

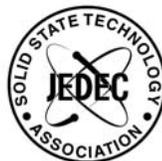
Bias Life

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PUBLICLY AVAILABLE SPECIFICATION



INTERNATIONAL
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COMMISSION



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Withdrawn

JEDEC STANDARD

Bias Life

JESD22-A108-A

(Revision of Test Method A108 - previously published in JESD22)

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ELECTRONIC INDUSTRIES ASSOCIATION
ENGINEERING DEPARTMENT



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BIAS LIFE

FOREWORD

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IEC-PAS 62189 was submitted by JEDEC and has been processed by IEC technical committee 47: Semiconductor devices.

The text of this PAS is based on the following document:

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document:

Draft PAS	Report on voting
47/1474/PAS	47/1510/RVD

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**TEST METHOD A108-A
BIAS LIFE**

(From JEDEC Council Ballot JCB-90-31 , formulated under the cognizance of JC-14.1 Committee on Reliability Test Methods for Packaged Devices.)

1. PURPOSE

This test is performed to determine the effects of bias conditions and temperature on solid state devices over an extended period of time. It is intended primarily for device Qualification and reliability monitoring.

2. APPARATUS

The performance of this test requires equipment that is capable of providing the particular test conditions to which the test samples will be subjected.

2.1 Circuitry

The circuitry through which the samples will be biased must* be designed with several considerations:

2.1.1 Device Schematic

The biasing and operating schemes shall** consider the limitations of the device and shall not overstress the devices nor contribute to thermal runaway. Device thermal characterization shall be considered (or may be made) to ensure that the temperature of "Hot Spots" on the die does not exceed maximum rated junction temperature.

2.1.2 Power

The test circuit should*** be designed to limit power dissipation such that, if a device failure occurs, excessive power will not be applied to other devices in the sample.

* The word must is cautionary in the sense that the stated action is essential to successful achievement of a purpose.

* * The word shall is to be understood as mandatory.

* * * The word should is to be understood as advisory.

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2.2 Device Mounting

Equipment design if required, shall provide for mounting of devices to minimize adverse effects during test, (e.g., improper heat dissipation) .

2.3 Power Supplies and Signal Sources

Instruments (such as DVMs, oscilloscopes, etc.) used to set up and monitor power supplies and signal sources shall be maintained in a calibrated system and shall be of the type that provides good long-term stability.

2.4 Environmental Chamber

The environmental chamber shall be capable of maintaining the specified ambient temperature within a tolerance of $\pm 5^{\circ}\text{C}$ throughout the chamber while a test is being conducted.

3. PROCEDURE

The sample devices shall be subjected to the specified or selected test conditions for the time and temperature required.

3.1 Test Duration

The bias life shall be conducted for 1000 (+168, -0) hours. If interim measurements are deemed necessary, they may* be chosen from the following standard time intervals, as time to perform such measurements:

24 hours	(+8,	-0)
48 hours	(+8,	-0)
96 hours	(+24,	-0)
168 hours	(+72,	-24)
504 hours	(+168,	-24).

3.2 Test Conditions

The test condition shall be applied continuously (except during interim measurement periods). The time spent reducing chamber conditions to room ambient and conducting the interim measurements shall not be considered a portion of the total specified test duration.

* The word may is to be understood as permissive.

3.2.1 Ambient Temperature

Unless otherwise specified, the ambient temperature shall be 125°C ±5°C.

3.2.2 Operating Mode

The operating mode(s) shall be specified in the applicable Procurement document.

3.2.2.1 High-Temperature Reverse-Bias

The "High-Temperature Reverse-Bias" (HTRB) test is configured to apply voltage to the devices which remain in a static mode of operation for the duration of the test. The particular bias conditions should be determined to reverse bias as many of the solid state junctions in the device as possible. Voltages shall be specified in the applicable procurement document.

NOTE: Depending upon the device, the supply and input voltage are either grounded or raised to a maximum potential chosen to produce an operating temperature not higher than the maximum-rated junction temperature. Device outputs are either unloaded or loaded, so as to achieve the specified output voltage level.

3.2.2.2 High-Temperature Forward-Bias

The "High-Temperature Forward-Bias" (HTFB) test is configured to apply power to the device samples so as to forward bias major power-handling junctions. The devices are operated in either a static or pulsed operating mode. Pulsed operation is used to test the devices at, or near, maximum-rated current levels without exceeding the maximum-rated junction temperature. The HTFB test is typically used for diodes, transistors or power driver integrated circuits.

3.2.2.3 High-Temperature Operating Life

The "High-Temperature Operating Life" (HTOL) test is configured to exercise the maximum number of nodes feasible.

NOTE: Several parameters may be adjusted to control internal power dissipation. These include supply voltages, that may be operated either above or below their normal values, and clock frequency. (Care must be exercised to ensure that device operation remains predictable and in a nondestructive range).

3.2.2.3 High-Temperature Operating Life (Continued)

NOTE: (Continued)

Device outputs are either unloaded or loaded so as to achieve the specified output voltage level without exceeding maximum-rated junction temperature.

4. COOL-DOWN

All devices shall be cooled to room temperature ($25 \pm 5^{\circ}\text{C}$) prior to removal of bias. The interruption of bias for up to one minute, for the purpose of moving the devices to cool-down positions separate from the chamber within which life testing was performed, shall not be considered removal of bias. All specified electrical measurements at room temperature shall be completed prior to any reheating of the devices.

5. MEASUREMENTS

The measurements specified in the applicable procurement document shall be made initially, at the end of each interim period (if required), and at the conclusion of the life test. Electrical endpoint testing shall be completed within 48 hours of removal of bias from devices. If the availability of test equipment or other factors make meeting this requirement difficult, the bias life test shall be extended at room ambient until equipment becomes available.

6. FAILURE CRITERIA

A device is defined as a failure if the parametric limits are exceeded or if functionality cannot be demonstrated under nominal and worst-case conditions, as specified in the applicable procurement document.

7. SUMMARY

The following items shall be specified in the applicable procurement document:

- (a) Special preconditioning, when applicable.
- (b) Test temperature, if other than specified in paragraph 3.2.1.
- (c) Test duration, if other than specified in paragraph 3.1
- (d) Test mounting, if special instructions are needed.
- (e) Test condition and test circuit schematic.

7. SUMMARY (Continued)

- (f) **Sample size and acceptance number.**
- (g) **Time to complete endpoint measurements, if other than specified in paragraph 5.**
- (h) **Operating mode.**
- (i) **Interim read points, if required.**
- (j) **Interim measurement time interval , if different from paragraph 3.1**
- (k) **Maximum junction temperature.**

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