



# 회사소개서

## IoT의 미래가 보인다. 주식회사 엘테크

누구도 생각해내지 못한 아이디어,  
시대에 앞장서는 기술을 경험해보세요.





## IoT(Internet of Things) 기술의 선도기업



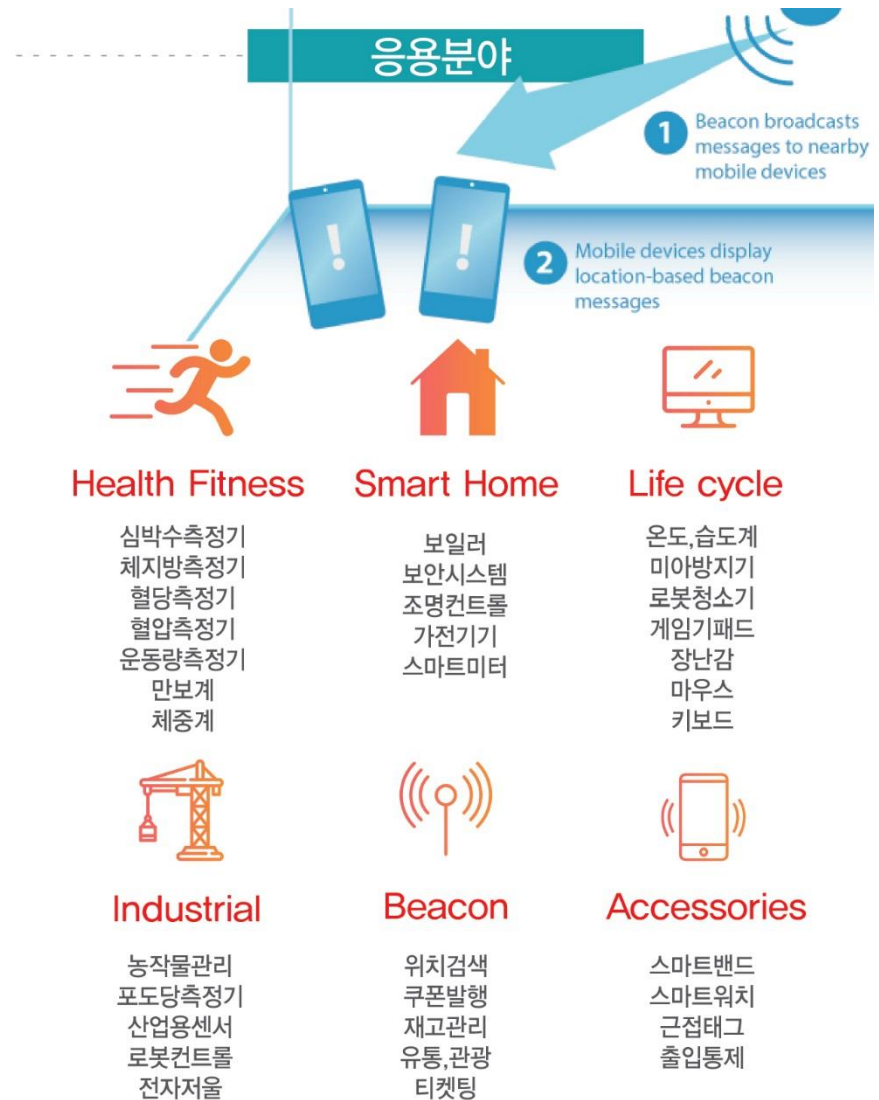
# NORDIC BLE Chip, BLE Module 응용분야

## Bluetooth



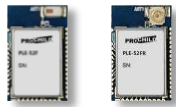
BLE module

## Bluetooth Low Energy



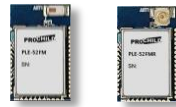


## Bluetooth Low Energy Modules



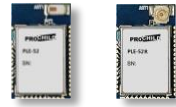
PLE-52F PLE-52FR

16 x 10 x 2.3 (mm)



PLE-52FM PLE-52FMR

16 x 10 x 2.3 (mm)



PLE-52 PLE-52R

16 x 10 x 2.3 (mm)



PLE-52ML PLE-52MLR

16 x 10 x 2.3 (mm)



PLE-52M PLE-52MR

16 x 10 x 2.3 (mm)

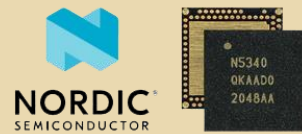
### Specifications

IC	nRF52840-QIAA	nRF52833-QIAA	nRF52832-QFAA	nRF52811-QFAA	nRF52810-QFAA
<b>CPU</b>	ARM Cortex-M4F at 64MHz	ARM Cortex-M4F at 64MHz	ARM Cortex-M4F at 64MHz	ARM Cortex-M4 at 64MHz	ARM Cortex-M4 at 64MHz
<b>Memory</b>	1MB Flash + 256kB RAM	512kB Flash + 128kB RAM	512kB Flash + 64kB RAM	192kB Flash + 24kB RAM	192kB Flash + 24kB RAM
<b>Wireless Protocol</b>	Bluetooth 5 / ANT / Bluetooth mesh / 802.15.4 / Thread / Zigbee / 2.4 GHz proprietary	Bluetooth 5.1 / ANT / Bluetooth mesh / 802.15.4 / Thread / Zigbee / 2.4 GHz proprietary	Bluetooth 5 / ANT / Bluetooth mesh / 2.4 GHz proprietary	Bluetooth 5.1 / ANT / 802.15.4 / 2.4 GHz proprietary	Bluetooth 5 / ANT / 2.4 GHz proprietary
<b>Max Data Rate</b>	Bluetooth : 2Mbs ANT : 1Mbs 2.4GHz : 2Mbs 802.15.4 : 250kbs	Bluetooth : 2Mbs ANT : 1Mbs 2.4GHz : 2Mbs 802.15.4 : 250kbs	Bluetooth : 2Mbps ANT : 1Mbs 2.4GHz : 2Mbps	Bluetooth : 2Mbps ANT : 1Mbs 2.4GHz : 2Mbps 802.15.4 : 250kbs	Bluetooth : 2Mbps ANT : 1Mbs 2.4GHz : 2Mbps
<b>TX power</b>	+8 dBm to -20 dBm in 4dB steps	+8 dBm to -20 dBm in 4dB steps	+4 dBm to -20 dBm in 4dB steps	+4 dBm to -20 dBm in 4dB steps	+4 dBm to -20 dBm in 4dB steps
<b>Sensitivity</b>	Bluetooth : -103 dBm to -92 dBm 802.15.4 : -100 dBm ANT : -93dBm 2.4GHz : -93 dBm to -89 dBm	Bluetooth : -103 dBm to -92 dBm 802.15.4 : -99 dBm ANT : -93dBm 2.4GHz : -93 dBm to -89 dBm	Bluetooth : -96 dBm to -89 dBm 802.15.4 : -100 dBm ANT : -93dBm	Bluetooth : -104 dBm to -94 dBm 802.15.4 : -101 dBm ANT : -94dBm 2.4GHz : -94 dBm to -91 dBm	Bluetooth : -96 dBm to -93 dBm ANT : -93 dBm 2.4GHz : -96 dBm to -93 dBm
<b>Hardware security</b>	128-bit AES CCM, ECB, AAR	128-bit AES CCM, ECB, AAR	128-bit AES CCM, ECB, AAR	128-bit AES CCM, ECB, AAR	128-bit AES CCM, ECB, AAR
<b>Voltage Supply</b>	1.7 to 5.5 V LDO or DC/DC (optional) (VDD : 1.7 V to 3.6 V) (VDDH : 2.5 V to 5.5 V)	1.7 to 5.5 V LDO or DC/DC (optional) (VDD : 1.7 V to 3.6 V) (VDDH : 2.5 V to 5.5 V)	1.7 to 3.6 V LDO or DC/DC (optional)	1.7 to 3.6 V LDO or DC/DC (optional)	1.7 to 3.6 V LDO or DC/DC (optional)
<b>Operating Temperature</b>	-40 °C. to +85 °C	-40 °C to +105 °C	-40 °C to +85 °C	-40 °C. to +85 °C	-40 °C to +85 °C
<b>GPIO</b>	48	42	32	32	32
<b>Interfaces</b>	USB 2.0, SPIM x 4, SPIS x 2, TWIM x 2, TWIS x 2, UART x 2, PWM x 4, QSPI, I2 S, PDM, QDEC, ADC, NFC Tag	USB 2.0, SPIM x 4, SPIS x 2, TWIM x 2, TWIS x 2, UART x 2, PWM x 4, I2S, PDM, QDEC, ADC, NFC Tag	SPIM/SPIS x 3, TWIM/TWIS x 2, UART x 1, PWM x 3, I2S, PDM, QDEC, ADC, NFC C Tag	SPIM/SPIS x 2, TWIM/TWIS, UART, PWM, PDM, QDEC, ADC	SPIM/SPIS, TWIM/TWIS, UART, PWM, PDM, QDEC, ADC
<b>Bluetooth 5.1</b>	-	Direction Finding (AoA, AoD)	-	Direction Finding (AoA, AoD)	-
<b>Bluetooth 5.0</b>	2Mbps, Long Range, Advertising Extensions	2Mbps, Long Range, Advertising Extensions	2Mbps, Advertising Extensions	2Mbps, Long Range, Advertising Extensions	2Mbps, Advertising Extensions

### Certifications

<b>KC</b>	O	-	O	O	O	O	O	O	O
<b>FCC</b>	-	-	-	-	-	-	-	-	-
<b>CE</b>	-	-	-	-	-	-	-	-	-
<b>TELEC</b>	-	-	-	-	-	-	-	-	-

# Nordic BLE [ Bluetooth Low Energy ] Chip 소개



## Product Summary

Full product details at: [www.nordicsemi.com/Products](http://www.nordicsemi.com/Products)

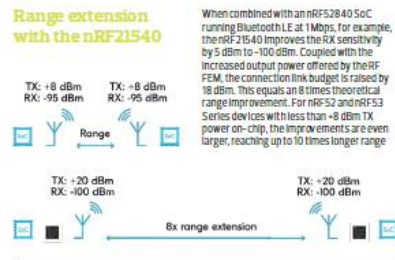
	nRF54 SERIES	nRF53 SERIES	nRF52 SERIES							nRF51 SERIES		
	nRF9160	nRF5340	nRF52840	nRF52833	nRF52832	nRF52820	nRF52811	nRF52810	nRF52805	nRF51822	nRF51422	nRF51824
WIRELESS PROTOCOL	•	•	•	•	•	•	•	•	•	•	•	•
TYPE	•	•	•	•	•	•	•	•	•	•	•	•
CORE/SYSTEM	CPU: 64MHz Arm Cortex-M33	128MHz Arm Cortex-M33	64MHz Arm Cortex-M4	64MHz Arm Cortex-M4	64MHz Arm Cortex-M4	64MHz Arm Cortex-M4	64MHz Arm Cortex-M4	64MHz Arm Cortex-M4	64MHz Arm Cortex-M4	16MHz Arm Cortex-M0	16MHz Arm Cortex-M0	16MHz Arm Cortex-M0
SECURITY	•	•	•	•	•	•	•	•	•	•	•	•
RADIO	1.5, 8, 12, 14, 17, 20, 25, 26, 28, 06	2.4GHz	2.4GHz	2.4GHz	2.4GHz	2.4GHz	2.4GHz	2.4GHz	2.4GHz	2.4GHz	2.4GHz	2.4GHz
PERIPHERALS	•	•	•	•	•	•	•	•	•	•	•	•
APPLICATIONS	•	•	•	•	•	•	•	•	•	•	•	•
CERTIFICATIONS	•	•	•	•	•	•	•	•	•	•	•	•
OPERATING TEMPERATURE	-40 to 85°C	-40 to 105°C	-40 to 105°C	-40 to 105°C	-40 to 85°C	-40 to 85°C	-40 to 85°C	-40 to 85°C	-40 to 85°C	-40 to 85°C	-40 to 85°C	-40 to 105°C
SUPPLY VOLTAGE RANGE	3.0 to 5.5V	1.7 to 5.5V	1.7 to 5.5V	1.7 to 5.5V	1.7 to 3.6V	1.7 to 3.6V	1.7 to 3.6V	1.7 to 3.6V	1.7 to 3.6V	1.8 to 3.6V	1.8 to 3.6V	1.8 to 3.6V
DEVELOPMENT KITS	nRF9160 DK, Nordic Thingy 51	nRF5340 DK	nRF52840 DK, Nordic Thingy 51	nRF52833 DK	nRF52832 DK, Nordic Thingy 52	nRF52820 DK	nRF52811 DK	nRF52810 DK	nRF52805 DK	nRF51822 DK, nRF51422 DK, nRF51824 DK	nRF51422 DK	nRF51824 DK
PACKAGES	10x10x1.04mm LGA	7x7mm QFN48 (48 GPIOs), 4x4mm WLCSP48 (48 GPIOs)	7x7mm QFN48 (48 GPIOs), 6x6mm QFN48 (48 GPIOs), 3.5x3.2mm WLCSP48 (48 GPIOs)	7x7mm QFN48 (48 GPIOs), 6x6mm QFN48 (48 GPIOs)	6x6mm QFN48 (48 GPIOs), 3.0x3.2mm WLCSP48 (48 GPIOs)	5x5mm QFN48 (48 GPIOs), 2.5x2.5mm WLCSP48 (48 GPIOs)	6x6mm QFN48 (48 GPIOs), 5x5mm QFN48 (48 GPIOs), 2.48x2.46mm WLCSP48 (48 GPIOs)	6x6mm QFN48 (48 GPIOs), 5x5mm QFN48 (48 GPIOs)	2.48x2.46mm WLCSP48 (48 GPIOs)	6x6mm QFN48, WLCSP48, Thin CSP	6x6mm QFN48, WLCSP48	6x6mm QFN48, WLCSP48

## Tech Profile nRF21540

**Description:** The nRF21540 is an RF front-end module (FEM) that improves range and connection robustness for Nordic nRF52 and nRF53 Series SoCs. The nRF21540 is a complementary device operating as a 'plug-and-play' range extender with the addition of just a few external components. The nRF21540's 13 dB RX gain and low noise figure of 2.7 dB coupled with up to -21 dBm TX output power, ensure a superior link budget boosting the range of the SoCs by between 6.3 and 10 times. The nRF21540 is supplied in a 4 by 4 mm QFN6 package and operates from 1.7 to 3.6 V input supply range.

**Operation:** The nRF21540 supports Bluetooth LE, Bluetooth mesh, Thread, Zigbee and 2.4 GHz proprietary protocol applications. The RF FEM's TX output power is dynamically adjustable and can be set in small increments such that products can run with output power within 1 dBm of the allowable range across all geographical regions. The RF FEM's power consumption is 110 mA with TX at -20 dB and 38 mA at TX -10 dB. RX power is 2.9 mA and power use in power down modes is 45 nA. The RF FEM suits all applications that require increased range and/or robust coverage. In demanding RF environments, or where the application is operating close to the range limit, it can be more energy efficient to use the nRF21540 than continuously resend packets. The nRF21540 can operate across a -40 to 105°C temperature range, making the RF FEM suitable for use with Nordic's extended temperature qualified nRF5340, nRF52833 and nRF52820 SoCs in industrial applications such as professional lighting.

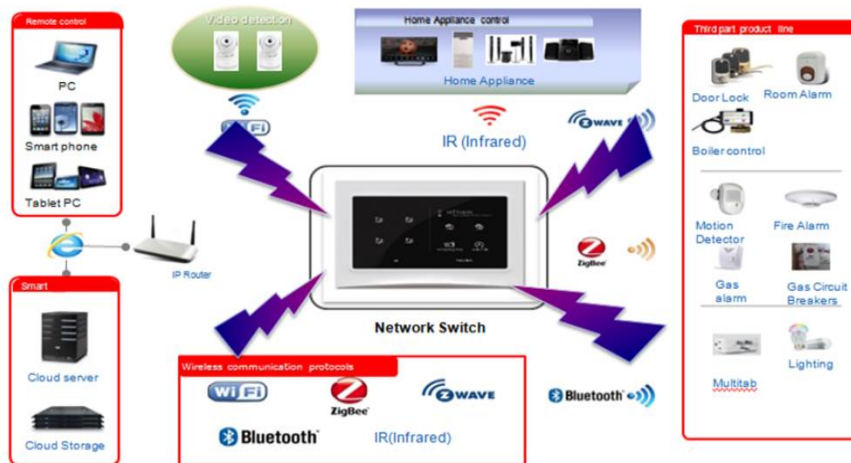
**Development tools:** The nRF21540 Development Bundle (DB) comprises an nRF21540 DK and an nRF21540 Evaluation Kit (EK). The DK incorporates the nRF21540 RF FEM and the nRF52840 SoC. The EK has two antennas with SWF ports for direct RF measurements. The dual antennas can be used in an antenna diversity scenario with, for example, Thread or Zigbee protocols to reduce multipath fading effects. The RF FEM is connected to, and controlled by, the nRF52840 SoC. The SoC supports all Bluetooth 5.2 features. The EK can link to lab equipment via SMA connectors to monitor the RF FEM's performance. The EK can also be used with nRF52 and nRF53 Series DKs, as well as other devices. The nRF21540's TX gain control, antenna switching and modes are controlled via GPIO or SPI or a combination of both, accessible through the Arduino Uno Rev3 compatible headers. The shield also features two additional SMA connector sockets for the dual antenna ports from the RF FEM, to monitor the chip performance using the desired equipment. Driver support for the nRF21540 RF FEM is included in the nRF Connect SDK and nRF5 SDK for Thread and Zigbee.



## Wi-Fi Module



SmartConnect Wi-Fi  
IEEE 802.11 b/g/n IoT



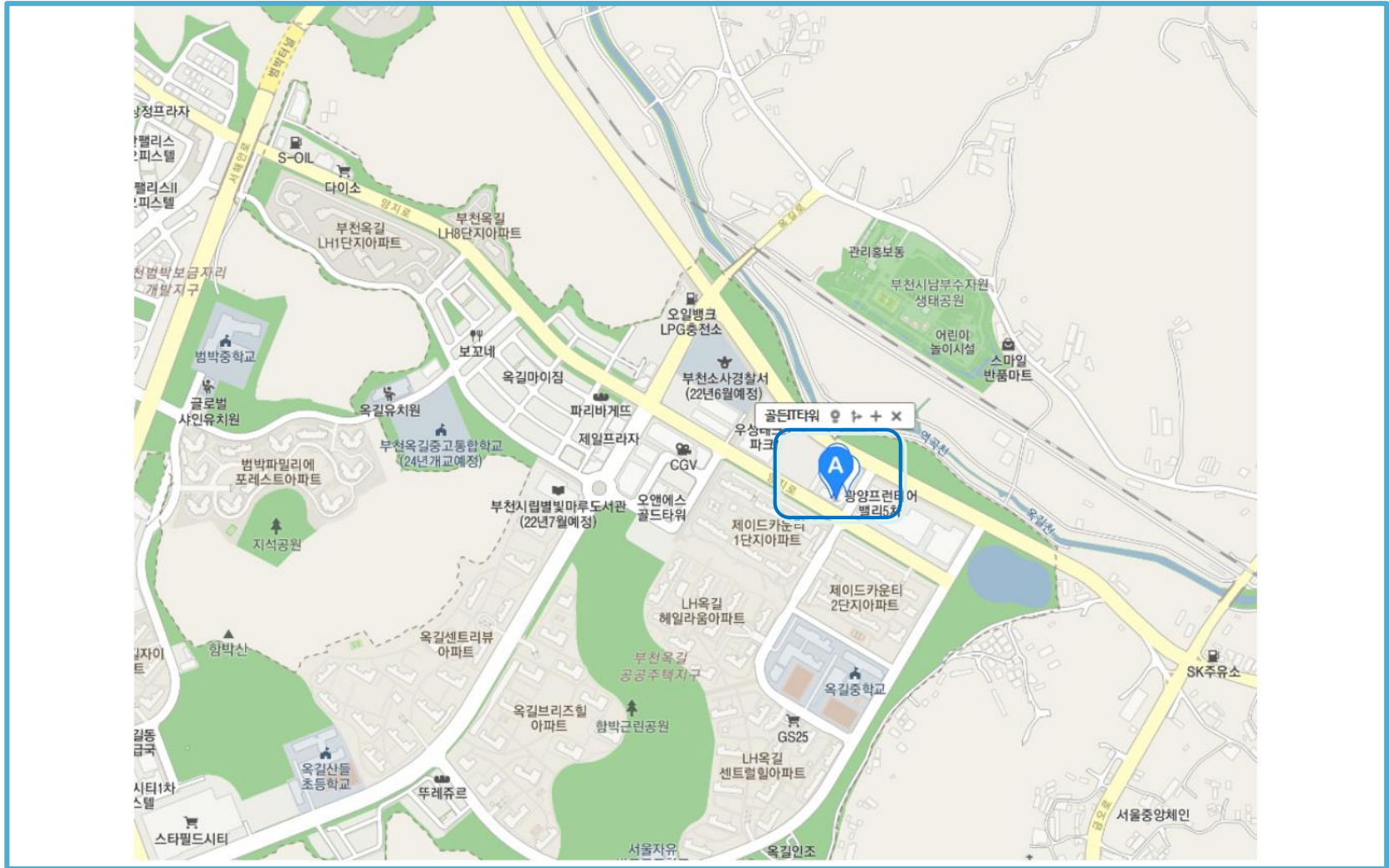
## 특성

- Connectivity to Access Points
- Cloud-ready platform with multiple Cloud partners
- Best in the Industry Security

## Application

- IoT applications
- Smart appliances
- Multimedia streaming
- Safety and security
- Home automation
- Consumer electronics
- Industrial automation

# 오시는 길



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감사합니다.

**Thank you**

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