

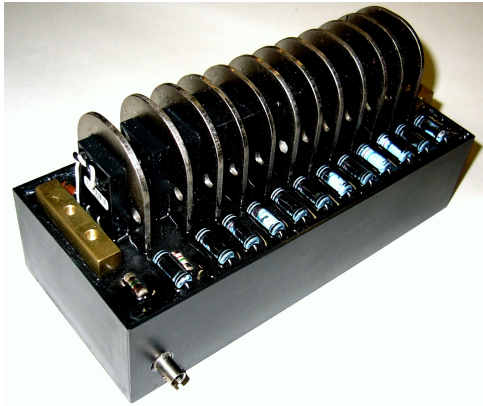


# Applied Pulsed Power™

A Division of Silicon Power Corporation

280 Great Valley Parkway  
Malvern, PA 19355-1308

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www.appliedpulsedpower.com



## Model S33A Compact High Voltage Solid State Switch

The Model S33A is a compact high voltage switch for low repetition rate pulsed power systems. It can be used to replace Thyatron as well as gas and vacuum triggered spark gap switches in high voltage applications such as Marx generators and pulsed magnet drivers. The model S33A can handle 40kA/ $\mu$ s, 14kA peak, damped-oscillating currents.

This solid state switch consists of multiple series connected thyristors specifically designed for high di/dt, high voltage, pulsed power applications. The trigger can be either a single low voltage electrical or a standard fiber-optic trigger, making triggering much easier than for Thyatron or triggered spark gap switches.

### Operational Ratings (T<sub>j</sub>=80 °C, unless otherwise specified)

|  |         |               |
|--|---------|---------------|
| Peak Non-Repetitive Forward Current                          | 14000   | Amps          |
| Peak Repetitive Forward Current (5 $\mu$ sec pulse, 10 pps)  | 9000    | Amps          |
| Peak di/dt   | 40      | kA/ $\mu$ Sec |
| Maximum RMS On-State Current (T <sub>j</sub> =120 °C)        | 100     | Amps          |
| Operating Temperature Range                                  | 0 to 60 | °C            |
| Peak Rate of Reapplication of Off-State Voltage <sub>1</sub> | 1000    | V/ $\mu$ Sec  |
| Peak Pulse Repetition Rate                                   | 10      | Hz            |

### Operational Characteristics

|                                       |                          |     |           |
|---------------------------------------|--------------------------|-----|-----------|
| Typical Leakage Current               | (T <sub>j</sub> =25 °C)  | 200 | $\mu$ Amp |
|                                       | (T <sub>j</sub> =80 °C)  | 200 | $\mu$ Amp |
|                                       | (T <sub>j</sub> =120 °C) | 800 | $\mu$ Amp |
| Turn-On Delay (from external trigger) |                          | 120 | nSec      |
| Turn-On Delay Jitter                  |                          | <2  | nSec      |
| Turn-Off Time                         | (T <sub>j</sub> =25 °C)  | 1   | mSec      |
|                                       | (T <sub>j</sub> =60 °C)  | 2   | mSec      |
|                                       | (T <sub>j</sub> =120 °C) | 5   | mSec      |



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## Part Number Selection Guide

| Part Number | Peak Off-State Voltage Rating | Maximum DC Voltage Rating | Parallel Resistance | Capacitance | Switch Length (Z) | W (inch) |
|-------------|-------------------------------|---------------------------|---------------------|-------------|-------------------|----------|
| S33A-2-x    | 10 kV                         | 8 kV                      | 44 MΩ               | 2.4 nF      | 2.5 ”             | 2        |
| S33A-3-x    | 15 kV                         | 12 kV                     | 66 MΩ               | 1.6 nF      | 3.0 ”             | 2.5      |
| S33A-4-x    | 20 kV                         | 16 kV                     | 88 MΩ               | 1.2 nF      | 3.5 ”             | 3        |
| S33A-5-x    | 25 kV                         | 20 kV                     | 110 MΩ              | 960 pF      | 4.0 ”             | 3.5      |
| S33A-6-x    | 30 kV                         | 24 kV                     | 132 MΩ              | 800 pF      | 4.5 ”             | 4        |
| S33A-7-x    | 35 kV                         | 28 kV                     | 154 MΩ              | 690 pF      | 5.0 ”             | 4.5      |
| S33A-8-x    | 40 kV                         | 32 kV                     | 176 MΩ              | 600 pF      | 5.5 ”             | 5        |
| S33A-9-x    | 45 kV                         | 36 kV                     | 198 MΩ              | 540 pF      | 6.0 ”             | 5.5      |
| S33A-10-x   | 50 kV                         | 40 kV                     | 220 MΩ              | 480 pF      | 6.5 ”             | 6        |
| S33A-11-x   | 55 kV                         | 44 kV                     | 242 MΩ              | 440 pF      | 7.0 ”             | 6.5      |
| S33A-12-x   | 60 kV                         | 48 kV                     | 264 MΩ              | 400 pF      | 7.5 ”             | 7*       |

\*: This unit also has an additional pair of threaded inserts located at W/2. See Figure 2.

### S33A Trigger Options (-x in model number)

|              |  |
|--------------|--|
| -F (Default) | Fiber-optic with ST style bayonet (850 nm, 1 mW)   |
| -T           | Electrical trigger (15 V, 1 A, fast rising pulse)  |
| -E           | External trigger circuit required<br>(provides the shortest turn-on time, contact factory for details) |
| -B           | Fiber-optic with FSMA style bayonet (850 nm, 1 mW)   |

### Note:

(1) -E option only. For other versions the peak rate of reapplication of off-state voltage should be less than 100 V/μSec

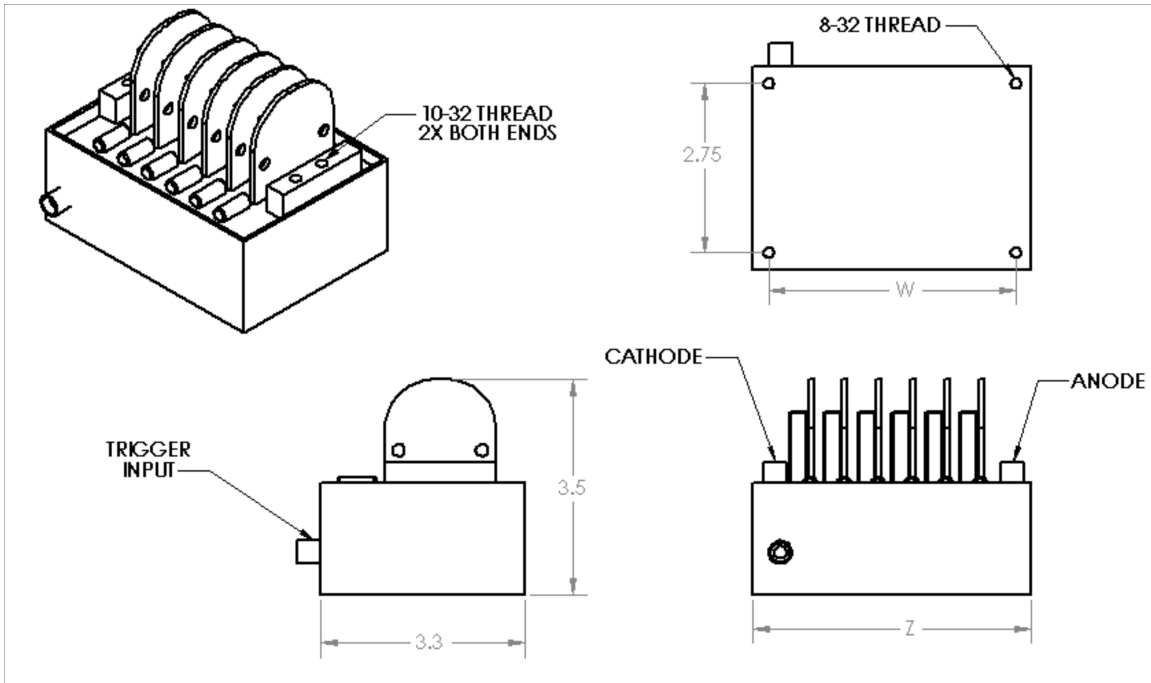


Figure 1: S33A Dimensions (see Figure 2 for additional details on S33A-12-x)

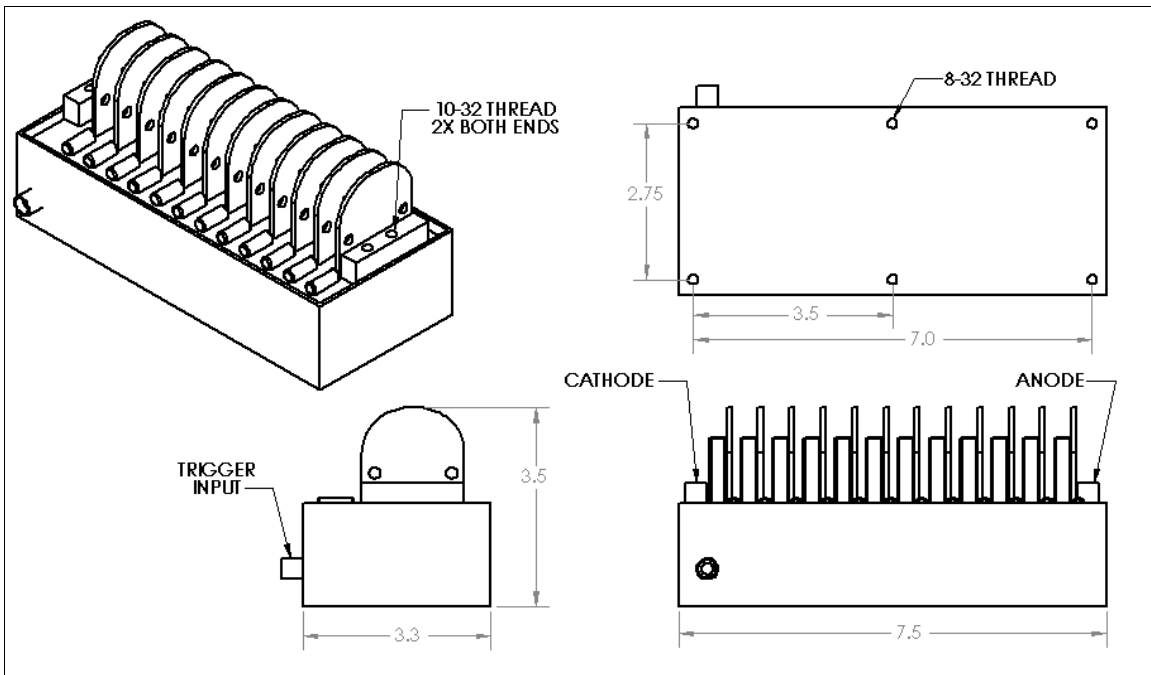


Figure 2: S33A-12-x Dimensions