

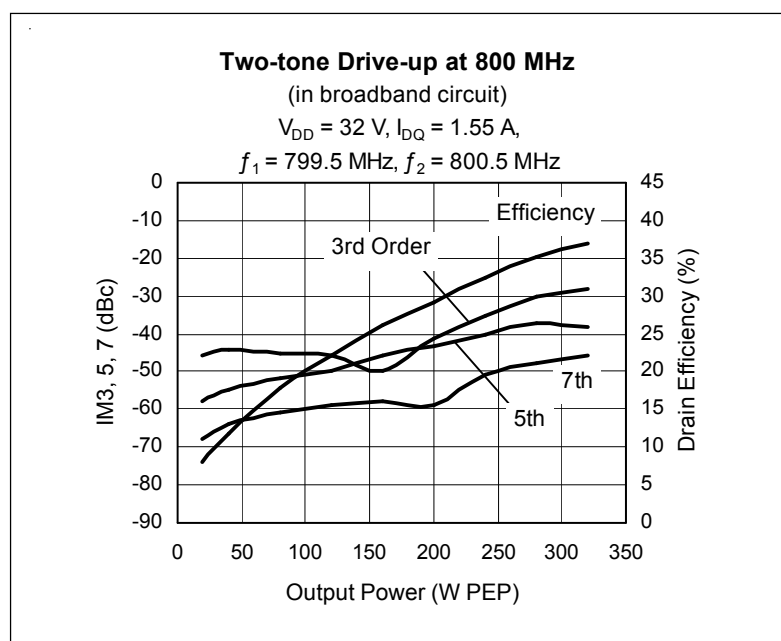
Thermally-Enhanced High Power RF LDMOS FET 300 W, 470 – 860 MHz

Description

The PTFA043002 is a 300-watt, internally-matched, laterally-diffused, **GOLDMOS®** push-pull FET intended for analog and digital broadcast, including 8VSB and COFDM applications from 470 to 860 MHz. The thermally-enhanced package provides the coolest operation available. Full gold metallization ensures excellent device lifetime and reliability.



PTFA043002E
Package H-30275-4



Features

- Thermally-enhanced package
- Broadband internal matching
- Typical 8VSB performance
 - Average output power = 100 W
 - Gain = 16 dB
 - Adjacent < -33 dBc
- Integrated ESD protection: Human Body Model, Class 2 (minimum)
- Excellent thermal stability
- Low HCI drift
- Pb-free and RoHS compliant
- Capable of handling 5:1 VSWR at 32 V, 300 W (CW) output power

RF Characteristics

ATSC 8VSB Characteristics (broadband fixture, push-pull configuration)

($V_{DD} = 32\text{ V}$, $P_{OUT} = 100\text{ W}_{AVG}$, $I_{DQ} = 1.55\text{ A}$, $f = 800\text{ MHz}$)

Characteristic	Symbol	Min	Typ	Max	Unit
Common Source Power Gain	G_{ps}	—	16	—	dB
Drain Efficiency	η_D	—	28	—	%
Flrst Adjacent	IMD	—	-33	—	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 narrowband test fixture)

 $V_{DD} = 32\text{ V}$, $I_{DQ} = 1.55\text{ A}$, $P_{OUT} = 300\text{ W}_{PEP}$, $f = 860\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	16	17.5	—	dB
Drain Efficiency	η_D	38	41	—	%
Intermodulation Distortion	IMD	—	-29	-28	dBc

DC Characteristics (one side)

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_{DS} = 10\text{ mA/side}$	$V_{(BR)DSS}$	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	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.08	—	$\text{m}\Omega$
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ} = 0.75\text{ A/side}$	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

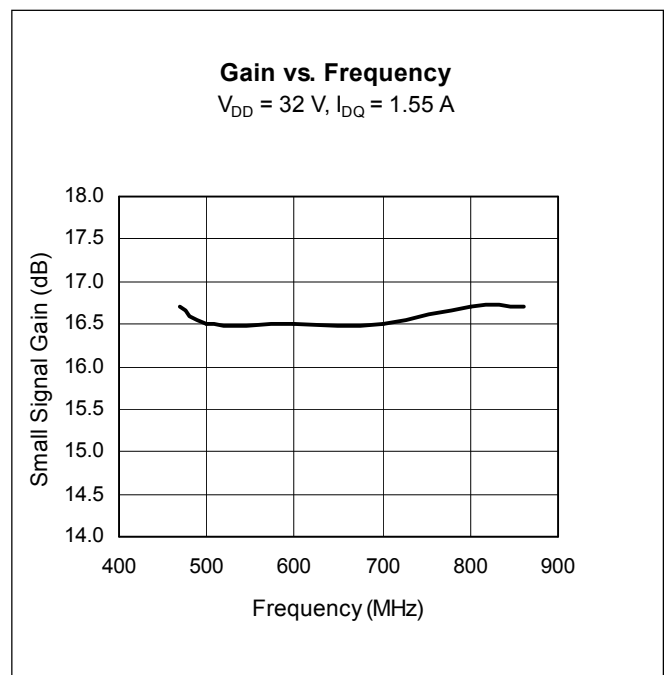
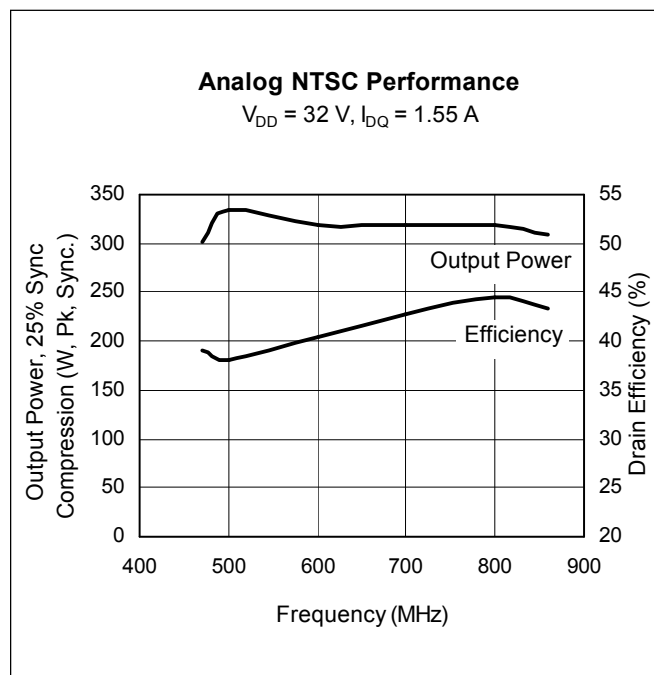
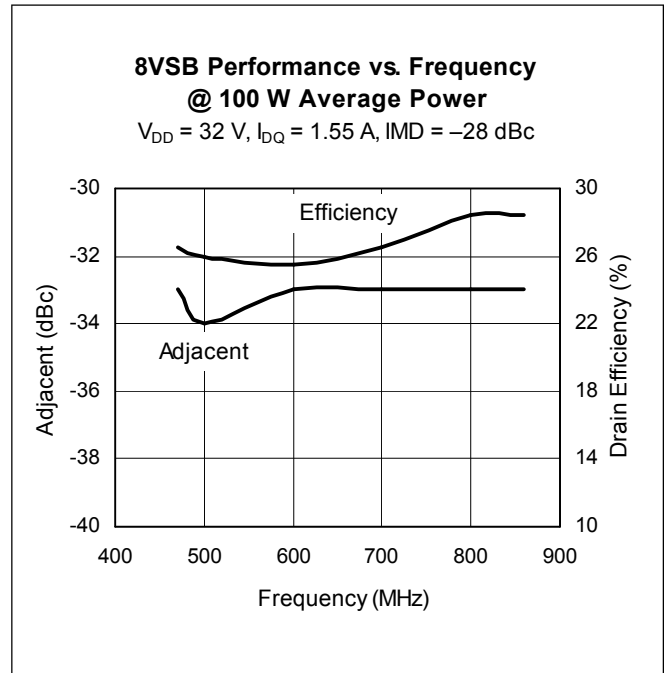
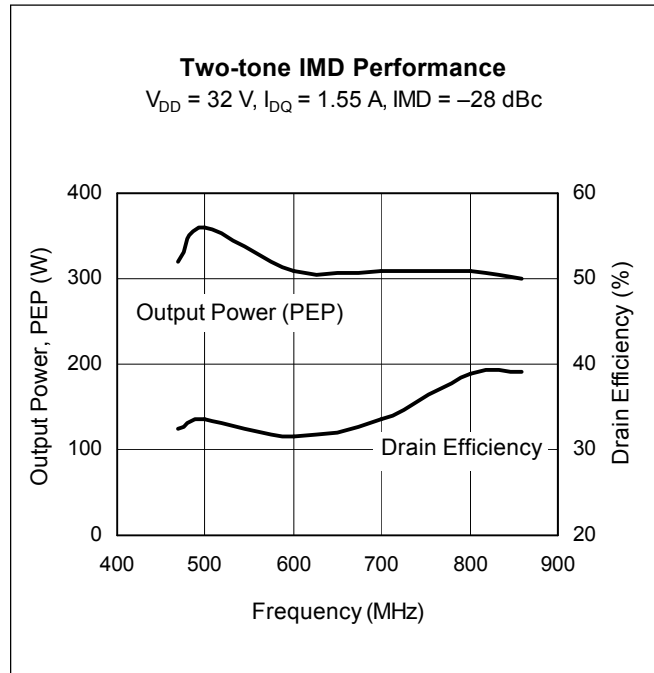
Maximum Ratings

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	761	W
		4.35	W/ $^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$, 300 W CW)	$R_{\theta JC}$	0.23	$^{\circ}\text{C/W}$

Ordering Information

Type	Package Outline	Package Description	Marking
PTFA043002E	H-30275-4	Thermally-enhanced, flange mount	PTFA043002E

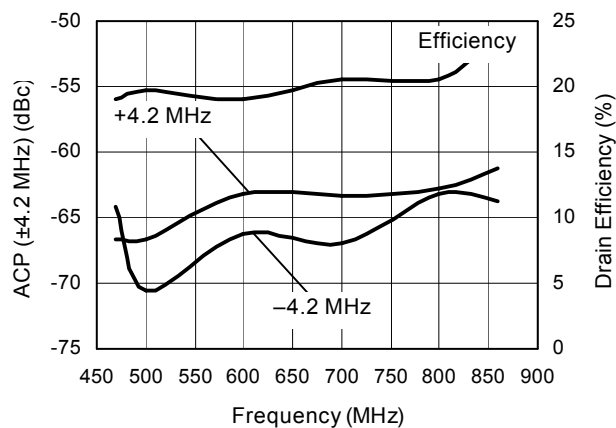
Typical Performance (data taken in a broadband test fixture)



Typical Performance (cont.)

DVB Adjacent Channel Power

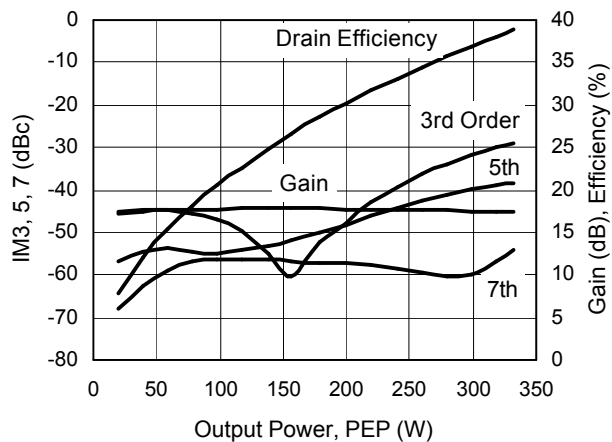
$V_{DD} = 32\text{ V}$, $I_{DQ} = 1.55\text{ A}$,
63 W DVB signal



Two-tone Drive-up at 800 MHz

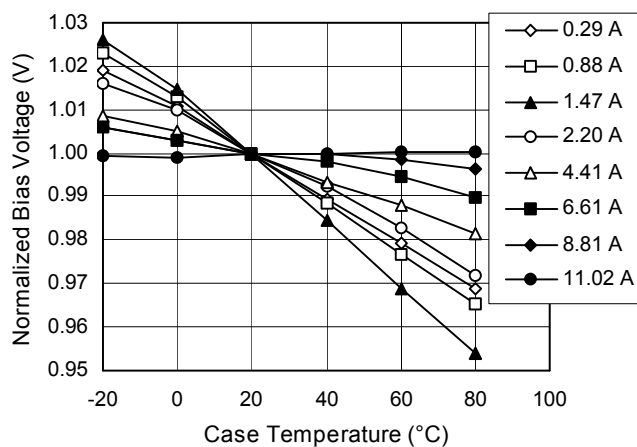
(in narrowband circuit)

$V_{DD} = 32\text{ V}$, $I_{DQ} = 1.55\text{ A}$, $f_1 = 799.5\text{ MHz}$, $f_2 = 800.5\text{ MHz}$

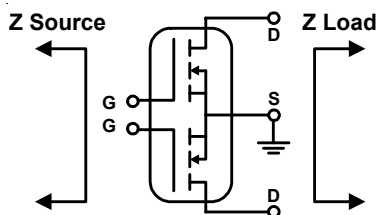


Bias Voltage vs. Temperature

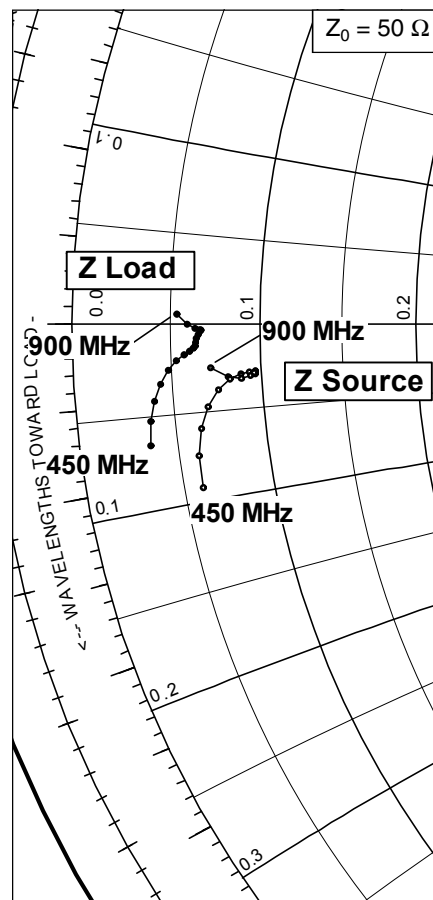
Voltage normalized to typical gate voltage,
series show current



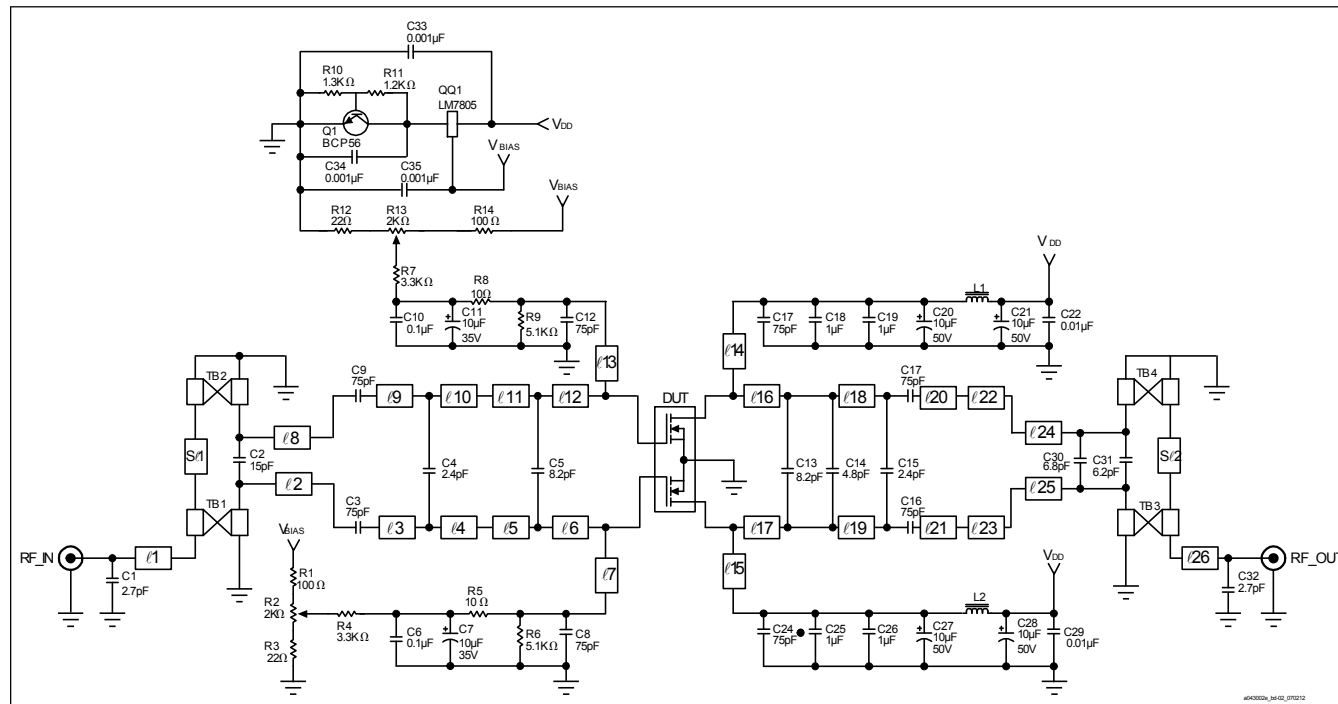
Broadband Circuit Impedance Data



Frequency MHz	Z Source W		Z Load W	
	R	jX	R	jX
450	3.00	-4.61	1.78	-3.26
475	3.02	-3.71	1.85	-2.63
500	3.18	-2.96	1.99	-2.09
525	3.43	-2.36	2.18	-1.64
550	3.75	-1.90	2.41	-1.28
575	4.10	-1.61	2.64	-1.03
600	4.42	-1.47	2.85	-0.87
625	4.66	-1.44	3.01	-0.77
650	4.79	-1.47	3.10	-0.70
675	4.84	-1.50	3.15	-0.63
700	4.84	-1.50	3.17	-0.53
725	4.82	-1.46	3.20	-0.42
750	4.82	-1.42	3.24	-0.31
775	4.83	-1.41	3.30	-0.22
800	4.80	-1.46	3.33	-0.18
825	4.69	-1.54	3.30	-0.16
850	4.43	-1.61	3.17	-0.13
875	4.04	-1.54	2.95	-0.01
900	3.57	-1.27	2.67	0.27



Reference Circuit



Reference circuit schematic for 470 to 860 MHz—rated for 300 W (PEP) only

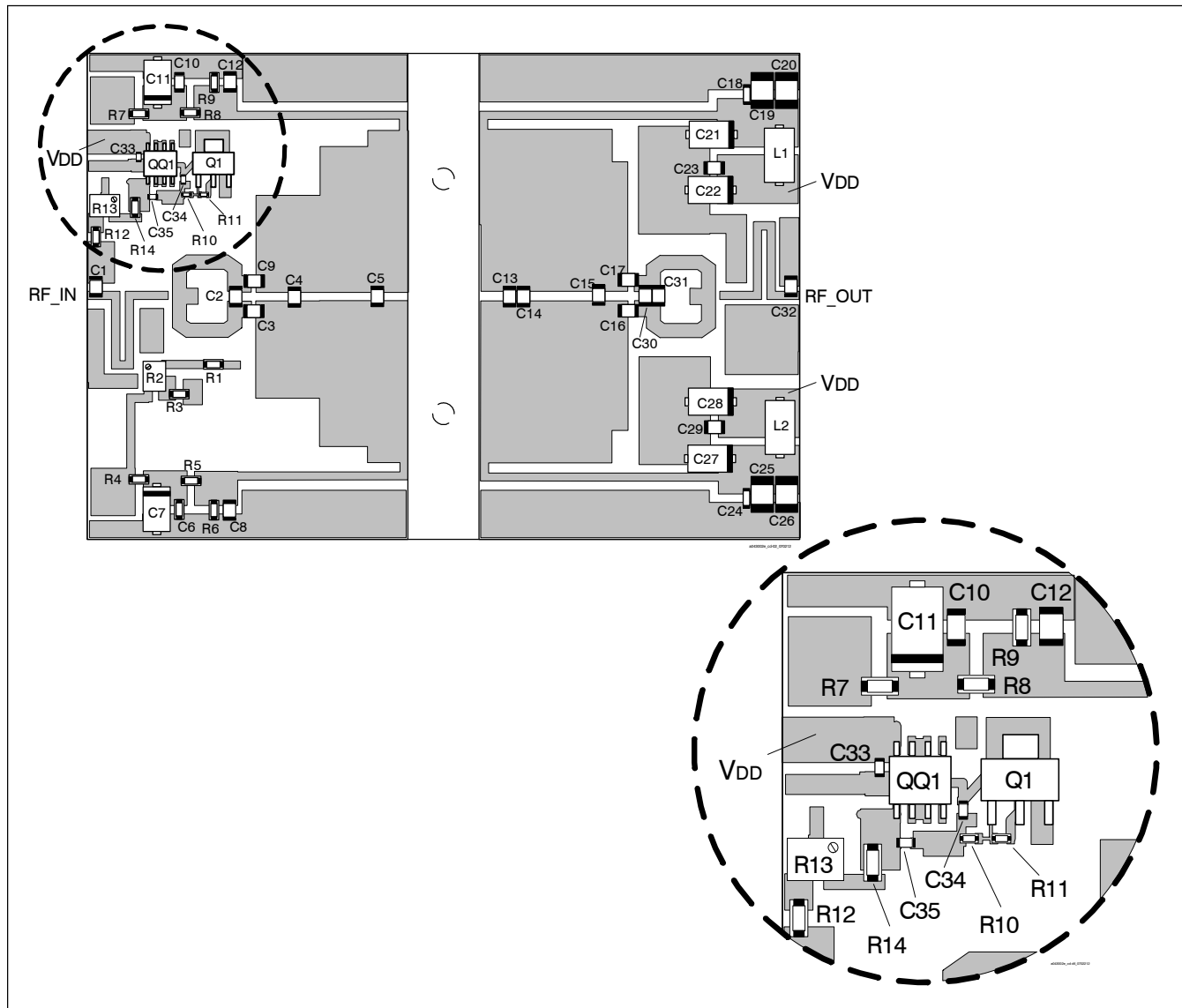
Circuit Assembly Information

DUT	PTFA043002E	LDMOS transistor
Circuit board	0.25 mm [.010"] over .635 mm [.025"] thick, $\epsilon_r = 10.2$ copper: 10 mils top 25 mils bottom	Rogers 3010, multilayer

Microstrip	Electrical Characteristics at 860 MHz ¹	Dimensions: L x W (mm)	Dimensions: L x W (in.)
TB1, TB2, TB3, TB4	Broadside coupled striplines	14.63 x 1.70	0.576 x 0.067
S1, S2	0.017 λ , 15.6 Ω	33.02 x 1.32	0.075 x 0.067
l1, l26	0.250 λ , 39.0 Ω	0.51 x 2.54	1.300 x 0.052
l2, l8, l24, l25	0.004 λ , 26.0 Ω	5.59 x 15.24	0.020 x 0.100
l3, l9	0.049 λ , 6.1 Ω	4.45 x 15.24	0.220 x 0.600
l4, l10	0.038 λ , 6.1 Ω	7.62 x 22.86	0.175 x 0.600
l5, l11	0.067 λ , 4.2 Ω	6.25 x 25.40	0.300 x 0.900
l6, l12	0.055 λ , 3.8 Ω	28.45 x 1.22	0.246 x 1.000
l7, l13	0.216 λ , 41.0 Ω	40.39 x 1.22	1.120 x 0.048
l14, l15	0.307 λ , 41.0 Ω	5.08 x 25.40	1.590 x 0.048
l16, l17	0.045 λ , 3.8 Ω	12.70 x 25.40	0.200 x 1.000
l18, l19	0.112 λ , 3.8 Ω	2.74 x 25.40	0.500 x 1.000
l20, l21	0.024 λ , 3.8 Ω	2.54 x 20.32	0.108 x 1.000
l22, l23	0.022 λ , 4.7 Ω	2.54 x 20.32	0.100 x 0.800

¹Electrical characteristics are rounded.

Reference Circuit (cont.)



Reference circuit assembly diagram* (not to scale)—rated for 300 W (PEP) only

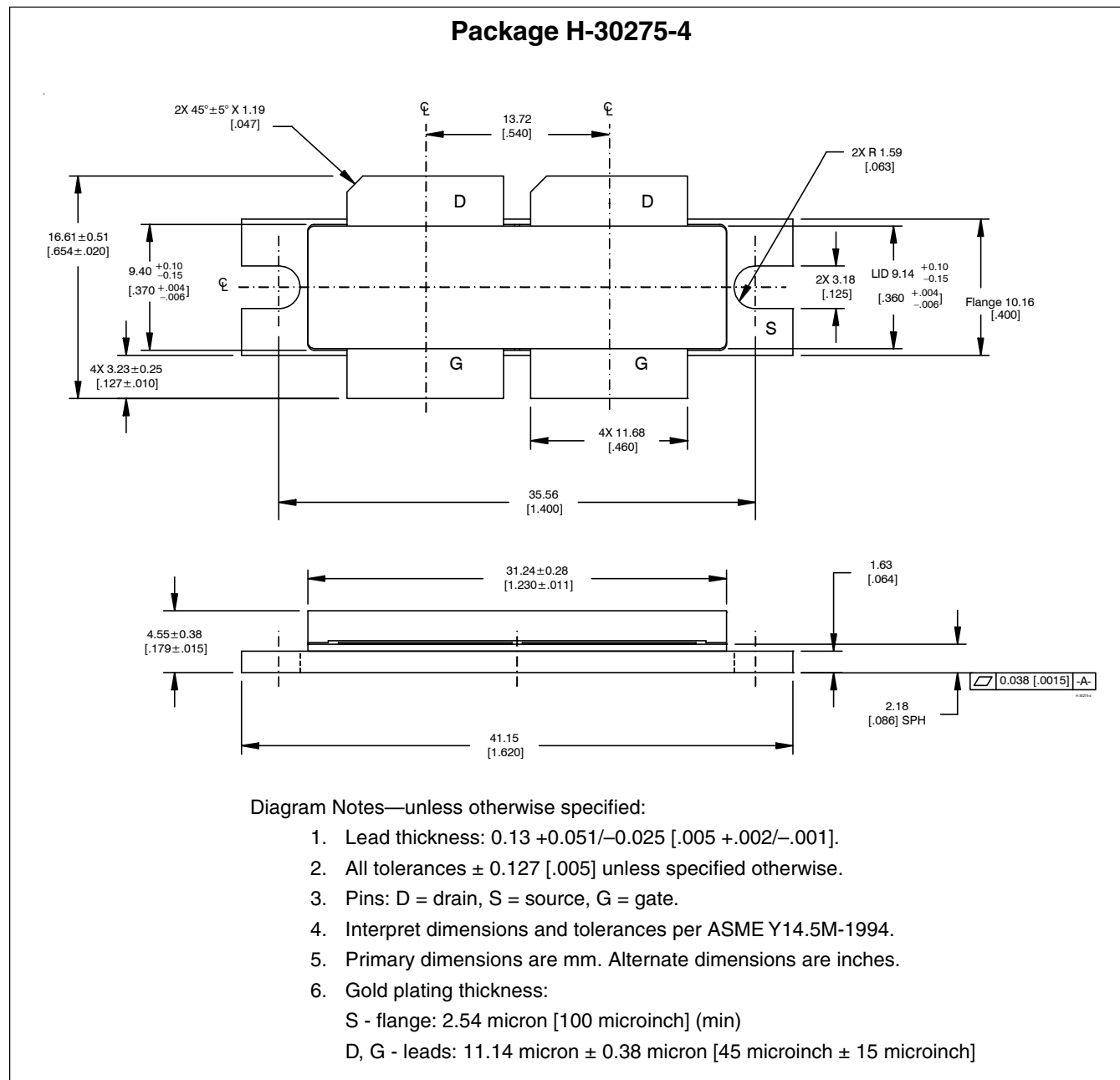
*Gerber Files for this circuit available on request.

Reference Circuit (cont.)

Component	Description	Suggested Manufacturer	P/N or Comment
C1, C32	Ceramic capacitor, 2.7 pF	ATC	100B 2R7
C2	Capacitor, 15 pF	ATC	100B 150
C3, C8, C9, C12, C16, C17, C18, C24	Ceramic capacitor, 75 pF	ATC	100B 750
C4, C15	Ceramic capacitor, 2.4 pF	ATC	100B 2R4
C5, C13	Ceramic capacitor, 8.2 pF	ATC	100B 8R2
C6, C10	Capacitor, 0.1 μ F	Digi-Key	PCC104BCT-ND
C7, C11	Tantalum capacitor, 10 μ F, 35 V	Digi-Key	PCS6106TR-ND
C14	Ceramic capacitor, 4.8 pF	ATC	100B 4R8
C19, C20, C25, C26	Capacitor, 1 μ F	ATC	920C105
C21, C22, C27, C28	Tantalum capacitor, 10 μ F, 50 V	Garrett Electronics	TPS106K050R0400
C23, C29	Ceramic capacitor, 0.01 μ F	ATC	200B 103
C30	Ceramic capacitor, 6.8 pF	ATC	100B 6R8
C31	Ceramic capacitor, 6.2 pF	ATC	100B 6R2
C33, C34, C35	Capacitor, 0.001 μ F	Digi-Key	PCC1772CT-ND
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, R14	Chip Resistor 100 ohms	Digi-Key	P100ECT-ND
R2, R13	Potentiometer 2 k-ohms	Digi-Key	3224W-202ETR-ND
R3, R12	Chip Resistor 22 ohms	Digi-Key	P22KECT-ND
R4, R7	Chip Resistor 3.3 k-ohms	Digi-Key	P3.3KECT-ND
R5, R8	Chip Resistor 10 ohms	Digi-Key	P10ECT-ND
R6, R9	Chip Resistor 5.1 k-ohms	Digi-Key	P5.1KECT-ND
R10	Chip Resistor 1.0 k-ohms	Digi-Key	P1KGCT-ND
R11	Chip Resistor 1.1 k-ohms	Digi-Key	P1.1KGCT-ND

See next page for package information

Package Outline Specifications



Find the latest and most complete information about products and packaging at the Infineon Internet page
<http://www.infineon.com/products>

Revision History: 2009-02-20 Data Sheet
Previous Version: 2005-11-18, Data Sheet

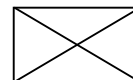
Page	Subjects (major changes since last revision)
6	Revise circuit board information.
1, 2, 9	Update package designation.
8	Fixed typing error

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