

Reliability Data Sheet

Description

The reliability data shown includes Avago 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 Avago Technologies devices using internal Avago 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 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.

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 1. Demonstrated Operating Life Test Performance.

Stress Test Condition	Total Device Tested	Total Device Hours	Number of Failed Units	Demonstrated MTTF(hr) @ Ta = +100 °C	Demonstrated FITs @ Ta = +100 °C
Ta = 100 °C If = 25mA Vcc = 25V Iout = 17mA	160	480,000	0	> 480,000	< 2,083

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)
100	115	523,852	1,909	208,461	4,797
90	105	735,785	1,359	292,798	3,415
80	95	1,052,720	950	418,918	2,387
70	85	1,536,615	651	611,479	1,635
60	75	2,292,223	436	912,166	1,096
50	65	3,501,277	286	1,393,295	718
40	55	5,487,995	182	2,183,889	458
30	45	8,848,648	113	3,521,224	284
25	40	11,365,267	88	4,522,685	221

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	120	0
Terminal Strength	2004	2 lb tension 8 oz lead bend stress	380	0
Physical Dimension	2009	Dev profile @ 10X	200	0
Solder Heat Resistance	N/A	Temp = 260C, 10 sec	20	0
Solderability	2003	Sn 60 Pb 40 Solder Temp = 230 °C (2 sec)	20	0

Environmental Testing

Test Name	MIL-STD-883	Test Conditions	Units Tested	Units Failed
Wet Temp Biased Test	-	Ta = 85C, RH = 85% If = 25mA Vcc = 25V Iout = 17mA	80	0
Autoclave	-	Ta = 121C, RH = 100% Unbiased Time = 168 hours	40	0

Basic Material Properties

Material Property	Test Result
Mold Compound Flammability Classification	UL 94V-0
Mold Compound Oxygen Index	32%
Mold Compound Glass Transition Temperature	Tg = 160 °C
Mold Compound Hydrolyzable Chlorine	<30 ppm

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