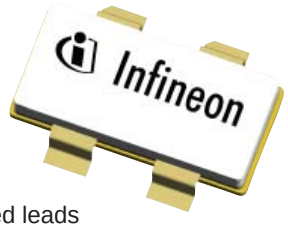
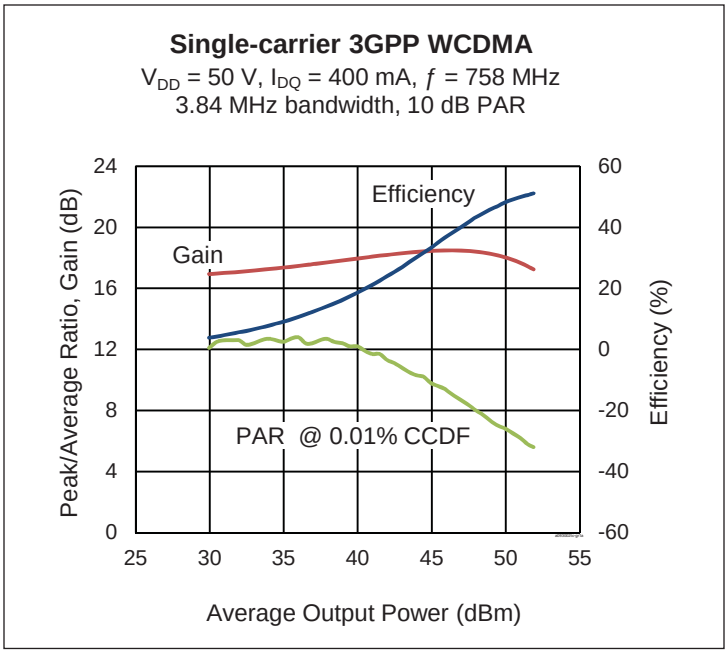
Thermally-Enhanced High Power RF LDMOS FET
300 W, 50 V, 703 – 960 MHz

Description

The PTVA093002TC is a 300-watt LDMOS FET. Designed for use in multi-standard cellular power amplifier applications, it can be used as single-ended or in a Doherty configuration. It features dual-path design, input matching, and a thermally-enhanced surface-mount package. Manufactured with Infineon's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PTVA093002TC
Package H-49248H-4, formed leads



Features

- Typical CW performance in a combined-lead 50-ohm single-ended fixture, 780 MHz, 50 V
  - Output power at P_{1dB} = 158 W
  - Gain = 18.2 dB
  - Efficiency = 52%
- Typical pulsed CW performance in a combined-lead 50-ohm single-ended fixture, 870 MHz, 50 V
  - Output power at P_{3dB} = 280 W
  - Gain = 16.2 dB
  - Efficiency = 50%
- Integrated ESD protection, Human Body Model class 2 (per JESD22-A114)
- Capable of withstanding a 10:1 load mismatch at 50 V, 63 W (CW) output power
- Low thermal resistance
- Pb-free and RoHS compliant

RF Specifications

Single-carrier WCDMA Characteristics (device with flat leads tested in an Infineon Doherty production test fixture)
V_{DD} = 50 V, I_{DQ} = 400 mA, V_{GSpeak} = 1.9 V, P_{OUT} = 63 W average, f = 803 MHz.
3GPP WCDMA signal: 3.84 MHz bandwidth, 10 dB PAR @0.01% CCDF.

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	17.5	18.5	—	dB
Drain Efficiency	η_D	40	45	—	%
Adjacent Channel Power Ratio	ACPR	—	–34	–32	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 mA	$V_{(BR)DSS}$	105	—	—	V
Drain Leakage Current		V_{DS} = 50 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	µA
		V_{DS} = 105 V, V_{GS} = 0 V	I_{DSS}	—	—	10.0	µA
Gate Leakage Current		V_{GS} = 10 V, V_{DS} = 0 V	I_{GSS}	—	—	1.0	µA
On-state Resistance		V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.265	—	Ω
Operating Gate Voltage	(main)	V_{DS} = 50 V, I_{DQ} = 400 mA	V_{GS}	—	3.8	—	V
	(peak)	V_{DS} = 50 V, I_{DQ} = 0 A	V_{GS}	—	1.9	—	V

Maximum Ratings

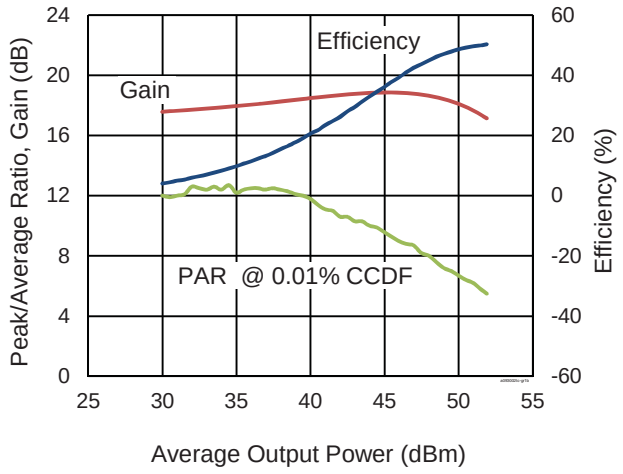
Parameter	Symbol	Value	Unit
Drain-source Voltage	V_{DSS}	105	V
Gate-source Voltage	V_{GS}	–6 to +12	V
Junction Temperature	T_J	200	°C
Storage Temperature Range	T_{STG}	–65 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 200 W CW)	$R_{\theta JC}$	0.44	°C/W

Ordering Information

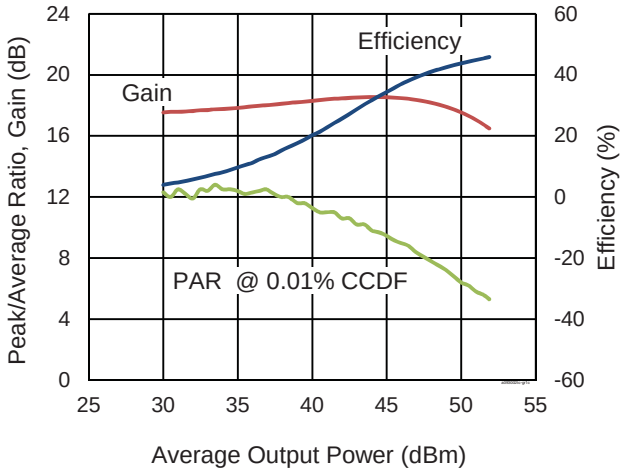
Type and Version	Order Code	Package and Description	Shipping
PTVA093002TC V1 R250	PTVA093002TCV1R250XTMA1	H-49248H-4, earless, ceramic open-cavity, formed leads, surface mount	Tape & Reel, 250 pcs

Typical Performance (data taken in a reference test fixture)

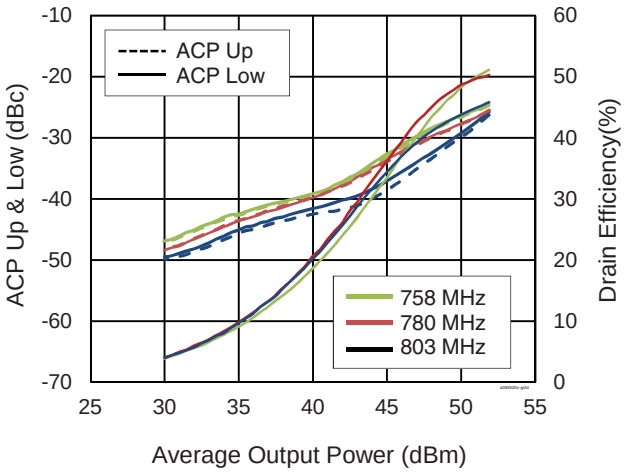
Single-carrier 3GPP WCDMA
V_{DD} = 50 V, I_{DQ} = 400 mA, f = 780 MHz
3.84 MHz bandwidth, 10 dB PAR



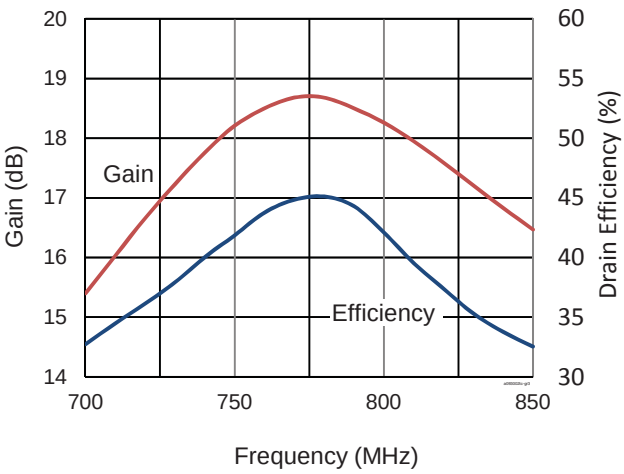
Single-carrier WCDMA Drive-up
V_{DD} = 50 V, I_{DQ} = 400 mA, f = 803 MHz
3.84 MHz bandwidth, 10 dB PAR



Single-carrier 3GPP WCDMA
V_{DD} = 50 V, I_{DQ} = 400 mA,
3.84 MHz bandwidth, 10 dB PAR

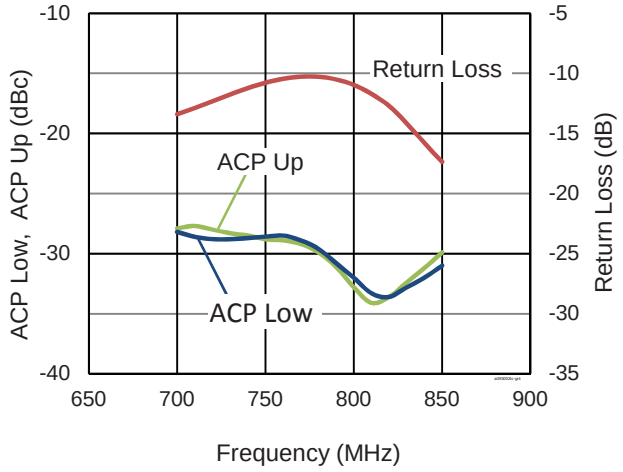


Broadband Performance
3GPP WCDMA single-carrier
V_{DD} = 50 V, I_{DQ} = 400 mA,
P_{OUT} = 48 dBm, PAR = 10 dB

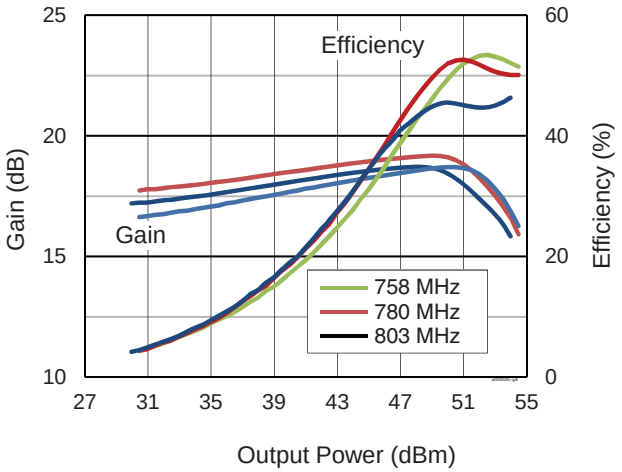


Typical Performance (cont.)

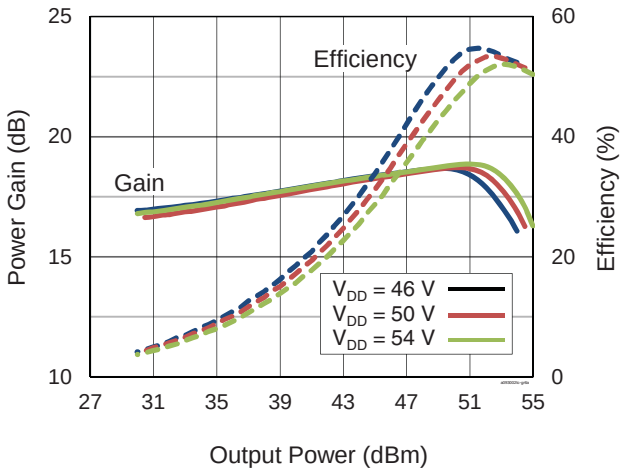
Broadband Performance
3GPP WCDMA single-carrier
V_{DD} = 50 V, I_{DQ} = 400 mA,
P_{OUT} = 48 dBm, PAR = 10 dB



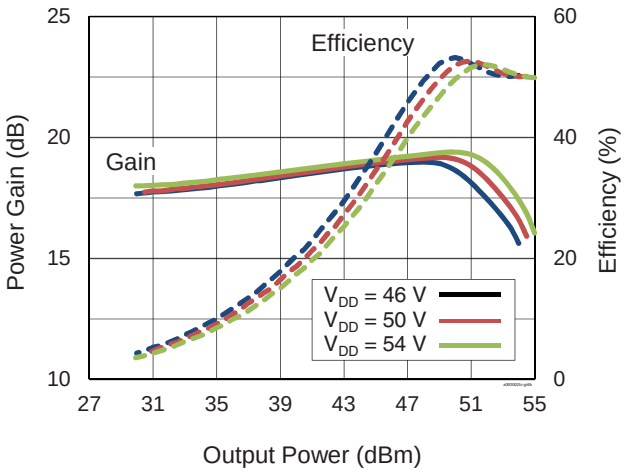
CW Performance
V_{DD} = 50 V, I_{DQ} = 400 mA
(series show frequency)



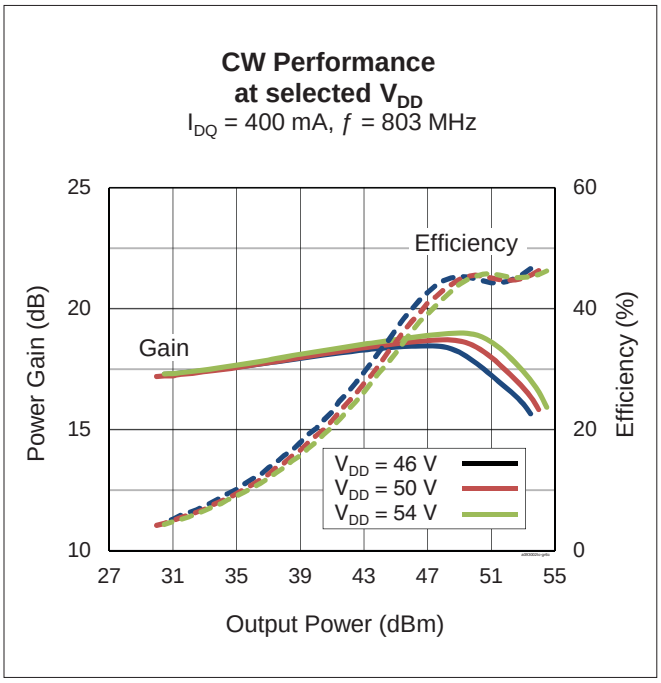
CW Performance
at selected V_{DD}
I_{DQ} = 400 mA, f = 758 MHz

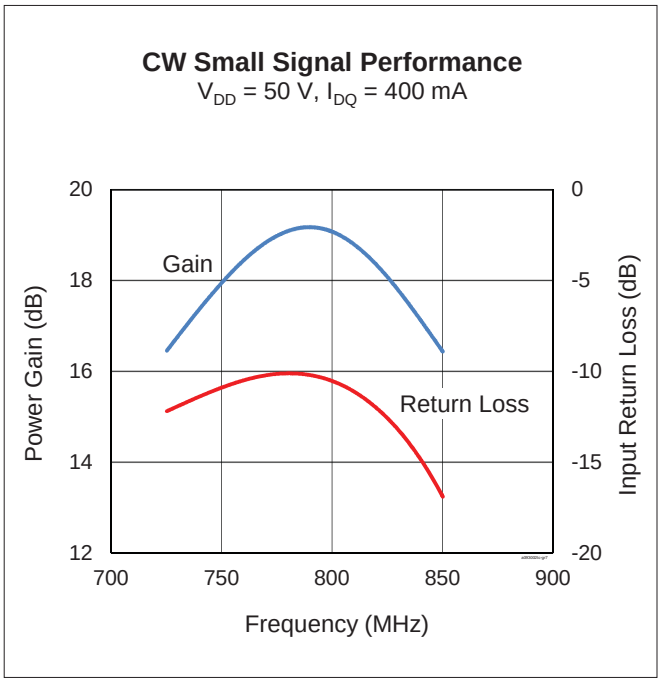


CW Performance
at selected V_{DD}
I_{DQ} = 400 mA, f = 780 MHz



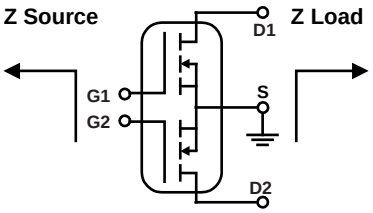
Typical Performance (cont.)





See next page for Load Pull

Load Pull Performance



Main side pulsed CW signal: 160 µsec, 10% duty cycle; 50 V, V_{GS} = 3.8 V, I_{DQ} = 350 mA

Class AB		P_{1dB}									
		Max Output Power					Max PAE				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{OUT} [dBm]	P_{OUT} [W]	PAE [%]	Zl [Ω]	Gain [dB]	P_{OUT} [dBm]	P_{OUT} [W]	PAE [%]
758	1.62 – j4.90	2.53 – j2.78	21.16	53.39	218	59.8	2.25 – j0.37	23.46	51.01	126	71.9
791	2.16 – j5.30	2.59 – j2.99	21.12	53.32	215	60.7	1.78 – j0.51	23.61	50.31	107	73.2
803	2.54 – j5.29	2.16 – j2.82	21.08	53.39	218	61.4	1.81 – j0.56	23.59	50.38	109	74.1

Peak side pulsed CW signal: 160 µsec, 10% duty cycle; 28 V, I_{DQ} = 75 mA

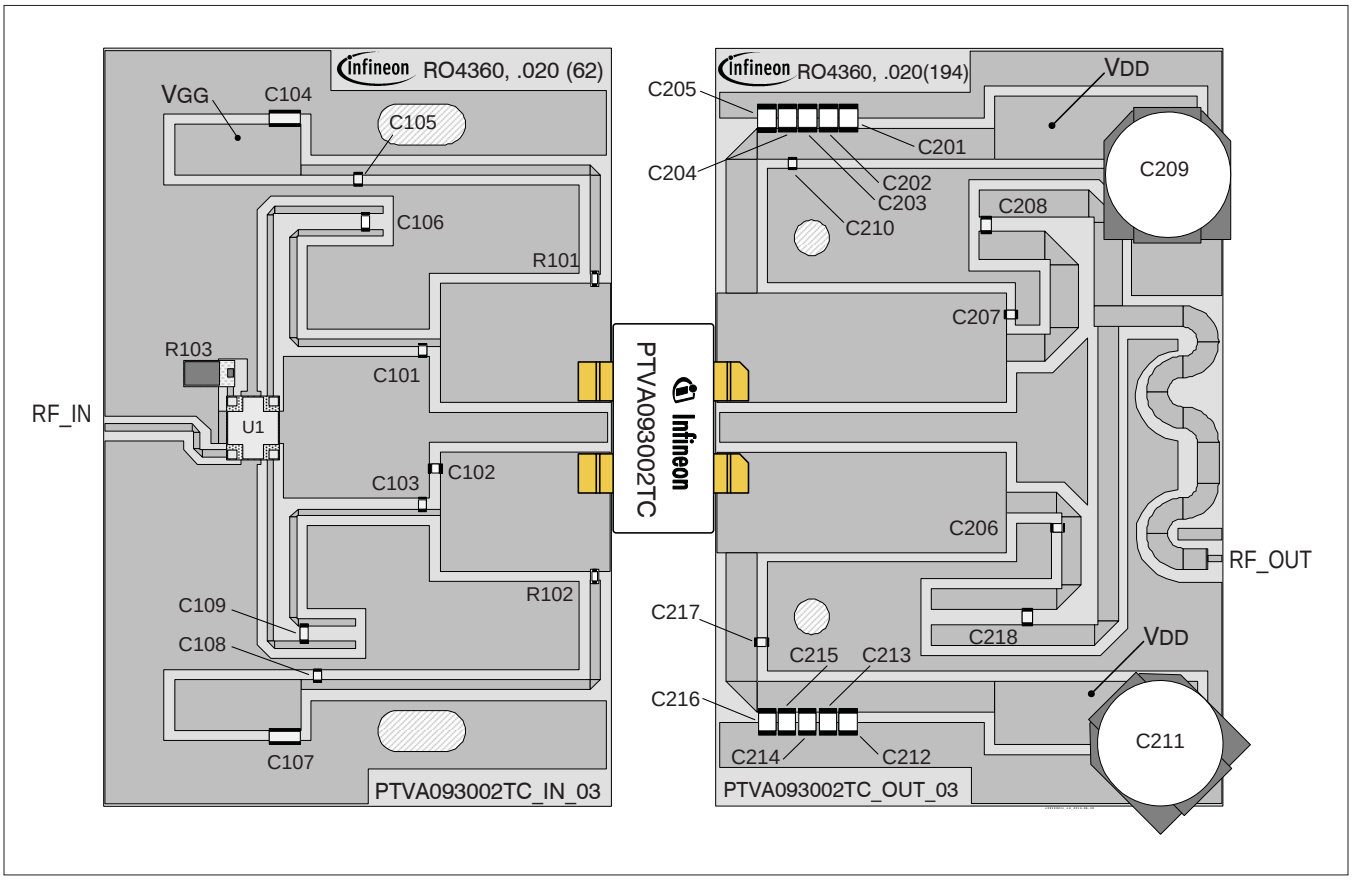
Class C		P_{1dB}									
		Max Output Power					Max PAE				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{OUT} [dBm]	P_{OUT} [W]	PAE [%]	Zl [Ω]	Gain [dB]	P_{OUT} [dBm]	P_{OUT} [W]	PAE [%]
MHz	Ohm	Ohm	dB	dBm	W	%	Ohm	dB	dBm	W	%
758	1.62 – j4.90	2.47 – j2.74	20.43	53.46	222	63.9	2.14 – j0.55	22.20	51.32	135	75.0
791	2.16 – j5.30	2.15 – j2.66	20.46	53.38	218	66.1	1.92 – j0.99	22.02	51.41	138	76.3
803	2.54 – j5.29	2.14 – j2.82	20.30	53.49	224	65.7	1.91 – j0.89	22.08	51.19	131	77.4

Reference Circuit, tuned for 758 – 803 MHz

DUT	PTVA093002TC
Test Fixture Part No.	LTD/PTVA093002TC V1
PCB	Rogers RO4360, 0.508 mm [.020"] thick, 2 oz. copper, ε_r = 6.4

Find Gerber files for this reference fixture on the Infineon Web site at (**www.infineon.com/rfpower**)

Reference Circuit, tuned for 758 – 803 MHz (cont.)



Reference circuit assembly diagram (not to scale)

Component Information

Component	Description	Manufacturer	P/N
Input			
C101	Chip capacitor, 3.6 pF	ATC	ATC100A3R6CW150XB
C102	Chip capacitor, 3.9 pF	ATC	ATC800A3R9CW150XB
C104, C107	Capacitor, 10 µF	Murata Electronics North America	LLL31BC70G106MA01L
C105, C106, C108, C109	Chip capacitor, 6 pF	ATC	ATC100A6R0CW150XB
R101, R102	Resistor, 10 Ohm	Panasonic – ECG	ERJ-3GEYJ100V
R103	Resistor, 50 Ohm	Anaren	RFP-060120A15Z50
U1	Hybrid Coupler, 4 dB, 90°	Anaren	X3C07P-04S

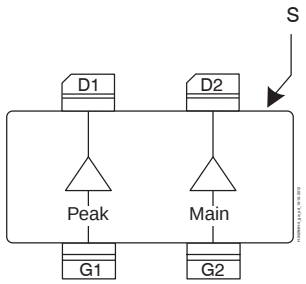
(table continued on page 8)

Reference Circuit (cont.)

Component Information (cont.)

Component	Description	Manufacturer	P/N
Output			
C206	Chip capacitor, 3.3 pF	ATC	ATC100A3R3CW150XB
C207	Chip capacitor, 5.6 pF	ATC	ATC800A5R6CW150XB
C208, C210, C217, C218	Chip capacitor, 6 pF	ATC	ATC100A6R0CW150XB
C207, C209	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C209, C211	Capacitor, 100 µF, 100 V	United Chemi-Con	EMVE101ARA101MKE0S

Pinout Diagram (top view)



Pin	Description
D1, D2	Drain
G1, G2	Gate
S	Source (flange)

Lead connections for PTVA093002TC

Package Outline Specifications

Package H-49248H-4, formed leads

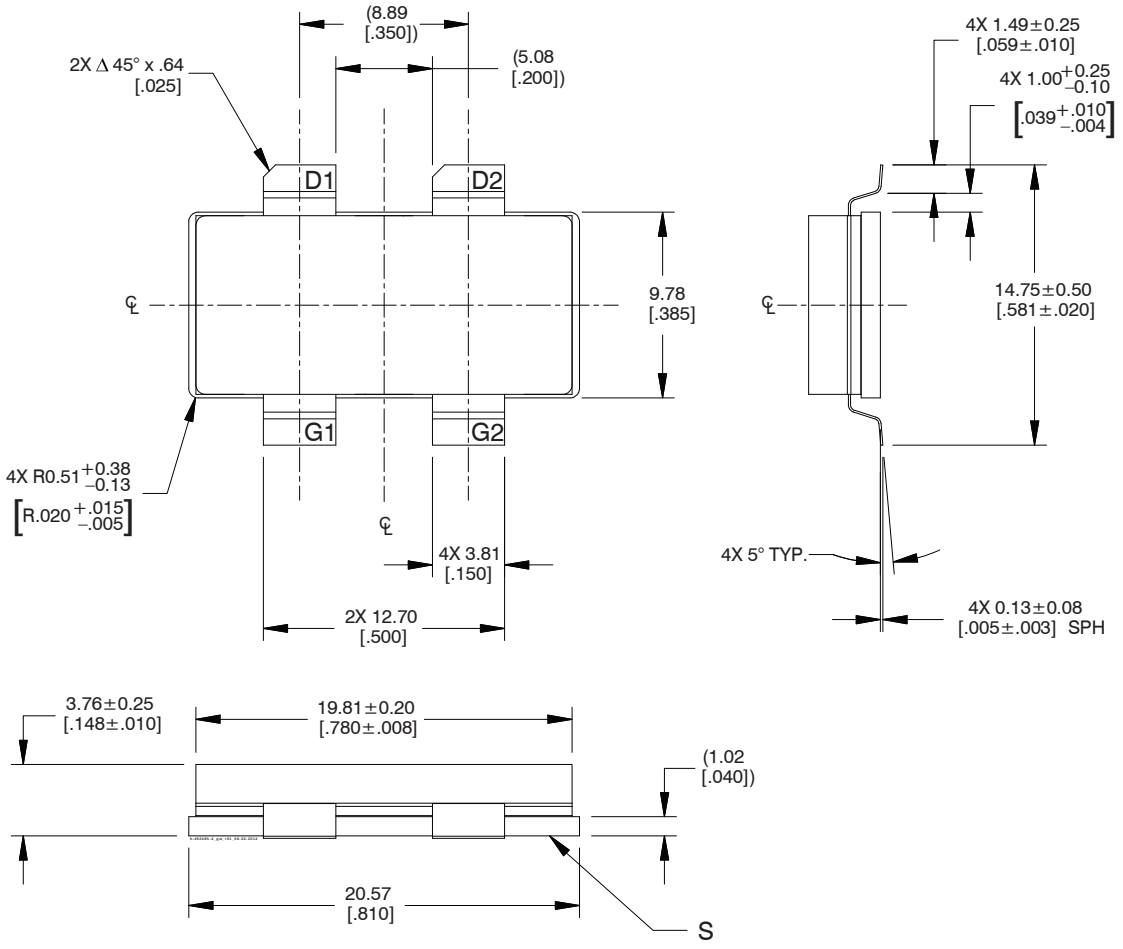


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
3. All tolerances ± 0.127 [.005].
4. Pins: D1, D2 – drain; G1, G2 – gate; S – source (flange).
5. Lead thickness: 0.10 +0.051/–0.025 [.004 +.002/–.001].
6. Gold plating thickness:
   flange – 0.25 micron [10 microinch] max;
   leads – 1.14 ± 0.38 micron [45 ± 15 microinch] max.

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

Revision History

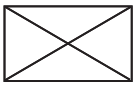
Revision	Date	Data Sheet	Page	Subjects (major changes since last revision)
01	2014-01-08	Advance	All	New product, proposed only.
02	2014-01-29	Advance	All	Package type number and configuration revised.
03	2014-05-02	Advance	All	Package type number revised.
04	2014-06-16	Production	All	Data Sheet now represents released product specifications, including reference circuit and performance information

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 2014-06-16

Published by
Infineon Technologies AG
85579 Neubiberg, 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.