Keysight Technologies
TS-8989 Automotive Body and Safety Test Reference Solution

Configuration Guide
Introduction

This configuration guide contains information to help you configure your body and safety test reference solution with the TS-8989 functional tester, and tailor the system to meet your requirements. The configuration for this solution primarily uses U8989A which has already a number of pre-configured instruments created for each selection/option, hence the user does not need to consider the individual options of the instruments.

The power supply is configured separately and not included in the U8989A options.

What the solution includes

- 1 x 8-slot PXI chassis
- 1 x 11-slot switch/load chassis

1. This view is referred to as the instrument interface side
2. Embedded PC, PXI cards and switching card are for illustration purposes only. Selections need to be made for the instruments and cards.
A. Selecting the Stimulus Instruments

Recommended stimulus instruments for Body and Safety, Reference Solution indicated below with ■. Not all available instruments from Keysight are shown below. See www.keysight.com/find/pxi for more details on available instruments.

<table>
<thead>
<tr>
<th>Step 1. Select the M9188A Analog Output (occupies 1 PXI slot)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qty 1</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2. Select the M9186A Voltage/Current Source (occupies 2 PXI slot)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qty 1</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
B. Selecting the Measurement Instruments

Recommended measurement instruments for Body and Safety, Reference Solution indicated below with ■. Not all available instruments from Keysight are shown below. See www.keysight.com/find/pxi for more details on available instruments.

### Step 1. Select a digital multimeter for measurements

<table>
<thead>
<tr>
<th>Qty</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>U8989A-311</td>
<td>M9183A-FG PXI Digital Multimeter, 6½ digit, Enhanced Performance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inclusive of cable set that connects the M9183A output to the instrument matrix E8792A/ E8782A</td>
</tr>
</tbody>
</table>

C. Selecting Signal Switching Cards

Signal switching cards enable connection to different pins of the DUT/UUT for the purpose of measurement or supplying signals. The signal switching cards are fitted into the switch/load chassis. Following are the recommendations for Body and Safety, Reference Solution indicated below ■. See www.keysight.com/find/slu for more details on available matrix cards.

### Step 1. Select a signal switching card

(please refer to the diagram below, illustrating the architecture and connection concept of E8782A and E8783A)

<table>
<thead>
<tr>
<th>Qty</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E8782A</td>
<td>Pin Card with Instrumentation Matrix, 1 slot</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 24 channels for instruments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 40 channels for measurement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The E8782A Pin Card is a matrix type switching card, consist of 4 analog BUS lines and a 5th UUT common line, hence 40 x 5.</td>
</tr>
<tr>
<td>1</td>
<td>E8783A</td>
<td>Pin Card Measurement Matrix, 1 slot</td>
</tr>
<tr>
<td></td>
<td></td>
<td>64 channels for measurement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The E8783A Pin Card is a matrix type switching card, consist of 4 analog BUS lines and a 5th UUT common line, hence 64 x 5. The E8783A can be cascaded with the E8782A, expanding the number of channels.</td>
</tr>
</tbody>
</table>

More details of the internal architecture and connection between instruments, matrix cards and load cards to DUT/UUT are illustrated in the TS-8989 System Block Diagram and can be found in the Document Library of www.keysight.com/find/ts8989ref
D. Selecting Load Switching Cards

Load switching cards can be used for the purpose of simulating a load input into the DUT/UUT or as a load output to the DUT/UUT. The load cards are fitted into the switch/load chassis. The following are the recommendations for configuring a Body and Safety, Reference Solution indicated below with ■. Available load cards from Keysight are listed in a table below. See [www.keysight.com/find/slu](http://www.keysight.com/find/slu) for more details on available load cards.

**Step 1. Select a load card to handle current switching**

<table>
<thead>
<tr>
<th>Qty</th>
<th>Load Card</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>U7177A</td>
<td>24-Ch Load Card, 2A, Current Sense Resistor, 1-slot</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Simulating input from discrete switches</td>
</tr>
<tr>
<td>1</td>
<td>U7178A</td>
<td>8-Ch Load Card, 40A, Current Transducer, 2-slots</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Switches input power supply to DUT/UUT and are also able to simulate load effects, for example: motors at high currents</td>
</tr>
<tr>
<td>1</td>
<td>U7179A</td>
<td>16-Ch Load Card, 15A, Current Sense Resistor, 2 slots</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Simulate load effect, for example: lamps at moderate currents</td>
</tr>
</tbody>
</table>

This table provides more description of the load cards:

<table>
<thead>
<tr>
<th>Function</th>
<th>E6175A</th>
<th>E6176A</th>
<th>E6177A</th>
<th>E6177A</th>
<th>E6178A</th>
<th>E6178A</th>
<th>N9377A</th>
<th>N9378A</th>
<th>N9379A</th>
<th>U7178A</th>
<th>U7179A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Channels (maximum)</td>
<td>8</td>
<td>16</td>
<td>24</td>
<td>24</td>
<td>8</td>
<td>16</td>
<td>24</td>
<td>48</td>
<td>8</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Number of channels – unshared relays</td>
<td>4</td>
<td>16</td>
<td>24</td>
<td>24</td>
<td>8</td>
<td>16</td>
<td>24</td>
<td>48</td>
<td>8</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Maximum current per channel</td>
<td>7.5 A (15 A peak)</td>
<td>7.5 A (15 A peak)</td>
<td>2A</td>
<td>2A</td>
<td>30A</td>
<td>7.5 A (15A peak)</td>
<td>2A</td>
<td>2A</td>
<td>40A</td>
<td>15A</td>
<td></td>
</tr>
<tr>
<td>Current measuring with sense resistor</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Current measuring with current transducer</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Fly-back protection available (user installed)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Engineered for application</td>
<td>Inductive Load</td>
<td>Common Load</td>
<td>Low current</td>
<td>Low Current</td>
<td>High Current</td>
<td>High current, dual-load</td>
<td>Low current, quad load</td>
<td>Low current, quad load</td>
<td>High Current</td>
<td>High Current</td>
<td></td>
</tr>
</tbody>
</table>
E. Selecting the Cable Management

Recommended options for Body and Safety, Reference Solution indicated below with ■.

**Step 1. Select Instrumentation Routing Card**

<table>
<thead>
<tr>
<th>Qty</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>U8989A-I01</td>
<td>Universal Instrumentation Routing Card. The routing card is designed to connect the PXI and PCI modules from the instrument interface side to the DUT interface side.</td>
</tr>
</tbody>
</table>

For more information on the instrument routing card, please refer to the TS-8989 PXI Functional Test System Wiring Guide and Hardware Reference manual that can be found in the Document Library on [www.keysight.com/find/ts8989](http://www.keysight.com/find/ts8989).

F. Selecting the Controller, Display and Software

Recommended options for Body and Safety, Reference Solution indicated below with ■.

**Step 1. Select a Controller**

<table>
<thead>
<tr>
<th>Qty</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1   | U8989A-PC1  | TS-5000 External Industrial PC Controller  
- Core i5-2400 3.1 GHz Processor  
- 8 GB RAM, 500 GB HDD  
- No DVD-RW and FDD  
- PCIe-8560/PXI-8565 PCIe-to-PXI expansion  
- Windows 7 64-bit, TestExec SL v7 software with TS-5000 v7 library |
| 1   | U8989A-PC2  | TS-5000 Embedded PC controller  
- Core i7 2.1GHz processor  
- 8 GB S-DIMM  
- 500 GB HDD SATA  
- 2x Gigabit Ethernet ports  
- 4x USB 2.0 ports  
- 2x USB 3.0 ports with Built-in GPIB controller  
- Windows 7 64-bit, TestExec SL v7 software with TS-5000 v7 library |

**Step 2. Select Display** - The display has been selected below. It is an option, and customer can choose to run their own display. Cabling is not provided. The Embedded PC Controller supports dual display with VGA + DVI connections.

<table>
<thead>
<tr>
<th>Qty</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E6249A-012</td>
<td>Standalone LCD Display</td>
</tr>
</tbody>
</table>

G. Selecting the Power Supplies

Recommended options for Body and Safety, Reference Solution indicated below with ■.

**Step 1. Configure the N6951A Advance Power System**

<table>
<thead>
<tr>
<th>Qty</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1   | N6951A      | Advanced Power System – DC Power Supply  
- 20 V, 50 A, 1000 W |
| 1   | N6951A-UK6  | Commercial calibration certificate with test data |

Additional 3rd Party Instrument / Accessories

Automotive Electronic Communication

One of the key requirements for automotive electronic testing is the ability to talk / communicate with the DUT/UUT. CAN is one of the most common methods used. There are multiple suppliers of CAN PXI Cards to choose form, with users having a preferred supplier.
Reference Solution Diagram

SLU E8782A + PXI M9183A
- Switching for all test nodes
- All voltage/current measurement
- All resistance measurement

Power Supply N6702A/N6951A
- Power Up DUT
- Voltage/current source, force voltage/current with measureable sense resistor
- Pin check → open short and leakage test

PXI M9186A
- Various multiple automotive sensor signal emulation – up to frequency ~50 kHz
- Dynamic voltage/current source to emulate the corresponding change of hall effect or magnetic field sensors.

SLU U7177A
- Discrete input switches simulation
- 2A load card with current sense capability

SLU E6176A, U7178A, U7179A
- Various load card for simulation of load effect (motors, lamps, etc.) using resistive/inductive load
- Establish low side, high side or bridge load driver
- Current handling up to 40 A with sense capability

Select Services
No selection required.

All parts under the U8989A is covered, including the M9186A, M9183A, E8782A, E8783A, U7177A, U7178A, U7179A, U8989A-PC2 and all accompanying options that will be highlighted in the official quote.
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