



Agilent 6N135/6, HCPL-2502, HCPL-4502/3 Single Channel, High Speed Optocoupler Reliability Data Sheet

Description

The reliability data shown includes Agilent Technologies reliability test data from the qualification of this product family. All of these products use 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 (245 °C peak temperature, 2X) and 20 temperature cycles (-55 °C to +125 °C, 15 mins dwell, 5 mins transfer). These data are taken from testing on Agilent Technologies devices using internal Agilent 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 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.

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 = +125 °C	Demonstrated FITs @ Ta = +125 °C
Ta = 125 °C If = 20mA Vcc = 15V Iout = 6mA	320	320,000	0	> 320,000	< 3,125



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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 h)	MTTF (Hr/fail)	FITs (Fail/10 ⁹ h)
125	140	349,234	2,863	138,974	7,196
120	135	404,880	2,470	161,118	6,207
110	125	550,284	1,817	218,979	4,567
100	115	759,828	1,316	302,365	3,307
90	105	1,067,230	937	424,693	2,355
80	95	1,526,932	655	607,626	1,646
70	85	2,228,804	449	886,929	1,127
60	75	3,324,788	301	1,323,063	756
50	65	5,078,477	197	2,020,925	495
40	55	7,960,141	126	3,167,652	316
30	45	12,834,646	78	5,107,409	196
25	40	16,484,913	61	6,559,993	152

Mechanical Tests (Testing done on a constructional basis)

Test Name	MIL-STD-883	Test Conditions	Units Tested	Units Failed
Temp Cycle	1010 Cond. B	-55 to 125 °C, Transfer = 5 mins Dwell = 15 mins, 1000 cycles	560	0
Solderability	2003	Sn 60 Pb 40 Solder, Temp = 230 °C (2 sec)	100	0
Terminal Strength	2004	2 lb tension, 8 oz lead bend stress	380	0
Physical Dimensions	2009	Dev Profile @ 10X	220	0

Environmental Testing

Test Name	MIL-STD-883	Test Conditions	Units Tested	Units Failed
Resistance to Solvents	2015	3 one min immersion, Brush after solvents	80	0
Autoclave	-	Ta = 121°C, RH = 100% Unbiased, Time = 168 hours	200	0

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 = 160C
Mold Compound Hydrolizable Chlorine	<30 ppm

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July 30, 2004

5989-1525EN



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