tii network technologies

Tii Angle Drivers®

Are Hybrid Station Protectors Really Better?

Executive Summary

There is a perception by some in the marketplace that hybrid station protectors outperform GDT only protectors, providing better protection of equipment and personnel. The test data presented here measures the proprietary Tii "11" tube based Angle Driver sealed station protectors against a hybrid station protector from an alternate supplier. The measured data clearly indicate that the breakdown voltage of the Tii Angle Driver protector is superior to the tested hybrid protector for virtually all surge waveforms tested. Furthermore, the Tii GDT protector does not have the additional capacitance and MOV lifetime concerns potentially associated with hybrid protectors.

Introduction

Hybrid station protectors have been introduced by several manufactures in the past few years. These hybrid protectors typically use fast acting MOVs in conjunction with a GDT protector. The concept is simple: the fast acting MOV absorbs the initial fast transient clamping it at a reasonable voltage, then the GDT fires and absorbs the bulk of the surge energy. The MOV element is supposed to augment an inherent limitation of all GDT devices, which is that the breakdown voltage increases as the rise time of the surge transient waveform increases.

Coordinating the breakdown characteristics of the MOV and GDT, in particular their respective breakdown voltage, is essential to provide a reliable protector. The physically small MOV must not be allowed to absorb a significant amount of the surge.

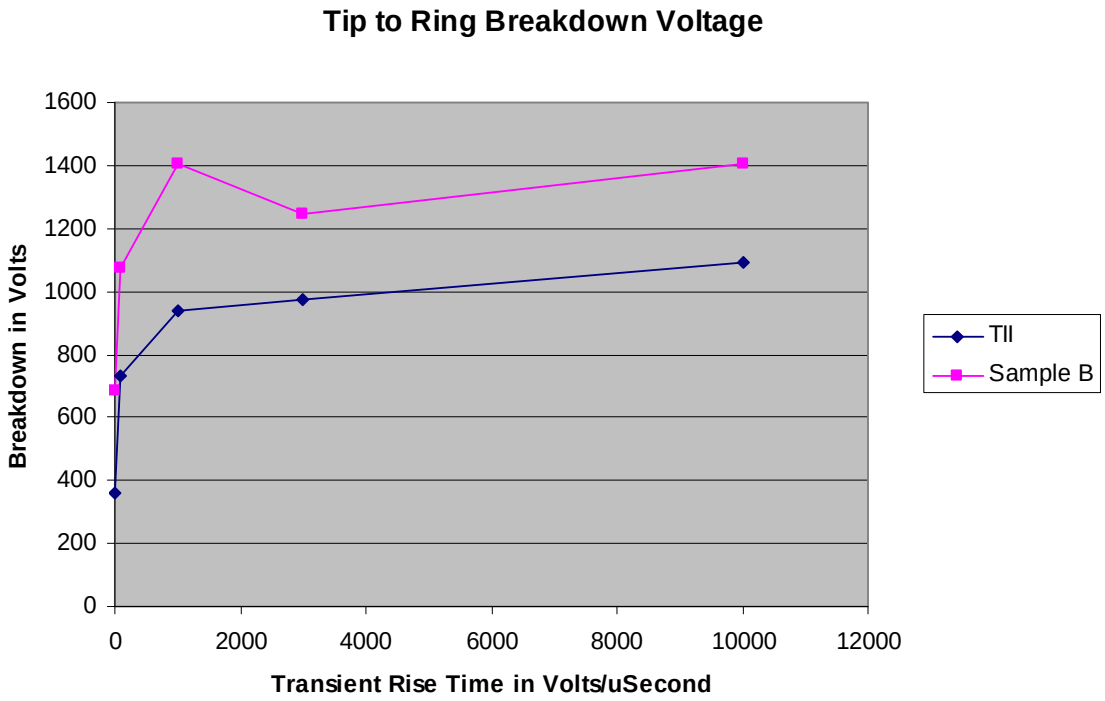
The theoretical advantage of a hybrid protector makes it an intriguing concept to many. Adding fast acting MOVs in parallel to the GDT must make it a better protector, right? In practice, the necessary safe coordination of the MOV and GDT in a hybrid protector limit their combined effectiveness. A well designed GDT such as Tii's proprietary 11 tube used in our Angle Driver station protectors actually performs better than the hybrid protector tested.

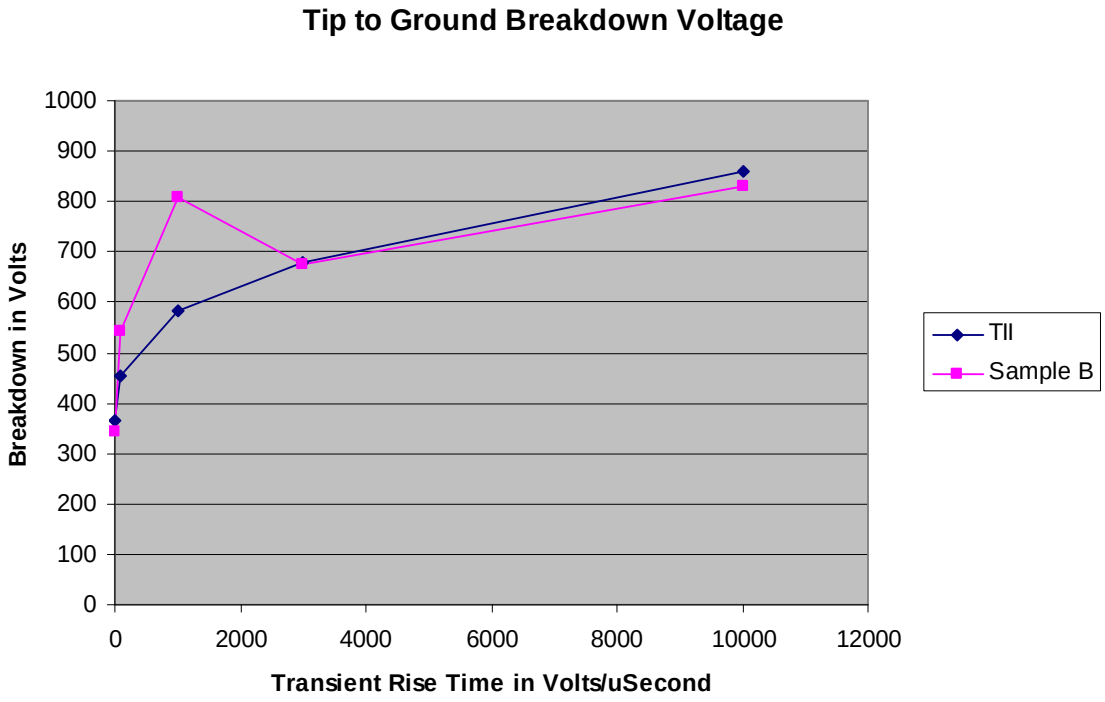
Test Methodology

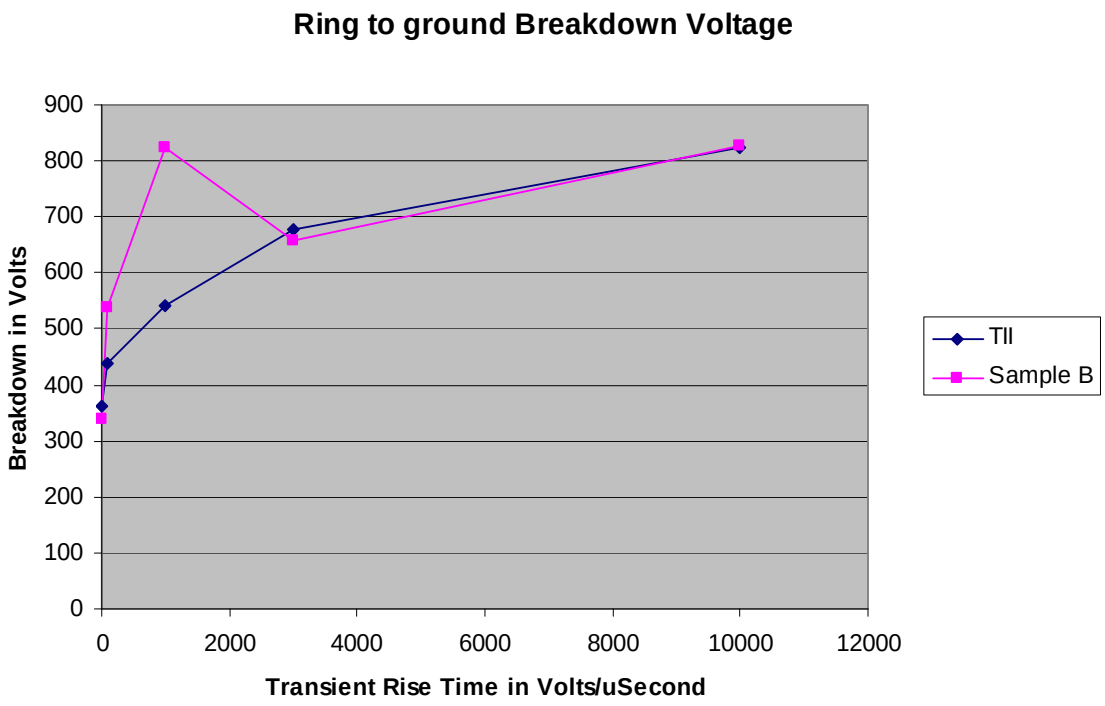
The station protectors were tested at Tii in January 2008 using surge test equipment in our new state of the art laboratory. The devices were surge tested from Tip to Ground, Ring to Ground, and Tip to Ring for surges of various rise times.

Two devices were available from the alternate manufacturer. Both were tested, and the results averaged. Three randomly selected Tii devices were tested and averaged.

Test Results







Conclusions

A lower breakdown voltage is of course better, and indicates that the devices inside the home are exposed to less energy.

The Tii Angle Driver Tip to Ring breakdown is several hundred volts lower than the hybrid protector for every surge waveform. This can be understood by the fact that the two MOVs in a hybrid protector are from Tip to Ground and Ring to Ground. In Tip to Ring testing, the two MOVs are in series, and the GDT is the primary protection element. The GDT element in the Tii Angle Driver is a symmetrical 3 element design, and performs significantly better than the GDT/MOV combination in the hybrid protector.

Tip to Ground and Ring to Ground test results are virtually identical as would be expected. The hybrid protector and Tii Angle driver perform nearly identically for most surges, with the Tii device showing a significant protection advantage of over 200 volts for slow rising surges of 1000 Volts/uSecond.

Raw Data

DC Breakdown @ 2000V/S

Sample	T-G	R-G	T-R
TII1	359	360	364
TII2	393	374	459
TII3	342	356	366
B1	352	338	687
B2	332	337	684

Impulse Breakdown 100V/uS

Sample	T-G	R-G	T-R
TII1	446	436	707
TII2	461	466	786
TII3	453	416	704
B1	548	545	1089
B2	535	530	1059

Impulse Breakdown 1000V/uS

Sample	T-G	R-G	T-R
TII1	546	530	912
TII2	622	578	944
TII3	578	518	968
B1	812	836	1416
B2	804	812	1392

Impulse Breakdown 3000V/uS

Sample	T-G	R-G	T-R
TII1	686	690	968
TII2	646	662	1016
TII3	702	685	936
B1	694	666	1264
B2	654	650	1232

Impulse Breakdown 10,000V/uS

Sample	T-G	R-G	T-R
TII1	840	832	1032
TII2	872	808	1120
TII3	864	832	1128
B1	824	808	1416
B2	840	848	1392