# MB39C031-EVBSK-01

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

Doc. No. 002-08724 Rev. *C

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

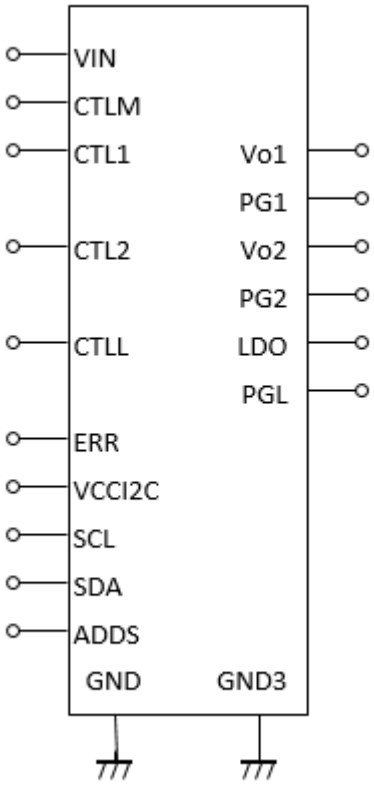
| | |
|---|---|
| **Damage** | When turning the power on or off, follow the relevant procedure as described in this document. Before turning the power on, in particular, be sure to finish making all the required connections. Furthermore, be sure to configure and use the product by following the instructions 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

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 $I^2C$ communication. This board implements our MCU : FM3(MB9AF312K) and can select the soft-start time, ON/OFF sequence, PFM/PWM mode easily with $I^2C$ 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 |
| | CTLMAIN | I | Control terminal for common block and MCU block |
| ERR | ERR | O | ERR signal output terminal |
| $I^2C$ | VCCI2C | I | Power supply terminal for $I^2C$. |
| | SCL | I | $I^2C$ clock terminal |
| | SDA | I/O | $I^2C$ 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 |

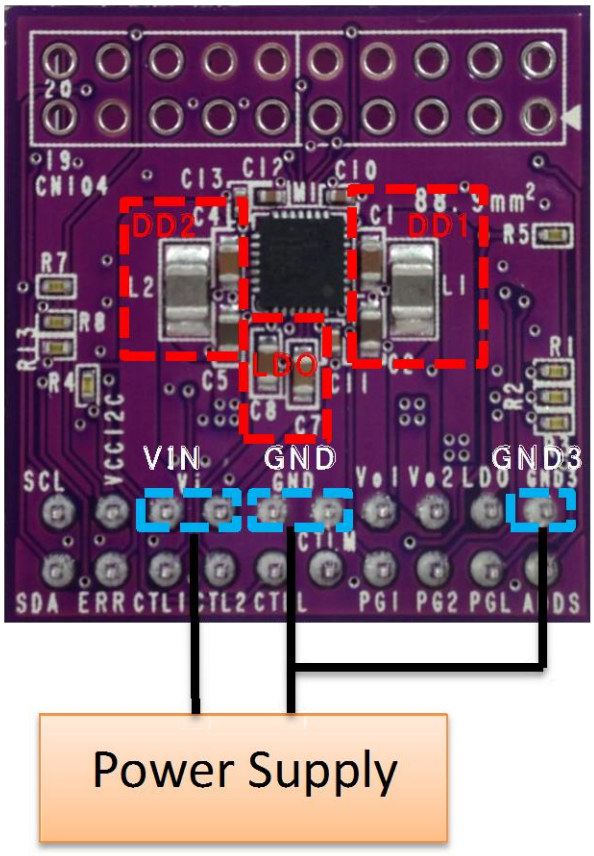
# 4. Setup and Checkup

MB39C031 preset value can be evaluated with stabilized power supply.

* : CTLM, CTL1, CTL2, CTLL

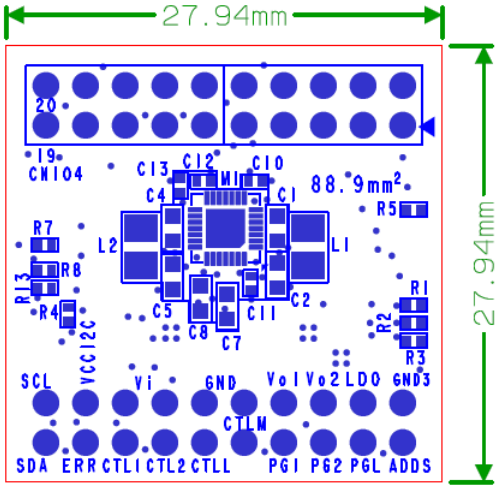
1. 3.3V is applied to VIN terminal.
2. CTLM, CTL1, CTL2, CTLL are connected to VIN terminal.
3. Vo1:1.0V, Vo2:1.8V, Vo3:3.3V is output.

Figure 4-1. Image of Connection



# 5. Component Layout

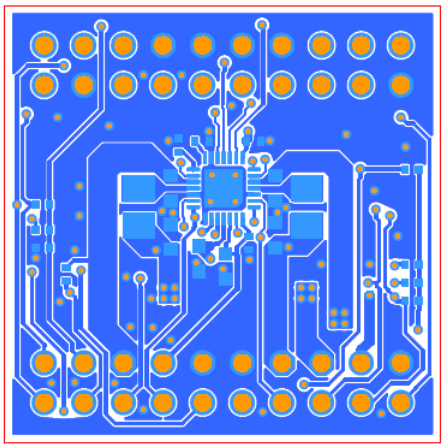
Figure 5-1. Component Layout Top View



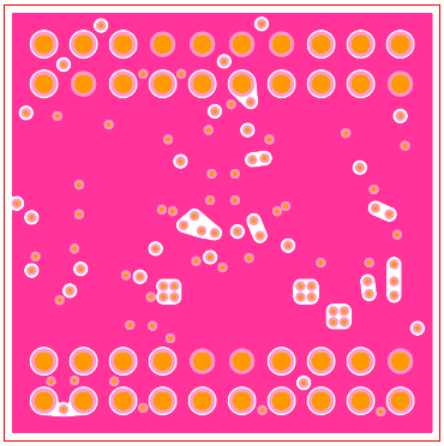
# 6. Wiring Layout

Figure 6-1. Wiring Layout

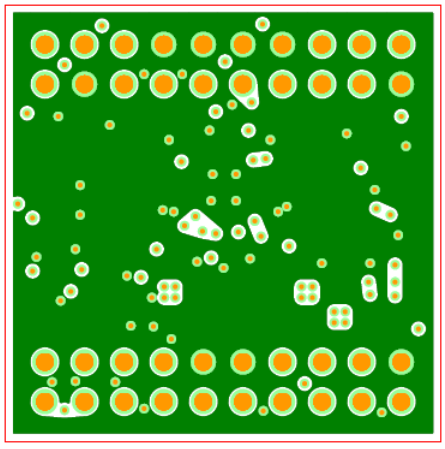
**Top Side (Layer 1)**



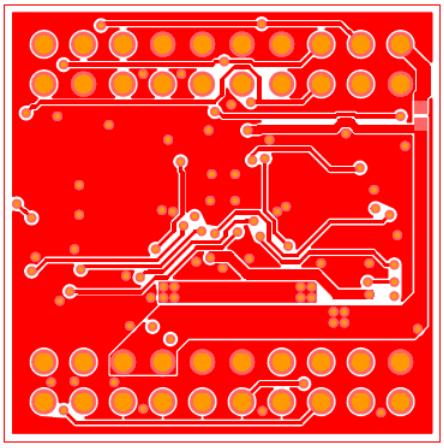
**Inside (Layer 2)**



**Inside (Layer 3)**

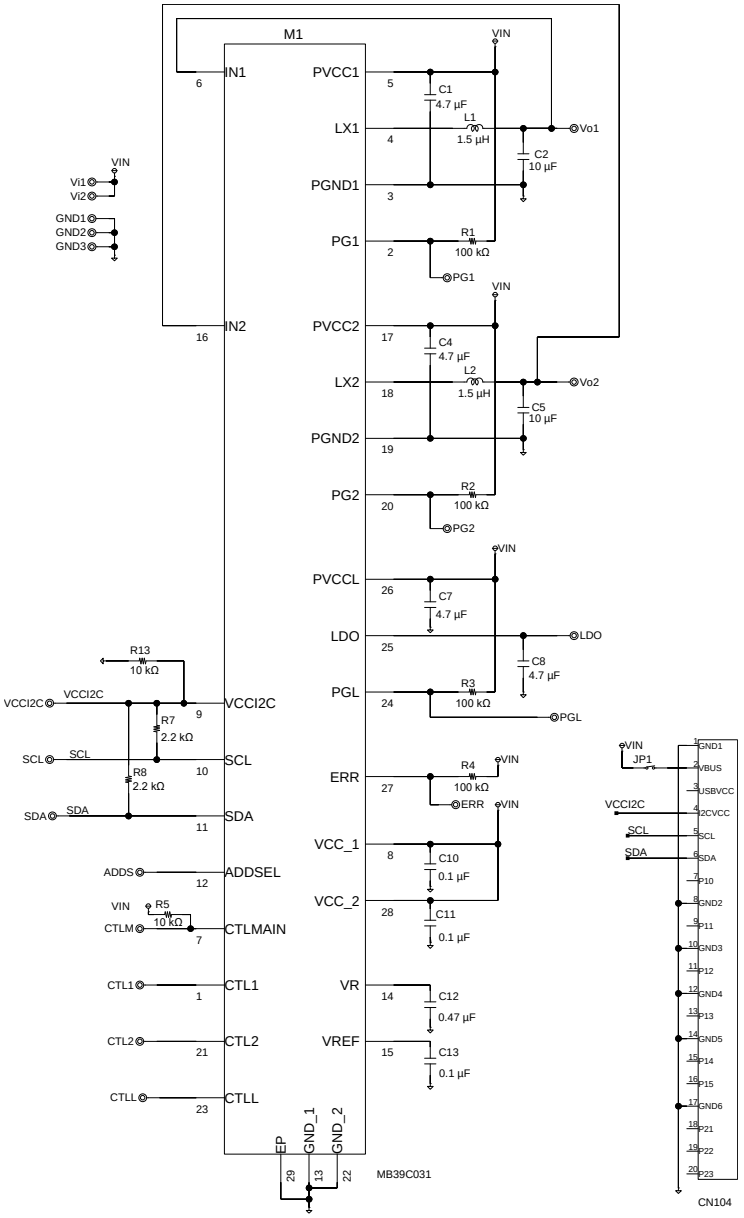


**Bottom Side (Layer 4)**



# 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)

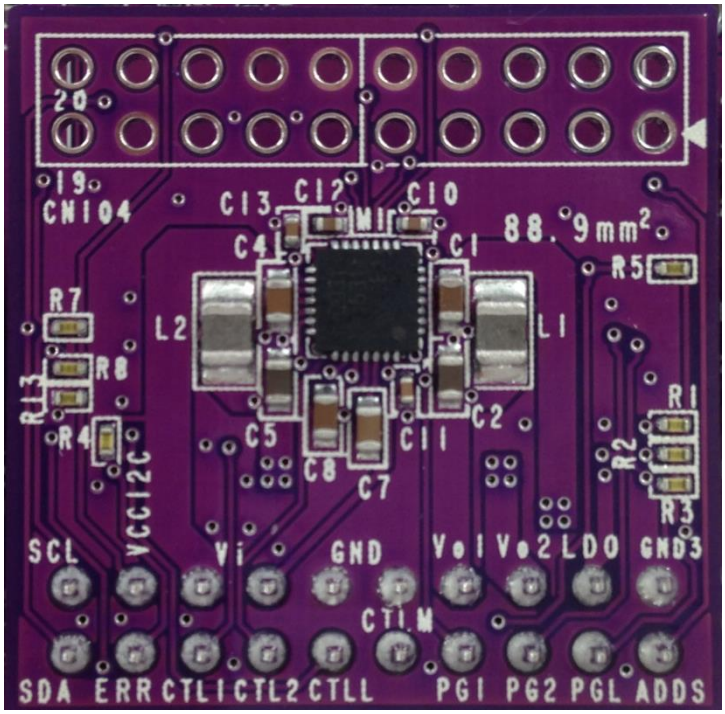
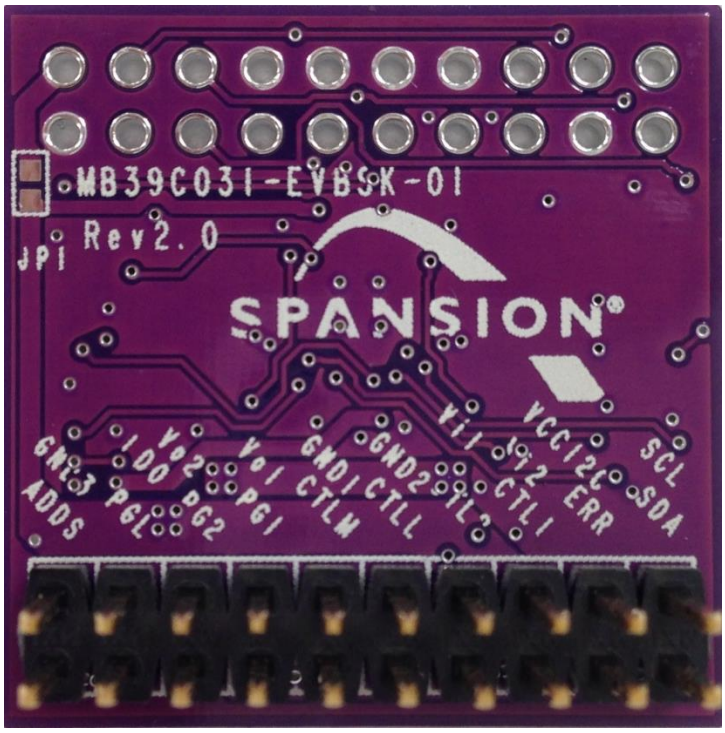


Figure 9-2. Evaluation Board Picture (Back)



# 10. Ordering Information

Table 10-1. Ordering Information

| Part Number | EVB Revision | Note |
|---|---|---|
| MB39C031-EVBSK-01 | Rev 1.0 | --- |

# Revision History

| Document Title: MB39C031-EVBSK-01 2ch Buck DC/DC + LDO Evaluation Board Operation Guide<br>Document Number: 002-08724 | | | | |
|---|---|---|---|---|
| **Revision** | **ECN Number** | **Issue Date** | **Origin of Change** | **Description of Change** |
| ** | - | 01/16/2015 | ATTS | Initial release. |
| *A | 5120338 | 02/04/2016 | ATTS | Updated to Cypress template. |
| *B | 6006452 | 12/27/2017 | ATTS | Updated to new template.<br>Completing Sunset Review. |
| *C | 6411275 | 12/14/2018 | ATTS | No technical updates.<br>Completing Sunset Review. |