Application Note

BRT_AN_004

FT93x RTC External Power Switch Circuit

Version 1.0

Issue Date: 2017-03-07

This application note describes implementing a simple circuit for the FT930/FT931 RTC external power supply switch. The Texas Instruments SN74AUC2G53 Single-Pole Double-Throw (SPDT) analog switch is used to select the power supplied by the 1.5V battery or by the 1.2V internal LDO.

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1 Introduction

The FT930/FT931 device contains an internal Real Time Clock (RTC) circuit with an external power pin (VDDBAT, PIN 63 of FT930 / PIN 54 of FT931). It is connected to a separate 1.5V battery or the chip's internal +1.2V regulator output (VCC1V2).

The RTC will run continuously after it is activated. The following conditions are required for the RTC to draw minimal power from the battery:

1. It is always powered.
2. Powered by VCC1V2 when the system is powered on.
3. Powered by the battery when the system is powered down.
4. It should not reset during a system power cycle (power on and off).
5. The switch circuit can operate at a low VCC with ultra-low power consumption.
6. The switch circuit has minimal voltage drop.

This application note describes an example external power switch circuit for the FT930/FT931 RTC.

2 Schematic and Circuit Description

2.1 Schematic

The RTC external power switch schematic is shown in Figure 2.1.

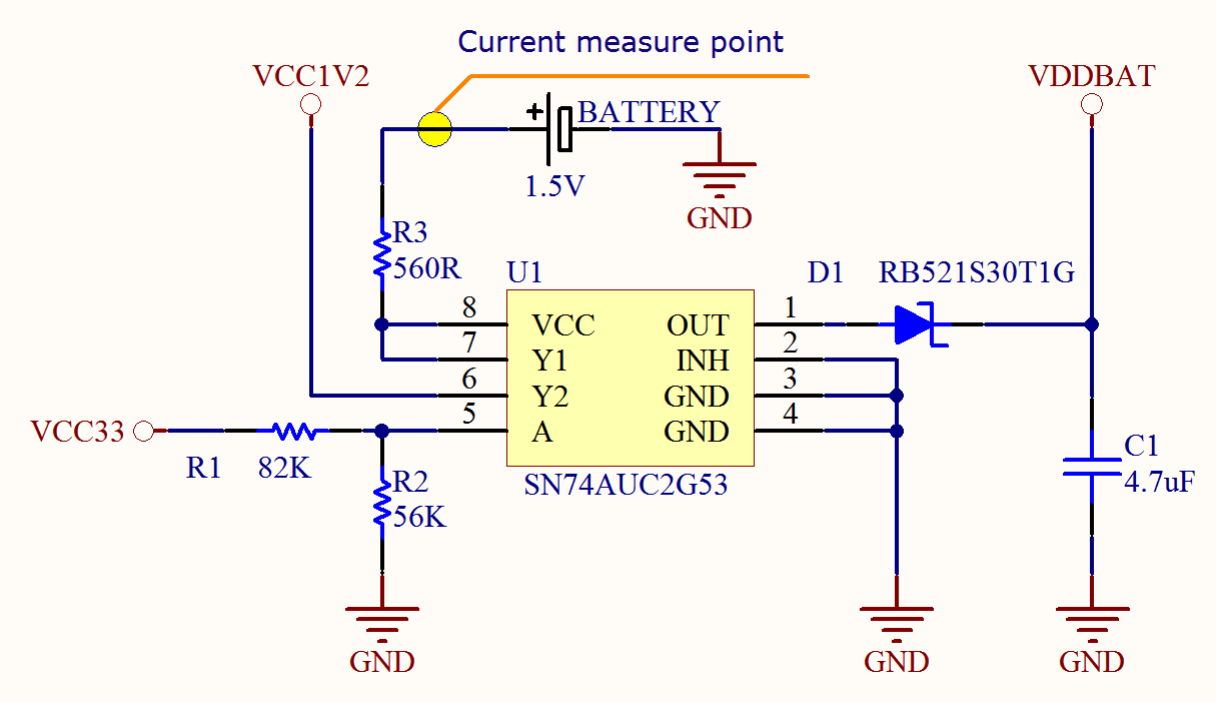

Figure 2.1 External Power Switch Circuit

2.2 Circuit Description

This circuit has two power source inputs (VCC1V2 and 1.5V Battery) and one output (VDDBAT). VCC33 is used as a control signal via the resistor divider circuit R1 and R2.

VCC1V2 is the internal regulator output of the FT930/FT931; it connects to VCC33 internally.

U1 is a Texas Instruments SN74AUC2G53 Single-Pole Double-Throw (SPDT) analog switch. It can operate from 0.8V to 2.7V with low power consumption. It can still operate if the battery voltage drops to 0.9V. Table 2.1 describes its function.

CONTROL INPUTS		ON CHANNEL
INH	A	
L	L	Y1 (Battery)
L	H	Y2 (VCC1V2)
H	X	None

Table 2.1 Function Table

U1 is powered by the battery. Pin 2 (INH) connects to ground; this pin is an active-low enable pin.

Pin 5 (A) is the input select pin, connects to the R1/R2 voltage divider which divides VCC33 the main power of the FT930/FT931 device. The voltage of pin 5 is around 1.5V after the divider, equals the VCC of U1.

Table 2.2 shows the output voltage (VDDBAT) when the FT930/FT931 system power (VCC33) turns on and off.

VCC33	A	VDDBAT
ON	H	VCC1V2
OFF	L	Battery

Table 2.2 VDDBAT Voltage

C1: Ceramic capacitor, capacitance is 2.2uF to 4.7uF. It maintains VDDBAT at the same level when VCC33 switches its voltage level.

D1: Low forward voltage schottky barrier diode. ON Semiconductor RB521S30T1G. This diode prevents VDDBAT discharge to the battery or VCC1V2 when VCC33 switches its voltage level.

R3: 560Ω resistor, it reduces U1's current draw and prevents ringing on VDDBAT when U1 is switching between its analog channels. It may be removed if an alternative part to U1 is used.

3 Power Consumption

Table 3.1 shows typical battery current consumption. The measurement point is the connection between the 1.5V battery and R3.

VCC33	A	Battery Current (uA)
ON	H	<1.0
OFF	L	9

Table 3.1 Battery Current

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Appendix A – References

Document References

FT93x Datasheet

U1 Datasheet: SN74AUC2G53

D1 Datasheet: RB521S30T1G

Acronyms and Abbreviations

Terms	Description
RTC	Real Time Clock
SPDT	Single-Pole Double-Throw

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Appendix C – Revision History

Document Title: BRT_AN_004 FT930 RTC External Power Switch Circuit
Document Reference No.: BRT_000078
Clearance No.: BRT#068
Product Page: http://brtchip.com/product
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Revision	Changes	Date
1.0	Initial Release	2017-03-07