All Window–Watchdog Supervisors

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ABSTRACT

This application report presents the configuration of the window–watchdog in a supervisor circuitry. The report presents analysis for various window settings and their worst-case scenarios.

1 Introduction

The configuration of the window–watchdog in a supervisor is realized by examining the different components of the window–watchdog, the different possible settings, and the calculations required to analyze the worst-case scenario.

For example, the TPS3813 supervisor was used to analyze the different settings of the window–watchdog and their worst-case scenario.

2 Watchdog – Window Settings

In supervisors with window–watchdog circuitry, the window–watchdog can be implemented by wiring pins WDT and WDR to the V_{DD} or the ground pins. Four different timings are available with four different combinations for the TPS3813, as shown Table 1.

Table 1 contains different combinations of operation mode (WDT, WDR), along with their corresponding window frame and lower window frame for TPS3813.

Table 1. Different Combinations of Operation Mode (WDT, WDR)

		Window Frame (s)	Lower Window Frame (ms)
WDT = 0	WDR = 0	0.3	9.46
		0.25	7.86
		0.2	6.27
	WDR = V_{DD}	0.3	2.43
		0.25	2
		0.2	1.58
WDT = V_{DD}	WDR = 0	3	93.8
		2.5	78.2
		2	62.5
	WDR = V_{DD}	3	23.5
		2.5	19.6
		2	15.6

Table 1 can be better understood using Figure 1. The figure displays the possible ranges of the window frame for the case where WDT = WDR = 0 V. As can be deduced from the figure, the next WDI pulse must occur between 9.46 ms to 209.46 ms to prevent the circuit from resetting. Calculation of these values is explained in the next section.

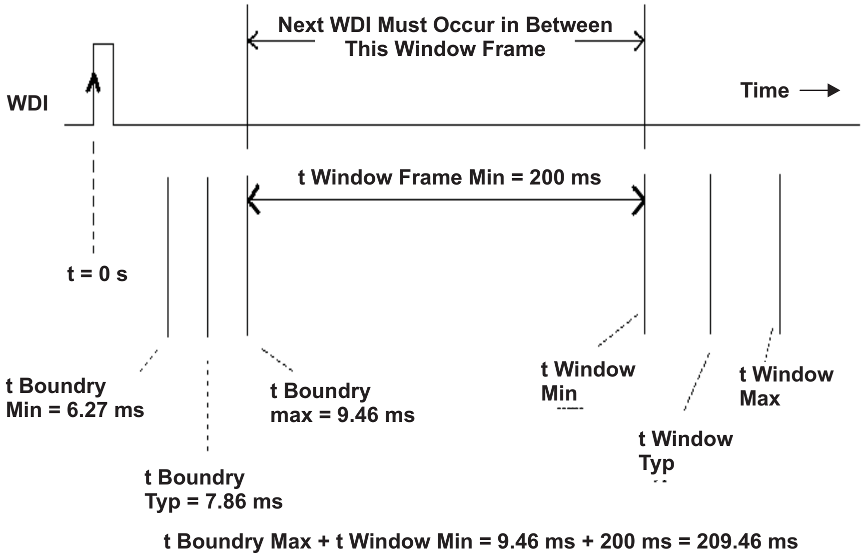

Figure 1. For the Case Where WDT = WDR = 0 V (TPS3813)

3 Window–Watchdog Calculations

The worst-case scenario is configured using the maximum value for the lower window boundary and the minimum value for window frame length giving the worst-case window frame range within which the WDI pulse needs to trigger in order to avoid resetting the system. For TPS3813, consider the case where WDT = WDR = 0 V. The maximum lower window boundary is 9.46 ms and the minimum window frame length is 200 ms. Hence, the worst-case scenario range for the WDI pulse to trigger is from 9.46 ms to 209.46 ms (9.46 ms + 200 ms) after the rising edge of the last WDI.

Table 2 shows different combinations of operation mode (WDT, WDR), along with their corresponding worst-case ranges for the window frame for TPS3813.

Table 2. Different Combinations of Operation Mode (WDT, WDR)

Worst-Case Scenario			
		Range of Window Frame	
		Maximum Lower Limit (ms)	Minimum Upper Limit (ms)
WDT = 0	WDR = 0	9.46	209.46
	WDR = V_{DD}	2.43	202.43
WDT = V_{DD}	WDR = 0	93.8	2093.8
	WDR = V_{DD}	23.5	2023.5

After the reset pin of the supervisor is released during power up, the lower boundary of the first WDI window is disabled. This aforementioned condition helps generate a window without a lower boundary giving the system a wider range of time to produce the first WDI pulse. The wider range of window frame is needed to counteract for the systems (perhaps processors) that are powered up quicker than the lower boundary limit, producing the first WDI before the lower boundary is reached. After the first WDI pulse (rising edge) is detected, the lower boundary of the window frame is enabled. Thereafter, all rising edges of WDI pulses need to be detected within the predetermined window frame.

4 Conclusion

The configuration of the window–watchdog is realized by examining the different components of the window–watchdog and the calculations required to analyze the worst-case scenario. In summary, this application report helps to understand the calculation of window–watchdog frame in an SVS.

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