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Effectively Using the Intersil Small Form Factor Power Management Evaluation Boards

Abstract

Today's telecom, datacom and computing environments are delivering more power than ever and requiring less space for the DC/DC conversion. Intersil has numerous power management reference designs for POL conversion in the smallest space available. Designers can take the schematic, BOM (Bill of Materials) layout information and apply it directly to their present design, saving them time and money.

As with every benefit there are tradeoffs. In this case, the tradeoff is access to testing. Since there are limited places to probe on the board, special techniques must be implemented when using small form factor evaluation boards. In this paper we will discuss some of these techniques.

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Introduction

As you can see, most of the evaluation boards are about a ½" on a side. Intersil small reference designs mentioned here are listed below, but not limited to the following part numbers: ISL85410, ISL85413, ISL85415, ISL85418, ISL85403, ISL85412, ISL8033, ISL85003A, ISL8002B, ISL8016, ISL8023 and ISL8024.

Intersil small form factor evaluation boards, great size but challenging to validate the design.

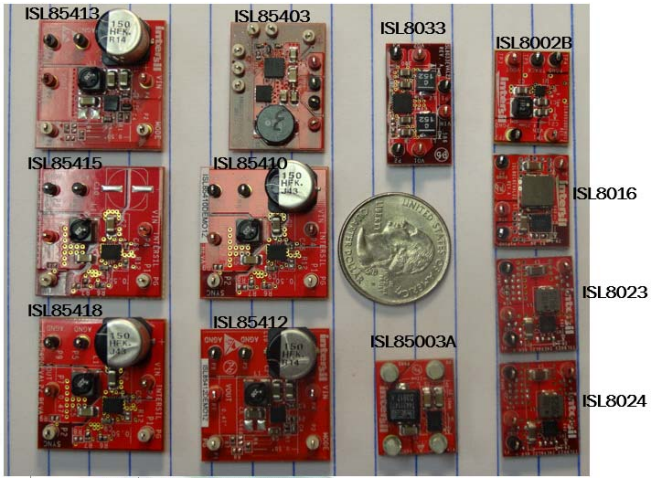

FIGURE 1. INTERSIL SMALL FORM FACTOR EVALUATION BOARDS

Application Example

Coincidental voltage tracking using two ISL8002B demonstration boards. Showing the issues with a small form factor board.

Tracking is easy to accomplish by connecting a feedback resistor network, R_3 and R_4 from VOUT of the master (m) to the SS/TR2 pin of the slave (s) with the same ratio of R_1 and R_2 that sets the VOUT voltage of the slave device. Note: the ISL8002B demonstration board already has this resistor divider included for the default output voltage. Therefore, the VOUT (TP3) from the master device needs to be connected directly to the TRK/SS pin (TP5) of the slave device.

1. Connect the positive terminal of PS#1 to VIN (TP1) and negative terminal to PGND (TP2) for BOTH master board and slave board.
2. Connect positive (+) terminal of PS#2 to TRK/SS pin (TP5) and negative terminal to PGND on the master boards. (Set the soft-start and enable for master board.)
3. Connect VOUT of master board to TRK/SS pin of slave board.
4. Connect one channel of the oscilloscope to VOUT of master board. Connect another channel of the oscilloscope to the slave board. Trigger the master channel for ONE SHOT on the RISING EDGE.
5. Turn on PS#1 to give power to both boards.
6. Turn on PS#2 to enable the master board. Observe the oscilloscope capture of slave tracking master output. The slave device VOUT will rise with the master device VOUT to respective voltages. If both boards are default, the output voltages will match (1.8V).

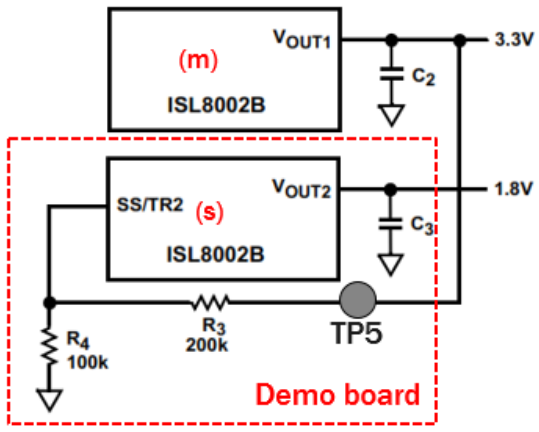

FIGURE 2. ISL8002B DEMONSTRATION BOARD

FIGURE 3. ISL8002B TRACKING START-UP

Simplified Schematic Connection

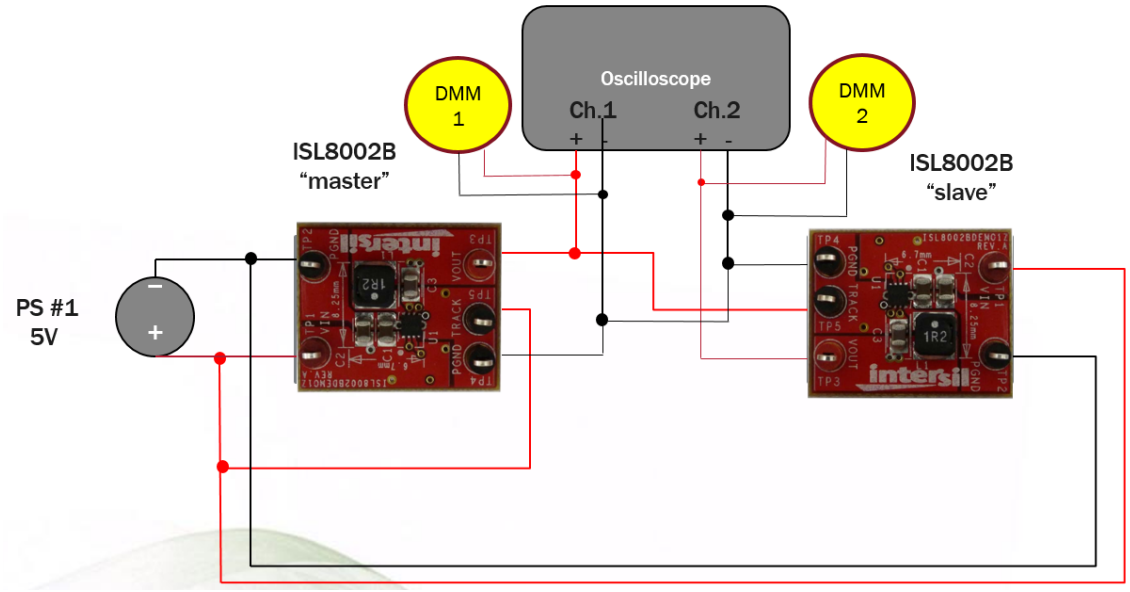

FIGURE 4. SIMPLIFIED SCHEMATIC CONNECTION

Traditional Method for Lab Measurements

PROBLEM: Board is not big enough for all the connections; VIN, VOUT, GND and Tracking. There are 23 connections needed for measuring the output voltage tracking capability.

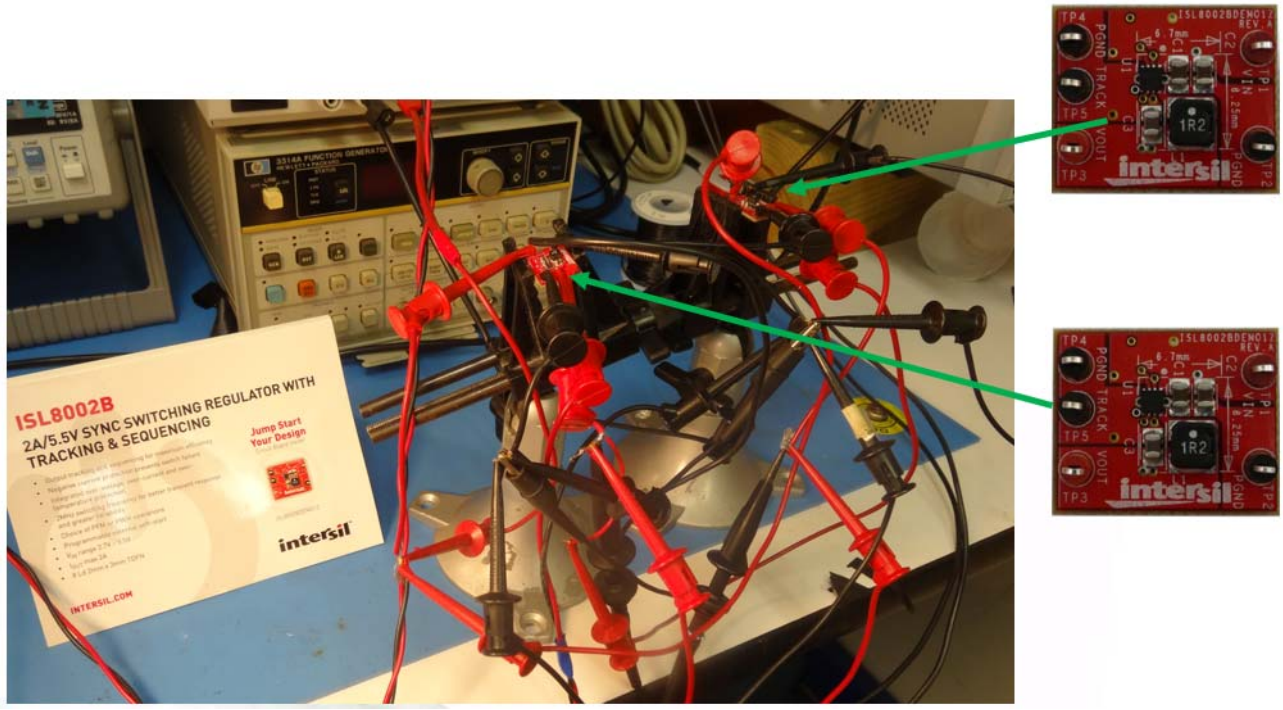

FIGURE 5. TRADITIONAL METHOD FOR LAB MEASUREMENTS

SOLUTION: Build a new connector system using a 18-20 gauge wire with a 64 pin strip socket solder tail. This reduces the number of connections to 8.

Manufacturer: Mill-Max Mfg. Corp. Manufacturer Part #: 310-93-164-41-001000

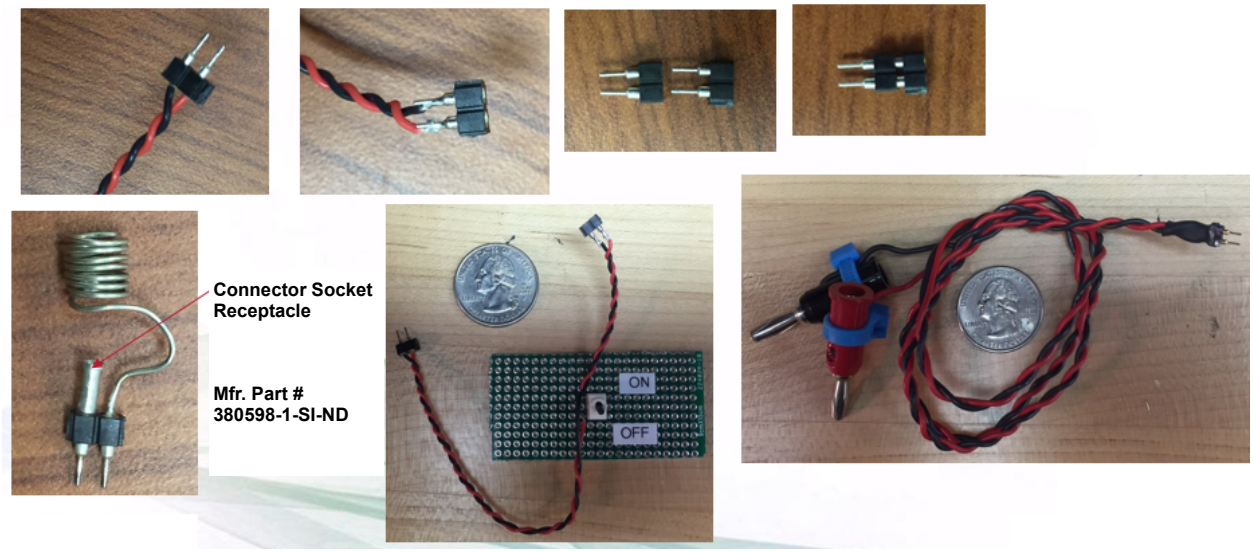

FIGURE 6. NEW CONNECTOR SYSTEM

FIGURE 7. 64 PIN SOLDER TAIL

NOTE: The 64 pin solder tails snap apart to any length needed.

Application Example

New Interconnect System

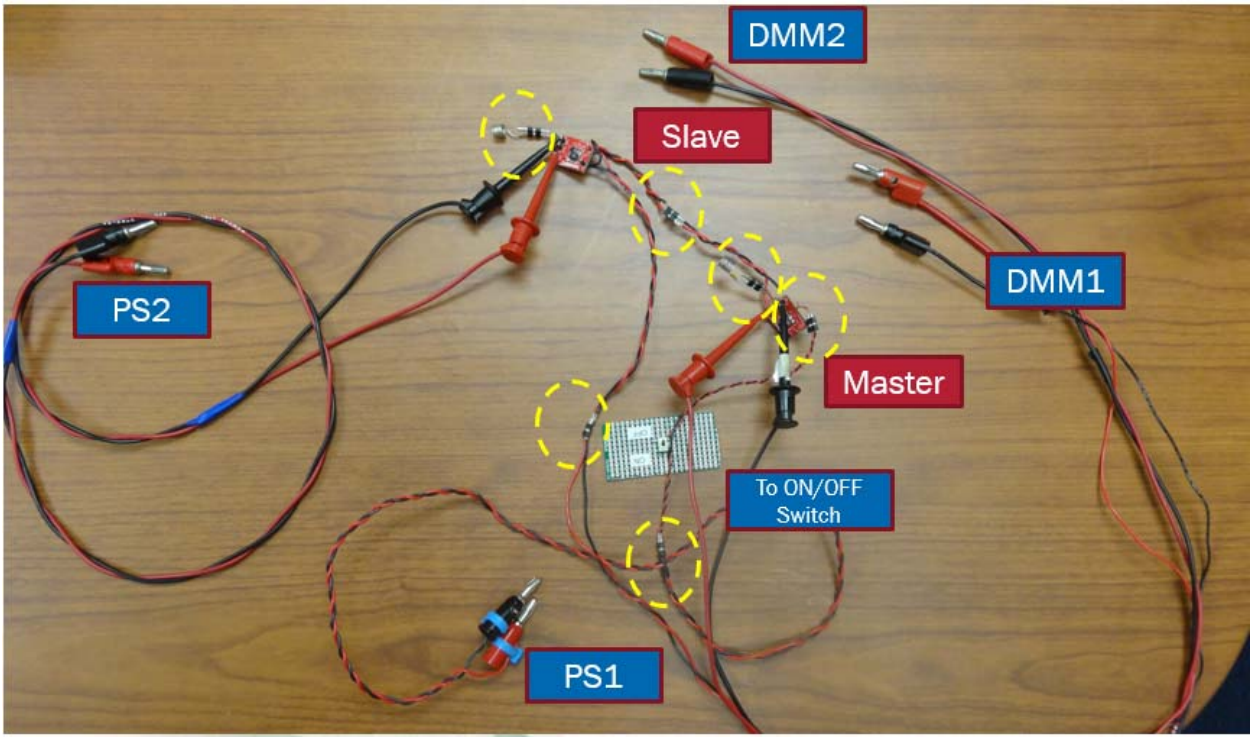

FIGURE 8. NEW INTERCONNECT SYSTEM

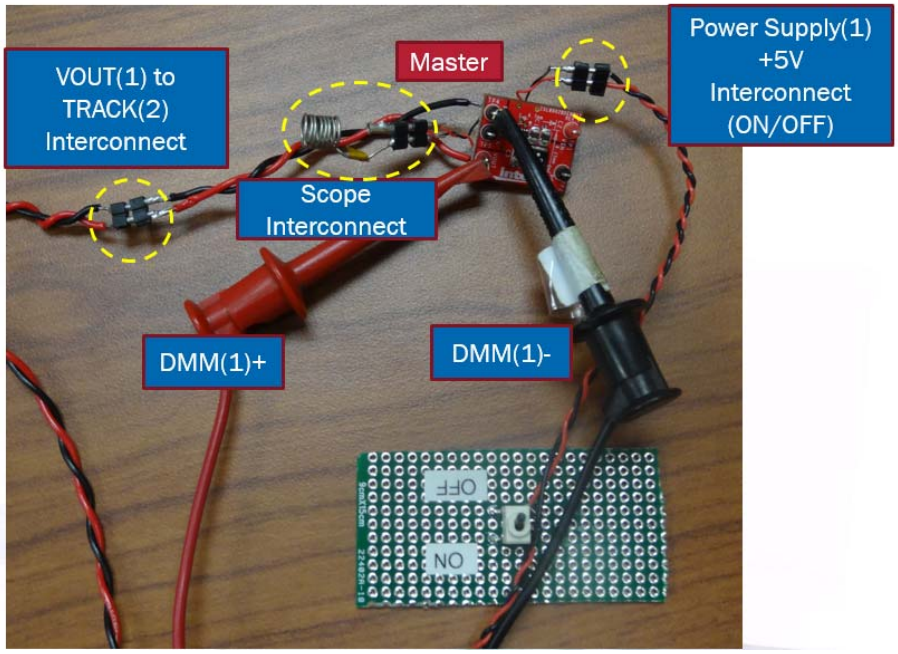

FIGURE 9. DETAILED VIEW SHOWING INTERCONNECTS AND DMM CONNECTION ON THE MASTER

New Interconnect System (Continued)

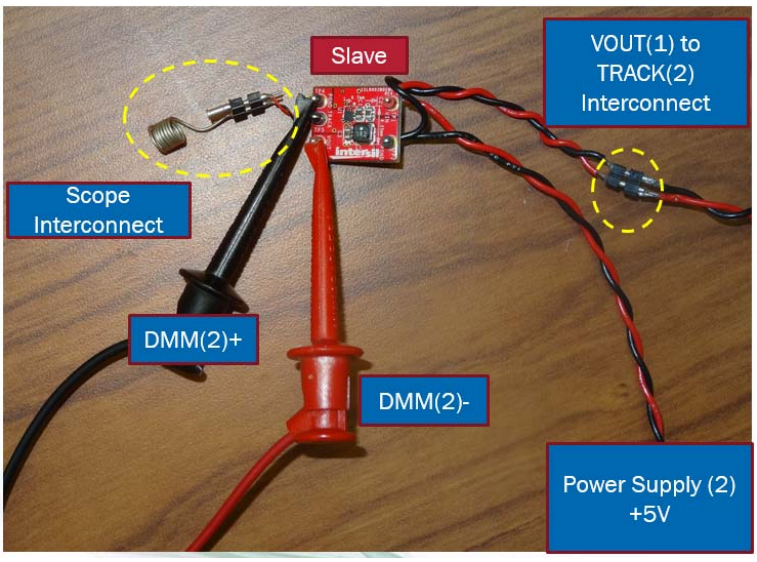

FIGURE 10. DETAILED VIEW SHOWING INTERCONNECTS AND DMM CONNECTION ON THE SLAVE

High Frequency Scope Connection

Creating a high frequency scope connection minimizes noise induced in the output waveform. Using the same strip socket for the interconnections, use a receptacle listed in Figure 11 in one of the sockets and the other to create a ground connection. The ground connection can be made from a solid wire wrapped around the scope probe (see Figure 12) or order one from Cal Test Electronics (Figure 13).

FIGURE 11. CONNECTOR SOCKET RECEPTACLE

FIGURE 12. GROUND CONNECTION

Oscilloscope probe tip ground compatible with most 5mm scope probes. 5mm probe accessories.

FIGURE 13. CT2714 OSCILLOSCOPE PROBE TIP GROUND

New High Frequency Interconnect Method

FIGURE 14. CONNECTION USING NEW HIGH FREQUENCY INTERCONNECT METHOD

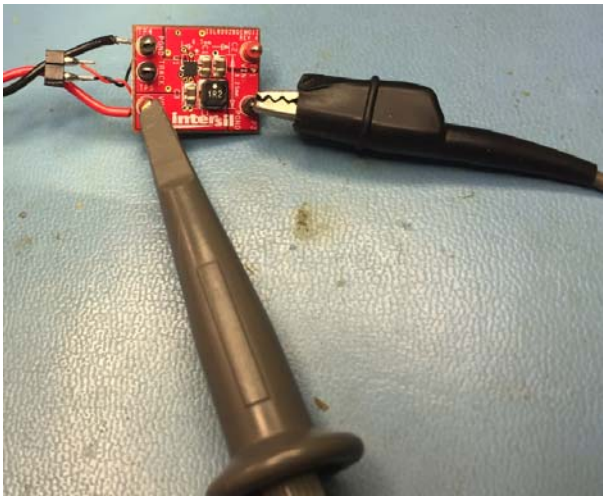

FIGURE 15. TRADITIONAL SCOPE CONNECTION

Performance Comparison

A different evaluation board was used to help show the difference between the two different scope connections. The boards used in Figures 16 and 17 had a 10A load step with VOUT AC coupled.

Summary

In this paper a low cost, highly effective method was introduced to help the designer analyze his design with the small form factor evaluation boards from Intersil. One thing to note is that this method is targeted for low power circuit analysis (PGOOD signal generation, sequencing and other timing validation) and not intended for full load efficiency testing because of the small gauge wire and the interconnect system.

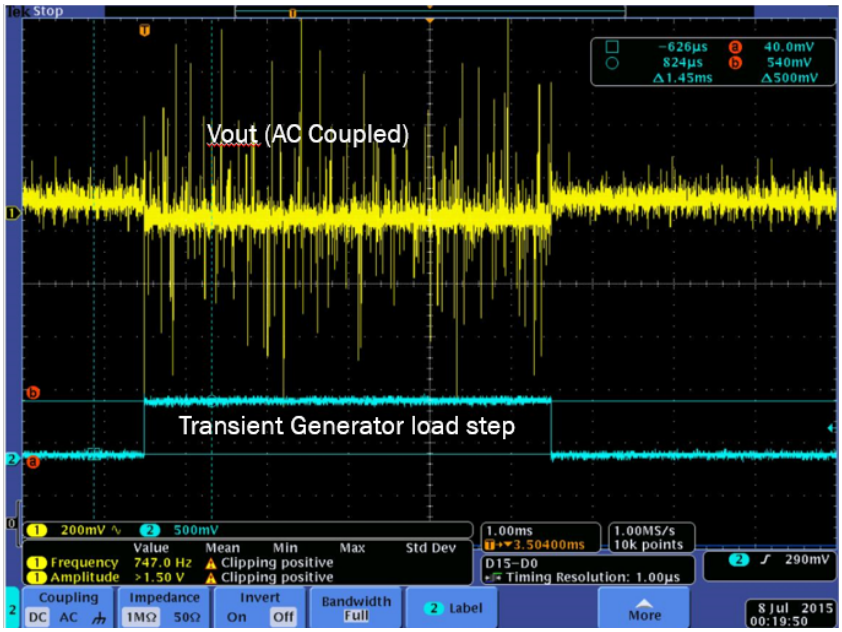

FIGURE 16. TRADITIONAL SCOPE PROBE METHOD

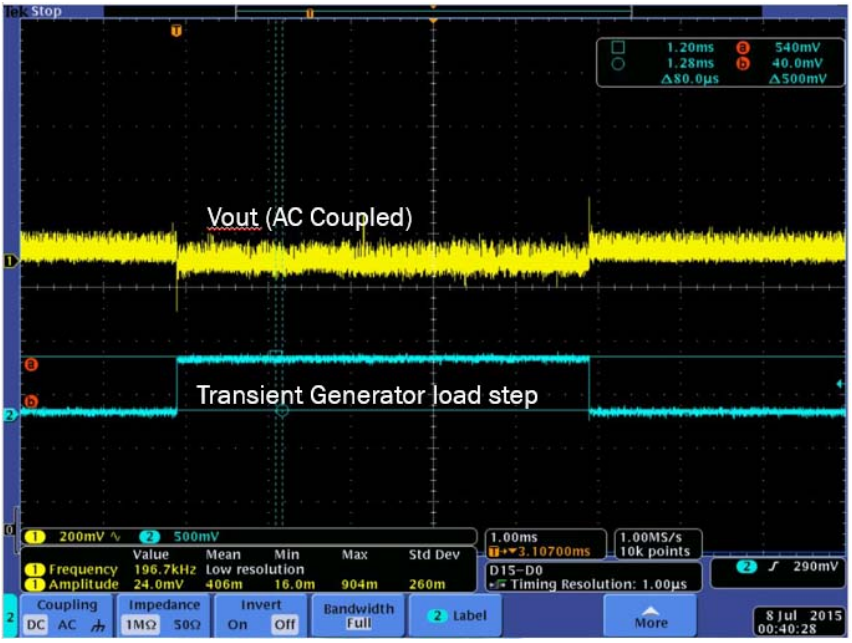

FIGURE 17. INTERCONNECT SCOPE PROBE METHOD

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Renesas Electronics America Inc.
1001 Murphy Ranch Road, Milpitas, CA 95035, U.S.A.
Tel: +1-408-432-8888, Fax: +1-408-434-5351

Renesas Electronics Canada Limited
9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3
Tel: +1-905-237-2004

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
Tel: +44-1628-651-700, Fax: +44-1628-651-804

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
Room 1709 Quantum Plaza, No.27 ZhichunLu, Haidian District, Beijing, 100191 P. R. China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, 200333 P. R. China
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited
Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2265-6688, Fax: +852 2886-9022

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.
Unit 1207, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics India Pvt. Ltd.
No.777C, 100 Feet Road, HAL 2nd Stage, Indiranagar, Bangalore 560 038, India
Tel: +91-80-67208700, Fax: +91-80-67208777

Renesas Electronics Korea Co., Ltd.
17F, KAMCO Yangjae Tower, 262, Gangnam-daero, Gangnam-gu, Seoul, 06265 Korea
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