

## **Sinewave Tracking**

**It's a Matter of Time, But Inverted**

The title of this article provides a few clues regarding the "mystery" of sinewave tracking. This black magic is really quite simple. You see, time inverted is frequency (for you electronic buffs  $f=1/t$  or  $t=1/f$ , if you recall) - so frequency is a matter of time, but inverted. Therefore, one might deduce that sinewave tracking has something to do with frequency. When, in fact, it has everything to do with frequency.

In contrast to the standard clamping portion (shown in the first figure below) of the suppression circuitry - which simply responds to an overvoltage or change in voltage - sinewave tracking responds to a change in frequency. This is shown in the second figure below. Since the sinewave tracking circuitry responds to a change in frequency, it will react regardless of the location of the surge in relation to the sinewave. This is why sinewave tracking is so effective in mitigating surges that occur at phase angles near and greater than 180 degrees and less than 360 degrees - but the same action occurs at all phase angles or locations on the sinewave.

From the fixed clamping graph, notice that the threshold clamping circuitry does not respond until the voltage reaches the "positive (or negative) fixed or preset voltage level". This is in contrast to the graph that shows sinewave tracking. Notice the sinewave tracking circuitry does not have a preset voltage level - it simply reacts to the change in frequency or the frequency component of the surge at any phase angle on the sinewave.

OK - are you confused yet? Hopefully not - but if you are, pretend that you are a gold miner and sinewave tracking is the screen that you use to separate the gold from the sand. Think of the sand as the sinewave and the gold as the surges. (Hint: You are trying to capture the gold!) The screen (sinewave tracking) allows the sand (sinewave) to pass through while capturing (mitigating) the valuable gold (surges). Think of the size of an object - sand or gold - as being the frequency (or change in frequency) - the larger the object the higher the frequency. The screen (sinewave tracking) prevents the larger objects (surges) from passing through.

**If you capture the surges - you will also capture the gold!**

Figure 1

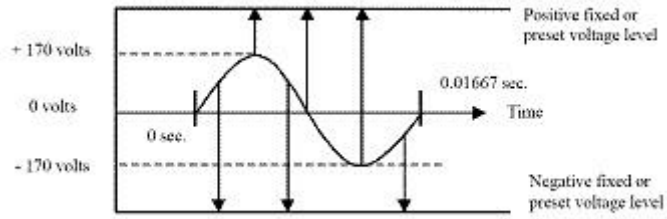
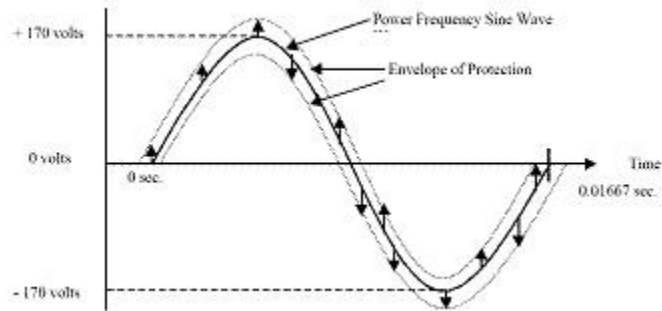


Figure 2



***For more information or assistance with custom surge protection, please,  
contact Boulevard.Engineering.Sdn.Bhd or  
contact mac at 603-7983-4030.***