MGA-43040

High Linearity (2.3 – 2.4) GHz Power Amplifier Module

Data Sheet

Description

Avago Technologies' MGA-43040 is a fully matched power amplifier for use in the (2.3 – 2.4) GHz band. High linear output power at 5V is achieved through the use of Avago Technologies' proprietary 0.25 µm GaAs Enhancement-mode pHEMT process. MGA-43040 is housed in a miniature 5.0 mm × 5.0 mm molded-chip-on-board (MCOB) module package. A detector is also included on-chip. The compact footprint coupled with high gain, high linearity and good efficiency makes the MGA-43040 an ideal choice as a power amplifier for small cell BTS PA applications.

Applications

- Final stage high linearity amplifier for Picocell and Enterprise Femtocell PA targeted for small cell BTS downlink applications.

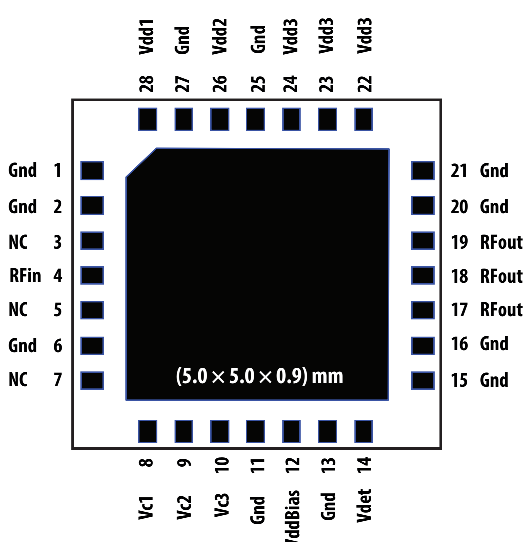
Component Image

TOP VIEW

(5.0 × 5.0 × 0.9) mm Package Outline

Notes:
Package marking provides orientation and identification
"43040" = Tentative device part number
"YYWW" = Year and work week
"XXXX" = Assembly lot number

Pin Configuration



Features

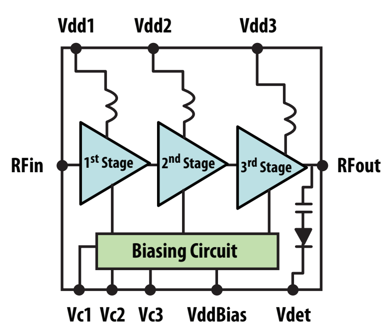
- High linearity performance: Typ -48dBc ACPR1 [1] at 27.0 dBm linear output power (biased with 5V supply)
- High Gain : 40 dB
- Good efficiency
- Fully matched
- Built-in detector
- GaAs E-pHEMT Technology [2]
- Low cost small package size: (5.0 × 5.0 × 0.9) mm

Specifications

- 2.35 GHz; 5.0 V, I_{dq_total} = 340 mA (typ), LTE 20 MHz 100 RB
- PAE: 13%
- 27.0 dBm linear P_{out} @ ACPR1 = -48 dBc [1]
- 40 dB Gain
- Detector range: 20 dB

Notes:
1. LTE 20 MHz 100 RB Test Mode 1.1 downlink signal
2. Enhancement mode technology employs positive V_{GS}, and so eliminates the need for negative gate voltage associated with conventional depletion mode devices

Functional Block Diagram



Attention: Observe precautions for handling electrostatic sensitive devices.
ESD Machine Model = 70 V
ESD Human Body Model = 350 V
Refer to Avago Application Note A004R: Electrostatic Discharge, Damage and Control.

Absolute Maximum Rating [1] $T_A = 25$ °C

Symbol	Parameter	Units	Absolute Max.
Vdd, VddBias	Supply voltages, bias supply voltage	V	6
Vc	Control Voltage	V	(Vdd)
$P_{in,max}$	CW RF Input Power	dBm	20
P_{diss}	Total Power Dissipation [3]	W	5.3
T_j	Junction Temperature	°C	150
T_{STG}	Storage Temperature	°C	-65 to 150

Thermal Resistance [2,3]

θ_{jc} = 14.2 °C/W

Notes:

1. Operation of this device in excess of any of these limits may cause permanent damage.
2. Thermal resistance measured using Infra-Red Measurement Technique.
3. Board temperature (T_B) is 25 °C , for T_B > 74.7 °C derate the device power at 70.4 mW per °C rise in Board (package belly) temperature.

Electrical Specifications

T_A = 25 °C, Vdd1,2,3 = Vddbias=5.0 V, Idqtotal = 350 mA, RF performance at 2.35 GHz, unless otherwise stated.

Symbol	Parameter and Test Condition	Units	Min.	Typ.	Max.
Vdd	Supply Voltage	V		5.0	
Idq_total	Quiescent Supply Current	mA		340	
Gain	Gain	dB	35	40	
OP1dB	Output Power at 1dB Gain Compression	dBm		35	
ACPR1 @ P_{out}=27.0 dBm	LTE 20 MHz 100 RB Test Mode 1.1 downlink signal	dBc		-48	-45
PAE	Power Added Efficiency	%		13	
S11	Input Return Loss, 50 Ω source	dB		20	
DetR	Detector RF dynamic range	dB		20	
2fo	2fo Harmonics	dBc		-27	

Product Consistency Distribution Charts [4]

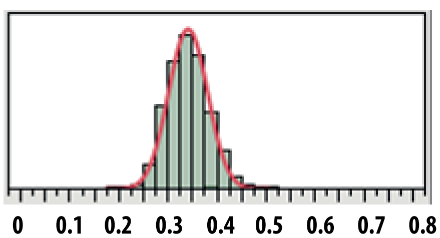


Figure 1. Idq_total, Nominal = 340mA

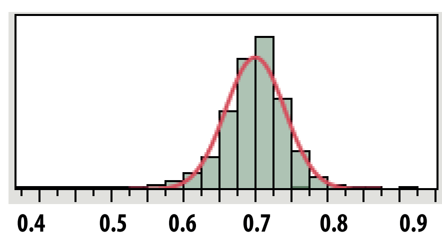


Figure 2. Idd_total at Pout=27.0dBm, Nominal = 700mA

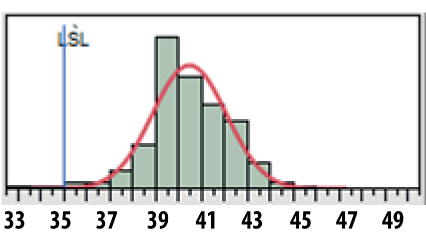


Figure 3. Gain at Pout=27.0dBm, LSL= 35dB, Nominal = 40dB

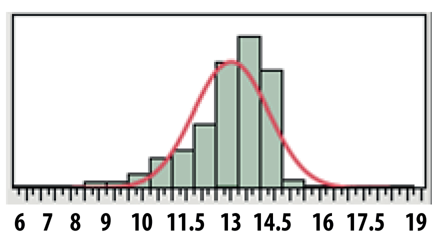


Figure 4. PAE at Pout=27.0dBm, Nominal = 13%

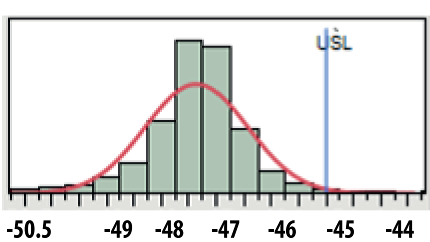


Figure 5. ACPR1 at Pout=27.0dBm, USL= -45dBc, Nominal = -47.7dBc

Note:

4. Distribution data sample size is 1500 samples taken from 3 different wafer lots. TA=25°C, Vdd=VddBias=5.0V, Vc1=2.0V, Vc2=1.8V, Vc3=1.8V, RF performance at 2.35 GHz unless otherwise stated. Future wafers allocated to this product may have nominal values anywhere between the upper and lower limits.

Application Schematic

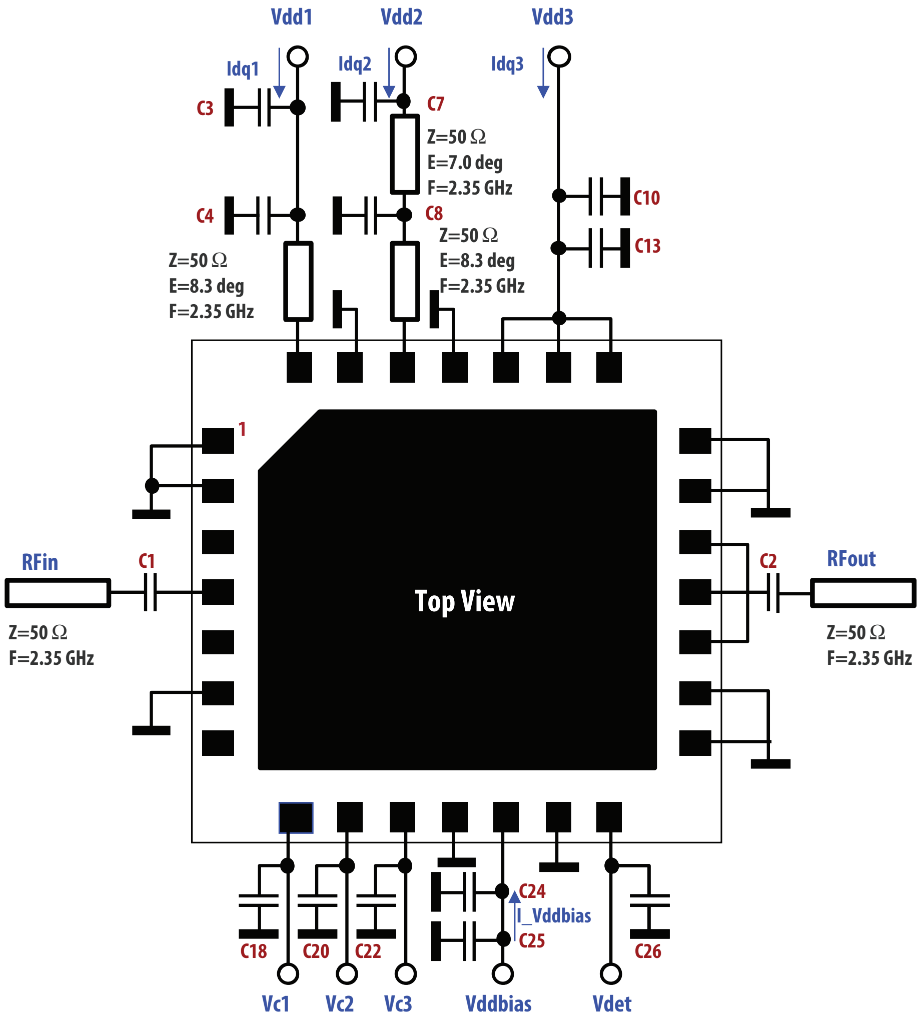
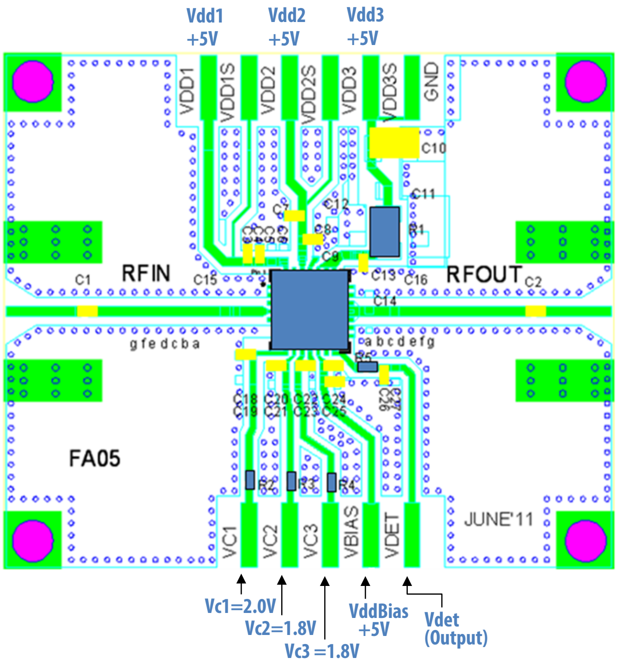


Figure 6. Application circuit in demonstration board

Notes

1. All capacitors on supply lines are bypass capacitors.
2. C1/C2 are RF coupling capacitors.
3. Idq1= 60 mA, Idq2 = 110 mA, Idq3 = 180.0 mA, I_Vddbias = 16.0 mA at Vdd1,2,3=VddBias=5.0 V. Idq1/2/3 are adjusted by voltages to CMOS-compatible control pins Vc1/2/3, respectively. These typical bias currents were obtained with Vc1/2/3 voltages in Figure 2. Adjustment of these currents enable optimum bias conditions to be achieved for best linearity and efficiency for a given modulation type.

Demonstration Board Top View



Component	Value	Part Number	Size
C1, C2, C18, C20, C22	7.5 pF ± 0.5 pF	GJM1555C1H7R5DB01D	0402
C24	6.0 pF ± 0.5 pF	GJM1555C1H6R0DB01D	0402
C4, C8	8.2 pF ± 0.25 pF	GJM1555C1H8R2WB01D	0402
C3, C7, C13, C25	0.1 µF ± 10%	GRM155R71C104KA88D	0402
C10	2.2 µF ± 10%	GRM21BR61E225KA12L	0805
C26	22 nF ± 10%	CM05X7R223K16AHF	0402
R2, R3, R4, R5	0 Ω	RMC1/16S JPTH	0402
R1	0 Ω	RMC1/10 JPTP	0805

Figure 7. Demonstration board application circuit for MGA-43040 module

MGA-43040 typical over-temperature performance at Vc1=2.0 V, Vc2=1.8 V, Vc3=1.8 V as shown in Figure 2, unless otherwise stated

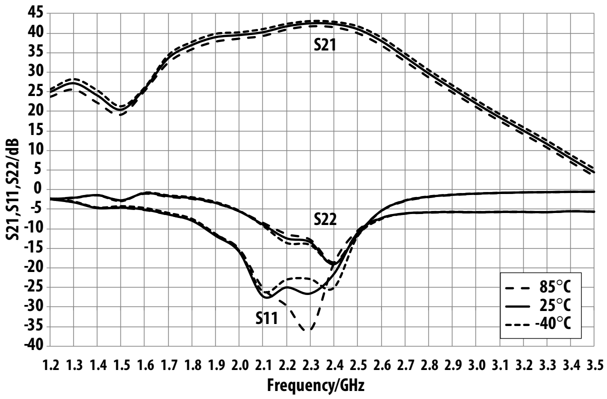


Figure 8. Small-signal performance Over-temperature Vdd=VddBias=5.0 V operating voltage

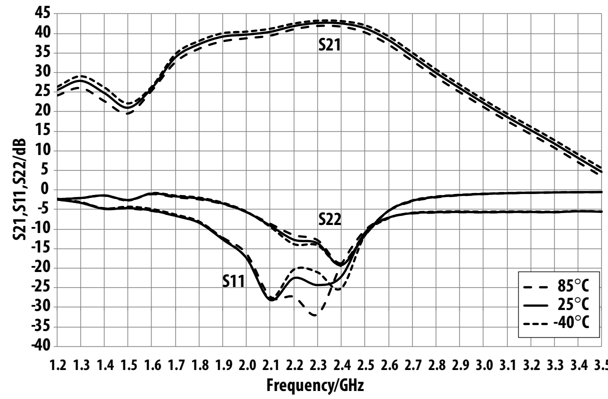


Figure 9. Small-signal performance Over-temperature Vdd=VddBias=5.5 V operating voltage

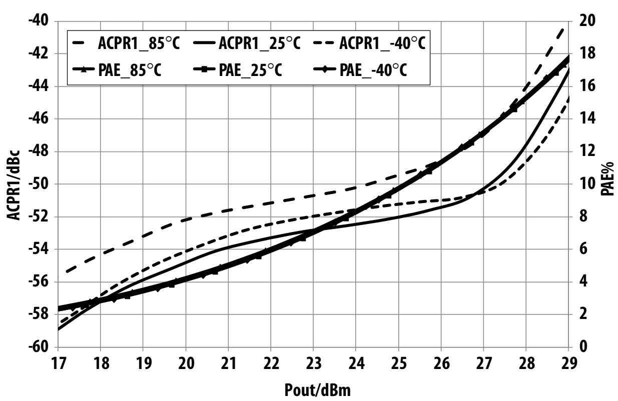


Figure 10. Over-temperature ACPR1, PAE vs. P_{out} @ 2.33 GHz Vdd=VddBias=5.0 V operating voltage

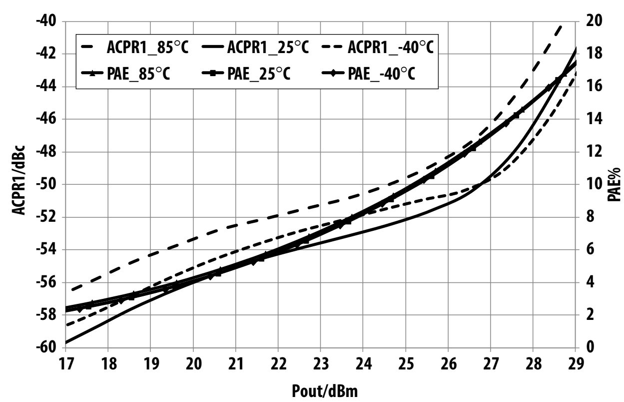


Figure 11. Over-temperature ACPR1, PAE vs. P_{out} @ 2.35 GHz Vdd=VddBias=5.0 V operating voltage

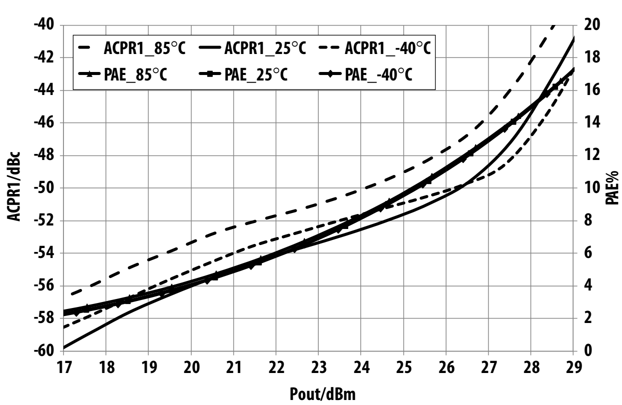


Figure 12. Over-temperature ACPR1, PAE vs. P_{out} @ 2.36 GHz Vdd=VddBias=5.0 V operating voltage

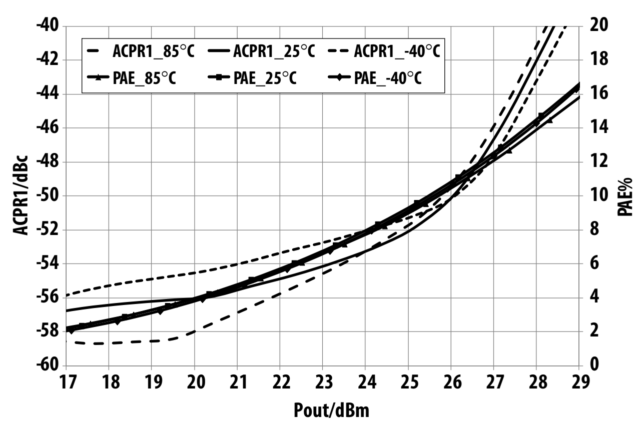


Figure 13. Over-temperature ACPR1, PAE vs. P_{out} @ 2.39 GHz Vdd=VddBias=5.0 V operating voltage

MGA-43040 typical over-temperature performance at Vc1=2.0 V, Vc2=1.8 V, Vc3=1.8 V as shown in Figure 2, unless otherwise stated (Cont.)

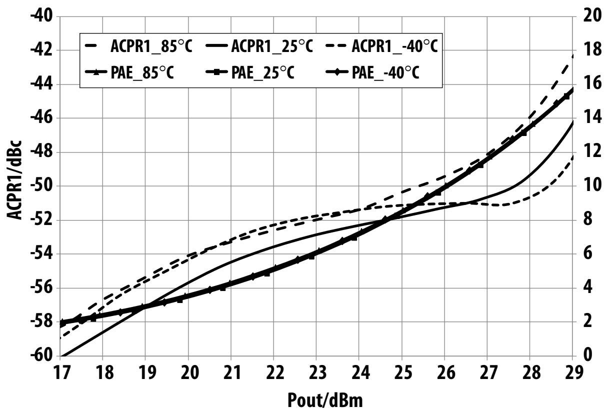


Figure 14. Over-temperature ACPR1, PAE vs. P_{out} @ 2.33 GHz Vdd=VddBias=5.5 V operating voltage

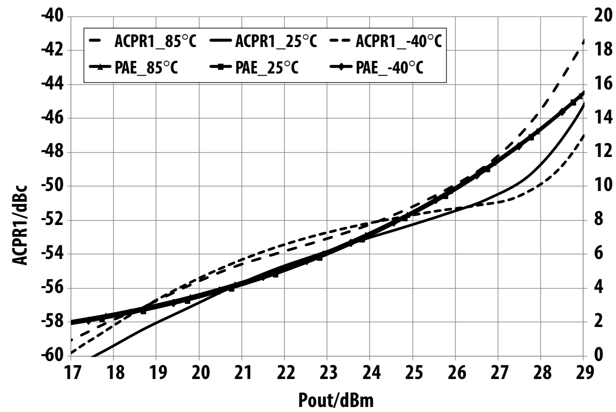


Figure 15. Over-temperature ACPR1, PAE vs. P_{out} @ 2.35 GHz Vdd=VddBias=5.5 V operating voltage

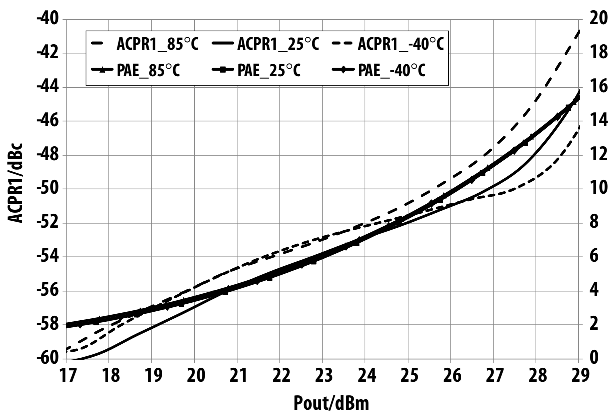


Figure 16. Over-temperature ACPR1, PAE vs. P_{out} @ 2.36 GHz Vdd=VddBias=5.5 V operating voltage

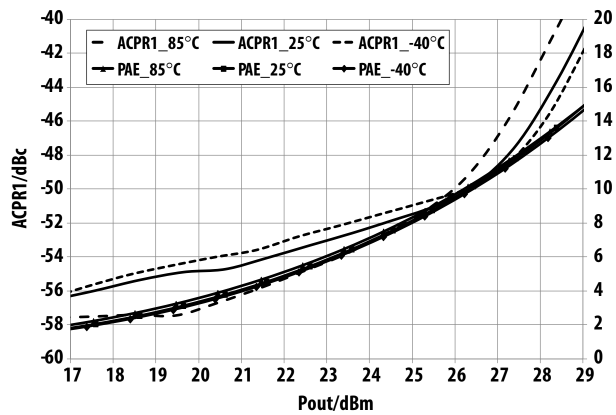


Figure 17. Over-temperature ACPR1, PAE vs. P_{out} @ 2.39 GHz Vdd=VddBias=5.5 V operating voltage

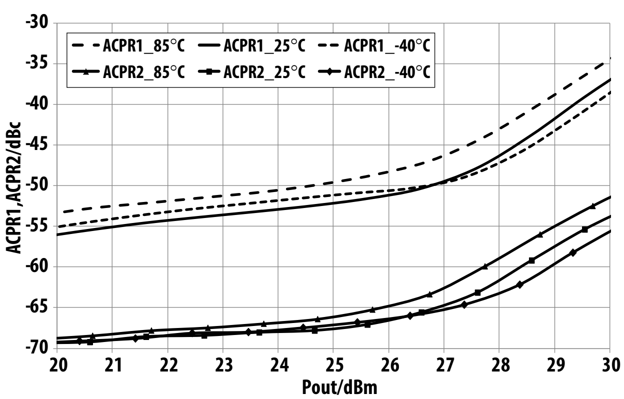


Figure 18. Over-temperature ACPR1, ACPR2 vs. P_{out} @ 2.35 GHz Vdd=VddBias=5.0 V operating voltage

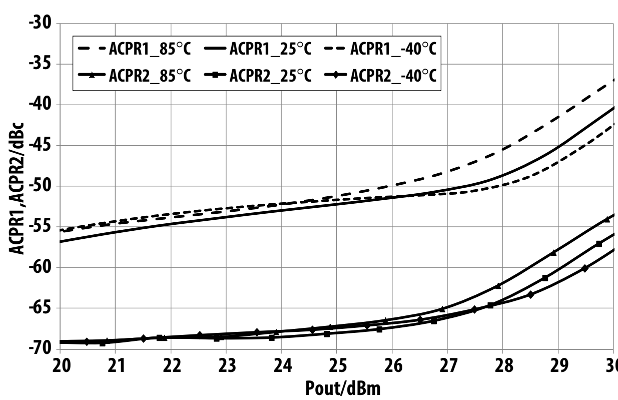


Figure 19. Over-temperature ACPR1, ACPR2 vs. P_{out} @ 2.35 GHz Vdd=VddBias=5.5 V operating voltage

MGA-43040 typical over-temperature performance at Vc1=2.0 V, Vc2=1.8 V, Vc3=1.8 V as shown in Figure 2, unless otherwise stated (Cont.)

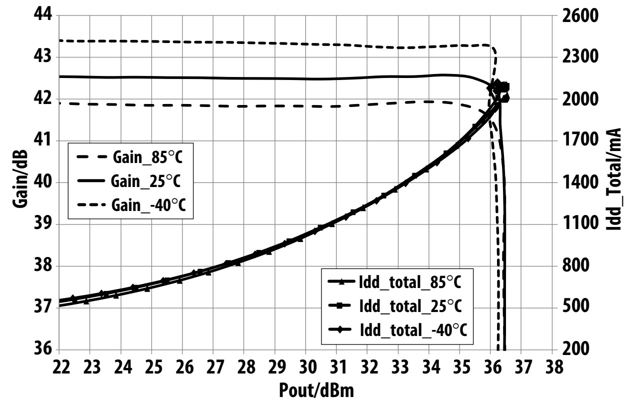


Figure 20. Over-temperature Gain, Idd_total vs. P_{out} @ 2.33GHz Vdd=VddBias=5.0 V operating voltage

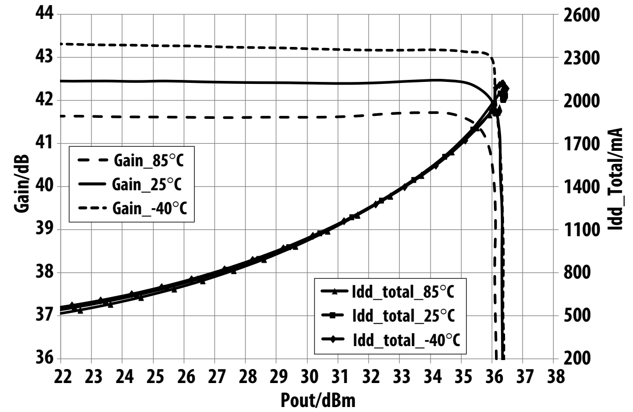


Figure 21. Over-temperature Gain, Idd_total vs. P_{out} @ 2.35 GHz Vdd=VddBias=5.0 V operating voltage

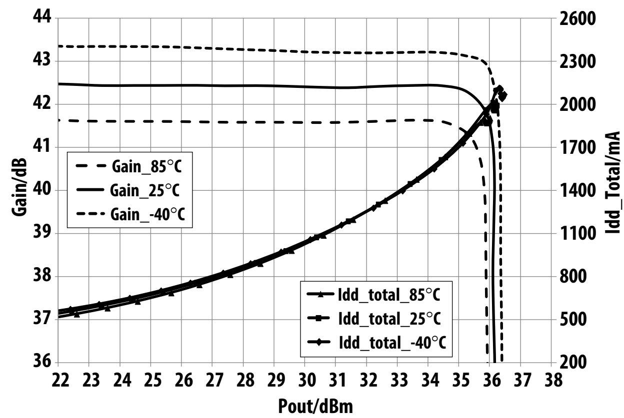


Figure 22. Over-temperature Gain, Idd_total vs. P_{out} @ 2.36GHz Vdd=VddBias=5.0 V operating voltage

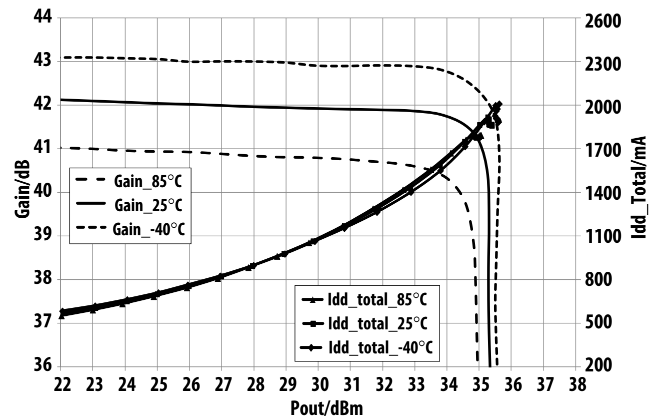


Figure 23. Over-temperature Gain, Idd_total vs. P_{out} @ 2.39GHz Vdd=VddBias=5.0 V operating voltage

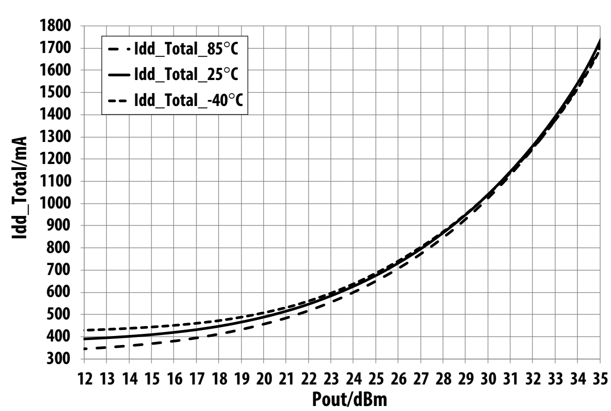


Figure 24. Over-temperature Idd_total vs. P_{out} @ 2.35 GHz Vdd=VddBias=5.0 V operating voltage

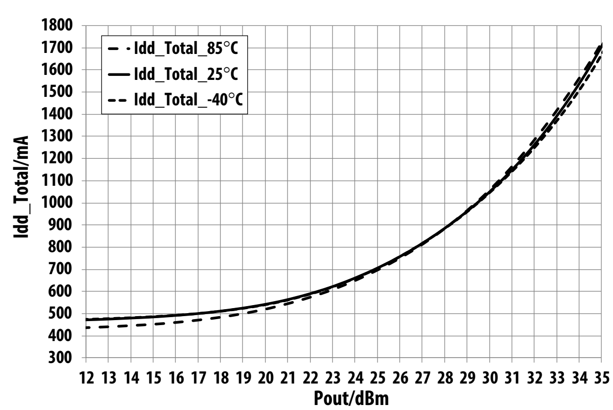


Figure 25. Over-temperature Idd_total vs. P_{out} @ 2.35 GHz Vdd=VddBias=5.5 V operating voltage

MGA-43040 typical over-temperature performance at V_{c1}=2.0 V, V_{c2}=1.8 V, V_{c3}=1.8 V as shown in Figure 2, unless otherwise stated (Cont.)

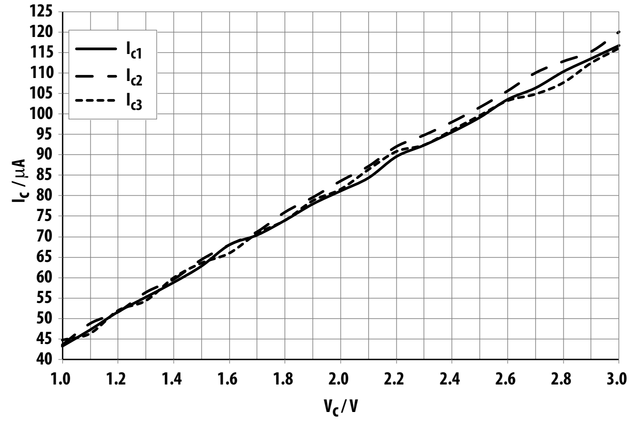


Figure 26. I_c vs. V_c @ Vdd=VddBias=5.0 V

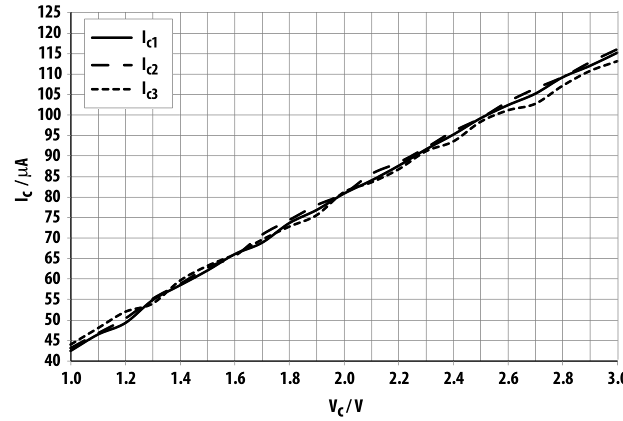


Figure 27. I_c vs. V_c @ Vdd=VddBias=5.5 V

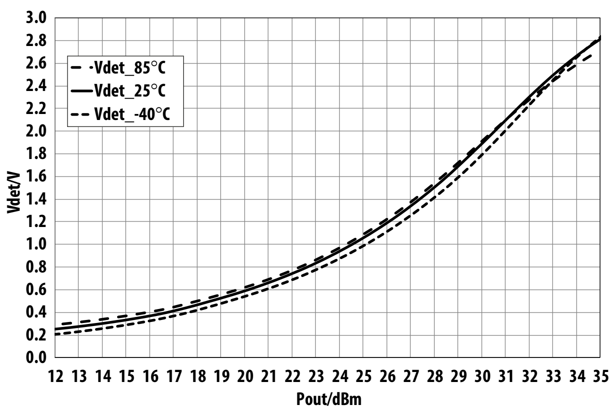


Figure 28. Over-temperature Vdet vs. Pout @ 2.35 GHz Vdd=VddBias=5.0 V operating voltage

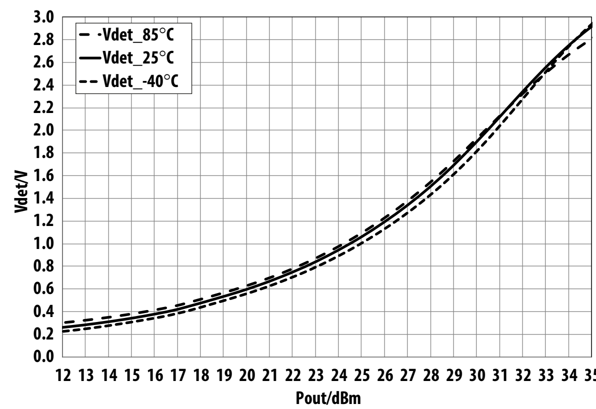


Figure 29. Over-temperature Vdet vs. Pout @ 2.35 GHz Vdd=VddBias=5.5 V operating voltage

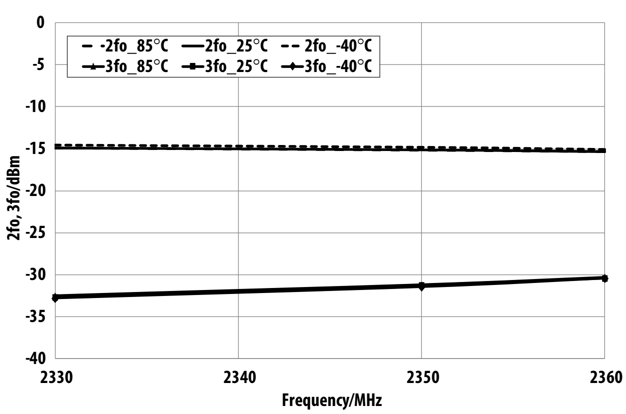


Figure 30. Over-temperature 2nd, 3rd Harmonics vs. Freq at Pout=27.0 dBm Vdd=VddBias=5.0 V operating voltage

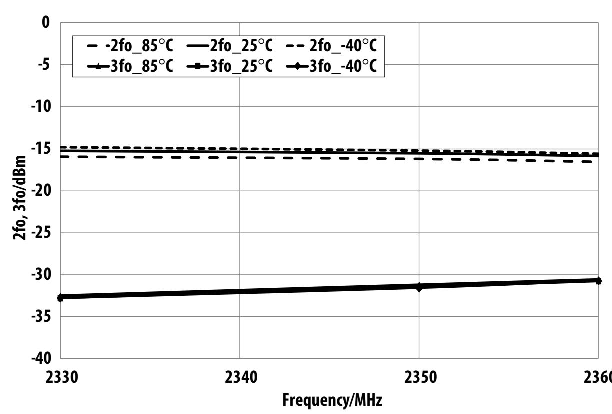


Figure 31. Over-temperature 2nd, 3rd Harmonics vs. Freq at Pout=27.0 dBm Vdd=VddBias=5.5 V operating voltage

MGA-43040 typical LTE 20MHz 100RB Test model 1.1 downlink signal Spectrum Emission Mask (3GPP TS 36.141v8.2.0 [2009-03] standard) performance at Vdd=VddBias=5.0V, Vc1=2.0V, Vc2=1.8V, Vc3=1.8V, unless otherwise stated

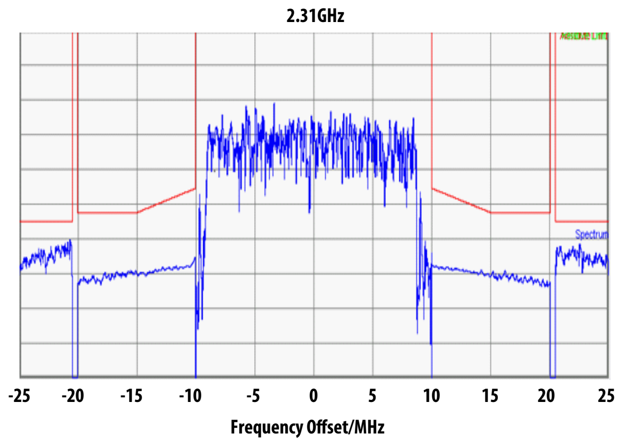


Figure 32. Spectrum Emission Mask 29.0dBm @ 2.31GHz

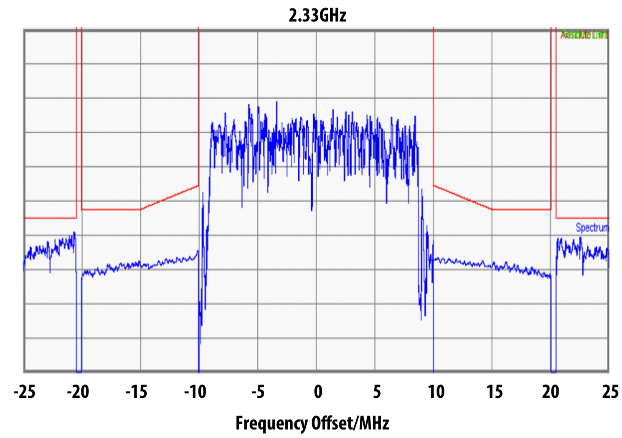


Figure 33. Spectrum Emission Mask 29.0dBm @ 2.33GHz

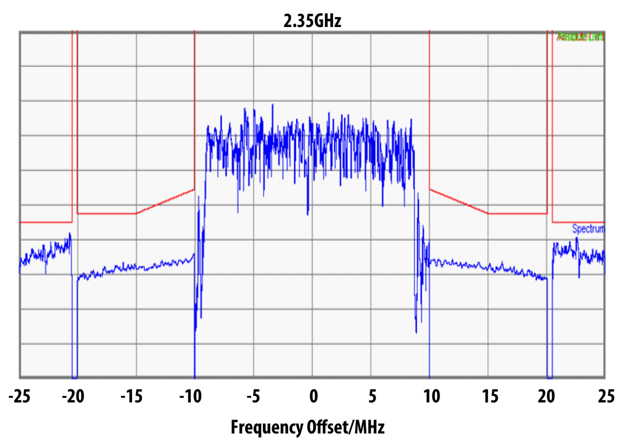


Figure 34. Spectrum Emission Mask 29.0dBm @ 2.35GHz

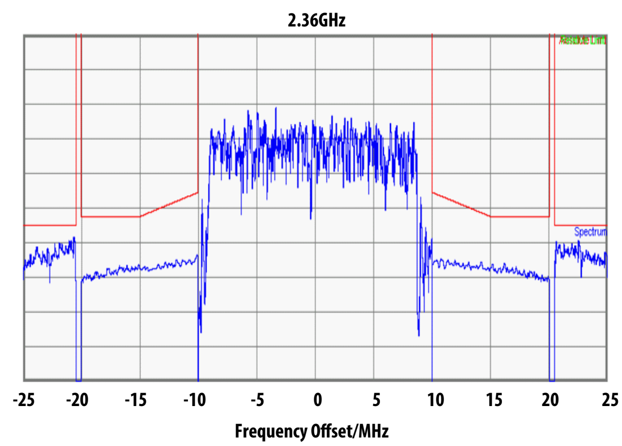


Figure 35. Spectrum Emission Mask 29.0dBm @ 2.36GHz

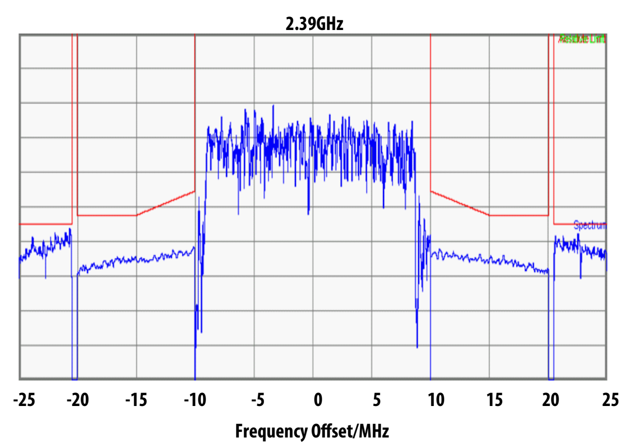


Figure 36. Spectrum Emission Mask 29.0dBm @ 2.39GHz

S-Parameter [5] (Vdd=VddBias=5.0 V, Vc1=2.0 V, Vc2=1.8 V, Vc3=1.8 V), T=25 °C, 50 Ω matched)

Freq (GHz)	S11 (dB)	S11 (ang)	S21 (dB)	S21 (ang)	S12 (dB)	S12 (ang)	S22 (dB)	S22 (ang)
0.1	-0.05	-43.46	-82.39	-171.41	-67.41	-91.79	-0.30	166.08
0.2	-0.22	-83.93	-60.05	-51.56	-64.37	168.17	-0.87	155.53
0.3	-0.36	-118.96	-53.12	-81.90	-63.68	155.26	-0.98	146.84
0.4	-0.37	-148.39	-45.86	-59.12	-67.47	105.30	-1.01	137.19
0.5	-0.35	-174.08	-31.36	-62.51	-73.24	172.77	-1.02	127.41
0.6	-0.28	163.16	-17.64	-90.87	-65.58	38.34	-1.05	117.77
0.7	-0.17	141.41	-4.02	-130.57	-66.15	61.01	-1.10	108.24
0.8	-0.58	116.96	9.92	158.29	-74.19	2.78	-1.16	98.76
0.9	-1.87	107.86	14.37	53.34	-66.90	15.50	-1.29	89.64
1.0	-1.42	93.88	15.71	-3.31	-63.91	36.37	-1.40	80.96
1.1	-1.30	77.99	18.00	-55.30	-61.66	8.43	-1.51	68.16
1.2	-1.43	61.07	19.49	-111.33	-63.18	-18.31	-1.36	60.32
1.3	-2.07	45.60	16.61	-165.69	-71.45	-87.61	-0.88	50.72
1.4	-2.57	33.09	7.46	-107.91	-68.04	40.18	-0.78	33.71
1.5	-2.53	16.75	22.97	-147.49	-59.29	-49.87	-1.03	35.08
1.6	-3.13	-3.43	26.55	169.35	-63.70	-84.48	-0.79	15.51
1.7	-4.26	-26.39	31.66	131.53	-64.44	-77.11	-1.03	3.68
1.8	-6.46	-54.59	35.65	81.77	-62.93	-76.77	-1.48	-10.92
1.9	-13.31	-95.41	37.67	23.38	-56.37	-66.15	-2.52	-26.00
2.0	-18.65	-1.32	36.26	-14.30	-56.63	-65.83	-4.20	-38.55
2.1	-16.25	-3.09	40.32	-56.14	-53.00	-88.72	-6.67	-43.62
2.2	-13.94	-16.83	41.97	-112.63	-52.08	-126.04	-7.70	-42.86
2.3	-17.96	-14.21	42.23	-169.83	-50.57	-142.00	-9.59	-49.60
2.4	-11.93	24.47	41.55	130.45	-52.68	-173.57	-13.58	-18.72
2.5	-6.32	-3.43	38.86	71.56	-51.37	135.22	-6.49	-0.10
2.6	-4.80	-34.45	34.80	23.16	-53.36	110.86	-3.03	-21.17
2.7	-4.70	-58.87	30.56	-15.19	-56.87	93.98	-1.71	-42.16
2.8	-5.06	-78.96	26.53	-47.47	-61.31	53.15	-1.15	-60.74
2.9	-5.55	-96.34	22.75	-75.99	-60.49	66.61	-0.93	-77.44
3.0	-6.04	-111.81	19.12	-101.86	-64.94	63.84	-0.80	-93.08
3.1	-6.46	-126.18	15.60	-125.84	-65.29	103.36	-0.73	-108.06
3.2	-6.74	-139.55	12.10	-148.15	-76.12	19.05	-0.67	-122.43
3.3	-6.91	-152.76	8.51	-169.35	-64.76	102.40	-0.62	-136.19
3.4	-7.02	-165.47	4.66	170.79	-69.86	137.59	-0.54	-149.53
3.5	-6.99	-176.99	0.35	152.68	-65.06	153.96	-0.47	-162.24
3.6	-6.84	172.04	-5.03	138.01	-63.50	88.03	-0.41	-174.49
3.7	-6.57	161.88	-13.04	137.28	-66.30	58.78	-0.38	174.06
3.8	-6.30	152.18	-17.23	-150.27	-58.06	106.16	-0.37	163.22
3.9	-6.04	143.23	-10.45	-135.35	-60.22	60.37	-0.40	153.18
4.0	-5.83	135.05	-6.91	-147.18	-58.13	54.12	-0.43	143.70
4.1	-5.62	127.63	-4.71	-163.53	-62.57	29.32	-0.49	134.88
4.2	-5.42	120.90	-3.08	177.72	-58.19	68.88	-0.56	126.39
4.3	-5.24	114.55	-1.72	156.43	-58.33	16.63	-0.67	118.23
4.4	-5.07	108.37	-0.60	131.65	-58.92	2.69	-0.79	110.33
4.5	-4.89	102.16	0.01	101.82	-58.16	12.63	-0.95	102.89
4.6	-4.75	95.64	-0.64	67.36	-57.84	-11.34	-1.09	95.88
4.7	-4.68	89.17	-3.44	34.50	-57.37	-17.51	-1.09	88.73
4.8	-4.47	82.84	-8.97	21.77	-57.27	-47.42	-1.02	80.48
4.9	-3.99	74.73	-8.48	53.69	-58.38	-43.04	-0.95	71.12

S-Parameter [5] (Vdd=VddBias=5.0 V, Vc1=2.0 V, Vc2=1.8 V, Vc3=1.8 V), T=25 °C, 50 Ω matched) Cont.

Freq (GHz)	S11 (dB)	S11 (ang)	S21 (dB)	S21 (ang)	S12 (dB)	S12 (ang)	S22 (dB)	S22 (ang)
5.0	-3.59	61.28	-3.08	29.83	-57.42	-35.25	-0.93	60.96
5.1	-4.37	36.66	-2.57	-19.13	-57.92	-62.36	-0.80	50.35
5.2	-5.26	23.79	-4.28	-53.55	-58.55	-59.91	-0.76	40.57
5.3	-5.88	12.71	-6.50	-80.69	-57.69	-91.30	-0.74	30.57
5.4	-6.20	2.76	-8.78	-103.41	-57.51	-95.73	-0.71	19.99
5.5	-6.25	-7.06	-10.97	-123.32	-57.76	-103.19	-0.67	9.14
5.6	-6.10	-16.77	-13.06	-141.61	-58.97	-109.41	-0.64	-1.94
5.7	-5.80	-25.91	-15.06	-158.95	-54.67	-120.47	-0.63	-13.50
5.8	-5.48	-35.03	-16.98	-175.90	-56.69	-131.66	-0.60	-25.07
5.9	-5.14	-43.63	-18.87	167.55	-56.83	-152.33	-0.60	-36.95
6.0	-4.82	-51.97	-20.74	150.39	-58.21	-152.79	-0.60	-48.72
7.0	-5.11	-132.66	-23.12	-85.01	-64.22	98.12	-1.39	-169.64
8.0	-3.83	107.44	-34.36	57.37	-59.42	24.83	-0.55	105.31
9.0	-4.93	40.09	-28.91	-71.64	-54.36	-71.04	-0.82	21.49
10.0	-5.53	-104.31	-31.42	99.30	-54.74	144.95	-3.07	-136.30
11.0	-3.22	169.79	-49.93	-10.50	-57.78	55.44	-1.21	140.03
12.0	-6.22	60.73	-56.09	-46.50	-55.70	-47.33	-2.57	69.05
13.0	-3.07	-48.51	-42.09	-128.24	-52.00	-159.54	-2.46	-95.76
14.0	-3.97	-101.62	-40.85	123.51	-55.49	157.53	-3.35	178.00
15.0	-5.04	143.00	-36.15	-6.88	-51.09	39.71	-1.86	77.50
16.0	-4.24	8.62	-39.62	179.55	-50.99	-59.49	-8.41	-63.09
17.0	-2.27	-108.22	-46.66	93.23	-48.60	172.19	-0.99	167.24
18.0	-1.14	-174.30	-47.70	6.98	-53.18	84.31	-0.78	127.20
19.0	-4.34	30.77	-43.73	-133.37	-42.83	-15.74	-4.37	6.29
20.0	-2.93	-133.19	-41.47	56.10	-45.27	165.59	-1.75	-145.59

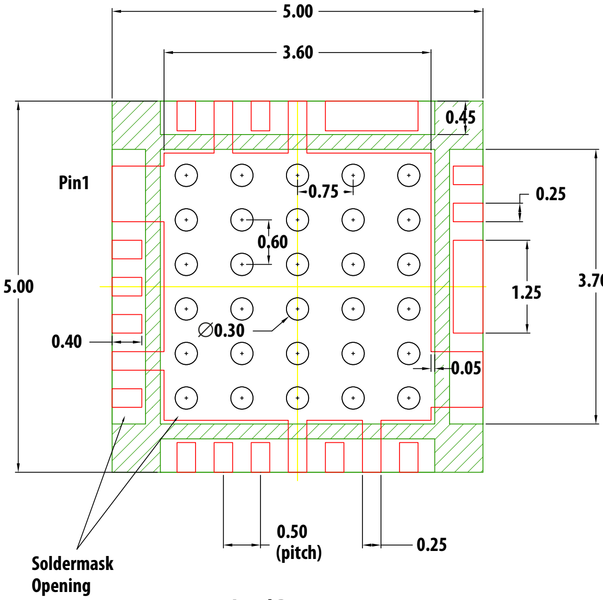
S-Parameter [5] (Vdd=VddBias=5.5 V, Vc1=2.0 V, Vc2=1.8 V, Vc3=1.8 V), T=25 °C, 50 Ω matched)

Freq (GHz)	S11 (dB)	S11 (ang)	S21 (dB)	S21 (ang)	S12 (dB)	S12 (ang)	S22 (dB)	S22 (ang)
0.1	-0.05	-43.41	-59.26	96.93	-60.56	-156.87	-0.30	166.26
0.2	-0.20	-83.95	-63.48	-48.09	-68.73	73.17	-0.83	156.07
0.3	-0.33	-118.94	-55.05	-83.65	-69.82	117.86	-0.91	147.31
0.4	-0.32	-148.39	-45.15	-55.28	-66.66	59.32	-0.93	137.52
0.5	-0.29	-174.02	-31.01	-63.49	-74.45	149.91	-0.94	127.66
0.6	-0.23	163.15	-17.28	-92.18	-66.22	69.69	-0.96	117.93
0.7	-0.12	141.37	-3.67	-131.53	-66.28	71.54	-1.01	108.30
0.8	-0.56	116.88	10.27	157.42	-70.81	19.85	-1.09	98.77
0.9	-1.84	107.94	14.71	53.14	-73.36	33.95	-1.22	89.55
1.0	-1.39	93.91	16.14	-3.12	-60.59	15.42	-1.34	80.80
1.1	-1.29	77.89	18.55	-55.03	-66.41	-5.14	-1.46	67.91
1.2	-1.46	60.87	20.17	-111.57	-65.11	-12.62	-1.34	60.03
1.3	-2.13	45.59	17.38	-166.86	-67.49	-59.05	-0.88	50.53
1.4	-2.63	33.20	8.48	-111.17	-63.62	-17.80	-0.78	33.70
1.5	-2.59	16.55	23.20	-150.98	-60.37	-64.57	-0.96	34.04
1.6	-3.26	-3.69	26.82	167.44	-62.39	-76.48	-0.80	15.02
1.7	-4.48	-26.73	31.99	129.64	-65.62	-101.90	-1.04	2.90
1.8	-6.90	-54.92	35.96	79.57	-60.29	-65.69	-1.54	-11.81
1.9	-14.65	-93.46	37.86	21.21	-57.67	-52.55	-2.63	-26.71
2.0	-17.42	2.90	36.52	-15.80	-53.43	-63.61	-4.31	-39.36
2.1	-15.03	-4.42	40.48	-58.00	-55.14	-105.91	-6.90	-44.05
2.2	-13.35	-21.65	42.08	-113.77	-52.56	-126.58	-7.83	-42.59

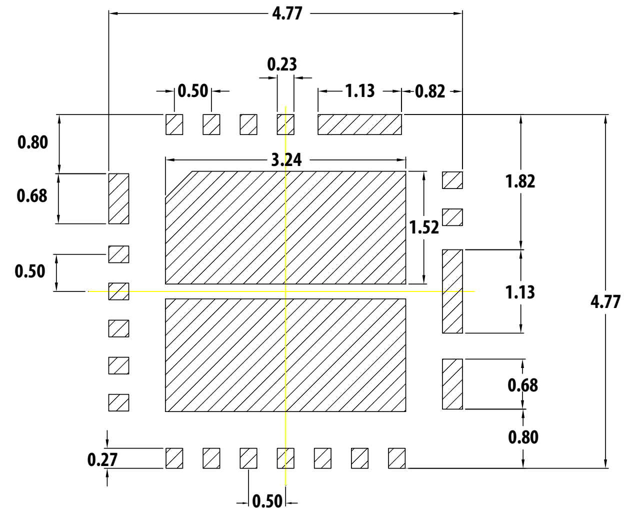
S-Parameter [5] (Vdd=VddBias=5.5 V, Vc1=2.0 V, Vc2=1.8 V, Vc3=1.8 V), T=25 °C, 50 Ω matched) Cont.

Freq (GHz)	S11 (dB)	S11 (ang)	S21 (dB)	S21 (ang)	S12 (dB)	S12 (ang)	S22 (dB)	S22 (ang)
2.3	-18.31	-21.82	42.39	-170.44	-51.31	-149.44	-9.72	-49.31
2.4	-12.11	26.52	41.79	129.83	-51.67	173.34	-13.78	-15.82
2.5	-6.22	-3.58	39.12	70.51	-51.68	137.22	-6.32	0.70
2.6	-4.67	-35.13	35.01	22.12	-54.35	125.00	-2.91	-21.23
2.7	-4.61	-59.81	30.75	-16.14	-55.30	105.67	-1.62	-42.21
2.8	-4.99	-80.06	26.70	-48.29	-57.92	92.83	-1.09	-60.70
2.9	-5.45	-97.30	22.92	-76.60	-71.59	-37.57	-0.85	-77.36
3.0	-5.91	-112.79	19.30	-102.37	-65.70	36.73	-0.72	-92.89
3.1	-6.33	-127.25	15.78	-126.22	-71.48	111.04	-0.65	-107.77
3.2	-6.59	-140.57	12.29	-148.49	-70.55	45.34	-0.58	-122.12
3.3	-6.74	-153.77	8.71	-169.61	-72.80	91.80	-0.52	-135.88
3.4	-6.82	-166.45	4.87	170.59	-70.33	121.18	-0.44	-149.14
3.5	-6.78	-177.97	0.55	152.52	-63.59	106.84	-0.36	-161.87
3.6	-6.61	171.13	-4.82	137.92	-66.82	130.42	-0.30	-174.10
3.7	-6.35	160.90	-12.86	137.62	-57.85	56.97	-0.28	174.43
3.8	-6.09	151.26	-16.85	-149.92	-58.56	84.26	-0.27	163.58
3.9	-5.83	142.49	-10.13	-135.70	-62.86	50.14	-0.30	153.56
4.0	-5.63	134.32	-6.61	-147.52	-58.80	68.08	-0.34	144.04
4.1	-5.43	126.90	-4.41	-163.96	-56.99	51.06	-0.41	135.17
4.2	-5.24	120.15	-2.78	177.29	-59.93	66.36	-0.49	126.67
4.3	-5.08	113.87	-1.40	155.95	-60.54	37.34	-0.61	118.47
4.4	-4.92	107.72	-0.27	130.87	-59.65	19.57	-0.74	110.59
4.5	-4.75	101.52	0.33	100.58	-56.07	4.88	-0.91	103.16
4.6	-4.63	95.03	-0.39	65.69	-54.64	-23.10	-1.05	96.18
4.7	-4.56	88.57	-3.31	32.85	-56.59	-21.29	-1.04	89.00
4.8	-4.39	82.29	-8.91	21.19	-58.31	-41.89	-0.98	80.67
4.9	-3.94	74.28	-8.23	52.50	-59.45	-37.14	-0.92	71.24
5.0	-3.61	61.01	-2.98	28.17	-59.95	-33.07	-0.91	61.01
5.1	-4.41	36.98	-2.57	-20.46	-57.55	-72.71	-0.79	50.39
5.2	-5.30	24.62	-4.31	-54.54	-56.22	-71.81	-0.76	40.60
5.3	-5.92	14.04	-6.58	-81.33	-56.03	-88.18	-0.74	30.56
5.4	-6.20	4.51	-8.90	-103.67	-56.97	-94.91	-0.70	20.01
5.5	-6.20	-5.13	-11.12	-123.03	-60.23	-105.13	-0.66	9.16
5.6	-6.01	-14.82	-13.17	-140.74	-58.04	-110.34	-0.62	-1.90
5.7	-5.66	-24.22	-15.13	-157.62	-56.77	-107.61	-0.60	-13.48
5.8	-5.34	-33.50	-17.00	-174.30	-57.20	-121.15	-0.56	-25.03
5.9	-4.99	-42.36	-18.84	168.83	-61.46	-164.74	-0.54	-36.85
6.0	-4.67	-50.88	-20.71	152.22	-61.22	-166.08	-0.52	-48.53
7.0	-5.02	-132.43	-22.78	-84.70	-59.87	119.04	-1.15	-169.10
8.0	-3.85	107.23	-34.21	58.74	-58.07	13.28	-0.46	105.57
9.0	-4.96	39.65	-28.69	-70.03	-54.81	-80.12	-0.81	21.44
10.0	-5.51	-104.42	-30.90	99.71	-54.91	144.60	-2.44	-137.42
11.0	-3.24	169.87	-49.39	-6.85	-55.79	52.18	-0.94	138.03
12.0	-6.28	60.37	-56.16	-46.56	-54.40	-25.21	-2.58	69.16
13.0	-3.14	-48.95	-42.18	-125.78	-50.24	-162.84	-2.87	-96.90
14.0	-4.05	-101.67	-41.26	123.50	-57.87	168.13	-3.35	177.07
15.0	-5.10	142.53	-35.81	-9.67	-50.12	36.87	-1.84	77.30
16.0	-4.31	8.79	-40.29	179.61	-49.42	-49.38	-9.61	-57.73
17.0	-2.29	-108.55	-46.34	88.66	-47.95	171.22	-1.16	168.18
18.0	-1.16	-174.54	-46.67	1.51	-51.92	81.61	-0.78	127.39
19.0	-4.39	29.22	-43.44	-138.00	-43.09	-16.13	-4.36	6.80
20.0	-2.96	-134.17	-41.55	52.85	-45.10	163.01	-1.74	-144.60

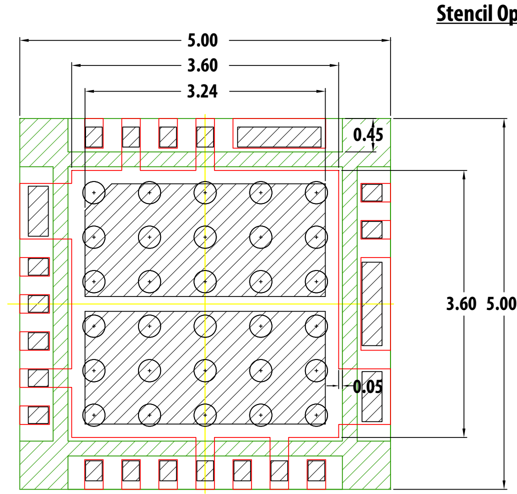
PCB Land Pattern and Stencil Outline

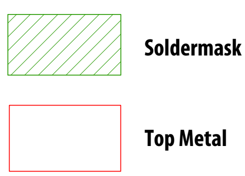


Land Pattern



Stencil Opening



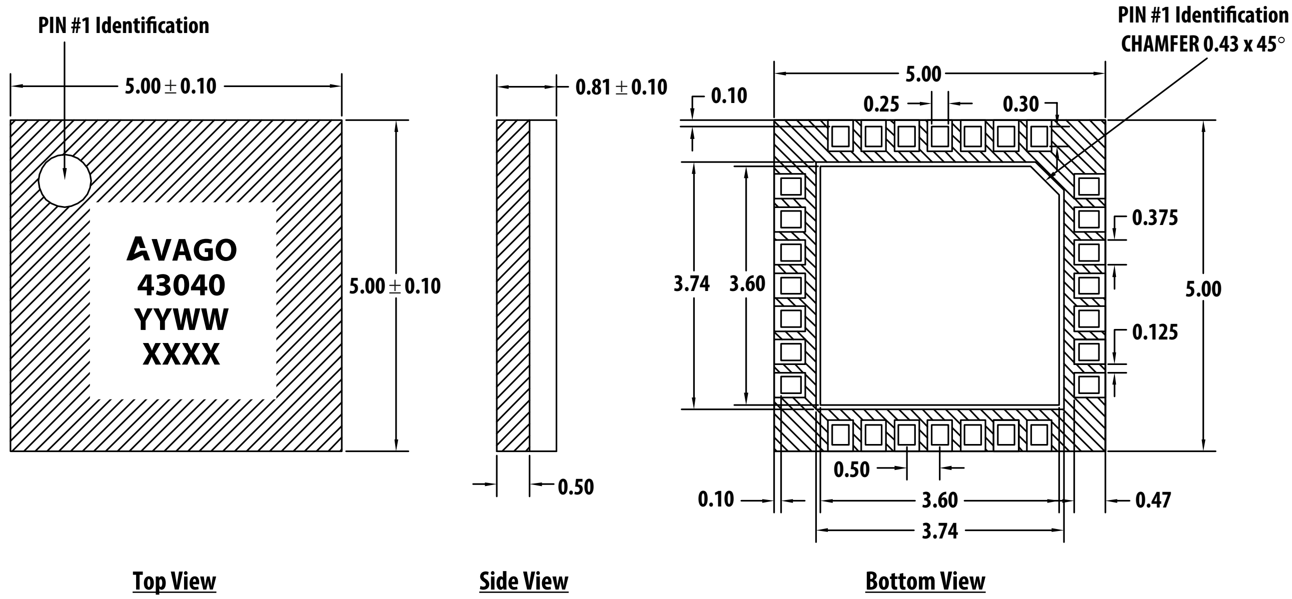


Combination of Land Pattern & Stencil Opening

Note :

1. **Recommended Land Pattern and Stencil.**
2. **4 mils stencil thickness recommended.**
3. **All dimensions are in mm**

MCOB (5.0 x 5.0 x 0.9) mm 28-Lead Package Dimensions

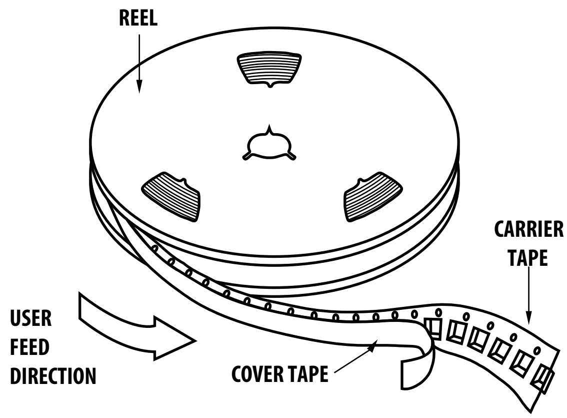


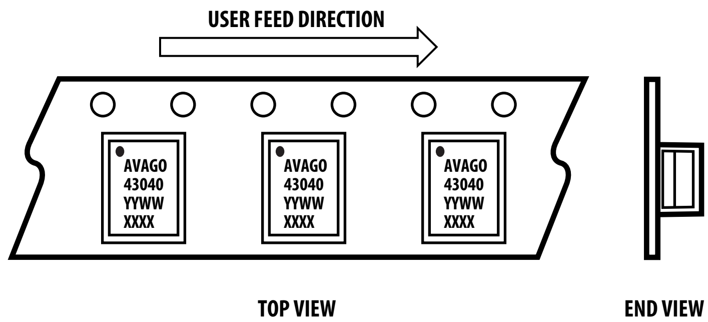
Note
1. All dimensions are in millimeters.
2. Dimensions are inclusive of plating.
3. Dimensions are exclusive of mold flash and metal burr.

Part Number Ordering Information

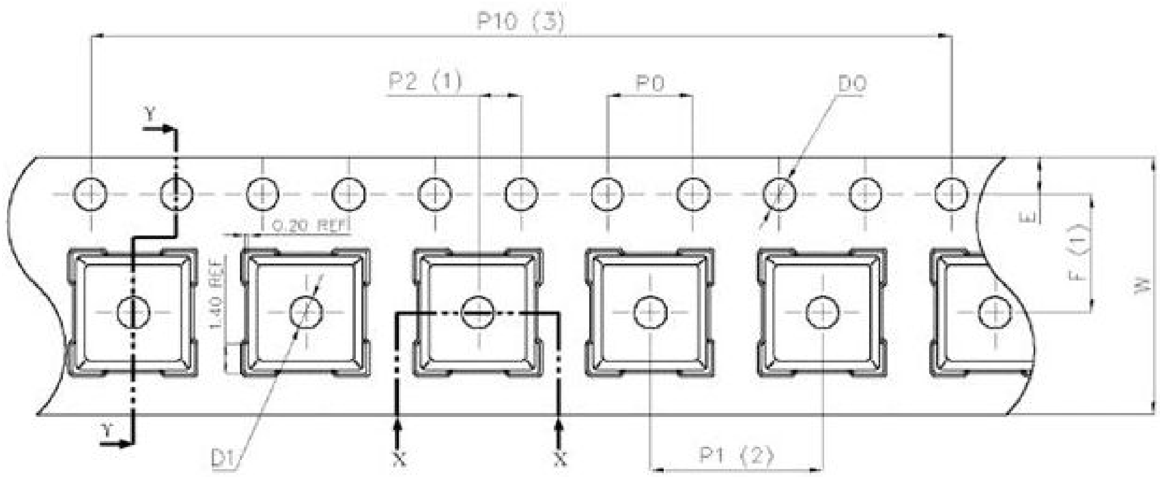
Part Number	Qty	Container
MGA-43040-BLKG	100	Antistatic Bag
MGA-43040-TR1G	1000	7" Reel

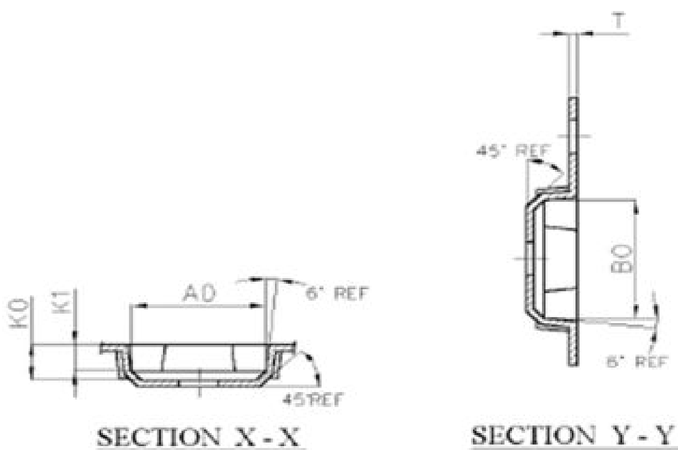
Device Orientation





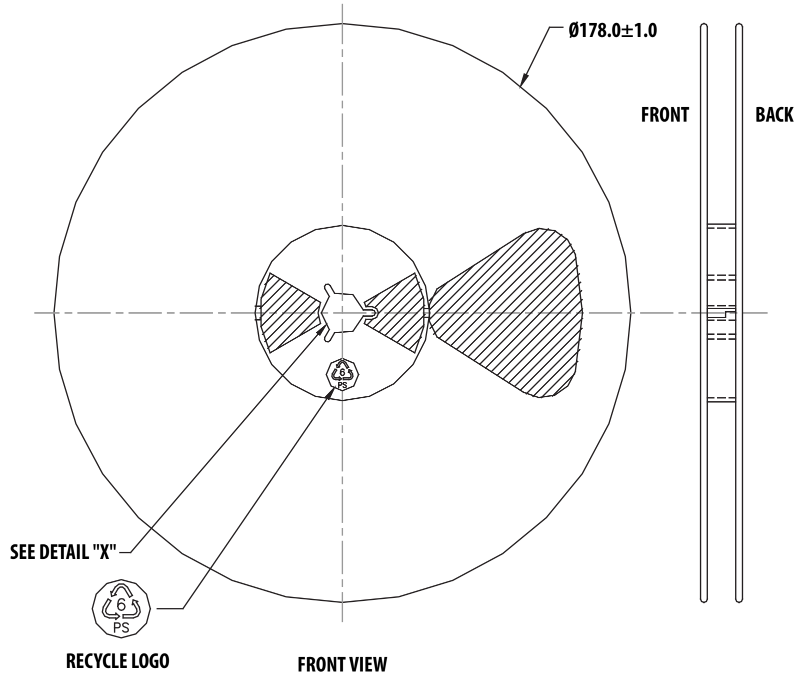
Tape Dimensions

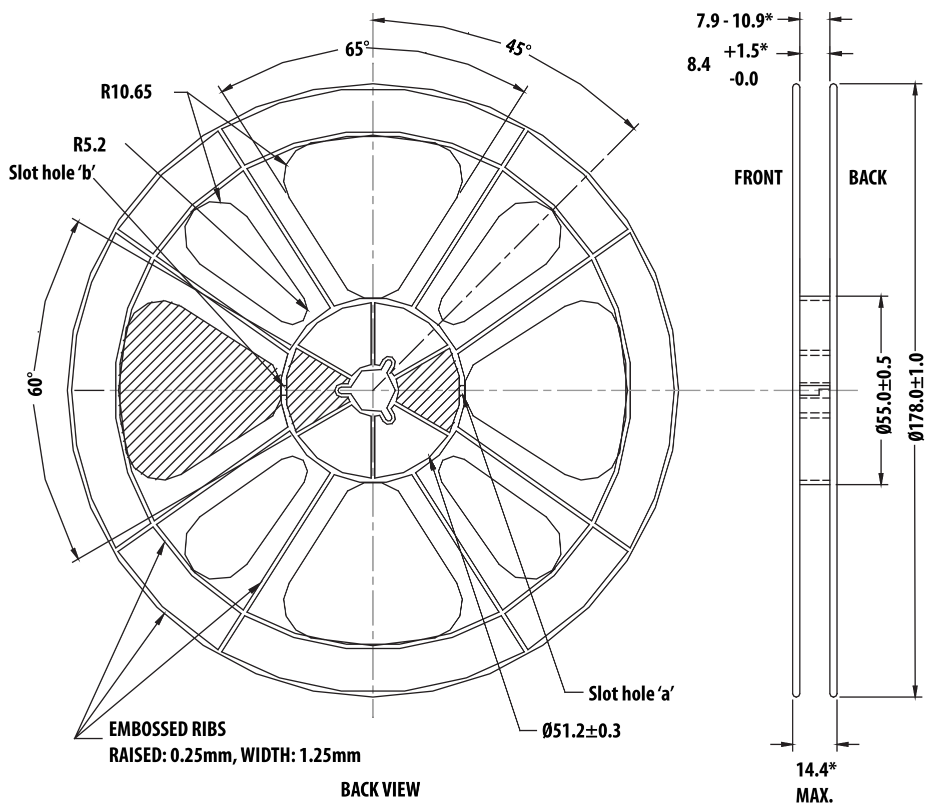




Dimension List			
Annote	Milimeter	Annote	Milimeter
A0	5.40±0.10	P0	4.00±0.10
B0	5.40±0.10	P2	2.00±0.10
D0	$1.50^{+0.10}_{-0}$	P10	40.00±0.20
D1	1.60±0.10	E	1.75±0.10
K0	1.90±0.10	F	5.50±0.10
K1	1.50±0.10	T	0.30±0.03
P1	8.00±0.10	W	12.00±0.30

Reel Dimensions (7" reel)





For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**

AV02-4488EN - September 23, 2014

AVAGO TECHNOLOGIES

Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.

Как с нами связаться

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