

# Scienlab Measurement & Control Module

|         |         |         |         |
|---------|---------|---------|---------|
| SL1060A | SL1062A | SL1063A | SL1063B |
| SL1064A | SL1064B | SL1065B | SL1066A |
| SL1066B | SL1067B | SL1068B |         |



## Table of Contents

|  |    |
|--|----|
| General Information .....                            | 3  |
| Scienlab Measurement & Control Modules.....          | 5  |
| SL1060A – Voltage input – 16 channels .....          | 5  |
| SL1062A – Thermocouple Type K – 16 channels.....     | 6  |
| SL1063A – Digital I/O module – 8 channels .....      | 7  |
| SL1063B – Digital I/O module – 16 channels .....     | 8  |
| SL1064A – Communication interface module.....        | 9  |
| SL1064B – Communication interface module.....        | 10 |
| SL1065B – Analog input module – 3x4 channels .....   | 12 |
| SL1066A – Terminal control module – 8 channels ..... | 13 |
| SL1066B – Terminal control module – 4 channels ..... | 14 |
| SL1067B – Analog input module – 16 channels .....    | 15 |
| SL1068B – Analog output module – 8 channels.....     | 16 |
| Measurement Cables.....                              | 17 |
| Rack Cabinets.....                                   | 18 |

## General Information

### Product description

Keysight has developed the reliable Scienlab Measurement & Control Modules for a wide range of test, measurement, and control tasks, e.g. in the development of automotive and industrial products. They can be combined as required and are ideal for carrying out challenging measurement tasks. The modules offer top quality, robustness, and easy and intuitive operation.

### Versatile module types

Keysight offers modules with analog measurement inputs for voltages, temperature sensors, as well as a Digital I/O Module for recording and switching digital signals. A communication interface enables the integration of various field-bus systems like CAN, CAN-FD, or LIN. In a battery management system (BMS), tasks like time-synchronous recording of the state of charge (SoC) as well as the voltages and temperatures measured by the BMS are thus possible. The Terminal Control Module also makes it possible to emulate vehicle-specific interfaces via switched terminals, power supply, terminal 15, 30 etc. and control them from the test sequence.

### Precise, reproducible and time-synchronous measurement data acquisition

The circuit design and the choice of electronic components meet the highest requirements, especially with respect to electromagnetic compatibility. This ensures precise and reproducible measurement data acquisition. All the measurement data is also recorded time-synchronously and provided with a synchronized time stamp in accordance with the Precision Time Protocol (PTP). This makes it possible to accurately compare and evaluate different data.

### Integration in Scienlab Energy Storage Discover or the customer's software

For easy and efficient evaluation of the measurement data and activation of all the measurement modules, Keysight offers the Scienlab Energy Storage Discover (ESD) operating software shipped as standard with our battery test systems. This software automatically detects all Scienlab Measurement & Control Modules from Keysight present in the laboratory network. Using the ESD user interface, all measurement channels in a test environment can be freely assigned to the individual test channels in the test systems. ESD offers the option of using the recorded measurement data as variables in the test procedure or as limit values for abort criteria, etc. Find out more about [Scienlab Energy Storage Discover](#). Alternatively, the Keysight's Scienlab Measurement & Control Modules can also be integrated in the customer's software or automation solutions via the open ethernet interface.

## A safe working environment, even under difficult test conditions

Keysight's Scienlab Measurement & Control Modules have up to 16 independent measurement channels, each of which is fully electrically isolated and has an insulation voltage up to 1,000 V for safe working conditions. High insulation strength within the measuring technology is imperative, especially when working with pre-assembled high voltage batteries where the measurement sensors are usually in direct contact with the battery terminals. For this reason, the Scienlab Measurement & Control Modules offer an insulation strength of 1,000 V not only between the channels, but also between the channels and the supply voltage, the interface and the housing (PE).

## Easy handling thanks to reduced cabling

The Scienlab Measurement & Control Modules from Keysight can be flexibly combined and extended, making them extremely space saving. Some of the modules can be supplied with mains power via Power over Ethernet (PoE) or a standard power supply unit. To reduce the amount of cabling required when dealing with multiple modules, the power supply and network connection can be daisy chained across several modules.



## Scienlab Measurement & Control Modules

### SL1060A – Voltage input – 16 channels



The Scienlab Measurement & Control Module SL1060A from Keysight - Voltage Input  $\pm 10$  V is a mobile measurement module for measuring voltages (e.g. single cell voltages in battery modules or packs). It features fully galvanically isolated measurement and supply inputs and records all measured values synchronously and with common time stamps by Precision Time Protocol (PTP). The module can be used either as a stand-alone device or as extension for a Scienlab Battery Test System.

| Technical specifications          |  |
|-----------------------------------|--|
| Number of channels                | 16x differential voltage input                                       |
| Measuring range                   | -10 to +10 V   |
| Measuring accuracy                | $\pm 1$ mV (typ. $\pm 0.1$ mV)                                       |
| Data rate                         | 1 to 1000 Hz (free programmable)                                     |
| Resolution                        | 32 bits  |
| Insulation strength               | 1 kV   |
| Mechanical specifications         |  |
| Dimensions (H x W x D)            | 90 mm x 296 mm x 115 mm  |
| Weight (approx.)                  | 2 kg   |
| Operating temperature             | 10 to 50 °C  |
| Protection class                  | IP20   |
| Recommended re-calibration period | 12 months  |
| Interfaces                        |  |
| Power supply                      | Power-over-Ethernet (PoE- IEEEStandard 802.3af-2003) or 48 VDC Input |
| Communication                     | 2x Ethernet 10 / 100 Mbit/s (internal 2-Port-Switch)                 |
| Compatibility                     | Full integration and parametrization via the Scienlab ESD Software   |

**Note:** For a 19" rack version of this Measurement & Control Module please refer to product SL1067B.

## SL1062A – Thermocouple Type K – 16 channels



The Scienlab Measurement & Control Module SL1062A – Thermocouple Type K is a portable temperature measuring module for record thermocouple - temperature sensors of type K. It features fully galvanically isolated measurement and supply inputs and records all measured values synchronously and with common time stamps by Precision Time Protocol (PTP). The module can either be used as stand-alone-device or as an extension of a Scienlab Battery Test System.

| Technical specifications          |  |
|-----------------------------------|--|
| Number of channels                | 16x temperature measurement input                                  |
| Sensor type                       | Thermocouple Type K  |
| Measuring range                   | -100 to +1300 °C   |
| Measuring accuracy                | < ±0.5% of measured value ±1 K (@ 25 °C)                           |
| Temperature coefficient (@25 °C)  | < ±200 ppm/K (valid for environment temperature -50 to +80 °C)     |
| Data rate                         | 0.1 to 10 Hz (free programmable)                                   |
| Resolution                        | 32 bits  |
| Insulation strength               | 1 kV   |
| Mechanical specifications         |  |
| Dimensions (H x W x D)            | 90 mm x 296 mm x 115 mm  |
| Weight (approx.)                  | 2 kg   |
| Operating temperature             | 10 to 50 °C  |
| Protection class                  | IP20   |
| Recommended re-calibration period | 12 months  |
| Interfaces                        |  |
| Power supply                      | Power-over-Ethernet PoE (IEEEStandard 802.3af-2003) or 48 VDC      |
| Communication                     | 2x Ethernet 10/100 Mbit/s (internal 2-Port-Switch)                 |
| Compatibility                     | Full integration and parametrization via the Scienlab ESD Software |

## SL1063A – Digital I/O module – 8 channels



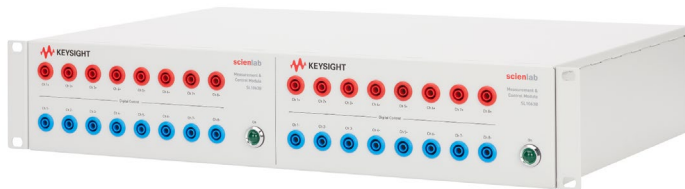
The Scienlab Measurement & Control Module SL1063A – Digital I/O is a mobile measuring and control module for measuring and switching of digital signals. It features fully galvanically isolated measurement inputs and records all measured values synchronously and with common time stamps by Precision Time Protocol (PTP). The module can either be used as stand-alone-device or as an extension of a Scienlab Battery Test System.

Within the Scienlab ESD software, each channel can be individually configured to work in “input” or “output” mode. In operating mode “input” a differential voltage is measured at the contacts of the module which is transferred as a digital signal to the operating software according to a threshold set by the operator. In operation mode “output” the terminals of the channel are connected to floating relay contacts.

| Technical specifications  |   |
|---------------------------|---|
| Number of channels        | 8 digital in-/output channels                       |
| Input                     | Differential input $\pm 25$ V                       |
|                           | Input resistance $> 1$ M $\Omega$                   |
|                           | Programmable switching threshold (0.1 V resolution) |
| Output                    | Max. switching voltage: 400 VAC / 220 VDC @ 0.12 A  |
|                           | Max. switching current DC: 4 A @ 30 VDC             |
| Data rate                 | 0.1 to 10 Hz  |
| Resolution                | 32 bits   |
| Insulation strength       | 1 kV  |
| Mechanical specifications |   |
| Dimensions (H x W x D)    | 90 mm x 296 mm x 115 mm                             |
| Weight (approx.)          | 3 kg  |
| Operating temperature     | 10 to 50 °C   |
| Protection class          | IP20  |

| Interfaces    |  |
|---------------|--|
| Power supply  | Power-over-Ethernet PoE (IEEE Standard 802.3af-2003) or 48 VDC     |
| Communication | 2x Ethernet 10/100 Mbit/s (RJ45 Connector)                         |
| Compatibility | Full integration and parametrization via the Scienlab ESD Software |

## SL1063B – Digital I/O module – 16 channels



The Scienlab Measurement & Control Module SL1063B – Digital I/O is a rack-mount measuring and control module for measuring and switching of digital signals. It features fully galvanically isolated measurement inputs and records all measured values synchronously and with common time stamps by Precision Time Protocol (PTP). The module can either be used as stand-alone-device or as an extension of a Scienlab Battery Test System.

Within the Scienlab ESD software, each channel can be individually configured to work in “input” or “output” mode. In operating mode “input” a differential voltage is measured at the contacts of the module which is transferred as a digital signal to the operating software according to a threshold set by the operator. In operation mode “output” the terminals of the channel are connected to floating relay contacts.

| Technical specifications |   |
|--------------------------|---|
| Number of channels       | 16 digital in-/output channels                      |
| Input                    | Differential input $\pm 25$ V                       |
|                          | Input resistance $> 1$ M $\Omega$                   |
|                          | Programmable switching threshold (0.1 V resolution) |
| Output                   | Max. switching voltage: 400 VAC / 220 VDC @ 0.12 A  |
|                          | Max. switching current DC: 4 A @ 30 VDC             |
| Data rate                | 0.1 to 1000 Hz                                      |
| Resolution               | 32 bits   |
| Insulation strength      | 1 kV  |



| Mechanical specifications |  |
|---------------------------|--|
| Dimensions (H x W x D)    | 89 mm x 483 mm x 310 mm (19-inch rack compatible, 2U)              |
| Weight (approx.)          | 5 kg   |
| Operating temperature     | 5 to 40 °C   |
| Protection class          | IP20   |
| Interfaces                |  |
| Power supply              | 88 to 264 VAC 47 to 63 Hz (IEC Connector)                          |
| Communication             | 2x Ethernet 10/100 Mbit/s (RJ45 Connector)                         |
| Compatibility             | Full integration and parametrization via the Scienlab ESD Software |

### SL1064A – Communication interface module



The Scienlab Measurement & Control Module SL1064A – Communication Interface Module is a mobile gateway for CAN-buses. It can be used as a configurable communication interface between Scienlab Battery Test Systems and devices under test (especially their BMS) as well as additional components using CAN communication.

| Technical specifications  |                                       |
|---------------------------|---------------------------------------|
| Number of CAN channels    | Up to 6 channels (4 CAN HS, 2 CAN LS) |
| Insulation strength       | 1 kV                                  |
| Mechanical specifications |                                       |
| Dimensions (H x W x D)    | 150 mm x 360 mm x 310 mm              |
| Weight (approx.)          | 5 kg                                  |
| Operating temperature     | 10 to 50 °C                           |
| Protection Class          | IP20                                  |

| Interfaces                  |  |
|-----------------------------|--|
| Power supply                | 230 VAC 50 Hz (IEC Connector)  |
| Communication               | Ethernet 10/100 Mbit/s (RJ45 Connector)  |
|                             | CAN required between communication interface and test system or test channel for configuration and data exchange   |
| Functions and compatibility | Full integration and parametrization via the Scienlab ESD Software   |
|                             | 6 ethernet ports for embedding all measurement signals and CAN-messages into test sequence with uniform time stamps  |
|                             | Integrated CAN bus simulation, event-triggered blanking and sending of messages  |
|                             | Mapping of DUT specific CAN commands (.dbc-files) to integrated command sets of all battery test systems   |
|                             | Optional XCPonCAN protocol for reading and writing XCP values via CAN. Import of A2L description file in configuration software and routing on CAN bus possible. |

**Note:** Only one Scienlab Measurement & Control Module SL1064A – Communication interface module can be connected per test channel. For real-time integration of CAN signals 2 ethernet ports per DC channel of the connected battery test system needed.

## SL1064B – Communication interface module



The Scienlab Measurement & Control Module SL1064B – Communication interface module is a rack-mount gateway for CAN- and LIN-buses. It can be used as a configurable communication interface between Scienlab Battery Test Systems and devices under test (especially their BMS) as well as additional components using CAN communication.

| Technical specifications |  |
|--------------------------|--|
| Number of CAN Channels   | Up to 6 channels (max. 4 CAN-FD, 2 CAN HS) |
| Number of LIN Channels   | Max. 2 channels (optional)                 |
| Insulation Strength      | 1 kV for CAN channels                      |

| Mechanical specifications   |   |
|-----------------------------|---|
| Dimensions (H x W x D)      | 134 mm x 483 mm x 310 mm (19-inch rack compatible, 3U)  |
| Weight (approx.)            | 5 kg  |
| Operating temperature       | 5 to 40 °C  |
| Protection class            | IP20  |
| Interfaces                  |   |
| Power supply                | 88 to 264 VAC 47 to 63 Hz (IEC Connector)   |
| Communication               | Ethernet 10/100 Mbit/s (RJ45 Connector)   |
|                             | CAN required between communication interface and test system or test channel for configuration and data exchange  |
| Functions and compatibility | Full integration and parametrization via the Scienlab ESD Software  |
|                             | 6 ethernet ports for embedding all measurement signals and CAN-messages into test sequence with uniform time stamps   |
|                             | Integrated CAN bus simulation, event-triggered blanking and sending of messages   |
|                             | Mapping of DUT specific CAN commands (.dbc-files) to integrated command sets of all battery test systems  |
|                             | Optional XCPonCAN protocol for reading and writing XCP values via CAN. Import of A2L description file in configuration software and routing on CAN or LIN bus possible. |

**Note:** Only one Scienlab Measurement & Control Module SL1064B – Communication interface module can be connected per test channel. For real-time integration of CAN signals 2 ethernet ports per DC channel of the connected battery test system needed. CAN-FD communication with CAN protocol 2.0 A only, while CAN protocol 2.0 B is not supported.

## SL1065B – Analog input module – 3x4 channels



The Scienlab Measurement & Control Module SL1065B – Analog Input is a rack-mount measuring and control module for measuring voltages and currents (e.g. single cell voltages in battery modules or packs). It features fully galvanically isolated measurement inputs and records all measured values synchronously and with common time stamps by Precision Time Protocol (PTP).

| Technical specifications          |   |
|-----------------------------------|---|
| Number of channels                | 4x analog voltage input $\pm 10$ V<br>4x analog voltage input $\pm 30$ V<br>4x analog current input $\pm 20$ mA   |
| Measuring accuracy                | for 10 V inputs: $\pm 1$ mV<br>for 30 V inputs: $\pm 0.05\%$ of measurement value $\pm 1.5$ mV<br>for 20 mA inputs: $\pm 0.05\%$ of measurement value $\pm 2.5$ $\mu$ A |
| Data rate                         | 0.1 to 1000 Hz (freely parametrizable)  |
| Resolution                        | 32 Bit  |
| Insulation strength               | 1 kV  |
| Mechanical specifications         |   |
| Dimensions (H x W x D)            | 89 mm x 485 mm x 310 mm (19-inch rack compatible, 2U)   |
| Weight (approx.)                  | 5 kg  |
| Operating temperature             | 5 to 40 °C  |
| Protection class                  | IP20  |
| Recommended re-calibration period | 12 months   |
| Interfaces                        |   |
| Power supply                      | 230 VAC 50 Hz (IEC Connector)   |
| Communication                     | Ethernet 10/100 Mbit/s (RJ45 connector)   |
| Compatibility                     | Full integration and parametrization via the Scienlab ESD Software  |

## SL1066A – Terminal control module – 8 channels



The Scienlab Measurement & Control Module SL1066A – Terminal Control Module provides adjustable voltage outputs for BMS and DUT power supply and floating relay contacts to simulate e.g. vehicle-specific terminals 15, 30 and 31. The mobile module provides fully isolated outputs and allows recording all measured values synchronously and with common time stamps by Precision Time Protocol (PTP).

Switching states and output parameters of the SL1066A – Terminal Control Module may be set and changed at any point in the ESD test sequence. Pre- and post-test sequences can be used to initialize/shut down the DUT before test start or in case of an aborted test run.

| Technical specifications    |  |
|-----------------------------|--|
| Relay output                | 8x switchable floating contacts                                    |
| Max. switching power        | 5 A / 30 VDC   |
| BMS voltage supply          | 0 to 36 VDC (max. 22 A / 800 W, max. 5 A per channel)              |
| Display panel               | For output current and output voltage                              |
| Insulation strength         | 500 V  |
| Mechanical specifications   |  |
| Dimensions (H x W x D)      | 150 x 360 x 310 mm   |
| Weight (approx.)            | 7.5 kg   |
| Operating temperature       | 10 to 50 °C  |
| Protection class            | IP20   |
| Interfaces                  |  |
| Power supply                | 230 VAC 50 Hz (IEC Connector)                                      |
| Communication               | Ethernet 10/100 Mbit/s (RJ45 connector)                            |
| Functions and compatibility | Full integration and parametrization via the Scienlab ESD Software |
|                             | Free allocation of the I/O channels to the testing channels        |

## Short-circuit plug

The SL1066A and SL1066B Terminal Control Modules can act in two different ways to control the voltage for BMS signals.

In the first the SL1066A/B is supplied by an external voltage source and is only responsible for the on and off status of the signal. In the second the SL1066A/B also provides the voltage by itself. To do so the electrical potential must be transferred onto the high side of the signal connection. This is done via the short-circuit plug.

## SL1066B – Terminal control module – 4 channels



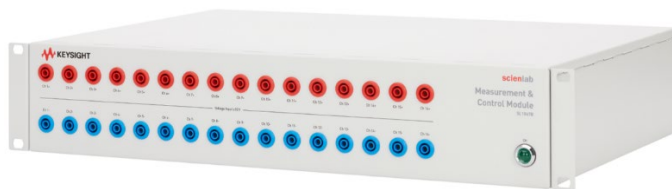
The Scienlab Measurement & Control Module SL1066B – Control Module provides adjustable voltage outputs for BMS and DUT power supply and floating relay contacts to simulate e.g. vehicle-specific terminals 15, 30 and 31. The rack-mount module provides fully isolated outputs and allows recording all measured values synchronously and with common time stamps by Precision Time Protocol (PTP).

Switching states and output parameters of the SL1066B – Terminal Control Module may be set and changed at any point in the ESD test sequence. Pre- and post-test sequences can be used to initialize/shut down the DUT before test start or in case of an aborted test run.

| Technical specifications  |   |
|---------------------------|---|
| Relay output              | 4x switchable floating contacts                       |
| Max. switching power      | 5 A / 30 VDC  |
| BMS voltage supply        | 0 to 36 VDC (max. 22 A / 800 W, max. 5 A per channel) |
| Display panel             | For output current and output voltage                 |
| Insulation strength       | 500 V   |
| Mechanical specifications |   |
| Dimensions (H x W x D)    | 134 x 483 x 310 mm (19-inch rack compatible, 3U)      |
| Weight (approx.)          | 7.5 kg  |
| Operating temperature     | 5 to 40 °C  |
| Protection class          | IP20  |

| Interfaces                  |  |
|-----------------------------|--|
| Power supply                | 100 to 264 VAC 47 to 63 Hz (IEC Connector)                         |
| Communication               | Ethernet 10/100 Mbit/s (RJ45 connector)                            |
| Functions and compatibility | Full integration and parametrization via the Scienlab ESD Software |
|                             | Free allocation of the I/O channels to the testing channels        |

## SL1067B – Analog input module – 16 channels



The Scienlab Measurement & Control Module SL1067B – Analog Input is a rack-mount measuring and control module for measuring voltages (e.g. single cell voltages in battery modules or packs). It features fully galvanically isolated measurement inputs and records all measured values synchronously and with common time stamps by Precision Time Protocol (PTP).

| Technical specifications          |   |
|-----------------------------------|---|
| Number of channels                | 16x analog voltage input                              |
| Measuring range                   | -10 V to +10 V  |
| Measuring accuracy                | < ±1 mV (typ. < ±0.1 mV)                              |
| Data rate                         | 0.1 to 1000 Hz (freely parametrizable)                |
| Resolution                        | 32 bit  |
| Insulation strength               | 1 kV  |
| Mechanical specifications         |   |
| Dimensions (H x W x D)            | 89 mm x 483 mm x 310 mm (19-inch rack compatible, 2U) |
| Weight (approx.)                  | 5 kg  |
| Operating temperature             | 5 to 40 °C  |
| Protection class                  | IP20  |
| Recommended re-calibration period | 12 months   |

| Interfaces    |  |
|---------------|--|
| Power supply  | 88 to 264 VAC 47 to 63 Hz (IEC Connector)                          |
| Communication | Ethernet 10/100 Mbit/s (RJ45 connector)                            |
| Compatibility | Full integration and parametrization via the Scienlab ESD Software |

**Note:** For a stand-alone version of this Measurement & Control Module please refer to product SL1060A.

## SL1068B – Analog output module – 8 channels



The Scienlab Measurement & Control Module SL1068B – Analog Output is a rack-mountable measuring and control module which provides voltage outputs for analog signaling – useful e.g. for the emulation of temperature sensors or the controlling of regulation vents with voltage input. It features fully galvanically isolated outputs and records all measured values synchronously and with common time stamps by Precision Time Protocol (PTP).

| Technical specifications          |   |
|-----------------------------------|---|
| Number of channels                | 8x analog output  |
| Voltage output range              | $\pm 10$ V  |
| Output accuracy                   | $< \pm 0.1$ FS (@25 °C), $\pm 0.01\%$ , typ. internal resistance 20m $\Omega$ |
| Data rate                         | 0.1 to 1000 Hz (freely programmable)  |
| Resolution                        | 32 bit  |
| Insulation strength               | 1 kV  |
| Mechanical specifications         |   |
| Dimensions (H x W x D)            | 89 mm x 483 mm x 310 mm (19-inch rack compatible, 2U)                         |
| Weight (approx.)                  | 5 kg  |
| Operating temperature             | 5 to 40 °C  |
| Protection class                  | IP20  |
| Recommended re-calibration period | 12 months   |



| Interfaces    |  |
|---------------|--|
| Power supply  | 88 to 264 VAC 47 to 63 Hz (IEC connector)                          |
| Communication | Ethernet 10/100 Mbit/s (RJ45 connector)                            |
| Compatibility | Full integration and parametrization via the Scienlab ESD Software |

## Measurement Cables

| Measurement cable for SL1060A and SL1067B |   |
|---|---|
| Cable length                              | 0.5 m, 2 m or 4 m                               |
| Dimensions                                | 2 x 0.5 mm <sup>2</sup>                         |
| Isolation                                 | Teflon (FEP)                                    |
| NiCr-Ni-measurement cable for SL1062A     |   |
| Cable length                              | 2 m or 4 m                                      |
| Dimensions                                | 2 x 0.22 mm <sup>2</sup>                        |
| Thermocouples                             | NiCr-Ni, Type K (acc. to DIN EN 60584, class 1) |
| Digital I/O cable for SL1063A and SL1066B |   |
| Cable length                              | 4 m   |
| Dimensions                                | 2 x 4 mm <sup>2</sup>                           |
| Isolation                                 | Teflon (FEP)                                    |

## Rack Cabinets

All 19-inch rack compatible Measurement & Control Modules can be stored in a space-saving and organized way, using one of the following Keysight Rack Cabinets:

| Instrument racks | Height                         |
|------------------|--------------------------------|
| E7590A           | 1.3 m or 25 EIA <sup>1</sup> U |
| E3661B           | 1.6 m or 32 EIA <sup>1</sup> U |
| E3662B           | 2.0 m or 41 EIA <sup>1</sup> U |

<sup>1</sup> Electronic Industries Alliance (EIA)

Learn more at: [www.keysight.com](http://www.keysight.com)

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: [www.keysight.com/find/contactus](http://www.keysight.com/find/contactus)

