

## DE10-Nano FFT Benchmark Conditions

The FFT application is performed separately by the dual-core ARM Cortex-A9 CPU, and an FFT hardware accelerator inside the FPGA. The sections below list the versions of tools and settings used to generate both the executable code (CPU) as well and the FPGA hardware (FFT accelerator).

### FFT Software Application (CPU)

#### Compiler Version:

```
gcc : Linaro 6.2-2016-11 (6.2.1 20161016)
glibc: glibc_linaro-2.20
libne10: ne10_1.2.1
```

#### Compiler Options:

```
gcc \
    -march=armv7-a \
    -mfloat-abi=hard \
    -mfpu=neon \
    -mthumb-interwork \
    -mthumb \
    -O2 \
    -g \
    -feliminate-unused-debug-types \
    -std=gnu99 \
    -W \
    -Wall \
    -Werror \
    -Wc++-compat \
    -Wwrite-strings \
    -Wstrict-prototypes \
    -pedantic \
    -o "${1}.o" \
    -c \
    "${1}.c"
```

#### Neon Library:

```
EXTRA_OECMAKE = '-DGNULINUX_PLATFORM=ON -DNE10_BUILD_SHARED=ON -
DNE10_LINUX_TARGET_ARCH="${NE10_TARGET_ARCH}"'
```

Where NE10\_TARGET\_ARCH is armv7

## FFT Hardware Core (FPGA)

Quartus Prime Standard Edition: Version 16.1.0 Build 196 10/24/2016

IP Core:

Intel FFT MegaCore Function (altera\_fft\_ii)

Version: 16.0

Parameters:

- Transform
  - Length: 8192
  - Direction: Bi-directional
- I/O
  - Data Flow: Variable streaming
  - Input Order: Natural
  - Output Order: Natural
- Data and Twiddle
  - Representation: Fixed Point
  - Data Input Width: 16 bits
  - Twiddle Width: 16 bits
  - Data Output Width: 24 bits

The screenshot shows the configuration window for the Intel FFT MegaCore Function (altera\_fft\_ii). The window is titled "Basic" and contains several sections with expandable headers:

- Transform**
  - Length: 8192 (dropdown)
  - Direction: Bi-directional (dropdown)
- I/O**
  - Data Flow: Variable Streaming (dropdown)
  - Input Order: Natural (dropdown)
  - Output Order: Natural (dropdown)
- Data and Twiddle**
  - Representation: Fixed Point (dropdown)
  - Data Input Width: 16 bits (dropdown)
  - Twiddle Width: 16 bits (dropdown)
  - Data Output Width: 24 bits (text input)
- Latency Estimates**
  - Calculation Latency: 8192 cycles (text input)
  - Throughput Latency: 16384 cycles (text input)