

High Frequency, High Efficiency, Step-up DC/DC Converter

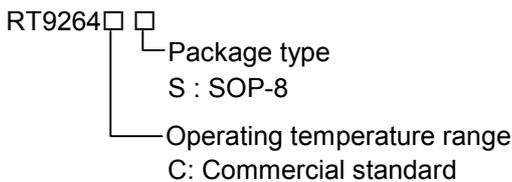
General Description

The RT9264 is a compact, high efficient, step-up DC/DC converter with current mode PWM control loop, providing stable and high efficient operations without external compensation.

The RT9264 suitable for 1 to 4 battery cells as well as USB power applications providing up to 400mA output current. The high switching rate minimized the size of external components.

A 300mA LDO is included in RT9264 to provide a secondary low noise output as well as an output current stop in the shutdown mode. RT9264 is provided in SOP-8 packages.

Ordering Information



Features

- 400mA High Supply Capability
- 90% Efficiency
- Switching Rate higher Than 1.4MHz
- Providing Flexibility for Using Internal and External Power Switches
- Built-in 300mA LDO, also for the Zero-Output-Current Shutdown Mode
- Boost DC-DC Integrating LDO for Up-Down Regulation
- 8-Pin SOP Package

Applications

- Portable Instrument
- ADSL Modem
- USB Devices

Pin Configurations

| Part Number | Pin Configurations |
|-----------------------------|--------------------|
| RT9264CS (Plastic SOP-8) | <p>TOP VIEW</p> |

Typical Application Circuit

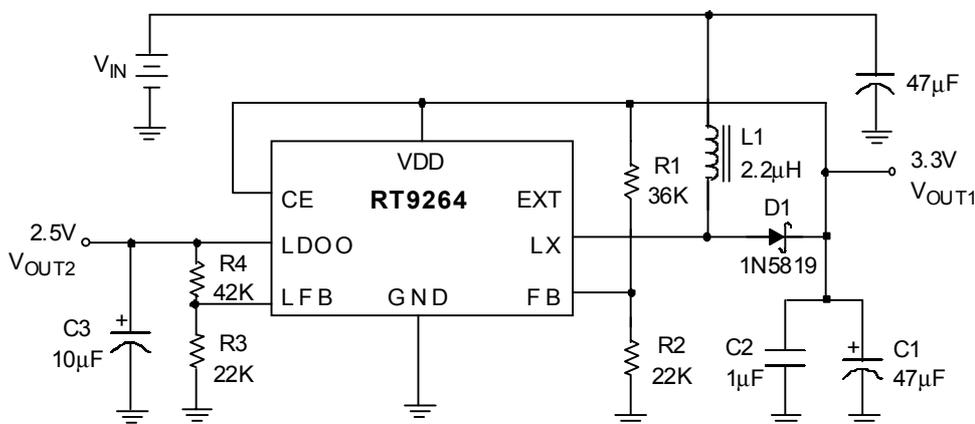


Fig. 1 RT9264 Typical Application for Portable Instruments

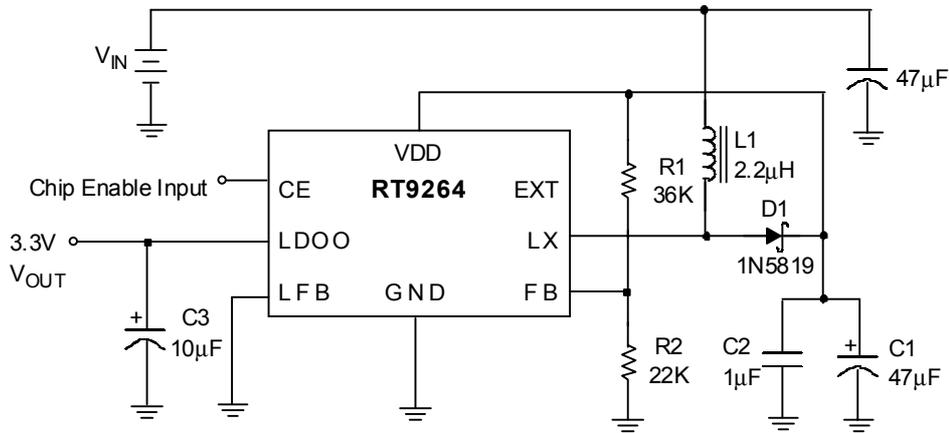


Fig. 2 Application Circuit with Zero-Output-Current Shutdown Mode Control

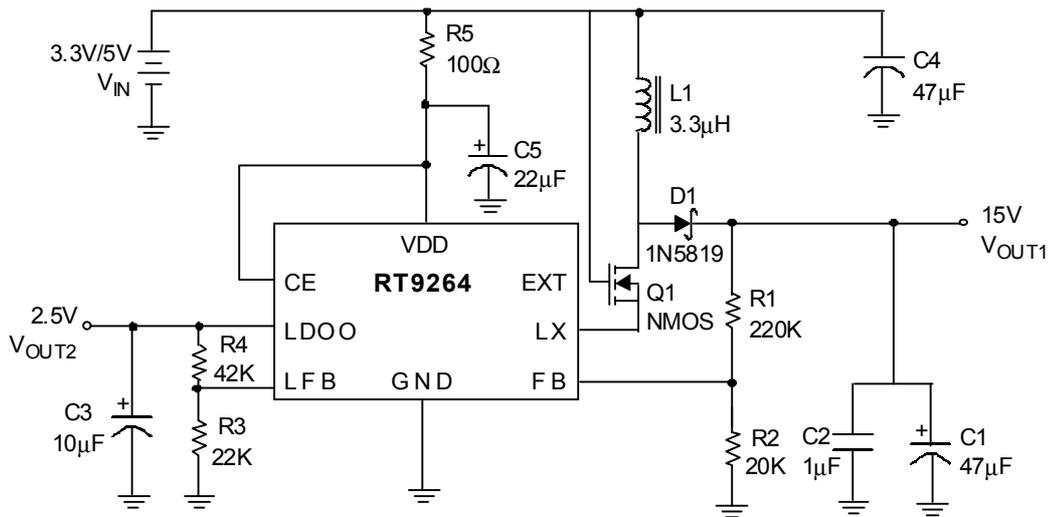
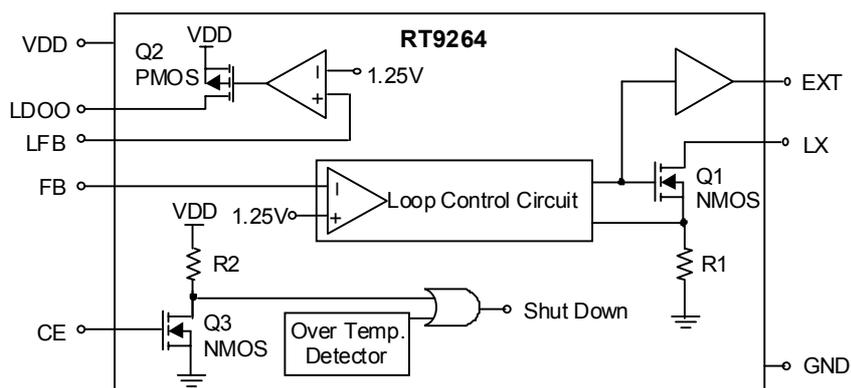


Fig. 3 High Voltage Application

Pin Description

| Pin No. | Pin Name | Pin Function |
|---------|----------|---|
| 1 | GND | Ground |
| 2 | EXT | Output pin for driving external NMOS or NPN When driving an NPN, a resistor should be added for limiting base current. |
| 3 | LFB | Feedback pin of the built-in LDO (Internal Vref = 0.86V) |
| 4 | LDOO | Voltage output pin of the built-in LDO |
| 5 | FB | Feedback input pin Internal reference voltage for the error amplifier is 1.25V. |
| 6 | VDD | Input positive power pin of RT9264 |
| 7 | LX | Pin for switching |
| 8 | CE | Chip enable RT9264 gets into shutdown mode when CE pin set to low. |

Function Block Diagram



Absolute Maximum Ratings

- Supply Voltage..... -0.3V to 6V
- LX Pin Switch Voltage -0.3V to (VDD + 0.8V)
- LDO Output Voltage -0.3V to (VDD + 0.3V)
- Other I/O Pin Voltages -0.3V to (VDD + 0.3V)
- LX Pin Switch Current 2.5A
- EXT Pin Driver Current 30mA
- Power Dissipation, P_D @ T_A = 25°C
 SOP-8 0.625W
- Package Thermal Resistance
 SOP-8, θ_{JA} 160°C/W
- Operating Junction Temperature 150°C
- Storage Temperature Range..... -65°C ~ +150°C

Electrical Characteristics

(V_{IN} = 3.3V, VDD set to 5V, Load Current = 0, T_A = 25°C, unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|--|-------------------------|---|-------|------|-------|--------|
| Operating VDD Range | V _{DD} | | 1 | -- | 6 | V |
| No Load Current I (V _{IN}) | I _{NO LOAD} | V _{IN} = 3.3V, V _{OUT} = 5V | -- | 3 | -- | mA |
| Switch-off Current I (VDD) | I _{SWITCH OFF} | V _{IN} = 6V | -- | 1 | -- | mA |
| Shutdown Current I (V _{IN}) | I _{OFF} | CE Pin = 0V, V _{IN} = 4.5V | -- | 0.1 | 1 | μA |
| Feedback Reference Voltage | V _{REF} | Close Loop, VDD = 3.3V | 1.225 | 1.25 | 1.275 | V |
| Feedback Reference Voltage for LDO | V _{REF} | Close Loop, VDD = 3.3V | 0.843 | 0.86 | 0.877 | V |
| Switching Rate | F _S | VDD = 5V | 1.4 | -- | 2.8 | MHz |
| Maximum Duty | D _{MAX} | VDD = 5V | -- | 80 | -- | % |
| LX ON Resistance | | VDD = 5V | -- | 0.25 | -- | Ω |
| Current Limit Setting | I _{LIMIT} | VDD = 5V | -- | 2 | -- | A |
| EXT ON Resistance to VDD | | VDD = 5V | -- | 30 | -- | Ω |
| EXT ON Resistance to GND | | VDD = 5V | -- | 20 | -- | Ω |
| Line Regulation | ΔV _{LINE} | V _{IN} = 3 ~ 4V, I _L = 1mA | -- | 20 | -- | mV/V |
| Load Regulation | ΔV _{LOAD} | V _{IN} = 3.3V, I _L = 1 ~ 50mA | -- | 0.5 | -- | mV/mA |
| LDO PMOS ON Resistance | | VDD = 5V | -- | 1 | 1.5 | Ω |
| LDO Drop Out Voltage | V _{DROP} | VDD = 5V, I _L = 100mA | -- | 70 | -- | mV |
| CE Pin Trip Level | | VDD = 5V | 0.2 | 0.8 | 1.4 | V |
| Temperature Stability for FB, LFB, LBI | T _S | Guaranteed by Design | -- | 50 | -- | ppm/°C |
| Thermal Shutdown | T _{SD} | Guaranteed by Design | -- | 165 | -- | °C |
| Thermal Shutdown Hysterises | ΔT _{SD} | Guaranteed by Design | -- | 10 | -- | °C |

Application Note

Output Voltage Setting

Referring to application circuits Fig.1 to Fig.3, the output voltage of the switching regulator (V_{OUT1}) can be set with Eq.1.

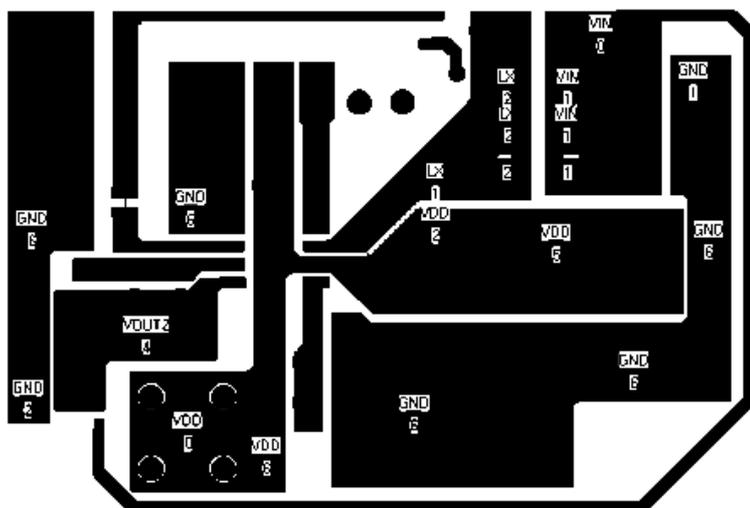
$$V_{OUT1} = \left(1 + \frac{R1}{R2}\right) \times 1.25V \quad \text{Eq.1}$$

$$V_{OUT2} = \left(1 + \frac{R4}{R3}\right) \times 0.86V \quad \text{Eq.2}$$

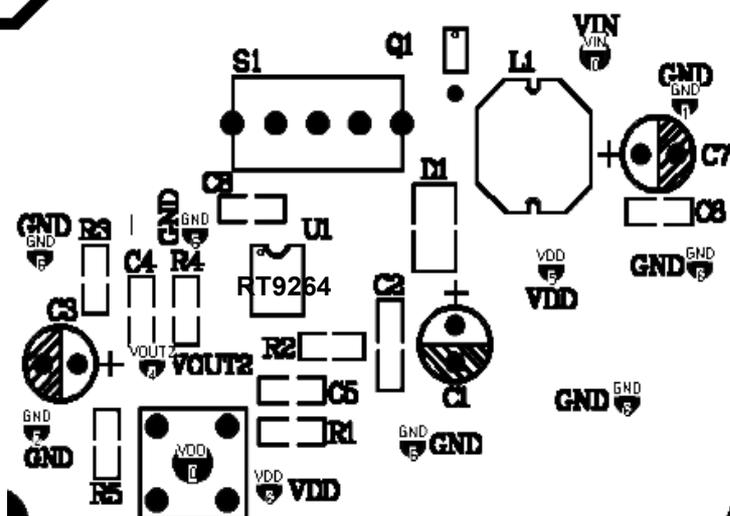
The LDO output voltage can be set with Eq.2.

Layout Guide

- A full GND plane without gap break.
- V_{OUT1} to GND noise bypass – Short and wide connection for C2 to Pin1 and Pin6.
- V_{IN} to GND noise bypass – Add a 100 μ F capacitor close to L1 inductor, when V_{IN} is not an idea voltage source.
- Minimized FB/LFB node copper area and keep far away from noise sources.
- Minimized parasitic capacitance connecting to LX and EXT nodes, which may cause additional switching loss.
- The following diagram is an example of 2-layer board layout for application circuits Fig.1 and Fig.2.

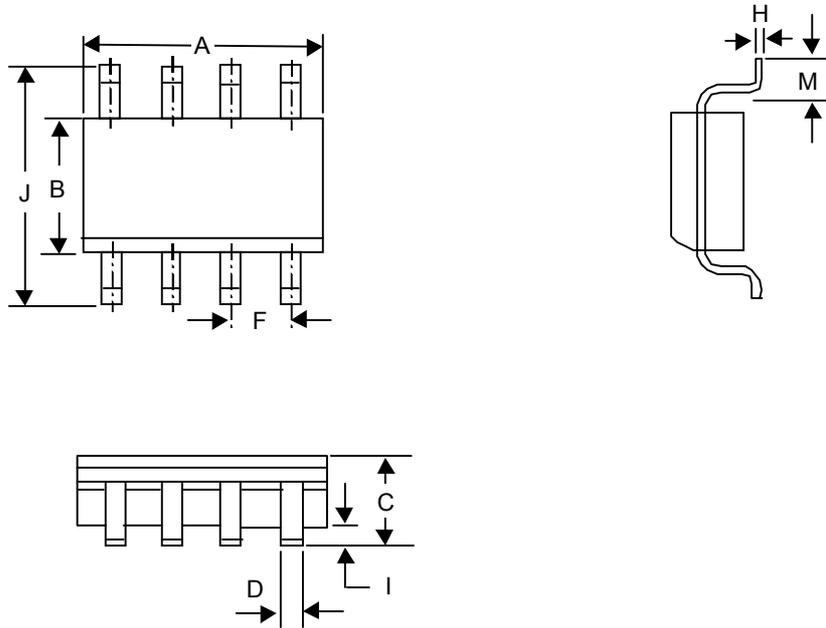


First Layer



Second Layer (Full GND Plane)

Package Information



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 4.801 | 5.004 | 0.189 | 0.197 |
| B | 3.810 | 3.988 | 0.150 | 0.157 |
| C | 1.346 | 1.753 | 0.053 | 0.069 |
| D | 0.330 | 0.508 | 0.013 | 0.020 |
| F | 1.194 | 1.346 | 0.047 | 0.053 |
| H | 0.178 | 0.254 | 0.007 | 0.010 |
| I | 0.102 | 0.254 | 0.004 | 0.010 |
| J | 5.791 | 6.198 | 0.228 | 0.244 |
| M | 0.406 | 1.270 | 0.016 | 0.050 |

8-Lead SOP Plastic Package

RICHTEK TECHNOLOGY CORP.

Headquarter

6F, No. 35, Hsintai Road, Chupei City

Hsinchu, Taiwan, R.O.C.

Tel: (8863)5510047 Fax: (8863)5537749

RICHTEK TECHNOLOGY CORP.

Taipei Office (Marketing)

8F-1, No. 137, Lane 235, Paochiao Road, Hsintien City

Taipei County, Taiwan, R.O.C.

Tel: (8862)89191466 Fax: (8862)89191465

Email: marketing@richtek-ic.com.tw