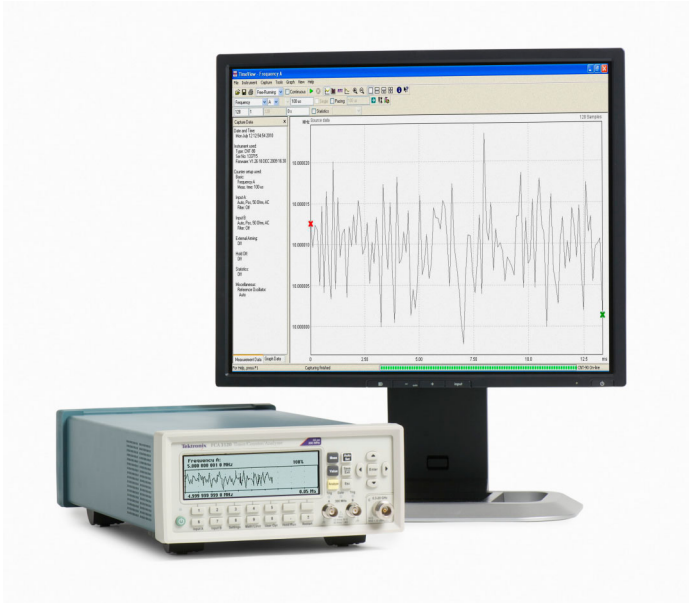


# Modulation Domain Analysis Software

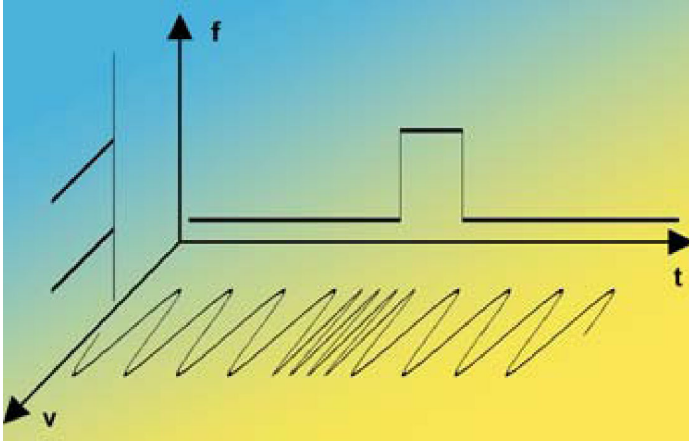
## TVA3000 TimeView™ Data Sheet



## Features & Benefits

### Key Performance Specifications

- Displays Dynamic Frequency Changes over Time
- Displays Residual FM and AM on up to 40 GHz Carriers
- Detects Frequency Changes Every 4  $\mu$ s in Real Time (Every 10 ns with repetitive sampling)
- Statistical Distribution Histogram
  - FFT Analysis
  - Smoothing Mode
- Zero Dead-time Measurements



The modulation domain (f versus t) complements the time domain (v versus t) and the frequency domain (v versus f) to provide a complete picture of your signal.

## Transform Your Timer/Counter into a Modulation Domain Analyzer

With the TimeView™ analysis software, you can transform your Tektronix FCA or MCA Series timer/counter into a Modulation Domain Analyzer (MDA). An MDA displays frequency versus time, just like an oscilloscope displays voltage versus time. With an MDA on your bench, you will be able to completely characterize your signal.

## Dynamically Analyze Your Signal's Amplitude and Frequency

Amplitude and frequency content are the two most important properties of any signal. Oscilloscopes are used to analyze changes in amplitude over time but not changes in frequency. The traditional tool for analyzing signal frequency content is the spectrum analyzer. However, this can only find static frequency components or give an averaged view of dynamic (changing) frequencies.

The modulation domain is the “missing domain” that complements the time and frequency domains. TimeView is the software that works with the Tektronix Timer/Counter/Analyzer FCA3000, FCA3100, and MCA3000 Series (through USB or GPIB) and converts them into a Modulation Domain Analyzer.

## Simple to Setup and Easy to Use

Using TimeView is as simple as connecting your Tektronix FCA or MCA Series timer/counter to your PC. Tektronix timer/counters offer both a

USB port and a GPIB port to simplify this connection. Once connected to TimeView, you remotely control the product with all the same setup and analysis features found on the product.

The fast sampling front-end of your timer/counter will sample the frequency (or time, or phase, or voltage if selected) then transfer that data to your PC. TimeView will then post-process the data and display the results in a variety of formats, depending on your selection:

- Modulation domain (frequency versus time)
- Continuous time stamp (trigger events versus time)
- Time domain (voltage versus time for repetitive signals)
- Any measured parameter versus time

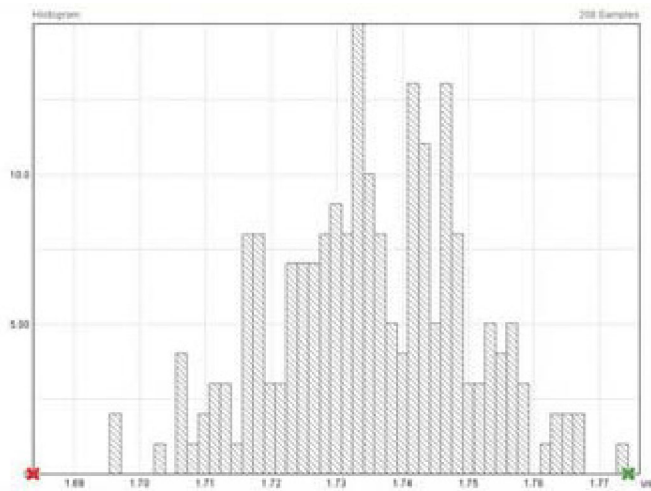
Graphs can be printed, and settings and results are stored as ASCII-files that are easily imported in various programs such as Microsoft Excel for further analysis.

## Analyze Your Device with the Industry's Only Modulation Domain Analysis Software

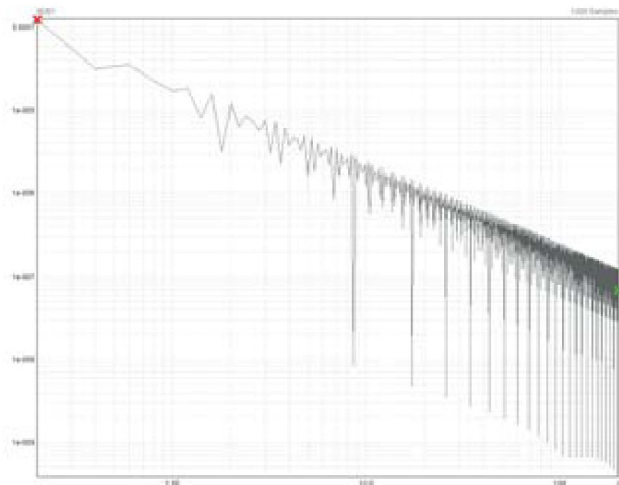
You will find the MDA to be a very versatile tool, especially suited for R&D engineers, but an MDA also fits in the RF service lab and in metrology labs. You have all the same measurement capabilities and analysis tools as the product, but with the ability to view and analyze your signals over time. A few applications that otherwise would be impossible, or very expensive to carry out are:

- Visualize frequency-hopping patterns in FHSS frequency-agile communication, missile guidance systems
- Measure frequency stability per individual channel in TDMA communication systems
- Measure frequency droop on individual channels in frequency-hopping systems
- Analyze chirp radar performance
- Measure pulse jitter and view distribution histograms
- Calibrate frequency-sweep signals
- Calibrate intentional modulation (FM or FSK)
- Discover phase jumps in synchronization clocks
- Measure frequency settling times of VCOs
- Characterize start-up/warm-up of oscillators

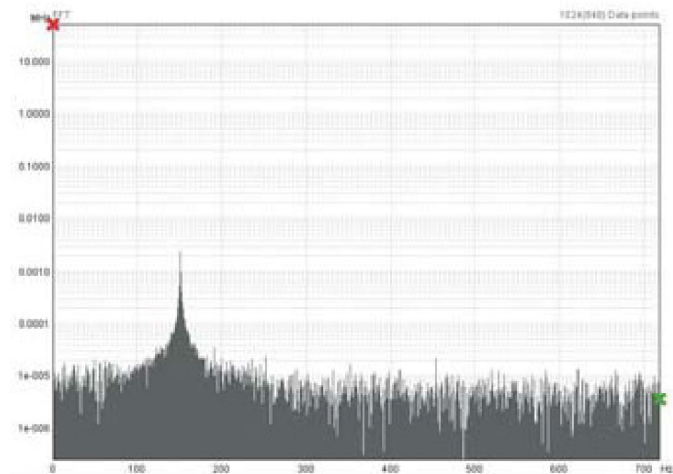
Analysis Examples



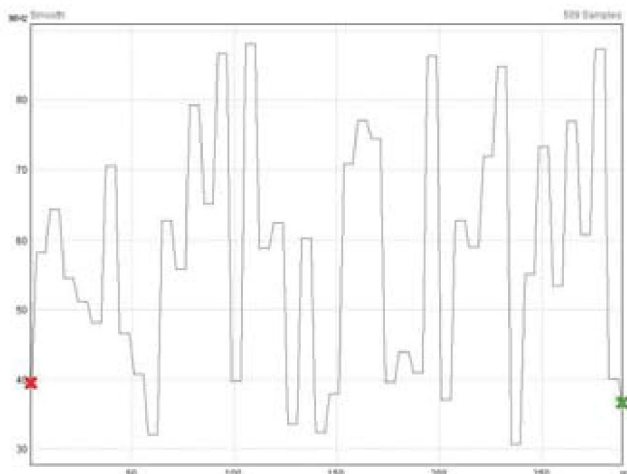
Jitter (RMS and peak-peak) and noise is quantified with distribution histograms.



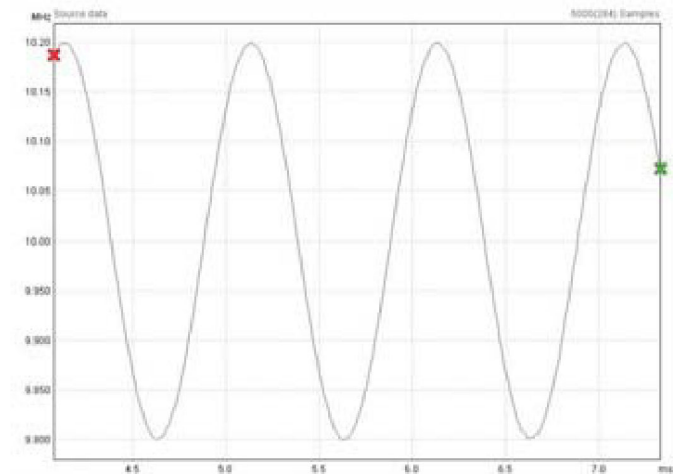
ADEV versus Zero Dead-time measurement reveals poor performance of a synthesized function generator.



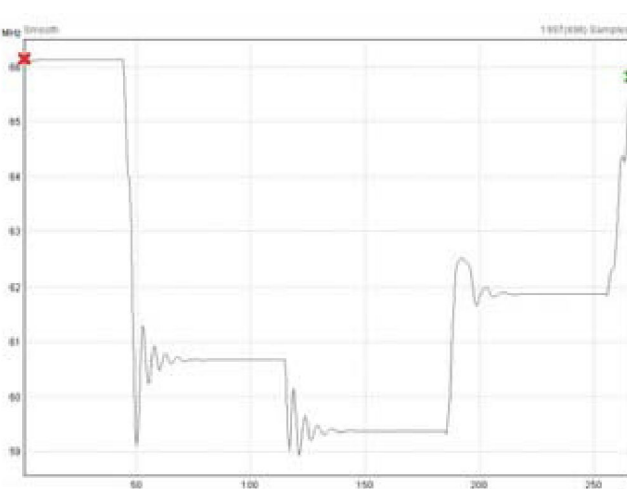
The FFT diagram reveals the modulation frequency, whether intended or unwanted.



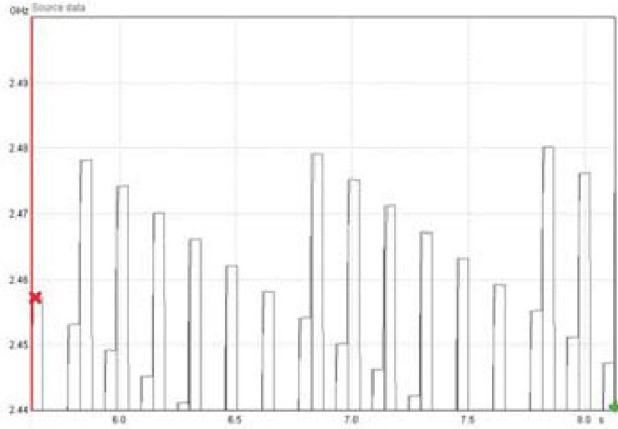
Frequency hopping in high-quality military troop radio.



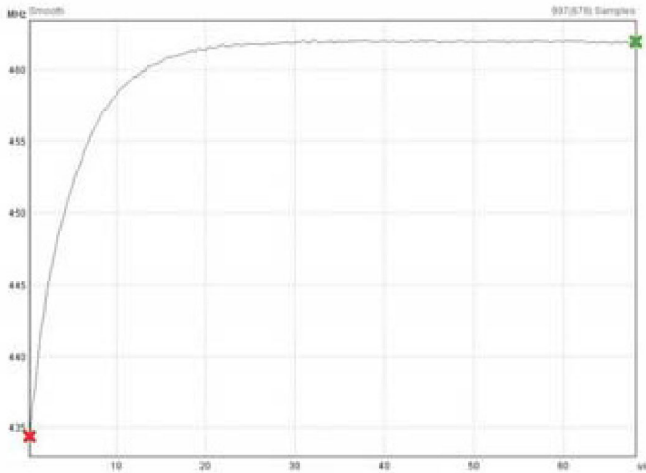
The Modulation Domain view shows frequency versus time. Shown here is a 10 MHz signal with 1 kHz FM.



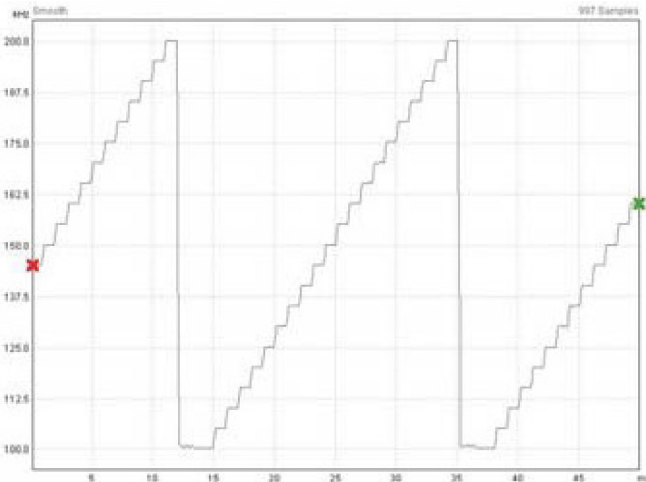
Frequency hopping in low-cost commercial radio channel scanner.



Frequency hopping in 2.4 GHz WLAN (FHSS).



Frequency settling of VCO after step change of input voltage.



Frequency sweep of a digital low-cost sweep generator.

## Characteristics

### TimeView Specifications

#### HW and SW Requirements

Characteristic	Description
Measurement HW	FCA3000, FCA3003, FCA3020, FCA3100, FCA3103, FCA3120, MCA3027, MCA3040
Operating System	MS Windows 2000, XP, or Vista
PC Interfaces	USB, GPIB

### Measurement and Speed

#### Measurement Functions

Function	FCA3100 Series	FCA3000 Series	MCA3000 Series
Frequency	X	X	X
Period	X	X	X
Frequency and Period Back-to-Back	X		
Time Interval	X	X	X
Phase	X	X	X
Duty Factor	X	X	X
Frequency Ratio	X	X	X
Voltage Max/Min/p-p	X	X	X
Pulse Width	X	X	X
Rise/Fall Time	X	X	X
Time Stamping	X	X	X
Totalize	X		

#### Speed

Sample speed to internal memory up to 250,000 Samples/s.

#### Result Memory

Model Series	Description
FCA3100	1.9M results (result plus time stamps)
FCA/MCA3000	375k results (result plus time stamps)

#### Time Stamp Resolution

Model Series	Description
FCA3100	35 pS <sub>RMS</sub>
FCA/MCA3000	70 pS <sub>RMS</sub>

## Capture Modes

Mode	Description
Free-running Measurements	Measurements are captured as quickly as possible and stored in internal memory
FCA/MCA3000	<4 $\mu$ s dead-time between measurements
Repetitive Sampling	Measurements are repeated with a delayed start that is incremented for each new measurement. The results are combined into a resulting graph (similar to repetitive sampling DSOs). This capture mode requires a repetitive signal
FCA/MCA3000	Down to 10 ns delay between measurements (effective 100M Samples/s)
Waveform Measurements	This capture mode requires a repetitive signal
FCA3100	Voltage resolution is 1.0 mV
FCA/MCA3000	Voltage resolution is 3.0 mV
Zero Dead-time Time-stamping Capture (FCA/MCA3000 family only)	
Frequency Range	DC to 250 kHz (capture and time stamp ALL trigger events) DC to 160 MHz (count all trigger events, time stamp with set pacing interval)
Pacing	4 $\mu$ s to 500 s

## Display Modes

Mode	Description
Modulation Domain	Frequency versus time
Continuous Time Stamp	Trigger events versus time
Time Domain	Voltage versus time for repetitive signals
Any measured parameter versus time	

## Analysis Modes

Mode	Description
Statistical Distribution	Histogram
Statistical Numerical Analysis	Max value Min value Mean value Standard deviation Allan deviation
Dual Cursor	Readout in graphs with calculation of dx, dy, and 1/dx
FFT Analysis	Detect modulation frequencies
Window Functions	Hamming, Hanning, rectangular
Smoothing	Digital LP filter using a moving average of data points
Time Stamp	ADEV versus time
Data Analysis (FCA/MCA3000 only)	MADEV versus time

## Ordering Information

### TVA3000

TimeView software for PC. One license per user. The program will be delivered on a CD-ROM.





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**For Further Information.** Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit [www.tektronix.com](http://www.tektronix.com)



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