



Varistor Components

Bourns® MOV, MLV and Hybrid Product Guide



BOURNS®

Overview



Bourns offers a comprehensive array of varistor technologies, form factors and ratings designed to match diverse voltage protection needs in almost any application.

Our product breadth gives designers the needed options to meet the complex technology requirements in a variety of applications including low voltage board level (LVBL), telecommunication, automotive electronics, AC-line, TVSS and high-energy industrial equipment designs.



SMD

Traditional MOV devices offered in surface mount packages



MLV

Effective on-board ESD and surge protection for consumer and automotive electronics.



Automotive

Qualified for use in the harsh environments found in automotive and industrial applications.



Through-Hole

Traditional PCB products provide rugged protection in the industry standard form factor.



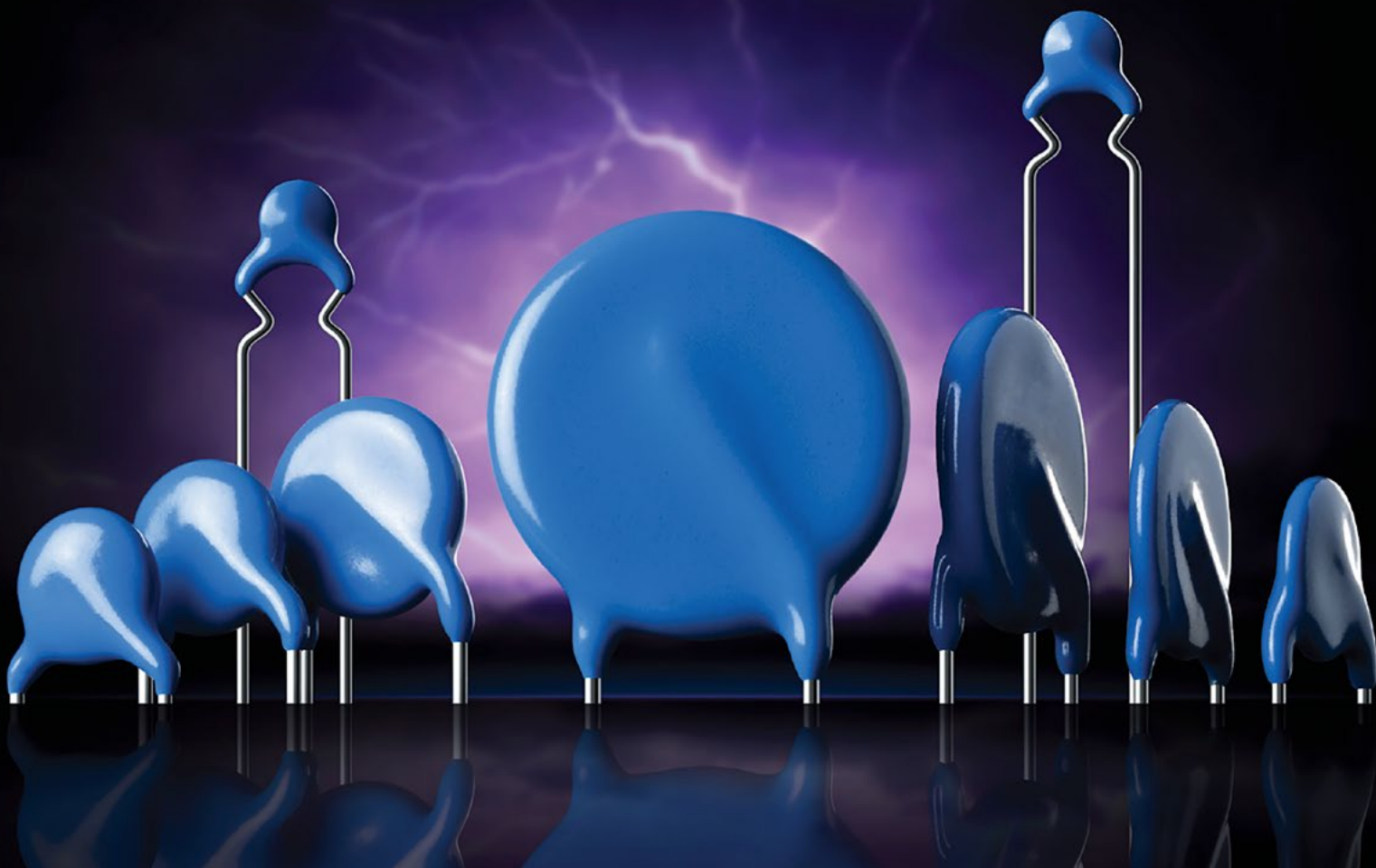
Hybrid

Combining varistor with other technologies for advanced performance and space savings.



High Energy

Surge ratings enable protected equipment to thrive in environments exposed to severe disturbances.



INDUSTRIAL ELECTRONICS

High quality and relatively inexpensive varistors provide excellent protection against overvoltage surges for sophisticated equipment. Bourns offers a wide spectrum of varistors that are used in different applications. Our products protect high-end industrial equipment, entertainment and consumer electronics, power supplies, energy meters, etc.

Bourns® CVQ Series plastic encapsulated SMD varistors offer very high energy capabilities compared to standard disc varistors of the same size. These plastic encapsulated SMD size 3225 and 4032 varistors represent an exact performance equivalent to through-hole disc varistors of 5 and 7 mm diameter, respectively.

HIGH ENERGY & HYBRID COMPONENTS

Lightning strikes and other high energy surges release very powerful flows of electricity which can damage whole buildings as well as indoor and outdoor objects if they are not protected against these powerful overvoltages. These surges can be simulated either by 8/20 μ s or 10/350 μ s surge current pulses. Appropriate high energy varistors should be selected according to the level of protection needed.

Bourns offers several series of high energy varistors. Bare discs or epoxy coated varistors with custom made terminals can be mounted in surge protective devices (SPDs) and in products for renewable energy, photovoltaic and other heavy duty industrial systems.

Automotive Grade Components



AUTOMOTIVE GRADE VARISTORS

Bourns® products can be found in automotive electronic systems. Based on EMI measurement results we can suggest optimal components for customers' applications to comply with CISPR standards.

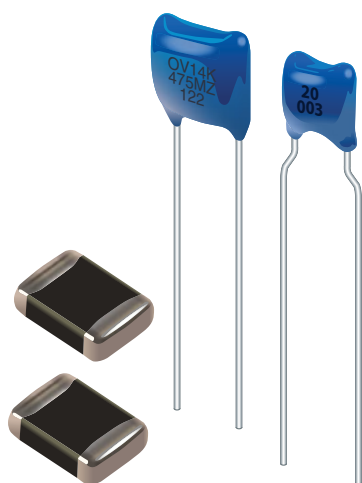
Many electronic systems in vehicles make driving safer and more comfortable. These systems typically need certain protection against voltage surges, as well as suppression of radio frequency noise. Filter components are optimal solutions in small DC motor drives for wiper systems, side mirrors, sun roofs, side windows, doors, etc. Customers are able to choose their own combination of electrical parameters, including capacitance, operating voltages and surge currents. Compared to common disc varistors, automotive varistors and varistor + capacitor EMI filters offer better electrical performance in much smaller case sizes.

SAFETY SYSTEMS

- Anti-lock brake systems
- Airbag control systems
- Window lifting systems
- Locking systems

CONTROL AND COMFORT SYSTEMS

- Direct ignition systems
- Wiper motors
- Central locking systems
- Seat adjustment motors
- Seat heating
- Air conditioning



FEATURES

- Through-hole and surface mount styles
- Surge protection & broad-band frequency noise suppression (dual component)
- Broadband EMI filter suppressors complying with international standards
- Extended temperature ranges
- Supply voltage: 12, 24, 42 V
- Operating voltage range: 16, 20, 26, 38, 56 Vdc
- Very good overcurrent and overvoltage protection
- Excellent energy handling capability
- AEC-Q200 Compliant
- RoHS compliant*

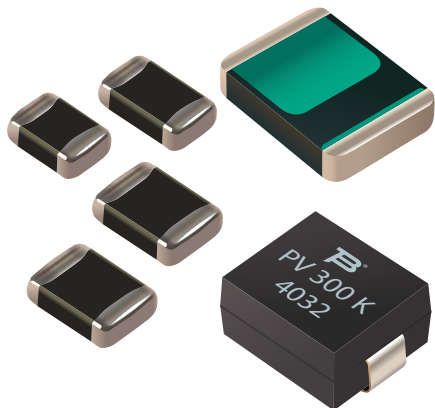
Automotive Grade Varistors – Through-Hole & SMD

Model	Technology & Package	Sizes (mm) or Package	Max. Continuous Voltage (V_{rms})	Max. Continuous Voltage (Vdc)	Peak Single Pulse Current 8/20 μs (I_{max})	Load Dump Energy (WLD)	Temperature Rating ($^{\circ}C$)	AEC-Q200
OV	Dual-function Hybrid MLV-capacitor through-hole	9 mm, 12 mm	14 – 40 V	16 – 56 V	800 A, 1200 A	6 – 12 J	–55 to +125	Grade 1 compliant
AV-TH	MLV-through-hole	602, 802, 902, 1103	14 – 40 V	16 – 56 V	400 – 2000 A	3 – 50 J	–55 to +125	Grade 1 compliant
AV-SMD	SMD	0805, 1206, 1812, 2220, 3225	14 – 40 V	16 – 56 V	200 – 2000 A	1 – 25 J	–55 to +125	Grade 1 compliant
AV HT-SMD	High temperature rated SMD	0805, 1206, 1812, 2220, 3225	14 – 40 V	16 – 56 V	200 – 2000 A	1 – 25 J	–55 to +150	Grade 1 compliant



*RoHS Directive 2015/863, Mar 31, 2015 and Annex.

Surface Mount (SMD) Varistors



FEATURES

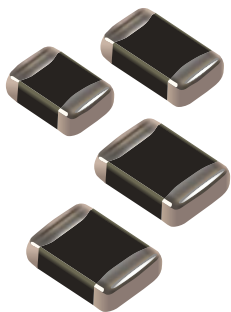
- Surface mount styles with multiple sizes available
- Leadless chip form - zero inductance facilitating extremely fast response time to transient surges
- Broad range of current and energy handling capabilities
- Extended temperature ranges
- Very good overcurrent and overvoltage protection
- Excellent energy handling capability
- Available in tape and reel packaging for automatic pick-and-place
- RoHS compliant*

Low & Medium Energy Varistors – SMD

Model	Description	Sizes (mm) or Package	Max. Continuous Voltage (V_{rms})	Max. Continuous Voltage (Vdc)	Peak Single Pulse Current 8/20 μs (I_{max})	Response Time	Temperature Rating ($^{\circ}C$)
DV	Low & medium voltage SMD MOV	2220, 3225, 4032	11 – 300 V	14 – 385 V	100 – 1200 A	<5 ns	–55 to +125
PV	Low & medium encapsulated SMD MOV	3225, 4032	60 – 300 V	85 – 385 V	100 – 1200 A	<5 ns	–40 to +85
ZV	Low voltage SMD MLV	0603, 0805, 1206, 1210, 1812, 2220	11 – 130 V	14 – 170 V	30 – 1200 A	<2 ns	–55 to +125
ZV HT	High temperature low voltage SMD MLV	0603, 0805, 1206, 1210, 1812, 2220	11 – 130 V	14 – 170 V	30 – 1200 A	<2 ns	–55 to +150
ZVX	Low capacitance & low energy SMD MLV	0603, 0805, 1206	11 – 30 V	14 – 38 V	30 – 40 A	<1 ns	–55 to +125
ZVE	ESD suppression SMD MLV	0603, 0805, 1206, 1210	14 V	18 V	20 – 30 A	<1 ns	–55 to +125



Multilayer Varistors (MLV)



FEATURES

- Surface mount styles with multiple sizes available
- Leadless chip form - zero inductance facilitating extremely fast response time to transient surges
- Broad range of current and energy handling capabilities
- Extended temperature ranges
- Very good overcurrent and overvoltage protection
- Excellent energy handling capability
- Available in tape and reel packaging for automatic pick-and-place
- RoHS compliant*

Low & Medium Energy Varistors – SMD

Model	Description	Sizes (mm) or Package	Max. Continuous Voltage (V_{rms})	Max. Continuous Voltage (Vdc)	Peak Single Pulse Current 8/20 μs (I_{max})	Response Time	Temperature Rating ($^{\circ}C$)
ZV	Low voltage varistors SMD MLV	0603, 0805, 1206, 1210, 1812, 2220	11 – 130 V	14 – 170 V	30 – 1200 A	<2 ns	–55 to +125
ZV HT	High temperature low voltage SMD MLV	0603, 0805, 1206, 1210, 1812, 2220	11 – 130 V	14 – 170 V	30 – 1200 A	<2 ns	–55 to +150
ZVX	Low capacitance & low energy SMD MLV	0603, 0805, 1206	11 – 30 V	14 – 38 V	30 – 40 A	<1 ns	–55 to +125
ZVE	ESD suppression SMD MLV	0603, 0805, 1206, 1210	14 V	18 V	20 – 30 A	<1 ns	–55 to +125



Through-Hole Metal Oxide Varistors (MOVs)



FEATURES

- Model sizes equivalent to standard disc varistors
- Smaller nominal dimensions than disc varistors
- Broad range of current and energy handling capabilities
- Extended temperature ranges
- Low clamping voltage
- Available with straight or crimped leads
- Available in tape and reel packaging for automatic pick-and-place
- RoHS compliant*

Low & Medium Energy Varistors – Through-Hole

Model	Description	Sizes (mm) or Package	Max. Continuous Voltage (V_{rms})	Max. Continuous Voltage (V_{dc})	Peak Single Pulse Current 8/20 μs (I_{max})	Response Time	Temperature Rating ($^{\circ}C$)
SV	Special medium voltage MOV square disk	5, 7, 10, 14, 20, 23	60 – 500 V	60 – 550 V	600 – 15,000 A	<25 ns	–40 to +85
CVQ	Extended medium voltage MOV round disk	7, 10, 14, 20, 23	60 – 550 V	85 – 745 V	1,750 – 15,000 A	<25 ns	–40 to +85
CV	Medium voltage MOV round disk	5, 7, 10, 14, 20	50 – 680 V	65 – 895 V	400 – 6,500 A	<25 ns	–40 to +85
ZV	Low voltage leaded style MLV leaded	5, 7, 10, 14, 20	11 – 40 V	15 – 56 V	100 – 2,000 A	<25 ns	–55 to +125





FEATURES

- High voltage rating
- High current rating
- Bidirectional
- Surge protection
- Fast response time
- RoHS compliant*

Extended Temperature & Voltage Varistors – Through-Hole

Model	Description	Sizes (mm) or Package	Max. Continuous Voltage (V_{rms})	Max. Continuous Voltage (V_{dc})	Peak Single Pulse Current 8/20 μs (I_{max})	Response Time	Temperature Rating ($^{\circ}C$)
MOV-07DxxxK	Extended temperature and voltage MOV round disk	7 mm	11 – 510 V	14 – 675 V	250 – 1,200 A	<25 ns	–40 to +105
MOV-10DxxxK	Extended temperature and voltage MOV round disk	10 mm	11 – 510 V	14 – 675 V	500 – 2500 A	<25 ns	–40 to +105
MOV-14DxxxK	Extended temperature and voltage MOV round disk	14 mm	11 – 1100 V	14 – 1465 V	1,000 – 4,500 A	<25 ns	–40 to +105
MOV-20DxxxK	Extended temperature and voltage MOV round disk	20 mm	11 – 1100 V	14 – 1465 V	2,000 – 6,500 A	<25 ns	–40 to +105



High Energy Varistors



FEATURES

- Customizable metal blocks with rigid terminals
- Max. continuous voltage V_{rms} 60 V to 680 V and 275 to 440 V
- Max. continuous voltage V_{dc} 85 V to 900V and 350 to 385 V
- Model sizes: 23, 25, 32, 40 and 60 mm
- Broad range of current and energy handling capabilities
- RoHS compliant*

High Energy Varistors – Epoxy Coated Metal Blocks with Rigid Terminals

Model	Description	Sizes (mm) or Package	Max. Continuous Voltage (V_{rms})	Max. Continuous Voltage (V_{dc})	Peak Single Pulse Current 8/20 μs (I_{max})	Response Time	Temperature Rating ($^{\circ}C$)
ZOV	High energy square shaped, Class II, epoxy coated, metalized blocks with rigid terminals	23, 25, 32, 40, 60	60 – 680 V	85 – 895 V	18 – 80 kA	<25 ns	–40 to +85
ZOVR	High energy round shaped, Class II epoxy coated, metalized blocks with rigid terminals	25, 32, 40	60 – 680 V	85 – 900 V	18 – 40 kA	<25 ns	–40 to +85
ZOVH	High energy stacked square shaped, Class I + II, epoxy coated, metalized blocks with rigid terminals	40	275 – 440 V	350 – 385 V	40 kA	<25 ns	–40 to +85
ZOVS	High energy stacked square shaped, Class I + II, epoxy coated, metalized blocks with rigid terminals	40	275 – 440 V	350 – 385 V	40 kA	<25 ns	–40 to +85



Hybrid Components



FEATURES

- Combined varistor with other technologies for advanced performance and space savings.
- Wide range of sizes and voltages
- Matched GDT-MOV pairings
- Extended temperature ranges
- Bidirectional protection
- Low leakage
- UL 1449 4th edition Type 5 Recognized
- Available in tape and reel packaging for automatic pick-and-place
- RoHS compliant*

Hybrid Varistors – Through-Hole

Model	Description	Sizes (mm) or Package	Max. Continuous Voltage (V_{rms})	Max. Continuous Voltage (Vdc)	Peak Single Pulse Current 8/20 μs (I_{max})	Response Time	Temperature Rating ($^{\circ}C$)
MV	Dual function MLV & capacitor EMI filter	9 mm	2 – 95 V	3 – 125 V	150 A	<25 ns	–55 to +125
OV	Automotive dual function MLV & capacitor EMI filter	9 mm, 12 mm	14 – 40 V	16 – 56 V	800 A, 1200 A	<25 ns	–55 to +125
GMOV	Hybrid MOV-GDT	14 mm, 20 mm	45 – 320 V	56 – 415 V	6 kA, 10 kA	<0.3 μs	–40 to +85



Worldwide Sales & Representative Offices



Country/Region	Phone	Email
Americas:	+1-951-781-5500	americus@bourns.com
Brazil:	+55 11 5505 0601	americus@bourns.com
China:	+86 21 64821250	asiacus@bourns.com
Europe, Middle East, Africa:	+36 88 885 877	eurocus@bourns.com
Japan:	+81 49 269 3204	asiacus@bourns.com
Korea:	+82 70 4036 7730	asiacus@bourns.com
Singapore:	+65 6348 7227	asiacus@bourns.com
Taiwan:	+886 2 25624117	asiacus@bourns.com
Other Asia-Pacific Countries:	+886 2 25624117	asiacus@bourns.com

Technical Assistance Region	Phone	Email
Asia-Pacific:	+886 2 25624117	techweb@bourns.com
Europe, Middle East, Africa:	+36 88 885 877	eurotech@bourns.com
Americas:	+1-951-781-5500	techweb@bourns.com

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