

# MGA-43003

## High Linearity (1.805 – 1.88) GHz Power Amplifier Module



### Data Sheet

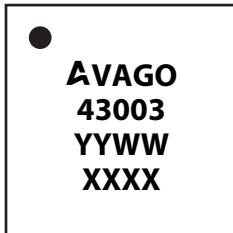
#### Description

Avago Technologies' MGA-43003 is a fully matched power amplifier for use in the (1.805-1.88) GHz band. High linear output power at 5V is achieved through the use of Avago Technologies' proprietary 0.25um GaAs Enhancement-mode pHEMT process. MGA-43003 is housed in a miniature 5.0mm x 5.0mm 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-43003 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

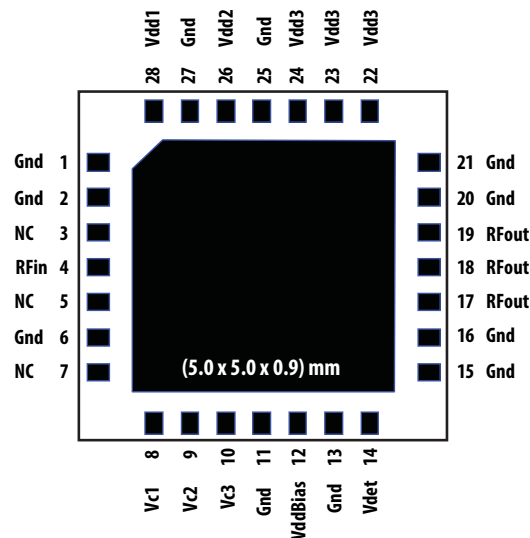


#### 5.0 x 5.0 x 0.9 mm Package Outline

Notes:  
 Package marking provides orientation and identification  
 "43003" = Device part number  
 "YYWW" = Year and work week  
 "XXXX" = Assembly lot number

TOP VIEW

#### Pin Configuration



#### Features

- High linearity performance : Typ -48dBc ACLR1 [1] at 27.0dBm linear output power (biased with 5V supply)
- High Gain : 41.7dB
- Good efficiency
- Fully matched
- Built-in detector
- GaAs E-pHEMT Technology [2]
- Low cost small package size: (5.0 x 5.0 x 0.9) mm

#### Specifications

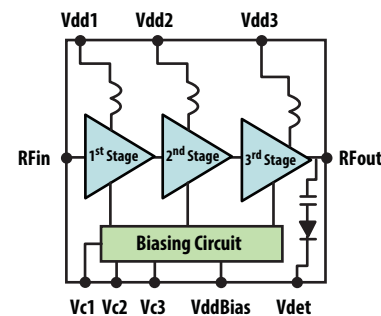
1.842GHz; 5.0V, Idq=360mA (typ), LTE DL E-TM1.1, 20MHz 100RB, downlink signal

- PAE : 14%
- 27.0dBm linear Pout @ ACLR1 = -48dBc [1]
- 41.7dB Gain
- Detector range : 20dB

Note:

- LTE DL E-TM1.1, 20MHz 100RB, downlink signal
- Enhancement mode technology employs positive Vgs, thereby eliminating the need of negative gate voltage associated with conventional depletion mode devices.

#### Functional Block Diagram



**Attention: Observe precautions for handling electrostatic sensitive devices.**

ESD Machine Model = 60 V  
 ESD Human Body Model = 400 V  
 Refer to Avago Application Note A004R:  
 Electrostatic Discharge, Damage and Control.

**Absolute Maximum Rating**<sup>[1]</sup>  $T_A = 25^\circ\text{C}$ 

Symbol	Parameter	Units	Absolute Max.
Vdd, VddBias	Supply voltages, bias supply voltage	V	6
Vc	Control Voltage	V	(Vdd)
P <sub>in,max</sub>	CW RF Input Power	dBm	20
P <sub>diss</sub>	Total Power Dissipation <sup>[3]</sup>	W	7.2
T <sub>j</sub>	Junction Temperature	°C	150
T <sub>STG</sub>	Storage Temperature	°C	-65 to 150

**Thermal Resistance**<sup>[2,3]</sup>

$\theta_{jc} = 14^\circ\text{C/W}$

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 at Vdd=5.5V operating voltage.
3. Board temperature (TB) is 25 °C , for TB >49.2°C derate the device power at 71.4mW per °C rise in Board (package belly) temperature.

**Electrical Specifications**

TA = 25°C, Vdd1,2,3 = VddBias=5.0V, Idqtotal = 360mA, RF performance at 1.842GHz, LTE DL E-TM1.1, 20MHz 100RB downlink signal operation unless otherwise stated.

Symbol	Parameter and Test Condition	Units	Min.	Typ.	Max.
Vdd	Supply Voltage	V		5.0	
Iqtotal	Quiescent Supply Current	mA		360	
Gain	Gain	dB	35	41.7	
OP1dB	Output Power at 1dB Gain Compression	dBm		36.8	
ACLR1 @ Pout=27.0dBm	LTE DL E-TM1.1, 20MHz 100RB downlink signal	dBc		-48	-45
PAE	Power Added Efficiency	%	12	14	
S11	Input Return Loss, 50Ω source	dB		14	
DetR	Detector RF dynamic range	dB		20	
2fo	2fo Harmonics (LTE DL E-TM1.1, 20MHz 100RB downlink signal)	dBc		-40	

## Product Consistency Distribution Charts [1]

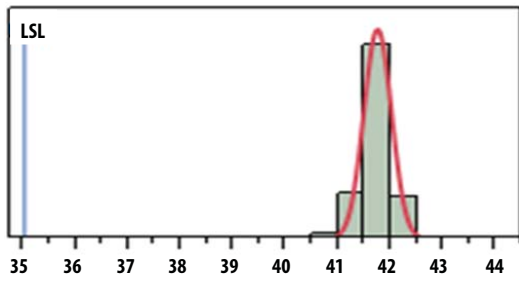


Figure 1. Gain at Pout=27.0dBm; LSL=35.0dB, Nominal = 41.7dB

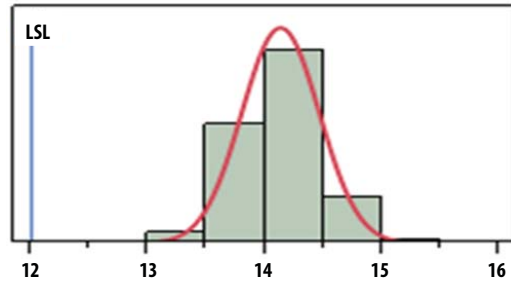


Figure 2. PAE at Pout=27.0dBm; LSL=12.0% Nominal = 14.1%

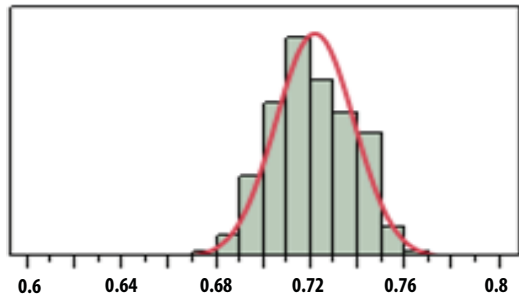


Figure 3. Idd\_total at Pout=27.0dBm, Nominal = 720mA

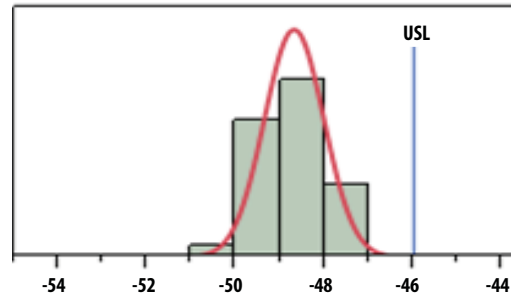


Figure 4. ACLR1 at Pout=27.0dBm, Nominal = -48.7dBc

Note:

1. Distribution data sample size is 3853 samples taken from 3 different wafer lots.  $T_A = 25^\circ\text{C}$ ,  $V_{dd} = V_{dd\text{Bias}} = 5.0\text{V}$ ,  $V_{c1} = 1.8\text{V}$ ,  $V_{c2} = 1.6\text{V}$ ,  $V_{c3} = 2.0\text{V}$ , RF performance at 1.842GHz unless otherwise stated. Future wafers allocated to this product may have nominal values anywhere between the upper and lower limits.

MGA-43003 typical over-temperature performance at  $V_{c1}=1.8V$ ,  $V_{c2}=1.6V$ ,  $V_{c3}=2.0V$  as shown in Figure 23 unless otherwise stated

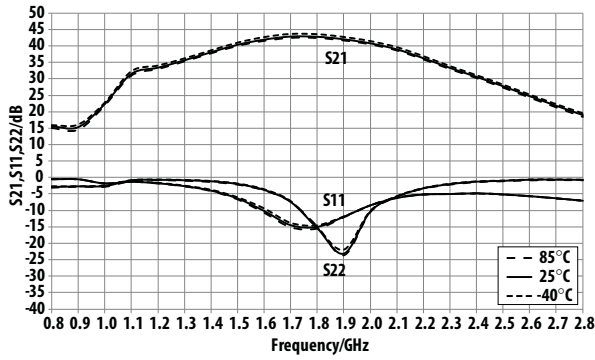


Figure 5. Small-signal performance Over-temperature  
 $V_{dd}=V_{ddBias}=5.0V$  operating voltage

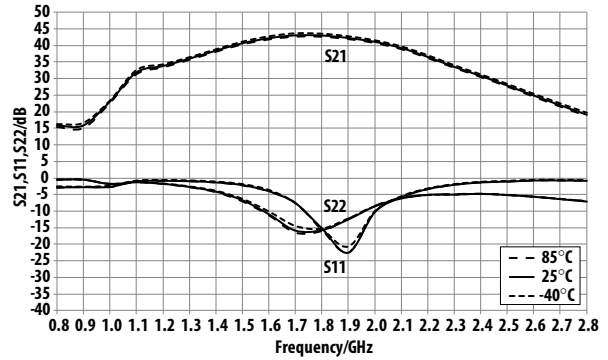


Figure 6. Small-signal performance Over-temperature  
 $V_{dd}=V_{ddBias}=5.5V$  operating voltage

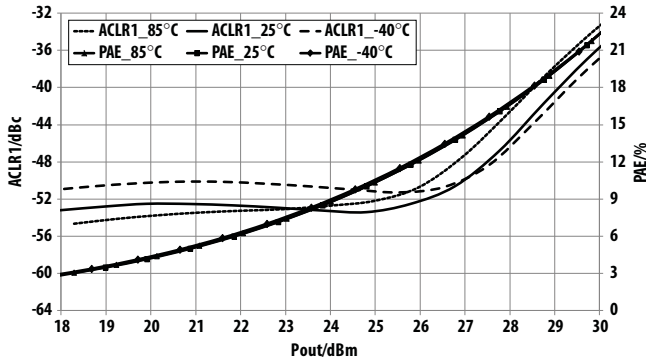


Figure 7. Over-temperature ACLR1, PAE vs Pout @ 1.815GHz  
 $V_{dd}=V_{ddBias}=5.0V$  operating voltage

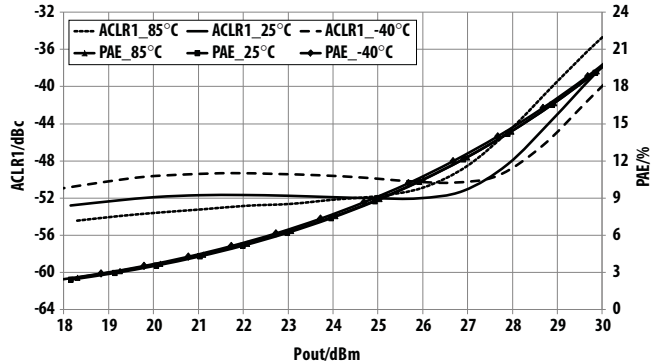


Figure 8. Over-temperature ACLR1, PAE vs Pout @ 1.815GHz  
 $V_{dd}=V_{ddBias}=5.5V$  operating voltage

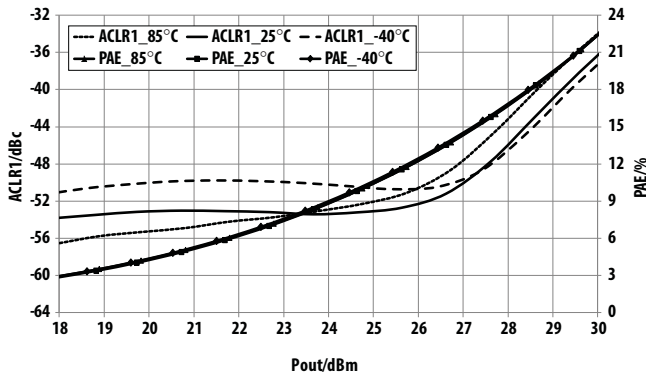


Figure 9. Over-temperature ACLR1, PAE vs Pout @ 1.842GHz  
 $V_{dd}=V_{ddBias}=5.0V$  operating voltage

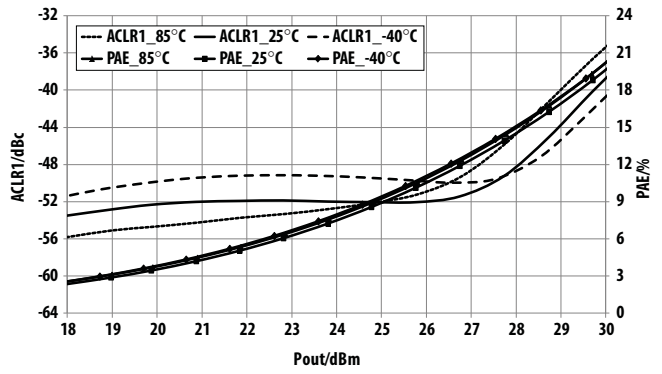
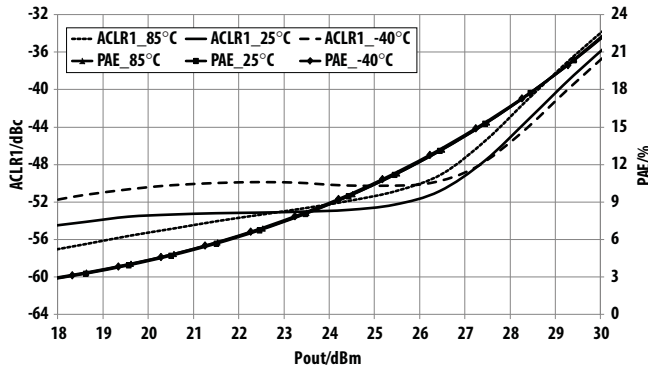
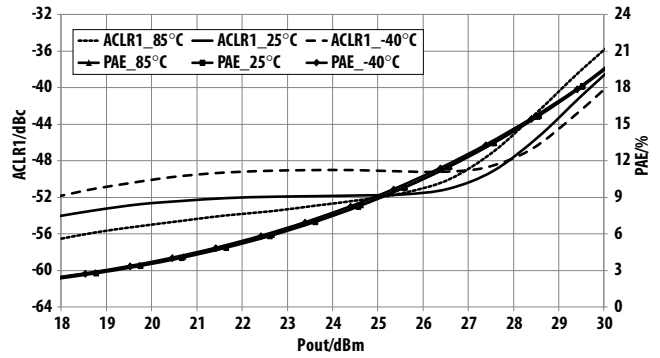


Figure 10. Over-temperature ACLR1, PAE vs Pout @ 1.842GHz  
 $V_{dd}=V_{ddBias}=5.5V$  operating voltage

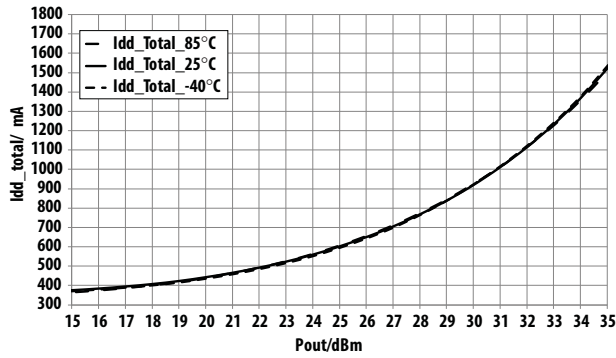
**MGA-43003 typical over-temperature performance at Vc1=1.8V, Vc2=1.6V, Vc3=2.0V unless otherwise stated**



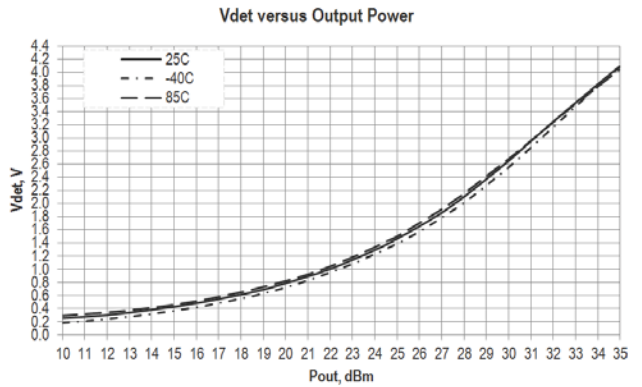
**Figure 11. Over-temperature ACLR1, PAE vs Pout @ 1.87GHz  
Vdd=VddBias=5.0V operating voltage**



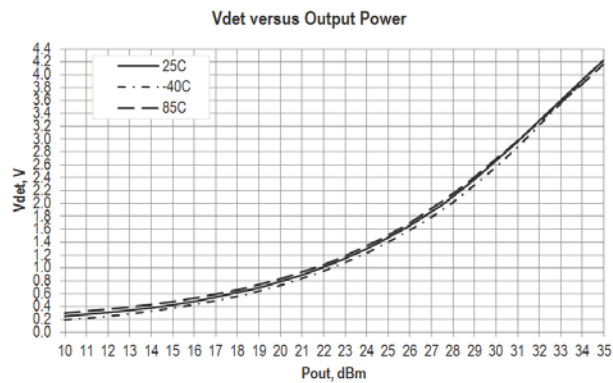
**Figure 12. Over-temperature ACLR1, PAE vs Pout @ 1.87GHz  
Vdd=VddBias=5.5V operating voltage**



**Figure 13. Over-temperature Idd\_total vs Pout @ 1.842GHz  
Vdd=VddBias=5.0V operating voltage**

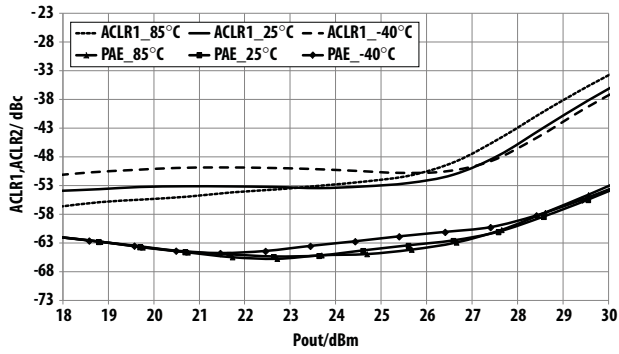


**Figure 14. Over-temperature Vdet vs Pout @ 1.842 GHz, Vdd=VddBias=5.0V  
operating voltage**

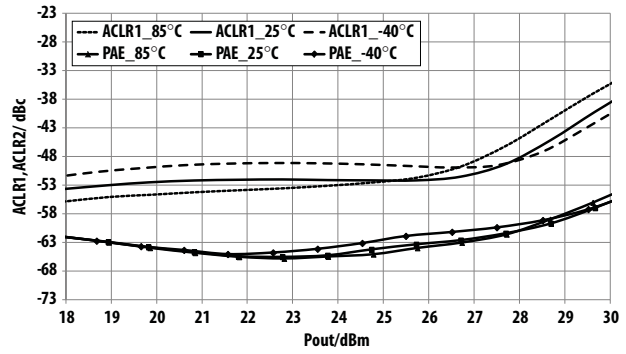


**Figure 15. Over-temperature Vdet vs Pout @ 1.842 GHz, Vdd=VddBias=5.5V  
operating voltage**

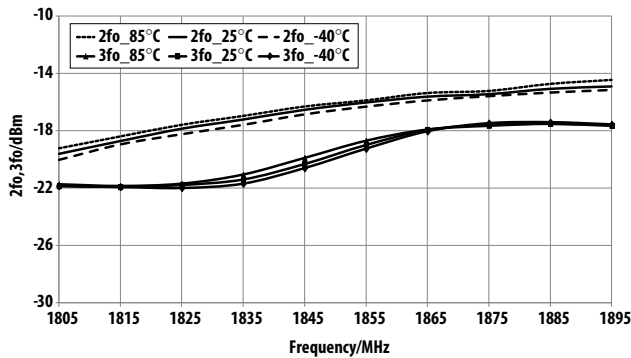
**MGA-43003 typical over-temperature performance at Vc1=1.8V, Vc2=1.6V, Vc3=2.0V unless otherwise stated**



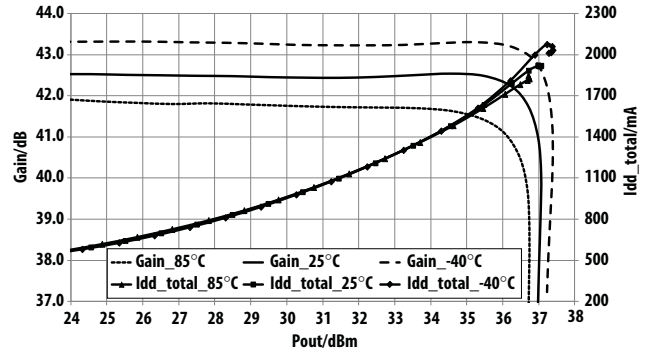
**Figure 16. Over-temperature ACLR1, ACLR2 Pout @ 1.842GHz  
Vdd=VddBias=5.0V operating voltage**



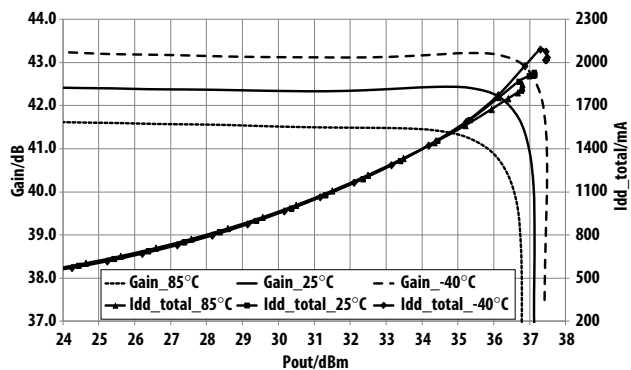
**Figure 17. Over-temperature ACLR1, ACLR2 vs Pout @ 1.842GHz  
Vdd=VddBias=5.5V operating voltage**



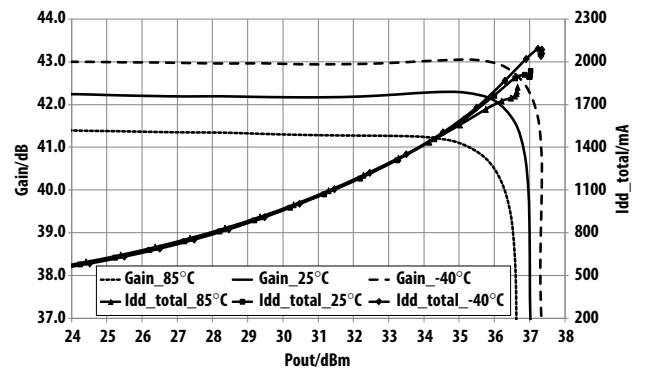
**Figure 18. Over-temperature 2nd, 3rd Harmonics vs Freq at Pout=27.2dBm,  
Vdd=VddBias=5.0V operating voltage**



**Figure 19. Over-temperature Gain, Idd\_total vs Pout @ 1.815GHz  
Vdd=VddBias=5.0V operating voltage**



**Figure 20. Over-temperature Gain, Idd\_total vs Pout @ 1.842GHz  
Vdd=VddBias=5.0V operating voltage**



**Figure 21. Over-temperature Gain, Idd\_total vs Pout @ 1.87GHz  
Vdd=VddBias=5.0V operating voltage**

**MGA-43003 typical LTE DL E-TM1.1, 20MHz 100RB downlink signal Spectrum Emission Mask (3GPP TS 36.141v8.2.0 [2009-03] standard) performance at Vdd=VddBias=5.0V, Vc1=1.8V, Vc2=1.6V, Vc3=2.0V unless otherwise stated**

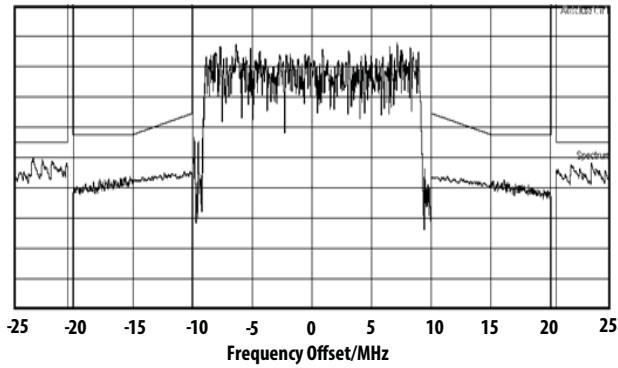


Figure 22. SEM at Pout=29dBm @ 1.815GHz

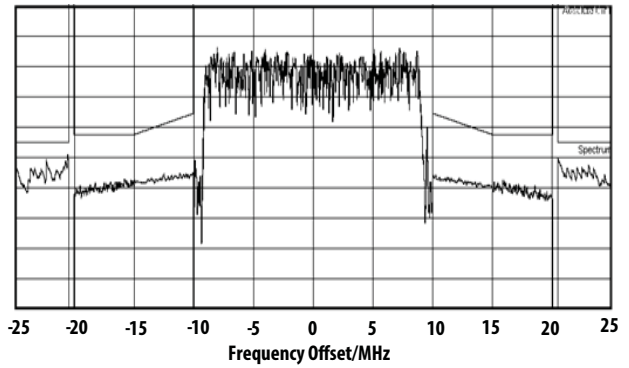


Figure 23. SEM at Pout=29dBm @ 1.842GHz

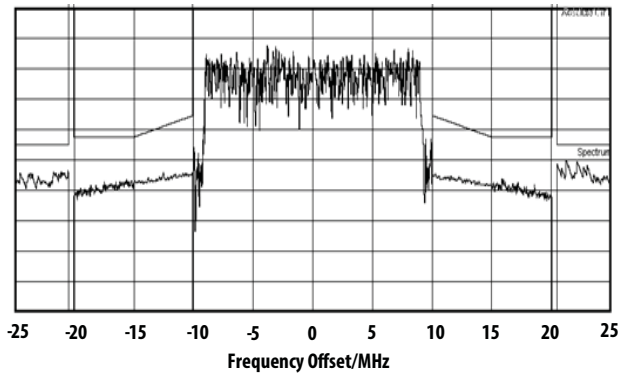


Figure 24. SEM at Pout=29dBm @ 1.87GHz

**S-Parameter<sup>[5]</sup> (Vdd=VddBias=5.0V, Vc1=1.8V, Vc2=1.6V, Vc3=2.0V), T=25 °C, 50ohm matched)**

Freq	S11	S11	S21	S21	S12	S12	S22	S22
(GHz)	(dB)	(ang)	(dB)	(ang)	(dB)	(ang)	(dB)	(ang)
0.1	0.02	-12.18	-53.22	-113.21	-61.81	-61.45	-0.33	174.99
0.2	-0.05	-24.76	-62.17	91.05	-59.88	16.11	-0.71	172.67
0.3	-0.13	-37.48	-50.87	49.37	-61.41	-8.51	-1.00	171.15
0.4	-0.15	-50.25	-27.10	26.63	-62.19	16.69	-1.22	170.39
0.5	-0.23	-62.53	-17.17	-106.40	-66.10	-38.14	-1.23	170.94
0.6	-0.21	-75.28	-10.72	-16.93	-67.69	3.06	-0.86	165.36
0.7	-0.70	-90.22	14.88	-112.32	-61.38	-15.52	-1.57	164.23
0.8	-0.78	-98.74	16.50	146.55	-73.02	117.70	-1.99	164.17
0.9	-0.74	-112.15	16.51	90.18	-60.95	-20.09	-1.97	167.39
1.0	-2.01	-125.59	23.25	140.55	-59.10	101.96	-1.96	162.80
1.1	-1.48	-132.03	30.98	33.36	-58.75	95.96	-0.48	165.02
1.2	-1.75	-148.04	32.31	-13.95	-59.09	92.21	-0.34	156.35
1.3	-2.37	-164.49	34.10	-52.54	-59.72	85.52	-0.48	148.90
1.4	-3.35	177.93	36.14	-88.47	-59.83	90.76	-0.81	140.82
1.5	-4.85	158.44	38.39	-125.22	-58.44	79.14	-1.47	130.92
1.6	-7.33	137.04	40.54	-165.96	-61.01	93.92	-2.99	118.37
1.7	-10.96	115.06	42.07	148.46	-56.02	74.28	-6.31	105.66
1.8	-14.92	86.57	42.53	100.93	-53.82	65.28	-13.68	107.12
1.9	-15.94	25.56	42.01	54.32	-53.16	53.46	-16.70	-163.90
2.0	-11.09	-34.91	40.62	10.02	-54.51	29.22	-8.63	-146.33
2.1	-7.88	-74.95	37.99	-30.72	-52.38	8.13	-4.61	-153.16
2.2	-5.26	-98.87	35.59	-63.76	-54.74	-12.61	-2.41	-163.53
2.3	-4.32	-122.98	32.42	-95.66	-58.92	-12.13	-1.34	-173.20
2.4	-4.28	-140.69	28.98	-121.61	-60.91	-18.61	-0.84	179.27
2.5	-4.61	-153.25	25.61	-142.42	-61.09	-12.03	-0.58	173.34
2.6	-4.86	-162.31	22.64	-159.89	-63.46	-4.17	-0.43	168.67
2.7	-5.16	-170.59	19.79	-177.05	-66.55	-63.25	-0.33	164.81
2.8	-5.57	-177.31	16.92	167.26	-66.50	-24.26	-0.27	161.52
2.9	-6.00	177.57	14.06	152.66	-70.35	-61.20	-0.22	158.59
3.0	-6.41	173.63	11.11	138.82	-63.63	-21.39	-0.19	155.95
3.1	-6.74	170.48	7.91	125.69	-67.73	8.56	-0.17	153.58
3.2	-7.05	168.22	4.20	113.39	-68.24	-32.37	-0.15	151.39
3.3	-7.27	166.88	-0.77	103.68	-69.91	31.40	-0.14	149.31
3.4	-7.39	165.96	-9.14	112.95	-63.83	27.19	-0.12	147.35
3.5	-7.29	165.72	-8.62	-166.09	-66.55	37.37	-0.12	145.44
3.6	-6.98	164.79	-1.67	-167.55	-64.47	44.29	-0.13	143.64
3.7	-6.52	162.00	1.30	170.54	-62.24	30.98	-0.16	141.93
3.8	-6.28	157.47	1.95	145.51	-62.33	-0.72	-0.17	140.39
3.9	-6.30	152.98	1.10	122.79	-65.81	43.97	-0.16	138.88
4.0	-6.52	149.50	-0.61	104.10	-63.27	4.34	-0.17	137.36
4.1	-6.72	147.31	-2.94	89.19	-65.10	48.03	-0.17	135.76
4.2	-6.87	145.97	-6.33	81.65	-63.92	20.30	-0.17	134.12



**S-Parameter<sup>[5]</sup> (Vdd=VddBias=5.0V, Vc1=1.8V, Vc2=1.6V, Vc3=2.0V), T=25 °C, 50ohm matched) Cont.**

<b>Freq</b>	<b>S11</b>	<b>S11</b>	<b>S21</b>	<b>S21</b>	<b>S12</b>	<b>S12</b>	<b>S22</b>	<b>S22</b>
<b>(GHz)</b>	<b>(dB)</b>	<b>(ang)</b>	<b>(dB)</b>	<b>(ang)</b>	<b>(dB)</b>	<b>(ang)</b>	<b>(dB)</b>	<b>(ang)</b>
4.3	-6.79	145.06	-6.45	107.23	-60.57	40.03	-0.20	132.54
4.4	-6.96	142.22	-4.10	68.90	-68.21	51.65	-0.21	131.15
4.5	-7.10	142.38	-7.49	47.19	-67.57	58.95	-0.20	129.43
4.6	-6.95	142.44	-11.52	37.89	-62.71	63.97	-0.20	127.81
4.7	-6.73	140.79	-13.72	46.27	-60.40	36.87	-0.22	126.09
4.8	-6.77	139.70	-14.73	36.88	-65.41	38.72	-0.24	124.36
4.9	-6.63	139.90	-17.65	27.01	-62.36	60.80	-0.25	122.55
5.0	-6.44	139.23	-22.00	23.96	-61.98	37.52	-0.28	120.14
5.1	-6.19	136.72	-27.45	42.11	-60.09	40.81	-0.31	117.42
5.2	-5.45	132.68	-28.97	84.01	-58.87	29.68	-0.33	115.51
5.3	-4.86	124.46	-29.44	134.62	-58.95	22.78	-0.34	113.63
5.4	-4.95	113.92	-16.70	-2.45	-57.28	3.49	-0.38	111.56
5.5	-5.58	105.38	-5.38	139.67	-56.66	-11.62	-0.51	109.48
5.6	-6.53	98.03	-2.17	60.33	-60.03	-38.51	-0.57	109.13
5.7	-7.60	95.21	-5.78	15.29	-64.40	-36.65	-0.44	107.45
5.8	-8.37	93.99	-8.46	-7.79	-64.51	-5.03	-0.42	105.20
5.9	-8.91	93.42	-9.93	-26.68	-67.65	7.36	-0.42	103.15
6.0	-9.28	93.03	-10.11	-50.17	-65.82	-11.19	-0.45	100.97
7.0	-9.44	88.94	-43.86	-20.96	-65.23	1.20	-0.33	81.15
8.0	-6.99	92.65	-38.89	14.17	-59.33	-19.34	-0.25	57.99
9.0	-5.37	94.02	-38.76	-24.58	-59.43	-25.98	-0.31	34.72
10.0	-5.34	82.43	-38.90	-60.68	-57.52	-30.13	-0.73	10.01
11.0	-5.90	51.47	-40.96	-105.14	-59.26	-90.50	-0.80	-12.94
12.0	-4.59	19.47	-44.46	-140.43	-59.54	-82.99	-0.53	-31.07
13.0	-2.66	14.93	-48.34	-158.88	-62.23	-85.69	-0.31	-45.43
14.0	-1.76	22.63	-45.78	170.33	-63.35	-13.45	-0.46	-62.69
15.0	-2.29	9.47	-48.60	95.13	-52.08	-26.50	-0.87	-86.21
16.0	-2.94	-49.06	-47.19	14.21	-48.33	-67.90	-0.77	-103.76
17.0	-1.84	-108.03	-43.74	-50.70	-46.28	-82.71	-0.58	-109.24
18.0	-3.97	-7.55	-40.92	-94.62	-42.77	-119.59	-0.17	-108.26
19.0	-3.37	32.65	-41.60	-3.51	-43.88	-164.24	-0.26	-116.06
20.0	-1.76	13.85	-44.07	-144.61	-45.33	-144.82	-0.50	-130.43

**S-Parameter<sup>[5]</sup> (Vdd=VddBias=5.5V, Vc1=1.8V, Vc2=1.6V, Vc3=2.0V), T=25 °C, 50ohm matched)**

Freq	S11	S11	S21	S21	S12	S12	S22	S22
(GHz)	(dB)	(ang)	(dB)	(ang)	(dB)	(ang)	(dB)	(ang)
0.1	0.02	-12.26	-52.99	32.05	-55.38	-165.54	-0.34	175.02
0.2	-0.05	-24.76	-58.04	-113.23	-57.83	-41.45	-0.71	172.83
0.3	-0.14	-37.49	-50.90	76.80	-59.78	-127.57	-0.98	171.30
0.4	-0.15	-50.21	-26.79	25.07	-62.51	105.44	-1.18	170.44
0.5	-0.24	-62.52	-16.75	-107.05	-60.46	91.97	-1.19	170.90
0.6	-0.22	-75.28	-10.17	-18.11	-60.75	-151.29	-0.84	165.51
0.7	-0.72	-90.20	15.20	-113.74	-64.79	-10.97	-1.51	164.20
0.8	-0.79	-98.69	16.88	146.06	-68.09	127.58	-1.91	163.99
0.9	-0.75	-112.12	17.03	90.15	-60.23	-11.50	-1.94	166.97
1.0	-2.04	-125.41	23.87	137.41	-61.24	134.02	-1.92	162.77
1.1	-1.50	-132.01	31.33	31.53	-59.37	95.45	-0.49	164.49
1.2	-1.80	-148.07	32.67	-15.64	-62.22	107.74	-0.36	155.93
1.3	-2.47	-164.56	34.43	-54.27	-61.65	77.08	-0.50	148.55
1.4	-3.50	177.91	36.45	-90.23	-62.11	84.84	-0.85	140.40
1.5	-5.11	158.82	38.66	-127.04	-61.01	100.53	-1.54	130.64
1.6	-7.70	138.20	40.75	-167.80	-56.98	83.96	-3.07	117.99
1.7	-11.47	118.35	42.21	146.88	-55.45	71.63	-6.52	105.84
1.8	-15.52	91.99	42.65	99.90	-54.32	76.98	-13.86	108.14
1.9	-16.59	27.79	42.14	53.80	-53.27	57.81	-16.53	-163.36
2.0	-11.30	-35.55	40.80	9.74	-53.44	20.87	-8.68	-146.65
2.1	-7.80	-75.81	38.24	-31.01	-53.41	3.79	-4.62	-152.91
2.2	-5.22	-99.77	35.83	-64.10	-54.43	-19.54	-2.39	-163.22
2.3	-4.27	-123.91	32.67	-96.12	-59.46	-11.06	-1.32	-173.05
2.4	-4.25	-141.60	29.22	-122.05	-62.04	-32.43	-0.82	179.31
2.5	-4.58	-154.07	25.85	-142.85	-61.00	-21.77	-0.57	173.40
2.6	-4.85	-163.04	22.87	-160.27	-64.78	-57.14	-0.43	168.76
2.7	-5.17	-171.17	20.02	-177.39	-64.36	3.87	-0.33	164.90
2.8	-5.56	-177.79	17.14	166.98	-64.78	-25.02	-0.27	161.57
2.9	-6.00	177.13	14.28	152.48	-66.20	47.47	-0.22	158.68
3.0	-6.40	173.35	11.33	138.70	-75.73	43.47	-0.18	156.09
3.1	-6.73	170.30	8.13	125.65	-66.66	25.20	-0.16	153.72
3.2	-7.02	168.15	4.44	113.38	-65.99	64.41	-0.14	151.54
3.3	-7.23	166.81	-0.52	103.74	-65.73	20.30	-0.13	149.47
3.4	-7.34	165.92	-8.88	113.21	-68.13	48.97	-0.11	147.53
3.5	-7.24	165.88	-8.28	-166.14	-61.78	25.49	-0.11	145.63
3.6	-6.90	164.90	-1.33	-168.00	-67.35	82.38	-0.13	143.84
3.7	-6.43	161.99	1.61	169.76	-61.69	26.24	-0.15	142.15
3.8	-6.20	157.42	2.21	144.60	-61.13	36.14	-0.16	140.60
3.9	-6.25	152.81	1.29	121.96	-68.09	70.71	-0.16	139.12
4.0	-6.45	149.46	-0.45	103.48	-67.82	-37.04	-0.16	137.62
4.1	-6.66	147.31	-2.80	88.77	-66.35	16.58	-0.17	136.03
4.2	-6.81	146.03	-6.20	81.63	-65.67	42.55	-0.17	134.46

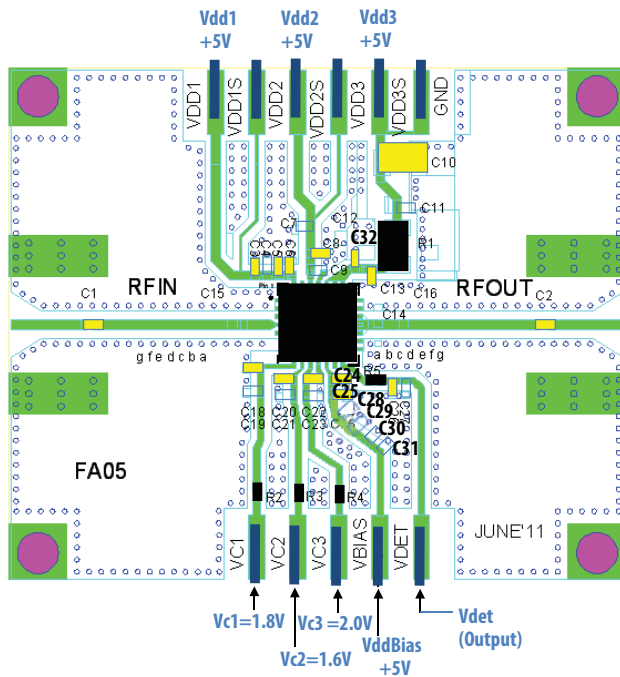
**S-Parameter<sup>[5]</sup> (Vdd=VddBias=5.5V, Vc1=1.8V, Vc2=1.6V, Vc3=2.0V), T=25 °C, 50ohm matched) Cont.**

<b>Freq</b>	<b>S11</b>	<b>S11</b>	<b>S21</b>	<b>S21</b>	<b>S12</b>	<b>S12</b>	<b>S22</b>	<b>S22</b>
<b>(GHz)</b>	<b>(dB)</b>	<b>(ang)</b>	<b>(dB)</b>	<b>(ang)</b>	<b>(dB)</b>	<b>(ang)</b>	<b>(dB)</b>	<b>(ang)</b>
4.3	-6.73	145.09	-6.23	106.85	-65.05	33.32	-0.20	132.86
4.4	-6.90	142.21	-3.98	68.76	-67.23	36.21	-0.21	131.52
4.5	-7.04	142.33	-7.36	47.30	-66.38	35.96	-0.19	129.86
4.6	-6.90	142.38	-11.36	38.21	-62.34	14.90	-0.20	128.24
4.7	-6.69	140.65	-13.54	46.44	-63.24	37.89	-0.21	126.50
4.8	-6.74	139.57	-14.54	36.92	-62.19	56.23	-0.23	124.74
4.9	-6.61	139.68	-17.48	27.16	-62.79	42.79	-0.24	122.95
5.0	-6.43	138.98	-21.83	24.15	-59.87	29.35	-0.27	120.51
5.1	-6.19	136.43	-27.31	42.39	-62.62	50.95	-0.30	117.75
5.2	-5.48	132.32	-28.76	84.21	-58.57	29.40	-0.32	115.82
5.3	-4.93	124.24	-29.21	135.36	-59.18	26.78	-0.34	113.92
5.4	-5.02	113.88	-16.47	-2.90	-58.22	12.27	-0.37	111.82
5.5	-5.65	105.57	-5.22	139.20	-57.13	-0.63	-0.51	109.71
5.6	-6.57	98.37	-2.09	60.18	-61.53	-44.07	-0.56	109.37
5.7	-7.62	95.50	-5.70	15.51	-65.35	1.13	-0.43	107.64
5.8	-8.35	94.38	-8.36	-7.49	-62.34	-29.35	-0.41	105.44
5.9	-8.88	93.72	-9.82	-26.15	-69.08	-30.82	-0.41	103.41
6.0	-9.22	93.31	-9.99	-49.72	-64.77	-19.58	-0.44	101.23
7.0	-9.40	88.81	-44.00	-19.50	-61.85	3.64	-0.31	81.41
8.0	-7.02	92.52	-38.56	16.91	-60.62	7.26	-0.25	58.37
9.0	-5.40	94.06	-38.50	-23.70	-59.21	-29.55	-0.33	35.08
10.0	-5.40	82.91	-38.71	-58.44	-57.47	-40.69	-0.73	10.52
11.0	-5.98	52.21	-40.79	-103.76	-59.42	-78.22	-0.80	-12.50
12.0	-4.67	20.54	-44.75	-140.47	-60.73	-94.41	-0.52	-30.11
13.0	-2.68	16.08	-47.88	-152.48	-61.73	-85.07	-0.31	-44.91
14.0	-1.80	23.47	-45.63	172.49	-61.57	-34.42	-0.42	-62.03
15.0	-2.31	10.32	-47.97	100.28	-51.49	-25.39	-0.87	-85.45
16.0	-2.97	-47.89	-47.56	12.07	-47.76	-67.84	-0.75	-103.23
17.0	-1.89	-107.22	-43.40	-46.37	-46.31	-83.79	-0.55	-108.08
18.0	-3.98	-7.49	-41.22	-93.11	-43.24	-120.74	-0.17	-107.59
19.0	-3.48	35.04	-41.01	-7.28	-43.70	-166.91	-0.24	-115.31
20.0	-1.89	14.22	-43.65	-143.65	-44.08	-144.54	-0.49	-129.83

Notes:

- S-parameter is measured with deembedded reference plane at DUT RFin and RFout pins.

### Demonstration Board Top View (Vdd=VddBias=5.0V operating voltage)



Component	Value	Part Number
C1, C2, C6, C18, C20, C22, C24	8.2pF ± 0.5pF	GJM1555C1H8R2WB01D
C3, C8, C13, C25	0.1uF ± 10%	GRM155R71C104KA88D
C5, C32	82pF ± 5%	GRM1555C1H820JA01D
C10	2.2uF ± 10%	GRM21BR71E225KA73L
C26	22nF ± 10%	CM05X7R223K16AHF
R1	0 Ω	RMC1/10 JPTP
R2, R3, R4, R5	0 Ω	RMC1/16S JPTH

Note:

For performance optimization control voltage for individual stages can be adjusted by varying R2, R3 and R4 resistor value.

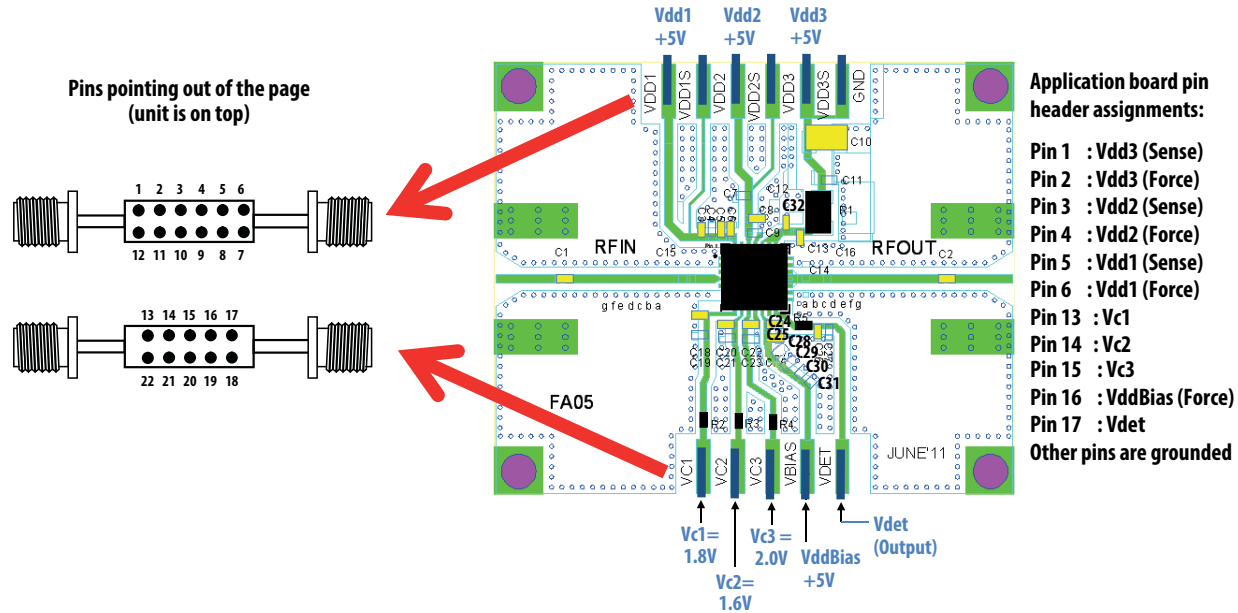


Figure 25. Demonstration board application circuit for MGA-43003 module

## Application Schematic

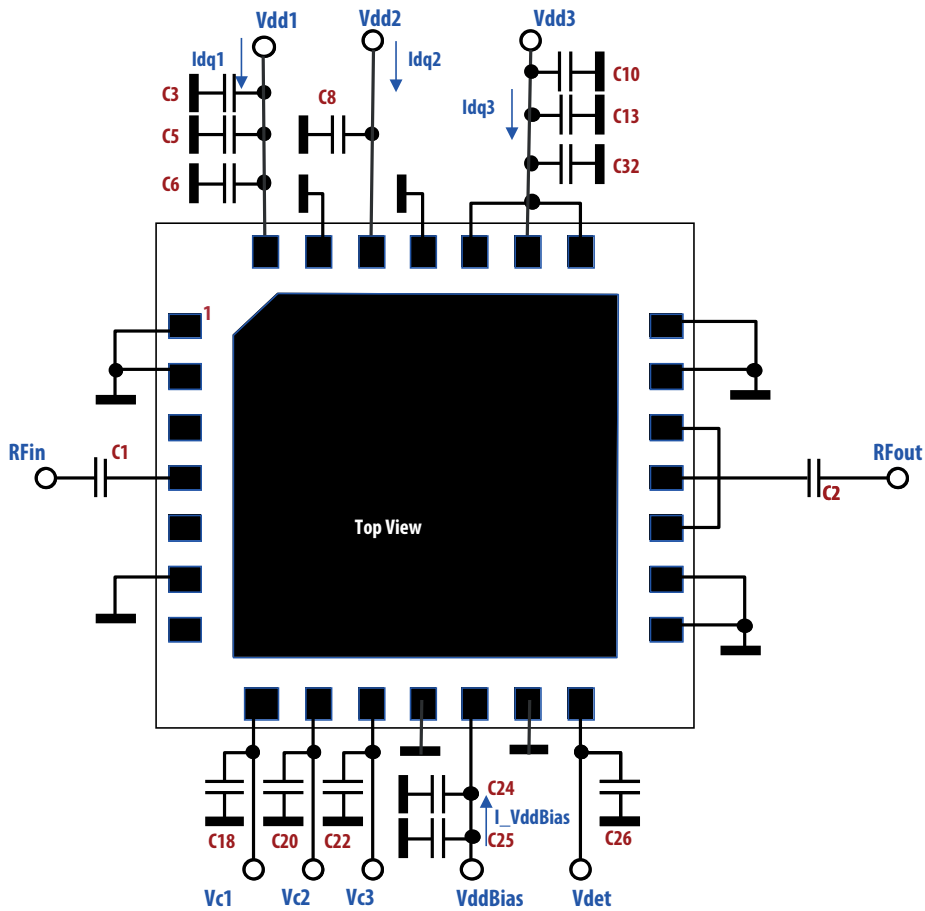


Figure 26. Application schematic in demonstration board

### Notes

1. All capacitors on supply lines are bypass capacitors
2. C1 / C2 are RF coupling capacitors.
3. Idq1 = 55.0mA, Idq2 = 105.0mA, Idq3 = 200.0mA, I\_VddBias = 14.0mA. 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 23 above. Adjustment of these currents enable optimum bias conditions to be achieved for best linearity and efficiency for a given modulation type.

## MGA-43003 typical $I_{c2}$ , $I_{c3}$ Vs $V_c$ performance unless otherwise stated

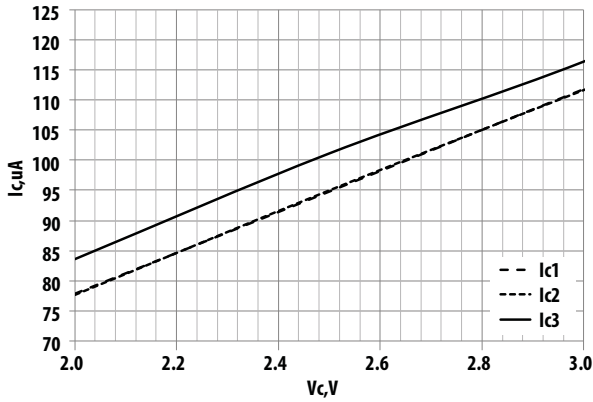


Figure 27.  $I_c$  Versus  $V_c$  at  $V_{dd}=V_{ddBias}=5.0V$

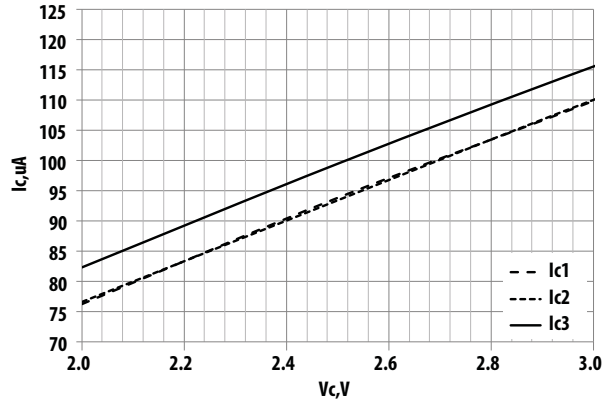
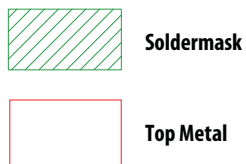
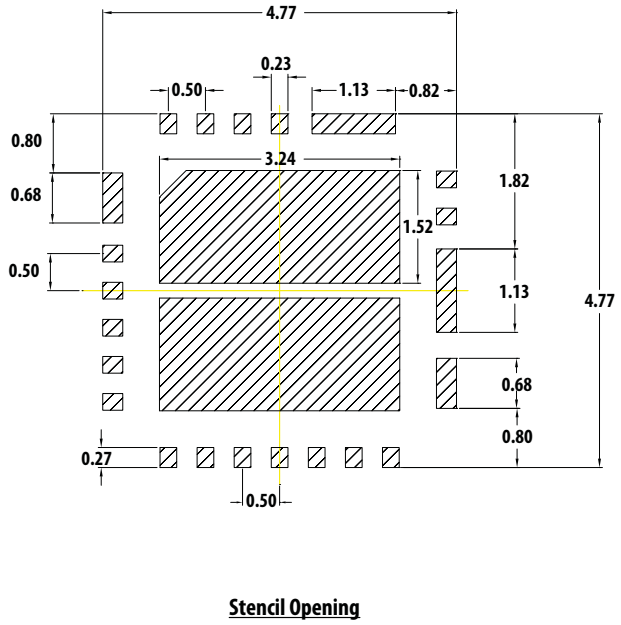
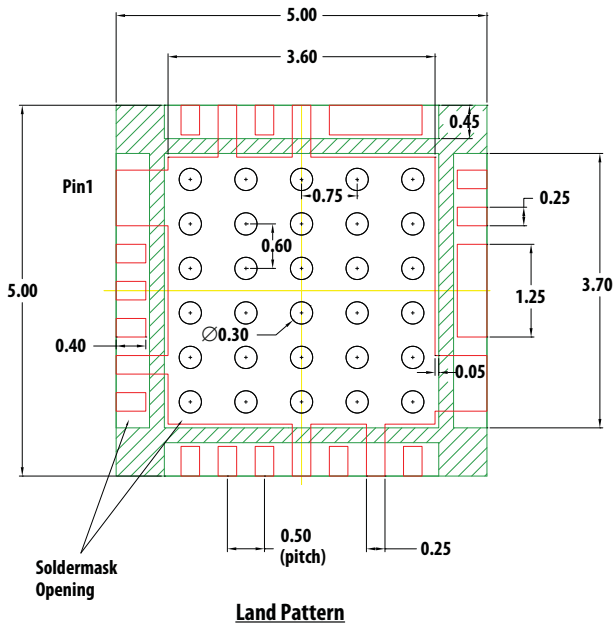


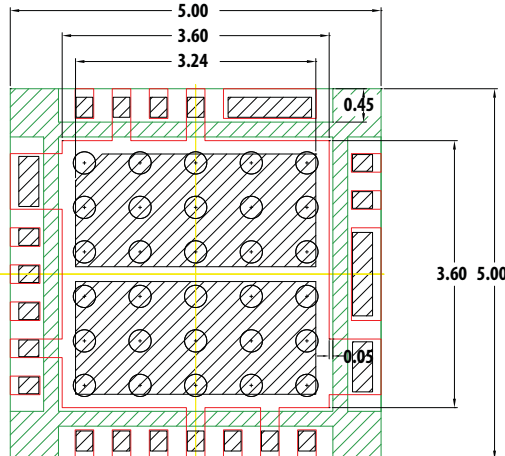
Figure 28.  $I_c$  Versus  $V_c$  at  $V_{dd}=V_{ddBias}=5.5V$

## PCB Land Pattern and Stencil Outline



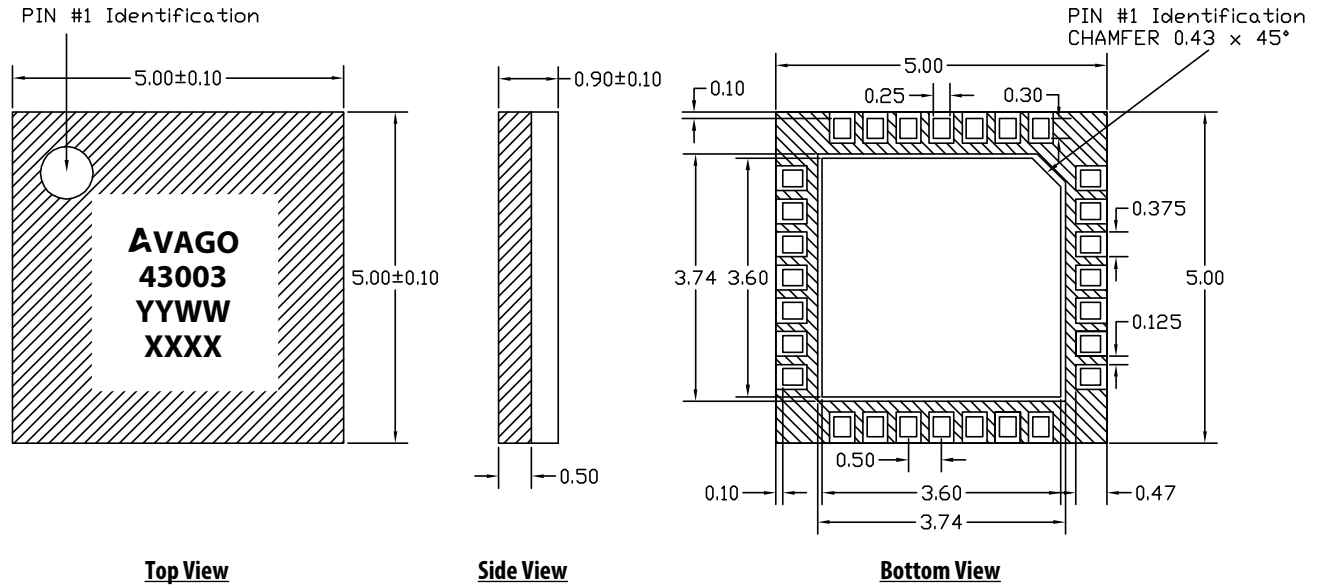
**Note :**

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



Combination of Land Pattern & Stencil Opening

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



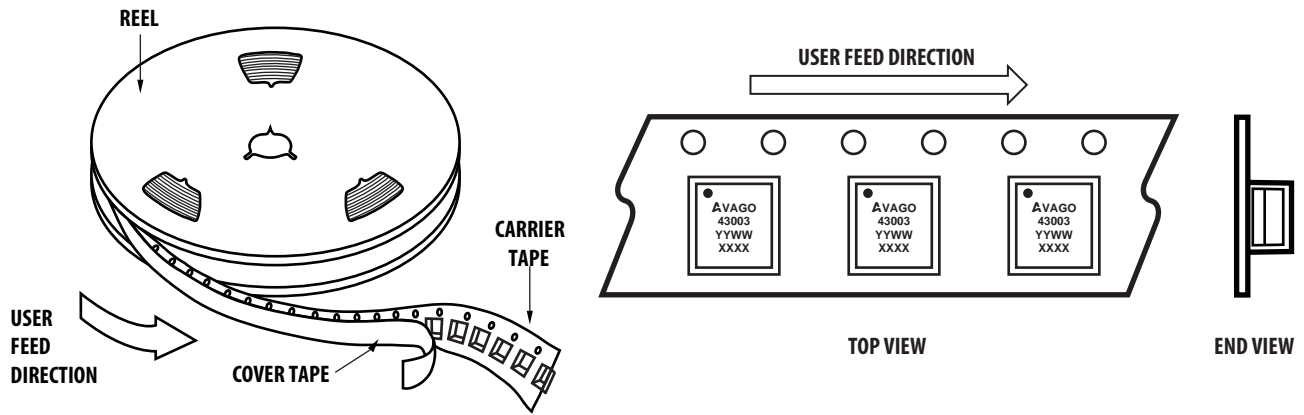
### Note

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

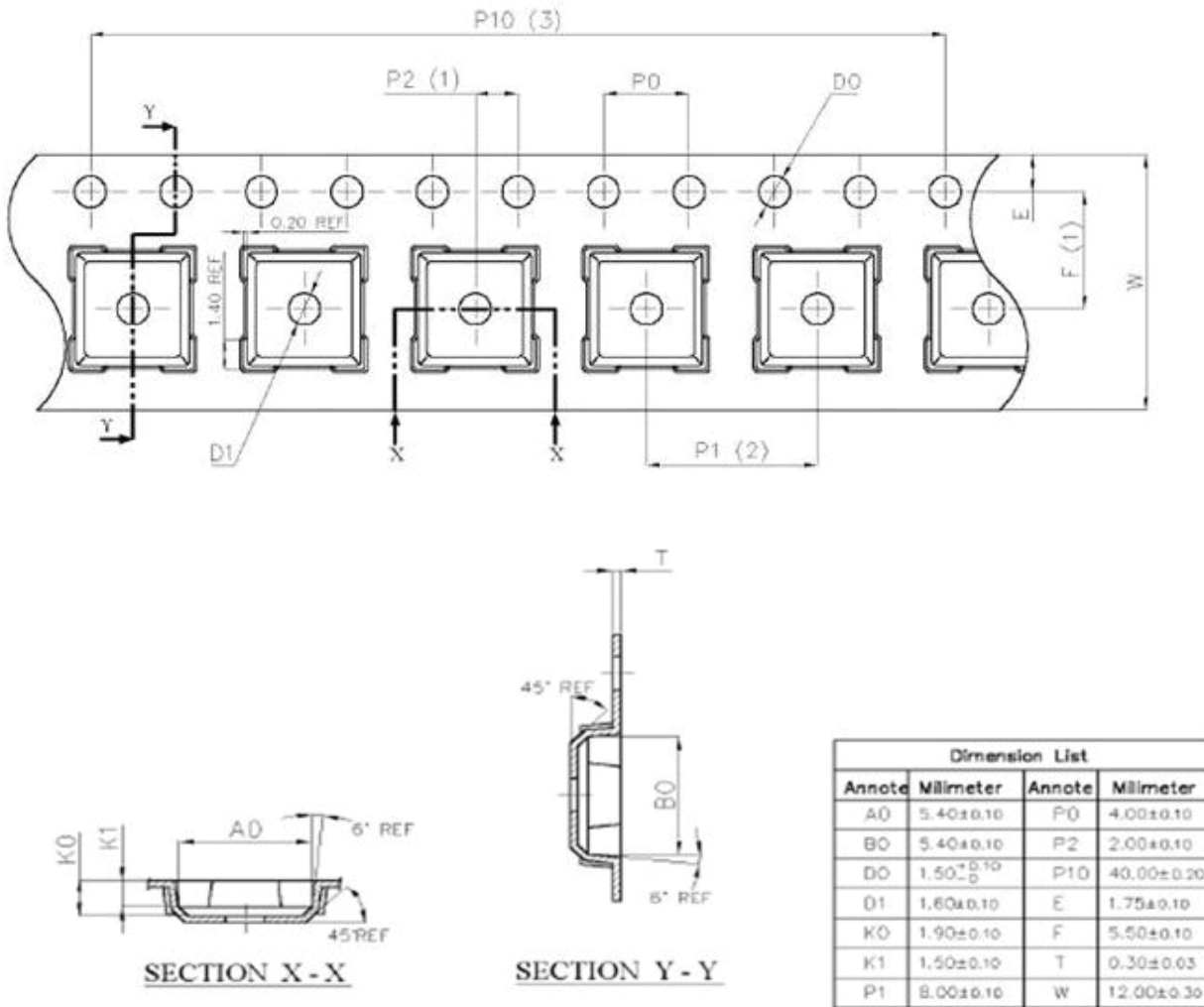
### Part Number Ordering Information

Part Number	Qty	Container
MGA-43003-BLKG	100	Antistatic Bag
MGA-43003-TR1G	1000	7" Reel

### Device Orientation

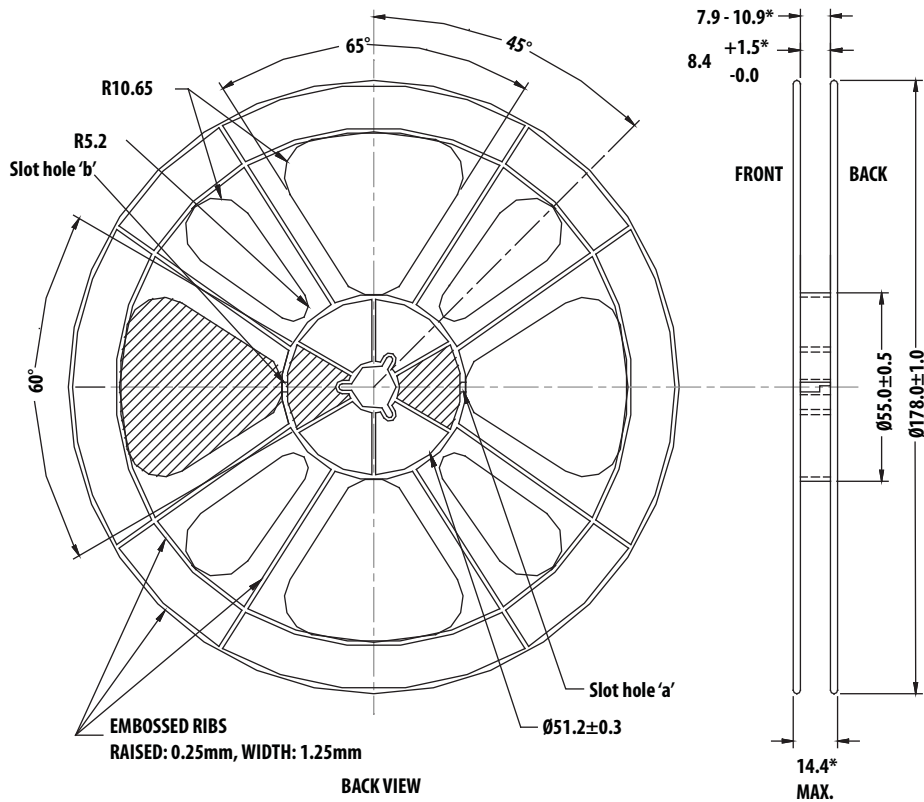
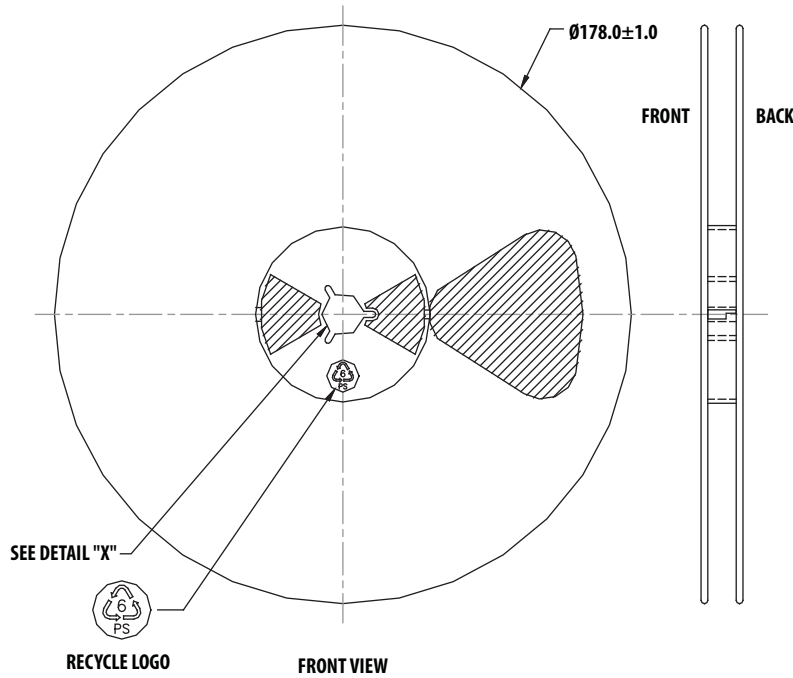


### Tape Dimensions





# Reel Dimensions (7" reel)



For product information and a complete list of distributors, please go to our web site: [www.avagotech.com](http://www.avagotech.com)

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