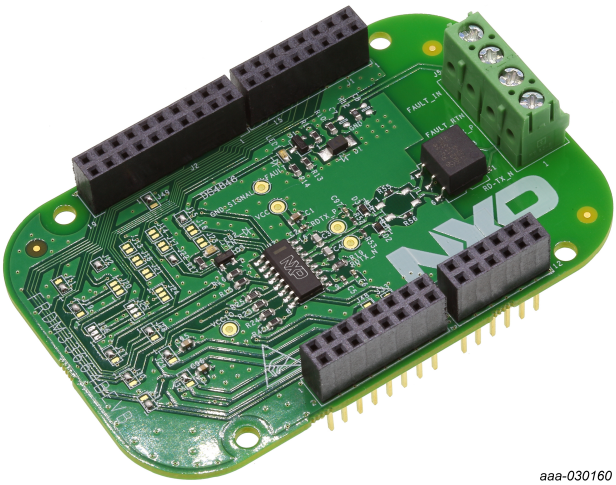
FRDM33664BEVB

Featuring the MC33664ATL1EG isolated communication network high-speed transceiver IC

Rev. 1.0 — 22 June 2018 User guide

1 FRDM33664BEVB



aaa-030160

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The tool summary page for is located at http://www.nxp.com/FRDM33664BEVB. The overview tab provides an overview of the device, product features, a description of the kit contents, a list of (and links to) supported devices, list of (and links to) any related products and a **Get Started** section.

The **Get Started** section provides links to everything needed to start using the device and contains the most relevant, current information applicable to the FRDM33771BTPLEVB.

- Go to http://www.nxp.com/FRDM33664BEVB.
- On the **Overview** tab, locate the **Jump To** navigation feature on the left side of the window.
- Select the **Get Started** link.
- Review each entry in the **Get Started** section and download an entry by clicking on the title.
- After reviewing the **Overview** tab, visit the other product related tabs for additional information:
  - **Documentation**: download current documentation
  - **Software & Tools:** download current hardware and software tools
  - **Buy/Parametrics**: purchase the product and view the product parametrics

After downloading files, review each file, including the user guide which includes setup instructions. If applicable, the Bill of Materials (BOM), suporting schematics, and layout are available via NXP DocStore. [4]

3.1 Kit contents/packing list

The kit contents include:

- Assembled and tested evaluation board/module in anti-static bag
- Quick-start guide
- Four connectors to be mounted on the MCU board

3.2 Required equipment and software

To use this kit, you need:

- 5.0 V power supply, 50 mA capability
- 3.3 V power supply, 50 mA capability (optional: Depends if the application requires 3.3 V logic threshold)
- NXP Microcontroller Development Platform (optional)

4 Getting to know the hardware

4.1 Board overview

The FRDM33664BEVB is a hardware tool for evaluation and development and is ideal for rapid prototyping of an Isolated Network High Speed Transceiver. It can be used to evaluate the features of the MC33664ATL1EG device. The EVB allows the user to connect SPI signals from the MCU to the device SPI_TX and be able to create bit pulses transmission to the bus through the transformer. The messages received by the device can be converted bit by bit and transferred to the MCU by SPI.

4.2 Board features

The board features are as follows:

- MC33664ATL1EG Isolated Communication Transceiver in a 16-pin SOICN package
- SPI interface
- LED indicators
- Fault detection report
- Isolated Communication by transformers with connector

4.3 Block diagram

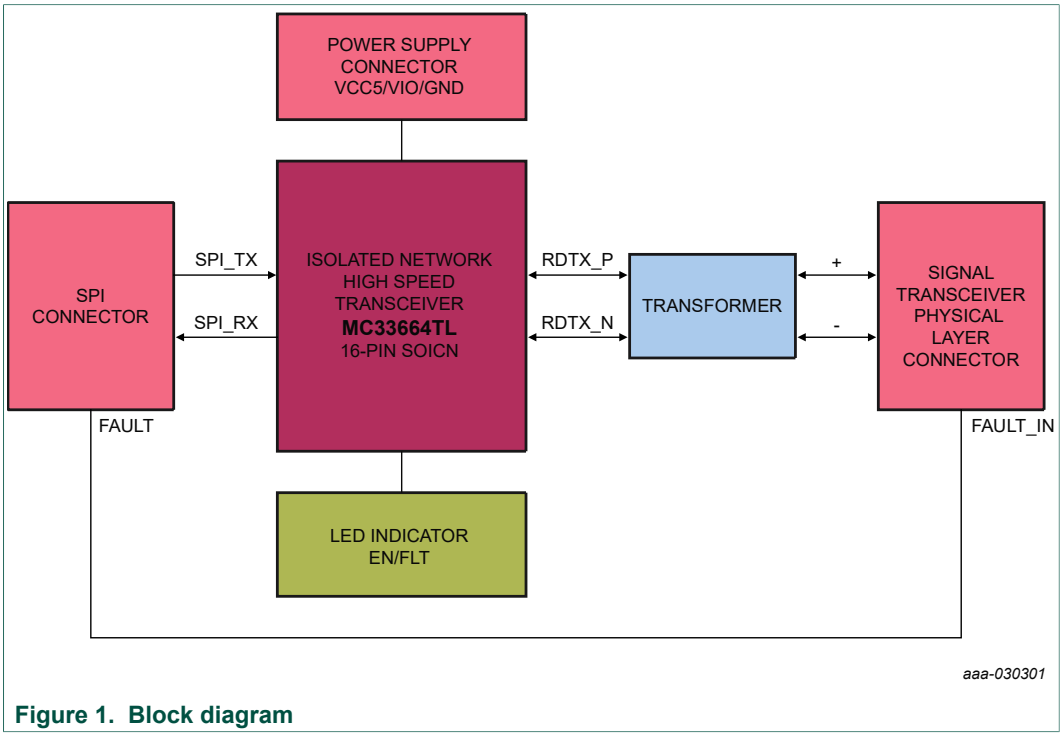

Figure 1. Block diagram

4.3.1 Device features

This evaluation board features the following product:

Table 1. Device features

Device	Description	Features
MC33664ATL1EG	The MC33664ATL1EG is an Isolated Communication Network High Speed Transceiver IC intended to provide a simple method for isolated high speed differential communication.	• 2.0 Mbps isolated network communication rate • Dual SPI architecture for message confirmation • Robust conducted and radiated immunity with wake-up • 3.3 V and 5.0 V compatible logic thresholds • Low sleep mode current with automatic bus wake-up • Ultra-low radiated emissions

4.4 Board description

The FRDM33664BEVB allows the user to exercise all the functions of the MC33664ATL1EG.

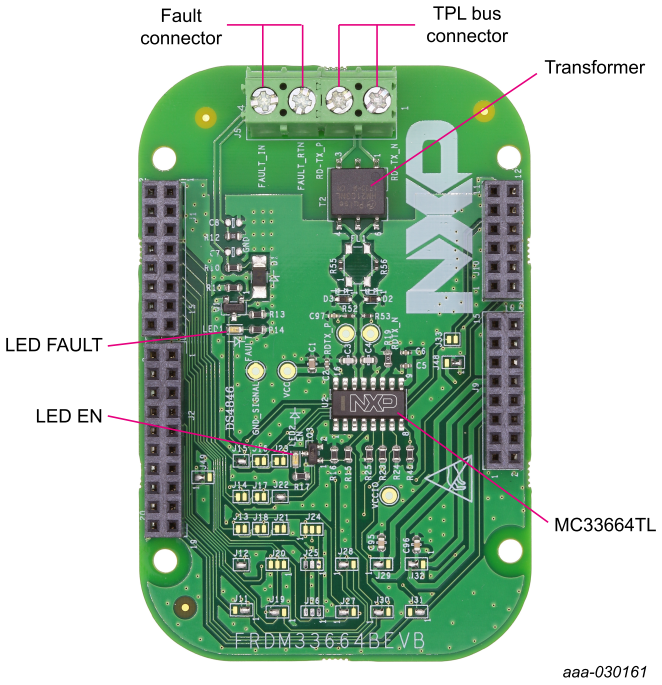

Figure 2. Board description

Table 2. Board description

Name	Description
LED EN	Indicates when EN pin is set to high level (VIO) by MCU
LED FAULT	Indicates when Fault pin is set to high level (VIO) by MCU
Transformer	Bus Isolator Transformer
TPL BUS Connector	The two bus cables must be placed inside the connector
Fault Connector	The fault cable to report the error to the MCU must be placed inside the connector
MC33664ATL1EG	Isolated Network High Speed Transceiver

The modes of operation followed by MC33664ATL1EG for the VIO and EN pins are shown in Table 3.

Table 3. Modes of operation

Device mode	EN pin	VIO pin	LED EN	Comment
Normal	1	1	On	The MC33664 operates as a full transceiver. MCU messages transmitted on the SPI_TX emerge on the SPI_RX for the MCU to read.
Sleep	0	1	Off	In Sleep mode, the transceiver activates the INTB pin when a valid wake-up sequence is detected. The INTB pin remains low until the rising edge of the EN pin places the device in Normal mode.
Reset	x	0	Off	The RDTX± outputs are in high impedance and the device is not able to transmit, receive, or report bus wake-up events.

4.5 Test-point definitions

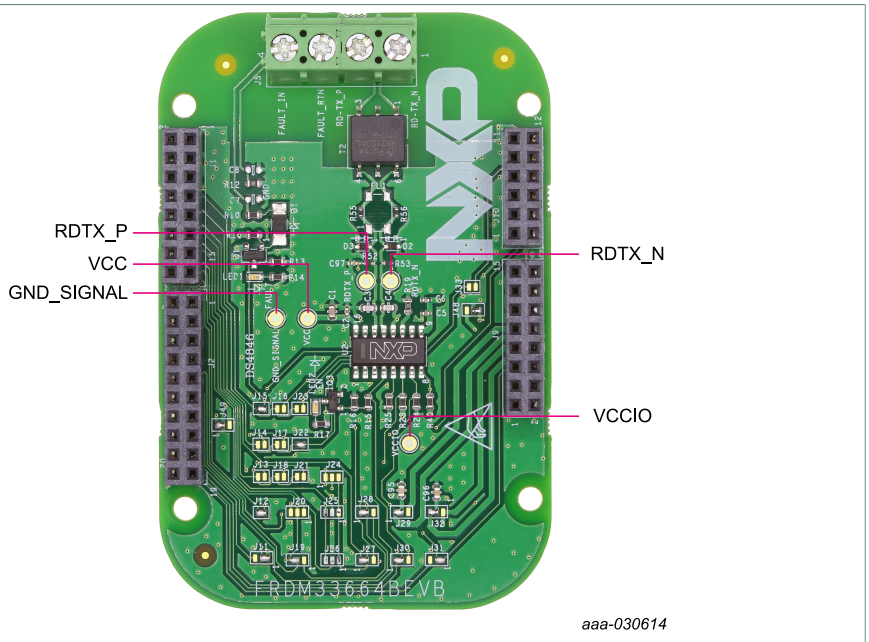

Figure 3. Test points

The following test points provide access to various signals to and from the board.

Table 4. Test points

Test-point name	Signal name	Description
RTDX_P	RDTX+	Measures the isolated pulse communication sent to the device
RDTX_N	RDTX–	
GND_SIGNAL	GND	Ground reference of the device
VCC	VCC5	5 V Input supply
VCCIO	VIO	digital 3.3 V / 5.0 V power to the IC

4.6 Connectors

Figure 4 shows the location of connectors on the board. Table 4, Table 5, and Table 6 list the pinouts for each connector.

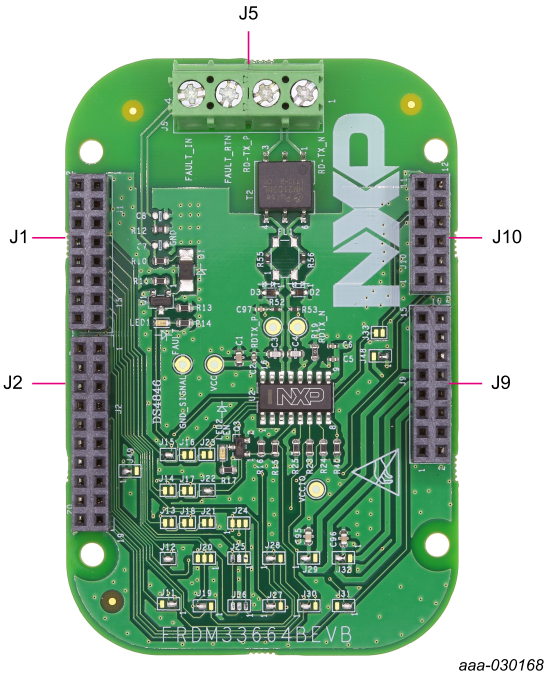

Figure 4. Connectors

Table 5. Connector J5 description

Pin	Name	Description
1	J5_1	TPL bus – Receive/transmit input negative
2	J5_2	TPL bus – Receive/transmit input positive
3	J5_3	FAULT_RTN
4	J5_4	FAULT_IN

Table 6. Connector J1 description

Pin	Name	Description
1	J1_1	No connection
2	J1_2	No connection
3	J1_3	No connection
4	J1_4	No connection
5	J1_5	No connection
6	J1_6	Connected to jumpers J15, J16, J23
7	J1_7	No connection
8	J1_8	Connected to jumpers J14, J17, J22
9	J1_9	Connected to jumpers J31_1
10	J1_10	Connected to jumpers J13, J18, J21
11	J1_11	Connected to jumper J25_2
12	J1_12	Connected to jumper J26_2

Pin	Name	Description
13	J1_13	Connected to jumper J20_1
14	J1_14	Connected to jumper J12
15	J1_15	Connected to jumper J24_2
16	J1_16	No connection

Table 7. Connector J2 description

Pin	Name	Description
1	J2_1	No connection
2	J2_2	No connection
3	J2_3	No connection
4	J2_4	No connection
5	J2_5	No connection
6	J2_6	Connected to jumper J31_3
7	J2_7	No connection
8	J2_8	Connected to jumper J19_2
9	J2_9	No connection
10	J2_10	Connected to jumper J28_3
11	J2_11	No connection
12	J2_12	Connected to jumper J11_3
13	J2_13	Connected to jumper J49_3
14	J2_14	Connected to jumper J49_1
15	J2_15	No connection
16	J2_16	No connection

Table 8. Connector J9 description

Pin	Name	Description
1	J9_1	No connection
2	J9_2	No connection
3	J9_3	No connection
4	J9_4	No connection
5	J9_5	Connected to jumper J31_1
6	J9_6	No connection
7	J9_7	Connected to jumper J11_1
8	J9_8	Connected to jumper J32_1
9	J9_9	Connected to jumper J29_3
10	J9_10	Connected to jumper J29_1

Pin	Name	Description
11	J9_11	Connected to jumper J48_3
12	J9_12	Connected to jumper J48_1
13	J9_13	Connected to jumper J48_3
14	J9_14	Connected to jumper J
15	J9_15	No connection
16	J9_16	No connection

Table 9. Connector J10 description

Pin	Name	Description
1	J10_1	No connection
2	J10_2	No connection
3	J10_3	Connected to jumper J20_3
4	J10_4	No connection
5	J10_5	No connection
6	J10_6	Connected to jumper J30_3
7	J10_7	Connected to jumper J27_3
8	J10_8	No connection
9	J10_9	No connection
10	J10_10	Connected to jumper J33
11	J10_11	No connection
12	J10_12	No connection

4.7 Compatible NXP MCU development platforms

FRDM33664BEVB is compatible with multiple NXP MCU development platforms:

- FRDM-KL25Z (default)
- FRDM-KE06Z
- FRDM-KL43Z
- FRDM-KV31F
- FRDM-KW40Z
- FRDM-KEAZ128

Please find MCU development platform ordering, instruction, and other information on nxp.com.

Table 10. Jumper setting to work with FRDM-KL25Z (default)

Jumper	Setting	Description
J11	1-2	SCLK_RX
J12	1-2	CSB_TX
J13	open	—

Jumper	Setting	Description
J14	open	—
J15	1-2	FAULT
J16	open	—
J17	open	—
J18	open	—
J19	2-3	DATA_TX
J20	open	—
J21	open	—
J22	1-2	INTB
J23	open	—
J24	open	—
J25	open	—
J26	open	—
J27	1-2	SCLK_TX
J28	1-2	DATA_RX
J29	1-2	VCC
J30	1-2	EN
J31	1-2	CSB_RX
J32	1-2	VCCIO
J33	open	—
J48	1-2	GND
J49	1-2	GND

Table 11. Jumper Setting to Work with FRDM-KE06Z

Jumper	Setting	Description
J11	2-3	SCLK_RX
J12	open	—
J13	open	—
J14	open	—
J15	open	—
J16	open	—
J17	1-2	SCLK_TX
J18	open	—
J19	2-3	DATA_RX
J20	open	—
J21	1-2	FAULT

Jumper	Setting	Description
J22	open	—
J23	1-2	CSB_TX
J24	open	—
J25	open	—
J26	2-3	DATA_TX
J27	open	—
J28	open	—
J29	1-2	VCC
J30	2-3	EN
J31	2-3	CSB_RX
J32	1-2	VCCIO
J33	1-2	INTB
J48	1-2	GND
J49	1-2	GND

Table 12. Jumper Setting to Work with FRDM-KL43Z

Jumper	Setting	Description
J11	2-3	SCLK_RX
J12	open	—
J13	open	—
J14	1-2	FAULT
J15	open	—
J16	open	—
J17	open	—
J18	open	—
J19	2-3	DATA_RX
J20	open	—
J21	open	—
J22	open	—
J23	1-2	CSB_TX
J24	2-3	SCLK_TX
J25	2-3	DATA_TX
J26	open	—
J27	open	—
J28	open	—
J29	1-2	VCC

Jumper	Setting	Description
J30	2-3	EN
J31	2-3	CSB_RX
J32	1-2	VCCIO
J33	1-2	INTB
J48	1-2	GND
J49	1-2	GND

Table 13. Jumper Setting to Work with FRDM-KV31F

Jumper	Setting	Description
J11	2-3	SCLK_RX
J12	open	—
J13	open	—
J14	1-2	FAULT
J15	open	—
J16	open	—
J17	open	—
J18	open	—
J19	open	—
J20	1-2	DATA_TX
J21	open	—
J22	open	—
J23	1-2	CSB_TX
J24	1-2	CSB_RX
J25	1-2	SCLK_TX
J26	open	—
J27	open	—
J28	2-3	DATA_RX
J29	1-2	VCC
J30	2-3	EN
J31	open	—
J32	1-2	VCCIO
J33	1-2	INTB
J48	1-2	GND
J49	1-2	GND

Table 14. Jumper Setting to Work with FRDM-KW40Z

Jumper	Setting	Description
J11	2-3	SCLK_RX
J12	open	—
J13	open	—
J14	1-2	FAULT
J15	open	—
J16	1-2	DATA_TX
J17	open	—
J18	1-2	CSB_TX
J19	2-3	DATA_RX
J20	open	—
J21	open	—
J22	open	—
J23	open	—
J24	open	—
J25	open	—
J26	1-2	SCLK_TX
J27	open	—
J28	open	—
J29	1-2	VCC
J30	2-3	EN
J31	2-3	CSB_RX
J32	1-2	VCCIO
J33	1-2	INTB
J48	1-2	GND
J49	1-2	GND

Table 15. Jumper Setting to Work with FRDM-KEAZ128

Jumper	Setting	Description
J11	2-3	SCLK_RX
J12	open	—
J13	1-2	SCLK_TX
J14	1-2	FAULT
J15	open	—
J16	open	—
J17	open	—
J18	open	—

Jumper	Setting	Description
J19	2-3	DATA_RX
J20	open	—
J21	open	—
J22	open	—
J23	1-2	CSB_TX
J24	open	—
J25	open	—
J26	2-3	DATA_TX
J27	open	—
J28	open	—
J29	2-3	VCC
J30	2-3	EN
J31	2-3	CSB_RX
J32	2-3	VCCIO
J33	1-2	INTB
J48	2-3	GND
J49	2-3	GND

5 Configuring the hardware

The FRDM33664BEVB can be configured as a shield board connected to selected Freedom boards or it can be used in a stand-alone configuration (without a Freedom board).

5.1 Freedom board configuration

The layout of the connectors allow MCU development boards mentioned in Section 4.7 to be mounted directly to the FRDM33664BEVB. See Figure 5. When both boards are connected together, the SPI connector is directly connected with the MCU SPI pins. The routing of SPI signals through the Arduino™ connectors depends on the specific Freedom board being used. In this configuration, power is supplied to the FRDM33664BEVB through a USB cable connected between the Freedom board and a PC. No external power supply is required.

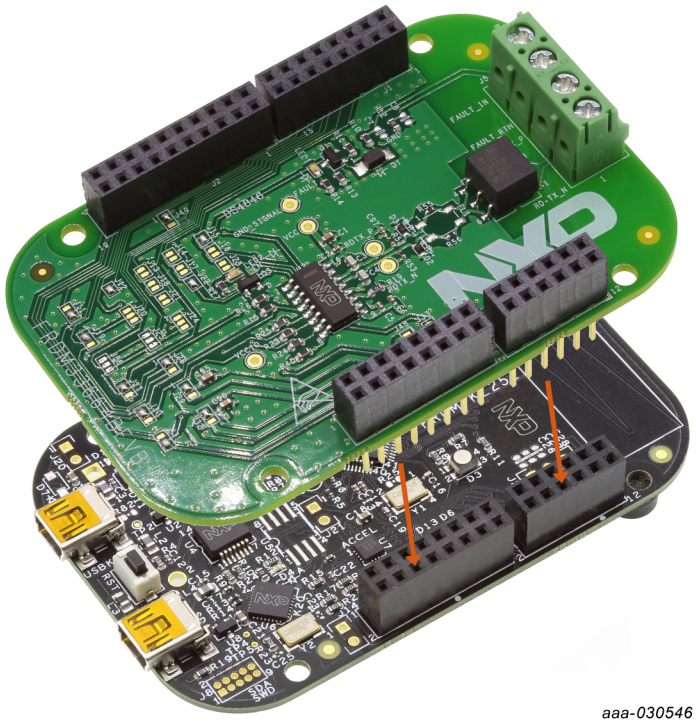

Figure 5. FRDM33664BEVB mounted to a FRDM-KL25Z

The board must be modified to be compatible with each specific Freedom board. This modification is described in Section 4.7.

5.2 Standalone configuration

When the board is used in standalone mode, the SPI signals must be manually connected to connectors J1, J2 and J9 on the board.

Table 16. Standalone configuration table

Signal	Pin
FAULT	J1 − 6
INTB	J1 − 8
SCLK_TX	J1 − 9
CSB_TX	J1 − 14
DATA_TX	J2 − 8
SCLK_RX	J9 − 7
CSB_RX	J9 − 5
DATA_RX	J2 − 19
EN	J2 − 18

Power supply connections to the FRDM33664BEVB are:

- VCC (5.0 V): J9 − 10
- VCCIO (3.3 V or 5.0 V depending on the required communication signal levels): J9 − 8
- GND: J9 − 12, J9 − 14, J2 − 14

6 References

[1] **Product summary page** — nxp.com/MC33664

[2] **Product summary page** — nxp.com/MC33771

[3] **Product summary page** — nxp.com/MC33772

[4] **NXP DocStore** — docstore.nxp.com

7 Revision history

Revision history

Rev	Date	Description
1.0	20180622	Initial release

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