Integrated Suite of 12 Instruments for Interactive, Cost-Effective, Multidisciplinary, Hands-On Learning

NI ELVIS II *NEW!*

- Design and prototyping platform for circuit design, control, instrumentation, telecommunications, and embedded/MCU experiments
- Complete integration with Multisim for circuits and electronics
- Hi-Speed USB plug-and-play interface
- Virtual instrumentation suite includes oscilloscope, digital multimeter (DMM), function generator, variable power supply, Bode analyzer, arbitrary waveform generator, dynamic signal analyzer (DSA), voltage/current analyzer with LabVIEW source code
- Completely open and customizable in LabVIEW graphical system design environment
- Express VIs for point-and-click configuration of customized instruments in LabVIEW and LabVIEW SignalExpress

Workstation Features

- New, sleek design with an open connector architecture for third-party boards
- Isolated DMM for better signal integrity
- Short-circuit and high-voltage protection with resettable fuse board
- Variable power supplies – manual or programmatic control
- Function generator – manual or programmatic control
- ±15 and +5 V supply available

Overview

NI ELVIS, an educational design and prototyping platform based on NI LabVIEW graphical system design software, is a leading tool for teaching concepts in areas such as instrumentation, circuits, control, communication, and embedded design in a hands-on, interactive manner. It features a new design and an integrated suite of the 12 most commonly used instruments in a compact, rugged, laboratory-friendly form factor. NI ELVIS II includes a Hi-Speed USB interface that delivers a complete design and prototyping platform you can use from lower-division freshman classes to advanced senior classes to help students learn concepts from circuit design to telecommunications.

NI ELVIS II is a primary component of the NI electronics education platform along with NI Multisim, a leading tool for SPICE simulation and schematic capture in academia, and the NI LabVIEW graphical system design platform. Students can simulate theoretical concepts in Multisim, prototype the actual circuit with NI ELVIS II, and compare the simulation with real-world measurements using LabVIEW and LabVIEW SignalExpress. With NI ELVIS II and Multisim 10.1, learning circuits becomes more interactive using features such as 3D NI ELVIS II as well as the ability to access NI ELVIS II instruments inside the Multisim environment and switch from simulated data to real-world data with a single mouse click. For more information on the NI electronics education platform, visit **ni.com/eep**.

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

Table 1. NI ELVIS I versus NI ELVIS II
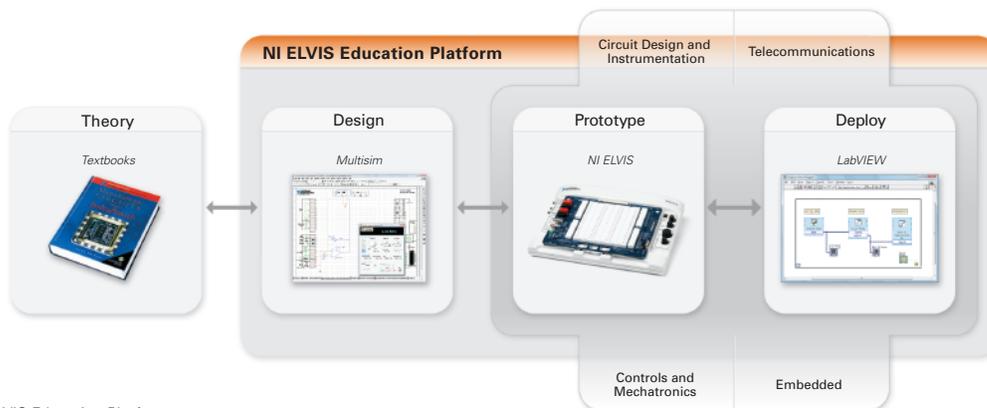
Figure 1. The NI ELVIS Education Platform

NATIONAL INSTRUMENTS™

Integrated Suite of 12 Instruments for Interactive, Cost-Effective, Multidisciplinary, Hands-On Learning

LabVIEW Accessibility

NI ELVIS II is completely customizable in LabVIEW and includes Express VIs for each of the 12 instruments in its virtual instrumentation suite. This provides point-and-click configuration capabilities for the individual instruments, which makes building customizable instruments very easy. You also can use NI ELVIS II with LabVIEW SignalExpress to help students compare simulated data from Multisim and real-world data from NI ELVIS and create interactive reports for class assignments.
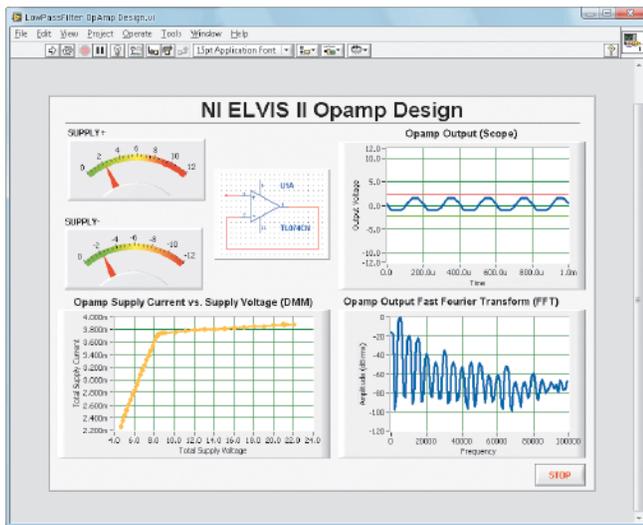

Figure 2. Integration with NI LabVIEW

Open Architecture with Plug-In Boards for Multidisciplinary Education

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

- Control design with Quanser trainers
  - Quanser QNET DC motor
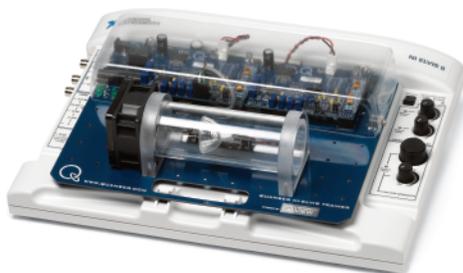 - Quanser QNET inverted pendulum
  - Quanser QNET HVAC system

Figure 3. Quanser QNET plants and NI ELVIS II

- Embedded/MCU design with Freescale Microcontroller Student Learning Kit (SLK) featuring the following application modules:
  - 8-bit HCS08
  - 16-bit HCS12/HCS12X/DSP
  - 32-bit ColdFire processor
  - RF transceiver

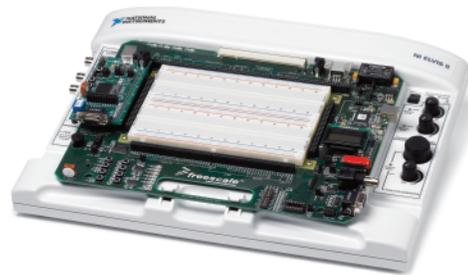*Figure 4. Freescale Microcontroller SLK and NI ELVIS II*

- Telecommunications with Emona DATEx telecommunications trainer for NI ELVIS

Figure 5. Emona DATEx Telecommunications Board and NI ELVIS II

Other Companion Products

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

Specifications

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 Specifications at **ni.com/manuals**
Maximum sampling rate	1.25 MS/s single channel, 1.00 MS/s multichannel (aggregate)
Input range	±10 V, ±5 V, ±2 V, ±1 V, ±0.5 V, ±0.2 V, ±0.1 V
Maximum working voltage for analog inputs (signal + common mode)	±11 V of AIGND
CMRR (DC to 60 Hz)	90 dB
Input impedance	
Device on – AI+ or AI- to AIGND	>10 GΩ ∥ 100 pF
Device off – AI+ or AI- to AIGND	820 Ω
Input bias current	±100 pA
Crosstalk @100 kHz	
(adjacent channel)	-70 dB
(nonadjacent channel)	-80 dB
Small signal bandwidth (-3 dB)	1.2 MHz
Input FIFO size	4095 samples
Scan list memory	4095 entries
Data transfers	USB signal stream, programmed I/O
Overvoltage protection (AI±, AISENSE)	
Device on	±25 V for up to four lines
Device off	±15 V for up to four lines
Input current during overvoltage condition	±20 mA max per line

Analog Triggers

Number of triggers	1
Source	AI<0..15>, ScopeCH0, ScopeCH1
Functions	Start trigger, reference trigger, pause trigger, sample clock, convert clock, sample clock timebase
Source level	±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	±10 V, ±5 V
Data transfer	USB signal stream, programmed I/O
AO waveform modes	Nonperiodic waveform, periodic waveform regeneration from onboard FIFO, periodic waveform regeneration from host buffer including dynamic update
Slew rate	20 V/µs

Digital I/O and PFI

Channels	24 DIO (Port 0),15 PFI (ports 1 and 2)
Direction control	Each line individually programmable as input or output
Pull-down resistor	50 kΩ typ, 20 kΩ min
Input voltage protection	±20 V on up to two pins

PFI/Port 1/Port 2 Functionality

Functionality	Static digital input, static digital output, timing input, timing output
Debounce filter settings	125 ns, 6.425 µs, 2.56 ms, disable; high and low transitions; selectable per input

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
Internal base clocks	80, 20, 0.1 MHz
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
Default output line	PFI 14/FREQ_OUT

External Digital Triggers

Source	TRIG BNC or any PFI
Polarity	Software-selectable for most signals

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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_{rms}, Installation Category I

   Resolution..................................... 5½ digits
   Input impedance .... 11 MΩ
   Input coupling .... DC (DC voltage, DC current, resistance, diode) AC (AC voltage, AC current)

Nonisolated functions........................ Capacitance, inductance

Voltage Measurement

DC ranges... 100 mV, 1 V, 10 V, 60 V
AC ranges... 200 mV_{rms}, 2 V_{rms}, 20 V_{rms}
Accuracy.. Refer to NI ELVIS II Specifications at **ni.com/manuals**

Input frequency range (AC mode)....... 40 Hz to 20 kHz

Current Measurement

DC range .... 2 A
AC ranges... 500 mA_{rms}, 2 A_{rms}
Shunt resistor.................................... 0.1 Ω
Burden voltage................................... <0.6 V
Accuracy.. Refer to NI ELVIS II Specifications at **ni.com/manuals**

Input frequency range (AC mode)....... 40 Hz to 5 kHz
Input protection................................. F 3.15 A 250 V, fast-acting user-replaceable fuse

Resistance Measurement

Ranges.. 100 Ω, 1 kΩ, 10 kΩ, 100 kΩ, 1 MΩ, 100 MΩ
Accuracy.. Refer to NI ELVIS II Specifications at **ni.com/manuals**

Diode Measurement

Range .... 1 V
Nominal test current.......................... 1 mA (1 V range)

Capacitance Measurement

Range .... 50 pF to 500 uF
Accuracy.. 1%

Inductance Measurement

Range .... 100 µH 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_{pp}
Waveform amplitude resolution......... 10 bits
Waveform amplitude accuracy........... 1% ±15 mV
Waveform offset range...................... ±5 V
Duty cycle range .... 0 to 100%
Output impedance.............................. 50
Maximum output current .... 100 mA
Sine total harmonic distortion (THD).. -50 dB max @ 1 MHz
Sine flatness .... -40 dB max @ 5 MHz -0.5 dB to 3 MHz-3 dB to 5 MHz

Modulation

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

Oscilloscope

Channels.. 2
Input coupling .... AC or DC
Input impedance .... 1 MΩ Il 25 pF
Bandwidth (-3 dB) .... 1.7 MHz
DC accuracy .... Refer to NI ELVIS II Specifications at **ni.com/manuals**

Dynamic Signal Analyzer

Accuracy.. Refer to NI ELVIS II Specifications at **ni.com/manuals**

Frequency resolution.......................... Software-controllable (200, 400, 800, 1600, 3200 Hz)

Bode Analyzer

Accuracy.. Refer to NI ELVIS II Specifications at **ni.com/manuals**
Phase accuracy .... 1 Hz to 200 kHz

Two-Wire Current-Voltage Analyzer

Current range .... ±40 mA
Voltage sweep range .... ±10 V

Three-Wire Current-Voltage Analyzer

Supported devices .... NPN and PNP transistors
Minimum base current increment ...... 0.48 µA
Maximum collector current................. ±40 mA
Maximum collector voltage .... ±10 V

Impedance Analyzer

Measurement frequency range .... 1 Hz to 35 kHz

Power Supplies

+15 V Supply

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

-15 V Supply

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

+5 V Supply

Output voltage (no load) .... +5 V ±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

Calibration

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

Communication

Bus interface..................................... Hi-Speed USB
USB signal stream .... 4 streams; can be used for analog input, analog output, and counter/timers

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

Safety and Compliance

Safety

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

Note: For UL and other safety certifications, refer to the product label or visit **ni.com/certification**, search by model number or product line, and click the appropriate link in the Certification column.

Electromagnetic Compatibility

This product is designed to meet the requirements of the following standards of EMC for electrical equipment for measurement, control, and laboratory use:

- EN 61326 EMC requirements; Minimum Immunity
- EN 55011 Emissions; Group 1, Class A
- CE, C-Tick, ICES, and FCC Part 15 Emissions; Class A

Note: For EMC compliance, operate this device according to product documentation.

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Note: Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit **ni.com/certification**, search by model number or product line, and click the appropriate link in the Certification column.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers: At the end of their life cycle, all products must be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit **ni.com/environment/weee.htm**.

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Hardware Services

NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with **ni.com/pxiadvisor**.

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**.

Repair and Extended Warranty

NI provides complete repair services for our products. Express repair and advance replacement services are also available. We offer extended warranties to help you meet project life-cycle requirements. Visit **ni.com/services**.

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