

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

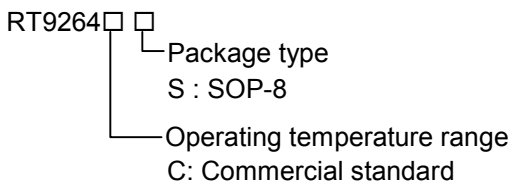
## General Description

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

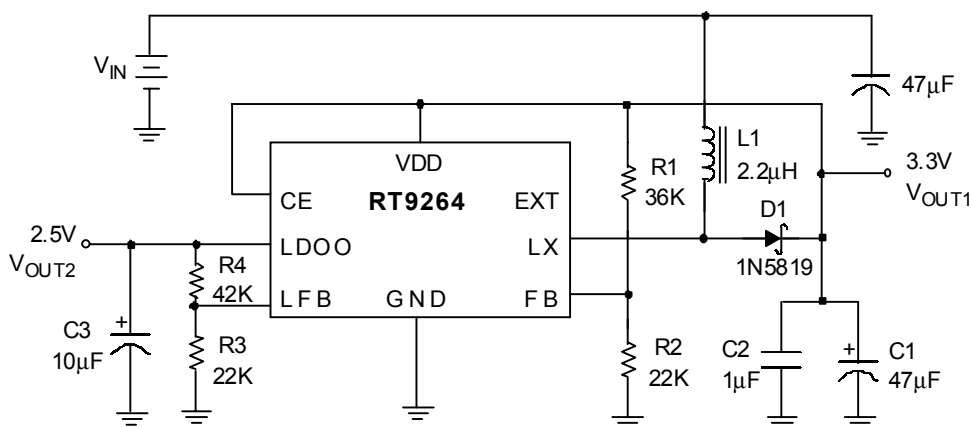
## Applications

- Portable Instrument
- ADSL Modem
- USB Devices

## Pin Configurations

Part Number	Pin Configurations
RT9264CS (Plastic SOP-8)	<p style="text-align: center;">TOP VIEW</p>

## Typical Application Circuit



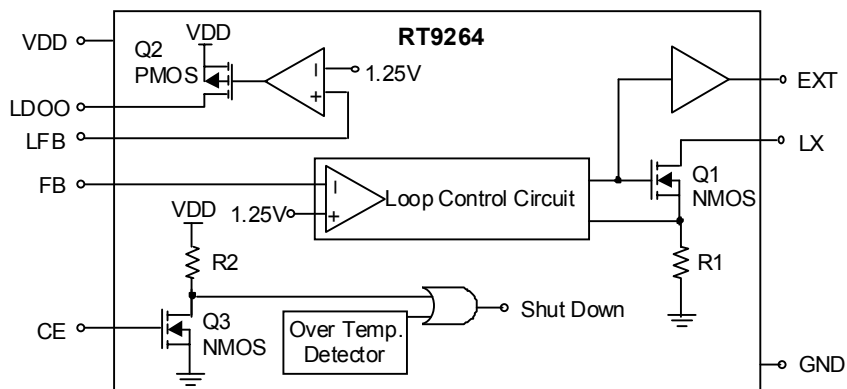
**Fig. 1 RT9264 Typical Application for Portable Instruments**



**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, $P_D$ @ $T_A = 25^\circ\text{C}$ SOP-8 .....	0.625W
• Package Thermal Resistance SOP-8, $\theta_{JA}$ .....	160°C/W
• Operating Junction Temperature.....	150°C
• Storage Temperature Range.....	-65°C ~ +150°C

## Electrical Characteristics

( $V_{IN} = 3.3\text{V}$ , VDD set to 5V, Load Current = 0,  $T_A = 25^\circ\text{C}$ , unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Operating VDD Range	$V_{DD}$		1	--	6	V
No Load Current I ( $V_{IN}$ )	$I_{NO\ LOAD}$	$V_{IN} = 3.3\text{V}$ , $V_{OUT} = 5\text{V}$	--	3	--	mA
Switch-off Current I (VDD)	$I_{SWITCH\ OFF}$	$V_{IN} = 6\text{V}$	--	1	--	mA
Shutdown Current I ( $V_{IN}$ )	$I_{OFF}$	CE Pin = 0V, $V_{IN} = 4.5\text{V}$	--	0.1	1	$\mu\text{A}$
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	--	$\Omega$
Current Limit Setting	$I_{LIMIT}$	VDD = 5V	--	2	--	A
EXT ON Resistance to VDD		VDD = 5V	--	30	--	$\Omega$
EXT ON Resistance to GND		VDD = 5V	--	20	--	$\Omega$
Line Regulation	$\Delta V_{LINE}$	$V_{IN} = 3 \sim 4\text{V}$ , $I_L = 1\text{mA}$	--	20	--	mV/V
Load Regulation	$\Delta V_{LOAD}$	$V_{IN} = 3.3\text{V}$ , $I_L = 1 \sim 50\text{mA}$	--	0.5	--	mV/mA
LDO PMOS ON Resistance		VDD = 5V	--	1	1.5	$\Omega$
LDO Drop Out Voltage	$V_{DROP}$	VDD = 5V, $I_L = 100\text{mA}$	--	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/ $^\circ\text{C}$
Thermal Shutdown	$T_{SD}$	Guaranteed by Design	--	165	--	$^\circ\text{C}$
Thermal Shutdown Hysterises	$\Delta T_{SD}$	Guaranteed by Design	--	10	--	$^\circ\text{C}$

**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.

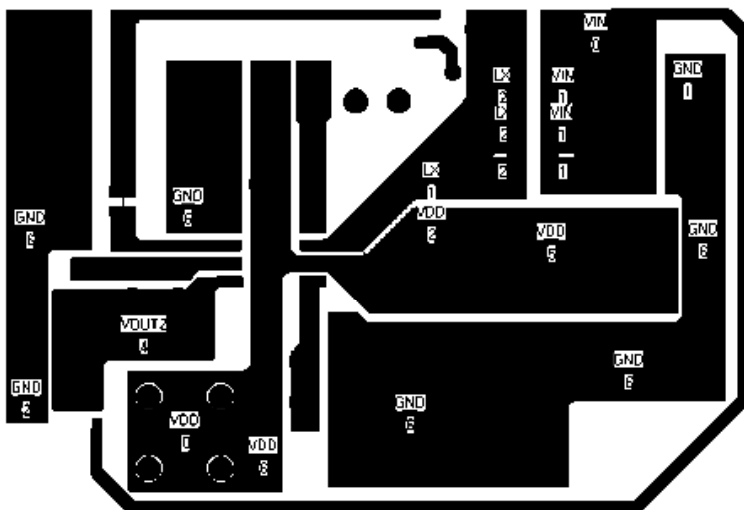
$$V_{OUT1} = \left(1 + \frac{R1}{R2}\right) \times 1.25V \quad \text{Eq.1}$$

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

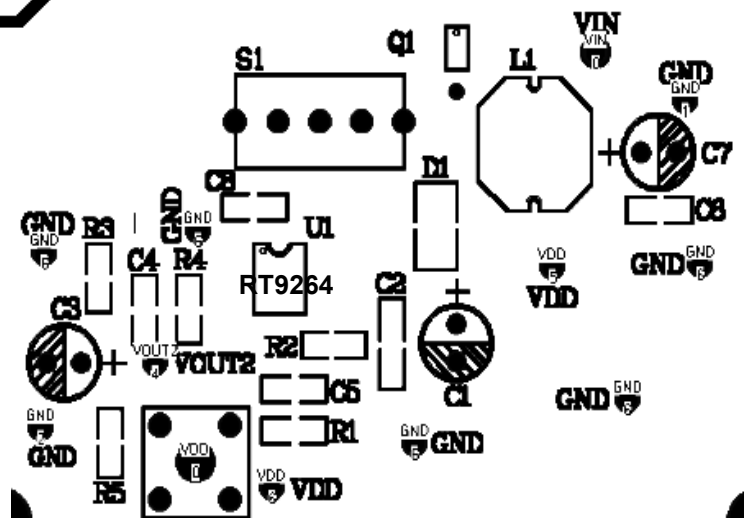
The LDO output voltage can be set with Eq.2.

**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 $\mu$ 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.

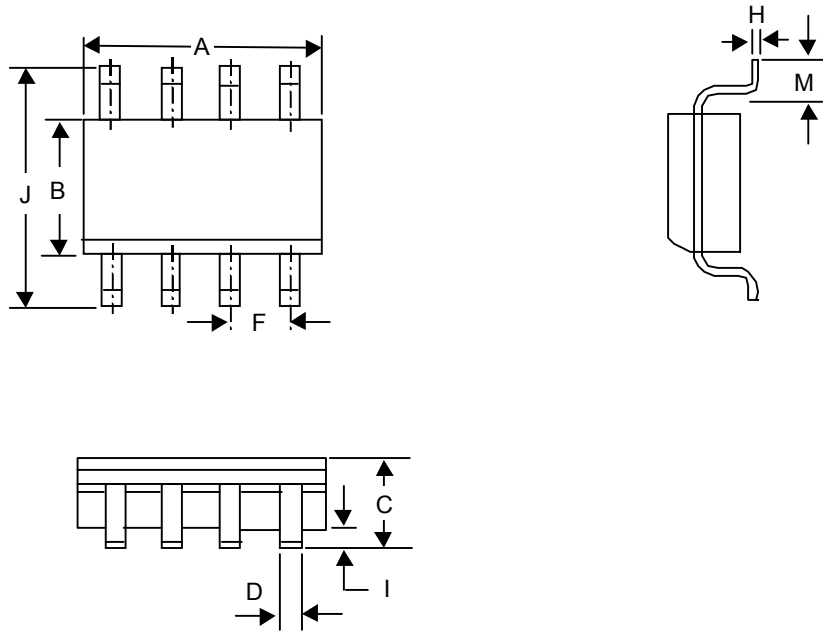


First Layer



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



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