Equipment Voltage Surge Thresholds

The Information Technology Industry Council (**I.T.I**, formerly known as the Computer Business Manufacturers' Association, or CBEMA) provides a guideline that is a realistic, at-the-equipment, maximum allowable voltage that equipment can withstand without damage or upset. This profile is commonly called the "CBEMA Power Curve" or the "ITI Power Curve" Simply put, it not only describes what amount of voltage will cause upset or damage, but it also shows how long this voltage must be present to cause effect.

The ITI Power Curve shows that a voltage rise (Voltage Surge) as low as 120% above RMS or Peak voltage for a duration between 0.003-0.5 of a second will cause damage. It also shows that a voltage rise (Voltage Surge) as low as 110% above RMS or Peak voltage for a duration over 0.5 of a second will cause equipment damage.

SPGS America produces the best surge protective devices because they absorb the surge in the shortest amount of time and pass the lowest Let-Through-Voltage to the equipment.

Quick Surge Duration Time and PEAK Voltages That Will Result in Equipment Damage			
Line Voltage (RMS/Peak)	(.000008/.00002 Second)	(.0001 second)	
	8/20 µSecond	Up to 100 µSeconds	More than 100 µSeconds
480 RMS/678 Peak	2,400/3,394 Volts	1,680/2,376 Volts	622/880 Volts
277 RMS/392 Peak	1,387/1,958 Volts	970/1,371 Volts	360/509 Volts
240 Volts/339 Peak	1,202/1,700 Volts	840/1,188 Volts	311/440 Volts
120 Volts/170 Peak	601/850 Volts	356/593 Volts	156/220 Volts

Slow Surge Duration Time and PEAK Voltages That Will Result in Equipment Damage		
Line Voltage (RMS/Peak)	0.003 to 0.5 Seconds	Over 0.5 Seconds
480 RMS/678 Peak	576/814 Volts	528/746 Volts
277 RMS/392 Peak	332/470 Volts	305/431 Volts
240 Volts/339 Peak	288/497 Volts	264/373 Volts
120 Volts/170 Peak	144/204 Volts	132/187 Volts

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Equipment damage are classified into the following categories:

1. **No observed change (unforeseen consequence):** This absence of visible change would demonstrate that the equipment specimen is actually immune to the surge level in question; however, appearances can be deceiving. The equipment can continue normal performance within specified limits, thus meeting the criterion of .No loss of function or performance.. Yet, significant consequences are possible: degradation of performance still within limits, but foreboding larger degradation, latent failure of a component, or an unforeseen consequence elsewhere in the equipment environment

2. **Upset (susceptibility:** This consequence can be a self-recoverable upset by design of the software and, therefore, not immediately apparent; or it might be a permanent upset requiring operator intervention or programmed automatic action occurring after some time delay. Many documents on test methods suggest three classes for this type of consequence, as follows:
   a. Minor:Acceptable temporary loss of function, but no faulty operation.
   b. Major:Temporary faulty operation or performance (which is self-recoverable).
   c. Critical: Faulty operation or performance that requires operator intervention or system reset. Another consequence that may be classified in this category is an upset caused by spark-over of air clearances without permanent degradation of adjacent solid insulation.

3. *Damage (vulnerability)* This consequence includes the subtle as well as the obvious. As discussed under category 1, damage might occur without being detected unless special assessment of the equipment condition is performed. One of the most vexing problems in insulation testing is the risk of creating an incipient defect by applying a surge test.

4. *Consequential damage:* This consequence includes the possibility that equipment subjected to a surge might cause damage to their surroundings well beyond the importance of the damage or upset done to the equipment. Ignition of a fire or an explosion could occur. Damage might result from unseen hardware upset, during which data become corrupted and might subtly degrade other elements in the database, with the user left unaware of the situation

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