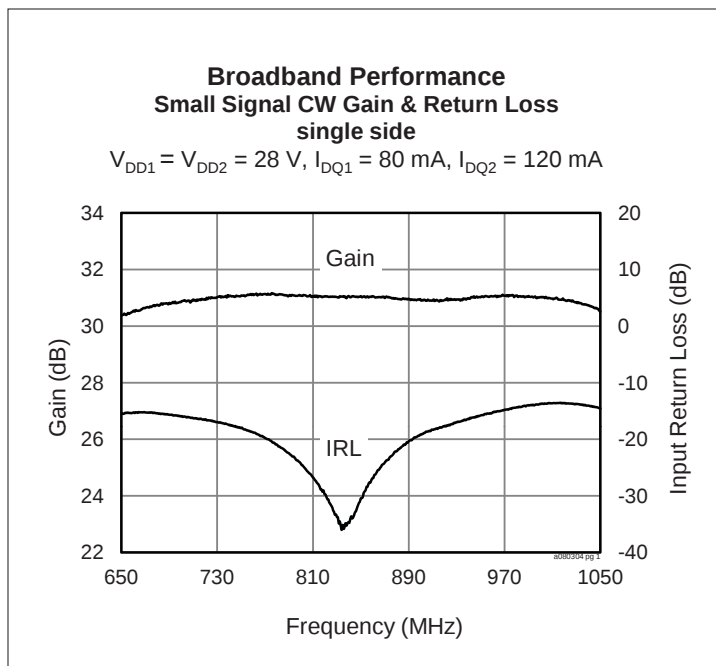


Dual Wideband RF LDMOS Power Amplifier 30 W (2 x 15 W), 28 V, 700 – 1000 MHz

Description

The PTMA080304M integrates two wideband 2-stage LDMOS integrated amplifier in a 20-lead plastic package. It is designed for use in cellular amplifier applications in the 700 to 1000 MHz frequency band. Manufactured with Infineon's advanced LDMOS process, it offers excellent thermal performance and superior reliability.

PTMA080304M
Package PG-DSO-20-63



Features

- Typical channel isolation = 20 dB
- Typical CW single channel performance, 960 MHz, 28 V
 - $P_{OUT} = 20\text{ W}$
 - Efficiency = 50%
- Typical GSM / EDGE performance of each channel, 960 MHz, 28 V
 - Average output power = 8 W
 - Gain = 30 dB
 - Efficiency = 33%
 - EVM = 1.91%
 - ACPR @ 400 KHz = -63 dBc
 - ACPR @ 600 KHz = -76 dBc
- Capable of handling 10:1 VSWR @ 28 V, 15 W (CW) output power
- Integrated ESD protection. Meets HBM Class 1B (minimum), per JESD22-A114F
- RoHS compliant

RF Characteristics

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

$V_{DD} = 28\text{ V}$, $I_{DQ1} = 80\text{ mA}$, $I_{DQ2} = 120\text{ mA}$, $P_{OUT} = 6\text{ W}$ average, $f = 960\text{ MHz}$, 3GPP signal, Test Model 1W/ 64DPCH, channel bandwidth = 3.84 MHz, peak/average = 7.5 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	31	—	dB
Power Added Efficiency	PAE	—	31	—	%
Intermodulation Distortion	IMD	—	-35	—	dBc

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-Tone Measurements (combined outputs, tested in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ1} = 2 \times 70\text{ mA}$, $I_{DQ2} = 2 \times 110\text{ mA}$, $P_{OUT} = 30\text{ W PEP}$, $f = 960\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	29.5	30.5	—	dB
Drain Efficiency	η_D	33	34.5	—	%
Intermodulation Distortion	IMD	—	−32	−30	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	μA
	$V_{DS} = 63\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	10.0	μA
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1.0	μA
On-state Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	3.48	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ1} = 80\text{ mA}$,	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	μA
	$V_{DS} = 63\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	10.0	μA
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1.0	μA
On-state Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.6	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ2} = 120\text{ mA}$	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}	11.5	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 ($T_{CASE} = 70^{\circ}\text{C}$) of each chip	Stage 1 $R_{\theta JC}$	8.5	°C/W
$P_{OUT} = 15\text{ W}$, $I_{DQ1} = 70\text{ mA}$, $I_{DQ2} = 110\text{ mA}$	Stage 2 $R_{\theta JC}$	2.5	°C/W

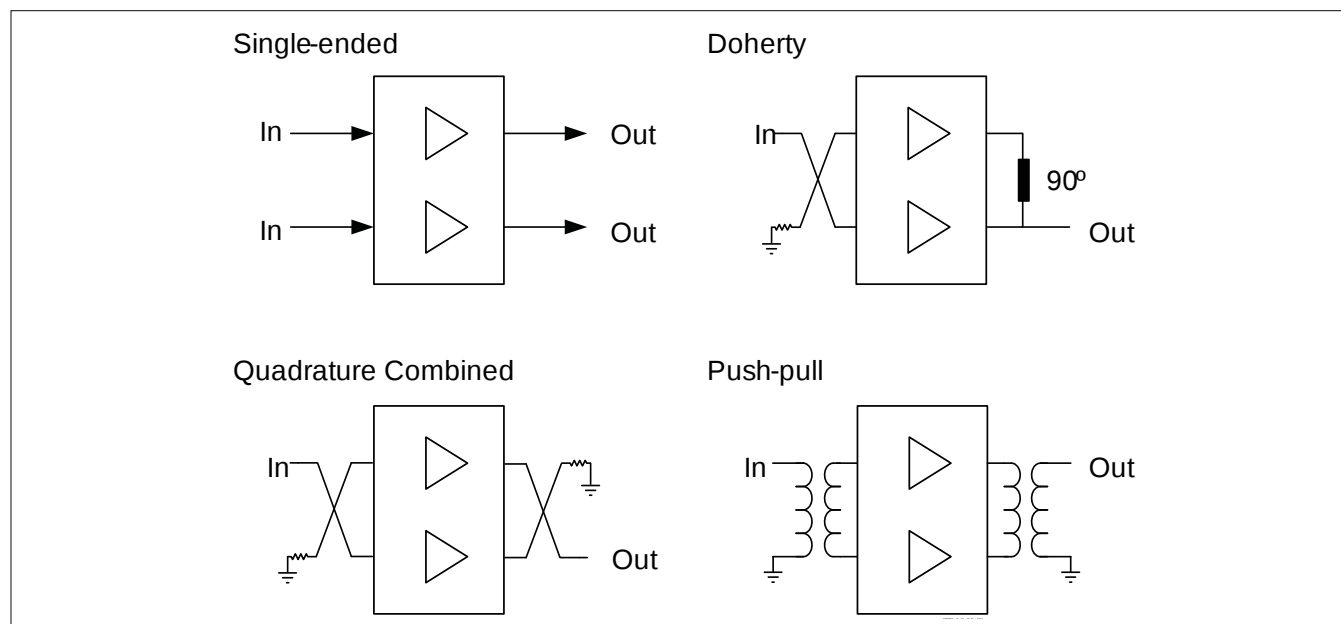
Moisture Sensitivity Level

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

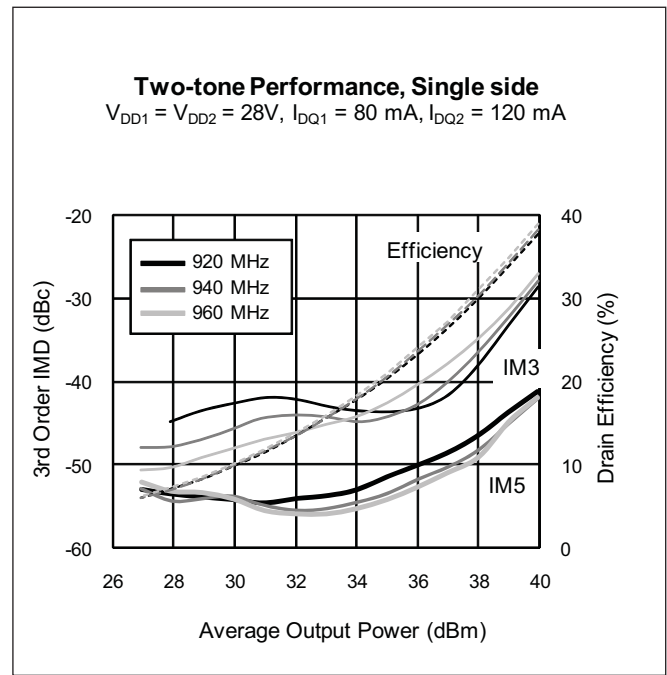
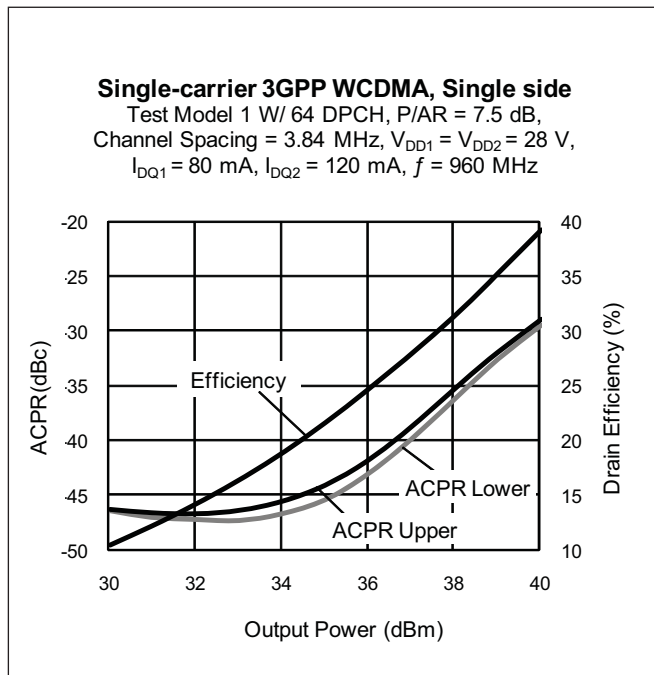
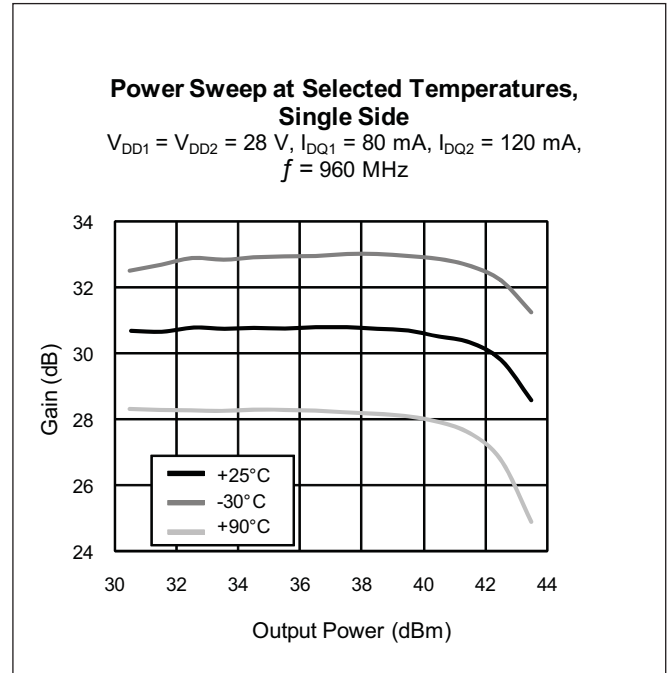
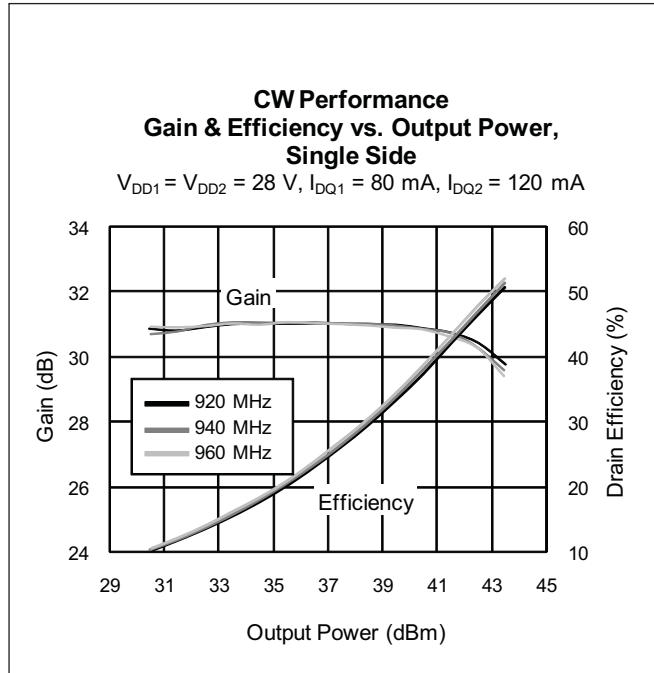
Ordering Information

Type and Version	Package Outline	Package Description	Shipping
PTMA080304M V1	PG-DSO-20-63	Molded plastic	Tape & reel, 250 pcs

Application Examples



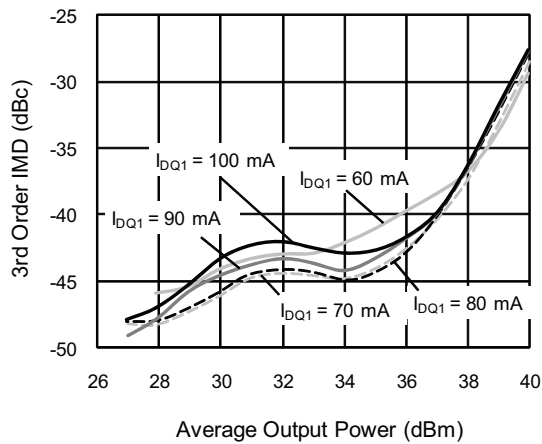
Typical Performance



Typical Performance (cont.)

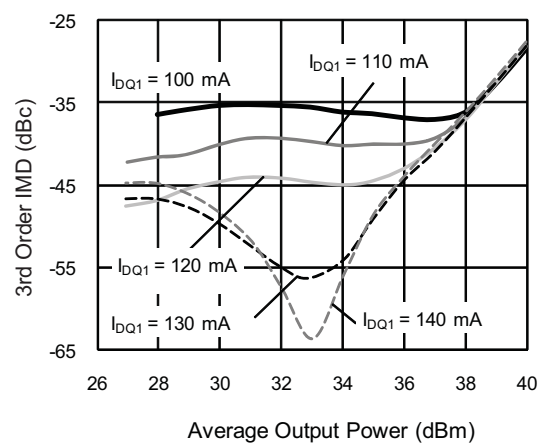
Two-tone Performance at Various I_{DQ1} , Single side

$V_{DD1} = V_{DD} = 28$ V, $I_{DQ1} = \text{Varying}$, $I_{DQ2} = 120$ mA,
 $f = 940$ MHz, Tone Spacing = 1 MHz



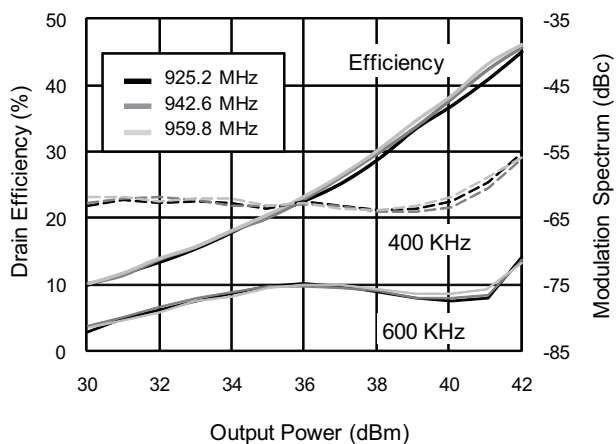
Two-tone Performance at Various I_{DQ2} , Single side

$V_{DD1} = V_{DD2} = 28$ V, $I_{DQ1} = 80$ mA, $I_{DQ2} = \text{Varying}$,
 $f = 940$ MHz, Tone Spacing = 1 MHz



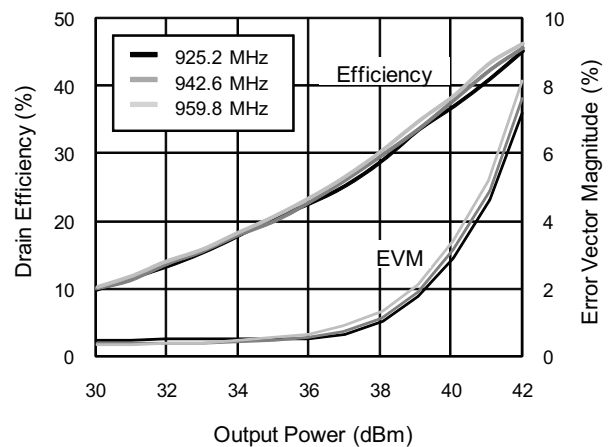
EDGE Spectrum Modulation Performance, Single side

$V_{DD1} = V_{DD2} = 28$ V, $I_{DQ1} = 70$ mA, $I_{DQ2} = 130$ mA



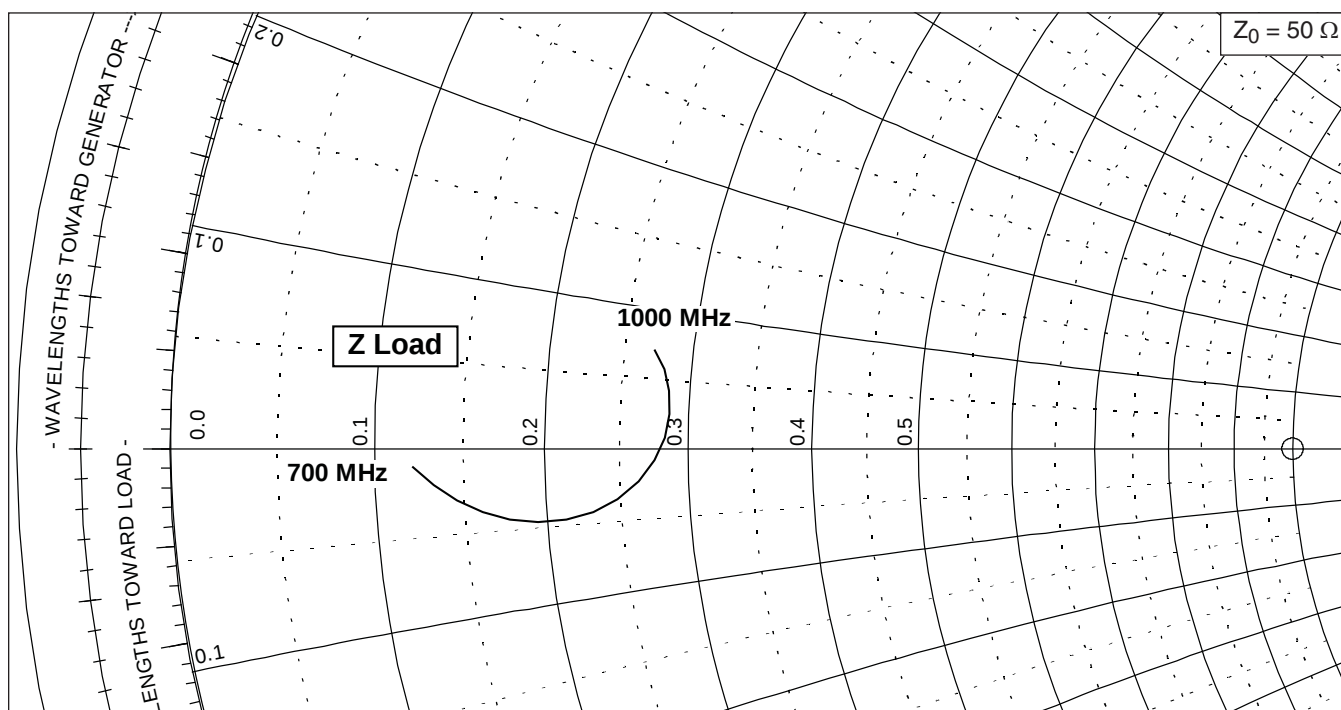
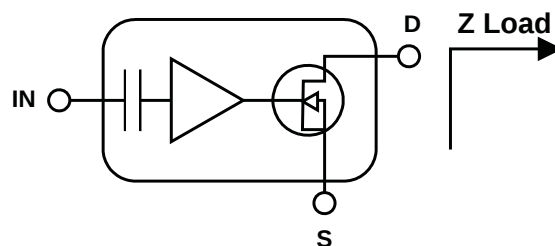
EDGE Error Vector Magnitude Performance, Single side

$V_{DD1} = V_{DD2} = 28$ V, $I_{DQ1} = 70$ mA, $I_{DQ2} = 130$ mA

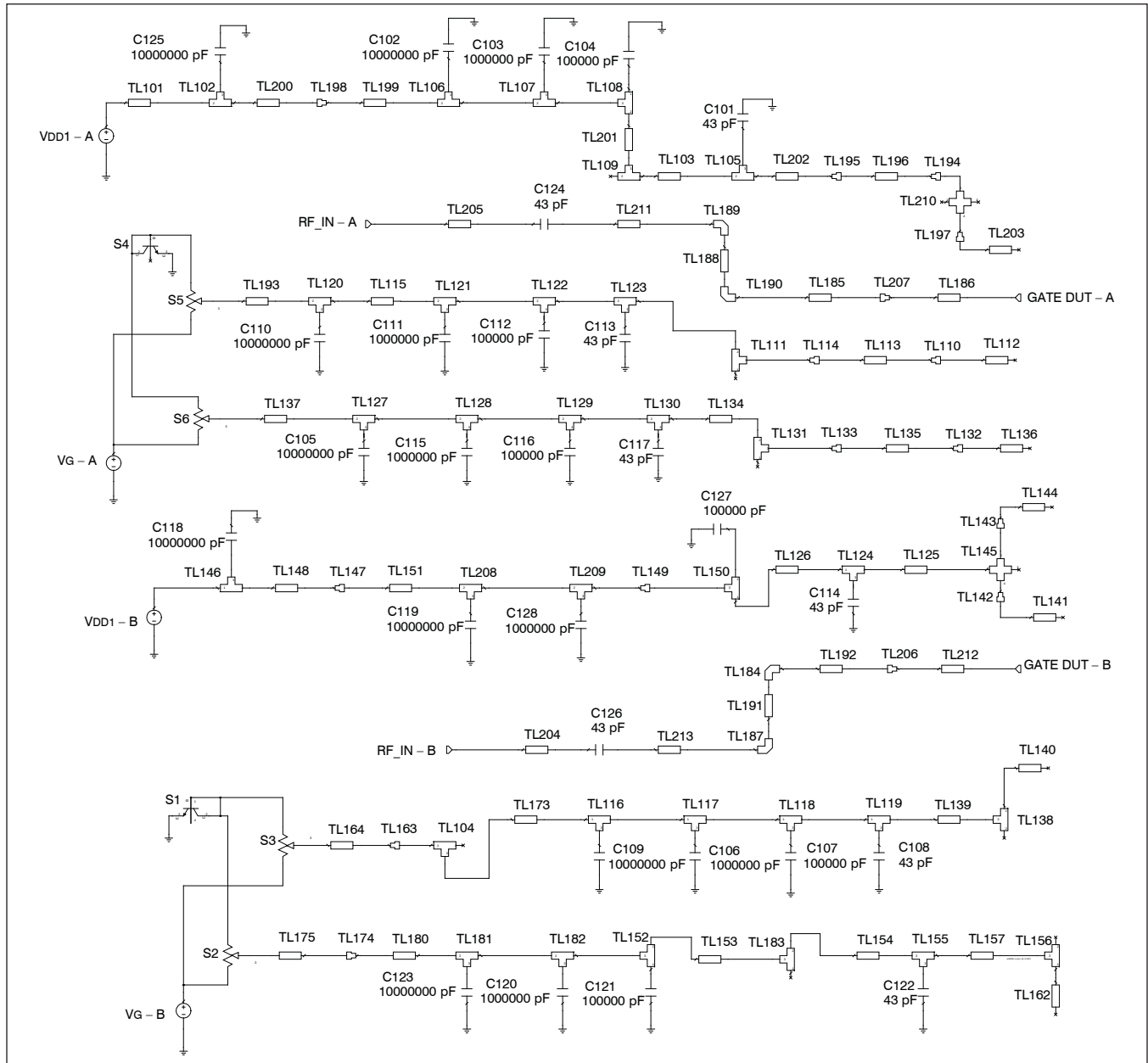


Broadband Circuit Impedance

Frequency	Z Load Ω	
MHz	R	jX
700	13.6	3.5
720	14.0	2.9
740	14.2	2.1
760	14.3	1.3
780	14.1	0.4
800	13.7	-0.4
820	13.2	-1.2
840	12.4	-1.8
860	11.5	-2.1
880	10.6	-2.3
900	9.7	-2.4
920	8.8	-2.2
940	8.0	-1.9
960	7.3	-1.5
980	6.6	-1.1
1000	6.1	-0.5

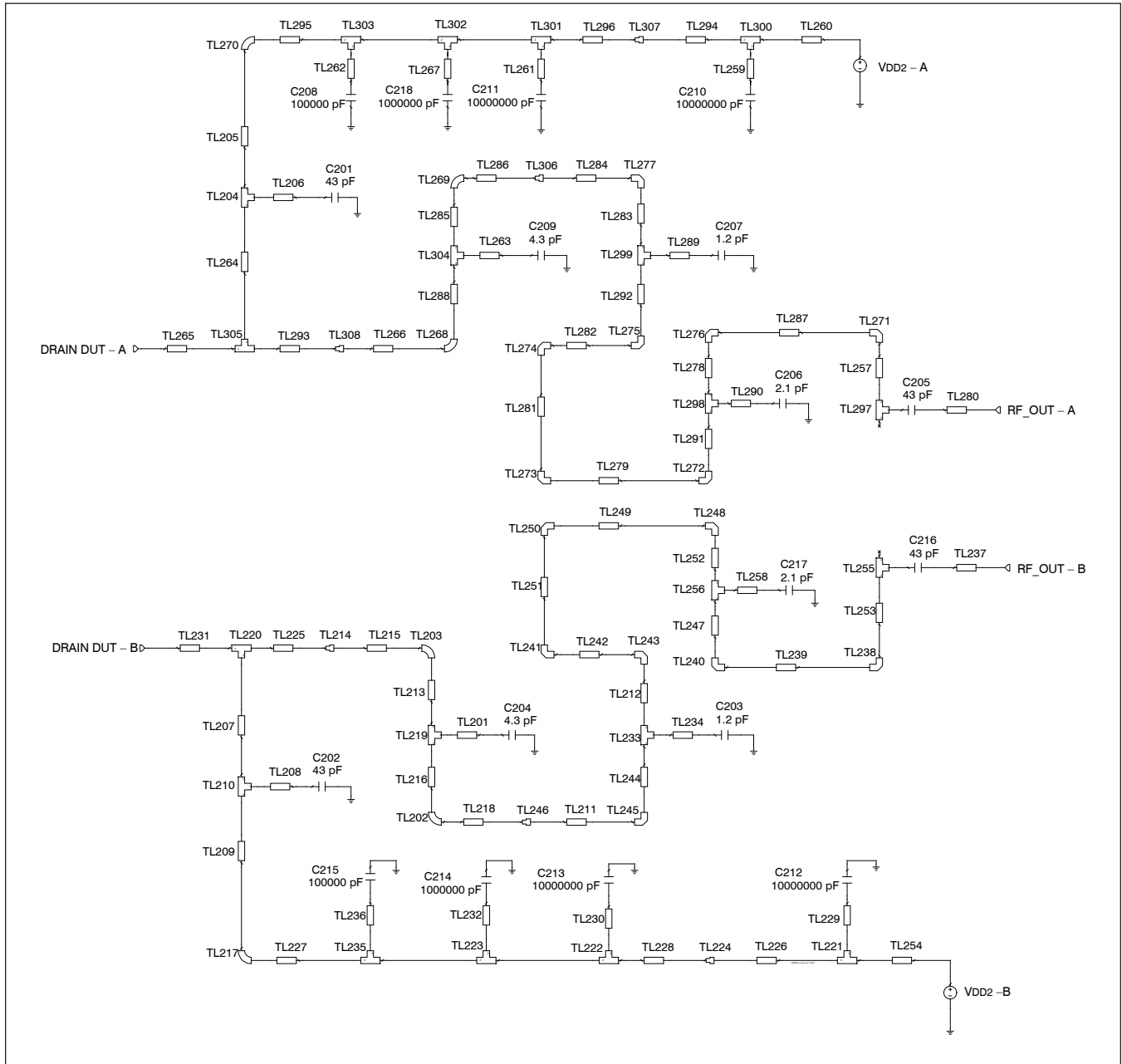


Reference Circuit (cont.)



Reference circuit input schematic for $f = 894$ MHz

Reference Circuit (cont.)



Reference circuit output schematic for $f = 894$ MHz

Reference Circuit (cont.)

Electrical Characteristics at 894 MHz

Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
Input			
TL101	0.023 λ , 20.13 Ω	W = 5.994, L = 4.445	W = 236, L = 175
TL102	0.011 λ , 20.13 Ω	W1 = 5.994, W2 = 5.994, W3 = 2.032	W1 = 236, W2 = 236, W3 = 80
TL103	0.005 λ , 68.91 Ω	W = 0.991, L = 1.092	W = 39, L = 43
TL104	0.010 λ , 68.91 Ω	W1 = 0.991, W2 = 0.991, W3 = 2.108	W1 = 39, W2 = 39, W3 = 83
TL105, TL118, TL119, TL123, TL130	0.007 λ , 68.91 Ω	W1 = 0.991, W2 = 0.991, W3 = 1.397	W1 = 39, W2 = 39, W3 = 55
TL106, TL116, TL120, TL127	0.008 λ , 68.91 Ω	W1 = 0.991, W2 = 0.991, W3 = 1.600	W1 = 39, W2 = 39, W3 = 63
TL107, TL108, TL109, TL117, TL128, TL131, TL152, TL155, TL166, TL167	0.005 λ , 68.91 Ω	W1 = 0.991, W2 = 0.991, W3 = 0.991	W1 = 39, W2 = 39, W3 = 39
TL110, TL114, TL132, TL133, TL162, TL181, TL142, TL143		W1 = 0.001, W2 = 0.001, Offset = 0.000	W1 = 1, W2 = 21, Offset = 6
TL111	0.002 λ , 68.91 Ω	W1 = 0.991, W2 = 0.991, W3 = 0.508	W1 = 39, W2 = 39, W3 = 20
TL112, TL136	0.016 λ , 74.86 Ω	W = 0.838, L = 3.353	W = 33, L = 132
TL113	0.031 λ , 89.88 Ω	W = 0.549, L = 6.553	W = 22, L = 258
TL115	0.009 λ , 68.91 Ω	W = 0.991, L = 1.905	W = 39, L = 75
TL121, TL122, TL129	0.005 λ , 68.91 Ω	W1 = 0.991, W2 = 0.991, W3 = 1.016	W1 = 39, W2 = 39, W3 = 40
TL124, TL192	0.007 λ , 63.13 Ω	W1 = 1.168, W2 = 1.168, W3 = 1.524	W1 = 46, W2 = 46, W3 = 60
TL125	0.033 λ , 63.13 Ω	W = 1.168, L = 6.693	W = 46, L = 264
TL126	0.004 λ , 63.13 Ω	W = 1.168, L = 0.787	W = 46, L = 31
TL134	0.004 λ , 68.91 Ω	W = 0.991, L = 0.838	W = 39, L = 33
TL135	0.059 λ , 82.83 Ω	W = 0.671, L = 12.294	W = 26, L = 484
TL137	0.035 λ , 68.91 Ω	W = 0.991, L = 7.181	W = 39, L = 283
TL138, TL156	0.005 λ , 72.76 Ω	W1 = 0.889, W2 = 0.889, W3 = 0.993	W1 = 35, W2 = 35, W3 = 39
TL139	0.038 λ , 68.91 Ω	W = 0.991, L = 7.925	W = 39, L = 312
TL140	0.013 λ , 72.76 Ω	W = 0.889, L = 2.713	W = 35, L = 107
TL141, TL144	0.004 λ , 35.17 Ω	W = 2.918, L = 0.808	W = 115, L = 32
TL145		W1 = 0.457, W2 = 2.032, W3 = 0.457 W4 = 2.032	W1 = 18, W2 = 80, W3 = 18, W4 = 80
TL146	0.007 λ , 17.84 Ω	W1 = 6.929, W2 = 6.929, W3 = 1.270	W1 = 273, W2 = 273, W3 = 50
TL147		W1 = 0.002, W2 = 0.001, Offset = 0.001	W1 = 2, W2 = 43, Offset = 40
TL148	0.013 λ , 17.84 Ω	W = 6.929, L = 2.540	W = 273, L = 100
TL149		W1 = 0.002, W2 = 0.001, Offset = 0.000	W1 = 2, W2 = 43, Offset = -17
TL150	0.010 λ , 63.13 Ω	W1 = 1.168, W2 = 1.168, W3 = 2.032	W1 = 46, W2 = 46, W3 = 80
TL151	0.016 λ , 63.13 Ω	W = 1.168, L = 3.211	W = 46, L = 126
TL153	0.033 λ , 68.91 Ω	W = 0.991, L = 6.731	W = 39, L = 265
TL154	0.006 λ , 68.91 Ω	W = 0.991, L = 1.219	W = 39, L = 48
TL157	0.051 λ , 68.91 Ω	W = 0.991, L = 10.465	W = 39, L = 412
TL158	0.006 λ , 72.76 Ω	W = 0.889, L = 1.140	W = 35, L = 45
TL159		W1 = 0.001, W2 = 0.001, Offset = -0.001	W1 = 1, W2 = 50, Offset = -28

Table continued next page

Reference Circuit (cont.)

Electrical Characteristics at 894 MHz

Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
TL160	0.011 λ , 40.23 Ω	W = 2.413, L = 2.289	W = 95, L = 90
TL161	0.035 λ , 68.91 Ω	W = 0.991, L = 7.188	W = 39, L = 283
TL163	0.010 λ , 43.05 Ω	W = 2.184, L = 2.057	W = 86, L = 81
TL164	0.015 λ , 68.91 Ω	W = 0.991, L = 3.073	W = 39, L = 121
TL165	0.010 λ , 68.91 Ω	W1 = 0.991, W2 = 0.991, W3 = 2.032	W1 = 39, W2 = 39, W3 = 80
TL168, TL171, TL173, TL174		W = 1.676	W = 66
TL169, TL176	0.010 λ , 51.10 Ω	W = 1.676, L = 2.032	W = 66, L = 80
TL170, TL196	0.019 λ , 74.86 Ω	W = 0.838, L = 3.962	W = 33, L = 156
TL172, TL175, TL195, TL197	0.050 λ , 51.10 Ω	W = 1.676, L = 10.160	W = 66, L = 400
TL177	0.026 λ , 68.91 Ω	W = 0.991, L = 5.309	W = 39, L = 209
TL178		W1 = 0.002, W2 = 0.002, Offset = 0.000	W1 = 2, W2 = 61, Offset = -18
TL179		W1 = 0.001, W2 = 0.001, Offset = 0.001	W1 = 1, W2 = 39, Offset = 38
TL180	0.004 λ , 35.17 Ω	W = 2.918, L = 0.744	W = 115, L = 29
TL182		W1 = 0.001, W2 = 0.001, Offset = -0.002	W1 = 1, W2 = 39, Offset = -91
TL183	0.034 λ , 68.91 Ω	W = 0.991, L = 6.967	W = 39, L = 274
TL184	0.013 λ , 20.13 Ω	W = 5.994, L = 2.540	W = 236, L = 100
TL185	0.014 λ , 68.91 Ω	W = 0.991, L = 2.972	W = 39, L = 117
TL186	0.036 λ , 68.91 Ω	W = 0.991, L = 7.460	W = 39, L = 294
TL187	0.004 λ , 35.17 Ω	W = 2.918, L = 0.737	W = 115, L = 29
TL188, TL189	0.036 λ , 51.10 Ω	W = 1.676, L = 7.341	W = 66, L = 289
TL190, TL191		W1 = 1.676, W2 = 0.838	W1 = 66, W2 = 33
TL193	0.006 λ , 63.13 Ω	W1 = 1.168, W2 = 1.168, W3 = 1.168	W1 = 46, W2 = 46, W3 = 46
TL194		W1 = 0.635, W2 = 2.007, W3 = 0.635, W4 = 2.007	W1 = 25, W2 = 79, W3 = 25, W4 = 79

Output			
TL201, TL263	0.000 λ , 129.71 Ω	W = 0.127, L = 0.025	W = 5, L = 1
TL202, TL203		W = 0.006, ANG = 90.000, R = 0.005	W = 6, ANG = 354330, R = 200
TL204, TL210	0.005 λ , 60.26 Ω	W1 = 1.270, W2 = 1.270, W3 = 1.016	W1 = 50, W2 = 50, W3 = 40
TL205, TL209	0.000 λ , 60.26 Ω	W = 1.270, L = 0.025	W = 50, L = 1
TL206, TL208, TL262, TL267	0.000 λ , 68.02 Ω	W = 1.016, L = 0.025	W = 40, L = 1
TL207, TL264	0.100 λ , 60.26 Ω	W = 1.270, L = 20.549	W = 50, L = 809
TL211, TL284	0.011 λ , 38.82 Ω	W = 2.540, L = 2.159	W = 100, L = 85
TL212, TL292	0.002 λ , 38.82 Ω	W = 2.540, L = 0.434	W = 100, L = 17
TL213, TL288	0.059 λ , 19.85 Ω	W = 6.096, L = 11.303	W = 240, L = 445
TL214, TL308		W1 = 10.160, W2 = 6.020	W1 = 400, W2 = 237
TL215, TL266	0.007 λ , 20.06 Ω	W = 6.020, L = 1.397	W = 237, L = 55
TL216	0.001 λ , 19.85 Ω	W = 6.096, L = 0.127	W = 240, L = 5
TL217, TL270		W = 0.001, ANG = 0.001, R = 0.003	W = 1, ANG = 50, R = 118
TL218, TL286	0.038 λ , 19.85 Ω	W = 6.096, L = 7.366	W = 240, L = 290
TL219, TL301	0.001 λ , 19.85 Ω	W1 = 6.096, W2 = 6.096, W3 = 0.127	W1 = 240, W2 = 240, W3 = 5

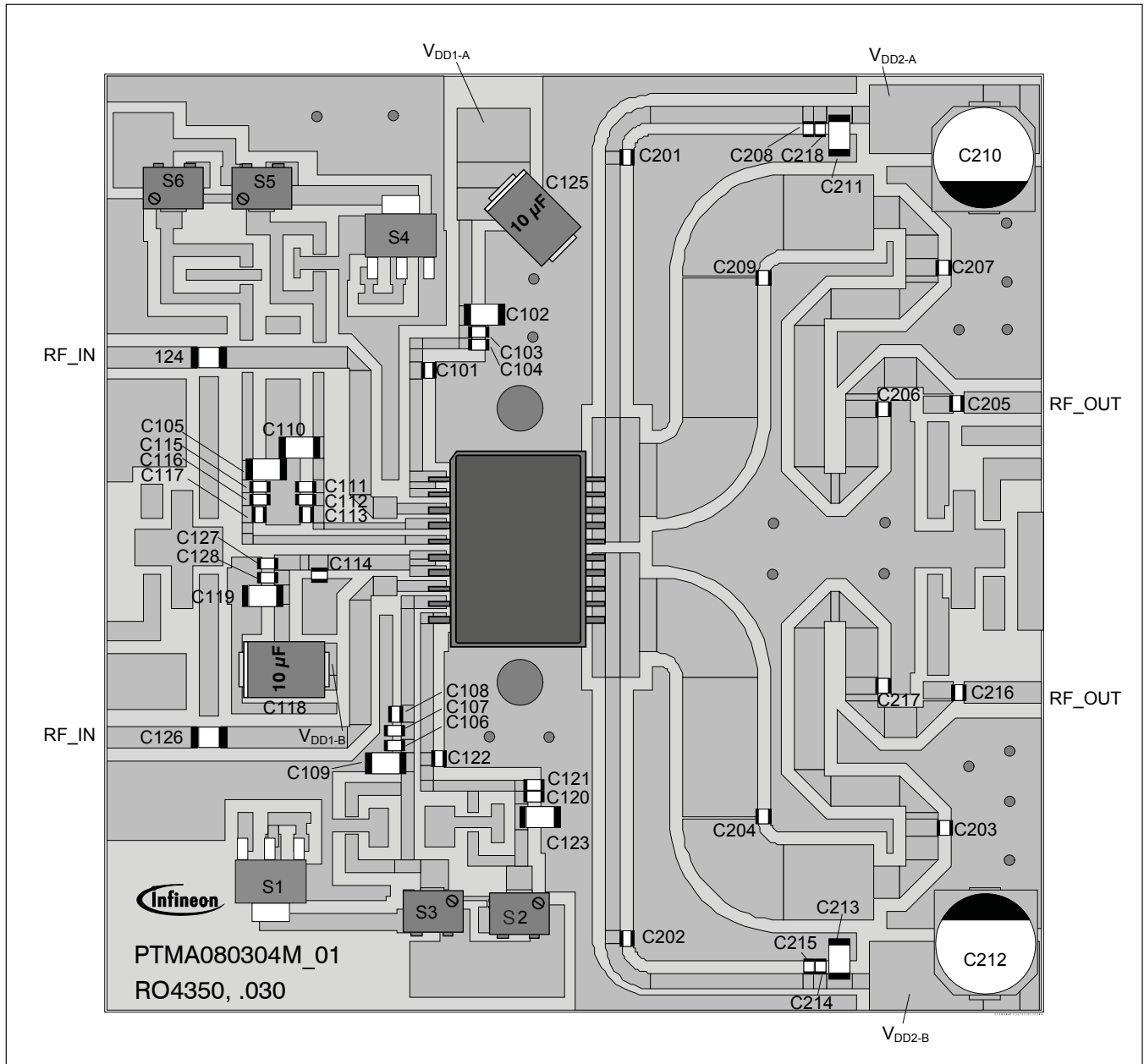
Table continued next page

Reference Circuit (cont.)

Electrical Characteristics at 894 MHz

Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
TL220, TL305	0.007 λ , 12.84 Ω	W1 = 10.160, W2 = 10.160, W3 = 1.270	W1 = 400, W2 = 400, W3 = 50
TL225, TL293	0.008 λ , 12.84 Ω	W = 10.160, L = 1.524	W = 400, L = 60
TL226, TL294	0.048 λ , 21.16 Ω	W = 5.639, L = 9.246	W = 222, L = 364
TL227, TL295	0.060 λ , 60.26 Ω	W = 1.270, L = 12.283	W = 50, L = 484
TL228, TL296	0.007 λ , 60.26 Ω	W = 1.270, L = 1.397	W = 50, L = 55
TL229, TL259	0.000 λ , 34.08 Ω	W = 3.048, L = 0.025	W = 120, L = 1
TL230, TL261	0.000 λ , 45.17 Ω	W = 2.032, L = 0.025	W = 80, L = 1
TL231, TL265	0.005 λ , 12.84 Ω	W = 10.160, L = 1.016	W = 400, L = 40
TL232	0.000 λ , 68.02 Ω	W = 1.016, L = 0.025	W = 40, L = 1
TL233, TL255, TL256, TL297, TL298, TL299	0.007 λ , 38.82 Ω	W1 = 2.540, W2 = 2.540, W3 = 1.397	W1 = 100, W2 = 100, W3 = 55
TL234, TL258, TL289, TL290	0.000 I, 57.05 Ω	W = 1.397, L = 0.025	W = 55, L = 1
TL236	0.000 I, 68.02 Ω	W = 1.016, L = 0.025	W = 40, L = 1
TL237, TL280	0.031 I, 51.10 Ω	W = 1.676, L = 6.289	W = 66, L = 248
TL238, TL240, TL241, TL243, TL245, TL248, TL250, TL271, TL272, TL273, TL274, TL275, TL276, TL277		W = 2.540	W = 100
TL239, TL287	0.013 λ , 38.82 Ω	W = 2.540, L = 2.540	W = 100, L = 100
TL242, TL282	0.028 λ , 38.82 Ω	W = 2.540, L = 5.588	W = 100, L = 220
TL244, TL283	0.010 λ , 38.82 Ω	W = 2.540, L = 1.981	W = 100, L = 78
TL246, TL306		W1 = 6.096, W2 = 2.540	W1 = 240, W2 = 100
TL247, TL278	0.002 λ , 38.82 Ω	W = 2.540, L = 0.483	W = 100, L = 19
TL249, TL279	0.004 λ , 38.82 Ω	W = 2.540, L = 0.762	W = 100, L = 30
TL251, TL281	0.057 λ , 38.82 Ω	W = 2.540, L = 11.430	W = 100, L = 450
TL252, TL291	0.020 λ , 38.82 Ω	W = 2.540, L = 3.962	W = 100, L = 156
TL253, TL257	0.001 λ , 38.82 Ω	W = 2.540, L = 0.127	W = 100, L = 5
TL254, TL260	0.008 λ , 21.16 Ω	W = 5.639, L = 1.499	W = 222, L = 59
TL268, TL269		W = 0.006, ANG = 90.000, R = 0.005	W = 6, ANG = 3543307, R = 200
TL285	0.001 λ , 19.85 Ω	W = 6.096, L = 0.127	W = 240, L = 5

Reference Circuit (cont.)



Reference Circuit (cont.)

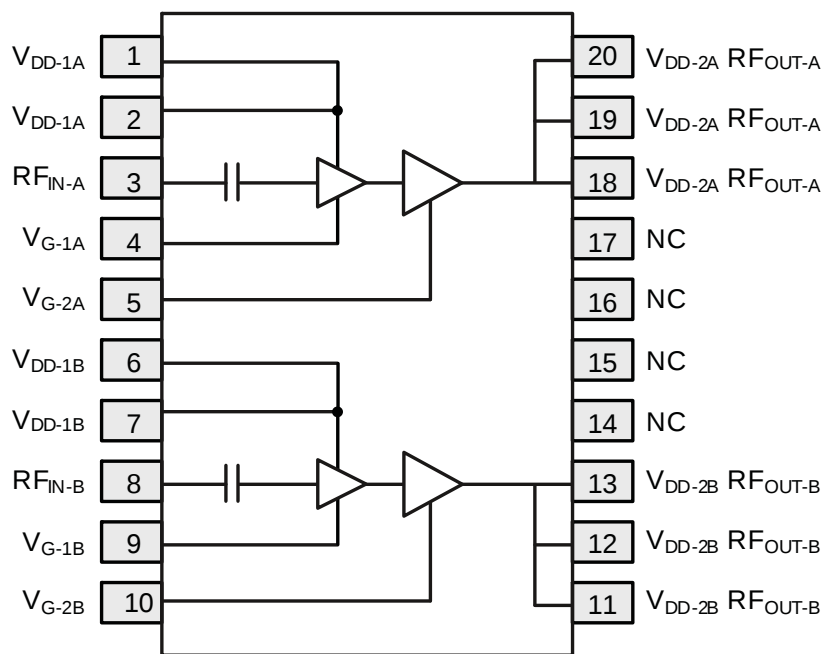
Circuit Assembly Information

DUT	PTFA080304M	LDMOS Transistor	
PCB	LTN/PTFA080304M	0.508 mm [.020"] thick, $\epsilon_r = 3.48$	Rogers 4350, 1 oz. copper

Component	Description	Suggested Manufacturer	P/N
Input			
C101, C108, C113, C114, C117, C122	Chip capacitor, 43 pF	ATC	ATC100A430FW150XB
C102, C105, C109, C110, C119, C123	Capacitor, 10 μ F	Digi-Key	587-1352-1-ND
C103, C106, C111, C115, C120, C128	Chip capacitor, 1 μ F	Digi-Key	490-4736-1-ND
C104, C107, C112, C116, C121, C127	Chip capacitor, 0.1 μ F	Digi-Key	490-1723-1-ND
C118, C125	Capacitor, 10 μ F	Digi-Key	399-1655-2-ND
C124, C126	Chip capacitor, 43 pF	ATC	ATC100B430FW500XB
S1, S4	Transistor	Digi-Key	BCP5616TA-ND
S2, S3, S5, S6	Potentiometer, 2k Ω	Digi-Key	3224W-202ECT-ND

Output			
C201, C202, C205, C216	Chip capacitor, 43 pF	ATC	ATC100A430FW150XB
C203, C207	Chip capacitor, 1.2 pF	ATC	ATC100A1R2BW150XB
C204, C209	Chip capacitor, 4.3 pF	ATC	ATC100A4R3BW150XB
C206, C217	Chip capacitor, 2.1 pF	ATC	ATC100A2R1BW150XB
C208, C215	Chip capacitor, 0.1 μ F	Digi-Key	490-1723-1-ND
C210, C212	Capacitor, 10 μ F	Digi-Key	PCE4442TR-ND
C211, C213	Capacitor, 10 μ F	Digi-Key	587-1352-1-ND
C214, C218	Chip capacitor, 1 μ F	Digi-Key	490-4736-1-ND

Pinout Diagram



Source: Plated copper heatslug on backside of package

Package Outline Specifications

Package PG-DSO-20-63

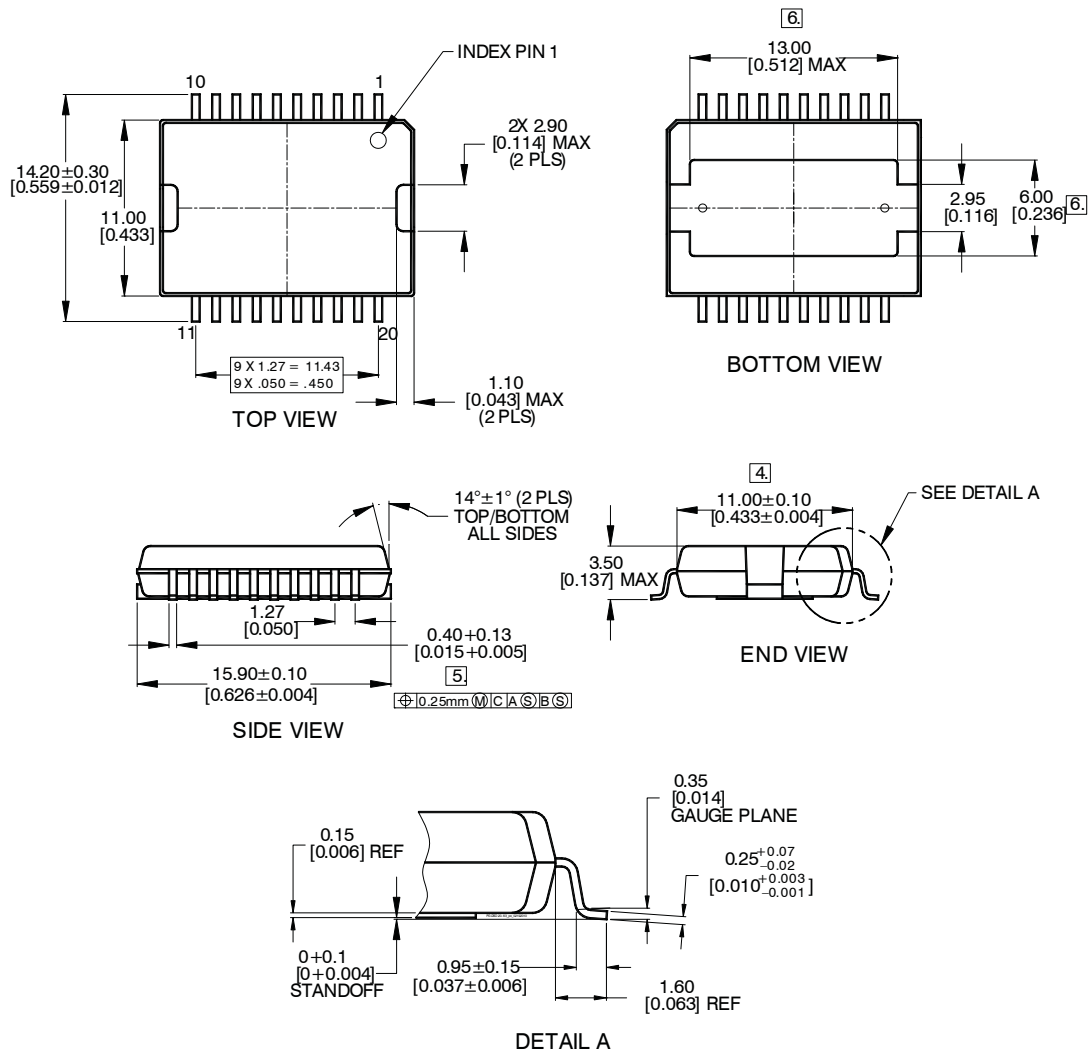


Diagram Notes—unless otherwise specified:

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

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<http://www.infineon.com/rfpower>

Revision History: 2011-12-14

Data Sheet

Previous Version: 2010-06-02, Data Sheet

Page	Subjects (major changes since last revision)
2	Divided DC table into Stage 1 and Stage 2 for clarity.

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