MILITARY SPECIFICATION

# SEMICONDUCTOR DEVICE, DIODE, SILICON, POWER RECTIFIER, FAST RECOVERY, HIGH VOLTAGE TYPES 1N6528 THROUGH 1N6535 JANTX, JANTXV, AND JANS

This specification is approved for use by all Departments and Agencies of the Department of Defense.

## 1. SCOPE

1.1 Scope. This specification covers the detail requirements for silicon, high voltage, fast recovery semiconductor diodes for use as power rectifiers. Three levels of product assurance are provided for each device type as specified in MIL-S-19500.

1.2 Physical dimensions. See figure 1.

1.3 Maximum ratings.

| Types | $V_{RWM}$ | $I_O$ $T_A$ = 55°C 1/ | $I_O$ $T_A$ = 100°C 2/ | $I_{FSM}$ $t_p$ = 8.3 ms | $t_{rr}$ | $T_{STG}$ | $T_J$ | $R_{\theta JL}$ L = .25 |
|---|---|---|---|---|---|---|---|---|
| | V dc | mA dc | mA dc | A (pk) | ns | °C -65 to +200 | °C -65 to +175 | °C/W |
| 1N6528 | 1500 | 250 | 125 | 10 | 70 | | | 50 |
| 1N6529 | 2000 | 250 | 125 | 10 | 70 | | | 50 |
| 1N6530 | 2500 | 100 | 50 | 8 | 70 | | | 50 |
| 1N6531 | 3000 | 100 | 50 | 8 | 70 | | | 50 |
| 1N6532 | 4000 | 50 | 25 | 4 | 70 | | | 50 |
| 1N6533 | 5000 | 50 | 25 | 4 | 70 | | | 50 |
| 1N6534 | 7500 | 25 | 12.5 | 2 | 70 | | | 50 |
| 1N6535 | 10,000 | 25 | 12.5 | 2 | 70 | | | 50 |

1/ Derate linearly for 55°C $\leq T_A \leq$ 100°C. $I_O$ @ $T_A$ = +55°C to $I_O$ @ $T_A$ = +100°C.

2/ Derate linearly for 100°C $\leq T_A \leq$ 175°C. $I_O$ @ $T_A$ = +100°C to $I_O$ = 0 A @ $T_A$ = +175°C.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Laboratory Command, ATTN: SLCET-R-S, Fort Monmouth, NJ 07703-5302 by using the self-addressed Standardization Document Proposal (DD Form 1426) appearing at the end of this document or by letter



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1.4 Primary electrical characteristics.

| Types | $V_{RWM}$ | $I_O$ $T_A$ = 55°C | $I_{R1}$ $T_A$ = 25°C | $V_{F1}$ | C $V_R$ = 50 V $F_O$ = 1kHz |
|---|---|---|---|---|---|
| | V dc | mA dc | µA dc | V (pk) | pF |
| 1N6528 | 1500 | 250 | 0.10 | 3.0 | 4.0 |
| 1N6529 | 2000 | 250 | 0.10 | 3.0 | 4.0 |
| 1N6530 | 2500 | 100 | 0.10 | 7.0 | 2.0 |
| 1N6531 | 3000 | 100 | 0.10 | 7.0 | 2.0 |
| 1N6532 | 4000 | 50 | 0.10 | 9.0 | 1.0 |
| 1N6533 | 5000 | 50 | 0.10 | 9.0 | 1.0 |
| 1N6534 | 7500 | 25 | 0.10 | 14.0 | 0.5 |
| 1N6535 | 10000 | 25 | 0.10 | 14.0 | 0.5 |

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATION

MILITARY

MIL-S-19500 - Semiconductor Devices, General Specification for.

STANDARD

MILITARY

MIL-STD-750 - Test Methods for Semiconductor Devices.
MIL-STD-1276 - Leads for Electronic Component Parts.

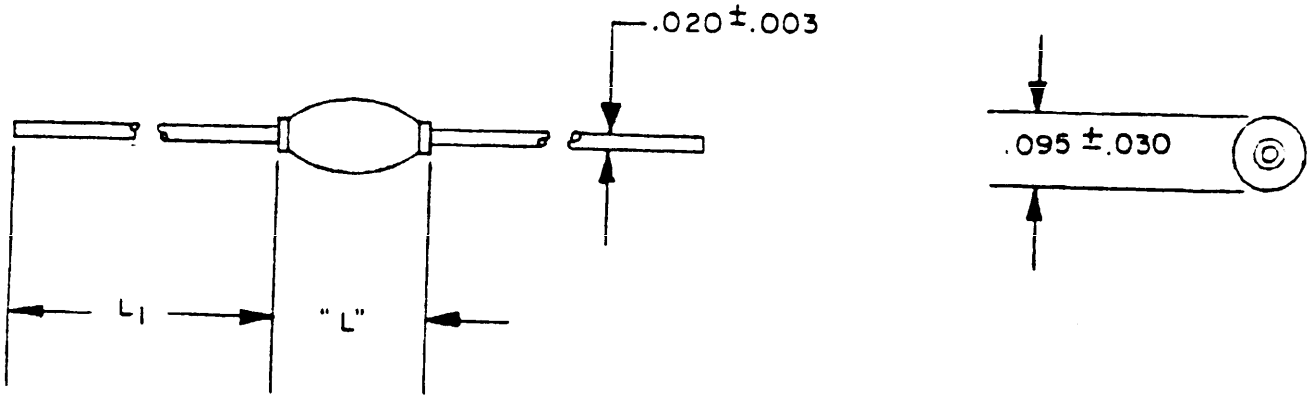
(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.2 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications, specification sheets, or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Detail specification. The individual item requirements shall be in accordance with MIL-S-19500, and as specified herein.

3.2 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-S-19500.




| Part no. | L inches | | $L_1$ inches | |
|---|---|---|---|---|
| | min | max | min | max |
| 1N6528 | .140 | .200 | 1.0 | 1.3 |
| 1N6529 | .140 | .200 | " | " |
| 1N6530 | .160 | .220 | " | " |
| 1N6531 | .160 | .220 | " | " |
| 1N6532 | .180 | .240 | " | " |
| 1N6533 | .180 | .240 | " | " |
| 1N6534 | .240 | .300 | " | " |
| 1N6535 | .240 | .300 | " | " |

| Inches | mm |
|---|---|
| .003 | 0.08 |
| .020 | 0.50 |
| .030 | 0.76 |
| .095 | 2.41 |
| .140 | 3.56 |
| .180 | 4.57 |
| .200 | 5.08 |
| .220 | 5.58 |
| .240 | 6.10 |
| .280 | 7.11 |
| 1.00 | 25.4 |
| 1.3 | 33.0 |

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information.

FIGURE 1. Dimensions and configuration.

3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-S-19500, and figure 1.

3.3.1 Lead material and finish. Lead material shall be type C, 99.9 percent silver or copper in accordance with MIL-STD-1276. Lead finish shall be gold, tin or solder dipped. Where a choice of lead material or finish is desired, it shall be specified in the contract or purchase order (see 6.2).

3.4 Marking. Marking shall be in accordance with MIL-S-19500. At the option of the manufacturer, the following marking may be omitted from the body of the device:

a. Manufacturer's identification.
b. Country of origin.
c. Lot identification code.
d. "1N" of the type designation.

4. QUALITY ASSURANCE PROVISIONS.

4.1 Sampling and inspection. Sampling and inspection shall be in accordance with MIL-S-19500, and as specified herein.

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-S-19500.

4.3 Screening (JANS, JANTXV and JANTX levels only). Screening shall be in accordance with MIL-S-19500 (table II), and as specified herein. The following shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

| Screen (see table II of MIL-STD-19500) | Measurement | |
|---|---|---|
| | JANS level | JANTX and JANTXV levels |
| 1/ | Surge, see 4.3.2 | Surge, see 4.3.2 |
| 9 | $V_{F1}$ and $I_{R1}$ | Not applicable |
| 11 | $V_{F1}$ and $I_{R1}$; $\Delta V_{F1}$ and $\Delta I_{R1}$, see table V. | $V_{F1}$ and $I_{R1}$ |
| 12 | See 4.3.1 | See 4.3.1. |
| 13 | Subgroup 2 and 3 of table I herein; $\Delta V_{F1}$ and $\Delta I_{R1}$ see table V $V_{F1}$, $I_{R1}$ | Subgroup 2 of table I herein; $\Delta V_{F1}$ and $\Delta I_{R1}$ see table V $V_{F1}$, $I_{R1}$ |

1/ Surge screening shall be performed anytime after screen 3 and before screen 10.

4.3.1 Power burn-in conditions. Power burn-in conditions are as follows:

| Types | $V_{RWM}$ (V dc) | $I_O$ (mA dc) | $T_A$ °C (min) | f (Hz) |
|---|---|---|---|---|
| 1N6528 | 1000 | 250 | 25 | ≥ 60 |
| 1N6529 | " | 250 | " | " |
| 1N6530 | " | 100 | " | " |
| 1N6531 | " | 100 | " | " |
| 1N6532 | " | 50 | " | " |
| 1N6533 | " | 50 | " | " |
| 1N6534 | " | 25 | " | " |
| 1N6535 | " | 25 | " | " |

4.3.2 Surge screening. See MIL-STD-750, method 4066. $V_{RWM} = 0$. Six surges, $T_A = 25°C$. Apply 20 x $I_O$ at 55°C; $t_p = 8.3$ ms.

4.4 Quality conformance inspection. Quality conformance inspections shall be in accordance with MIL-S-19500.

4.4.1 Group A inspection. Group A inspections shall be conducted in accordance with MIL-S-19500, and table I herein. Endpoint electrical measurements shall be in accordance with the applicable steps of table V herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table IVa (JANS) and table IVb (JANTX and JANTXV) of MIL-S-19500, and tables IIa and IIb herein. Electrical measurements (end points) and delta requirements shall be in accordance with the applicable steps of table V herein.

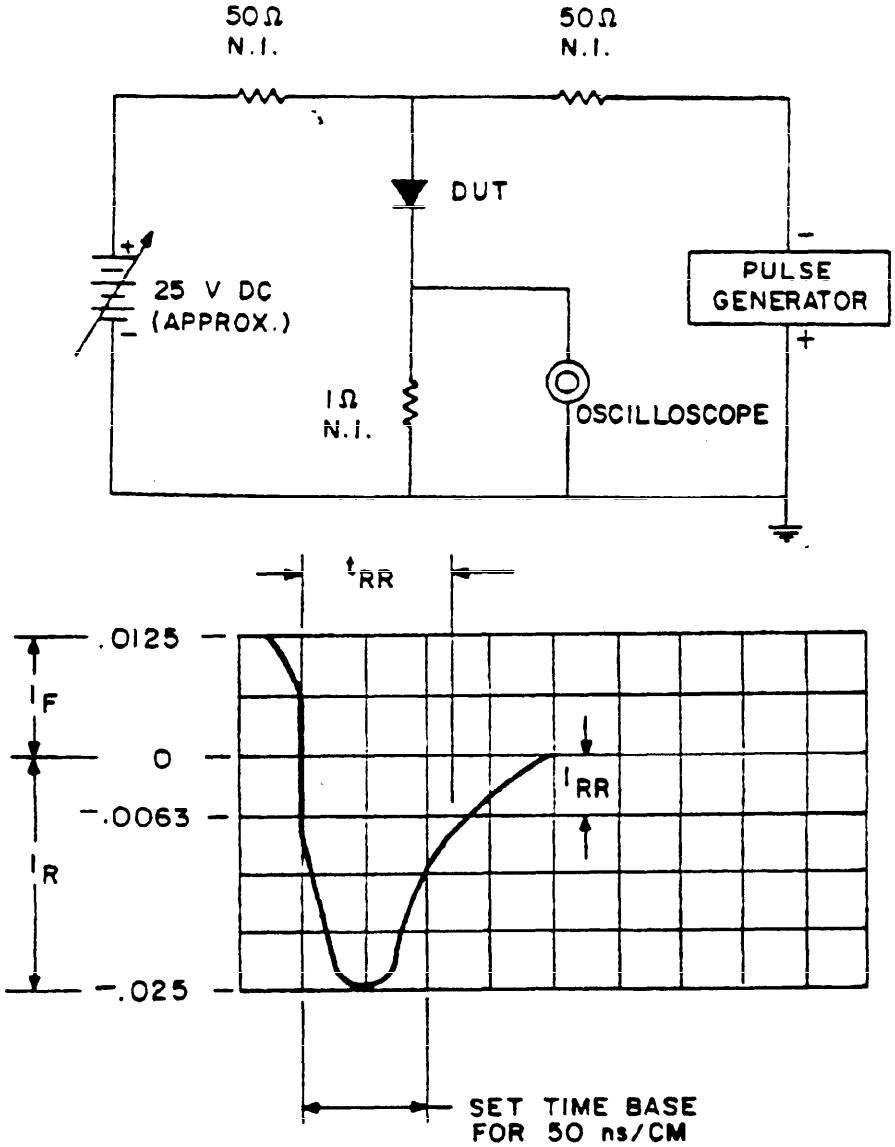
4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table V of MIL-S-19500, and table III herein. Electrical measurements (end-points) and delta requirements shall be in accordance with the applicable steps of table V herein.

4.4.4 Group E inspection. Group E inspections shall be conducted in accordance with table IV herein.

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows:

4.5.1 Pulse measurements. Conditions for pulse measurement shall be as specified in section 4 of MIL-STD-750.

4.5.2 Reverse recovery time. The reverse-recovery time shall be measured in the circuit of figure 2 or an equivalent circuit. The recovery conditions shall be 12.5 mA forward current to 25 mA reverse current. The reverse-recovery time is defined as the time the rectifier begins to conduct in the reverse direction (crosses I = 0) until the reverse current decays to -6.25 mA. The point of contact on the leads shall be no less than .375 inch from the diode body.




NOTES:

1. Oscilloscope-rise time ≤ 7 ns; input impedance = 1 megohm; 22 pF.
2. Pulse generator - rise time ≤ 10 ns; source impedance 50Ω.
3. Recovery time shall be measured on the above circuit and with equipment as shown. The pulse generator shall have a pulse repetition frequency of 1 HKz and a pulse width of 200 ns recovery conditions 12.5 A forward current to 25 mA reverse current. Recovery time measured when rectifier recovers to 6.3 mA.

FIGURE 2. Reverse-recovery-time test circuit and characteristic nomograph.

TABLE I. Group A inspection.

| Inspection | MIL-STD-750 Method | MIL-STD-750 Conditions | LTPD 1/ | Symbol | Limits Min | Limits Max | Unit |
|---|---|---|---|---|---|---|---|
| Subgroup 1 | | | | | | | |
| Visual and mechanical inspection | 2071 | | | | | | |
| Subgroup 2 | | | | | | | |
| Forward voltage | 4011 | $I_F$ = 25 mA | | $V_{F1}$ | | | |
| 1N6528 | | | | | | 3.0 | V dc |
| 1N6529 | | | | | | 3.0 | V dc |
| 1N6530 | | | | | | 7.0 | V dc |
| 1N6531 | | | | | | 7.0 | V dc |
| 1N6532 | | | | | | 9.0 | V dc |
| 1N6533 | | | | | | 9.0 | V dc |
| 1N6534 | | | | | | 14.0 | V dc |
| 1N6535 | | | | | | 14.0 | V dc |
| Reverse current | 4016 | $D_C$ method; $V_R$ = rated (see 1.3) | | $I_{R1}$ | | .10 | µA dc |
| Breakdown voltage | 4021 | $I_R$ = 50 µA | | $V_{(BR)R1}$ | | | |
| 1N6528 | | | | | 1650 | | V dc |
| 1N6529 | | | | | 2200 | | V dc |
| 1N6530 | | | | | 2750 | | V dc |
| 1N6531 | | | | | 3300 | | V dc |
| 1N6532 | | | | | 4400 | | V dc |
| 1N6533 | | | | | 5500 | | V dc |
| 1N6534 | | | | | 8250 | | V dc |
| 1N6535 | | | | | 11000 | | V dc |
| Subgroup 3 | | | | | | | |
| High temperature operation: | | $T_A$ = +150°C | | | | | |
| Reverse current | 4016 | $D_C$ method; $V_R$ = rated (see 1.3) | | $I_{R2}$ | | 50 | µA dc |

See footnote at end of table.

TABLE I. Group A inspection - Continued.

| Inspection | MIL-STD-750 | | LTPD 1/ | Symbol | Limits | | Unit |
|---|---|---|---|---|---|---|---|
| | Method | Conditions | | | Min | Max | |
| Subgroup 3 Continued | | | | | | | |
| Low temperature operation: | | $T_A$ = -55°C | | | | | |
| Forward voltage | 4011 | $I_F$ = 25 mA | | $V_{F2}$ | | | |
| 1N6528 | | | | | | 4.8 | V dc |
| 1N6529 | | | | | | 4.8 | V dc |
| 1N6530 | | | | | | 11.2 | V dc |
| 1N6531 | | | | | | 11.2 | V dc |
| 1N6532 | | | | | | 14.4 | V dc |
| 1N6533 | | | | | | 14.4 | V dc |
| 1N6534 | | | | | | 22.4 | V dc |
| 1N6535 | | | | | | 22.4 | V dc |
| Breakdown voltage | 4021 | $I_R$ = 50 µA | | $V_{(BR)R2}$ | | | |
| 1N6528 | | | | | 1500 | | V dc |
| 1N6529 | | | | | 2000 | | V dc |
| 1N6530 | | | | | 2500 | | V dc |
| 1N6531 | | | | | 3000 | | V dc |
| 1N6532 | | | | | 4000 | | V dc |
| 1N6533 | | | | | 5000 | | V dc |
| 1N6534 | | | | | 7500 | | V dc |
| 1N6535 | | | | | 10000 | | V dc |
| Subgroup 4 | | | | | | | |
| Reverse recovery time | | See figure 2 and 4.5.2. | | $t_{rr}$ | | 70 | ns |
| Capacitance | 4001 | $V_R$ = 50 V dc<br>1 kHz ≤ f ≤ 100 kHz | | C | | | |
| 1N6528 | | | | | | 4.0 | pF |
| 1N6529 | | | | | | 4.0 | pF |
| 1N6530 | | | | | | 2.0 | pF |
| 1N6531 | | | | | | 2.0 | pF |
| 1N6532 | | | | | | 1.0 | pF |
| 1N6533 | | | | | | 1.0 | pF |
| 1N6534 | | | | | | 0.5 | pF |
| 1N6535 | | | | | | 0.5 | pF |
| Subgroups 5, 6, and 7 | | | | | | | |
| Not applicable | | | | | | | |

1/ LTPD numbers used are taken from MIL-S-19500.

TABLE IIa. Group B inspection for JANS devices.

| Inspection | MIL-STD-750 | | Qualification and large lot quality conformance inspection LTPD 1/ | Small lot quality conformance inspection n/c 1/ |
|---|---|---|---|---|
| | Method | Conditions | | |
| Subgroup 1 | | | | |
| Physical dimensions | 2066 | See figure 1. | | |
| Subgroup 2 | | | | |
| Solderability | 2026 | | | |
| Resistance to solvents | 1022 | | | |
| Subgroup 3 | | | | |
| Thermal shock (temperature cycling) | 1051 | | | |
| Surge current | 4066 | $I_O = I_O$ at $T_A$ of 55°C<br>$I_{FSM}$ = see 1.3; $V_{RWM}$ = 0 V<br>one surge 8.3 ms | | |
| Hermetic seal | 1071 | | | |
| Fine leak<br>Gross leak | | | | |
| Electrical measurements | | See table V, steps 1, 2, 3, 4, 5, and 6. | | |
| Decap internal visual | 2075 | | | |
| Subgroup 4 | | | | |
| Intermittent operation life | 1037 | See 4.3.1<br>$t_{on} = t_{off}$ = 3 minutes minimum for 2,000 cycles. | | |
| Electrical measurements | | See table V, steps 1, 2, 3, 4, 5, and 6. | | |
| Subgroup 5 | | | | |
| Accelerated steady-state operation life | 1027 | $T_A$ = 150°C min,<br>$I_O$ = (see 1.3) min, or adjust $T_A$ or $I_O$ as required by the corresponding chosen value of $T_A$ or $I_O$ to achieve a lot $T_J$ = 275°C for a minimum of 96 hours at $V_{RWM}$ = 1,000 V. | | |
| Electrical measurements | | See table V, steps 1, 2, 3, 4, 5, 6, and 7. | | |
| Subgroup 6 | | | | |
| Thermal resistance | 4081 | $T_A$ = 25°C; $R_{\theta JL}$ = see 1.3. | | |

1/ For LTPD numbers, see MIL-S-19500.

TABLE IIb. Group B inspection for JANTX and JANTXV.

| Inspection | MIL-STD-750 Method | MIL-STD-750 Conditions | LTPD 1/ |
|---|---|---|---|
| Subgroup 1 | | | |
| Solderability | 2026 | | |
| Resistance to solvents | 1022 | | |
| Subgroup 2 | | | |
| Thermal shock (temperature cycling) | 1051 | | |
| Surge current | 4066 | $I_{FSM}$ = see 1.3. $I_O = I_O$ at $T_A$ of 55°C<br>$V_{RWM}$ = 0 V, one surge = 8.3 ms | |
| Hermetic seal<br>Fine leak<br>Gross leak | 1071 | | |
| Electrical measurements | | See table V, steps 1, 2, and 3. | |
| Subgroup 3 | | | |
| Steady-state dc operation life | 1027 | See 4.3.1 | |
| Electrical measurements | | See table V, steps 1, 2, 3, and 4. | |
| Subgroup 4 | | | |
| Not applicable | | | |
| Subgroup 5 | | | |
| Thermal resistance | 4081 | $T_1$ = 25°C; $R_{\theta JL}$ = (see 1.3).<br>$R_{\theta JT}$ = see 1.3. | |
| Subgroup 6 | | | |
| High-temperature life (nonoperating) | 1032 | $T_A$ = 200°C | |
| Electrical measurements | | See table V, steps 1, 2, 3, and 4. | |

1/ For LTPD numbers, see MIL-S-19500.

TABLE III. Group C inspection (all quality levels).

| Inspection | MIL-STD-750 | | LTPD 1/ |
|---|---|---|---|
| | Method | Conditions | |
| Subgroup 1 | | | |
| Physical dimensions | 2066 | See figure 1. | |
| Subgroup 2 | | | |
| Thermal shock (glass strain) | 1056 | | |
| Terminal strength | 2036 | Test condition A; weight = 5 lbs; t = 30 s | |
| Hermetic seal | 1071 | | |
| Fine leak<br>Gross leak | | | |
| Moisture resistance | 1021 | | |
| Electrical measurements | | See table V, steps 1, 2, 3, 4, 5, 6, and 7 (JANS), and steps 2 and 3 (JANTX and JANTXV). | |
| Subgroup 3 | | | |
| Shock | 2016 | | |
| Vibration, variable frequency | 2056 | Nonoperating | |
| Constant acceleration | 2006 | | |
| Electrical measurements | | See table V, steps 1, 2 and 3 (all levels). | |
| Subgroup 4 | | | |
| Salt atmosphere (corrosion) | 1041 | | |
| Subgroup 5 | | | |
| Barometric pressure (reduced) | 1001 | Pressure = 8.0 mm Hg, t = 1 minute (min). | |
| Subgroup 6 | | | |
| Steady-state dc operation life | 1026 | See 4.3.1. | |
| Electrical measurements | | See table V, steps 1, 2, 3, 4, 5, and 7 (JANS), and steps 2, 3, 4, and 5 (JANTX and JANTXV). | |

1/ For LTPD numbers, see MIL-S-19500.

TABLE IV. Group E inspection (all quality levels) for qualification only.

| Inspection | MIL-STD-750 | | LTPD | Small lot quality conformance inspection n/c |
|---|---|---|---|---|
| | Method | Conditions | | |
| Subgroup 1 | | | 5 | 12/0 |
| Thermal shock | 1051 | 500 cycles | | |
| Electrical measurement | | See table V, steps 1 and 2 | | |
| Subgroup 2 | | | 5 | 12/0 |
| Steady-state dc blocking life | 1038 | 1,000 hours, condition A. | | |
| Electrical measurement | | See table V steps 1, 2 | | |
| Subgroup 3 | | | 3/0 | 1/0 |
| Destructive physical analysis | | Photos of cross sections shall be submitted in the qualification report. Vendors shall retain duplicate photos | | |

TABLE V. Groups A, B, and C end-point electrical measurements.

| Step | Inspection | MIL-STD-750 Method | MIL-STD-750 Conditions | Symbol | Limits Min | Limits Max | Unit |
|---|---|---|---|---|---|---|---|
| 1. | Forward voltage | 4011 | $I_F$ = 25 mA (pulsed); | $V_{F1}$ | | | V (pk) |
| | 1N6528 | | $t_p$ = 300 µs; PPR = 60 Hz | | | 3.0 | |
| | 1N6529 | | | | | 3.0 | |
| | 1N6530 | | | | | 7.0 | |
| | 1N6531 | | | | | 7.0 | |
| | 1N6532 | | | | | 9.0 | |
| | 1N6533 | | | | | 9.0 | |
| | 1N6534 | | | | | 14.0 | |
| | 1N6535 | | | | | 14.0 | |
| 2. | Reverse current | 4016 | DC method; $V_R$ = (see 1.3) | $I_{R1}$ | | 0.10 | µA dc |
| 3 | Reverse recovery | | See 4.5.2 | $t_{rr}$ | | 70 | ns |
| 4 | Scope display | | | | | | |
| 5 | Capacitance | 4001 | $V_R$ = 50 V dc<br>1 kHz $\leq$ f $\leq$ 100 kHz | C | | | pF |
| | 1N6528 | | | | | 4.0 | |
| | 1N6529 | | | | | 4.0 | |
| | 1N6530 | | | | | 2.0 | |
| | 1N6531 | | | | | 2.0 | |
| | 1N6532 | | | | | 1.0 | |
| | 1N6533 | | | | | 1.0 | |
| | 1N6534 | | | | | 0.5 | |
| | 1N6535 | | | | | 0.5 | |
| 6 | Forward voltage | 4011 | $I_F$ = 25 mA dc | $\Delta V_{F1}$ 1/ | | | V dc |
| | 1N6528 | | | | | ±0.2 | |
| | 1N6529 | | | | | ±0.2 | |
| | 1N6530 | | | | | ±0.4 | |
| | 1N6531 | | | | | ±0.4 | |
| | 1N6532 | | | | | ±0.8 | |
| | 1N6533 | | | | | ±0.8 | |
| | 1N6534 | | | | | ±1.2 | |
| | 1N6535 | | | | | ±1.2 | |
| 7 | Reverse current | 4016 | DC method | $\Delta I_{R1}$ 1/ | | 50 nA dc or 100% of initial value whichever is greater | |

1/ Devices that exceed group A limits for this test shall be rejected

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-S-19500.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Notes. The notes specified in MIL-S-19500 are applicable to this specification.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of the specification.

b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).

c. Lead material and finish may be specified (see 3.3.1).

6.2.1 Substitution information. Devices covered by this specification are substitutable for the manufacturer's and user's Part or Identifying Numbers (PIN's). This information in no way implies that manufacturer's PIN's are suitable as a substitute for the military PIN.

| Military PIN | Manufacturer's CAGE code | Manufacturer's and user's PIN |
|---|---|---|
| 1N6528 | 53711<br>60211 | 8502234-215<br>RM115<br>M15FG<br>M15UFG |
| 1N6529 | 53711<br>49956<br>94117<br>60211 | 8502234-220<br>G339806<br>194087<br>RM116<br>RM135<br>RM140<br>M20FG<br>M20UFG |
| 1N6530 | 53711<br>60211 | 8502234-225<br>RM117<br>M25FG<br>M25UFG |
| 1N6531 | 53711<br><br><br><br>60211 | 4027428-103<br>4027428-113<br>8502234-230<br>4056502<br>RA352<br>RA643<br>RM118<br>RM123<br>M30FG<br>M30UFG |

| Military PIN | Manufacturer's CAGE code | Manufacturer's and user's PIN |
|---|---|---|
| 1N6532 | 53711 | 8502234-240 |
| | 23426 | 28005-12 |
| | 60211 | RM119 |
| | | RM130 |
| | | M40FG |
| | | M40UFG |
| 1N6533 | 53711 | 4027428-105 |
| | | 4027428-115 |
| | | 8502234-250 |
| | | 304-1-58A2 |
| | 60211 | RA641 |
| | | RA644 |
| | | RM120 |
| | | RM137 |
| | | M50FG |
| | | M50UFG |
| 1N6534 | 53711 | 4027428-106 |
| | | 4027428-116 |
| | | 8502234-260 |
| | 23426 | 28005-7 |
| | 60211 | RA642 |
| | | RA645 |
| | | RM121 |
| | | RM131 |
| | | M60FG |
| | | M60UFG |
| 1N6535 | 58260 | 13084424 |
| | 53711 | 8502234-280 |
| | | 8502234-300 |
| | 23426 | 28005-8 |
| | 60211 | M100FG |
| | | RM122 |
| | | RM109 |
| | 23426 | RM132 |
| | 60211 | M100UFG |
| | | M80FG |
| | | M80UFG |

CONCLUDING MATERIAL

Custodians:
Army - ER
Navy - EC
Air Force - 17
NASA - NA

Review activities:
Army - AR, AV, MI
Air Force - 11, 19, 85
DLA - ES
NASA - MSFC-EG02

User activities:
Army - SM
Navy - AS, CG, MC, OS
Air Force - 13
NASA - NA

Preparing activity
Army - ER

Agent:
DLA - ES

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