

**Total Dose Radiation Test Report**  
**MSK 5971 RH and MSK 5971 RHL**  
**RAD Hard Positive Voltage Regulator**

May 14, 2009

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## **I. Introduction:**

The total dose radiation test plan for the MSK 5971RH series was developed to qualify the devices as RAD Hard to 100 KRADS(Si). The testing was performed beyond 100 KRADS(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 5971RH and the MSK5971 RHL use the same active component. The data in this report is from direct measurement of the MSK 5971RH response to irradiation, but is indicative of the response of both device types.

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 5971RH series.

## **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 176 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 in accordance with the device data sheet. In addition, all devices received 320 hours of burn-in per MIL-STD-883 Method 1015 and were fully screened IAW MIL-PRF-38534 Class K. 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 MSK 5971RH and the MSK5971 RHL use the same active component

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. Maximum recommended operating voltage of +30 Volts 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 the devices were transported to the MSK automatic electrical test platform. Testing was performed in accordance with the 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:**

Reference voltage exhibited the most significant shifts due to irradiation. The reference voltage decreased with each successive dose. It is important to note however, that all devices maintained post irradiation output tolerance levels up to 300 Krad(Si).

Line and load regulation shifts were very small and stayed within pre-irradiation limits throughout testing.

Dropout voltage showed a slight increase, but also stayed within pre-irradiation limits up to 300 Krad(Si).

Current Limit decreased by approximately 2.5 percent at 100 Krad(Si). Decrease in current limit was linear to 5 percent at 300 Krad(Si).

MSK 5971 RH Biased/Unbiased Dose Rate  
Schedule

Dosimetry Equipment  
Bruker Biospin # 0141

Irradiation Date  
5/14/09

Exposure Length (min:sec)	Incremental Dose rads(Si)	Cumulative Dose rads(Si)
4:53	51,568	51,568
4:53	51,568	103,136
4:53	51,568	154,704
4:53	51,568	206,272
9:46	103,136	309,408
14:39	154,704	464,112

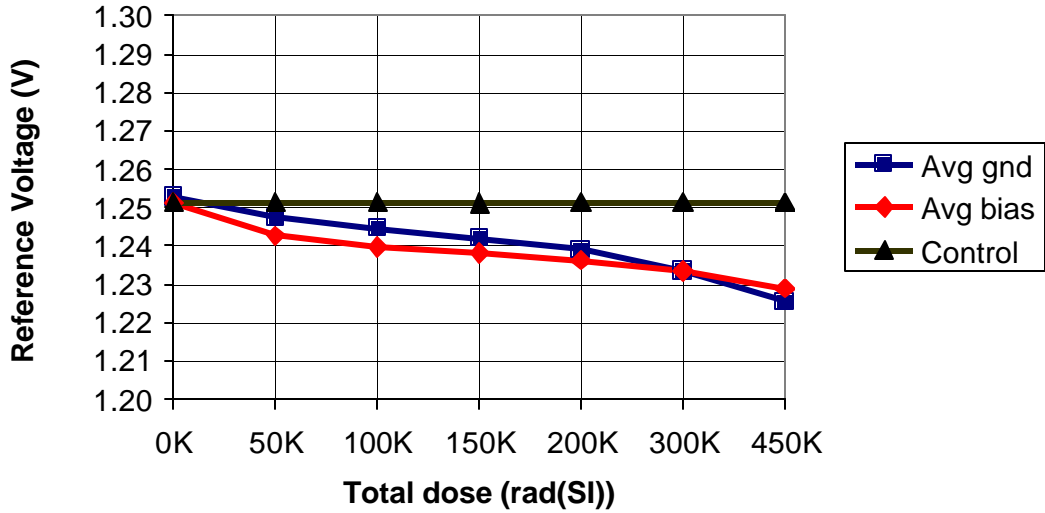
Biased S/N – 0026, 0027, 0028, 0030, 0031

Unbiased S/N – 0032, 0033, 0034, 0039, 0042

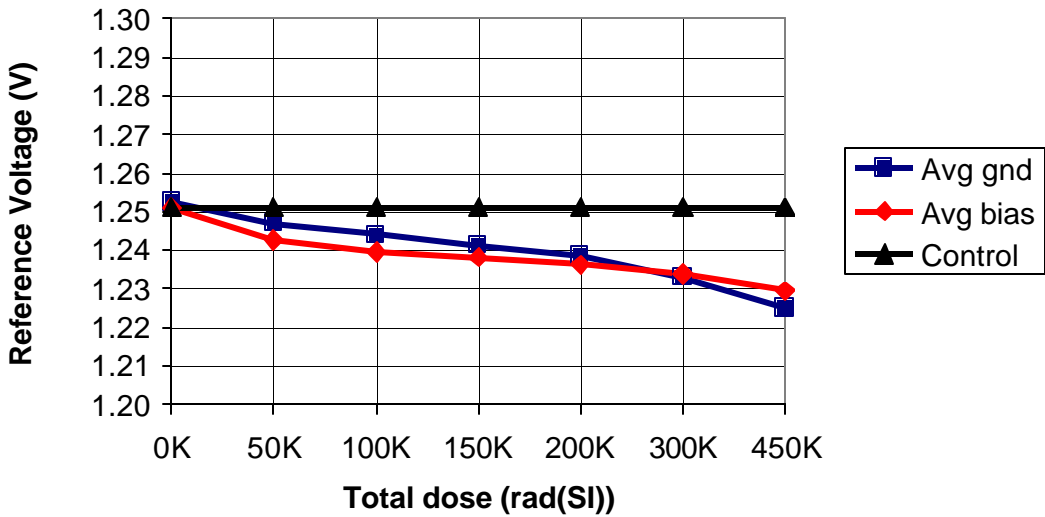
Table 1

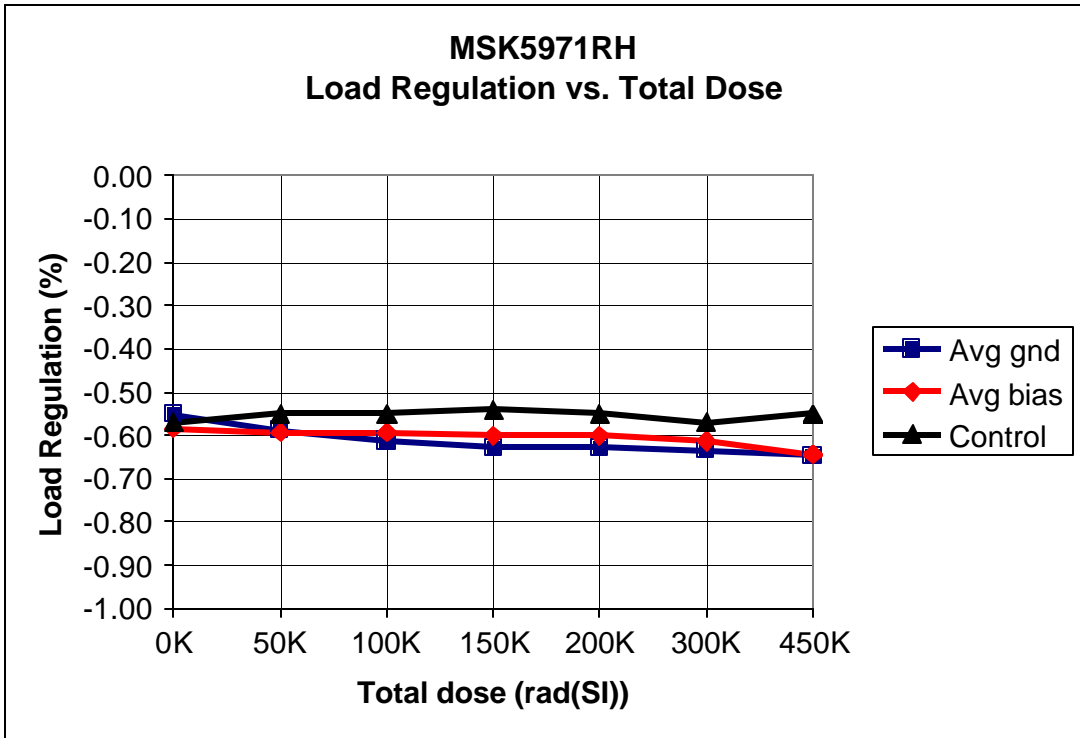
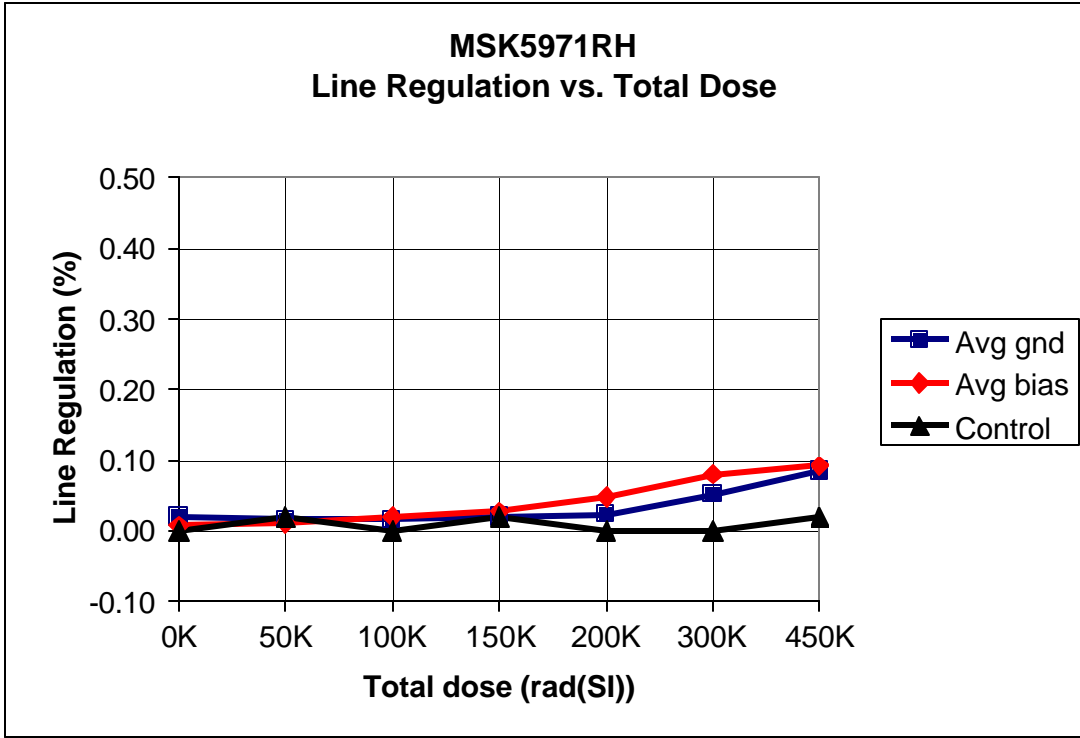
**Dose Time, Incremental Dose and Total Cumulative Dose**

**MSK5971RH**  
**Reference Voltage vs. Total Dose**  
**V<sub>in</sub> - V<sub>out</sub> = 3 Volts**

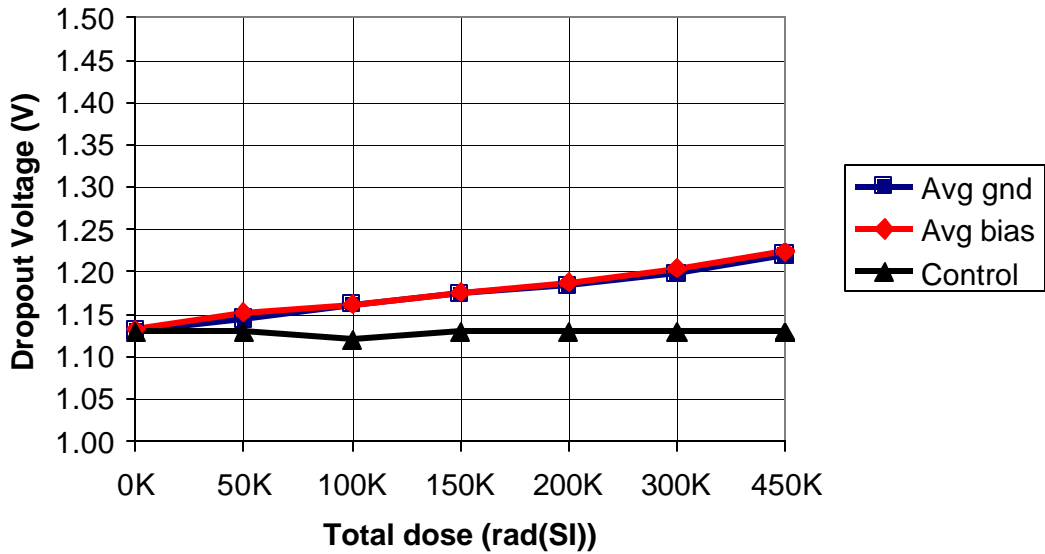


**MSK5971RH**  
**Reference Voltage vs. Total Dose**  
**V<sub>in</sub> - V<sub>out</sub> = 20 Volts**





**MSK5971RH**  
**Dropout Voltage vs. Total Dose**



**MSK5971RH**  
**Output Current Limit vs. Total Dose**

