



Agilent HCPL-0900/0930/0931

High Speed Digital 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.

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 = 5.0V Input pulse @ 50MHz	176	264,000	0	> 204,000	< 4,902



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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 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	288,118	3,471	114,654	8,722
110	125	453,984	2,203	180,658	5,535
100	115	626,858	1,595	249,452	4,009
90	105	880,464	1,136	350,372	2,854
80	95	1,259,718	794	501,292	1,995
70	85	1,838,762	544	731,717	1,367
60	75	2,742,948	365	1,091,529	916
50	65	4,189,741	239	1,667,265	600
40	55	6,567,111	152	2,613,316	383
30	45	10,588,576	94	4,213,618	237
25	40	13,600,043	74	5,412,001	185

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	230	0
Solderability	2003	Sn 60 Pb 40 Solde Temp = 230 °C (2 sec)	30	0
Solvent Resistance	2015		10	0

Environmental Testing

Test Name	MIL-STD-883	Test Conditions	Units Tested	Units Failed
Autoclave	-	Ta = 121C, RH = 100% Unbiased Time = 168 hours	230	0

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