



**Solitron**  
DEVICES, INC.

**Integrated Power Solutions  
High Density Power Semiconductors**

**INNOVATION • RELIABILITY • QUALITY**

**[www.solitrondevices.com](http://www.solitrondevices.com)**

# Silicon Carbide Power Modules



- Zero Forward and Reverse Recovery
- Temperature Independent Switching Behaviour
- Very Low Stray Inductance
- ALN Substrate for Improved Thermal Performance
- Internal Thermistor for Temperature Monitoring

Silicon Carbide (SiC) semiconductors are innovative new options for power applications improving system efficiency, size, weight, form factor and operating temperature ranges. Solitron combines the latest state-of-the-art SiC technology with unique light weight packaging in a new series of high density half bridge and full bridge modules. Very low stray inductance in the module is critical for full speed switching of the SiC MOSFETs. The high switching frequencies translate to smaller magnetics significantly reducing system weight and size. Solitron uses advanced techniques and materials including ALN substrates enhancing the high thermal conductivity of silicon carbide MOSFETs. This allows for better system thermal conductivity, lower switching losses and enhanced reliability.

Solitron offers a variety of standard SiC Power modules which include half bridge & full bridge configurations along with the PowerMOD series of Application Specific Power Modules. With the PowerMOD series users can choose from a variety of circuit configurations and packaging options to optimally tailor devices for specific opportunities.

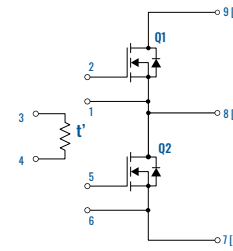
Silicon Carbide power modules are ideal for switch mode power supplies, inverters, battery chargers, actuation and motor control applications.

Device Type	Type Number	Voltage	Continuous Current	$R_{DS(on)}$	Temperature Range	Recovery Diodes	Package
Half Bridge	SD11902	1200V	50A	32mΩ	-55°C to 175°C	Yes	3x6B
Half Bridge	SD11903	1200V	50A	32mΩ	-55°C to 175°C	No	3x6A
Half Bridge	SD11904	1200V	50A	32mΩ	-55°C to 175°C	Yes	3x6A
Half Bridge	SD11905	1200V	50A	32mΩ	-55°C to 175°C	No	3x6B
Half Bridge	SD11906	1200V	105A	13mΩ	-55°C to 175°C	Yes	3x6B
Half Bridge	SD11956	1200V	105A	13mΩ	-55°C to 175°C	No	3x6B
Half Bridge	SD11907	1200V	105A	13mΩ	-55°C to 175°C	Yes	3x6B
Half Bridge	SD11957	1200V	105A	13mΩ	-55°C to 175°C	No	3x6B
Half Bridge	SD11908	650V	50A	7mΩ	-55°C to 175°C	Yes	3x6B
Half Bridge	SD11910	1200V	50A	8mΩ	-55°C to 175°C	Yes	3x6B
Dual MOSFET	SD11911 *	1200V	50A	8.6mΩ	-55°C to 175°C	Yes	4x6
Dual MOSFET	SD11912 *	1200V	105A	13mΩ	-55°C to 175°C	Yes	4x6
Full Bridge	SD11915 *	1200V	40A	32mΩ	-55°C to 175°C	Yes	4x10
Full Bridge	SD11916 *	1200V	50A	8mΩ	-55°C to 175°C	Yes	4x10
Half Bridge	SD11918 *	1200V	105A	13mΩ	-55°C to 175°C	Yes	6x6
Half Bridge	SD11919 *	1200V	105A	13mΩ	-55°C to 175°C	Yes	6x6 SMD

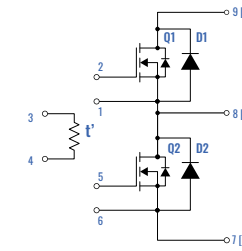
\* Preliminary Information consult factory for availability

## CONFIGURATIONS & PACKAGES

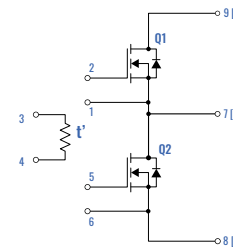
Half Bridge without Recovery Diode (3x6A)



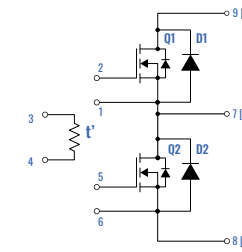
Half Bridge with Recovery Diode (3x6A)



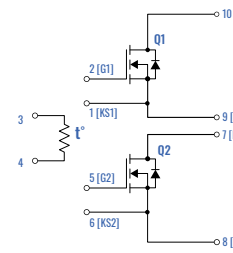
Half Bridge without Recovery Diode (3x6B)



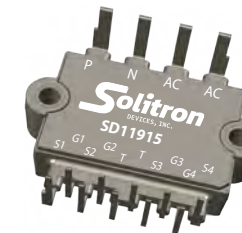
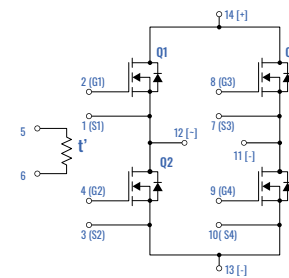
Half Bridge with Recovery Diode (3x6B)



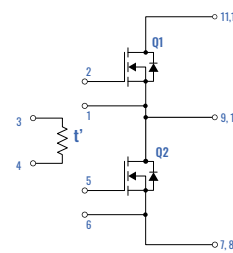
Dual MOSFET (4x6)



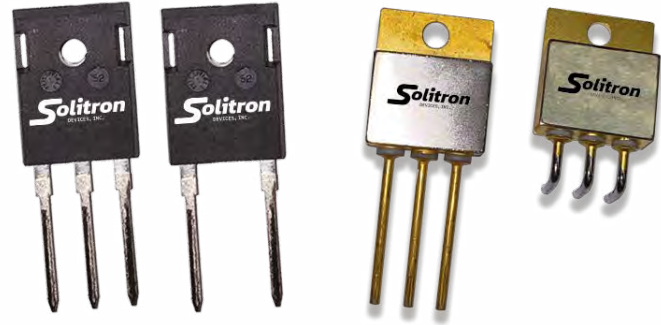
Full Bridge (4x10)



Half Bridge (6x6)



## Silicon Carbide Diodes



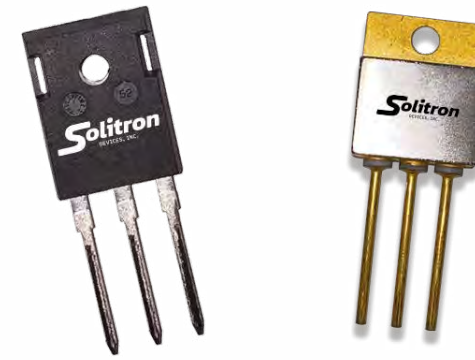
- 650V to 1700V Ratings
- Isolated Back Side
- 200°C Operation
- High speed switching with low Capacitance
- High blocking voltage with low  $R_{DS(on)}$
- Hermetic Packages

Solitron's Silicon Carbide (SiC) Schottky diodes range from 650V to 1700V and include singles, duals and bridge configurations. Available in a wide variety of packages including hermetic they offer designers high efficiency and the ultimate in robust technology. The total capacitive charge (Qc) is small, reducing switching loss, enabling high-speed switching operation. In addition, unlike Si-based fast recovery diodes where the trr increases along with temperature, Silicon Carbide (SiC) diodes maintain constant characteristics, resulting in better performance.

A range of package options from plastic TO-247 to hermetic TO-258 make these 650V to 1700V SiC diodes ideal for power supplies, motor controls and applications requiring the smallest size, lightest weight and highest efficiency levels. COTS, TX, TXV and S level screening is available. Customized configurations and packaging including power modules are available upon request. See Solitron's PowerMOD series for additional information.

Type Number	Reverse Voltage	Forward Current	Dual / Single	Package	Isolated Case	Temp. Range
SD11800	1200V	10A	Single	TO-247 2L	Yes	-40°C to 175°C
SD11801	1200V	10A	Single	TO-247 2L	No	-40°C to 175°C
SD11803	1200V	10A	Single	TO-258 3L	Yes	-55°C to 210°C
SD11804	1200V	10A/20A	Dual	TO-258 3L	Yes	-55°C to 210°C
SD11805	1200V	20A	Single	TO-258 3L	Yes	-55°C to 175°C
SD11806	1200V	20A/40A	Dual	TO-258 3L	Yes	-55°C to 175°C
SD11808	1700V	10A	Single	TO-258 3L	Yes	-55°C to 210°C
SD11809	1700V	25A	Single	TO-258 3L	Yes	-55°C to 210°C
SD11810	650V	88A	Single	TO-258 3L	Yes	-55°C to 175°C
SDD10120AD	1200V	10A/20A	Dual	TO-247 3L	No	-40°C to 175°C
SDD50065SHD	1300V	50A	Dual	TO-247-2L	Yes	-40°C to 175°C

## Silicon Carbide MOSFETs



- Very Low  $R_{DS(on)}$
- 650V to 1200V
- 200°C Operation
- Isolated Back Side
- Hermetic TO-258 Packages
- Thousands shipped with S Level Screening

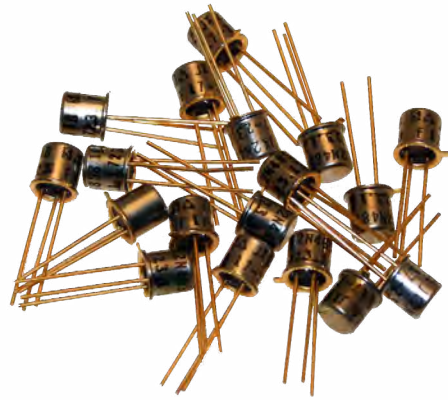
Solitron's Silicon Carbide (SiC) MOSFETs are packaged to survive the most extreme environments. They feature very low  $R_{DS(on)}$  even at high temperatures and excellent switching performance versus the best-in-class silicon technologies, with minimal variation versus temperature. Silicon Carbide offers higher efficiency levels than silicon due to significantly lower energy loss and reverse charge. This results in more switching power and less energy required in the switch-on and switch-off phase. Combined with high switching frequencies this translates to smaller magnetics significantly reducing system weight and size.

Hermetic TO-258 packages with 200°C operation make these 650V TO 1200V SiC MOSFETs ideal for power supplies, motor controls and applications requiring the smallest size, lightest weight and highest efficiency levels. COTS, TX, TXV and S level screening is available. Customized configurations and packaging including power modules are available upon request. See Solitron's PowerMOD series for additional information.

Type Number	Voltage	Drain Current	$R_{ds(on)}$	Package	Isolated Case	Temp. Range
SD11701	650V	50A	15mΩ	TO-258 5L hermetic	Yes	-40°C to 175°C
SD11702	650V	50A	7mΩ	TO-258 3L hermetic	Yes	-55°C to 175°C
SD11703	900V	50A	10mΩ	TO-258 3L hermetic	Yes	-55°C to 175°C
SD11704	900V	32A	35mΩ	TO-258 5L hermetic	Yes	-55°C to 150°C
SD11705	1200V	50A	32mΩ	TO-258 3L hermetic	Yes	-55°C to 175°C
SD11707	1200V	50A	16mΩ	TO-258 3L hermetic	Yes	-55°C to 175°C
SD11720	1200V	58A	50mΩ	TO-243 3L plastic	No	-55°C to 175°C



## Small Signal JFETs



- JAN/JANTX/JANTXV Standard Products
- N-Channel and P-Channel
- Low On Resistance <math><25\Omega</math>
- S Level Equivalent Screening
- Superior Replacement for Vishay and Siliconix
- Radiation Tolerant

Solitron is the world's leading manufacturer of standard QPL JAN/JANTX/JANTXV small signal JFETs.

Solitron's JFET offering features low on-resistance, low capacitance, good isolation and fast switching. High radiation tolerance and space level processing make them ideal for satellite applications.

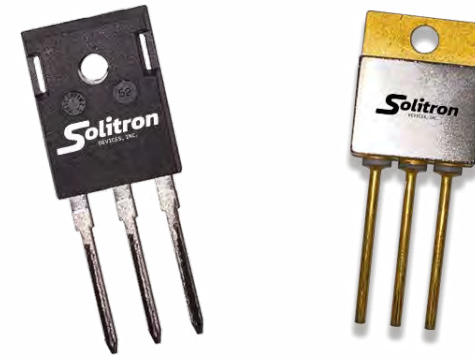
### N-Channel

Type Number	Package	19500/	$BV_{gss}$ Min	$V_{gs(off)}$ Min	$V_{gs(off)}$ Max	$I_{dss}$ Min	$I_{dss}$ Max	$R_{(on)}$ Max
2N3821	TO-72	375	50V	-	4V	0.5mA	2.5mA	-
2N3822	TO-72	375	50V	-	6V	2mA	10mA	-
2N3823	TO-72	375	50V	-	8V	4mA	20mA	-
2N4856	TO-18	385	40V	4V	10V	50mA	-	25 $\Omega$
2N4857	TO-18	385	40V	2V	6V	20mA	100mA	40 $\Omega$
2N4858	TO-18	385	40V	0.8V	4V	8mA	80mA	60 $\Omega$
2N4859	TO-18	385	30V	4V	10V	50mA	-	25 $\Omega$
2N4860	TO-18	385	30V	2V	6V	20mA	100mA	40 $\Omega$
2N4861	TO-18	385	30V	0.8V	4V	8mA	80mA	60 $\Omega$

### P-Channel

Type Number	Package	19500/	$BV_{gss}$ Min	$V_{gs(off)}$ Min	$V_{gs(off)}$ Max	$I_{dss}$ Min	$I_{dss}$ Max	$R_{(on)}$ Max
2N2609	TO-18	296	30V	1V	4V	2mA	10mA	-
2N5114	TO-18	476	30V	5V	10V	30mA	90mA	90 $\Omega$
2N5115	TO-18	476	30V	3V	6V	16mA	60mA	60 $\Omega$
2N5116	TO-18	476	30V	1V	4V	5mA	25mA	25 $\Omega$

## Silicon MOSFETs



- 500V to 1000V
- Screened to COTS, MIL-PRF-19500 or MIL-PRF-38534
- 200°C Operation available
- Customized Packaging and Configurations
- Hermetic Packages

Solitron has a long history supporting military defense and space level applications with standard and customized high reliability power MOSFETs.

Our capabilities range from a single MOSFET in a hermetic TO-254/257/258 to duals, quads and customized bridge configurations.

Type Number	Voltage	Drain Current	$R_{ds(on)}$	Package	Isolated Case	Temp. Range
SMF404	1000V	15A	760m $\Omega$	TO-254 hermetic	Yes	-55°C to 150°C
SMF459	1000V	6A	2000m $\Omega$	TO-254 hermetic	Yes	-55°C to 125°C
SMF460	650V	10A	300m $\Omega$	TO-254 hermetic	Yes	-55°C to 125°C
SMF178	500V	23A	300m $\Omega$	TO-254 hermetic	Yes	-55°C to 125°C
SMF182	500V	7A	850m $\Omega$	TO-257 hermetic	Yes	-55°C to 125°C
SMF387	500V	14A	400m $\Omega$	TO-254 hermetic	Yes	-55°C to 125°C
SMF473	400V	23A	230m $\Omega$	TO-254 hermetic	Yes	-55°C to 150°C
SD11461-1	100V	47A	25m $\Omega$	TO-258 hermetic	Yes	-55°C to 150°C
SD11461-2	100V	47A	25m $\Omega$	TO-254 hermetic	Yes	-55°C to 150°C

## Voltage Regulators



- 5V, 12V, 15V Positive or Negative Outputs
- 1.5A to 5A fixed or adjustable output
- Built in accordance with Standard Military Drawings
- Screened to MIL-PRF-38534
- Customized Packaging and Configurations

Solitron offers the industry standard 117/137, 78XX, 79XX configurations of voltage regulators. Full military processing is available to MIL-PRF-38534 in accordance with several Standard Military Drawings. Customized configurations and packages are also available.

### POSITIVE

Type Number	Input Voltage	Output Voltage	Output Current	Tolerance	Temperature Range	Package
SDP117	40V	Variable	1.5A	2%	-55 to +150°C	TO-257
SDP1084	25V	Variable	5A	1%	-55 to +125°C	TO-258
SDP1085	25V	Variable	3A	1%	-55 to +125°C	TO-257
SDP150	35V	Variable	3A	2%	-55 to +150°C	TO-257
SDP7805A	35V	5V	1.5A	2%	-55 to +150°C	TO-257
SDP7812A	35V	12V	1.5A	2%	-55 to +150°C	TO-257
SDP7815A	35V	15V	1.5A	2%	-55 to +150°C	TO-257

### NEGATIVE

Type Number	Input Voltage	Output Voltage	Output Current	Tolerance	Temperature Range	Package
SDP137	40V	Variable	1.5A	2%	-55 to +150°C	TO-257
SDP7905A	35V	-5V	1.5A	2%	-55 to +150°C	TO-257
SDP7912A	35V	-12V	1.5A	2%	-55 to +150°C	TO-257
SDP7915A	35V	-15V	1.5A	2%	-55 to +150°C	TO-257

## Bipolar Power Transistors



- 40V to 700V
- N-Channel and P-Channel
- JAN/JANTX/JANTXV Standard Products
- S Level Equivalent Screening
- Customized Packaging and Configurations

Solitron has been a recognized leader and pioneer in the manufacturing of state-of-the-art bipolar power transistor products for over 50 years. Standard Packaging options include TO-3, TO-5, TO-39, TO-66, TO-111 (stud), TO-254, TO-257 and TO-258. Customized leaded or leadless surface mount packages are also available.

### NPN

Type Number	Package	19500/	V <sub>CBO</sub>	V <sub>CEO</sub>	I <sub>C (cont.)</sub>	P @ 25°C
2N2880	TO-59	-	110V	80V	5A	30W
2N3439	TO-5/39	368	450V	350V	1A	5W
2N3440	TO-5/39	368	300V	250V	1A	5W
2N3442	TO-3	370	160V	140V	10A	6W
2N3771	TO-3	518	50V	40V	30A	6W
2N3772	TO-3	518	100V	60V	20A	6W
2N3902	TO-3	371	700V	400V	3.5A	100W
2N5039	TO-3	439	125V	75V	20A	140W
2N5157	TO-3	371	700V	500V	3.5A	100W
2N5672	TO-3	488	150V	120V	30A	140W
2N6306	TO-3	498	500V	250V	8A	125W
2N6308	TO-3	498	700V	350V	8A	125W
2N6350	TO-33	472	80V	80V	5A	400W
BSS52	TO-39	-	90V	80V	1A	80W

### PNP

Type Number	Package	19500/	V <sub>CBO</sub>	V <sub>CEO</sub>	I <sub>C (cont.)</sub>	P @ 25°C
2N4399	TO-3	-	69V	60V	30A	5W
2N6437	TO-3	-	120V	100V	25A	200W
2N6438	TO-3	-	120V	100V	25A	200W

## Custom PowerMOD



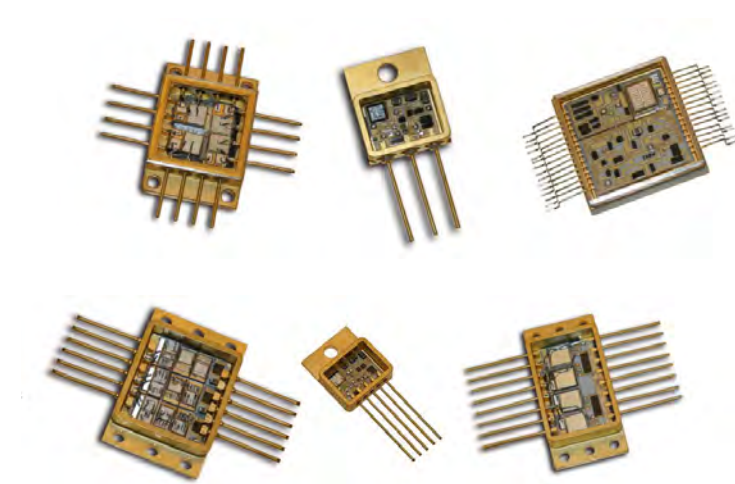
- Latest GEN Silicon Carbide and Silicon Power Devices MOSFETs, IGBTs, Diodes 600V to 1700V
- High Switching Frequencies, Ultra Low Capacitance, Low Parasitic Inductance
- Low Junction to Case Thermal Resistance
- High System Efficiency, smaller magnetics, lower system size and weight
- Kelvin Source Connections for Stable Gate Drive
- Rugged COTS Packaging with high temperature 200°C plus operation

Solitron offers numerous standard SiC Power modules which include half bridge, full bridge and individual MOSFET or diode array architectures. The PowerMOD series has been designed with flexibility and ease of configuration. A variety of configurations, beyond the standard modules seen on page 2 can be implemented for customer programs requiring as few as 100 units per year. These variations are typically available with little to no non-recurring engineering and rapid prototype development. This minimizes both product development cost and time to market. PowerMODs allow small to medium program requirements the luxury of specifically tailored solutions.

PowerMOD modules offer numerous advantages over discrete designs that truly highlight the advantageous performance of silicon carbide in high power applications. Low inductance paths allow high speed switching frequencies and low switching losses reducing the size of external magnetics and increasing efficiency. Advanced alumina nitride substrate material is used for heat dissipation and excellent CTE matching. Copper base plates provide optimal thermal conductivity.

Excellent relationships with the leading industry suppliers of silicon, silicon carbide and gallium nitride place Solitron in a unique position to offer state of the art customized solutions. Our engineering team is always available for PowerMOD consultation whether working from a concept, block diagram, or full schematic.

## Custom Hi-Rel Multichip Modules



- Fully Tested Integrated Solutions
- High Power Density with Superior Thermal Performance
- Significant Space, Weight and Efficiency Savings
- MIL-PRF-19500, MIL-PRF-38534 and Class S Equivalent Screening
- High Temperature 200°C + Screening

For the highest reliability applications requiring hermetically sealed components with full military processing such as MIL-PRF-19500 or MIL-PRF-38534 Solitron has a variety of solutions. Tailored electrical and mechanical requirements are often needed to optimize performance. Modifications as small as lead forming to building full custom multi-function solutions from a block diagram or schematic are well within Solitron's capabilities.

Solitron provides advanced circuits for the most demanding applications including rad hard devices for space & booster launch systems; miniaturized power devices for fighter aircraft and ruggedized components for the most advanced missiles, ground based and marine based platforms. Applications where size, weight and efficiency are essential to reliability and mission performance.



## About Solitron Devices

For over 50 years Solitron Devices has been an industry leader in power semiconductors. With corporate headquarters and manufacturing in West Palm Beach FL, our facility includes circuit design, wafer fabrication, power microelectronics assembly, packaging, electrical test and environmental screening. Certifications and qualifications include MIL-PRF-19500 for JAN/JANTX/JANTXV, MIL-PRF-38534 Class H, ISO 9001:2008 and AS9100 Rev C. Solitron also builds to customer supplied source control drawings and commercial off-the-shelf (COTS) standards.

Solitron is dedicated to manufacturing power components for the most demanding high reliability applications including space, avionics and defense. Standard products include JFETs, MOSFETs, diodes, voltage regulators and high voltage / high current power modules. When standard solutions won't fit the application, we can tailor products to meet specific electrical or mechanical requirements. Solitron's design expertise has also provided customized versions of dc-dc converters, half/full bridge circuits, motor controllers, IGBTs, and PFC circuits to name a few.

Solitron is developing the next generation of power technology for applications such as electric control to replace traditional hydraulic control systems in aircraft ..... next generation high density radar ..... and extreme temperature downhole oil exploration. From innovation in process to design, Solitron is developing leading edge products to meet the most challenging power applications of the future.

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