MGA-43428

High Linearity 851 – 894 MHz Power Amplifier Module

Data Sheet

Description

Avago Technologies' MGA-43428 is a fully matched power amplifier for use in the (851-894) MHz band. High linear output power at 5V is achieved through the use of Avago Technologies' proprietary 0.25um GaAs Enhancement-mode pHEMT process. MGA-43428 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-43428 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.

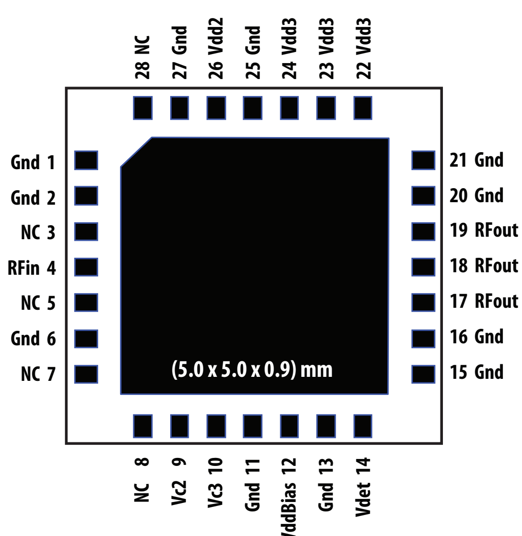
Component Image

TOP VIEW

5.0 x 5.0 x 0.9 mm Package Outline

Note:
Package marking provides orientation and identification
"43428" = Device part number
"YYWW" = year and work week
"XXXX" = assembly lot number

Pin Configuration



Features

- High linearity performance : Max -50dBc ACLR [1] at 27.2dBm linear output power (biased on 5V supply)
- High gain : 33.7dB
- 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
- MSL3
- Lead free/Halogen free/RoHS compliance

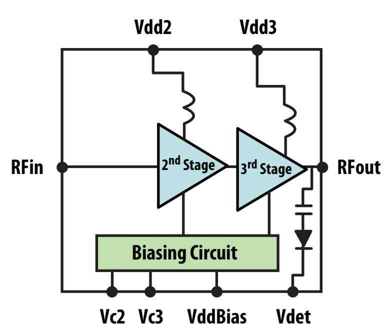
Specifications

880MHz; 5.0V, Idqtotal =350mA (typ), W-CDMA Test model #1, 64DPCH downlink signal

- PAE : 14.9%
- 27.2dBm linear Pout @ ACLR = -50dBc [1]
- 33.7dB Gain
- Detector range : 20dB

Note:
1. W-CDMA Test model #1, 64DPCH downlink signal.
2. 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 = 80 V
ESD Human Body Model = 400 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	4.9
T_j	Junction Temperature	°C	150
T_{STG}	Storage Temperature	°C	-65 to 150

Thermal Resistance [2,3]

θ_{jc} = 13.5°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 = 5.5 V operating voltage.
3. Board temperature (TB) is 25 °C , for TB >83.8 °C derate the device power at 74mW per °C rise in Board (package belly) temperature.

Electrical Specifications

T_A = 25 °C, Vdd = VddBias = 5.0V, Vc2=Vc3=3V, Idqtotal = 350mA, RF performance at 880MHz, W-CDMA Test model #1, 64DPCH downlink signal operation unless otherwise stated.

Symbol	Parameter and Test Condition	Units	Min.	Typ.	Max.
Vdd	Supply Voltage	V	-	5.0	-
Idqtotal	Quiescent Supply Current	mA	-	350	560
Gain	Gain	dB	31	33.7	-
OP1dB	Output Power at 1dB Gain Compression	dBm	-	36.4	-
ACLR1 @ Pout = 27.2 dBm	W-CDMA Test model #1, 64DPCH downlink signal	dBc	-	-50	-
PAE @ Pout = 27.2 dBm	Power Added Efficiency	%	13	14.9	-
|S11|	Input Return Loss, 50 Ω source	dB	-	25	-
DetR	Detector RF dynamic range	dB	-	20	-

T_A = 25 °C, Vdd =VddBias=5.5V, Vc2=2.9V, Vc3=2.7V Idqtotal = 345mA, RF performance at 880MHz, W-CDMA Test model #1, 64DPCH downlink signal operation unless otherwise stated.

Symbol	Parameter and Test Condition	Units	Typ.
Vdd	Supply Voltage	V	5.5
Idqtotal	Quiescent Supply Current	mA	345
Gain	Gain	dB	33.7
OP1dB	Output Power at 1dB Gain Compression	dBm	37.0
ACLR1 @ Pout = 27.9 dBm	W-CDMA Test model #1, 64DPCH downlink signal	dBc	-50
PAE @ Pout = 27.9 dBm	Power Added Efficiency	%	15
|S11|	Input Return Loss, 50 Ω source	dB	25
DetR	Detector RF dynamic range	dB	20

Product Consistency Distribution Charts [1]

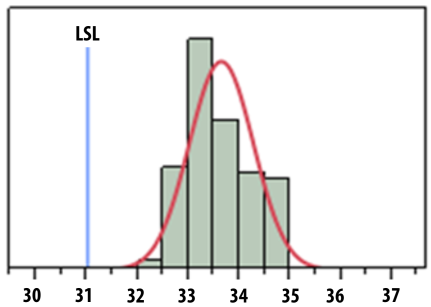


Figure 1. Gain at Pout=27.2dBm, LSL= 31dB, nominal = 33.7dB

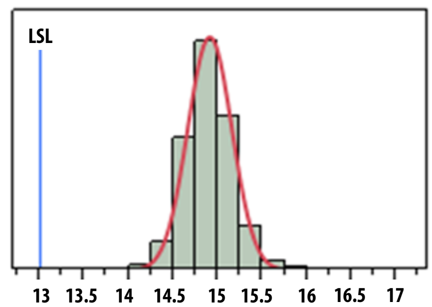


Figure 2. PAE at Pout=27.2dBm, LSL=13%, nominal = 14.9%

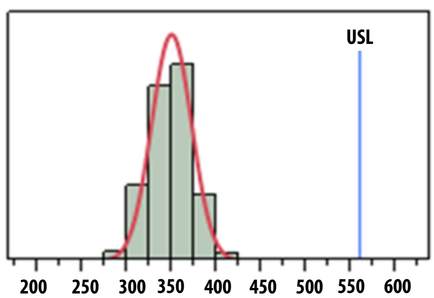


Figure 3. Idqtotal, Nominal = 350mA, USL=560mA

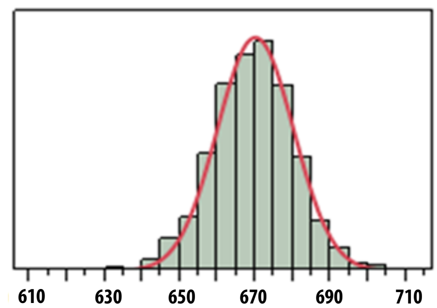


Figure 4. Idd_Total at Pout=27.2dBm, nominal = 670mA

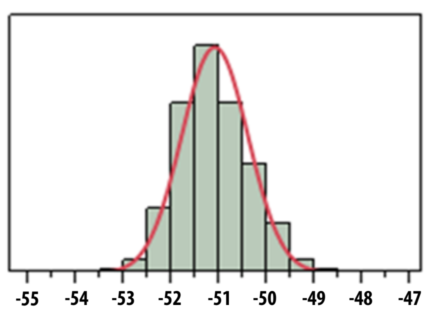


Figure 5. ACLR1 at Pout=27.2dBm, nominal = -51.1dBc

Note:

1. Distribution data sample size is 1500 samples taken from 3 different wafer lots. T_A = 25 °C, Vdd=VddBias = 5.0V, Vc2 = Vc3 = 3V, RF performance at 880MHz unless otherwise stated. Future wafers allocated to this product may have nominal values anywhere between the upper and lower limits.

MGA-43428 typical over-temperature performance at Vc2= Vc3=3V (Vdd=VddBias=5V) as shown in Figure 35 and Vc2= 2.9V, Vc3=2.7V (Vdd=VddBias=5.5V) unless otherwise stated.

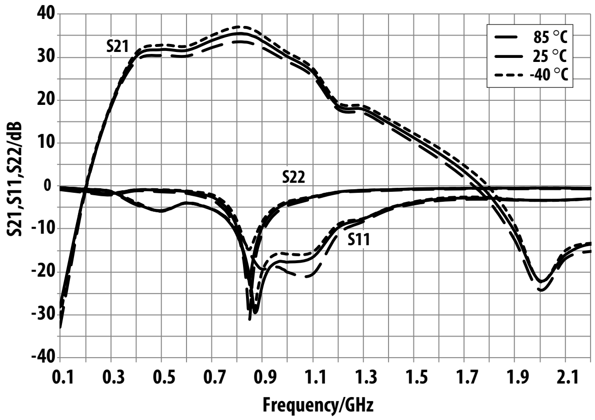


Figure 6. Small-signal performance Over-temperature Vdd=VddBias=5.0V operating voltage

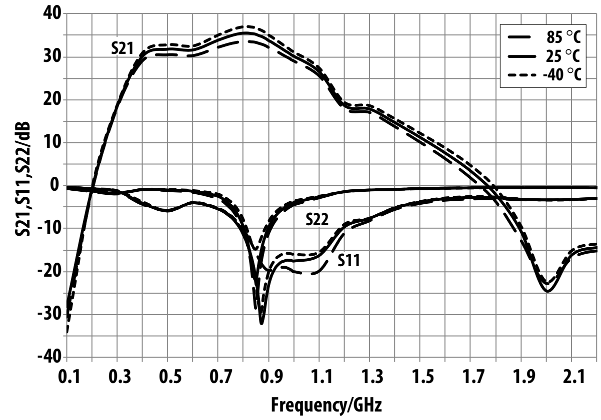


Figure 7. Small-signal performance Over-temperature Vdd=VddBias=5.5V operating voltage

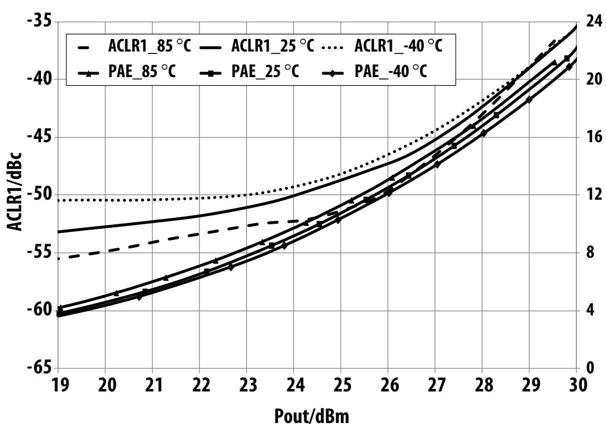


Figure 8. Over-temperature ACLR1, PAE vs Pout @ 851MHz Vdd=VddBias=5.0V operating voltage

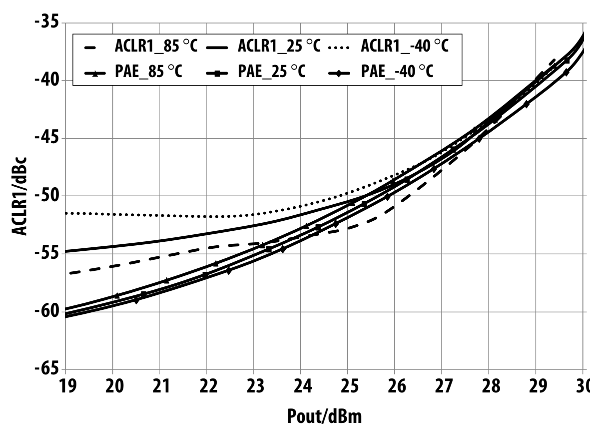


Figure 9. Over-temperature ACLR1, PAE vs Pout @ 859MHz Vdd=VddBias=5V operating voltage

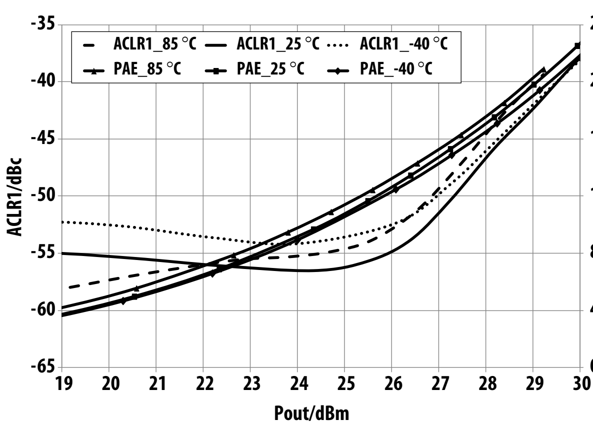


Figure 10. Over-temperature ACLR1, PAE vs Pout @ 869MHz Vdd=VddBias=5.0V operating voltage

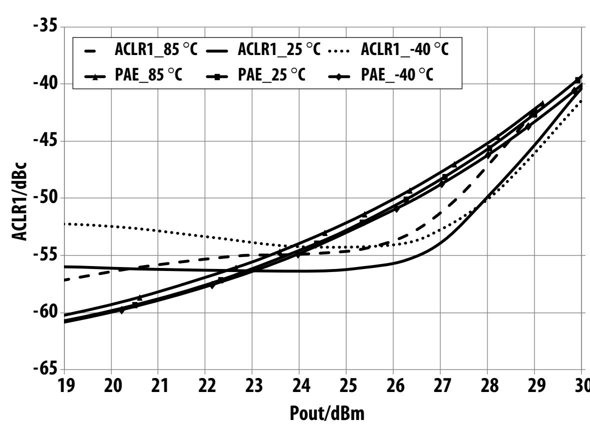


Figure 11. Over-temperature ACLR1, PAE vs Pout @ 869MHz Vdd=VddBias=5.5V operating voltage

MGA-43428 typical over-temperature performance at Vc2= Vc3=3V (Vdd=VddBias=5V) as shown in Figure 35 and Vc2= 2.9V, Vc3=2.7V (Vdd=VddBias=5.5V) unless otherwise stated.

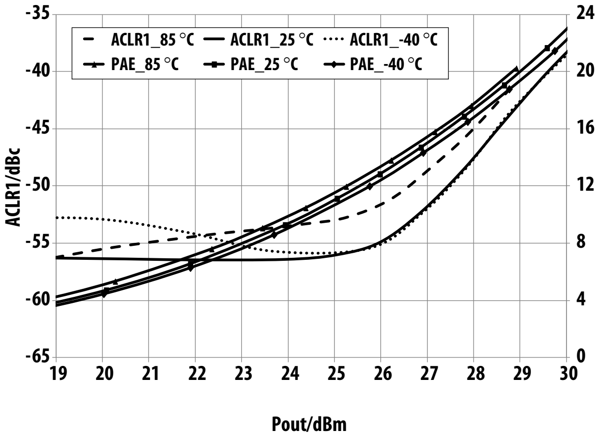


Figure 12. Over-temperature ACLR1, PAE vs Pout @ 880MHz Vdd=VddBias=5.0V operating voltage

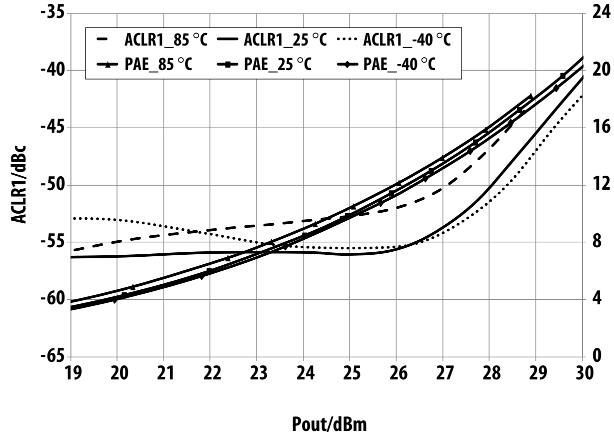


Figure 13. Over-temperature ACLR1, PAE vs Pout @ 880MHz Vdd=VddBias=5.5V operating voltage

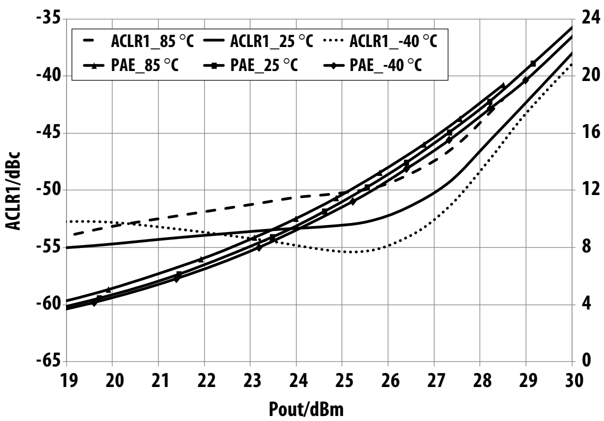


Figure 14. Over-temperature ACLR1, PAE vs Pout @ 894MHz Vdd=VddBias=5.0V operating voltage

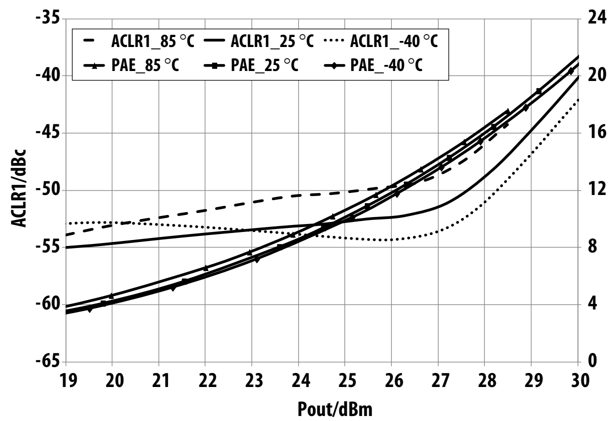


Figure 15. Over-temperature ACLR1, PAE vs Pout @ 894MHz Vdd=VddBias=5.5V operating voltage

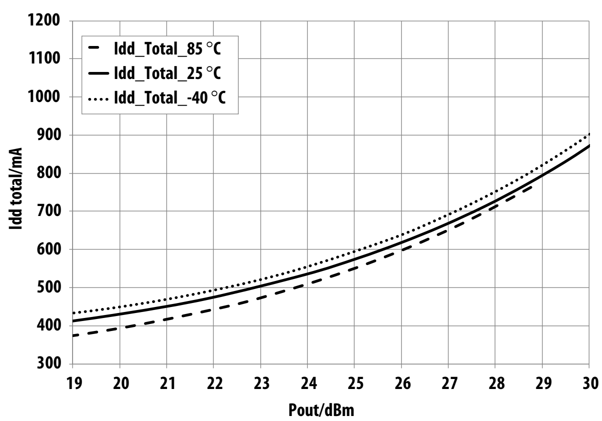


Figure 16. Over-temperature Idd_Total vs Pout @ 880MHz Vdd=VddBias=5.0V operating voltage

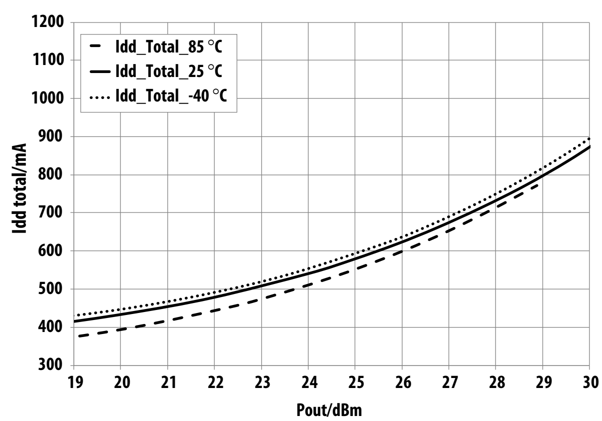


Figure 17. Over-temperature Idd_Total vs Pout @ 880MHz Vdd=VddBias=5.5V operating voltage

MGA-43428 typical over-temperature performance at Vc2= Vc3=3V (Vdd=VddBias=5V) as shown in Figure 35 and Vc2= 2.9V, Vc3=2.7V (Vdd=VddBias=5.5V) unless otherwise stated.

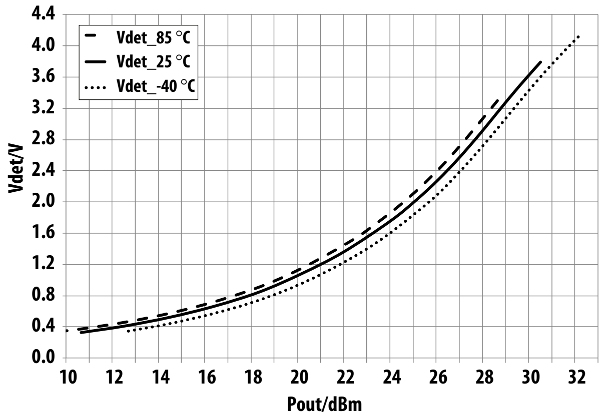


Figure 18. Over-temperature Vdet vs Pout @ 880MHz Vdd=VddBias=5.0V operating voltage

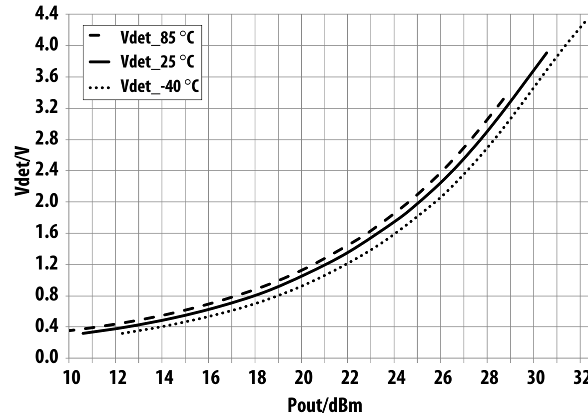


Figure 19. Over-temperature Vdet vs Pout @ 880MHz Vdd=VddBias=5.5V operating voltage

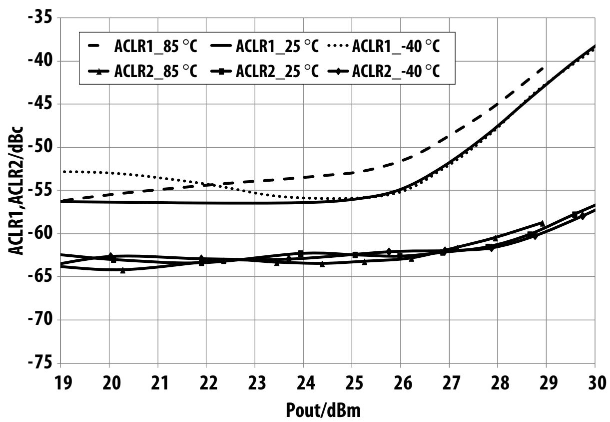


Figure 20. Over-temperature ACLR1, ACLR2/dBc Pout @ 880MHz Vdd=VddBias=5.0V operating voltage

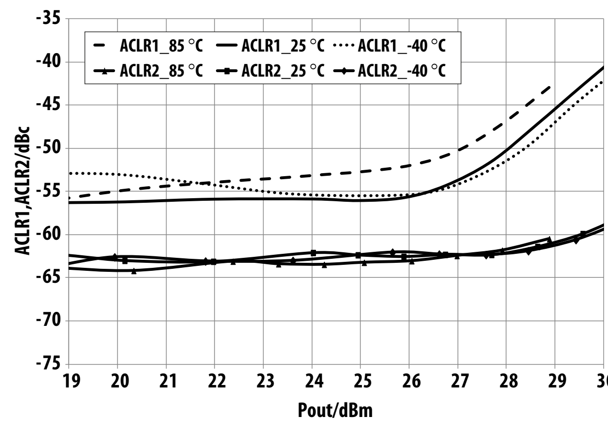


Figure 21. Over-temperature ACLR1, ACLR2/dBc vs Pout @ 880MHz Vdd=VddBias=5.5V operating voltage

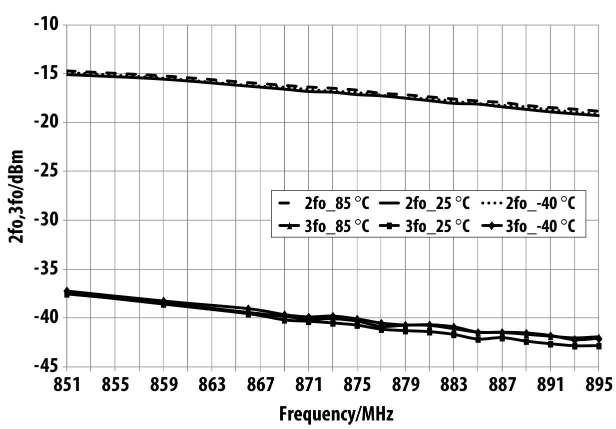


Figure 22. Over-temperature 2nd, 3rd Harmonics vs Freq at Pout=27.2dBm, Vdd=VddBias=5.0V operating voltage

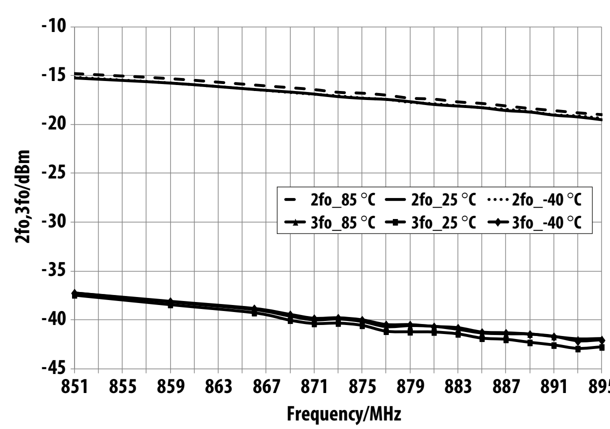


Figure 23. Over-temperature 2nd, 3rd Harmonics vs Freq at Pout=27.2dBm, Vdd=VddBias=5.5V operating voltage

MGA-43428 typical over-temperature performance at Vc2= Vc3=3V (Vdd=VddBias=5V) as shown in Figure 35 and Vc2= 2.9V, Vc3=2.7V (Vdd=VddBias=5.5V) unless otherwise stated.

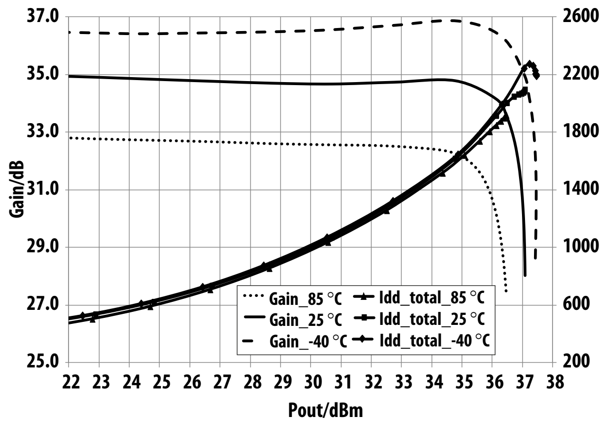


Figure 24. Over-temperature Gain, Idd_Total vs Pout @ 851MHz Vdd=VddBias=5.0V operating voltage

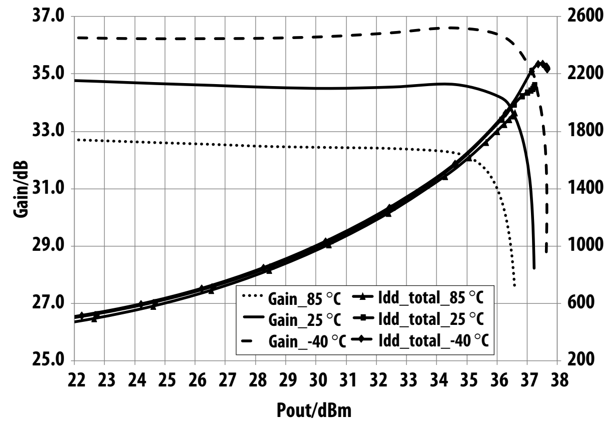


Figure 25. Over-temperature Gain, Idd_Total vs Pout @ 859MHz Vdd=VddBias=5.0V voltage

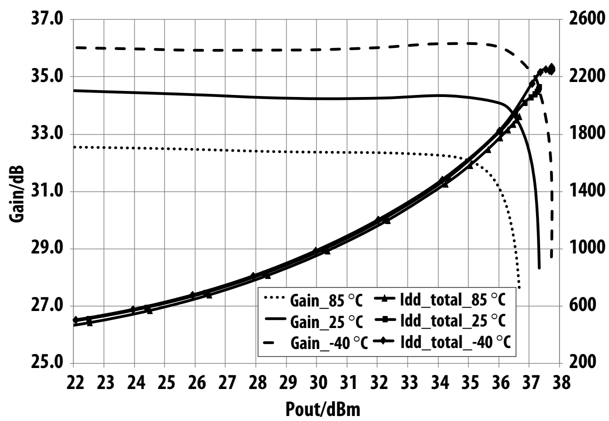


Figure 26. Over-temperature Gain, Idd_Total vs Pout @ 869MHz Vdd=VddBias=5.0V operating voltage

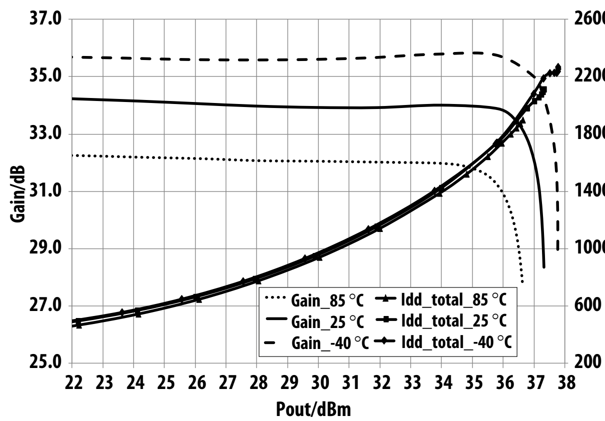


Figure 27. Over-temperature Gain, Idd_Total vs Pout @ 880MHz Vdd=VddBias=5.0V voltage

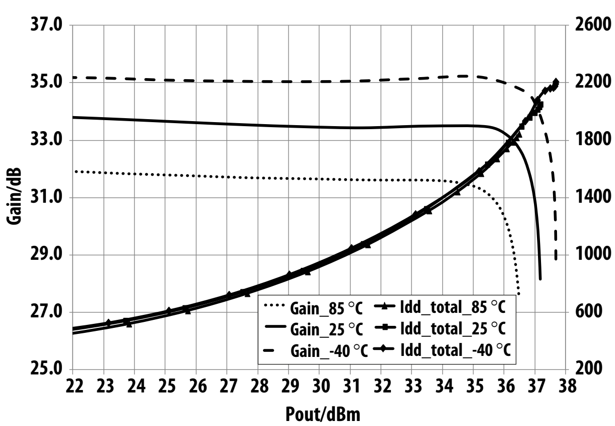


Figure 28. Over-temperature Gain, Idd_Total vs Pout @ 894MHz Vdd=VddBias=5.0V operating voltage

MGA-43428 typical 3GPP W-CDMA Test model #1 Spectrum Emission Mask performance at Vdd=VddBias=5.0V, Vc2=Vc3=3V unless otherwise stated.

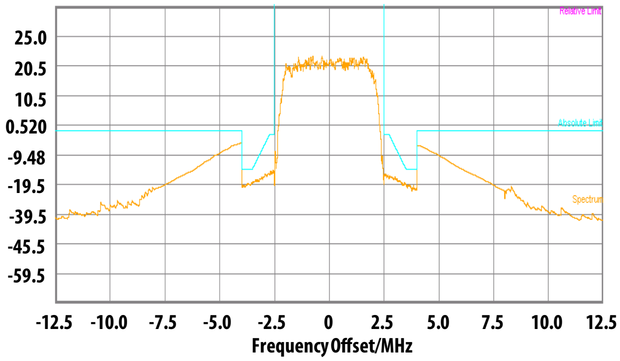


Figure 29. SEM at Pout=28dBm @ 851MHz

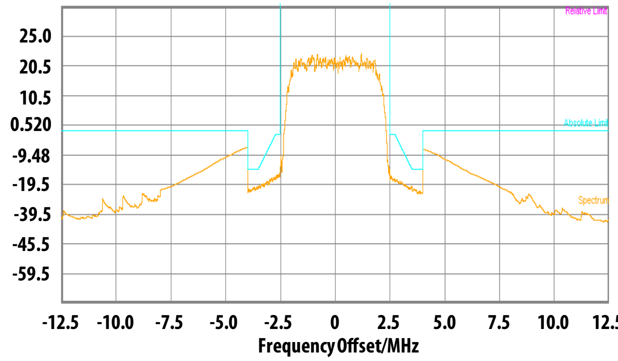


Figure 30. SEM at Pout=28dBm @ 859MHz

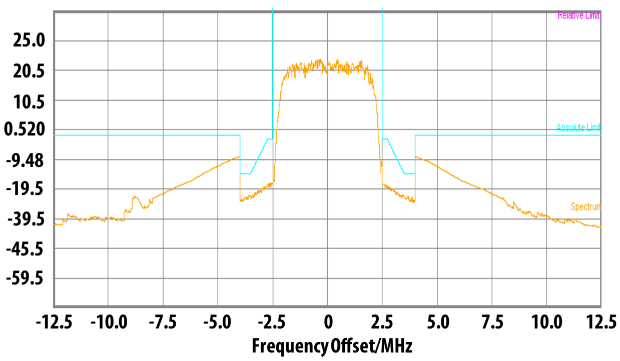


Figure 31. SEM at Pout=28dBm @ 869MHz

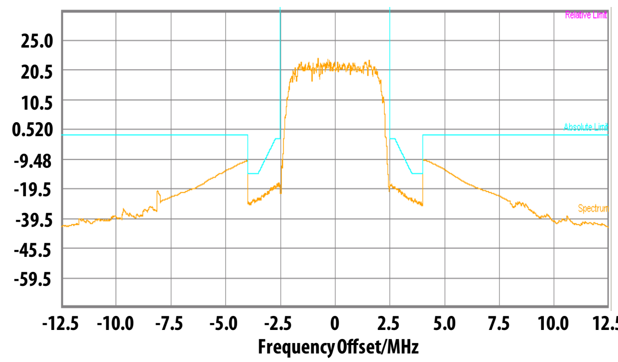


Figure 32. SEM at Pout=28dBm @ 880MHz

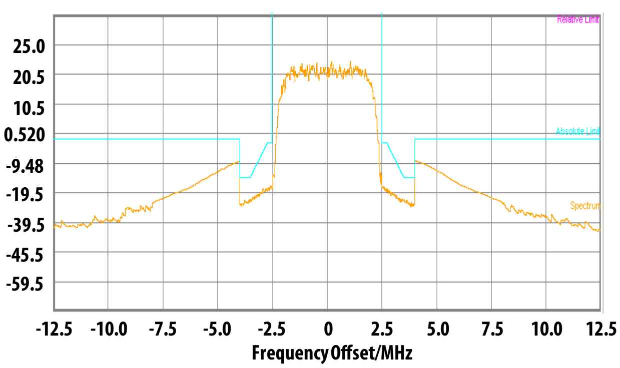


Figure 33. SEM at Pout=28dBm @ 894MHz

S-Parameter[5] (Vdd=VddBias=5.0V, Vc2=Vc3=3V, TA=25 °C, 50ohm)

Freq	S11	S11	S21	S21	S12	S12	S22	S22
(GHz)	(dB)	(ang)	(dB)	(ang)	(dB)	(ang)	(dB)	(ang)
0.1	-0.279	163.713	-28.202	-21.616	-63.031	-63.949	-0.748	174.481
0.2	-0.462	144.704	-1.01	-61.828	-63.509	-121.03	-1.172	171.921
0.3	-0.847	114.595	17.853	-124.749	-79.206	-132.692	-1.461	173.548
0.4	-3.813	40.322	29.673	139.221	-65.466	-51.065	-0.637	170.986
0.5	-6.353	-105.622	31.19	44.592	-63.041	-112.889	-0.818	162.172
0.6	-3.764	-175.42	31.777	5.7	-57.981	-156.352	-0.88	155.194
0.70	-4.76	148.36	33.604	-44.016	-51.025	178.006	-1.968	136.005
0.75	-6.288	129.471	34.716	-70.21	-48.786	161.263	-3.67	120.258
0.76	-6.763	125.483	34.918	-75.948	-48.366	158.687	-4.22	116.371
0.77	-7.339	121.292	35.114	-81.952	-47.791	151.075	-4.906	111.915
0.78	-8.001	117.126	35.286	-88.131	-47.225	147.119	-5.734	107.047
0.79	-8.796	112.954	35.429	-94.496	-46.979	141.353	-6.727	101.727
0.80	-9.741	108.927	35.539	-101.032	-46.63	134.179	-7.933	95.81
0.81	-10.83	105.292	35.614	-107.702	-45.549	129.29	-9.429	89.08
0.82	-12.153	101.863	35.634	-114.496	-45.766	121.44	-11.386	80.772
0.83	-13.737	99.621	35.609	-121.38	-46.181	116.344	-13.877	69.025
0.84	-15.608	98.82	35.54	-128.276	-45.979	109.828	-17.087	49.51
0.85	-17.824	100.403	35.422	-135.133	-45.224	101.98	-20.429	16.245
0.86	-20.478	105.858	35.255	-141.912	-44.529	95.379	-21.19	-35.397
0.87	-23.096	120.412	35.035	-148.549	-45.07	90.014	-17.336	-67.009
0.88	-24.32	144.578	34.78	-155.023	-45.382	86.305	-14.306	-84.631
0.89	-23.832	167.094	34.491	-161.319	-45.459	80.565	-12.037	-95.432
0.90	-22.279	-177.303	34.171	-167.415	-45.402	74.488	-10.302	-102.979
0.91	-20.561	-170.127	33.823	-173.297	-45.396	72.391	-8.924	-109.046
0.92	-19.244	-167.627	33.451	-178.939	-45.905	66.811	-7.864	-113.892
0.93	-18.252	-166.43	33.074	175.672	-45.84	64.594	-6.996	-118.083
0.94	-17.533	-166.226	32.691	170.464	-45.894	59.934	-6.266	-121.89
0.95	-17.021	-166.597	32.299	165.435	-46.183	53.987	-5.651	-125.334
0.96	-16.655	-167.016	31.893	160.607	-46.477	51.213	-5.139	-128.326
0.97	-16.434	-167.132	31.502	155.928	-46.507	42.658	-4.705	-131.01
0.98	-16.369	-167.175	31.106	151.415	-46.475	41.817	-4.333	-133.457
0.99	-16.39	-167.015	30.713	147.009	-46.787	41.403	-4.01	-135.701
1.0	-16.836	-165.927	30.35	142.87	-47.117	39.826	-3.775	-137.292
1.1	-16.787	-123.059	26.778	103.521	-48.588	4.326	-2.322	-150.146
1.2	-9.819	-126.66	19.659	68.37	-53.365	-29.741	-1.188	-154.668
1.3	-7.267	-125.881	18.231	53.823	-53.431	-32.282	-0.737	-163.55
1.4	-4.808	-136.026	14.993	28.337	-54.615	-57.338	-0.553	-168.2
1.5	-3.381	-147.083	11.549	5.48	-56.792	-54.424	-0.422	-171.185
1.6	-2.589	-157.355	8.124	-16.899	-59.051	-79.166	-0.194	-174.217
1.7	-2.235	-166.689	4.221	-40.731	-63.931	-92.696	-0.185	-177.218

S-Parameter [5] (Vdd=VddBias=5.0V, Vc2=Vc3=3V, TA=25 °C, 50ohm) Continued

Freq	S11	S11	S21	S21	S12	S12	S22	S22
(GHz)	(dB)	(ang)	(dB)	(ang)	(dB)	(ang)	(dB)	(ang)
1.8	-2.282	-174.564	-0.751	-65.616	-69.219	-91.567	-0.208	-179.247
1.9	-2.582	-179.634	-8.178	-88.022	-64.601	92.695	-0.198	179.406
2.0	-2.757	178.106	-21.965	-70.735	-64.369	14.153	-0.119	177.883
2.1	-2.669	176.392	-17.748	6.253	-65.617	79.033	-0.112	176.235
2.2	-2.458	174.164	-14.874	-2.106	-65.682	-47.983	-0.118	174.931
2.3	-2.251	171.2	-14.688	-15.524	-69.286	47.691	-0.11	173.746
2.4	-2.109	167.967	-15.533	-29.596	-67.105	-173.868	-0.077	172.506
2.5	-2.053	164.605	-17.077	-44.476	-69.846	72.07	-0.062	171.142
2.6	-2.104	161.476	-19.799	-62.06	-65.351	-126.523	-0.095	169.817
2.7	-2.276	159.689	-26.062	-80.022	-71.683	-152.203	-0.14	168.728
2.8	-2.162	159.831	-30.924	10.411	-73.062	110.648	-0.129	167.958
2.9	-1.68	157.912	-23.025	-1.993	-65.882	100.057	-0.063	166.791
3.0	-1.397	154.167	-21.821	-18.25	-64.199	36.793	-0.09	165.216
3.5	-1.164	137.153	-17.47	-103.818	-69.85	46.932	-0.1	159.674
4.0	-1.288	122.791	-29.151	73.457	-62.117	92.479	-0.143	153.672
4.5	-1.534	109.313	-38.499	24.405	-70.059	62.88	-0.127	147.428
5.0	-1.814	99.01	-41.898	-11.621	-64.041	23.512	-0.161	140.379
5.5	-1.835	91.189	-46.309	-38.949	-68.856	47.119	-0.166	134.306
6.0	-1.749	81.178	-54.485	-36.192	-66.832	29.174	-0.2	127.319
7.0	-1.435	62.172	-49.891	13.721	-74.107	-28.35	-0.268	113.34
8.0	-1.369	41.12	-43.968	-24.325	-68.592	-20.144	-1.14	94.776
9.0	-2.048	8.852	-28.906	-154.272	-47.076	-160.962	-10.112	109.804
10.0	-3.801	-25.311	-45.49	120.099	-50.085	74.482	-1.003	47.132
11.0	-3.308	-57.449	-43.674	-14.743	-45.763	19.486	-1.497	-3.019
12.0	-2.966	-105.22	-46.11	-100.306	-43.048	-34.07	-2.188	-57.299
13.0	-4.892	-158.802	-45.46	77.676	-55.304	-92.766	-4.392	-93.561
14.0	-10.148	31.119	-39.937	-34.287	-46.152	-37.767	-1.789	-121.928
15.0	-5.004	-132.258	-40.974	-98.027	-39.762	-109.061	-1.151	-162.806
16.0	-2.471	165.237	-45.503	-142.428	-44.893	-161.603	-0.833	171.414
17.0	-1.547	146.582	-41.172	-160.839	-42.663	-162.441	-1.362	145.508
18.0	-1.616	112.011	-44.76	122.642	-44.824	119.407	-4.375	70.222
19.0	-2.206	78.724	-59.163	22.859	-54.654	50.726	-3.611	-38.084
20.0	-2.549	52.466	-50.574	120.932	-48.794	110.88	-3.061	-100.732

S-Parameter [5] (Vdd=VddBias=5.5V, Vc2=2.9V, Vc3=2.7V, TA=25 °C, 50ohm)

Freq	S11	S11	S21	S21	S12	S12	S22	S22
(GHz)	(dB)	(ang)	(dB)	(ang)	(dB)	(ang)	(dB)	(ang)
0.1	-0.286	163.587	-28.113	-20.473	-59.949	124.392	-0.764	174.406
0.2	-0.465	144.74	-0.954	-60.978	-72.397	143.991	-1.201	171.792
0.3	-0.852	114.587	17.985	-124.557	-70.615	-59.588	-1.506	173.659
0.4	-3.81	40.462	29.736	138.709	-63.075	-5.667	-0.644	171.064
0.5	-6.333	-105.35	31.199	44.086	-58.997	-149.366	-0.842	162.243
0.6	-3.747	-175.157	31.77	5.281	-55.079	-147.417	-0.913	155.328
0.70	-4.752	148.707	33.561	-44.539	-50.92	177.275	-2.04	136.354
0.75	-6.262	130.173	34.639	-70.706	-48.526	155.844	-3.785	121.029
0.76	-6.745	126.145	34.834	-76.43	-47.924	154.719	-4.345	117.267
0.77	-7.297	122.137	35.026	-82.402	-47.162	146.629	-5.042	113.067
0.78	-7.957	118.09	35.19	-88.535	-47.265	144.931	-5.867	108.432
0.79	-8.743	114.122	35.326	-94.847	-46.736	140.178	-6.867	103.394
0.80	-9.659	110.345	35.433	-101.326	-45.772	131.728	-8.099	97.832
0.81	-10.701	106.869	35.505	-107.934	-45.359	124.52	-9.64	91.528
0.82	-12.004	103.81	35.522	-114.66	-46.047	124.202	-11.645	83.853
0.83	-13.518	101.689	35.494	-121.48	-46.159	114.997	-14.301	73.481
0.84	-15.277	101.048	35.425	-128.302	-45.533	107.384	-17.882	55.435
0.85	-17.332	102.713	35.312	-135.082	-44.982	103.656	-21.844	20.215
0.86	-19.743	107.781	35.147	-141.803	-45.587	100.985	-22.734	-41.021
0.87	-21.994	120.516	34.933	-148.379	-45.245	92.519	-18.069	-72.179
0.88	-23.38	140.646	34.684	-154.773	-45.448	84.093	-14.697	-88.553
0.89	-23.249	160.564	34.402	-161.028	-45.609	79.511	-12.303	-98.361
0.90	-21.997	176.014	34.09	-167.105	-45.602	76.916	-10.524	-105.294
0.91	-20.56	-175.193	33.75	-172.934	-45.575	71.343	-9.117	-110.743
0.92	-19.322	-171.735	33.39	-178.576	-45.468	65.167	-8.024	-115.281
0.93	-18.389	-169.954	33.02	176.049	-45.427	62.522	-7.131	-119.253
0.94	-17.692	-169.259	32.643	170.862	-45.449	59.112	-6.387	-122.873
0.95	-17.181	-169.17	32.256	165.842	-45.719	54.312	-5.764	-126.15
0.96	-16.813	-169.225	31.86	160.993	-46.491	49.458	-5.238	-129.005
0.97	-16.614	-169.18	31.473	156.308	-46.529	43.464	-4.801	-131.602
0.98	-16.544	-169.187	31.083	151.795	-46.174	40.697	-4.422	-133.965
0.99	-16.567	-168.844	30.696	147.381	-46.449	38.713	-4.089	-136.141
1.0	-17.035	-167.585	30.336	143.218	-46.977	36.093	-3.842	-137.678
1.1	-17.075	-122.526	26.798	103.645	-48.729	5.626	-2.362	-150.208
1.2	-9.913	-126.184	19.671	68.526	-53.615	-32.039	-1.2	-154.678
1.3	-7.305	-125.412	18.279	53.652	-52.97	-36.668	-0.748	-163.544
1.4	-4.826	-135.822	15.026	27.891	-54.817	-59.095	-0.558	-168.195
1.5	-3.399	-146.974	11.554	4.822	-56.408	-75.543	-0.424	-171.164
1.6	-2.615	-157.241	8.082	-17.645	-61.14	-92.315	-0.193	-174.207
1.7	-2.269	-166.539	4.121	-41.437	-63.405	-145.986	-0.182	-177.204
1.8	-2.308	-174.296	-0.908	-66.026	-66.51	-130.127	-0.205	-179.259
1.9	-2.584	-179.354	-8.352	-87.931	-73.06	173.723	-0.206	179.382

S-Parameter [5] (Vdd=VddBias=5.5V, Vc2=2.9V, Vc3=2.7V, TA=25 °C, 50ohm) Continued

Freq	S11	S11	S21	S21	S12	S12	S22	S22
(GHz)	(dB)	(ang)	(dB)	(ang)	(dB)	(ang)	(dB)	(ang)
2.0	-2.761	178.271	-22.039	-69.716	-65.774	151.339	-0.121	177.893
2.1	-2.663	176.54	-17.819	6.795	-63.97	-13.319	-0.113	176.222
2.2	-2.464	174.227	-14.889	-1.559	-67.191	104.434	-0.119	174.928
2.3	-2.251	171.314	-14.697	-15.111	-66.77	-106.52	-0.111	173.744
2.4	-2.104	168.054	-15.546	-29.015	-68.601	-19.953	-0.077	172.53
2.5	-2.047	164.65	-17.094	-44.425	-62.938	-9.8	-0.064	171.132
2.6	-2.092	161.602	-19.729	-61.989	-72.969	-143.209	-0.094	169.813
2.7	-2.258	159.742	-26.149	-79.872	-71.475	65.475	-0.135	168.749
2.8	-2.145	159.798	-30.83	10.899	-72.344	120.391	-0.126	167.924
2.9	-1.681	157.858	-22.97	-1.781	-73.269	131.105	-0.059	166.765
3.0	-1.395	154.134	-21.785	-18.675	-62.432	106.999	-0.095	165.205
3.5	-1.159	137.132	-17.429	-104.237	-67.221	44.106	-0.094	159.67
4.0	-1.288	122.79	-29.08	73.168	-62.342	67.886	-0.148	153.651
4.5	-1.527	109.297	-38.443	21.915	-64.339	63.746	-0.128	147.402
5.0	-1.803	98.976	-42.087	-12.946	-68.747	-12.26	-0.162	140.367
5.5	-1.821	91.127	-46.559	-42.386	-64.34	28.7	-0.173	134.291
6.0	-1.744	81.077	-53.972	-39.128	-67.047	9.154	-0.198	127.323
7.0	-1.44	62.029	-50.315	13.331	-64.987	-8.73	-0.271	113.315
8.0	-1.38	41.054	-43.776	-23.713	-68.971	6.022	-1.142	94.756
9.0	-2.061	8.775	-28.893	-155.39	-47.692	-159.637	-10.044	109.905
10.0	-3.817	-25.346	-46.107	116.46	-51.239	74.057	-1.006	47.044
11.0	-3.305	-57.386	-43.697	-11.253	-45.56	19.399	-1.499	-3.149
12.0	-2.955	-105.162	-45.718	-108.798	-42.729	-35.532	-2.193	-57.433
13.0	-4.867	-158.812	-44.919	75.339	-52.813	-85.386	-4.396	-93.647
14.0	-10.184	30.467	-39.941	-33.914	-46.323	-32.018	-1.793	-122.102
15.0	-5.008	-132.666	-41.079	-100.137	-39.888	-107.586	-1.155	-162.923
16.0	-2.467	165.054	-45.916	-140.817	-45.06	-165.069	-0.838	171.323
17.0	-1.544	146.276	-41.593	-160.555	-42.588	-158.639	-1.378	145.37
18.0	-1.619	111.824	-44.741	119.814	-45.26	119.527	-4.408	69.888
19.0	-2.211	78.503	-58.683	56.644	-54.262	31.438	-3.612	-38.577
20.0	-2.547	52.28	-49.019	110.908	-50.645	116.823	-3.059	-101.004

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

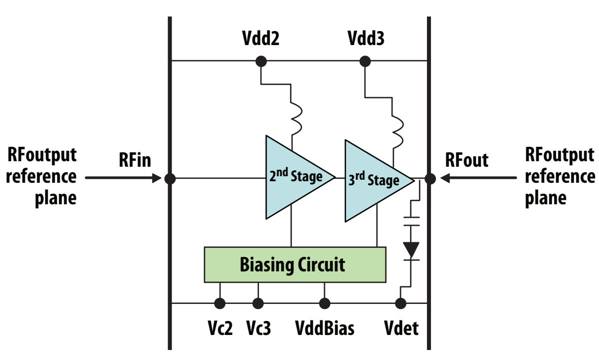
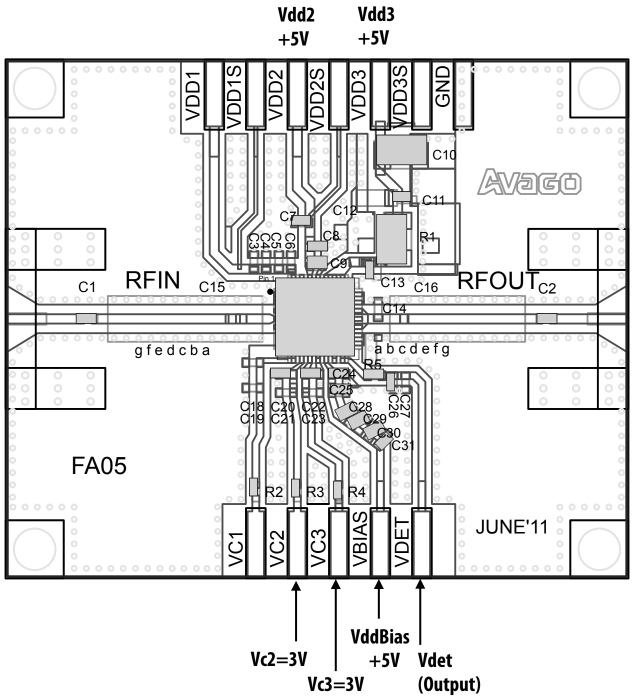


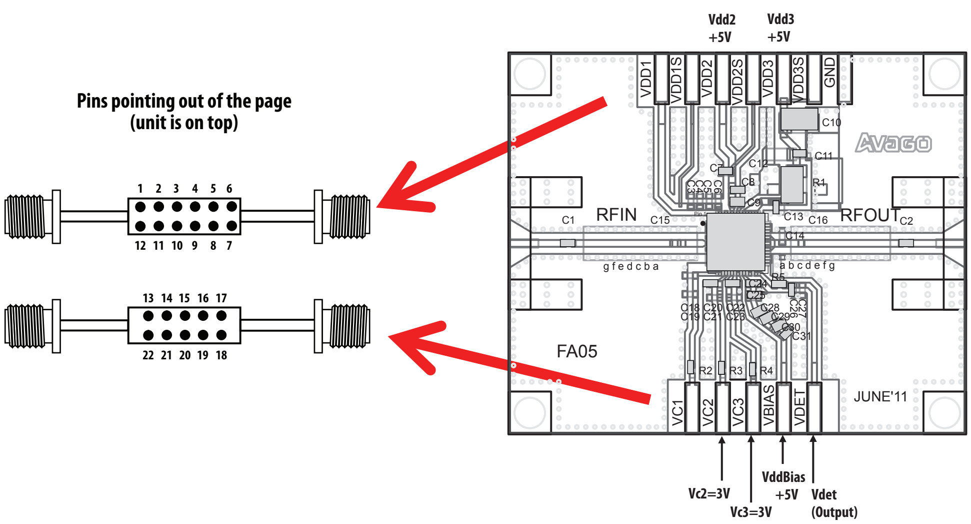
Figure 34. RFinput and RFoutput Reference Plane

Demonstration Board Top View
(Vdd=VddBias=5.0V, Vc2= Vc3=3V; Vdd=VddBias=5.5V operating voltage, Vc2=2.9V, Vc3=2.7V)



Component	Value	Supplier	Size
C1, C2, C20, C22	56pF ± 5%	Murata	0402
C11, C31	0.1uF ± 10%	Murata	0402
C3, C4,C5, C6, C12,C14, C18, C19,C21,C23,C27	Not Used	Murata	0402
C10	2.2uF ± 10%	Murata	0805
C26	22nF ± 10%	Kyocera	0402
R1	0Ω	KOA	0805
R3, R4, R5	0Ω	KOA	0402
C24	3.9pF ± 0.025	Murata	0402
C25	22pF ± 5%	Murata	0402
C28	82pF JA01	Murata	0402
C8, C29	2200pF JA01	Murata	0402
C7, C13, C30	0.047uF ± 5%	Murata	0402
C9	12pF ± 5%	Murata	0402

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



Application board pin header assignments

Pin 1 : Vdd3 (Sense)
Pin 2 : Vdd3 (Force)
Pin 3 : Vdd2 (Sense)
Pin 4 : Vdd2 (Force)
Pin 5 : Vdd1 (Sense) – not used
Pin 6 : Vdd1 (Force) – not used
Pin 13 : Vc1 – not used
Pin 14 : Vc2
Pin 15 : Vc3
Pin 16 : VddBias
Pin 17 : Vdet
Other pins are grounded

Figure 35. Demonstration board application circuit for MGA-43428 module

Application Schematic

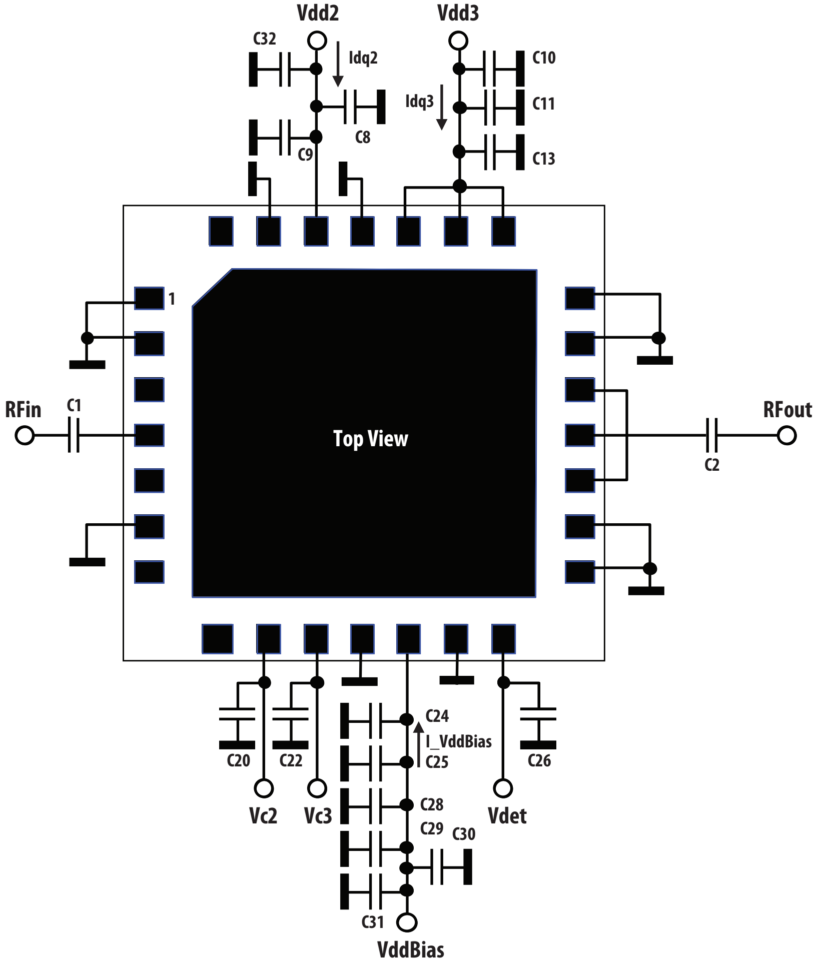


Figure 36. Application schematic in demonstration board

Notes

1. All capacitors on supply lines are bypass capacitors
2. C1 / C2 are RF coupling capacitors.
3. For Vdd=VddBias=5V, Idq2 = 100 mA, Idq3 = 250 mA, I_VddBias = 14 mA. Idq 2/3 are adjusted by voltages to CMOS-compatible control pins Vc 2/3 respectively. These typical bias currents were obtained with Vc 2/3 voltages in Fig 2 below. Adjustment of these currents enable optimum bias conditions to be achieved for best linearity and efficiency for a given modulation type.
4. For Vdd=VddBias=5.5V, Vc2 = 2.9V and Vc3 = 2.7V with typical Idq2 = 100 mA, Idq3 = 245 mA, I_VddBias = 14 mA

MGA-43428 typical Ic2, Ic3 Vs Vc performance unless otherwise stated

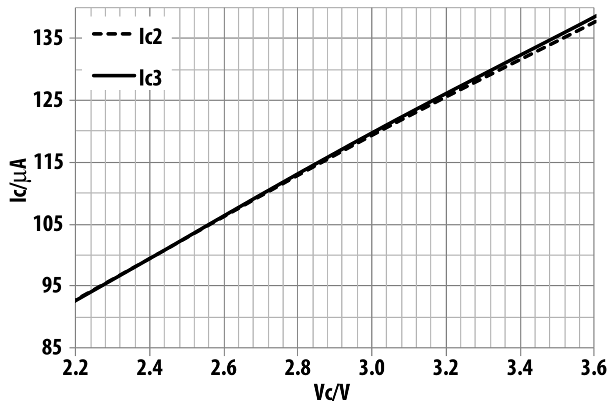


Figure 37. Ic Versus Vc at Vdd=VddBias=5.0V

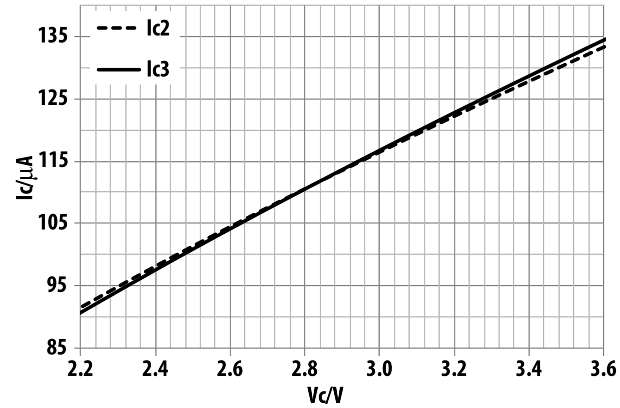
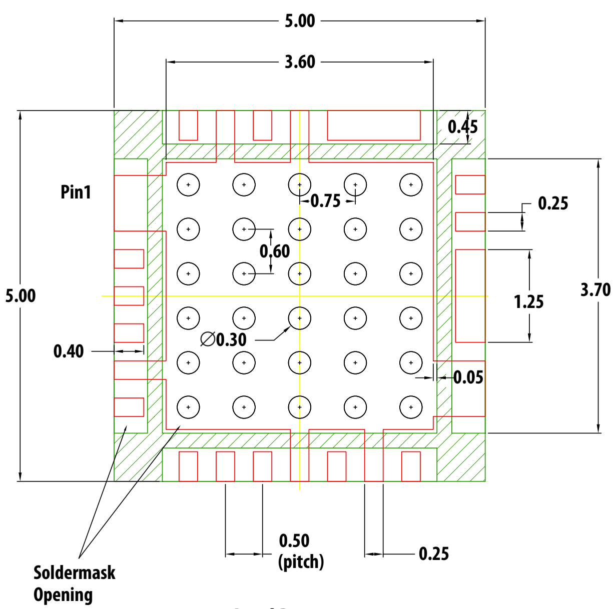
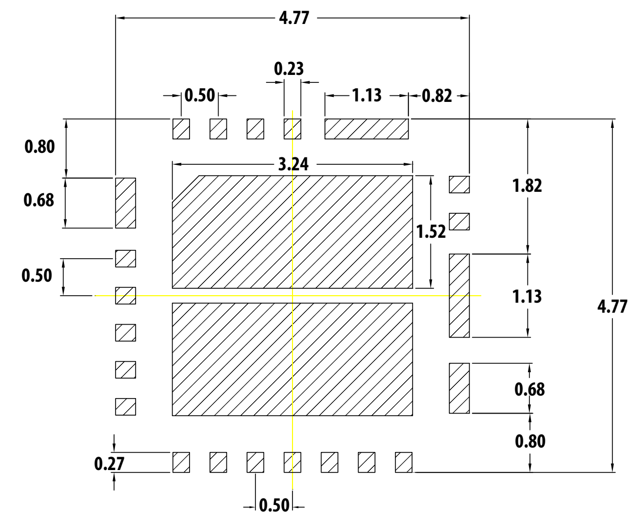


Figure 38. Ic Versus Vc at Vdd=VddBias=5.5V

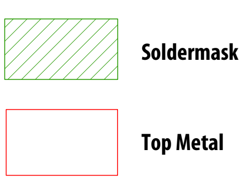
PCB Land Pattern and Stencil Outline

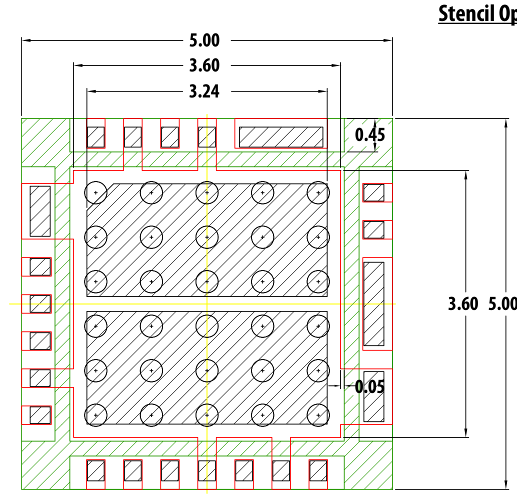


Land Pattern



Stencil Opening

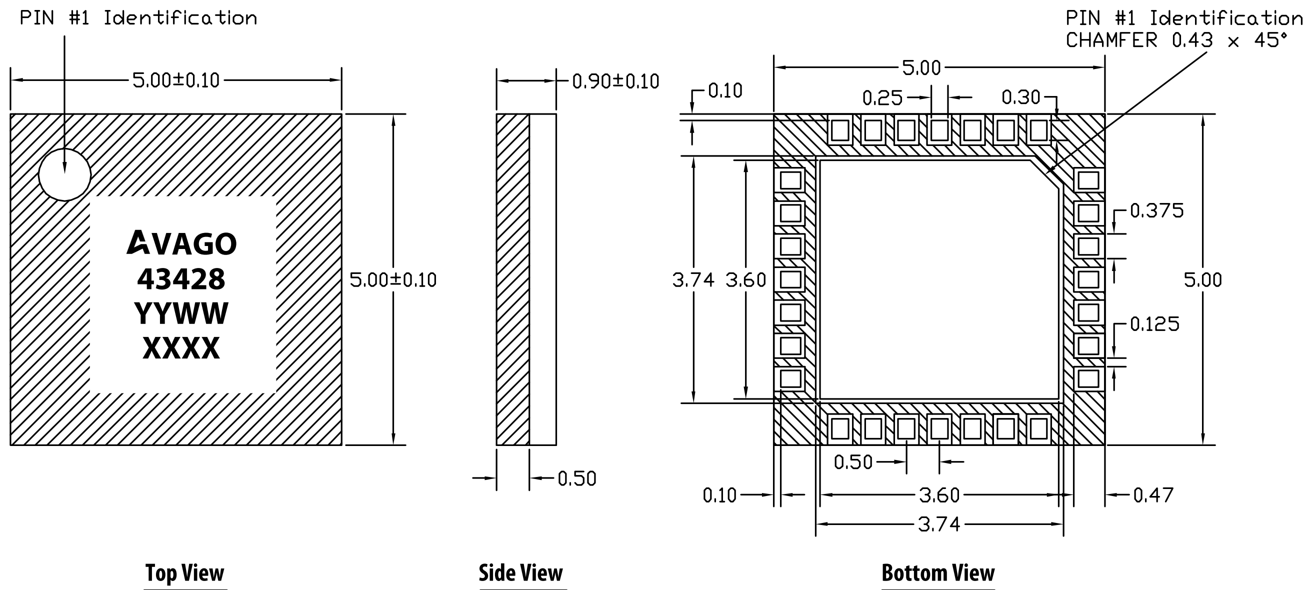




Note :
1. Recommended Land Pattern and Stencil.
2. 4 mils stencil thickness recommended.
3. All dimensions are in mm

Combination of Land Pattern & Stencil Opening

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

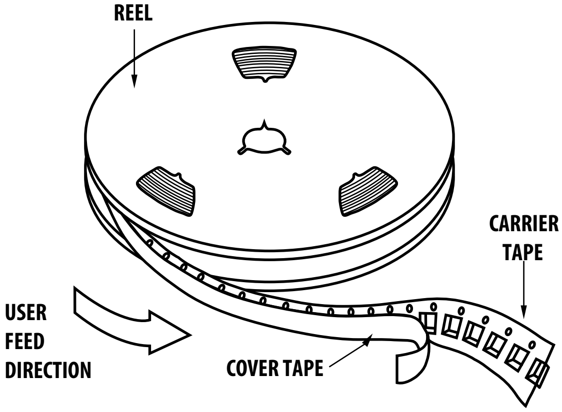


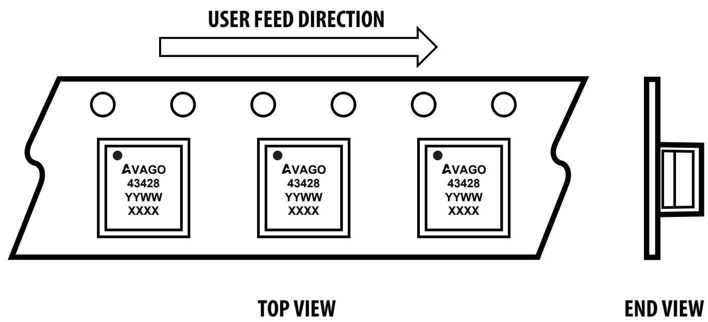
Note
1. All dimensions are in millimeters.
2. Dimensions are inclusive of plating.
3. Dimensions are exclusive of mold flash and metal burr.

Part Number Ordering Information

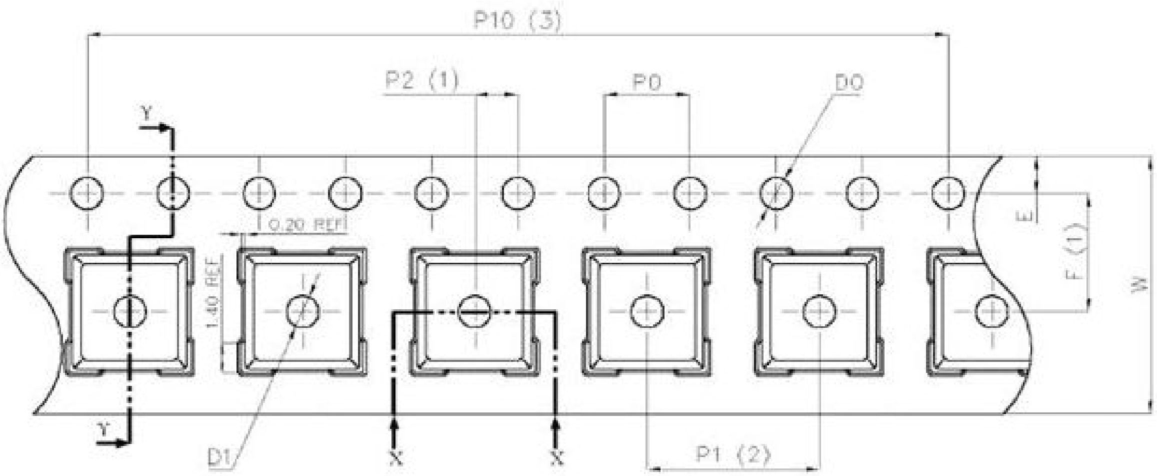
Part Number	Qty	Container
MGA-43428-BLKG	100	Antistatic Bag
MGA-43428-TR1G	1000	7″ Reel

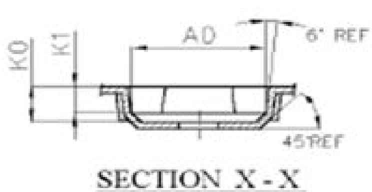
Device Orientation

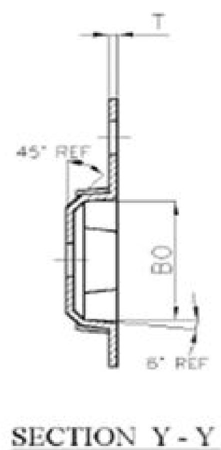




Tape Dimensions



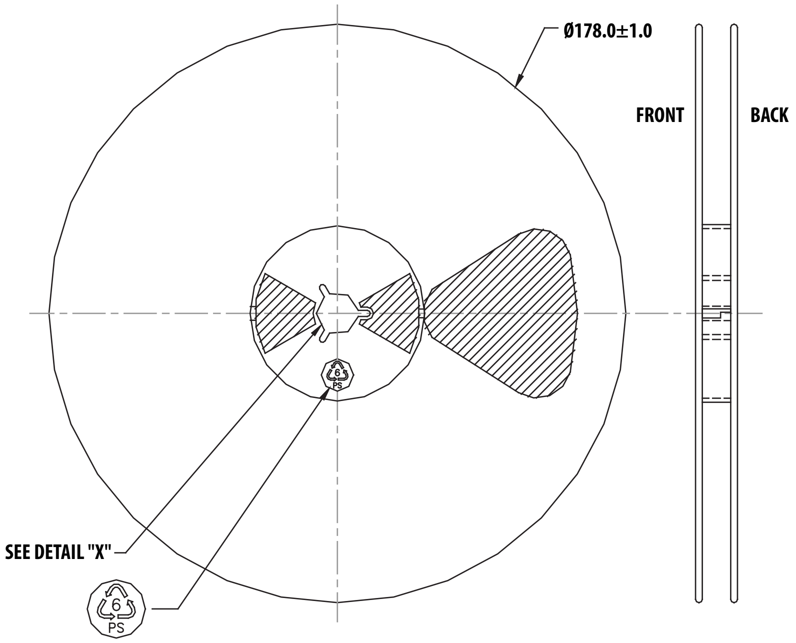




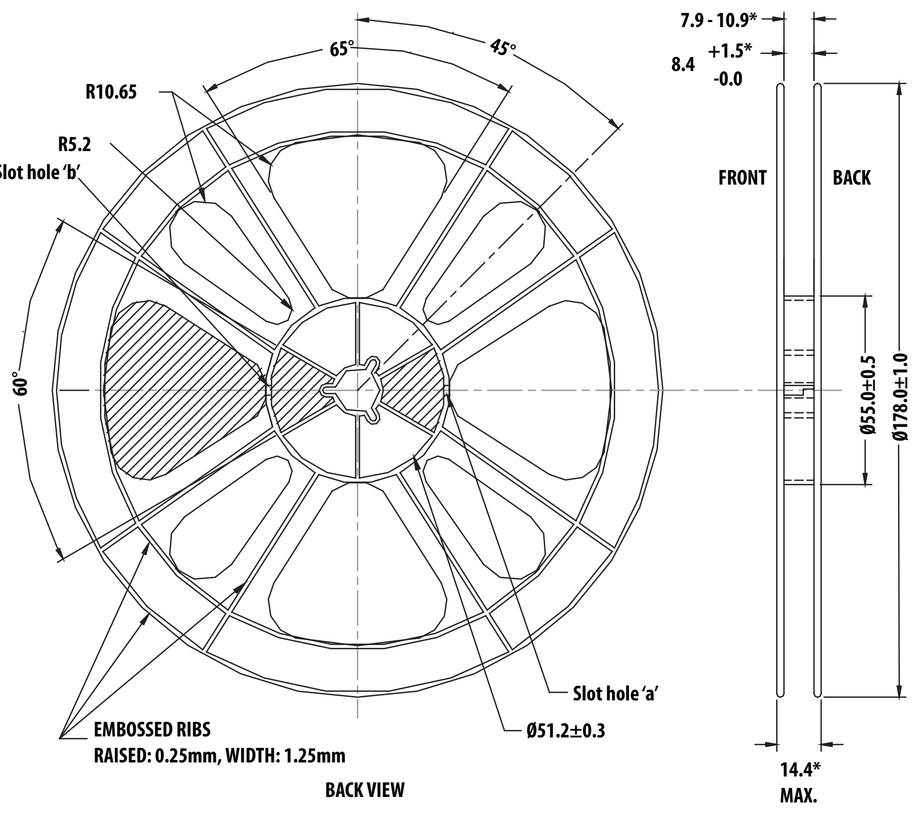
Dimension List

Annote	Millimeter	Annote	Millimeter
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)



FRONT VIEW



BACK VIEW

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

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