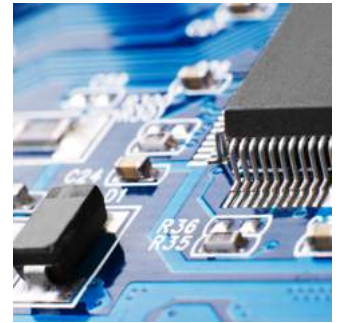


# AVIX<sup>®</sup>



# MEDICAL PRODUCTS

Version 18.5

## Introduction

### ABOUT AVX

AVX is an industry leader in the manufacture and supply of passive electronic components and interconnect solutions. Our worldwide manufacturing capability includes facilities located in seventeen countries on four continents, allowing us to continue meeting customer needs on a global basis. We offer the broadest selection of passive components and connectors.

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](http://www.avx.com).

### ELECTRICAL COMPONENTS FOR MEDICAL APPLICATIONS

AVX has over 20 years experience supplying capacitors, filters and other components to the medical device industry. We offer industry leading technology and reliability, and have a deep understanding of the requirements of the medical electronics industry. Our quality systems lead the industry and support customer-specific change control, documentation, specification and testing procedures. We have a broad range of solutions for Class 3 devices that meet the strictest requirements, and we offer cost-effective components for Class 1 and Class 2 that allow you to satisfy FDA requirements for your systems.

This guide provides an overview of the components we offer for medical applications. The links below will take you to the detailed datasheets in the Medical Industry section of our website: [www.avx.com](http://www.avx.com).

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### AVX CONTACT INFORMATION

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| <a href="mailto:medical.info@avx.com">medical.info@avx.com</a>      |   |
| <a href="http://www.avx.com/medical">http://www.avx.com/medical</a> |   |

## TANTALUM CAPACITORS

### TAZ SERIES | T4Z SERIES



The TAZ medical series is a MnO<sub>2</sub> molded surface mount tantalum.

- **TAZ HRC5000 – (Critical)** The TAZ Medical Grade series is designed for use in critical medical applications. AVX's original tantalum medical specification which establishes reliability for tantalum capacitors using design/process change controls, statistical screening, Weibull burn-in, maverick piece/lot screening, DPA and lot conformance testing.
- **T4Z HRC4000 – (Non-Critical)** The T4Z Medical Grade series is designed for use in non-critical medical applications. The T4Z product line is based on the MIL-PRF55365 case sizes A-H. These components are manufactured and tested in AVX's high reliability tantalum capacitor plant in Biddeford, Maine which is ISO 13485

#### PRODUCT HIGHLIGHTS

- Molded cases based on MIL-PRF-55365 case sizes
- Voltage range from 4v to 50v
- Capacitance up to 330µF
- Lowest DC leakage in the industry
- Ultra high reliability
- 100% tin, gold, and tin/lead terminations available
- Manufactured in ISO 13485 facility

#### APPLICATIONS

- Filtering
- Pacing
- Hold Up
- Charging

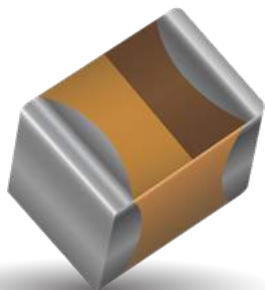
#### CRITICAL

- Implanted life-sustaining devices
- Implanted devices intended to be operable for 1+ years where the AVX component can have an impact on the battery life of the device

#### NON-CRITICAL

- External devices
- Implanted non-life-sustaining devices intended to be operable for <1 year

## TBC MICROCHIP SERIES



The TBC medical series are the smallest surface mount tantalum capacitors on the market.

- **TBC HRC5000 – (Critical)** The TBC Medical Grade series is designed for use in critical medical applications. AVX's original tantalum medical specification which establishes reliability for tantalum capacitors using design/process change controls, statistical screening, Weibull burn-in, maverick piece/lot screening, DPA and lot conformance testing.
- **TBC HRC6000 – (Critical)** The TBC Medical Grade series is designed for use in critical medical applications. AVX's next generation medical specification uses fundamental elements of the HRC5000 specification and adds recent developments incorporated into the AVX proprietary Q Process. This effectively removes components that may experience parametric shifts through customer processing or display instability through life testing.

The need for typical 50% derating of the capacitor's rated voltage can be relaxed – 20% derating in filtering applications and 0% for pacing, hold up, & charging.

- **T4C HRC4000 – (Non-Critical)** The T4C medical series are the smallest surface mount tantalum capacitors on the market and are designed for applications other than implantable/life support. These parts use AVX's HRC4000 medical specification which was designed to meet low leakage requirements and are processed using AVX's patented Q-Process which includes 125°C burn-in and statistical screening methods for high reliability assurance.

#### PRODUCT HIGHLIGHTS

- 0603 to 1411 case sizes
- Voltage range from 4v to 40v
- Capacitance up to 47µF
- Lowest DC leakage in the industry
- Ultra high reliability
- 100% tin, gold, and tin/lead terminations available
- HRC5000 & HRC6000 Manufactured in ISO 13485 facility

#### APPLICATIONS

- Filtering
- Pacing
- Hold Up
- Charging

#### CRITICAL

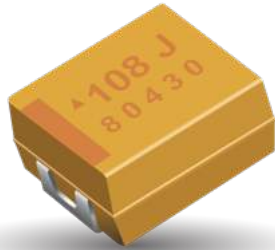
- Implanted life-sustaining devices
- Implanted devices intended to be operable for 1+ years where the AVX component can have an impact on the battery life of the device

#### NON-CRITICAL

- External devices
- Implanted non-life-sustaining devices intended to be operable for <1 year

## TANTALUM CAPACITORS

### T4J SERIES



The T4J medical series are designed for applications other than implantable/life support utilizing AVX's **HRC4000** medical specification. These parts are designed to meet low leakage requirements and are processed using AVX's patented Q-Process which includes 125°C burn-in and statistical screening methods for high reliability assurance.

#### PRODUCT HIGHLIGHTS

- Basic reliability better than 0.1%/1000 hours
- Molded cases based on EIA case sizes
- Voltage range from 6.3v to 50v
- Capacitance ranges from 0.47 $\mu$ F to 10 $\mu$ F
- Custom DCL/ESR options on selected parts

#### APPLICATIONS

- Filtering
- Hold Up
- Charging

#### NON-CRITICAL

- External devices
- Implanted non-life-sustaining devices intended to be operable for <1 year

### TCP SERIES



AVX designs & manufactures custom multi-capacitor modules using our medical implantable range of tantalum capacitors as sub-components. These modules can improve overall device size efficiency, and minimize placement cost. These are offered using our traditional **HRC5000** or the new **HRC6000** series.

#### PRODUCT HIGHLIGHTS

- Improved volumetric efficiency & total assembly cost
- Testing performed on completed module to insure medical grade performance
- Modules offered in standard 2, 4, and 6 capacitor designs
- Custom designs are available to meet specific circuit layouts
- Manufactured in ISO 13485 facility

#### APPLICATIONS

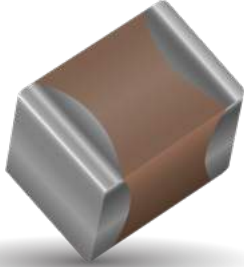
- Filtering
- Pacing
- Hold Up
- Charging

#### CRITICAL

- Implanted life-sustaining devices
- Implanted devices intended to be operable for 1+ years where the AVX component can have an impact on the battery life of the device

## CERAMIC CAPACITORS

### MQ SERIES



AVX's **QA-MU-MB-005** specification establishes a standard system of control for MLCCs intended for medical implantable life sustaining and ultra high reliability applications. It covers: design/process change controls, maverick lot control, qualification & lot acceptance testing (burn-in, life test/voltage conditioning, DPA, cap/DF/IR, etc.), and data packages.

#### PRODUCT HIGHLIGHTS

- 0402 to 2225 case sizes
- Voltage range from 4v to 200v
- Capacitance up to 100 $\mu$ F
- Class I & II dielectric materials
- Tight tolerances on Class I dielectric materials
- Various termination options
- Customer specific requirements, screening, & testing

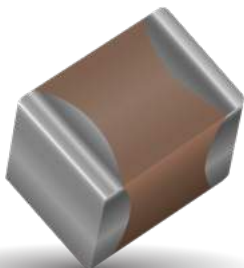
#### APPLICATIONS

- I/O filtering
- Power hold up
- Decoupling

#### CRITICAL

- Implanted life-sustaining devices
- Implanted devices intended to be operable for 1+ years where the AVX component can have an impact on the battery life of the device

### MM SERIES



The AVX MM series is a multi-layer ceramic capacitor designed for use in medical applications other than implantable/life support. These components have the design and change control expected for medical devices and also offers statistical IR testing which identifies any maverick part or outlier within the population and removes from the acceptance lot.

#### PRODUCT HIGHLIGHTS

- 0402 to 2220 case sizes
- Voltage range from 4v to 100v
- Capacitance up to 1.5 $\mu$ F
- Class I NP0/COG, Class II X7R
- Tight tolerances on Class I dielectric materials
- Various termination options

#### APPLICATIONS

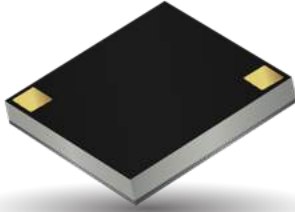
- Power regulation – low ripple filtering and IC decoupling
- Timing
- High frequency filtering

#### NON-CRITICAL

- External devices
- Implanted non-life-sustaining devices intended to be operable for <1 year

## THIN FILM PRODUCTS

### PMC SERIES THIN FILM RESISTOR NETWORKS



AVX custom thin film resistors are designed and tested for medical implantable and life sustaining applications. Methods and protocols include 100% automated electrical testing, life tests, MIL-883 visual inspection, design & process controls, reliability screening, and lot conformance testing.

#### PRODUCT HIGHLIGHTS

- Low TCR & VCR
- Tolerances up to  $\pm 0.1\%$
- Resistance range from 5 to 50 mOhm
- Laser Trimmable
- Voltage up to 2000V
- Surface mount, wire bonded, ball grid array, land grid array
- High stability
- Parts can be free of nickel or other magnetic materials

#### APPLICATIONS

- Implantable medical systems
- High voltage resistor networks
- Medical power applications which require extremely high accuracy

#### CRITICAL

- Implanted life-sustaining devices
- Implanted devices intended to be operable for 1+ years where the AVX component can have an impact on the battery life of the device

#### NON-CRITICAL

- External devices
- Implanted non-life-sustaining devices intended to be operable for <1 year

### ACCU-P THIN FILM CAPACITORS



AVX's **PD-025** specification was developed to describe the requirements for Accu-P MP series thin film chip capacitors intended for medical implantable applications. This document includes design/process change controls, qualification, IPT & LAT testing, life test, DPA and electrical tests.

#### PRODUCT HIGHLIGHTS

- 0603 case sizes
- Voltage range from 10v to 100v
- Capacitance range from 0.05 pF to 47 pF
- Tight capacitance tolerance ( $\pm 0.01$  pF)
- Tin/lead & RoHS compliant terminations available
- Low ESR, High Q at very high frequencies
- Low lot to lot variability
- High stability with respect to temperature, time, frequency, and voltage variation

#### APPLICATIONS

- Embedded medical systems
- Medical systems featuring RF signals
- Medical power applications which require extremely high accuracy

#### CRITICAL

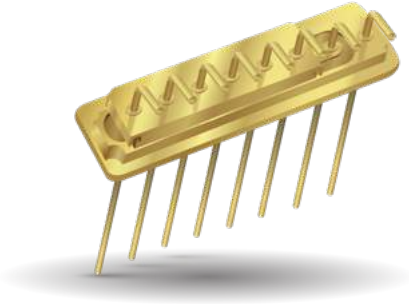
- Implanted life-sustaining devices
- Implanted devices intended to be operable for 1+ years where the AVX component can have an impact on the battery life of the device

#### NON-CRITICAL

- External devices
- Implanted non-life-sustaining devices intended to be operable for <1 year

## EMI FILTERS & FEEDTHROUGHS

### FILTERED FEEDTHROUGH ASSEMBLIES



AVX Filters offers custom and semi-custom configured filtered feedthrough assemblies. These products are available for both high and low voltage applications and have fast rise time pulse capabilities on high voltage product with complete in house custom testing available. The designs include polyamide and solder-attached methods for cost competitive solutions.

|   |   |  |
|---|---|--|
| <p><b>PRODUCT HIGHLIGHTS</b></p> <ul style="list-style-type: none"> <li>• Custom designs</li> <li>• Low and high voltage designs</li> <li>• Multiple cost effective lead attachment methods</li> <li>• Hermetically sealed</li> </ul> | <p><b>APPLICATIONS</b></p> <ul style="list-style-type: none"> <li>• Electromagnetic interference (EMI) passive filtering</li> </ul> | <p><b>CRITICAL</b></p> <ul style="list-style-type: none"> <li>• Implanted life-sustaining devices</li> </ul> <p><b>NON-CRITICAL</b></p> <ul style="list-style-type: none"> <li>• External devices</li> <li>• Implanted non-life-sustaining devices intended to be operable for &lt;1 year</li> </ul> |
|---|---|--|

### DISCOIDAL FILTER ELEMENTS & ARRAYS



AVX Filters offers custom capacitor arrays to include linear and circular configurations with multi-hole designs. These products have both high and low voltage capabilities for many medical implantable applications.

AVX Filters also offers custom discoidal capacitors for multiple medical filtering applications, including implantable devices.

|   |   |  |
|---|---|--|
| <p><b>PRODUCT HIGHLIGHTS</b></p> <ul style="list-style-type: none"> <li>• Custom designs</li> <li>• Low and high voltage designs</li> <li>• Low inductance for high frequency performance</li> <li>• Low ESR</li> </ul> | <p><b>APPLICATIONS</b></p> <ul style="list-style-type: none"> <li>• Electromagnetic interference (EMI) passive filtering</li> </ul> | <p><b>CRITICAL</b></p> <ul style="list-style-type: none"> <li>• Implanted life-sustaining devices</li> </ul> <p><b>NON-CRITICAL</b></p> <ul style="list-style-type: none"> <li>• External devices</li> <li>• Implanted non-life-sustaining devices intended to be operable for &lt;1 year</li> </ul> |
|---|---|--|

### CONNECTORS

AVX's medical connectors are based on industry proven contact technology to provide robust and performance driven solutions to meet application specific requirements. Please contact AVX for information on medically qualified connectors.

#### 9257 SERIES – I/O CONNECTORS



AVX has been providing robust and reliable compression connectors in mission critical applications for over 25 years. With eight unique configurations, these high performance gold plated beryllium copper contact systems outperform competition in the harshest environmental conditions. Typical applications include: disposable medical cartridges, portable patient monitoring platforms, pluggable modules and docking or cradle charging solutions.

##### PRODUCT HIGHLIGHTS

- Custom medical specification
- Plug & socket
- 8, 12, & 16 positions
- Pitch: 0.5mm and 1.25mm
- 0.5 & 1.0 amp/contact
- 5k mating cycles
- No latching required

##### APPLICATIONS

- Signal and data transmission

##### CRITICAL

- Implanted life-sustaining devices

##### NON-CRITICAL

- External devices
- Implanted non-life-sustaining devices intended to be operable for <1 year

#### 9155 SERIES – PLUGGABLE MODULE / BATTERY CONNECTORS



This range of miniaturized input/output connectors pack medical and industrial level performance in a consumer packaged product. Based on high performance contact materials and industry proven contact geometries, these cable-to-board connectors maximize performance and durability in applications demanding up to 5000 mating cycles.

##### PRODUCT HIGHLIGHTS

- Custom medical specification
- 8 styles; horizontal, vertical & single contact
- Number of positions range from 1 to 8
- Pitch: 2.0mm, 2.5mm, & 3.0mm
- 3 amps/contact
- 5k mating cycles
- End-to-end stackable
- Various plating options
- -40°C to +125°C

##### APPLICATIONS

- Power/recharge
- Signal transmission
- Docking / cradle ports

##### CRITICAL

- Implanted life-sustaining devices

##### NON-CRITICAL

- External devices
- Implanted non-life-sustaining devices intended to be operable for <1 year





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