

# Integrated Suite of 12 Instruments for Hands-On, Multidiscipline Education

## NI ELVIS II/II+ **NEW!**

- Design and prototyping platform for measurement and instrumentation, circuits, controls, telecommunications, and embedded/MCU experiments
- Complete integration with Multisim for circuits and electronics
- Completely open and customizable in LabVIEW
- Express VIs for point-and-click configuration in LabVIEW and LabVIEW SignalExpress

### Platform Features

- Open architecture for third-party plug-in boards
- Hi-Speed USB plug-and-play connectivity
- 1.25 MS/s oscilloscope with 100 MS/s option on NI ELVIS II+
- 5½-digit isolated digital multimeter
- ±15 and +5 V power supply
- Manual control – function generator and variable power supply
- Circuit protection with resettable fuse

### Integrated Suite of 12 Virtual Instruments

- Oscilloscope
- Function generator (manual control)
- Digital multimeter (DMM)
- Arbitrary waveform generator
- Bode analyzer
- 2-wire current voltage analyzer
- 3-wire current voltage analyzer
- Dynamic signal analyzer (DSA)
- Impedance analyzer
- Digital reader
- Digital writer
- Variable power supply (manual control)

### Recommended Software

- LabVIEW
- NI Circuit Design Suite

### Driver Software (included)

- NI-ELVISmx
- LabVIEW SignalExpress



## Overview

The NI Educational Laboratory Virtual Instrumentation Suite (NI ELVIS) is a hands-on design and prototyping platform that integrates 12 of the most commonly used instruments – including the oscilloscope, DMM, function generator, and Bode analyzer – into a compact form factor ideal for the hardware lab or classroom. A 100 MS/s oscilloscope option is available on the NI ELVIS II+.

Based on NI LabVIEW graphical system design software, NI ELVIS, with USB plug-and-play capabilities, offers the flexibility of virtual instrumentation and allows for quick and easy measurement acquisition and display.

This hardware platform, used from first-year classes to advanced senior classes, helps educators teach a variety of concepts, including measurement and instrumentation, analog and digital circuits, controls and mechatronics, telecommunications, and embedded theory.

Features	NI ELVIS I	NI ELVIS II	NI ELVIS II+
12 integrated instruments	✓	✓	✓
PCI/PCMCIA	✓	–	–
Integrated USB	–	✓	✓
Isolated digital multimeter	–	✓	✓
NI-DAQmx software	–	✓	✓
True Multisim integration	–	✓	✓
100 MS/s oscilloscope	–	–	✓

Table 1. NI ELVIS Platform Comparison

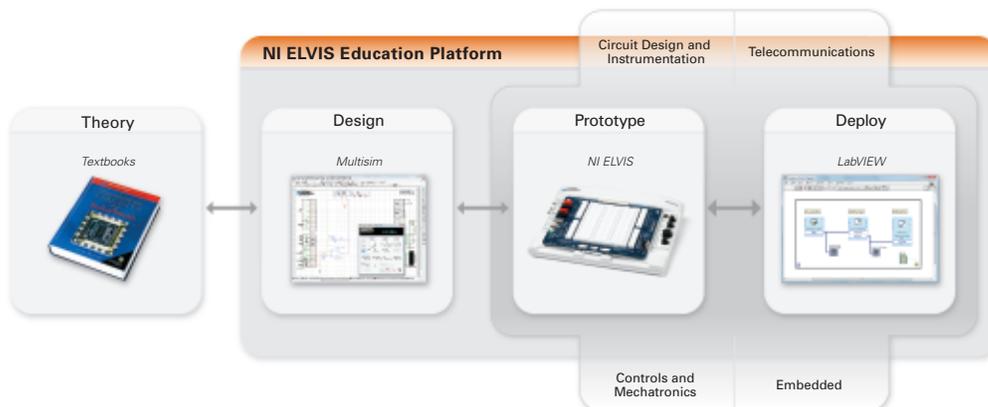


Figure 1. The NI ELVIS Education Platform

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### NI Electronics Education Platform

NI ELVIS, an integral part of the NI electronics education platform, combines simulation and measurements from NI ELVIS inside the NI Multisim capture and SPICE simulation environment. Students transfer concepts taught in a textbook to Multisim, where they can learn through modeling circuit behavior and interactive circuits. They can compare simulation and real measurements with a single mouse click using NI ELVIS instruments inside the Multisim environment and achieve more complex analysis using LabVIEW or LabVIEW SignalExpress.

For more information on the NI electronics education platform, visit [ni.com/academic/eep](http://ni.com/academic/eep).

### NI-ELVISmx Driver and LabVIEW Accessibility

With the NI-ELVISmx driver, students can access their suite of 12 instruments through the NI-ELVISmx instrument launcher. These virtual instruments with their soft front panels provide an interactive interface to configure instruments.

NI ELVIS virtual instruments are open-sourced and customizable in LabVIEW. With the installation of the driver, students can use LabVIEW Express VIs and LabVIEW SignalExpress steps to program their devices. This provides point-and-click configuration capabilities for the individual instruments, so they can achieve customized and more complex analysis of acquired data in LabVIEW.

Those who are familiar with the DAQmx API can program general analog input, analog output, and timing functionality on NI ELVIS using NI-DAQmx.

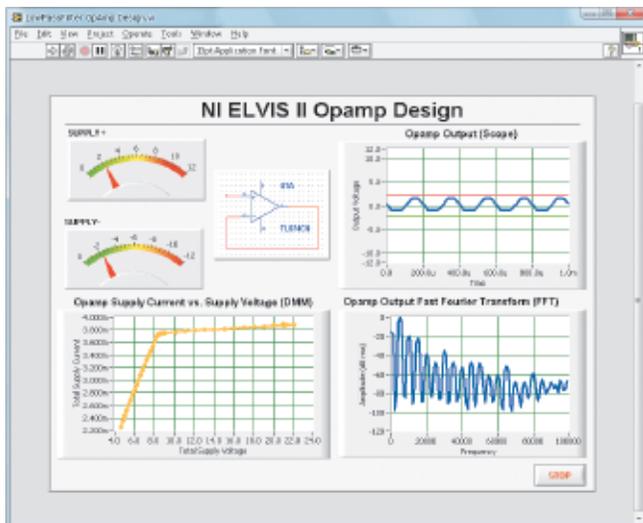


Figure 2. Integration with NI LabVIEW

### Teach a Variety of Disciplines with Plug-In Boards

Educators can extend their labs beyond instrumentation and circuits with NI ELVIS plug-in boards and courseware from third-party collaborators such as Emona, Freescale Semiconductor, and Quanser to teach telecommunications, microcontroller, and control concepts. National Instruments also now provides introduces a digital electronics and field-programmable gate array (FPGA) plug-in board for the platform.

NI ELVIS is an open architecture, which helps leading teaching solution providers take advantage of the platform. The following plug-in boards are available from the following companies.

### Digital Electronics with National Instruments

- NI Digital Electronics FPGA Board based on Xilinx Spartan-3E FPGA



Figure 3. NI Digital Electronics FPGA Board and NI ELVIS II+

### Control and Simulation with Quanser

- QNET-010 DC motor control
- QNET-011 rotary inverted pendulum
- QNET-012 HVAC system
- QNET-013 Vertical Take-Off and Landing (VTOL) actuator
- QNET-014 mechatronics sensor 1

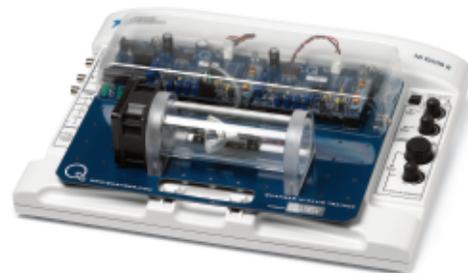


Figure 4. Quanser QNET Plants and NI ELVIS II

## Integrated Suite of 12 Instruments for Hands-On, Multidiscipline Education

### Embedded/MCU Design with Freescale

- Embedded/MCU design with Freescale Microcontroller Student Learning Kit (SLK)

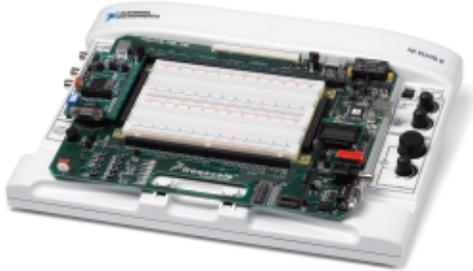


Figure 5. Freescale Microcontroller SLK and NI ELVIS II

### Telecommunications and Fiber Optics with Emona

- Telecommunications with Emona DATEx
- Fiber optics with Emona FOTEx



Figure 6. Emona FOTEx Fiber Optics Board and NI ELVIS II+

### Other Companion Products

- Circuits – NI electronics education platform with Multisim
- Embedded/DSP – Analog Devices ADSP-BF537 Blackfin Processor
- Sensors – Vernier sensor adapters for NI ELVIS

### Ordering Information

#### Bundles

NI ELVIS II+ Circuit Design Bundle.....	780379-02
NI ELVIS II Circuit Design Bundle.....	780379-01
<i>Includes NI ELVIS workstation, Multisim, LabVIEW, LabVIEW SignalExpress, and user manual.</i>	
NI ELVIS II+ Basic Bundle .....	780378-02
NI ELVIS II Basic Bundle.....	780378-01
<i>Includes NI ELVIS workstation, LabVIEW, LabVIEW SignalExpress, and user manual.</i>	
NI ELVIS II+ instrumentation design and training platform .....	780380-02
NI ELVIS II instrumentation design and training platform .....	780380-01
<i>Includes NI ELVIS workstation only and user manual for industry and vocational training.</i>	
NI ELVIS II prototyping board .....	188432-01
<i>Used with NI ELVIS II and NI ELVIS II+.</i>	

### BUY NOW!

For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S.) or go to [ni.com/nielvis](http://ni.com/nielvis).

# Integrated Suite of 12 Instruments for Hands-On, Multidiscipline Education

## Specifications

>> For complete specifications, see the *NI ELVIS II series* user manual at [ni.com/manuals](http://ni.com/manuals).

Performance is typical at 25 °C unless otherwise specified.

### Analog Input

Channels.....	8 differential or 16 single-ended
ADC resolution.....	16 bits
Absolute accuracy.....	Refer to NI ELVIS II
Maximum sampling rate.....	1.25 MS/s single channel, 1.00 MS/s multichannel (aggregate)
Input range.....	$\pm 10$ , $\pm 5$ , $\pm 2$ , $\pm 1$ , $\pm 0.5$ , $\pm 0.2$ , and $\pm 0.1$ V
Maximum working voltage for analog inputs (signal + common mode).....	$\pm 11$ V of AIGND
Input impedance	
Device on – AI+ or AI- to AIGND.....	$>10$ G $\Omega$    100 pF
Device off – AI+ or AI- to AIGND.....	820 $\Omega$
Small signal bandwidth (-3 dB).....	1.2 MHz

### Analog Triggers

Number of triggers.....	1
Source.....	AI<0..15>, and available on NI ELVIS II only, ScopeCHO, ScopeCH1
Functions.....	Start trigger, reference trigger, pause trigger, sample clock, convert clock, sample clock timebase
Source level.....	$\pm$ Full scale
Resolution.....	10 bits
Modes.....	Analog edge triggering, analog edge triggering with hysteresis, and analog window triggering

### Arbitrary Waveform Generator/Analog Output

Channels.....	2
DAC resolution.....	16 bits
Maximum update rate	
1 channel.....	2.8 MS/s
2 channels.....	2.0 MS/s
Timing resolution.....	50 ns
Output range.....	$\pm 10$ V, $\pm 5$ V
Slew rate.....	20 V/ $\mu$ s

### Digital I/O and PFI

Channels.....	24 DIO, 15 PFI
Direction control.....	Each line individually programmable as input or output
Pull-down resistor.....	50 k $\Omega$ typ, 20 k $\Omega$ min

### General-Purpose Counter/Timers

Counter/timers.....	2
Resolution.....	32 bits

Counter measurements.....	Edge counting, pulse, semiperiod, period, two-edge separation
Position measurements.....	X1, X2, X4 quadrature encoding with Channel Z reloading; two-pulse encoding
Output applications.....	Pulse, pulse train with dynamic updates, frequency division, equivalent time sampling
External base clock frequency.....	0 to 20 MHz
Base clock accuracy.....	50 ppm
Maximum frequency.....	1 MHz
Inputs.....	Gate, source, HW_Arm, Aux, A, B, Z, Up_Down

### Frequency Generator

Channels.....	1
Base clocks.....	10 MHz, 100 kHz
Divisors.....	1 to 16
Maximum frequency.....	1 MHz
Base clock accuracy.....	50 ppm

### External Digital Triggers

Source.....	TRIG BNC or any PFI
Polarity.....	Software-selectable for most signals
Analog input function.....	Start trigger, reference trigger, pause trigger, sample clock, convert clock, sample clock timebase
Analog output function.....	Start trigger, pause trigger, sample clock, sample clock timebase
Counter/timer function.....	Gate, source, HW_Arm, Aux, A, B, Z, Up_Down

### Digital Multimeter (DMM)

Isolated functions.....	DC voltage, AC voltage, DC current, AC current, resistance, diode
Isolation level.....	60 VDC/20 V <sub>rms</sub> , Installation Category I
Resolution.....	5 $\Omega$ digits
Input impedance.....	11 M $\Omega$
Nonisolated functions.....	Capacitance, inductance

### Voltage Measurement

DC ranges.....	100 mV, 1 V, 10 V, 60 V
AC ranges.....	200 mV <sub>rms</sub> , 2 V <sub>rms</sub> , 20 V <sub>rms</sub>
Accuracy.....	Refer to NI ELVIS II

### Current Measurement

DC range.....	2 A
AC ranges.....	500 mA <sub>rms</sub> , 2 A <sub>rms</sub>
Shunt resistor.....	0.1 $\Omega$
Burden voltage.....	<0.6 V
Accuracy.....	Refer to NI ELVIS II
Input protection.....	F 3.15 A 250 V, fast-acting user-replaceable fuse

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### Resistance Measurement

Ranges.....	100 $\Omega$ , 1 k $\Omega$ , 10 k $\Omega$ , 100 k $\Omega$ , 1 M $\Omega$ , 100 M $\Omega$
Accuracy.....	Refer to NI ELVIS II

### Diode Measurement

Range .....	10 V
Nominal test current.....	100 $\mu$ A (10 V range)

### Capacitance Measurement

Range .....	50 pF to 500 $\mu$ F
Accuracy.....	1%

### Inductance Measurement

Range .....	100 $\mu$ H to 100 mH
Accuracy.....	1%

### Function Generator

Channels.....	1
Output waveform type .....	Sine, square, triangle
Frequency range.....	0.186 Hz to 5 MHz (sine) 0.186 Hz to 1 MHz (square and triangle)
Frequency resolution.....	0.186 Hz
Waveform amplitude range .....	10 V <sub>pp</sub>
Waveform amplitude resolution .....	10 bits
Waveform amplitude accuracy.....	1% $\pm$ 15 mV
Waveform offset range.....	$\pm$ 5 V
Duty cycle range .....	0 to 100%
Output impedance.....	50
Maximum output current.....	100 mA

### Modulation

Inputs.....	2 (AM and FM)
Modulation input range .....	$\pm$ 10 V
Amplitude modulation factor.....	10%/V
Frequency modulation factor .....	20%/V

### Oscilloscope (NI ELVIS II)

Channels.....	2
Input coupling .....	AC or DC
Input impedance .....	1 M $\Omega$    25 pF
Bandwidth (-3 dB) .....	1.7 MHz
AC coupling cutoff frequency (-3 dB)..	10 MHz
Resolution .....	16 bits
Maximum sampling rate.....	1.25 MS/s (single channel) 500 kS/s (two channels)
DC accuracy .....	Refer to NI ELVIS II

### Oscilloscope (NI ELVIS II+)

Channels.....	2
Input coupling .....	AC, DC, GND
Input impedance .....	1 M $\Omega$    21 pF
Bandwidth (-3 dB) .....	35 MHz (40 mV <sub>pp</sub> range) 50 MHz (all other ranges)
Optional noise filter .....	20 MHz
AC coupling cutoff frequency (-3 dB)...	12 Hz

Resolution .....	8 bits
Maximum sampling rate.....	100 MS/s (two channels)
Timebase accuracy.....	50 ppm
Waveform memory.....	16384 samples per channel
DC accuracy .....	Refer to NI ELVIS II/II+

### Dynamic Signal Analyzer

Frequency resolution.....	Software-controllable (200, 400, 800, 1600, 3200 lines)
Accuracy.....	Refer to NI ELVIS II

### Bode Analyzer

Frequency range.....	1 Hz to 200 kHz (ELVIS II); 1 Hz to 5 MHz (ELVIS II+)
Accuracy.....	Refer to NI ELVIS II

### Two-Wire Current-Voltage Analyzer

Current range .....	$\pm$ 40 mA
Voltage sweep range .....	$\pm$ 10 V

### Three-Wire Current-Voltage Analyzer

Supported devices .....	NPN and PNP transistors
Minimum base current increment .....	0.48 $\mu$ A
Maximum collector current.....	$\pm$ 40 mA
Maximum collector voltage .....	$\pm$ 10 V

### Impedance Analyzer

Measurement frequency range .....	1 Hz to 35 kHz
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### Power Supplies

#### +15 V Supply

Output voltage (no load) .....	+15 V $\pm$ 5%
Maximum output current .....	500 mA
Short circuit protection .....	Resettable circuit breaker

#### -15 V Supply

Output voltage (no load) .....	-15 V $\pm$ 5%
Maximum output current .....	500 mA
Short circuit protection .....	Resettable circuit breaker

#### +5 V Supply

Output voltage (no load) .....	+5 V $\pm$ 5%
Maximum output current .....	2 A
Short circuit protection .....	Resettable circuit breaker

#### Positive Variable Supply

Output voltage .....	0 to +12 V
Voltage setpoint resolution .....	10 bits
Voltage accuracy (no load).....	100 mV
Maximum output current.....	500 mA
Short circuit protection .....	Self-resetting current limiter

#### Negative Variable Supply

Output voltage .....	0 to -12 V
Voltage setpoint resolution .....	10 bits
Voltage accuracy (no load).....	100 mV
Maximum output current .....	500 mA
Short circuit protection .....	Self-resetting current limiter

## Integrated Suite of 12 Instruments for Hands-On, Multidiscipline Education

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### Calibration

Recommended warm-up time..... 15 minutes  
Calibration interval ..... 1 year

### Communication

Bus interface..... Hi-Speed USB

### Physical

Dimensions..... 34.3 by 28.0 by 7.6 cm  
(14.5 by 11 by 3 in.)  
Weight (with prototyping board) ..... 1.9 kg (4.2 lb)

### Environmental

Operating temperature ..... 10 to 35 °C  
Storage temperature..... 65 °C  
Humidity ..... 10 to 90% relative  
humidity, noncondensing  
Maximum altitude..... 2000 m  
Pollution degree (indoor use only)..... 2

# NI Services and Support



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range from start-up assistance to turnkey system integration. Visit [ni.com/alliance](http://ni.com/alliance).

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NI system assurance programs are designed to make it even easier for you to own an NI system. These programs include configuration and deployment services for your NI PXI, CompactRIO, or Compact FieldPoint system. The NI Basic System Assurance Program provides a simple integration test and ensures that your system is delivered completely assembled in one box. When you configure your system with the NI Standard System Assurance Program, you can select from available NI system driver sets and application development environments to create customized, reorderable software configurations. Your system arrives fully assembled and tested in one box with your software preinstalled. When you order your system with the standard program, you also receive system-specific documentation including a bill of materials, an integration test report, a recommended maintenance plan, and frequently asked question documents. Finally, the standard program reduces the total cost of owning an NI system by providing three years of warranty coverage and calibration service. Use the online product advisors at [ni.com/advisor](http://ni.com/advisor) to find a system assurance program to meet your needs.

### Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit [ni.com/calibration](http://ni.com/calibration).

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