

Total Dose Radiation Test Report
MSK 5046RH
High Efficiency, 5 Amp Switching Regulator

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I. Introduction:

The total dose radiation test plan for the MSK 5046RH was developed to qualify the device as a radiation tolerant device to 300 Krad(Si). The testing was performed up to 450 Krad to show trends in device performance as a function of total dose.

MIL-STD-883 Method 1019.7 and ASTM F1892-98 were used as guidelines in the development and implementation of the total dose test plan for the MSK 5046RH.

II. Radiation Source:

Total dose was performed at the University of Massachusetts, Lowell, using a cobalt 60 radiation source. Alanine dosimetry was performed and the dose rate was determined to be 130 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. Eight 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. Four devices were kept under bias during irradiation. Four devices had all leads grounded during irradiation for the unbiased condition.

After each irradiation the device leads were held electrically common and the devices were transported to the MSK electrical test platform and tested IAW the MSK 5046RH device data sheet Rev H. 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.

IV. Data:

All performance curves are averaged from the test results of the biased and unbiased devices respectively.

V. Summary:

Based on the test data recorded during radiation testing, the MSK 5046RH qualified as a 300 Krad(Si) radiation tolerant device. All test parameters stayed within specification even after 450 Krad(Si) exposure. The current limit function was tested with a 15 mΩ sense resistor and showed the greatest variation. The sense resistor is user selectable allowing the current limit to be adjusted to the application.

An ELDRS test is planned for the future to determine the effects of Low Dose Rate Exposure.

Dosimetry Equipment:
Bruker Biospin #0141

Dose Rate = 130 Rads(Si)/Sec

Testing Performed:
11/28/2006

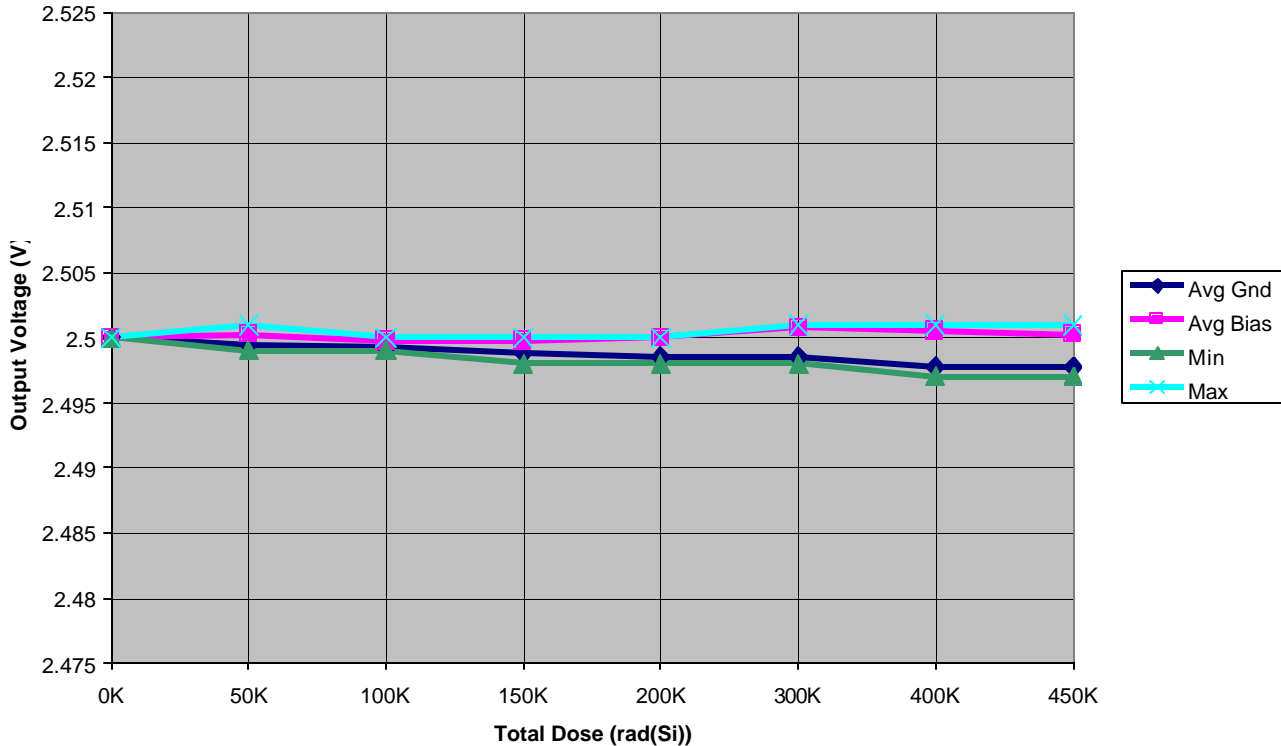
DEVICE DATE CODE 0644

Board Identification MSK 5046-2.5 GND		
Exposure Length (min:sec)	Incremental Dose Rads(Si)	Cumulative Dose Rads(Si)
0:06:36	51,480	51,480
0:06:36	51,480	102,960
0:06:36	51,480	154,440
0:06:36	51,480	205,920
0:13:12	102,960	308,880
0:13:12	102,960	411,840
0:06:36	51,480	463,320
0:06:36	51,480	514,800
SERIAL NUMBERS: 0023, 0024, 0025, 0026		

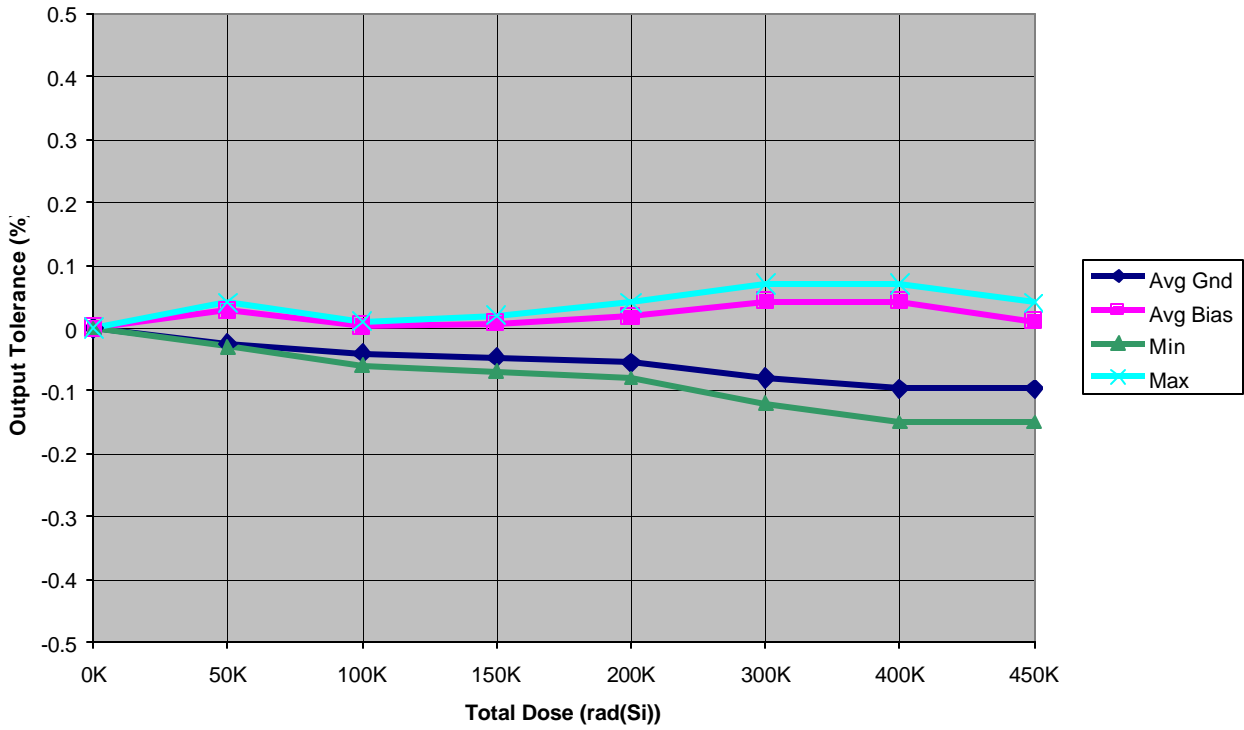
Board Identification 5046-2.5 BIAS		
Exposure Length (min:sec)	Incremental Dose Rads(Si)	Cumulative Dose Rads(Si)
0:06:36	51,480	51,480
0:06:36	51,480	102,960
0:06:36	51,480	154,440
0:06:36	51,480	205,920
0:13:12	102,960	308,880
0:13:12	102,960	411,840
0:06:36	51,480	463,320
0:06:36	51,480	514,800
SERIAL NUMBERS: 0028, 0029, 0031, 0032		

Table I
Dose Time, Incremental Dose and Total Cumulative Dose

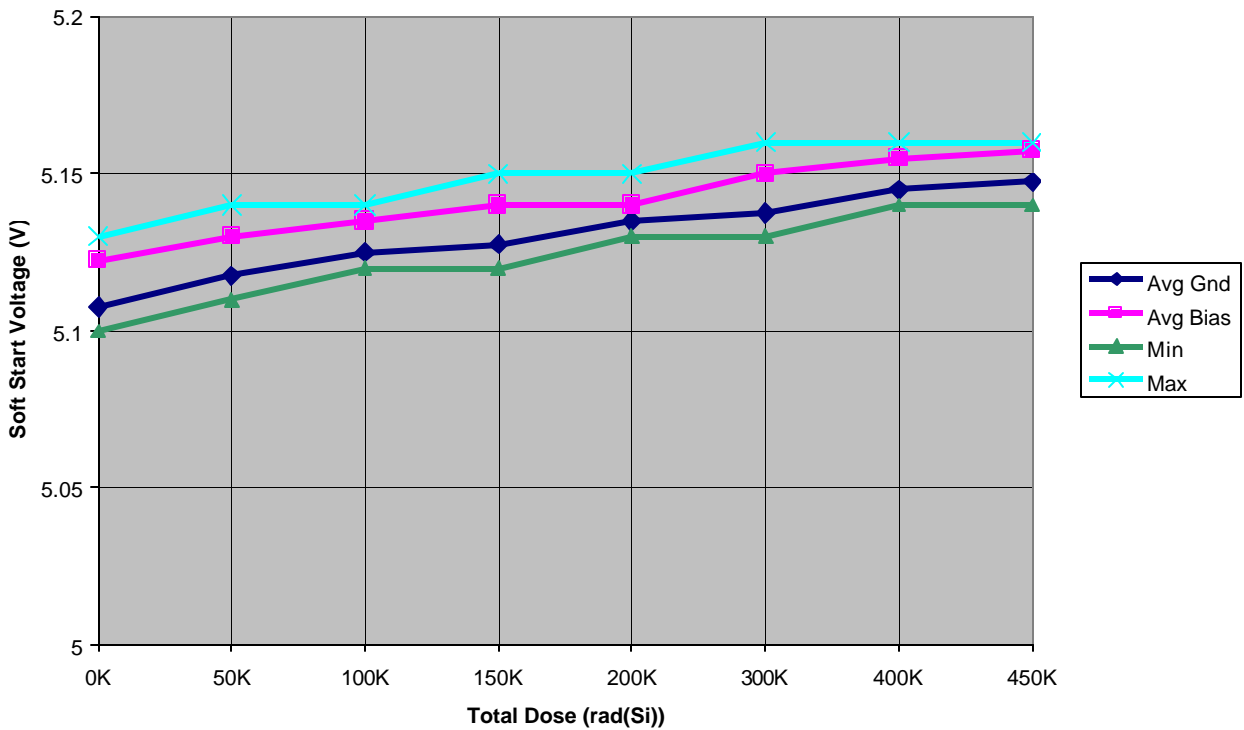
MSK5046-2.5KRH Normalized Output Voltage vs. Total Dose
Vin = Vbias = 12V, Iout = 4A



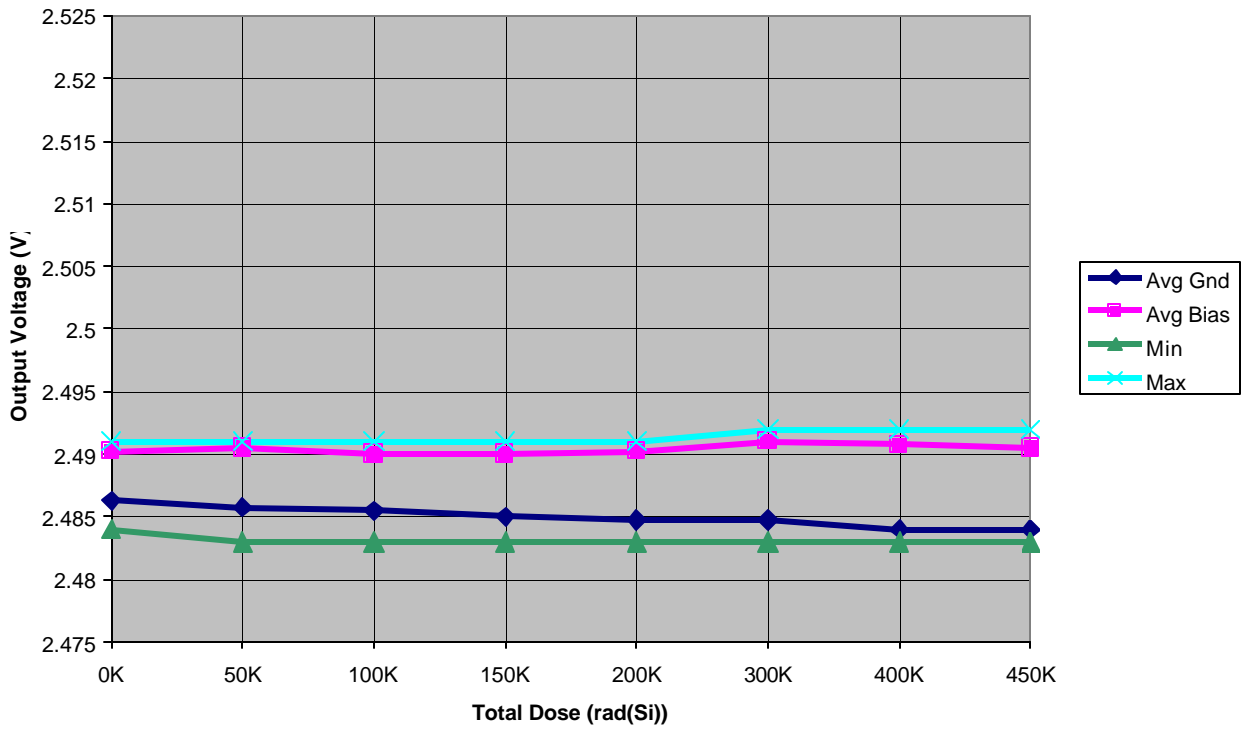
MSK5046-2.5KRH Normalized Output Voltage Tolerance vs. Total Dose
 Vin = Vbias = 12V, Iout = 4A



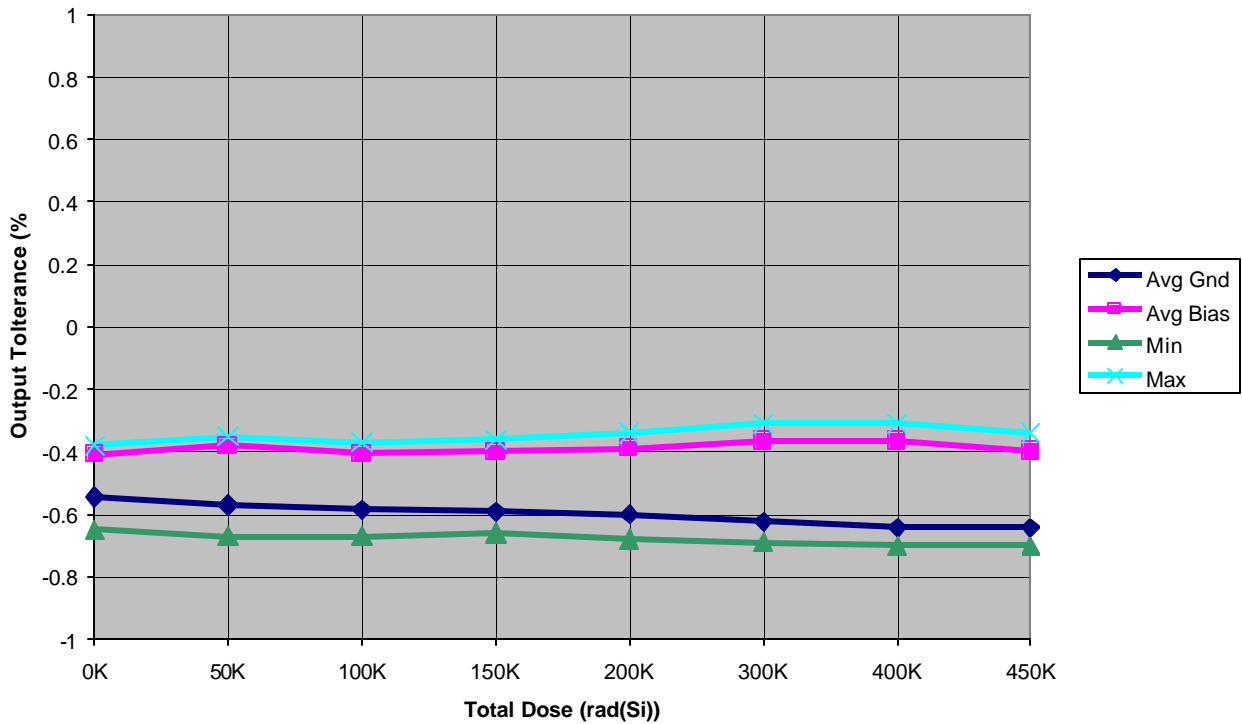
MSK5046-2.5KRH Soft Start Voltage vs. Total Dose
 Vin = Vbias = 12V, Iout = 4A



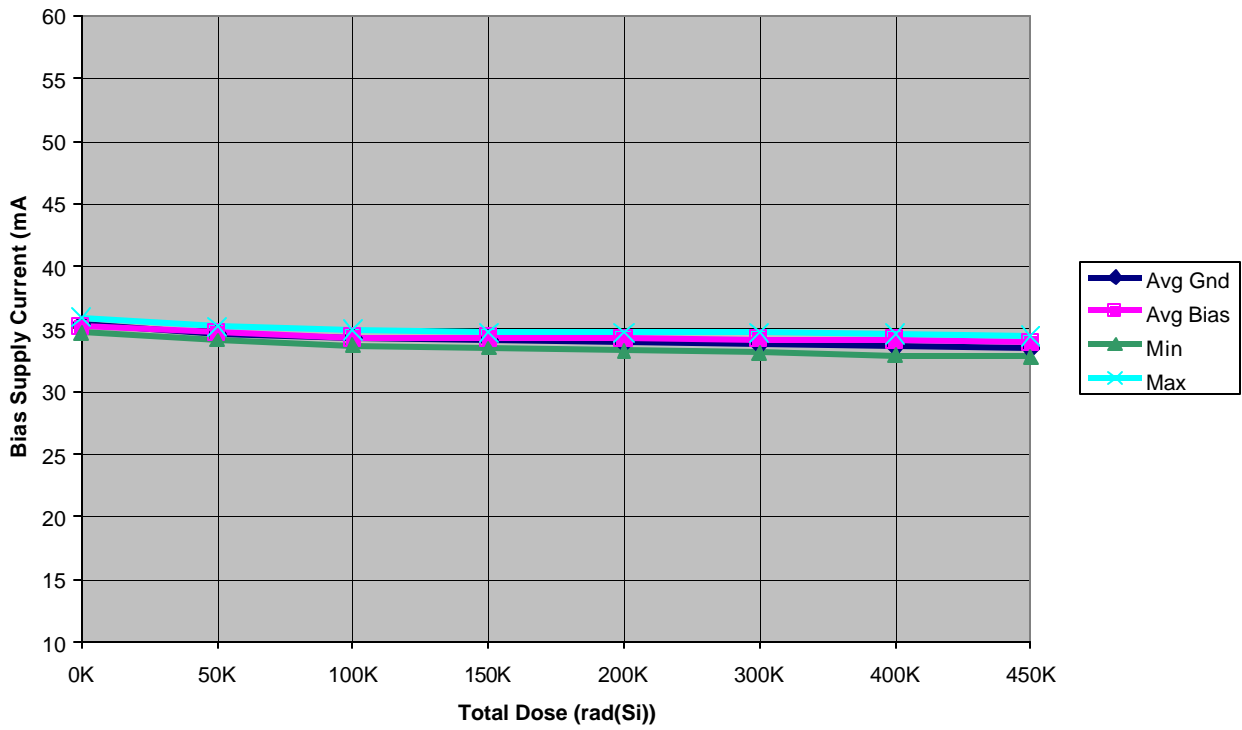
MSK5046-2.5KRH Output Voltage vs. Total Dose
 Vin = Vbias = 12V, Iout = 4A



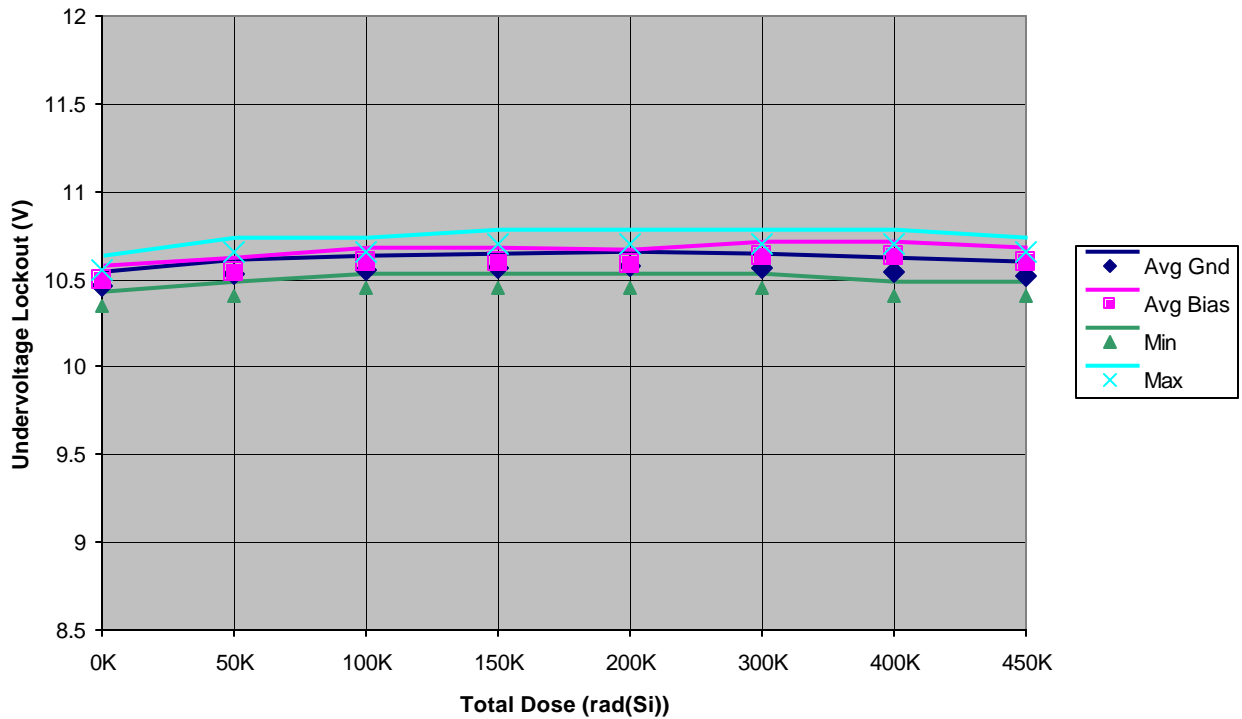
MSK5046-2.5KRH Output Voltage Tolerance vs. Total Dose
 Vin = Vbias = 12V, Iout = 4A



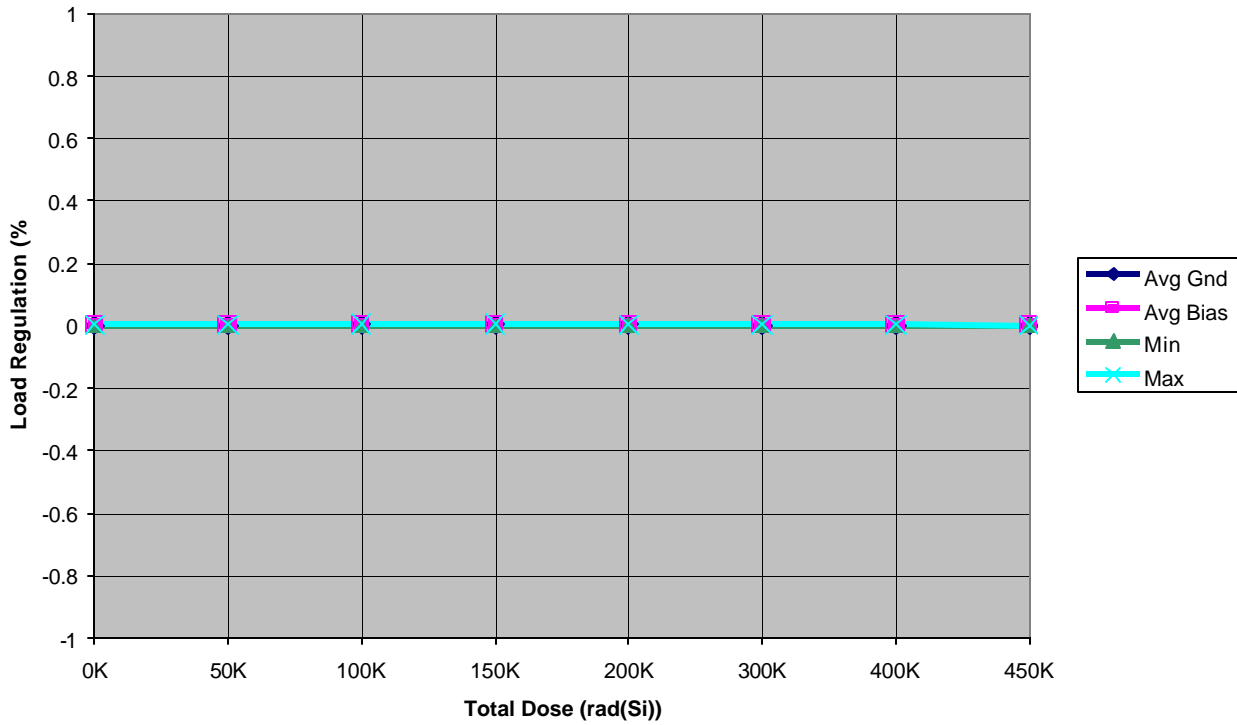
MSK5046-2.5KRH Bias Supply Current vs. Total Dose
Vin = Vbias = 12V, Iout = 4A



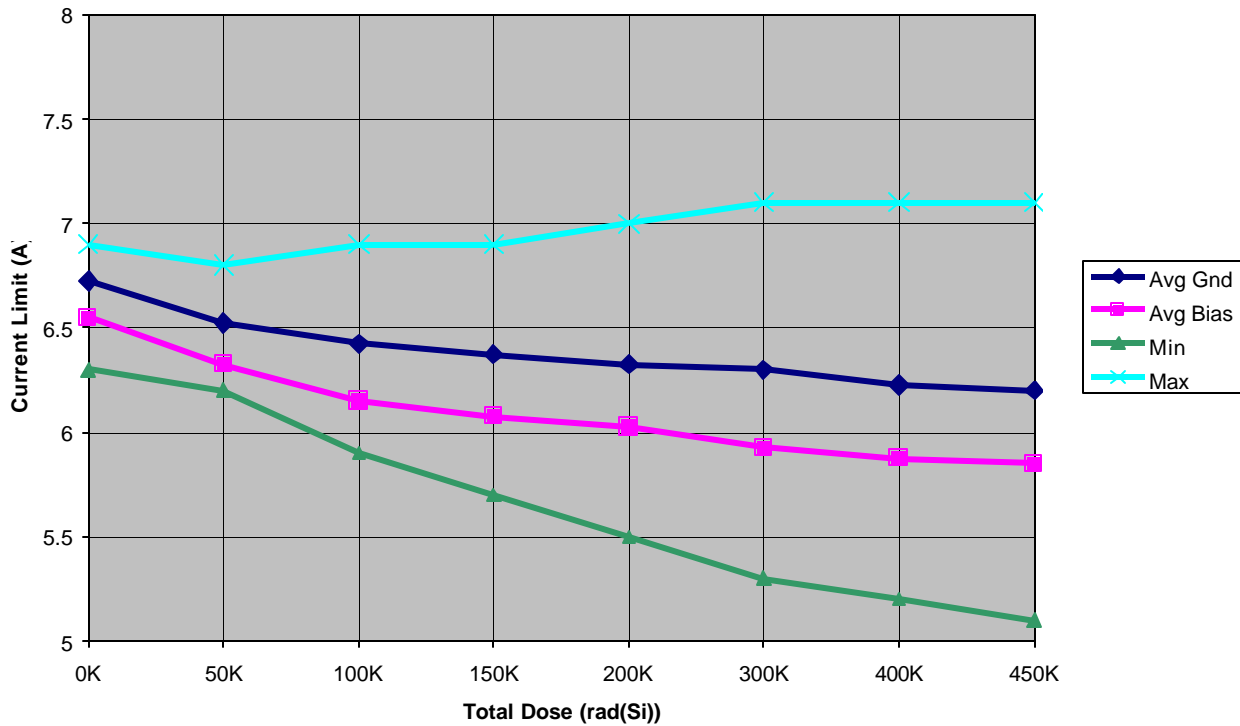
MSK5046-2.5KRH Undervoltage Lockout (Vbias) vs. Total Dose
Vin = 12V, Iout = 4A



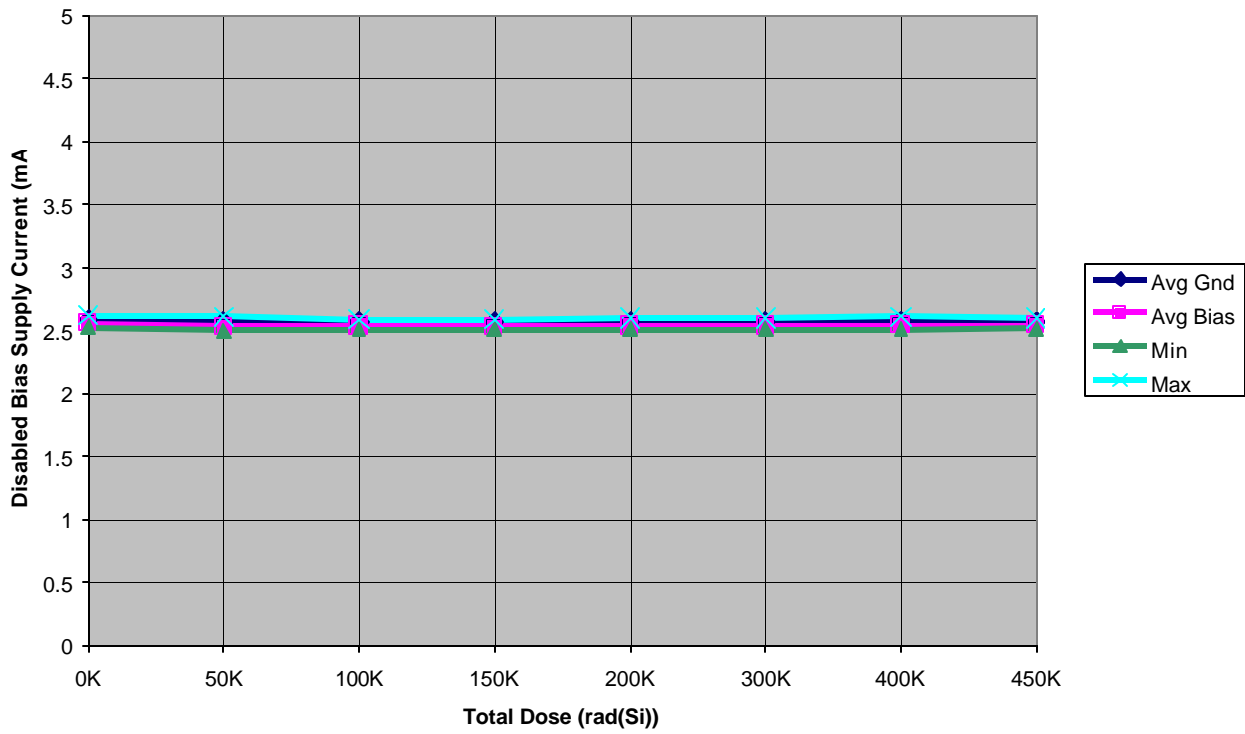
MSK5046-2.5KRH Load Regulation vs. Total Dose
 Vin = Vbias = 12V, Iout Step = 0.5A to 4.0A



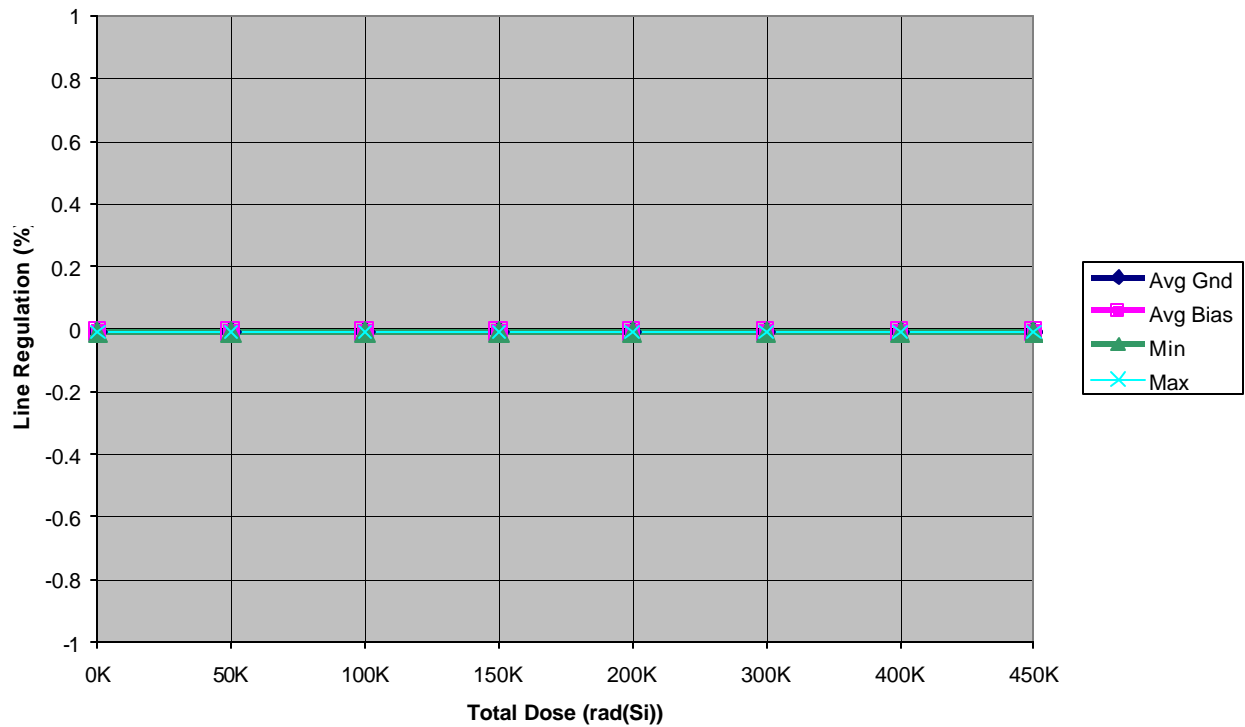
MSK5046-2.5KRH Output Current Limit vs. Total Dose
 Vin = Vbias = 12V, Rsense = 0.015 ohm



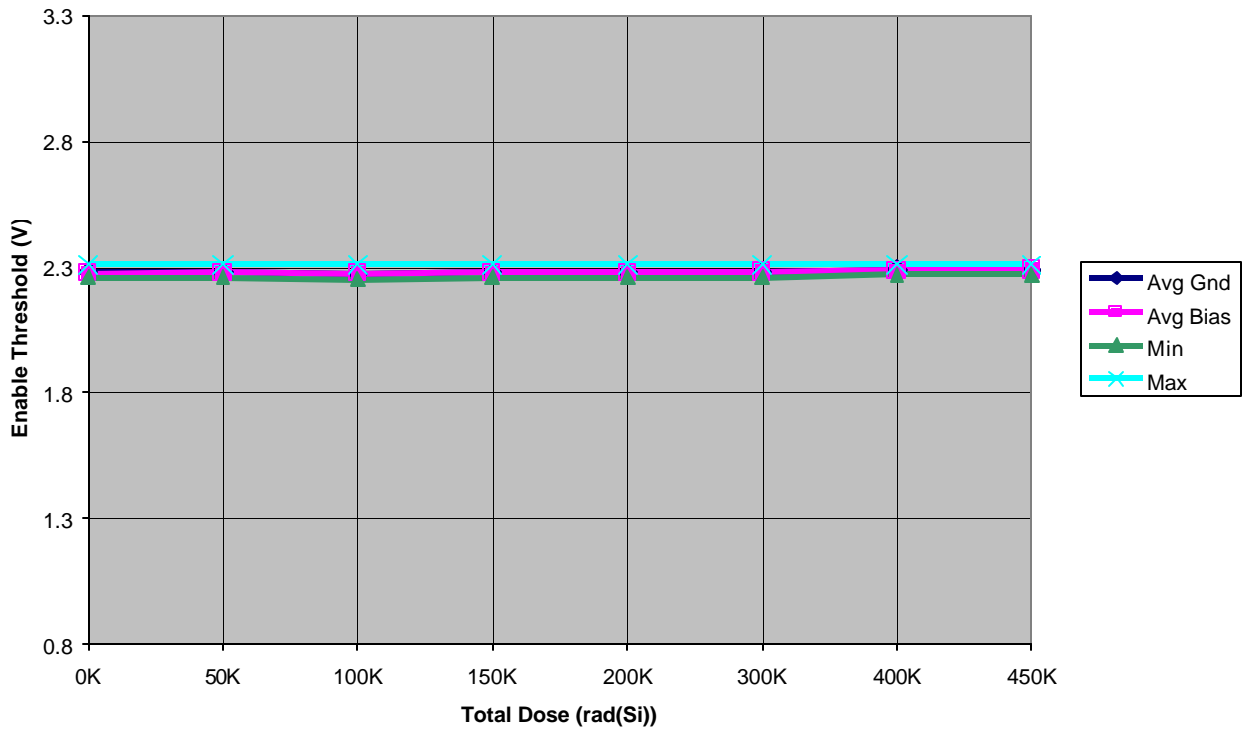
MSK5046-2.5KRH Disabled Bias Supply Current vs. Total Dose
Vin = Vbias = 12V, Enable = 0V



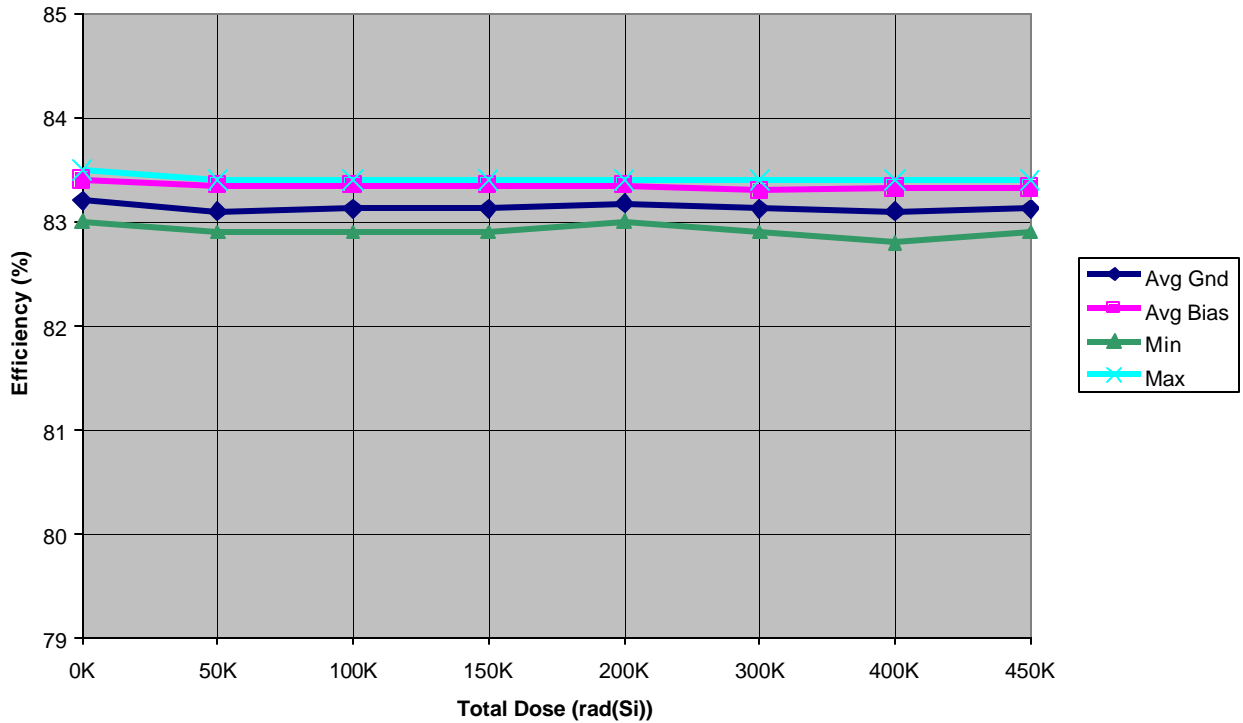
MSK5046-2.5KRH Line Regulation vs. Total Dose
Vin = Vbias = 12V, Iout = 4.0A, Line Step = 6V to 18V



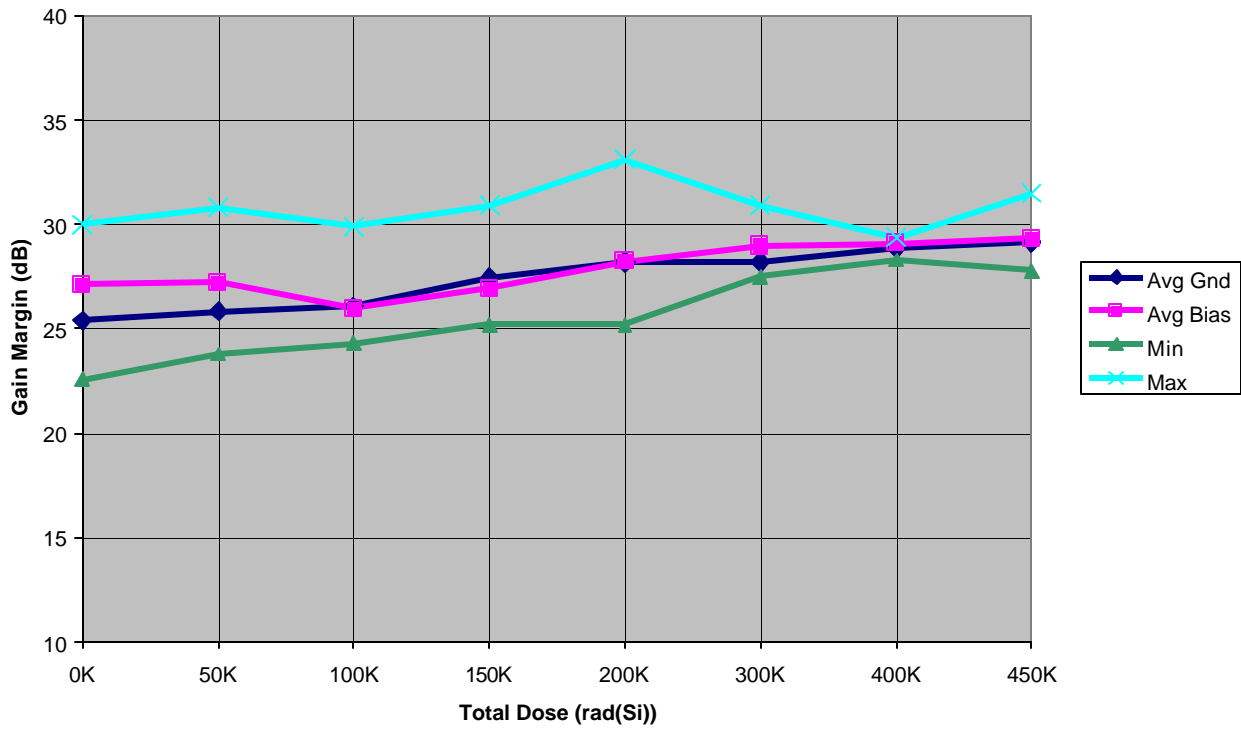
MSK5046-2.5KRH Enable Threshold vs. Total Dose
Vin = Vbias = 12V, Iout = 4A



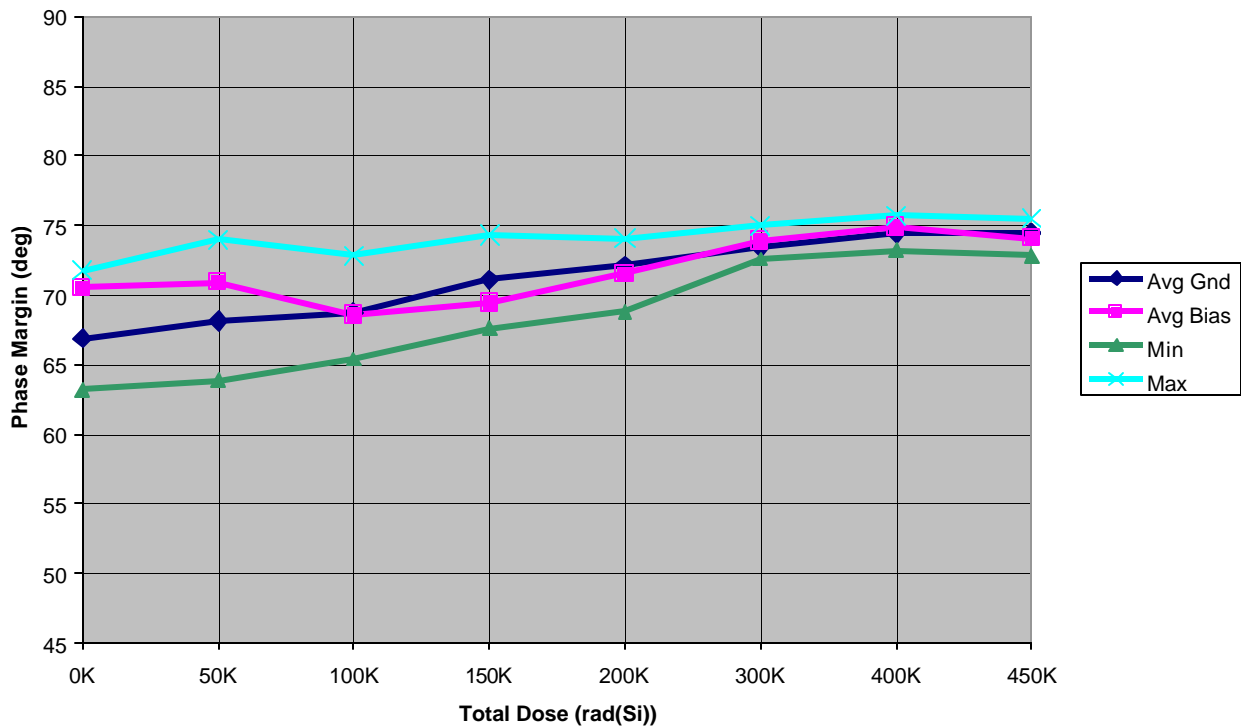
MSK5046-2.5 KRH Efficiency vs. Total Dose
Vin = 5.0V, Vbias = 12V, Iout = 3A



MSK5046-2.5KRH Gain Margin vs. Total Dose
 Vin = Vbias = 12V, Iout = 4A



MSK5046-2.5KRH Phase Margin vs. Total Dose
 Vin = Vbias = 12V, Iout = 4A



MSK5046-2.5KRH Oscillator Frequency vs. Total Dose
Vin = Vbias = 12V, Iout = 4A

