

Replacing the Maxim DS1337 RTC with the ISL12057

TB480
Rev 0.00
June 9, 2009

Introduction

Intersil has recently introduced the ISL12057 Real Time Clock (RTC) devices. The device is pin-to-pin (8 Ld SOIC and 8 Ld MSOP package) and software compatible to Maxim DS1337 RTC. In fact, the ISL12057 is an enhancement because it provides:

- Fixed Default Register Values at Power-up
- Flexible Alarm Selection
- Stable Frequency Output vs V_{DD}
- Smaller Package Option - 2mmx2mm μ TDFN (Tiniest RTC available in the market)

The features are detailed in the data sheets. This Technical Brief provides information for an engineer wishing to use the ISL12057 to replace the DS1337 in their system.

Replacing the DS1337 with the ISL12057

The ISL12057 can drop into a DS1337 socket with no hardware and software changes required.

There is one difference that may affect hardware requirements. The DS1337 can operate at V_{DD} up to 5.5V, while the ISL12057 has an operating range up to 3.6V. The ISL12057 allows SDA, SCL, IRQ1 and IRQ2 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} to 3.3V and I²C lines and IRQx pulled up to 5.5V

A system that cannot connect V_{DD} to voltage lower than 3.6V can use a Zener diode on 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} .

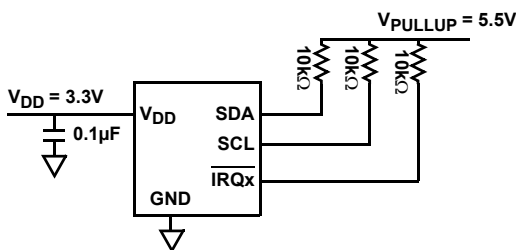


FIGURE 1. EXAMPLE CIRCUIT WITH V_{DD} AT 3.3V AND I²C AND IRQx PULLED UP TO 5.5V

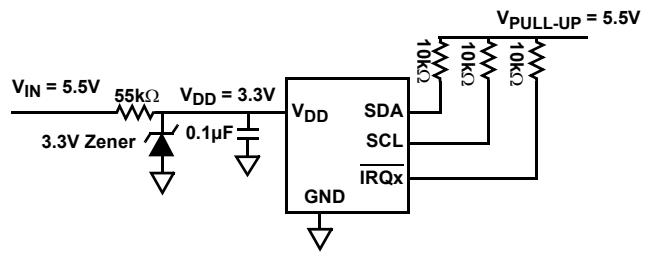


FIGURE 2. EXAMPLE CIRCUIT WITH ZENER DIODE ON V_{DD} TO REDUCE INPUT VOLTAGE TO 3.3V

Advantage on Using ISL12057 vs DS1337

The ISL12057 has a fixed default register value at power-up so a system can easily check for a power failure condition by examination the register value versus the default value.

The ISL12057 has a flexible alarm selection for the two alarms versus the fixed alarm selections for the DS1337. For Alarm1, the ISL12057 has a total of 24 alarm selections. For Alarm2, the ISL12057 has a total of 12 alarm selections. The Alarm can be set to any Clock/Calendar value for a match. For example, every minute, every Tuesday or at 5:23 AM on 1st day of a month.

The ISL12057 has more stable frequency output versus V_{DD} than the DS1337. Figure 3 shows the 32.768kHz F_{OUT} vs V_{DD} for ISL12057 and DS1337. As the graph shows, the ISL12057 32.768kHz F_{OUT} is flat across V_{DD} but the DS1337 has a linear slope on the 32.768kHz F_{OUT} across V_{DD} .

The ISL12057 has the 8 Ld SOIC and MSOP package that are pin-to-pin compatible to the DS1337. In addition to the SOIC and MSOP packages, the ISL12057 offers the tiniest 2mmx2mm μ TDFN package. A standard 8 Ld SOIC package occupies approximately 29.4mm² (4.9mmx6mm) of board space, and a standard 8 Ld MSOP package occupies approximately 14.7mm² (3mmx4.9mm) of board space. The ISL12057 2mmx2mm μ TDFN package only occupies 4mm² (2mmx2mm) of board space, which is equal to 86% space saving versus the 8 Ld SOIC package and 72% space saving versus the 8 Ld MSOP package. Figure 4 shows the package dimension for μ TDFN, MSOP, and SOIC.

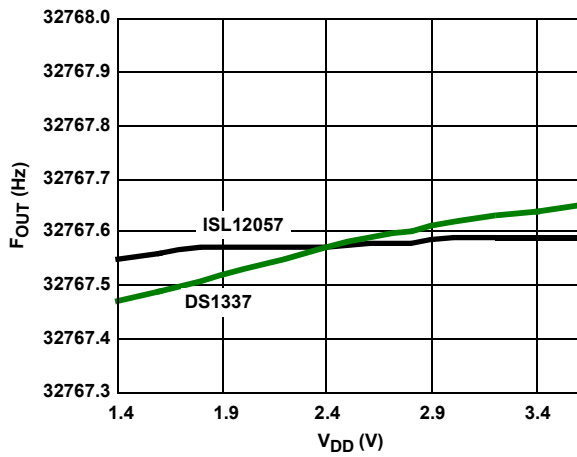


FIGURE 3. F_{OUT} vs V_{DD}

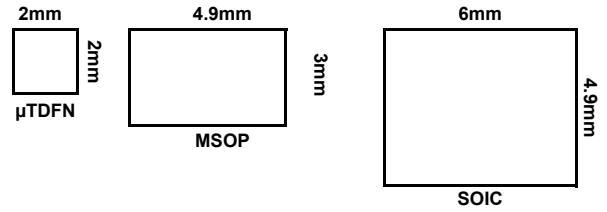


FIGURE 4. PACKAGE DIMENSION (NOT ACTUAL SIZE)

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(Rev.4.0-1 November 2017)



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