BD82A26MUF-M Evaluation Board

REFLED003-EVK-003

User's Guide

＜High Voltage Safety Precautions＞

◇ Read all safety precautions before use

Please note that this document covers only the BD82A26MUF-M evaluation board (REFLED003-EVK-003) and its functions. For additional information, please refer to the datasheet.

To ensure safe operation, please carefully read all precautions before handling the evaluation board

Depending on the configuration of the board and voltages used,

Potentially lethal voltages may be generated.

Therefore, please make sure to read and observe all safety precautions described in the red box below.

Before Use

[1] Verify that the parts/components are not damaged or missing (i.e. due to the drops).
[2] Check that there are no conductive foreign objects on the board.
[3] Be careful when performing soldering on the module and/or evaluation board to ensure that solder splash does not occur.
[4] Check that there is no condensation or water droplets on the circuit board.

During Use

[5] Be careful to not allow conductive objects to come into contact with the board.
[6] **Brief accidental contact or even bringing your hand close to the board may result in discharge and lead to severe injury or death.**

Therefore, DO NOT touch the board with your bare hands or bring them too close to the board.
In addition, as mentioned above please exercise extreme caution when using conductive tools such as tweezers and screwdrivers.

[7] If used under conditions beyond its rated voltage, it may cause defects such as short-circuit or, depending on the circumstances, explosion or other permanent damages.
[8] Be sure to wear insulated gloves when handling is required during operation.

After Use

[9] The ROHM Evaluation Board contains the circuits which store the high voltage. Since it stores the charges even after the connected power circuits are cut, please discharge the electricity after using it, and please deal with it after confirming such electric discharge.
[10] Protect against electric shocks by wearing insulated gloves when handling.

This evaluation board is intended for use only in research and development facilities and should by handled **only by qualified personnel familiar with all safety and operating procedures.**
We recommend carrying out operation in a safe environment that includes the use of high voltage signage at all entrances, safety interlocks, and protective glasses.

LED Driver for Automotive Panel Backlight

6ch White LED Driver Built-in Current Driver Boost DC/DC Converter for Automotive BD82A26MUF-M Evaluation Board

REFLED003-EVK-003

Introduction

This user's guide will provide the necessary steps to operate the Evaluation Board of ROHM's BD82A26MUF-M LED Driver. This document includes the external parts, operating procedures and application data.

Description

This Evaluation Board was developed for ROHM's LED Driver BD82A26MUF-M. BD82A26MUF-M is a white LED driver for LCD backlight. It has 6 built-in current drivers for LED drive, making it ideal for high brightness LED drive. LED pin max voltage is 50 V, making it suitable for driving large LCD panels. The dimming is controlled by the PWM signal and can be set up to 20,000: 1@100 Hz. It also supports analog dimming and can accommodate even higher brightness ranges by combining with PWM dimming. DC/DC converters can be controlled for boost applications, and the input operating voltage range is 3.0V to 48V.

Application

Automotive backlight application for CID, cluster panel, car navigation, HUD, or car audio system.

Evaluation board operating condition (default setting)

Table 1. Evaluation board operating condition (default setting)

Parameter	Min	Typ	Max	Unit
Power supply voltage *1	7	13.5	18	V
LEDs in series	6	-	8	pcs
LEDs in parallel	-	6	-	ch
Output voltage *2	19	-	26.5	V
Output current (per channel)	-	125	-	mA
DC/DC oscillation frequency	-	300	-	kHz
Over voltage limit	-	31	-	V
Over current limit	-	5.4	-	A

*1 This indicates the voltage near the VCC pin. Be careful of voltage drop by the impedance of power line.

*2 Output voltage is determined by the Vf value of the connected LED and the numbers of series. Since this evaluation board has a boost-configuration, output voltage should be higher than input voltage. Also, output voltage should be lower than OVP voltage.

Evaluation board

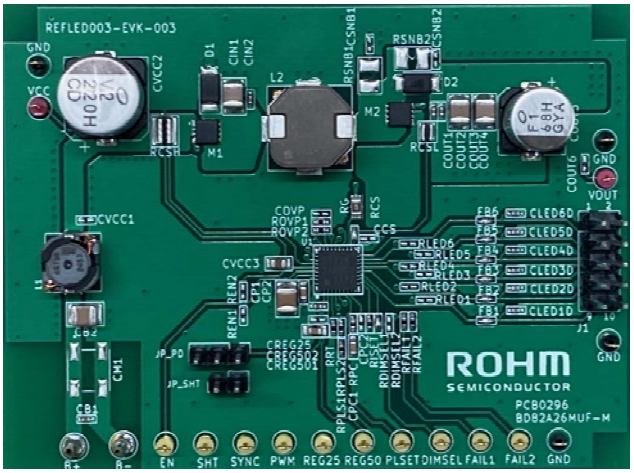


Figure 1. Top view

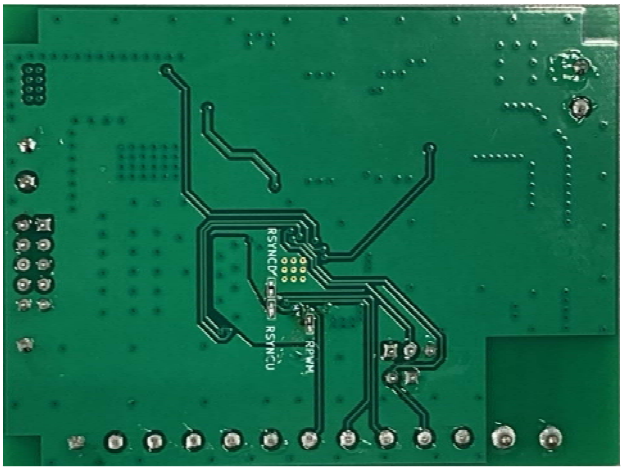
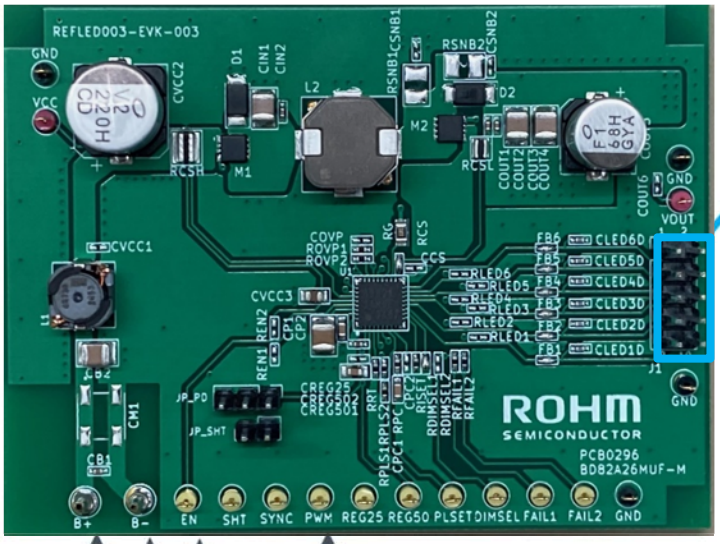


Figure 2. Bottom view

Evaluation board setup



REFLED003-EVK-001 Pin order	
VOUT Connect to Panel(Anode)	GND
LED1 Connect to Panel(Cathode1)	LED2 Connect to Panel(Cathode2)
LED3 Connect to Panel(Cathode3)	LED4 Connect to Panel(Cathode4)
LED5 Connect to Panel(Cathode5)	LED6 Connect to Panel(Cathode6)
N.C.	N.C.

Figure 3. Evaluation board setup

Operating procedure

1. Connect panel or LEDs to evaluation board. (Anode to VOUT-pin. Cathode to LEDx-pin.)
2. Connect power supply to +B-pin and –B-pin of the evaluation board.
3. Connect power supply to EN-pin. It must be less than 7V.
4. Connect pulse generator to PWM-pin. It should be 100Hz to 25kHz and the minimum pulse width must be longer than 0.5µs.
5. Turn on the power supply for +B-pin.
6. Turn on the power supply for EN-pin.
7. Turn on the pulse generator for PWM-pin.

Operation mode settings

The table below describes the settings for SYNC, PD, SHT terminals.

Table 2. Mode settings

Terminal	Setting	Function
SYNC	GND or OPEN	Fixed Frequency Mode Determined by RRT
	VREG50	Spread Spectrum Mode (SSCG) of the Frequency Determined by RRT
	Pulse Input	Mode to Synchronize with the Frequency Input to the
PD	GND or OPEN	Phase delay function is disabled
	VREG50	Phase delay function is enabled
SHT	GND (OPEN is not allowed)	LED short protection voltage: V_{LEDn} > 4.5V(typ)
	DC voltage Input	LED short protection voltage: V_{LEDn} > input voltage x 10

For unused channels, pull up the LED pin (LED1 to LED6) to REG50 with 100kΩ and pull down to GND with 20kΩ.

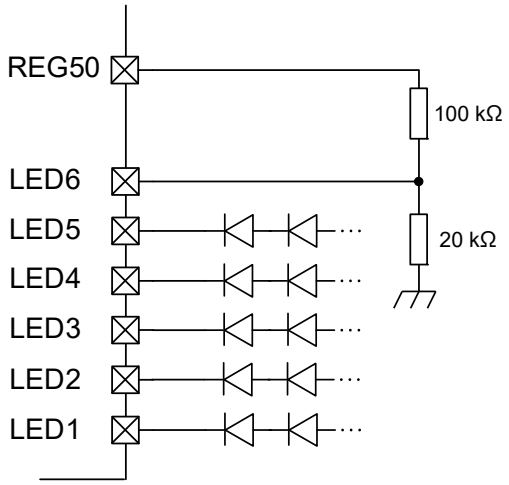


Figure 4. Setting LED6 to Unused

Pin configuration

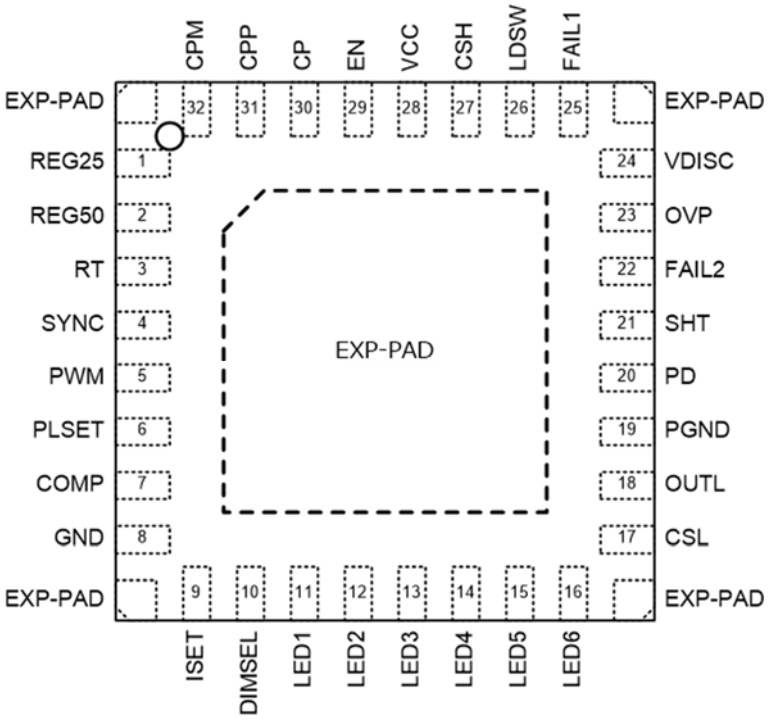


Figure 5. Pin configuration

Evaluation board schematic

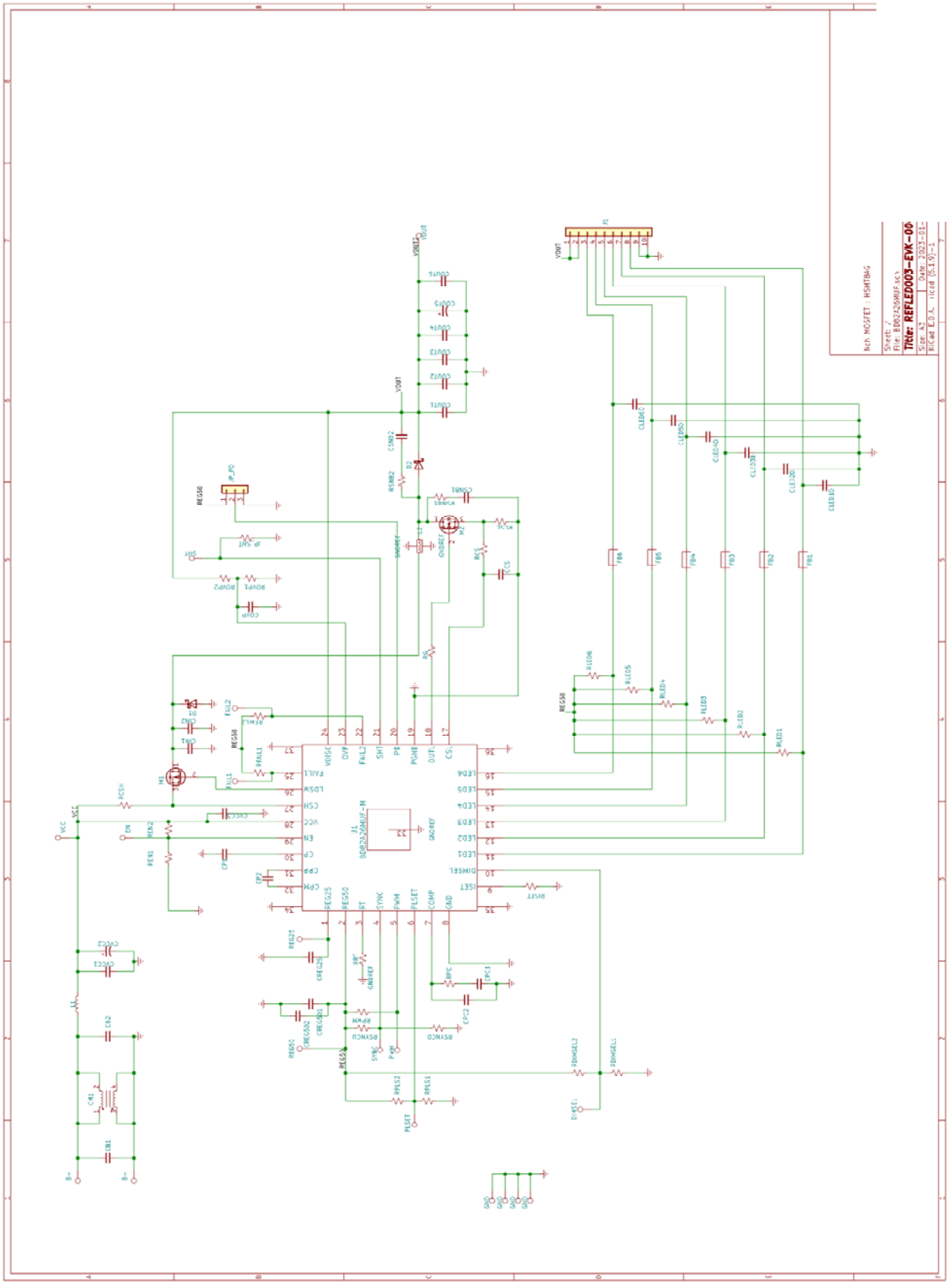


Figure 6. Evaluation board schematic

Parts list

Table 3. Parts list

No	Package	Parameters	Part name(series)	Type	Manufacturer
CB1	1005	0.1μF, X7R, 50V	GCM155R71H104KE02	Ceramic	Murata
CB2	3225	10μF, X7S, 50V	GCM32EC71H106KA03	Ceramic	Murata
CM1	L12.9 x W6.6 x T9.4mm	Open	-	-	-
L1	W7.0 x H4.5 x L7.4mm	4.7μH, 4.1A	CLF7045NIT-4R7N-D	Inductor	TDK
CVCC1	1005	Open	-	Ceramic	-
CVCC2	Φ10 x 10mm	220μF, 50V	Nichicon UCD series	Electrolytic	Nichicon
CVCC3	2012	1μF, X7R, 50V	GCM21BR71H105KA03	Ceramic	Murata
RCSH	1632	27mΩ, 1.0W	LTR18 series	Resistor	ROHM
M1	HSMT8AG	-40V, -27A	RQ3G270BJ	MOSFET	ROHM
CIN1	3225	10μF, X7S, 50V	GCM32EC71H106KA03	Ceramic	Murata
CIN2	1005	0.1μF, X7R, 50V	GCM155R71H104KE02	Ceramic	Murata
D1	PMDTM	60V, 5A	RB088LAM-60TF	SBD	ROHM
L2	W10.5 x H6.5 x L10.0mm	33μH, 8.8A	SPM10065VT-330-D	Inductor	TDK
RG	2012	10Ω, 1/8W	MCR10 series	Resistor	ROHM
M2	HSMT8AG	60V, 12A	RQ3L120BKFRA	MOSFET	ROHM
RCSL	1220	56mΩ, 1.0W	LTR10L series	Resistor	ROHM
RCS	1005	Short	-	Resistor	-
CCS	1005	Open	-	Ceramic	-
D2	PMDTM	60V, 5A	RB088LAM-60TF	SBD	ROHM
COUT1	1005	0.01μF, X7R, 50V	GCM155R71H103KA55	Ceramic	Murata
COUT2	1005	0.1μF, X7R, 50V	GCM155R71H104KE02	Ceramic	Murata
COUT3	3225	10μF, X7S, 50V	GCM32EC71H106KA03	Ceramic	Murata
COUT4	3225	10μF, X7S, 50V	GCM32EC71H106KA03	Ceramic	Murata
COUT5	Φ8 x 10mm	68μF, 50V	GYA1H680MC	Hybrid	Nichicon
COUT6	1005	Open	-	Ceramic	-
RISET	1005	20kΩ, 1/16W	MCR01 series	Resistor	ROHM
RRT	1005	33kΩ, 1/16W	MCR01 series	Resistor	ROHM
ROVP1	1005	11kΩ, 1/16W	MCR01 series	Resistor	ROHM
ROVP2	1005	330kΩ, 1/16W	MCR01 series	Resistor	ROHM
COVP	1005	Open	-	Ceramic	-
RDIMSEL1	1005	Short	-	Resistor	-
RDIMSEL2	1005	Open	-	Resistor	-
RPLS1	1005	100kΩ, 1/16W	MCR01 series	Resistor	ROHM
RPLS2	1005	100kΩ, 1/16W	MCR01 series	Resistor	ROHM
RPC	1005	200Ω, 1/16W	MCR01 series	Resistor	ROHM
CPC1	1608	1μF, X7R, 16V	GCM188R71C105KA49	Ceramic	Murata
CPC2	1005	Open	-	Ceramic	-

Parts list - continued

Table 3. Parts list - continued

No	Package	Parameters	Part name(series)	Type	Manufacturer
CREG251	1005	0.22μF, X7R, 16V	GCM155R71C224KE02	Ceramic	Murata
CREG501	1608	2.2μF, X7S, 10V	GCM188C71A225KE01	Ceramic	Murata
CREG502	1005	Open	-	Ceramic	-
CP1	3225	10μF, X7S, 50V	GCM32EC71H106KA03	Ceramic	Murata
CP2	1608	2.2μF, X7S, 10V	GCM188C71A225KE01	Ceramic	Murata
RFAIL1	1005	100kΩ, 1/16W	MCR01 series	Resistor	ROHM
RFAIL2	1005	100kΩ, 1/16W	MCR01 series	Resistor	ROHM
REN1	1005	Open	-	Resistor	-
REN2	1005	Open	-	Resistor	-
RSYNCU	1005	Short	-	Resistor	-
RSYNCD	1005	Open	-	Resistor	-
RPWM	1005	Open	-	Resistor	-
CSNB1	1005	Open	-	Ceramic	-
CSNB2	1005	Open	-	Ceramic	-
RSNB1	3225	Open	-	Resistor	-
RSNB2	3225	Open	-	Resistor	-
CLED1D	1005	470pF, C0G, 50V	GCM1555C1H471JA16	Ceramic	Murata
CLED2D	1005	470pF, C0G, 50V	GCM1555C1H471JA16	Ceramic	Murata
CLED3D	1005	470pF, C0G, 50V	GCM1555C1H471JA16	Ceramic	Murata
CLED4D	1005	470pF, C0G, 50V	GCM1555C1H471JA16	Ceramic	Murata
CLED5D	1005	470pF, C0G, 50V	GCM1555C1H471JA16	Ceramic	Murata
CLED6D	1005	470pF, C0G, 50V	GCM1555C1H471JA16	Ceramic	Murata
RLED1	1005	Open	-	Resistor	-
RLED2	1005	Open	-	Resistor	-
RLED3	1005	Open	-	Resistor	-
RLED4	1005	Open	-	Resistor	-
RLED5	1005	Open	-	Resistor	-
RLED6	1005	Open	-	Resistor	-
FB1	1005	Short	-	-	-
FB2	1005	Short	-	-	-
FB3	1005	Short	-	-	-
FB4	1005	Short	-	-	-
FB5	1005	Short	-	-	-
FB6	1005	Short	-	-	-

Board layout

Evaluation board PCB information

Material	FR-4
Board thickness	1.6mm
Copper thickness	1 oz
Number of layers	4
Board size	60X80mm
Minimum copper width	0.15mm
Minimum air gap	0.15mm
Minimum hole size	0.3mm

The layout of REFLED003-EVK-003 is shown below.

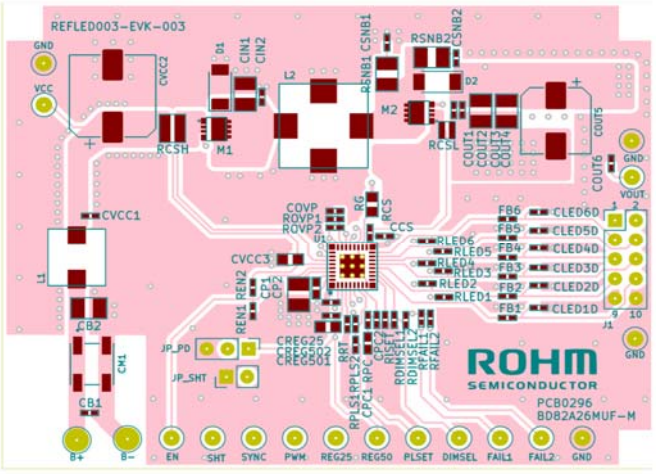


Figure 7. Top layer layout

(Top view)

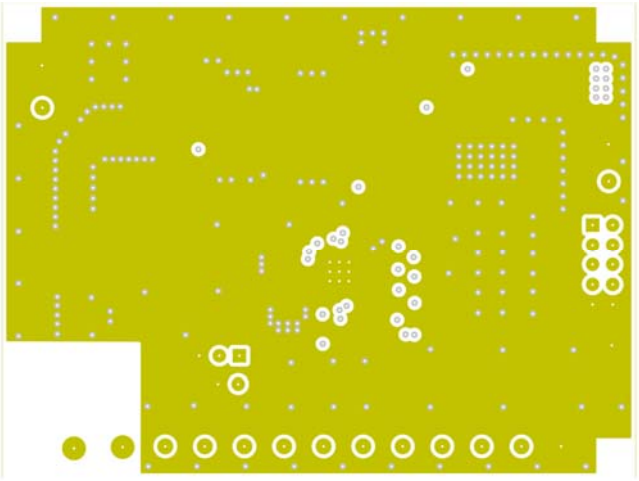


Figure 8. 2nd layer layout

(Top view)

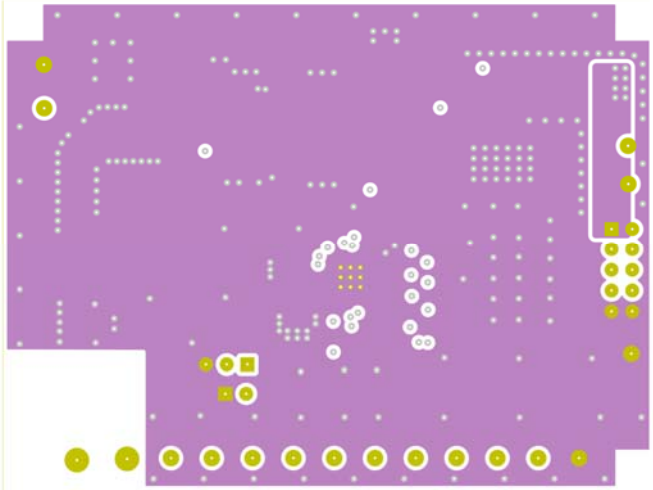


Figure 9. 3rd layer layout

(Top view)

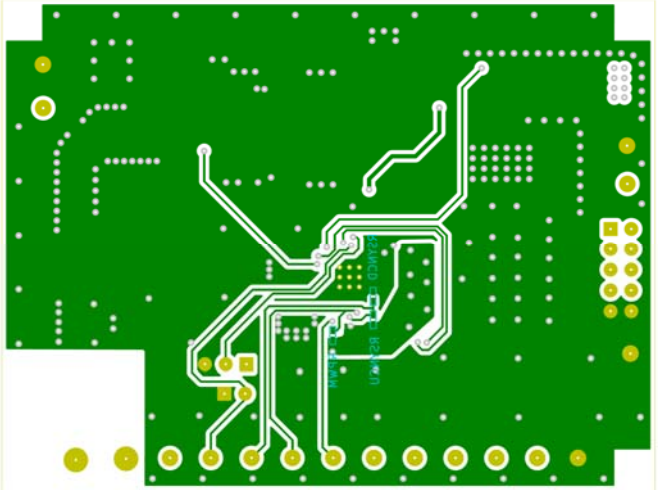
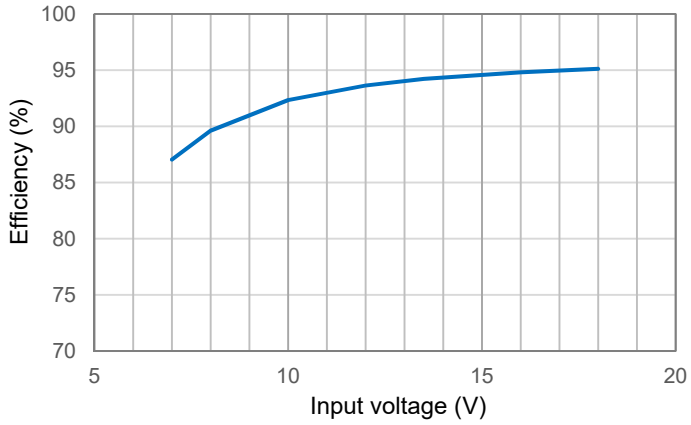


Figure 10. Bottom layer layout

(Top view)

Reference application data

(Ta=25°C, Output voltage=25.3V, Iout=125mA x 6ch)



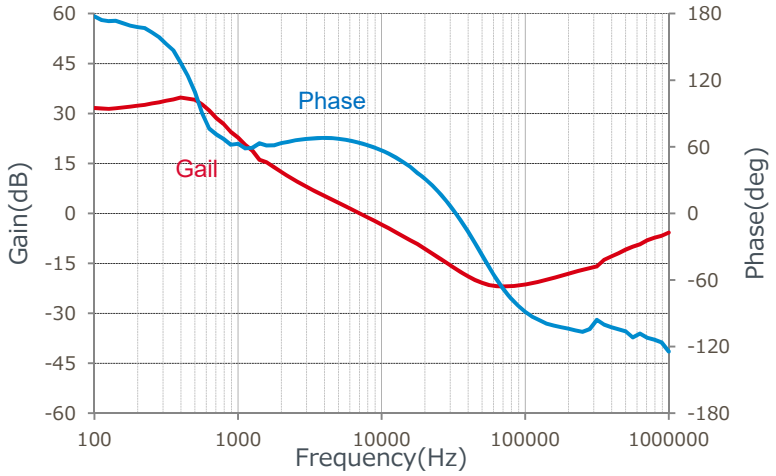


Figure 12. Gain, Phase vs Frequency (VCC=13.5V)

Revision history

Date	Revision number	Description
1. Sep. 2023	001	Initial release

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