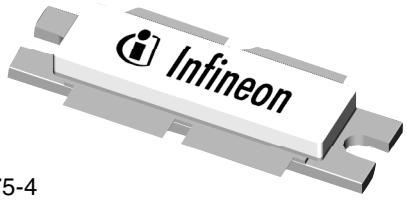
green Product

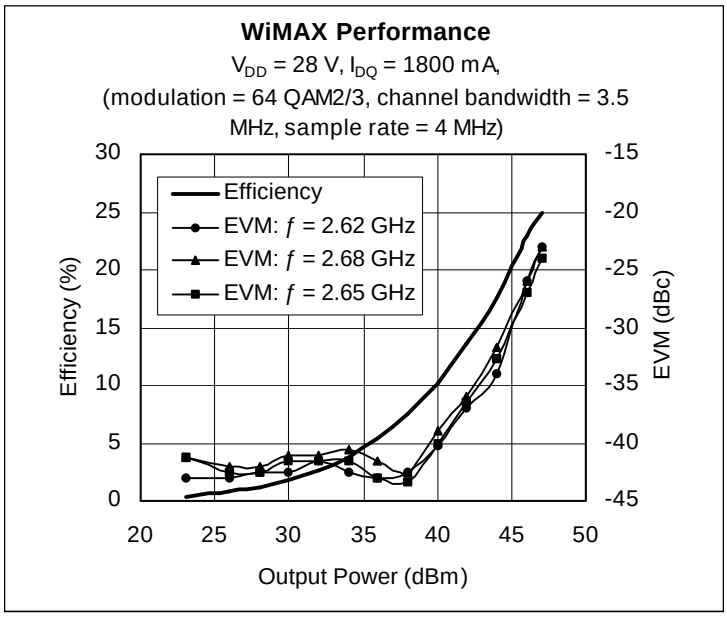
Thermally-Enhanced High Power RF LDMOS FETs
170 W, 2500 – 2700 MHz

Description

The PTFA261702E is a 170-watt LDMOS FET designed for WiMAX power amplifier applications in the 2500 to 2700 MHz band. Features include input and output matching, and thermally-enhanced package with slotted flange. Manufactured with Infineon's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PTFA261702E
Package H-30275-4



Features

- Thermally-enhanced packages, Pb-free and RoHS-compliant
- Broadband internal matching
- Typical WiMAX performance at 2650 MHz, 28 V
  - Average output power = 32 W
  - Linear gain = 15 dB
  - Efficiency = 20%
  - Error vector magnitude = –29 dB
- Integrated ESD protection: Human Body Model, Class 2 (minimum)
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 170 W (CW) output power

RF Characteristics

WiMAX Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)

V_{DD} = 28 V, I_{DQ} = 1800 mA, P_{OUT} = 32 W average
ƒ = 2650 MHz, modulation = 64 QAM 2/3, channel bandwidth = 3.5 MHz, sample rate = 4 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	15	—	dB
Drain Efficiency	η_D	—	20	—	%
Error Vector Magnitude	EVM	—	–29	—	dB

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} = 28 V, I_{DQ} = 1800 mA, P_{OUT} = 170 W PEP, f = 2650 MHz, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	14	15	—	dB
Drain Efficiency	η_D	31	33	—	%
Intermodulation Distortion	IMD	—	–30	–27	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	$R_{DS(on)}$	—	0.08	—	Ω
Operating Gate Voltage	V_{DS} = 28 V, I_{DQ} = 1800 mA	V_{GS}	—	2.5	—	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	643	W
Above 25°C derate by		3.68	W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 170 W CW)	$R_{\theta JC}$	0.272	°C/W

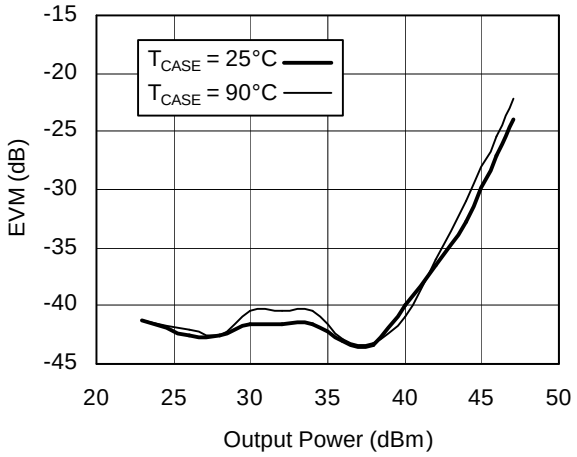
Ordering Information

Type and Version	Package Type	Package Description	Marking
PTFA261702E V1	H-30275-4	Thermally-enhanced slotted flange, push-pull	PTFA261702E

Typical Performance (data taken in a production test fixture)

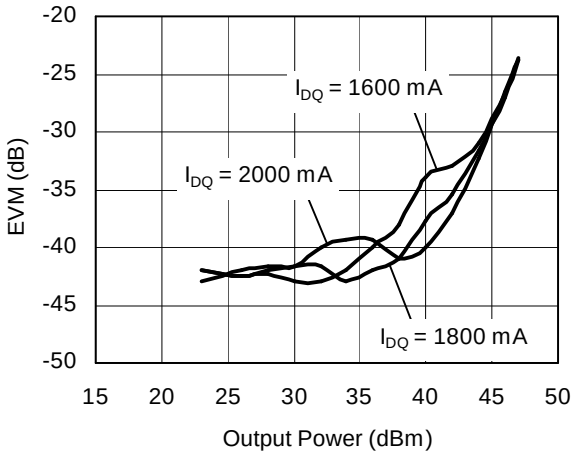
WiMAX Performance

V_{DD} = 28 V, I_{DQ} = 1800 mA, f = 2650 MHz,
(modulation = 64 QAM2/3, channel bandwidth = 3.5 MHz,
sample rate = 4 MHz)



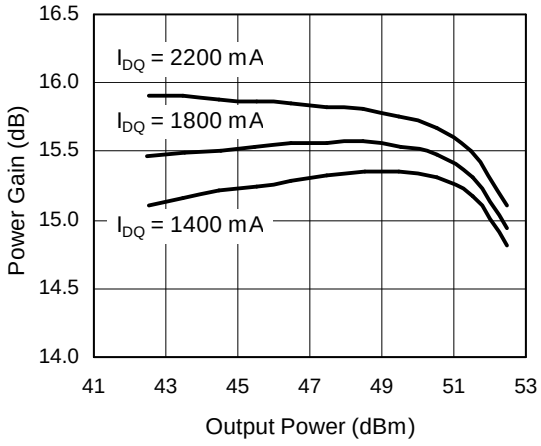
WiMAX Performance

V_{DD} = 28 V, f = 2650 MHz
(modulation = 64 QAM2/3, channel bandwidth = 3.5 MHz,
sample rate = 4 MHz)



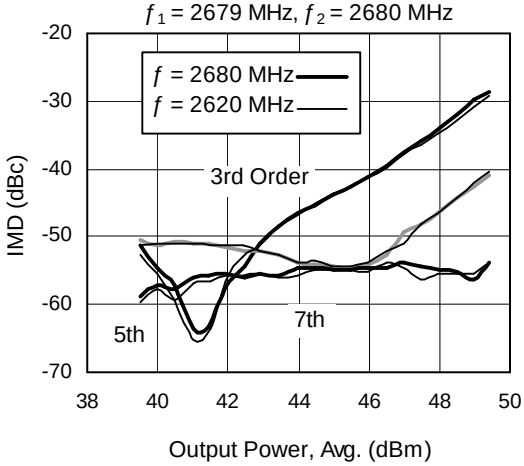
Gain vs. Output Power

V_{DD} = 28 V, f = 2650 MHz



Intermodulation Distortion vs. Output Power

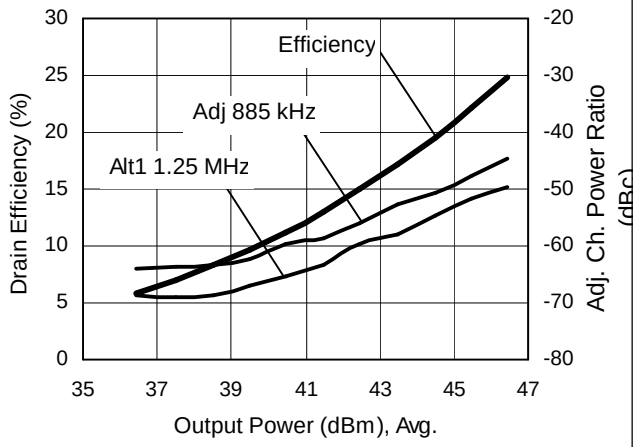
V_{DD} = 28 V, I_{DQ} = 1800 mA
f_1 = 2619 MHz, f_2 = 2620 MHz;
f_1 = 2679 MHz, f_2 = 2680 MHz



Typical Performance (cont.)

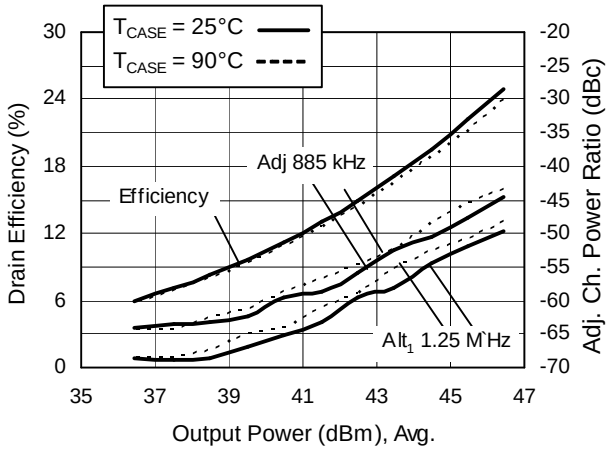
IS-95 CDMA Performance

V_{DD} = 28 V, I_{DQ} = 1800 mA, f = 2680 MHz,
PAR = 9.8 dB @ 0.01 probability on CCDF



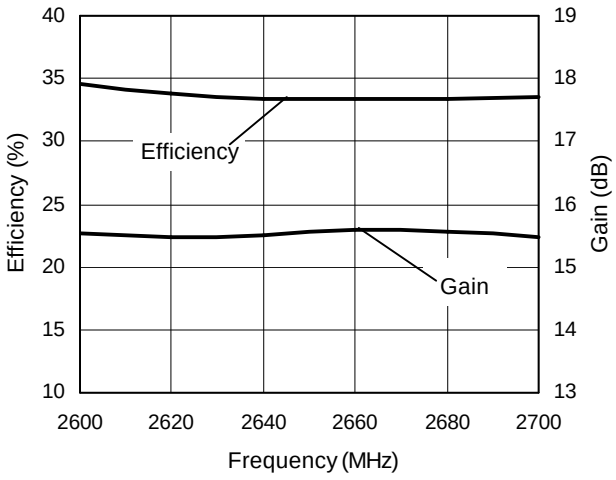
IS-95 CDMA Performance

V_{DD} = 28 V, I_{DQ} = 1800 mA, f = 2680 MHz,
PAR = 9.8 dB @ 0.01 probability on CCDF



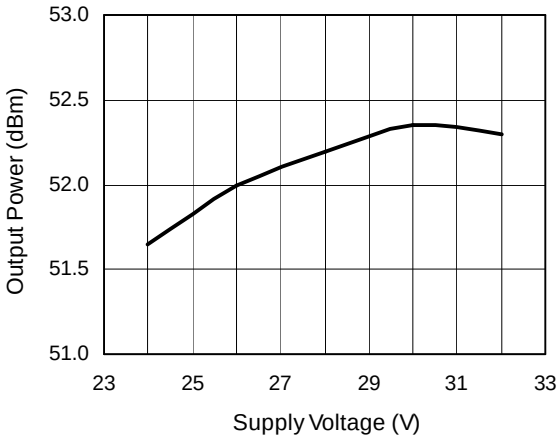
CW Sweep in a Broadband Test Fixture

V_{DD} = 28 V, I_{DQ} = 1800 mA, P_{OUT} = 50 dBm

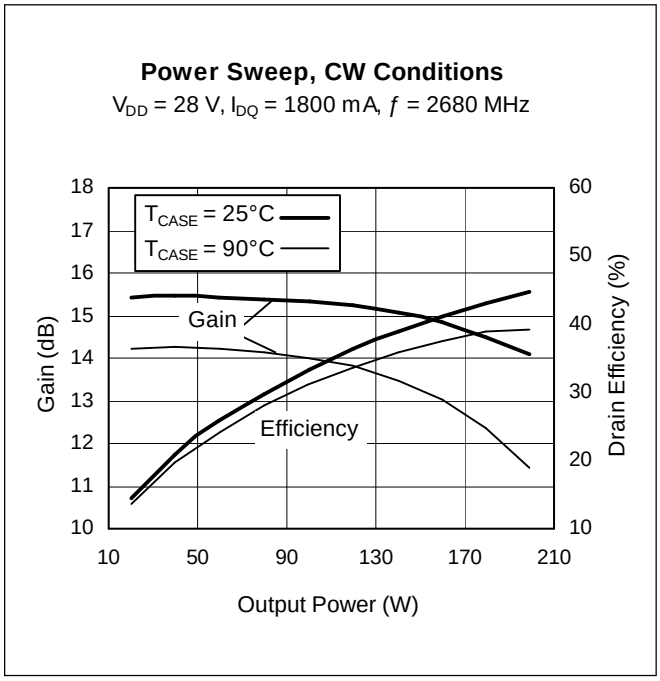


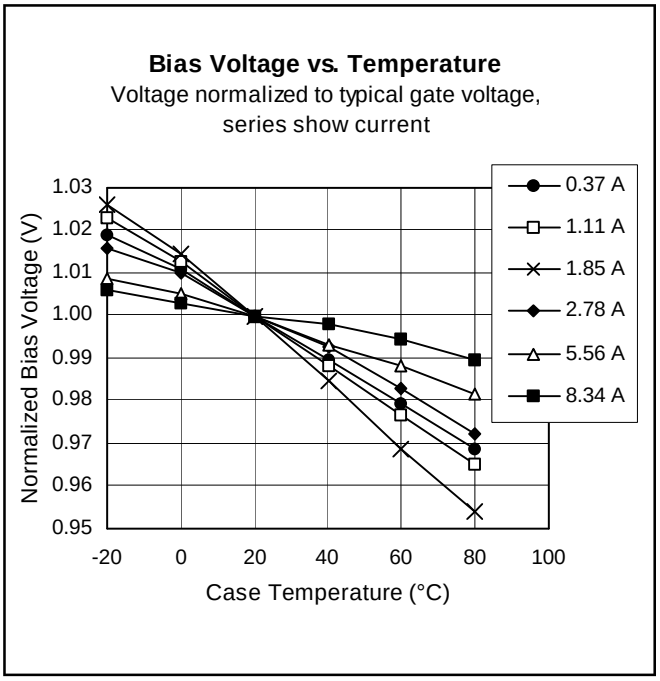
Output Power vs. Supply Voltage

I_{DQ} = 1800 mA, f = 2680 MHz

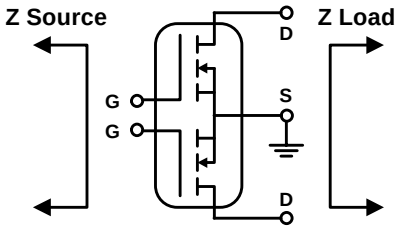


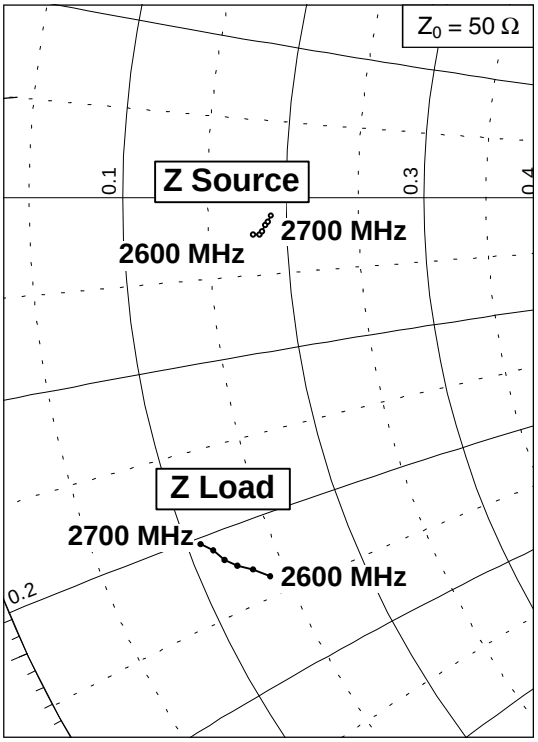
Typical Performance (cont.)





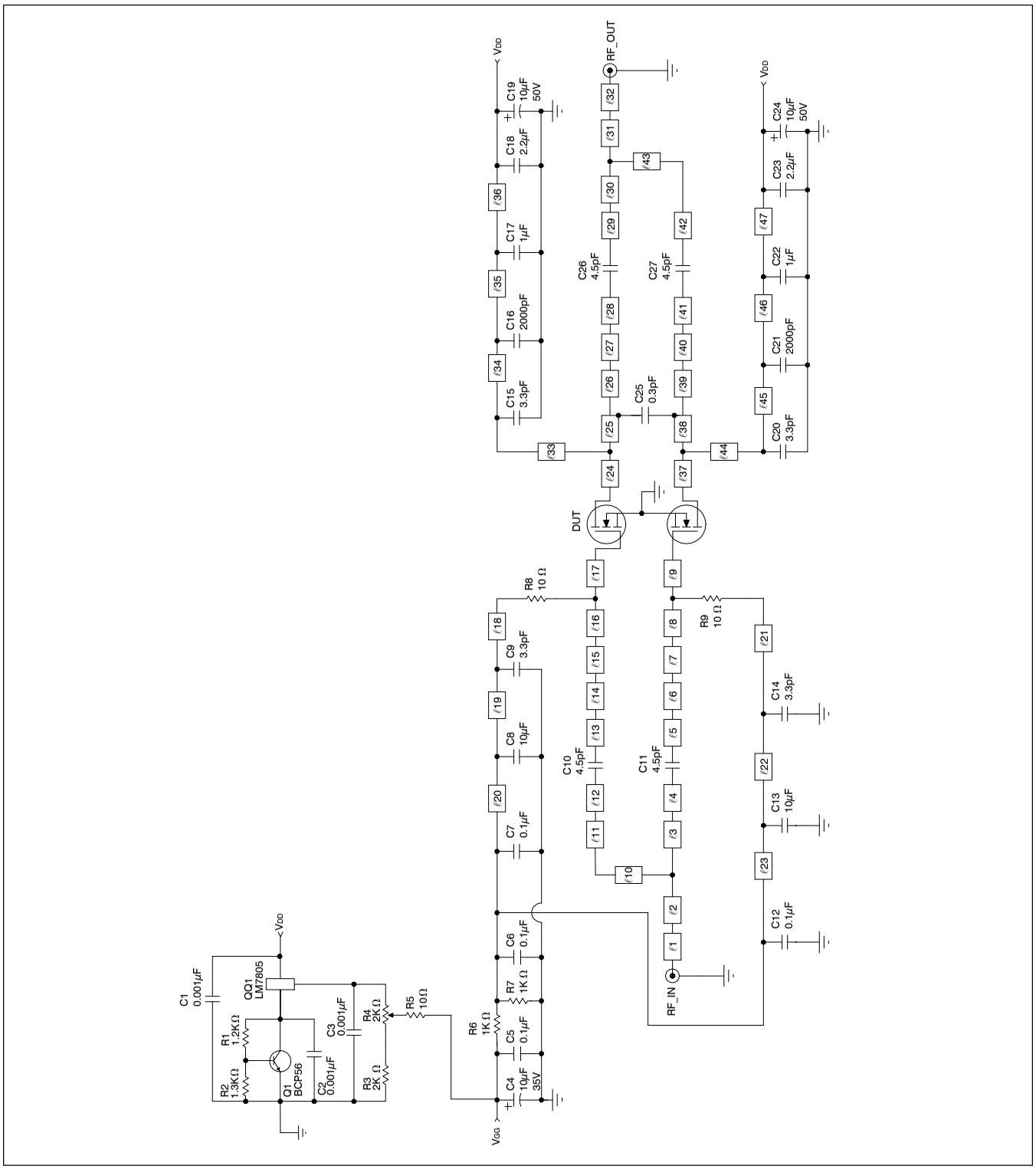
Broadband Circuit Impedance





Frequency	Z Source W		Z Load W	
MHz	R	jX	R	jX
2600	8.9	–1.2	7.0	–11.9
2620	9.1	–1.2	6.6	–11.5
2640	9.2	–1.1	6.2	–11.2
2660	9.3	–0.9	5.9	–10.9
2680	9.4	–0.8	5.7	–10.5
2700	9.5	–0.6	5.4	–10.2

Reference Circuit



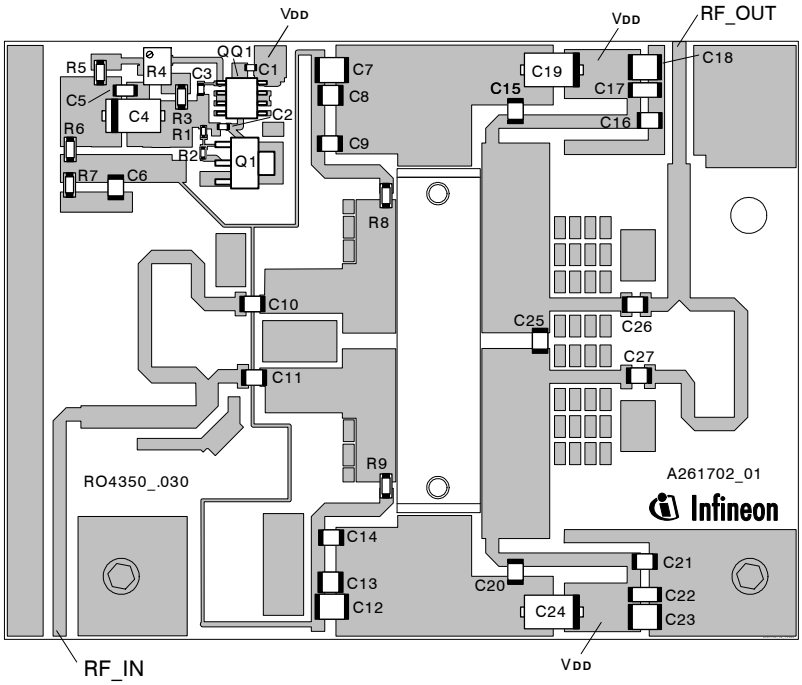
Reference circuit block diagram for ƒ = 2680 MHz

Reference Circuit (cont.)

Circuit Assembly Information			
DUT	PTFA261702E	LDMOS Transistor	
PCB	0.76 mm [.030"] thick, e_r = 3.48	Rogers RO4350	1 oz. copper

Microstrip	Electrical Characteristics at 2680 MHz	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ1	0.450 λ, 49.9 Ω	30.45 x 1.70	1.199 x 0.067
ℓ2	0.296 λ, 35.5 Ω	19.56 x 2.84	0.770 x 0.112
ℓ3	0.049 λ, 49.9 Ω	3.30 x 1.70	0.130 x 0.067
ℓ4, ℓ12, ℓ28, ℓ29, ℓ41, ℓ42	0.021 λ, 34.0 Ω	1.40 x 3.02	0.055 x 0.119
ℓ5, ℓ13	0.010 λ, 40.6 Ω	0.69 x 2.34	0.027 x 0.092
ℓ6, ℓ14	0.153 λ, 21.0 Ω	9.80 x 5.66	0.386 x 0.223
ℓ7, ℓ15	0.028 λ, 14.6 Ω	1.78 x 8.81	0.070 x 0.347
ℓ8, ℓ16	0.067 λ, 8.2 Ω	4.11 x 16.94	0.162 x 0.667
ℓ9, ℓ17	0.015 λ, 8.2 Ω	0.94 x 16.94	0.037 x 0.667
ℓ10	0.099 λ, 44.6 Ω	6.65 x 2.03	0.262 x 0.080
ℓ11	0.463 λ, 49.9 Ω	31.32 x 1.70	1.233 x 0.067
ℓ18, ℓ21	0.193 λ, 49.9 Ω	13.06 x 1.70	0.514 x 0.067
ℓ19, ℓ22	0.105 λ, 49.9 Ω	7.11 x 1.70	0.280 x 0.067
ℓ20, ℓ23,	0.043 λ, 49.9 Ω	2.92 x 1.70	0.115 x 0.067
ℓ24, ℓ37	0.020 λ, 5.9 Ω	1.24 x 24.16	0.049 x 0.951
ℓ25, ℓ38	0.101 λ, 5.9 Ω	6.17 x 24.16	0.243 x 0.951
ℓ26, ℓ39	0.019 λ, 5.9 Ω	1.19 x 24.16	0.047 x 0.951
ℓ27, ℓ40	0.132 λ, 50.3 Ω	8.97 x 1.68	0.353 x 0.066
ℓ30	0.044 λ, 50.3 Ω	2.95 x 1.68	0.116 x 0.066
ℓ31	0.258 λ, 35.5 Ω	17.04 x 2.84	0.671 x 0.112
ℓ32	0.229 λ, 49.9 Ω	15.52 x 1.70	0.611 x 0.067
ℓ33, ℓ44	0.083 λ, 49.9 Ω	5.64 x 1.70	0.222 x 0.067
ℓ34, ℓ45	0.225 λ, 49.9 Ω	15.24 x 1.70	0.6 x 0.067
ℓ35, ℓ46	0.060 λ, 49.9 Ω	4.06 x 1.70	0.16 x 0.067
ℓ36, ℓ47	0.043 λ, 49.9 Ω	2.92 x 1.70	0.115 x 0.067
ℓ43	0.553 λ, 49.9 Ω	37.44 x 1.70	1.474 x 0.067

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, C6, C7, C12	Capacitor, 0.1 µF	Digi-Key	PCC104BCT-ND
C8, C13	Capacitor, 10 µF	Digi-Key	490-1819-2-ND
C9, C14, C15, C20	Ceramic capacitor, 3.3 pF	ATC	100B 3R3
C10, C11, C26, C27	Ceramic capacitor, 4.5 pF	ATC	100B 4R5
C16, C21	Capacitor, 2000 pF	ATC	100B 203JW
C17, C22	Ceramic capacitor, 1 µF	Digi-Key	445-1411-2-ND
C18, C23	Capacitor, 2.2 µF	Digi-Key	445-1447-2-ND
C19, C24	Tantalum capacitor, 10 µF, 50 V	Garrett Electronics	TPSE106K050R0400
C25	Ceramic capacitor, 0.3 pF	ATC	100B 0R3
Q1	Transistor	Infinion Technologies	BCP56
QQ1	Voltage regulator	National Semiconductor	LM7805
R1	Chip resistor 1.2K ohms	Digi-Key	P1.2KGCT-ND
R2	Chip resistor 1.3K ohms	Digi-Key	P1.3KGCT-ND
R3	Chip resistor 2K ohms	Digi-Key	P2KECT-ND
R4	Potentiometer 2K ohms	Digi-Key	3224W-202ETR-ND
R5, R8, R9	Chip resistor 10 ohms	Digi-Key	P10ECT-ND
R6, R7	Chip resistor 1K ohms	Digi-Key	P1KECT-ND

**Gerber files for this circuit available on request.*

Package Outline Specifications

Package H-30275-4

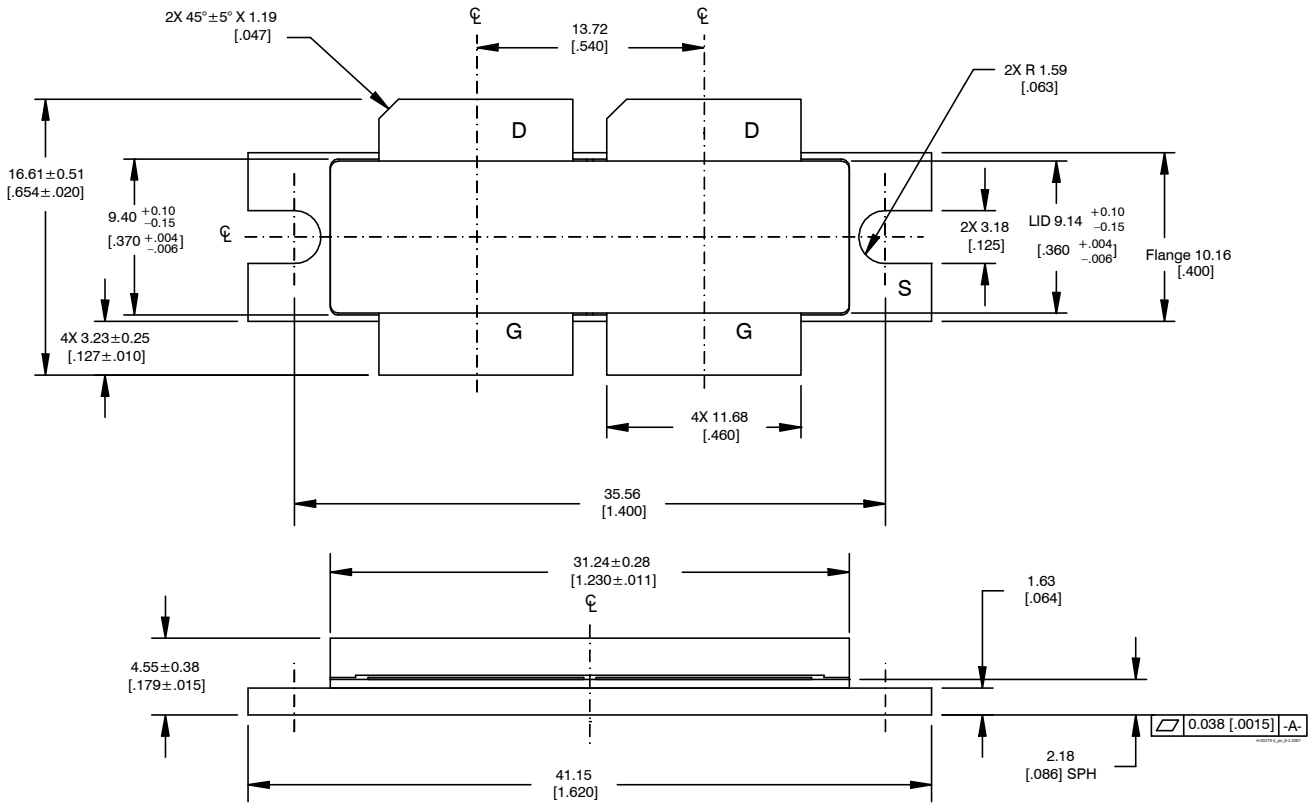


Diagram Notes—unless otherwise specified:

1. Lead thickness: 0.13 +0.051/–0.025 [.005 +.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 ± 0.38 micron [45 ± 15 microinch].

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PTFA261702E

Revision History:	2008-02-21	Data Sheet
Previous Version:	none	

Page	Subjects (major changes since last revision)

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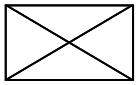

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