



Vishay Intertechnology, Inc.

# ***Automotive Micro and Mild Hybrids***





**Automotive**

Micro and  
Mild Hybrids

Integrated Starter Generators	4
Start-Stop Systems, Idle-Stop Systems	5
Bidirectional DC/DC Converters	6

The Engineer's Toolbox highlights, by market application, some innovative components Vishay manufactures that help design engineers develop superior end products. We recognize that offering unique component solutions helps improve the performance of next-generation devices, overcome technical barriers, and create new markets.

More information on the Engineer's Toolbox, including product datasheet links, can be found at [www.vishay.com/ref/et2](http://www.vishay.com/ref/et2). For inquiries, please contact your local sales representative.



## Key components for MICRO- AND MILD HYBRIDS



**INTEGRATED STARTER GENERATORS**



**START-STOP, IDLE STOP SYSTEMS**



**BIDIRECTIONAL DC/DC CONVERTERS**

**THE VISHAY ADVANTAGE**  
AEC Qualifications  
High-Temperature Performance  
Customized Modules  
High Reliability  
High Power Density  
*and more...*



### INTEGRATED STARTER GENERATORS

#### CAPACITORS

##### K...V Series

Radial Leaded MLCCs for Automotive



##### Features

- Operating temperature from - 55 °C to + 160 °C
- Rated voltage of 50 V, 100 V, and 200 V
- Class 1 and Class 2 ceramic
- Radial leaded

#### RESISTORS, NON-LINEAR

##### NTHS0603

SMD NTC 0603 Chip Thermistor



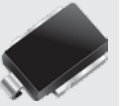
##### Features

- Tolerance  $R_{25}$  down to 1 %
- High-density monolithic construction with glass overcoat
- Wide operating temperature range: - 40 °C to + 125 °C

#### DIODES

##### SM8S

6600 W Automotive Load-Dump PAR® TVS



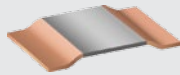
##### Features

- AEC-Q101 qualified
- Provides 10 V to 43 V stand-off voltage load dump
- Meets ISO7637-2 surge specifications (varied by test condition)
- $T_j = 175 °C$

#### RESISTORS

##### WSLP3921

SMD, Power Metal Strip® Resistor



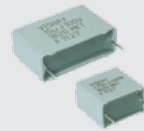
##### Features

- High power ratings from 5 W to 9 W in 3921 package size
- Extremely low resistance values: 0.5 mΩ, 1.0 mΩ, 2.0 mΩ, 3.0 mΩ, and 4.0 mΩ
- Tight tolerances of 1.0 % and 5.0 %
- Low thermal EMF (< 3 μV/° C)

#### CAPACITORS

##### MKT1820

Automotive Grade DC MKT Film Capacitor



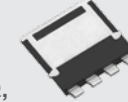
##### Features

- AEC-Q200 approved, automotive grade
- Maximum application temperature: 125 °C
- Maximum operating temperature for limited time: 150 °C
- Capacitance range: 1000 pF up to 15 μF

#### MOSFETs

##### SQJQ480E

80 V PowerPAK® 8x8L: 0.003 Ω, 200 A



##### Features

- AEC-Q101 qualified, automotive grade
- 8 mm x 8 mm size for TO package replacement
- 175 °C maximum temperature

Vishay Intertechnology's reputation for innovation, reliability, and quality is complemented by a decades-long record of service to the automotive industry.

#### Key Website Content

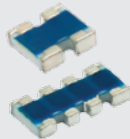
AEC-Qualified Products Overview  
[www.vishay.com/doc?49923](http://www.vishay.com/doc?49923)

Automotive Grade Products Overview  
[www.vishay.com/doc?49924](http://www.vishay.com/doc?49924)

#### RESISTORS

##### ACAS 0606 AT, ACAS 0612 AT - Precision

Precision Thin Film Chip Resistor Array



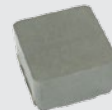
##### Features

- TCR tracking down to 10 ppm/K (± 5 ppm/K)
- Tolerance matching down to 0.1 % (± 0.05 %)
- AEC-Q200 qualified
- Resistance ratio up to 1:20

#### INDUCTORS

##### IHLP-8787

Low-Profile, High-Current Inductor



##### Features

- High temperature, up to 155 °C
- Shielded construction
- Handles high transient current spikes without saturation
- Ultra-low buzz noise due to composite construction

#### RECTIFIERS

##### V10P10

10 A, 100 V TMBS® in SMPG Package



##### Features

- Trench MOS Schottky technology
- Low forward voltage drop, low power losses
- Very low profile with typical height of 1.1 mm
- RoHS and halogen-free compliant

#### Design Support Tools

Thermal Simulation Tools, Performance Calculators, and SPICE and 3D Models  
[www.vishay.com/how/design-support-tools/](http://www.vishay.com/how/design-support-tools/)

Technical Library  
[www.vishay.com/how/onlineliterature/technical-library/](http://www.vishay.com/how/onlineliterature/technical-library/)

Video Library  
[www.vishay.com/videos/](http://www.vishay.com/videos/)

View datasheets for these products at  
[www.vishay.com/ref/et2au](http://www.vishay.com/ref/et2au)



### START-STOP, IDLE STOP SYSTEMS

#### RESISTORS

##### D2T035

Power Thick Film Resistor

##### Features

- TO-263 standard package
- AEC-Q200 qualified
- RoHS-compliant/high temperature capability
- High pulse capability up to 10 J short pulse



#### INDUCTORS

##### IHLP-6767GZ

Low-Profile, High-Current Inductor

##### Features

- High temperature, up to 155 °C
- Shielded construction
- Handles high transient current spikes without saturation
- Ultra-low buzz noise due to composite construction



#### RESISTORS

##### WSBS8518

Power Metal Strip® Battery Shunt Resistor

##### Features

- 36 W power capability in the 8518 size package
- Extremely low resistance values of 50 μΩ to 1000 μΩ
- Tolerance of 5.0 %
- Features a very low thermal EMF design and all-welded construction



#### CAPACITORS

##### 146 CTI - High Temperature SMD Aluminum Capacitors

125 °C, Low Impedance, High Ripple, SMD

##### Features

- Soldering heat resistant according to IPC/JEDEC J-STD-020 (up to 260 °C/40 s)
- Long useful life: up to 6000 h at 125 °C
- AEC-Q200 qualified
- Sizes 10 mm x 10 mm up to 18 mm x 21 mm; vibration-proof, 4-pin and 6-pin versions



#### MOSFETS

##### KGD MOSFETS (Customized)

100 % Tested Known Good Die in Tape/Reel

##### Features

- Die are automotive AEC-Q101 qualified when in standard package
- Die sizes from 0.7 mm² to 95 mm²
- 175 °C maximum temperature



#### RESISTORS

##### TNPW e3 Series

High Stability Thin Film Chip Resistors

##### Features

- Low temperature coefficient and tight tolerances: ± 0.1 %, ± 10 ppm/K
- Excellent overall stability at different environmental conditions
- AEC-Q200 qualified
- Case sizes: 0402 to 1210



#### CAPACITORS

##### MKP1848 DC-Link

Automotive Grade MKP DC-Link Capacitor

##### Features

- High CV product (1 μF to 400 μF; 450 V to 1200 V), with operating temperature up to 105 °C
- Long life (100 000 h at U<sub>NDC</sub> and 70 °C)
- High ripple current capabilities: up to 54 A
- AEC-Q200 qualified, automotive grade



#### RECTIFIERS

##### V10P10

10 A, 100 V TMBS® in SMPC Package

##### Features

- Trench MOS Schottky technology
- Low forward voltage drop, low power losses
- Very low profile with typical height of 1.1 mm
- RoHS and halogen-free compliant



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#### Detailed Applications Information

Diesel ECU and Fuel Injector Drivers  
[www.vishay.com/applications/automotive/diesel\\_ecuandfuelinjectordrivers/](http://www.vishay.com/applications/automotive/diesel_ecuandfuelinjectordrivers/)

Electric Power Steering (EPS)  
[www.vishay.com/applications/automotive/eps\\_electricpowersteering/](http://www.vishay.com/applications/automotive/eps_electricpowersteering/)

HID Headlight AFL  
[www.vishay.com/applications/automotive/hid\\_headlightafl/](http://www.vishay.com/applications/automotive/hid_headlightafl/)

HVAC Climate Control  
[www.vishay.com/applications/automotive/hvac\\_climatecontrol/](http://www.vishay.com/applications/automotive/hvac_climatecontrol/)

#### Design Support Tools

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Video Library  
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View datasheets for these products at  
[www.vishay.com/ref/et2au](http://www.vishay.com/ref/et2au)



**BIDIRECTIONAL DC/DC CONVERTERS**

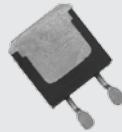
**RESISTORS**

**D2T020**

Power Thick Film Resistor

**Features**

- TO-263 standard package
- AEC-Q200 qualified
- RoHS-compliant/high temperature capability
- High-pulse capability up to 10 J short pulse



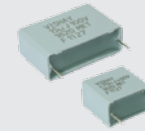
**CAPACITORS**

**MKT1820**

Automotive Grade DC MKT Film Capacitor

**Features**

- AEC-Q200 qualified, automotive grade
- Maximum application temperature: 125 °C
- Maximum operating temperature for limited time: 150 °C
- Capacitance range: 1000 pF up to 15 µF



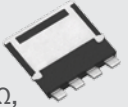
**MOSFETs**

**SQJQ410E**

100 V PowerPAK® 8x8L: 0.0045 Ω, 200 A

**Features**

- AEC-Q101 qualified, automotive grade
- 8 mm x 8 mm size for TO package replacement
- 175 °C maximum temperature



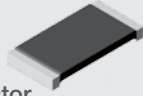
**RESISTORS**

**WSLPxxxx**

SMD, Power Metal Strip® Resistor

**Features**

- Extremely high power ratings, from 0.4 W to 1.0 W for SMD devices
- Available in many case sizes: 0603 to 5931
- Very low resistance value range: 0.3 mΩ to 50 mΩ
- Standard tolerance of 1.0 % with 0.5 % available



**CAPACITORS**

**146 CTI - High Temperature SMD Aluminum Capacitor**

125 °C, Low Impedance, High Ripple, SMD

**Features**

- Soldering heat resistant according to IPC/JEDEC J-STD-020 (up to 260 °C/40 s)
- Long useful life: up to 6000 h at 125 °C
- AEC-Q200 qualified
- Sizes 10 mm x 10 mm up to 18 mm x 21 mm; vibration-proof, 4-pin and 6-pin versions



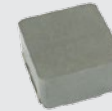
**INDUCTORS**

**IHLP-8787**

Low-Profile, High-Current Inductor

**Features**

- High temperature, up to 155 °C
- Shielded construction
- Handles high transient current spikes without saturation
- Ultra-low buzz noise due to composite construction



**RECTIFIERS**

**V10P10**

10 A, 100 V TMBS® in SMPC Package

**Features**

- Trench MOS Schottky technology
- Low forward voltage drop, low power losses
- Very low profile with typical height of 1.1 mm
- RoHS and halogen-free compliant



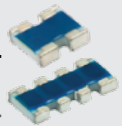
**RESISTORS**

**ACAS 0606 AT, ACAS 0612 AT - Precision**

Precision Thin Film Chip Resistor Arrays

**Features**

- TCR tracking down to 10 ppm/K (± 5 ppm/K)
- Tolerance matching down to 0.1 % (± 0.05 %)
- AEC-Q200 qualified
- Resistance ratio up to 1:20



**CAPACITORS**

**VJ...H (X8R)**

Multilayer Ceramic Chip Capacitors

**Features**

- X8R dielectric
- Case sizes: 0603 to 1210
- Operating temperature up to + 150 °C
- AgPd termination available for epoxy bonding



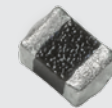
**RESISTORS, NON-LINEAR**

**NTCS0805E3**

Glass-Protected SMD 0805 NTC Thermistors

**Features**

- High stability with  $R_{25}$  drift of < 0.1%
- High operating temperature up to 150° C
- AEC-Q200 qualified



**DIODES**

**SM8S**

6600 W Automotive Load-Dump PAR® TVS

**Features**

- AEC-Q101 qualified
- Provides 10 V to 43 V stand-off voltage load dump
- Meets ISO7637-2 surge specifications (varied by test condition)
- $T_J = 175 °C$





Vishay Intertechnology, Inc.

**BUILD VISHAY**

into your **DESIGN**

