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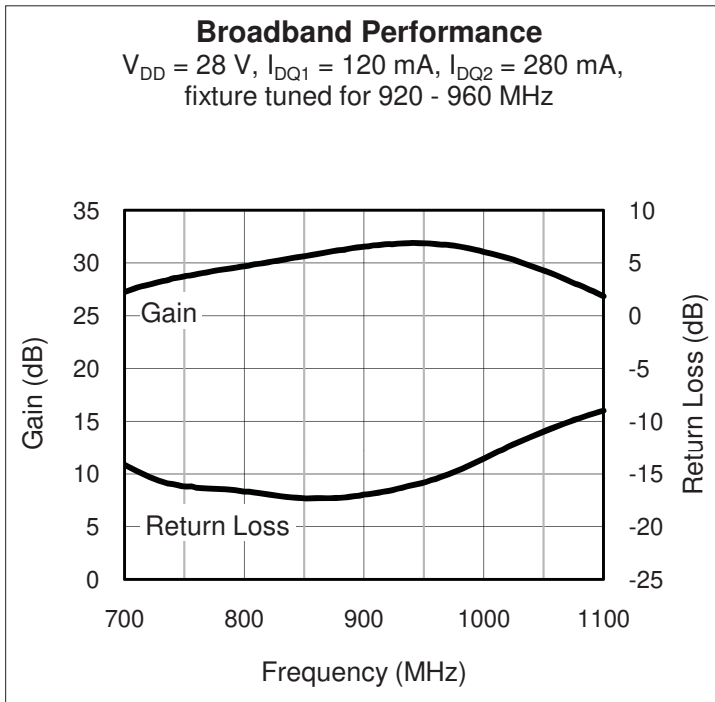


## Wideband RF LDMOS Integrated Power Amplifier 30 W, 28 V, 700 – 1000 MHz

### Description

The PTMA080302M is a wideband, matched, 30-watt, 2-stage LDMOS integrated amplifier intended for use in all typical modulation formats from 700 to 1000 MHz. This device is offered in a 20-lead, thermally-enhanced, overmolded package for cool and reliable operation.

PTMA080302M  
Package PG-DSO-20-63



### Features

- Designed for wide RF modulation bandwidths, and low memory effects
- On-chip matching, integrated input DC block, 50-ohm input and ~ 8-ohm output
- Typical GSM/EDGE performance, 940 MHz, 28 V
  - Output power = 15 W Avg.
  - Linear gain = 31 dB
  - Power added efficiency = 36%
  - EVM at 15 W = 1.7 %
  - ACPR at 400 kHz = -61 dBc
  - ACPR at 600 kHz = -73 dBc
- Typical CW performance at 940 MHz, 28 V
  - Output power at  $P_{1dB}$  = 32 W
  - Linear gain (1 W) = 31 dB
  - Power added efficiency = 46%
- Capable of handling 10:1 VSWR @ 28 V, 30 W (CW) output power
- Integrated ESD protection. Meets HBM Class 1B (minimum), per JESD22-A114F
- RoHS-compliant package

### RF Characteristics

**GSM/EDGE Specifications** (not subject to production test—verified by design/characterization in Infineon test fixture)

$V_{DD} = 28\text{ V}$ ,  $I_{DQ1} = 120\text{ mA}$ ,  $I_{DQ2} = 280\text{ mA}$ ,  $f = 920\text{ to }960\text{ MHz}$ ,  $P_{OUT} = 15\text{ W Avg.}$

| Characteristic         | Symbol    | Min | Typ | Max | Unit |
|------------------------|-----------|-----|-----|-----|------|
| Gain                   | $G_{ps}$  | —   | 31  | —   | dB   |
| Power-added Efficiency | PAE       | —   | 36  | —   | %    |
| Error Vector Magnitude | EVM (RMS) | —   | 1.7 | —   | %    |

table continued next page

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!

**RF Characteristics** (cont.)

**GSM/EDGE Specifications** (cont.)

 $V_{DD} = 28\text{ V}$ ,  $I_{DQ1} = 150\text{ mA}$ ,  $I_{DQ2} = 280\text{ mA}$ ,  $f = 920\text{ to }960\text{ MHz}$ ,  $P_{OUT} = 15\text{ W Avg.}$ 

| Characteristic      |                | Symbol            | Min | Typ | Max | Unit |
|---------------------|----------------|-------------------|-----|-----|-----|------|
| Modulation Spectrum | 400 kHz offset | ACPR <sub>1</sub> | —   | -61 | —   | dBc  |
|                     | 600 kHz offset | ACPR <sub>2</sub> | —   | -73 | —   | dBc  |
| Gain Flatness       |                | $\Delta G$        | —   | 0.2 | —   | dB   |

**Two-tone Measurements** (tested in Infineon test fixture)

 $V_{DD} = 28\text{ V}$ ,  $I_{DQ1} = 150\text{ mA}$ ,  $I_{DQ2} = 280\text{ mA}$ ,  $P_{OUT} = 15\text{ W Avg.}$ ,  $f = 940\text{ MHz}$ , tone spacing = 1 MHz

| Characteristic                         |  | Symbol   | Min  | Typ | Max | Unit |
|--|--|----------|------|-----|-----|------|
| Gain                                   |  | $G_{ps}$ | 31   | 32  | —   | dB   |
| Drain Efficiency                       |  | $\eta_D$ | 32.5 | 35  | —   | %    |
| Third Order Intermodulation Distortion |  | IMD3     | —    | -33 | -29 | dBc  |

**Single-tone Specifications** (not subject to production test—verified by design/characterization in Infineon test fixture)

 $V_{DD} = 28\text{ V}$ ,  $I_{DQ1} = 150\text{ mA}$ ,  $I_{DQ2} = 280\text{ mA}$ ,  $f = 940\text{ MHz}$ 

| Characteristic         |  | Symbol    | Min | Typ | Max | Unit |
|------------------------|--|-----------|-----|-----|-----|------|
| Gain                   |  | $G_{ps}$  | —   | 32  | —   | dB   |
| Power-added Efficiency |  | PAE       | —   | 46  | —   | %    |
| Output Power           |  | $P_{1dB}$ | —   | 31  | —   | W    |

**DC Characteristics**

| Stage 1 Characteristics | Conditions   | Symbol       | Min | Typ  | Max  | Unit          |
|-------------------------|--|--------------|-----|------|------|---------------|
| Drain Leakage Current   | $V_{DS} = 28\text{ V}$ , $V_{GS} = 0\text{ V}$       | $I_{DSS}$    | —   | —    | 1.0  | $\mu\text{A}$ |
|                         | $V_{DS} = 63\text{ V}$ , $V_{GS} = 0\text{ V}$       | $I_{DSS}$    | —   | —    | 10.0 | $\mu\text{A}$ |
| Gate Leakage Current    | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0\text{ V}$       | $I_{GSS}$    | —   | —    | 1.0  | $\mu\text{A}$ |
| On-state Resistance     | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.1\text{ V}$     | $R_{DS(on)}$ | —   | 1.85 | —    | $\Omega$      |
| Operating Gate Voltage  | $V_{DS} = 28\text{ V}$ , $I_{DQ1} = 120\text{ mA}$ , | $V_{GS}$     | 2.0 | 2.5  | 3.0  | V             |

**DC Characteristics** (cont.)

| Stage 2 Characteristics        | Conditions                                      | Symbol        | Min | Typ  | Max  | Unit          |
|--------------------------------|---|---------------|-----|------|------|---------------|
| Drain-source Breakdown Voltage | $V_{GS} = 0\text{ V}, I_{DS} = 10\text{ mA}$    | $V_{(BR)DSS}$ | 65  | —    | —    | V             |
| Drain Leakage Current          | $V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}$     | $I_{DSS}$     | —   | —    | 1.0  | $\mu\text{A}$ |
|                                | $V_{DS} = 63\text{ V}, V_{GS} = 0\text{ V}$     | $I_{DSS}$     | —   | —    | 10.0 | $\mu\text{A}$ |
| Gate Leakage Current           | $V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V}$     | $I_{GSS}$     | —   | —    | 1.0  | $\mu\text{A}$ |
| On-state Resistance            | $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$   | $R_{DS(on)}$  | —   | 0.25 | —    | $\Omega$      |
| Operating Gate Voltage         | $V_{DS} = 28\text{ V}, I_{DQ2} = 280\text{ mA}$ | $V_{GS}$      | 2.0 | 2.5  | 3.0  | V             |

**Maximum Ratings**

| Parameter   | Symbol    | Value                                 | Unit               |                       |
|---|-----------|---------------------------------------|--------------------|-----------------------|
| Drain-Source Voltage  | $V_{DSS}$ | 65                                    | V                  |                       |
| Gate-Source Voltage   | $V_{GS}$  | -0.5 to +12                           | V                  |                       |
| Junction Temperature  | $T_J$     | 200                                   | $^{\circ}\text{C}$ |                       |
| Input Power   | $P_{IN}$  | 16                                    | dBm                |                       |
| Total Device Dissipation  | $P_D$     | 129.5                                 | W                  |                       |
|   |           | Above 25 $^{\circ}\text{C}$ derate by | 0.74               | W/ $^{\circ}\text{C}$ |
| Storage Temperature Range   | $T_{STG}$ | -40 to +150                           | $^{\circ}\text{C}$ |                       |
| Thermal Resistance<br>( $T_{CASE} = 70^{\circ}\text{C}, 30\text{ W CW}$ ) | Stage 1   | $R_{\theta JC}$                       | 6.7                | $^{\circ}\text{C/W}$  |
|   | Stage 2   | $R_{\theta JC}$                       | 1.7                | $^{\circ}\text{C/W}$  |

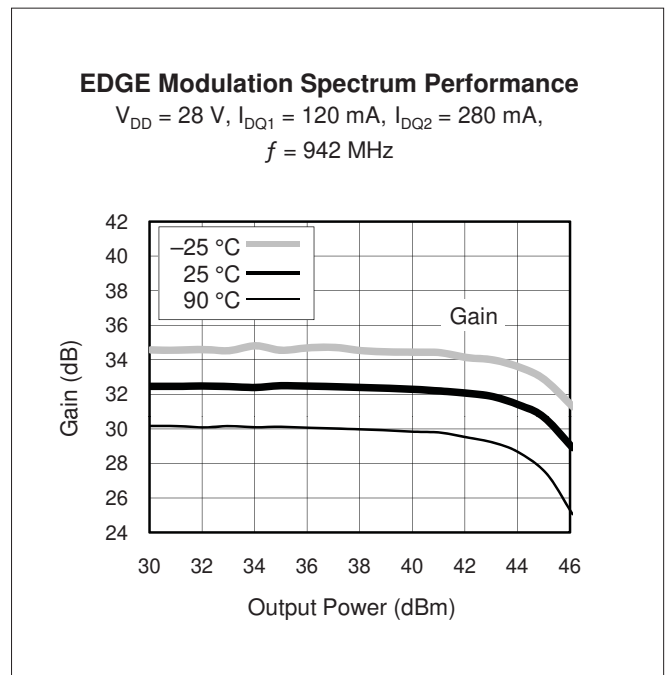
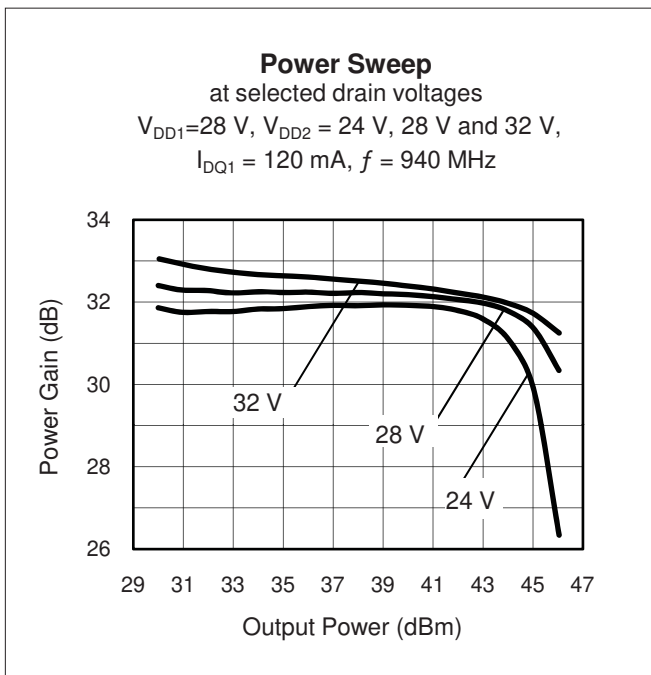
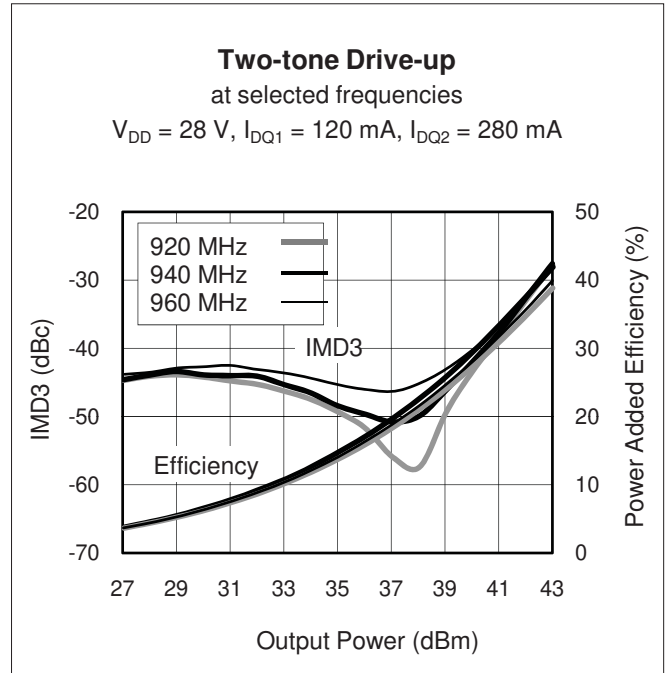
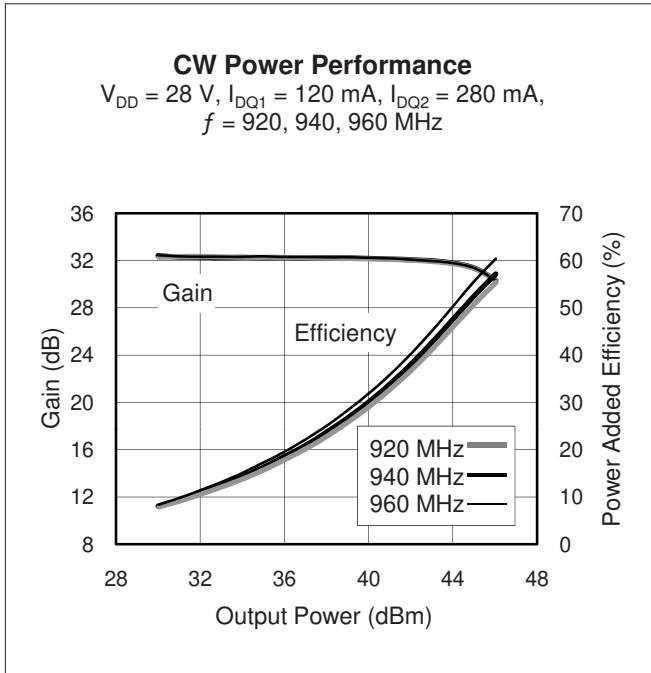
**Moisture Sensitivity Level**

| Level | Test Standard       | Package Temperature | Unit               |
|-------|---------------------|---------------------|--------------------|
| 3     | IPC/JEDEC J-STD-020 | 260                 | $^{\circ}\text{C}$ |

**Ordering Information**

| Type and Version    | Order Code             | Package and Description                          | Shipping              |
|---------------------|------------------------|--|-----------------------|
| PTMA080302M V1 R250 | PTMA080302MV1R250AUMA1 | PG-DSO-20-63, Copper heat slug, plastic EMC body | Tape & Reel, 250 pcs. |

**Typical Performance** (data taken in a production test fixture)

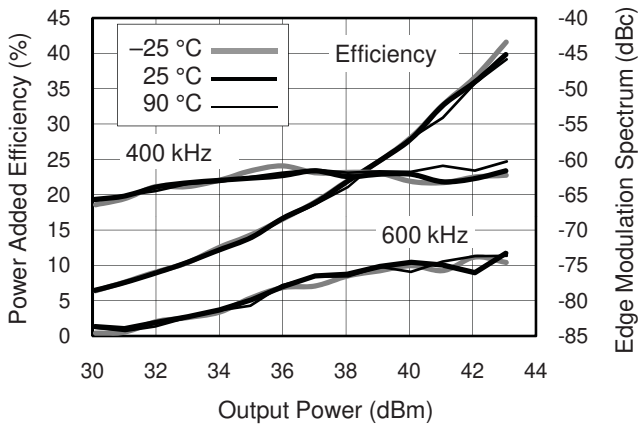


Typical Performance (cont.)

**EDGE Modulation Spectrum Performance**

at selected temperatures

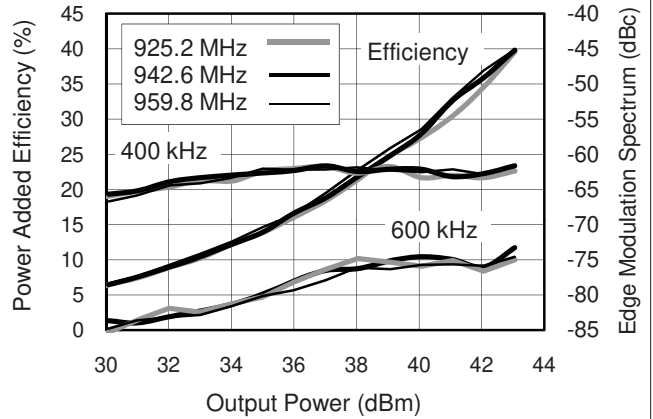
$V_{DD} = 28\text{ V}$ ,  $I_{DQ1} = 120\text{ mA}$ ,  $I_{DQ2} = 280\text{ mA}$ ,  
 $f = 942\text{ MHz}$



**EDGE Modulation Spectrum Performance**

at selected frequencies

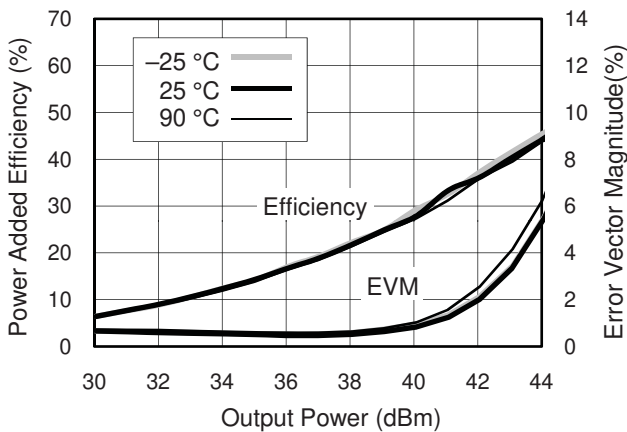
$V_{DD} = 28\text{ V}$ ,  $I_{DQ1} = 120\text{ mA}$ ,  $I_{DQ2} = 280\text{ mA}$



**EDGE EVM**

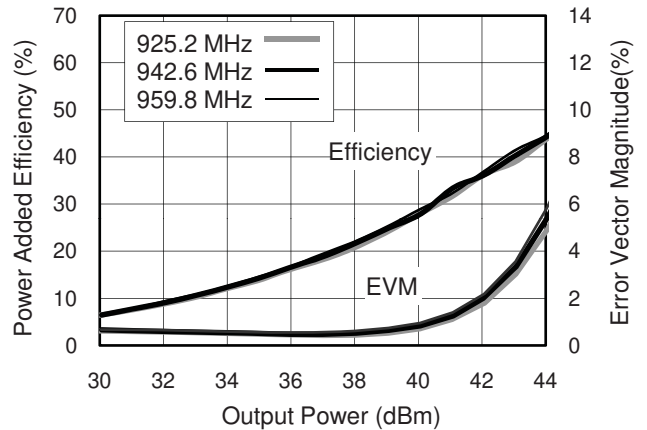
at selected temperatures

$V_{DD} = 28\text{ V}$ ,  $I_{DQ1} = 120\text{ mA}$ ,  $I_{DQ2} = 280\text{ mA}$ ,  
series show  $f = 942\text{ MHz}$

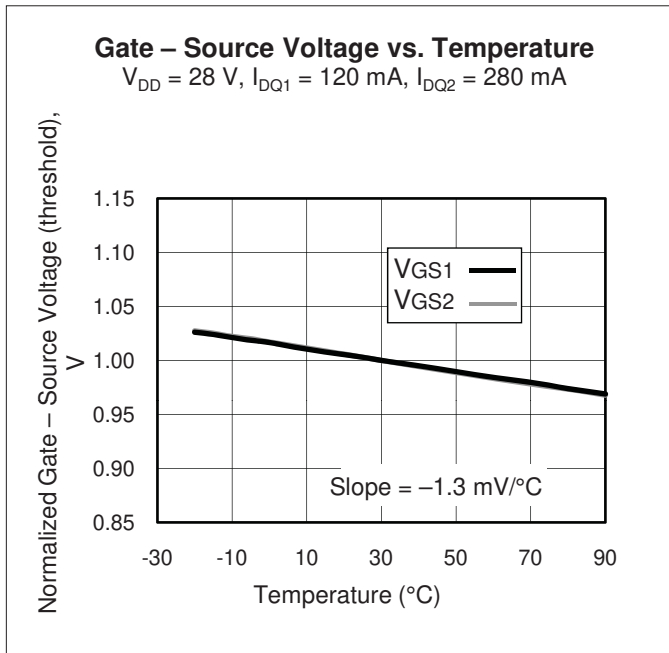


**EDGE EVM**

$V_{DD} = 28\text{ V}$ ,  $I_{DQ1} = 120\text{ mA}$ ,  $I_{DQ2} = 280\text{ mA}$ ,  
series are at selected frequencies

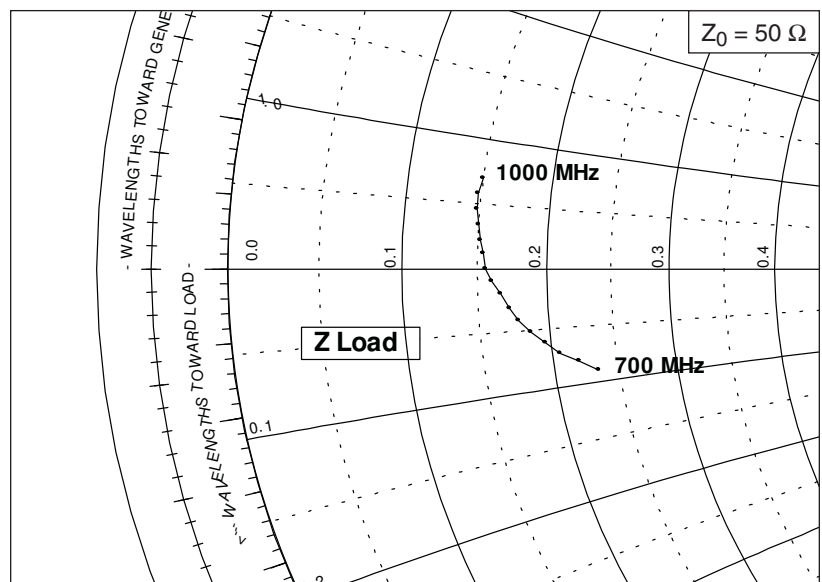
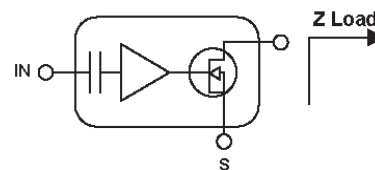


Typical Performance (cont.)

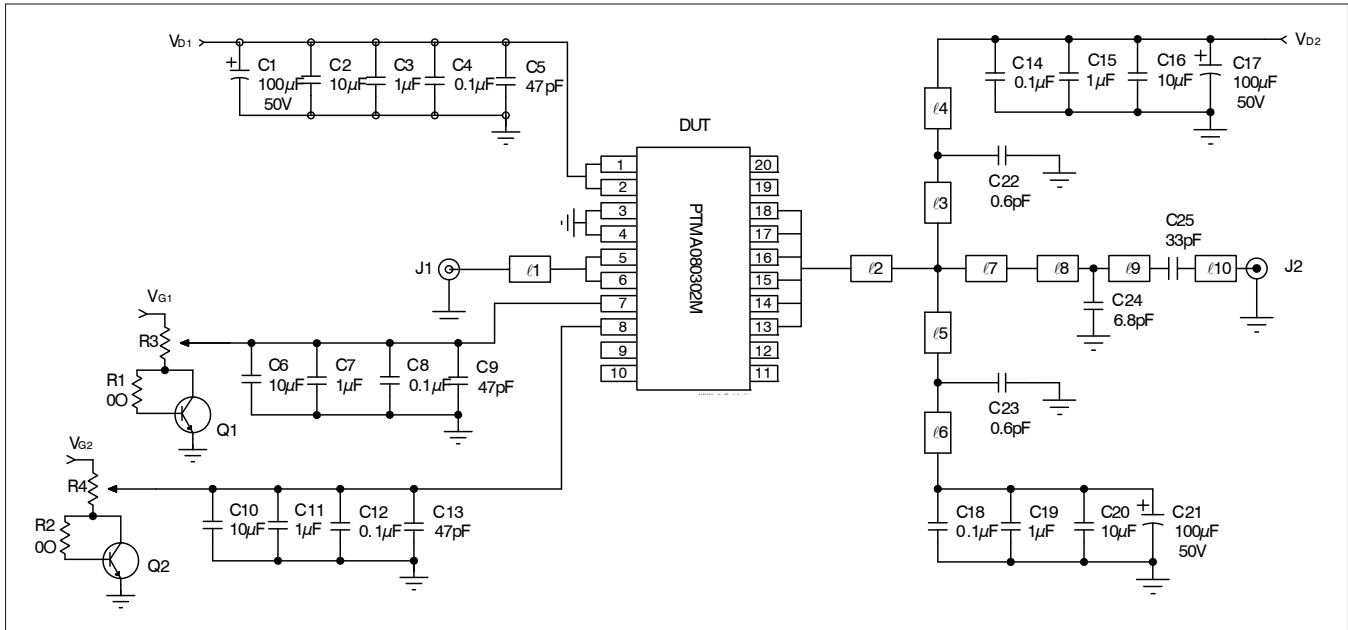


Broadband Circuit Impedance

| Frequency<br>MHz | Z Load $\Omega$ |      |
|------------------|-----------------|------|
|                  | R               | jX   |
| 700              | 11.7            | -4.5 |
| 720              | 11.0            | -4.0 |
| 740              | 10.3            | -3.6 |
| 760              | 9.8             | -3.1 |
| 780              | 9.3             | -2.6 |
| 800              | 8.9             | -2.1 |
| 820              | 8.6             | -1.6 |
| 840              | 8.3             | -1.0 |
| 860              | 8.0             | -0.5 |
| 880              | 7.8             | 0.0  |
| 900              | 7.7             | 0.6  |
| 920              | 7.6             | 1.1  |
| 940              | 7.5             | 1.7  |
| 960              | 7.4             | 2.3  |
| 980              | 7.4             | 2.9  |
| 1000             | 7.5             | 3.5  |



Reference Circuit — for evaluation only



Reference circuit schematic for  $f = 940$  MHz

**Circuit Description**

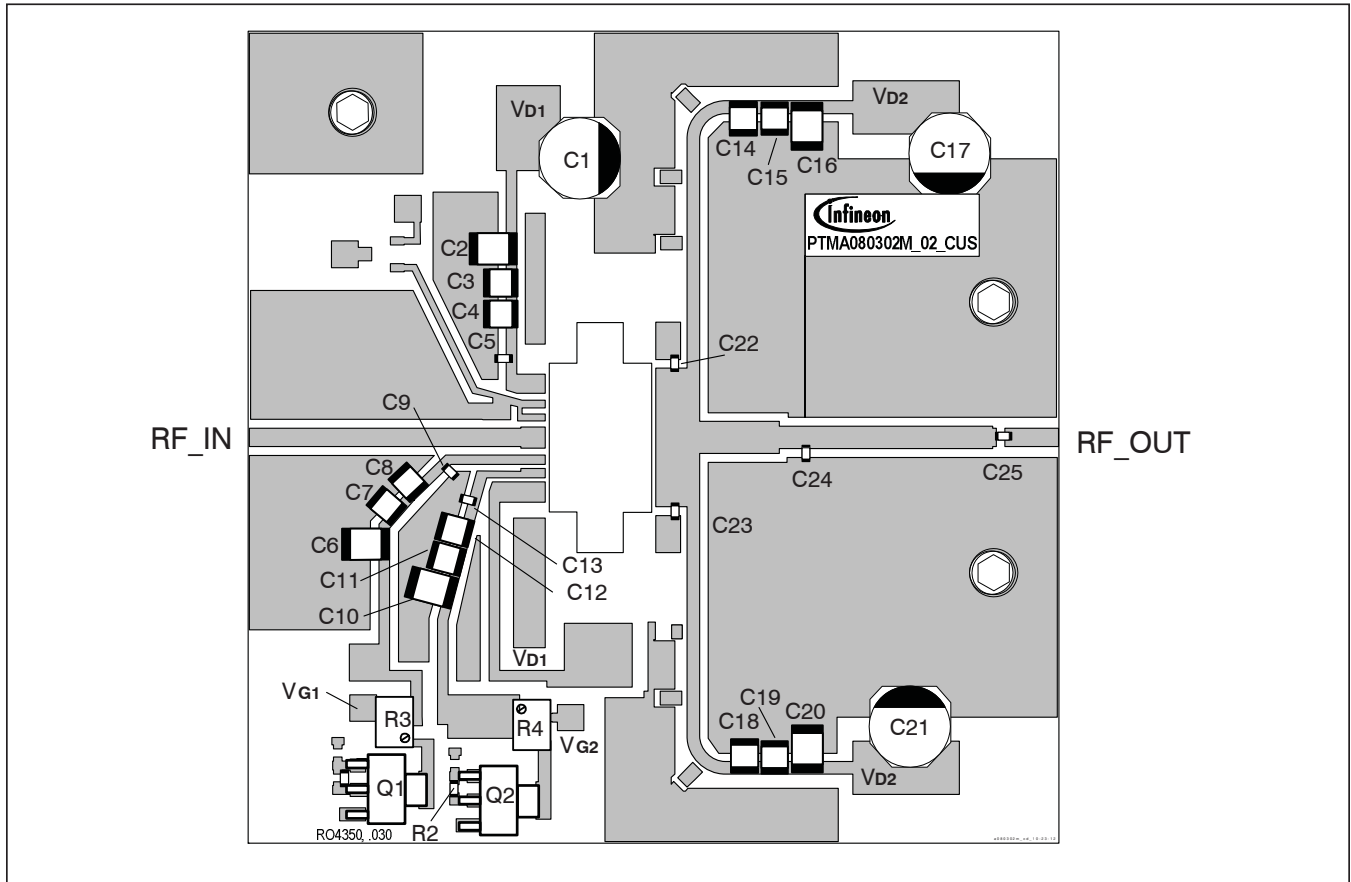
|                       |  |
|-----------------------|--|
| DUT                   | PTMA080302M  |
| PCB                   | Rogers 4350, 0.76 mm [.030"] thick, $\epsilon_r = 3.48$ , 1 oz. copper |
| Test Fixture Part No. | LTN/PTMA080302M  |

Find Gerber files for this test fixture on the Infineon Web site at <http://www.infineon.com/rfpower>

| Microstrip       | Electrical Characteristics at 940 MHz | Dimensions: L x W (mm) | Dimensions: L x W (in.) |
|------------------|---------------------------------------|------------------------|-------------------------|
| $\ell 1$         | $0.143 \lambda$ , 50.0 $\Omega$       | 27.76 x 1.70           | 1.093 x 0.067           |
| $\ell 2$         | $0.012 \lambda$ , 10.4 $\Omega$       | 2.01 x 13.00           | 0.079 x 0.512           |
| $\ell 3, \ell 5$ | $0.012 \lambda$ , 10.4 $\Omega$       | 2.06 x 13.00           | 0.081 x 0.512           |
| $\ell 4, \ell 6$ | $0.156 \lambda$ , 60.0 $\Omega$       | 30.61 x 1.22           | 1.205 x 0.048           |
| $\ell 7$         | $0.040 \lambda$ , 34.0 $\Omega$       | 7.52 x 3.00            | 0.296 x 0.118           |
| $\ell 8$         | $0.020 \lambda$ , 43.3 $\Omega$       | 3.81 x 2.11            | 0.150 x 0.083           |
| $\ell 9$         | $0.086 \lambda$ , 43.3 $\Omega$       | 16.43 x 2.11           | 0.647 x 0.083           |
| $\ell 10$        | $0.026 \lambda$ , 50.0 $\Omega$       | 5.03 x 1.70            | 0.198 x 0.067           |



Reference Circuit (cont.)

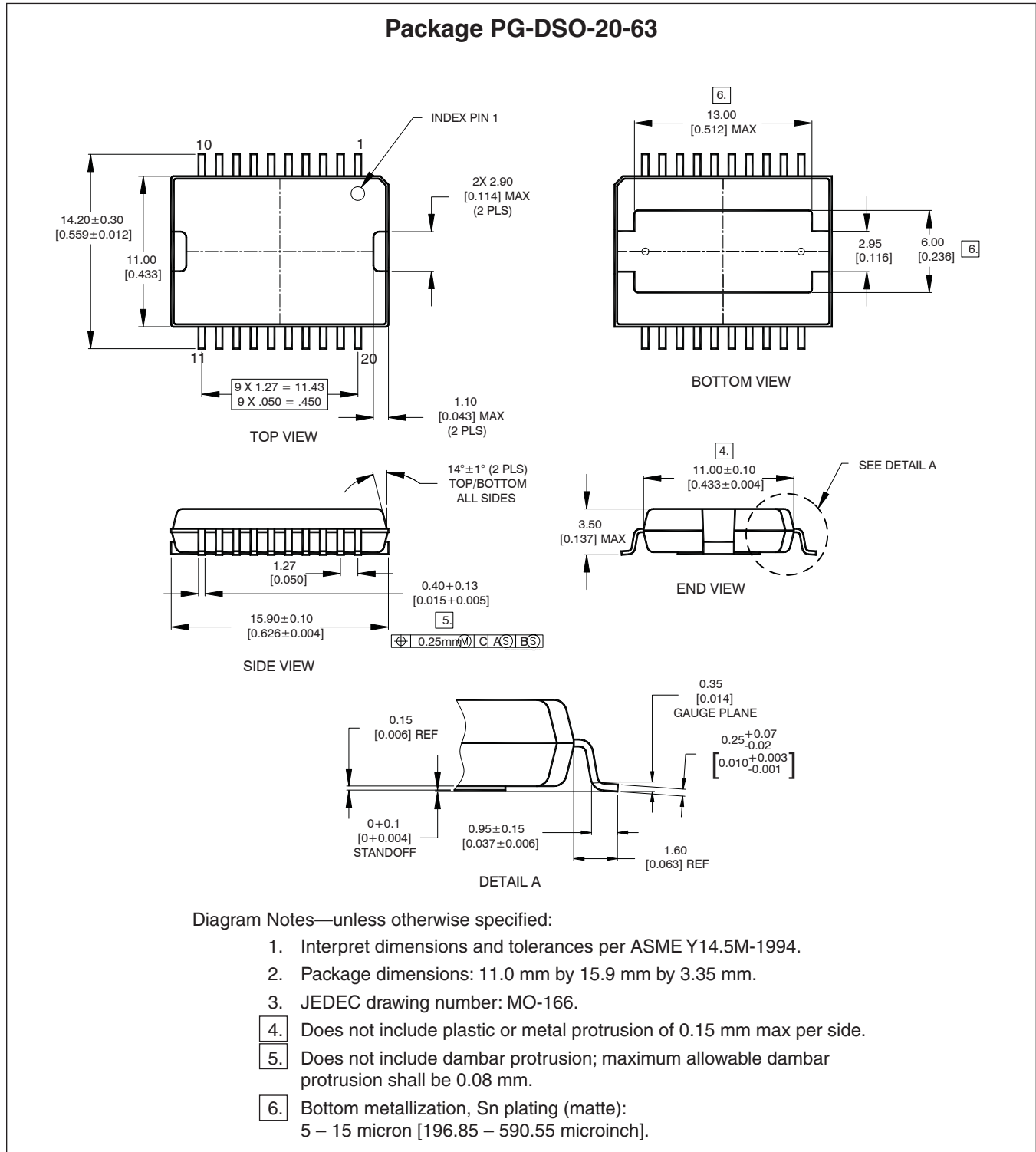


Reference circuit assembly diagram (not to scale)

| Component             | Description                               | Suggested Supplier    | P/N or Comment     |
|-----------------------|---|-----------------------|--------------------|
| C1, C17, C21          | Electrolytic capacitor, 100 $\mu$ F, 50 V | Digi-Key              | PCE3718CT-ND       |
| C2, C6, C10, C16, C20 | Ceramic capacitor, 10 $\mu$ F             | Murata                | GRM422Y5V106Z050AL |
| C3, C7, C11, C15, C19 | Ceramic capacitor, 1 $\mu$ F              | Digi-Key              | 445-1411-2-ND      |
| C4, C8, C12, C14, C18 | Capacitor, 0.1 $\mu$ F                    | Digi-Key              | 399-1267-2-ND      |
| C5, C9, C13           | Ceramic capacitor, 47 pF                  | ATC                   | 600F470JT          |
| C22, C23              | Ceramic capacitor, 0.6 pF                 | ATC                   | 600S0R6BT          |
| C24                   | Ceramic capacitor, 6.8 pF                 | ATC                   | 600S6R8CT          |
| C25                   | Ceramic capacitor, 33 pF                  | ATC                   | 600F330JT          |
| Q1, Q2                | Transistor                                | Infineon Technologies | BCP56              |
| R1, R2                | Resistor, 0 $\Omega$                      | Digi-Key              | 603                |
| R3, R4                | Potentiometer 2k $\Omega$                 | Digi-Key              | 3224W-202ETR-ND    |

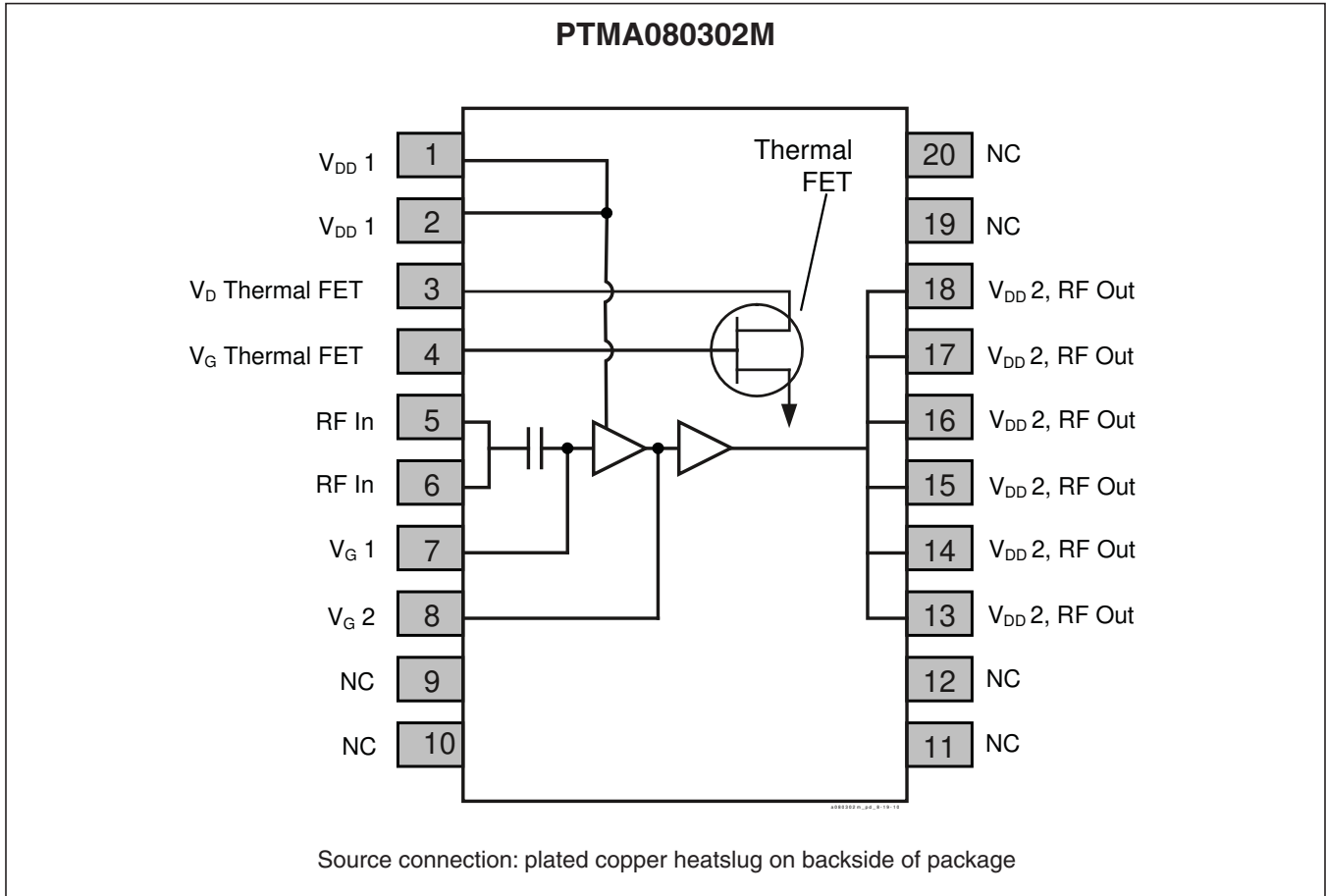
Refer to Application Note "Recommendations for Printed Circuit Board Assembly of Infineon DSO and SSOP Packages" for additional information.

Package Outline Specifications



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

Pinout Diagram



Revision History: 2012-10-24

Data Sheet

Previous Version: 2010-11-09, Data Sheet

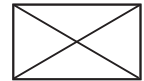
| Page | Subjects (major changes since last revision)            |
|------|---|
| 3    | Added Order Code, output power.                         |
| 8    | Circuit assembly diagram relabeled for revision number. |
|      |   |
|      |   |
|      |   |

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**Edition 2012-10-24**

**Published by**  
**Infineon Technologies AG**  
**81726 Munich, Germany**

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