



Temperature Testing was completed on the Circuit Seed Test chip by Desert Micro in Phoenix Arizona. The chip was fabricated on GlobalFoundries 130nm process. The Circuit Seed Trans-Impedance Amplifier that was tested had an iRatio of 4:1. The temperatures tested were:

-80°C	-60°C	-40°C	-20°C	0°C	20°C	40°C	60°C	80°C	100°C	120°C	140°C	160°C	180°C	200°C	220°C
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The input current went from -25 µA to +25µA in steps of .02 µA using a 1.2v power supply. This generated a table of 250 elements measuring the input and output voltage. The transresistance gain was then computed using the formula $20 * \text{Log}_{10}(V_{out}/I_{in})$ for each element.

The median standard deviation for each current tested across the entire temperature range for the entire data set was only 0.916 dB.

The maximum standard deviation was 2.493 dB and the minimum standard deviation was 0.075 dB.

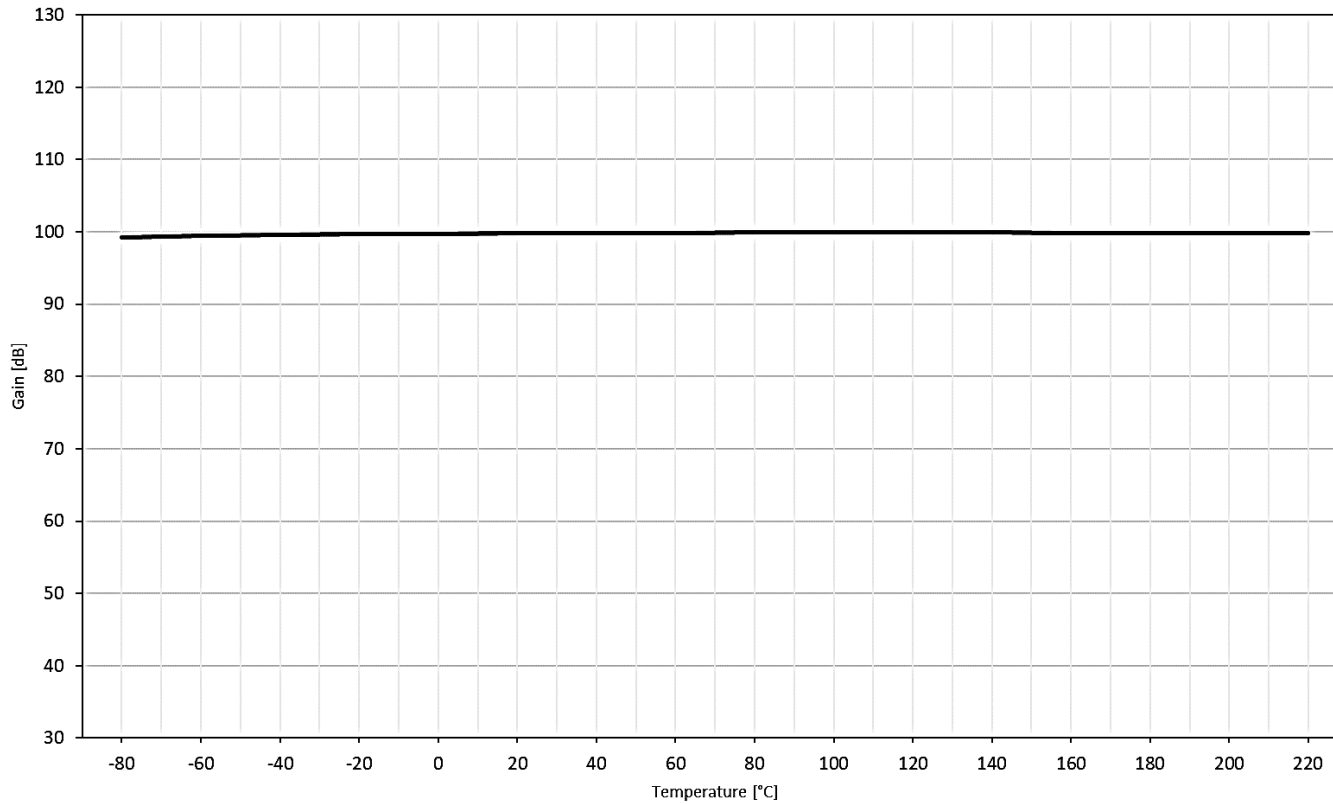
The difference between the maximum gain and minimum gain across all temperatures was computed and averaged to 3.626 dB with a high value of 8.304 dB and a low value 0.232 dB. Since the average gain was 92.834 dB the average temperature variation is only 3.91%. If we only look at the normal operating current of +/- 10 µA the results are even more impressive.

Iin [uA]	Gain [dB]															Max	Min	Avg	STD	Max-Min	
	-80°C	-60°C	-40°C	-20°C	0°C	20°C	40°C	60°C	80°C	100°C	120°C	140°C	160°C	180°C	200°C						220°C
-1.40	106.87	107.47	107.93	108.28	108.67	108.95	109.21	109.40	109.60	109.77	109.90	110.02	110.11	110.25	110.34	110.48	110.48	106.87	109.20	1.05	3.61
-1.20	108.38	108.96	109.41	109.77	110.16	110.44	110.71	110.86	111.06	111.23	111.34	111.47	111.57	111.68	111.78	111.91	111.91	108.38	110.67	1.03	3.53
-1.00	110.12	110.70	111.15	111.50	111.87	112.14	112.39	112.57	112.75	112.92	113.05	113.15	113.26	113.37	113.46	113.60	113.60	110.12	112.38	1.01	3.48
-0.80	112.22	112.80	113.24	113.58	113.94	114.22	114.46	114.63	114.82	114.98	115.10	115.20	115.29	115.41	115.51	115.64	115.64	112.22	114.44	1.00	3.42
-0.60	114.89	115.46	115.87	116.22	116.57	116.86	117.08	117.26	117.43	117.59	117.70	117.81	117.90	118.02	118.10	118.23	118.23	114.89	117.06	0.97	3.34
-0.40	118.56	119.13	119.56	119.88	120.23	120.51	120.74	120.91	121.07	121.23	121.33	121.43	121.54	121.64	121.73	121.85	121.85	118.56	120.71	0.96	3.29
-0.20	124.75	125.30	125.73	126.05	126.39	126.65	126.88	127.04	127.22	127.37	127.47	127.58	127.66	127.76	127.84	127.96	127.96	124.75	126.85	0.94	3.22
0.20	125.09	125.61	126.02	126.33	126.66	126.90	127.14	127.28	127.45	127.58	127.69	127.79	127.87	127.97	128.04	128.17	128.17	125.09	127.10	0.90	3.08
0.40	119.23	119.76	120.14	120.48	120.78	121.02	121.24	121.39	121.54	121.67	121.78	121.87	121.96	122.07	122.13	122.24	122.24	119.23	121.21	0.87	3.01
0.60	115.86	116.38	116.77	117.08	117.40	117.63	117.84	117.98	118.14	118.26	118.37	118.46	118.53	118.63	118.71	118.82	118.82	115.86	117.80	0.86	2.96
0.80	113.54	114.04	114.40	114.70	115.04	115.26	115.45	115.61	115.76	115.87	115.97	116.07	116.14	116.23	116.31	116.41	116.41	113.54	115.42	0.84	2.87
1.00	111.75	112.25	112.62	112.91	113.22	113.46	113.66	113.78	113.93	114.05	114.17	114.23	114.30	114.40	114.48	114.56	114.56	111.75	113.61	0.82	2.82
1.20	110.32	110.83	111.19	111.46	111.78	112.00	112.19	112.32	112.46	112.57	112.70	112.76	112.83	112.91	112.98	113.07	113.07	110.32	112.15	0.80	2.75
1.40	109.14	109.64	109.99	110.27	110.56	110.79	110.97	111.11	111.24	111.34	111.47	111.53	111.59	111.67	111.75	111.83	111.83	109.14	110.93	0.78	2.69
1.60	108.16	108.63	108.98	109.25	109.54	109.78	109.94	110.06	110.20	110.29	110.40	110.45	110.53	110.62	110.68	110.78	110.78	108.16	109.89	0.76	2.62
1.80	107.29	107.76	108.09	108.36	108.64	108.88	109.03	109.15	109.29	109.38	109.49	109.52	109.60	109.70	109.75	109.84	109.84	107.29	108.99	0.74	2.55
2.00	106.54	106.99	107.33	107.59	107.86	108.05	108.25	108.36	108.49	108.58	108.68	108.74	108.79	108.88	108.93	109.02	109.02	106.54	108.19	0.72	2.48
2.20	105.86	106.32	106.64	106.89	107.16	107.38	107.54	107.65	107.77	107.86	107.95	108.01	108.07	108.15	108.20	108.29	108.29	105.86	107.48	0.70	2.43
2.40	105.27	105.71	106.02	106.27	106.55	106.74	106.90	107.01	107.12	107.21	107.30	107.37	107.41	107.49	107.54	107.63	107.63	105.27	106.85	0.68	2.36
2.60	104.73	105.16	105.47	105.71	105.98	106.17	106.31	106.41	106.53	106.62	106.71	106.78	106.83	106.87	106.93	107.02	107.02	104.73	106.26	0.66	2.29
2.80	104.23	104.67	104.97	105.19	105.49	105.64	105.79	105.89	106.00	106.08	106.17	106.22	106.29	106.34	106.38	106.46	106.46	104.23	105.74	0.64	2.23

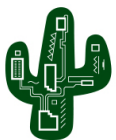
We can conclude that the actual temperature test results demonstrate little sensitivity to temperature particularly in normal range of +/- 10 μ A.

Current In [μ A]	7.4
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Temperature [$^{\circ}$ C]	-80	-60	-40	-20	0	20	40	60	80	100	120	140	160	180	200	220
Gain [dB]	99.26	99.44	99.57	99.66	99.74	99.81	99.85	99.87	99.90	99.91	99.91	99.90	99.88	99.88	99.87	99.87



Independent testing done by:



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