SENSITRON SEMICONDUCTOR

Your Power Solutions Provider

Solid State Power Management

Solid State Power Management

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SENSITRON SEMICONDUCTOR

Solid State Power Management Solutions

The Sensitron Advantage:

- ✓ Variety of COTS Solid State Power Controllers product availability reduces lead time
- ✓ Flexible, battle-tested technology allows for reduced design time
- ✓ Efficient electrical and mechanical design optimized for small space/footprint
- ✓ Low power dissipation and wide-temperature range operation
- ✓ ***Proven*** solutions for tough requirements

Features:

- ✓ True I^2t and instant trip protection
- ✓ Solid state reliability
- ✓ Software and hardware current rating programmability
- ✓ Accurate current, temperature and voltage measurements
- ✓ Isolated discrete or serial interface controls and load monitoring
- ✓ EMC reduction
- ✓ Built in test features

Benefits:

Sensitron's SSPC technology and products combine functionalities of electro-mechanical breakers, solid state relays and system monitors and provide the following benefits to our customers:

- ✓ Electrical load protection and monitoring: current, voltage and temperature measurements
- ✓ Operational improvements by allowing for diagnostics, prognostics and condition-based maintenance
- ✓ Life cycle cost savings and reduced cost of ownership
- ✓ Increased radius of operation through power budgeting and load shedding
- ✓ Power sequencing, crew off-loading and network-controlled intelligent load management

Sensitron Solid State Power Management Solutions

	Single Ch. Modules	Cobra	Diamondback	Boa	Enclosed Unit Capability
Voltage	28 – 375 VDC 115/230 VAC	28 VDC	28 VDC	28 VDC	28VDC - 600 VDC 115VAC - 230 VAC
Current	Up to 150 A	6x 25 A (150 A)	(16ch) 8x 5A, 3x 15A, 5x 25A (32ch) 32x 10A	4x 100A	100A @ 375VDC 30A @ 610VDC
Measurements	Load Status Switch Status	Output Current Input Voltage	Output Current Input & Output Voltage Temperature	Output Current Input & Output Voltage Temperature	Output Current Input & Output Voltage Temperature
Interface	Discrete	RS232 RS485	CAN RS232, 422, 485	CAN RS232, 422, 485	CAN RS232, 422, 485
Temp Range	-40/-55 to 85	-55 to 100	-45 to 100	-55 to 100	-40 to 105






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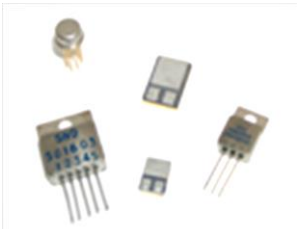
Smart Power Management Product Integration

Sensitron has heritage in over two decades of smart power management, from packaged devices to hybrids and modules -



Packaged Fets & IGBT Discretes

1990's

AC Solid State Circuit Breaker

AC Solid State Relay

2000's

High Voltage SSPC

Cobra Multi-Channel Boards

Single Channel Modules

Chassis Mountable SSPC

High Current SSPC

Slot SSPC

Multi-Channel Boards

Multi-Channel Boards

2010's

Bi-Directional Surge Limiter

High Current Multi-Channel Enclosures

Multi-Channel Enclosures

Multi-Channel Boards

Smart Power	Markets	Smart Power	Applications	Smart Power	Standards
	Aircrafts, Helicopters		Exploration Equipment		MIL-STD-1275
	UAV, UMG		Command Centers		MIL-STD-704
	Ground Vehicles		Test Equipment		MIL-STD-461
	Off-Road Vehicles		Weapon Launchers		MIL-STD-217
	Commercial Vessels				**Interfaces**
					RS-232, RS-422, RS-485, CAN

Programmable Single Channel Control, ≤ 50A

Part Number	Current Program Range	Voltage
SPDP05D28-1	1A to 5A	28 Vdc
SPDP10D28-1	2A to 10A	28 Vdc
SPDP15D28-1	3A to 15A	28 Vdc
SPDP20D28-1	4A to 20A	28 Vdc
SPDP25D28-1	5A to 25A	28 Vdc
SPDP30D28-1	6A to 30A	28 Vdc
SPDP40D28-1	8A to 40A	28 Vdc
SPDP50D28-1	10A to 50A	28 Vdc

Part Number	Current Program Range	Voltage
SPDP03D270	0.9A to 3A	270 Vdc
SPDP10D270	3.0A to 10A	270 Vdc
SPDP03D375	0.9A to 3A	375Vdc
SPDP10D375	3.0A to 10A	375Vdc

Features:

- 5:1 programming range for 28V
- True I^2T with thermal memory
- Instant trip at higher level
  - 10x for 28V
  - 7x for 270/375V
- Isolated Logic Control, Status
- On/Off
- Low Power Consumption
- Low Weight
  - 30 grams for 28V
  - 40 grams for 270/375V
- No heat sinking or cooling required
- Soft turn-on for EMI control
- Nuisance Trip Suppression
- 28V Status outputs
  - Load status – Hi =<5%, Low = 15%
  - Gate status – indicates switch state
- 270/375V Status outputs
  - Line input
  - Overtemperature

Single Channel Control, up to 150A

SPDB Series, Low Current

Part Number	Current	Voltage
SPDB10D28	10A	28 Vdc
SPDB35D28	35A	28 Vdc

Features:

- True I^2T with thermal memory
- Instant trip at higher level
- Isolated Logic Control, Status
- On/Off
- Low Power Consumption
- Soft turn-on for EMI control
- Nuisance Trip Suppression

Part Number	Current	Voltage	Max Voltage Drop@ Amps
SRPC80D28	80A	28 Vdc	175 mV
SPDC130D28	130A	28 Vdc	230 mV
SPDC150D28	150A	28 Vdc	260 mV
SPDP50D375	50A	375Vdc	440 mV

AC Solid State Circuit Breaker

Part Number	Current	Voltage
SPD8A115	8A	150 Vdc

Standard Features, *plus:*

- 115 VAC / 150 VDC
- 2 pole single throw switch (2PST)
- Overcurrent shutdown protection
- Overvoltage transient suppression
- TTL/CMOS input compatible
- Operating voltage up to 100V

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Multi-Channel Boards

Sensitron's Multi-Channel Solid State Power Controllers (SSPC) are programmable, microcontroller based, Solid State Power Controller products designed to be used in 28V DC Power Management applications. Each independent channel can be programmed to support variable loads, and can be programmed to operate in parallel with other channels in order to act as a single channel with combined current capabilities. These products feature integrated current, temperature, and voltage sensing, with a serial communications interface which allows a system controller to command channels on and off, as well as monitor measured parameters and status.

Diamondback Series

16 Channel Board

- ✓ 16 Programmable Channels
- ✓ Like channels can be paralleled
- ✓ Up to 210A of Total Current
- ✓ Measurements:
  - ✓ Output Currents, Input & Output Voltages, Board Temperature
- ✓ Flags – per channel
  - ✓ Load Present (20% of rating threshold)
  - ✓ Faults–OCP Trip, BIT Failure, Vout Low
- ✓ CAN Interface (up to 1Mbaud) J1939
- ✓ 100°C Operation, 5VDC Aux Power – Internal/External options

32 Channel Board

- ✓ 32 Programmable Channels
- ✓ Like channels can be paralleled
- ✓ Up to ~300A of Total Current
- ✓ Measurements:
  - ✓ Output Currents, Input & Output Voltages, Board Temperature
- ✓ CAN Interface (up to 1Mbaud) J1939
- ✓ 100°C Operation
- ✓ 5VDC or 28VDC Aux Power
- ✓ New connectors optimum for rack mounting

Enclosures

- ✓ Support for return current wires
- ✓ One or two 16-CH Cards
- ✓ One or two 32-CH Cards
- ✓ Circular, Rugged Connectors
- ✓ Design and Production Capability
- ✓ Build-to-Print Capability
- ✓ Price / Performance Leader
- ✓ Can be waterproof
- ✓ Can be EMI-tight

Cobra Series: 6 Channel Board

- ✓ Up to 6 channels, can be used individually or in parallel combinations
- ✓ Programmable from 1 Amp to 25 Amps rated current
- ✓ Parallel channel capability up to 150 amps
- ✓ RS-232, RS-422,or RS-485 serial interface bus
- ✓ BATTLESHORT setting to prevent tripping in extreme circumstances
- ✓ MAINTENANCE MODE for safe maintenance

Boa Series: 4 Channel Board

- ✓ Four Individual Channels Programmable to 100A
- ✓ Up to 200A with Channel Paralleling
- ✓ Total Current up to 400 amps
- ✓ 28VDC-derived auxiliary power
- ✓ True I2t and thermal memory protection
- ✓ J1939 CAN bus communications
- ✓ Soft Turn-On/Off to Reduce EMI
- ✓ Battle short and Maintenance modes
- ✓ Power-up and continuous Self-Test (BIT)
- ✓ -55°C to 100°C operating temperature range

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High Current/High Voltage DC Solid State Contactor: SSR Series

Part Number	Max Contact Voltage (Vout)	Continuous Contact Current (I_{out})	Voltage drop @ I_{out} (V_{drop})
SSR033D005	50	33	0.080
SSR066D005	50	66	0.152
SSR100D005	50	100	0.230
SSR033D010	100	33	0.103
SSR066D010	100	66	0.205
SSR100D010	100	100	0.310
SSR033D020	200	33	0.139
SSR066D020	200	66	0.278
SSR100D020	200	100	0.420

Part Number	Max Contact Voltage (Vout)	Continuous Contact Current (I_{out})	Voltage drop @ I_{out} (V_{drop})
SSR015D060	600	15	0.248
SSR025D060	600	25	0.413
SSR033D060	600	33	0.545
SSR050D060	600	50	0.825
SSR015D080	800	15	0.408
SSR025D080	800	25	0.680
SSR033D080	800	33	0.900
SSR015D120	1200	15	0.224
SSR025D120	1200	25	0.373
SSR033D120	1200	33	0.492

Features/Benefits:

- **2000V Input to Output / Output to Baseplate Isolation**
- **Up to 1200V Blocking, Up to 100A Continuous Current**
- **Up to 400A Surge Capability**
- **-55°C to 100°C Operation**
- **Single wide range DC input signal 4.6V to 36V**
- **Fast turn on/turn off, less than 1 us**
- **Low power control, 0.5W Typ**
- **Low "on" state resistance**

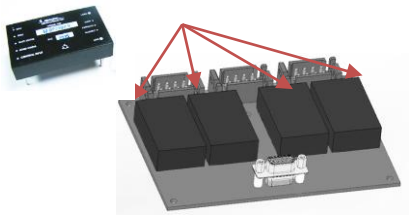
Package Size: 1.4" x 2.6" x 0.5"
MIL-STD-704 and MIL-STD-461 Compliant

AC Solid State Relay: SCP-5285

Features/Benefits:

- **Back-to-back SCR output for high reliability**
- **75A rating upto 85°C base plate temperature**
- **1600V surge voltage withstand capability**
- **Zero voltage turn-ON switching to reduce EMC issues**
- **Flexible design configuration**
- **Customizable terminal & device options**
- **Similar to Teledyne SSR1600660D75**

Also Available: Integrated Carrier Boards for Single Channel Modules

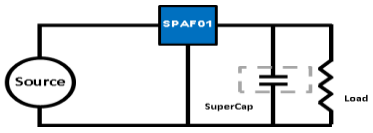


Features/Benefits:

- **Up to four loads and total board current of 120A**
- **Configurable mix of 10, 20, 30 and 40A devices**
- **On-board current rating programmability**
- **Power connectors for 28Vdc bus and return**
- **5V available on the connector to control the devices**
- **Integrated auxiliary power supply, Low board & connector power dissipation**
- **High current bus bar system, low power current routing**
- **Balanced current distribution**

Bidirectional Charge/Discharge Controller: SPAF01Cxx

Dimensions:6.60" x 4.00" x 2.64"
Weight: 3.85lb Max



Features/Benefits:

- **Useful for SuperCapacitor control & protection**
- **Programmable Current Limit to 150A max continuous**
- **No auxiliary power required**
- **Control & status monitoring over CAN bus**
- **Configurable isolated discrete control**
- **External Bypass Relay control and monitoring**
- **500V Isolation from chassis**
- **-45 °C to 100 °C operating temperature range**

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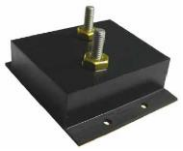
Vehicle Power Surge Protection

MIL-STD-1275 Military Vehicles, 28V



Features/Benefits:

- 28V power system voltage transient protection including load dump
- Clamping below 55V DC for both 100V and 250V pulse
- Power savings by allowing lower FET voltage ratings to be used
- Reliability: 100% production tested to meet MIL-STD-1275 test method

The Sensitron Advantage:

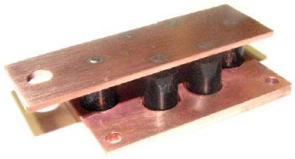
- Low leakage at working voltage means no significant power loss at normal conditions
- Protection without power interruption

Product Options:

- **SCP-5282-3,& -5/A** are also designed to meet SAE J1113-xx requirements
- **SCP-5282-3** also meets ISO16750 & ISO7637 requirements
- **SCP-5282-6** tested to 1275 & Aircraft DO-160 spec

Type	Body Dimensions Inch	Weight, gm
SAE-5282-12	1.85x3.20x0.80	115
SCP-5282-1	1.24x2.25x0.61	72
SCP-5282-1U	1.24x2.25x0.61	72
SCP-5282-2	1.24x2.25x0.61	72
SCP-5282-3	2.02x2.25x0.61	122
SCP-5282-5	1.85x3.20x0.80	115
SCP-5282-6	0.950x0.50x0.420	18

PN	Config	Peak Pwr 1ms	Vwm, Min	Leakage Max @Vwm	Vbr, Min	Ippm	Vclamp @ Ippm Max	100% Tested To:
SCP-5282-1	Bi	60kW	33V	25 uA	36.7V	100A	49V	100A/80ms square
SCP-5282-1U	Uni	60kW	33V	25 uA	36.7V	100A	49V	100A/80ms square
SCP-5282-2	Bi	60kW	33V	25 uA	36.7V	100A	49V	5x 100A, 50ms sq
SCP-5282-3	Bi	100kW	33V	40 uA	36.7V	135A	49V	5x 110A, 50ms sq
SCP-5282-5/ A	Uni	50kW	33V	30mA	-	120A	43V/ 42V	120A/100ms
SCP-5282-6A/B	Bi	65kW	52V	30uA	60V	54A	77V	1275 waveform



MIL-STD-1275 Transorb
SCP-1275, Replacement for GPZ1275

- Voltage transient protection / load dump function
- Clamping below 55V DC for both 100V and 250V pulse
- 100% production tested to Meet MIL-STD-1275 test method
- Advantages: No power consumption under clamping voltage threshold, no power interruption, high pulse power capability, low cost & small size

SAE Compliant Military Vehicles, 12V

SAE Compliant Transorb

- SAE compliant high pulse power transorb for +12 Vdc systems, clamping below 32Vdc for 100V pulse with 142A peak current
- SAE J1113-11 compliant; 100V surge withstand
- ding with 0.5 Ohm source impedance, 400 msec pulse
- Allows the use of 40V high efficiency FET

PN	Config	Peak Pwr	Vwm, Min	Leakage Max Vwm	Vbr, Min	Ippm	Vclamp @ Ippmmax	100% Tested To:
SAE-5282-12	Uni	4kW/400ms	18V	250 uA	25.1V	142A	32V	J1113-11, 142A/400ms

Tools and Capabilities (Engineering & Production)

Product Development Equipment

- 4 Dual quadcore simulation workstations
- Dukane ultrasonic welder
- SST DAP sealer
- SSEC seam welder
- Sonix ultrasonic scanner
- BTU belt reflow furnaces
- Orthodyne 360 fully automatic wirebonder
- K&S 4526 semi-automatic wirebonder
- Dage bond pull tester
- Polaris percussion welder
- Trebor eutectic die bonder
- Trebor epoxy pick & place
- K&S semi-automatic pick & place
- ESPEC thermal cycling machine

Software Tools

- AutoCAD 2005
- Inventor 9
- Solidworks 2010
- Design Modeler
- ANSYS Mechanical v.13
- CFX v.13

MTBF Computational Tool

- Relex Architect 2008

Mathematical Tools

- MathCAD 14
- Visual Basic
- APDL
- C++
- Origin 8.1

Rapid Prototyping Tool

- ZCorp 3D Plus

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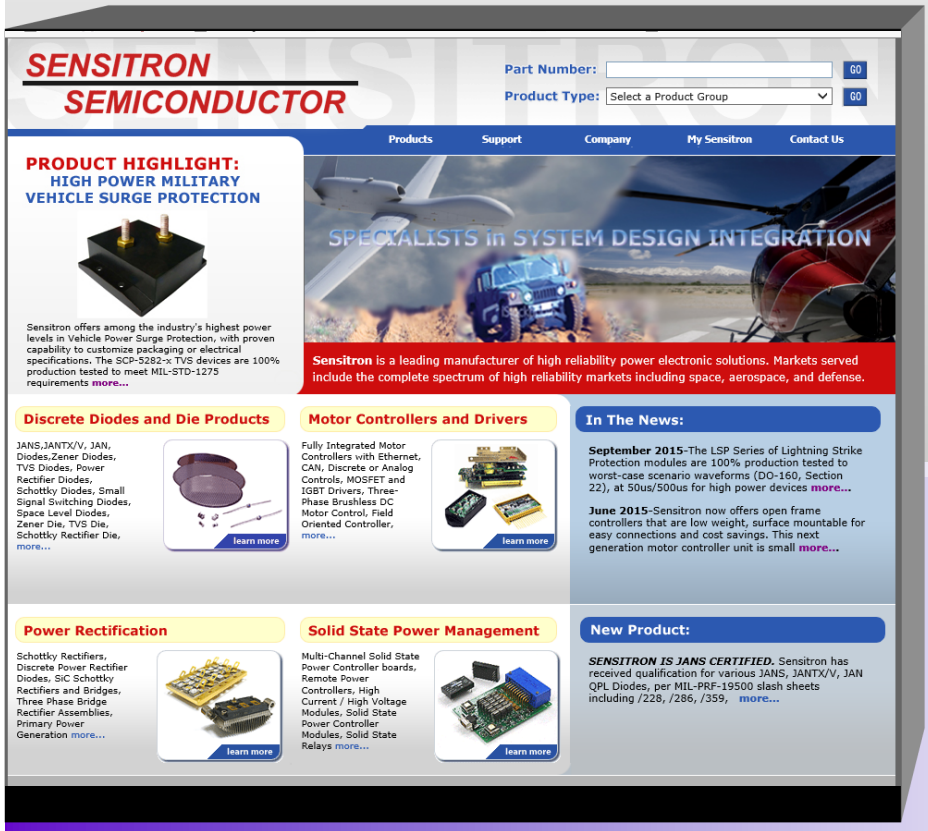

Your Power Solutions Provider

Sensitron Semiconductor

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About Sensitron: Sensitron is a leading manufacturer of high reliability power electronic solutions including motor controllers, diodes, smart power management and conversion, voltage protection components and embedded boards, with over 40 years heritage serving space, aerospace, and defense markets.