

Data Sheet No. PD-1.018B

INTERNATIONAL RECTIFIER **SERIES SP**
Microelectronic
Power IC Relay**ChipSwitch® SIP Relay**1.0 Amp (Free Standing)
3.0 Amps (with Heat Management)
20-280 VAC**GENERAL DESCRIPTION**

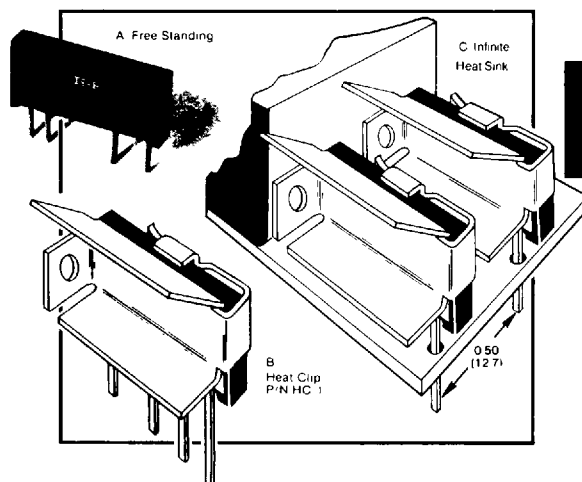
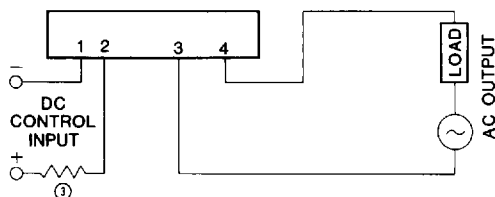
The ChipSwitch SIP uses exclusive International Rectifier S²X power integrated circuit technology to form a fully functioning solid-state relay. The S²X technology combines MOS and bipolar processes, derived from IR's HEXFET™ power MOSFET designs, to eliminate the need for both discrete components and hybrid circuits. The basic ChipSwitch SIP consists of two identical power integrated circuits connected in inverse parallel (analogous to back-to-back SCRs) for AC control plus an isolated light emitting diode (LED) for actuation.

Extreme reliability is achieved by the reduction of component count from approximately 20 discrete components in a conventional SSR to 3 basic components in the ChipSwitch. The power integrated circuits are fabricated in IR's advanced MOSFET fabrication plant which achieves standards of cleanliness, precision, and consistency unprecedented in the manufacture of power semiconductors.

The ChipSwitch SIP is a normally open SSR of 1 to 3 Amps rating with precise zero voltage turn-on and zero current turn-off. EMI emission conforms to the most severe FCC and VDE requirements.

The devices are ideally suited for interfacing microprocessors to AC loads such as small motors, lamps, solenoids, valves, and high power motor starters. The economy of the ChipSwitch SIP allows the in-house manufacturer to replace assemblies of triacs, triac drivers and associated components with a highly reliable, miniature, standard SSR.

- S²X Power IC Chips
- 30-40 Amps Surge
- 4000V RMS Isolation
- Zero Voltage Turn-On
- EMI Meets FCC/VDE Limits
- Operates Without Snubber
- 600V/ μ sec dv/dt
- 10 Microamps Leakage
-  UL Recognized - File E50015
-  CSA Approval Pending
-  VDE File - 53105

**WIRING DIAGRAM****Part Identification**

Part No.	Transient Overvoltage (V _{PK})	Operating Voltage (V _{RMS})	DC Input Turn-On
SP1110 SP1210	300	20-140	5 mA 10 mA
SP2110 SP2210	450	20-280	5 mA 10 mA
SP6110 SP6210	600	20-280	5 mA 10 mA

ChipSwitch SIP



ELECTRICAL SPECIFICATIONS ($-30^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$ unless otherwise specified)

GENERAL CHARACTERISTICS		Units
Dielectric Strength — Input/Output		4000
Insulation Resistance @ 500VDC — Input/Output		10^{12}
Tracking Resistance (VDE Test)		KB 100/A
Max Capacitance — Input/Output		2.0
Ambient Temperature Range	Operating	-30 to 85
	Storage	-40 to 100
Lead Temperature (1.6 mm below seating plane) for 10 sec.		260

INPUT CHARACTERISTICS	SP1110	SP1210	SP2110	SP2210	SP6110	SP6210	Units
Control Current Range ② (see Fig. 3)	5-25	10-25	5-25	10-25	5-25	10-25	mA (DC)
Max Reverse Voltage	7.0						V (DC)
Max Turn-On Current	5.0	10	5.0	10	5.0	10	mA (DC)
Min Turn-Off Current	0.5						mA (DC)
Max Turn-On Time (60 Hz)	8.3						mSec
Max Turn-Off Time (60 Hz)	8.3						mSec

OUTPUT CHARACTERISTICS				Units
Operating Voltage Range (47-440 Hz)	20-140	20-280	20-280	V (RMS)
Transient Overvoltage (Non-Repetitive)	300	450	600	V (peak)
Min Off-State dv/dt (static) ① @ Max Rated Voltage (25°C)	600			V/ μs
Max Load Current (See Figs. 1 and 4)	1.0 A (RMS) Free Standing in 40°C Air 3.0 A (RMS) Attached to an infinite heat sink @ 40°C ($\theta_{JS} = 7^{\circ}\text{C/Watt}$)			A (RMS)
Min Load Current	0.5			mA (RMS)
Power Factor Range	0.2 to 1.0			—
Max Surge Current Single Cycle (Non-Rep.) 20 ms (see Fig. 2)	30			A (peak)
Max Over Current (Non-Rep.) 1 sec	7.5			A (peak)
Max On-State Voltage Drop @ 1.0A (RMS)	1.5			V (peak)
Max I^2T for Fusing (0.1 sec)	4.5			A ² sec
Max Zero Voltage Turn-On	12			V (peak)
Max Peak Repetitive Turn-On Voltage @ 20mA Input	1.5			V (peak)
Max Off-State Leakage Current ③ @ Max. Operating Voltage, 25°C	10			μA (RMS)

GENERAL NOTES

Data and specifications subject to change without notice

① Off-state dv/dt test method per EIA/NARM standard RS-443 with V_p equal to the instantaneous peak of the maximum operating voltage

② External current limiting resistor required

③ LED input current of zero MA

ChipSwitch SIP

PERFORMANCE CHARACTERISTICS CURVES

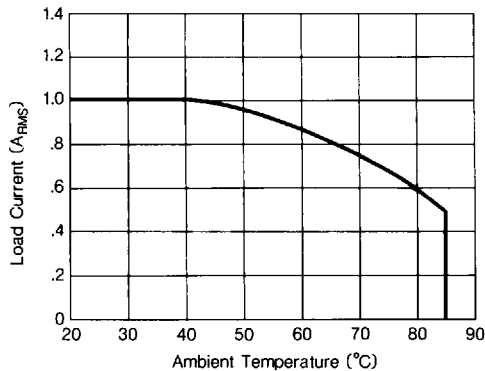


Figure 1. Derating Curve, Free Standing

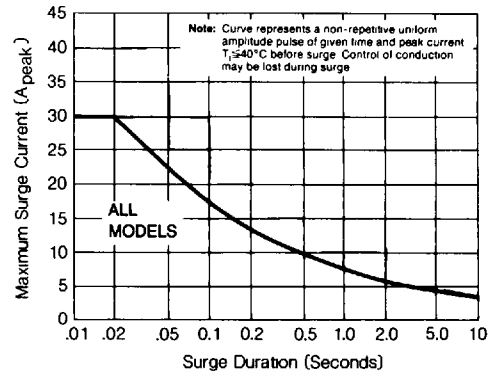


Figure 2. Maximum Allowable Surge

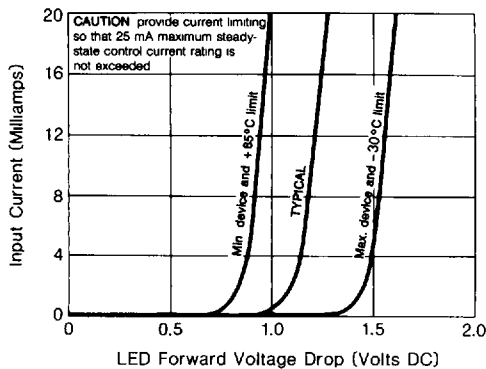


Figure 3. Input Characteristics (Current Controlled)

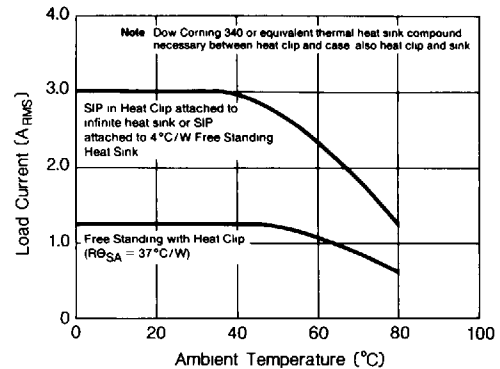


Figure 4. Load Current Under Heat Management

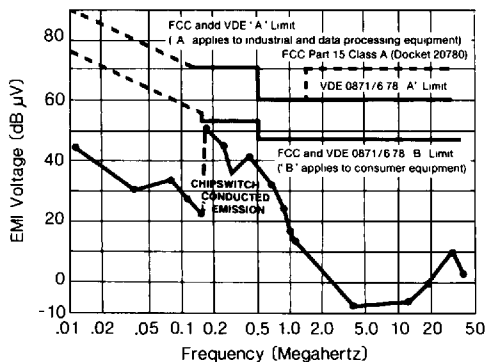
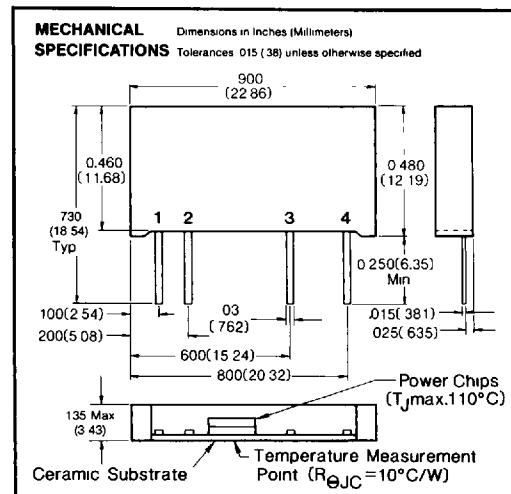


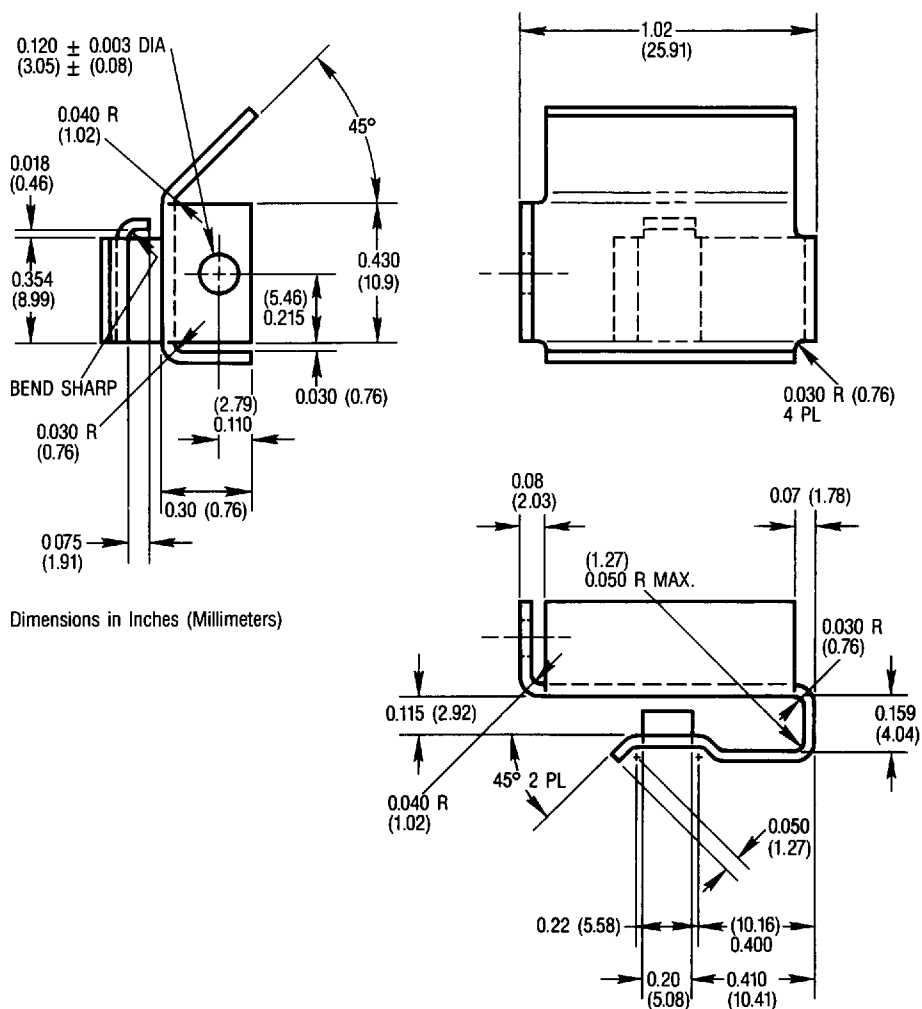
Figure 5. Conducted Electromagnetic Interference. (Measured With SP1XXX and SP2XXX models).



ChipSwitch SIP



The HC-1 Heat Clip is designed to improve the thermal coupling between the SIP Chipswitch and its ambient. The use of a little thermal grease will enhance its performance. The Heat Clip may be used as a stand alone device or it can be used to conveniently couple the SIP to a larger heatsink.



HC-1 Heat Clip, SIP