

High Reliability Varistors

MIL QPL



Description

Littelfuse High Reliability Varistors offer the latest in increased product performance, and are available for applications requiring quality and reliability assurance levels consistent with military or other standards (MIL-STD-19500, MIL-STD-750, Method 202). Additionally, Littelfuse Varistors are inherently radiation hardened compared to Silicon Diode suppressors as illustrated in Figure 1.

Littelfuse High-Reliability Varistors involve five categories:

- 1 DSSC Qualified Parts List (QPL) MIL-R-83530**
(4 items presently available)
- 2 Littelfuse High Reliability Series TX Equivalents**
(29 items presently available)
- 3 Custom Types**
Processed to customer-specific requirements - (SCD) or to Standard Military Flow
- 4 Commercial Item Descriptors (CID) identified for Government use:**
CID AA-55564-3 - Littelfuse ZA Series
CID AA-55564-2 - Littelfuse DA, DB Series

Agency Approvals

- DSSC Approved
- QPL Listed
- CECC Certified
- ISO Approved
- UL Recognized
- CSA Certified

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1) DSSC Qualified Parts List (QPL) MIL-R-83530

This series of varistors are screened and conditioned in accordance with MIL-R-83530 as outlined in Table 2. Manufacturing system conforms to MIL-I-45208; MIL-Q-9858.

Table 1. MIL-R-83530/1 Ratings and Characteristics

| Part Number M83530/ | Nominal Varistor Voltage (V) | Tolerance (%) | Voltage Rating (V) | | Energy Rating (J) | Clamping Voltage at 100A (V) | Capacitance at 1MHz (pF) | Clamping Voltage At Peak Current Rating (V) | I _{TM} (A) | Nearest Commercial Equivalent |
|---------------------|------------------------------|---------------|--------------------|------|-------------------|------------------------------|--------------------------|---|---------------------|-------------------------------|
| | | | (RMS) | (DC) | | | | | | |
| 1-2000B | 200 | -/+ 10 | 130 | 175 | 50 | 325 | 3800 | 570 | 6000 | V130LA20B |
| 1-2200D | 220 | +10, -5 | 150 | 200 | 55 | 360 | 3200 | 650 | 6000 | V150LA20B |
| 1-4300E | 430 | +5, -10 | 275 | 369 | 100 | 680 | 1800 | 1200 | 6000 | V275LA40B |
| 1-5100E | 510 | +5, -10 | 320 | 420 | 120 | 810 | 1500 | 1450 | 6000 | V320LA40B |

Table 2. Mil-R-83530 Group A, B, and C Inspections

| Inspection | | AQL (Percent Defective) | Major | Minor | Number of Sample Units | Failures Allowed |
|------------|--|-------------------------|------------------|------------------|------------------------|------------------|
| Group A | SUBGROUP 1 | | | | | |
| | High Temperature Life (Stabilization Bake) | 100% | - | - | - | - |
| | Thermal Shock | 100% | - | - | - | - |
| | Power Burn-In | 100% | - | - | - | - |
| | Clamping Voltage | 100% | - | - | - | - |
| | Nominal Varistor Voltage | 100% | - | - | - | - |
| | SUBGROUP 2 | | | | | |
| | Visual and Mechanical Examination | - | 1.0% AQL 7.6% LQ | 25% AQL 13.0% LQ | Per Plan | - |
| | Body Dimensions | - | | | Per Plan | - |
| | Diameter and Length of Leads | - | | | Per Plan | - |
| | Marking | - | | | Per Plan | - |
| | Workmanship | - | | | Per Plan | - |
| | SUBGROUP 3 | | | | | |
| | Solderability | - | - | - | Per Plan | - |
| Group B | SUBGROUP 1 | | | | | |
| | Dielectric Withstanding Voltage | - | - | - | Per Plan | - |
| | SUBGROUP 2 | | | | | |
| | Resistance to Solvents | - | - | - | Per Plan | - |
| | SUBGROUP 3 | | | | | |
| | Terminal Strength (Lead Fatigue) | - | - | - | Per Plan | - |
| | Moisture Resistance | - | - | - | Per Plan | - |
| | Peak Current | - | - | - | Per Plan | - |
| Energy | - | - | - | Per Plan | - | |
| Group C | EVERY 3 MONTHS | | | | | |
| | High Temperature Storage | - | - | - | 10 | 0 |
| | Operating Life (Steady State) | - | - | - | 10 | 0 |
| | Pulse Life | - | - | - | 10 | 0 |
| | Shock | - | - | - | 10 | 0 |
| | Vibration | - | - | - | 10 | 0 |
| | Constant Acceleration | - | - | - | 10 | 0 |
| | Energy | - | - | - | 10 | 0 |

2) Littelfuse High Reliability Series TX Equivalents

TABLE 5. Available TX Model Types

| TX Model | Model Size | Device Mark | (See Section 4) Nearest Commercial Equivalent | TX Model | Model Size | Device Mark | (See Section 4) Nearest Commercial Equivalent |
|--------------------------------|---------------------|--------------------------|---|--------------------------------------|---------------------|-----------------------------|---|
| V8ZTX1 V8ZTX2 | 7mm 10mm | 8TX1 8TX2 | V8ZA1 V8ZA2 | V130LTX2 V130LTX10A V130LTX20B | 7mm 14mm 20mm | 130TX 130TX10 130TX20 | V130LA2 V130LA10A V130LA20A |
| V12ZTX1 V12ZTX2 | 7mm 10mm | 12TX1 12TX2 | V12ZA1 V12ZA2 | V150LTX2 V150LTX10A V150LTX20B | 7mm 14mm 20mm | 150TX 150TX10 150TX20 | V150LA2 V150LA10A V150LA20B |
| V22ZTX1 V22ZTX3 | 7mm 14mm | 22TX1 22TX3 | V22ZA1 V22ZA3 | V250LTX4 V250LTX20A V250LTX40B | 7mm 14mm 20mm | 250TX 250TX20 250TX40 | V250LA4 V250LA20A V250LA40B |
| V24ZTX50 | 20mm | 24TX50 | V24ZA50 | V420LTX20A V420LTX40B | 14mm 20mm | 420TX20 420TX40 | V420LA20A V420LA40B |
| V33ZTX1 V33ZTX5 V33ZTX70 | 7mm 14mm 20mm | 33TX1 33TX5 33TX70 | V33ZA1 V33ZA5 V33ZA70 | V480LTX40A V480LTX80B | 14mm 20mm | 480TX40 480TX80 | V480LA40A V480LA80B |
| V68ZTX2 V68ZTX10 | 7mm 14mm | 68TX2 68TX10 | V68ZA2 V68ZA10 | V510LTX40A V510LTX80B | 14mm 20mm | 510TX40 510TX80 | V510LA40A V510LA80B |

The TX Series of varistors are 100% screened and conditioned in accordance with MIL-STD-750. Tests are as outlined in Table 6.

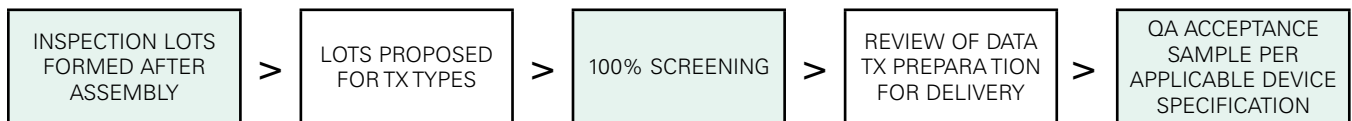


TABLE 6. TX Equivalents Series 100% Screening

| | MIL-STD-105 | | LTPD |
|--|-------------|-----|------|
| | LEVEL | AQL | |
| Electrical (Bidirectional) V_{NIDC}, V_C (Per Specifications Table) | II | 0.1 | - |
| Dielectric Withstand Voltage MIL-STD-202, Method 301, 2500V Min. at $1.0\mu A_{DC}$ | - | - | 15 |
| Solderability MIL-STD-202, Method 208, No Aging, Non-Activated | - | - | 15 |

TABLE 7. Quality Assurance Acceptance Test

| Screen | MIL-STD-750 Method | Condition | TX Requirements |
|---|--------------------|--|-----------------|
| High Temperature Life (Stabilization Bake) | 1032 | 24 hours min at max rated storage temperature. | 100% |
| Thermal Shock (Temperature Cycling) | 1051 | No dwell is required at 25°C. Test condition A1, 5 cycles -55°C to +125°C (extremes) >10 minutes. | 100% |
| Humidity Life | | 85°C, 85% RH, 168 Hrs. | 100% |
| Interim Electrical V_{NIDC}, V_C (Note 3) | | As specified, but including delta parameter as a minimum. | 100% Screen |
| Power Burn-In | 1038 | Condition B, 85°C, rated V_{MIAC} , 72 hours min. | 100% |
| Final Electrical $+V_{NIDC}, V_C$ (Note 3) | | As specified - All parameter measurements must be completed within 96 hours after removal from burn-in conditions. | 100% Screen |
| External Visual Examination | 2071 | To be performed after complete marking. | 100% |

High Reliability MOVs

3) Custom Types

In addition to our comprehensive high-reliability series, Littelfuse can screen and condition to specific requirements. Additional mechanical and environmental capabilities are defined in Table 8.

TABLE 8. Mechanical And Environmental Capabilities (Typical Conditions)

| Test Name | Test Method | Description |
|--------------------------------------|-----------------------|--|
| Terminal Strength | MIL-STD-750-2036 | 3 Bends, 90° Arc, 16oz. Weight |
| Drop Shock | MIL-STD-750-2016 | 1500g's, 0.5ms, 5 Pulses, X ₁ , V ₁ , Z ₁ |
| Variable Frequency Vibration | MIL-STD-750-2056 | 20g's, 100-2000Hz, X ₁ , V ₁ , Z ₁ |
| Constant Acceleration | MIL-STD-750-2006 | V ₂ , 20,000g's Min |
| Salt Atmosphere | MIL-STD-750-1041 | 35°C, 24Hr, 10-50g/m ² Day |
| Soldering Heat/Solderability | MIL-STD-750-2031/2026 | 260°C, 10s, 3 Cycles, Test Marking |
| Resistance to Solvents | MIL-STD-202-215 | Permanence, 3 Solvents |
| Flammability | MIL-STD-202-111 | 15s Torching, 10s to Flameout |
| Flammability | UL1414 | 3 μ, 15s Torching |
| Cyclical Moisture Resistance | MIL-STD-202-106 | 10 Days |
| Steady-State Moisture Resistance | MIL-STD-750-1021.3 | 85/85 96Hr |
| Biased Moisture Resistance | MIL-STD-750-1021.3 | Not Recommended for High-Voltage Types |
| Temperature Cycle | MIL-STD-202-107 | -55°C to 125°C, 5 Cycles |
| High-Temperature Life (Nonoperating) | MIL-STD-750-1032 | 125°C, 24Hr |
| Burn-In | MIL-STD-750-1038 | Rated Temperature and V _{RMS} |
| Hermetic Seal | MIL-STD-750-1071 | Condition D |