Nwazet DAQ Module & Secret Labs Shield Base | Buyer's Guide

The following document is intended to assist our customers in making an educated decision when considering a Nwazet DAQ module or a Secret Labs Shield Base module. While the **two modules are in fact complementary**, understanding the fundamental differences and the features offered by these two radically different systems is key to building a successful application, regardless of the domain where it will be deployed.

In a nutshell, the **Nwazet DAQ** module is designed for **building industrial-type applications with high-throughput, high-frequency and large data volumes**. A substantial amount of software and hardware engineering went into the design of the DAQ to meet these requirements. Even if your application is not industrial, you will appreciate the simplicity, the reliable performance and the highly integrated features of the DAQ.

The **Shield Base** was designed for **interfacing Arduino shields** with Netduino Go and as a **transition path from Netduino to Netduino Go**.

Feature	DAQ	ShieldBase	Comment
Interface	SPI (16 Mhz)	UART (~57.6 kHz)	The DAQ module is designed for low-latency applications and maximizes throughput. In addition, the DAQ firmware can be updated to push communication frequency higher.
3.3v Power Rail	16	1	The DAQ is designed to simplify wire connections and maximizes the number of
5v Power Rail	8	1	power and ground connection points.
Ground Rail	18	3	
Wire Connection Points	64	29	The DAQ is designed to simplify wire connections and it maximizes the number of power and ground connection points.
MOSFET Control of Power Rails	No	Yes	This is a power-saving scenario. The DAQ power rails can be externally controlled with MOSFET if needed by the user.
Dedicated Power Pin Headers	Yes	No	
Wire Connector Type	Industrial (Spring-loaded wire cage)	Standard (0.1" female header)	The DAQ offers spring-loaded wire cages designed to ensure snug, secure connections, resilient to vibrations and dust. This results in clean power and signal connections.
Go Bus Sockets Required	1	4 (UART Interface)	The DAQ is GoBus compliant, uses SPI for communications and takes a single socket on the Go! Main board.
Instances on Go Bus (max)	8	1	The DAQ is not limited by the amount of power that can be provided by the Go! Main board and only uses a single socket for communications.
Analog Inputs	8 (12-bit)	6 (12-bit)	
Analog Sampling	8 per call	1 per call	The DAQ maximizes throughput by bringing back all analog samples with one call, including a timestamp, the internal voltage reference and the battery voltage level.
Analog Sample Timestamp	Yes	No	A time stamp is automatically associated with every set of analog samples.
Digital I/O	8 dedicated, 16 max	20	The DAQ's analog inputs can be reconfigured as digital I/Os with a firmware change.
Digital I/O Read / Write	8 per call	1 per call	The DAQ maximizes throughput by allowing read and writing of multiple digital I/Os and PWM duty cycle values with a single call. Digital ouputs and PWM outputs can be mixed when writing in a single call.

Feature	DAQ	ShieldBase	Comment
PWM Outputs	8	6	The DAQ provides a 1 kHz time base by default for all PWM outputs. The time base can be easily changed to a wide range of frequencies. In addition, the DAQ provides access to pre-scalers to further increase the frequency range.
Read & Write I/O Multiplexing	Yes	No	The DAQ module maximizes throughput by allowing applications to read and write multiple I/O lines and analog values with a single call.
Interrupt Lines	7	?	The DAQ has a very low-interrupt processing latency and can handle very high interrupt counts per second. Interrupt-tracking is handled locally and lets the application deal with them asynchronously without losing information.
Interrupt Edge Detection	Rising, Falling, Both	Rising, Falling	
Interrupt Detection Frequency	16Mhz	57.6 kHz	The Shield Base is limited at processing and demultiplexing interrupt signals at 57.6 kHz due to its serial interface .
Interrupt Count Tracking	Yes	No	The DAQ is capable of processing interrupts at a very high frequency and caches
Interrupt Rollover Tracking	Yes	No	interrupt counts locally. It also handles the case where interrupt counters roll over.
Interrupt Sampling	8 per call	1 per call	
User USART	1	3 (Not usable)	
User USART Baud Rate (max)	921,600	115,200	
User USART Hardware Flow Control	Yes	Yes	
Advanced Internal Diagnostics	Yes	No	The DAQ provides detailed diagnostic messages for each of its sub-systems. Diagnostics can be enabled by the user for troubleshooting purposes or during development of new drivers.
I2C	Yes	Not Implemented	I2C connections are present on the Shield Base but there is no API support as of today.
I2C Sensor Library	Yes	No	The DAQ provides added value out of the box by offering sensor drivers for Adafruit and other manufacturers that are I2C compliant. The sensor library is maintained by Nwazet and open source.
Real Time Clock	Yes	No	Provides date / time / millisecond timing data. All analog samples are automatically tagged with a timestamp.
Battery Voltage Monitoring	Yes	No	Automatically sampled with analog inputs
SD Storage	Yes (up to 16GB)	No	The DAQ has been tested with SD and SDHC cards from 1GB up to 16GB successfully. It is currently the only Go Bus compliant storage solution that is readily usable.
User Storage Registers	Yes (4 x 32-bit)	No	The DAQ offers 4 32-bit registers that are battery-backed, perfect for storing configuration settings and status codes quickly, even when an SD card is not present.
User Controlled Status LED	19	No	19 status LEDs are available on the DAQ so that an application can convey status and user feedback without taking away digital I/O connectors for that purpose alone.
Voltage Reference	Yes (Internal)	Yes (External)	Automatically sampled with analog inputs
Reset line	Yes	Yes	

Feature	DAQ	ShieldBase	Comment
Documentation & Code Samples	Yes	No	The DAQ modules comes with a detailed wire connection map and 10 tutorials showing how to use its features, all in one place.
MCU Programming interface	SWD 0.1" header	SWD miniJTAG header	The cost of developing for the Shield Base is higher
MCU	STM32F051	STM32F205RET6 (Limited time)	The DAQ uses a smaller processor and a slower clock speed which is more energy efficient. Yet, it delivers more performance than the Shield Base in terms of data throughput and interrupt processing frequency.
MCU Frequency	48Mhz	120Mhz	
MCU RAM	8 KB	128KB	
MCU Flash	64KB	512KB	The first generation Shield Base can run the .Net MF. However, Secret Labs has announced that this capability will be discontinued at some unspecified point in the future when a different STM32Fxx chip is used on the Shield Base.
External Crystal	16 Mhz	25 Mhz	
External RTC Crystal	32,768 kHz	No	Millisecond resolution
Arduino Shield form factor	No	Yes (Rev 'C' headers)	The DAQ is designed with industrial applications in mind where the 'Arduino form factor' does not offer any advantage for reliable wire connections.
Firmware Release	Stable (1.0)	Beta (4.2.0.1 beta 1)	