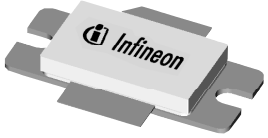
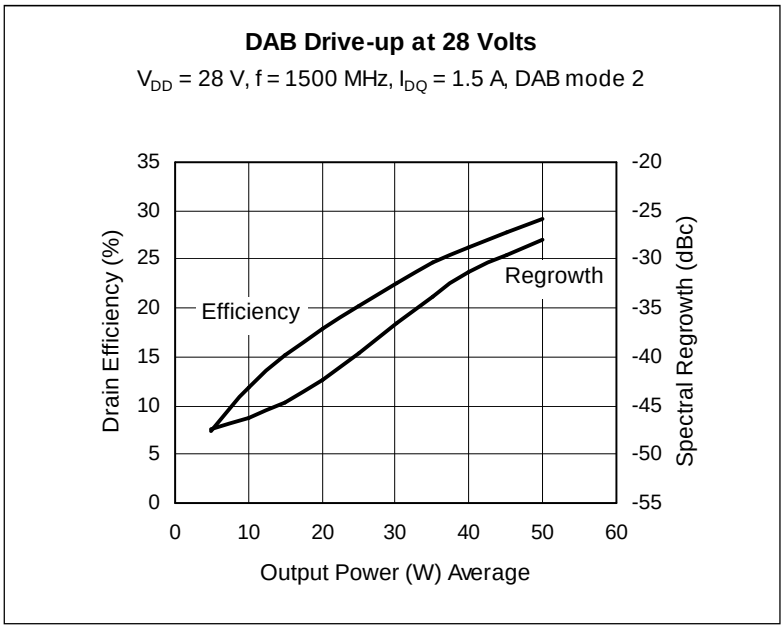
Thermally-Enhanced High Power RF LDMOS FET
150 W, 1450 – 1500 MHz, 1600 – 1700 MHz

Description

The PTF141501E is a 150-watt, *GOLDMOS*® FET intended for DAB applications. This device is characterized for Digital Audio Broadcast operation in the 1450 to 1500 MHz band. Thermally-enhanced packaging provides the coolest operation available. Full gold metallization ensures excellent device lifetime and reliability.

PTF141501E
Package H-30260-2





Features

- Thermally-enhanced package, pB-free and RoHS-compliant
- Broadband internal matching
- Typical DAB Mode 2 performance at 1500 MHz, 32 V
  - Average output power = 50 W
  - Efficiency = 28%
  - Spectral regrowth = –30 dBc
  - Δ 975 kHz f_C
- Typical DAB Mode 2 performance at 1500 MHz, 28 V
  - Average output power = 40 W
  - Efficiency = 26%
  - Spectral regrowth = –31 dBc
  - Δ 975 kHz f_C
- Typical CW performance, 1500 MHz, 28 V
  - Minimum output power = 150 W
  - Linear gain = 16.5 dB
  - Efficiency = 48% at P–1dB
- Integrated ESD protection: Human Body Model, Class 1 (minimum)
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR at 28 V, 150 W (CW) output power

RF Characteristics

DAB Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)
V_{DD} = 32 V, I_{DQ} = 1.5 A, P_{OUT} = 50 W_{AVG}, f = 1500 MHz, DAB Mode 2, f_C Δ 975 kHz

Characteristic	Symbol	Min	Typ	Max	Unit
Spectral Regrowth	RGTH	—	–30	—	dBc
Gain	G_{ps}	—	16.5	—	dB
Drain Efficiency	η_D	—	29	—	%

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} = 1.5 A, P_{OUT} = 150 W_{PEP}, f = 1500 MHz, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	15.0	16.5	—	dB
Drain Efficiency	η_D	35	—	—	%
Intermodulation Distortion	IMD	—	–30	–28	dBc

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 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 V	$R_{DS(on)}$	—	0.07	—	Ω
Operating Gate Voltage	V_{DS} = 28 V, I_{DQ} = 1.5 A	V_{GS}	2.5	3.3	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	438	W
Above 25°C derate by		2.5	W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C)	$R_{\theta JC}$	0.4	°C/W

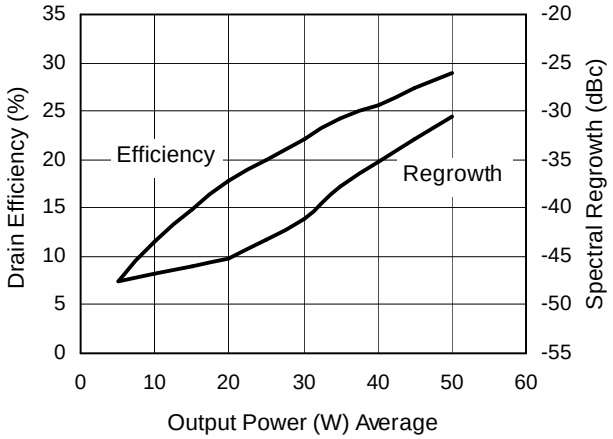
Ordering Information

Type	Package Outline	Package Description	Marking
PTF141501E	H-30260-2	Thermally-enhanced slotted flange, single-ended	PTF141501E

Typical Performance

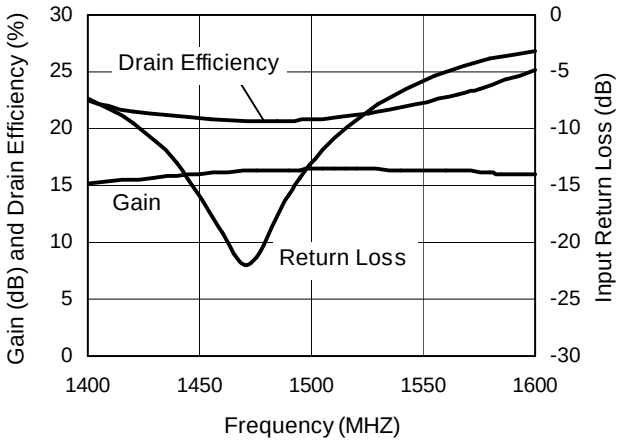
DAB Drive-up at 32 Volts

V_{DD} = 32, I_{DQ} = 1.5 A, f = 1500 MHz, DAB Mode 2



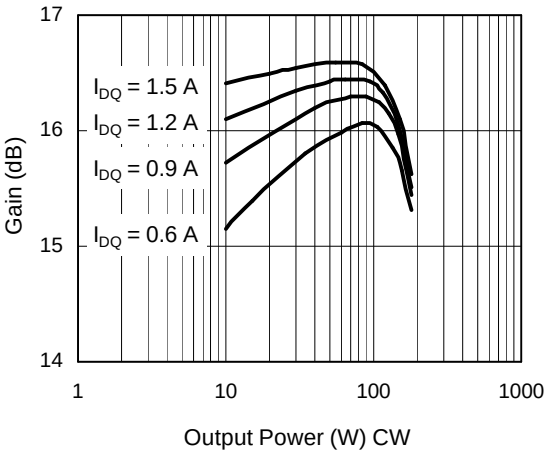
CW Sweep in a Broadband Test Fixture

V_{DD} = 28 V, I_{DQ} = 1.5 A, P_{OUT} (CW) = 30 W



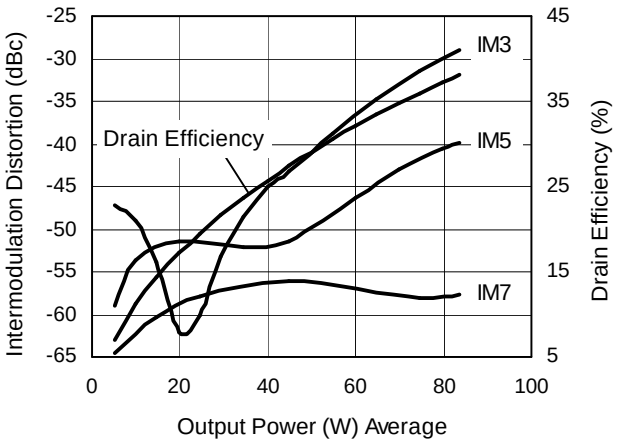
CW Sweep
for Varying Bias Conditions

V_{DD} = 28 V, f = 1500 MHz

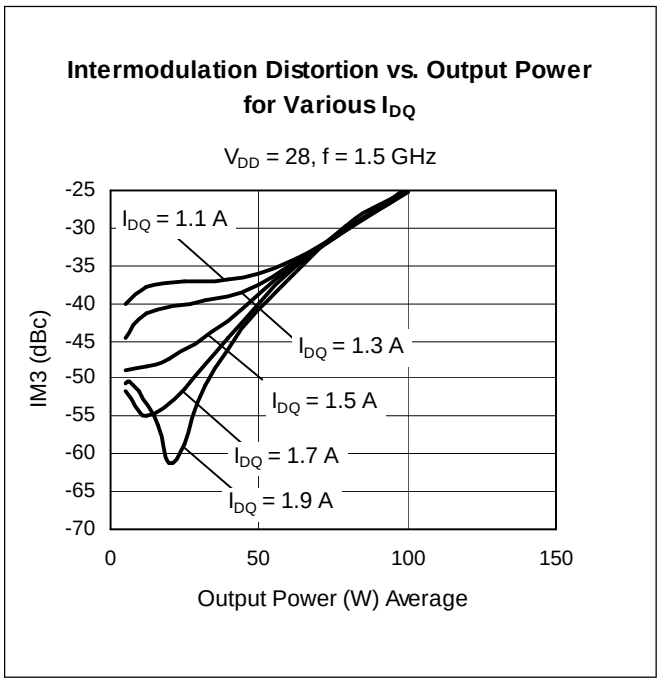


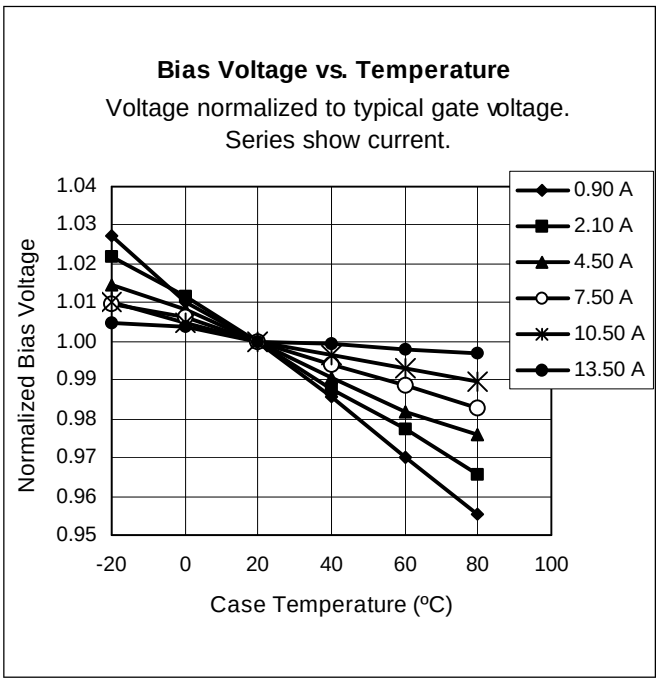
Intermodulation Distortion Products
vs. Output Power

V_{DD} = 28, I_{DQ} = 1.5 A, f = 1.5 GHz, tone spacing = 1 MHz

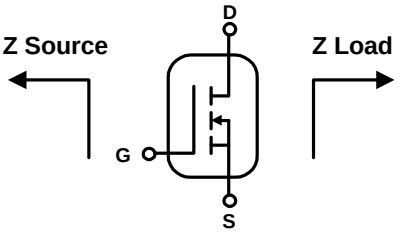


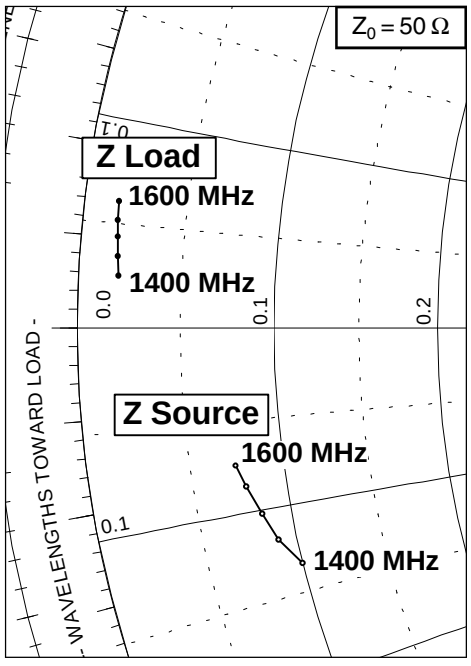
Typical Performance (cont.)





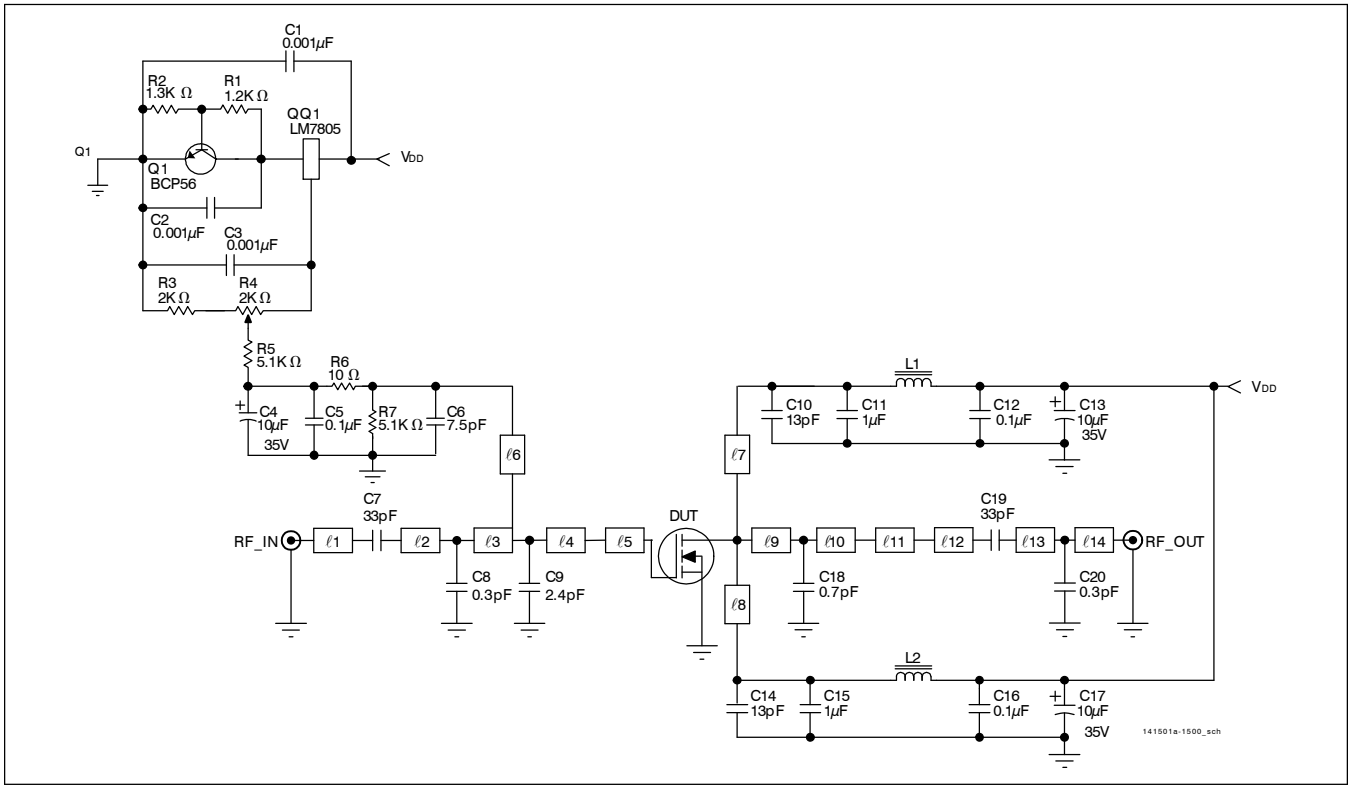
Broadband Circuit Impedance, 1500 MHz





Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
1400	5.00	–6.70	0.94	1.27
1450	4.50	–5.90	0.90	1.73
1500	4.20	–5.10	0.86	2.21
1550	3.90	–4.30	0.82	2.60
1600	3.70	–3.70	0.80	3.05

Reference Circuit for 1500 MHz



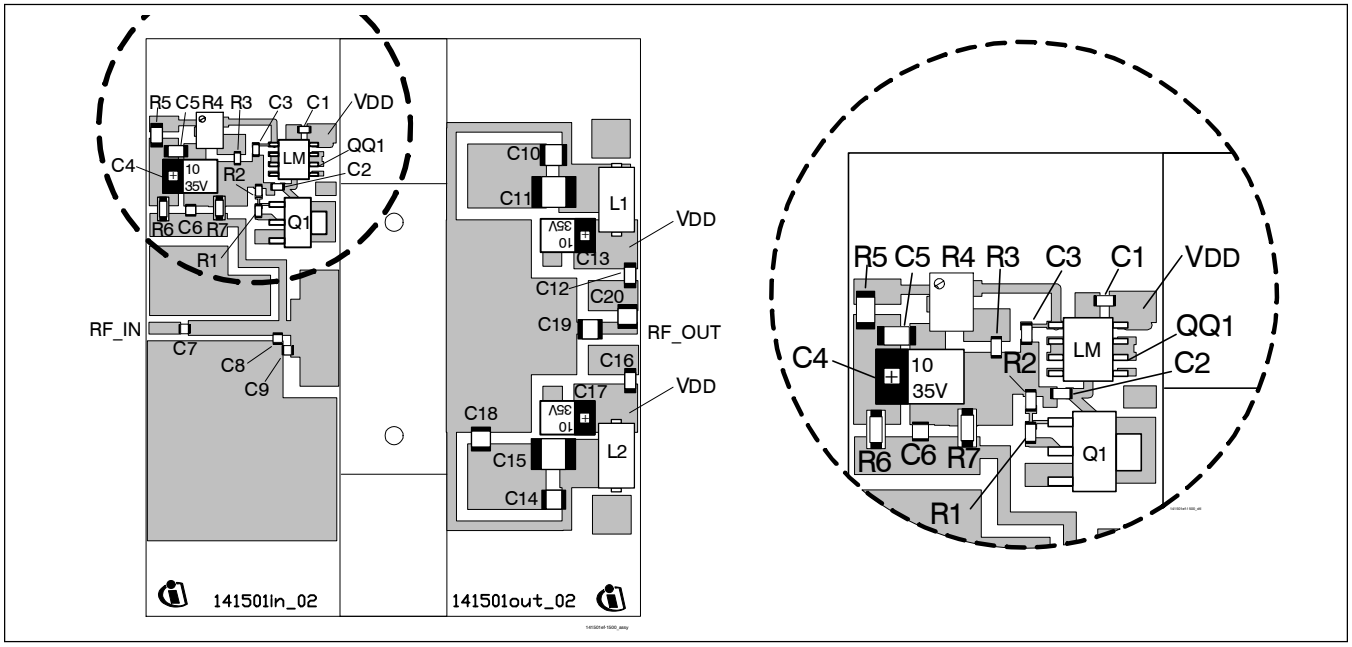
Reference Circuit Schematic for 1500 MHz

Circuit Assembly Information			
DUT	PTF141501E	LDMOS Transistor	
PCB	0.76 mm [0.030"] thick, ε_r = 4.5	TMM4	2 oz. copper, both sides

Microstrip	Electrical Characteristics at 1500 MHz[1]	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ1	0.043 λ, 50.0 Ω	4.67 x 1.47	0.185 x 0.058
ℓ2	0.118 λ, 42.0 Ω	12.70 x 1.85	0.500 x 0.073
ℓ3	0.015 λ, 42.0 Ω	1.57 x 1.85	0.062 x 0.073
ℓ4	0.012 λ, 14.7 Ω	1.22 x 7.57	0.048 x 0.298
ℓ5	0.052 λ, 8.0 Ω	5.08 x 15.19	0.200 x 0.598
ℓ6	0.182 λ, 60.0 Ω	20.17 x 0.97	0.794 x 0.038
ℓ7	0.283 λ, 63.0 Ω	31.45 x 0.89	1.238 x 0.035
ℓ8	0.283 λ, 63.0 Ω	31.45 x 0.89	1.238 x 0.035
ℓ9	0.026 λ, 4.6 Ω	2.46 x 27.89	0.097 x 1.098
ℓ10	0.086 λ, 4.6 Ω	8.23 x 27.89	0.324 x 1.098
ℓ11	0.061 λ, 9.4 Ω	5.97 x 12.62	0.235 x 0.497
ℓ12	0.011 λ, 50.0 Ω	1.14 x 1.47	0.045 x 0.058
ℓ13	0.056 λ, 50.0 Ω	6.10 x 1.47	0.240 x 0.058
ℓ14	0.010 λ, 50.0 Ω	1.07 x 1.47	0.042 x 0.058

[1]Electrical Characteristics are rounded.

Reference Circuit for 1500 MHz (cont.)



*Reference circuit (not to scale)**

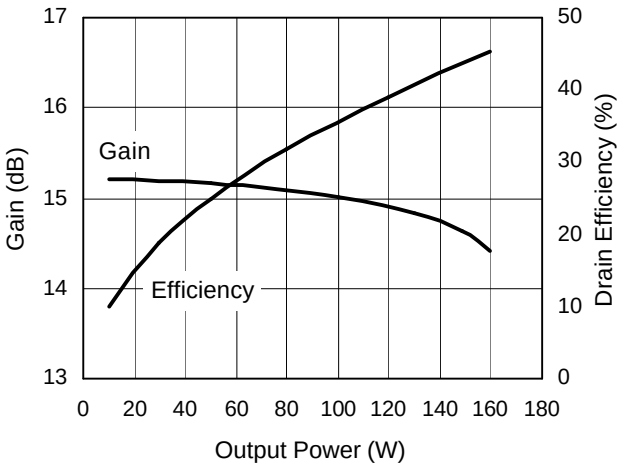
Component	Description	Suggested Manufacturer	P/N or Comment
C1, C2, C3	Capacitor, 0.001 µF, 50 V, 0603	Digi-Key	PCC1772CT-ND
C4, C13, C17	Capacitor, 10 µF, 35 V, SMD	Digi-Key	PCS6106TR-ND, Tant. TE Series
C5, C12, C16	Capacitor, 0.1 µF, 50 V, 1206	Digi-Key	P4525-ND
C6	Capacitor, 7.5 pF	ATC	100A 7R5
C7	Capacitor, 33 pF	ATC	100A 330
C8	Capacitor, 0.3 pF	ATC	100A 0R3
C9	Capacitor, 2.4 pF	ATC	100A 2R4
C10, C14	Capacitor, 13 pF	ATC	100B 130
C11, C15	Capacitor, 1 µF, 50 V	Digi-Key	19528-ND
C18	Capacitor, 0.7 pF	ATC	100B 0R7
C19	Capacitor, 33 pF	ATC	100B 330
C20	Capacitor, 0.3 pF	ATC	100B 0R3
L1, L2	Ferrite, 6 mm	Philips	53/3/4.6-452
Q1	Transistor	Infineon	BCP56
QQ1	Voltage regulator	Digi-Key	LM7805
R1	Resistor, 1.2 k-ohms, 1/10 W, 0603	Digi-Key	P1.2KGCT-ND
R2	Resistor, 1.3 k-ohms, 1/10 W, 0603	Digi-Key	P1.3KGCT-ND
R3	Resistor, 2 k-ohms, 1/10 W, 0603	Digi-Key	P2KGCT-ND
R4	Potentiometer, 2 k-ohms, 0.25 W	Digi-Key	3224W-202ETR-ND
R5, R7	Resistor, 5.1 k-ohms, 1/4 W, 1206	Digi-Key	P5.1KECT-ND
R6	Resistor, 10 ohms, 1/4 W, 1206	Digi-Key	P10ECT-ND

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

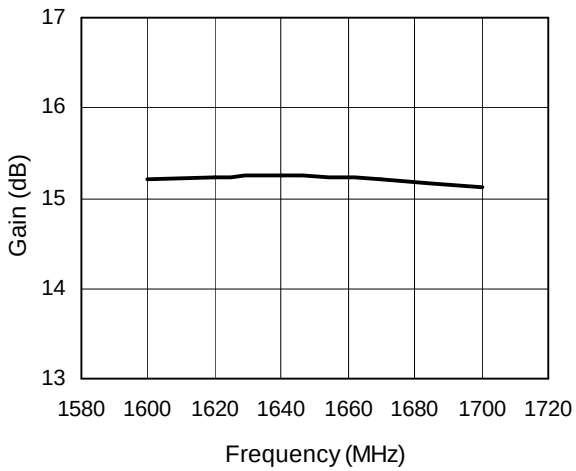
Alternate Application for 1600 MHz

Typical Performance

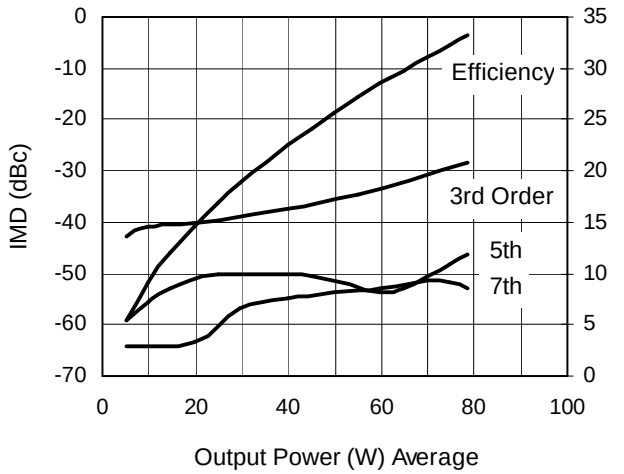
CW Power Sweep
(1600 MHz application circuit)
V_{DD} = 28 V, I_{DQ} = 1.2 A, f = 1675 MHz



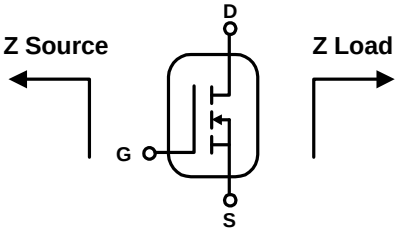
Frequency Sweep, 1.6 – 1.7 GHz
V_{DD} = 28 V, I_{DQ} = 1.2 A



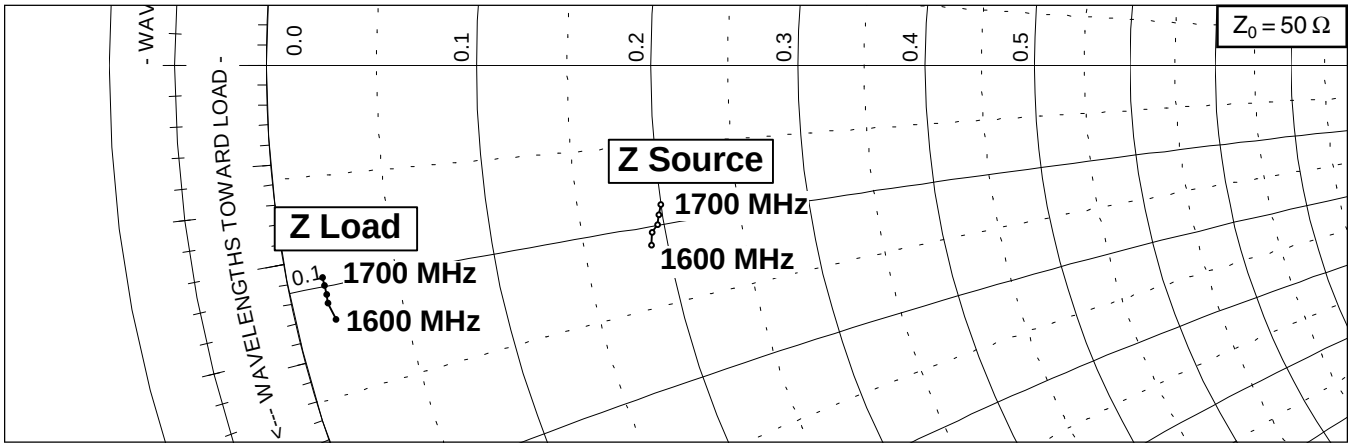
2-Tone Drive-up at Optimum Current
V_{DD} = 28 V, I_{DQ} = 1.2 A, f_1 = 1675 MHz, f_2 = 1676 MHz



Broadband Circuit Impedance, 1600 MHz

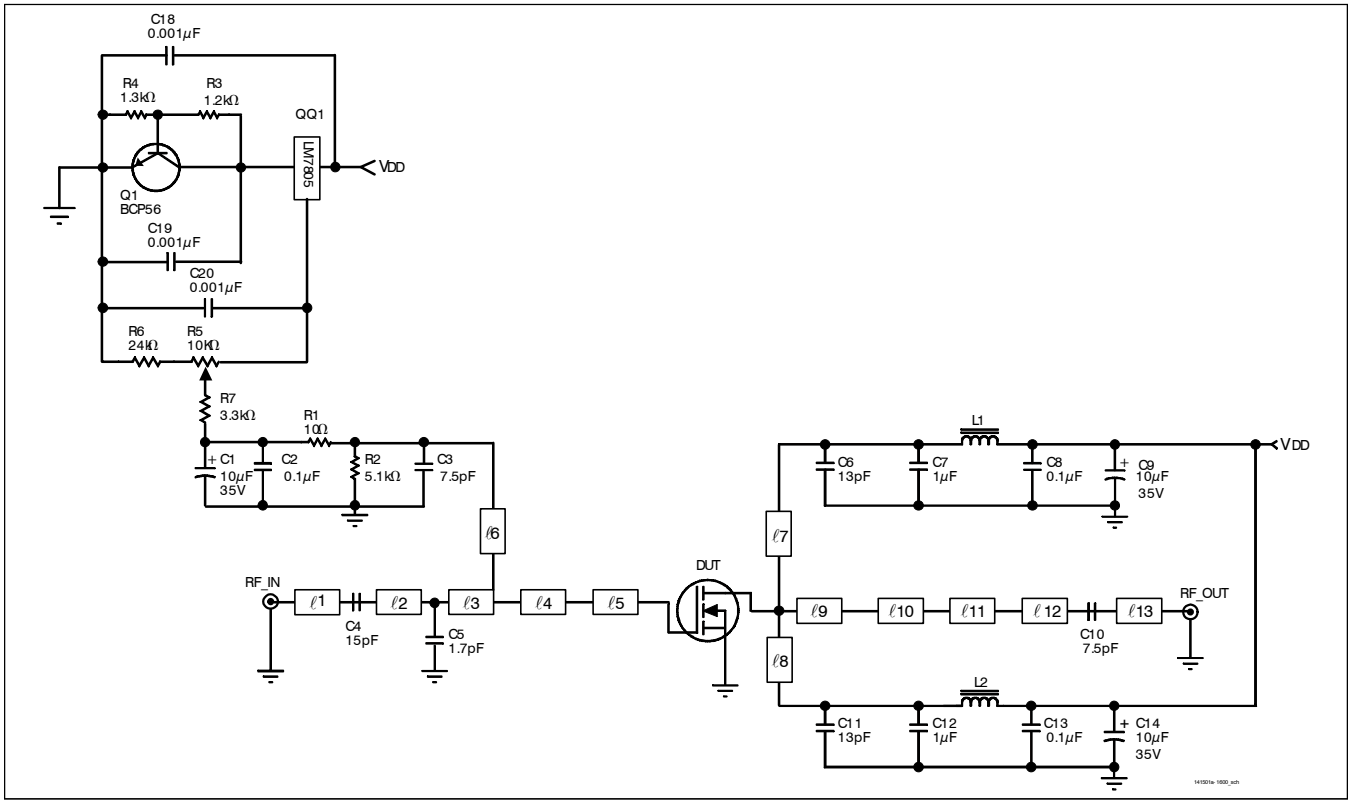


Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
1600	9.5	–5.6	0.9	–5.8
1625	9.6	–5.2	0.8	–5.4
1650	9.8	–5.0	0.8	–5.2
1675	9.9	–4.7	0.8	–5.0
1700	10.0	–4.4	0.8	–4.8



See next page for alternate Reference Circuit, 1600 MHz

Reference Circuit for 1600 MHz



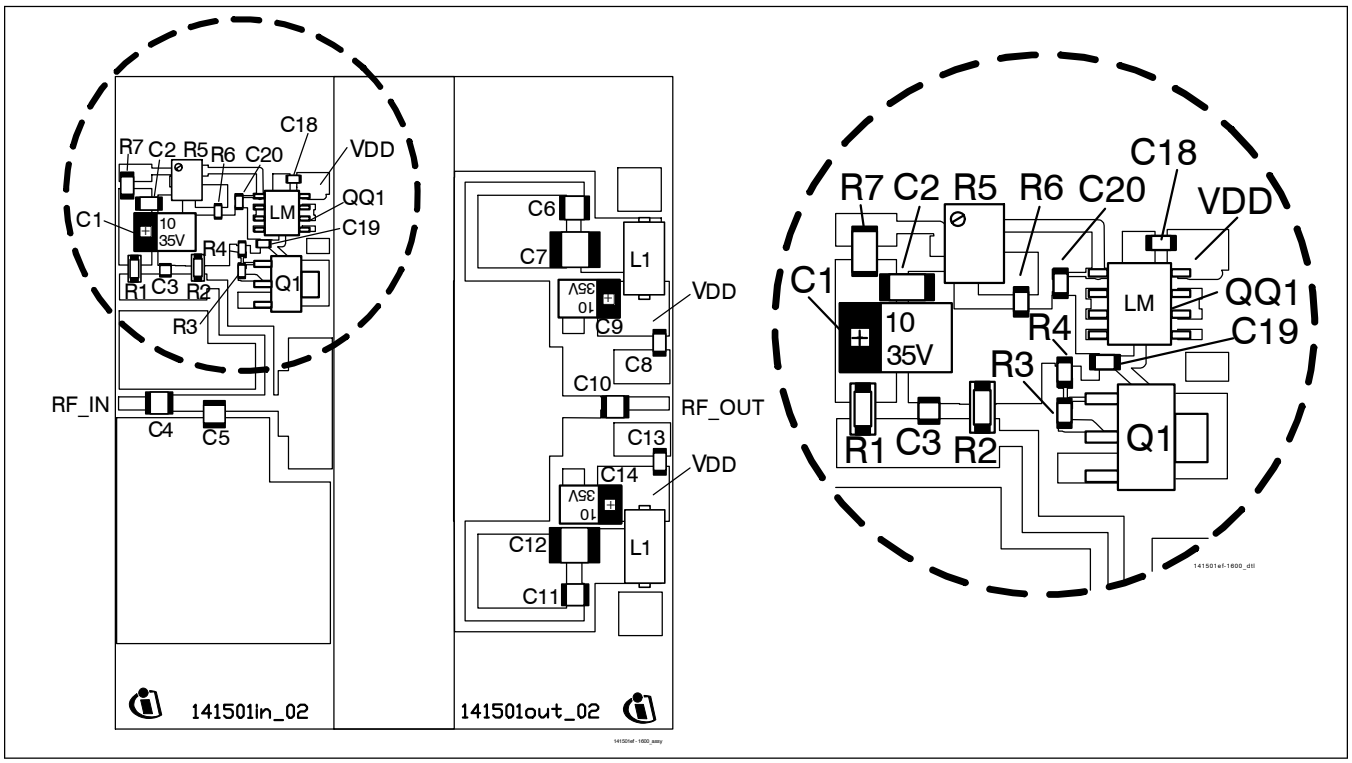
Reference Circuit Schematic for 1600 MHz

Circuit Assembly Information			
DUT	PTF141501E	LDMOS Transistor	
PCB	0.76 mm [0.030"] thick, ε_r = 4.5	TMM4	2 oz. copper, both sides

Microstrip	Electrical Characteristics[1] at 1500 MHz	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ1	0.043 λ, 50.0 Ω	4.67 x 1.47	0.185 x 0.058
ℓ2	0.065 λ, 42.0 Ω	6.73 x 1.85	0.265 x 0.073
ℓ3	0.065 λ, 42.0 Ω	6.73 x 1.85	0.265 x 0.073
ℓ4	0.012 λ, 14.7 Ω	1.22 x 7.57	0.048 x 0.298
ℓ5	0.052 λ, 8.0 Ω	5.08 x 15.19	0.200 x 0.598
ℓ6	0.182 λ, 60.0 Ω	20.17 x 0.97	0.794 x 0.038
ℓ7	0.283 λ, 63.0 Ω	31.45 x 0.89	1.238 x 0.035
ℓ8	0.283 λ, 63.0 Ω	31.45 x 0.89	1.238 x 0.035
ℓ9	0.112 λ, 4.6 Ω	10.67 x 27.89	0.420 x 1.098
ℓ10	0.016 λ, 9.4 Ω	1.52 x 27.89	0.060 x 0.497
ℓ11	0.053 λ, 34.0 Ω	5.72 x 12.62	0.225 x 0.100
ℓ12	0.011 λ, 50.0 Ω	1.14 x 1.47	0.045 x 0.058
ℓ13	0.066 λ, 50.0 Ω	7.17 x 1.47	0.282 x 0.058

[1]Electrical Characteristics are rounded.

Reference Circuit for 1600 MHz (cont.)



Reference circuit for 1600 MHz (not to scale)*

Component	Description	Suggested Manufacturer	P/N or Comment
C1, C9, C14	Capacitor, 10 µF, 35 V, Tant. TE Series	Digi-Key	PCS6106TR-ND, SMD
C2, C8, C13	Capacitor, 0.1 µF, 50 V, 1206	Digi-Key	P4525-ND
C3	Capacitor, 7.5 pF	ATC	100A 7R5
C4	Capacitor, 15 pF	ATC	100B 150
C10	Capacitor, 7.5 pF	ATC	100B 7R5
C5	Capacitor, 1.7 pF	ATC	100B 1R7
C6, C11	Capacitor, 13 pF	ATC	100B 130
C7, C12	Capacitor, 1 µF, 50 V	Digi-Key	19528-ND
C18, C19, C20	Capacitor, 0.001 µF, 50 V, 0603	Digi-Key	PCC1772CT-ND
L1, L2	Ferrite, 6 mm	Philips	53/3/4.6-452
Q1	Transistor	Infineon	BCP56
QQ1	Voltage regulator	Digi-Key	LM7805
R1	Resistor, 10 ohms, 1/4W, 1206	Digi-Key	P10ECT-ND
R2	Resistor, 5.1 k-ohms, 1/4W, 1206	Digi-Key	P5.1KECT-ND
R3	Resistor, 1.2 k-ohms, 1/10W, 0603	Digi-Key	P1.2KGCT-ND
R4	Resistor, 1.3 k-ohms, 1/10W, 0603	Digi-Key	P1.3KGCT-ND
R5	Potentiometer, 10 k-ohms, 0.25W	Digi-Key	3224W-103ETR-ND
R6	Resistor, 24 k-ohms, 1/10W, 0603	Digi-Key	P24KGCT-ND
R7	Resistor, 3.3 k-ohms, 1/4W, 1206	Digi-Key	P3.3KECT-ND

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

Package Outline Specifications

Package H-30260-2

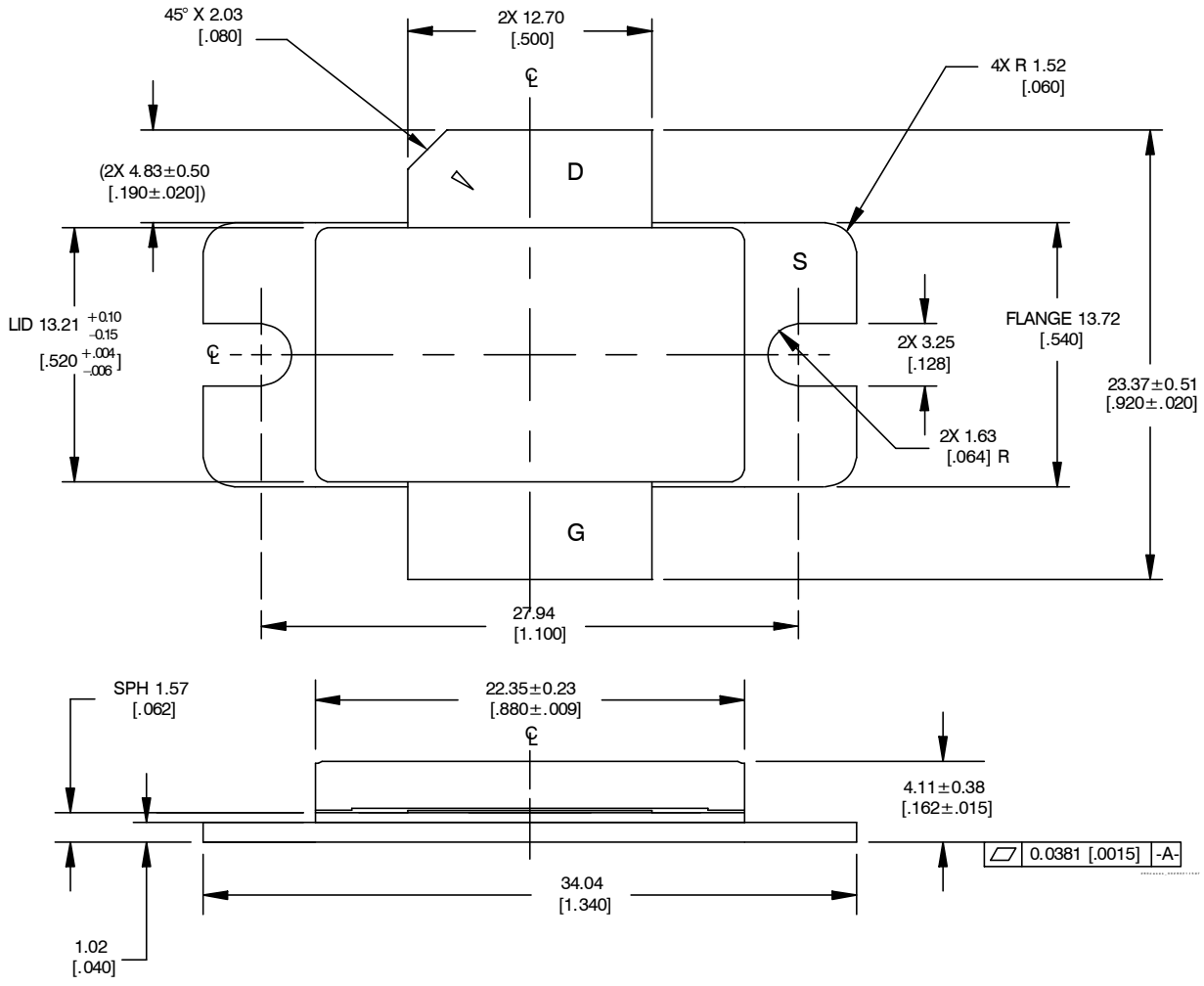


Diagram Notes:

1. Lead thickness: 0.10 +0.051/–0.025 [.004 +.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.

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

PTF141501E

Revision History:	2008-02-13	Data Sheet
Previous Version:	2005-08-30, Data Sheet	

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

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Entegreden kapasitöre tüm elektronik komponent kategorileri.

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