



Vishay Intertechnology, Inc.

Medical

(Medical Equipment)



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





Medical

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.

For inquiries, please contact your local sales representative.

Key components for MEDICAL EQUIPMENT



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)



Cardiac
Pacing



External
Defibrillators



Patient
Monitoring



Glucose
Meters



MRI / MRT



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 μ H, 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 m Ω
- 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_{DC} and 15 kV_{DC}



[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 G Ω)

MOSFETs

E Series 650 V Power MOSFET



[SiHG24N65E](#)

- High-performance E Series, high-voltage technology, maximum $R_{DS(on)}$ 145 m Ω
- 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 G Ω)

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



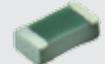
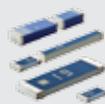
[GLI](#)

- Low losses at high frequencies
- High current rating

View datasheets for these products
www.vishay.com/ref/et3me1a

Cardiac Pacing



<p>MOSFETs</p> <p>Dual N-Channel 20 V (D-S) MOSFET</p>  <p>SMMB912DK</p> <ul style="list-style-type: none"> • High-grade TrenchFET® technology, maximum $R_{DS(on)}$ 216 mΩ, hi-rel medical • 1.6 mm x 1.6 mm PowerPAK® SC-75 packaging 	<p>RESISTORS</p> <p>High-Stability Thin Film Flat Chip Resistors</p>  <p>TNPW0402...e3</p> <ul style="list-style-type: none"> • Excellent overall stability, endurance < 0.05 %, TCR down to 10 ppm/K • AEC-Q200 qualified, sulfur resistant, halogen-free 	<p>DIODES</p> <p>Small-Signal Switching Diode</p>  <p>IMBD4148-VGS08</p> <ul style="list-style-type: none"> • AEC-Q101 qualified • Fast switching diode in SOT-23 case, especially suited for automatic insertion
<p>RESISTORS</p> <p>Thin Film, Top-Contact Miniature Resistor</p>  <p>MSFM</p> <ul style="list-style-type: none"> • 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 	<p>INDUCTORS</p> <p>Custom Magnetics</p>  <ul style="list-style-type: none"> • Ultra-compact transformers and inductors for high-reliability implantable devices • Custom designs for high reliability and efficient operation to extend battery life 	<p>CERAMIC CAPACITORS</p> <p>MIL-PRF-55681-Qualified Facility, Reliability Testing Done on Maintenance Basis</p>  <p>MLCC Hi-Rel</p> <ul style="list-style-type: none"> • Multiple screening options (group A, group C, voltage conditioning) available • Customized certification available on request to meet your quality requirements
<p>NON-LINEAR RESISTORS</p> <p>NTC Thermistors, Naked Chips</p>  <p>NTCC100E4</p> <ul style="list-style-type: none"> • High stability over long time • Wire-bondable NTC die version available 	<p>INDUCTORS</p> <p>Certified COTS RF Inductors</p> <ul style="list-style-type: none"> • Variety of small-size SMD devices for high-frequency filtering applications • 100 % testing to customer specifications available 	<p>TANTALUM CAPACITORS</p> <p>Solid Tantalum Chip Capacitors, MICROTAN®, High Reliability, Low DC Leakage</p>  <p>TM8</p> <ul style="list-style-type: none"> • Hi-rel devices with maximum capacitance in case sizes as small as 0402 • Hi-rel screening in accordance with MIL-PRF-55365
<p>CERAMIC CAPACITORS</p> <p>Frequency Range from 400 MHz to 5 GHz</p>  <p>Ceramic Chip Antenna</p> <ul style="list-style-type: none"> • Frequency range from 400 MHz to 5 GHz • Wide operating temperature range: -40 °C to +85 °C 	<p>ICs</p> <p>High-Voltage, Single- and Dual-Supply SPDT Analog Switch with Enable Pin</p>  <p>DG469</p> <ul style="list-style-type: none"> • 3.6 Ω low and flat switch on-resistance in MSOP8 and SO8 packages • Integrated VL and fast switching with guaranteed break before make 	<p>CERAMIC CAPACITORS</p> <p>Body Sizes: 0402 to 3838, Excellent Power Handling Capabilities</p>  <p>MLCC RF Capacitors</p> <ul style="list-style-type: none"> • 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

External Defibrillators


RESISTORS
Metal Oxide Resistors, Special Purpose, High Voltage
[ROX](#)

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


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 μs 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 Ω
- 1 pC charge injection with fast switching



View datasheets for these products
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-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

ICs

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



[DG2037](#)

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

RESISTORS

High-Precision Wraparound, Thin Film Chip Resistors



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

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

MOSFETs

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



[SiA906EDJ](#)

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

RESISTORS

Metal Film Resistors, High Precision, High Stability



[PTF](#)

- Tolerances to ± 0.01 %
- TCR down to 5 ppm/ $^{\circ}C$, in temperature range of -20 $^{\circ}C$ to +85 $^{\circ}C$

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

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

NON-LINEAR RESISTORS

SMD 0805, Glass Protected NTC Thermistors



[NTCS0805E3](#)

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

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

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

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

Glucose Meters



<p>RESISTORS</p> <p>High-Stability Thin Film Flat Chip Resistors</p>  <p>TNPW0402...e3</p> <ul style="list-style-type: none"> • Excellent overall stability, endurance < 0.05 %, TCR down to 10 ppm/K • AEC-Q200 qualified, sulfur resistant, halogen-free 	<p>MOSFETs</p> <p>N-Channel 20 V (D-S) MOSFET</p>  <p>Si1012CR</p> <ul style="list-style-type: none"> • Classic TrenchFET® technology, maximum $R_{DS(on)}$ 396 mΩ • Popular SC-75A packaging 	<p>DIODES</p> <p>Small-Signal Schottky Diode</p>  <p>BAT54-02V-V-G-08</p> <ul style="list-style-type: none"> • Space-saving SOD-523 package • This diode features very low turn-on voltage and fast switching
<p>RECTIFIERS</p> <p>Surface-Mount Schottky Barrier Rectifiers</p>  <p>MSS1P3U-M3/89A</p> <ul style="list-style-type: none"> • Very low profile – typical height of 0.65 mm ideal for automated placement • Low forward voltage drop, low power losses 	<p>RESISTORS</p> <p>High-Precision Wraparound, Thin Film Chip Resistors</p>  <p>P (Sizes 0302 to 2512)</p> <ul style="list-style-type: none"> • 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 	<p>DISPLAYS</p> <p>High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions</p>  <p>LCD, Color TFT, OLED</p> <ul style="list-style-type: none"> • Standard and custom display / modules for flight control and monitoring • High brightness options for LCD, OLED, and color TFT
<p>OPTOELECTRONICS</p> <p>High-Sensitivity PIN Photodiode in Leadless Low-Profile Package</p>  <p>VEMD5010X01</p> <ul style="list-style-type: none"> • 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 	<p>INDUCTORS</p> <p>Low-Profile, High-Current IHLP® Inductors</p>  <p>IHLP-1212AB-11</p> <ul style="list-style-type: none"> • Very low-profile, high-current power inductor for DC/DC converters and filters • High-frequency energy storage up to 5 MHz 	<p>NON-LINEAR RESISTORS</p> <p>NTC Thermistors, SMD 0603, Chip</p>  <p>NTHS0603</p> <ul style="list-style-type: none"> • Standard series • Glass protected
<p>ICs</p> <p>1.0 A Slew Rate Controlled Load Switch with Reverse Blocking in SC70-6, and TDFN4</p>  <p>SiP32431DR3-T1GE3</p> <ul style="list-style-type: none"> • 40 pA low quiescent current, 1.5 V to 5.5 V wide operation voltage range • Features true reverse current blocking and output discharge 	<p>NON-LINEAR RESISTORS</p> <p>NTC Thermistors, Radial Leaded, Accuracy Line</p>  <p>NTCLE203E3103SB0</p> <ul style="list-style-type: none"> • Thermal cycling resistant • Suitable for potting 	<p>CERAMIC CAPACITORS</p> <p>Body Sizes: 0402 to 3838, Excellent Power Handling Capabilities</p>  <p>MLCC RF Capacitors</p> <ul style="list-style-type: none"> • 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

MRI / MRT



<p>MOSFETs</p> <p>P-Channel 60 V Power MOSFET</p>  <p>IRFR9024</p> <ul style="list-style-type: none"> • Rugged planar technology, maximum $R_{DS(on)}$ 280 mΩ • Popular DPAK packaging 	<p>RESISTORS</p> <p>Lead (Pb)-Bearing High-Stability Thin Film Chip Resistors</p>  <p>TNPW1206</p> <ul style="list-style-type: none"> • Excellent overall stability, endurance < 0.05 %, resistance range from 10 Ω to 2 MΩ • Pb content > 6 %, TCR down to 10 ppm/K, and tolerance down to 0.1 % 	<p>DIODES</p> <p>Standard Recovery Diodes (Hockey PUK Version), 650 A</p>  <p>SD300C04</p> <ul style="list-style-type: none"> • High voltage ratings up to 3200 V • Case style DO-200AA
<p>RESISTORS</p> <p>Power Resistor for Mounting onto a Heatsink, Thick Film Technology</p>  <p>LPS</p> <ul style="list-style-type: none"> • 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 μH, high pulse capability up to 1000 J for short pulse 	<p>MOSFETs</p> <p>P-Channel 30 V (D-S) MOSFET</p>  <p>Si4435DDY</p> <ul style="list-style-type: none"> • Classic TrenchFET[®] technology, maximum $R_{DS(on)}$ 24 mΩ • Popular SO-8 packaging 	<p>RESISTORS</p> <p>Compact Non-Magnetic Precision Thin Film Chip Resistor</p>  <p>PNM Non-Magnetic</p> <ul style="list-style-type: none"> • Multiple case sizes from 0402 to 2512, with wide resistance range from 10 Ω to 3 MΩ • TCR down to 25 ppm/$^{\circ}$C and tolerance as low as 0.1 % available
<p>OPTOELECTRONICS</p> <p>Dual-Channel, 5 MBd High-Speed Optocoupler in DIP-8 Package</p>  <p>SFH6732</p> <ul style="list-style-type: none"> • Schmitt-Trigger stage detector for improved noise immunity • Faraday shield provides common-mode transient immunity of 500 V/μs at $V_{CM} = 300$ V 	<p>RESISTORS</p> <p>Wirewound Resistors, Non-Magnetic, Non-Inductive, Axial Lead</p>  <p>MRA Non-Magnetic</p> <ul style="list-style-type: none"> • Not susceptible to high magnetic field strengths, power ratings to 12 W • High energy pulse capability, all welded construction, non-inductive winding 	<p>CERAMIC CAPACITORS</p> <p>Body Sizes: 0402 to 3838, Excellent Power Handling Capabilities</p>  <p>MLCC RF Capacitors</p> <ul style="list-style-type: none"> • Non-magnetic available with copper or epoxy bondable terminations • Lead-bearing terminations available for high-reliability applications
<p>MODULES</p> <p>“Full Bridge” IGBT MTP (Ultrafast NPT IGBT), 20 A</p>  <p>20MT120UFAPbF</p> <ul style="list-style-type: none"> • Speed: 8 kHz to 60 kHz • 10 μs short circuit capability 	<p>CERAMIC CAPACITORS</p> <p>Wide Range of Case Sizes, Voltage Ratings, and Capacitance Values</p>  <p>VJ Non-Magnetic Series</p> <ul style="list-style-type: none"> • Non-magnetic available with copper or epoxy bondable terminations • Safety screened for magnetic properties 	<p>TANTALUM CAPACITORS</p> <p>Solid Tantalum Surface-Mount Chip Capacitors, TANTAMOUNT[®], Molded Case, Hi-Rel COTS</p>  <p>T83</p> <ul style="list-style-type: none"> • 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



Vishay Intertechnology, Inc.



A *WORLD OF*
SOLUTIONS