


# User's Manual for PowerSight® PS4000

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# Table of Contents

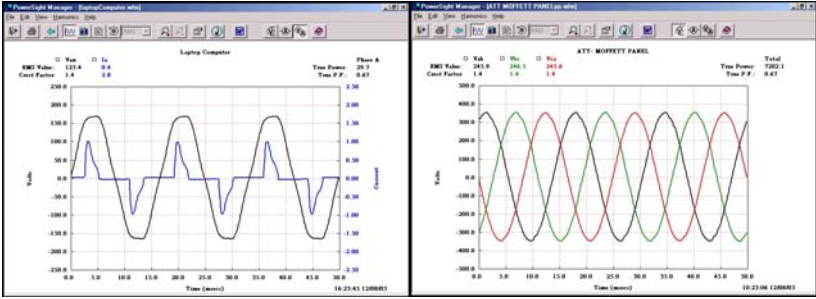
<b>Introducing PowerSight .....</b>	<b>7</b>
<b>Connecting to PowerSight.....</b>	<b>8</b>
Voltage Test Leads .....	8
Current Probes .....	9
Connections to PowerSight.....	12
Introduction to Power Delivery Configurations.....	13
Connecting to Single-phase Power .....	15
Connecting to 120 V Outlet Adapter Box.....	16
Connecting to Multiple Single-phase Loads .....	17
Connecting to Two-Phase Power .....	18
Connecting to Three-Phase Four-Wire (Wye) Power .....	19
Connecting to Three-Phase Three-Wire (Delta) Power .....	20
Connecting to Three-Phase Four-Wire Delta Power.....	21
Connecting to Three-Phase Grounded Delta Power .....	21
Connections Using 2 Current Approach .....	22
Connections To a 3 CT / 3 PT Metering Circuit .....	23
Connections To a 2 CT / 2 PT Metering Circuit.....	26
Connections To an Open Delta (3CT / 2PT) Metering Circuit .....	27
Measuring Multiple Parallel Conductors .....	27
Measuring Currents Below the Range of the Current Probe.....	28
<b>Turning PowerSight On .....</b>	<b>30</b>
Connecting to Power.....	30
Turning PowerSight On .....	31
Turning PowerSight Off .....	31
<b>Checking out Connections Using PowerSight .....</b>	<b>32</b>
Importance of Checking Connections and Wiring .....	32
Checking Voltage Levels - Using Checkout Connections .....	34
Check Voltage Phase Sequence - Using Checkout Connections .....	35
Checking Current Levels - Using Checkout Connections.....	36
Checking I Phase Sequence - Using Checkout Connections .....	37
Checking Phase Lag Angle - Using Checkout Connections .....	38
<b>Checking out Connections using PSM .....</b>	<b>40</b>
Checking Voltage Levels - Using PSM .....	40
Check Voltage Phase Sequence - Using PSM .....	41
Checking Current Levels - Using PSM.....	42
Checking I Phase Sequence - Using PSM.....	43
Checking Phase Lag Angle - Using PSM .....	43

<b>Measurement Types.....</b>	<b>45</b>
Voltage Measurements.....	45
Voltage Measurements in PowerSight.....	46
Voltage Measurements in PSM.....	48
Current Measurements.....	50
Current Measurements in PowerSight.....	52
Current Measurements in PSM.....	53
Power Measurements.....	55
Power Measurements in PowerSight.....	56
Power Measurements in PSM.....	57
Power Factor Measurements.....	58
True Power Factor Measurements in PowerSight.....	60
Displacement P.F. and Phase Measurements in PowerSight.....	61
Power Factor and Phase Measurements in PSM.....	63
Energy Measurements.....	64
Energy Measurements in PowerSight.....	65
Energy Measurements in PSM.....	66
Cost Measurements.....	66
Cost Measurements in PowerSight.....	67
Cost Measurements in PSM.....	68
Demand Period Measurements.....	69
Demand Period Measurements in PowerSight.....	69
Demand Period Measurements in PSM.....	69
Frequency Measurements.....	70
Frequency Measurements in PowerSight.....	71
Frequency Measurements in PSM.....	71
Duty Cycle / Power Cycle Measurements.....	72
Duty Cycle / Power Cycle Measurements in PowerSight.....	73
Time and Capacity Measurements.....	74
Time and Capacity Measurements in PowerSight.....	76
Time and Capacity Measurements in PSM.....	76
Harmonic Measurements.....	77
Harmonic Measurements in PowerSight.....	79
Harmonic Measurements in PSM.....	79
Swells (Surges) and Inrush Measurements.....	80
Dips (Sags) Measurement.....	81
High-Speed Transient Measurements.....	81

<b>Measurement Modes.....</b>	<b>83</b>
Introducing Measurement Modes.....	83
Phase-Neutral vs Phase-Phase vs 2 Current Mode.....	83
Changing the Voltage Measurement Mode in PowerSight.....	85
Changing the Voltage Measurement Mode in PSM.....	85
50/60/400Hz vs DC vs Variable Frequency.....	86
Changing the Frequency Measurement Mode in PowerSight.....	87
Changing the Frequency Measurement Mode in PSM.....	88

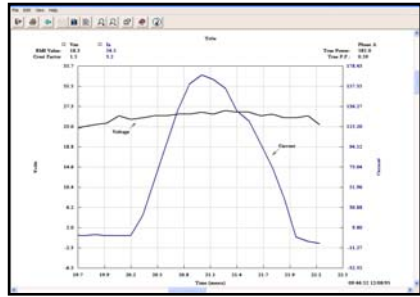
Always Positive Power versus Negative Power Allowed .....	88
Changing the Power Measurement Mode in PowerSight .....	90
Changing the Power Measurement Mode in PSM .....	90
Defining Inputs .....	90
Changing Input Ratios in PowerSight.....	92
Changing Input Ratios in PSM .....	93
<b>Voltage &amp; Current Waveforms .....</b>	<b>95</b>
Introduction.....	95
Saving Consumption Waveforms .....	95
Receiving Stored Consumption Waveforms .....	97
Viewing Consumption Waveforms.....	98
<b>Monitoring Power Consumption .....</b>	<b>102</b>
Introduction.....	102
Basic Consumption Data Logging .....	104
Receiving Consumption Data Log from PowerSight.....	106
Viewing Consumption Logs .....	107
<b>Custom Consumption Data Logging.....</b>	<b>109</b>
Introduction.....	109
Starting Data Logging.....	109
Stopping Data Logging .....	110
Setting the Consumption Logging Period .....	111
Setting Measurement Types.....	112
Setting Measurement Modes.....	113
Saving and Retrieving Data Setups to File or PowerSight.....	114
<b>Monitoring Swell/Dip/Inrush.....</b>	<b>115</b>
Introduction.....	115
Swell/Dip Event Log.....	117
Swell/Dip RMS Graph Log .....	118
Swell/Dip Event Waveforms .....	119
Setting the Swell/Dip Trigger Thresholds in PowerSight .....	120
Setting the Swell/Dip Trigger Thresholds in PSM.....	121
Receiving Swell/Dip Data from PowerSight .....	122
Viewing Swell/Dip Event Data.....	124
<b>Monitoring High-speed Transient Events .....</b>	<b>126</b>
Introduction.....	126
Transient Event Log.....	127
Transient Event Waveforms.....	128
Setting the Transient Trigger Thresholds in PowerSight .....	129
Setting the Transient Trigger Thresholds in PSM.....	130

Receiving Transient Data from PowerSight .....	132
Viewing Transient Event Data.....	133
<b>Allocating Memory within PowerSight.....</b>	<b>135</b>
<b>Report Generator Software .....</b>	<b>137</b>
Introduction.....	137
Generating a Report .....	137
Viewing a Report.....	139
<b>Other Functions of PowerSight .....</b>	<b>142</b>
Calibrating PowerSight.....	142
Setup Functions.....	142
Administrative Functions.....	144
<b>Other Functions within PSM .....</b>	<b>147</b>
Introduction.....	147
Remote Control of PowerSight.....	147
Locating and Installing Software and Firmware.....	148
Setting up Administrative Features of PowerSight via PSM .....	148
Setting Operational Features of PSM.....	149
<b>Putting it all Together (Monitoring for the First Time).....</b>	<b>151</b>
<b>Working with Graphs and Waveforms.....</b>	<b>154</b>
General.....	154
Reading Graphs and Waveforms .....	156
Zooming and Panning .....	159
<b>Troubleshooting &amp; Frequently Asked Questions (FAQ) .....</b>	<b>162</b>
<b>Overview of the Keypad Functions .....</b>	<b>166</b>
<b>Compatibility Guide .....</b>	<b>168</b>
<b>Specifications* .....</b>	<b>170</b>

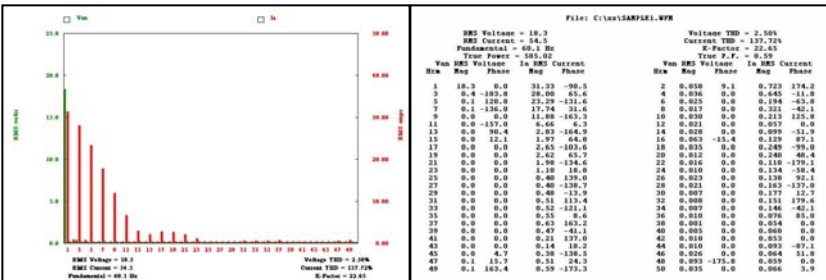
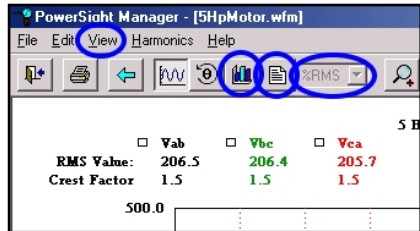


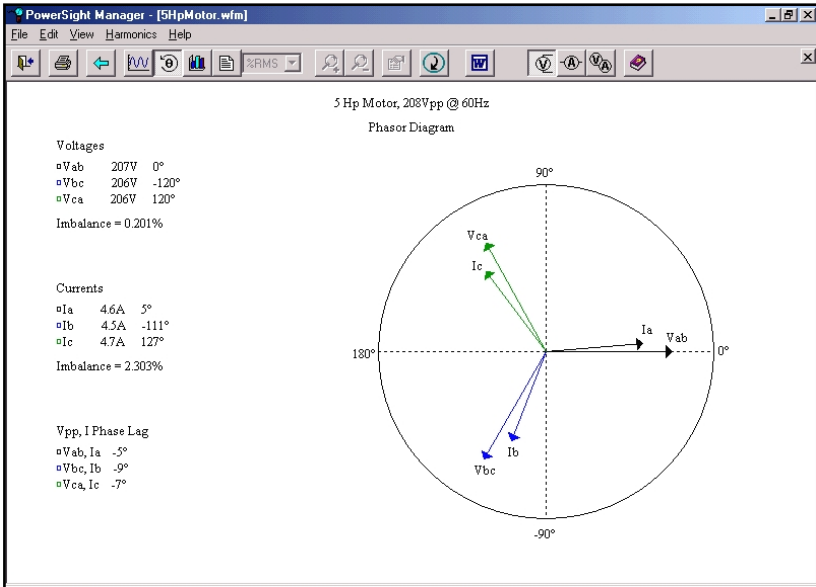
There is a wealth of features related to viewing and analyzing waveforms. Voltage and current can be viewed together and multiple phases of signals can be viewed together.

Portions of waveforms can be zoomed into and panned left/right or up/down. Refer to the [Working with Graphs and Waveforms](#) section to learn more about available presentation and analysis features.

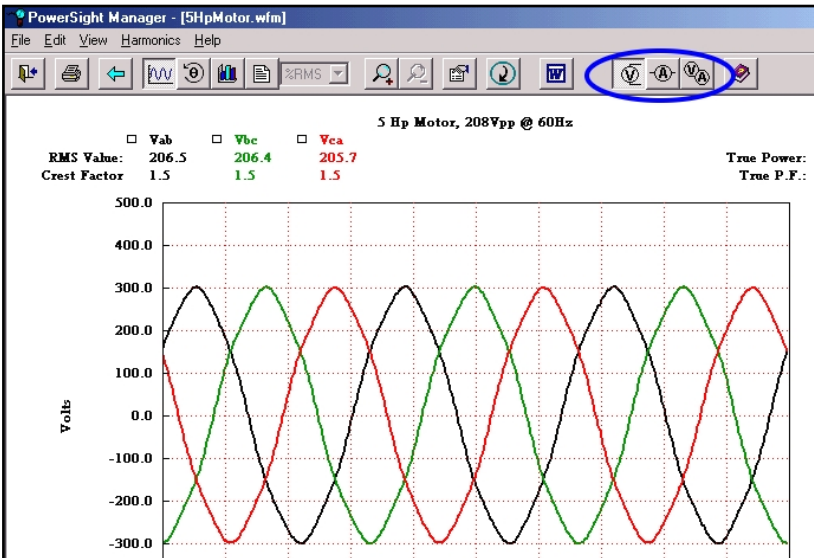


You can easily transform any waveform into either a graph of harmonic data or a view the raw data for each harmonic and K factor. To convert a waveform (“time domain” representation) into a harmonic graph (“frequency domain” representation), click on the



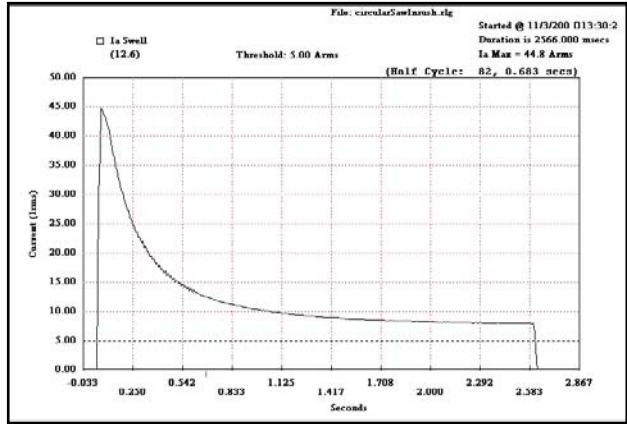


Another convenient analysis feature are the signal selection icons. Clicking on these icons allow you to simply cycle through the individual voltages, currents, or phases. The order of presentation as you click on the icon is A, B, C, and then ABC together.



## Swell/Dip RMS Graph Log

Each record of the Swell/Dip RMS graph log is a recording of the RMS level of the signal starting 2 cycles before the trigger threshold is passed and continuing for 48 cycles or until the first  $\frac{1}{2}$  cycle that did not exceed the trigger threshold and was followed by 1 second of not passing the trigger threshold. The record has timestamp and the RMS levels of each  $\frac{1}{2}$  cycle during the duration of the event. These records are typically not too data intensive, so they do not require an excessive amount of memory.



Each record of the swell/dip RMS graph log can be graphed for overall viewing of the event. Key data is listed above the graph. The time at which the trigger occurred, the duration, the signal name, and the magnitude are all listed. The graph displays RMS values of each  $\frac{1}{2}$  cycle for the entire length of the event. The graph can be zoomed-in on and can be printed.

The swell/dip event RMS data log is recorded as tab delimited text, so it can be imported into Excel for custom analysis.

## Swell/Dip Event Waveforms

Swell/Dip Waveforms are detailed records of the waveform of a swell/dip event. They start 2 cycles before the event and continue for 10 cycles. These files are very data intensive and therefore a limited number of them should be recorded.

# Monitoring High-speed Transient Events

## Introduction

The three general areas of power quality analysis are in investigating on-going harmonic content, analyzing temporary changes in RMS voltage and current levels, and in analyzing instantaneous high-speed (non-RMS) voltage and current transients.

High-speed transients are voltages or currents unrelated to the fundamental frequency of the power being used. They may be due to lightning strikes, sudden shorts or opens, or switching of power sources, loads, and correction equipment. They may be large enough or last long enough to affect the RMS value of a cycle and thereby trigger a swell or a dip, but they are categorized by their peak level and their width rather than their RMS value and duration.

Transients are captured when the instantaneous voltage or current level exceeds the trigger level set by the user. Trigger levels can be set for an “absolute value” and for a “relative value”.

When a trigger is set to an absolute value, such as 180V, anytime the waveform reaches +180V or -180V, the event is captured. The event continues until the level goes slightly below the trigger level again.

When a trigger is set to a relative level, such as 20V, the underlying periodic waveform is removed from consideration and the remaining, transient, signal is examined to see if it exceeds the relative trigger level (in this case, above +20V or below -20V).

There are two types of recordings of high-speed transient events that may be used:

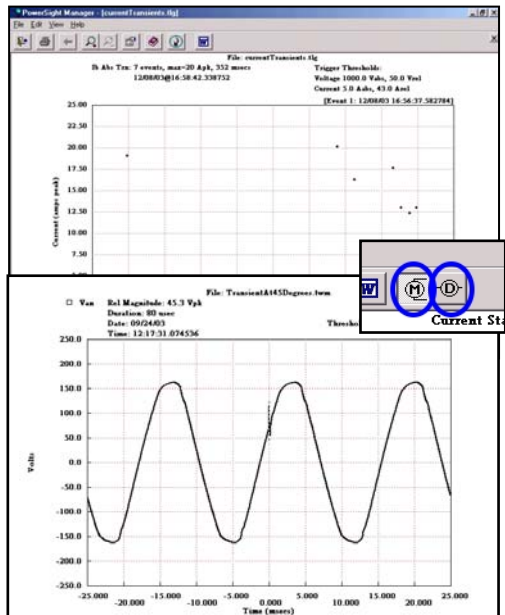
- Transient Event log
- Transient Event waveforms.

The “timestamp” records the date and the time that the event began, to the nearest microsecond. The “signal affected” is simply the name of the signal that had was triggered, such as “Van”. The “peak value” is the highest (or lowest) instantaneous value that was reached. The “duration” is how long, in milliseconds, the event lasted, starting with the moment when the signal exceeded the trigger threshold and ending when the transient returned below the trigger level.

The placement of magnitude vs calendar timeframe allows spotting times of day that events occur, and noticing if events are of similar magnitudes. To view transient magnitude vs. time, click on the magnitude icon. To view transient duration vs. time, click on the duration icon.

### Transient Event Waveforms

Transient event waveforms are detailed records of the waveform of a transient event. They last 50 msec, starting one cycle before the transient event occurred. These files are very data intensive and therefore a limited number of them should be recorded.



**The waveforms can be graphed in order to better understand the transient event. Important information is at the top. The**

# Report Generator Software

## Introduction

PSM comes with a Report Generator Software program. The Report Generator software provides concise reports to summarize and document findings. Comparison reports are excellent for presenting before/after comparisons of power usage and projected cost. Separate logs can be compared or sections of the same log can be compared for this analysis. Summary reports summarize the data of a log or a designated section of the log. The reports can be data only, or can combine data and graphs.

## Generating a Report

To generate a report, either click “File” and then “New Report” at the main menu of PSM or run the program “Report.exe” located in the same directory of your computer that psm.exe is installed in.



The “Report Information” screen will now be displayed. This screen allows you to enter general information that will be printed on the report, such as the title of the report and contact information about the preparer of the report, so the reader can contact him. When you are done entering the information, click on “Next”.

Report Title	Baseline for 6/5/12
Preparer Information:	
Author	Ken Douglas
Company	Miles Engineering, Twin Falls
Street	1676 140th Ave.
Address	Twin Falls, ID
Email	kdougl@mytel.com
Contact Number	925-944-212

The “Report Type Selection” screen will now be displayed. You must choose between doing a summary report or a comparison report. A summary report

Choose the report type. Report types consist of either a summary or a comparison. A comparison can either be between two logs or different time periods within the same log.

Report Type

Summary

Comparison

Since you chose the "comparison" type, the report will summarize and contrast two different groups of data, two different "data sets". Summaries of each data set will be arranged in two columns, one for each data set. Each column needs a column heading.

provides a concise summary value would be for one month if the “before” data continued for the entire month.

After the “Before” column, is the “After” column. This provides the summaries for the measurement types during the timeframe of

<b>20 Ton Air Handler</b>					
<b>Before Upgrade</b>			<b>After Upgrade</b>		
File C:\v\SAMPLE1.LOG			File C:\v\SAMPLE1.LOG		
Test began at 9/23/02 10:17:00			Test began at 9/24/02 13:55:00		
Test ended at 9/23/02 22:15:00			Test ended at 9/25/02 1:55:00		
<b>Measurement</b>	<b>Before</b>	<b>After</b>	<b>Units</b>	<b>Change</b>	<b>%Change</b>
Voltage, A Phase, Ave:	266.3	269.0	volts	2.7	1.0 %
Voltage, B Phase, Ave:	268.9	272.2	volts	3.3	1.2 %
Voltage, C Phase, Ave:	266.5	269.5	volts	3.0	1.1 %
Current, A Phase, Ave	16.1	14.9	amps	-1.2	-7.5 %
Current, B Phase, Ave	14.6	14.4	amps	-0.2	-1.4 %
Current, C Phase, Ave:	15.9	14.9	amps	-1.0	-6.3 %
Total True Power:	10632.0	10141.2	Watts	-490.8	-4.6 %
Total VA Power:	12472.9	11957.5	VA	-515.4	-4.1 %
Power Factor, A Phase, Ave:	0.84	0.84		0.00	0.0 %
Power Factor, B Phase, Ave:	0.85	0.84		-0.01	-1.2 %
Power Factor, C Phase, Ave:	0.88	0.86		-0.02	-2.3 %
Energy, Total Elapsed:	127.584	121.691	KWH	-5.893	-4.6 %
Energy, estimated per month:	7788.3	7407.9	KWH	-380.4	-4.9 %
Cost:	\$6.38	\$6.08		-\$0.29	-4.6 %
Cost, estimated per month: (at \$0.05000/KWH)	\$389.42	\$370.40		-\$19.02	-4.9 %
Report Prepared By: Ken Douglas Miles Engineering, Twin Falls 1676 140th Ave. Twin Falls, ID Phone: 925-944-1212 Email: sales@bjw.com					

the “after” data. The next column is a statement of the units associated with the “before” and “After” columns. For instance, the “Units” for voltage measurement types is “volts”.

The next column is the “Change” in the value of the “After” column from the data in the “Before” column. The values of this column use the same units as the “Before” and “After” columns (such as “volts”). At the far right is the “%Change” column. This presents what percent the “before” data has changed in going from “before” to “after”. A negative number represents a decrease. Therefore the example shows an estimated cost savings of 4.9%, which represents a project savings of \$19.02 per month for this one system.

Following the main body of the report is the information about how to contact the preparer of the report for follow-up.

# Specifications\*

## Size

4" Wide × 8" Long × 1.75" Deep

## Weight

Less than 2 pounds

## Operating Range

0 - 50 degrees C (32 - 122 degrees F)

Relative humidity to 70% (non-condensing)

## Power Requirement

12 VDC @ 500 ma, wall mount power supply included

Internal Li-ion operates up to 8 hours after 4 hours charge.

## Voltage

Input Range: 1 - 600 Vrms steady-state (direct input),  
or 600 – 5,000 Vrms with 5KVP probes,  
or 600 – 15,000 Vrms with 15KVP probes.

Display Range: 1 - 6 megavolts (using input ratios)

Accuracy: 0.1% of reading +/- 0.3 Vrms

Measure Rate: Measure every cycle of every input.

Frequency Response: No de-rating of accuracy for  
harmonics through 4500 Hz)

## Current

Input Range: 0.01 - 5000 Amps, AC or DC with the  
proper current probe attached

With HA5: 0.02 - 5 Amps

With HA100: 0.1 - 100 Amps

With HA1000: 1 - 1000 Amps

With FX3000: 10 – 3000 Amps

With FX5000: 100 - 5000 Amps

With DC600: 5 - 600 Amps DC

6 autoranges

Display Range: 1ma - 6 megamps (using input ratios)

Accuracy: 0.1% of reading plus accuracy of probe

Measure Rate: Measure every cycle of every input.

Frequency Response: dependent on current probe attached

With HA1000: no de-rating of accuracy for harmonics through 4500 Hz)

### **Frequency**

Range: DC, 22 - 200 Hz, 360 – 440 Hz fundamental frequency  
DC and 22 - 4500 Hz included in RMS  
22 - 3900 Hz for harmonic measurements  
Accuracy: 0.25%

### **Power, Energy, Cost, Power Factor**

Display Range: 1 watt - 60 megawatts (using input ratios)  
Accuracy: 0.5% plus accuracy of current probe  
Measure Rate: Measure every cycle of every input.

### **Harmonic Distortion:**

Range: Display of THD and individual harmonics through 25th (1800 Hz) of all signals  
With PowerSight Manager software, display of harmonics through 63rd (3900 Hz)  
Accuracy: To within 1% of fundamental  
Measure Rate: Measure every cycle of every input.

### **Swell/Dip Detection:**

Measure Rate: Measured every ½ cycle of every input.

### **High-speed Transient Detection:**

Measure Rate: Measured every 8usec on every input.

### **Captured Waveforms**

Quantity: set by user allocation of memory

\* These specifications are subject to change without notice.