

Keysight Technologies

U2351A DAQ

DC-to-DC Regulator

Auto Evaluation Test

Application Note

The aim of this application note is to trigger the change in voltage manually at a controlled environment using the U2351A. This helps to determine the high and low margin of which the DUT can function normally.





Introduction

Voltage regulation is a crucial point to consider when one designs an electronics system. Voltage regulation can cause electronics system to become unstable and may cause system shutdown or failure.

The Keysight Technologies, Inc. U2351A data acquisition (DAQ) is used as an automatic DC voltage regulator in this application. The U2351A is used to induce voltage into the electronics system thereby causing an amount of under voltage or over voltage stress to the device under test (DUT). Therefore, when adding a certain plug-and-play device to the system, it is important to know if the DUT can maintain stability if the voltage varies.

Operation Principle

This test system is used for DC-to-DC voltage regulation. The U2351A analog output channel (U2351A_Vout) provides voltage control biasing for the DUT, whereas the analog input channel (U2351A_Vmon) is used to monitor the DUT's overall total voltage level. The U2351A is controlled through the PC using the customized console automation user interface developed and written with Keysight VEE Pro 8.5.

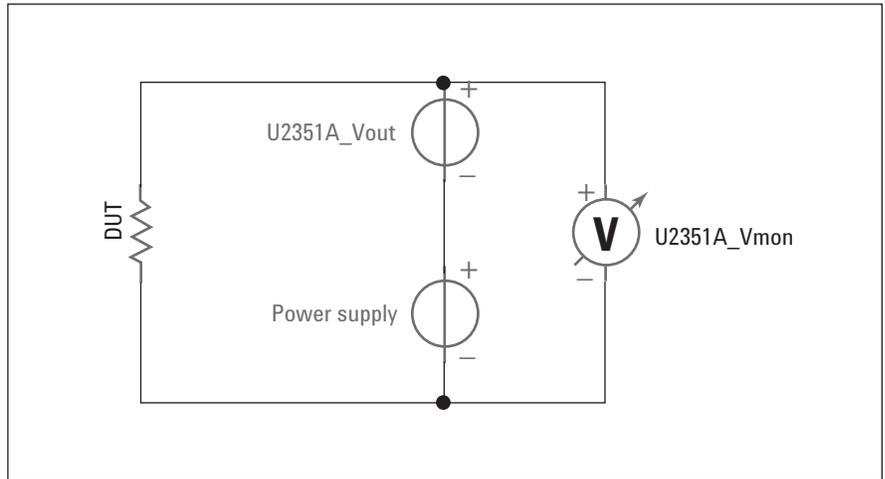


Figure 1. Schematic circuit for U2351A connectivity with DUT

The target voltage provided to the DUT (V_{DUT}) can be calculated using the following equation, where the U2351A_Vmon is indicated by VR_x while U2351A_Vout is indicated by VR_y .

$$V_{DUT} = VR_x - (VR_y/10)$$

In order to adjust the margin for the DUT, the VR_y of the U2351A is varied. A feedback loop is formed to decrease or increase the voltage into the DUT by coupling it with the U2351A_Vmon. For example, if the voltage of 1.2 V at VR_x needs to be increased to 1.3 V, then setting the VR_y to -1 V of the U2351A will allow you to get this value, thanks to the Keysight U2351A's capability to allow bipolar setting of voltage output from -10 V to +10 V.

System Configuration

The DUT is connected to the PS2 socket module, which is linked to six U2351A DAQs that are inserted in the U2781A Chassis. USB 2.0 cable is used to connect the chassis to the computer for access to the user interface and test controls.

The function of each product is described below:

U2351A DAQ	This product comes with two analog output channels and 16 channels of analog input. For this application, two analog outputs are paired with two analog inputs to form a system for testing two DUTs together.
U2781A Chassis	This product holds up to six U2351A DAQs at the same time, providing the maximum of 12 channels to do the testing on DUTs.
PS2 Socket	This product provides connection to U2351A's 68 pin SCSI-II. Each module has two sockets connecting to two analog inputs/outputs of the U2351A DAQ.
Console automation user Interface	This product enables the control, regulation, and monitoring of DUT voltage changes. It also provides the following functions: a) Upper/lower limit setting and monitoring before test to prevent DUT damage. b) Auto detection of available channels for testing. c) Input ratio percentage, steps, and step duration, as well as step up/down cycling in a number of tests, with voltage monitoring included.

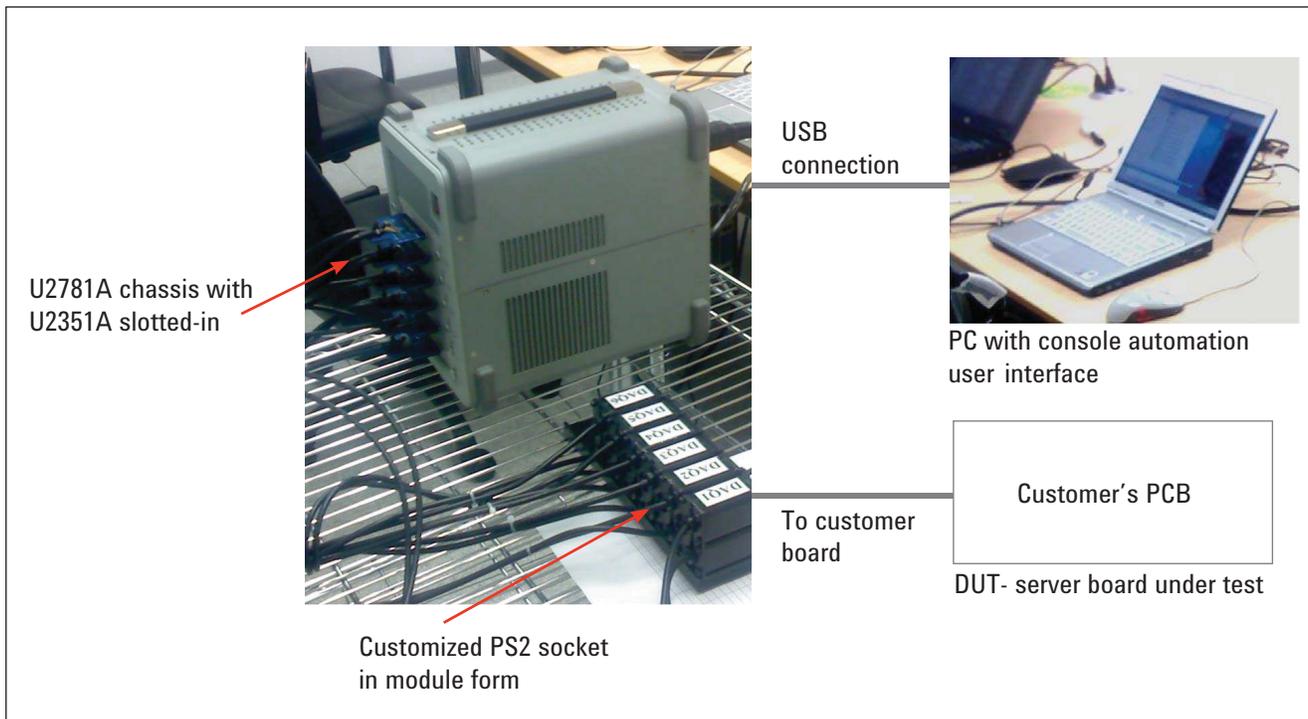


Figure 2. Overall test system setup

Table 1. List of hardware and software

Item	Model Number	Description	Qty
1	Keysight U2351A	16-channel 250kS/s USB modular multifunction data acquisition	6
2	Keysight U2781A	USB modular product chassis	1
3	PC/ NB for control purpose	Notebook/ PC with Windows XP OS	1
4	Keysight VEE	Keysight VEE Pro 8.5 for Windows™	1
5	Customize software user interface developed with Keysight VEE	Linking whole system for remote control	1
6	Accessories	PS2 accessories for system	1

Figure 3 and Figure 4 show the user interface. Both figures show the setting for two channels with voltage control for two DUTs. This user interface can be expanded up to 12 channels if six DAQs are used and cascaded in the U2781A chassis.

The program will perform the calibration with U2351A Vout = 0 V. If the initial value exceeds the upper/lower limit set, a warning message will pop up.

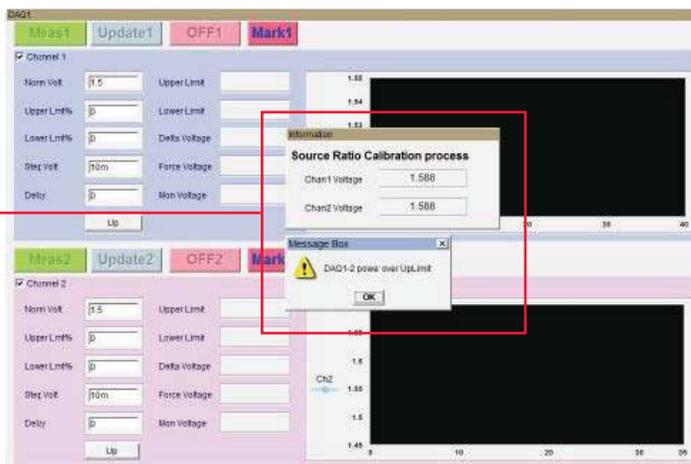


Figure 3. Customized console automation user interface



Figure 4. Graph showing U2351A responds to changes in U2351A_Vmon

Summary

This application is not new to the market. Users who used the similar VXI system for many years have chosen to switch to this U2351A system mainly for cost, maintenance, and upgradeability considerations which provides the following benefits:

1. The USB connection provides simple plug-and-play functionality.
2. The slim and compact U2351A DAQ can be used in standalone mode for two-channel DUT testing or to be slotted in a U2781A chassis to test multiple channels at the same time.
3. The Keysight VEE Pro 8.5 allows easy access to USB device and control through the user interface.

References

Please refer to the following publications for further information.

Publication title	Pub number
<i>System Developer Guide - Using USB in the Test and Measurement Environment - Application Note</i>	5989-1417EN
<i>Keysight U2300A Series USB Multifunction Data Acquisition Devices - User's Guide</i>	U2351-90002
<i>Keysight U2300A Series USB Multifunction Data Acquisition Devices - Data Sheet</i>	5989-5626EN

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