Nordic Product Guide

This handy summary describes all of Nordic's IoT solutions

Full product details at:
www.nordicsemi.com/Products

NORDIC SEMICONDUCTOR

Nordic's RF SoCs and SiP

|	nRF9160	nRF5340	nRF52840	nRF52833	nRF52832	nRF52820	nRF52811	nRF52810	nRF52805
WIRELESS PROTOCOL									
LTE-M	●								
NB-IoT	●								
GPS	●								
BLUETOOTH LOW ENERGY		●	●	●	●	●	●	●	●
BLUETOOTH 5.3		●	●	●	●	●	●	●	●
LE AUDIO		●							
DIRECTION FINDING		●		●		●	●		
2 Mbps		●	●	●	●	●	●	●	●
LONG RANGE		●	●	●		●	●		
BLUETOOTH MESH		●	●	●	●	●			
THREAD		●	●	●			●		
MATTER		●	●						
ZIGBEE		●	●	●		●			
ANT		●	●	●	●		●	●	●
2.4 GHz PROPRIETARY		●	●	●	●	●	●	●	●
NFC		●	●	●	●				
TYPE									
SYSTEM–ON–CHIP (SoC)		●	●	●	●	●	●	●	●
SYSTEM–IN–PACKAGE (SiP)	●								
CORE SYSTEM									
CPU	64 MHz Arm Cortex-M33	128 MHz Arm Cortex-M33 + 64 MHz Arm Cortex-M33	64 MHz Arm Cortex-M4	64 MHz Arm Cortex-M4	64 MHz Arm Cortex-M4	64 MHz Arm Cortex-M4	64 MHz Arm Cortex-M4	64 MHz Arm Cortex-M4	64 MHz Arm Cortex-M4
FPU	●	●	●	●	●				
DSP INSTRUCTION SET	●	●	●	●	●	●	●	●	●
CACHE	●	●	●						
MEMORY	1 MB Flash, 256 KB RAM	1 MB Flash, 512 KB RAM + 256 KB Flash, 64 KB RAM	1 MB Flash, 256 KB RAM	512 KB Flash, 128 KB RAM	512 KB or 256 KB Flash, 64 KB or 32 KB RAM	256 KB Flash, 32 KB RAM	192 KB Flash, 24 KB RAM	192 KB Flash, 24 KB RAM	192 KB Flash, 24 KB RAM
CLOCKS	64 MHz / 32 kHz	128 MHz / 64 MHz / 32 kHz	64 MHz / 32 kHz	64 MHz / 32 kHz	64 MHz / 32 kHz	64 MHz / 32 kHz	64 MHz / 32 kHz	64 MHz / 32 kHz	64 MHz / 32 kHz
SECURITY									
ARM TRUSTZONE	●	●							
ARM CRYPTOCELL	310	312	310						
ROOT–OF–TRUST	●	●	●						
SECURE KEY STORAGE	●	●							
AES ENCRYPTION	●	●	●	●	●	●	●	●	●
RADIO									
LTE–M/NB–IoT/GPS MODEM	●								
CERTIFIED LTE BANDS	1–5, 8, 12–14, 17–20, 25–26, 28, 66								
FREQUENCY	700–2200 MHz	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz
MAXIMUM TX POWER	23 dBm	3 dBm	8 dBm	8 dBm	4 dBm	8 dBm	4 dBm	4 dBm	4 dBm
RX SENSITIVITY	-108 dBm (LTE-M), -114 dBm (NB-IoT), -155 dBm (GPS)	-98 dBm (1Mbps)	-95 dBm (1Mbps)	-96 dBm (1Mbps)	-96 dBm (1Mbps)	-95 dBm (1Mbps)	-97 dBm (1Mbps)	-96 dBm (1Mbps)	-97 dBm (1Mbps)
ANTENNA INTERFACE	50 Ω single-ended	Single-ended	Single-ended	Single-ended	Single-ended	Single-ended	Single-ended	Single-ended	Single-ended
PERIPHERALS									
HIGH SPEED SPI		●	●	●					
TWI, SPI, UART	4xTWI/SPI/UART	4xTWI/SPI/UART +TWI/SPI/UART	2xTWI/SPI, SPI, 2xUART	2xTWI/SPI, SPI, 2xUART	2xTWI/SPI, SPI, 2xUART	2xTWI/SPI, UART	TWI/SPI, SPI, UART	TWI, SPI, UART	TWI, SPI, UART
QSPI		●	●						
USB		●	●	●		●			
PWM	4	4	4	4	3		1	1	
PDM	●	●	●	●	●		●	●	
I2S		●	●	●	●				
ADC, COMPARATOR	ADC	●	●	●	●	COMP	ADC, COMP	ADC, COMP	ADC
TIMER, RTC	3,2	3,2 + 3,2	5,3	5,3	5,3	4,2	3,2	3,2	3,2
TEMPERATURE SENSOR	●	●	●	●	●	●	●	●	●
CERTIFICATIONS	nordicsemi.com/9160cert	CE, FCC	CE, FCC	CE, FCC	CE, FCC	CE, FCC	CE, FCC	CE, FCC	CE, FCC
OPERATING TEMPERATURE	-40 to 85°C	-40 to 105°C	-40 to 85°C	-40 to 105°C	-40 to 85°C	-40 to 105°C	-40 to 85°C	-40 to 85°C	-40 to 85°C
SUPPLY VOLTAGE RANGE	3.0 to 5.5 V	1.7 to 5.5 V	1.7 to 5.5 V	1.7 to 5.5 V	1.7 to 3.6 V	1.7 to 5.5 V	1.7 to 3.6 V	1.7 to 3.6 V	1.7 to 3.6 V
DEVELOPMENT KITS	nRF9160 DK, Nordic Thingy:91	nRF5340 DK, nRF5340 Audio DK	nRF52840 DK, nRF52840 Dongle	nRF52833 DK	nRF52832 DK, Nordic Thingy:52	nRF52833 DK	nRF52840 DK	nRF52 DK	nRF52 DK
PACKAGES	10x16x1.04 mm LGA	7x7 mm aQFN94 (48 GPIOs), 4.4x4.0 mm WLCSP95 (48 GPIOs)	7x7 mm aQFN73 (48 GPIOs), 6x6 mm QFN48 (30 GPIOs), 3.5x3.6 mm WLCSP94 (48 GPIOs)	7x7 mm aQFN73 (42 GPIOs), 5x5 mm QFN40 (18 GPIOs), 3.2x3.2 mm WLCSP (42 GPIOs)	6x6 mm QFN48 (32 GPIOs), 3.0x3.2 mm WLCSP50 (32 GPIOs)	5x5 mm QFN40 (18 GPIOs), 2.53x2.53 mm WLC-SP44 (18 GPIOs)	6x6 mm QFN48 (32 GPIOs), 5x5 mm QFN32 (17 GPIOs), 2.48x2.46 mm WLCSP33 (15 GPIOs)	6x6 mm QFN48 (32 GPIOs), 5x5 mm QFN32 (17 GPIOs), 2.48x2.46 mm WLC-SP33 (15 GPIOs)	2.48x2.46 mm WLC-SP28 (10 GPIOs)

Range Extender
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 supported SoCs by between 6.3 and 10x. 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.

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 to comply with the allowable range across all geographical regions. The RF FEM can be use with Nordic's extended temperature qualified nRF5340, nRF52833 and nRF52820 SoCs in industrial applications such as professional lighting.
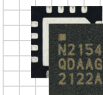
Tech Spec

Output power
Adjustable in small increments up to +21 dBm

Receive gain and noise figure ratings
13 dB receive gain. 2.7 dB noise figure

Input supply
1.7 to 3.6 V

Package
4 by 4 mm QFN16

Development hardware
The nRF21540 Development Bundle (DB) comprises an nRF21540 DK and an nRF21540 Evaluation Kit (EK)

Applications
Asset tracking, smart home, industrial, toys, audio

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Power Management
nPM1100

Description: The nPM1100 is a dedicated power management IC (PMIC) with dual-mode configurable buck regulator and integrated battery charger. It is designed to work with Nordic's nRF52 and nRF53 Series SoCs. It offers reliable and stable power delivery, while maximizing battery life through high efficiency and low quiescent currents. The product can also be used as a generic PMIC for rechargeable applications. Its compact form factor makes it ideal for advanced wearables, medical devices, and other size constrained devices. When optimized for size, PCB usage is around 23 mm^2 including passives. This increases to around 27 mm^2 when optimized for performance.

Operation: The dual-mode regulator operates at up to 92 percent power conversion efficiency, prolonging battery life of Nordic SoC based applications using a rechargeable battery. Hysteretic mode reduces current consumption for low loads, while PWM mode allows for cleaner power operation and better performance for higher loads. The regulator can deliver up to 150 mA, providing ample current for the SoCs plus additional circuitry.
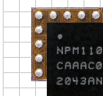
Tech Spec

Battery charger
JEITA compliant, 4.1 or 4.2 V selectable, 20 to 400 mA

Input regulator
Input 4.1 to 6.7 V, output 3.0 to 5.5 V (unregulated), USB current limit 100 or 500 mA

Buck regulator
Output 1.8, 2.1, 2.7 or 3.0 V, current limit 150 mA output

Package
2.075 by 2.075 mm WLCSP

Operating temperature
-40 to 85°C

Applications
Wearables, remote controls, medical devices, sensors

Cloud Services
nRF Cloud

Description: nRF Cloud is a versatile IoT connectivity enabler that can be directly used with Nordic's cellular IoT devices or with the nRF52 and nRF53 Series via a gateway. nRF Cloud services support Device-to-Cloud or Cloud-to-Cloud use cases. In the former, the device connects directly to nRF Cloud. In the latter, the device connects to a customer's Cloud that then connects to nRF Cloud's REST API.

Services: nRF Cloud Location Services are offered in nRF Cloud and include GPS and cell based location services. The product supplies accurate and rapid location data for customer connected devices. The A-GPS service can reduce time-to-first-fix significantly compared with regular GPS. The result is lower latency and improved power consumption. P-GPS downloads predictive data, extending validity of assistance data. Cell based services use base stations to predict location. SCELL uses a nearby cell tower, whereas MCELL uses multiple cell towers to triangulate a position. If power saving is more important than location accuracy, the cell based services are a good option. They are also useful for indoor positioning.

Tech Spec

Location services
Assisted GPS (A-GPS), Predictive GPS (P-GPS), Single-Cell (SCELL), Multi-Cell (MCELL)

Additional services
Supports Cloud-to-Cloud use cases for devices provisioned to a different Cloud provider

Supported products
nRF9160 SiP, nRF9160 DK, Nordic Thingy:91

Applications
Industrial, smart appliances, asset tracking, RTLS