

Introduction

Intersil has recently introduced the ISL12059 Real Time Clock (RTC) device. The device is pin-to-pin, and software compatible to the STMicro M41T00S and Maxim DS1340 RTCs. The ISL12059 has some advantages against the M41T00S and DS1340. These advantages include:

- Lower Operating, Standby and Timekeeping Current
- Power Failure Indicator

This Technical Brief provides information for an engineer wishing to use the ISL12059 to replace the M41T00S or DS1340 in their system.

Replacing the M41T00S with the ISL12059

The ISL12059 can drop into an M41T00S socket with no hardware and software changes required.

There are two differences that may affect hardware requirements. First, the M41T00S can operate at V_{DD} up to 5.5V, while the ISL12059 has an operating range of up to 3.6V. The ISL12059 allows SDA, SCL, FT/OUT to be pulled up to 5.5V.

A system that has the I²C lines pulled up to 5.5V (or other voltage higher than 3.6V), but has a 3.3V regulator on board requires a simple modification to connect the V_{DD} to 3.3V, instead of 5.5V. Figure 1 shows an example circuit with $V_{DD} = 3.3V$ and the I²C lines and FT/OUT pulled up to 5.5V.

A system that cannot connect V_{DD} to a voltage lower than 3.6V can use a Zener diode on the V_{DD} pin to lower the V_{DD} to 3.6V or below. Figure 2 shows an example circuit with a Zener diode to lower the 5.5V input voltage to 3.3V for V_{DD} .

The second difference that may affect hardware requirements is the ISL12059 does not offer battery back-up. A system requiring battery back-up can implement a slight hardware change and use a BAT54C Schottky Diode on V_{DD} to accept a regular input voltage and battery voltage. Figure 3 shows the example circuit of using the BAT54C on V_{DD} .

Replacing the DS1340 with the ISL12059

The ISL12059 can drop into an DS1340 8 Ld SOIC socket with no hardware and software changes required.

There are three differences that may affect hardware requirements.

First, the DS1340 offers three subsets that operate at different voltage levels. These voltage levels are: 1.8V, 3V and 3.3V. The ISL12059 can replace the 1.8V, 3V and 3.3V options. The 3.3V option can operate at V_{DD} up to 5.5V,

while the ISL12059 has an operating range up to 3.6V. The ISL12059 allows SDA, SCL, FT/OUT pull-up to 5.5V.

A system that has the I²C lines pulled up to 5.5V (or other voltage higher than 3.6V), but has a 3.3V regulator on board requires a simple modification to connect the V_{DD} to 3.3V instead of 5.5V. Figure 1 shows an example circuit with V_{DD} to 3.3V and I²C lines and FT/OUT pull-up to 5.5V.

A system that cannot connect V_{DD} to a voltage lower than 3.6V can use a Zener diode on the V_{DD} pin to lower the V_{DD} to 3.6V or below. Figure 2 shows an example circuit with Zener diode to lower the 5.5V input voltage to 3.3V for V_{DD} .

The second difference that may affect hardware requirement is the ISL12059 does not offer battery back-up. A system requiring battery back-up can implement a slight hardware change, and use a BAT54C Schottky Diode on V_{DD} to accept a regular input voltage and battery voltage. Figure 3 shows the example circuit of using the BAT54C on V_{DD} .

The DS1340 has battery charging function, and the ISL12059 does not provide battery charging function.

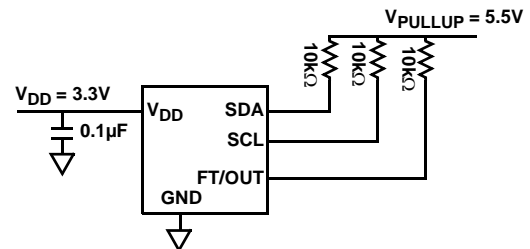


FIGURE 1. EXAMPLE CIRCUIT WITH V_{DD} AT 3.3V AND I²C AND IRXQ PULL-UP TO 5.5V

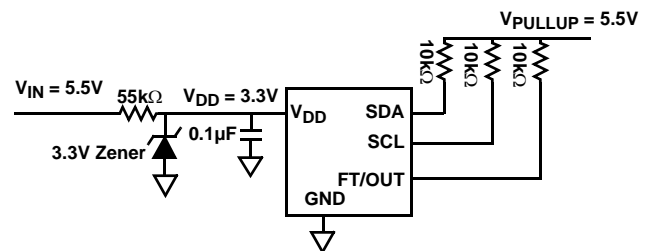


FIGURE 2. EXAMPLE CIRCUIT WITH ZENER DIODE ON V_{DD} TO REDUCE INPUT VOLTAGE TO 3.3V

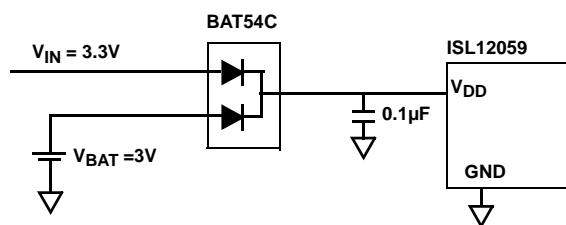


FIGURE 3. EXAMPLE CIRCUIT FOR SYSTEM REQUIRING BATTERY BACKUP BY USING BAT54C ON V_{DD}

TABLE 1. REPLACING THE M41T00S AND DS1340 WITH ISL12059

FUNCTION	M41T00S			DS1340-3			M41T00S			AFFECTS SOFTWARE?
	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
Supply Voltage	2.7V		5.5V	2.7V		3.3V	1.4V		3.6V	NO
Operating Current			300µA		108µA	200µA		15µA	40µA	NO
Standby Current			70µA		81µA	125µA		0.5µA	0.95µA	NO
Timekeeping Current @ 3.3V		0.8µA	1µA		0.8µA	1µA		0.6µA	0.95µA	NO

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