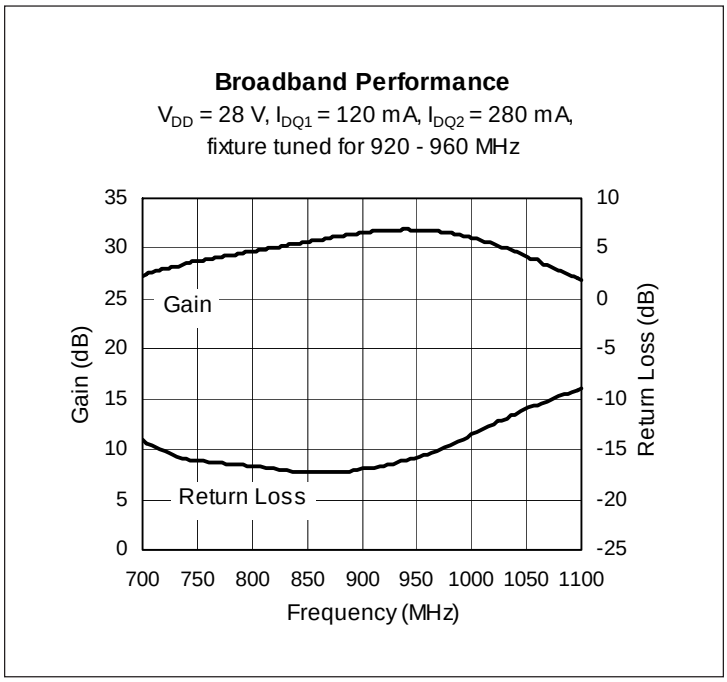
Wideband RF LDMOS Integrated Power Amplifier 30 W, 700 – 1000 MHz

Description

The PTMA080302M is a wideband, matched, 30-watt, 2-stage LDMOS integrated amplifier intended for use in all typical modulation formats from 700 to 1000 MHz. This device is offered in a 20-lead, thermally-enhanced, overmolded package for cool and reliable operation.

PTMA080302M
Package PG-DSO-20-63



Features

- Designed for wide RF modulation bandwidths, and low memory effects
- On-chip matching, integrated input DC block, 50-ohm input and ~ 8-ohm output
- Typical GSM/EDGE performance, 940 MHz, 28 V
  - Output power = 15 W Avg.
  - Linear gain = 31 dB
  - Power added efficiency = 36%
  - EVM at 15 W = 1.7 %
  - ACPR at 400 kHz = –61 dBc
  - ACPR at 600 kHz = –73 dBc
- Typical CW performance at 940 MHz, 28 V
  - Output power at P–1dB = 32 W
  - Linear gain (1 W) = 31 dB
  - Power added efficiency = 46%
- Capable of handling 10:1 VSWR @ 28 V, 30 W (CW) output power
- Integrated ESD protection. Meets HBM Class 1B (minimum), per JESD22-A114F
- RoHS-compliant package

RF Characteristics

GSM/EDGE Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)
V_{DD} = 28 V, I_{DQ1} = 120 mA, I_{DQ2} = 280 mA, f = 920 to 960 MHz, P_{OUT} = 15 W Avg.

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	31	—	dB
Power-added Efficiency	PAE	—	36	—	%
Error Vector Magnitude	EVM (RMS)	—	1.7	—	%

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!

RF Characteristics (cont.)

GSM/EDGE Measurements (cont.)

V_{DD} = 28 V, I_{DQ1} = 120 mA, I_{DQ2} = 280 mA, f = 920 to 960 MHz, P_{OUT} = 15 W Avg.

Characteristic		Symbol	Min	Typ	Max	Unit
Modulation Spectrum	400 kHz offset	$ACPR_1$	—	–61	—	dBc
	600 kHz offset	$ACPR_2$	—	–73	—	dBc
Input Return Loss		IRL	—	–15	—	dB
Gain Flatness		ΔG	—	0.2	—	dB

Two-tone Measurements (tested in Infineon test fixture)

V_{DD} = 28 V, I_{DQ1} = 120 mA, I_{DQ2} = 280 mA, P_{OUT} = 32 W PEP, f = 940 MHz, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	31	32	—	dB
Power-added Efficiency	PAE	34	35	—	%
Intermodulation Distortion	IMD	—	–33	–31	dBc

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

V_{DD} = 28 V, I_{DQ1} = 120 mA, I_{DQ2} = 280 mA, f = 940 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	32	—	dB
Power-added Efficiency	PAE	—	46	—	%
Output Power	P–1dB	—	31	—	W

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	Stage 1	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.25	—	Ω
	Stage 2	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	1.85	—	Ω
Operating Gate Voltage		V_{DS} = 28 V, I_{DQ1} = 120 mA, I_{DQ2} = 280 mA	V_{GS}	2.0	2.5	3.0	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
Input Power		P_{IN}	16	dBm
Total Device Dissipation		P_D	129.5	W
Above 25°C derate by			0.74	W/°C
Storage Temperature Range		T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C)	Stage 1	$R_{\theta JC}$	6.7	°C/W
	Stage 2	$R_{\theta JC}$	1.7	°C/W

Moisture Sensitivity Level

Level	Test Standard	Package Temperature	Unit
3	IPC/JEDEC J-STD-020	260	°C

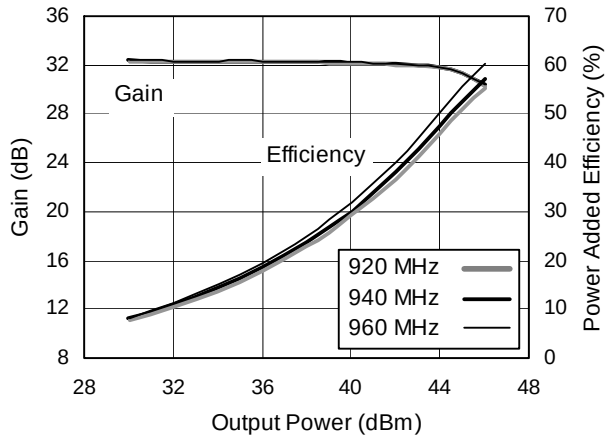
Ordering Information

Type and Version	Package Outline	Package Description	Shipping
PTMA080302M V1	PG-DSO-20-63	Copper heat slug, plastic EMC body	Tape

Typical Performance (data taken in a production test fixture)

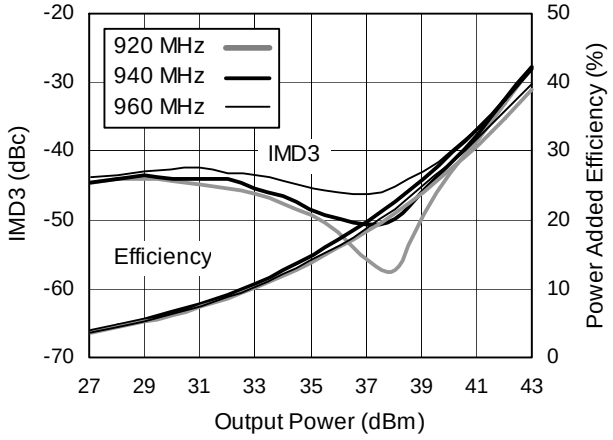
CW Power Performance

V_{DD} = 28 V, I_{DQ1} = 120 mA, I_{DQ2} = 280 mA,
f = 920, 940, 960 MHz



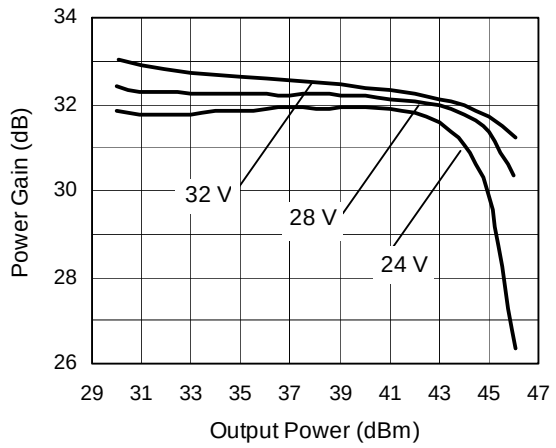
Two-tone Drive-up

V_{DD} = 28 V, I_{DQ1} = 120 mA, I_{DQ2} = 280 mA,
selected frequencies



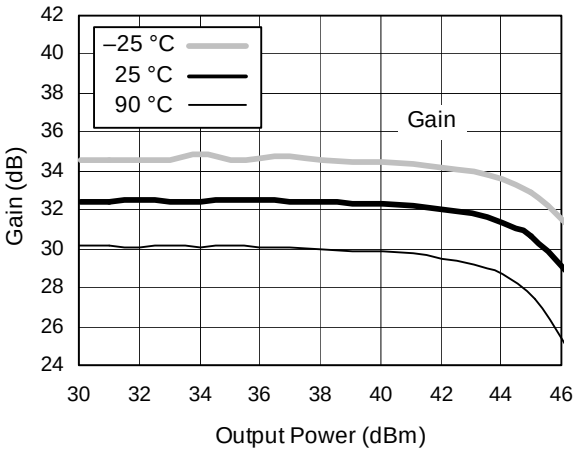
Power Sweep at Selected Drain Voltages

V_{DD1}=28 V, V_{DD2} = 24 V, 28 V and 32 V,
I_{DQ1} = 120 mA, f = 940 MHz



EDGE Modulation Spectrum Performance

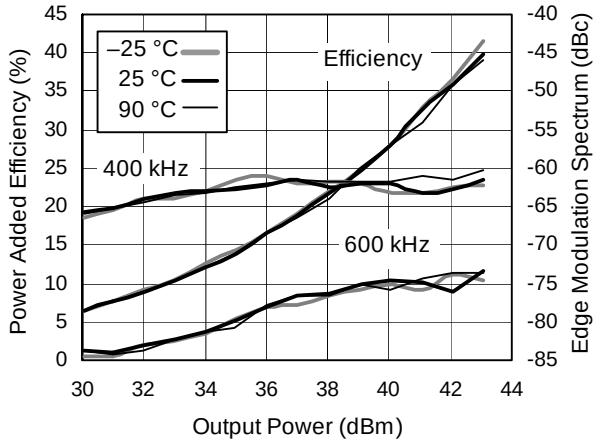
V_{DD} = 28 V, I_{DQ1} = 120 mA, I_{DQ2} = 280 mA,
series show f = 942 MHz at selected temperatures



Typical Performance (cont.)

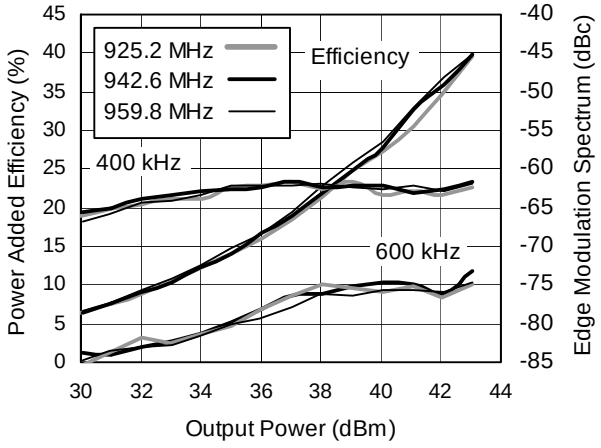
EDGE Modulation Spectrum Performance

V_{DD} = 28 V, I_{DQ1} = 120 mA, I_{DQ2} = 280 mA,
series show f = 942 MHz at selected temperatures



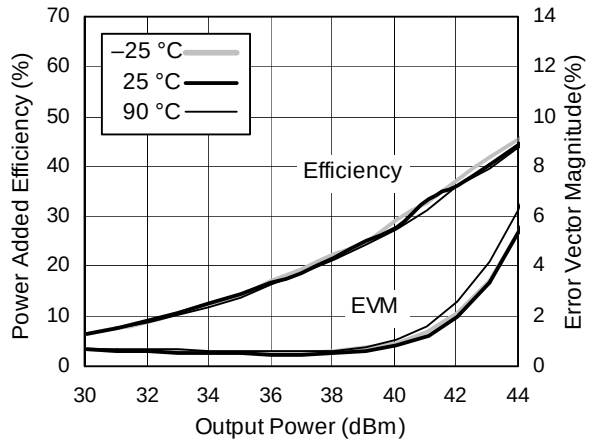
EDGE Modulation Spectrum Performance

V_{DD} = 28 V, I_{DQ1} = 120 mA, I_{DQ2} = 280 mA,
series are at selected frequencies



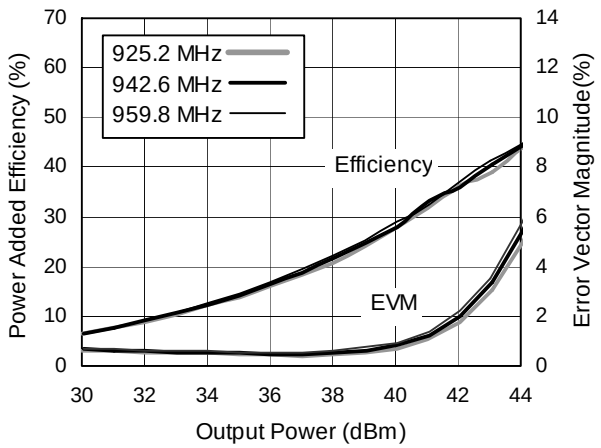
EDGE EVM

V_{DD} = 28 V, I_{DQ1} = 120 mA, I_{DQ2} = 280 mA,
series show f = 942 MHz at selected temperatures

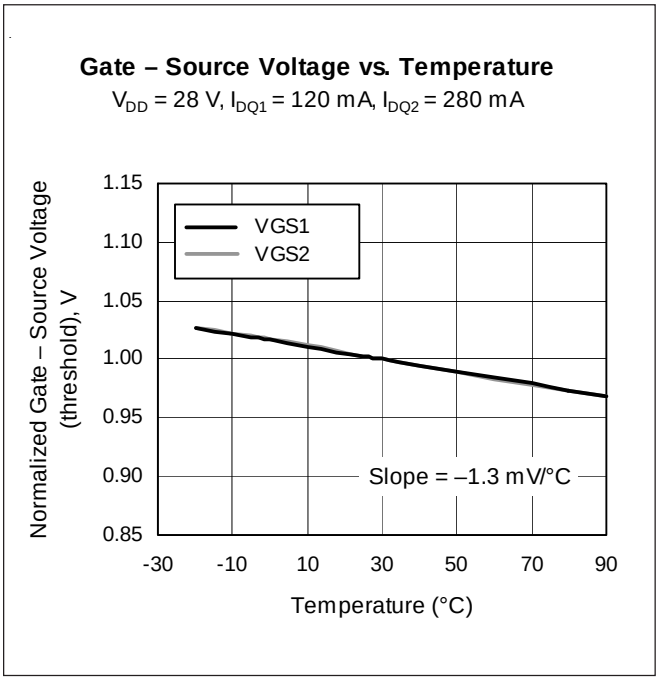


EDGE EVM

V_{DD} = 28 V, I_{DQ1} = 120 mA, I_{DQ2} = 280 mA,
series are at selected frequencies

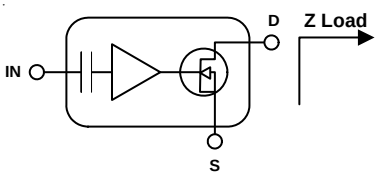


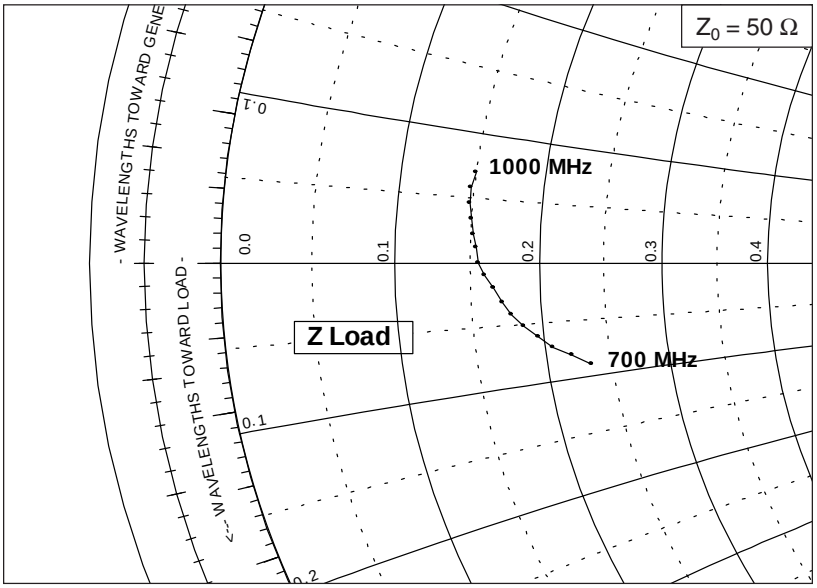
Typical Performance (cont.)



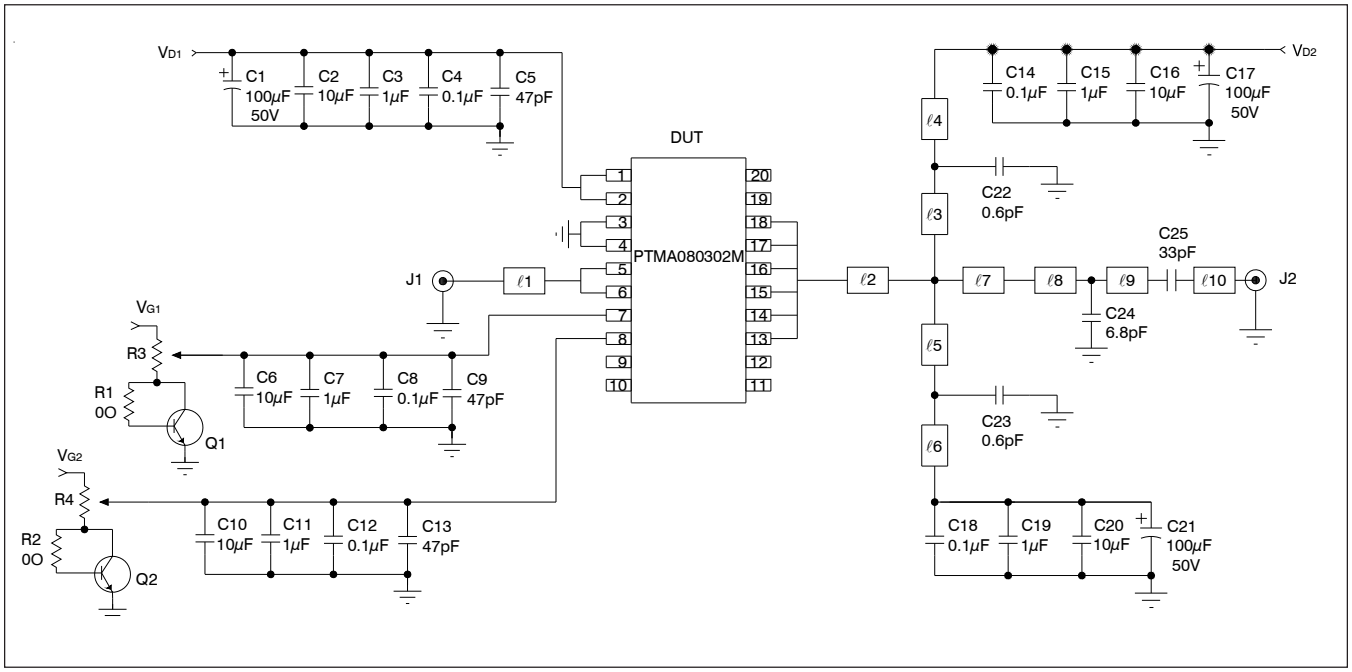
Broadband Circuit Impedance

Frequency	Z Load Ω	
MHz	R	jX
700	11.7	–4.5
720	11.0	–4.0
740	10.3	–3.6
760	9.8	–3.1
780	9.3	–2.6
800	8.9	–2.1
820	8.6	–1.6
840	8.3	–1.0
860	8.0	–0.5
880	7.8	0.0
900	7.7	0.6
920	7.6	1.1
940	7.5	1.7
960	7.4	2.3
980	7.4	2.9
1000	7.5	3.5





Reference Circuit — for evaluation only



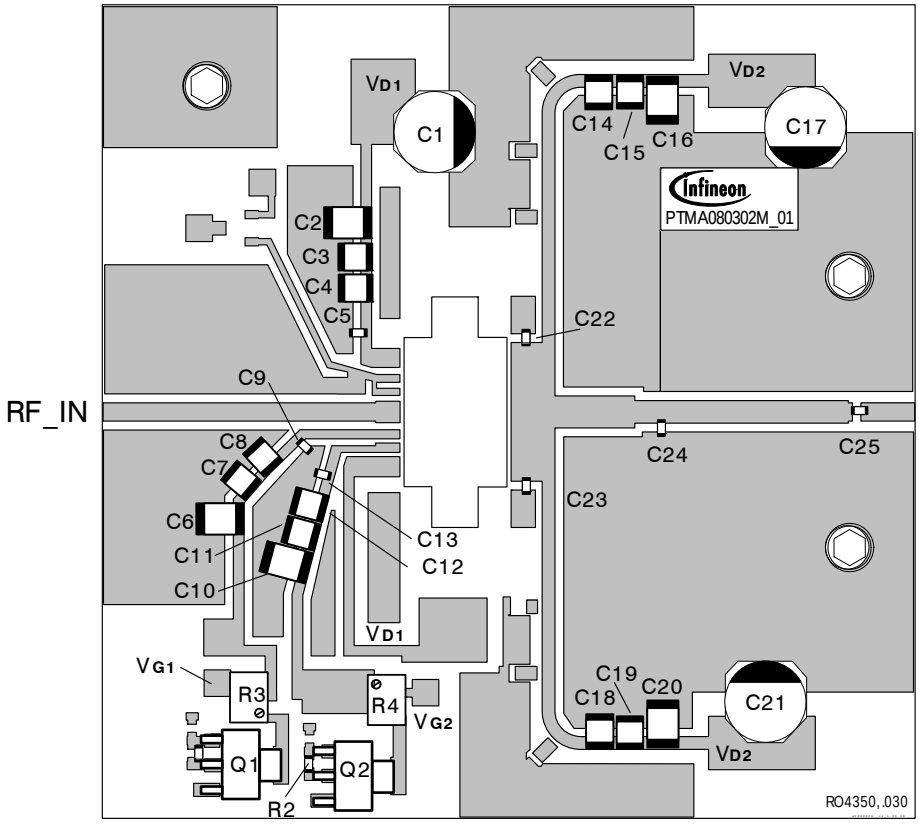
Reference circuit schematic for ƒ = 940 MHz

Circuit Assembly Information

DUT	PTMA080302M	LDMOS IC	
PCB	0.76 mm [.030"] thick, ε_r = 3.48	Rogers RO4350	1 oz. copper

Microstrip	Electrical Characteristics at 1960 MHz	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ1	0.161 λ, 50.0 Ω	27.76 x 1.70	1.093 x 0.067
ℓ2	0.012 λ, 10.4 Ω	2.01 x 13.00	0.079 x 0.512
ℓ3	0.012 λ, 10.4 Ω	2.06 x 13.00	0.081 x 0.512
ℓ4	0.044 λ, 34.2 Ω	7.52 x 3.00	0.296 x 0.118
ℓ5	0.022 λ, 34.2 Ω	3.81 x 3.00	0.150 x 0.118
ℓ6	0.095 λ, 43.6 Ω	16.43 x 2.11	0.647 x 0.083
ℓ7, ℓ8	0.093 λ, 50.0 Ω	5.03 x 1.70	0.198 x 0.067
ℓ9	0.161 λ, 47.8 Ω	27.79 x 1.83	1.094 x 0.072

Reference Circuit (cont.)



Reference circuit asembly diagram (not to scale)*

Component	Description	Suggested Manufacturer	P/N or Comment
C1, C17, C21	Electrolytic capacitor, 100 µF, 50 V	Digi-Key	PCE3718CT-ND
C2, C6, C10, C16, C20	Ceramic capacitor, 10 µF	Murata	GRM422Y5V106Z050AL
C3, C7, C11, C15, C19	Ceramic capacitor, 1 µF	Digi-Key	445-1411-2-ND
C4, C8, C12, C14, C18	Capacitor, 0.1 µF	Digi-Key	399-1267-2-ND
C5, C9, C13	Ceramic capacitor, 47 pF	ATC	600F470JT
C22, C23	Ceramic capacitor, 0.6 pF	ATC	600S0R6BT
C24	Ceramic capacitor, 6.8 pF	ATC	600S6R8CT
C25	Ceramic capacitor, 33 pF	ATC	600F330JT
Q1 , Q2	Transistor	Infineon Technologies	BCP56
R1, R2	Resistor, 0 Ω	Digi-Key	603
R3, R4	Potentiometer 2k Ω	Digi-Key	3224W-202ETR-ND

Package Outline Specifications

Package PG-DSO-20-63

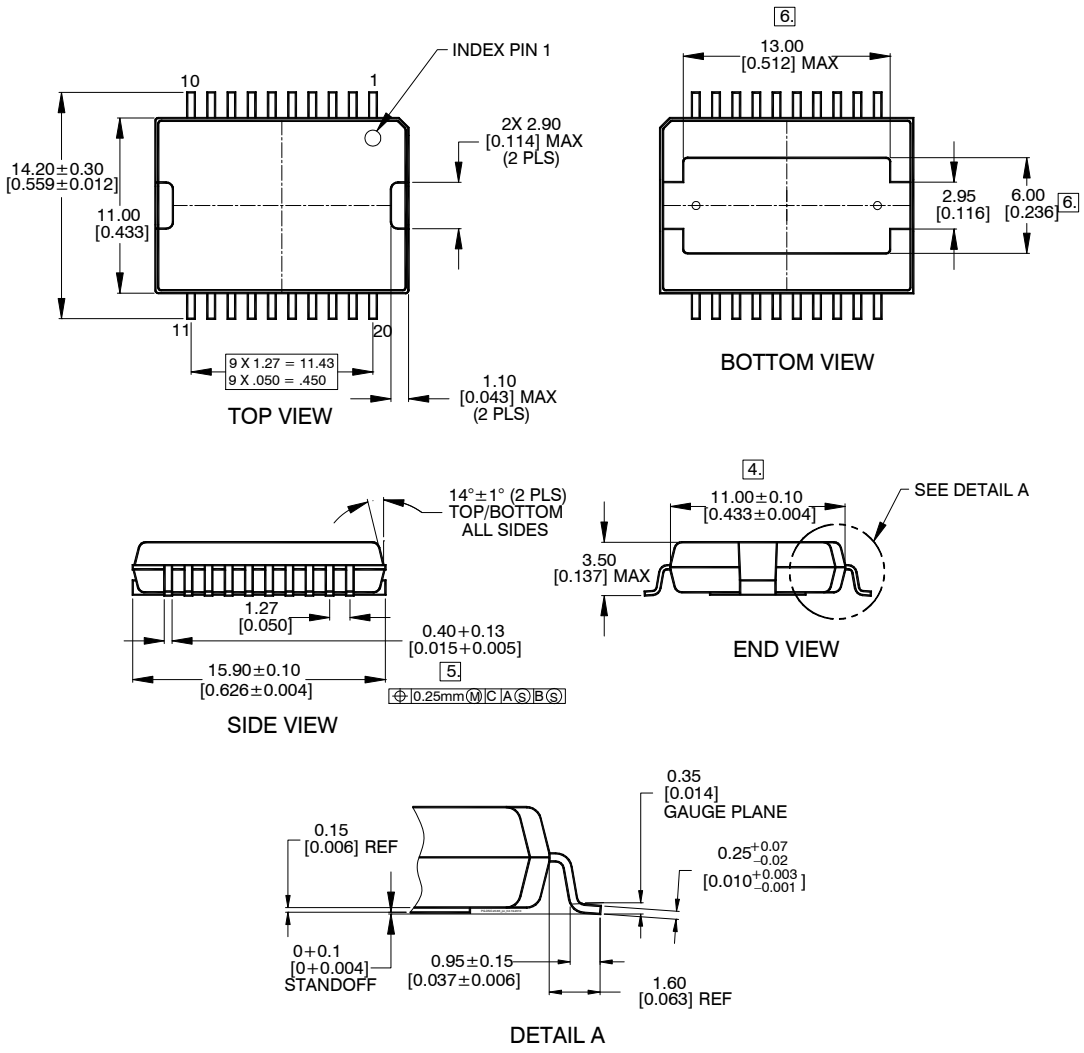
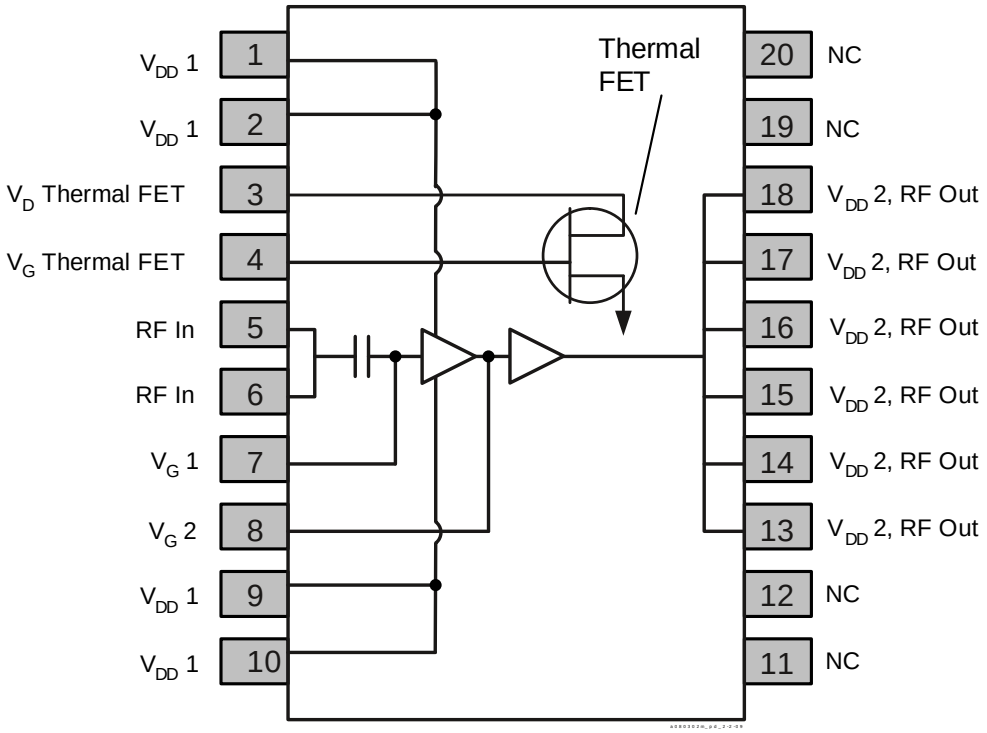


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Package dimensions: 11.0 mm by 15.9 mm by 3.35 mm.
3. JEDEC drawing number: MO-166.
4. Does not include plastic or metal protrusion of 0.15 mm max per side.
5. Does not include dambar protrusion; maximum allowable dambar protrusion shall be 0.08 mm.
6. Bottom metallization.
7. Sn plating (matte) : 5 – 15 micron [196.85 – 590.55 microinch].

Refer to Application Note "Recommendations for Printed Circuit Board Assembly of Infineon DSO and SSOP Packages" for additional information.

Pinout Diagram



Source: Plated copper heatslug on backside of package

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

Revision History:	2010-04-16	Data Sheet
Previous Version:	2009-08-31, Data Sheet	

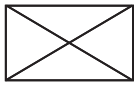
Page	Subjects (major changes since last revision)
3	Added moisture sensitivity level table
9	Updated package outline notes

We Listen to Your Comments

Any information within this document that you feel is wrong, unclear or missing at all?
Your feedback will help us to continuously improve the quality of this document.
Please send your proposal (including a reference to this document) to:

highpowerRF@infineon.com

To request other information, contact us at:
+1 877 465 3667 (1-877-GO-LDMOS) USA
or +1 408 776 0600 International



Edition 2010-04-16

Published by
Infineon Technologies AG
81726 Munich, Germany

Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

Information

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office (**www.infineon.com/rfpower**).

Warnings

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.

Infineon Technologies components may be used in life-support devices or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.