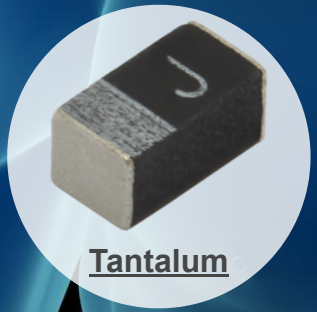
# Capacitors for Implantable Medical Applications

## Challenges

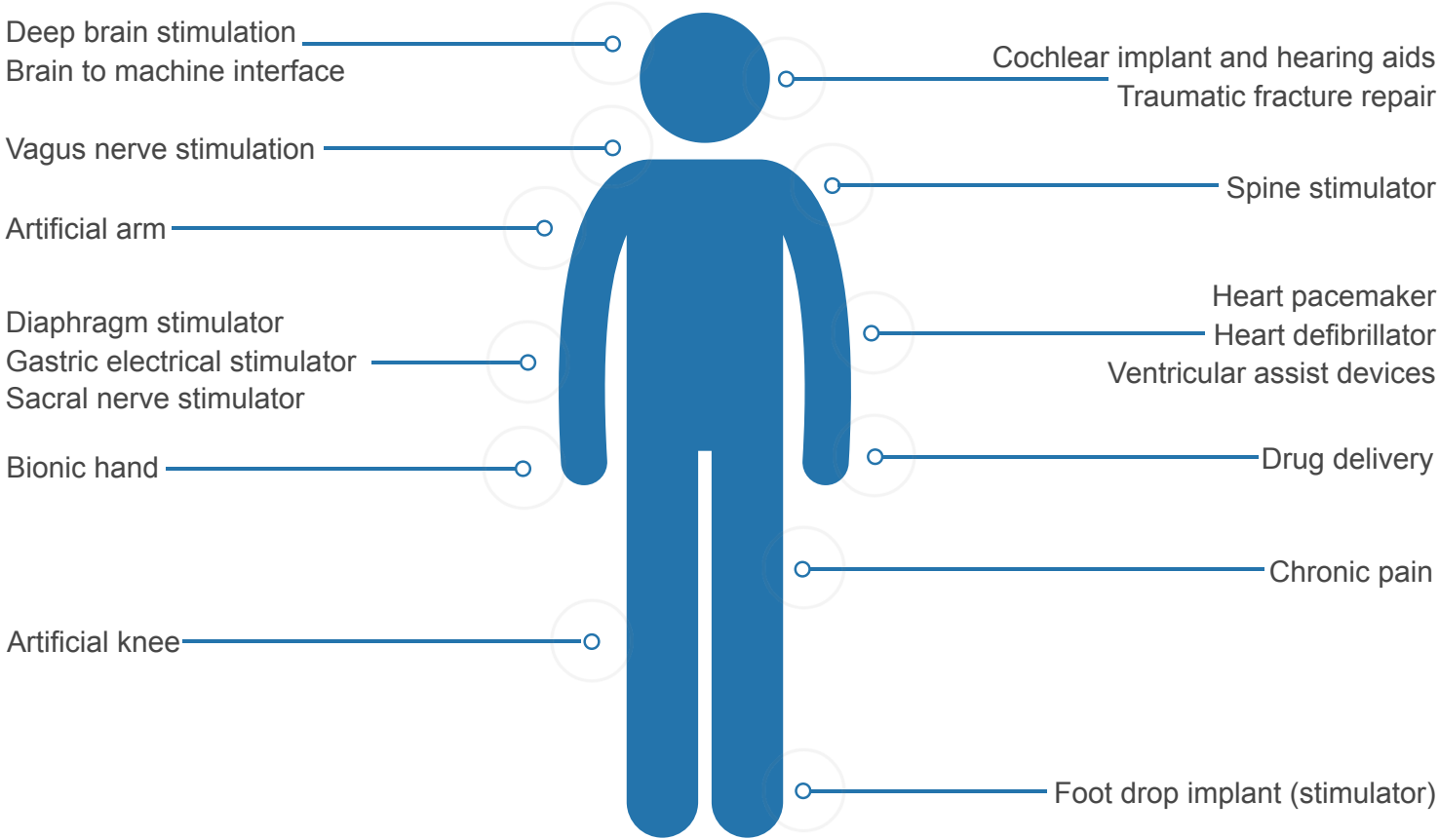
Capacitors must work reliably within size constraints for implantable applications.



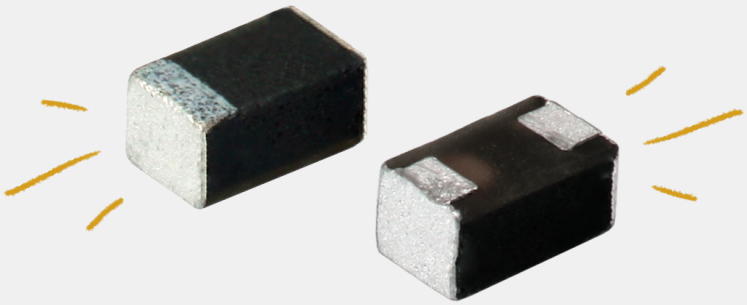
Tantalum

MLCC

Manufactured in medical-qualified ISO 13485 locations for FDA Class II & III devices


Deep brain stimulation
Brain to machine interface
Vagus nerve stimulation
Artificial arm
Diaphragm stimulator
Gastric electrical stimulator
Sacral nerve stimulator
Bionic hand
Artificial knee
Cochlear implant and hearing aids
Traumatic fracture repair
Spine stimulator
Heart pacemaker
Heart defibrillator
Ventricular assist devices
Drug delivery
Chronic pain
Foot drop implant (stimulator)

# Implantable Tantalum Specifications



## TM8 Series

0.33 µF to 47 µF
Capacitance range

2 $V_{DC}$ to 40 $V_{DC}$
Voltage range

-55 °C to +125 °C
Operating temperature

**Compact**
As small as 0402 footprint

**Reliable**
Failure rate levels available
Surge current tests

**Custom Solutions**
Electrical, testing, statistical parametric screening, data

**DCL**
50 % lower than commercial
20 % lower than polymer

# Implantable MLCC Specifications

## VJ Hi-Rel Series

1 pF to 1 µF
Capacitance range

Up to 1500 $V_{DC}$
Voltage range

-55 °C to +125 °C
Operating temperature

**Compact**
As small as 0402 footprint

**Reliable**
Based on high-rel military products

**Custom Solutions**
Testing protocols
Data reporting
Manufacturing processes

**High Frequency**
Tght tolerance MLCCs for communication circuits

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