

INTERNATIONAL RECTIFIER

IR CRYDOM

A-29-07

# SERIES DP

## Integrated Circuit Solid-State Relay

1 Amp  
5-280V AC

### GENERAL DESCRIPTION

The Crydom ChipSwitch uses the exclusive International Rectifier S<sup>3</sup>X power integrated circuit technology to form a fully functioning solid-state relay. The S<sup>3</sup>X technology combines MOS and bipolar processes, derived from IR's HEXFET<sup>®</sup> power MOSFET designs, to eliminate the need for both discrete components and hybrid circuits. The basic ChipSwitch consists simply 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. Voltage controlled models with an internal resistor to limit the control current are also available.

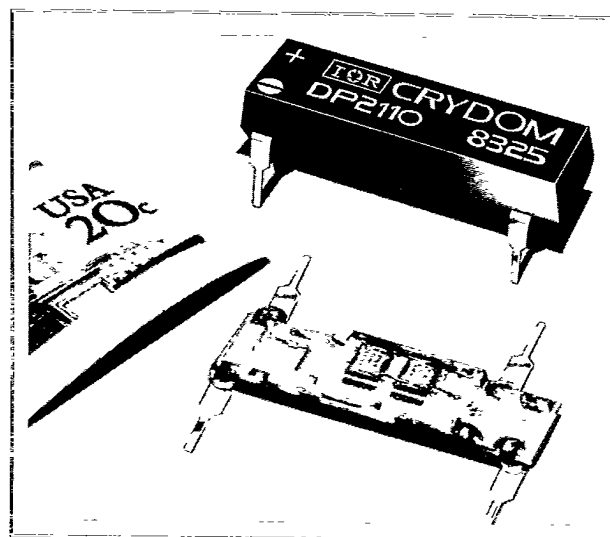
Extreme reliability is achieved by the reduction of component count from approximately 20 discrete components in a conventional SSR to 3 basic components in the ChipSwitch. The power integrated circuits are fabricated in IR's advanced MOSFET fabrication plant which achieves standards of cleanliness,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

The ChipSwitch is a normally open SSR of 1.0 ampere rating with precise zero voltage turn-on and zero current turn-off. EMI emission conforming to the most severe FCC and VDE requirements.

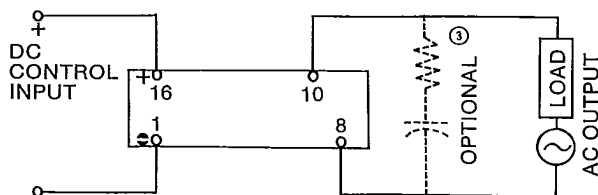
The devices are ideally suited for interfacing microprocessors to AC loads such as small motors, lamps, solenoids, valves, and high power motor starters. The economy of the ChipSwitch allows the in-house manufacturer to replace assemblages of triacs, triac drivers and associated components with a highly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

- S<sup>3</sup>X Power IC Chips ☐
- 30 Amps Surge ☐
- 3750V RMS Isolation ☐
- Zero Voltage Turn-On ☐
- EMI Meets FCC/VDE Limits ☐
- 600V/ $\mu$ sec dv/dt ☐
- 10 Microamps Leakage ☐
- TO-116 Pinout ☐

## ChipSwitch<sup>™</sup>



### WIRING DIAGRAM



### Part Identification

Part No.	Operating Voltage	DC Input Turn-On
DP1110	5 to 140VAC	5 mA
DP1210		10 mA
DP1610		3.5 V
DP2110	5 to 280VAC	5 mA
DP2210		10 mA
DP2610		3.5 V

# GENERAL CHARACTERISTICS

Dielectric Strength — Input/Output		3750	V (RMS)
Insulation Resistance @ 500VDC — Input/Output		10 <sup>9</sup>	Ohms
Max Capacitance — Input/Output		1.0	pf
Ambient Temperature Range	Operating	-30 to 80	°C
	Storage	-40 to 100	°C

# ELECTRICAL SPECIFICATIONS (-30°C ≤ T<sub>A</sub> ≤ 80°C unless otherwise specified)

INPUT CHARACTERISTICS	DP1110	DP1210	DP1610	DP2110	DP2210	DP2610	Units
Control Current Range (see Fig. 3)	5-20	10-20	N/A	5-20	10-20	N/A	mA (DC)
Control Voltage Range (see Fig. 4)	N/A		3.5-7	N/A		3.5-7	V (DC)
Max Reverse Voltage	7.0						V (DC)
Max Turn-On Voltage	N/A		3.5	N/A		3.5	V (DC)
Min Turn-Off Voltage	N/A		0.8	N/A		0.8	V (DC)
Min Input Impedance	N/A		270	N/A		270	Ohms
Max Turn-On Current	5.0	10	N/A	5.0	10	N/A	mA (DC)
Min Turn-Off Current	0.5		N/A	0.5		N/A	mA (DC)
Max Turn-On Time (60 Hz)	8.3						mSec
Max Turn-Off Time (60 Hz)	8.3						mSec

# OUTPUT CHARACTERISTICS

Operating Voltage Range 47-63 Hz	5-140	5-280	V (RMS)
Transient Overvoltage (Non-Repetitive)	300	450	V (peak)
Min Off-State dv/dt (static) ①③ @ Max Rated Voltage (25°C)	600		V/μs
Max Load Current (see Fig. 1) ②	1.0		A (RMS)
Min Load Current	0.5		mA (RMS)
Max Surge Current (Non-Rep.) 20 ms (see Fig. 2)	30		A (peak)
Max Over Current (Non-Rep.) 1 sec	10		A (peak)
Max On-State Voltage Drop @ Rated Current	1.4		V (peak)
Max I <sup>2</sup> T for Fusing (.01 sec)	5		A <sup>2</sup> sec
Max Zero Voltage Turn-On	5.0		V (peak)
Max Peak Repetitive Turn-On Voltage	1.5		V (peak)
Max Off-State Leakage Current @ Rated Voltage	10		A (RMS)

**GENERAL NOTES** ① Off-state dv/dt test method per EIA/NARM standard RS-443 with V<sub>0</sub> equal to the instantaneous peak of the maximum operating voltage.  
② Parameters are met at 0.5 power factor or greater.

③ The application of an RC snubber (see front cover wiring diagram) is good practice when operating inductive loads at high ambient temperatures and under heavy load conditions. Typical values are 0.03 mfd plus 10 ohms. Consult factory for application aid.

Data and specifications subject to change without notice.

## ChipSwitch™ PERFORMANCE CHARACTERISTICS CURVES

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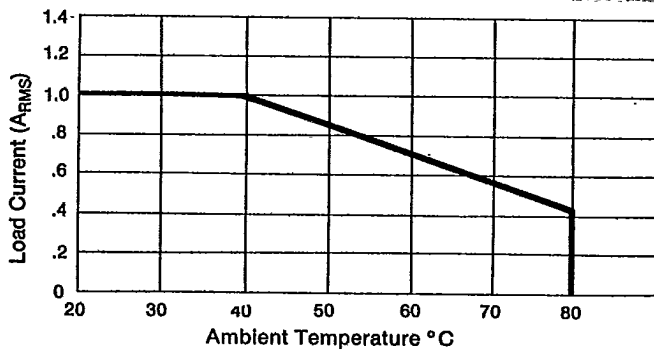


Figure 1. Derating Curve

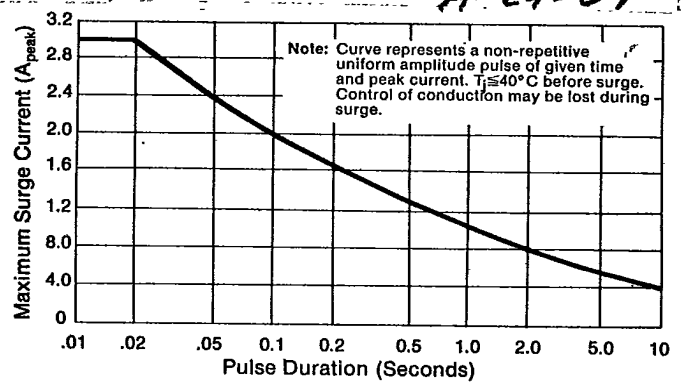


Figure 2. Maximum Allowable Surge

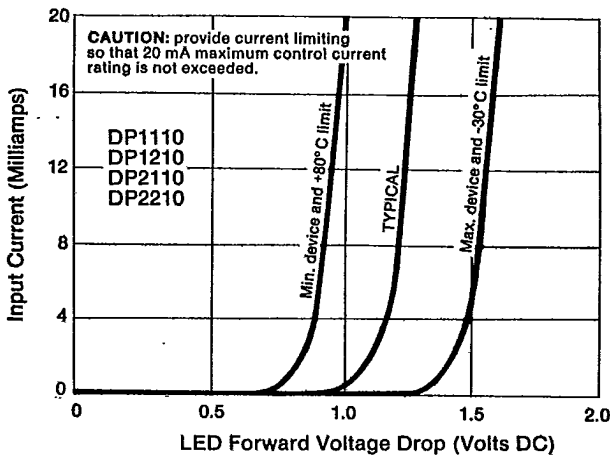


Figure 3. Input Characteristics (Current Controlled)

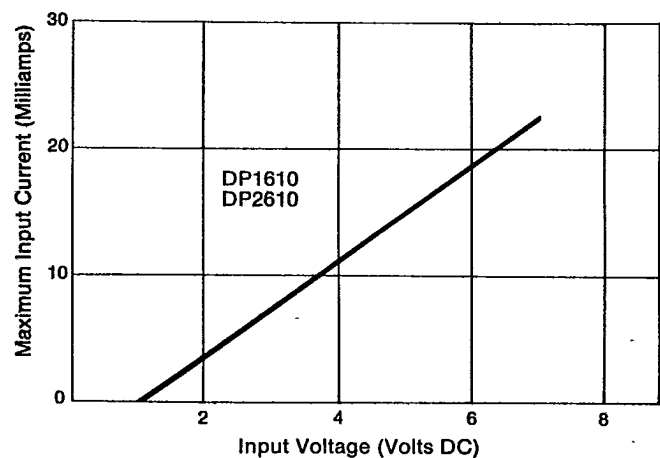


Figure 4. Input Characteristics (Voltage Controlled)

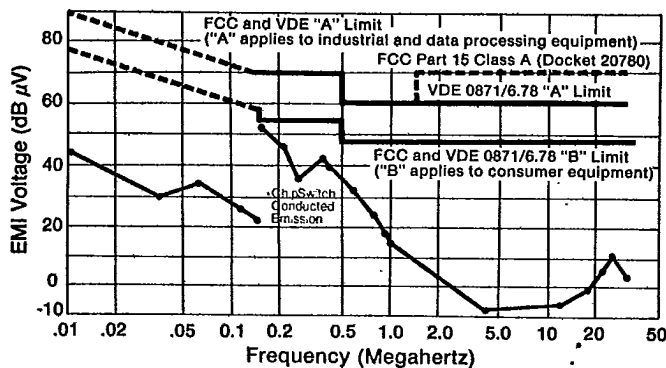


Figure 5. Conducted Electromagnetic Interference

## MECHANICAL SPECIFICATIONS

## ChipSwitch™

- TO-116 Pinout
- Tolerances .015 (.38) unless otherwise specified
- Dimensions in Inches (Millimeters)

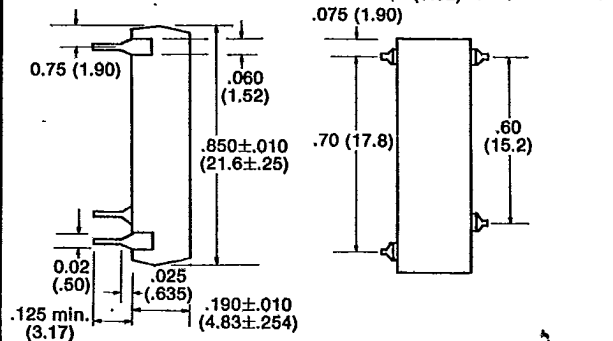


Figure 6.