

Single Event Effects Test Report

G4, 550V, N, SEE

June 2001 - B.N.L.

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INTRODUCTION

On May 2, 2001, International Rectifier Corp. (IR) tested several product types for Single Event Effects (SEE) hardness. The irradiation was performed at Brookhaven National Laboratory, using the Tandem Van de Graaff (TVDG) generator. Three ion species were used to characterize and verify the SEE hardness of each product type. The product types submitted for evaluation are included in Table 1 below:

Table 1 Product Types Tested

| Product Type | BVDSS Rating | Gen. / Channel / Process | Wafer Lot |
|---------------------|---------------------|---------------------------------|--------------------------|
| IR7434SE | 550 Volts | G4 / N / SEE | EER413993C EER412990C |

The wafer lot noted above is the lot from which the test samples originated. For each product type, the results of testing herein are applicable to all other wafer lots having the same design and process.

Additionally, Mr. Louis Jaquish of Defense Supply Center Columbus (DSCC-VQE) has performed an audit of IR for the purpose of assigning lab suitability and has granted IR a *Letter of Lab Suitability for Test Method 1080* in June 1998.

TEST METHOD

The test method used as a guide in developing the test plan is MIL-STD-750, Test Method 1080. The test method establishes the basic requirements for the performance of the test. Additionally, DSCC has established a minimum acceptance level of three (3) devices for each insitu bias condition. Test method 1080, in conjunction with DSCC requirements, was utilized to write the test plan.

TEST PLAN and PROCEDURE

The test plan is included in Appendix D. In summary, the testing occurred in the following manner: All devices / test samples were built in TO-3 packages. The lid was removed from each test sample at the test site or the samples were produced without the lid. Up to 18 test samples were loaded onto the test board and placed into the beam line, under high vacuum conditions. The desired test sample was positioned into the beam line, and when ready the beam shutter was removed beginning the irradiation of the test sample. Once the desired fluence was achieved the beam was automatically shuttered and the bias removed. The biasing equipment then subjected the test sample's gate to a 20V gate stress.

TEST FACILITY

The Tandem Van de Graaff (TVDG) generator is equipped with the necessary dosimetry to ensure the ion beam is meeting the customer expectation. A printout of the runs, included in Appendix B, also includes the beam parameters, i.e., LET, energy, Range, etc., for each run. Table 2 summarizes the beam criteria for the 2 ion species utilized.

Table 2. Ion Beam Criteria

| Ion | LET MeV/(mg/cm ²) | Energy MeV | Range μm |
|------------|---|----------------------|--------------------|
| Br | 37.8 | 250 | 32.7 |
| I | 59.9 | 333 | 31.9 |

The fluence and flux specified for this test was 5E3 ions/cm² and 1E5 ions/cm²/sec, respectively. The beam diameter was set to 1.5 cm. The angle of incidence was set to zero (normal to the die surface). For Angular Dependence Study, the fluence and flux was 1E3 ions/cm² and 1E5 ions ions/cm²/sec respectively. The effective LET and range are calculated accordingly based on the set angle.

RESULTS

The insitu bias conditions, where 0 failures occurred for each product type, are shown in Table 3. These results are shown graphically in Figure 1 as a plot of the Safe Operation Area (SOA). Each point on the graph, or insitu bias condition, has been verified by irradiating and subsequent electrical testing of a minimum of 3 devices, with no valid failures allowed. The devices were returned to IR and tested using production ATE. The results of the test were inspected and matched to the notes taken during the test, see Appendix F. The post-irradiation data correlates with the expected test results.

It should be noted that acceptance is assumed for product types operating at conditions below those tested herein. For example the IRH7434SE was not tested under VGS bias conditions of 0V with the Br ion. The test engineer made a calculated risk assessment based on SEE Process History and chose to begin characterization and verification at VGS = -5V. The acceptance at the -5V was then extended to the lower VGS bias voltages. Furthermore the extension of more stressful conditions to less stressful conditions shall also apply to the LET conditions of the various ion species. For example successful operation using the Au ion (LET of 82.3 MeV/(mg/cm²)) shall also imply that the Br or I or any other ion with a LET < 82.3, shall also be acceptable and not require verification.

The different runs and respective test conditions are all tabulated in Appendices A and B. Table 4 may be used as an index to identify which runs apply to a specific product type with a specific ion. Unlisted Runs are not related to this report.

Table 3 Device Insitu Bias Conditions (VDS vs. VGS) with Ion Species

| Device Type / Part Number | Ion | VGS=0V | VGS=-5V | VGS= -10V | VGS= -15V | VGS= -20V |
|--------------------------------|-----|-----------|---------|-----------|-----------|-----------|
| IRH7434SE (550 Volts, N-ch) | Br | Qualified | 550 V | 550 V | 550 V | 550 V |
| | I | 250 V | 250 V | 225 V | | |

Note: “Qualified” indicates part is qualified by extension of insitu bias testing at higher VGS level. See [Concluding Tutorial](#) for more details.

Table 4 Run Number Index

| Device Type / Part Number | Wafer Lot Number | Ion Specie | Run Date | Run Number | Batch Number |
|--------------------------------|--------------------------|------------|----------|--------------|--------------------|
| IRH7434SE (550 Volts, N-ch) | EER413993C EER412990C | Br | 5/2/01 | 1 thru 47 | Normal (0° Angle) |
| | | | 5/2/01 | 48 thru 175 | Angular Dependence |
| | | I | 5/2/01 | 176 thru 195 | Normal (0° Angle) |
| | | | 5/2/01 | 196 thru 316 | Angular Dependence |

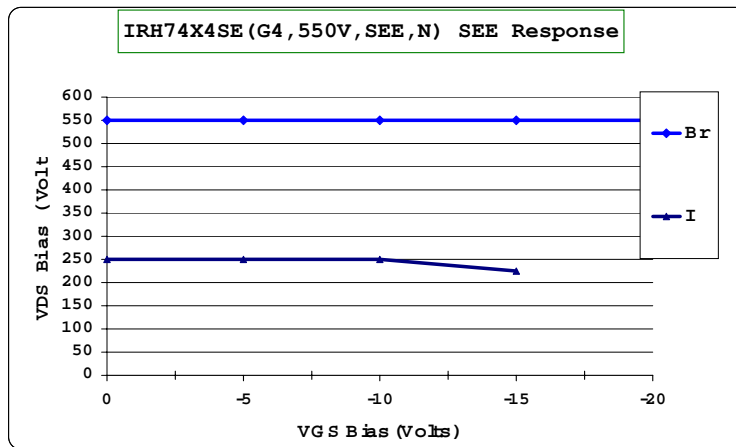
Table 5 Device Angular Response

| Device Type / Part Number | Ion | Bias | Cross Section | | | | | | | |
|--------------------------------|-----|--------------------------|---------------|------------|------------|------------|------------|------------|------------|------------|
| | | | Angle | 0° | 10° | 15° | 20° | 30° | 40° | 45° |
| IRH7434SE (550 Volts, N-ch) | Br | VAS = -5V VDS = 550 V | Angle | 0° | 10° | 15° | 20° | 30° | 40° | 45° |
| | | | Cross Section | 0.000 E+00 | 0.000 E+00 | 1.593 E-06 | 0.000 E+00 | 4.514 E-06 | 3.610 E-05 | 1.921 E-05 |
| | I | VAS = -5V VDS = 550 V | Angle | 20° | 25° | 30° | 35° | 40° | 45° | |
| | | | Cross Section | 1.281E -05 | 0.000E +00 | 0.000E +00 | 0.000E +00 | 0.000E +00 | 0.000E +00 | |

Figure 1 Device Safe Operating Area

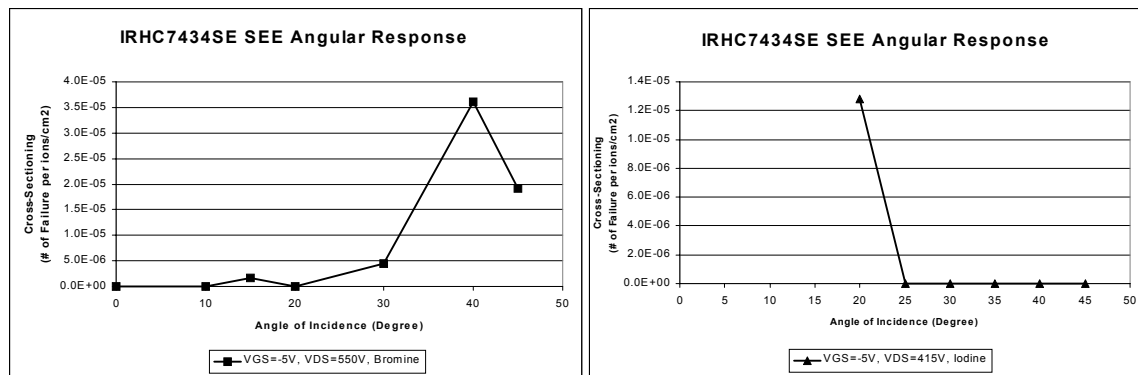
IRH74X4SE

| VGS Bias (Volts) | VDS Bias (Volts) | |
|------------------|------------------|-----|
| | Br | I |
| 0 | 550 | 250 |
| -5 | 550 | 250 |
| -10 | 550 | 250 |
| -15 | 550 | 225 |
| -20 | 550 | 550 |



Note: X in Part Number is for Die Size

Figure 2 Device Angular Response



CONCLUSION

For two lots tested in a row, the new G4 N-Channel device type IRH_7434SE has demonstrated superior SEE performance. This device type is SEE hard with Bromine Ion at 100% rated VDS (550V) and -20V VGS applied, exceeding customer's requirement of 550 VDS and -5V VGS for this LET=38MeV/(mg/cm²).

This device type is also SEE-Hard capable with Iodine Ion at 250V VDS and -10V VGS.

The results of SEE Angular Response of this device type are also posted for customer's usage in determination of In-Orbit Failure rate.

CONCLUDING TUTORIAL

The following is presented to help the reader understand the basis on which SEE Testing is extended to the other part numbers.

Extending Single Event Effects Testing

International Rectifier has designed Single Event Effects (SEE) experiments to maximize facility usage using four, industry accepted, assumptions as follows:

- I. Test results for one die size are representative of other die sizes, if the process and design rules are not changed. In other words the scaling of die size has no effect if all other variables are held constant. Please note that for a given voltage and technology, there are no differences in design and process for the various sizes of IR's radiation hardened MOSFET die, thus the assumption is valid. In reality, IR will always test the largest available die size. We consider this a worst-case scenario. The industry standard for acceptance of a given in-situ bias condition, is the acceptable performance of three or more devices at the specified conditions. Presently a supplier could achieve this standard with size 1 die thru size 6 die. We believe that use of the smaller die reduces the probability of failure, and thus reduces the chance of a SEE problem being discovered. The size 1 die are about one-fourth the size of the size 6 die. Thus successfully testing three size 6 die is roughly equivalent to testing 12 size 1 die. This results in a savings of valuable test time at the SEE test facility, without degrading the final test result.
- II. Acceptable test results taken at given VGS and VDS conditions are applicable to lower VGS and VDS conditions. In other words an acceptable test result (≥ 3 devices passing) at VGS = -5V and VDS = 550V, would also apply to VGS = 0V at the same or lower VDS condition. In several cases parts have been tested at the worst-case in-situ bias condition of VGS = -20V and VDS = max rated BVDSS. With acceptable test results, the safe operation area, has been extended from VGS = 0 to -20V and VDS from 0 to the max rating. It is not necessary to verify every point below the accepted in-situ bias conditions. Again this saves valuable experiment time.
- III. Acceptable test results taken with a given LET, would also apply at other lower LETs. It is generally accepted that successful test results with Iodine, for example, implies the device would be hard against Bromine, Krypton, Nickel, etc., ion species with a lower LET. It is not necessary to test at each lower LET, again saving valuable test time.
- IV. The package used has no effect on the SEE hardness of a die. The die are characterized fully exposed to the ion beam. In other words the lid of the package is removed making the die visible. This removes the package as a variable when comparing test results. As a rule IR uses the common TO3 package for mounting die for SEE tests.

Each of the assumptions above is generally accepted within the industry. IR has verified their validity over the last several years and makes appropriate use of them to maximize the benefit for our customers.

Appendix A

Log Sheets

(SEE Run Data)

International Rectifier Corp.
 SEE Test Report
 June 2001 - B.N.L.

| Run # | Ion | LET MeV.cm ² /mg | Energy MeV | Range μm | Flux #/cm ² /sec | Fluence #/cm ² | Angle deg | BeamDia. cm. | Device Type | S/N | Socket # | VGS Volts | VDS Volts | Pass/Fail Blank=Pass |
|---------------------------|-------|--------------------------------|---------------|-------------|--------------------------------|------------------------------|--------------|-----------------|----------------|-----|-------------|--------------|--------------|-------------------------|
| 550V, N to Bromine | | | | | | | | | | | | | | |
| 1 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A1 | 1 | 0 | 500 | |
| 2 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A1 | 1 | 0 | 525 | |
| 3 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A1 | 1 | 0 | 550 | |
| 4 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A1 | 1 | -5 | 500 | |
| 5 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A1 | 1 | -5 | 525 | |
| 6 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A1 | 1 | -5 | 550 | |
| 7 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A2 | 2 | -5 | 550 | |
| 8 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A3 | 4 | -5 | 550 | * |
| 9 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A4 | 5 | -10 | 475 | |
| 10 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A4 | 5 | -10 | 500 | |
| 11 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A4 | 5 | -10 | 525 | |
| 12 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A4 | 5 | -10 | 550 | * |
| 13 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A5 | 6 | -10 | 500 | |
| 14 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A5 | 6 | -10 | 525 | |
| 15 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A5 | 6 | -10 | 550 | * |
| 16 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A6 | 7 | -10 | 525 | |
| 17 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A6 | 7 | -10 | 550 | * |
| 18 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A7 | 8 | -15 | 475 | |
| 19 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A7 | 8 | -15 | 500 | |
| 20 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A7 | 8 | -15 | 525 | |
| 21 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A7 | 8 | -15 | 550 | * |
| 22 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A8 | 9 | -15 | 500 | |
| 23 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A8 | 9 | -15 | 525 | |
| 24 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A8 | 9 | -15 | 550 | * |
| 25 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A9 | 10 | -15 | 525 | |
| 26 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A9 | 10 | -15 | 550 | * |
| 27 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A10 | 11 | -20 | 475 | |
| 28 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A10 | 11 | -20 | 500 | |
| 29 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A10 | 11 | -20 | 525 | |
| 30 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A10 | 11 | -20 | 550 | * |
| 31 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A11 | 12 | -20 | 500 | |
| 32 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A11 | 12 | -20 | 525 | |
| 33 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A11 | 12 | -20 | 550 | * |
| 34 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A12 | 13 | -20 | 500 | |
| 36 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A12 | 13 | -20 | 550 | * |

Invalid data

International Rectifier Corp.
 SEE Test Report
 June 2001 - B.N.L.

| Run # | Ion | LET MeV.cm ² /mg | Energy MeV | Range µm | Flux #/cm ² /sec | Fluence #/cm ² | Angle deg | BeamDia. cm. | Device Type | S/N | Socket # | VGS Volts | VDS Volts | Pass/Fail Blank=Pass |
|---|-------|--------------------------------|---------------|-------------|--------------------------------|------------------------------|--------------|-----------------|----------------|-----|-------------|--------------|--------------|-------------------------|
| 550V, N to Bromine | | | | | | | | | | | | | | |
| 37 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A12 | 13 | -20 | 500 | |
| 39 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A13 | 14 | -20 | 500 | |
| 40 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A13 | 14 | -20 | 525 | |
| 41 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A14 | 15 | -20 | 550 | |
| 42 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A12 | 13 | -20 | 550 | |
| 43 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A13 | 14 | -20 | 550 | |
| 44 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A2 | 2 | -5 | 500 | |
| 45 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A2 | 2 | -5 | 525 | |
| 46 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A3 | 4 | -5 | 500 | |
| 47 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A3 | 4 | -5 | 525 | |
| 550V, N to Bromine, Angular Dependence | | | | | | | | | | | | | | |
| 48 | Br-81 | 39.19 | 250 | 31.6 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A15 | 16 | -5 | 550 | |
| 49 | Br-81 | 43.71 | 250 | 28.3 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A15 | 16 | -5 | 550 | |
| 50 | Br-81 | 53.54 | 250 | 23.1 | 1.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A15 | 16 | -5 | 550 | 8.274 E4 Failed |
| 51 | Br-81 | 39.19 | 250 | 31.6 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A16 | 17 | -5 | 550 | 3.146 E4 Failed |
| 52 | Br-81 | 43.71 | 250 | 31.6 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A17 | 18 | -5 | 550 | |
| 53 | Br-81 | 43.71 | 250 | 31.6 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A17 | 18 | -5 | 550 | |
| 54 | Br-81 | 43.71 | 250 | 31.6 | 1.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A17 | 18 | -5 | 550 | |
| 55 | Br-81 | 43.71 | 250 | 31.6 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A18 | 1 | -5 | 550 | Failed 2.379 E4 |
| 56 | Br-81 | 43.71 | 250 | 31.6 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A19 | 2 | -5 | 550 | |
| 57 | Br-81 | 43.71 | 250 | 31.6 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A19 | 2 | -5 | 550 | Failed 7.356 E4 |
| 58 | Br-81 | 43.71 | 250 | 31.6 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A20 | 4 | -5 | 550 | |
| 59 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A20 | 4 | -5 | 550 | Failed 6.267 E4 |
| 60 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A21 | 5 | -5 | 550 | |
| 61 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A21 | 5 | -5 | 550 | |
| 62 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A21 | 5 | -5 | 550 | |
| 63 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A21 | 5 | -5 | 550 | Failed 3.989 E3 |
| 64 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A22 | 6 | -5 | 550 | |
| 65 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A22 | 6 | -5 | 550 | |
| 66 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A22 | 6 | -5 | 550 | Failed 2.513 E3 |
| 67 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A23 | 7 | -5 | 550 | |
| 68 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A23 | 7 | -5 | 550 | |

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| Run # | Ion | LET MeV.cm ² /mg | Energy MeV | Range μm | Flux #/cm ² /sec | Fluence #/cm ² | Angle deg | BeamDia. cm. | Device Type | S/N | Socket # | VGS Volts | VDS Volts | Pass/Fail Blank=Pass |
|---|-------|--------------------------------|---------------|-------------|--------------------------------|------------------------------|--------------|-----------------|----------------|-----|-------------|--------------|--------------|-------------------------|
| 550V, N to Bromine, Angular Dependence | | | | | | | | | | | | | | |
| 69 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A23 | 7 | -5 | 550 | Failed 9.263 E4 |
| 70 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A25 | 9 | -5 | 550 | |
| 72 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A25 | 9 | -5 | 550 | Failed 1.435 E3 |
| 73 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A26 | 10 | -5 | 550 | |
| 74 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A26 | 10 | -5 | 550 | |
| 75 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A26 | 10 | -5 | 550 | Failed 1.298 E3 |
| 76 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A27 | 11 | -5 | 525 | |
| 77 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A27 | 11 | -5 | 525 | |
| 78 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A27 | 11 | -5 | 525 | |
| 79 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A28 | 12 | -5 | 525 | |
| 80 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A28 | 12 | -5 | 525 | |
| 81 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A28 | 12 | -5 | 525 | |
| 82 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A29 | 13 | -5 | 525 | |
| 83 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A29 | 13 | -5 | 525 | |
| 84 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A29 | 13 | -5 | 525 | * |
| 85 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A27 | 11 | -5 | 535 | |
| 86 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A27 | 11 | -5 | 535 | |
| 87 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A27 | 11 | -5 | 535 | |
| 88 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A27 | 11 | -5 | 535 | |
| 89 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A28 | 12 | -5 | 535 | |
| 90 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A28 | 12 | -5 | 535 | |
| 91 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A28 | 12 | -5 | 535 | |
| 92 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A28 | 12 | -5 | 535 | |
| 93 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A29 | 13 | -5 | 535 | |
| 94 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A29 | 13 | -5 | 535 | |
| 95 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A29 | 13 | -5 | 535 | |
| 96 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A29 | 13 | -5 | 535 | * |
| 97 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A27 | 11 | -5 | 550 | |
| 98 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A27 | 11 | -5 | 550 | |
| 99 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A27 | 11 | -5 | 550 | |
| 100 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A27 | 11 | -5 | 550 | |
| 101 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A28 | 12 | -5 | 550 | |
| 102 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A28 | 12 | -5 | 550 | |
| 103 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A28 | 12 | -5 | 550 | |

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| Run # | Ion | LET MeV.cm ² /mg | Energy MeV | Range μm | Flux #/cm ² /sec | Fluence #/cm ² | Angle deg | BeamDia. cm. | Device Type | S/N | Socket # | VGS Volts | VDS Volts | Pass/Fail Blank=Pass |
|--|-------|--------------------------------|---------------|-------------|--------------------------------|------------------------------|--------------|-----------------|----------------|-----|-------------|--------------|--------------|-------------------------|
| 550 V, N to Bromine, Angular Dependence | | | | | | | | | | | | | | |
| 104 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A28 | 12 | -5 | 550 | Failed 2.030 E4 |
| 105 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A29 | 13 | -5 | 550 | |
| 106 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A29 | 13 | -5 | 550 | |
| 107 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A29 | 13 | -5 | 550 | |
| 108 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A29 | 13 | -5 | 550 | Failed 2.551 E3 |
| 109 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A30 | 14 | -5 | 540 | |
| 110 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A30 | 14 | -5 | 540 | |
| 111 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A30 | 14 | -5 | 540 | |
| 112 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A30 | 14 | -5 | 540 | |
| 113 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A31 | 15 | -5 | 540 | |
| 114 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A31 | 15 | -5 | 540 | |
| 115 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A31 | 15 | -5 | 540 | |
| 116 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A31 | 15 | -5 | 540 | |
| 117 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A32 | 16 | -5 | 540 | |
| 118 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A32 | 16 | -5 | 540 | |
| 119 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A32 | 16 | -5 | 540 | |
| 120 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A32 | 16 | -5 | 540 | Failed 3.975 E4 |
| 121 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A33 | 17 | -5 | 540 | |
| 122 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A33 | 17 | -5 | 540 | |
| 123 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A33 | 17 | -5 | 540 | |
| 124 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A33 | 17 | -5 | 540 | |
| 125 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A34 | 18 | -5 | 540 | |
| 126 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A34 | 18 | -5 | 540 | |
| 127 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A34 | 18 | -5 | 540 | |
| 128 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A34 | 18 | -5 | 540 | |
| 129 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | B1 | 1 | -5 | 540 | |
| 130 | Br-81 | 37.8 | 250 | 32.7 | 5.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | B1 | 1 | -5 | 550 | |
| 131 | Br-81 | 38.44 | 250 | 32.2 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B1 | 1 | -5 | 550 | |
| 132 | Br-81 | 40.29 | 250 | 30.7 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | B1 | 1 | -5 | 550 | |
| 133 | Br-81 | 43.71 | 250 | 28.3 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | B1 | 1 | -5 | 550 | |
| 134 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | B1 | 1 | -5 | 550 | Failed 9.061 E3 |
| 135 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | B2 | 2 | -5 | 550 | |
| 136 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B2 | 2 | -5 | 550 | |
| 137 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | B2 | 2 | -5 | 550 | |

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| Run # | Ion | LET MeV.cm ² /mg | Energy MeV | Range μm | Flux #/cm ² /sec | Fluence #/cm ² | Angle deg | BeamDia. cm. | Device Type | S/N | Socket # | VGS Volts | VDS Volts | Pass/Fail Blank=Pass |
|--|-------|--------------------------------|---------------|-------------|--------------------------------|------------------------------|--------------|-----------------|----------------|-----|-------------|--------------|--------------|-------------------------|
| 550 V, N to Bromine, Angular Dependence | | | | | | | | | | | | | | |
| 138 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | B2 | 2 | -5 | 550 | Failed 1.317 E4 |
| 139 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | B3 | 4 | -5 | 550 | |
| 140 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B3 | 4 | -5 | 550 | |
| 141 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | B3 | 4 | -5 | 550 | |
| 142 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | B3 | 4 | -5 | 550 | |
| 143 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | B3 | 4 | -5 | 550 | Failed 1.137 E4 |
| 144 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | B4 | 5 | 5 | 550 | |
| 145 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B4 | 5 | -5 | 550 | |
| 146 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | B4 | 5 | -5 | 550 | |
| 147 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | B4 | 5 | -5 | 550 | |
| 148 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | B4 | 5 | -5 | 550 | Failed 1.441 E4 |
| 149 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | B5 | 6 | -5 | 550 | |
| 150 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B5 | 6 | -5 | 550 | |
| 151 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | B5 | 6 | -5 | 550 | |
| 152 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | B5 | 6 | -5 | 550 | |
| 153 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | B5 | 6 | -5 | 550 | Failed 1.298 E4 |
| 154 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | B6 | 7 | -5 | 550 | |
| 155 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B6 | 7 | -5 | 550 | |
| 156 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | B6 | 7 | -5 | 550 | |
| 157 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | B6 | 7 | -5 | 550 | |
| 158 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | B6 | 7 | -5 | 550 | Failed 1.003 E4 |
| 159 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | B8 | 9 | -5 | 550 | |
| 160 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B8 | 9 | -5 | 550 | |
| 161 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | B8 | 9 | -5 | 550 | |
| 162 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | B8 | 9 | -5 | 550 | |
| 163 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | B8 | 9 | -5 | 550 | Failed 8.370 E3 |
| 164 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | B9 | 10 | -5 | 550 | |
| 165 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B9 | 10 | -5 | 550 | |
| 166 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | B9 | 10 | -5 | 550 | |
| 167 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | B9 | 10 | -5 | 550 | Failed 3.047 E4 |
| 168 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | B10 | 11 | -5 | 560 | |
| 169 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B10 | 11 | -5 | 560 | |
| 170 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | B10 | 11 | -5 | 560 | |

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| Run # | Ion | LET MeV.cm ² /mg | Energy MeV | Range μm | Flux #/cm ² /sec | Fluence #/cm ² | Angle deg | BeamDia. cm. | Device Type | S/N | Socket # | VGS Volts | VDS Volts | Pass/Fail Blank=Pass |
|--|-------|--------------------------------|---------------|-------------|--------------------------------|------------------------------|--------------|-----------------|----------------|------|-------------|--------------|--------------|-------------------------|
| 550 V, N to Bromine, Angular Dependence | | | | | | | | | | | | | | |
| 171 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | B10 | 11 | -5 | 560 | Failed 9.492 E4 |
| 172 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | B11 | 12 | -5 | 560 | |
| 173 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B11 | 12 | -5 | 560 | |
| 174 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | B11 | 12 | -5 | 560 | |
| 175 | Br-81 | 49.42 | 250 | 25 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | B11 | 12 | -5 | 560 | Failed 2.280 E3 |
| 250V, N to Iodine | | | | | | | | | | | | | | |
| 176 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A35 | 1 | 0 | 250 | |
| 177 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A35 | 1 | 0 | 300 | Failed 2.551 E5 |
| 178 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A36 | 2 | 0 | 250 | |
| 179 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A36 | 2 | 0 | 260 | Failed 2.668 E05 |
| 180 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A36A | 4 | 0 | 250 | |
| 181 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A37 | 5 | 0 | 250 | |
| 182 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A38 | 6 | 0 | 250 | * |
| 183 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A39 | 7 | -5 | 225 | |
| 184 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A39 | 7 | -5 | 250 | |
| 185 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A40 | 8 | -5 | 225 | |
| 186 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A40 | 8 | -5 | 250 | |
| 187 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A41 | 9 | -5 | 225 | |
| 188 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A41 | 9 | -5 | 250 | * |
| 189 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A42 | 10 | -10 | 200 | |
| 190 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A42 | 10 | -10 | 225 | |
| 191 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A42 | 10 | -10 | 250 | |
| 192 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A43 | 11 | -10 | 225 | |
| 193 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A43 | 11 | -10 | 250 | Failed 2.863 E05 |
| 194 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A44 | 12 | -10 | 225 | * |
| 195 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A42 | 10 | -5 | 250 | |
| 250V, N to Iodine, Angular Dependence | | | | | | | | | | | | | | |
| 196 | I | 60.73 | 333 | 31.4 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | A42 | 10 | -5 | 250 | |
| 197 | I | 63.64 | 333 | 30 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | A42 | 10 | -5 | 250 | |
| 198 | I | 69.06 | 333 | 27.6 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A42 | 10 | -5 | 250 | |
| 199 | I | 78.07 | 333 | 24.4 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | A42 | 10 | -5 | 250 | |
| 200 | I | 78.07 | 333 | 24.4 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A42 | 10 | -5 | 260 | |
| 201 | I | 78.07 | 333 | 24.4 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A42 | 10 | -5 | 270 | |
| 202 | I | 78.07 | 333 | 24.4 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A42 | 10 | -5 | 280 | Failed 4.871E03 |

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| Run # | Ion | LET MeV.cm ² /mg | Energy MeV | Range μm | Flux #/cm ² /sec | Fluence #/cm ² | Angle deg | BeamDia. cm. | Device Type | S/N | Socket # | VGS Volts | VDS Volts | Pass/Fail Blank=Pass |
|--|-----|--------------------------------|---------------|-------------|--------------------------------|------------------------------|--------------|-----------------|----------------|-----|-------------|--------------|--------------|-------------------------|
| 250V, N to Iodine, Angular Dependence | | | | | | | | | | | | | | |
| 203 | I | 78.07 | 333 | 24.4 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A44 | 12 | -5 | 270 | |
| 204 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A44 | 12 | -5 | 270 | |
| 205 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 10 | 1.50 | IRH7434SE | A44 | 12 | -5 | 270 | |
| 206 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 20 | 1.50 | IRH7434SE | A44 | 12 | -5 | 270 | |
| 207 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 30 | 1.50 | IRH7434SE | A44 | 12 | -5 | 270 | |
| 208 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 40 | 1.50 | IRH7434SE | A44 | 12 | -5 | 270 | |
| 209 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A44 | 12 | -5 | 280 | |
| 210 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 10 | 1.50 | IRH7434SE | A44 | 12 | -5 | 280 | |
| 211 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 20 | 1.50 | IRH7434SE | A44 | 12 | -5 | 280 | |
| 212 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 30 | 1.50 | IRH7434SE | A44 | 12 | -5 | 280 | |
| 213 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 40 | 1.50 | IRH7434SE | A44 | 12 | -5 | 280 | |
| 214 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A44 | 12 | -5 | 290 | Failed 1.72 E04 |
| 215 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A45 | 13 | -5 | 260 | Failed 6.933 E04 |
| 216 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A46 | 14 | -5 | 250 | |
| 217 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A46 | 14 | -5 | 260 | |
| 218 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A46 | 14 | -5 | 270 | |
| 219 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A46 | 14 | -5 | 280 | Failed 8.844 E4 |
| 220 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A47 | 15 | -5 | 280 | |
| 221 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 10 | 1.50 | IRH7434SE | A47 | 15 | -5 | 280 | |
| 222 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 20 | 1.50 | IRH7434SE | A47 | 15 | -5 | 280 | |
| 223 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 30 | 1.50 | IRH7434SE | A47 | 15 | -5 | 280 | |
| 224 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 40 | 1.50 | IRH7434SE | A47 | 15 | -5 | 280 | |
| 225 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 45 | 1.50 | IRH7434SE | A47 | 15 | -5 | 280 | |
| 226 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A47 | 15 | -5 | 290 | |
| 227 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A47 | 15 | -5 | 300 | Failed 2.490 E04 |
| 228 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A48 | 16 | -5 | 290 | Failed 1.327 E4 |
| 229 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A49 | 17 | -5 | 290 | Failed 1.396 E4 |
| 230 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 0 | 1.50 | IRH7434SE | A50 | 18 | -5 | 290 | Failed 2.399 E4 |
| 231 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 10 | 1.50 | IRH7434SE | A51 | 1 | -5 | 290 | |
| 232 | I | 59.8 | 333 | 31.9 | 1.0E+04 | 3.0E+05 | 20 | 1.50 | IRH7434SE | A51 | 1 | -5 | 290 | |
| 233 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A51 | 1 | -5 | 290 | |
| 234 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | A51 | 1 | -5 | 290 | |
| 235 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A51 | 1 | -5 | 290 | |
| 236 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A51 | 1 | -5 | 290 | Failed 4.929 E03 |

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| Run # | Ion | LET MeV.cm ² /mg | Energy MeV | Range μm | Flux #/cm ² /sec | Fluence #/cm ² | Angle deg | BeamDia. cm. | Device Type | S/N | Socket # | VGS Volts | VDS Volts | Pass/Fail Blank=Pass |
|--|-----|--------------------------------|---------------|-------------|--------------------------------|------------------------------|--------------|-----------------|----------------|-----|-------------|--------------|--------------|-------------------------|
| 250V, N to Iodine, Angular Dependence | | | | | | | | | | | | | | |
| 237 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | A52 | 2 | -5 | 325 | Failed 1.263 E4 |
| 238 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | A53 | 4 | -5 | 310 | Failed 1.358 E4 |
| 239 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | A54 | 5 | -5 | 300 | Failed 4.692 E4 |
| 240 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | A55 | 6 | -5 | 300 | Failed 6.765 E4 |
| 241 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | A56 | 7 | -5 | 300 | Failed 9.387 E4 |
| 242 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | A57 | 8 | -5 | 300 | Failed 7.654 E3 |
| 243 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | A58 | 9 | -5 | 300 | Failed 3.318 E03 |
| 244 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | A59 | 10 | -5 | 300 | |
| 245 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A59 | 10 | -5 | 300 | |
| 246 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | A59 | 10 | -5 | 300 | |
| 247 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A59 | 10 | -5 | 300 | |
| 248 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | A60 | 11 | -5 | 300 | |
| 249 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A60 | 11 | -5 | 300 | |
| 250 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | A60 | 11 | -5 | 300 | |
| 251 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A60 | 11 | -5 | 300 | |
| 252 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A59 | 10 | -5 | 325 | |
| 253 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A59 | 10 | -5 | 350 | |
| 254 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A59 | 10 | -5 | 375 | |
| 255 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A59 | 10 | -5 | 400 | |
| 256 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | A59 | 10 | -5 | 415 | |
| 257 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | A59 | 10 | -5 | 325 | |
| 258 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | A59 | 10 | -5 | 350 | |
| 259 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | A59 | 10 | -5 | 375 | |
| 260 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | A59 | 10 | -5 | 400 | |
| 261 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | A59 | 10 | -5 | 412 | |
| 262 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | A59 | 10 | -5 | 415 | |
| 263 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 35 | 1.50 | IRH7434SE | A59 | 10 | -5 | 350 | |
| 264 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 35 | 1.50 | IRH7434SE | A59 | 10 | -5 | 375 | |
| 265 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 35 | 1.50 | IRH7434SE | A59 | 10 | -5 | 375 | |
| 266 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 35 | 1.50 | IRH7434SE | A59 | 10 | -5 | 412 | |
| 267 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 35 | 1.50 | IRH7434SE | A59 | 10 | -5 | 415 | |
| 268 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A59 | 10 | -5 | 375 | |
| 269 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A59 | 10 | -5 | 395 | |
| 270 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A59 | 10 | -5 | 412 | |

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| Run # | Ion | LET MeV.cm ² /mg | Energy MeV | Range μm | Flux #/cm ² /sec | Fluence #/cm ² | Angle deg | BeamDia. cm. | Device Type | S/N | Socket # | VGS Volts | VDS Volts | Pass/Fail Blank=Pass |
|--|-----|--------------------------------|---------------|-------------|--------------------------------|------------------------------|--------------|-----------------|----------------|-----|-------------|--------------|--------------|-------------------------|
| 250V, N to Iodine, Angular Dependence | | | | | | | | | | | | | | |
| 271 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | A59 | 10 | -5 | 415 | |
| 272 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 25 | 1.50 | IRH7434SE | A59 | 10 | -5 | 375 | |
| 273 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 25 | 1.50 | IRH7434SE | A59 | 10 | -5 | 395 | |
| 274 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 25 | 1.50 | IRH7434SE | A59 | 10 | -5 | 412 | |
| 275 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 25 | 1.50 | IRH7434SE | A59 | 10 | -5 | 415 | |
| 276 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | A59 | 10 | -5 | 395 | |
| 277 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | A59 | 10 | -5 | 412 | |
| 278 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | A59 | 10 | -5 | 415 | |
| 279 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A59 | 10 | -5 | 395 | Failed 2.279 E3 |
| 280 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A60 | 10 | -5 | 375 | |
| 281 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A60 | 10 | -5 | 385 | |
| 282 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A60 | 10 | -5 | 395 | |
| 283 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A60 | 10 | -5 | 405 | Failed 6.17 E4 |
| 284 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A61 | 12 | -5 | 395 | Failed 1.793 E3 |
| 285 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A62 | 13 | -5 | 395 | Failed 7.783 E3 |
| 286 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | A63 | 14 | -5 | 395 | Failed 1.865 E4 |
| 287 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | B18 | 1 | -5 | 250 | |
| 288 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | B18 | 1 | -5 | 112 | |
| 289 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 45 | 1.50 | IRH7434SE | B18 | 1 | -5 | 415 | |
| 290 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 40 | 1.50 | IRH7434SE | B18 | 1 | -5 | 415 | |
| 291 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 35 | 1.50 | IRH7434SE | B18 | 1 | -5 | 415 | |
| 292 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 30 | 1.50 | IRH7434SE | B18 | 1 | -5 | 415 | |
| 293 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 25 | 1.50 | IRH7434SE | B18 | 1 | -5 | 415 | |
| 294 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | B18 | 1 | -5 | 415 | Failed 9.627 E4 |
| 295 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | B19 | 2 | -5 | 415 | Failed 3.211 E4 |
| 296 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 20 | 1.50 | IRH7434SE | B20 | 4 | -5 | 415 | Failed 5.752 E3 |
| 297 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | B21 | 5 | -5 | 375 | |
| 298 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | B21 | 5 | -5 | 385 | |
| 299 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | B21 | 5 | -5 | 395 | Failed 2.062 E4 |
| 300 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | B22 | 6 | -5 | 395 | Failed 1.586 E4 |
| 301 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 15 | 1.50 | IRH7434SE | B23 | 7 | -5 | 315 | Failed 1.373 E4 |
| 302 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B24 | 8 | -5 | 300 | Failed 3.483 E4 |

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| Run # | Ion | LET MeV.cm ² /mg | Energy MeV | Range μm | Flux #/cm ² /sec | Fluence #/cm ² | Angle deg | BeamDia. cm. | Device Type | S/N | Socket # | VGS Volts | VDS Volts | Pass/Fail Blank=Pass |
|--|-----|--------------------------------|---------------|-------------|--------------------------------|------------------------------|--------------|-----------------|----------------|-----|-------------|--------------|--------------|-------------------------|
| 250V, N to Iodine, Angular Dependence | | | | | | | | | | | | | | |
| 303 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B25 | 9 | -5 | 300 | |
| 304 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B26 | 10 | -5 | 300 | |
| 305 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B25 | 9 | -5 | 325 | |
| 306 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B25 | 9 | -5 | 350 | Failed 4.098 E3 |
| 307 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B26 | 10 | -5 | 325 | |
| 308 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B26 | 10 | -5 | 350 | Failed 3.013 E4 |
| 309 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 10 | 1.50 | IRH7434SE | B27 | 11 | -5 | 350 | Failed 2.213 E4 |
| 310 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 5 | 1.50 | IRH7434SE | B28 | 12 | -5 | 325 | Failed 1.587 E4 |
| 311 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 5 | 1.50 | IRH7434SE | B29 | 13 | -5 | 325 | Failed 1.864 E4 |
| 312 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 5 | 1.50 | IRH7434SE | B30 | 14 | -5 | 325 | Failed 5.690 E3 |
| 313 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | B31 | 15 | -5 | 290 | Failed 5.695 E4 |
| 314 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | B32 | 16 | -5 | 290 | Failed 7.040 E4 |
| 315 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | B33 | 17 | -5 | 290 | Failed 1.363 E4 |
| 316 | I | 59.8 | 250 | 31.9 | 1.0E+03 | 1.0E+05 | 0 | 1.50 | IRH7434SE | B34 | 18 | -5 | 290 | Failed 4.133 E4 |

Appendix B

BNL Facility

Data & Graphs

International Rectifier Corp.
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| Run # | Device ID | Ion | Energy MeV | Range μm | LET(Si) MeV.cm2/mg | Tilt deg | Roll deg | Time sec | Flux #/cm2/ sec | Fluence #/cm2 | Dose RAD (Si) | TotalDose RAD (Si) | Upsets | CrossSec cm2 | Left % | Top % | Bottom % | Right % | Unif % | Center % |
|-------|-----------|-------|------------|---------------------|--------------------|----------|----------|----------|-----------------|---------------|---------------|--------------------|--------|--------------|--------|-------|----------|---------|--------|----------|
| 1 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 24.9 | 1.22E+04 | 3.02E+05 | 1.83E+02 | 1.92E+04 | 0 | 0.00E+00 | -5.6 | -6.1 | 3 | 8.8 | 93.1 | C |
| 2 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 25.1 | 1.20E+04 | 3.02E+05 | 1.82E+02 | 1.94E+04 | 0 | 0.00E+00 | -3.5 | -3.2 | 0.1 | 6.6 | 95.2 | C |
| 3 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 25.9 | 1.16E+04 | 3.02E+05 | 1.82E+02 | 1.96E+04 | 0 | 0.00E+00 | -5.6 | -1.7 | -0.2 | 7.5 | 94.7 | C |
| 4 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 24.6 | 1.23E+04 | 3.02E+05 | 1.83E+02 | 1.75E+04 | 0 | 0.00E+00 | -5.9 | -2.3 | -0.2 | 8.4 | 94.1 | C |
| 5 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 1.5 | 1.22E+04 | 1.88E+04 | 1.13E+01 | 1.75E+04 | 1 | 5.34E-05 | -3.3 | -6.2 | 0.9 | 8.5 | 93.4 | C |
| 6 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 25 | 1.21E+04 | 3.02E+05 | 1.82E+02 | 9.36E+03 | 1 | 3.31E-06 | -6.9 | -1.9 | -0.9 | 9.6 | 93.4 | C |
| 7 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 24.6 | 1.23E+04 | 3.03E+05 | 1.83E+02 | 9.54E+03 | 0 | 0.00E+00 | -6.1 | -2.4 | 0 | 8.5 | 94 | C |
| 8 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 25.4 | 1.19E+04 | 3.02E+05 | 1.83E+02 | 9.73E+03 | 0 | 0.00E+00 | -6.2 | -1.6 | -0.5 | 8.3 | 94.2 | C |
| 9 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 1.3 | 1.27E+04 | 1.63E+04 | 9.82E+00 | 9.74E+03 | 1 | 6.15E-05 | -7.4 | -3.2 | 0.6 | 10.1 | 92.9 | C |
| 10 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 24.4 | 1.24E+04 | 3.03E+05 | 1.83E+02 | 7.67E+03 | 0 | 0.00E+00 | -6.5 | -1.8 | -0.4 | 8.7 | 93.9 | C |
| 11 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 23.8 | 1.27E+04 | 3.03E+05 | 1.83E+02 | 7.85E+03 | 0 | 0.00E+00 | -5.5 | -1.7 | -0.8 | 8 | 94.5 | C |
| 12 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 4.1 | 1.27E+04 | 5.22E+04 | 3.15E+01 | 7.88E+03 | 1 | 1.92E-05 | -6.5 | -4 | -0.2 | 10.6 | 92.7 | C |
| 13 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 21.6 | 1.40E+04 | 3.03E+05 | 1.83E+02 | 1.98E+04 | 0 | 0.00E+00 | -6 | -2.2 | -1 | 9.1 | 93.7 | C |
| 14 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 21.2 | 1.43E+04 | 3.03E+05 | 1.83E+02 | 2.00E+04 | 0 | 0.00E+00 | -5.8 | -2.6 | -0.1 | 8.6 | 94 | C |
| 15 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 21.8 | 1.39E+04 | 3.02E+05 | 1.83E+02 | 2.01E+04 | 0 | 0.00E+00 | -6.2 | -2 | -0.6 | 8.7 | 94 | C |
| 16 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 21.1 | 1.43E+04 | 3.02E+05 | 1.83E+02 | 2.03E+04 | 1 | 3.31E-06 | -6.6 | -2.4 | -0.8 | 9.8 | 93.3 | C |
| 17 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 21.5 | 1.41E+04 | 3.02E+05 | 1.83E+02 | 1.77E+04 | 0 | 0.00E+00 | -6.3 | -2.2 | -0.8 | 9.2 | 93.6 | C |
| 18 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 21.5 | 1.41E+04 | 3.03E+05 | 1.83E+02 | 9.92E+03 | 0 | 0.00E+00 | -6.8 | -0.5 | -1.5 | 8.8 | 93.8 | C |
| 19 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 20.8 | 1.46E+04 | 3.04E+05 | 1.83E+02 | 8.06E+03 | 0 | 0.00E+00 | -5.8 | -1.9 | -0.7 | 8.4 | 94.2 | C |
| 20 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 22.4 | 1.35E+04 | 3.03E+05 | 1.83E+02 | 2.05E+04 | 0 | 0.00E+00 | -7.2 | -1.9 | -0.9 | 10 | 93.1 | C |
| 21 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 22.4 | 1.35E+04 | 3.02E+05 | 1.83E+02 | 2.07E+04 | 0 | 0.00E+00 | -5.9 | -0.6 | -1.2 | 7.6 | 94.6 | C |
| 22 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 22.4 | 1.35E+04 | 3.03E+05 | 1.83E+02 | 2.09E+04 | 0 | 0.00E+00 | -5.5 | -2.3 | -0.7 | 8.5 | 94.1 | C |
| 23 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 22.7 | 1.33E+04 | 3.02E+05 | 1.83E+02 | 2.11E+04 | 0 | 0.00E+00 | -5.8 | -1.9 | -1.3 | 9 | 93.8 | C |
| 24 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 1.6 | 1.32E+04 | 2.17E+04 | 1.31E+01 | 2.11E+04 | 1 | 4.61E-05 | -4.6 | 1.5 | -2.8 | 6 | 95.4 | C |
| 25 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 21.8 | 1.39E+04 | 3.03E+05 | 1.83E+02 | 1.79E+04 | 0 | 0.00E+00 | -5.2 | -1.2 | -0.9 | 7.3 | 94.9 | C |
| 26 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 23.8 | 1.27E+04 | 3.02E+05 | 1.83E+02 | 1.01E+04 | 0 | 0.00E+00 | -5.8 | -2.2 | -0.8 | 8.8 | 93.9 | C |
| 27 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 22.5 | 1.35E+04 | 3.03E+05 | 1.83E+02 | 8.25E+03 | 0 | 0.00E+00 | -5.3 | -1.6 | -1.2 | 8 | 94.5 | C |
| 28 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 22.3 | 1.36E+04 | 3.02E+05 | 1.83E+02 | 2.12E+04 | 0 | 0.00E+00 | -4.6 | -1.8 | -0.8 | 7.3 | 94.9 | C |
| 29 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 22.6 | 1.34E+04 | 3.02E+05 | 1.83E+02 | 2.14E+04 | 0 | 0.00E+00 | -4.4 | -1.8 | -1.3 | 7.5 | 94.8 | C |
| 30 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 22.2 | 1.36E+04 | 3.03E+05 | 1.83E+02 | 2.16E+04 | 0 | 0.00E+00 | -3.8 | -2.3 | -1.5 | 7.6 | 94.7 | C |
| 31 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 23 | 1.32E+04 | 3.02E+05 | 1.82E+02 | 2.18E+04 | 0 | 0.00E+00 | -4.4 | -2.4 | 0 | 6.8 | 95.2 | C |
| 32 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 1.2 | 1.34E+04 | 1.64E+04 | 9.90E+00 | 2.18E+04 | 1 | 6.11E-05 | -4.9 | 2 | 0 | 2.9 | 96.5 | C |
| 33 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 23.1 | 1.31E+04 | 3.02E+05 | 1.83E+02 | 1.80E+04 | 0 | 0.00E+00 | -4.6 | -1.6 | -0.7 | 6.9 | 95.2 | C |
| 34 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 22.8 | 1.33E+04 | 3.02E+05 | 1.83E+02 | 1.03E+04 | 0 | 0.00E+00 | -3.7 | -1.8 | -0.3 | 5.7 | 95.9 | C |

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| Run # | Device ID | Ion | Energy MeV | Range μm | LET(Si) MeV.cm2/mg | Tilt deg | Roll deg | Time sec | Flux #/cm2/sec | Fluence #/cm2 | Dose RAD (Si) | TotalDose RAD (Si) | Upsets | CrossSec cm2 | Left % | Top % | Bottom % | Right % | Unif % | Center % |
|-------|-----------|-------|------------|---------------------|--------------------|----------|----------|----------|----------------|---------------|---------------|--------------------|--------|--------------|--------|-------|----------|---------|--------|----------|
| 36 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 1.4 | 3.23E+03 | 4.44E+03 | 2.68E+00 | 2.18E+04 | 1 | 2.25E-04 | -1.3 | 1.3 | -2.8 | 2.8 | 97.4 | C |
| 37 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 142 | 2.13E+03 | 3.02E+05 | 1.82E+02 | 1.82E+04 | 0 | 0.00E+00 | -2.9 | -3.6 | 1.6 | 4.9 | 96 | C |
| 39 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 31 | 9.75E+03 | 3.02E+05 | 1.83E+02 | 1.86E+04 | 0 | 0.00E+00 | -7.4 | -3 | 0.8 | 9.6 | 93.2 | C |
| 40 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 31.1 | 9.71E+03 | 3.02E+05 | 1.82E+02 | 1.88E+04 | 0 | 0.00E+00 | -8.2 | -3.3 | 0.8 | 10.7 | 92.5 | C |
| 41 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 38.9 | 7.74E+03 | 3.01E+05 | 1.82E+02 | 1.05E+04 | 0 | 0.00E+00 | -9.5 | -4 | 0.6 | 12.9 | 91.1 | C |
| 42 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 45.9 | 6.57E+03 | 3.02E+05 | 1.82E+02 | 8.61E+03 | 0 | 0.00E+00 | -9 | -3.3 | 1.2 | 11.1 | 92.1 | C |
| 43 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 142 | 2.13E+03 | 3.02E+05 | 1.83E+02 | 2.20E+04 | 0 | 0.00E+00 | -7.6 | -3.5 | 1 | 10.2 | 92.8 | C |
| 44 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 23.9 | 1.27E+04 | 3.03E+05 | 1.83E+02 | 2.22E+04 | 0 | 0.00E+00 | 0.1 | -1.1 | -1.4 | 2.4 | 97.8 | C |
| 45 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 19.4 | 1.56E+04 | 3.03E+05 | 1.83E+02 | 2.24E+04 | 0 | 0.00E+00 | -0.2 | -2.5 | -1.2 | 3.8 | 96.7 | C |
| 46 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 15 | 2.02E+04 | 3.04E+05 | 1.83E+02 | 2.25E+04 | 0 | 0.00E+00 | -0.6 | -2 | -1.3 | 3.9 | 96.8 | C |
| 47 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 15.5 | 1.97E+04 | 3.04E+05 | 1.84E+02 | 2.27E+04 | 0 | 0.00E+00 | -1.2 | -1.4 | -1.2 | 3.8 | 97.1 | C |
| 48 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 6.4 | 1.92E+04 | 1.23E+05 | 7.41E+01 | 2.28E+04 | 1 | 8.16E-06 | 0.1 | -2.5 | -2.8 | 5.2 | 95.4 | C |
| 49 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 14.7 | 2.07E+04 | 3.04E+05 | 1.83E+02 | 1.90E+04 | 0 | 0.00E+00 | 0.5 | -2.3 | -1 | 2.8 | 97.2 | C |
| 50 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 14.4 | 2.10E+04 | 3.03E+05 | 1.83E+02 | 1.91E+04 | 0 | 0.00E+00 | -0.2 | -1.6 | -1 | 2.9 | 97.5 | C |
| 51 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 15.3 | 1.99E+04 | 3.04E+05 | 1.84E+02 | 1.93E+04 | 0 | 0.00E+00 | -0.6 | -1.6 | -1.5 | 3.7 | 97 | C |
| 52 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 30.4 | 9.95E+03 | 3.03E+05 | 1.83E+02 | 1.07E+04 | 0 | 0.00E+00 | -2.7 | -1.7 | -1.1 | 5.5 | 96.1 | C |
| 53 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 30.3 | 9.99E+03 | 3.03E+05 | 1.83E+02 | 1.08E+04 | 0 | 0.00E+00 | -1.5 | -1.8 | -2 | 5.3 | 96 | C |
| 54 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 30.5 | 9.90E+03 | 3.02E+05 | 1.82E+02 | 1.10E+04 | 0 | 0.00E+00 | -1.9 | -2.5 | -0.7 | 5.2 | 96.2 | C |
| 55 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 4.2 | 9.43E+03 | 4.00E+04 | 2.42E+01 | 1.10E+04 | 1 | 2.50E-05 | 0.2 | -2.9 | -2.9 | 5.6 | 95 | C |
| 56 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 31.5 | 9.58E+03 | 3.02E+05 | 1.82E+02 | 8.79E+03 | 0 | 0.00E+00 | -0.1 | -2 | -0.5 | 2.6 | 97.7 | C |
| 57 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 31.8 | 9.48E+03 | 3.02E+05 | 1.82E+02 | 8.98E+03 | 0 | 0.00E+00 | -2 | -2.2 | -0.6 | 4.8 | 96.5 | C |
| 58 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 30.1 | 1.01E+04 | 3.02E+05 | 1.83E+02 | 9.16E+03 | 0 | 0.00E+00 | -2.1 | -1.5 | -0.2 | 3.9 | 97.2 | C |
| 59 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 26.1 | 1.16E+04 | 3.02E+05 | 1.82E+02 | 2.30E+04 | 0 | 0.00E+00 | -2.2 | -0.9 | -1.8 | 4.9 | 96.5 | C |
| 60 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 29.8 | 1.01E+04 | 3.02E+05 | 1.82E+02 | 2.32E+04 | 0 | 0.00E+00 | -3.1 | -2.3 | -1.5 | 6.9 | 95.1 | C |
| 61 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 31 | 9.73E+03 | 3.02E+05 | 1.82E+02 | 2.33E+04 | 0 | 0.00E+00 | -3.8 | -1.4 | -2.1 | 7.3 | 94.9 | C |
| 62 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 27.3 | 1.11E+04 | 3.02E+05 | 1.82E+02 | 2.35E+04 | 0 | 0.00E+00 | -2.4 | -1 | -2.1 | 5.6 | 96 | C |
| 63 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 26.1 | 1.15E+04 | 3.02E+05 | 1.82E+02 | 2.37E+04 | 0 | 0.00E+00 | -2.2 | -2.1 | -1.5 | 5.8 | 95.8 | C |
| 64 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 2.9 | 1.06E+04 | 3.04E+04 | 1.84E+01 | 2.37E+04 | 1 | 3.29E-05 | -4.5 | 0.1 | -2.1 | 6.5 | 95.3 | C |
| 65 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 43.3 | 6.96E+03 | 3.02E+05 | 1.82E+02 | 1.95E+04 | 0 | 0.00E+00 | -7.5 | -1.9 | -2 | 11.4 | 92.3 | C |
| 66 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 46.8 | 6.43E+03 | 3.01E+05 | 1.82E+02 | 1.97E+04 | 0 | 0.00E+00 | -6.6 | -2.8 | -0.7 | 10.1 | 93.1 | C |
| 67 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 18.6 | 7.25E+03 | 1.35E+05 | 8.13E+01 | 1.98E+04 | 1 | 7.43E-06 | -6.5 | -2.2 | -0.7 | 9.4 | 93.5 | C |
| 68 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 60.4 | 5.00E+03 | 3.02E+05 | 1.82E+02 | 1.12E+04 | 0 | 0.00E+00 | -8.1 | -2.4 | -1.1 | 11.6 | 92.1 | C |
| 69 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 21.6 | 1.41E+04 | 3.04E+05 | 1.84E+02 | 1.14E+04 | 0 | 0.00E+00 | -7.4 | -1.3 | -2 | 10.7 | 92.7 | C |
| 70 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 19.7 | 1.54E+04 | 3.03E+05 | 1.83E+02 | 1.16E+04 | 0 | 0.00E+00 | -7.6 | -2.3 | -1.3 | 11.2 | 92.4 | C |
| 72 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 36.7 | 8.22E+03 | 3.02E+05 | 1.82E+02 | 9.52E+03 | 0 | 0.00E+00 | -8 | -2.7 | -1.2 | 11.9 | 92 | C |

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| Run # | Device ID | Ion | Energy MeV | Range μm | LET(Si) MeV.cm2/mg | Tilt deg | Roll deg | Time sec | Flux #/cm2/sec | Fluence #/cm2 | Dose RAD (Si) | TotalDose RAD (Si) | Upsets | CrossSec cm2 | Left % | Top % | Bottom % | Right % | Unif % | Center % |
|-------|-----------|-------|------------|---------------------|--------------------|----------|----------|----------|----------------|---------------|---------------|--------------------|--------|--------------|--------|-------|----------|---------|--------|----------|
| 73 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 33.8 | 8.95E+03 | 3.02E+05 | 1.83E+02 | 9.71E+03 | 0 | 0.00E+00 | -8.1 | -2.9 | -1.3 | 12.2 | 91.8 | C |
| 74 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 32.2 | 9.38E+03 | 3.02E+05 | 1.83E+02 | 2.39E+04 | 0 | 0.00E+00 | -6.5 | -1.3 | -2.1 | 9.9 | 93.2 | C |
| 75 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 29.8 | 1.02E+04 | 3.02E+05 | 1.83E+02 | 2.41E+04 | 0 | 0.00E+00 | -7.5 | -1.8 | -0.9 | 10.2 | 93 | C |
| 76 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 25.4 | 1.19E+04 | 3.03E+05 | 1.83E+02 | 2.43E+04 | 0 | 0.00E+00 | -5.7 | -1.8 | -1.9 | 9.5 | 93.5 | C |
| 77 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 24.1 | 1.26E+04 | 3.03E+05 | 1.83E+02 | 2.45E+04 | 0 | 0.00E+00 | -6.1 | -1.2 | -1.3 | 8.6 | 94 | C |
| 78 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 21.6 | 1.40E+04 | 3.03E+05 | 1.83E+02 | 2.46E+04 | 0 | 0.00E+00 | -5.1 | -2.5 | -0.9 | 8.4 | 94.2 | C |
| 79 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 21.3 | 1.42E+04 | 3.03E+05 | 1.83E+02 | 2.48E+04 | 0 | 0.00E+00 | -5.3 | -2.5 | -1.8 | 9.5 | 93.5 | C |
| 80 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 21.9 | 1.38E+04 | 3.03E+05 | 1.83E+02 | 2.00E+04 | 0 | 0.00E+00 | -5.2 | -1.8 | -1.6 | 8.6 | 94.1 | C |
| 81 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 23.6 | 1.28E+04 | 3.02E+05 | 1.83E+02 | 2.01E+04 | 0 | 0.00E+00 | -5.2 | -2.1 | -1.6 | 8.9 | 93.9 | C |
| 82 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 23.1 | 1.31E+04 | 3.03E+05 | 1.83E+02 | 2.03E+04 | 0 | 0.00E+00 | -5.2 | -1.9 | -2 | 9 | 93.8 | C |
| 83 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 21.2 | 1.43E+04 | 3.03E+05 | 1.83E+02 | 1.18E+04 | 0 | 0.00E+00 | -5 | -1.4 | -1.6 | 8 | 94.5 | C |
| 84 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 25 | 1.21E+04 | 3.02E+05 | 1.83E+02 | 1.20E+04 | 0 | 0.00E+00 | -6.4 | -1.7 | -1.2 | 9.3 | 93.6 | C |
| 85 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 24.3 | 1.25E+04 | 3.03E+05 | 1.83E+02 | 1.21E+04 | 0 | 0.00E+00 | -5.9 | -1.7 | -0.9 | 8.5 | 94.1 | C |
| 86 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 26.2 | 1.15E+04 | 3.02E+05 | 1.82E+02 | 9.89E+03 | 0 | 0.00E+00 | -5.7 | -2.3 | -0.5 | 8.5 | 94.1 | C |
| 87 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 27.7 | 1.09E+04 | 3.02E+05 | 1.82E+02 | 1.01E+04 | 0 | 0.00E+00 | -5.3 | -2.3 | -1.7 | 9.3 | 93.6 | C |
| 88 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 27.7 | 1.09E+04 | 3.02E+05 | 1.82E+02 | 1.03E+04 | 0 | 0.00E+00 | -5.5 | -2.5 | -1.4 | 9.4 | 93.5 | C |
| 89 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 28.6 | 1.06E+04 | 3.02E+05 | 1.83E+02 | 1.04E+04 | 0 | 0.00E+00 | -5.4 | -3 | -0.8 | 9.2 | 93.7 | C |
| 90 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 15.4 | 9.31E+03 | 1.43E+05 | 8.66E+01 | 1.05E+04 | 1 | 6.97E-06 | -6.8 | -2.2 | -1 | 10 | 93.2 | C |
| 91 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 26.6 | 1.14E+04 | 3.02E+05 | 1.82E+02 | 2.50E+04 | 0 | 0.00E+00 | -4.5 | -1.6 | -1.1 | 7.1 | 95 | C |
| 92 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 31 | 9.71E+03 | 3.01E+05 | 1.82E+02 | 2.05E+04 | 0 | 0.00E+00 | -5.3 | -2.3 | -0.9 | 8.5 | 94.1 | C |
| 93 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 3.7 | 8.65E+03 | 3.19E+04 | 1.93E+01 | 1.22E+04 | 1 | 3.14E-05 | -6.1 | -0.9 | -1.8 | 8.7 | 94 | C |
| 94 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 41.4 | 7.29E+03 | 3.01E+05 | 1.82E+02 | 2.52E+04 | 0 | 0.00E+00 | -4.6 | -2.4 | -1.3 | 8.3 | 94.3 | C |
| 95 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 31.9 | 9.46E+03 | 3.01E+05 | 1.82E+02 | 2.54E+04 | 0 | 0.00E+00 | -5.2 | -3.1 | 0.3 | 8 | 94.3 | C |
| 96 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 29.5 | 1.03E+04 | 3.02E+05 | 1.83E+02 | 2.56E+04 | 0 | 0.00E+00 | -5.4 | -2.9 | -0.1 | 8.3 | 94.2 | C |
| 97 | 1 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 27.2 | 1.11E+04 | 3.02E+05 | 1.82E+02 | 2.57E+04 | 0 | 0.00E+00 | -5.2 | -2.4 | 0 | 7.7 | 94.6 | C |
| 98 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 28.6 | 1.06E+04 | 3.02E+05 | 1.83E+02 | 2.07E+04 | 0 | 0.00E+00 | -5.2 | -1.4 | -0.7 | 7.3 | 94.9 | C |
| 99 | 2 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 29.5 | 1.02E+04 | 3.02E+05 | 1.82E+02 | 2.09E+04 | 0 | 0.00E+00 | -5 | -1.5 | -0.8 | 7.2 | 95 | C |
| 100 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 29.6 | 1.03E+04 | 3.03E+05 | 1.83E+02 | 1.23E+04 | 0 | 0.00E+00 | -5.5 | -2.4 | -0.5 | 8.4 | 94.1 | C |
| 101 | 3 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 31.8 | 9.53E+03 | 3.03E+05 | 1.83E+02 | 1.25E+04 | 0 | 0.00E+00 | -5.3 | -2.2 | -0.6 | 8.1 | 94.3 | C |
| 102 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 31.4 | 9.57E+03 | 3.01E+05 | 1.82E+02 | 1.07E+04 | 0 | 0.00E+00 | -5.3 | -2.9 | 0.7 | 7.6 | 94.5 | C |
| 103 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 28.5 | 1.06E+04 | 3.03E+05 | 1.83E+02 | 1.09E+04 | 0 | 0.00E+00 | -3.9 | -3.6 | 0.5 | 7 | 94.9 | C |
| 104 | 4 | Br-81 | 274 | 35.52 | 37.54 | 0 | 0 | 2.9 | 1.12E+04 | 3.26E+04 | 1.97E+01 | 1.09E+04 | 1 | 3.06E-05 | -3.8 | -3.3 | 0.7 | 6.5 | 95.2 | C |
| 105 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 4.9 | 1.17E+04 | 5.75E+04 | 5.54E+01 | 2.58E+04 | 1 | 1.74E-05 | 0.7 | 3 | -1.9 | -1.7 | 97.7 | T |

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| Run # | Device ID | Ion | Energy MeV | Range μm | LET(Si) MeV.cm2/mg | Tilt deg | Roll deg | Time sec | Flux #/cm2/sec | Fluence #/cm2 | Dose RAD (Si) | TotalDose RAD (Si) | Upsets | CrossSec cm2 | Left % | Top % | Bottom % | Right % | Unif % | Center % |
|-------|-----------|-------|------------|---------------------|--------------------|----------|----------|----------|----------------|---------------|---------------|--------------------|--------|--------------|--------|-------|----------|---------|--------|----------|
| 106 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 25.2 | 1.20E+04 | 3.02E+05 | 2.91E+02 | 2.12E+04 | 0 | 0.00E+00 | 4.8 | 0.9 | 1.3 | -6.9 | 95.2 | T |
| 107 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 25.3 | 1.19E+04 | 3.02E+05 | 2.91E+02 | 2.14E+04 | 0 | 0.00E+00 | 5.4 | 1.5 | 0.6 | -7.5 | 94.8 | T |
| 108 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 25.4 | 1.19E+04 | 3.03E+05 | 2.91E+02 | 2.17E+04 | 0 | 0.00E+00 | 8.2 | 0 | 0.9 | -9.1 | 93.3 | T |
| 109 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.3 | 1.16E+04 | 2.48E+05 | 2.39E+02 | 2.20E+04 | 1 | 4.04E-06 | -0.4 | 0.4 | 0.9 | -1 | 98.9 | T |
| 110 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.4 | 1.15E+04 | 3.03E+05 | 2.92E+02 | 1.28E+04 | 0 | 0.00E+00 | 7.1 | 0.5 | 0.5 | -8 | 94.2 | T |
| 111 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 14.8 | 1.16E+04 | 1.72E+05 | 1.66E+02 | 1.30E+04 | 1 | 5.82E-06 | 2.3 | 0 | 1.5 | -3.8 | 97.3 | T |
| 112 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.6 | 1.13E+04 | 3.02E+05 | 2.91E+02 | 1.12E+04 | 0 | 0.00E+00 | 11 | 0.7 | -0.3 | -11.4 | 91.6 | T |
| 113 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.1 | 1.16E+04 | 3.02E+05 | 2.91E+02 | 1.15E+04 | 0 | 0.00E+00 | 2.1 | 1 | 0.9 | -4 | 97.1 | T |
| 114 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 18 | 1.16E+04 | 2.09E+05 | 2.01E+02 | 1.17E+04 | 1 | 4.78E-06 | 2.6 | 0.7 | 1.2 | -4.5 | 96.8 | T |
| 115 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 25.8 | 1.17E+04 | 3.02E+05 | 2.91E+02 | 2.61E+04 | 0 | 0.00E+00 | -0.8 | 2 | 1.1 | -2.3 | 97.4 | T |
| 116 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.1 | 1.16E+04 | 3.02E+05 | 2.90E+02 | 2.64E+04 | 0 | 0.00E+00 | -3 | 1 | 1.3 | 0.7 | 97.6 | T |
| 117 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26 | 1.16E+04 | 3.02E+05 | 2.91E+02 | 2.67E+04 | 0 | 0.00E+00 | -0.5 | 1.3 | 2.2 | -3 | 97 | T |
| 118 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.5 | 1.14E+04 | 3.02E+05 | 2.91E+02 | 2.70E+04 | 0 | 0.00E+00 | -1.3 | 1 | 0.7 | -0.5 | 98.5 | T |
| 119 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26 | 1.16E+04 | 3.02E+05 | 2.91E+02 | 2.72E+04 | 0 | 0.00E+00 | -3.1 | 0.8 | 1.8 | 0.5 | 97.5 | T |
| 120 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 25.7 | 1.18E+04 | 3.02E+05 | 2.90E+02 | 2.75E+04 | 0 | 0.00E+00 | 4.5 | 0.4 | 0.8 | -5.7 | 95.9 | T |
| 121 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.1 | 1.16E+04 | 3.02E+05 | 2.91E+02 | 2.78E+04 | 0 | 0.00E+00 | 5.3 | 1.1 | 0.6 | -7 | 95 | T |
| 122 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 2.8 | 1.15E+04 | 3.19E+04 | 3.07E+01 | 2.79E+04 | 1 | 3.14E-05 | 0.7 | 2.1 | -0.9 | -1.9 | 98.1 | T |
| 123 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.7 | 1.13E+04 | 3.02E+05 | 2.91E+02 | 2.23E+04 | 0 | 0.00E+00 | -2 | 1.1 | 0.5 | 0.3 | 98.4 | T |
| 124 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.5 | 1.14E+04 | 3.02E+05 | 2.91E+02 | 2.26E+04 | 0 | 0.00E+00 | -0.5 | 1.5 | 1.2 | -2.2 | 97.8 | T |
| 125 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 1.7 | 1.12E+04 | 1.95E+04 | 1.88E+01 | 2.26E+04 | 1 | 5.13E-05 | -1.8 | 3.6 | -0.4 | -1.4 | 97.1 | T |
| 126 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.6 | 1.14E+04 | 3.03E+05 | 2.92E+02 | 1.33E+04 | 0 | 0.00E+00 | 2.1 | 1.3 | 1.1 | -4.5 | 96.8 | T |
| 127 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.4 | 1.15E+04 | 3.02E+05 | 2.91E+02 | 1.36E+04 | 0 | 0.00E+00 | 6.3 | 0.4 | 0.3 | -7 | 94.8 | T |
| 128 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.6 | 1.14E+04 | 3.02E+05 | 2.91E+02 | 1.20E+04 | 0 | 0.00E+00 | -2.8 | 1.3 | 0.6 | 0.9 | 97.8 | T |
| 129 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.4 | 1.15E+04 | 3.03E+05 | 2.91E+02 | 1.23E+04 | 0 | 0.00E+00 | 8.1 | 0 | 0 | -8.1 | 93.8 | T |
| 130 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 25.1 | 1.21E+04 | 3.03E+05 | 2.92E+02 | 2.81E+04 | 0 | 0.00E+00 | -0.1 | 1.4 | 1.4 | -2.8 | 97.5 | T |
| 131 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 9.8 | 1.20E+04 | 1.17E+05 | 1.13E+02 | 2.83E+04 | 1 | 8.52E-06 | -0.2 | 0.1 | 1.7 | -1.6 | 98.3 | T |
| 132 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 9.5 | 1.17E+04 | 1.12E+05 | 1.08E+02 | 2.27E+04 | 1 | 8.95E-06 | -5.7 | 0.1 | 1.3 | 4.3 | 95.9 | T |
| 133 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 25.7 | 1.18E+04 | 3.03E+05 | 2.91E+02 | 1.39E+04 | 0 | 0.00E+00 | -1 | 0.7 | 0.5 | -0.3 | 99 | T |
| 134 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 25.5 | 1.18E+04 | 3.02E+05 | 2.91E+02 | 1.41E+04 | 0 | 0.00E+00 | 6.8 | 0.7 | 0.5 | -8 | 94.2 | T |
| 135 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 27.5 | 1.10E+04 | 3.03E+05 | 2.91E+02 | 1.44E+04 | 0 | 0.00E+00 | 14.1 | -0.1 | -2.2 | -11.8 | 90.3 | T |
| 136 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 25.8 | 1.17E+04 | 3.02E+05 | 2.91E+02 | 1.47E+04 | 0 | 0.00E+00 | 7.2 | 0.5 | 0.9 | -8.5 | 93.9 | T |
| 137 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 16.6 | 1.13E+04 | 1.87E+05 | 1.81E+02 | 1.49E+04 | 1 | 5.34E-06 | -5.9 | -0.7 | 1.2 | 5.4 | 95.5 | T |
| 138 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 25.5 | 1.18E+04 | 3.02E+05 | 2.90E+02 | 1.26E+04 | 0 | 0.00E+00 | -0.4 | 0.3 | 0.6 | -0.5 | 99.3 | T |
| 139 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 7 | 1.19E+04 | 8.32E+04 | 8.01E+01 | 1.26E+04 | 1 | 1.20E-05 | 1.2 | 1.1 | 1.7 | -4 | 97 | T |
| 140 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 73.5 | 4.12E+03 | 3.03E+05 | 2.92E+02 | 2.86E+04 | 0 | 0.00E+00 | -2.9 | 0.5 | -0.6 | 3 | 97.6 | T |

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| Run # | Device ID | Ion | Energy MeV | Range μm | LET(Si) MeV.cm2/mg | Tilt deg | Roll deg | Time sec | Flux #/cm2/sec | Fluence #/cm2 | Dose RAD (Si) | TotalDose RAD (Si) | Upsets | CrossSec cm2 | Left % | Top % | Bottom % | Right % | Unif % | Center % |
|-------|-----------|-------|------------|---------------------|--------------------|----------|----------|----------|----------------|---------------|---------------|--------------------|--------|--------------|--------|-------|----------|---------|--------|----------|
| 141 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 24.8 | 1.22E+04 | 3.02E+05 | 2.91E+02 | 2.88E+04 | 1 | 3.31E-06 | -1.1 | 2 | -0.2 | -0.7 | 98.3 | T |
| 142 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 24.9 | 1.22E+04 | 3.03E+05 | 2.91E+02 | 2.30E+04 | 0 | 0.00E+00 | 6.5 | 1.5 | -0.7 | -7.2 | 94.6 | T |
| 143 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.4 | 1.14E+04 | 3.02E+05 | 2.91E+02 | 1.52E+04 | 0 | 0.00E+00 | -1.3 | 1.5 | -1.9 | 1.8 | 98.1 | T |
| 144 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 18 | 1.01E+04 | 1.82E+05 | 1.75E+02 | 1.28E+04 | 1 | 5.50E-06 | -2.1 | 0.8 | -0.9 | 2.2 | 98.2 | T |
| 145 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 37.5 | 8.06E+03 | 3.02E+05 | 2.91E+02 | 2.91E+04 | 0 | 0.00E+00 | -4.1 | 1.2 | -0.9 | 3.8 | 96.8 | T |
| 146 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 31.5 | 9.55E+03 | 3.01E+05 | 2.90E+02 | 2.33E+04 | 0 | 0.00E+00 | -0.3 | 1.4 | -1.5 | 0.3 | 98.8 | T |
| 147 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 6.9 | 9.71E+03 | 6.72E+04 | 6.47E+01 | 1.53E+04 | 1 | 1.49E-05 | 6.3 | 2 | -2.5 | -5.8 | 95 | T |
| 148 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 31.2 | 9.67E+03 | 3.02E+05 | 2.90E+02 | 1.31E+04 | 0 | 0.00E+00 | 12.3 | -0.5 | -1.2 | -10.6 | 91.4 | T |
| 149 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 29.5 | 1.02E+04 | 3.02E+05 | 2.91E+02 | 1.34E+04 | 0 | 0.00E+00 | 5.4 | 1.5 | 0 | -6.9 | 95.1 | T |
| 150 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 30.7 | 9.81E+03 | 3.02E+05 | 2.91E+02 | 1.37E+04 | 0 | 0.00E+00 | 7.9 | 0.5 | -1.1 | -7.3 | 94.1 | T |
| 151 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 34.2 | 8.84E+03 | 3.02E+05 | 2.91E+02 | 1.40E+04 | 0 | 0.00E+00 | -2.4 | 0.9 | -1.1 | 2.6 | 97.8 | T |
| 152 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 33 | 9.17E+03 | 3.02E+05 | 2.91E+02 | 1.43E+04 | 0 | 0.00E+00 | 2.6 | 0.6 | 0.4 | -3.5 | 97.5 | T |
| 153 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 33.5 | 9.01E+03 | 3.02E+05 | 2.91E+02 | 1.46E+04 | 0 | 0.00E+00 | 1.1 | 0.4 | -0.2 | -1.3 | 99 | T |
| 154 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 33.1 | 9.15E+03 | 3.02E+05 | 2.91E+02 | 1.49E+04 | 0 | 0.00E+00 | 7.8 | 0.4 | -0.8 | -7.4 | 94.1 | T |
| 155 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 11.2 | 8.97E+03 | 1.01E+05 | 9.68E+01 | 1.50E+04 | 1 | 9.95E-06 | 17.4 | 0 | -3.6 | -13.8 | 88.4 | T |
| 156 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 33.6 | 8.98E+03 | 3.02E+05 | 2.90E+02 | 2.94E+04 | 0 | 0.00E+00 | 0.2 | 1 | -1 | -0.1 | 99.2 | T |
| 157 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 33 | 9.15E+03 | 3.02E+05 | 2.91E+02 | 2.97E+04 | 0 | 0.00E+00 | 4.8 | 1.3 | -1.3 | -4.8 | 96.1 | T |
| 158 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 33.8 | 8.94E+03 | 3.02E+05 | 2.91E+02 | 3.00E+04 | 0 | 0.00E+00 | 10.5 | 0.4 | -1.1 | -9.9 | 92.3 | T |
| 159 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 34.5 | 8.74E+03 | 3.01E+05 | 2.90E+02 | 2.36E+04 | 0 | 0.00E+00 | 4.5 | 1.7 | -1 | -5.3 | 96 | T |
| 160 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 40.1 | 7.50E+03 | 3.01E+05 | 2.90E+02 | 2.38E+04 | 0 | 0.00E+00 | -11 | -0.8 | -3.7 | 15.9 | 89.5 | T |
| 161 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 55.8 | 5.42E+03 | 3.02E+05 | 2.91E+02 | 3.03E+04 | 0 | 0.00E+00 | -11 | -0.8 | -3.6 | 15.4 | 89.7 | T |
| 162 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 27.3 | 1.11E+04 | 3.02E+05 | 2.91E+02 | 3.06E+04 | 0 | 0.00E+00 | -8.2 | 1.4 | -4.8 | 11.7 | 91.8 | T |
| 163 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 19.9 | 1.23E+04 | 2.45E+05 | 2.36E+02 | 3.08E+04 | 1 | 4.09E-06 | 5.5 | 2.6 | -1.4 | -6.7 | 94.9 | T |
| 164 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 23.6 | 1.28E+04 | 3.02E+05 | 2.91E+02 | 2.41E+04 | 0 | 0.00E+00 | 3.1 | 0.6 | -1.3 | -2.4 | 97.6 | T |
| 165 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 23.1 | 1.31E+04 | 3.03E+05 | 2.91E+02 | 2.44E+04 | 0 | 0.00E+00 | -1.7 | 2.9 | -2.2 | 1 | 97.6 | T |
| 166 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 7.2 | 1.20E+04 | 8.59E+04 | 8.27E+01 | 1.53E+04 | 1 | 1.17E-05 | -5.5 | 1.2 | -1.3 | 5.6 | 95.6 | T |
| 167 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 25.6 | 1.18E+04 | 3.03E+05 | 2.91E+02 | 1.52E+04 | 0 | 0.00E+00 | -1.7 | 2.8 | -1.9 | 0.8 | 97.8 | T |
| 168 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 11.2 | 1.15E+04 | 1.29E+05 | 1.24E+02 | 1.54E+04 | 1 | 7.78E-06 | -2.3 | 3.2 | -2.1 | 1.2 | 97.3 | T |
| 169 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.5 | 1.14E+04 | 3.02E+05 | 2.91E+02 | 3.11E+04 | 0 | 0.00E+00 | -8.5 | 2 | -3.8 | 10.3 | 92.5 | T |
| 170 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 25 | 1.21E+04 | 3.03E+05 | 2.91E+02 | 3.14E+04 | 0 | 0.00E+00 | -8.1 | 0.9 | -3.8 | 11 | 92.3 | T |
| 171 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 25 | 1.21E+04 | 3.02E+05 | 2.90E+02 | 3.17E+04 | 0 | 0.00E+00 | -6.9 | 3.4 | -3.1 | 6.6 | 94.2 | T |
| 172 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 23.4 | 1.30E+04 | 3.03E+05 | 2.92E+02 | 3.20E+04 | 0 | 0.00E+00 | -0.9 | 2.9 | -2.2 | 0.3 | 97.8 | T |
| 173 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 3.1 | 1.21E+04 | 3.69E+04 | 3.55E+01 | 3.20E+04 | 1 | 2.71E-05 | -10 | 0.7 | -2.1 | 11.5 | 91.8 | T |
| 174 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 16.8 | 1.28E+04 | 2.15E+05 | 2.07E+02 | 2.46E+04 | 1 | 4.65E-06 | -0.8 | 3.2 | -1.1 | -1.3 | 97.5 | T |
| 175 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 38.6 | 7.83E+03 | 3.02E+05 | 2.91E+02 | 1.56E+04 | 0 | 0.00E+00 | -13 | 2.2 | -4.8 | 15.1 | 89.4 | T |

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| Run # | Device ID | Ion | Energy MeV | Range μ m | LET(Si) MeV.cm2 /mg | Tilt deg | Roll deg | Time sec | Flux #/cm2/sec | Fluence #/cm2 | Dose RAD (Si) | TotalDose RAD (Si) | Upsets | CrossSec cm2 | Left % | Top % | Bottom % | Right % | Unif % | Center % |
|-------|-----------|-------|------------|---------------|---------------------|----------|----------|----------|----------------|---------------|---------------|--------------------|--------|--------------|--------|-------|----------|---------|--------|----------|
| 176 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 42.2 | 7.14E+03 | 3.01E+05 | 2.90E+02 | 1.59E+04 | 0 | 0.00E+00 | -17 | -1.1 | -6.2 | 24.2 | 84.8 | T |
| 177 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 29.1 | 1.04E+04 | 3.02E+05 | 2.91E+02 | 1.62E+04 | 0 | 0.00E+00 | -20 | -3.1 | -6.2 | 29.1 | 82.4 | T |
| 178 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 19.6 | 1.54E+04 | 3.02E+05 | 2.91E+02 | 1.65E+04 | 0 | 0.00E+00 | -0.2 | 2 | 2.4 | -4.2 | 96.2 | T |
| 179 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.7 | 1.46E+04 | 3.02E+05 | 2.91E+02 | 1.57E+04 | 0 | 0.00E+00 | 9.6 | 1.9 | 0.2 | -11.8 | 91.8 | T |
| 180 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.4 | 1.41E+04 | 3.02E+05 | 2.91E+02 | 1.60E+04 | 0 | 0.00E+00 | 5.6 | 2.3 | 1.9 | -9.8 | 93.3 | T |
| 181 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 22.7 | 1.34E+04 | 3.03E+05 | 2.92E+02 | 1.62E+04 | 0 | 0.00E+00 | 0.2 | 2.2 | 1.8 | -4.1 | 96.5 | T |
| 182 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 22.6 | 1.34E+04 | 3.03E+05 | 2.92E+02 | 1.65E+04 | 0 | 0.00E+00 | 3.5 | 1.4 | 2.1 | -6.9 | 95.1 | T |
| 183 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.8 | 1.13E+04 | 3.03E+05 | 2.92E+02 | 1.68E+04 | 0 | 0.00E+00 | -3.7 | 1 | 0.6 | 2.1 | 97.4 | T |
| 184 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 24.5 | 1.23E+04 | 3.03E+05 | 2.91E+02 | 3.23E+04 | 0 | 0.00E+00 | -6.3 | 2.4 | -0.1 | 4 | 95.5 | T |
| 185 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 40.2 | 7.51E+03 | 3.02E+05 | 2.91E+02 | 3.26E+04 | 0 | 0.00E+00 | -5.9 | 1.8 | -0.2 | 4.3 | 95.8 | T |
| 186 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 28.4 | 6.97E+03 | 1.98E+05 | 1.91E+02 | 3.28E+04 | 1 | 5.05E-06 | -6.2 | 1.3 | 0.8 | 4.1 | 95.6 | T |
| 187 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 24 | 1.26E+04 | 3.02E+05 | 2.91E+02 | 2.49E+04 | 0 | 0.00E+00 | 5.2 | 2.1 | 3 | -10.2 | 93 | T |
| 188 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 22.9 | 1.32E+04 | 3.02E+05 | 2.91E+02 | 2.52E+04 | 0 | 0.00E+00 | 6.6 | 1.9 | 2.5 | -11 | 92.6 | T |
| 189 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 25.6 | 1.18E+04 | 3.02E+05 | 2.91E+02 | 2.55E+04 | 0 | 0.00E+00 | 6.9 | 2.5 | 1.6 | -11 | 92.6 | T |
| 190 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 26.9 | 1.12E+04 | 3.02E+05 | 2.91E+02 | 2.58E+04 | 0 | 0.00E+00 | 9.3 | 3.1 | 1.4 | -13.8 | 90.8 | T |
| 191 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 30.4 | 9.93E+03 | 3.02E+05 | 2.91E+02 | 2.61E+04 | 0 | 0.00E+00 | -0.2 | 1.9 | 3.9 | -5.6 | 95 | T |
| 192 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 2.4 | 9.97E+03 | 2.41E+04 | 2.32E+01 | 2.61E+04 | 1 | 4.16E-05 | 7.2 | 2.8 | 0.7 | -10.7 | 92.7 | T |
| 193 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 38 | 7.93E+03 | 3.02E+05 | 2.91E+02 | 1.68E+04 | 0 | 0.00E+00 | 3.8 | 2.6 | 3.6 | -10 | 93 | T |
| 194 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 36 | 8.37E+03 | 3.01E+05 | 2.90E+02 | 1.71E+04 | 0 | 0.00E+00 | -2.9 | 3 | 4 | -4 | 94.6 | T |
| 195 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 37.1 | 8.15E+03 | 3.02E+05 | 2.91E+02 | 1.74E+04 | 0 | 0.00E+00 | -1 | 1.8 | 4.3 | -5.1 | 94.9 | T |
| 196 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 30.5 | 9.88E+03 | 3.02E+05 | 2.90E+02 | 1.77E+04 | 0 | 0.00E+00 | 7.9 | 3.1 | 2.1 | -13 | 91.3 | T |
| 197 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 40.6 | 7.43E+03 | 3.02E+05 | 2.90E+02 | 1.80E+04 | 0 | 0.00E+00 | -5.4 | 2.1 | 4.3 | -0.9 | 94.7 | T |
| 198 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 50.5 | 5.97E+03 | 3.01E+05 | 2.90E+02 | 1.54E+04 | 0 | 0.00E+00 | -6.8 | 1.3 | 1.8 | 3.7 | 95.2 | T |
| 199 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 27 | 7.83E+03 | 2.11E+05 | 2.03E+02 | 1.56E+04 | 1 | 4.74E-06 | 5 | 2.7 | 2.1 | -9.7 | 93.4 | T |
| 200 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 53.3 | 5.66E+03 | 3.02E+05 | 2.91E+02 | 3.11E+04 | 0 | 0.00E+00 | -12 | -1.4 | 2.5 | 11.2 | 91.1 | T |
| 201 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 45 | 6.68E+03 | 3.01E+05 | 2.90E+02 | 3.14E+04 | 0 | 0.00E+00 | -6.2 | 1.1 | 3.5 | 1.6 | 95.2 | T |
| 202 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 62.9 | 8.79E+03 | 5.53E+05 | 5.32E+02 | 3.19E+04 | 0 | 0.00E+00 | 1.2 | 3.3 | 3.3 | -7.8 | 93.9 | T |
| 203 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 32 | 9.40E+03 | 3.01E+05 | 2.90E+02 | 3.22E+04 | 0 | 0.00E+00 | -2.9 | 2.9 | 4.1 | -4.2 | 94.5 | T |
| 204 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 38.1 | 7.91E+03 | 3.02E+05 | 2.91E+02 | 3.25E+04 | 0 | 0.00E+00 | -7 | 2.2 | 3.2 | 1.6 | 94.7 | T |
| 205 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 6.3 | 7.39E+03 | 4.68E+04 | 4.51E+01 | 3.26E+04 | 1 | 2.14E-05 | -6.2 | 1.3 | 4.8 | 0.1 | 94.6 | T |
| 206 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 43.6 | 6.91E+03 | 3.02E+05 | 2.90E+02 | 2.47E+04 | 0 | 0.00E+00 | -6 | 1.5 | 4 | 0.5 | 94.9 | T |
| 207 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 30.6 | 9.90E+03 | 3.03E+05 | 2.92E+02 | 2.50E+04 | 0 | 0.00E+00 | -4.7 | 3.8 | 2.5 | -1.6 | 94.9 | T |
| 208 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 23.5 | 1.29E+04 | 3.03E+05 | 2.91E+02 | 2.53E+04 | 0 | 0.00E+00 | 5.3 | 3.1 | 2.9 | -11.4 | 92.2 | T |
| 209 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 23.1 | 1.31E+04 | 3.03E+05 | 2.91E+02 | 2.56E+04 | 0 | 0.00E+00 | 5.5 | 2.8 | 1.5 | -9.8 | 93.3 | T |
| 210 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 25 | 1.21E+04 | 3.02E+05 | 2.91E+02 | 2.59E+04 | 0 | 0.00E+00 | 2.6 | 3.3 | 2.3 | -8.2 | 94 | T |
| 211 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 27.7 | 1.09E+04 | 3.02E+05 | 2.91E+02 | 1.56E+04 | 0 | 0.00E+00 | 0.6 | 2.9 | 3.5 | -7.1 | 94.2 | T |

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| Run # | Device ID | Ion | Energy MeV | Range μm | LET(Si) MeV.cm2/mg | Tilt deg | Roll deg | Time sec | Flux #/cm2/sec | Fluence #/cm2 | Dose RAD (Si) | TotalDose RAD (Si) | Upsets | CrossSec cm2 | Left % | Top % | Bottom % | Right % | Unif % | Center % |
|-------|-----------|-------|------------|---------------------|--------------------|----------|----------|----------|----------------|---------------|---------------|--------------------|--------|--------------|--------|-------|----------|---------|--------|----------|
| 212 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 23.7 | 1.27E+04 | 3.02E+05 | 2.91E+02 | 1.59E+04 | 0 | 0.00E+00 | 4.2 | 3.7 | 2.2 | -10.1 | 92.9 | T |
| 213 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 28.2 | 1.07E+04 | 3.02E+05 | 2.91E+02 | 1.62E+04 | 0 | 0.00E+00 | -3 | 3.2 | 2.9 | -3.1 | 95.3 | T |
| 214 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 24.8 | 8.84E+03 | 2.19E+05 | 2.11E+02 | 1.64E+04 | 1 | 4.57E-06 | -6.9 | 2.6 | 2.5 | 1.8 | 94.8 | T |
| 215 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 31.8 | 9.49E+03 | 3.02E+05 | 2.91E+02 | 1.59E+04 | 0 | 0.00E+00 | -1.2 | 2.2 | 3.6 | -4.6 | 95.3 | T |
| 216 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 27.5 | 1.10E+04 | 3.02E+05 | 2.91E+02 | 1.62E+04 | 0 | 0.00E+00 | 3.8 | 3.8 | 1.9 | -9.6 | 93.2 | T |
| 217 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 27.1 | 1.12E+04 | 3.02E+05 | 2.91E+02 | 1.64E+04 | 0 | 0.00E+00 | 2.9 | 2.9 | 2.8 | -8.6 | 93.8 | T |
| 218 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 27.8 | 1.09E+04 | 3.02E+05 | 2.91E+02 | 1.67E+04 | 0 | 0.00E+00 | -1.2 | 3.9 | 2.8 | -5.6 | 94.5 | T |
| 219 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 28.7 | 1.05E+04 | 3.02E+05 | 2.91E+02 | 1.70E+04 | 0 | 0.00E+00 | 1.1 | 4.5 | 3.2 | -8.8 | 93 | T |
| 220 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 22.1 | 1.37E+04 | 3.03E+05 | 2.92E+02 | 3.29E+04 | 0 | 0.00E+00 | 8.1 | -2.8 | -3.5 | -1.8 | 93.8 | T |
| 221 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 22.4 | 1.35E+04 | 3.03E+05 | 2.91E+02 | 3.31E+04 | 0 | 0.00E+00 | 7.6 | -3.2 | -2.8 | -1.7 | 94.2 | T |
| 222 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 22.3 | 1.35E+04 | 3.02E+05 | 2.91E+02 | 3.34E+04 | 0 | 0.00E+00 | 5 | -1.8 | -3.1 | -0.1 | 95.6 | T |
| 223 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.8 | 1.38E+04 | 3.02E+05 | 2.91E+02 | 3.37E+04 | 0 | 0.00E+00 | 10.5 | -3.1 | -4.2 | -3.1 | 92.4 | T |
| 224 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.8 | 1.39E+04 | 3.03E+05 | 2.92E+02 | 3.40E+04 | 0 | 0.00E+00 | 7.6 | -2.5 | -4.3 | -0.8 | 93.9 | T |
| 225 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 22.6 | 1.34E+04 | 3.03E+05 | 2.92E+02 | 3.43E+04 | 0 | 0.00E+00 | 2.8 | -2.4 | -3.4 | 3 | 95.4 | T |
| 226 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.4 | 1.41E+04 | 3.02E+05 | 2.91E+02 | 3.46E+04 | 0 | 0.00E+00 | 15 | -3.3 | -4.9 | -6.8 | 90 | T |
| 227 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.8 | 1.39E+04 | 3.02E+05 | 2.91E+02 | 3.49E+04 | 0 | 0.00E+00 | 13.6 | -3.3 | -4.2 | -6.1 | 90.8 | T |
| 228 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 22.9 | 1.32E+04 | 3.02E+05 | 2.91E+02 | 2.62E+04 | 0 | 0.00E+00 | 3.3 | -3.2 | -3.6 | 3.5 | 94.7 | T |
| 229 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 22.2 | 1.37E+04 | 3.03E+05 | 2.92E+02 | 2.65E+04 | 0 | 0.00E+00 | 6.5 | -3.2 | -2.9 | -0.3 | 94.6 | T |
| 230 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.5 | 1.41E+04 | 3.03E+05 | 2.92E+02 | 2.68E+04 | 0 | 0.00E+00 | 15 | -3.5 | -4.8 | -6.7 | 89.9 | T |
| 231 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.5 | 1.41E+04 | 3.03E+05 | 2.92E+02 | 2.71E+04 | 0 | 0.00E+00 | 16.3 | -4 | -4.3 | -8.1 | 89.3 | T |
| 232 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.6 | 1.40E+04 | 3.03E+05 | 2.92E+02 | 2.73E+04 | 0 | 0.00E+00 | 14.1 | -3.3 | -4.7 | -6 | 90.5 | T |
| 233 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 23.4 | 1.30E+04 | 3.04E+05 | 2.93E+02 | 2.76E+04 | 0 | 0.00E+00 | -1.4 | -3 | -2.7 | 7.1 | 94.5 | T |
| 234 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 22.7 | 1.33E+04 | 3.02E+05 | 2.91E+02 | 2.79E+04 | 0 | 0.00E+00 | 1.5 | -2.3 | -4.2 | 5 | 94.8 | T |
| 235 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.8 | 1.39E+04 | 3.02E+05 | 2.91E+02 | 2.82E+04 | 0 | 0.00E+00 | 5.5 | -3.2 | -2.7 | 0.3 | 95.1 | T |
| 236 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.9 | 1.38E+04 | 3.02E+05 | 2.91E+02 | 2.85E+04 | 0 | 0.00E+00 | 7.1 | -2.7 | -3.5 | -0.8 | 94.3 | T |
| 237 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.5 | 1.41E+04 | 3.03E+05 | 2.91E+02 | 1.67E+04 | 0 | 0.00E+00 | 12 | -4.3 | -2.4 | -5.4 | 91.8 | T |
| 238 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.9 | 1.45E+04 | 3.02E+05 | 2.91E+02 | 1.70E+04 | 0 | 0.00E+00 | 13.2 | -3.4 | -3.8 | -5.9 | 91.1 | T |
| 239 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21 | 1.44E+04 | 3.03E+05 | 2.92E+02 | 1.73E+04 | 0 | 0.00E+00 | 14.5 | -3.1 | -4.6 | -6.8 | 90.3 | T |
| 240 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.6 | 1.40E+04 | 3.03E+05 | 2.92E+02 | 1.76E+04 | 0 | 0.00E+00 | 5.4 | -2.6 | -2.2 | -0.6 | 95.6 | T |
| 241 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 22.9 | 1.32E+04 | 3.03E+05 | 2.92E+02 | 1.79E+04 | 0 | 0.00E+00 | -2.7 | -3.3 | -3.9 | 9.9 | 92.7 | T |
| 242 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.5 | 1.48E+04 | 3.03E+05 | 2.92E+02 | 1.82E+04 | 0 | 0.00E+00 | 13.4 | -3.4 | -3.9 | -6.2 | 90.9 | T |
| 243 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.4 | 1.48E+04 | 3.03E+05 | 2.92E+02 | 1.85E+04 | 0 | 0.00E+00 | 10 | -2.5 | -3.7 | -3.8 | 93 | T |

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| Run # | Device ID | Ion | Energy MeV | Range μm | LET(Si) MeV.cm2 /mg | Tilt deg | Roll deg | Time sec | Flux #/cm2/sec | Fluence #/cm2 | Dose RAD (Si) | TotalDose RAD (Si) | Upsets | CrossSec cm2 | Left % | Top % | Bottom % | Right % | Unif % | Center % |
|-------|-----------|-------|------------|---------------------|---------------------|----------|----------|----------|----------------|---------------|---------------|--------------------|--------|--------------|--------|-------|----------|---------|--------|----------|
| 244 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.4 | 1.42E+04 | 3.03E+05 | 2.92E+02 | 1.88E+04 | 0 | 0.00E+00 | 1.2 | -3 | -2.9 | 4.7 | 95.2 | T |
| 245 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.7 | 1.40E+04 | 3.03E+05 | 2.92E+02 | 1.73E+04 | 0 | 0.00E+00 | -1.2 | -3.3 | -3.2 | 7.7 | 94 | T |
| 246 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 22.1 | 1.37E+04 | 3.03E+05 | 2.92E+02 | 1.76E+04 | 0 | 0.00E+00 | -4.4 | -3.1 | -3.1 | 10.5 | 92.7 | T |
| 247 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 22.1 | 1.37E+04 | 3.03E+05 | 2.92E+02 | 1.79E+04 | 0 | 0.00E+00 | -2.3 | -3.5 | -2.4 | 8.2 | 93.9 | T |
| 248 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.6 | 1.47E+04 | 3.02E+05 | 2.91E+02 | 1.82E+04 | 0 | 0.00E+00 | 5.9 | -2.6 | -3.1 | -0.3 | 95 | T |
| 249 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.2 | 1.50E+04 | 3.03E+05 | 2.92E+02 | 1.85E+04 | 0 | 0.00E+00 | 8.7 | -3 | -3 | -2.7 | 93.7 | T |
| 250 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 16 | 1.44E+04 | 2.30E+05 | 2.22E+02 | 1.87E+04 | 1 | 4.35E-06 | 10.1 | -3.1 | -4.1 | -2.9 | 92.6 | T |
| 251 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21.1 | 1.43E+04 | 3.02E+05 | 2.91E+02 | 3.52E+04 | 0 | 0.00E+00 | 4.4 | -3.3 | -2.6 | 1.5 | 95.3 | T |
| 252 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.5 | 1.48E+04 | 3.03E+05 | 2.92E+02 | 3.55E+04 | 0 | 0.00E+00 | 7.5 | -2.8 | -3 | -1.7 | 94.3 | T |
| 253 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.7 | 1.46E+04 | 3.03E+05 | 2.91E+02 | 3.58E+04 | 0 | 0.00E+00 | 6.5 | -2.4 | -3.7 | -0.4 | 94.6 | T |
| 254 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.7 | 1.46E+04 | 3.02E+05 | 2.91E+02 | 3.61E+04 | 0 | 0.00E+00 | 13.9 | -3.5 | -3.7 | -6.7 | 90.7 | T |
| 255 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 21 | 1.44E+04 | 3.02E+05 | 2.91E+02 | 3.63E+04 | 0 | 0.00E+00 | 30.3 | -6.3 | -8.4 | -15.5 | 81.8 | T |
| 256 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.3 | 1.50E+04 | 3.03E+05 | 2.92E+02 | 2.88E+04 | 0 | 0.00E+00 | 5 | -5.8 | -6.4 | 7.1 | 90.9 | T |
| 257 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.3 | 1.49E+04 | 3.03E+05 | 2.92E+02 | 2.91E+04 | 0 | 0.00E+00 | 4.4 | -5.8 | -6.1 | 7.5 | 91.1 | T |
| 258 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.8 | 1.46E+04 | 3.04E+05 | 2.93E+02 | 2.94E+04 | 0 | 0.00E+00 | -3.4 | -6.2 | -6.6 | 16.2 | 88.4 | T |
| 259 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.6 | 1.47E+04 | 3.04E+05 | 2.93E+02 | 1.91E+04 | 0 | 0.00E+00 | -6.6 | -6.6 | -6.8 | 20 | 86.7 | T |
| 260 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20 | 1.51E+04 | 3.02E+05 | 2.91E+02 | 1.94E+04 | 0 | 0.00E+00 | -4.4 | -6.7 | -5.5 | 16.6 | 88.4 | T |
| 261 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.5 | 1.47E+04 | 3.02E+05 | 2.91E+02 | 1.96E+04 | 0 | 0.00E+00 | -6.5 | -6.5 | -6 | 19 | 87.3 | T |
| 262 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20 | 1.51E+04 | 3.03E+05 | 2.92E+02 | 1.99E+04 | 0 | 0.00E+00 | -1.5 | -5.8 | -7.1 | 14.4 | 89 | T |
| 263 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20 | 1.52E+04 | 3.03E+05 | 2.92E+02 | 2.02E+04 | 0 | 0.00E+00 | -0.9 | -5 | -6.6 | 12.5 | 90.1 | T |
| 264 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20 | 1.51E+04 | 3.02E+05 | 2.91E+02 | 1.90E+04 | 0 | 0.00E+00 | -6.2 | -5.7 | -7.3 | 19.2 | 87 | T |
| 265 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.3 | 1.49E+04 | 3.03E+05 | 2.91E+02 | 1.93E+04 | 0 | 0.00E+00 | -2.3 | -7.1 | -6.2 | 15.6 | 88.4 | T |
| 266 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.2 | 1.50E+04 | 3.04E+05 | 2.92E+02 | 1.96E+04 | 0 | 0.00E+00 | 2 | -5.9 | -6.2 | 10.1 | 90.5 | T |
| 267 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20 | 1.52E+04 | 3.03E+05 | 2.92E+02 | 1.99E+04 | 0 | 0.00E+00 | -0.4 | -5.8 | -7.1 | 13.3 | 89.3 | T |
| 268 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.2 | 1.50E+04 | 3.03E+05 | 2.92E+02 | 2.02E+04 | 0 | 0.00E+00 | -1.7 | -5.3 | -6.4 | 13.3 | 89.8 | T |
| 269 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 19.9 | 1.52E+04 | 3.03E+05 | 2.91E+02 | 2.05E+04 | 0 | 0.00E+00 | -5.7 | -7 | -6.4 | 19 | 87.1 | T |
| 270 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.1 | 1.51E+04 | 3.03E+05 | 2.91E+02 | 2.07E+04 | 0 | 0.00E+00 | -5.6 | -6.7 | -6.2 | 18.4 | 87.5 | T |
| 271 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.2 | 1.50E+04 | 3.02E+05 | 2.91E+02 | 2.10E+04 | 0 | 0.00E+00 | -4.6 | -6.6 | -5.8 | 16.9 | 88.2 | T |
| 272 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.3 | 1.49E+04 | 3.03E+05 | 2.91E+02 | 2.13E+04 | 0 | 0.00E+00 | -4.7 | -6.2 | -6.6 | 17.5 | 87.9 | T |
| 273 | 4 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 1.5 | 1.54E+04 | 2.34E+04 | 2.25E+01 | 2.14E+04 | 1 | 4.28E-05 | -1.1 | -3.4 | -8.8 | 13.3 | 89.5 | T |
| 274 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 19.9 | 1.53E+04 | 3.04E+05 | 2.92E+02 | 3.66E+04 | 0 | 0.00E+00 | -1.4 | -5.6 | -6.7 | 13.7 | 89.4 | T |
| 275 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 19.5 | 1.56E+04 | 3.04E+05 | 2.92E+02 | 3.69E+04 | 0 | 0.00E+00 | 3.7 | -5.4 | -6.3 | 8 | 91.1 | T |
| 276 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 19.6 | 1.55E+04 | 3.04E+05 | 2.93E+02 | 3.72E+04 | 0 | 0.00E+00 | 6.7 | -5.9 | -6.2 | 5.4 | 91 | T |
| 277 | 1 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 19.8 | 1.53E+04 | 3.02E+05 | 2.91E+02 | 3.75E+04 | 0 | 0.00E+00 | -2.6 | -6 | -7 | 15.6 | 88.5 | T |
| 278 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 19.8 | 1.53E+04 | 3.03E+05 | 2.91E+02 | 2.97E+04 | 0 | 0.00E+00 | 12.5 | -5.7 | -6.5 | -0.3 | 89.9 | T |

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| Run # | Device ID | Ion | Energy MeV | Range μm | LET(Si) MeV.cm2/mg | Tilt deg | Roll deg | Time sec | Flux #/cm2/sec | Fluence #/cm2 | Dose RAD (Si) | TotalDose RAD (Si) | Upsets | CrossSec cm2 | Left % | Top % | Bottom % | Right % | Unif % | Center % |
|-------|-----------|-------|------------|---------------------|--------------------|----------|----------|----------|----------------|---------------|---------------|--------------------|--------|--------------|--------|-------|----------|---------|--------|----------|
| 279 | 2 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 19.7 | 1.54E+04 | 3.03E+05 | 2.92E+02 | 3.00E+04 | 0 | 0.00E+00 | 2.2 | -6.2 | -6.3 | 10.4 | 90.3 | T |
| 280 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.2 | 1.50E+04 | 3.03E+05 | 2.92E+02 | 2.05E+04 | 0 | 0.00E+00 | -6.5 | -6.8 | -6.1 | 19.4 | 87 | T |
| 281 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.5 | 1.48E+04 | 3.03E+05 | 2.92E+02 | 2.08E+04 | 0 | 0.00E+00 | -6.6 | -6.6 | -6 | 19.1 | 87.2 | T |
| 282 | 3 | I-127 | 343 | 32.6 | 59.85 | 0 | 0 | 20.8 | 1.46E+04 | 3.03E+05 | 2.92E+02 | 2.11E+04 | 0 | 0.00E+00 | -6.1 | -6.2 | -6 | 18.4 | 87.6 | T |
| 283 | 1 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 2 | 1.20E+04 | 2.35E+04 | 1.44E+01 | 1.49E+04 | 1 | 4.25E-05 | -6.4 | 5.4 | -7.8 | 8.8 | 92.2 | Y |
| 284 | 2 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 23.2 | 1.30E+04 | 3.02E+05 | 1.85E+02 | 3.24E+03 | 0 | 0.00E+00 | -4.2 | 2.5 | -5.9 | 7.6 | 93.9 | Y |
| 285 | 2 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 6.8 | 1.31E+04 | 8.90E+04 | 5.44E+01 | 3.29E+03 | 1 | 1.12E-05 | -4.5 | 1.8 | -3.6 | 6.3 | 95.1 | Y |
| 286 | 4 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 19.8 | 1.54E+04 | 3.03E+05 | 1.85E+02 | 7.92E+03 | 0 | 0.00E+00 | -4.6 | 2.4 | -5.1 | 7.2 | 94.3 | Y |
| 287 | 4 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 21.6 | 1.40E+04 | 3.03E+05 | 1.85E+02 | 8.11E+03 | 0 | 0.00E+00 | -3.9 | 3.1 | -5.1 | 5.9 | 94.8 | Y |
| 288 | 4 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 21.3 | 1.42E+04 | 3.02E+05 | 1.85E+02 | 8.29E+03 | 0 | 0.00E+00 | -4.4 | 3.1 | -5.6 | 6.9 | 94.2 | Y |
| 289 | 4 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 21.2 | 1.42E+04 | 3.02E+05 | 1.85E+02 | 8.47E+03 | 0 | 0.00E+00 | -4.3 | 3.4 | -4.9 | 5.7 | 94.8 | Y |
| 290 | 4 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 1.2 | 1.45E+04 | 1.68E+04 | 1.02E+01 | 8.48E+03 | 1 | 5.97E-05 | -4.9 | 2.3 | -6.3 | 8.8 | 93.2 | Y |
| 291 | 5 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 21.5 | 1.41E+04 | 3.03E+05 | 1.85E+02 | 6.42E+03 | 0 | 0.00E+00 | -3.8 | 3.2 | -5.8 | 6.5 | 94.4 | Y |
| 292 | 6 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 3 | 1.40E+04 | 4.16E+04 | 2.54E+01 | 6.70E+03 | 1 | 2.40E-05 | -4.2 | 3.4 | -6.2 | 6.9 | 94 | Y |
| 293 | 7 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 23.6 | 1.29E+04 | 3.03E+05 | 1.85E+02 | 5.63E+03 | 0 | 0.00E+00 | -3.9 | 3.2 | -5.2 | 6 | 94.7 | Y |
| 294 | 8 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 25 | 1.21E+04 | 3.03E+05 | 1.85E+02 | 3.91E+03 | 0 | 0.00E+00 | -4.2 | 2.7 | -5.2 | 6.7 | 94.4 | Y |
| 295 | 9 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 24.7 | 1.22E+04 | 3.02E+05 | 1.85E+02 | 2.29E+03 | 0 | 0.00E+00 | -5 | 3.5 | -5.2 | 6.7 | 94.2 | Y |
| 296 | 10 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 25.6 | 1.18E+04 | 3.03E+05 | 1.85E+02 | 1.48E+04 | 0 | 0.00E+00 | -4.6 | 3.6 | -5.1 | 6.1 | 94.6 | Y |
| 297 | 10 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 1.2 | 1.18E+04 | 1.42E+04 | 8.65E+00 | 1.48E+04 | 1 | 7.06E-05 | -1.6 | 3.3 | -8.7 | 7.1 | 93 | Y |
| 298 | 11 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 26.9 | 1.12E+04 | 3.02E+05 | 1.85E+02 | 6.20E+03 | 0 | 0.00E+00 | -4.5 | 3.3 | -5.2 | 6.4 | 94.5 | Y |
| 299 | 11 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 1.3 | 1.08E+04 | 1.43E+04 | 8.74E+00 | 6.21E+03 | 1 | 6.99E-05 | -5.1 | 6.1 | -3 | 2.1 | 94.9 | Y |
| 300 | 12 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 28.4 | 1.06E+04 | 3.02E+05 | 1.84E+02 | 9.11E+03 | 0 | 0.00E+00 | -5.5 | 3.6 | -5.1 | 7 | 94 | Y |
| 301 | 12 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 29.3 | 1.03E+04 | 3.02E+05 | 1.85E+02 | 9.29E+03 | 0 | 0.00E+00 | -3.8 | 4.1 | -6.6 | 6.2 | 94 | Y |
| 302 | 12 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 29.2 | 1.04E+04 | 3.02E+05 | 1.84E+02 | 9.48E+03 | 0 | 0.00E+00 | -5.1 | 1.7 | -4.8 | 8.3 | 93.8 | Y |
| 303 | 15 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 30.1 | 1.00E+04 | 3.01E+05 | 1.84E+02 | 9.76E+03 | 0 | 0.00E+00 | -5.1 | 3 | -5.3 | 7.4 | 94 | Y |
| 304 | 15 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 29.2 | 1.03E+04 | 3.02E+05 | 1.84E+02 | 9.95E+03 | 0 | 0.00E+00 | -4.8 | 2.1 | -5.2 | 8 | 93.9 | Y |
| 305 | 15 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 29.1 | 1.04E+04 | 3.02E+05 | 1.84E+02 | 1.01E+04 | 0 | 0.00E+00 | -4.4 | 2.6 | -5.3 | 7.1 | 94.2 | Y |
| 306 | 16 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 30.6 | 9.87E+03 | 3.02E+05 | 1.84E+02 | 8.33E+03 | 0 | 0.00E+00 | -4.9 | 3.3 | -4.9 | 6.5 | 94.4 | Y |
| 307 | 16 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 30.7 | 9.82E+03 | 3.02E+05 | 1.84E+02 | 8.51E+03 | 0 | 0.00E+00 | -4.7 | 2.8 | -5.8 | 7.7 | 93.8 | Y |
| 308 | 16 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 29.8 | 1.01E+04 | 3.02E+05 | 1.85E+02 | 8.69E+03 | 0 | 0.00E+00 | -4.2 | 2.9 | -5.7 | 7.1 | 94.1 | Y |
| 309 | 18 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 31.8 | 9.50E+03 | 3.02E+05 | 1.85E+02 | 6.77E+03 | 0 | 0.00E+00 | -4.6 | 2.7 | -5 | 7 | 94.4 | Y |
| 310 | 18 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 30.9 | 9.79E+03 | 3.02E+05 | 1.85E+02 | 6.96E+03 | 0 | 0.00E+00 | -3.6 | 2.5 | -5.7 | 6.8 | 94.3 | Y |
| 311 | 18 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 36 | 8.37E+03 | 3.01E+05 | 1.84E+02 | 7.14E+03 | 0 | 0.00E+00 | -4.8 | 2.6 | -4.4 | 6.7 | 94.6 | Y |

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| Run # | Device ID | Ion | Energy MeV | Range μm | LET(Si) MeV.cm2/mg | Tilt deg | Roll deg | Time sec | Flux #/cm2/sec | Fluence #/cm2 | Dose RAD (Si) | TotalDose RAD (Si) | Upsets | CrossSec cm2 | Left % | Top % | Bottom % | Right % | Unif % | Center % |
|-------|-----------|-------|------------|---------------------|--------------------|----------|----------|----------|----------------|---------------|---------------|--------------------|--------|--------------|--------|-------|----------|---------|--------|----------|
| 312 | 18 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 36.4 | 8.30E+03 | 3.02E+05 | 1.84E+02 | 7.33E+03 | 0 | 0.00E+00 | -4.5 | 2.6 | -5.1 | 7 | 94.4 | Y |
| 313 | 18 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 37.9 | 7.95E+03 | 3.01E+05 | 1.84E+02 | 7.51E+03 | 0 | 0.00E+00 | -4.2 | 2.1 | -5.1 | 7.2 | 94.3 | Y |
| 314 | 18 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 38.3 | 7.87E+03 | 3.01E+05 | 1.84E+02 | 7.69E+03 | 0 | 0.00E+00 | -4.9 | 2.9 | -5 | 7 | 94.3 | Y |
| 315 | 12 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 39.7 | 7.60E+03 | 3.02E+05 | 1.84E+02 | 9.66E+03 | 0 | 0.00E+00 | -4.8 | 2.8 | -4.7 | 6.6 | 94.5 | Y |
| 316 | 12 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 39.9 | 7.56E+03 | 3.01E+05 | 1.84E+02 | 9.85E+03 | 0 | 0.00E+00 | -4.7 | 2.9 | -4.7 | 6.4 | 94.6 | Y |
| 317 | 12 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 0.8 | 7.31E+03 | 5.95E+03 | 3.64E+00 | 9.85E+03 | 1 | 1.68E-04 | -6.9 | 0.6 | -2 | 8.4 | 93.9 | Y |
| 318 | 15 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 41.4 | 7.28E+03 | 3.02E+05 | 1.84E+02 | 1.03E+04 | 0 | 0.00E+00 | -5.4 | 2.8 | -4 | 6.7 | 94.6 | Y |
| 319 | 15 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 41.8 | 7.22E+03 | 3.02E+05 | 1.84E+02 | 1.05E+04 | 0 | 0.00E+00 | -4.8 | 2.6 | -4.4 | 6.6 | 94.6 | Y |
| 320 | 16 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 47.9 | 6.29E+03 | 3.01E+05 | 1.84E+02 | 8.88E+03 | 0 | 0.00E+00 | -5 | 2.4 | -5.3 | 7.9 | 93.8 | Y |
| 321 | 16 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 21.2 | 6.02E+03 | 1.28E+05 | 7.80E+01 | 8.96E+03 | 1 | 7.83E-06 | -5.5 | 3.1 | -4.5 | 7 | 94.3 | Y |
| 322 | 1 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 23.9 | 1.27E+04 | 3.03E+05 | 1.85E+02 | 1.51E+04 | 0 | 0.00E+00 | 2.5 | 4 | -5.8 | -0.7 | 95.8 | Y |
| 323 | 1 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 26.5 | 1.14E+04 | 3.02E+05 | 1.85E+02 | 1.53E+04 | 0 | 0.00E+00 | 2.7 | 3.8 | -6 | -0.5 | 95.6 | Y |
| 324 | 1 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 22.3 | 1.36E+04 | 3.02E+05 | 1.85E+02 | 1.55E+04 | 0 | 0.00E+00 | 1.9 | 3.7 | -5.9 | 0.2 | 95.8 | Y |
| 325 | 1 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 25.1 | 1.21E+04 | 3.02E+05 | 1.85E+02 | 1.57E+04 | 0 | 0.00E+00 | 2.1 | 3.7 | -6.3 | 0.4 | 95.6 | Y |
| 326 | 1 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 28.1 | 1.07E+04 | 3.02E+05 | 1.85E+02 | 1.59E+04 | 0 | 0.00E+00 | 3.7 | 3.8 | -6.6 | -0.9 | 95.1 | Y |
| 327 | 1 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 29.9 | 1.01E+04 | 3.02E+05 | 1.84E+02 | 1.60E+04 | 0 | 0.00E+00 | 4.4 | 3.3 | -6.4 | -1.2 | 95 | Y |
| 328 | 2 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 26.1 | 1.16E+04 | 3.02E+05 | 1.84E+02 | 3.48E+03 | 0 | 0.00E+00 | 3.2 | 3.4 | -6.1 | -0.5 | 95.5 | Y |
| 329 | 2 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 31.3 | 9.66E+03 | 3.03E+05 | 1.85E+02 | 3.66E+03 | 0 | 0.00E+00 | 4.7 | 3.4 | -6.8 | -1.3 | 94.7 | Y |
| 330 | 2 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 40.8 | 7.40E+03 | 3.02E+05 | 1.84E+02 | 3.85E+03 | 0 | 0.00E+00 | 6 | 3.4 | -6.5 | -2.9 | 94.4 | Y |
| 331 | 4 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 28 | 1.08E+04 | 3.03E+05 | 1.85E+02 | 8.67E+03 | 0 | 0.00E+00 | 3.2 | 2.9 | -5.3 | -0.8 | 95.9 | Y |
| 332 | 4 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 26.7 | 1.13E+04 | 3.02E+05 | 1.85E+02 | 8.85E+03 | 0 | 0.00E+00 | 3.4 | 3.8 | -6.5 | -0.7 | 95.2 | Y |
| 333 | 7 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 9.1 | 1.07E+04 | 9.75E+04 | 5.96E+01 | 5.69E+03 | 1 | 1.03E-05 | 2.4 | 3.7 | -5.5 | -0.6 | 96 | Y |
| 334 | 9 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 191 | 1.77E+03 | 3.37E+05 | 2.06E+02 | 2.49E+03 | 0 | 0.00E+00 | 0.3 | 3.1 | -6 | 2.6 | 95.7 | Y |
| 335 | 10 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 7.4 | 1.76E+04 | 1.30E+05 | 7.92E+01 | 1.49E+04 | 1 | 7.72E-06 | -3.7 | 4.3 | -5.9 | 5.3 | 94.6 | Y |
| 336 | 12 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 25.1 | 1.19E+04 | 2.99E+05 | 1.83E+02 | 1.01E+04 | 1 | 3.34E-06 | -4.5 | 3.9 | -6.4 | 7.1 | 93.7 | Y |
| 337 | 13 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 34.1 | 8.83E+03 | 3.01E+05 | 1.84E+02 | 7.70E+03 | 0 | 0.00E+00 | -4.8 | 3.9 | -5.7 | 6.6 | 94.1 | Y |
| 338 | 13 | Br-81 | 250 | 23.19 | 53.7 | 45 | 0 | 19.6 | 1.02E+03 | 1.99E+04 | 1.72E+01 | 7.72E+03 | 1 | 5.04E-05 | -4.3 | -4.7 | 3.2 | 5.9 | 94.9 | Y |
| 339 | 14 | Br-81 | 250 | 23.19 | 53.7 | 45 | 0 | 7.3 | 9.11E+02 | 6.64E+03 | 5.74E+00 | 2.04E+03 | 1 | 1.51E-04 | -3.2 | -7.6 | 5.5 | 5.2 | 93.8 | Y |
| 340 | 15 | Br-81 | 250 | 23.19 | 53.7 | 45 | 0 | 10.8 | 9.42E+02 | 1.02E+04 | 8.79E+00 | 1.05E+04 | 1 | 9.83E-05 | -1.9 | -6.6 | 3.4 | 5 | 94.7 | Y |
| 341 | 16 | Br-81 | 250 | 25.12 | 49.57 | 40 | 0 | 9.9 | 8.74E+02 | 8.65E+03 | 6.90E+00 | 9.01E+03 | 1 | 1.16E-04 | -4.8 | -6.2 | 3.1 | 7.9 | 93.5 | Y |
| 342 | 17 | Br-81 | 250 | 25.12 | 49.57 | 40 | 0 | 117 | 8.58E+02 | 1.00E+05 | 7.99E+01 | 9.28E+03 | 0 | 0.00E+00 | -3.9 | -8.9 | 5 | 7.9 | 92.5 | Y |
| 343 | 18 | Br-81 | 250 | 25.12 | 49.57 | 40 | 0 | 24 | 8.83E+02 | 2.12E+04 | 1.69E+01 | 7.71E+03 | 1 | 4.72E-05 | 1.4 | -8.6 | -1.6 | 8.7 | 91.5 | Y |
| 344 | 17 | Br-81 | 250 | 28.4 | 43.84 | 30 | 0 | 109 | 9.17E+02 | 1.00E+05 | 7.06E+01 | 9.35E+03 | 0 | 0.00E+00 | -0.5 | -7.9 | 1.1 | 7.3 | 93.1 | Y |
| 345 | 17 | Br-81 | 250 | 30.81 | 40.41 | 20 | 0 | 119 | 8.46E+02 | 1.00E+05 | 6.52E+01 | 9.42E+03 | 0 | 0.00E+00 | 1.6 | -7 | 1.6 | 3.8 | 94.6 | Y |
| 346 | 17 | Br-81 | 250 | 32.29 | 38.56 | 10 | 0 | 118 | 8.53E+02 | 1.00E+05 | 6.22E+01 | 9.48E+03 | 0 | 0.00E+00 | 1.2 | -7 | 1.5 | 4.2 | 94.5 | Y |
| 347 | 1 | Br-81 | 250 | 25.12 | 49.57 | 40 | 0 | 4.5 | 5.78E+02 | 2.61E+03 | 2.09E+00 | 1.60E+04 | 1 | 3.83E-04 | 2.2 | -12 | 1.9 | 7.3 | 91.1 | Y |

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| Run # | Device ID | Ion | Energy MeV | Range μm | LET(Si) MeV.cm2 /mg | Tilt deg | Roll deg | Time sec | Flux #/cm2/sec | Fluence #/cm2 | Dose RAD (Si) | TotalDose RAD (Si) | Upsets | CrossSec cm2 | Left % | Top % | Bottom % | Right % | Unif % | Center % |
|-------|-----------|-------|------------|---------------------|---------------------|----------|----------|----------|----------------|---------------|---------------|--------------------|--------|--------------|--------|-------|----------|---------|--------|----------|
| 348 | 2 | Br-81 | 250 | 28.4 | 43.85 | 30 | 0 | 5.8 | 6.16E+02 | 3.55E+03 | 2.51E+00 | 3.85E+03 | 1 | 2.82E-04 | -3.6 | -8.1 | 1.1 | 10.6 | 91.8 | Y |
| 349 | 4 | Br-81 | 250 | 28.4 | 43.85 | 30 | 0 | 8.5 | 1.17E+03 | 9.94E+03 | 7.01E+00 | 8.86E+03 | 1 | 1.01E-04 | -3.6 | -2.9 | 0.5 | 6.1 | 95.6 | Y |
| 350 | 5 | Br-81 | 250 | 30.81 | 40.41 | 20 | 0 | 11 | 1.26E+03 | 1.38E+04 | 8.97E+00 | 6.42E+03 | 1 | 7.25E-05 | -2.4 | -0.9 | -5.7 | 9 | 93.1 | Y |
| 351 | 6 | Br-81 | 250 | 30.81 | 40.41 | 20 | 0 | 74.3 | 1.35E+03 | 1.00E+05 | 6.52E+01 | 6.76E+03 | 0 | 0.00E+00 | -0.4 | -2.9 | -3.3 | 6.6 | 94.5 | Y |
| 352 | 7 | Br-81 | 250 | 30.81 | 40.41 | 20 | 0 | 76.5 | 1.31E+03 | 1.00E+05 | 6.53E+01 | 5.76E+03 | 0 | 0.00E+00 | -2 | -2.4 | -1.5 | 5.9 | 95.6 | Y |
| 353 | 7 | Br-81 | 250 | 30.81 | 40.41 | 20 | 0 | 6.5 | 1.60E+04 | 1.04E+05 | 6.76E+01 | 5.82E+03 | 0 | 0.00E+00 | -0.4 | 0.5 | -5.1 | 4.9 | 95.4 | Y |
| 353 | 7 | Br-81 | 250 | 30.81 | 40.41 | 20 | 0 | 6.5 | 1.60E+04 | 1.04E+05 | 6.76E+01 | 5.82E+03 | 0 | 0.00E+00 | -0.4 | 0.5 | -5.1 | 4.9 | 95.4 | P |
| 354 | 7 | Br-81 | 250 | 30.81 | 40.41 | 20 | 0 | 6.4 | 1.61E+04 | 1.03E+05 | 6.70E+01 | 5.89E+03 | 0 | 0.00E+00 | -1.4 | 1.1 | -5.7 | 6.1 | 94.7 | Y |
| 355 | 6 | Br-81 | 250 | 32.29 | 38.56 | 10 | 0 | 5.9 | 1.74E+04 | 1.02E+05 | 6.34E+01 | 6.82E+03 | 1 | 9.78E-06 | -1.3 | 2.2 | -5.6 | 4.6 | 95.4 | Y |
| 356 | 7 | Br-81 | 250 | 32.29 | 38.56 | 10 | 0 | 5.6 | 1.82E+04 | 1.03E+05 | 6.39E+01 | 5.95E+03 | 0 | 0.00E+00 | -0.8 | 1.9 | -4.8 | 3.7 | 96.1 | Y |
| 357 | 7 | Br-81 | 250 | 32.79 | 37.97 | 0 | 0 | 2.1 | 1.78E+04 | 3.82E+04 | 2.33E+01 | 5.98E+03 | 1 | 2.62E-05 | -2.2 | 3.3 | -5.8 | 4.7 | 95.1 | Y |
| 358 | 9 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 21.3 | 1.42E+04 | 3.02E+05 | 2.90E+02 | 2.78E+03 | 0 | 0.00E+00 | -4.7 | -4.2 | -1.7 | 10.6 | 92.6 | P |
| 359 | 9 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 20.6 | 1.48E+04 | 3.04E+05 | 2.92E+02 | 3.08E+03 | 0 | 0.00E+00 | -4.7 | -4.4 | -1.7 | 10.7 | 92.5 | P |
| 360 | 9 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 15.6 | 1.98E+04 | 3.08E+05 | 2.96E+02 | 3.37E+03 | 0 | 0.00E+00 | -9.4 | -8.9 | 2.4 | 15.9 | 88.9 | P |
| 361 | 9 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 9.8 | 3.09E+04 | 3.03E+05 | 2.91E+02 | 3.66E+03 | 0 | 0.00E+00 | -15 | -11 | 1.9 | 23.8 | 84.7 | P |
| 362 | 9 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 26.4 | 1.15E+04 | 3.03E+05 | 2.91E+02 | 3.95E+03 | 0 | 0.00E+00 | 7.5 | -3.7 | -15.2 | 11.4 | 86 | P |
| 363 | 9 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 26.7 | 1.13E+04 | 3.02E+05 | 2.90E+02 | 4.24E+03 | 0 | 0.00E+00 | 8.4 | -4.4 | -16.5 | 12.6 | 84.8 | P |
| 364 | 9 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 27 | 1.12E+04 | 3.02E+05 | 2.90E+02 | 4.53E+03 | 0 | 0.00E+00 | 7.3 | -4.1 | -15.2 | 12 | 85.8 | P |
| 365 | 9 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 26.4 | 1.15E+04 | 3.03E+05 | 2.91E+02 | 4.82E+03 | 0 | 0.00E+00 | 7.1 | -3.1 | -14.8 | 10.8 | 86.6 | P |
| 366 | 9 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 11.1 | 1.14E+04 | 1.27E+05 | 1.22E+02 | 4.95E+03 | 0 | 0.00E+00 | 7.7 | -3.2 | -16.7 | 12.2 | 85.3 | P |
| 367 | 10 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 27.1 | 1.12E+04 | 3.03E+05 | 2.91E+02 | 1.52E+04 | 0 | 0.00E+00 | 7.7 | -4.2 | -14.1 | 10.6 | 86.5 | P |
| 368 | 10 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 26.9 | 1.12E+04 | 3.03E+05 | 2.91E+02 | 1.55E+04 | 0 | 0.00E+00 | 9.2 | -4.6 | -13.7 | 9.1 | 86.7 | P |
| 369 | 10 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 27.3 | 1.11E+04 | 3.02E+05 | 2.90E+02 | 1.58E+04 | 0 | 0.00E+00 | 7.2 | -4.8 | -13.4 | 11 | 86.7 | P |
| 370 | 11 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 25.7 | 1.18E+04 | 3.02E+05 | 2.90E+02 | 6.50E+03 | 0 | 0.00E+00 | 8.9 | -4.1 | -13.4 | 8.7 | 87.1 | P |
| 371 | 11 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 25.2 | 1.20E+04 | 3.02E+05 | 2.90E+02 | 6.79E+03 | 0 | 0.00E+00 | 9.3 | -4.9 | -12.7 | 8.2 | 87.2 | P |
| 372 | 12 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 27.6 | 1.10E+04 | 3.02E+05 | 2.90E+02 | 1.04E+04 | 0 | 0.00E+00 | 7.7 | -4.6 | -14.8 | 11.7 | 85.8 | P |
| 373 | 12 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 50.6 | 5.94E+03 | 3.01E+05 | 2.89E+02 | 1.07E+04 | 0 | 0.00E+00 | 9.1 | -4.6 | -14.1 | 9.6 | 86.4 | P |
| 374 | 12 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 78.6 | 2.73E+03 | 2.14E+05 | 2.06E+02 | 1.09E+04 | 1 | 4.67E-06 | 12.8 | -4.3 | -12.3 | 3.8 | 87.4 | P |
| 375 | 12 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 82.5 | 3.65E+03 | 3.01E+05 | 2.90E+02 | 1.12E+04 | 0 | 0.00E+00 | 9.5 | -4.2 | -13.8 | 8.5 | 86.8 | P |
| 376 | 14 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 22.1 | 1.37E+04 | 3.03E+05 | 2.91E+02 | 2.34E+03 | 0 | 0.00E+00 | 16.5 | -5.5 | -9 | -2 | 87.6 | P |
| 377 | 14 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 22.1 | 1.37E+04 | 3.02E+05 | 2.90E+02 | 2.63E+03 | 0 | 0.00E+00 | 15.7 | -5.7 | -9.9 | -0.1 | 87.4 | P |
| 378 | 14 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 22.4 | 1.35E+04 | 3.02E+05 | 2.91E+02 | 2.92E+03 | 0 | 0.00E+00 | 15.3 | -4.8 | -10.4 | -0.1 | 87.7 | P |
| 379 | 15 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 22.2 | 1.36E+04 | 3.02E+05 | 2.90E+02 | 1.08E+04 | 0 | 0.00E+00 | 17.4 | -5.1 | -9.1 | -3.2 | 87.4 | P |
| 380 | 15 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 16.7 | 1.34E+04 | 2.24E+05 | 2.15E+02 | 1.10E+04 | 1 | 4.47E-06 | 17.8 | -5.1 | -9.4 | -3.2 | 87.1 | P |
| 381 | 16 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 22.2 | 1.36E+04 | 3.03E+05 | 2.91E+02 | 9.30E+03 | 0 | 0.00E+00 | 16.8 | -5.4 | -9.2 | -2.2 | 87.5 | P |

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| Run # | Device ID | Ion | Energy MeV | Range μm | LET(Si) MeV.cm2 /mg | Tilt deg | Roll deg | Time sec | Flux #/cm2/sec | Fluence #/cm2 | Dose RAD (Si) | TotalDose RAD (Si) | Upsets | CrossSec cm2 | Left % | Top % | Bottom % | Right % | Unif % | Center % |
|-------|-----------|-------|------------|---------------------|---------------------|----------|----------|----------|----------------|---------------|---------------|--------------------|--------|--------------|--------|-------|----------|---------|--------|----------|
| 382 | 17 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 3.6 | 1.33E+04 | 4.78E+04 | 4.59E+01 | 9.53E+03 | 1 | 2.09E-05 | 16.3 | -6.1 | -8 | -2.2 | 87.9 | P |
| 383 | 1 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 40 | 7.53E+03 | 3.02E+05 | 2.90E+02 | 1.63E+04 | 0 | 0.00E+00 | 19.3 | -6.6 | -6.8 | -5.9 | 87 | P |
| 384 | 1 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 1.4 | 2.52E+03 | 3.65E+03 | 3.51E+00 | 1.63E+04 | 1 | 2.74E-04 | 17.8 | -13 | -10.9 | 6.1 | 83.2 | P |
| 385 | 2 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 92.4 | 3.28E+03 | 3.03E+05 | 2.91E+02 | 4.19E+03 | 0 | 0.00E+00 | 17.1 | -8.3 | -7 | -1.8 | 87.2 | P |
| 386 | 2 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 2.1 | 1.14E+04 | 2.40E+04 | 2.31E+01 | 4.21E+03 | 1 | 4.17E-05 | 22 | -7.2 | -6 | -8.8 | 85.8 | P |
| 387 | 4 | I-127 | 319 | 30.9 | 59.71 | 0 | 0 | 66.3 | 4.53E+03 | 3.01E+05 | 2.89E+02 | 9.15E+03 | 0 | 0.00E+00 | 11.6 | -10 | -2.3 | 0.7 | 89.7 | P |
| 388 | 6 | I-127 | 319 | 30.43 | 60.63 | 10 | 0 | 1.2 | 3.81E+03 | 4.49E+03 | 4.38E+00 | 6.83E+03 | 1 | 2.23E-04 | 17.1 | -13 | -2.7 | -1 | 86.4 | P |
| 389 | 7 | I-127 | 319 | 30.43 | 60.63 | 10 | 0 | 1.3 | 1.60E+03 | 2.01E+03 | 1.96E+00 | 5.98E+03 | 1 | 4.98E-04 | 15.7 | -11 | -6.7 | 1.4 | 86.8 | P |
| 390 | 9 | I-127 | 319 | 29.04 | 63.54 | 20 | 0 | 1.2 | 9.77E+01 | 1.19E+02 | 1.21E-01 | 4.95E+03 | 1 | 8.43E-03 | 15.4 | 7.7 | -15.4 | -7.7 | 87.2 | P |
| 391 | 10 | I-127 | 319 | 26.76 | 68.95 | 30 | 0 | 59.7 | 1.68E+03 | 1.00E+05 | 1.11E+02 | 1.59E+04 | 0 | 0.00E+00 | 10.5 | -8.5 | -7.7 | 5.7 | 88.2 | P |
| 392 | 11 | I-127 | 319 | 26.76 | 68.95 | 30 | 0 | 1.1 | 1.66E+03 | 1.87E+03 | 2.08E+00 | 6.79E+03 | 1 | 5.34E-04 | 3.7 | -12 | -6.6 | 14.9 | 86.2 | P |
| 393 | 12 | I-127 | 319 | 23.67 | 77.95 | 40 | 0 | 3.9 | 1.51E+03 | 5.85E+03 | 7.33E+00 | 1.12E+04 | 1 | 1.71E-04 | 14.2 | -8.8 | -8.8 | 3.4 | 86.9 | P |
| 394 | 13 | I-127 | 319 | 23.67 | 77.95 | 40 | 0 | 67.8 | 1.48E+03 | 1.00E+05 | 1.26E+02 | 7.85E+03 | 0 | 0.00E+00 | 10 | -8.4 | -6.6 | 5 | 88.9 | P |
| 395 | 14 | I-127 | 319 | 21.85 | 84.45 | 45 | 0 | 1.2 | 1.21E+03 | 1.42E+03 | 1.93E+00 | 2.92E+03 | 1 | 7.05E-04 | 14.8 | -8.5 | -9.9 | 3.6 | 86.4 | P |
| 396 | 15 | I-127 | 319 | 21.85 | 84.45 | 45 | 0 | 1.1 | 1.31E+03 | 1.47E+03 | 1.99E+00 | 1.10E+04 | 1 | 6.83E-04 | 13.5 | -11 | -9.5 | 7.4 | 85.3 | P |

Appendix C

International Rectifier

Test Plan

and

Procedure

Test Plan, Single Event Effects (BNL, TDVG Accelerator)

1.0 Purpose

The purpose of this test is to characterize and establish Single Event Effects (SEE) Safe-Operating-Area (SOA) curves for several International Rectifier Corp. (IR) Power MOSFET devices. The data resulting from the tests shall be used for qualification to several US Government military slash sheets and shall be incorporated in the IR data sheets.

2.0 Test Responsibility

IR shall be responsible for conducting the tests, which shall be performed at the Brookhaven National Laboratory (BNL), Tandem Van De Graaff (TDVG) Accelerator. IR shall be responsible for the SEE testing of devices-under-test (DUT) and final Test Report.

3.0 Test Facility

3.1 Accelerator

The Brookhaven National Laboratory, Tandem Van De Graaff Accelerator (TDVG) shall be used to provide the necessary ion species and energy. Brookhaven National Laboratory (BNL) shall provide adequate dosimeter for verification of the ion beam parameters.

3.2 Test Equipment

The necessary test equipment including the test interface board, cables, power supplies, etc. shall be provided by IR. IR shall provide the equipment needed to de-lid and handle the individual test devices.

4.0 Test Devices

4.1 The following device types are planned for characterization :

IRH7434SE (Hex-3, 500V, N-channel, G4 SEE Process)

4.2 All devices shall be built in TO-3 packages. The devices shall be properly sealed and packed for transportation to BNL.

4.3 All devices shall be verified for correct electrical performance prior to arrival at BNL.

5.0 Test Method

The MIL-STD-750, Method 1080 shall be used to set procedure for all testing described herein.

6.0 Ion Specie and Energy

There are three (3) available ion specie, each with different energy level, at BNL. All parts will be first tested with one specie of lowest energy (LET) level before the TDVG is switched to the next ion specie with higher energy level.

| | | | | |
|------------|------------------------|------------------|--------------------------------------|----------------------------|
| a. Bromine | $_{35}\text{Br}^{79}$ | Energy = 309 MeV | LET = 36.7 MeV/(mg/cm ²) | Range = 39.5 μm |
| b. Iodine | $_{63}\text{I}^{127}$ | Energy = 341 MeV | LET = 59.8 MeV/(mg/cm ²) | Range = 32.5 μm |
| c. Gold | $_{79}\text{Au}^{197}$ | Energy = 350 MeV | LET = 82.3 MeV/(mg/cm ²) | Range = 28.4 μm |

7.0 Record Keeping

Each irradiation shall be assigned a run number. This number will be used to correlate data from different sources.

7.1 TDVG Output

The TDVG shall provide a hardcopy summary of all test runs showing key parameters such as run, date, time, flux, fluence, ion, energy, LET, and range. A separate output of beam diagnostics shall also be provided.

7.2 IR Output

IR shall also keep a written log of each run including run, ion, device tested, VDS and VGS biases. IR shall also record comments regarding the test including observations or deviations from test plan.

8.0 Characterizations and Verification

Characterization and Verification may be accomplished simultaneously. Characterization implies that the SOA curve is set using at least one (1) device at each insitu bias. Verification is simply an extension of the characterization, demonstrating two (2) additional devices passing at each insitu bias, for a total of three (3) devices per insitu bias condition.

9.0 Test Procedure

The IR Product Engineer assigned to this test shall control the following test procedure based on Test Method 1080. IR shall be responsible to direct the ion specie, beam characteristics, insitu bias conditions and device selection.

9.1 Nominal Beam Characteristics are : Flux = 1×10^4 (1E4) ions/cm²/sec. [1E3 for Angular Dependence]
Fluence = 3×10^5 (3E5) ions/cm². [1E5 for Angular Dependence]
Beam Diameter = 1.5 cm.
Angle of Incidence = 0 Degrees

9.2 Initial Starting Point : typically at VDS = Rated VDS and VGS = 0.

9.3 Irradiate the device at the selected flux, fluence and angle of incidence.

9.4 Post irradiation, test IGSS at VGS = 20 V.

9.5 Based on apparent pass or fail, select next operating conditions.

9.6 Repeat with new device.

10. Test Report

The Test Report shall include the following information :

- a. Device Type(s), serial numbers, wafer lot identification, date code (if applicable).
- b. Test dates and personnel names.
- c. Facility, accelerator type.
- d. Ion specie, energy, LET, range, flux and fluence.
- e. Schematic of test circuit used.
- f. Dosimeter for each ion beam used.
- g. Insitu bias conditions.
- h. Comments and observations.
- i. Pre and post electrical test results.
- j. Summary description including curves.
- k. Cross Sectioning data & graph for Angular Dependence.

Appendix D

Test Circuit

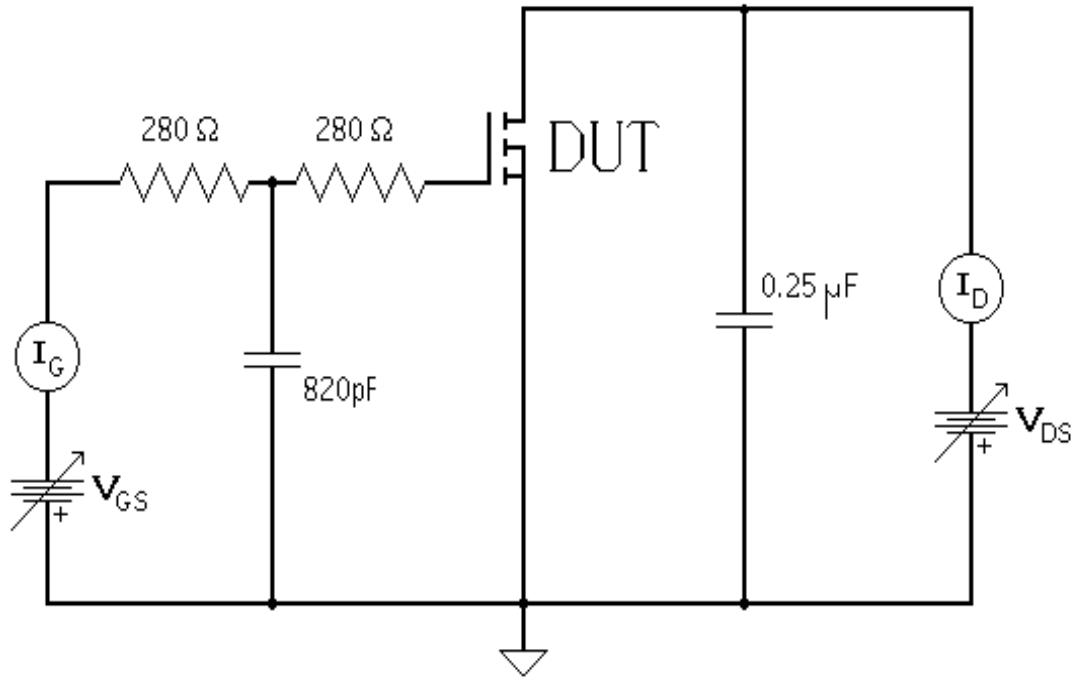
Schematic

Diagram

Reference: MIL-STD-750, Method 1080

Details of Test Method can be reviewed from DSCC Website:

www.dsccl.dla.Downloads/MilSpec/Docs/MIL-STD-750/std750_1000.pdf



Test Circuit Schematic Diagram

Appendix E

BNL TVDG

Ion Species, Surface LET and Range



Ion Species Available At The TVDG

Due to the large number of available ions we have to know, in advance, what ions and LETs you plan to use. This will help us make the necessary preparations and provide the most efficient service possible. Please use the **Time Request** fill-in form to let us know which ions you will be using.

See a list of **Peak LETs** , Energies and Ranges in Silicon.

Calculate LET and Range in selected targets using a selected list of ions at various energies.

See a Graph of Ion Penetration Range vs Surface LET for typical ions.

Available Ion Species

| Z | Symbol | Mass AMU | Max Energy MeV | In Silicon | | | In GaAs | |
|----|--------------------------------|-------------|----------------------|---|------------------|---|------------------|------|
| | | | | Surface LET MeV mg/cm ² | Range Microns | Surface LET MeV mg/cm ² | Range Microns | |
| 1 | ¹ H ¹ | 1.0079 | 29 | 28.77 | 0.015 | 4591 | 0.012 | 2660 |
| 1 | ¹ D ² | 2.0140 | 29 | 14.40 | 0.026 | 2699 | 0.017 | 1620 |
| 3 | ³ Li ⁷ | 7.0160 | 58 | 8.27 | 0.366 | 403 | 0.269 | 250 |
| 5 | ⁵ B ¹¹ | 11.0093 | 87 | 7.90 | 1.04 | 220 | 0.766 | 138 |
| 6 | ⁶ C ¹² | 12.0000 | 102 | 8.50 | 1.42 | 193 | 1.04 | 120 |
| 7 | ⁷ N ¹⁴ | 14.0067 | 116 | 8.28 | 1.95 | 163 | 1.43 | 102 |
| 8 | ⁸ O ¹⁶ | 15.9994 | 131 | 8.19 | 2.53 | 145 | 1.86 | 90.8 |
| 9 | ⁹ F ¹⁹ | 18.9954 | 145 | 7.63 | 3.31 | 126 | 2.43 | 79.8 |
| 11 | ¹¹ Na ²³ | 22.9898 | 170 | 7.39 | 4.88 | 105 | 3.51 | 69.3 |
| 12 | ¹² Mg ²⁴ | 23.9927 | 180 | 7.50 | 5.65 | 97.2 | 4.14 | 61.8 |
| 13 | ¹³ Al ²⁷ | 26.9815 | 192 | 7.12 | 6.70 | 89.7 | 4.90 | 57.4 |
| 14 | ¹⁴ Si ²⁸ | 28.0855 | 203 | 7.23 | 7.55 | 85.3 | 5.51 | 54.6 |
| 15 | ¹⁵ P ³¹ | 30.9738 | 206 | 6.65 | 8.88 | 76.0 | 6.46 | 49.1 |
| 16 | ¹⁶ S ³² | 31.9822 | 217 | 6.79 | 9.79 | 73.4 | 7.13 | 47.4 |
| 17 | ¹⁷ Cl ³⁵ | 34.9688 | 224 | 6.41 | 11.1 | 68.5 | 8.08 | 44.4 |
| 19 | ¹⁹ K ³⁹ | 38.9637 | 235 | 6.03 | 13.7 | 60.9 | 9.90 | 39.9 |
| 20 | ²⁰ Ca ⁴⁰ | 39.9753 | 242 | 6.05 | 14.8 | 58.7 | 10.7 | 38.5 |
| 21 | ²¹ Sc ⁴⁵ | 44.9559 | 242 | 5.38 | 16.7 | 54.1 | 12.0 | 35.8 |
| 22 | ²² Ti ⁴⁸ | 47.9479 | 253 | 5.28 | 18.1 | 53.2 | 13.0 | 35.4 |
| 23 | ²³ V ⁵¹ | 50.9420 | 253 | 4.97 | 19.7 | 50.1 | 14.1 | 33.5 |
| 24 | ²⁴ Cr ⁵² | 51.9405 | 264 | 5.08 | 20.8 | 49.9 | 14.9 | 33.3 |
| 25 | ²⁵ Mn ⁵⁵ | 54.9380 | 264 | 4.81 | 22.5 | 47.4 | 16.1 | 31.9 |
| 26 | ²⁶ Fe ⁵⁶ | 55.9349 | 270 | 4.83 | 23.7 | 46.4 | 17.0 | 31.2 |

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| | | | | | | | | |
|----|------------------------|----------|-----|------|------|------|------|------|
| 27 | $^{59}\text{Co}_{27}$ | 58.9332 | 270 | 4.58 | 25.4 | 44.4 | 18.1 | 30.0 |
| 28 | $^{58}\text{Ni}_{28}$ | 57.9353 | 280 | 4.83 | 26.3 | 44.3 | 18.8 | 29.9 |
| 29 | $^{63}\text{Cu}_{29}$ | 62.9296 | 285 | 4.53 | 28.0 | 43.4 | 20.0 | 29.4 |
| 30 | $^{64}\text{Zn}_{30}$ | 63.9291 | 285 | 4.46 | 29.4 | 41.9 | 21.0 | 28.4 |
| 31 | $^{69}\text{Ga}_{31}$ | 68.9257 | 290 | 4.21 | 31.2 | 41.3 | 22.1 | 28.2 |
| 32 | $^{72}\text{Ge}_{32}$ | 71.9221 | 290 | 4.03 | 32.7 | 40.0 | 23.3 | 27.6 |
| 33 | $^{75}\text{As}_{33}$ | 74.9216 | 295 | 3.94 | 34.2 | 39.6 | 24.2 | 27.2 |
| 34 | $^{80}\text{Se}_{34}$ | 79.9165 | 295 | 3.69 | 35.9 | 38.6 | 25.3 | 26.7 |
| 35 | $^{79}\text{Br}_{35}$ | 78.9183 | 305 | 3.86 | 36.9 | 38.7 | 26.1 | 26.7 |
| 38 | $^{88}\text{Sr}_{38}$ | 87.9056 | 305 | 3.47 | 41.4 | 36.3 | 29.0 | 25.3 |
| 40 | $^{90}\text{Zr}_{40}$ | 89.9047 | 315 | 3.50 | 43.9 | 35.7 | 30.8 | 24.9 |
| 41 | $^{93}\text{Nb}_{41}$ | 92.9060 | 313 | 3.37 | 45.3 | 34.9 | 31.7 | 24.4 |
| 44 | $^{102}\text{Ru}_{44}$ | 101.9043 | 320 | 3.14 | 49.3 | 34.0 | 34.3 | 23.9 |
| 45 | $^{103}\text{Rh}_{45}$ | 102.9055 | 330 | 3.21 | 50.4 | 34.3 | 35.2 | 24.1 |
| 47 | $^{107}\text{Ag}_{47}$ | 106.9051 | 345 | 3.23 | 52.9 | 34.5 | 36.9 | 24.2 |
| 50 | $^{120}\text{Sn}_{50}$ | 119.9022 | 340 | 2.84 | 56.6 | 33.2 | 39.2 | 23.6 |
| 51 | $^{121}\text{Sb}_{51}$ | 120.9038 | 340 | 2.81 | 57.8 | 32.7 | 40.0 | 23.3 |
| 52 | $^{130}\text{Te}_{52}$ | 129.9062 | 350 | 2.69 | 58.9 | 33.5 | 40.7 | 23.9 |
| 53 | $^{127}\text{I}_{53}$ | 126.9045 | 370 | 2.92 | 60.1 | 34.3 | 41.7 | 24.3 |
| 65 | $^{159}\text{Tb}_{65}$ | 158.9250 | 370 | 2.33 | 72.4 | 31.2 | 49.5 | 22.5 |
| 67 | $^{165}\text{Ho}_{67}$ | 164.9303 | 370 | 2.24 | 74.2 | 30.8 | 50.5 | 22.3 |
| 73 | $^{181}\text{Ta}_{73}$ | 180.9480 | 375 | 2.07 | 79.2 | 30.2 | 53.7 | 21.9 |
| 74 | $^{184}\text{W}_{74}$ | 183.9510 | 375 | 2.04 | 79.9 | 30.1 | 54.1 | 21.9 |
| 75 | $^{187}\text{Re}_{75}$ | 186.9560 | 372 | 1.99 | 80.5 | 29.8 | 54.4 | 21.7 |
| 76 | $^{192}\text{Os}_{76}$ | 191.9614 | 377 | 1.96 | 81.3 | 30.0 | 54.9 | 21.9 |
| 77 | $^{193}\text{Ir}_{77}$ | 192.9633 | 377 | 1.95 | 82.1 | 29.8 | 55.4 | 21.7 |
| 78 | $^{195}\text{Pt}_{78}$ | 194.9648 | 380 | 1.95 | 83.0 | 29.8 | 56.0 | 21.8 |
| 79 | $^{197}\text{Au}_{79}$ | 196.9665 | 390 | 1.98 | 84.1 | 30.2 | 56.8 | 22.0 |
| 92 | $^{238}\text{U}_{92}$ | 238.1243 | 385 | 1.62 | 91.3 | 29.1 | 60.8 | 21.4 |

WebElements - Periodic table database contains links to data for the first 109 elements.

See the **TVDG run Calendar**.

Calculate LET and Range in selected targets using a selected list of ions at various energies.

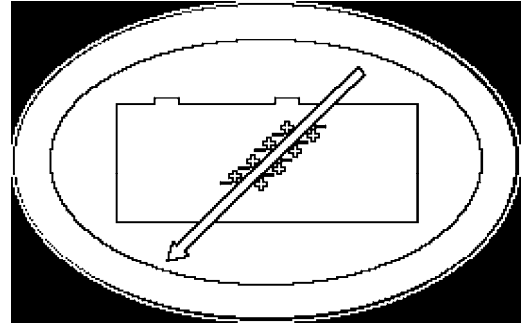
Contact us for technical assistance, we'll be glad to help.

Go to the **TVDG Home Page**

Use our **Time Request** fill-in form to schedule beam time and let us know the ions and/or LETs you need.

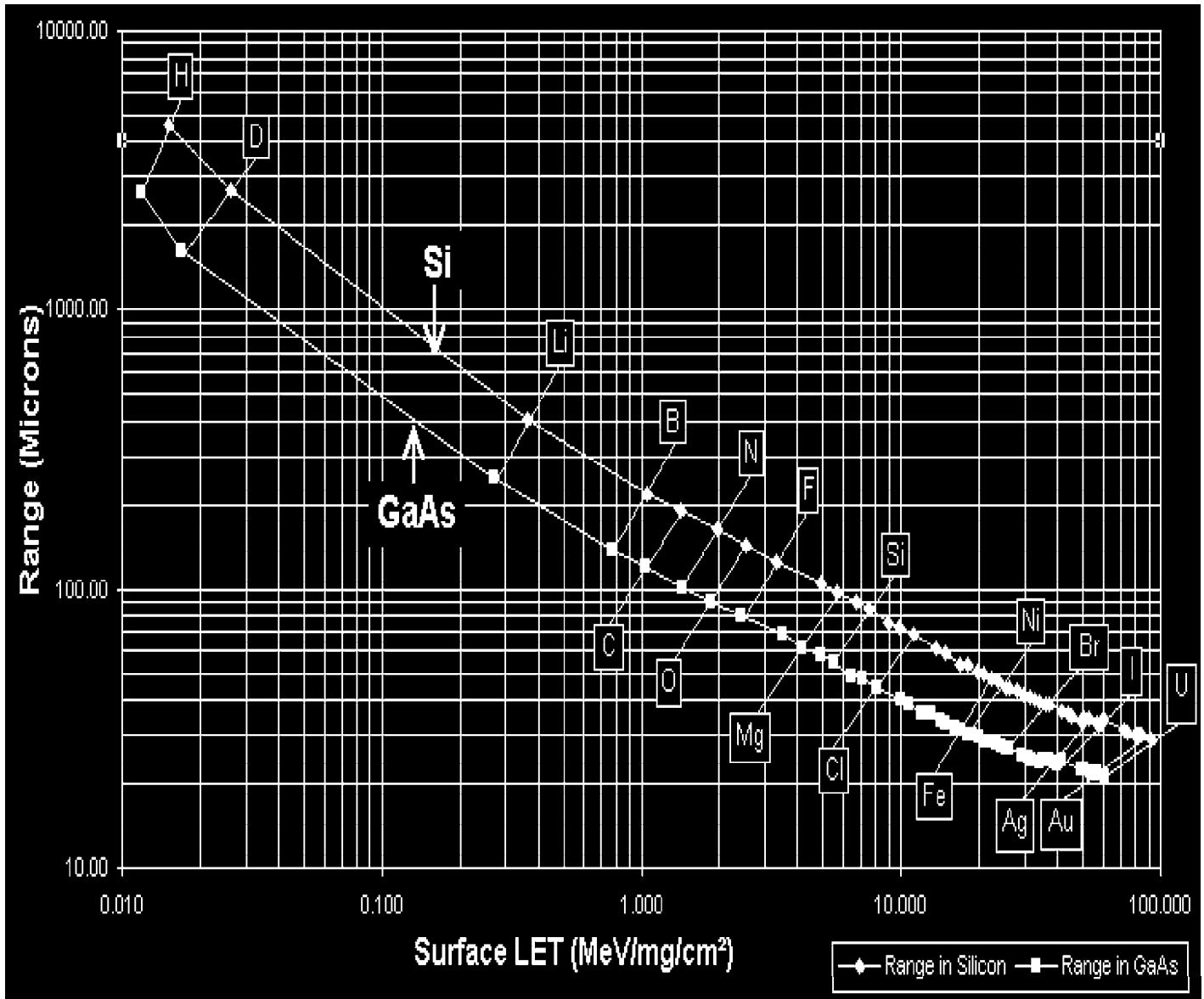
Give us some **Feedback** about our web site, our services or tell us how we can help you.

Last Updated: 12:16 PM 3/14/00 mwiplich@bnl.gov



Range vs Surface LET

For typical TVDG ions.



Go to [TVDG Home Page](#).

Table of available TVDG [Ion Species](#).

Information about the [SEU Test Facility](#).

Last updated 09-22-97 12:17 mwiplich@bnl.gov

Appendix F

Post-SEE

Electrical

Measurements

Rad-Hard MOSFET - G4, Hex-3, 550V, N-Channel, SEE

Post-SEE Electricals

| Parameter | I GSSf | I GSSr | V GS(th) | BV DSS | I DSS | R DS(on) | VSD |
|---------------|-------------------|--------------------|----------------------|-------------|--------------------|--------------------|---------------|
| Conditions | VGS=20V VDS=0V | VGS=-20V VDS=0V | VDS=VGS ID=1.0 mA | IDSS=1.0 mA | VDS=440V VGS=0V | ID=2.6A VGS=12V | IS=4.1A |
| Temperature | 25C | 25C | 25C | 25C | 25C | 25C | 25C |
| Limits | 100 nA Max | -100 nA Max | 2.5 V to 4.5 V | 550 V Min | 25 uA Max | 3.0 Ohms Max | 1.4 Volts Max |
| Unit | nA | nA | V | V | nA | Ohms | V |
| DEVICE Serial | | | | | | | |
| A1 | 10.09 | 7.709 | 4.347 | 603.3 | 1.509 | 2.360 | 0.8970 |
| A2 | 9.99 | 7.824 | 4.285 | 676.6 | 1.388 | 2.205 | 0.9057 |
| A3 | 10.23 | 7.966 | 4.188 | 572.1 | 1.399 | 2.168 | 0.8999 |
| A4 | 10.11 | 7.911 | 4.263 | 599.0 | 1.474 | 2.204 | 0.8993 |
| A5 | 10.10 | 7.965 | 4.172 | 568.5 | 1.260 | 2.095 | 0.9075 |
| A6 | 10.35 | 8.089 | 4.209 | 569.7 | 1.266 | 2.105 | 0.8982 |
| A7 | 9.99 | 7.965 | 4.205 | 572.7 | 1.410 | 2.151 | 0.9065 |
| A8 | 9.83 | 7.914 | 4.372 | 610.9 | 1.211 | 2.399 | 0.9049 |
| A9 | 9.94 | 8.412 | 4.272 | 577.9 | 1.395 | 2.201 | 0.9060 |
| A10 | 10.09 | 7.863 | 4.334 | 650.5 | 1.501 | 2.470 | 0.9072 |
| A11 | 10.04 | 7.895 | 4.224 | 559.2 | 1.430 | 2.391 | 0.9085 |
| A13 | 10.36 | 7.832 | 4.305 | 655.9 | 1.487 | 2.397 | 0.9075 |
| A14 | 10.00 | 7.839 | 4.172 | 602.9 | 1.525 | 2.225 | 0.9079 |
| A17 | 8.93 | 7.765 | 4.243 | 588.0 | 1.471 | 2.440 | 0.9089 |
| A27 | 8.90 | 7.677 | 4.307 | 647.4 | 1.488 | 2.562 | 0.8995 |
| A30 | 10.05 | 7.682 | 4.359 | 617.2 | 1.542 | 2.425 | 0.9064 |
| A31 | 10.17 | 8.112 | 4.314 | 644.5 | 1.557 | 2.810 | 0.9077 |
| A33 | 9.90 | 8.083 | 4.408 | 649.3 | 1.589 | 2.799 | 0.9075 |
| A34 | 9.85 | 7.669 | 4.258 | 594.2 | 1.364 | 2.763 | 0.9000 |
| A36A | 10.01 | 7.707 | 4.425 | 599.9 | 1.499 | 2.642 | 0.9050 |
| A37 | 8.91 | 8.333 | 4.322 | 606.5 | 1.431 | 2.180 | 0.9046 |
| A38 | 9.87 | 7.749 | 4.307 | 622.6 | 1.408 | 2.554 | 0.9044 |
| A40 | 10.06 | 8.162 | 4.225 | 597.2 | 1.559 | 2.126 | 0.9062 |
| A41* | 8.90 | 8.262 | 4.401 | 579.7 | 1.396 | 6.303 | 0.8960 |
| A39 | 8.35 | 7.842 | 4.246 | 612.0 | 1.584 | 2.386 | 0.8953 |

NOTE: * This device starts with 5.38 Ohm RDSon

Since only IGSSf, IGSSr and IDSS are parameters that determine functionality of devices at Post-SEE, the device A41 with high RDSon & good leakages passed Post-SEE Electrical Requirements, as indicated in the test method and procedure.