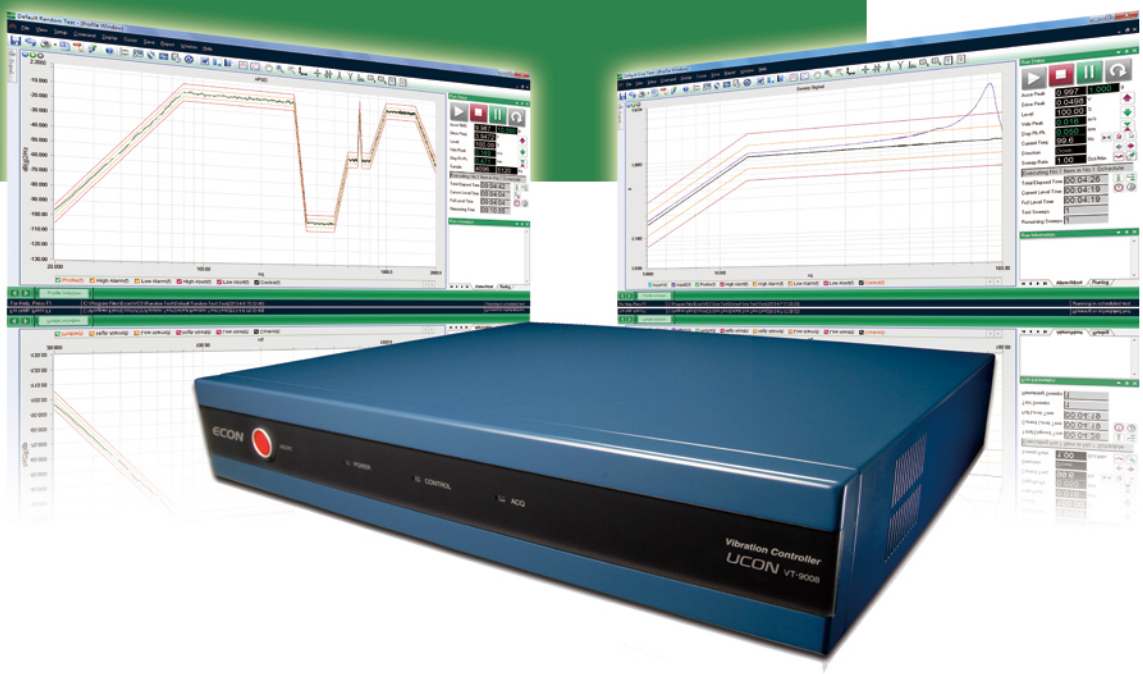
ECON

Vibration Controller

Technical Specifications

UCON® series



Econ Technologies Co., Ltd.

Overview

UCON is a cutting-edge vibration control system for electro-dynamic and servo-hydraulic shakers, utilizing the latest DSP technology, low noise hardware design, advanced vibration control algorithms and data transmission protocols.

UCON is also a multi-tasking system with close-loop control handled by a DSP processor. The control is independent of PC, to ensure the efficiency of real-time control system, with timely and rapid response to system dynamic changes. Thus it guarantees high performance, powerful features, and safety assurance. It also provides test engineers an easy-to use application software packages.

Features

High Reliability

Robust hardware design
Anti-shock housing
Long-lasting durability
Strict environmental tests of EMI temperature and humidity (EN 61326-1:2006, EN 61010-1:2001)

Real-time Loop-control

Independent of PC
Centralized 32-bit floating 300MHz DSP processing

Enhanced Safety Assurance

More than 20 inter safety checking and lock functions
Pre-test with small test level to obtain system transformation characteristics
Unique test preview without drive output to identify system characteristics
Software and hardware abort interruption

Easy to Use

Windows O/S GUI and USB 2.0 connectivity
One-click test report generation to Word or PDF
Immediate value detection, data import and export
A smart SDK for you to customize client software
Extendable scale and software without changing of existed hardware, one platform, multiple applications, extensible
Multi-language software (Chinese/ English/ Japanese/ Russian), on-line switch

High Performance

Latest 32-bit floating point DSP technique
24-bit ADC/DAC, 160 dB/Oct digital anti-aliasing filter
Higher than 120dB input dynamic range
Higher than 90 dB control dynamic range
12 multiple control strategies
Support displacement control, Lower frequency of Sine Test to 0.01Hz

Specifications

Hardware		VT-9002	VT-9008
Input Channels		2	8
Output Channels		1 Drive	1 Drive & 1 COLA, 2 Digital I/O
Sensor Compatible		Voltage, IEPE, Charge, TEDS	
PC Connectivity		USB 2.0	
Control Software			
Random Control		✓	✓
Random frequency extension to 18.75 kHz			✓
Kurtosis Control			✓
SoR, RoR, SRoR			✓
Sine Control		✓	✓
Step Sine Control, RSTD, THD Detection		✓	✓
Sine Frequency Extension high to 10,000Hz			✓
Sine Frequency Extension low to 0.1Hz			✓
Classical Shock Control		✓	✓
Shock Response Spectrum (SRS) Control			✓
Transient Time History Control (FDR-TTH)			✓
Shock Response Spectrum Analysis			✓
Road Simulation Control (FDR-LTH)			✓
Vibro-Shock Control			✓
Multi-Sine Control			✓
Operating System		Windows XP, Windows 7, Windows 10, 32bit or 64bit	
General			
Electrical		88V to 264V, 47Hz to 63Hz AC, Auto Sensing	
Power Consumption (W)		40	45
Mechanical	Dimension (mm)	362x278x79	455x355x92
	Weight (Kg)	2.77	4.25
Environmental	Temperature	0 to 40℃	
	Humidity	20% to 90% RH non-condensing(40℃)	
	Regulatory Compliance	CE Marking, According to EN 61326-1:2006, EN 61010-1:2001	

Hardware

I/O Specifications

Output

Output Channels	1 Drive(VT-9002) 1 Drive, 1 COLA (VT-9008)
Output Connectors	BNC
Voltage Range	±10 V_{PEAK}
Resolution	24-bit DAC
Output Impedance	30 Ω
Output load	Max.30 mA $_{PEAK}$
Dynamic Range	100 dB
Filtering	160 dB / Oct digital and analog filters
Amplitude accuracy	0.1 % (@1 kHz, 1 V_{input})
Frequency accuracy	0.001 %
	<−95 dB (@1 kHz, Fifth harmonic)

Digital I/O

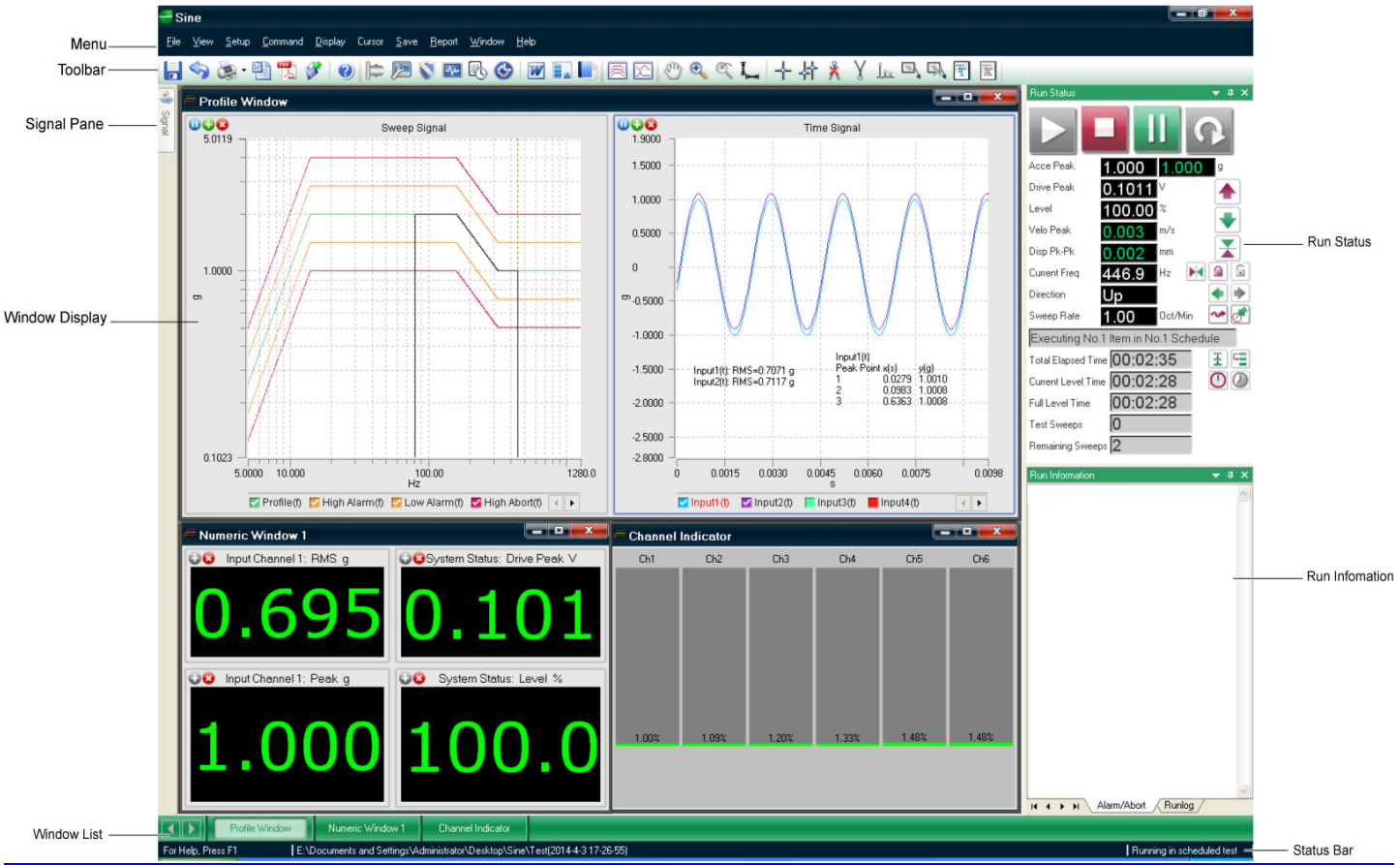
37 Pins
Output +5V TTL
1 port/group

Input

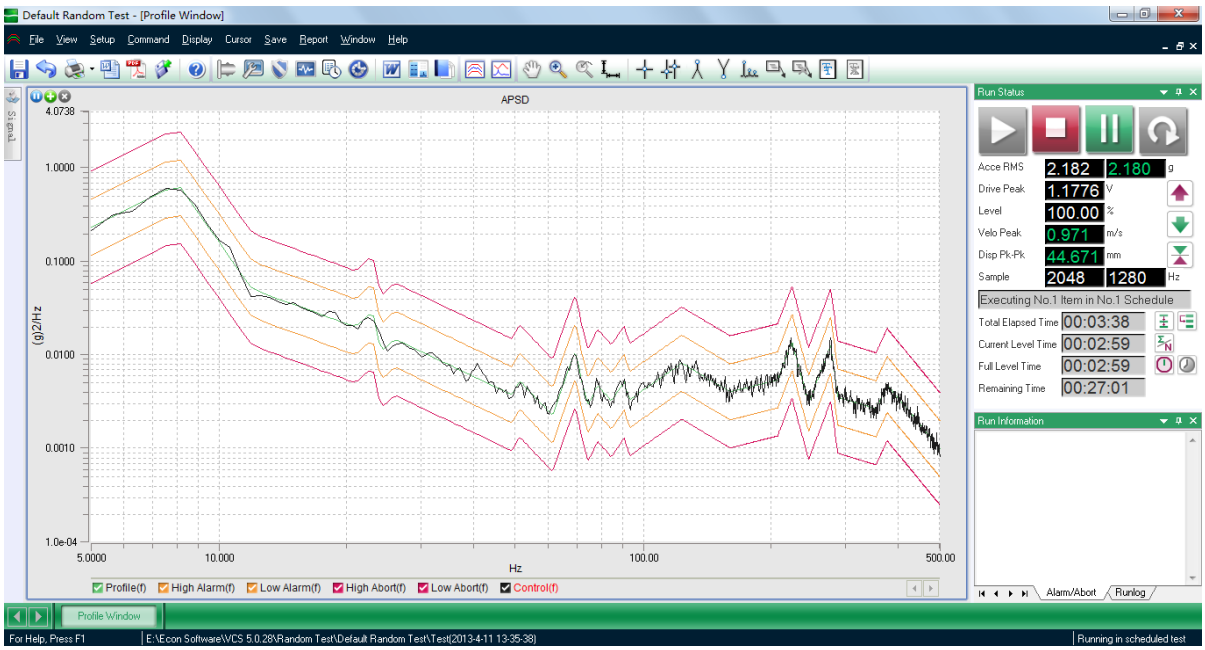
Input Channels	1 to 2 (VT-9002), 2 to 8 (VT-9008,VT-9008L) 2 to 16 (VT-9016)
Input Connectors	BNC
Input Range	± 10 V_{PEAK}
Max. input	± 36 V_{PEAK}
Resolution	24-bit ADC
Input Impedance	220 kΩ
Dynamic Range	120 dB
Anti-aliasing Filter	160dB/Oct digital filter plus analog filter
Coupling	AC, DC, IEPE, TEDS (optional), charge(VT-9002, VT-9008)
IEPE power supply	+24 V / +4 mA
Amplitude accuracy	0.5 % FS
Frequency Accuracy	0.001 %
Harmonic Distortion	< -100dB (@1 kHz, Fifth harmonic)
Channel match	Amplitude: ±0.05 dB (DC ~ 20 kHz) Phase: ±0.5 Degree (DC ~ 20 kHz)
SNR	>100 dB (@1 kHz, 1 V_{input}) typical
Channel Crosstalk	< -105 dB

Software

Main Interface



Random



Control Methods

Control loop	PSD control method of Gaussian random, adaptive control algorithm with frequency response equalization and updating. Quickly response of system non-linear, resonance, changes in the dynamic load.
Drive signal	Continuous Gaussian random signal

Performance

Dynamic Range	> 90 dB
Control Accuracy	Within ±1 dB
Loop time	Equal to the linear average of the frame time, typical 100
Security Checks	Each frame

Profiles

Breakpoint	Breakpoint table with unlimited combination of PSD levels with slope (dB / octave) at user-defined frequencies
Calculation	Auto-calculates the value of crossover frequency, auto-check the validity of defined Breakpoint
Alarm/Abort	High and low profile limits specified at each breakpoint in dB with respect to reference. RMS high and low limits calculated automatically from profile or defined by user Auto-calculated or manual set
Profile view	Profile graphics are shown and updated after created. Automatic listing of RMS acceleration and displacement values for profile. Profile operating levels are compared to the shaker parameter table

Commands

Control commands	Start, Stop, Pause, Continue
Level commands	Set Level, Increase Level, Decrease Level, Resume Schedule Level
Process commands	Next Event, Next Profile Preview, Open/Close Control Loop, Enable/Disable Abort Check,
Other commands	Digital I/O Input /Output, Reset Averaging, Adjust DOF, Continue/Pause Schedule Clock

Schedule

Level Test	Set Level and time
Start/End Loop	Set Loop time and Loop Start/Stop
Abort Check	Enable and Disable Abort Check
Loop Control	Open/Close Loop
Pause	Set the condition of Continue
Test Report	Automatically generate customizable reports

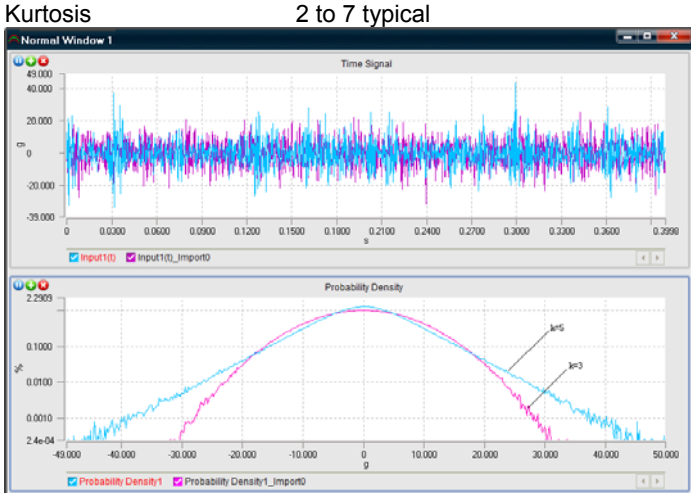
Parameters

Frequency ranges	DC to 4680 Hz, up to 18750 Hz
Frequency resolution	100, 200, 400, 800, 1600, 3200, up to 6400 lines
Control strategy	Single channel control, multi-channel control (Weighted Average, Minimum, Maximum)
Degrees of freedom	4 to 1200
Drive clipping	2 to 6 Sigma
FRF	Obtain from pre-test or import the pre-stored FRF

Kurtosis control (optional)

Adjust random signal amplitude distribution, support for super-Gaussian control.

Kurtosis 2 to 7 typical



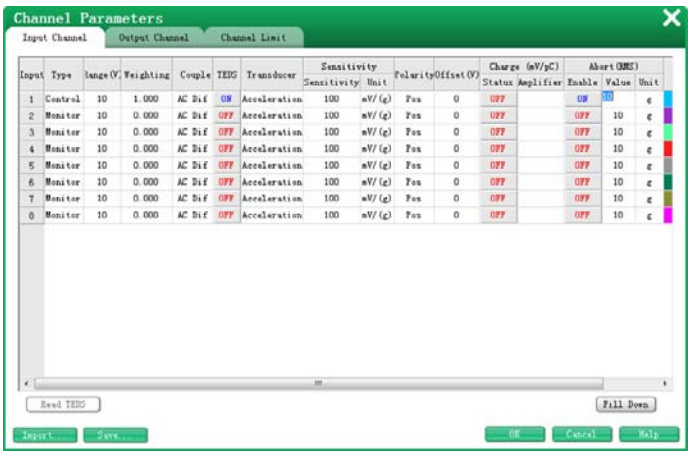
Save	Auto-save Pane, Screen, or Signals
Partly open loop	Open loop operation and abort
Run Flow Chart	Support up to 6 Profiles

Safety

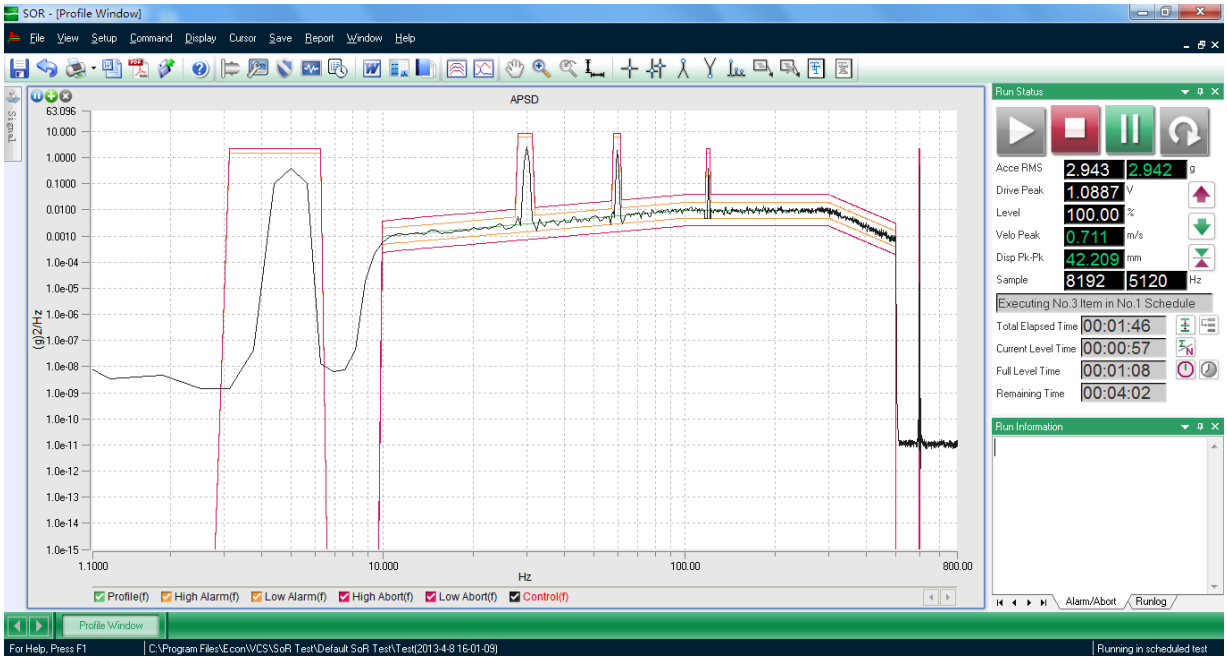
Shaker Limit	Max. Acceleration, Velocity, Displacement and Force limit
Channel Limit	Notching, RMS limit
RMS Abort	Each channel can set abort value
Input channel	Auto-check Open-loop and Overload
Over-limit Check	Auto check over-limit lines, Line Alarm/Abort ratio: 0 to 100%
Drive Limit	User-defined Drive Limit Voltage
Abort Rate	User-defined
Abort	Stop by software or press Abort button

Channel RMS Abort

Each channel can set RMS Abort value to protect the article.



Sine on Random



Sine on Random supports all features of Random.

Test Parameters

Frequency ranges	DC to 4,680 Hz, up to 9,375 Hz
Frequency resolution	400, 800, 1600, 3200
Drive signal	Continuous Gaussian random signal plus Sine Tones

Schedule

Sine tones	Each one is independent and can be turned on / off
Random Broadband	Can be turned on / off
Component	Support to set offset time and offset time for each component, also include sweep times and residence time.

Safety

Shaker Limit	Max. Acceleration, Velocity, Displacement and Force limit
Channel Limit	Notching, user defined profile

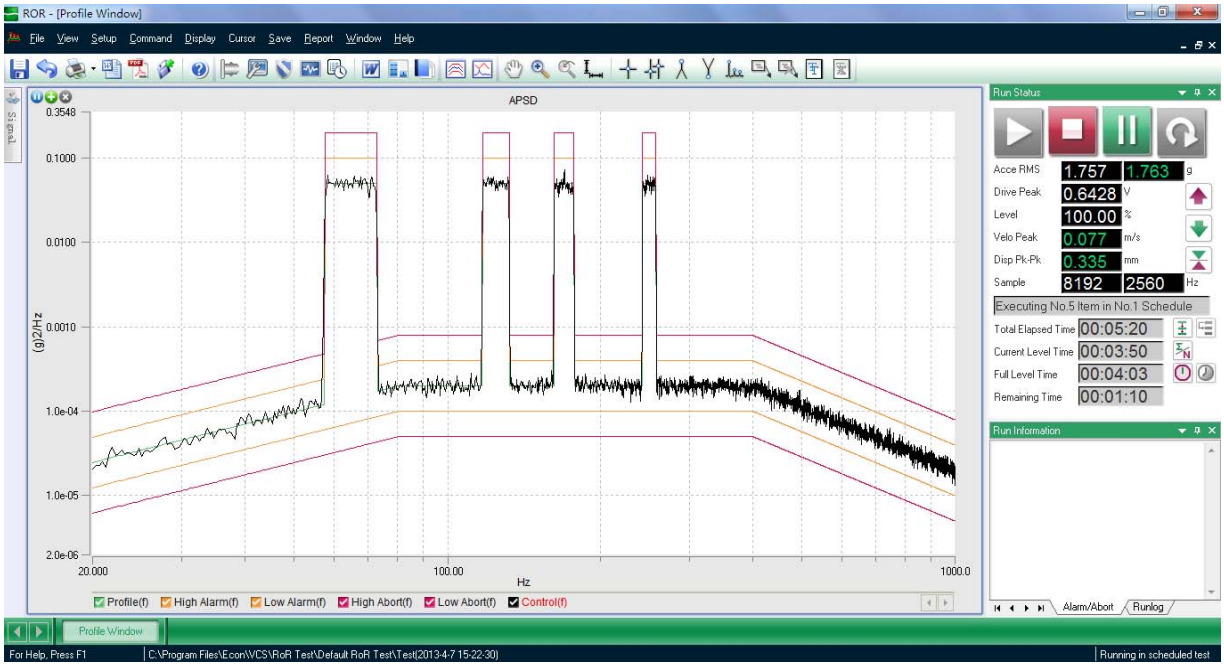
Sine Tone

Type	Dwell, Sweep, Up to 20 sine tones
Level	Constant A, V, D or user-defined profile
Frequency ranges	Frequency of Sweep and Dwell can be in or out of wide band random.
Sweep Mode	Linear or Log
Sweep Direction	Up / Down
Burst	Set independent time for tones ON /Off
Alarm/Abort	Specified in dB with respect to reference
Harmonic Sweep	Enable other Sine tones are integer harmonics of the first Sine tone.

Sine Tones outside of Random

Within defined Max. Frequency, Sine Tone's frequency can beyond Random Broadband.

Random on Random



Random on Random supports all features of Random.

Test Parameters

Frequency ranges	DC to 4,680 Hz, up to 9,375 Hz
Frequency resolution	400, 800, 1600, 3200
Drive signal	Continuous Gaussian random signal plus Narrowbands

Schedule

Narrowband	Each one is independent and can be turned on / off
Broadband Random	Can be turned on / off
Component	Support to set offset time and offset time for each component, also include sweep times and residence time.

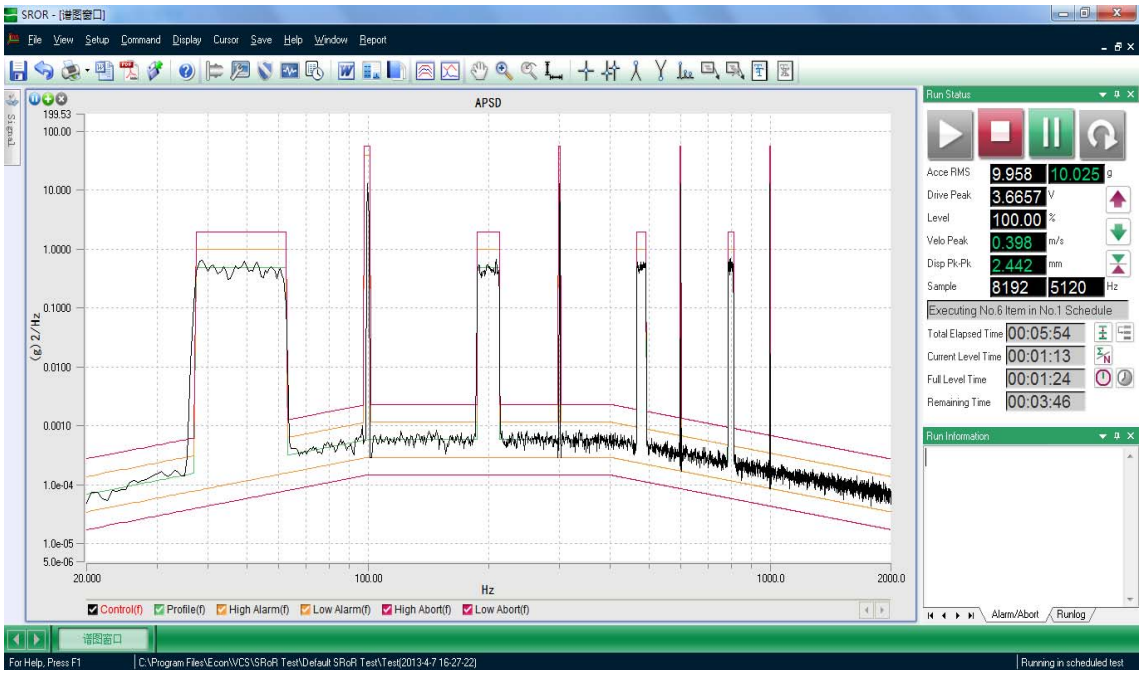
Safety

Shaker Limit	Max. Acceleration, Velocity, Displacement and Force limit
Channel Limit	Notching or RMS Limit

Narrowbands

Type	Dwell, Sweep, Up to 20 narrow bands
Level	Constant APSD or user-defined profile
Frequency ranges	Frequency of Sweep and Dwell can be defined within the Broadband.
Bandwidth	User defined
Sweep Mode	Linear or Log
Sweep Direction	Up/Down
Alarm/Abort	Specified in dB with respect to reference
Harmonic Sweep	Enable frequency of other Narrow bands are integral multiples of the first signal.
Summation	Sum or The Maximal Value

Sine and Random on Random



Sine and Random on Random supports all features of RoR and SoR.

Test Parameters

Frequency ranges	DC to 4,680 Hz, up to 9,375 Hz
Frequency resolution	400, 800, 1600, 3200
Drive signal	Continuous Gaussian random signal plus Sine Tone and Narrowbands

Schedule

Sine Tone	up to 12, each one is independent and can be turned on / off
Narrowband	up to 12, each one is independent and can be turned on / off
Broadband Random	Can be turned on / off
Component	Support to set offset time and offset time for each component, also include sweep times and residence time.

Safety

Shaker Limit	Max. Acceleration, Velocity, Displacement and Force limit
Channel Limit	Notching

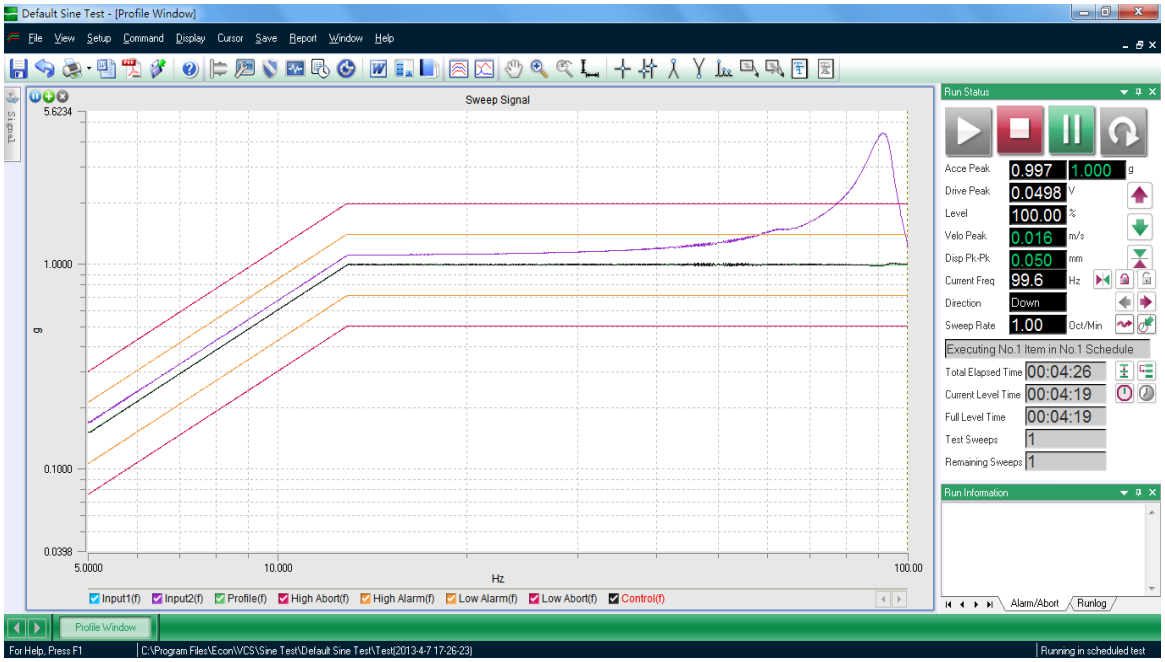
Sine Tone

Type	Dwell, Sweep, Up to 20 sine tones
Level	Constant A, V, D or user-defined profile
Frequency ranges	Frequency of Sweep and Dwell can be in or out of wide band random.
Sweep Mode	Linear or Log
Sweep Direction	Up / Down
Burst	Set independent time for tones ON /Off
Alarm/Abort	Specified in dB with respect to reference
Harmonic Sweep	Enable other Sine tones are integer harmonics of the first Sine tone.
Dwell Mark	Mark dwell point on the signal.

Narrowbands

Type	Dwell, Sweep, Up to 20 narrow bands
Level	Constant APSD or user-defined profile
Frequency ranges	Frequency of Sweep and Dwell can be defined within the Broadband.
Bandwidth	User defined
Sweep Mode	Linear or Log
Sweep Direction	Up/Down
Alarm/Abort	Specified in dB with respect to reference
Harmonic Sweep	Enable frequency of other Narrow bands are integral multiples of the first signal.
Summation	Sum or The Maximal Value

Sine



Control Methods

Control Method	Sine waveform amplitude control, adaptive control based on sine signal amplitude updating, can accurately and quickly compensate for non-linear and time varying changes in the dynamic load.
Drive	Analog quality digital sine generation using a double precision integrated phase algorithm for low distortion and accurate sweeping drive frequency.

Control Performance

Dynamic Range	> 95 dB
Control accuracy	Within ±1 dB
Loop time	5ms typically
Frequency accuracy	0.01%

Control Parameters

Frequency ranges	1 Hz to 5000 Hz, up to10000Hz, Low frequency extension to 0.01Hz
Frequency resolution	512, 1024, 2048, 4096 lines
Time Resolution	>10ms
Control strategy	Single channel control, multi-channel control (Weighted Average, Minimum, Maximum)
Sweep Mode	Linear/Log
Sweep Rate	1e-006 Oct/Min to 100 Oct/Min
Tracking filters	Proportional Bandwidth (7 to 100%) or Fixed Bandwidth
Box Tolerance	Threshold and Alarm / Abort Width can be defined
THD	Calculate total harmonic distortion within analysis frequency, and the order of the THD can be defined (optional)

Commands

Control commands	Start, Stop, Pause, Continue
Level commands	Set Level, Increase Level, Decrease Level, Resume Schedule Level
Frequency command	Set frequency
Sweep commands	Up/Down/Hold/Release, Set Sweep Rate, Resume Schedule Sweep Rate, Set Compress Rate, Resume Schedule Compress Rate Next Event, Next Profile
Process commands	Start/Stop Preview, Open/Close Control

Profile

Breakpoint	Breakpoint table with unlimited combination of A, V, D levels with slope (dB / octave) at user defined frequencies
Calculated	Auto-calculates the value of crossover frequency, auto-check the validity of defined Breakpoint
Alarm / Abort	High and low profile limits specified at each breakpoint in dB with respect to reference.
Profile view	Profile graphics are shown and updated after created. Automatic listing of RMS acceleration and displacement values for profile. Profile operating levels are compared to the shaker parameter table
Compression rate	Define different compression rate for different frequency bands
Sweep rate	Define different sweep rate for different frequency bands
COLA	Supported

Schedule

Sweep Event	Set Level, Frequency, Sweep rate, Compression rate, Sweep Direction and time
Sweep timing	Time, Sweeps, Cycles
Resume Sweep	Follow previous Sweep Event, Level, Low/High Frequency, Sweep rate, Compression rate, and time can be defined
Step Test	Step sine dwell, the Step Size can be Linear/Log defined, and Sine turned on/off time also can be defined
Dwell	Set Level, Amplitude, Frequency, Compression rate, and time
Resume Dwell	Follow previous Dwell event, Level, Compression rate, and time can be defined
Start/End Loop	Set Loop time and Loop Start/Stop
Abort Check	Enable and Disable Abort Check
Loop Control	Open/Close Loop
Pause	Set the condition of Continue
Test Report	Automatically generate reports based on user-defined
Save	Auto-save Pane, Screen, or Signals
Partly open loop	Open loop operation and abort
Part Open Loop Run	In Multi-channel control, allow test continue to run even some input channels open

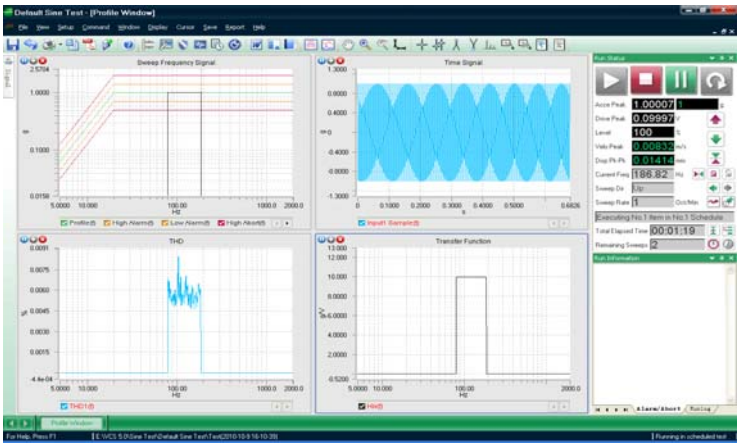
Other commands	Loop, Enable/Disable Abort Check, Continue/Pause Schedule Clock	Run Flow Chart	Support up to 6 Profiles

Safety

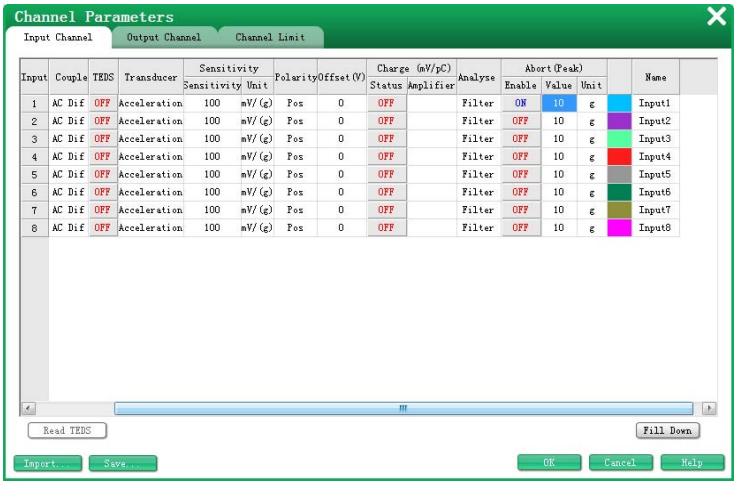
Shaker Limit	Max. Acceleration, Velocity, Displacement and Force limit
Channel Limit	Notching, user defined profile
Peak Abort	Each channel can set abort value
Input channel	Auto-check Open-loop and Overload
Over-limit C heck	Line Alarm/Abort check, Line Alarm/Abort ratio range: 0 to 100%
Drive Limit	User-defined Drive Limit Voltage
Abort Rate	User-defined
Abort	User Stop command, Abort button

New Features

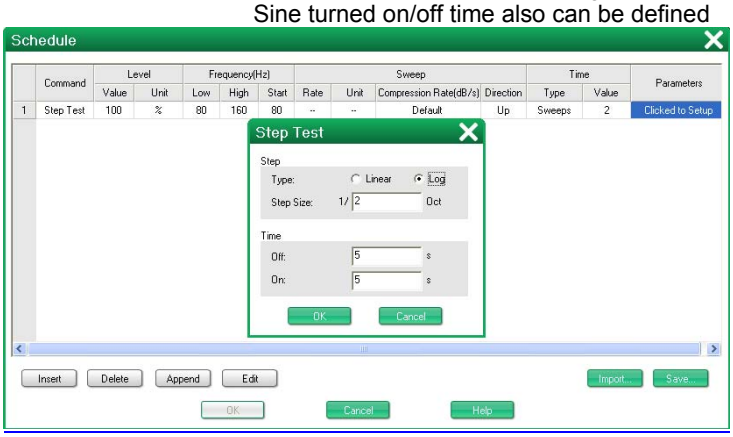
THD(Optional) User-defined harmonic order between 1 to 20 or all harmonics



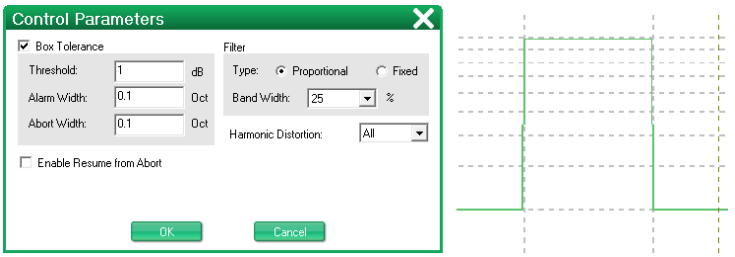
Peak Abort Each channel can set abort peak value to protect specimen



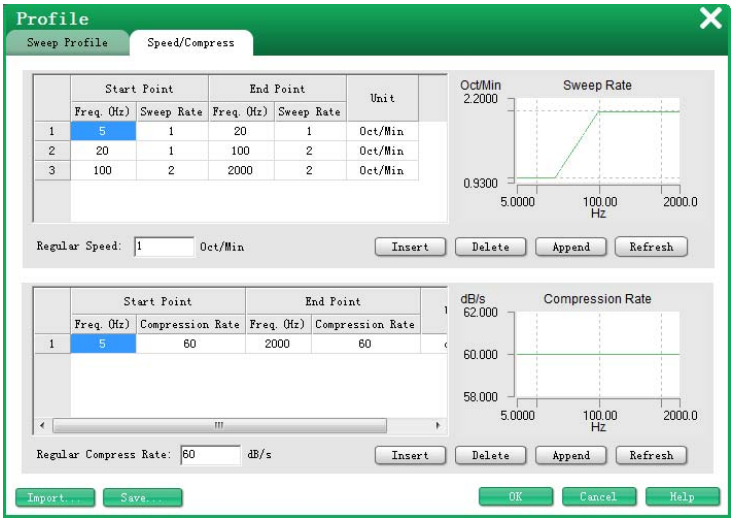
Step Sine(Option) The Step Size can be Linear/Log defined, and Sine turned on/off time also can be defined



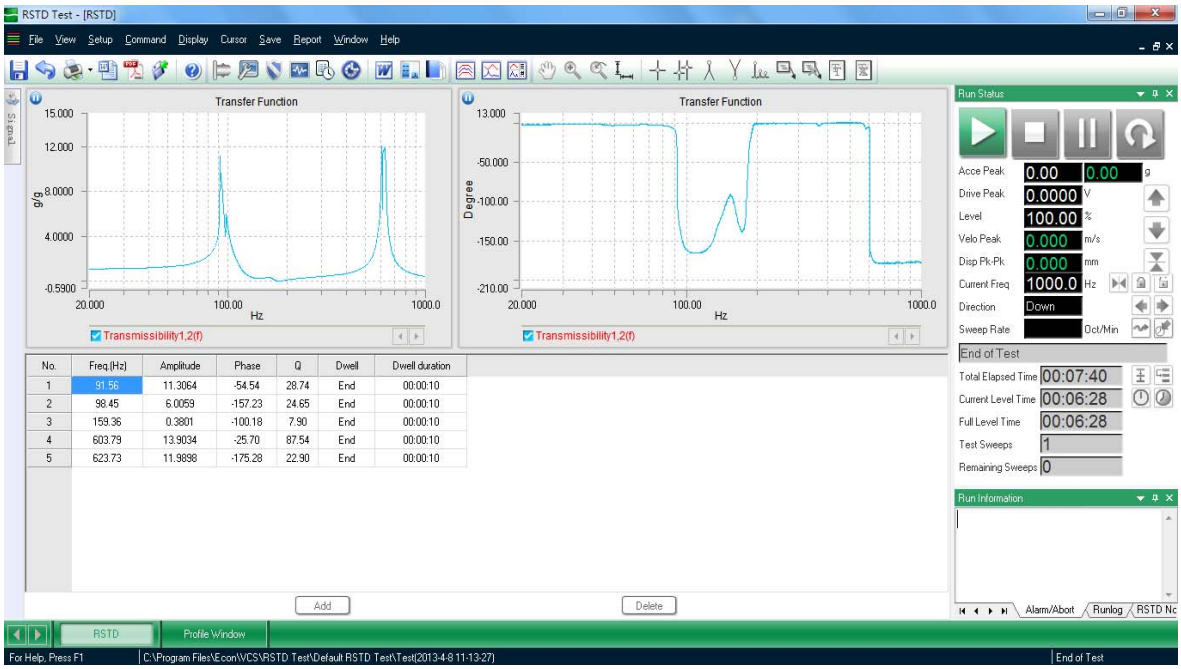
Box-Tolerance Allow you to modify the tolerance bands near a discontinuity segment that defined in Profile



Sweep Rate and Compression Rate are changeable during the whole test frequency range



Resonance Search Track & Dwell (RSTD)



Test Parameters

Contains all parameters same as sine

Resonance Search

Search object	Transfer function between a pair of input channels or between input signal and control signal
Search range	Between user-defined Low Frequency and High Frequency
Sweep Mode	Linear / Log
Resonance identify	Based on Q (Quality factor) value or Amplitude Ratio of Transfer function

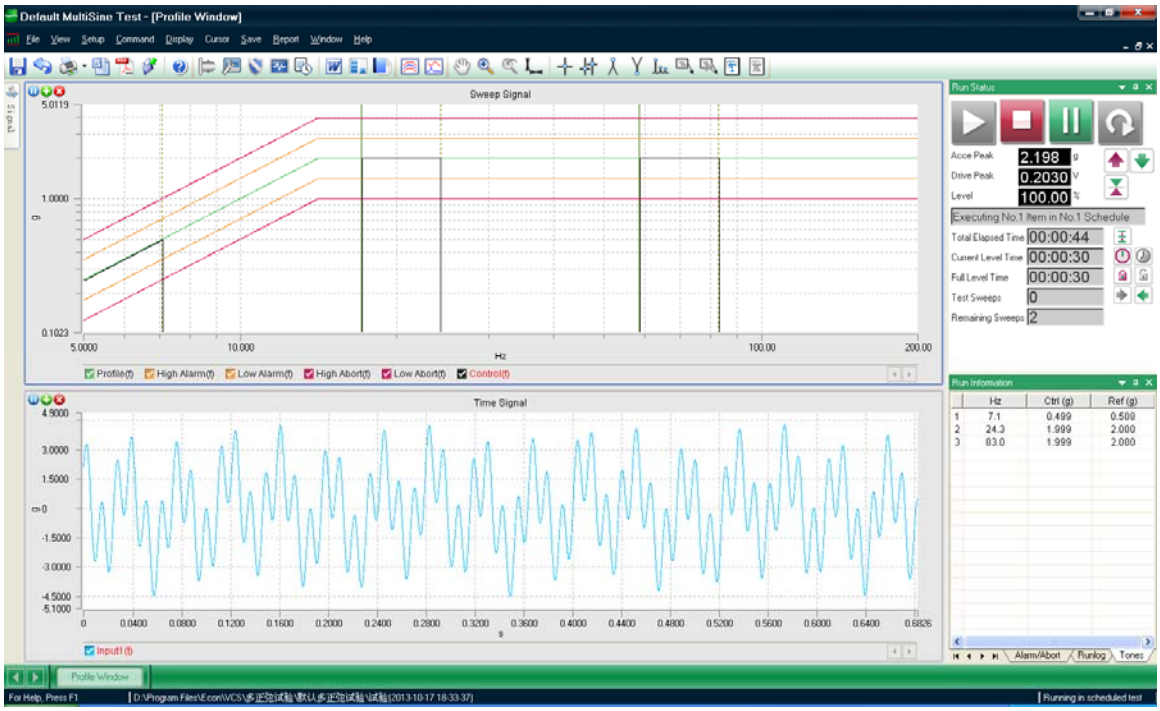
Signal Display

Curve display	Amplitude-frequency curve and Phase-frequency curve of transfer function
RSTD Note	Record RSTD information
RSTD Window	Dwell table list the resonance point's frequency, Amplitude, Phase, Q value, Planned Dwell time and Dwell duration

Dwell

Search Mode	Dwell when Search for a resonant frequency or Dwell after finished Search
Dwell Mode	Frequency Locked Dwell Resonance Track Dwell Phase Track Dwell
Frequency Locked Dwell Conditions	User define the Dwell Time or Sine Cycles or Amplitude Ratio Changing
Stop Dwell Conditions	Dwell Time, Dwell Sine Cycles, Amplitude Ratio Changing (dB), Resonant Frequency Changing, Phase Difference (Degree)

Multi-Sine



Features

- ✧ Greatly reduce test time and cost.
- ✧ No damage of control accuracy and test performance.

Control Methods

Control Method	Utilize multiple swept sine control loops with independent digital tracking filter, which makes multiple sine tones sweeping simultaneously to excite all resonances in frequency range
Drive	Output composite analog sine signal

Tones Setup

Tones	1 to 8
Tracking filter	All sine tones are independent and working with **separate digital tracking filter**, Proportional (1 to 100%) or Fixed
Compression rate	User defined
Sweep rate	Same sweep rate for all sine tones, setting method is same with sine

Test Parameters

Parameters are all same as sine

Schedule

Sine tone	Each tone is independent and can be turned on / off
Sweep Event	Set Level, Sweep rate, Compression rate, Sweep Direction and time
Sweep timing	Time, Sweeps
Dwell time	Support to test frequency of 8components simultaneously.

Signal Display

Sweep Signal	Frequency sweep curve display real-time control effect of each sine tone
Tones Window	Display every sweep sine tones in each independent window
Run Information	List frequency and amplitude of each sine tone, alarm / abort information and running log.

Classical Shock

Control Parameters

Pulse Interval	Define the time interval between two pulses
Average Number	1 to 10
Low-pass Filter	User-defined Cutoff Frequency
FRF	Obtain from pre-test or import the pre-stored FRF
Block Size	256 to 32768

Profile

Pulse Types	Half Sine, Initial Peak Saw-tooth, Final Peak Saw-tooth, Triangular, Rectangular, Trapezoid, Haversine
Pulse Duration	0.05ms to 10s
Pulse Amplitude	User-defined
Test Standard	ISO, IEC, ISTA, ASTM, MIL-STD, User-defined

Pulse Compensation

Pulse Compensation	Pre- and post-pulse, post-pulse only or pre-pulse only; single or double sides for minimum acceleration and fully use of shaker stroke
Pre- and Post- Amp.	specified in % with respect to reference

Commands

Control commands	Start, Stop, Pause, Continue
Level commands	Set Level, Increase Level, Decrease Level, Resume Schedule Level
Pulse commands	Single/Positive/Negative Pulse
Process command	Next Event
Other commands	Open/Close Control Loop, Enable/Disable Abort Check, Auto/Manual Mode

Schedule

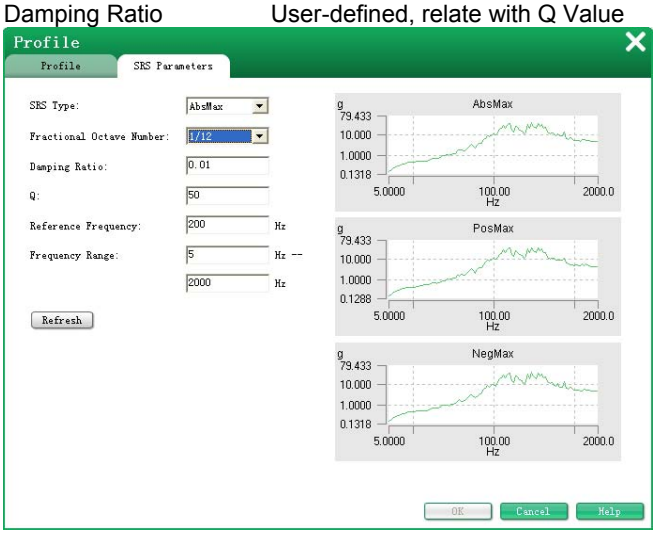
Level Test	Set Level and Pulses
Start/End Loop	Set Loop time and Loop Start/Stop
Abort Check	Enable and Disable Abort Check
Loop Control	Open/Close Loop
Reverse Pulse	Invert Pulse in shape
Run Mode	Auto/Manual Mode
Test Report	Automatically generate reports based on user-defined
Save	Auto-save Pane, Screen, or Signals

Safety

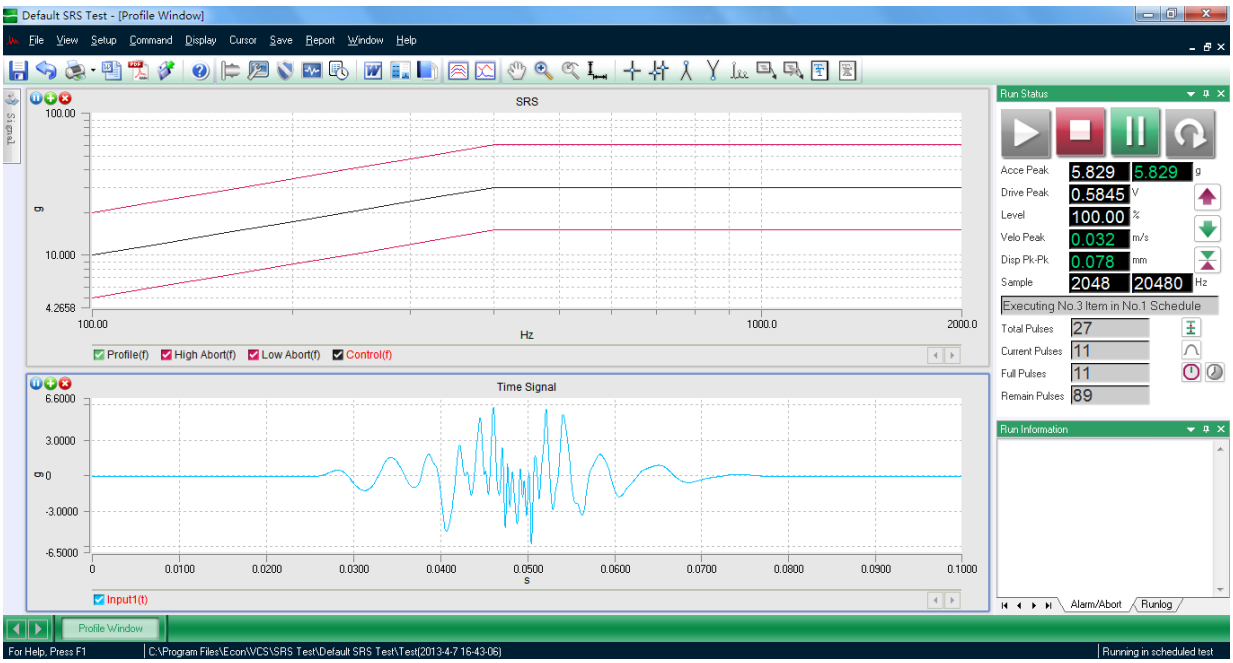
Shaker Limit	Max. Acceleration, Velocity, Displacement and Force limit
RMS Abort	Each channel can set abort value
Input channel	Auto-check Open-loop and Overload
Over-limit Check	Line Alarm/Abort check, Point
Alarm/Abort ratio range:	0 to 100%
Drive Limit	User-defined Drive Limit Voltage
Abort Rate	User-defined
Abort	User Stop command, Abort button

SRS Analysis (optional)

SRS Type	Max. Absolute, Max. Positive, Max. Negative
Frequency Range	User defined Frequency Range and Reference Frequency
Fractional Octave	1/1, 1/3, 1/6, 1/12, 1/24, 1/48
Q Value	User-defined, relate with Damping Ratio
Damping Ratio	User-defined, relate with Q Value



Shock Response Spectrum



Control Parameters

Pulse Interval	Define the time interval between two pulses
Average Number	1 to 10
FRF	Obtain from pre-test or import the pre-stored FRF
Block Size	Up to 32768
Sampling Frequency	up to 48000 Hz

Profile

Break point	Breakpoint table with unlimited combination of Acceleration levels with slope (dB/octave) at user defined frequencies
Calculated	Auto-calculates the value of crossover frequency, auto-check the validity of defined Break point
Alarm/Abort	High and low profile limits specified at each breakpoint in dB with respect to reference.
Profile view	Profile graphics shown and updated as profile is created. Automatic listing of RMS acceleration and displacement values for profile. Profile operating levels are compared to the shaker parameter table

Analysis Parameters

SRS Type	Max. Absolute, Max. Positive, Max. Negative
Fractional Octave	1/1, 1/3, 1/6, 1/12, 1/24, 1/48
Damping Ratio	0.001 to 0.999999
Pulse Compensation	DC Remove, High Pass Filter
Effective duration of shock TE,Te	Showed by calculating

Waveform Synthesis

Wavelet Window	Sine, Exponential, Hanning, Rectangle
Reduce Factor	1, 2, 4, 8, 12
Synthesis Type	Auto, User Defined Duration
Wavelet Parameters	Frequency, Amplitude, Delay, Half Cycles, Demand Amplitude, Synthesized Amplitude
Wavelet Optimize	One Step, Auto Optimize
Signal View	Profile, SRS, Error, Acceleration, Velocity, Displacement

Commands

Control commands	Start, Stop, Pause, Continue
Level commands	Set Level, Increase Level, Decrease Level, Resume Schedule Level
Pulse command	Single Pulse
Process command	Next Event
Other commands	Open/Close Control Loop, Enable/Disable Abort Check, Auto/Manual Mode

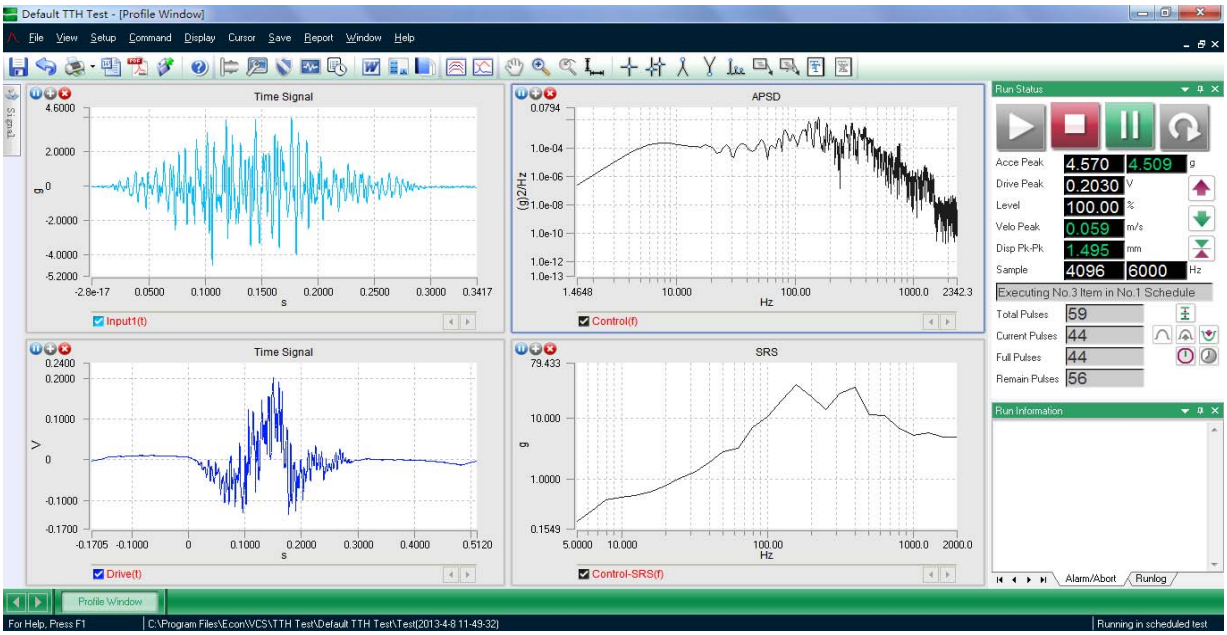
Schedule

Level Test	Set Level and Pulses
Start/End Loop	Set Loop time and Loop Start/Stop
Abort Check	Enable and Disable Abort Check
Loop Control	Open/Close Loop
Run Mode	Auto/Manual Mode
Test Report	Automatically generate reports based on user-defined
Save	Auto-save Pane, Screen, or Signals

Safety

Shaker Limit	Max. Acceleration, Velocity, Displacement and Force limit
RMS Abort	Each channel can set abort value
Input channel	Auto-check Open-loop and Overload
Over-limit Check	Line Alarm/Abort check, Point Alarm/Abort ratio range: 0 to 100%
Drive Limit	User-defined Drive Limit Voltage
Abort Rate	User-defined
Abort	User Stop command, Abort button

Transient Time History (FDR-TTH)



Control Parameters

Pulse Interval	Define the time interval between two pulses 1 to 10
Average Number	User-defined Cutoff Frequency
Low-pass Filter	Obtain from pre-test or import the
FRF	pre-stored FRF
Block Size	Up to 32768

Profile

Profile waveforms	Sine, Beat, Chirp, White Noise, Test Data
Pre-stored Data	Bellcore1, Bellcore2, Bellcore3, Bellcore4
Import data format	Support Binary, txt, UFF, Excel, Waveform Editor generated road data files (. cps) Sampling frequency up to 48 kHz
Re-Sampling Modify Data	Modify scale factor to adjust the amplitude or modify polarity of the waveform, or modify some of the data points values, or waveform interception
Window	Hanning, ant the Front/Back Length can be defined
	DC Remove, High Pass Filter
Pulse Compensation	High / Low Abort Limit specified in acceleration
Abort Limit	Profile graphics are shown and updated after created. Automatic listing of
Profile view	acceleration velocity and displacement values for profile. Profile operating levels are compared to the shaker parameter table

Schedule

Level Test	Set Level and Pulses
Start/End Loop	Set Loop time and Loop Start/Stop
Abort Check	Enable and Disable Abort Check
Loop Control	Open/Close Loop
Reverse Pulse	Invert Pulse in shape
Run Mode	Auto/Manual Mode
Test Report	Automatically generate reports based on user definition
Save	Auto-save Pane, Screen, or Signals

Commands

Control commands	Start, Stop, Pause, Continue
Level commands	Set Level, Increase Level, Decrease Level, Resume Schedule Level
Pulse commands	Single/Positive/Negative Pulse
Process command	Next Event
Other commands	Open/Close Control Loop, Enable/Disable Abort Check, Auto/Manual Mode

Safety

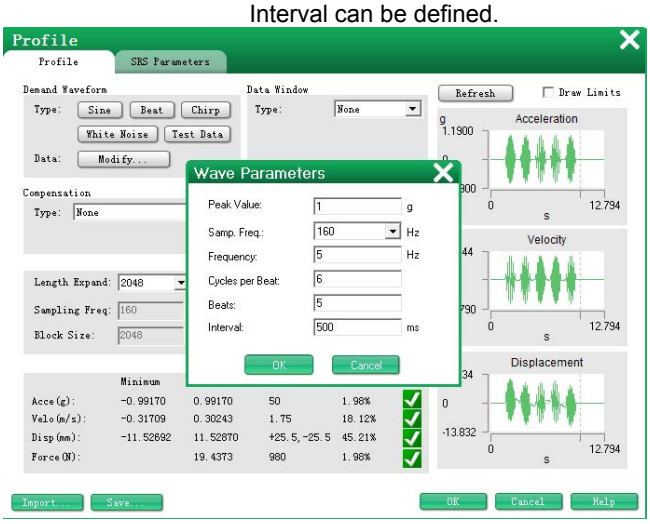
Shaker Limit	Max. Acceleration, Velocity, Displacement and Force limit
RMS Abort	Each channel can set abort value
Input channel	Auto-check Open-loop and Overload
Over-limit Check	Line Alarm/Abort check, Point Alarm/Abort ratio range: 0 to 100%
Drive Limit	User-defined Drive Limit Voltage
Abort Rate	User-defined
Abort	User Stop command, Abort button

SRS Analysis (optional)

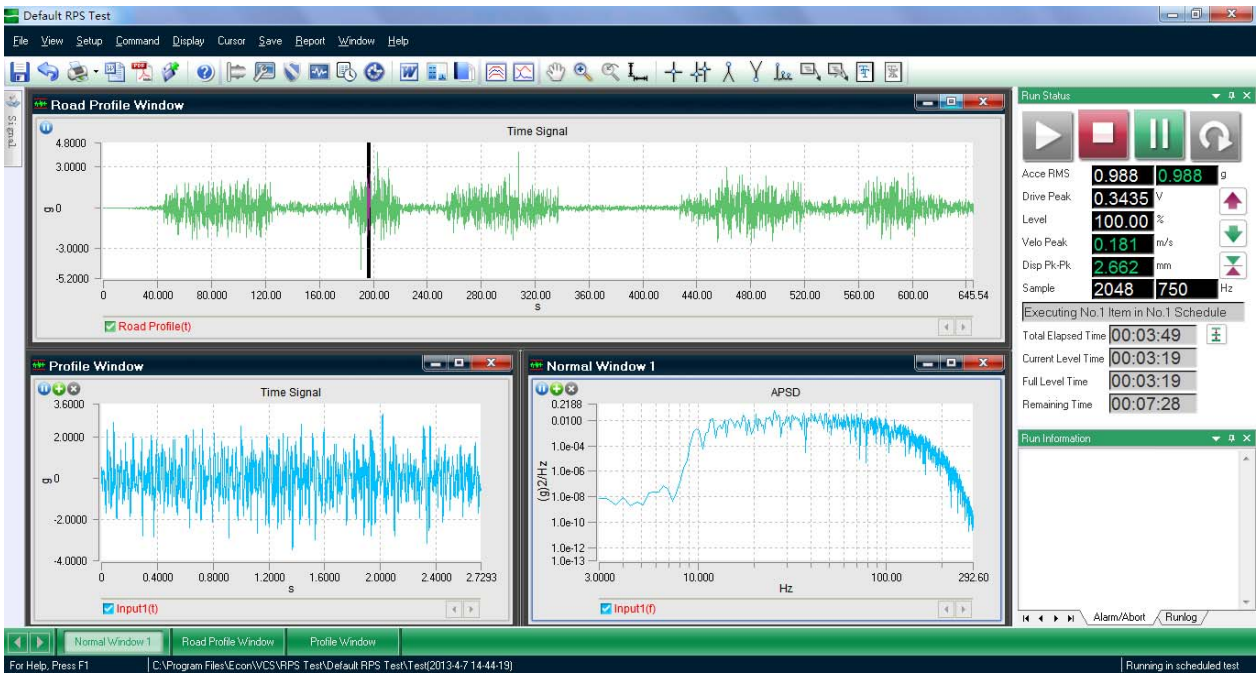
Parameters are totally same as Classical shock

Beat waveform

Wave Parameters	Peak Value, Sampling Frequency, Frequency, Cycles per Beat, Beats and Interval can be defined.



Road Simulation Control (FDR-LTH)



Control Methods

Equalization method	Low level random equalize transfer function

Control Performance

Control strategy	Single channel control, multi-channel control (optional)
FRF	Obtain from pre-test or import the pre-stored FRF
FRF Update Ratio	0 to 0.5

Pre-test Profile

Break point	Breakpoint table with unlimited combination of APSD levels with slope (dB/octave) at user defined frequencies
Calculated	Auto-calculates the value of crossover frequency, auto-check the validity of defined Break point

Profile

Data sources	Waveform Editor generated road data files (. cps)
Modify Data	Modify scale factor to adjust the amplitude or modify polarity of the waveform
Abort Limit	High/Low Abort Limit specified in acceleration
Frame Size	1024, 2048, 4096
Duration	From tens of milliseconds to several tens of hours, the longest time is related to sampling parameters

Command

Control command	Start, Stop, Pause, Continue
Level command	Set Level, Increase Level, Decrease Level, Resume Schedule Level
Process command	Next Event, Next Profile
Other command	Set FRF Update Ratio, Open/Close Control Loop, Enable/Disable Abort Check

Schedule

Level Test	Set Level
Start/End Loop	Set Loop time and Loop Start/Stop
Abort Check	Enable and Disable Abort Check
Loop Control	Open/Close Loop
Test Report	Automatically generate reports based on user-defined
Save	Auto-save Pane, Screen, or Signals
Run Flow Chart	Support up to 6 Profiles

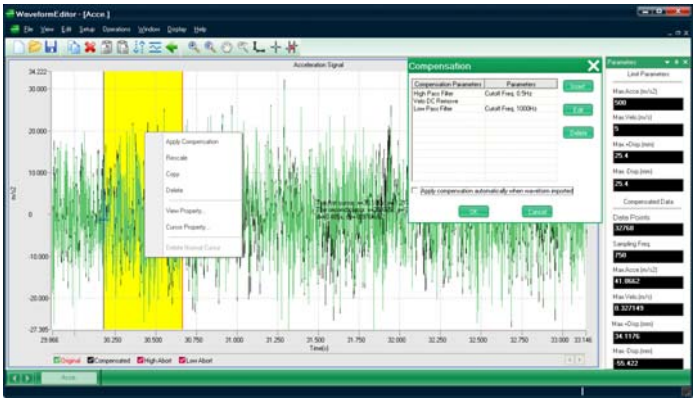
Safety

Shaker Limit	Max. Acceleration, Velocity, Displacement and Force limit
RMS Abort	Each channel can set abort value
Input channel	Auto-check Open-loop and Overload
Over-limit Check	Line Alarm/Abort check, Line Alarm/Abort ratio range: 0 to 100%
Drive Limit	User-defined Drive Limit Voltage
Abort Rate	User-defined
Abort	User Stop command, Abort button

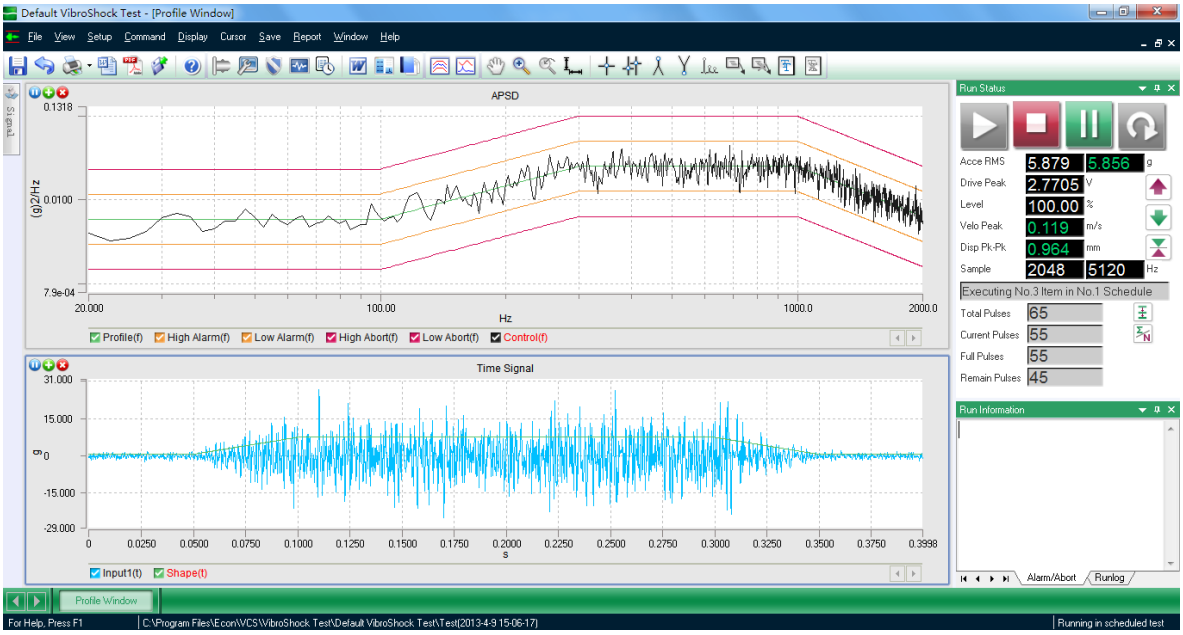
Waveform Editor

Provides tools to compensate and preprocess waveforms so that it can be used on the shaker system.

Waveform Type	Sine, White Noise, Chirp, Band-Limited Random or import data
Import data format	txt, UFF, csv files, ECON data records (. dar), road profile file (. cps)
Digital Resampling	20Hz to 48000Hz
Limiting parameters	The Max. Positive and Negative Displacement, Max. Velocity, Max. Acceleration
Resolution	200,400,800,1600
Data Splice	Overlapping, Data Window
Compensation	Acceleration DC remove, Velocity DC remove, High Pass Filter, Low Pass Filter
Amplitude Adjustment	Modify scale factor to adjust the amplitude or modify polarity of the waveform
Editing method	Copy, Paste, Delete, Undo



Vibro-Shock



Control Methods

Control loop	PSD control method of Gaussian random signal, patented adaptive control algorithm with frequency response equalization and updating. Open-loop control of Random time domain signal cut-off by defined Shock
Drive signal	Continuous Gaussian random time domain signal Cut-off by defined Shock Shape

Control Parameters

Pulse Interval	Define the time interval between two pulses, support to output random shock wave continuously in the space of 0s.
Control strategy	Single channel control, multi-channel control (Weighted Average, Minimum, Maximum)
FRF	Obtain from pre-test or import the pre-stored FRF
Frequency ranges	DC to 4,680 Hz, up to 18,750 Hz
Frequency resolution	100, 200, 400, 800, 1600, 3200, up to 6400 lines
Degrees of freedom	4 to 1200
Drive clipping	2 to 6 Sigma
Block Size	256 to 16384

Control Performance

Dynamic Range	> 90 dB
Security Checks	Each frame

Profile

Commands

Control commands	Start, Stop, Pause, Continue
Level commands	Set Level, Increase Level, Decrease Level, Resume Schedule Level
Process command	Next Event
Other commands	Enable/Disable Abort Check, Reset Averaging

Schedule

Level Test	Set Level and time
Start/End Loop	Set Loop time and Loop Start/Stop
Abort Check	Enable and Disable Abort Check
Test Report	Automatically generate reports based on user-defined
Save	Auto-save Pane, Screen, or Signals

Shape Profile

Calculation	Cut-off random time domain signal based on time setting to control the output
Slope	Linear/Log

History Signal

Block size	2048, 4096, 8192, 16384, 32768
Resolutions	8 to 128
Oscilloscope Points	128, 256, 512, 1024, 2048, 4096

Safety

Shaker Limit	Max. Acceleration, Velocity, Displacement and Force limit
RMS Abort	Each channel can set abort value

Breakpoint	Breakpoint table with unlimited combination of PSD levels with slope (dB / octave) at user defined frequencies	Input channel	Auto-check Open-loop and Overload
		Over-limit Check	Line Alarm/Abort check, Line Alarm/Abort ratio range: 0 to 100%
		Drive Limit	User-defined Drive Limit Voltage
Calculation	Auto-calculates the value of crossover frequency, auto-check the validity of defined Break point	Abort Rate	User-defined
		Abort	User Stop command, Abort button
Alarm / Abort	High and low profile limits specified at each breakpoint in dB with respect to reference. RMS high and low limits calculated automatically from profile or defined by user Auto-calculated or manual set		
Profile view	Profile graphics are shown and updated after created. Automatic listing of RMS acceleration and displacement values for profile. Profile operating levels are compared to the shaker parameter table		

System Check

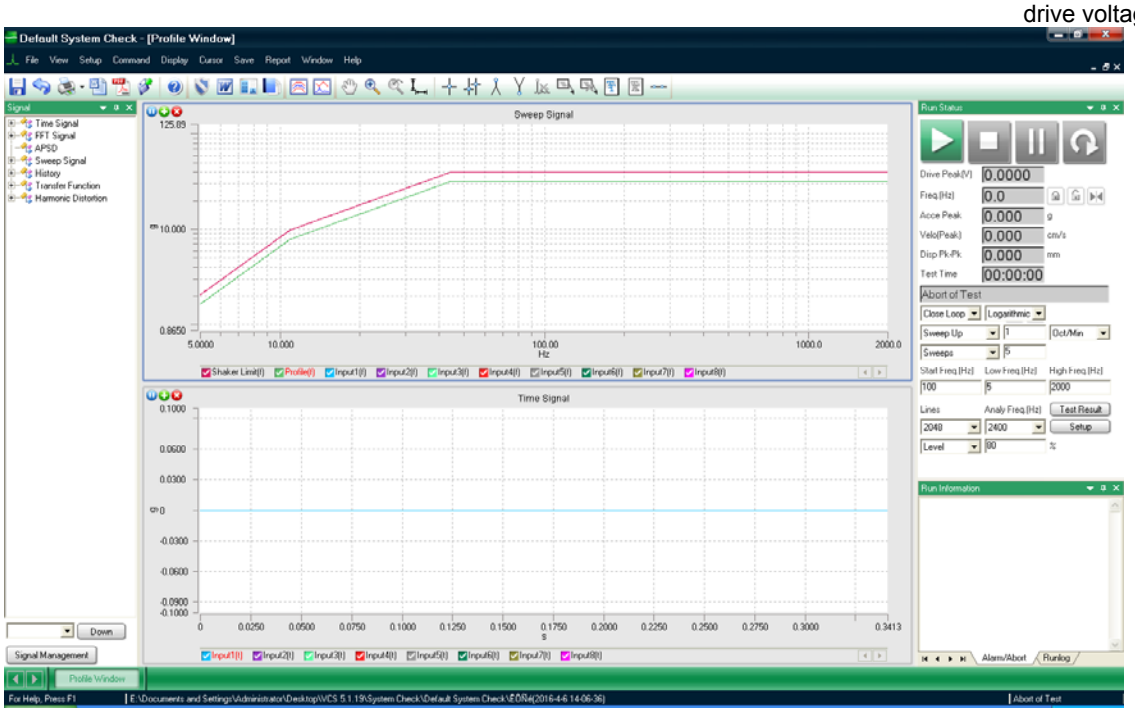
Acceleration SNR, basic parameters test, frequency resonance specification, amplitude uniformity, transverse motion ratio, THD, control dynamic range.

Control parameter

Control Methods:	Open/Close Loop
Control Model:	Dwell, Log sweep, Linear Sweep, Random
Sweep Direction:	Up/Down
Frequency resolution:	Sine up to 4096, Random up to 6400
Frequency ranges:	Sine up to 10000Hz, Random up to 18750Hz

Test Parameter

Frequency Change:	Switch directly to a specified frequency and before attenuation
Level Change :	Log and Liner
Open Loop Check:	loop control check, Max gain both start and adjust.
Filter :	Proportion and fixed
Abort :	React time and abort level
Open loop check:	loop control check
Others:	harmonic distortion, time resolution, drive voltage, drive limit



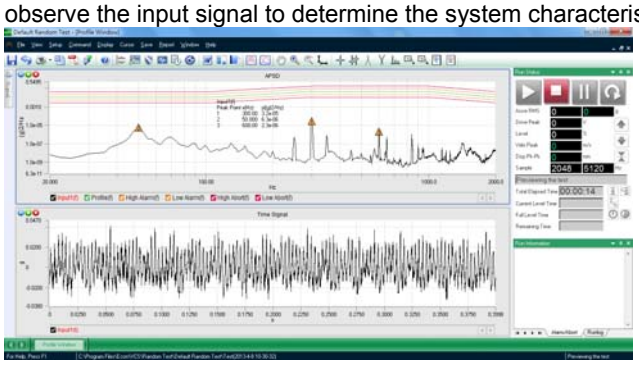
Other Applications

Notching/Channel Limit Control (optional)

Including RMS limit and Notching to protect article.

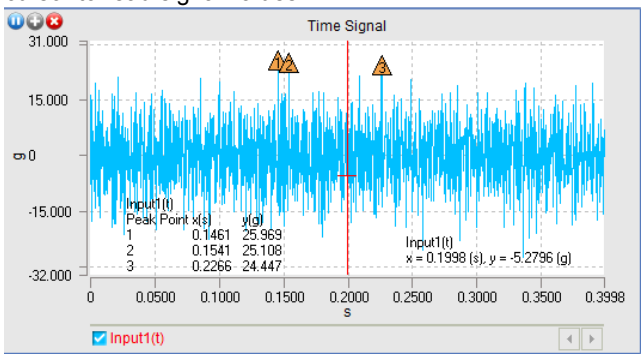
Test Preview

Preview test is an effective tool for system detection. Controller only does data acquisition and not output waveform. You can observe the input signal to determine the system characteristics.



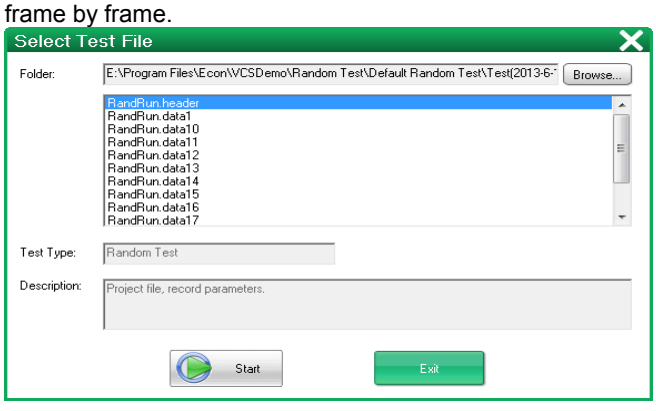
Data Display Cursors

Provides many kinds of windows to display different signals and each window can display multiple signals. Also, provides line cursor, band cursor, peak cursor, valley cursor and harmonic cursor to read signal values.



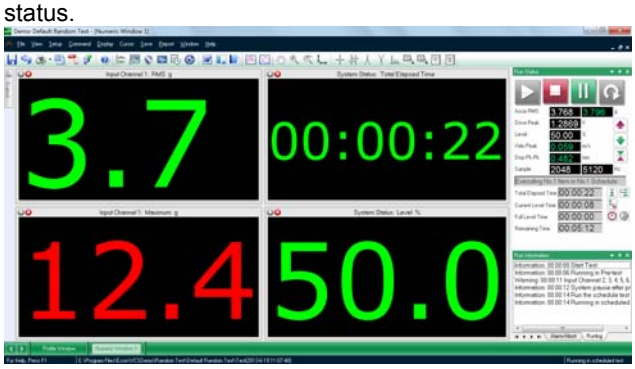
Offline View

First save test data during test, via setup in Offline data page of Save setting dialog. Then playback the test data like a snapshot frame by frame.



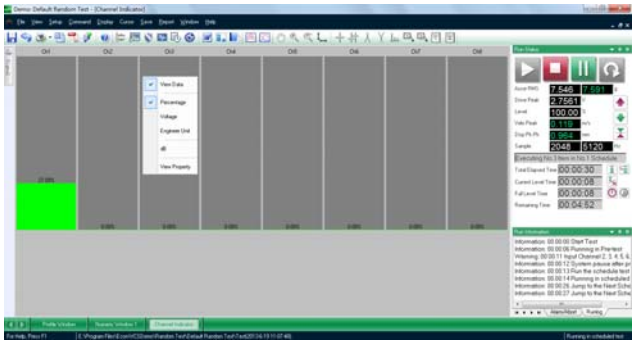
Value Indicator

Can display either channel characteristic values or system status.



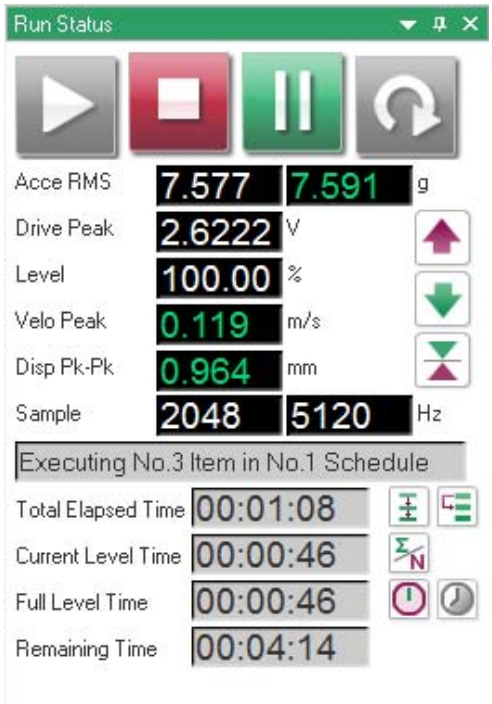
Channel Indicator

Can display channel voltage occupation.



Test Status

Real-time display test and operating states include control and demand acceleration RMS value (peak value), the Drive Voltage peak value, the Current Level, velocity Peak value, Displacement peak-peak value, etc.



Save Setting

Auto/Manual/Schedule Save Signal, Pane, Screens and Offline data. Data format including Binary, txt and so on.
Signals can also be free exported to all kinds of standard software, such as Excel.

Other Applications

Test Report

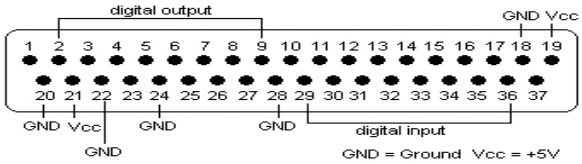
Automatically generate test reports in Word or PDF format, or you can preview the report and print reports directly.

MATLAB Interface

Provides tools for importing data into the MATLAB software which superb engineering computation and numerical analysis functions are available.

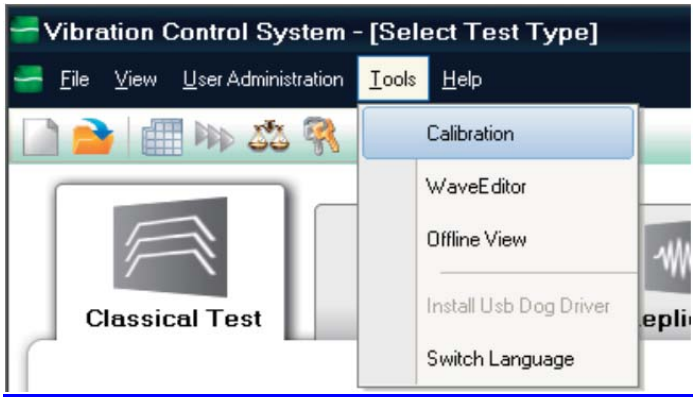
Digital Inputs/Outputs

Provide a 37-pin pluggable terminal block for digital level signals – eight inputs and eight outputs – to be interfaced with your product and other systems like (Temp. Humi. and Vibration comprehensive environmental testing system). Used for remote test control like start/stop/pause/continue.



Self calibration

UCON is featured with self-calibration utility. By this, users could re-calibrate the UCON hardware under automated calibration procedure, and get calibration file, text reports rapidly and conveniently. It helps users to save energy and time to send the hardware to metrology institutes and get a renewal and précised hardware again in short time.



Ordering Information

Part No.	Hardware	Part No.	Application Software (version 5, for VT-9002 hardware)
VT-9002-1	1 Channel UCON Controller	9201	Random Control
VT-9002-2	2 Channel UCON Controller	9201-07	Random Independent Channel Notching Control
VT-9008-2	2 Channel UCON Controller	9202	Sine Control
VT-9008-4	4 Channel UCON Controller	9202-01	Step Sine Control
VT-9008-8	8 Channel UCON Controller	9202-02	Resonance Search, Track and Dwell Control (RSTD)
VT-90EX01	Enable one extra analog input (for VT-9002 &VT-9008)	9202-05	THD Detection
VT-90EX02	Enable one extra analog input	9202-07	Sine Independent Channel Notching Control
VT-90EX03	Emergency Stop Switch with 10 meters cable	9203	Classical Shock Control
ACC-9000	Accessories (1 pcs/copy for each system)	90CAL	Self-Calibration software for UCON controller calibration with permanent license.

Part No.	Application Software (version 5, for VT-9008/9016 hardware)
9801	Random Control
9801-01	Random frequency extension to 18,750 Hz
9801-02	Random higher resolution lines extension to 6,400 lines
9801-03	Kurtosis Control
9801-04	Sine on Random Control
9801-05	Random on Random Control
9801-06	Sine and Random on Random Control
9801-07	Random Independent Channel Notching Control
9802	Sine Control
9802-01	Step Sine Control
9802-02	Resonance Search, Track and Dwell Control (RSTD)
9802-03	Sine Frequency Extension low to 0.01 Hz
9802-04	Sine Frequency Extension high to 10,000 Hz
9802-05	THD Detection
9802-06	Constant Level Sine Output (COLA)
9802-07	Sine Independent Channel Notching Control
9802-08	Multi-sine Control, supporting 5,000 Hz test bandwidth
9803	Classical Shock Control
9804	Shock Response Spectrum Control
9805	Transient Time History Control (FDR-TTH)
9805-01	Shock Response Spectrum Analysis
9806	Road Simulation Control (FDR-LTH)
9807	Vibro-shock Control
9821	Multi-layer Password Security System
9822	Off-line View, Playback of recorded vibration test data during control
9823	Email report after test
9824	Digital I/O
9809	System Check
90CAL	Self-Calibration software
92B1	Control Software Bundle-Random, Sine, Classical Shock
98B1	Control Software Bundle-Random, Sine, Classical Shock
98B2	Control Software Bundle-Random, Sine, Classical Shock, RSTD
98B3	Control Software Bundle-Random, Sine, Classical Shock, RSTD, SoR, RoR, SRoR
98B4	Control Software Bundle-Random, Sine, Classical Shock, RSTD, SoR, RoR, SRoR, SRS, FDR-TTH
EVCS-0101	1 Channel UCON Controller (VT-9002-1) with Random or Sine
EVCS-0201	2 Channel UCON Controller (VT-9002-2) with Random or Sine
EVCS-0203	2 Channel UCON Controller (VT-9002-2) with Control Software Bundle 92B1
EVCS-0403	4 Channel UCON Controller (VT-9008-4) with Control Software Bundle 98B1
EVCS-0406	4 Channel UCON Controller (VT-9008-4) with Control Software Bundle 98B3
EVCS-0803	8 Channel UCON Controller (VT-9008-8) with Control Software Bundle 98B1
EVCS-0808	8 Channel UCON Controller (VT-9008-8) with Control Software Bundle 98B4

About Us

ECON is a leading designer and manufacturer of instruments and equipment for test and measurement, headquartered in Hangzhou, China.

With more than 10 years experiences, ECON is also a comprehensive solution supplier for Vibration Test, Vibration and Noise Measurement and Analysis, Structural Model Test, Transducer Calibration, and Environmental Reliability Test.

- Leading role in design and manufacturing of instrument and equipment for test and measurement in China
- A global sales and marketing network.
- Over 2,000 instruments installed worldwide: China-Mainland, Taiwan, Europe, USA, Russia, Mid-east, India, Korea, Japan……
- Customers among Aerospace, Aviation, Automotive, Electronics, IT & Computers, Packaging, transportation, Institutes and Universities…...
- 70 employees, with an experienced and innovative R&D Team.
- A subsidiary company specialized in environmental test service.

ECON is supplying products, solution and service to customers under support of our local partners and sales representatives. Also ECON is looking forward to more global partners for promotion in their area.

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