

NB-IoT Sensor Shield

AVNET[®] SILICA

ARDUINO COMPATIBILITY PROVIDES ULTIMATE FLEXIBILITY

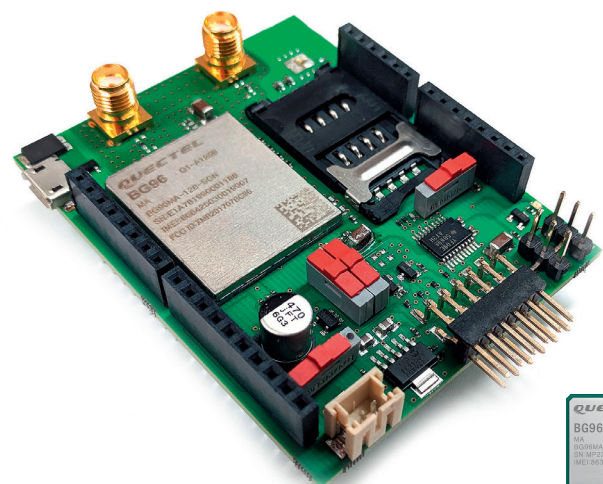
The Avnet Silica NB-IoT Sensor Shield is a Cat M1 and NB-IoT board providing Arduino pinout connectors. The Arduino compatibility provides ultimate flexibility, leveraging on a huge ecosystem of compatible boards. It enables you to choose the microcontroller board that best fits your application, like STM32 Nucleo Boards, and combine them with sensors and other peripheral boards as needed.

The NB-IoT Sensor Shield is equipped with Pmod connectors for an extended compatibility with additional boards. The shield is based on Quectel BG96, a low power module supporting Cat M1, Cat NB1 and EGPRS fallback. GNSS is also supported.

With AT commands Avnet Silica's NB-IoT Sensor Shield is easy to program and supports mbed OS for quick development and leveraging on free stacks like SSL, MQTT, COAP etc.

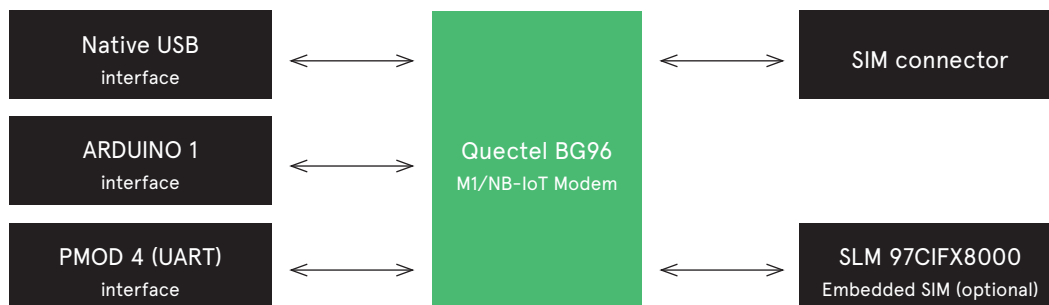
FEATURES

- Based on Quectel LPWA Module BG96
- Multi Modes: Cat.M1, Cat.NB1, EGPRS
- Global bands
 - Cat M1/NB1: B1 B2 B3 B4 B5 B8 B12 B13 B18 B19 B20 B26 B28 B39 (B39 for Cat M1 only)
 - EGPRS: 850/900/1800/1900 MHz
- Low Power Consumption
 - Approx. 10 uA in PSM mode
- Optional GNSS
 - GPS, GLONASS, BeiDou/Compass, Galileo, QZSS
- Voice Over LTE support (M1 only)
 - PCM digital audio interface
- Connectors
 - Sim holder
 - Arduino pinout
 - Pmod
- Software
 - AT Commands support
 - Built in support for PPP/TCP/UDP/SSL/TLS/FTP(S)/HTTP(S)
 - Support for major operating system Android, Linux, Windows
 - Support for mbed OS for integrated embedded development



NB-IoT Sensor Shield

BLOCK DIAGRAM



LTE COMPARISON

	Rel-8 Cat.4	Rel-11 Cat.1	Rel-13 Cat.M1	Rel-13 NB-IoT
Downlink Peak Rate	150Mbps	10Mbps	1Mbps	<100Kbps
Uplink Peak Rate	50Mbps	5Mbps	1Mbps (Full Dup.)	<100Kbps
Coverage MCL (Minimum Coupling Loss)	140.7dB	140.7dB	155.7dB	164dB
Battery Life (200 bytes/day)	<1 year	<1 year	~10 years	~10 years
Number of Antennas	2	2	1	1
UE Receive Bandwidth	20MHz	20MHz	1.4MHz	200KHz
UE Transmit Power	23dBm	23dBm	23dBm	23dBm
Standard Readiness	Now	Now	Now	Now
Network Readiness	Now	Now	Now *	Now *

* Network availability depends on geographic area

COMPARISON WITHIN LPWAN TECHNOLOGIES

	NB-IoT	CAT M1	LoRa (Semtech)	UNB (Sigfox)
Spectrum	LTE & 2G Bands	LTE & 2G Bands	Unlicensed 433/868MHz	Unlicensed 902MHz
Modulation & Demodulation	pi/4 QPSK pi/2 BPSK	QPSK QAM	Chirp Spread Spectrum	FSK
Uplink Data Rate	< 100kbps	1Mbps	< 10kbps	< 0.1kbps
Bandwidth	200kHz	1.4MHz	125-500kHz	100kHz
Transmit Power	23dBm	23dBm	14dBm	14dBm
Network	Mostly S/W Upgrad	S/W Upgrad	Green Field	Green Field
Terminal Price	~2G Price	~2G Price	~2G Price	~2G Price
Battery Life (200Byte/day)	>10 years	>10 years	>10 years	>10 years
MCL Coverage	164dB ~15km	155.7dB ~15km	157dB ~15km	16dB EU ~12km
Standard	Open 3GPP	Open 3GPP	Proprietary	Proprietary

APPLICATION MARKETS

Industry & Agriculture

- Gas Detector
- Soil PH Tester
- Optical Sensor
- Machinery Alarm System
- Irrigation Controller
- Elevator

Public Utilities

- Water/ Gas Metering
- Smart Parking System
- Fire Hydrant
- Smoke Alarm
- Trash Bin
- Street Lighting

Daily Life

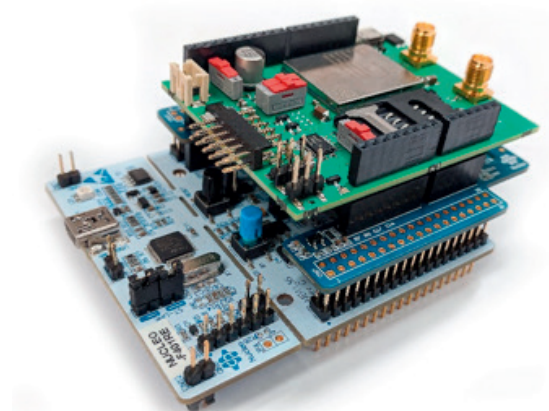
- Asset Tracking
- Electronics
- Person/Pet Tracking

READY FOR mbed OS 5 – A PLATFORM OS FOR IoT DEVICES

- ARM® mbed™ is a free, open-source embedded operating system designed specifically for the “things” in the Internet of Things.
 - Enables application and component libraries to work unchanged across MCUs, hence provides portability for developers and helps to deliver network effects for contributors
- Consistent boot and C/C++ runtime across MCUs, including support across different toolchains, std library integrations
- RTOS kernel
 - Built on the established, widely used, open source CMSIS-RTOS RTX
 - Very small kernel optimised for constrained memory devices
- Common Driver APIs for all common peripherals, supported across all MCUs
- Enhanced connectivity and security stack

AVNET SILICA CLOUD DEMO

- Using a modular approach, the NB-IoT Sensor Shield can be combined with
 - STM32 Nucleo-L476 RG board
 - ST X-NUCLEO-IKS01A2 MEMS 3D Accelerometer and 3D Gyroscope expansion board.
- Based on ARM® mbed™ OS – an operating system born for IoT



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