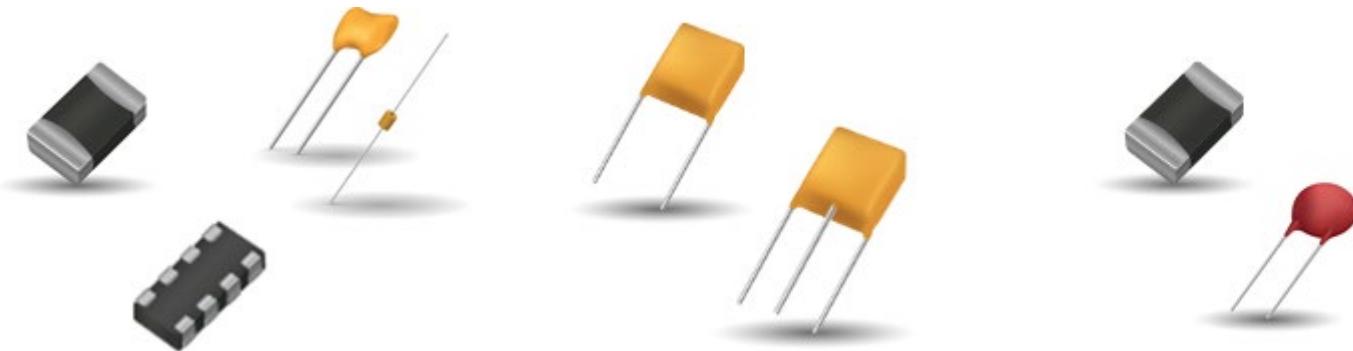
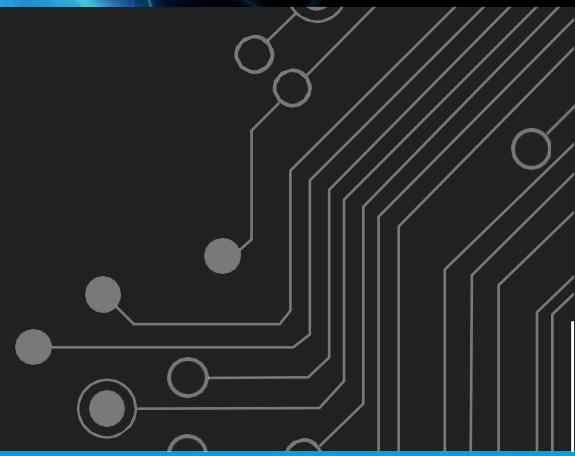


CIRCUIT PROTECTION



Multilayer Varistors

- Wide range of components
- From low cap to high energy
- Large automotive portfolio

Integrated Solutions

- Varistor and capacitor combined
- ESD protection and enhanced filtering
- Automotive qualified

NTC Thermistors

- Wide range of Components
- Customized NTC solutions
- Automotive Qualified

AVX TRANSGUARD®- MULTILAYER VARISTORS



The AVX TransGuard® Varistors - Transient Voltage Suppressors (TVS) with unique high-energy multilayer construction represent state-of-the-art overvoltage circuit protection. Monolithic multilayer construction provides protection from voltage transients caused by ESD (e.g. IEC 61000-4-2), lightning, inductive switching, automotive related transients such as load dump (ISO 7637-2-5), jump start with and other automotive transients (e.g. ISO 7637 Pulse 1-3, AEC-Q200-002, ISO 10605, ISO 16750-2, CI-220, CI-260) and more.

AVX Varistors provide bi-directional transient voltage protection in the on-state and EMI/RFI attenuation in the off-state which allows designers to combine the circuit protection and EMI/RFI attenuation function into a single highly reliable device. Parts are designed for use in temperatures from -55°C to +125°C with no derating (+150°C, 175 °C components available), exhibit very fast response, multiple strikes capability and high reliability. In addition, AVX automotive series varistors are AEC-Q200 qualified.

AVX Varistors are provided in different mounting options, covering wide range of applications requirements. Surface mount varistors are available in single element or multiple element (array) EIA industry standard packages. The parts are RoHS compliant and offer excellent solderability thanks to Ni Barrier/100% Sn termination. AVX also offers SnPb termination as a special option. Thru-hole components are supplied as conformally epoxy coated axial and radial devices and are RoHS compliant.

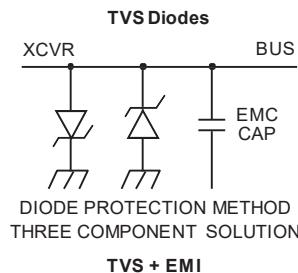
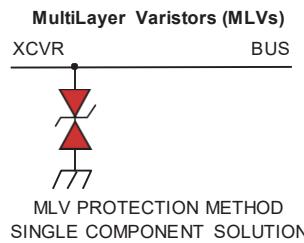
Features and Benefits

- SMT 0201 - 3220, Axial and Radial configuration
- Bi Directional transient voltage protection
- EMI Filtering in the off-state
- Very fast response (< 1ns)
- Multiple strikes capability
- High reliability
- No derating over operating temperature range -55°C to +125°C (+150°C, +175°C available)
- High peak current and high energy options
- Low capacitance parts for RF, high speed data lines and capacitance sensitive applications
- AEC-Q200 qualified automotive series
- RoHS Compliant

Applications

AVX Varistors are used in wide range of application sectors such as:

• Automotive	• Industrial/Professional
• Consumer	• Medical
• Home appliances	• Renewable/Smart Energy
• Automation	• Defense (SnPb Termination available)
• Lighting	



► Please visit AVX.COM to learn more about Circuit Protection & SPIMLV.AVX.COM to view our online MLV Simulation Software.



MULTILAYER VARISTORS

Professional
Industrial
Commercial

TVS + EMI Filtering

Series	PN Code	Fig	Features	Applications	Examples	
TransGuard®	VC		Case size: 0402 - 3220 Working Volt.: 3.3 - 85Vdc Energy: 0.05 - 12J Peak Current: 20 - 2000A	Wide range of MLVs for bi-directional ESD protection and EMI/RFI attenuation.	<ul style="list-style-type: none"> • IC Protection • DC Motors • Automation • LED • Alarms 	<ul style="list-style-type: none"> • Inductive switching • Bluetooth • I/O Lines • Portable devices
	VG		Case size: 0402 - 3220 Working Volt.: 3.3 - 85Vdc Energy: 0.05 - 12J Peak Current: 20 - 2000A	Wide range of MLVs for bi-directional ESD protection and EMI/RFI attenuation.	<ul style="list-style-type: none"> • IC Protection • DC Motors • Automation • LED • Alarms 	<ul style="list-style-type: none"> • Inductive switching • Bluetooth • I/O Lines • Portable devices
Low Clamp TransGuard®	VC		Case size: 0402 - 3220 Working Volt.: 3.3 - 85Vdc Energy: 0.05 - 12J Peak Current: 20 - 2000A	Wide range of MLVs for bi-directional ESD protection and EMI/RFI attenuation.	<ul style="list-style-type: none"> • IC Protection • DC Motors • Automation • LED • Alarms 	<ul style="list-style-type: none"> • Inductive switching • Bluetooth • I/O Lines • Portable devices
Miniature 0201 MLV	VC0201		Case size: 0201 Working Volt.: 3.5 - 16Vdc Energy: 0.01 - 0.02J Peak Current: 1 - 10A	Miniature 0201 varistor for any circuits with space constraints or for embedded applications.	<ul style="list-style-type: none"> • Hearing Aid • Portable devices • Embedded designs 	<ul style="list-style-type: none"> • Smart cards • Electronic tags
StaticGuard	VC**LC		Case size: 0402 - 1206 Working Volt.: 18Vdc Energy: 0.02 - 0.1J Capacitance: 40 - 200pF	Lower capacitance varistors for bi-directional ESD protection as well as EMI/RFI attenuation.	<ul style="list-style-type: none"> • Sensors • CMOS • Switches 	<ul style="list-style-type: none"> • Data lines • Bipolar and SiGe based systems
Controlled Capacitance	VCAC		Case size: 0402, 0603 Working Volt.: 9 - 30Vdc Energy: 0.05 - 0.3J Capacitance: 33 - 1000pF	Tight capacitance tolerance for targeted EMI/RFI filtering and transient suppression.	<ul style="list-style-type: none"> • EMI TVS Module Control • High Speed ASICs • IC 	<ul style="list-style-type: none"> • Sensors • Mixed signal environment
MultiGuard	MG		Case size: 0405 - 0612 Working Volt.: 5.6 - 18Vdc Energy: 0.02 - 0.1J Peak Current: 15 - 30A	2 and 4-element arrays for multiple lines ESD protection and EMI/RFI attenuation. Saves board space and pick and place costs.	<ul style="list-style-type: none"> • I/O Lines • Portable equipment • Radios 	<ul style="list-style-type: none"> • Programming ports • Differential data lines • ASIC
UltraGuard	VCUG MGUG		Case size: 0402 - 0612 Working Volt.: 3.0 - 32Vdc Energy: 0.02 - 0.4J Peak Current: 10 - 150A	Low leakage (<1µA) varistors	<ul style="list-style-type: none"> • Battery operated devices • Portable equipment • High clock speed IC 	<ul style="list-style-type: none"> • Fingerprint ID • Sensors • Optic circuits
Glass Encapsulated Varistors	VG VJ		Case size: 1206 - 3220 Working Volt.: 16 - 385Vdc Energy: 0.3 - 15J Peak Current: 120 - 3000A	High energy varistors, glass encapsulation provides enhanced resistance against harsh environment.	<ul style="list-style-type: none"> • Harsh Environment • High Energy Applications 	<ul style="list-style-type: none"> • DC motors • Inductive Loads
Radial and Axial Varistors	VR**AS VR**AT VA		Case size: Radial, Axial Working Volt.: 3.3 - 60Vdc Energy: 0.1 - 2.0J Peak Current: 30 - 500A	Radial and axial epoxy coated varistors, for harsh environment and applications where leaded component is preferred.	<ul style="list-style-type: none"> • DC Motors • Inductive loads • Down hole drilling • Relays 	<ul style="list-style-type: none"> • White goods • Industrial equipment • Sensors

TVS + Enhanced EMI Filtering

Series	PN Code	Fig	Features	Applications	Examples	
Radial CapGuard™	CG		Case size: Radial Working Volt.: 26 - 45Vdc Energy: 0.6 - 1.2J Capacitance: 0.47 - 4.7µF	Varistor and ceramic capacitor in single component for bi-directional ESD protection and EMI/RFI attenuation over wide frequency.	<ul style="list-style-type: none"> • Inductive loads • DC Motors • Relays 	<ul style="list-style-type: none"> • TVS and radiated and conducted noise filtering
Advanced Motor Protection	AMTS		Case size: Radial Working Volt.: 26 - 45Vdc Capacitance X: 0.47 - 4.7 µF Capacitance Y _{1,2} : 18 - 180nF	Varistor with 3 MLCC capacitors in single component for general and common mode noise filtering	<ul style="list-style-type: none"> • Inductive loads • DC Motors • Relays 	<ul style="list-style-type: none"> • TVS and radiated and conducted noise filtering
TransFeed	V2F		Case size: 0805 Working Volt.: 5.6 - 26Vdc Energy: 0.1 - 0.3J Peak Current: 20 - 120A	Varistor with FeedThru filter construction with enhanced noise reduction (notch filter) and low parallel inductance.	<ul style="list-style-type: none"> • Imaging • GPS • Bar code scanners • Instrumentation 	<ul style="list-style-type: none"> • O Lines • Power line



MULTILAYER VARISTORS

Professional
Industrial
Commercial

TVS + Low Signal Distortion/Low Loss (Low Cap)

Series	PN Code	Fig	Features	Applications	Examples	
USB Series	USB		Case size: 0402 - 0612 Working Volt.: 18Vdc Peak Current: 0.05 - 12J Capacitance: 3 - 10pF	Low capacitance varistors for high-speed data lines and other capacitance sensitive applications.	<ul style="list-style-type: none"> Sensors Data lines USB/Firewire Ethernet 	<ul style="list-style-type: none"> Computers LCD
Communication Bus Varistors	CAN FLX		Case size: 0402 - 0612 Working Volt.: 18 - 32Vdc Peak Current: 4 - 10A Capacitance: 15 - 37pF	Low capacitance varistors for communication bus, data lines and other capacitance sensitive applications	<ul style="list-style-type: none"> Data lines General I/O Protocols CMOS CAN bus 	<ul style="list-style-type: none"> Module Interfaces Switches Sensors
AntennaGuard Antenna PowerGuard	VC**AG VC**AP		Case size: 0402 - 0603 Working Volt.: 18 - 70Vdc Capacitance: 1.5 - 12pF	Low capacitance for RF circuits, antennas, high-speed data lines, optic circuits and other capacitance sensitive applications.	<ul style="list-style-type: none"> RF Circuits Antennas WLAN Ethernet 	<ul style="list-style-type: none"> Sensor Datalines USB
Sub pF AG Series	VCH4**AG		Case size: 0402 Working Volt.: 10 - 15Vdc Capacitance: 0.47 - 0.8pF	Ultra-low capacitance (<1pF) varistors for protection in RF circuits, antennas, sensors, high-speed data lines, optic circuits and capacitance sensitive applications.	<ul style="list-style-type: none"> RF Circuits Antennas WLAN Sensors 	<ul style="list-style-type: none"> Datalines USB HDMI Touch controls
Miniature MAV Series	MAV		Case size: 0402 - 0603 Working Volt.: 70Vdc Peak Current: 1 - 3A Capacitance: 6 - 22pF	Low capacitance varistors for low power AC circuits (110V p-to-p capability at 125kHz.) and higher voltage data lines.	<ul style="list-style-type: none"> Keyless entry Data Lines LC resonant circuits 	<ul style="list-style-type: none"> AC Sampling Transformer secondaries

TVS + High Temp (150°C, 175°C)

Series	PN Code	Fig	Features	Applications	Examples	
150°C Glass Encapsulated TransGuard	VGAH		Case size: 1206 - 3220 Working Volt.: 16 - 31Vdc Energy: 0.6 - 13J Peak Current: 200 - 1800A	High temperature 150°C varistors. In addition the glass encapsulation provides enhanced resistance against harsh environment.	<ul style="list-style-type: none"> High temperature applications Downhole drilling 	<ul style="list-style-type: none"> Industrial
175°C High Temp Varistors	VCAT		Case size: 0603 - 0805 Working Volt.: 18 - 31Vdc Energy: 0.1 - 0.3 μF Peak Current: 30 - 120A	High temperature 175°C varistors with no derating over specified operating temperature.	<ul style="list-style-type: none"> High temperature applications Downhole drilling 	<ul style="list-style-type: none"> Industrial
150°C Low Capacitance Varistors	CANAT VCAT CANATL		Case size: 0603 - 0612 Working Volt.: 18 - 32Vdc Energy: 4 - 5A Capacitance: 10 - 22pF	High temperature, low capacitance varistors with low loss, specified to +150°C.	<ul style="list-style-type: none"> Data lines Communication Bus RF Circuits 	<ul style="list-style-type: none"> Sensors High temperature
150°C Radial Varistors	VR**AT		Case size: Radial Working Volt.: 14 - 48Vdc Energy: 0.1 - 2J Peak Current: 30 - 250A	Radial epoxy coated varistors, specified to 150°C for high temp applications.	<ul style="list-style-type: none"> High temperature applications Downhole drilling 	<ul style="list-style-type: none"> Industrial

General Applications Examples



- Industrial Applications
- Communication
- Household Appliances
- Automation
- Safety and Security
- Energy and Smart Grid
- LED Lighting

- Commercial
- Healthcare
- Hobby
- Transportation
- Defense (SnPb termination available)
- and more



MULTILAYER VARISTORS

Automotive
AEC-Q200

AEC-Q200: TVS + EMI Filtering

Series	PN Code	Fig	Features	Applications	Examples	
TransGuard® Automotive	VCAS		Case size: 0402 - 3220 Working Volt.: 3.3 - 85Vdc Energy: 0.05 - 13J Peak Current: 20 - 2000A	Wide range of MLVs for bi-directional ESD protection and EMI/RFI attenuation. Specified with load dump and jump start rating where applicable	<ul style="list-style-type: none"> • All automotive applications • Safety • Body electronics 	<ul style="list-style-type: none"> • Drive train • Load dump protection • Comfort & convenience
	VGAS		Case size: 0402 - 3220 Working Volt.: 3.3 - 85Vdc Energy: 0.05 - 12J Peak Current: 20 - 2000A	Wide range of MLVs for bi-directional ESD protection and EMI/RFI attenuation.	<ul style="list-style-type: none"> • IC Protection • DC Motors • Automation • LED • Alarms 	<ul style="list-style-type: none"> • Inductive switching • Bluetooth • I/O Lines • Portable devices
Miniature 0201 MLV	VCAS0201		Case size: 0201 Working Volt.: 9Vdc Energy: 0.02J Peak Current: 5A	Miniature 0201 varistor for any circuits with space constraints or for embedded applications.	<ul style="list-style-type: none"> • Manifold absolute pressure sensor 	<ul style="list-style-type: none"> • Any applications with space constraint
StaticGuard Automotive	VCAS**LC		Case size: 0402 - 0805 Working Volt.: 18Vdc Energy: 0.02 - 0.1J Capacitance: 40 - 80pF	Lower capacitance varistors for bi-directional ESD protection as well as EMI/RFI attenuation.	<ul style="list-style-type: none"> • Sensors • CMOS • Switches 	<ul style="list-style-type: none"> • Data lines • Module Interfaces • General purpose logic
Controlled Capacitance	VCAC		Case size: 0402, 0603 Working Volt.: 9 - 30Vdc Energy: 0.05 - 0.3J Capacitance: 33 - 1000pF	Tight capacitance tolerance for targeted EMI/RFI filtering and transient suppression.	<ul style="list-style-type: none"> • EMI TVS Module Control • High Speed ASICs • IC 	<ul style="list-style-type: none"> • Sensors • Mixed signal environment
Glass Encapsulated Varistors	VGAS VJ		Case size: 1206 - 3220 Working Volt.: 16 - 385Vdc Energy: 0.3 - 15J Peak Current: 120 - 3000A	High energy varistors, glass encapsulation provides enhanced resistance against harsh environment.	<ul style="list-style-type: none"> • Harsh Environment • High Energy Applications • DC motors 	<ul style="list-style-type: none"> • Inductive Loads • Power Steering • Load Dump
Radial Varistors	VR**AS VR**AT		Case size: Radial Working Volt.: 3.3 - 60Vdc Energy: 0.1 - 2.0J Peak Current: 30 - 500A	Radial and axial epoxy coated varistors, for harsh environment and applications where leaded component is preferred.	<ul style="list-style-type: none"> • DC Motors • Inductive loads • Relays 	<ul style="list-style-type: none"> • Turbocharger

AEC-Q200: TVS + Enhanced EMI Filtering

Series	PN Code	Fig	Features	Applications	Examples	
Radial CapGuard™	CG		Case size: Radial Working Volt.: 26 - 45Vdc Energy: 0.6 - 1.2J Capacitance: 0.47 - 4.7μF	Varistor and ceramic capacitor in single component for bi-directional ESD protection and EMI/RFI attenuation over wide frequency.	<ul style="list-style-type: none"> • Inductive loads • DC Motors • Relays 	<ul style="list-style-type: none"> • TVS and radiated and conducted noise filtering
Advanced Motor Protection	AMTS		Case size: Radial Working Volt.: 26 - 45Vdc Capacitance X: 0.47 - 4.7 μF Capacitance Y _{1,2} : 18 - 180nF	Varistor with 3 MLCC capacitors in single component for general and common mode noise filtering	<ul style="list-style-type: none"> • Inductive loads • DC Motors • Relays 	<ul style="list-style-type: none"> • TVS and radiated and conducted noise filtering
TransFeed	V2AF		Case size: 0805 Working Volt.: 5.6 - 26Vdc Energy: 0.1 - 0.3J Peak Current: 20 - 120A	Varistor with FeedThru filter construction with enhanced noise reduction (notch filter) and low parallel inductance.	<ul style="list-style-type: none"> • Drive by Wire • Electric Mirror • LCD Dashboard 	<ul style="list-style-type: none"> • GPS • I/O Ports • Power line

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MULTILAYER VARISTORS

Automotive
AEC-Q200

AEC-Q200: TVS + Low Signal Distortion/Low Loss (Low Cap)

Series	PN Code	Fig	Features	Applications	Examples	
Communication Bus Varistors	CAN FLX		Case size: 0402 - 0612 Working Volt.: 18 - 32Vdc Peak Current: 4 - 10A Capacitance: 15 - 37pF	Low capacitance varistors for communication bus, data lines and other capacitance sensitive applications	<ul style="list-style-type: none"> CAN bus FlexRay Data lines Body control modules 	<ul style="list-style-type: none"> Sensors General I/O protocols
AntennaGuard Antenna PowerGuard	VC**AG		Case size: 0402 - 0603 Working Volt.: 18 - 32Vdc Capacitance: 1.5 - 12pF	Low capacitance for RF circuits, antennas, high-speed data lines, optic circuits and other capacitance sensitive applications.	<ul style="list-style-type: none"> RF Circuits Antennas WLAN Ethernet 	<ul style="list-style-type: none"> Sensor Datalines USB
	VC**AP		Case size: 0402 Working Volt.: 10 - 15Vdc Capacitance: 0.47 - 0.8pF	Ultra-low capacitance (<1pF) varistors for protection in RF circuits, antennas, sensors, high-speed data lines, optic circuits and capacitance sensitive applications.	<ul style="list-style-type: none"> RF Circuits Antennas WLAN Sensors 	<ul style="list-style-type: none"> Datalines USB HDMI Touch controls
Sub pF AG Series	VCASH4		Case size: 0402 - 0603 Working Volt.: 70Vdc Peak Current: 1 - 3A Capacitance: 6 - 22pF	Low capacitance varistors for low power AC circuits (110V p-to-p capability at 125kHz.) and higher voltage data lines.	<ul style="list-style-type: none"> Keyless entry Data Lines LC resonant circuits 	<ul style="list-style-type: none"> Immobilizers
Miniature MAV Series	MAV		Case size: 1206 - 3220 Working Volt.: 16 - 31Vdc Energy: 0.6 - 13J Peak Current: 200 - 1800A	High temperature 150°C varistors. In addition the glass encapsulation provides enhanced resistance against harsh environment.	<ul style="list-style-type: none"> High temperature applications Underhood 	<ul style="list-style-type: none"> Load dump DC motors
175°C High Temp Varistors	VCAT		Case size: 0603 - 0805 Working Volt.: 18 - 31Vdc Energy: 0.1 - 0.3 μF Peak Current: 30 - 120A	High temperature 175°C varistors with no derating over specified operating temperature.	<ul style="list-style-type: none"> High temperature applications Underhood 	<ul style="list-style-type: none"> LIN Bus
150°C Low Capacitance Varistors	CANAT VCAT CANATL		Case size: 0603 - 0612 Working Volt.: 18 - 32Vdc Energy: 4 - 5A Capacitance: 10 - 22pF	High temperature, low capacitance varistors with low loss, specified to +150°C.	<ul style="list-style-type: none"> Data lines Communication Bus RF Circuits 	<ul style="list-style-type: none"> Sensors High temperature
150°C Radial Varistors	VR**AT		Case size: Radial Working Volt.: 14 - 48Vdc Energy: 0.1 - 2J Peak Current: 30 - 250A	Radial epoxy coated varistors, specified to 150°C for high temp applications.	<ul style="list-style-type: none"> High temperature applications Underhood 	<ul style="list-style-type: none"> Turbocharger DC motors

AEC-Q200: TVS + High Temp (150°C, 175°C)

Series	PN Code	Fig	Features	Applications	Examples	
150°C Glass Encapsulated TransGuard	VGAH		Case size: 1206 - 3220 Working Volt.: 16 - 31Vdc Energy: 0.6 - 13J Peak Current: 200 - 1800A	High temperature 150°C varistors. In addition the glass encapsulation provides enhanced resistance against harsh environment.	<ul style="list-style-type: none"> High temperature applications Underhood 	<ul style="list-style-type: none"> Load dump DC motors
175°C High Temp Varistors	VCAT		Case size: 0603 - 0805 Working Volt.: 18 - 31Vdc Energy: 0.1 - 0.3 μF Peak Current: 30 - 120A	High temperature 175°C varistors with no derating over specified operating temperature.	<ul style="list-style-type: none"> High temperature applications Underhood 	<ul style="list-style-type: none"> LIN Bus
150°C Low Capacitance Varistors	CANAT VCAT CANATL		Case size: 0603 - 0612 Working Volt.: 18 - 32Vdc Energy: 4 - 5A Capacitance: 10 - 22pF	High temperature, low capacitance varistors with low loss, specified to +150°C.	<ul style="list-style-type: none"> Data lines Communication Bus RF Circuits 	<ul style="list-style-type: none"> Sensors High temperature
150°C Radial Varistors	VR**AT		Case size: Radial Working Volt.: 14 - 48Vdc Energy: 0.1 - 2J Peak Current: 30 - 250A	Radial epoxy coated varistors, specified to 150°C for high temp applications.	<ul style="list-style-type: none"> High temperature applications Underhood 	<ul style="list-style-type: none"> Turbocharger DC motors

Automotive Applications Examples



- **Drive Train**
- **Body Electronics**
- **Safety**
- **Comfort & Convenience**

- Electric Mirror
- ECU
- Airbag
- Traction Control
- Immobilizer
- Keyless Entry
- Lighting
- Audio Entertainment
- Sensors
- Windshield wipers
- Dashboard
- ADAS
- Camera
- Electric drive
- Engine Start/Stop



MULTILAYER VARISTORS

Automotive
AEC-Q200

TVS + EMI Filtering

AUTOMOTIVE TRANSIENTS

Today's automobiles are using new technologies based on electronics systems connected by wide variety of network to provide increased safety, convenience and comfort, to reduce emissions, increase fuel efficiency and more. During the lifetime these systems are subjected to many overvoltage transient surges. To ensure safe and reliable function it is necessary to protect these sensitive systems against overvoltage surges.

AUTOMOTIVE POWER RAIL TRANSIENTS

The transients on automotive power rails are usually medium to high energy transients and are caused by engine start such as Jump start (connecting other cars battery to jump start the engine), Load Dump (sudden load disconnect from alternator) or inductive switching (caused by DC motors on/off switching - e.g. window lifter, wipers, adaptive headlights). These transients are typically bi-directional.

AUTOMOTIVE DATA LINE TRANSIENTS

Data lines connecting the automotive systems need to be protected against various ESD pulses to ensure sensitive electronics protection. These transients are mainly caused by human interaction with the electronics systems (controls, buttons and ports) or by interaction between systems due to different charge build up. These transients are typically bidirectional and very fast.

When used in communication bus designs, MLVs can save approximately 90% of the board area involved with diode/EMC cap solutions. In addition, MLVs offer a FIT rate <0.1, an ability to be used at temperatures up to 150°C and a fast turn on time.

MLVs have traditionally been used in inductively generated automotive transient suppression applications such as motors, relays and latches. MLVs offer a large inrush current capability in a small package, high-energy transient suppression and a broad and definable off state bulk EMC capacitance. These, coupled with an extremely low FIT rate and excellent process capability makes MLVs a common device in today's intermediate to high power automotive circuit protection.

AVX MULTILAYER VARISTORS IN AUTOMOTIVE APPLICATIONS

The EMC requirements of today's automotive electronics are a natural fit for the use of AVX Multilayer Varistors (MLVs).

AVX Automotive Series Varistors provide reliable protection against automotive related transients - such as Load Dump, Jump Start and ESD to protect the growing number of electronics systems used in automotive applications.

TRANSIENT EXAMPLES:

• Load dump	• AEC-Q200-002	• CI-220
(ISO 7637-2-5)	• ISO 10605	• CI-260
• Jump Start	• ISO 16750-2	
• ISO 7637 Pulse 1-3		
• IEC 61000-4-2, etc.		

The parts offer fast turn on time, bi-directional protection, excellent multiple strikes capability and in addition also EMI/RFI filtering in the off-state that can improve overall system EMC performance.

High power MLV designs have been revised and miniaturized to allow efficient protection of today's most widely used communication bus designs.

Example of suitable AVX series based on data speed and line type is shown below:

SERIES	BUS	DATA SPEED	
Sub pF AntennaGuard Automotive Series	HDMI	3.2 Gbps	High Speed
	1394a	400 Mbps	
AG/Sub pF AG Automotive Series, Miniature AC	MOST	45 Mbps	
	TTP	25 Mbps	
FlexRay	FlexRay	10 Mbps	Data
CAN, FlexRay, AG Series	TTCAN	1 Mbps	
	CAN	1 Mbps - 50 Kbps	
TransGuard® Automotive Series, StaticGuard Automotive Series, Radial Varistor	Safe-by-Wire	150 Kbps	
	LIN	<20 Kbps	Low Speed
TransGuard® Automotive Series, StaticGuard Automotive Series, Radial Varistor, Miniature MAV, TransFeed Automotive Series	ALL		Power Line
TransFeed Automotive Series, Controlled Capacitance	10-100 Mbps		Cutoff Frequency

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NTC Thermistors

AVX offers reliable NTC thermistor solutions for a wide range of automotive, professional, industrial and commercial applications. Available in SMT, leaded, or leadless form, they provide multiple stability options and a wide resistance range with the option to offer customized solutions. Thermistors are widely used in temperature sensing or temperature compensation applications.

SMT Thermistors



0603 to 1206 case size thermistors are widely used for temperature compensation as well as for temperature control of printed circuits in wide range of applications. Available with Ni barrier/100% Sn termination for lead free soldering or with PdAg termination for hybrid assembly.

PN	Case Size	Resistance	Tolerance	Temp
NB / NC	0603 - 1206	10Ω - 1MΩ	±5%, ±10%, ±20%	-55 to +150°C

High Accuracy Thermistors



High precision resistance and ability to reproduce the sensibility index B makes these parts ideal for temperature measurement. These small head size thermistors with rapid response times are able to meet the most accurate requirements.

PN	Size	Resistance	Tolerance	Temp
NI / NJ	2.4 - 3.0mm	2kΩ - 100kΩ	±1%, ±2%, ±3%	-55 to +150°C
NP / NK				

Disc Thermistors



AVX disc thermistors with excellent thermal and electrical stability, resistance to mechanical and thermal shock with a wide range of resistance values for applications such as temperature measurement or thermal compensation.

PN	Size	Resistance	Tolerance	Temp
ND / NE	3 - 9mm	68Ω - 1MΩ	±5% ±10% ±20%	-55 to +150°C
NV / NR				

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Varistors
Scan Code for Catalog



NTC Thermistors
Scan Code for Catalog



Application Examples

AUTOMOTIVE (AEC-Q200)

- Outside Temperature
- Navigation System
- Air Conditioning
- Radio
- Auxiliary Heating System for Diesel
- Oil Temperature
- Evaporator Probe
- Water Temperature
- Electric Pump Module
- Air Intake Temperature
- Alarm
- Seats Heating
- and more

CONSUMER/INDUSTRIAL

- Mobile Phones
- Battery Packs
- Battery Chargers
- LCD Compensation
- Base Stations
- Home Appliances
- HVAC Systems
- Industrial Equipment
- Fans
- Fire detectors
- and more