
HPMX-5001, HPMX-5002

Integrated Circuits

Reliability Data

HPMX-5001
HPMX-5002

Description

The following cumulative test results have been obtained from testing performed at Hewlett-Packard. 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 Communications Components Designer's Catalog.

1. Life Test

A. Demonstrated Performance

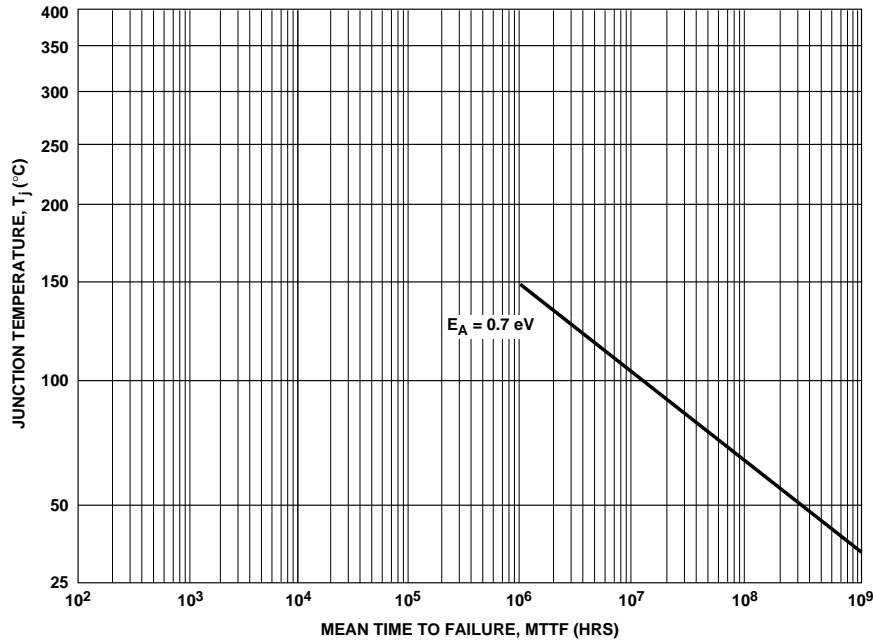
Test Name	Test Conditions	Units Tested	Total Device Hrs.	Total Failed	Failure Rate (%/1K Hours)
High Temperature Operating Life (O.L.)	T _J = 150°C, 1000 hr.	129	129,000	0	0
High Temperature Operating Life (O.L.)	T _J = 130°C, 1000 hr.	177	177,000	0	0

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 0.7 eV, and is listed in the following table.

Junction Temp. T _J (°C)	Point(1)		90% Confidence Level(2)	
	MTTF* (hours)	MTTF FIT(3)	MTTF (hours)	FIT(3)
150	9.36 x 10 ⁵	1068	4.68 x 10 ⁵	2137
125	3.13 x 10 ⁶	320	1.56 x 10 ⁶	640
100	1.23 x 10 ⁷	81	6.14 x 10 ⁶	163
80	4.21 x 10 ⁷	24	2.11 x 10 ⁷	47
60	1.68 x 10 ⁸	6	8.39 x 10 ⁷	12

*MTTF data calculated from high temperature Operating Life tests.


Notes:

1. The point MTTF is simply the total device hours divided by the number of failures.
2. This 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 = 10⁹/(MTTF).

C. Example of Failure Rate Calculation

At 100°C with a device operating 8 hours a day, 5 days a week, the percent utilization is:

$$\% \text{ Utilization} = (8 \text{ hours/day}) \times (5 \text{ days/week}) \div 168 \text{ hours/week} = 25\%$$

Then the point failure rate per year is:

$$(81 \times 10^{-7}/\text{hr.}) \times (0.25) \times (8760 \text{ hours/year}) = 1.8 \times 10^{-2}\% \text{ per year}$$

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

$$(163 \times 10^{-8}/\text{hr.}) \times (0.25) \times (8760 \text{ hours/year}) = 3.6 \times 10^{-2}\% \text{ per year}$$

2. Environmental Tests

Test Name	Test Conditions	Units Tested	Units Failed
Thermal Shock	-55°C to +125°C; Dwell time 5 min., 200 cycles	116	0
Moisture Resistance	85°C/85% RH, Biased, 1000 hr	36	0
Autoclave	121°C, 15 PSIG, 72 hr	95	0

3. Flammability Test

(MIL-STD-202, Method 111):

Meets Needle Flame test per UL

Category D (Flaming Time

<3 sec.) under Material

Classification 94VO.

4. EIA/JESD2-A114-A

Classification: Class 1

www.hp.com/go/rf

For technical assistance or the location of your nearest Hewlett-Packard sales office, distributor or representative call:

Americas/Canada: 1-800-235-0312 or 408-654-8675

Far East/Australasia: Call your local HP sales office.

Japan: (81 3) 3335-8152

Europe: Call your local HP sales office.

Data subject to change.
Copyright © 1998 Hewlett-Packard Co.

Printed in U.S.A. 5967-????E (6/98)