ISL3331EVAL1Z

Evaluation Board

The ISL3331EVAL1Z evaluation board is RoHS compliant, and provides a quick and easy method for evaluating this Dual Protocol IC. The evaluation board also accommodates the ISL3333; see the "ISL3333EVAL1Z User's Manual" for details.

This board was designed to allow the user to evaluate all the features available on the ISL3330 and ISL3331 products. The ISL3331 is the full featured version (see "Key Features" in next section), where the QFN package's increased pin count gives the user access to functionality not available on the pin limited ISL3330. The same die is used in both products, so other than minor package effects, evaluating the QFN packaged ISL3331 is a reasonable substitute for evaluating the ISL3330.

By changing jumper positions the user can quickly set the board to evaluate any of the ISL3331's many modes and features, and the input states can also be set via jumpers.

Refer to the ISL3331 data sheet for complete details regarding the functions and features of this device. These dual protocol ICs feature many modes, so studying the device's truth-table along with its operating circuits and detailed description is the best way to gain an understanding of how the part works.

Key Features

- QFN Version Demonstrates All Enhanced Features:
  - Logic Supply Pin (V_L)
  - Three RS-485 Speed Options - 115kbps/460kbps/20Mbps
  - Active Low RS-485 Rx Enable for Simple Direction Control
- Quick Configuration Using Jumpers
- State of All Inputs Can be Set by Jumper Positions
- No Bus Termination Resistors; Allows RS-232 or RS-485 Evaluation
- Simple Operation Requires Only One, 3.3V, Power Supply

Important Notes

To facilitate locating jumpers on this board, Figure 3 is a jumper locator and, in this Application Note, the (#) following a jumper mention corresponds to the red jumper number on the locator. See the "Jumper Definitions" section for a description of the function of each jumper.

The base board is used to evaluate both the ISL3333 (2-port) and ISL3331 (1-port) products, so the jumper and connector names reflect the functionality of both products. Due to space limitations some jumper labels are

abbreviated, but the corresponding BNC connector has the full label.

In most cases, a name that applies to both products contains no parenthesis (e.g., "B1"), a name that applies to only the ISL3333 is followed by "(NC)" (e.g., "B2 (NC)"), and a name that applies to only the ISL3331 is preceded by "NC" and/or has the name in parenthesis (e.g., "NC (RXEN)" or "(RXEN)").

It is important to note that the ISL333x don't follow the RS-485 convention whereby the inverting I/O is labeled "B/Z", and the noninverting I/O is "A/Y". Thus, the ISL3330 and ISL3331 A/Y (B/Z) pins connect to the B/Z (A/Y) pins of generic RS-485/422 ICs.

Input signals that are likely to be driven by a generator connect to a BNC connector, and there is a 50Ω termination resistor to GND when the jumper is in the "LOW" position.

Default Configuration

As delivered (see "Functional Diagram (Default Configuration)" on page 2), the evaluation board is configured for powered-up (not SHDN) RS-485 mode, driver enabled, via DEN, and set for high speed (20Mbps) operation, driver input (DY) low, Rx enabled via the RXEN line, Rx inputs floating, and V_L shorted to V_{CC}. To achieve this configuration, the jumpers are installed as follows (unlisted jumpers are not installed, and (#) indicates the jumper number on the Figure 3 jumper locator):
A2 (485/$\overline{232}$) (7) = VH; (DEN) (8) = VH; SPB (9) = VH; $\overline{RXEN1}$ (10) = VH; (RXEN) (11) = VH; (ON) (12) = VH; DY1(DZ/SLEW) (13) = VH; DZ1/DE1(DY) (14) = LOW; RXBIAS-V_{CC} (15) = installed; V_{CC}-V_L (16) = installed; V_L-VHIGH (17) = installed.

Note that there are no differential termination resistors on either the Rx inputs nor the Tx outputs. If these resistors are desired, they can be added at positions R_9 and R_7, respectively.

Functional Diagram *(Default Configuration)*
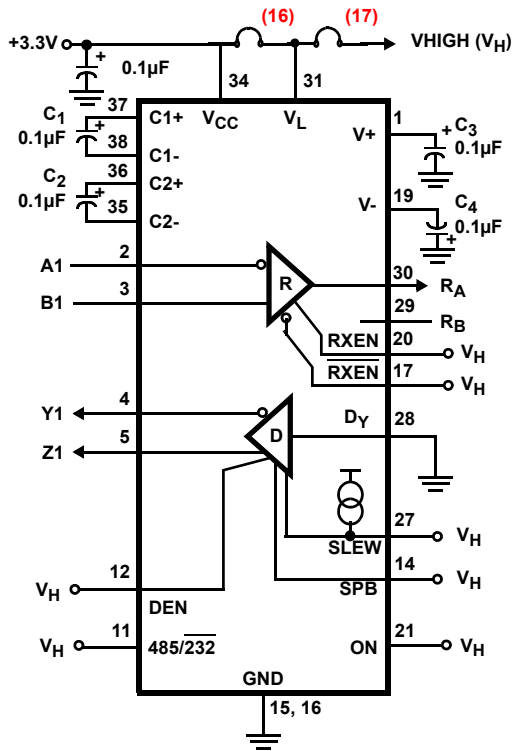
Supply Banana Jacks

There are eight banana jacks at the top of the board for power supply connections, but only V_{CC} and GND are required connections. The function and use of each jack (from left to right) are:

VLOAD - This is a load voltage driving the load resistors connected to the Rx and Tx outputs (Tx resistors - R_5 and R_6 - not populated); used mostly during output enable and disable time characterizations.

GND - Common connection for any supplies used.

RXBIAS - A voltage that can be applied to any or all Rx inputs via jumpers "J9" and "J10" (3 and 2); the "RXBIAS-VCC" (15) jumper shorts this jack to V_{CC}, so remove this jumper if supplying a voltage other than V_{CC}.

V+ - Used to monitor the positive charge pump voltage in RS-232 mode.

V- - Used to monitor the negative charge pump voltage in RS-232 mode.

VCC - The 3.3V supply connection.

VHIGH - Connects to all the "VH" positions on the jumpers to define the high level voltage for logic and Tx inputs; the "VL-VHIGH" (17) jumper shorts this jack to V_L, so remove this jumper if supplying a voltage other than V_L.

VL - The logic supply voltage that sets the ISL3331's Rx output V_{OH} levels, and the logic and Tx input switching

points; the "VCC-VL" (16) jumper shorts this jack to V_{CC}, so remove this jumper if supplying a voltage other than V_{CC}.

Getting Started

Connect a 3.3V, 500mA minimum, power supply to the V_{CC} and GND banana jacks. It is recommended that an ammeter be used between the supply and the board, so that I_{CC} can be monitored. Ensure that the "RXBIAS-VCC" (15), "VCC-VL" (16) and "VL-VHIGH" (17) jumpers are installed in the upper right hand corner of the board.

External Loopback Via Jumpers

To evaluate the Rx and Tx performance at the same time, an external loopback can be implemented simply by installing jumpers "A1/Y1_LB (5) and "B1/Z1_LB (6). In this configuration, the Tx output lines connect to the corresponding Rx input lines, so the data driven on the Tx input(s) appears at the Rx output(s). In RS-485 mode, data driven on DY loops back through A and B to R_A. In RS-232 mode, DY loops back to R_A, and DZ loops back to R_B.

For RS-485 mode, installing resistors R_7 and R_9 allows evaluation of performance with the Tx driving a double terminated load.

Basic RS-485 DC Evaluation

GENERAL OBSERVATIONS

I_{CC} should be approximately 1.2mA.

Measure V+ and V- at the banana jacks - V+ = VCC and V- = GND, indicating that the charge pumps are off for low power and low noise.

R_A is high - due to the "full failsafe" Rx - while R_B is always tri-stated because it is unused in RS-485 mode.

Note that this evaluation board isn't populated with differential termination resistors on either the Rx inputs nor the Tx outputs. If these resistors are desired, they can be added at positions R_9 and R_7, respectively.

RECEIVER TESTS

The "full failsafe" nature of the Rx can be evaluated by manipulating the "A1" (1) and "B1" (4) input jumpers. In the default configuration, A1 and B1 float, but RA (measure at the "RB1(RA)" test point to the right of jumper (1)) remains high due to the failsafe "open" functionality. Installing jumpers "A1" (1) and "B1" (4) effectively shorts the two inputs together (i.e., V_{ID} = 0). R_A still remains high, indicating that the Rx is also failsafe "shorted". The combination of failsafe "open" and "shorted" yields a "full-failsafe" Rx.

To switch the Rx output state leave the "B1" (4) jumper installed, remove the "A1" (1) jumper, and install the A1 Rx bias jumper, "J10" (2). The "RXBIAS-VCC" (15) jumper now drives the A1 input voltage to V_{CC}, which switches RA low. Removing the "RXBIAS-VCC" (15) jumper, and connecting a power supply between the "RXBIAS" banana jack and GND

RENESAS

now sets the Rx differential input voltage, via "A1", and varying this supply switches the Rx output state. For example, with the RXBIAS supply = 0V (V_{ID} = 0V) the output is high, and increasing RXBIAS to at least +200mV (V_{ID} = -200mV) switches RA low.

To disable the Rx output via the active high RXEN pin, ensure that the "$\overline{RXEN1}$" (10) jumper is in the "VH" position, and move jumper "(RXEN)" (11) to the "LOW" position. To disable the Rx output via the active low $\overline{RXEN}$ pin, ensure that the "(RXEN)" jumper is in the "LOW" position, and move jumper "$\overline{RXEN1}$" to the "VH" position.

Return the "$\overline{RXEN1}$" and "(RXEN)" jumpers to the "VH" position, remove the "RXBIAS" power supply and jumpers "J10" and "B1", and reinstall the "RXBIAS-VCC" jumper.

DRIVER TESTS

Tx DC output levels are independent of Tx speed setting. In the default configuration, the driver input, DY, is low, so the Tx noninverting output, Z1, is low, while the inverting output, Y1, is high. To switch the output states, simply move the "DZ1/DE1 (DY)" (14) jumper to the "VH" position. In either state, note the good differential voltage (V_{OD}) of ≈2.9V. To evaluate the double terminated V_{OD} (≈2.0V), install resistors R_7 and R_9, and configure the evaluation board for "external loopback", as described previously (i.e., install jumpers (5) and (6)).

To disable the Tx output via the active high DEN pin, move the "(DEN)" (8) jumper from the "VH" to the "LOW" position.

When finished, return the "DZ1/DE1 (DY)" and "(DEN)" jumpers to the "LOW" and "VH" positions respectively, and remove the "external loopback" jumpers.

INTERNAL LOOPBACK

To configure the ISL3331 for internal loopback mode, simply move the "(ON)" (12) jumper to the "LOW" position, while ensuring that the "(DEN)" (8) and "(RXEN)" (11) jumpers are set to "VH". Note that I_{CC} increases by ≈1.3mA, due to the enabling of the loopback receivers. RA is now low due to the Tx outputs internally driving the Rx. You can repeat the previous Rx switching tests to confirm that the external Rx input pins now have no affect on RA.

The internal loopback receivers are not RS-485/422 compliant, so internal loopback **can't** be used to create a half duplex transceiver.

LOW POWER SHDN

With the "(ON)" (12) jumper still in the "LOW" position, move the "(DEN)" (8) and "(RXEN)" (11) jumpers to the "LOW" position, while ensuring that the "$\overline{RXEN1}$" (10) jumper is set to "VH". This setting places the ISL3331 into shutdown (SHDN), which disables the Tx and Rx outputs, and places the IC in its lowest power mode. Note that I_{CC} drops to 10µA.

Return jumpers "(ON)", "(DEN)", and "(RXEN)" to the "VH" position.

Basic RS-485 AC Evaluation

Remember that there aren't any differential term resistors, so if they are desired they must be added at positions R_7 - for the Tx - and R_9 for the Rx.

RECEIVER TESTS

Before starting, ensure that the jumpers are back in the default positions. Note that the RS-485 Rx operates at high speed, regardless of the Tx speed selection.

Add jumper "B1" (4) to connect that input to GND, and add jumper "A1" (1) to engage the 50Ω term. Connect a generator to the "A1" BNC, and set it for a -1.5V to +1.5V swing. Monitoring test points "TP6" (input), and "RB1 (RA)" (output) with a scope allows the Rx prop delays and skews to be measured. If desired, you can load the Rx output with a 1kΩ resistor by adding jumper "J6" (not numbered), located below test point "RB1 (RA)". This resistor terminates to the "VLOAD" banana jack (upper left hand corner), allowing the resistor to be terminated to GND by shorting "VLOAD" to GND, or terminated to any voltage by connecting "VLOAD" to an external supply.

You can also measure the Rx enable/disable time to/from a low output state via the active high RXEN pin. From the previous jumper configuration, leave the "B1" and "J6" jumpers installed, remove the "A1" jumper, and install the A1 Rx bias jumper, "J10" (2). Connect the "VLOAD" jack to V_{CC}, switch the "(RXEN)" (11) jumper to the low position to engage the 50Ω term, set the generator to swing from 0V to 3V, and move the generator to the "DEN2 (RXEN)" BNC. Monitoring test points "TP12" (input), and "RB1 (RA)" (output) with a scope allows the Rx enable and disable times to be measured. To evaluate the Rx enable/disable time to/from a high output state, simply remove "J10", and connect "VLOAD" to GND.

To evaluate the Rx enable/disable times using the active low $\overline{RXEN}$ pin, repeat the previous test but leave the "(RXEN)" jumper in the "LOW" position, move the "$\overline{RXEN1}$" (10) jumper to the "LOW" position to connect the 50Ω term, and connect the generator to the "$\overline{RXEN1}$" BNC.

TX SPEED SELECTION

Before performing any Tx switching tests, ensure that the jumpers are in their default positions, and then configure the "DZ/(SLEW)" (13) and "SPB" (9) jumpers for the desired Tx speed setting. Table 1 details the jumper settings for each of the speed options.

TABLE 1. JUMPER SETTINGS FOR Tx SPEED SELECTION

DATA RATE	J-(DZ/SLEW) (13)	J-SPB (9)
115kbps	"LOW"	"LOW"
460kbps	"LOW"	"VH"
20Mbps	"VH"	"LOW" or "VH"

DRIVER TESTS

There are no driver loads on this board, so if loading is desired a differential load resistor, and/or differential load capacitor may be added at position "R_7". Alternatively, single ended loads (Y or Z to GND) may be added at positions "C4" and "C2".

Ensure that the "DZ1/DE1 (DY)" (14) jumper is in the "LOW" position to engage the 50Ω term resistor, connect the generator to the "DZ1/DE1 (DY)" BNC, and set the swing for 0V to 3V. Monitoring test points "TP18" (input), and "TP5" and "TP2" (Y and Z outputs respectively) with a scope allows the Tx prop delays, skews, and transition times to be measured. To view the differential waveform, use the scope's math function to generate "Z-Y".

To measure the Tx output enable and disable times, start with the previous jumper configuration and move the "DEN" (8) jumper to the "LOW" position to engage its 50Ω term resistor. Connect the generator to the "DEN1 (DEN)" BNC, and set the swing for 0V to 3V. Monitoring test points "TP9" (input), and "TP5" and "TP2" (Y and Z outputs respectively) with a scope allows the enable and disable times to be measured. Note that some form of termination resistor must be used to pull the disabled outputs to a known state; a differential termination resistor at "R_7" is the easiest approach.

EVALUATING DRIVER AND RECEIVER COMBINED PERFORMANCE

Performance through a cascaded Tx and Rx can easily be evaluated, utilizing the external loopback function, by installing jumpers "A1/Y1_LB (5)" and "B1/Z1_LB (6). In this configuration, the Tx output lines connect to the corresponding Rx input lines, so the data driven on the Tx input (DY) appears at the Rx output (RA).

Installing resistors R_7 and R_9 allows evaluation of the performance with the Tx driving a double terminated load.

Interconnecting Driver and Receiver with a Cable

To evaluate the performance of the Tx and Rx interconnected by a cable, start with the default configuration, connect single wire of a twisted pair between test points "TP2" and "TP1", and connect the other wire in the pair between "TP5" and "TP6". Ensure that the "DZ1/DE1 (DY)" (14) jumper is in the "LOW" position to engage the 50Ω term resistor, connect the generator to the "DZ1/DE1 (DY)" BNC, and set the swing for 0V to 3V. Monitoring test points "TP18" (input), and test point "RB1(RA)" illustrates the overall input to output performance.

Installing resistors R_7 and R_9 allows evaluation of the performance with the Tx driving a double terminated cable.

Switching to RS-232 Mode

To set the board for RS-232 evaluation, start with the jumpers in the "default configuration", and move jumper

"A2 (485/$\overline{232}$)" (7) to the "LOW" position. If RS-485 termination resistors ("R_7" or "R_9") were added, ensure that they have been removed. Note that the RS-232 data rate is fixed at 400kbps, so the "SPB" (9) jumper has no affect (connect it high to minimize SHDN I_{CC}), and that the "SLEW" pin becomes the second driver input, DZ. Figure 1 illustrates the ISL3331 configuration in this mode.
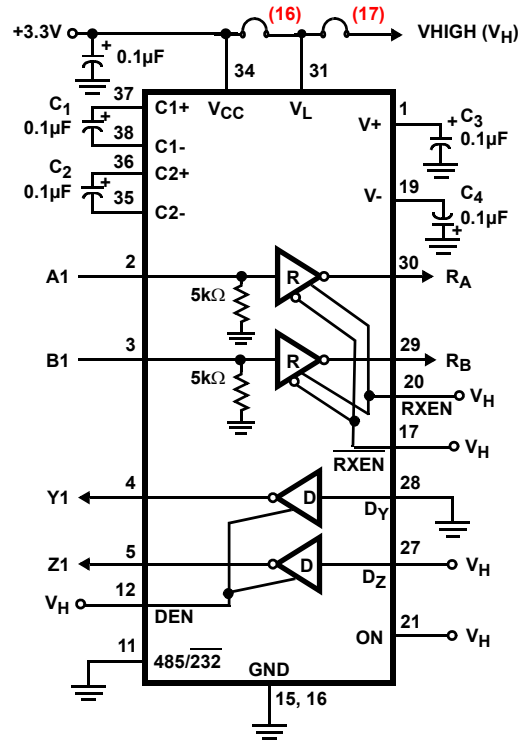
FIGURE 1. DEFAULT RS-232 CONFIGURATION

Basic RS-232 DC Evaluation

GENERAL OBSERVATIONS

Note that V+ and V- now pump up to approximately +6V and -5.6V, respectively, and the charge pump operation increases I_{CC} to 3.9mA. Also note that RS-232 drivers and receivers are inverting by definition.

Before starting, ensure that resistors R_7 and R_9 are removed, if they have been previously installed.

RECEIVER TESTS

In the default configuration of Figure 1, RB (measure at the "RA1 (RB)" test point to the left of jumper (14)) and RA (measure at the "RB1(RA)" test point to the right of jumper (1)) are high due to the A1 and B1 5kΩ input resistors to GND.

To switch the Rx output states, install the A1 and B1 Rx bias jumpers, "J10" (2) and "J9" (3). The "RXBIAS-VCC" (15) jumper now drives the Rx input voltages to V_{CC}, which switches RA and RB low. Removing the "RXBIAS-VCC" jumper and connecting a power supply between the "RXBIAS" banana jack and GND, allows this supply to set

the Rx input voltages, in case the user wants to evaluate the Rx switching points.

To disable the Rx outputs via the active high RXEN pin, remove "J10" (2) and "J9" (3), and switch the "(RXEN)" (11) jumper to the "LOW" position (make sure the "RXEN1" (10) jumper is in the "VH" position). To disable the Rx outputs via the active low RXEN1 pin, move jumper "RXEN1" to the "VH" position (make sure the "(RXEN)" jumper is in the "LOW" position).

Return the "RXEN1" and "(RXEN)" jumpers to the "VH" position, remove the "RXBIAS" power supply, and reinstall the "RXBIAS-VCC" (15) jumper.

DRIVER TESTS

The RS-232 Tx outputs, Y and Z, are high (≈6.2V) and low (≈ -5.7V), respectively, in the default configuration. To switch the output states, simply switch the "DY1 (DZ/SLEW)" (13) and "DZ1/DE1 (DY)" (14) jumpers to the opposite states. To evaluate the loaded driver output voltages, configure the port for "external loopback", as described previously (i.e., install jumpers (5) and (6)). Each driver output is now loaded by an Rx input resistor (≈5kΩ), and the output voltages still exceed ±5.5V.

The driver outputs can be disabled by moving the "(DEN)" (8) jumper to the "LOW" position.

Remove the "external loopback" jumpers when finished, switch the "DY1(DZ/SLEW)" and "(DEN)" jumpers to the "VH" position, and move the "DZ1/DE1 (DY)" jumper back to the "LOW" position.

INTERNAL LOOPBACK

To configure the ISL3331 for internal loopback mode, simply move the "(ON)" (12) jumper to the "LOW" position, while ensuring that the "(DEN)" (8) and "(RXEN)" (11) jumpers are set to "VH". Note that I_{CC} increases due to the enabling of the loopback receivers. RA is now low due to Tx output Y feeding back to Rx A, while RB is high due to Z feeding back to Rx B. You can repeat the previous Rx switching tests to confirm that the external Rx input pins now have no affect on RA nor RB.

LOW POWER SHDN

The ISL3331 enters the SHDN mode when "(ON)" (12) = "LOW", and the Tx and Rx are disabled ("(DEN)" (8) = "LOW", "(RXEN)" (11) = "LOW", and RXEN1 (10) = "VH"), and the already low supply current drops to as low as 10µA. SHDN disables the Tx and Rx outputs, and disables the charge pumps, so V+ collapses to V_{CC}, and V- collapses to GND.

All but 10µA of SHDN I_{CC} current is due to the on-chip SPB pull-up resistor (~10µA/resistor), so SHDN I_{CC} varies depending on the ISL333x configuration. To evaluate the lowest SHDN I_{CC}, ensure that the "SPB" (9) jumper is in the "VH" position.

SINGLE TX AND SINGLE TRANSCEIVER MODES

RS-232 mode also offers the options of selecting a single Tx mode, or a single Tx/Rx pair mode. To evaluate the single Tx mode, set the "(ON)" (12) and "(RXEN)" (11) jumpers "LOW" and "(DEN)" (8) and "RXEN1" (10) jumpers to "VH". To evaluate the single Tx/Rx mode, set the "(ON)" and "(DEN)" jumpers "LOW" and either the "RXEN1" jumper to "LOW" or the "(RXEN)" jumper to "VH".

Basic AC Evaluation

Before starting, ensure that the jumpers are back in the default RS-232 positions. Note that the RS-232 data rate is fixed, so the speed select pins have no effect.

RECEIVER TESTS

Add jumper "A1" (1) to engage the 50Ω term, connect a generator to the "A1" BNC, and set it for at least a 0V to 3V swing. Monitoring test points "TP6" (input), and "RB1(RA)" (output) with a scope allows the Rx prop delays and skews to be measured. If desired, you can load the Rx output with a 1kΩ resistor by adding jumper "J6" (not numbered), located below test point "RB1 (RA)". This resistor terminates to the "VLOAD" banana jack (upper left hand corner), allowing the resistor to be terminated to GND by shorting "VLOAD" to GND, or terminated to any voltage by connecting "VLOAD" to an external supply.

To measure the Rx enable/disable time to/from a high output state via the active high RXEN pin, start from the previous jumper configuration, leave the "J6" jumper installed, and connect the "VLOAD" banana jack to GND. Remove the "A1" jumper (Rx input is pulled low by its on-chip pull-down), switch the "(RXEN)" (11) jumper to the low position to engage the 50Ω term, set the generator to swing from 0V to 3V, and move the generator to the "DEN2 (RXEN)" BNC. Monitoring test points "TP12" (input), and "RB1 (RA)" (output) with a scope allows the Rx enable and disable times to be measured. To evaluate the Rx enable/disable time to/from a low output state, install the A1 Rx bias jumper, "J10" (2).

To evaluate the Rx enable/disable times using the active low RXEN pin, repeat the previous test but leave the "(RXEN)" jumper in the "LOW" position, move the "RXEN1" (10) jumper to the "LOW" position to connect the 50Ω term, and connect the generator to the "RXEN1" BNC.

DRIVER TESTS

Ensure that the "DZ1/DE1 (DY)" (14) jumper is in the "LOW" position to engage the 50Ω term resistor, connect the generator to the "DZ1/DE1 (DY)" BNC, and set the swing for 0V to 3V. Monitoring test points "TP18" (input) and "TP5" (output) with a scope, allows the Tx prop delays, skews, and transition times to be measured.

To measure the "loaded" driver performance, simply remove the "J10" (2) jumper, and connect the "A1/Y1_LB" (5) jumper,

which connects an Rx input, including its 5kΩ pull-down, to the driver output.

To measure the Tx output enable/disable times to/from a high output state, start with the previous jumper configuration and move the "(DEN)" (8) jumper to the "LOW" position to engage its 50Ω term resistor. Connect the generator to the "DEN1 (DEN)" BNC, and set the swing for 0V to 3V. Monitoring test points "TP9" (input), and "TP5" (output) with a scope allows the enable and disable times to be measured. Note that some form of output termination resistor must be used to pull the disabled output to a known state; installing the "A1/Y1_LB" jumper is the easiest solution.

EVALUATING DRIVER AND RECEIVER COMBINED PERFORMANCE

Performance through a cascaded Tx and Rx can easily be evaluated, utilizing the external loopback function. Ensure that the "A1/Y1_LB (5) jumper is installed, that the "(DEN)" (8) and "(RXEN)" (11) jumpers are set to the "VH" position, and that the "DZ1/DE1(DY)" (14) jumper is in the "LOW" position. Connect the generator to the "DZ1/DE1(DY)" BNC, and set the swing for 0V to 3V. Monitoring test points "TP18" (input), and "RB1 (RA)" (output) with a scope allows evaluation of the total Tx and Rx performance. In this configuration, the Tx output line connects to an Rx input line, so the data driven on the Tx input (DY) appears at the Rx output (RA).

Evaluating the Logic Supply (V$_L$) Function

The ISL3331 includes a V$_L$ pin that powers the logic inputs (Tx inputs and control pins) and Rx outputs, regardless of protocol selection. These pins interface with "logic" devices such as UARTs, ASICs, and μcontrollers, and today most of these devices use power supplies significantly lower than 3.3V. Connecting the V$_L$ pin to the power supply of the logic device limits the ISL3331's Rx output V$_{OH}$ to V$_L$, and reduces the Tx and control input switching points to values compatible with the logic device's output levels. If the logic device is also powered by 3.3V, then the V$_L$ pin should be shorted to the V$_{CC}$ pin.

Removing jumper "V$_{CC}$-V$_L$" (16), and connecting a new power supply to the "V$_L$" banana jack allows the user to evaluate this function. V$_L$ can be anywhere from V$_{CC}$ down to 1.2V, but the input switching points may not provide enough noise margin when V$_L$ < 1.5V. Table 2 indicates typical V$_{IH}$ and V$_{IL}$ values for various V$_L$ settings so the user can ascertain whether or not a particular V$_L$ voltage meets his needs.

TABLE 2. V$_{IH}$ AND V$_{IL}$ vs V$_L$ FOR V$_{CC}$ = 3.3V

V$_L$ (V)	V$_{IH}$ (V)	V$_{IL}$ (V)
1.2	0.85	0.26
1.5	0.9	0.5
1.8	0.9	0.73
2.3	1.2	1.0
2.7	1.4	1.3
3.3	1.8	1.7

To evaluate the V$_L$ impact on Rx V$_{OH}$, vary the V$_L$ voltage while monitoring a high Rx output. To evaluate the V$_L$ effect on input switching points, remove the "VL-VHIGH" (17) jumper, connect a new supply between the "VHIGH" and "GND" banana jacks, set the V$_L$ supply to the desired voltage, move the jumper of the input to be tested to the "VH" position, and vary the "VHIGH" supply to determine the switching point.

Jumper Definitions

The jumpers used to evaluate the ISL3331 are:

J-A1 (1) - Connects A1 input to GND through a 50Ω resistor.

J10 (2) - Connects A1 input to the RXBIAS jack.

J9 (3) - Connects B1 input to the RXBIAS jack.

J-B1 (4) - Connects B1 input to GND through a 50Ω resistor.

A1/Y1_LB (5) - Loops output Y1 back to input A1.

B1/Z1_LB (6) - Loops output Z1 back to input B1.

J-A2(485/232) (7) - "LOW" sets the IC to RS-232 mode; "VH" sets it to RS-485 mode.

J-(DEN) (8) - "LOW" disables RS-232 or RS-485 Tx outputs; "VH" enables all Tx outputs.

J-SPB (9) - Used with "SLEW" to set the RS-485 Tx data rate (see Table 1).

J-RXEN1 (10) - "LOW" enables all RS-232 or RS-485 Rx outputs; "VH" disables Rx outputs (if and only if J-(RXEN) = "LOW").

J-(RXEN) (11) - "LOW" disables all RS-232 or RS-485 Rx outputs (if and only if J-$\overline{RXEN1}$ = "VH"); "VH" enables Rx outputs.

J-(ON) (12) - "LOW" places IC in "special features" mode (loopback, SHDN, etc.); "VH" sets IC for normal operation.

J-DY1(DZ/SLEW) (13) - "LOW" sets the Z Tx input low in RS-232 mode or selects the slew rate limited data rates in RS-485 mode; "VH" sets the Z Tx input high in RS-232 mode or selects the 20Mbps data rate in RS-485 mode.

J-DZ1/DE1(DY) (14) - "LOW" sets the Y Tx input low in RS-232 or RS-485 Modes; "VH" sets the Y Tx input high in either mode.

RXBIAS-VCC (15) - Connects V_{CC} to the "RXBIAS" jack; if driving RXBIAS from a voltage other than V_{CC}, remove this jumper.

VCC-VL (16) - Connects V_{CC} to the "VL" jack; if driving VL from a voltage other than V_{CC}, remove this jumper.

VL-VHIGH (17) - Connects V_L to the "VHIGH" jack; if driving VHIGH from a voltage other than V_L, remove this jumper.

PCB Layout Information

The dimensions for the QFN land pattern used on this evaluation board are shown in Figure 2.
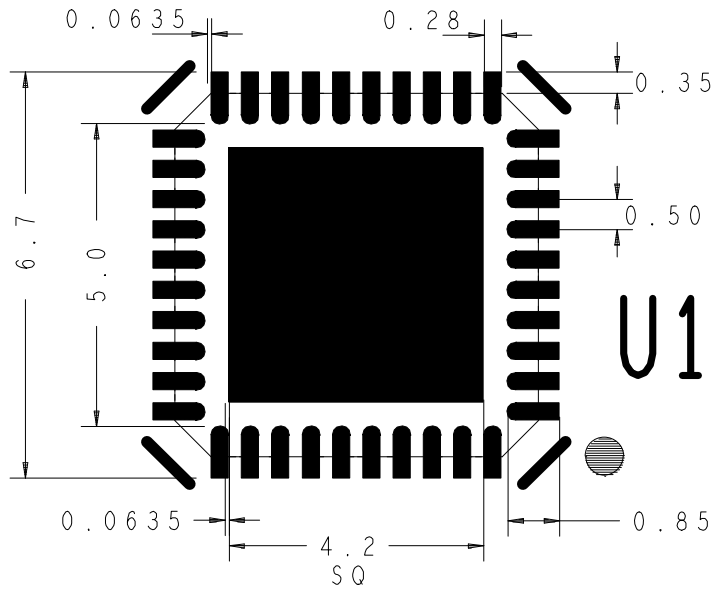
FIGURE 2. QFN LAND PATTERN AND DIMENSIONS (in mm)
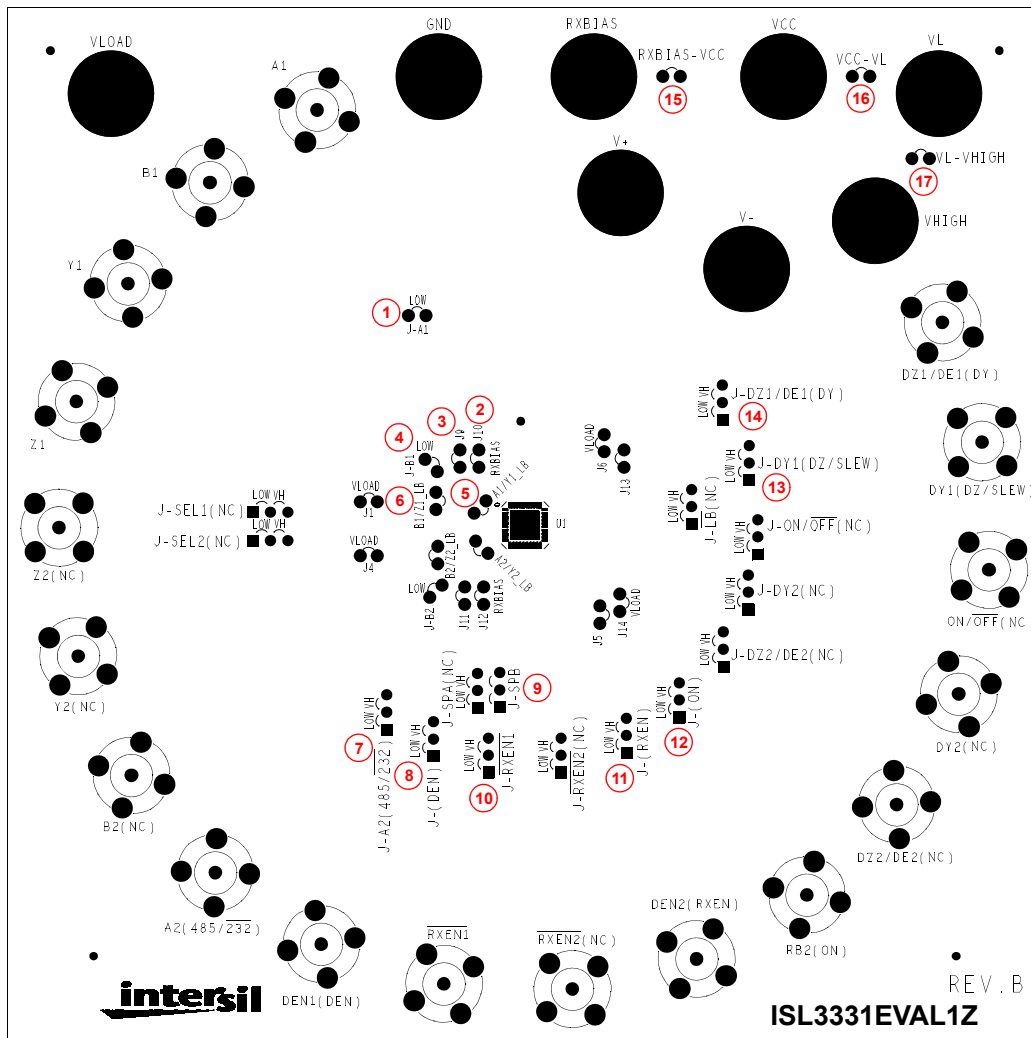
FIGURE 3. JUMPER LOCATOR DIAGRAM

R1, 3, 4, 8, 12, 15-18, 20, 24-26, 28 = 49.9Ω
R5, 6, 10, 11 = 499Ω (NOT POPULATED)
R7, 9 = 121Ω (NOT POPULATED)
R13, 14 = 121Ω
R19, 22, 23, 27 = 1kΩ
C1, 6-8,10-14, 16, 18-21, 23-26 = 0.1µF
C2-5 = 0.1µF (NOT POPULATED)
C9, 15, 17, 22, 27 = 10µF

Notice

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