



Hermetically Sealed, High Speed, High CMR, Logic Gate Optocouplers

Reliability Data Sheet

Agilent

8102801EX, 5962-9800101KEX
6N134/883B, HCPL-268K
8102802PX, 5962-9800102KPX
HCPL-5631, HCPL-563K
5962-9085501HPX, 5962-9085501KPX
HCPL-5601, HCPL-560K,
81028032A, 5962-9800103K2A
HCPL-6631, HCPL-663K
8102804FC, 5962-9800104KFC
HCPL-6651, HCPL-665K

Description

The reliability data shown includes Agilent reliability test data from the past three years on this product family. All of these products use the same LEDs, the same logic gate ICs, the same DSCC approved packaging materials, processes, stress conditions and testing.

The data in Tables 1 and 2 reflect actual test data on dual channel devices. The single channel HCPL-5601 data in Table 3 is inferred from the demonstrated life test data using the factor (1.5) found in the "Photodiode Detector Isolator" section of MIL-HDBK-217, combined with any single channel data obtained. This data

is taken from testing on Agilent Technologies devices using internal Agilent processes, material specifications, design standards, and statistical process controls. THEY ARE NOT TRANSFERABLE TO OTHER MANUFACTURERS' SIMILAR PART TYPES.

Operating Life Test

Table 1. Demonstrated Operating Life Test Performance, 6N134/883B

Stress Test Condition	Total Devices Tested	Total Device Hours	Number of Failed Units	Demonstrated MTTF (hr)@ $T_A = +125^\circ\text{C}$	Demonstrated FITs @ $T_A = +125^\circ\text{C}$
$I_f = 20\text{ mA}$ $I_{out} = 25\text{ mA}$ $V_{CC} = 5.5\text{ V}$ $T_A = +125^\circ\text{C}$ $T_j = +160^\circ\text{C}$	475	1,781,000	0	>1,781,000	<561

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 Tables 2

and 3 use the Arrhenius acceleration relationship, where a 0.43 eV activation energy is used as in the hybrid section of MIL-HDBK-217.

Applications Information

The data of Tables 1, 2, and 3 were obtained on MIL-PRF-38534 screened devices with high temperature operating life duration up to 5000 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.

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 Tables 2 and 3 due to the different conditions and factors



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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 testing does. Thus, your application total power and duty cycle must be carefully

considered when comparing Tables 2 and 3 to predictions using MIL-HDBK-217.

Table 2. Reliability Projections for Dual Channel 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	160	1,943,000	514	773,000	1,293
120	155	2,224,000	450	885,000	1,130
110	145	2,939,000	340	1,169,000	855
100	135	3,938,000	254	1,567,000	638
90	125	5,355,000	187	2,131,000	469
80	115	7,398,000	135	2,944,000	340
70	105	10,397,000	96	4,137,000	242
60	95	14,884,000	67	5,923,000	169
50	85	21,738,000	46	8,650,000	116
40	75	32,447,000	31	12,912,000	77
30	65	49,594,000	20	19,735,000	51
25	60	61,902,000	16	24,633,000	41

Table 3. Reliability Projections for Single Channel 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	150	2,920,000	342	1,971,000	507
120	145	3,359,000	298	2,270,000	440
110	135	4,493,000	222	3,042,000	329
100	125	6,098,000	164	4,137,000	242
90	115	8,408,000	119	5,715,000	175
80	105	11,791,000	85	8,031,000	125
70	95	16,843,000	59	11,497,000	87
60	85	24,542,000	41	16,791,000	60
50	75	36,543,000	27	25,063,000	40
40	65	55,710,000	18	38,308,000	26
30	55	87,140,000	11	60,086,000	17
25	50	110,225,000	9	76,042,000	13

Environmental Testing

All high reliability hermetic optocouplers listed meet the 100% screening and quality conformance inspection testing of MIL-PRF-38534, class H or class K as applicable.

Electrostatic Discharge Sensitivity

Table 4. ESDS Classification per Method 3015, MIL-STD-883

Part Number	ESD Class
5962-9800101KEX, HCPL-268K	3
8102801EX, 6N134/883B	3
5962-9800102KPX, HCPL-563K	3
8102802PX, HCPL-5631	3
5962-9085501KPX, HCPL-560K	1
5962-9085501HPX, HCPL-5601	1
5962-9800103K2A, HCPL-663K	3
5962-9800104KFC, HCPL-665K	3
8102803FC, HCPL-6631	3
81028042A, HCPL-6651	3

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