# Competitive Comparison: Keysight InfiniiVision 3000T/4000 X-Series versus Danaher Tektronix MDO32/34 Series

## An oscilloscope that sees everything, triggers on anything...

With much faster waveform update rates, zone trigger, hardware-based serial bus analysis, and a lower price-point, Keysight's InfiniiVision 3000T and 4000 X-Series oscilloscopes are much better scopes than the Tek 3 Series to use in the R&D environment to debug designs. Even though Tektronix is promoting this 3 Series as a "new" oscilloscope, the 3 Series is based on the same acquisition hardware as the MDO3000. The only thing new about this product is the GUI. Some will like it... some will not. The Tek 3 Series is nothing more than a make-over of the older MDO3000. Keysight "MegaZoom IV custom" ASIC technology powers the fastest waveform update rates, responsive deep memory, integrated MSO, integrated dual channel WaveGen, hardware-based Zone Trigger and integrated protocol analyzer with hardware-based decoding.

Hidden jitter & glitch

### Experience faster update rates

Fast Update Rates



Tek FastAcq special acquisition mode





**KEYSIGHT** TECHNOLOGIES

Tek 50,000 wfm/s

FastAcq On (Lots Compromise!)

- 1Kpts for acquisition memory
- No waveform math
- No automatic measurements
- No serial bus analysis
- No MSO
- No zoom display
- No waveform reconstruction.....





	Keysight 3000T/4000 X-Series	Tek MDO 32/34
Bandwidth	100 MHz to 1 GHz (3000T)	100 MHz to 1 GHz
	√ 200 MHz to 1.5GHz (4000X)	For all models:
		150 MHz @ 1 mV/div
		300 MHz @ 2 mV/div
Commission and a		
Sample rate	V 5 GSa/s	2.5 GSa/s
Channels	(2 or 4) + 16 (optional)	(2 or 4) + 16 (optional)
ADC Bits	8 bits	8 bits
Waveform update rate (max)	√ 1,000,000 wvfm/sec	50,000 wvfm/sec (Norm Acq)
		280,000 wvfm/sec (FastAcq)
Acquisition memory	4 M pts	√ 10 M Pts
Segmented Memory	√Yes	No
Zone Trigger	√Yes	No
Mask Test	√Yes	No
Frequency Response Analysis	√ Yes	No
Multi-Domain Analysis	√Yes	No
Serial bus support	√ Hardware-based decoding,	Software-based decoding,
	Symbolic and mask test for automotive	No symbolic, no masks
Serial protocol support	$\sqrt{I^2C}$ , SPI, RS232, CAN, CAN-FD, LIN,	I <sup>2</sup> C, SPI, RS232, CAN, CAN-FD,
	CAN-dbc, SENT, I <sup>2</sup> S, MIL-STD1553,	CAN-dbc, LIN, SENT, I <sup>2</sup> S, MIL-
	ARINC 429, FlexRay, CXPI, USB PD	STD1553, ARINC 429, FlexRay,
	NFC, User-definable Manchester/NRZ	USB
	USB HS/FS/LS (4000X)	
Spectrum Analysis	FFT only	Yes (Optional 3GHz RF channel)
Offline Analysis	√ Yes (BenchVue, N8900A)	No
Display	8.5 " capacitive touch (3000T)	11.6" capacitive touch
· -	$\sqrt{12.1}$ " capacitive touch (4000X)	
Training signals	√Yes	No
Warranty & Calibration Period	Warranty: 3 years	Warranty: 3 years
-	√ Calibration: 2 years	Calibration: 1 year
Weight	8.5 lbs (3.9 kg)	11.7 lbs (5.3 kg)



#### **FFT/Spectrum View**

In this measurement example, the Keysight InfiniiVision X-Series oscilloscope performed a gated FFT measurement only during digitally-encoded sideband modulation on an NFCenabled device. Gating is user-selectable. When gating is turned on, the FFT is performed only on acquired data that occurs during the time-span established by the scope's horizontal zoom window. The Tek 3 Series was not able to perform this measurement properly since it does not support gated FFTs. The built-in SpecAn can't perform this measurement either due to the complexity of this modulated signal. When using FFT, the Tek 3 Series performed the FFT across the entire acquisition window, which doesn't properly isolate the subcarrier modulation. If the user makes any changes to the scope's memory depth or timebase settings, FFT trace scaling changes as well. This can make it a very frustrating experience when attempting set up a simultaneous time-domain and frequency-domain measurements.





#### Serial decode using logic channel

For many of today's more common and lower speed serial buses such as I<sup>2</sup>C, SPI, and UART (RS232/485), engineers will often capture and decode these buses using the scope's logic channels (MSO) of acquisitions to save the analog channels of their scope for more important high-speed signals. When using the Tek 3 Series' logic channels for serial, waveform and decode update rates get painfully slow. The update rate is just 1 update every 4 seconds when using 1M points of acquisition memory. If the user decides to use the scope's entire 10M points of memory, update rates drop to 1 update every 35 seconds. Using logic channels for serial applications on Keysight's InfiniiVision oscilloscope have no effect on the scope's update rate (up to 1,000,000 waveforms/sec). Waveform and decode update rates remain responsive.

#### Advantage in trigger and memory

For triggering on more complex signals such as an infrequent non-monotonic edge signal, Keysight's InfiniiVision 3000T and 4000 X-Series oscilloscopes offer hardware-based Zone Triggering, which is a standard feature in these oscilloscopes. The Tek 3 Series does not offer anything like zone trigger. Keysight's InfiniiVision oscilloscopes have segmented memory acquisition. Segmented memory acquisition can be used to capture multiple and consecutive occurrences of selected data, such as protocol errors. With the Tek 3 Series, the only way to capture multiple and consecutive occurrences of specific data is to simply capture all bus transactions continuously using the scope's manually-selected deep memory. With segmented memory, Keysight's InfiniiVision scopes can capture more selective data over a longer time-span.



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requency Response Analysis

## InfiniiVision 3000T/4000 X-Series Key advantages

- Much faster waveform update rates without compromises/tradeoffs
- Hardware-based Zone trigger

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- Hardware-based serial decoding
- Serial decoding on all segments
- More serial bus protocol support

- Lower vertical noise
- Gated FFT and Multi-domain anlysis
- Frequency Response Analysis (Bode)
- Mask testing
- Power measurements
- Lower price

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