

Total Dose Radiation Test Report

**MSK 109 RH
(MSK 110 RH)
+2.5V RAD Hard Precision
Voltage Reference**

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I. Introduction:

The total dose radiation test plan for the MSK 109 RH was developed to qualify the devices as RAD Hard to 100 KRAD (Si). The testing was performed beyond 100 KRAD (Si) to show trends in device performance as a function of total dose. The test does not classify maximum radiation tolerance of the device, but simply offers designers insight to the critical parameter-shifts up to the specified total dose level. The MSK 110RH uses the same active component. The data in this report is from direct measurement of the MSK109H response to irradiation but it is indicative of the response for both device types and is applicable to both.

MIL-STD-883 Method 1019.7 and ASTM F1892-06 were used as guidelines in the development and implementation of the total dose test plan for the MSK 109RH.

II. Radiation Source:

Total dose was performed at the University of Massachusetts, Lowell, using a cobalt 60 radiation source. The dose rate was determined to be 142 Rads(Si)/sec. The total dose schedule can be found in Table I.

III. Test Setup:

All test samples were subjected to Group A Electrical Test at 25°C in accordance with the device data sheet. In addition, all devices received 240 hours of burn-in per MIL-STD-883 Method 1015. For test platform verification, one control device was tested at 25°C. Ten devices were then tested at 25°C, prior to irradiation, and were found to be within acceptable test limits.

The devices were vertically aligned with the radiation source and enclosed in a lead/aluminum container during irradiation. Five devices were kept under bias during irradiation. An operating voltage of +15V was used for the bias condition. Five devices had all leads grounded during irradiation for the unbiased condition.

After each irradiation the device leads were shorted together and transported to the MSK automatic electrical test platform and tested IAW MSK device data sheet. Testing was performed on irradiated devices, as well as the control device, at each total dose level. Electrical tests were completed within one hour of irradiation. Devices were subjected to subsequent radiation doses within two hours of removal from the radiation field.

IV. Data:

All performance curves are averaged from the test results of the biased and unbiased devices, respectively. If required, full test data can be obtained by contacting M.S. Kennedy Corporation.

V. Summary:

Based on a 99/90 statistical analysis of the test data recorded during radiation testing, the MSK109RH and MSK 110RH qualified as a 100 Krad(Si) radiation hardened device. Reverse Breakdown Voltage stayed within specification up to 450 Krad(Si) TID. Reverse Breakdown Voltage Change with Current stayed within specification up to 300 Krad(Si) TID.

MSK 109RH Biased/Unbiased Dose Rate
Schedule

Dosimetry Equipment
Bruker Biospin # 0162

Irradiation Date
3/11/10

Exposure Length (min:sec)	Incremental Dose rads(Si)	Cumulative Dose rads(Si)
6:03	51,546	51,546
6:03	51,546	103,092
6:03	51,546	154,638
6:03	51,546	206,184
12:06	103,092	309,276
18:09	154,638	463,914

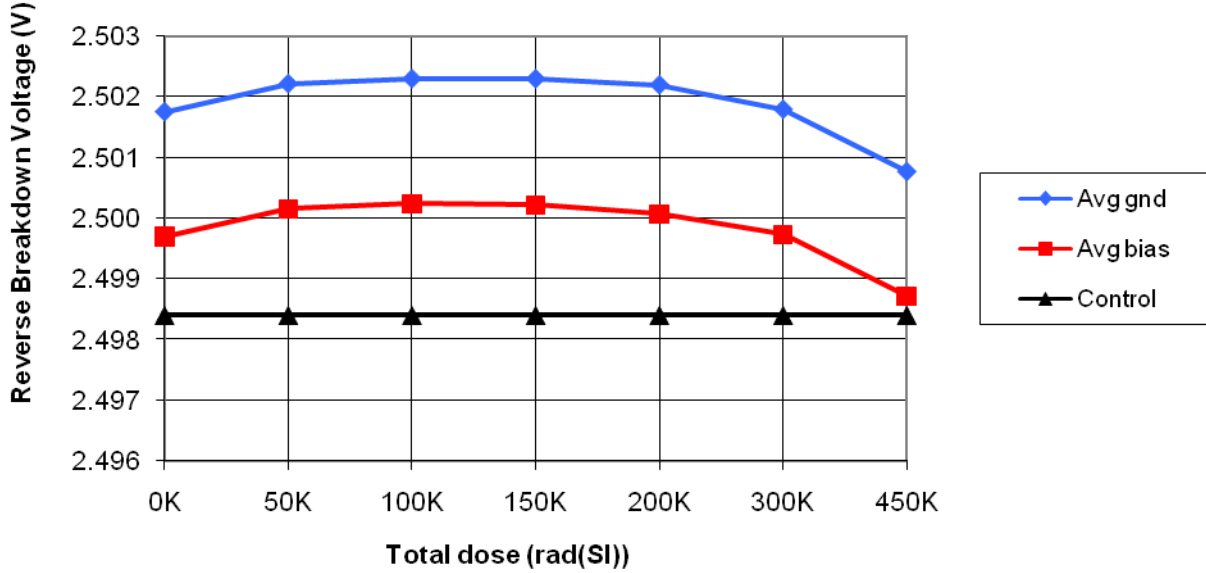
Biased S/N – 0029, 0032, 0049, 0057, 0059

Unbiased S/N – 0064, 0065, 0067, 0080, 0081

Table 1

Dose Time, Incremental Dose and Total Cumulative Dose

MSK 109RH
Reverse Breakdown Voltage vs.Total Dose



MSK 109RH
Reverse Breakdown Voltage Change with Current Change vs.
Total Dose

