

NEC

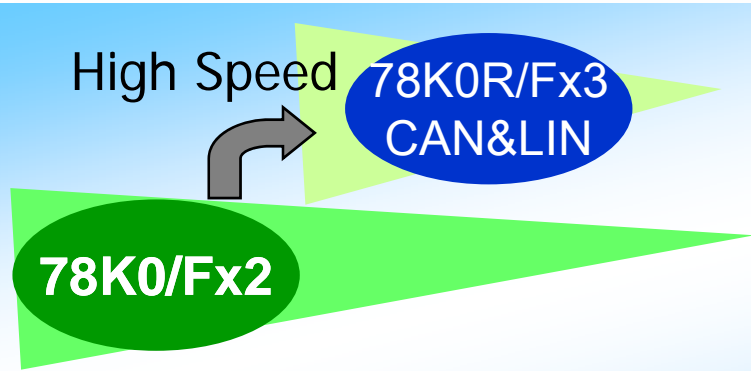
New 8bit microcomputer
78K0/Fx2-L



NEC Electronics America
Automotive SBU

78K serious Road Map

For C A N
27 products



256K	K0R/Fx3				16
192K					
128K	8	7 8	7 8	8	8
96K	6	5 6	5 6	6	6
60/64K	3 4	3 4	3 4	4	4
48K	3	3			
32K	2		K0/Fx2		
	48pin	64pin	80pin	100pin	

For L I N
61 products



128K			K0R/Fx3				7 8	7 8	7 8
96K						5 6	5 6	5 6	
60/64K			3 4	4		3 4	3 4	3 4	
48K			2 3	3		2 3	2 3	2	
32K			1 2	2	1	1 2	1 2		
24K			K0/Fx2-L		1	1 1.5	1		
16K	512	512	766	768		768	768	768	
8K	512	512	512	512				K0/Kx2	
4K	384	384							
	16 pin	20 pin	30pin	38/40pin	44pin	48pin	64pin	80pin	

Low Pin Count series : 78K0/Fx2-L

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LIN communication is possible

New

●Main feature

Low Power Current for eco

260uA @1MHz (Internal OSC4MHz/4) RUN

0.7uA @Halt mode + Internal 30KHz

0.3uA @Stop mode + POC

Selectable Internal OSC

4MHz or **8MHz**

Built-in PLL

20MHz RUN is possible without external OSC

High temperature Ta=125°C (Target)

Good Peripheral

LIN-UART, ADC, Comparator, WWDT, LVI/POC

●Target application

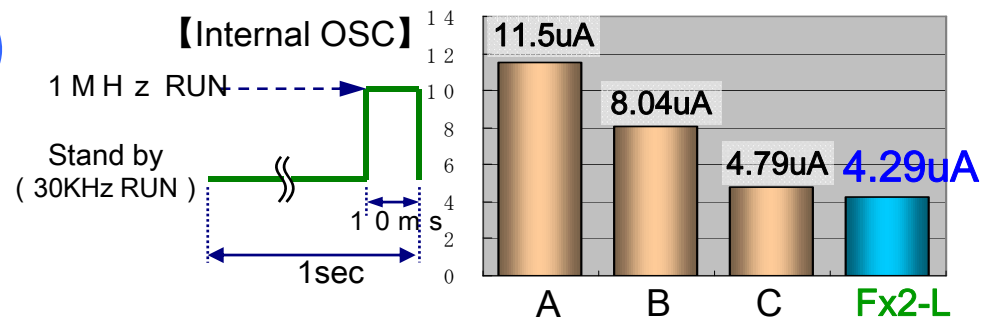
Power Window, Mirror control
SW Input, Panel control,
Lighting, RKE, etc

●Memory Line up

Flash	16K	512	512	768
	8K	512	512	512
	4K	384	384	
RAM		16pin	20pin	30pin

※LIN library = 4KB

●Power consumption Benchmark



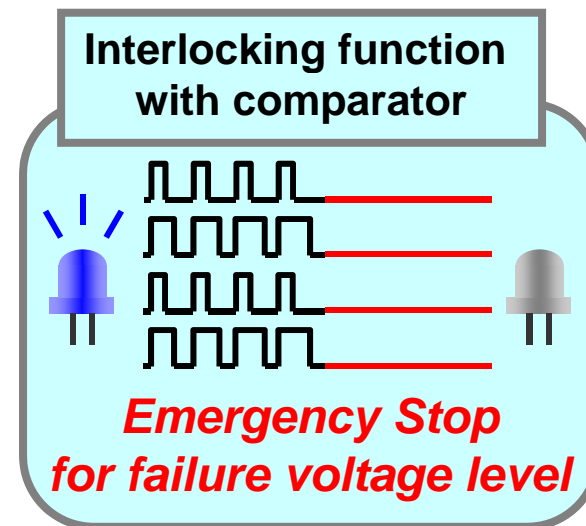
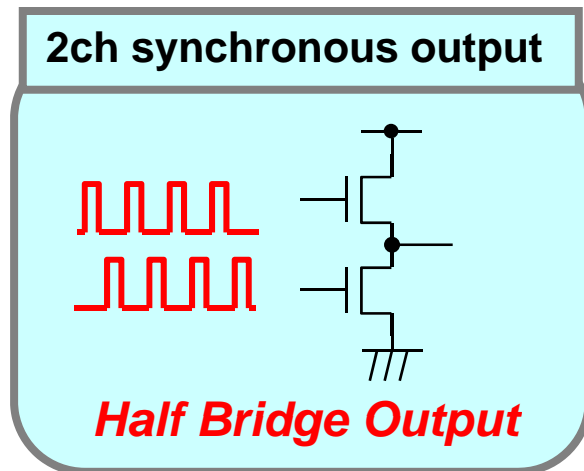
Specification

		78K0/FY2-L	78K0/FA2-L	78K0/FB2-L
		16pin	20pin	30pin
Flash		4K/8K/16K		8/16K
RAM		384/512/768		512/768
System Clock	Internal	4MHz ± 2% (Ta=-40~?°C) or 8MHz ± 5% (Ta=-40~?°C)		
	External	2MHz~20MHz		
PLL		PLL (x10)		
WDT /TM Clock		Internal OSC 30KHz (TYP.)		
I/O		I/O:9 I:3	I/O:13 I:3	I/O:22 I:3
Timer	16bit TMX	-	1ch (2 PWM outputs)	
	16bit TMO	1ch		
	8bit	TM5:1ch, TMH:1ch		
	WDT	1ch		
Serial I/F		UART/I2C 1ch (LIN)		UART/I2C 1ch (LIN) CSI:1ch
10bit A/D	Chanel	4ch	6ch	9ch
	Speed	2.7 V ≤ AVREF < 4.0 V 4.4us		
Comparator		1ch	3ch	
Calculation		8bit x 8bit, 16bit x 16bit		
Other		POC, LVI		
VDD		VDD = 1.8V~5.5V		
Operation Temp		(A) -40~85°C (A2) -40~125°C		

What is the 16bit PWM Timer X?

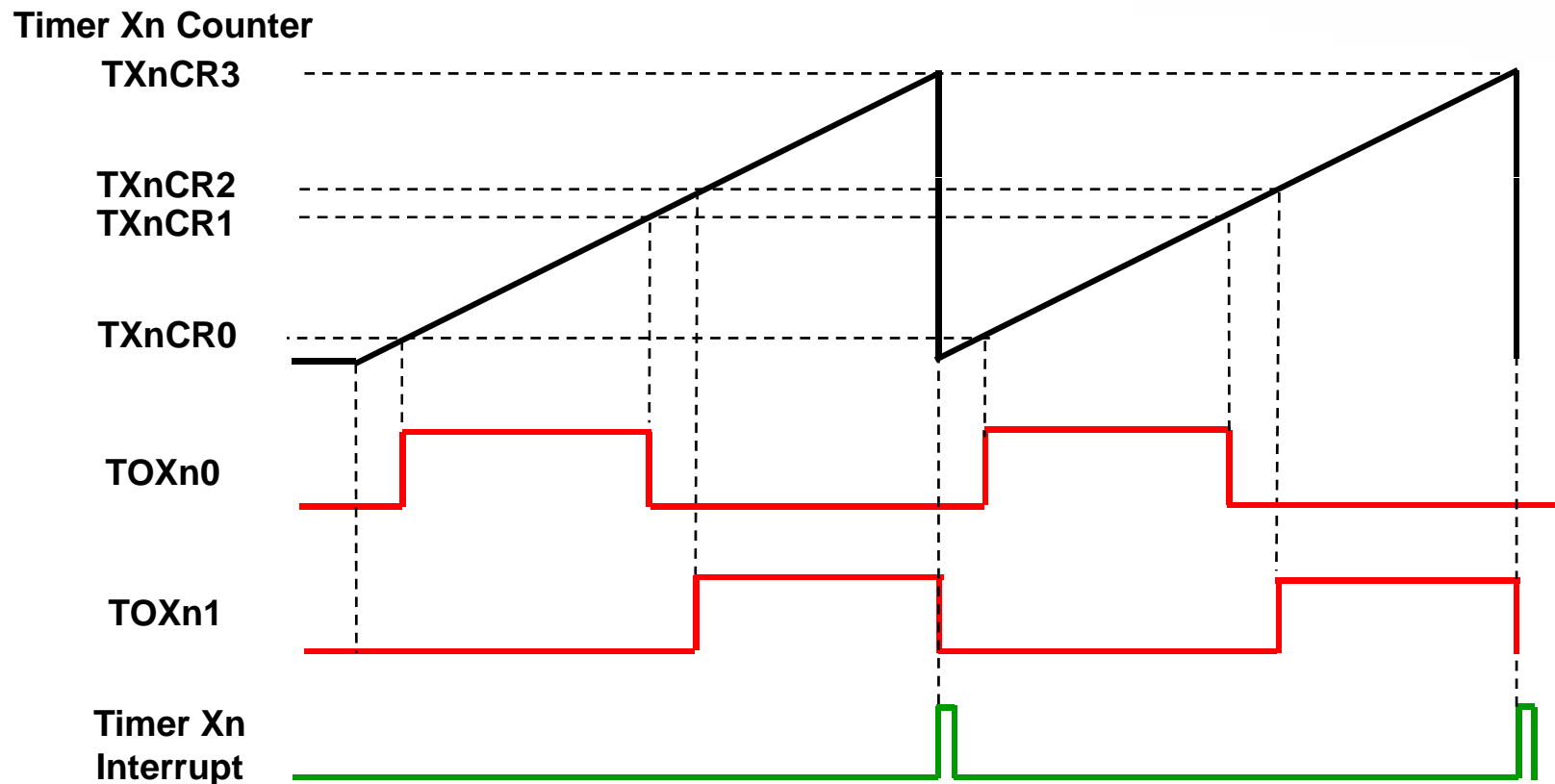
function	general-purpos timer (16bit timer 0)	PWM timer for lighting (16bit timer X)
output channel / timer	1ch	2ch
duty change during timer operation	△	○
cycle change during timer operation	×	○
interlocking function with comparators	×	○
interlocking function with other timer	×	○

Application:



16bit PWM Timer X specific Function (1)

- Possible to generate 2-phase PWM with dead time by using 4 compare registers and 2 output ports.
- Freq./Duty can be changed while timer operating.

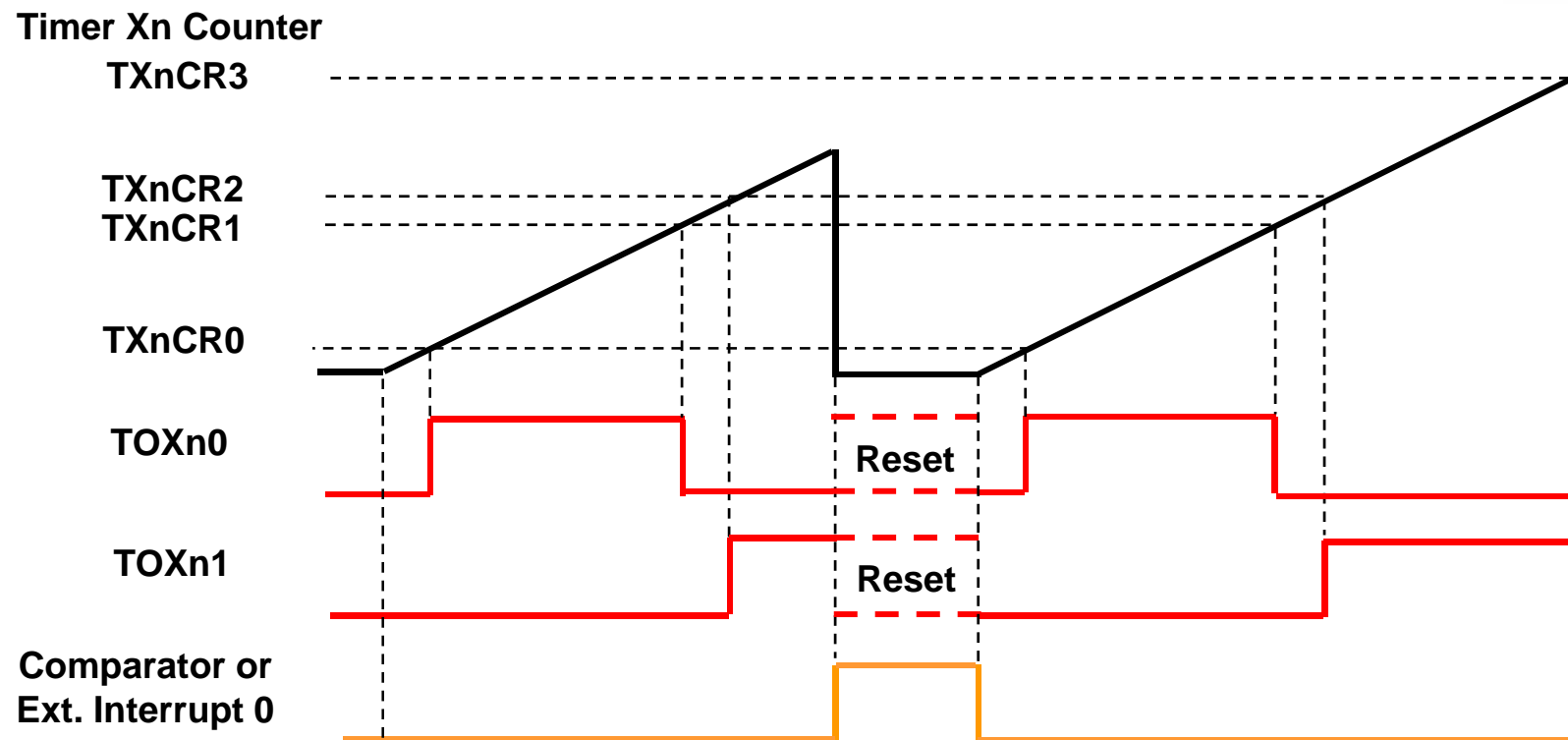


Application: Half-bridge output

16bit PWM Timer X specific Function (2)

- Support “Emergency PWM stop” by selecting interlock function with comparators or INTP0.

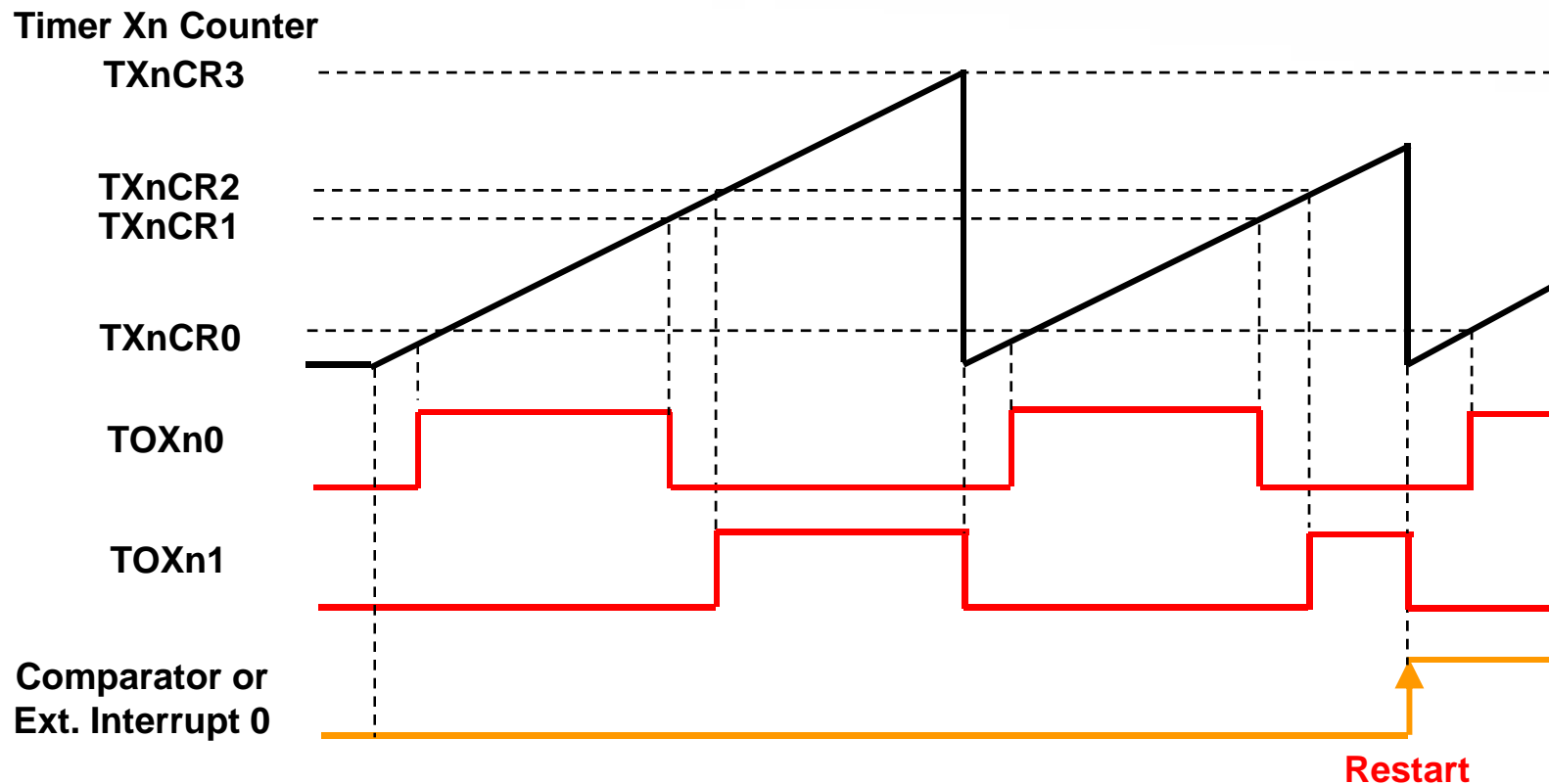
In this case, PWM output keep reset level during the comparator output is active level, and Timer X restart it's count operation after the signal become inactive level.



Application: Emergency stop for over voltage or current

16bit PWM Timer X specific Function (3)

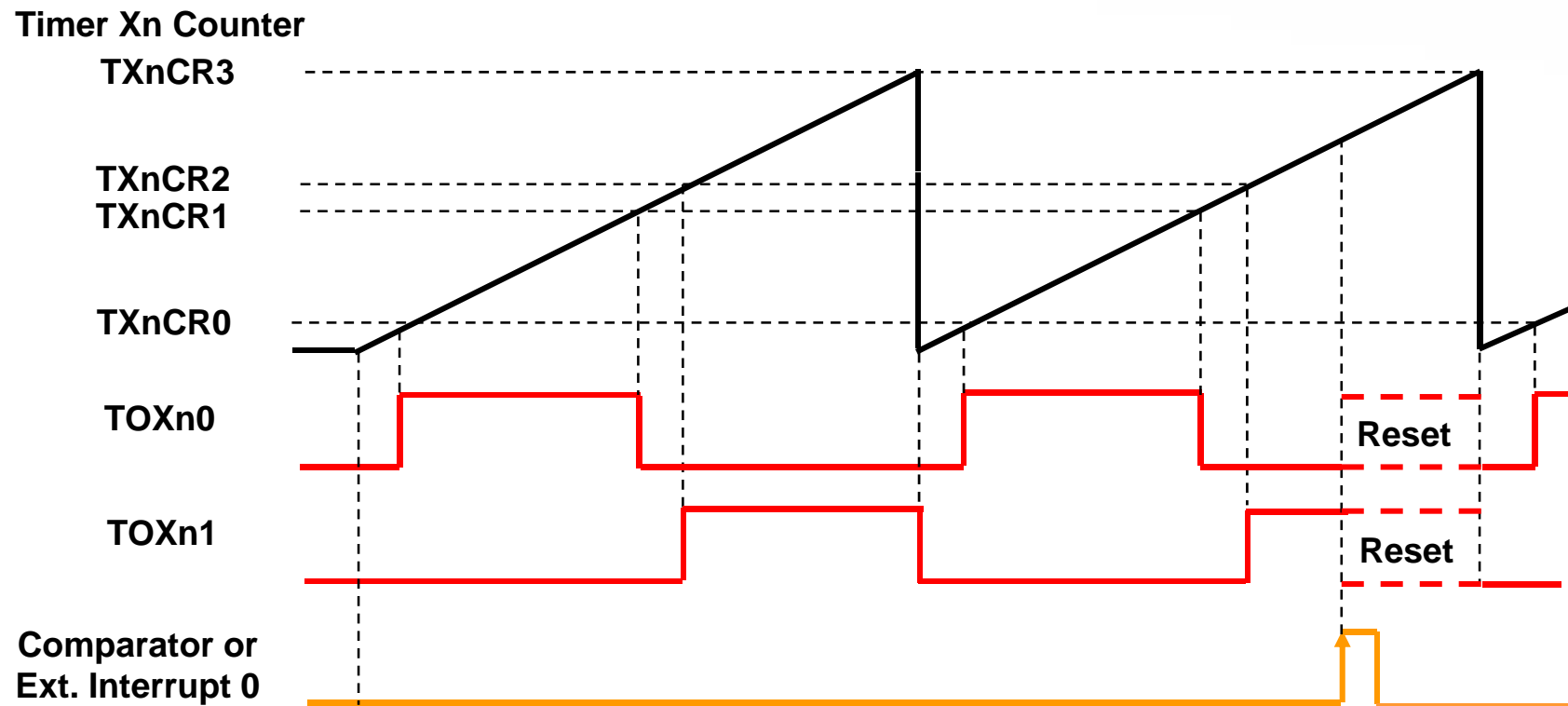
When the active edge of comparator or ext. interrupt is detected, Timer X restart count immediately.



Application: PFC control (adopted Ballast Evaluation Board)

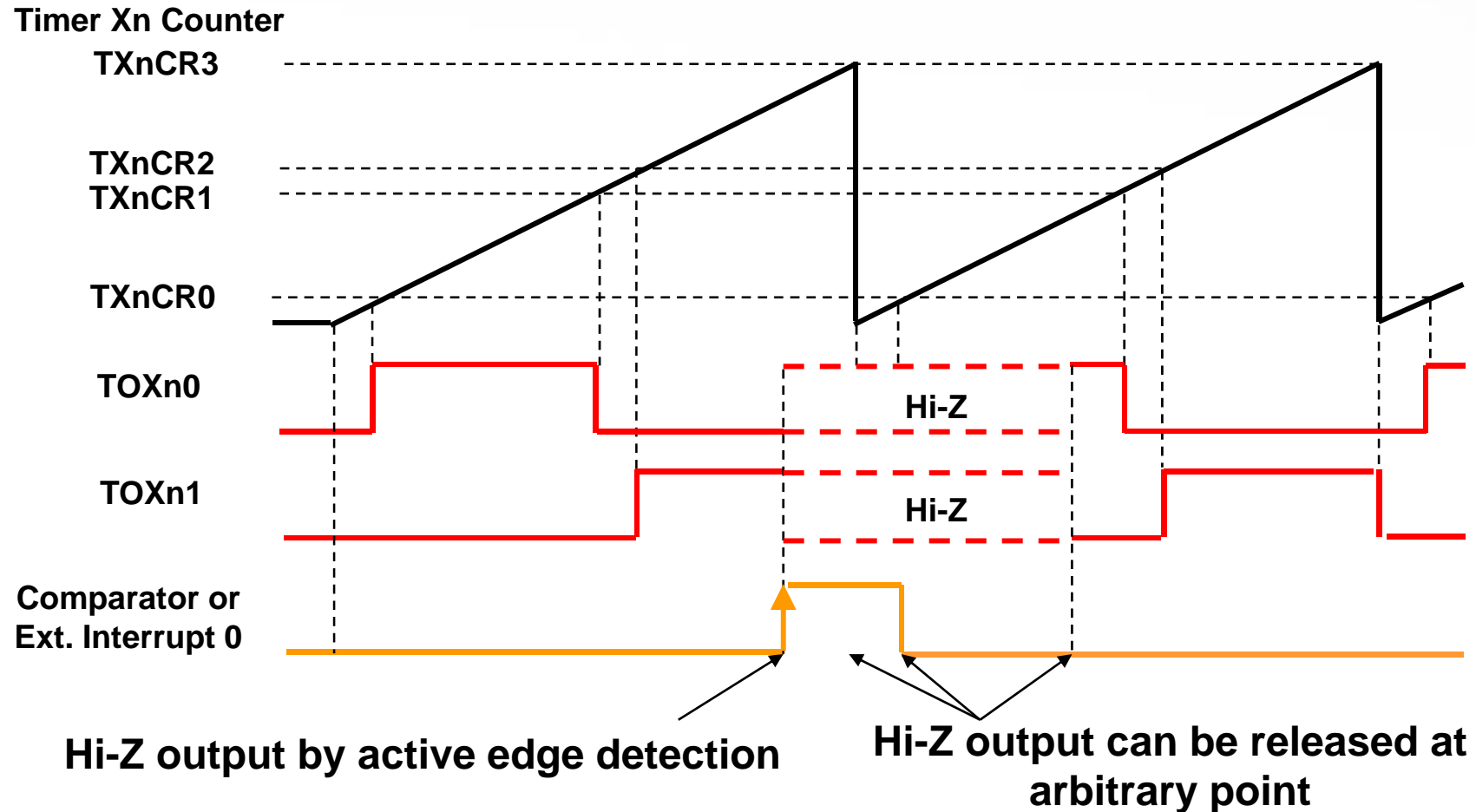
16bit PWM Timer X specific Function (4)

Timer X output keep reset level during the active edge detection to Timer X interrupt.



16bit PWM Timer X specific Function (5)

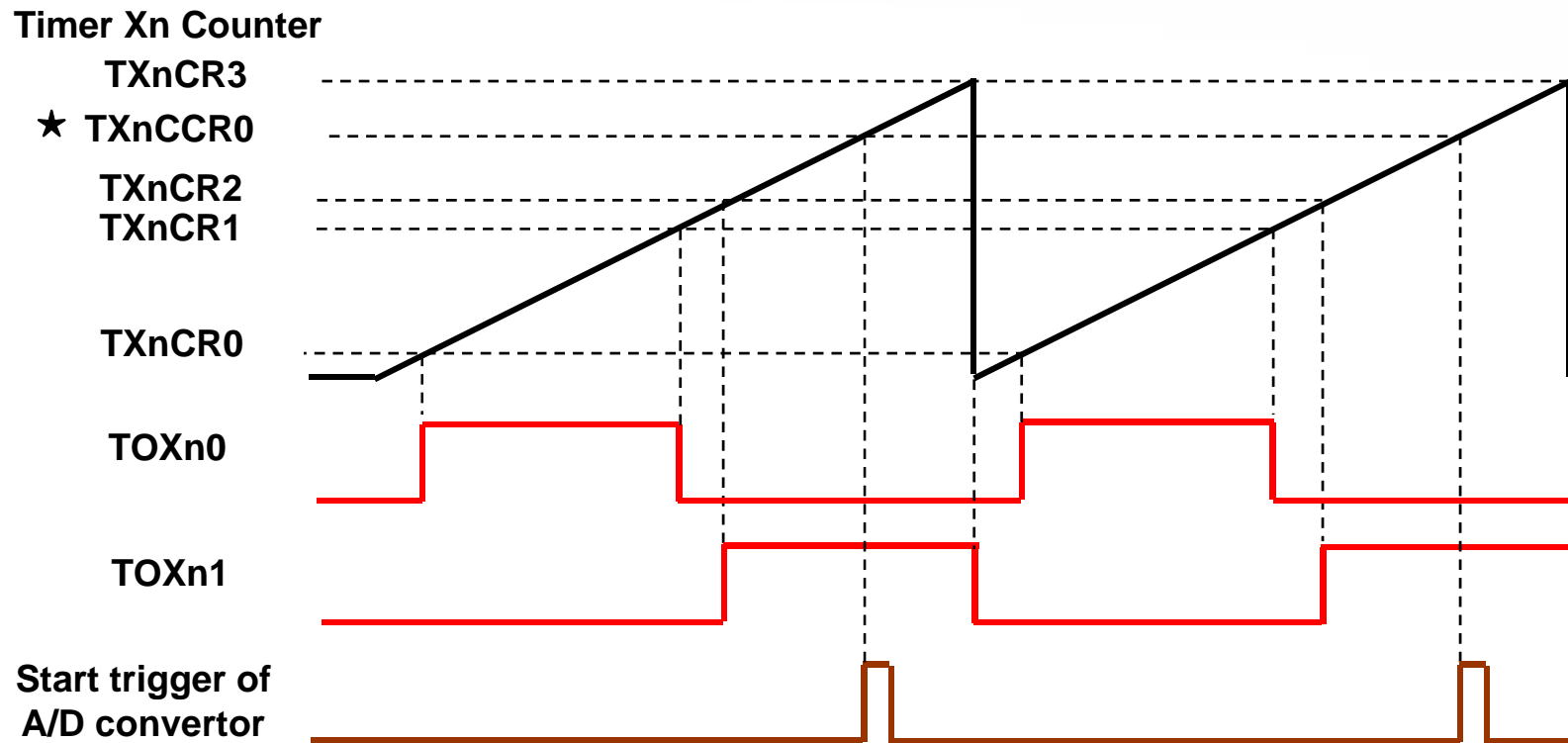
High-impedance output function for emergency stop



Application: Emergency stop for over voltage or current

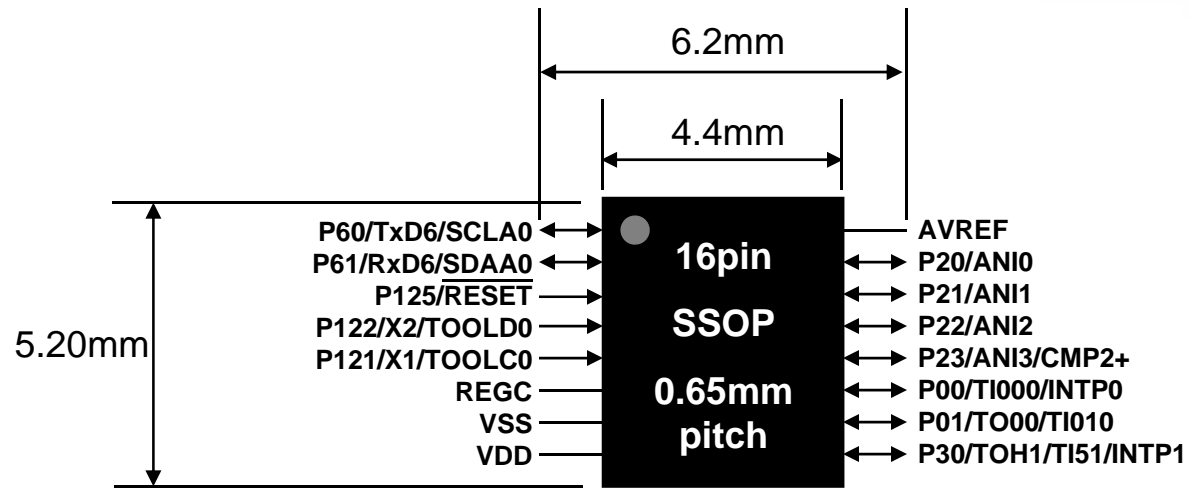
16bit PWM Timer X specific Function (6)

Synchronization of A/D conversion trigger and Timer X count

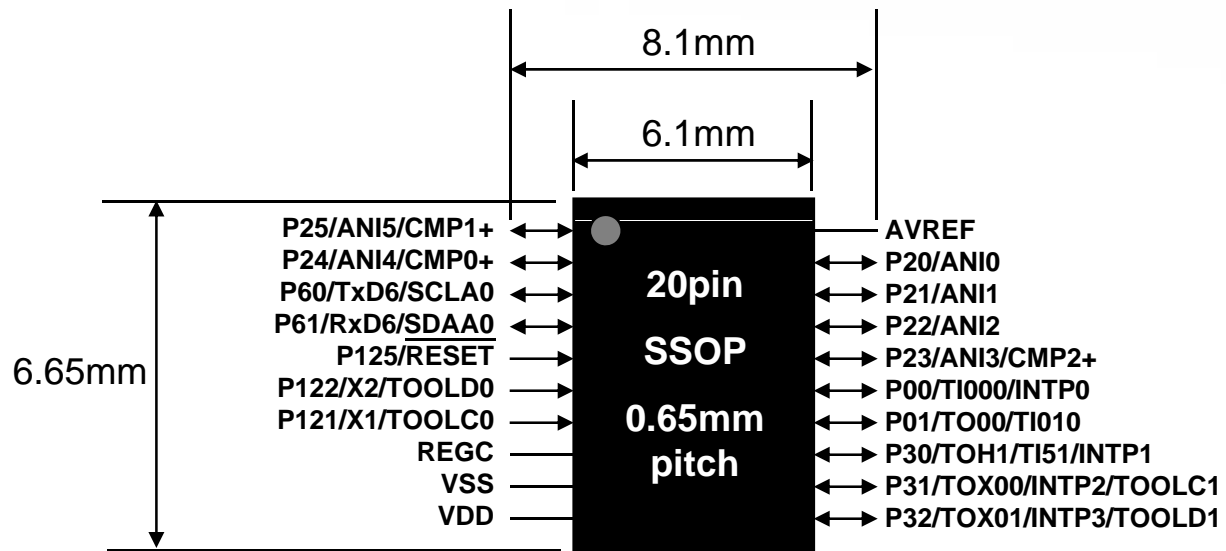


Application: Timing control of A/D conversion

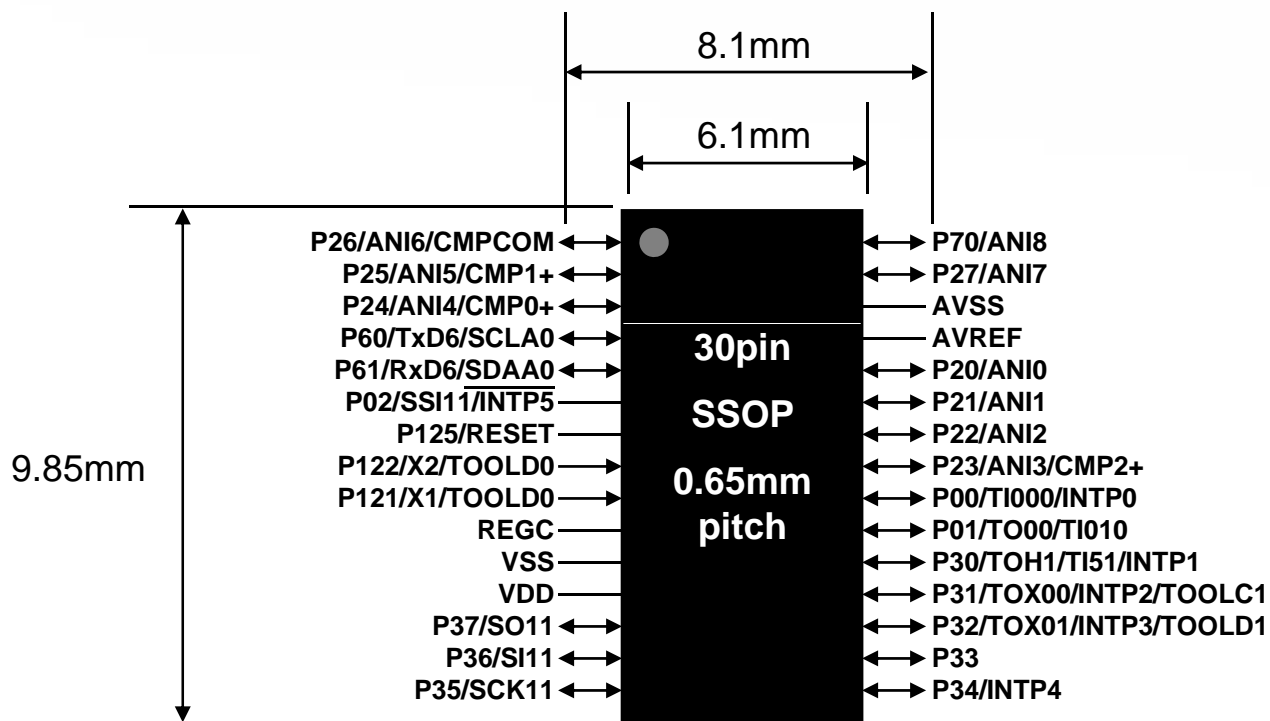
78K0/FY2-L 16pin



78K0/FA2-L 20pin



78K0/FB2-L 30pin



78k0/Fx2-L Development schedule

Milestone	78k0/Fx2-L (4k-16kB)		
Series name	78k0/FY2-L	78k0/FA2-L	78k0/FB2-L
Pin Count	16	20	30
ES	2009/Nov		
CS	2010/Mar		
NEC QT finished (AEC-Q100)	2010/May		
MP	2010/June		
PPAP	2010/May		
User's manual (UM)	available (preliminary)		

Development tool list (78K0/Fx2-L) 1/2

Products name	Order name	IECUVE	Socket package includes				option	
			Exchange adaptor	YQ connector	Target connector	Emulation probe	space adaptor	Mount adaptor,
78k0/Fx2-L common	QB-78K0FX2L-ZZZ	QB-78K0FX2L	-	-	-	-	-	
78k0/FY2-L (16pin SSOP)	QB-78K0FX2L-T16GR	QB-78K0FX2L	QB-78K0FY2L-EA-01T	Not	QB-16GR-NQ-01T	QB-80-EP-01T	Not	Not
78k0/FA2-L (20pin SSOP)	QB-78K0FX2L-T20MC	QB-78K0FX2L	QB-78K0FA2L-EA-01T	Not	QB-20MC-NQ-01T	QB-80-EP-01T	Not	Not
78k0/FB2-L (30pin SSOP)	QB-78K0FX2L-T30MC	QB-78K0FX2L	QB-78K0FB2L-EA-01T	QB-30MC-YQ-01T	QB-30MC-NQ-01T	QB-80-EP-01T	QB-30MC-HQ-01T	QB-30MC-YS-01T

Development tool list (78K0/Fx2-L) 2/2

Products name	Device file	Software package	OCD emulator
78k0/FY2-L (16pin SSOP)	DF780865	SP78K0	QB-MINI2
78k0/FA2-L (20pin SSOP)	DF780865	SP78K0	QB-MINI2
78k0/FB2-L (30pin SSOP)	DF780865	SP78K0	QB-MINI2



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