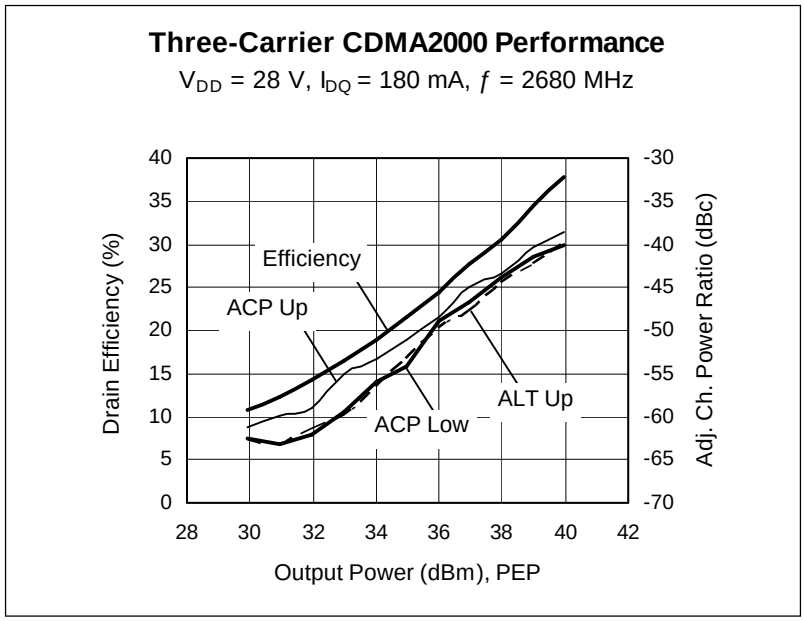
Thermally-Enhanced High Power RF LDMOS FET
10 W, 2400 – 2700 MHz

Description

The PTF240101S is a 10-watt, internally-matched *GOLDMOS*® FET device intended for CDMA2000 and WiMAX applications in the 2.4 to 2.7 GHz band. Full gold metallization ensures excellent device lifetime and reliability.

PTF240101S
Package 32259



Features

- Typical CDMA2000 performance
  - Average output power = 2.0 W
  - Gain = 16 dB
  - Efficiency = 18%
  - ACPR = –55 dBc
- Typical CW performance
  - Output power at P–1dB = 15 W
  - Efficiency = 45%
- Integrated ESD protection:
  Human Body Model Class 1 (minimum)
- Excellent thermal stability
- Low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 10 W (CW) output power

RF Characteristics, CDMA2000 Operation

CDMA2000 Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)
V_{DD} = 28 V, I_{DQ} = 180 mA, P_{OUT} = 2 W, f = 2680 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Adjacent Channel Power Ratio	ACPR	—	–55	—	dBc
Gain	G_{ps}	—	16	—	dB

Two-Tone Measurements (tested in Infineon test fixture)
V_{DD} = 28 V, I_{DQ} = 180 mA, P_{OUT} = 10 W PEP, f = 2680 MHz, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	15.5	16	—	dB
Intermodulation Distortion	IMD	—	–31	–28	dBc

All published data at T_{CASE} = 25°C unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_{DS} = 10 µA	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	µA
On-State Resistance	V_{GS} = 10 V, V_{DS} = 0.1 A	$R_{DS(on)}$	—	0.83	—	Ω
Operating Gate Voltage	V_{DS} = 28 V, I_{DQ} = 180 mA	V_{GS}	2.5	3.2	4.0	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	58	W
Above 25°C derate by		0.333	W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 10 W CW)	$R_{\theta JC}$	3.0	°C/W

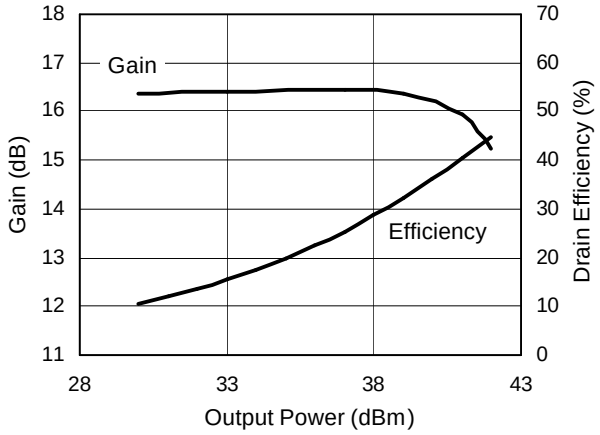
Ordering Information

Type	Package Outline	Package Description	Marking
PTF240101S	32259	Thermally-enhanced, surface mount	PTF240101S

Typical Performance (measurements taken in broadband test fixture)

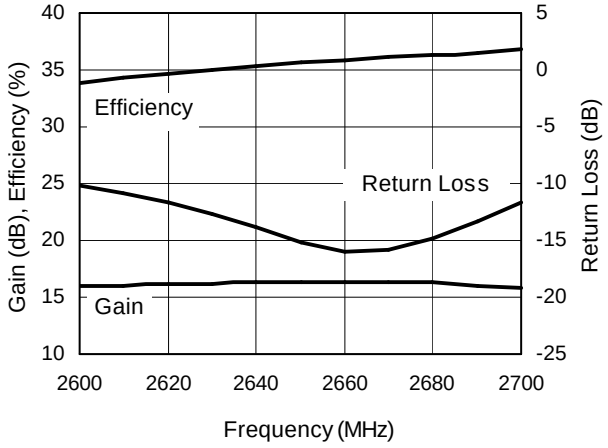
Gain & Efficiency vs. Output Power

V_{DD} = 28 V, I_{DQ} = 180 mA, f = 2680 MHz



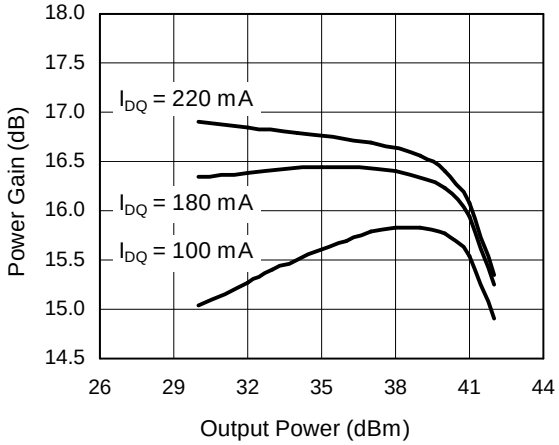
Broadband Performance

V_{DD} = 28 V, I_{DQ} = 180 mA, P_{OUT} = 10 W



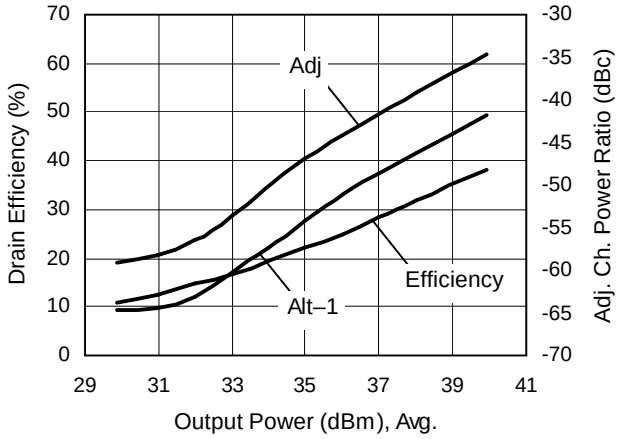
Gain vs. Output Power

V_{DD} = 28 V, f = 2680 MHz



IS-95 CDMA Performance

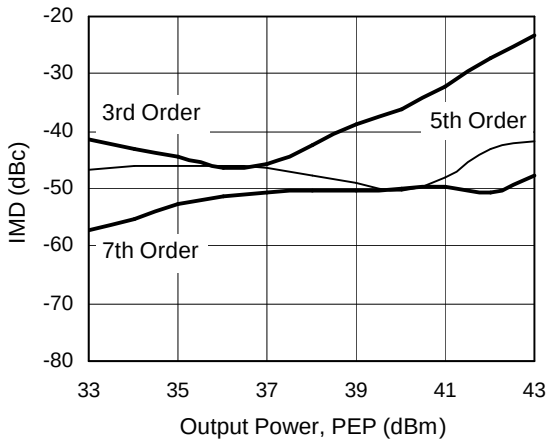
V_{DD} = 28 V, I_{DQ} = 180 mA, f = 2680 MHz



Typical Performance (cont.)

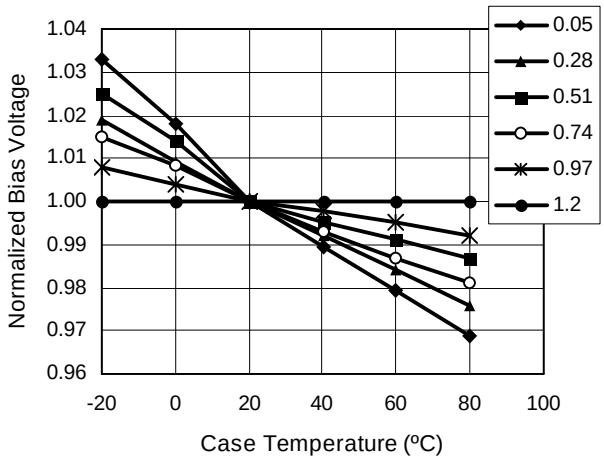
Intermodulation Distortion vs. Output Power

V_{DD} = 28 V, I_{DQ} = 180 mA, f_1 = 2679 MHz, f_2 = 2680 MHz

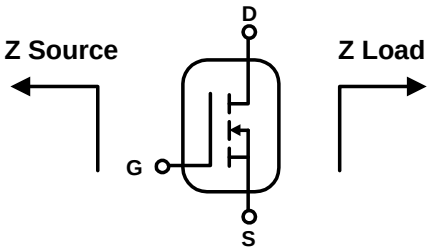


Gate-Source Voltage vs. Temperature

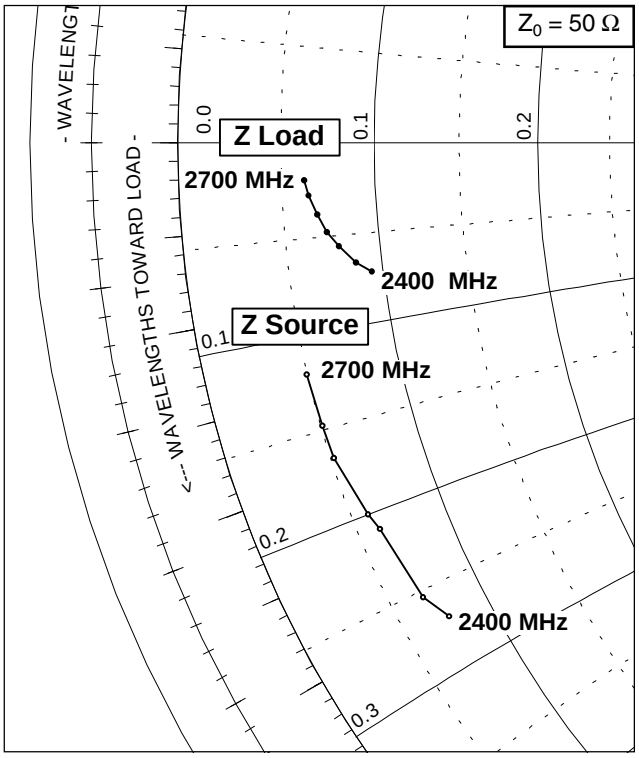
Voltage normalized to typical gate voltage, series show current.



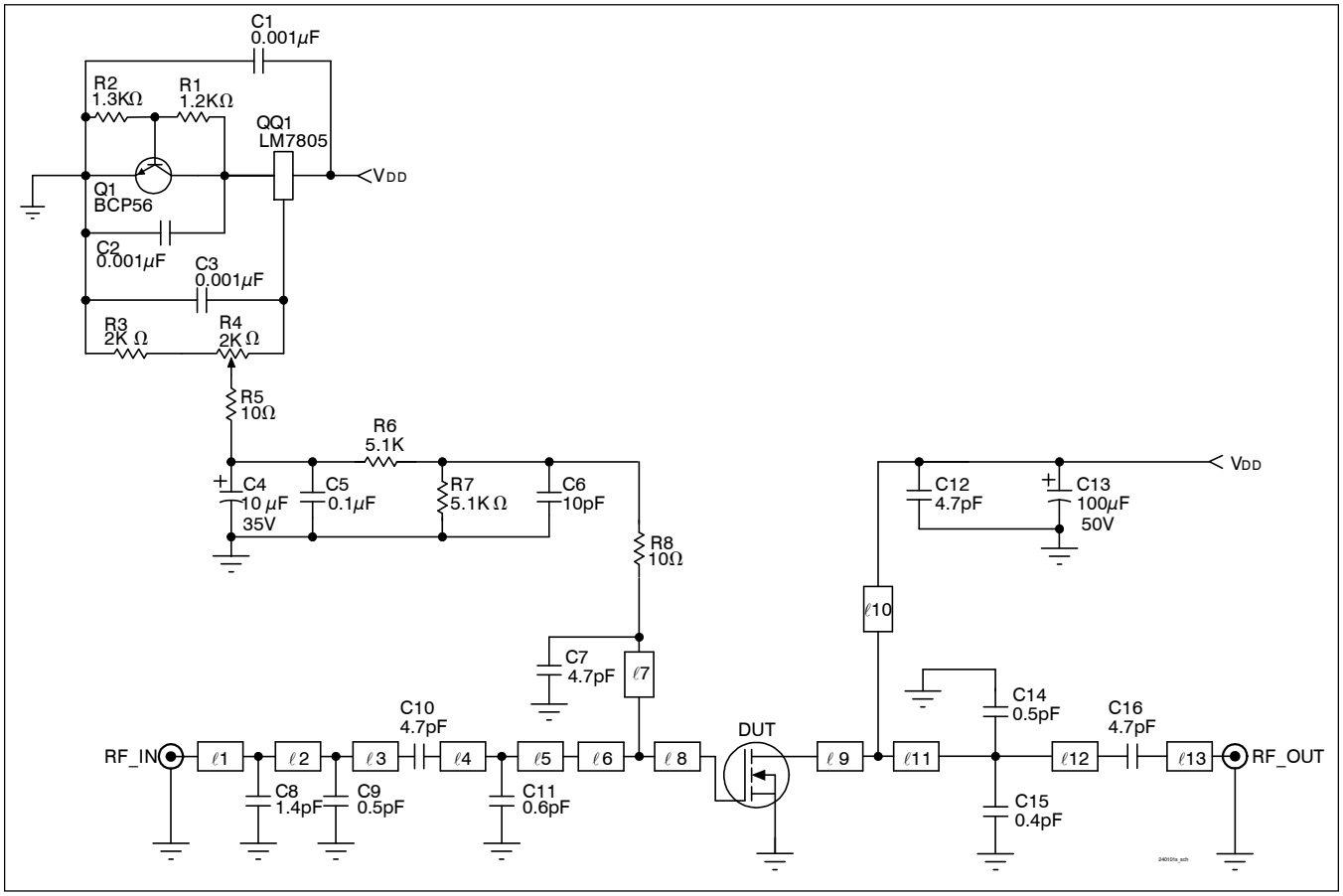
Broadband Circuit Impedance Data



Frequency	Z Source W		Z Load W	
MHz	R	jX	R	jX
2400	3.8	–13.5	4.7	–3.6
2450	3.4	–12.7	4.3	–3.3
2500	3.1	–10.5	4.0	–2.8
2550	3.3	–10.0	3.6	–2.4
2600	2.6	–8.3	3.4	–1.9
2650	2.9	–7.4	3.2	–1.4
2700	2.5	–6.0	3.1	–1.0



Reference Circuit



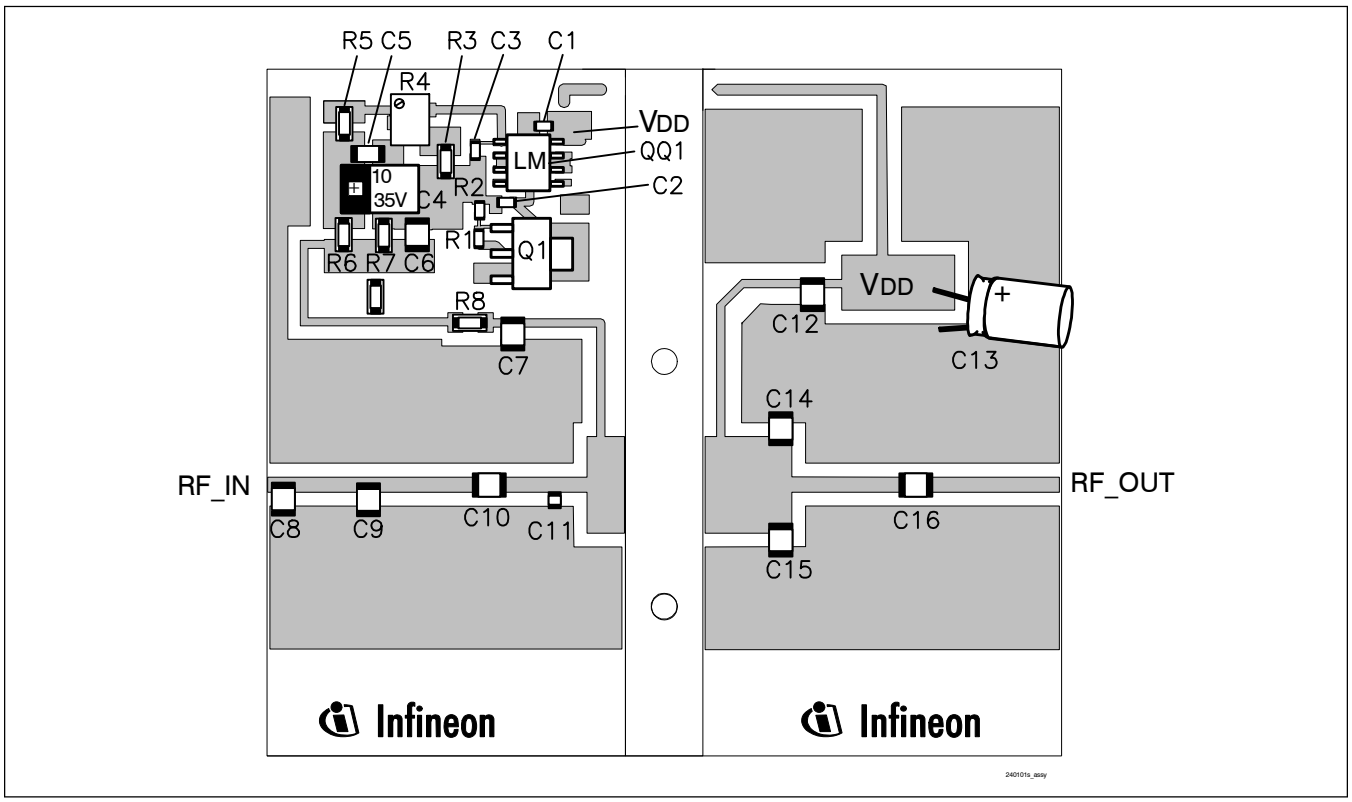
Reference Circuit Schematic ƒ = 2650 MHz

Circuit Assembly Information

DUT	PTF240101S	LDMOS Transistor	
Circuit Board	0.76 mm [0.030"] thick, ε_r = 4.5	Rogers TMM4, 2 oz. Copper	

Microstrip	Electrical Characteristics at 2650 MHz	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ1	0.043 λ, 50.0 Ω	2.67 x 1.35	0.105 x 0.053
ℓ2	0.119 λ, 50.0 Ω	7.37 x 1.35	0.290 x 0.053
ℓ3	0.173 λ, 50.0 Ω	10.67 x 1.35	0.420 x 0.053
ℓ4	0.114 λ, 50.0 Ω	7.06 x 1.35	0.278 x 0.053
ℓ5	0.030 λ, 50.0 Ω	1.83 x 1.35	0.072 x 0.053
ℓ6	0.019 λ, 13.3 Ω	1.09 x 8.81	0.043 x 0.347
ℓ7	0.278 λ, 75.0 Ω	17.60 x 0.69	0.693 x 0.027
ℓ8	0.038 λ, 13.3 Ω	2.18 x 8.81	0.086 x 0.347
ℓ9	0.027 λ, 13.3 Ω	1.52 x 8.81	0.060 x 0.347
ℓ10	0.327 λ, 75.0 Ω	20.73 x 0.69	0.816 x 0.027
ℓ11	0.086 λ, 13.3 Ω	4.83 x 8.81	0.190 x 0.347
ℓ12	0.177 λ, 50.0 Ω	10.92 x 1.35	0.430 x 0.053
ℓ13	0.217 λ, 50.0 Ω	13.41 x 1.35	0.528 x 0.053

Reference Circuit (cont.)

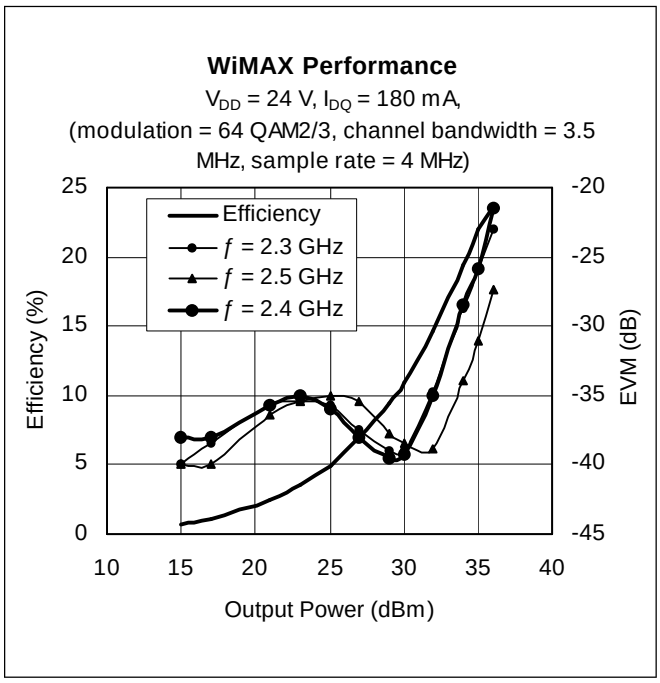


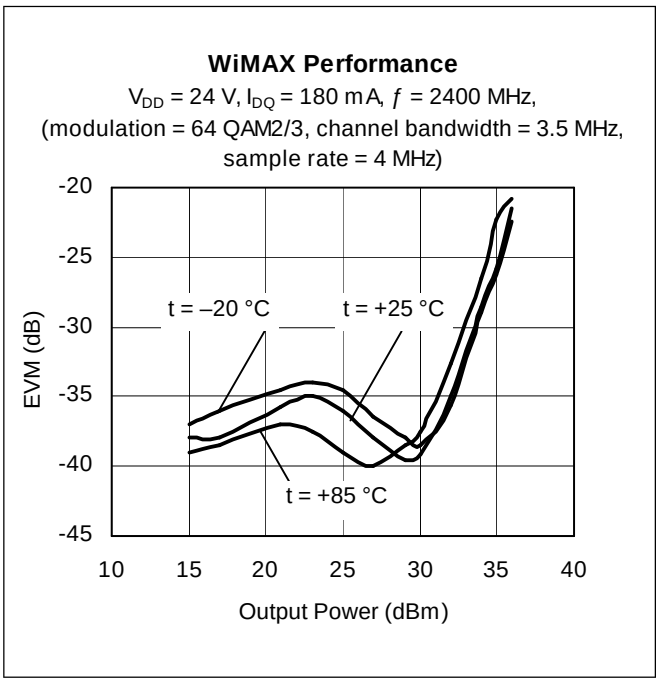
*Reference circuit assembly diagram (not to scale)**

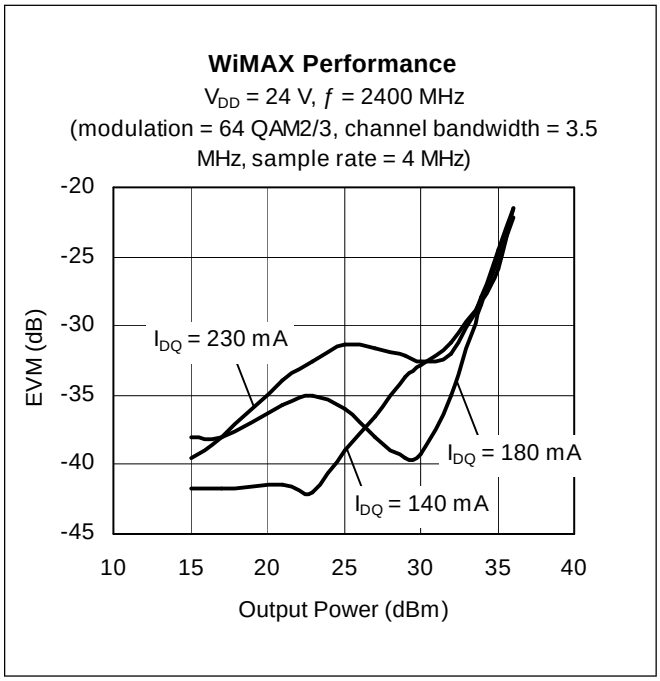
Component	Description	Suggested Manufacturer	P/N or Comment
C1, C2, C3	Capacitor, 0.001 µF	Digi-Key	PCC1772CT-ND
C4	Tantalum capacitor, 10 µF, 35 V	Digi-Key	PCS6106TR-ND
C5	Capacitor, 0.1 µF	Digi-Key	PCC104BCT-ND
C6	Ceramic capacitor, 10 pF	ATC	100B 100
C7, C10, C12, C16	Ceramic capacitor, 4.7 pF	ATC	100B 4R7
C8	Ceramic capacitor, 1.4 pF	ATC	100B 1R4
C9, C14	Ceramic capacitor, 0.5 pF	ATC	100B 0R5
C11	Ceramic capacitor, 0.6 pF	ATC	100A 0R6
C13	Tantalum capacitor, 100 µF, 50 V	Digi-Key	P5571-ND
C15	Ceramic capacitor, 0.4 pF	ATC	100B 0R4
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, R8	Chip resistor, 10 ohms	Digi-Key	P10ECT-ND
R6, R7	Chip resistor, 5.1 k-ohms	Digi-Key	P5.1KECT-ND

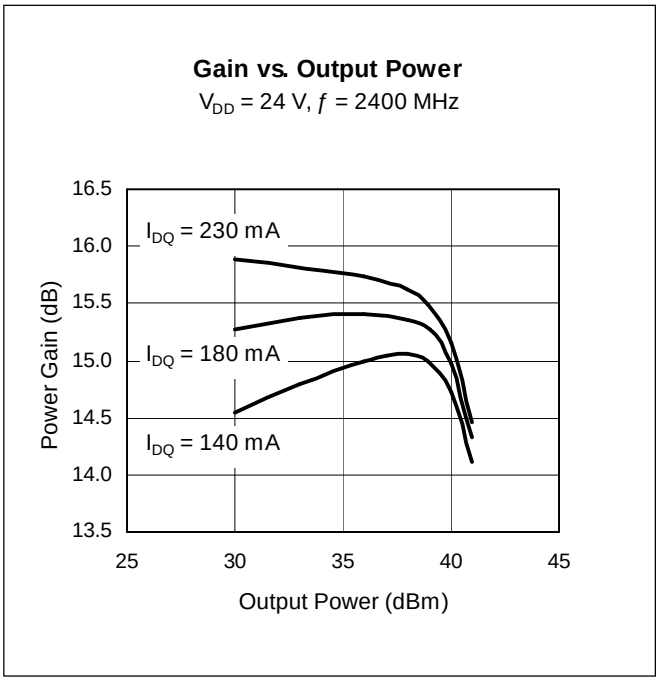
**Gerber files for this circuit are available upon request.*

Typical WiMAX Performance (measurements taken in broadband test fixture)







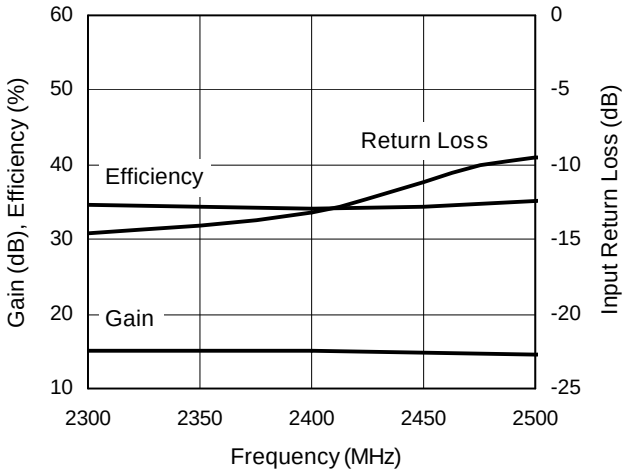


Typical WiMAXPerformance (cont.)

Broadband Performance

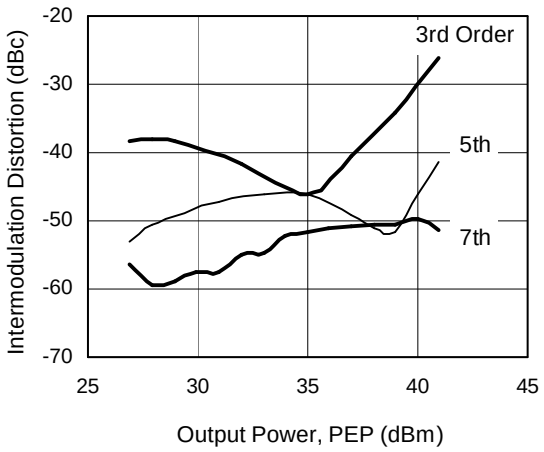
V_{DD} = 24 V, I_{DQ} = 180 mA, P_{OUT} = 10 W

(application circuit ACW1 covers 2.3 – 2.5 GHz)



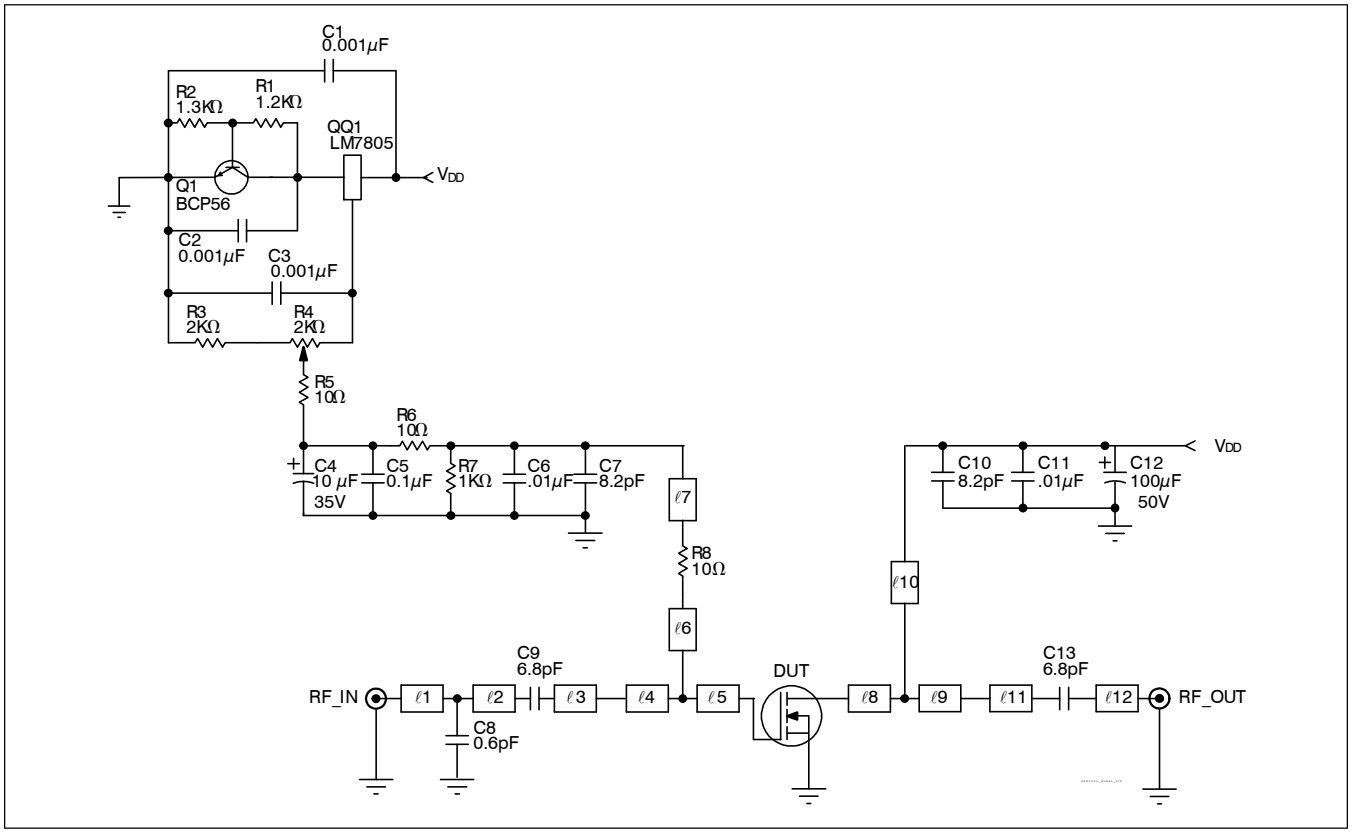
Intermodulation Distortion vs. Output Power

V_{DD} = 24 V, I_{DQ} = 180 mA, f_1 = 2399 MHz, f_2 = 2400 MHz



See next page for circuit information

WiMAX Reference Circuit



WiMAX reference circuit schematic ƒ = 2500 MHz

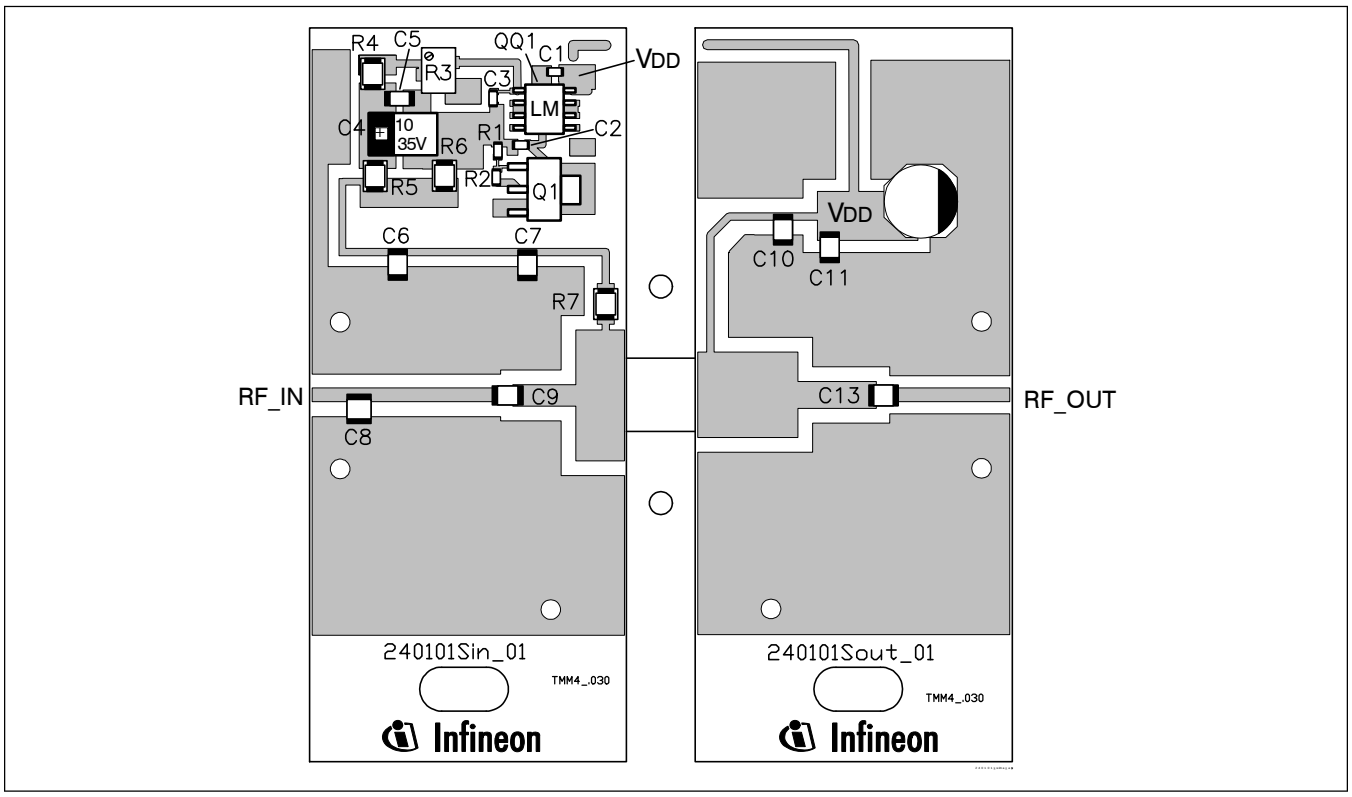
Circuit Assembly Information

DUT	PTF240101S	LDMOS Transistor	
Circuit Board	0.76 mm [0.030"] thick, ε_r = 4.5	Rogers TMM4, 2 oz. Copper	

Microstrip	Electrical Characteristics at 2500 MHz[1]	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ1	0.036 λ, 50.0 Ω	5.28 x 1.37	0.208 x 0.054
ℓ2	0.081 λ, 50.0 Ω	13.69 x 1.37	0.539 x 0.054
ℓ3	0.105 λ, 38.0 Ω	6.71 x 2.16	0.264 x 0.085
ℓ4	0.051 λ, 8.8 Ω	3.00 x 13.64	0.118 x 0.537
ℓ5	0.035 λ, 8.8 Ω	2.03 x 13.64	0.080 x 0.537
ℓ6	0.023 λ, 68.0 Ω	1.52 x 0.76	0.060 x 0.030
ℓ7	0.184 λ, 68.0 Ω	12.32 x 0.76	0.485 x 0.030
ℓ8	0.025 λ, 12.9 Ω	1.50 x 8.89	0.059 x 0.350
ℓ9	0.147 λ, 12.9 Ω	8.71 x 8.89	0.343 x 0.350
ℓ10	0.323 λ, 68.0 Ω	21.59 x 0.76	0.850 x 0.030
ℓ11	0.133 λ, 33.0 Ω	8.38 x 2.74	0.330 x 0.108
ℓ12	0.183 λ, 50.0 Ω	11.91 x 1.37	0.469 x 0.054

[1] Electrical Characteristics are rounded

WiMAX 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	PCS6106TR-ND
C5	Capacitor, 0.1 µF	Digi-Key	PCC104BCT-ND
C6	Ceramic capacitor, 10 pF	ATC	100B 100
C7, C10, C12, C16	Ceramic capacitor, 4.7 pF	ATC	100B 4R7
C8	Ceramic capacitor, 1.4 pF	ATC	100B 1R4
C9, C14	Ceramic capacitor, 0.5 pF	ATC	100B 0R5
C11	Ceramic capacitor, 0.6 pF	ATC	100A 0R6
C13	Tantalum capacitor, 100 µF, 50 V	Digi-Key	P5571-ND
C15	Ceramic capacitor, 0.4 pF	ATC	100B 0R4
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, 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 are available upon request.*

Package Outline Specifications

Package 32259

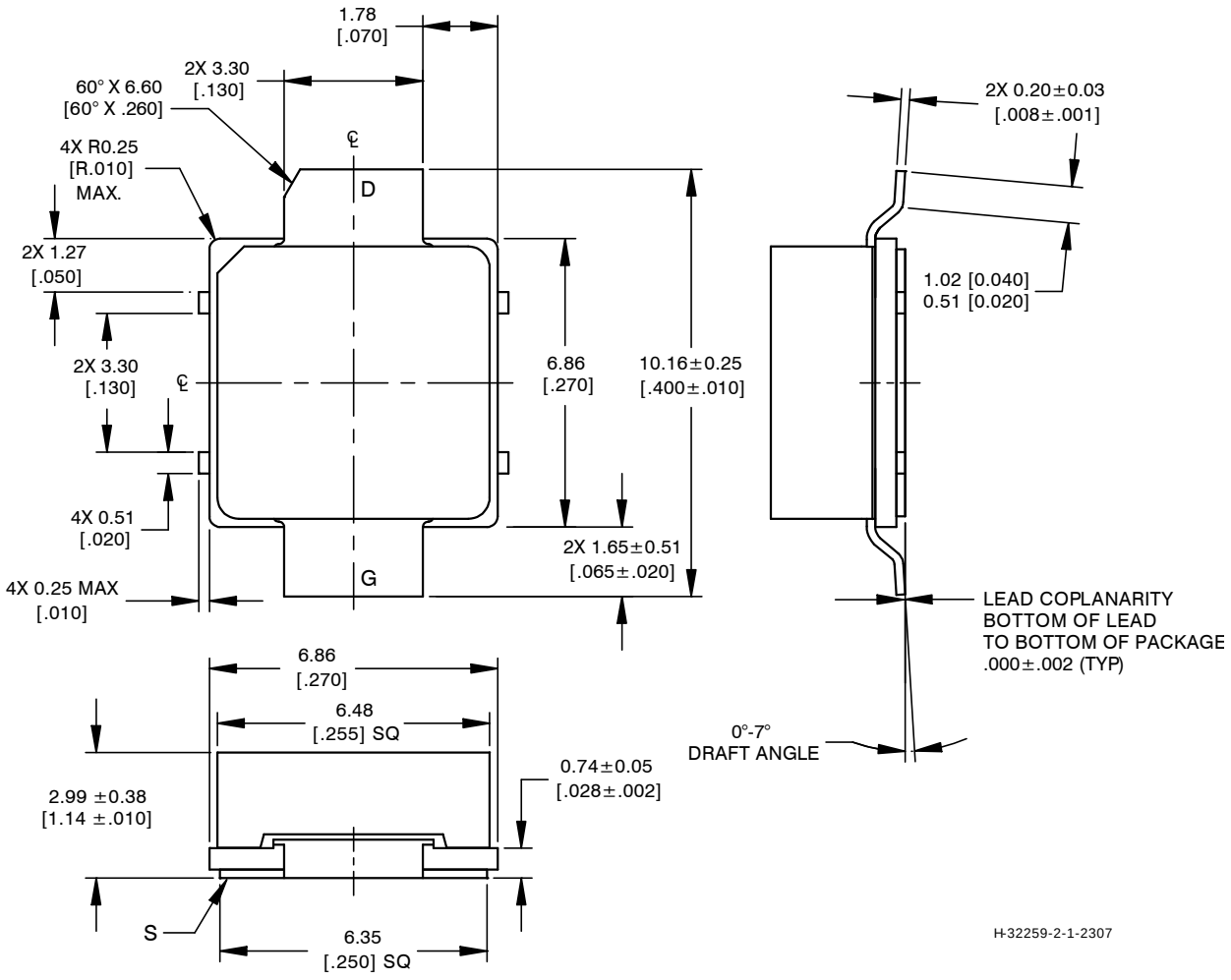


Diagram Notes: Unless otherwise specified

1. Lead thickness: 0.21 ± 0.03 [.008 ± .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.

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Revision History:	**2006-05-11**	Data Sheet
Previous Version:	2005-04-27, Data Sheet	
Page	Subjects (major changes since last revision)	
7-10	Add information about performance in a WiMAX application	

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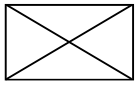

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