ACSL-6210, ACSL-6300, ACSL-6310, ACSL-6400, ACSL-6410 and ACSL-6420

Multi Channel 15MBd Digital Logic Gate Optocoupler

Reliability Data Sheet

Description

The reliability data shown includes Avago Technologies reliability test data from the reliability qualification done 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 ºC peak temp) and 20 temperature cycles (-55 ºC to +125 ºC, 15 mins dwell, 1 min transfer). These data are taken from testing on Avago 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 Avago 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 Iin = 20mA	252	252,000	0	> 252,000	< 3,968

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 data. 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 Projection for Device Listed in Title

Ambient Temperature (°C)	Junction Temperature (°C)	Typical (60% Confidence)		90% Confidence	
		MTTF (Hr/fail)	FITs (Fail/10^9h)	MTTF (Hr/fail)	FITs (Fail/10^9h)
125	140	275,022	3,636	109,442	9,137
120	135	318,843	3,136	126,880	7,881
110	125	433,348	2,308	172,447	5,799
100	115	598,364	1,671	238,113	4.200
90	105	840,443	1,190	334,446	2,990
80	95	1,202,458	832	478,506	2,090
70	85	1,755,182	570	698,457	1,432
60	75	2,618,268	382	1,041,914	960
50	65	3,999,298	250	1,591,481	628
40	55	6.268,606	160	2,492,529	401
30	45	10,107,277	99	4,022,090	249
25	40	12,981,859	77	5,166,001	194

Mechanical Tests (Testing done on a constructional basis)

Test Name	Reference Standard	Test Conditions	Units Tested	Units Failed
Temp Cycling	Mil Std 883 1010 Cond. B	-55 to 125 °C Transfer = 1 min Dwell = 15 mins 1000 cycles	160	0
Solderability	JB102	8hrs steam aging (93 °C), followed by solder dip (245 °C,5sec)	20	0
Mechanical Shock	MIL Std 883 2020 Cond. B	2 blows each axis 500G, 0.5ms pulse	10	0
Mechanical Vibration	MIL Std 883 2007 Cond. A	20G, 20-2000Hz, 4min/cycle, 4 times/axis	10	0
Thermal Shock	MIL Std 883 1011 Cond. B	-55 to 125 °C Transfer <10s Dwell = 15 mins 200 cycles	50	0

Environmental Testing

Test Name	Reference Standard	Test Conditions	Units Tested	Units Failed
Temp. and Humidity Bias	JA101	Ta = 85°C, RH = 85% See Table 1 for Bias Cond Time = 1000hrs	80	0
Unbiased Autoclave	JA102	Ta = 121°C, RH = 100% 15psig Time = 168 hours	130	0

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