i-Sense Monitor Report

i-Sense Monitor:	Acme Widgets (0099-9900-0099)
Model:	V3480B02 (Voltage Sag Detector (3 Channel))
Location:	Middleton, WI 53562
Location Within Facility:	Breaker Room 42
Report Date:	June 25, 2013 CDT
Monitoring Period:	April 17 through June 18, 2013 CDT

REPORTING OVERVIEW

This report provides detailed power quality information for one or more i-Sense monitors. Power quality events have been aggregated using a 2 minute time period. Transient events are NOT included in this report. For a more detailed explanation of terms, see Appendix A. This report contains the following sections:

* ***Figure 1*** shows the event overview by remaining RMS voltage and duration.
* ***Figure 2*** displays a monthly summary of each type of event.
* ***Figure 3*** displays a weekly summary of each type of event.
* ***Figure 4*** shows the magnitude and duration (MAG-DUR) of all the recorded PQ events in this interval.
* ***Figure 5*** displays the chronology of the event record.
* ***Figure 6*** displays histograms of the event times.
* ***Figure 7*** shows voltage regulation and imbalance.
* ***Figure 8*** shows detailed RMS over the entire reporting period.
* ***Figure 9*** shows waveform and RMS voltage profiles.
* ***Figure 10*** displays an event log for captured PQ events at this site during the specified time period.

MONITORING SUMMARY

A total of 13 significant power quality and power reliability events were recorded during the 9-week monitoring period.

Figure 1: Event Overview (by Remaining RMS Voltage and Duration)

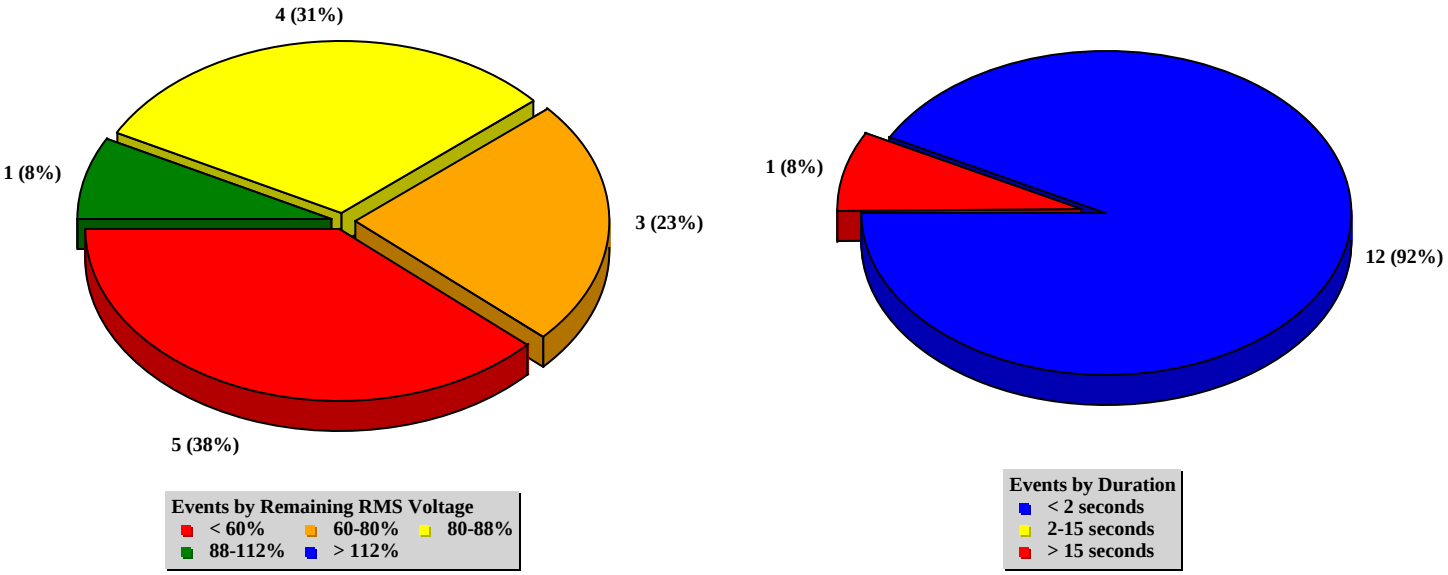


Figure 2: Monthly Summary of Recorded PQ Events

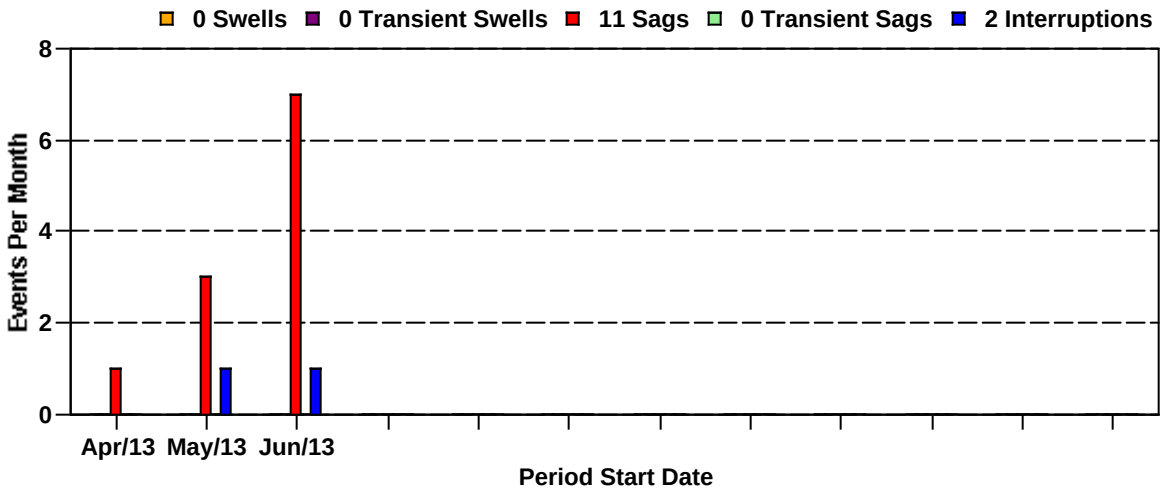


Figure 3: Weekly Summary of Recorded PQ Events

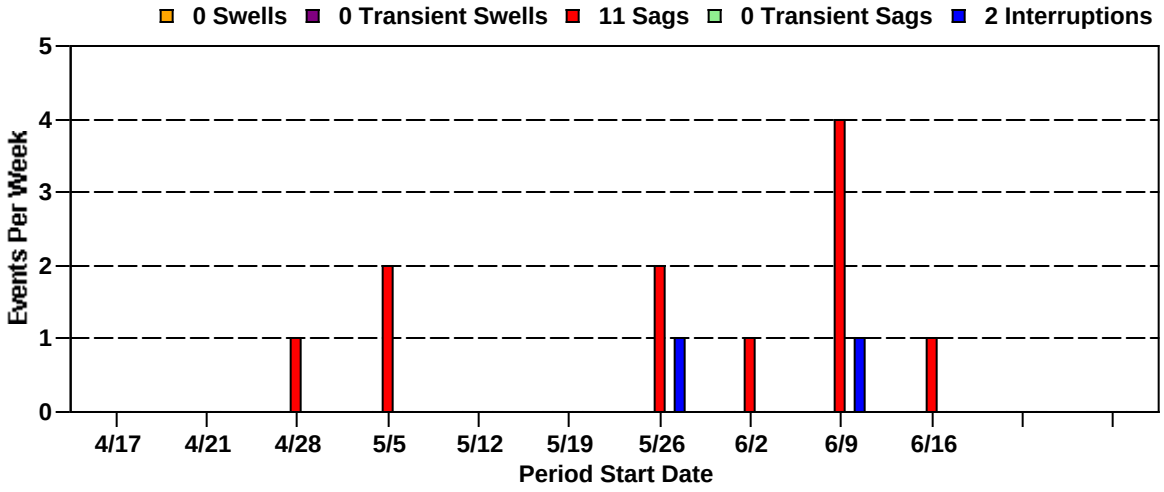


Figure 4: Magnitude Duration Plot of Recorded Events

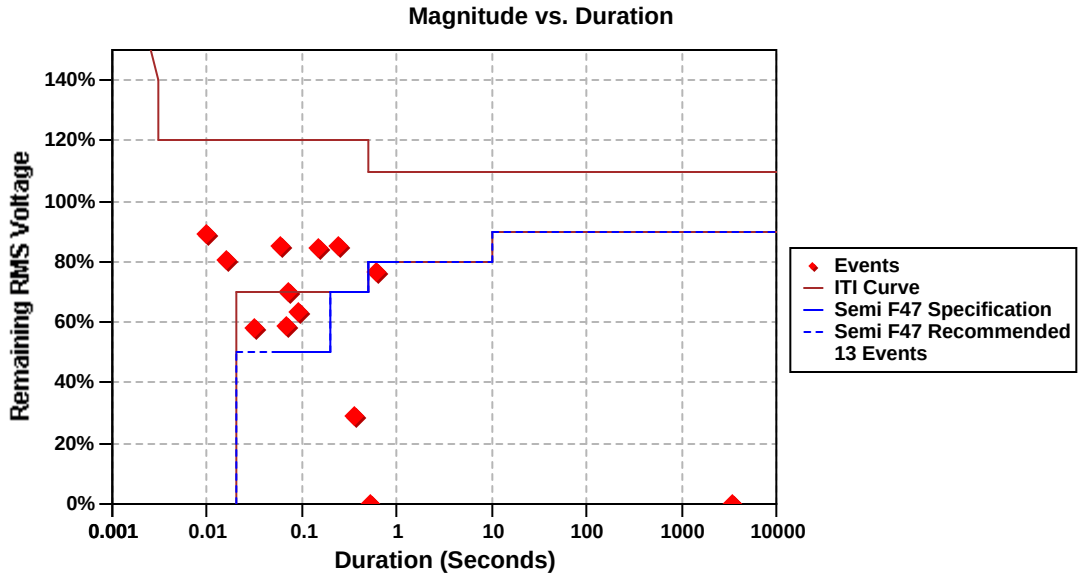


Figure 5: Chronology of Events

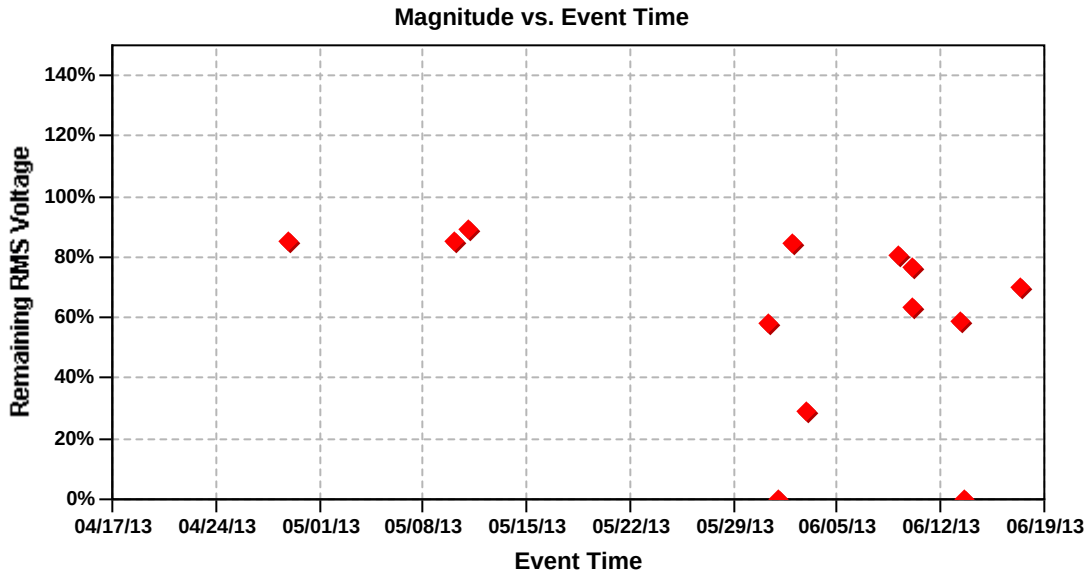


Figure 6: Event Hour of the Day Summary

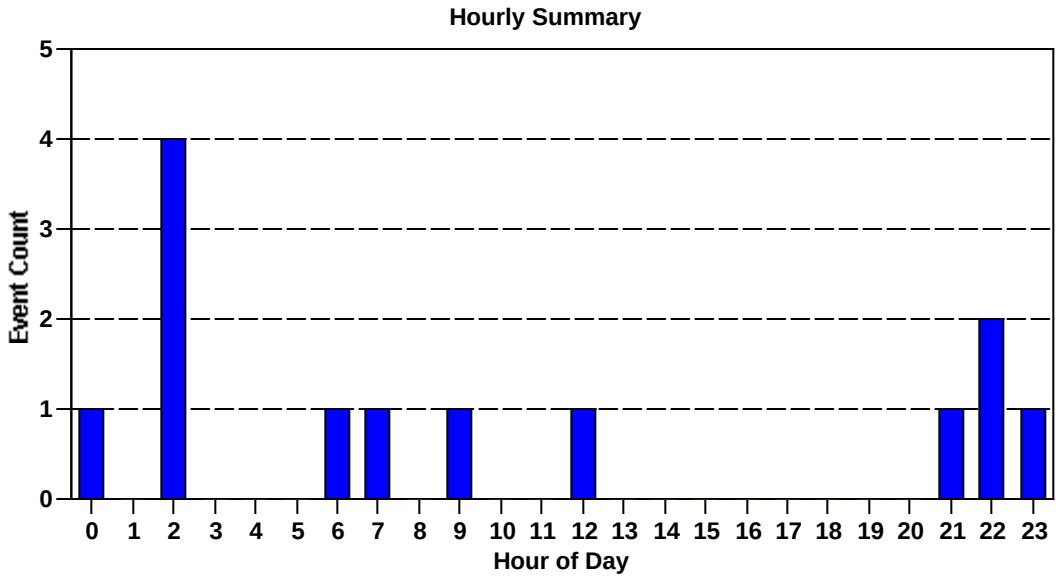


Figure 6: Event Day of the Week Summary

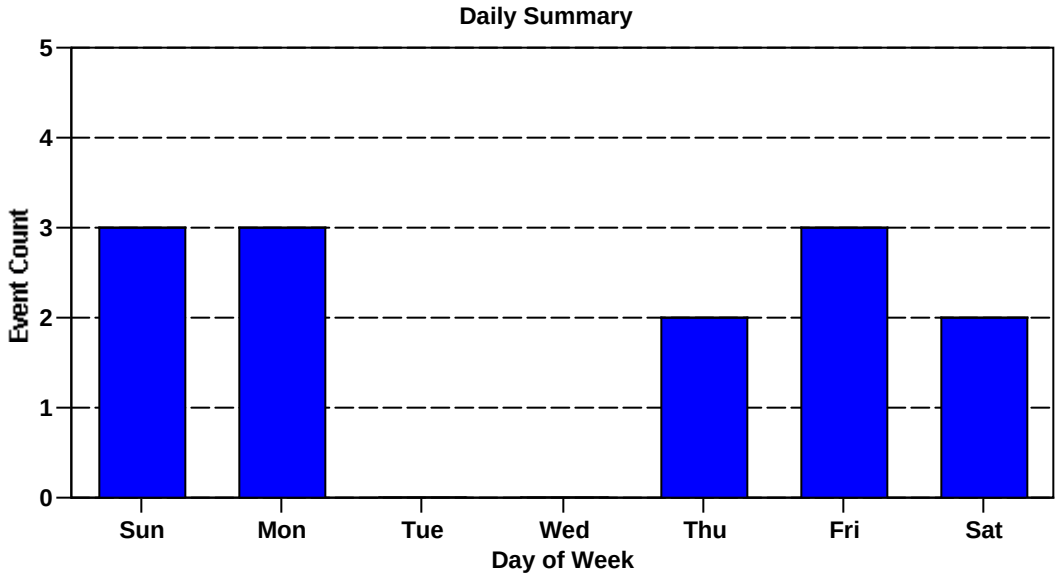


Figure 6: Event Month of the Year Summary

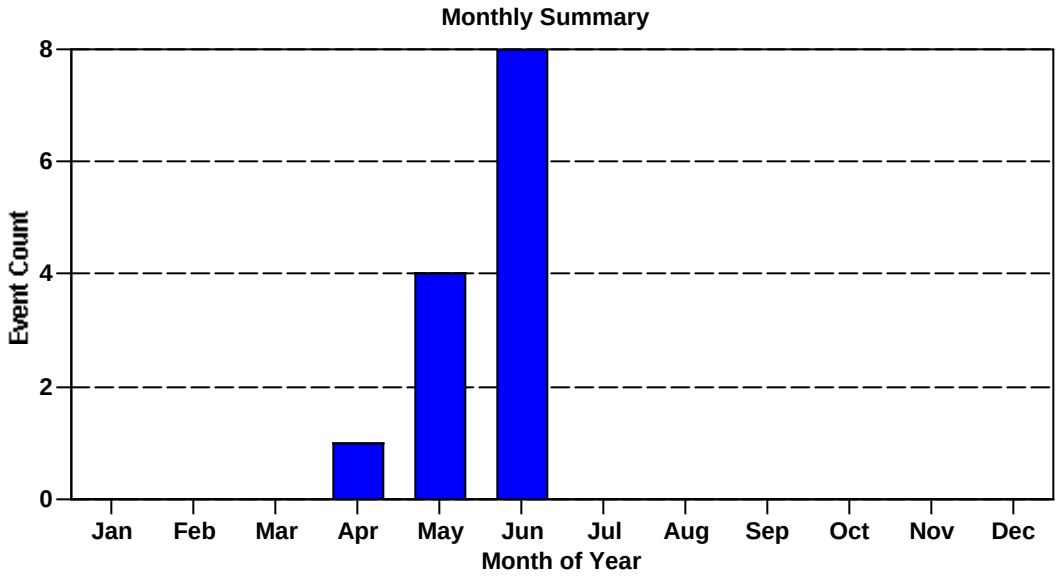
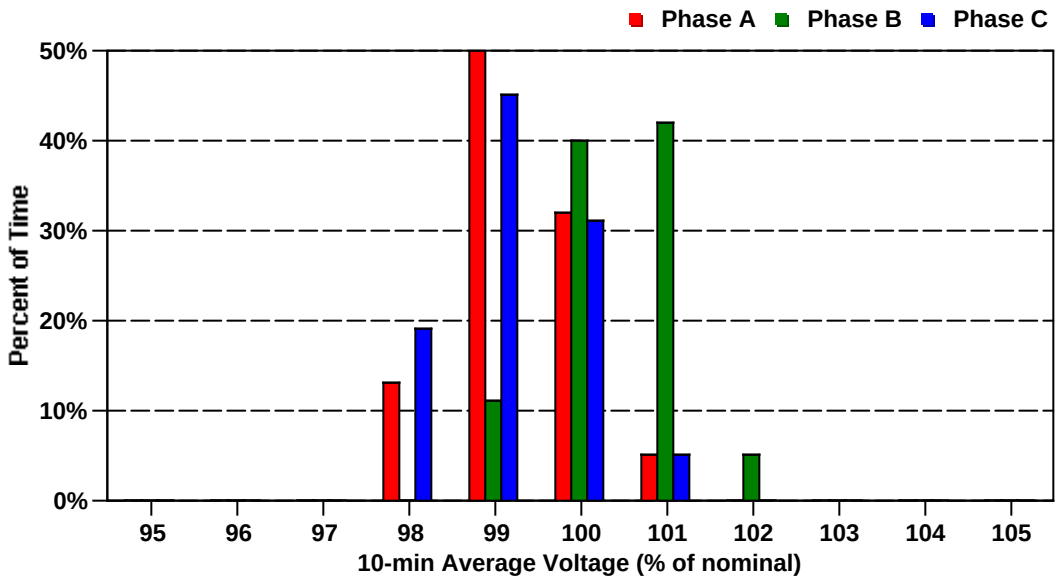
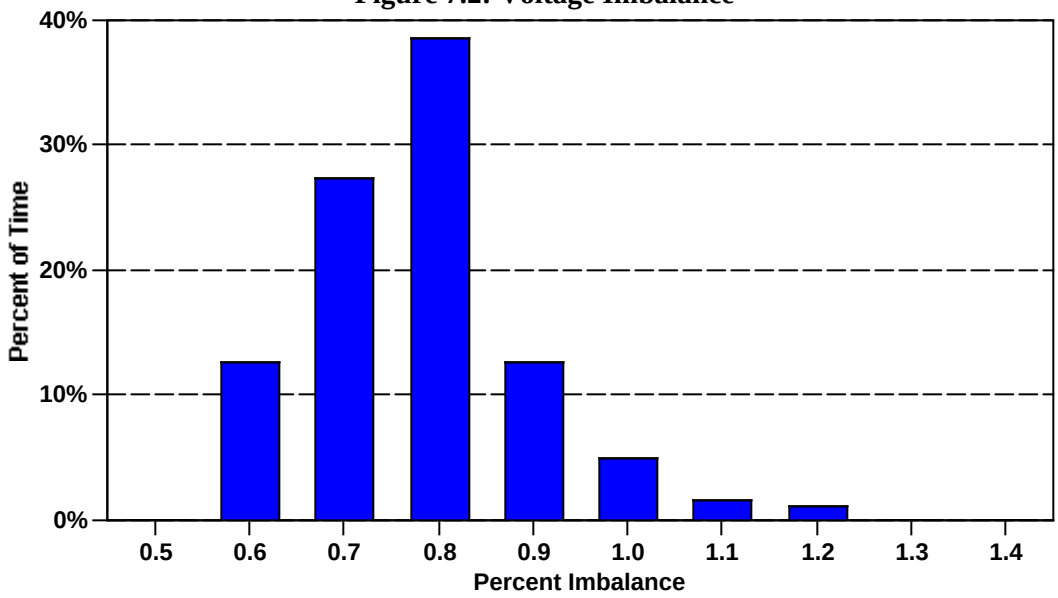


Figure 7.1: Voltage Regulation



Note: Deviations greater than +/-5% from 100% on the above chart may indicate equipment stress.

Figure 7.2: Voltage Imbalance



Note: Depending on equipment type, greater than 1% imbalance may indicate equipment stress.

Figure 8: RMS Voltages

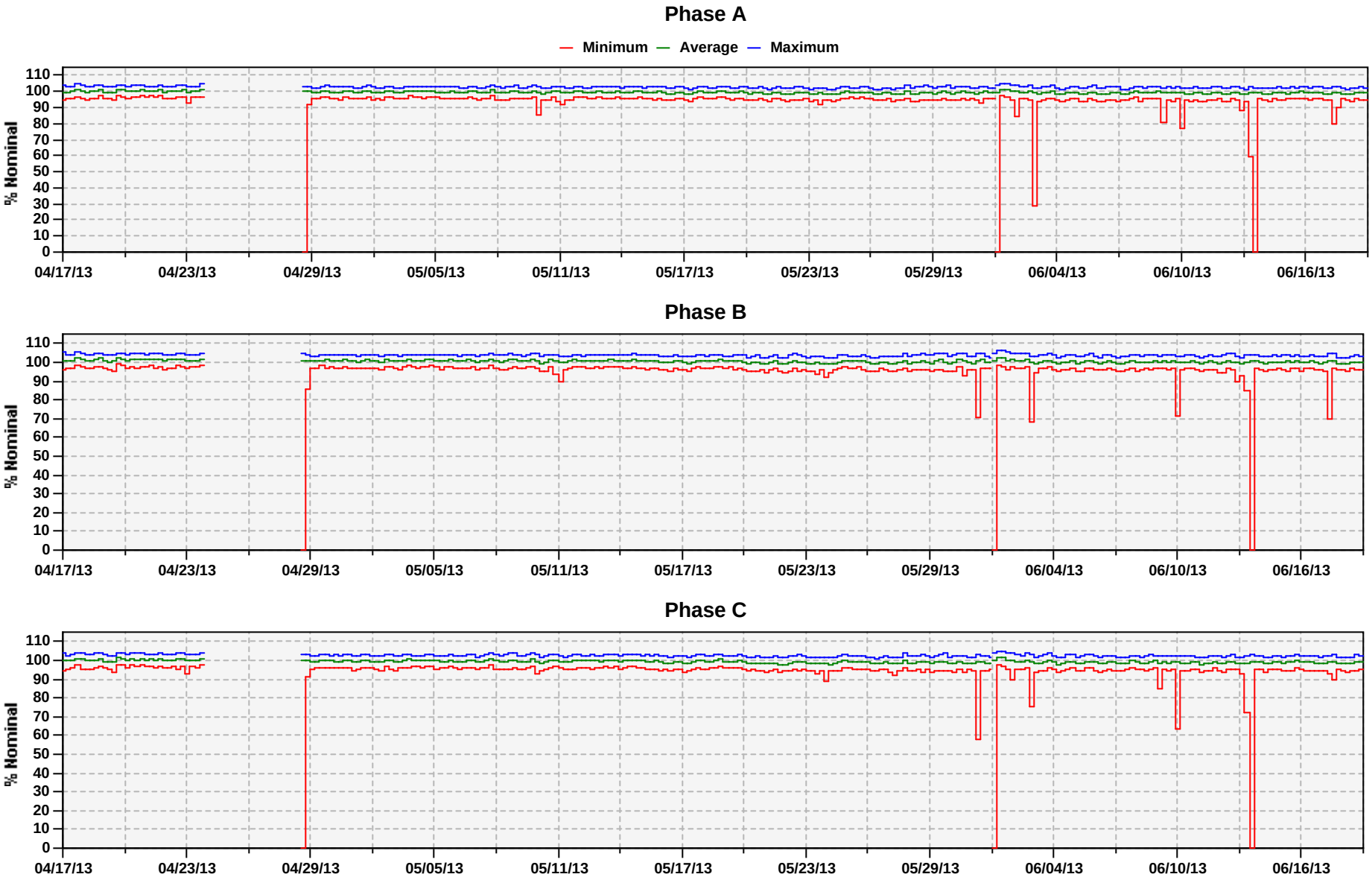


Figure 9: Waveform & RMS Voltage Profiles

Profiles of the 3 events with worst-case RMS voltage magnitude less than or equal to 50% are included. Profiles are presented in ascending order by RMS voltage magnitude.

Monitor: Acme Widgets (0099-9900-0099)

Event: 7787 (Sustained Interruption)

Time: Friday May 31 2013 11:55:36.237 PM CDT

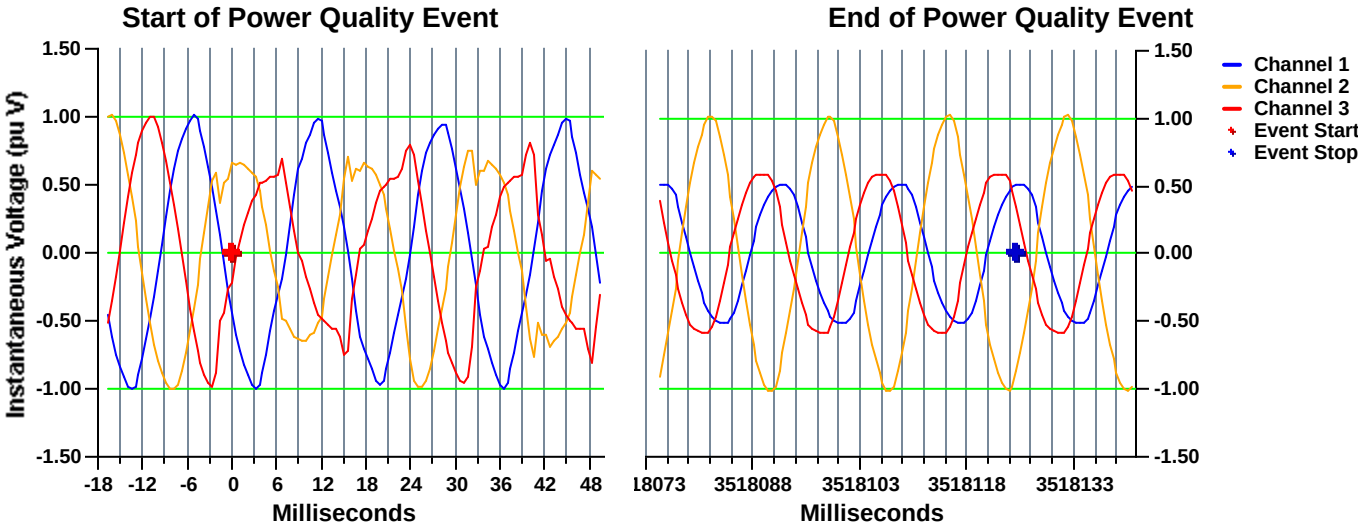
Duration: 58m 38s 125ms

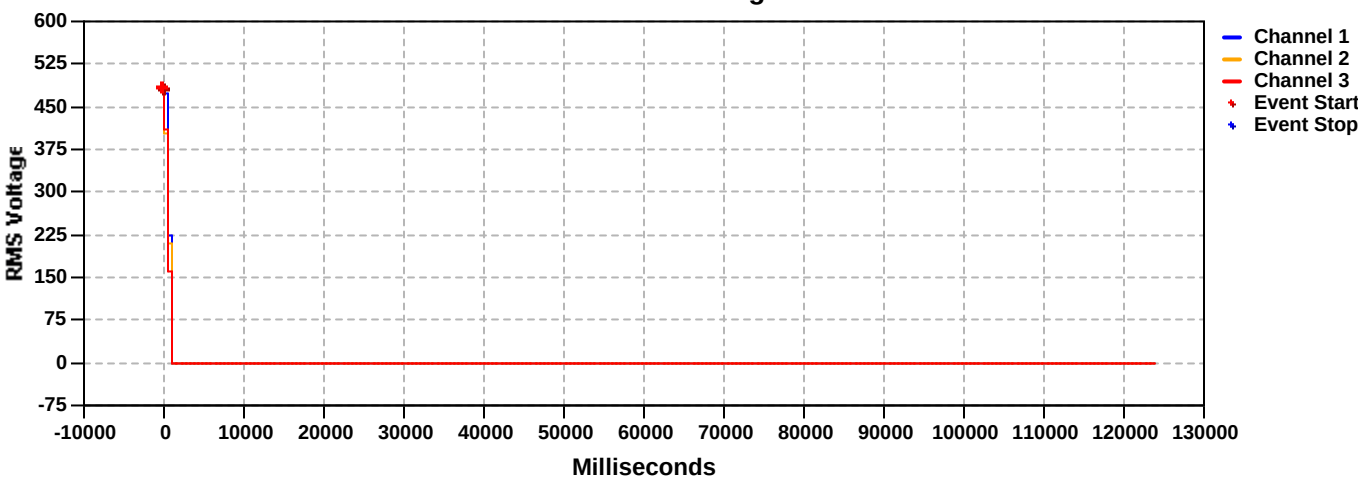
Frequency: 60.0 Hz

Nominal RMS: 480.0 Volts

RMS Summary

Channel	1	2	3
Min	0.0	0.0	0.0
Max	483.0	476.0	472.7
Worst Case RMS as % of Nominal	0.0%	0.0%	0.0%





Note: RMS only captured for beginning of long events

Figure 9: Waveform & RMS Voltage Profiles (continued)

Monitor: Acme Widgets (0099-9900-0099)

Event: 8101 (Momentary Interruption)

Time: Thursday Jun 13 2013 12:57:30.489 PM CDT

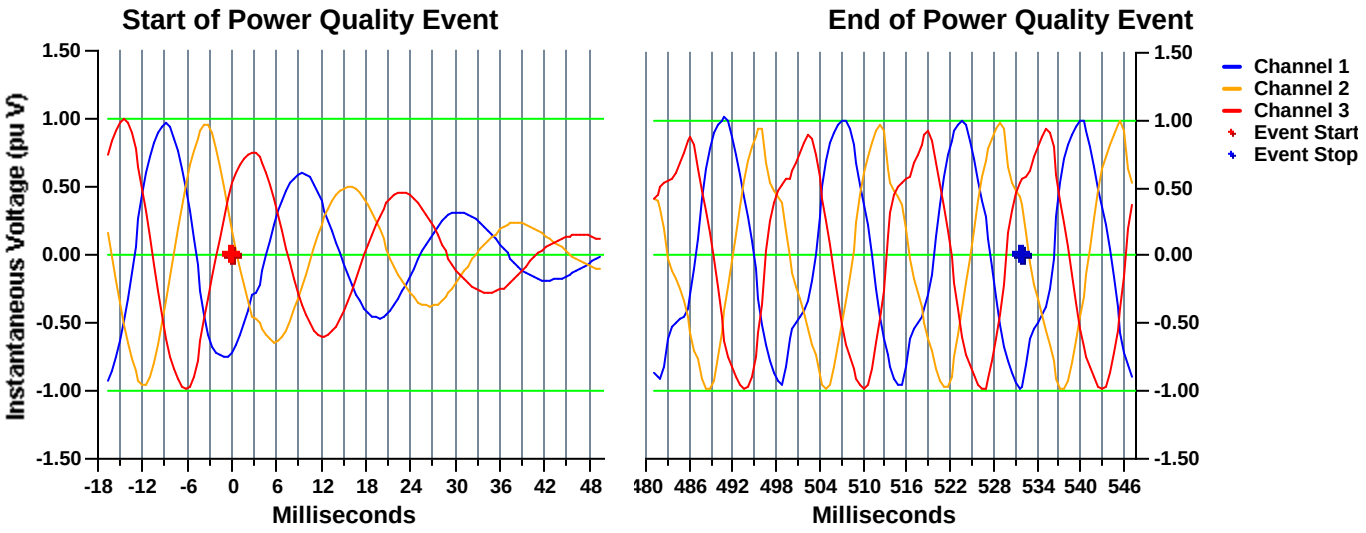
Duration: 532ms (31.92 cycles)

Frequency: 60.0 Hz

Nominal RMS: 480.0 Volts

RMS Summary

Channel	1	2	3
Min	0.0	0.0	0.0
Max	484.3	479.6	472.7
Worst Case RMS as % of Nominal	0.0%	0.0%	0.0%



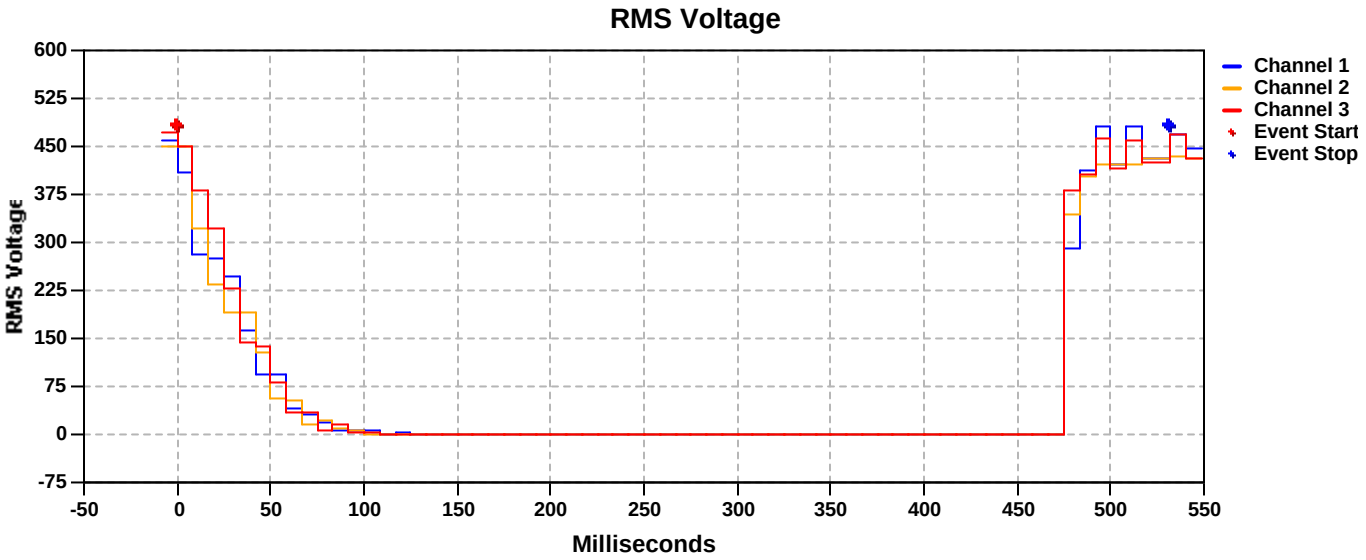


Figure 9: Waveform & RMS Voltage Profiles (continued)

Monitor: Acme Widgets (0099-9900-0099)

Event: 7809 (Instantaneous Sag)

Time: Sunday Jun 02 2013 10:33:46.449 PM CDT

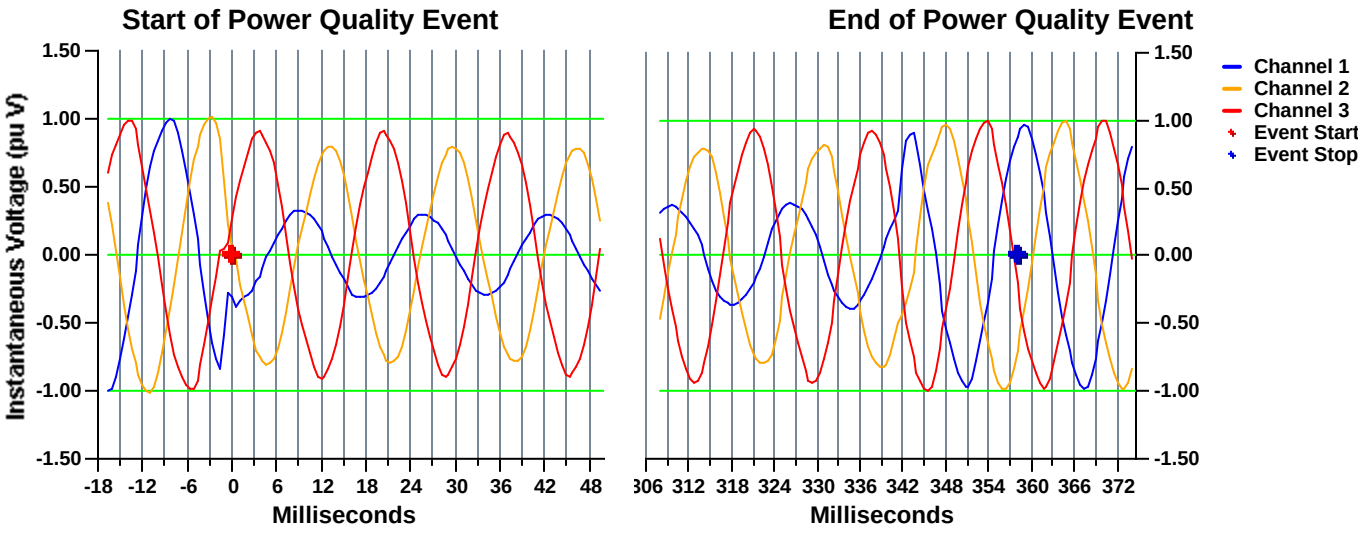
Duration: 358ms (21.48 cycles)

Frequency: 60.0 Hz

Nominal RMS: 480.0 Volts

RMS Summary

Channel	1	2	3
Min	139.3	376.0	391.5
Max	471.7	476.4	495.9
Worst Case RMS as % of Nominal	29.0%	78.3%	81.6%



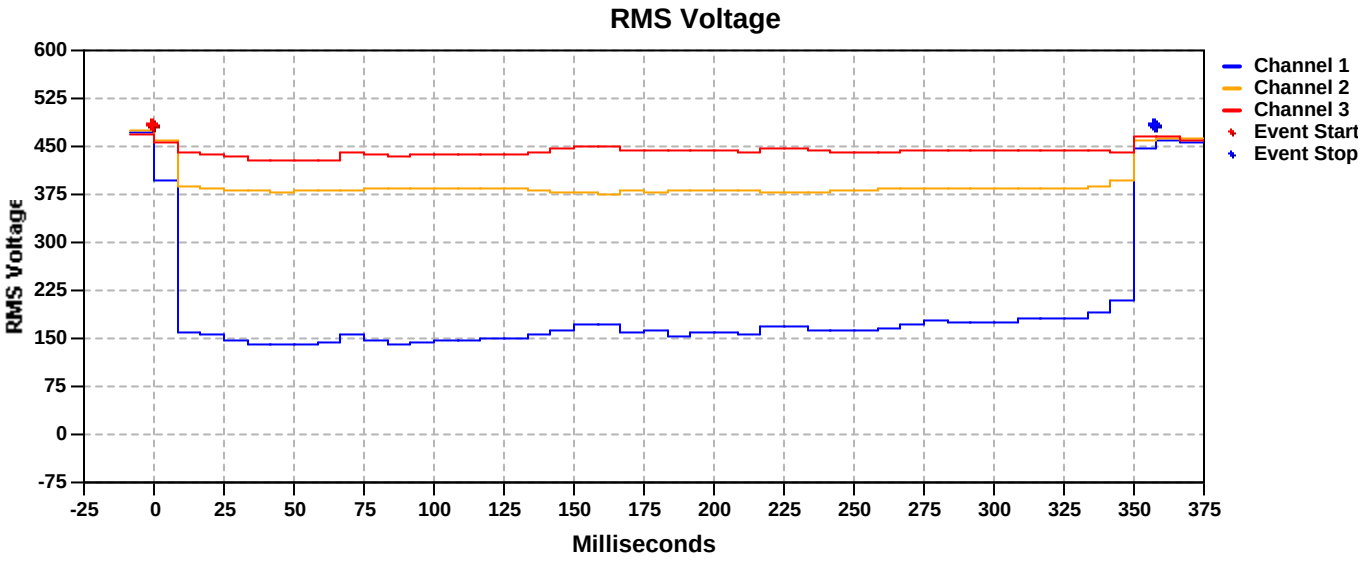


Figure 10: Event Log (transient events excluded)

Events are listed in ascending order by event time. The Event IDs for aggregate events are denoted with an asterisk (*). The power quality events are correlated to the severe weather conditions. The "Weather" column of the table below describes the type of severe weather conditions, if any, at the time of the power quality event.

Start Time (CST)	IEEE 1159 STD Classification	RMS%	Duration (seconds)	Outside ITIC?	Outside F47?	Weather	Grid Event?
04/28/2013 21:35:17.480	Instantaneous Sag	86%	0.24				Yes
05/10/2013 02:00:40.639	Instantaneous Sag	85%	0.06				Yes
05/11/2013 02:39:15.101	Instantaneous Sag	89%	0.01				
05/31/2013 07:50:23.213*	Instantaneous Sag	58%	0.03	Yes			
05/31/2013 23:55:36.237*	Sustained Interruption	0%	3,518.48	Yes	Yes		Yes
06/01/2013 22:29:27.746	Instantaneous Sag	85%	0.15				Yes
06/02/2013 22:33:46.449*	Instantaneous Sag	29%	0.36	Yes	Yes		Yes
06/09/2013 02:45:06.804	Instantaneous Sag	81%	0.02				
06/10/2013 00:17:09.493*	Momentary Sag	77%	0.61	Yes	Yes	Rain	Yes
06/10/2013 02:08:48.611*	Instantaneous Sag	63%	0.09	Yes			Yes
06/13/2013 06:23:55.386*	Instantaneous Sag	59%	0.07	Yes			
06/13/2013 12:57:30.489*	Momentary Interruption	0%	0.53	Yes	Yes		Yes
06/17/2013 09:06:27.945*	Instantaneous Sag	70%	0.07	Yes			Yes

Appendix A: Explanatory Appendix

Event Aggregation: If enabled, events are aggregated using a 2 minute time period. Individual events occuring within 2 minutes of each other are treated as a single aggregate event throughout the report. The aggregate event's remaining RMS voltage and event duration are derived from the *worst event*; the individual event with the lowest remaining RMS voltage.

Transient Events: A transient event is defined as any event with a duration less than .5 cycles, or an event with duration between .5 and 1 cycle and magnitude between 90% and 110% of nominal.

ITI/CBEMA Curve: The ITI/CBEMA curve describes an input voltage envelope that typically can be tolerated by most information technology equipment. Events between the ITI/CBEMA lines on the chart typically do not create problems with a system. Events that are shown outside the ITI/CBEMA curves have a high probability of disrupting the operation of a system.

Semi F47 Curve: The Semi F47 curve describes voltage sag ride-through capability required for equipment used by the semiconductor industry. Events above the F47 line on the chart typically do not cause problems with semiconductor equipment. Events below the F47 line have a high probability of disrupting the operation of semiconductor equipment.

Grid Event: An event is defined as a "Grid Event" if another monitor within a 200 mile radius recorded a similar event inside of a two minute window.

Event Classification: The i-Grid system classifies the severity of a power quality event according to the IEEE 1159 specification,

"IEEE Recommended Practice on Monitoring Electrical Power Quality",
IEEE Standard Number 1159-1995, ISBN 1-5593-7549-3,
available from the IEEE Standards Association,

as extended by IEEE draft proposal 1159.1, and further extended by Rockwell Automation/SoftSwitching in order to fill gaps in the proposed standard.