

# AVP514

## 100 TO 700 MHz, 20 WATTS HIGH POWER GaNPak A AMPLIFIER

**Typical Values**

<b>High Gain</b> .....	<b>+40 dB</b>
<b>High Saturated Power, Psat.</b> .....	<b>20 Watts</b>
<b>High Third Order I.P.</b> .....	<b>+50 dBm</b>
<b>Small Hermetic Package, Cougar GaNPakA</b>	

**AVP514**

### SPECIFICATIONS\*

Parameter	Typical	Guaranteed	
		0 to 50 °C	-55 to +85 °C
Frequency (Min.)	50-700 MHz	100-700 MHz	100-700 MHz
Small Signal Gain (Min.)	40.0 dB	39.0 dB	38.0 dB
Gain Flatness (Max.)	±0.8 dB	±1.0 dB	±1.2 dB
Noise Figure (Max.)		100-200 MHz	5.0 dB
		200-700 MHz	4.2 dB
SWR (Max.)	Input/Output	2.0:1	2.0:1
Power Output (Min.)		@ 4dB comp. 200-600 MHz	+42.5 dBm
		100-700 MHz	+41.5 dBm
Reverse Isolation	55.0 dB	52.0 dB	52.0 dB
DC Current (Max.)	1st Stg: +12V	200 mA	230 mA
	Linear Oper. 2nd Stg: +28V	1200 mA	1300 mA
	Psat w/+8 dBm Input		
	2nd Stage: +28V	2300 mA	2500 mA
Switching Speed (Max.)	2 ms	4 ms	5 ms
		50% TTL to 90% Rise time or 10% Fall Time <sup>^</sup>	

\* Measured in a 50-ohm system at +12/+28V.

<sup>^</sup> Faster switching speed option available upon request.

### INTERMODULATION PERFORMANCE

**Typical @ 25 °C**

<b>Second Order Harmonic Intercept Point</b> .....	<b>+70 dBm</b>
<b>Second Order Two Tone Intercept Point</b> .....	<b>+75 dBm</b>
<b>Third Order Two Tone Intercept Point</b> .....	<b>+50 dBm</b>

**AVP514**

### ABSOLUTE MAXIMUM RATINGS

<b>Storage Temperature</b> .....	<b>-62 to +125 °C</b>
<b>Maximum Case Temperature, +28V/+32V</b> .....	<b>+90 °C/+75 °C</b>
<b>Maximum DC Voltage</b> .....	<b>+33 Volts</b>
<b>Maximum Continuous RF Input Power</b> .....	<b>+18 dBm<sup>1</sup></b>
<b>Maximum Short Term Input Power (1 Minute Max.)</b> .....	<b>+10 dBm</b>
<b>Maximum Peak Power (3 µsec Max.)</b> .....	<b>+12 dBm</b>
<b>Burn-in Temperature, +28V</b> .....	<b>+85 °C</b>
<b>Thermal Resistance<sup>2</sup> (θjc)</b> .....	<b>+3.0 °C/Watt</b>
<b>Junction Temperature Rise Above Case (Tjc), +28V</b> .....	<b>+110 °C</b>

<sup>1</sup> If no load or a short on output; decrease input power by +10 dBm.

<sup>2</sup> Thermal resistance is based on total power dissipation.

*CougarGaNPak A*



**HEAT SINK WARNING:**

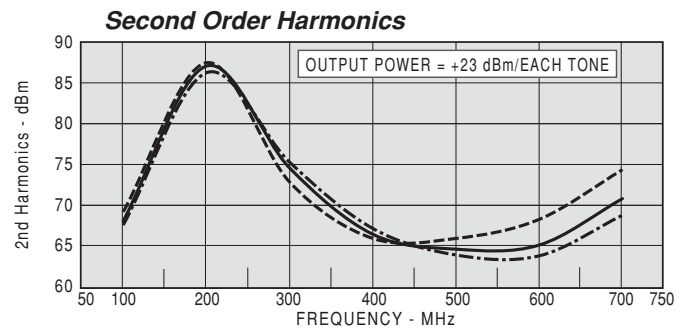
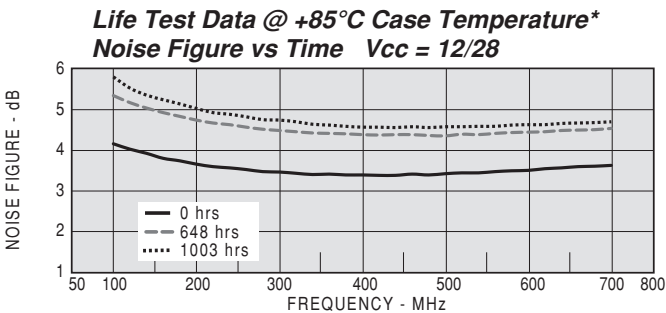
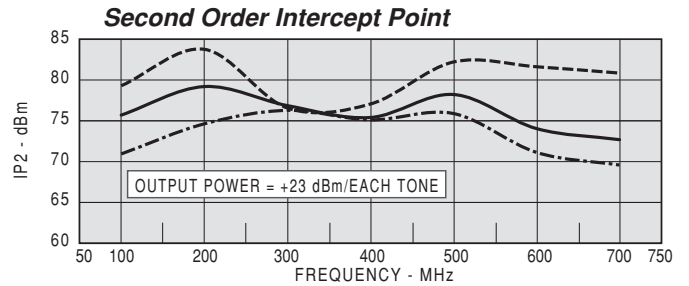
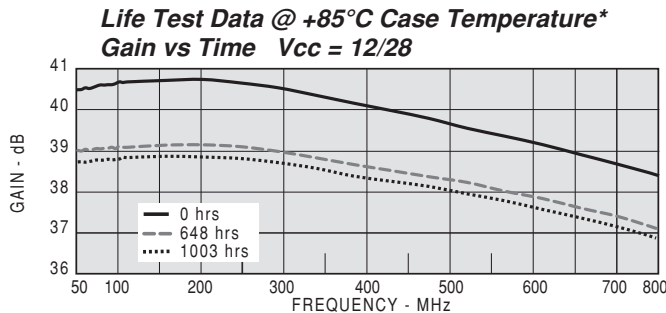
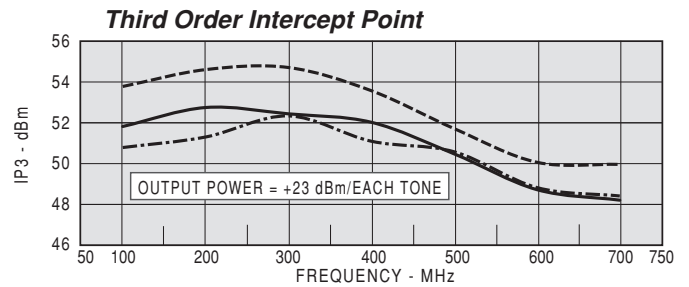
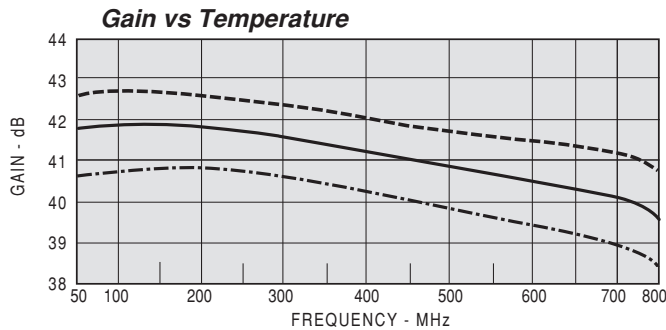
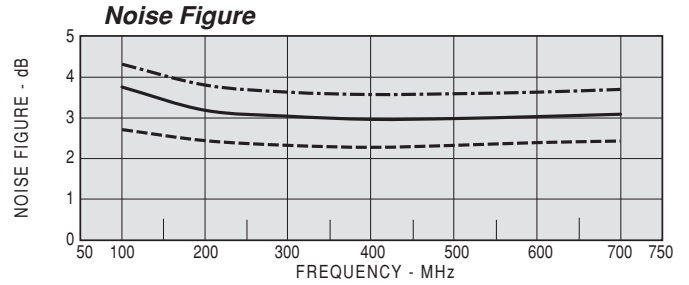
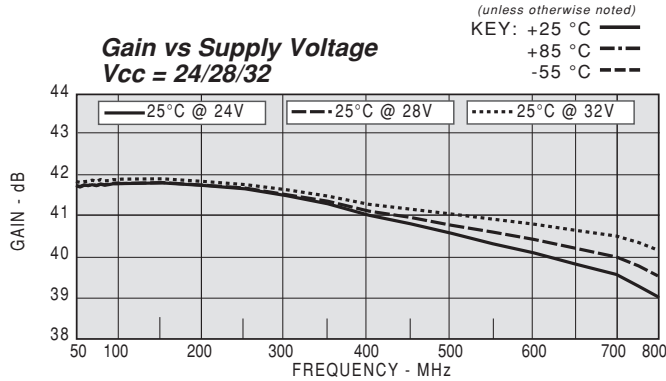
This amplifier requires an adequate heat sink to prevent damage. Maximum case temperature must not be exceeded. The package is designed to provide adequate heat transfer to proper aluminum heat sink.

The AVP514 and AVP598 amplifiers provide nominal output power of 20-22 Watts. Each amplifier uses control circuitry to ensure safe startup. The amplifiers have an external pin for TTL on/off control. On/Off Low or High can be specified; standard is Off/Low. The AVP514 uses the AVP598 output power module, but also includes preamp and driver stages to provide ~ 40 dB of overall gain.

Heat sinking is required to keep the case temperatures within a safe operating range. A thin layer of thermal grease or HiTherm (for example the HT-2500 series) helps provide a low resistance thermal path between the case and the mounting surface. The mounting surface should be metal with heat conduction of aluminum or better. Heat sink size depends on whether fan-driven air cooling is used, or if only convection is used.

Maximum Tj of both amplifiers is 200°C.

**TYPICAL PERFORMANCE**

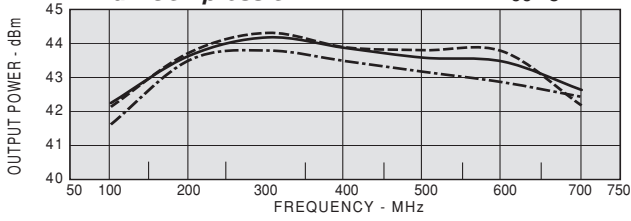


\*Pin = +4 dBm; 28 V DC Current = 1.7A; Tj c = 167 °C

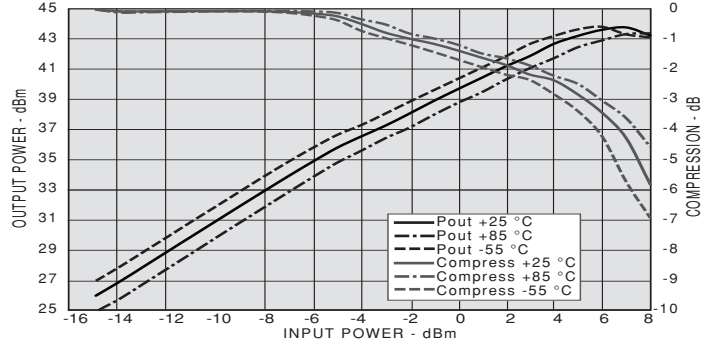
**TYPICAL PERFORMANCE**

(unless otherwise noted)  
 KEY: +25 °C —  
 +85 °C - -  
 -55 °C - - -

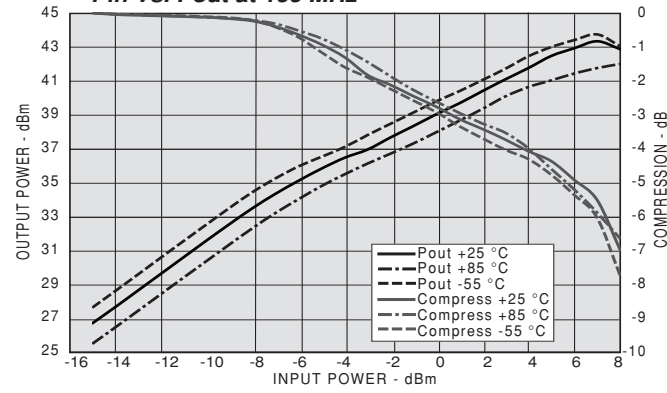
**Power Output at 4 dB Compression**



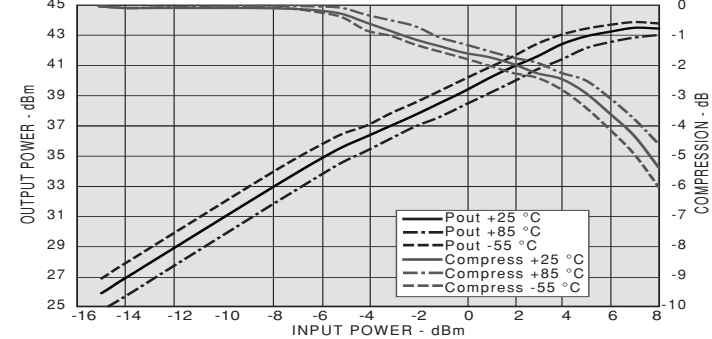
**Pin Vs. Pout at 400 MHz**



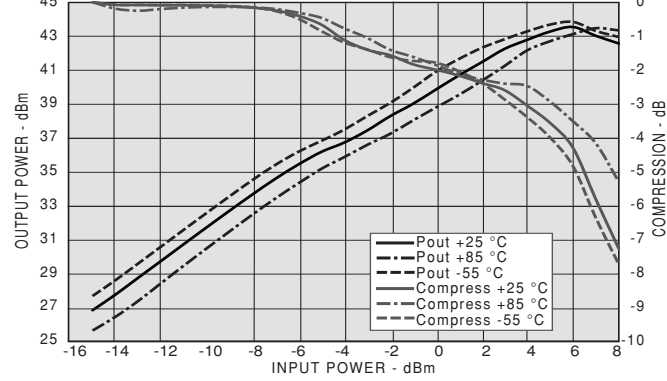
**Pin Vs. Pout at 100 MHz**



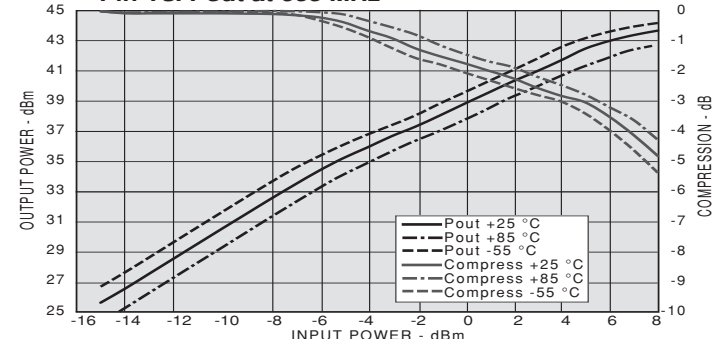
**Pin Vs. Pout at 500 MHz**



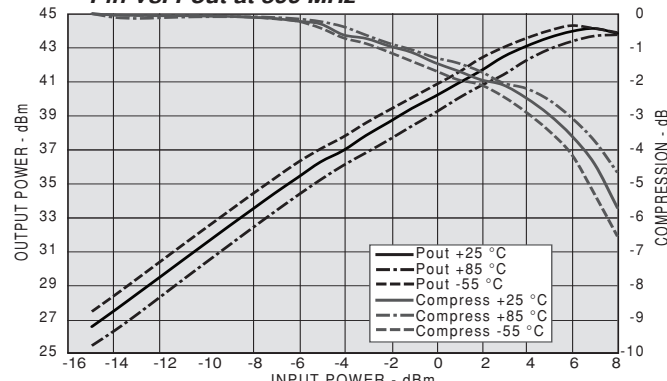
**Pin Vs. Pout at 200 MHz**



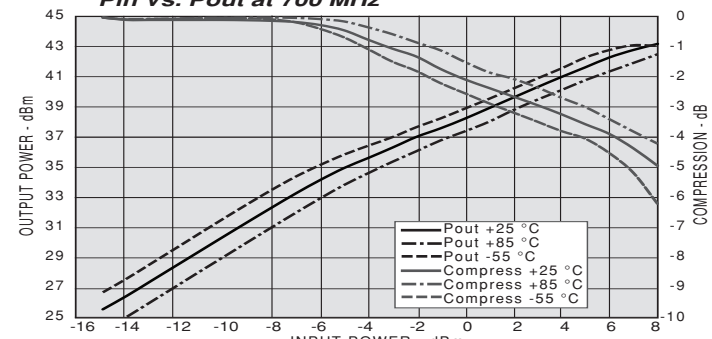
**Pin Vs. Pout at 600 MHz**



**Pin Vs. Pout at 300 MHz**

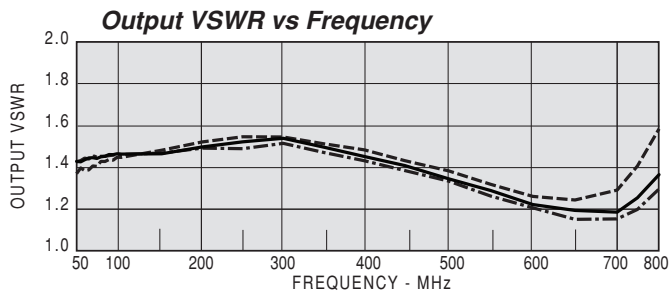
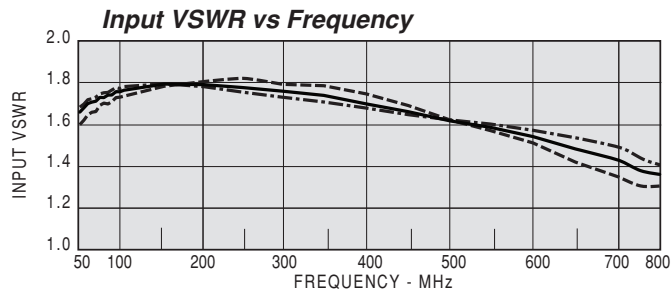
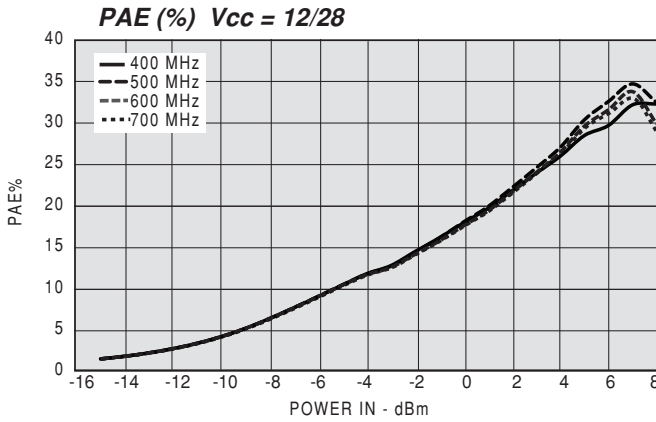
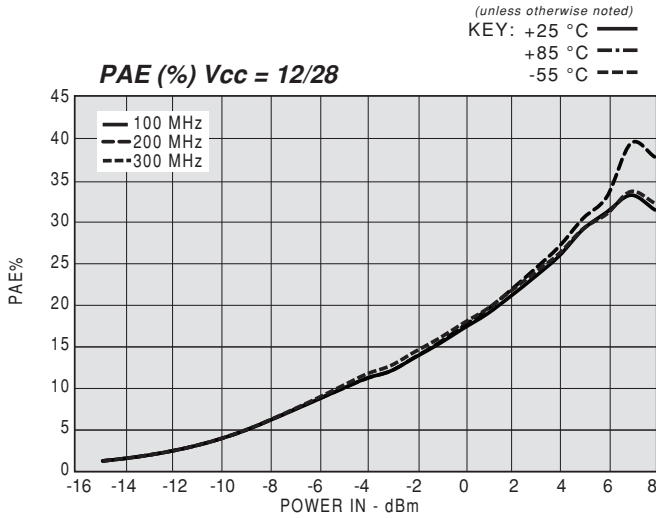


**Pin Vs. Pout at 700 MHz**



**TYPICAL PERFORMANCE**

**TYPICAL AUTOMATIC TEST DATA**



Model: AVP514  
Vcc=+12V / +28V  
Temp = +25 °C

FREQ. MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
30	0.23	9.71	122.04	19.36	0.0010	-165.85	0.16	3.57
50	0.26	0.49	122.30	-5.14	0.0010	171.69	0.17	-22.70
100	0.28	-13.80	123.37	-42.16	0.0008	155.27	0.18	-61.53
150	0.28	-26.56	123.66	-72.36	0.0010	132.95	0.19	-93.39
200	0.28	-38.37	122.77	-101.06	0.0009	116.65	0.20	-120.60
250	0.28	-50.37	121.77	-129.08	0.0010	112.58	0.20	-145.42
300	0.28	-61.02	119.51	-156.90	0.0009	84.74	0.21	-168.52
350	0.27	-72.73	117.31	176.15	0.0009	66.25	0.20	170.31
400	0.26	-83.63	114.07	149.14	0.0010	53.05	0.18	148.80
450	0.25	-94.58	112.07	122.53	0.0010	36.92	0.17	130.56
500	0.24	-105.34	109.59	95.78	0.0010	18.32	0.14	112.08
550	0.23	-115.95	107.47	69.12	0.0010	6.61	0.12	95.41
600	0.21	-125.71	105.26	42.31	0.0011	-19.85	0.10	85.27
650	0.19	-134.94	102.67	15.43	0.0011	-33.09	0.09	80.60
700	0.18	-142.23	100.14	-11.99	0.0011	-52.46	0.09	80.59
750	0.16	-147.43	97.65	-39.49	0.0011	-67.81	0.11	78.43
800	0.15	-148.67	94.90	-67.26	0.0011	-87.03	0.15	65.60
850	0.15	-148.85	91.23	-95.36	0.0011	-109.37	0.20	49.38
900	0.16	-150.63	87.32	-123.76	0.0011	-127.34	0.26	28.08
950	0.18	-156.93	82.21	-152.66	0.0010	-152.27	0.32	7.32
1000	0.19	-165.47	76.60	178.70	0.0010	-169.92	0.38	-14.50

Model: AVP514  
Vcc=+12V / +28V  
Temp = +85 °C

FREQ. MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
30	0.24	8.33	106.15	17.40	0.0010	-174.76	0.16	3.13
50	0.26	-0.45	107.06	-6.02	0.0009	177.52	0.17	-22.88
100	0.28	-14.84	108.82	-42.28	0.0009	163.60	0.18	-61.49
150	0.28	-27.47	109.69	-72.32	0.0009	136.18	0.19	-91.75
200	0.28	-39.34	109.54	-101.05	0.0009	122.36	0.20	-119.41
250	0.27	-50.34	108.67	-129.35	0.0009	108.60	0.20	-145.22
300	0.27	-60.64	107.04	-157.16	0.0009	85.05	0.20	-167.18
350	0.26	-71.71	105.04	175.55	0.0010	66.31	0.19	171.85
400	0.26	-81.36	102.14	148.41	0.0011	51.96	0.18	150.72
450	0.25	-91.40	100.24	121.51	0.0011	33.43	0.16	131.73
500	0.24	-101.63	97.76	94.58	0.0011	17.27	0.14	113.60
550	0.23	-111.65	95.29	67.79	0.0011	2.62	0.12	98.92
600	0.22	-121.28	93.03	41.08	0.0010	-10.21	0.10	86.14
650	0.21	-130.93	90.37	14.20	0.0011	-29.33	0.08	82.74
700	0.20	-139.59	87.94	-12.98	0.0010	-44.70	0.08	85.88
750	0.18	-146.43	85.44	-40.16	0.0010	-63.62	0.09	84.14
800	0.17	-151.14	83.03	-67.62	0.0010	-82.81	0.13	72.98
850	0.16	-153.22	79.90	-95.30	0.0010	-103.48	0.17	55.00
900	0.17	-156.43	76.68	-123.21	0.0010	-124.43	0.21	34.60
950	0.18	-161.03	72.76	-151.87	0.0009	-140.35	0.27	13.81
1000	0.19	-168.03	68.28	179.84	0.0010	-161.66	0.33	-7.38

Model: AVP514  
Vcc=+12V / +28V  
Temp = -55 °C

FREQ. MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
30	0.20	10.16	130.95	30.19	0.0010	-161.90	0.12	17.91
50	0.24	2.12	134.38	0.96	0.0009	173.33	0.16	-14.58
100	0.27	-12.15	135.85	-39.02	0.0008	155.94	0.17	-59.03
150	0.28	-24.03	135.88	-70.11	0.0008	134.55	0.19	-93.13
200	0.29	-36.11	134.59	-99.16	0.0009	116.92	0.20	-121.38
250	0.29	-48.55	133.04	-127.13	0.0008	105.13	0.21	-145.84
300	0.28	-60.15	131.71	-154.70	0.0010	89.44	0.21	-170.61
350	0.28	-72.31	129.36	178.28	0.0010	69.42	0.20	168.70
400	0.27	-84.23	126.46	151.21	0.0010	57.44	0.19	148.93
450	0.26	-96.48	124.45	124.60	0.0010	38.92	0.18	129.88
500	0.24	-108.19	122.08	97.84	0.0010	22.38	0.16	113.78
550	0.22	-118.85	120.14	71.24	0.0011	1.91	0.13	99.33
600	0.20	-128.89	118.55	44.27	0.0010	-17.94	0.11	92.35
650	0.17	-137.54	116.54	17.10	0.0010	-36.31	0.11	90.11
700	0.15	-142.48	114.57	-10.94	0.0011	-53.35	0.13	87.52
750	0.13	-142.03	111.74	-39.25	0.0010	-67.55	0.17	80.47
800	0.13	-138.09	108.28	-68.04	0.0011	-93.14	0.22	62.73
850	0.15	-136.04	103.31	-96.95	0.0011	-115.87	0.29	44.23
900	0.17	-140.94	97.36	-126.15	0.0009	-132.78	0.36	22.29
950	0.20	-151.21	90.03	-155.77	0.0009	-154.86	0.43	0.84
1000	0.21	-163.48	82.24	175.33	0.0009	-175.03	0.50	-21.59

**OUTLINE DRAWING - COUGAR GaNPak A**

