



MB39C326-EVBSK-01/02

# 6MHz Buck-boost DC/DC Converter Evaluation Board Operation Guide

Doc. No. 002-08675 Rev. \*B

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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.

 <b>WARNING</b>	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.
--	---

<b>Electric shock, Damage</b>	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.
<b>Electric shock, Damage</b>	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.

 <b>CAUTION</b>	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.
--	---

<b>Cuts, Damage</b>	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.
<b>Cuts</b>	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.
<b>Damage</b>	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.
<b>Damage</b>	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.
<b>Damage</b>	Use the product within the ranges given in the specifications. Operation over the specified ranges may cause a fault.
<b>Damage</b>	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.

<b>Damage</b>	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.
<b>Damage</b>	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.
<b>Damage</b>	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



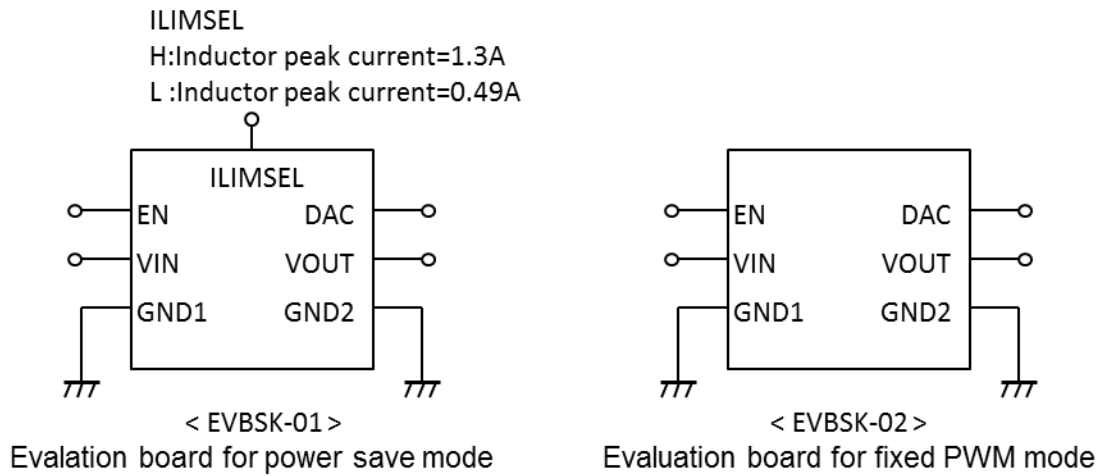
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# 1. Description



The MB39C326-EVBSK-01/02 is the small size evaluation board for the 6MHzBuck-boost DC/DC converter IC, MB39C326. This evaluation board output preset 3.3V or can be selected the other values by DAC signal input. The board consists of simple two layers. Two different function of boards lineup: MB39C326-EVBSK-01 for power save mode and MB39C326-EVBSK-02 for fixed PWM.

Figure 1-1. Board Outline



## 2. Evaluation Board Specification



Table 2-1. Evaluation Board Specification

Item	Symbol	Condition	Min	Typ	Max	Unit
Input voltage	VIN	-	2.5	3.7	5.5	V
Output voltage	VOUT	R1=620k $\Omega$ , R2=110k $\Omega$	3.18 5	3.31 8	3.451	V
Output current	IOUT(MAX1)	VIN=3.3V to 5.5V, EVBSK-02	-	-	1200	mA
	IOUT(MAX2)	VIN=2.5V to 3.3V, EVBSK-02	-	-	800	mA
	IOUT(MAX3)	VIN=3.3V to 5.5V, EVBSK-01, ILIMSEL=H	-	-	600	mA
	IOUT(MAX4)	VIN=2.5V to 3.3V, EVBSK-01, ILIMSEL=H	-	-	500	mA
Switching frequency	FREQUENCY	-	5.2	5.8	6.4	MHz
Maximum efficiency	EFFICIENCY	-	-	93	-	%
Signal input threshold voltage	VIL	EN, ILIMSEL	0.0	-	0.25	V
	VIH		1.5	-	VIN	V



# 3. Block Diagram



Figure 3-1. Block Diagram for EVBSK-01

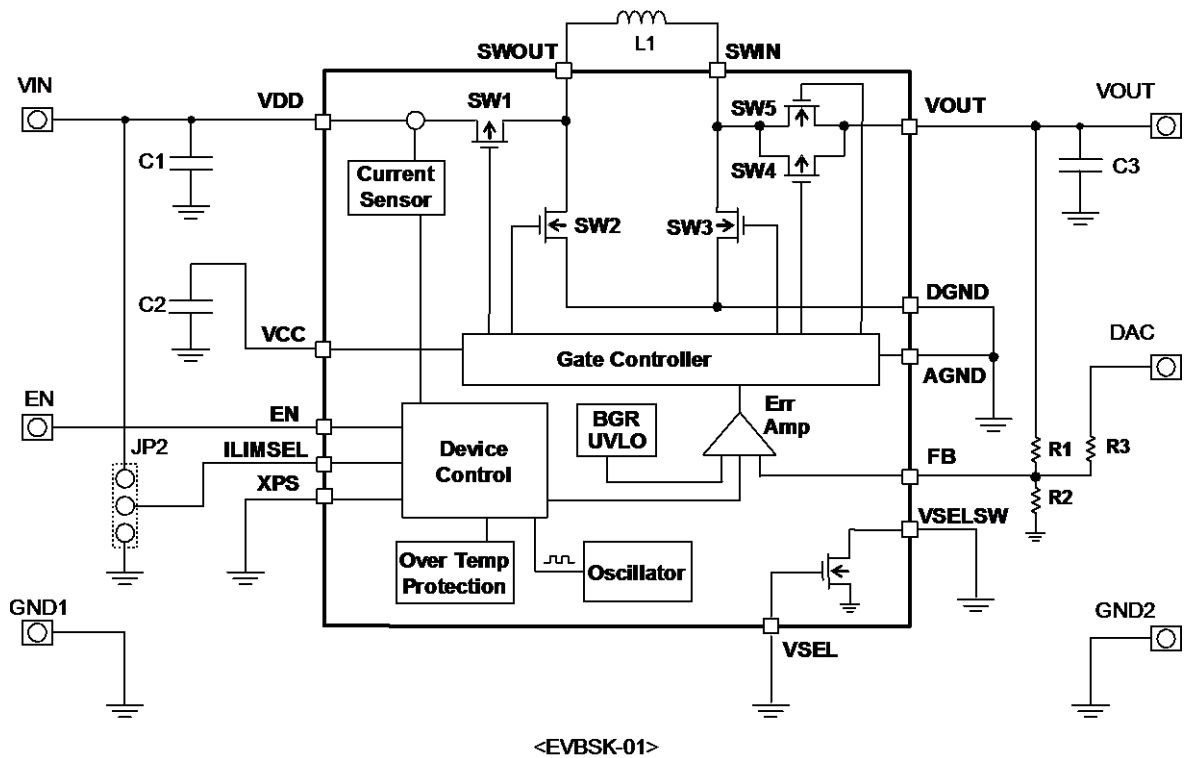
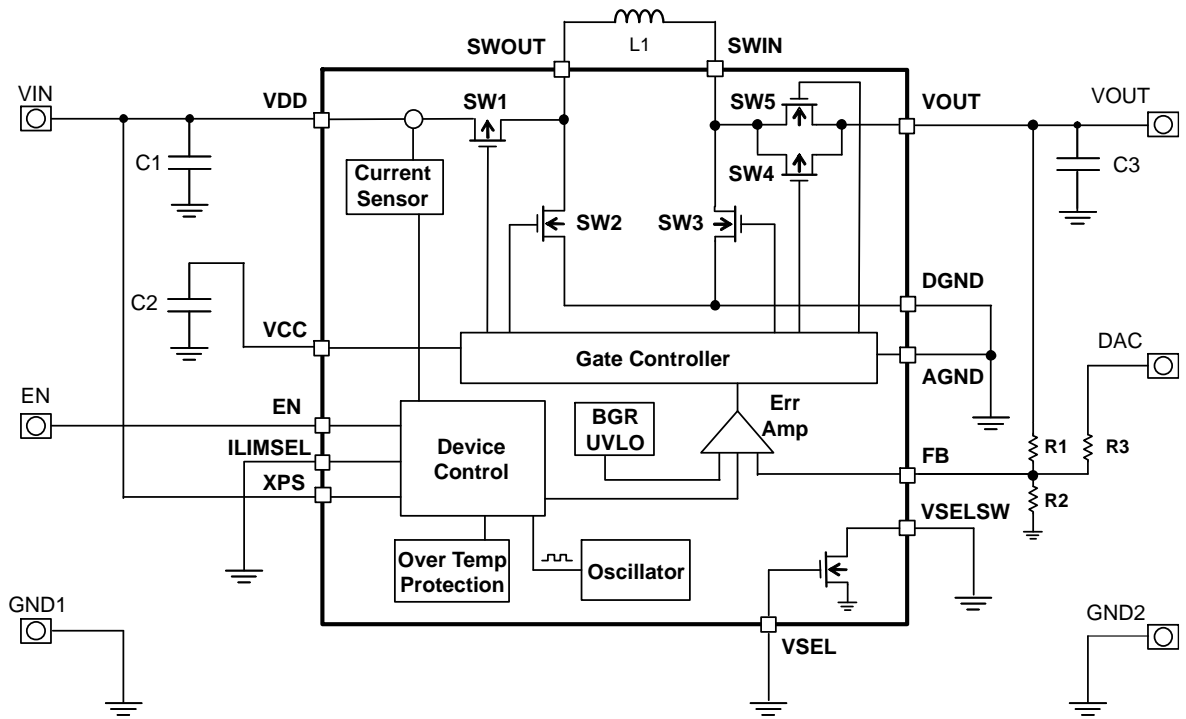


Figure 3-2. Block Diagram for EVBSK-02



< EVBSK-02 >

## 4. PIN Descriptions



### 4.1 Input/Output Pin Descriptions

Table 4-1. Input/Output Pin Descriptions

Terminal	I/O	Description
VIN	I	Power supply terminal
VOOUT	O	Output terminal
EN	I	IC enable terminal EN=H : Enable EN=L : Shutdown
DAC	I	Output voltage setting terminal (DAC signal input)(*1)
ILIMSEL	I	Inductor peak current select terminal (EVBSK-01)(*2) ILIMSEL=H : Inductor peak current value( $I_{PK}$ )= 1.3A ILIMSEL=L : Inductor peak current value( $I_{PK}$ )= 0.49A
GND1	-	Input GND terminal
GND2	-	Output GND terminal

\*1: Please refer the MB39C326 datasheet for setting output voltage by DAC.

\*2: EVBSK-01: MB39C326 XPS pin is set to L, ILIMSEL pin is set to H and output current limit value( $I_{PK}$ )= 1.3A at ILIMSEL=H and 0.49A at ILIMSEL=L.  
EVBSK-02: MB39C326 XPS pin is set to H, ILIMSEL pin is set to L and inductor peak current value( $I_{PK}$ )= 3.2A.

### 4.2 Jumper Descriptions

Table 4-2. Jumper Descriptions

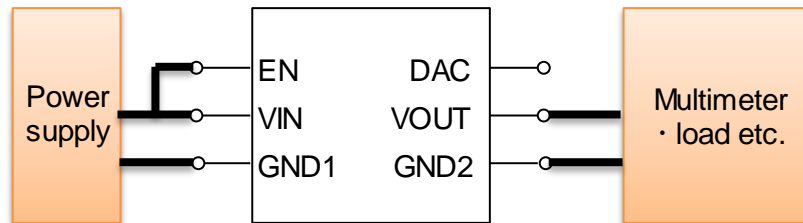
Jumper	Description	Initial
JP2	H: MB39C326 ILIMSEL pin is short to VIN. (L) : MB39C326 ILIMSEL pin is shorted to GND.	Short to VIN

### 4.3 Setup and Verification

1. Connect the power supply between VIN and GND1. EN is connected to VIN.
2. 3.3V is output to VOUT terminal after power is supplied.

Low impedance power supply is recommended to use. The power supply line can be stable at evaluation when some capacitor is connected to the line.

Figure 4-1. Image of Connection



# 5. Component and Wiring Layout



## 5.1 Component Layout

Figure 5-1. Component Layout (Layer 1)

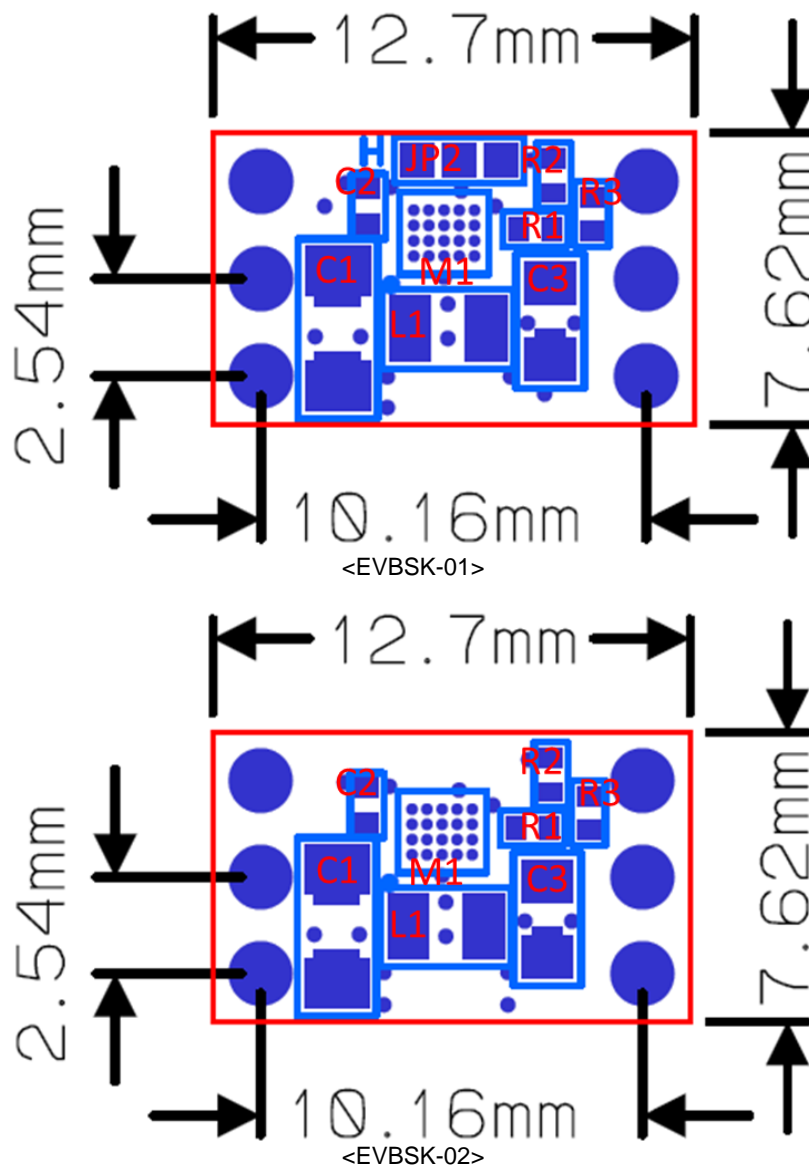
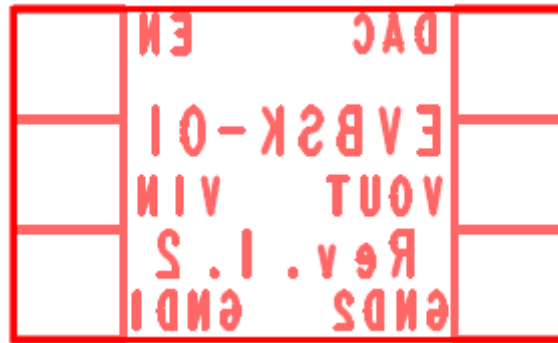
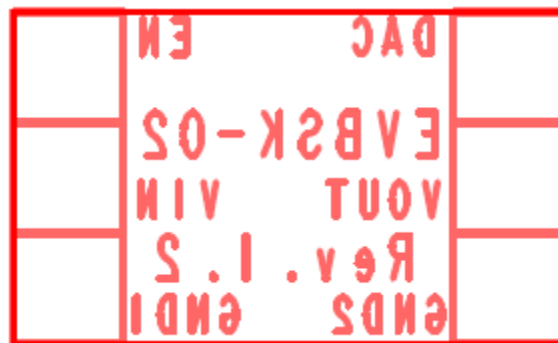


Figure 5-2. Component Layout (Layer 2, Top View)



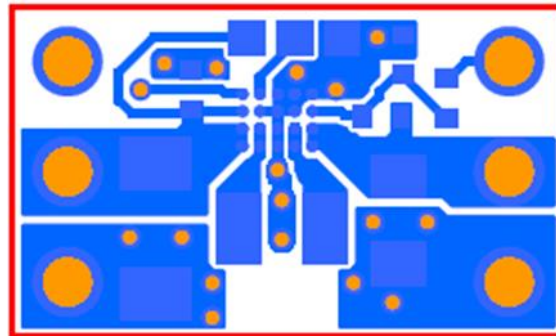
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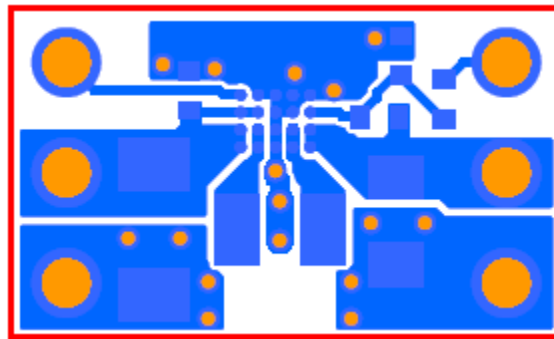
<EVBSK-02>

## 5.2 Wiring Layout

Figure 5-3. Wiring Layout (Layer 1)



<EVBSK-01>



<EVBSK-02>

Figure 5-4. Wiring Layout (Layer 2, Top View)



<EVBSK-01/02>

# 6. Schematic Circuit



Figure 6-1. Schematic Circuit for Power Save Mode

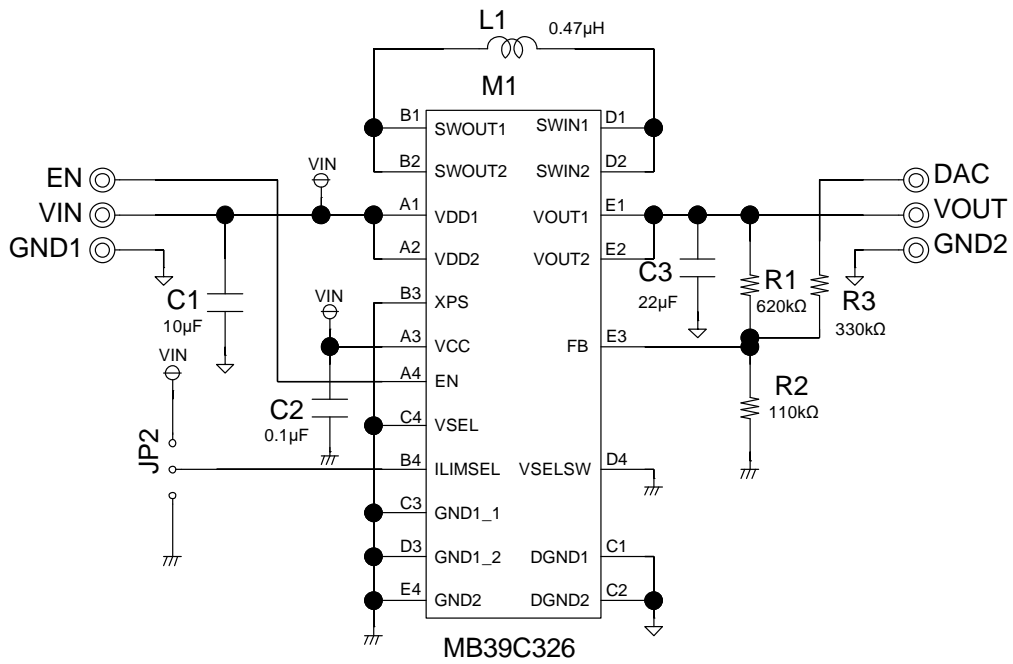
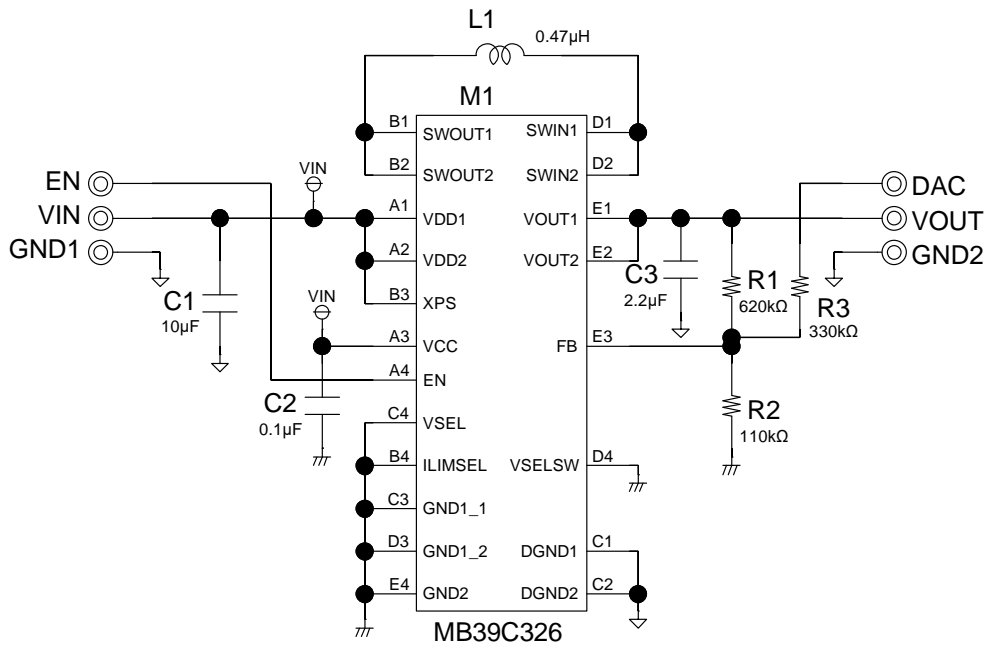




Figure 6-2. Schematic Circuit for Fixed PWM Mode



# 7. Component List



Table 7-1. Component List

No.	Component	Item	Parts Number	Vendor	Value	Remarks
1	M1	PMIC	MB39C326	Cypress	-	
2	L1	Inductor	GLCHKR4701A	ALPS	0.47 $\mu$ H	35m $\Omega$ , 3.7A
3	C1	Ceramic Capacitor	EMK107BBJ106MA-T	TAIYO YUDEN	10 $\mu$ F	16V, X5R, 1608
4	C2	Ceramic Capacitor	UMK105BJ104KV-F	TAIYO YUDEN	0.1 $\mu$ F	50V, X5R, 1005
5	C3	Ceramic Capacitor	EMK105ABJ225MV-F	TAIYO YUDEN	2.2 $\mu$ F	16V, X5R, 1005, EVBSK-02
		Ceramic Capacitor	JMK107BBJ226MA-T	TAIYO YUDEN	22 $\mu$ F(*1)	6.3V, X5R, 1608, EVBSK-01
6	R1	Chip Resistor	RK73H1ETTP6203F	KOA	620k $\Omega$	$\pm$ 1.0%
7	R2	Chip Resistor	RK73H1ETTP1103F	KOA	110k $\Omega$	$\pm$ 1.0%
8	R3	Chip Resistor	RK73H1ETTP3303F	KOA	330k $\Omega$	$\pm$ 1.0%
9	JP2	Solder jumper	JPPAD	-	-	H (Short to VIN)

ALPS :Alps Green Devices Co., Ltd  
 TAIYO YUDEN :Taiyo Yuden Co., LTD  
 KOA :KOA Corporation

These components are compliant with RoHS. Please ask each vendor for details if necessary.

\*1: EVBSK-01 operates by PFM mode at light load. Large output capacitor (around 22 $\mu$ F) is recommended to reduce the output ripple voltage.

# 8. Evaluation Board Picture



Figure 8-1. Picture of MB39C326-EVBSK-01

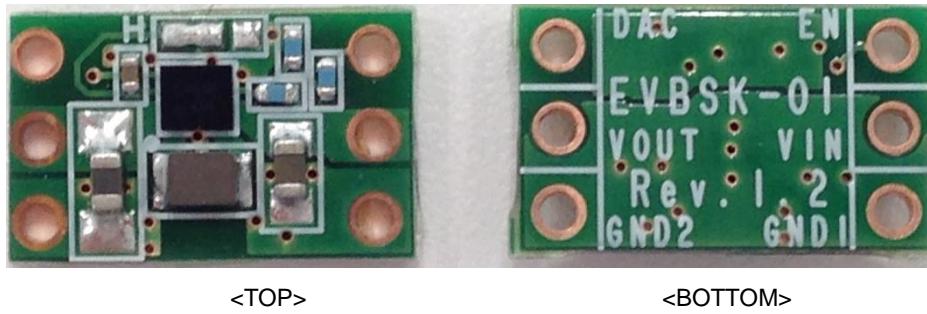
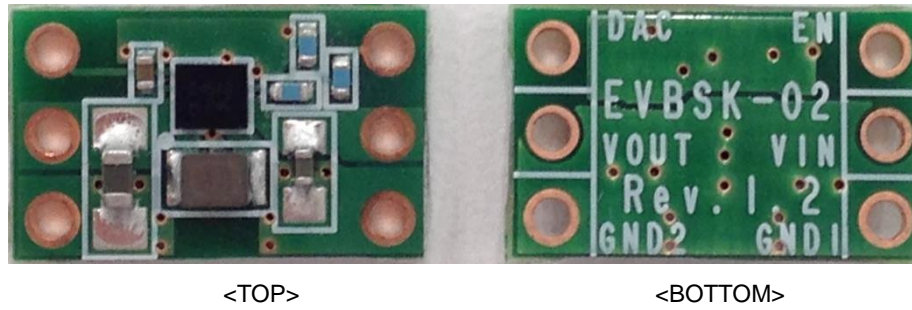


Figure 8-2. Picture of MB39C326-EVBSK-02



## 9. Ordering Information



Table 9-1. Ordering Information

Part Number	EVB Revision	Note
MB39C326-EVBSK-01	Rev 1.2	---
MB39C326-EVBSK-02	Rev 1.2	---

# Revision History



## Document Revision History

Document Title: MB39C326-EVBSK-01/02 6MHz Buck-boost DC/DC Converter Evaluation Board Operation Guide			
Document Number: 002-08675			
Revision	Issue Date	Origin of Change	Description of Change
**	06/19/2015	ATTS	<b>Revision 01:</b> Initial release
			<b>Revision 02:</b> Section 7 "Component List" Revised the Component of Component list GLC series → GLCHKR4701A
			Section 8 "Evaluation Board Picture" Inserted board pictures
*A	02/05/2016	ATTS	Migrated Spansion Guide from MB39C326-EVBSK-01/02_SS901-00022-2v0-E to Cypress format
*B	06/11/2018	ATTS	Updated Cypress Logo and Copyright year. Completing Sunset review.