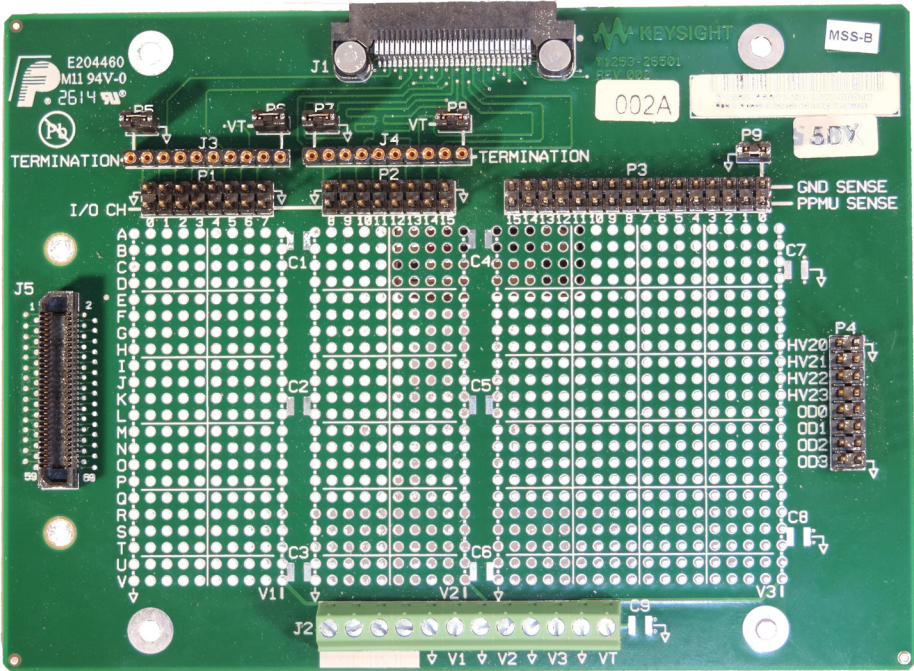


Keysight Y1253A Evaluation and Prototyping Kit



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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 or operating instructions in the product manuals 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.

General

Do not use this product in any manner not specified by the manufacturer. The protective features of this product must not be impaired if it is used in a manner specified in the operation instructions.

Before Applying Power

Verify that all safety precautions are taken. Make all connections to the unit before applying power. Note the external markings described under "Safety Symbols".

Ground the Instrument

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.

Do Not Operate in an Explosive Atmosphere

Do not operate the module/chassis in the presence of flammable gases or fumes.

Do Not Operate Near Flammable Liquids

Do not operate the module/chassis in the presence of flammable liquids or near containers of such liquids.

Cleaning

Clean the outside of the Keysight module/chassis with a soft, lint-free, slightly dampened cloth. Do not use detergent or chemical solvents.

Do Not Remove Instrument Cover

Only qualified, service-trained personnel who are aware of the hazards involved should remove instrument covers. Always disconnect the power cable and any external circuits before removing the instrument cover.

Keep away from live circuits

Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers and shields are for use by service-trained personnel only. Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, DO NOT perform procedures involving cover or shield removal unless you are qualified to do so.

DO NOT operate damaged equipment

Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to an Keysight Technologies Sales and Service Office for service and repair to ensure the safety features are maintained.

DO NOT block the primary disconnect

The primary disconnect device is the appliance connector/power cord when a chassis used by itself, but when installed into a rack or system the disconnect may be impaired and must be considered part of the installation.

Do Not Modify the Instrument

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Keysight Sales and Service Office to ensure that safety features are maintained.

In Case of Damage

Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel

CAUTION

Do NOT block vents and fan exhaust: To ensure adequate cooling and ventilation, leave a gap of at least 50mm (2") around vent holes on both sides of the chassis.

Do NOT operate with empty slots: To ensure proper cooling and avoid damaging equipment, fill each empty slot with an AXle filler panel module.

Do NOT stack free-standing chassis: Stacked chassis should be rack-mounted.

All modules are grounded through the chassis: During installation, tighten each module's retaining screws to secure the module to the chassis and to make the ground connection.

WARNING

Operator is responsible to maintain safe operating conditions. To ensure safe operating conditions, modules should not be operated beyond the full temperature range specified in the Environmental and physical specification. Exceeding safe operating conditions can result in shorter lifespan, improper module performance and user safety issues. When the modules are in use and operation within the specified full temperature range is not maintained, module surface temperatures may exceed safe handling conditions which can cause discomfort or burns if touched. In the event of a module exceeding the full temperature range, always allow the module to cool before touching or removing modules from the chassis.

Safety Symbols

CAUTION

A CAUTION denotes a hazard. It calls attention to an operating procedure or practice, 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.



This symbol represents the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of this product.

WARNING

A WARNING denotes a hazard. It calls attention to an operating procedure or practice, 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.



Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC

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

Products display the following symbols:



Warning, risk of electric shock



Refer to manual for additional safety information.



Earth Ground.



Chassis Ground.



Alternating Current (AC).



Standby Power. Unit is not completely disconnected from AC mains when switch is in standby.



Antistatic precautions should be taken.



Product Category: With reference to the equipment types in the WEEE directive Annex 1, this product is classified as a "Monitoring and Control instrumentation" product.

Do not dispose in domestic household waste.

To return unwanted products, contact your local Keysight office for more information.

For localized Safety Warnings, Refer to Keysight Safety document (p/n 9320-6792).

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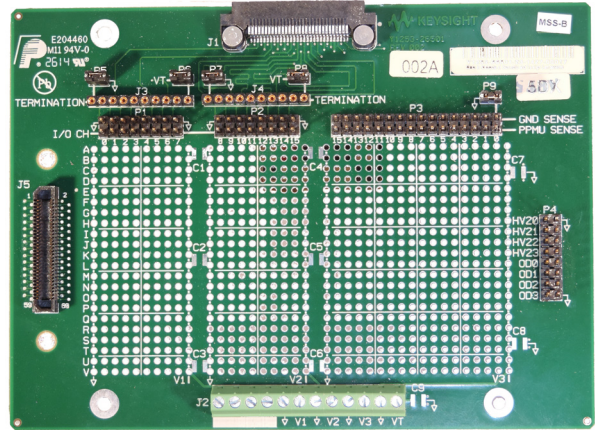
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Y1253A Evaluation and Breadboard Kit User Guide

Introduction

Keysight's Y1253A provides a connector block and prototyping area for the M9195A/B Digital Stimulus/Response module (DSR) and other modules. This kit provides the following:

- One prototyping board circuit board (breadboard).
- Connection for a Single Site Cable (Y1245A, Y1246A, or Y1247A cable, not included in kit).
- Termination sockets for the Channel IO pins located close to the breakout header.
- Dual 2x8 signal header pins for the 16 channels and associated grounds.
- 2x16 Sense header pins for the 16 PPMU sense high lines.
- Ground Sense lines go to a jumper so that you can connect to the board ground if desired.
- 2x8 header pins for the High Voltage (HV) and open-drain (OD) relay drive pins with 8 ground pins.
- Breadboarding area 5800 cm² (9 in²). Power and ground strips are available in the breadboard area. The breadboard area provides standard 1/10 inch spacing. This area does not include the portion of the circuit board required by the interface and power components.
- 12 pin terminal block for up six power supplies.



This guide describes how to set up and use the Evaluation and Prototyping Kit.

What is included in the Kit

- One Y1253A Prototyping PC Board

What you need to get Started

- One Keysight M9195A/B Digital Stimulus/Response module (DSR).*
- One Y1245A, Y1246A or Y1247A Single Site Signal cable
- Software such as the Soft Front Panel software for the M9195A/B

Other items you may find useful:

- Various resistors and capacitors for breadboarding. 10-pin in-line resistor networks for pull-up/pull-down and series termination.
- Header receptacles (2x16 and 2x8)
- 30 AWG silver-plated copper wire with Kynar™ insulation in a variety of colors and a wire-wrap tool
- One or more DC power supplies. Up to four may be used.

Related Documentation

The M9195A/B Startup Guide and the documentation listed below are on the M9195A/B Software and Product Information CD and at the following website:

www.Keysight.com/find/Y1253A (go to **Document Library > Manuals**).

- M9195A/B Soft Front Panel help system (provides complete operational information)
- M9195A/B device driver API help systems (IVI-C/IVI-COM and LabVIEW G)
- M9195A/B specifications (Data Sheet)

* The M9195A/B must be installed in a suitable PXIe chassis such as the M9018A and controlled by a host controller.

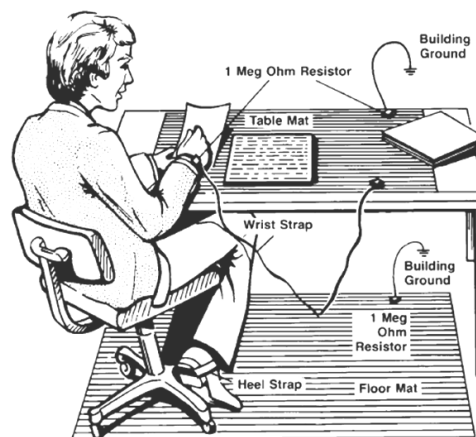
Electrostatic Discharge

There are no active components on the prototyping board. However, as you design and build circuitry on the breadboard area, you should use proper electrostatic discharge (ESD) precautions.

Electrostatic discharge (ESD) can damage or destroy electronic components. All work on electronic assemblies should be performed at a static-safe work station. The following figure shows an example of a static-safe work station using two types of ESD protection. Purchase acceptable ESD accessories from your local supplier.

- Conductive table-mat and wrist-strap combination.
- Conductive floor-mat and heel-strap combination.

Both types, when used together, provide a significant level of ESD protection. Of the two, only the table-mat and wrist-strap combination provides adequate ESD protection when used alone. To ensure user safety, the static-safe accessories must provide at least 1 M Ω of isolation from ground.



Soldering to the breadboard and termination pads, etc may be required.

Connecting to the M9195A/B Digital Stimulus/Response module

- 1 Install the M9195A/B Digital Stimulus/Response (DSR) in a PXIe chassis. Refer to the M9195A/B Startup Guide for installation information, initial turn-on and verification, etc.

CAUTION

Before connecting the cable, remove all power from the M9195A/B module and all other connected hardware.

NOTE

Optionally, you may want to run the M9195A/B Self Test (from the Soft Front Panel) to verify that the host computer can communicate with the DSR and that it is functioning.

- 2 Use a Keysight Y1245A 0.5 meter cable, Y1246A 1-meter cable or Y1247A 2-meter cable to connect the Keysight M9195A/B Digital Stimulus/Response (DSR) to J1 of the prototyping board.
- 3 Connect the Y1245A, Y1246A or Y1247A cable to the J1 connector on the Y1253A Breadboard.
- 4 Power-up the PXIe chassis with the M9195A/B DSR module.
- 5 Power-up the host computer.

Channel Pinout

All of the signals from the M9195A/B are available on the Y1253A breadboard. It is beyond the scope of this guide to fully describe the various signals and their use. Refer to the M9195A/B Startup Guide and M9195A/B User Guide for detailed user information about the various signals. The table on the next page shows the pin-out of the P1, P2, and P3 connectors on the breadboard as they relate to the channel connector on the M9195A/B DSR module.

You can use the M9195A/B Soft Front Panel (SFP) software to control/monitor the signal channels.

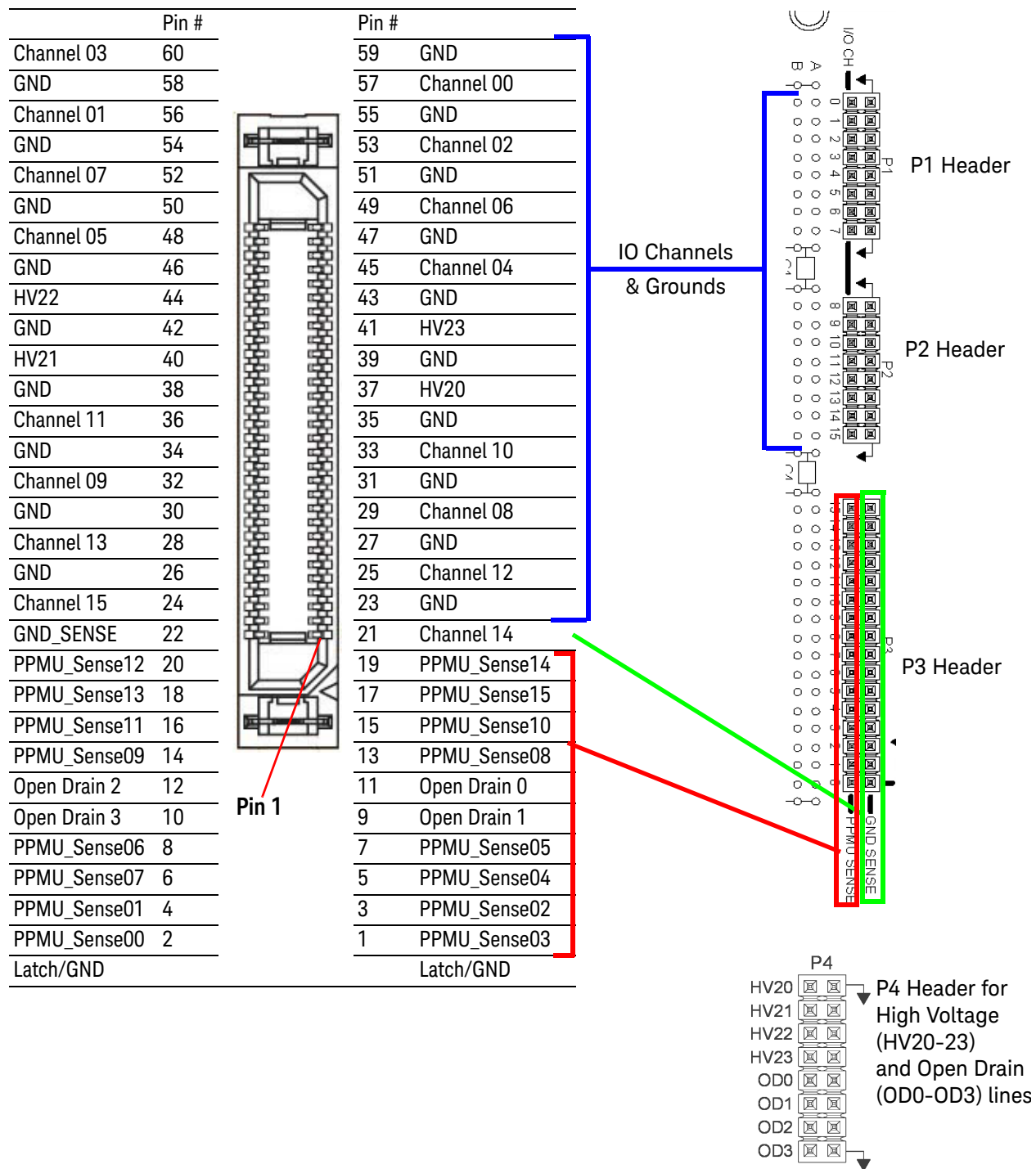
CAUTION

Before powering down the M9195A/B DSR module, always remove power from any prototyping area of the Y1253A prototyping board.

CAUTION

Connections that exceed any of the maximum ratings of the M9195A/B DSR or the Y1253A prototyping board may damage the module or breadboard. Maximum input ratings are provided in the specifications section of this guide and in the M9195A/B Data Sheet.

Connecting to the M9195A/B Digital Stimulus/Response module



Loopback Connections

The Y1253A breadboard is a great way to make loopback connections for testing and experimentation purposes. A loopback connection involves using one IO channel as an output that is connected to another IO channel used as an input. A ribbon cable or header receptacles can be used to connect one channel to another for loopback testing.

Using 1x2 Header Receptacles

Each channel and ground header pair or PPMU Sense and ground header pair is labeled on the Y1253A breadboard (see also [Figure 1](#)). These header pairs are arranged so that you can make quick connections using a 1 × 2 header receptacle to a coaxial cable assembly.

NOTE

Header receptacle assemblies are not included with the Y1253A kit. Create custom assemblies by purchasing parts from various vendors

Connectivity to the channel and ground header pair or PPMU Sense and Ground header pairs is made by inserting the header receptacle onto the appropriate header pair.



Figure 2 1x2 Header Receptacle with wires

Using a Ribbon Cable

You also can use ribbon cables to easily connect the channel and ground header pairs or PPMU Sense and ground header pairs to other devices. Cable type and quality can dramatically affect how well the signal integrity is maintained. Keysight recommends that you use short twisted-pair ribbon cables.

Using Wire-Wrap

Wire wrapping is great for prototypes because it's easy to make point-to-point connections and to repair them. Wire wrapped connections are more reliable than soldered connections because of the amount of contact the wire makes with the post. On a square post, a single turn of wire makes four contacts with the post at the corners. A properly made wire wrap connection will have 0.5 to 1.5 turns of insulated wire at the bottom serving as a strain relief (also called modified wrap) and have six to seven turns of stripped silver-plated wire wrapped around the post, essentially making 24 to 28 air-tight connections.

Terminating Signals

Termination of high-speed digital signals is necessary to prevent signal reflections and to force signal channels to a known state when no signal is present. Sockets for terminating resistors are connected to all Channel IO lines and control channels. These sockets are labeled in Figure 1.

Note Proper termination needs are application-specific. For some special considerations for choosing resistor values, refer to the Terminating Control Channel Signals section.

Minimizing the Effects of Stubs

Stubs are unterminated tributaries from the original signal path. Stubs decrease the signal quality of the system by adding reflections to the transmission channels. To minimize the effect of stubs, termination is placed at the end of the signal path.

If your signal transmission line ends on the breadboard, you can use the provided termination socket. If your signal terminates somewhere other than the breadboard, we recommend terminating the transmission line at the final signal destination.

Terminating IO Channel Signals

You can use different resistor networks and jumper placements to terminate the channels in multiple configurations.

Figure 3 shows the P1/P2 connectors and their Ground/VT jumpers. P5 provides a ground termination for pin 1 of the J3 Termination pads. P6 provides a pull-up from pin 10 of J3 to VT. Likewise, P7 provides a ground termination for pin 1 of the J4 Termination pads and P8 provides a pull-up from pin 10 of J4 to VT. Make certain you remove or place the jumpers as necessary for the pull-up/pull-down type of termination you need.

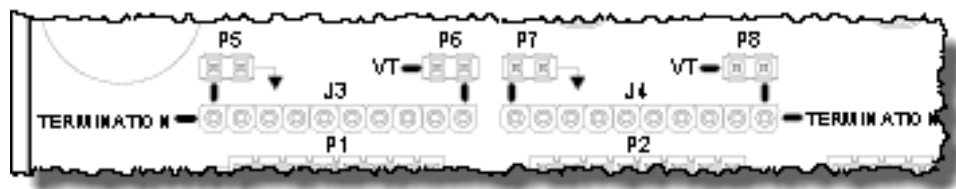


Figure 3 Y1253A Resistor Termination pads

Parallel Termination

Figure 4 shows a typical parallel resistor network. Refer to the resistor network manufacturer documentation for information on proper pin labeling and resistor values.

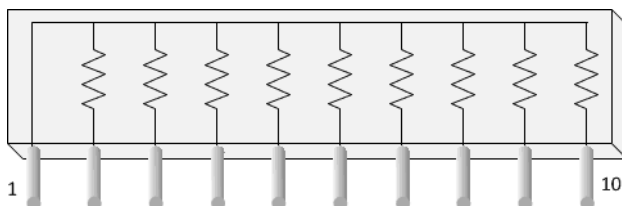


Figure 4 Typical 10-pin Parallel Resistor Network

Providing Pull-Down Termination Insert the 10-pin parallel resistor network into the appropriate termination pads (J3 or J4) on the breadboard with the common pin of the resistor network (pin 1 in Figure 4) connected to pin 1 of the termination pads. Make certain the P5 and P7 jumpers are in place and that P6 and P8 jumpers are removed.

Providing Pull-Up Termination Insert the 10-pin parallel resistor network into the appropriate termination pads (J3 or J4) on the breadboard with the common pin of the resistor network (pin 1 in Figure 4) connected to pin 10 of the termination pads. Make certain the P5 and P7 jumpers are removed and that P6 and P8 jumpers are in place. You will need to provide a pull-up voltage to the VT terminals.

Dual Termination

In some applications, you might need to provide a dual (sometimes known as a Thevenin) termination. Figure 5 shows a typical dual-termination resistor network.

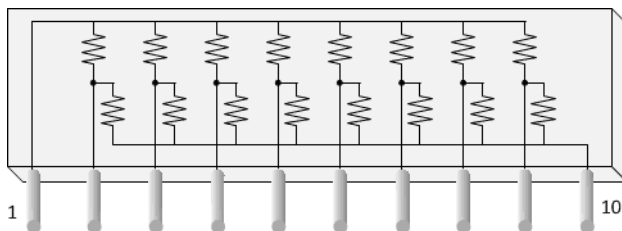


Figure 5 Typical Dual-Termination Resistor Network

To use this configuration, insert the 10-pin resistor network into J3 or J4 pads. Make connections to ground using jumpers P5 and P7 and connections to VT using jumpers P6 and P8 are in place.

Header P4 Connection to the High Voltage Pins

Header P4 has four high voltage signals (HV20 - HV23) which are suitable for use in flash programming memory devices.

CAUTION

Connections that exceed any of the maximum ratings of the M9195A/B DSR or the Y1253A prototyping board may damage the module or breadboard. Maximum ratings are provided in the specifications section of this guide and in the M9195A/B Data Sheet.

Header P4 Connection to the Relay Drive Pins

Header P4 also has four Open Drain Auxiliary Output channels (OD0 - OD3) connect to circuits on the M9195A/B suitable for driving relays. It is beyond the scope of this document to provide design requirements for the open-drain outputs. [Figure 6](#) provides a simplified circuit diagram for the outputs. These outputs are suitable for configuring relays on a Device Under Test (DUT) interface board. Note that you must provide the pull-up voltage and the pull-up resistor.

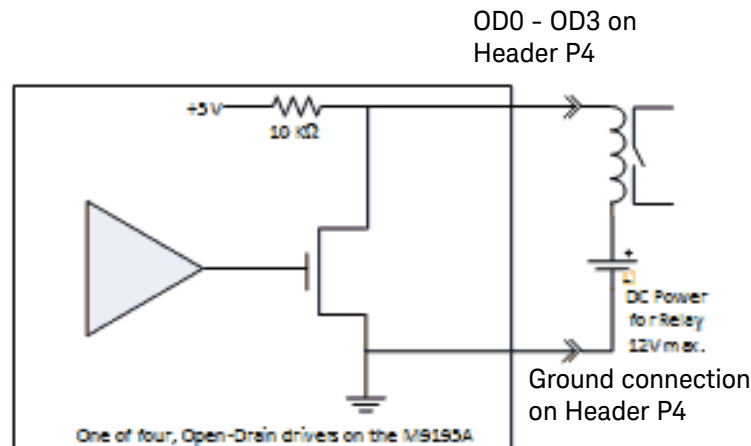


Figure 6 Open drain auxiliary output circuitry

NOTE

These four Open Drain lines are called Auxiliary Output Control channels on the M9195A/B Soft Front Panel.

CAUTION

Connections that exceed any maximum ratings of the M9195A/B DSR or the Y1253A prototyping board may damage the M9195A/B or the prototyping board.

Using the Y1253A Evaluation and Prototyping Kit Breadboarding Area

The Y1253A kit is designed to assist you in prototyping and circuit testing. Use the Y1253A with an with the M9195A/B Digital Stimulus/Response module for:

- prototyping, evaluating, and testing custom circuits and/or components,
- custom interfaces to other cables or devices.
- or for prototyping a DUT load board.

The prototyping area is labeled in Figure 1.

Component height/lead length

There are no protective covers for the prototyping board. Therefore, there are no restrictions on component height above the prototyping board. However, the maximum component lead length allowed below the prototyping board should not exceed 1.3 mm (0.05 in). See [Figure 7](#) below.

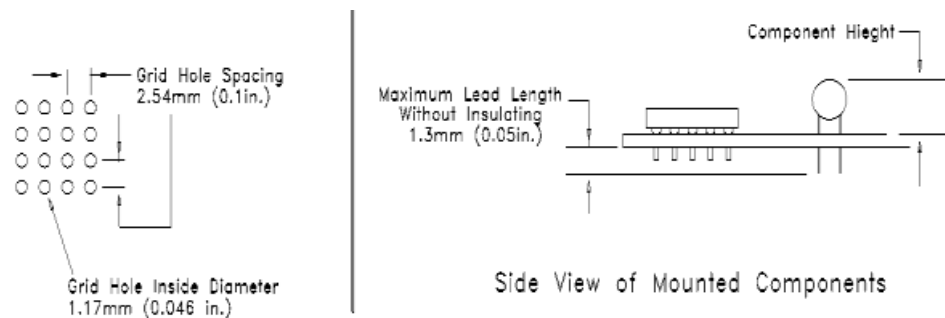


Figure 7 Component Height and Lead Length

Connecting Power to the Prototyping Board

The Y1253A has provisions for up to four external DC power Supplies. Refer to [Figure 8](#). Pads are provided for nine surface-mount filter capacitors (C1-C9).

CAUTION

Do not exceed the maximum specifications of the Y1253A. Refer to the Specifications section for the acceptable voltage ranges.

NOTE

You may want to add a resistor and LED to the power supply connections to indicate when power is applied to the breadboard.

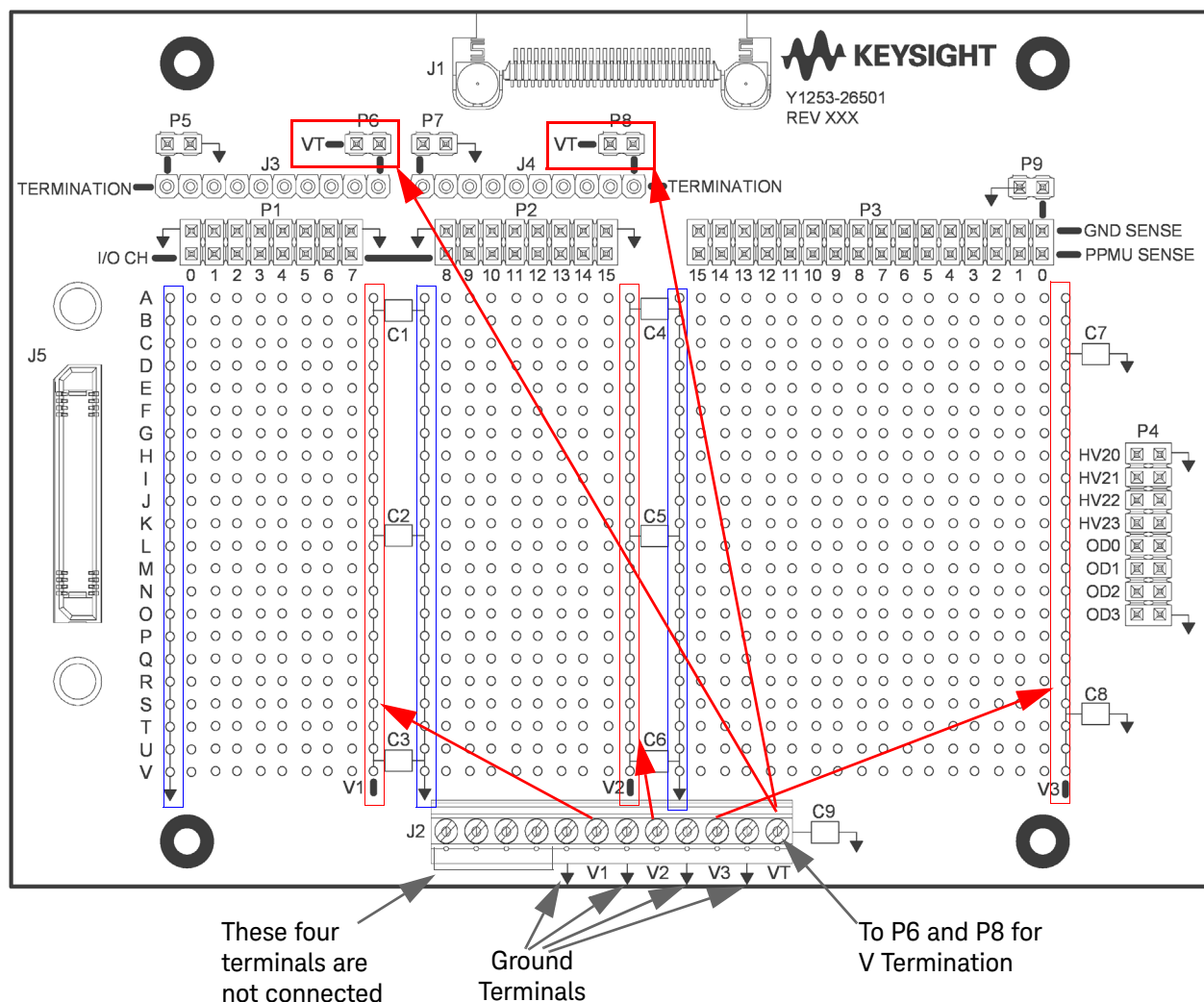


Figure 8 Connecting External DC Power Supplies to J2

Figure 8 shows the green power supply screw terminals for the Y1253A. Power (V1, V2, and V3) and ground solder pads are available in the breadboarding area. The VT terminals provide Pull-up voltage for the channel termination networks (J3 and J4). VT may be applied or removed using jumpers P6 and P8. Likewise, the ground may be connected or removed using jumpers P5 and P7.

Prototyping Area

The prototyping area of the Y1253A prototyping board consists of 880 through-hole solder pads—748 isolated pads for component mounting and wire connections, 22 pads connected to V1, 22 pads for V2, 22 pads for V3, and 66 pads connected to ground—and space for gluing surface-mount components.

Refer to the Specifications section of this guide for information on the voltage limitations on circuits created in the prototyping area.

Specifications

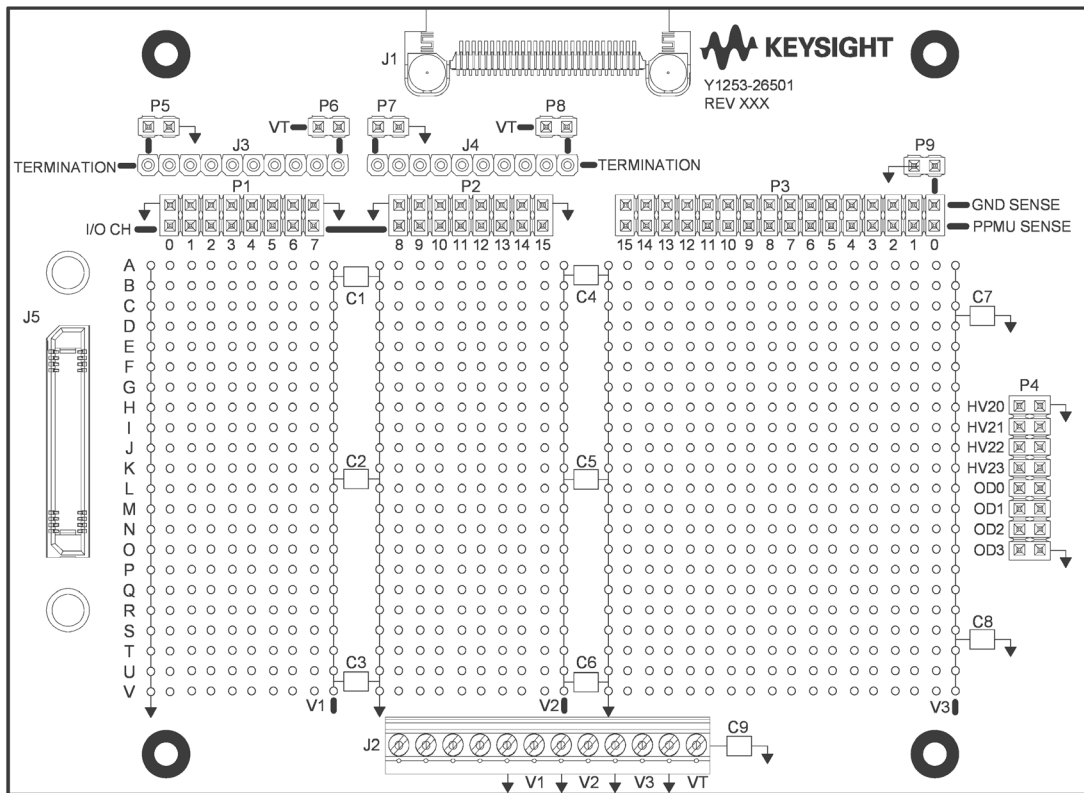
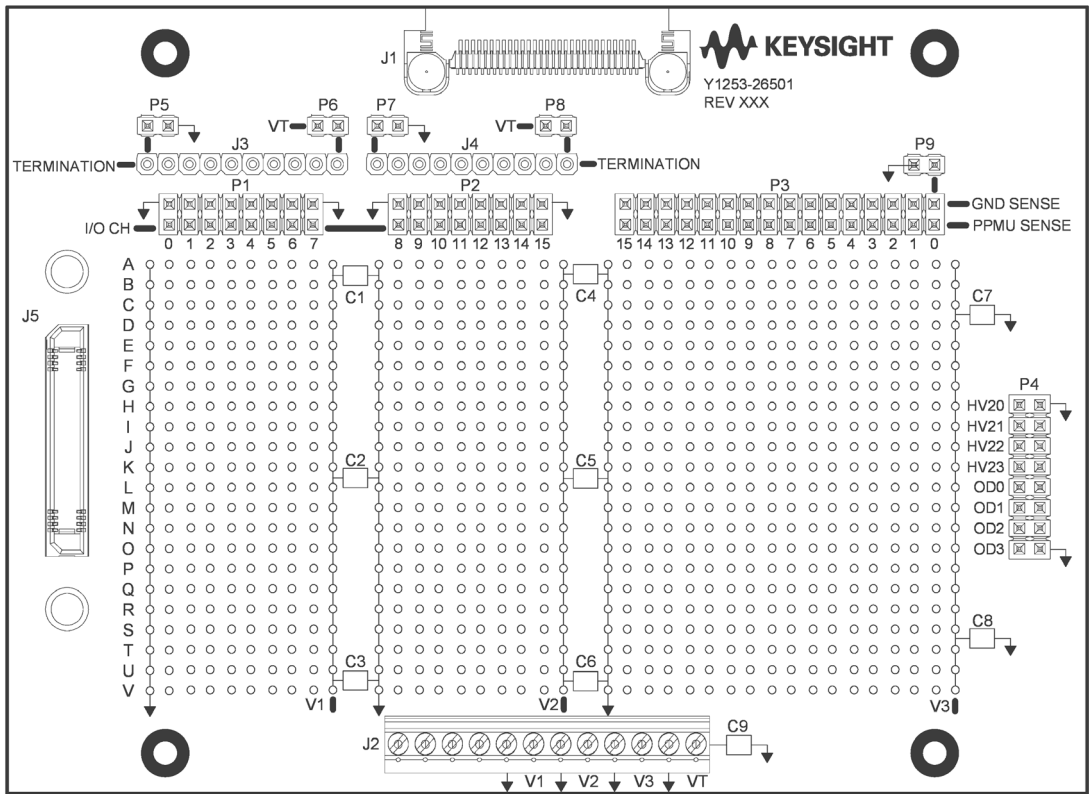
Module Dimensions: 4 in x 5.5 in (101.6 mm x 139.7 mm)

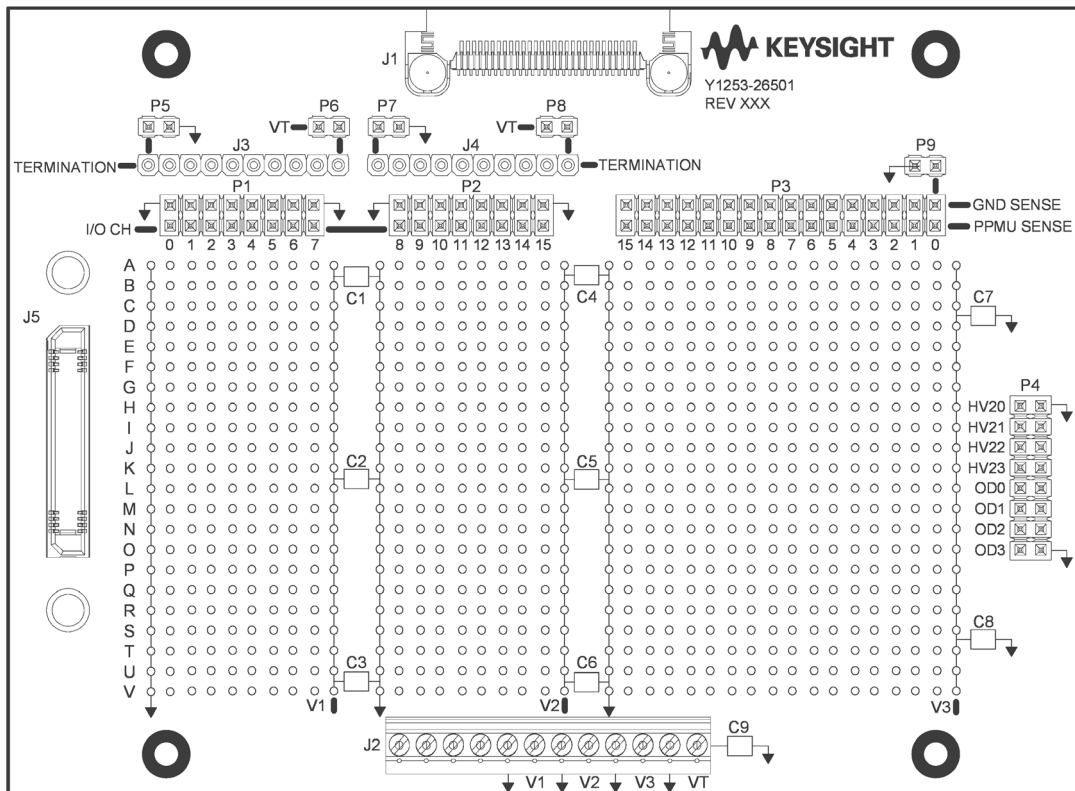
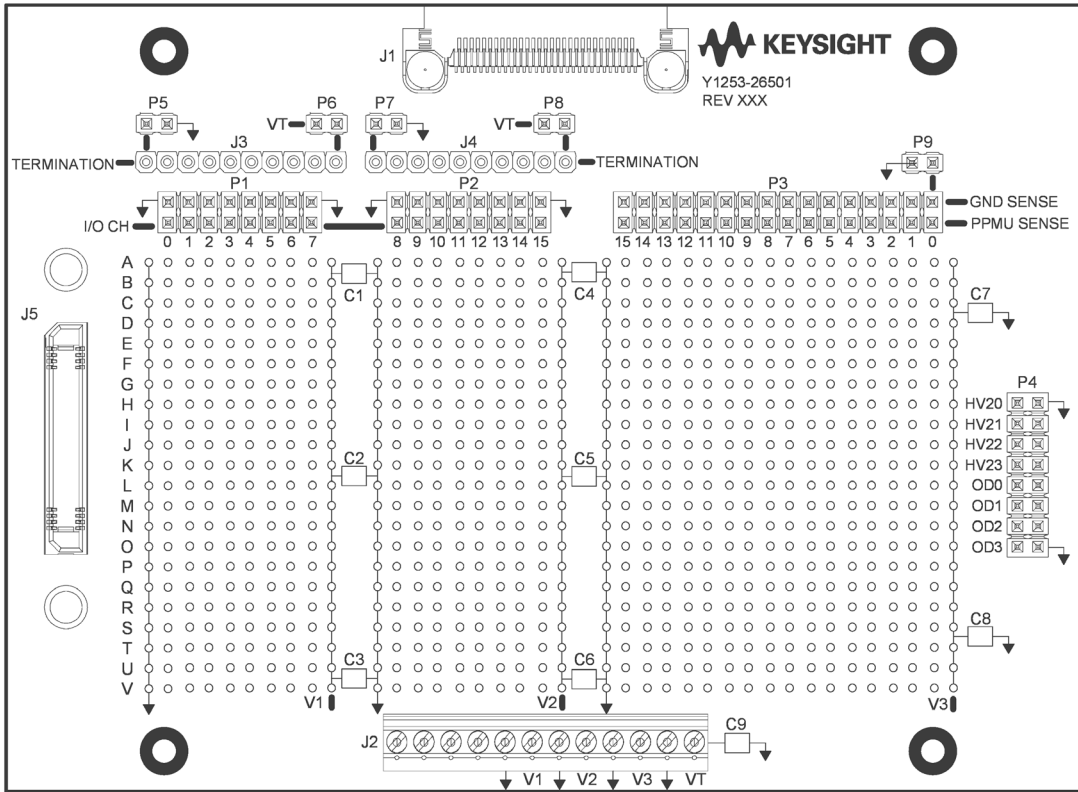
Product Warranty

To find warranty information on your Y1253A Kit, go to www.Keysight.com/find/warranty and enter your model number in the **Product Number** field.

PC Board Layout

The following pages provide full-size templates for you to use when arranging and placing components in the breadboarding area. You may photocopy these pages and use them as necessary.







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