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 (245°C peak temp) and 20 temperature cycles (-55°C to +125°C, 15 mins dwell, 1 min 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.

Table 1. Demonstrated Operating Life Test Performance

Stress Test Condition	Total Device Tested	Total Device Hours	Number of Failed Units	Demonstrated MTTF(hr) @ Ta = +125 °C	Demonstrated FITs @ Ta = +125 °C
Ta = 125 °C Vdd1 = 5.5V Vdd2 = 5.5V Vin+ = Gnd Vin- = Gnd	260	260,000	0	> 260,000	< 3,846

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 uses the Arrhenius acceleration relationship, where a 0.43 eV 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 data. 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 2. Reliability Projection for Device Listed in Title

		Typical (60% Confidence)		90% Confidence	
Ambient Temperature (°C)	Junction Temperature (°C)	MTTF (Hr/fail)	FITs (Fail/10^9h)	MTTF (Hr/fail)	FITs (Fail/10^9h)
125	140	283,753	3,524	112,917	8,856
120	135	328,965	3,040	130,908	7,639
110	125	447,105	2,237	177,921	5,620
100	115	617,360	1,620	245,672	4,070
90	105	867,124	1,153	345,063	2,898
80	95	1,240,632	806	493,697	2,026
70	85	1,810,902	552	720,630	1,388
60	75	2,701,388	370	1,074,990	930
50	65	4,126,260	242	1,642,004	609
40	55	6,467,610	155	2,573,721	389
30	45	10,428,143	96	4,149,775	241
25	40	13,393,982	75	5,330,001	188

Mechanical Tests (Testing done on a constructional basis)

Test Name	Reference Standard	Test Conditions	Units Tested	Units Failed
Temp Cycling	Mil Std 883 1010 Cond. B	-55 to 125 °C Transfer = 1 min Dwell = 15 mins 1000 cycles	190	0
Solderability (SnPb)	JB102	8hrs steam aging (93 °C), followed by solder dip (245 °C,5sec)	40	0
Solderability (Pb-free)	NA	8hrs steam aging (93 °C), followed by solder dip (260 °C,5sec)	40	0
Solder Heat Resistance	N/A	Temp = 260 °C, 2x 5sec	20	0
Physical Dimension	2009	Dev Profile @ 10X	80	0

Environmental Testing

Test Name	Reference Standard	Test Conditions	Units Tested	Units Failed
Temp and Humidity Bias	JA101	Ta = 85 °C, RH = 85% Time = 1000hrs Refer to Table 1 for bias conditions	60	0
Unbiased Autoclave	JA102	Ta = 121°C, RH = 100% 15psig Time = 168 hours	60	0

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