



Applied Pulsed Power, Inc.™

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Model S33 Solid State Spark Gap Replacement Switch

Using multiple silicon n-type thyristors in series, combining the aspects of SCR thyristors and high di/dt capability, Applied Pulsed Power, Inc. (APP) provides high voltage solid state spark gap replacement switches.

This switch features:

- Up to 60kV Peak Off-State Voltage
- 14kA Peak Non-Repetitive Current
- 30kA/μS Maximum di/dt
- 100nS turn-on delay time
- Low Inductance
- Simple isolated trigger requires only a single 1A, 15V pulse.
- Compact
- 10kA Ringing Discharge

This solid state spark gap replacement switch consists of multiple silicon thyristors in series connected to our proprietary trigger circuit. Our proprietary trigger circuit results in a compact switch with a simple trigger connection that is isolated from the switch by the full switch voltage rating. The thyristors are designed specifically for high di/dt, high voltage, pulsed power applications, and are capable of a peak off-state voltage of over 5000 volts. The switch can be made from as few as 2 to as many as 12 thyristors in series.

Operational Ratings (T_j=80°C, unless otherwise specified)

Peak Non-Repetitive Current	14000	Amps
Peak Repetitive Current (10μsec pulse, 60pps ¹)	10000	Amps
Peak di/dt	30	kA/μSec
Maximum RMS On-State Current (T _j =120°C)	100	Amps
Operating Temperature Range	-40 to +120	°C
Peak Rate of Reapplication of Off-State Voltage	1000	V/μSec

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Operational Characteristics

Trigger Voltage	15	Volts
Trigger Isolation Voltage	60	kV
Typical Leakage Current (Tj=25°C)	1	µAmp
(Tj=80°C)	40	µAmp
(Tj=120°C)	800	µAmp
Turn-On Delay	100	nSec
Turn-On Delay Jitter	<2	nSec
Switch footprint	4" x 2" (100mm x50mm) ¹	

Part Number Selection Guide

Part Number	Peak Off-State Voltage Rating	Maximum DC Voltage Rating	Switch Length
S33-2	10.7 kV	8 kV	3.5"
S33-3	16 kV	12 kV	4.5"
S33-4	21.3 kV	16 kV	5.5"
S33-5	26.7 kV	20 kV	6.5"
S33-6	32 kV	24 kV	7.5"
S33-7	37.3 kV	28 kV	8.5"
S33-8	42.7 kV	32 kV	9.5"
S33-9	48 kV	36 kV	10.5"
S33-10	53.3 kV	40 kV	11.5"
S33-11	58.7 kV	44 kV	12.5"
S33-12	64 kV	48 kV	13.5"

Higher current switches are available by using parallel thyristors on each stage. Contact Howard D. Sanders, hds@appliedpulsedpower.com, for more information.

APP also provides complete pulsed power systems. Contact Steven C. Glidden, scg@appliedpulsedpower.com, for more information.

Note 1: Switch size is dependent upon pulse width, peak current, and repetition rate. Higher power switches may require a larger footprint for proper cooling while lower power switches can have a smaller footprint. Switches can be made to fit customer specifications for dimensions and location of electrical connections.