



Stackpole Electronics, Inc.
Resistive Product Solutions

2014 Short Form Product Selector and Cross Reference

Thick Film Resistors

Thin Film Resistors

Current Sensing Resistors

Chip Resistor Arrays

Metal Film and Metal Oxide Resistors

Carbon Film and Carbon Comp Resistors

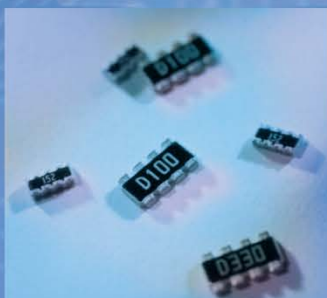
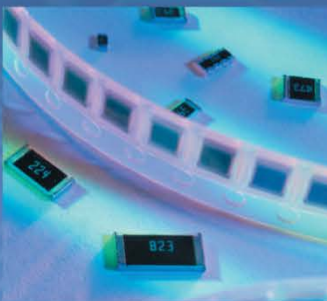
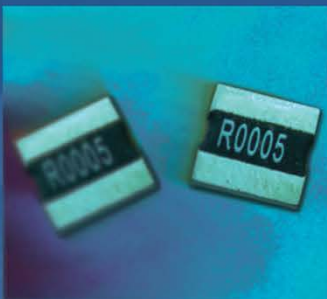
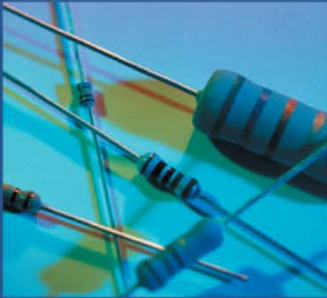
Wirewound Resistors

Single Layer Varistors (MOVs)

Multilayer Varistors

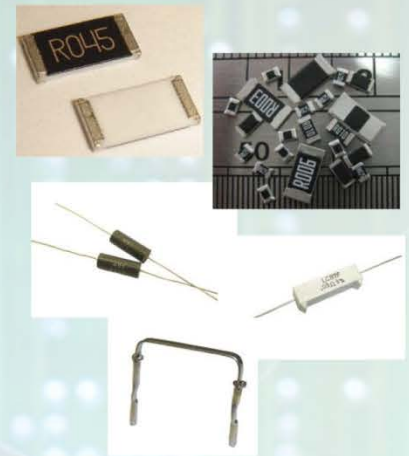
High Frequency Inductors

SMD Power Inductors



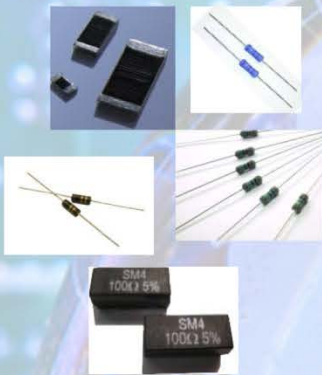
Current Sensing

Stackpole's broad line of current sensing resistors covers a wide range of performance and cost requirements. The **CSR / CSRN** is a thick film technology designed for reliable performance, low cost, and offers a wide range of resistance values and sizes. The **CSRF** is a foil on ceramic carrier technology which offers a good blend of precision and low resistance values including the industry's lowest values in the 0402 and 0603 sizes. The **CSNL**, **CSS**, and **CSSH** series are solid metal element technology offering the lowest possible resistance values and outstanding TCR in the larger chip sizes. The **CSM** series is also utilizes a metal element with a molded package. The **CSM** offers higher resistance values in a 3W 2512 size as well as a 10 milliohm 0603 size chip. For thru hole product, Stackpole offers the **BR**, **MR**, **LCB**, and **LVM** series with a solid metal element in various configurations. The **BR** is radial leaded open air element. The **MR** offers an axial leaded molded package. The **LCB** and **LVM** utilize a flame proof ceramic housed or vertical ceramic housed package respectively.



Pulse Handling Resistors

Pulse withstanding resistors are generally designed to withstand high pulse energy / power / current or high pulse voltage. For thru-hole resistors, high voltage resistors such as the **RNV**, **ASR / SPR**, and **MG / MGM** offer high working voltages as well as the ability to withstand thousands of high voltage pulses. Surface mount high voltage series include the economical **RVC** series and the **HVC** series which offers the highest voltage ratings and resistance values in the industry. For thru-hole pulse energy withstanding resistors, the **RC** series carbon comps are an excellent choice for low inductance and high pulse energy requirements. Stackpole's wide range of wirewound resistors is also well suited for a wide variety of pulse power requirements. The **RPC** series from Stackpole offers industry leading pulse power performance in a surface mount thick film chip. In addition, Stackpole's **SM** series of surface mount molded wirewounds can offer pulse handling up to 50 joules.



Harsh Environments

Some applications require operation in harsh conditions such as high humidity and high moisture, or high sulfur environments. Some common resistor technologies can fail under these conditions. Stackpole has several solutions to these requirements. For high humidity and high moisture environments standard nichrome resistor elements commonly found in thin film precision resistors may corrode and eventually open. Stackpole's **RNCS** series is a passivated nichrome element that can withstand thousands of hours at high humidity and low power without significant resistance shift. Thick film chip resistors are susceptible to contamination by sulfur also causing open circuits also. Stackpole's anti-sulfur solutions include:

- The high power and completely lead free **RNCP** low cost thin film chip resistors
- The **RMCS** sulfur resistant thick film chips
- The **RMCG** gold passivated sulfur impervious thick film chip resistors.



Engineering Design Kits

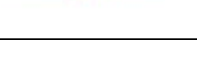
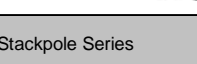
Stackpole offers engineering design kits for prototyping and design verification. The amount of resistance values and number of resistors per value depends on the product type. The **RMCF** series has sample kits for sizes from 0402 to 1206 with each kit having at least 20 pcs each of every E96 value in a decade. Individual kits exist for each decade, such as 10 ohms up to 97.6 ohms. Current sense kits are available for the 1206, 2010, and 2512 sizes. These kits have 25 pcs each of at least 20 of the most popular resistance values in each case size. Technology will vary with size and resistance value. For precision designs the **RNCS** anti-moisture precision thin film resistors have kits in the 0805 and 0603 sizes. These kits offer 20 pcs each of at least 45 of the most popular resistance values in each size.



Surface Mount Chip Resistors and Arrays

| Stackpole Series | | Description | Package Size | Resistance Range (Ω) | Tolerance (%) | TCR (ppm/ $^{\circ}$ C) | Vishay | KOA | Yageo | IRC | Panasonic |
|------------------|---|---------------------------------------|--|-------------------------------|--------------------------|-------------------------|--------------------|---------------------------|----------|-----|----------------|
| RMCF |  | General Purpose Thick Film | 0201 - 2512 | 0.1 - 20M | 1 5 | \pm 100 to \pm 600 | CRCW | RK73B RM73 RK 73Z | 9C RC | WCR | ERJ |
| RMCS |  | Sulfur Resistant Thick Film | 0201 - 2512 | 1 - 10M | 0.5 1 5 | \pm 100 to \pm 200 | RCA | N/A | N/A | N/A | ERJ-S |
| RMCG |  | Gold Barrier Sulfur Impervious | 0402 - 2512 | 1 - 10M | 1 2 5 | \pm 100 to \pm 600 | N/A | N/A | AR | N/A | N/A |
| HMC |  | High Value Thick Film | 0402 - 2512 | 11M - 100M | 1 5 10 | \pm 200 to \pm 1500 | CRCW_HR | N/A | N/A | HR | N/A |
| RMCP |  | General Purpose High Power Thick Film | 0402 - 2512 | 1 - 10M | 1 5 | \pm 100, \pm 200 | N/A | N/A | N/A | N/A | N/A |
| RHC |  | High Power Thick Film | 2512 (2W) | 0.1 - 1M | 1 5 | \pm 100 | N/A | N/A | N/A | N/A | N/A |
| FCR |  | Trimnable Thick Film | 0402 - 2512 | 10 - 1M | \pm 5% to \pm 20% | \pm 200 | CRCW-TR | RK73N | TR | N/A | N/A |
| RGC |  | Semi-Precision Thick Film | 0201 - 2512 | 10 - 10M | 0.5 1 | \pm 50 to \pm 200 | CRCW_P | RK73G | RJ | N/A | ERJ_D |
| RPC |  | Pulse Withstanding Thick Film | 0603 - 2512 | 1 - 20M | 0.5 to 20 | \pm 100 \pm 200 | CRCW-IF | SG73 | SRC | PWC | ERJP ERJT |
| RVC |  | Medium Voltage Thick Film | 0402 - 2512 | 10 - 100M | 1 5 | \pm 100 to \pm 400 | N/A | HV73 | RV | N/A | N/A |
| HVC |  | High Voltage Thick Film | 0603 - 3512 | 10K - 50G | 0.1 to 20 | \pm 25 to \pm 300 | CRHV | HV73 | N/A | HVC | N/A |
| RAVF |  | Convex Resistor Arrays | 0201x2, 0402x2 0402x4, 0603x2 0603x4, 0603x8 | 1 - 10M | 1 2 5 | \pm 200 to \pm 500 | CRA/S | CN_K/N CNZ | YC | WCA | EXB |
| RACF |  | Concave Resistor Array | 0402x2, 0402x4 0603x4, 0603x8 1206x4 | 1 - 10M | 1 2 5 | \pm 200 to \pm 650 | CRA/P | CN CNB CND_Y CNZ | TC | N/A | EXB |
| RAF |  | Flat Termination Chip Resistor Array | 0201x2, 0201x4 | 10 - 1M | 5 | \pm 200 | N/A | CNIH | YC102 | N/A | EXB14 EXB18 |
| RAVN |  | Thin Film Precision Array | 0603x4 | 100 - 33K | 0.1 0.25 0.5 | \pm 10 to \pm 50 | ACAL ACAS PR | N/A | N/A | N/A | N/A |
| RAVS |  | Convex Anti-Sulfur Chip Array | 104D-324D | 10 - 1M | 1 2 5 | \pm 200 | N/A | N/A | N/A | N/A | N/A |














Through-Hole Resistors

| Stackpole Series | | Description | Package Size | Resistance Range (Ω) | Tolerance (%) | TCR (ppm/°C) | Vishay | KOA | Yageo | IRC | NIC |
|------------------|---|---|---------------|----------------------|---------------|---------------------|------------------------------------|--|--------|-----------|-----|
| RNF RNMF |  | Metal Film | 1/8W - 2W | 1 - 22M | 0.05 to 5 | ±10 to ±100 | CMF CCF | MF RK | MFR | GP RC | NMR |
| FRN |  | Fusing Metal Film | 1/6W - 2W | 0.22 - 10K | 5 | ±350 | CMF XX-39 | N/A | FRM | WFF | N/A |
| RNS |  | High Power Metal Film | 1W, 2W | 10 - 1M | 0.5 1 | ±25 to ±100 | CPF SFR16S | N/A | N/A | MFP | N/A |
| RNV |  | High Voltage Anti-Moisture Metal Film | 1/4W | 100K - 15M | 1 5 | ±200 | VR25 HVR25 | RCR25 | N/A | N/A | N/A |
| RSF RSMF |  | Metal Oxide | 1/2W - 5W | 0.1 - 1M | 1 2 5 | ±200 | SXA CPF | MO MOS (RSS) | RSF | MO MOM | NMO |
| ASR SPR |  | Anti-Surge | 1/4W - 2W | 10 - 12M | 5 | +0/-500 +0/-1800 | N/A | RCR | N/A | N/A | N/A |
| RSPF RSPL |  | Flameproof Power | 1/4W - 3W | 0.1 - 1M | 1 2 5 | -200/+350 | FP | SPR | RSF | MO-S | N/A |
| MG MGM |  | High Voltage Metal Glaze | 1/4W - 3W | 100K - 1G | 1 5 10 | ±100 | VR | N/A | HVR | GC MH | N/A |
| CF CFM |  | Carbon Film | 1/8W - 2W | 1 - 22M | 2 5 | ±400 | N/A | CF | CFR | CF | NCF |
| HDM |  | Moisture Resistant Carbon Film | 1/4W, 1/2W | 1 - 2.2M | 1 2 5 | N/A | N/A | N/A | N/A | N/A | N/A |
| RC |  | Carbon Composition | 1/4W - 1W | 1 - 22M | 5 10 | N/A | N/A | RC | N/A | IBT | N/A |
| JW |  | Jumper Wire | 24 - 20 gauge | 3A to 4A max current | N/A | N/A | N/A | JL | JPW | N/A | N/A |
| CD |  | Zero Ohm | 1/8W - 1/2W | 0.01 or less | N/A | N/A | FRJ | Z J | ZOR | Zero Ohm | NZO |
| Stackpole Series | | Description | Package Size | Resistance Range (Ω) | Tolerance (%) | TCR (ppm/°C) | Ohmite | Caddock | Vishay | KOA | RCD |
| TR |  | Power Resistor | 20W - 100W | 0.05 - 10K | 0.5 to 10 | ±50 to ±300 | TAH, TBH, TCH, TDH, TEH, TFH | MP820, 821, 825, 850, 915, 916, 925, 930 | N/A | N/A | MP |
| HVR |  | High Voltage Radial Ledged Plate Resistor | 21 - 56 | 100K - 50G | 0.1 to 20 | ±25 to ±200 | N/A | THV USP | N/A | RK92 | N/A |


Wirewound and Power Resistors

| Stackpole Series | | Description | Package Size | Resistance Range (Ω) | Tolerance (%) | TCR (ppm/°C) | Vishay | IRC | Ohmite | RCD | Riedon |
|--------------------|---|---|--------------|----------------------|---------------|---------------------------|------------------------------|---------------------|-------------|------------------|------------|
| WW MWW WRC |  | Precision Wirewound | 0.4W - 11W | 0.1 - 150K | 0.1 to 5 | ±20 to ±90, -80 ~ +900 | RS/NS | AS SP20 SPH | 40 80 | 100 RW | UT |
| SP3A |  | UL1412 Recognized Fusible Wirewound | 4W | 10 - 100 | 5 | ±20 | N/A | ULW3 | N/A | N/A | N/A |
| SM |  | Surface Mount Wirewound | 1W - 4W | 0.01 - 3.01K | 0.1 to 5 | ±20 to ±100 | WSC WSR | WSM | RW | MWM | S SL |
| HPC |  | High Power Surface Mount | 12W | 0.025 - 250K | 1 5 | ±150 | N/A | N/A | N/A | N/A | N/A |
| CB WCB MCB |  | Ceramic Housed | 2W - 25W | 0.056 - 51K | 0.5 to 10 | ±20 to ±800 | CP CPW CPL | PW PPW LPW | TUW TUM | PW ULV LOR | UW |
| LCB LCBF TCB |  | Ceramic Housed Current Sensing | 2W - 15W | 0.005 - 0.33 | 0.25 - 10 | ±200(LCBF) ±50 to ±400 | CPL CPSL | N/A | LPW 4LPW | TUW TUM | LOR |
| NSZ PCB |  | Specialty Lead Ceramic Housed | 3W - 15W | 0.1 - 50K | 5 | N/A | CPR | N/A | TVM | PWLL | N/A |
| VM MVM |  | Ceramic Housed Vertical Mount | 2W - 10W | 0.056 - 51K | 5 10 | ±200 to ±800 | CPCC CPCF CPCL CPCP | PWR PWRG PWRL | TWM TWW | PV | UV |
| LVM NVM WVM |  | Vertical Mount Ceramic Housed Current Sensing | 5W - 10W | 0.01 - 8K | 0.5 - 10 | ±20 to ±400 | CPCL | N/A | PWRL | TWW | PV |
| BVM |  | Bracket Vertical Mount Wirewound | 5W - 25W | 0.1 - 50K | 5 | ±300 | N/A | N/A | N/A | PWV | N/A |
| RWT |  | Thermal Fusing Vertical Mount | 2W - 7W | 1 - 470 | 5 | ±200 | N/A | N/A | N/A | N/A | N/A |
| SWT EWT |  | Non-Flammable Edgewound Tubular | 12W - 1300W | 0.1 - 1M | 5 10 | ±100 to ±400 | HLW | N/A | 270 | T | TSC TVC |
| KAL |  | Aluminum Housed Surface Mount | 10W - 250W | 0.05 - 150K | 0.1 to 5 | ±20 to ±100 | RH | AL | 89 HS | 600 | UAL |
| MHL |  | Metal Clad Low Profile Power Wirewound | 60W - 1000W | 0.1 - 100K | 1 5 10 | ±260 | N/A | N/A | N/A | N/A | N/A |

Current Sense and Thin Film Resistors















| Stackpole Series | | Description | Package Size | Resistance Range (Ω) | Tolerance (%) | TCR (ppm/ $^{\circ}$ C) | Vishay | KOA | IRC | Ohmite | RCD |
|------------------|---|---|--------------|-------------------------------|---------------|------------------------------|-------------|--------------|--------------------|--------|-----------|
| CSR CSRN |  | Thick Film Current Sensing | 0402 - 1225 | 0.001 - 8 | 1 2 5 | ± 100 to ± 600 | CRCW LR | SR73 UR73 | LR PLR LRF3W | LVC | ML |
| CSRF |  | Foil on Ceramic Carrier Current Sensing | 0402 - 2512 | 0.003 - 0.1 | 1 5 | ± 50 ± 100 | N/A | N/A | N/A | MCS | N/A |
| CSM |  | Molded Metal Plate Current Sensing | 0603, 2512 | 0.002 to 0.1 | 1 5 | ± 75 ± 100 | N/A | N/A | N/A | N/A | N/A |
| CSNL |  | Metal Foil Current Sensing | 1206 - 2512 | 0.0005 - 0.1 | 1 5 | ± 50 | WSL | TLR | ULR | N/A | N/A |
| CSS CSSH |  | Ultra Precision Current Sensing | 1206 - 4527 | 0.00025 - 0.12 | 0.5 to 5 | ± 15 to ± 50 | WSL | TLR | ULR | N/A | N/A |
| BR |  | Bare Element Current Sensing | 1W - 5W | 0.005 - 0.1 | 1 2 5 | ± 20 (best available) | SR | N/A | OAR | 60 | OA |
| HLD |  | High Current Shunt | 1W - 5W | 0.003 - 0.1 | 2 5 10 | ± 100 - ± 50 | SPR | N/A | N/A | N/A | CSL |
| MPR |  | Flameproof Metal Plate | 3W, 5W | 0.01 - 0.47 | 5 10 | ± 350 | N/A | BPR | N/A | N/A | N/A |
| MR |  | Low Resistance Value | 1W - 10W | 0.005 - 0.5 | 1 5 | ± 40 to ± 400 | LVR | N/A | LOB | 10 | N/A |
| Stackpole Series | | Description | Package Size | Resistance Range (Ω) | Tolerance (%) | TCR (ppm/ $^{\circ}$ C) | Vishay | KOA | Yageo | IRC | Panasonic |
| RNCF |  | Precision Thin Film | 0201 - 2512 | 1 - 3M | 0.01 to 1 | ± 5 to ± 100 | TNPW PHR | RN73 | TF 9T RT | PCF | ERA |
| RNCS RNCH |  | Anti-Corrosive Tantalum Nitride Replacement | 0402 - 2512 | 10 - 1M | 0.1 to 0.5 | ± 15 to ± 50 | PTN | N/A | N/A | PFC | N/A |
| RNCP |  | High Power Anti-Sulfur Thin Film | 0402 - 1206 | 1 - 100K | 1 5 | ± 100 | N/A | N/A | N/A | N/A | N/A |
| MLF MLFM |  | Metal Film Precision Melf | 0204 - 0207 | 1 - 10M | 0.1 to 5 | ± 10 to ± 100 | MMA MMB | RN41 | MMF | CHP | N/A |

Inductors

| Stackpole Series | | Description | Package Size | Inductance Range (uH) | Rated Current (A) | DCR Range (Ω) | Pulse | Vishay | Coil Craft | NIC | Coiltronics |
|------------------|---|---|--------------|------------------------|--------------------|---------------|--|--------|------------|------------|-------------|
| PS |  | Shielded SMD Power Inductor | 1608 - 5022 | 1 - 10000 | 0.02 - 5 | 0.021 - 32.8 | P1174 | IDCS | DS | NIPS_R | N/A |
| PCS |  | Shielded SMD Power Inductor | 62B - 127 | 1 - 1000 | 0.14 - 15.9 | 0.007 - 9.44 | PF0601 PF1166/7/8/9 P1170 - P1173 | N/A | MSS | NPIS_H | DR |
| PCDR |  | Shielded SMD Power Inductor | 0628 - 1275 | 1.2 - 1500 | 0.13 - 13 | 0.0069 - 4.78 | N/A | N/A | MSS | MPIS_T | N/A |
| PCDS |  | Shielded SMD Power Inductor | 63B - 125B | 4.7 - 820 | 0.33 - 3.15 | 0.03 - 2 | N/A | N/A | N/A | N/A | N/A |
| SCDS |  | Shielded Low Profile SMD Power Inductor | 3D18 - 6D38 | 1 - 470 | 0.13 - 6.15 | 0.012 - 6.56 | N/A | N/A | N/A | NPIS_D | N/A |
| PDH |  | Unshielded SMD Power Inductor | 1608 - 5022 | 0.47 - 1000 | 0.4 - 30 | 0.003 - 1.6 | P1252 PF0638 PA0390 | N/A | DO | NPI_I | UP*B |
| PD |  | Unshielded SMD Power Inductor | 1608 - 5022 | 0.18 - 1000 | 0.1 - 20 | 0.007 - 13.8 | P0770 PO751/2 PF0382 PF0762 | IDC | DO | NPI_W | UP0.4C |
| PCD |  | Unshielded SMD Power Inductor | 0301 - 1006 | 1 - 1000 | 0.09 - 9.5 | 0.008 - 26 | PF0580 PF0581 PG0015 | IDCP | N/A | NPI_C | LD |
| Stackpole Series | | Description | Package Size | Inductance Range (nH)* | Rated Current (mA) | DCR Range (Ω) | SRF Range (GHz) | Murata | Vishay | TDK | Toko |
| AL |  | Thin Film Chip Inductor | 0201, 0402 | 0.1 - 33 | 75 - 800 | 0.1 - 4.5 | 2 - 14 | LQP | IMC | MLF | N/A |
| WL |  | Wirewound Ceramic Chip Inductor | 0402 - 1206 | 1 - 15000 | 80 - 2400 | 0.02 - 11.5 | 0.015 - 12.7 | LQW | IFC IMC | ACL MLF | LLQ |
| NL |  | SMD Ferrite Wirewound Inductor | 0805 - 2220 | 0.47uH - 1mH | 25 - 2600 | 0.03 - 150 | 0.0005 - 2 | LQH | IMC ISC | NL NLC | LLM |

* Unless specified otherwise.

Varistors and Circuit Protection

| Stackpole Series | | Description | Package Size | Voltage Range (Vrms) (V) | Max Energy (J) | Peak Current (Amps) | Epcos | Littelfuse | AVX | Maida |
|------------------|---|---|-----------------------|--------------------------|--|------------------------|----------------------|-----------------------|-------------|----------------|
| AV AVY |  | Automotive SMD Varistor Grade 12 and 24 Volt Power Supply AVY - High Temperature | 1206 - 3225 | 14 - 40 | 21 | 2K | CN CT AUTO | AUML | N/A | N/A |
| ZV ZVY |  | Low Voltage SMD Varicon ZVY - High Temperature | 0603 - 2220 | 2 - 130 | 12.2 | 1.2K | CN CT | ML | transguard | AV PV SV |
| ZVE ZVX |  | ESD Suppression SMD Varicon | 0603 - 1210 | 14(ZVE) 2 - 30(ZVX) | 0.1 | 2(ZVE) 40(ZVX) | N/A | MLE MLA | staticguard | TV |
| DV |  | Low and Medium Voltage SMD Varistor | 3225, 4032 | 11 - 300 | 30 | 1.2K | N/A | CH | VC | 8S |
| PV |  | Low and Medium Voltage Plastic Encapsulated SMD Varistor | 3225, 4032 | 11 - 300 | 30 | 1.2K | CU | N/A | N/A | N/A |
| Stackpole Series | | Description | Package Size | Operating Voltage (VDC) | ESD Capability | Trigger Voltage (V) | Clamping Voltage (V) | Littelfuse | Panasonic | Maida |
| ESD ESDU |  | Low and Ultra Low Capacitance ESD Suppressor | 0402 - 0603 | 3.3 - 24 | 8kV Direct Discharge 15kV Air Discharge | 150 - 250 (typical) | 17 - 25 (typical) | N/A | N/A | N/A |
| Stackpole Series | | Description | Package Size (mm) | Voltage Range (Vrms) (V) | Max Energy (J) | Peak Current (Amps) | Epcos | Littelfuse | Panasonic | Maida |
| AVL AVYL |  | Automotive Ledged Varistor AVY - High Temperature | 6 - 40 | 14 - 40 | 76 | 2K | S - AUTO | ZA | N/A | N/A |
| MV |  | Low Voltage Ledged Dual Function Varicon RFI Suppressors | 6 x 9 | 2 - 95 | 2.5 | 150 | N/A | N/A | N/A | N/A |
| OV |  | Automotive Ledged Dual Function Varicon RFI Suppressors | 7.5 x 9.0 8 x 12.0 | 14 - 40 | 12 | 1.2K | SHCV | N/A | N/A | N/A |
| ZVL ZVYL |  | Low Voltage Ledged Varicon ZVY - High Temperature | 5 - 20 | 2 - 40 | 37.8 | 2K | N/A | N/A | N/A | N/A |
| CV |  | Low and Medium Voltage Ledged Varistor | 5 - 20 | 50 - 680 | 620 | 6.5K | S | ZA/LA | ERZV | D_ZOV |
| CVH |  | Medium Voltage Ledged Varistor | 7 - 23 | 60 - 680 | 745 | 15K | S-E2 S-E3 | ZA/LA UltraMOV | ERZV | D_ZOV |
| SV |  | Special Medium Voltage Ledged Varistor | 5 - 23 | 60 - 680 | 980 | 15K | Q | N/A | N/A | R_ZOV |
| ZOV |  | Square Shaped High Energy Varistor | 23 - 60 | 60 - 680 | 4140 | 80K | LS | DHB HB HF HG | ERZC | D_ZOV |