



Agilent HCPL-817

Phototransistor Optocouplers

High Density Mounting Type

Reliability Data Sheet

The reliability data shown includes Agilent Technologies reliability test data from the reliability qualification of 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. Note single channel device hours are equal to 1.5X dual channel device hours according to MIL-HDBK-217. Before stress, all devices are preconditioned using a IR reflow process (EIAJ Profile, 3X) 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 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 Device Tested	Total Device Hours	Number of Failed Units	Demonstrated MTTF(hr) @ Ta = +125 °C	Demonstrated FITs @ Ta = +125 °C
Ta = 125°C Vcc=7V Iin=50mA Ilo=50mA	480	480,000	0	> 480,000	< 2083



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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 current no input.

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 0.43eV 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 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	524,000	1,909	208,000	4,797
120	135	607,321	1,647	242,000	4,138
110	125	825,000	1,211	328,000	3,044
100	115	1,140,000	877	454,000	2,205
90	105	1,601,000	625	637,000	1,570
80	95	2,290,000	437	911,000	1,097
70	85	2,343,000	299	1,330,000	752
60	75	4,987,000	201	1,985,000	504
50	65	7,618,000	131	3,031,000	330
40	55	11,940,000	84	4,751,000	210
30	45	19,252,000	52	7,661,000	131
25	40	24,727,000	40	9,840,000	102

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	480	0
Thermal Shock	1011 Cond B	-55 to 125°C Transfer < 10 sec Dwell = 5 mins 200 cycles	120	0
Solder Heat	N/A	Temp = 260°C (10 sec)	20	0
Solderability After Steam Aging	2003	Sn60 Pb40 SolderTemp= 260°C (5 sec, 2X) 8h steam aging	40	0

Environmental Testing

Test Name	MIL-STD-883	Test Conditions	Units Tested	Units Failed
Temp and Humidity Bias	N/A	Ta = 85C, RH = 85% See Table 1 for bias condition Time = 1000 hours	120	0
Unbiased Pressure Pot	N/A	Ta=121C, RH=100% Time=168 hours	240	0

Basic Material Properties

Material Property	Test Result
Mold Compound Flammability Classification	UL 94V-0
Mold Compound Oxygen Index	37%
Mold Compound Glass Transition Temperature	Tg = 170°C
Mold Compound Hydrolizable Chlorin	<30 ppm

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