

### Selection Guides

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### Matter Ready Modules and Gateways

- Matter Modules:** [WT02C40C](#), [WT02E40E](#), Nordic nRF7002 and nRF5340 combo, quad-radio (5GHz WiFi6; 2.4 GHz WiFi 6, BLE 5.3, 802.15.4) modules.
- [WM02C](#), [WM02E](#): nRF7002 Companion 2.4GHz+5 GHz WiFi 6, IEEE 802.11 a/b/g/n/ac/ax.
- Certified for BLE and 802.15.4**, used with a WiFi 6 companion module for matter applications.
  - [BT840](#),[BT840E](#),[BT840F](#), nRF52840 modules.
  - [BT840NE](#),[BT840N](#) (\$8.81 @ 1KPCS), NRF52840 + NRF21540 Modules.
  - [BT40](#),[BT40E](#),[BT40F](#), nRF5340 modules. Dual core Cortex M33, up to 128 MHz.
  - [BT40NE](#),[BT40N](#) (\$10.92@1K pcs), nRF5340 + nRF21540 for the longest range. Dual core Cortex M33, up to 128 MHz.
- OpenSource Matter/Medical Gateways**, Thread/BLE 5.3 to WiFi6, 4MB flash, a buzzer for audio alerting.
  - [MIG02C40F](#)(\$28.45@1K pcs) BT40F+WM02C.
  - [MIG02C840F](#)(\$25.46@1K pcs), low cost, 2.4GHz only, BT840F+WM02C
  - [MIG02V40NE](#), long range applications, with PA, external antennas, BT40NE+WM02V.
- Modules and Dongles for LE Audio**
- Compact nRF5340 modules, size from 8.4x9.0x1.6mm, [BC40C](#), [BC40M](#), [BC40P](#).

- nRF5340 modules, [BT40](#),[BT40E](#),[BT40F](#)
- nRF5340 with PA modules: [BT40N](#),[BT40NE](#).
- nRF5340+PA USB dongle: [USB40F](#),[USB40N](#)
- Wall mountable to reduce obstruction and maximize LE Audio broadcasting range, [BU40NE](#).

### Additional New Products

- [BM840](#), [BM840P](#)(\$4.76@1K pcs): The lowest cost nRF52840 mini module.
- [BT840NE](#), [BT840N](#)(\$8.81@1K pcs): nRF52840+nRF21540 modules.
- [BC40C](#), [BC40M](#), [BC40P](#): Compact nRF5340 modules, size from 8.4x9.0x1.6mm.
- LR62XE, Semtech SX1262 + PA, FCC certified at **+29.2 dBm** TX power.
- M262X840XE,
- [SL40F6](#): IP67 Battery-Powered, BLE-LTE or BLE-LoRa gateways. Up to 30 amp-hours with 4AA Lithium batteries. Up to 5 years battery life at +10 dBm LTE TX and 100-bytes transmission per minute, estimated. Optional M12 connector for external wired sensors.
- [BLG840FB4](#): Medical IoT, BLE 5.3 to LTE gateway with a buzzer for audio alerting, 4 MB or 16 flash memories.
- APprotect (Access Port protect)** version to prevent hacking for all BLE modules. [Order free appprotect module samples](#). All appprotect versions are in production.

## Highlight of Modules and OpenSource Products

Fanstel offers the most extensive module and open source product portfolio using Nordic Bluetooth, LTE, and WiFi SoCs.

### Bluetooth Modules

The Bluetooth modules consist of three series, BC, BM, and BT.

**BC, Compact or low Cost Module.** At 7.8x8.8x1.3mm, BC832 is the smallest BLE module with castellated pins. BC840E range is 3400 meters at 125 Kbps. BC805M costs \$2.21 at 1K pcs. BC833M with both crystals embedded and 512KB flash/128KB RAM is the most cost effective.

### BM, low cost, mini module, compatible footprint.

Module size is 10.2x15mm. Footprint is the same for the nRF52810/811/832/840 modules. The nRF52833 modules have 42 GPIOs, footprint is a compatible superset.

### BT, feature upgradeable from nRF52 to nRF53 to BLE-

**WiFi 6 combo WT modules.** Compatible footprint for nRF52810/832/840 and nRF5340 modules, options for an integrated Skyworks amplifier or Nordic amplifier. TX power up to +21 dBm with a 6dBi antenna. Link budget up to 137 dBm at 125Kbps. Bluetooth range between two BT840X is measured at >4500 meters. BT840XE with ANT000 is deployed at 11 KM apart in low obstruction.

**No External Component Required.** All nRF53 modules have 32MHz, 32.768 KHz, DCDC converter circuit for VDD, VDDH integrated. Host PCB area is minimized without needing an external component.

**AT Commands.** AT command codes are preloaded for all nRF52 modules. You can erase or use them free of charge.

### WiFi6 Modules

**WM Companion WiFi 6 modules.** Mini size companion modules have castellated pins. WM02C, WM02V, WM02F, WM02E, and WM02P support both bands.

**WT Combo WiFi 6 modules.** nRF7002 WiFi 6 and nRF5340 BLE 5.3 combo modules are footprint compatible with BT40F modules. A host board design can support BLE only, or BLE, Thread, and WiFi 6, 2.4 GHz + 5GHz radio protocols.

### LTE-BLE-LoRa Combo Modules for M.2 Connector

The LN Series are LTE-BLE combo and the M2 Series are LoRa-BLE combo modules. They have the standard 30x42mm size, B-key. These modules are widely used in the Fanstel open source products.

The LW Series support 6 radio protocols, Cat M, NB-IoT, 5GHz WiFi 6, and 2.4 GHz WiFi 6, BLE, and Thread.

### Semtech LoRa Module

SX1262 modules, LR62E and LR62XE (TX power at +29.2 dBm) are paired with a Nordic module for cloud connection.

### OpenSource Products

#### Connecting to a Cloud Server or an Android Device.

Open source codes for connecting to an Android device, or to an MQTT broker in Fanstel, AWS, Google, or Microsoft server through WiFi, Ethernet, and LTE gateways are available.

**SL40F6:** IP67, up to 30 amp-hours, Battery-Powered BLE to LTE gateways.

**LEWR840F6P:** IP65 BLE 5.3-LoRa to LTW-WiFi-PoE gateways

**BLG840FB4:** Medical IoT Gateways with flash memory, buzzer for audio alerting.

**MIG02C40F:** Matter/Medical IoT, BLE 5.3 to WiFi 6 gateways with flash memory, buzzer for audio alerting.

**BLG840F:** Bluetooth 5.3 to LTE gateways.

**BRX840XE:** The most powerful LoRa (+29.2 dBm TX)-BLE (+21 dBm TX) bridge.

**BU840XE,** Remote nRF52840 USB Dongle. Wall mountable to reduce obstruction and to maximize Bluetooth range.

**BU40NE,** nRF5340 with a PA for maximum LE audio broadcasting range.

**USB840F, USB40N:** nRF52840, nRF5340 USB dongles.

**BLE-LTE-LoRa Sensors, Beacons.** Open source and support Eddystone and iBeacon.

### Industrial Quality at Low Cost for Consumers

Industrial grade components are used in all products. Gateway and sensor PCBAs are tested and verified to operate from -70°C to +105°C, with margin for -40°C to +85°C specifications. Enclosure material, batteries, or AC adapter can further limit product operating temperature.

### Transition to Approtect, Free Verification Samples

All revised nRF52 SoCs will offer (**Approtect**) Access Port



**protection** features to prevent hacking. Without using any opt-in features, new certifications are not required. The availability of modules is the best if you can use both versions.

A “-p” is added to the new part number supporting approtect, e.g., BT840F-p is in the free verification sample program. Please visit [Fanstel](https://www.fanstel.com/approtect) to order.

<https://www.fanstel.com/approtect>

The modules begin production with approtect features are not included in the free verification sample program, e.g., all nRF5340 modules.

# Dual Band WiFi 6 and BLE 5.3/WiFi 6 Combo Modules



**Nordic** nRF7002 supports IEEE 802.11 a/b/g/n/ac/ax in both 2.4 GHz and 5 GHz frequency bands.

- Combo module integrates an nRF5340 to support 4 radio interfaces, 5GHz WiFi 6, 2.4 GHz WiFi 6, BLE 5.3 and 802.15.4.
- WT02C40C, WT02E40E, WT02E40F are footprint upgradeable from BLE modules BT40F and BT40N.
- Companion module WM02C and WM02E are managed by a host MCU through SPI interface.
- For low cost applications, uses a BM840@\$4.76, or a BT40@\$7.65 each at 1K pcs.
- For long range applications, use a BT40N with an nRF21540, \$10.92 each at 1K pcs.

- The sizes and prices of WiFi modules will be finalized when certified.
- WiFi ranges are the average of 12 measurements with an iPhone 14. Module antenna points to the sky and is rotated by 30 degrees after each measurement.
- WM02V\* is designed for maximum WiFi ranges. Both module sizes and WiFi ranges can increase.
- We are improving WT02C40C Series dual antenna design, limited samples in 2023. We will continue ship WT02C40C-eng and WT02E40E-eng.

## Nordic nRF7002 WiFi 6 Companion Modules. No external component required.

module	WM02C	WM02V	WM02E	WM02P	WM02F
Size, mm	12x20.0		12x16.2	12x12.4	12 (15.1) x23.8
SoC	nRF7002	nRF7002	nRF7002	nRF7002	nRF7002
Antenna	Chip, horizontal	Chip, vertical	u.FL	Pads	High performance PCB
2.4GHz WiFi range	217 meters	234 meters*	200 meters		234 meters
5GHz WiFi range	383 meters	403 meters*	400 meters		337 meters
Operating temp.	-40°C to +85°C				
Certifications (11/2023)	(FCC,IC,CE,JP,RCM)	(FCC,IC,CE,JP,RCM)	(FCC,IC,CE,JP,RCM)	(FCC,IC,CE,JP,RCM)	(FCC,IC,CE,JP,RCM)
Eval board	EV-WM02C	EV-WM02V	EV-WM02E	EV-WM02P	EV-WM02F
1K price, ea.	\$5.73		\$5.24	\$4.82	\$5.14
Availability	Samples	Samples	Samples	Samples	Samples

## Nordic nRF7002 WiFi 6 and nRF5340 BLE 5.3 Combo Modules. No external component required.

module	WT02E40E	WT02C40C	WT02V40V	WT02E40F	WT02F40F	WT02P40P
W(antenna)xHxT, mm	14(21.8)x18	14(22.5)x18	14(31.8)x27.1	14(18.6)x27.8	14(35.6)x25.7	14(14)x18
Engineering samples	WT02E40E-eng	WT02C40C-eng				
W(antenna)xHxT, mm	16(16)x28.2	16(26)x29.9				
SoC	nRF5340+7002	nRF5340+7002	nRF5340+7002	nRF5340+7002	nRF5340+7002	nRF5340+7002
MCU/Flash/RAM	M33/256/64KB	M33/256/64KB	M33/256/64KB	M33/256/64KB	M33/256/64KB	M33/256/64KB
MCU 2/Flash/RAM	M33/1024/512KB	M33/1024/512KB	M33/1024/512KB	M33/1024/512KB	M33/1024/512KB	M33/1024/512KB
NFC,802.15.4,USB,CryptoCell	Yes	Yes	Yes	Yes	Yes	Yes
GPIO pins	48, LGA	48, LGA	48, LGA/CAS	48, LGA/CAS	48, LGA/CAS	48, LGA/CAS
WiFi 6 frequencies	2.4GHz+5 GHz					
Antenna	WiFi u.FL/BLE	WiFi chip/BLE chip	WiFi chip/BLE chip	WiFi u.FL/BLE PCB	WiFi PCB/BLE PCB	WiFi pad BLE pad
2.4 GHz WiFi range						
5GHz WiFi range						
BLE range at 1Mbps						
Operating temp.	-40°C to +85°C					
DCDC inductors, power switch	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated
Crystals	32M+32K+40M	32M+32K+40M	32M+32K+40M	32M+32K+40M	32M+32K+40M	32M+32K+40M
Certifications(Q1,2024)	(FCC,IC,CE,JP,RCM)	(FCC,IC,CE,JP,RCM)	(FCC,IC,CE,JP,RCM)	(FCC,IC,CE,JP,RCM)	(FCC,IC,CE,JP,RCM)	(FCC,IC,CE,JP,RCM)
Eval board	EV-WT02E40E	EV-WT02C40C	EV-WT02V40V	EV-WT02E40F	EV-WT02F40F	EV-WT02P40P
1K price, ea.	\$13.11	\$13.81				
Availability	Eng. Samples	Eng. Samples				

# nRF5340 BLE 5.3 Modules

- No external component required. It uses minimum host PCB area. Both 32 MHz and 32.768 kHz crystals embedded. DCDC converter inductors are embedded.
- Compact nRF5340 modules: [BC40C](#), [BC40M](#), [BC40P](#);

- Long Range nRF5340 modules: [BT40](#), [BT40F](#), [BT40E](#), BLE certified, 802.15.4 certifications to be added.
- nRF5340 with nRF21540 power amplifier: BT40N, BT40NE, to be certified for BLE and 802.15.4.
- **APprotect**: All nRF5340 modules support appprotect.

## Nordic nRF53 Bluetooth 5.3 Modules. No external component required. Certified for both BLE and 802.15.4.

Module	BT40	BT40F	BT40E	BT40N	BT40NE
<b>APprotect</b>	<b>BT40</b>	<b>BT40F</b>	<b>BT40E</b>	<b>BT40N</b>	<b>BT40NE</b>
Size, mm	14x16x2.0	15x21x2.0	14x16x2.0	15x29.9x2.0	15x29.9x2.0
SoC	nRF5340	nRF5340	nRF5340	nRF5340+21540	nRF5340+21540
MCU/Flash/RAM	M33/256/64KB	M33/256/64KB	M33/256/64KB	M33/256/64KB	M33/256/64KB
MCU 2/Flash/RAM	M33/1024/512KB	M33/1024/512KB	M33/1024/512KB	M33/1024/512KB	M33/1024/512KB
NFC,802.15.4,USB	Yes	Yes	Yes	Yes	Yes
Directional Finding	Yes	Yes	Yes	Yes	Yes
CryptoCell-312	Yes	Yes	Yes	Yes	Yes
GPIO, pins	48, LGA/CAS	48, LGA/CAS	48, LGA/CAS	48, LGA/CAS	48, LGA/CAS
Antenna	PCB Trace/u.FL	High Perf. Trace	PCB Trace/u.FL	PA+PCB	PA+PCB+u.FL
Range,1Mbps	100 M, est.	700 meters, est.	1000 M, est.	>1100 meters	>1100 meters
Max TX, conducted, FCC	+3.4 dBm	+3.4 dBm	+3.4 dBm	+19.1 dBm	+19.1 dBm
Max TX, radiated, FCC	0 dBm	+4.3 dBm	+9.4 dBm	+20.0 dBm	+25.1 dBm
Operating temp.	-40°C to +105°C	-40°C to +105°C	-40°C to +105°C	-40°C to +105°C	-40°C to +105°C
peak current RX	2.6 mA	2.6 mA	2.6 mA		
peak current TX	3.2 mA, 0 dBm	3.2 mA, 0 dBm	3.2 mA, 0 dBm		
DCDC inductors VDD,VDDH	Integrated	Integrated	Integrated	Integrated	Integrated
32.768kHz crystal	Integrated	Integrated	Integrated	Integrated	Integrated
Certifications	FCC, ISED, CE, RCM, TELEC (BLE+ 802.15.4), QDID			FCC, ISED, CE, RCM, TELEC (BLE+ 802.15.4), QDID	
Eval board	EV-BT40	EV-BT40F	EV-BT40E	EV-BT40NE	EV-BT40NE
1K price, ea.	\$7.65	\$9.02	\$8.68	\$10.92	\$12.24
<b>AP Availability</b>	Production	Production	Production	Production	Production

## Nordic compact nRF53 Bluetooth 5.3 Modules. No external component required.

Module	BC40C	BC40M	BC40P
APprotect	BT40C	BC40M	BC40P
Size, mm	8.4x11.5x1.6	8.4(10.1)x12.7x1.6	8.4x9x1.6
SoC	nRF5340	nRF5340	nRF5340
MCU/Flash/RAM	M33/256/64KB	M33/256/64KB	M33/256/64KB
MCU 2/Flash/RAM	M33/1024/512KB	M33/1024/512KB	M33/1024/512KB
NFC,802.15.4,USB	Yes	Yes	Yes
Directional Finding	Yes	Yes	Yes
CryptoCell-312	Yes	Yes	Yes
GPIO pins	48, LGA	48, LGA	48, LGA
Antenna	Chip	PCB	Pads for external
Range,1Mbps			
Max. TX power, FCC	+3.60 dBm	+3.60 dBm	+3.60 dBm
Operating temp.	-40°C to +105°C	-40°C to +105°C	-40°C to +105°C
peak current RX	2.6 mA	2.6 mA	2.6 mA
peak current TX	3.2mA, +0dBm	3.2mA, +0dBm	3.2mA, +0dBm
DCDC inductors VDD,VDDH	Integrated	Integrated	Integrated
32.768kHz crystal	Integrated	Integrated	Integrated
Certifications	FCC,IC,CE,JP,AU,QDID	FCC,IC,CE,JP,AU,QDID	FCC,IC,CE,JP,AU,QDID
Eval board	EV-BC40C	EV-BC40M	EV-BC40P
1K price, ea.	\$10.10	\$9.02	\$8.97
<b>AP Availability</b>	Production	Production	Production

## *nRF52 Mini and Compact BLE-802.15.4 Modules*



- BM840/P begins production with approtect.

## Nordic nRF53 BM Series, Low Cost, Compatible Footprint

Modules	BM833A	BM833AF	BM832A	BM832	BM832E
APprotect	BM833A-p	BM833AF-p	BM832A-p	BM832-p	BM832E-p
Sizes, mm	10.2x15x1.9	15x20.8x1.9	10.2x15x1.9	10.2x15x1.9	10.2x15x1.9
SoC	nRF52811	nRF52811	nRF52810	nRF52832	nRF52832
Flash/RAM	192KB/24KB	192KB/24KB	192KB/24KB	512KB/64KB	512KB/64KB
NFC/802.15.4	No	No	No	Yes	Yes
GPIO pins	32	32	32	32	32
Pins	LGA	LGA	47, LGA	47, LGA	47, LGA
Antenna	PCB Trace	PCB Trace	PCB trace	PCB trace	PCB u.FL
Range, 125kbps	680M, est.	1400M, est.	340 meters	340 meters	
Ant at 1.52 m			270 meters	270 meters	
Max. TX power, FCC	+4.77 dBm	+4.77 dBm	+3.98 dBm	+3.98 dBm	+3.98 dBm
peak current RX	4.6mA	4.6mA	5.4 mA	5.4 mA	5.4 mA
peak current TX	4.6mA, +0dBm	4.6mA, +0dBm	7.5mA, +4dBm	7.5mA, +4dBm	7.5mA, +4dBm
DCDC inductors	Integrated	Integrated	Integrated	Integrated	Integrated
32.768kHz crystal	Ext.	Ext.	Ext.	Ext.	Ext.
Certifications	FCC, IC, CE, JPAU, QDID	FCC, IC, CE, JPAU, QDID	FCC, IC, CE, JPAU, KR, QDID	FCC, IC, CE, JPAU, KR, QDID	FCC, IC, CE, JPAU, KR, QDID
Eval board	EV-BM833A	EV-BM833AF	EV-BM832A	EV-BM832	EV-BM832E
1K price, ea.	\$3.32	\$3.67	\$3.00	\$3.92	\$4.08
AP Availability	Production	Production	Production	Production	Production

- **AP availability:** The initial date of appprotect module.

## Nordic nRF53 BM Series, Low Cost, Compatible Footprint

Modules	BM833	BM833E	BM833F	BM840	BM840P
APprotect	BM833-p	BM833E-p	BM833F-p	BM840	BM840P
Sizes, mm	10.2x15x1.9	10.2x15x1.9	15x20.6x1.9	10.2x15x1.9	10.2x15x1.9
SoC	nRF52833	nRF52833	nRF52833	nRF52840	nRF52840
Flash/RAM	512KB/128KB	512KB/128KB	512KB/128KB	1MB/256KB	1MB/256KB
NFC/IEEE 802.15.4	Yes	Yes	Yes	Yes	Yes
GPIO pins	42	42	42	30	30
Pins	LGA	LGA	LGA	LGA	LGA
Antenna	PCB	u.FL	PCB Trace	PCB trace	pads
Range,125kbps	1400/3400M,est.	1400/3400M,est.	2300M, est.		
Ant at 1.52 m					
Max. TX power, FCC	+8.13 dBm	+8.13 dBm	+8.13 dBm	+8.0 dBm	+8.0 dBm
peak current RX	4.6mA	4.6mA	4.6mA	4.6 mA	4.6 mA
peak current TX	4.8mA, +0dBm	4.8mA, +0dBm	4.8 mA, +0 dBm	4.8 mA at +0dBm	4.8 mA at +0dBm
DCDC inductors	Integrated	Integrated	Integrated	Integrated	Integrated
32.768kHz crystal	Ext.	Ext.	Ext.	Ext	Ext
Certifications	FCC,IC,CE,JP,AU,QRID	FCC,IC,CE,JP,AU,QRID	FCC,IC,CE,JP,AU,QRID	FCC,IC,CE,JP,AU,QRID	FCC,IC,CE,JP,AU,QRID
Eval board	EV-BM833	EV-BM833E	EV-BM833F	EV-BM840	EV-BM840P
1K price, ea.	\$4.80	\$5.73	\$5.77	\$4.76	\$4.76
<b>AP Availability</b>	Production	Production	Production	Production	Production

## Nordic nRF53 BC Series, Compact, the same footprint within a group

BT Series modules are full size with Bluetooth range up to 4500 meters. All BT modules have compatible footprint. An nRF52 module can be upgraded to an nRF53 module with a power amplifier or a BLE 5.3-WiFi 6 combo. BT modules are widely used in Fanstel pre-certified, market ready M.2 modules, basic, battery-powered, and PoE gateways.

- **M.2 modules:** nRF9160 + BT840F: [LN60E840F](#).
- **IP67 Battery-powered** BLE-LTE-LoRa gateways [SL40F6](#).

- **Medical IoT gateway:** [BLG840FB4](#).
- **IP65 BLE-LoRa to LTE, WiFi, PoE gateways** [LEWR840F6P](#).
- **BLE to WiFi 6 matter gateways:** BWG02C40F.
- Certified for both BLE and Thread, BT840F and BT840N Series are ready for Matter applications.
- **AP availability:** The initial production date of appprotect version.

## Nordic nRF52 BT Series, compatible footprint, upgradeable features and range

BLE 5 modules	BT832	BT832F	BT832A	BT832AF
APprotect	BT832-p	BT832F-p	BT832A-p	BT832AF-p
Sizes, mm	14x16x1.9	15x20.8x1.9	14x16x1.9	15x20.8x1.9
SoC	nRF52832	nRF52832	nRF52810	nRF52810
Flash/RAM	512KB/64KB	512KB/64KB	192KB/24KB	192KB/24KB
NFC	Yes	Yes	No	No
GPIO pins	32	32	32	32
Pins	40, CAS/LGA	40, CAS/LGA	40, CAS/LGA	40, CAS/LGA
Antenna	PCB trace	PCB trace	PCB trace	PCB trace
Range, 1 Mbps	100 meters	760 meters	100 meters	760 meters
Ant. at, 1.52m		390 meters		390 meters
Max. TX power, FCC	+2.55 dBm	+2.55 dBm	+2.55 dBm	+2.55 dBm
peak current RX	5.4 mA	5.4 mA	5.4 mA	5.4 mA
peak current TX	7.5mA, +4dBm	7.5mA, +4dBm	7.5mA, +4dBm	7.5mA, +4dBm
DCDC inductors	Integrated	Integrated	Integrated	Integrated
32.768kHz crystal	Ext.	Ext.	Ext.	Ext.
Certifications	FCC,IC,CE,JP,AU,QDID	FCC,IC,CE,JP,AU,QDID	FCC,IC,CE,JP,AU,QDID	FCC,IC,CE,JP,AU,QDID
Eval board	EV-BT832	EV-BT832F	EV-BT832A	EV-BT832AF
1K price, ea.	\$4.46	\$4.93	\$3.43	\$3.79
<b>AP Availability</b>	Production	Production	Production	Production

## Nordic nRF52 BT Series, compatible footprint, upgradeable features and range. Certified for BLE and 802.15.4.

BLE 5 modules	BT840F	BT840	BT840E	BT840N	BT840NE
APprotect	BT840F-p	BT840-p	BT840E-p	BT840N	BT840NE
Sizes, mm	15x20.8x1.9	14x16x1.9	14x16x1.9	15x29.9x1.9	15x29.9x1.9
SoC	nRF52840	nRF52840	nRF52840	nRF52840+21540	nRF52840+21540
MCU/flash/RAM	M4F/1MB/256KB	M4F/1MB/256KB	M4F/1MB/256KB	M4F/1MB/256KB	M4F/1MB/256KB
CryptoCell 310	Yes	Yes	Yes	Yes	Yes
IEEE 802.15.4,USB,NFC	Yes	Yes	Yes	Yes	Yes
GPIO pins	48	48	48	39	39
Pins	61, CAS/LGA	61, CAS/LGA	61, CAS/LGA	61, CAS/LGA	61, CAS/LGA
Antenna	PCB trace	PCB trace	u.FL	PA + PCB	PA + PCB+u.FL
Range, 1 Mbps	1000 meters	150 meters	>1000 meters, est.	1170 meters	>1100 meters, est.
Ant. at, 1.52m	390 meters	120 meters			
Range,125Kbps	2300 meters	320 meters	>2300 meters, est.	>4500 M, est.	>4500 M, est.
Ant at 1.52m	640 meters	210 meters			
Max. TX power, conducted	+8.49 dBm	+8.49 dBm	+8.49 dBm	+20.6 dBm	+20.6 dBm
Max. TX power, radiated	+9.4 dBm	+5.0 dBm	+14.5 dBm	+21.5 dBm	+26.6 dBm
peak current RX	4.6 mA	4.6 mA	4.6 mA		
peak current TX	13.6mA +8dBm	13.6mA +8dBm	13.6mA +8dBm		
DCDC inductors	Integrated	Integrated	Integrated	Integrated	Integrated
32.768kHz crystal	Ext.	Ext.	Ext.	Integrated	Integrated
Certifications	FCC,ISED,CE,RCM,TELEC (BLE+ 802.15.4), KCC, NCC, Anatel, QDID			FCC,ISED,CE,RCM,TELEC (BLE+ 802.15.4), QDID	
Eval board	EV-BT840F	EV-BT840	EV-BT840E	EV-BT840NE	EV-BT840NE
1K price, ea.	\$7.17	\$6.09	\$6.90	\$8.81	\$9.91
<b>AP Availability</b>	Production	Production	Production	Production	Production

## Modules with Skyworks PA

- nRF52832, nRF52840 with Skyworks power amplifier.
- **AP Availability:** The initial production date of appprotect versions.

## Semtech LoRa Module

- **LR62E:** SX1262 LoRa module.
- **LR62XE,** SX1262 + PA, max. TX: +29.2 dBm.

## Expressif WiFi Modules

**ESP32M4** is a Clone of ESP32-WROOM-32D with improved RF circuit and operating temperature -40°C to +105°C.

## Nordic nRF52 BT Series, compatible footprint, upgradeable features and range

BLE 5 modules	BT832X	BT832XE	BT840X	BT840XE
APprotect	BT832X-p	BT832XE-p	BT840X-p	BT840XE-p
Sizes, mm	15x28x1.9	15x28x1.9	15x28x1.9	15x28x1.9
SoC	nRF52832+SKY66112	nRF52832+SKY66112	nRF52840+SKY66112	nRF52840+SKY66112
Flash	512KB	512KB	1MB	1MB
RAM	64KB	64KB	256KB	256KB
CryptoCell 310			Yes	Yes
IEEE 802.15.4, USB			Yes	Yes
NFC	Yes	Yes	Yes	Yes
GPIO pins	29	29	45	45
Pins	40, CAS/LGA	40, CAS/LGA	61, CAS/LGA	61, CAS/LGA
Antenna	PCB trace	u.FL	PCB Trace	u.FL
Range, 1 Mbps	1140 meters	1140 meters	1170 meters	1170 meters
Ant. at. 1.52m	1120 meters	1120 meters	900 meters	900 meters
Range, 125Kbps			>4500 M	>4500 M
Ant at 1.52m			1240 meters	>1240M
Max. TX power, conducted	+18.75 dBm	+18.75 dBm	+21.0 dBm	+21 dBm
Max.TX power, radiated		+24.75 dBm		+27 dBm
peak current RX				
peak current TX	95mA,+20dBm	95mA,+20dBm		
DCDC inductors	Integrated	Integrated	Integrated	Integrated
32.768kHz crystal	Integrated	Integrated	Integrated	Integrated
Certifications	FCC,IC, QDID	FCC,IC, QDID	FCC,IC,CE,AU, QDID	FCC,IC,CE,AU, QDID
Eval board	EV-BT832X	EV-BT832XE	EV-BT840X	EV-BT840XE
1K price, ea.	\$9.69	\$9.87	\$12.50	\$12.75
<b>AP Availability</b>	Production	Production	Production	Production

## Expressif WiFi Modules

## Semtech LoRa Modules

Modules	ESP32M4	ESP32M16/E16	LR62E	LR62XE
Sizes, mm	18x25.5	18x25.5	10.2x15x1.9	10 (14) x22.3
SoC	ESP32-D0WD	ESP32-D0WD	SX1262	SX1262 + PA
Flash/RAM/ROM	4MB/520/448KB	16MB/520/448KB		
Max. TX power	+23.98 dBm	+23.98 dBm	+20.3 dBm	+29.2 dBm
Antenna	PCB Trace	PCB Trace/u.FL	u.FL	u.FL
Certifications	FCC, IC,CE,RCM,TELEC,KCC	FCC, IC,CE,RCM,TELEC,KCC	FCC,IC,RCM	FCC, IC,RCM
Operating temp.	-40°C to +105°C	-40°C to +105°C	-40°C to +85°C	-40°C to +85°C
Eval board			EV-LR62E	EV-LN60G
1K price, ea.	\$3.87	\$5.30/\$5.49	\$7.32	\$13.81
Availability	Production	Production	Production	Production

## LN60E840F Series LTE-BLE/802.15.4 Combo Modules

nRF52840 or nRF5340 module integrated with nRF9160 module. Bluetooth range can be > 4500 meters or 2.8 miles. An u.FL connector for external LTE antenna. A nano SIM card connector on board and SIM interface for external eSIM. GPS with integrated antenna and receiver amplifier, or an u.FL for external GPS antenna.

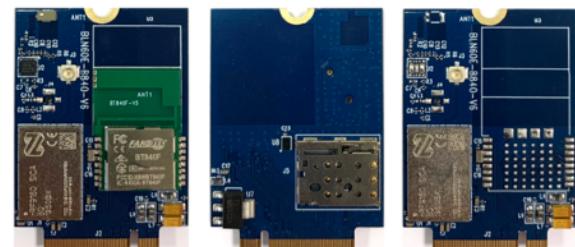
**LW60E02E40E Series:** 6-radios combo supporting Cat-M, NB-IoT, 5 GHz WiFi 6, 2.4 GHz WiFi 6-BLE 5.3-802.15.4. An nRF9160, nRF5340 and nRF7002 combo module.

## M262X840XE Series LoRa-BLE 5 Combo Module

nRF52840 and Semtech SX1262 combo module supporting BLE 5.2 and Long Range LoRa.

### M.2 Connector

B key, 67 pins.



### LN Modules Supporting LTE and BLE/802.15.4

Module	LN60E40F	LN60E40NE	LN60E840E	LN60E840F	LN60E840XE	LN60E
BLE module	BT40F	BT40NE	BT840E	BT840F	BT840XE	
BLE antenna	Integrated	u.FL+PCB+PA	u.FL	Integrated	PA + u.FL	
BLE TX power	+3.4 dBm		+8.5 dBm	+8.5 dBm	+21.0 dBm	
LTE module	nRF9160 SICA	nRF9160 SICA	nRF9160 SICA	nRF9160 SICA	nRF9160 SICA	nRF9160 SICA
LTE antenna	u.FL	u.FL	u.FL	u.FL	u.FL	u.FL
GPS antenna	u.FL	u.FL	u.FL	u.FL	u.FL	u.FL
Flash memory	16MB	16MB	None	None	None	None
Certifications	FCC,IC,TELEC (CE,RCM)		FCC,IC,TELEC (CE,RCM)	FCC,IC,TELEC (CE,RCM)	FCC,IC,(CE,RCM)	FCC,IC,TELEC (CE,RCM)
QDID	119517		108621	108621	108621	
1K price, each	\$49.48		\$40.56	\$40.56	\$57.11	\$32.75
Availability	Production		Production	Production	Production	Production

### M2 Modules Supporting WiFi 6/LTE and BLE/802.15.4

Module	LW60E02E40E	LW60E02C40C	LW02E40NE	LW02C40F
WiFi-BLE module	WT02E40E	WT02C40C	BT40NE	BT40F
WiFi/BLE antenna	u.FL/u.FL	Chip/Chip	PCB + u.FL	PCB
BLE TX power				
LTE-WiFi module	nRF9160 SICA	nRF9160 SICA	WM02E	WM02C
WiFi antenna	u.FL	u.FL	u.FL	Chip
Certifications				
QDID	119517	119517		
1K price, each				
Availability				

### M2 Module Supporting BLE/802.15.4-LoRa

Module	M262840F	M262X840XE	M2840XE	M240E	M262X840F
BLE module/TX	BT840F/+8.5dBm	BT840XE/+21dBm	BT840XE/+21dBm	BT40E	BT840F/+8.5dBm
BLE antenna	Integrated	PA + u.FL	PA + u.FL	u.FL	Integrated
LoRa module/TX	LR62E/+20.3dBm	LR62XE/+29.2dBm			LR62XE/+29.2dBm
LoRa antenna	u.FL	u.FL			u.FL
Certifications	FCC,IC,RCM	FCC,IC,RCM	FCC,IC,CE,RCM	FCC,IC,CE,RCM,TELEC	FCC,IC,RCM
QDID	108621	108621	108621	119517	108621
1K price, each	\$19.64	\$44.86			\$32.49
Availability	Production	Production	Non stock	Non stock	Production

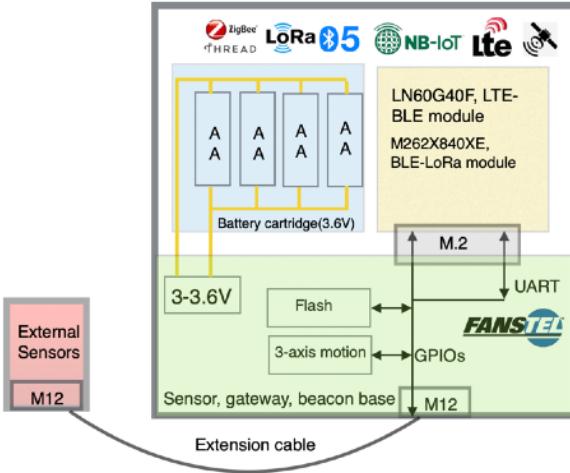
## SL60F6 Series IP67 BLE-LTE-LoRa Gateways

This sensor is available in IP67 (yellow) or IP51 (black).

- The battery cartridge can accommodate 4 x AA, 3.6 volts lithium batteries with 30 watts power.



- M12 connector for external sensor
- Use 1 - 4 AA, 3.6V Lithium batteries. Max. 30 Amp-hours.



- The IP67 enclosure can have an optional 8-pins, M12 connector for external sensors.
- The IP51 enclosure can have an optional 8-pins RJ45 connector for external sensors.
- The host board has an M.2 connector for an LTE module, a BLE module, an [LN LTE-BLE module](#) or an [M2 BLE-LoRa module](#).
- [SL40F6](#) can be used as a sensor or a battery powered BLE to LTE gateway.

hours.

	LTE-BLE gateway	LTE-BLE gateway	LTE-BLE gateway	LoRa-BLE bridge	LTE-GPS beacon
	SL840F5R	SL40E6M	SL40F6N	SR840F6N	SLG6N
Ingress Protect/Color	IP51/black	IP67/yellow	IP67/yellow	IP67/yellow	IP67/yellow
Radios	BLE5.3	BLE5.3,LTE	BLE5.3,LTE	BLE5.3,LoRa	LTE
LN, M2 module	LN60E840F	LN60E40E	LN60E40F	M262840F	LN60G1
Sensors	LIS3DH, 3-axis motion				
External antenna	0	1	0	1	0
Ext.sensor conn.	RJ45	M12	None	None	None
Power, not included	4AA, 3.6V Lithium				
Max operating temp	-40°C to +80°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
Mounting	Wall or pole mount				
Certifications					
1K price, each	\$79.29	\$105.78	\$86.81	\$53.20	
Availability	Samples	Samples	Samples		

## BLE-LoRa to LTE-WiFi-PoE Ethernet Gateways



## IP67 Industrial Multiple Network Gateways

- Basic edge computing industrial IoT gateways: IP67/ IP65 **LEW40E6P** (PoE), or IP51 LEW40E5P (PoE). BLE, 802.15.4 to LTE, WiFi, PoE gateways with dual core Cortex M33 processors up to 128 MHz. The PoE



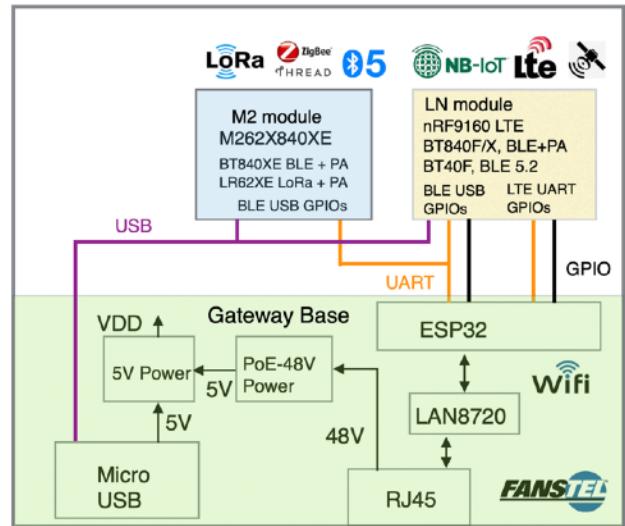
gateway enclosure is IP67 rated. A silicone shield for the cable RJ45 plug is required for IP67 rated gateway.

## IP51 Industrial Multiple Network Gateways

- Basic Bluetooth to WiFi, Ethernet gateway: **EW840F5P** (PoE) or EW840F5N (Non-PoE). IP51 for indoor applications.
- Multiple radio protocols, BLE/IEEE 802.15.4, LoRa to WiFi, Ethernet, LTE gateway: **LEWR840E5P**.

## OpenSource Supports

- **Mongoose OS** OpenSource codes for connecting to **Fanstel, AWS, MicroSoft, or Google Cloud platforms.**
- Firmware for BLE, WiFi, LTE modules.
- Android OS apps.
- Link to download document and source codes:  
**<http://www.fanstel.com/download-opensource/>**



## *BLE to WiFi, LTE, or LoRa Single Network Gateways*

## Bluetooth to WiFi Gateways

The size of this enclosure is 60x60x22mm. It is available with no external antenna, one external antenna, or 2 external antennas.

- **BWG832F**: low cost gateway for home or small mesh.
- **BWG832X**(+18dBm TX) can penetrate multiple walls.
- **BWG840F** BLE 5.2 secure gateway, long range
- **BWG840XE**, +21 dBm TX power. Preloaded with Works With Wiliot codes for battery less Bluetooth



tags (not open source). Fanstel open source codes available.

## Bluetooth to LTE Gateways

- **BLG840F**, LTE-M/NB-IoT, long range BLE 5.2.
- **BLG840XE**, +21 dBm BLE to LTE-M/NB-IoT gateway.
- **BLG40F** Basic edge computing IoT gateway with dual core Cortex M33 up to 128MHz, 16 MB flash memory for local storage.

## Bluetooth to LoRa Gateways

- **BR840F**, LTE-M/NB-IoT, long range BLE 5.2.
- **BRX840XE**, +21 dBm TX power BLE to +29.2 dBm TX power LoRa gateway.

## Remote USB Dongle

- **BU840XE**, remote dongle includes a 2-meters long USB cable, a wall mount bracket, an external antenna to maximize range by wall mounting to reduce obstruction.
- BU40NE, remote dongle includes a 2-meters long USB cable, a wall mount bracket, an external antenna to maximize LE audio broadcasting range by wall mounting to reduce obstruction.

## OpenSource Supports

- **Mongoose OS** OpenSource codes for connecting to **Fanstel**, **AWS**, **MicroSoft**, or **Google Cloud platforms**.
- Firmware for BLE, WiFi, LTE modules.
- Android OS apps.

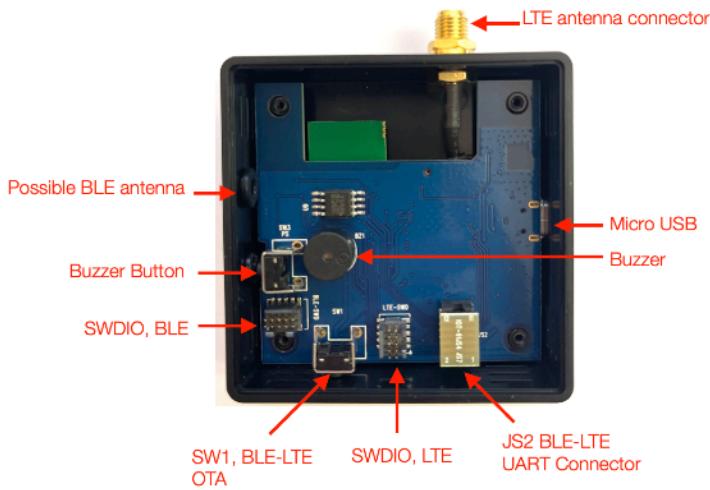
BLE to WiFi Gateways without Ingress Protection. Size, 60x60x22mm.				
Gateway	BWG832F	BWG832X	BWG840F	BWG840XE
WiFi Module	ESP 8266	ESP 8266	ESP 32	ESP 32
BLE Module	BT832F	BT832X	BT840F	BT840XE
BT range, 1Mbps	760 meters	1140 meters	1000 meters	
BT range, 125 Kbps			2300 meters	>4500 meters
Mounting	Desk, wall	Desk, wall	Desk, wall	Desk, wall
Certifications	FCC,IC	FCC,IC	FCC,IC,CE,RCM,TELEC	FCC,IC,CE,RCM
QDID	97989	97989	108621	108621
1K price, each	\$22.49	\$36.65	\$31.14	\$49.40
Development Kit	DK-BWG832F	DK-BWG832X	PK-BWG840XE	PK-BWG840XE
Availability	Production	Production	Production	Production

# Open Source Medical and Matter IoT Gateways

## Optimized for Remote Patient Monitoring

Features for remote patient monitoring:

- Flash memory to store patient data and forward to cloud upon LTE reconnection.
- A buzzer for audio alerting and a control button.



## Bluetooth to LTE Gateways

- **BLG840FB4, BLG840FB16**, Basic LTE-M/NB-IoT to BLE 5.3/802.15.4 gateways with 4MB or 16MB flash for local storage.

- **BLG40FB16** Edge computing medical IoT gateway with dual core Cortex M33 up to 128MHz, 16 MB flash memory for local storage..

## BLE 5.3/Thread to WiFi 6 Gateways

- **MIG02C40F**, WiFi 6 to BLE 5.3/Thread gateway for Matter applications, 4MB flash for local storage.
- **MIG02V40NE**, a PA and external antennas for long range BLE 5.3/Thread to long range WiFi 6 gateway for Matter applications, 16MB flash for local storage.
- **MIG02C840F**, Low cost WiFi 6 to BLE 5.3/Thread gateways, 4MB flash for local storage. Not recommended for Matter applications.

## OpenSource Supports

- OpenSource codes for connecting to **Fanstel**, **AWS**, **MicroSoft**, or **Google Cloud platforms**.
- Firmware for BLE, WiFi, LTE modules.
- Android OS apps.
- Link to download document and source codes:  
<http://www.fanstel.com/download-opensource/>

### Medical IoT Gateway for Remote Patient Monitoring, Bluetooth to LTE

	BLG840FB4	BLG840FB16	BLG40FB16
LTE module	nRF9160 SICA	nRF9160 SICA	nRF9160 SICA
BLE module/TX power	BT840F/+8.5 dBm	BT840F/+8.5dBm	BT40F/+3.4 dBm
Ext. flash memory	4MB	16MB	16MB
Certifications	FCC, ISED	FCC, ISED	FCC, ISED
QDID	108621, 182626	108621, 182626	119517, 182626
1K price, each	\$63.98	\$65.98	\$70.53
Programming Kit	PK-BLG840F	PK-BLG840F	PK-BLG840F
Availability	Production	Non stock	Production

	Matter IoT Gateway	Long Range Matter Application	LE Audio Broadcasting	BLE to WiFi 6 gateway
	MIG02C40F	MIG02V40NE	BU40NE	MIG02C840F
WiFi 6 module	WM02C, 2.4GHz + 5 GHz	WM02V, 2.4GHz+5GHz	None	WM02C, 2.4GHz+5GHz
BLE/TX power/External antenna	BT40F/+3.4 dBm	BT40NE/+19.1 dBm/ANT000	BT40NE/+19.1 dBm/ANT000	BT840F/+8.5 dBm
Ext. flash memory	4MB	16MB	0	0
Certifications				
QDID				
1K price, each	\$28.93	\$40.15	\$31.14	\$25.34
Programming Kit				
Availability	samples			

## SE Series BLE 5, LoRa Sensors

- **SE832AF-210, SE840F-210, SE840X-210**: BLE temperature, humidity sensors.
- **SE6233**: BLE-LoRa temperature, humidity, motion sensor.

## SC Series BLE 5.3 Compact Sensor, Beacon

- Preloaded with iBeacon and Eddystone codes
- **SC833AF** beacon.
- **SC833F** temperature, humidity, motion sensors

## nRF52840 USB Dongles

- Preloaded with Nordic USB CDC ACM secure DFU boot loader, USB dongle can be booted and firmware updated from a PC.
- **USB840F and USB840X** have pads for Tag-Connect cable TC2050-IDC-NL-050-ALL for programming nRF52840.
- Use USB840F to develop codes for **USB840M**.
- USB840F and USB840X with vertical antenna for near omni-directional range coverage.

- **BU840XE** remote dongle includes a 2-meters long USB cable, a wall mount bracket, an external antenna to maximize range by wall mounting to reduce obstruction.

## nRF5340 USB Dongles

- Preloaded with Nordic USB CDC ACM secure DFU boot loader, USB dongle can be booted and firmware updated from a PC.
- **USB40F and USB40N** have pads for Tag-Connect cable TC2050-IDC-NL-050-ALL for programming nRF5340.
- USB40F and USB40N with vertical antenna for near omni-directional range coverage.
- **BU40NE** remote dongle includes a 2-meters long USB cable, a wall mount bracket, an external antenna to maximize range by wall mounting to reduce obstruction.

Wireless Sensor/Beacon, no Ingress Protection.							
	SE832AF-210	SE840F-210	SE840X-210	SC805M	SC833AF	SC833F	SE6233
BLE Module	BT832AF	BT840F	BT840X	BC805M	BM833AF, BLE	BM833F, BLE 5.1	LoRa+BLE5.1
Size, mm	60x60x22	60x60x22	60x60x22	30x31x10	30x31x10	30x31x10	60x60x22
Humidity, temp	ENS210	ENS210	ENS210			ENS210	ENS210
Motion sensor						LIS3DH	LIS3DH
Power, not included	2 AAA	2 AAA/micro USB	Micro USB, included	CR2032	CR2032	CR2032	2AAA/micro USB
Mounting	Desk, wall	Desk, wall	Desk, wall	Hook, 2 sided tape	Hook, 2 sided tape	Hook, 2 sided tape	Desk, wall
Certifications	FCC,IC	FCC,IC	FCC,IC				
QDID	97989	108621	108621	138610	138767	138767	138767
1K price, each	\$11.31	\$15.54	\$25.20	\$4.44	\$7.37	\$12.97	\$30.47
Availability	Production	Production	Production	Sample	Sample	Sample	Sample

nRF52840 Bluetooth 5.3 USB Dongle				Remote USB Dongle
	USB840F	USB840M	USB840X	BU840XE
BLE Module	BT840F	BC840M	BT840X	BT840XE + ANT000
Size	52x21x21mm	26x15x6.0mm	52x21x21mm	60x60x22mm
LED indicators	2	1	2	2
Tag Connect pads	Yes	No	Yes	Connector
Certifications	FCC,IC,CE,RCM,TELEC,QDID	FCC,IC,CE,RCM,TELEC,QDID	FCC,IC,CE,RCM,QDID	FCC,IC,CE,RCM,QDID
1K price, each	\$10.67	\$10.67	\$19.99	\$33.33
Availability	Production	Production	Production	Production

nRF5340 Bluetooth 5.3 USB Dongle				Remote USB Dongle
	USB40F	USB40N	BU40NE	
BLE Module	BT40F	BT40N	BT40NE + ANT000	
Size	52x21x21mm	52x21x21mm	60x60x22mm	
LED indicators	2	2	2	
Tag Connect pads	Yes	Yes	Connector	
Certifications	FCC,IC,CE,RCM,TELEC,QDID			
1K price, each	\$13.59	\$19.99	\$31.14	
Availability				

## Bluetooth, LoRa, and LTE Antennas

- Most antennas include a 100 mm long u.FL to SMA adapter cable. SMA connector with panel mounting hardware.
- ANT032 uses a P822602, globally certified with nRF9160, includes a 2-sided tape for mounting inside an enclosure.

- ANT032E uses a P822601, globally certified with nRF9160, includes panel mounting hardware .

Panel mountable antenna with 100 mm long SMA to u.FL adapter cable					
Antenna	Band	Length	Ingress Protection	Certified with	1K price
ANT000	BLE, 2.4 GHz	50mm	IP67	FCC: BT840XE; CE/RCM/TELEC, BC833E, BM833E, BT840E	\$2.63
ANT020	BLE, 2.4 GHz	30mm		FCC/CE/RCM/TELEC: BM832E	\$2.63
ANT025	LoRa, 915MHz			FCC: LR62E, LR62XE	\$3.68
ANT025P	LoRa, 915MHz	198mm	IP67	FCC: LR62XE	\$3.68
ANT032	LTE, multiple	52mm		Uses a P822601, certified with nRF9160 globally. Glued to internal wall of enclosure.	\$5.03
ANT032E	LTE, multiple	78mm		Uses a P822601, certified with nRF9160 globally. Panel mountable, external antenna	\$7.42
ANT060	BLE, 2.4 GHz	195mm		FCC: BC833E, BM833E, BT840E, BT832XE. All: BT40E	\$3.15
ANT060P	BLE, 2.4 GHz		IP67		\$3.68



## Contact Fanstel

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