

System Reference series for Automotive application

## White LED driver BD81A74EFV-M

# reference design for automotive lighting application (boost operation)

REFLED001

### General Description

The REFLED001 is a reference design of BD81A74EFV-M LED driver IC dedicated for automotive backlight application. It is including set of evaluation reports, design resources so that users can refer to board design as well as various test report provided in the design.

BD81A74EFV-M is a white LED driver with the capability of withstanding high input voltage (maximum 35V). This driver has 4ch constant-current drivers in 1-chip, where each channel can draw up to 120mA (Max), and it is suitable for high illumination LED drive. Furthermore, a buck-boost current mode DC/DC controller is also built to achieve stable operation during power voltage fluctuation. Light modulation (10,000:1@100Hz dimming function) is possible by PWM input. The design require LED board attached to BD81A74EFV-TSB-001 board.

### Features

- Automotive backlight reference design
- Supporting BD81A74EFV-M in boost operation
- Verified to satisfy EMC CISPR 25 class 5 standard at practical operating condition.
- Thermal characteristics tested
- PCB design files are available

### Applications

- Automotive backlight application for cluster panel, car navigation system or car audio system

### Web page

<https://www.rohm.com/reference-designs/refled001>

### Key Specifications

- Input Voltage: 4.5V to 35.0V
- Number of LED channels: 4 ch
- LED current 120mA/ch
- EMC Performance:

Verified to satisfy CISPR 25 Class 5  
Conductive emission and Radiated emission test.

### Board Image

Board No.	W (Typ) x D (Typ)
BD81A74EFV-TSB-001	80 mm x 90 mm

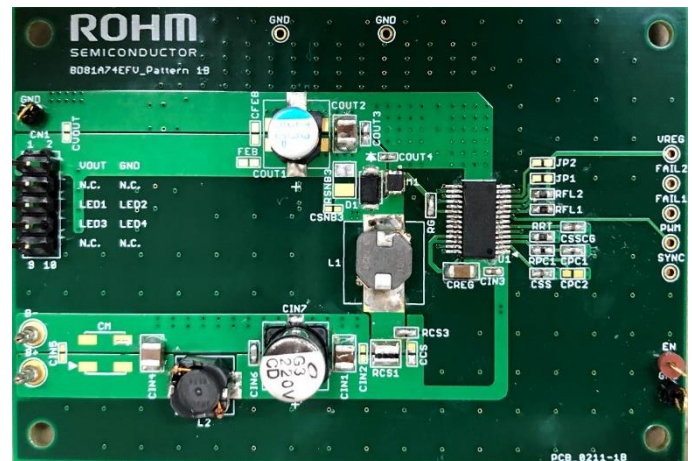


Figure 1. BD81A74EFV-TSB-001 Board

## System block diagram

Figure 2. shows typical application diagram of REFLED001 usage. Area indicated by dashed line is BD81A74EFV-M evaluation board.

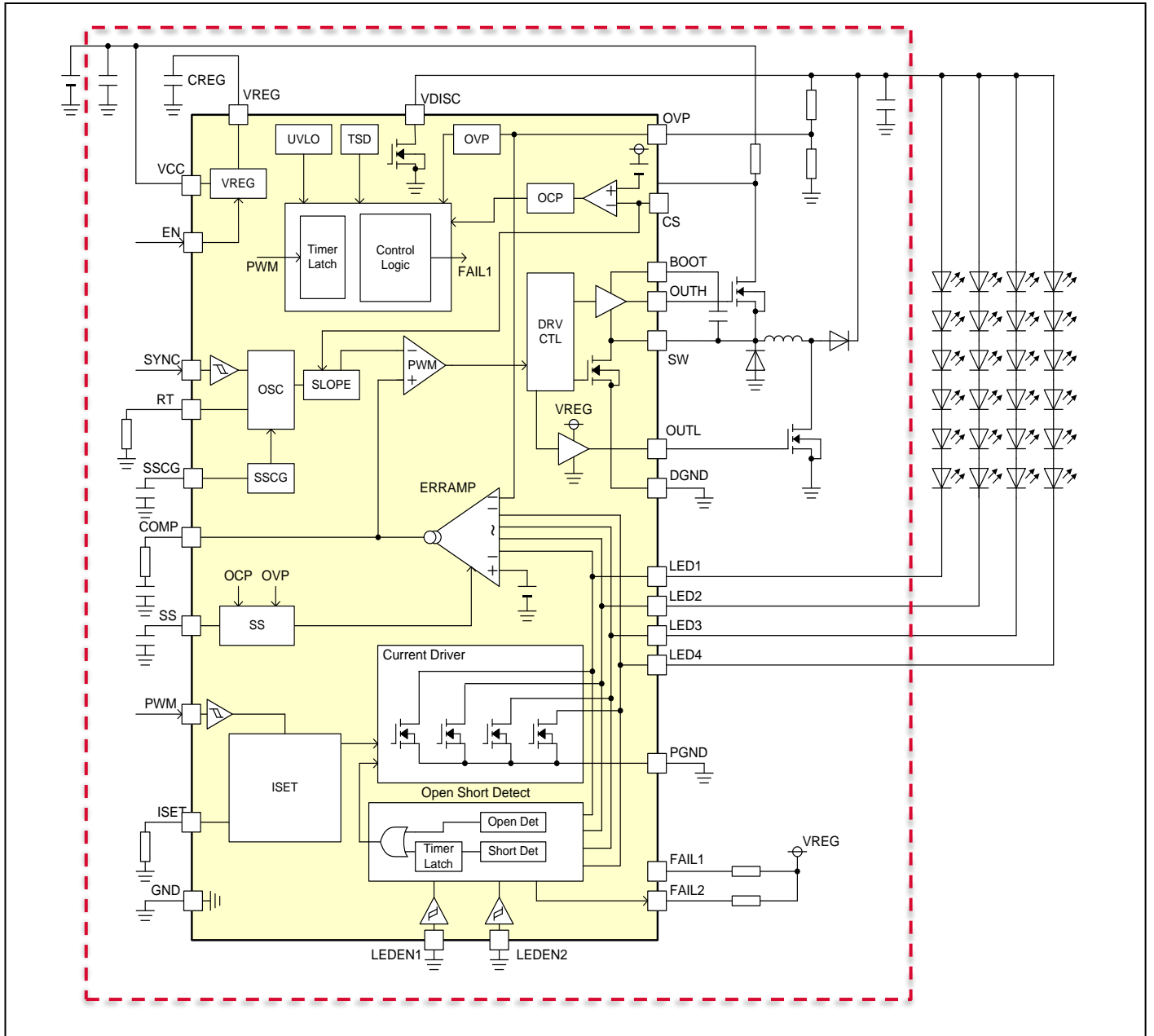


Figure 2. REFLED001 block diagram

## Electrical Characteristic

Table 1 Electrical Characteristics of REFLED001

Parameter	Min	Typ	Max	Unit	Conditions
Power supply voltage *1	7	13.5	18	V	
LEDs in series	6	-	10	pcs	
LEDs in parallel	-	4	-	ch	
Output voltage *2	20	-	34	V	
Output current (per channel)	-	85	-	mA	
DC/DC oscillation frequency	-	400 *3	-	kHz	
Over voltage limit	-	38	-	V	
Over current limit	-	3.9	-	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 number 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.

\*3 The default frequency is set to 400kHz so that it is higher than the EMC standard (LW: 150kHz to 300kHz) even if variations and SSCG functions are taken into account.

## Key components in the design

Table 2 Key parts list of REFLED001

Key components	Product type
<a href="#">BD81A74EFV-M</a>	White LED Driver IC for Automotive, 4ch constant-current driver, each channel can drive up to 120mA
RG9G120BFFRATB	Nch MOSFET 40V/12A 2.0 x 2.0 x 0.6mm (under development)
<a href="#">RB088LAM-60TF</a>	Super low IR shottky barrier diode suitable for general rectification

## Design support contents

In the ROHM official web site, various design support contents are available to download.

<https://www.rohm.com/reference-designs/refled001>

It is possible to start your pcb design based on design resources such as

- Schematic
- PCB layout (gerber data)
- Parts list

In addition to those design resources, device models and tools of key components are also available. Models and tools including SPICE model, calculation sheet and 2 resistor compact thermal models

## Important notes on the use of reference designs

- 1) The contents of this document are subject to change without notice for the purpose of improvement.
- 2) ROHM provides reference designs (including, but not limited to, circuit diagrams, layout data, parts lists, reference boards and their evaluation results, etc.) and all materials related to evaluation boards (hereinafter collectively referred to as "Reference Designs, etc.") to customers for the purpose of referencing them in the development of devices, equipment, software, etc. incorporating ROHM products (hereinafter collectively referred to as "Customer Products"). The design, verification, etc. required for the development of the Customer's Product shall be done at the customer's responsibility and expense. In no event shall the customer use the Reference Designs, etc. for any purpose other than the purpose mentioned above.
- 3) Reference Designs, etc. are provided on an "as is" basis. ROHM disclaims all warranties, express or implied, including, but not limited to, warranties of usefulness, functionality, accuracy, merchantability, and fitness for a particular purpose. In no event shall ROHM be liable for any damages (including, but not limited to, lost profits or other incidental, consequential, or punitive damages) arising out of, related to or in connection with the use of or application of the Reference Designs, etc. whether in contract or tort. For the avoidance of doubt, ROHM does not warrant that the Reference Designs, etc. will work with the Customer's Product.
- 4) When using Reference Designs, etc. be sure to request and verify the latest specifications (including the specifications of the products that compose the Reference Design, etc.) separately.
- 5) The customer shall be responsible for implementing safety measures such as derating, redundant design, fire prevention, backup, and fail-safe measures, etc., to prevent personal injury, fire damage, etc., caused by the Customer's Product developed with Reference Designs, etc. ROHM assumes no liability whatsoever for any use in excess of the ratings or in case of failure to observe the instructions for use.
- 6) The application circuit examples, constants, and other information provided in Reference Designs, etc. are intended to illustrate standard operation and usage. Therefore, when designing for mass production, please take into account various external conditions.
- 7) Reference Designs, etc. are intended to show typical operations and examples of application circuits, etc., and do not constitute a license, express or implied, to implement or use any intellectual property rights or any other rights of ROHM or any other company. ROHM shall not be liable for any disputes arising from, related to or in connection with the use of the Reference Designs, etc.
- 8) Please make sure to contact ROHM and obtain ROHM's consent before using the Reference Designs, etc. for the following Customer's Product that requires particularly high reliability. Transportation equipment (in-vehicle, ship, railroad, etc.), trunk line communication equipment, traffic signal equipment, disaster and security equipment, safety equipment, medical equipment, servers, solar cells, power transmission systems, etc.
- 9) Do not use Reference Designs, etc. for the following Customer's Product that requires extremely high reliability. Aerospace equipment, nuclear power control equipment, submarine relay equipment, etc.
- 10) Do not use Reference Designs, etc. for military use, such as development of weapons of mass destruction, or for any other military purpose.
- 11) ROHM does not assume any liability for any accidents or damages caused by non-compliance with the descriptions in this document.
- 12) The information contained in this document has been carefully prepared to ensure accuracy. However, ROHM shall not be liable for any loss or damage incurred by customers due to errors or misprints in this document.
- 13) Do not reproduce or duplicate any part of this document in any form or by any means without ROHM's permission.



Thank you for your accessing to ROHM product informations.  
More detail product informations and catalogs are available, please contact us.

### ROHM Customer Support System

<http://www.rohm.com/contact/>