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THIS SPEC IS OBSOLETE

Spec No: 002-04934

Spec Title: AN204934 - Note on Calculating Reload Values FFMC8L

Replaced by: None

Note on Calculating Reload Values FFMC8L

This application note describes how to generate circular interrupts with a fixed reload time and also shows how to calculate the correct reload value taking in account the produced extra code.

1 Introduction

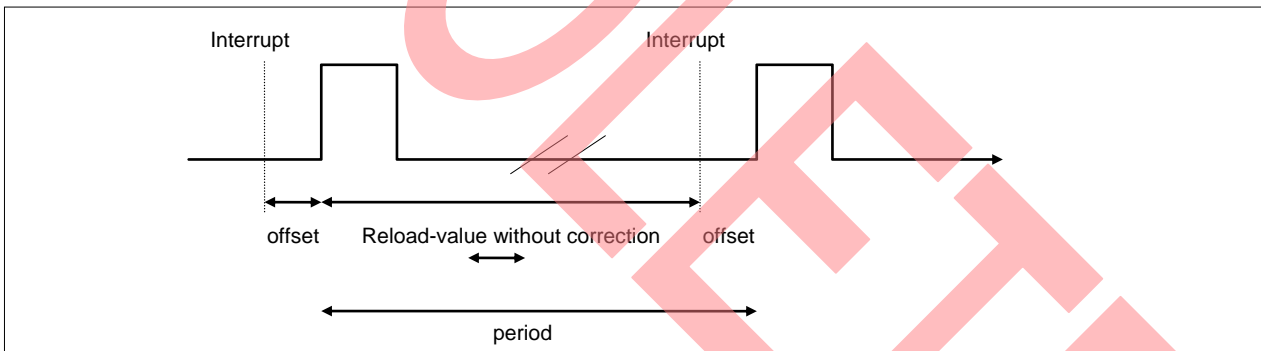
When using timers in reload mode, the main intention is to generate circular interrupts with a fixed reload time. But when interrupt service routines are called, a certain overhead will be produced by the compiler (context save!). This note shows how to calculate the correct reload value taking in account the produced extra code.

2 Calculating Reload Values FFMC8L

In this example, a rectangular signal with a frequency of 1,5 kHz should be produced on pin 40. The reload value has to be calculated to obtain this period. The positive width of the signal is fixed and much smaller than the period itself.

The diagram below shows the signal and the ISR procedure: When the interrupt is signaled and processed immediately, which would assume a certain priority and no other interrupt currently active, the context will be saved on the stack after the ISR-subroutine is called. This context save is produced by the compiler. After that the intended tasks can be processed – in this case a signal on pin 40 with a definite width.

Figure 1. Producing a signal on pin 40 using a 16-bit(reload)-timer interrupt



In the produced code, the offset (due to calling ISR and context save) takes 64 cycles (40_{hex}) which must be included in the calculation :

$$Reload = FFFF_{hex} - (f_c / (4 f_{int})) + 40_{hex} \quad \text{mit : } \begin{array}{l} f_c : \text{Quartzfreq.} \\ f_{int} : \text{Interruptfreq.} \end{array}$$

In this example: With $f_c = 10 \text{ MHz}$ and $f_{int} = 1500 \text{ Hz}$: $Reload = F9BD_{hex}$

2.1 Interrupt-Service Routine 16-bit-Timer:

(C-Source-code printed bold)

before calling ISR : finish actual command and save PS and address on stack approx. 10-14 cycles

220: void TC16INT6()

221: {

C2BA: 40 PUSHW	A	4
C2BB: 43 XCHW	A,T	2
C2BC: 40 PUSHW	A	4
C2BD: F3 MOVW	A,EP	2
C2BE: 40 PUSHW	A	4
C2BF: 41 PUSHW	IX	4
C2C0: F1 MOVW	A,SP	2
C2C1: E2 MOVW	IX,A	2
C2C2: 08 MOV	A,R0	3
C2C3: 10 SWAP		2
C2C4: 09 MOV	A,R1	3
C2C5: 40 PUSHW	A	4

222: TMCR = 0x22; /* Int enable again */

C2C6: 851822 MOV	18,#22	4
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223: TCHR = 0xF6; /* Reload value */

C2C9: 8519F6 MOV	19,#F6	4
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224: TCLR = 0x3B;

C2CC: 851A3B MOV	1A,#3B	4
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225: TCS = 1; /* start counter again */

C2CF: A818 SETB	18:00	4
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64 cycles

226: PDR4_0 = 1; /* show pulse on PIN 40 */

C2D1: A80F SETB	0F:00	
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227: wait(20);

C2D3: E40014 MOVW	A,#0014	
C2D6: 40 PUSHW	A	
C2D7: 31C04B CALL	\wait	
C2DA: 50 POPW	A	

228: PDR4_0 = 0;

C2DB: A00F CLR	B 0F:00	
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229:}

C2DD: 50 POPW A
2DE: 49 MOV R1,A
2DF: 10 SWAP
2E0: 48 MOV R0,A
2E1: F2 MOVW A,IX
2E2: E1 MOVW SP,A
2E3: 51 POPW IX
2E4: 50 POPW A
2E5: E3 MOVW EP,A
2E6: 50 POPW A
2E7: 43 XCHW A,T
2E8: 50 POPW A
2E9: 30 RETI

Document History

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Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	—	WOFR	02/20/2014	Initial release.
*A	5235611	WOFR	04/22/2016	Migrated Spansion Application Note from MCU-AN-389012-E-V10to Cypress format. This AN to be Obsolete, since this is the old 8-bit MCU

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