HCPL-316J, ACPL-331J/332J, ACPL-330J/333J, QCPL-325J/329J

Smart Gate Drive Optocoupler

Reliability Data Sheet

Description

This document's reliability data shown includes Broadcom Ltd. reliability test data from the tests done on this product family. All of these products use the similar wafer technology. 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 at MSL 1 using a solder reflow process (260°C peak temperature) and 20 temperature cycles (–55°C to +125°C, 15 mins dwell, 1 min transfer). These data are taken from testing on Broadcom devices using internal Broadcom processes, 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 IC always ON as Broadcom 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 twice the minimum recommended drive current (but not exceeding the maximum 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 Table 2 were obtained on devices with high temperature operating life duration. 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.

Test Results

Table 1 Demonstrated Operating Life Test Performance

Stress Test Condition	Total Device Tested	Total Device Hours	Number of Failed Units	Demonstrated MTTF(hr) at T_A = +125°C	Demonstrated FITs at T_A = +125°C
T_A = 125°C V_{CC} Bias (Based on DS)	984	984,000	0	984,000	1,016

Table 2 Reliability Projection for Devices 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)
125	140	1,073,895	931	427,346	2,340
120	135	1,245,007	803	495,438	2,018
110	125	1,692,121	591	673,363	1,485
100	115	2,336,469	428	929,775	1,076
90	105	3,281,731	305	1,305,932	766
80	95	4,695,313	213	1,868,453	535
70	85	6,853,569	146	2,727,309	367
60	75	10,223,715	98	4,068,425	246
50	65	15,616,306	64	6,214,353	161
40	55	24,477,415	41	9,740,543	103
30	45	39,466,509	25	15,705,303	64
25	40	50,691,071	20	20,172,005	50

For product information and a complete list of distributors, please go to our web site: www.broadcom.com.

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