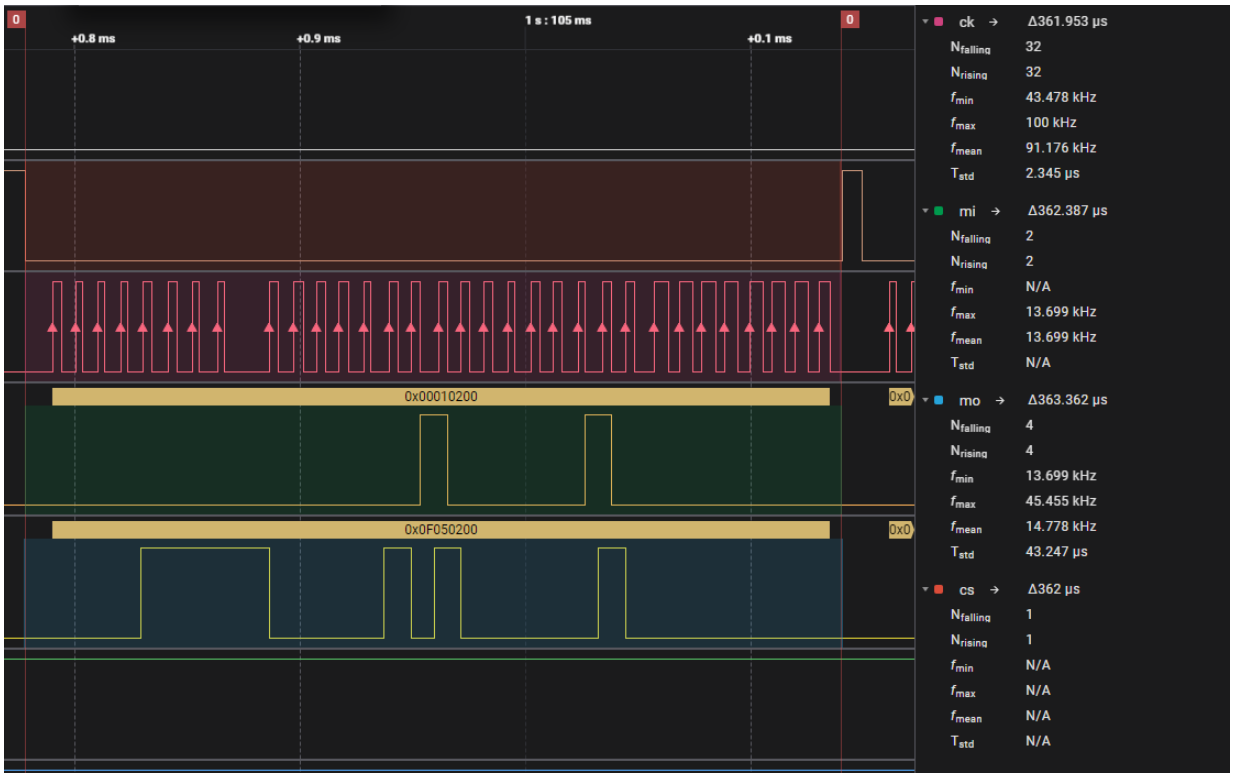
BB5

SPI Data Transfer Graphs

Graph 1: SPI Data Transfer in C



32-bit SPI read operation at register 0x0502 (Socket 1 IR Register)

MISO Signal:

Edges: 2 falling and 2 rising.

Frequency Range: 13.699 kHz to 13.699 kHz.

Average Frequency: 13.699 kHz.

Timing Variation: Standard Deviation ≈ N/A seconds.

MOSI Signal:

Edges: 4 falling and 4 rising.

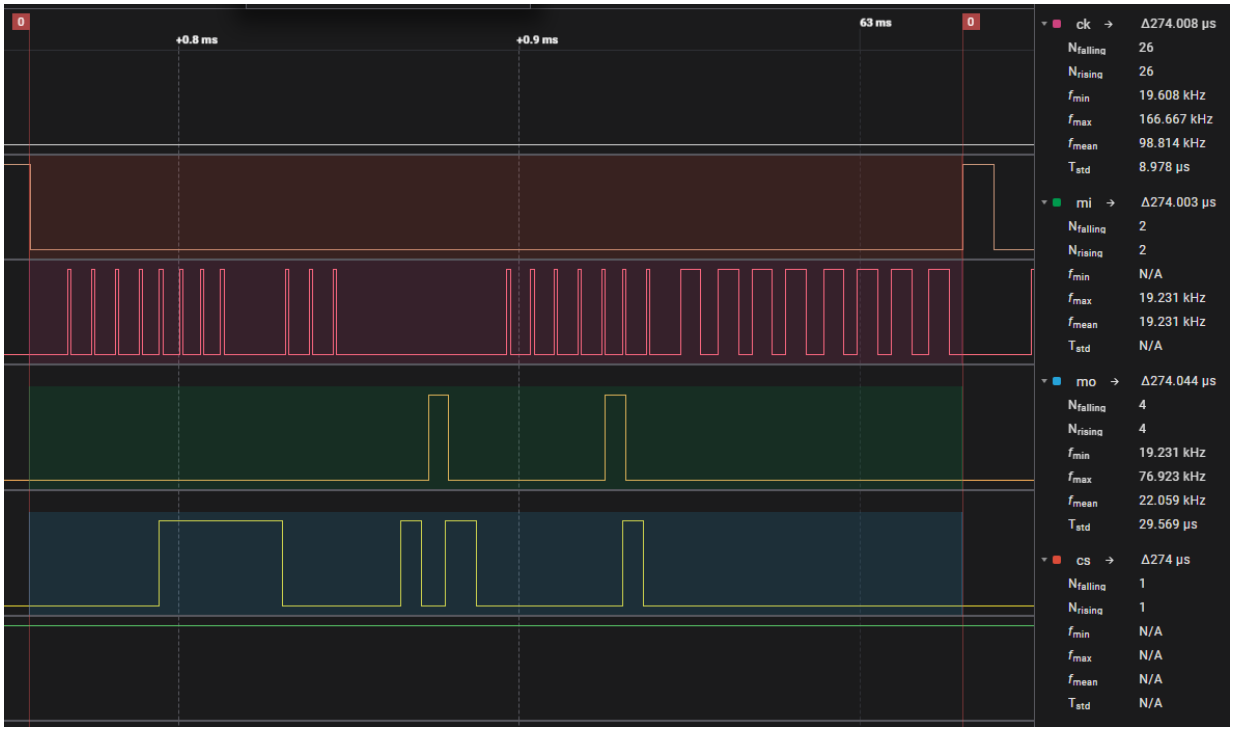
Frequency Range: 13.699 kHz to 45.455kHz.

Average Frequency: 14.778 kHz.

Timing Variation: Standard Deviation ≈ 43.246 µs

Total Measured Period: 361.954 µs

Graph 2: SPI Data Transfer in ASM



32-bit SPI read operation at register 0x0502 (Socket 1 IR Register)

For MISO Signal:

Edges: 2 falling and 2 rising.

Frequency Range: 19.231 kHz to 19.231 Hz.

Average Frequency: 19.231 Hz.

Timing Variation: Standard Deviation ≈ N/A seconds.

For MOSI Signal:

Edges: 4 falling and 4 rising.

Frequency Range: 19.231 kHz to 76.923 kHz.

Average Frequency: 22.059 kHz.

Timing Variation: Standard Deviation ≈ 29.569 µs.

Total Measured Period: 274.008 µs

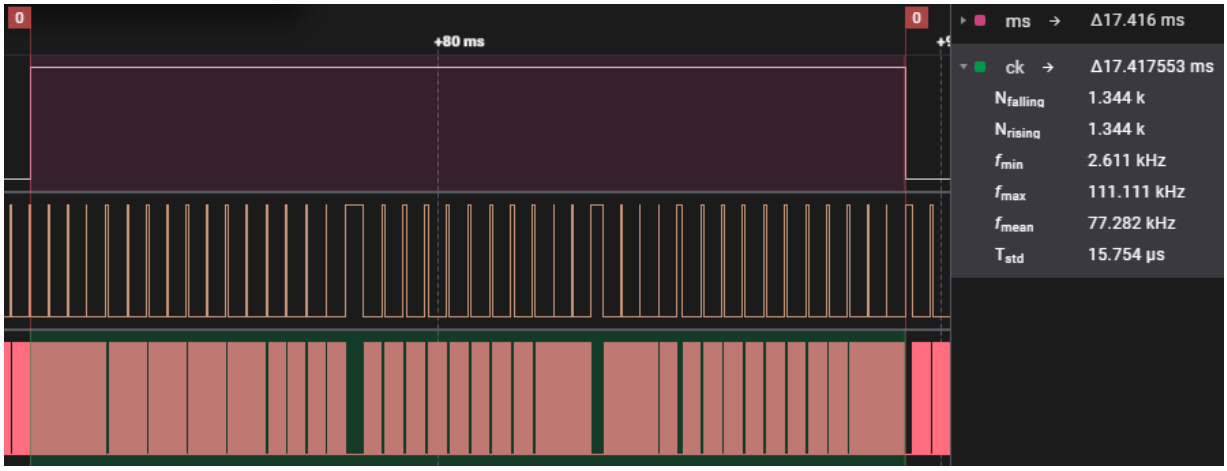
ASM vs C SPI Comparison:

With one sample each, although the average frequency of the measured period in assembly was higher, the total time period was lower.

ΔSPI Time = Δ87.946 µs

UDP Response Graphs

Graph 3: UDP response time in C



UDP Response time measures the interval between receiving packet [00000000] and sending response [00000000]

Response Time:

Time: 17.416 ms

Clock Cycles: 1,344

Graph 4: UDP response time in ASM

UDP Response time measures the interval between receiving packet [00000000] and sending response [00000000]

Response Time:

Time: 13.098 ms

Clock Cycles: 827

ASM vs C UDP Comparison:

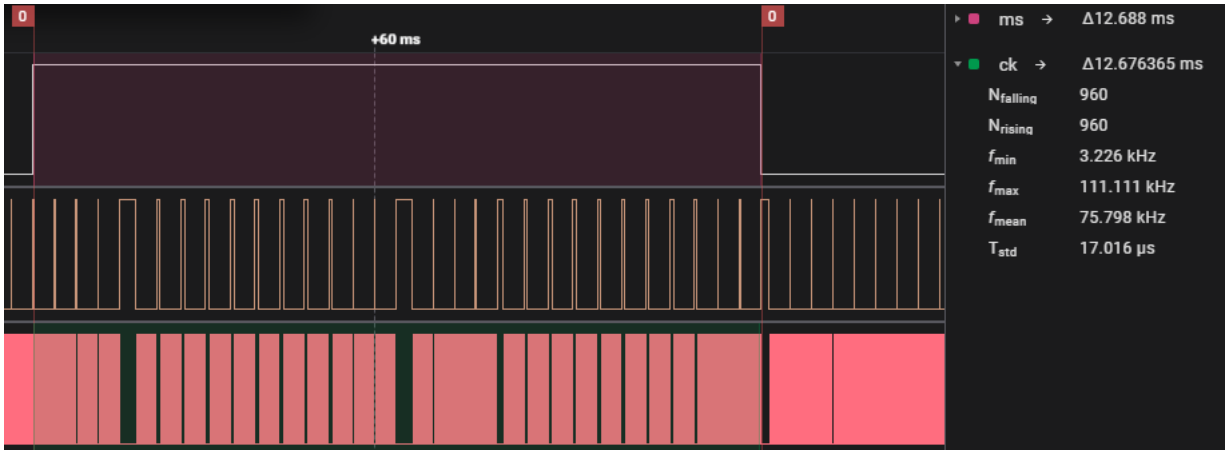
SPI in assembly resulted in lower response time and clock cycles.

Response Time ≈ Δ4.318 ms

Clock Cycles = Δ517

TCP Response Graphs

Graph 5: TCP response time in C



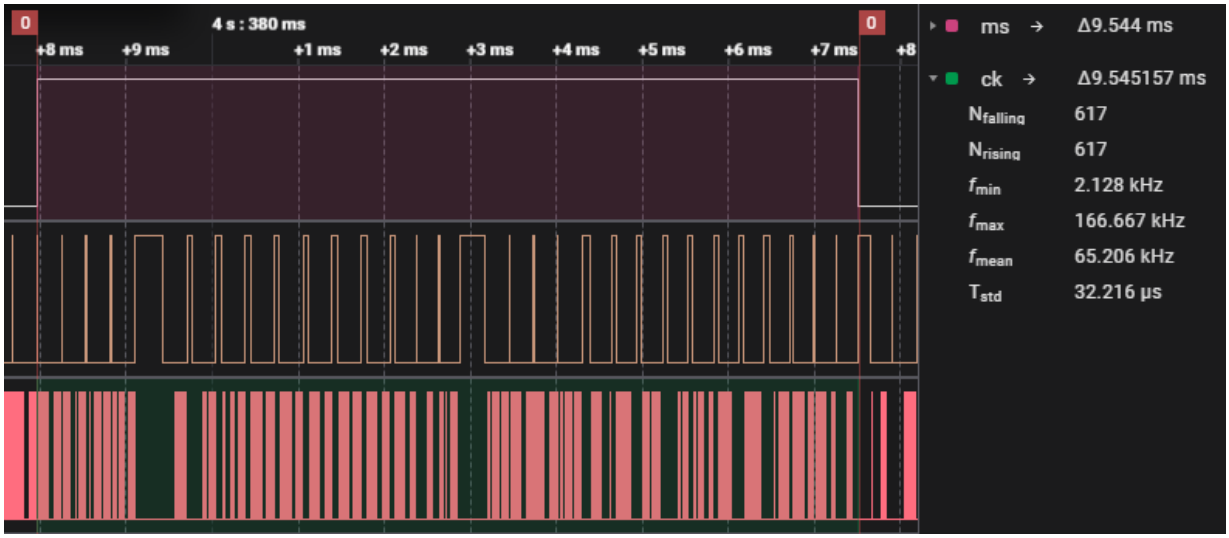
TCP Response time measures the interval between receiving packet [00000000] and sending response [00000000]

Response Time:

Time: 12.688 ms

Clock Cycles: 960

Graph 6: TCP response time in ASM



TCP Response time measures the interval between receiving packet [00000000] and sending response [00000000]

Response Time:

Time: 9.544 ms

Clock Cycles: 617

ASM vs C TCP Comparison:

SPI in assembly resulted in lower response time and clock cycles.

Response Time ≈ Δ3.14 ms

Clock Cycles = Δ343