



Vishay Intertechnology, Inc.

# *Medical / Avionics, Military, and Space (AMS)*



One of the World's Largest Manufacturers of  
**Discrete Semiconductors and Passive Components**



**Medical**

Medical

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Military, and  
Space (AMS)**

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A **WORLD OF**  
**SOLUTIONS**

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Avionics, Military, and Space (AMS)  
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Medical  
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More information on the Engineer's Toolbox, including product datasheet links, can be found at [www.vishay.com/ref/et3](http://www.vishay.com/ref/et3).

For inquiries, please contact your local sales representative.





## Key components for MEDICAL EQUIPMENT

**X-Ray /  
Computed  
Tomography (CT)**



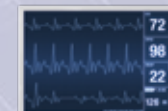
**Cardiac  
Pacing**



**External  
Defibrillators**



**Patient  
Monitoring**



**Glucose  
Meters**



**MRI / MRT**



### THE VISHAY ADVANTAGE

- High and Stable Accuracy
- Small Size
- Low Profile
- Non-Magnetic
- Tight Tolerance
- Ultra-Stable
- Low TCR
- Screening Options
- and more....



## X-Ray / Computed Tomography (CT)



### CERAMIC CAPACITORS

#### High-Voltage Ceramic Capacitor Multiplier Sets with Leads, Class 2 Ceramic



##### [RHK](#)

- Fully customizable: can be designed according to the customer's requirements
- High output voltage, compact design, up to 14 stages available

### RESISTORS

#### Power Resistor for Mounting onto a Heatsink, Thick Film Technology



##### [LPS](#)

- High power, 57 mm x 57 mm, up to 1100 W at 25 °C on heatsink, low weight of 83 g
- Non-inductive down to 1 µH, high pulse capability up to 1000 J for short pulse

### MOSFETs

#### Dual N-Channel 40 V (D-S) MOSFET



##### [Si4286DY](#)

- TrenchFET® Gen III technology, maximum  $R_{DS(on)}$  32.5 mΩ
- Popular SO-8 packaging

### RECTIFIERS

#### High-Voltage Ultrafast Avalanche SMD Rectifiers



##### [BYG23T](#)

- Ultrafast reverse recovery time
- Ideal for automated placement

### CERAMIC CAPACITORS

#### High-Voltage Ceramic DC Disc Capacitors, 10 kV<sub>DC</sub> and 15 kV<sub>DC</sub>



##### [615R](#)

- Very high voltage ratings, low dissipation and excellent voltage stability
- 20 kV rated voltage available on request, high degree of customization possible

### RESISTORS

#### Metal Oxide Resistors, Special Purpose, High Voltage



##### [RNX](#)

- High voltage (up to 8 kV) with rated power up to 5 W
- Wide value range (100 Ω to 2 GΩ)

### MOSFETs

#### E Series 650 V Power MOSFET



##### [SiHG24N65E](#)

- High-performance E Series, high-voltage technology, maximum  $R_{DS(on)}$  145 mΩ
- Popular TO-247 packaging, maximum continuous current of 24 A

### RESISTORS

#### Metal Oxide Resistors, Special Purpose, High Voltage



##### [ROX](#)

- High voltage (up to 45 kV)
- Wide value range (100 Ω to 3 GΩ)

### CERAMIC CAPACITORS

#### Wide Range of Case Sizes, Voltage Ratings, and Capacitance Values



##### [VJ Non-Magnetic Series](#)

- Non-magnetic available with copper or epoxy bondable terminations
- Safety screened for magnetic properties

### RESISTORS

#### Thick Film Chip Resistors, High Voltage



##### [CRMV / CRHV](#)

- High-voltage capability (up to 3 kV), with outstanding stability (< 0.5 %)
- Can be customized to meet specific customer needs

### CERAMIC CAPACITORS

#### Body Sizes: 0402 to 3838, Excellent Power Handling Capabilities



##### [MLCC RF Capacitors](#)

- Non-magnetic available with copper or epoxy bondable terminations
- Lead-bearing terminations available for high-reliability applications

### ESTA POWER CAPACITORS

#### Capacitors for Power Electronics (PEC) – Cylindrical



##### [GLI](#)

- Low losses at high frequencies
- High current rating

View datasheets for these products  
[www.vishay.com/ref/et3me1a](http://www.vishay.com/ref/et3me1a)



## Cardiac Pacing



### MOSFETs

#### Dual N-Channel 20 V (D-S) MOSFET



##### [SMMB912DK](#)

- High-grade TrenchFET® technology, maximum  $R_{DS(on)}$  216 mΩ, hi-rel medical
- 1.6 mm x 1.6 mm PowerPAK® SC-75 packaging

### RESISTORS

#### High-Stability Thin Film Flat Chip Resistors



##### [TNPW0402...e3](#)

- Excellent overall stability, endurance < 0.05 %, TCR down to 10 ppm/K
- AEC-Q200 qualified, sulfur resistant, halogen-free

### DIODES

#### Small-Signal Switching Diode



##### [IMBD4148-VGS08](#)

- AEC-Q101 qualified
- Fast switching diode in SOT-23 case, especially suited for automatic insertion

### RESISTORS

#### Thin Film, Top-Contact Miniature Resistor



##### [MSFM](#)

- 0.015 in x 0.015 in ultra-small form factor with value range from 2.5 Ω to 400 KΩ
- Self-passivating tantalum nitride film well suited for high-moisture environments

### INDUCTORS

#### Custom Magnetics



- Ultra-compact transformers and inductors for high-reliability implantable devices
- Custom designs for high reliability and efficient operation to extend battery life

### CERAMIC CAPACITORS

#### MIL-PRF-55681-Qualified Facility, Reliability Testing Done on Maintenance Basis



##### [MLCC Hi-Rel](#)

- Multiple screening options (group A, group C, voltage conditioning) available
- Customized certification available on request to meet your quality requirements

### NON-LINEAR RESISTORS

#### NTC Thermistors, Naked Chips



##### [NTCC100E4](#)

- High stability over long time
- Wire-bondable NTC die version available

### INDUCTORS

#### Certified COTS RF Inductors

- Variety of small-size SMD devices for high-frequency filtering applications
- 100 % testing to customer specifications available

### TANTALUM CAPACITORS

#### Solid Tantalum Chip Capacitors, MICROTAN®, High Reliability, Low DC Leakage



##### [TM8](#)

- Hi-rel devices with maximum capacitance in case sizes as small as 0402
- Hi-rel screening in accordance with MIL-PRF-55365

### CERAMIC CAPACITORS

#### Frequency Range from 400 MHz to 5 GHz



##### [Ceramic Chip Antenna](#)

- Frequency range from 400 MHz to 5 GHz
- Wide operating temperature range: -40 °C to +85 °C

### ICs

#### High-Voltage, Single- and Dual-Supply SPDT Analog Switch with Enable Pin



##### [DG469](#)

- 3.6 Ω low and flat switch on-resistance in MSOP8 and SO8 packages
- Integrated VL and fast switching with guaranteed break before make

### CERAMIC CAPACITORS

#### Body Sizes: 0402 to 3838, Excellent Power Handling Capabilities



##### [MLCC RF Capacitors](#)

- Non-magnetic available with copper or epoxy bondable terminations
- Lead-bearing terminations available for high-reliability applications

View datasheets for these products  
[www.vishay.com/ref/et3me1b](http://www.vishay.com/ref/et3me1b)





## External Defibrillators



### RESISTORS

#### Metal Oxide Resistors, Special Purpose, High Voltage

##### [ROX](#)

- High voltage (up to 45 kV)
- Wide value range (100  $\Omega$  to 3 G $\Omega$ )



### INDUCTORS

#### Custom Magnetics

- Ultra-compact transformers and inductors for high-reliability devices
- Custom designs for high reliability and efficient operation to extend battery life



### ENERGY STORAGE CAPACITORS

#### Hybrid Storage Capacitors

##### [196 HVC ENYCAP™](#)

- Power back-up for memory controllers, industrial PCs, real-time clocks
- Storage device for energy harvesting, emergency light, and micro power supplies



### CERAMIC CAPACITORS

#### MIL-PRF-55681-Qualified Facility, Reliability Testing Done on Maintenance Basis

##### [MLCC Hi-Rel Capacitors](#)

- Multiple screening options (group A, group C, voltage conditioning) available
- Customized certification available on request to meet your quality requirements



### RESISTORS

#### Thin Film Mini-MELF Resistors

##### [SMM0204...e3](#)

- Excellent stability in different environmental conditions



### INDUCTORS

#### Low-Profile, High-Current IHLP® Inductors

##### [IHLP-2525](#)

- Compact, high-current power inductor for DC/DC conversion and filter applications
- High-frequency energy storage up to 5 MHz



### NON-LINEAR RESISTORS

#### NTC Thermistors, SMD 0603, Chip

##### [NTHS0603](#)

- Standard series
- Glass protected



### TANTALUM CAPACITORS

#### Solid Tantalum Chip Capacitors 298D MICROTAN®, 298W Extended Range MICROTAN

##### [298D](#)

- High capacitance in small case sizes including 0603 and 0402 footprint
- Perfect for space constrained designs



### MOSFETs

#### E Series 650 V N-Channel Power MOSFET

##### [SiHG47N65E](#)

- Low figure-of-merit (FOM)  $R_{ON} \times Q_g$



### ICs

#### Dual 2 A, 1.2 V, Slew Rate Controlled Load Switch

##### [SiP32413](#)

- Low and flat  $R_{ON}$  over the full operation voltage range of 1.2 V to 5.5 V
- Features 150  $\mu$ s turn-on rise time, switch-off reverse blocking, and output discharge



### DIODES

#### 2-Line Bus-Port ESD Protection, Flow-Through Design

##### [VBUS052CD-FAH](#)

- Compact LLP1713-7L package
- Low load capacitance  $C_D = 0.8$  pF



### ICs

#### Low-Voltage, Low $R_{ON}$ Quad SPST Analog Switch

##### [DG2041, DG2042, DG2043](#)

- Low on resistance of 1  $\Omega$
- 1 pC charge injection with fast switching



View datasheets for these products  
[www.vishay.com/ref/et3me1c](http://www.vishay.com/ref/et3me1c)



## Patient Monitoring



### DISPLAYS

#### High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions



[LCD, Color TFT, OLED](#)

- Standard and custom display / modules for flight control and monitoring
- High brightness options for LCD, OLED, and color TFT

### RESISTORS

#### High-Precision Wraparound, Thin Film Chip Resistors



[P \(Sizes 0302 to 2512\)](#)

- Low TCR down to 5 ppm/°C (-55 °C; +155 °C), tight tolerance down to 0.01 %
- Sulfur resistant, failure rate E7 level, from 10  $\Omega$  up to 200 M $\Omega$

### CERAMIC CAPACITORS

#### Body Sizes: 0402 to 3838, Excellent Power Handling Capabilities



[MLCC RF Capacitors](#)

- Non-magnetic available with copper or epoxy bondable terminations
- Lead-bearing terminations available for high-reliability applications

### ICs

#### microBUCK® SiC403 6 A, 28 V Integrated Buck Regulator with Programmable LDO



[SiC403A](#)

- Offers a scalable design with 10 A and 15 A parts in the same footprint
- Soft-start, UVP / OVP, OCP, selectable power-saving mode, LDO, PGOOD, OTP

### RESISTORS

#### High-Stability Thin Film Flat Chip Resistors



[TNPW0402...e3](#)

- Excellent overall stability, endurance < 0.05 %, TCR down to 10 ppm/K
- AEC-Q200 qualified, sulfur resistant, halogen-free

### MOSFETs

#### Dual N-Channel 20 V (D-S) MOSFET



[SiA906EDJ](#)

- High-performance TrenchFET® technology, maximum  $R_{DS(on)}$  46 m $\Omega$
- 2 mm x 2 mm PowerPAK® SC-70 packaging

### OPTOELECTRONICS

#### 115.2 kbit/s Infrared Transceiver in a SMD package, 9.7 mm x 4.7 mm x 4 mm



[TFDU4101](#)

- Capable of surface-mount soldering in side- or top-view orientation
- Split power supply; transmitter and receiver can operate from different supplies

### CERAMIC CAPACITORS

#### MIL-PRF-55681-Qualified Facility, Reliability Testing Done on Maintenance Basis



[MLCC Hi-Rel Capacitors](#)

- Multiple screening options (group A, group C, voltage conditioning) available
- Customized certification available on request to meet your quality requirements

### ICs

#### Low-Voltage, Low $R_{ON}$ , Dual SPST Analog Switch

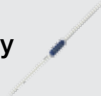


[DG2037](#)

- Low  $R_{ON}$  of 3  $\Omega$  in cost effective SOT-23-8 and MSOP-8 packages
- Low power consumption ideal for portable devices and handheld instrumentation

### RESISTORS

#### Metal Film Resistors, High Precision, High Stability



[PTE](#)

- Tolerances to  $\pm 0.01$  %
- TCR down to 5 ppm/°C, in temperature range of -20 °C to +85 °C

### NON-LINEAR RESISTORS

#### SMD 0805, Glass Protected NTC Thermistors



[NTCS0805E3](#)

- Glass protected with soft terminations
- Tolerance on  $R_{25}$  down to 1 %

### DIODES

#### 2-Line Bus-Port ESD Protection, Flow-Through Design



[VBUS052CD-FAH](#)

- Compact LLP1713-7L package
- Low load capacitance  $C_D = 0.8$  pF

View datasheets for these products  
[www.vishay.com/ref/et3me1d](http://www.vishay.com/ref/et3me1d)





## Glucose Meters



### RESISTORS

#### High-Stability Thin Film Flat Chip Resistors



##### [TNPW0402...e3](#)

- Excellent overall stability, endurance < 0.05 %, TCR down to 10 ppm/K
- AEC-Q200 qualified, sulfur resistant, halogen-free

### MOSFETs

#### N-Channel 20 V (D-S) MOSFET



##### [Si1012CR](#)

- Classic TrenchFET® technology, maximum  $R_{DS(on)}$  396 mΩ
- Popular SC-75A packaging

### DIODES

#### Small-Signal Schottky Diode

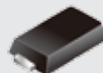


##### [BAT54-02V-V-G-08](#)

- Space-saving SOD-523 package
- This diode features very low turn-on voltage and fast switching

### RECTIFIERS

#### Surface-Mount Schottky Barrier Rectifiers



##### [MSS1P3U-M3/89A](#)

- Very low profile – typical height of 0.65 mm ideal for automated placement
- Low forward voltage drop, low power losses

### RESISTORS

#### High-Precision Wraparound, Thin Film Chip Resistors



##### [P \(Sizes 0302 to 2512\)](#)

- Low TCR down to 5 ppm/°C (-55 °C; +155 °C), tight tolerance down to 0.01 %
- Sulfur resistant, failure rate E7 level, from 10 Ω up to 200 MΩ

### DISPLAYS

#### High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions



##### [LCD, Color TFT, OLED](#)

- Standard and custom display / modules for flight control and monitoring
- High brightness options for LCD, OLED, and color TFT

### OPTOELECTRONICS

#### High-Sensitivity PIN Photodiode in Leadless Low-Profile Package



##### [VEMD5010X01](#)

- 0.8 mm height SMD photodiode featuring a chip with a 7.5 mm² sensitive area
- Daylight blocking filter matched with IR emitters operating at wavelength 870 nm or 950 nm

### INDUCTORS

#### Low-Profile, High-Current IHL® Inductors



##### [IHL-1212AB-11](#)

- Very low-profile, high-current power inductor for DC/DC converters and filters
- High-frequency energy storage up to 5 MHz

### NON-LINEAR RESISTORS

#### NTC Thermistors, SMD 0603, Chip



##### [NTHS0603](#)

- Standard series
- Glass protected

### ICs

#### 1.0 A Slew Rate Controlled Load Switch with Reverse Blocking in SC70-6, and TDFN4



##### [SiP32431DR3-T1GE3](#)

- 40 pA low quiescent current, 1.5 V to 5.5 V wide operation voltage range
- Features true reverse current blocking and output discharge

### NON-LINEAR RESISTORS

#### NTC Thermistors, Radial Leaded, Accuracy Line



##### [NTCLE203E3103SB0](#)

- Thermal cycling resistant
- Suitable for potting

### CERAMIC CAPACITORS

#### Body Sizes: 0402 to 3838, Excellent Power Handling Capabilities



##### [MLCC RF Capacitors](#)

- Non-magnetic available with copper or epoxy bondable terminations
- Lead-bearing terminations available for high-reliability applications

View datasheets for these products  
[www.vishay.com/ref/et3me1e](http://www.vishay.com/ref/et3me1e)



## MRI / MRT



### MOSFETs

#### P-Channel 60 V Power MOSFET

[IRFR9024](#)

- Rugged planar technology, maximum  $R_{DS(on)}$  280 m $\Omega$
- Popular DPAK packaging



### RESISTORS

#### Lead (Pb)-Bearing High-Stability Thin Film Chip Resistors

[TNPW1206](#)

- Excellent overall stability, endurance < 0.05 %, resistance range from 10  $\Omega$  to 2 M $\Omega$
- Pb content > 6 %, TCR down to 10 ppm/K, and tolerance down to 0.1 %



### DIODES

#### Standard Recovery Diodes (Hockey PUK Version), 650 A

[SD300C04](#)

- High voltage ratings up to 3200 V
- Case style DO-200AA



### RESISTORS

#### Power Resistor for Mounting onto a Heatsink, Thick Film Technology

[LPS](#)

- High power, 57 mm x 57 mm, up to 1100 W at 25  $^{\circ}$ C on heatsink, low weight of 83 g
- Non-inductive down to 1  $\mu$ H, high pulse capability up to 1000 J for short pulse



### MOSFETs

#### P-Channel 30 V (D-S) MOSFET

[Si4435DDY](#)

- Classic TrenchFET<sup>®</sup> technology, maximum  $R_{DS(on)}$  24 m $\Omega$
- Popular SO-8 packaging



### RESISTORS

#### Compact Non-Magnetic Precision Thin Film Chip Resistor

[PNM Non-Magnetic](#)

- Multiple case sizes from 0402 to 2512, with wide resistance range from 10  $\Omega$  to 3 M $\Omega$
- TCR down to 25 ppm/ $^{\circ}$ C and tolerance as low as 0.1 % available



### OPTOELECTRONICS

#### Dual-Channel, 5 MBd High-Speed Optocoupler in DIP-8 Package

[SFH6732](#)

- Schmitt-Trigger stage detector for improved noise immunity
- Faraday shield provides common-mode transient immunity of 500 V/ $\mu$ s at  $V_{CM} = 300$  V

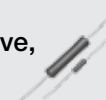


### RESISTORS

#### Wirewound Resistors, Non-Magnetic, Non-Inductive, Axial Lead

[MRA Non-Magnetic](#)

- Not susceptible to high magnetic field strengths, power ratings to 12 W
- High energy pulse capability, all welded construction, non-inductive winding



### CERAMIC CAPACITORS

#### Body Sizes: 0402 to 3838, Excellent Power Handling Capabilities

[MLCC RF Capacitors](#)

- Non-magnetic available with copper or epoxy bondable terminations
- Lead-bearing terminations available for high-reliability applications



### MODULES

#### “Full Bridge” IGBT MTP (Ultrafast NPT IGBT), 20 A

[20MT120UFAPbF](#)

- Speed: 8 kHz to 60 kHz
- 10  $\mu$ s short circuit capability



### CERAMIC CAPACITORS

#### Wide Range of Case Sizes, Voltage Ratings, and Capacitance Values

[VJ Non-Magnetic Series](#)

- Non-magnetic available with copper or epoxy bondable terminations
- Safety screened for magnetic properties



### TANTALUM CAPACITORS

#### Solid Tantalum Surface-Mount Chip Capacitors, TANTAMOUNT<sup>®</sup>, Molded Case, Hi-Rel COTS

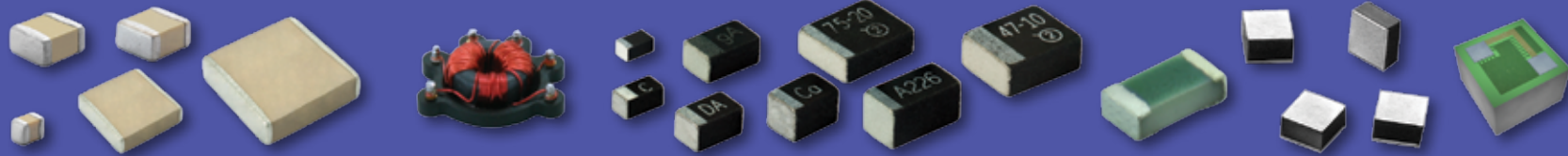
[T83](#)

- Weibull grading and surge current test options, standard and low-ESR option
- Medical Instrumentation, high-reliability applications



View datasheets for these products  
[www.vishay.com/ref/et3me1f](http://www.vishay.com/ref/et3me1f)

# Spotlight on Vishay Passive Components for Medical Applications



## Passives for Implantable Applications

Vishay Intertechnology is a leader in meeting the critical demands of the medical implantables device market. Vishay components can be found in many cardiac treatment devices including pacemakers used to treat bradycardia (abnormally low heart rate) and defibrillators used to treat tachyarrhythmia (abnormally fast heart rate), and in devices used to treat congestive heart failure.

Vishay components, in addition to being used in cardiac treatment devices, are also used in neurostimulators for the treatment of neurological disorders such as Parkinson's disease, bone growth stimulators used to speed the body's healing process, drug delivery systems used for the treatment of chronic pain and diabetes, devices used to treat incontinence, and devices used to enhance hearing.

Vishay products for the medical implantables market include inductors, custom magnetics, multilayer ferrite beads, medical-grade MLCC and tantalum capacitors, and thick film, thin film, MELF, and Power Metal Strip® resistors. Small case sizes, tight tolerances, and high reliability are just some of the industry-leading benefits they provide. Vishay is a leading supplier of custom transformers, which are used to step up voltages in implantable defibrillators, while the Company's WPC-compliant charging receiving coils enable wireless charging of handheld medical equipment.

Vishay's dedicated engineering staff is focused on providing solutions that prolong battery life and require minimum space in the cramped environment of implantable devices.

## Non-Magnetic Terminations

Did you know that Vishay offers thin film and thick film resistors, SMD MLCCs, and ceramic disc capacitors with non-magnetic terminations? Highlighted below are some key Vishay components that highlight our capabilities in this area.

### RC SERIES THICK FILM RESISTORS

- Solderable, epoxy-bondable, and wire-bondable
- Sizes 0504 to 2512 (custom sizes available)
- Resistance: 10  $\Omega$  to 1 M $\Omega$ \*

*\*Higher values available in alternative series*

### PNM THIN FILM RESISTORS

- TCR to  $\pm 25$  ppm/ $^{\circ}$ C
- Sizes 0402 to 2512
- Resistance: 10  $\Omega$  to 3 M $\Omega$

### VJ NON-MAGNETIC SMD MLCC CAPACITORS

- NP0, X7R, and X5R dielectrics
- Voltage range up to 3000 V
- Capacitance: 1 pF to 6.8  $\mu$ F

### MRA SERIES WIREWOUND RESISTORS

- Power ratings from 4 W to 12 W
- Non-inductive
- All-welded construction for enhanced frequency response

NOTE: Vishay's new high-volume, solderable, non-magnetic (Cu/Sn) terminations are available on a wide range of thick film chip resistors. Please contact your local sales office for more information.





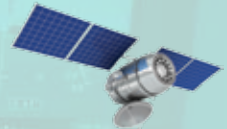
## Key components for AMS (AVIONICS, MILITARY, AND SPACE)



**Airborne  
Systems**



**Satellite / GPS**



**Flight Control  
Computers**



**Cockpit  
Panels**



**Braking  
Systems**



**UAVs (Unmanned  
Aerial Vehicles) /  
Drones**



### THE VISHAY ADVANTAGE

- High Reliability
- MIL-PRF Qualifications
- CECC Approvals
- S-Level Failure Rates
- Hermetic Sealing
- and more...



### Airborne Systems



#### RESISTORS

##### Lead (Pb)-Bearing MINI-MELF Resistors with Established Reliability

###### [MS1...EN803E8](#)

- Failure rate level 8, high stability over life time, proven reliability
- TCR and tolerance of 15 ppm/K and 0.1 % available, ohmic range from 1  $\Omega$  to 2.21 M $\Omega$



#### RESISTORS

##### Metal Film Resistors, Military / Established Reliability, MIL-PRF-55182 Qualified

###### [RNC](#)

- Very low noise (-40 dB)
- ERC (RNC) series has an operating temperature range of -65 °C to +175 °C

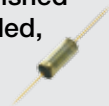


#### RESISTORS

##### Metal Film Resistors, Established Reliability, Hermetically Sealed, MIL-PRF-55182 Qualified

###### [RNR / RNN](#)

- Hermetic glass enclosure is impervious to harmful environments
- The glass enclosure will withstand in excess of 3000 psi external pressure



#### CERAMIC CAPACITORS

##### MIL-PRF-55681-Qualified Facility, BP, BR, and BX Dielectrics

###### [DSCC](#)

- Multiple screening options (group A, group C, voltage conditioning) available
- Lead (Pb)-free termination code "M", tin / lead termination code "Z"



#### MOSFETs

##### N-Channel 60 V (D-S) Power MOSFET

###### [IRFZ44](#)

- Rugged planar technology, maximum  $R_{DS(on)}$  28 m $\Omega$
- Popular TO-220 packaging, maximum continuous current of 50 A



#### SENSORS

##### Precision Rotative Transducers, Conductive Plastic, Servo Mounting

###### [ROT SF](#)

- 8 diameters from 19 mm to 76 mm, redundant signals, tight linearity down to  $\pm 0.015$  %
- Excellent repeatability, life span up to 50M cycles, low current consumption



#### TANTALUM CAPACITORS

##### Solid Tantalum Chip Capacitors, TANTAMOUNT®, Hi-Rel COTS, Ultra-Low ESR

###### [T97](#)

- High capacitance, high-voltage tantalum capacitors with low ESR and low ESL
- Hi-rel screening in accordance with MIL-PRF-55365



#### RESISTORS

##### Thick Film Chip Resistors, Military / Established Reliability, MIL-PRF-55342 Qualified

###### [RCWPM](#)

- Construction is impervious to a high-sulfur environment
- Also qualified to Mil-PRF-32159 zero ohm jumper



#### INDUCTORS

##### Custom Magnetics

- High-reliability custom designs for all types of AMS applications
- Many magnetic materials available with outstanding engineering design support



#### CERAMIC CAPACITORS

##### MIL-PRF-55681-Qualified Facility, Reliability Testing Done on Maintenance Basis

###### [MLCC Hi-Rel](#)

- Multiple screening options (group A, group C, voltage conditioning) available
- Customized certification available on request to meet your quality requirements



#### RESISTORS

##### Thick Film Resistor Networks, Military, MIL-PRF-83401 Qualified

###### [MSM](#)

- Isolated, bussed, and dual-terminator schematics available
- Rugged molded case construction

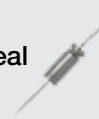


#### TANTALUM CAPACITORS

##### SuperTan® Wet Tantalum Capacitors with Hermetic Seal

###### [STE / T16](#)

- Extended capacitance, 6 V<sub>DC</sub> to 125 V<sub>DC</sub>, -55 °C to +125 °C operation
- Axial leaded, industry-standard case sizes (T1, T2, T3, T4)



View datasheets for these products  
[www.vishay.com/ref/et3as1a](http://www.vishay.com/ref/et3as1a)



## Satellite / GPS

### RESISTORS

#### Hi-Rel Thin Film Chip Resistors



##### [TNPS...ESCC](#)

- ESA approved according to ESCC 4001/029, high-reliability product
- Advanced thin film technology, SnPb plating with Pb content > 6 %

### MOSFETs

#### N-Channel 80 V (D-S) MOSFET



##### [SiR880DP](#)

- Medium-voltage ThunderFET® technology, maximum  $R_{DS(on)}$  down to 5.9 mΩ
- Thermally enhanced PowerPAK® SO-8 packaging

### RESISTORS

#### ESCC 4001/023 Qualified, High-Precision Thin Film Chip Resistors



##### [PHR](#)

- ESA qualified, failure rate E7, down to 0.01 % tolerance and 5 ppm/°C (-55 °C to +155 °C)
- Process QML certified, screening tests: 100 % overload, 100 % burn In

### RESISTORS

#### Metal Film Resistors, Military / Established Reliability, MIL-PRF-39017 Qualified, Type RLR



##### [RLR](#)

- Epoxy-coated construction provides superior moisture protection
- Very low noise (-40 dB)

### DIODES

#### Small-Signal Zener Diodes



##### [1N5235B](#)

- Standard Zener voltage tolerance is ± 5 %
- AEC-Q101 qualified

### INDUCTORS

#### Low-Profile, High-Current IHL® Inductors



##### [IHL-2525CZ](#)

- Compact, high-current power inductor for DC/DC conversion, filter applications
- High-frequency operation up to 5 MHz, high-temperature and gold terminations available

### CERAMIC CAPACITORS

#### Body Sizes: 0402 to 3838, Excellent Power Handling Capabilities



##### [MLCC RF Capacitors](#)

- Non-magnetic available with copper or epoxy bondable termination
- Lead-bearing termination available for high-reliability applications

### RESISTORS

#### QPL MIL-PRF-55342-Qualified Thin Film Resistor, Surface-Mount Chip



##### [M55342](#)

- Case sizes 0201 to 2512 with reliability level T (space level) available
- Both short-side and long-side terminations available

### TANTALUM CAPACITORS

#### Solid Tantalum Surface-Mount Capacitors, TANTAMOUNT®, Military MIL-PRF-55365/4 Qualified



##### [CWR06](#)

- MIL-PRF-55365 established reliability failure rate style
- High capacitance, conformal coated, 8 case sizes

### MELF RESISTORS

#### MELF Resistors with Established Reliability



##### [MM...VG03](#)

- Approved to EN 140401-803, version E, single lot date code
- Established reliability, failure rate level E6, advanced thin film technology

### RESISTORS

#### Wirewound Resistor, Military / Established Reliability, MIL-PRF-39007 Qualified Type RWR



##### [RWR](#)

- High energy pulse capability, all welded construction, "S" failure rate
- Non-inductive Ayrton-Perry winding available, high-temp. silicone coating

### RESISTORS

#### Thick Film Resistor Networks, Military, MIL-PRF-83401 Qualified, Type RZ030, Flat Pack



##### [DFM](#)

- 0.065 in (1.65 mm) height for high-density packaging

View datasheets for these products  
[www.vishay.com/ref/et3as1b](http://www.vishay.com/ref/et3as1b)





## Flight Control Computers



### RESISTORS

#### CECC High-Precision Wraparound Thin Film Chip Resistors



[RV \(0503 to 1206\) / P \(0302 to 2512\)](#)

- Low TCR down to 5 ppm/°C (-55 °C to +155 °C), tight tol. down to 0.01 %
- Sulfur resistant, failure rate E7 level, from 10  $\Omega$  up to 200 M $\Omega$

### DISPLAYS

#### High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions



[LCD, Color TFT, OLED](#)

- Standard and custom display / modules for flight control and monitoring
- High-brightness options for LCD, OLED, and color TFT

### NON-LINEAR RESISTORS

#### NTC Thermistors, SMD 0603 Chip



[NTHS0603N03N1001JE](#)

- Standard series
- Glass protected

### INDUCTORS

#### Custom Magnetics



- Custom designed to customer requirements, focus on reliability and performance
- Internal test lab can perform almost any electrical and environment test

### RECTIFIERS

#### Surface-Mount Schottky Barrier Rectifier



[SS32HE3](#)

- Low-profile package ideal for automated assembly process
- Low power losses, high efficiency

### RESISTORS

#### QPL MIL-PRF-55342-Qualified Thin Film Resistor, Surface-Mount Chip



[M55342](#)

- Case sizes 0201 to 2512 with reliability level T (space level) available
- Tantalum nitride and nichrome resistive film available

### INDUCTORS

#### MIL-PRF-15305 Qualified, Type LT, Molded Axial Leaded Inductors



[MS7508x](#)

- Axial inductors for RF filter applications

### NON-LINEAR RESISTORS

#### SMD PTC – Nickel Thin Film Linear Thermistors



[TFPT](#)

- Standard  $R_{25}$  tolerances of  $\pm 0.5$  %,  $\pm 1$  % available
- cUL-recognized component: file E148885

### DIODES

#### 6-Line ESD Protection Diode Array in LLP75



[VESD05A6A-HAF](#)

- 6-line ESD protection
- Low load capacitance  $C_D = 40$  pF

### INDUCTORS

#### Inductors, Military, MIL-PRF-15305 Qualified, Type LT, Molded, Shielded, Miniature, Axial Leaded



[MS21426](#)

- Axial inductors for RF filter applications

### TANTALUM CAPACITORS

#### SuperTan® Wet Tantalum Capacitors with Hermetic Seal



[ST / STE](#)

- Extended capacitance, 6  $V_{DC}$  to 125  $V_{DC}$ , -55 °C to +125 °C operation
- Axial leaded, industry-standard case sizes (T1, T2, T3, T4)

### TANTALUM CAPACITORS

#### Solid Tantalum Chip Capacitors, TANTAMOUNT®, Hi-Rel COTS, Ultra-Low ESR



[T97](#)

- High-capacitance, high-voltage tantalum capacitors with low ESR and low ESL
- Hi-rel screening in accordance with MIL-PRF-55365

View datasheets for these products  
[www.vishay.com/ref/et3as1c](http://www.vishay.com/ref/et3as1c)



## Cockpit Panels



### MOSFETs

#### N-Channel 100 V (D-S) MOSFET



##### [SiS892ADN](#)

- Medium-voltage ThunderFET® technology, maximum  $R_{DS(on)}$  down to 33 mΩ
- Thermally enhanced PowerPAK® 1212-8 is 1/3 the size of an SO-8

### DISPLAYS

#### High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions



##### [LCD, Color TFT, OLED](#)

- Standard and custom display / modules for flight control and monitoring
- High-frequency operation up to 5 MHz, high temperature available

### RESISTORS

#### Leaded Metal Film Resistors with Established Reliability



##### [MB / SMA VG06](#)

- IECQ-CECC approved to EN 140101-806, version E, est. reliability, level E7
- Advanced thin film technology, fused pure tin (Sn) plating on copper (Cu) wire, single lot date code

### RESISTORS

#### Power Metal Strip® Resistors, Low Value (Down to 0.0005 Ω), Surface-Mount



##### [WSL2512](#)

- Extremely low resistance values from 0.0005 Ω to 0.5 Ω and tolerance of 1 %
- High power of 1 W in 2512 size resistor

### RESISTORS

#### Long-Life Cermet Potentiometer



##### [P11L](#)

- Long life of 2M cycles, 12.5 mm square single-turn panel control, versatile options
- Compliant to RoHS, tested according to CECC, value added and customs available

### RESISTORS

#### QPL MIL-PRF-55342-Qualified Thin Film Resistor, Surface-Mount Chip



##### [M55342](#)

- Case sizes 0201 to 2512 with reliability level T (space level) available
- Tantalum nitride and nichrome resistive film available

### CERAMIC CAPACITORS

#### MIL-PRF-55681-Qualified Facility, BP, BR, and BX dielectrics



##### [DSCC](#)

- Multiple screening options (group A, group C, voltage conditioning) available
- Lead (Pb)-free termination code "M", tin / lead termination code "Z"

### INDUCTORS

#### Low-Profile, High-Current IHLP® Inductors



##### [IHLP-6767GZ](#)

- Very high current SMD inductor for DC/DC conversion and filtering
- High-frequency operation up to 5 MHz, high temperature available

### RECTIFIERS

#### High-Performance Schottky Rectifier, 8 A



##### [8TQ100SPBF](#)

- 175 °C  $T_j$  operation
- AEC-Q101 qualified and halogen-free

### MOSFETs

#### N-Channel 400 V (D-S) Power MOSFET



##### [IRF740AS](#)

- Rugged planar technology, maximum  $R_{DS(on)}$  550 mΩ
- Popular D²PAK packaging, maximum continuous current of 10 A

### TANTALUM CAPACITORS

#### Solid Tantalum Chip Capacitors, MICROTAN®, High Reliability, Low DC Leakage



##### [TM8](#)

- Hi-rel devices with maximum capacitance in case sizes as small as 0402
- Hi-rel screening in accordance with MIL-PRF-55365

### MELF RESISTORS

#### Hi-Rel Thin Film MINI-MELF Resistors



##### [MS1...ESCC](#)

- ESA approved to ESCC 4001/022, high-reliability product
- Advanced thin film technology, SnPb plating with Pb content > 6 %

View datasheets for these products  
[www.vishay.com/ref/et3as1d](http://www.vishay.com/ref/et3as1d)



## Braking Systems

### RESISTORS

**High-Stability, High-Temperature  
230 °C Thin Film Wraparound  
Chip Resistors**



#### [PHT](#)

- Operating temp. up to 215 °C, low TCR down to 15 ppm/°C (-55 °C to +215 °C)
- Sulfur resistant, from 10 Ω up to 7.5 MΩ, tight tolerance down to 0.05 %

### INDUCTORS

**Inductors, Military,  
MIL-PRF-15305 Qualified,  
Type LT, Molded, Shielded,  
Miniature, Axial Leaded**



#### [MS21426](#)

- Axial inductors for RF filter applications

### CERAMIC CAPACITORS

**MIL-PRF-55681-Qualified  
Facility, Cage Code SHV71BP,  
BR and BX Dielectrics**



#### [CDR](#)

- Tin / lead termination codes “Z” and “U”
- Lead (Pb)-free termination codes “W,” “Y,” and “M”

### INDUCTORS

**MIL-PRF-15305 Qualified,  
Type LT, Molded Axial  
Leaded Inductors**



#### [MS7508x](#)

- Axial inductors for RF filter applications

### RESISTORS

**Thick Film Resistor Networks,  
Military, MIL-PRF-83401 Qualified,  
Type RZ030, Flat Pack**



#### [DFM](#)

- 0.065 in (1.65 mm) height for high-density packaging

### INDUCTORS

**Custom Magnetics**



- Custom designed to customer requirements, focus on reliability and performance
- Internal test lab can perform almost any electrical and environment test

### TANTALUM CAPACITORS

**Wet Tantalum Capacitors,  
Tantalum Case with Glass-  
to-Tantalum Hermetic Seal**



#### [135D](#)

- High capacitance, 6 V to 125 V, -55 °C to +200 °C operation, high vibration
- Axial leaded, industry-standard case sizes (T1, T2, T3, T4)

### TANTALUM CAPACITORS

**SuperTan® Wet Tantalum  
Capacitors with Hermetic Seal**



#### [ST / STE](#)

- Extended capacitance, 6 V<sub>DC</sub> to 125 V<sub>DC</sub>, -55 °C to +125 °C operation
- Axial leaded, industry-standard case sizes (T1, T2, T3, T4)

### RESISTORS

**Wirewound Resistors, Military /  
Established Reliability MIL-PRF-39009  
Qualified, Type RER, R Level**



#### [RER](#)

- Heat sink / chassis mount, rated power up to 30 W, all welded construction
- Aluminum housing, molded construction for total environmental protection





## UAVs (Unmanned Aerial Vehicles) / Drones

### SENSORS

**Precision Rotative Transducers, Conductive Plastic, Servo Mounting**

[ROT SE](#)

- 8 diameters from 19 mm to 76 mm, redundant signals, tight linearity down to  $\pm 0.015\%$
- Excellent repeatability, lifespan up to 50M cycles, low current consumption



### RESISTORS

**QPL MIL-PRF-55342-Qualified Thin Film Resistor, Surface-Mount Chip**

[M55342](#)

- Case sizes 0201 to 2512 with reliability level T (space level) available
- Tantalum nitride and nichrome resistive film available



### DISPLAYS

**High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions**

[LCD, Color TFT, OLED](#)

- Standard and custom display / modules for flight control and monitoring
- High-brightness options for LCD, OLED, and color TFT



### TANTALUM CAPACITORS

**SuperTan® Wet Tantalum Capacitors with Hermetic Seal**

[ST / STE](#)

- Extended capacitance,  $6 V_{DC}$  to  $125 V_{DC}$ ,  $-55^{\circ}C$  to  $+125^{\circ}C$  operation
- Axial leaded, industry standard case sizes (T1, T2, T3, T4)



### MOSFETs

**N-Channel 35 V (D-S) MOSFET**

[2N6659, 2N6659-2](#)

- Military qualified, low on-resistance:  $1.3 \Omega$ , low input and output leakage
- Low threshold: 1.7 V, low input capacitance: 35 pF, fast switching speed: 8 ns



### CERAMIC CAPACITORS

**MIL-PRF-55681-Qualified Facility BP, BR and BX Dielectrics**

[DSCC](#)

- Multiple screening options (group A, group C, voltage conditioning) available
- Lead (Pb)-free termination code "M", tin / lead termination code "Z"



### MELF RESISTORS

**Hi-Rel Thin Film MINI-MELF Resistors**

[MS1...ESCC](#)

- ESA approved to ESCC 4001/022, high-reliability product
- Advanced thin film technology, SnPb plating with Pb content  $> 6\%$



### TANTALUM CAPACITORS

**Solid Tantalum Chip Capacitors, TANTAMOUNT®, Hi-Rel COTS, Ultra-Low ESR**

[T97](#)

- High-capacitance, high-voltage tantalum capacitors with low ESR and low ESL
- Hi-rel screening in accordance with MIL-PRF-55365

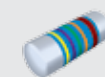


### MELF RESISTORS

**MELF Resistors with Established Reliability**

[MM...VG03](#)

- Approved to EN 140401-803, version E, single lot date code
- Established reliability, failure rate level E6, advanced thin film technology







Vishay Intertechnology, Inc.



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*SOLUTIONS*