HCPL-3020

0.4 Amp Output Current IGBT Gate Drive Optocoupler

AVAGO TECHNOLOGIES

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 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 = +100 °C	Demonstrated FITs @ Ta = +100 °C
Ta = 100 °C Iin = 25mA Vcc =35V	140	280,000	0	> 280,000	< 3,571

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	305,580	3,272	121,602	8,224
90	105	429,208	2,330	170,799	5,855
80	95	614,086	1,628	244,369	4,092
70	85	896,358	1,116	356,697	2,804
60	75	1,337,129	748	532,097	1,879
50	65	2,042,410	490	812,757	1,230
40	55	3,201,328	312	1,273,937	785
30	45	5,161,707	194	2,054,050	487
25	40	6,629,734	151	2,638,237	379

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 1000 cycles	150	0
Solderability after Steam Aging	2003	8hrs steam aging + 1x solder dip (245°C)	50	0
Thermal Shock	1011	-55 to 125 °C Transfer <10s Dwell = 15mins 200cycles	120	0
Physical Dimension	2009	Dev. profile @ 10X	40	0

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

Test Name	MIL-STD-883	Test Conditions	Units Tested	Units Failed
Autoclave	N/A	Ta = 121 °C, RH = 100% 15 PSI, Unbiased Time = 168 hours	100	0
Wet Temp and Humidity Bias	N/A	Ta=85 °C, RH=85% See Table 1for bias cond Time =1000hrs	120	0

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