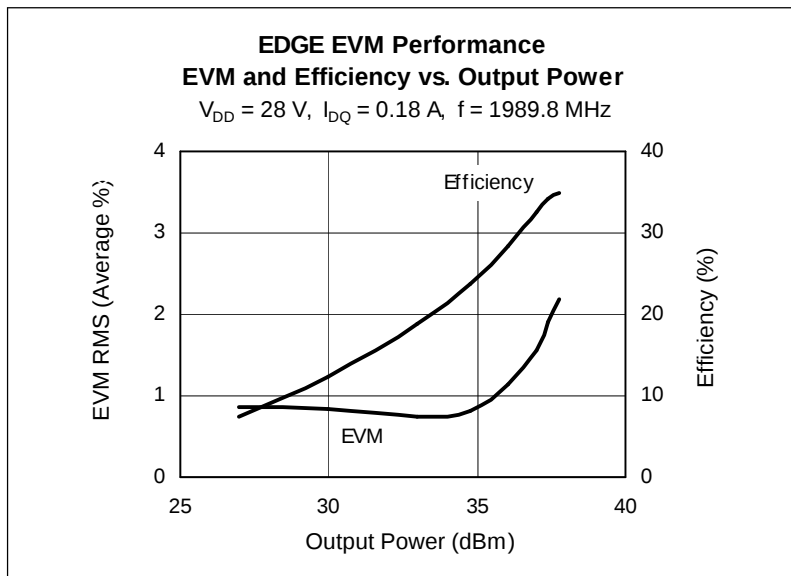


LDMOS RF Power Field Effect Transistor 10 W, 1805–1880 MHz, 1930–1990 MHz 10 W, 2110–2170 MHz

Description

The PTF180101 is a 10 W, internally-matched *GOLDMOS* FET device intended for EDGE applications in the DCS/PCS band. Full gold metallization ensures excellent device lifetime and reliability.



Features

- Typical EDGE performance
 - Average output power = 4.0 W
 - Gain = 19.0 dB
 - Efficiency = 28%
 - EVM = 1.1 %
- Typical WCDMA performance
 - Average output power = 1.8 W
 - Gain = 18.0 dB
 - Efficiency = 20%
 - ACPR = -45 dBc
- Typical CW performance
 - Output power at P-1dB = 15 W
 - Efficiency = 50%
- 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

PTF180101S
 Package 32259



ESD: Electrostatic discharge sensitive device — observe handling precautions!

RF Characteristics, EDGE Operation at $T_{CASE} = 25^{\circ}\text{C}$ unless otherwise indicated

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

$V_{DD} = 28\text{ V}$, $I_{DQ} = 180\text{ mA}$, $P_{OUT} = 4\text{ W}$, $f = 1989.8\text{ MHz}$

Characteristic	Symbol	Min	Typ	Max	Units
Error Vector Magnitude	EVM (RMS)	—	1.1	—	%
Modulation Spectrum @ 400 kHz	ACPR	—	-60	—	dBc
Modulation Spectrum @ 600 kHz	ACPR	—	-70	—	dBc
Gain	G_{ps}	—	19	—	dB
Drain Efficiency	η_D	—	28	—	%

Two-Tone Measurements (tested in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 180\text{ mA}$, $P_{OUT} = 10\text{ W PEP}$, $f = 1990\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Units
Gain	G_{ps}	18	19	—	dB
Drain Efficiency	η_D	30	33	—	%
Intermodulation Distortion	IMD	—	-30	-28	dBc

RF Characteristics, WCDMA Operation at $T_{CASE} = 25^{\circ}\text{C}$ unless otherwise indicated

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

$V_{DD} = 28\text{ V}$, $I_{DQ} = 135\text{ mA}$, $P_{OUT} = 1.8\text{ W}$,

$f = 2170\text{ MHz}$, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8.7 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Units
Adjacent Channel Power Ratio	ACPR	—	−45	—	dBc
Gain	G_{ps}	—	18	—	dB
Drain Efficiency	η_D	—	20	—	%

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

$V_{DD} = 28\text{ V}$, $I_{DQ} = 135\text{ mA}$, $P_{OUT} = 10\text{ W PEP}$, $f = 2170\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Units
Gain	G_{ps}	—	18	—	dB
Drain Efficiency @ −30 dBc IM3	η_D	—	37	—	%
Intermodulation Distortion	IMD	—	−30	—	dBc

DC Characteristics at $T_{CASE} = 25^{\circ}\text{C}$ unless otherwise indicated

Characteristic	Conditions	Symbol	Min	Typ	Max	Units
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
On–State Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ A}$	$R_{DS(on)}$	—	0.83	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ} = 180\text{ mA}$	V_{GS}	2.5	3.2	4.0	V
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1.0	μA

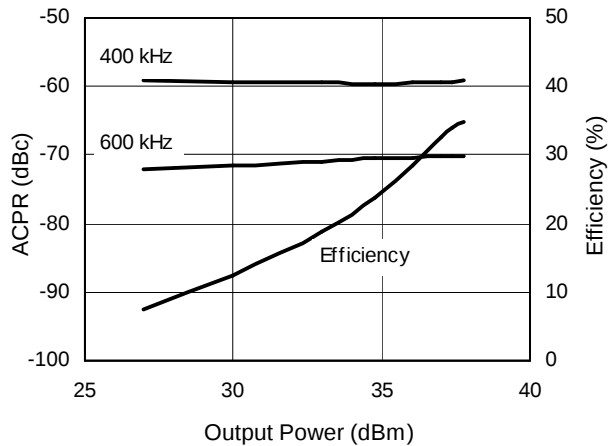
Maximum Ratings at $T_{CASE} = 25^{\circ}\text{C}$ unless otherwise indicated

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	P_D	58	W
Above 25°C derate by		0.333	W/ $^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	−40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$, 10 W CW)	$R_{\theta JC}$	3.0	$^{\circ}\text{C/W}$

Typical Performance measurements taken in broadband test fixture

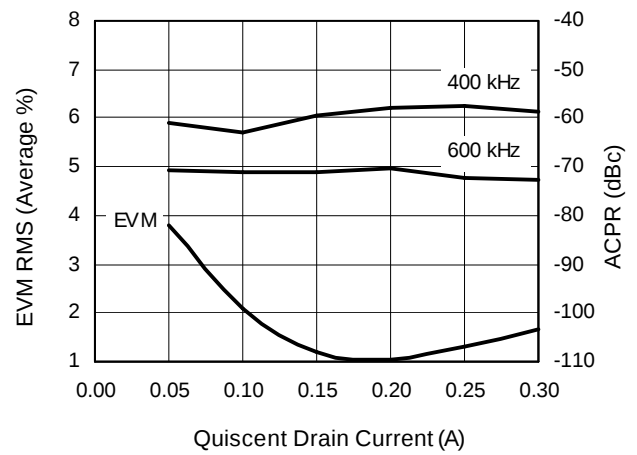
EDGE Modulation Spectrum Performance

$V_{DD} = 28\text{ V}$, $I_{DQ} = 0.18\text{ A}$, $f = 1989.8\text{ MHz}$



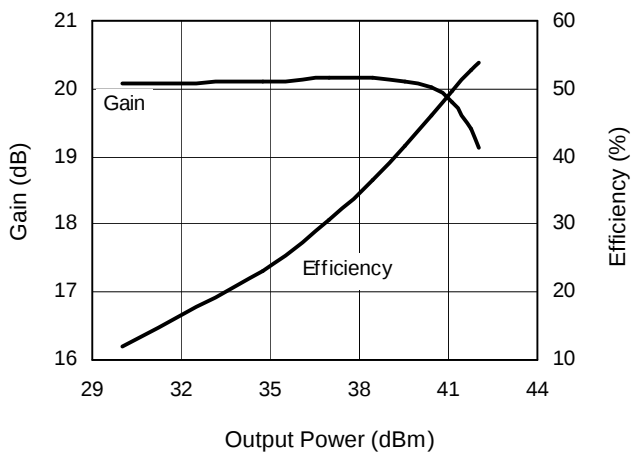
EVM and Modulation Spectrum Performance

$f = 1989.8\text{ MHz}$, $P_{OUT} = 3.5\text{ W}$



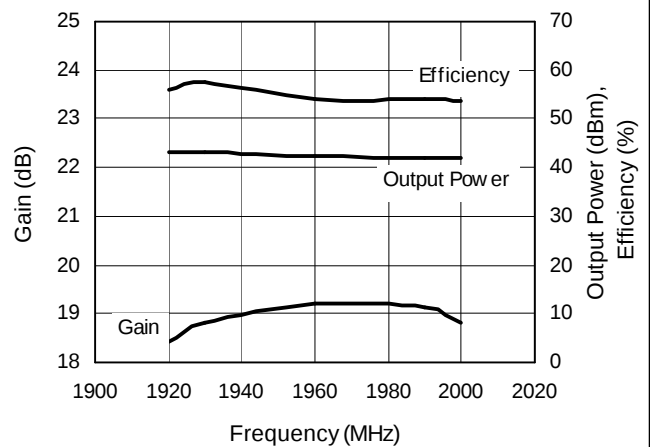
Gain & Efficiency vs. Output Power

$V_{DD} = 28\text{ V}$, $I_{DQ} = 0.18\text{ A}$, $f = 1990\text{ MHz}$

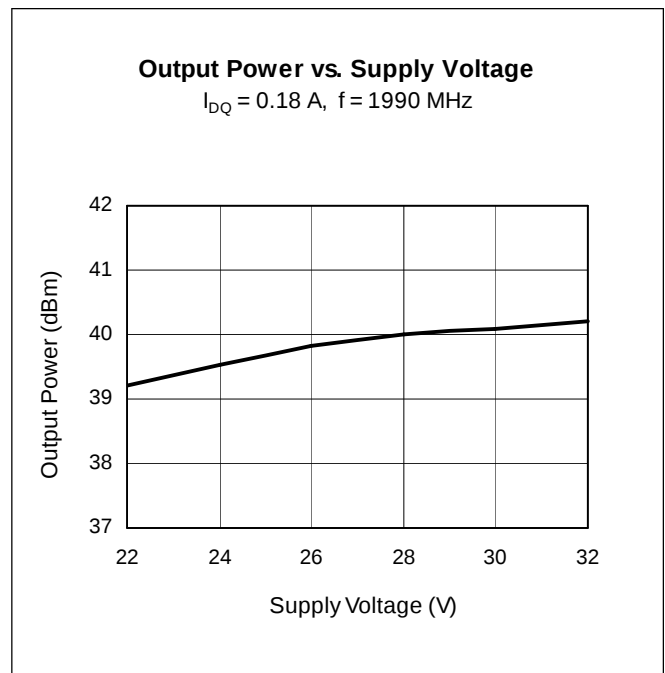
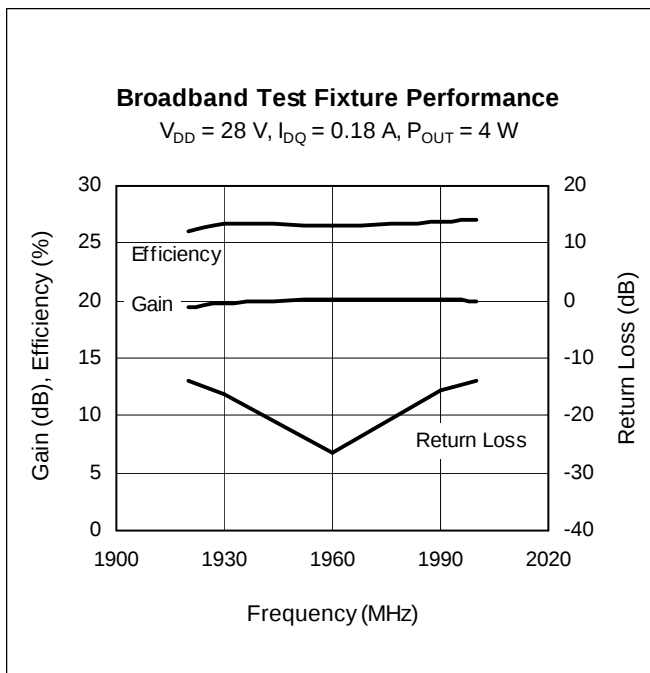
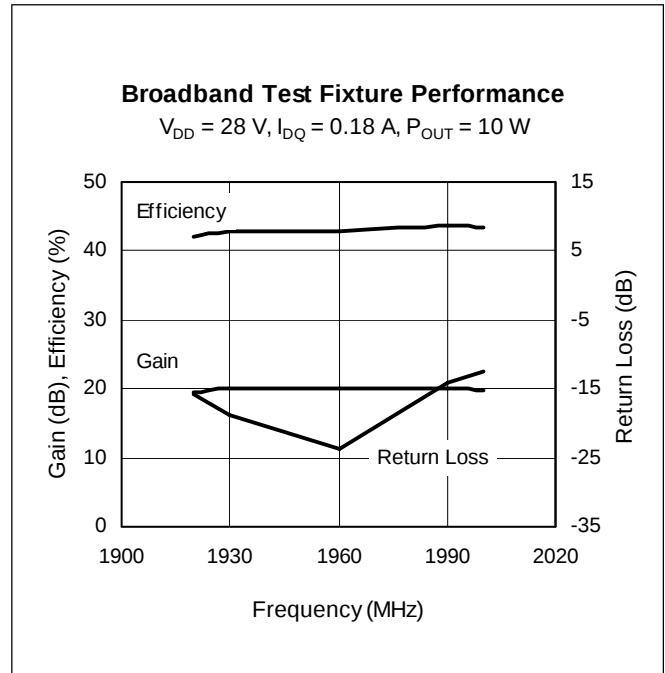
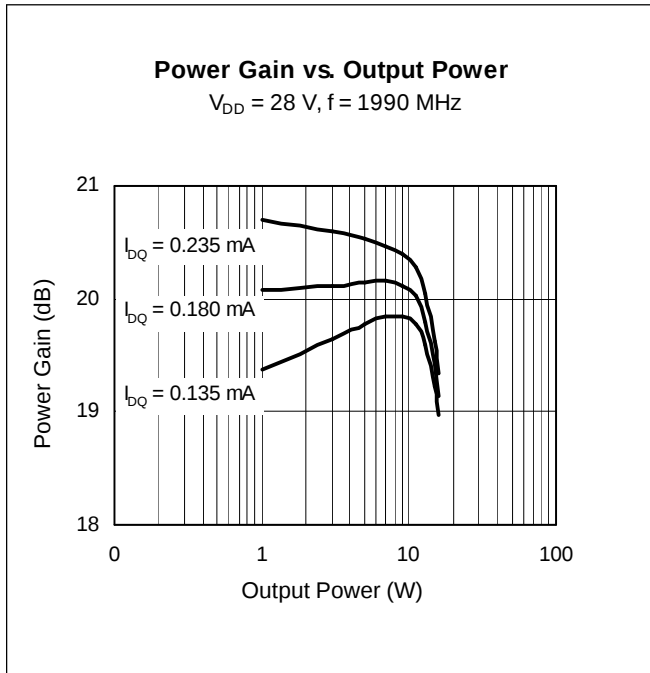


Output Power, Gain & Efficiency (at P-1dB) vs. Frequency

$V_{DD} = 28\text{ V}$, $I_{DQ} = 0.18\text{ A}$



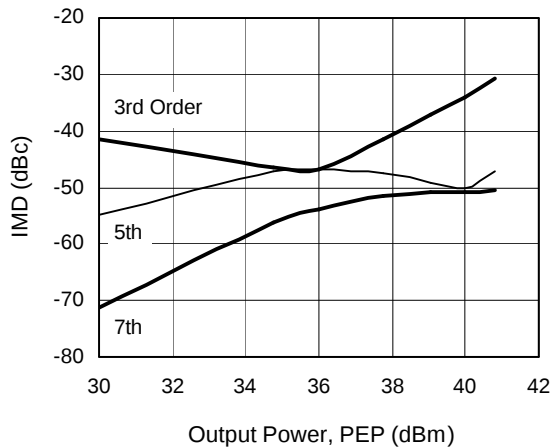
Typical Performance (cont.)



Typical Performance (cont.)

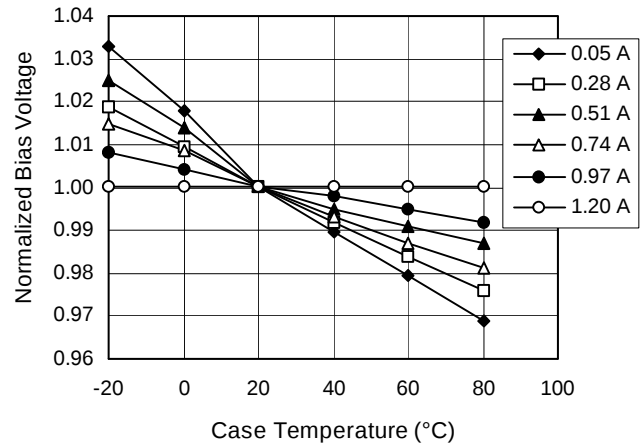
Intermodulation Distortion vs. Output Power

$V_{DD} = 28\text{ V}$, $I_{DQ} = 0.18\text{ A}$, $f_1 = 1990\text{ MHz}$, $f_2 = 1991\text{ MHz}$



Gate-Source Voltage vs. Case Temperature

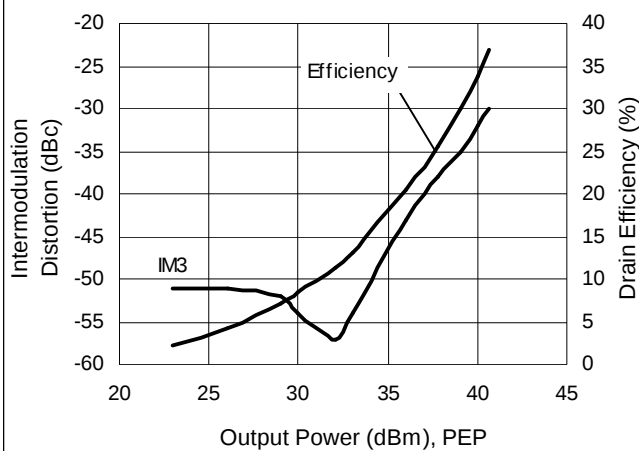
Voltage normalized to typical gate voltage.
Series show current.



Typical Performance, WCDMA Operation

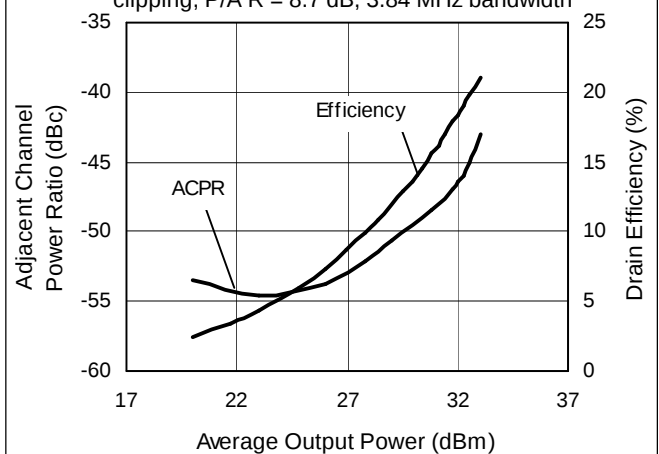
Two-Tone Drive-up

$V_{DD} = 28\text{ V}$, $I_{DQ} = 135\text{ mA}$, $f = 2170\text{ MHz}$,
tone spacing = 1 MHz

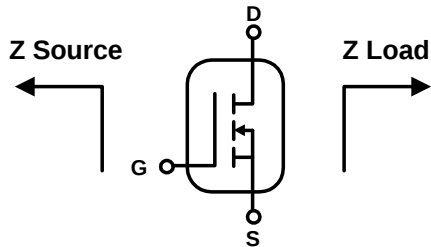


Single-Carrier WCDMA Drive-Up

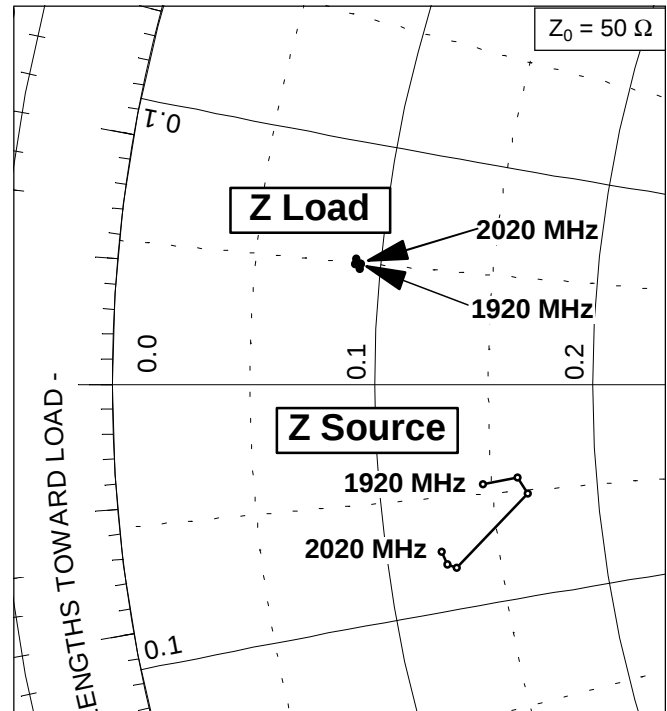
$V_{DD} = 28\text{ V}$, $I_{DQ} = 135\text{ mA}$, $f = 2170\text{ MHz}$,
3GPP WCDMA signal, Test Model 1 w/16 DPCH, 67%
clipping, P/A R = 8.7 dB, 3.84 MHz bandwidth



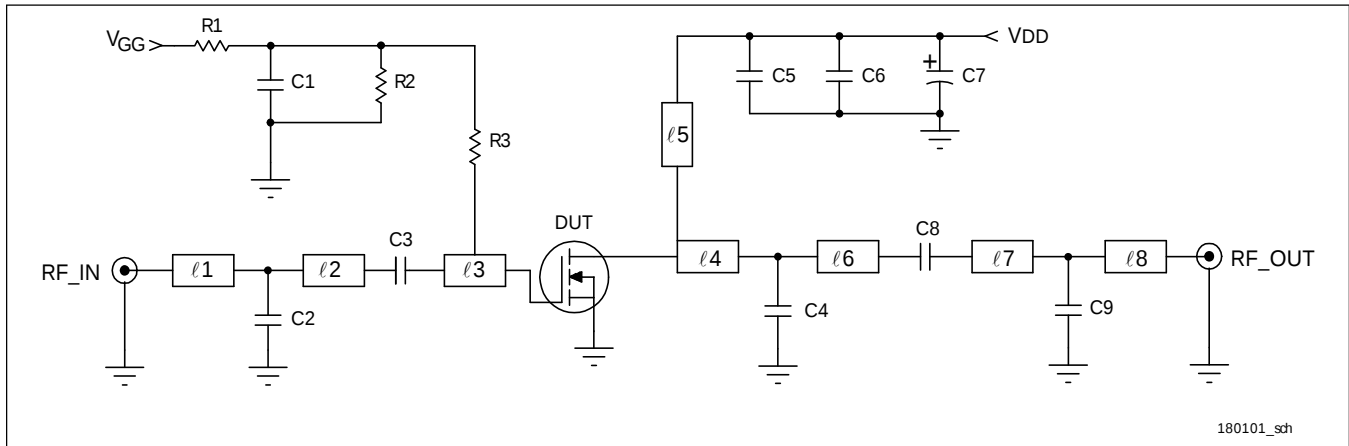
Broadband Circuit Impedance Data



Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
1920	7.3	-2.3	4.6	2.4
1930	8.1	-2.2	4.6	2.5
1960	8.3	-2.6	4.5	2.6
1990	6.5	-4.1	4.5	2.5
2000	6.3	-4.0	4.5	2.5
2020	6.2	-3.7	4.6	2.5



Reference Circuits



Reference Circuit Schematic

Circuit Assembly Information

DUT	PTF180101	LDMOS Transistor	
Circuit Board	0.76 mm [.030"] thick, $\epsilon_r = 4.5$	Rogers TMM4, 2 oz. Copper	

Microstrip	Electrical Characteristics at 1990 MHz	Dimensions: L x W (mm)	Dimensions: L x W (in.)
l1	0.133 λ , 50 Ω	10.92 x 1.37	0.430 x 0.054
l2	0.096 λ , 50 Ω	7.87 x 1.37	0.310 x 0.054
l3	0.155 λ , 9.5 Ω	11.30 x 12.45	0.445 x 0.490
l4	0.008 λ , 12.8 Ω	0.64 x 8.86	0.025 x 0.349
l5	0.286 λ , 70 Ω	23.88 x 0.71	0.940 x 0.028
l6	0.247 λ , 12.8 Ω	18.29 x 8.86	0.720 x 0.349
l7	0.145 λ , 50 Ω	11.81 x 1.37	0.465 x 0.054
l8	0.008 λ , 50 Ω	0.64 x 1.37	0.025 x 0.054

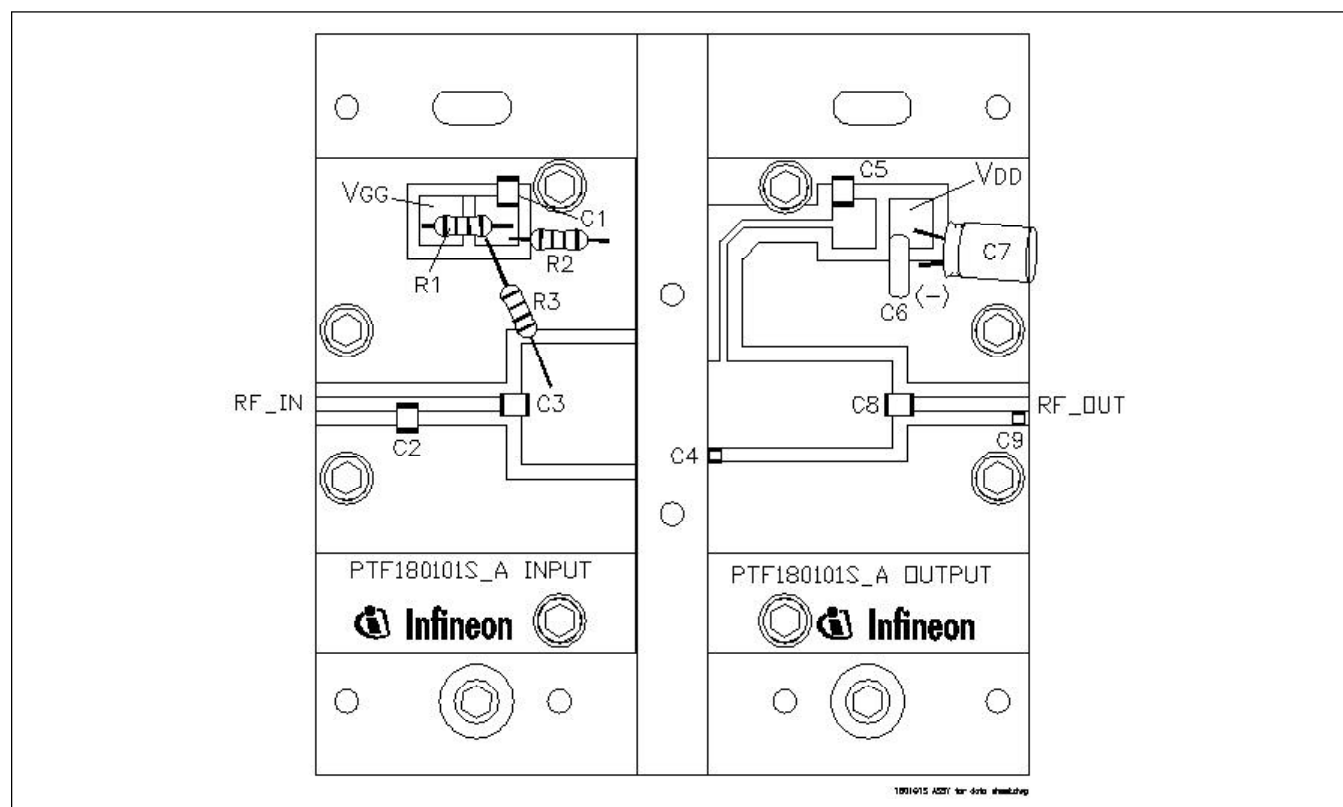
Reference Circuits (cont.)

1930–1990 MHz Operation

Component	Description	Manufacturer	P/N or Comment
C1, C3, C5, C8	Capacitor, 10 pF	ATC	100B 100
C2	Capacitor, 1.7 pF	ATC	100B 1R7
C4	Capacitor, 2.0 pF	ATC	100A 2R0
C6	Capacitor, 0.1 μ F, 50 V	Digi-Key	P4525-ND
C7	Capacitor, 100 μ F, 50 V	Digi-Key	P5182-ND
C9	Capacitor, 0.6 pF	ATC	100A 0R6
R1, R2, R3	Resistor, 220 ohm, 1/4 W	Digi-Key	220QBK

2.11–2.17 GHz Operation

Component	Description	Manufacturer	P/N or Comment
C1, C3, C5, C8	Capacitor, 10 pF	ATC	100B 100
C2	Capacitor, 0.8 pF	ATC	100B 0R8
C4	Capacitor, 2.2 pF	ATC	100A 2R2
C6	Capacitor, 0.1 μ F, 50 V	Digi-Key	P4525-ND
C7	Capacitor, 100 μ F, 50 V	Digi-Key	P5182-ND
C9	Capacitor, 1.0 pF	ATC	100A 1R0
R1, R2, R3	Resistor, 220 ohm, 1/4 W	Digi-Key	220QBK



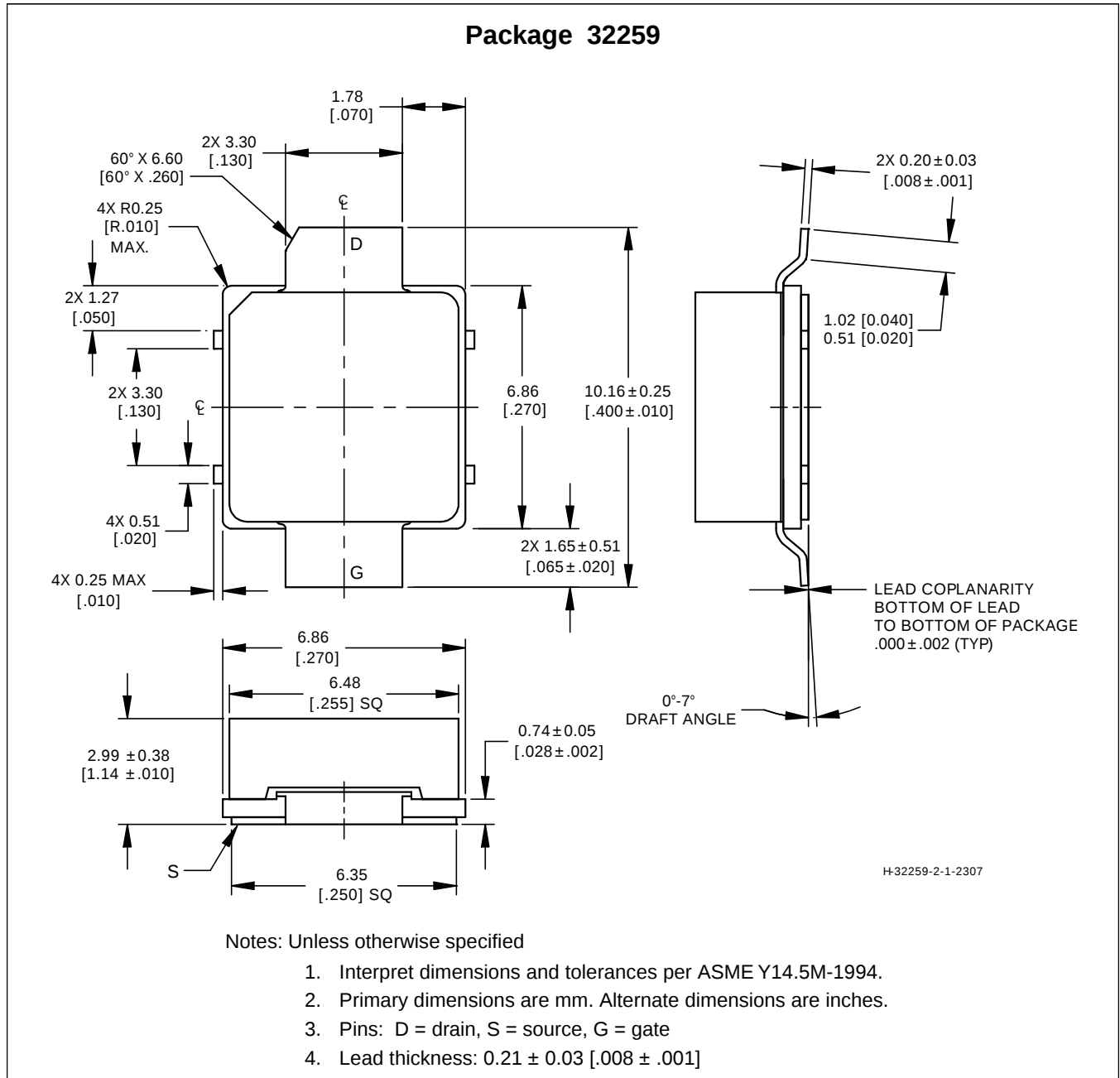
Reference circuit assembly diagram¹ (not to scale)

¹ Gerber files for this circuit are available upon request.

Ordering Information

Type	Package Outline	Package Description	Marking
PTF180101S	32259	Thermally enhanced, surface mount	PTF180101S

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: 2004-02-03

Data Sheet

Previous Version: none

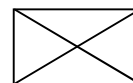
Page	Subjects (major changes since last revision)
1, 5, 7	Add information about WCDMA operation

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