XR31233 / XR31234 / XR31235
Evaluation Board User's Manual

Introduction

Exar's XR31233 / XR31234 / XR31235 EVB evaluation board provides a platform on which to examine the features and performance of the XR31233 / XR31234 / XR31235 CAN Bus transceivers. The XR31233 / XR31234 / XR31235 EVB is a 2 layer pcb that allows for access to all the device pins.

Hardware Setup

To use the Evaluation Board, the following components are required:

1. XR31233 / XR31234 / XR31235 EVB evaluation board
2. Power supply
3. Signal source
4. Oscilloscope for data analysis
5. Digital Multimeter

Refer to the product data sheet for additional information.

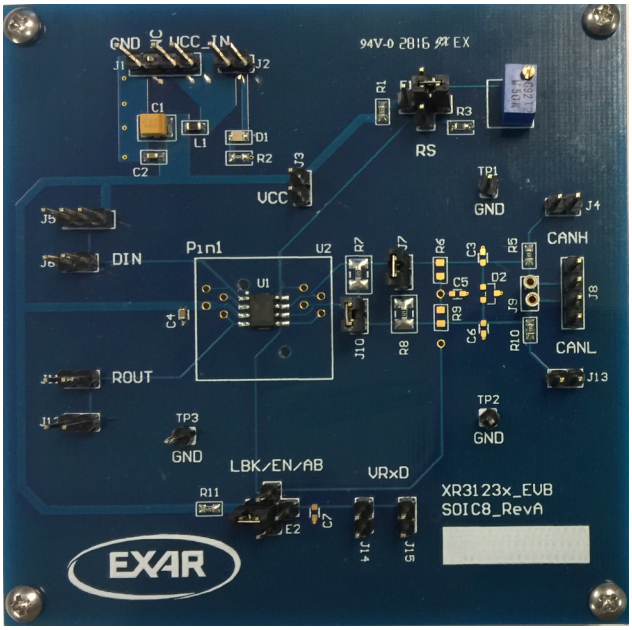


Figure 1:
Top View of XR31233 / XR31234 / XR31235 EVB

Evaluation Board Overview

The block diagram shown in Figure 2, illustrates the connection points for the CAN Bus, power and ground, TTL/CMOS driver input, TTL/CMOS receiver output and the mode pins.

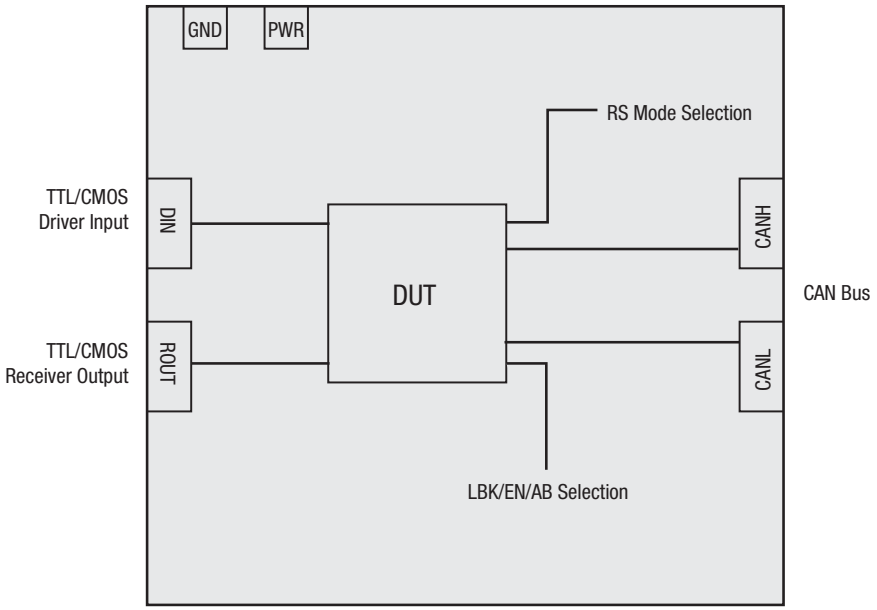


Figure 2: Block Diagram XR31233 / XR31234 / XR31235 - EVB

Hardware / System Setup

The EVB is factory installed with the CAN Bus transceiver per Table 1.

CAN Bus Transceiver	Evaluation Board
XR31233	XR31233EDEVB
XR31234	XR31234EDEVB
XR31235	XR31235EDEVB

Table 1: Evaluation Board Part Numbers

Jumpers are factory installed per Table 2 to configure the EVB for normal mode operation. Jumper and testing options are described in the next section.

Header	Factory Setting		Description
E1	Jumper 1-5		RS = GND, high speed mode
E2	XR31233 XR31235	Jumper 4-5	LBK = 0 enables normal mode AB = 0 enables normal mode
	XR31234	Jumper 3-5	EN = 1 enables normal mode
J7	Jumper 1-2		Connects 120Ω between CANH and CANL
J10	Jumper 1-2		Connects 120Ω between CANH and CANL

Table 2: Factory Settings

Connect the CAN Bus, TTL/CMOS Driver Input and Receiver Output per Table 3 and power and ground per Table 4 for immediate operation.

Header	Connection
J5-2	TTL/CMOS Driver Input from CAN Controller
J8	CAN Bus
J11	TTL/CMOS Receiver Output to CAN Controller

Table 3: Input and Output Connections

J1	J!-1	J1-2	J1-3	J1-4
Name	GND	NC	V_{CC}[1]	V_{CC}[1]

NOTE:

1. V_{CC} = 3.0V to 3.6V

Table 4: J1 Power and Ground Connections

Use probes summarized in Table 5 to observe operation at various points. TP1, TP2 and TP3 provide GND for probes at 3 different spots.

Header	Probe Point
J3	V_{CC} into transceiver
J6	Driver input from CAN Controller to pin 1 (D)
J9	Differential CANH and CANL probe
J12	Receiver output from pin 4 (R) to CAN Controller
J14	VRxD (see next section).

Table 5: Monitoring Probes

Jumper and Testing Options

Power LED - J2

Connect Jumper J2 1-2 to illuminate the D1 LED when power is connected if desired.

$V_{OD\ (D)}$ Under Maximum CAN Bus Load - J4 and J13

Connect J4, J13 and V_{TEST} together to form the Figure 5 test circuit in the datasheet. The 330Ω resistors represent the maximum resistance or load of N nodes in parallel on the CAN Bus while measuring V_{OD} and other device performance.

Driver Input - J5 and J6

J5 allows for connecting pin 1 (D) of the transceiver under test to one of the following:

- Ground (dominant bus state),
- V_{CC} (recessive bus state)
- An external input signal.

J6 is provided for probing as mentioned in Table 5.

Bus Termination - J7 and J10

As mentioned in the last section, J7 and J10 are factory installed for bus termination between CANH and CANL. If two EVBs are used, then connect J7 on one board and J10 on the other board for balanced termination.

Pin 8 (RS) Mode Selection - E1

Connect E1 in one of the following ways to configure pin 8 (RS):

- 1-5 to ground for high speed mode (factory setting)
- 3-5 to pullup to V_{CC} for lower power mode
- 4-5 to pulldown to ground for slope control mode
- 2-5 to pulldown to ground for slope control mode with the TRIMPOT to adjust slope and speed.

Configuring Pin 5 (LBK / EN / AB) Mode Selection - E2

See the E2 connection in Table 6 to configure the input of pin 5:

Transceiver	Pin Name	Input	Logic Level	E2 Connection
XR31233	LBK	Loopback mode input	1	3-5
			0	4-5 (factory setting)
XR31234	EN	Enable input	1	3-5 (factory setting)
			0	4-5
XR31235	AB	Autobaud loopback mode input	1	3-5
			0	4-5 (factory setting)

Table 6: Pin 5 Configuration

CAN Bus Split Termination - E2, J14, J15, C3, C5, C6, R6 and R9

For CAN Bus split termination, instead of using Table 6, connect E2 1-5 and 2-5. Populate C3, C5, C6, R6 and R9. Connect VRxD to J15. J14 can be used for probing.

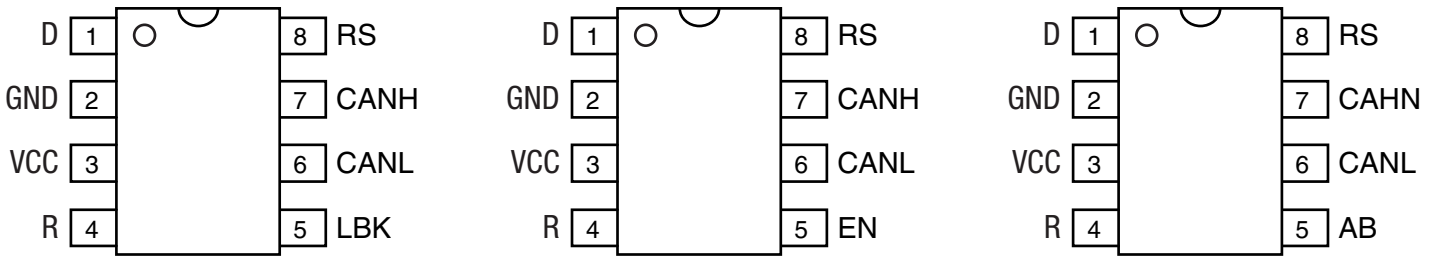
CAN Bus Transceiver Socket - U2

Provisions are made on the EVB to install a socket (U2) if desired.

High Transcient Protection - D2

Provisions are made to add high transcient protection (D2) if desired.

Pin Configurations



Top View, XR31233 Top View, XR31234 Top View, XR31235

Figure 3: Pin Configurations for the XR31233, XR31234 and XR31235 CAN Bus Transceivers

XR31233 / XR31234 / XR31235 EVB Schematic

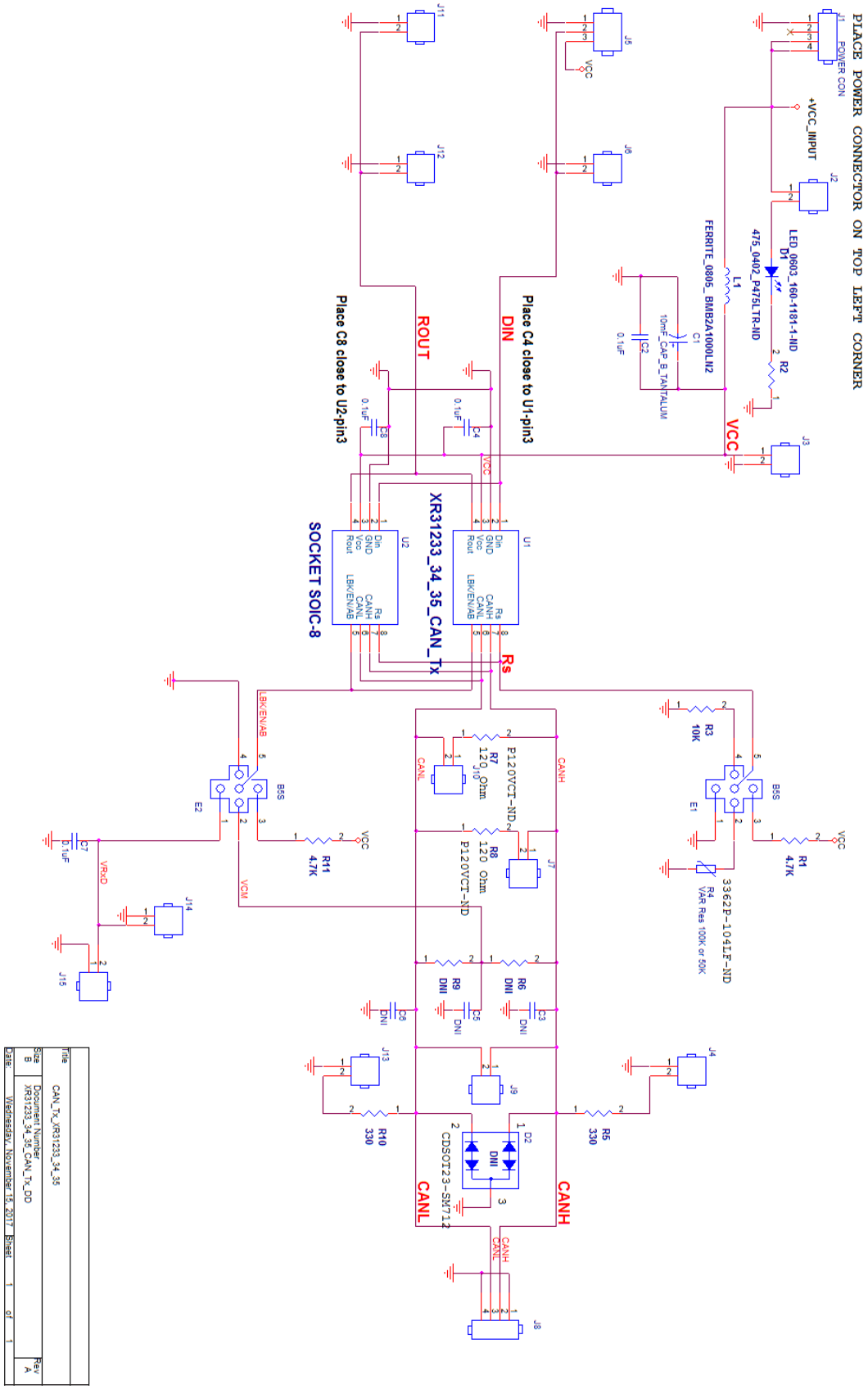


Figure 4: XR31233 / XR31234 / XR31235 EVB Schematic

XR31233 / XR31234 / XR31235 EVB, Top View

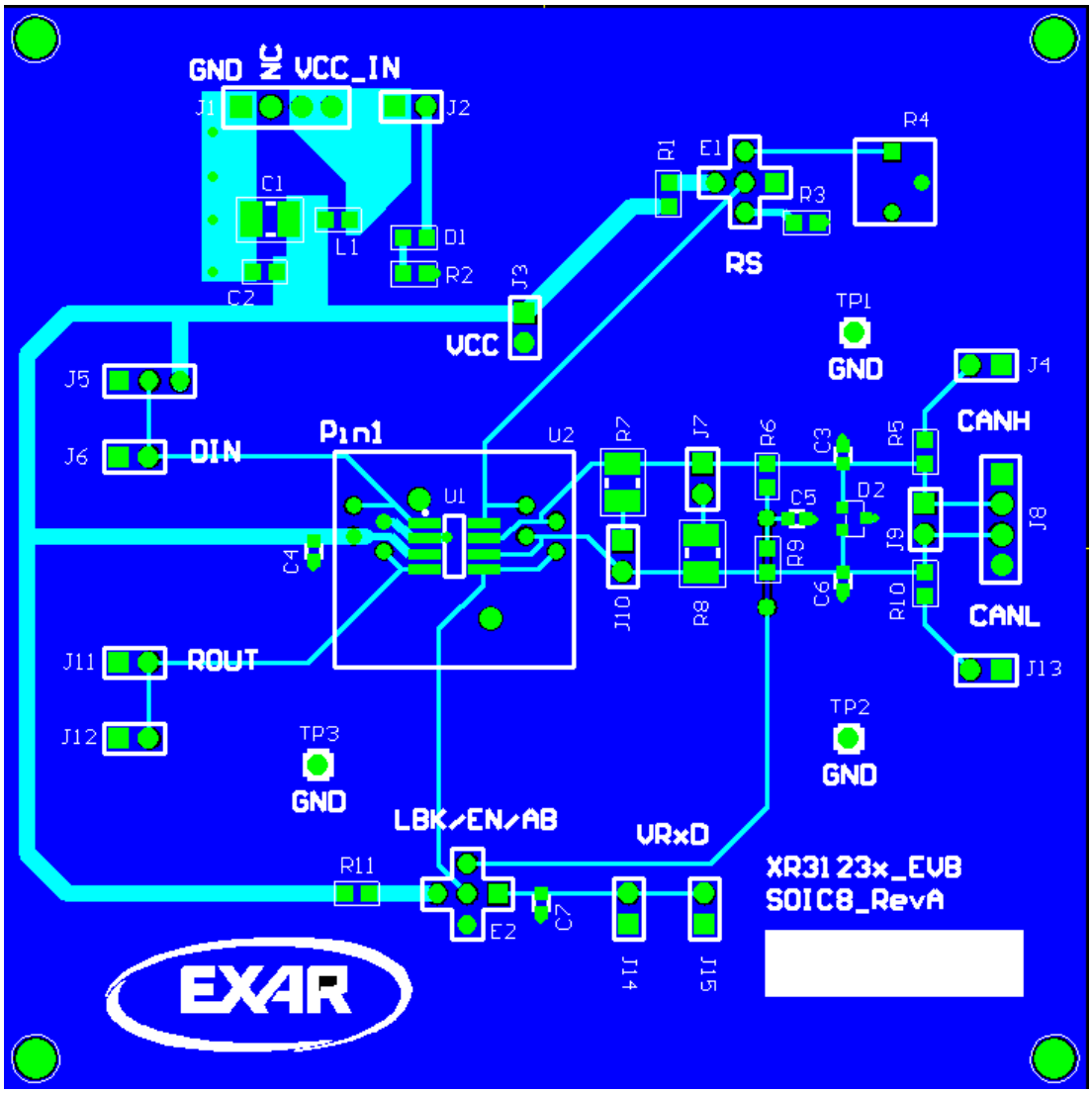


Figure 5: XR31233 / XR31234 / XR31235 EVB, Top View

XR31233 / XR31234 / XR31235 EVB, Bottom View

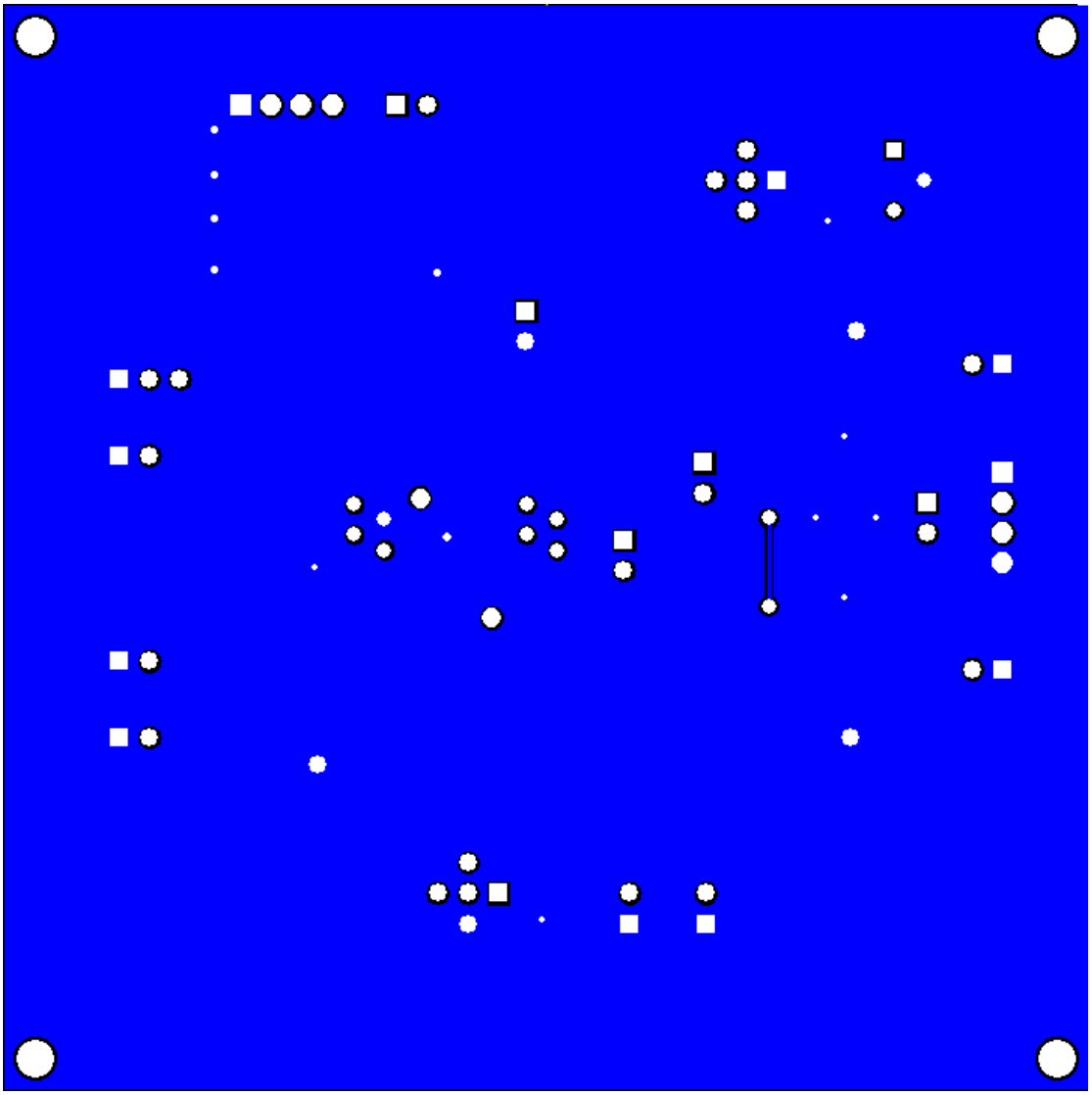


Figure 5: XR31233 / XR31234 / XR31235 EVB, Bottom View

XR31233 / XR31234 / XR31235 EVB Bill of Materials

Item	Quantity	Reference	Part
1	1	C1	10mF_CAP_B AVX TAJA106K016RNJ
2	1	C2	0.1uF 0603, 311-1088-1-ND
3	3	C3, C5, C6	Not Stuffed, 0603, 311-1088-1-ND
4	2	C4, C7	0.1uF 0603, 311-1088-1-ND
5	1	D1	LED_0603_160-1181-1-ND
6	1	D2	Not Stuffed, CDSOT23
7	2	J8	HEADER 4 pins
8	12	J2,J3,J4,J6,J7,J9,J10,J11, J12,J13,J14,J15	HEADER 2 pins
9	1	J5	HEADER 3 pins
10	1	L1	FERRITE_0805_ BMB2A1000LN2
11	2	R1, R11	0805 4.7K
12	1	R2	475_0402_P475LTR-ND (475 Ohm)
13	1	R3	0805 10K
14	1	R4	100K/50K TRIMPOT
15	2	R5, R10	0402, 330 Ohm resistor, 311-330JRCT-ND
16	2	R6, R9	Not Stuffed
17	2	R7, R8	1210/0805, 120 Ohm resistor, 311-120GRCT-ND
18	2	E1, E2	B5S CROSSED HEADER
19	1	U1	XR312xx CAN-Tx Sample
20	1	U2	Not Stuffed, SOCKET
21	1	J1	HEADER 4 pins

Table 7: Evaluation Board Bill of Materials (BOM)

Power Supply Recommendations

In order to ensure reliable operation at all data rates and supply voltages, each supply should have at least 100nF ceramic capacitor located as close to the supply terminals (V_{CC}) as possible. Additional 10uF and 100nF (C1 and C2) are recommended if the supply source is generated from a linear power supply/regulator.

Layout Recommendations

1. Apply at least 100nF bypass capacitors as close as possible to V_{CC} terminal of transceiver.
2. Use at least two vias for V_{CC} and GROUND connections of bypass capacitors to minimize effective via-inductance.
3. When possible, use Vcc and GROUND plane to provide low-inductance traces and signal path.

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