NORDIC® SEMICONDUCTOR

RF SoCs and SiPs

		nRF 91 SERIES	nRF 70 SERIES	nRF 54 L SERIES	nRF 53 SERIES	nRF 52 SERIES
		nRF91 Series	**nRF70 Series**	**nRF54L Series**	**nRF53 Series**	**nRF52 Series**
IC TYPE		Wireless SiP	Wi-Fi Companion IC	Wireless SoC	Wireless SoC	Wireless SoC
ICs		nRF9160, nRF9151, nRF91M1	nRF7002, nRF7001, nRF7000	nRF54LM20B, nRF54LM20A, nRF54L15, nRF54L10, nRF54L05, nRF54LV10A	nRF5340	nRF52840, nRF52833, nRF52832, nRF52820, nRF52811, nRF52810, nRF52805
WIRELESS	LTE-M, NB-IoT, NON-TERRESTRIAL NETWORKS (NTN), DECT NR+, GNSS	Yes				
	DUAL-BAND Wi-Fi 6		Yes (with host)	Yes (with nRF70 Series)	Yes (with nRF70 Series)	Yes (with nRF70 Series)
	Wi-Fi LOCATIONING	Yes (with nRF70 Series)	Yes (with host)	Yes (with nRF70 Series)	Yes (with nRF70 Series)	Yes (with nRF70 Series)
	BLUETOOTH LE			Yes	Yes	Yes
	BLUETOOTH CHANNEL SOUNDING			Yes		
	BLUETOOTH LE AUDIO				Yes	
	BLUETOOTH MESH, ZIGBEE, THREAD, MATTER, AMAZON SIDEWALK, NFC			Yes	Yes	Yes
	ESB AND 2.4 GHz PROPRIETARY PROTOCOLS			Yes up to 4 Mbps	Yes up to 2 Mbps	Yes up to 2 Mbps
MCU FUNCTIONALITY	PROCESSOR	64 MHz Arm Cortex-M33		128 MHz Arm Cortex-M33	2× Arm Cortex-M33, up to 128 MHz	64 MHz Arm Cortex-M4
	AI ACCELERATOR			Axon NPU		
	RISC-V COPROCESSOR			RISC-V, 128 MHz		
	NVM	1 MB		Up 2 MB	1 MB + 256 KB	Up to 1 MB
	RAM	256 KB		Up to 512 KB	512 KB + 64 KB	Up to 256 KB
	STANDARD PERIPHERALS AND INTERFACES	Yes	High-speed SPI/QSPI	Yes	Yes	Yes
	HIGHLIGHTED DIGITAL INTERFACES			High-speed USB	Full-speed USB	Full-speed USB
SECURITY	ISOLATION	TrustZone		TrustZone	TrustZone	
	CRYPTOGRAPHIC ACCELERATOR	Yes		Yes with side-channel leakage protection	Yes	Yes
	TAMPER DETECTORS			Yes		
GPIOs		32		Up to 66	48	Up to 48
PACKAGE TYPES		LGA	QFN, CSP	QFN, CSP	aQFN, CSP	aQFN, QFN, CSP
EDGE AI MODELS		Yes	Yes	Yes	Yes	Yes
MINIMUM PACKAGE SIZE		12×11×1.2 mm	3.8×3.4 mm	1.9×2.3 mm	3.5×3.6 mm	2.5×2.5 mm
Neuton EDGE AI MODELS		Yes	Yes	Yes	Yes	Yes
COMPATIBLE PMICs		nPM1300, nPM6001	nPM6001	nPM1100, nPM1300, nPM1304	nPM1100, nPM1300, nPM1304	nPM1100, nPM1300, nPM1304
nRF Cloud SERVICES		Yes	Yes	Yes	Yes	Yes

PMICs — nPM FAMILY

		nPM6001	nPM2100	nPM1304	nPM1300	nPM1100
TYPE	PMIC	●	●	●	●	●
FEATURES	BUCK REGULATOR	4		2	2	1
	BOOST REGULATOR		1			
	BATTERY CHARGER			●	●	●
	LDO		1	2	2	
	LOAD SWITCH		1	2	2	
CHARGER	TERMINATION VOLTAGE			3.5 to 4.65 V	3.5 to 4.45 V	4.1 to 4.2 V or 4.25 to 4.35 V
	MAX CHARGING CURRENT			100 mA	800 mA	400 mA
	POWER PATH MANAGEMENT			●	●	●
	THERMAL PROTECTION	●	●	●	●	●
	BATTERY COMPATIBILITY		LiMnO2, AA/AAA 1S or 2S	LiFePO4, Li-ion, LiPo	LiFePO4, Li-ion, LiPo	Li-ion, LiPo
POWER RAILS	INPUT VOLTAGE	3 to 5.5 V	0.7 to 3.4 V	4 to 5.5 V	4 to 5.5 V	4.1 to 6.7 V
	USB COMPLIANCE			●	●	●
	REGULATED OUTPUT VOLTAGE	0.5 to 3.3 V	1.8 to 3.3 V	V 1 to 3.3 V	1 to 3.3 V	1.8 to 3 V
	MAX CURRENT PER BUCK	550 mA, 200 mA, 150 mA, 150 mA	150 mA	200 mA, 200 mA	200 mA, 200 mA	150 mA
SYSTEM MANAGEMENT	SYSTEM MONITORING		Battery-voltage and -temp (derived from die temp)	System-, input bus- and battery-voltage; battery-current and -temp; die temp	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	0, 3	0, 2	3, 5	3, 5	2, 0
	CONTROL INTERFACE	TWI	TWI	TWI	TWI	Pin-configurable
REGULATORY COMPLIANCE		CE, RoHS	CE, RoHS	CE, JEITA, RoHS	CE, JEITA, RoHS	CE, JEITA, RoHS
OPERATING TEMPERATURE		-40 to 85°C	-40 to 85°C	-40 to 85°C	-40 to 85°C	-40 to 85°C
EVALUATION KITS		nPM6001 EK	nPM2100 EK	nPM6001 EK	nPM1300 EK	nPM1100 EK
PACKAGE OPTIONS		2.2×3.6 mm WLCSP	4×4 mm QFN16, 1.9×1.9 mm WLCSP	5.5 mm QFN32, 3.1×2.4 mm WLCSP	5×5 mm QFN32, 3.1×2.4 mm WLCSP	4×4 mm QFN24, 2.1×2.1 mm WLCSP

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	●	●	
	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°C	-40 to 85°C	-40 to 85°C
	EVALUATION KITS	nPM1300 EK	nPM1100 EK	nPM6001 EK
	PACKAGE OPTIONS	5×5 mm QFN32, 3.1×2.4 mm WLCSP	4×4 mm QFN24, 2.1×2.1 mm WLCSP	2.2×3.6 mm WLCSP

Range Extender

nRF21540

nRF 21 SERIES

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 10×. 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 +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 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

Cloud Services

nRF CLOUD

Description: nRF Cloud Services are optimized for Nordic's low power IoT Devices. nRF Cloud Services consist of nRF Cloud Location Services, and Device Management and Security Services. 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 Device Management enables an IoT data-as-a-service model. It acts as the single entry-point for all device data, scaling across different devices and applications. Device management includes a firmware-over-the-air (FOTA) update function, whereby modem and/or application firmware can be updated. Device management keeps IoT products in the field operating at their best to ensure the data continues to flow. The data collect feature allows devices to send both operational and application data to nRF Cloud, utilizing a unified interface that ensures the lowest power and simplest implementation. nRF Cloud Security Services provide a secure and unique identity for devices that can be used for authentication. Nordic's nRF91 Series SiPs have a cryptographically provable unique identity to verify origin during end-product manufacturing. Secure provisioning then enables an IoT device to be configured remotely with the required credentials and custom configurations. This eliminates the need for customer credential management or the need to generate keys on the factory floor — simplifying and lowering the cost of manufacture. Remote secure provisioning enables the manufacture of generic products that can be deployed and provisioned anywhere. And nRF Cloud Security Services ensure devices stay secure after deployment with the capability to rotate keys, rollout new certifications or clean credentials and configurations.

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
nRF9131, nRF9151, nRF9160, nRF9161 SiPs, nRF7000, nRF7001, nRF7002 Companion ICs

Applications
Industrial, smart appliances, asset tracking, RTLS