HEWLETT® PACKARD

Passivated General Purpose Schottky Diodes

Reliability Data

1N5711/12
5082-2800/04/05
5082-2810/11
5082-2826
5082-2835
5082-2080

The following cumulative test results have been obtained from testing performed at Hewlett-Packard in accordance with the latest revision of MIL-STD-750. Data was gathered from the product qualification, reliability monitor, and engineering evaluation.

For the purpose of this reliability data sheet, a failure is any part which fails to meet the electrical and/or mechanical specification listed in the Hewlett-Packard Communications Components Designer's Catalog.

1. Life Test

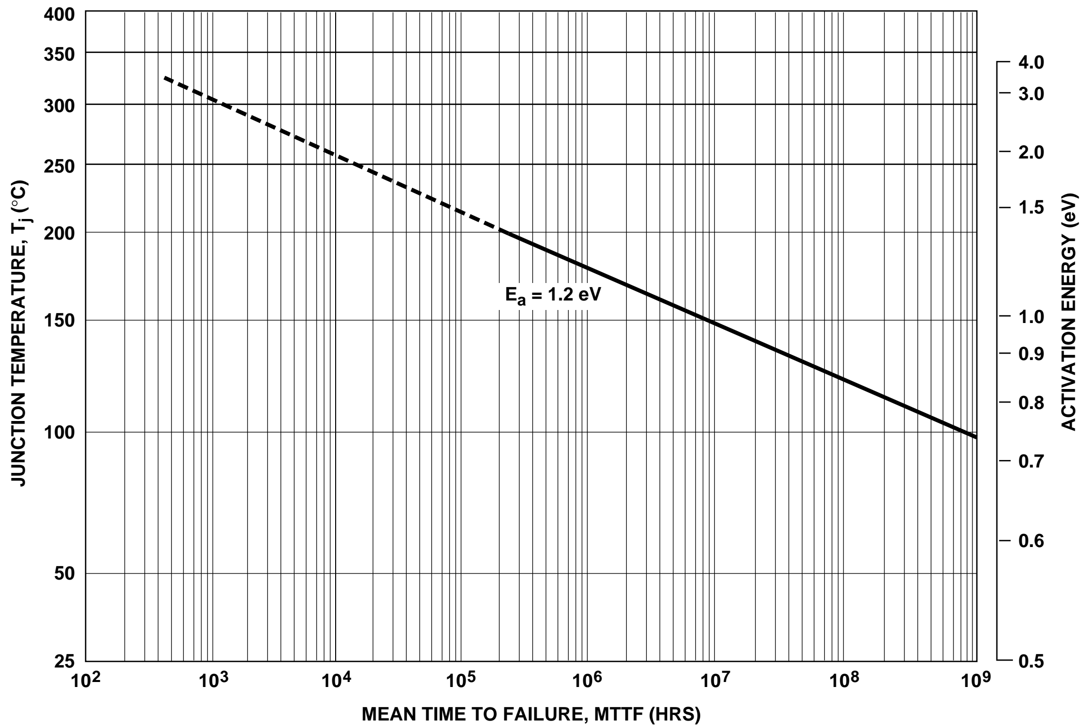
A. Demonstrated Performance

Test	Test Conditions	Units Tested	Total Device Hrs.	Total Failed	Failure Rate 1%/1K Hrs.
High Temp. Rev. Bias (HTRB)	$V_R = 80\% V_{BR}, T_A = 200°C$	676	598,000	0	0
Room Temp. Operating Life (RTOL)	$P_{fm} = 250$ mW, $T_A = 25°C$ $V_R = 80\% V_{BR}$, 60 Hz	364	364,000	0	0
High Temp. Storage (HTS)	$T_A = 200°C$	367	271,000	0	0

B. Failure Rate Prediction

The failure rate will depend on the junction temperature of the device. The estimated life at different temperatures is calculated, using the Arrhenius plot with activation energy of 1.2 eV, and listed in the following table.

Junction Temp. T_J (°C)	Point[1]		90% Confidence Level[2]	
	MTTF (Hours)	FIT[3]	MTTF (Hours)	FIT[3]
200	2.7×10^5	3704.0	1.2×10^5	8333.0
175	1.4×10^6	714.0	6.1×10^5	1639.0
150	8.9×10^6	112.0	4.0×10^6	250.0
125	7.1×10^7	14.0	3.1×10^7	32.0
100	7.4×10^8	1.3	3.2×10^8	3.1
75	1.0×10^{10}	0.10	4.3×10^9	2.3



Notes:

1. The point MTTF is simply the total device hours divided by the number of failures.
2. The MTTF and failure rate represent the performance level for which there is a 90% probability of the device doing better than the stated value. The confidence level is based on the statistics of failure distribution. The assumed distribution is exponential. This particular distribution is commonly used in describing useful life failures.
3. FIT is defined as Failure in Time, or specifically, failures per billion hours. The relationship between MTTF and FIT is as follows: FIT = 10^9/(MTTF).

C. Example of Failure Rate Calculation

At 75°C with a device operating 8 hours a day, 5 days a week, the percent utilization is:

% Utilization = (8 hrs/day x 5 days/wk) ÷ 168 hrs/wk = 25%

Then the point failure rate per year is:

(1.0×10^{-10}/hr.) x (25%) x (8760 hrs/yr) = 2.2×10^{-5} % per year

Likewise, the 90% confidence level failure rate per year is:

(2.3×10^{-10}/hrs.) x (25%) x (8760 hrs/yr) = 5.1×10^{-5} % per year

2. Environmental and Mechanical Tests

Test	MIL-STD-750 Reference	Test Conditions	Units Tested	Total Failed
Solderability	2026	260°C, 5 seconds	198	0
Solder Heat	2031	260°C, 10 seconds	44	0
Resistance to Solvent	1022	4 solvent groups	126	0
Thermal Shock	1056	-65/200°C, 5 min dwell, 200 cycles	116	0
Temperature Cycle	1051	-55/100°C, 10 min dwell, 200 cycles	416	0
Mechanical Shock	2016	1500 g's, 0.5 msec pulse 5 blows each X1, Y1, Y2	272	0
Acceleration	2006	20,000 g's, 1 min, X1, Y, Y2	116	0
Vibration Variable Freq.	2056	20–2000 Hz, 20 g, 4 min all axis	116	0
Hermeticity	1017	Fine And Gross	416	0
Lead Integrity		4 lbs Minimum	176	0
Salt Atmosphere	1041	10–50 gr/m^2 @ 35°C, 24 hrs.	45	0

3. DOD-HDBK-1686 ESD Classification:

5082-28XX Class I