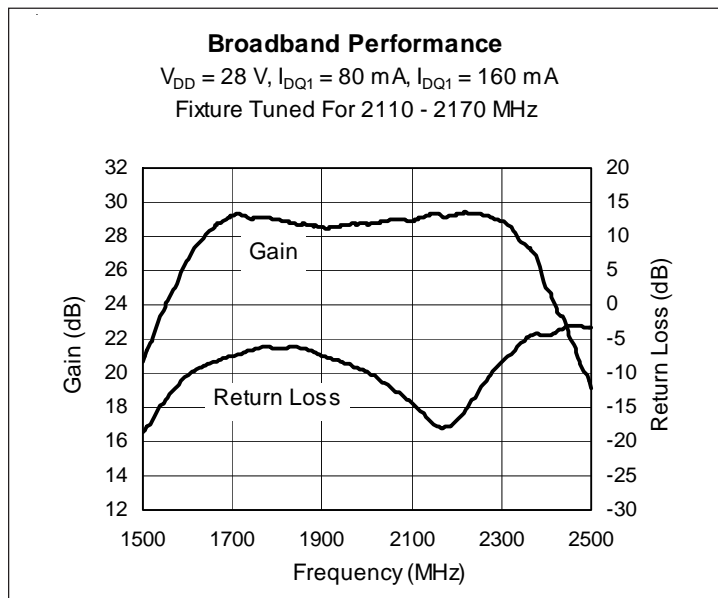


Wideband RF LDMOS Integrated Power Amplifier 15 W, 1800 – 2200 MHz

Description

The PTMA210152M is a wideband, matched, 15-watt, 2-stage LDMOS integrated amplifier intended for wideband driver applications in the 1800 to 2200 MHz band. This device is offered in a 20-lead thermally-enhanced overmolded package for cool and reliable operation.

PTMA210152M
Package PG-DSO-20-63



Features

- Designed for wide RF bandwidth and low memory effects
- Broadband input on-chip matching
- Typical two-carrier WCDMA performance at 2140 MHz, 28 V, 7 W avg.
 - Gain = 28.5 dB
 - Efficiency = 33 %
 - IMD3 = -32 dBc
- Typical CW performance at 2140 MHz, 28 V
 - Output power at P-1dB ~ 20 W
 - Efficiency > 49%
- Integrated ESD protection. Meets HBM Class 1B (minimum), per JESD22-A114F
- Capable of handling 10:1 VSWR @ 28 V, 15 W (CW) output power
- Thermally-enhanced RoHS-compliant package

RF Characteristics

Two-carrier WCDMA Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)

$V_{DS} = 28\text{ V}$, $I_{DQ1} = 80\text{ mA}$, $I_{DQ2} = 160\text{ mA}$, $f = 2110 - 2170\text{ MHz}$, $P_{OUT} = 7\text{ W}$ average

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	28.5	—	dB
Power Added Efficiency	η	—	33	—	%
Input Return Loss	IRL	—	-14	—	dB
Adjacent Channel Power Ratio	ACPR	—	-36	—	dBc
Intermodulation Distortion	IMD3	—	-32	—	dBc

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.)

Two-carrier WCDMA Measurements (cont.)

 $V_{DS} = 28\text{ V}$, $I_{DQ1} = 80\text{ mA}$, $I_{DQ2} = 160\text{ mA}$, $f = 2110 - 2170\text{ MHz}$, $P_{OUT} = 7\text{ W}$ average

Characteristic	Symbol	Min	Typ	Max	Unit
Spurs Load 3:1	—	—	-60	—	dBc
Gain Flatness	ΔG	—	0.43	—	dB

Two-tone Measurements (tested in Infineon test fixture)

 $V_{DD} = 28\text{ V}$, $I_{DQ1} = 80\text{ mA}$, $I_{DQ2} = 160\text{ mA}$, $P_{OUT} = 15\text{ W PEP}$, $f = 2140\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	27.5	28.5	30	dB
Drain Efficiency	η_D	33	34	—	%
Intermodulation Distortion	IMD	—	-33	-30	dBc
Input Return Loss		—	-14	-10	dB

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_{DS} = 10\text{ mA}$	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	$V_{DS} = 28\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	1.0	μA
	$V_{DS} = 63\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	10.0	μA
On-State Resistance	Stage 1 $V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.6	—	Ω
	Stage 2 $V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	3.5	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$	V_{GS}	2	2.5	3	V
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1.0	μA

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	70	W	
Above 25°C derate by		0.4	W/°C	
Storage Temperature Range	T_{STG}	-40 to +150	°C	
Thermal Resistance ($T_{CASE} = 70^\circ\text{C}, 15 \text{ W CW}$)	Stage 1	$R_{\theta JC}$	10.7	°C/W
	Stage 2	$R_{\theta JC}$	2.9	°C/W

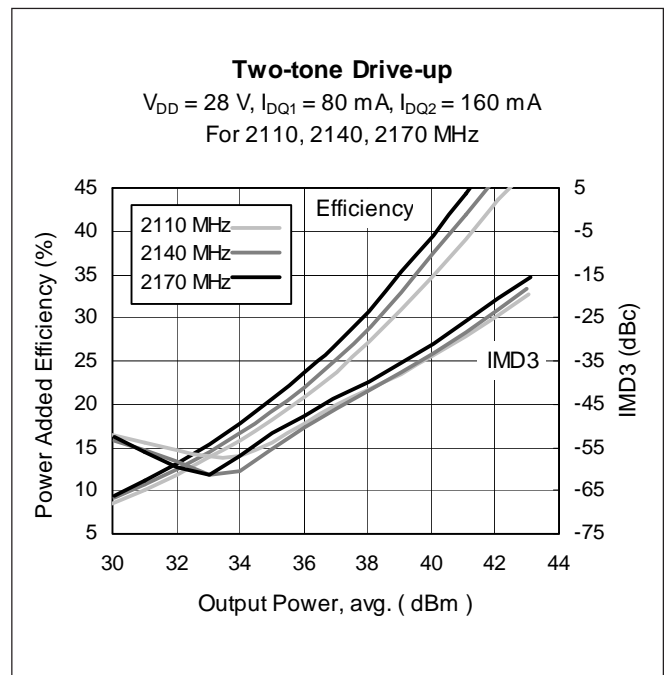
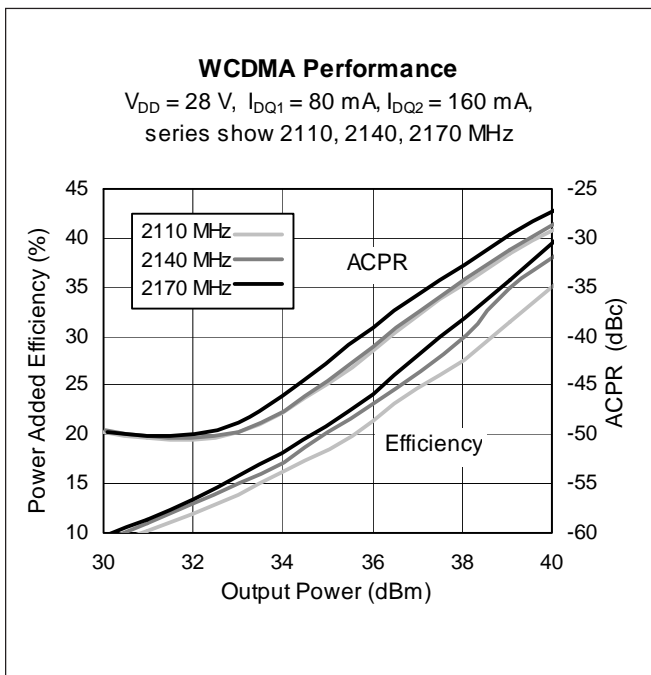
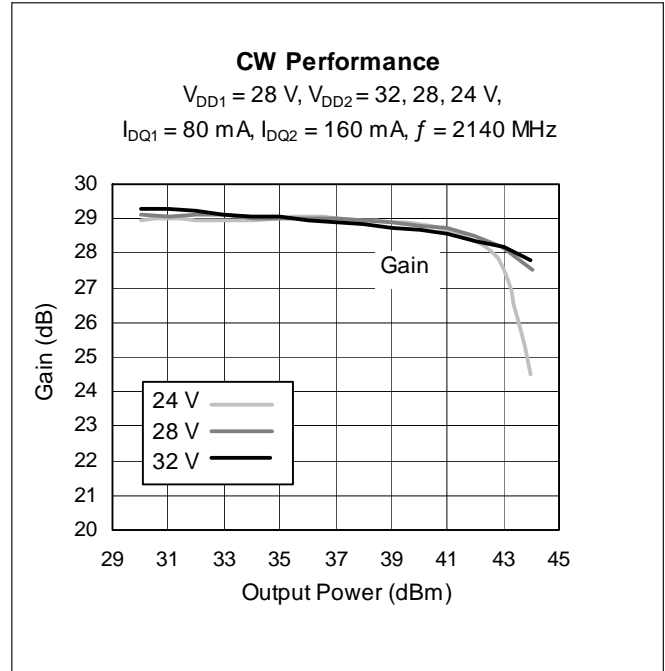
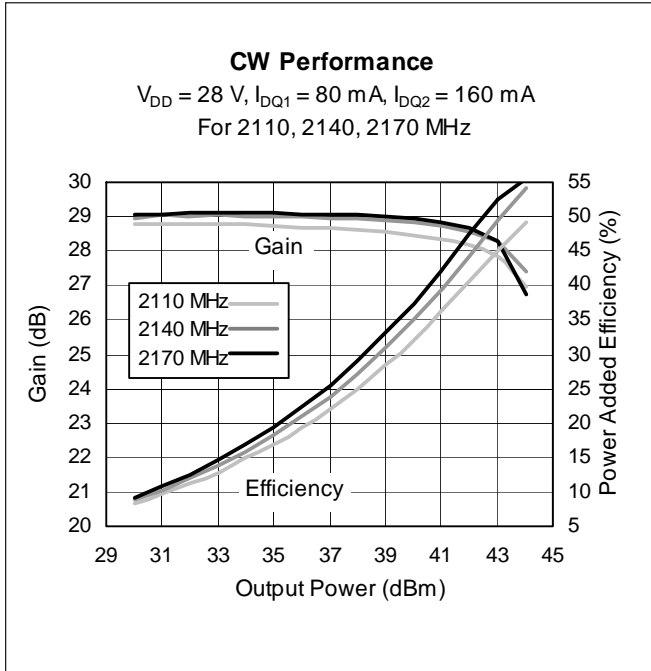
Moisture Sensitivity Level

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

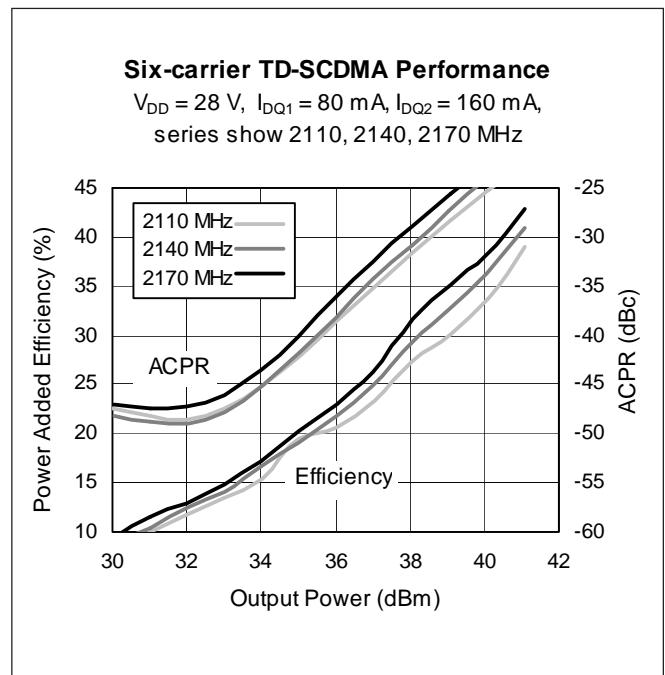
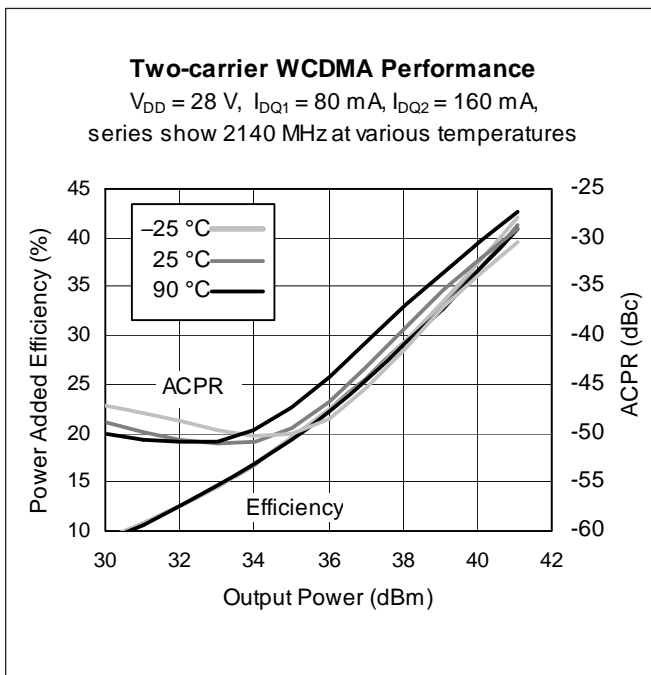
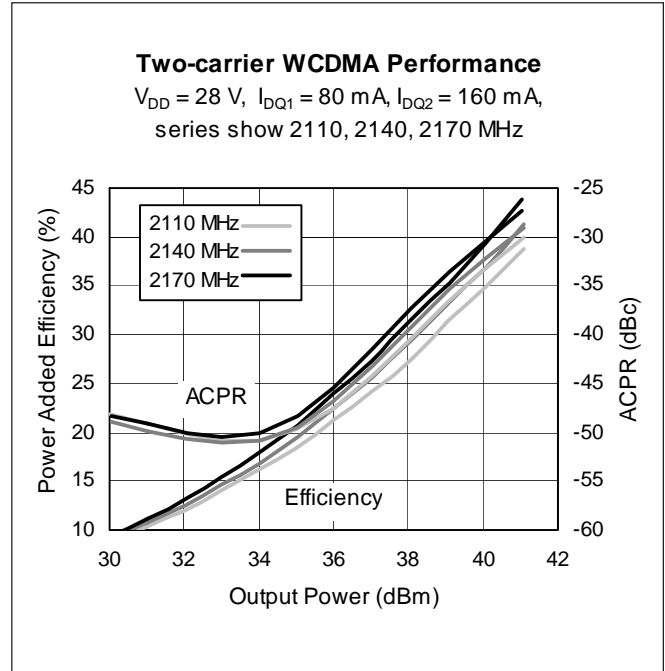
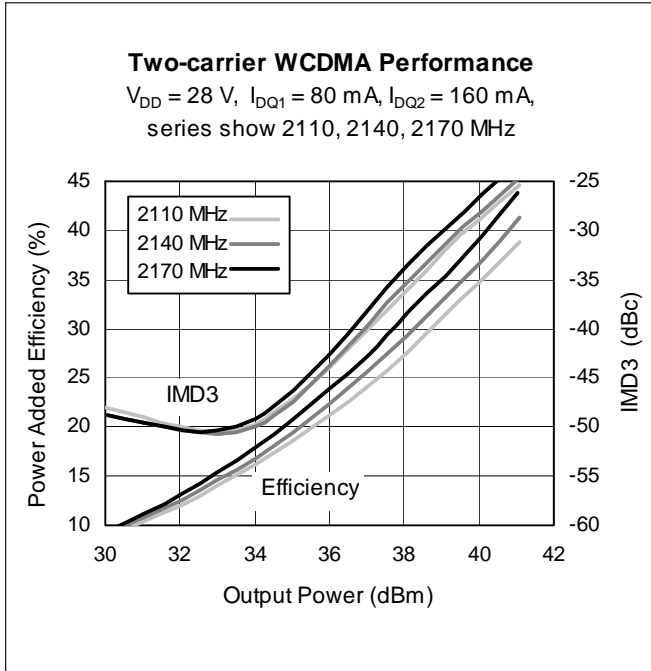
Ordering Information

Type and Version	Package Outline	Package Description	Shipping
PTMA210152M V1	PG-DSO-20-63	Thermally-enhanced surface-mount	Tape

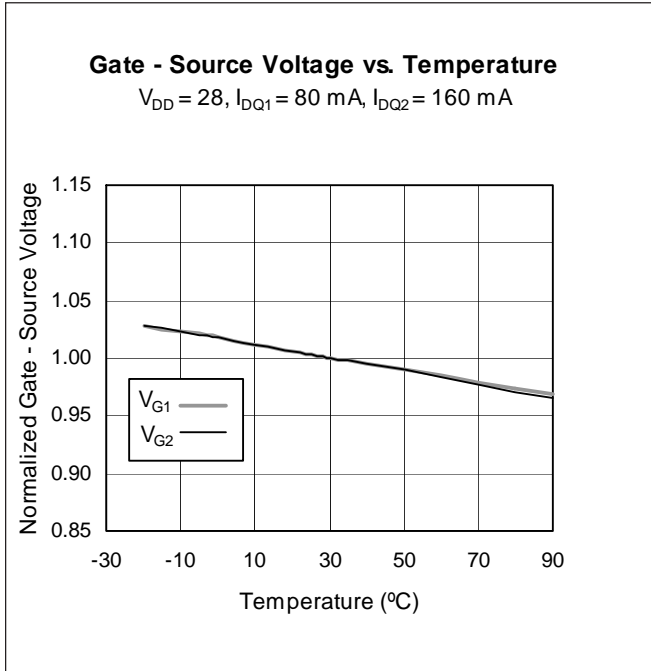
Typical Performance at 2140 MHz (data taken in a production test fixture)



Typical Performance at 2140 MHz (cont.)

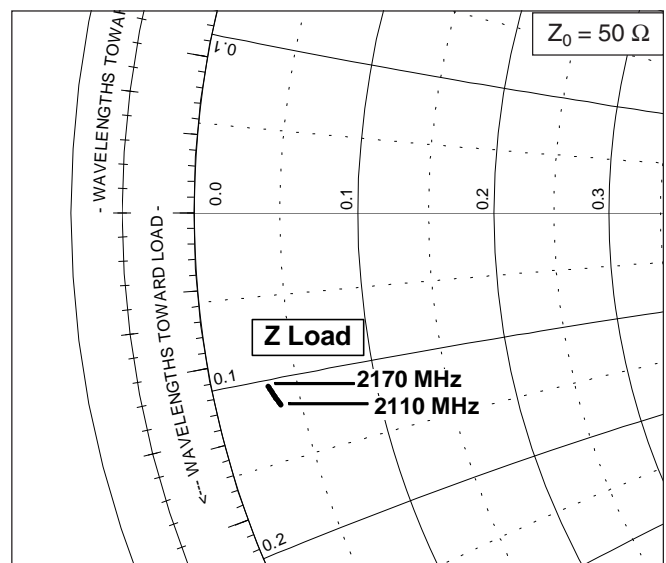
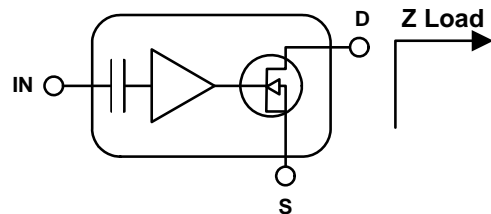


Typical Performance at 2140 MHz (cont.)

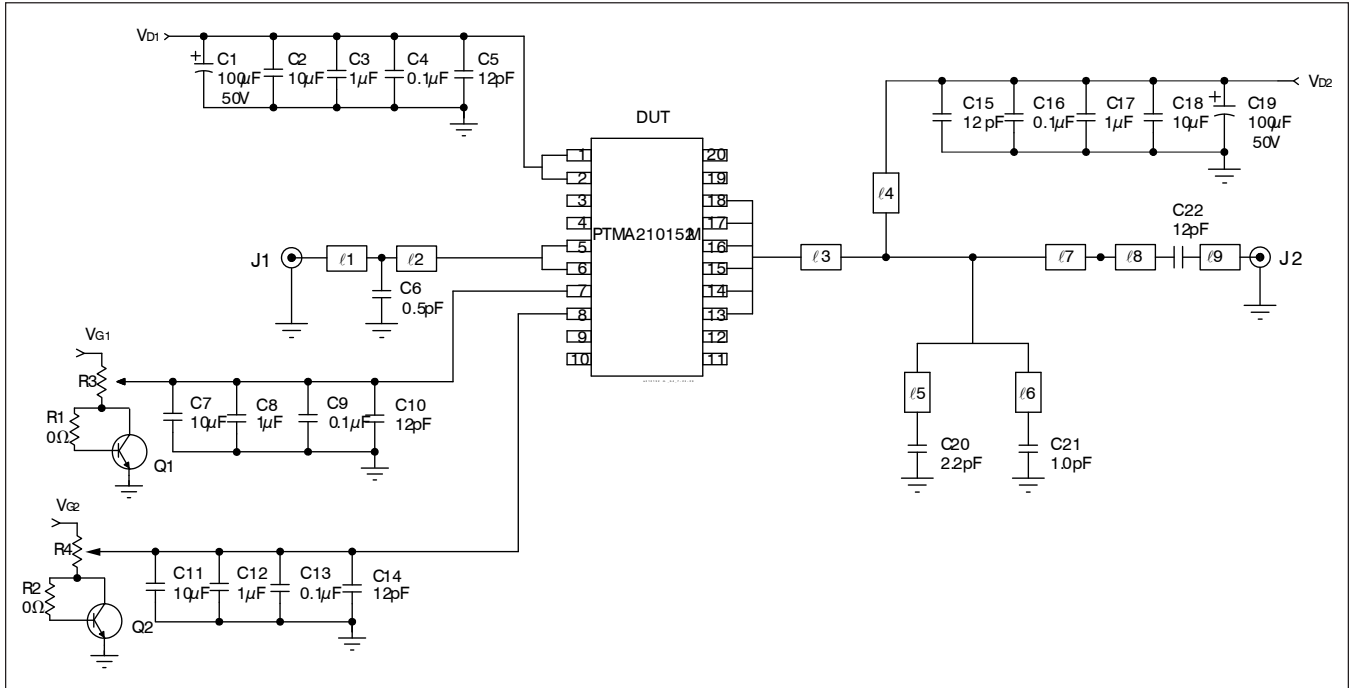


Broadband Circuit Impedance, 2140 MHz

Frequency MHz	Z Load W	
	R	jX
2110	1.89	-5.84
2114	1.87	-5.80
2118	1.85	-5.76
2122	1.84	-5.72
2126	1.82	-5.67
2130	1.80	-5.63
2134	1.78	-5.60
2138	1.77	-5.55
2142	1.75	-5.51
2146	1.73	-5.47
2150	1.71	-5.42
2154	1.70	-5.38
2158	1.68	-5.34
2162	1.66	-5.30
2166	1.65	-5.25
2170	1.63	-5.21



Reference Circuit, 2140 MHz



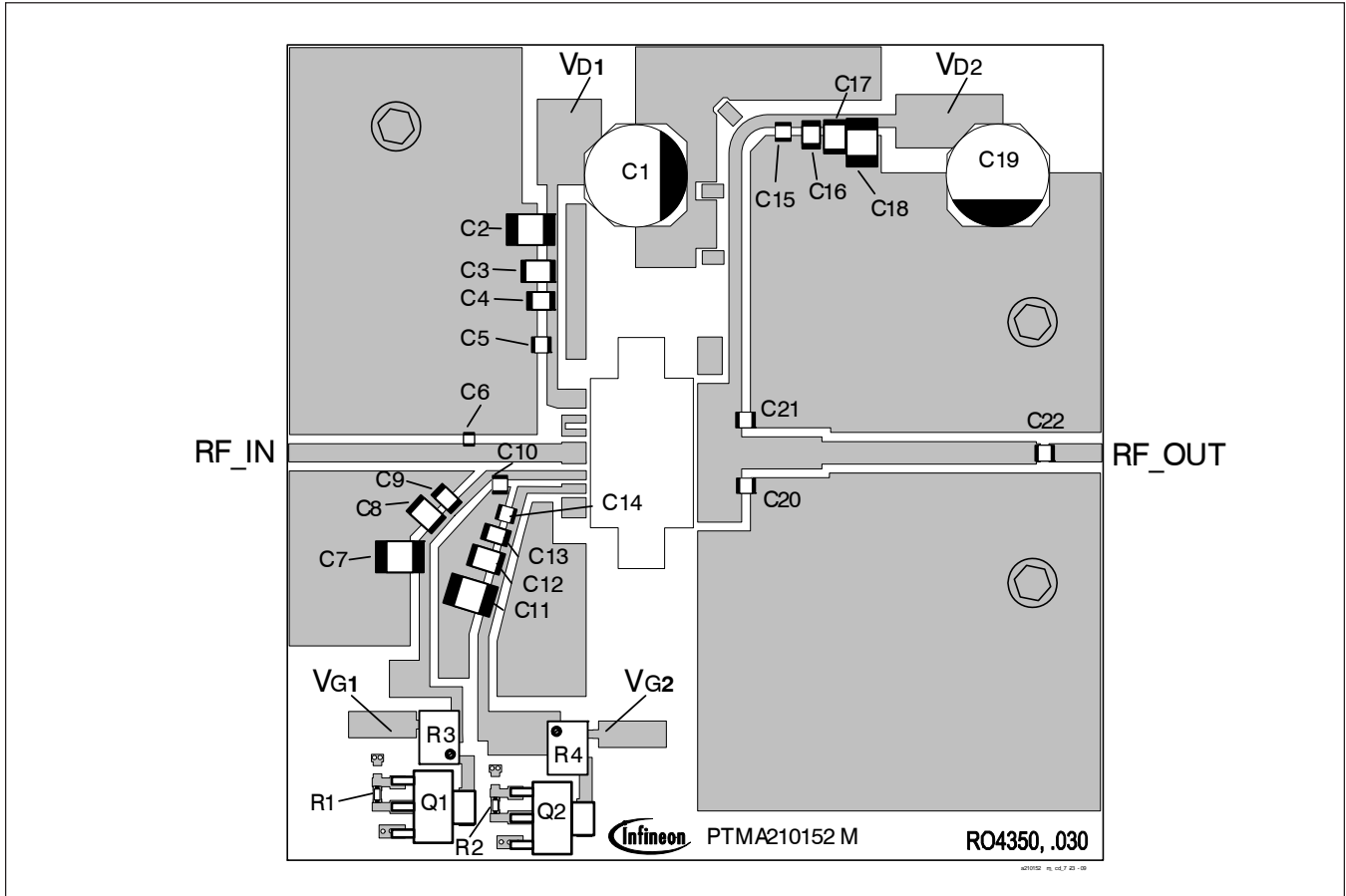
Reference circuit schematic for $f = 2140$ MHz

Circuit Assembly Information

DUT	PTMA210152M	LDMOS IC		
PCB	LTN/PTMA210152M	0.76 mm [.030"] thick, $\epsilon_r = 3.43$	Rogers RO4350	1 oz. copper

Microstrip	Electrical Characteristics at 2140 MHz	Dimensions: L x W (mm)	Dimensions: L x W (in.)
$l1$	0.228λ , 50 Ω	17.48 x 1.70	0.688 x 0.067
$l2$	0.125λ , 50 Ω	9.40 x 1.70	0.370 x 0.067
$l3$	0.054λ , 10 Ω	4.09 x 12.83	0.161 x 0.505
$l4$	0.340λ , 61 Ω	25.91 x 1.19	1.020 x 0.047
$l5$	0.005λ , 71 Ω	0.38 x 0.89	0.015 x 0.035
$l6$	0.005λ , 71 Ω	0.38 x 0.89	0.015 x 0.035
$l7$	0.100λ , 34 Ω	7.47 x 3.00	0.294 x 0.118
$l8$	0.271λ , 44 Ω	20.40 x 2.11	0.803 x 0.083
$l9$	0.066λ , 50 Ω	4.95 x 1.70	0.195 x 0.067

Reference Circuit, 2140 MHz (cont.)

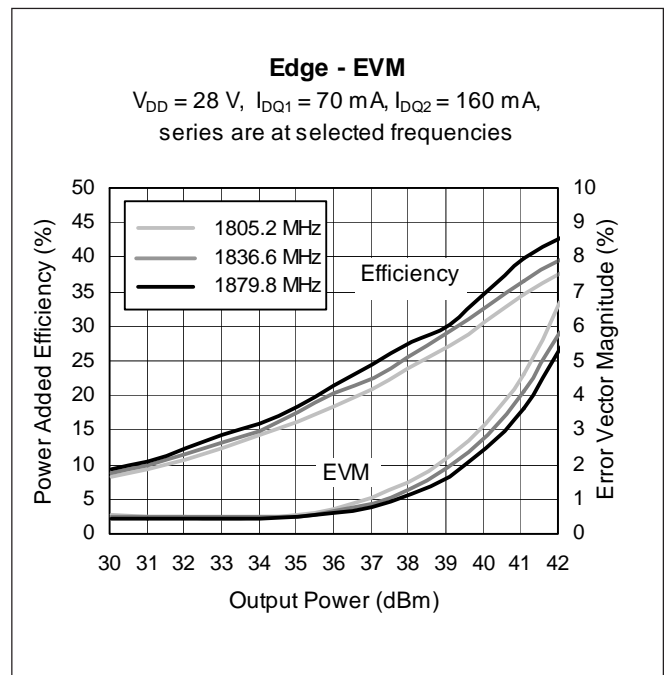
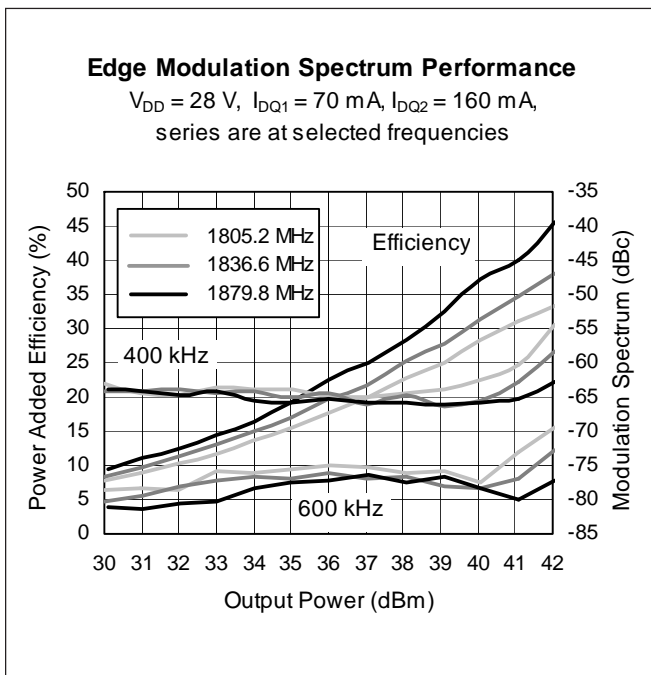
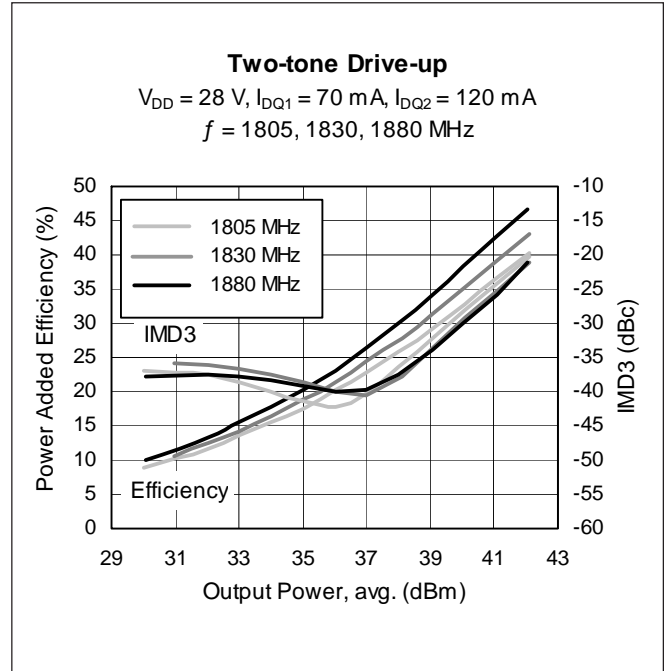
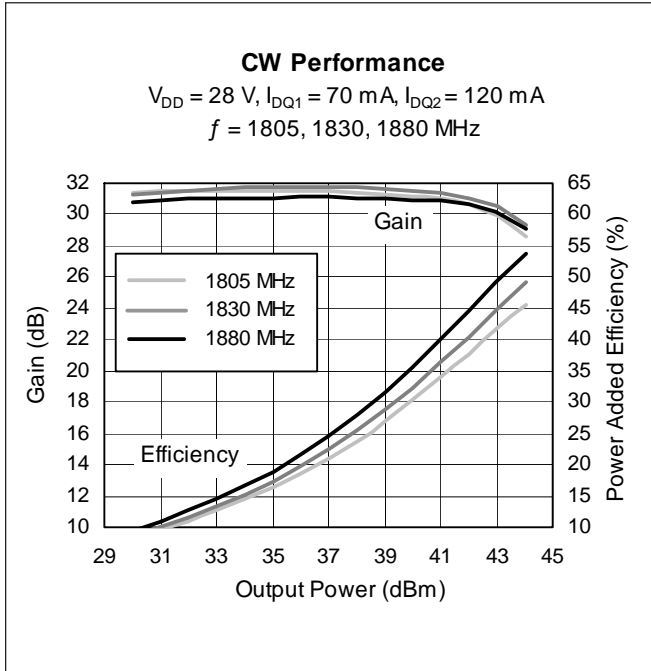


Reference circuit assembly diagram (not to scale)*

Component	Description	Suggested Manufacturer	P/N or Comment
C3, C8, C12, C17	Ceramic capacitor, 1 μ F	Digi-Key	445-1411-2-ND
C4, C9, C13, C16	Capacitor, 0.1 μ F	Digi-Key	PCC104BCT-ND
C2, C7, C11, C18	Tantalum capacitor, 10 μ F, 50 V	Digi-Key	P5571-ND
C1, C19	Electrolytic capacitor, 100 μ F, 50 V	Digi-Key	PCE3718CT-ND
C6	Ceramic capacitor, 0.5 pF	ATC	600S 0R5 CT
C20	Ceramic capacitor, 2.2 pF	ATC	600S 2R2 CT
C21	Ceramic capacitor, 1.0 pF	ATC	600S 1R0 CT
C5, C10, C14, C15, C22	Ceramic capacitor, 12 pF	ATC	600S 120 JT
Q1, Q2	Transistor	Infineon Technologies	BCP56
R1, R2	Chip resistor, 0 ohms	Digi-Key	P00ECT-ND
R3, R4	Potentiometer, 2 k ohms	Digi-Key	3224W-202ETR-ND

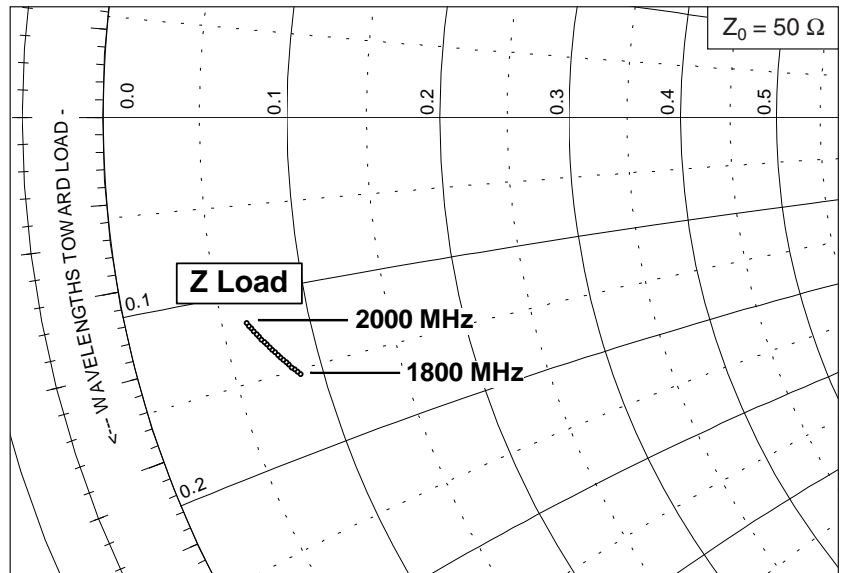
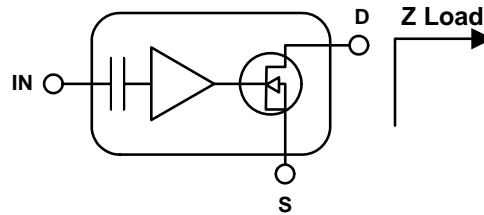
*Gerber Files for this circuit available on request

Typical Performance, 1840 MHz (data taken in Infineon test fixture)

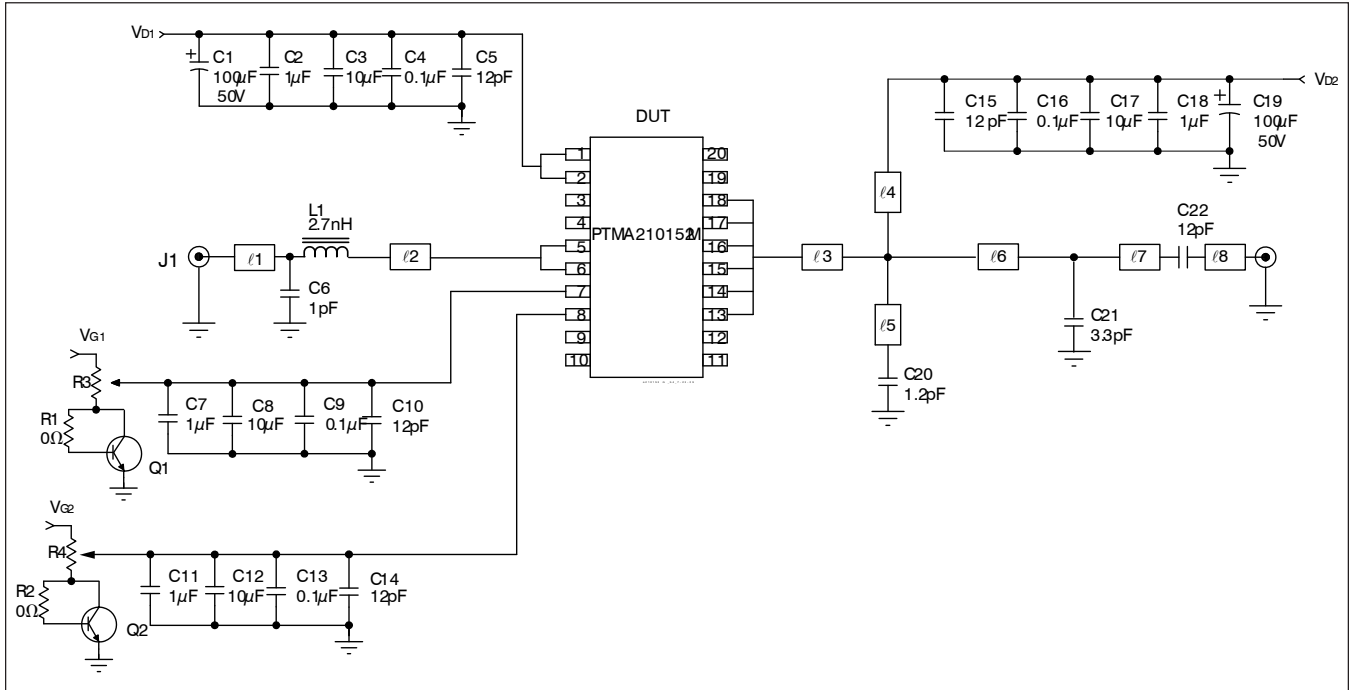


Broadband Circuit Impedance, 1840 MHz

Frequency MHz	Z Load W	
	R	jX
1800	4.34	-7.66
1810	4.28	-7.57
1820	4.21	-7.48
1830	4.15	-7.40
1840	4.09	-7.30
1850	4.03	-7.21
1860	3.96	-7.12
1870	3.90	-7.03
1880	3.85	-6.94
1890	3.79	-6.85
1900	3.73	-6.76
1910	3.67	-6.67
1920	3.62	-6.57
1930	3.56	-6.48
1940	3.50	-6.39
1950	3.45	-6.30
1960	3.40	-6.21
1970	3.34	-6.11
1980	3.29	-6.02
1990	3.24	-5.93
2000	3.19	-5.84



Reference Circuit, 1840 MHz



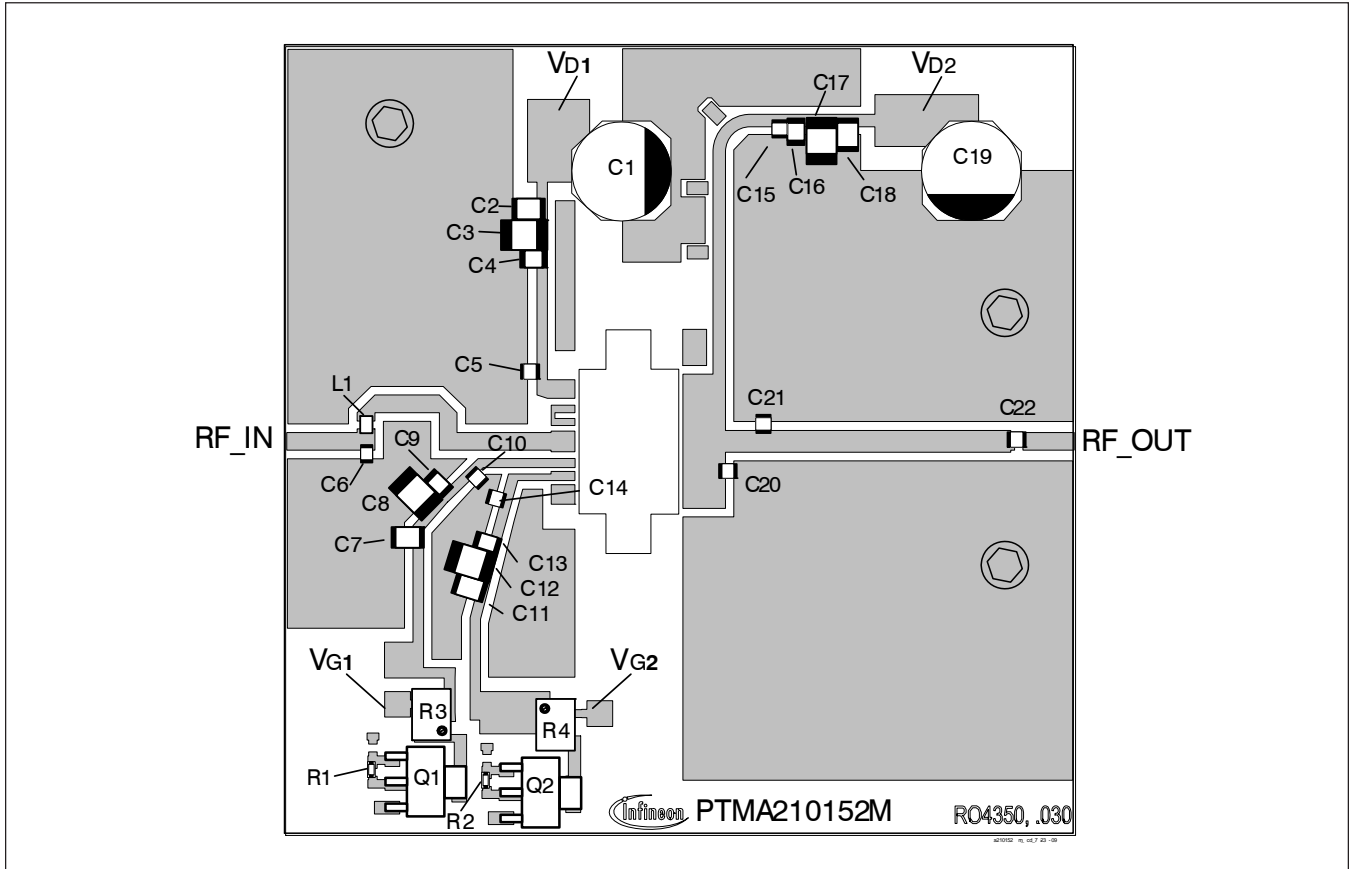
Reference circuit schematic for $f = 1840$ MHz

Circuit Assembly Information

DUT	PTMA210152M	LDMOS IC		
PCB	LTN/PTMA210152M-18	0.76 mm [.030"] thick, $\epsilon_r = 3.43$	Rogers RO4350	1 oz. copper

Microstrip	Electrical Characteristics at 1840 MHz	Dimensions: L x W (mm)	Dimensions: L x W (in.)
l_1	$0.135 \lambda, 50 \Omega$	7.59 x 1.70	0.299 x 0.067
l_2	$0.438 \lambda, 50 \Omega$	24.66 x 1.70	0.971 x 0.067
l_3	$0.073 \lambda, 10 \Omega$	4.09 x 12.83	0.161 x 0.505
l_4	$0.461 \lambda, 61 \Omega$	25.91 x 1.19	1.020 x 0.047
l_5	$0.0068 \lambda, 71 \Omega$	0.38 x 0.89	0.015 x 0.035
l_6	$0.0307 \lambda, 44 \Omega$	1.73 x 2.08	0.068 x 0.082
l_7	$0.465 \lambda, 44 \Omega$	26.16 x 2.08	1.030 x 0.082
l_8	$0.0881 \lambda, 50 \Omega$	4.95 x 1.70	0.195 x 0.067

Reference Circuit, 1840 MHz (cont.)

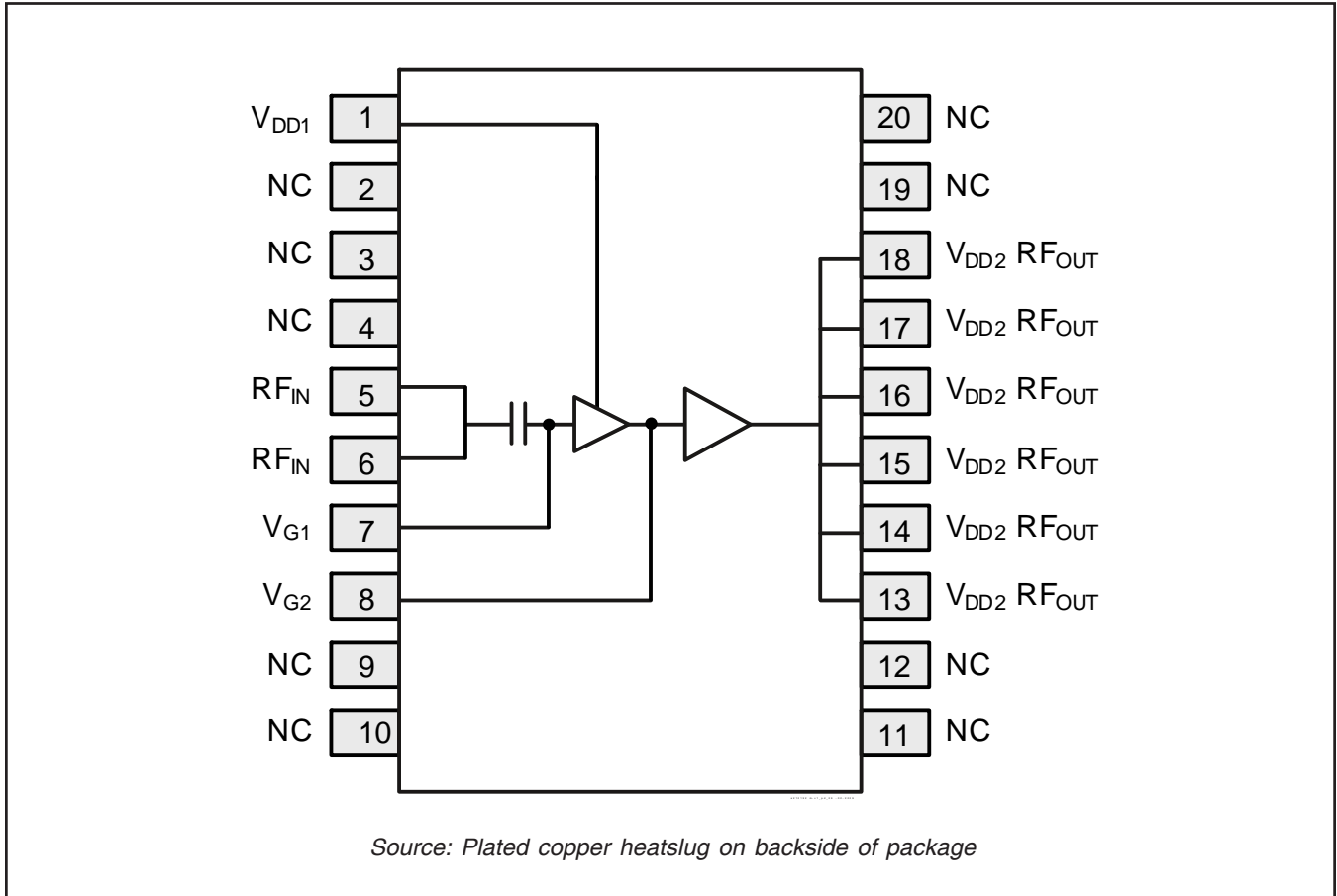


Reference circuit assembly diagram (not to scale)*

Component	Description	Suggested Manufacturer	P/N or Comment
C3, C8, C12, C17	Ceramic capacitor, 1 μ F	Digi-Key	445-1411-2-ND
C4, C9, C13, C16	Capacitor, 0.1 μ F	Digi-Key	PCC104BCT-ND
C2, C7, C11, C18	Tantalum capacitor, 10 μ F, 50 V	Digi-Key	P5571-ND
C1, C19	Electrolytic capacitor, 100 μ F, 50 V	Digi-Key	PCE3718CT-ND
C6	Ceramic capacitor, 1.0 pF	ATC	600S 1R0 CT
C20	Ceramic capacitor, 1.2 pF	ATC	600S 1R2 CT
C21	Ceramic capacitor, 3.3 pF	ATC	600S 3R3 CT
C5, C10, C14, C15, C22	Ceramic capacitor, 12 pF	ATC	600S 120 JT
Q1, Q2	Transistor	Infineon Technologies	BCP56
R1, R2	Chip resistor, 0 ohms	Digi-Key	P00ECT-ND
R3, R4	Potentiometer, 2 k ohms	Digi-Key	3224W-202ETR-ND
L1	Inductor, 2.7 nH	Digi-Key	PCD1287CT-ND

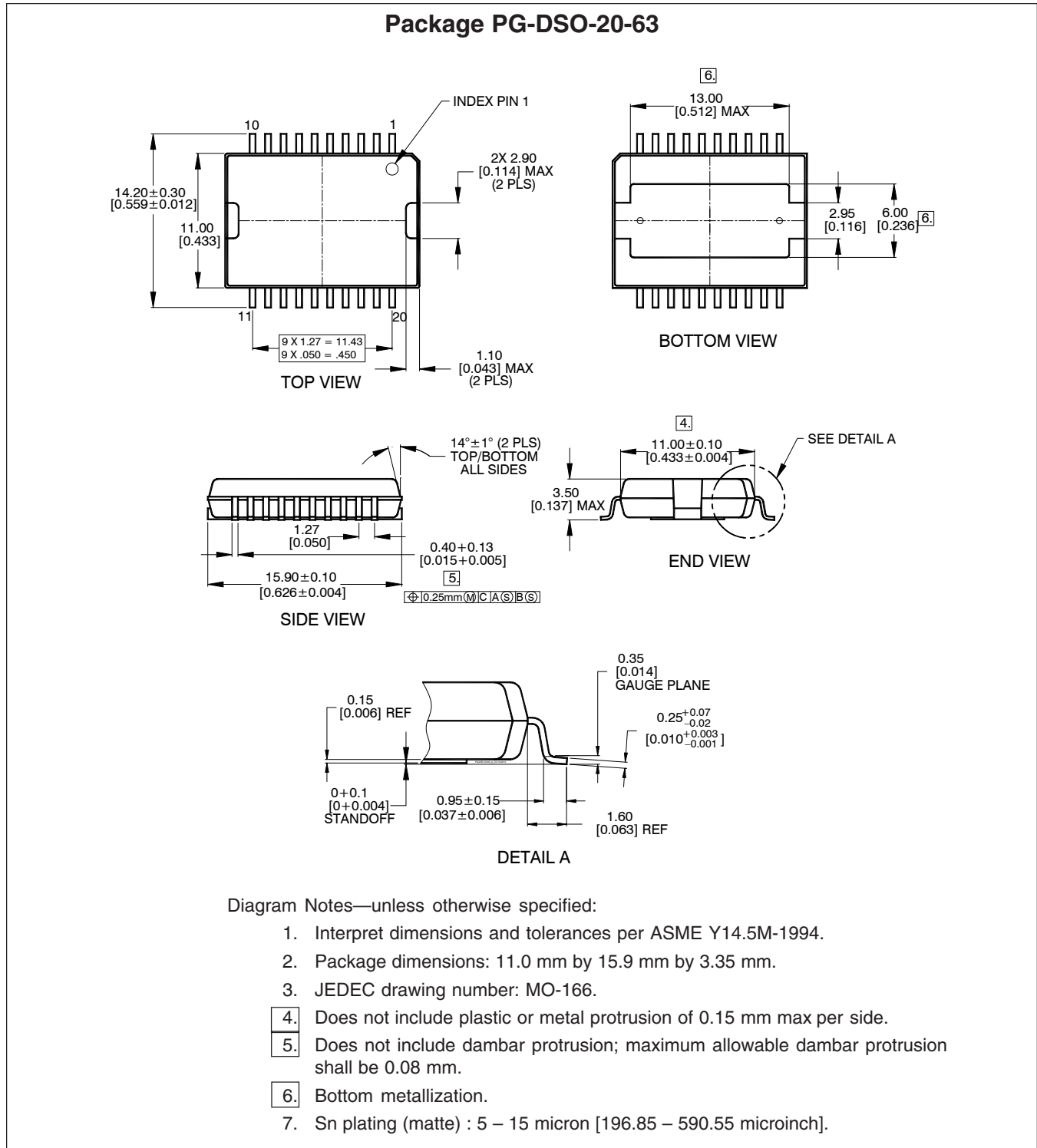
*Gerber Files for this circuit available on request

Pinout Diagram



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

Package Outline Specifications



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

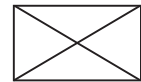
Page	Subjects (major changes since last revision)
3	Added moisture sensitivity level table
14	Updated package outline notes

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Edition 2010-04-16

Published by
Infineon Technologies AG
81726 Munich, Germany

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