



MB39C031-EVBSK-01

2ch Buck DC/DC + LDO Evaluation Board Operation Guide

Doc. No. 002-08724 Rev. *B

Cypress Semiconductor
198 Champion Court
San Jose, CA 95134-1709
<http://www.cypress.com>

Copyrights

© Cypress Semiconductor Corporation, 2015-2017. This document is the property of Cypress Semiconductor Corporation and its subsidiaries, including Spansion LLC ("Cypress"). This document, including any software or firmware included or referenced in this document ("Software"), is owned by Cypress under the intellectual property laws and treaties of the United States and other countries worldwide. Cypress reserves all rights under such laws and treaties and does not, except as specifically stated in this paragraph, grant any license under its patents, copyrights, trademarks, or other intellectual property rights. If the Software is not accompanied by a license agreement and you do not otherwise have a written agreement with Cypress governing the use of the Software, then Cypress hereby grants you a personal, non-exclusive, nontransferable license (without the right to sublicense) (1) under its copyright rights in the Software (a) for Software provided in source code form, to modify and reproduce the Software solely for use with Cypress hardware products, only internally within your organization, and (b) to distribute the Software in binary code form externally to end users (either directly or indirectly through resellers and distributors), solely for use on Cypress hardware product units, and (2) under those claims of Cypress's patents that are infringed by the Software (as provided by Cypress, unmodified) to make, use, distribute, and import the Software solely for use with Cypress hardware products. Any other use, reproduction, modification, translation, or compilation of the Software is prohibited.

TO THE EXTENT PERMITTED BY APPLICABLE LAW, CYPRESS MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARD TO THIS DOCUMENT OR ANY SOFTWARE OR ACCOMPANYING HARDWARE, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. No computing device can be absolutely secure. Therefore, despite security measures implemented in Cypress hardware or software products, Cypress does not assume any liability arising out of any security breach, such as unauthorized access to or use of a Cypress product. In addition, the products described in these materials may contain design defects or errors known as errata which may cause the product to deviate from published specifications. To the extent permitted by applicable law, Cypress reserves the right to make changes to this document without further notice. Cypress does not assume any liability arising out of the application or use of any product or circuit described in this document. Any information provided in this document, including any sample design information or programming code, is provided only for reference purposes. It is the responsibility of the user of this document to properly design, program, and test the functionality and safety of any application made of this information and any resulting product. Cypress products are not designed, intended, or authorized for use as critical components in systems designed or intended for the operation of weapons, weapons systems, nuclear installations, life-support devices or systems, other medical devices or systems (including resuscitation equipment and surgical implants), pollution control or hazardous substances management, or other uses where the failure of the device or system could cause personal injury, death, or property damage ("Unintended Uses"). A critical component is any component of a device or system whose failure to perform can be reasonably expected to cause the failure of the device or system, or to affect its safety or effectiveness. Cypress is not liable, in whole or in part, and you shall and hereby do release Cypress from any claim, damage, or other liability arising from or related to all Unintended Uses of Cypress products. You shall indemnify and hold Cypress harmless from and against all claims, costs, damages, and other liabilities, including claims for personal injury or death, arising from or related to any Unintended Uses of Cypress products.

Cypress, the Cypress logo, Spansion, the Spansion logo, and combinations thereof, WICED, PSoC, CapSense, EZ-USB, F-RAM, and Traveo are trademarks or registered trademarks of Cypress in the United States and other countries. For a more complete list of Cypress trademarks, visit cypress.com. Other names and brands may be claimed as property of their respective owners.

Preface



This manual explains how to use the evaluation board. Be sure to read this manual before using the product. For this product, please consult with sales representatives or support representatives.

Handling and use

Handling and use of this product and notes regarding its safe use are described in the manuals.

Follow the instructions in the manuals to use this product.

Keep this manual at hand so that you can refer to it anytime during use of this product.

Notice on this document

All information included in this document is current as of the date it is issued. Such information is subject to change without any prior notice.


Please confirm the latest relevant information with the sales representatives.

Cautions




Caution of the products described in this document

The following precautions apply to the product described in this manual.

| | |
|--|---|
|  WARNING | Indicates a potentially hazardous situation which could result in death or serious injury and/or a fault in the user's system if the product is not used correctly. |
|--|---|

| | |
|-------------------------------|---|
| Electric shock, Damage | Before performing any operation described in this manual, turn off all the power supplies to the system. Performing such an operation with the power on may cause an electric shock or device fault. |
| Electric shock, Damage | Once the product has been turned on, do not touch any metal part of it. Doing so may cause an electric shock or device fault. |

| | |
|--|---|
|  CAUTION | Indicates the presence of a hazard that may cause a minor or moderate injury, damages to this product or devices connected to it, or may cause to lose software resources and other properties such as data, if the device is not used appropriately. |
|--|---|

| | |
|---------------------|---|
| Cuts, Damage | Before moving the product, be sure to turn off all the power supplies and unplug the cables. Watch your step when carrying the product. Do not use the product in an unstable location such as a place exposed to strong vibration or a sloping surface. Doing so may cause the product to fall, resulting in an injury or fault. |
| Cuts | The product contains sharp edges that are left unavoidably exposed, such as jumper plugs. Handle the product with due care not to get injured with such pointed parts. |
| Damage | Do not place anything on the product or expose the product to physical shocks. Do not carry the product after the power has been turned on. Doing so may cause a malfunction due to overloading or shock. |
| Damage | Since the product contains many electronic components, keep it away from direct sunlight, high temperature, and high humidity to prevent condensation. Do not use or store the product where it is exposed to much dust or a strong magnetic or electric field for an extended period of time. Inappropriate operating or storage environments may cause a fault. |
| Damage | Use the product within the ranges given in the specifications. Operation over the specified ranges may cause a fault. |
| Damage | To prevent electrostatic breakdown, do not let your finger or other object come into contact with the metal parts of any of the connectors. Before handling the product, touch a metal object (such as a door knob) to discharge any static electricity from your body. |

| | |
|---------------|---|
| Damage | When turning the power on or off, follow the relevant procedure as described in this document. Before turning the power on, in particular, be sure to finish making all the required connections. Furthermore, be sure to configure and use the product by following the instructions given in this document. Using the product incorrectly or inappropriately may cause a fault. |
| Damage | Always turn the power off before connecting or disconnecting any cables from the product. When unplugging a cable, unplug the cable by holding the connector part without pulling on the cable itself. Pulling the cable itself or bending it may expose or disconnect the cable core, resulting in a fault. |
| Damage | Because the product has no casing, it is recommended that it be stored in the original packaging. Transporting the product may cause a damage or fault. Therefore, keep the packaging materials and use them when re-shipping the product. |

Contents



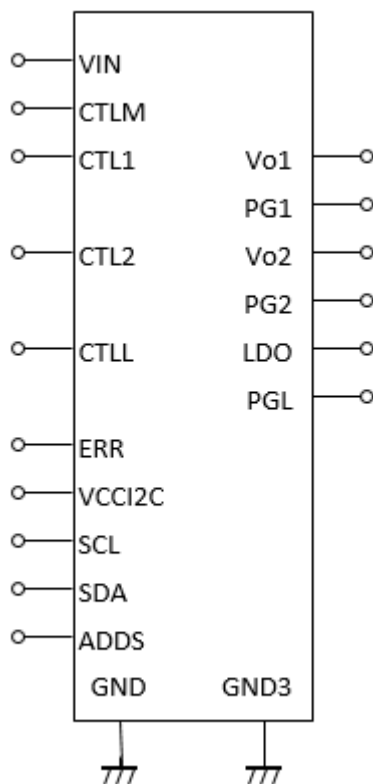
| | |
|---|----|
| 1. Description | 7 |
| 2. Evaluation Board Specification | 8 |
| 3. Pin Description | 9 |
| 3.1 Jumper, Switch Descriptions | 9 |
| 4. Setup and Checkup | 10 |
| 5. Component Layout | 11 |
| 6. Wiring Layout | 12 |
| 7. Circuit Diagram | 13 |
| 8. Parts List | 14 |
| 9. Evaluation Board Picture | 16 |
| 10. Ordering Information | 18 |
| Revision History | 19 |

1. Description



The MB39C031-EVB-01 is the evaluation board for 2ch Buck DC/DC + 1ch LDO, MB39C031. This board implements MB39C031: Option-code 142, and output preset voltage DD1:1.2V, DD2:1.8V, LDO:3.3V or selectable voltage controlled by I²C communication. This board implements our MCU : FM3(MB9AF312K) and can select the soft-start time, ON/OFF sequence, PFM/PWM mode easily with I²C communication using windows PC and prepared software.

Figure 1-1. Board Outline



2. Evaluation Board Specification



Table 2-1. Evaluation Board Specification

| Item | Symbol | Min. | Typ. | Max. | Unit |
|----------------|--------|------|------|------|------|
| Input voltage | VIN | 2.5 | 3.6 | 5.5 | V |
| Output voltage | Vo1 | 0.99 | 1.00 | 1.01 | V |
| Output current | Io1 | - | - | 1400 | mA |
| Output voltage | Vo2 | 1.78 | 1.80 | 1.82 | V |
| Output current | Io2 | - | - | 600 | mA |
| Output voltage | LDO | 3.24 | 3.30 | 3.36 | V |
| Output current | Io3 | - | - | 250 | mA |

Board size: 27.94mm × 27.94mm

3. Pin Description



Table 3-1. Pin Description

| Block | Pin symbol | I/O | Function Description |
|------------------|------------|-----|---|
| DD1 | Vo1 | O | DD1 output terminal |
| | PG1 | O | DD1 POWERGOOD output monitor terminal |
| DD2 | Vo2 | O | DD2 output terminal |
| | PG2 | O | DD2 POWERGOOD output monitor terminal |
| LDO | LDO | O | LDO output terminal |
| | PGL | O | LDO POWERGOOD output monitor terminal |
| CTL | CTL1 | I | DD1 control terminal |
| | CTL2 | I | DD2 control terminal |
| | CTLL | I | LDO control terminal |
| | CTLMAN | I | Control terminal for common block and MCU block |
| ERR | ERR | O | ERR signal output terminal |
| I ² C | VCCI2C | I | Power supply terminal for I ² C. |
| | SCL | I | I ² C clock terminal |
| | SDA | I/O | I ² C data I/O terminal |
| | ADDSEL | I | Switch terminal for slave address |
| COMMON | VIN | I | Control circuit block power supply terminal |
| | GND | - | Control circuit block ground terminal |
| | GND3 | - | Control circuit block ground terminal |

3.1 Jumper, Switch Descriptions

Table 3-2. Jumper, Switch Descriptions

| Jumper, Switch | Description | Initial Setting |
|----------------|---|-----------------|
| JP1 | Short VIN terminal and VBUS pin (2 pin) | Open |

4. Setup and Checkup

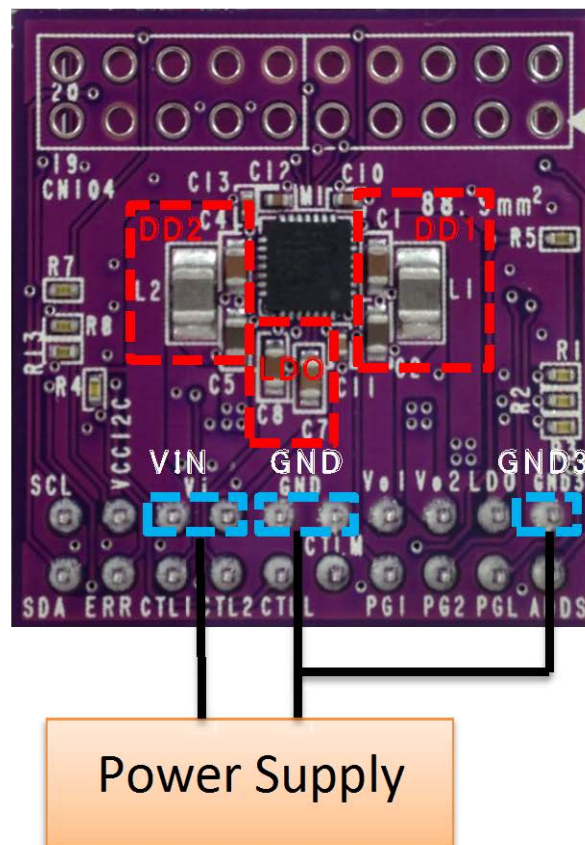


MB39C031 preset value can be evaluated with stabilized power supply.

* : CTLM, CTL1, CTL2, CTLL

1. 3.3V is applied to VIN terminal.
2. CTLM, CTL1, CTL2, CTLL are connected to VIN terminal.
3. Vo1:1.0V, Vo2:1.8V, Vo3:3.3V is output.

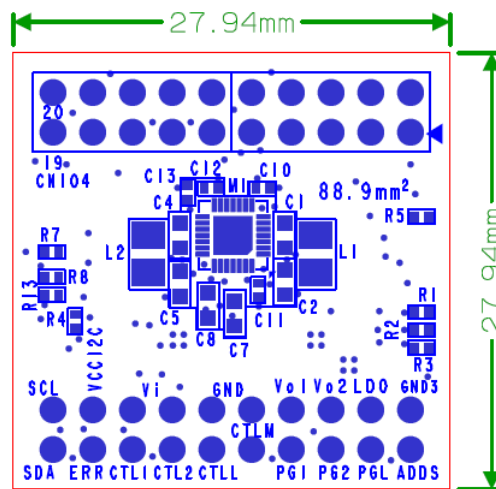
Figure 4-1. Image of Connection



5. Component Layout



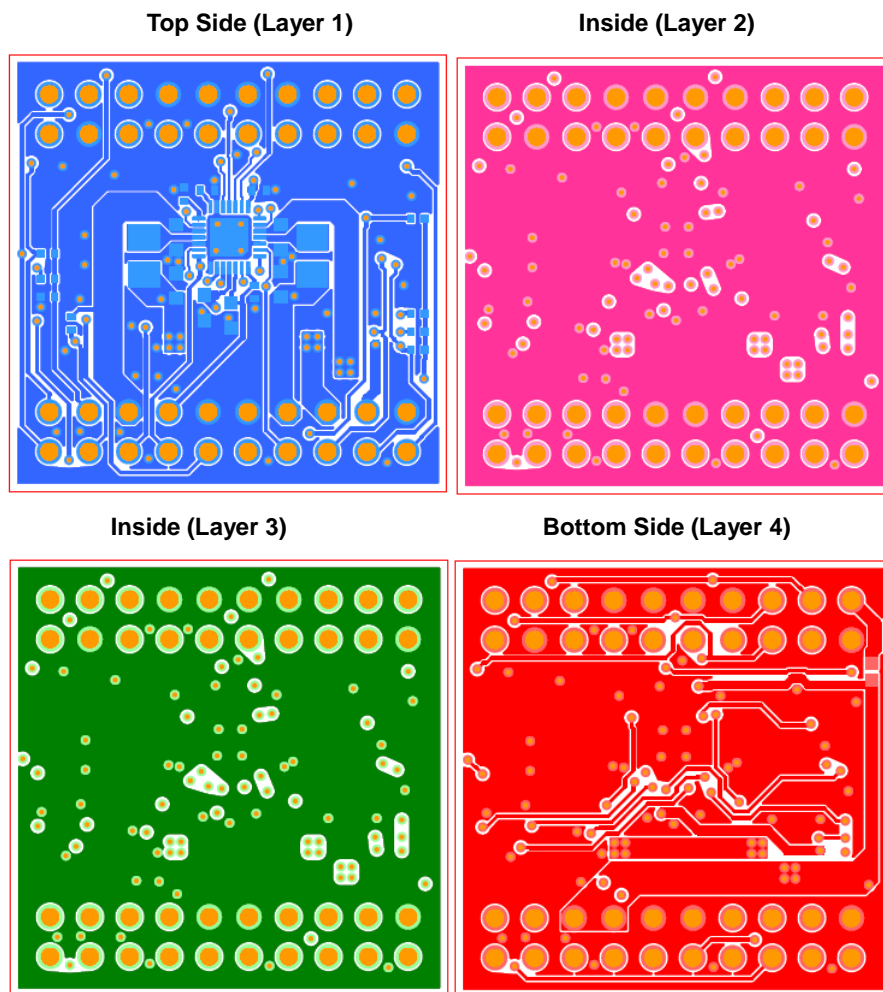
Figure 5-1. Component Layout Top View



6. Wiring Layout



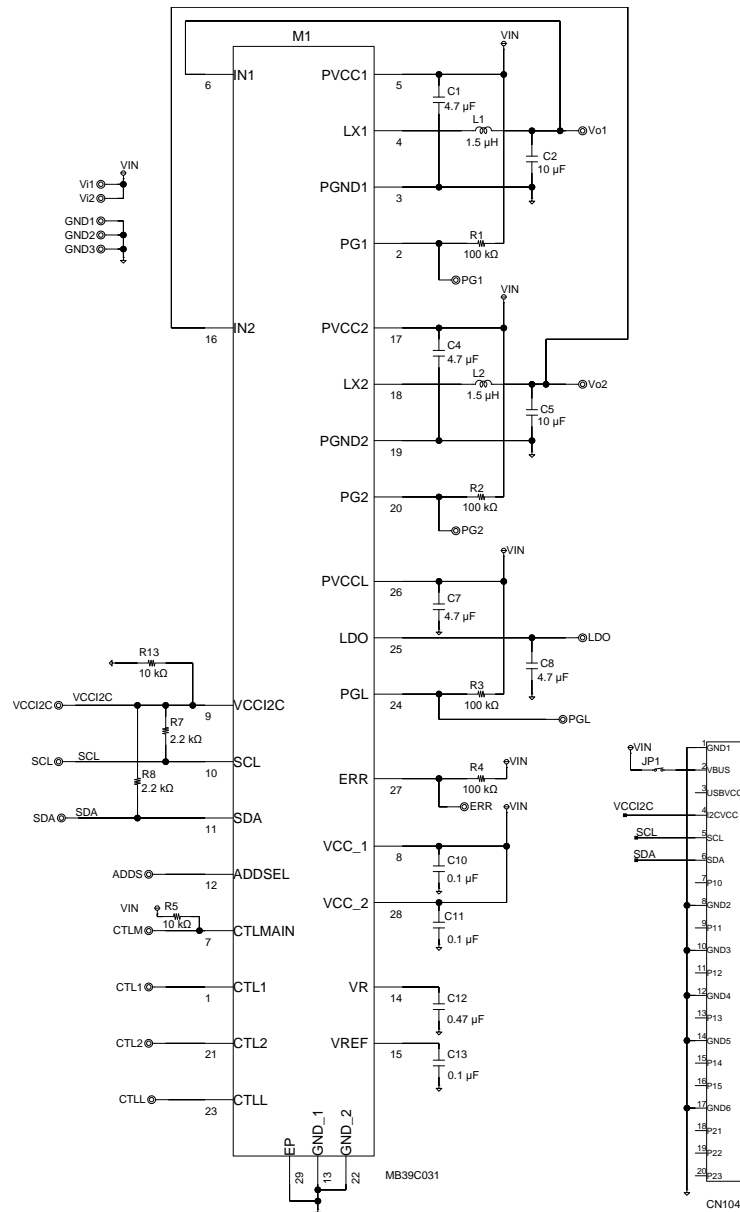
Figure 6-1. Wiring Layout



7. Circuit Diagram



Figure 7-1. Circuit Diagram



8. Parts List



Table 8-1. Parts List

| No. | Component | Item | Parts Number | Vendor | Value | Remarks |
|-----|-----------|-------------------|-------------------|---------|--------|------------------|
| 1 | M1 | PMIC | MB39C031WQN-G-142 | Cypress | - | - |
| 2 | L1 | Inductor | DFE252008C-1R5M | TOKO | 1.5μH | - |
| 3 | L2 | Inductor | DFE252008C-1R5M | TOKO | 1.5μH | - |
| 4 | C1 | Ceramic Capacitor | C1608X5R1V475K | TDK | 4.7μF | 35V |
| 5 | C2 | Ceramic Capacitor | C1608X5R1E106M | TDK | 10μF | 25V |
| 6 | C4 | Ceramic Capacitor | C1608X5R1V475K | TDK | 4.7μF | 35V |
| 7 | C5 | Ceramic Capacitor | C1608X5R1E106M | TDK | 10μF | 25V |
| 8 | C7 | Ceramic Capacitor | C1608X5R1V475K | TDK | 4.7μF | 35V |
| 9 | C8 | Ceramic Capacitor | C1608X5R1V475K | TDK | 4.7μF | 35V |
| 10 | C10 | Ceramic Capacitor | C1005JB1H104K | TDK | 0.1μF | 50V,1005 |
| 11 | C11 | Ceramic Capacitor | C1005JB1H104K | TDK | 0.1μF | 50V,1005 |
| 12 | C12 | Ceramic Capacitor | C1005JB1V474K | TDK | 0.47μF | 35V,1005 |
| 13 | C13 | Ceramic Capacitor | C1005JB1H104K | TDK | 0.1μF | 50V,1005 |
| 14 | R1 | Chip Resistor | RR0510P-104-D | SUSUMU | 100kΩ | ±0.5%, ±50ppm |
| 15 | R2 | Chip Resistor | RR0510P-104-D | SUSUMU | 100kΩ | ±0.5%, ±50ppm |
| 16 | R3 | Chip Resistor | RR0510P-104-D | SUSUMU | 100kΩ | ±0.5%, ±50ppm |
| 17 | R4 | Chip Resistor | RR0510P-104-D | SUSUMU | 100kΩ | ±0.5%, ±25ppm |
| 18 | R5 | Chip Resistor | RR0510P-103-D | SUSUMU | 10kΩ | ±0.5%, ±25ppm |

| No. | Component | Item | Parts Number | Vendor | Value | Remarks |
|-----|-----------|---------------|---------------|--------|-------|------------------|
| 19 | R7 | Chip Resistor | RR0510P-222-D | SUSUMU | 2.2kΩ | ±0.5%, ±25ppm |
| 20 | R8 | Chip Resistor | RR0510P-222-D | SUSUMU | 2.2kΩ | ±0.5%, ±25ppm |
| 21 | R13 | Chip Resistor | RR0510P-103-D | SUSUMU | 10kΩ | ±0.5%, ±25ppm |
| 22 | JP1 | - | - | - | - | No Mounted |
| 23 | CN104 | - | - | - | - | No Mounted |
| 24 | SCL | Terminal | 90131-0770 | molex | - | 2 × 10pin header |
| | SDA | Terminal | | | | |
| | VCCI2C | Terminal | | | | |
| | ERR | Terminal | | | | |
| | Vi | Terminal | | | | |
| | Vi | Terminal | | | | |
| | GND | Terminal | | | | |
| | GND | Terminal | | | | |
| | CTL1 | Terminal | | | | |
| | CTL2 | Terminal | | | | |
| | CTLL | Terminal | | | | |
| | CTLM | Terminal | | | | |
| | Vo1 | Terminal | | | | |
| | Vo2 | Terminal | | | | |
| | LDO | Terminal | | | | |
| | GND3 | Terminal | | | | |
| | PG1 | Terminal | | | | |
| | PG2 | Terminal | | | | |
| | PGL | Terminal | | | | |
| | ADDS | Terminal | | | | |

9. Evaluation Board Picture



Figure 9-1. Evaluation Board Picture (Top)

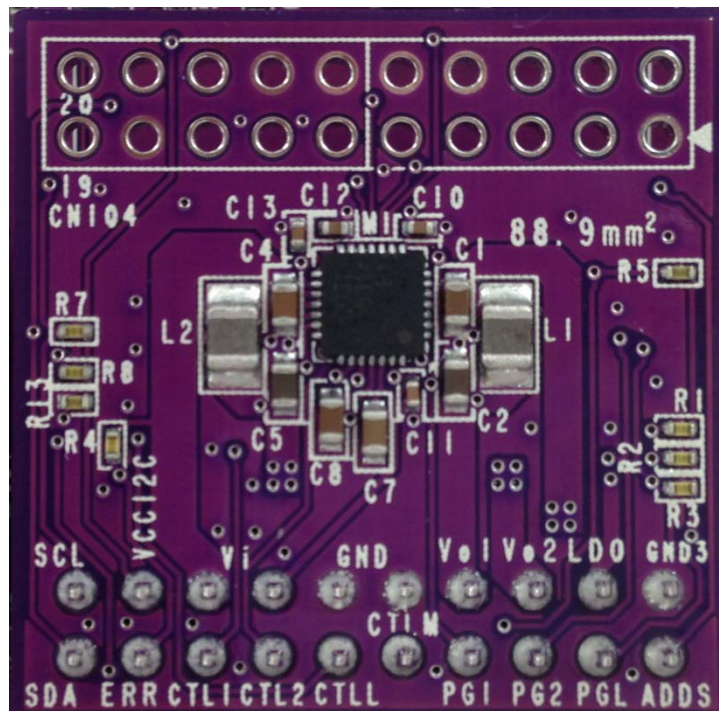
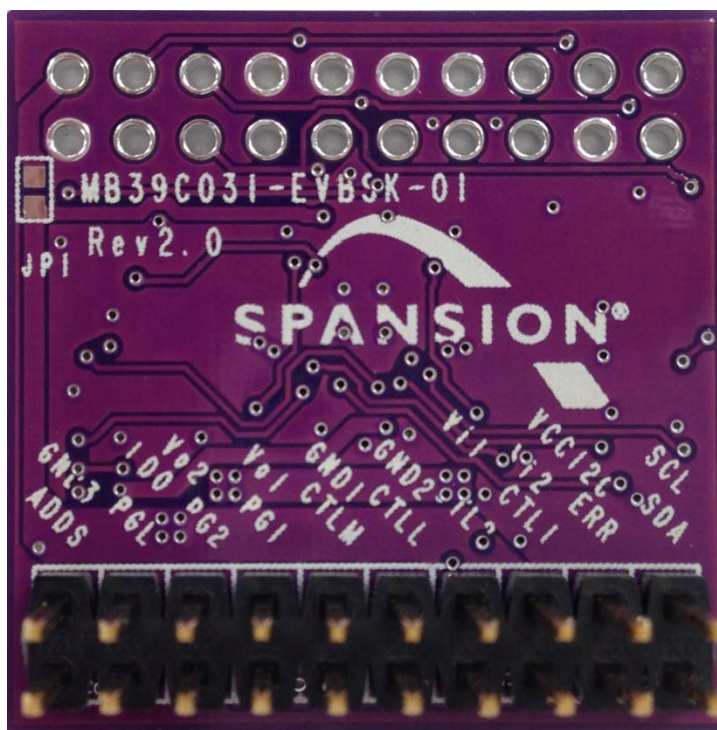


Figure 9-2. Evaluation Board Picture (Back)



10. Ordering Information



Table 10-1. Ordering Information

| Part Number | EV B Revision | Note |
|-------------------|---------------|------|
| MB39C031-EVBSK-01 | Rev 1.0 | --- |

Revision History



Document Title: MB39C031-EVBSK-01 2ch Buck DC/DC + LDO Evaluation Board Operation Guide

Document Number: 002-08724

| Revision | Issue Date | Origin of Change | Description of Change |
|----------|------------|------------------|--|
| ** | 01/16/2015 | ATTS | Initial release |
| *A | 02/04/2016 | ATTS | Migrated Spansion Guide from MB39C031-EVBSK-01_SS901-00035-1v0-E to Cypress format |
| *B | 12/27/2017 | ATTS | Updated template |