**APPLICATION NOTE**

**The S²Cwire Serial Digital Interface in Real-Time Systems**

**Introduction**

The Simple Serial Control single wire (S²Cwire™) and Advanced Simple Serial Control single wire (AS²Cwire™) interfaces are used to set parameters in many Skyworks products.

Parameters that can be programmed using the S²Cwire or AS²Cwire interfaces include setting current levels in LED driver I/Cs, programming battery characteristics in battery chargers, or controlling the on/off state of load switches in a multi-output load switch. A single microcontroller I/O port typically serves as the S²Cwire interface driver, as shown by the application circuit for the AATA3123 Fractional Charge Pump in Figure 1.

This Application Note describes a timing issue that must be considered when the S²Cwire or AS²Cwire interface is applied to real-time or human interface systems.

**Application Problem**

When a high priority interrupt occurs during S²Cwire data transfer, the transfer may be corrupted if the interrupt halts I/O activity during the logic low state for a period of time longer than tEN/SET_LO (75 μs).

**Application Solution**

The high-speed ability of the S²Cwire interface can be used, along with interrupt masking, to ensure proper operation of the interface. When operated at high speed, operation of the S²Cwire interface would not typically interfere with human interface operations. A high rate S²Cwire clock cycle lasts for no more than 350 ns. Applying this timing for setting the maximum LED brightness in the LED application requires only 31 x 350 ns, or 10.85 μs.

If interrupts are masked for this period of time, proper transfer is ensured. This delay is insignificant compared to answering calls, making calls, entering numbers, or other human interface functions performed in a cell phone application.

The philosophy of the S²Cwire interface is to perform an operation as quickly as possible to set a given level or option, and then leave it. Refer to Figures 2 and 3 for S²Cwire timing.

In the case of the AS²Cwire interface, where an address accompanies a data burst (if necessary), interrupts may be masked and unmasked to accommodate the time associated with latching the address. For example, interrupts are masked during a 500 μs tLAT timeout. See Figure 4.

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**Figure 1: S²Cwire Application Circuit**
Figure 2: S²Cwire Timing

Figure 3: Interrupt Masking for S²Cwire Data Burst

Figure 4: Interrupt Masking for AS²Cwire Data Burst

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