Nordic Product Guide
This handy summary describes all of Nordic's IoT solutions

NORDIC SEMICONDUCTOR

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

RF SoCs and SiP

		nRF91 SERIES	nRF53 SERIES	nRF52 SERIES						
		nRF9160	**nRF5340**	**nRF52840**	**nRF52833**	**nRF52832**	**nRF52820**	**nRF52811**	**nRF52810**	**nRF52805**
WIRELESS PROTOCOL	LTE-M	●								
	NB-IoT	●								
	GNSS	●								
	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	1MB Flash, 256 KB RAM	1MB Flash, 512 KB RAM +256 KB Flash, 64 KB RAM	1MB Flash, 256 KB RAM	512 KB Flash, 128 KB RAM	512 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	●	●	●						
	PSA CERTIFICATION	Level 2	Level 2	Level 1						
	LTE-M/NB-IoT/GPS MODEM	●								
	CERTIFIED LTE BANDS	1–5, 8, 12–14, 17–20, 25–26, 28, 66								
RADIO	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, UART	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℃	-40 to 105℃	-40 to 85℃	-40 to 105℃	-40 to 85℃	-40 to 105℃	-40 to 85℃	-40 to 85℃	-40 to 85℃
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, Nordic Thingy:53	nRF52840 DK, nRF52840 Dongle	nRF52833 DK	nRF52 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 WLCSP (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)

PMICs — nPM FAMILY

		nPM1300	**nPM1100**	**nPM6001**
TYPE	PMIC	●	●	●
FEATURES	BUCK REGULATOR	2	1	4
	BATTERY CHARGER	●	●	
	LDO	2		2
	LOAD SWITCH	2		
CHARGER	TERMINATION VOLTAGE	3.5 to 4.45 V	4.1 to 4.2 V or 4.25 to 4.35 V	
	MAX CHARGING CURRENT	800 mA	400 mA	
	POWER PATH MANAGEMENT	●	●	
	THERMAL PROTECTION	●	●	
	BATTERY COMPATIBILITY	LiFePO4, Li-ion, LiPo	Li-ion, LiPo	
POWER RAILS	INPUT VOLTAGE	4 to 5.5 V	4.1 to 6.7 V	3 to 5.5 V
	USB COMPLIANCE	Type-C		
	REGULATED OUTPUT VOLTAGE	1 to 3.3 V	1.8 to 3 V	0.5 to 3.3 V
	MAX CURRENT PER BUCK	200 mA, 200 mA	150 mA	550 mA, 200 mA, 150 mA, 150 mA
SYSTEM MANAGEMENT	SYSTEM MONITORING	System-, input bus- and battery-voltage; battery-current and -temp; die temp		
	FUEL GAUGE	●		
	HARD SYSTEM RESET	●		
	TIMED WAKE-UP	●		●
	WATCHDOG TIMER	●		●
	SHIP MODE / HIBERNATE	●	●	●
	BROWN-OUT DETECTOR	●		●
	LED DRIVERS, GPIOs	3, 5	2, 0	0, 3
	CONTROL INTERFACE	TWI	Pin-configurable	TWI
REGULATORY COMPLIANCE		CE, JEITA, RoHS	CE, JEITA, RoHS	CE, RoHS
OPERATING TEMPERATURE		-40 to 85℃	-40 to 85℃	-40 to 85℃
EVALUATION KITS		nPM1300 EK	nPM1100 EK	nPM6001EK
PACKAGE OPTIONS		5x5 mm QFN32, 3.1x2.4 mm WLCSP	4x4 mm QFN24, 2.1x2.1 mm WLCSP	2.2x3.6 mm WLCSP

Cloud Services
nRF Cloud Services

Description: nRF Cloud Services are optimized for Nordic's low-power IoT Devices. nRF Cloud Services consists of nRF Cloud Location Services, and Device Management and Security Services will be available soon. Both Device-to-Cloud or Cloud-to-Cloud use cases are supported. CoAP and MQTT protocols are both supported.

Services: nRF Cloud Location Services include Assisted GPS, Predictive GPS, Wi-Fi, single-cell and multi-cell, and supply accurate and power-efficient location data for IoT devices employing nRF91 Series products. The Wi-Fi feature requires a Wi-Fi scanning IC, such as one of the nRF70 Series companion ICs. Each location feature has accuracy and power efficiency benefits, so switching between different location services during operation can be useful. nRF Cloud also includes a firmware-over-the-air update function, whereby the nRF91 Series' modem firmware, middleware and/or application firmware can be updated.

Tech Spec
Location services
A-GPS, P-GPS, Wi-Fi, Single-Cell, Multi-Cell
Additional features
Device-to-Cloud and Cloud-to-Cloud use cases
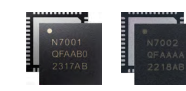CoAP, MQTT and REST API support
Supported products
nRF9160, nRF9131, nRF9161 SiPs, nRF7000, nRF7001, nRF7002 companion ICs
Applications
Industrial, smart appliances, asset tracking, RTLS

Range Extender
nRF21540

Description: The nRF21540 is an RF front-end module (FEM) that improves range and connection robustness for Nordic's nRF52, nRF53 and nRF54 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, Matter, Thread, Zigbee and 2.4 GHz protocols. The RF FEM's TX output power is dynamically adjustable and can be set to comply across all geographical regions. The RF FEM can be used with Nordic's extended temperature-qualified nRF5340, nRF52833 and nRF52820 SoCs in industrial applications.

Tech Spec
Output power
Adjustable in small increments up to +21dBm
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 bundle
nRF21540 DK and nRF21540 EK. The EK is a shield for use with nRF52 and nRF53 Series DKs
Applications
Asset tracking, smart home, industrial, toys, audio

Wi-Fi 6 companion ICs
nRF70 Series

Description: The nRF70 Series comprises three Wi-Fi companion ICs. The nRF7001 offers low-power 2.4 GHz connectivity, while the nRF7002 operates in both the 2.4 and 5 GHz bands. The nRF7000 is designed purely for active and passive scanning of Wi-Fi networks. These ICs ensure excellent coexistence with Bluetooth LE devices, advanced power saving with TWT and OFDMA for efficient uplink and downlink communication.

Operation: The nRF70 Series companion ICs provide low power, secure Wi-Fi connectivity as well as Wi-Fi assisted locationing based on Service Set identifier (SSID) scanning. The nRF70 Series accompany Nordic's nRF52 and nRF53 Series Bluetooth LE SoCs, and the nRF91 Series cellular IoT SiPs. The nRF70 Series can also be used as companion ICs in applications hosted by non-Nordic products. For non-Nordic host products, Nordic supplies the appropriate Linux drivers via the GitHub developer platform (github.com).

Tech Spec
Compliance
nRF7001: IEEE 802.11b (Wi-Fi 1)/g (Wi-Fi 3)/n (Wi-Fi 4)/ax (Wi-Fi 6)
nRF7002: IEEE 802.11a (Wi-Fi 5)/b/g/n/ac (Wi-Fi 5)/ax
Package
6 by 6 mm QFN
Features
Low power, good coexistence with Bluetooth LE, TWT
Development tools
nRF7002 DK, nRF7002 EK, nRF7002 EB
Applications
Asset tracking, smart home, industrial

Fourth generation SoCs

nRF54H20

Description: The nRF54H20 is a revolutionary multiprocessor and multiprotocol SoC for Bluetooth LE (supporting all Bluetooth 5.4 features), LE Audio, Bluetooth Mesh, Thread, Matter, ANT+ and 2.4 GHz proprietary protocols with a new 4 Mbps throughput option.

Technical details: The nRF54H20 features multiple processors optimized for specific types of workloads. The application processor was tested with ULPMark–CoreMark and outclassed other wireless SoCs and low-power general purpose MCUs both in processing performance and efficiency. The nRF54H20's radio offers long range and improved robustness with 10 dBm TX power, 100 dBm RX sensitivity for Bluetooth LE and –104 dBm for 802.15.4. In addition to remarkable processing power, ample memory and best-in-class radio, the SoC is also equipped with advanced peripherals and state-of-the-art security features, including physical protection. The nRF54H20 will enable developers to build revolutionary IoT products, with simpler designs, reduced sizes, longer battery life and the ability to perform more advanced tasks, including the execution of machine learning models.

Tech Spec
Processing
Multiple Arm Cortex-M33 processors (clocked up to 320 MHz), Multiple RISC-V coprocessors
Memory
2 MB non-volatile memory, 1MB RAM
Advanced peripherals
High-speed USB (480 Mbps), CAN FD controller, 2x I3C, 14-bit ADC
Security (in bold)
Designed for PSA Certified Level 3 IoT security standard

nRF54L15

Description: The nRF54L15 is an ultra low power multiprotocol SoC for Bluetooth LE, Bluetooth Mesh, Thread, Matter, ANT+ and 2.4 GHz proprietary protocols with a new 4 Mbps throughput option. The nRF54L Series enhances the popular nRF52 Series with greater processing power and efficiency, more memory, security and new peripherals – all in a more compact package.

Technical details: nRF54L15 doubles the processing power of nRF52840 SoC while reducing power consumption. This processing efficiency, combined with a low power consumption radio and low sleep currents, extends battery life or allows for a reduction in form factor by using smaller batteries. Larger memory enables multiple RF protocols to run concurrently and aids firmware update functionality. The radio brings lower latency and longer range with up to 8 dBm TX power and –98 dBm RX sensitivity for 1 Mbps Bluetooth LE. The nRF54L15 offers security services such as Secure Boot, Secure Firmware Update and Secure Storage. It is designed for PSA Certified Level 3.

Tech Spec
Processing
128 MHz Arm Cortex-M33 processor
Memory
1.5 MB non-volatile memory, 256 KB RAM
New peripherals
Global RTC, 14-bit ADC, Software-defined peripheral enabled by a RISC-V coprocessor
Security
Designed for PSA Certified Level 3 IoT security standard