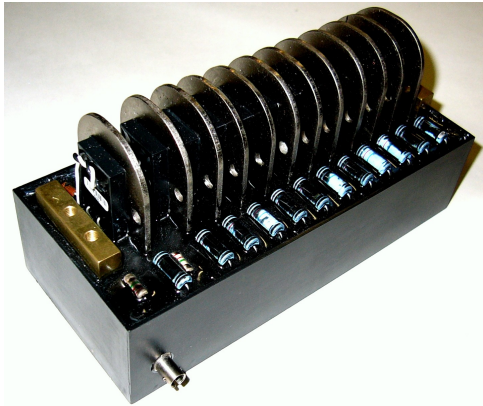




## Applied Pulsed Power, Inc.™

2025 Dryden Road  
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### 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, 10pps) | 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            | 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     |
|-------------|-------------------------------|---------------------------|---------------------|-------------|-------------------|-------|
| S33A-2-x    | 10kV                          | 8kV                       | 44MΩ                | 2.4nF       | 2.5"              | 2.0"  |
| S33A-3-x    | 15kV                          | 12kV                      | 66MΩ                | 1.6nF       | 3.0"              | 2.5"  |
| S33A-4-x    | 20kV                          | 16kV                      | 88MΩ                | 1.2nF       | 3.5"              | 3.0"  |
| S33A-5-x    | 25kV                          | 20kV                      | 110MΩ               | 960pF       | 4.0"              | 3.5"  |
| S33A-6-x    | 30kV                          | 24kV                      | 132MΩ               | 800pF       | 4.5"              | 4.0"  |
| S33A-7-x    | 35kV                          | 28kV                      | 154MΩ               | 690pF       | 5.0"              | 4.5"  |
| S33A-8-x    | 40kV                          | 32kV                      | 176MΩ               | 600pF       | 5.5"              | 5.0"  |
| S33A-9-x    | 45kV                          | 36kV                      | 198MΩ               | 540pF       | 6.0"              | 5.5"  |
| S33A-10-x   | 50kV                          | 40kV                      | 220MΩ               | 480pF       | 6.5"              | 6.0"  |
| S33A-11-x   | 55kV                          | 44kV                      | 242MΩ               | 440pF       | 7.0"              | 6.5"  |
| S33A-12-x   | 60kV                          | 48kV                      | 264MΩ               | 400pF       | 7.5"              | 7.0"* |

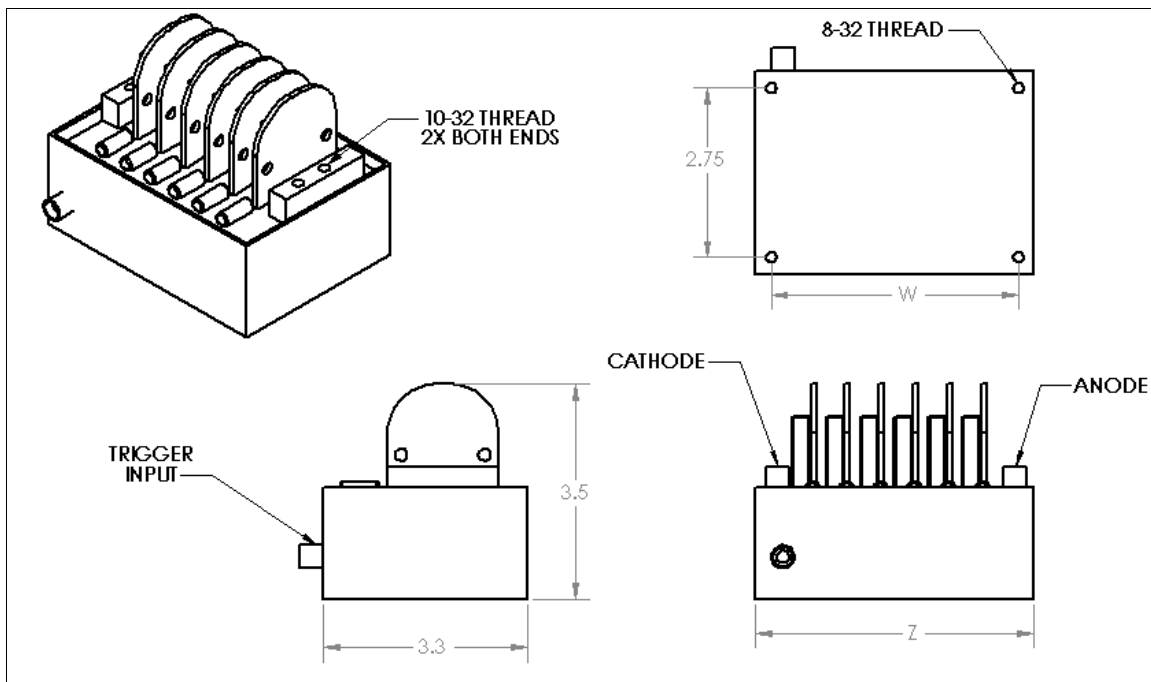


Figure 1: S33A Dimensions (see Figure 2 for additional details on S33A-12-x)

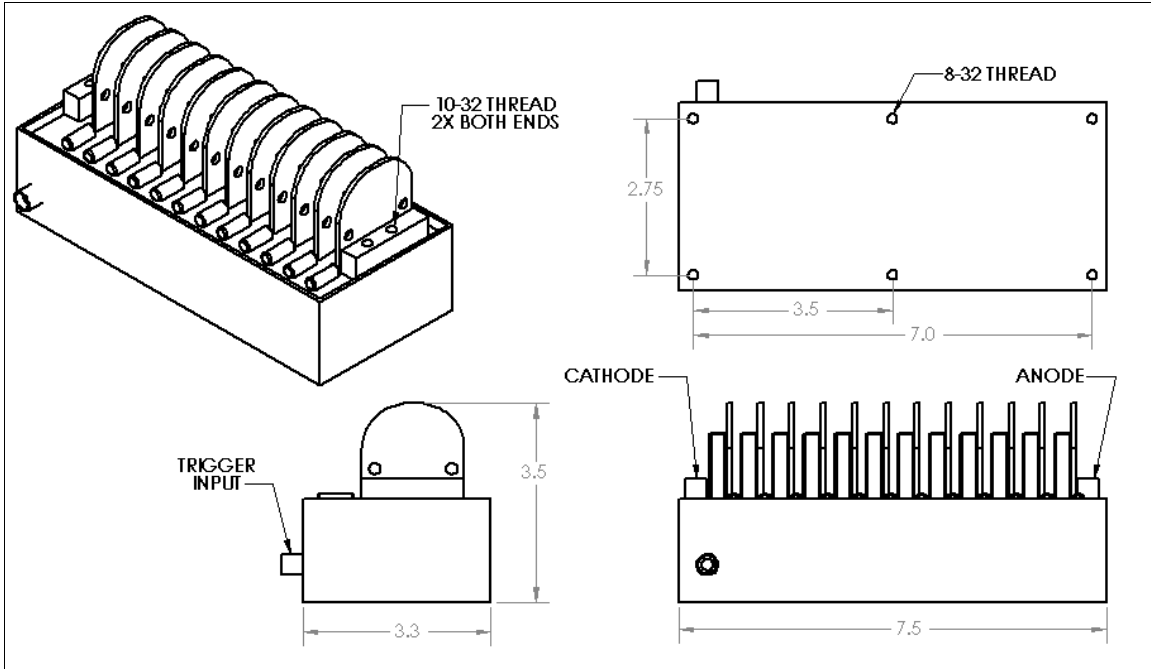


Figure 2: S33A-12-x Dimensions

\*: 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 (850nm, 1mW)   |
| -T           | Electrical trigger (15V, 1A, 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 (850nm, 1mW)   |

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

APP also provides complete pulsed power systems. Contact Steven C. Glidden, [scg@appliedpulsedpower.com](mailto:scg@appliedpulsedpower.com), for more information.

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.