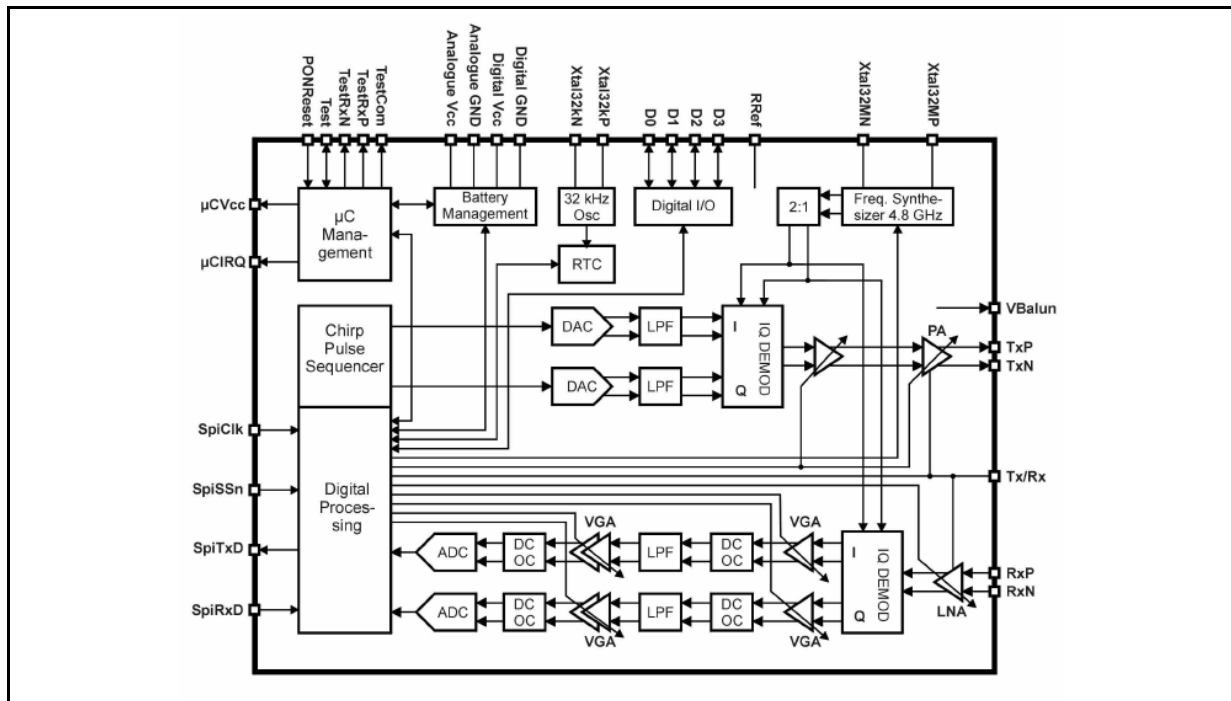


High performance CSS transceiver enabling location awareness

Data Brief

Features

- Single-chip solution for ISM 2.45 GHz RF transceiver
- Built-in ranging capability for link distance estimation
- Modulation technique: chirp spread spectrum (CSS)
- FDMA support: 7 channels, 3 non-overlapping
- Data rates: 2, 1 Mbps; 500, 250, 125, 62.5, 31.25 kbps
- Adjustable output power from -33 dBm to 0 dBm
- Receiver sensitivity: -97 dBm @ 250 kbps, FEC, and BER=10-3
- In-band carrier-to-interference C/I = 0 to 3 dB @ 250 kbps & C=-80 dBm
- Supports external power amplifier to increase output power
- High precision ranging: 2 m indoors and 1 m outdoors
- Supply voltage range from 2.3 V to 2.7 V
- Current consumption: 27 mA (RX), 30 mA (TX) @ 0 dBm
- Standby current with active RTC: 2 µA
- RSSI sensitivity: -95 dBm
- 32.768 kHz clock available for external µC
- Integrated fast SPI interface (32 Mbps)
- Integrated MAC controller with FEC, CRC checking
- CSMA/CA, FDMA, and TDMA modes
- Automatic retransmission and acknowledgement
- Automatic address matching
- Industrial temperature range from -40°C to +85°C
- QFN48 package



1 Description

The TN100 transceiver is a highly integrated mixed signal chip that uses the wireless communication technology CSS (chirp spread spectrum) developed by Nanotron Technologies.

With its unique ranging capability, TN100 can measure the link distance between two nodes. Thus, TN100 supports location awareness applications including location based services (LBS) and asset tracking (2D/3D RTLS). Ranging is performed during regular data communication and does not require additional infrastructure, power, and/or bandwidth. For an even better ranging accuracy, a high precision mode is provided. SDS-TWR algorithm (symmetrical double-sided two-way ranging) allows superior accuracy even with the use of low cost crystals for the oscillators.

The TN100 transceiver IC is designed to build up robust, short distance wireless networks operating in the 2.45 GHz ISM band with extremely low power consumption over a wide range of operating temperatures.

The TN100 supports 7-frequency channels with 3 non-overlapping channels. This provides support for multiple physically independent networks and improved coexistence performance with existing 2.4 GHz wireless technologies. Data rates are selectable between 31.25 kbps and 2 Mbps. Due to the chip's unique chirp pulse, adjustment of the antenna is not critical. This significantly simplifies the system's installation and maintenance ("pick-and-place").

The TN100 transceiver includes a sophisticated MAC controller with CSMA/CA and TDMA support as well as forward error correction (FEC) and 128-bit hardware encryption. It also provides scrambling, automatic address matching, and packet retransmission, thus minimizing the requirements for microcontroller and software.

Through its high-speed standard SPI interface, the TN100 can be interfaced with a wide range of external micro-controllers. It includes a 4 kbits frame buffer which allows even very slow microcontrollers to work with the transceiver. This means that several receive and transmit frames can be stored simultaneously in the buffers. This solution eliminates the problems of different peak data rates between air and microcontroller interfaces.

Target applications for the TN100 include:

- Asset tracking
- Enabling 2D/3D real-time location systems
- Security
- Industrial monitoring and control
- Medical applications

2 Pin assignment

This section provides a brief overview of the location and function of each pin.

Figure 1. QFN48 package top view

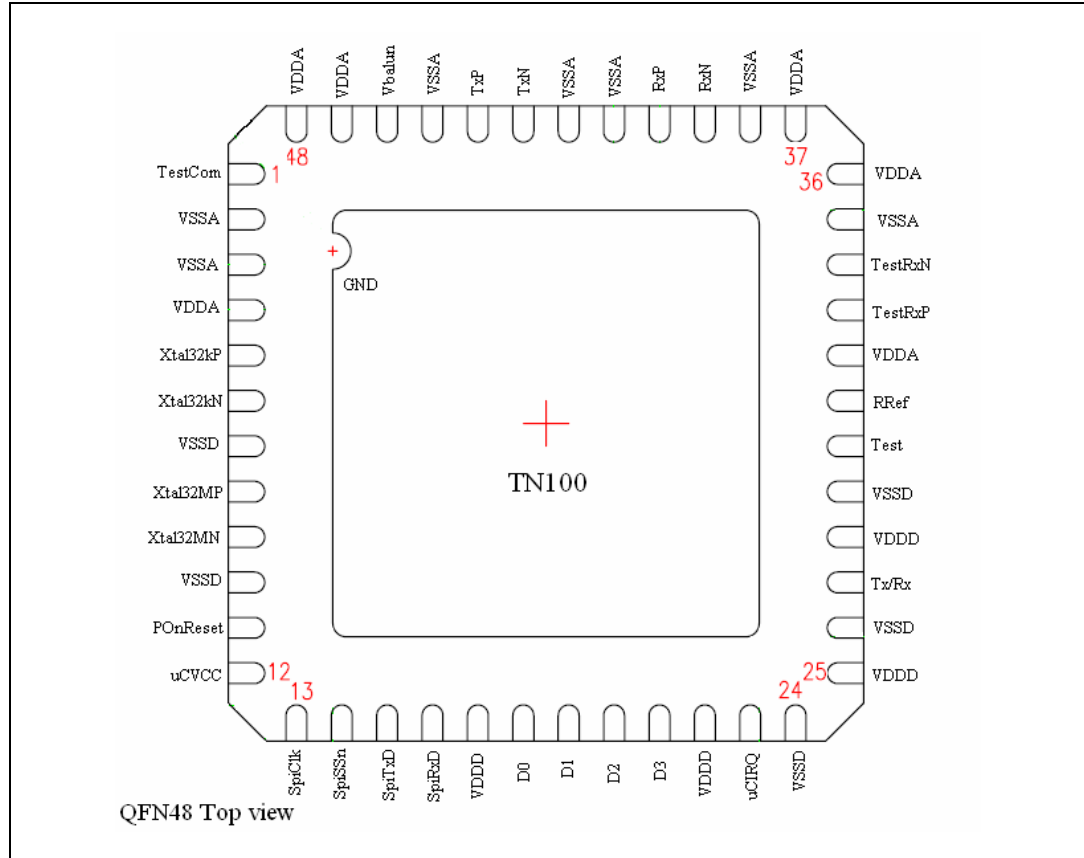


Table 1. Pin descriptions

Pin	Signal	Direction	Description
1	TestCom	LF signal	Test pin for analogue signals
2	VSSA	Supply	Power supply for analog parts
3	VSSA	Supply	Power supply for analog parts
4	VDDA	Supply	Power supply for analog parts
5	Xtal32kP	Analog IO	Crystal 32768 Hz, input from external 32768 Hz frequency reference
6	Xtal32kN	Analog IO	Crystal 32768 Hz
7	VSSD	Supply	Power supply for digital parts
8	Xtal32MP	Analog IO	Crystal 32.0 MHz, input from external 32 MHz frequency reference
9	Xtal32MN	Analog IO	Crystal 32.0 MHz

Table 1. Pin descriptions (continued)

Pin	Signal	Direction	Description
10	VSSD	Supply	Power supply for digital parts
11	POnReset	Digital input	Power on reset line
12	μ CVCC	Supply	Switchable power supply for external microcontroller
13	SpiClk	Digital input	SPI clock
14	SpiSSn	Digital input	SPI slave selected
15	SpiTxD	Digital output	SPI transmit data (MISO)
16	SpiTxD	Digital Input	SPI receive data (MOSI)
17	VDDD	Supply	Power supply for digital parts
18	D0	Digital IO	Digital input or output line 0
19	D1	Digital IO	Digital input or output line 1
20	D2	Digital IO	Digital input or output line 2
21	D3	Digital IO	Digital input or output line 3
22	VDDD	Supply	Power supply for digital parts
23	μ CIRQ	Digital output	Interrupt request to external microprocessor
24	VSSD	Supply	Power supply for digital parts
25	VDDD	Supply	Power supply for digital parts
26	VSSD	Supply	Power supply for digital parts
27	Tx/Rx	Digital output	Output signal to distinguish between transmit and receive
28	VDDD	Supply	Power supply for digital parts
29	VSSD	Supply	Power supply for digital parts
30	Test	Digital IO	Pin for digital tests
31	RRef	Analog IO	Pin for external reference resistor
32	VDDA	Supply	Power supply for analog parts
33	TestRxP	LF Signal	Test pin for RX signals
34	TestRxN	LF Signal	Test pin for RX signals inverted
35	VSSA	Supply	Power supply for analog parts
36	VDDA	Supply	Power supply for analog parts
37	VDDA	Supply	Power supply for analog parts
38	VSSA	Supply	Power supply for analog parts
39	RxN	RF input	Differential receiver input (inverted)
40	RxP	RF input	Differential receiver input
41	VSSA	Supply	Power supply for analog parts
42	VSSA	Supply	Power supply for analog parts

Table 1. Pin descriptions (continued)

Pin	Signal	Direction	Description
43	TxN	RF output	Differential transmitter output (inverted)
44	TxP	RF output	Differential transmitter output
45	VSSA	Supply	Power supply for analog parts
46	VBalun	Supply	Power supply for external balun (DC for TxP/TxN; needs to be blocked with an external capacitor in the 27pF to 47pF range close to balun)
47	VDDA	Supply	Power supply for analog parts
48	VDDA	Supply	Power supply for analog parts

3 Ordering information

Part number	Temperature range	Package	Packing	Marking
TN100Q	-40°C to +85°C	QFN48	Tube	TN100Q
TN100QT	-40°C to +85°C	QFN48	tape & reel	TN100QT

4 Revision history

Table 2. Document revision history

Date	Revision	Changes
15-Dec-2006	1	Initial release.

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