

# Battery Management System - NEW

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# Battery Management System - NEW

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## Application Overview

BMS (Battery Management System) is important electronic control unit for EV/HEV vehicle, which including battery monitor and battery balancing units. In multi-battery packs no two cells are identical, they are varying in cell capacity, self discharge, impedance, temperature characteristics and varying cell aging. These differences in general increase over lifetime and damage batteries. Two types batteries balancing method are used, passive balancing and active balancing. For passive balancing, the discharge current creates power dissipation in the balancing resistor, the dissipated energy is a loss of energy to reducing the capacity of the battery. the generated heat will warm up the battery. For active balancing, the batteries charge is transferred from cells to their neighbor cells, using low ESR MOSFET as power switch to reduce energy loss, the capacity of the battery will be improved. For the application, Vishay offers you a broad portfolio of solutions. With standard devices like MOSFETs, TVS, Schottky Diodes, Zener & CAN ESD Diodes, Shunt Resistors, Power Inductors as well as with temperature sensor NTC components.

## Battery Management System - NEW : Battery Pack #1, Temperature Sensor

NTC

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">NTCALUG01A</a>		NTC Thermistors, Standard Lug Sensors	Resistance/25c: 4.7K to 100Kohm B25/85: 3535K~4190K	'LUG package	AEC Q200
<a href="#">NTCALUG01T</a>		NTC Thermistors, Standard Lug Sensors, 150 °C	Resistance/25c: 10Kohm; B25/85: 3435K/3984K	'LUG package	AEC Q200
<a href="#">NTCALUG02A</a>		NTC Thermistors, Low Thermal Gradient Lug Sensors	Resistance/25c: 4.7K to 100Kohm; B25/85: 3435K~4190K	'LUG package	AEC Q200
<a href="#">NTCALUG03 Mini Lug</a>		NTC Thermistors, Mini Lug Sensors	Resistance/25c: 10K to 47Kohm B25/85: 3740K~3984K	miniLUG package	AEC Q200

## Battery Management System - NEW : Battery Pack #2, Temperature Sensor

NTC

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">NTCALUG01A</a>		NTC Thermistors, Standard Lug Sensors	Resistance/25c: 4.7K to 100Kohm B25/85: 3535K~4190K	LUG package	AEC Q200
<a href="#">NTCALUG01T</a>		NTC Thermistors, Standard Lug Sensors, 150 °C	Resistance/25c: 10Kohm; B25/85: 3435K/3984K	LUG package	AEC Q200
<a href="#">NTCALUG02A</a>		NTC Thermistors, Low Thermal Gradient Lug Sensors	Resistance/25c: 4.7K to 100Kohm B25/85: 3435K~4190K	LUG package	AEC Q200
<a href="#">NTCALUG03 Mini Lug</a>		NTC Thermistors, Mini Lug Sensors	Resistance/25c: 10K to 47Kohm B25/85: 3740K~3984K	miniLUG package	AEC Q200

## Battery Management System - NEW : Current Detection, Shunt Resistor

### Power Metal Strip

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">WSBM8518</a>		Power Metal Strip® Battery Shunt Resistor W/Molded Enclosure	Very Low Value (50 $\mu\Omega$ , 100 $\mu\Omega$ , 125 $\mu\Omega$ , and 500 $\mu\Omega$ ) 25W/36W	8518	
<a href="#">WSBS8518</a>		Power Metal Strip® Battery Shunt Resistor	Very Low Value (50 $\mu\Omega$ , 100 $\mu\Omega$ , 125 $\mu\Omega$ , and 250 $\mu\Omega$ ) 36W	8518	
<a href="#">WSBS8518...20</a>		Power Metal Strip® Shunt Resistor With Two Sense Pins	Very Low Value (50 $\mu\Omega$ , 100 $\mu\Omega$ , 125 $\mu\Omega$ , and 250 $\mu\Omega$ ) 36W	8518	
<a href="#">WSBS8518...34</a>		Power Metal Strip® Shunt Resistor	Low TCR (Down to $< \pm 10$ ppm/ $^{\circ}\text{C}$ ) Very Low Value (100 $\mu\Omega$ , 500 $\mu\Omega$ , and 1000 $\mu\Omega$ ) 20W/25W/36W	8518	
<a href="#">WSBS8518...35</a>		Power Metal Strip® Shunt Resistor With Sense Pins	Low TCR (Down to $< \pm 10$ ppm/ $^{\circ}\text{C}$ ) Very Low Value (100 $\mu\Omega$ , 500 $\mu\Omega$ , and 1000 $\mu\Omega$ ) 20W/25W/36W	8518	
<a href="#">WSBS8518...40</a>		Power Metal Strip® Shunt Resistor With Three Sense Pins	Very Low Value (50 $\mu\Omega$ , 100 $\mu\Omega$ , and 125 $\mu\Omega$ ) 36W	8518	

## Battery Management System - NEW : DC/DC Converter, DC/DC Diode

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### Schottky diodes

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">SS3P4HM3</a>		High Current Density Surface Mount Schottky Rectifiers	Rev. Voltage 40V, IF(AV) 3.0A, VF at IF 0.5	SMP	AEC Q101
<a href="#">V8P10HM3</a>		High Current Density Surface Mount Trench MOS Barrier Schottky Rectifier	Ultra Low VF = 0.466 V at IF = 4A	SMPC	AEC Q101

## Battery Management System - NEW : DC/DC Converter, MOS switch

### MOSFET

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">SQ4080EY</a>		Automotive N-Channel 150 V (D-S) 175 °C MOSFET	VDS=150V; rds(on)/10V=85mohm Id=19A@Tc=25c	SO-8	AEC Q101
<a href="#">SQ4940AEY</a>		Automotive Dual N-Channel 40 V (D-S) 175 °C MOSFET	VDS=40V; rds(on)/4.5V=29mohm Id=8A@Tc=25c	SO-8	AEC-Q101
<a href="#">SQJ402EP</a>		Automotive N-Channel 100 V (D-S) 175 °C MOSFET	VDS=100V; rds(on)/4.5V=14mohm Id=32A@Tc=25c	PowerPAK SO-8L	AEC Q101
<a href="#">SQJ431AEP</a>		Automotive P-Channel 200 V (D-S) 175 °C MOSFET	VDS=200V; rds(on)/-10V=305mohm Id=-9.4A@Tc=25c	PowerPAK SO-8L	AEC Q101
<a href="#">SQJ488EP</a>		Automotive N-Channel 100 V (D-S) 175 °C MOSFET	VDS=100V; rds(on)/4.5V=25.8mohm Id=42A@Tc=25c	PowerPAK SO-8L	AEC Q101
<a href="#">SQJ912AEP</a>		Automotive Dual N-Channel 40 V (D-S) 175 °C MOSFET	VDS=40V; rds(on)/4.5V=11.1mohm Id=30A@Tc=25c	PowerPAK SO-8L	AEC Q101
<a href="#">SQJ952EP</a>		Automotive Dual N-Channel 60 V (D-S) 175 °C MOSFET	VDS=60V; rds(on)/4.5V=24mohm Id=23A@Tc=25c	PowerPAK SO-8L	AEC Q101
<a href="#">SQJ956EP</a>		Automotive Dual N-Channel 60 V (D-S) 175 °C MOSFET	VDS=60V; rds(on)/4.5V=29mohm Id=23A@Tc=25c	PowerPAK SO-8L	AEC Q101
<a href="#">SQM120P10-10m1L</a>		Automotive P-Channel 100 V (D-S) 175 °C MOSFET	VDS=100V; rds(on)/-4.5V=15mohm Id=-120A@Tc=25c	TO-263	AEC Q101
<a href="#">SQS481ENW</a>		Automotive P-Channel 150 V (D-S) 175 °C MOSFET	VDS=150V; rds(on)/-10V=1.095ohm Id=-916A@Tc=25c	PowerPAK 1212-8w	AEC Q101
<a href="#">SQS484EN</a>		Automotive N-Channel 40 V (D-S) 175 °C MOSFET	VDS=40V; rds(on)/4.5V=10mohm Id=16A@Tc=25c	PowerPAK 1212-8	AEC Q101
<a href="#">SQS840EN</a>		Automotive N-Channel 40 V (D-S) 175 °C MOSFET	VDS=40V; rds(on)/4.5V=30mohm; Id=12A@Tc=25c	PowerPAK 1212-8	AEC Q101

## Battery Management System - NEW : DC/DC Converter, Reverse Polarity Protection

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### Schottky diodes

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">V8PM10HE3</a>		High Current Density Surface Mount Trench MOS Barrier Schottky	Rectifier Ultra Low VF = 0.50 V at IF = 4 A	TO-277A (SMPC)	AEC-Q101
<a href="#">VSSAF5M12HM3</a>		Surface Mount Trench MOS Barrier Schottky Rectifier	Rev. Voltage 120V, IF(AV) 5.0A VF at IF 0.64, Trench	DO-221AC	AEC-Q101



## Battery Management System - NEW : DC/DC Converter, Storage Inductor

### Power Inductors

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">IHLP-2525CZ-5A</a>		IHLP® Automotive Inductors, High Temperature (155 °C) Series	Inductance 0.47-22uH, Rated current: 2.8-20A	6.47 x 6.47 x 3.0mm	AEC Q200
<a href="#">IHLP-3232DZ-1A</a>		IHLP® Automotive Inductors, Low DCR Series	Inductance 0.22-33uH, Rated current: 3.2-34A	8.18 x 8.18 x 4.0mm	AEC Q200
<a href="#">IHLP-4040DZ-1A</a>		IHLP® Automotive Inductors, Low DCR Series	Inductance 0.19-47uH, Rated current: 8.3-66A	10.16 x 10.16 x 4.0mm	AEC Q200
<a href="#">IHLP-5050FD-5A</a>		IHLP® Automotive Inductors, High Temperature (155 °C) S	Inductance 0.22-22uH, Rated current: 3.2-34A	13.259 x 12.9 x 6.4mm	AEC Q200
<a href="#">IHLP-6767GZ-5A</a>		IHLP® Automotive Inductors, High Temperature (155 °C) Series	Inductance 0.47-47uH, Rated current: 7.25-65A	17.15 x 17.15 x 7.0mm	AEC Q200

## Battery Management System - NEW : DC/DC Converter, Transient protection

### Load dump TVS

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">SM5S..AT</a>		Surface Mount PAR® Transient Voltage Suppressors High Temperature Stability and High Reliability Conditions	Vwm: 10V to 43V; Vbr: 11.1V to 52.8V Pppm(10x1000us): 3600W	DO-218AC	AEC-Q101
<a href="#">SM6A27THE3</a>		Surface Mount PAR® Transient Voltage Suppressors High Temperature Stability and High Reliability Conditions	Vwm: 22V; Vbr: 27V; Pppm(10x1000us): 4600W	DO-218AC	AEC-Q101
<a href="#">SM6S..AT</a>		Surface Mount PAR® Transient Voltage Suppressors High Temperature Stability and High Reliability Conditions	Vwm: 10V to 43V; Vbr: 11.1V to 52.8V Pppm(10x1000us): 4600W	DO-218AC	AEC-Q101
<a href="#">SM8A27THE3</a>		Surface Mount PAR® Transient Voltage Suppressors High Temperature Stability and High Reliability Conditions	Vwm: 22V; Vbr: 27V; Pppm(10x1000us): 6600W	DO-218AC	AEC-Q101
<a href="#">SM8S..AT</a>		Surface Mount PAR® Transient Voltage Suppressors High Temperature Stability and High Reliability Conditions	Vwm: 10V to 43V; Vbr: 11.1V to 52.8V Pppm(10x1000us): 6600W	DO-218AC	AEC Q101

### TVS Protection

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">1.5SMC Series</a>		Surface Mount TransZorb® Transient Voltage Suppressor	Vwm: 5.8V to 459V; Vbr: 6.8V to 540V Pppm(10x1000us): 1500W	DO-214AB (SMC)	
<a href="#">SMAJ5.0A thru SMAJ188CA</a>		Surface Mount TransZorb® Transient Voltage Suppressor	Vwm: 5.0V to 188V; Vbr: 6.4V to 231V; Pppm(10x1000us): 400W	DO-214AC (SMA)	AEC-Q101
<a href="#">SMBJ5.0A thru SMBJ188A</a>		Surface Mount TransZorb® Transient Voltage Suppressor	Vwm: 5.0V to 188V; Vbr: 6.4V to 231V; Pppm(10x1000us): 600W	DO-214AA (SMB)	AEC-Q101
<a href="#">SMC3K24CAHM3</a>		Surface Mount TRANSZORB® Transient Voltage Suppress	Vwm: 22V to 78V; Vbr: 24.4V to 95.8V Pppm(10x1000us): 3000W	DO-214AB (SMC J-Bend)	AEC-Q101

# Battery Management System - NEW : Main Control Unit, CAN ESD Protection

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Product Name	Status	Description	Features	Package	Q-Level
<a href="#">VCAN26A2-03S</a>		Bidirectional Symmetrical (BiSy) Low Capacitance Dual-Line ESD Protection Diode in SOT-23	2-line ESD protection, working range +/-26.5V Cd<13pF	SOT-23	AEC Q101

## CAN ESD Protection

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">VCAN26A2-03G</a>		Bidirectional Symmetrical (BiSy) Low Capacitance Dual-Line ESD-Protection Diode in SOT-323	2-line ESD protection, working range +/-26.5V Cd<15pF	SOT-323	

## Battery Management System - NEW : Main Control Unit, High Voltage Detection

### Resistor

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">MCA 1206 AT</a>		Professional Thin Film Chip Resistors	Resistance 2.43ohm to 1.0Mohm; 0.1W to 0.4W	0402-1206	
<a href="#">MCS 0402 AT</a> <a href="#">MCT 0603 AT</a> <a href="#">MCU 0805 AT</a>		Professional Thin Film Chip Resistors	Resistance 2.43ohm to 1Mohm; 0.1W to 0.4W	0402-1206	
<a href="#">MMA 0204 HV</a> <a href="#">MMB 0207 HV - Prof</a>		Professional High-Voltage Thin Film MELF Resistors	Resistance 340ohm to 10Mohm; 0.4W to 1.0W	0204/0207	
<a href="#">MMU 0102</a> <a href="#">MMA 0204</a> <a href="#">MMB 0207 - Prof</a>		Professional Thin Film MELF Resistors	Resistance 0.1ohm to 15Mohm; 0.3W to 1.0W	0102/0204/0207	
<a href="#">RCV e3</a>		High Voltage (up to 0.5 kV) Thick Film Chip Resistors	Resistance 100Kohm to 10Mohm; 0.125W to 0.25W	0805/1206	
<a href="#">TNPW</a>		Lead (Pb)-Bearing High Stability Thin Film Chip Resistors	Resistance 10ohm to 3.01Mohm; 0.063W to 0.33W	0402-1210	

## Battery Management System - NEW : Main Control Unit, Load Dump TVS

### Load Dump TVS

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">SM5S..AT</a>		Surface Mount PAR® Transient Voltage Suppressors High Temperature Stability and High Reliability Conditions	Vwm: 10V to 43V; Vbr: 11.1V to 52.8V Pppm(10x1000us): 3600W	DO-218AC	AEC Q101
<a href="#">SM6A27THE3</a>		Surface Mount PAR® Transient Voltage Suppressors High Temperature Stability and High Reliability Conditions	Vwm: 22V; Vbr: 27V; Pppm(10x1000us): 4600W	DO-218AC	AEC Q101
<a href="#">SM6S..AT</a>		Surface Mount PAR® Transient Voltage Suppressors High Temperature Stability and High Reliability Conditions	Vwm: 10V to 43V; Vbr: 11.1V to 52.8V Pppm(10x1000us): 4600W	DO-218AC	AEC Q101
<a href="#">SM8A27THE3</a>		Surface Mount PAR® Transient Voltage Suppressors High Temperature Stability and High Reliability Conditions	Vwm: 22V; Vbr: 27V Pppm(10x1000us): 6600W	DO-218AC	AEC Q101
<a href="#">SM8S..AT</a>		Surface Mount PAR® Transient Voltage Suppressors High Temperature Stability and High Reliability Conditions	Vwm: 10V to 43V; Vbr: 11.1V to 52.8V; Pppm(10x1000us): 6600W	DO-218AC	AEC Q101

## Battery Management System - NEW : Main Control Unit, Temperature Sensor

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### NTC

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">NTCS...E3...SMT</a>		SMD NTC Thermistors with Enhanced Stability	Resistance/25c: 100K to 210Kohm B25/85: 3590K	'0402/0603/0805	
<a href="#">NTCS0603E3.....T</a>		SMD 0603, Glass Protected NTC Thermistors	Resistance/25c: 2.0K to 100Kohm B25/85: 3420-4100	'0402	

## Battery Management System - NEW : Multicell battery Monitors, Balancing Resistor

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### Resistor

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">CRCW-HP e3</a>		Pulse Proof, High Power Thick Film Chip Resistors	Resistance 1.0ohm to 1.0Mohm; 0.2W to 1.5W	0402-2512	AEC Q200
<a href="#">MCA 1206 AT</a>		Professional Thin Film Chip Resistors	Resistance 2.43ohm to 1.0Mohm; 0.1W to 0.4W,	0402-1206	AEC Q200
<a href="#">RCL e3</a>		Long Side Termination Thick Film Chip Resistors	Resistance 1.0ohm to 2.2Mohm; 0.25W to 2W,	0406-1225	AEC Q200

## Battery Management System - NEW : Multicell battery Monitors, Balancing Switch

### MOSFET

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">SQ1464EEH</a>		Automotive N-Channel 60 V (D-S) 175 °C MOSFET	VDS=60V; rds(on)/1.5V=1.41ohm Id=0.44A@Tc=25c	SC-70	AEC Q101
<a href="#">SQ2301ES</a>		Automotive P-Channel 20 V (D-S) 175 °C MOSFET	VDS=-20V; rds(on)/-4.5V=120mohm Id=3.9A@Tc=25c	SOT-23	AEC Q101
<a href="#">SQ2303ES</a>		Automotive P-Channel 30 V (D-S) 175 °C MOSFET	VDS=-30V; rds(on)/-4.5V=370mohm Id=2.5A@Tc=25c	SOT-23	AEC Q101
<a href="#">SQ2308CES</a>		Automotive N-Channel 60 V (D-S) 175 °C MOSFET	VDS=60V; rds(on)/4.5V=164mohm Id=2.3A@Tc=25c	SOT-23	AEC Q101
<a href="#">SQ2309ES</a>		Automotive P-Channel 60 V (D-S) 175 °C MOSFET	VDS=-60V; rds(on)/-4.5V=500mohm Id=-1.7A@Tc=25c	SOT-23	AEC Q101
<a href="#">SQ2310ES</a>		Automotive N-Channel 20 V (D-S) 175 °C MOSFET	VDS=20V; rds(on)/4.5V=30mohm Id=6A@Tc=25c	SOT-23	AEC Q101
<a href="#">SQ2351ES</a>		Automotive P-Channel 20 V (D-S) 175 °C MOSFET	VDS=-20V; rds(on)/-4.5V=115mohm Id=-3.2A@Tc=25c	SOT-23	AEC Q101
<a href="#">SQ2361AEES</a>		Automotive P-Channel 60 V (D-S) 175 °C MOSFET	VDS=-60V; rds(on)/-4.5V=230mohm Id=-2.9A@Tc=25c	SOT-23	AEC Q101
<a href="#">SQ2364EES</a>		Automotive N-Channel 60 V (D-S) 175 °C MOSFET	VDS=60V; rds(on)/1.5V=245Mohm Id=4A@Tc=25c	SOT-23	AEC Q101
<a href="#">SQ4940AEY</a>		Automotive Dual N-Channel 40 V (D-S) 175 °C MOSFET	VDS=40V; rds(on)/4.5V=29mohm Id=8A@Tc=25c	SO-8	AEC Q101
<a href="#">SQJ912AEP</a>		Automotive Dual N-Channel 40 V (D-S) 175 °C MOSFET	VDS=40V; rds(on)/4.5V=11.1mohm Id=30A@Tc=25c	PowerPAK SO-8L	AEC Q101



## Battery Management System - NEW : Multicell battery Monitors, CAN ESD Protection

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### CAN ESD Protection

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">VCAN26A2-03G</a>		Bidirectional Symmetrical (BiSy) Low Capacitance Dual-Line ESD-Protection Diode in SOT-323	2-line ESD protection, working range +/-26.5V Cd<15pF	SOT-323	AEC Q101
<a href="#">VCAN26A2-03S</a>		Bidirectional Symmetrical (BiSy) Low Capacitance, Dual-Line ESD Protection Diode in SOT-23	2-line ESD protection, working range +/-26.5V; Cd<13pF	SOT-23	

## Battery Management System - NEW : Multicell battery Monitors, Temperature Sensor

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### NTC

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">NTCS...E3...SMT</a>		SMD NTC Thermistors with Enhanced Stability	Resistance/25c: 100K to 210Kohm; B25/85: 3590K	'0402/0603/0805	
<a href="#">NTCS0603E3.....T</a>		SMD 0603, Glass Protected NTC Thermistors	Resistance/25c: 2.0K to 100Kohm; B25/85: 3420-410	'0402	

## Battery Management System - NEW : Multicell battery Monitors, Voltage Detection

### Resistor

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">MCA 1206 AT</a>		Professional Thin Film Chip Resistors	Resistance 2.43ohm to 1.0Mohm; 0.1W to 0.4W	0402-1206	AEC Q200
<a href="#">MCS 0402 AT</a> <a href="#">MCT 0603 AT</a> <a href="#">MCU 0805 AT</a>		Professional Thin Film Chip Resistors	Resistance 2.43ohm to 1Mohm; 0.1W to 0.4W	0402-1206	AEC Q200
<a href="#">MMA 0204 HV</a> <a href="#">MMB 0207 HV - Prof</a>		Professional High-Voltage Thin Film MELF Resistors	Resistance 340ohm to 10Mohm; 0.4W to 1.0W	0204/0207	
<a href="#">MMU 0102</a> <a href="#">MMA 0204</a> <a href="#">MMB 0207 - Prof</a>		Professional Thin Film MELF Resistors	Resistance 0.1ohm to 15Mohm; 0.3W to 1.0W	0102/0204/0207	
<a href="#">RCV e3</a>		High Voltage (up to 0.5 kV) Thick Film Chip Resistors	Resistance 100Kohm to 10Mohm; 0.125W to 0.25W	0805/1206	
<a href="#">TNPW</a>		Lead (Pb)-Bearing High Stability Thin Film Chip Resistors	Resistance 10ohm to 3.01Mohm; 0.063W to 0.33W	0402-1210	

## Battery Management System - NEW : Multicell battery Monitors, Zener/TVS Protection

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### TVS Protection

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">VTVS3V3ASMF to VTVS63GSMF</a>		400 W TransZorb® Transient Voltage Suppressors (TVS)	Vwm: 3.3V to 63V; Vbr: 6.4V to 78.2V Pppm(10x1000us): 400W	DO-219AB (SMF)	AEC Q101

### Zener Diode

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">BZT52-Series</a>		Small Signal Zener Diodes	Vz: 2.4V to 75V; Power dissipation 500mW	SOD-123	AEC Q101
<a href="#">BZX384-Series</a>		Small Signal Zener Diodes	Vz: 2.4V to 75V; Power dissipation 200mW	SOD-323	AEC Q101
<a href="#">PLZ Series</a>		Zener Diodes Permitting 500 mW Power Dissipation	Vz: 2.0V to 39V; Power dissipation 500mW	DO-219AC (MicroSMF)	AEC Q101