

Surge Protection Devices SPDs

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Assumptions

Men don't read instructions (except tools, of course)

You've probably never learned anything about
Surge Protection Devices

You probably have old (over 4 years) plug-in
SPDs in your house that should be replaced

What is a surge?

Figure 1 illustrates two typical transients. They are measured by duration (50 ns to 2 ms), rise time (10 ns to 100 μ s), frequency (20 Hz to 20 MHz, ringing transients), and voltage (up to 20 kV).

Typically nanosecond events

May be high voltage - typically about 7KV

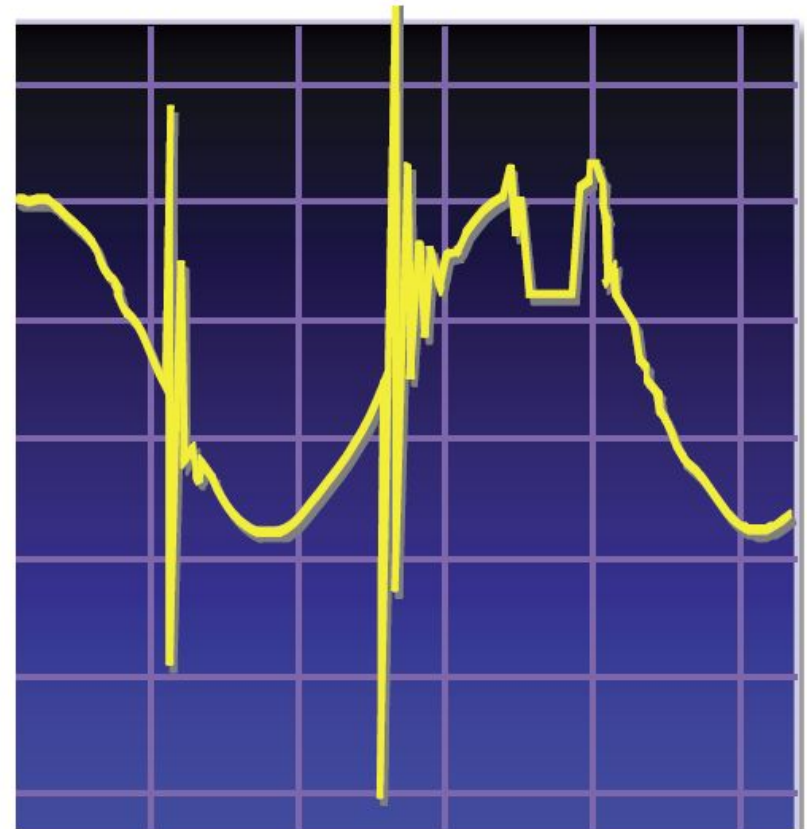


Figure 1. The first transient (left) is an impulse transient, typically associated with external events; the second transient is a ringing (oscillatory) transient typically associated with internal switching events. Ringing transients also occur as external transients enter the system.

Where do surges come from?

Utility events - transformer or capacitor bank switching ...

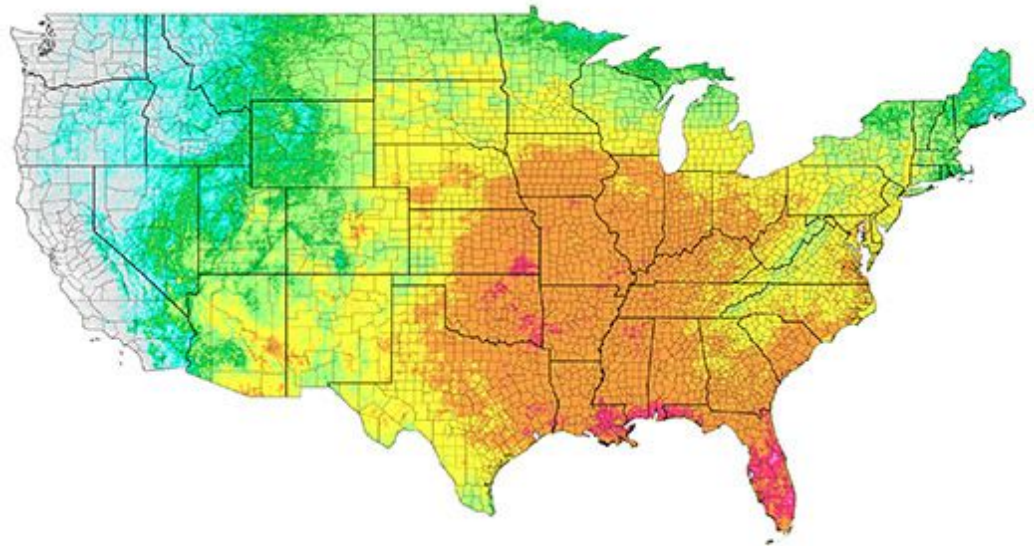
Motors stopping and starting

Appliances - e.g. spark ignitors

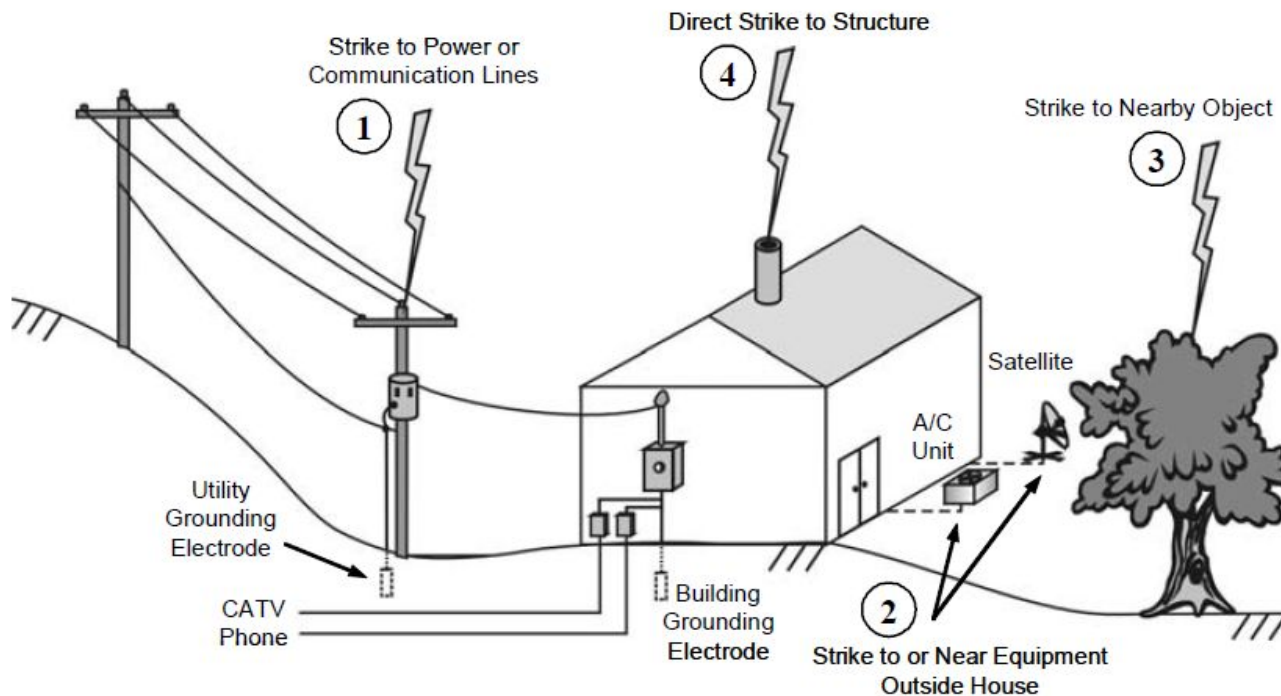
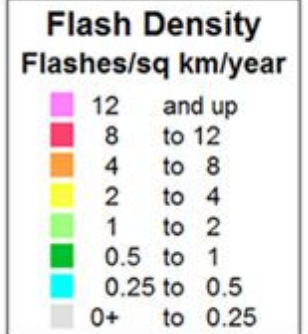
Faulty wiring - arcs ...

Static electricity

Lightning



**National Lightning Detection Network
2005 - 2014**



Protecting Electronics

A lot more electronics in your house and shop than you might think

Variable speed tools, battery chargers,
Sawstop ...

Appliances, A/C, furnace, computers, LED
lights ...

**Nothing will protect against a direct
lightning strike - except unplugging**

How do I choose?

Marking:

UL1449 Listed (tested by UL)

Voltage Protection Rating - the maximum let-through voltage

- 330 Volts or less (best)

- 400 Volts (good)

- 500 Volts or higher - may not protect electronics

Surge Protection Devices (SPDs)

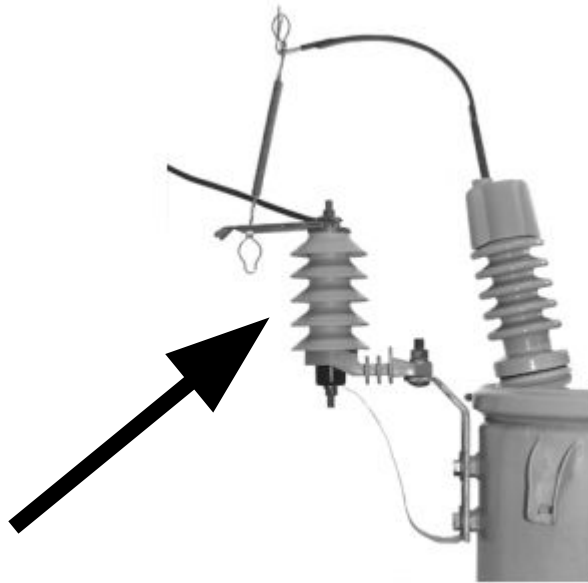
Also known as Surge Suppressors or Transient Voltage Surge Suppressors (TVSS)

Levels of Surge Protection

At the utility transformer

Typical let-through voltage: 7000-15,000

Designed to protect their equipment



At the meter

At the Meter Box, UL Type 1
Duke Energy Strike Stop: \$3/month
Typical let-thru voltage: 600-1000V
Replace every 10 years



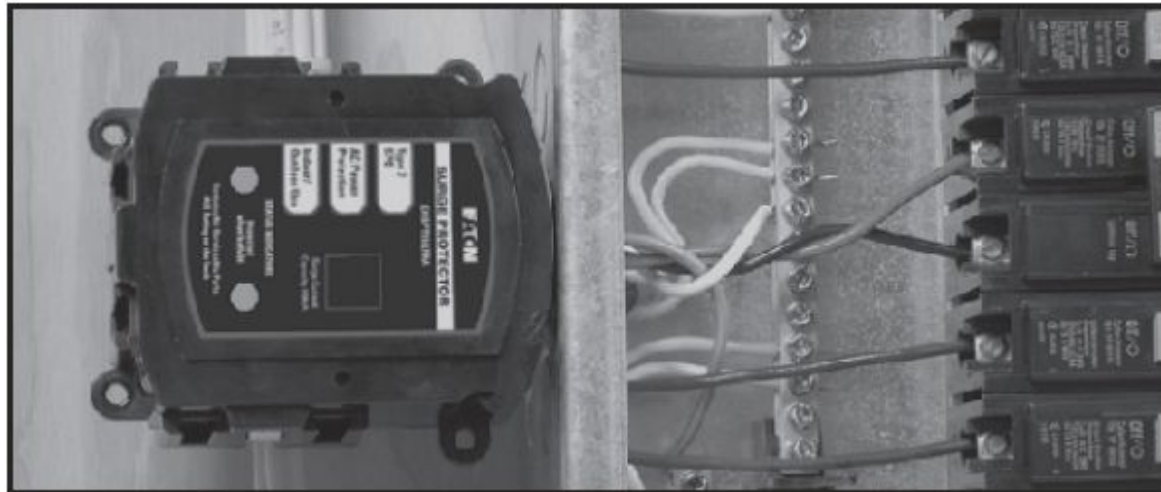
Whole House

Installed in the breaker panel

UL Type 2

Typical max let-thru voltage: 600-1000V

Adds protection against events originating in the house



Whole House



Eaton
CHSPT2Ultra
~\$115 each



Eaton
CHSPCable
~\$45 each

CHSPCABLE

- Protects 2 quad shield cables
- Bi-directional cable
- 10kA Surge Current Capacity, per line
- 145V DC breakdown voltage
- *\$10,000 warranty

Plug-in Style

UL Type 3

Two types:

- MOV (Metal Oxide Varistor) - inexpensive and should be replaced every 3-4 years

- Typically fails by melting or exploding the MOVs
- Joule ratings are meaningless

- Series - more expensive, better specs, longer life
- Uses inductors and capacitors to limit voltage

MOV style



Roll over image to zoom in

Tripp Lite

Tripp Lite Protect It! 10 outlet 2395 Joule Surge Suppressor w/ 8ft cord (TLP1008TEL)



1,109 customer reviews | 140 answered questions

Amazon's Choice for "tripp lite surge protector"

Price: \$27.61 ✓prime

Note: Available at a lower price from other sellers, potentially without free Prime shipping.

In Stock.

Ships from and sold by Amazon.com. Gift-wrap available.

Style: 10 Outlet + TEL

10 Outlet + TEL

\$27.61

✓prime

10 Outlet + TEL/TV

\$27.83

✓prime

10 Outlet + TEL/TV/NET

\$77.25

✓prime

12 Outlet + TEL

\$25.34

✓prime

12 Outlet + TEL/TV

\$31.24

✓prime

12 Outlet + TEL/TV/NET

\$33.99

✓prime

~\$28 each
400V let-thru



APC

APC 11-Outlet Surge Protector 3020 Joules with Phone, Network Ethernet and Coaxial Protection, SurgeArrest Performance (P11VNT3)



1,903 customer reviews | 185 answered questions

Amazon's Choice for "apc surgearrest"

Price: \$25.99 ✓prime

In Stock.

Ships from and sold by Amazon.com. Gift-wrap available.

Style: P11VNT3

P11GTV

\$33.08

✓prime

P11U2

used from \$57.58

P11VNT3

\$25.99

✓prime

~\$26 each
400V let-thru



Belkin

Belkin 12-Outlet Power Strip Surge Protector with 10-Foot Cord and Telephone, Ethernet, Coaxial Protection, BE112234-10

★★★★★ 8,944 customer reviews | 443 answered questions

Amazon's Choice for "10ft surge protector"

Was: \$24.88

Price: **\$23.12** ✓prime

You Save: \$1.76 (7%)

In Stock.

Ships from and sold by Amazon.com.

Size: **10'**



Style: **12-Outlet**

~\$23 each
500V let-thru

Series Type

Furman

Furman PST-8 SMP EVS LiFT
15-Amp Aluminum Chassis 8-
Outlet Cable and Telco
Protection Advanced Level
Power Conditioning



~\$200 each
188V let-thru
3yr warranty

ZeroSurge



8R Series

8R15W-I - #002-00713

\$252 – 9 lbs.

- > 8 outlets (2 always on, 6 controlled by an on/off switch) with 15 Amp capacity and a built-in circuit breaker to prevent overloading
- > Isolated duplex receptacles help prevent cross-talk when mixing digital and analog equipment or for isolating items with a large in-rush current
- > 6 foot, 14 gauge power cord with wall hugging right angle plug and magnetic shielded steel enclosure
- > Non-sacrificial filter technology repeatedly suppresses worst case surges and removes EMI/RFI noise disturbances from the power line without wear or degradation to the components
- > Certified to UL Standards, Made in USA, 10 year warranty

~\$250 each
300V let-thru
10yr warranty

Summary

Probably more to the subject than you thought

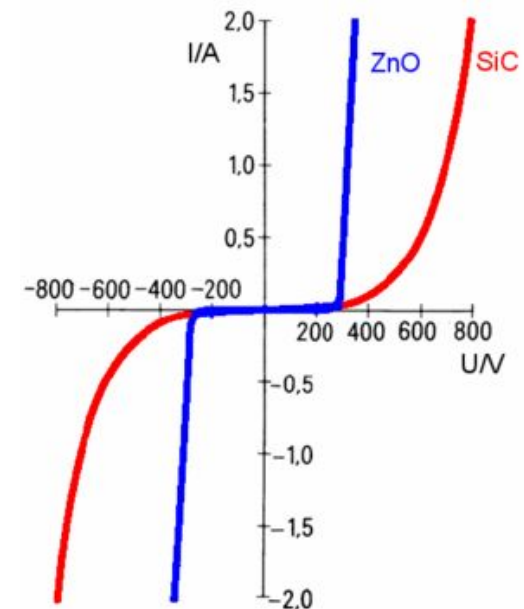
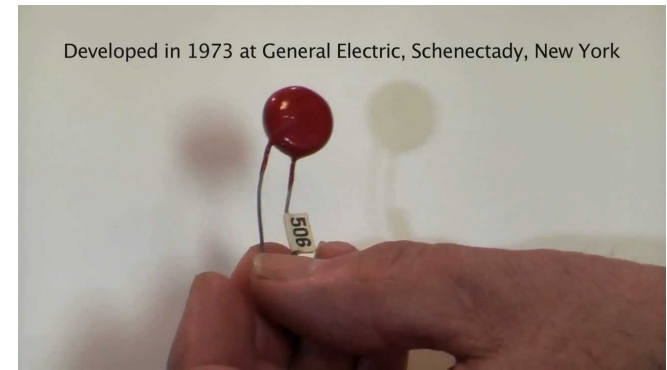
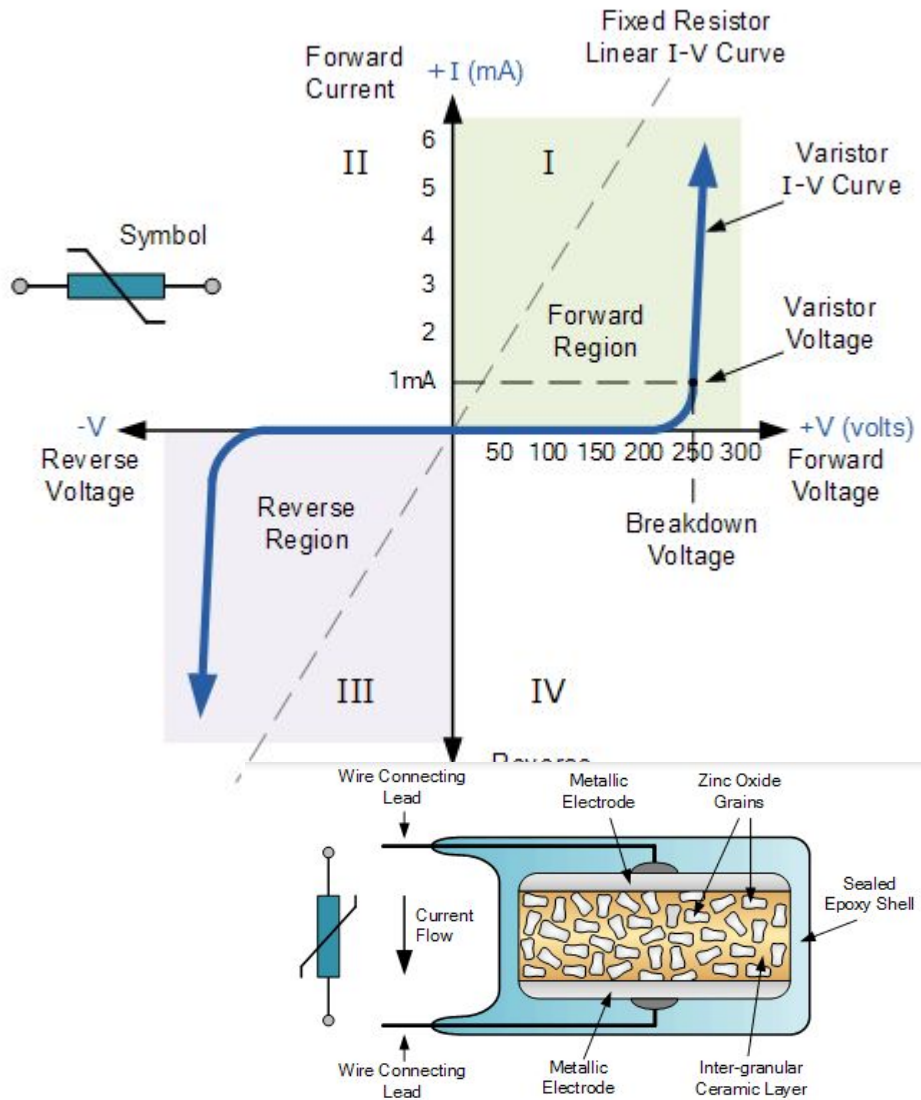
Like most things, you get what you pay for

Only protection in a lightning storm is to unplug

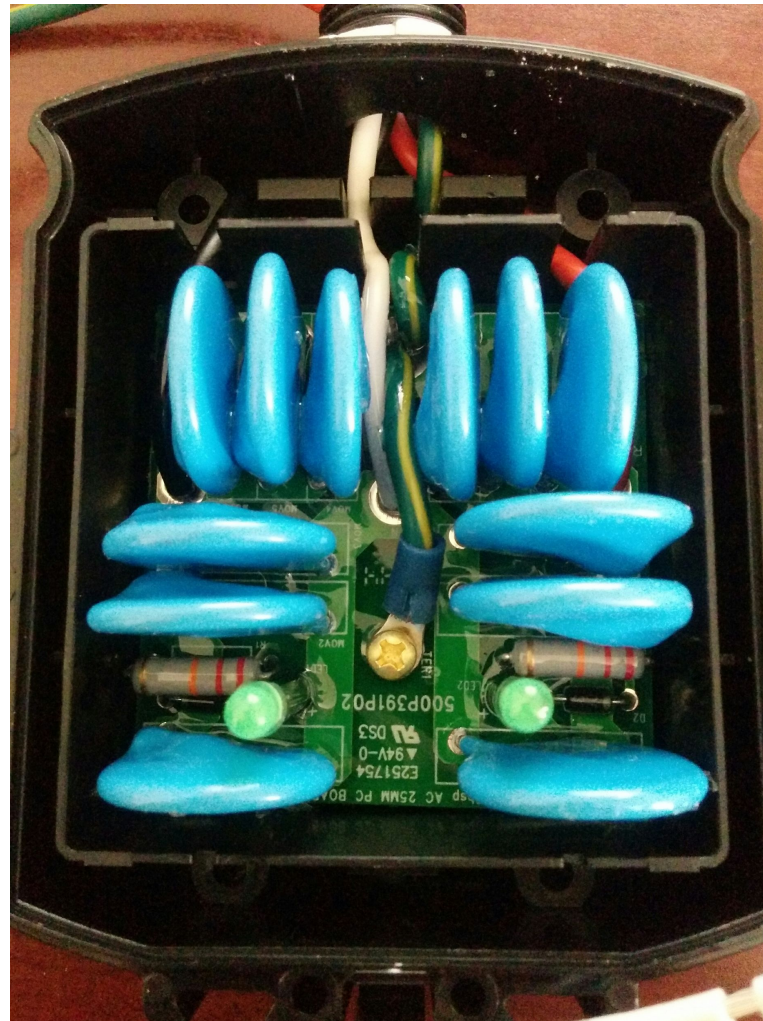
Replace those old ones!

Backup

How an MOV works

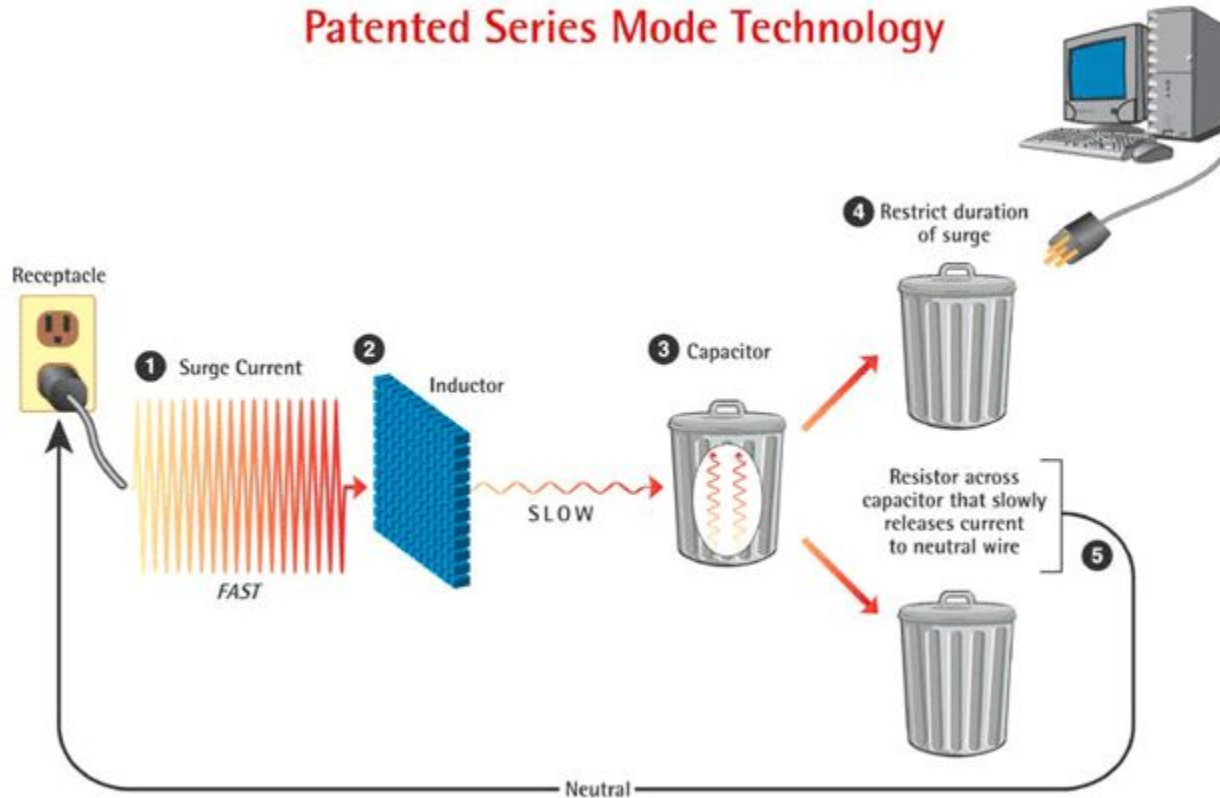


Inside Eaton CHSP2ULTRA



ZeroSurge

Patented Series Mode Technology



Inside ZeroSurge

