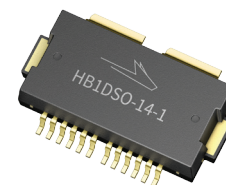


PTMC210124MD

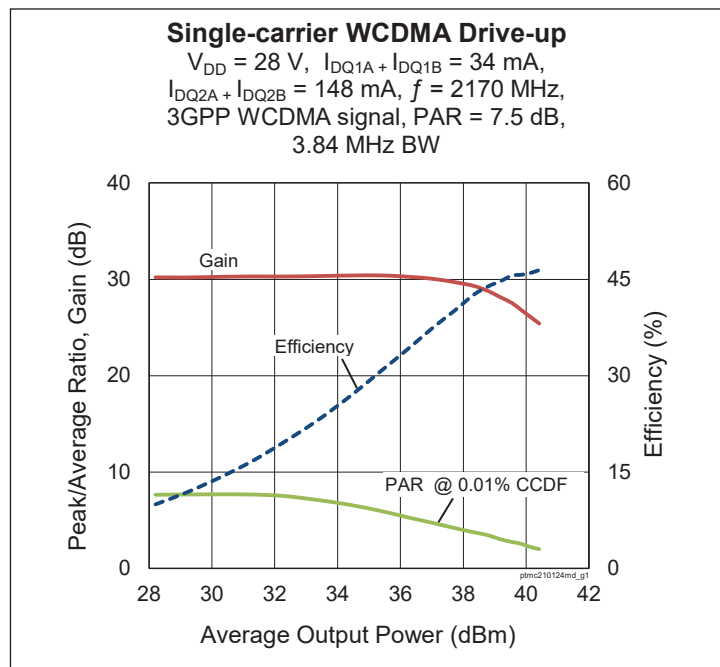
Wideband LDMOS Two-stage Integrated Power Amplifier 12 W, 28 V, 1805 – 2200 MHz

Description

The PTMC210124MD 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 6 W of output power each. It is available in a 14-lead plastic overmold package with gull wing leads.



PTMC210124MD
Package PG-HB1DSO-14-1
(formed leads)



Features

- On-chip matching for broadband operation
- Typical CW performance, 2170 MHz, 28 V, combined outputs
 - Output power at $P_{1dB} = 12\text{ W}$
 - Gain = 30.5 dB
 - Efficiency = 51.9%
- Capable of handling 10:1 VSWR @ 28 V, 12 W (CW) output power
- Integrated ESD protection
- Human Body Model Class 0B (per ANSI/ESDA/ JEDEC JS-001)
- Integrated temperature compensation
- Pb-free and RoHS-compliant

RF Characteristics

Single-carrier WCDMA Specifications (tested in Wolfspeed production test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ1A} = I_{DQ1B} = 17\text{ mA}$, $I_{DQ2A} = I_{DQ2B} = 73\text{ mA}$, $P_{OUT} = 1.38\text{ W avg}$, $f = 2170\text{ MHz}$, 3GPP WCDMA signal, channel bandwidth = 3.84 MHz, peak/average = 7.5 dB @ 0.01% CCDF

| Characteristic | Symbol | Min | Typ | Max | Unit |
|------------------------------|----------|-----|-------|-----|------|
| Gain | G_{ps} | 29 | 30.5 | — | dB |
| Drain Efficiency | η_D | 15 | 16.5 | — | % |
| Adjacent Channel Power Ratio | ACPR | — | -49.5 | -47 | dBc |

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!



DC Characteristics (each side)

| Stage 1 | Conditions | Symbol | Min | Typ | Max | Unit |
|--------------------------------|--|--------------|-----|-----|-----|---------------|
| Drain Leakage Current | $V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 0.1 | μA |
| | $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 1 | μA |
| Gate Leakage Current | $V_{GS} = 1\text{ V}, V_{DS} = 0\text{ V}$ | I_{GSS} | — | — | 0.1 | μA |
| On-state Resistance | $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$ | $R_{DS(on)}$ | — | 10 | — | Ω |
| Operating Gate Voltage | $V_{DS} = 28\text{ V}, I_{DQ1A} = I_{DQ1B} = 17\text{ mA}$ | V_{GS1} | — | 2.7 | — | V |
| Fixture Operating Gate Voltage | $V_{DS} = 28\text{ V}, I_{DQ1A} = I_{DQ1B} = 17\text{ mA}$ | V_{GS1} | — | 4.9 | — | V |

| Stage 2 | Conditions | Symbol | Min | Typ | Max | Unit |
|----------------------------------|--|--------------|-----|-----|-----|---------------|
| Drain Leakage Current | $V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 0.1 | μA |
| | $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 1 | μA |
| Gate Leakage Current | $V_{GS} = 1\text{ V}, V_{DS} = 0\text{ V}$ | I_{GSS} | — | — | 0.1 | μA |
| On-state Resistance | $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$ | $R_{DS(on)}$ | — | 1.9 | — | Ω |
| Operating Gate Voltage | $V_{DS} = 28\text{ V}, I_{DQ2A} = I_{DQ2B} = 73\text{ mA}$ | V_{GS2} | — | 2.7 | — | V |
| Fixture Opererating Gate Voltage | $V_{DS} = 28\text{ V}, I_{DQ2A} = I_{DQ2B} = 73\text{ mA}$ | V_{GS2} | — | 4.9 | — | V |

Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---------------------------|-----------|-------------|--------------------|
| Drain-Source Voltage | V_{DSS} | 65 | V |
| Gate-Source Voltage | V_{GS} | -6 to +10 | V |
| Junction Temperature | T_J | 225 | $^{\circ}\text{C}$ |
| Storage Temperature Range | T_{STG} | -65 to +150 | $^{\circ}\text{C}$ |
| Operating Voltage | V_{DD} | 0 to 32 | V |

Operation above the maximum values listed here may cause permanent damage. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the component. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. For reliable continuous operation, the device should be operated within the operating voltage range (V_{DD}) specified above.

Thermal Characteristics

| Characteristic | Symbol | Value | Unit | |
|--------------------|--|-----------------|------|----------------------|
| Thermal Resistance | Stage 1 ($T_{CASE} = 70^{\circ}\text{C}, 12\text{ W CW}$) | $R_{\theta JC}$ | 4.8 | $^{\circ}\text{C/W}$ |
| | Stage 2 ($T_{CASE} = 70^{\circ}\text{C}, 12\text{ W CW}$) | $R_{\theta JC}$ | 1.9 | $^{\circ}\text{C/W}$ |

Moisture Sensitivity Level

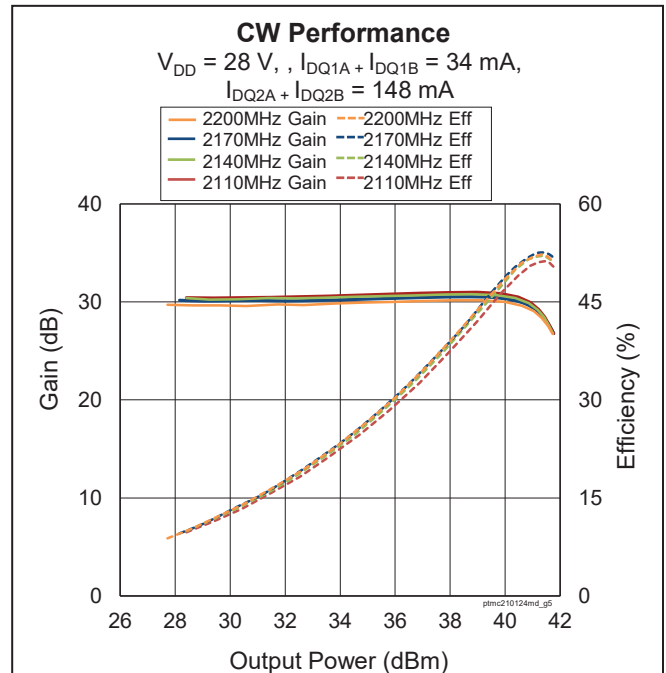
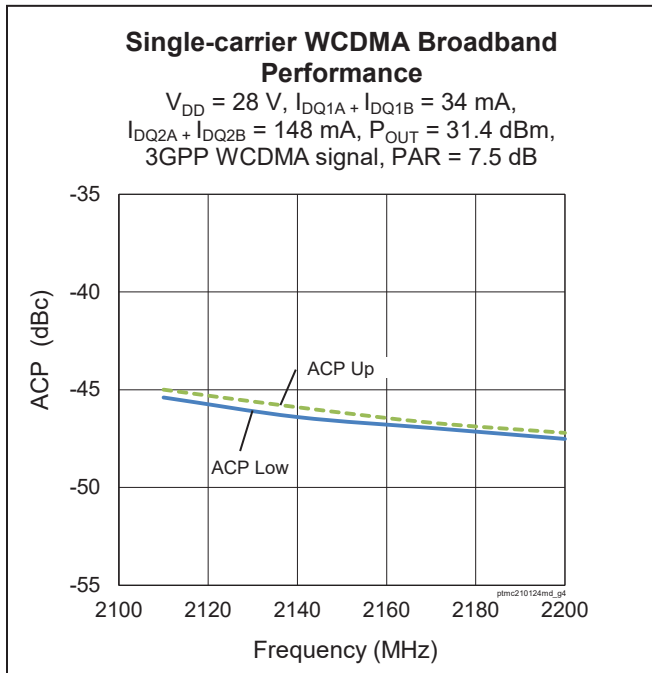
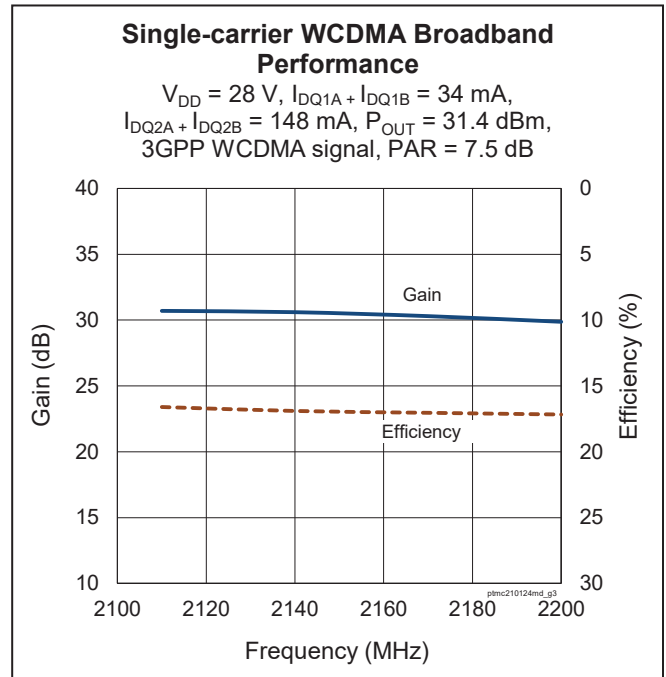
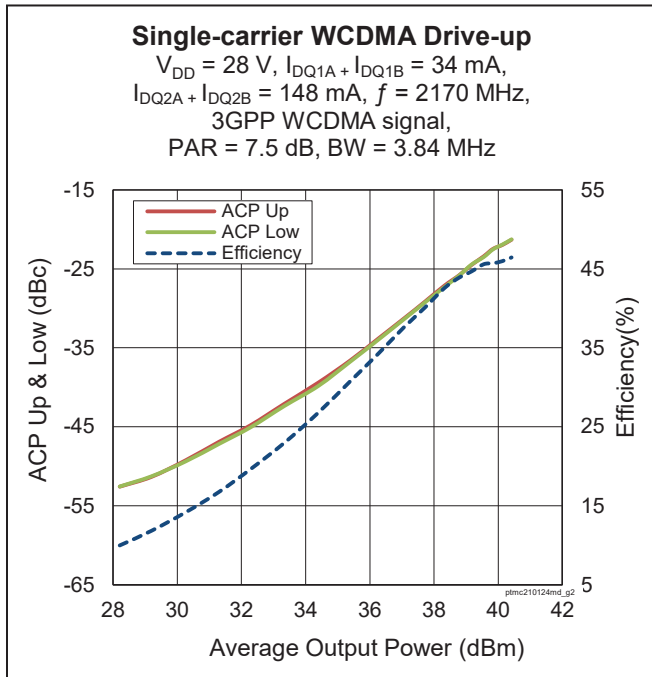
| Level | Test Standard | Package Temperature | Unit |
|-------|---------------------|---------------------|------|
| 3 | IPC/JEDEC J-STD-020 | 260 | °C |

Ordering Information

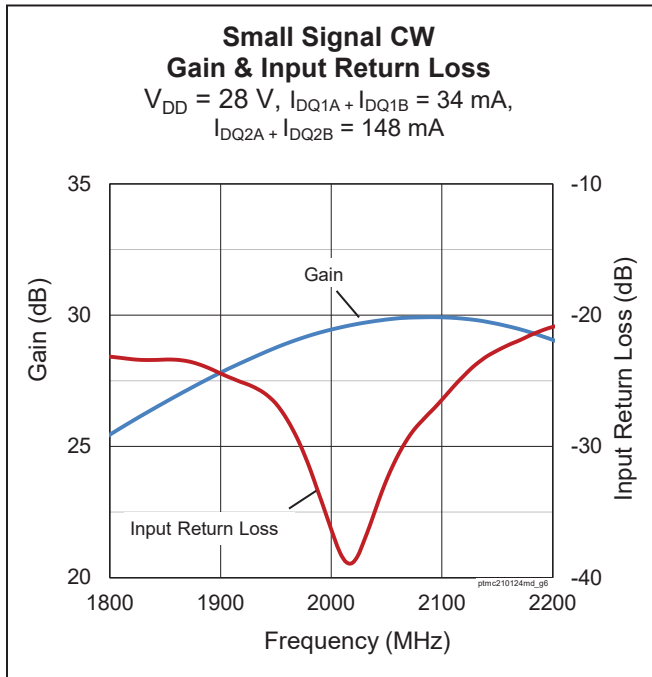
| Type and Version | Order Code | Package Description | Shipping |
|--------------------|--------------------|---------------------|----------------------|
| PTMC210124MD V1 R5 | PTMC210124MD-V1-R5 | PG-HB1DSO-14-1 | Tape & Reel, 500 pcs |



Typical Performance (data taken in production test fixture)



Typical Performance (cont.)

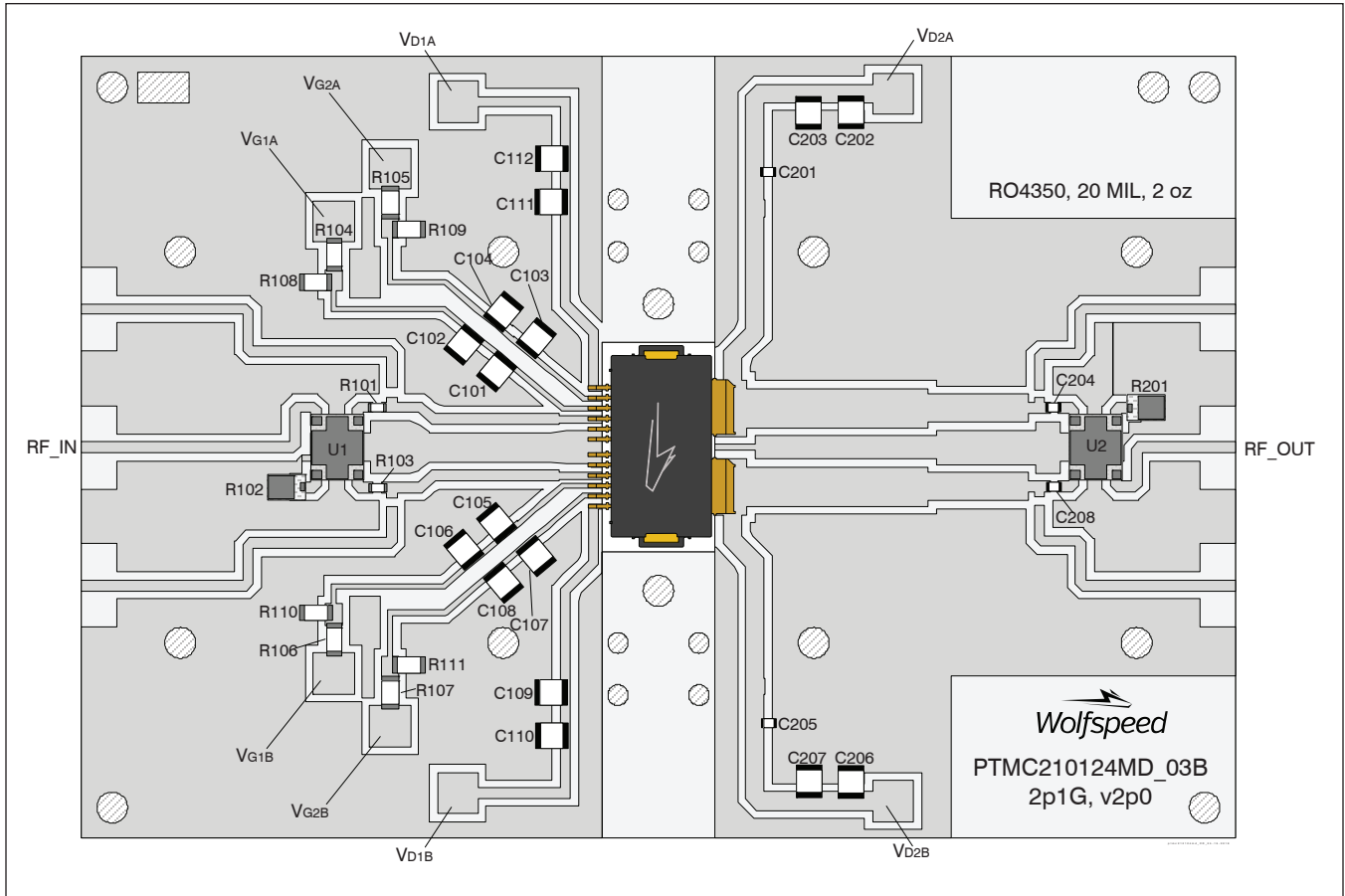


Load Pull Performance

CW signal: $V_{DD} = 28\text{ V}$, $I_{DQ1A} = I_{DQ1B} = 17\text{ mA}$, $I_{DQ2A} = I_{DQ2B} = 74\text{ mA}$

| Freq [MHz] | Zs [Ω] | P _{1dB} | | | | | | | | | |
|------------|------------|------------------|-----------|------------------------|----------------------|---------|------------|-----------|------------------------|----------------------|---------|
| | | Max Output Power | | | | | Max PAE | | | | |
| | | ZL [Ω] | Gain [dB] | P _{1dB} [dBm] | P _{1dB} [W] | PAE [%] | ZL [Ω] | Gain [dB] | P _{1dB} [dBm] | P _{1dB} [W] | PAE [%] |
| 1805 | 49.8+j2.25 | 28.5+j0.97 | 29.2 | 39.5 | 9.0 | 53.4 | 36.1+j19.6 | 30.6 | 38.4 | 6.9 | 58.8 |
| 1960 | 49.9-j0.12 | 24.0+j4.31 | 30.1 | 39.4 | 8.6 | 53.4 | 21.8+j16.3 | 31.3 | 38.5 | 7.1 | 58.4 |
| 2180 | 48.5-j1.88 | 19.5+j3.58 | 29.0 | 39.5 | 8.9 | 51.5 | 12.0+j13.7 | 30.7 | 38.0 | 6.3 | 58.4 |
| 2200 | 49.3+j1.0 | 18.7+j4.81 | 29.0 | 39.5 | 8.9 | 53.6 | 12.3+j12.4 | 30.3 | 38.3 | 6.7 | 59.1 |

Reference Circuit, 2110 – 2200 MHz



Reference circuit assembly diagram (not to scale)

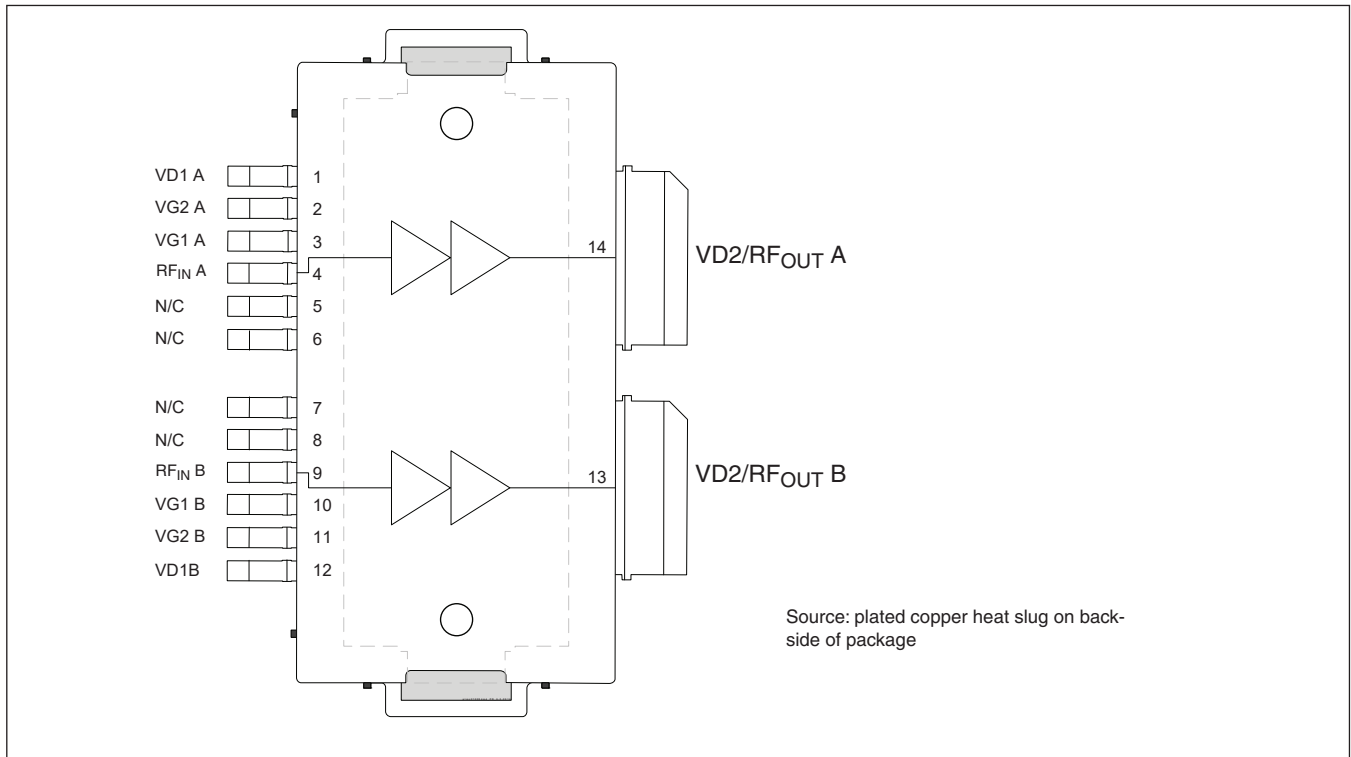
Reference Circuit Assembly

| | |
|---|---|
| DUT | PTMC210124MD V1 |
| Test Fixture Part No. | LTN/PTMC210124MD V1 |
| PCB | Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$, $f = 2110\text{--}2200$ MHz |
| Find Gerber files for this test fixture on the Wolfspeed Web site at www.wolfspeed.com/RF | |

Components Information

| Component | Description | Manufacturer | P/N |
|--|------------------------|----------------------------------|--------------------|
| C101, C103, C105, C107, C109, C111, C203, C207 | Capacitor, 4.7 μ F | Murata Electronics North America | GRM32ER71H475KA88L |
| C102, C104, C106, C108, C110, C112, C202, C206 | Capacitor, 10 μ F | Taiyo Yuden | UMK325C7106MM-T |
| 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 | X3C21P1-03S |

Pinout Diagram (top view)



Package Outline Specifications

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

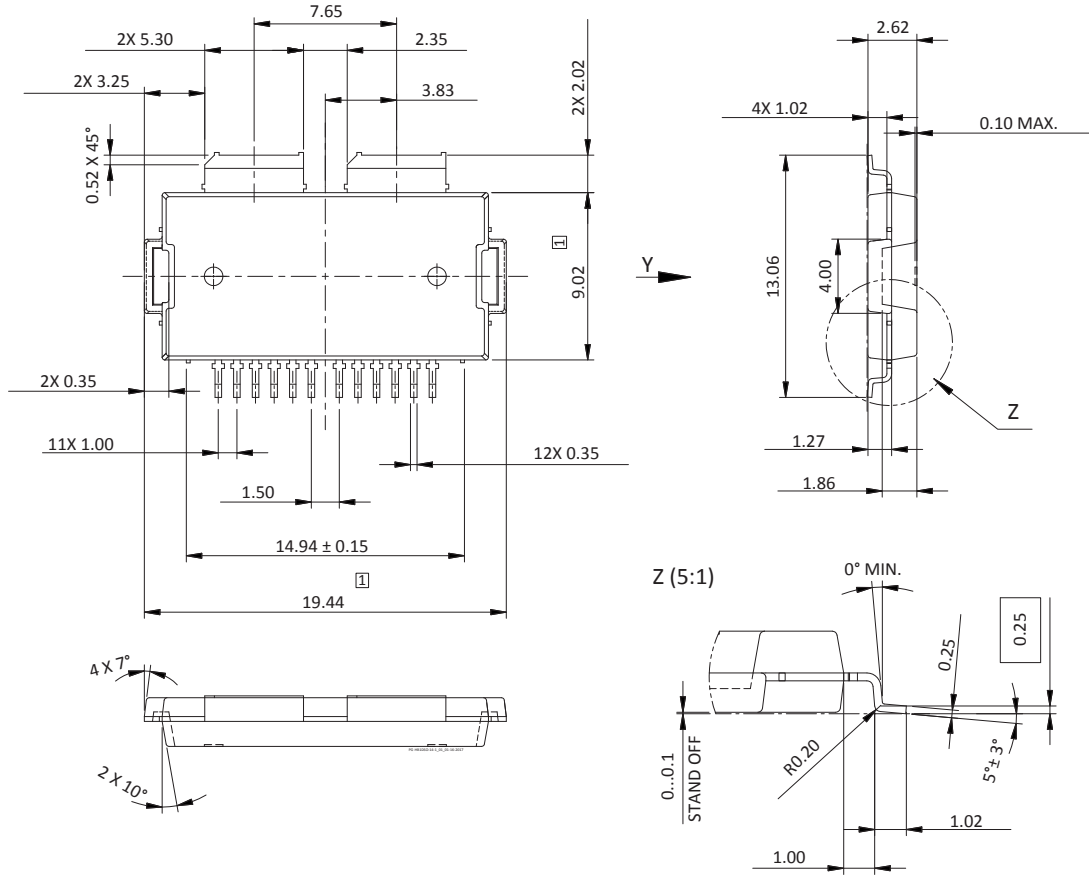


Diagram Notes—unless otherwise specified:

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

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

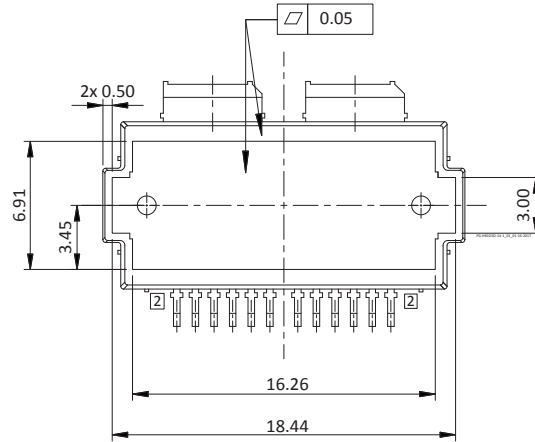


Diagram Notes—unless otherwise specified:

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.
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8. Lead thickness: 0.25 mm.
9. Gold plating thickness: 0.25 micron max.