Q: How to use specified timer to realize real-time operation?

Applied to:

Platform	*OS version*	*XPAC utility version*
XPAC series	*All versions (WinCE6)*	Note1

Note1: *It doesn't matter with the utility.*

Which timer is used to realize for Real-Time?

Multimedia Timer is used for Real-Time.

Multimedia Timer functions:

(1).timeBeginPeriod
(2).timeEndPeriod
(3).timeKillEvent
(4).timeSetEvent,
(5).TimeProc

Why choose Multimedia Timer for Real-Time?

Other timer can not adjust the priority so that can not meet the requirement for Real-Time.

What is the input range of the priority of Multimedia Timer?

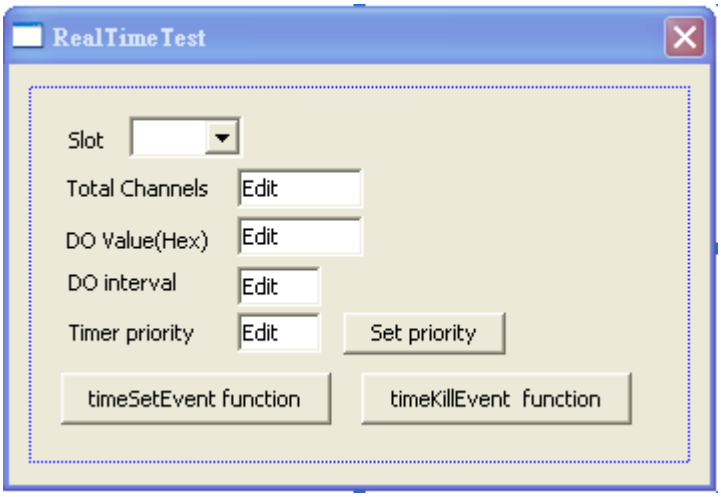
The range is 8 to 256.

How to use Multimedia Timer?

We provide three kinds demo of programming language(C sharp, VB.net, VC++) to teach user to use Multimedia Timer.

1. VC++ demo

Use any one 8K DO module to output square wave to test real time. Change the timer priority to enhance the real-time capability. Use the oscilloscope to see the square wave.

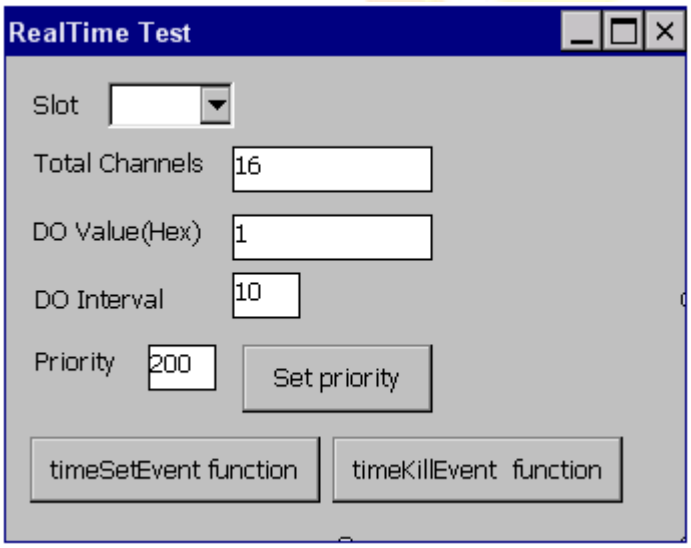


2. C sharp demo

There is no Multimedia Timer in compact framework. We provide an external "mmtimer.dll" to support Multimedia Timer.

Use any 8K DO modules to output square wave to test real time. Change the timer priority to enhance the real-time capability. Use the oscilloscope to see the square wave.

Note: Please be sure to put the mmtimer.dll and the executable file in the same folder.

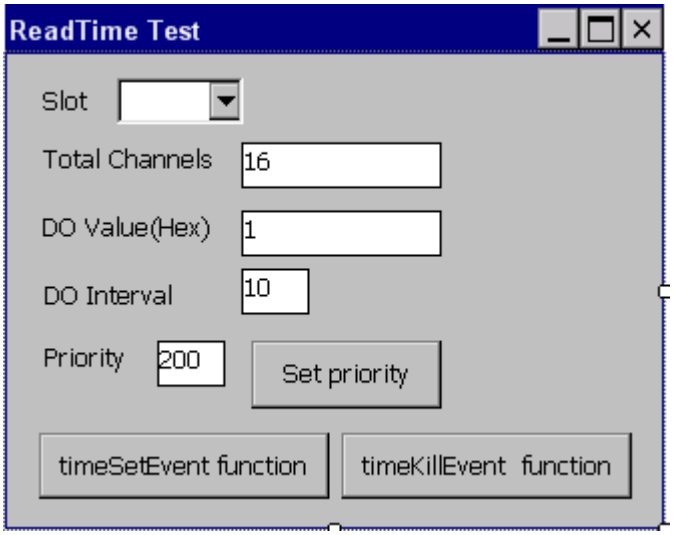


3. VB.net demo

There is no Multimedia Timer in compact framework. We provide an external "mmtimer.dll" to support Multimedia Timer.

Use any 8K DO modules to output square wave to test real time. Change the timer priority to enhance the real-time capability. Use oscilloscope to see the square wave.

Note: Please be sure to put the mmtimer.dll and the executable file in the same folder.



Location of demo download

C sharp:
http://ftp.icpdas.com/pub/cd/xp-8000-ce6/demo/xpac/c%23/standard/realtimetest/

VC++:
http://ftp.icpdas.com/pub/cd/xp-8000-ce6/demo/xpac/vc2005/standard/realtimetest/

VB.net:
http://ftp.icpdas.com/pub/cd/xp-8000-ce6/demo/xpac/vb.net/standard/realtimetest/

The Actual Test

Test platform: XP-8000-Atom-CE6, OS V1002
Test modules: I-8054W (Isolation)
Test conditions:

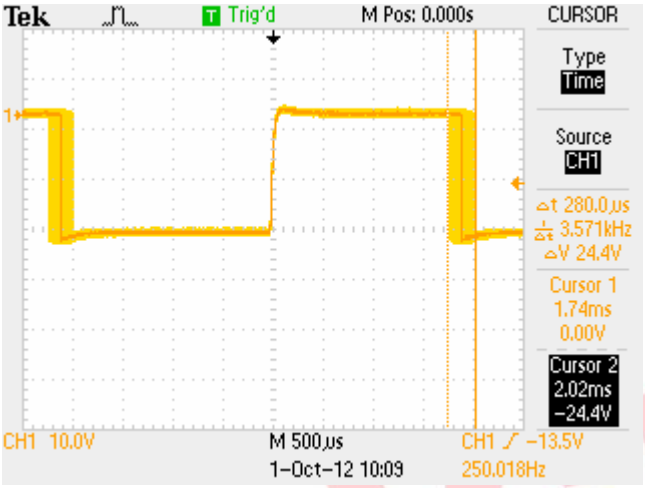
1. Run the following programs to make CPU loading 100%
   - Do endless loop to write data to a file on \Temp.
   - FTP data upload and download between PC and WinPAC.
   - Play video file using TCPMP.
2. Set thread priority of Real-time timer to 50

Test methods:

Connect any one DO channel of I-8054W to an oscilloscope. Run C# or VC real-time timer program, and set timer's interval and then press "timeSetEvent function" button to start the timer. Use the persistence feature on the oscilloscope, which records and overwrites ALL traces for a total of many thousands of traces for 12 hours. The results of the Jitter time can be measured from the oscilloscope. Lower jitter time represents the real-time performance is better.

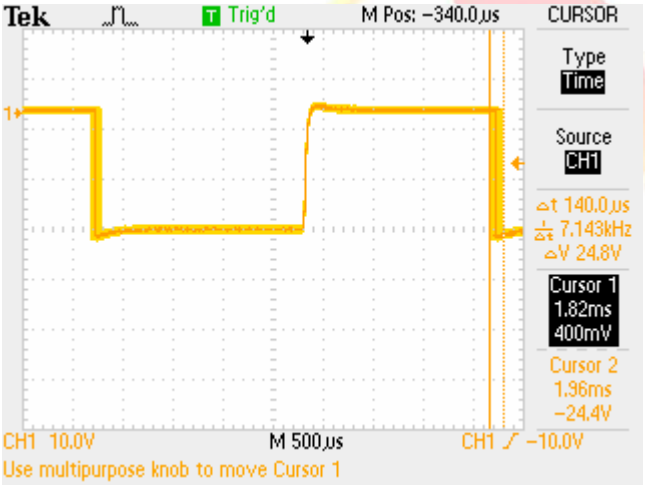
Using C# program
Time Interval: 2 ms
Jitter time: 280 μs

The result is:



Using VC program
Time Interval: 2 ms
Jitter time: 140 μs

The result is:



References

What is Real-Time?

Please refer to the links below for more details.

http://en.wikipedia.org/wiki/Windows_CE
http://blogs.msdn.com/b/mikehall/archive/2005/07/27/443924.aspx
http://msdn.microsoft.com/en-us/library/ms836535.aspx

Read-Time API description

http://msdn.microsoft.com/en-us/library/ee483451%28WinEmbedded.60%29.aspx

Basic Terminology

Interrupt

An interrupt is a Hardware signal indicates that a real-world event has occurred The corresponding hardware device needs to be serviced by the computer system in some way.

Latency

Latency describes the time from when the interrupt occurred to when the hardware begins to be serviced.

Jitter

Jitter defines the range of allowable variations in service times, and is usually defined by the "tolerance" of a mechanical system for variability in the response.

Refer to the following link for more details.

ftp://ftp.icpdas.com/pub/cd/xp-8000-ce6/document/faq/performance_report/x8-01_interrupt_performance_en.pdf
ftp://ftp.icpdas.com/pub/cd/xpac-atom-ce6/document/faq/performance_report/x8-01_interrupt_performance_en.pdf