



HIGH RELIABILITY, DEFENSE & SPACE APPLICATIONS

CERAMIC CAPACITORS | TANTALUM & POLYMER CAPACITORS | EMI FILTERS | THIN FILM
CAPACITORS & INDUCTORS | ESTABLISHED RELIABILITY PRODUCTS



HIGH RELIABILITY

INTRODUCTION



ABOUT AVX

High Reliability Products for Demanding Applications

AVX Corporation is a leading supplier of advanced components and interconnect solutions, offering the world's broadest selection of passive components and connectors.

The company has over 30 years experience in producing industry-leading, high-reliability passive components, offering an expanding range of products for defense, aerospace, space, and other high reliability industries.

AVX currently has 11 factories in Europe and USA qualified to AS9100, IECQ-CECC, TS16949-2009 and ISO 9001-2008 standards. The company also has a number of products qualified to COTS+, ESCC, SRC, MIL and DSCC drawings, as well as optional custom screening and test service capabilities.

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

HIGH RELIABILITY PRODUCTS

MIL	SMD Ceramic Capacitors • Leaded Ceramic Capacitors • SMPS Capacitors • SMD Tantalum • EMI Filters Wet Tantalum Capacitors
DSCC/DLA	SMD Ceramic Capacitors • Leaded Ceramic Capacitors • SMPS Capacitors • Wet Tantalum Capacitors Leaded Ceramic Capacitors Array (SIP) • SMD Tantalum • Thin Film Capacitors and Inductors
SRC9000	SMD Tantalum
SRW9000	Wet Tantalum Capacitors
NASA	SMD Ceramic Capacitors
ESA/ESCC	SMD Ceramic Capacitors • Leaded Ceramic Capacitors • SMPS Capacitors • SMD Tantalum
CECC	SMD Ceramic Capacitors • Leaded Ceramic Capacitors • SMD Tantalum • Tantalum Leaded
COTS Plus	SMD Ceramic Capacitors • Wet Tantalum Capacitors • SMD Tantalum • SMD Polymer
BS9100	Leaded Ceramic Capacitors • SMPS Capacitors • Wet Tantalum Capacitors • SMD Tantalum

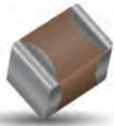
HIGH RELIABILITY PRODUCT SELECTION GUIDE



CERAMIC CAPACITORS

SURFACE MOUNT CERAMIC CAPACITORS

NASA

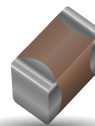


- QPL BME technology available
- High CV technology enabling case size downsizing, PCB weight and size reduction
- FLEXITERM® for enhanced mechanical stress resistance available for BME
- SnPb termination for BME

Oper. Temp: -55°C to +125°C
Case: 0603 - 2220
Voltage: 16V - 100V
Capacitance: 2.2 nF - 8.2µF

NASA S-311-P-838

ESA ESCC QPL

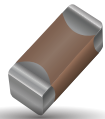


- QPL BME and PME technologies available
- Low ESR / ESL compared to other technologies
- FLEXITERM® for enhanced mechanical stress resistance available for BME
- PdPtAg or SnPb terminations for PME, SnPb termination for BME

Oper. Temp: -55°C to +125°C
Case: 0402 - 2220
Voltage: 16V - 3KV
Capacitance: 2.2nF - 22µF

ESCC 3009 • ESA 3009034
 ESCC 3009041

MIL PRF 32535

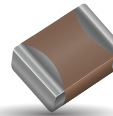


- M and T reliability levels available
- Higher CV capability for PCB weight/size reduction
- Flexiterm® technology for greater protection
- Max cap value 22µF
- Termination with Sn/Pb

Oper. Temp: -55°C to +150°C
Case: 0402 - 2225
Voltage: 16V - 100V
Capacitance: 2.2nF - 22µF

MIL PRF 32535

CECC

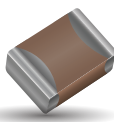


- PME technology available
- NP0 and X7R technologies available
- Terminations: Hybrid, Ni/SnPb, Ni/Sn
- Burn in options available from 0/48/96/168 hours
- Capacitance Tolerance from 1% to 20% available

Oper. Temp: -55°C to +125°C
Case: 0805 - 2220
Voltage: 25V - 500V
Capacitance: 4.7pF - 1.5µF

CECC 32101 • CECC 32100

MIL / DSCC / DLA / COTS-PLUS

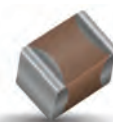


- MIL/DSCC dielectrics BP, BG and where wider variation can be accepted, BX, BR
- APS COTS Plus dielectrics NP0, X7R, X8R/L
- Low ESR / ESL compared to other technologies
- Au, PdAg, Tin Lead or Pure Tin terminations available
- APS COTS Plus X7R available with Flexiterm®

Oper. Temp: -55°C to +150°C
Case: 0402 - 2225
Voltage: 10V - 500V
Capacitance: 0.1pF - 22µF

MIL PRF 123 • MIL PRF 55681 (CDR)
 APS COTS+ • DSCC 03029 (0402)
 DSCC 03028 (0603) • DSCC 05006 (0805)
 DSCC 05007 (1206)

HIGH TEMPERATURE AT RANGE



- Max Temperature Range 250°C
- Terminations Pd/Ag, Sn, Ni/Au
- Dielectrics: VHT (Class II) and C0G/NP0 (Class I)
- Uses PME and BME technologies for maximum capacitance ranges

Oper. Temp: -55°C to +250°C
Case: 0603 - 2225
Voltage: 10V - 50V
Capacitance: 2.2nF - 1µF

MIL STD 202

LEADED CERAMIC CAPACITORS

MIL / DSCC / DLA / BS9100



- Excellent reliability and low ESR / ESL compared to other capacitor technologies
- Radial & Axial epoxy encapsulated for harsh environment
- High voltage range 1-5kV also available

Oper. Temp: -55°C to +125°C
Case: Radial, Axial
Voltage: 50V - 5000V
Capacitance: 1pF - 2µF

MIL PRF 20 • MIL PRF 123 • MIL PRF 11015
 MIL PRF 39014 • DSCC 87046 • DSCC 87114
 DSCC 87081 • DSCC 87043 • DSCC 87047
 DSCC 87040 • DSCC 87076 • DSCC 87077
 DSCC 89044 • DSCC 87070 • BS9100

ESA ESCC / CECC



- QPL PME technologies available
- Excellent reliability and low ESR / ESL compared to other capacitor technologies
- High voltage range 1-5kV also available
- A range of lead types: Leaded Radial (Epoxy coated, Polyurethane Varnish), Straight Dual in Line, L Dual in Line

Oper. Temp: -55°C to +125°C
Case: Radial
Voltage: 50V - 5000V
Capacitance: 820pF - 180µF

ESCC 3001030 • ESCC 3001034
 CECC 30701

CERAMIC CAPACITORS

RF SURFACE MOUNT CERAMIC CAPACITOR

MIL / DSCC / DLA / COTS-PLUS



- High Q ultra low ESR
- High current handling
- High self resonance
- BG and BP dielectrics
- Tight tolerances from $\pm 0.01\text{pF}$
- Au, PdAg, Tin Lead or Pure Tin terminations

Oper. Temp: -55°C to +125°C
Case: 01005 – 1210
Voltage: 50V – 500V
Capacitance: 0.1pF – 5100pF

MIL PRF 55681 (CDR)
 MIL PRF 123 • DSCC 06019 (0605)
 DSCC 06022 (1210)

SWITCH MODE POWER SUPPLY CAPACITORS (SMPS)

MIL / DSCC / BS9100



- Designed for programs requiring high reliability performance in harsh environment
- Suitable for high current, high power & high temperature applications
- Low ESR / ESL & excellent high frequency performance compared to other technologies

Oper. Temp: -55°C to +200°C
Case: Stacked
Voltage: 50V – 500V
Capacitance: 0.15 μF – 270 μF

MIL-PRF-49470 • BS9100
 DSCC 87106/88011

ESA ESCC / CECC



- Designed for space based programs requiring ultra-high reliability performance
- Designed for high current, high power applications
- Low ESR / ESL and excellent high frequency performance
- A range of lead types: Leaded Radial (Epoxy coated, Polyurethane Varnish), Straight Dual in Line, L Dual in Line

Oper. Temp: -55°C to +125°C
Case: Stacked, Radial
Voltage: 50V – 5000V
Capacitance: 820pF – 180 μF

ESCC 3001030 • ESCC 3001034
 CECC 30701

ESCC 3012 (in preparation)

TANTALUM & POLYMER CAPACITORS

SURFACE MOUNT TANTALUM & POLYMER

MIL / DSCC / DLA / SRC / COTS-PLUS



- TAZ (CWR), TBJ, TBM, TCS, TCP Series
- Available with MnO₂ or polymer cathode in SMD chip case size
- Polymer offers low ESR & higher inrush current robustness
- MnO₂ chips & multianodes offer excellent reliability & are qualified to the highest MIL/Space reliability levels

Oper. Temp: -55°C to +105/125°C
Case: SMD
Voltage: 2V – 50V
Capacitance: 0.1 μF – 1500 μF

MIL-PRF-55365 (CWR)
 MIL PRF 55365 (T Level) • SRC9000
 DSCC 07016 • DSCC 95158
 DSCC 09009 • COTS-Plus

ESA ESCC / CECC



- TES, TAJ, TAJ ESCC
- Long term stability, high capacitance in small case sizes
- Manufactured in EU, ESA qualified plant
- TCS – polymer multianode – ongoing ESA qualification

Oper. Temp: -55°C to +125°C
Case: 3216 – 7343
Voltage: 4V – 50V
Capacitance: 0.1 μF – 470 μF

ESCC 3012/004 • ESCC 3012/001
 CECC 30801-01 • CECC 30801-005

MIL / SRC / COTS-PLUS



- TBC (CWR) microchip
- Available in standard MnO₂ SMD chip with case sizes down to 0603
- MnO₂ chips offer excellent reliability and parameters stability over temperature, voltage, and time
- Qualified to the highest MIL/Space reliability levels

Oper. Temp: -55°C to +125°C
Case: 0603, 0805, 1206
Voltage: 4V - 20V
Capacitance: 0.47 μF - 68 μF

COTS-Plus • SRC9000
 MIL-PRF-55365/12 (CRW)

ESA EPPL2 (under preparation)



- TCH Low ESR Hermetic Series
- Designed for Aerospace & Hi-Rel applications
- Endurance minimum up to 10,000 hrs. on selected codes
- Excellent stability under humidity and ambient conditions due to ceramic case hermetic packaging
- Effective up-screen testing for high reliability

Oper. Temp: -55°C to +125°C
Case: (CTC-21D)
Voltage: 10V – 100V
Capacitance: 22 μF – 330 μF

ESCC 3012 (in preparation)

TANTALUM & POLYMER CAPACITORS

WET ELECTROLYTIC TANTALUM

SRW / MIL / DSCC / DLA / COTS-PLUS



- TWA, TWA-X, TWA-Y, TWC, TWC-Y, TWM, TWD, TWS
- Includes a welded tantalum can & header assembly that provides a hermetic seal to withstand harsh shock & vibration requirements
- Customized capacitance & voltage ratings are possible
- TWC-Y and TWA-Y capable of continuous operation at 200°C, TWA-X 230°C

Oper. Temp: -55°C to +200/230°C
Case: T1,T2,T3,T4, TWM module
Voltage: 6V – 125V
Capacitance: 2.5µF – 50mF

DSCC 93026 • SRW9000
 MIL-PRF-39006 • COTS-Plus

LEADED TANTALUM

CECC



- Tantalum Capacitors with dipped resin encapsulation with SnPb terminations
- Optional radial lead wire terminations
- Low leakage current
- Very small physical sizes
- Excellent temperature stability

Oper. Temp: -55°C to +125°C
Case: Radial
Voltage: 6.3V – 50V
Capacitance: 0.1µF – 330µF

CECC 30201-032

THIN FILM PRODUCTS

RF THIN FILM CAPACITORS

DLA



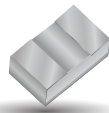
- Ultra tight capacitance tolerances
- Low ESR at VHF, UHF and microwave frequencies
- Enhanced RF power handling capability
- High stability with respect to time, temperature, frequency and voltage variation

Oper. Temp: -55°C to +125°C
Case: 0402 – 1210
Capacitance: 0.05 pF – 68 pF
Tolerances: from ±0.01 pF

DLA 09024 (0402)
 DLA 09025 (0603)
 DLA 09026 (0805)
 DLA 09027 (1210)

RF THIN FILM INDUCTORS

DLA



- High Q
- RF Power Capability
- High SRF
- Low DC Resistance
- Ultra-Tight Tolerance

Oper. Temp: -55°C to +125°C
Case: 0402 – 0805
Inductance: 0.56nH – 22nH
Tolerances: from ±0.05nH

DLA 11017 (0402)
 DLA 11018 (0603)
 DLA 11019 (0805)

EMI FILTERS

MIL

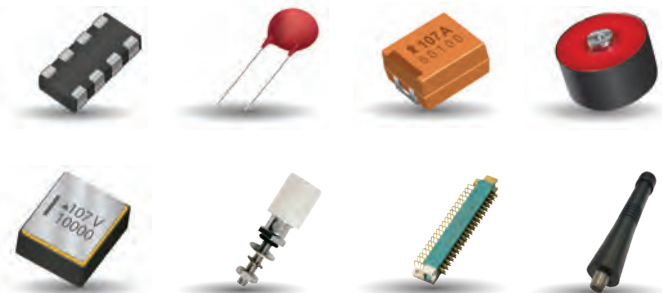


- High temp construction withstands 300°C installation temps
- Rugged monolithic discoidal MIL-C-31033 capacitor construction
- Glass hermetic seal on one end with epoxy seal on the opposite end

Oper. Temp: -55°C to +125°C
Case: Axial
Voltage: 25V to 400V
Capacitance: 10pF - 1.2nF

MIL-PRF-28861 • MIL-PRF-31033
 MIL-STD-202

ESTABLISHED RELIABILITY PRODUCTS



Tantalum Capacitors

- THH 230°C Hermetically Sealed
- Niobium Oxide

Antennas

- Omni-direction Transceiver Antennas

Multilayer Varistors

- DSCC AA555682 (Industrial Grade)

NTC Thermistors

- SMT and Leaded

Film Capacitors

- High Power
- Medium Power
- DC Film

M55032 DIN

- M55302 Compliant

Varicon • Rack and Panel

- MIL-E-5400, MIL-E-8189, MIL-T-21200, MIL-C-21097, MIL-C-28731, MIL-C-55302 Compliant

HIGH RELIABILITY APPLICATIONS & TEST CAPABILITIES

HIGH RELIABILITY APPLICATIONS

These products have been designed for the most demanding applications, such as space, aerospace, defense industry, and other high reliability programs.

AVIONICS

- FADEC
- Lighting
- Control Surfaces
- UAV
- Instrumentation/Comms
- Guidance
- Sensor (FLIR, SARS)
- Engine Controls
- Flap and Brake Controls
- Transducer
- Jet Ignition
- Radar Antenna Arrays
- Power Supplies

SPACE/SATELLITE

- GEO / LEO
- GPS / DGPS
- Scientific
- Telemetry
- Launch Vehicle
- Exploration
- Rovers
- Communication
- Power Supplies

DEFENSE

- Air / Sea / Land / Space
- Munitions
- Radars
- Communication
- JTRS
- SINCGARS
- Surveillance
- Navigation
- Night Vision
- Target Acquisition
- Countermeasures
- Sonars

HIGH RELIABILITY TESTING CAPABILITY

As a matter of course, AVX maintains a level of quality control that is sufficient to guarantee whatever reliability specifications are needed. However, AVX goes further and in addition to testing the components to the defined high reliability standards, AVX also has the capability to perform a wide range of custom-specific testing. The abbreviated list indicates the breadth and thoroughness of available quality control services at AVX.

For further specific test capabilities or details, please contact AVX.

- DPA
- X-Ray Analysis
- Ultrasonic Scan
- Termination Pull Testing
- Terminal Strength
- Solderability
- Thermal Shock
- Load/Humidity Life Testing
- Moisture Sensitivity
- Temperature Cycling
- Failure Analysis
- First Article Verification
- Sorting and Matching to Spec. Limits
- Bondability Testing
- Immersion Cycling
- Voltage Conditioning
- Pre-encapsulation Inspection
- Shock and Vibration
- RF Characterization
- Weibull Testing
- Lot Validation Testing
- Burn-in
- Group A/B/C
- LAT 1/2/3



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