HCPL-315J
0.5Amp Output Current
IGBT Gate Drive 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, 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.

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 1. Demonstrated Operating Life Test Performance

Stress Test Condition	Total Device Tested	Total Device Hours	Number of Failed Units	Demonstrated MTTF(hr) @ Ta = +105 °C	Demonstrated FITs @ Ta = +105 °C
Ta = 100 °C Vin = 11.5V Vcc = 35V	180	180,000	0	> 180,000	< 5,556

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/10^9h)	MTTF (Hr/fail)	FITs (Fail/10^9h)
100	115	196,444	5,091	78,173	12,792
90	105	275,919	3,624	109,799	9,108
80	95	394,770	2,533	157,095	6,366
70	85	576,230	1,735	229,305	4,361
60	75	859,583	1,163	342,063	2,923
50	65	1,312,978	762	522,486	1,914
40	55	2,057,997	486	818,959	1,221
30	45	3,318,240	301	1,320,461	757
25	40	4,261,972	235	1,696,009	590

Table 3. 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	80	0
Solderability	Method 2003	8hrs steam aging (93 °C), followed by solder dip (245 °C,5sec)	20	0
Solderability (Pb-free)	-	8hrs steam aging (93 °C), followed by solder dip (260 °C,5sec)	20	0

Table 4. Environmental Testing

Test Name	Reference Standard	Test Conditions	Units Tested	Units Failed
Unbiased Autoclave	JA102	Ta = 121°C, RH = 100% 15psig, Time = 168 hours	40	0

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