

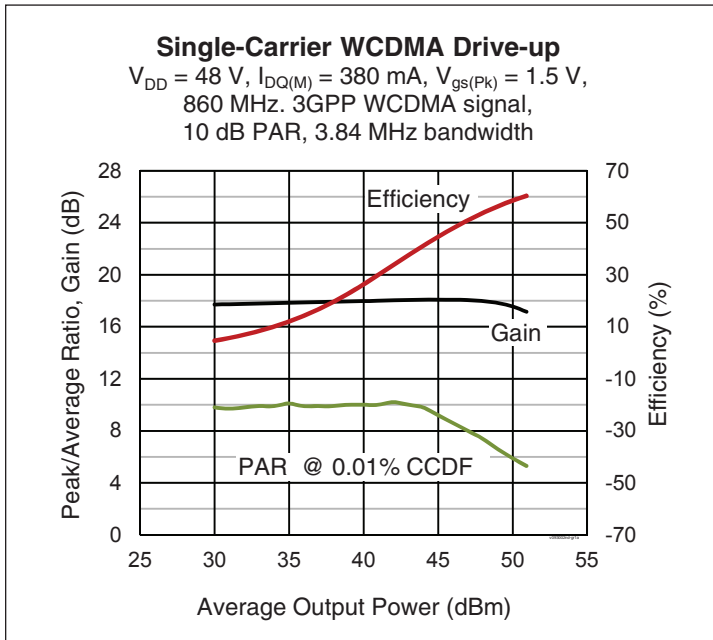
Thermally-Enhanced High Power RF LDMOS FET 300 W, 50 V, 703 – 960 MHz

Description

The PTVA093002ND is a 300-watt LDMOS FET manufactured with Infineon's 50-V LDMOS process. It is designed for use in multi-standard cellular power amplifier applications. It features a symmetric dual-path design and input matching that allow for use from 703 MHz to 960 MHz. Manufactured with Infineon's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PTVA093002ND
Package PG-HB1SOF-4-1



Features

- Input matching
- CW performance (combined output) 870 MHz, 48 V
 - Output power at $P_{1dB} = 200\text{ W}$
 - Gain = 17 dB
 - Efficiency = 63%
- Capable of handling 10:1 VSWR @ 48 V, 56 W (CW) output power
- Integrated ESD protection
- ESD rating: Human Body Model Class 1C (per ANSI/ESDA/JEDEC JS-001)
- Low thermal resistance
- Pb-free and RoHS compliant

RF Specifications

Single-carrier WCDMA Characteristics (as tested in an Infineon Doherty production test fixture)

$V_{DD} = 48\text{ V}$, $I_{DQ} = 380\text{ mA}$, $V_{GS(peak)} = V_{GS}$ at I_{DQ} 380 mA – 2.1 V, $P_{OUT} = 56.2\text{ W}$ average, $f = 870\text{ MHz}$.
 3GPP WCDMA signal: 3.84 MHz bandwidth, 10 dB PAR @ 0.01% CCDF.

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	16.7	18	—	dB
Drain Efficiency	η_D	47.5	52	—	%
Adjacent Channel Power Ratio	ACPR	—	-30	-27	dBc

All published data at $T_{CASE} = 25^\circ\text{C}$ unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_{DS} = 10\text{ mA}$	$V_{(BR)DSS}$	105	—	—	V
Drain Leakage Current	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}$	I_{DSS}	—	—	1.0	μA
	$V_{DS} = 105\text{ V}, V_{GS} = 0\text{ V}$	I_{DSS}	—	—	10.0	μA
Gate Leakage Current	$V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1.0	μA
On-state Resistance	(peak) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.265	—	Ω
	(main) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.265	—	Ω
Operating Gate Voltage	(peak) $V_{DS} = 50\text{ V}, I_{DQ} = 0\text{ A}$	V_{GS}	1.0	1.5	2.5	V
	(main) $V_{DS} = 50\text{ V}, I_{DQ} = 380\text{ mA}$	V_{GS}	3.0	3.67	4.0	V

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source Voltage	V_{DSS}	105	V
Gate-source Voltage	V_{GS}	-6 to +12	V
Operating Voltage	V_{DD}	0 to +55	V
Junction Temperature	T_J	225	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-65 to +150	$^{\circ}\text{C}$

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Thermal Resistance, Symmetric Doherty $T_{CASE} = 70\text{ }^{\circ}\text{C}, 56.2\text{ W (CW)}, 860\text{ MHz}, V_{DD} = 48\text{ V},$ $I_{DQ(main)} = 360\text{ mA}, V_{GS(peak)} = 1.5\text{ V}$	$R_{\theta JC}$	0.35	$^{\circ}\text{C/W}$

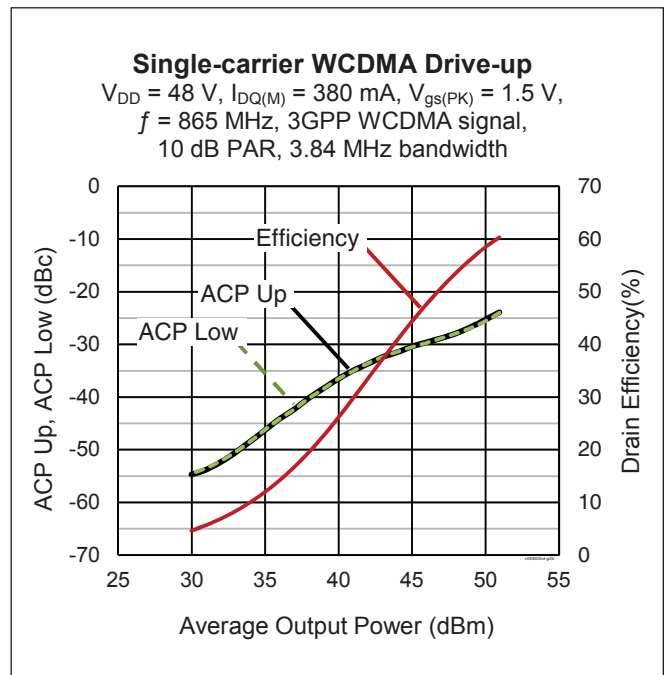
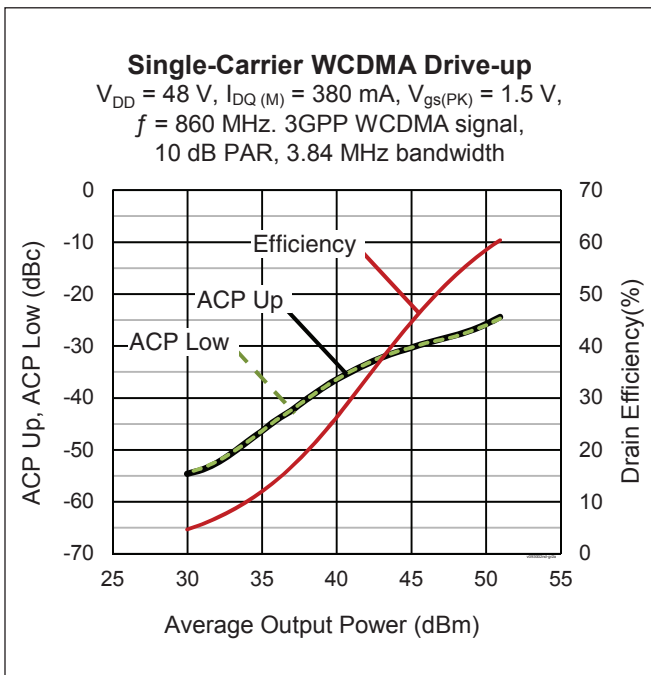
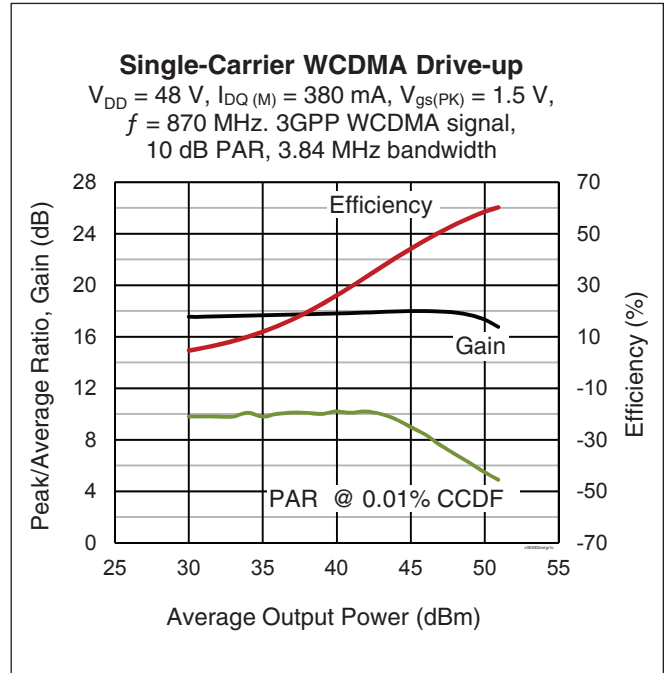
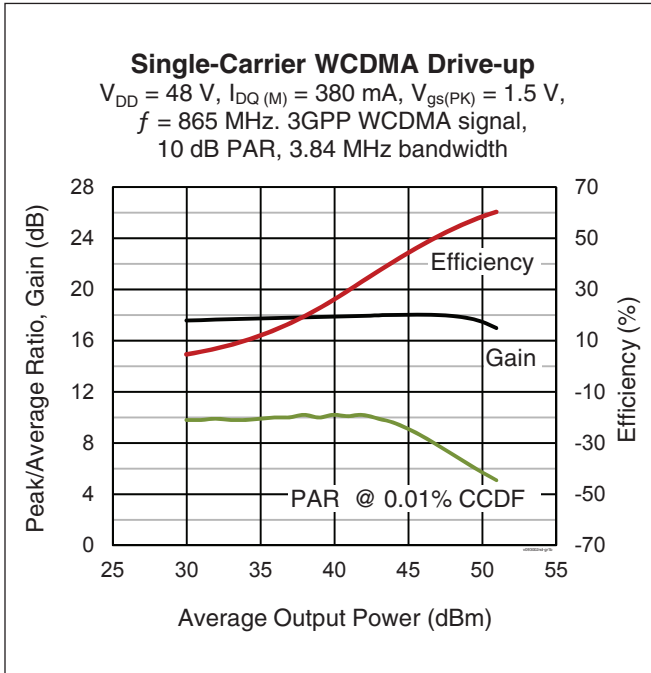
Moisture Sensitivity Level

Level	Test Standard	Package Temperature	Unit
3	IPC/JEDEC J-STD-020	Maximum Reflow Temperature	$^{\circ}\text{C}$

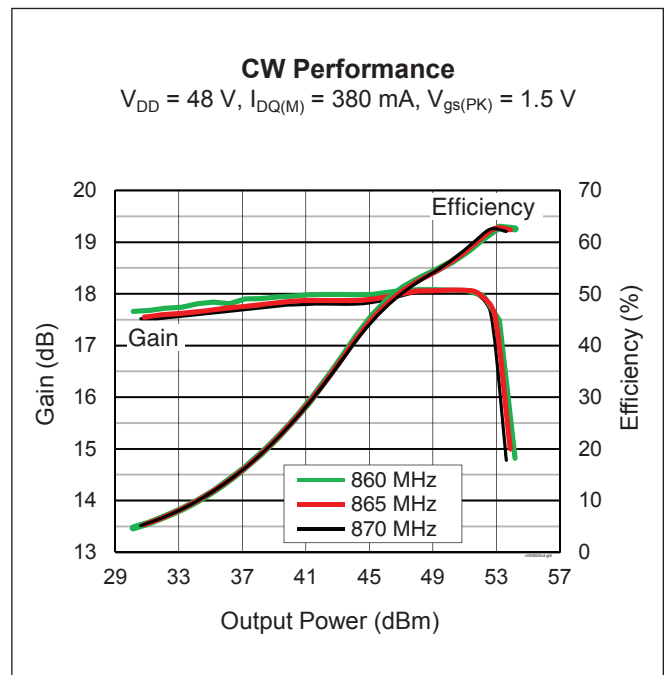
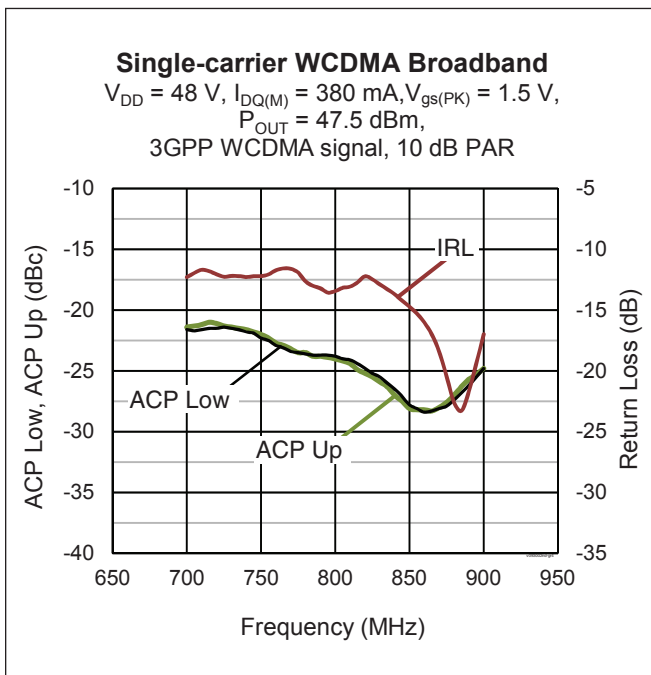
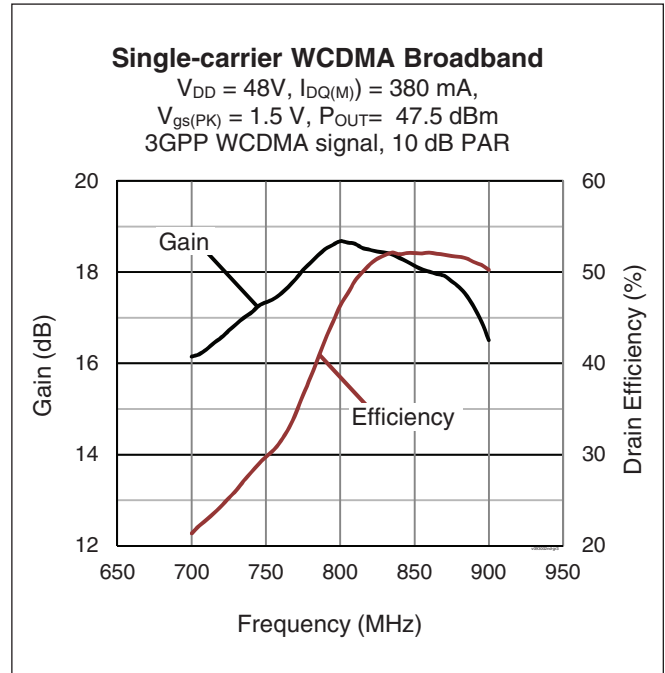
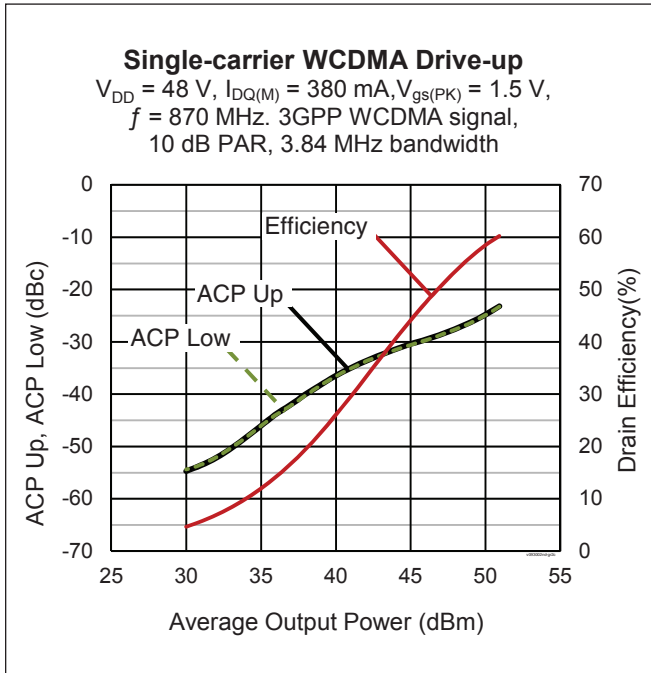
Ordering Information

Type and Version	Order Code	Package and Description	Shipping
PTVA093002ND V1 R5	PTVA093002NDV1R5XUMA1	PG-HB1SOF-4	Tape & Reel, 500 pcs

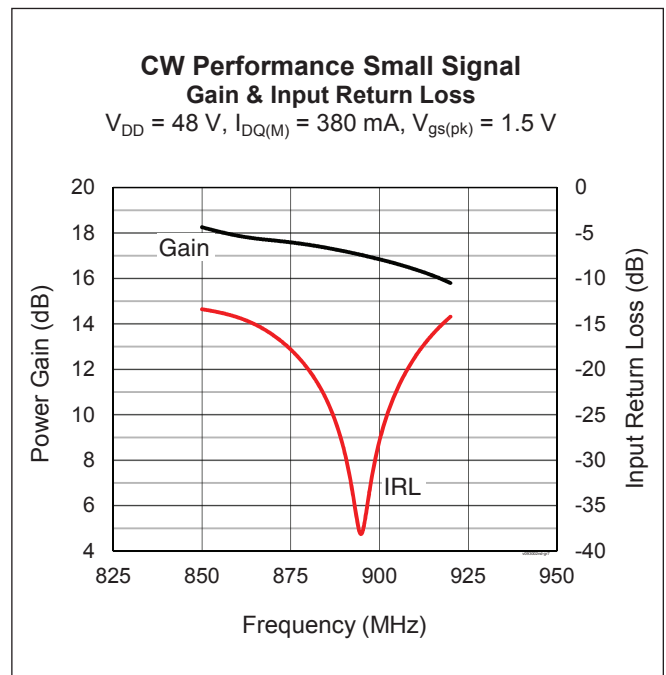
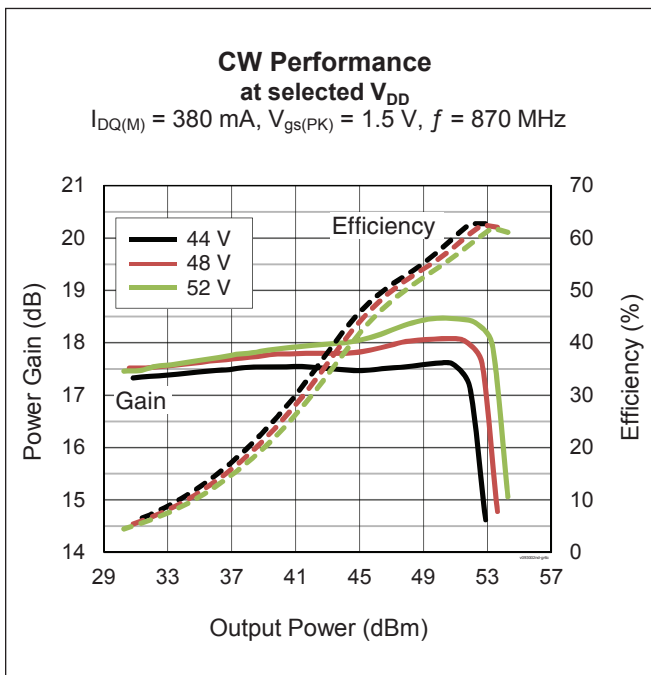
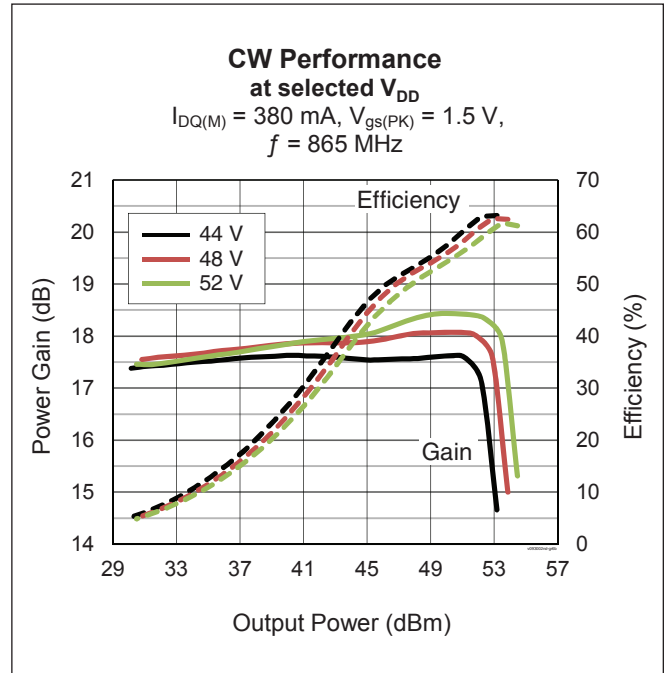
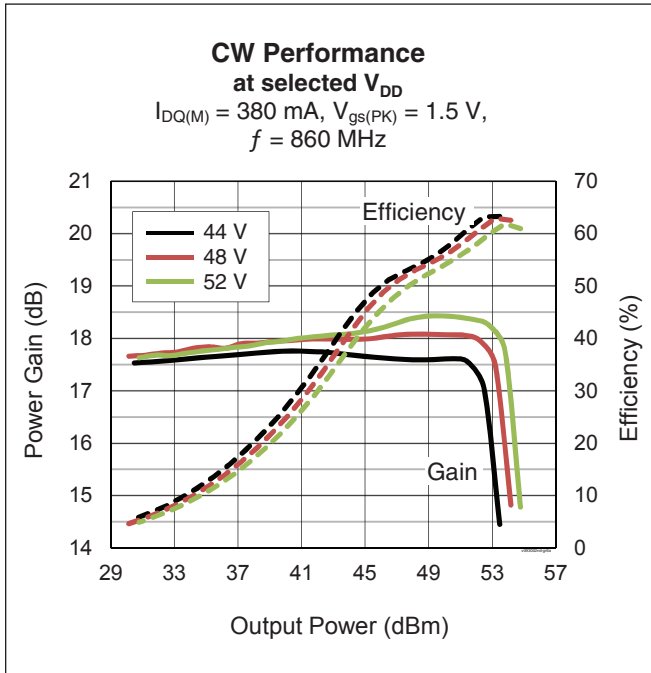
Typical Performance (data taken in an Infineon production test fixture)



Typical Performance (cont.)



Typical Performance (cont.)



Load Pull Performance

Main Side Load Pull Performance – Pulsed CW signal: 10 μ sec, 10% duty cycle; 48 V, 280 mA

Class AB		P _{1dB}									
		Max Output Power					Max PAE				
Freq [MHz]	Z _s Ω	ZI Ω	Gain [dB]	P _{OUT} [dBm]	P _{OUT} [W]	PAE %	ZI Ω	Gain [dB]	P _{OUT} [dBm]	P _{OUT} [W]	PAE %
821	3.1 – j7.80	1.7 + j1.0	20.74	52.55	180.0	50.6	2.04 + j2.89	22.7	50.11	102.6	64.8
869	2.87 – j8.73	1.67 + j0.91	20.32	52.64	183.0	53.5	2.31 + j2.13	21.7	50.86	122.0	62.7
881	3.05 – j9.02	2.11 + j0.59	20.63	52.50	178.0	55.9	2.11 + j2.11	22.0	50.77	119.5	62.8
894	3.36 – j9.44	2.33 + j0.51	20.48	52.49	177.3	57.0	2.02 + j2.38	21.9	50.40	109.7	63.6

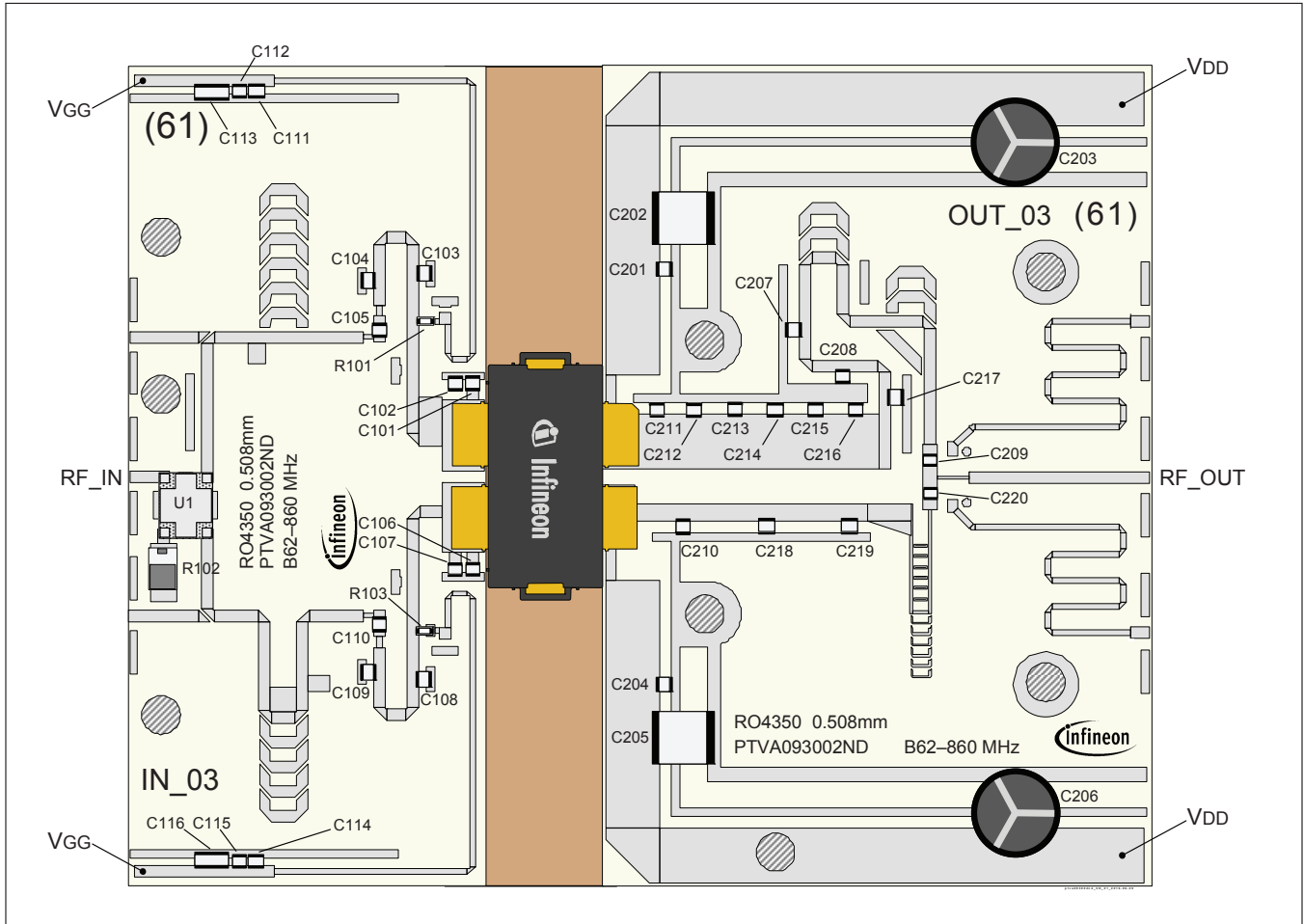
Peak Side Load Pull Performance – Pulsed CW signal: 10 μ sec, 10% duty cycle; 48 V, 280 mA

Class C		P _{1dB}									
		Max Output Power					Max PAE				
Freq [MHz]	Z _s Ω	ZI Ω	Gain [dB]	P _{OUT} [dBm]	P _{OUT} [W]	PAE %	ZI Ω	Gain [dB]	P _{OUT} [dBm]	P _{OUT} [W]	PAE %
821	3.10 – j7.80	3.29 + j0.29	18.71	53.49	223.0	57.5	2.37 + j2.37	20.4	52.02	159.3	65.7
869	2.87 – j8.73	2.95 – j0.18	17.84	53.57	227.0	56.5	2.37 + j1.94	19.6	52.19	165.5	65.4
881	3.05 – j9.02	2.63 + j0.06	18.30	53.61	229.0	58.4	2.27 + j1.92	19.8	52.16	164.4	66.6
894	3.36 – j9.44	2.42 + j.27	18.25	53.61	229.6	58.8	2.19 + j2.33	19.8	51.64	145.8	66.6

Reference Circuit, tuned for 860 MHz

DUT	PTVA093002ND V1
Test Fixture Part No.	LTN/PTVA093002ND V1
PCB	Rogers 4350, 0.508 mm [.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$
Find Gerber files for this reference fixture on the Infineon Web site (www.infineon.com/rfpower)	

Reference Circuit (cont.)



(Reference circuit assembly diagram (not to scale))

Component Information

Component	Description	Manufacturer	P/N
Input			
C101, C102, C106, C107	Capacitor, 6.8 pF	ATC	ATC600F6R8BT250XT
C103, C104, C108, C109	Capacitor, 1.8 pF	ATC	ATC600F1R8BT250XT
C105, C110, C111, C114	Capacitor, 56 pF	ATC	ATC100A560JW150XB
C112, C115	Capacitor, 1 μF	Murata Electronics North America	GRM21BR71H105KA12L
C113, C116	Capacitor, 10 μF	Murata Electronics North America	LLL31MR60J106ME01L
R101, R103	Resistor, 10 Ω	Panasonic – ECG	ERJ-3GEYJ100V
R102	Resistor, 50 Ω	Anaren	C16A50Z4
U1	Hybrid coupler	Anaren	X3C07P1-03S

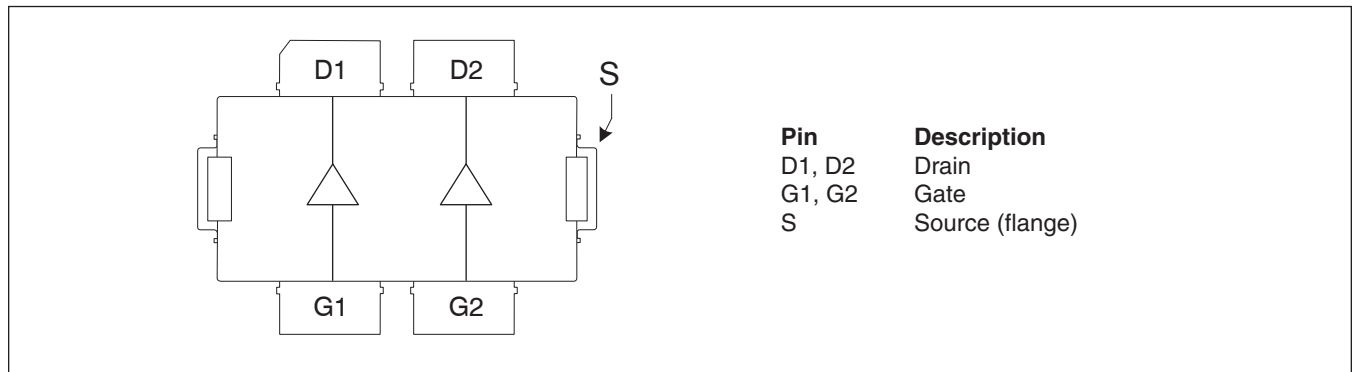
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Reference Circuit (cont.)

Component Information

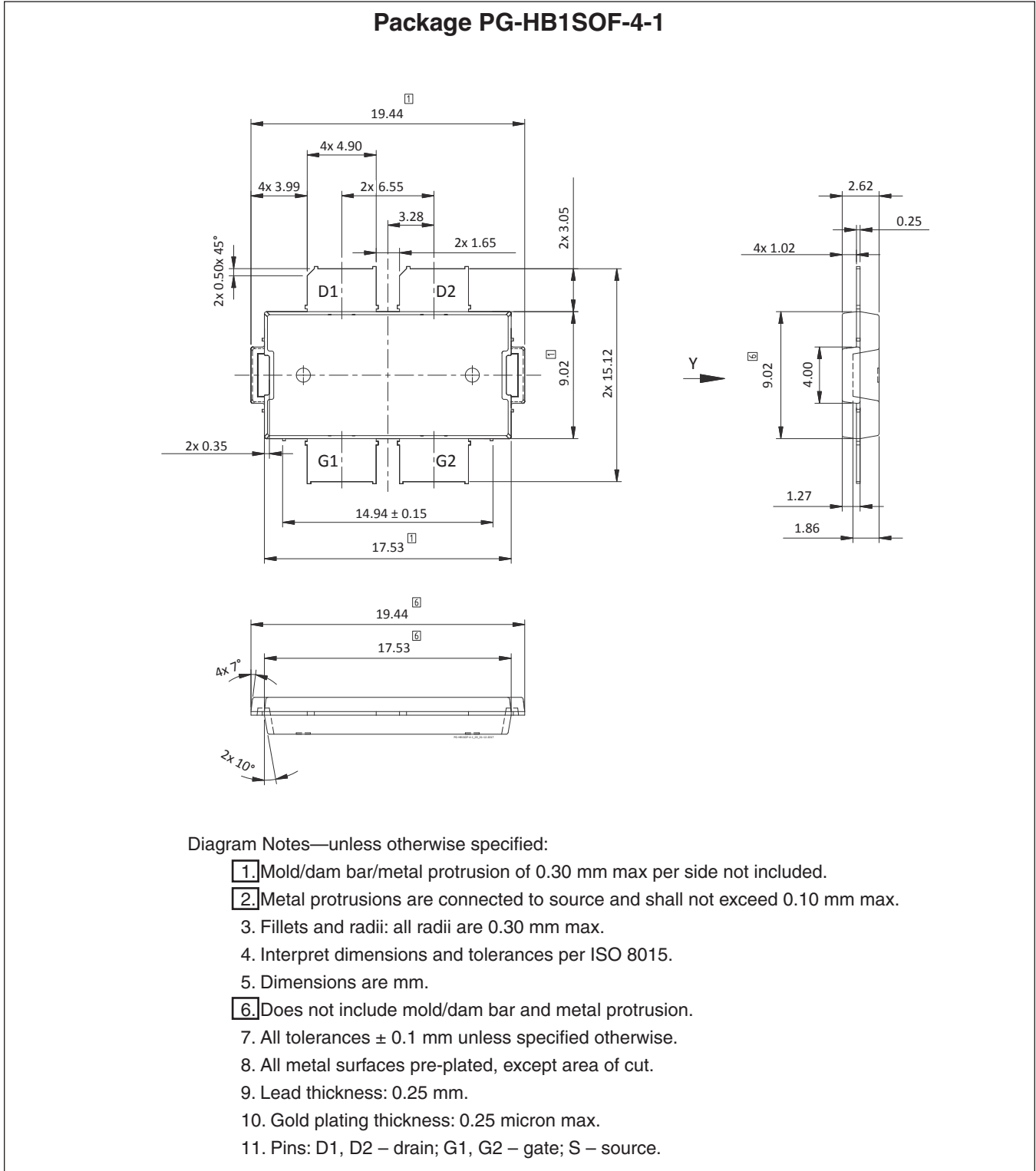
Component	Description	Manufacturer	P/N
Output			
C201, C204, C209, C220	Capacitor, 47 pF	ATC	ATC600F470FT250XT
C202, C205	Capacitor, 10 μF	TDK Corporation	C5750X7S2A106M230KB
C203, C206	Capacitor, 47 μF	Cornell Dubilier Electronics (CDE)	SEK470M100ST
C207, C208	Capacitor, 1.8 pF	ATC	ATC600F1R8BT250XT
C210, C218, C219	Capacitor, 3.9 pF	ATC	ATC600F3R9BT250XT
C211, C212, C213, C214, C215, C216	Capacitor, 6.8 pF	ATC	ATC600F6R8BT250XT
C217	Capacitor, 2.2 pF	ATC	ATC600F2R2BT250XT

Pinout Diagram (top view)



Lead connections for PTVA093002ND

Package Outline Specifications



Package Outline Specifications (cont.)

Package PG-HB1SOF-4-1

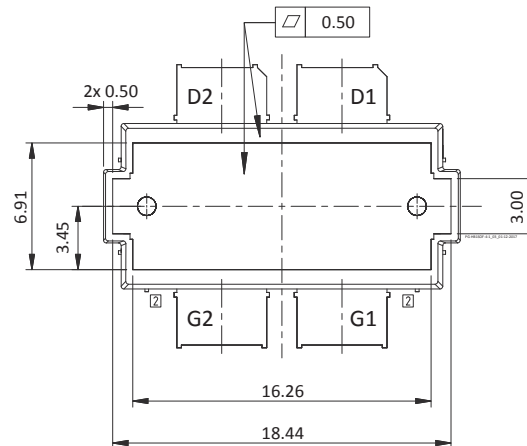


Diagram Notes—unless otherwise specified:

1. Mold/dam bar/metal protrusion of 0.30 mm max per side not included.
2. Metal protrusions are connected to source and shall not exceed 0.10 mm max.
 3. Fillets and radii: all radii are 0.30 mm max.
 4. Interpret dimensions and tolerances per ISO 8015.
 5. Dimensions are mm.
6. Does not include mold/dam bar and metal protrusion.
 7. All tolerances ± 0.1 mm unless specified otherwise.
 8. All metal surfaces pre-plated, except area of cut.
 9. Lead thickness: 0.25 mm.
 10. Gold plating thickness: 0.25 micron max.
 11. Pins: D1, D2 – drain; G1, G2 – gate; S – source.

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

Revision History

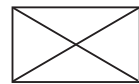
Revision	Date	Data Sheet	Page	Subjects (major changes at each revision)
01	2016-02-16	Advance	All	New product proposal
02	2016-08-04	Production	All	Product released to production: firm specifications. Add further performance information, and reference circuit.
02.1	2017-02-08	Production	2, 9,10	Update operating voltage and junction temperature, fixed typo in package outline

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:

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