

Design Guide

NO.ED-255-150121

■ TYPICAL APPLICATION

R1202xxxxA / R1202xxxxB

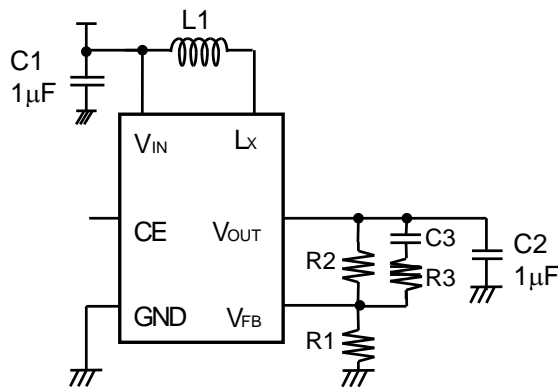


Fig.1

R1202xxxxD

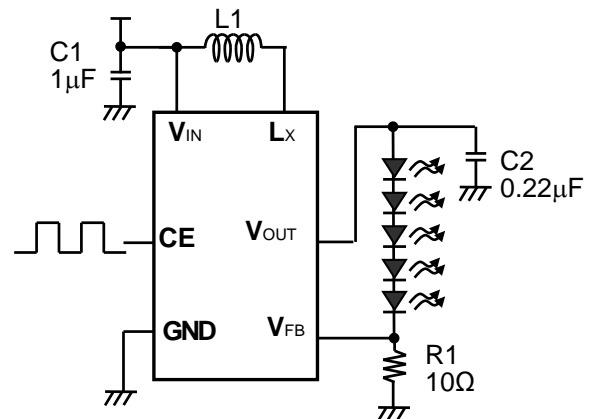


Fig.2

● Selection of Inductors

The peak current of the inductor at normal mode can be estimated as the next formula when the efficiency is 80%.

$$I_{Lxmax} = 1.25 \times I_{LED} \times V_{OUT} / V_{IN} + 0.5 \times V_{IN} \times (V_{OUT} - V_{IN}) / (L \times V_{OUT} \times f_{osc})$$

In the case of start-up or dimming control by CE pin, inductor transient current flows, and the peak current of it must be equal or less than the current limit of the IC. The peak current should not beyond the rated current of the inductor.

The recommended inductance value is 10-22µH.

Table 1 Peak current value in each condition

Condition				
V _{IN} (V)	V _{OUT} (V)	I _{OUT} (mA)	L(µH)	I _{Lxmax} (mA)
3	14	20	10	215
3	14	20	22	160
3	21	20	10	280
3	21	20	22	225

Table 2 Recommended inductors

L (μH)	Part No.	Rated current (mA)	Size (mm)
10	LQH32CN100K53	450	3.2x2.5x1.55
10	LQH2MC100K02	225	2.0x1.6x0.9
10	VLF3010A-100	490	2.8x2.6x0.9
10	VLS252010-100	520	2.5x2.0x1.0
10	VLF403212MT-100M	900	4.0x3.2x1.2
22	LQH32CN220K53	250	3.2x2.5x1.55
22	LQH2MC220K02	185	2.0x1.6x0.9
22	VLF3010A-220	330	2.8x2.6x0.9
22	VLF504015MT-220M	930	5.0x4.0x1.5

● Selection of Capacitors

Set 1μF or more value bypass capacitor C1 between V_{IN} pin and GND pin as close as possible.

【 R1202xxxxA / R1202xxxxB 】

Set 1μF – 4.7μF or more capacitor C2 between V_{OUT} and GND pin.

【 R1202xxxxD 】

Set 0.22μF or more capacitor C2 between V_{OUT} and GND pin.

When 4-5LEDs are driven, rated voltage of C2 should be 25V or more.

Table 3 Recommended components for R1202xxxxA / R1202xxxxB

	Rated voltage(V)	Part No.
C1	6.3	CM105B105K06
C2	25	GRM21BR11E105K
C3	25	220pF
R1		For V _{OUT} Setting
R2		For V _{OUT} Setting
R3		2kΩ

Table 4 Recommended components for R1202xxxxD

	Rated voltage(V)	Part No.
C1	6.3	CM105B105K06
C2	25	GRM21BR11E224

■ TYPICAL BOARD LAYOUT

● Current path on PCB

The current paths in an application circuit are shown in Fig.3 and 4.

A current flows through the paths shown in Fig.3 at the time of MOSFET-ON, and shown in Fig.4 at the time of MOSFET-OFF. In the paths pointed with red arrows in Fig.4, current flows just in MOSFET-ON period or just in MOSFET-OFF period. Parasitic impedance / inductance and the capacitance of these paths influence stability of the system and cause noise outbreak. So please minimize this side effect. In addition, please shorten the wiring of other current paths shown in Fig.3 and 4 except for the paths of LED load.

● LAYOUT Guide for PCB

- Please shorten the wiring of the input capacitor(C1) between V_{IN} pin and GND pin of IC. The GND pin should be connected to the strong GND plane.
- The area of L_x land pattern should be smaller.
- Please put output capacitor(C2) close to the V_{OUT} pin.
- Please make the GND side of output capacitor(C2) close to the GND pin of IC.

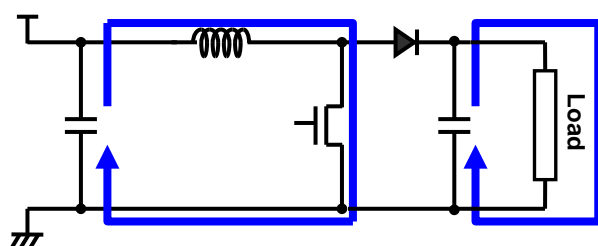


Fig.3 MOSFET-ON

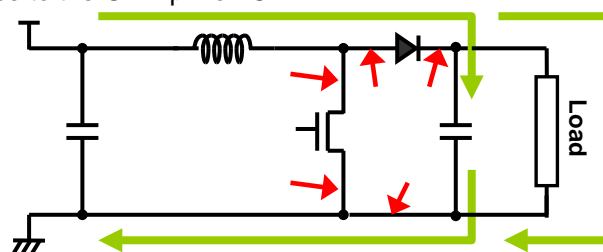


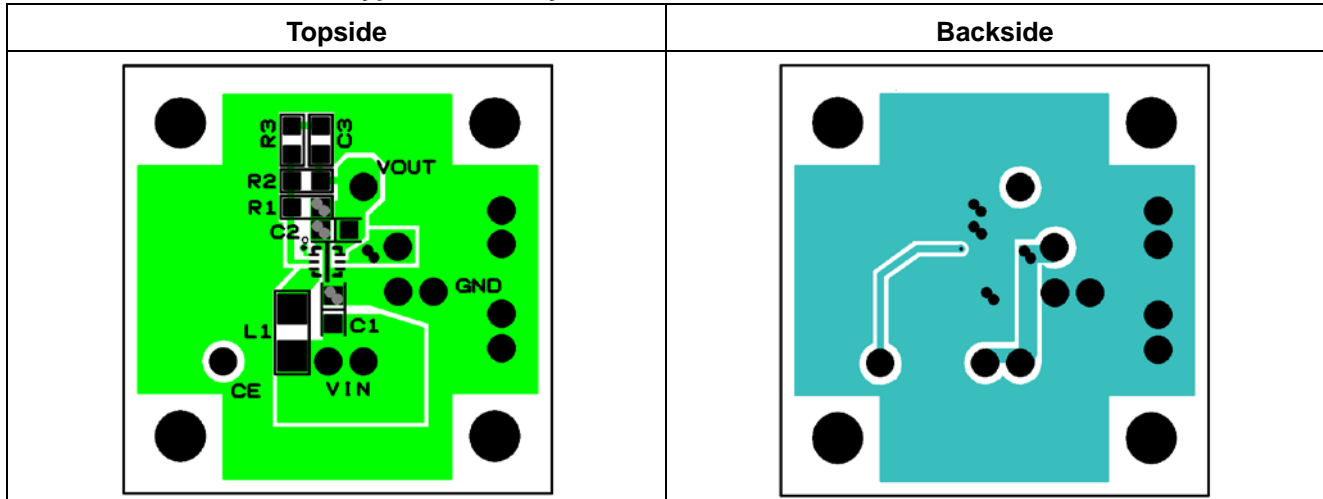
Fig.4 MOSFET-OFF

R1202x Series

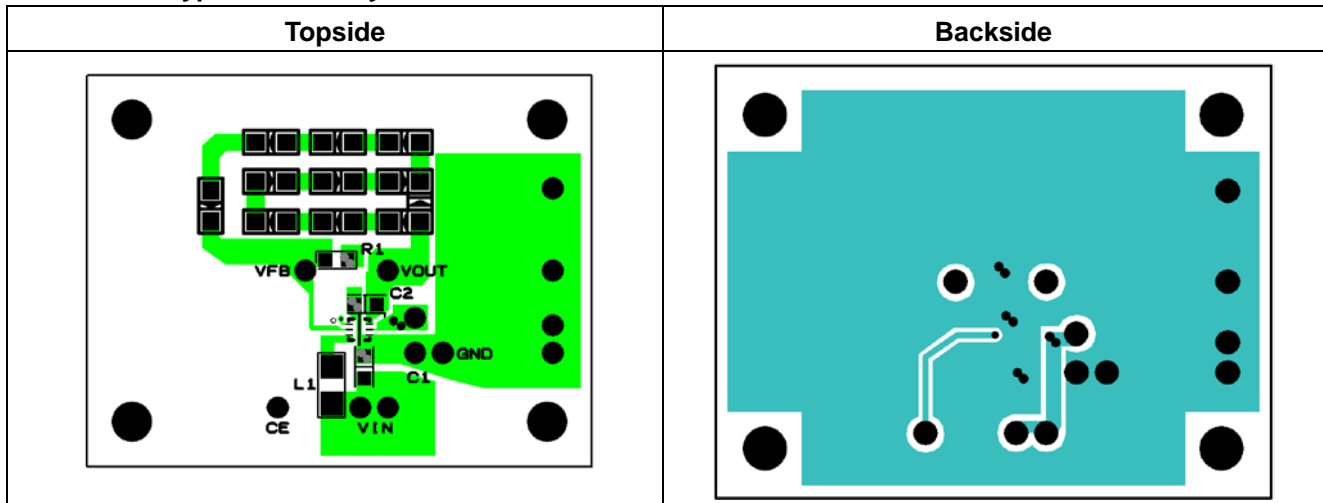
● Board Layout

- PKG:DFN1616-6 pin

R1202LxxxA / R1202LxxxB typical board layout

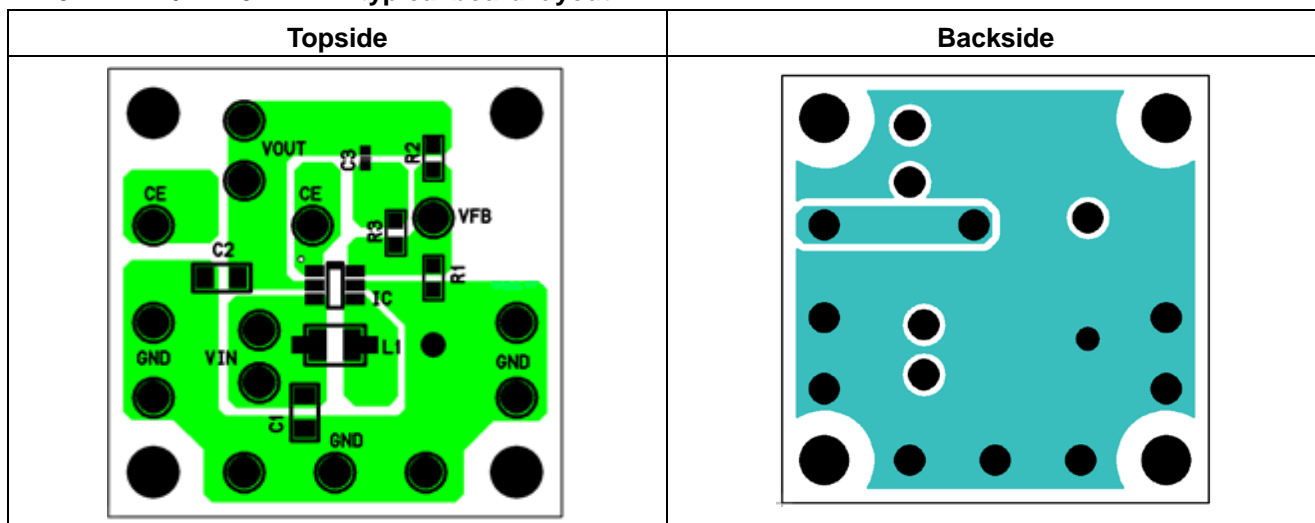


R1202LxxxD typical board layout

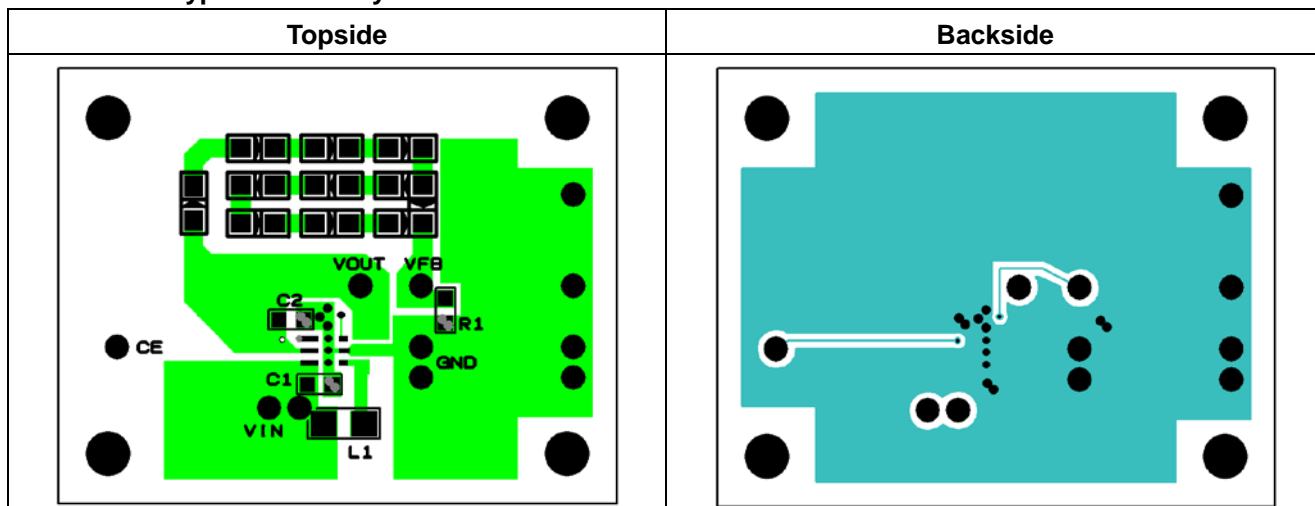


• PKG: TSOT-23-6 pin

R1202NxxxA / R1202NxxxB typical board layout



R1202NxxxD typical board layout





1. The products and the product specifications described in this document are subject to change or discontinuation of production without notice for reasons such as improvement. Therefore, before deciding to use the products, please refer to Ricoh sales representatives for the latest information thereon.
2. The materials in this document may not be copied or otherwise reproduced in whole or in part without prior written consent of Ricoh.
3. Please be sure to take any necessary formalities under relevant laws or regulations before exporting or otherwise taking out of your country the products or the technical information described herein.
4. The technical information described in this document shows typical characteristics of and example application circuits for the products. The release of such information is not to be construed as a warranty of or a grant of license under Ricoh's or any third party's intellectual property rights or any other rights.
5. The products listed in this document are intended and designed for use as general electronic components in standard applications (office equipment, telecommunication equipment, measuring instruments, consumer electronic products, amusement equipment etc.). Those customers intending to use a product in an application requiring extreme quality and reliability, for example, in a highly specific application where the failure or misoperation of the product could result in human injury or death (aircraft, spacevehicle, nuclear reactor control system, traffic control system, automotive and transportation equipment, combustion equipment, safety devices, life support system etc.) should first contact us.
6. We are making our continuous effort to improve the quality and reliability of our products, but semiconductor products are likely to fail with certain probability. In order to prevent any injury to persons or damages to property resulting from such failure, customers should be careful enough to incorporate safety measures in their design, such as redundancy feature, fire containment feature and fail-safe feature. We do not assume any liability or responsibility for any loss or damage arising from misuse or inappropriate use of the products.
7. Anti-radiation design is not implemented in the products described in this document.
8. Please contact Ricoh sales representatives should you have any questions or comments concerning the products or the technical information.



Ricoh is committed to reducing the environmental loading materials in electrical devices with a view to contributing to the protection of human health and the environment.

Ricoh has been providing RoHS compliant products since April 1, 2006 and Halogen-free products since April 1, 2012.

RICOH RICOH ELECTRONIC DEVICES CO., LTD.

<http://www.e-devices.ricoh.co.jp/en/>

Sales & Support Offices

RICOH ELECTRONIC DEVICES CO., LTD.

Higashi-Shinagawa Office (International Sales)
3-32-3, Higashi-Shinagawa, Shinagawa-ku, Tokyo 140-8655, Japan
Phone: +81-3-5479-2857 Fax: +81-3-5479-0502

RICOH EUROPE (NETHERLANDS) B.V.

Semiconductor Support Centre
Prof. W.H. Keesomlaan 1, 1183 DJ Amstelveen, The Netherlands
Phone: +31-20-5474-309

RICOH ELECTRONIC DEVICES KOREA CO., LTD.

3F, Haesung Bldg. 504, Teheran-ro, Gangnam-gu, Seoul, 135-725, Korea
Phone: +82-2-2135-5700 Fax: +82-2-2051-5713

RICOH ELECTRONIC DEVICES SHANGHAI CO., LTD.

Room 403, No.2 Building, No.690 Bilbo Road, Pu Dong New District, Shanghai 201203, People's Republic of China
Phone: +86-21-5027-3200 Fax: +86-21-5027-3299

RICOH ELECTRONIC DEVICES CO., LTD.

Taipei office
Room 109, 10F-1, No.51, Hengyang Rd., Taipei City, Taiwan (R.O.C.)
Phone: +886-2-2313-1621/1622 Fax: +886-2-2313-1623