

Total Dose Radiation Test Report
MSK 5970 RH Series
RAD Hard Positive Voltage Regulator

April 7, 2009
April 28, 2009 (Updated)

B. Erwin
R. Wakeman

M.S. Kennedy Corporation
Liverpool, NY

I. Introduction:

The total dose radiation test plan for the MSK 5970RH 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.

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 5970RH 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 178 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 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 +25 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 with the majority of the shift occurring beyond 100 Krad(Si).

Current Limit also increased by approximately 10 percent at 100 Krad(Si).

MSK 5970 RH Biased/Unbiased Dose Rate Schedule
--

Dosimetry Equipment
Bruker Biospin # 0141

Irradiation Date
4/07/09

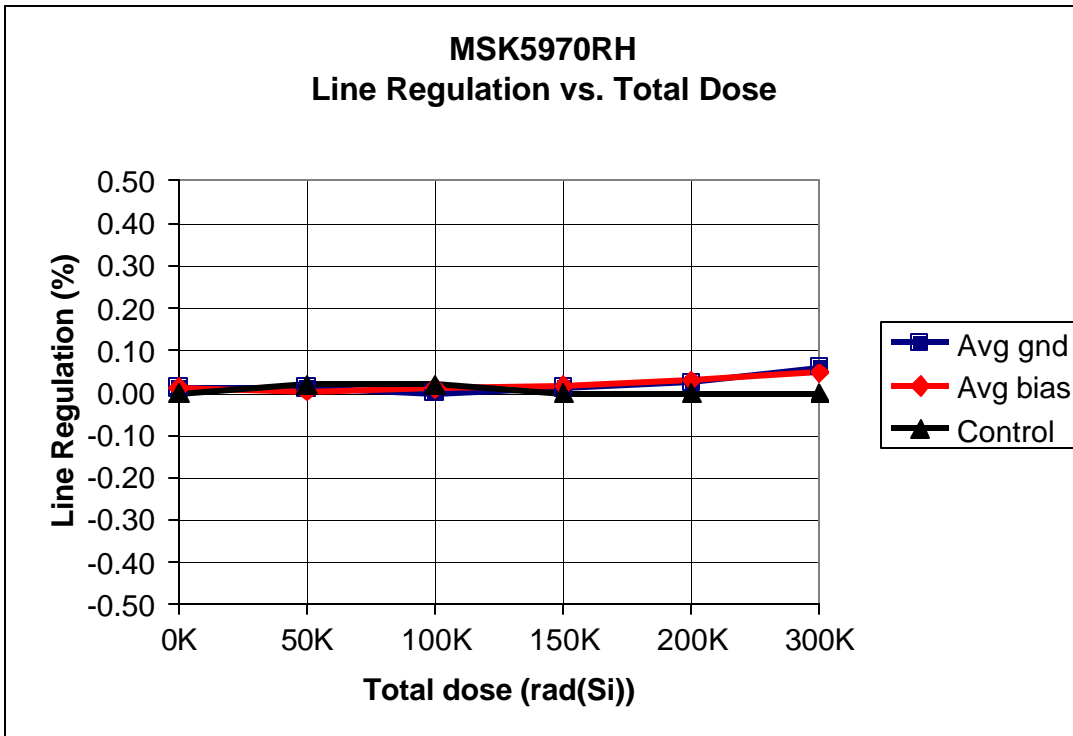
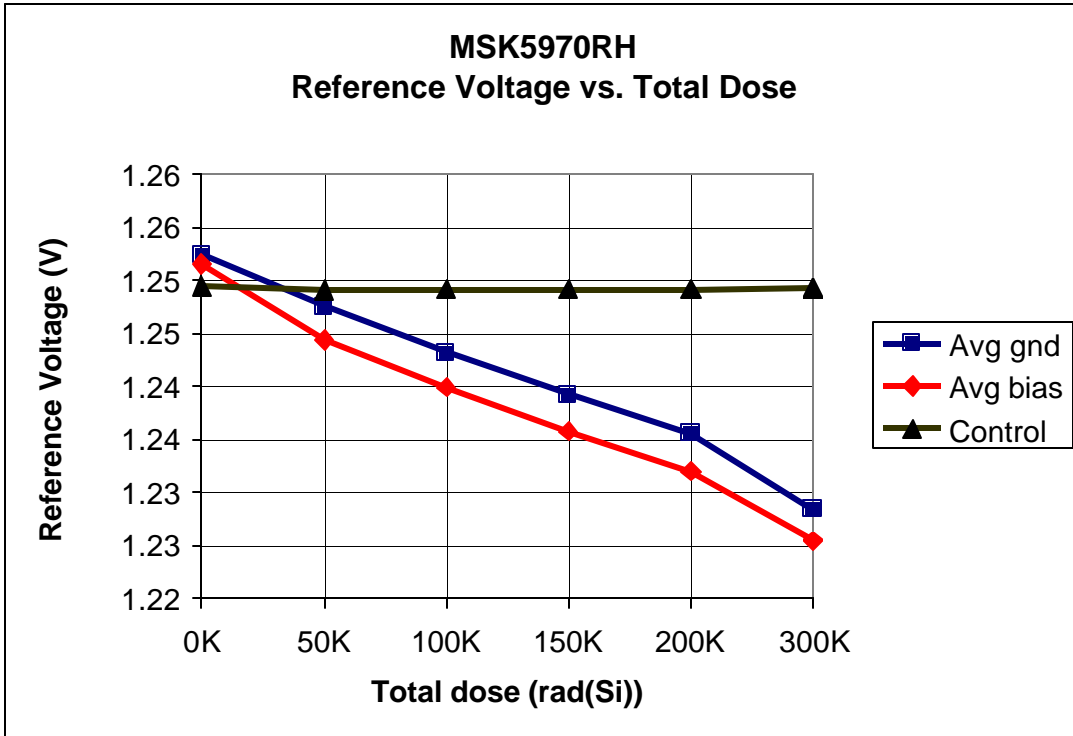
Exposure Length (min:sec)	Incremental Dose rads(Si)	Cumulative Dose rads(Si)
4:49	51,442	51,442
4:49	51,442	102,884
4:49	51,442	154,326
4:49	51,442	205,768
9:20	103,040	308,830
14:00	154,560	463,512

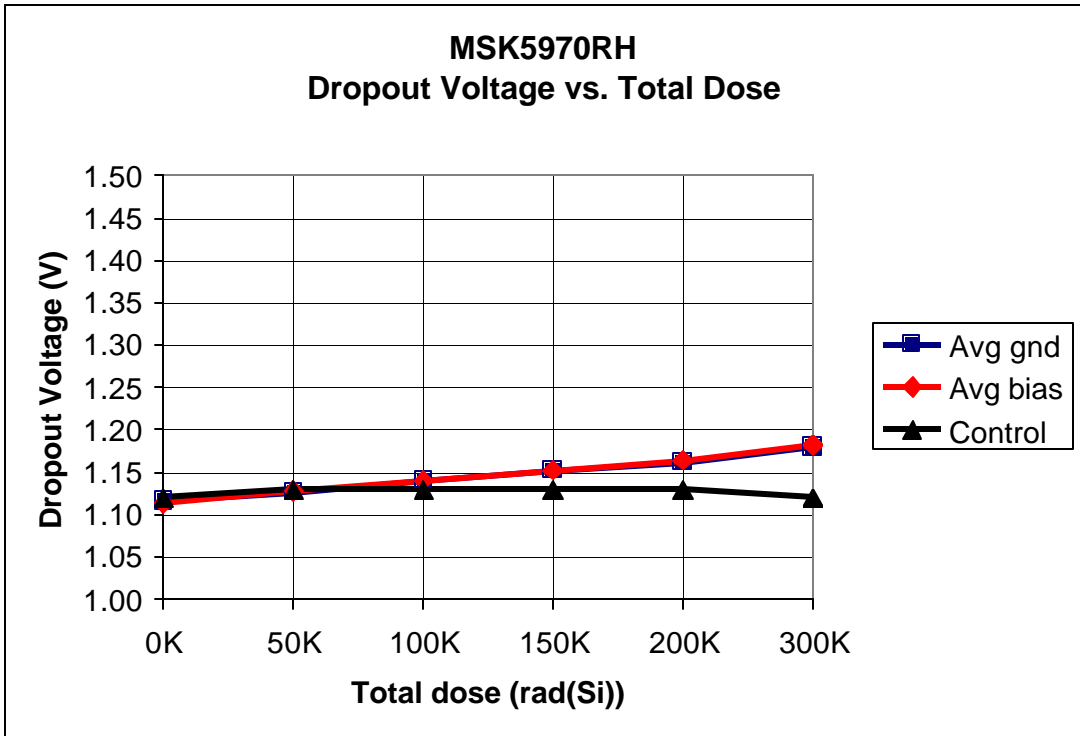
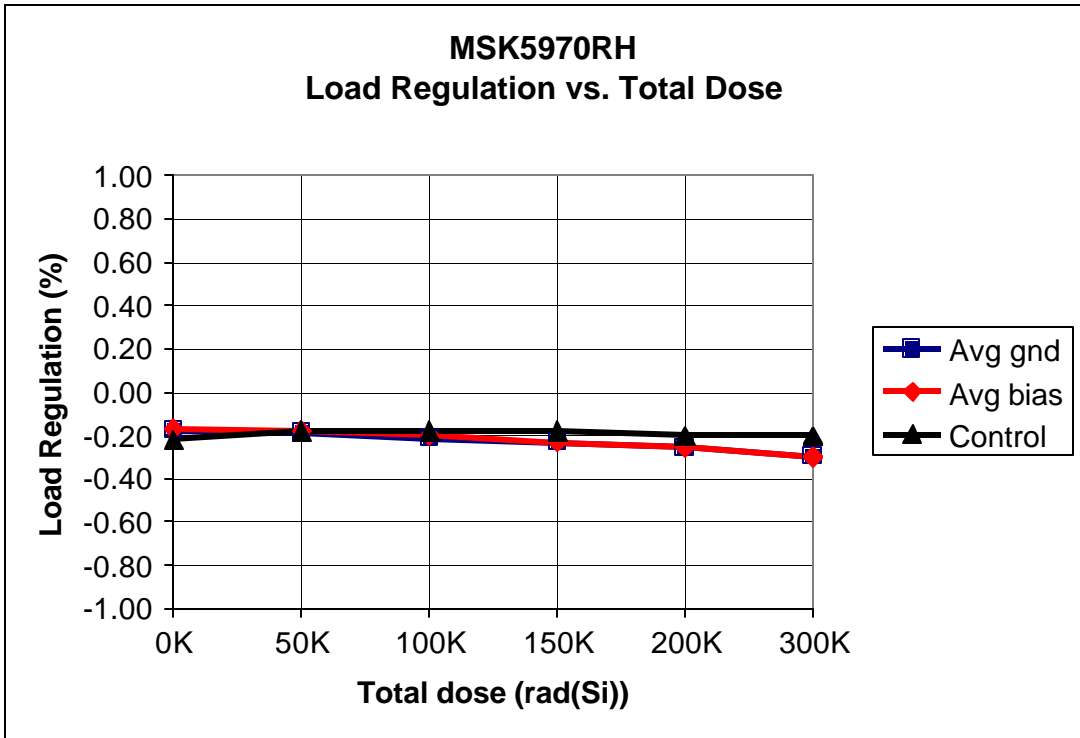
Biased S/N – 0011, 0012, 0013, 0014, 0015

Unbiased S/N – 0017, 0018, 0019, 0020, 0021

Table 1

Dose Time, Incremental Dose and Total Cumulative Dose





MSK5970RH
Output Current Limit vs. Total Dose

