



# **V7000 Product Brief**

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## General Description

The RF transceiver V7000 is our first-generation sub-GHz radio to fulfill the wireless communications needs for IoT applications. It features low power consumption, long-range and robust wireless links, being able to reject large nearby interfering RF signals. Mesh network software stack is provided as a part of ready-to-use IoT radio solution to extend coverage while tight integration of hardware and software enhances system performance at different communication layers. Varieties of power-saving modes are developed to reflect characteristics of IoT networks and reduce power consumption at the system level. With these features, V7000 is a perfect fit for IoT applications, demanding wide coverage, long battery life and reliable link quality.

RF transmit/receive frontend, RF synthesizer, T/R switches, power amplifiers and high-dynamic range ADCs are integrated on a single die. In addition, a radio controller is embedded for radio control and simple protocol processing and SPI is adopted as the interface to host system. The high-level integration enables low-cost and small footprint solutions for the ever-increasing demands of IoT applications.

## Key Features

- Support IEEE 802.15.4g/Wi-SUN PHY
- Support wireless M-Bus
- Frequency bands: 315, 433, 470-510, 779-787, 868, 915 and 920MHz
- High selectivity and blocking performance
  - Adjacent channel rejection: 42 dB
  - Blocking performance: > 70 dB
- Receiver sensitivity in 802.15.4g mode
  - -106 dBm at 50 kbps
- Maximum data rate: 300 kbps
- Maximum transmit output power
  - +20 dBm
  - +13 dBm
- Automatic output power ramping
- Current consumption
  - Shut-down: 70 nA
- Sleep mode: 0.8  $\mu$ A
- Receive at 433 MHz: TBA
- Receive (Low-power mode): TBA
- TX mode at 868MHz: 105mA at +20dBm
- Modulation schemes: OOK, (G)FSK, 4(G)FSK and GMSK
- Antenna diversity support
- Automatic RX wake-up for low power listen
- Fast wake-up and AGC for low-power listen
- Functions for communication robustness
  - RF channel hopping
  - Retransmission
  - Auto-acknowledgement
- Digital RSSI and clear channel

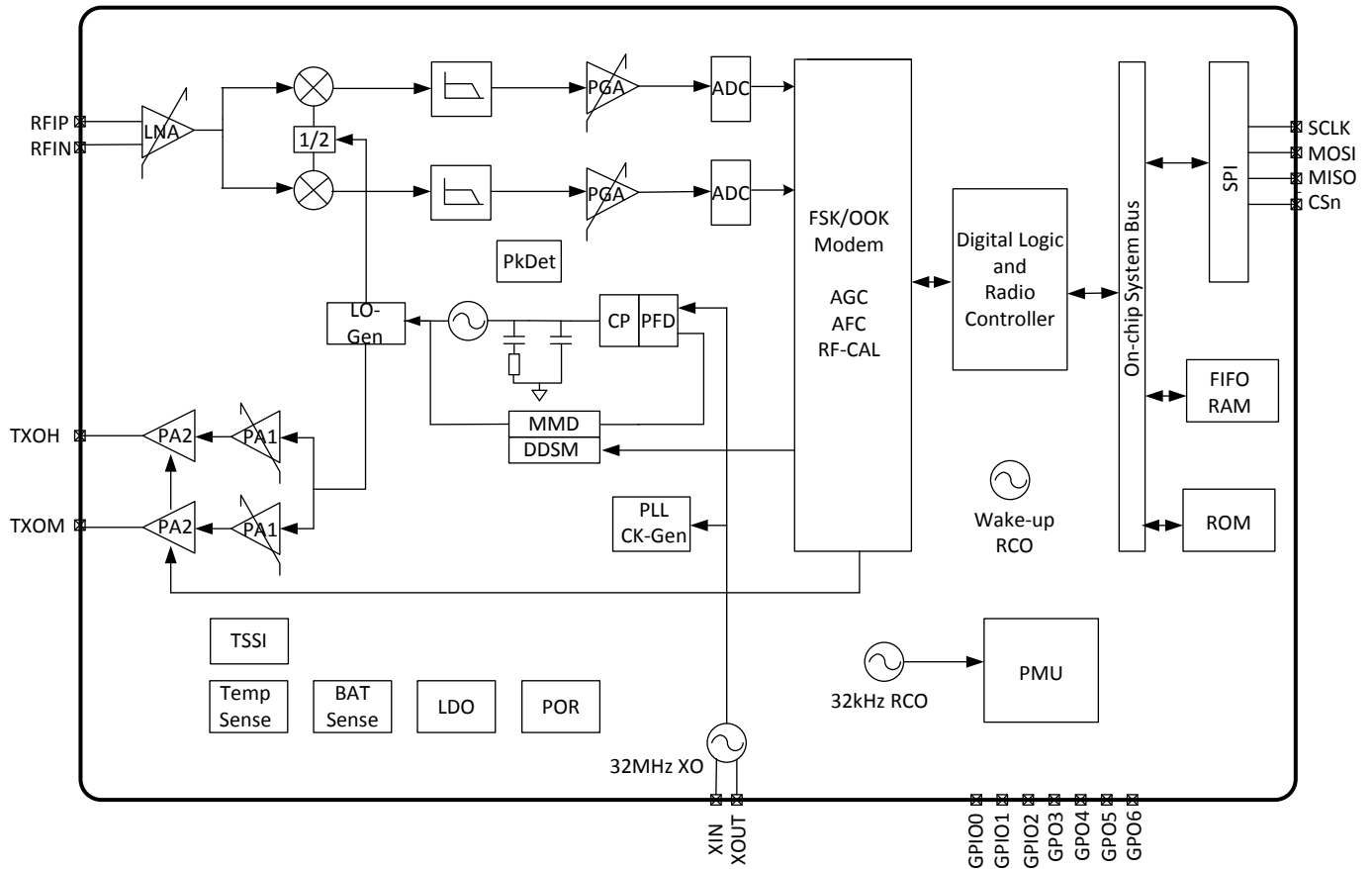
**Low-power High-performance Sub-GHz RF Transceiver**

- assessment for CSMA and listen-before-talk systems
- Hardware-based user identification listen to eliminate false wake-up
- Higher layer protocol support
  - IPv6 network layer protocol
  - 802.15.4e compliant 6LoWPAN adaptation layer with optimized network formation and mesh routing function
- Oscillators: 32MHz XO, 32kHz RCO and a fast wake-up RCO
- One SPI interface to host MCU
- Single power supply voltage with integrated LDOs: 2.0 V ~ 3.6 V
- Package: QFN-32 (5mm x 5mm)
- Ambient temperature range: -40 °C ~ +85 °C

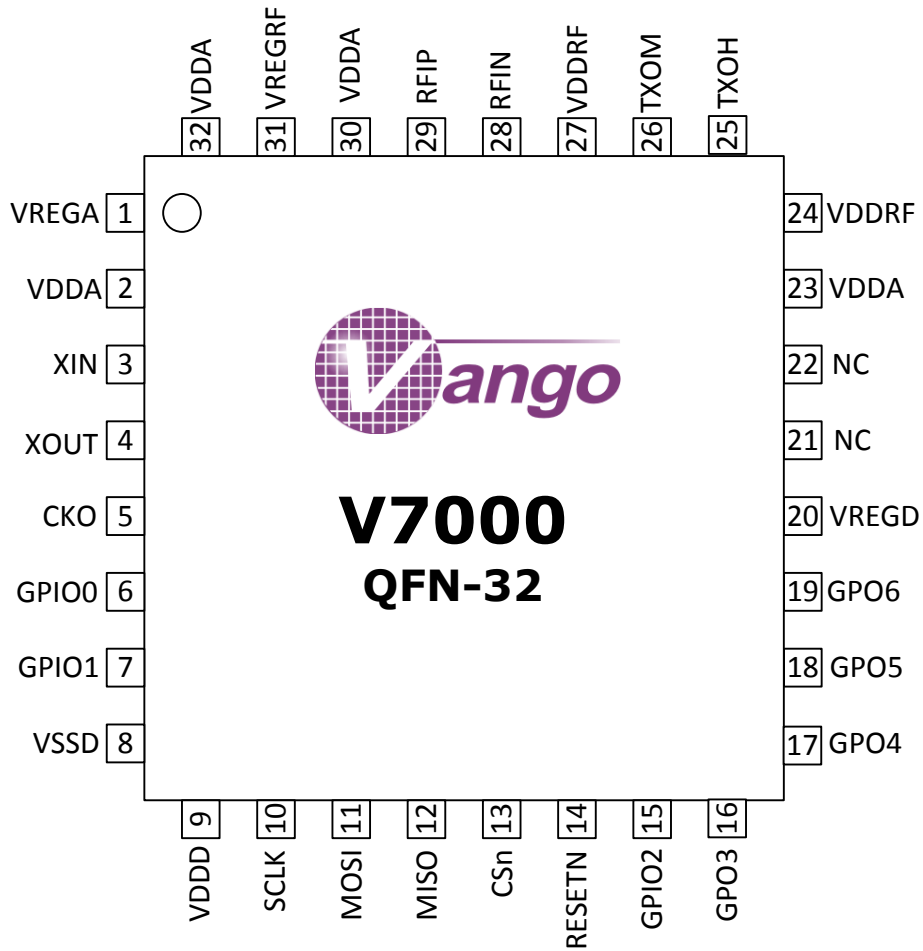
## Applications

- 802.15.4g-based applications
- Wi-SUN FAN applications
- Wireless M-Bus
- Smart metering, such as gas, water, and electricity meters, etc.
- Smart home and building
- Industrial monitoring and control
- Wireless alarm and security systems

# Functional Block Diagram



# Pin Assignments



NOTE: The exposed thermal pad is connected to the ground.

# Pin Descriptions

(Pin type: "O"=Output, "I"= Input, "P"=Power, "G"=Ground)

No.	Mnemonic	Type	Description
1	VREGA	O	Regulated voltage; connected to 100nF capacitor
2	VDDA	P	2.0 V to 3.6 V supply; 3.3 V is recommended
3	XIN	I	32 MHz crystal oscillator driver
4	XOUT	O	32 MHz crystal oscillator driver
5	CKO	O	Floated or output a clock signal
6	GPIO0	I/O	General purpose I/O
7	GPIO1	I/O	General purpose I/O
8	VSSD	G	Ground for digital circuits
9	VDDD	P	2.0 V to 3.6 V supply; 3.3 V is recommended
10	SCLK	I	SPI clock input
11	MISO	O	SPI data output
12	MOSI	I	SPI data input
13	CSn	I	SPI chip select, active low
14	RESETN	I	Reset signal, active low
15	GPIO2	O	General purpose I/O
16	GPO3	O	General purpose Output
17	GPO4	O	General purpose Output
18	GPO5	O	General purpose Output
19	GPO6	O	General purpose Output
20	VREGD	O	Regulated voltage supply for digital circuits; connected to 1 $\mu$ F capacitor
21	NC	O	Not connected; only for testing purpose
22	NC	O	Not connected; only for testing purpose
23	VDDA	P	2.0 V to 3.6 V supply; 3.3 V is recommended
24	VDDRF	P	2.0 V to 3.6 V supply; 3.3 V is recommended
25	TXOH	O	PA output, high power

**Low-power High-performance Sub-GHz RF Transceiver**

No.	Mnemonic	Type	Description
26	TXOM	O	PA output, medium power
27	VDDRF	P	2.0 V to 3.6 V supply; 3.3 V is recommended
28	RFIN	I	RF receiver input
29	RFIP	I	RF receiver input
30	VDDA	P	2.0 V to 3.6 V supply; 3.3 V is recommended
31	VREGRF	O	Regulated voltage; connected to 100nF capacitor
32	VDDA	P	2.0 V to 3.6 V supply; 3.3 V is recommended
	EPAD	G	