

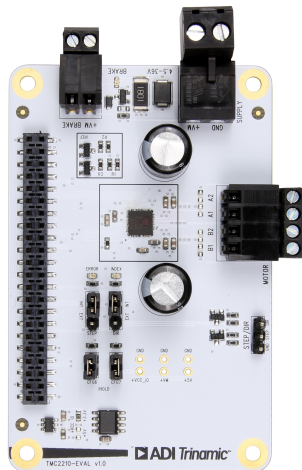
TMC2210-EVAL Evaluation Board

Document Revision V1.00 • 2022-AUG-24

The TMC2210-EVAL allows evaluation of the TMC2210 in combination with the TRINAMIC evaluation board system, or as a stand-alone-board. It uses the standard schematic and offers several options in order to test different modes of operation. The TMC2210 is a Step/Dir Driver for Two-Phase Bipolar Stepper Motors up to 2.0A RMS (3.0A peak).

⚠ WARNING

DO NOT CONNECT / DISCONNECT MOTOR WHILE POWER IS CONNECTED.



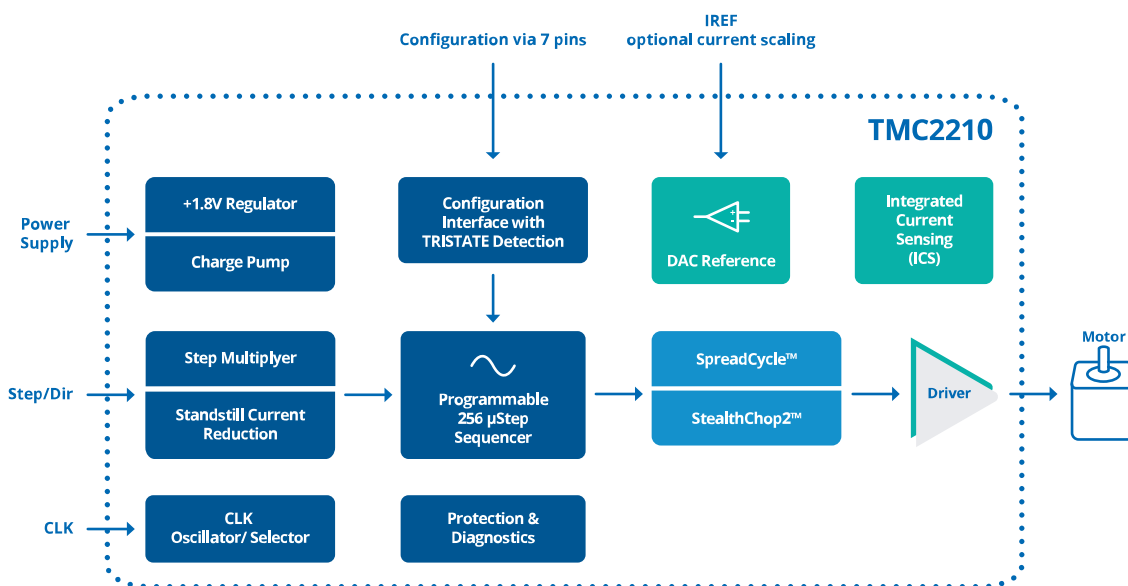
Features

- **2-phase** stepper motor up to 2.0A coil current (3.0A peak)
- **Supply Voltage** 4.5...36V DC
- 1...256 microsteps
- Step/Dir interface
- **StealthChop2™** silent PWM mode
- **StallGuard4™** sensorless motor load detection

Applications

- Compatible Design Upgrade
- 3D Printers
- Printers, POS
- Office and home automation
- Textile, Sewing Machines
- CCTV, Security
- ATM, Cash recycler
- Antenna positioning
- HVAC

Simplified Block Diagram



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1 Order Codes

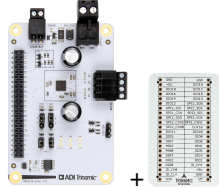
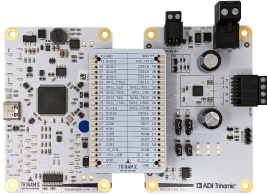
Order Code	Description	Size
TMC2210-EVAL	The evaluation board includes: - TMC2210 evaluation board - Eselsbruecke (bridge connector board) 	55mm x 85mm
TMC2210-EVAL-KIT	The kit includes: - TMC2210 evaluation board - Landungsbruecke (interface board to a PC) - Eselsbruecke (bridge connector board) 	140mm x 85mm

Table 1: TMC2210-EVAL Order Codes

2 Getting Started

You need

- TMC2210-EVAL
- [Landungsbruecke](#) with latest firmware
- Eselsbruecke bridge board
- Stepper motor (e.g. QMot line)
- USB interface
- Power Supply
- Latest TMCL-IDE V3.5
- Cables for interface, motors and power

Precautions

- Do not mix up connections or short-circuit pins.
- Avoid bundling I/O wires with motor wires.
- Do not exceed the maximum rated supply voltage!
- Do not connect or disconnect the motor while powered!
- **START WITH POWER SUPPLY OFF!**

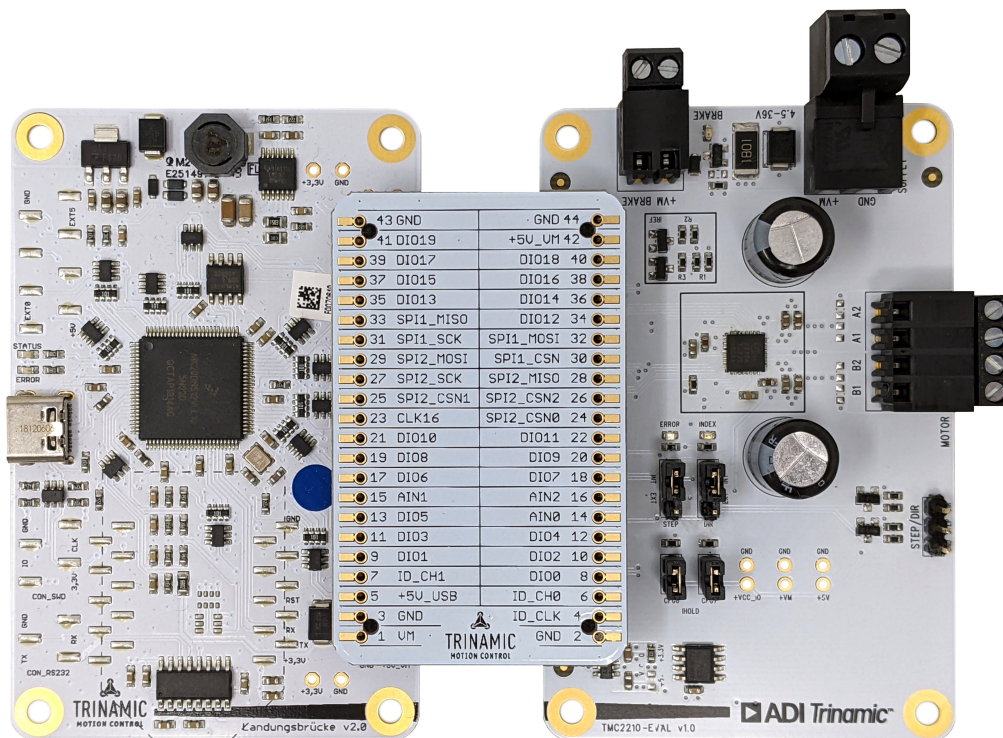


Figure 1: Getting started

2.1 First Start-Up

1. Make sure that the latest version of the TMCL-IDE 3.5 is installed. The TMCL-IDE can be downloaded from www.trinamic.com/support/software/tmcl-ide/.
2. Open the TMCL-IDE and connect the Landungsbruecke via USB to the computer. For Windows 8 and higher is no driver needed, on Windows 7 machines the TMCL-IDE is installing the driver automatically.
3. Verify that the Landungsbruecke is using the latest firmware version. The firmware version is shown in the connected device tree.

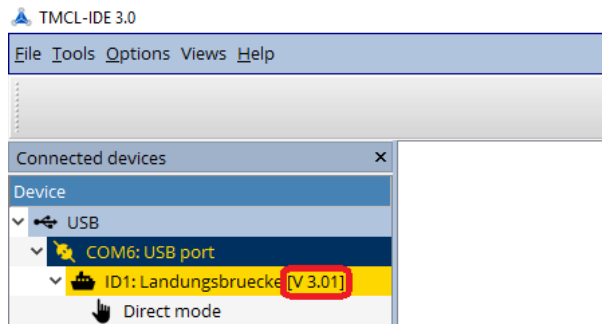


Figure 2: Firmware Version

4. The TMCL-IDE 3.0 needs room to show all important information and to provide a good overview. Therefore, arrange the main window related to your needs. We recommend using the full screen. For evaluation boards it is essential to have access to the registers. Therefore open up the Register Browser (left side). For a better view click top right on the normal icon to get a maximized register browser window.
5. The TMCL-IDE includes a dialogue window for diagnostic tasks. Further, the dialogue provides an overview of the connected motion controller and driver chips. A window pops up immediately after connecting the evaluation kit the first time. The window shows the actual status of the connections. The second tab of the dialogue offers the possibility to choose basic settings or to reset the module to factory defaults.

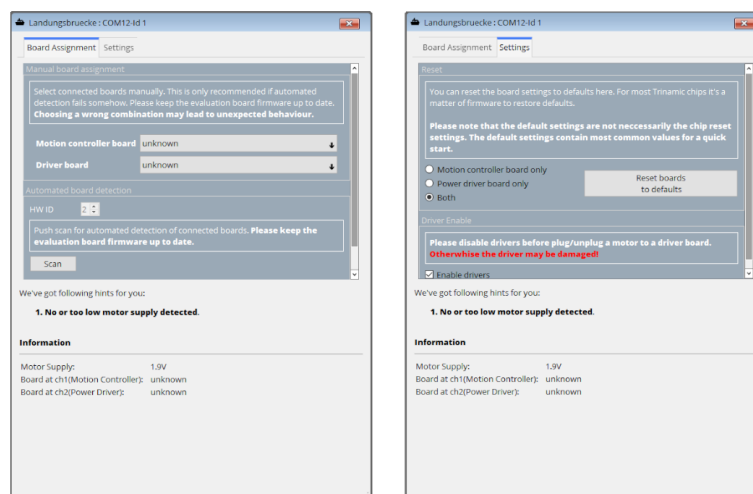


Figure 3: Landungsbruecke Dialogue

3 Hardware Information

All design files for our evaluation boards are available for free. We offer the original ECAD files, Gerber data, the BOM, and PDF copies. Typically, the ECAD files are in KiCAD format. Some (older) evaluation boards may only be available in Eagle, Altium, or PADS format.

Please check schematics for Jumper settings and input/output connector description.

The files can be downloaded from the evaluation boards' website directly at our homepage: [TRINAMIC Eval Kit homepage](#).

Note If files are missing on the website or something is wrong please send us a note.

3.1 Onboard Jumpers

3.1.1 STEP/DIR

The TMC2210-EVAL board has two jumpers (mid-left) to select the Step/Direction source between MCU and external pin header (right bottom corner).

3.1.2 Voltage selection

In case the TMC2210 VIO should be used with +5 V instead of +3.3 V (e.g. you want to use the board standalone without Landungsbruecke) there is a solder selection near the EEPROM. The selection should be changed if an external electronic with 5 V levels is connected.

NOTICE

Don't bridge both selections at the same time. This might disturb the onboard voltage regulator.

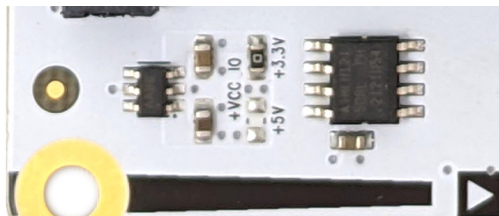


Figure 4: +VCC IO selection near the EEPROM

3.2 Onboard Connectors

The TMC2210-EVAL has 9 onboard connectors. The following table contains information on the connector type and mating connectors.

The connector pinning and signal names can be derived from the board design and schematic files available here: [TRINAMIC TMC2210-EVAL homepage](#)

#	Connects to...	Connector Type	Description
1	Power Supply	METZ CONNECT 31330102	Connects a battery or power supply to the evaluation board. Mating cable for example METZ CONNECT 31349102
2	Brake	METZ CONNECT 31182102	Connects a brake resistor to the TMC2210 output. Mating connector METZ CONNECT 31169102
3	Motor	METZ CONNECT 31182104	Connects the motor to the TMC2210 output. Mating connector METZ CONNECT 31169104
4	Landungsbruecke	46-3492-44-3-00-10-PPTR from W+P Series 3492	Main I/O and digital supply connector to connect to Trinamic's Landungsbruecke or Startrampe controller boards via the Eselsbruecke connector or to connect to an own controller board.
5	STEP/DIR	Standard header 3x 2.54mm	Use to connect external STEP/DIR.
6	STEP	Standard header 3x 2.54mm	Use to select STEP as internal or external signal via a jumper.
7	DIR	Standard header 3x 2.54mm	Use to select DIR as internal or external signal via a jumper.
8	CFG6	Standard header 2x 2.54mm	Selection for CFG6.
9	CFG7	Standard header 2x 2.54mm	Selection for CFG7.

Table 3: TMC2210-EVAL connectors

3.2.1 Landungsbruecke Connector

As the TMC2210 is configured via pin selection only, the SPI lines are used exclusively for the Landungsbruecke identification EEPROM.

NOTICE All signals are connected to the TMC2210 directly, without any additional protection. Please consult the TMC2210 datasheet for electrical ratings.

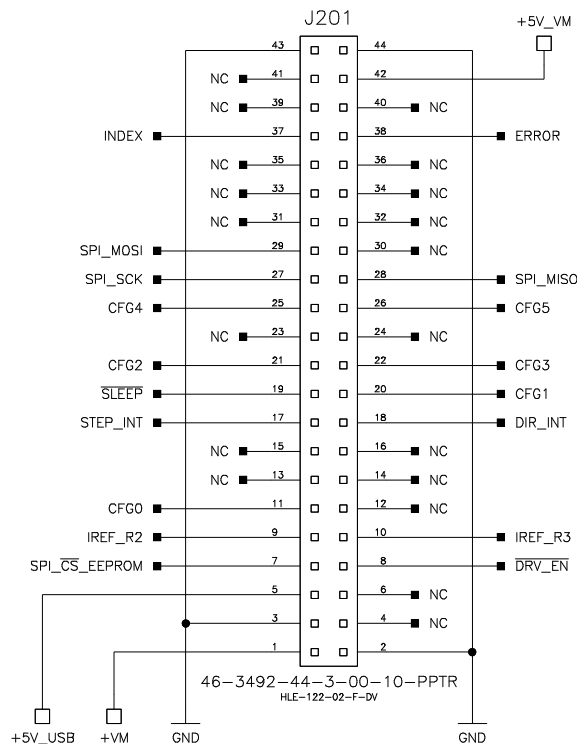


Figure 5: Pin assignment on Landungsbruecke connector

3.2.2 Current scaling IREF-Pins

The IREF pin of TMC2210 is connected to a resistance network as shown in figure 6. IREF of TMC2210 is connected to the upper rail.

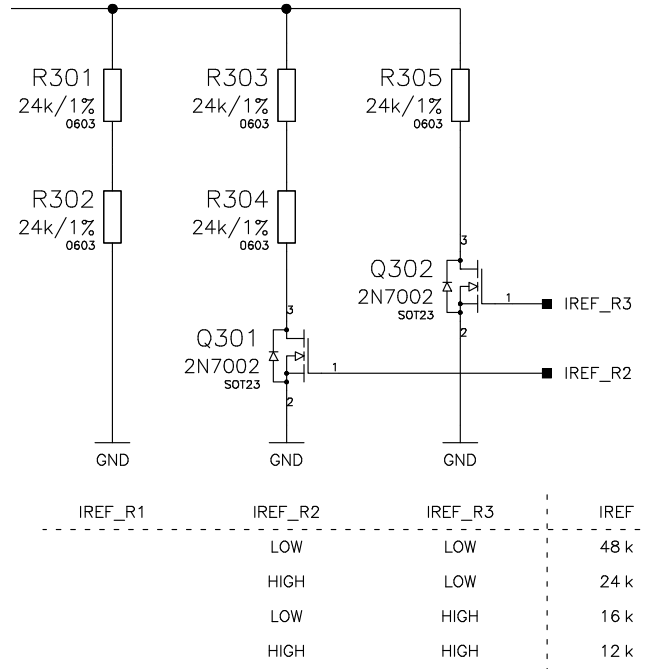


Figure 6: Pin assignment and logic table for IREF (upper rail)

4 Evaluation Features in the TMCL-IDE

This chapter gives some hints and tips on using the functionality of the TMCL-IDE, e.g., how to use the velocity mode or some feature-based tools.

Note

In order to achieve good settings please refer to descriptions and flowcharts in the TMC2210 data sheet. The register browser of the TMCL-IDE provides helpful information about any currently selected parameter. Beyond that, the data sheet explains concepts and ideas which are essential for understanding how the registers are linked together and which setting will fit for which kind of application. For getting more familiar with the evaluation kit in the beginning of your examinations, drive the motor using velocity mode and/or positioning mode first. Beyond this, the direct mode function can be used. This way, TMCL commands can be sent to the evaluation board system.

4.1 General Settings

To configure general settings for the TMC2210-EVAL, open the TMC2210 General Settings tool by clicking the appropriate entry in the tool tree. This tool usually includes settings to control the IC globally e.g. to turn it on or set special modes.

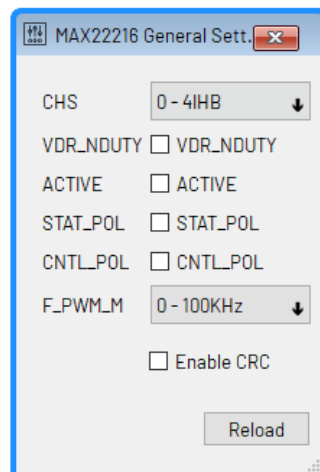


Figure 7: Configuring general settings of a MAX22216 (similar for other ICs).

4.2 Velocity Mode

To move the motor in velocity mode, open the velocity mode tool by clicking the appropriate entry in the tool tree. In the velocity mode tool you can enter the desired velocity and acceleration and then move the motor using the arrow buttons. The motor can be stopped at any time by clicking the stop button. Open the velocity graph tool to get a graphical view of the actual velocity. You might have to change the desired run and hold currents in *Current settings* tool before.

Note

In order to get a more accurate graphical velocity view, close the register browser window when using the velocity graph.

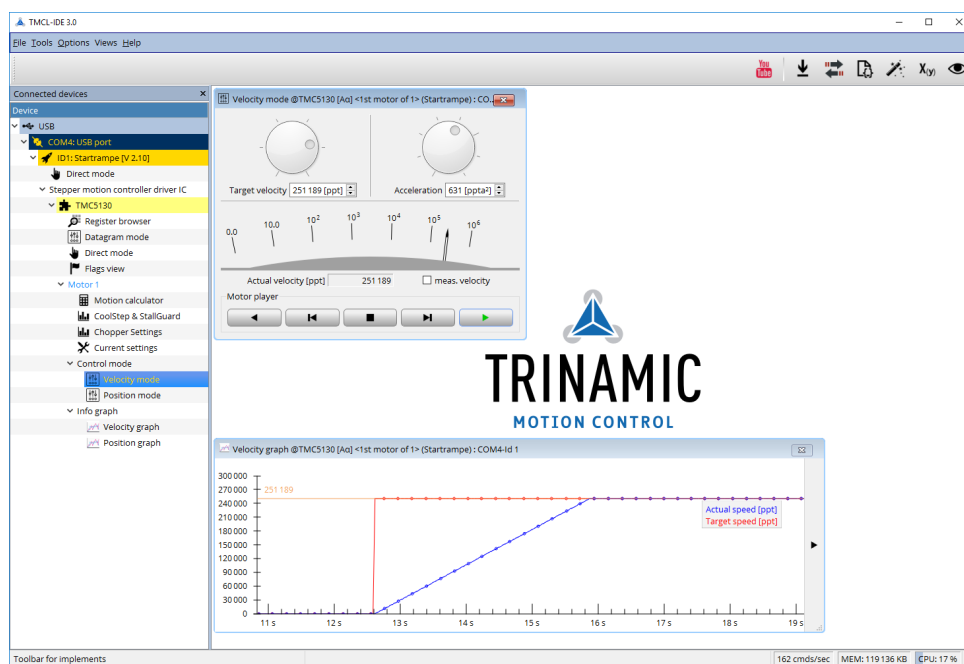


Figure 8: Driving the motor in velocity mode (TMCL-IDE provides similar view for TMC2210-EVAL)

4.3 Position Mode

To move the motor in position mode, open the position mode tool by clicking the appropriate entry in the tool tree. In the position mode tool you can enter a target position and then start positioning by clicking the Absolute or Relative Move button. The speed and acceleration used for positioning can also be adjusted here.

Open the position graph tool to get a graphical view of the actual position. You might have to change the desired run and hold currents in *Current settings* tool before.

Note

In order to get a more accurate graphical position view, close the register browser window when using the position graph.

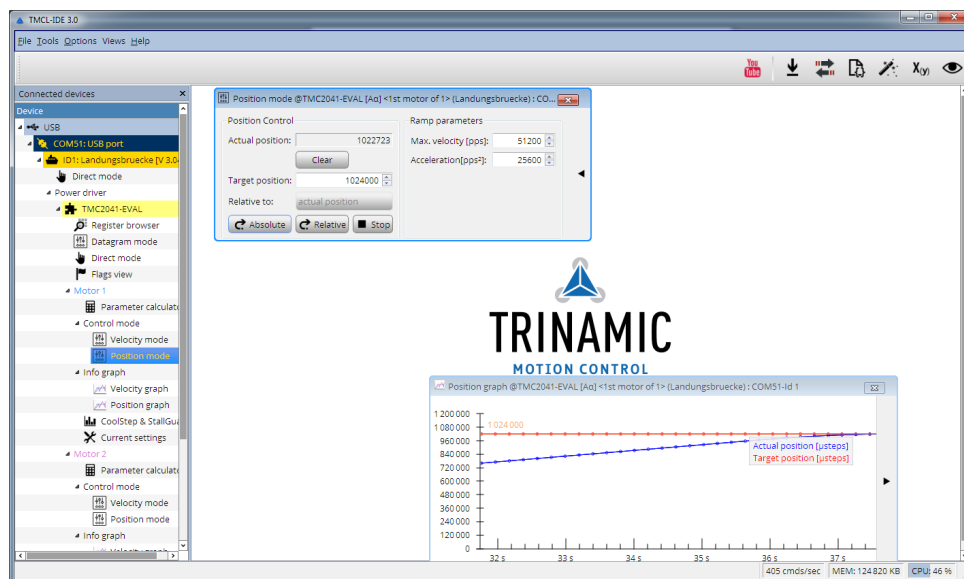


Figure 9: Driving the motor in position mode (TMCL-IDE provides similar view for TMC2210-EVAL)

4.4 ChipClick

To configure the control pins for the TMC2210-EVAL, open the ChipClick tool by clicking the appropriate entry in the tool tree. To view a description of a pins possible configurations, hover the mouse over the pin in the graphical view. To change the pins state, click on it.

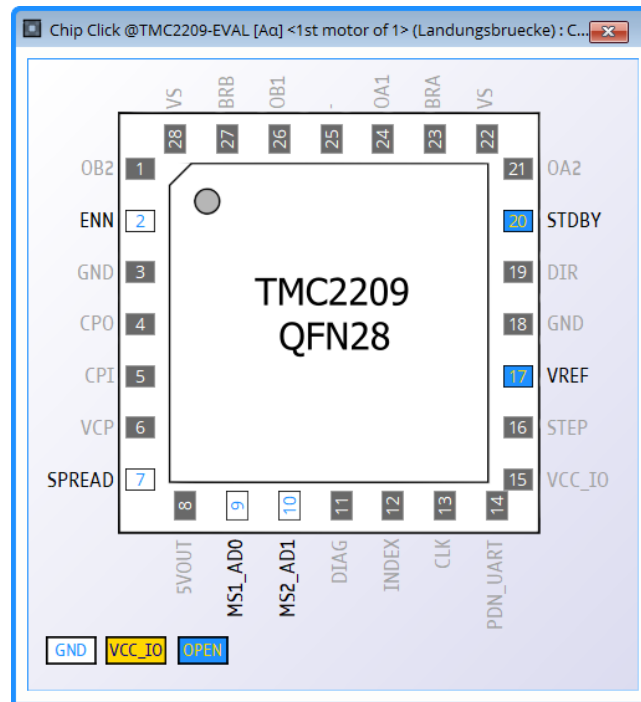


Figure 10: Configuring the control pins of a TMC2209 (similar for other ICs).

5 Revision History

5.1 Document Revision

Version	Date	Author	Description
1.00	2022-AUG-24	FV	Initial release.

Table 4: Document Revision