VT UltraMic-384E Manual

Note: VIRTINS TECHNOLOGY reserves the right to make modifications to this manual at any time without notice. This manual may contain typographical errors.

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1 Installation and Quick Start Guide

VT UltraMic-384E is a 16-bit, single-channel, audio and ultrasonic USB microphone specially designed for sound measurement in the frequency range from 20Hz to up to 190kHz. It has four externally switchable gains. When used in conjunction with the Multi-Instrument® software, it converts any desktop, laptop, or tablet PC into a powerful audio and ultrasonic sound analyzer.

1.1 Package Contents

A standard VT UltraMic-384E Package contains the following items:

1) VT UltraMic-384E USB microphone

2) Magnetic Cone

3) USB Cable (3 m)

4) USB hardkey (contains a Multi-Instrument Pro software license)

5) Microphone Clip and Stand

6) CD (contains the copy-protected Multi-Instrument software)

7) Carrying case

8) Sound Level calibration data (@ 1kHz)

1.2 Multi-Instrument Software Installation

Multi-Instrument is a powerful multi-function virtual instrument software. It is a professional tool for time, frequency and time-frequency domain analyses. It supports a variety of hardware ranging from sound cards which are available in almost all computers to proprietary ADC and DAC hardware such as NI DAQmx cards, VT DSO, VT RTA, VT IEPE, VT CAMP and so on. It consists of an oscilloscope, a spectrum analyzer, a multimeter, a spectrum 3D plot, a vibrometer, a data logger, a LCR meter and a Device Test Plan, all of which can run simultaneously. Please refer to the Multi-Instrument software manual for details.

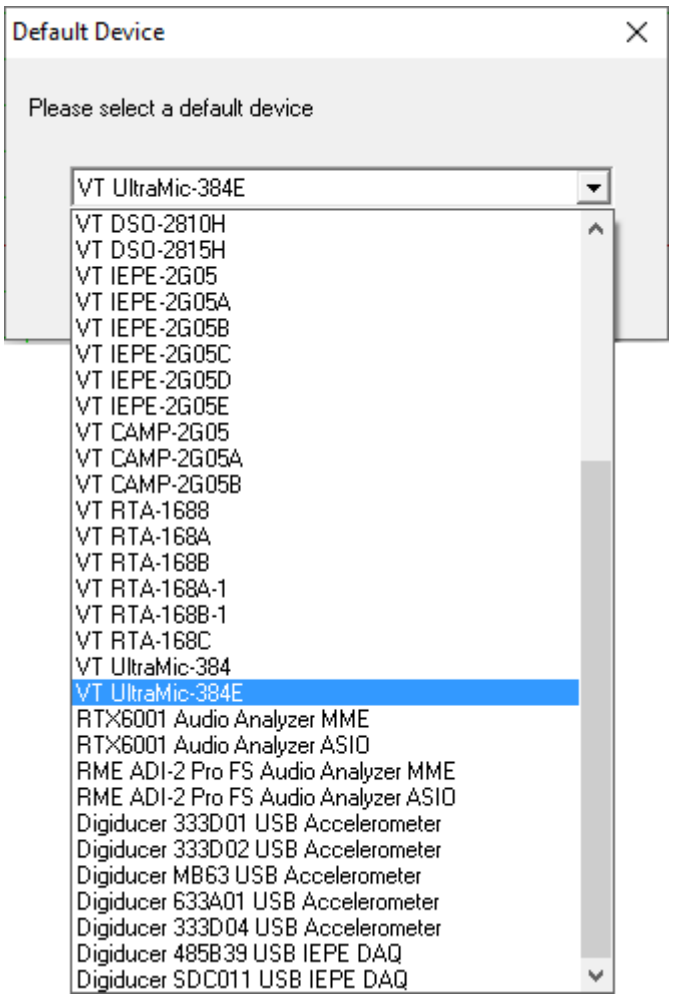
Insert the installation CD into your computer's CD-ROM drive and follow the instruction on the screen to install the Multi-Instrument software. Alternatively, you can always download the latest software from: www.virtins.com/MIsetup.exe.

By default, VT UltraMic-384E uses sound card MME driver which comes natively with all Windows versions. Thus no driver installation is required.

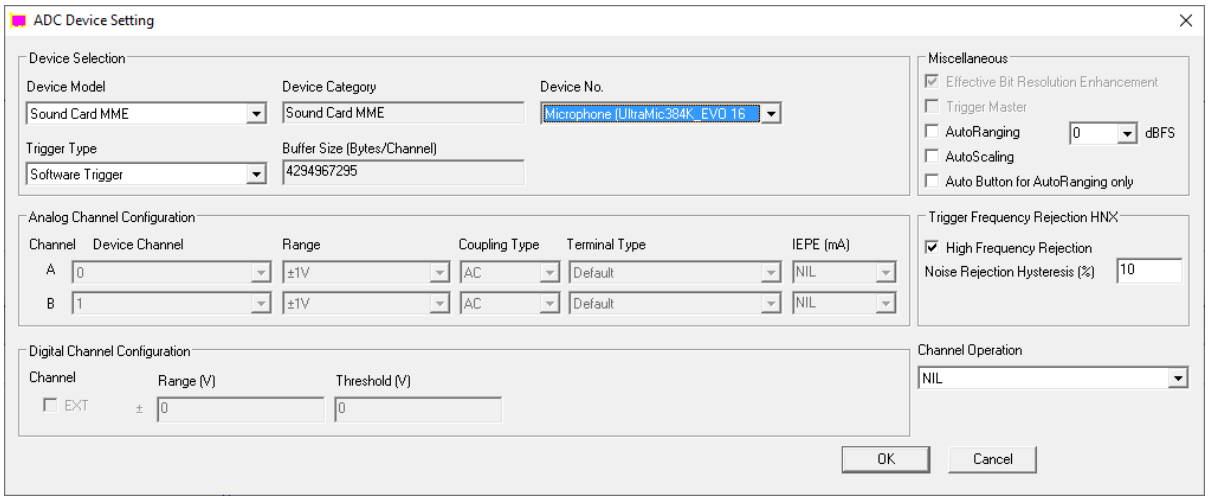
1.3 Start Multi-Instrument Software

With the hardkey activated Multi-Instrument license, the hardkey must be connected to a USB port of the computer first before the software can be launched. Otherwise, the software will work in 21-day fully functional trial mode.

To start the Multi-Instrument software, on Windows desktop, click the MI icon directly, or select [Start]>[All Programs]>[Multi-Instrument]>[VIRTINS Multi-Instrument]. If the software is started for the very first time, the following dialog box will pop up. Select "VT UltraMic-384E" to load its default setting. This dialog box can also be accessed via [Setting]>[Restore to Factory Default].

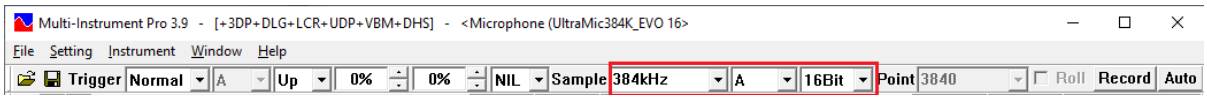


All sound cards in the system will be listed as Sound Card MME devices. To select VT UltraMic-384E for data acquisition, with the VT UltraMic-384E connected, go to [Setting]>[ADC Device], and make sure that Sound Card MME is selected in the Device Model selection box, and select UltraMic384E in the Device No. selection box, as shown below.



After returning to the software's main window, click the round button at the upper left corner of the screen, or simply press the ENTER key, to start or stop data acquisition. The button will turn green when the data acquisition is running and red when it is stopped.

Note: Under Windows XP, 384 kHz sampling rate, single channel and 16 bits must be selected in the software for data acquisition, as shown below. Otherwise, an error message will pop up. The above parameters are recommended for other Windows versions as well.



Now, if you start the oscilloscope by pressing the red button at the upper left corner of the screen, and then talk before the measurement microphone, you should be able to see your "voices" in the Oscilloscope and Spectrum Analyzer.

1.4 Gain Adjustment and Sound Level Calibration

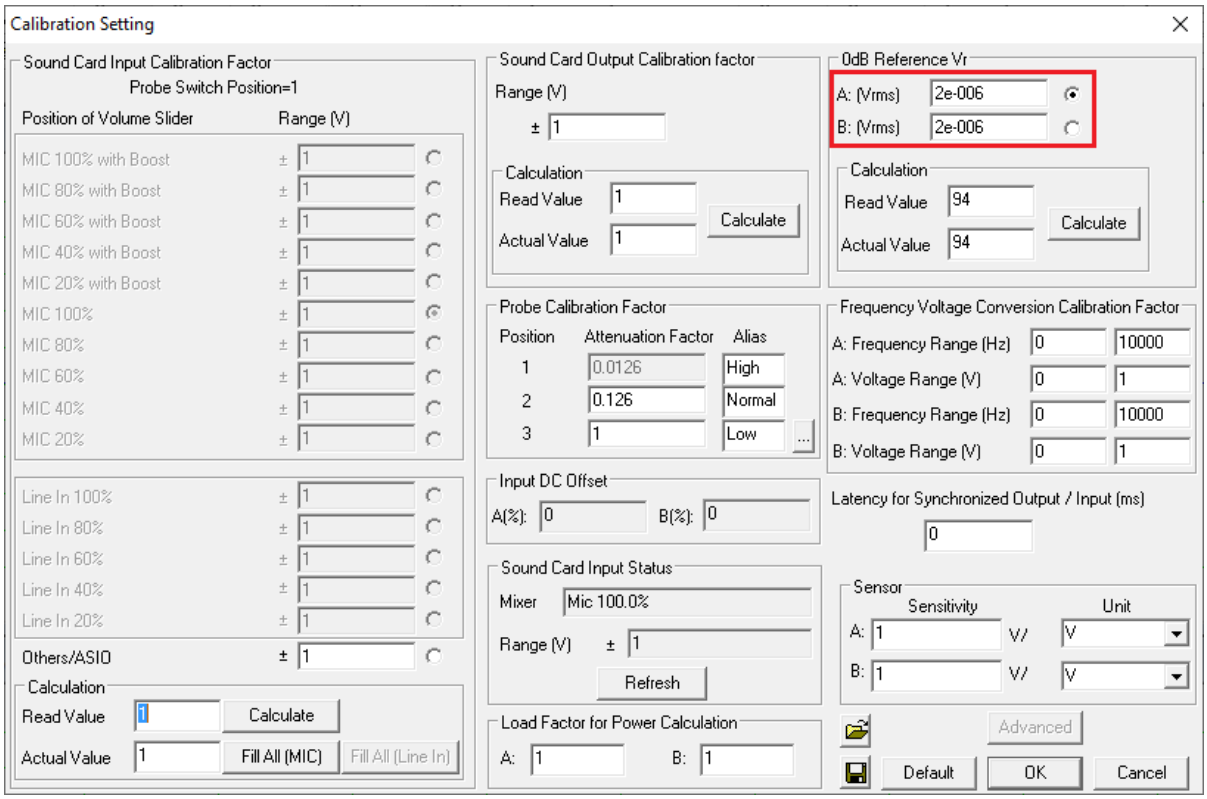
The VT UltraMic-384E hardware unit exposes a 4-position gain switch on its side. It can be used to switch the gain among:

(1) High: +38dB (or attenuation ratio 0.0126), typically 72 dBSPL @1kHz at full-scale
(2) Normal: +18 dB (or attenuation ratio 0.126), typically 92 dBSPL @1kHz at full-scale (default)
(3) Low: 0dB (or attenuation ratio 1), typically 110 dBSPL @1kHz at full-scale
(4) Lower: -3dB (or attenuation ratio 1.41), typically 113 dBSPL @1kHz at full-scale

The hardware gain of the unit is preset at (2) in the factory. To scale data for sound level measurement properly, the probe switch position in the software (see figure below) should be set manually according to the current physical gain switch position.

Software gain adjustment through the Recording Control under Windows Control Panel does not have any effect on the unit.

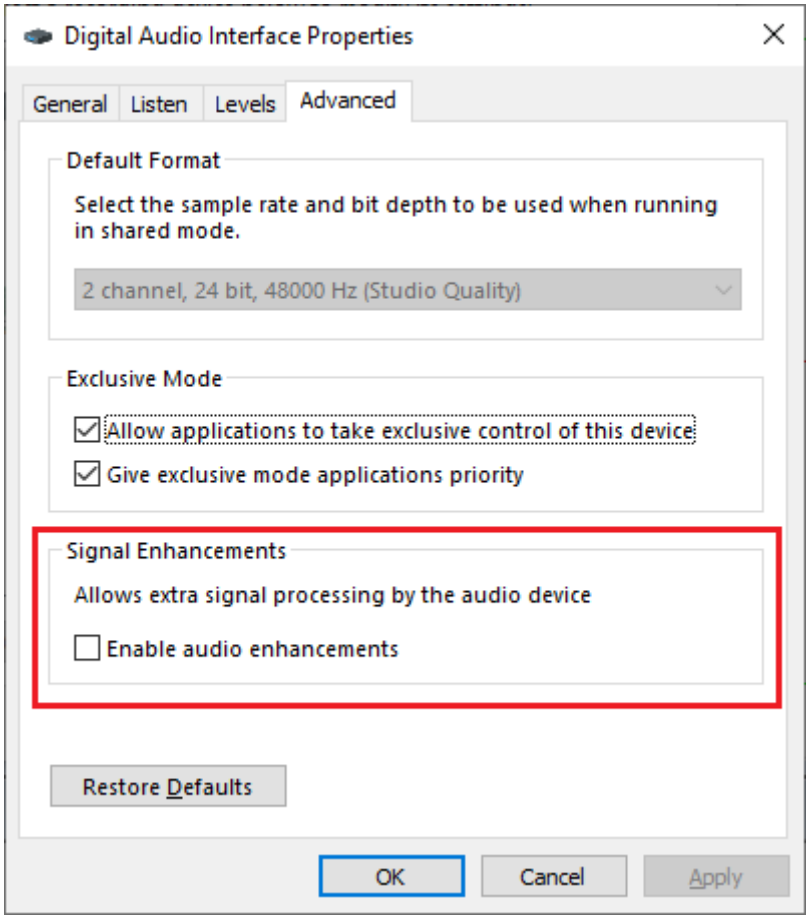
The product comes with unique sound level calibration data @1kHz (measured at gain = "Low"). The calibration data can be entered into the software via [Setting]>[Calibration]> "0dB Reference Vr" as follows.



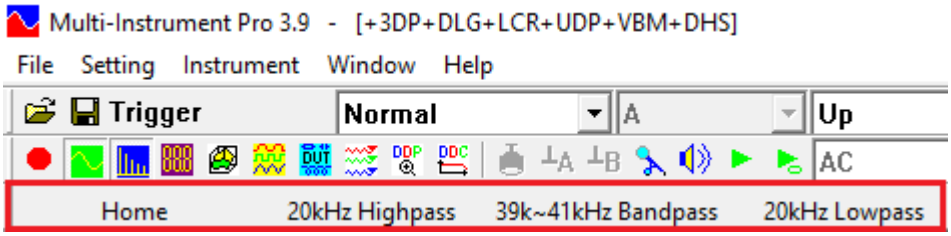
It is possible to calibrate the sound level yourself using a sound level calibrator or a sound level meter. Please refer to Section 2.6.2.3.5 of the Multi-Instrument software manual for details.

VT UltraMic-384E has a very flat frequency response in the frequency range 100 Hz ~ 100 kHz. Outside this range, its sensitivity starts decreasing gradually. If there is a need to compensate its frequency response, especially in the higher frequency range 100 kHz ~ 190 kHz, then right click the Spectrum Analyzer window and select [Spectrum Analyzer Processing]> "Compensation 1" and load the generic frequency compensation file "UltraMic-384E.fcf" in the FCF subdirectory of the software.

Some Windows versions / editions come with some audio signal enhancement features which are enabled by default. These features must be disabled through the Sound Recording Control under Windows Control Panel to prevent them from altering the originally sampled data, as shown below. One of the possible problems caused by these features is the unwanted alteration of the frequency response of the setup.



1.5 Most Frequently Used Measurement Settings



Multi-Instrument bundled with VT UltraMic-384E comes with many pre-configured panel setting files. This saves your time to configure various parameters for some frequently performed measurements by yourself. You can load these panel setting files via [Setting]>[Load Panel Settings]. You can save your own Panel Setting File via [Setting]>[Save Current Panel Setting]. Furthermore, up to 20 most frequently used panel setting files can be configured in the Hot Panel Setting Toolbar (The third toolbar from the top) via [Setting]>[Configure Hot Panel Setting Toolbar]. You can load one of them by a single mouse click. Four panel setting files are preconfigured in this toolbar. They are:

(1) Home: Default Setting
The factory default panel setting.

(2) 20kHz Highpass

A 20kHz FFT highpass filter is configured in the oscilloscope.

(3) 39k~41kHz Bandpass
A 39kHz~41kHz FFT bandpass filter is configured in the oscilloscope.

(4) 20kHz Lowpass
A 20kHz FFT lowpass filter is configured in the oscilloscope.

1.6 Detachable Magnetic Cone

The magnetic cone makes UltraMic-384E more directional. It can also protect the microphone sensor in a way. Detach it if you want the mic to be more omnidirectional.

2 Specifications

2.1 VT UltraMic-384E Hardware Specifications

Sampling Frequency	384 kHz (original)	
Frequency Range	20 Hz ~ 190 kHz	
ADC Bit Resolution	16 Bits	
Number of Input Channels	1	
Frequency Accuracy	0.01%	
Full-Scale Sound Level (at 1 kHz)	72 dB (Typical) when gain switch @ High 92 dB (Typical) when gain switch @ Normal (default) 110 dB (Typical) when gain switch @ Low 113 dB (Typical) when gain switch @ Lower	
Anti-aliasing Filter	190 kHz at Sampling Rate 384 kHz, proportionally adaptive to Sampling Rate Chosen	
Buffer Size	Virtually unlimited (streaming mode)	
Digital Input/Output Standard	USB Audio Class 1.1	
PC Interface	USB 2.0 Full Speed / USB 1.1	
Device Category in Multi-Instrument	ADC Device	Sound Card MME
	DAC Device	Not Applicable
Power	Bus powered by USB port, no external power source required	
Power Consumption	Max. 0.1W	
Dimensions	80 × 30 × 15 mm (Main Body) 37 × 25 × 18 mm (Magnetic Cone Guide)	
System Requirement	Windows XP, Vista, 7, 8, 10, 11 or above, 32 bit or 64 bit	
Operating Temperature	0°C ~50°C	

2.2 Multi-Instrument Software Specifications

Please refer to Multi-Instrument software manual for detail. The following table shows the function allocation matrix for Multi-Instrument series. The Spectrum 3D Plot, Data Logger, LCR Meter, Device Test Plan, Vibrometer, Dedicated Hardware Support are add-on modules/functions and should be purchased separately, and they are only available for Multi-Instrument Lite, Standard, and Pro editions, except that the Vibrometer is only available for Multi-Instrument Standard and Pro editions.

Legend: √ - Function available *√* - Function available in Full version only*

		Sound Card Oscilloscope	Sound Card Spectrum Analyzer	Sound Card Signal Generator	Multi-Instrument Lite	Multi-Instrument Standard	Multi-Instrument Pro
General Functions							
ADC / DAC	Sound Card MME	√	√	√	√	√	√
	Sound Card ASIO						√
	Other Hardware				√	√	√

		Sound Card Oscilloscope	Sound Card Spectrum Analyzer	Sound Card Signal Generator	Multi-Instrument Lite	Multi-Instrument Standard	Multi-Instrument Pro
	vtDAQ, vtDAO software development kit	License automatically activated with the presence of the corresponding hardware, e.g. a USB hardkey or a VT DSO.					
File Operation	Load WAV File	√	√	√	√	√	√
	Load TXT File					√	√
	Load WAV File Frame by Frame (fore Long WAV File)					√	√
	Combine WAV Files	√	√	√	√	√	√
	Extract Data and save them into a new WAV File	√	√	√	√	√	√
	Save/Load Panel Setting	√	√	√	√	√	√
Data Export	Copy Text to Clipboard	√	√	√	√	√	√
	Copy BMP to Clipboard	√	√	√	√	√	√
	Print Preview	√	√	√	√	√	√
	Print	√	√	√	√	√	√
	Export as TXT File	√	√	√	√	√	√
	Export as BMP File	√	√	√	√	√	√
Trigger Settings	Trigger Mode	√	√		√	√	√
	Trigger Source	√	√		√	√	√
	Trigger Edge	√	√		√	√	√
	Trigger Level	√	√		√	√	√
	Trigger Delay	√	√		√	√	√
	High Frequency Rejection	√	√		√	√	√
	Noise Rejection	√	√		√	√	√
Sampling Settings	Sampling Rate	√	√	√	√	√	√
	Sampling Channels	√	√	√	√	√	√
	Sampling Bit Resolution	√	√	√	√	√	√
	Record Length	√	√		√	√	√
Calibration	Input	√	√		√	√	√
	Output			√	√	√	√
	Probe	√	√		√	√	√
	Sound Pressure Level	√	√		√	√	√
	F/V Conversion					√	√
	Latency for Sync. Output/Input						√
	Sensor Sensitivity	√	√		√	√	√
	Load Factor for Power Calculation	√	√		√	√	√
Graph Operation	Zoom	√	√	√	√	√	√
	Scroll	√	√	√	√	√	√
	Cursor Reader	√	√	√	√	√	√
	Marker	√	√	√	√	√	√
	Chart Type	√	√	√	√	√	√
	Line Width	√	√	√	√	√	√
	Color	√	√	√	√	√	√
	Fast/Slow Display Mode	√	√	√	√	√	√
	Refresh Delay	√	√	√	√	√	√

		Sound Card Oscilloscope	Sound Card Spectrum Analyzer	Sound Card Signal Generator	Multi-Instrument Lite	Multi-Instrument Standard	Multi-Instrument Pro
	Font Size	√	√	√	√	√	√
	Roll Mode					√	√
	Reference Curves & Limits					√	√
Others	Gain Adjustment	√	√	√	√	√	√
	Input Peak Indicator	√	√	√	√	√	√
	Sound Card Selection	√	√	√	√	√	√
	Sampling Parameter Auto Setting	√	√	√	√	√	√
	Multilingual GUIs	√	√	√	√	√	√
	Show/Hide Toolbar	√	√	√	√	√	√
	Lock/Unlock Panel Setting	√	√	√	√	√	√
	Hot Panel Setting Toolbar	√	√	√	√	√	√
	ActiveX Automation Server	√	√	√	√	√	√
	AutoRanging	√	√	√	√	√	√
	AutoScaling	√	√		√	√	√
	Input Channel Operation	√	√		√	√	√
Oscilloscope							
Type	Individual Waveform	√	√	√ (offline)	√	√	√
	Waveform Addition	√	√	√ (offline)	√	√	√
	Waveform Subtraction	√	√	√ (offline)	√	√	√
	Waveform Multiplication	√	√	√ (offline)	√	√	√
	Lissajous Pattern	√	√	√ (offline)	√	√	√
Inter-Frame Processing	Linear Average					√	√
	Exponential Average					√	√
Intra-Frame	Time Delay Removal					√	√
Demodulation (Intra-Frame)	AM					√	√
	FM					√	√
	PM					√	√
Digital Filtering (Intra-Frame Processing)	Remove DC					√	√
	Rectification					√	√
	FFT Low Pass					√	√
	FFT High Pass					√	√
	FFT Band Pass					√	√
	FFT Band Stop					√	√
	FFT Frequency Response					√	√
	FIR Low Pass					√	√
	FIR High Pass					√	√

		Sound Card Oscilloscope	Sound Card Spectrum Analyzer	Sound Card Signal Generator	Multi-Instrument Lite	Multi-Instrument Standard	Multi-Instrument Pro
	FIR Band Pass					√	√
	FIR Band Stop					√	√
	FIR Frequency Response					√	√
	IIR Coefficients					√	√
Others	Max, Min, Mean, RMS	√	√	√ (offline)	√	√	√
	Record Mode					√	√
	Persistence Display Mode	√	√		√	√	√
	Equivalent Time Sampling Mode	√	√		√	√	√
	Analog & Digital Signal Mixed Display				√	√	√
	SINC Interpolation	√	√	√	√	√	√
Spectrum Analyzer							
Type	Amplitude Spectrum		√		√	√	√
	Phase Spectrum		√		√	√	√
	Auto-correlation		√		√	√	√
	Cross-correlation		√		√	√	√
	Coherence/Non-Coherence						√
	Transfer Function / Impedance Analyzer						√
	Impulse Response						√
Intra-Frame Processing	Frequency Compensation		√		√	√	√
	Frequency Weighting		√		√	√	√
	Remove DC		√		√	√	√
	Smoothing via Moving Average		√		√	√	√
Inter-Frame Processing	Peak Hold		√		√	√	√
	Linear Average		√		√	√	√
	Exponential Average		√		√	√	√
Parameter Measurement	THD,THD+N,SNR, SINAD,Noise Level, ENOB		√		√	√	√
	IMD		√		√	√	√
	Bandwidth		√		√	√	√
	Crosstalk		√		√	√	√
	Harmonics & Phase		√		√	√	√
	Energy in User Defined Frequency Band		√		√	√	√
	Peaks, SFDR		√		√	√	√
	Wow & Flutter						√*
	Sound Loudness						√
	Sound Loudness Level						√
	Sound Sharpness						√

		Sound Card Oscilloscope	Sound Card Spectrum Analyzer	Sound Card Signal Generator	Multi-Instrument Lite	Multi-Instrument Standard	Multi-Instrument Pro
	Total Non-Coherent Distortion + Noise						√
	GedLee Metric						√
FFT	FFT Size 128~32768		√		√	√	√
FFT	FFT Size 65536~4194304						√
FFT	Intra-Frame Average		√		√	√	√
FFT	Window function		√		√	√	√
FFT	Window Overlap		√		√	√	√
Others	Peak Frequency detection		√		√	√	√
Others	Cross Correlation Peak detection		√		√	√	√
Others	Octave Analysis (1/1, 1/3, 1/6, 1/12, 1/24, 1/48, 1/96)		√		√	√	√
Others	Linear/Log/Power Spectral Density Scale for X and Y		√		√	√	√
Others	Peak Marker		√		√	√	√
Signal Generator							
Waveform	Sine			√	√	√	√
Waveform	Rectangle			√	√	√	√
Waveform	Triangle			√	√	√	√
Waveform	Saw Tooth			√	√	√	√
Waveform	White Noise			√	√	√	√
Waveform	Pink Noise			√	√	√	√
Waveform	MultiTones			√	√	√	√
Waveform	Arbitrary Waveform			√	√	√	√
Waveform	MLS			√	√	√	√
Waveform	DTMF			√	√	√	√
Waveform	Musical Scale			√	√	√	√
Waveform	Wave File					√	√
Waveform	Play Waveform in Oscilloscope	√	√	√	√	√	√
Waveform	Cyclic Play Waveform in Oscilloscope	√	√	√	√	√	√
Sweep	Frequency Sweep (Linear/Log)			√	√	√	√
Sweep	Amplitude Sweep (Linear/Log)			√	√	√	√
Burst (Mask)	Normal			√	√	√	√
Burst (Mask)	Phase Locked			√	√	√	√
Fade	Fade In			√	√	√	√
Fade	Fade Out			√	√	√	√
Modulation	AM			√	√	√	√
Modulation	FM			√	√	√	√
Modulation	PM			√	√	√	√
Other	Software Loopback (all channels)			√	√	√	√

		Sound Card Oscilloscope	Sound Card Spectrum Analyzer	Sound Card Signal Generator	Multi-Instrument Lite	Multi-Instrument Standard	Multi-Instrument Pro
	Software Loopback (1 channel)				√	√	√
	Sync. with Oscilloscope						√
	Save as WAV file			√	√	√	√
	Save as TXT file			√	√	√	√
	DDS				√	√	√
	DC Offset				√	√	√
Multimeter							
Type	RMS					√	√
	dBV					√	√
	dBu					√	√
	dB					√	√
	dB(A)					√	√
	dB(B)					√	√
	dB(C)					√	√
	Frequency Counter				√	√	√
	RPM					√	√
	Counter					√	√
	Duty Cycle					√	√
	Frequency/Voltage					√	√
	Cycle RMS					√	√
	Cycle Mean					√	√
	Pulse Width					√	√
Settings	Counter Trigger Hysteresis				√	√	√
	Counter Trigger Level				√	√	√
	Frequency Divider				√	√	√
DDP Viewer							
Function	DDP & UDDP display						√
	HH, H, L, LL Alarm						√
	Set Display Precision						√
	Define UDDP						√
	Alarm Sound						√
	Alarm Acknowledge						√
	Linear / Exponential Average						√
	DDP Array Viewer						√

Legend: Blank - Function available if purchased Shaded Blank - Function NOT available for that version

		Sound Card Oscilloscope	Sound Card Spectrum Analyzer	Sound Card Signal Generator	Multi-Instrument Lite	Multi-Instrument	Multi-Instrument Pro
Spectrum 3D Plot							
Type	Waterfall Plot						
	Spectrogram						
Se tti	Spectrogram Color Palette						

		Sound Card Oscilloscope	Sound Card Spectrum Analyzer	Sound Card Signal Generator	Multi-Instrument Lite	Multi-Instrument	Multi-Instrument Pro
	Waterfall Color Palette	■	■	■			
	Waterfall tilt Angle	■	■	■			
	Waterfall / Spectrogram Height	■	■	■			
	Linear / Log Scale for X and Y	■	■	■			
	Number of Spectral Profiles (10~200)	■	■	■			
Others	3D Cursor Reader	■	■	■			
Data Logger							
Real Time Logging		■	■	■			
Load Historical Log File		■	■	■			
Three logging methods		■	■	■			
212 derived data points available for logging		■	■	■			
Up to 8 × 8 = 64 variables can be logged simultaneously		■	■	■			
LCR Meter							
High Impedance Measurement		■	■	■			
Low Impedance Measurement		■	■	■			
Up to 8 X-Y Plots (Linear/Log)		■	■	■			
Device Test Plan							
25 Instructions		■	■	■			
Create/Edit/Lock/Execute/Load/Save a Device Test Plan		■	■	■			
Up to 8 X-Y Plots (Linear/Log)		■	■	■			
Device Test Plan Log		■	■	■			
Vibrometer							
RMS, Peak/PP, Crest Factor for acceleration, velocity, displacement (in Multimeter)		■	■	■	■		
Waveform conversion among acceleration, velocity and displacement (in Oscilloscope)		■	■	■	■		
SI / English units		■	■	■	■		
Dedicated Hardware Support							
RTX6001 Remote /Local Control		■	■	■			

2.3 Software Development Interface Specifications

Multi-Instrument provides the following software development features:

1. Multi-Instrument can work as an ActiveX automation server so that an external program can access the data and functions that Multi-Instrument exposes. You can integrate Multi-Instrument into your own software seamlessly via the ActiveX automation server interfaces exposed by Multi-Instrument.

   Please refer to: *Multi-Instrument Automation Server Interfaces*

   Download link:
   http://www.virtins.com/Multi-Instrument-Automation-Server-Interfaces.pdf

   The above document and the sample automation client programs in Visual C++, Visual Basic, Visual C# and Python can be found in the AutomationAPIs directory of the software.

2. You can use the vtDAQ and vtDAO interface DLLs supplied in this software to allow your own back-end software to interface to sound cards, NI DAQmx cards, VT DSOs, VT RTAs, etc.. You can also develop your own vtDAQ and vtDAO compatible DLLs to allow Multi-Instrument to interface to your own hardware.

   Please refer to: *vtDAQ and vtDAO_Interfaces*

   Download link:
   http://www.virtins.com/vtDAQ-and-vtDAO-Interfaces.pdf

   The above document and the sample DAQ and DAO back-end programs and sample vtDAQ compatible DLL in Visual C++, Visual C# and Labview can be found in the DAQDAOAPIs directory of the software.

3. Virtins Technology's Signal Processing and Analysis (vtSPA) Application Programming Interfaces (APIs) provides a suite of generic APIs for data processing and analysis. It contains some unique features / algorithms originated and only available from Virtins Technology.

   Please refer to: *Signal Processing and Analysis (vtSPA) Interfaces*

   Download link:
   http://www.virtins.com/Signal-Processing-and-Analysis-APIs.pdf

   The above document and the sample programs in Visual C++ and Visual C# can be found in the DAQDAOAPIs directory of the software.

Furthermore, Multi-Instrument is well prepared to be rebranded for OEM services. Its look and feel can be readily changed through configuration without even reprogramming. Contact Virtins Technology if interested.

3 Multi-Instrument Software License Information

3.1 License Types

The License of Multi-Instrument software has six levels and six add-on modules/functions. The six levels are: Sound Card Oscilloscope, Sound Card Spectrum Analyzer, Sound Card Signal Generator, Multi-Instrument Lite, Multi-Instrument Standard, Multi-Instrument Pro. The six add-on modules/functions are: Spectrum 3D Plot, Data Logger, LCR Meter, Device Test Plan, Vibrometer, Dedicated Hardware Support.

The license contained in the standard VT UltraMic-384E package is a USB hardkey activated Multi-Instrument Pro license, without any add-on modules/functions. No softkey (activation code) are provided in this type of license. The software will run under the licensed mode as long as the USB hardkey is connected to your computer before you start the Multi-Instrument software.

Note: If the software is started without the USB hardkey connected to the computer, it will enter into 21-day fully functional trial mode, unless the software is activated by a softkey (activation code), which are NOT included in the standard VT UltraMic-384E package and should be purchased separately as a brand-new license if needed.

3.2 License Upgrade from one level to another

You can purchase an upgrade of the license, e.g. from Multi-instrument Pro to Multi-Instrument Pro + Data Logger, at any time if necessary. After you purchase the upgrade, a small upgrade package file will be sent to you via email. You can then use it to upgrade the license inside the USB hardkey by selecting [Start]>[All Programs]>[Multi-Instrument]>[VIRTINS Hardware Upgrading Tool] on your Windows desktop.

3.3 Software Upgrade for the same level

Software upgrade in the same level (if the hardware is still supported by the new version), e.g. from Multi-Instrument 3.0 Standard to Multi-Instrument 3.1 Standard, is always FREE. You just need to download the new version from our website and install it on any computer.

Thus, please do visit frequently our website to see if a new version or build is available.

4 Extended Use of Multi-Instrument Software

Multi-Instrument is a powerful multi-function virtual instrument software. It supports a variety of hardware ranging from sound cards which are available in almost all computers to proprietary ADC and DAC hardware such as NI DAQmx cards, VT DSO units, and so on. Furthermore, the ADC and DAC device can be chosen independently in Multi-Instrument. For example, you can use VT UltraMic-384E for data acquisition and use your computer's sound card for signal generation simultaneously.

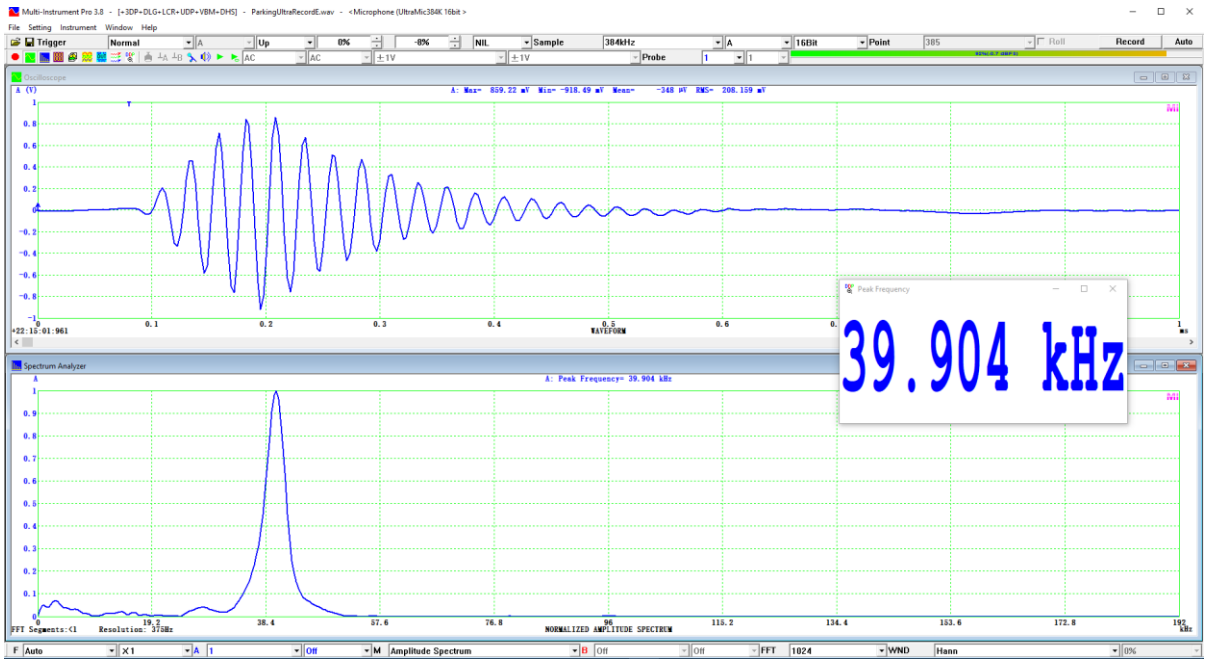
You can change the ADC device via [Setting]>[ADC Device]>[Device Model]. For example you can also use your computer's sound card as the ADC device.

You can choose a DAC device via [Setting]>[DAC Device]>[Device Model]. For example, you can use your computer's sound card as the DAC device and thus make full use of the signal generator function of Multi-Instrument.

If you want to use the sound card as the ADC/DAC device, you may need to purchase the dedicated sound card oscilloscope probe kit from Virtins Technology separately, or you may make the connection by yourself.

5 Measurement Examples

5.1 Detection of Ultrasound Burst (about 40 kHz) Emitted by Car Parking Sensor



6 Warranty

Virtins Technology guarantees this product against defective materials and manufacturing defects for a period of 12 months. During this period of warranty, a replacement of the faulty part will be shipped to the buyer's address free of charge upon receiving and verifying the returned faulty part. The Warranty is only applicable to the original buyer and shall not be transferable. The warranty shall exclude malfunctions or damages resulting from acts of God, fire, civil unrest and/or accidents, and defects from using wrong electrical supply/voltage and/or consequential damage by negligence and/or abuse, as well as use other than in accordance with the instructions for operation. The Warranty shall immediately cease and become void if the hardware is found to have been tampered, modified, repaired by any unauthorized person(s). Decisions by Virtins Technology on all questions relating to complaints as to defects either of workmanship or materials shall be deemed conclusive and the buyer shall agree to abide by such decisions.

8 Disclaimer

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