November 1, 2017

Dear Mark,

I read your article titled “The Best Surge Protector” dated October 25, 2017. Thank you for including Series Mode technology in your testing but I am disappointed with your conclusions. There are two main differences with Series Mode vs all other technologies that need to be addressed.

The first is that other technologies are shunting and they divert the energy to another part of the building (usually via the ground line). There are two problems with this. One, communication equipment needs to have the ground line free of any voltage as it uses the ground for signal reference. Putting surges on the ground line interrupts communication and is a path for surges to enter equipment via the data line. That is the main reason that MOV based protection offers data line protection - they are protecting you from themselves. The other effect of the diversion to ground is to cause problems in another part of a building. There is an independent research article here http://incompliancemag.com/article/lightning-surge-damage-to-ethernet-and-pots-ports-connected-to-inside-wiring/ that explains how MOVs divert surges to other parts of a building. One would think that their surge protection worked to protect their office computer but the modem at the service entrance failed because the IT company uses cheap routers when in fact the surge was diverted from the office computer.

The second difference is truly identifying what the mode of failure is for electronics from surge damage. It is NOT the total (or peak) voltage that causes the failure. Given enough time and cooling, one could slowly increase voltage several times nominal and equipment would not fail. The failures occur because the rate of voltage change (and more importantly for switch mode power supplies – the rate of change in current) exceeds the component’s rating. How does one measure the change in voltage? Using the same brand of equipment your engineer used (we have an older model), I included here two oscillograms of Series mode vs MOV. The red line is the surge voltage over time without any protection (we cap our measurement at 500 Volts for practical reasons). What is important to note is the slope of the red line just after that first dip. This high slope (or dV/dt) is what kills electronics. Looking at the green line, you can see that the peak is lower but the slope is almost in parallel with the unprotected surge. This happens in 20-40 microseconds. Looking at the second oscillogram, the light blue line represents the Zero Surge protection relative to the surge energy. Note how the rate of rise is much less as the surge gets to the peak of the power wave. That is what makes a huge difference in surge protection. The same occurs for the rise in current. If one integrates under just the peak of the curve to measure the total energy, one will find that series mode technology will reduce the exposure to surges by 25 times!

Truly the issue in creating protection that extends the life of electronics, one must be able to withstand the catastrophic surges and work to protect devices from the smaller surges that happen every day. They may not be high in total voltage, but the change in voltage over time is what degrades the life of your sensitive electronics. I could go on about the fallacy of using Joule ratings (both high and low Joule ratings have importance), the fact that MOVs can announce their failure by causing a fire, not mentioning the damage caused by in rush current, and how Furman’s filtering is not tuned to attenuate the frequencies that make up most surges. But the two issues I presented are the basis of what

differentiates Series Mode technology from all other technologies. Besides this theory, Series Mode technology has 28+ years of practical experience with the most demanding customers. I would be happy to discuss this information with you and your engineer.

Sincerely,

Jim Minadeo
President
Zero Surge Inc.

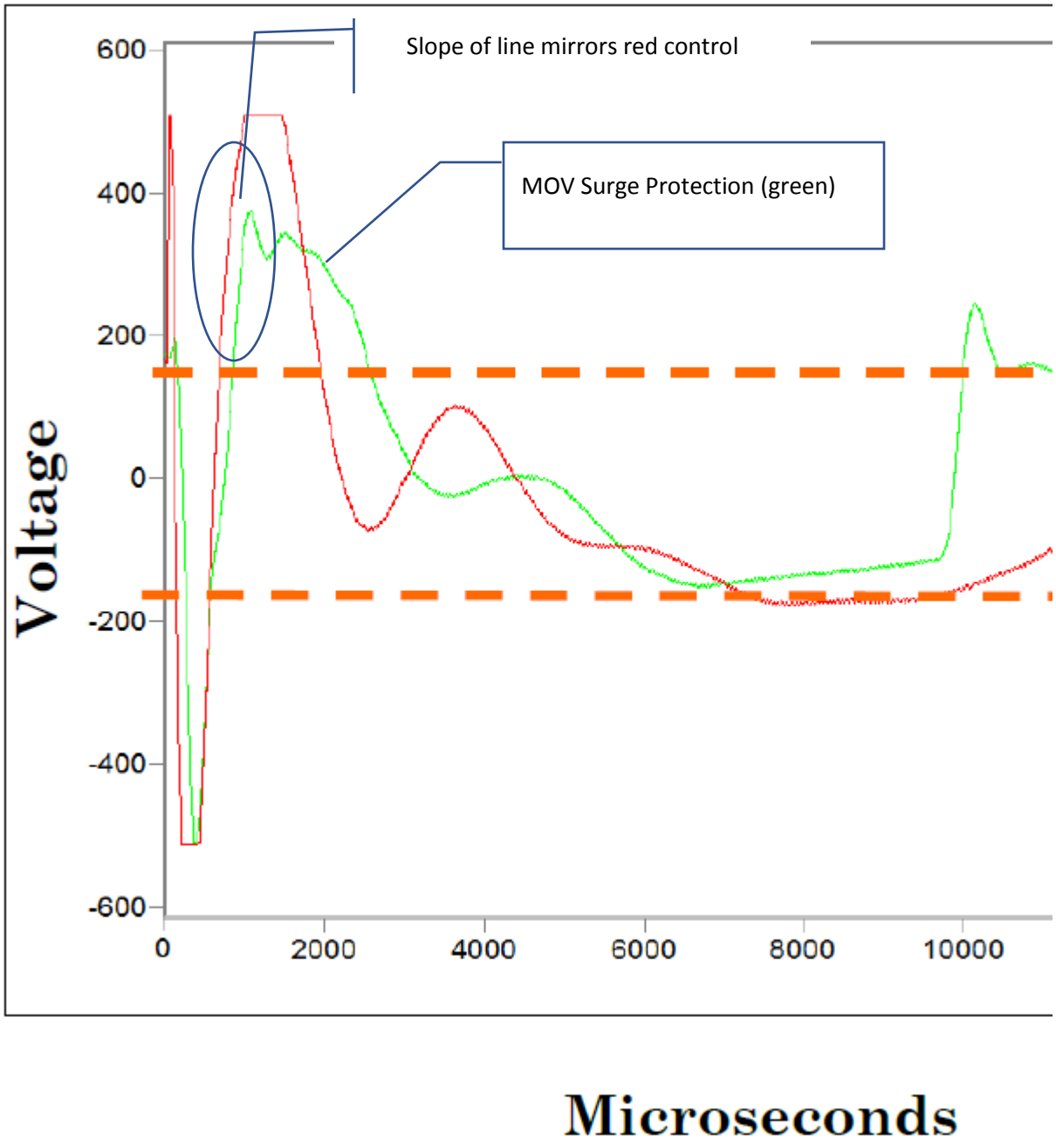

Figure 1 MOV Based Surge Protection

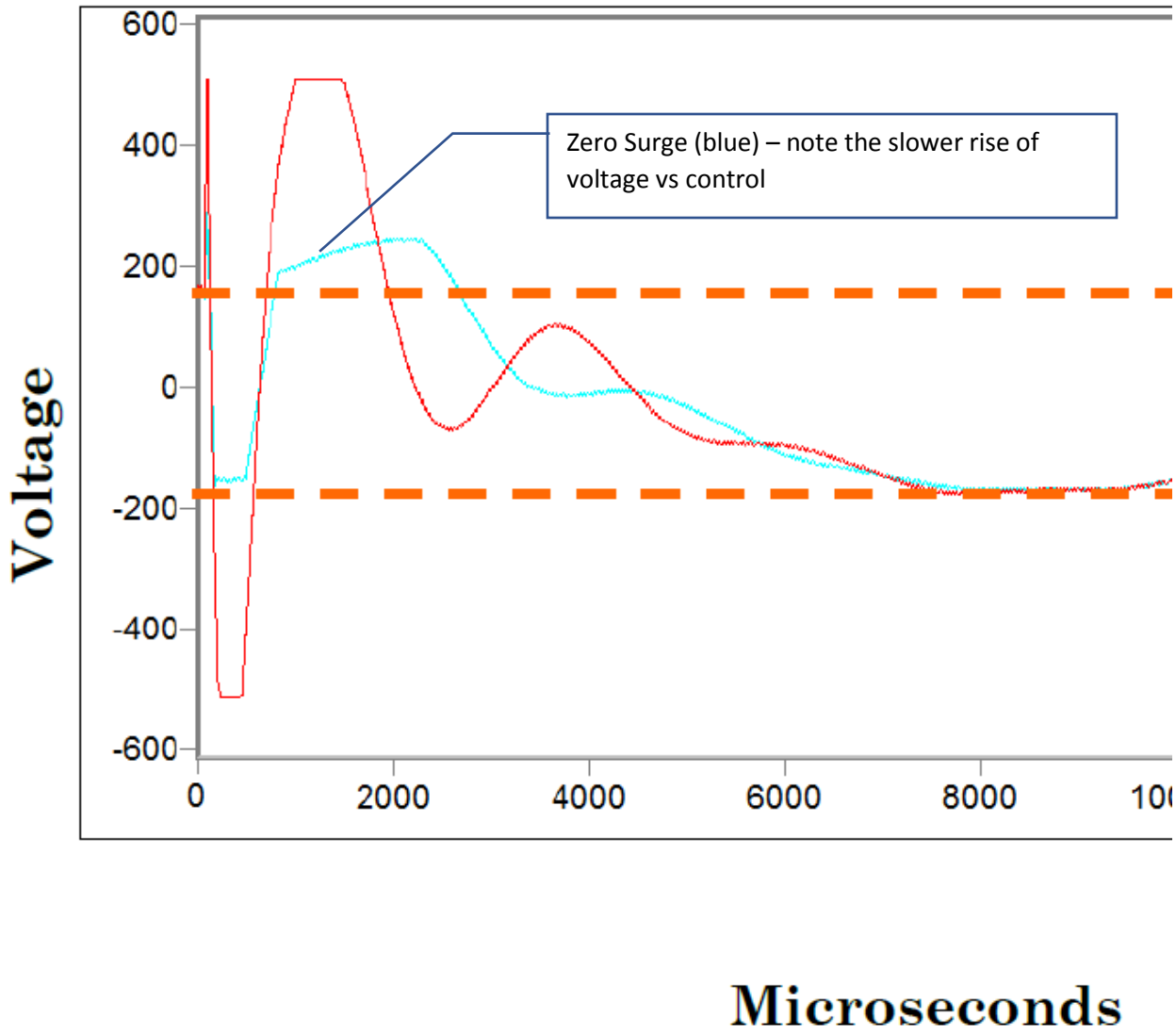

Figure 2- Zero Surge Series Mode Surge Protection