

# PTMA080152M

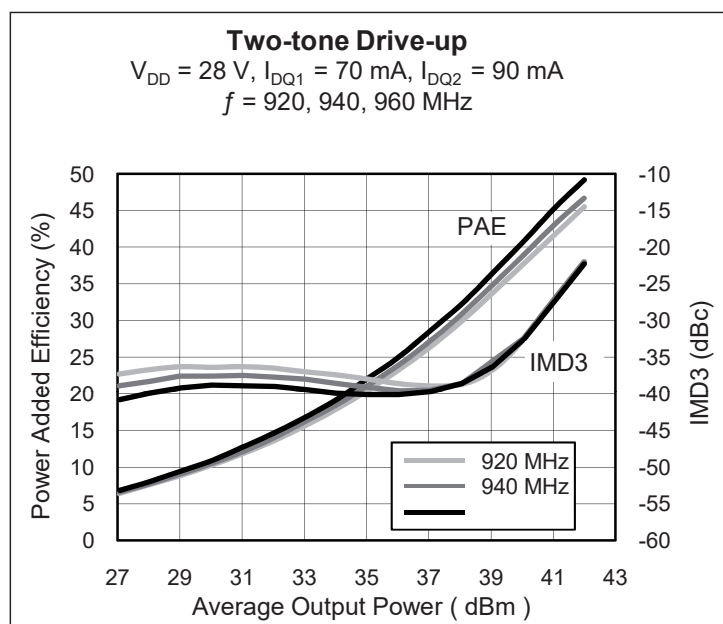
## Wideband RF LDMOS Integrated Power Amplifier 15 W, 28 V, 700 – 1000 MHz

### Description

The PTMA080152M is a wideband, on-chip-matched, 15-watt, 2-stage LDMOS integrated power amplifier intended for wideband driver applications in the 700 to 1000 MHz frequency range. It is offered in a 20-lead thermally-enhanced overmolded package for cool and reliable operation.



PTMA080152M  
Package PG-DSO-20-63



### Features

- Broadband on-chip matching, 50-ohm input and ~10-ohm output
- Typical GSM/EDGE performance at 28 V, 920 to 960 MHz
  - Gain = 30 dB
  - Efficiency = 34% at 8 W output power
  - EVM @ 8 W = 1.5%
  - ACPR @ 400 kHz = -61 dBc
  - ACPR @ 600 kHz = -75 dBc
- Typical CW performance, 940 MHz, 28 V
  - Output power at  $P_{1dB}$  = 20 W
  - Efficiency = 49%
- Integrated ESD protection. Meets HBM Class 1B (minimum), per JESD22-A114F.
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 20 W (CW) output power
- RoHS-compliant package

### RF Characteristics

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

$V_{DD} = 28\text{ V}$ ,  $I_{DQ1} = 70\text{ mA}$ ,  $I_{DQ2} = 120\text{ mA}$ ,  $f = 920\text{ to }960\text{ MHz}$ ,  $P_{OUT} = 8\text{ W Avg.}$

Characteristic	Symbol	Min	Typ	Max	Unit
Input Return Loss	IRL	—	-15	—	dB
Gain	$G_{ps}$	—	30	—	dB
Power Added Efficiency	PAE	—	34	—	%
Error Vector Magnitude	EVM (RMS)	—	1.5	—	%

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 Characteristics** (cont.)

$V_{DD} = 28\text{ V}$ ,  $I_{DQ1} = 70\text{ mA}$ ,  $I_{DQ2} = 120\text{ mA}$ ,  $f = 920\text{ to }960\text{ MHz}$ ,  $P_{OUT} = 8\text{ W Avg.}$

Characteristic		Symbol	Min	Typ	Max	Unit
Modulation Spectrum	400 kHz offset	ACPR1	—	-61	—	dBc
	600 kHz offset	ACPR2	—	-75	—	dBc
Spurs Load 3:1		—	—	—	-60	dBc
Gain Flatness		$\Delta G$	—	0.2	—	dB

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

$V_{DD} = 28\text{ V}$ ,  $I_{DQ1} = 70\text{ mA}$ ,  $I_{DQ2} = 90\text{ mA}$ ,  $P_{OUT} = 8\text{ W avg.}$ ,  $f = 940\text{ MHz}$ , tone spacing = 1 MHz

Characteristic		Symbol	Min	Typ	Max	Unit
Gain		$G_{ps}$	29	30	—	dB
Drain Efficiency		$\eta_D$	32.5	33.5	—	%
Third Order Intermodulation Distortion		IMD3	—	-34	-31	dBc

**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	$V_{GS} = 10\text{ V}$ , $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	3.48	—	$\Omega$
Operating Gate Voltage	$V_{DS} = 28\text{ V}$ , $I_{DQ1} = 70\text{ mA}$ ,	$V_{GS}$	2.0	2.5	3.0	V
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	$V_{GS} = 10\text{ V}$ , $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.6	—	$\Omega$
Operating Gate Voltage	$V_{DS} = 28\text{ V}$ , $I_{DQ2} = 90\text{ mA}$	$V_{GS}$	2.0	—	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	°C	
Input Power	$P_{IN}$	15	dBm	
Total Device Dissipation	$P_D$	91	W	
Above 25°C derate by		0.52	W/°C	
Storage Temperature Range	$T_{STG}$	-40 to +150	°C	
Overall Thermal Resistance ( $T_{CASE} = 70^\circ\text{C}$ )	Stage 1	$R_{\theta JC}$	8.5	°C/W
$P_{OUT} = 15\text{ W}, I_{DQ1} = 70\text{ mA}, I_{DQ2} = 90\text{ mA}$	Stage 2	$R_{\theta JOC}$	2.5	°C/W

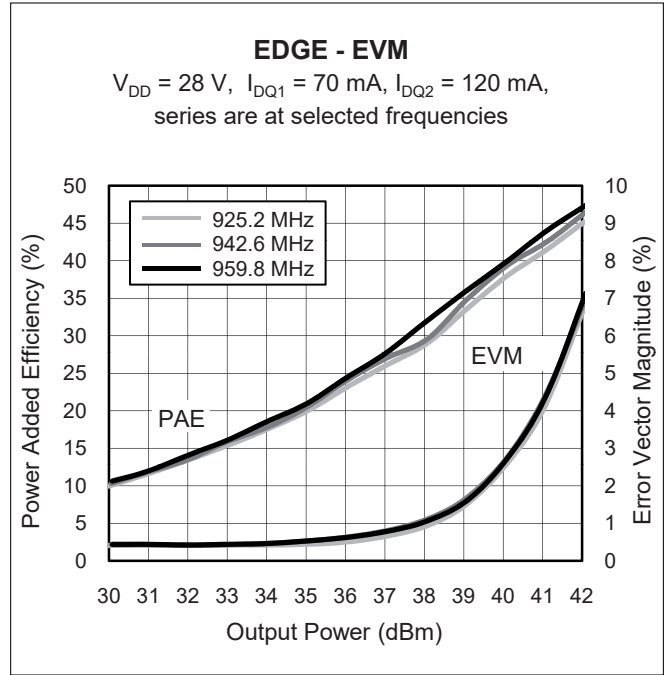
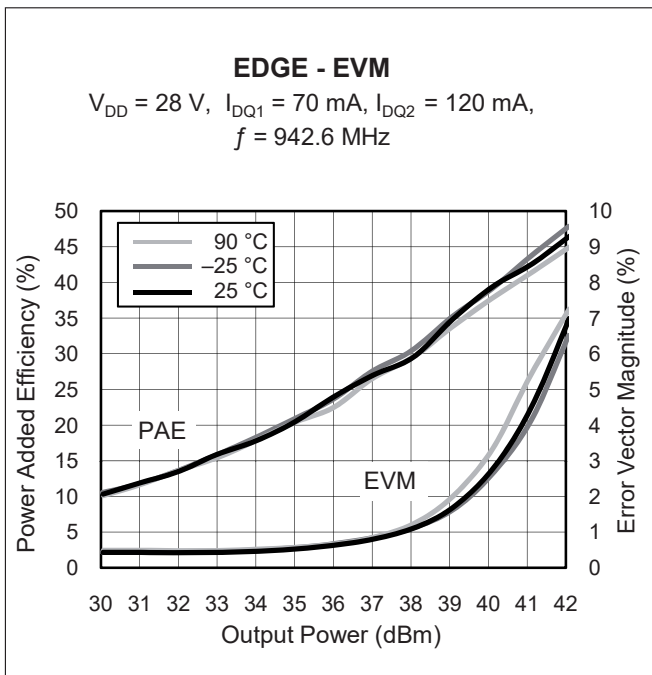
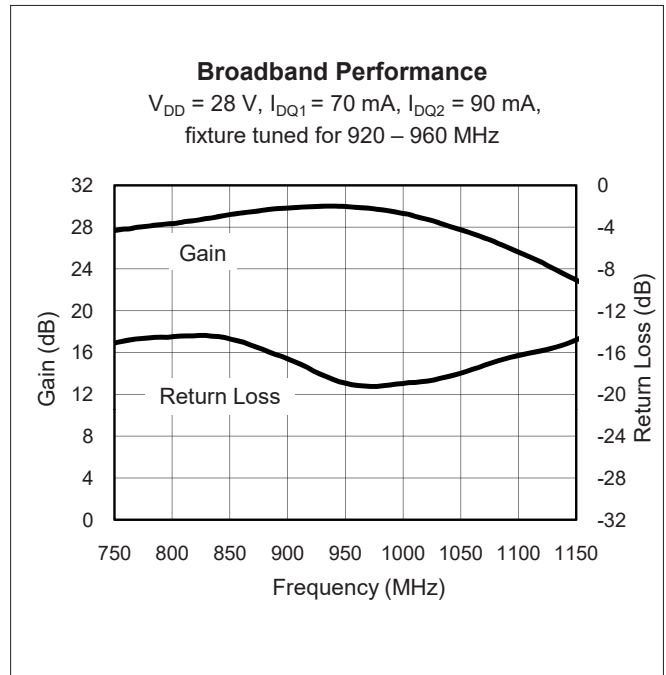
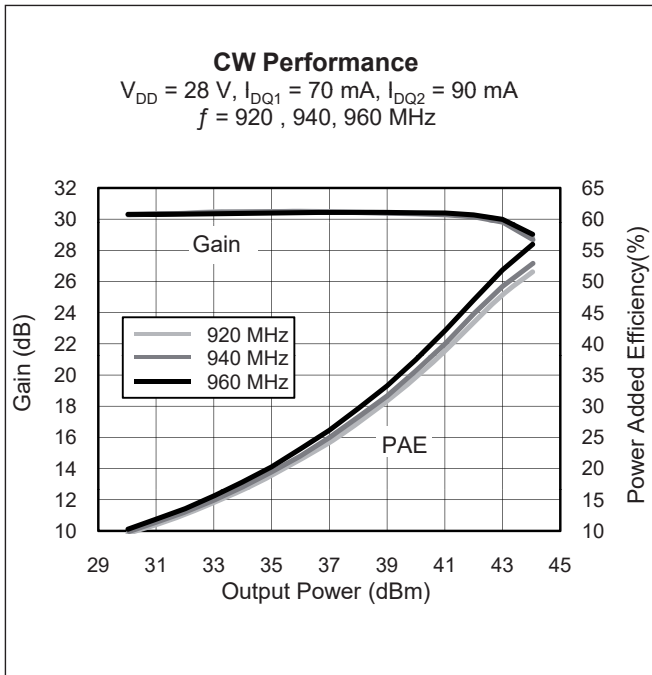
## Moisture Sensitivity Level

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

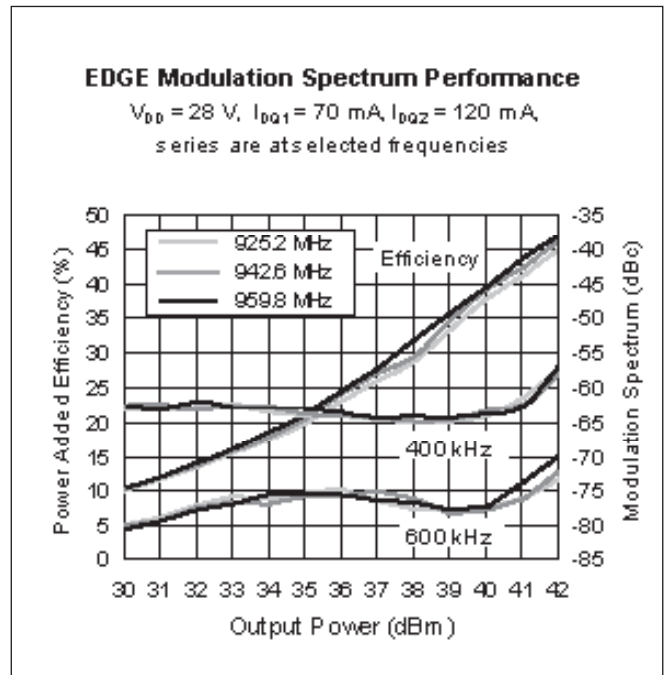
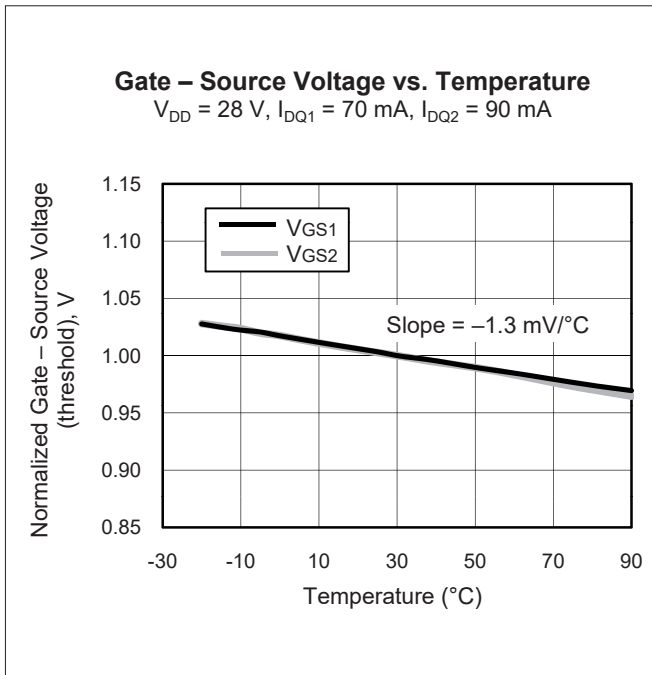
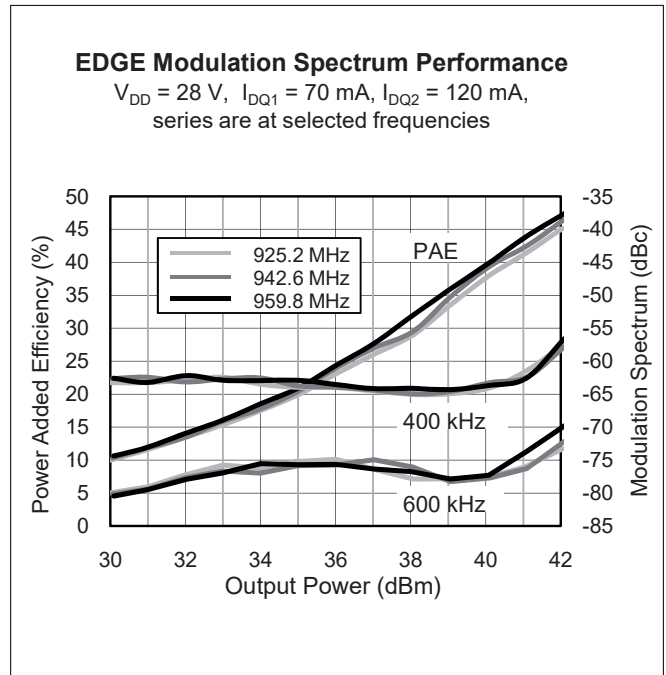
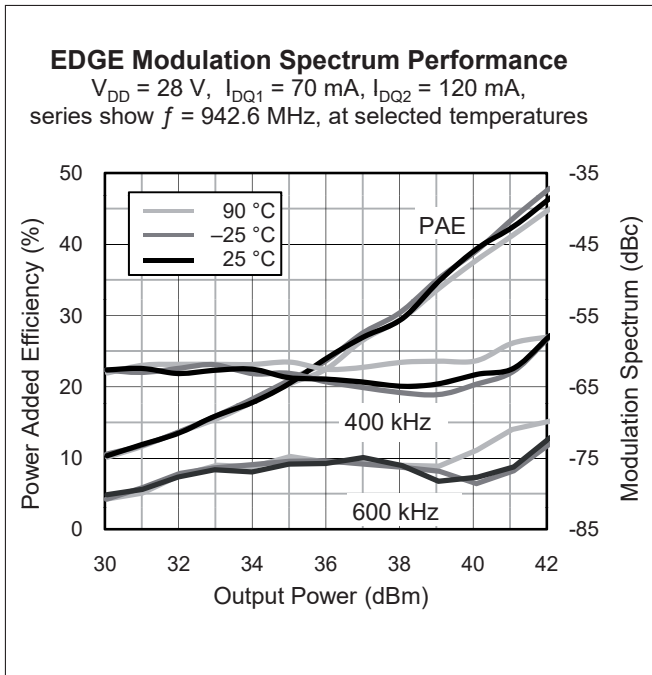
## Ordering Information

Type and Version	Order Code	Package and Description	Shipping
PTMA080152M V1 R500	PTMA080152M-V1- R500	PG-DSO-20-63, molded plastic	Tape & Reel, 500 pcs

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

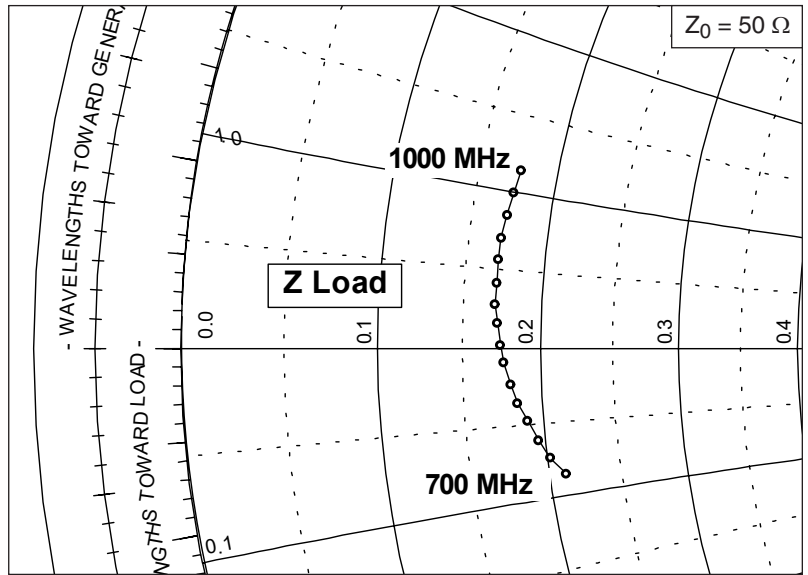
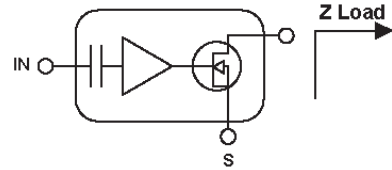


Typical Performance (cont.)



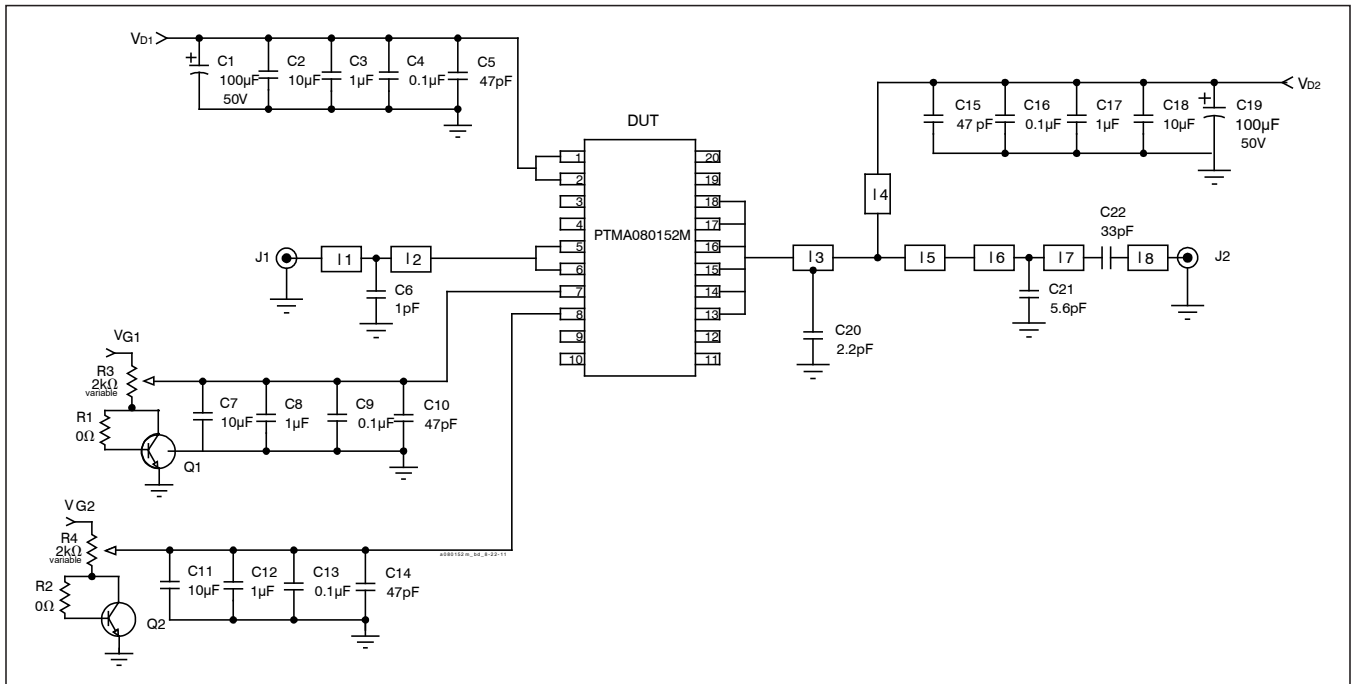
**Broadband Circuit Impedance**

Frequency MHz	Z Load $\Omega$	
	R	jX
700	10.6	-4.3
720	10.1	-3.7
740	9.8	-3.1
760	9.5	-2.4
780	9.2	-1.8
800	9.0	-1.2
820	8.8	-0.5
840	8.7	0.1
860	8.6	0.8
880	8.5	1.4
900	8.5	2.1
920	8.5	2.8
940	8.5	3.5
960	8.6	4.3
980	8.7	5.0
1000	8.8	5.8



See next page for reference circuit information

Reference Circuit



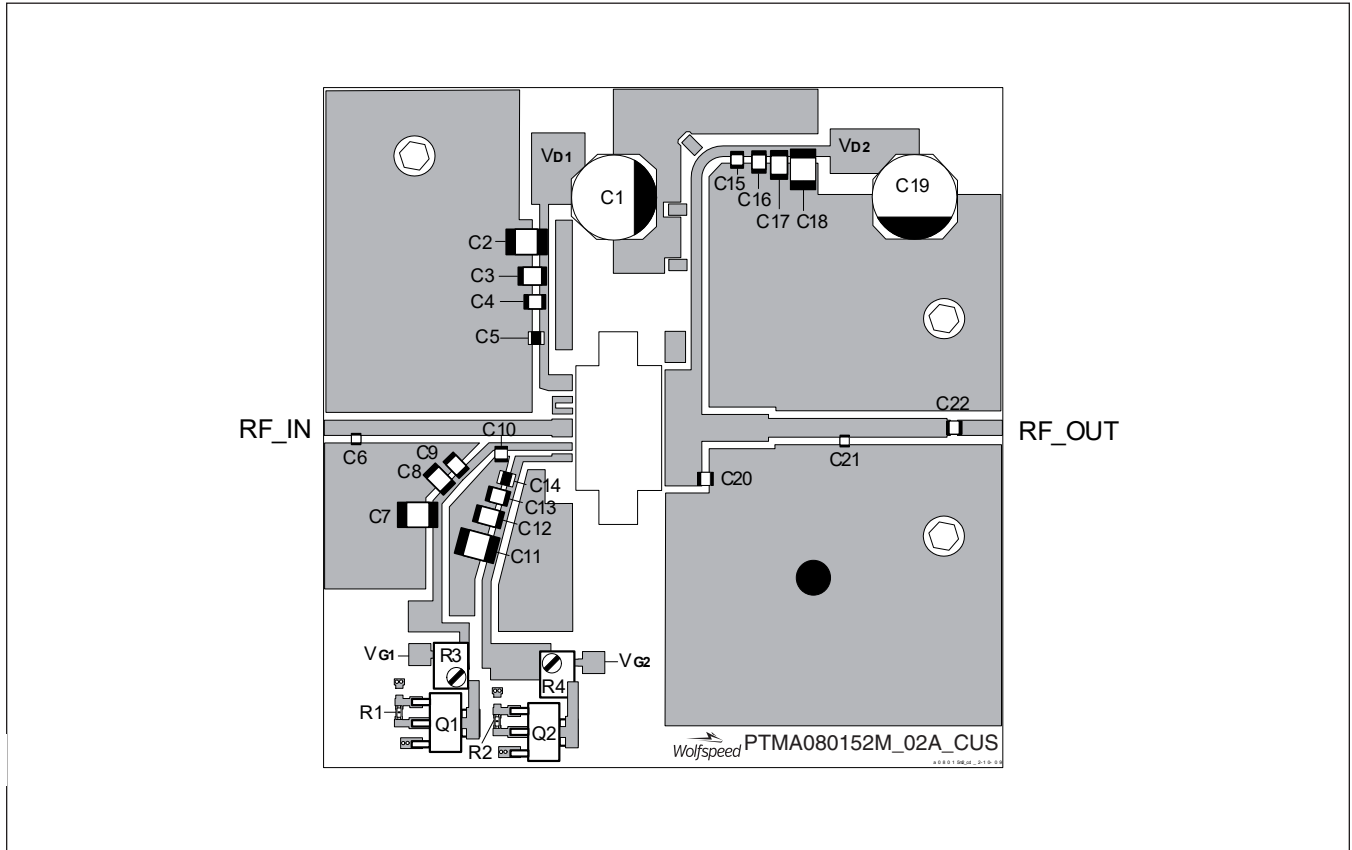
Reference circuit schematic for  $f = 940 \text{ MHz}$

Circuit Assembly Information

DUT	PTMA080152M, LDMOS IC
Reference Fixture Part No.	LTN/PTMA080152M
PCB	0.76 mm [.030"] thick, $\epsilon_r = 3.48$ , Rogers RO4350, 1 oz. copper
Find Gerber files for this reference fixture on the WolfSpeed Web site at ( <a href="http://www.wolfspeed.com/RF">www.wolfspeed.com/RF</a> )	

Microstrip	Electrical Characteristics at 940 MHz	L x W (mm)	L x W (in.)
$\ell_1$	0.017 $\lambda$ , 50.0 $\Omega$	3.00 x 1.70	0.118 x 0.067
$\ell_2$	0.143 $\lambda$ , 50.0 $\Omega$	24.71 x 1.70	0.973 x 0.067
$\ell_3$	0.024 $\lambda$ , 10.6 $\Omega$	4.09 x 12.70	0.161 x 0.500
$\ell_4$	0.144 $\lambda$ , 59.0 $\Omega$	24.77 x 1.30	0.975 x 0.051
$\ell_5$	0.044 $\lambda$ , 34.0 $\Omega$	7.57 x 3.02	0.298 x 0.119
$\ell_6$	0.044 $\lambda$ , 44.0 $\Omega$	8.33 x 2.11	0.328 x 0.083
$\ell_7$	0.0702 $\lambda$ , 44.0 $\Omega$	12.12 x 2.11	0.477 x 0.083
$\ell_8$	0.030 $\lambda$ , 44.0 $\Omega$	5.18 x 2.11	0.204 x 0.083

**Reference Circuit** (cont.)

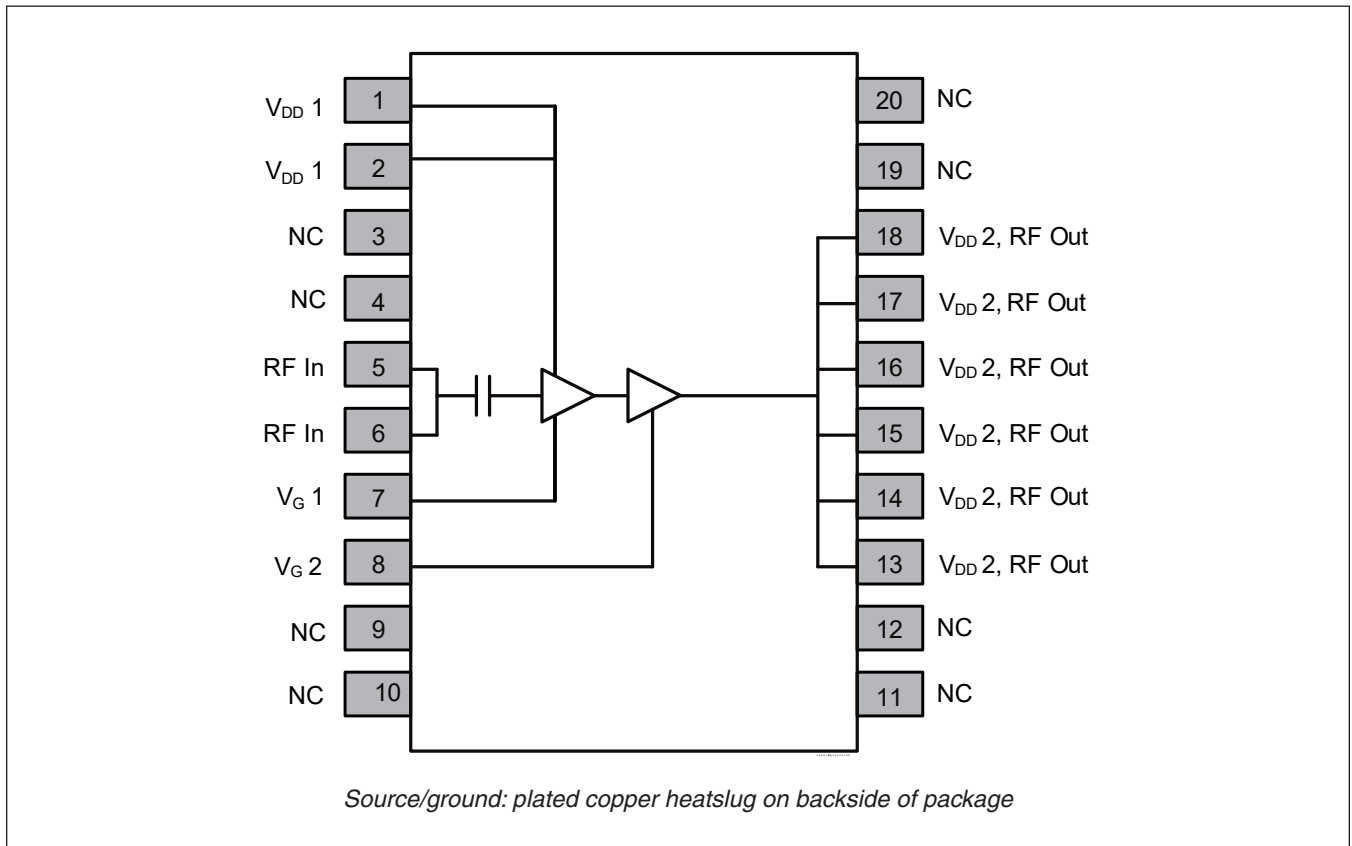


Reference circuit assembly diagram (not to scale)

Component	Description	Suggested Manufacturer	P/N or Comment
C3, C8, C12, C17	Ceramic capacitor, 1 $\mu$ F	Digi-Key	445-1411-2-ND
C4, C9, C13, C16	Capacitor, 0.1 $\mu$ F	Digi-Key	PCC104BCT-ND
C2, C7, C11, C18	Tantalum capacitor, 10 $\mu$ F, 50 V	Digi-Key	P5571-ND
C1, C19	Electrolytic capacitor, 100 $\mu$ F, 50 V	Digi-Key	PCE3718CT-ND
C6	Ceramic capacitor, 1.0 pF	ATC	600S 1RO CT
C20	Ceramic capacitor, 2.2 pF	ATC	600S 2R2 CT
C21	Ceramic capacitor, 5.6 pF	ATC	600S 5R6 CT
C22	Ceramic capacitor, 33 pF	ATC	600S 330 JT
C5, C10, C14, C15	Ceramic capacitor, 47 pF	ATC	600S 470 JT
Q1, Q2	Transistor	Infineon Technologies	BCP56
R1, R2	Chip resistor, 0 ohms	Digi-Key	PXXECT-ND
R3, R4	Variable resistor, 2K ohms	Digi-Key	3224W-202ETR-ND



**Pinout Diagram** (top view)



Package Outline Specifications

Package PG-DSO-20-63

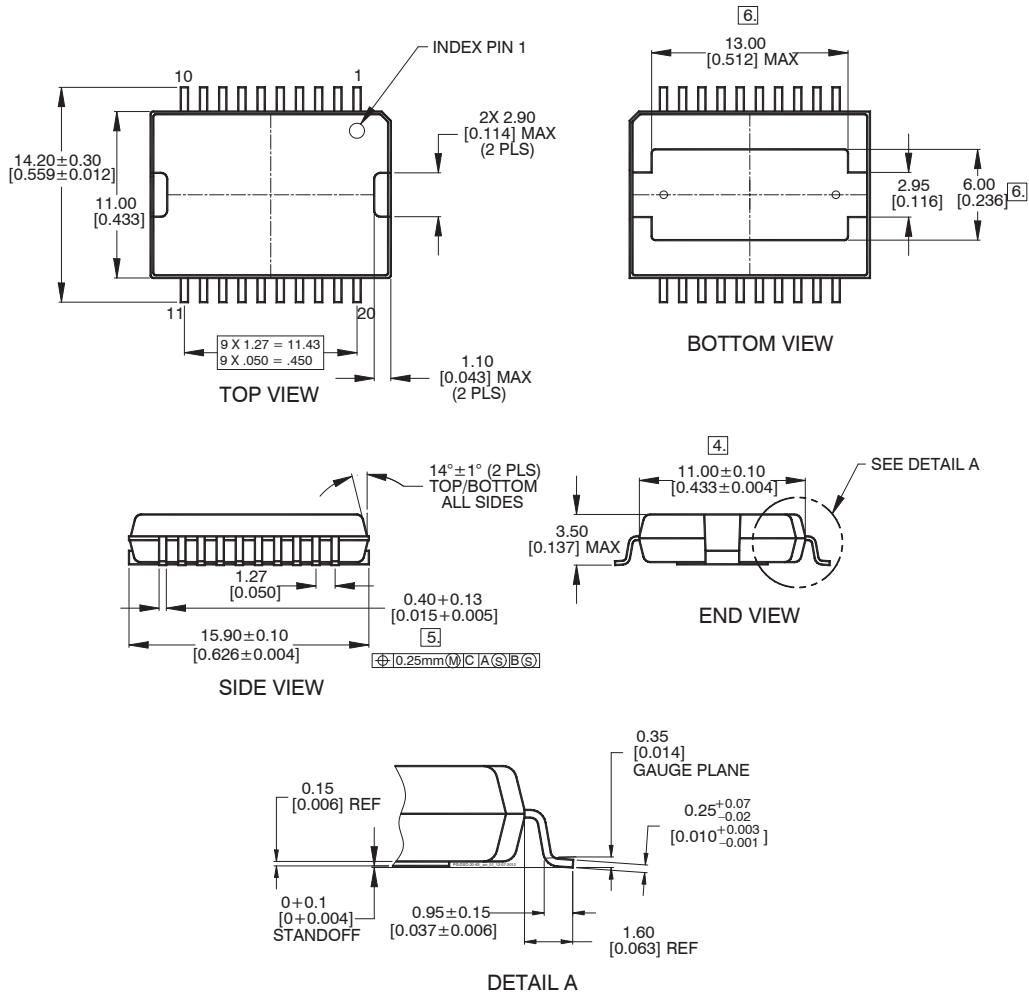


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Package dimensions: 11.0 mm by 15.9 mm by 3.35 mm.
3. JEDEC drawing number: MO-166.
4. Does not include plastic or metal protrusion of 0.15 mm max per side.
5. Does not include dambar protrusion; maximum allowable dambar protrusion shall be 0.08 mm.
6. Bottom metallization.
7. Sn plating (matte): 5 – 15 micron [196.85 – 590.55 microinch].

## Revision History

01	2007-05-05	Preliminary	all	Preliminary specification for new product in development.
02	2009-02-27	Production	all	Revise package information and circuit diagrams, add impedance information.
03	2009-08-31	Production	1	Revise VSWR rating.
04	2010-04-16	Production	3; 10	Add moisture sensitivity information; update package outline notes.
05	2011-05-17	Production	2; 4	Revise DC table; remove graph.
06	2011-08-22	Production	2; all	Revise two-tone table; minor updates to graphics and diagrams for readability.
07	2014-05-07	Production	3	Add shipping option.
08	2018-05-19	Production	All	Converted to Wolfspeed Data Sheet

For more information, please contact:

4600 Silicon Drive  
 Durham, North Carolina, USA 27703  
[www.wolfspeed.com/RF](http://www.wolfspeed.com/RF)

Sales Contact  
[RFSales@wolfspeed.com](mailto:RFSales@wolfspeed.com)

RF Product Marketing Contact  
[RFMarketing@wolfspeed.com](mailto:RFMarketing@wolfspeed.com)  
 919.407.7816

## Notes

---

### Disclaimer

Specifications are subject to change without notice. Cree, Inc. believes the information contained within this data sheet to be accurate and reliable. However, no responsibility is assumed by Cree for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Cree. Cree makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose. "Typical" parameters are the average values expected by Cree in large quantities and are provided for information purposes only. These values can and do vary in different applications and actual performance can vary over time. All operating parameters should be validated by customer's technical experts for each application. Cree products are not designed, intended or authorized for use as components in applications intended for surgical implant into the body or to support or sustain life, in applications in which the failure of the Cree product could result in personal injury or death or in applications for planning, construction, maintenance or direct operation of a nuclear facility.