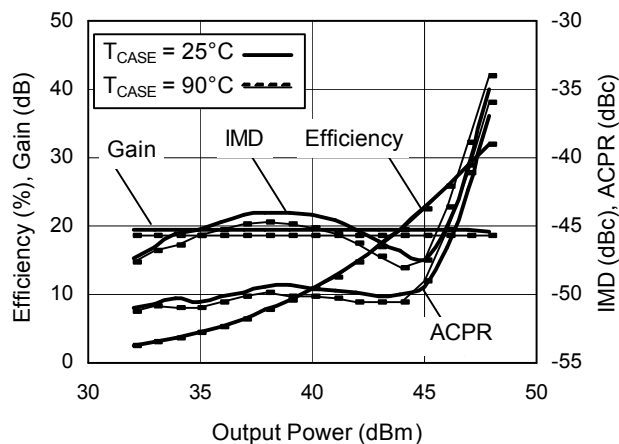
Ordering Information

Type and Version	Package Outline	Package Description	Shipping	Marking
PTFA082201E V4	H-36260-2	Thermally-enhanced slotted flange, single-ended	Tray	PTFA082201E
PTFA082201F V4	H-37260-2	Thermally-enhanced earless flange, single-ended	Tray	PTFA082201F

Typical Performance (data taken in a production test fixture)

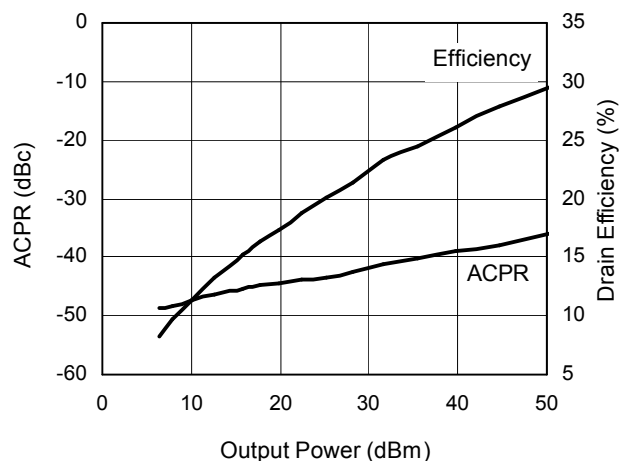
2-Carrier WCDMA Performance

$V_{DD} = 30\text{ V}$, $I_{DQ} = 1950\text{ mA}$, $f = 894\text{ MHz}$, 3GPP WCDMA signal, P/A R = 8.1 dB, 10 MHz carrier spacing, 3.84 MHz bandwidth



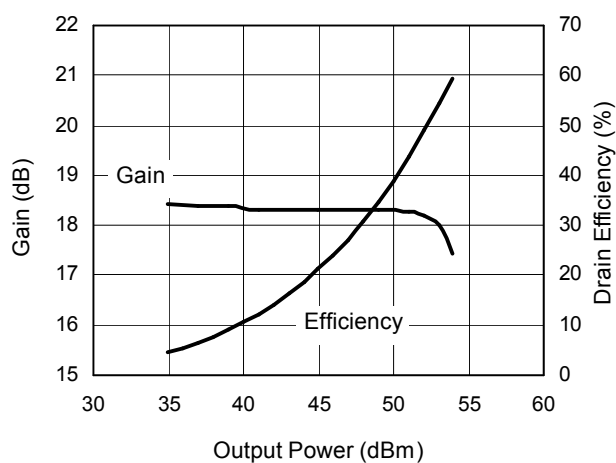
Two-carrier WCDMA Power Sweep

$V_{DD} = 30\text{ V}$, $I_{DQ} = 1600\text{ mA}$, $f_1 = 889\text{ MHz}$, $f_2 = 894\text{ MHz}$



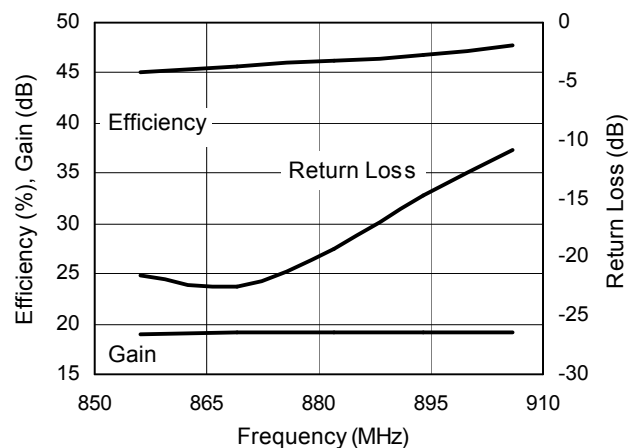
Gain & Efficiency vs. Output Power

$V_{DD} = 30\text{ V}$, $I_{DQ} = 1950\text{ mA}$, $f = 894\text{ MHz}$

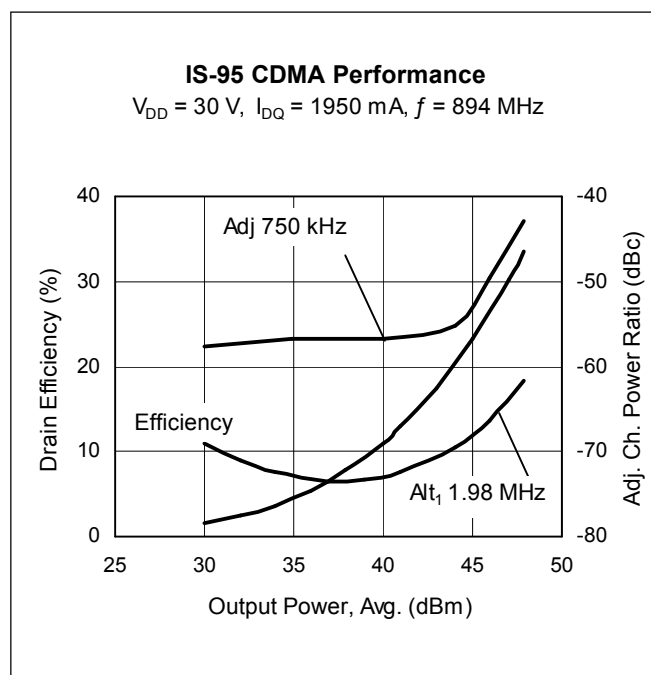
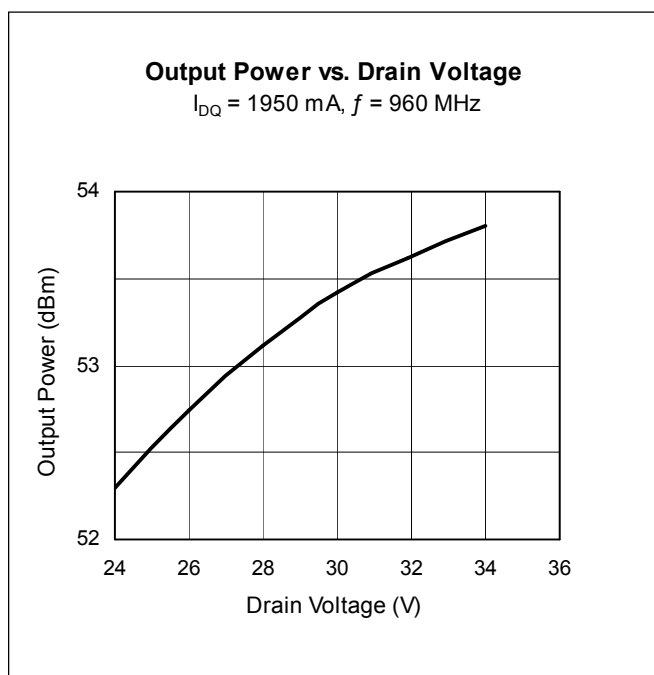
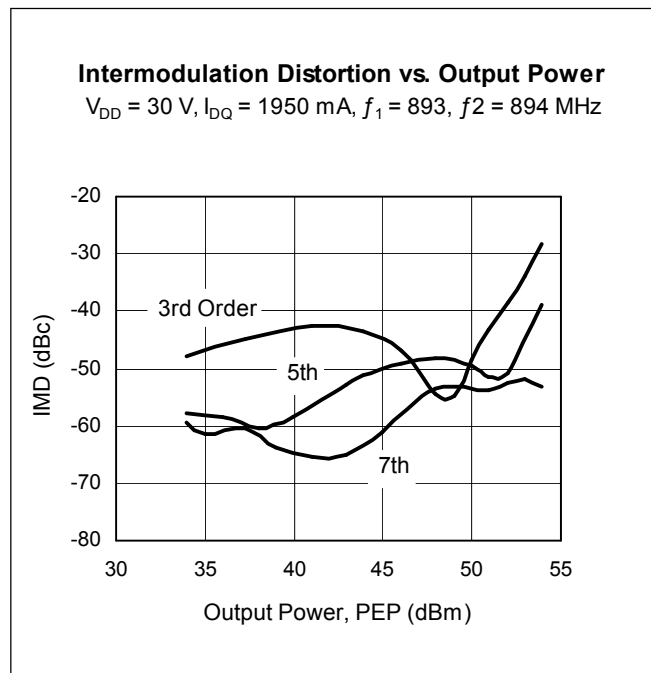
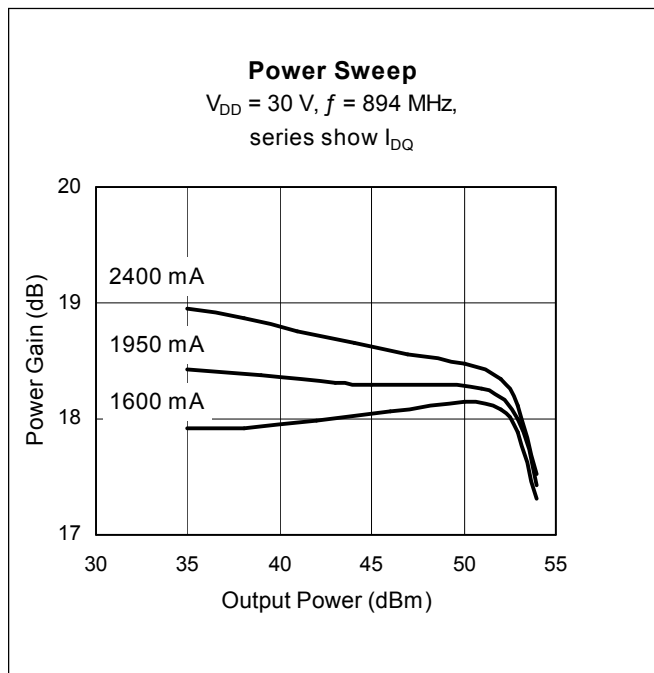


2-Tone Broadband Performance

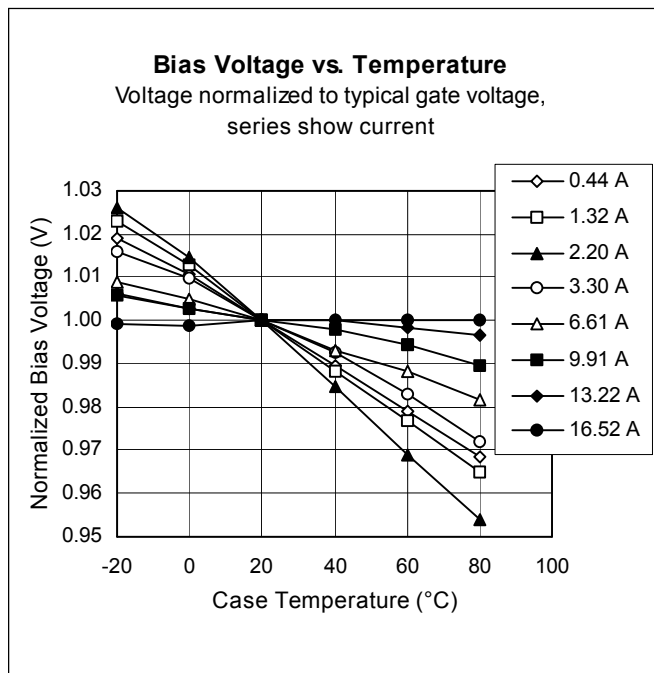
$V_{DD} = 30\text{ V}$, $I_{DQ} = 1950\text{ mA}$, $P_{OUT} = 110\text{ W}$



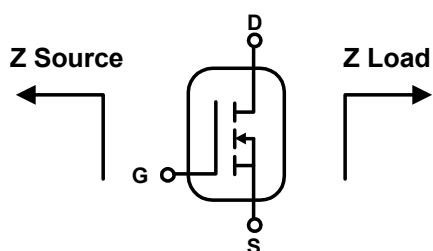
Typical Performance (cont.)



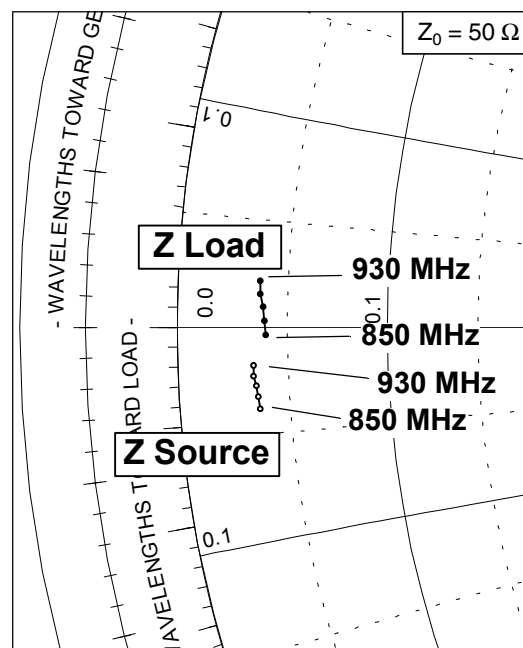
Typical Performance (cont.)



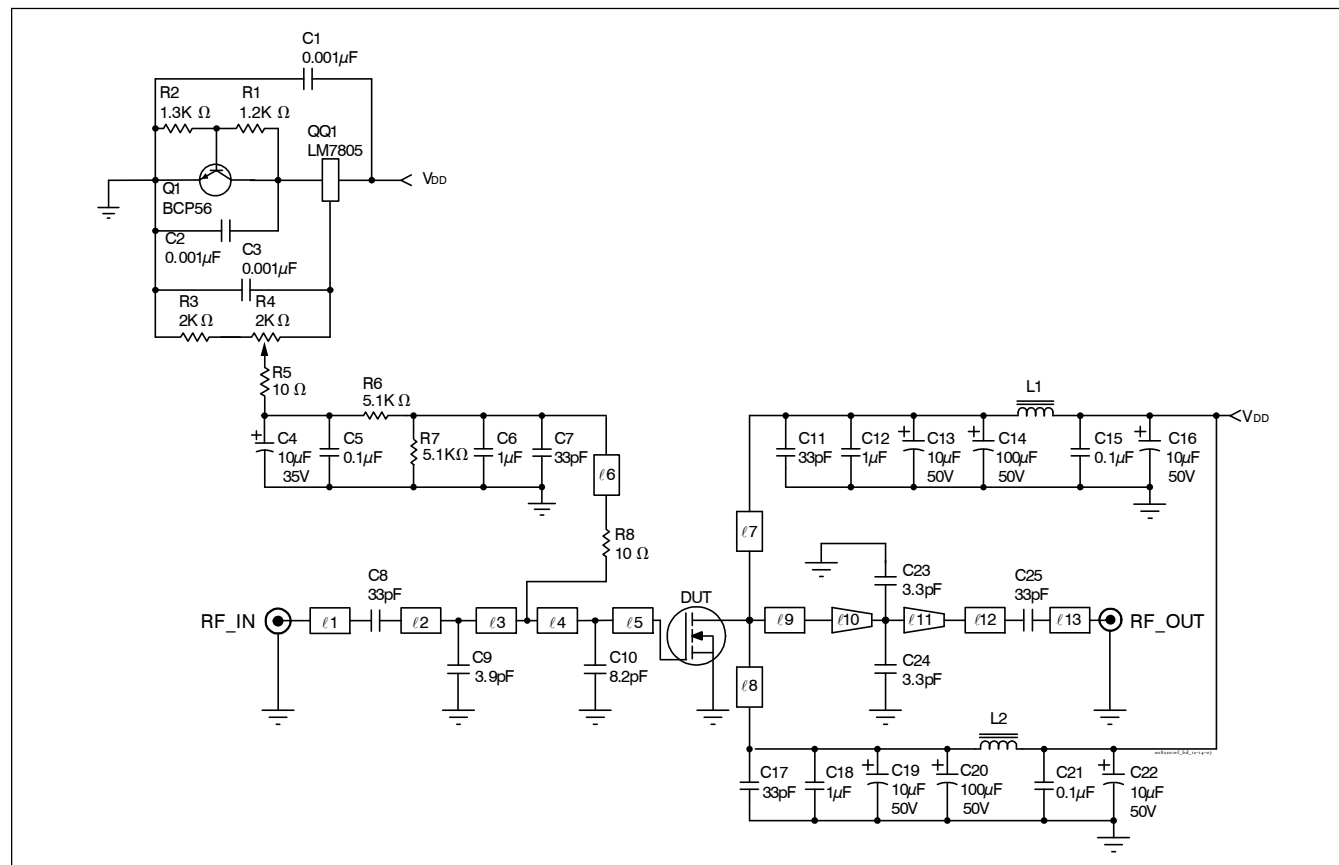
Broadband Circuit Impedance



Frequency MHz	Z Source W		Z Load W	
	R	jX	R	jX
850	1.792	-1.910	1.999	-0.196
870	1.764	-1.624	1.963	0.165
890	1.737	-1.360	1.924	0.485
910	1.693	-1.147	1.854	0.793
930	1.703	-0.896	1.853	1.087



Reference Circuit



Reference circuit schematic for $f = 894 \text{ MHz}$

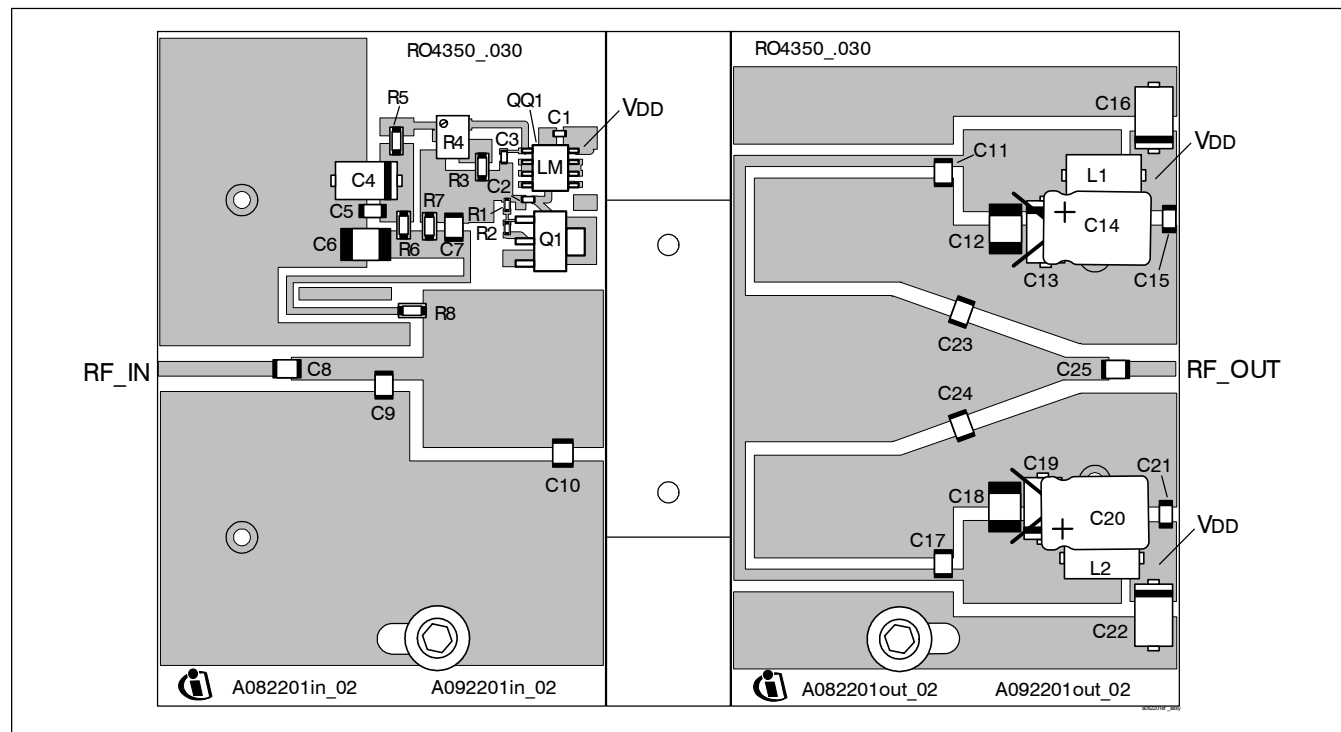
Circuit Assembly Information

DUT	PTFA082201E or PTFA082201F	LDMOS Transistor	
PCB	0.76 mm [.030"] thick, $\epsilon_r = 3.48$	Rogers RO4350	1 oz. copper

Microstrip	Electrical Characteristics at 894 MHz ¹	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ_1	0.065λ , 50.0 Ω	13.13 x 1.60	0.517 x 0.063
ℓ_2	0.049λ , 38.0 Ω	9.78 x 2.54	0.385 x 0.100
ℓ_3	0.024λ , 38.0 Ω	4.83 x 2.54	0.190 x 0.100
ℓ_4	0.083λ , 7.8 Ω	15.44 x 17.83	0.608 x 0.702
ℓ_5	0.027λ , 7.8 Ω	4.95 x 17.83	0.195 x 0.702
ℓ_6	0.190λ , 78.0 Ω	40.64 x 0.74	1.600 x 0.029
ℓ_7, ℓ_8	0.183λ , 60.0 Ω	37.54 x 1.24	1.478 x 0.049
ℓ_9	0.095λ , 8.4 Ω	17.68 x 16.48	0.696 x 0.649
ℓ_{10} (taper)	0.031λ , 8.4 Ω / 11.2 Ω	5.94 x 16.48 / 11.91	0.234 x 0.649 / 0.469
ℓ_{11} (taper)	0.077λ , 11.2 Ω / 37.0 Ω	14.53 x 11.91 / 2.64	0.572 x 0.469 / 0.104
ℓ_{12}	0.025λ , 37.0 Ω	4.98 x 2.64	0.196 x 0.104
ℓ_{13}	0.028λ , 50.0 Ω	5.74 x 1.60	0.226 x 0.063

¹Electrical characteristics are rounded.

Reference Circuit (cont.)

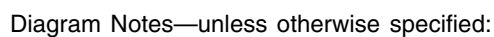


Reference circuit assembly diagram (not to scale)*

Component	Description	Suggested Manufacturer	P/N or Comment
C1, C2, C3	Capacitor, 0.001 μ F	Digi-Key	PCC1772CT-ND
C4	Tantalum capacitor, 10 μ F, 35 V	Digi-Key	399-1655-2-ND
C5, C15, C21	Capacitor, 0.1 μ F	Digi-Key	PCC104BCT-ND
C6, C12, C18	Capacitor, 1 μ F	ATC	920C105
C7, C8, C11, C17, C25	Ceramic capacitor, 33 pF	ATC	100B 330
C9	Ceramic capacitor, 3.9 pF	ATC	100B 3R9
C10	Ceramic capacitor, 8.2 pF	ATC	100B 8R2
C13, C16, C19, C22	Tantalum capacitor, 10 μ F, 50 V	Garrett Electronics	TPSE106K050R0400
C14, C20	Electrolytic capacitor, 100 μ F, 50 V	Digi-Key	P5182-ND
C23, C24	Ceramic capacitor, 3.3 pF	ATC	100B 3R3
L1, L2	Ferrite, 8.9 mm	Elna Magnetics	BDS 4.6/3/8.9-4S2
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, R8	Chip resistor 10 ohms	Digi-Key	P10ECT-ND
R6, R7	Chip resistor 5.1 k-ohms	Digi-Key	P5.1KECT-ND

*Gerber Files for this circuit available on request

Package H-36260-2



1. Lead thickness: $0.10 + 0.051/-0.025$ [$.004 + .002/- .001$].
2. All tolerances ± 0.127 [$.005$] unless specified otherwise.
3. Pins: D = drain, S = source, G = gate.
4. Interpret dimensions and tolerances per ASME Y14.5M-1994.
5. Primary dimensions are mm. Alternate dimensions are inches.
6. Gold plating thickness:
S, D, G - flange & leads: 1.14 ± 0.38 micron [45 ± 15 microinch]

Package Outline Specifications (cont.)

Package H-37260-2

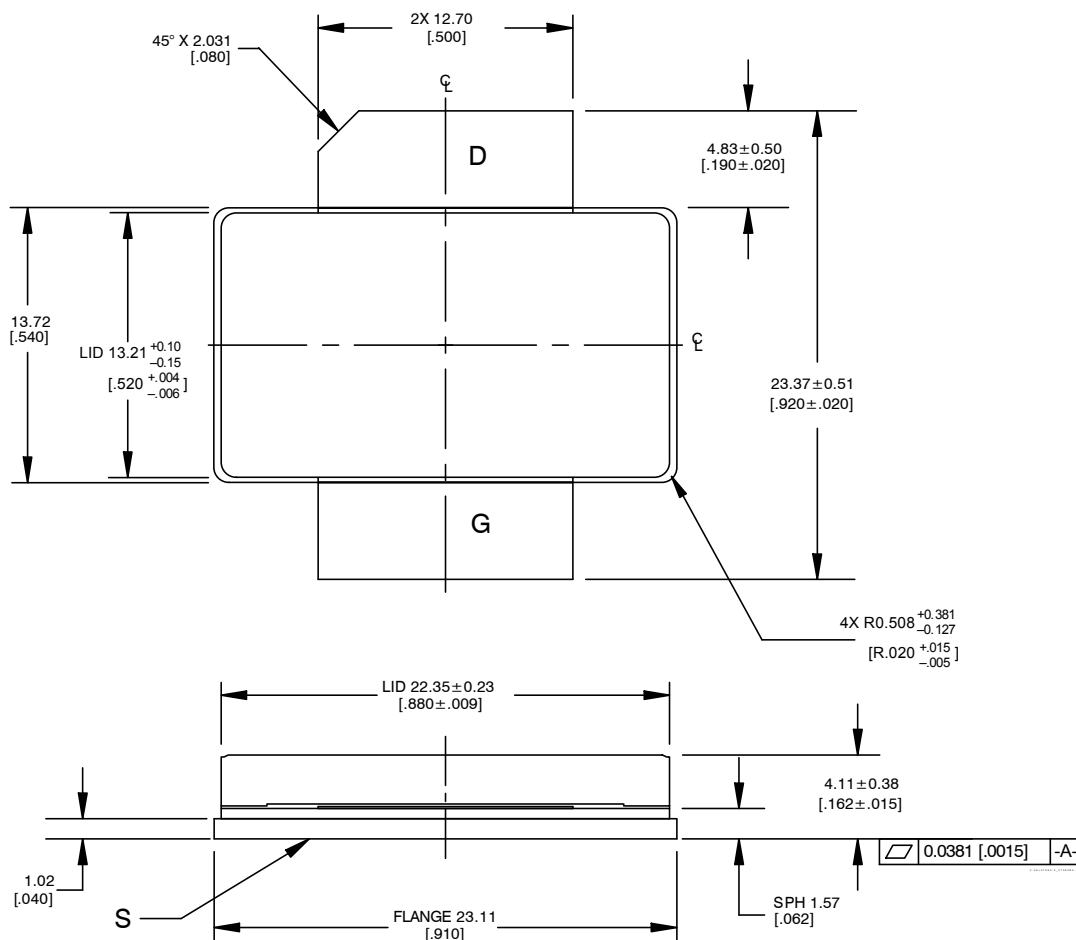


Diagram Notes—unless otherwise specified:

1. Lead thickness: $0.10 \pm 0.051 / -0.025$ [$.004 \pm .002 / -.001$].
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Revision History: 2009-02-20 Data Sheet

Previous Version: 2008-07-08 and 2007-12-13, Data Sheets

Page	Subjects (major changes since last revision)
1, 2, 9, 10	Update product to V4, with new package technologies. Updated package outline diagrams.
1 – 4	Update RF characteristics.
7	Revise block diagram.
7	Fixed typing error

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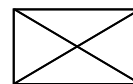
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