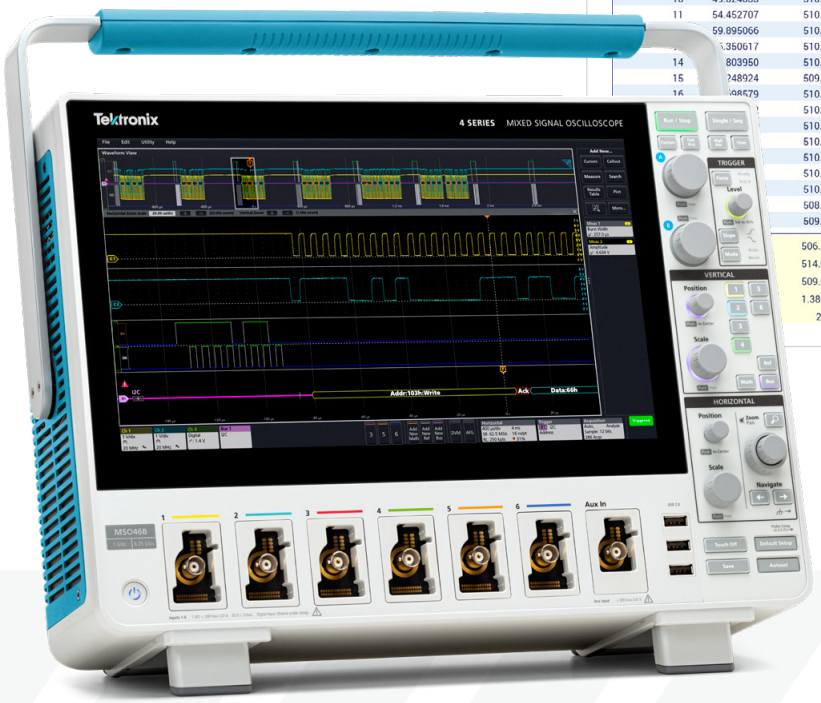
Tektronix®

Measurement Data Logging with the 4 Series B MSO Mixed Signal Oscilloscope and KickStart Software

APPLICATION NOTE

Settings | Table | Graph

	Channel 1					
	Time (s)	Peak To Peak (V)	Maximum (V)	Minimum (V)	Period (s)	Frequency (Hz)
1	0.000000	510.0313e-3	253.0469e-3	-256.9844e-3	10.00040e-6	99.99602e+3
2	5.431227	510.0938e-3	253.1094e-3	-256.9844e-3	9.999687e-6	100.0032e+3
3	10.881757	509.6250e-3	253.1563e-3	-256.4688e-3	9.999925e-6	100.0008e+3
4	16.328363	513.9688e-3	256.9844e-3	-256.9844e-3	9.999502e-6	100.0050e+3
5	21.798968	513.5000e-3	256.5469e-3	-256.9531e-3	9.999271e-6	100.0073e+3
6	27.241486	510.0625e-3	253.0312e-3	-257.0312e-3	10.00185e-6	99.98155e+3
7	32.682592	510.0313e-3	253.0469e-3	-256.9844e-3	10.00104e-6	99.98964e+3
8	38.138223	510.0156e-3	253.0938e-3	-256.9219e-3	10.00047e-6	99.99530e+3
9	43.580949	509.6875e-3	253.0469e-3	-256.6406e-3	9.999699e-6	100.0030e+3
10	49.024033	510.0469e-3	253.0625e-3	-256.9844e-3	10.00013e-6	99.99868e+3
11	54.452707	510.1094e-3	253.0469e-3	-257.0625e-3	10.00076e-6	99.99238e+3
	59.895066	510.0469e-3	253.0625e-3	-256.9844e-3	9.998594e-6	100.0141e+3
	.350617	510.0938e-3	253.1094e-3	-256.9844e-3	10.00044e-6	99.99559e+3
14	803950	510.0781e-3	253.0469e-3	-257.0312e-3	9.999886e-6	100.0012e+3
15	248924	509.6563e-3	253.0469e-3	-256.6094e-3	9.999928e-6	100.0007e+3
16	085579	510.0313e-3	253.0469e-3	-256.9844e-3	10.00025e-6	99.99759e+3
		510.0625e-3	253.0781e-3	-256.9844e-3	9.998952e-6	100.0105e+3
		510.0938e-3	253.1094e-3	-256.9844e-3	9.999939e-6	100.0006e+3
		510.0781e-3	253.0938e-3	-256.9844e-3	9.999078e-6	100.0093e+3
		510.0938e-3	253.0469e-3	-257.0469e-3	10.00099e-6	99.99018e+3
		510.0938e-3	253.1094e-3	-256.9844e-3	10.00024e-6	99.99764e+3
		510.0781e-3	253.0938e-3	-256.9844e-3	10.00058e-6	99.99425e+3
		508.3594e-3	253.0625e-3	-255.2969e-3	9.999689e-6	100.0032e+3
		509.5781e-3	252.9844e-3	-256.5938e-3	10.00032e-6	99.99685e+3
		506.1094e-3	252.9844e-3	-257.0625e-3	9.997884e-6	99.97695e+3
		514.0469e-3	257.0312e-3	-253.0469e-3	10.00231e-6	100.0212e+3
		509.6600e-3	253.1855e-3	-256.4745e-3	9.999991e-6	100.0001e+3
		1.381502e-3	650.6596e-6	1.175707e-3	699.0957e-12	6.988210
		270e-3 %	260e-3 %	-460e-3 %	10e-3 %	10e-3 %



Introduction

Oscilloscopes are highly versatile and powerful instruments for collecting precise measurements with an outstanding range of analysis tools. The Tektronix 4 Series B MSO Mixed Signal Oscilloscope, the latest digital oscilloscope from Tektronix, is now also supported by KickStart Software as of version 2.11.3.

Figure 1: The Tektronix 4 Series B MSO.

Digital oscilloscopes have functions that make waveform measurements easy. They have front-panel buttons and screen-based menus from which you can select automated measurements. These automated measurements appear as on-screen alphanumeric readouts.

However, getting these measurements off the oscilloscope and onto a PC for further analysis and disaggregation typically requires the use of a physical USB drive, programming or software.

The KickStart Software Scope App can be used to configure and capture these measurements and gather screenshots from the convenience of your PC, while also providing easy to use data visualization and analysis tools.

What is Measurement Data Logging?

Data logging can be separated into three different categories: seamless data logging, triggered data logging and measurement data logging. For the purposes of this application note, we will be focusing on measurement data logging, but it is important to define the other categories to distinguish between them.

Seamless Data Logging

Seamless data logging is when data points are taken at consistent intervals over a long period of time. At the end of the test, the full set of data can then be analyzed for anomalies or long-term trends. This type of data logging is commonly performed by dedicated datalogger instrumentation and software such as the DAQ6510 6½-digit Data Acquisition and Multimeter System with the KickStart Data Logger App. Seamless datalogging is used when it is imperative that there be no gaps larger than the sample intervals in the data. Oscilloscopes are triggered devices and, as such, are unable to perform seamless data logging.

Figure 2: Dedicated switching and datalogging instrumentation used for seamless data logging.

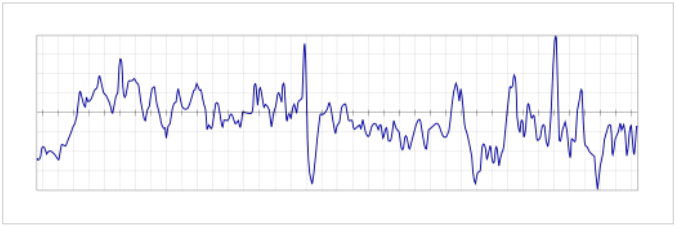


Figure 3: An example of seamless data logging. There are no gaps in the captured data.

Triggered Data Logging

Triggered data logging is when an event known as a "trigger" is defined, and the data recording does not begin until the trigger requirements are fulfilled. This results in taking "snapshots" of data that are centered on the trigger point. This is useful for detecting and recording certain events over a period for analysis, especially if you don't want to collect the data in between these events.

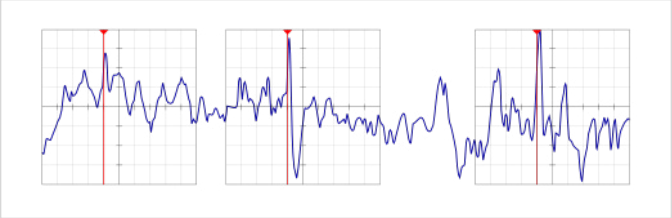


Figure 4: Triggered datalogging will have gaps in the captured data. The red vertical line indicates the trigger point.

Measurement Data Logging

Measurement data logging is similar to triggered data logging, where the goal is to detect and record an event, but is used when the only important parameter to log is a measurement, such as a peak-to-peak measurement, or a rise time measurement. During measurement data logging, a measurement is made on each oscilloscope acquisition and saved. This means that there is less data to sort through, and it takes less time to transfer the measurement data then waveform data, so the repeat rate can be much faster.

Measurement data logging is useful for event monitoring, ensuring that an event never exceeds a certain value, such as when monitoring the power output of a transmitter.

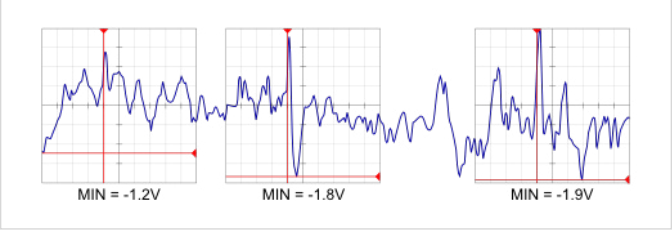


Figure 5: Measurement datalogging will make a measurement on each triggered acquisition. These measurements can then be collected and graphed to visualize trends in the data.

Using the KickStart Software Scope App for Logging Measurements

The KickStart Scope app can be used for the datalogging of measurements via its Measurements Mode. Measurements Mode allows a user to select up to eight measurements to retrieve from the scope. The measurements are made by the oscilloscope and logged into the KickStart Table. The user can then use the Graph tab in KickStart to view the measurement data and easily note trends or spot anomalies.

To start, connect the scope to a PC via LAN or USB, attach the probes to the device under test and set up the oscilloscope's acquisition settings from the front panel. The main settings of interest are the record length, sample rate and trigger type.

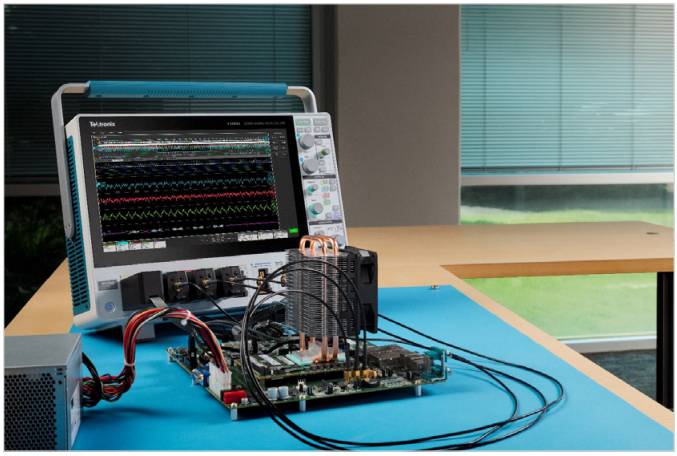


Figure 6: A 4 Series B MSO used on a bench setup for power integrity testing.

Once the oscilloscope acquisition settings are configured on the front panel, KickStart Software can be used to acquire and log measurements.

Launch KickStart Software and connect to the 4 Series B MSO.

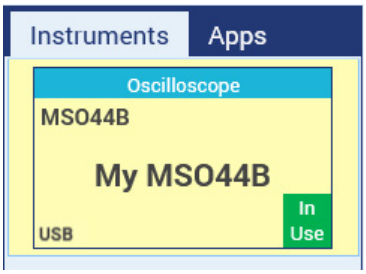


Figure 7: A connected 4 Series B MSO appearing in the KickStart Software Instruments tab.

Select the Measurements mode and use the Add A Measurement button to add up to eight measurements to be logged.

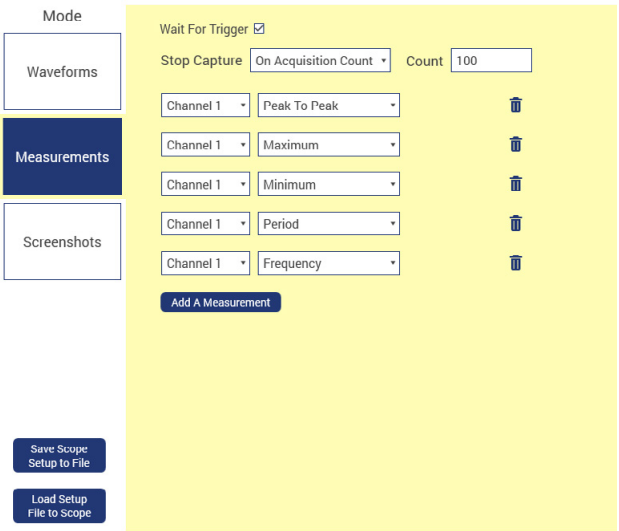


Figure 8: The KickStart Scope App Measurement Mode settings screen.

The measurements that can be logged by the KickStart Scope app include:

- AC RMS
- Amplitude
- Area
- Base
- Burst Width
- Data Rate
- Delay
- Duration N-Periods
- Falling Slew Rate
- Fall Time
- Frequency
- High Time
- Hold Time
- Maximum
- Mean
- Minimum
- Negative Duty Cycle
- Negative Overshoot
- Negative Pulse Width
- Positive Duty Cycle
- Period
- Phase
- Peak to Peak
- Positive Overshoot
- Positive Pulse Width
- Rise Time
- Rising Slew Rate
- RMS
- Skew
- Setup Time
- Time Outside Level
- Top
- Unit Interval

Measurement logging can be configured to end after a specified number of acquisitions, after a specified duration of time or to be taken continuously.

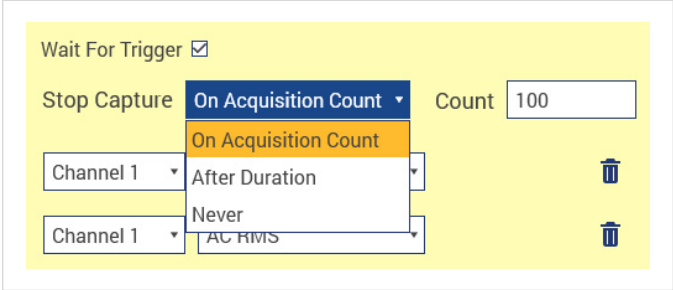


Figure 9: The KickStart Scope App Stop Capture options.

To start measurement logging, simply press the run button at the bottom left of the app window.

Figure 10: The KickStart Scope App run button is in the toolbar at the bottom of the app window.

Retrieving the Data

When the test is finished, the data can be viewed in the Table tab or the Graph tab.

The KickStart Software Table tab comes equipped with built in statistics to highlight key trends and assist users in coming to conclusions more quickly.

Settings | Table | Graph

	Channel 1					
	Time (s)	Peak To Peak (V)	Maximum (V)	Minimum (V)	Period (s)	Frequency (Hz)
1	0.000000	510.0313e-3	253.0469e-3	-256.9844e-3	10.00040e-6	99.99602e+3
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4	16.328363	513.9688e-3	256.9844e-3	-256.9844e-3	9.999502e-6	100.0050e+3
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6	27.241486	510.0625e-3	253.0312e-3	-257.0312e-3	10.00185e-6	99.98155e+3
7	32.682592	510.0313e-3	253.0469e-3	-256.9844e-3	10.00104e-6	99.98964e+3
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10	49.024033	510.0469e-3	253.0625e-3	-256.9844e-3	10.00013e-6	99.99868e+3
11	54.452707	510.1094e-3	253.0469e-3	-257.0625e-3	10.00076e-6	99.99238e+3
12	59.895066	510.0469e-3	253.0625e-3	-256.9844e-3	9.998594e-6	100.0141e+3
13	65.350617	510.0938e-3	253.1094e-3	-256.9844e-3	10.00044e-6	99.99559e+3
14	70.803950	510.0781e-3	253.0469e-3	-257.0312e-3	9.999886e-6	100.0012e+3
15	76.248924	509.6563e-3	253.0469e-3	-256.6094e-3	9.999928e-6	100.0007e+3
16	81.698579	510.0313e-3	253.0469e-3	-256.9844e-3	10.00025e-6	99.99759e+3
17	87.149362	510.0625e-3	253.0781e-3	-256.9844e-3	9.998952e-6	100.0105e+3
18	92.593620	510.0938e-3	253.1094e-3	-256.9844e-3	9.999939e-6	100.0006e+3
19	98.047004	510.0781e-3	253.0938e-3	-256.9844e-3	9.999078e-6	100.0093e+3
20	103.495883	510.0938e-3	253.0469e-3	-257.0469e-3	10.00099e-6	99.99018e+3
21	108.940113	510.0938e-3	253.1094e-3	-256.9844e-3	10.00024e-6	99.99764e+3
22	114.384609	510.0781e-3	253.0938e-3	-256.9844e-3	10.00058e-6	99.99425e+3
23	119.832121	508.3594e-3	253.0625e-3	-255.2969e-3	9.999689e-6	100.0032e+3
24	125.273099	509.5781e-3	252.9844e-3	-256.5938e-3	10.00032e-6	99.99685e+3
Min	0.000000	506.1094e-3	252.9844e-3	-257.0625e-3	9.997884e-6	99.97695e+3
Max	539.203157	514.0469e-3	257.0312e-3	-253.0469e-3	10.00231e-6	100.0212e+3
Mean	269.643141	509.6600e-3	253.1855e-3	-256.4745e-3	9.999991e-6	100.0001e+3
StdDev	158.030254	1.381502e-3	650.6596e-6	1.175707e-3	699.0957e-12	6.988210
CV	58.61 %	270e-3 %	260e-3 %	-460e-3 %	10e-3 %	10e-3 %

Figure 11:The KickStart Software Table tab.

The KickStart Software Graph tab can be used to visualize the data collected by the KickStart Scope App. The graph includes several tools to assist with data analysis, including cursors, statistics and a run comparison feature.

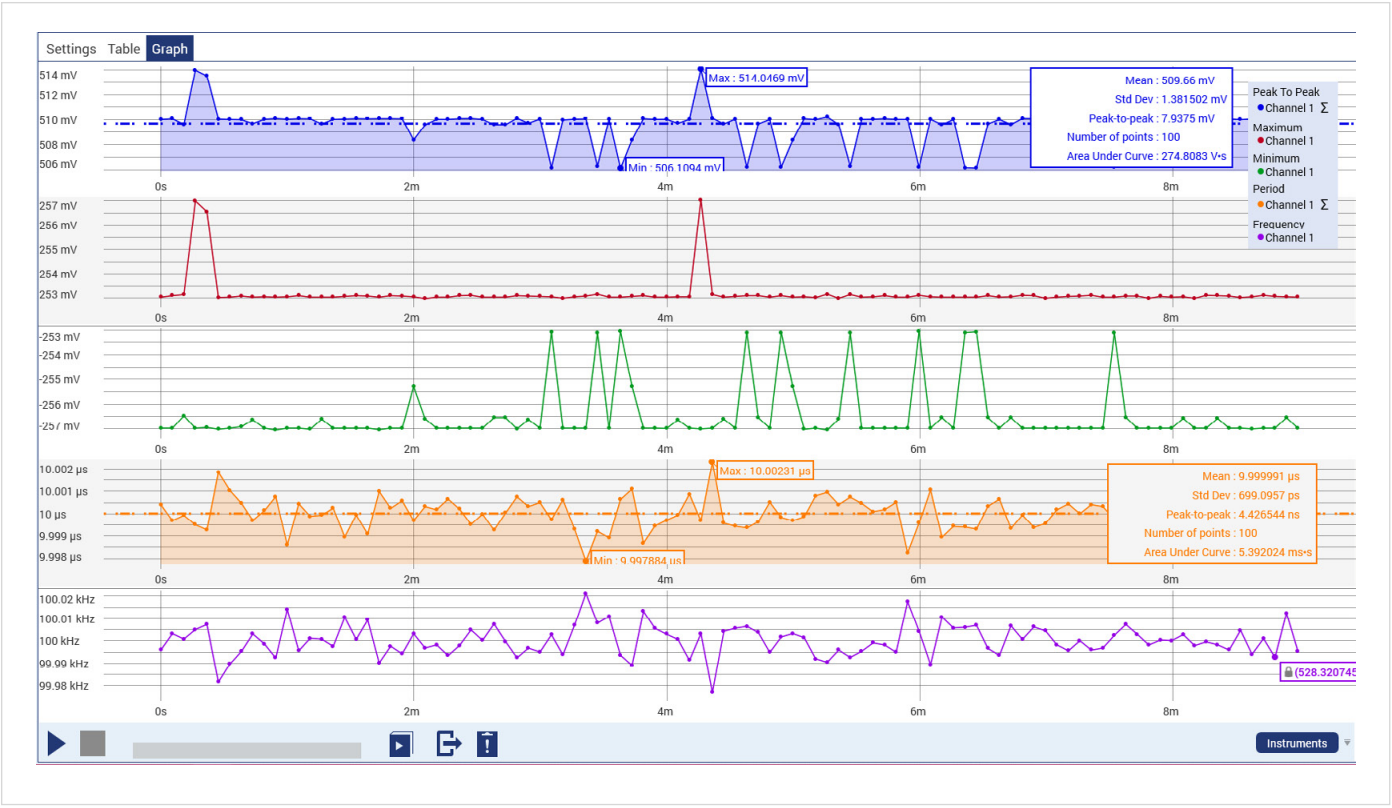

Figure 12: The KickStart Software Graph tab showing the logged data of five different measurement types with statistics applied to the period and peak to peak measurements.

KickStart Software also allows for easy data export, enabling users to take the data collected by the software and use it elsewhere, such as for further analysis and computing or for generating reports.

Figure 13: The KickStart Software Data Export button is in the toolbar at the bottom of the app window.

The data table contents can be exported in a *.csv or *.xlsx formats and the graph can be exported as a *.png at multiple different image resolutions. The Export Data menu can even be configured to automatically export new data at the completion of each run, saving time and ensuring that data is never lost.

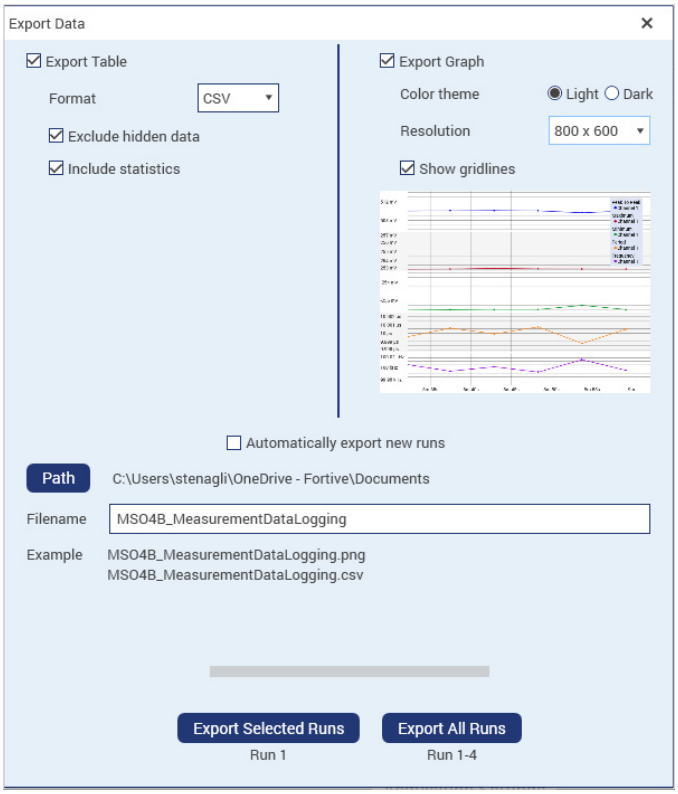

Figure 14: The KickStart Software Data Export menu.

Conclusion

Measurement data logging comes in handy when specific parameters and events need to be tracked over a period of time. However, getting these measurements off the oscilloscope and onto a PC to use in reporting or further analysis can be a hassle, particularly for sites where security is a concern.

The KickStart Software Scope App can be used to configure and capture these measurements, while also providing easy to use data visualization and analysis tools, and data export options all from the convenience of a PC.

As of KickStart Software version 2.11.3, the Tektronix 4 Series B MSO Mixed Signal Oscilloscope is now supported by KickStart Software and can utilize all of the productivity and convenience features it provides.

To learn more about KickStart Software, visit tek.com/KickStart.

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