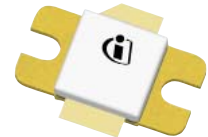


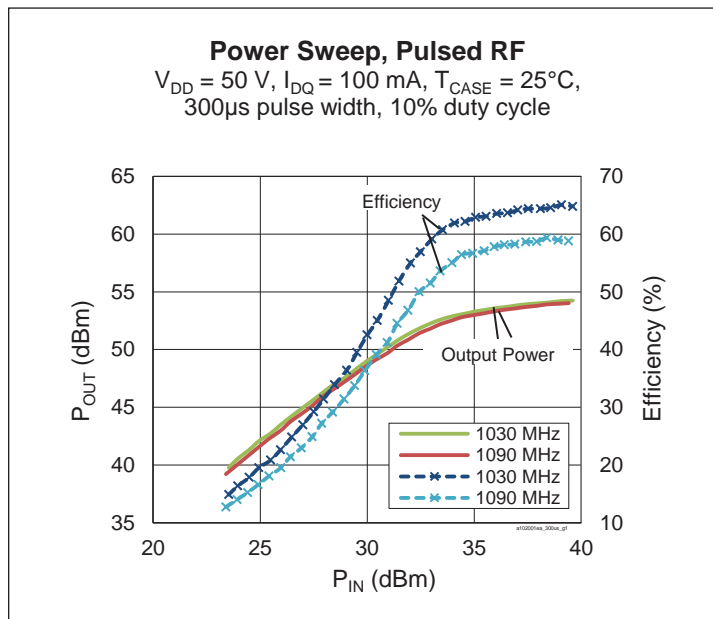
Thermally-Enhanced High Power RF LDMOS FET 200 W, 50 V, 960 – 1600 MHz

Description

The PTVA102001EA is a 200-watt LDMOS FET intended for use in power amplifier applications in the 960 to 1600 MHz frequency band. Features include high gain and thermally-enhanced package with bolt-down flange. Manufactured with Infineon's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PTVA102001EA
Package H-36265-2



Features

- Input matched
- Capable of handling 10:1 VSWR @50 V, 200 W (CW) output power
- Integrated ESD protection
- Low thermal resistance
- Pb-free and RoHS compliant

RF Characteristics

Pulsed RF Performance (tested in Infineon production test fixture)

$V_{DD} = 50\text{ V}$, $I_{DQ} = 100\text{ mA}$, $P_{OUT} = 200\text{ W}$, $f = 1090\text{ MHz}$, 300 µs pulse width, 10% duty cycle

| Characteristic | Symbol | Min | Typ | Max | Unit |
|------------------|----------|-----|------|-----|------|
| Gain | G_{ps} | 17 | 18.5 | — | dB |
| Drain Efficiency | η_D | 56 | 59.5 | — | % |

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!

RF Characteristics

Typical RF Performance (not subject to production test, verified by design/characterization in Infineon test fixture)

$V_{DD} = 50\text{ V}$, $I_{DQ} = 100\text{ mA}$, Input signal ($t_r = 5\text{ ns}$, $t_f = 6.5\text{ ns}$), $T_{CASE} = 25^\circ\text{C}$, class AB test

| Mode of Operation | f (MHz) | IRL (dB) | P _{1dB} | | | P _{3dB} | | | P _{droop (pulse) @ 200 W} | t _r (ns) | t _f (ns) |
|------------------------|---------|----------|------------------|---------|----------------------|------------------|---------|----------------------|------------------------------------|---------------------|---------------------|
| | | | Gain (dB) | Eff (%) | P _{OUT} (W) | Gain (dB) | Eff (%) | P _{OUT} (W) | | | |
| 300 μs, 10% Duty Cycle | 1030 | -10 | 18.5 | 60 | 204 | 16.5 | 62 | 240 | 0.10 | 6.0 | 7.9 |
| 1 ms, 10% Duty Cycle | 1030 | -10 | 18.3 | 60 | 200 | 16.3 | 62 | 235 | 0.20 | — | — |
| 20 ms, 10% Duty Cycle | 1030 | -10 | 18.2 | 59 | 195 | 16.2 | 61 | 225 | 0.25 | — | — |
| 16 ms, 50% Duty Cycle | 1030 | -10 | 18.2 | 58 | 190 | 16.2 | 60 | 215 | 0.30 | — | — |

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 | μA |
| | $V_{DS} = 111\text{ V}$, $V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 10 | μA |
| Gate Leakage Current | $V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$ | I_{GSS} | — | — | 1 | μA |
| On-State Resistance | $V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$ | $R_{DS(on)}$ | — | 0.34 | — | Ω |
| Operating Gate Voltage | $V_{DS} = 50\text{ V}$, $I_{DQ} = 100\text{ mA}$ | V_{GS} | 3.1 | 3.35 | 3.5 | 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 | °C |
| Storage Temperature Range | T_{STG} | -65 to +150 | °C |

Thermal Characteristics

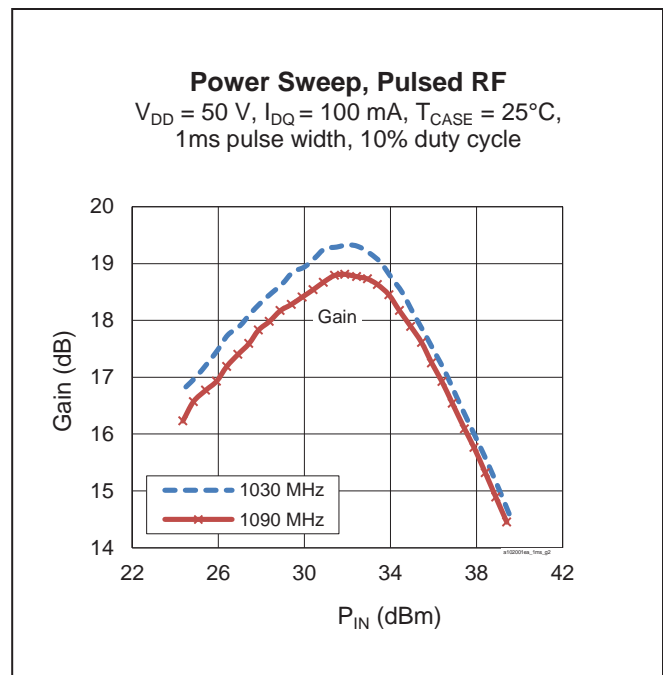
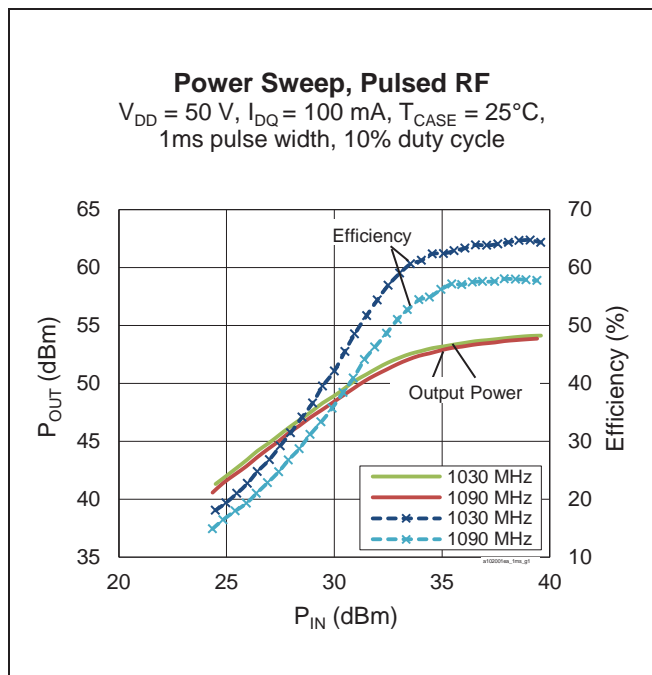
$T_{CASE} = 70^\circ\text{C}$, 167 W (CW), 50 V, $I_{DQ} = 100\text{ mA}$, 1030 MHz

| Characteristic | Symbol | Value | Unit |
|--------------------|-----------------|-------|------|
| Thermal Resistance | $R_{\theta JC}$ | 0.70 | °C/W |

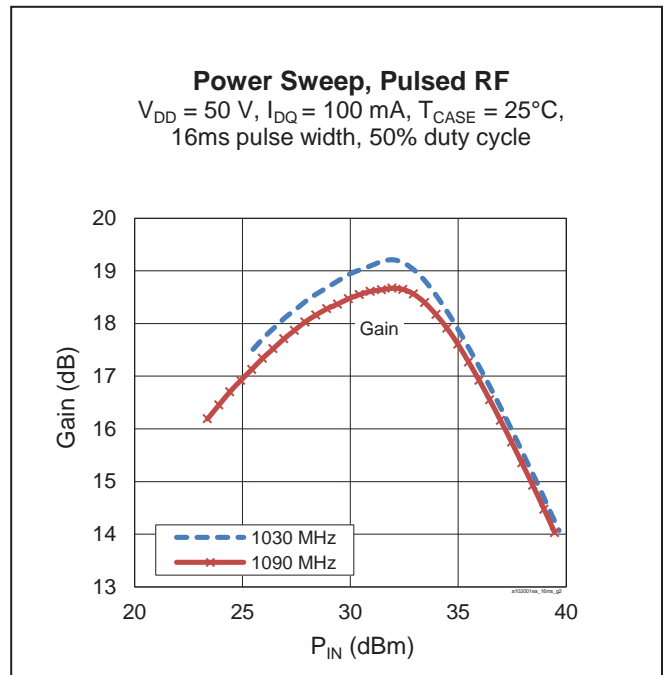
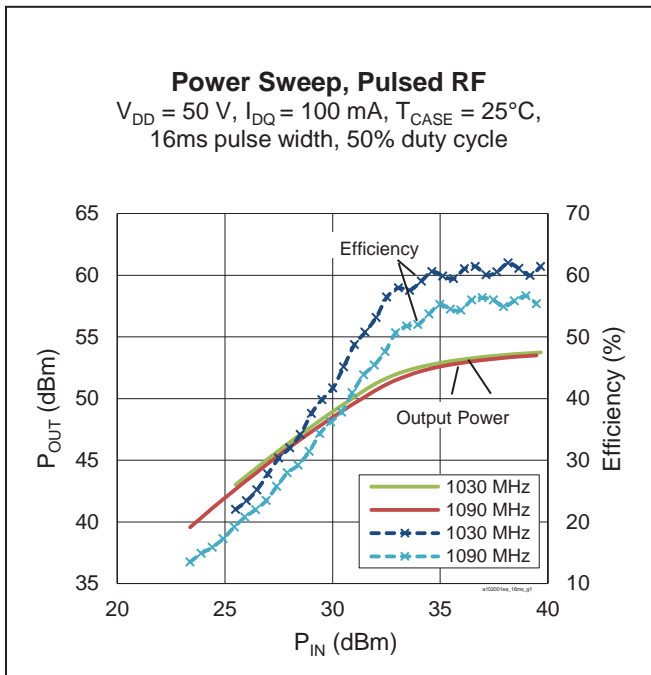
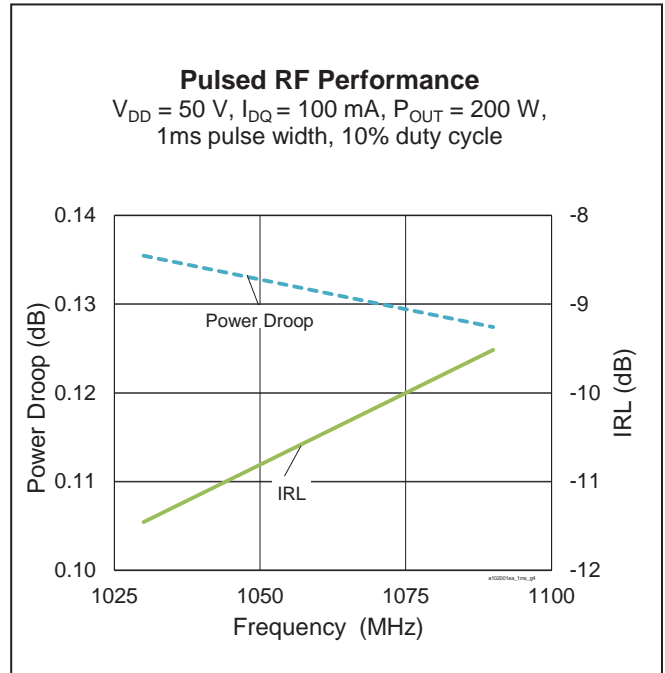
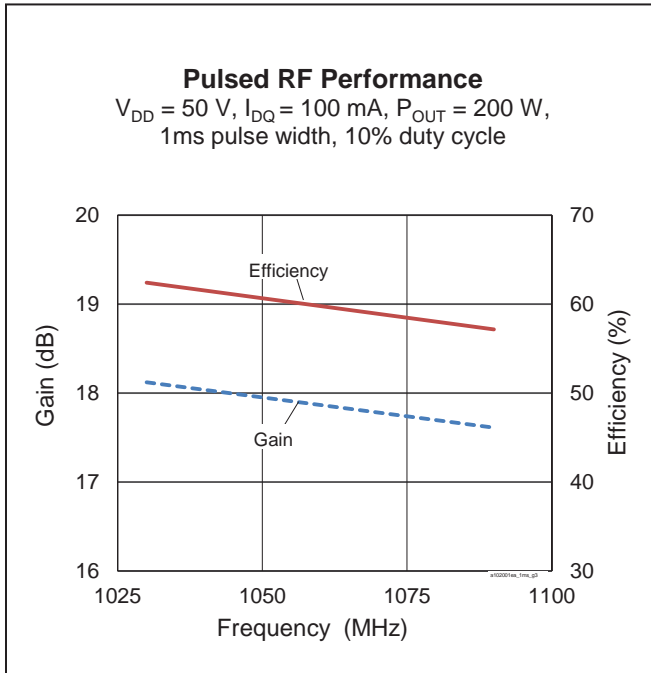
Ordering Information

| Type and Version | Order Code | Package Description | Shipping |
|--------------------|-----------------------|----------------------|----------------------|
| PTVA102001EA V1 R0 | PTVA102001EAV1R0XTMA1 | H-36265-2, bolt-down | Tape & Reel, 50 pcs |
| PTVA102001EA V1 R2 | PTVA102001EAV1R2XTMA1 | H-36265-2, bolt-down | Tape & Reel, 250 pcs |

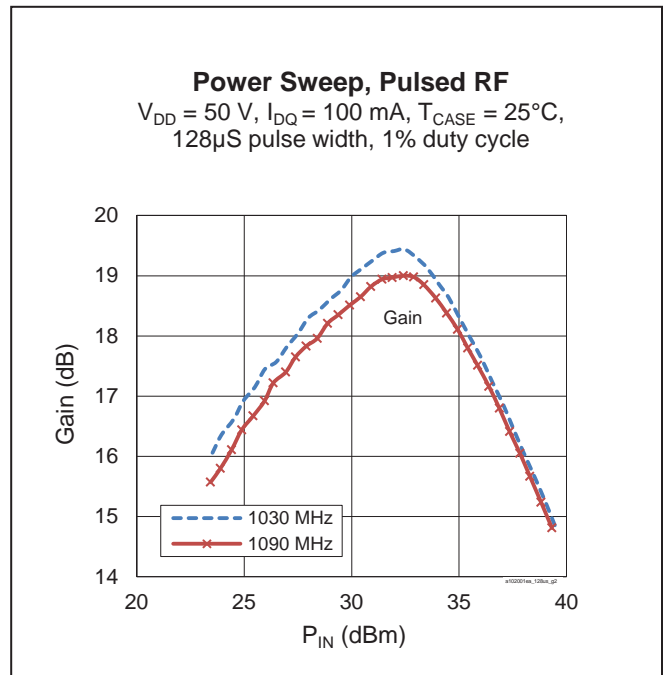
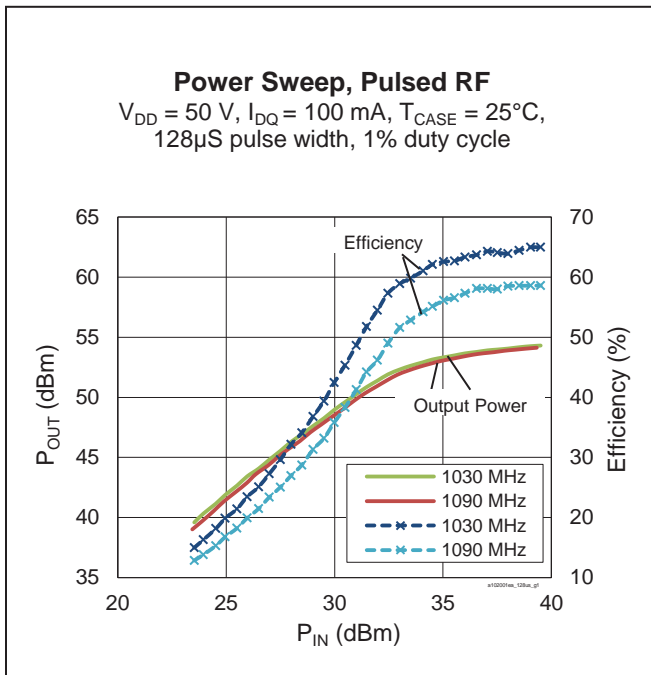
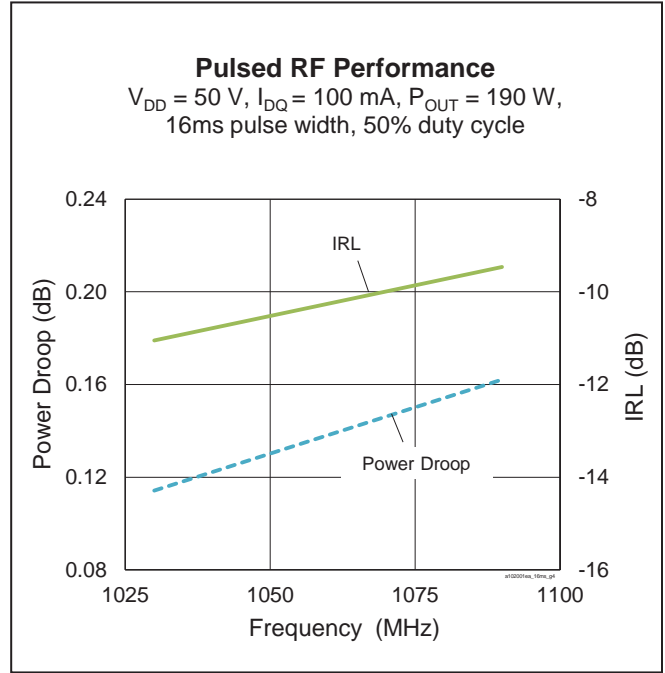
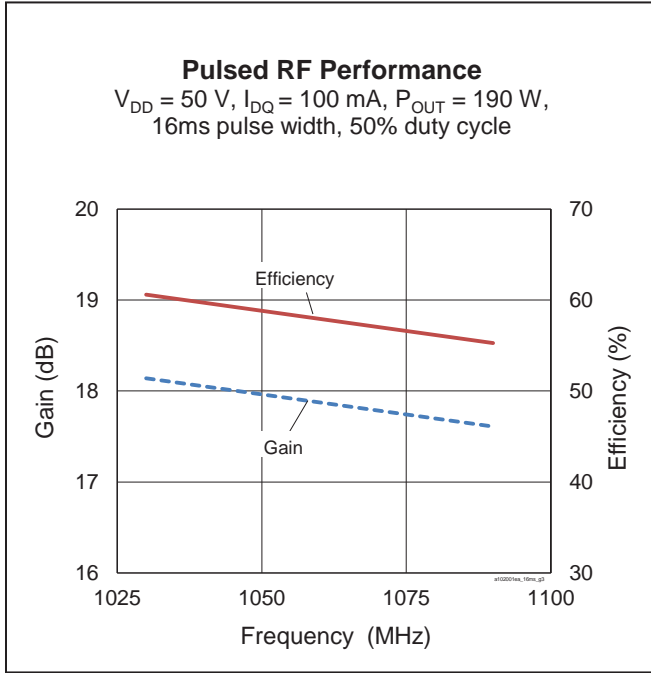
Typical RF Performance (data taken in production test fixture)



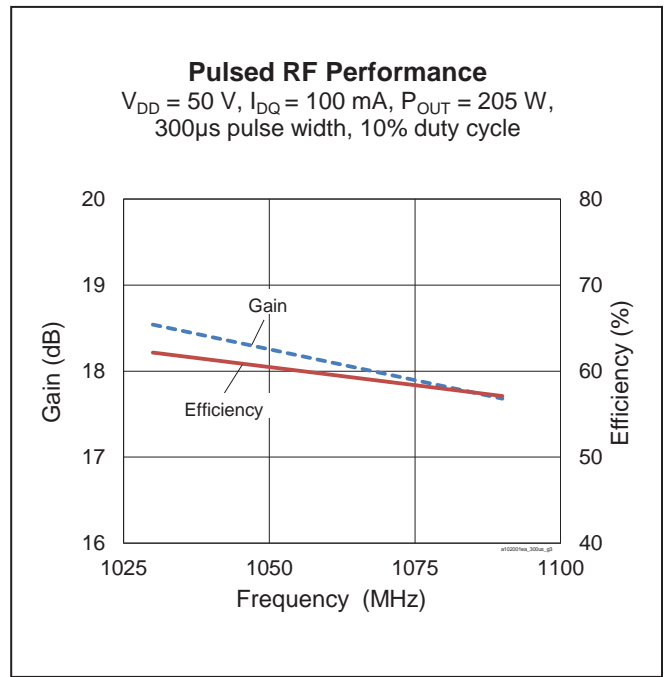
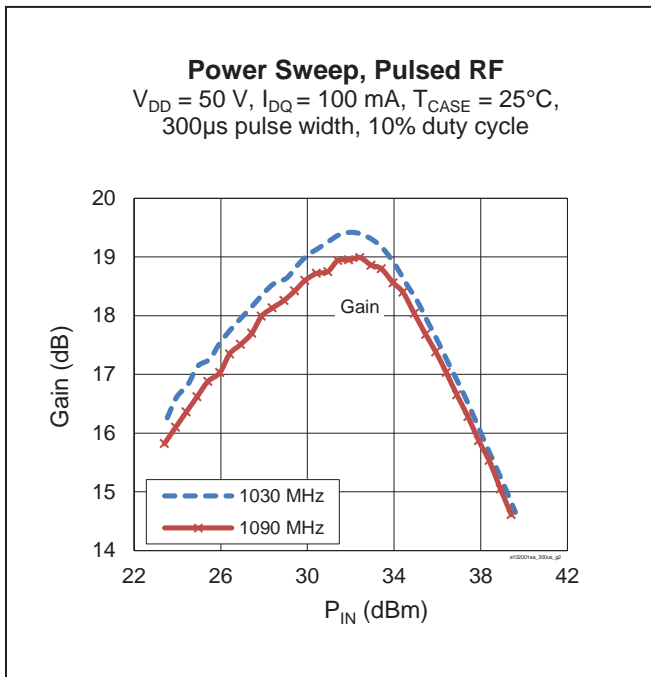
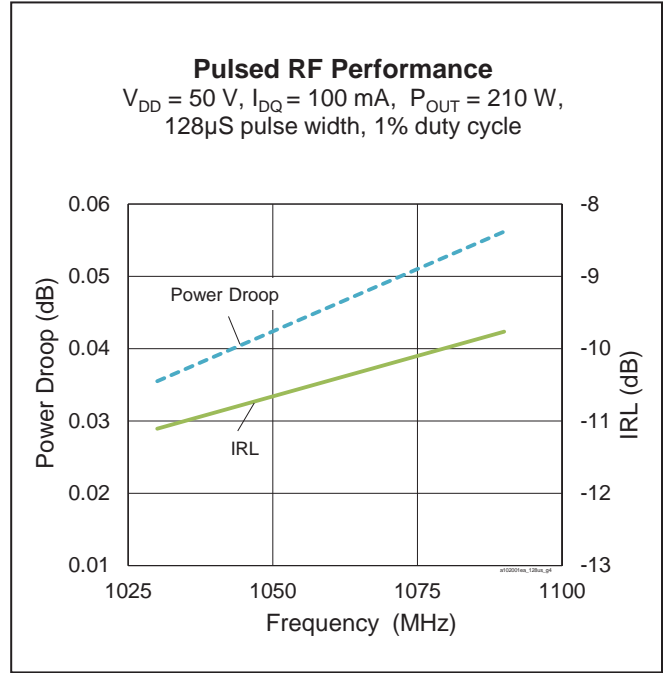
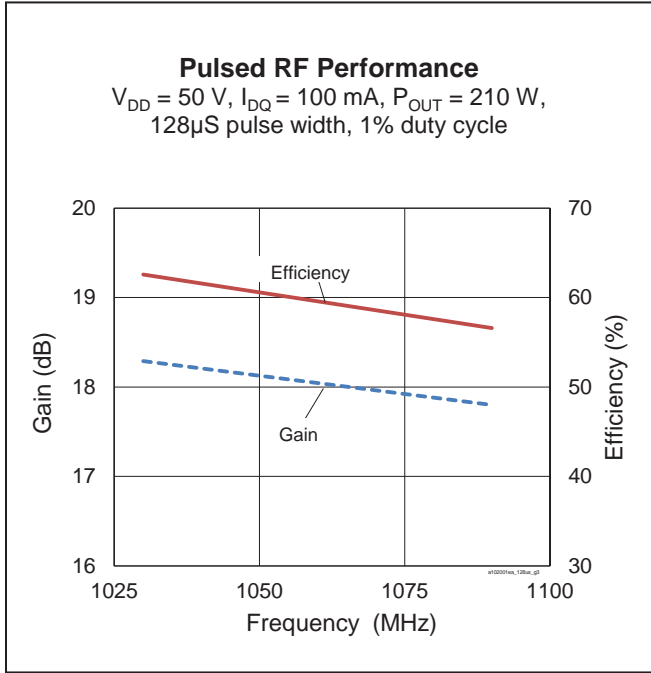
Typical RF Performance (cont.)



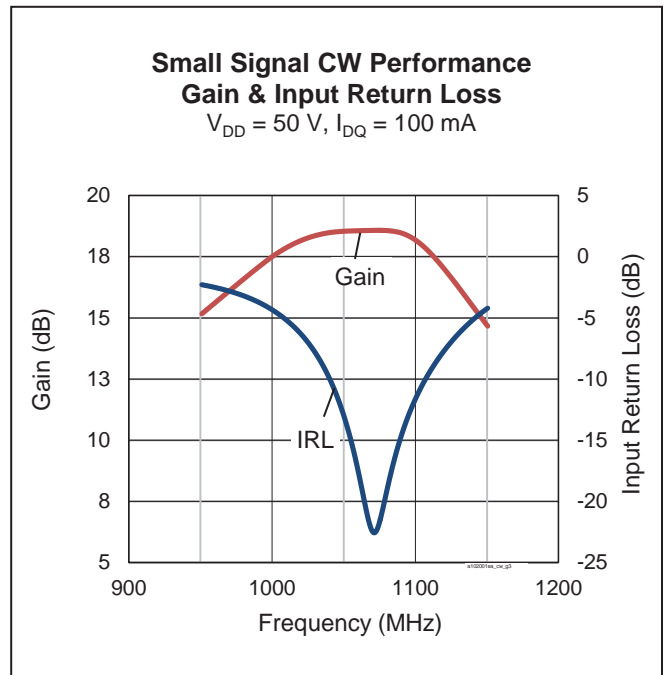
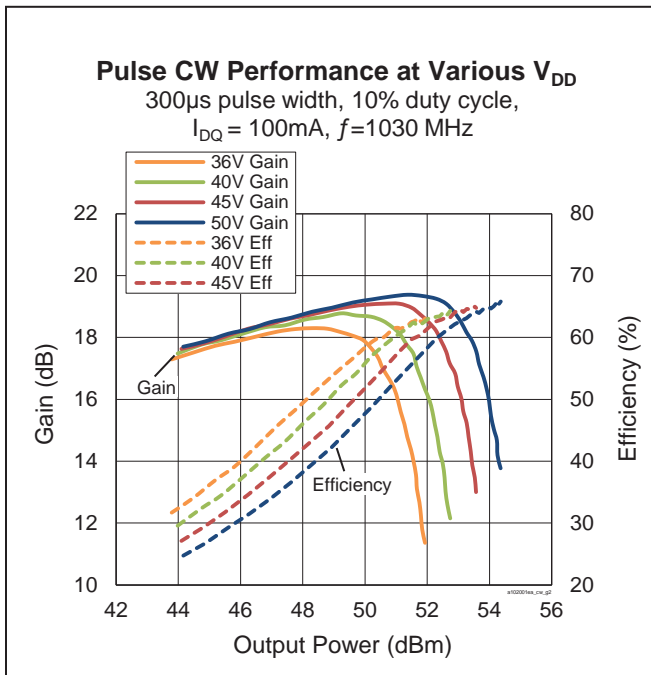
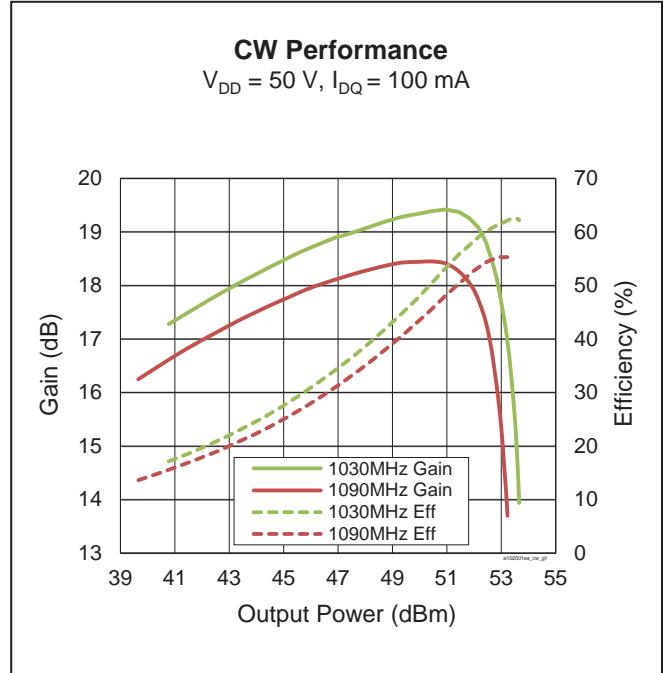
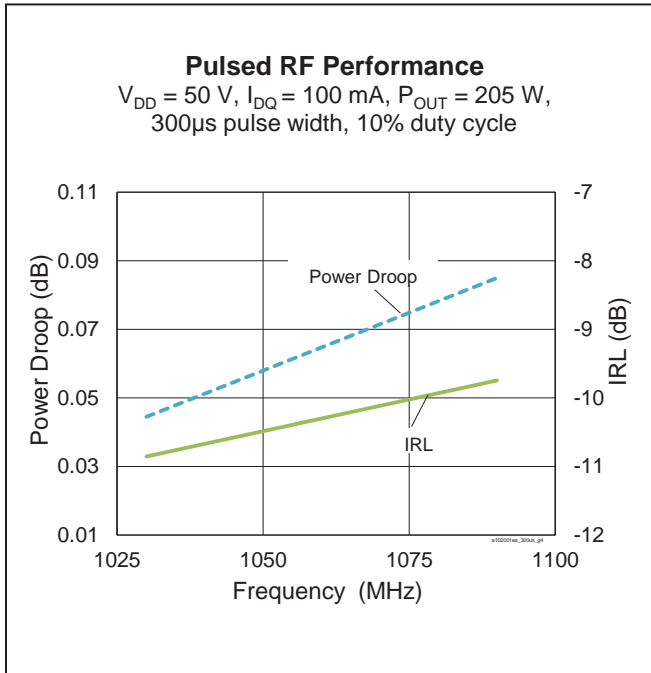
Typical RF Performance (cont.)



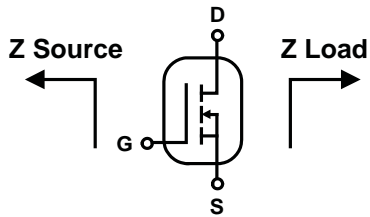
Typical RF Performance (cont.)



Typical RF Performance (cont.)



Load Pull Performance



Pulsed CW signal: 16 μ s pulse width, 10% duty cycle, class AB, $V_{DD} = 50$ V, $I_{DQ} = 90$ mA

| P3dB | | | | | | |
|---------------|-----------------------|-----------------|---------------|------------|-------------|------------------------|
| Maximum Power | | | | | | |
| Freq [MHz] | Z_{IN} [Ω] | P_{OUT} [dBm] | P_{OUT} [W] | P_G [dB] | PAE Eff [%] | Z_{OUT} [Ω] |
| 960 | 0.97 - j4.50 | 54.99 | 315 | 16.56 | 59.8 | 2.04 - j0.34 |
| 1030 | 1.25 - j5.26 | 54.59 | 288 | 15.63 | 57.5 | 2.26 - j0.43 |
| 1090 | 1.80 - j5.85 | 54.53 | 284 | 15.64 | 58.9 | 1.77 - j0.33 |
| 1150 | 2.37 - j7.11 | 54.53 | 284 | 15.23 | 57.0 | 2.04 - j0.65 |
| 1200 | 2.51 - j6.97 | 54.31 | 270 | 15.13 | 55.3 | 2.09 - j0.67 |
| 1300 | 4.92 - j7.48 | 54.55 | 285 | 14.70 | 56.4 | 1.80 - j0.99 |
| 1400 | 10.54 - j3.45 | 54.41 | 276 | 14.27 | 55.7 | 1.43 - j1.28 |
| 1500 | 7.87 - j0.31 | 54.36 | 273 | 13.62 | 53.1 | 1.66 - j1.93 |
| 1600 | 3.97 - j1.99 | 54.19 | 262 | 13.10 | 52.3 | 1.49 - j2.21 |

Pulsed CW signal: 16 μ s pulse width, 10% duty cycle, class AB, $V_{DD} = 50$ V, $I_{DQ} = 90$ mA

| P3dB | | | | | | |
|--------------------|-----------------------|-----------------|---------------|------------|-------------|------------------------|
| Maximum Efficiency | | | | | | |
| Freq [MHz] | Z_{IN} [Ω] | P_{OUT} [dBm] | P_{OUT} [W] | P_G [dB] | PAE Eff [%] | Z_{OUT} [Ω] |
| 960 | 0.97 - j4.50 | 53.57 | 228 | 18.32 | 70.0 | 1.73 + j1.19 |
| 1030 | 1.25 - j5.26 | 53.42 | 220 | 17.35 | 67.2 | 1.63 + j0.98 |
| 1090 | 1.80 - j5.85 | 53.38 | 218 | 17.14 | 67.3 | 1.50 + j0.72 |
| 1150 | 2.37 - j7.11 | 53.47 | 222 | 16.82 | 65.8 | 1.41 + j0.42 |
| 1200 | 2.51 - j6.97 | 52.40 | 174 | 17.04 | 65.4 | 1.08 + j0.60 |
| 1300 | 4.92 - j7.48 | 53.17 | 207 | 16.41 | 65.5 | 1.17 - j0.02 |
| 1400 | 10.54 - j3.45 | 52.99 | 199 | 15.95 | 63.4 | 0.85 - j0.61 |
| 1500 | 7.87 - j0.31 | 53.17 | 208 | 15.20 | 60.8 | 1.01 - j1.19 |
| 1600 | 3.97 - j1.99 | 53.15 | 207 | 14.51 | 58.5 | 0.94 - j1.66 |

Load Pull Performance (cont.)

Pulsed CW signal: 16 μ s pulse width, 10% duty cycle, class AB, $V_{DD} = 50$ V, $I_{DQ} = 90$ mA

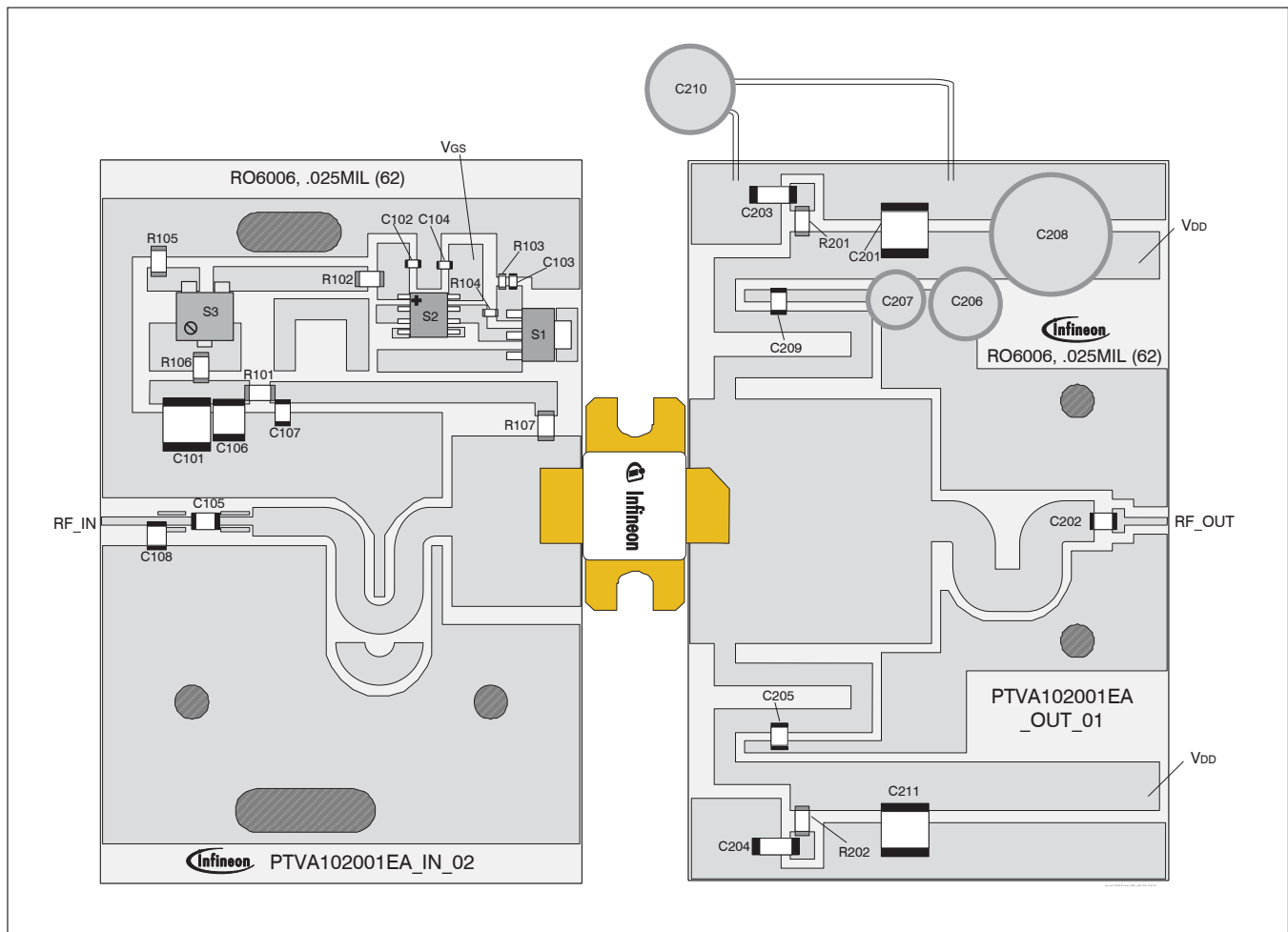
| | | P3dB | | | | |
|-------------------|---|------------------------------|----------------------------|---------------------------|--------------------|--|
| | | Z Optimized | | | | |
| Freq [MHz] | Z_{IN} [Ω] | P_{OUT} [dBm] | P_{OUT} [W] | P_G [dB] | PAE Eff [%] | Z_{OUT} [Ω] |
| 960 | 0.97 – j4.50 | 54.51 | 282 | 17.55 | 67.5 | 1.94 + j0.54 |
| 1030 | 1.25 – j5.26 | 54.18 | 262 | 16.79 | 65.1 | 1.85 + j0.51 |
| 1090 | 1.80 – j5.85 | 54.17 | 261 | 16.54 | 65.3 | 1.71 + j0.28 |
| 1150 | 2.37 – j7.11 | 54.12 | 258 | 16.28 | 63.9 | 1.65 + j0.04 |
| 1200 | 2.51 – j6.97 | 53.78 | 239 | 16.23 | 62.9 | 1.48 + j0.06 |
| 1300 | 4.92 – j7.48 | 53.99 | 251 | 15.79 | 62.3 | 1.54 – j0.32 |
| 1400 | 10.54 – j3.45 | 53.89 | 245 | 15.34 | 62.0 | 1.07 – j0.84 |
| 1500 | 7.87 – j0.31 | 53.86 | 243 | 14.71 | 59.5 | 1.22 – j1.43 |
| 1600 | 3.97 – j1.99 | 53.71 | 235 | 14.09 | 57.5 | 1.05 – j1.82 |

See next page for reference circuit information

Reference Circuit, 1030 – 1090 MHz

Reference Circuit Assembly

| | |
|-----------------------|---|
| DUT | PTVA102001EA |
| Test Fixture Part No. | LTN/PTVA102001EA V1 |
| PCB | Rogers 6006, 0.635 mm [0.025"] thick, 2 oz. copper, $\epsilon_r = 6.15$ |



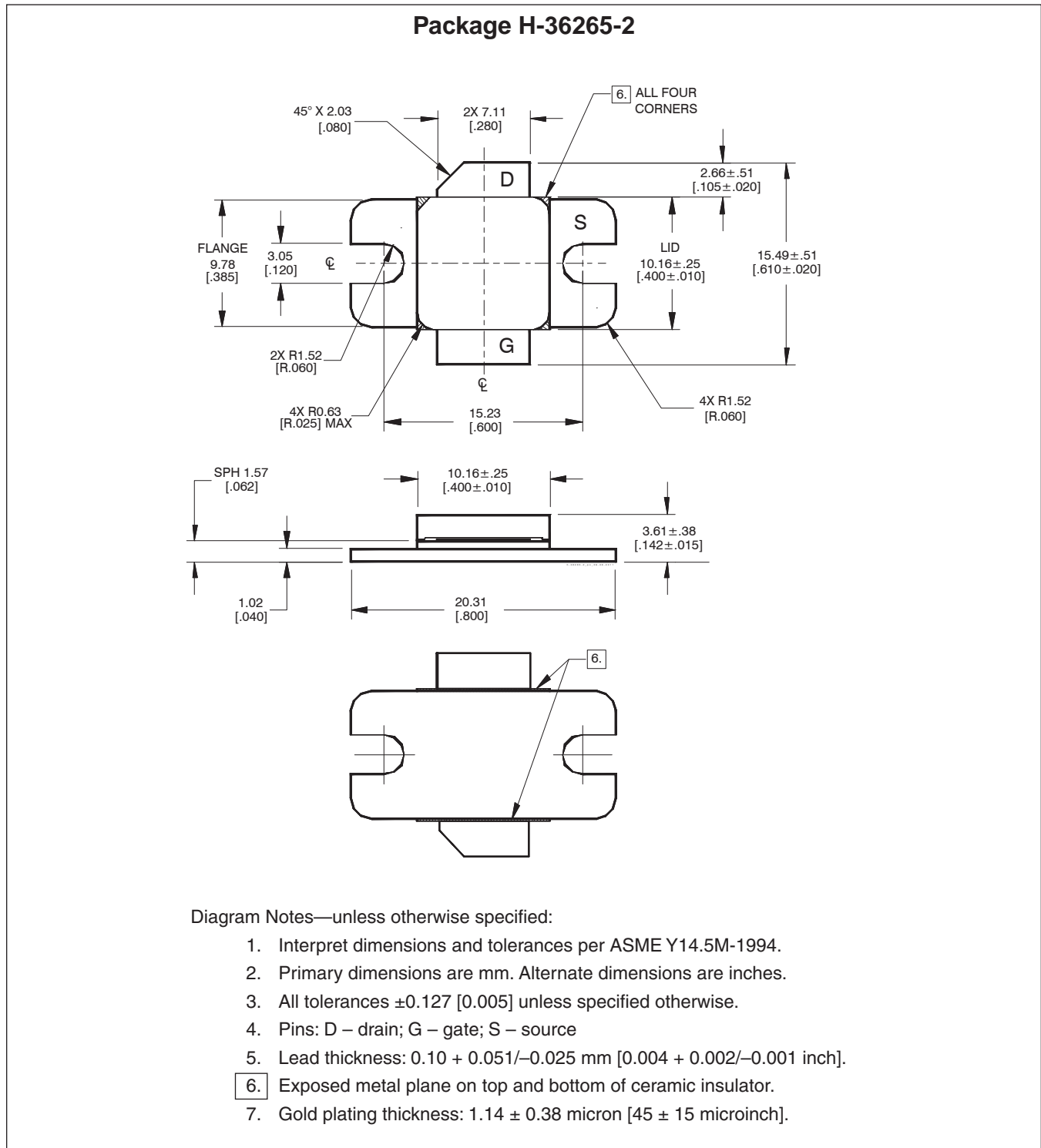
Reference circuit assembly diagram (not to scale)

Reference Circuit (cont.)

Components Information

| Component | Description | Manufacturer | P/N |
|------------------|----------------------------|------------------------------------|---------------------|
| Input | | | |
| C101 | Capacitor, 10 μ F | TDK Corporation | C5750X5R1H106K230KA |
| C102, C103, C104 | Capacitor, 1000 pF | Panasonic Electronic Components | ECJ-1VB1H102K |
| C105, C107 | Capacitor, 39 pF | ATC | ATC100B390KW500XB |
| C106 | Capacitor, 1 μ F | TDK Corporation | C4532X7R2A105M230KA |
| C108 | Capacitor, 3.6 pF | ATC | ATC100B3R6CW500XB |
| R101 | Resistor, 5.6 Ω | Panasonic Electronic Components | ERJ-8RQJ5R6V |
| R102, R107 | Resistor, 10 Ω | Panasonic Electronic Components | ERJ-8GEYJ100V |
| R103 | Resistor, 1.3K Ω | Panasonic Electronic Components | ERJ-3GEYJ132V |
| R104 | Resistor, 1.2K Ω | Panasonic Electronic Components | ERJ-3GEYJ122V |
| R105 | Resistor, 2000 Ω | Panasonic Electronic Components | ERJ-8GEYJ202V |
| R106 | Resistor, 1000 Ω | Panasonic Electronic Components | ERJ-8GEYJ102V |
| S1 | Transistor | Infineon Technologies | BCP56 |
| S2 | Voltage Regulator | Texas Instruments | LM78L05ACM |
| S3 | Potentiometer, 2k Ω | Bourns Inc. | 3224W-1-202E |
| Output | | | |
| C201, C211 | Capacitor, 10 μ F | TDK Corporation | C5750X5R1H106K230KA |
| C202, C205, C209 | Capacitor, 39 pF | ATC | ATC100B390KW500XB |
| C203, C204 | Capacitor, 1 μ F | TDK Corporation | C4532X7R2A105M230KA |
| C206 | Capacitor, 22 μ F | Cornell Dubilier Electronics (CDE) | SEK220M100ST |
| C207 | Capacitor, 10 μ F | Cornell Dubilier Electronics (CDE) | SEK100M100ST |
| C208 | Capacitor, 100 μ F | Cornell Dubilier Electronics (CDE) | SK101M100ST |
| C210 | Capacitor, 6800 μ F | Panasonic Electronic Components | ECO-S2AP682EA |
| R201, R202 | Resistor, 5.6 Ω | Panasonic Electronic Components | ERJ-8RQJ5R6V |

Package Outline Specifications



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

Revision History

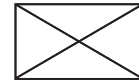
| Revision | Date | Data Sheet Type | Page | Subjects (major changes at each revision) |
|----------|------------|-----------------|---------------------|---|
| 01 | 2015-07-22 | Advance | All | Data Sheet reflects advance specification for product development |
| 02 | 2015-09-22 | Production | All | Data Sheet reflects released product specification |
| 02.1 | 2017-02-08 | Production | 2 | Updated operating voltage and junction temperature |
| 03 | 2017-08-17 | Production | 1 2 5 8, 9 | Extend bandwidth to 1600 MHz New Thermal Characteristics table Remove duplicate graph Add load pull points |

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Please send your proposal (including a reference to this document) to:

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