

# xPC Target Version 5.2 (R2012a)

## Benchmarks

The xPC Target real-time kernel is designed for minimum computational overhead and maximum performance. When running xPC Target software on a target computer, the kernel dedicates all resources to the target application. This provides a fast and efficient environment for deploying and running Simulink models as real-time applications. Computational performance measures of several target computers are compared below. Benchmark your target computer with the xPC Target utility, `xpcbench`.

## About `xpcbench`

Using five different Simulink models (low-complexity to high-complexity), `xpcbench` calculates the smallest sample time that can be achieved when the models are run as xPC Target real-time applications. The figures in this document summarize the benchmark results for several target computers. To display these results type `xpcbench` in the MATLAB Command Window. The stored benchmarks are collected from test runs with “Multicore CPU support” disabled thus providing a baseline for comparison across all CPU types and a direct comparison with benchmark results from previous releases.

To use `xpcbench` to benchmark your target computer, configure your xPC Target host-target environment, then type the following in the MATLAB Command Window.

```
>> xpcbench('this')
```

This function runs the benchmark models on your target computer and plots (in rank order) the performance results along with the measurements collected from other target computers. The five benchmark models are:

- Minimal : This is based on a “minimal” model consisting of just three blocks (Constant, Gain, Termination). The model has neither continuous nor discrete states. The result of this benchmark gives an indication of target computer interrupt latencies.
- F14 : This is based on the standard Simulink example model 'f14'. Type f14 in the MATLAB Command Window to open and view the model. It contains 62 blocks and 10 continuous states.
- F14\*5 : This is based on the standard Simulink example model 'f14' as well, but this benchmark model consists of five f14 systems, each configured in separate subsystems. This benchmark is therefore 5 times more demanding than the previous benchmark.  
(310 blocks, 50 continuous states)
- F14\*10 : This benchmark contains ten f14 systems  
(620 blocks, 100 continuous states)
- F14\*25 : This benchmark contains twenty five f14 systems  
(1550 blocks, 250 continuous states)

Benchmark results are labeled by CPU type, CPU clock rate, and compiler used during the model application build phase. Compiler are:

- VisualC10.0 : Microsoft Visual C/C++ 2010 Professional
- VisualC9.0 : Microsoft Visual C/C++ 2008 Professional
- VisualC6.0 : Microsoft Visual C/C++ Professional 6.0
- OpenWatcom1.8 : Open Watcom 1.8

## Other Performance Factors

xpcbench provides a measure of the raw computational speed of a target computer as a function of model complexity and build compiler. Other factors may affect your overall performance:

- CPU Cache size
- Unwanted system management interrupts (SMIs)
- Background task switching (e.g., when using scopes)
- I/O requirements (e.g., device driver latency, channel conversion time)

The Simulink models tested with xpcbench do not include I/O blocks. However, many applications require I/O and include blocks from the xPC Target I/O device driver library, xpc.lib. Although xPC Target I/O device drivers are very efficient, when you create models containing I/O blocks, performance results will also include I/O hardware dependencies and driver latencies.

The screenshot shows a window titled "xPC Target Benchmark - Details" with a menu bar (File, Edit, View, Insert, Tools, Desktop, Window, Help). The main content area displays a table titled "Minimal achievable sample times in  $\mu$  s". The table lists various CPU models and their configurations, along with their minimal sample times and times for different test cases (F14, F14\*5, F14\*10, F14\*25).

		Minimal	F14	F14*5	F14*10	F14*25
Intel Core 2 Duo E6420	2.13GHz (VisualC9.0)	8	9	11	14	21
Intel Core 2 Duo E6420	2.13GHz (VisualC10.0)	8	10	11	13	22
AMD Athlon X2 4600+	2.4GHz (VisualC9.0)	8	9	11	14	25
AMD Athlon X2 4600+	2.4GHz (VisualC10.0)	8	9	12	14	25
Intel Quad-Core Q6600	2.48Ghz (VisualC9.0)	8	12	13	16	30
Intel Quad-Core Q6600	2.48Ghz (VisualC10.0)	8	10	13	17	30
Intel Pentium M	1.8GHz (VisualC10.0)	8	8	13	18	36
Intel Pentium M	1.8GHz (VisualC9.0)	8	10	13	17	36
Intel Core 2 Duo E6420	2.13GHz (VisualC6.0)	8	10	13	19	33
Intel Core 2 Duo E6420	2.13GHz (OpenWatcom1.8)	8	9	14	19	33
Intel Pentium 4	2.8GHz (VisualC9.0)	8	10	14	17	37
Intel Pentium 4	2.8GHz (VisualC10.0)	8	10	13	18	38
Intel Core 2 Duo	1.5GHz (VisualC9.0)	9	9	18	23	43
Intel Core 2 Duo	1.5GHz (VisualC10.0)	9	12	17	24	44
Intel Quad-Core Q6600	2.48Ghz (VisualC6.0)	8	13	18	24	47
AMD Athlon X2 4600+	2.4GHz (VisualC6.0)	8	11	16	25	55
Intel Quad-Core Q6600	2.48Ghz (OpenWatcom1.8)	8	13	17	26	48
AMD Athlon X2 4600+	2.4GHz (OpenWatcom1.8)	8	11	16	26	58
Intel Pentium M	1.8GHz (VisualC6.0)	8	11	17	27	65
Intel Celeron M	1.0GHz (VisualC10.0)	9	9	19	27	66
Intel Pentium M	1.8GHz (OpenWatcom1.8)	8	10	18	29	67
Intel Celeron M	1.0GHz (VisualC9.0)	9	11	20	27	66
Intel Core 2 Duo	1.5GHz (VisualC6.0)	9	12	23	34	84
Intel Core 2 Duo	1.5GHz (OpenWatcom1.8)	8	13	24	36	83
Intel Pentium 4	2.8GHz (VisualC6.0)	8	12	22	40	90
Intel Celeron M	600MHz (VisualC9.0)	8	14	24	44	108
Intel Pentium 4	2.8GHz (OpenWatcom1.8)	9	13	24	44	101
Intel Celeron M	600MHz (VisualC10.0)	10	14	25	44	108
Intel Celeron M	1.0GHz (VisualC6.0)	8	14	27	46	153
Intel Celeron M	1.0GHz (OpenWatcom1.8)	10	13	28	50	123
Intel Celeron M	600MHz (VisualC6.0)	9	16	40	76	197
Intel Celeron M	600MHz (OpenWatcom1.8)	10	17	46	89	209
Intel Pentium III	400MHz (VisualC10.0)	12	17	50	96	259
Intel Pentium III	400MHz (VisualC9.0)	13	16	51	97	264
Intel Pentium III	400MHz (VisualC6.0)	12	22	70	146	378
Intel Pentium III	400MHz (OpenWatcom1.8)	11	22	84	172	405

