ADK-2579 Quick Start Guide – HI-2579 Dual Transceiver Signal Break-Out Board

July 2017

REVISION HISTORY

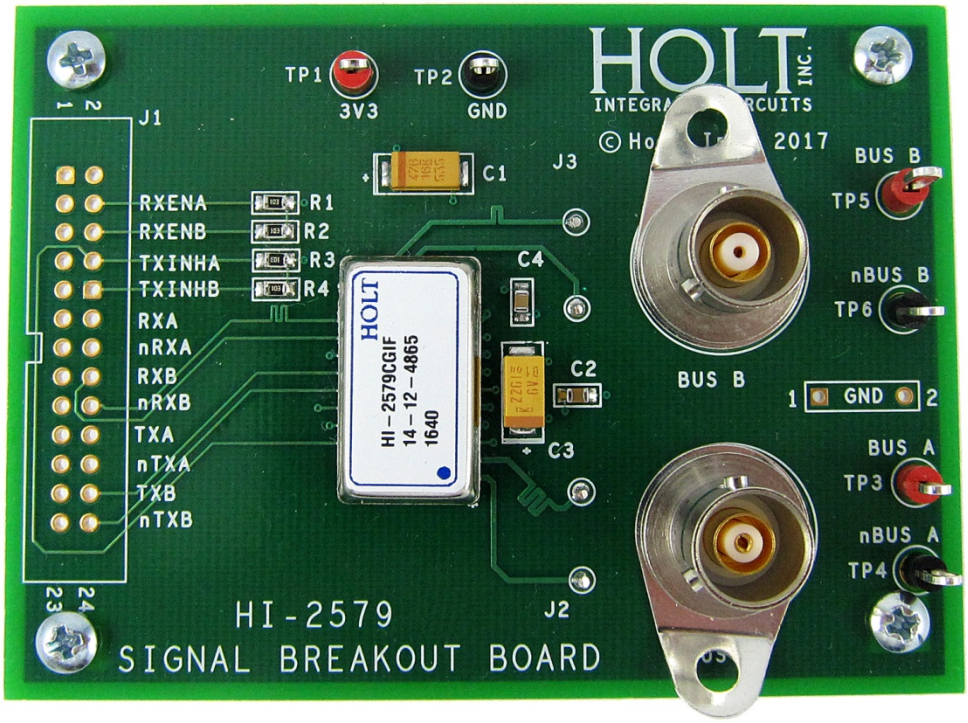
Revision	Date	Description of Change
QSG-2579 Rev. New	07-27-17	Initial Release

Introduction

The Holt HI-2579 is a dual bus MIL-STD-1553 transceiver with integrated isolation transformers in a low profile package. The HI-2579 Signal Break-Out Board provides a logic-level digital signal interface to your external Manchester II encode/decode logic and transmit/receive control signals:

- TXA and $\overline{\text{TXA}}$ bipolar transmit inputs and TXINHA transmit inhibit signal for Bus A
- TXB and $\overline{\text{TXB}}$ bipolar transmit inputs and TXINHB transmit inhibit signal for Bus B
- RXA and $\overline{\text{RXA}}$ bipolar receive outputs and RXENA receive enable signal for Bus A
- RXB and $\overline{\text{RXB}}$ bipolar receive outputs and RXENB receive enable signal for Bus B

Refer to the HI-2579 data sheet for further information regarding signal interface.



HI-2579 Signal Break-Out Board

Set Up

To operate the board, you must connect a power supply providing 3.3VDC at 700mA. Connect the power supply to test points labeled 3V3 and GND along the top edge of the board. Signal header J1 is the logic-level interface for connecting user-provided transmit and receive signals.

All odd numbered pins on header J1 are grounded. J1 pins 1 and 2 are connected to GND and VDD; they can be an alternate way to provide 3.3V power. If providing power through a ribbon cable at J1, make sure transceiver VDD pin does not sag below 3.3V while transmitting, or transmit amplitude will suffer. Ideally, the transceiver is close to the power supply output to minimize power delivery path impedance.

Bus Receive Signal Path

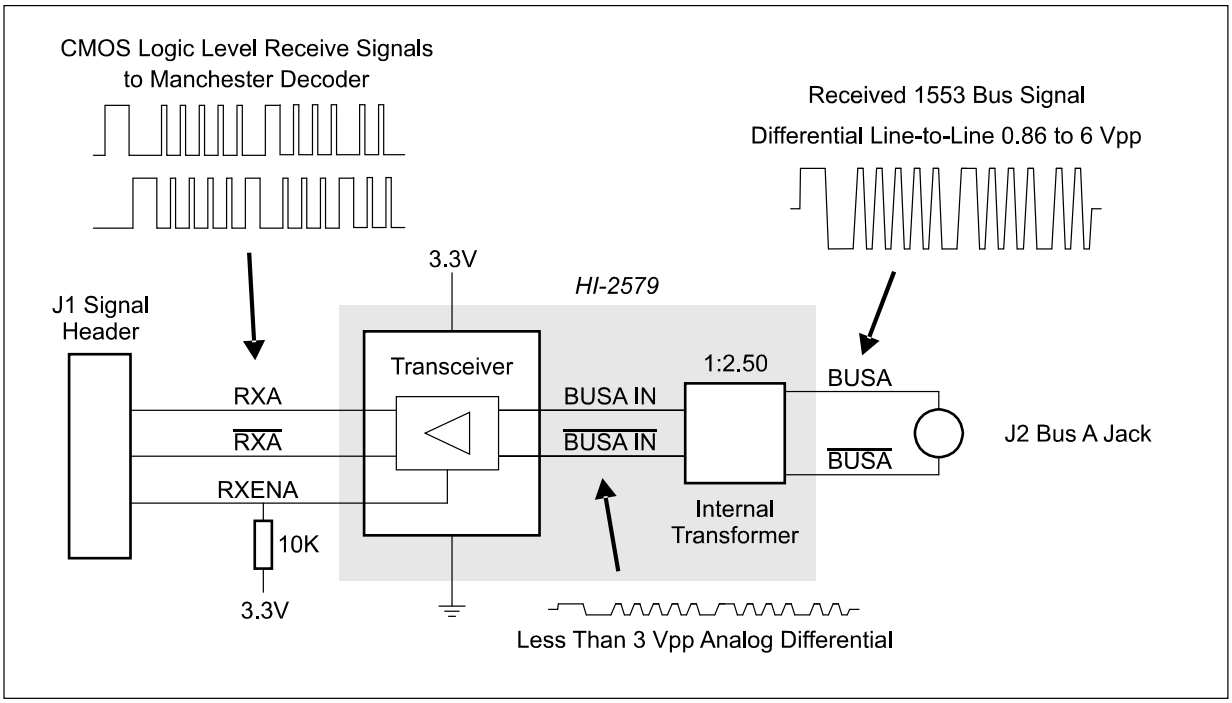
A pair of 3.3V CMOS logic-level outputs provides bipolar serial signals for connecting each bus to an external user-provided Manchester II decoder.

RXA and $\overline{\text{RXA}}$ are the non-inverted and inverted receiver outputs for Bus A.

Similarly RXB and $\overline{\text{RXB}}$ are the receiver outputs for Bus B.

The logic-level Bus A and Bus B receiver outputs can be enabled/disabled using the transceiver RXENA and RXENB inputs. On the HI-2579 Signal Break-Out Board, the receiver enable signals are pulled-up (enabled) by default, using 10kΩ resistors R1 and R2. If desired, receive signal outputs can be disabled by presenting logic-0 at the RXENA and/or RXENB input signals (pins 4 and 6) at the signal interface header J1.

When either receive enable input reads logic-0, the RX and $\overline{\text{RX}}$ receive signal outputs for the respective bus remain at logic-0.



Bus A Receive Signal Path (Bus B is Identical)

Bus Transmit Signal Path

A pair of 3.3V CMOS logic-level inputs accepts MIL-STD-1553 bipolar serial signals for driving each bus from an external user-provided Manchester II encoder.

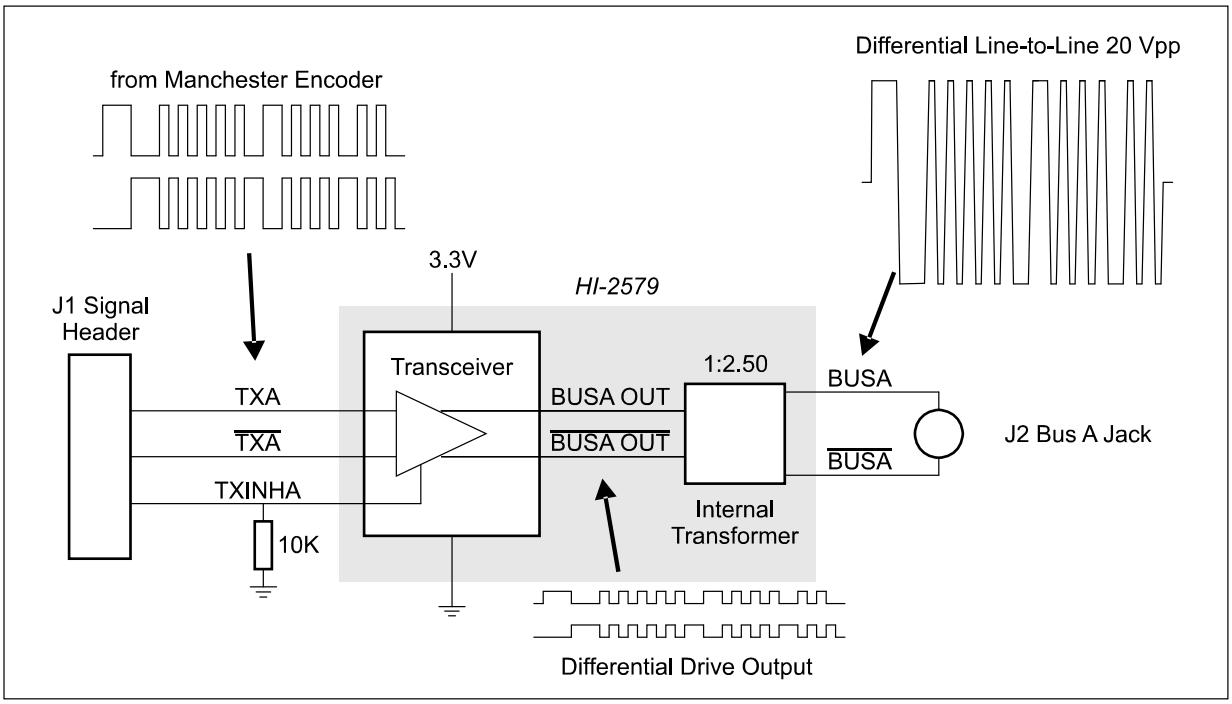
TXA and $\overline{\text{TXA}}$ are the non-inverted and inverted transmit input signals for Bus A.

Similarly, TXB and $\overline{\text{TXB}}$ are the transmit input signals for Bus B.

Transmit for each bus can be enabled or inhibited using the corresponding TXINH transmit inhibit signal at the signal interface header J1.

On the HI-2579 Signal Break-Out Board, both transmit inhibit signals are pulled down by default (transmit enabled) using 10kΩ resistors R3 and R4.

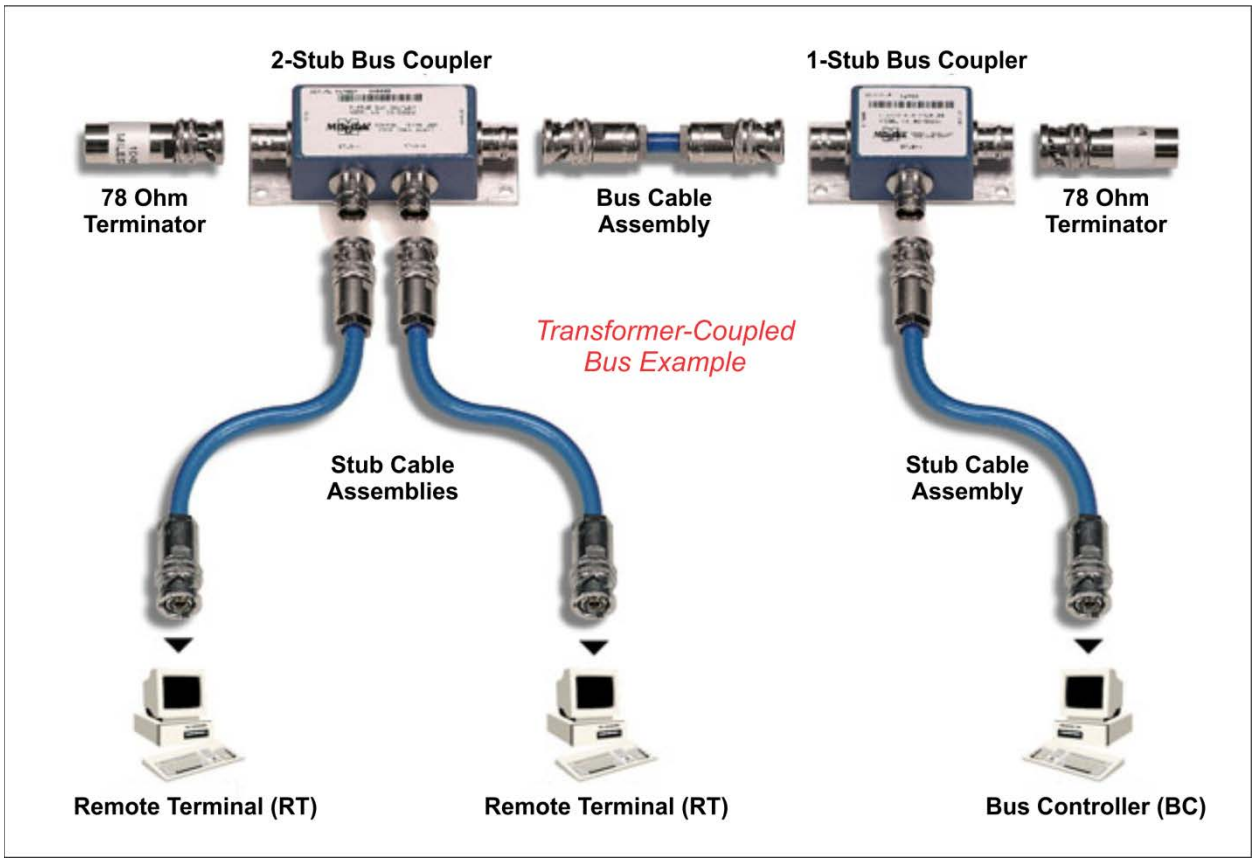
Bus transmit for either bus can be disabled by presenting logic-1 on the TXINHA and/or TXINHB input signal pins 8 or 10 at signal interface header J1.



Bus A Transmit Signal Path (Bus B is Identical)

Direct-Coupled or Transformer-Coupled 1553 Bus Interface

The HI-2579 Signal Break-Out Board is preconfigured for transformer-coupled operation. Transformer-coupled 1553 bus interface is the predominant configuration used for terminal connection. This diagram shows a network comprised of three transformer-coupled terminals, a Bus Controller (BC) and two Remote Terminals (RTs). Transformer-coupled stub cables must be < 20 feet (6.1 meters).



The transformer-coupled HI-2579 Signal Break-Out Board (and user-provided encoder/decoder and protocol logic) takes the place of the BC or one of the RTs in the above diagram.

As seen above, each terminal's stub cable connects to the MIL-STD-1553 bus through a "bus coupler," which is typically an off-the-shelf hardware component comprised of coupling transformer(s) for one or more terminal stubs (each with its own pair of internal current-limiting resistors). Two bus couplers are shown above. The bus couplers have a bus connection jack at each end for serial connection into the 1553 bus structure. Each end of the bus has a 78Ω terminator.

Direct-coupled operation requires simple board modification. Two current limiting resistors are required for each bus. These are mounted on the bottom side of the board, top-side jumper locations JP1 through JP4 short out these resistors using copper traces. For Bus A, cut shorting traces JP1 and JP2 at silkscreened hash marks. For Bus B, cut traces shorting JP3 and JP4. Once configured for direct-coupling, the terminal no longer connects to the bus cable assembly through a Bus Coupler, it connects directly to

the 1553 bus. Direct-coupled stub cables cannot exceed 1 foot (30.5 cm) length. Holt application note AN-550 provides more information about the direct-coupled and transformer-coupled configurations. Transformer coupled operation can be restored by soldering jumpers across locations JP1 – JP4.

Using Dummy Bus Load Resistors

The HI-2579 Signal Break-Out Board provides jacks J2 and J3 for conventional off-board 1553 bus connection, as seen in the diagram above. If desired instead, you can connect user-provided dummy load resistors which replace the stub cable assembly in the diagram and everything above it; the resistor load appears directly at the HI-1584 bus interface. The load is 70 Ω 1 Watt for transformer-coupled operation or 35 Ω 1 Watt for direct-coupled operation.

To use dummy load resistors, disconnect any cables at jacks J2 and J3. Connect the dummy load resistor across test points TP3-TP4 for Bus A. An identical resistor is connected across test points TP5-TP6 for Bus B. Only one type of bus load can be connected at a time: choose between dummy bus load resistors and external conventional 1553 bus connection using jacks J2 and J3.

Using Single Scope Probe to View Differential Bus Stub Signal

When characterizing a MIL-STD-1553 terminal, most bus voltage measurements are defined as the differential line-to-line stub voltage measured across the bus side of the terminal's isolation transformer. For the HI-2579 signal break-out board, pairs of red and black differential test points are labeled $\mathrm{BUSA}/\overline{\mathrm{BUSA}}$ and $\mathrm{BUSB}/\overline{\mathrm{BUSB}}$ at the correct measurement point for the two buses. An oscilloscope is easily connected to these test points labeled TP3 through TP6.

Differential line-to-line voltage measurement for Bus A can be accomplished by connecting your oscilloscope channel 1 probe to the TP3 BUSA and the channel 2 probe to the TP4 $\overline{\mathrm{BUSA}}$ test point. Then use oscilloscope built-in math function to observe "channel 1 minus channel 2" to see the Bus A differential signal.

Comparable differential line-to-line voltage measurement for Bus B can be accomplished by connecting your oscilloscope channel 3 probe to the TP4 BUSB and the channel 4 probe to the TP6 $\overline{\mathrm{BUSB}}$ test point. Then use oscilloscope built-in math function to observe "channel 3 minus channel 4" to view the Bus B differential signal.

To simplify matters, wire jumpers can be added to ground bus negative bus test points TP4 $\overline{\mathrm{BUSA}}$ and TP6 $\overline{\mathrm{BUSB}}$. After this modification, the user can forgo the channel 2 and channel 4 oscilloscope connections to black test points $\overline{\mathrm{BUSA}}$ and $\overline{\mathrm{BUSB}}$.

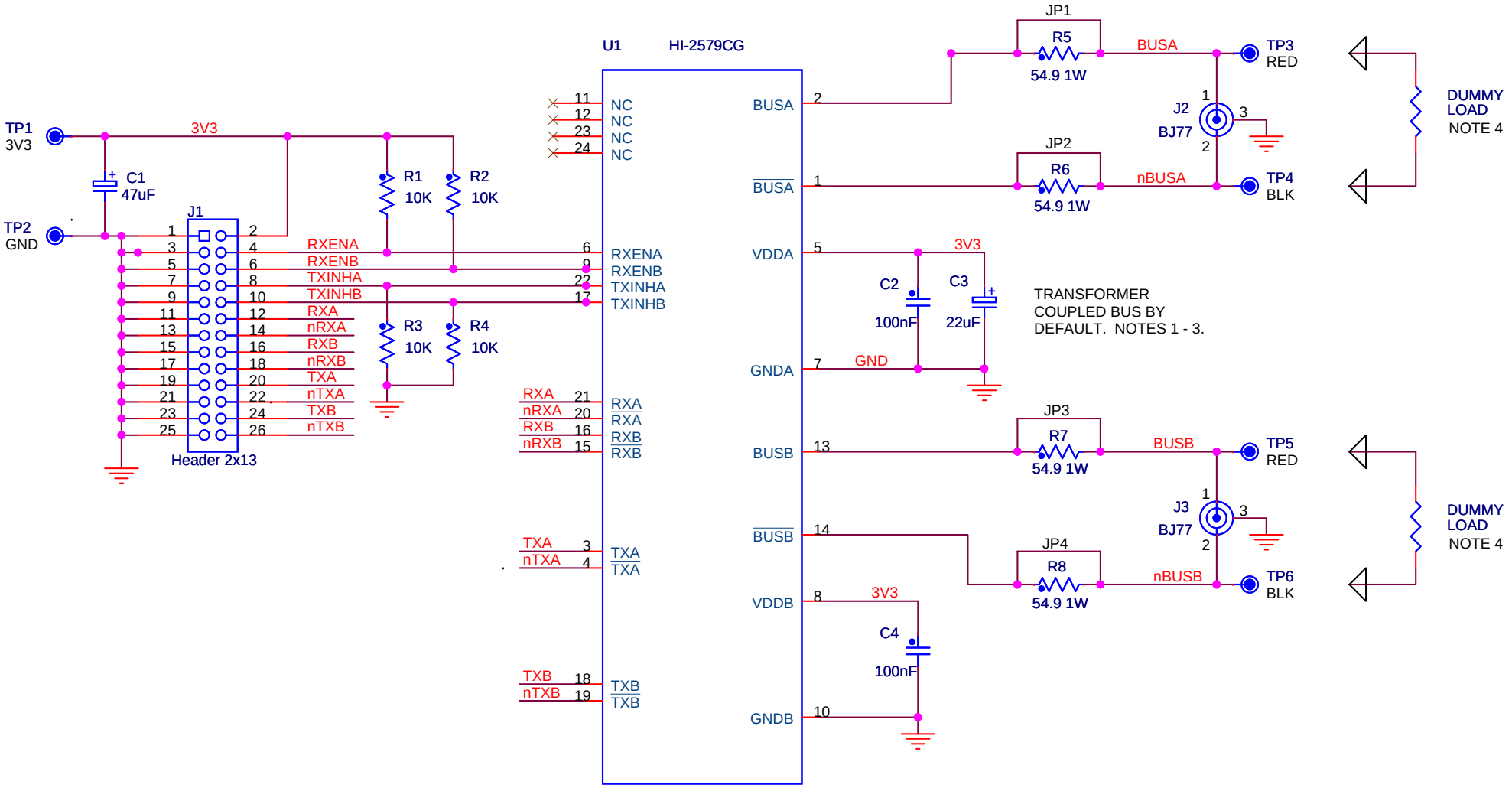
With TP4 $\overline{\mathrm{BUSA}}$ grounded, the single channel 1 probe connection to BUSA provides true differential viewing of Bus A stub voltage.

With TP6 $\overline{\text{BUSB}}$ grounded, the single channel 3 probe connection to BUSB provides true differential viewing of Bus B stub voltage.

This is strictly a convenience measure to be used when evaluating HI-2579 transceiver performance; the minus side of the 1553 bus stub would never be left grounded under normal circumstances for production hardware.

Board Schematic Diagram and Bill of Materials

The schematic diagram and Bill of Materials for the HI-2579 Signal Break-Out Board are on the following pages.



NOTES:

1. BY DEFAULT, BOARD IS SET UP FOR TRANSFORMER COUPLED OPERATION, JUMPERS JP1 - JP4 ARE COPPER TRACES.
2. RESISTORS R5 - R8 ARE USED FOR DIRECT COUPLING ONLY.
3. FOR DIRECT COUPLED OPERATION, CUT JUMPERS JP1 - JP4 AT HASH MARKS ON TOP SIDE OF THE BOARD.
4. IF BUS JACKS J2 AND J3 ARE NOT USED, RESISTOR DUMMY BUS LOADS MAY BE CONNECTED TO BUS TEST POINTS.
   USE 70 OHM 1 WATT LOAD FOR TRANSFORMER COUPLED OPERATION.
   USE 35 OHM 1 WATT LOAD FOR DIRECT COUPLED OPERATION.

HOLT INTEGRATED CIRCUITS

Title
HI-2579 SIGNAL BREAKOUT EVALUATION BOARD

Size	Document Number	Rev
A	HI-2579 Break Out Board	A

Date: Friday, July 21, 2017 Sheet 1 of 1

Rev. B
P/N HE082

Bill of Materials
HI-2579 Signal Breakout Evaluation Board

Item	*Qty*	*Description*	*Reference*	*DigiKey*	*Mfr P/N*
1	1	PCB, Bare, Eval Board	N/A	--------	NewTek PCB # 13582
2	2	Capacitor, Cer 0.1uF 20% 50V Z5U 0805	C2,C4	399-1176-1-ND	Kemet C0805C104M5UACTU
3	1	Capacitor, 47uF 20% 16V Tant SMD 6032	C1	399-9739-1-ND	Kemet T491C476M016AT
4	1	Capacitor, 22uF 20% 16V Tant SMD 6032	C3	399-3747-1-ND	Kemet T491C226M016AT
5	2	Connector 3-Lug Concentric Triax Bayonet Jack, Panel Front Mount TRB (BJ77)	J2,J3	1097-1030-ND	Cinch BJ77
6	1	Header 2 x 13 with 0.1" pitch	J1 not installed	S9173-ND	Sullins SBH11-PBPC-D13-ST-BK
7	4	Resistor, 10K 5% 1/8W 0805	R1,R2,R3,R4	P10KACT-ND	Panasonic ERJ-6GEYJ103V
8	4	Resistor, 54.9 1% 1W 2512	R5,R6,R7,R8	541-54.9AFCT-ND	Vishay CRCW251254R9FKEG
9	3	Test Point, Red Insulator, 0.062" hole	(+)BusA, (+)BusB, 3V3	36-5010-ND	Keystone 5010
10	3	Test Point, Black Insulator, 0.062" hole	(-)BusA, (-)BusB, GND	36-5011-ND	Keystone 5011
11	1	IC HI-2579CG	U1	HOLT IC	Holt IC
12	4	Hookup Wire 20AWG Solid, Black Insul 1" Long	Triax jack J2 - J3 wiring	C2028B-XX-ND	General Cable C2028A.12.01
13	4	Stand-off, Threaded #4-40F, 3/4" Long Round	n/a	36-3481-ND	Keystone 3481
14	4	Machine Screw, #4-40 x 5/16"	n/a	H343-ND	B&F Supply PMS 440 0025 PH
15	4	Lock Washer, Int.Tooth #4-40	n/a	H236-ND	B&F Supply INTLWZ 004