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| MBB <small>Messerschmitt-Bölkow-Blöhm</small> RAUMFAHRT | IRRADIATION TEST REPORT | | MBB RAD 00305 PAGE 2 of 8 |
| DEVICE TYPE: <u>3C 91C</u> | FUNCTIONAL ASSIGNMENT: OPTO COUPLER | | MANUFACTURER HAFO S |
| SPECIFICATION: SCC 5401/001/3A | DATE CODE: 8809 | PACKAGE: TO 72 | SAMPLE SIZE: 4/4 |
| IRRADIATION SPECIFICATION: ISO.CP.22.PL.0003 | MASK IDENTIFICATION: | | DATE OF TEST 29.01.90 |

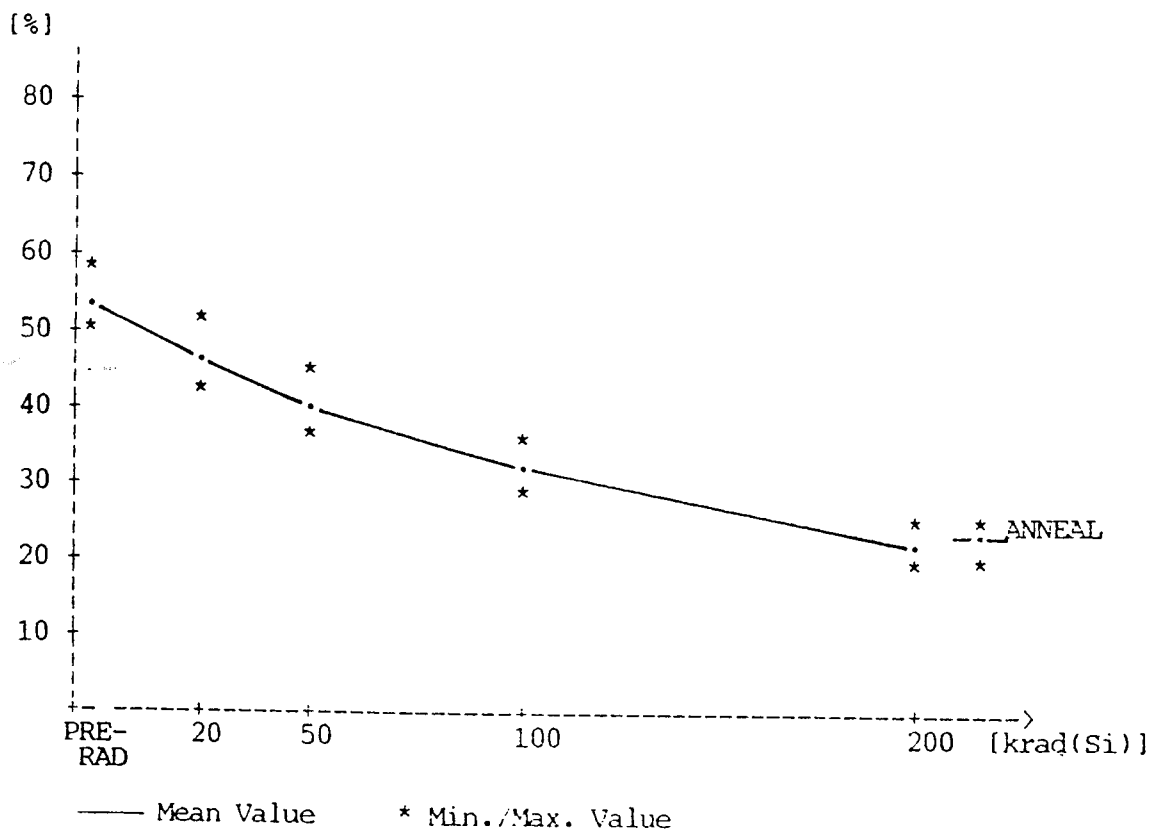
MEASURED VALUES

| STEP SER.NO. | CTR [%] | V(sat)1 [V] | V(sat)2 [V] | I(OH) [nA] | V(fwd) [V] | I(R) [nA] |
|-----------------|------------|----------------|----------------|---------------|---------------|--------------|
| PRERAD | | | | | | |
| 39 | 50.6 | 0.079 | 0.394 | 3.0 | 1.212 | 1.0 |
| 69 | 58.6 | 0.080 | 0.349 | 3.0 | 1.283 | 1.0 |
| 81 | 51.8 | 0.082 | 0.437 | 3.0 | 1.201 | 1.0 |
| 261 | 53.4 | 0.077 | 0.314 | 3.5 | 1.209 | 1.0 |
| 20 krad | | | | | | |
| 39 | 42.8 | 0.091 | 0.538 | 6.5 | 1.197 | 1.5 |
| 69 | 52.0 | 0.086 | 0.427 | 5.0 | 1.276 | 1.0 |
| 81 | 45.0 | 0.088 | 0.517 | 4.5 | 1.200 | 1.0 |
| 261 | 46.3 | 0.084 | 0.378 | 6.0 | 1.206 | 1.0 |
| 50 krad | | | | | | |
| 39 | 36.9 | 0.095 | 0.637 | 18.5 | 1.201 | 1.5 |
| 69 | 45.3 | 0.091 | 0.512 | 16.0 | 1.278 | 1.0 |
| 81 | 38.8 | 0.095 | 0.625 | 15.5 | 1.197 | 1.5 |
| 261 | 40.1 | 0.089 | 0.463 | 17.5 | 1.208 | 1.5 |
| 100 krad | | | | | | |
| 39 | 29.4 | 0.100 | 0.951 | 52.0 | 1.197 | 1.5 |
| 69 | 36.4 | 0.096 | 0.686 | 46.0 | 1.274 | 1.0 |
| 81 | 31.4 | 0.098 | 0.811 | 37.0 | 1.196 | 1.5 |
| 261 | 32.0 | 0.092 | 0.654 | 47.5 | 1.206 | 1.5 |
| 200 krad | | | | | | |
| 39 | 20.1 | 0.108 | 12.233 | 89.0 | 1.200 | 1.5 |
| 69 | 25.6 | 0.104 | 5.840 | 86.5 | 1.273 | 1.0 |
| 81 | 22.0 | 0.106 | 12.156 | 76.5 | 1.195 | 1.5 |
| 261 | 21.7 | 0.101 | 12.159 | 103.0 | 1.202 | 1.5 |
| ANNEAL | | | | | | |
| 39 | 20.3 | 0.109 | 12.229 | 107.5 | 1.201 | 1.0 |
| 69 | 25.7 | 0.104 | 6.040 | 66.0 | 1.275 | 1.0 |
| 81 | 22.2 | 0.106 | 12.155 | 105.0 | 1.197 | 1.5 |
| 261 | 22.1 | 0.100 | 12.151 | 83.5 | 1.207 | 1.0 |

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| SPECIFICATION: SCC 5401/001/3A | DATE CODE: 8809 | PACKAGE: TO 72 | SAMPLE SIZE: 4/4 | |
| IRRADIATION SPECIFICATION: ISO.CP.22.PL.0003 | MASK IDENTIFICATION: | | DATE OF TEST 29.01.90 | |

Characteristic : CTR

Test Conditions: I(fwd) = 10.0 mA Ambient Temperature: 21±3 °C
 V(CE) = 5.0 V

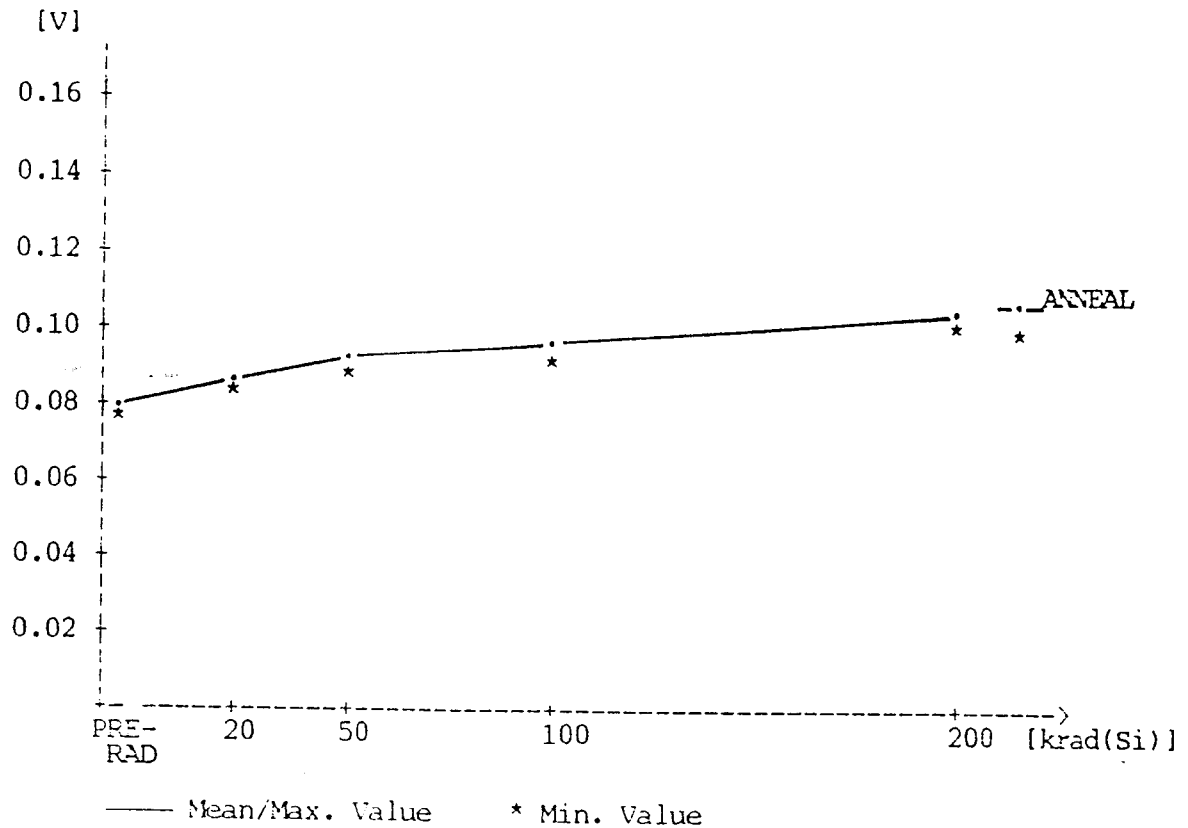


| | Mean Value [%] | St. Deviation [%] | Min. Value [%] | Max. Value [%] | used for Statistics |
|----------|----------------|-------------------|----------------|----------------|---------------------|
| PRERAD | 53.6 | 3.5 | 50.6 | 58.6 | 4 |
| 20 krad | 46.5 | 3.9 | 42.8 | 52.0 | 4 |
| 50 krad | 40.3 | 3.6 | 36.9 | 45.3 | 4 |
| 100 krad | 32.3 | 3.0 | 29.4 | 36.4 | 4 |
| 200 krad | 22.3 | 2.3 | 20.1 | 25.6 | 4 |
| ANNEAL | 22.6 | 2.3 | 20.3 | 25.7 | 4 |

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| SPECIFICATION: SCC 5401/001/3A | DATE CODE: PACKAGE: 8809 TO 72 | SAMPLE SIZE: 4/4 |
| IRRADIATION SPECIFICATION: ISO.CP.22.PL.0003 | MASK IDENTIFICATION: | DATE OF TEST 29.01.90 |

Characteristic : $V(sat)1$

Test Conditions: $I(fwd) = 30.0 \text{ mA}$ Ambient Temperature: $21 \pm 3 \text{ }^\circ\text{C}$
 $I(C) = 1.0 \text{ mA}$

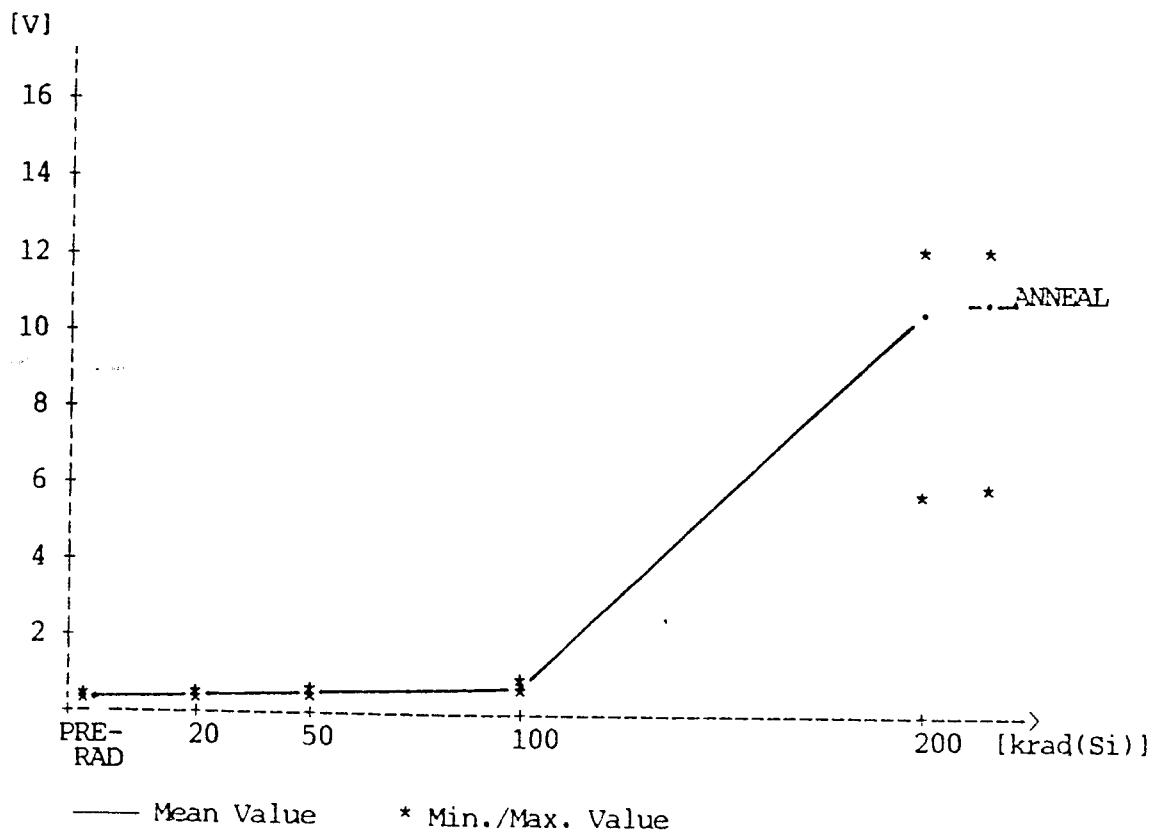


| | Mean Value [V] | St. Deviation [V] | Min. Value [V] | Max. Value [V] | used for Statistics |
|----------|----------------|-------------------|----------------|----------------|---------------------|
| PRE-RAD | 0.080 | 0.002 | 0.077 | 0.082 | + |
| 20 krad | 0.087 | 0.003 | 0.084 | 0.091 | + |
| 50 krad | 0.093 | 0.003 | 0.089 | 0.095 | + |
| 100 krad | 0.097 | 0.003 | 0.092 | 0.100 | + |
| 200 krad | 0.105 | 0.003 | 0.101 | 0.108 | + |
| ANNEAL | 0.105 | 0.004 | 0.100 | 0.109 | + |

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| SPECIFICATION: SCC 5401/001/3A | DATE CODE: PACKAGE: 8809 TO 72 | SAMPLE SIZE: 4/4 |
| IRRADIATION SPECIFICATION: ISO.CP.22.PL.0003 | MASK IDENTIFICATION: | DATE OF TEST 29.01.90 |

Characteristic : $V(sat)2$

Test Conditions: $I(fwd) = 30.0 \text{ mA}$ Ambient Temperature: $21 \pm 3 \text{ }^\circ\text{C}$
 $I(C) = 10.0 \text{ mA}$

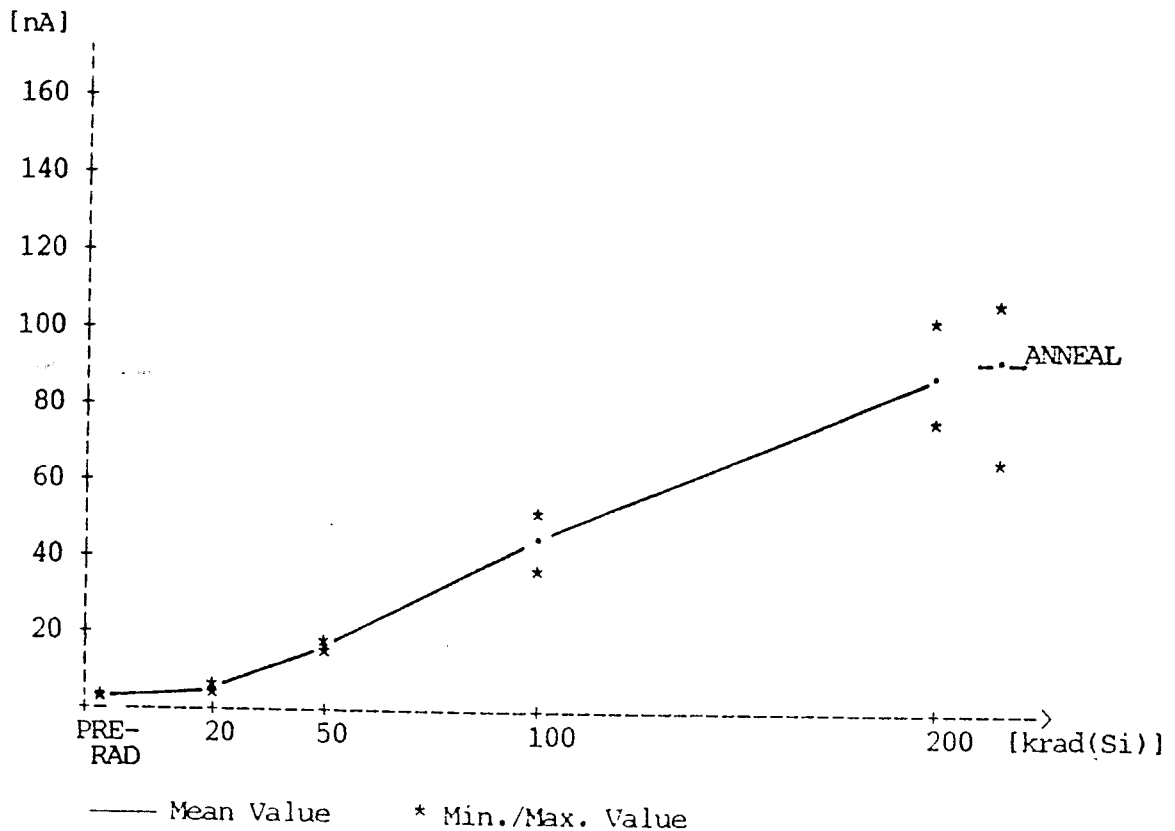


| | Mean Value [V] | St. Deviation [V] | Min. Value [V] | Max. Value [V] | used for Statistics |
|----------|----------------|-------------------|----------------|----------------|---------------------|
| PRERAD | 0.374 | 0.054 | 0.314 | 0.437 | 4 |
| 20 krad | 0.465 | 0.075 | 0.378 | 0.538 | 4 |
| 50 krad | 0.559 | 0.085 | 0.463 | 0.637 | 4 |
| 100 krad | 0.775 | 0.135 | 0.654 | 0.951 | 4 |
| 200 krad | 10.597 | 3.172 | 5.840 | 12.233 | 4 |
| ANNEAL | 10.644 | 3.069 | 6.040 | 12.229 | 4 |

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| SPECIFICATION: SCC 5401/001/3A | DATE CODE: 8809 | PACKAGE: TO 72 | SAMPLE SIZE: 4/4 |
| IRRADIATION SPECIFICATION: ISO.CP.22.PL.0003 | MASK IDENTIFICATION: | | DATE OF TEST 29.01.90 |

Characteristic : I (OH)

Test Conditions: V(CE) = 40.0 V Ambient Temperature: 21±3 °C

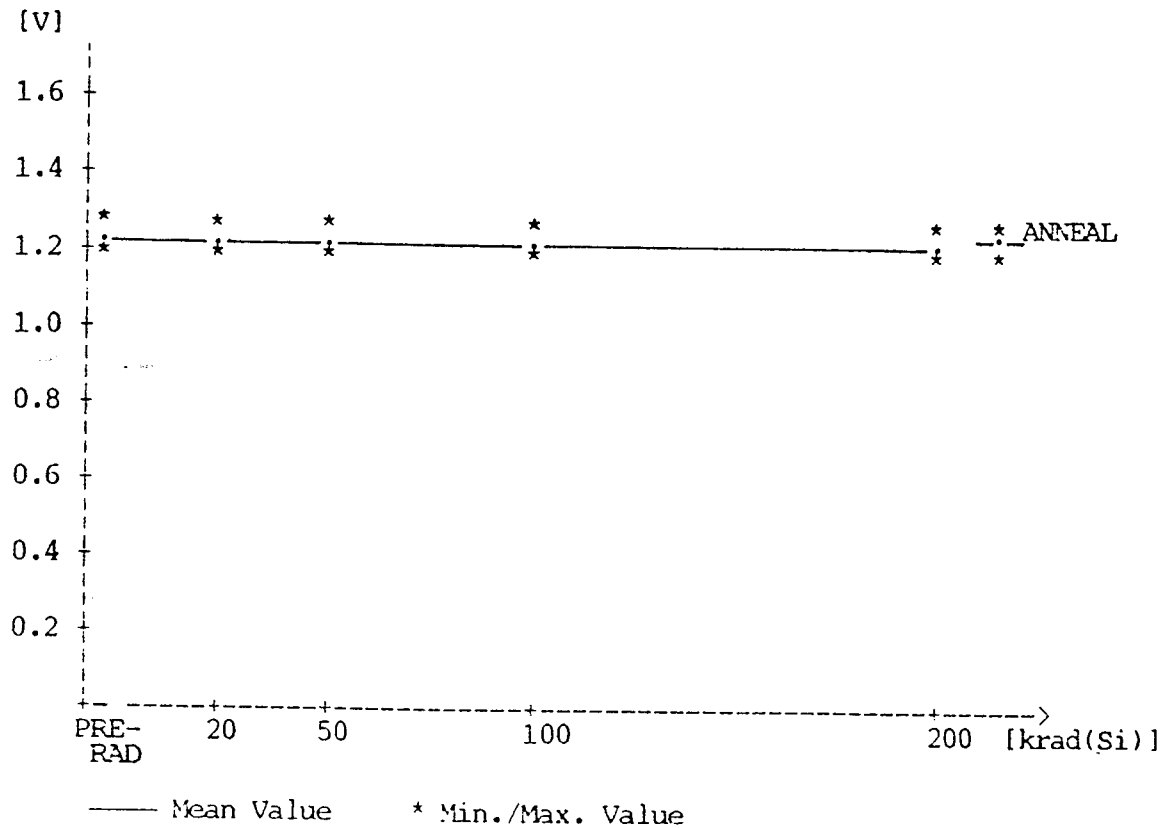


| | Mean Value [nA] | St. Deviation [nA] | Min. Value [nA] | Max. Value [nA] | used for Statistics |
|----------|-----------------|--------------------|-----------------|-----------------|---------------------|
| PRERAD | 3.1 | 0.2 | 3.0 | 3.5 | 4 |
| 20 krad | 5.5 | 0.9 | 4.5 | 6.5 | 4 |
| 50 krad | 16.9 | 1.4 | 15.5 | 18.5 | 4 |
| 100 krad | 45.6 | 6.3 | 37.0 | 52.0 | 4 |
| 200 krad | 88.8 | 10.9 | 76.5 | 103.0 | 4 |
| ANNEAL | 90.5 | 19.6 | 66.0 | 107.5 | 4 |

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| SPECIFICATION: SCC 5401/001/3A | DATE CODE: 8809 PACKAGE: TO 72 | SAMPLE SIZE: 4/4 |
| IRRADIATION SPECIFICATION: ISO.CP.22.PL.0003 | MASK IDENTIFICATION: | DATE OF TEST 29.01.90 |

Characteristic : $V(fwd)$

Test Conditions: $I(fwd) = 30.0 \text{ mA}$ Ambient Temperature: $21 \pm 3 \text{ }^\circ\text{C}$



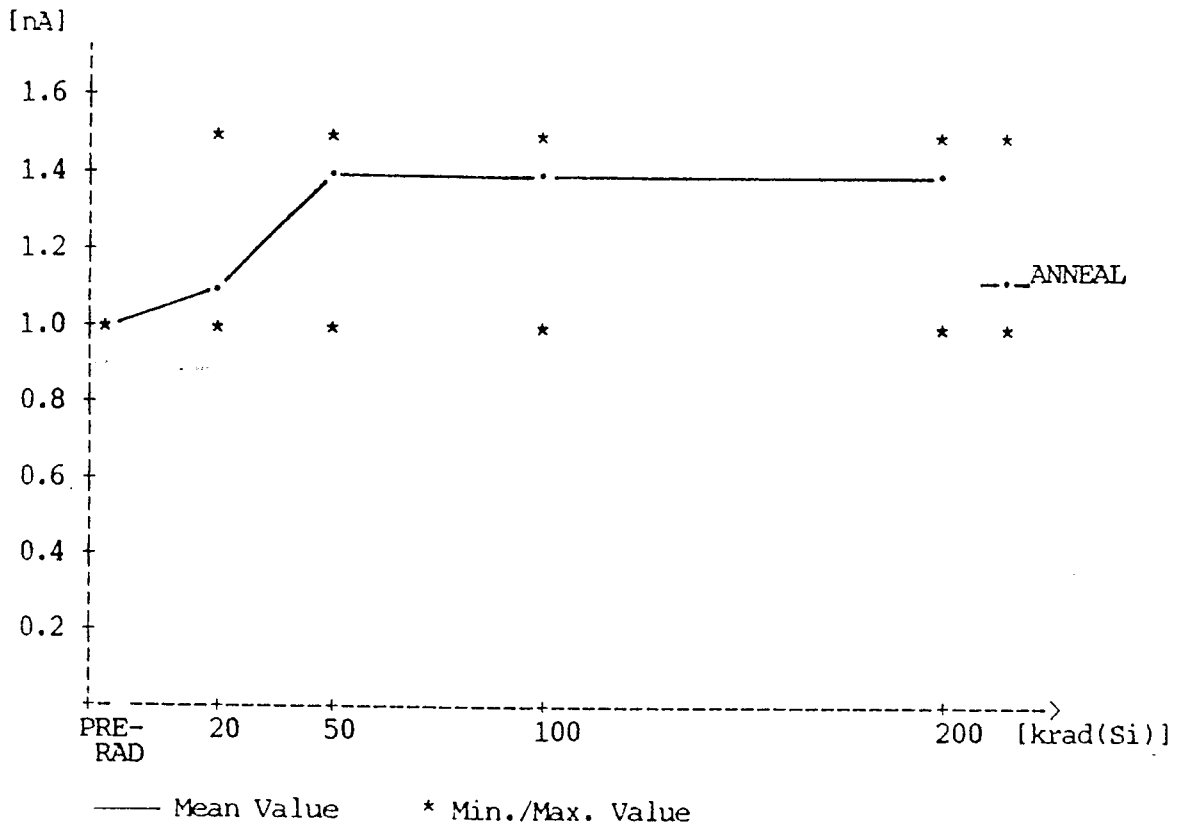
| | Mean Value [V] | St. Deviation [V] | Min. Value [V] | Max. Value [V] | used for Statistics |
|----------|----------------|-------------------|----------------|----------------|---------------------|
| PRE-RAD | 1.226 | 0.038 | 1.201 | 1.283 | 4 |
| 20 krad | 1.220 | 0.038 | 1.197 | 1.276 | 4 |
| 50 krad | 1.221 | 0.038 | 1.197 | 1.278 | 4 |
| 100 krad | 1.218 | 0.037 | 1.196 | 1.274 | 4 |
| 200 krad | 1.218 | 0.037 | 1.195 | 1.273 | 4 |
| ANNEAL | 1.220 | 0.037 | 1.197 | 1.275 | 4 |

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| SPECIFICATION: SCC 5401/001/3A | DATE CODE: 8809 | PACKAGE: TO 72 | SAMPLE SIZE: 4/4 |
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Characteristic : I (R)

Test Conditions: V(R) = -3.0 V

Ambient Temperature: 21±3 °C



| | Mean Value [nA] | St. Deviation [nA] | Min. Value [nA] | Max. Value [nA] | used for Statistics |
|----------|--------------------|-----------------------|--------------------|--------------------|------------------------|
| PRERAD | 1.0 | 0.0 | 1.0 | 1.0 | 4 |
| 20 krad | 1.1 | 0.2 | 1.0 | 1.5 | 4 |
| 50 krad | 1.4 | 0.2 | 1.0 | 1.5 | 4 |
| 100 krad | 1.4 | 0.2 | 1.0 | 1.5 | 4 |
| 200 krad | 1.4 | 0.2 | 1.0 | 1.5 | 4 |
| ANNEAL | 1.1 | 0.2 | 1.0 | 1.5 | 4 |