BROADCOM®

Reliability Data Sheet

Automotive R^{2}Coupler™

With AlGaAs LED

Description

The reliability information here is compiled from life tests on R^{2}Coupler™ devices. These devices are hybrid devices containing an LED, a light guide, and an output IC. As such, the reliability projection here is for the overall performance of the complete device.

The data in Table 2 and Table 3 reflects actual test data for devices on a per-channel basis.

This data is taken from testing on Broadcom® devices using internal Broadcom processes, material specifications, design standards, and statistical process controls. **It is not transferable to other manufacturers' similar part types.**

Definition of Failure

Inability of the optocoupler to switch, that is, *functional failure*, is the definition of failure in this data sheet.

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 3 use the Arrhenius acceleration relationship with activation energy of 0.43 eV.

For the AlGaAs LED technology, the appropriate activation energy would be 0.43 eV. For the output IC, the appropriate activation energy would be 0.7eV. Due to the inability to separate these components in the reliability calculations of the optocoupler, a conservative value of 0.43 eV is adopted as the activation energy for the output IC. 0.43 eV is also recommended from Mil-HDBK-217 under hybrid section.

Application Information

The data of Table 2 and Table 3 was 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.

NOTE: If more information is required on specific product, contact the respective sales representative in the region.

Table 1: List of Automotive R^{2}Couplers[a]

SO-5	SSO-8	SSO-12	SO-16	SO-24	SO-32	300-mil 8-pin
ACPL-M43T	ACPL-K30T	ACFL-3161T	ACPL-31JT	ACFJ-3262T	ACFH-3548T	ACPL-312T
ACPL-M46T	ACPL-K33T	ACFL-5211T	ACPL-32JT	ACFJ-332BT		ACPL-782T
ACPL-M49T	ACPL-K34T	ACFL-5212T	ACPL-33JT	ACFJ-3439T		
ACPL-M61T	ACPL-K43CT	ACFL-6211T	ACPL-34JT	ACFJ-3530T		
ACPL-M71T	ACPL-K43T	ACFL-6212T	ACPL-344JT	ACFJ-3531T		
ACPL-M72T	ACPL-K44CT		ACPL-36JT	ACFJ-3540T		
	ACPL-K44T		ACPL-36JV			
	ACPL-K49CT		ACPL-38JT			
	ACPL-K49T		ASSR-601JT			
	ACPL-K71T		ASSR-601JV			
	ACPL-K72T					
	ACPL-K74T					
	ACPL-K75T					
	ACPL-C797T					
	ACPL-C799T					
	ACPL-C87AT					
	ACPL-C87BT					

a. All associated options and specials apply.

Table 2: Reliability Projection for Broadcom Optocouplers

Total Devices Tested	Total Device Hours	Number of Failed Units	MTTF (Hours) at T_A = +55°C, 60% Confidence	FITs at T_A = +55°C, 60% Confidence
145,538	136,861,200	0	1,752,015,212	0.57

Table 3: Reliability Projection at 60% and 90% Confidence for Broadcom Optocouplers

Ambient Temperature (°C)	Junction Temperature (°C)	Typical (60% Confidence)		90% Confidence	
		MTTF (Hours/Failures)	FITs (Fail/10^9 Hours)	MTTF (Hours/Failures)	FITs (Fail/10^9 Hours)
125	140	149,364,383	6.70	59,438,064	16.82
115	130	201,493,053	4.96	80,182,147	12.47
105	120	275,987,584	3.62	109,826,502	9.11
95	110	384,285,246	2.60	152,922,474	6.54
85	100	544,661,164	1.84	216,742,468	4.61
75	90	786,945,602	1.27	313,157,140	3.19
65	80	1,160,961,657	0.86	461,993,092	2.16
55	70	1,752,015,212	0.57	697,196,949	1.43
45	60	2,710,140,474	0.37	1,078,473,324	0.93
35	50	4,307,017,389	0.23	1,713,934,537	0.58
25	40	7,050,447,912	0.14	2,805,655,303	0.36
15	30	11,922,980,948	0.08	4,744,631,142	0.21
5	20	20,899,101,190	0.05	8,316,588,509	0.12

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RoHS 6 fully compliant
RoHS 6 fully compliant options available;
-xxxE denotes a lead-free product