



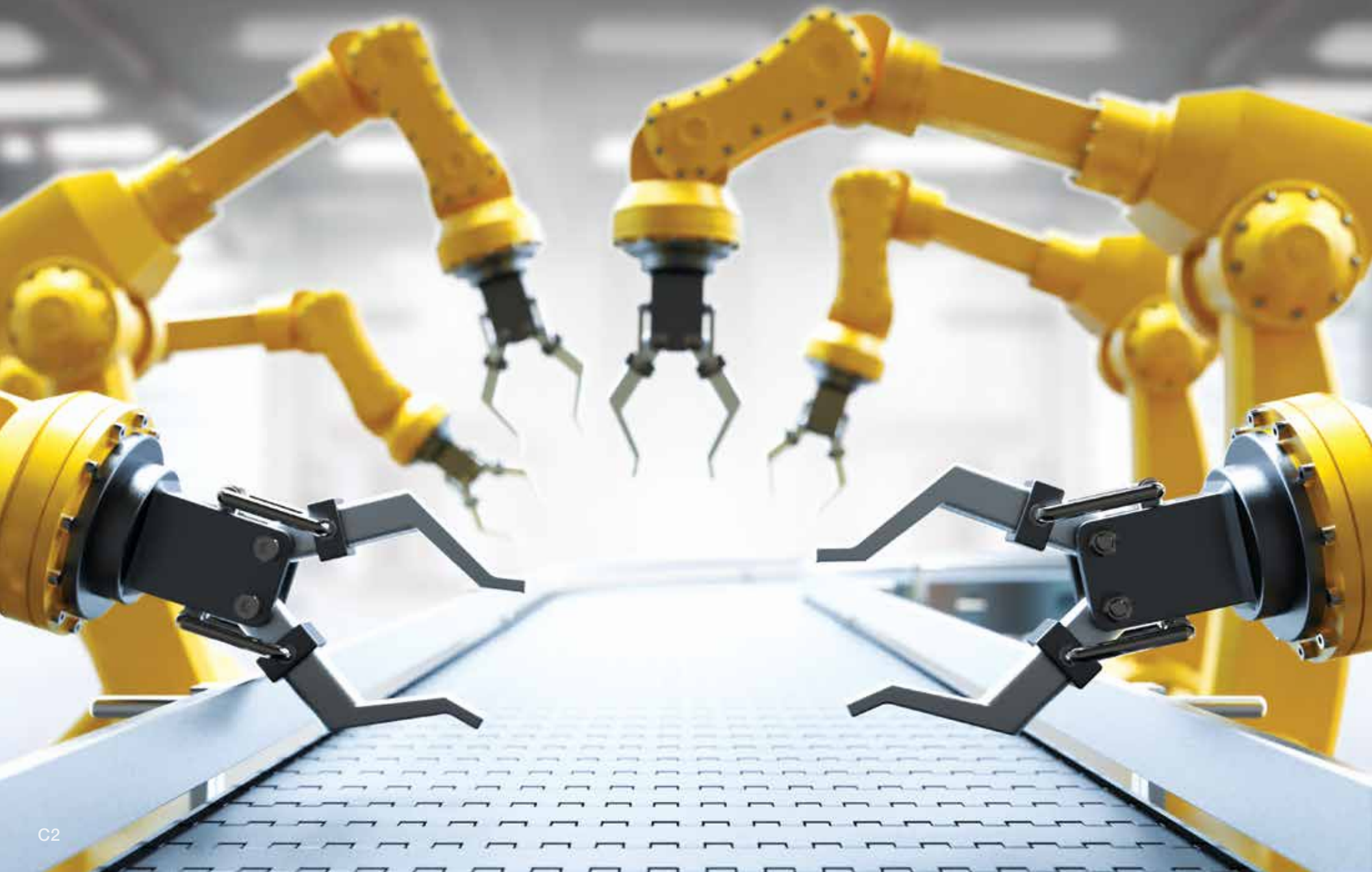
Vishay Intertechnology, Inc.

Industrial



Engineer's
Toolbox

EFFICIENCY IN PRODUCTION





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Surveillance Systems	Cameras / CCTV	25
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Key components for FACTORY AUTOMATION



THE VISHAY ADVANTAGE

- Long Useful Life
- Safety Approvals
- Robust Design
- High Peak Pulse Power
- High Precision and Stability
- High Surge Current Capabilities
- and more....

Motor Drives



Testers



Control Units



Air Conditioning Systems



Laser Marking and Coding



Collaborative Robots (COBOTS)

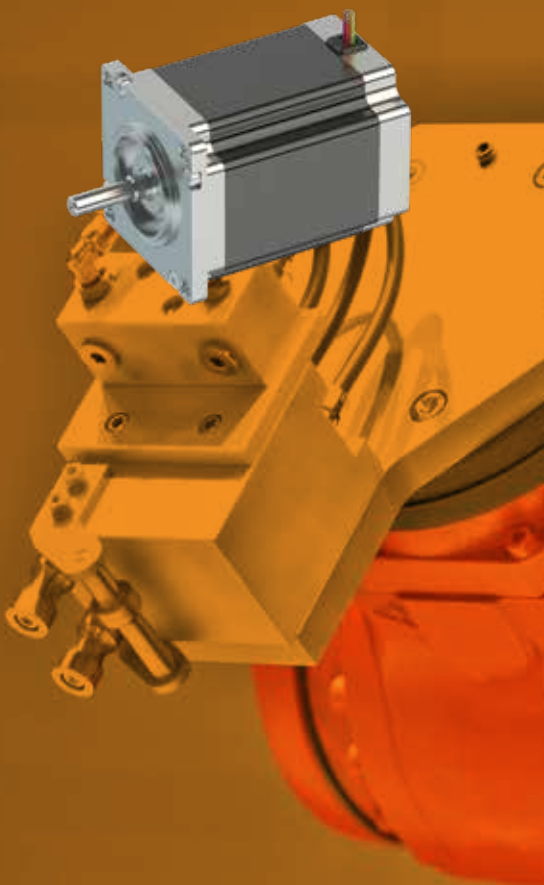


Low Voltage UPS





Motor Drives



ICs

5 V, 1 A H-Bridge Motor Driver**SiP2100**

- High efficiency with an extremely low operating current
- Brush / stepper motor driver



RESISTORS

Power Resistor for Mounting onto Heatsink, Thick Film Technology**LPS 800**

- High power, 57 mm x 57 mm, 800 W at 25 °C on heatsink, low weight 83 g
- Non-inductive down to 1 μ H, high pulse capability up to 1000 J short pulse



ALUMINUM CAPACITORS

High Ripple Current, Compact 105 °C Aluminum Capacitor**259 PHM-SI**

- 105 °C maximum temperature allows for high peak ripple current
- 3000 h lifetime translates to > 15 years of 24/7 operation at 60 °C
- Small size allows for use in compact designs



ESTA POWER CAPACITORS

Capacitors for Power Electronic (PEC) - Cylindrical**DCMKP Tubular**

- High impulse current rating
- Low inductance



CERAMIC CAPACITORS

IEC 60384-14, CAN/CSA/ cCSAus, and ANSI/UL CB Certificates**VJ Safety Capacitors**

- Surface-mount design for simpler assembly and reduced board space requirements
- Available in NP0 (C0G) or X7R dielectrics



MOSFETs

N-Channel 60 V (D-S) 175 °C MOSFET in D²PAK**SUM50020EL**

- Maximum $R_{DS(on)}$ of 2.1 m Ω in rugged D²PAK package
- Improves switching characteristics with Q_{gd} / Q_{gs} less than 1



TANTALUM CAPACITORS

Solid Tantalum Surface-Mount Chip Capacitors, TANTAMOUNT[®], Molded Case**293D**

- Molded tantalum capacitor, standard industrial grade
- General purpose capacitor



INDUCTORS

IHLP[®] Commercial Inductors, High Saturation Series**IHLP-2525CZ-01**

- Compact composite inductor for high efficiency DC/DC conversion
- High frequency operation out to 5 MHz, excellent saturation



RECTIFIERS

Single-Phase Single In-Line Bridge Rectifiers**GSIB2560**

- UL recognition file number E54214
- Solder dip 275 °C max. 10 s, per JESD 22-B106
- General purpose use in AC/DC bridge full wave rectification



NON-LINEAR RESISTORS

NTC Thermistors, High Temperature Lug Sensors, 150 °C**NTCALUG01T**

- 150 °C long term stability
- High insulation voltage up to 2700 V_{AC}
- UL recognized, AEC-Q200 compliant



MOSFETs

EF Series 600 V Fast Recovery Power MOSFET**SiHG47N60AEF**

- 3rd generation EF Series superjunction MOSFET with $R_{DS(on)}$ max = 70 m Ω
- In standard TO-247 package with 40 A continuous current rating



RESISTORS

Power Metal Strip[®] Resistors, High Power Density, Very High Power (10 W) Surface-Mount**WSHP2818**

- Optimized thermal design provides superior power density
- All metal welded construction provides high reliability and pulse withstanding





Testers



MOSFETs

P-Channel 40 V (D-S) MOSFET**Si2319DDS**

- Industry leading TrenchFET® P-channel technology, maximum $R_{DS(on)}$ of 75 mΩ
- Popular SOT-23 package

OPTOELECTRONICS

SPST Normally Open (1 Form A) Solid-State Relay in DIP-6 Package**VO14642AT**

- Isolation voltage of 5300 V_{RMS}, load voltage of 60 V, DC load current of 2 A
- Can be configured for AC/DC or DC only operation with clean, bounce-free switching

ICs

Precision 8-Channel / Dual 4-Channel CMOS Analog Multiplexers**DG508B**

- High precision, low noise signal switching, 2 pC low charge injection
- Low parasitic capacitance of 18 pF $C_{D(ON)}$, low leakage typically of 3 pA
- Reduced switching errors, glitching and power consumption

TANTALUM CAPACITORS

Solid Tantalum Surface-Mount Chip Capacitors, TANTAMOUNT®, Molded Case, Low ESR**TR3**

- Molded tantalum capacitor, low ESR
- Automation and control, SMPS, motion and drives, telecom infrastructure, networking and multiplexers, general purpose

DIODES

Surface-Mount TRANSZORB® Transient Voltage Suppressors**SMCJxx**

- Available in unidirectional and bidirectional
- AEC-Q101 qualified

CERAMIC CAPACITORS

AC Line Rated Ceramic Disc Capacitors, Class X1: 760 V_{AC} Class Y1: 500 V_{AC}**VY1 Series**

- X1 / Y1 safety rating according to IEC 60384-14, 4th edition
- Highest reliability and lifetime, operating temperature -40 °C to +125 °C

RECTIFIERS

Hyperfast Rectifier, 15 A FRED Pt®**VS-15ETH06FP-N3**

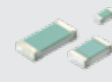
- 175 °C operating junction temperature
- Hyperfast recovery time

RESISTORS

Molded, 25 mil Pitch 8 pin QSOP, Dual-In-Line Thin Film Resistor, Surface-Mount Network**MORN**

- Multiple divider ratios with resistance values from 100 Ω to 100 kΩ per resistor
- Available in 0.01 % ratio tolerance and 1 ppm/°C TCR tracking
- Excellent long-term ratio stability, ± 0.015 % over 2000 h at 70 °C

RESISTORS

Precision Thin Film Chip Resistors**MC Precision**

- Excellent overall stability, sulfur resistant
- CECC approved according to EN 140401-801

INDUCTORS

Wirewound, Surface-Mount Molded Inductors**IMC-1210**

- RF inductor for high density filter applications
- Vertical-bobbin construction eliminates cross-talk with nearby components

ICs

6 V to 28 V, 58 mΩ Programmable Overcurrent Protection Switches**SiP32419, SiP32429**

- Programmable turn on time with fast (<1 μs) short circuit response
- Undervoltage lockout, thermal shutdown, power good, fault flag
- Control features simplify the design and increase the reliability

OPTOELECTRONICS

AC and DC Linear Optocoupler with VDE, UL, BSI, FIMKO Certifications**IL300**

- Feedback photodiode compensates for LED's time and temperature characteristics
- Isolation test voltage, 5300 V_{RMS} in DIP or SMD package



Control Units



MOSFETs

P-Channel 20-V (D-S) MOSFET**Si7615ADN**

- Industry leading p-channel Gen III technology, maximum $R_{DS(on)}$ of 4.4 m Ω
- Thermally enhanced PowerPAK® 1212-8 package is 1/3 the size of SO-8 package

RESISTORS

High Precision Wraparound, Thin Film Chip Resistors, Sizes 0302 to 2512**P Series**

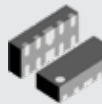
- Low TCR down to 5 ppm/°C (-55 °C to +155 °C), tight tolerance down to 0.01 %
- Sulfur resistant, failure rate E7 level, from 10R up to 200M

MOSFETs

N-Channel 1000 V Power MOSFET**IRFBG20**

- Rugged Planar technology, maximum $R_{DS(on)}$ of 11 Ω
- Popular TO-220 package, maximum continuous current 1.4 A

DIODES

4-Line Bus-Port ESD Protection, Flow-Through Design**VBUS54GD-FBL**

- Low leakage current I_R : < 0.1 μ A, low load capacitance C_D = 0.8 pF
- Compact LLP2510-10M package

INDUCTORS

IHLP® Commercial Inductors, High Saturation Series**IHLP-2525CZ-01**

- Compact size, high current DC/DC conversion and filtering
- High frequency operation out to 5 MHz, excellent saturation

ICs

4- / 8-Channel, Triple SPDT, \pm 5 V / 12 V / 5 V / 3 V Analog Multiplexers**DG4051E**

- High precision, low noise signal switching, < 0.3 pC low charge injection
- Guaranteed 2 V logic high limit when operating from 5 V or \pm 5 V supplies

FILM CAPACITORS

Interference Suppression Film Capacitor, Class Y2, Radial MKP 300 V_{AC}**MKP338 6**

- RFI Y2 capacitor for bypass applications

OPTOELECTRONICS

Optically-Isolated 1 Form A Solid-State Relay in Surface-Mount 4-Pin SOP Package**VO1400AEFTR**

- Clean, bounce-free switching with maximum R_{ON} of 5 Ω , and load voltage of 60 V
- Load current, AC peak of 100 mA, isolation test voltage 3750 V_{RMS}

NON-LINEAR RESISTORS

TFPT Thermistors, Nickel Thin Film Linear Temperature Sensors**TFPT**

- Temperature compensation RTD, excellent overall stability
- AEC-Q200 compliant
- Wide operating temperature range: -55 °C to +150 °C

TANTALUM CAPACITORS

Solid Tantalum Surface-Mount Chip Capacitors, TANTAMOUNT®, Molded Case, HI-TMP®**TH4**

- Temperature molded tantalum capacitors, HI-TMP® (to 175 °C)
- Harsh environments, high temperature sensors, decoupling, filtering

RESISTORS

Metal Film Resistors, High Precision, High Stability**PTF**

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

CERAMIC CAPACITORS

Standard Reflow, Process Assembly, High Reliability Ceramic-Oxide Body Construction**Ceramic Chip Antenna**

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



Air Conditioning Systems



RECTIFIERS

PFC Diode**VS-E4TU2006FP-N3**

- Low EMI
- Optimizes PFC efficiency
- T_J max = 175 °C



RESISTORS

Professional Thin Film MELF Resistors**MM / SMM**

- Best-in-class pulse load capability, excellent overall stability
- CECC approved acc. EN 140401-803, sulfur resistant



RECTIFIERS

PFC Diode**VS-C4ZU6006FP-E3**

- Low EMI
- Optimize PFC efficiency
- T_J max = 175 °C



RESISTORS

Power Metal Strip® Resistors, Low Value (down to 0.0005 Ω), Surface-Mount**WSLP**

- Extremely low resistance values from 0.0005 Ω to 0.1 Ω and tolerance of 1 % and 0.5 %
- Power Metal Strip® all-welded construction offers high pulse capacity



NON-LINEAR RESISTORS

PTC Thermistors, Inrush Current Limiter and Energy Load-Dump**PTCEL**

- High energy absorption levels up to 240 J, rugged construction
- High direct voltage up to 1000 V_{DC} at increased ambient temperature up to 105 °C



MOSFETs

E Series 650 V Power MOSFET**SiHP24N65E**

- High performance E Series high voltage technology, maximum $R_{DS(on)}$ of 145 mΩ
- Popular TO-220 package, maximum continuous current 24 A



RESISTORS

Power Resistor for Mounting onto Heatsink, Thick Film Technology**RCH**

- High power from 5 W to 50 W on heatsink
- Non-inductive fasten type or screw terminations



FILM CAPACITORS

Metallized Polypropylene Film Capacitors DC-Link Capacitor**MKP1848**

- High performance DC filter, low ESR, high peak current capabilities
- High RMS current capabilities, radial mounting



OPTOELECTRONICS

High Power Infrared Emitting Diode, 940 nm, GaAlAs, MQW**TSAL6400**

- 940 nm emitting diode in GaAlAs with high radiant power and high speed
- Angle of half intensity: $\varphi = \pm 25^\circ$, low forward voltage
- Suitable for high pulse current operation



NON-LINEAR RESISTORS

NTC Thermistor Assembly for Temperature Sensing**NTCACAPE3C90807**

- Accurate Vishay NTC chips, enabling class A to class A+++ refrigerator grades
- Design following class II insulation (principal + supplementary insulation)
- Designed for robust water, moisture and ice resistance: 6000 h in water immersion under voltage



OPTOELECTRONICS

Optocoupler, Phototransistor Output, High Reliability, 5300 V_{RMS}**VO617A**

- Good CTR linearity depending on forward current 5300 V_{RMS} isolation test voltage
- High collector emitter voltage, V_{CEO} = 80 V, low saturation voltage, fast switching
- Temperature-stable, low coupling capacitance



RESISTORS

Power Metal Strip® Resistors, Low Value (down to 0.001 Ω), Surface-Mount**WSR**

- Current sense resistor, molded high temperature encapsulation
- Low thermal EMF (< 3 μV/°C)
- Extremely low resistance values (down to 0.001 Ω)





Laser Marking and Coding



OPTOELECTRONICS

Silicon PIN Photodiode



T1110P6-SD-F

- High speed and high sensitivity PIN photodiode chip with 7.5 mm² sensitive area
- Detects visible and near infrared radiation
- High photo sensitivity, high radiant sensitivity

MOSFETs

N-Channel 30-V (D-S) MOSFET



Si2304DDS

- TrenchFET[®] power MOSFET in SOT-23 package
- 100 % R_g tested
- For small DC/DC converter applications

DIODES

Small Signal Fast Switching Diode



BAS16

- Silicon epitaxial planar diode, ultra fast switching speed
- High conductance

RESISTORS

Pulse Proof, High Power Thick Film Chip Resistors



CRCW-HP e3

- Excellent pulse load capability
- Enhanced power rating, double-sided printed resistor element
- Perfect choice for most fields of power measurement

RESISTORS

High Stability Thin Film Flat Chip Resistors



TNPW e3

- Excellent overall stability at different environmental conditions
- Sulfur resistant, halogen-free

ICs

4.5 V to 60 V Input, 2 A, 4 A, 6 A, 10 A Synchronous Buck Regulators



SIC461, SIC462, SIC463, SIC464

- High efficiency (up to 98 %), integrated high side and low side power MOSFETs
- Scalable solution, 2 A to 10 A, adjustable output voltage down to 0.8 V
- Adjustable switching frequency from 100 kHz to 2 MHz

NON-LINEAR RESISTORS

SMD 0603, Glass Protected NTC Thermistors



NTCS0603

- Standard series, AEC-Q200 qualified
- Glass protected with soft terminations

RECTIFIERS

High-Voltage Surface-Mount Schottky Rectifier



SS1H10-E3\61T

- High barrier technology for improved high temperature performance
- Guardring for overvoltage protection, low power losses, high efficiency
- High surge capability

MOSFETs

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



Si4186DY

- N-channel TrenchFET[®] power MOSFET in SO-8 package
- 100 % R_g tested, 100 % UIS tested
- DC/DC low side switch, OR-ing

DIODES

Small Signal Zener Diode

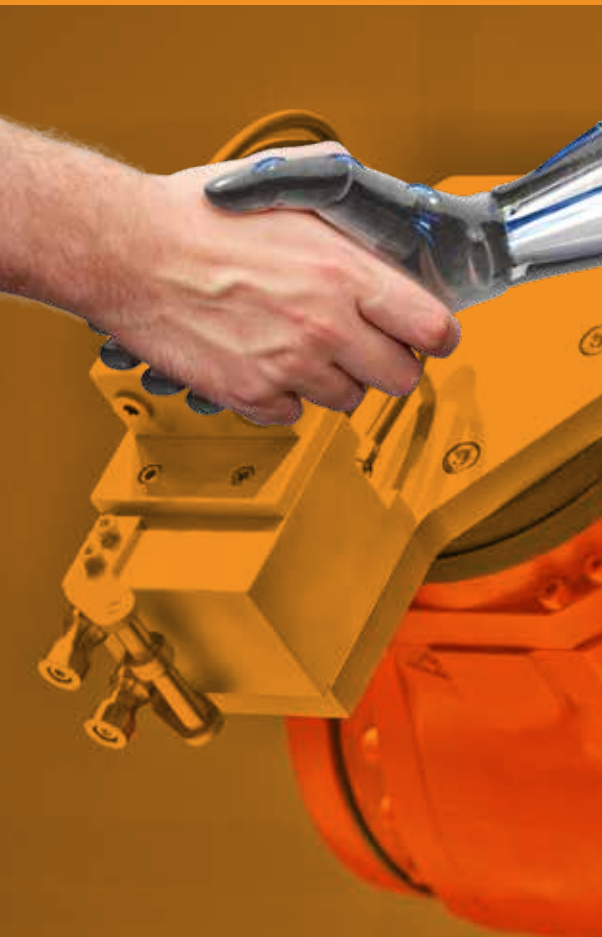


MMBZ

- Silicon planar power Zener diodes
- Enhanced Zener voltage tolerance of $\pm 2\%$ with a "C" suffix (e.g.: MMBZ5225C)



Collaborative Robots (COBOTS)



POSITION SENSOR, NON-CONTACTING

Magnetic Encoders, High Accuracy, High Resolution, 33 mm Diameter



RAMK033...

- 13 bit accuracy, 16.5 bit resolution
- Output SSI RS422 by connector, operating temperature range -40 °C to +105 °C
- Outer diameter 33 mm, inner diameter 4.77 mm, thickness < 6 mm

OPTOELECTRONICS

Triple Channel Transmissive Optical Sensor for "Turn and Push" Encoding



TCUT1630X01

- Phototransistor outputs, SMD package, $I_c = 1.3$ mA typical
- IR emitter and 3 phototransistor detectors, located face-to-face
- Tall dome supports an additional transistor and room for vertical signal encoding

RECTIFIERS

Surface-Mount ESD Capability Rectifier



MSE1PJHM3

- Very low profile - typical height of 0.65 mm
- Low forward voltage drop, low leakage current, ESD capability
- General purpose, polarity protection, and rail-to-rail protection

MOSFETs

P-Channel 30 V (D-S) MOSFET, SOT-23



SI2369DS

- TrenchFET® power MOSFET, 100 % R_g tested
- Low $R_{DS(on)}$ of 0.029 Ω at I_D of -7.6 A
- For load switch and DC/DC converter applications

RESISTORS

Power Metal Strip® Resistors, Low Value (down to 0.001 Ω), Surface-Mount



WSR

- Current sense resistor, molded high temperature encapsulation
- Low thermal EMF (< 3 μ V/°C)
- Extremely low resistance values (down to 0.001 Ω)

ICs

4.5 V to 60 V Input, 2 A, 4 A, 6 A, 10 A Synchronous Buck Regulators



SIC461, SIC462, SIC463, SIC464

- High efficiency (up to 98 %), integrated high side and low side power MOSFETs
- Scalable solution, 2 A to 10 A; adjustable output voltage down to 0.8 V
- Adjustable switching frequency from 100 kHz to 2 MHz

OPTOELECTRONICS

High Power Infrared Emitting Diode, 940 nm, GaAlAs, MQW

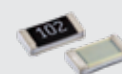


TSAL6400

- 940 nm emitting diode in GaAlAs with high radiant power and high speed
- Angle of half intensity: $\varphi = \pm 25^\circ$, low forward voltage
- Suitable for high pulse current operation

RESISTORS

Pulse Proof, High Power Thick Film Chip Resistors

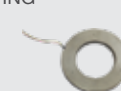


CRCW-HP e3

- Excellent pulse load capability
- Enhanced power rating, double-sided printed resistor element
- The perfect choice for power measurement

POSITION SENSOR, NON-CONTACTING

Magnetic Encoders, High Accuracy, High Resolution, 90 mm Diameter



RAMK090...

- 16 bit accuracy, 20 bit resolution
- Output SSI RS422, operating temperature range -40 °C to +85 °C
- Outer diameter 90 mm, inner diameter 50 mm, thickness < 10.1 mm

OPTOELECTRONICS

Optocoupler, Phototransistor Output, High Reliability, 5300 V_{RMS}

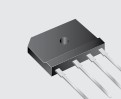


SFH6156

- Excellent CTR linearity dep. on forward current, 5300 V_{RMS} isolation test voltage
- Fast switching times, low CTR degradation, low coupling capacitance
- UL1577, file no. E52744 system code H or J, double protection

RECTIFIERS

Single-Phase Single In-Line Bridge Rectifiers



GSIB2580

- Thin single in-line package; glass passivated chip junction
- High surge current capability; high case dielectric strength of 2500 V_{RMS}
- For AC/DC bridge full wave rectification

ENERGY STORAGE CAPACITORS

Ruggedized Electrical Double Layer Energy Storage Capacitors

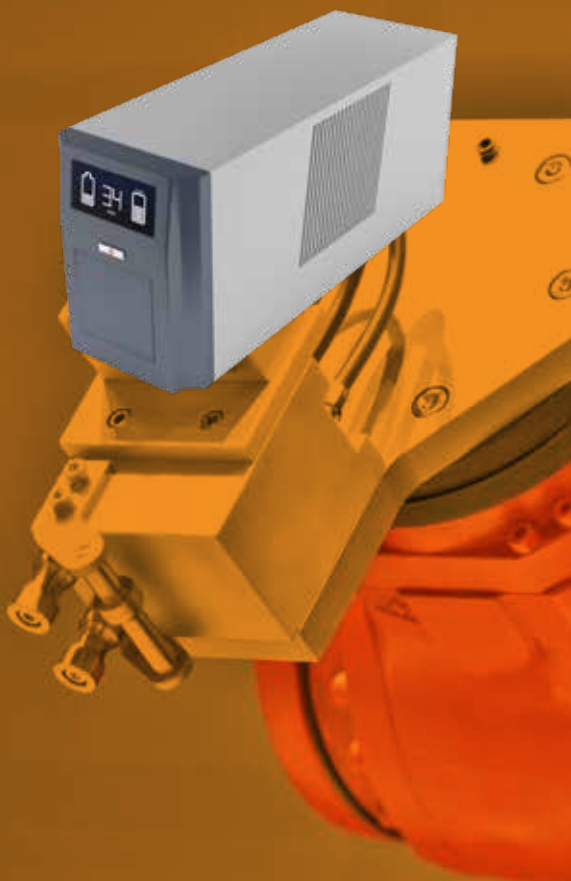


225EDLC-R

- Polarized energy storage capacitor with high capacity and energy density



Low Voltage UPS



RECTIFIERS

Surface-Mount Schottky Barrier Rectifiers**MSS1P3L**

- Very low profile - typical height of 0.65 mm
- Low forward voltage drop, low power losses, high efficiency

RECTIFIERS

High Current Density Surface-Mount Schottky Barrier Rectifiers**SS1P3**

- Very low profile - typical height of 1.0 mm
- Low forward voltage drop, low power losses, high efficiency
- Low thermal resistance

RESISTORS

Power Metal Strip® Resistors, High Power (2 x Standard WSL)**WSL1206-18**

- Low value (down to 0.0005 Ω), high stability, surface-mount
- Power Metal Strip® all-welded construction offers high pulse capacity
- Very low inductance 0.5 nH to 5 nH

INDUCTORS

IHLP® Commercial Inductors, Low DCR Series**IHLP-1616AB-11**

- Compact composite inductor for high efficiency DC/DC conversion
- High frequency operation out to 5 MHz, excellent saturation
- Suitable for input/output filter

INDUCTORS

IHLP® Commercial Inductors, Low DCR Series**IHLP2020BZER-11**

- Compact composite inductor for high efficiency DC/DC conversion
- High frequency operation up to 5 MHz, excellent saturation

INDUCTORS

IHLP® Commercial Inductors, High Saturation Series**IHLP-3232CZ-01**

- Compact composite inductor for high efficiency DC/DC conversion
- High frequency operation up to 5 MHz, excellent saturation
- Lowest DCR/ μ H in this package size

ENERGY STORAGE CAPACITORS

Ruggedized Electrical Double Layer Energy Storage Capacitors**225EDLC-R**

- Polarized energy storage capacitor with high capacity and energy density
- Rated voltage: 2.7 V, useful life: 2000 h at 85 °C, rapid charge and discharge
- Ruggedized for high humidity operation, maintenance free

MOSFETs

N-Channel 30 V (D-S) MOSFET in PowerPAK® 1212-8 Single**SiS472BDN**

- N-channel TrenchFET® Gen IV power MOSFET, low $R_{DS(on)}$ of 7.5 m Ω
- Low Q_g , 100% R_g and UIS tested
- Thermally enhanced PowerPAK® 1212-8 package is 1/3 the size of SO-8 package

ENERGY STORAGE CAPACITORS

Double-Layer Aluminum Capacitors**220 EDLC ENYCAP™**

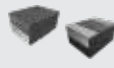
- Energy storage for backup of CMOS in all fields of electronics
- Unlimited charge and discharge cycle numbers

TANTALUM CAPACITORS

vPolyTan™ Polymer SMD Chip Capacitors, Low Profile, Leadframeless Molded Type**T52**

- Ultra low ESR, 100 % surge current tested
- Low profile and DCL
- Bulk energy storage capacitor in DC/DC converters

INDUCTORS

Low Profile, High Current Inductors**IHHP-0806AZ-01**

- Magnetic alloy power choke coil, miniature size (2.0 x 1.6), and low profile
- Low acoustic noise and high efficiency
- Magnetic shielded

ENERGY STORAGE CAPACITORS

Hybrid Storage Capacitors**196 HVC ENYCAP™**

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

Key components for FABRICATION



Welding



Cutting



3D Printers



**Melting / Forging /
Hardening**



THE VISHAY ADVANTAGE

Long Useful Life
Safety Approvals
High Peak Pulse Power
High Operating Temperature
High Surge Current Capability
Long-Term Transient Strength
and more....



Welding



RESISTORS

Power Resistor for Mounting onto Heatsink, Thick Film Technology



RCEC 850

- High power, high voltage 850 W at 85 °C bottom case temperature
- Single element or two and three resistive elements in the same case

MOSFETs

N-Channel 200-V (D-S) MOSFET in TO-247



SUG90090E

- Class-leading 200 V TrenchFET® technology, maximum $R_{DS(on)}$ of 9.5 mΩ
- Rugged TO-247 package with maximum junction temperature of 175 °C
- Very low $R_{DS(on)}$, Q_g , FOM enables high efficiency in switching applications

CERAMIC CAPACITORS

AC Line Rated Ceramic Disc Capacitors, Class X1: 760 V_{AC}, Class Y1: 500 V_{AC}



VY1 Series

- X1 / Y1 safety rating according to IEC 60384-14, 4th edition
- Highest reliability and lifetime, operating temperature range -40 °C to +125 °C

RECTIFIERS

High Voltage Input Rectifier Diode, 60 A



VS-60CPH03

- 175 °C operating junction temperature
- Hyperfast recovery time

INDUCTORS

Filter Inductors, High Current, Axial-Leaded



IHD3

- Conventional high current, radial-leaded filter inductor

MODULES

Dual IAP Low Profile, Half-Bridge, 400 A



GA400TD60S

- Optimized for hard-switching speed DC to 1 kHz
- Very low $V_{CE(ON)}$

RESISTORS

Wirewound / Metal Film Resistors, Commercial Power, Axial Leads



CP

- High power-to-size ratio, meets / exceeds EIA RS-344 requirements, fireproof
- High thermal conductivity ceramic case, circuit board standoff option

DIODES

Small Signal Zener Diodes



PLZ Series

- 500 mW Zener diodes in low profile MicroSMF (DO-219AC) package provide voltage stabilization
- Very tight Zener voltage tolerances of $\pm 2.5\%$
- ESD and surge rated

OPTOELECTRONICS

Widebody IGBT and MOSFET Driver with High Creepage and Clearance of 10 mm



VOW3120

- 10 mm minimum external creepage distance, 8000 V maximum transient isolation voltage
- 2.5 A peak output current, 45 kV/μs common mode rejection

MOSFETs

E Series 650 V Power MOSFET



SiHP24N65E

- High performance E Series high-voltage technology, maximum $R_{DS(on)}$ of 145 mΩ
- Popular TO-220 package, maximum continuous current 24 A

ESTA POWER CAPACITORS

Capacitors for Power Electronics (PEC) - Rectangular



DCMKP Rectangular

- Heavy duty
- Low self-inductance

RESISTORS

Wirewound Resistors, Industrial, Circuit Board Mount



FS Series

- Circuit board mount, high power (to 20 W)
- Built-in stand offs helps resist unit contamination during board mounting and cleaning operations



Cutting



RESISTORS

Cemented Wirewound Resistors

AC

- Non-flammable cement coating, high power dissipation in small design
- Rated dissipation up to 10 W, various lead termination bending forms

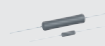
DIODES

Ultrafast Avalanche Sinterglass Diode

SF1600

- Hermetically sealed axial-leaded glass
- High reverse voltage

RESISTORS

Miniature, Industrial, High-Temperature, Precision Wirewound Resistors

G,GN

- High power (to 10 W), high precision (as low as 0.05 %), non-inductive design
- Small size, high precision, and high temperature capability for use in high ambient temperature environments

OPTOELECTRONICS

2.5 A Output Current IGBT and MOSFET Driver

VO3120

- 2.5 A peak output current in DIP or SMD package
- 35 kV/μs common mode rejection and UL, cUL, VDE certified

MODULES

Ultrafast Diode, 300 A, 600 V in IAP Package, H/B Configuration

VS-VSKDU300/06PbF

- UL approved file E78996
- High surge capability

CERAMIC CAPACITORS

RF Power Plate Capacitors with Contoured Rim, Class 1 Ceramic

PS55

- Class 1 ceramic dielectric featuring extremely low dissipation factors
- High power ratings, wide range of capacitance values available

MODULES

FRED Pt®, Ultrafast Soft Recovery Diode Module, 400 A

VS-VSUD400CW60

- UL approved file E222165
- Specifically designed for HF welding and plasma cutting

RESISTORS

Wirewound Resistors, Industrial Power, Aluminum Housed, Chassis Mount

RH

- High pulse energy capability, high power ratings to 250 W, heatsink mount
- All-welded construction ideal for harsh environments

MODULES

Buck PFC Stage with Hyperfast IGBT and FRED Pt® Diode

VS-100MT060WDF

- Speed 30 kHz to 150 kHz
- Very low stray inductance design for high speed operations

OPTOELECTRONICS

Optocoupler with Phototransistor Output and Forward Current of $I_F = 1$ mA

VOL618A

- High current transfer ratio and high isolation voltage of 5000 V_{RMS}
- Operating temperature range -55 °C to +110 °C in 4-pin LSOP, mini-flat package

RESISTORS

Power Resistor for Mounting onto Heatsink, Thick Film Technology

LPS 800

- High power, 57 mm x 57 mm, 800 W at 25 °C on heatsink, low weight 83 g
- Non-inductive down to 1 μH, high pulse capability up to 1000 J short pulse

OPTOELECTRONICS

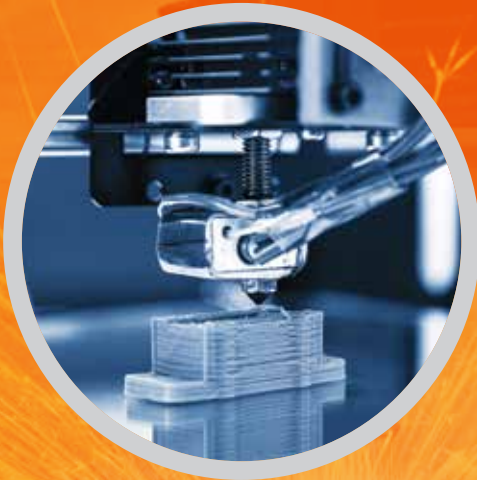
Widebody 1 MBd High Speed Optocoupler with High Creepage and Clearance of 10 mm

VOW136

- 8000 V maximum transient isolation voltage
- Integrated Faraday shield provides very high input-to-output noise isolation of 1000 V/μs



3D Printers



RESISTORS

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



WSLP

- Extremely low resistance values from 0.0005 Ω to 0.1 Ω and tolerance of 1 % and 0.5 %
- Power Metal Strip® all-welded construction offers high pulse capacity

MOSFETs

P-Channel -30 V (D-S) MOSFET in PowerPAK® 1212-8

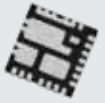


SiSH617DN

- P-channel TrenchFET® Gen III technology, maximum $R_{DS(on)}$ of 12.3 m Ω
- Thermally enhanced PowerPAK® 1212-8 package is 1/3 the size of SO-8 package
- ± 25 V rated V_{GS} enables operation with various gate drive voltage levels

ICs

3 V to 28 V Input, 8 A and 12 A Synchronous Buck Regulators



SIC437, SIC438

- Internal compensation; small solution; high efficiency (up to 97 %)
- Scalable solution 8 A and 12 A; adjustable output voltage down to 0.6 V
- Cycle-by-cycle current limit, OVP, UV, power good flag, over temperature protection

INDUCTORS

Low Profile, High Current IHLP® Inductors



IHLP-2525

- High frequency operation out to 5 MHz, excellent saturation

CERAMIC CAPACITORS

IEC 60384-14, CAN/CSA/cCSAus, and ANSI/UL CB Certificates



VJ Safety Capacitors

- Surface-mount design for simpler assembly and reduced board space requirements
- Available in NP0 (C0G) or X7R dielectrics

NON-LINEAR RESISTORS

NTC Thermistors, Low Thermal Gradient Lug Sensors



NTCALUG02...

- Low thermal gradient surface temperature sensor
- High insulation voltage

OPTOELECTRONICS

Subminiature Dual-Channel Transmissive Optical Sensor with Phototransistor Outputs



TCUT1350X01

- Emitter wavelength: 950 nm, released for high operating temperatures up to 125 °C
- Gap: 3 mm; aperture: 0.3 mm
- Channel distance (center-to-center): 0.8 mm

DISPLAYS

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

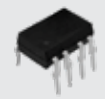


LCD, Color TFT, OLED

- Standard or customized glass / modules for specific applications and monitoring
- Low cost options for LCD / OLED / TFT for industrial applications

OPTOELECTRONICS

AC and DC Linear Optocoupler with VDE, UL, BSI, FIMKO Certifications



IL300

- Feedback photodiode compensates for LED's time and temperature characteristics
- Isolation test voltage, 5300 V_{RMS} in DIP or SMD package

TANTALUM CAPACITORS

vPolyTan™, Polymer Surface-Mount Chip Capacitors, Molded Case, High Performance Type



T55 Series

- Ultra low ESR
- Moisture sensitivity level 3

ICs

3.2 Ω , 8-Channel, ± 15 V, ± 12 V, ± 5 V Precision Multiplexers



DG1408E

- Low, flat, and highly-matched channel resistance over a wide voltage range
- Low parasitics: 121 pF $C_{D(ON)}$, 20 pC charge injection, and fast signal switching

ALUMINUM CAPACITORS

Power, Miniaturized, General Purpose, Snap-In



256 PMG-SI

- Useful life: 2000 h at +105 °C, > 5000 h at +85 °C
- General purpose



Melting / Forging / Hardening



RESISTORS

Indirect Water Cooled Resistors



DCRF

- Up to 2500 W indirect water cooling, multi-resistive elements option
- Up to eight resistive elements on the same support

DISPLAYS

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



LCD, Color TFT, OLED

- Standard or customized glass / modules for specific applications and monitoring
- LCD / OLED / TFT displays can withstand extreme industrial conditions

RESISTORS

Wirewound, 300 W Liquid-Cooled Load Resistor



SPR2232

- Element wire precisely wound on insulated copper tubing and welded to terminals
- High temperature silicone coating, non-inductive winding available

OPTOELECTRONICS

Photovoltaic MOSFET Driver with Integrated Fast Turn-Off, Solid-State Relay



VOM1271

- Drive current from primary side LED; one less external power supply needed
- Isolation test voltage 4500 V_{RMS} and integrated turn-off circuitry for high speed switching

ALUMINUM CAPACITORS

Power, High Ripple Current, Screw Terminals



101/102 PHR-ST

- Long life, screw-terminal, high ripple current
- Custom made - the perfect aluminum capacitors for your application

OPTOELECTRONICS

Optocouplers with Phototransistor Output with Reinforced, CAT IV Isolation



CNY6x

- Isolation test voltage up to 13.9 kV, rated recurring peak voltage V_{IORM} of 1450 V_{peak}
- Class I - IV with mains voltage up to 600 V; Class I - III with mains voltage up to 1000 V

OPTOELECTRONICS

Optocoupler, Power Phototriac



VO2223A

- Optically-coupled phototriac driving a power triac in DIP-8 package
- Load current of 1 A_{RMS} and 5300 V of input to output isolation

TANTALUM CAPACITORS

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



135D

- High capacitance, voltage range 6 V to 125 V, operating temperature -55 °C to +200 °C
- Axial leaded, industry standard case sizes (T1, T2, T3, T4)

ESTA POWER CAPACITORS

Medium Frequency Capacitors, Water Cooled



Phawo

- Frequency range up to 100 KHz
- Maximum of 6 partial outputs

RESISTORS

High Stability, High Temperature (230 °C) Thin Film Wraparound Chip Resistors



PHT

- Operating temperature up to 215 °C, low TCR down to 15 ppm/°C (-55 °C to +215 °C)
- Sulfur resistant, from 10R up to 7.5M, tight tolerance down to 0.05 %
- Case sizes 0402 to 2010

CERAMIC CAPACITORS

Internal Design Reduces Risk of Shorts Caused by Board Flex, High Breakdown Voltage



VJ OMD Series

- Polymer terminations available for intensive board flex requirements
- 100 % voltage conditioning available up to 630 V_{DC} rating (process code "5H")

RESISTORS

Direct Water Cooled Resistors



WCR

- Up to 9000 W direct water cooling, modular concept
- Low ohmic values: 4.7 Ω to 56 kΩ, low inductance

Spotlight on NTC Thermistor Curve Calculator

Vishay's new NTC Thermistor Curve Calculator is a free program. In order to compute a resistance temperature curve for a Vishay NTC thermistor, you will need to download our program "My Vishay NTC Curve." When the user inputs a Vishay NTC thermistor part number, this program will supply the full nominal resistance temperature curve, together with the tolerances. All the specific corresponding Steinhart and Hart equations are supplied as well. Every NTC thermistor part number on the Vishay website is covered by this program.

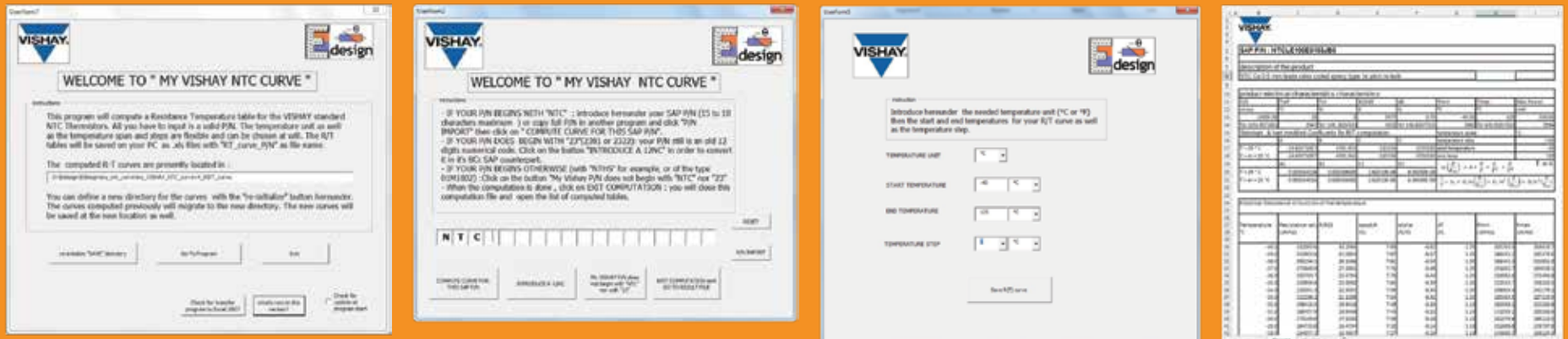
Data output is directly available in Excel. Each computed resistance temperature is saved in a directory chosen by the user and determined at the time of program installation. At any further opening, the curves can be moved to another directory. Update verification is provided each time that the program is opened. If an update is available, a link leads the user to the relevant web page. This enables the user to be updated on new RT curves on the Vishay website.

In the "My Vishay NTC Curve" program, you can type in a valid Vishay NTC part number or copy/paste the part number from another application. The different part numbers included in this application begin with the three characters NTC (like NTCLE100E3103JB0), with the four characters NTHS (like NTHS0805N01N1002J), or with a sequence consisting of a two-digit number followed by a letter (like 01M). Old 12-digit part numbers from the BCcomponents era (like 2381 640 55103) are also accepted.

The curves are computed between the limits of the temperature range defined in the datasheet, but the user can limit the table by choosing the minimum and maximal temperature of his own application. A temperature step of 5 °C is common, but it can be reduced down to 0.1 °C. The user can select either the degree Fahrenheit (°F) or degree Celsius (°C) temperature scale.

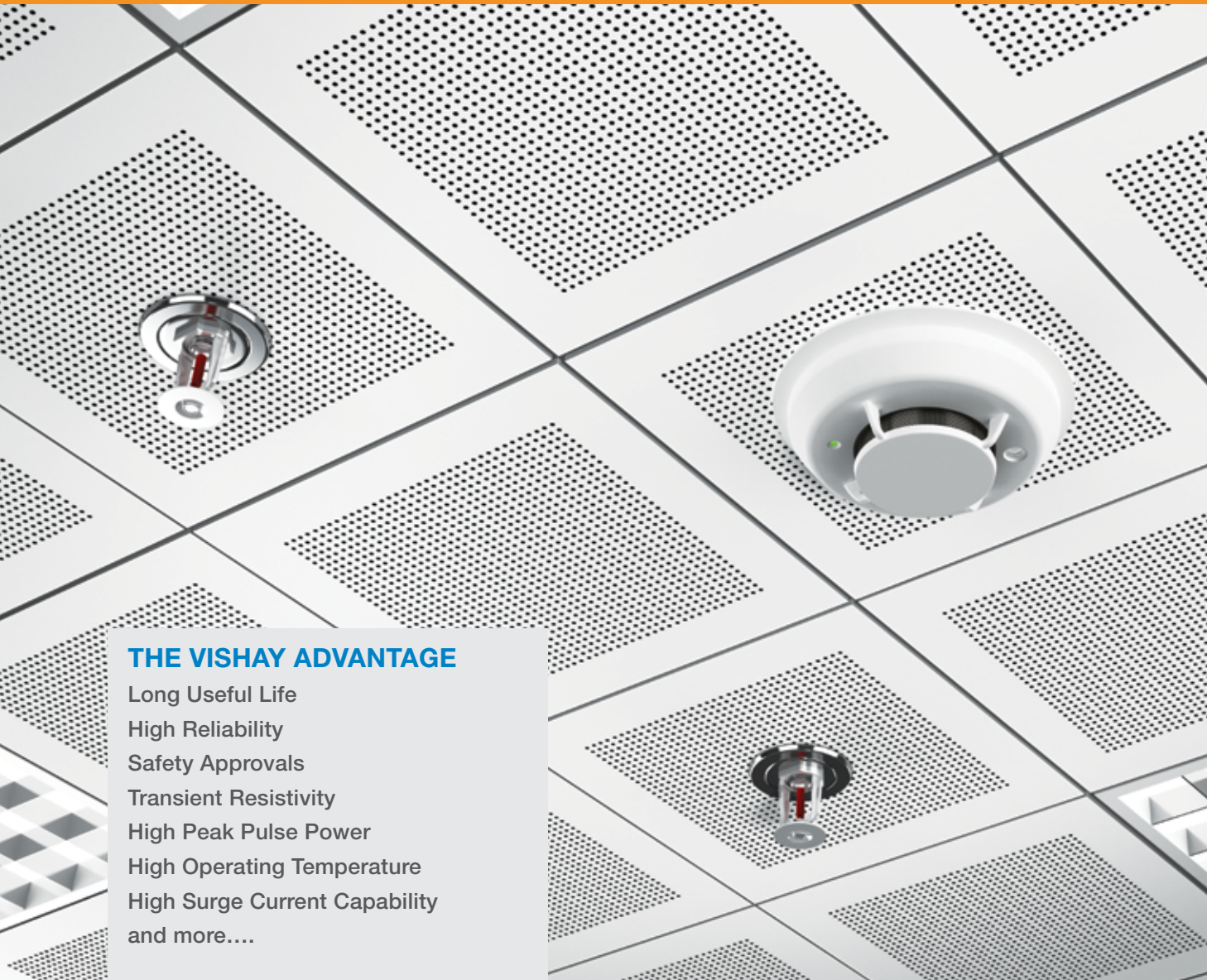
To access the NTC Thermistor Curve Calculator, go to this page: www.vishay.com/resistors-non-linear/curve-computation-list/

"My Vishay NTC curve" can be downloaded at: www.vishay.com/resistors-non-linear/ntc-curve-list/





Key components for DETECTION AND INITIAL SAFETY DEVICES



THE VISHAY ADVANTAGE

- Long Useful Life
- High Reliability
- Safety Approvals
- Transient Resistivity
- High Peak Pulse Power
- High Operating Temperature
- High Surge Current Capability
- and more....

Gas



**Flame /
Fire**



Smoke



Heat



Water



Radiation





Gas



RECTIFIERS

Surface-Mount Glass Passivated Ultrafast Rectifier[EGF1T](#)

- Avalanche surge energy capability
- Low switching losses, high efficiency

CERAMIC CAPACITORS

Axial Leaded Multilayer Ceramic Capacitors[A Series](#)

- High capacitance value in small size
- Rated voltages of 50 V, 100 V, 200 V, and 500 V

ICs

Enhanced Versions of Vishay's Quad SPST CMOS Analog Switches[DG444B, DG445B](#)

- Supports single and dual power operations, rail-to-rail signal switching capable
- 10 pA typical low leakage and 1 pC charge injection

OPTOELECTRONICS

Optocoupler with Phototransistor Output and Trigger Current of $I_F = 1$ mA[VOL618A](#)

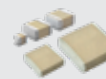
- High current transfer ratio, high isolation voltage of 5000 V_{RMS}
- Operating temperature range -55 °C to +110 °C in 4-pin LSOP, mini-flat package

MOSFETs

N-Channel 600 V Power MOSFET[IRFR1N60APBE](#)

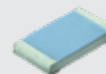
- Rugged Planar technology, maximum $R_{DS(on)}$ of 7 Ω
- Popular DPAK package, maximum continuous current of 1.4 A

CERAMIC CAPACITORS

Capacitors with Excellent Power Handling Capabilities[MLCC RF Capacitors](#)

- Non-magnetic available with copper or epoxy bondable terminations
- Lead-bearing terminations available for high reliability applications
- Case sizes: 0402 to 3838

RESISTORS

High Precision Wraparound, Thin Film Chip Resistors[P0805](#)

- Low TCR down to 5 ppm/°C (-55 °C to +155 °C), tight tolerance down to 0.01 %
- Sulfur resistant, failure rate E7 level, from 10R up to 200M for P Series

FILM CAPACITORS

Interference Suppression Film Capacitor, Class X2, Axial, MKT 253 V_{AC} [F1773](#)

- RFI X2 film capacitors for continuous across-the-line and series impedance applications
- Withstands 85 °C / 85 % relative humidity for 1000 h at 240 V_{AC}

RESISTORS

Professional Thin Film MELF Resistors[MM / SMM](#)

- Excellent overall stability, intrinsic sulfur resistance
- CECC approved acc. EN 140401-803

MOSFETs

Dual P-Channel -30V (D-S) MOSFETs in PowerPAK® SC-70 Dual[SiA929DJ](#)

- Low $R_{DS(on)}$ reduces power loss from conduction and increases battery life
- Thermally enhanced and compact package footprint increase power density
- Dual-configured device reduces component count

ALUMINUM CAPACITORS

Double-Layer Aluminum Capacitors[220 EDLC ENYCAP™](#)

- Energy storage for backup of CMOS in all fields of electronics
- Unlimited charge and discharge cycle numbers

FILM CAPACITORS

Metallized Polypropylene Film Capacitor, Related Document: IEC 60384-16[MKP1841](#)

- High voltage, high current, and high pulse operations



Flame / Fire



CERAMIC CAPACITORS

Radial Leaded Multilayer Ceramic Capacitors for General Purpose



K Series

- High capacitance value in small size
- Rated voltages of 50 V, 100 V, 200 V, and 500 V

OPTOELECTRONICS

High Power SurfLight™ Emitter with 850 nm Peak Wavelength



VSMY2850G

- SMD gullwing and reverse gullwing package with dimensions of 2.3 mm x 2.3 mm x 2.8 mm
- Radiant intensity of 100 mW/sr with angle of half intensity: $\varphi = \pm 10^\circ$

CERAMIC CAPACITORS

Capacitors with Excellent Power Handling Capabilities



MLCC RF Capacitors

- Non-magnetic available with copper or epoxy bondable terminations
- Lead-bearing terminations available for high reliability applications
- Case sizes: 0402 to 3838

OPTOELECTRONICS

PIN Photodiode with High Speed and High Radiant Sensitivity



BPV22NF

- Daylight blocking filter matched with IR emitters operating at wavelength 870 nm to 950 nm
- Large radiant sensitive area of 7.5 mm², angle of half sensitivity: $\varphi = \pm 60^\circ$

DISPLAYS

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



LCD, Color TFT, OLED

- Standard or customized glass / modules for specific applications and monitoring
- Low cost options for LCD / OLED / TFT for industrial applications

RESISTORS

Professional Thin Film Chip Resistors



MC Professional

- Excellent overall stability, sulfur resistant
- CECC approved acc. EN 140401-801

NON-LINEAR RESISTORS

2-Point Micro-Chip Sensor, Insulated Flexible Leads



NTCLE305E4

- Miniature sensor head (1.6 mm) with AWG32 ETFE insulated leads
- AEC-Q200 qualified, fast response time for exposed mounting
- Exceptional withstanding in thermal shocks

MOSFETs

N-Channel 60 V (D-S) MOSFET in PowerPAK® SO-8



SiR184DP

- TrenchFET® Gen IV technology, maximum $R_{DS(on)}$ of 5.8 m Ω
- Thermally enhanced compact package with high current handling capability
- Leadership $R_{DS(on)}$ - Q_g FOM increases efficiency of switching applications

FILM CAPACITORS

Interference Suppression Film Capacitor, Class X2, MKT 310 V_{AC}, High Stability Grade



F1772S

- RFI X2 film capacitors for continuous across-the-line and series impedance applications
- Withstands 85 °C / 85 % relative humidity for 1000 h at 240 V_{AC}

ICs

1.0 Slew Rate Controlled Load Switch with Reverse Blocking in SC70-6, and TDFN4 1.2 mm x 1.6 mm



SiP32431

- 1.5 V to 5.5 V input voltage range, very low $R_{DS(on)}$, 105 m Ω at 5 V
- Slew rate controlled turn-on time: 100 μ s, low quiescent current < 1 μ A

TANTALUM CAPACITORS

vPolyTan™ Solid Tantalum Surface-Mount Chip Capacitors, Molded Case, High Performance Polymer Type



T55 Series

- Ultra low ESR
- Available in case sizes from 1608 to 7343

OPTOELECTRONICS

High Speed PIN Photodiode with Infrared Light Blocking Filter

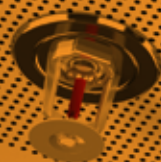


VEMD5510CF

- Profile height of 0.9 mm, SMD photodiode featuring chip with 7.5 mm² sensitive area
- Peak sensitivity at 540 nm with an excellent infrared light filter, blocking signals > 700 nm



Smoke



MOSFETs

N-Channel 60 V (D-S) MOSFET in PowerPAK® SC-70-6L



[SiA106DJ](#)

- TrenchFET® Gen IV technology, maximum $R_{DS(on)}$ of 18.5 mΩ
- Thermally enhanced package in a footprint less than 4.6 mm²
- Leadership RDS-Qg FOM increases efficiency of switching applications

OPTOELECTRONICS

High Power Infrared Emitting Diode with Peak Wavelength of 940 nm in T-1¾ Package



[TSAL6100](#)

- Typical radiant intensity of 170 mW/sr at $I_F = 100$ mA, 1450 mW/sr at $I_F = 1$ mA
- Angle of half intensity: $\varphi = \pm 10^\circ$

DIODES

Small Signal Zener Diodes



[MMSZ5258](#)

- AEC-Q101 qualified
- ESD capability according to AEC-Q101

FUSES

Thin Film Chip Fuses



[MFU](#)

- Very quick-acting fuse characteristics
- Outstanding stability of fusing characteristics

OPTOELECTRONICS

High Speed and High Sensitivity PIN Photodiode



[BPV22NF](#)

- Daylight blocking filter matched with IR emitters operating at wavelength 870 nm to 950 nm
- Large radiant sensitive area of 7.5 mm², angle of half sensitivity: $\varphi = \pm 60^\circ$

NON-LINEAR RESISTORS

SMD 0603, Glass Protected NTC Thermistors



[NTCS0603](#)

- Standard series, AEC-Q200 qualified
- Glass protected with soft terminations

INDUCTORS

High Current, Surface-Mount Inductors - Non-Shielded



[IDCP2218](#)

- Low cost filtering and DC/DC conversion inductor

RESISTORS

Professional Thin Film Chip Resistors



[MC Professional](#)

- Excellent overall stability, sulfur resistant
- CECC approved acc. EN 140401-801

TANTALUM CAPACITORS

vPolyTan™ Polymer Surface-Mount Chip Capacitors, Molded Case, High Performance Type



[T55 Series](#)

- Ultra low ESR
- Available in case sizes from 1608 to 7343

RESISTORS

Thick Film Surface-Mount Chip Resistors, Wraparound, Extremely Low Value



[RCWE](#)

- Low resistance values from 0.01 Ω to 0.976 Ω and tolerance of 1 %
- Thick film construction with 2x power capacity

OPTOELECTRONICS

High Power SurfLight™ Emitter with 940 nm Peak Wavelength



[VSMY2940GX01](#)

- SMD gullwing and reverse gullwing package with dimensions of 2.3 mm x 2.3 mm x 2.8 mm
- Radiant intensity of 145 mW/sr with angle of half intensity: $\varphi = \pm 10^\circ$

NON-LINEAR RESISTORS

VDR Metal Oxide Varistors, Standard



[VDRS..](#)

- Standard overvoltage surge protector
- UL recognized



Heat



RESISTORS

Professional Thin Film Chip Resistors



MC Professional

- Excellent overall stability, sulfur resistant
- CECC approved acc. EN 140401-801

CERAMIC CAPACITORS

IEC 60384-14, CAN/CSA/cCSAus, and ANSI/UL CB Certificates



VJ Safety Capacitors

- Surface-mount design: simpler assembly and reduced board space requirements

Available in NP0 (C0G) or X7R dielectrics

OPTOELECTRONICS

Optocoupler with Phototransistor Output, ATEX Certified for Explosive Environments



CNY65Exi

- ATEX certificate: PTB 03 ATEX 2033 U, Gas: II (1) G (EX ia) IIC, Dust: II (1) D (EX ia) IIIC
- V_{ISO} of 11,600 V_{peak} for 1 minute

ICs

1.0 A Slew Rate Controlled Load Switch with Reverse Blocking in SC70-6, and TDFN4 1.2 mm x 1.6 mm

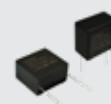


SiP32431

- Industry's lowest operating current (only 50 pA)
- Ideal for battery-operated equipment

FILM CAPACITORS

Interference Suppression Film Capacitor, Class X2, MKT 310 V_{AC} , High Stability Grade



F1772S

- RFI X2 film capacitors for continuous across-the-line and series impedance applications
- Withstands 85 °C / 85 % relative humidity for 1000 h at 240 V_{AC}

RESISTORS

High Stability, High Temperature (230 °C), Thin Film Wraparound Chip Resistors



PHT

- Operating temperature up to to 215 °C, low TCR down to 15 ppm/°C (-55 °C to +215 °C)
- Sulfur resistant, from 10R up to 7.5M, tight tolerance down to 0.05 %
- Cases sizes: 0402 to 2010



Water



ICs

1 pC Charge Injection, 100 pA Leakage, +5 V / +3 V, Dual SPST Analog Switches



DG9232E

- High precision, low noise signal switching
- Low leakage, charge injection, and parasitic capacitance

CERAMIC CAPACITORS

Standard Reflow Process Assembly, High Reliability Ceramic-Oxide Body Construction



Ceramic Chip Antenna

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

RESISTORS

Professional Thin Film MELF Resistors



MM / SMM

- Excellent overall stability, intrinsic sulfur resistance
- CECC approved acc. EN 140401-803

ALUMINUM CAPACITORS

Hybrid Storage Capacitors



196 HVC ENYCAP™

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

DISPLAYS

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



LCD, Color TFT, OLED

- Standard or customized glass / modules for specific applications and monitoring
- Can withstand excessive temperatures and extreme conditions

FILM CAPACITORS

Interference Suppression Film Capacitor, Class X2, Axial, MKT 253 V_{AC}



F1773

- RFI X2 film capacitors for continuous across-the-line and series impedance applications
- Withstands 85 °C / 85 % relative humidity for 1000 h at 240 V_{AC}



Radiation



RESISTORS

High Stability Thin Film Flat Chip Resistors**TNPW e3**

- Excellent overall stability at different environmental conditions
- Sulfur resistant, halogen-free

DISPLAYS

High Quality Displays Offer Excellent Human-to-Machine Interface Solutions**LCD, Color TFT, OLED**

- Standard or customized glass / modules for specific applications and monitoring
- Can withstand excessive temperatures and extreme conditions

FILM CAPACITORS

Interference Suppression Film Capacitor, Class X2, MKT 310 V_{AC}, High Stability Grade**F1772S**

- RFI X2 film capacitors for continuous across-the-line and series impedance applications
- Withstands 85 °C / 85 % relative humidity for 1000 h at 240 V_{AC}

MOSFETs

Dual P-Channel 30-V (D-S) MOSFET**Si4925DDY**

- TrenchFET® technology providing two p-channel devices with maximum R_{DS(on)} of 29 mΩ
- Proven dual SO-8 package

RESISTORS

Molded, 25 mil Pitch 8 Pin QSOP, Dual-In-Line Thin Film Resistor, Surface-Mount Network**MORN**

- Multiple divider ratios with resistance values from 100 Ω to 100 kΩ per resistor
- Available in 0.01 % ratio tolerance and 1 ppm/°C TCR tracking
- Excellent long-term ratio stability, ± 0-015 % over 2000 h at 70 °C

DIODES

Small Signal Zener Diodes**PLZ Series**

- 500 mW Zener diodes in low profile MicroSMF (DO-219AC) package provide voltage stabilization
- Very tight Zener voltage tolerances of ± 2.5 %
- ESD and surge rated

TANTALUM CAPACITORS

Solid-Electrolyte TANTALEX® Capacitors, Axial Leaded, Molded Case**173D**

- Miniature axial-leaded solid tantalum capacitor in five case sizes
- Laser-marked molded flame retardant case

OPTOELECTRONICS

Infrared Transceiver with Data Rate Up to 115.2 kbit/s**TFBS4711**

- Small package size (1.9 mm x 3 mm x 6 mm), transmit range of 1 m
- Idle current: 70 µA; shutdown current: 10 nA; operates from 2.4 V to 5.5 V

RESISTORS

High Precision Wraparound, Thin Film Chip Resistors**P0805**

- Low TCR down to 5 ppm/°C (-55 °C to +155 °C), tight tolerance down to 0.01 %
- Sulfur resistant, failure rate E7 level, from 10R up to 200M for P Series

Spotlight on MELF Resistors

The World's Most Reliable and Predictable High-Performance Film Resistors



For more than 25 years, Vishay's MELF resistors have successfully met the demanding requirements of the automotive industry. They offer superior SMD resistor performance in terms of accuracy, stability, reliability, and pulse load capability. The cylindrical construction of MELF devices provides an optimal power rating and pulse load capability related to the mounting space. Continuous development has led to improved long-term stability and moisture resistance, and allows high-temperature operation to +175 °C.

KEY PERFORMANCE BENEFITS:

- Predictable behavior of components
- Zero-defect philosophy
- Harsh operating environments
- Long-term stability
- Moisture resistance
- Reliability
- Temperature cycling in lead (Pb)-free assembly processes
- Insulation voltage up to 500 V

APPROVALS

- EN140401-803
- AEC-Q200

All products are completely lead (Pb)-free and comply with the Global Automotive Declarable Substances List (GADSL), which includes full compliance with the RoHS directive.

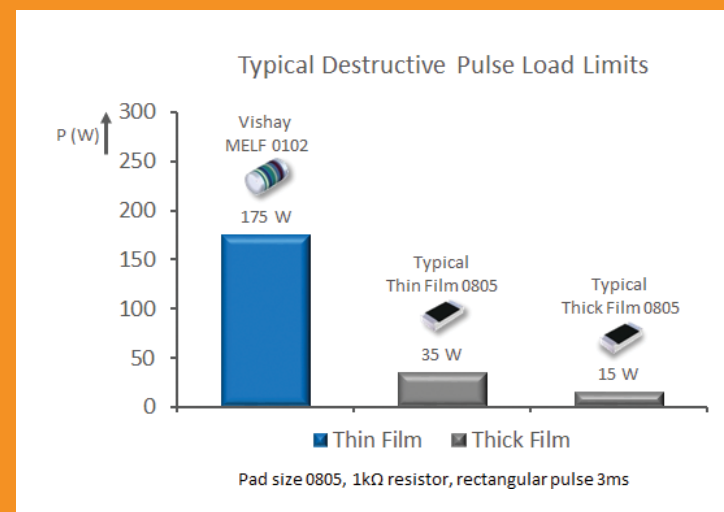
TEMPERATURE COEFFICIENT, TOLERANCE, AND STABILITY

Resistor temperature coefficients down to ± 5 ppm/K are available, as well as tolerances down to ± 0.02 %. Long-term stability results in a superior maximum resistance change ($\Delta R/R$) of $< \pm 0.05$ % after 8000 h operation for high-precision MELF resistors.

PULSE LOAD CAPABILITY

Another aspect of MELF resistors is their reliability when exposed to various overload conditions. The metal film technology, together with the cylindrical construction of the MELF devices, provides an advantage compared to standard thick and thin film chip resistors in regard to pulse load capability. MELF resistors are also available in advanced carbon film technology, offering up to 6 kV ESD capability on the 1206 pad size, or 10 kV surge handling on the 2512 pad size. As shown in the diagram below, thick film flat chip resistors fail at much lower pulse loads than thin film flat chips, and both types are outperformed by thin film MELF resistors.

For technical questions, contact: melf@vishay.com





Key components for SURVEILLANCE SYSTEMS



THE VISHAY ADVANTAGE

- Long Life
- High Reliability
- Safety Approvals
- High Power Density
- Ruggedized Construction
- Good Sensitivity
- Good Humidity and Aging Resistance
- and more....

Cameras / CCTV



Access Control Systems / Door and Gate Openers



RFID





Cameras / CCTV



NON-LINEAR RESISTORS

SMD 0402, Glass Protected NTC Thermistors



NTCS0402

- Standard series, AEC-Q200 qualified
- Glass protected with soft terminations

DIODES

Small Signal Zener Diodes



BZX84C18-E3-08

- AEC-Q101 qualified
- Silicon planar Zener diodes

OPTOELECTRONICS

High Power SurfLight™ Emitter with 850 nm Peak Wavelength



VSMY98545

- Radiant intensity of 380 mW/sr at 1 A and 1600 mW/sr at 5 A pulsed
- Radiant power of 660 mW in 3.85 mm x 3.85 mm x 2.24 mm package

OPTOELECTRONICS

High Power SurfLight™ Emitter with 850 nm Peak Wavelength



TSHG6400

- Uniform illumination for CMOS-based camera systems for vision systems
- Ø5 mm LED with 850 nm wavelength and $\pm 22^\circ$ angle of half intensity

NON-LINEAR RESISTORS

SMD 0603, Glass Protected NTC Thermistors



NTCS0603

- Standard series, AEC-Q200 qualified
- Glass protected with soft terminations

RECTIFIERS

Surface-Mount Schottky Barrier Rectifiers



MSS1P4

- AEC-Q101 qualified
- Very low profile with typical height of 0.65 mm

FILM CAPACITORS

DC Film Capacitors, MKT Axial Type



MKT1813

- General purpose MKT film capacitor
- Axial construction for low building height applications

MOSFETs

N-Channel 200 V (D-S) MOSFET in PowerPAK® SO-8



SiR616DP

- Provides a maximum $R_{DS(on)}$ of 50.5 mΩ with the latest 200 V technology
- Excellent R_{DS-Q_g} FOM increases efficiency of switching applications
- Thermally enhanced PowerPAK® SO-8 package

OPTOELECTRONICS

Optocoupler with Phototransistor Output and Trigger Current of $I_F = 1$ mA



VOS618A

- High current transfer ratio, high isolation voltage 3050 V_{RMS}
- Operating temperature range -55°C to $+110^\circ\text{C}$ in SSOP-4, half-pitch, mini-flat package

INDUCTORS

Low Profile, High Current Inductors



IFSC111AZER3R3M01

- Very small power inductor for low current DC/DC conversion and filtering

TANTALUM CAPACITORS

vPolyTan™ Polymer Surface Mount Chip Capacitors, Molded Case, High Performance Type

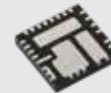


T55 Series

- Ultra low ESR
- Available in case sizes from 1608 to 7343

ICs

4.5 V to 60 V Input, 2 A, 4 A, 6 A, 10 A Synchronous Buck Regulators



SIC461, SIC462, SIC463, SIC464

- High efficiency (up to 98 %), integrated high side and low side power MOSFETs
- Scalable solution, 2 A to 10 A; adjustable output voltage down to 0.8 V
- Adjustable switching frequency from 100 kHz to 2 MHz



Access Control Systems / Door and Gate Openers



OPTOELECTRONICS

High Power SurfLight™ Emitter with 810 nm Peak Wavelength



VSMY3850

- 810 nm wavelength delivers best performance for iris scanning covering all eye colors
- Radiant power of 1 W in 3.85 mm x 3.85 mm power QFN package

CERAMIC CAPACITORS

Excellent Power Handling Capabilities



MLCC RF Capacitors

- Non-magnetic available with copper or epoxy bondable terminations
- Lead-bearing terminations available for high reliability applications
- Case sizes: 0402 to 3838

MOSFETs

N-Channel 100 V (D-S) MOSFET in PowerPAK® SO-8



SiR106DP

- Provides a maximum $R_{DS(on)}$ of 8 mΩ with the latest 100 V technology
- R_{DS,Q_g} and $R_{DS,Q_{oss}}$ FOMs tuned to increase switching efficiency
- Q_{gd} / Q_{gs} ratio is less than 1 and optimizes switching characteristics

ALUMINUM CAPACITORS

Hybrid Storage Capacitor



196 HVC ENYCAP™

- Polarized electrochemical storage capacitor with high capacity and energy density
- No cell balancing necessary, soft and low transient voltage controlled charging

TANTALUM CAPACITORS

vPolyTan™ Solid Tantalum Surface-Mount Chip Capacitors, Molded Case, High Performance Polymer Type



T55 Series

- Ultra low ESR, molded case available in five case sizes
- Available in case sizes from 1608 to 7343

DISPLAYS

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



LCD, Color TFT, OLED

- Standard or customized glass / modules for specific applications and monitoring
- Can withstand excessive temperatures and extreme conditions



RFID



MOSFETs

P-Channel 20 V (D-S) MOSFET



SiS407ADN

- Industry leading p-channel Gen III technology, maximum $R_{DS(on)}$ of 9 m Ω
- Thermally enhanced PowerPAK® 1212-8 is 1/3 the size of SO-8 package

MOSFETs

N- and P-Channel 12 V (D-S) MOSFETs in PowerPAK® SC-70 Dual



SiA517DJ

- Less than 4.6 mm² compact footprint reduces PCB real estate requirement
- Dual-configured device reduces component count
- Thermally enhanced package with low $R_{DS(on)}$

ALUMINUM CAPACITORS

Hybrid Storage Capacitors



196 HVC ENYCAP™

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

INDUCTORS

Low Profile, High Current IHLP® Inductors



IHLP2020ABER2R2M01

- Compact composite inductor for high efficiency DC/DC conversion
- High frequency operation out to 5 MHz, excellent saturation

OPTOELECTRONICS

High Radiant Power and High Speed 850 nm Infrared Emitter



VSMY3850

- Radiant intensity up to 150 mW/sr with I_F up to 1 A, 10 ns rise and fall time
- Angle of half intensity: $\varphi = \pm 60^\circ$ in PLCC-2 package

NON-LINEAR RESISTORS

NTC Thermistors, 2-Point Micro Chip Sensor, Insulated Leads



NTCLE305E4

- Miniature sensor head (1.6 mm) with AWG32 ETFE insulated leads
- AEC-Q200 qualified, fast response time for exposed mounting
- Excellent withstanding thermal shock

OPTOELECTRONICS

High Radiant Power and High Speed 890 nm Infrared Emitter



VSMF2890RGX01

- Radiant intensity up to 350 mW/sr with I_F up to 1 A, 30 ns rise and fall time
- Angle of half intensity: $\varphi = \pm 12^\circ$ in gullwing or reverse gullwing package

CERAMIC CAPACITORS

Standard Reflow, Process Assembly, High Reliability Ceramic-Oxide Body Construction



Ceramic Chip Antenna

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

Spotlight on the IHLP® Inductor Loss Calculator Tool

Vishay's "IHLP Core Loss Calculator" is a free tool that assists designers in selecting the proper IHLP inductor based on the operating conditions of their circuit. This tool will simulate the losses in the inductor, including core and both AC and DC copper losses. The temperature rise and final component temperature will also be predicted based on the estimated losses. This tool will allow designers to compare several different inductors, both in size and value, to assist in the selection process. The calculator can be used for buck, boost and buck/boost style converters.

The calculator requires eight inputs: input voltage, output voltage, switch (FET) voltage drop, diode (or sync FET) voltage drop, output current, frequency, ambient temperature and inductance. The calculator will do the rest based on these inputs. Inductance can be selected by using the "radio" buttons on the left hand side.

Please note: all designs should be verified in circuit as this tool is for simulation only.

Access the loss calculator tool at: www.vishay.com/inductors/calculator/calculator/

Access the user guide at: www.vishay.com/doc?49421

Important Design Criteria

IHLP inductors have a recommended maximum component temperature based on materials (see spec sheet). Subtracting the ambient temperature will give us the maximum allowed temperature rise for the part. If this number should exceed 40 °C it is recommended that 40 °C be used for the allowed temperature rise. It is recommended that core losses be limited to $\leq 1/3$ of the total losses to mitigate any aging effects associated with the powdered iron in the core at temperatures exceeding the maximum temperature of the part. The recommended range for the ripple current is 30% to 50% of inductor current. This is based on a trade off of inductor size and cost versus output capacitor size and cost. The maximum peak current should be kept below the I_{sat} value of the selected inductor, although it can be exceeded with caution due to the soft saturation characteristics of the powdered iron core material. The calculators are based on operation in the continuous conduction mode only, information determined in the discontinuous conduction mode should be considered suspect and in need of verification by the user.

IHLP® INDUCTOR LOSS CALCULATOR TOOL

Choose Calculator Type: ☐ Boost ☐ Buck

Applications: ☐ Automotive ☐ Industrial

Family/Case Size: ☐ IHLP-4540 ☐ IHLP-4540Z

Series: ☐ DZ-A1 ☐ DZ-A1Z

IHLP-4540Z-A1 - 1 Boost μ H Ind. Loss Calculator


Inputs: Enter data into yellow fields				Outputs			
Frequency =	300000	Hz	ET _{tot} =	4.02	Watts	V _{sat} =	0.004270
Output Current =	4	Amps	P _{tot} =	198136.7	Watts	R _{dc} =	0.004270
Ambient Temp =	25	°C	I _{avg} =	8.73	Amps	I _{peak} =	4.71
Volts In =	5	Volts	I _{avg} =	4.02	Amps	Duty	0.40
Volts Out =	5	Volts	P _{core} =	3.105	Watts	P _{cu} =	3.182
V _{sw} =	0.025	Volts	P _{tot} =	0.102	Watts	P _{cu} =	0.395
V _d =	0.025	Volts	Temp. Coeff.	30.8	°C/W	Temp Rise	12.1
I _{sw} =	6.7	Amps	Comp Temp	37.5	°C		
ET _{tot} =	1.37	Watts					
R _{dc} =	355.8	Ω					
A	0.403	Inch	11.5	mm			
B	0.405	Inch	10.3	mm			
C	0.196	Inch	4.9	mm			

Reference: Cost 1.1 Compared to IHLP-2505Z-01

Warning Messages:

Notes May Be Added Here:

Inductor Current (One Cycle)



Time (µSec)

EFFICIENCY IN PRODUCTION





Vishay Intertechnology, Inc.



A *WORLD OF*
SOLUTIONS

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