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

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

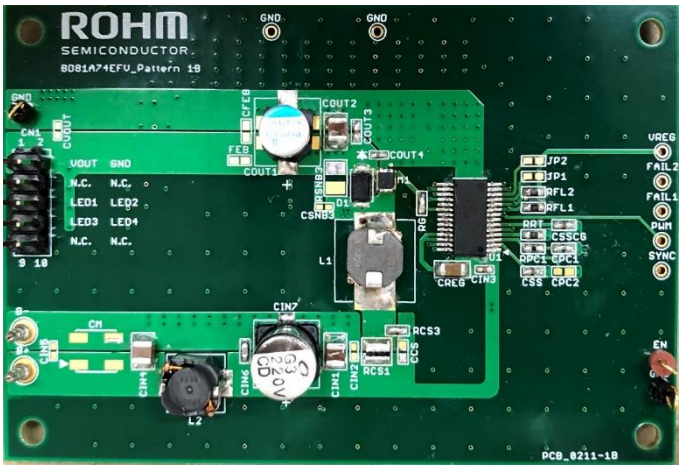

Figure 1. BD81A74EFV-TSB-001 Board

Web page

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

System block diagram

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

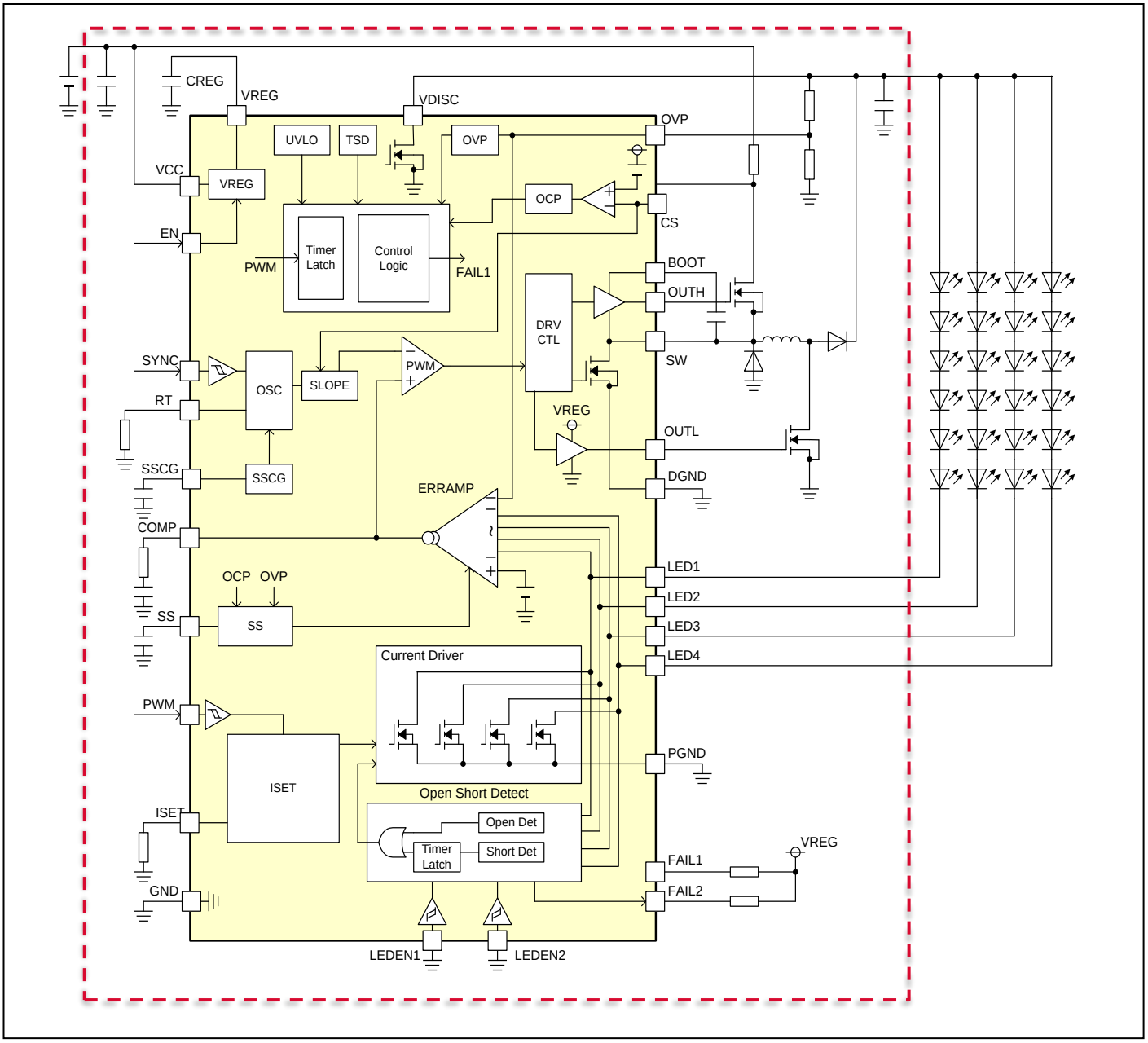

Figure 2. REFLED001 block diagram

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
BD81A74EFV-M	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)
RB088LAM-60TF	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.
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