



# Agilent HCPL-7601/7611

## CMOS/TTL Compatible, Low Input Current, High Speed & CMR

### Optocouplers

#### Reliability Data Sheet

#### Description

The reliability data shown includes Agilent Technologies reliability test data from the past four 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 (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 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 = 5.5V If = 10mA Iout = 50mA	200	200,000	0	>200,000	<5,000



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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 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 2. Reliability Projections (per channel) for Devices Listed**

Ambient Temperature (°C)	Junction Temperature (°C)	Typical (60% Confidence)		90% Confidence	
		MTTF (Hr/fail)	(Fail/109h)	MTTF (Hr/fail)	FITs (Fail/109h)
125	140	218,271	4,581	86,859	11,513
110	125	343,927	2,908	136,862	7,307
100	115	474,892	2,106	188,979	5,292
90	105	667,019	1,499	265,433	3,767
80	95	954,332	1,048	379,767	2,633
70	85	1,393,002	718	554,331	1,804
60	75	2,077,991	481	826,916	1,209
50	65	3,174,046	315	1,263,080	792
40	55	4,975,084	201	1,979,785	505
30	45	8,021,648	125	3,192,135	313
25	40	10,303,063	97	4,100,001	244

**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 1000 cycles	170	0
Solderability After Steam Aging	Method 2003	Sn60 Pb40 Solder Temp = 245°C (5sec, 2X)	30	0
Physical Dimension	2009	Dev. Profile @ 10X	30	0

**Table 4: Environmental Tests (Testing done on a constructional basis)**

Test Name	MIL-STD-883	Test Conditions	Units Tested	Units Failed
Temp and Humidity Bias	N/A	Ta = 85°C, RH = 85% Time = 1000hrs Refer to Table 1 for bias	70	0
Unbiased Pressure Pot	N/A	Ta = 121°C, RH = 100% Time =168hrs	70	0

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