

NEW

Note: Ethernet Versions Available Q1 2008

600 Series

Dynamic Signal Analyzer (DSA)

iOtech®
iotech.com

Features

- Analysis rates are software programmable from 20 Hz to 40 kHz
- 24-bit Sigma Delta ADC per analog input
- Spurious-free dynamic range of 108 dB (typical)
- AC/DC coupling, software selectable per channel
- TEDS support for accelerometers
- Pseudo-differential input
- Total harmonic distortion of -100 dB (typical)
- Channel-to-channel phase matching of <0.12 degrees at 1 kHz
- 8-bit digital IO port
- USB 2.0 high-speed and 10/100BaseT Ethernet versions



640 Models

- 4 analog inputs, ±10V input range (±60V max without damage)
- 2.1 mA IEPE current source per channel (20V compliance)
- 1.0 Hz AC Coupling HPF
- 24-bit Sigma Delta DAC analog output
- Analog outputs: sine, swept sine, random, burst, arbitrary
- Analog output signal-to-noise ratio: 100 dB (typical)



Vibration analysis and monitoring has never been easier than with the 600 Series of dynamic signal analyzers and eZ-Series software

650 Models

- 5 analog inputs, ±40V input range (±60V max without damage)
- 2.1 mA IEPE current source per channels 1-4 (20V compliance)
- 0.1 Hz AC coupling HPF

Vibration data acquisition, analysis, and monitoring has never been easier than with the IOtech 600 Series of dynamic signal analyzers and eZ-Series software. More than 30 years of engineering experience in vibration measurements have gone into the design of the 600 Series of DSAs. They come in either USB or Ethernet versions for maximum flexibility. The DSA hardware provides signal conditioning and data acquisition, while the eZ-Series PC-based software provides monitoring and analysis functions.

The 640 and 650 models are targeted for NVH (Noise, Vibration, Harshness) and Rotating Machinery applications. Each

model includes a 24-bit ADC for each analog input. The 640 model has 4 analog inputs, with an input range of ±10V. It also includes a 24-bit DAC analog excitation output. The 650 model has 5 analog inputs, with an input range of ±40V.

Software Overview

Four end-user software packages are available for the 600 Series, each tailored to a particular type of vibration measurement and analysis application. Select the package that best suits your application now, and upgrade to additional packages as your requirements evolve.

eZ-Analyst provides throughput data recording and multiple channel vibration analyses. Time Waveform, Spectrum, Waterfall, FRF, Cross, Transfer Function, Coherence, and Octave analyses are provided. Data acquisition and storage can be triggered based on events or scheduled. Direct export to the most accepted Modal Analysis packages, ME Scope and Star Modal is supported.

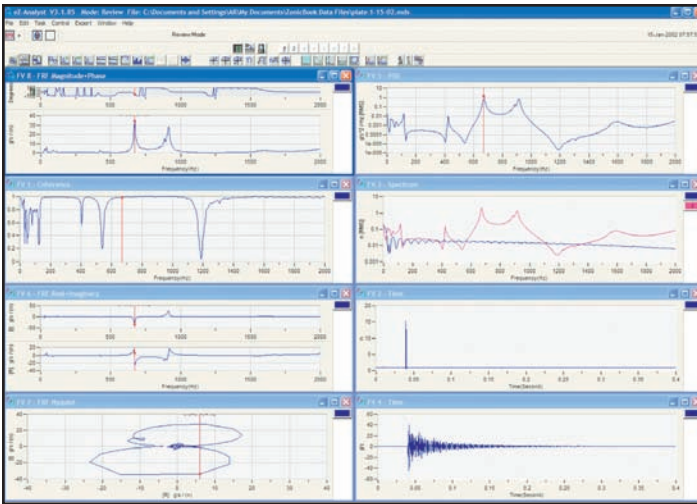
eZ-TOMAS provides on-line vibration measurement, limit checking, transient data storage, and rotating-machinery analyses. Time Waveform, Spectrum, Waterfall, Orbit, Polar, Bode, Shaft Center Line, and Trend analyses are provided. Data storage can be triggered based on user defined triggers and alarm events. Limit settings can be learned using machine condition.

eZ-Balance is used to balance rotating machinery with up to seven planes. A Toolkit, which includes Split Weight calculations, supports the balance process. The vibration vectors and correction weights are displayed on polar displays. Time and spectrum plots show the detailed vibration measurements during the balance process.

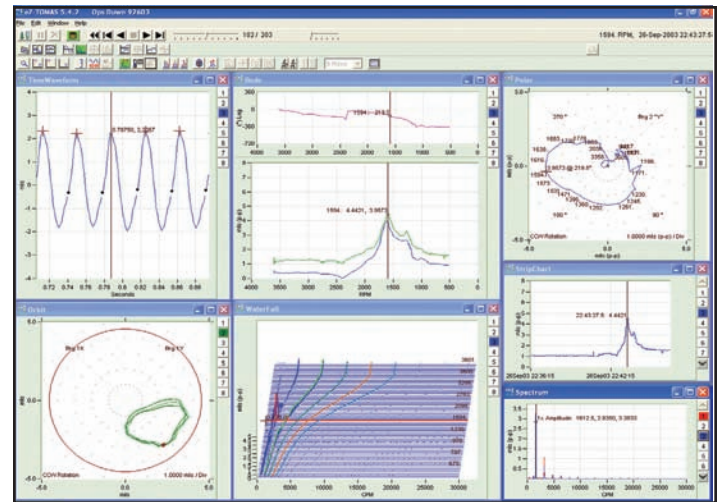
eZ-NDT is used in production applications to determine the quality of production products. Resonance Inspection provides a measure of quality. Spectral limit criteria can be learned by comparing known good and bad samples. Production rates of one part per second are supported.

600 Series

General Information



eZ-Analyst software with the 600 Series and your PC makes a real-time, portable vibration and acoustic analysis system



eZ-TOMAS allows you to view up to eight display windows with overlays for each window

Hardware Overview

The IOtech 600 Series are 24-bit Dynamic Signal Analyzers (DSA) with USB or Ethernet interfaces to transfer acquired data to the PC in real time. This means that every data sample can reside on a PC's hard drive, which makes effective waveform re-creation and post acquisition analysis. The DSA is not required to post process and analyze historical data.

Measurement

The spurious-free dynamic range of the 600 Series analog input is 108 dB. The 24-bit Sigma Delta ADC provides high resolution and excellent AC and DC accuracy. All channels are sampled synchronously and provide better than 0.12° of channel-to-channel phase matching at 1 kHz. The extremely low noise floor and extremely low distortion provide the user with high quality test data.

Analog Inputs

The IOtech 600 Series support a variety of analog input types, including Accelerometer, Velometer, Proximity, Microphone, Tachometer, or other voltage input. The 640 model accepts up to ±10V inputs, and the 650 model can accept up to ±40V inputs. Both are rated to withstand up to ±60V maximum without damaging the input. These signals may be either AC or DC coupled.

Signal Conditioning

The DSA supports software selectable AC or DC coupling, and automatically connects the 2.1 mA bias current with AC coupling for integrated electronic piezoelectric (IEPE) sensors. Both models also supply the current source with a 20V compliance voltage at the input terminals for biasing the IEPE sensors.

Both models can be programmed to select IEPE sensors and read sensor calibration information using Transducer Electronic Data Sheets (TEDS). The software can automatically connect to the sensors' EEPROM memory, and retrieve their data sheet.

Additional advantages include detecting over-voltages and open or shorted inputs or IEPE sensors. This information is available through the eZ-Series software packages.

The 600 Series DSAs have special input signal conditioning amplifiers to help reject noise commonly found in multiple accelerometer installations. Accelerometers located in various places in some applications are susceptible to large differences in ground potentials. The pseudo-differential inputs designed into the 600 Series are unbalanced with respect to analog circuit ground, specifically, 1k Ohm to ground from the outer shield conductor, while the resistance from the inner conductor to ground is 210k Ohm for the 640 model and 800k Ohm for the 650 model. This arrangement improves noise rejection, but does not eliminate the need for following standard, reliable techniques for shielding and grounding all types of sensors.

Source Output

The 640 model contains one programmable analog output channel that generates continuous or swept sine-wave signals, as well as random, burst, and arbitrary signals. A programmable 24-bit, Sigma-Delta DAC and an internal amplifier stage drives these output signals at 93 kSamples per second. In addition, it can operate while receiving analog input data. The software synchronizes the signals between the ADC and the DAC within the unit. The analog output signal can drive audio or shaker table amplifiers and can be used for noise, vibration, and harshness (NVH) testing with a typical signal-to-noise ratio of 100 dB.

600 Series

General Information

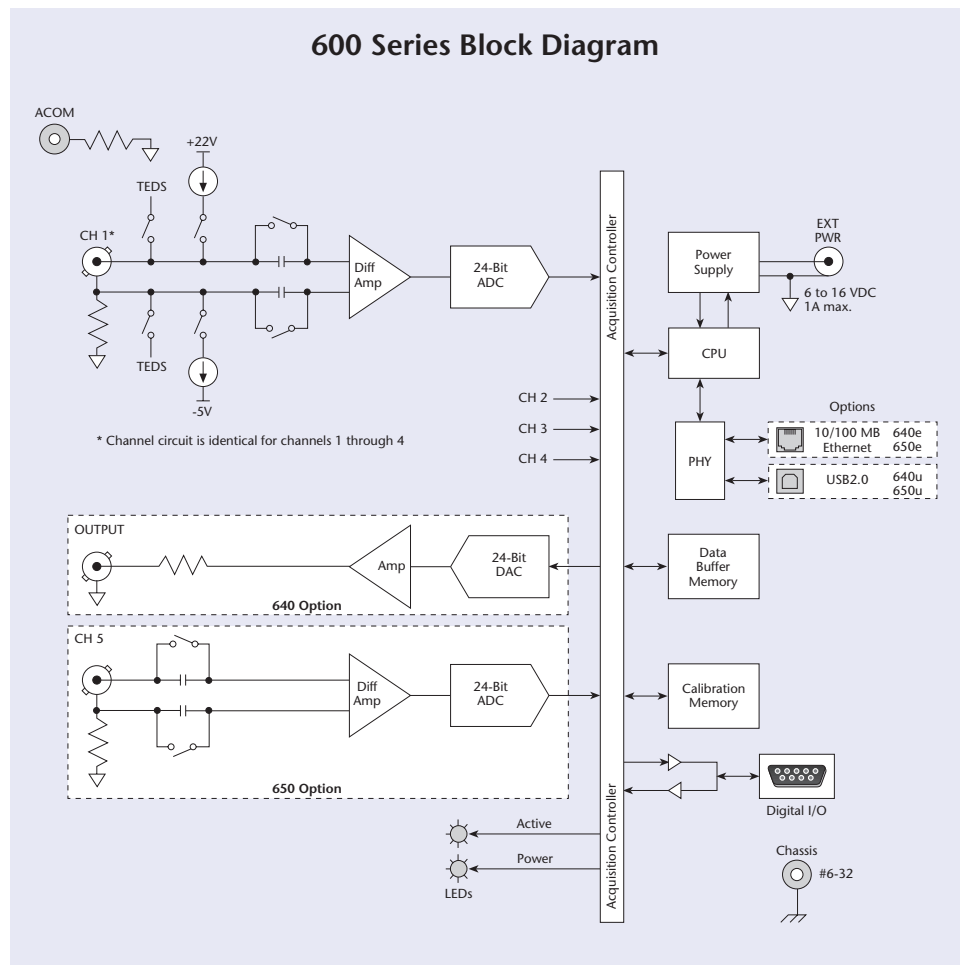
Power

The 600 Series DSAs were designed to consume little power. The 640u and 650u models draw power from either the USB source (PC or USB hub), or an external power source. The 640e and 650e must use external power, and come with a universal AC/DC power adapter. The 640e and 650e models also may be powered from a regulated 5W supply ranging from 6 to 16 VDC. An LED on the input side of the unit illuminates when it connects to a power source.

PC Connection

The 600 Series DSA comes in two interface versions: one connects to the PC through a 10/100BaseT Ethernet interface, and the other uses a USB port.

The 600 Series Ethernet version, the 640e or 650e models, also may be attached to a sufficient wide-band network. The data bandwidth is a function of the analysis rate, number of spectral lines, Nyquist factor, and the number of signals being measured. When measuring continuous signals over multiple channels, however, it is recommended to use a dedicated Ethernet or USB connection between the 600 Series DSA and the PC to ensure the data transfer is not interrupted.



Noise, Vibration, & Harshness Testing Applications

The 600 Series DSA was designed specifically for Noise, Vibration, and Harshness (NVH) testing applications. Either the 640 or 650 model can be used for this application.

The 640 model provides 4 input channels, each with an input range of $\pm 10V$. Additionally, the 640 model is a valued portable vibration test equipment by virtue of its programmable analog output channel that generates continuous or swept sine-wave signals, as well as sine, random, burst, and arbitrary signals. In addition, it can output these signals while receiving analog input data. The software synchronizes the signals between the ADC and the DAC within the unit.

If output source excitation is not required, the 650 model provides 5 input channels. The extra input channel can be useful for in-vehicle NVH applications that require data correlation to Tachometer inputs.

The eZ-Series software packages are the software of choice for these applications. Data recording, resonance testing, balancing, and production quality testing functions are supported in the eZ-Series software. The Windows®-style graphical user interface allows operators to easily select hardware parameters and access widely used analysis modules. The system supports resolution from 64 to 25,600 spectral lines, and frequency ranges from DC to 40 kHz.

600 Series

General Information & Specifications

Rotating Machinery and Predictive Maintenance Applications

The 600 Series DSA was also designed for rotating machinery monitoring and predictive maintenance applications. Again, either the 640 or 650 model can be used for this application.

The 650 model provides 5 input channels each with an input range of $\pm 40V$. The higher voltage range can be especially convenient for connection to proximity sensors (Eddy Current Probes) that operate from a -24 VDC supply. In addition, it accommodates both IEPE and voltage-type sensors providing greater flexibility than other instruments that only support IEPE-type sensors. Tachometer signals can be connected to any input channel.

If output source excitation is required or a lower input voltage range is desired, the 640 model can be selected. The output source is useful for structure excitation with shakers.

The eZ-Series software packages are the software of choice for these applications. Transient and steady state data recording, limit checking, resonance testing, multi-plane balancing, and rotating machinery analysis functions are supported in the eZ-Series software. The Windows®-style graphical user interface allows operators to easily select hardware parameters and access widely used analysis modules. The system supports resolution from 64 to 25,600 spectral lines, and frequency ranges from DC to 40 kHz.

Specifications

General Specifications

Environment

Operating Temperature

640u and 650u: -30° to 70°C

640e and 650e: 0° to 50°C

Humidity: 0° to 95% RH, non-condensing

Vibration: IEC 600068-2-64

Shock: IEC 600068-2-27

Emissions: EN61326, 89/366EEC

Safety: EN61010

Ingress: IP 40

Power Consumption

640e, 650e: 5.0W max

640u, 650u: 2.5W max

Input Power Range

640e, 650e: 6.5 to 16 VDC

640u, 650u: 6.0 to 16 VDC

PC Communication

640e, 650e: 10/100BaseT Ethernet

640u, 650u: USB 2.0

Dimensions: 142.24 mm W x 180.34 mm D x 38.1 mm H
(5.6" x 7.1" x 1.5")

Weight: 675g (1.5 lbs)

Warm-Up: 30 minutes to rated specifications

Analog Specifications

Analog Measurements

ADC Converter Resolution: 24 bits

ADC Converter Type: Delta-sigma

Sample Rates: Up to 105,468 samples per second (software dependent)

Sample Rate Accuracy: ± 50 ppm

Channels

640e, 640u: 4 input channels

650e, 650u: 5 input channels

Input Connector: 1 BNC per channel

Input Impedance	640e/640u	650e/650u
High to ground	200k Ohm 130 pF	800k Ohm 120 pF
Low to ground	1k Ohm	1k Ohm
High to low	201k Ohm	801k Ohm

Input Coupling: DC, AC, or AC + IEPE; software programmable per channel basis

High-Pass Filter (AC Coupling Cutoff)

640e, 640u: 1.0 Hz

650e, 650u: 0.1 Hz

Input Ranges

640e, 640u: $\pm 10V$ peak

650e, 650u: $\pm 40V$ peak

Input Protection: $\pm 60V$ max without damage

Over-Range Indication: Software

Low-Pass Filter: Software programmable per channel

Type: Anti-aliasing hardware 3-pole 360 kHz, software selectable FIR filter. Any unwanted signals above 27 MHz are lost in the noise floor of 64k FFT.

600 Series

Specifications & Ordering Information

Amplitude Accuracy

	640e / 640u	650e / 650u
AC at 1 kHz	±0.07 dB typ ±0.12 dB max	±0.1 dB typ ±0.15 dB max
DC	±(0.01% of reading + 2mV)	±(0.2% of reading + 15 mV)

Amplitude -3 dB: 0.49 x sample rate
Amplitude Flatness: ±0.05 dB typ ±0.10 dB max DC to 20 kHz
Total Harmonic Distortion: -100 dB typ 1 kHz, -97 dB typ 10 kHz
SFDR Including Harmonics: 108 dB typ DC to 50 kHz
SFDR (@ -60 dB): 128 dB typ DC to 50 kHz
Channel-to-Channel Crosstalk: <-100 dB at 1 kHz
Channel-to-Channel Phase Matching
 640e, 640u: <0.04°/kHz + 0.08°
 650e, 650u: <0.06°/kHz + 0.1°
Common Mode Rejection Ratio
 640e, 640u: -70 dB typ -55 dB max at 1 kHz
 650e, 650u: -56 dB typ -41 dB max at 1 kHz
Wideband Noise
 640e, 640u: <46 µV RMS typ 76 µV RMS max
 650e, 650u: <184 µV RMS typ 304 µV RMS max
IEPE Bias Source (Channels 1 to 4)
Current: 2.1 mA, 21V compliance (on/off software programmable per channel)
Impedance: >255k Ohm
IEPE Fault Detection Thresholds: <1V (short), >20V (open)
IEPE Fault Indication: Software indicator, per channel

Analog Output (640e, 640u only)

Channels: 1
Signal Connection: BNC
Frequency Range: DC to 45 kHz (-3.0 dB)
Frequency Accuracy: ±50 ppm
DAC Resolution: 24 bit
DAC Update Rate: 93,750 samples per second (continuous)
DAC Type: Delta-sigma
Total Harmonic Distortion: 1 kHz -96 dB typ
Total Harmonic Distortion + Noise: 1 kHz -87 dB typ
Amplitude Settings
 640e, 650e: 0 to 7V p-p
 640u, 650u: 0 to 3.5V peak
Amplitude Accuracy at 1 kHz: ±0.05 dB typ ±0.12 dB max
Amplitude Flatness (DC to 20 kHz): ±0.02 dB typ ±0.1 dB max
SNR (DC to 20 kHz): 100 dB typ 90 dB max
Maximum Load: 1k Ohm (50 Ohm with external power)
Waveform Modes: Sine, swept sine, random, burst, arbitrary
Output Impedance: 50 Ohm

Tachometer Inputs

Any analog input channel may be used as a tachometer input

Digital I/O Lines

Note: To make use of digital I/O, eZ-TOMAS or eZ-NDT software must be running in the host PC.
Channels: 8 digital I/O, programmable as inputs or outputs on a line by line basis
Ports: 1 x 8-bit; each bit is programmable as input or output
Power-Up Mode: Inputs pulled low
Connector: DB9 female
Input Scanning Modes: 2 programmable scanning modes
 Asynchronous, under program control at any time relative to analog scanning;
 Synchronous with analog scanning
Input Protection: ±5.6V
Input Levels
Low: 0 to +0.8V
High: +2.0V to +5.0V
Output Pull-Down Resistor: 10k Ohm
Output Voltage Range: 0 to +3.3V, may be pulled up to +5V
Output Resistance: 100 Ohm
Output Levels
Low: <0.8V
High: >3.0V with no load
Sampling: 105,468 Hz, max
Output Timing: Outputs are always written asynchronously

Ordering Information

Description	Part No.
Ethernet-based dynamic signal analyzer for NVH testing	640e
USB-based dynamic signal analyzer for NVH testing	640u
Ethernet-based dynamic signal analyzer for rotating machinery and maintenance	650e
USB-based dynamic signal analyzer for rotating machinery and maintenance	650u

Accessories & Cables

High-speed USB cable, 1 m.	CA-179-1
External power supply, 90 to 264 VAC; requires additional cable	TR-2U
USA version	CA-1
European version	CA-216

Software

Real-time vibration and acoustic analysis software	eZ-Analyst
Rotating machine monitoring and analysis software	eZ-TOMAS
Machine balancing software	eZ-Balance
Resonant inspection software	eZ-NDT

BUY NOW!

For complete product specifications, pricing, and accessory information, call 1-888-714-3272 (U.S. only) or visit iotech.com.