

Keysight TS-8989 PXIe Functional Test System

Wiring Guide
and Hardware
Reference

Notices

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Safety Information

CAUTION















A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Safety Symbols

The following symbols on the instrument and in the documentation indicate precautions which must be taken to maintain safe operation of the instrument.

	Caution, risk of electric shock.		Alternating current (AC).
	Caution, hot surface.		Both direct and alternating current.
	Caution, risk of danger (refer to this manual for specific Warning or Caution information).		3-phase alternating current.
	Laser radiation symbol: marked on products that have a laser output.		Frame or chassis (ground) terminal.
	Protective earth (ground) terminal.		Earth (ground) terminal.
	Terminal for a neutral conductor on permanently installed equipment.		Terminal for a line conductor on permanently installed equipment.
	Terminal is at earth potential. Used for measurement and control circuits designed to be operated with one terminal at earth potential.		Standby (supply); units with this symbol are not completely disconnected from the AC mains when this switch is turned off. To completely disconnect the unit from the AC mains, either disconnect the power cord, or have a qualified electrician install an external switch.

General Safety Considerations

This product is provided with a protective earth terminal. The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

WARNING

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE. Do not operate the product in the presence of flammable gases or flames.

DO NOT REMOVE RACK PANELS OR INSTRUMENT COVERS. Operating personnel must not remove any rack panels or instrument covers. Component replacement and internal adjustments must be made only by qualified service personnel. Products that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by a qualified service personnel.

The protection provided by the TS-8989 PXIe Functional Test System may be impaired if the system is used in a manner not specified by Keysight.

Environmental Conditions

The PXIe Functional Test System is designed for indoor use only. [Table 0-1](#) shows the general environmental requirements.




Environmental condition	Requirement
Operating Temperature	5 °C to 40 °C
Relative Humidity	The test system is designed to operate in the range from 5% to 80% relative humidity (non-condensing)
Maximum Altitude	2000 m

Table 0-1 General environmental requirements

CAUTION

This product is designed for use in Installation Category II and Pollution Degree 2, per IEC 61010-1 and 664 respectively.

Regulatory Markings

 <p>The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives. If accompanied by a year, it indicates the year the design was approved.</p> <p>ISM 1-A indicates that the instrument is an Industrial Scientific and Medical Group 1 Class A product (CISPER 11, Clause 4).</p>	 <p>The CSA mark is a registered trademark of the Canadian Standards Association.</p>
 <p>The C-tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australian EMC Framework regulations under the terms of the Radio Communications Act of 1992.</p>	

End of Life: Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC

This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical or electronic product in domestic household waste.

Product Category

With reference to the equipment types in the WEEE directive Annex 1, this instrument is classified as a “Monitoring and Control Instrument” product.

The affixed product label is as shown below.



Do not dispose in domestic household waste.

To return this unwanted instrument, contact your nearest Keysight Service Center, or visit <http://about.keysight.com/en/companyinfo/environment/takeback.shtml> for more information.

Services and Support

Any adjustment, maintenance, or repair of this product must be performed by qualified personnel. Contact your customer engineer through your local Keysight Service Center.

Keysight on the web

You can find information about technical and professional services, product support, and equipment repair and service on the web: <http://www.keysight.com/>

Safety Summary

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Keysight Technologies assumes no liability for the customer's failure to comply with these requirements.

Before Applying Power

Verify that the product is set to match the available line voltage and that all safety precautions are taken. Note the external markings of the instruments described in [Regulatory Markings](#).

Ground the System

Keysight chassis' are provided with a grounding-type power plug. The instrument chassis and cover must be connected to an electrical ground to minimize shock hazard. The ground pin must be firmly connected to an electrical ground (safety ground) terminal at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

Fuses

Use only fuses with the required rated current, voltage, and specified type (fast acting). Do not use repaired fuses or short-circuited fuse holders. Doing so could cause a shock or fire hazard.

WARNING

To avoid electrical hazards, all system internal fuses must be replaced by trained and qualified personnel.

Operator Safety Information

WARNING

Module connectors and test signal cables connected to them cannot be operator-accessible.

Cables and connectors are considered inaccessible if a tool (such as a screwdriver, wrench, or socket) or a key (for equipment in a locked cabinet) is required to gain access to a conductive surface connected to any cable conductor (High, Low, or Guard).

WARNING

Do not touch the exposed connector pins or remove connected cables while the system is powered ON.



Figure 0-1 Examples of exposed connectors

WARNING

Do not use the DMM for measurement on mains circuits. The system is intended for measurement up to max 60 Vdc working voltage.

Declaration of Conformity

The Declaration of Conformity (DoC) for this instrument is available on the Keysight website. You can search the DoC by its product model or description at the following web address:

<http://www.keysight.com/go/conformity>

NOTE

If you are unable to search for the respective DoC, contact your local Keysight representative.

Electrostatic Discharge (ESD) Precautions

Static electricity is destructive to your production process and the TS-8989. Careless handling and poor site planning can cause system reliability problems and reduce your product yield. The system may not be as easily damaged as the modules you will be testing, but good anti-static planning will help ensure high reliability.

The ESD symbol below indicates areas where ESD caution must be exercised. This is to prevent damage to instruments and/or test disruption.



Caution: static sensitive

Electrostatic discharge in this area may cause equipment damage and/or test disruption.

While not an exhaustive list of anti-static precautions, the following table provides suggestions to consider as you plan your system area.

Precaution	Suggested solution
Anti-static flooring	Plan to use an anti-static floor covering or mats.
Grounding straps	Plan for foot straps in conjunction with anti-static flooring and wrist straps for system operators.

Table 0-2 Suggested anti-static solutions for site planning

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System Intended Use

The Keysight TS-8989 PXIe functional test system is a very lean and cost effective solution designed to be used in mechatronic test environments. The core of the TS-8989 is the Switch/Load Unit with 8-slots PXI chassis integrated within and 11-slots for Switch/Load Unit cards. The main value differentiator for the TS-8989 is its size, and its ability to handle loads more than 5 A (up to 40 A), which is typical required for automotive applications.

Instructions For Use

The Keysight TS-8989 system contain all of the instrumentation needed to test most electronics modules. You may also add additional instruments and cabling to increase the test capabilities of the system. The locations of the instruments are standardized as much as possible. Because the Keysight TS-8989 system uses open system standards and is configurable by the system integrator, systems at your site may be different from the factory configurations.

Typical system operation is dependent on the target application. The system is to be modified by trained personnel for the target test module application. Typically, the test system development process consists of:

- Identifying the number of load resources required and assigning the load resources
- Identifying the number of measurement resources required and assigning the measurement resources
- Identifying the ECM serial interface communication needs and assigning the serial resources
- Identifying the fixture control resources required and assigning the I/O and power resources
- Constructing the test fixture and the test system interconnect cabling required for the specific application
- Developing the TXSL based test-plan for the specific application
- Developing the software operator user interface for the specific application
- Validating and deploying the test system to the manufacturing site

Test System Specifications and Capabilities

The TS-8989 PXIe functional test system specifications are derived directly from the specifications of the instrumentation that make up the system.

The overall test system measurement capability is a combination of the measurement uncertainty as specified by the individual instrumentation combined with the system switch paths of the switching sub-systems. For test system instrumentation specifications and characteristics, refer directly to the manufacturer documentation.

Table 1-1 lists various instrumentations that may be configured into the system. Refer to the manufacturer supplied datasheets for detailed specifications.

Table 1-1 Typical TS-8989 instrumentation

Part number	Manufacturer	Description
E6198B	Keysight Technologies	21 slot switch/load unit
E8782A	Keysight Technologies	40 channel measurement and 24 channel instrument matrix card
E8783A	Keysight Technologies	64-pin matrix card
E8792A	Keysight Technologies	32 channel measurement and 16 channel instrument matrix card
E8793A	Keysight Technologies	32-pin matrix card
E6175A	Keysight Technologies	8 channel load card
E6176A	Keysight Technologies	16 channel load card
E6177A	Keysight Technologies	24 channel load card
E6178B	Keysight Technologies	8 channel load card
U7177A	Keysight Technologies	24 channel load card with current sense
U7178A	Keysight Technologies	8 channel heavy duty load card
U7179A	Keysight Technologies	16 channel high current load card
N9377A	Keysight Technologies	16 channel dual-load load card
N9378A	Keysight Technologies	24 channel low resistance load card
N9379A	Keysight Technologies	48 channel high density load card
M9182A	Keysight Technologies	DMM

Table 1-1 Typical TS-8989 instrumentation (continued)

Part number	Manufacturer	Description
M9183A	Keysight Technologies	DMM
M9186A	Keysight Technologies	V/I source
M9185A	Keysight Technologies	8 channel/16 channel DAC
M9216A	Keysight Technologies	32 channel HV-DAQ
M9187A	Keysight Technologies	32 channel digital I/O
M9188A	Keysight Technologies	PXI 16 channel dynamic D/A converter
PCI-1750	Advantech Corporation	32 channel isolated digital I/O
PXI-3980	ADLINK Technology	PXI embedded controller
PXI-8565	ADLINK Technology	PCI express-to-PXI expansion interface card for PXI chassis
PCIe-8560	ADLINK Technology	PCI express-to-PXI expansion interface card for host PC

Test Capabilities – Measurement Sample Methods

The following steps serve as a guideline to determine if the Keysight TS-8989 Test System is able to meet your Electronic Control Module (ECM) test requirements.

Determine the accuracy required to test the ECM. For example, a particular output driver test measurement requires a measurement of $12.5\text{ V} \pm 10\text{ mV}$.

- 1 Retrieve the instrument's specifications from the datasheet or manual, for example, the Keysight M9183 accuracy specification for 20 V range:

The 1-year accuracy specifications \pm (% of reading + % of range) of the Keysight M9183A PXI DMM for DC voltage in 20 V range is 0.0070% of reading + 0.0008% of range at $23\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$.

M9183A @ 20 V range = 0.0070% of reading + 0.0008% of range = 0.875 mV + 0.16 mV = 1.035 mV

- 2 Determine the path, including the number of relays, from DMM to DUT. From this, determine the accuracy offset incurred by all the relays.

The typical thermal offset of a reed relay used in the pin matrix card should not exceed 50 μV .

Figure 1-1 shows the block diagram for the E8782A instrument matrix card. When making a DCV measurement, depending on the application, there will be either 6 or 8 reed relays involved. Reed relays marked 7 and 8 in Figure 1-1 are used if there is a need to bypass the 200 Ω protection resistors on the Abus.

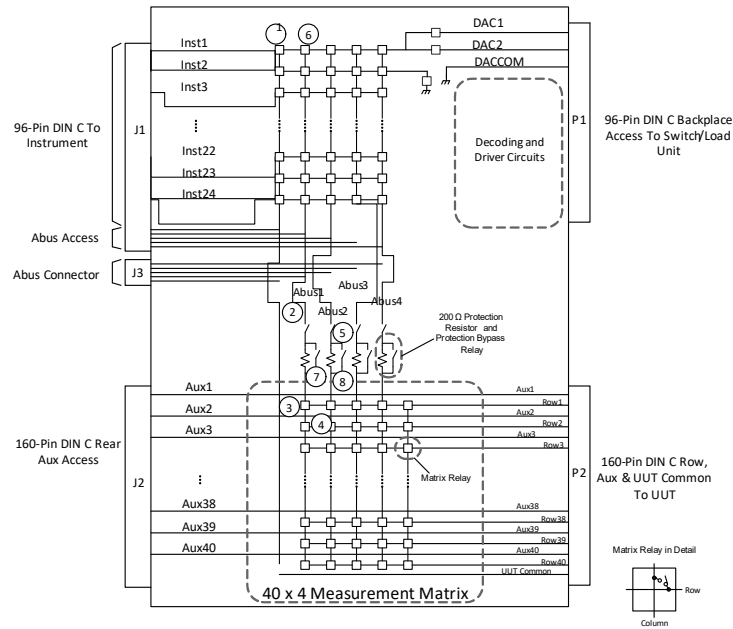


Figure 1-1 E8782A instrument matrix card block diagram

- 3** Determine the thermal offset from any other sources, for example, contact between the banana plug and the DMM input ports.

The typical thermal offset between the banana plug and the DMM input ports should not exceed $15 \mu\text{V}$.

The calculated system error due to the thermal offsets using the Root Sum Square (RSS, $\sqrt{}$) method (banana plug and reed relays)

$$= \sqrt{[(15 \mu\text{V})^2 + 8(50 \mu\text{V})^2]}$$

$$= \underline{142.2 \mu\text{V}}$$

- 4** Calculate the sum of the accuracy uncertainty due to the instrument's specifications and system switch paths, and compare it to the accuracy required by the DUT.

The calculated system accuracy offset using the Root Sum Square (RSS, $\sqrt{}$) method (DMM accuracy offset and thermal offset)

1 System Overview

$$= \sqrt{[(1.035 \text{ mV})^2 + (142.2 \text{ } \mu\text{V})^2]}$$

$$= \underline{1.04 \text{ mV}}$$

The measurement accuracy for 12.5 V in percentage

$$= (1.04 \text{ mV} / 12.5 \text{ V}) * 100\%$$

$$= \underline{0.008\%}$$

The calculated TS-8989 System Capability Accuracy for a 12.5 V reading is 0.008%. This value may vary depending on application, temperature, and hardware accuracy.

TS-8989 System Overview

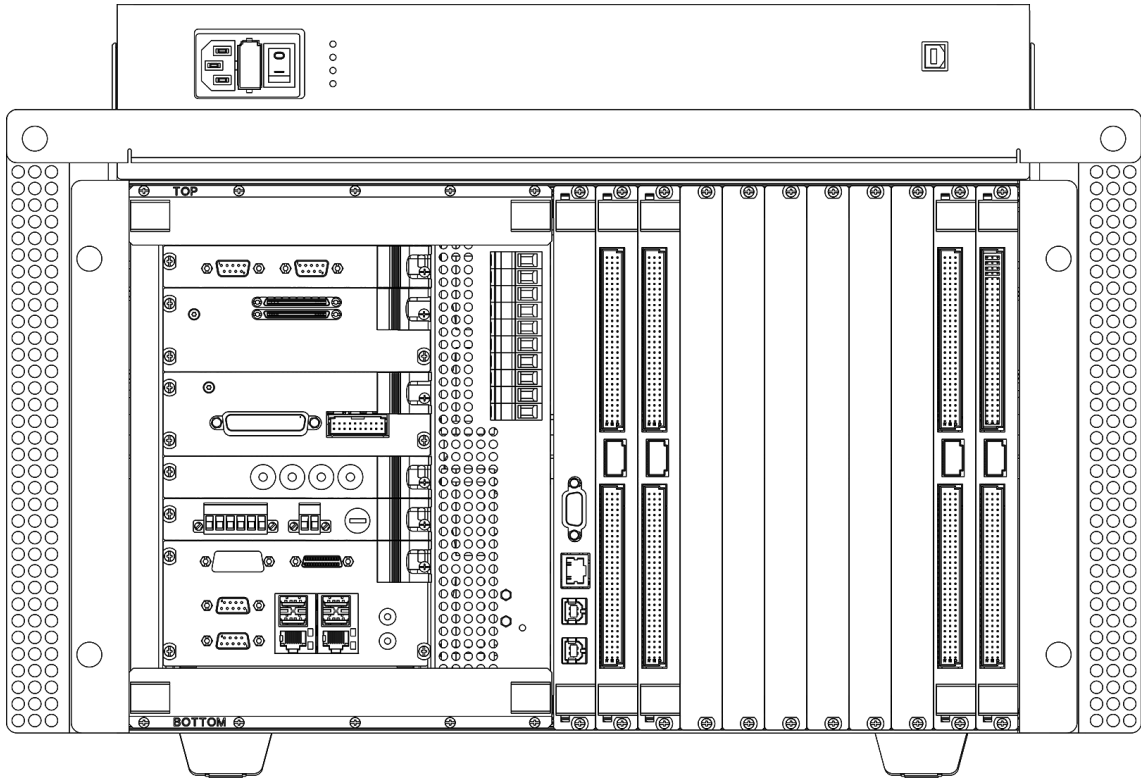


Figure 1-2 TS-8989 system overview (instrument interface)

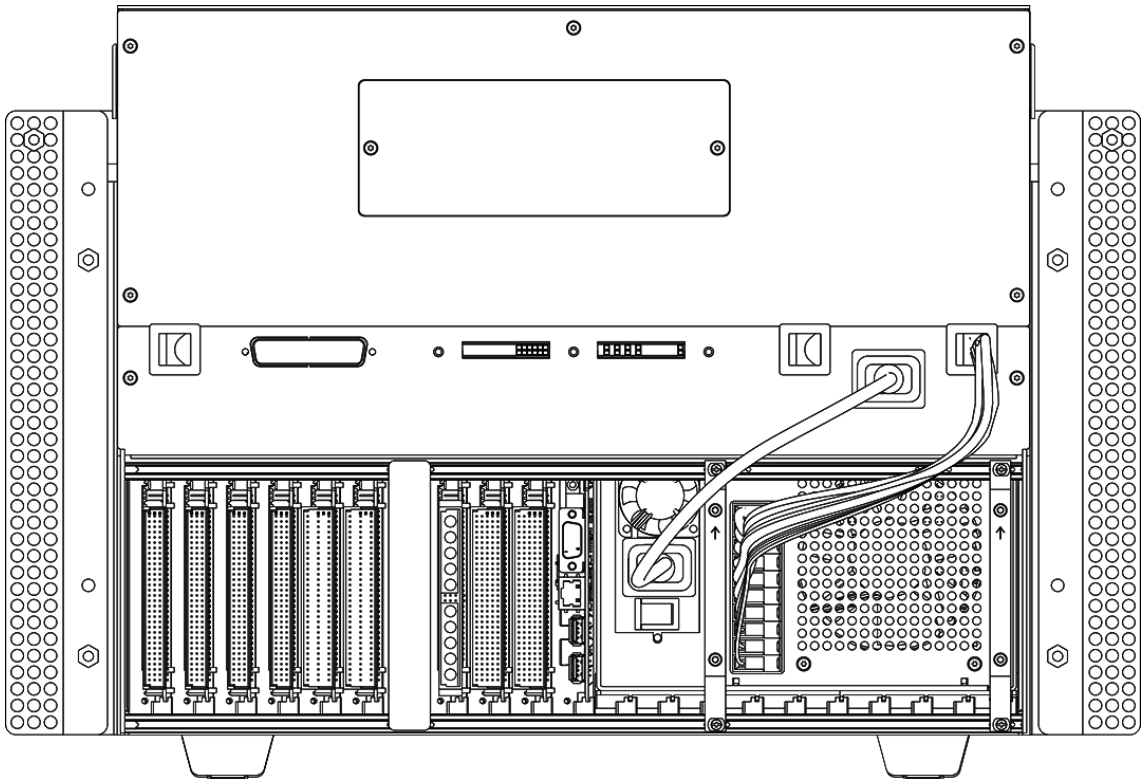


Figure 1-3 TS-8989 system overview (DUT interface)

U8989-66601 Universal Instrument Routing Card

The U8989-66601 universal instrument routing card is designed to connect the PXI and PCI modules from the instrument interface to the DUT interface. This card has five connectors which are P1 and P2; and J1, J2, and J3 respectively. P1 is connected to the SLU backplane^[1] and P2's connectivity is directly from connectors J1, J2, and J3. [Table 1-2](#) shows the card pinout.

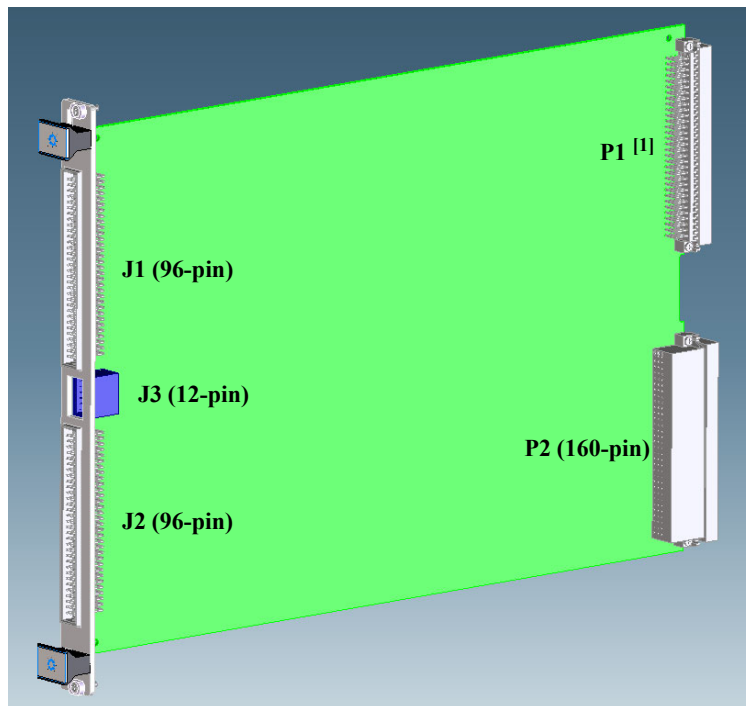


Figure 1-4 U8989-66601 universal instrument routing card

[1] There is no connectivity between the P1 connector and the SLU backplane. The connector serves as a guide and secures the universal instrument routing card on the SLU rail.

Table 1-2 U8989-66601 cable pinout

On J1 Connector				On J3 Connector			On J2 Connector				On P3 Connector					
Row	a	b	c	Row	a	b	Row	a	b	c	Row	e	d	c	b	a
32	COM1	J1_33	J1_1	6	J3_1	J3_7	32	COM2	J2_33	J2_1	1	J1_1	J1_33	COM1	J2_33	J2_1
31	COM1	J1_34	J1_2	5	J3_2	J3_8	31	COM2	J2_34	J2_2	2	J1_2	J1_34	COM1	J2_34	J2_2
30	COM1	J1_35	J1_3	4	J3_3	J3_9	30	COM2	J2_35	J2_3	3	J1_3	J1_35	COM1	J2_35	J2_3
29	COM1	J1_36	J1_4	3	J3_4	J3_10	29	COM2	J2_36	J2_4	4	J1_4	J1_36	COM1	J2_36	J2_4
28	COM1	J1_37	J1_5	2	J3_5	J3_11	28	COM2	J2_37	J2_5	5	J1_5	J1_37	COM1	J2_37	J2_5
27	COM1	J1_38	J1_6	1	J3_6	J3_12	27	COM2	J2_38	J2_6	6	J1_6	J1_38	COM1	J2_38	J2_6
26	COM1	J1_39	J1_7				26	COM2	J2_39	J2_7	7	J1_7	J1_39	COM1	J2_39	J2_7
25	COM1	J1_40	J1_8				25	COM2	J2_40	J2_8	8	J1_8	J1_40	COM1	J2_40	J2_8
24	COM1	J1_41	J1_9				24	COM2	J2_41	J2_9	9	J1_9	J1_41	COM1	J2_41	J2_9
23	COM1	J1_42	J1_10				23	COM2	J2_42	J2_10	10	J1_10	J1_42	COM1	J2_42	J2_10
22	COM1	J1_43	J1_11				22	COM2	J2_43	J2_11	11	J1_11	J1_43	J3_1	J2_43	J2_11
21	COM1	J1_44	J1_12				21	COM2	J2_44	J2_12	12	J1_12	J1_44	J3_2	J2_44	J2_12
20	COM1	J1_45	J1_13				20	COM2	J2_45	J2_13	13	J1_13	J1_45	J3_3	J2_45	J2_13
19	COM1	J1_46	J1_14				19	COM2	J2_46	J2_14	14	J1_14	J1_46	J3_4	J2_46	J2_14
18	COM1	J1_47	J1_15				18	COM2	J2_47	J2_15	15	J1_15	J1_47	J3_5	J2_47	J2_15
17	COM1	J1_48	J1_16				17	COM2	J2_48	J2_16	16	J1_16	J1_48	J3_6	J2_48	J2_16
16	COM1	J1_49	J1_17				16	COM2	J2_49	J2_17	17	J1_17	J1_49	J3_7	J2_49	J2_17
15	COM1	J1_50	J1_18				15	COM2	J2_50	J2_18	18	J1_18	J1_50	J3_8	J2_50	J2_18
14	COM1	J1_51	J1_19				14	COM2	J2_51	J2_19	19	J1_19	J1_51	J3_9	J2_51	J2_19
13	COM1	J1_52	J1_20				13	COM2	J2_52	J2_20	20	J1_20	J1_52	J3_10	J2_52	J2_20
12	COM1	J1_53	J1_21				12	COM2	J2_53	J2_21	21	J1_21	J1_53	J3_11	J2_53	J2_21
11	COM1	J1_54	J1_22				11	COM2	J2_54	J2_22	22	J1_22	J1_54	J3_12	J2_54	J2_22
10	COM1	J1_55	J1_23				10	COM2	J2_55	J2_23	23	J1_23	J1_55	COM2	J2_55	J2_23
9	COM1	J1_56	J1_24				9	COM2	J2_56	J2_24	24	J1_24	J1_56	COM2	J2_56	J2_24
8	COM1	J1_57	J1_25				8	COM2	J2_57	J2_25	25	J1_25	J1_57	COM2	J2_57	J2_25
7	COM1	J1_58	J1_26				7	COM2	J2_58	J2_26	26	J1_26	J1_58	COM2	J2_58	J2_26
6	COM1	J1_59	J1_27				6	COM2	J2_59	J2_27	27	J1_27	J1_59	COM2	J2_59	J2_27
5	COM1	J1_60	J1_28				5	COM2	J2_60	J2_28	28	J1_28	J1_60	COM2	J2_60	J2_28
4	COM1	J1_61	J1_29				4	COM2	J2_61	J2_29	29	J1_29	J1_61	COM2	J2_61	J2_29
3	COM1	J1_62	J1_30				3	COM2	J2_62	J2_30	30	J1_30	J1_62	COM2	J2_62	J2_30
2	COM1	J1_63	J1_31				2	COM2	J2_63	J2_31	31	J1_31	J1_63	COM2	J2_63	J2_31
1	COM1	J1_64	J1_32				1	COM2	J2_64	J2_32	32	J1_32	J1_64	COM2	J2_64	J2_32

U8989-66602 Breakout IO Card

Similar to the [U8989-66601 Universal Instrument Routing Card](#), the U8989-66602 breakout IO card extends connectivity from the instrument interface to the DUT interface, but it is designed for the communication ports: the serial port, LAN port, and USB port.

The communication ports on this card are one 9 pin D-sub connector, one RJ23 port, and two USB ports. The USB port on the instrument interface is Type B, while the USB port on DUT interface is Type A. Connector P2 is connected to the SLU backplane^[1].

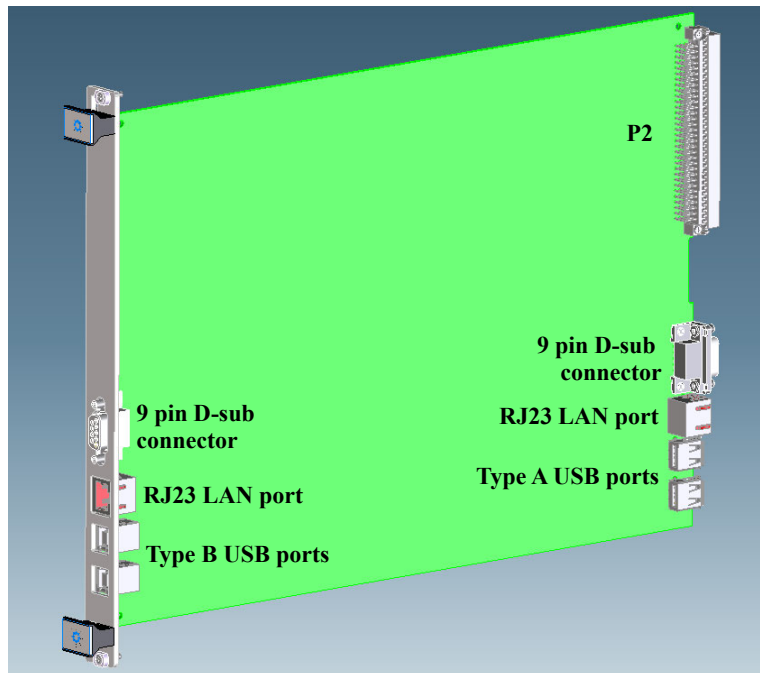


Figure 1-5 U8989-66602 breakout IO card

[1] There is no connectivity between the P2 connector and the SLU backplane. The connector serves as a guide and secures the breakout IO card on the SLU rail.

Instrumentation (PXI/PCI) Subsystem

Install the PXI modules according to the priority listed below.

1 M9183A 6½ Digits PXI Digital Multimeter

The M9183A DMM takes up one slot in the PXI chassis. Its functionality includes measurement of DC voltage and current, AC voltage and current, 2- and 4-wire resistance, frequency, period, capacitance, and temperature measurement.

The M9183A has a maximum measurement rate of 15000 readings per second.

2 M9185A PXI 8/16-Channel Isolated D/A Converter

The M9185A is a 2- or 3-slot fully independent, isolated D/A converter that is capable of supplying high voltage levels in parallel of up to eight or sixteen channels. Each channel is able to output up to ± 16 V as stimulus signals to DUTs.

The M9185A comes in 8 or 16 channel option, where the 8-channel option is a 2-slot size module and the 16-channel option is a 3-slot size module.

3 M9187A PXI Digital IO: 32 Inputs, 32 Outputs

The M9187A has 32 input channels that can be used for comparing inputs to user-defined thresholds between 0.3 V and 50 V, with 12 mV setting resolution. Each input is protected up to 100 V. In addition, the 32 output channels use a high current to drive the output high or low, and are capable of sourcing 0.4 A from the high side or 0.5 A sink from the low side of each channel. These outputs are protected against over-voltage or over-current conditions.

The M9187A takes up one slot in the PXI chassis.

4 M9216A PXI 32-Channel High Voltage Data Acquisition (DAQ)

The M9216A only takes up two slots in the PXI chassis while offering 32 channels for high voltage data acquisition. For positive voltage measurements, the resolution is 16 bits.

The M9216A takes a large input range from 1 mV to 100 V. With this wide range of voltage input, the DAQ would have to be flexible with voltage input ranges. Thus, it has auto ranging capabilities to enable high speed parallel voltage acquisition even with a wide range of voltages. The input ranges are:

- 5 V: 1 mV to 5 V
- 100 V: 20 mV to 100 V

It has a fast sampling rate of 250 kS/s per channel.

5 M9186A PXI Isolated Single Channel Voltage/Current Source

The M9186A PXI isolated single channel voltage/current source takes up two slots in the PXI chassis.

Its high voltage range is from –10 V to 100 V and low voltage range is from –16 V to 16 V. Its high current range is from –0.2 A to 0.2 A and low current range is from –0.02 A to 0.02 A.

It also has a safety feature, which is the interlock capability. This enhances safety when using the M9186A.

6 M9188A Dynamic D/A Converter, 16-Channel, 16-Bit, Unipolar, 30 V/20 mA

The M9188A is a PXI-based, 1-slot unipolar dynamic DAC which has 16 channels capable of supplying typical waveforms at high voltages. It has four isolated banks with four channels in each bank.

The M9188A's capability of outputting high voltages meets voltage test requirements of 0 V to +30 V, therefore, eliminating the need for design and development of additional signal conditioning circuits for applications that require voltages of up to +30 V such as an engine electronic control unit.

With the ability to provide a dynamic current source signal of up to +20 mA, the M9188A eliminates the need for an additional current transformer or source measure unit (SMU) for application tests that require current source signals.

Another unique feature of the M9188A is that it is designed with output amplifiers that provide protection from short-circuits and over-temperatures. Every channel is designed with an output disconnect switch that is capable of providing isolation between the module and application.

With 1 MB of available memory per channel, the M9188A is able to simulate waveforms with a sampling period from 2 μ s to 512 μ s. This effectively enables the M9188A to behave like a basic arbitrary waveform generator (ARB) for waveforms of up to 500 kSa/s update rate.

PXI/PCI Modules Pinout

PXI M9185A DAC pinout

NOTE

The instrument routing card must be present in your configuration.

On Instrument Routing Card P2 Connector					
Row	e	d	c	b	a
1	CH1_HI	N/C	N/C	N/C	CH9_HI
2	CH1_HIS	N/C	N/C	N/C	CH9_HIS
3	CH1_LO	N/C	N/C	N/C	CH9_LO
4	CH1_LOS	N/C	N/C	N/C	CH9_LOS
5	CH2_HI	N/C	N/C	N/C	CH10_HI
6	CH2_HIS	N/C	N/C	N/C	CH10_HIS
7	CH2_LO	N/C	N/C	N/C	CH10_LO
8	CH2_LOS	N/C	N/C	N/C	CH10_LOS
9	CH3_HI	N/C	N/C	N/C	CH11_HI
10	CH3_HIS	N/C	N/C	N/C	CH11_HIS
11	CH3_LO	N/C	DMM_H	N/C	CH11_LO
12	CH3_LOS	N/C	DMM_L	N/C	CH11_LOS
13	CH4_HI	N/C	DMM_C	N/C	CH12_HI
14	CH4_HIS	N/C	CAL_GND	N/C	CH12_HIS
15	CH4_LO	N/C	GND	N/C	CH12_LO
16	CH4_LOS	N/C	EXT_TRIG_IO	N/C	CH12_LOS
17	CH5_HI	N/C	N/C	N/C	CH13_HI
18	CH5_HIS	N/C	N/C	N/C	CH13_HIS
19	CH5_LO	N/C	N/C	N/C	CH13_LO
20	CH5_LOS	N/C	N/C	N/C	CH13_LOS
21	CH6_HI	N/C	N/C	N/C	CH14_HI
22	CH6_HIS	N/C	N/C	N/C	CH14_HIS
23	CH6_LO	N/C	N/C	N/C	CH14_LO
24	CH6_LOS	N/C	N/C	N/C	CH14_LOS
25	CH7_HI	N/C	N/C	N/C	CH15_HI
26	CH7_HIS	N/C	N/C	N/C	CH15_HIS
27	CH7_LO	N/C	N/C	N/C	CH15_LO
28	CH7_LOS	N/C	N/C	N/C	CH15_LOS
29	CH8_HI	N/C	N/C	N/C	CH16_HI
30	CH8_HIS	N/C	N/C	N/C	CH16_HIS
31	CH8_LO	N/C	N/C	N/C	CH16_LO
32	CH8_LOS	N/C	N/C	N/C	CH16_LOS



 **Module #1**
 (Connect to J1, J2, and J3
 column a of the
 Instrument Routing Card)

Figure 1-6 PXI M9185A DAC pinout (with DAC 16 channel)

On Instrument Routing Card P2 Connector					
Row	e	d	c	b	a
1	CH1_HI	N/C	N/C	N/C	CH1_HI
2	CH1_HIS	N/C	N/C	N/C	CH1_HIS
3	CH1_LO	N/C	N/C	N/C	CH1_LO
4	CH1_LOS	N/C	N/C	N/C	CH1_LOS
5	CH2_HI	N/C	N/C	N/C	CH2_HI
6	CH2_HIS	N/C	N/C	N/C	CH2_HIS
7	CH2_LO	N/C	N/C	N/C	CH2_LO
8	CH2_LOS	N/C	N/C	N/C	CH2_LOS
9	CH3_HI	N/C	N/C	N/C	CH3_HI
10	CH3_HIS	N/C	N/C	N/C	CH3_HIS
11	CH3_LO	N/C	DMM_H	N/C	CH3_LO
12	CH3_LOS	N/C	DMM_L	N/C	CH3_LOS
13	CH4_HI	N/C	DMM_C	N/C	CH4_HI
14	CH4_HIS	N/C	CAL_GND	N/C	CH4_HIS
15	CH4_LO	N/C	GND	N/C	CH4_LO
16	CH4_LOS	N/C	EXT_TRIG_IO	N/C	CH4_LOS
17	CH5_HI	N/C	DMM_H	N/C	CH5_HI
18	CH5_HIS	N/C	DMM_L	N/C	CH5_HIS
19	CH5_LO	N/C	DMM_C	N/C	CH5_LO
20	CH5_LOS	N/C	CAL_GND	N/C	CH5_LOS
21	CH6_HI	N/C	GND	N/C	CH6_HI
22	CH6_HIS	N/C	EXT_TRIG_IO	N/C	CH6_HIS
23	CH6_LO	N/C	N/C	N/C	CH6_LO
24	CH6_LOS	N/C	N/C	N/C	CH6_LOS
25	CH7_HI	N/C	N/C	N/C	CH7_HI
26	CH7_HIS	N/C	N/C	N/C	CH7_HIS
27	CH7_LO	N/C	N/C	N/C	CH7_LO
28	CH7_LOS	N/C	N/C	N/C	CH7_LOS
29	CH8_HI	N/C	N/C	N/C	CH8_HI
30	CH8_HIS	N/C	N/C	N/C	CH8_HIS
31	CH8_LO	N/C	N/C	N/C	CH8_LO
32	CH8_LOS	N/C	N/C	N/C	CH8_LOS

 **Module #1**
 (Connect to J1 and J3
 column a of the
 Instrument Routing Card)


 **Module #2**
 (Connect to J2 and J3
 column b of the
 Instrument Routing Card)


Figure 1-7 PXI M9185A DAC pinout (with DAC 8 channel)

PXI M9186A VI pinout

NOTE

The instrument routing card must be present in your configuration.

On Instrument Routing Card P2 Connector					
Row	e	d	c	b	a
1	N/C	N/C	N/C	N/C	N/C
2	N/C	N/C	N/C	N/C	N/C
3	N/C	N/C	N/C	N/C	N/C
4	N/C	N/C	N/C	N/C	N/C
5	N/C	N/C	N/C	N/C	N/C
6	N/C	N/C	N/C	N/C	N/C
7	N/C	N/C	N/C	N/C	N/C
8	N/C	N/C	N/C	N/C	N/C
9	N/C	N/C	N/C	N/C	N/C
10	N/C	N/C	N/C	N/C	N/C
11	N/C	N/C	N/C	N/C	N/C
12	N/C	N/C	N/C	N/C	N/C
13	N/C	N/C	INTRCLK	N/C	N/C
14	N/C	N/C	DCOM	N/C	N/C
15	N/C	N/C	N/C	N/C	N/C
16	N/C	N/C	N/C	N/C	N/C
17	N/C	N/C	N/C	N/C	N/C
18	N/C	N/C	N/C	N/C	N/C
19	N/C	N/C	INTRCLK	N/C	N/C
20	N/C	N/C	DCOM	N/C	N/C
21	N/C	N/C	N/C	N/C	N/C
22	N/C	N/C	N/C	N/C	N/C
23	N/C	N/C	N/C	N/C	N/C
24	N/C	N/C	N/C	N/C	N/C
25	N/C	N/C	N/C	N/C	N/C
26	N/C	N/C	N/C	N/C	N/C
27	N/C	N/C	N/C	N/C	N/C
28	N/C	N/C	N/C	N/C	N/C
29	N/C	N/C	N/C	N/C	N/C
30	N/C	N/C	N/C	N/C	N/C
31	N/C	N/C	N/C	N/C	N/C
32	N/C	N/C	N/C	N/C	N/C

 **Module #1**
(Connect to J3 column a of the Instrument Routing Card)


 **Module #2**
(Connect to J3 column b of the Instrument Routing Card)

Figure 1-8 PXI M9186A VI pinout

PXI M9187A DIO pinout

NOTE

The instrument routing card must be present in your configuration.

On Instrument Routing Card P2 Connector					
Row	e	d	c	b	a
1	Input1	Output1	GND	Output1	Input1
2	Input2	Output2	GND	Output2	Input2
3	Input3	Output3	GND	Output3	Input3
4	Input4	Output4	GND	Output4	Input4
5	Input5	Output5	GND	Output5	Input5
6	Input6	Output6	GND	Output6	Input6
7	Input7	Output7	GND	Output7	Input7
8	Input8	Output8	GND	Output8	Input8
9	Input9	Output9	GND	Output9	Input9
10	Input10	Output10	GND	Output10	Input10
11	Input11	Output11	GND	Output11	Input11
12	Input12	Output12	Vext	Output12	Input12
13	Input13	Output13	Vext	Output13	Input13
14	Input14	Output14	Vext	Output14	Input14
15	Input15	Output15	Vext	Output15	Input15
16	Input16	Output16	GND	Output16	Input16
17	Input17	Output17	GND	Output17	Input17
18	Input18	Output18	Vext	Output18	Input18
19	Input19	Output19	Vext	Output19	Input19
20	Input20	Output20	Vext	Output20	Input20
21	Input21	Output21	Vext	Output21	Input21
22	Input22	Output22	GND	Output22	Input22
23	Input23	Output23	GND	Output23	Input23
24	Input24	Output24	GND	Output24	Input24
25	Input25	Output25	GND	Output25	Input25
26	Input26	Output26	GND	Output26	Input26
27	Input27	Output27	GND	Output27	Input27
28	Input28	Output28	GND	Output28	Input28
29	Input29	Output29	GND	Output29	Input29
30	Input30	Output30	GND	Output30	Input30
31	Input31	Output31	GND	Output31	Input31
32	Input32	Output32	GND	Output32	Input32

Module #1
*(Connect to J1 and J3
column a of the
Instrument Routing Card)*

Module #2
*(Connect to J2 and J3
column b of the
Instrument Routing Card)*

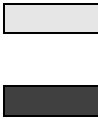
Figure 1-9 PXI M9187A DIO pinout

PXI M9216A DAQ input port pinout

NOTE

- The instrument routing card must be present in your configuration.
 - COM is equivalent to the DAQ.G pin.
-

On Instrument Routing Card P2 Connector					
Row	e	d	c	b	a
1	Port1	N/C	COM	N/C	Port1
2	Port9	N/C	COM	N/C	Port9
3	Port17	N/C	COM	N/C	Port17
4	Port25	N/C	COM	N/C	Port25
5	Port2	N/C	COM	N/C	Port2
6	Port10	N/C	COM	N/C	Port10
7	Port18	N/C	COM	N/C	Port18
8	Port26	N/C	COM	N/C	Port26
9	Port3	N/C	COM	N/C	Port3
10	Port11	N/C	COM	N/C	Port11
11	Port19	N/C	N/C	N/C	Port19
12	Port27	N/C	N/C	N/C	Port27
13	Port4	N/C	N/C	N/C	Port4
14	Port12	N/C	N/C	N/C	Port12
15	Port20	N/C	N/C	N/C	Port20
16	Port28	N/C	N/C	N/C	Port28
17	Port5	N/C	N/C	N/C	Port5
18	Port13	N/C	N/C	N/C	Port13
19	Port21	N/C	N/C	N/C	Port21
20	Port29	N/C	N/C	N/C	Port29
21	Port6	N/C	N/C	N/C	Port6
22	Port14	N/C	N/C	N/C	Port14
23	Port22	N/C	COM	N/C	Port22
24	Port30	N/C	COM	N/C	Port30
25	Port7	N/C	COM	N/C	Port7
26	Port15	N/C	COM	N/C	Port15
27	Port23	N/C	COM	N/C	Port23
28	Port31	N/C	COM	N/C	Port31
29	Port8	N/C	COM	N/C	Port8
30	Port16	N/C	COM	N/C	Port16
31	Port24	N/C	COM	N/C	Port24
32	Port32	N/C	COM	N/C	Port32



Module #1
(Connect to J1 of the Instrument Routing Card)

Module #2
(Connect to J3 of the Instrument Routing Card)

Figure 1-10 PXI M9216A DAQ input port pinout

PXI M9216A DAQ aux port pinout

NOTE

The E879xA pin matrix card must be present in your configuration.

On E879xA Pin Matrix Card Aux P2 Connector					
Row	c		b		a
	Pin	Pin Reference	Pin	Pin Reference	Pin
1	UUT COM	DAQ2.ACOM	Aux1	DAQ2.Aux82	Row1
2	UUT COM	DAQ2.ACOM	Aux2	DAQ2.Aux81	Row2
3	UUT COM	DAQ2.ACOM	Aux3	DAQ2.Aux72	Row3
4	UUT COM	DAQ2.ACOM	Aux4	DAQ2.Aux71	Row4
5	UUT COM	DAQ2.ACOM	Aux5	DAQ2.Aux62	Row5
6	UUT COM	DAQ2.ACOM	Aux6	DAQ2.Aux61	Row6
7	UUT COM	DAQ2.ACOM	Aux7	DAQ2.Aux52	Row7
8	UUT COM	DAQ2.ACOM	Aux8	DAQ2.Aux51	Row8
9	UUT COM	DAQ2.ACOM	Aux9	DAQ2.Aux42	Row9
10	UUT COM	DAQ2.ACOM	Aux10	DAQ2.Aux41	Row10
11	UUT COM	DAQ2.ACOM	Aux11	DAQ2.Aux32	Row11
12	UUT COM	DAQ2.ACOM	Aux12	DAQ2.Aux31	Row12
13	UUT COM	DAQ2.ACOM	Aux13	DAQ2.Aux22	Row13
14	UUT COM	DAQ2.ACOM	Aux14	DAQ2.Aux21	Row14
15	UUT COM	DAQ2.ACOM	Aux15	DAQ2.Aux12	Row15
16	UUT COM	DAQ2.ACOM	Aux16	DAQ2.Aux11	Row16
17	UUT COM	DAQ1.ACOM	Aux17	DAQ1.Aux82	Row17
18	UUT COM	DAQ1.ACOM	Aux18	DAQ1.Aux81	Row18
19	UUT COM	DAQ1.ACOM	Aux19	DAQ1.Aux72	Row19
20	UUT COM	DAQ1.ACOM	Aux20	DAQ1.Aux71	Row20
21	UUT COM	DAQ1.ACOM	Aux21	DAQ1.Aux62	Row21
22	UUT COM	DAQ1.ACOM	Aux22	DAQ1.Aux61	Row22
23	UUT COM	DAQ1.ACOM	Aux23	DAQ1.Aux52	Row23
24	UUT COM	DAQ1.ACOM	Aux24	DAQ1.Aux51	Row24
25	UUT COM	DAQ1.ACOM	Aux25	DAQ1.Aux42	Row25
26	UUT COM	DAQ1.ACOM	Aux26	DAQ1.Aux41	Row26
27	UUT COM	DAQ1.ACOM	Aux27	DAQ1.Aux32	Row27
28	UUT COM	DAQ1.ACOM	Aux28	DAQ1.Aux31	Row28
29	UUT COM	DAQ1.ACOM	Aux29	DAQ1.Aux22	Row29
30	UUT COM	DAQ1.ACOM	Aux30	DAQ1.Aux21	Row30
31	UUT COM	DAQ1.ACOM	Aux31	DAQ1.Aux12	Row31
32	UUT COM	DAQ1.ACOM	Aux32	DAQ1.Aux11	Row32

Figure 1-11 PXI M9216A DAQ aux port pinout (E879xA)

On E878xA Pin Matrix Card Aux P2 Connector								
Row	e	d	c		b		a	
	Pin	Pin	Pin	Pin Reference	Pin	Pin Reference	Pin	Pin Reference
1	Row1	Row33	Aux1	DAQ1.Aux11	Aux33	DAQ1.Aux21	UUT COM	DAQ1.ACOM
2	Row2	Row34	Aux2	DAQ1.Aux12	Aux34	DAQ1.Aux22	UUT COM	DAQ1.ACOM
3	Row3	Row35	Aux3	DAQ1.Aux31	Aux35	DAQ1.Aux41	UUT COM	DAQ1.ACOM
4	Row4	Row36	Aux4	DAQ1.Aux42	Aux36	DAQ1.Aux42	UUT COM	DAQ1.ACOM
5	Row5	Row37	Aux5	DAQ1.Aux51	Aux37	DAQ1.Aux61	UUT COM	DAQ1.ACOM
6	Row6	Row38	Aux6	DAQ1.Aux52	Aux38	DAQ1.Aux62	UUT COM	DAQ1.ACOM
7	Row7	Row39	Aux7	DAQ1.Aux71	Aux39	DAQ1.Aux81	UUT COM	DAQ1.ACOM
8	Row8	Row40	Aux8	DAQ1.Aux72	Aux40	DAQ1.Aux82	UUT COM	DAQ1.ACOM
9	Row9	Row41	Aux9	DAQ2.Aux11	Aux41	DAQ2.Aux21	UUT COM	DAQ2.ACOM
10	Row10	Row42	Aux10	DAQ2.Aux12	Aux42	DAQ2.Aux22	UUT COM	DAQ2.ACOM
11	Row11	Row43	Aux11	DAQ2.Aux31	Aux43	DAQ2.Aux41	UUT COM	DAQ2.ACOM
12	Row12	Row44	Aux12	DAQ2.Aux42	Aux44	DAQ2.Aux42	UUT COM	DAQ2.ACOM
13	Row13	Row45	Aux13	DAQ2.Aux51	Aux45	DAQ2.Aux61	UUT COM	DAQ2.ACOM
14	Row14	Row46	Aux14	DAQ2.Aux52	Aux46	DAQ2.Aux62	UUT COM	DAQ2.ACOM
15	Row15	Row47	Aux15	DAQ2.Aux71	Aux47	DAQ2.Aux81	UUT COM	DAQ2.ACOM
16	Row16	Row48	Aux16	DAQ2.Aux72	Aux48	DAQ2.Aux82	UUT COM	DAQ2.ACOM
17	Row17	Row49	Aux17	DAQ3.Aux11	Aux49	DAQ3.Aux21	UUT COM	DAQ3.ACOM
18	Row18	Row50	Aux18	DAQ3.Aux12	Aux50	DAQ3.Aux22	UUT COM	DAQ3.ACOM
19	Row19	Row51	Aux19	DAQ3.Aux31	Aux51	DAQ3.Aux41	UUT COM	DAQ3.ACOM
20	Row20	Row52	Aux20	DAQ3.Aux42	Aux52	DAQ3.Aux42	UUT COM	DAQ3.ACOM
21	Row21	Row53	Aux21	DAQ3.Aux51	Aux53	DAQ3.Aux61	UUT COM	DAQ3.ACOM
22	Row22	Row54	Aux22	DAQ3.Aux52	Aux54	DAQ3.Aux62	UUT COM	DAQ3.ACOM
23	Row23	Row55	Aux23	DAQ3.Aux71	Aux55	DAQ3.Aux81	UUT COM	DAQ3.ACOM
24	Row24	Row56	Aux24	DAQ3.Aux72	Aux56	DAQ3.Aux82	UUT COM	DAQ3.ACOM
25	Row25	Row57	Aux25	DAQ4.Aux11	Aux57	DAQ4.Aux21	UUT COM	DAQ4.ACOM
26	Row26	Row58	Aux26	DAQ4.Aux12	Aux58	DAQ4.Aux22	UUT COM	DAQ4.ACOM
27	Row27	Row59	Aux27	DAQ4.Aux31	Aux59	DAQ4.Aux41	UUT COM	DAQ4.ACOM
28	Row28	Row60	Aux28	DAQ4.Aux42	Aux60	DAQ4.Aux42	UUT COM	DAQ4.ACOM
29	Row29	Row61	Aux29	DAQ4.Aux51	Aux61	DAQ4.Aux61	UUT COM	DAQ4.ACOM
30	Row30	Row62	Aux30	DAQ4.Aux52	Aux62	DAQ4.Aux62	UUT COM	DAQ4.ACOM
31	Row31	Row63	Aux31	DAQ4.Aux71	Aux63	DAQ4.Aux81	UUT COM	DAQ4.ACOM
32	Row32	Row64	Aux32	DAQ4.Aux72	Aux64	DAQ4.Aux82	UUT COM	DAQ4.ACOM

Figure 1-12 PXI M9216A DAQ aux port pinout (E878xA)

PXI M9188A 16-channel dynamic D/A converter

NOTE

The instrument routing card must be present in your configuration.

Instrument Routing Connector J3					
Row	e	d	c	b	a
1	Chn 1+	DIO0	COM	DIO0	Chn 1+
2	Chn 2+	DIO1	COM	DIO1	Chn 2+
3	Chn 3+	DIO2	COM	DIO2	Chn 3+
4	Chn 4+	DIO3	COM	DIO3	Chn 4+
5	Chn 5+	DIO4	COM	DIO4	Chn 5+
6	Chn 6+	DIO5	COM	DIO5	Chn 6+
7	Chn 7+	DIO6	COM	DIO6	Chn 7+
8	Chn 8+	DIO7	COM	DIO7	Chn 8+
9	Chn 9+	SelfTest-IN	COM	SelfTest-IN	Chn 9+
10	Chn 10+	+5V-PXI	COM	+5V-PXI	Chn 10+
11	Chn 11+	12V-PXI	N/C	12V-PXI	Chn 11+
12	Chn 12+	N/C	N/C	N/C	Chn 12+
13	Chn 13+	N/C	N/C	N/C	Chn 13+
14	Chn 14+	N/C	N/C	N/C	Chn 14+
15	Chn 15+	N/C	N/C	N/C	Chn 15+
16	Chn 16+	N/C	N/C	N/C	Chn 16+
17	Chn 1-	N/C	N/C	N/C	Chn 1-
18	Chn 2-	N/C	N/C	N/C	Chn 2-
19	Chn 3-	N/C	N/C	N/C	Chn 3-
20	Chn 4-	N/C	N/C	N/C	Chn 4-
21	Chn 5-	N/C	N/C	N/C	Chn 5-
22	Chn 6-	N/C	N/C	N/C	Chn 6-
23	Chn 7-	N/C	COM	N/C	Chn 7-
24	Chn 8-	N/C	COM	N/C	Chn 8-
25	Chn 9-	N/C	COM	N/C	Chn 9-
26	Chn 10-	N/C	COM	N/C	Chn 10-
27	Chn 11-	N/C	COM	N/C	Chn 11-
28	Chn 12-	N/C	COM	N/C	Chn 12-
29	Chn 13-	N/C	COM	N/C	Chn 13-
30	Chn 14-	N/C	COM	N/C	Chn 14-
31	Chn 15-	N/C	COM	N/C	Chn 15-
32	Chn 16-	N/C	COM	N/C	Chn 16-



Module #1
(Connect to J1 of the
Instrument Routing Card)



Module #2
(Connect to J2 of the
Instrument Routing Card)


Figure 1-13 PXI M9188A 16-channel dynamic D/A converter

PCI AD1750 DIO pinout

NOTE

The instrument routing card must be present in your configuration.

On Instrument Routing Card P2 Connector					
Row	e	d	c	b	a
1	DI0	N/C	GND	N/C	DI0
2	DI1	N/C	GND	N/C	DI1
3	DI2	N/C	GND	N/C	DI2
4	DI3	N/C	GND	N/C	DI3
5	DI4	N/C	GND	N/C	DI4
6	DI5	N/C	GND	N/C	DI5
7	DI6	N/C	GND	N/C	DI6
8	DI7	N/C	GND	N/C	DI7
9	DI8	N/C	GND	N/C	DI8
10	DI9	N/C	GND	N/C	DI9
11	DI10	N/C	N/C	N/C	DI10
12	DI11	N/C	N/C	N/C	DI11
13	DI12	N/C	N/C	N/C	DI12
14	DI13	N/C	N/C	N/C	DI13
15	DI14	N/C	N/C	N/C	DI14
16	DI15	N/C	N/C	N/C	DI15
17	DO0	COM1	N/C	COM1	DO0
18	DO1	COM1	N/C	COM1	DO1
19	DO2	COM1	N/C	COM1	DO2
20	DO3	COM1	N/C	COM1	DO3
21	DO4	COM1	N/C	COM1	DO4
22	DO5	COM1	N/C	COM1	DO5
23	DO6	COM1	GND	COM1	DO6
24	DO7	COM1	GND	COM1	DO7
25	DO8	COM2	GND	COM2	DO8
26	DO9	COM2	GND	COM2	DO9
27	DO10	COM2	GND	COM2	DO10
28	DO11	COM2	GND	COM2	DO11
29	DO12	COM2	GND	COM2	DO12
30	DO13	COM2	GND	COM2	DO13
31	DO14	COM2	GND	COM2	DO14
32	DO15	COM2	GND	COM2	DO15

 **Module #1**
(Connect to J1 of the Instrument Routing Card)


 **Module #2**
(Connect to J2 of the Instrument Routing Card)


Figure 1-14 PCI AD1750 DIO pinout

PCI softing CAN pinout

NOTE

The instrument routing card must be present in your configuration.

On Instrument Routing Card P2 Connector					
Row	e	d	c	b	a
1	N/C	N/C	N/C	N/C	N/C
2	N/C	N/C	N/C	N/C	N/C
3	N/C	N/C	N/C	N/C	N/C
4	N/C	N/C	N/C	N/C	N/C
5	N/C	N/C	N/C	N/C	N/C
6	N/C	N/C	N/C	N/C	N/C
7	N/C	N/C	N/C	N/C	N/C
8	N/C	N/C	N/C	N/C	N/C
9	N/C	N/C	N/C	N/C	N/C
10	N/C	N/C	N/C	N/C	N/C
11	N/C	N/C	CH1.CAN_H	N/C	N/C
12	N/C	N/C	CH1.CAN_L	N/C	N/C
13	N/C	N/C	CH1.GND	N/C	N/C
14	N/C	N/C	CH2.GND	N/C	N/C
15	N/C	N/C	CH2.CAN_L	N/C	N/C
16	N/C	N/C	CH2.CAN_H	N/C	N/C
17	N/C	N/C	CH1.CAN_H	N/C	N/C
18	N/C	N/C	CH1.CAN_L	N/C	N/C
19	N/C	N/C	CH1.GND	N/C	N/C
20	N/C	N/C	CH2.GND	N/C	N/C
21	N/C	N/C	CH2.CAN_L	N/C	N/C
22	N/C	N/C	CH2.CAN_H	N/C	N/C
23	N/C	N/C	N/C	N/C	N/C
24	N/C	N/C	N/C	N/C	N/C
25	N/C	N/C	N/C	N/C	N/C
26	N/C	N/C	N/C	N/C	N/C
27	N/C	N/C	N/C	N/C	N/C
28	N/C	N/C	N/C	N/C	N/C
29	N/C	N/C	N/C	N/C	N/C
30	N/C	N/C	N/C	N/C	N/C
31	N/C	N/C	N/C	N/C	N/C
32	N/C	N/C	N/C	N/C	N/C

 **Module #1**
(Connect to J3 column a
of the Instrument Routing
Card)


 **Module #2**
(Connect to J3 column b
of the Instrument Routing
Card)

Figure 1-15 PCI softing CAN pinout

Switch/Load Unit (SLU) Subsystem

The Keysight E6198B switch/load unit acts as a switching platform for the TS-8989 system. The E6198B utilizes a standard VERSA Module Eurocard (VME) type enclosure to bring you the best-in-class switching solution for mechatronic type testing.

The E6198B is controlled via USB. It has four power buses which can take loads up to 30 A each.

The E6198B comes with added features that provide you with an 8-bit DIO that can be used for fixture control or ID, a pair of DAC channels to drive voltage controlled power supplies.

For more detailed information on the specifications and usage of this unit, refer to the *E6198B User's Guide*.

Switch/load unit pinout

E8792A/E8793A 32-pin matrix card pinout

E8792A/E8793A			
P2 Connector on E8792A/93A Pin Card			
Row	c	b	a
1	UUT Com	Aux1	Row1
2	UUT Com	Aux2	Row2
3	UUT Com	Aux3	Row3
4	UUT Com	Aux4	Row4
5	UUT Com	Aux5	Row5
6	UUT Com	Aux6	Row6
7	UUT Com	Aux7	Row7
8	UUT Com	Aux8	Row8
9	UUT Com	Aux9	Row9
10	UUT Com	Aux10	Row10
11	UUT Com	Aux11	Row11
12	UUT Com	Aux12	Row12
13	UUT Com	Aux13	Row13
14	UUT Com	Aux14	Row14
15	UUT Com	Aux15	Row15
16	UUT Com	Aux16	Row16
17	UUT Com	Aux17	Row17
18	UUT Com	Aux18	Row18
19	UUT Com	Aux19	Row19
20	UUT Com	Aux20	Row20
21	UUT Com	Aux21	Row21
22	UUT Com	Aux22	Row22
23	UUT Com	Aux23	Row23
24	UUT Com	Aux24	Row24
25	UUT Com	Aux25	Row25
26	UUT Com	Aux26	Row26
27	UUT Com	Aux27	Row27
28	UUT Com	Aux28	Row28
29	UUT Com	Aux29	Row29
30	UUT Com	Aux30	Row30
31	UUT Com	Aux31	Row31
32	UUT Com	Aux32	Row32

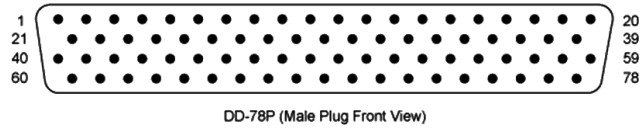
Figure 1-16 E8792A/E8793A 32-pin matrix card pinout

E8782A/E8783A 64-pin matrix card pinout

1	o	o	o	o	o	E8782A						E8783A					
	o	o	o	o	o	P2 Connector on E8782A Pin Card						P2 Connector on E8783A Pin Card					
	o	o	o	o	o	Row	e	d	c	b	a	Row	e	d	c	b	a
	o	o	o	o	o	1	Row1	Row33	Aux1	Aux33	UUT Com	1	Row1	Row33	Aux1	Aux33	UUT Com
	o	o	o	o	o	2	Row2	Row34	Aux2	Aux34	UUT Com	2	Row2	Row34	Aux2	Aux34	UUT Com
	o	o	o	o	o	3	Row3	Row35	Aux3	Aux35	UUT Com	3	Row3	Row35	Aux3	Aux35	UUT Com
	o	o	o	o	o	4	Row4	Row36	Aux4	Aux36	UUT Com	4	Row4	Row36	Aux4	Aux36	UUT Com
	o	o	o	o	o	5	Row5	Row37	Aux5	Aux37	UUT Com	5	Row5	Row37	Aux5	Aux37	UUT Com
	o	o	o	o	o	6	Row6	Row38	Aux6	Aux38	UUT Com	6	Row6	Row38	Aux6	Aux38	UUT Com
	o	o	o	o	o	7	Row7	Row39	Aux7	Aux39	UUT Com	7	Row7	Row39	Aux7	Aux39	UUT Com
	o	o	o	o	o	8	Row8	Row40	Aux8	Aux40	UUT Com	8	Row8	Row40	Aux8	Aux40	UUT Com
	o	o	o	o	o	9	Row9	NC	Aux9	NC	UUT Com	9	Row9	Row41	Aux9	Aux41	UUT Com
	o	o	o	o	o	10	Row10	NC	Aux10	NC	UUT Com	10	Row10	Row42	Aux10	Aux42	UUT Com
	o	o	o	o	o	11	Row11	NC	Aux11	NC	UUT Com	11	Row11	Row43	Aux11	Aux43	UUT Com
	o	o	o	o	o	12	Row12	NC	Aux12	NC	UUT Com	12	Row12	Row44	Aux12	Aux44	UUT Com
	o	o	o	o	o	13	Row13	NC	Aux13	NC	UUT Com	13	Row13	Row45	Aux13	Aux45	UUT Com
	o	o	o	o	o	14	Row14	NC	Aux14	NC	UUT Com	14	Row14	Row46	Aux14	Aux46	UUT Com
	o	o	o	o	o	15	Row15	NC	Aux15	NC	UUT Com	15	Row15	Row47	Aux15	Aux47	UUT Com
	o	o	o	o	o	16	Row16	NC	Aux16	NC	UUT Com	16	Row16	Row48	Aux16	Aux48	UUT Com
	o	o	o	o	o	17	Row17	NC	Aux17	NC	UUT Com	17	Row17	Row49	Aux17	Aux49	UUT Com
	o	o	o	o	o	18	Row18	NC	Aux18	NC	UUT Com	18	Row18	Row50	Aux18	Aux50	UUT Com
	o	o	o	o	o	19	Row19	NC	Aux19	NC	UUT Com	19	Row19	Row51	Aux19	Aux51	UUT Com
	o	o	o	o	o	20	Row20	NC	Aux20	NC	UUT Com	20	Row20	Row52	Aux20	Aux52	UUT Com
	o	o	o	o	o	21	Row21	NC	Aux21	NC	UUT Com	21	Row21	Row53	Aux21	Aux53	UUT Com
	o	o	o	o	o	22	Row22	NC	Aux22	NC	UUT Com	22	Row22	Row54	Aux22	Aux54	UUT Com
	o	o	o	o	o	23	Row23	NC	Aux23	NC	UUT Com	23	Row23	Row55	Aux23	Aux55	UUT Com
	o	o	o	o	o	24	Row24	NC	Aux24	NC	UUT Com	24	Row24	Row56	Aux24	Aux56	UUT Com
	o	o	o	o	o	25	Row25	NC	Aux25	NC	UUT Com	25	Row25	Row57	Aux25	Aux57	UUT Com
	o	o	o	o	o	26	Row26	NC	Aux26	NC	UUT Com	26	Row26	Row58	Aux26	Aux58	UUT Com
	o	o	o	o	o	27	Row27	NC	Aux27	NC	UUT Com	27	Row27	Row59	Aux27	Aux59	UUT Com
	o	o	o	o	o	28	Row28	NC	Aux28	NC	UUT Com	28	Row28	Row60	Aux28	Aux60	UUT Com
	o	o	o	o	o	29	Row29	NC	Aux29	NC	UUT Com	29	Row29	Row61	Aux29	Aux61	UUT Com
	o	o	o	o	o	30	Row30	NC	Aux30	NC	UUT Com	30	Row30	Row62	Aux30	Aux62	UUT Com
o	o	o	o	o	31	Row31	NC	Aux31	NC	UUT Com	31	Row31	Row63	Aux31	Aux63	UUT Com	
o	o	o	o	o	32	Row32	NC	Aux32	NC	UUT Com	32	Row32	Row64	Aux32	Aux64	UUT Com	
32	e	d	c	b	a												

Figure 1-17 E8782A/E8783A 64-pin matrix card pinout

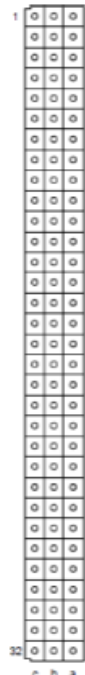
78-pin SLU system utility pinout



SLU System Utility							
78-pin D-Sub Connector Pinouts							
Pin	Pin Reference	Pin	Pin Reference	Pin	Pin Reference	Pin	Pin Reference
1	System Gnd	21	System Gnd	40	System Gnd	60	System Gnd
2	Fixture ID (0)	22	Open Drain Out (0)	41	Digital In (0)	61	Spare_DigOut(0)
3	Fixture ID (1)	23	Open Drain Out (1)	42	Digital In (1)	62	Spare_DigOut(1)
4	Fixture ID (2)	24	Open Drain Out (2)	43	Digital In (2)	63	Spare_DigOut(2)
5	Fixture ID (3)	25	Open Drain Out (3)	44	Digital In (3)	64	Spare_DigOut(3)
6	Fixture ID (4)	26	Open Drain Out (4)	45	Digital In (4)	65	Spare_DigOut(4)
7	Fixture ID (5)	27	Open Drain Out (5)	46	Digital In (5)	66	Spare_DigOut(5)
8	Fixture ID (6)	28	Open Drain Out (6)	47	Digital In (6)	67	Spare_DigOut(6)
9	Fixture ID (7)	29	Open Drain Out (7)	48	Digital In (7)	68	Spare_DigOut(7)
10	System Gnd	30	System Gnd	49	System Gnd	69	System Gnd
11	ISense+ (1)	31	ISense- (1)	50	Power Bus Sense 1	70	+12 Vdc Supply
12	ISense+ (2)	32	ISense- (2)	51	Power Bus Sense 2	71	+12 Vdc Supply
13	ISense+ (3)	33	ISense- (3)	52	Power Bus Sense 3	72	+12 Vdc Supply
14	ISense+ (4)	34	ISense- (4)	53	Power Bus Sense 4	73	+12 Vdc Supply
15	NC	35	NC	54	NC	74	-12 Vdc Supply
16	DAC1	36	DAC2	55	NC	75	Spare Supply
17	System Gnd	37	System Gnd	56	NC	76	NC
18	NC	38	NC	57	NC	77	NC
19	NC	39	NC	58	NC	78	NC
20	NC		NC	59	NC		NC

Figure 1-18 78-pin SLU system utility pinout

N9379A 48 channel load card pinout



N9379A			
Row	c	b	a
1	Ch1	Ch2	Ch3
2	CH1 Pow	CH2 Pow	CH3 Pow
3	CH4	CH5	CH6
4	CH4 Pow	CH5 Pow	CH6 Pow
5	CH7	CH8	CH9
6	CH7 Pow	CH8 Pow	CH9 Pow
7	CH10	CH11	CH12
8	CH10 Pow	CH11 Pow	CH12 Pow
9	CH13	CH14	CH15
10	CH13 Pow	CH14 Pow	CH15 Pow
11	CH16	CH17	CH18
12	CH16 Pow	CH17 Pow	CH18 Pow
13	CH19	CH20	CH21
14	CH19 Pow	CH20 Pow	CH21 Pow
15	CH22	CH23	CH24
16	CH22 Pow	CH23 Pow	CH24 Pow
17	CH25	CH26	CH27
18	CH25 Pow	CH26 Pow	CH27 Pow
19	CH28	CH29	CH30
20	CH28 Pow	CH29 Pow	CH30 Pow
21	CH31	CH32	CH33
22	CH31 Pow	CH32 Pow	CH33 Pow
23	CH34	CH35	CH36
24	CH34 Pow	CH35 Pow	CH36 Pow
25	CH37	CH38	CH39
26	CH37 Pow	CH38 Pow	CH39 Pow
27	CH40	CH41	CH42
28	CH40 Pow	CH41 Pow	CH42 Pow
29	CH43	CH44	CH45
30	CH43 Pow	CH44 Pow	CH45 Pow
31	CH46	CH47	CH48
32	CH46 Pow	CH47 Pow	CH48 Pow

Figure 1-19 N9379A 48 channel load card pinout

E6176A/N9377A/U7179A 16 channel load card pinout

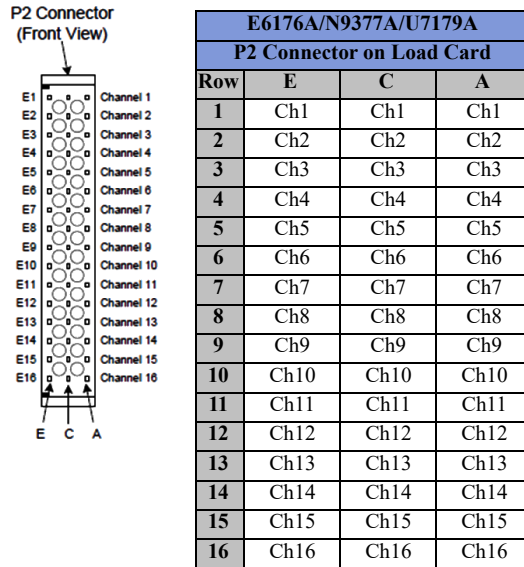


Figure 1-20 E6176A/N9377A/U7179A 16 channel load card pinout

E6177A/U7177A/N9378A 24 channel load card pinout

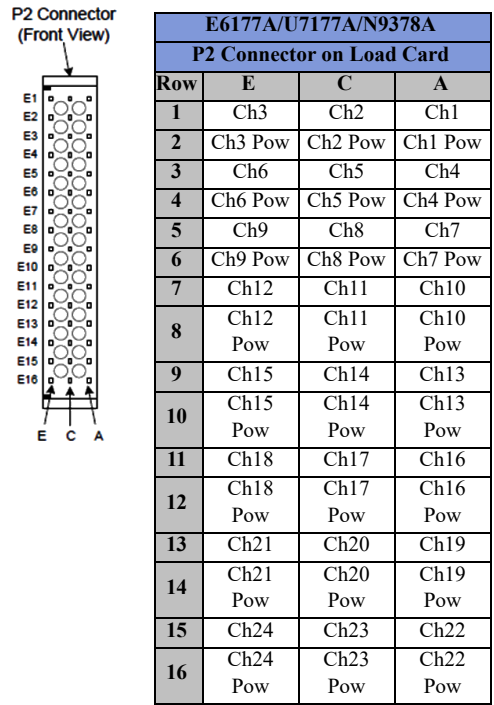


Figure 1-21 E6177A/U7177A/N9378A 24 channel load card pinout

E6175A 8 channel load card pinout

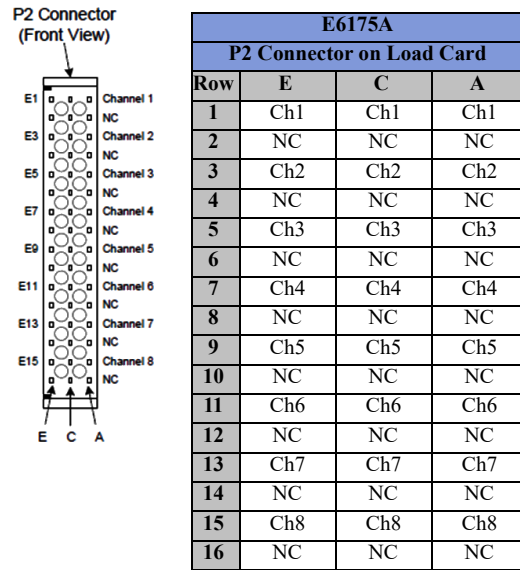


Figure 1-22 E6175A 8 channel load card pinout

E6178B/U7178A 8 channel heavy duty load card pinout

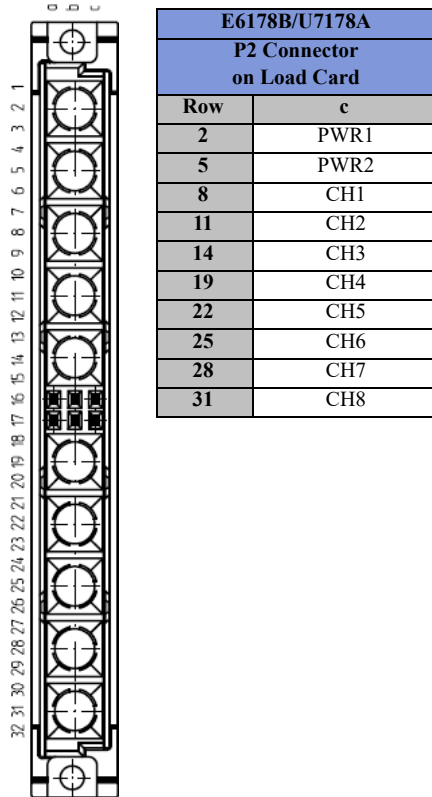


Figure 1-23 E6178B/U7178A 8 channel heavy duty load card pinout

2 System Interconnects

System Interconnects 61

System Interface

There is no mass system interface for the TS-8989 system. You are required to connect the DUT fixture cables directly onto the load card or pin card. [Table 2-1](#) lists all the available modules and connector types.

Table 2-1 Available modules and connector types

Connector	Mating connector ^[a]	Mating pin	Use in
78-pin D-Sub Connector	1658674-1 (AMP)	1658670-1 (AMP)	SLU Utility
96-pos DIN Connector	925486-1 (AMP)	1-104480-3 (AMP)	E879xA Matrix Card 48-Ch Load Card
48-pos DIN Connector	9050483202 (HARTING)	9060006472 (Harting)	24-/16-/8-Ch Load Card
160-pos DIN Connector	024070 (ERNI)	234063 (ERNI)	E878xA Matrix Card Universal Instrument Routing Card
10-pos Heavy Duty Connector	354152 (ERNI)	9030006203 (Harting)	Heavy Duty Load Card

[a] The mating connectors listed in this column are the suggested mating connectors.

Keysight also offers the E6170-02100 mounting plate ([Figure 2-1 on page 63](#)) to secure the connector on the TS-8989 system.

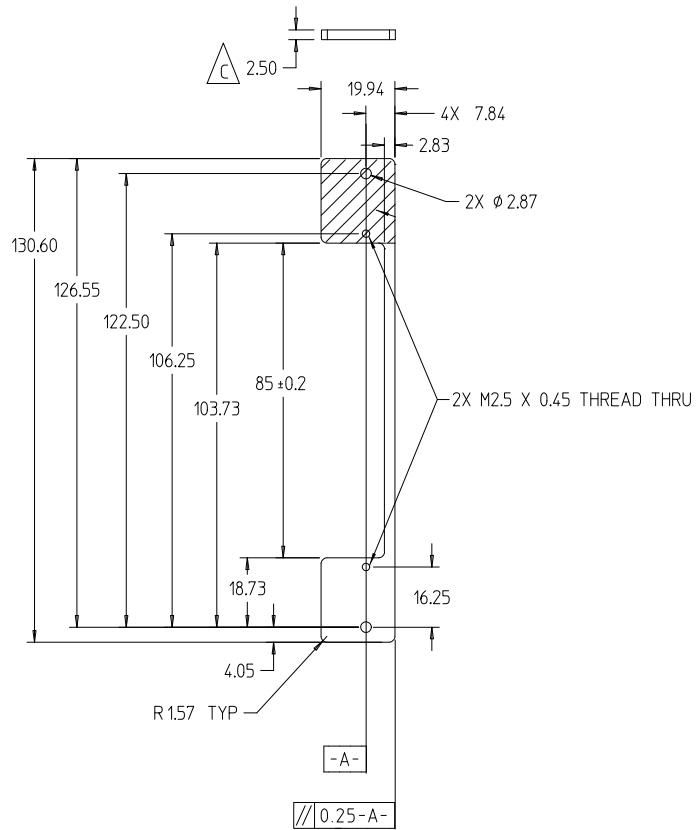


Figure 2-1 E6170-02100 mounting plate

Mounting Plate Installation

- 1 Install one piece of the E6170-02100 and two pieces of 0515-0894 onto the fixture cable that connects to the pin card or load card or instrument routing card.



Figure 2-2 Mounting plate installation step 1

- 2 Remove the cards from the SLU.



Figure 2-3 Mounting plate installation step 2

WARNING

Turn OFF the power supply before you remove the cards.

- 3 Next, proceed to install the fixture cable with the 0515-0894 pre-installed onto the T-threaded strip at the back of the SLU and fasten it with two pieces of the 0515-0894 at the top and bottom of the T-threaded strips accordingly.

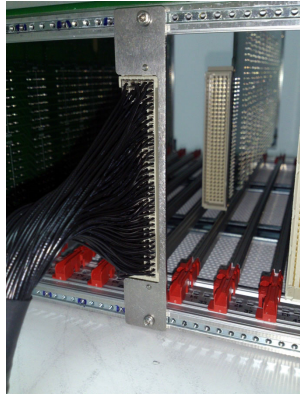


Figure 2-4 Mounting plate installation step 3

- 4 Upon completion, proceed to insert the pin matrix card or load card or instrument routing card into the respective SLU slot. Mating it with the fixture cable installed at the T-threaded strip.

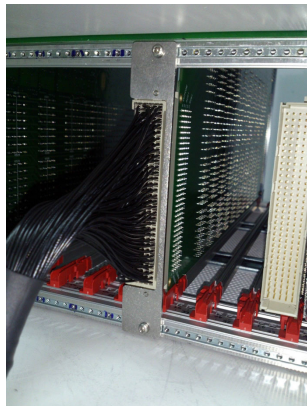


Figure 2-5 Mounting plate installation step 4

- 5 For the TS-8989 that is integrated into a rack, Keysight recommends that a strain relief bar be installed – to fasten the fixture cables – to eliminate possible intermittent disconnection between the fixture cables and its respective pin matrix or load card or instrument routing card. Below is a sample of a strain relief bar that is installed in Keysight's functional test systems.

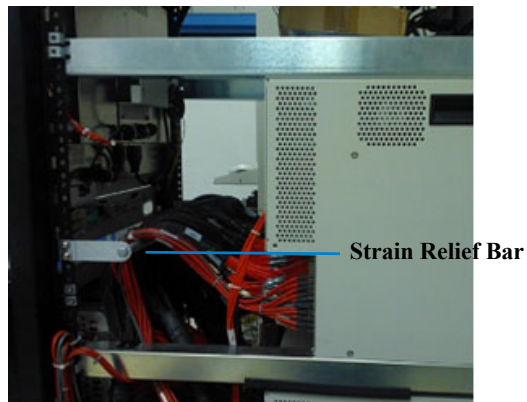


Figure 2-6 Mounting plate installation step 5

3 Test System Interface Cables

U8989-61606 DAC M9185A to Instrument Routing Card or E8792A Pin Matrix Aux Cable	68
U8989-61609 DIO M9187A to Instrument Routing Card Cable	70
U8989-61607 DAQ M9216A to Instrument Routing Card Cable	72
U8989-61608 DAQ M9216A Aux to E8792A Pin Matrix Aux Cable	74
U8970-61705 DAQ M9216A Aux to E8782A Pin Matrix Aux Cable	76
U8989-61628 M9188A Dynamic DAC to Instrument Routing Card	79
U8989-61611 VI M9186A to Instrument Routing Card and Pin Matrix Instrument Cable	81
U8989-61610 PCI DIO AD1750 Cable	83
U8989-61612 PCI Softing CAN (CAN-AC2-PCI) Cable	85

U8989-61606 DAC M9185A to Instrument Routing Card or E8792A Pin Matrix Aux Cable

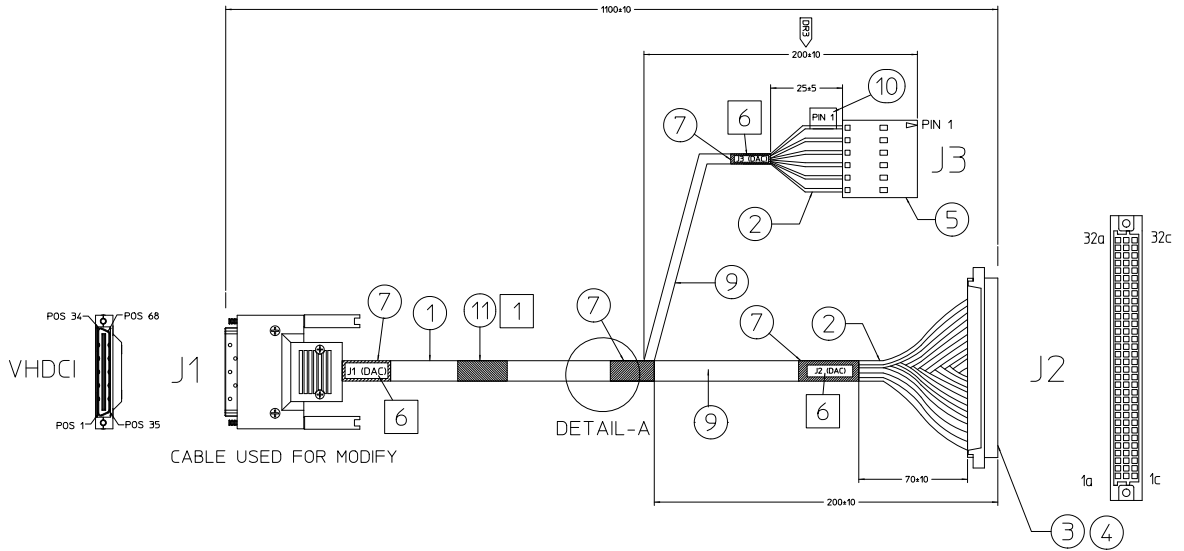


Figure 3-1 U8989-61606 DAC M9185A to instrument routing card or E8792 pin matrix aux cable

The following table shows the cable pinout for U8989-61606.

J1			
To DAC Channel 1-8 ^[a] ^[b]			
Pin	Pinout	Pin	Pinout
1	CH1_LO	35	CH1_HI
2	CH1_LOS	36	CH1_HIS
3	GND	37	GND
4	CH2_LO	38	CH2_HI
5	CH2_LOS	39	CH2_HIS
6	GND	40	GND
7	CH3_LO	41	CH3_HI
8	CH3_LOS	42	CH3_HIS
9	GND	43	GND
10	CH4_LO	44	CH4_HI
11	CH4_LOS	45	CH4_HIS
12	GND	46	GND
13	CH5_LO	47	CH5_HI
14	CH5_LOS	48	CH5_HIS
15	GND	49	GND
16	CH6_LO	50	CH6_HI
17	CH6_LOS	51	CH6_HIS
18	GND	52	GND
19	CH7_LO	53	CH7_HI
20	CH7_LOS	54	CH7_HIS
21	GND	55	GND
22	CH8_LO	56	CH8_HI
23	CH8_LOS	57	CH8_HIS
24	GND	58	GND
25	GND	59	GND
26	CAL_GND	60	CAL_GND
27	CAL_GND	61	CAL_GND
28	DMM_H	62	DMM_L
29	DMM_C	63	CAL_GND
30	CAL_GND	64	CAL_GND
31	CAL_GND	65	CAL_GND
32	GND	66	GND
33	EXT_TRIG_I O	67	GND
34	GND	68	GND

J2			
To Inst Routing Connector J1 or J2			
Pin	a	b	c
32	N/C	N/C	CH1_HI
31	N/C	N/C	CH1_HIS
30	N/C	N/C	CH1_LO
29	N/C	N/C	CH1_LOS
28	N/C	N/C	CH2_HI
27	N/C	N/C	CH2_HIS
26	N/C	N/C	CH2_LO
25	N/C	N/C	CH2_LOS
24	N/C	N/C	CH3_HI
23	N/C	N/C	CH3_HIS
22	N/C	N/C	CH3_LO
21	N/C	N/C	CH3_LOS
20	N/C	N/C	CH4_HI
19	N/C	N/C	CH4_HIS
18	N/C	N/C	CH4_LO
17	N/C	N/C	CH4_LOS
16	N/C	N/C	CH5_HI
15	N/C	N/C	CH5_HIS
14	N/C	N/C	CH5_LO
13	N/C	N/C	CH5_LOS
12	N/C	N/C	CH6_HI
11	N/C	N/C	CH6_HIS
10	N/C	N/C	CH6_LO
9	N/C	N/C	CH6_LOS
8	N/C	N/C	CH7_HI
7	N/C	N/C	CH7_HIS
6	N/C	N/C	CH7_LO
5	N/C	N/C	CH7_LOS
4	N/C	N/C	CH8_HI
3	N/C	N/C	CH8_HIS
2	N/C	N/C	CH8_LO
1	N/C	N/C	CH8_LOS

J3		
To Inst Routing Connector J3 ^[a]		
Pin	Pinout	Remark
6	DMM_H	
5	DMM_L	
4	DMM_C	
3	CAL_GND	From J1 Pin 63
2	GND	From J1 Pin 66
1	EXT_TRIG_IO	

[a] If J1 is connect to DAC Channel 9-16, J3 will not connect to the Instrument Routing Card

- [a] The same cable can be used for DAC Channel 9-16
 [b] Pin 26-34 and Pin 60-68 will be GND for DAC Channel 9-16

U8989-61609 DIO M9187A to Instrument Routing Card Cable

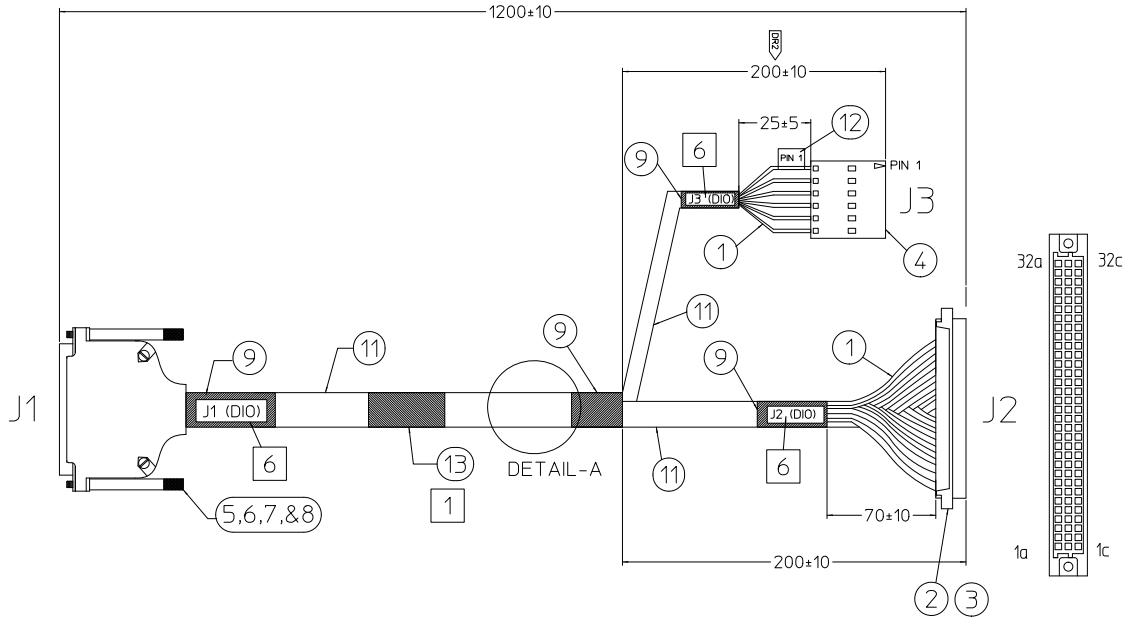


Figure 3-2 U8989-61609 DIO M9187A to instrument routing card cable

Table 3-1 U8989-61609 cable pinout

J1							
To DIO							
Pin	Pinout	Pin	Pinout	Pin	Pinout	Pin	Pinout
60	Vext	40	Vext	21	Vext	1	Vext
61	Output 4	41	Output 3	22	Output 2	2	Output 1
62	Output 8	42	Output 7	23	Output 6	3	Output 5
63	Output 12	43	Output 11	24	Output 10	4	Output 9
64	Output 16	44	Output 15	25	Output 14	5	Output 13
65	Output 20	45	Output 19	26	Output 18	6	Output 17
66	Output 24	46	Output 23	27	Output 22	7	Output 21
67	Output 28	47	Output 27	28	Output 26	8	Output 25
68	Output 32	48	Output 31	29	Output 30	9	Output 29
69	GND	49	GND	30	GND	10	GND
70	Input 4	50	Input 3	31	Input 2	11	Input 1
71	Input 8	51	Input 7	32	Input 6	12	Input 5
72	Input 12	52	Input 11	33	Input 10	13	Input 9
73	Input 16	53	Input 15	34	Input 14	14	Input 13
74	Input 20	54	Input 19	35	Input 18	15	Input 17
75	Input 24	55	Input 23	36	Input 22	16	Input 21
76	Input 28	56	Input 27	37	Input 26	17	Input 25
77	Input 32	57	Input 31	38	Input 30	18	Input 29
78	GND	58	GND	39	GND	19	GND
		59	GND			20	GND

J3	
To Inst Routing Connector J3	
Pin	Pinout
6	GND
5	Vext
4	Vext
3	Vext
2	Vext
1	GND

J2			
To Inst Routing Connector J1 or J2			
Pin	a	b	c
32	GND	Output1	Input1
31	GND	Output2	Input2
30	GND	Output3	Input3
29	GND	Output4	Input4
28	GND	Output5	Input5
27	GND	Output6	Input6
26	GND	Output7	Input7
25	GND	Output8	Input8
24	N/C	Output9	Input9
23	N/C	Output10	Input10
22	N/C	Output11	Input11
21	N/C	Output12	Input12
20	N/C	Output13	Input13
19	N/C	Output14	Input14
18	N/C	Output15	Input15
17	N/C	Output16	Input16
16	N/C	Output17	Input17
15	N/C	Output18	Input18
14	N/C	Output19	Input19
13	N/C	Output20	Input20
12	N/C	Output21	Input21
11	N/C	Output22	Input22
10	N/C	Output23	Input23
9	N/C	Output24	Input24
8	N/C	Output25	Input25
7	N/C	Output26	Input26
6	N/C	Output27	Input27
5	N/C	Output28	Input28
4	N/C	Output29	Input29
3	N/C	Output30	Input30
2	N/C	Output31	Input31
1	N/C	Output32	Input32

U8989-61607 DAQ M9216A to Instrument Routing Card Cable

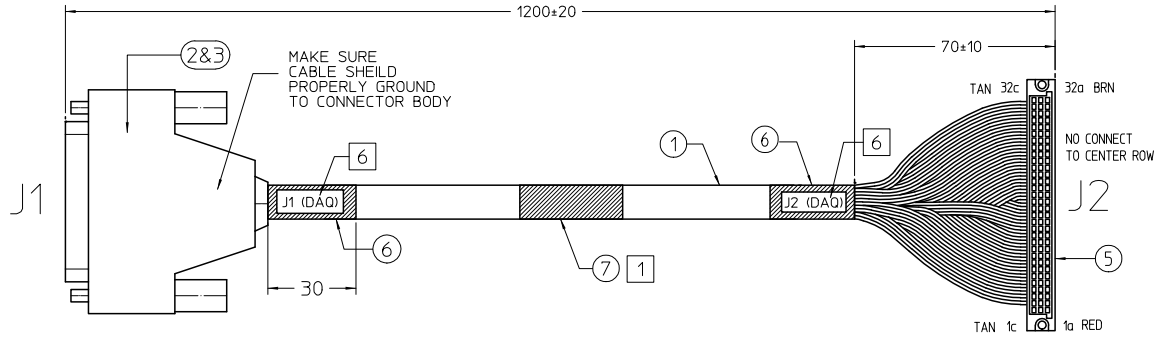


Figure 3-3 U8989-61607 DAQ M9216A to instrument routing card cable

Table 3-2 U8989-61607 cable pinout

J1						J2			
To DAQ Input Port						To Inst Routing Connector J1 or J2			
Pin	Pinout	Pin	Pinout	Pin	Pinout	Pin	a	b	c
44	Port24	30	G4	15	Port16	32	G1	N/C	Port1
43	Port32	29	G4	14	Port8	31	G1	N/C	Port9
42	Port23	28	G4	13	Port15	30	G1	N/C	Port17
41	Port31	27	G4	12	Port7	29	G1	N/C	Port25
40	Port22	26	G3	11	Port14	28	G1	N/C	Port2
39	Port21	25	Port30	10	Port6	27	G1	N/C	Port10
38	Port29	24	G3	9	Port13	26	G1	N/C	Port18
37	Port20	23	G3	8	Port5	25	G1	N/C	Port26
36	Port28	22	G2	7	Port12	24	G2	N/C	Port3
35	Port19	21	Port11	6	Port4	23	G2	N/C	Port11
34	Port27	20	G2	5	Port3	22	G2	N/C	Port19
33	Port18	19	G1	4	Port10	21	G2	N/C	Port27
32	Port26	18	G1	3	Port2	20	G2	N/C	Port4
31	Port25	17	G1	2	Port9	19	G2	N/C	Port12
		16	Port17	1	Port1	18	G2	N/C	Port20
						17	G2	N/C	Port28
						16	G3	N/C	Port5
						15	G3	N/C	Port13
						14	G3	N/C	Port21
						13	G3	N/C	Port29
						12	G3	N/C	Port6
						11	G3	N/C	Port14
						10	G3	N/C	Port22
						9	G3	N/C	Port30
						8	G4	N/C	Port7
						7	G4	N/C	Port15
						6	G4	N/C	Port23
						5	G4	N/C	Port31
						4	G4	N/C	Port8
						3	G4	N/C	Port16
						2	G4	N/C	Port24
						1	G4	N/C	Port32

U8989-61608 DAQ M9216A Aux to E8792A Pin Matrix Aux Cable

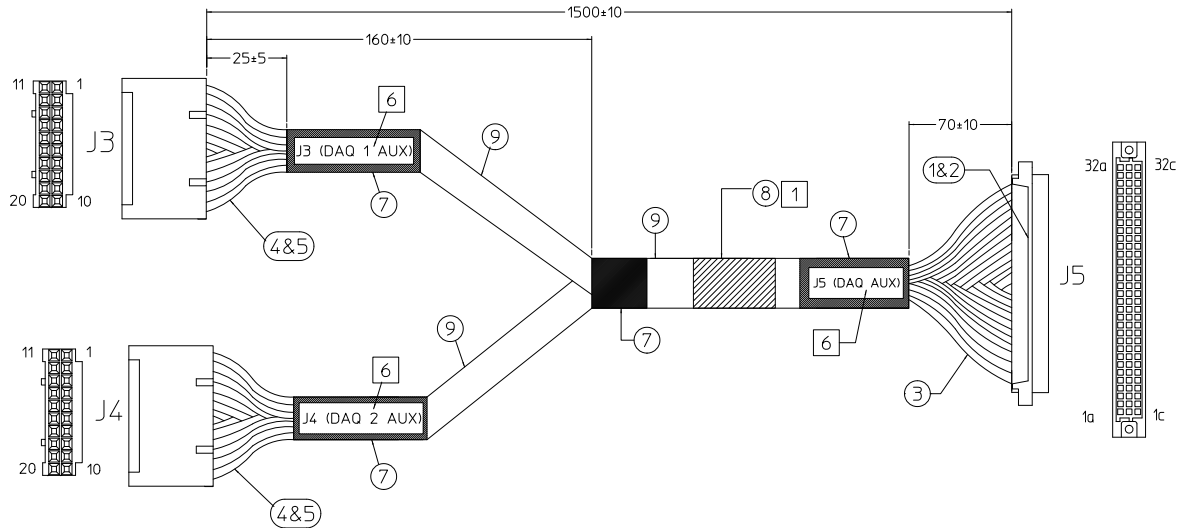


Figure 3-4 U8989-61608 DAQ M9216A aux to E8792A pin matrix aux cable [1]

[1] This cable can connect up to two DAQ modules.

Table 3-3 U8989-61608 cable pinout

J3				J5			
To DAQ Aux Port (DAQ1)				To E879xA Aux			
Pin	Pinout	Pin	Pinout	Pin	a	b	c
20	DAQ1.Aux82	10	DAQ1.Aux72	32	DAQ1.ACOM1	N/C	DAQ1.AUX11
19	DAQ1.Aux81	9	DAQ1.Aux71	31	N/C	N/C	DAQ1.AUX12
18	DAQ1.ACom4	8	DAQ1.ACom3	30	N/C	N/C	DAQ1.AUX21
17	DAQ1.Aux62	7	DAQ1.Aux52	29	N/C	N/C	DAQ1.AUX22
16	DAQ1.Aux61	6	DAQ1.Aux51	28	DAQ1.ACOM2	N/C	DAQ1.AUX31
15	DAQ1.Aux42	5	DAQ1.Aux32	27	N/C	N/C	DAQ1.AUX32
14	DAQ1.Aux41	4	DAQ1.Aux31	26	N/C	N/C	DAQ1.AUX41
13	DAQ1.ACom2	3	DAQ1.ACom1	25	N/C	N/C	DAQ1.AUX42
12	DAQ1.Aux22	2	DAQ1.Aux12	24	DAQ1.ACOM3	N/C	DAQ1.AUX51
11	DAQ1.Aux21	1	DAQ1.Aux11	23	N/C	N/C	DAQ1.AUX52
				22	N/C	N/C	DAQ1.AUX61
				21	N/C	N/C	DAQ1.AUX62
				20	DAQ1.ACOM4	N/C	DAQ1.AUX71
				19	N/C	N/C	DAQ1.AUX72
				18	N/C	N/C	DAQ1.AUX81
				17	N/C	N/C	DAQ1.AUX82
				16	DAQ2.ACOM1	N/C	DAQ2.AUX11
				15	N/C	N/C	DAQ2.AUX12
				14	N/C	N/C	DAQ2.AUX21
				13	N/C	N/C	DAQ2.AUX22
				12	DAQ2.ACOM2	N/C	DAQ2.AUX31
				11	N/C	N/C	DAQ2.AUX32
				10	N/C	N/C	DAQ2.AUX41
				9	N/C	N/C	DAQ2.AUX42
				8	DAQ2.ACOM3	N/C	DAQ2.AUX51
				7	N/C	N/C	DAQ2.AUX52
				6	N/C	N/C	DAQ2.AUX61
				5	N/C	N/C	DAQ2.AUX62
				4	DAQ2.ACOM4	N/C	DAQ2.AUX71
				3	N/C	N/C	DAQ2.AUX72
				2	N/C	N/C	DAQ2.AUX81
				1	N/C	N/C	DAQ2.AUX82

J4			
To DAQ Aux Port (DAQ2)			
Pin	Pinout	Pin	Pinout
11	DAQ2.Aux82	10	DAQ2.Aux72
12	DAQ2.Aux81	9	DAQ2.Aux71
13	DAQ2.ACom4	8	DAQ2.ACom3
14	DAQ2.Aux62	7	DAQ2.Aux52
15	DAQ2.Aux61	6	DAQ2.Aux51
16	DAQ2.Aux42	5	DAQ2.Aux32
17	DAQ2.Aux41	4	DAQ2.Aux31
18	DAQ2.ACom2	3	DAQ2.ACom1
19	DAQ2.Aux22	2	DAQ2.Aux12
20	DAQ2.Aux21	1	DAQ2.Aux11

Table 3-4 U8970-61705 cable pinout

J2			
To DAQ Aux Port (DAQ1)			
Pin	Pinout	Pin	Pinout
20	DAQ1.Aux82	10	DAQ1.Aux72
19	DAQ1.Aux81	9	DAQ1.Aux71
18	DAQ1.ACom4	8	DAQ1.ACom3
17	DAQ1.Aux62	7	DAQ1.Aux52
16	DAQ1.Aux61	6	DAQ1.Aux51
15	DAQ1.Aux42	5	DAQ1.Aux32
14	DAQ1.Aux41	4	DAQ1.Aux31
13	DAQ1.ACom2	3	DAQ1.ACom1
12	DAQ1.Aux22	2	DAQ1.Aux12
11	DAQ1.Aux21	1	DAQ1.Aux11

J3			
To DAQ Aux Port (DAQ2)			
Pin	Pinout	Pin	Pinout
20	DAQ2.Aux82	10	DAQ2.Aux72
19	DAQ2.Aux81	9	DAQ2.Aux71
18	DAQ2.ACom4	8	DAQ2.ACom3
17	DAQ2.Aux62	7	DAQ2.Aux52
16	DAQ2.Aux61	6	DAQ2.Aux51
15	DAQ2.Aux42	5	DAQ2.Aux32
14	DAQ2.Aux41	4	DAQ2.Aux31
13	DAQ2.ACom2	3	DAQ2.ACom1
12	DAQ2.Aux22	2	DAQ2.Aux12
11	DAQ2.Aux21	1	DAQ2.Aux11

J4			
To DAQ Aux Port (DAQ3)			
Pin	Pinout	Pin	Pinout
20	DAQ3.Aux82	10	DAQ3.Aux72
19	DAQ3.Aux81	9	DAQ3.Aux71
18	DAQ3.ACom4	8	DAQ3.ACom3
17	DAQ3.Aux62	7	DAQ3.Aux52
16	DAQ3.Aux61	6	DAQ3.Aux51
15	DAQ3.Aux42	5	DAQ3.Aux32
14	DAQ3.Aux41	4	DAQ3.Aux31
13	DAQ3.ACom2	3	DAQ3.ACom1
12	DAQ3.Aux22	2	DAQ3.Aux12
11	DAQ3.Aux21	1	DAQ3.Aux11

J5			
To DAQ Aux Port (DAQ4)			
Pin	Pinout	Pin	Pinout
20	DAQ4.Aux82	10	DAQ4.Aux72
19	DAQ4.Aux81	9	DAQ4.Aux71
18	DAQ4.ACom4	8	DAQ4.ACom3
17	DAQ4.Aux62	7	DAQ4.Aux52
16	DAQ4.Aux61	6	DAQ4.Aux51
15	DAQ4.Aux42	5	DAQ4.Aux32
14	DAQ4.Aux41	4	DAQ4.Aux31
13	DAQ4.ACom2	3	DAQ4.ACom1
12	DAQ4.Aux22	2	DAQ4.Aux12
11	DAQ4.Aux21	1	DAQ4.Aux11

Table 3-5 U8970-61705 cable pinout

J1					
To E878xA Aux					
Pin	a	b	c	d	e
32	DAQ1.AUX11	DAQ1.ACOM1	N/C	DAQ1.ACOM1	DAQ1.AUX21
31	DAQ1.AUX12	DAQ1.ACOM1	N/C	DAQ1.ACOM1	DAQ1.AUX22
30	DAQ1.AUX31	DAQ1.ACOM2	N/C	DAQ1.ACOM2	DAQ1.AUX41
29	DAQ1.AUX32	DAQ1.ACOM2	N/C	DAQ1.ACOM2	DAQ1.AUX42
28	DAQ1.AUX51	DAQ1.ACOM3	N/C	DAQ1.ACOM3	DAQ1.AUX61
27	DAQ1.AUX52	DAQ1.ACOM3	N/C	DAQ1.ACOM3	DAQ1.AUX62
26	DAQ1.AUX71	DAQ1.ACOM4	N/C	DAQ1.ACOM4	DAQ1.AUX81
25	DAQ1.AUX72	DAQ1.ACOM4	N/C	DAQ1.ACOM4	DAQ1.AUX82
24	DAQ2.AUX11	DAQ2.ACOM1	N/C	DAQ2.ACOM1	DAQ2.AUX21
23	DAQ2.AUX12	DAQ2.ACOM1	N/C	DAQ2.ACOM1	DAQ2.AUX22
22	DAQ2.AUX31	DAQ2.ACOM2	N/C	DAQ2.ACOM2	DAQ2.AUX41
21	DAQ2.AUX32	DAQ2.ACOM2	N/C	DAQ2.ACOM2	DAQ2.AUX42
20	DAQ2.AUX51	DAQ2.ACOM3	N/C	DAQ2.ACOM3	DAQ2.AUX61
19	DAQ2.AUX52	DAQ2.ACOM3	N/C	DAQ2.ACOM3	DAQ2.AUX62
18	DAQ2.AUX71	DAQ2.ACOM4	N/C	DAQ2.ACOM4	DAQ2.AUX81
17	DAQ2.AUX72	DAQ2.ACOM4	N/C	DAQ2.ACOM4	DAQ2.AUX82
16	DAQ3.AUX11	DAQ3.ACOM1	N/C	DAQ3.ACOM1	DAQ3.AUX21
15	DAQ3.AUX12	DAQ3.ACOM1	N/C	DAQ3.ACOM1	DAQ3.AUX22
14	DAQ3.AUX31	DAQ3.ACOM2	N/C	DAQ3.ACOM2	DAQ3.AUX41
13	DAQ3.AUX32	DAQ3.ACOM2	N/C	DAQ3.ACOM2	DAQ3.AUX42
12	DAQ3.AUX51	DAQ3.ACOM3	N/C	DAQ3.ACOM3	DAQ3.AUX61
11	DAQ3.AUX52	DAQ3.ACOM3	N/C	DAQ3.ACOM3	DAQ3.AUX62
10	DAQ3.AUX71	DAQ3.ACOM4	N/C	DAQ3.ACOM4	DAQ3.AUX81
9	DAQ3.AUX72	DAQ3.ACOM4	N/C	DAQ3.ACOM4	DAQ3.AUX82
8	DAQ4.AUX11	DAQ4.ACOM1	N/C	DAQ4.ACOM1	DAQ4.AUX21
7	DAQ4.AUX12	DAQ4.ACOM1	N/C	DAQ4.ACOM1	DAQ4.AUX22
6	DAQ4.AUX31	DAQ4.ACOM2	N/C	DAQ4.ACOM2	DAQ4.AUX41
5	DAQ4.AUX32	DAQ4.ACOM2	N/C	DAQ4.ACOM2	DAQ4.AUX42
4	DAQ4.AUX51	DAQ4.ACOM3	N/C	DAQ4.ACOM3	DAQ4.AUX61
3	DAQ4.AUX52	DAQ4.ACOM3	N/C	DAQ4.ACOM3	DAQ4.AUX62
2	DAQ4.AUX71	DAQ4.ACOM4	N/C	DAQ4.ACOM4	DAQ4.AUX81
1	DAQ4.AUX72	DAQ4.ACOM4	N/C	DAQ4.ACOM4	DAQ4.AUX82

U8989-61628 M9188A Dynamic DAC to Instrument Routing Card

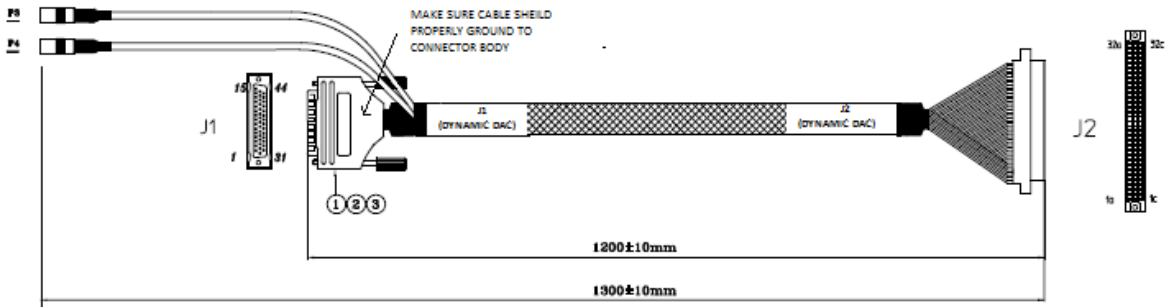


Figure 3-6 U8989-61628 M9188A dynamic DAC to instrument routing card

Table 3-6 U8989-61628 cable pinout

J1					
To DAC Input Port					
Pin	Pinout	Pin	Pinout	Pin	Pinout
		30	DO3	15	DO2
44	GND-PXI	29	DO1	14	DO0
43	+12V-PXI	28	DI3	13	DI2
42	-5V-PXI	27	DI1	12	Chn 16-
41	SelfTest-IN	26	DI0	11	Chn 16+
40	Chn 15-	25	Chn 14-	10	Chn 13-
39	Chn 15+	24	Chn 14+	9	Chn 13+
38	Chn 12-	23	Chn 11-	8	Chn 10-
37	Chn 12+	22	Chn 11+	7	Chn 10+
36	Chn 9-	21	Chn 8-	6	Chn 7-
35	Chn 9+	20	Chn 8+	5	Chn 7+
34	Chn 6-	19	Chn 5-	4	Chn 4-
33	Chn 6+	18	Chn 5+	3	Chn 4+
32	Chn 3-	17	Chn 2-	2	Chn 1-
31	Chn 3+	16	Chn 2+	1	Chn 1+

P3	
Pin	EXT_TRIG
Body	GND

P4	
Pin	EXT_CLK
Body	GND

J2			
To Instrument Routing Connector J1 or J2			
Pin	a	b	c
32	GNDPXi	DI0	Chn 1+
31	GNDPXi	DI1	Chn 2+
30	GNDPXi	DI2	Chn 3+
29	GNDPXi	DI3	Chn 4+
28	GNDPXi	DO0	Chn 5+
27	GNDPXi	DO1	Chn 6+
26	GNDPXi	DO2	Chn 7+
25	GNDPXi	DO3	Chn 8+
24	N/C	SelfTest-IN	Chn 9+
23	N/C	+5V-PXI	Chn 10+
22	N/C	+12V-PXI	Chn 11+
21	N/C	EXT_TRIG	Chn 12+
20	N/C	GND	Chn 13+
19	N/C	EXT_CLK	Chn 14+
18	N/C	GND	Chn 15+
17	N/C	N/C	Chn 16+
16	N/C	N/C	Chn 1-
15	N/C	N/C	Chn 2-
14	N/C	N/C	Chn 3-
13	N/C	N/C	Chn 4-
12	N/C	N/C	Chn 5-
11	N/C	N/C	Chn 6-
10	N/C	N/C	Chn 7-
9	N/C	N/C	Chn 8-
8	N/C	N/C	Chn 9-
7	N/C	N/C	Chn 10-
6	N/C	N/C	Chn 11-
5	N/C	N/C	Chn 12-
4	N/C	N/C	Chn 13-
3	N/C	N/C	Chn 14-
2	N/C	N/C	Chn 15-
1	N/C	N/C	Chn 16-

U8989-61611 VI M9186A to Instrument Routing Card and Pin Matrix Instrument Cable

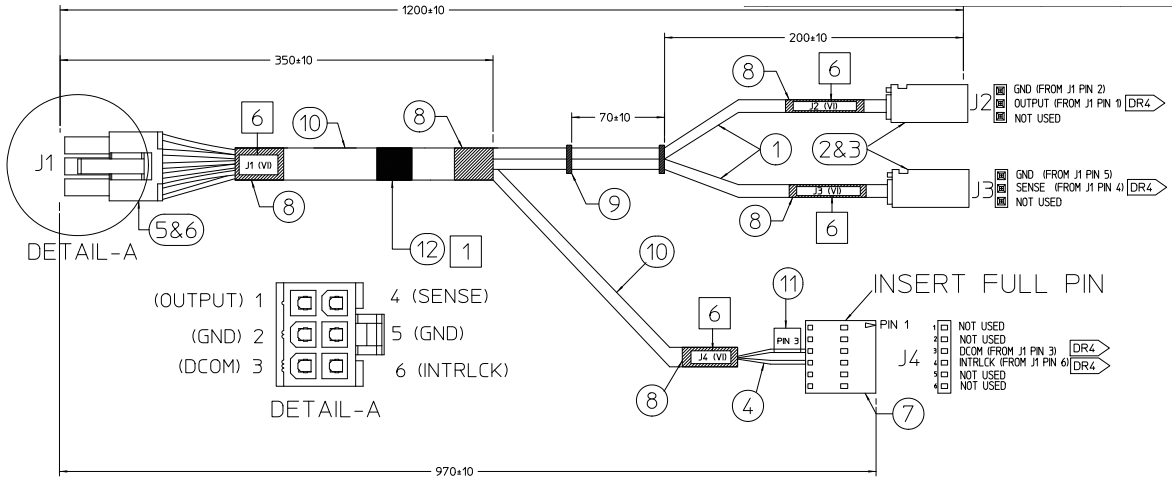


Figure 3-7 U8989-61611 VI M9186A to instrument routing card and pin matrix instrument cable

Table 3-7 U8989-61611 cable pinout

J1			
To VI			
Pin	Pinout	Pinout	Pin
1	DCOM	INTRLCK	4
2	GND	GND	5
3	OUTPUT	SENSE	6

J2		
To Instrument Matrix		
Pin	Pinout	Remark
A	GND	From J1 Pin 2
B	OUTPUT	From J1 Pin 3
C	N/C	

J3		
To Instrument Matrix		
Pin	Pinout	Remark
D	GND	From J1 Pin 5
E	SENSE	From J1 Pin 6
F	N/C	

J4		
To Inst Routing Connector J3		
Pin	Pinout	Remark
6	N/C	
5	N/C	
4	INTRLCK	From J1 Pin 4
3	DCOM	From J1 Pin 1
2	N/C	
1	N/C	

U8989-61610 PCI DIO AD1750 Cable

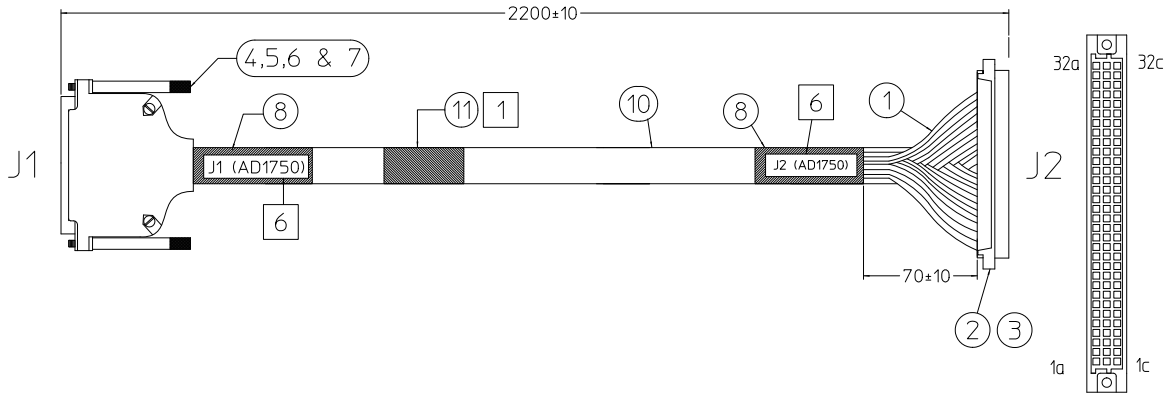


Figure 3-8 U8989-61610 PCI DIO AD1750 cable

Table 3-8 U8989-61610 cable pinout

J1				J2			
To DIO				To Inst Routing Connector J1 or J2			
Pin	Pinout	Pin	Pinout	Pin	a	b	c
1	DI0	20	DI1	32	GND	N/C	DI0
2	DI2	21	DI3	31	GND	N/C	DI1
3	DI4	22	DI5	30	GND	N/C	DI2
4	DI6	23	DI7	29	N/C	N/C	DI3
5	DI8	24	DI9	28	N/C	N/C	DI4
6	DI10	25	DI11	27	N/C	N/C	DI5
7	DI12	26	DI13	26	N/C	N/C	DI6
8	DI14	27	DI15	25	N/C	N/C	DI7
9	GND	28	GND	24	N/C	N/C	DI8
10	COM1	29	GND	23	N/C	N/C	DI9
11	DO0	30	DO1	22	N/C	N/C	DI10
12	DO2	31	DO3	21	N/C	N/C	DI11
13	DO4	32	DO5	20	N/C	N/C	DI12
14	DO6	33	DO7	19	N/C	N/C	DI13
15	DO8	34	DO9	18	N/C	N/C	DI14
16	DO10	35	DO11	17	N/C	N/C	DI15
17	DO12	36	DO13	16	N/C	COM1	DO0
18	DO14	37	DO15	15	N/C	COM1	DO1
19	COM2			14	N/C	COM1	DO2
				13	N/C	COM1	DO3
				12	N/C	COM1	DO4
				11	N/C	COM1	DO5
				10	N/C	COM1	DO6
				9	N/C	COM1	DO7
				8	N/C	COM2	DO8
				7	N/C	COM2	DO9
				6	N/C	COM2	DO10
				5	N/C	COM2	DO11
				4	N/C	COM2	DO12
				3	N/C	COM2	DO13
				2	N/C	COM2	DO14
				1	N/C	COM2	DO15

U8989-61612 PCI Softing CAN (CAN-AC2-PCI) Cable

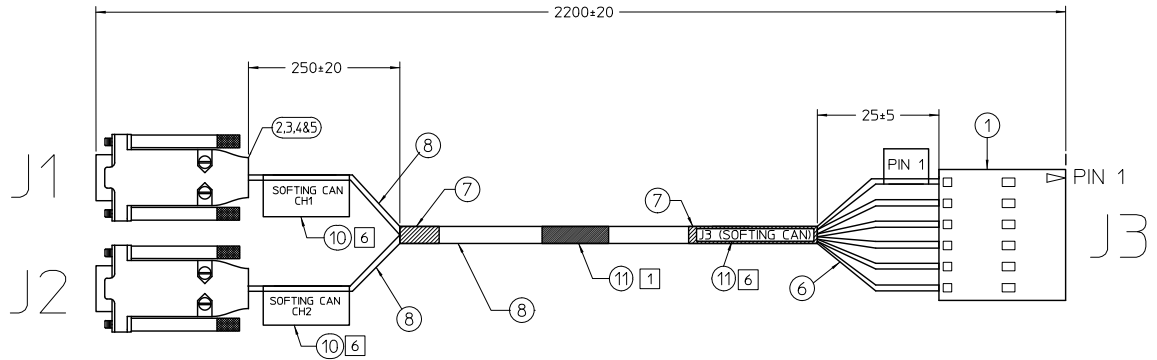


Figure 3-9 U8989-61612 PCI softing CAN (CAN-AC2-PCI) cable

Table 3-9 U8989-61612 cable pinout

J1	
To Softing CAN CH1	
Pin	Pinout
1	N/C
2	CH1.CAN_L
3	N/C
4	N/C
5	N/C
6	CH1.GND
7	CH1.CAN_H
8	N/C
9	N/C

J3		
To Inst Routing Connector J3		
Pin	Pinout	Remark
6	CH1.CAN_H	
5	CH1.CAN_L	
4	CH1.GND	From J1 Pin 6
3	CH2.GND	From J2 Pin 6
2	CH2.CAN_L	
1	CH2.CAN_H	

J2	
To Softing CAN CH2	
Pin	Pinout
1	N/C
2	CH2.CAN_L
3	N/C
4	N/C
5	N/C
6	CH2.GND
7	CH2.CAN_H
8	N/C
9	N/C

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