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Hardware user manual for FRDM665CANFDEVB

Rev. 2 — 25 August 2022   **User manual**

Document information

Information	Content
Keywords	MC33665A, CAN (FD), BMS gateway IC
Abstract	Hardware user manual for FRDM665CANFDEVB.

Revision history

Rev	Date	Description
2	20220825	• Global edits throughout • Corrected spelling of CAN(FD) and TPL_AUTOWAKE • Section 3.1: Corrected first three bullet items • Section 4.2: Corrected sixth bullet item • Added note to Section 3
1	20220726	initial version

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1   Introduction

The NXP analog product development boards provide an easy-to-use platform for evaluating NXP products. The boards support a range of analog, mixed-signal, and power solutions. They incorporate monolithic integrated circuits and system-in-package devices that use proven high-volume technology. NXP products offer longer battery life, a smaller form factor, reduced component counts, lower cost, and improved performance in powering state-of-the-art systems.

2   Finding kit resources and information on the NXP web site

NXP Semiconductors provides online resources for this evaluation board and its supported device(s) on http://www.nxp.com.

The information page for the FRDM665CANFDEVB evaluation board is at http://www.nxp.com/FRDM665CANFDEVB. The information page provides overview information, documentation, software and tools, parametrics, ordering information and a Getting Started tab. The Getting Started tab provides quick-reference information applicable to using the FRDM665CANFDEVB evaluation board, including the downloadable assets referenced in this document.

3   Getting ready

Working with the FRDM665CANFDEVB evaluation board requires the kit contents, additional hardware.

Note: MC33665A referred to in this document is a CAN (FD) variant with MC33665ATF4AE.

3.1   Kit contents

The FRDM665CANFDEVB kit includes:

- MC33665A CAN (FD)
- One transport protocol link (TPL) daisy chain cable
- One power cable
- Quick start guide

3.2   Additional hardware

In addition to the kit contents, the following hardware is necessary or beneficial:

- External dual power supply 8 V to 16 V/2 A (optional)
- EVBs of battery cell controller (BCC) devices from NXP
- 14-cell battery pack or a battery emulator, such as BATT-14CEMULATOR

4   Getting to know the hardware

4.1   Kit overview

The FRDM665CANFDEVB serves as a hardware evaluation tool in support of the MC33665A device of NXP. The MC33665A is a gateway router that can route TPL

messages from the microcontroller to four different TPL ports. It is designed for use in both automotive and industrial applications. The device can route both TPL2 and TPL3 messages with CAN (FD) communication. FRDM665CANFDEVB is an ideal board for rapid prototyping of MC33665A for interface to MCU.

FRDM665CANFDEVB supports both classical CAN or CAN (FD). Differential communication to daisy chain devices can be established with four different TPL ports.

4.2 Board features

The main features of FRDM665CANFDEVB are:

- CAN and CAN FD
- Onboard transformer isolation for TPL communication to BCC devices
- Configurable VIO voltage
- Configurable VDD5V from internal and external supply
- DIP switch for configuring the arbitration baud rate and CAN ID (ID0_STB_OD, ID1, ID2 and ID3) of MC33665A
- Reset switch
- LED display for the status of power
- Connectors for external interface to general-purpose input/output (GPIO) and I^{2}C-bus
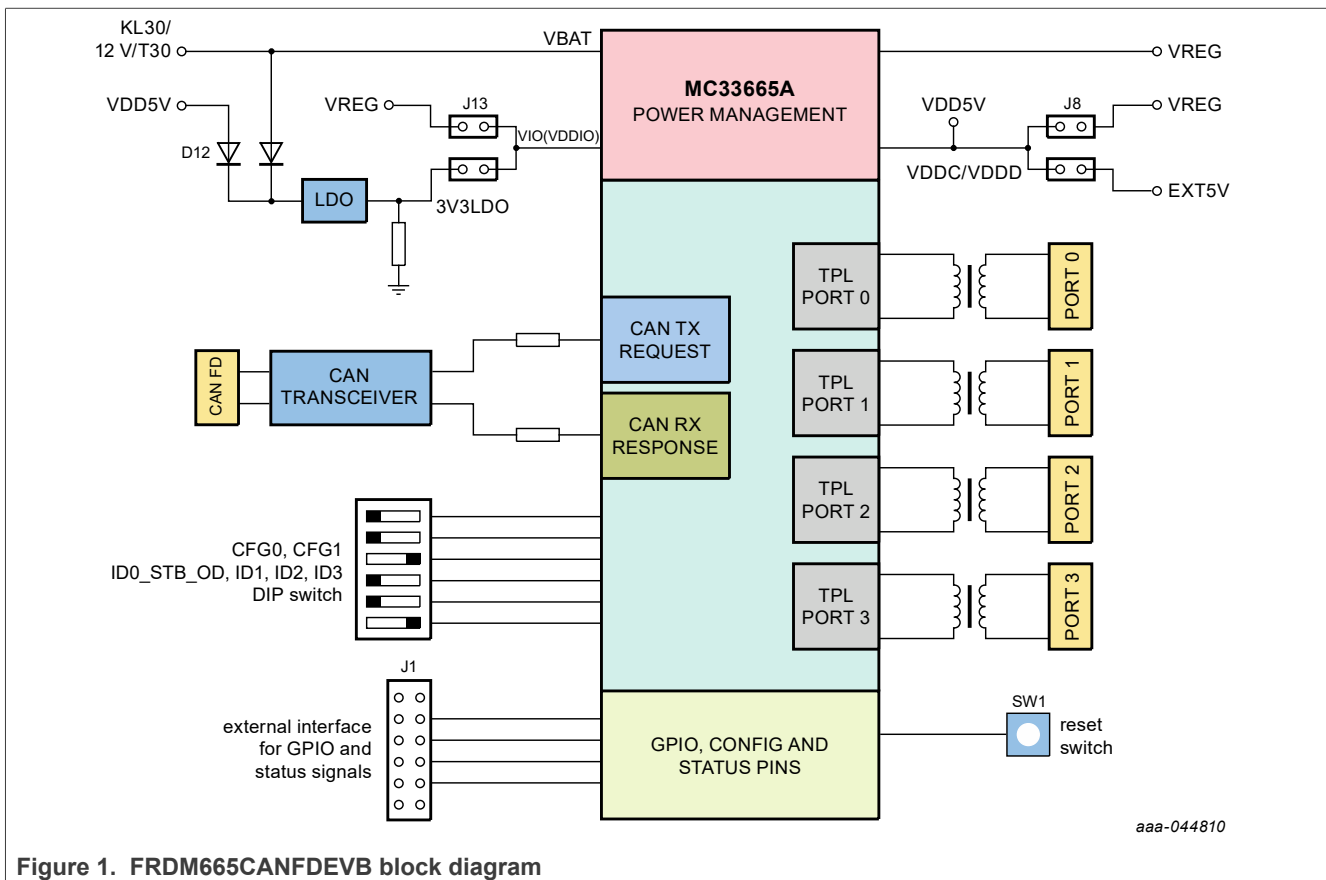
4.3 Block diagram

Figure 1. FRDM665CANFDEVB block diagram

4.4 Board description

The FRDM665CANFDEVB allows the user to prototype and test all functions of the MC33665A gateway router with CAN or CAN FD communication.

CAN or CAN FD communication can be established with MC33665A via sub-D9 connector. In addition to sub-D9 CAN connector, same signals of CANH and CANL are available in both power and CAN connector J6 and CANFDEVB interface J10. TJA1443 is the CAN transceiver used for FRDM665CANFDEVB.

12 V (> 5 W) DC power supply can be connected to J6. VDD5V selection and VIO selection have no influence in FRDM665CANFDEVB as there is a constant 12 V power supply and there is no direct microcontroller to select VIO. CAN ID can be selected by setting the position in DIP switch SW2. Take care to set the position of DIP switches (SW2) appropriately to configure ID (ID0_STB_OD, ID1, ID2 and ID3) and CFG (CFG0 and CFG1) to MC33665A.

External 5 V can be connected to bypass the VREG circuit of MC33665A. Take care in selecting the appropriate jumper J8 to power the VDD5V.

Connector J1 gives the option to access the GPIO and I^{2}C pins of MC33665A.

Contact the NXP engineering team for using TPL_AUTOWAKE function in FRDM665CANFDEVB.

Figure 2. CAN (FD) EVB description
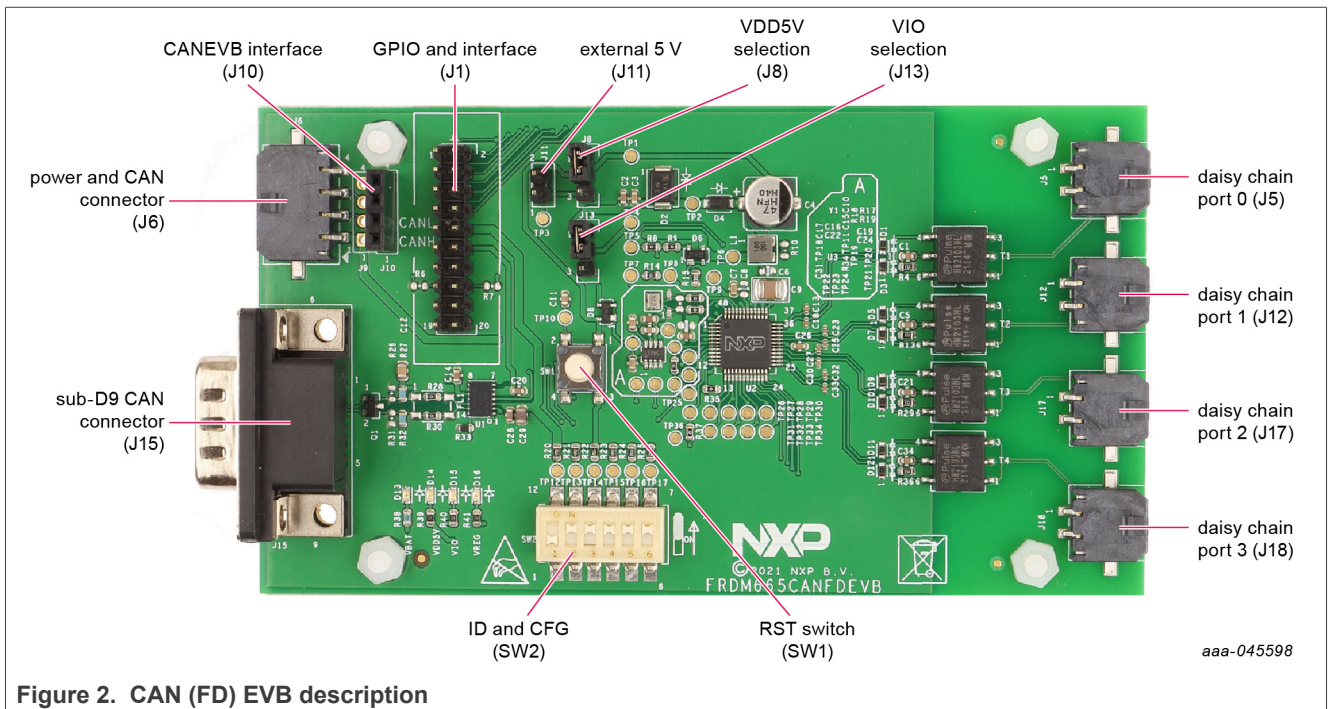
Power configuration of the board can be reflected by LEDs populated on board. LEDs glowing on board reflect the power interface connected to FRDM665CANFDEVB.

Table 1. Power status LEDs

LED	VBAT 12 V	External 5 V
D13 - red	X	-
D14 - green	X	X

Table 1. Power status LEDs...*continued*

LED	VBAT 12 V	External 5 V
D15 - green	X	X
D16 - red	X	-

4.5 Connectors

FRDM665CANFDEVB has multiple connectors for interfacing MCU, internal GPIO, and external BCC devices.

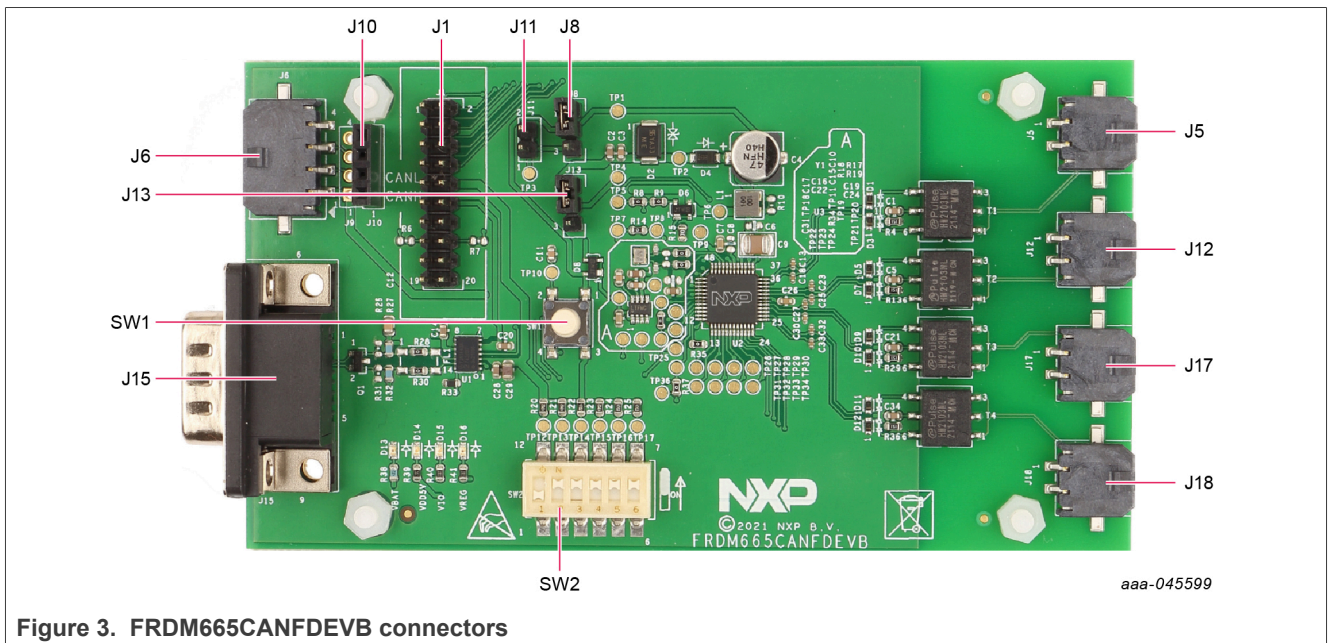**Figure 3. FRDM665CANFDEVB connectors**

Pin configuration of connectors is shown in Table 2 to Table 8.

Table 2. Power and CAN connector - J6

Pin number	Connection	Description
1	VBAT	connection to 12 V
2	CANH	CANH interface for TJA1443
3	CANL	CANL interface for TJA1443
4	GND	ground connection for MC33665A and interface boards

Table 3. CANFDEVB connector - J10

Pin number	Connection	Description
1	CANH	CANH interface for TJA1443
2	CANL	CANL interface for TJA1443
3	GND	ground connection for MC33665A and interface boards
4	-	no connection

Table 4. GPIO and interface - J1

Pin number	Connection	Description
1	GPIO0	interface to GPIO0 or INT0 for MC33665A
2	GPIO1	interface to GPIO1 or INT1 for MC33665A
3	GPIO2	interface to GPIO2 or INT2 for MC33665A
4	GPIO3	interface to GPIO3 or INT3 for MC33665A
5	GPIO4	interface to GPIO4 or I^2C-bus in MC33665A
6	GPIO5	interface to GPIO5 or I^2C-bus in MC33665A
7	GPIO6	interface to GPIO6 or SYNC in MC33665A
8	GPIO7	interface to GPIO7 or HOLD in MC33665A
9	VSS/GND	ground
10	VDD5V	5 V supply line
11	VSS/GND	ground
12	VIO	VIO interface for MC33665A
13	-	not connected
14	-	not connected
15	NC-CAN_TXD	populate R6 to connect CAN_TXD
16	NC-CAN_RXD	populate R7 to connect CAN_RXD
17	STB_N_OUT	inverted standby signal from MC33665A
18	STB_OUT	standby signal from MC33665A
19	RESET	reset signal for MC33665A
20	VDD5V	5 V supply line

Table 5. External 5 V - J11

Pin number	Connection	Description
1	EXT5V	external 5 V supply
2	VSS/GND	ground

Table 6. VDD5V jumper - J8

Pin number	Connection	Description
1-2	VREG-VDD5V	Connection from VREG generated by internal low dropout (LDO) connection to VDD5V for MC33665A and interface circuits. Note: Default connection.
2-3	EXT5V-VDD5V	External 5 V supply can be connected to VDD5V to MC33665A and interface circuits.

Table 7. VIO jumper - J13

Pin number	Connection	Description
1-2	VREG-VIO	connect VREG (5 V) generated by internal LDO of MC33665A to VDDIO/VIO of MC33665A and interface circuit. Note: Default connection.

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Table 7. VIO jumper - J13...*continued*

Pin number	Connection	Description
2-3	3V3LDO-VIO	connect constant 3.3 V generated by external LDO to VIO

Table 8. Sub-D9 CAN connector - J15

Pin number	Connection	Description
2	CANL	CANL interface for TJA1443
3	VSS	ground connection for MC33665A and interface boards
7	CANH	CANH interface for TJA1443
Others	-	not connected

4.6 Schematic, board layout and bill of materials

The schematic, board layout and bill of materials for the FRDM665CANFDEVB evaluation board are available at http://www.nxp.com/FRDM665CANFDEVB

5 Configuring the hardware

5.1 CAN (FD) interface

FRDM665CANFDEVB can be connected to a PC/laptop or other ECUs with power and CAN cable. A 12 V supply line can be used to power the FRDM665CANFDEVB, female sub-D9 connector can be interfaced to relevant CAN tool or ECU. SW2 can be used to configure the CAN ID for MC33665A. CFG pins can also be configured to set the arbitration speed for MC33665A. Press SW1 button (RST switch) after changing any settings on SW2. Ensure the settings on J8 for VDD5V and J13 for VIO selection are appropriate for power supplied to the board. CANFDEVB interface J10 can be used for direct interface with S32K344EVB for CAN or CAN FD.
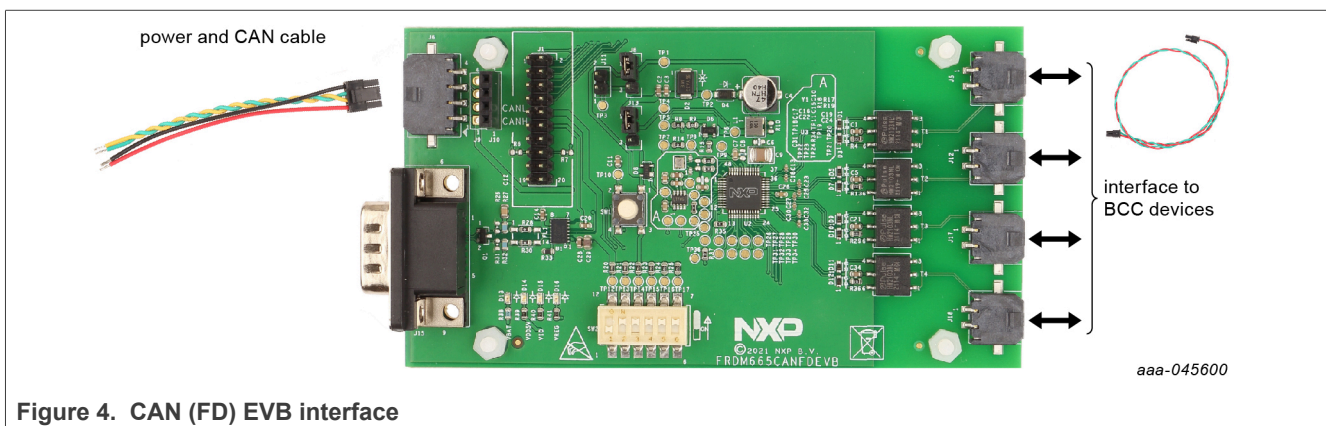

Figure 4. CAN (FD) EVB interface

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6   Available accessories

Table 9. Accessories

Part number	Description
FRDM33772CSPEVB	evaluation board for MC33772C with SPI communication
RD33771CDSTEVB	evaluation board for MC33771C BCC with isolated daisy chain communication
BATT-14EXTENDER	battery emulator extender
BATT-14CEMULATOR	14-cell battery pack to supply MC33771C EVBs
BATT-TPLCABLE20	TPL, two-wire, twisted, 20 cm long cable
BATT-TPLCABLE50	TPL, two-wire, twisted, 50 cm long cable
BATT-14CTCABLE25	cell terminal (CT) cable, 14 cells, 25 cm long

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