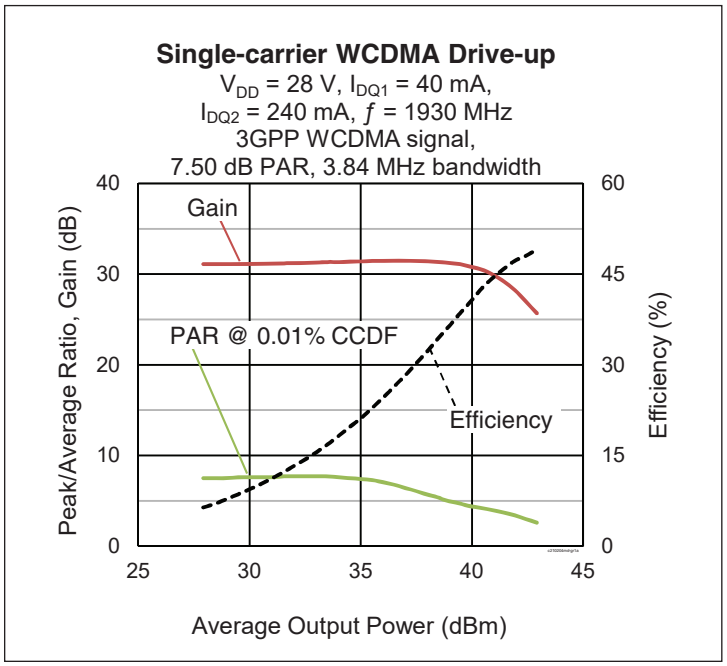
PTMC210204MD

Wideband LDMOS Two-stage Integrated Power Amplifier
20 W, 28 V, 1805 – 2200 MHz

Description

The PTMC210204MD is a wideband, two-stage, LDMOS integrated power amplifier. It incorporates internal matching for operation from 1805 MHz to 2200 MHz, and dual independent outputs with 10 W of output power each. It is available in an 14-lead plastic overmold package with gull wing leads.

PTMC210204MD
Package PG-HB1DSO-14-1
(formed leads)



Features

- On-chip matching for broadband operation
- Typical pulsed CW performance, 1990 MHz, 28 V, combined outputs
  - Output power at P_{1dB} = 20.9 W
  - Efficiency = 56%
  - Gain = 31 dB
- Capable of handling 10:1 VSWR @28 V, 20.9 W (CW) output power
- Integrated ESD protection
- Human Body Model Class 1A (per ANSI/ESDA/JEDEC JS-001)
- Integrated temperature compensation
- Pb-free and RoHS compliant

RF Characteristics

Single-carrier WCDMA Specifications (tested in Wolfspeed test fixture)
V_{DD} = 28 V, $I_{DQ1(A+B)}$ = 20 mA, $I_{DQ2(A+B)}$ = 120 mA, P_{OUT} = 2.5 W avg, f = 1990 MHz, 3GPP WCDMA signal, channel bandwidth = 3.84 MHz, peak/average = 7.5 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Linear Gain	G_{ps}	28.5	30.5	33.5	dB
Power Added Efficiency	PAE	17	19	—	%
Adjacent Channel Power Ratio	ACPR	—	–47	–40	dBc

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!

DC Characteristics

Stage 1	Conditions	Symbol	Min	Typ	Max	Unit
Drain Leakage Current	V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	0.1	µA
	V_{DS} = 60 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	µA
Gate Leakage Current	V_{GS} = 1 V, V_{DS} = 0 V	I_{GSS}	—	—	0.1	µA
On-state Resistance	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	8	—	Ω
Operating Gate Voltage	V_{DS} = 28 V, I_{DQ1} = 20 mA	V_{GS1}	—	2.7	—	V
Fixture Operating Gate Voltage	V_{DS} = 28 V, I_{DQ1} = 20 mA	V_{GS1}	—	4.52	—	V

Stage 2	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}	—	—	0.1	µA
	V_{DS} = 60 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	µA
Gate Leakage Current	V_{GS} = 1 V, V_{DS} = 0 V	I_{GSS}	—	—	0.1	µA
On-state Resistance	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.9	—	Ω
Operating Gate Voltage	V_{DS} = 28 V, I_{DQ2} = 120 mA	V_{GS2}	—	2.72	—	V
Fixture Opererating Gate Voltage	V_{DS} = 28 V, I_{DQ2} = 120 mA	V_{GS2}	—	4.74	—	V

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	–6 to +12	V
Junction Temperature	T_J	225	°C
Storage Temperature Range	T_{STG}	–65 to +150	°C
Operating Voltage	V_{DD}	0 to 32	V

Thermal Characteristics

Characteristic			Symbol	Value	Unit
Thermal Resistance	Stage 1	(T_{CASE} = 70°C, 10 W CW)	$R_{\theta JC}$	9.7	°C/W
	Stage 2	(T_{CASE} = 70°C, 10 W CW)	$R_{\theta JC}$	3.1	°C/W

Moisture Sensitivity Level

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

Ordering Information

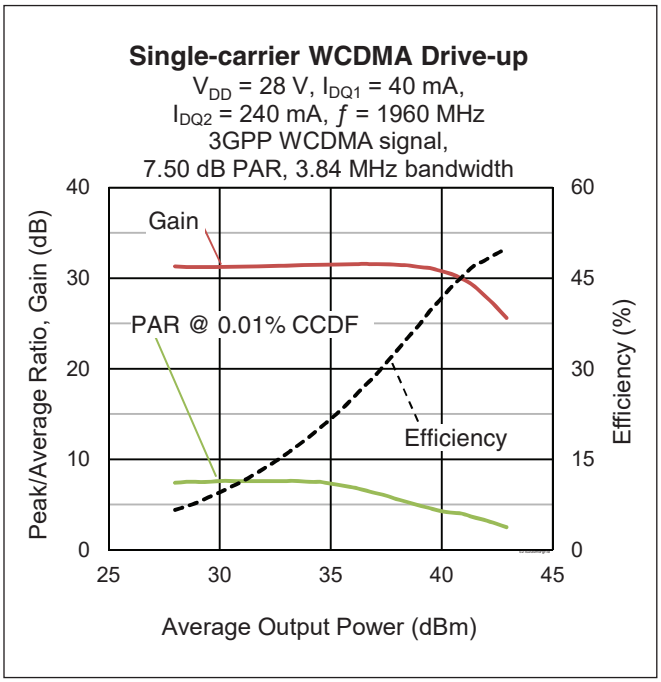
Type and Version	Order Code	Package and Description	Shipping
PTMC210204MD V1 R5	PTMC210204MD-V1-R5	PG-HB1DSO-14-1, 14-lead, overmold	Tape & Reel, 500 pcs

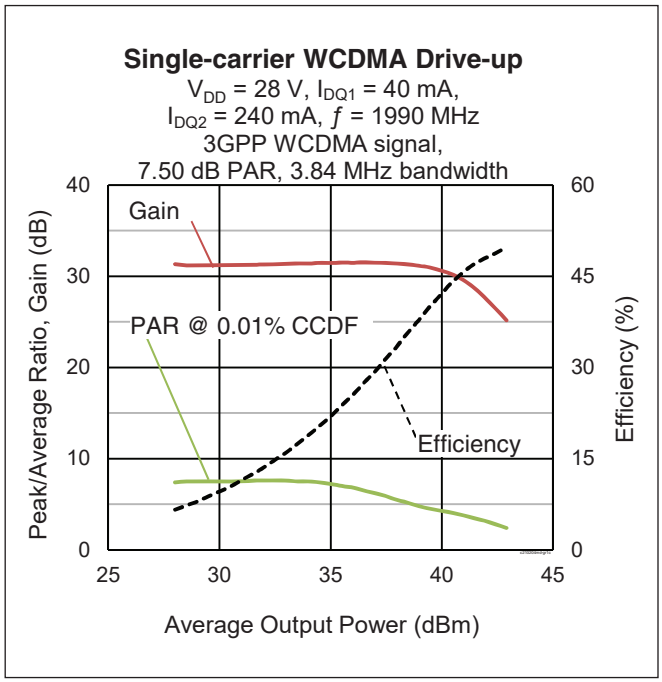
Evaluation Boards

Order Code	Frequency	Description
LTN/PTMC210204MD V1	1930 – 1990 MHz	Class AB with combined outputs, R04360, 0.508 mm thick
LTN/PTMC210204MD E2	1805 – 1880 MHz	Class AB with combined outputs, R04360, 0.508 mm thick
LTN/PTMC210204MD E3	2110 – 2200 MHz	Class AB with combined outputs, R04360, 0.508 mm thick

Find Gerber files for these reference fixtures on the Wolfspeed Web site at **www.wolfspeed.com/RF**

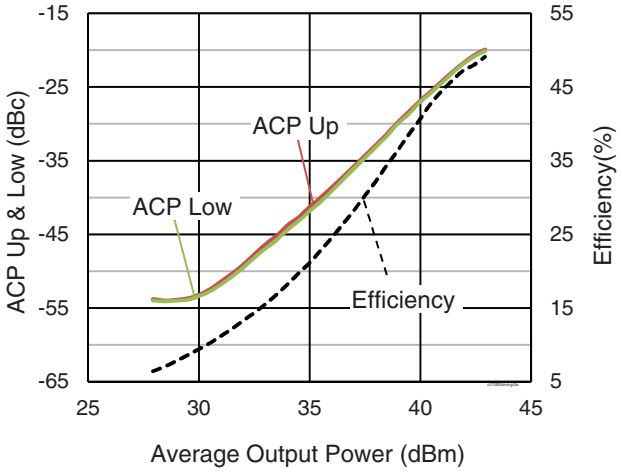
Typical RF Performance (data taken in production test fixture)



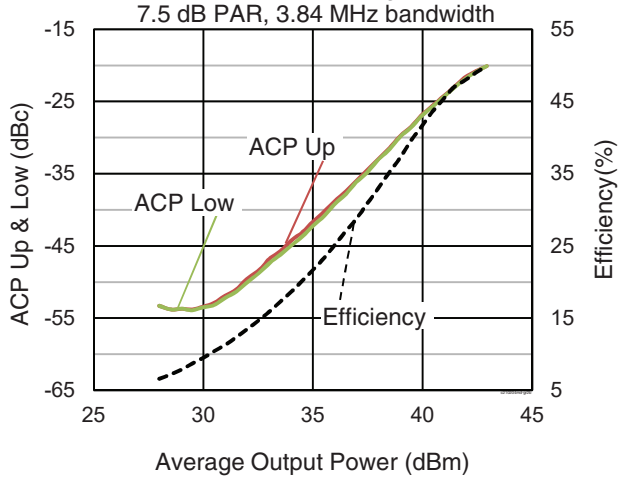


Typical Performance (cont.)

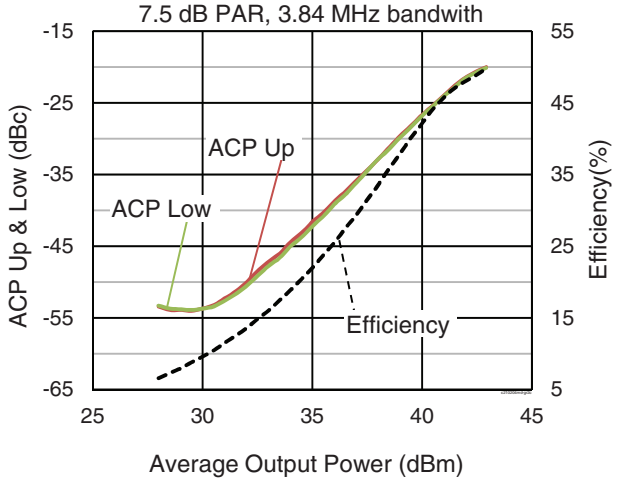
Single-carrier WCDMA Drive-up
V_{DD} = 28 V, I_{DQ1} = 40 mA,
I_{DQ2} = 240 mA, f = 1930 MHz,
3GPP WCDMA signal,
7.5 dB PAR, 3.84 MHz bandwidth



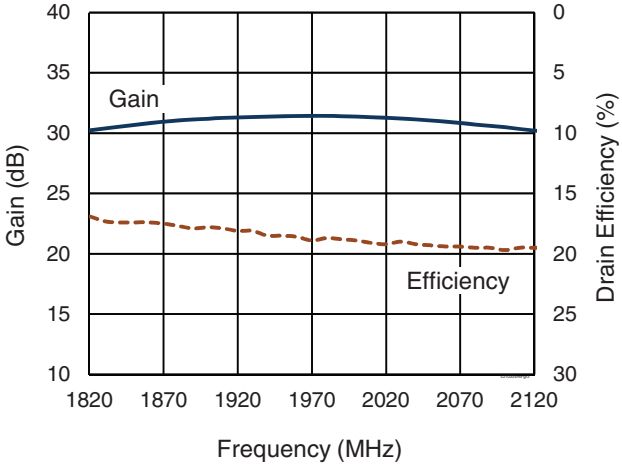
Single-carrier WCDMA Drive-up
V_{DD} = 28 V, I_{DQ1} = 40 mA,
I_{DQ2} = 240 mA, f = 1960 MHz,
3GPP WCDMA signal,
7.5 dB PAR, 3.84 MHz bandwidth



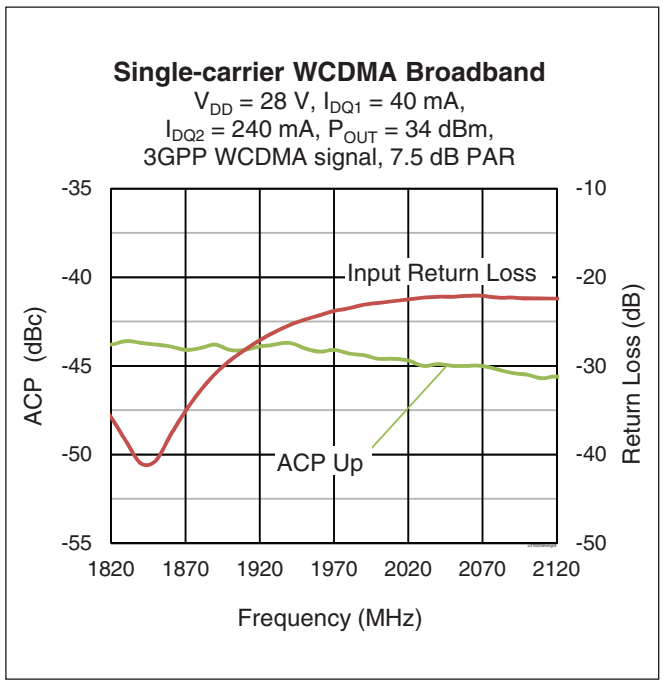
Single-carrier WCDMA Drive-up
V_{DD} = 28 V, I_{DQ1} = 40 mA,
I_{DQ2} = 240 mA, f = 1990 MHz,
3GPP WCDMA signal,
7.5 dB PAR, 3.84 MHz bandwith

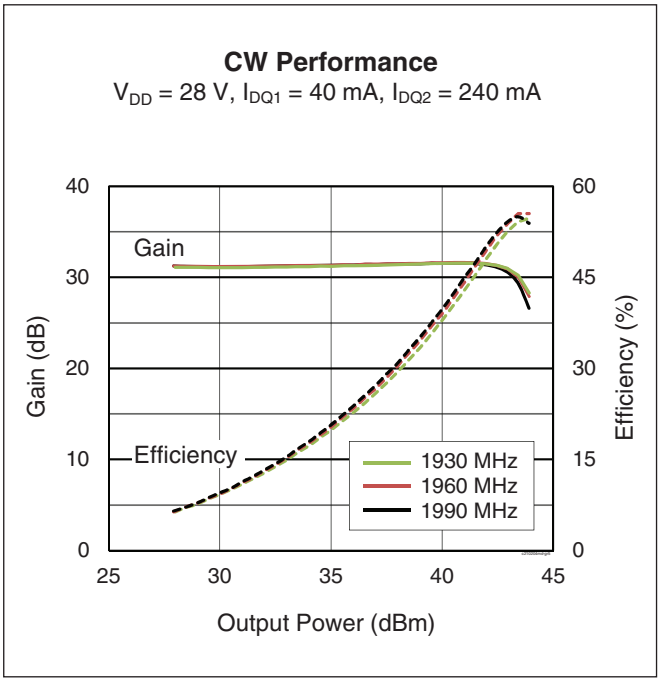


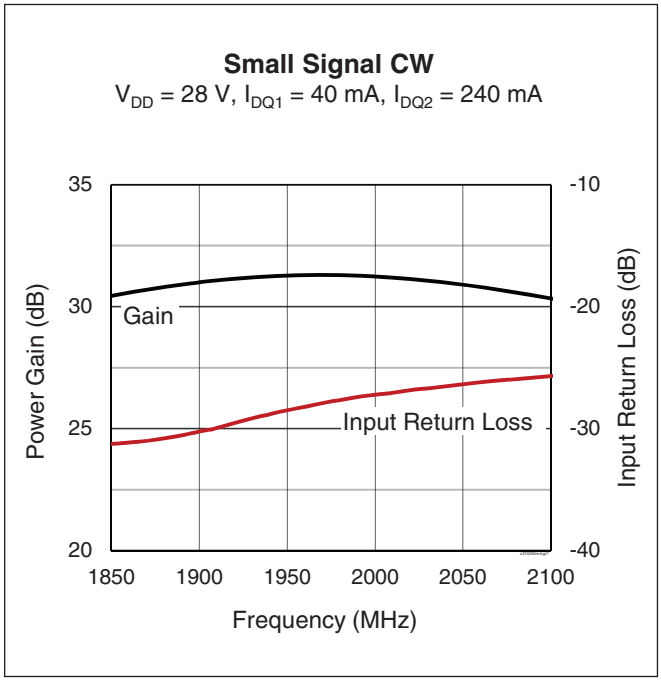
Single-carrier WCDMA Broadband
V_{DD} = 28 V, I_{DQ1} = 40 mA,
I_{DQ2} = 240 mA, P_{OUT} = 34 dBm, 3GPP WCDMA
signal, 7.5 dB PAR, 3.84 MHz BW



Typical Performance (cont.)







Load Pull

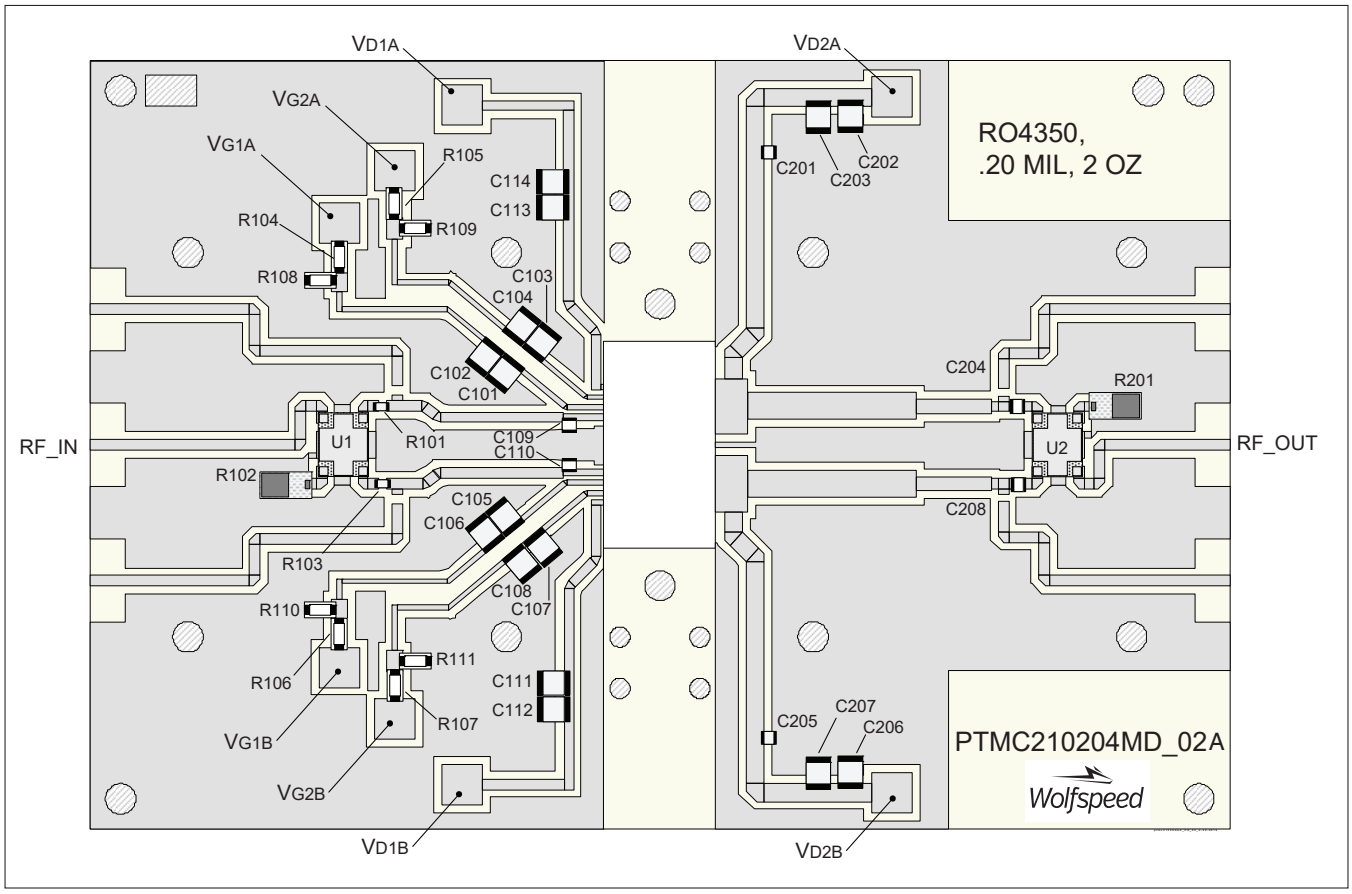
CW signal: $V_{DD1} = V_{DD2} = 28$ V, $I_{DQ1} = 20$ mA, $I_{DQ2} = 120$ mA

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 [%]
1930	30.5 – j12.8	15.40 – j8.85	29.92	41.07	12.79	51.47	18.01 + j1.18	31.45	39.94	9.86	57.02
1960	30.5 – j12.8	14.58 – j7.65	29.97	41.09	12.85	52.17	17.16 + j0.14	31.26	40.16	10.38	57.35
1990	30.5 – j12.8	15.26 – j9.82	29.61	41.06	12.76	50.58	16.16 + j0.97	31.25	39.88	9.73	57.30

Reference Circuit, tuned for 1930 – 1990 MHz

DUT	PTMC210204MD V1
Test Fixture Part No.	LTN/PTMC210204MD V1
PCB	Rogers 4350, 0.508 mm [.020"] thick, 2 oz. copper, $\varepsilon_r = 3.66$

Find Gerber files for this reference fixture on the Wolfspeed Web site at **www.wolfspeed.com/RF**



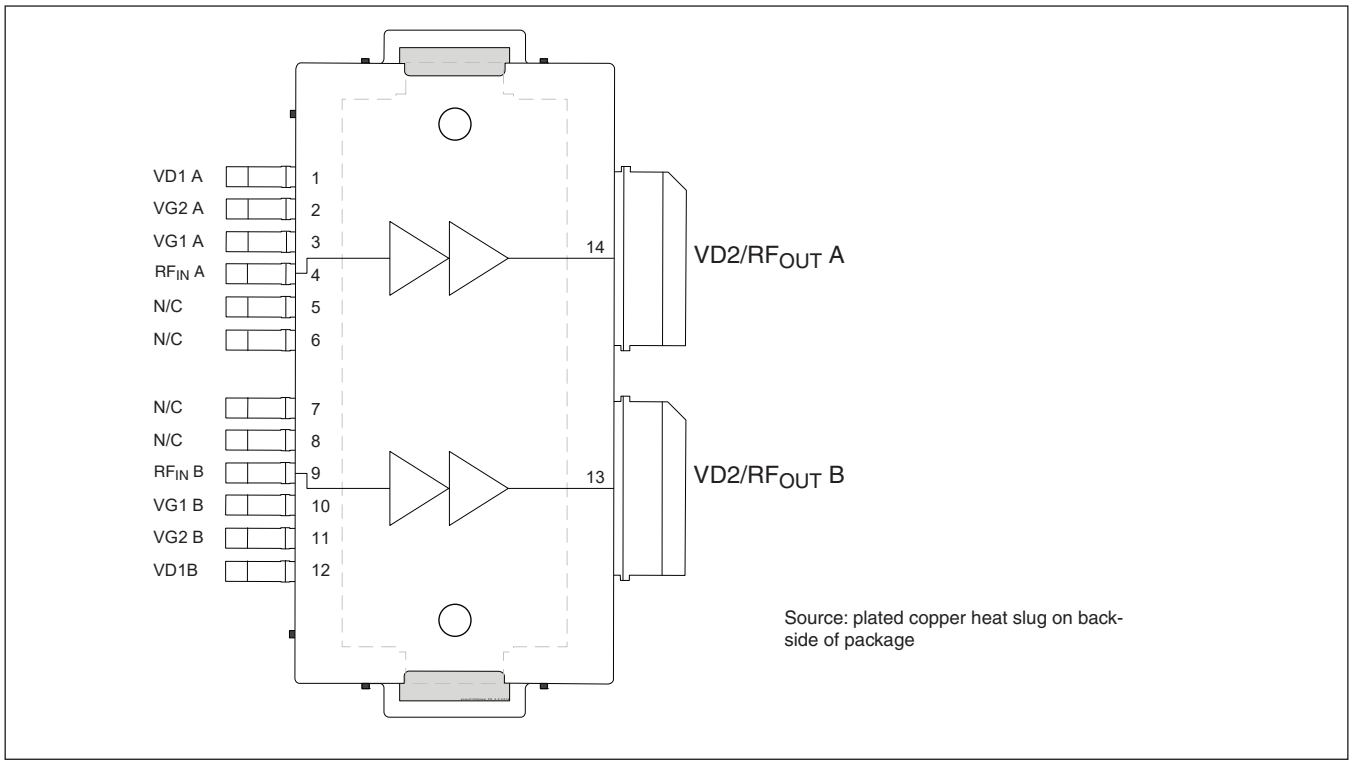
Reference circuit assembly diagram (not to scale)

Reference Circuit (cont.)

Component Information

Component	Description	Manufacturer	P/N
Input			
C101, C103, C105, C107, C111, C113, C203, C207	Capacitor, 4.7 µF	Murata Electronics North America	GRM32ER71H475KA88L
C102, C104, C106, C108, C112, C114, C202, C206	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C109, C110	Capacitor, 0.8 pF	ATC	ATC800A0R8CT250T
C201, C204, C205, C208	Capacitor, 10 pF	ATC	ATC800A100JT250T
R101, R103	Resistor, 0.0 ohms	Panasonic Electronic Components	ERJ-3GEY0R00V
R102, R201	Resistor, 50 ohms	Anaren	C8A50Z4A
R104, R105, R106, R107	Resistor, 1K ohms	Panasonic Electronic Components	ERJ-8GEYJ102V
R108, R109, R110, R111	Resistor, 4.3K ohms	Panasonic Electronic Components	ERJ-8GEYJ432V
U1, U2	Hybrid Coupler	Anaren	X3C19P1-03S

Pinout Diagram



Package Outline Specifications

Package PG-HB1DSO-14-1
(formed leads)

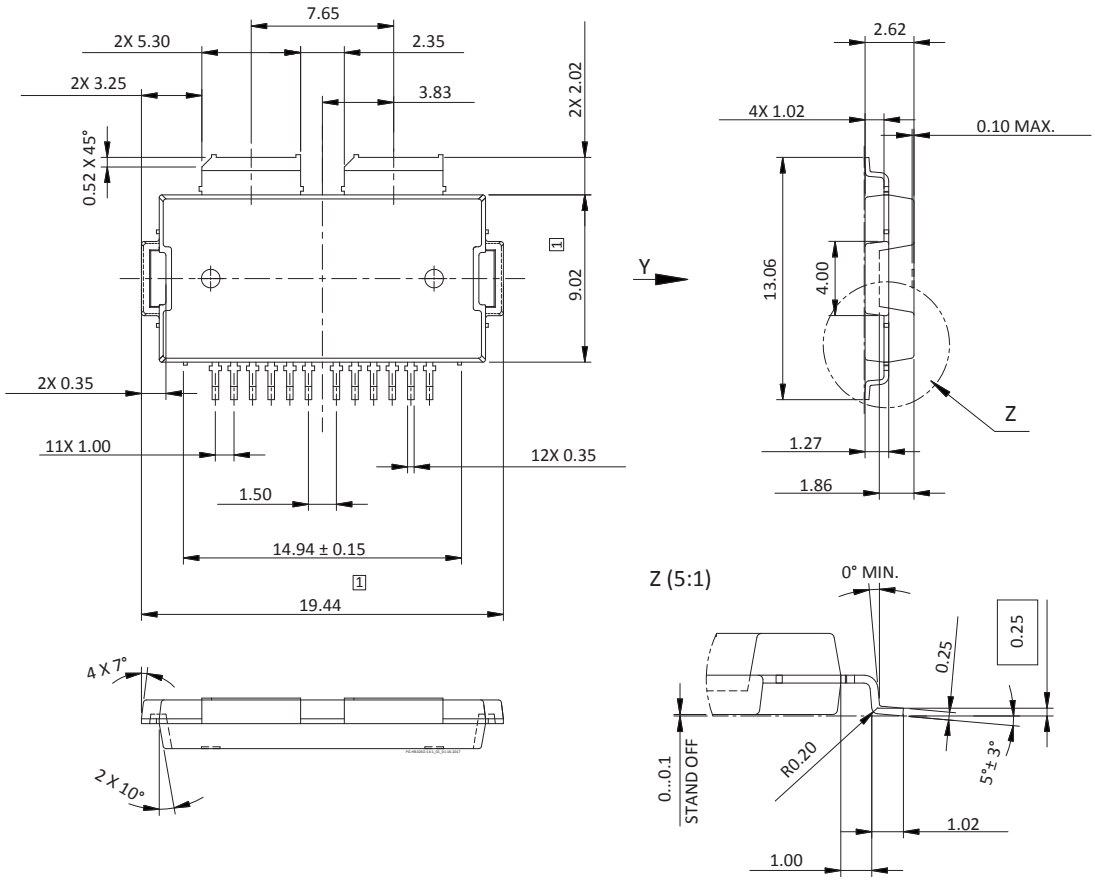


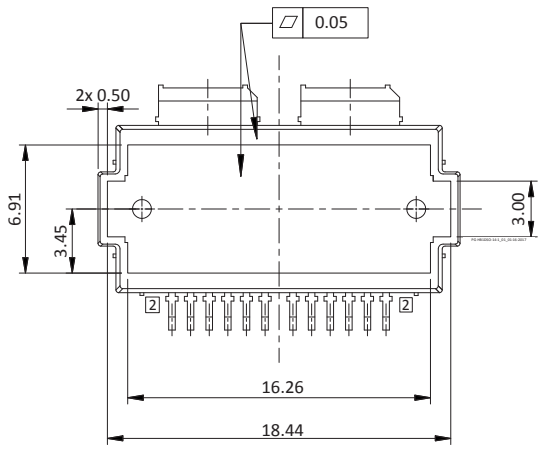
Diagram Notes—unless otherwise specified:

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. All tolerances ± 0.1 mm unless specified otherwise.
7. All metal surfaces pre-plated, except area of cut.
8. Lead thickness: 0.25 mm.
9. Gold plating thickness: 0.25 micron max.

Package Outline Specifications (cont.)

Package PG-HB1DSO-14-1
(formed leads, bottom side)

VIEW Y



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Revision History

01	2015-12-09	Advance	All	Data Sheet reflects advance specification for product development.
02	2016-05-04	Production	All	Product released to production: firm specifications. Add further performance information, and reference circuit.
03	2016-06-14	Production	1 2 3	Revise Description. Rearrange tables, add operating voltatage. Add further evaluation boards information.
04	2018-05-19	Production	All	Converted to Wolfspeed Data Sheet

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Notes

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