

ARCHIVES: Benchmarking Single-Point Performance on National Instruments Real-Time Hardware

This document is the archives for past benchmarking data found either in error or in using new and different targets. You will find the date that this change was made and the reason for removing it from the main white paper.

8/30/2007

The numbers below are for LabVIEW 8.2 and the best controllers available at the time of the LabVIEW 8.2 release.

CompactRIO

Hardware

- NI cRIO-9002: Real-Time Controller
 - 200 MHz Pentium-class processor
 - 32 MB DRAM
- OR NI cRIO-9012: Real-Time Controller
 - 400 MHz PowerPC processor
 - 64 MB RAM
- (4) NI cRIO-9263: 4-Channel, 100 kS/s, 16-bit, ± 10 V, Simultaneous-Update Analog Output Module
- (2) NI cRIO-9201: 8-Channel, ± 10 V, 500 kS/s, 12-Bit Analog Input Module
- NI cRIO-9102: 8-Slot, 1 M Gate Reconfigurable Embedded Chassis

Software

- LabVIEW Real-Time 8.2
- NI-RIO Driver for Reconfigurable I/O in LabVIEW FPGA (Host)
- NI-RIO FPGA Communications Framework 2.2.0 (Real-Time Controller)
- NI-VISA 4.0
- NI-VISA Server 4.0

Notes

- PID performed on real-time controller

Test Results

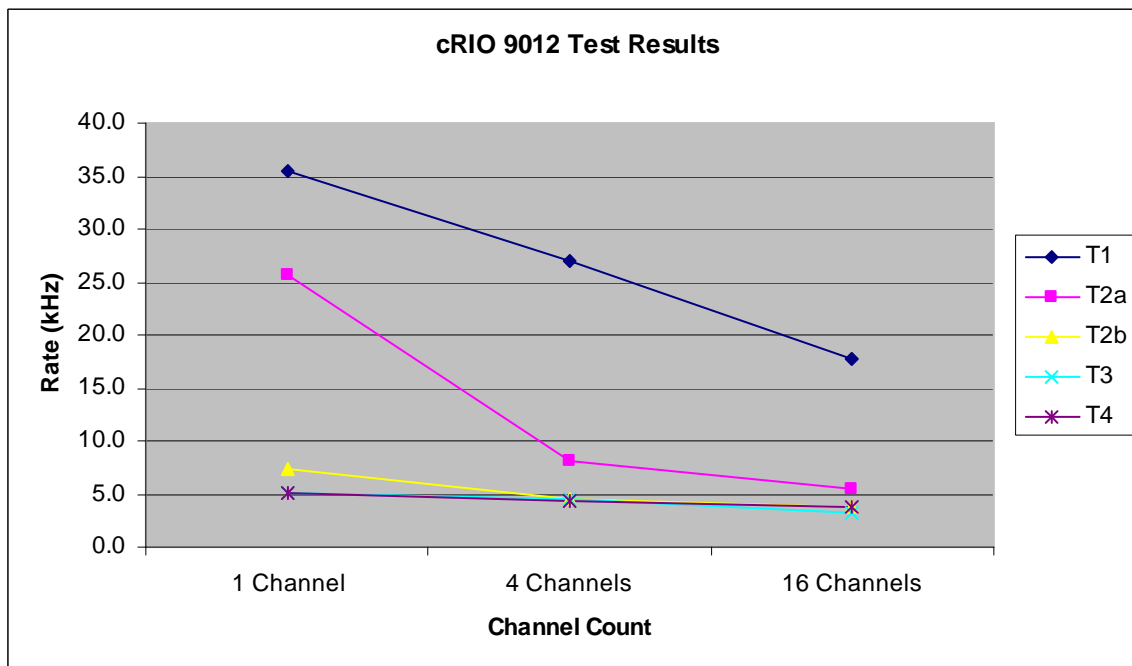
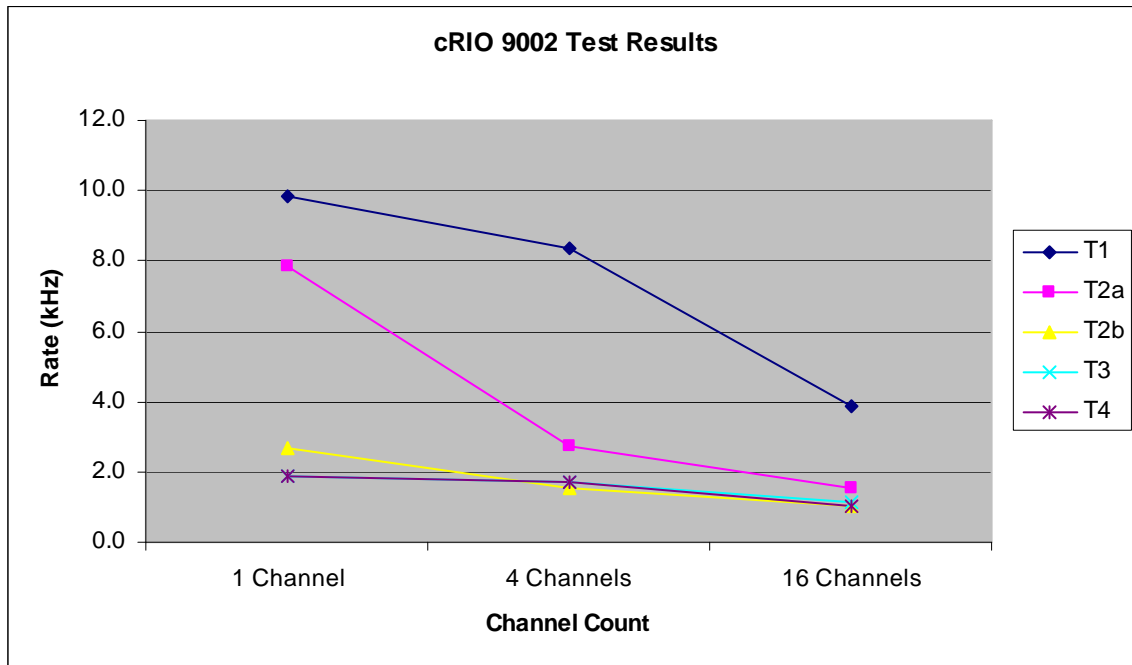
Test	1 Channel	4 Channels	16 Channels
T1	9.8 kHz	8.4 kHz	3.9 kHz
T2a	7.9 kHz	2.7 kHz	1.5 kHz
T2b	2.6 kHz	1.5 kHz	1.0 kHz
T3	1.9 kHz	1.7 kHz	1.1 kHz
T4	1.9 kHz	1.7 kHz	1.0 kHz

Table 1: Compact RIO 9002 Test Results

Test	1 Channel	4 Channels	16 Channels
T1	35.6 kHz	27.0 kHz	17.8 kHz
T2a	25.6 kHz	8.0 kHz	5.6 kHz
T2b	7.3 kHz	4.6 kHz	3.7 kHz
T3	5.2 kHz	4.5 kHz	3.2 kHz

T4	5.1 kHz	4.4 kHz	3.8 kHz
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Table 2: Compact RIO 9012 Test Results



Compact FieldPoint

Hardware

- NI cFP-2120: Rugged Intelligent Ethernet Controller Interface for Compact FieldPoint with Removable Storage

- 200 MHz Pentium-class processor
- 128 MB SDRAM
- (4) NI cFP-AIO-600: 8-Channel Combination Analog Input/Analog Output Module
- (4) NI cFP-CB-1: Integrated Connector Block for Wiring to Compact FieldPoint I/O
- NI cFP-BP-8: 8-Slot Backplane

Software

- LabVIEW Real-Time 8.2
- FieldPoint version 5.0.1
- FieldPoint Drivers 5.2.0
- FieldPoint VI Manager 4.1.0

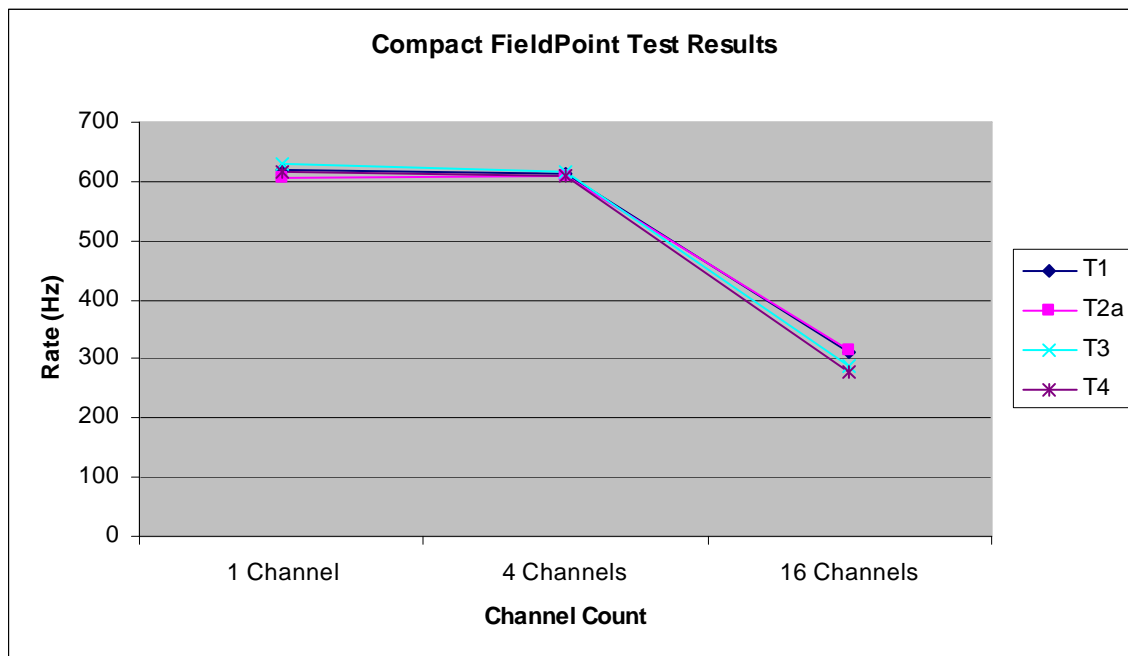
Notes

- Analog channels use 0 to 20 mA current mode

Results

Test	1 Channel	4 Channels	16 Channels
T1	619.9 Hz	611.3 Hz	312 Hz
T2a	605.6 Hz	609.8 Hz	313.7 Hz
T2b	N/A	N/A	N/A
T3	629.6 Hz	616.2 Hz	289.1 Hz
T4	617.3 Hz	608.4 Hz	278.3 Hz

Table 3: Compact FieldPoint Test Results



PXI/DAQmx

Hardware

- NI PXI-8196 RT
 - 2.0 GHz Intel Pentium M 760 processor

- 512 MB dual-channel DDR2 RAM
- NI PXI-6071E: 1.25 MS/s, 12-Bit, 64-Analog-Input Multifunction DAQ
- NI PXI-6723: Static and Waveform Analog Output -- 13-Bit, 32 Channels

Software

- LabVIEW Real-Time 8.2
- NI-DAQmx 8.3

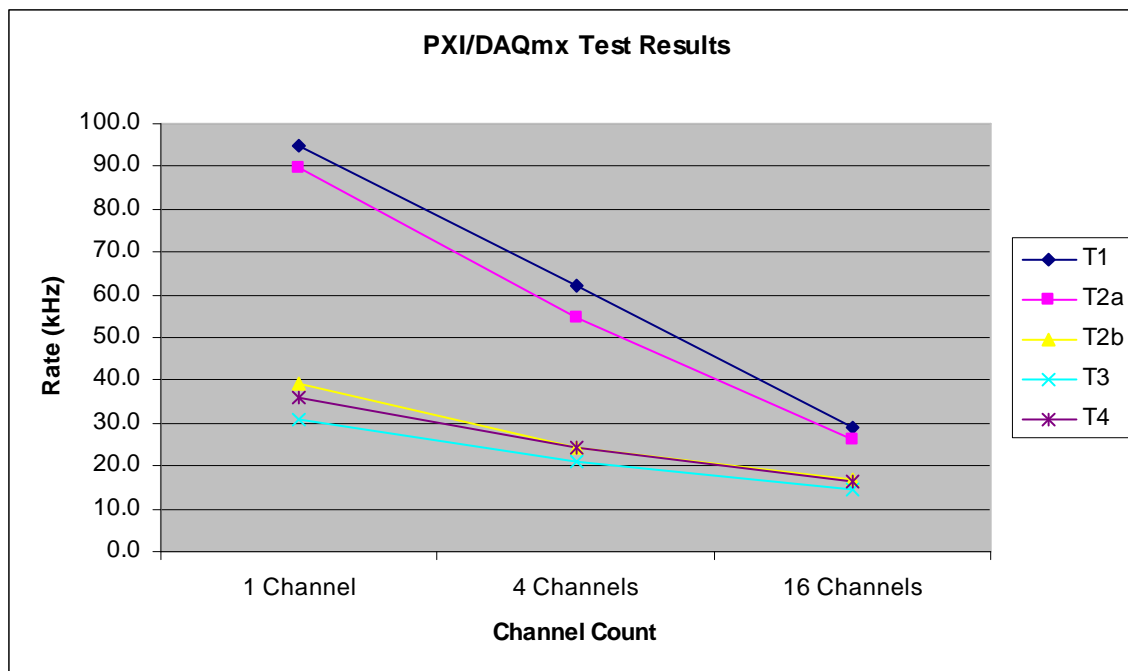
Notes

- Ethernet driver set to polling

Results

Test	1 Channel	4 Channels	16 Channels
T1	94.8 kHz	61.9 kHz	29.2 kHz
T2a	89.7 kHz	54.6 kHz	26.4 kHz
T2b	39.4 kHz	24.4 kHz	16.9 kHz
T3	30.7 kHz	21.0 kHz	14.3 kHz
T4	36.2 kHz	24.3 kHz	16.3 kHz

Table 4: PXI/DAQmx Test Results



PXI/RIO

Hardware

- NI PXI-8196 RT
 - 2.0 GHz Intel Pentium M 760 processor
 - 512 MB dual-channel DDR2 RAM
- (2) NI PXI-7831R: Reconfigurable Multifunction I/O

Software

- LabVIEW Real-Time 8.2
- NI-RIO Driver for Reconfigurable I/O in LabVIEW FPGA 2.1 (Host)
- NI-RIO FPGA Communications Framework 2.2 (Real-Time Controller)

- NI-VISA 4.0
- NI-VISA Server 4.0

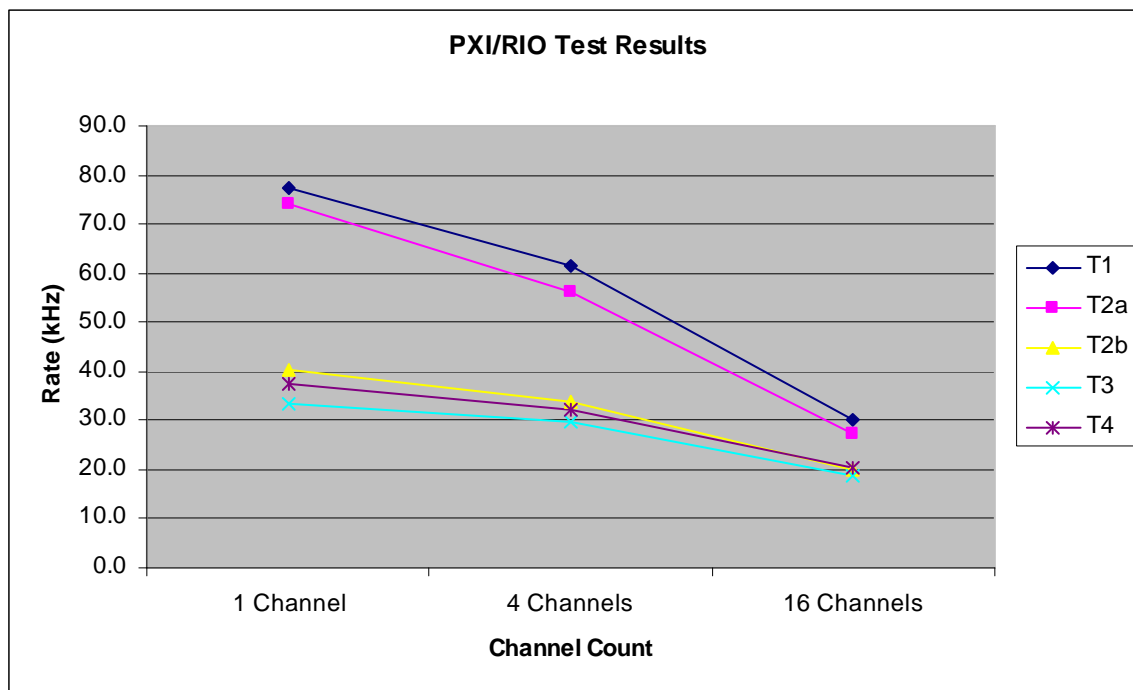
Notes

- Ethernet driver set to polling
- PID performed on real-time Pentium controller

Results

Test	1 Channel	4 Channels	16 Channels
T1	77.3 kHz	61.6 kHz	30.3 kHz
T2a	73.9 kHz	56.1 kHz	27.3 kHz
T2b	40.5 kHz	33.8 kHz	20.1 kHz
T3	33.3 kHz	29.8 kHz	18.7 kHz
T4	37.3 kHz	32.3 kHz	20.4 kHz

Table 5: PXI/RIO Test Results



PCI/DAQmx

Hardware

- Athlon™ 64-based Real-Time Desktop
 - Athlon™ 64 3500+ 2.2 GHz Processor
 - 512 MB DDR SDRAM
 - VIA™ K8T890 Chipset
 - PCIe Broadcom™ Gigabit network adapter (Broadcom™ 57XX chipset)
- NI PCI-6070E: 12-Bit, 1.25 MS/s, 16-Analog-Input Multifunction DAQ
- NI PCI-6723: Static and Waveform Analog Output -- 13-bit, 32 Channels

Software

- LabVIEW Real-Time 8.2
- NI-DAQmx 8.3

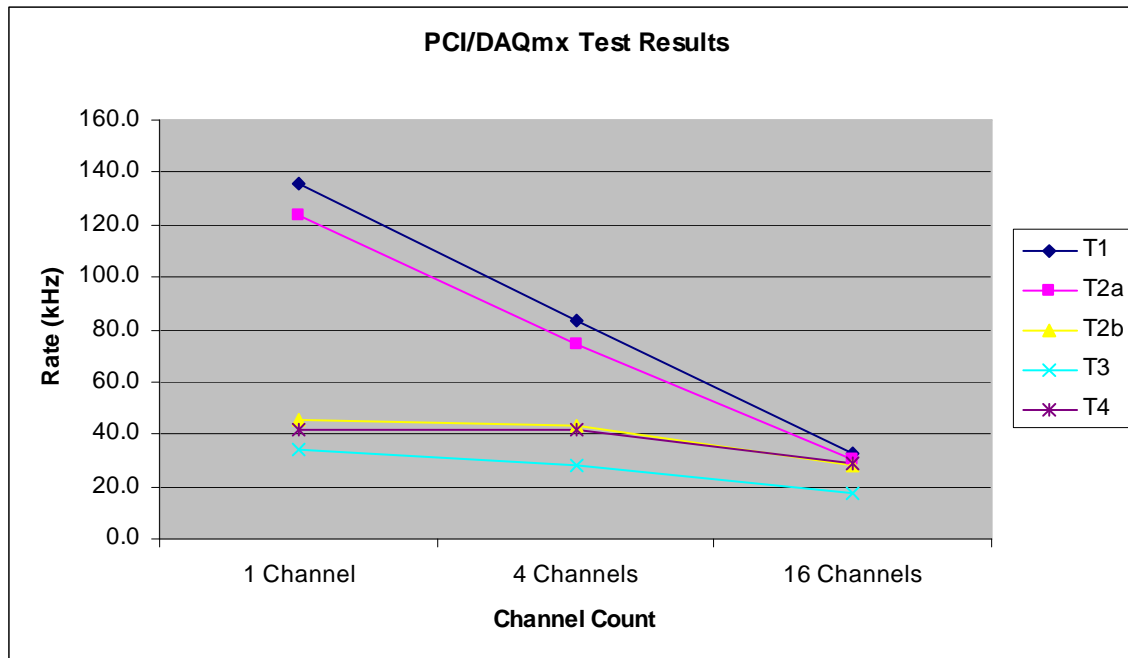
Notes

- Ethernet driver set to polling

Results

Test	1 Channel	4 Channels	16 Channels
T1	136.1 kHz	83.7 kHz	32.8 kHz
T2a	123.5 kHz	74.6 kHz	30.5 kHz
T2b	45.8 kHz	43.2 kHz	28.3 kHz
T3	34.1 kHz	28.2 kHz	17.4 kHz
T4	41.9 kHz	41.9 kHz	29.1 kHz

Table 6: PCI/DAQmx Test Results



PCI/RIO

Hardware

- Athlon™ 64-based Real-Time Desktop
 - Athlon™ 64 3500+ 2.2 GHz Processor
 - 512 MB DDR SDRAM
 - VIA™ K8T890 Chipset
 - PCIe Broadcom™ Gigabit network adapter (Broadcom™ 57XX chipset)
- (2) NI PCI-7831R: Reconfigurable Multifunction I/O

Software

- LabVIEW Real-Time 8.2
- NI-RIO Driver for Reconfigurable I/O in LabVIEW FPGA 2.1 (Host)
- NI-RIO FPGA Communications Framework 2.2 (Real-Time Controller)
- NI-VISA 4.0
- NI-VISA Server 4.0

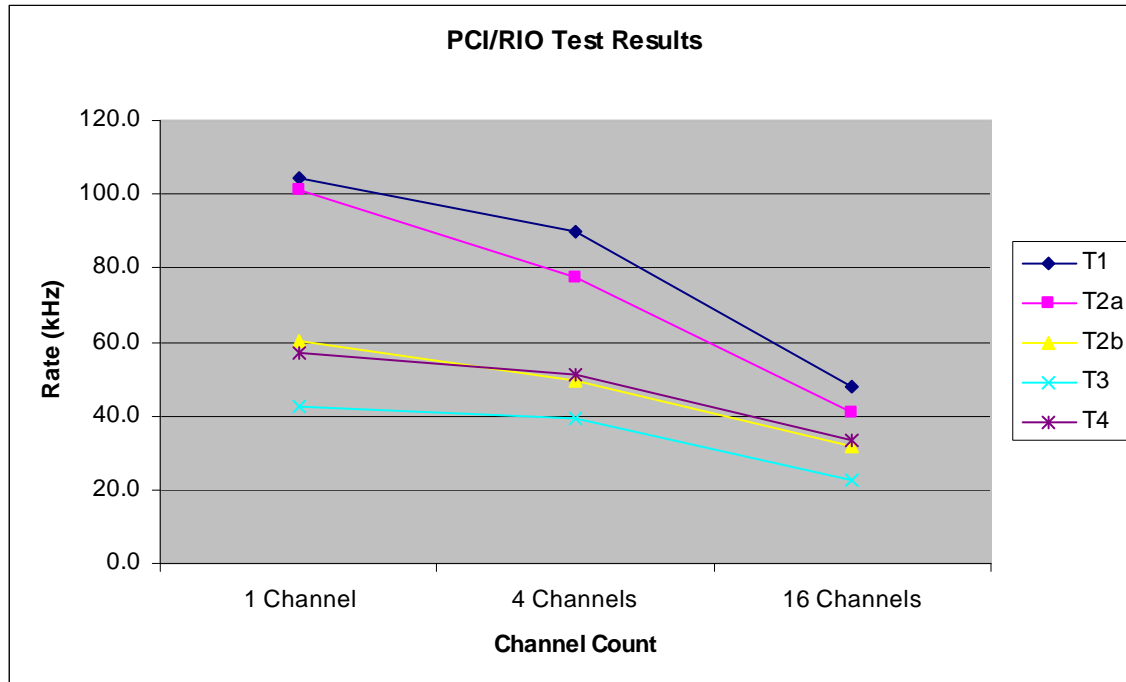
Notes

- Ethernet driver set to polling

Results

Test	1 Channel	4 Channels	16 Channels
T1	104.5 kHz	89.6 kHz	48.0 kHz
T2a	101.2 kHz	77.3 kHz	41.0 kHz
T2b	60.4 kHz	49.6 kHz	31.9 kHz
T3	42.4 kHz	39.2 kHz	22.7 kHz
T4	57.0 kHz	51.2 kHz	33.3 kHz

Table 7: PCI/RIO Test Results



12/27/06

The Compact FieldPoint numbers below are a result in a bug we detected in our error checking logic and are no longer valid. We have confirmed that this bug no longer exists and does not exist in other benchmarking tests

Compact FieldPoint

Hardware

- NI cFP-2120: Rugged Intelligent Ethernet Controller Interface for Compact FieldPoint with Removable Storage
 - 200 MHz Pentium-class processor
 - 128 MB SDRAM
- (4) NI cFP-AIO-600: 8-Channel Combination Analog Input/Analog Output Module
- (4) NI cFP-CB-1: Integrated Connector Block for Wiring to Compact FieldPoint I/O
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Software

- LabVIEW Real-Time 8.2
- FieldPoint version 5.0.1
- FieldPoint Drivers 5.2.0

- FieldPoint VI Manager 4.1.0

Notes

- Ethernet driver set to interrupt
- Analog channels use 0 to 20 mA current mode

Results

Test	1 Channel	4 Channels	16 Channels
T1	1195.5 Hz	1023.4 Hz	351.2 Hz
T2a	1152.3 Hz	895.7 Hz	346.7 Hz
T2b	N/A	N/A	N/A
T3	934.8 Hz	798.9 Hz	330.8 Hz
T4	958.7 Hz	768.8 Hz	316.9 Hz

Table 8: Compact FieldPoint Test Results

