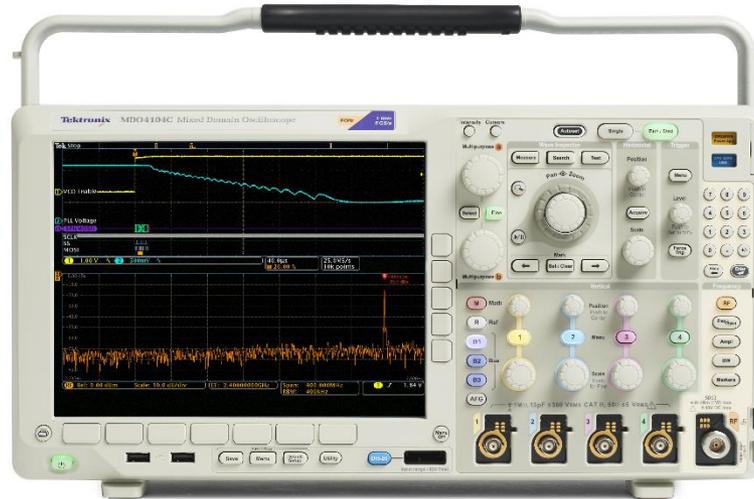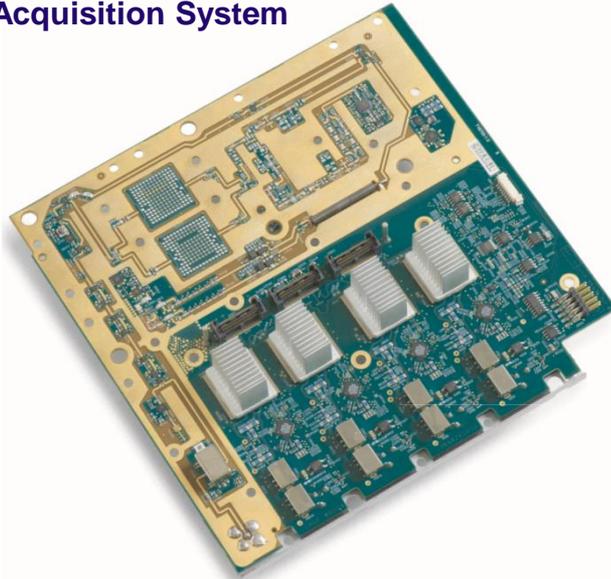# MDO4000C Series vs. Regular Scope FFTs
Competitive Fact Sheet

Dedicated RF Acquisition System

User Interface Designed For Easy Spectral Analysis

Benefits:

- Dedicated front panel controls make spectral analysis easy

- Automatic markers identify spectral peaks

- Easy viewing / navigation of time correlated analog, digital, and RF

- Spectral analysis features such as assorted trace types, detection methods, and automated measurements

Benefits:

- ~20dB better dynamic range than a scope FFT

- RF support to 3 or 6 GHz in a 200 MHz – 1 GHz scope

- Independent control of time and frequency domain provides optimal view in both domains (impossible with scope FFT)

- Synchronized analog, digital, and RF displays

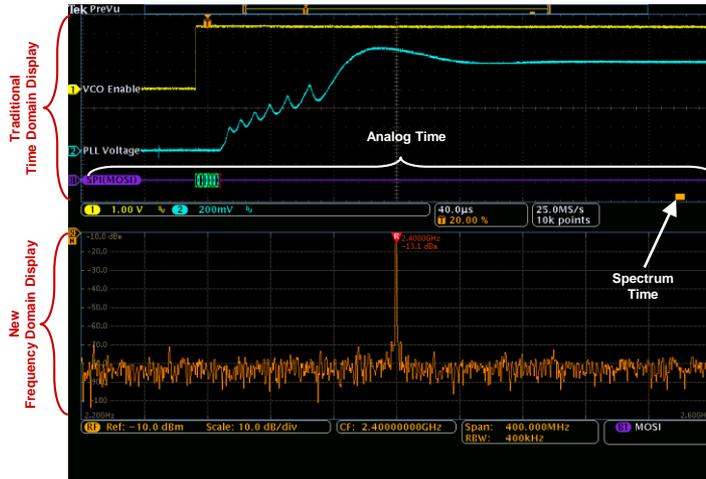- Doesn't use one of the scope's four analog inputs (MDO provides dedicated N-connector input for RF)

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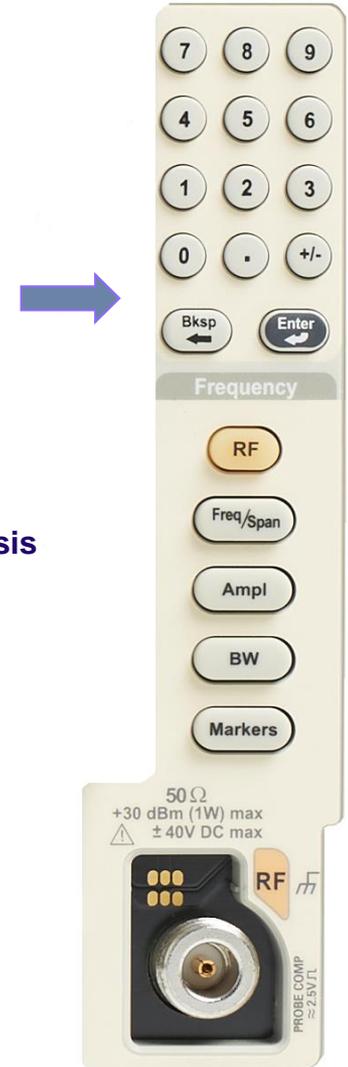
MDO4000C Series vs. Regular Scope FFTs
Competitive Fact Sheet

## Time Correlated Analog, Digital and RF

Integrated spectrum analyzer with dedicated acquisition system enables independent control and optimal views of both the time and frequency domains. Spectrum time indicates where in time the spectrum shown came from. Using WaveInspector®, one can easily view and navigate through time correlated analog, digital, and RF.

Automatic Markers
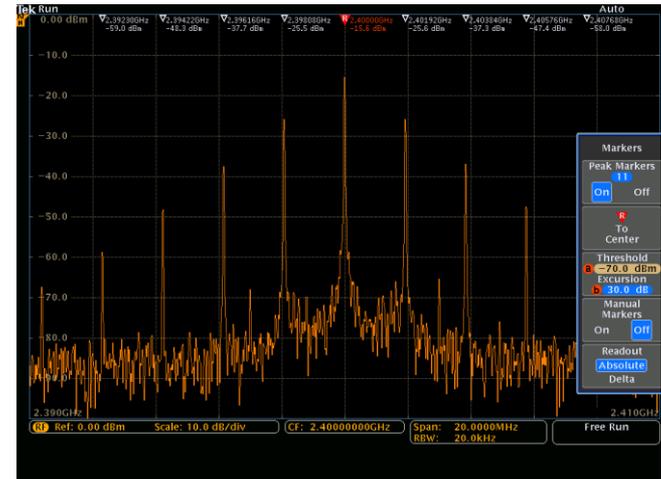
Automatic Markers identify spectral peaks, with the reference marker assigned to the highest amplitude peak. Manual Markers can also be used to investigate other areas of interest in the spectrum or to measure phase noise and noise density.

Spectrum Traces
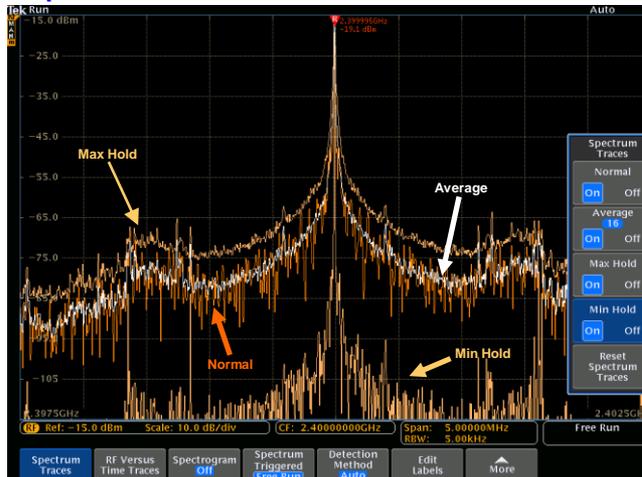
Unlike traditional FFT, the MDO4000C supports typical spectrum analyzer traces: Normal, Average, Max Hold and Min Hold.

Spectral Measurements
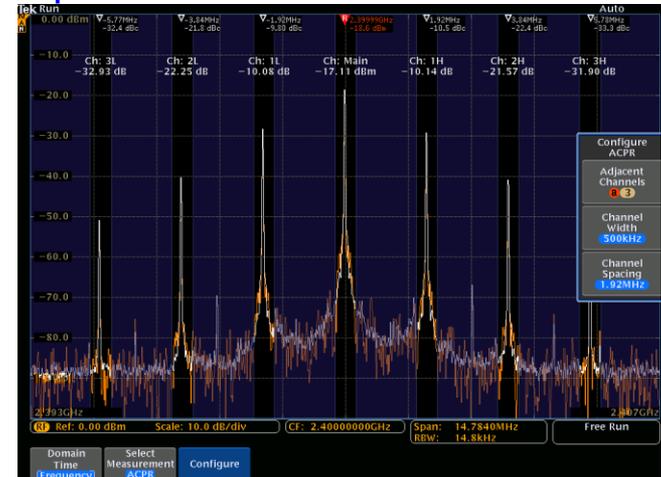
Typical spectrum analyzer measurements are supported, including Channel Power, Adjacent Channel Power Ratio, and Occupied Bandwidth.

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MDO4000C Series vs. Regular Scope FFTs
Competitive Fact Sheet

	Tektronix MDO4000C with SA3 or SA6 option	Agilent X3000, X4000, X6000, S Series	LeCroy HDO4000/6000, WR Mxi-A, 6Zi	R&S RTM / RTO / RTE
① Specifications				
Analog Channel Bandwidth	200 MHz - 1 GHz	100 MHz - 4 GHz	400 MHz - 4 GHz	600 MHz - 4 GHz
Integrated Spectrum Analyzer	Std.	--	--	--
Maximum RF Frequency	6 GHz	Determined by scope bandwidth		
Frequency Response	Flat	Rolls off to 3dB down at rated bandwidth (not flat at higher frequencies)		
Spurious Free Dynamic Range	-60 dBc (-65 dBc typical)	not specified, but ~45 dBc		
② Spectrum Analysis				
Automatic Peak Markers	Std.	--	opt. w/ -SPECTRUM	--
Manual Markers	Std.	Std. (cursors)	Std. (cursors)	Std. (cursors)
Trace Types	Normal, Max Hold, Min Hold, Average	Normal	Normal, Max Hold, Average	Normal
Detection Methods	+ Peak, -Peak, Average, Sample	Sample	Sample	Sample
Measurements	Channel Power, Adjacent Channel Power Ratio, Occupied Bandwidth, Noise Density, Phase Noise	--	--	--
Spectrogram	Std.	--	--	--
Preamp for low-amplitude signals	Opt.	--	--	--
③ Synchronization of Analog, Digital and RF				
Independent Control of Time & Freq Domains	Std.	--	--	--
Ability to position spectrum in time	Spectrum Time	gated FFT	gated FFT	gated FFT
RF Amplitude vs. Time	Std.	--	--	--
RF Frequency vs. Time	Std.	--	--	--
RF Phase vs. Time	Std.	--	--	--
RF Power Level Trigger	Std.	--	--	--
④ Usability				
Front panel access to common SA controls	Std.	--	--	--
Front panel controls for positioning spectrum in time	Std.	--	--	--
Front panel keypad for numeric entry	Std.	--	--	--
⑤ Price				
Minimum cost to analyze up to 3 GHz RF	$10,300 (MDO4024C SA3)	$23,529 (DSOx6002A 4 GHz)	$32,545 (WR 640Zi)	$37,800 (RTO1044)
Minimum cost to analyze up to 6 GHz RF	$13,300 (MDO4024C SA6)	$29,529 (DSOx6002A 6 GHz)	$75,955 (WP 760Zi-A)	--

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MDO4000C Series vs. Regular Scope FFTs
Competitive Fact Sheet

1 Specifications

Tektronix MDO4000C

- ✓ Dedicated SA input doesn't use up one of the scope's four analog channels.
- ✓ RF Frequency range not determined by scope analog bandwidth – you can get the right level of performance for both your RF needs and your analog/digital needs.
- ✓ Spectrum analyzer has flat frequency response across the entire range leading to more accurate measurements.
- ✓ Integrated spectrum analyzer provides 65 dBc (typical) dynamic range, far better than a scope's analog channels.

Regular Scope FFT

- ✗ Must give up one of the scope's analog channels to view an FFT.
- ✗ To get multi-GHz RF performance, you need to buy a multi-GHz scope which may be way more than needed or budgeted.
- ✗ Signal amplitude gradually rolls off to -3dB at the scope's rated bandwidth. Therefore RF measurements made anywhere near the rate bandwidth of the scope are being attenuated significantly.
- ✗ Typical scope FFTs provide ~45dBc dynamic range.

2 Spectrum Analysis

Tektronix MDO4000C

- ✓ Spectrum peaks are automatically labeled (both frequency and amplitude) making signal identification easy.
- ✓ Typical spectrum analyzer trace types are supported including Normal, Max Hold, Min Hold, and Average.
- ✓ Typical spectrum analyzer detection methods are supported including +Peak, -Peak, Average, and Sample.
- ✓ Typical spectrum analyzer measurements are supported including Channel Power, Adjacent Channel Power Ratio, and Occupied Bandwidth.
- ✓ TPA-N-PRE preamp available for investigation of very low amplitude signals.

Regular Scope FFT

- ✗ Manual cursors are typically required to identify the frequency and amplitude of peaks in the spectrum.
- ✗ Only Normal trace is available.
- ✗ Only Sample detection is available.
- ✗ Spectral measurements not typically available.
- ✗ No preamp available.

3 Time Correlation

Tektronix MDO4000C

- ✓ Dedicated spectrum analyzer acquisition system enables independent control of time and frequency domains allowing optimal views in both domains.
- ✓ Spectrum Time indicates where in time the spectrum shown came from.
- ✓ RF Ampl, Freq, and Phase vs. time traces make it easy to visualize modulation characteristics and measure timing delays between analog or digital control signals and changes or events in the RF signal.
- ✓ RF power level triggering enables you to trigger on events in the frequency domain such as the RF signal turning on or off.

Regular Scope FFT

- ✗ A single set of controls (sample rate, record length, etc.) control everything leading to either the desired view in the time domain OR the frequency domain but virtually never both at the same time.
- ✓ Competitors have a gated FFT that works similar to spectrum time.
- ✗ LeCroy offers RF vs. Time traces as part of their DEMOD math function. No one else offers this capability.
- ✗ Limited to traditional analog or digital triggers, no RF triggering.

4 Usability

Tektronix MDO4000C

- ✓ The MDO4000C was designed for simple RF analysis. As such, dedicated front panel controls are provided for the most common adjustments (Center Frequency, Span, Reference Level, RBW, Markers, etc.).
- ✓ Front panel keypad makes specific value entry easy (for example, precise Center Frequencies).
- ✓ Spectrum Time controlled through intuitive Wave Inspector front panel controls.

Regular Scope FFT

- ✗ Regular scope FFTs are not designed for serious RF analysis. Controls are always buried in menus and adjustments often have unforeseen consequences as the time and frequency domains are all tied to a single acquisition system.
- ✗ No front panel keypad.
- ✗ If the spectrum location can be controlled at all, the controls to do so are buried in menus.

5 Prices

To analyze RF signals with a traditional scope, you need to purchase a scope with analog bandwidth sufficient to view the RF frequency range of interest, even though that bandwidth may be well beyond what you need to observe your analog and digital signals. With the MDO4000C, you can purchase the analog BW you need (from 200 MHz to 1 GHz) while still being able to capture RF up to 6 GHz. This results in a solution ~1/3 the price of traditional scope FFT solutions.

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