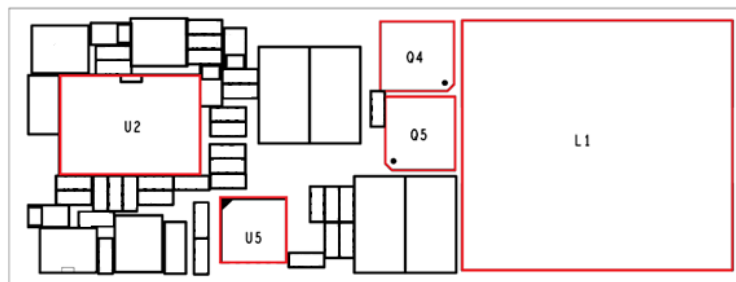


The following document details the thermal performance of the Ag7010 series for use with designing thermal management when integrating into an application.

The Ag7010 module is a compact power component and as a result will generate heat in the small footprint. The amount of heat generated by the module will depend on the load it is required to drive and the input voltage. To ensure continuous operation maximum power it is important that any enclosure used has sufficient ventilation and airflow over the Ag7010. It is also highly recommended that heat is drawn away from the module and into a larger thermal mass, by use of soldering the module into a host PCB containing copper pours with thermal vias.

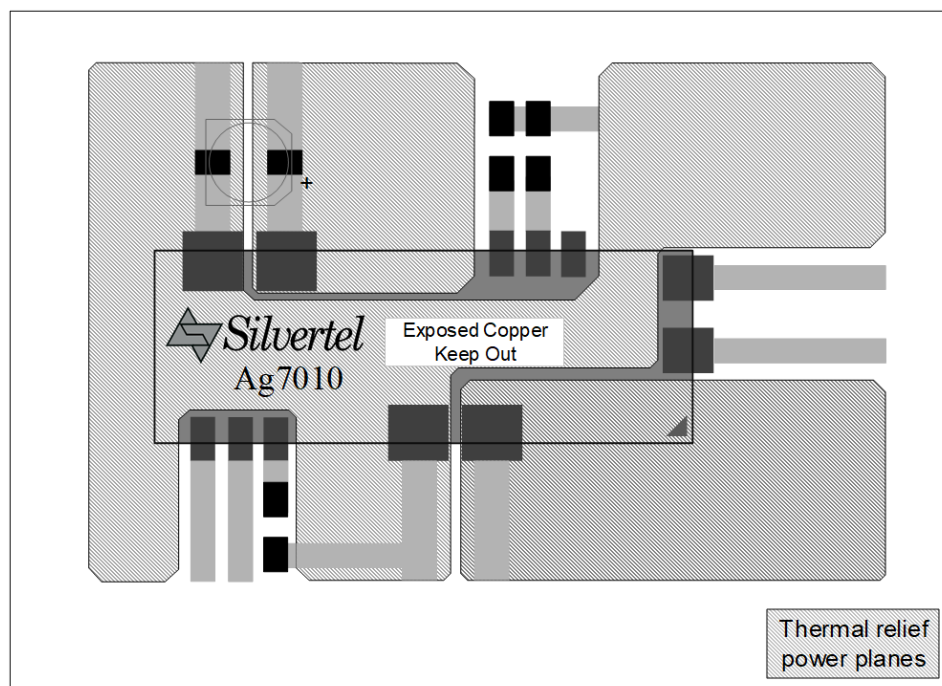
The Ag7010 series is capable of supplying up to 10A of current. The module will shut down as a result of the thermal protection if the additional heat generated is not removed from the device. Highlighted below are the hottest components on the module.



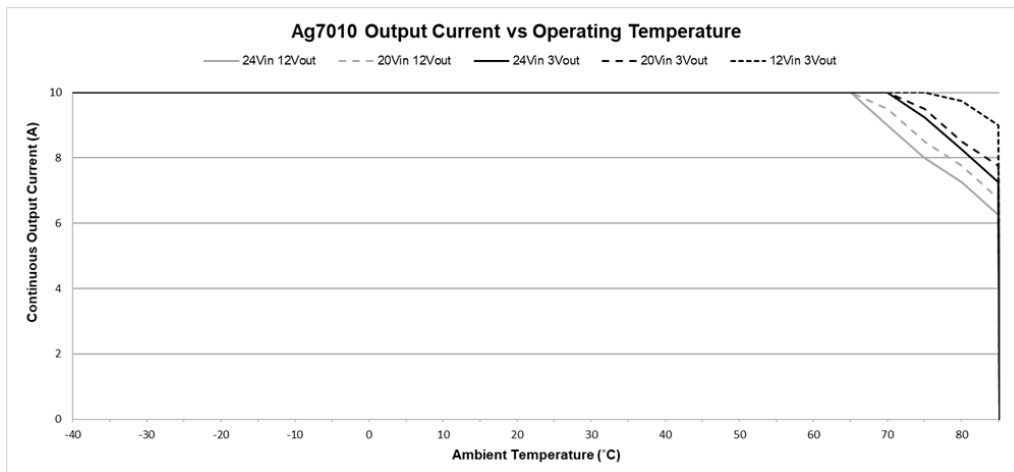
Ag7010 SST

The Ag7010 is only a single component in a system, and any enclosure that is to house should be designed to dissipate the highest average power demand of the whole system. The Ag7010 is a high efficiency device, so will only contribute up to 5W of heat.

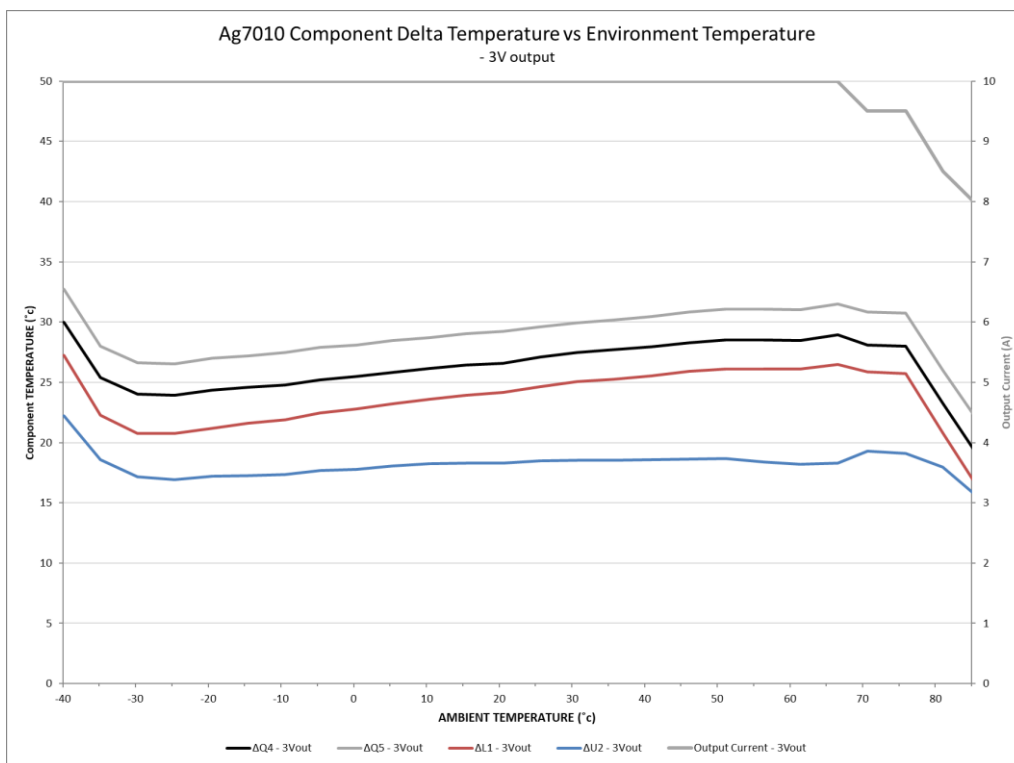
It is always preferential to have enough airflow in a system to remove any pockets of higher than ambient air surrounding the components on the module. Additionally thermal planes can be used to draw heat out of the module into a larger surface area to assist in heat dissipation.

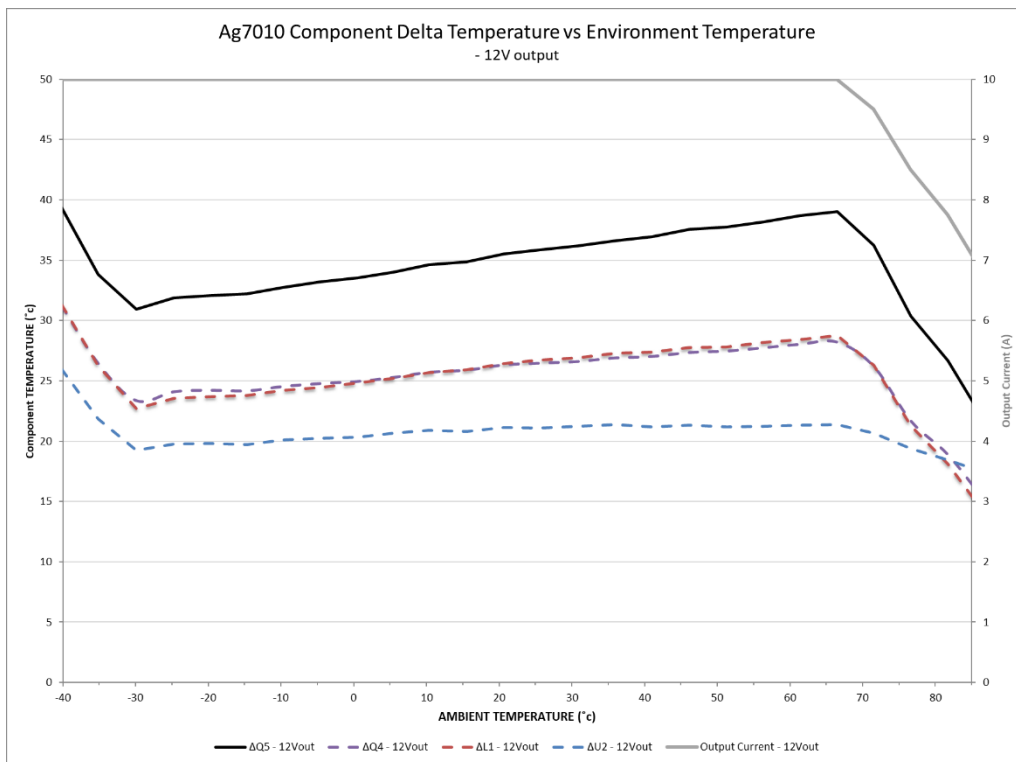


The following tests show typical component temperatures while operating in ambient temperatures between -40°C and 85°C . These tests were performed in a Temperature Applied Sciences Ltd ECO MT135 Environmental chamber with circulating air at a rate of approximately 1.5m/s over the Ag7010 module while mounted onto an EvalAg7010 evaluation board.

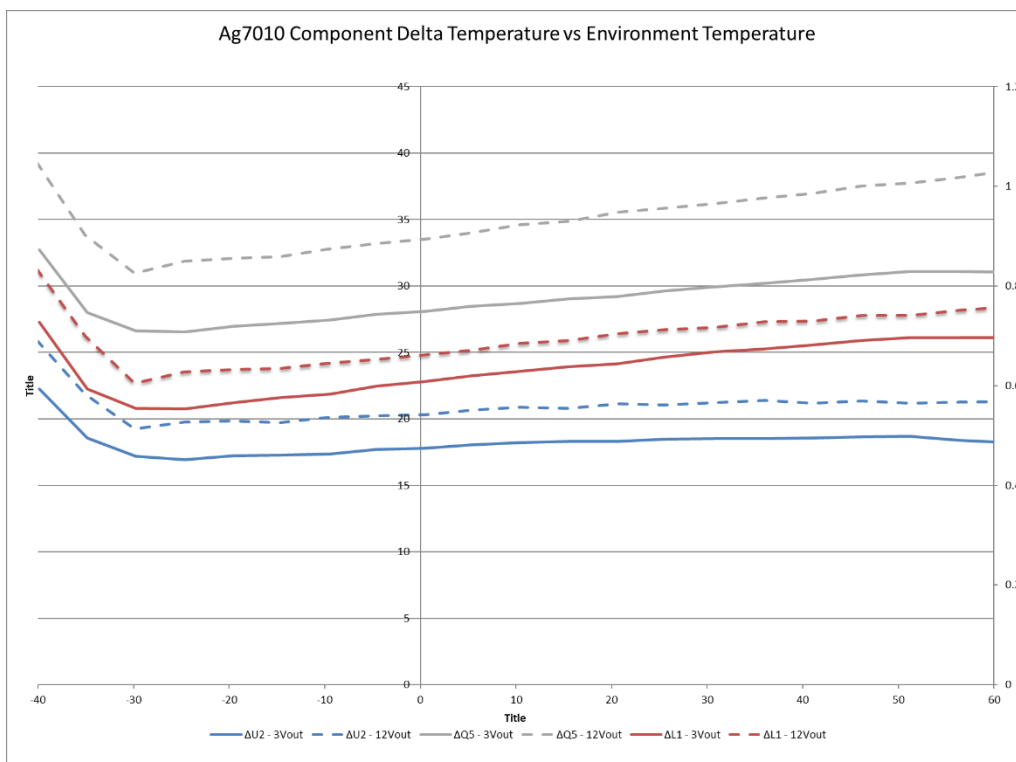


While the hottest components on the Ag7010 is Q5. Below shows the temperature of the components relative to the ambient temperature of the chamber for the module output both 3V and 12V.





The graph below shows the difference in component temperature between the Ag7010 outputting its nominal 3V and 12V, supplying 30W and 120W respectively.





Ag7010

Thermal considerations

Version 1.1

Ag7010								
- 3V output								
Chamber Temperature (°C)	U2 Temperature (°C)	Q4 Temperature (°C)	Q5 Temperature (°C)	L1 Temperature (°C)	Supply Voltage (V)	Supply Current (A)	Output Voltage (V)	Output Current (A)
-40	-17.61	-9.86	-7.12	-12.59	20.0	1.73	3.053	10
-35	-16.29	-9.46	-6.87	-12.60	20.0	1.73	3.053	10
-30	-12.59	-5.75	-3.14	-8.99	20.0	1.73	3.054	10
-25	-7.71	-0.72	1.91	-3.86	20.0	1.74	3.054	10
-20	-2.28	4.85	7.49	1.71	20.0	1.74	3.055	10
-15	2.73	10.04	12.67	7.09	20.0	1.75	3.056	10
-10	7.94	15.38	18.05	12.48	20.0	1.75	3.056	10
-5	13.09	20.61	23.26	17.83	20.0	1.76	3.058	10
0	18.20	25.90	28.49	23.23	20.0	1.76	3.058	10
5	23.37	31.15	33.78	28.56	20.0	1.77	3.058	10
10	28.69	36.60	39.16	34.04	20.0	1.77	3.06	10
15	33.72	41.88	44.48	39.35	20.0	1.77	3.06	10
20	38.83	47.11	49.74	44.67	20.0	1.78	3.059	10
25	44.09	52.71	55.24	50.27	20.0	1.78	3.06	10
30	49.24	58.19	60.67	55.77	20.0	1.78	3.062	10
35	54.31	63.49	65.98	61.04	20.0	1.79	3.061	10
40	59.49	68.84	71.39	66.46	20.0	1.79	3.064	10
45	64.74	74.37	76.94	72.00	20.0	1.79	3.063	10
50	69.84	79.68	82.27	77.27	20.0	1.8	3.063	10
55	74.76	84.86	87.45	82.47	20.0	1.8	3.064	10
60	79.67	89.92	92.47	87.55	20.0	1.8	3.065	10
65	84.90	95.52	98.09	93.06	20.0	1.8	3.066	10
70	89.92	98.73	101.46	96.49	20.0	1.71	3.069	9.5
75	95.05	103.96	106.66	101.68	20.0	1.71	3.068	9.5
80	99.00	104.31	107.05	101.84	20.0	1.52	3.071	8.5
85	102.07	104.92	107.85	102.21	20.0	1.38	3.072	7.75

Ag7010								
- 12V output								
Chamber Temperature (°C)	U2 Temperature (°C)	Q4 Temperature (°C)	Q5 Temperature (°C)	L1 Temperature (°C)	Supply Voltage (V)	Supply Current (A)	Output Voltage (V)	Output Current (A)
-40	-14.19	-8.93	-0.78	-8.81	20.0	6.23	11.951	10
-35	-13.24	-8.66	-1.29	-8.88	20.0	6.23	11.955	10
-30	-10.67	-6.53	1.05	-7.22	20.0	6.24	11.954	10
-25	-4.90	-0.57	7.19	-1.13	20.0	6.24	11.963	10
-20	0.15	4.54	12.40	4.01	20.0	6.26	11.965	10
-15	5.08	9.51	17.55	9.13	20.0	6.27	11.969	10
-10	10.32	14.76	22.98	14.42	20.0	6.28	11.975	10
-5	15.63	20.18	28.59	19.87	20.0	6.29	11.981	10
0	20.90	25.53	34.12	25.39	20.0	6.3	11.989	10
5	26.10	30.73	39.44	30.64	20.0	6.31	11.991	10
10	31.28	36.10	44.99	36.08	20.0	6.31	12	10
15	36.29	41.37	50.36	41.39	20.0	6.32	12.002	10
20	41.84	47.02	56.23	47.13	20.0	6.33	12.01	10
25	46.64	52.03	61.44	52.30	20.0	6.33	12.017	10
30	52.03	57.41	67.01	57.71	20.0	6.34	12.02	10
35	57.40	62.92	72.66	63.33	20.0	6.35	12.025	10
40	62.23	68.07	78.01	68.42	20.0	6.35	12.032	10
45	67.52	73.52	83.72	73.95	20.0	6.36	12.039	10
50	72.46	78.74	89.02	79.08	20.0	6.36	12.045	10
55	77.60	84.09	94.51	84.54	20.0	6.37	12.05	10
60	82.75	89.45	100.11	89.86	20.0	6.38	12.059	10
65	87.89	94.71	105.52	95.24	20.0	6.38	12.063	10
70	92.20	97.71	107.76	97.84	20.0	6.06	12.073	9.5
75	95.98	98.30	107.01	97.90	20.0	5.41	12.087	8.5
80	100.13	100.60	108.36	99.82	20.0	4.93	12.095	7.75
85	104.10	101.82	108.36	100.75	20.0	4.29	12.108	6.75