



Very High CMR, Wide V_{CC} Logic Gate Optocouplers

Reliability Data Sheet

Agilent
HCPL-0201
HCPL-0211

Description

The reliability data shown includes Agilent Technologies reliability test data from the past three years 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, 5 seconds 2X) and 20 temperature cycles (-55°C to +125°C, 15 minutes dwell, 5 minutes transfer). These data are taken from testing

on Agilent Technologies devices using internal Agilent 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 Agilent 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 Devices Tested	Total Device Hours	Number of Failed Units	Demonstrated MTTF (hr) @ T _A = +125°C	Demonstrated FITs @ T _A = +125°C
T _A = +125°C V _{CC} = 20.0 V I _{in} = 20 mA I _{out} = 10 mA	440	440,000	1	440,000	2,273

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 use the Arrhenius acceleration relationship, where a 0.43eV activation energy is used as in the hybrid section of MIL-HDBK-217.

Application Information

The data of Tables 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.



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Table 2. Reliability Projections (per channel) for Devices Listed in Title

Ambient Temperature (°C)	Junction Temperature (°C)	Typical (60% Confidence)		90% Confidence	
		MTTF (hr/fail)	FITs (fail/10 ⁹ hr)	MTTF (hr/fail)	FITs (fail/10 ⁹ hr)
125	140	218,000	4,591	113,000	8,841
120	135	252,000	3,963	131,000	7,624
110	125	342,000	2,920	178,000	5,607
100	115	472,000	2,118	246,000	4,059
90	105	662,000	1,510	346,000	2,888
80	95	946,000	1,057	496,000	2,018
70	85	1,378,000	726	724,000	1,381
60	75	2,052,000	487	1,081,000	925
50	65	3,129,000	320	1,651,000	606
40	55	4,894,000	204	2,590,000	386
30	45	7,873,000	127	4,180,000	239
25	40	10,101,000	99	5,370,000	186

Table 3. Mechanical Tests (Testing done on a constructional basis)

Test Name	MIL-STD-883	Test Conditions	Units Tested	Units Failed
Temperature Cycle	1010 Cond. B	-55 to 125°C Transfer = 5 mins Dwell = 15 mins 500 cycles	240	0
Moisture Storage Plus Solder Heat	N/A	T _A = 85°C, RH = 85% Time = 168 hours Temp. = 260°C (10 sec.)	40	0
Terminal Strength	2004	2 lb tension 8 oz lead bend stress	150	0
Solderability After Steam Aging	2003	Sn60 Pb40 Solder Temp. = 260°C (5 sec, 2X)	10	0
Physical Dimension	2009	Dev. profile @ 10X	220	0

Table 4. Basic Material Properties

Material Property	Test Result
Mold Compound Flammability Classification	UL 94V-0
Mold Compound Oxygen Index	32%
Mold Compound Glass Transition Temperature	T _g = 160°C
Mold Compound Hydrolizable Chlorine	< 30 ppm

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Data subject to change.

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传真：0755-83376182 (0) 13823648918 MSN: SUNS8888@hotmail.com

邮编：518033 E-mail:szss20@163.com QQ: 195847376

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西安分公司：西安高新开发区 20 所(中国电子科技集团导航技术研究所)

西安劳动南路 88 号电子商城二楼 D23 号

TEL: 029-81022619 13072977981 FAX:029-88789382