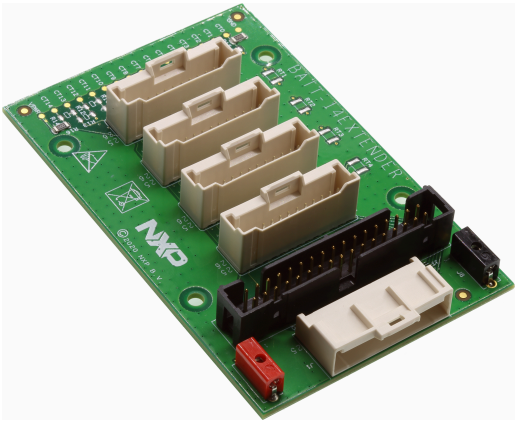
# UM11484

## Introduction to BATT-14EXTENDER 14-cell battery pack extender

**Rev. 2 — 16 September 2021** **User guide**



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# 1 Overview of the BATT-14EXTENDER, 14-cell battery pack extender

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

The information page for BATT-14EXTENDER, 14-cell battery pack extender is at http://www.nxp.com/products/:BATT-14EXTENDER. 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 BATT-14EXTENDER, 14-cell battery pack extender, including the downloadable assets referenced in this document.

**CAUTION:** This product has not undergone formal EMC assessment. It is the responsibility of the user to ensure that any finished assembly complies with applicable regulations on EMC interference. EMC testing, and other testing requirements for CE is the responsibility of the user.

# 2 Getting started

## 2.1 Kit contents

The BATT-14EXTENDER kit contents include:

- BATT-14EXTENDER, 14-cell battery pack extender board
- 26-conductor cell terminal cable

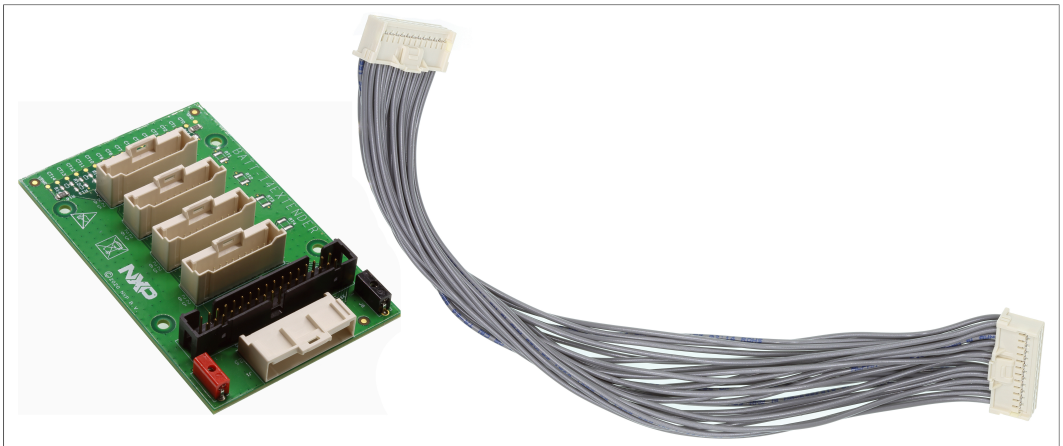

**Figure 1. Kit components**

Figure 1 - BATT-14EXTENDER Kit components

## 2.2 Required equipment

To use this kit, you will need:

- 14-cell battery pack or a battery pack emulator, such as BATT-14CEMULATOR, BATT-14EMULATOR or BATT-14AAAPACK
- External power supply 10 to 60 V – 0.5 A (optional)
- Up to four BCC Evaluation boards (EVBs)

# 3 Getting to know the hardware

## 3.1 Board features

The BATT-14EXTENDER board allows the user to connect up to four evaluation boards to a single battery pack or battery emulator.

There are two options to supply the EVBs:

- Battery or battery emulator such as BATT-14CEMULATOR, BATT-14EMULATOR or BATT-14AAAPACK
- External power supply provided some additional components are added to BATT-14EXTENDER board

The following EVBs are compatible with the BATT-14EXTENDER board:

- RD33771CDSTEVB
- FRDM33771CSPEVB
- XRD33775ADSTEVB

## 3.2 Board description

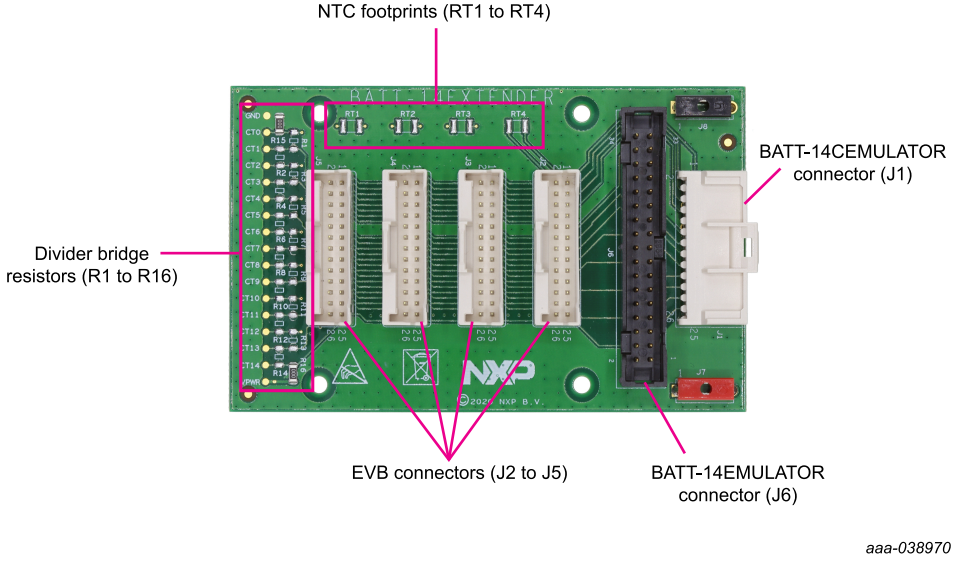


**Figure 2. Board description**

## 3.3 Connectors

The J1 connector is typically connected to a battery pack or to BATT-14CEMULATOR battery emulator. When connecting to a 14-cell battery pack, the user can use the cable provided in the kit by cutting out one of the connectors and making the appropriate connections to the battery pack.

The EVBs are connected, from J2 to J5.

The J1-J5 connectors are from Molex, series 501876. These connectors share the same pinout described in Table 1. The mate connector reference is 501646-2600 from Molex.

**Table 1. J1-J5 connectors pinouts**

| Pin | Connection | Description |
|---|---|---|
| 1 | NTC3_GND | NTC connection (-) |
| 2 | NTC3 | NTC connection (+) |
| 3 | NTC2_GND | NTC connection (-) |
| 4 | NTC2 | NTC connection (+) |
| 5 | NTC1_GND | NTC connection (-) |
| 6 | NTC1 | NTC connection (+) |
| 7 | NTC0_GND | NTC connection (-) |
| 8 | NTC0 | NTC connection (+) |
| 9 | GND | negative battery |
| 10 | GND | negative battery |
| 11 | CT1 | Battery cell1P connection |
| 12 | CT0 | Battery cell1M connection |
| 13 | CT3 | Battery cell3P connection |
| 14 | CT2 | Battery cell2P connection |
| 15 | CT5 | Battery cell5P connection |
| 16 | CT4 | Battery cell4P connection |
| 17 | CT7 | Battery cell7P connection |
| 18 | CT6 | Battery cell6P connection |
| 19 | CT9 | Battery cell9P connection |
| 20 | CT8 | Battery cell8P connection |
| 21 | CT11 | Battery cell11P connection |
| 22 | CT10 | Battery cell10P connection |
| 23 | CT13 | Battery cell13P connection |
| 24 | CT12 | Battery cell12P connection |
| 25 | VBAT | positive battery |
| 26 | CT14 | Battery cell14P connection |

The J6 connector can be used to supply the EVBs from BATT-14EMULATOR or BATT-14AAAPACK. The pinout of the J6 connector is described in Table 2.

**Table 2. J6 connector pinouts**

| Pin | Connection | Description |
|---|---|---|
| 1 | VBAT | positive battery |
| 2 | VBAT | positive battery |
| 3 | CT14 | Battery cell14P connection |
| 4 | CT14 | Battery cell14P connection |
| 5 | CT13 | Battery cell13P connection |
| 6 | CT13 | Battery cell13P connection |

**Table 2. J6 connector pinouts**...*continued*

| Pin | Connection | Description |
|---|---|---|
| 7 | CT12 | Battery cell12P connection |
| 8 | CT12 | Battery cell12P connection |
| 9 | CT11 | Battery cell11P connection |
| 10 | CT11 | Battery cell11P connection |
| 11 | CT10 | Battery cell10P connection |
| 12 | CT10 | Battery cell10P connection |
| 13 | CT9 | Battery cell9P connection |
| 14 | CT9 | Battery cell9P connection |
| 15 | CT8 | Battery cell8P connection |
| 16 | CT8 | Battery cell8P connection |
| 17 | CT7 | Battery cell8P connection |
| 18 | CT7 | Battery cell8P connection |
| 19 | CT6 | Battery cell8P connection |
| 20 | CT6 | Battery cell8P connection |
| 21 | CT5 | Battery cell8P connection |
| 22 | CT5 | Battery cell8P connection |
| 23 | CT4 | Battery cell8P connection |
| 24 | CT4 | Battery cell8P connection |
| 25 | CT3 | Battery cell8P connection |
| 26 | CT3 | Battery cell8P connection |
| 27 | CT2 | Battery cell8P connection |
| 28 | CT2 | Battery cell8P connection |
| 29 | CT1 | Battery cell8P connection |
| 30 | CT1 | Battery cell8P connection |
| 31 | NC | Not connected |
| 32 | NC | Not connected |
| 33 | CT0 | Battery cell1M connection |
| 34 | GND | negative battery |

## 3.4 Changing the board to the divider bridge option

The BATT-14EXTENDER board offers the option to use an external power supply to power-up the EVBs. In this case, the user will have to populate the divider bridge with the appropriate resistors:

- R1 to R14: 1 K recommended with a (1206) footprint
- R15 to R16: 0 R with a (1206) footprint

The user will also have to populate the temperature sensor footprint RT1-RT4 with a (1206) NTC. For example, NC20K00103JBA from AVX.

# 4 Possible use cases

## 4.1 Use case 1

In this use case, the BATT-14EXTENDER is powered up by a BATT-14CEMULATOR. Up to four EVBs can be connected to the BATT-14EXTENDER. No additional components need to be populated. The board is delivered by default for this use case.

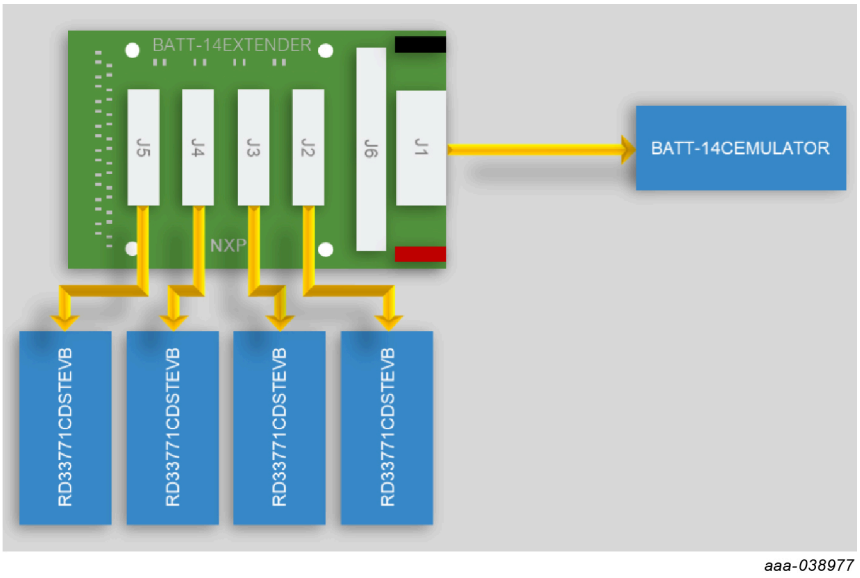


**Figure 3. Use case 1**

## 4.2 Use case 2

In this use case, the BATT-14EXTENDER is powered up by a BATT-14EMULATOR and up to four EVB can be connected to the board. BATT-14EMULATOR doesn't have an NTC emulation. In order to allow the EVBs to have an NTC emulation, it is recommended to populate RT1-RT4 footprints with NTCs.

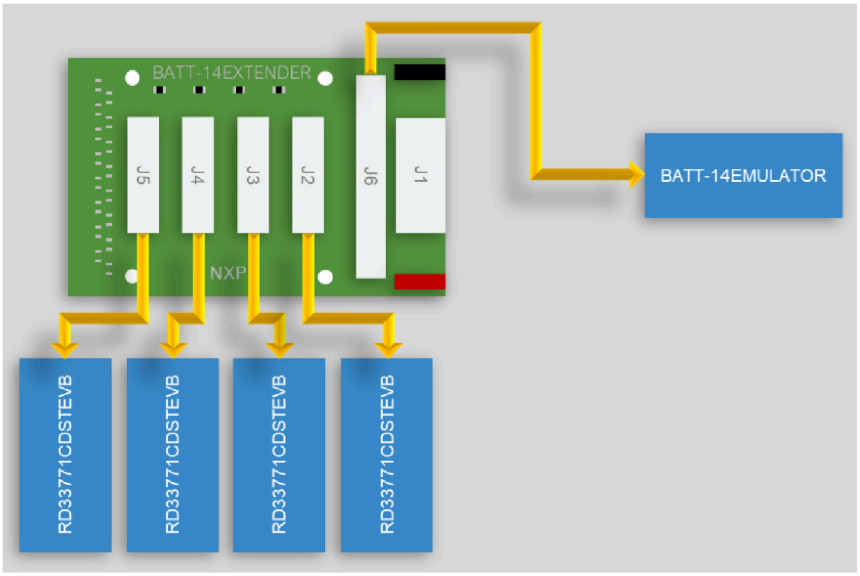


**Figure 4. Use case 2**

## 4.3 Use case 3

In this use case, the BATT-14EXTENDER is powered up by an external power supply. The positive terminal of the power supply is connected to J7 and the negative to J8. J7 and J8 are 2 mm banana plugs.

Divider bridge resistors as well as NTCs must be populated to be able to use the board with that option. See Section 3.4.

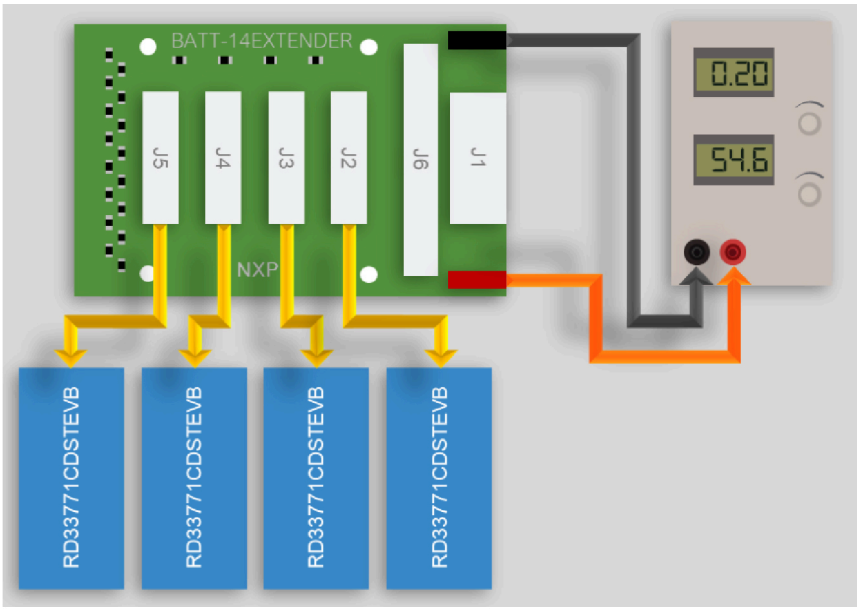


**Figure 5. Use case 3**

# 5 Schematics

The schematics of the BATT-14EXTENDER board is attached to this pdf document. To open it, please open the attachment tab on the left panel in Acrobat Reader and double-click on the file name.

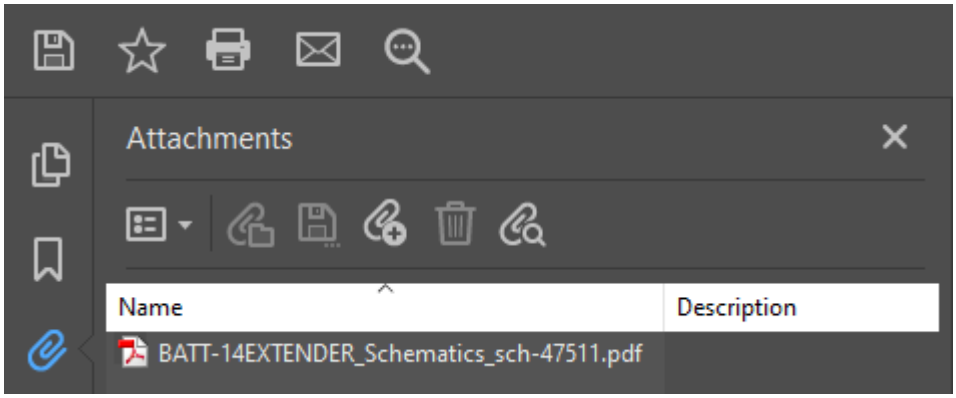


**Figure 6. Schematics as attachment in Acrobat**

# 6 References

The following are URLs where the user can obtain information on related NXP products and application solutions.

**Table 3.**

| Item | Description | Link |
|---|---|---|
| MC33771/MC33772 | Battery Cell Controllers page | http://www.nxp.com/Battery-Cell-Controllers |
| RD33771CDSTEVB | MC33771C Evaluation Board | https://www.nxp.com/design/development-boards/analog-toolbox/evaluation-board-for-mc33771c-bcc-with-isolated-daisy-chain-communication:RD33771CDSTEVB |
| FRDM33771CSPEVB | MC33771C Evaluation Board | https://www.nxp.com/design/development-boards/analog-toolbox/evaluation-board-for-mc33771c-with-spi-communication:FRDM33771CSPEVB |
| XRD33775ADSTEVB | MC33775A Evaluation Board | Contact your sales representative or FAE |
| BATT-14CEMULATOR | Battery emulator | https://www.nxp.com/design/development-boards/analog-toolbox/14-cell-battery-pack-emulator-to-supply-mc33771c-bcc-evbs:BATT-14CEMULATOR |
| BATT-14EMULATOR | Battery emulator | https://www.nxp.com/products/power-management/battery-management/14-cell-battery-pack-to-supply-mc33771-evbs:BATT-14EMULATOR |
| BATT-14AAAPACK | Configurable Battery Pack to supply the MC33771/MC33772 EVB's | https://www.nxp.com/products/power-management/battery-management/battery-cell-controllers/configurable-battery-pack-to-supply-the-mc33771-mc33772-evbs:BATT-14AAAPACK |

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## Tables



## Figures

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