Agilent MGA-565P8 20 dBm P_{sat} High Isolation Buffer Amplifier

Data Sheet

Description

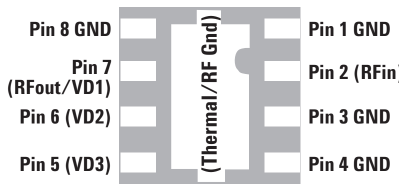
The MGA-565P8 is designed for use in LO chains to drive high dynamic range passive mixers. It provides high isolation, high gain, and consistent output power. It is a GaAs MMIC, fabricated using Agilent Technologies' cost effective, reliable enhancement mode PHEMT (Pseudomorphic High Electron Mobility Transistor)[1] process. This device is housed in the LPCC 2x2 mm package. This package offers good thermal dissipation and RF characteristics.

MGA-565P8 features a saturated power of 20 dBm (with 0 dBm input power) and reverse isolation in excess of 40 dB at 2 GHz. The saturated output power can be set between 9 dBm and 20 dBm using an external resistor, with a corresponding adjustment in current consumption.

Notes:

1. Enhancement mode technology employs a single positive V_{gs}, eliminating the need of negative gate voltage associated with conventional depletion mode devices.
2. Conform to JEDEC reference outline MO229 for DRP-N

Pin Connections and Package Marking



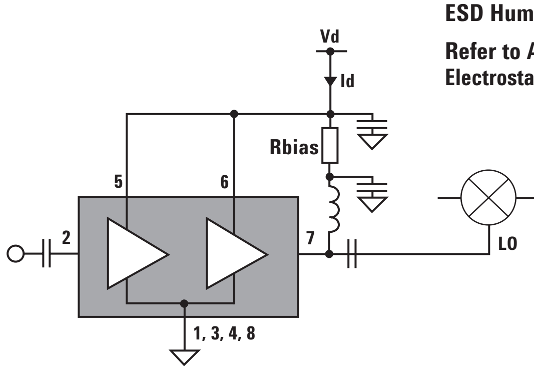
Bottom View

Top View

Note:
Package marking provides orientation and identification

"1B" = Device Code
"x" = Data code indicates the month of manufacture.

Simplified Schematic



Features

- Up to 3.5 GHz operating frequency
- 2:1 VSWR input and output at 2GHz
- Small package size: 2.0 x 2.0 x 0.75 mm LPCC[3]
- MSL-1 and lead-free
- Tape-and-reel packaging option available

Specifications

@ 2 GHz, V_d = 5V, P_{in} = 0 dBm

- P_{sat} = 20 dBm
- I_{dsat} = 67 mA
- Isolation = 42 dB
- Small Signal Gain = 22 dB

Applications

- VCO buffer amplifier for Cellular/PCS or other wireless infrastructures

Attention:
Observe precautions for handling electrostatic sensitive devices.

ESD Machine Model (Class A)

ESD Human Body Model (Class 0)

Refer to Agilent Application Note A004R: Electrostatic Discharge Damage and Control.

Agilent Technologies

MGA-565P8 Absolute Maximum Ratings[1]

Symbol	Parameter	Units	Absolute Maximum
V_d	DC Supply Voltage	V	8
P_{diss}	Total Power Dissipation [2]	mW	448
P_{in} max.	RF Input Power (Vd=5V)	dBm	15
T_{CH}	Channel Temperature	°C	150
T_{STG}	Storage Temperature	°C	-65 to 150
θ_{ch_b}	Thermal Resistance [3]	°C/W	91
	ESD (Human Body Model)	V	100
	ESD (Machine Model)	V	30

Notes:
1. Operation of this device in excess of any one of these parameters may cause permanent damage.
2. Board (package belly) temperature T_B is 25°C. Derate 11 mW/°C for T_B > 109°C.
3. Channel-to-board thermal resistance measured using 150°C Liquid Crystal Measurement method.

Electrical Specifications

T_A = 25°C, Frequency = 2 GHz, R_{bias} = 0Ω (unless specified otherwise)

Symbol	Parameter and Test Condition		Units	Min.	Typ.	Max.
P_{sat}	Saturated Power at 0 dBm input	Vd = 5V[1] Vd = 3V	dBm dBm	18.5	20 17	20.6
I_{dsat}	Saturation Current	Vd = 5V[1] Vd = 3V	mA mA	58	67 45	78
ISL [1]	Reverse Isolation		dB	42	50	
Gain	Small Signal Gain	Vd = 5V[1] Vd = 3V	dB	20	21.8 20	23.5
I_{ds}	Small Signal Current (P_{in} = -10 dBm)	Vd = 5V[1] Vd = 3V	mA dB	33	37 27	43
RL [1]	Return Loss Input Output		dB		-8 -10	

Notes:
1. Typical value determined from a sample size of 500 parts from 3 wafers.
2. Measurement obtained using production test board described in the block diagram below. Circuit losses have been de-embedded from actual measurements.

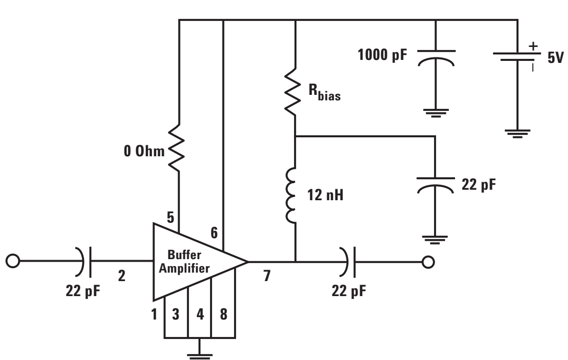


Figure 1. Production Test Circuit Schematic at 2 GHz..

Product Consistency Distribution Charts at 2 GHz[1, 2]

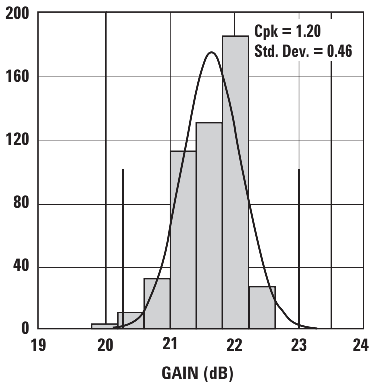


Figure 2. Gain Distribution.
LSL = 20.0 dB, USL = 23.5 dB.

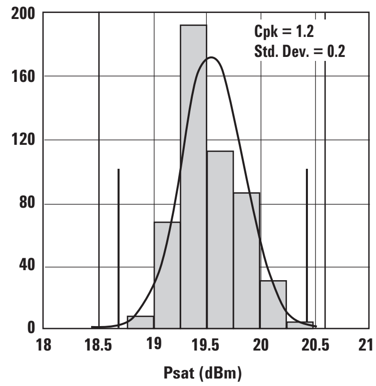


Figure 3. Psat Distribution.
LSL = 18.5 dBm, USL = 20.6

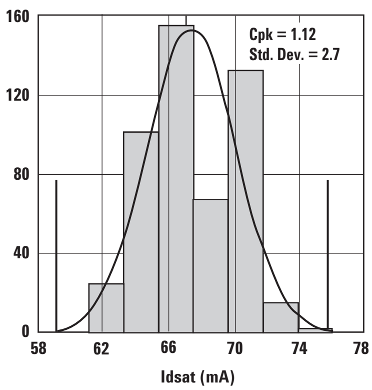


Figure 4. Idsat Distribution.
LSL = 58.0 dBm, USL = 78.0 dBm.

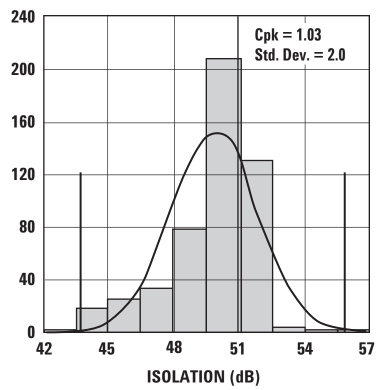


Figure 5. Isolation Distribution.
LSL = 42.0 dB, USL = 56.0 dB.

Notes:

1. Statistical distribution determined from a sample size of 500 parts from 3 wafers.
2. Future wafers allocated to this product may have typical values anywhere between the minimum and maximum specification limits.

MGA-565P8 Typical Performance Curves (at 25°C, 2 GHz, R_{bias} = 0Ω, unless specified otherwise)

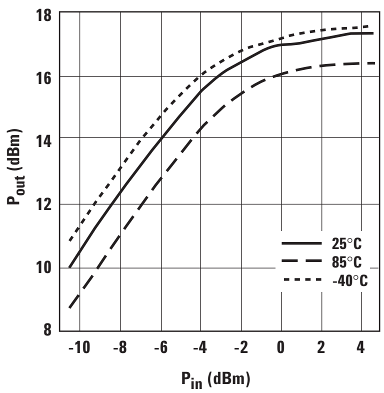


Figure 6. P_{out} vs. P_{in}, V_d = 3V.

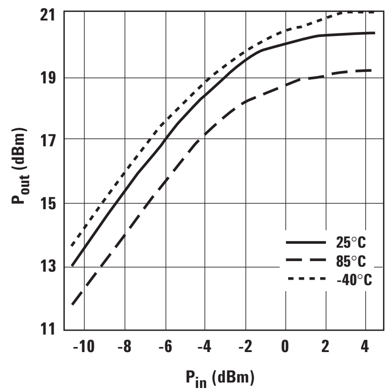


Figure 7. P_{out} vs. P_{in}, V_d = 5V.

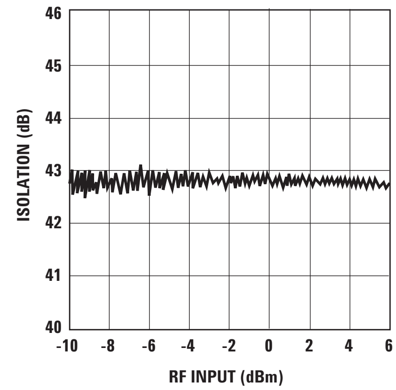


Figure 8. Isolation vs P_{in}, V_d = 3V.

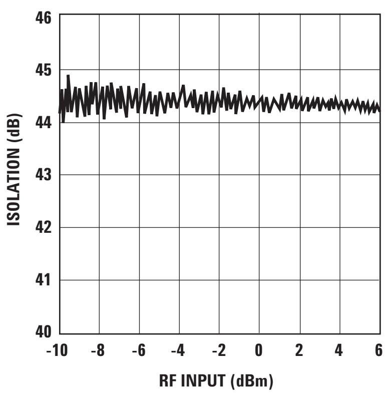


Figure 9. Isolation vs. P_{in}, V_d = 5V.

MGA-565P8 Typical Performance Curves (R_{bias} = 0Ω, temperature variation)

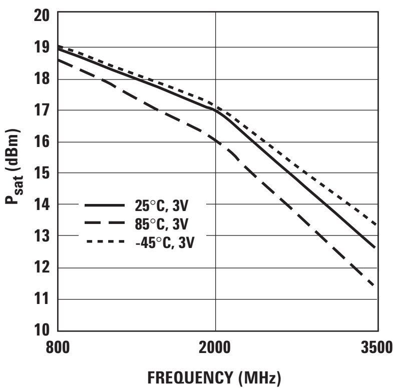


Figure 10. P_{sat} vs. Frequency. (P_{in} = 0 dBm, V_d = 3V)

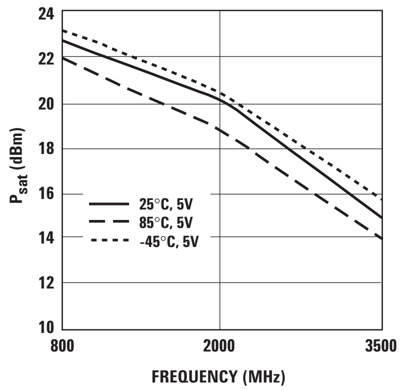


Figure 11. P_{sat} vs. Frequency. (P_{in} = 0 dBm, V_d = 5V)

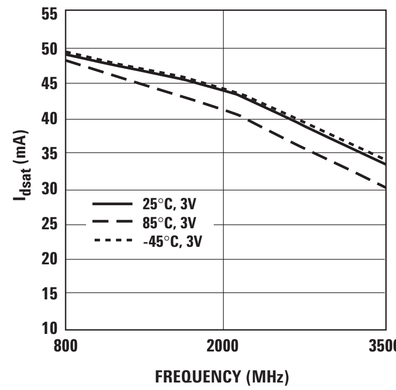


Figure 12. I_{dsat} vs. Frequency. (P_{in} = 0 dBm, V_d = 3V)

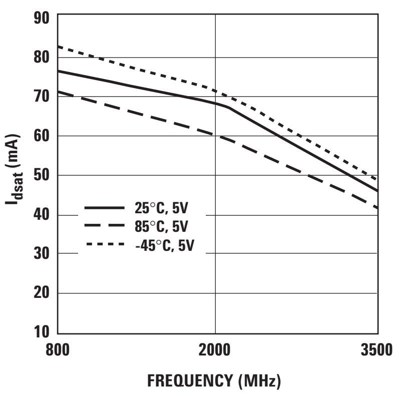


Figure 13. I_{dsat} vs. Frequency. (P_{in} = 0 dBm, V_d = 5V)

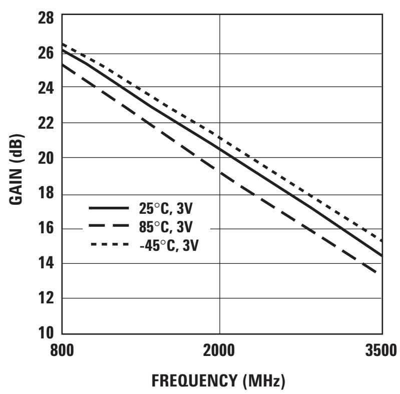


Figure 14. Gain vs. Frequency. (P_{in} = -10 dBm, V_d = 3V)

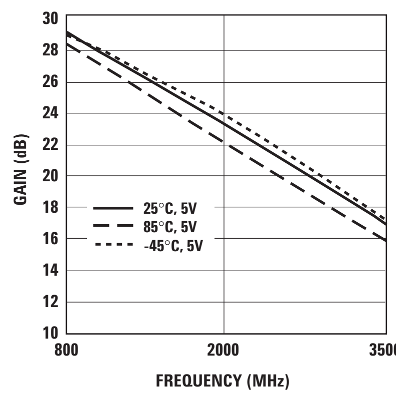


Figure 15. Gain vs Frequency. (P_{in} = -10 dBm, V_d = 5V)

MGA-565P8 Typical Performance Curves (R_{bias} = 0Ω, temperature variation), continued

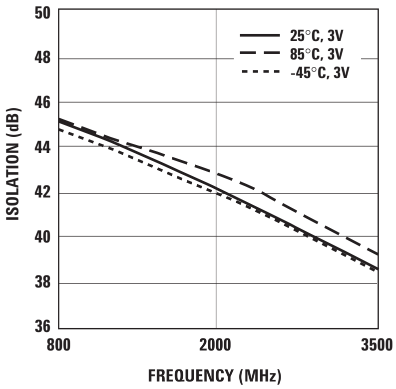


Figure 16. Isolation vs. Frequency. (P_{in} = -10 dBm, V_d = 3V)

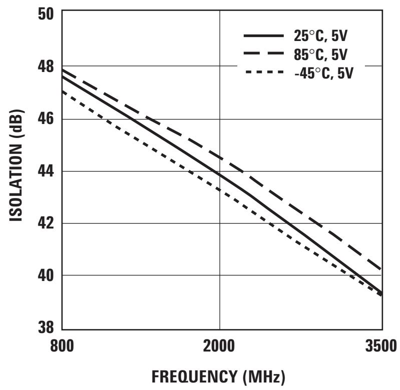


Figure 17. Isolation vs. Frequency. (P_{in} = -10 dBm, V_d = 5V)

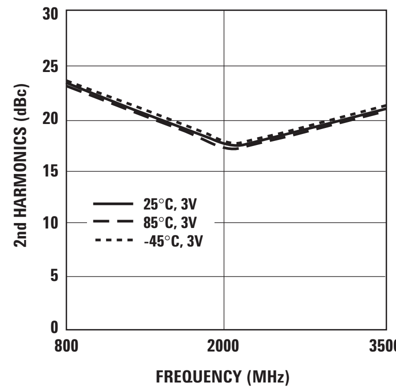


Figure 18. Second Harmonics vs. Frequency. (P_{in} = 0 dBm, V_d = 3V)

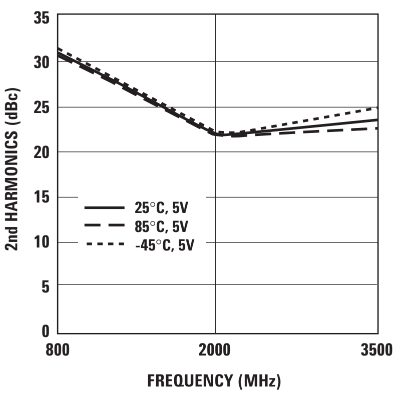


Figure 19. Second Harmonics vs. Frequency. (P_{in} = 0 dBm, V_d = 5V)

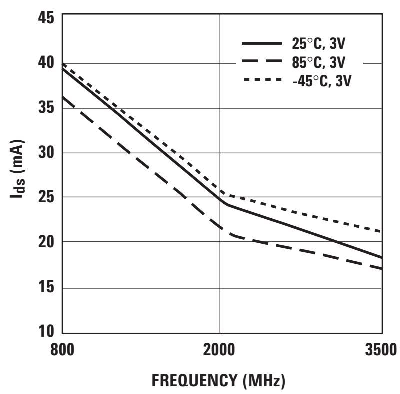


Figure 20. I_{ds} vs. Frequency. (P_{in} = -10 dBm, V_d = 3V)

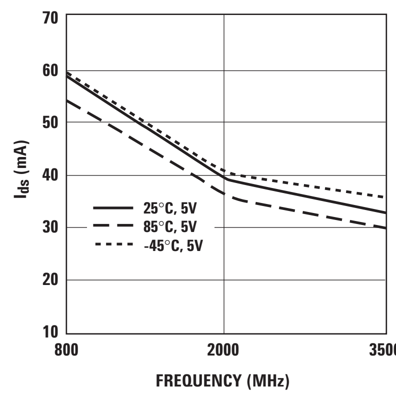


Figure 21. I_{ds} vs. Frequency. (P_{in} = -10 dBm, V_d = 5V)

MGA-565P8 Typical Performance Curves (at 25°C, 2 GHz, unless specified otherwise)

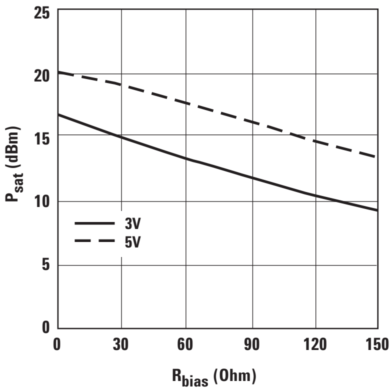


Figure 22. P_{sat} vs. R_{bias}, P_{in} = 0 dBm for V_d = 3V and 5V.

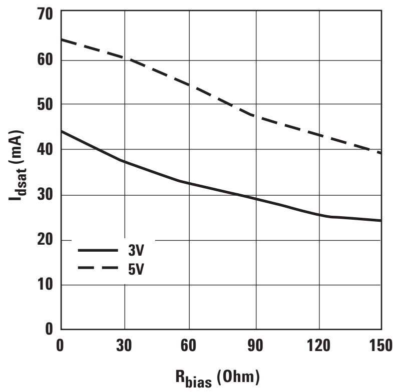


Figure 23. I_{dsat} vs. R_{bias}, P_{in} = 0 dBm for V_d = 3V and 5V.

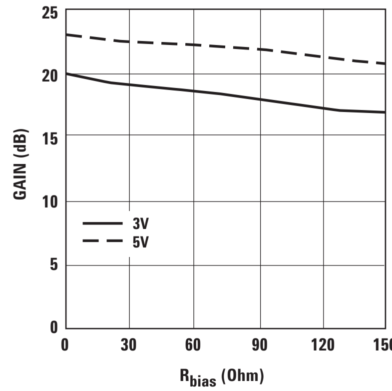


Figure 24. Gain vs. R_{bias}, P_{in} = -10 dBm for V_d = 3V and 5V.

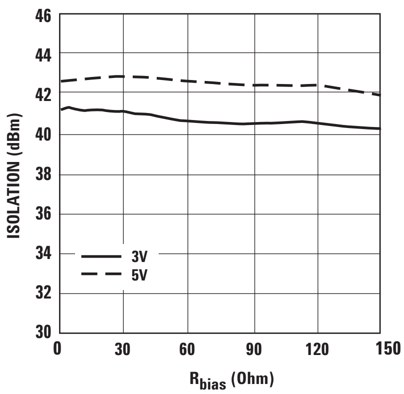


Figure 25. Isolation vs. R_{bias}, P_{in} = -10 dBm for V_d = 3V and 5V.

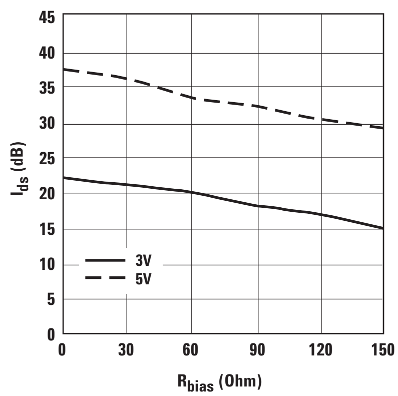


Figure 26. I_{ds} vs. R_{bias}, P_{in} = -10 dBm for V_d = 3V and 5V.

MGA-565P8 Typical Scattering Parameters (at 25°C, V_d = 5V, I_d = 35 mA, R_{bias} = 0Ω)

Freq.	S_{11}		S_{21}			S_{12}			S_{22}		K
GHz	Mag.	Ang.	dB	Mag.	Ang.	dB	Mag.	Ang.	Mag.	Ang.	
0.1	0.48	-82.9	33.7	48.51	20.3	-66.0	0.001	96.5	0.46	-27.5	12.7
0.2	0.19	-136.9	33.9	49.83	-21.5	-60.1	0.001	86.2	0.43	-34.8	8.1
0.3	0.08	127.4	33.5	47.25	-48.8	-56.0	0.002	61.1	0.40	-49.9	5.6
0.4	0.14	54.5	32.3	41.22	-70.5	-53.1	0.002	39.3	0.38	-61.2	4.6
0.5	0.20	23.2	32.2	40.90	-90.8	-52.6	0.002	26.6	0.36	-77.0	4.3
0.6	0.25	0.2	31.5	37.47	-109.9	-51.6	0.003	13.3	0.34	-89.5	4.1
0.7	0.29	-18.7	30.8	34.58	-127.1	-50.6	0.003	1.3	0.33	-101.8	4.0
0.8	0.33	-36.0	30.1	32.04	-143.8	-49.5	0.003	-9.5	0.32	-114.5	3.7
0.9	0.36	-54.3	29.3	29.32	-161.1	-48.0	0.004	-25.4	0.31	-129.7	3.3
1.0	0.36	-71.0	28.4	26.32	-176.0	-48.1	0.004	-44.9	0.27	-141.3	3.9
1.1	0.36	-85.0	27.7	24.18	170.1	-48.6	0.004	-56.7	0.25	-149.8	4.5
1.2	0.37	-98.1	27.1	22.60	156.4	-48.7	0.004	-66.7	0.24	-159.4	4.9
1.3	0.37	-111.5	26.4	21.01	142.3	-48.7	0.004	-75.9	0.24	-169.0	5.2
1.4	0.37	-124.1	25.8	19.56	129.1	-48.7	0.004	-85.4	0.23	-178.8	5.6
1.5	0.38	-135.9	25.3	18.36	116.2	-48.6	0.004	-94.0	0.22	171.5	6.0
1.6	0.38	-148.7	24.8	17.36	102.6	-48.5	0.004	-102.9	0.22	161.7	6.2
1.7	0.38	-160.8	24.2	16.26	89.5	-48.5	0.004	-111.9	0.21	151.9	6.6
1.8	0.38	-172.4	23.7	15.28	76.8	-48.4	0.004	-120.6	0.21	142.2	7.0
1.9	0.38	176.3	23.2	14.43	64.4	-48.3	0.004	-129.1	0.20	132.2	7.4
2.0	0.38	165.0	22.8	13.73	51.9	-48.3	0.004	-137.0	0.20	122.5	7.7
2.1	0.37	153.7	22.3	12.99	39.3	-48.1	0.004	-143.4	0.19	113.1	8.1
2.2	0.37	143.3	21.8	12.33	27.3	-46.8	0.005	-151.2	0.19	105.0	7.4
2.3	0.37	131.1	21.5	11.86	15.1	-47.0	0.004	-168.4	0.19	93.0	7.8
2.4	0.37	119.5	21.1	11.31	2.6	-47.5	0.004	-177.2	0.19	82.3	8.7
2.5	0.36	108.2	20.7	10.80	-9.6	-47.5	0.004	174.1	0.18	71.7	9.2
2.6	0.36	96.8	20.3	10.33	-21.5	-47.4	0.004	165.1	0.18	61.5	9.5
2.7	0.35	85.6	19.9	9.91	-33.7	-47.4	0.004	155.8	0.18	51.0	10.0
2.8	0.34	74.0	19.6	9.50	-45.9	-47.3	0.004	144.5	0.17	40.0	10.4
2.9	0.34	62.5	19.2	9.13	-58.1	-47.5	0.004	131.2	0.17	28.7	11.1
3.0	0.32	51.1	18.8	8.70	-70.3	-49.6	0.003	112.5	0.16	16.0	15.2
3.1	0.32	43.0	18.4	8.33	-81.6	-50.7	0.003	131.5	0.16	8.4	18.0
3.2	0.32	31.4	18.1	8.08	-93.5	-49.1	0.004	123.9	0.16	-0.7	15.4
3.3	0.31	19.7	17.8	7.78	-105.6	-48.8	0.004	113.8	0.16	-11.8	15.5
3.4	0.30	8.1	17.5	7.49	-117.6	-48.9	0.004	105.4	0.16	-21.8	16.4
3.5	0.30	-3.7	17.2	7.22	-129.7	-48.8	0.004	97.3	0.16	-31.9	16.8
3.6	0.29	-16.1	16.8	6.93	-142.1	-49.3	0.003	87.8	0.17	-42.7	18.8
3.7	0.27	-29.6	16.4	6.61	-153.3	-49.7	0.003	93.0	0.16	-68.1	20.8
3.8	0.25	-43.8	16.1	6.37	-165.9	-49.3	0.003	87.1	0.14	-70.2	21.0
3.9	0.22	-59.0	15.5	5.96	-178.3	-48.7	0.004	90.2	0.13	-77.6	21.5
4.0	0.14	-64.5	14.7	5.44	171.9	-45.6	0.005	91.4	0.14	-84.1	16.9
4.1	0.16	-41.6	14.6	5.37	165.1	-43.9	0.006	68.4	0.15	-95.7	13.8
4.2	0.22	-56.0	14.8	5.50	153.7	-43.7	0.007	42.7	0.15	-111.2	12.9
4.3	0.23	-73.2	14.7	5.42	141.0	-44.0	0.006	19.5	0.15	-124.9	13.6
4.4	0.22	-87.9	14.4	5.26	128.9	-44.3	0.006	7.6	0.15	-137.1	14.5
4.5	0.21	-99.6	14.1	5.06	117.2	-45.1	0.006	-21.7	0.14	-153.5	16.5
4.6	0.20	-110.4	13.7	4.86	106.0	-47.2	0.004	-55.1	0.13	-168.4	22.2
4.7	0.19	-111.2	13.6	4.77	96.6	-48.8	0.004	-176.2	0.09	-170.7	27.6
4.8	0.23	-127.2	13.6	4.76	83.4	-44.0	0.006	32.8	0.12	-175.4	15.6
4.9	0.22	-140.4	13.2	4.59	72.3	-47.0	0.004	5.6	0.11	170.3	22.9
5.0	0.21	-153.3	13.0	4.48	60.8	-46.4	0.005	-11.0	0.11	160.7	22.1
5.1	0.21	-165.3	12.8	4.37	49.3	-46.9	0.005	-22.0	0.11	152.2	24.0
5.2	0.20	-177.2	12.6	4.25	37.7	-47.5	0.004	-28.1	0.11	142.3	26.3
5.3	0.20	170.5	12.3	4.14	26.2	-47.8	0.004	-30.1	0.11	132.3	28.3
5.4	0.19	158.7	12.1	4.02	14.7	-47.4	0.004	-25.1	0.12	124.4	27.7
5.5	0.19	146.7	11.8	3.90	3.4	-44.5	0.006	-27.6	0.13	113.5	20.3
5.6	0.18	135.4	11.6	3.79	-8.0	-42.6	0.007	-47.1	0.13	100.8	16.8
5.7	0.18	123.7	11.3	3.68	-19.4	-42.5	0.008	-66.0	0.14	88.9	17.1
5.8	0.18	111.4	11.0	3.56	-30.5	-43.2	0.007	-80.4	0.14	77.2	19.3
5.9	0.18	100.4	10.8	3.45	-41.7	-44.2	0.006	-85.9	0.14	70.6	22.1
6.0	0.18	88.9	10.4	3.32	-52.7	-44.1	0.006	-88.2	0.16	62.3	22.6

MGA-565P8 Typical Scattering Parameters (at 25°C, V_d = 3V, I_d = 20 mA, R_{bias} = 0Ω)

Freq.	S_{11}			S_{21}			S_{12}		S_{22}		K
GHz	Mag.	Ang.	dB	Mag.	Ang.	dB	Mag.	Ang.	Mag.	Ang.	
0.1	0.53	-75.3	30.8	34.87	27.3	-62.9	0.001	105.7	0.48	-27.5	11.2
0.2	0.17	-116.2	31.1	35.82	-21.4	-55.2	0.002	89.1	0.45	-34.4	6.3
0.3	0.00	162.6	30.6	34.07	-47.6	-52.3	0.002	61.2	0.43	-53.8	5.0
0.4	0.12	26.9	29.4	29.48	-71.1	-50.5	0.003	36.9	0.40	-72.6	4.7
0.5	0.18	3.8	29.4	29.43	-89.6	-48.9	0.004	25.1	0.38	-83.5	3.9
0.6	0.24	-13.8	28.6	26.95	-108.7	-47.9	0.004	10.7	0.36	-97.1	3.8
0.7	0.28	-30.1	27.9	24.85	-126.0	-47.0	0.004	-3.0	0.34	-111.3	3.7
0.8	0.31	-45.9	27.2	22.90	-142.7	-46.2	0.005	-16.6	0.32	-125.3	3.6
0.9	0.33	-61.5	26.4	20.95	-159.2	-45.7	0.005	-30.3	0.30	-138.5	3.7
1.0	0.34	-75.5	25.6	19.15	-174.2	-45.4	0.005	-43.6	0.27	-150.8	4.0
1.1	0.35	-89.0	24.9	17.63	171.4	-45.3	0.005	-55.7	0.25	-162.2	4.3
1.2	0.36	-101.9	24.3	16.46	157.5	-45.2	0.005	-67.1	0.24	-173.9	4.5
1.3	0.37	-114.8	23.7	15.30	143.4	-45.2	0.005	-77.7	0.22	175.0	4.9
1.4	0.37	-127.0	23.1	14.25	130.1	-45.2	0.006	-88.0	0.21	164.8	5.2
1.5	0.37	-138.4	22.5	13.38	117.2	-45.1	0.006	-97.1	0.19	155.1	5.6
1.6	0.38	-150.8	22.1	12.67	103.7	-45.0	0.006	-106.8	0.19	144.7	5.8
1.7	0.37	-162.4	21.5	11.89	90.4	-45.0	0.006	-116.1	0.18	134.0	6.2
1.8	0.37	-173.8	21.0	11.20	77.8	-44.9	0.006	-125.0	0.16	124.2	6.6
1.9	0.37	175.2	20.5	10.59	65.3	-44.9	0.006	-134.0	0.16	114.5	6.9
2.0	0.37	164.3	20.1	10.09	52.7	-44.8	0.006	-142.2	0.15	104.7	7.2
2.1	0.37	153.2	19.6	9.57	40.0	-44.7	0.006	-150.0	0.14	94.9	7.6
2.2	0.37	142.9	19.1	9.05	27.9	-43.8	0.006	-157.7	0.14	87.3	7.3
2.3	0.37	131.2	18.8	8.75	15.6	-43.8	0.006	-172.5	0.13	76.1	7.5
2.4	0.36	119.9	18.4	8.35	3.1	-44.1	0.006	178.3	0.12	64.7	8.2
2.5	0.35	108.8	18.1	7.99	-9.2	-44.2	0.006	169.9	0.12	53.6	8.7
2.6	0.35	97.8	17.7	7.65	-21.2	-44.1	0.006	161.0	0.11	43.9	9.0
2.7	0.35	86.8	17.3	7.34	-33.5	-44.0	0.006	151.0	0.11	34.0	9.3
2.8	0.34	75.7	17.0	7.04	-45.8	-43.8	0.006	140.5	0.10	23.2	9.7
2.9	0.33	64.4	16.6	6.76	-58.0	-43.9	0.006	128.6	0.10	12.0	10.2
3.0	0.32	53.6	16.2	6.45	-70.2	-45.1	0.006	115.1	0.10	-0.7	12.5
3.1	0.32	44.9	15.9	6.20	-81.7	-45.5	0.005	119.6	0.09	-8.0	13.5
3.2	0.32	33.7	15.6	6.00	-93.8	-44.6	0.006	111.0	0.09	-15.5	12.6
3.3	0.31	22.3	15.2	5.78	-106.0	-44.4	0.006	101.1	0.09	-26.4	12.9
3.4	0.31	11.3	14.9	5.56	-118.0	-44.5	0.006	91.5	0.08	-34.8	13.5
3.5	0.30	-0.1	14.6	5.35	-130.0	-44.5	0.006	82.2	0.09	-43.1	14.2
3.6	0.29	-11.9	14.2	5.15	-142.1	-45.1	0.006	72.4	0.10	-54.3	15.8
3.7	0.28	-24.4	14.0	5.00	-154.1	-45.1	0.006	76.0	0.10	-92.6	16.4
3.8	0.27	-37.4	13.6	4.79	-166.8	-44.5	0.006	63.6	0.06	-97.0	16.1
3.9	0.25	-51.6	13.1	4.53	-179.4	-44.9	0.006	56.0	0.05	-99.7	18.2
4.0	0.20	-66.7	12.5	4.21	168.6	-45.2	0.006	58.1	0.05	-100.9	20.6
4.1	0.13	-63.3	11.7	3.85	159.7	-43.6	0.007	61.7	0.06	-101.1	19.3
4.2	0.18	-48.6	11.8	3.87	152.0	-43.5	0.007	39.9	0.06	-115.6	18.7
4.3	0.21	-64.6	11.8	3.89	140.0	-43.2	0.007	13.8	0.06	-132.4	17.7
4.4	0.22	-80.1	11.6	3.80	127.7	-43.6	0.007	2.6	0.06	-143.7	18.9
4.5	0.21	-91.4	11.3	3.66	116.0	-44.3	0.006	-23.8	0.06	-165.6	21.2
4.6	0.21	-102.3	10.9	3.52	104.7	-44.2	0.006	-50.6	0.05	172.5	22.0
4.7	0.20	-105.6	10.7	3.42	95.0	-44.9	0.006	-115.3	0.02	156.2	24.6
4.8	0.24	-120.3	10.6	3.41	82.1	-44.4	0.006	4.5	0.04	-175.3	23.0
4.9	0.23	-133.3	10.3	3.28	71.1	-44.6	0.006	-34.5	0.03	166.0	24.5
5.0	0.22	-146.0	10.1	3.20	59.8	-43.8	0.006	-47.7	0.03	164.1	23.1
5.1	0.22	-158.0	9.8	3.10	48.4	-44.1	0.006	-61.1	0.03	166.9	24.6
5.2	0.22	-170.0	9.6	3.01	37.0	-44.8	0.006	-72.7	0.03	162.5	27.4
5.3	0.21	177.7	9.3	2.92	25.6	-45.9	0.005	-82.5	0.04	157.3	32.4
5.4	0.21	165.5	9.0	2.82	14.3	-48.1	0.004	-84.1	0.04	153.6	43.1
5.5	0.20	152.8	8.7	2.73	3.4	-48.1	0.004	-64.4	0.06	139.9	44.3
5.6	0.20	142.6	8.5	2.66	-7.4	-44.2	0.006	-70.4	0.06	125.5	29.2
5.7	0.20	131.3	8.2	2.58	-18.6	-43.0	0.007	-90.9	0.07	111.2	26.2
5.8	0.20	118.6	8.0	2.50	-29.4	-43.7	0.007	-109.0	0.08	97.5	29.4
5.9	0.19	106.8	7.7	2.43	-40.0	-45.6	0.005	-115.0	0.09	89.2	37.4
6.0	0.19	94.9	7.5	2.36	-50.3	-46.4	0.005	-106.5	0.12	73.1	42.2

Device Models

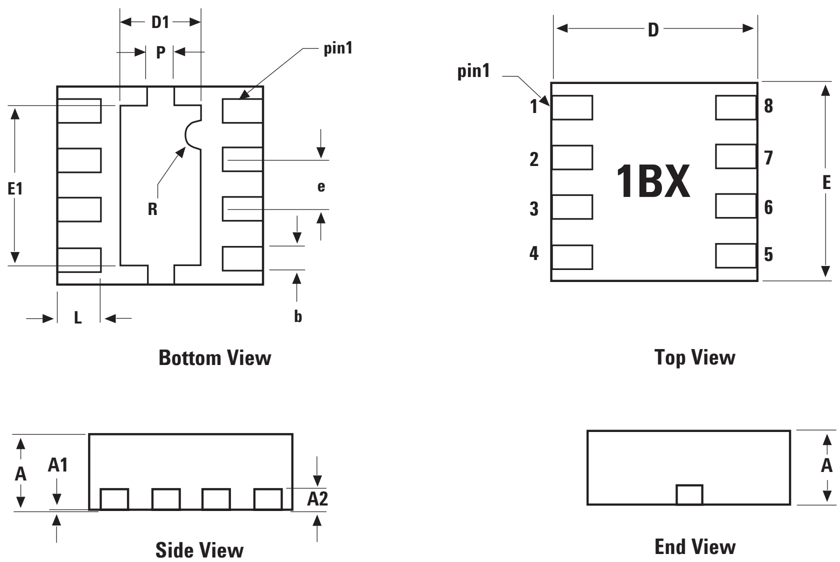
Refer to Agilent's Web Site

www.agilent.com/view/rf

Ordering Information

Part Number	No. of Devices	Container
MGA-565P8-TR1	3000	7″ Reel
MGA-565P8-TR2	10000	13″Reel
MGA-565P8-BLK	100	antistatic bag

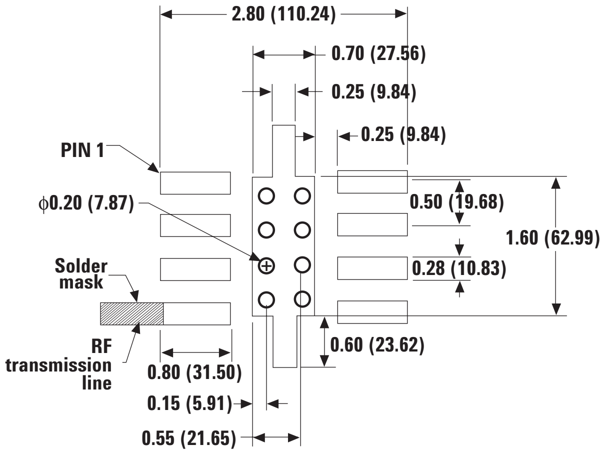
2 x 2 LPCC (JEDEC DFP-N) Package Dimensions



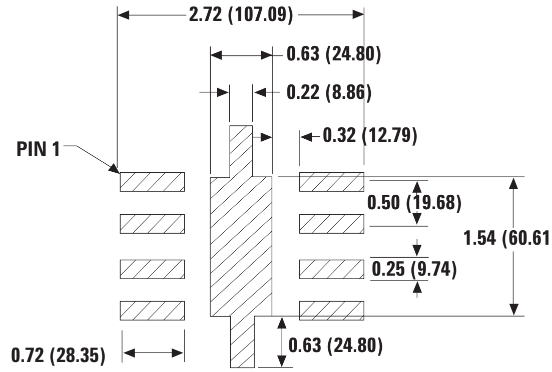
SYMBOL	DIMENSIONS MIN.	NOM.	MAX.
A	0.70	0.75	0.80
A1	0	0.02	0.05
A2		0.203 REF	
b	0.225	0.25	0.275
D	1.9	2.0	2.1
D1	0.65	0.80	0.95
E	1.9	2.0	2.1
E1	1.45	1.6	1.75
e		0.50 BSC	

DIMENSIONS ARE IN MILLIMETERS

PCB Land Pattern and Stencil Design



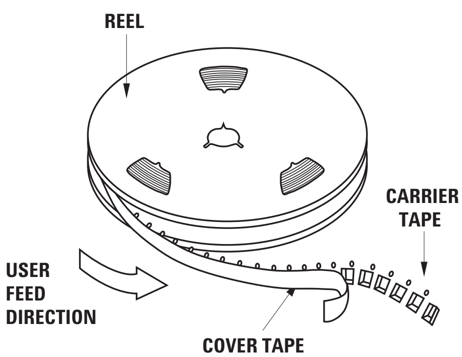
PCB Land Pattern (top view)

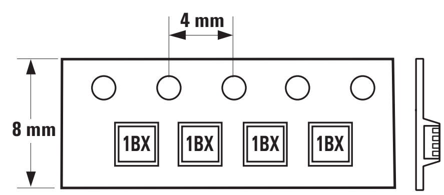


Stencil Layout (top view)

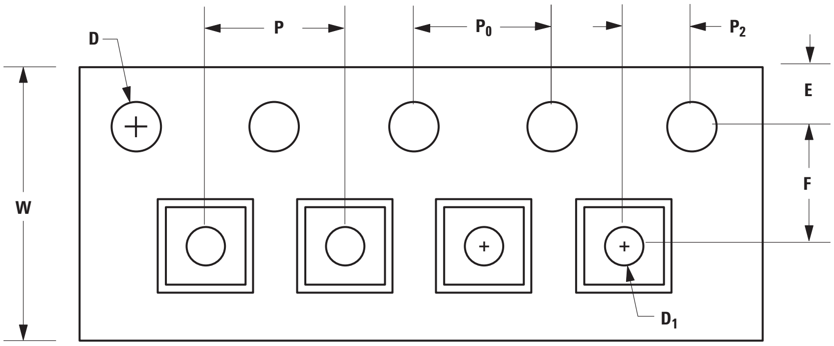
Notes: Typical stencil thickness is 5 mils.
Measurements are in millimeters (mils).

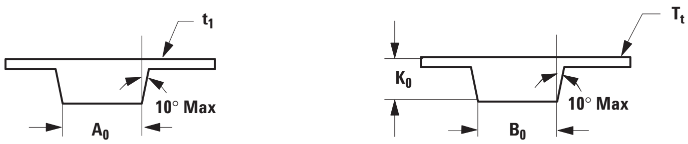
Device Orientation





Tape Dimensions





DESCRIPTION		SYMBOL	SIZE (mm)	SIZE (inches)
CAVITY	LENGTH	A_0	2.30 ± 0.05	0.091 ± 0.004
	WIDTH	B_0	2.30 ± 0.05	0.091 ± 0.004
	DEPTH	K_0	1.00 ± 0.05	0.039 ± 0.002
	PITCH	P	4.00 ± 0.10	0.157 ± 0.004
	BOTTOM HOLE DIAMETER	D_1	1.00 + 0.25	0.039 + 0.002
PERFORATION	DIAMETER	D	1.50 ± 0.10	0.060 ± 0.004
	PITCH	P_0	4.00 ± 0.10	0.157 ± 0.004
	POSITION	E	1.75 ± 0.10	0.069 ± 0.004
CARRIER TAPE	WIDTH	W	8.00 + 0.30 8.00 – 0.10	0.315 ± 0.012 0.315 ± 0.004
	THICKNESS	t_1	0.254 ± 0.02	0.010 ± 0.0008
COVER TAPE	WIDTH	C	5.4 ± 0.10	0.205 ± 0.004
	TAPE THICKNESS	T_t	0.062 ± 0.001	0.0025 ± 0.0004
DISTANCE	CAVITY TO PERFORATION (WIDTH DIRECTION)	F	3.50 ± 0.05	0.138 ± 0.002
	CAVITY TO PERFORATION (LENGTH DIRECTION)	P_2	2.00 ± 0.05	0.079 ± 0.002

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Data subject to change.

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5989-1805EN

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