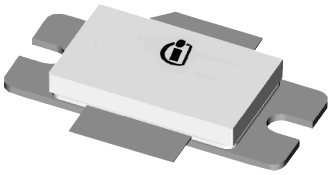
PTFA082201E
PTFA082201F

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

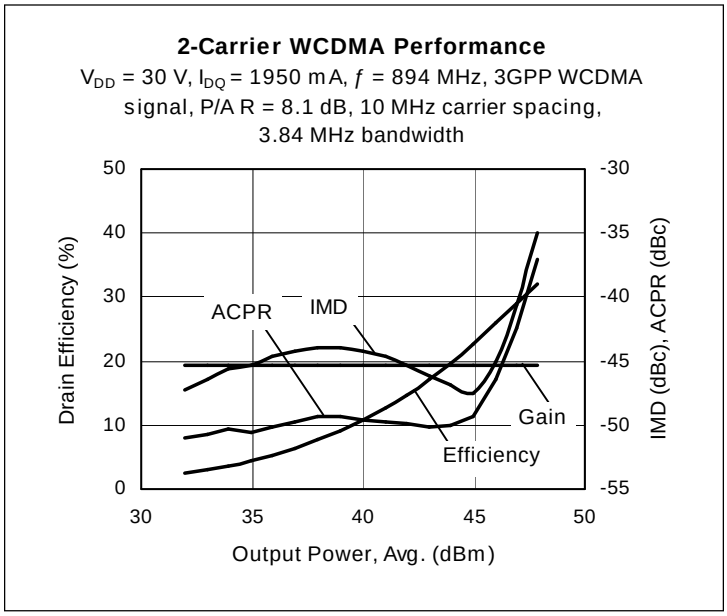
Description

The PTFA082201E and PTFA082201F are thermally-enhanced, 220-watt, internally-matched *GOLDMOS*® FETs intended for CDMA and WCDMA applications. They are characaterized for two-carrier WCDMA operation from 869 to 894 MHz. Thermally-enhanced packages provide the coolest operation available. Full gold metallization ensures excellent device lifetime and reliability.

PTFA082201E
Package H-30260-2



PTFA082201F
Package H-31260-2



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 = 18.5 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 V, I_{DQ} = 1950 mA, P_{OUT} = 55 W average
f_1 = 884 MHz, f_2 = 894 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}	—	18.5	—	dB
Drain Efficiency	η_D	—	30	—	%
Intermodulation Distortion	IMD	—	–37	—	dBc

All published data at T_{CASE} = 25°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 V, I_{DQ} = 1950 mA, P_{OUT} = 220 W PEP, f = 894 MHz, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	17.5	18.5	—	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 V, I_{DS} = 10 mA	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	µA
	V_{DS} = 63 V, V_{GS} = 0 V	I_{DSS}	—	—	10.0	µA
On-State Resistance	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	1.82	—	Ω
Operating Gate Voltage	V_{DS} = 30 V, I_{DQ} = 1950 mA	V_{GS}	2.0	2.5	3.0	V
Gate Leakage Current	V_{GS} = 10 V, V_{DS} = 0 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	°C
Total Device Dissipation	P_D	700	W
Above 25°C derate by		4.0	W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 220 W CW)	$R_{\theta JC}$	0.25	°C/W

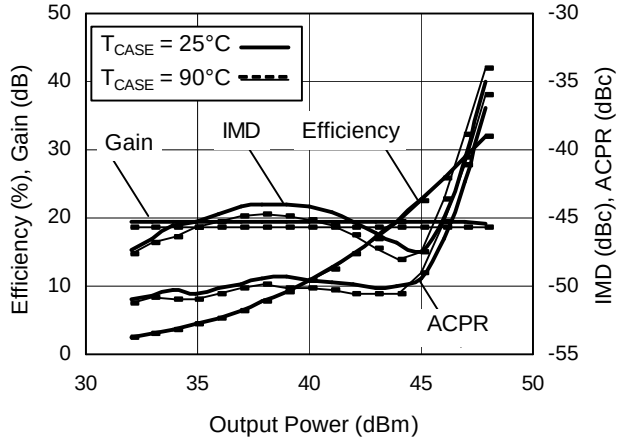
Ordering Information

Type	Package Outline	Package Description	Marking
PTFA082201E	H-30260-2	Thermally-enhanced slotted flange, single-ended	PTFA082201E
PTFA082201F	H-31260-2	Thermally-enhanced earless flange, single-ended	PTFA082201F

Typical Performance (data taken in a production test fixture)

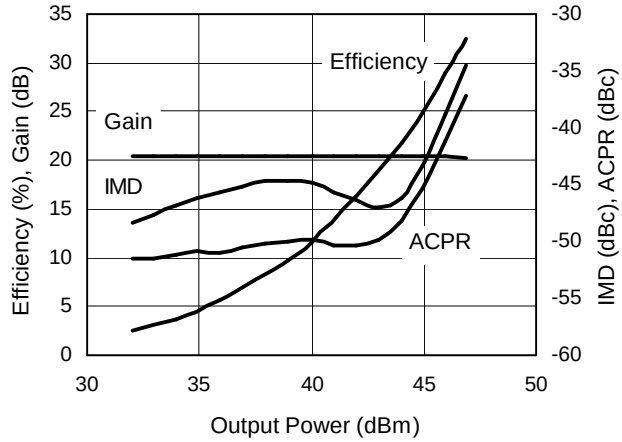
2-Carrier WCDMA Performance

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



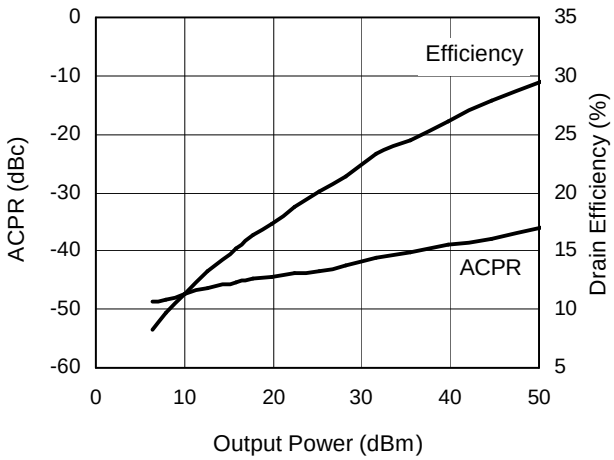
2-Carrier WCDMA (high gain tune)

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



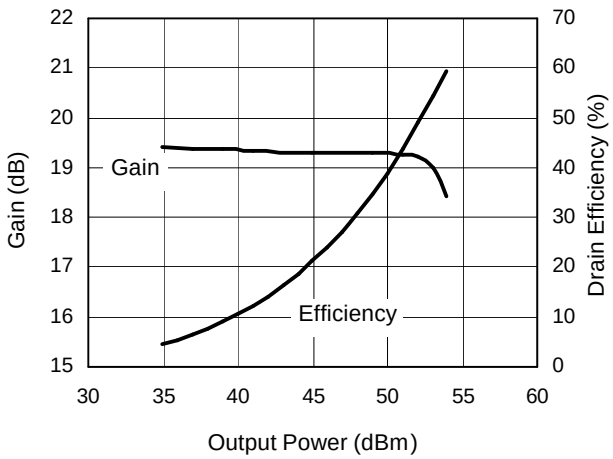
Two-carrier WCDMA Power Sweep

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



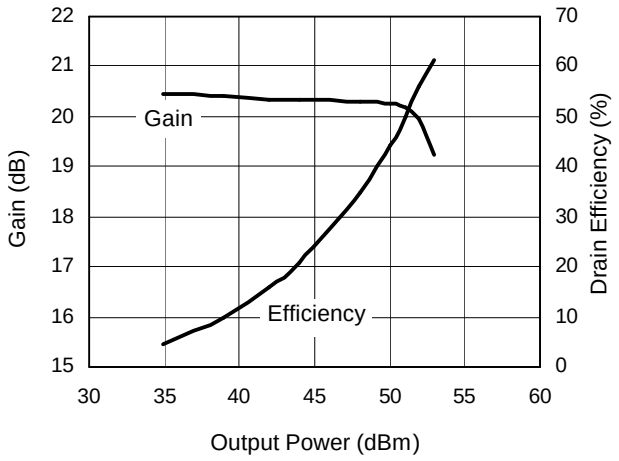
Gain & Efficiency vs. Output Power

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

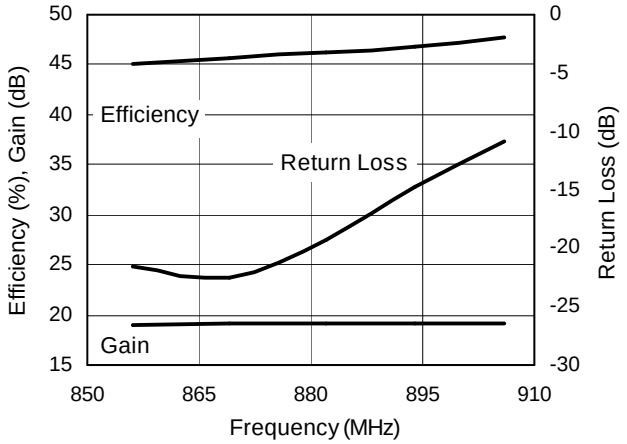


Typical Performance (cont.)

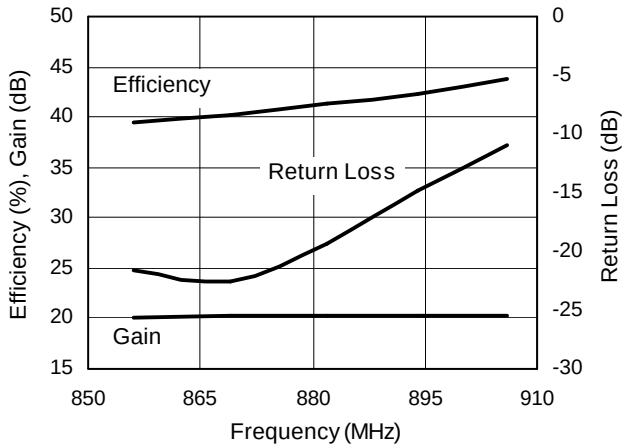
CW (high gain tuned)
Gain & Efficiency vs. Output Power
V_{DD} = 30 V, I_{DQ} = 1950 mA, f = 894 MHz



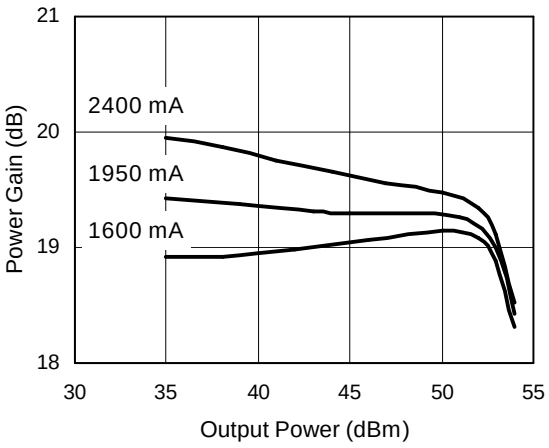
2-Tone Broadband Performance
V_{DD} = 30 V, I_{DQ} = 1950 mA, P_{OUT} = 110 W



2-Tone Broadband (tuned for high gain)
V_{DD} = 30 V, I_{DQ} = 1950 mA, P_{OUT} = 80 W



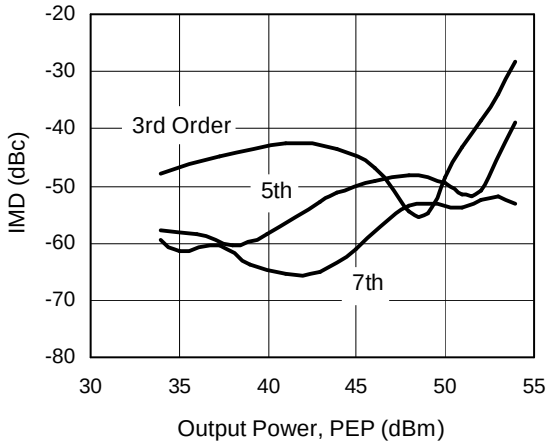
Power Sweep
V_{DD} = 30 V, f = 894 MHz,
series show I_{DQ}



Typical Performance (cont.)

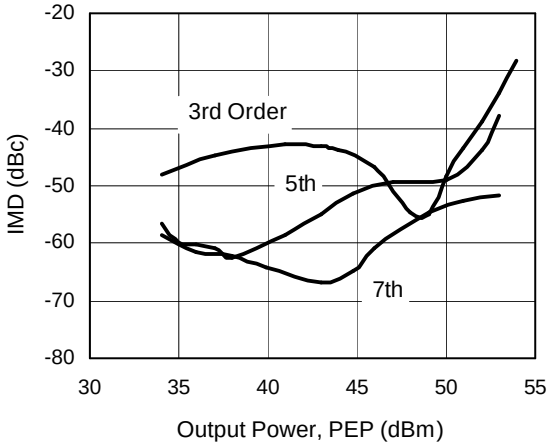
Intermodulation Distortion vs. Output Power

V_{DD} = 30 V, I_{DQ} = 1950 mA, f_1 = 893, f_2 = 894 MHz



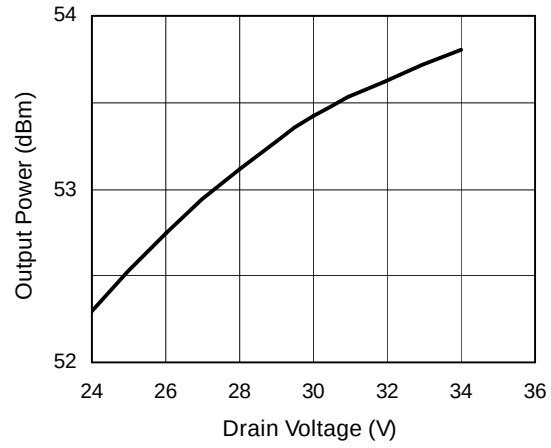
Intermodulation Distortion vs. Output Power (high gain tune)

V_{DD} = 30 V, I_{DQ} = 1950 mA, f_1 = 893, f_2 = 894 MHz



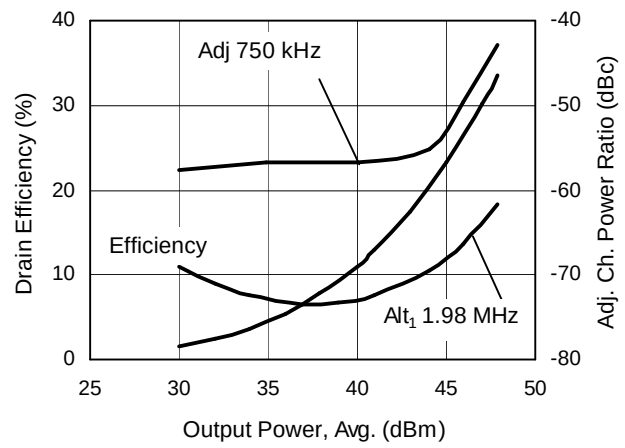
Output Power vs. Drain Voltage

I_{DQ} = 1950 mA, f = 960 MHz

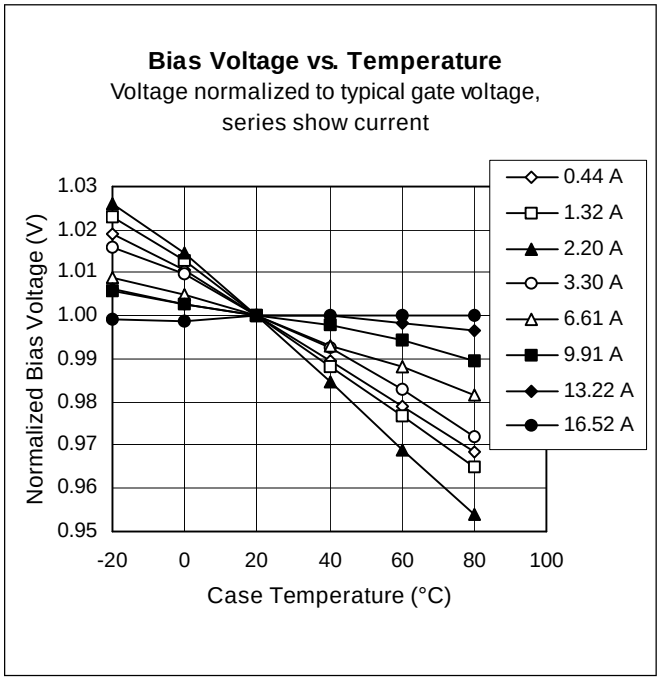


IS-95 CDMA Performance

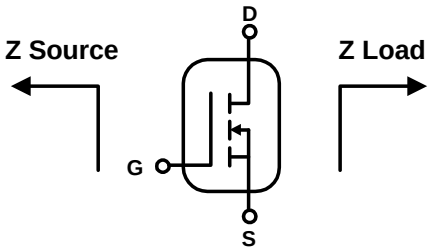
V_{DD} = 30 V, I_{DQ} = 1950 mA, f = 894 MHz



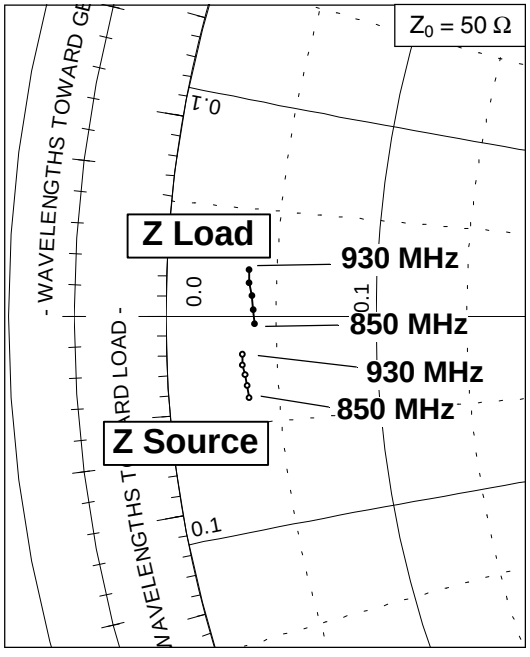
Typical Performance (cont.)



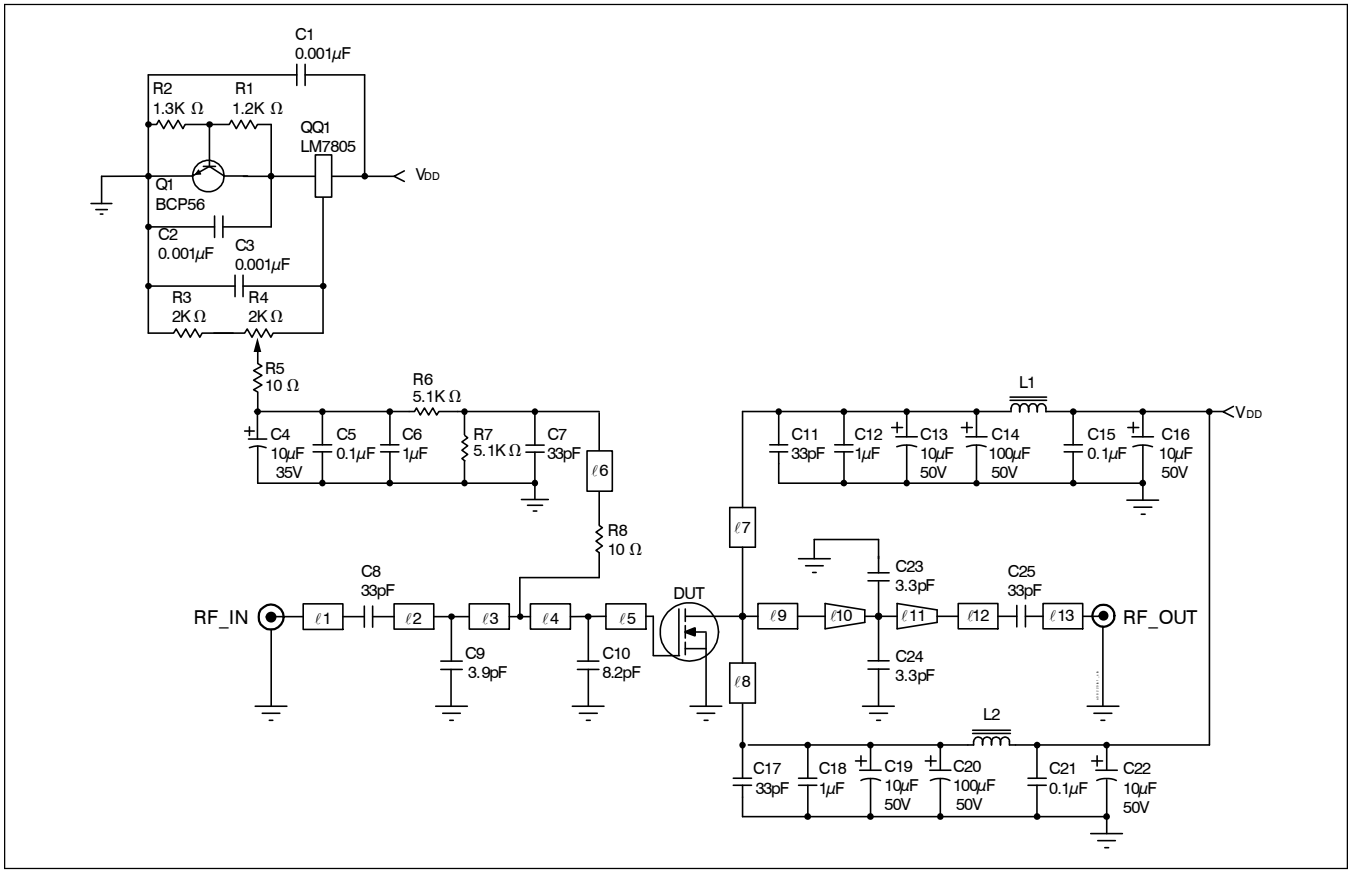
Broadband Circuit Impedance



Frequency	Z Source Ω		Z Load Ω	
MHz	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 ƒ = 894 MHz

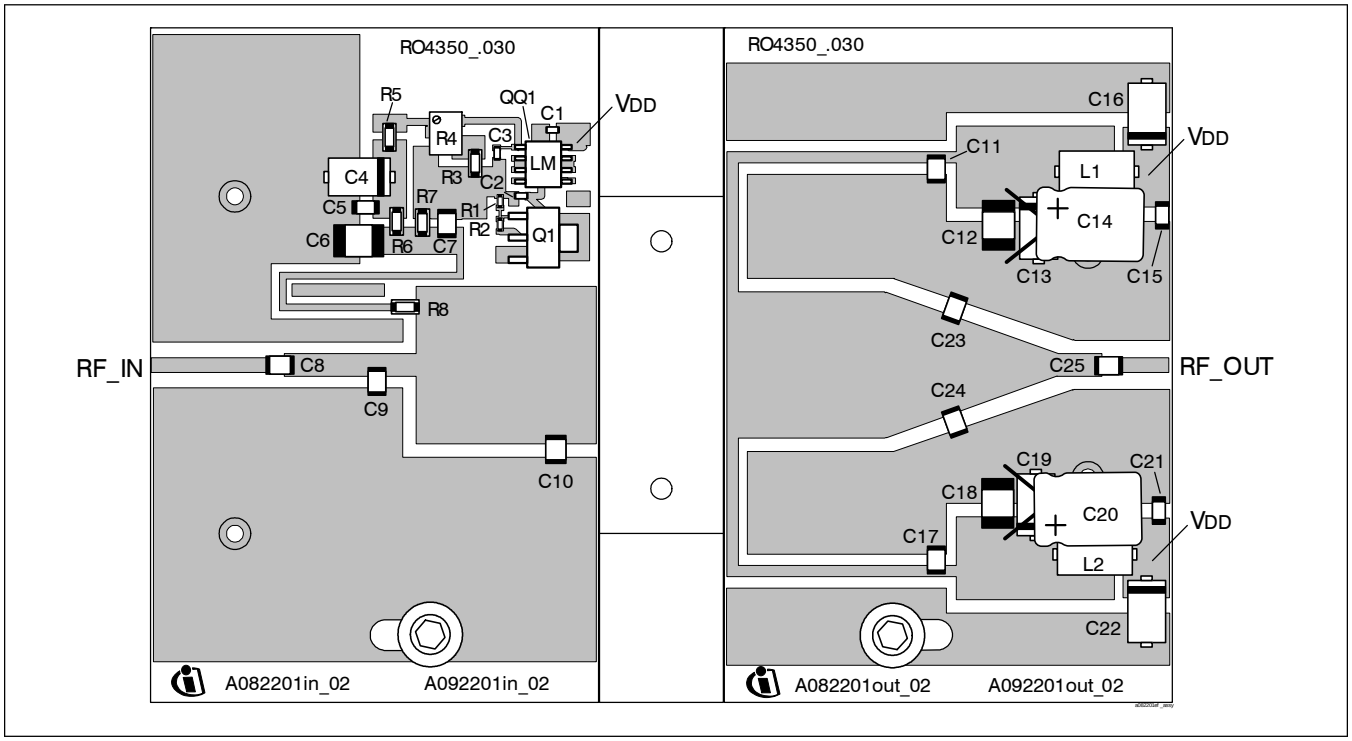
Circuit Assembly Information

DUT	PTFA082201E or PTFA082201F	LDMOS Transistor	
PCB	0.76 mm [.030"] thick, ε_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.)
ℓ1	0.065 λ, 50.0 Ω	13.13 x 1.60	0.517 x 0.063
ℓ2	0.049 λ, 38.0 Ω	9.78 x 2.54	0.385 x 0.100
ℓ3	0.024 λ, 38.0 Ω	4.83 x 2.54	0.190 x 0.100
ℓ4	0.083 λ, 7.8 Ω	15.44 x 17.83	0.608 x 0.702
ℓ5	0.027 λ, 7.8 Ω	4.95 x 17.83	0.195 x 0.702
ℓ6	0.190 λ, 78.0 Ω	40.64 x 0.74	1.600 x 0.029
ℓ7, ℓ8	0.183 λ, 60.0 Ω	37.54 x 1.24	1.478 x 0.049
ℓ9	0.095 λ, 8.4 Ω	17.68 x 16.48	0.696 x 0.649
ℓ10 (taper)	0.031 λ, 8.4 Ω / 11.2 Ω	5.94 x 16.48 / 11.91	0.234 x 0.649 / 0.469
ℓ11 (taper)	0.077 λ, 11.2 Ω / 37.0 Ω	14.53 x 11.91 / 2.64	0.572 x 0.469 / 0.104
ℓ12	0.025 λ, 37.0 Ω	4.98 x 2.64	0.196 x 0.104
ℓ13	0.028 λ, 50.0 Ω	5.74 x 1.60	0.226 x 0.063

[1]Electrical 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 µF	Digi-Key	PCC1772CT-ND
C4	Tantalum capacitor, 10 µF, 35 V	Digi-Key	399-1655-2-ND
C5, C15, C21	Capacitor, 0.1 µF	Digi-Key	PCC104BCT-ND
C6, C12, C18	Capacitor, 1 µF	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 µF, 50 V	Garrett Electronics	TPSE106K050R0400
C14, C20	Electrolytic capacitor, 100 µF, 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	Infinion 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 Outline Specifications

Package H-30260-2

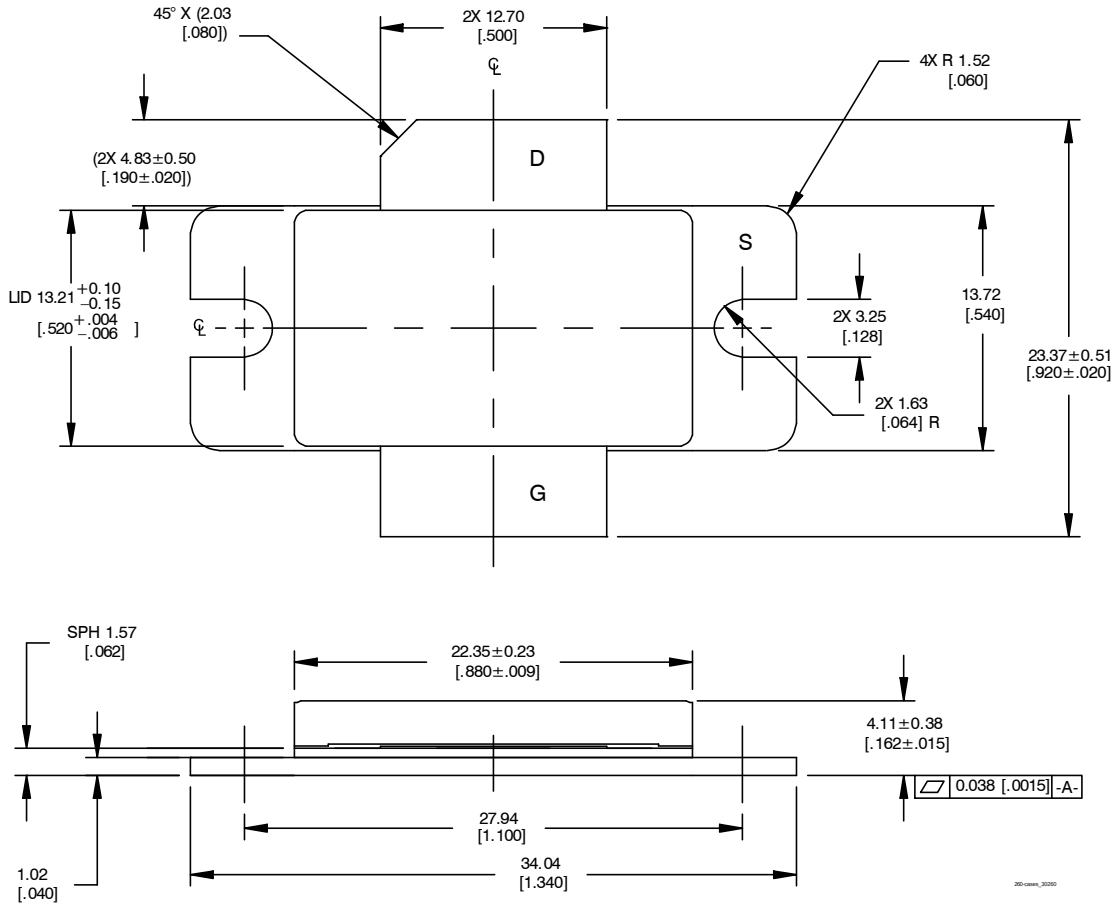


Diagram Notes—unless otherwise specified:

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 - flange: 2.54 micron [100 microinch] (min)
   D, G - leads: 1.14 micron ± 0.38 micron [45 microinch ± 15 microinch]

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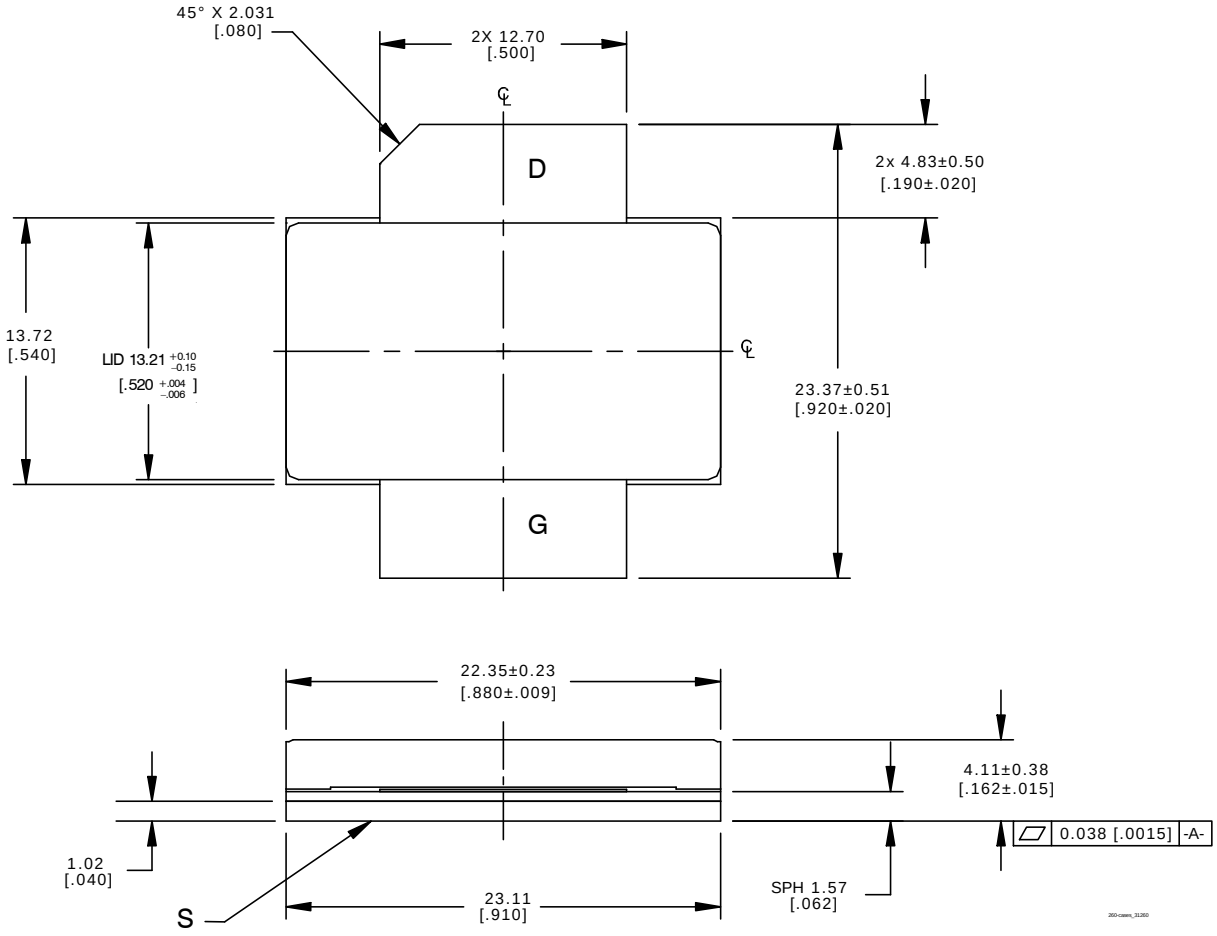
Package Outline Specifications (cont.)

Package H-31260-2



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Revision History:	2006-06-05	Data Sheet
Previous Version:	2006-04-10	Preliminary Data Sheet

Page	**Subjects (major changes since last revision)**
6 – 8	Add impedance and reference circuit information.
all	Remove Preliminary status.

Notes:

We Listen to Your Comments

Any information within this document that you feel is wrong, unclear or missing at all?
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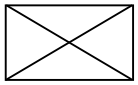
or +1 408 776 0600 International



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