

NB-IoT Sensor Shield

AVNET[®] SILICA

ARDUINO COMPATIBILITY PROVIDES ULTIMATE FLEXIBILITY

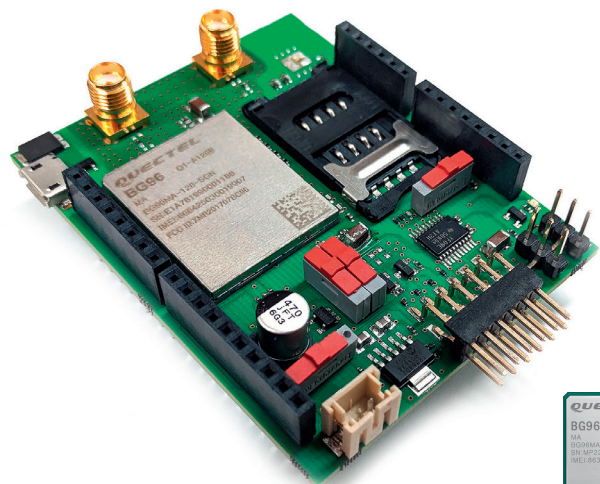
The Avnet Silica NB-IoT Sensor Shield is a Cat M1 and NB-IoT board providing Arduino pinout connectors. The Arduino compatibility provides ultimate flexibility, leveraging on a huge ecosystem of compatible boards. It enables you to choose the microcontroller board that best fits your application, like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

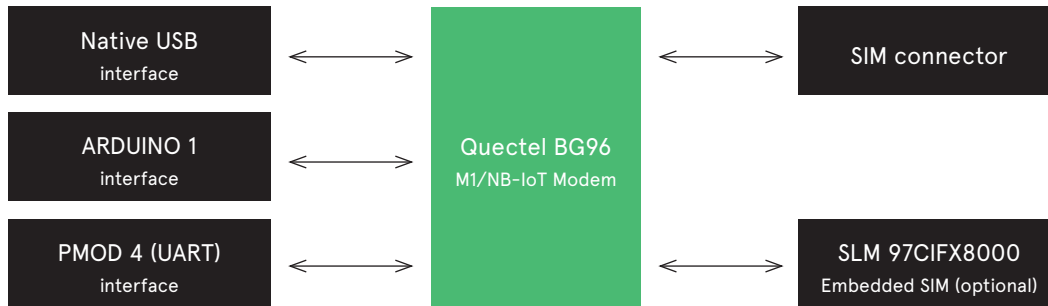
FEATURES

- 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

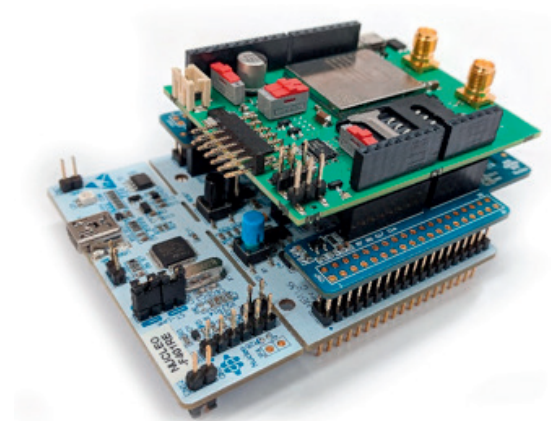
- Asset Tracking
- Electronics
- Person/Pet Tracking

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



Offices

AUSTRIA

Vienna
Phone: +43 186 642 300
Fax: +43 186 642 350
wien@avnet.eu

BELGIUM

Merelbeke
Phone: +32 9 210 24 70
Fax: +32 9 210 24 87
gent@avnet.eu

CZECH REPUBLIC (SLOVAKIA)

Prague
Phone: +420 234 091 031
Fax: +420 234 091 030
praha@avnet.eu

DENMARK

Herlev
Phone: +45 432 280 10
Fax: +45 432 280 11
herlev@avnet.eu

ESTONIA

(LATVIA, LITHUANIA)

Pärnu
Phone: +372 56 637737
paernu@avnet.eu

FINLAND

Espoo
Phone: +358 207 499 200
Fax: +358 207 499 280
helsinki@avnet.eu

FRANCE (TUNISIA)

Cesson Sévigné
Phone: +33 299 838 485
Fax: +33 299 838 083
rennes@avnet.eu

Illkirch

Phone: +33 390 402 020
Fax: +33 164 479 099
strasbourg@avnet.eu

Massy Cedex

Phone: +33 164 472 929
Fax: +33 164 470 084
paris@avnet.eu

Toulouse

Phone: +33 05 62 47 47
toulouse@avnet.eu

Vénissieux Cedex

Phone: +33 478 771 360
Fax: +33 478 771 399
lyon@avnet.eu

GERMANY

Berlin
Phone: +49 30 214 882 0
Fax: +49 30 214 882 33
berlin@avnet.eu

Freiburg

Phone: +49 761 881 941 0
Fax: +49 761 881 944 0
freiburg@avnet.eu

Hamburg

Phone: +49 40 608 235 922
Fax: +49 40 608 235 920
hamburg@avnet.eu

Holzwickede

Phone: +49 2301 919 0
Fax: +49 2301 919 222
holzwickede@avnet.eu

Lehrte

Phone: +49 5132 5099 0
hannover@avnet.eu

Leinfelden-Echterdingen

Phone: +49 711 782 600 1
Fax: +49 711 782 602 00
stuttgart@avnet.eu

Leipzig

Phone: +49 34204 7056 00
Fax: +49 34204 7056 11
leipzig@avnet.eu

Nürnberg

Phone: +49 911 24425 80
Fax: +49 911 24425 85
nuernberg@avnet.eu

Poing

Phone: +49 8121 777 02
Fax: +49 8121 777 531
muenchen@avnet.eu

Wiesbaden

Phone: +49 612 258 710
Fax: +49 612 258 713 33
wiesbaden@avnet.eu

HUNGARY

Budapest
Phone: +36 1 43 67215
Fax: +36 1 43 67213
budapest@avnet.eu

ITALY

Cusano Milanino
Phone: +39 02 660 921
Fax: +39 02 660 923 33
milano@avnet.eu

Firenze

Phone: +39 055 436 039 2
Fax: +39 055 431 035
firenze@avnet.eu

Modena

Phone: +39 059 348 933
Fax: +39 059 344 993
modena@avnet.eu

Padova

Phone: +39 049 807 368 9
Fax: +39 049 773 464
padova@avnet.eu

Rivoli

Phone: +39 011 204 437
Fax: +39 011 242 869 9
torino@avnet.eu

Roma Tecnocittà

Phone: +39 06 413 115 1
Fax: +39 06 413 116 1
roma@avnet.eu

NETHERLANDS

Breda
Phone: +31 765 722 700
Fax: +31 765 722 707
breda@avnet.eu

NORWAY

Asker
Phone: +47 667 736 00
Fax: +47 667 736 77
asker@avnet.eu

POLAND

Gdansk
Phone: +48 58 307 81 51
Fax: +48 58 307 81 50
gdansk@avnet.eu

Katowice

Phone: +48 32 259 50 10
Fax: +48 32 259 50 11
katowice@avnet.eu

Warszawa

Phone: +48 222 565 760
Fax: +48 222 565 766
warszawa@avnet.eu

PORTUGAL

Vila Nova de Gaia
Phone: +35 1 223 779 502
Fax: +35 1 223 779 503
porto@avnet.eu

ROMANIA (BULGARIA)

Bucharest
Phone: +40 21 528 16 32
Fax: +40 21 529 68 30
bucuresti@avnet.eu

RUSSIA (BELARUS, UKRAINE)

Moscow
Phone: +7 495 737 36 70
Fax: +7 495 737 36 71
moscow@avnet.eu

Saint Petersburg

Phone: +7 812 245 1571
stpetersburg@avnet.eu

SLOVENIA

(BOSNIA AND HERZEGOVINA, CROATIA, MACEDONIA, MONTENEGRO, SERBIA)

Ljubljana
Phone: +386 156 097 50
Fax: +386 156 098 78
ljubljana@avnet.eu

SPAIN

Barcelona
Phone: +34 933 278 530
Fax: +34 934 250 544
barcelona@avnet.eu

Galdàcano. Vizcaya

Phone: +34 944 572 777
Fax: +34 944 568 855
bilbao@avnet.eu

Las Matas

Phone: +34 913 727 100
Fax: +34 916 369 788
madrid@avnet.eu

SWEDEN

Sundbyberg
Phone: +46 8 587 461 00
Fax: +46 8 587 461 01
stockholm@avnet.eu

SWITZERLAND

Rothrist
Phone: +41 62 919 555 5
Fax: +41 62 919 550 0
rothrist@avnet.eu

TURKEY (GREECE, EGYPT)

Kadikoy Istanbul
Phone: +90 216 528 834 0
Fax: +90 216 528 834 4
istanbul@avnet.eu

UNITED KINGDOM (IRELAND)

Berkshire
Phone: +44 1628 512 900
Fax: +44 1628 512 999
maidenhead@avnet.eu

Bolton

Phone: +44 1204 547 170
Fax: +44 1204 547 171
bolton@avnet.eu

Bucks. Aylesbury

Phone: +44 1296 678 920
Fax: +44 1296 678 939
aylesbury@avnet.eu

Stevenage, Herts, Meadway

Phone: +44 1438 788 310
Fax: +44 1438 788 250
stevenage@avnet.eu

ISRAEL

Tel-Mond
Phone: +972 (0)9 7780280
Fax: +972 (0)3 760 1115
avnet.israel@avnet.com

SOUTH AFRICA

Cape Town
Phone: +27 (0)21 689 4141
Fax: +27 (0)21 686 4709
sales@avnet.co.za

Durban

Phone: +27 (0)31 266 8104
Fax: +27 (0)31 266 1891
sales@avnet.co.za

Johannesburg

Phone: +27 (0)11 319 8600
Fax: +27 (0)11 319 8650
sales@avnet.co.za



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