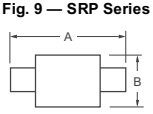
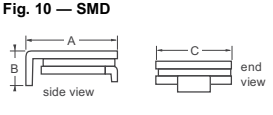
**Fig. 9 — SRP Series**



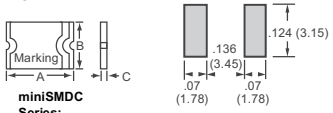

These products help provide reliable, non-cycling protection for rechargeable batteries. Weldable nickel leads and a narrow, low-profile design make these devices extremely easy to install on the edges of battery packs.

**Fig. 10 — SMD**



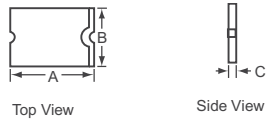

This product series is specifically designed for surface mount applications. The products range in hold currents from 0.3 amps to 3.0 amps and voltages from 6 volts to 60 volts. These devices are ideally suited for high density board applications in computer and computer peripheral products, telecommunications and general electronics applications. They are designed to be reflowed onto a PCB using standard surface mount processes. Packaged per EIA-481 standard.

**Fig. 11 — miniSMD**



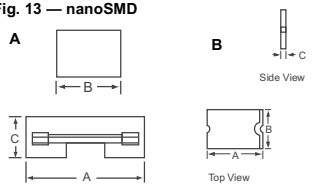

The miniSMD resettable devices extremely small size makes them excellent choices for keyboard and mouse ports, SCSI devices, battery packs, PC cards and sockets, cellular modems and phones, and portable electronic equipment. SMT packaging for automated assembly compared to SMD the miniSMD offers: 40% reduction in size, 300% faster time to trip, 50% reduction in DC resistance, 66% reduction in profile, 80% reduction in mass and drop in replacement for the NANO 2 device in many applications.

**Fig. 12 — microSMD**




This product series is designed for surface-mount applications. Its smaller component size enables installation on crowded printed circuit boards and in small end-user devices such as digital cameras, personal digital assistants (PDAs) and palm-top computers. The new low hold current devices are ideal for protecting industrial sensors and data acquisition systems.

**Fig. 13 — nanoSMD**




The nanoSMD series reduces the component size to a 1206 footprint, nearly half the size of the microSMD series and one-quarter the size of the popular miniSMD series. The industries fastest time to trip. Smaller size saves board space and cost. Compatible with high volume electronics assembly.

| Fig. | Max Volt. | Rated Current (20°C) (amps) Hold | Trip | Max Current (Amp) | RMax Initial (Ohms) | Recognized By | Dimensions Inches (mm) A | B | C | Digi-Key Part No. | Price Each 1 | 10 | 100 | Raychem Part No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | ***SRP*** | | | | | | | |
| 9 | 15 | 1.20 | 2.70 | 100 | 0.16 | UL, TUV, CSA | 0.87 (22.1) | 0.20 (5.2) | 0.04 (1.0) | SRP120-ND | .62 | .57 | .52 | SRP120 |
| 9 | 15 | 1.75 | 3.80 | 100 | 0.09 | UL, TUV, CSA | 0.91 (23.1) | 0.20 (5.2) | 0.04 (1.0) | SRP175-ND | .62 | .57 | .52 | SRP175 |
| 9 | 30 | 2.00 | 4.40 | 100 | 0.06 | UL, TUV, CSA | 0.92 (23.4) | 0.43 (11.0) | 0.04 (1.1) | SRP200-ND | .62 | .57 | .52 | SRP200 |
| 9 | 30 | 3.50 | 6.30 | 100 | 0.03 | UL, TUV, CSA | 1.25 (31.8) | 0.53 (13.5) | 0.04 (1.1) | SRP350-ND | .66 | .61 | .55 | SRP350 |
| 9 | 30 | 4.20 | 7.60 | 100 | 0.024 | UL, TUV, CSA | 1.28 (32.4) | 0.54 (13.6) | 0.04 (1.1) | SRP420-ND | .66 | .61 | .55 | SRP420 |

| Fig. | Max Volt. | Rated Current (20°C) (amps) Hold | Trip | Max Current (Amp) | $R_1$Max Initial (Ohms) | Recognized By | Dimensions Inches (mm) A (max.) | B (max.) | C (max.) | D | E | F | Digi-Key Part No. | Cut Tape Price Each 1 | 10 | 100 | Tape & Reel† Size | Pricing | Raychem Part No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | ***SMD*** | | | | | | | | | | |
| 10 | 60 | 0.30 | 0.60 | 10 | 4.8 | UL, TUV, CSA | .314 (7.98) | .125 (3.18) | .214 (5.44) | .12 (3.1) | .200 (5.1) | .09 (2.3) | SMD030CT-ND | .86 | .74 | .68 | 2,000 | 412.00/M | SMD030-2 |
| 10 | 60 | 0.50 | 1.00 | 10 | 1.4 | UL, TUV, CSA | .314 (7.98) | .125 (3.18) | .214 (5.44) | .12 (3.1) | .200 (5.1) | .09 (2.3) | SMD050CT-ND | .86 | .74 | .68 | 2,000 | 412.00/M | SMD050-2 |
| 10 | 30 | 0.75 | 1.50 | 40 | 1.0 | UL, TUV, CSA | .314 (7.98) | .125 (3.18) | .214 (5.44) | .12 (3.1) | .200 (5.1) | .09 (2.3) | SMD075CT-ND | .86 | .74 | .68 | 2,000 | 412.00/M | SMD075-2 |
| 10 | 30 | 1.10 | 2.20 | 40 | .48 | UL, TUV, CSA | .314 (7.98) | .118 (3.00) | .214 (5.44) | .12 (3.1) | .200 (5.1) | .09 (2.3) | SMD100CT-ND | .82 | .70 | .65 | 2,000 | 391.00/M | SMD100-2 |
| 10 | 15 | 1.25 | 2.50 | 40 | .25 | UL, TUV, CSA | .314 (7.98) | .118 (3.00) | .214 (5.44) | .12 (3.1) | .200 (5.1) | .09 (2.3) | SMD125CT-ND | .82 | .70 | .65 | 2,000 | 391.00/M | SMD125-2 |
| 10 | 15 | 1.50 | 3.00 | 40 | .25 | UL, TUV, CSA | .370 (9.40) | .118 (3.00) | .264 (6.71) | .18 (4.6) | .240 (6.1) | .09 (2.3) | SMD150CT-ND | .86 | .74 | .68 | 1,500 | 412.00/M | SMD150-2 |
| 10 | 15 | 2.00 | 4.00 | 40 | 0.125 | UL, TUV, CSA | .370 (9.40) | .118 (3.00) | .264 (6.71) | .18 (4.6) | .240 (6.1) | .09 (2.3) | SMD200CT-ND | .86 | .74 | .68 | 1,500 | 412.00/M | SMD200-2 |
| 10 | 15 | 2.50 | 5.00 | 40 | .085 | UL, TUV, CSA | .370 (9.40) | .118 (3.00) | .264 (6.71) | .18 (4.6) | .240 (6.1) | .09 (2.3) | SMD250CT-ND | .86 | .74 | .68 | 1,500 | 412.00/M | SMD250-2 |
| 10 | 6 | 2.60 | 5.20 | 40 | .075 | UL, TUV, CSA | .314 (7.98) | .118 (3.00) | .214 (5.44) | .12 (3.1) | .200 (5.1) | .09 (2.3) | SMD260CT-ND | .86 | .74 | .68 | 2,000 | 391.00/M | SMD260-2 |
| 10 | 6 | 3.00 | 6.00 | 40 | .048 | UL, TUV, CSA | .314 (7.98) | .118 (3.00) | .214 (5.44) | .12 (3.1) | .200 (5.1) | .09 (2.3) | SMD300CT-ND | .82 | .70 | .65 | 2,000 | 391.00/M | SMD300-2 |

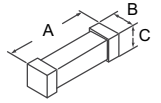
| Fig. | Max Volt. | Rated Current (20°C) (amps) Hold | Trip | Max Current (Amp) | $R_1$Max Initial (Ohms) | Recognized By | Dimensions – Inches (mm) A (max.) | B (max.) | C (max.) | Digi-Key Part No. | Cut Tape Price Each 1 | 10 | 100 | Tape & Reel† Size | Pricing | Raychem Part No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | ***miniSMD*** | | | | | | | |
| 11 | 60 | 0.14 | 0.34 | 10 | 6.0 | UL, TUV, CSA | .186 (4.73) | .134 (3.41) | .035 (.89) | MINISMDC014CT-ND | .63 | .55 | .50 | 2,000 | 304.00/M | MINISMDC014-2 |
| 11 | 24 | 0.50 | 1.00 | 40 | 1.0 | UL, TUV, CSA | .186 (4.73) | .134 (3.41) | .025 (.62) | MINISMDC050CT-ND | .63 | .55 | .50 | 2,000 | 304.00/M | MINISMDC050-2 |
| 11 | 13.2 | 0.75 | 1.50 | 40 | .45 | UL, TUV, CSA | .186 (4.73) | .134 (3.41) | .025 (.62) | MINISMDC075CT-ND | .63 | .55 | .50 | 2,000 | 304.00/M | MINISMDC075-2 |
| 11 | 6 | 1.1 | 2.2 | 40 | .21 | UL, TUV, CSA | .186 (4.73) | .134 (3.41) | .025 (.62) | MINISMDC110CT-ND | .63 | .55 | .50 | 2,000 | 304.00/M | MINISMDC110-2 |
| 11 | 6 | 1.5 | 3.0 | 40 | .11 | UL, TUV, CSA | .186 (4.73) | .134 (3.41) | .019 (.48) | MINISMDC150CT-ND | .63 | .55 | .50 | 2,000 | 304.00/M | MINISMDC150-2 |
| 11 | 6 | 2.0 | 4.0 | 40 | .07 | UL, TUV, CSA | .186 (4.73) | .134 (3.41) | .048 (1.22) | MINISMDC200CT-ND | .79 | .68 | .63 | 2,000 | 380.00/M | MINISMDC200-2 |
| | | | | | | | | | ***microSMD*** | | | | | | | |
| 12 | 30 | 0.05 | 0.15 | 10 | 50 | UL, TUV, CSA | .135 (3.43) | .110 (2.80) | .034 (.85) | MICROSMD005CT-ND | .63 | .55 | .50 | 4,000 | 350.45/M | MICROSMD005-2 |
| 12 | 30 | 0.10 | 0.25 | 10 | 15 | UL, TUV, CSA | .135 (3.43) | .110 (2.80) | .034 (.85) | MICROSMD010CT-ND | .72 | .64 | .55 | 4,000 | 441.00/M | MICROSMD010-2 |
| 12 | 6 | 0.35 | 0.75 | 40 | 1.3 | UL, TUV, CSA | .135 (3.43) | .110 (2.80) | .025 (.62) | MICROSMD035CT-ND | .72 | .64 | .55 | 4,000 | 441.00/M | MICROSMD035-2 |
| 12 | 13.2 | 0.50 | 1.0 | 40 | .90 | UL, TUV, CSA | .135 (3.43) | .110 (2.80) | .025 (.62) | MICROSMD050CT-ND | .63 | .55 | .50 | 4,000 | 305.00/M | MICROSMD050-2 |
| 12 | 6 | 0.75 | 1.5 | 40 | .40 | UL, TUV, CSA | .135 (3.43) | .110 (2.80) | .025 (.62) | MICROSMD075CT-ND | .63 | .55 | .50 | 4,000 | 305.00/M | MICROSMD075-2 |
| 12 | 6 | 1.10 | 2.2 | 40 | .21 | UL, TUV, CSA | .135 (3.43) | .110 (2.80) | .019 (.48) | MICROSMD110CT-ND | .63 | .55 | .50 | 4,000 | 305.00/M | MICROSMD110-2 |
| 12 | 6 | 1.50 | 3.0 | 40 | .11 | UL, TUV, CSA | .135 (3.43) | .110 (2.80) | .048 (1.22) | MICROSMD150CT-ND | .70 | .60 | .55 | 4,000 | 335.00/M | MICROSMD150-2 |
| | | | | | | | | | ***nanoSMD*** | | | | | | | |
| 13A | 6 | 0.50 | 1.00 | 40 | 0.7 | UL, TUV, CSA | .134 (3.40) | .071 (1.80) | .047 (1.20) | NANOSMDM050CT-ND | .66 | .57 | .52 | 3,000 | 318.00/M | NANOSMDM050-2 |
| 13A | 6 | .75 | 1.50 | 40 | 0.29 | UL, TUV, CSA | .134 (3.40) | .071 (1.80) | .047 (1.20) | NANOSMDM075CT-ND | .66 | .57 | .52 | 3,000 | 318.00/M | NANOSMDM075-2 |
| 13A | 6 | 1.00 | 1.80 | 40 | 0.21 | UL, TUV, CSA | .134 (3.40) | .071 (1.80) | .047 (1.20) | NANOSMDM100CT-ND | .66 | .57 | .52 | 3,000 | 318.00/M | NANOSMDM100-2 |
| 13B | 6 | 1.50 | 3.00 | 40 | 0.11 | UL, TUV, CSA | .134 (3.40) | .075 (1.90) | .055 (1.40) | NANOSMDC150CT-ND | .66 | .57 | .52 | 3,000 | 318.00/M | NANOSMDC150-2 |

† For Tape and Reel Part Number, change CT-ND to TR-ND.

K

tyco Electronics Raychem CIRCUIT PROTECTION

# Overcurrent Fuses — FT600 Series




**Benefits:** • When combined with a SiBar™ overvoltage protection device, assists equipment in meeting regulatory standards with no additional series components • Improved temperature rise performance over other similar SMT fuse devices under sneak current testing • High density placement in multi-port system designs
**Target Applications:** • xDSL and ADSL linecards and modems • T1/E1 systems • Twisted pair telecom ports requiring Telcordia GR-1089, UL60950 and FCC Part 68 compliance
**Features:** • The lightning robust surface-mount fuse offers overcurrent protection from power faults • Designed to assist equipment in complying with telecom specifications including UL60950, FCC Part 68, and Telcordia GR-1089
**Specifications:** • **Termination Material:** Silver-plated brass • **Body Material:** Ceramic

| Ampere Rating (A) | Voltage Rating (V) | Typical Resistance Ω | Dimensions Inches (mm) A | B | C | Digi-Key Part No. | Cut Tape Price Each 1 | 10 | 100 | Tape & Reel† Size | Pricing | Raychem Part No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.25 | 250 | 0.1 | 0.413 (10.5) | 0.133 (3.4) | 0.133 (3.4) | FT600-1250CT-ND | .88 | .75 | .69 | 2,500 | 420.00/M | FT600-1250-2 |
| 2.00 | 250 | 0.05 | 0.413 (10.5) | 0.133 (3.4) | 0.133 (3.4) | FT600-2000CT-ND | .88 | .75 | .69 | 2,500 | 420.00/M | FT600-2000-2 |

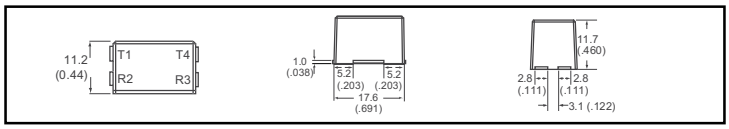
† For Tape and Reel Part Number, change CT-ND to TR-ND.

tyco / Electronics  Raychem CIRCUIT PROTECTION

# PolySwitch® TSM600-250

The TSM600-250 is an overcurrent protection device designed for DSL and other telecommunications network equipment applications.

The TSM600-250 incorporates two matched, low-resistance PPTC components into a single device yielding balanced protection on tip-and-ring lines with minimal attenuation of data transmission.




| Operating Voltage (Vdc) | IHOLD (mA) @20°C | @60°C | Resistance (Ohm)** Rmin | Rtyp | R1max* | Time to Trip @3A (Seconds) Typ. | Max. | Digi-Key Part No. | Price Each 1 | 10 | 100 | Digi-Key Part No. | Tape & Reel Pricing 200 | Raychem Part No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 250 | 250 | 140 | 1.0 | 3.5 | 7.0 | 0.8 | 6 | TSM600-250-2CT-ND | 2.52 | 2.31 | 2.10 | TSM600-250-2TR-ND | 378.00 | TSM600-250-2 |
| 250 | 250 | 140 | 1.0 | 3.0 | 5.0 | 1.0 | 6 | TSM600-250-RA-2CT-ND | 2.66 | 2.44 | 2.22 | TSM600-250-RA-2TR-ND | 398.70 | TSM600-250-RA-2 |

*Maximum device resistance, measured 1-hour post reflow or post trip  **Resistance per PPTC device

# PolySwitch® Resettable Devices — TR Series

These product families help provide protection against power cross and power induction surge as defined in ITU, Telcordia, and UL.

**Fig. 1 — TR Series**

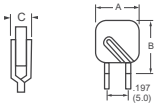
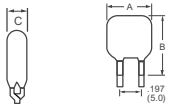



**Fig. 2 — Encapsulated TR Series**




| Fig. | Max Volt. | Oper. Vdc | Rated Current (20°C) (amps) Hold | Trip | Max Current (Amp) | RMax Initial (Ohms) | Recognized By | Dimensions Inches (mm) A | B | C | Digi-Key Part No. | Price Each 1 | 10 | 100 | Raychem Part No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 250 | 60 | 0.080 | 0.16 | 3 | 20.0 | UL, TUV, CSA | 0.189 (4.80) | 0.366 (9.30) | 0.150 (3.80) | TR080U-ND* | .66 | .61 | .55 | TR250-080U |
| 1 | 250 | 60 | 0.120 | 0.24 | 3 | 10.0 | UL, TUV, CSA | 0.236 (6.00) | 0.394 (10.00) | 0.150 (3.80) | TR120U-ND* | .66 | .61 | .55 | TR250-120U |
| 1 | 250 | 60 | 0.145 | 0.29 | 3 | 6.5 | UL, TUV, CSA | 0.236 (6.00) | 0.394 (10.00) | 0.150 (3.80) | TR145U-ND* | .66 | .61 | .55 | TR250-145U |
| 1 | 250 | 60 | 0.180 | 0.50 | 10 | 2.0 | UL, TUV, CSA | 0.410 (10.40) | 0.496 (12.60) | 0.150 (3.80) | TR180U-ND* | .83 | .76 | .69 | TR250-180U |
| 2 | 250 | 60 | 0.120 | 0.24 | 3 | 8.0 | UL, TUV, CSA | 0.256 (6.50) | 0.433 (11.00) | 0.180 (4.60) | TR120-ND* | .73 | .68 | .61 | TR250-120 |
| 2 | 250 | 60 | 0.145 | 0.29 | 3 | 6.0 | UL, TUV, CSA | 0.256 (6.50) | 0.433 (11.00) | 0.180 (4.60) | TR145-ND* | .73 | .68 | .61 | TR250-145 |
| 2 | 600 | 60 | 0.150 | 0.30 | 3 | 12.0 | UL, CSA | 0.531 (13.50) | 0.496 (12.60) | 0.236 (6.00) | TR150-ND* | 1.15 | 1.06 | .96 | TR600-150 |
| 2 | 600 | 60 | 0.150 | 0.30 | 3 | 10.0 | UL, CSA | 0.531 (13.50) | 0.496 (12.60) | 0.236 (6.00) | TR150RA-ND* | 1.24 | 1.14 | 1.04 | TR600-150-RA-B-0.5 |

* Warning: TR devices are not intended for continuous utility line voltage such as 120/220V or 240Vdc.  Operating Voltage: 60Vdc

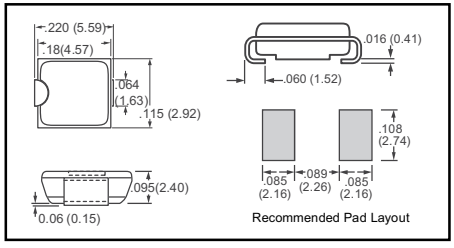
# SiBar Thyristor Surge Protectors

SiBar thyristor surge protectors are designed specifically for telecommunications and computer telephony applications, including: • Modems • Fax machines • PBX Systems • Phones • POS Systems • Analog and digital linecards • Other customer premise and network equipment requiring protection.

**Features:** • Bidirectional transient voltage protection • High off-state impedance • Low on-state voltage • High surge capability • Short-circuit failure mode • Surface-mount technology • UL 497B recognized, file #E179610

SiBar thyristor surge protectors are bidirectional silicon devices that foldback in the presence of transient overvoltage faults. When the breakover voltage of a SiBar device is exceeded, the device switches from high to low impedance to protect sensitive downstream equipment from harmful voltage surges. The device remains latched in a low-impedance state until the current decreases below the hold current, at which point the device returns to its high-impedance state.

SiBar devices may be used in conjunction with PolySwitch resettable devices in telecommunications applications, including network equipment and customer premise equipment. Proper selection of both devices can provide reliable, self-resetting overvoltage and overcurrent protection, allowing designers to meet worldwide telecommunications standards and to lower equipment-service and warranty cost.



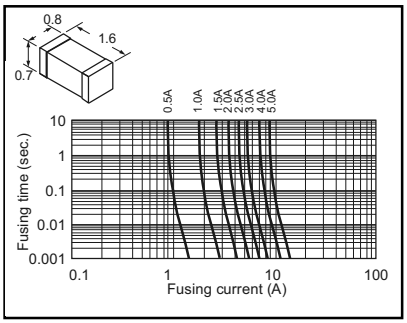

| $V_{DM}$ max. (V) | $V_{BO}$ max. (V) | $I_H$ min. (mA) | $V_T$ max. (V) | $C_1$ typ. (pF) | $I_{TSM}$ min. (A) | Digi-Key Part No. | Cut Tape Price Each 1 | 10 | 100 | Digi-Key Part No. | Tape & Reel Size | Pricing | Raychem Part No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 215 | 325 | 200 | 5.0 | 20 | 22 | TVB280CT-ND | 1.07 | .92 | .85 | — | — | — | TVB280-050 |
| 165 | 265 | 200 | 5.0 | 20 | 22 | TVB330CT-ND | 1.07 | .92 | .85 | — | — | — | TVB330-050 |
| 270 | 370 | 175 | 5.0 | 50 | 60 | TVB270SCCT-ND | 1.50 | 1.29 | 1.18 | TVB270SCTR-ND | 2,500 | 719.00/M | TVB270SC |
| 200 | 320 | 175 | 5.0 | 50 | 60 | TVB200SCCT-ND | 1.50 | 1.29 | 1.18 | TVB200SCTR-ND | 2,500 | 719.00/M | TVB200SC |
| 170 | 265 | 175 | 5.0 | 50 | 60 | TVB170SCCT-ND | 1.50 | 1.29 | 1.18 | TVB170SCTR-ND | 2,500 | 719.00/M | TVB170SC |
| 270 | 370 | 175 | 5.0 | 20 | 22 | TVB270SACT-ND | .74 | .63 | .58 | TVB270SATR-ND | 2,500 | 353.00/M | TVB270SA |
| 200 | 320 | 175 | 5.0 | 20 | 22 | TVB200SACT-ND | .99 | .85 | .78 | TVB200SATR-ND | 2,500 | 473.00/M | TVB200SA |
| 170 | 265 | 175 | 5.0 | 20 | 22 | TVB170SACT-ND | .99 | .85 | .78 | TVB170SATR-ND | 2,500 | 473.00/M | TVB170SA |
| 270 | 365 | 175 | 3.0 | 22 | 22 | TVA270SACT-ND | .69 | .64 | .58 | TVA270SATR-ND | 5,000 | 360.00/M | TVA270SA |

K

# Panasonic® Micro Chip Fuse Surface Mount "0603" (1608) Size

**Features:** • Small size 0603 (1608) • Sharp fusing characteristics (Very fast acting) • Pb free **Applications:** • Computer and peripheral equipment, mobile phone and other digital devices **Approved Safety Standards:** • C-UL(CSA)C22.2 No. 248-14: File No. E194052: UL 248-14: File No. E194052

**Specifications:** • Operating Temperature Range: -40°C to +125°C • Fusing Current / Fusing Time (at 25°C): 100% rated current / 4 hours, Min., 200% rated current / 1 sec., Max., 300% rated current / 0.2 sec., Max.




| Rated Current (A) | Rated Voltage (VDC) | Marking Code | Internal R. (mohm) Max. @ 25°C | Digi-Key Part No. | Cut Tape Price Each 1 | 10 | 100 | Digi-Key Part No. | Tape & Reel Pricing 5,000 | Panasonic Part No. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | ***ERB-FE Series*** | | | | | | |
| 0.5 | 32 | F | 330 | P11353CT-ND | .42 | .39 | .30 | P11353TR-ND | 161.79/M | ERB-FE0R50U |
| 1.0 | 32 | H | 120 | P11354CT-ND | .42 | .39 | .30 | P11354TR-ND | 161.79/M | ERB-FE1R00U |
| 1.5 | 32 | K | 70 | P11355CT-ND | .42 | .39 | .30 | P11355TR-ND | 161.79/M | ERB-FE1R50U |
| 2.0 | 32 | N | 50 | P11356CT-ND | .42 | .39 | .30 | P11356TR-ND | 161.79/M | ERB-FE2R00U |
| 2.5 | 32 | O | 38 | P11357CT-ND | .42 | .39 | .30 | P11357TR-ND | 161.79/M | ERB-FE2R50U |
| 3.0 | 32 | P | 31 | P11358CT-ND | .42 | .39 | .30 | P11358TR-ND | 161.79/M | ERB-FE3R00U |
| 4.0 | 24 | S | 22 | P11359CT-ND | .42 | .39 | .30 | P11359TR-ND | 161.79/M | ERB-FE4R00U |
| 5.0 | 24 | T | 17 | P11360CT-ND | .42 | .39 | .30 | P11360TR-ND | 161.79/M | ERB-FE5R00U |