# EVM TEST PROCEDURE

## SN65HVD257D CAN EVM

**CAN Transceivers with Fast Loop Times for Highly Loaded Networks and Features For Functional Safety Networks**

REVISION: A

By: Scott Monroe and Jason Blackman

# REVISION HISTORY

| DATE | REV | DESCRIPTION | BY WHOM |
|---|---|---|---|
| 08-22-2012 | A | INITIAL CREATION | SCOTT MONROE<br>JASON BLACKMAN |
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# SPECIAL NOTES

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**1.0** **Parameter:** Installation Checkout

Verify the SN65HVD257D devices (U1 & U6) and supporting logic gates (U2, U3, U4, U5) are installed correctly. (All passive components were inspected prior to device installation)

**1.1** **Definition:** Component Verification

Inspect the markings on the SN65HVD257D devices to insure it is the correct component with production symbolization. Inspect the other logic gates symbolization for correct installation and component.

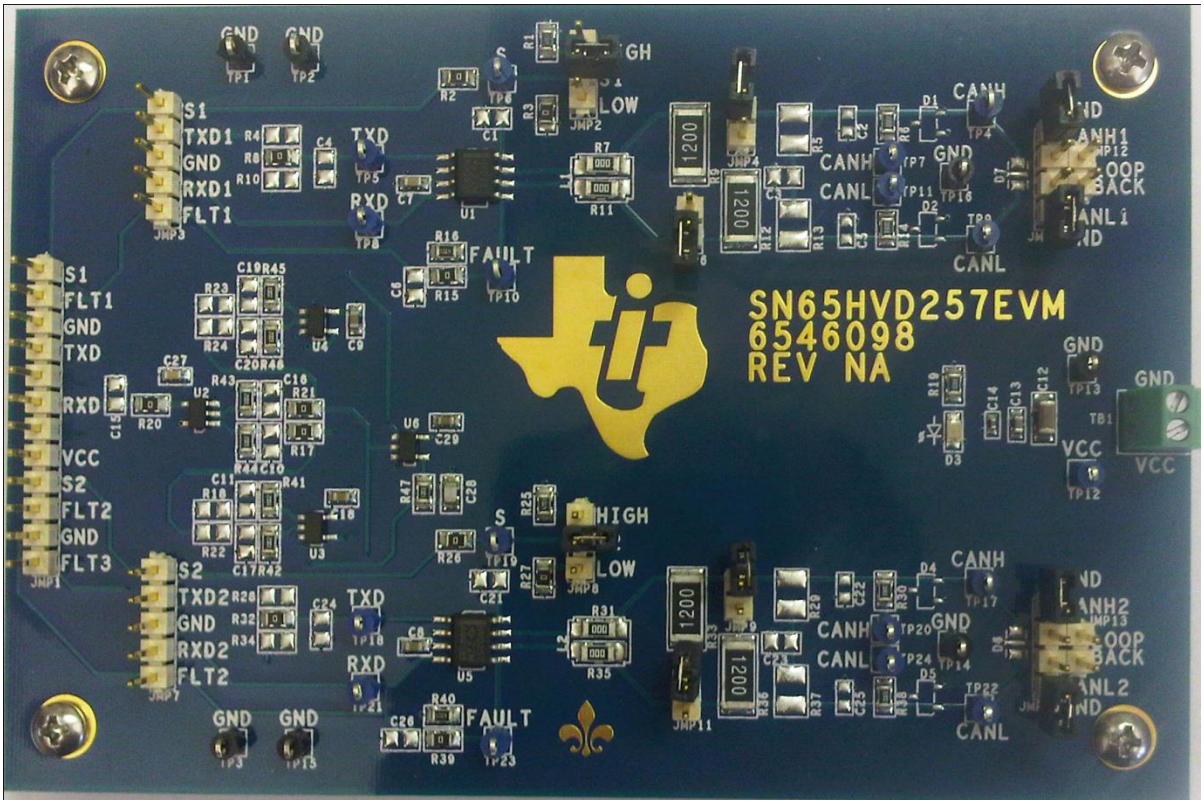


**FIGURE 1. Top side of SN65HVD257 CAN EVM**

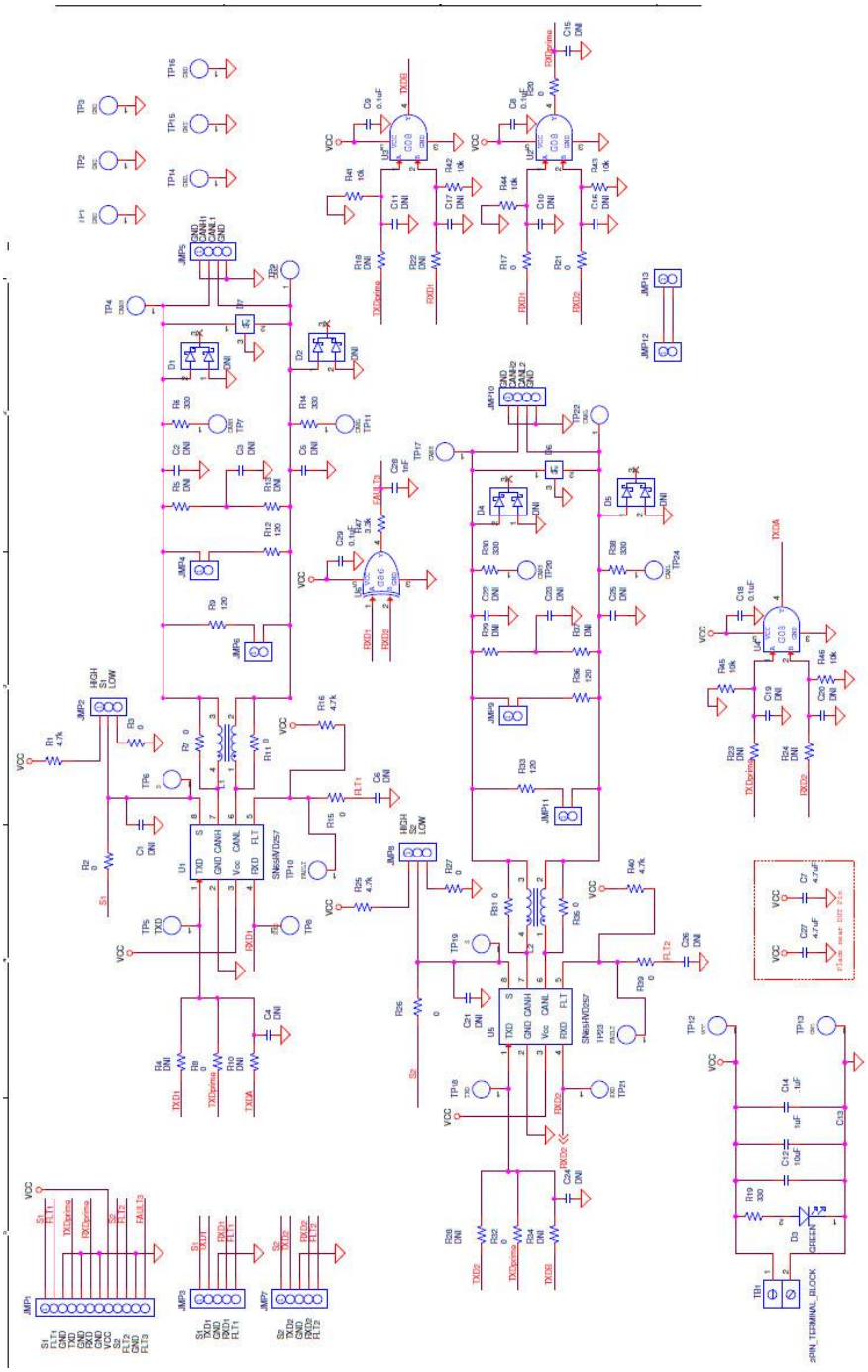

**Figure 1. SN65HVD257 CAN EVM Schematic**

# Bill of Material (BOM)

| Item | Quantity | Reference | Part | Footprint | Manufacturer |
|---|---|---|---|---|---|
| 1 | 23 | C1,C3,R4,C4,C6,R10,C10,C11,C15,C16,C17,R18,C19,C20,C21,R22,R23,C23,R24,C24,C26,R28,R34 | DNI | 805 | ANY |
| 2 | 4 | C2,C5,C22,C25 | DNI | 603 | ANY |
| 3 | 2 | C7,C27 | 4.7uF | 603 | ANY |
| 4 | 4 | C8,C9,C18,C29 | 0.1uF | 603 | ANY |
| 5 | 1 | C12 | 10uF | 1206 | ANY |
| 6 | 1 | C13 | 1uF | 603 | ANY |
| 7 | 1 | C14 | .1uF | 402 | ANY |
| 8 | 1 | C28 | 1nF | 805 | ANY |
| 9 | 4 | D1,D2,D4,D5 | DNI | SOT_3DBZ | ANY |
| 10 | 1 | D3 | GREEN | C170 | ANY |
| 11 | 2 | D6,D7 | DNI | CA05M2S10T100HG | EPCOS |
| 12 | 1 | JMP1 | Header 1x12 | HDR_THVT_1X12_100 | ANY |
| 13 | 2 | JMP2,JMP8 | Header 1x3 | HDR_THVT_1X3_100 | ANY |
| 14 | 2 | JMP3,JMP7 | Header 1x5 | HDR_THVT_1X5_100 | ANY |
| 15 | 6 | JMP4,JMP6,JMP9,JMP11,JMP12,JMP13 | Header 1x2 | HDR_THVT_1X2_100 | ANY |
| 16 | 2 | JMP5,JMP10 | Header 1x4 | HDR_THVT_1X4_100 | ANY |
| 17 | 2 | L1,L2 | DNI | M2022_Common-Mode_Choke | TDK / EPCOS |
| 18 | 4 | R1,R16,R25,R40 | 4.7k | 805 | ANY |
| 19 | 11 | R2,R3,R8,R15,R17,R20,R21,R26,R27,R32,R39 | 0 | 805 | ANY |
| 20 | 4 | R5,R13,R29,R37 | DNI | 1210 | ANY |
| 21 | 5 | R6,R14,R19,R30,R38 | 330 | 805 | ANY |
| 22 | 4 | R7,R11,R31,R35 | 0 | 1206 | ANY |
| 23 | 4 | R9,R12,R33,R36 | 120 | 2512 | ANY |
| 24 | 6 | R41,R42,R43,R44,R45,R46 | 10k | 805 | ANY |
| 25 | 1 | R47 | 3.3k | 805 | ANY |
| 26 | 1 | TB1 | 2PIN_TERMINAL_BLOCK | TB_THRTSCR_1x2_100 | ANY |
| 27 | 18 | TP4,TP5,TP6,TP7,TP8,TP9,TP10,TP11,TP12,TP13,TP17,TP18,TP19,TP20,TP21,TP22,TP23,TP24 | Test Point | HDR_THVT_1x1_100 | ANY |
| 28 | 6 | TP1,TP2,TP3,TP14,TP15,TP16 | Test Point | HDR_THVT_1x1_100 | ANY |
| 29 | 2 | U1,U5 | SN65HVD257D | SOIC_8D | TI |
| 30 | 3 | U2,U3,U4 | SN74AHC1G08DBV | SOT_5DBV | TI |
| 31 | 1 | U6 | SN74AHC1G86DBV | SOT_5DBV | TI |

**2.0 Parameter:** Functionality
**2.1 Definition:** Basic Operation
**2.2 Purpose:** To verify basic operation of the CAN Transceivers and the preconfigured logic for combining the signals to create a redundant CAN network and fault outputs.
**2.3 Sequence:**

**a. Set EVM jumpers and Check Termination Resistances:**

- Set the CAN Bus 1 termination for standard loading of 60 ohms:
  - Jump JMP6 – check resistance between CANH1 (TP4) and CANL1 (TP6) is 120 ohms
  - Jump JMP4 – check resistance between CANH1 (TP4) and CANL1 (TP6) is now 60 ohms
  - Leave both JMP6 and JMP4 jumped
- Set the CAN Bus 2 termination for standard loading of 60 ohms:
  - Jump JMP11 – check resistance between CANH2 (TP17) and CANL2 (TP22) is 120 ohms
  - Jump JMP9 – check resistance between CANH2 (TP17) and CANL2 (TP22) is now 60 ohms
  - Leave both JMP11 and JMP9 jumped
- Set HVD257 U1 for normal mode: jumper JMP2, S1 to LOW.
- Set HVD257 U5 for normal mode: jumper JMP8, S1 to LOW.

**b.** Set Up Scope: Use a 4 channel scope with 4 Single-Ended Probes
Set Trigger to Ch.1 Rising Edge
Set Horizontal Scale to 1μs per division
Set Ch.1: Vertical Position = 2.5, Vertical Scale = 5V per division
Set Ch.2: Vertical Position = -2.5, Vertical Scale = 1V per division
Set Ch.3: Vertical Position = -2.5, Vertical Scale = 1V per division
Set Ch.4: Vertical Position = -3.5, Vertical Scale = 5V per division
Connect Ch.1 to TXD U1 (TP5)
Connect Ch.2 to CANH1 (TP4 or JMP5)
Connect Ch.3 to CANL1 (TP9 or JMP5)
Connect Ch.4 to RXD1 U1 (TP8)

**c.** Connect power supply to TB1 pins.
Program supply to 5V, 250mA. Enable Power Supply.

**d.** Check Power: Observe current and D3 (LED).
Current should not be excessive (~32mA).
D3 (LED) should be on.

**e.** Connect a signal generator to TXD pin on JMP1.
Program generator to 500 kHz, 50% Duty Cycle, Vih = 2.5V, Vil = 0V.
Enable Signal Generator.

**[NOTE: TXD is not 50Ω terminated; therefore to achieve 5V using the HFS9000, Vih is set 2.5V]**

**f.** Observe current and scope display.
Current should not be excessive (~32mA).
Scope display should look like Figure 2 below.

**g.** Disable Signal Generator and Power Supply

**h.** Use same scope settings but check 2nd HVD257 CAN bus.
Connect Ch.1 to TXD U2 (TP18)
Connect Ch.2 to CANH2 (TP17 or JMP10)
Connect Ch.3 to CANL2 (TP22 or JMP10)
Connect Ch.4 to RXD U2 (TP721)

**i.** Enable Power Supply and function generator.

**j.** Observe current and scope display.
Current should not be excessive (~85mA).
Scope display should look like Figure 2 below.

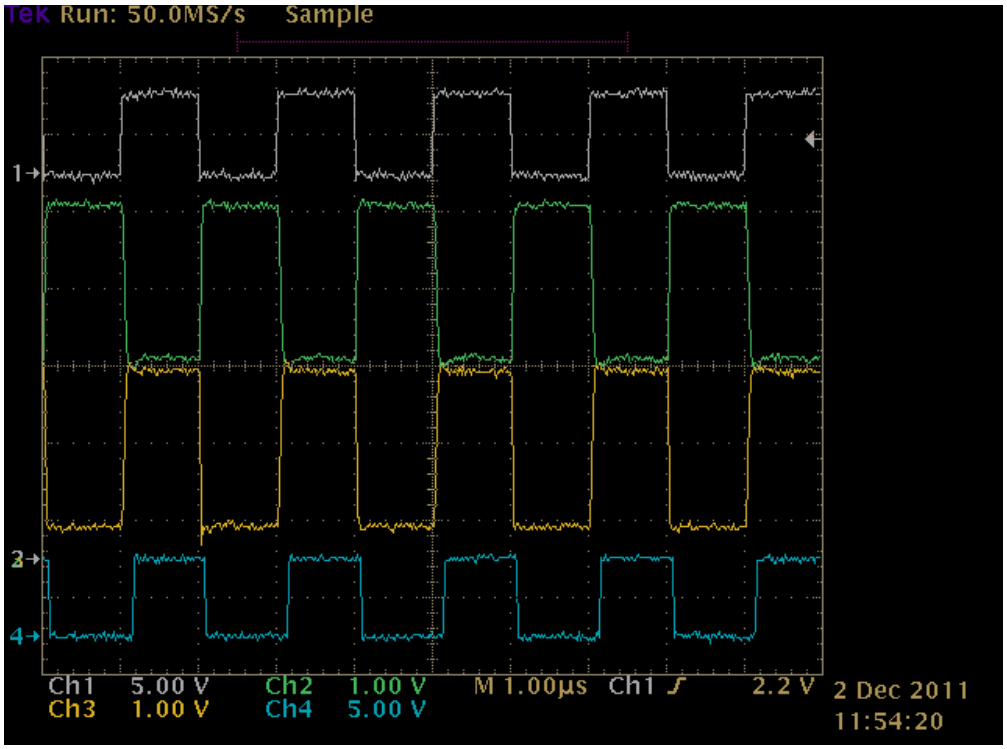

**FIGURE 2. Scope Screen Shot**

**k.** Use same scope settings but check combining logic of both HVD257 CAN buses.
Connect Ch.1 to TXD U2 (TP18)
Connect Ch.2 to CANH2 (TP17)
Connect Ch.3 to CANL2 (TP22)
Connect Ch.4 to RXD (JMP1)

**l.** Observe scope display.
Scope display should look like Figure 2 above

**m.** Check for loss of HVD257 1 (U1), same scope settings.
Move JMP2 (S1) to High.

**n.** Observe scope display.
Scope display should look like Figure 2 above.

**o.** Check Bus 1 transmission is disabled.
Connect Ch.2 to CANH1 (TP4 or JMP5)
Connect Ch.3 to CANL1 (TP9 or JMP5)

**p.** Observe scope display.
Scope display should look like Figure 2 above except CANH and L should be 2.5V steady.

**q.** Check for loss of HVD257 2 (U5), same scope settings.
Move JMP2 (S1) to LOW
Move JMP8 (S2) to HIGH

**r.** Observe scope display.
Scope display should look like Figure 2 above

**s.** Check Bus 2 transmission is disabled.
Connect Ch.2 to CANH2 (TP17)
Connect Ch.3 to CANL2 (TP22)

**t.** Observe scope display.
Scope display should look like Figure 2 above except CANH and L should be 2.5V steady.

**u.** Disable Signal Generator and Power Supply

**v.** Use same scope settings to check fault logic outputs of both HVD257 CAN buses.
Set Ch.1: Vertical Position = 2, Vertical Scale = 5V per division
Set Ch.2: Vertical Position = 0, Vertical Scale = 5V per division

Set Ch.3: Vertical Position = -2, Vertical Scale = 5V per division
Set Ch.4: Vertical Position = -3, Vertical Scale = 5V per division
Connect Ch.1 to RXD (JMP1)
Connect Ch.2 to FLT1 (JMP1)
Connect Ch.3 to FLT2 (JMP1)
Connect Ch.4 to FLT3 (JMP1)
Set horizontal scale to 5μs per division

**w.** Check Bus Dominant Faults (FLT1) from CAN1 being shorted Dominant
Connect CANH1 to Vcc (TP4 or JMP5)
Connect CANL1 to GND (TP9 or JMP5)
Move JMP2 (S1) to HIGH
Move JMP8 (S2) to LOW

**x.** Set the frequency of the function generator to 50kHz. All other settings stay the same.

**y.** Enable Power Supply and function generator.

**z.** Observe scope display.
Scope display should look like Figure 3 (below)

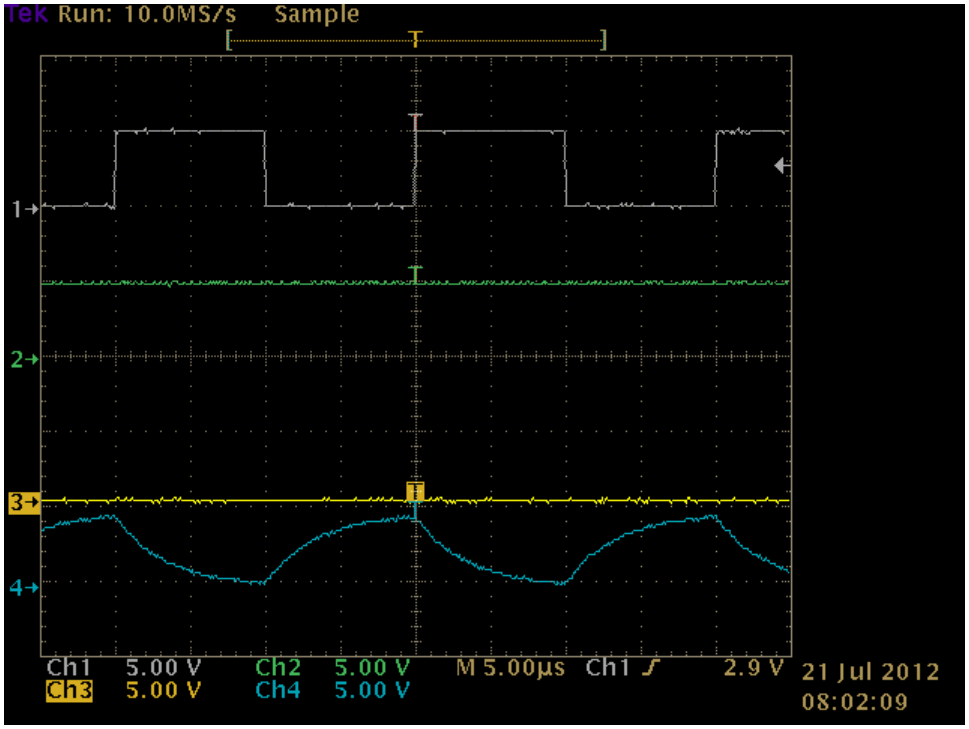


**FIGURE 3. Scope Screen Shot**

**aa.** Disable Power Supply and Function Generator

**bb.** Check Bus Dominant Faults (FLT2) from CAN2 being shorted Dominant
Connect CANH2 to Vcc (TP17 or JMP10)
Connect CANL1 to GND (TP22 or JMP10)
Move JMP2 (S1) to LOW
Move JMP8 (S2) to HIGH
Remove connection from CANH1 to Vcc (TP4 or JMP5)
Remove connection from CANL1 to GND (TP9 or JMP5)

**cc.** Enable Power Supply and function generator.

**dd.** Observe scope display.
Scope display should look like Figure 4 (below)

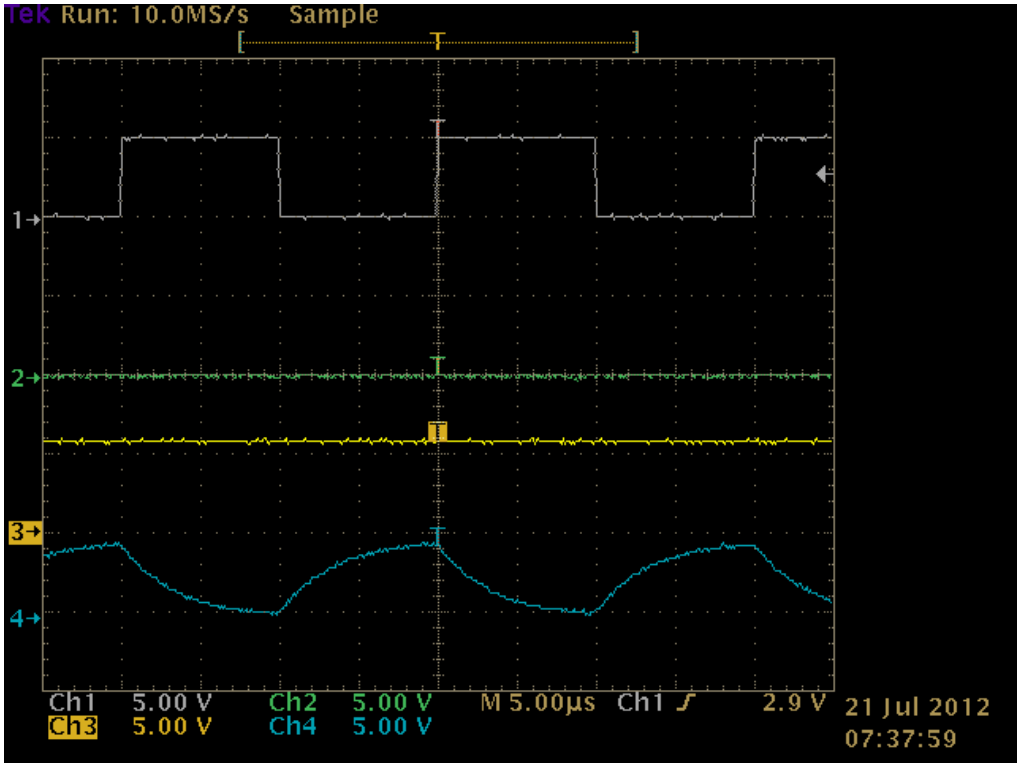


**FIGURE 4. Scope Screen Shot**

**ee.** Disable Power Supply and Function Generator

**ff.** If all these check out good then the EVM may be considered good.

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