AUTOMOTIVE APPLICATIONS

CERAMIC CAPACITORS | TANTALUM CAPACITORS | POLYMER CAPACITORS
NIOBIUM OXIDE | FILM CAPACITORS | CONNECTORS | NTC THERMISTORS
MULTILAYER VARISTORS | ANTENNAS

AUTOMOTIVE
OVERVIEW

ABOUT AVX

AVX is a worldwide leading supplier of passive electronic components, connectors, passive and active antennas, sensors and control units. We offer a wide range of components manufactured to the highest quality and reliability standards. Our worldwide manufacturing capability includes facilities located in seventeen countries in four continents, allowing us to continue meeting customer needs on a global basis.

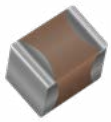
Our products include ceramic, tantalum, niobium oxide, conductive polymer and film capacitors, varistors, thermistors, filters, connectors, antennas, sensors and control units. Our long track record and more than 30 years of expertise in automotive products enable customers to rely on AVX as the one stop source for passive components needs.

As a technology leader, AVX will continue to add to its product portfolio on a regular basis. Details of new devices being offered and their specifications will be shown on the AVX website, www.avx.com

	SAFETY							BODY ELECTRONICS									DRIVE TRAIN										COMFORT & CONVENIENCE												HYBRID & ELECTRIC						
	Airbag	Anti-Lock Brake System	Crash Avoidance Circuit	Tire Pressure	Traction Control (ESP)	Seat Weight Sensor	Telematics Control Unit (eCall, V2X)	Small Motor Drives	Communication Bus (Lin, CAN, FLexRay)	Transponders	Dashboard Systems	Car Alarm	Lamp / LED Driver	HID Lighting	Windshield Wipers	Rain Sensor	Light Sensor	Engine Control Unit (ECU)	Electronic Clutch	Fuel Pump	Water Pump	Electric Oil Pump	Gear Box Sensors	Electric Power Steering	Engine Cooling Fan	Temperature Sensor	Transmission Control Unit	Turbo Charger	Underhood Modules	Seat Heating	Air Conditioning	GPS Location System	Electric Seat Controls	Electric Window Controls	Electric Mirror Controls	Parking Assistant	Infotainment	Satellite Radio	Keyless System	Cruise Control	Remote Start	DC/DC Converters	Regenerative Braking	Start/Stop System	Electric Drive	Battery Management (Charging)	Battery Cell Temp Monitoring
CERAMIC CAPACITORS																																													
NP0									■	■	■	■	■	■	■	■	■													■	■	■	■	■	■	■	■	■	■	■	■						
X7R														■								■			■		■	■		■	■	■	■	■	■	■	■	■	■	■	■						
X7R High Voltage																			■	■	■		■																							
High Temp. X8R																						■	■		■	■	■	■		■																	
FLEXITERM®								■	■	■	■	■	■	■	■	■	■													■	■	■	■	■	■	■	■	■	■	■	■						
FLEXISAFE™																			■				■	■			■				■				■	■	■	■			■					
U Series									■																							■						■	■		■						
IPC Array											■							■														■					■									
ESD-Safe™										■	■	■						■					■	■			■					■					■	■	■							■
Radial & Axial								■							■					■	■	■			■			■																		
X7R Feedthru								■	■								■	■										■			■					■	■									
TANTALUM CAPACITORS																																													
TAJ / F93-AJ6								■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■						
TPS / F91-AJ6								■			■	■	■					■	■	■	■	■	■	■	■			■			■	■	■	■	■	■				■	■	■				
TRJ / F97								■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■					■	■					
TRM								■																■			■																			
TMJ																																														
F98-AJ6											■																				■			■		■		■		■						
F97-HT3 / F9H												■	■				■					■			■		■															■	■			
THJ													■				■								■																	■				
CONDUCTIVE POLYMER CAPACITORS																																														
TCQ								■	■	■	■	■	■	■			■													■	■	■	■	■	■	■	■	■	■	■	■						
NIOBIUM OXIDE - OXICAP®																																														
NOJ									■		■	■	■			■	■			■	■	■				■				■	■	■	■	■	■	■	■	■	■	■	■						
NOS											■	■								■	■	■			■					■		■	■	■	■				■	■						
NOM																								■									■														
FILM CAPACITORS																																														
PPS Film Chip														■										■											■	■	■									
PEN Film Chip								■					■		■									■											■											
PET-HT Film Chip								■					■	■	■									■											■											
FFV / FFLI / Custom																								■																						
FAV																								■																						
CIRCUIT PROTECTION																																														
Automotive Varistors								■	■	■	■	■	■	■		■	■	■												■	■	■	■	■	■	■	■	■	■	■	■						
NTC THERMISTORS																																														
SMT Thermistors											■		■					■					■			■	■			■	■	■				■	■									
Leaded Thermistors											■																			■	■															
CONNECTORS																																														
IDC								■	■			■	■														■			■			■	■					■							
Custom Automotive								■			■	■	■	■	■	■											■			■	■		■	■					■	■						
ANTENNAS																																														
Antennas																															■				■	■	■	■		■						

AUTOMOTIVE
PRODUCT SELECTION GUIDE

SMT CERAMIC CAPACITORS

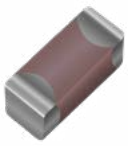


TIN TERMINATION

AVX Ceramic Capacitors exhibit low parasitics and excellent EMI filtering capabilities. AVX MLC Capacitors are available in wide range of values, styles,voltage ratings and dielectrics.

Ultra Low ESR NP0 - "U" dielectric parts are designed for RF applications requiring ultra-low ESR. NP0 parts are suitable for use in MHz range with very stable characteristics. X7R parts are suitable for use for use in general kHz range. X8R / X8L parts are designed for high temperature applications up to +150°C. (**Contact AVX for +150°C X7R option*)

Dielectric	Operating Temp	Range
NP0 Ultra Low ESR	+125°C	50V – 200V | 0.2pF – 1.0nF
NP0	+125°C	25V – 100V | 1pF – 4.7nF
X7R	+125°C	16V – 500V | 220pF – 22µF
X7R High Voltage	+125°C	600V – 3000V | 100pF – 0.15µF
X8R / X8L X7R*	+150°C	25V – 100V | 330pF – 4.7µF

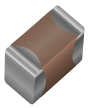


FLEXITERM®

FLEXITERM® MLC Capacitors equipped with an AVX flexible termination system. They have superior resistance to both mechanical stress (board flexure - 5mm bend test guaranteed) and thermal stress (increased temperature cycling performance, 3000 cycles and beyond).

(**Contact AVX for +150°C X7R option*)

Dielectric	Operating Temp	Range
X7R	+125°C	16V – 200V | 270pF – 22µF
X7R High Voltage	+125°C	600V – 3000V | 100pF – 0.15µF
X8R / X8L X7R*	+150°C	25V – 100V | 330pF – 4.7µF



FLEXISAFE

Specifically designed with an industry leading set of safety features for safety critical applications. Combines FLEXITERM® layer in conjunction with the cascade design.

Dielectric	Operating Temp	Range
X7R	+125°C	16V – 100V | 1nF – 470nF

ESD SAFE

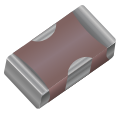
Enhanced MLC capacitor designed specifically for general ESD protection.

Dielectric	Operating Temp	Range
X7R	+125°C	25V – 100V | 4.7nF – 2.2µF

IPC ARRAY

Integrated Passive Component (IPC) and associates up to four capacitance elements in a single case, and is ideal for use in modern integrated circuits in automotive applications. It offers PCB space saving, increased assembly line output and better electrical performance thanks to small dimensions. Available also with FLEXITERM® for X7R and X8R range.

Dielectric	Operating Temp	Range
NP0	+125°C	16V – 100V | 1pF – 470pF
X7R	+125°C	10V – 100V | 220pF – 100nF
X8R	+150°C	16V | 220pF – 680pF



EMI FILTER

Capacitor with excellent filtering capability thanks to the feedthru L-C-T like filter design.

Dielectric	Operating Temp	Range
NP0 / X7R	+125°C	50V – 100V | 22pF – 47nF

LEADED CERAMIC CAPACITORS

RADIAL

AVX leaded MLCCs offer excellent mechanical shock and vibration resistance in harsh environment applications. With a wide range of dielectric materials, capacitance values, voltage ratings and lead styles, leaded capacitors offer robust mechanical shock and vibration characteristics, exceptional thermal resistance and proven reliability and quality. Both dipped and molded configurations available.

Dielectric	Operating Temp	Range
NP0	+125°C	50V – 200V | 1pF – 8200pF
X7R	+125°C	50V – 100V | 470pF – 10µF
X7R High Voltage	+125°C	1000V – 3000V | 470pF – 10nF
X8R	+150°C	50V | 1nF – 330nF

AXIAL

Axial version of the leaded epoxy coated capacitors. Both dipped and molded configurations available.

Dielectric	Operating Temp	Range
X7R	+125°C	50V | 10nF – 4.7µF

AUTOMOTIVE
PRODUCT SELECTION GUIDE

TANTALUM CAPACITORS

AVX automotive tantalum capacitors offer excellent parameters stability over lifetime, resistance against thermo-mechanical stresses, and high surge robustness.

Capacitors are available in both standard and low ESR options. They are also available in a high temperature series up to +175°C which makes them suitable for a wide range of automotive control circuits in applications such as engine control units, ABS systems, MDPS, electronic gearboxes, TPMS, etc.

Series	Operating Temp	Range
TAJ	+125°C	6.3V – 50V | 0.22µF – 680µF
F93-AJ6	+125°C	4V – 35V | 1µF – 680µF
TPS	+125°C	6.3V – 50V | 0.22µF – 680µF
F91-AJ6	+125°C	6.3V – 16V | 10µF – 220µF
TRJ	+125°C	4V – 50V | 0.1µF – 680µF
F97	+125°C	6.3V – 35V | 0.33µF – 150µF
TRM	+125°C	2.5V – 50V | 4.7µF – 1500µF
TMJ	+125°C	6.3V – 50V | 0.22µF – 680µF
F98-AJ6	+125°C	6.3V – 16V | 4.7µF – 47µF
F97-HT3	+135ºC	6.3V – 35V | 0.33µF – 100µF
F9H	+150ºC	10V – 16V | 10µF – 47µF
THJ +175°C	+175°C	6.3V – 50V | 0.1µF – 220µF

CONDUCTIVE POLYMER CAPACITORS

Automotive polymer series of low ESR capacitors. Qualified in accordance with AEC-Q200.

Series	Operating Temp	Range
TCQ	+105/125°C	2.5V – 50V | 10µF – 470µF

NIOBIUM OXIDE CAPACITORS

Niobium OxiCap® capacitors offer unique features - high reliability, non-burn and non-smoke technology, more resistance to overvoltage breakdown, lower recommended derating, and high resistance failure mode. OxiCap® capacitors suits application where reliability and safety is of primary focus.

Series	Operating Temp	Range
NOJ	+105°C	1.8V – 10V | 4.7µF – 1000µF
NOS	+125°C	1.8V – 8V | 10µF – 1000µF
NOM	+125°C	1.8V – 6.3V | 220µF – 680µF

FILM CAPACITORS

FILM CHIP CAPACITORS
The self-healing property of film dielectric provides an open failure mode capacitor with excellent reliability. The intrinsic characteristic of film provides a capacitor that exhibits low DC bias, excellent thermal behavior and thermal shock resistance, no piezo effect and low ESR, ESL and dissipation factor.

Series	Operating Temp	Range
PPS	+125°C	16V – 50V | 1nF – 180nF
PEN	+125°C	25V – 630V | 0.01µF – 4.7µF
PEN-HT	+125°C	63V – 630V | 0.01µF – 4.7µF

MEDIUM POWER FILM & DC LINK FILM CAPACITORS
FFV, FFLI and Custom parts are medium power film capacitors for DC filtering, high rms current and high temperature automotive applications. FAV series are high reactive energy tuning capacitors for HEV/EV battery charging applications.

FHC DC link capacitors are designed for use in conjunction with HEV/EV vehicles IGBT modules.

Series	Operating Temp	Range
FFV Series (PET/PPY)	+105°C	300V – 1900V | 22µF – 400µF
FFLI (PPY)	+95°C	800V – 1400V | 105µF – 3mF
Custom Parts (PPY)	+105°C	75V – 1400V | 300µF – 1.5mF
FHC (PPY)	+105°C	410V – 900V | 410µF – 900µF

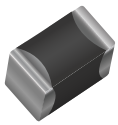
THIN FILM CAPACITORS

Very low-loss (high-Q) SMT capacitors, especially for the wireless communications market at frequencies up to and above 5.8GHz. Accu-P® is unique in its ability to offer very low capacitance values (0.05 pF) and ultra tight capacitance tolerances (±0.01 pF).

Series	Operating Temp	Range
Accu-P®	+125°C	10 – 200V | 0.05pF – 68pF

AUTOMOTIVE
PRODUCT SELECTION GUIDE

CIRCUIT PROTECTION



AUTO SERIES MULTILAYER VARISTORS
Reliable bi-directional protection from voltage transients (ESD, inductive switching, automotive transients, etc). Multiple strike capability, high reliability, and EMI/RFI filtering in the off-state. Available in wide range of ratings to suit various application needs from high energy/load dump to low capacitance or ultra-low leakage. AEC-Q200 qualified.

Case Sizes	Operating Temp	Range
0201 – 3220 Radial, Axial	+125/150/175°C	3.3 – 85V | 0.8pF – 4.7µF

NTC VARISTORS
Parts are AEC-Q200 qualified and offer fast thermal response, excellent reliability in SMT, leaded and leadless configuration. High accuracy series available with tolerances from ±1%. Customized solutions are available.

Case Sizes	Operating Temp	Range
0603 – 1206 Radial	+150°C	10Ω – 1MΩ B25/85: 3250 – 4840K

CONNECTORS

IDC
Provides reliable “Gas Tight” wire-to-board connections for high temperature, shock and vibration applications. Can also be used with Press-Fit pin technology as 1-piece solution to replace costly 2-piece connector solution.

Range
IDC : AWG 12-28, SMT and PTH IDC Press-Fit : AWG 18-24

CUSTOM AUTO CONNECTORS
Advanced component, process and automation technology provides high pin and component (Mechatronics) count connector and module solutions for emerging automotive systems, engine management, braking, steering, safety, environmental, etc.

Range
Based on customer requirements

ANTENNAS

ON BOARD
SMT antennas using different technologies for easy implementation and fast time to-market.Ceramic, PCB based, stamped metal, patch. PPAP documentation available.

Bands	Frequency
GSM, 3G, LTE /4G, WiFi, BT, V2X, GNSS, UHF, ISM, LPWAN, Satellite, 5G	433, 868 MHz 700 MHz – 2.7 GHz 5.1 – 5.9 GHz; 20 – 67 GHz

EXTERNAL
Roof mounted, shark fin, aftermarket antennas. Waterproof IP67/68. PPAP documentation available.

Bands	Frequency
GSM, 3G, LTE /4G, WiFi, BT, V2X, GNSS, UHF, ISM, LPWAN, Satellite, 5G	433, 868 MHz 700 MHz – 2.7 GHz 5.1 – 5.9 GHz; 20 – 67 GHz

CUSTOMER SPECIFIC
Custom antennas in different manufacturing technologies: LDS, two-shot molding, insert molding. Testing services: simulations and measurements in Automotive Chamber

Bands	Frequency
GSM, 3G, LTE /4G, WiFi, BT, V2X, GNSS, UHF, ISM, LPWAN, Satellite, 5G	433, 868 MHz 700 MHz – 2.7 GHz 5.1 – 5.9 GHz; 20 – 67 GHz

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