Eaton's Residential Surge Protection Product Line

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Powering Business Worldwide

HomeSphere The Building Universe

Presenter Information

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Agenda

- Surge Technical Overview
- Eaton Product Offering
- Homeowner Value
- Available Resources
- Question & Answer

Surge Technical Overview

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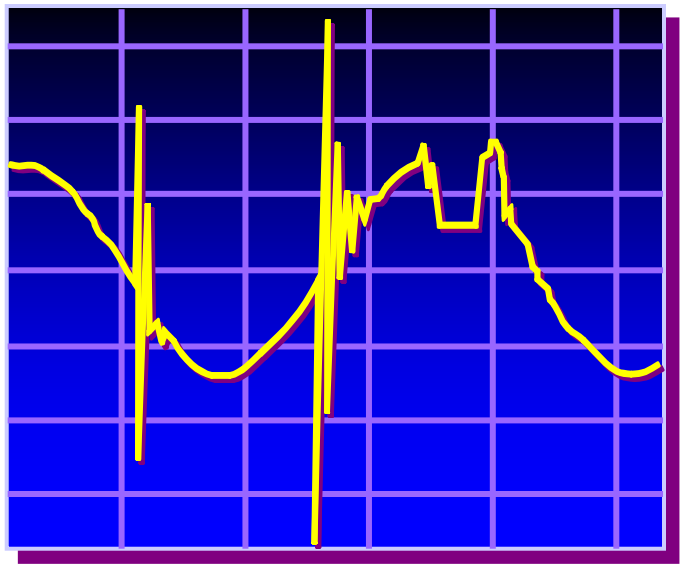
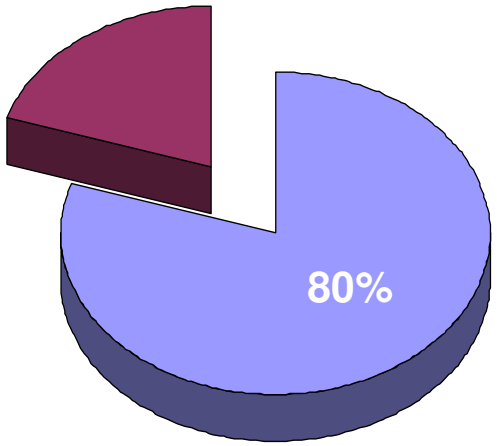
What is a Surge?

Surge

- Also known as a transient
- Simply put: It is a random, high energy, short duration electrical disturbance
  - A subcycle disturbance in the AC waveform that is evidenced by a sharp, brief discontinuity of the waveform
- Often nano or micro-seconds in duration



Where Do Surges Come From?



80% Internal

- Air Conditioner
- Furnace
- Garage Door
- Power Tools
- Any Motor Load Turning On & Off

20% External

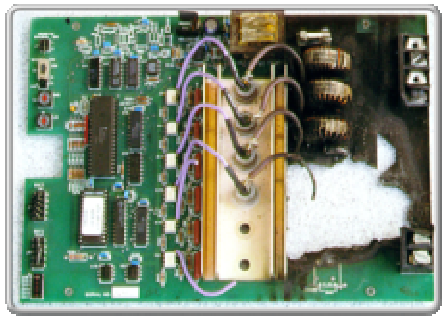
- Lightning
- Power Companies Switching Loads

Although most homeowners associate lightning with surges, most originate inside the home.

Harm Caused by Surges

Voltage surges or transients damage electronic equipment by delivering more voltage than the electronics can handle.

- The effect is very similar to applying too much water pressure to a hose. If there is too much water pressure, the hose will burst.
- The same thing happens when too much electrical pressure runs through a circuit board. The circuit board “bursts.”

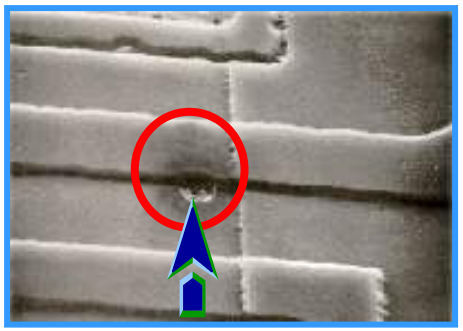


Harm Caused by Surges

If a surge does not initially damage the electronics, it will reduce its life span

- Similar to hot water over an ice cube, the first touch does not melt it… but if enough hot water is poured the ice cube is completely gone.
- Can cause issues with electronics
- Like electronic rust

Impact to Electronic Loads	Impulse 4x	Impulse 2x	Repetitive Disturbanc (noise)
Circuit Board Failure	Yes	Yes	
Data Transmission Errors	Yes	Yes	Yes
Memory Scramble	Yes	Yes	Yes
Hard Disk Crash	Yes		
SCR Failure	Yes		
Process Interrupt	Yes	Yes	Yes
Power Supply Failure	Yes		
Program Lock Up	Yes	Yes	Yes



How Do Surges Travel?

Travel On:

- AC Power Lines
- Cable Lines
- Telephone Lines
- Network Cables

- Protection for all surge paths is necessary for complete home protection

Electricity is *FAST*

How fast does electricity travel?

- 186,000 mps – near the speed of light (186,246 mps)
- Electricity and surges will travel 11 inches in 1 nano second
- Surge protection needs to work fast and be near the source to be effective
- Surge protection should have as short as possible leads to reduce electrical surge travel time

How do surge protectors work?

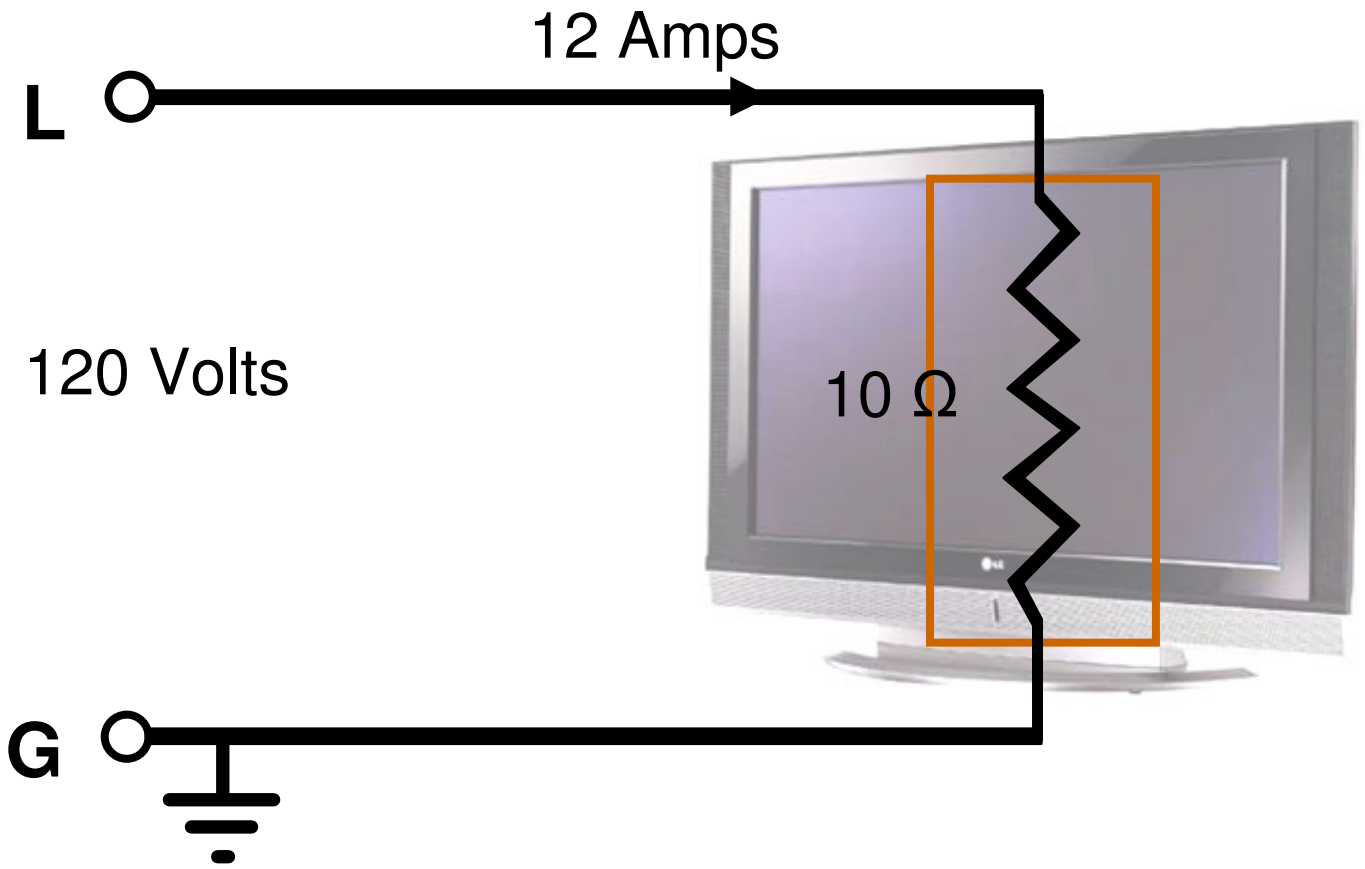
- Metal Oxide Varistors (MOVs) are contained within Eaton's surge protectors
- MOVs turn on when the a surge is detected
- The MOV clamps the voltage and immediately sends it to ground
- Very simple, effective operation

Complete Home Surge Protector

Surge Suppressors Act As “Pressure Relief Valves”

- The ideal surge suppressor shunts harmful surge current to **ground** and appears as a high impedance under normal operating conditions
- The surge suppressor is a self sacrificing device – bearing the brunt of harmful surge currents

Normal Operation - No Protection



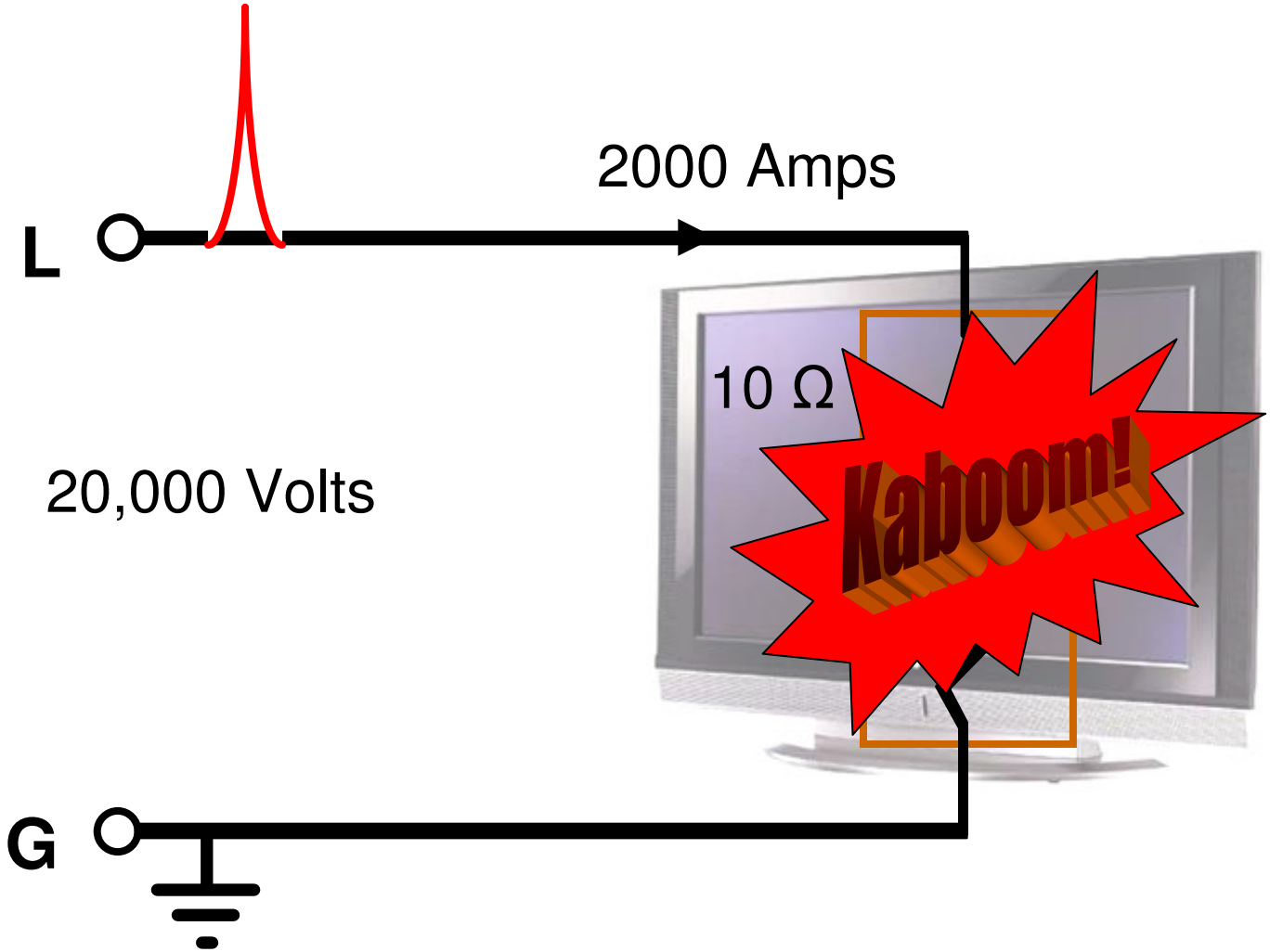
Ohms Law

I=V/R

I=120V/10Ω

I=**12** Amps

Surge - No Protection



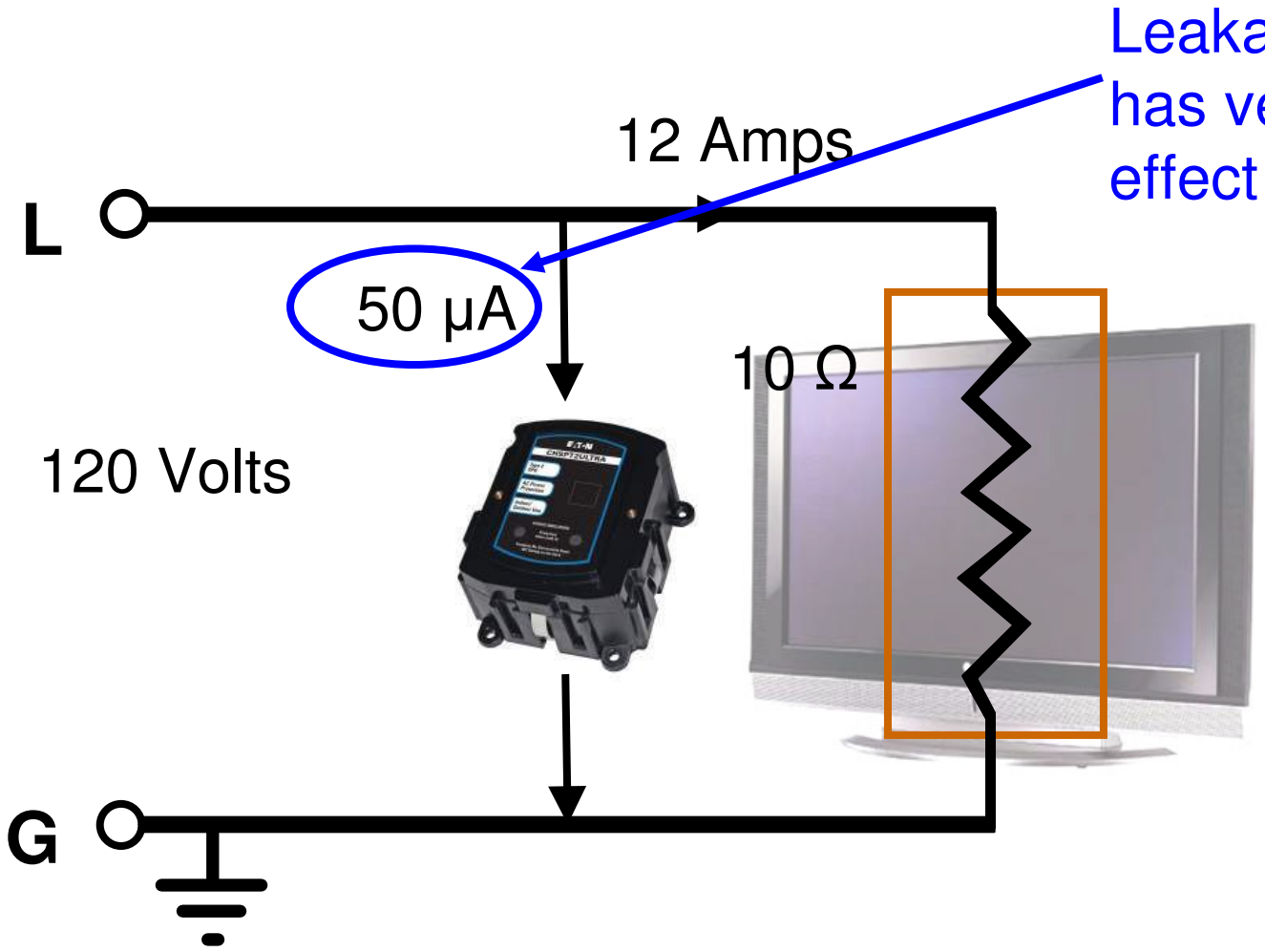
Ohms Law

I=E/R

I=20kV/10Ω

I=**2000** Amps

Normal Operation - Protection



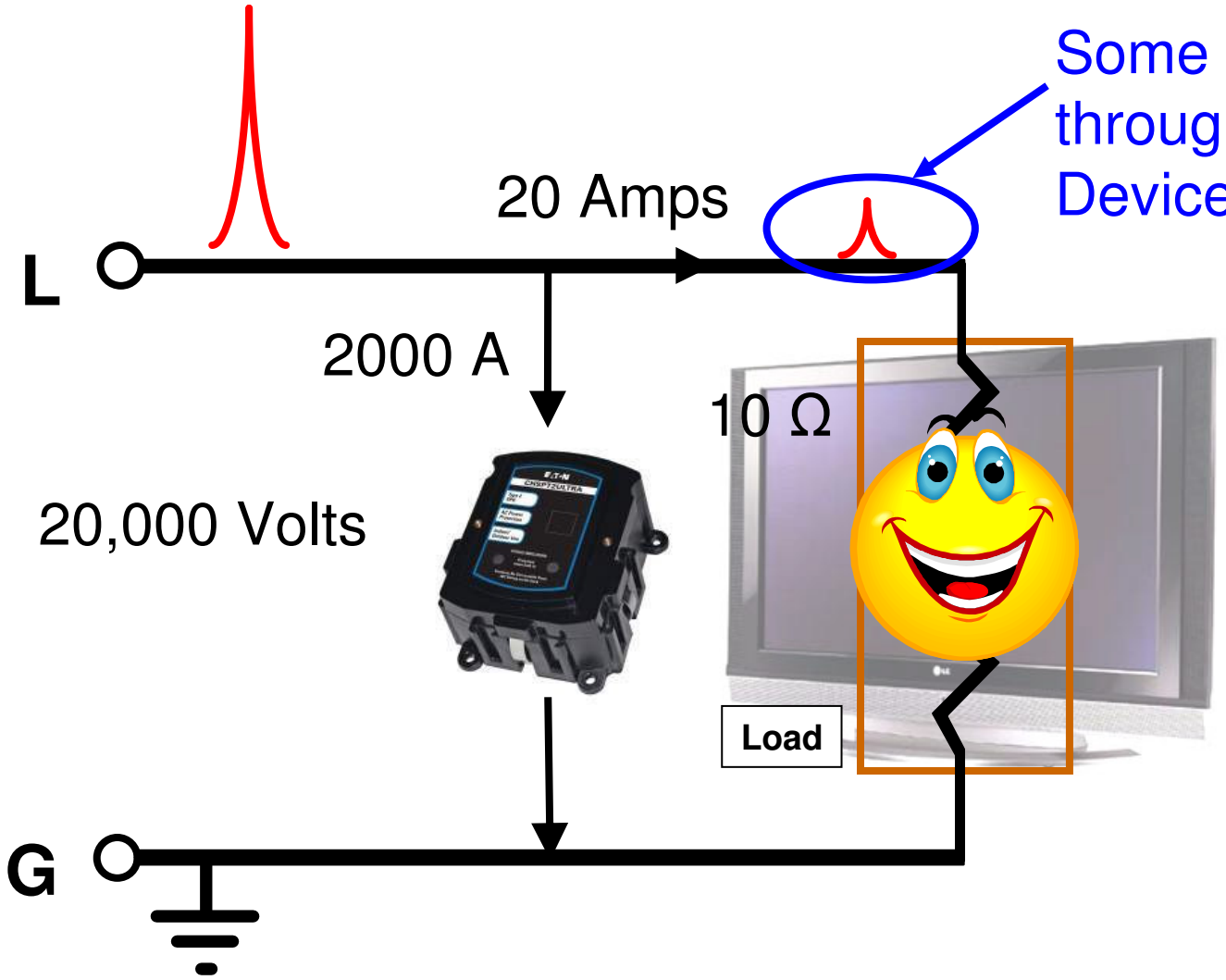
Ohms Law

I=E/R

I=120V/10Ω

I=**12** Amps

Surge - With Protection



Ohms Law

I=E/R

I=200V/10Ω

I=**20** Amps

Common Surge Vocabulary

- Surge Current Capacity, Per Phase Rating
  - Measured in amperage
  - Expresses the maximum amount of surge current a SPD can shunt to ground during a surge event on one phase
  - Indicator of life or longevity expectations of a SPD
  - Also referred to as “single impulse rating”, “maximum surge current rating” or “life rating”
  - Look for: High amperage ratings

Higher Rating, The Better

How long do they last?

Surge Current Capacity, Per Phase Rating
is a predictor of how long a surge device will last in a given environment

The Higher the kA, the Longer the Life of the MOVs

Similar to the tread on a tire…

The Thicker the Tread, the Longer the Tire will Last

Common Surge Vocabulary

- Nominal Discharge Current Rating (I_n)
  - Measured in amperage
  - Indicator of the “ruggedness” or “robustness” of a SPD
  - Measure of how the SPD performs when installed and subjected to operating scenarios closer to real life situations
  - Look for: High amperage ratings

Higher Rating, The Better

Common Surge Vocabulary

- Nominal Discharge Current tests the complete SPD under strenuous “real life” scenarios
  - MOV’s, circuit protection, leads, resistors, circuit boards, etc.
- Similar to a test track or road test for a car

Common Surge Vocabulary

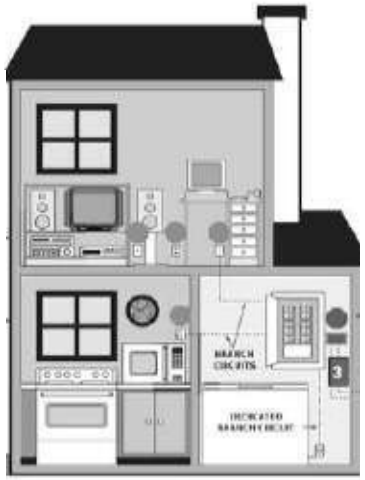
- Voltage Protection Rating (VPR)
  - Measured in voltage
  - Measures the maximum amount of voltage that will be let through the SPD
  - Also referred to as the “let through” voltage
  - Look for: Low voltage ratings

Lower Rating, The Better

Common Surge Vocabulary

- Safety Testing Standard
  - Always look for a surge device that is UL1449 3rd Edition Listed
  - This standard consists of the most stringent safety and performance based tests in the industry

Two-Stage Surge Protection



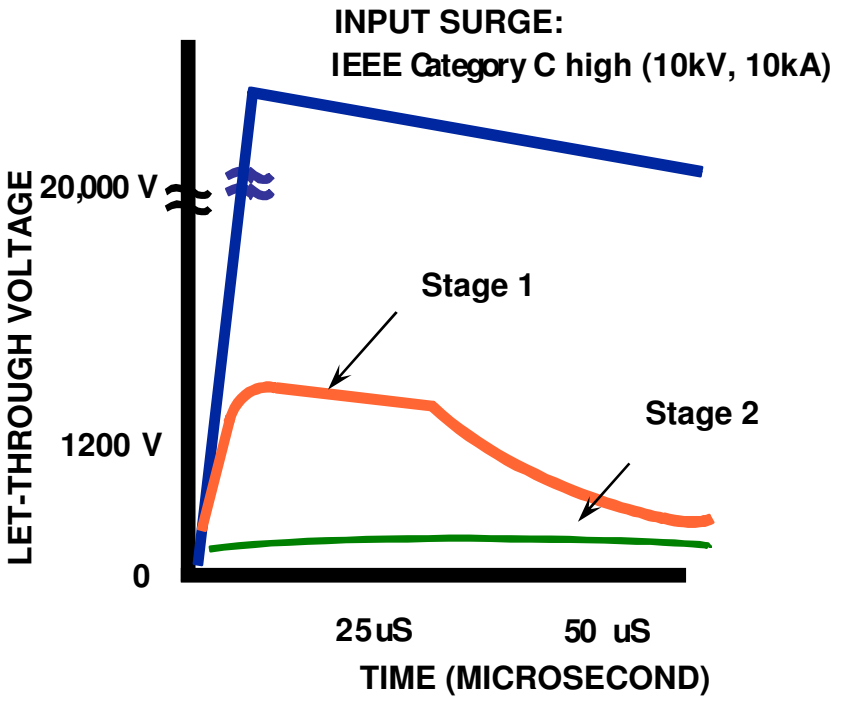
Two-stage surge suppression should be provided for all cables entering a home, including power, Internet, coaxial and telephone.

Why Two Stages?

IEEE Emerald Book

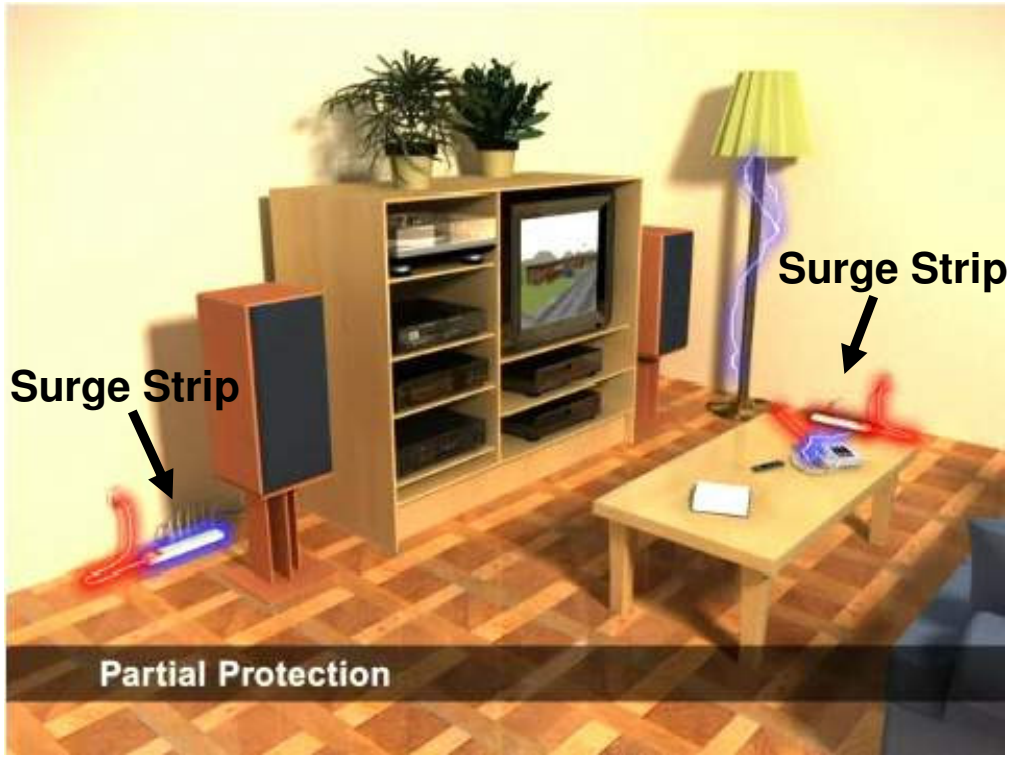
8.6.3 Large Surge Suppression

*"…For large surge currents, (transient) diversion is best accomplished in **<u>two stages</u>**: the first diversion should be performed at the **service entrance** to the building. Then, any residual voltage resulting from the action (of the suppression device) can be dealt with by a **second protective device** at the power panel of the computer room (or other critical load)."*



System Test Parameters:
Input Wave: IEEE C62.41 Category C high (10 kV; 10 kA)
Test procedure: IEEE C62.45
System Voltage 230 Volt (Phase-Neutral)

2 Stages: Homeowner Mistake



Living Room Example:

- Protected:
  - TV (AC Power)
  - Entertainment System
- Not Protected:
  - Lamp
  - Telephone
  - TV (Cable Lines)

- Only apply partial inadequate protection with point-of-use surge strips
- Surge strips only protect what is plugged in so your complete home is not protected

Eaton's Product Offering

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A Complete Product Offering:

2-Stage Approach to Surge Protection

Stage 1 Protection

- First line of protection from a surge
- Installed at breaker box or service entrance
- Reduces surges to a manageable level for surge strips to handle
- Protects:
  - Home Electronics
  - Appliances

Power

Telephone

Cable

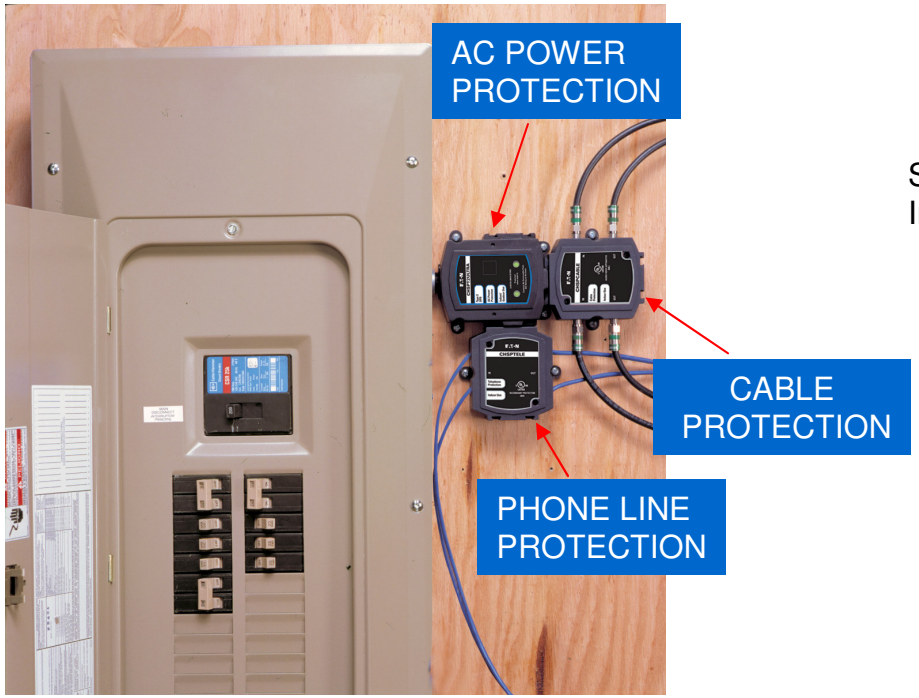
Stage 2: Point of Use Protection

- Second line of protection from a surge event
- Applied at the point of use
- Further reduces surges down to a manageable level for home electronics
- Guards against internally generated surges
- Protects:
  - TV / DVD / VCR
  - Gaming Systems
  - Computers / Modems / Printer

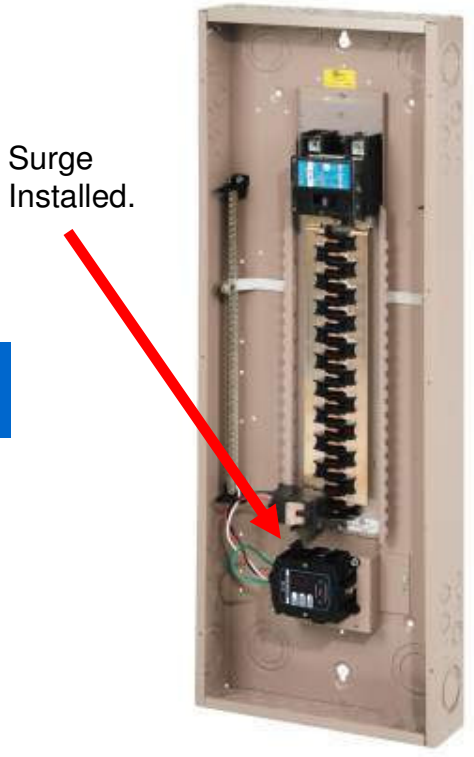
Stage 1 - Service Entrance

There are 2 Options for Installing Stage 1 Protection

Option 1: Install surge externally on any loadcenter (does not have to be a Cutler-Hammer Loadcenter).



Option 2: Purchase a Surge Loadcenter. A CHSPT2ULTRA will come already installed.



CHSPT2 Series Product Family

CHSPT2ULTRA

AC POWER PROTECTION
"BEST"
108kA Surge Current Capacity,
Per Phase Rating
20kA Nominal Discharge Current
$75,000 Warranty*

CHSPT2MAX

AC POWER PROTECTION
"BETTER"
72kA Surge Current Capacity,
Per Phase Rating
10kA Nominal Discharge Current
$50,000 Warranty*

CHSPT2MICRO

AC POWER PROTECTION
"GOOD"
36kA Surge Current Capacity,
Per Phase Rating
5kA Nominal Discharge Current
$25,000 Warranty*

CHSPCABLE

CABLE PROTECTION
Protects 2 quad shield cables
10kA Surge Current Capacity,
Per Line
$10,000 Warranty*

CHSPTELE

PHONE LINE PROTECTION
Protects 4 telephone lines
20kA Surge Current Capacity,
Per Phase Rating
$10,000 Warranty*

*Warranty amount is for connected equipment. Complete warranty details visit, www.eaton.com/surgetrap

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CHSPT2 Series Product Features

- UL1449 3rd Edition Listed
- Provides residential grade AC power protection for sensitive electronics
  - Up to 108kA Surge Current Capacity, Per Phase Rating
  - Up to 20kA Nominal Discharge Current
- Clear, visible LED indication displaying status of device
- Suitable for indoor/outdoor applications
- Universally fits to any manufacturer's loadcenter
  - Installed using a 15Amp 2-Pole Circuit Breaker
- Additional Cable and Telephone units available
  - Quick connect feature
- Mounting kit accessories available
- Up to $75,000 Connected Equipment Warranty
- Limited Product Warranty

Stage 1 – Surge Loadcenter

- Factory-mounted SPD saves labor on installation
  - Includes a CHSPT2ULTRA and branch breakers
  - Provides premium protection for the entire home
    - 108kA Surge Current Capacity, Per Phase Rating
    - 20kA Nominal Discharge Current
- Reduced lead length increases the effectiveness of surge protection
- A modified deadfront allows for easy viewing of indicating lights
- Add Phone and Cable Modules for complete protection
- All products come with a Limited Lifetime Warranty

Industry Exclusive Design

HomeSphere Program

Pkg #	Points	Package Name	Package Contents
4754	3	Cable TV / Satellite Surge Protection	• CHSPCABLE - Surge Protection for incoming cable TV, satellite, cable modem services
4756	3	Telephone / Modem Surge Protection	• CHSPTELE - Surge Protection for incoming telephone, modem, and DSL services, features protection for 4 telephone lines
	3	Surge – AC Power Protection	• CHSPT2ULTRA – Ultimate AC Power protection at loadcenter or meter breaker
	3	Surge – AC Power Protection	• CHSPT2MAX – Standard AC Power protection at loadcenter or meter breaker
	3	Surge – AC Power Protection	• CHSPT2MICRO – Basic AC Power protection at loadcenter or meter breaker
5430	18	Loadcenter w-Wholehouse Integrated Surge	• Surge Loadcenter with Integrated Surge. AC Surge unit, CHSPT2ULTRA, supplied as standard with panel.
5597	20	Service Entrance Package	• Air Conditioner Disconnect • Single Meter Socket (were applicable by Utility) • Surge Loadcenter or Meter Breaker Unit With Surge • Applicable Breaker Fill
5598	40	Home Connected / Home Protected Package	• Air Conditioner Disconnect • Single Meter Socket (were applicable by Utility) • Surge Loadcenter or Meter Breaker Unit With Surge • Applicable Breaker Fill • Air Cooled Generator, 10kW, 14kW, 17kW, or 20kW with Automatic Transfer Switch

Homeowner Value

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Surge Homeowner Value

The average home has any where from $15,000 to $100,000 of electronics that can be damaged from voltage surges

ELECTRONICS	APPLIANCES	INFRASTRUCTURE
Televisions	Stoves	Air conditioners
Stereo systems	Refrigerators	Heat pumps
Entertainment centers	Dishwasher	Hot water tank
Personal computers	Countertop appliances	Lighting controls
DVD players	Microwave ovens	Garage door openers
Video games	Washers and dryers	Lighting
Printer/copier/fax	Electrical tools	Security system
Satellite receivers	Treadmill	Pool pump
Internet modems	Other exercise equipment	Hot tub controls
Telephone/answering machine		
Clock radios		
MP3 players		
Various battery chargers		
$5-20,000 typical	$4-$15,000 typical	$7-25,000 typical

Surge Homeowner Value

- CHSP surge devices protect appliances, electronics and electro-mechanical devices
- Two stages of protection will mitigate the risk of damage due to internal and external surges
- Peace of mind, knowing that your investments are protected
- Small Investments equal Big Rewards
- One time insurance premium for replacement or reimbursement

Homeowner Awareness and Education is Key To Successful Surge Product Selling

Resources Available

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Resources Available

- ✓ **Service Entrance Surge Protection Brochure**
  Publication# BR00404001E
- ✓ **Complete Home Surge Protection Sales Aid (Homeowner Focused)**
  Publication# SA00404006E
- ✓ **Surge Strip Brochure**
  Publication# BR00414001E
- ✓ **Surge Warranty Document**
  Publication# WA00414003E
- ✓ **www.Eaton.com/2StagesSurge**
  Video
- ✓ **www.Eaton.com/SurgeTrap**

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Questions and Answers

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