

# 12V to 24V @ 1A Step-up switching regulator using Lm2585

This is a DC-DC step-up converter based on LM2585-ADJ regulator manufactured by Texas Instruments. This IC was chosen for its simplicity of use, requiring minimal external components and for its ability to control the output voltage by defining the feedback resistors (R1,R2). NPN switching/power transistor is integrated inside the regulator and is able to withstand 3A maximum current and 65V maximum voltage. Switching frequency is defined by internal oscillator and it's fixed at 100KHz.

The power switch is a 3-A NPN device that can standoff 65 V. Protecting the power switch are current and thermal limiting circuits and an under-voltage lockout circuit. This IC contains a 100-kHz fixed-frequency internal oscillator that permits the use of small magnetics. Other features include soft start mode to reduce in-rush current during start-up, current mode control for improved rejection of input voltage, and output load transients and cycle-by-cycle current limiting. An output voltage tolerance of  $\pm 4\%$ , within specified input voltages and output load conditions, is specified for the power supply system.

## Features

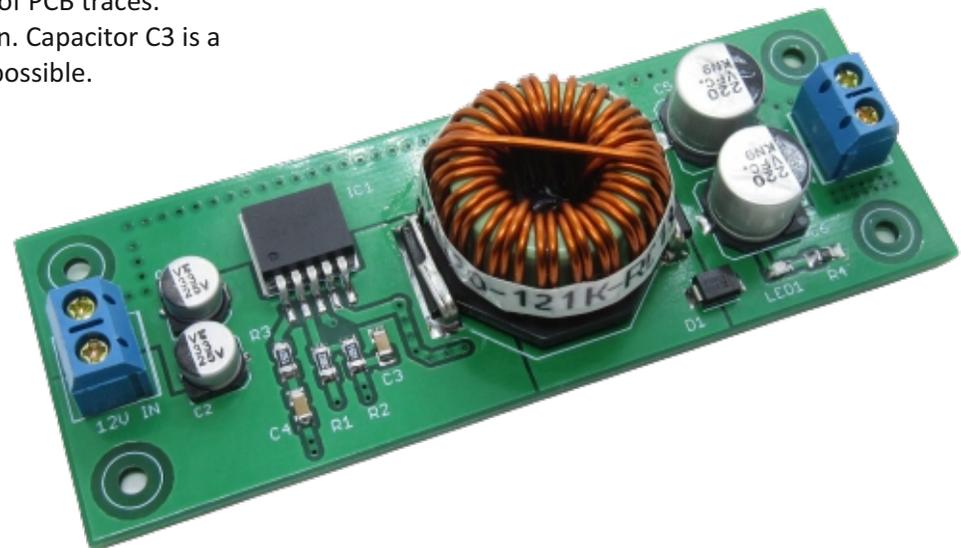
- Vin: 10-15V DC
- Vout: 24V DC
- Iout: 1A (can go up to 1.5A with forced cooling)
- Switching Frequency: 100KHz

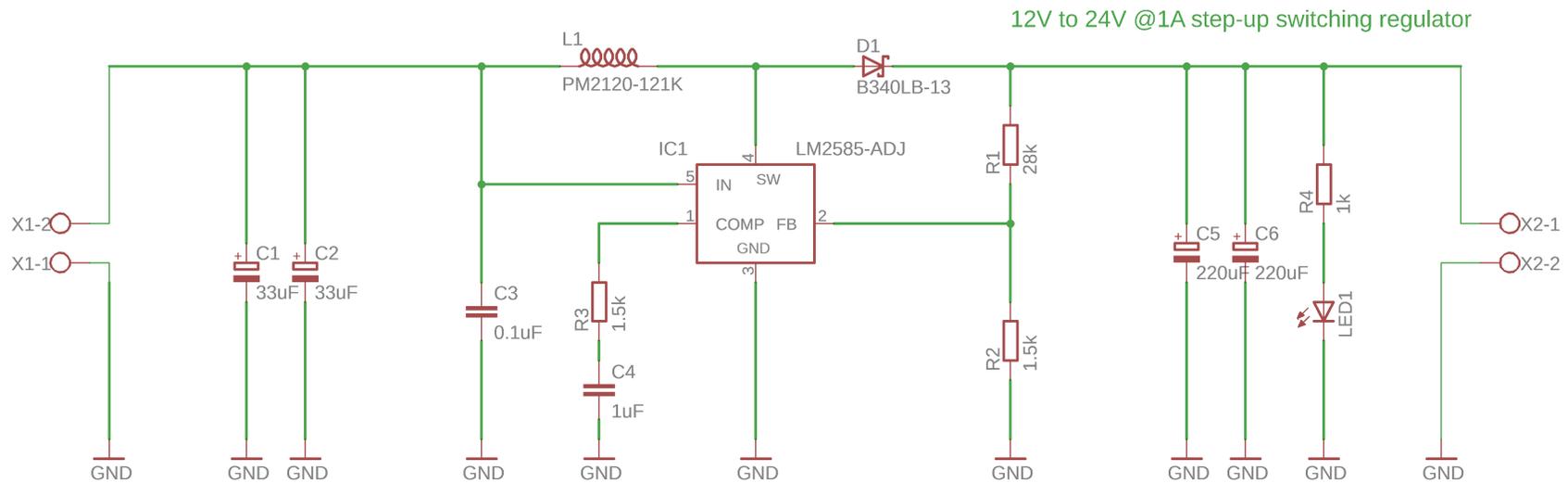
Schematic is a simple boost topology arrangement based on datasheet. Input capacitors and diode should be placed close enough to the regulator to minimize the inductance effects of PCB traces.

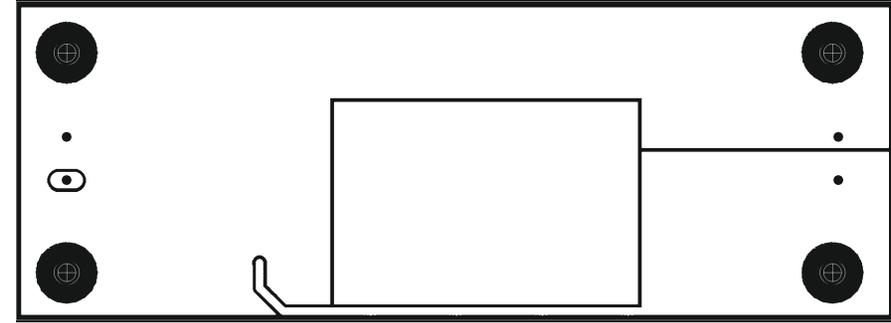
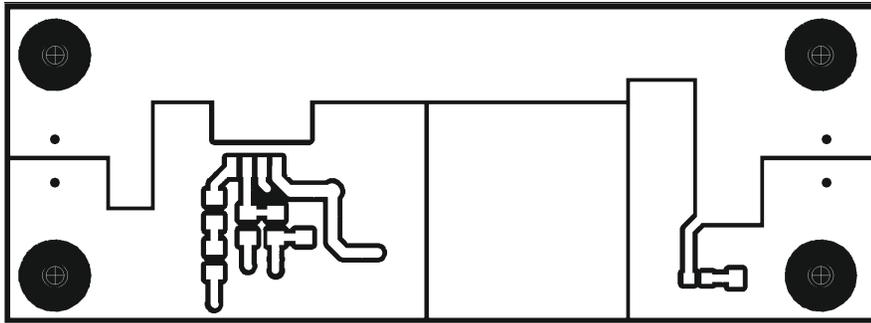
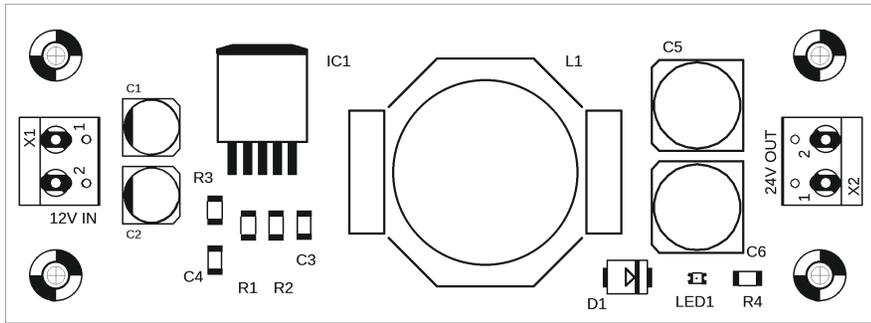
IC1, L1, D1, C1,C2 and C5,C6 are the main parts used in voltage conversion. Capacitor C3 is a high-frequency bypass capacitor and should be placed as close to IC1 as possible.

All components are selected for their low loss characteristics. So capacitors selected have low ESR and inductor selected has low DC resistance.

At maximum output power, there is significant heat produced by IC1 and for that reason, we mounted it directly on the ground plane to achieve maximum heat dissipation.







| Part  | Value                  | Package               | MPN              | Mouser No            |
|-------|------------------------|-----------------------|------------------|----------------------|
| C1 C2 | 33uF 25V 1Ω            | 6.3 x 5.4mm           | UWX1E330MCL1GB   | 647-UWX1E330MCL1     |
| C3    | 0.1uF 50V 0Ω           | 1206                  | C1206C104J5RACTU | 80-C1206C104J5R      |
| C4    | 1uF 25V                | 1206                  | C1206C105K3RACTU | 80-C1206C105K3R      |
| C5 C6 | 220uF 35V 0.15Ω        | 10 x 10.2mm           | EEE-FC1V221P     | 667-EEE-FC1V221P     |
| D1    | 0.45 V 3A 40V Schottky | SMB                   | B340LB-13-F      | 621-B340LB-F         |
| IC1   | LM2585S-ADJ            | TO-263                | LM2585S-ADJ/NOPB | 926-LM2585S-ADJ/NOPB |
| L1    | 120 uH 0.04Ω           | 30.5 x 25.4 x 22.1 mm | PM2120-121K-RC   | 542-PM2120-121K-RC   |
| R1    | 28 KΩ                  | 1206                  | ERJ-8ENF2802V    | 667-ERJ-8ENF2802V    |
| R2 R3 | 1.5 KΩ                 | 1206                  | ERJ-8ENF1501V    | 667-ERJ-8ENF1501V    |
| R4    | 1 KΩ                   | 1206                  | RT1206FRE07931KL | 603-RT1206FRE07931KL |
| LED1  | RED LED 20mA 2.1V      | 0805                  | 599-0120-007F    | 645-599-0120-007F    |

