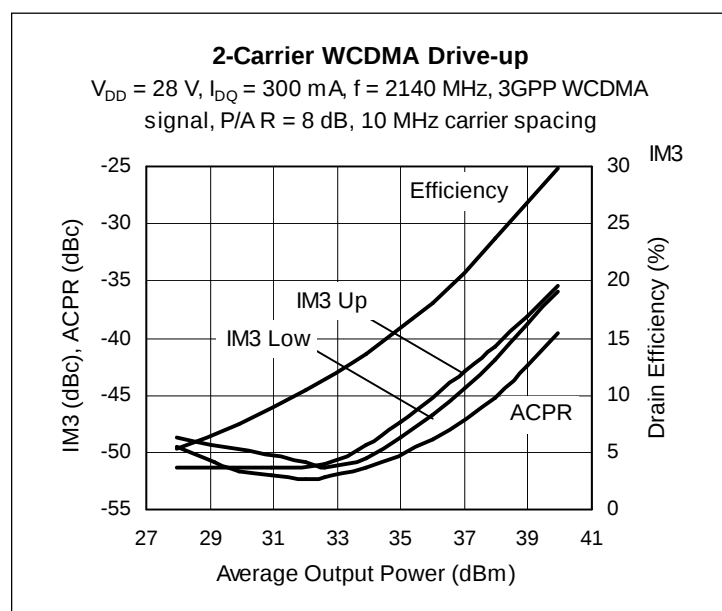
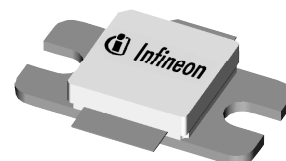


Thermally-Enhanced High Power RF LDMOS FET 30 W, 2110 – 2170 MHz

Description

The PTFA210301E is a thermally-enhanced, 30-watt, internally matched *GOLDMOS* FET intended for WCDMA applications. It is optimized 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.

PTFA210301E
Package H-30265-2



Features

- Thermally-enhanced packaging, Pb-free and RoHS-compliant
- Broadband internal matching
- Typical two-carrier WCDMA performance at 2140 MHz, 28 V
 - Average output power = 33 dBm
 - Linear Gain = 16.5 dB
 - Intermodulation distortion = -50 dBc
 - Adjacent channel power = -52 dBc
- Typical CW performance, 2170 MHz, 28 V
 - Output power at P-1dB = 40 W
 - Efficiency = 59%
- Integrated ESD protection: Human Body Model, Class 2 (minimum)
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 30 W (CW) output power

RF Characteristics

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

$V_{DD} = 28\text{ V}$, $I_{DQ} = 300\text{ mA}$, $P_{OUT} = 8\text{ W}$ 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}	—	17	—	dB
Drain Efficiency	η_D	—	27	—	%
Intermodulation Distortion	IMD	—	-38	—	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)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 300\text{ mA}$, $P_{OUT} = 30\text{ W PEP}$, $f = 2170\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	16	17	—	dB
Drain Efficiency	η_D	34	36	—	%
Intermodulation Distortion	IMD	—	−32	−30	dBc

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
	$V_{DS} = 63\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	10.0	μA
On-State Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.23	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ} = 300\text{ mA}$	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

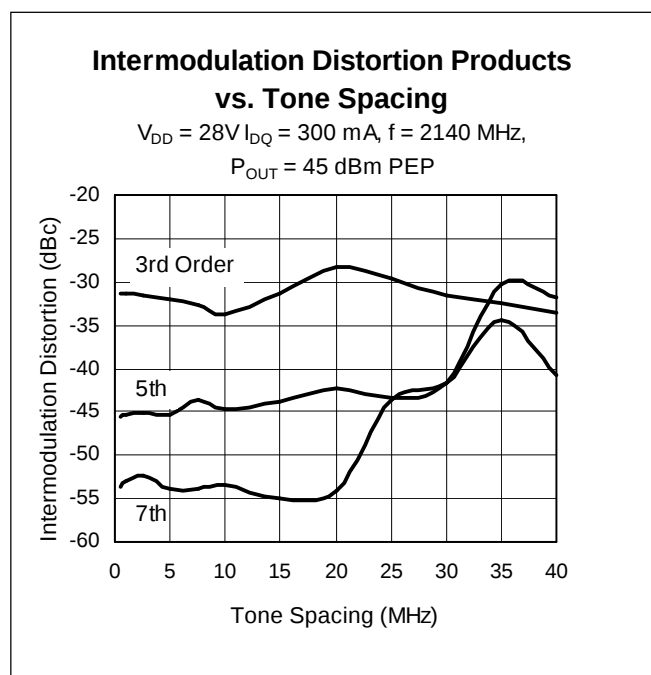
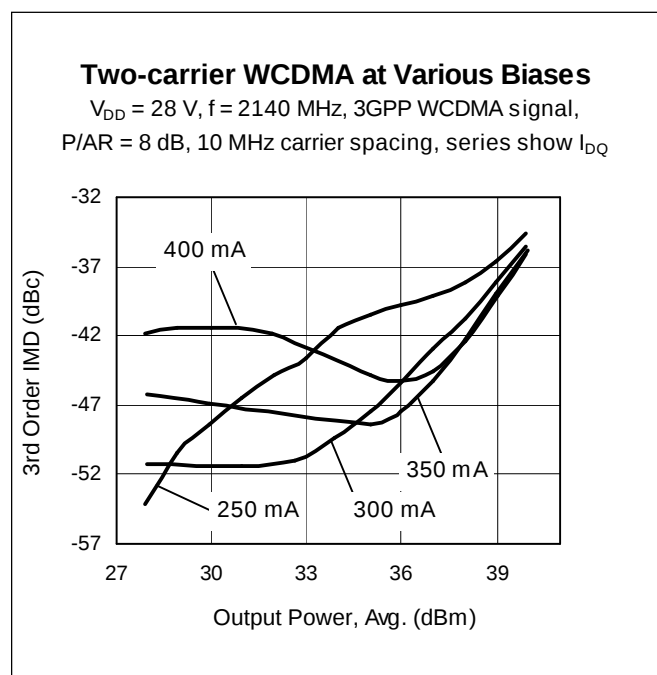
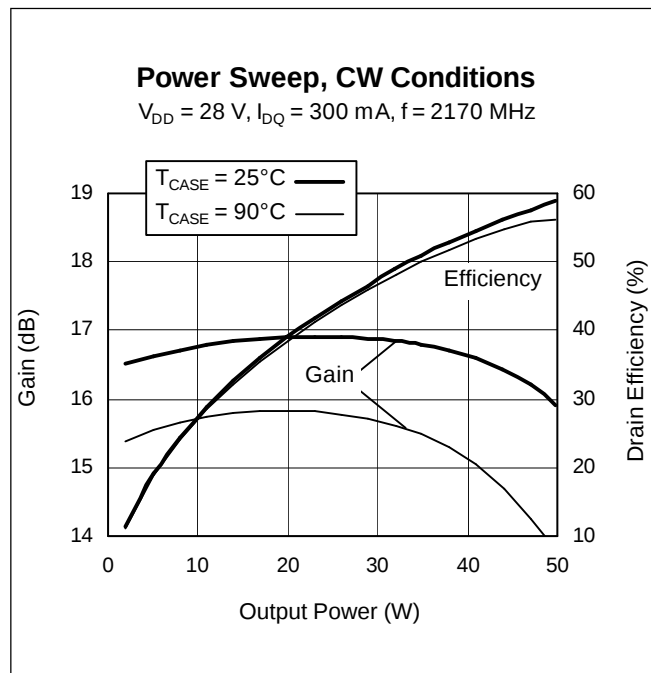
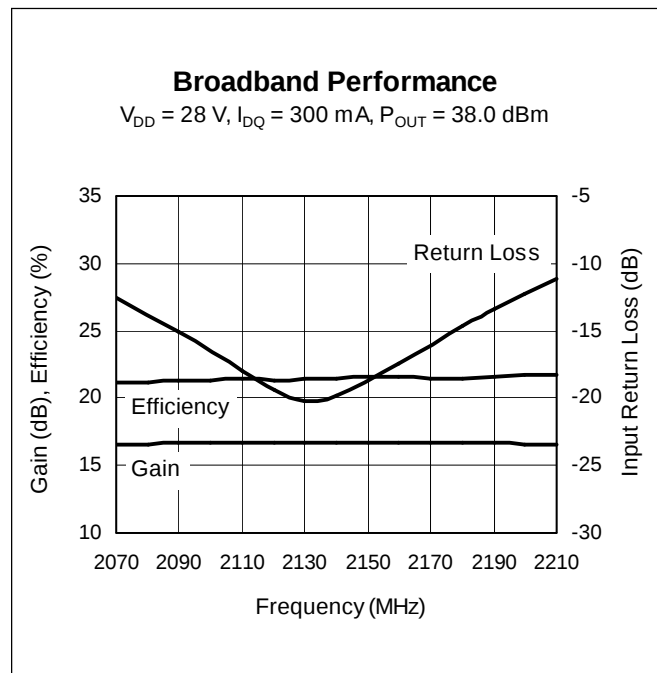
Maximum Ratings

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	145	W
		0.83	W/ $^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	−40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$, 30 W CW)	$R_{\theta JC}$	1.2	$^{\circ}\text{C/W}$

Ordering Information

Type and Version	Package Outline	Package Description	Marking
PTFA210301E V1	H-30265-2	Thermally-enhanced slotted flange, single-ended	PTFA210301E

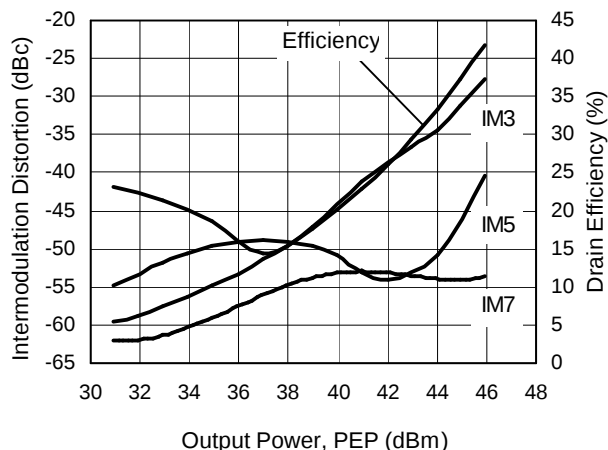
Typical Performance (data taken in a production test fixture)



Typical Performance (cont.)

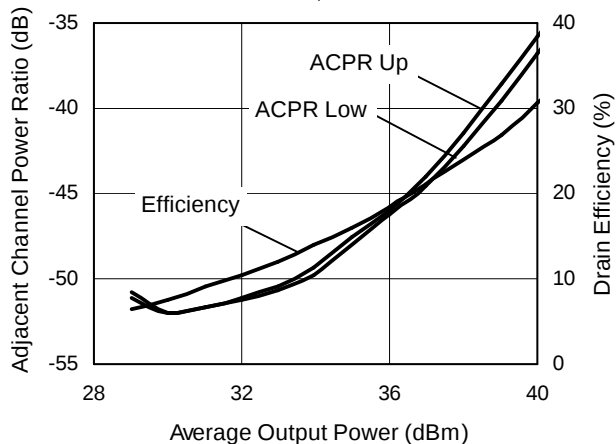
2-Tone Drive-up

$V_{DD} = 28\text{ V}$, $I_{DQ} = 300\text{ mA}$,
 $f = 2140\text{ MHz}$, tone spacing = 1 MHz



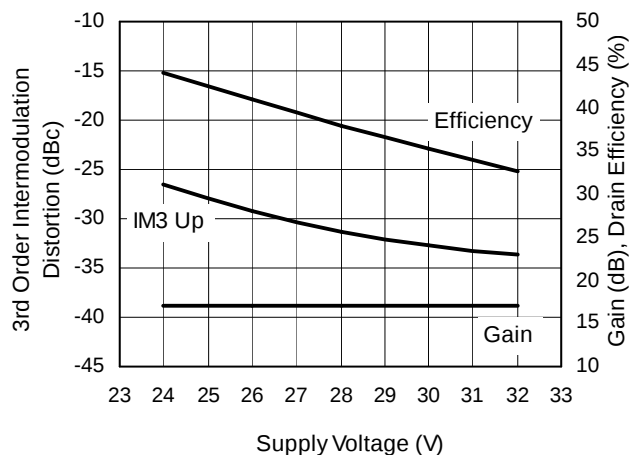
Single-carrier WCDMA Drive-up

$V_{DD} = 28\text{ V}$, $I_{DQ} = 300\text{ mA}$, $f = 2140\text{ MHz}$,
 3GPP WCDMA signal, TM1 w/16 DPCH, 67% clipping,
 P/A R = 8.5 dB, 3.84 MHz BW



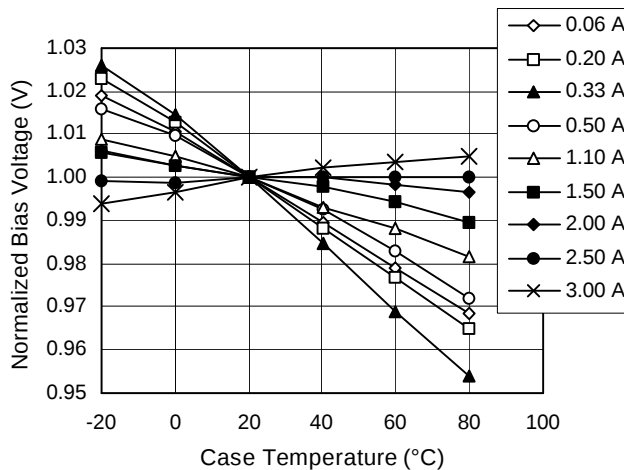
IM3, Drain Efficiency and Gain vs. Supply Voltage

$I_{DQ} = 300\text{ mA}$, $f = 2140\text{ MHz}$,
 $P_{OUT} (PEP) = 45\text{ dBm}$, tone spacing = 1 MHz

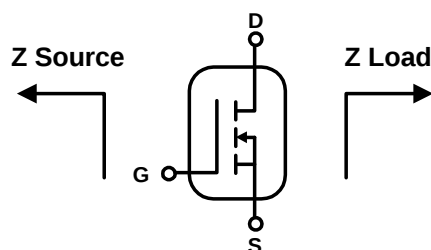


Bias Voltage vs. Temperature

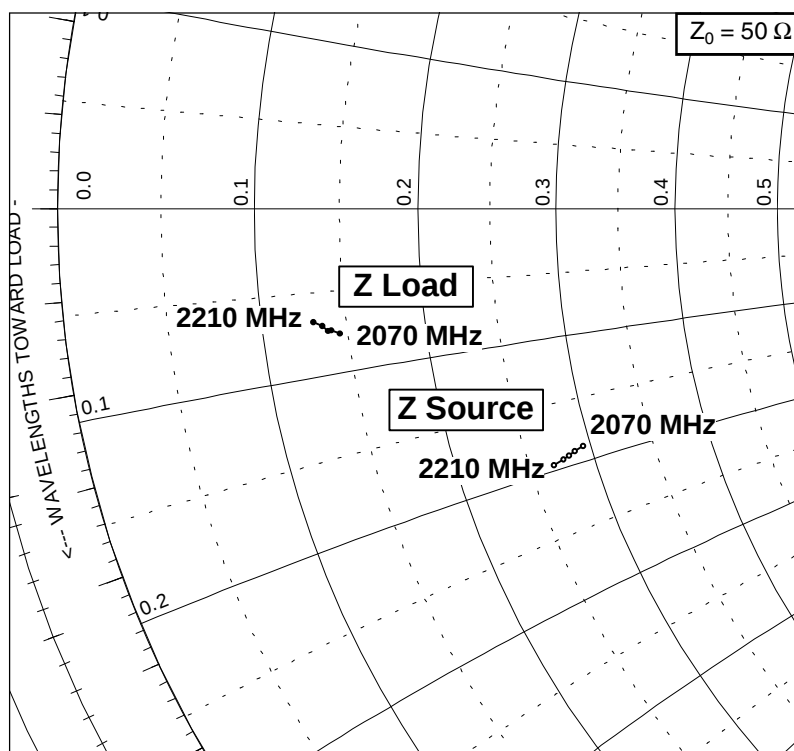
Voltage normalized to typical gate voltage,
 series show current



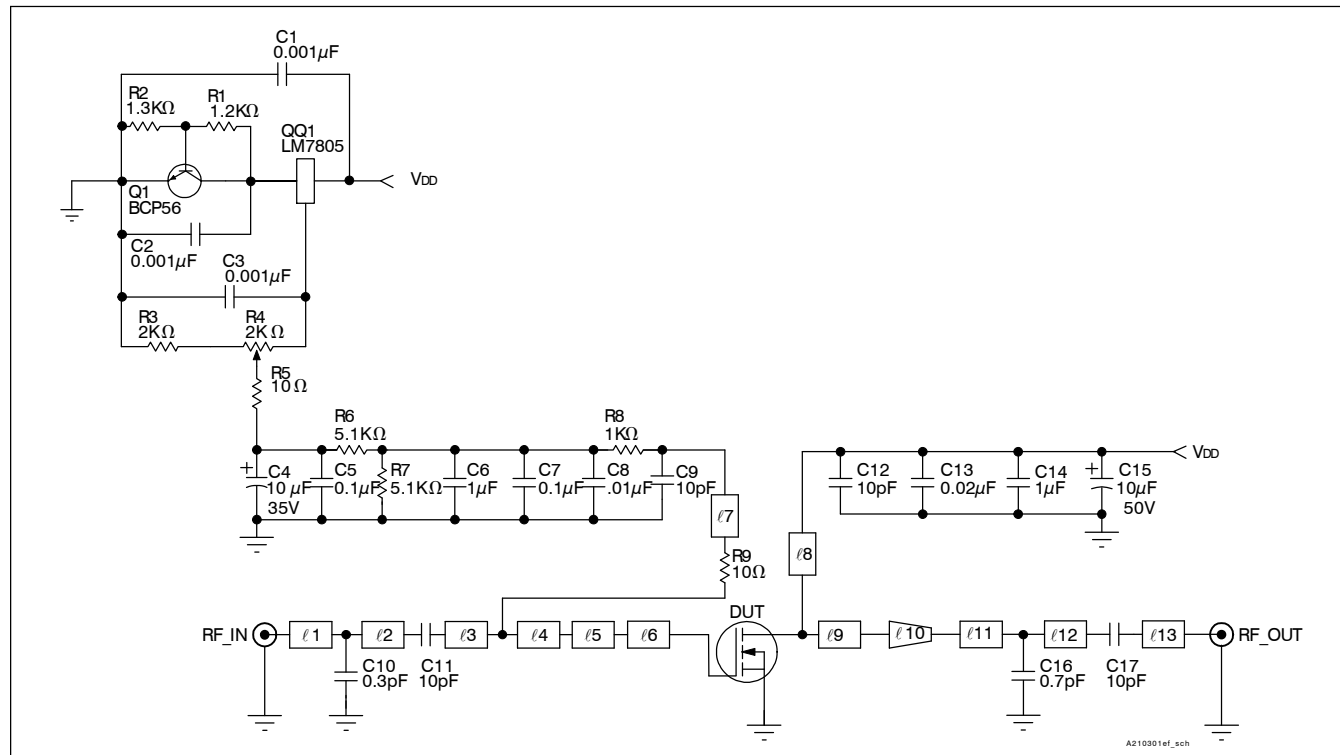
Broadband Circuit Impedance



Frequency MHz	Z Source W		Z Load W	
	R	jX	R	jX
2070	14.70	-9.41	7.26	-3.82
2110	14.33	-9.52	7.01	-3.70
2140	14.07	-9.61	6.91	-3.69
2170	13.81	-9.69	6.77	-3.53
2210	13.40	-9.79	6.52	-3.39



Reference Circuit



Reference Circuit Schematic for $f = 2140$ MHz

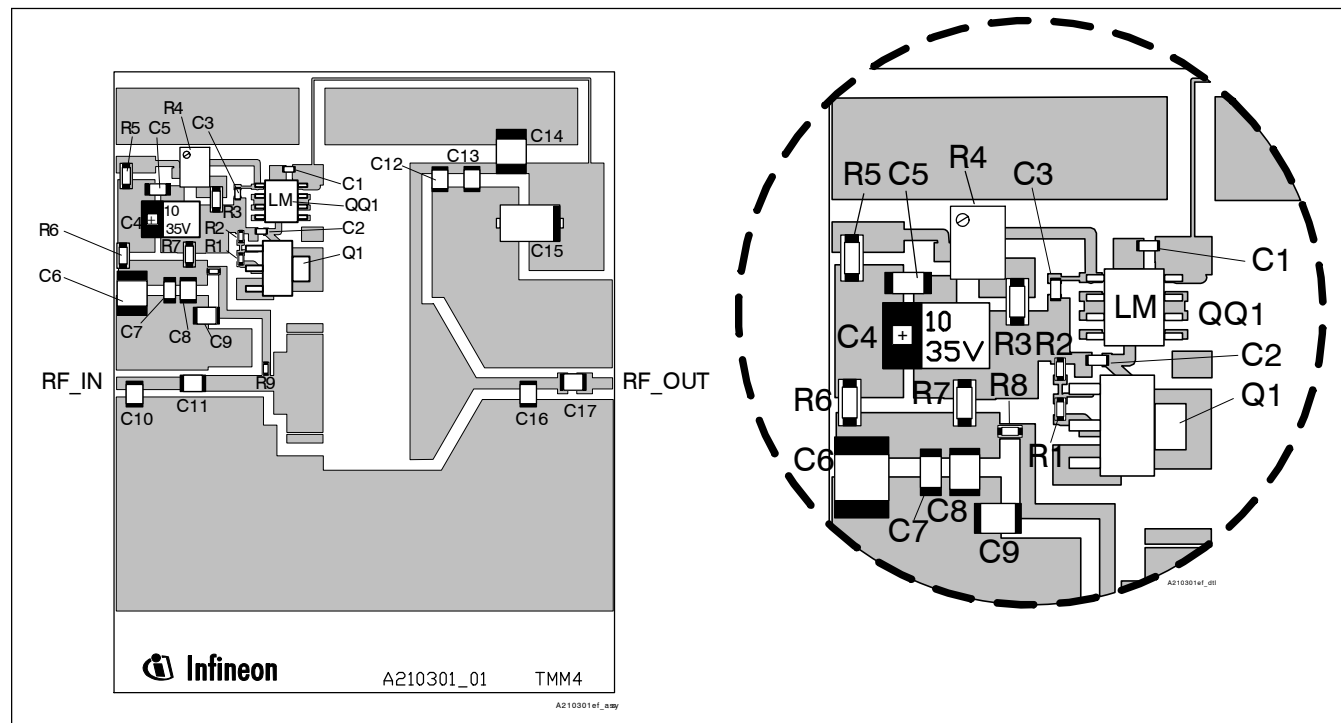
Circuit Assembly Information

DUT	PTFA210301E	LDMOS Transistor	
PCB	0.76 mm [.030"] thick, $\epsilon_r = 4.5$	Rogers TMM4	2 oz. copper

Microstrip	Electrical Characteristics at 2140 MHz ¹	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ_1	0.013 λ , 50.0 Ω	1.02 x 1.42	0.040 x 0.056
ℓ_2	0.081 λ , 50.0 Ω	6.17 x 1.42	0.243 x 0.056
ℓ_3	0.108 λ , 42.0 Ω	8.23 x 1.85	0.324 x 0.073
ℓ_4	0.172 λ , 61.0 Ω	13.39 x 0.94	0.527 x 0.037
ℓ_5	0.013 λ , 42.0 Ω	0.94 x 1.85	0.037 x 0.073
ℓ_6	0.023 λ , 15.0 Ω	1.63 x 7.57	0.064 x 0.298
ℓ_7	0.063 λ , 9.9 Ω	4.29 x 12.07	0.169 x 0.475
ℓ_8	0.171 λ , 53.0 Ω	13.13 x 1.22	0.517 x 0.048
ℓ_9	0.039 λ , 6.5 Ω	2.64 x 19.10	0.104 x 0.752
ℓ_{10} (taper)	0.185 λ , 6.5 Ω / 50.0 Ω	4.70 x 19.10 / 1.37	0.185 x 0.752 / 0.054
ℓ_{11}	0.025 λ , 50.0 Ω	1.88 x 1.42	0.074 x 0.056
ℓ_{12}	0.128 λ , 50.0 Ω	9.78 x 1.42	0.385 x 0.056
ℓ_{13}	0.057 λ , 50.0 Ω	4.32 x 1.42	0.170 x 0.056

¹Electrical characteristics are rounded.

Reference Circuit (cont.)

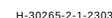


Reference Circuit* (not to scale)

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	PCS6106TR-ND
C5, C7	Capacitor, 0.1 μ F	Digi-Key	P4525-ND
C6, C14	Capacitor, 1 μ F	Digi-Key	PCC104BCT-ND
C8	Capacitor, 0.01 μ F	ATC	100B 103
C9, C11, C12, C17	Capacitor, 10 pF	ATC	100B 100
C10	Capacitor, 0.3 pF	ATC	100B 0R3
C13	Capacitor, 0.02 μ F	ATC	100B 203
C15	Tantalum capacitor, 10 μ F, 50 V	Garrett Electronics	TPS106K050R0400
C16	Capacitor, 0.7 pF	ATC	100B 0R7
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	Chip resistor, 10 ohms	Digi-Key	P10ECT-ND
R6, R7	Chip resistor, 5.1 k-ohms	Digi-Key	P5.1KECT-ND
R8	Chip resistor, 1 k-ohms	Digi-Key	P1.0KGCT-ND
R9	Chip resistor, 10 k-ohms	Digi-Key	P10GCT-ND

*Gerber Files for this circuit available on request

Package H-30265-2



1. Lead thickness: $0.10 + 0.051/-0.025$ [$0.004 + .002/-0.001$].
2. All tolerances ± 0.127 [0.005] 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 ± 0.38 micron [45 ± 15 microinch]

Rev. 03, 2008-03-04

Revision History: 2008-03-04

Data Sheet

Previous Version: 2005-06-22, Data Sheet, Rev. 02

Page	Subjects (major changes since last revision)
All	Remove references to alternate products.

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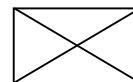
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