

ACPL-824, ACPL-827
ACPL-844, ACPL-847
 Multi-Channel Full Pitch
 Phototransistor Optocoupler



Reliability Data Sheet

Description

The reliability data shown includes Avago Technologies reliability test data from the reliability qualification done on this product family. All of these products use the same LEDs, similar IC, and the same packaging materials, processes, stress conditions and testing. The data in Table 1 and Table 2 reflect actual test data for devices on a per channel basis. Before stress, all devices are preconditioned using a solder reflow process (260 °C peak temp) and 20 temperature cycles (-55 °C to +125 °C, 15 mins dwell, 5 mins transfer). These data are taken from testing on Avago Technologies devices using internal Avago Technologies process, material specifications, design standards, and statistical process controls. THEY ARE NOT TRANSFERABLE TO OTHER MANUFACTURERS' SIMILAR PART TYPES.

Operating Life Test

For valid system reliability calculations it is necessary to adjust for the time when the system is not in operation. Note that if you are using MIL-HDBK-217 for predicting component reliability, the results may not be comparable to those given in Table 2 due to different conditions and factors that have been accounted for in MIL-HDBK-217. For example it is unlikely that your application will exercise all available channels at full rated power with the LED(s) always ON as Avago Technologies testing does. Thus, your application total power and duty cycle must be carefully considered when comparing Table 2 to predictions using MIL-HDBK-217.

Definition of Failure

Inability to switch, i.e. "functional failure" is the definition of failure in this data sheet. Specifically, failure occurs when the device fails to switch ON with 2 times the minimum recommended drive current (but not exceeding the max rating) or fails to switch off when there is no input current

Failure Rate Projections

The demonstrated point mean time to failure (MTTF) is measured at the absolute maximum stress condition. The failure rate projections in Table 2 use the Arrhenius acceleration relationship, where a 0.7eV activation energy is used as in the hybrid section of MIL-HDBK-217.

Application Information

The data of Table 1 and 2 were obtained on devices with high temperature operating life duration up to 1000 hours. An exponential (random) failure distribution is assumed, expressed in units of FIT (failures per billion device hours) are only defined in the random failure portion of the reliability curve.

Table 1. Demonstrated Operating Life Test Performance

Stress Test Condition	Total Device Tested	Total Device Hours	Number of Failed Units	Demonstrated MTTF(hr) @ Ta = +110 °C	Demonstrated FITs @ Ta = +110 °C
Ta = 110 °C Iin = 20mA Ic = 30mA	80	40,000	0	> 40,000	< 25,000

Table 2. Reliability Projection for Device Listed in Title

Ambient Temperature (°C)	Junction Temperature (°C)	Typical (60% Confidence)		90% Confidence	
		MTTF (Hr/fail)	FITs (Fail/10 ⁹ h)	MTTF (Hr/fail)	FITs (Fail/10 ⁹ h)
110	125	43,654	22,907	17,372	57,565
100	115	60,278	16,590	23,987	41,690
90	105	84,664	11,811	33,691	29,681
80	95	121,132	8,255	48,203	20,745
70	85	176,812	5,656	70,361	14,212
60	75	263,757	3,791	104,959	9,527
50	65	402,878	2,482	160,321	6,237
40	55	631,482	1,584	251,292	3,979
30	45	1,018,179	982	405,174	2,468
25	40	1,307,756	765	520,409	1,922

Table 3. Mechanical Tests (Testing done on a constructional basis)

Test Name	MIL-STD-883	Test Conditions	Units Tested	Units Failed
Temp Cycling	1010 Cond. B	-55 to 125 °C Transfer = 1 min Dwell = 15 mins 500 cycles	80	0
Solderability	2003	Steam Aging (8hrs) + Solder dip (1x, 245 °C)	40	0
High Temp Storage Test	-	125°C, 1000hrs Unbiased	80	0
Low Temp Storage Test	-	-55°C, 1000hrs Unbiased	80	0

Table 4. Environmental Testing (Testing done on a constructional basis)

Test Name	MIL-STD-883	Test Conditions	Units Tested	Units Failed
Temp Humidity Bias	N/A	Ta = 85 °C, RH = 85% Reverse Bias 1000hrs	80	0
Unbiased Pressure Pot	N/A	Ta = 121 °C, RH = 100% Unbiased Time = 96 hours	80	0

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