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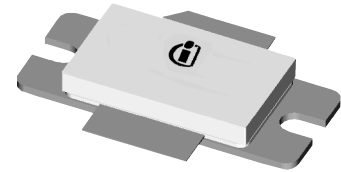


## Thermally-Enhanced High Power RF LDMOS FETs 180 W, 2110 – 2170 MHz

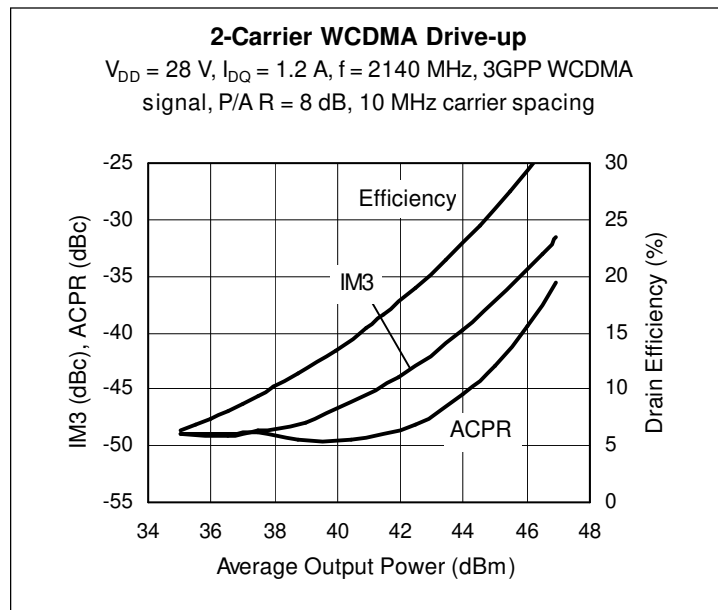
### Description

The PTFA211801E and PTFA211801F are thermally-enhanced, 180-watt, internally matched *GOLDMOS* FETs intended for WCDMA applications. They are characterized for single- and two-carrier WCDMA operation from 2110 to 2170 MHz. Thermally-enhanced packaging provides the coolest operation available. Full gold metallization ensures excellent device lifetime and reliability.

PTFA211801E  
Package 30260



PTFA211801F  
Package 31260



### Features

- Broadband internal matching
- Typical two-carrier WCDMA performance at 2140 MHz, 28 V
  - Average output power = 45.5 dBm
  - Linear Gain = 15.5 dB
  - Efficiency = 27.5%
  - Intermodulation distortion = -36 dBc
  - Adjacent channel power = -41 dBc
- Typical CW performance, 2170 MHz, 30 V
  - Output power at P-1dB = 180 W
  - Efficiency = 52%
- Integrated ESD protection: Human Body Model, Class 2 (minimum)
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 150 W (CW) output power

### RF Characteristics

#### WCDMA Measurements (tested in Infineon test fixture)

$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 1.2\text{ A}$ ,  $P_{OUT} = 35\text{ W}$  average

$f_1 = 2135\text{ MHz}$ ,  $f_2 = 2145\text{ MHz}$ , 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	$G_{ps}$	14.5	15.5	—	dB
Drain Efficiency	$\eta_D$	26	27.5	—	%
Intermodulation Distortion	IMD	—	-36	-34	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.)

### CW Measurements (tested in Infineon test fixture)

$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 1.2\text{ A}$ ,  $P_{OUT} = 150\text{ W}$  average,  $f = 2170\text{ MHz}$

Characteristic	Symbol	Min	Typ	Max	Unit
Gain Compression	$G_{comp}$	—	0.5	1.0	dB

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

$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 1.2\text{ A}$ ,  $P_{OUT} = 140\text{ W PEP}$ ,  $f = 2140\text{ MHz}$ , tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	$G_{ps}$	—	15.5	—	dB
Drain Efficiency	$\eta_D$	—	38.5	—	%
Intermodulation Distortion	IMD	—	-28	—	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	$\mu\text{A}$
Drain Leakage Current	$V_{DS} = 63\text{ V}$ , $V_{GS} = 0\text{ V}$	$I_{DSS}$	—	—	10.0	$\mu\text{A}$
On-State Resistance	$V_{GS} = 10\text{ V}$ , $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.05	—	$\Omega$
Operating Gate Voltage	$V_{DS} = 28\text{ V}$ , $I_{DQ} = 1.2\text{ A}$	$V_{GS}$	2.0	2.5	3.0	V
Gate Leakage Current	$V_{GS} = 10\text{ V}$ , $V_{DS} = 0\text{ V}$	$I_{GSS}$	—	—	1.0	$\mu\text{A}$

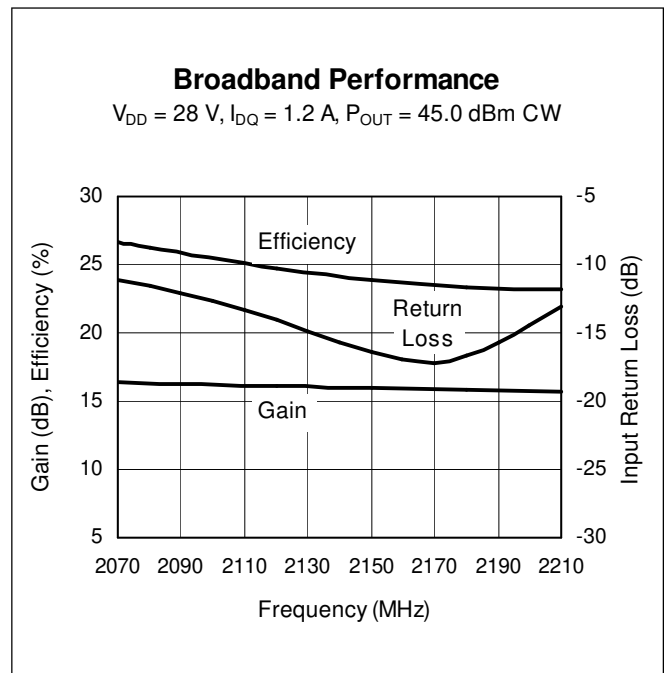
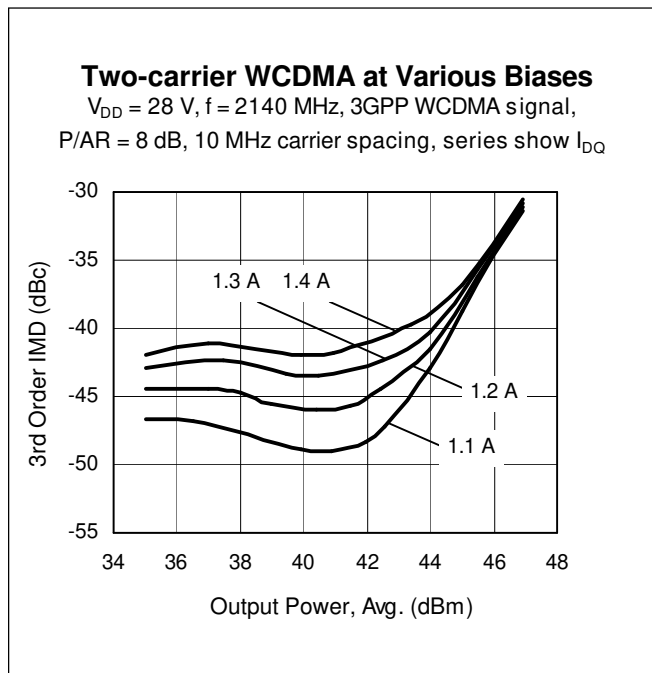
## Maximum Ratings

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	$P_D$	565	W
Above 25 $^{\circ}\text{C}$ derate by		3.23	W/ $^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-40 to +150	$^{\circ}\text{C}$
Thermal Resistance ( $T_{CASE} = 70^{\circ}\text{C}$ , 150 W CW)	$R_{\theta JC}$	0.31	$^{\circ}\text{C}/\text{W}$

### Ordering Information

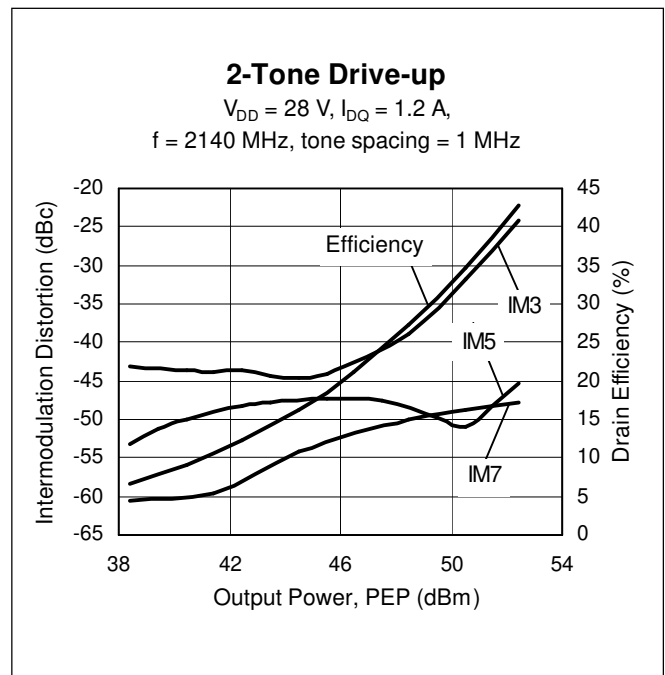
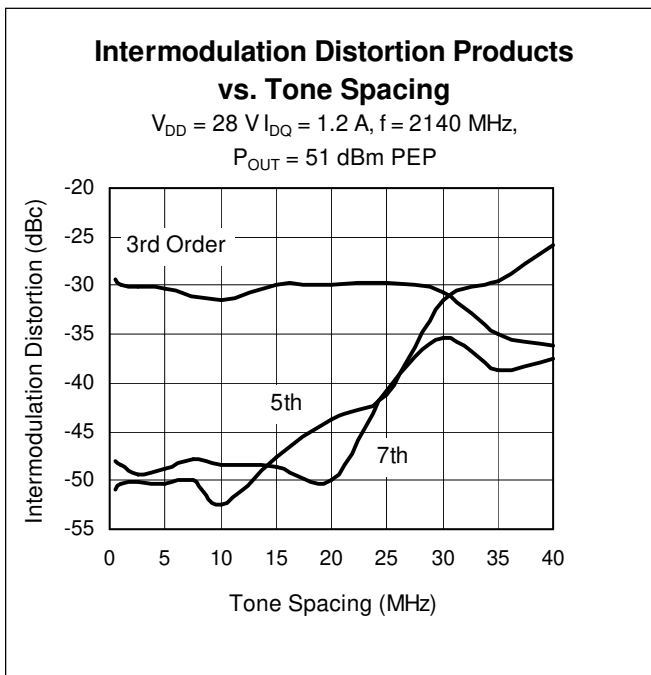
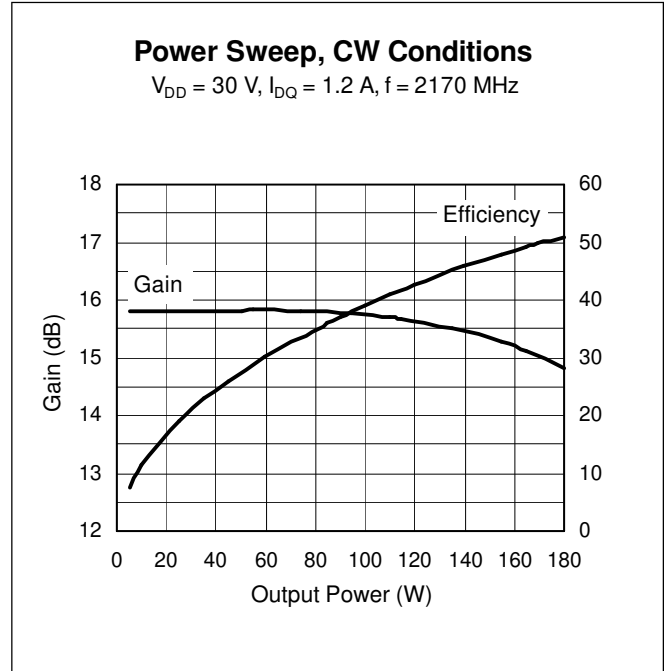
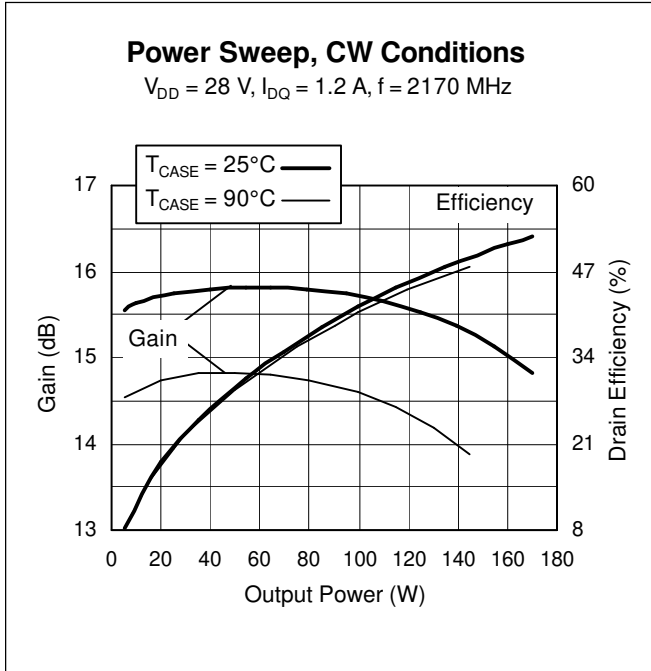
Type	Package Outline	Package Description	Marking
PTFA211801E	30260	Thermally-enhanced slotted flange, single-ended	PTFA211801E
PTFA211801F	31260	Thermally-enhanced earless flange, single-ended	PTFA211801F

### Typical Performance (data taken in a production test fixture)

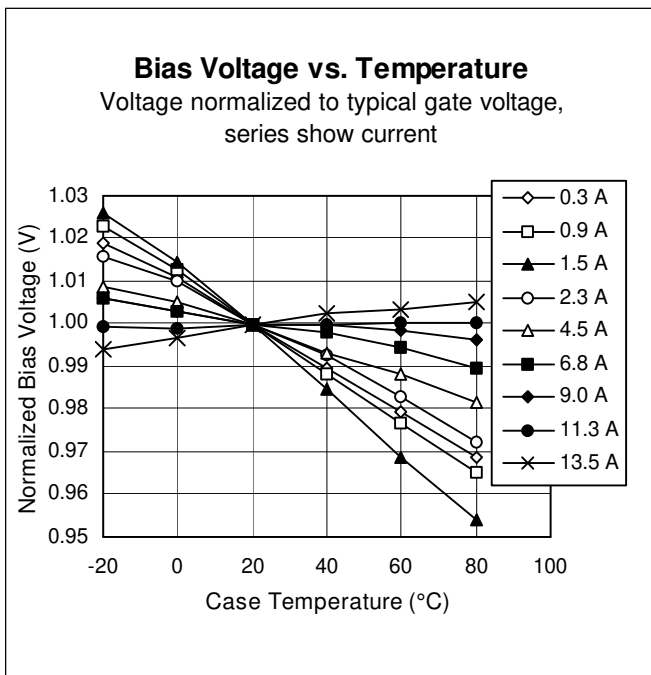
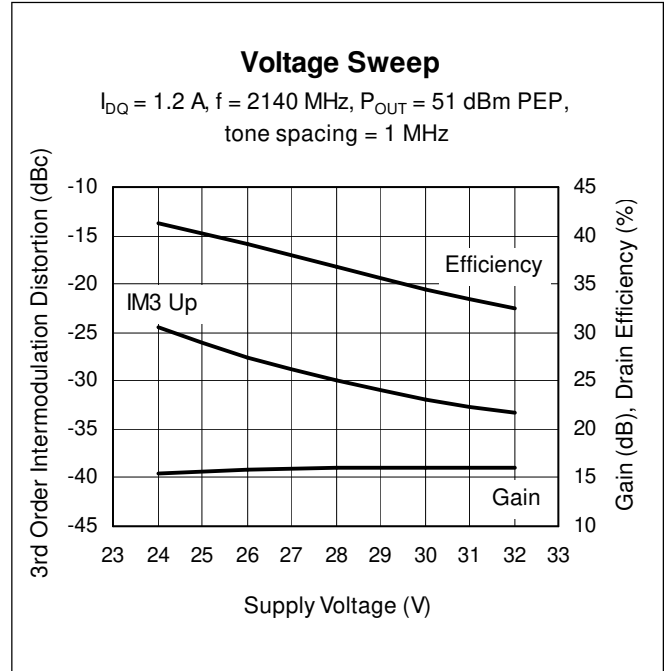
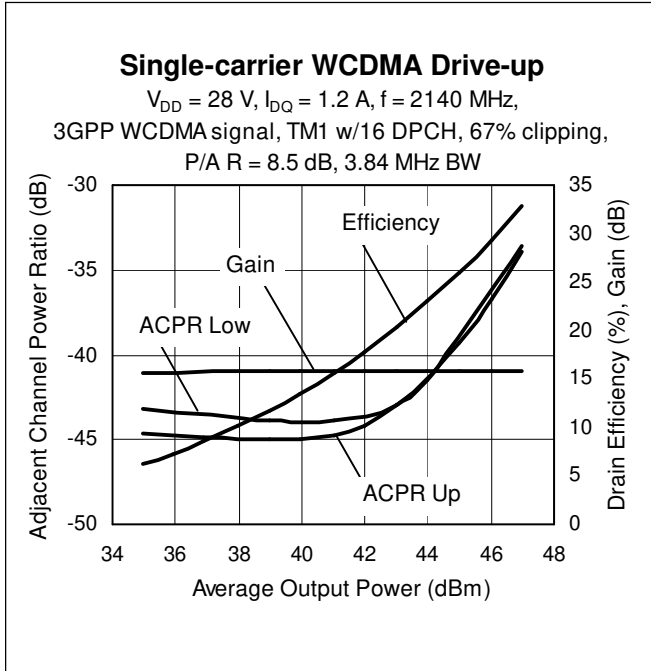




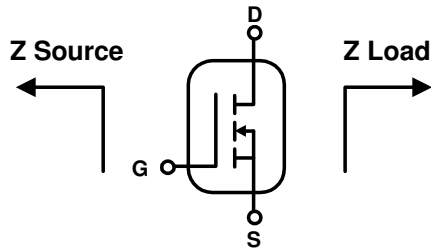
**Typical Performance (cont.)**



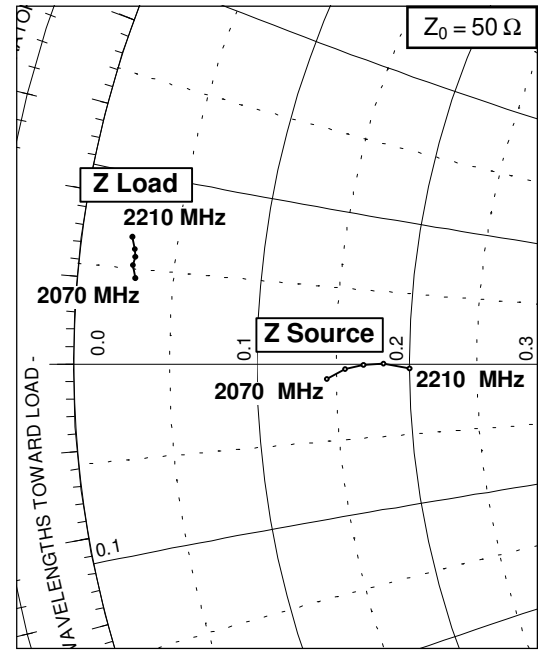
Typical Performance (cont.)



### Broadband Circuit Impedance

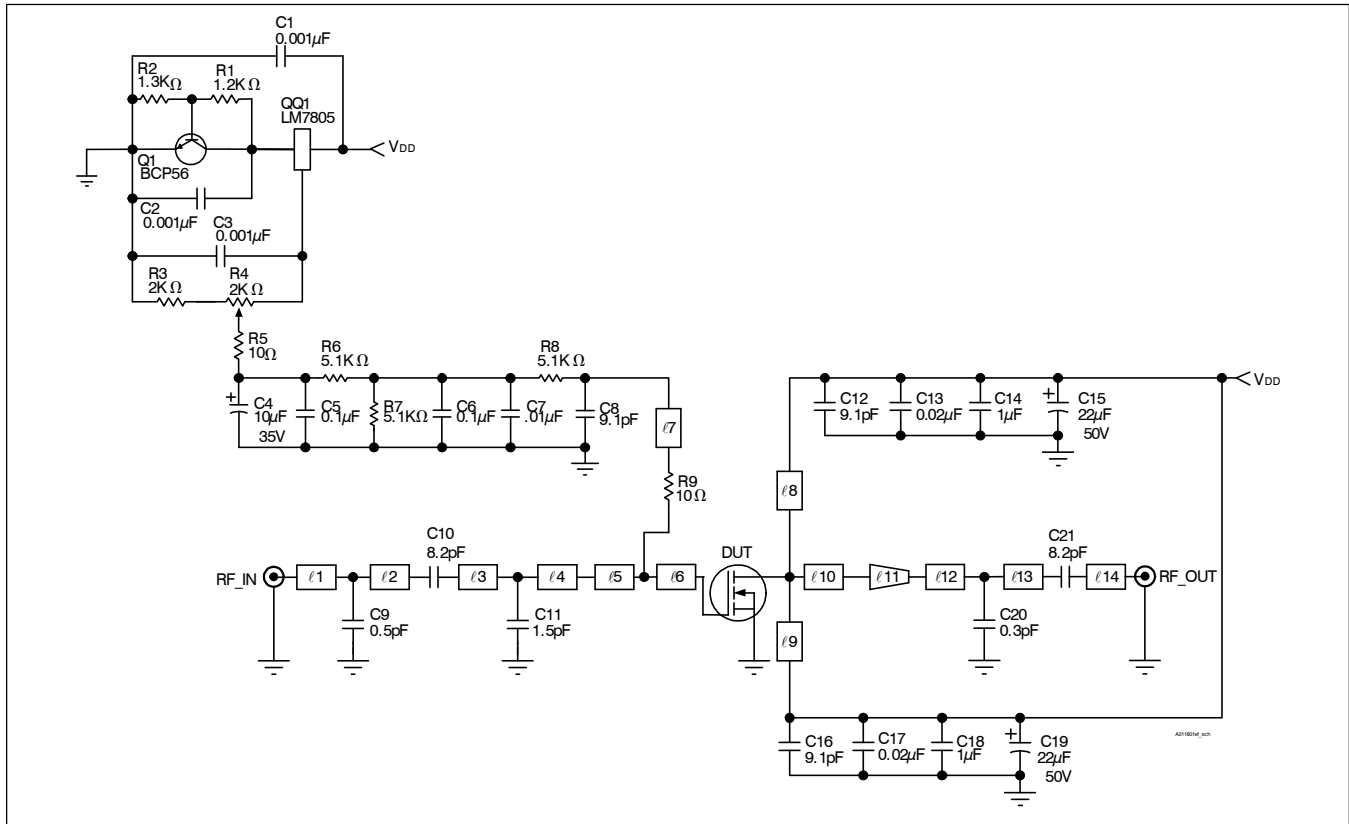


Frequency MHz	Z Source $\Omega$		Z Load $\Omega$	
	R	jX	R	jX
2070	7.2	-0.5	1.5	2.3
2110	7.8	-0.2	1.4	2.6
2140	8.4	-0.0	1.4	2.8
2170	9.1	0.0	1.4	3.0
2210	10.0	-0.2	1.3	3.4



See next page for Reference Circuit information

## Reference Circuit



Reference Circuit Schematic for  $f = 2140 \text{ MHz}$

### Circuit Assembly Information

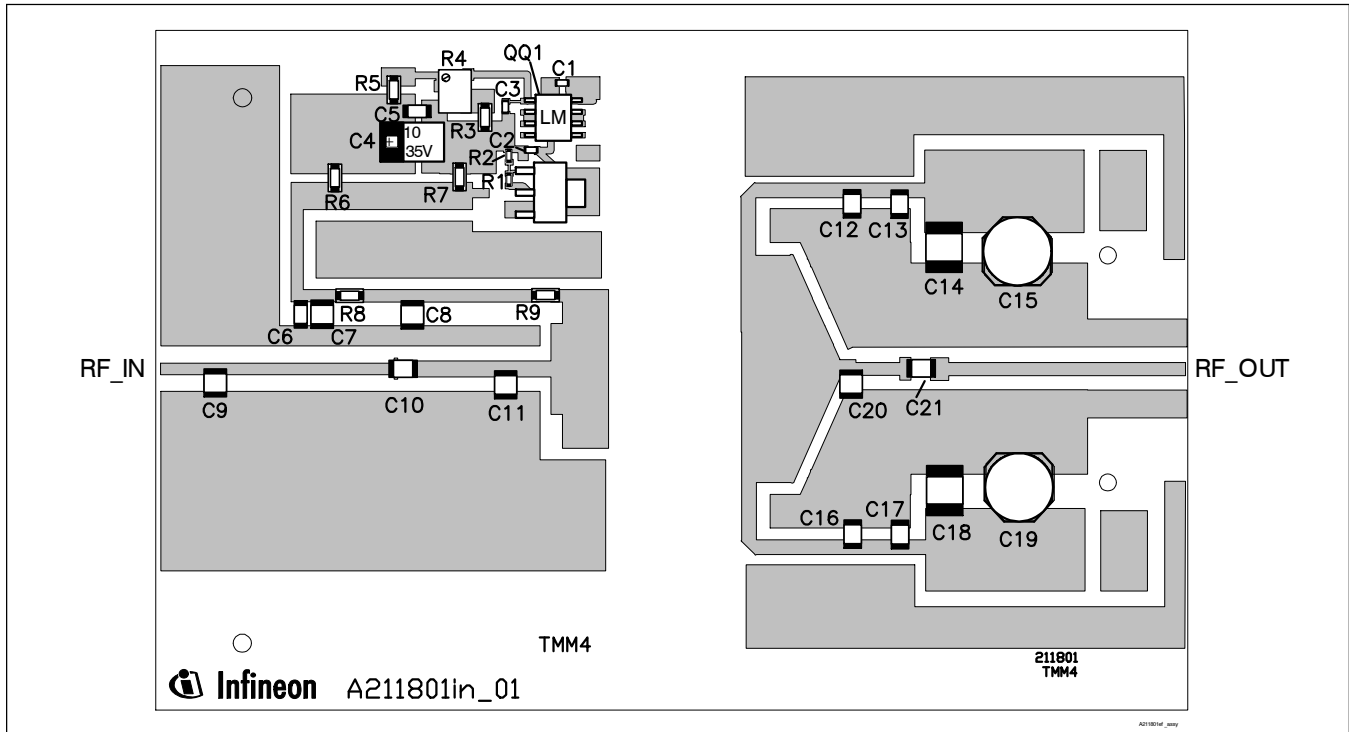
DUT	PTFA211801E or PTFA211801F	LDMOS Transistor	
PCB	0.76 mm [.030"] thick, $\epsilon_r = 4.5$	Rogers TMM4	2 oz. copper

Microstrip	Electrical Characteristics at 2140 MHz*	Dimensions: L x W (mm)	Dimensions: L x W (in.)
$l_1$	$0.097 \lambda$ , $50.0 \Omega$	7.37 x 1.40	0.290 x 0.055
$l_2$	$0.267 \lambda$ , $50.0 \Omega$	19.86 x 1.40	0.782 x 0.055
$l_3$	$0.136 \lambda$ , $42.0 \Omega$	10.24 x 1.85	0.403 x 0.073
$l_4$	$0.087 \lambda$ , $42.0 \Omega$	6.50 x 1.85	0.256 x 0.073
$l_5$	$0.018 \lambda$ , $11.4 \Omega$	1.24 x 10.24	0.049 x 0.403
$l_6$	$0.077 \lambda$ , $6.9 \Omega$	5.23 x 17.78	0.206 x 0.700
$l_7$	$0.207 \lambda$ , $48.0 \Omega$	15.70 x 1.50	0.618 x 0.059
$l_8, l_9$	$0.256 \lambda$ , $45.0 \Omega$	19.30 x 1.65	0.760 x 0.065
$l_{10}$	$0.087 \lambda$ , $5.0 \Omega$	5.84 x 25.40	0.230 x 1.000
$l_{11}$ (taper)	$0.073 \lambda$ , $5.0 \Omega / 40.0 \Omega$	5.59 x 25.40 / 1.98	0.220 x 1.000 / 0.078
$l_{12}$	$0.019 \lambda$ , $40.0 \Omega$	1.45 x 1.98	0.057 x 0.078
$l_{13}$	$0.087 \lambda$ , $50.0 \Omega$	6.65 x 1.40	0.262 x 0.055
$l_{14}$	$0.403 \lambda$ , $50.0 \Omega$	30.73 x 1.40	1.210 x 0.055

\*Electrical characteristics are rounded.



Reference Circuit (cont.)

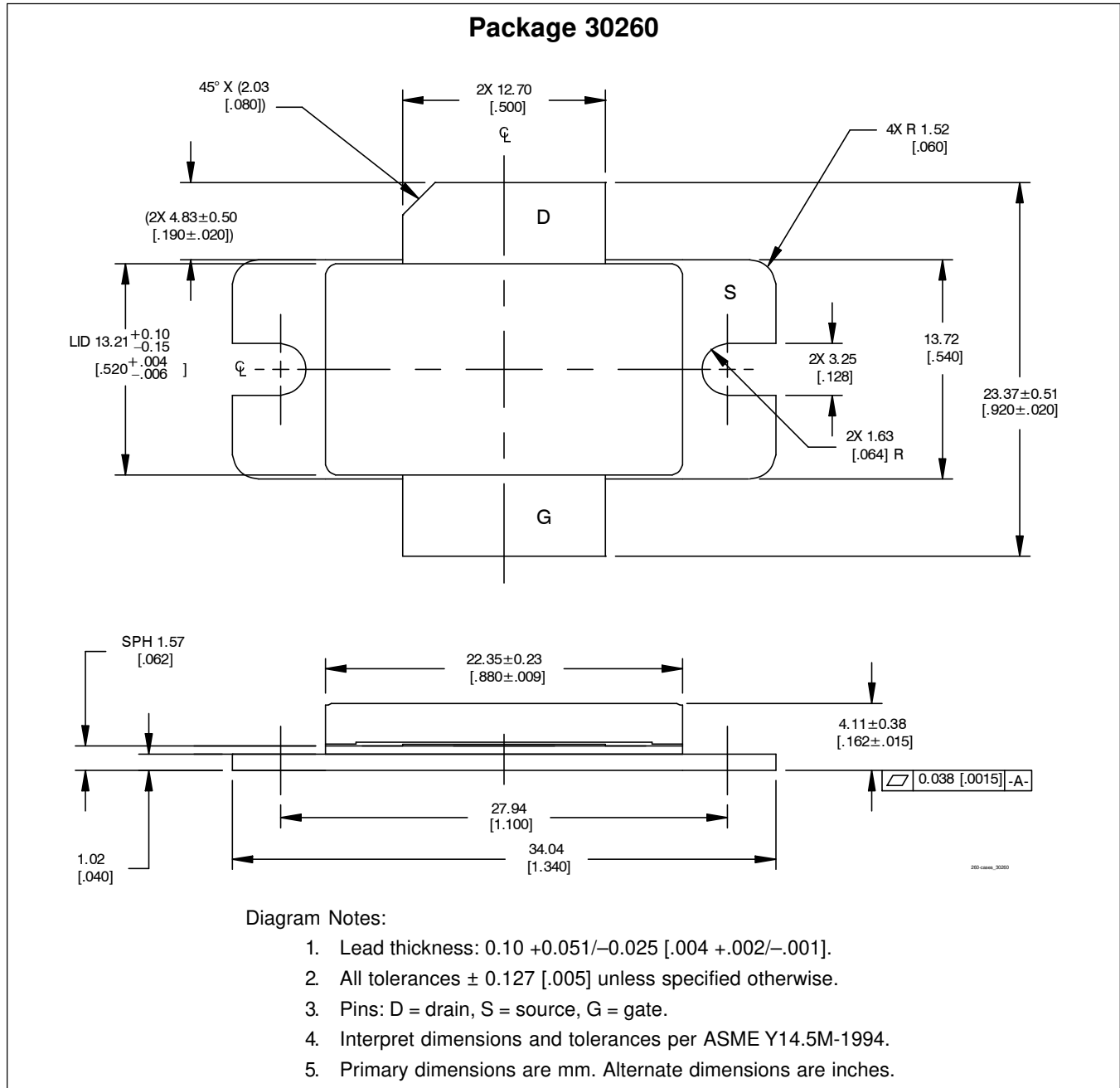


Reference Circuit<sup>1</sup> (not to scale)

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	PCS6106TR-ND
C5, C6	Capacitor, 0.1 µF	Digi-Key	PCC104BCT
C7	Capacitor, 0.01 µF	ATC	200B103
C8, C12, C16	Ceramic capacitor, 9.1 pF	ATC	100B 9R1
C9	Ceramic capacitor, 0.5 pF	ATC	100B 0R5
C10, C21	Ceramic capacitor, 8.2 pF	ATC	100B 8R2
C11	Ceramic capacitor, 1.5 pF	ATC	100B 1R5
C13, C17	Ceramic capacitor, 0.02 µF	ATC	200B 203
C14, C18	Ceramic capacitor, 1 µF	ATC	920C105
C15, C19	Electrolytic capacitor, 22 µF, 50 V	Digi-Key	PCE3374CT-ND
C20	Ceramic capacitor, 0.3 pF	ATC	100B 0R3
Q1	Transistor	Infineon	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, R9	Chip resistor, 10 ohms	Digi-Key	P10ECT-ND
R6, R7, R8	Chip resistor, 5.1 k-ohms	Digi-Key	P5.1KECT-ND

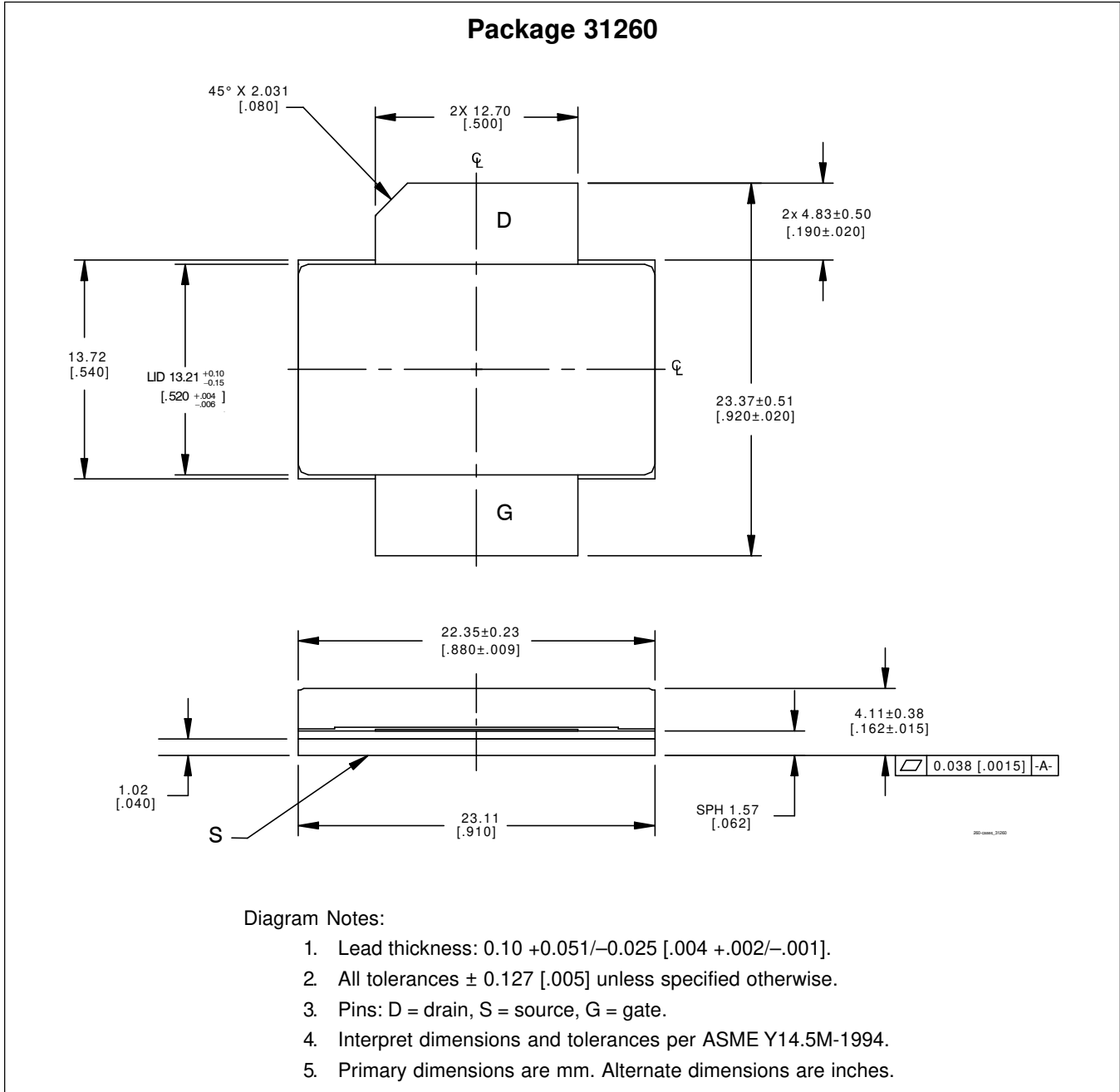
<sup>1</sup>Gerber Files for this circuit available on request

## Package Outline Specifications



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Package Outline Specifications (cont.)



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**Revision History:** 2005-06-10, Rev. 03

Data Sheet

Previous Version: 2005-05-02, Data Sheet

Page	Subjects (major changes since last revision)
4	Add Power Sweep graph for 30 V

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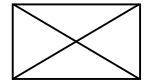
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