NL68 Module — Circuit Description

FCC ID: 2BR8WNL68 | Rule Part: 15C (DTS) | Emission Designator: 1M00F1D

1. Overview

The NL68 is an unlicensed ISM-band radio module operating in 902–928 MHz under FCC Part 15 Subpart C (DTS). The module integrates an RF transceiver, power amplifier/low-noise amplifier (PA/LNA), RF filtering and matching, a 26.000 MHz TCXO reference, a 32.768 kHz RTC crystal for low-power timing, and a host MCU/controller that manages the RF, baseband, and protocol. External connections include antenna (50 Ω), power (2.0–3.6 V), and digital host interfaces (UART/I2C/SPI).

2. Circuit Function Blocks

• Power Subsystem: VBAT input is regulated to internal rails (e.g., 1.8/3.3 V). DC/DC switching frequency is approximately 1–2 MHz.
• Timing: A 26.000 MHz temperature■compensated crystal oscillator (TCXO) provides the RF reference for the transceiver PLL. A 32.768 kHz crystal provides accurate low-power sleep timing for the MCU.
• RF Transceiver & PLL: Synthesizes carrier frequencies across 902–928 MHz. Direct conversion/IQ with integrated baseband filtering. Programmable channelization supports 1.00 MHz occupied bandwidth for data transmissions.
• RF Front End: Integrated PA/LNA and band-select filtering (e.g., SAW/LPF) feed a 50 Ω antenna port.
• Controller & Interfaces: MCU manages protocol timing, SPI control of the transceiver, and host data via UART/I2C/SPI (SCLK up to ~8–20 MHz).

3. Modulation, Bandwidth, and Deviation

Type of Modulation: Digital frequency modulation (FSK/GFSK) carrying data (Emission Designator: 1M00F1D).
Necessary/Occupied Bandwidth: 1.00 MHz nominal for data channels, as evaluated in the test report.
Maximum Deviation or Modulation: The device uses digital modulation; there is no analog FM audio deviation rating. For digital FSK/GFSK operation, modulation depth is controlled to maintain the 1.00 MHz occupied bandwidth within Part 15 requirements. Compliance is demonstrated by occupied bandwidth and spectral mask measurements rather than an analog peak deviation parameter.

4. Transmit Power and Tolerance

Rated RF Power Output: 0.121 W conducted at the antenna port (≈20.8 dBm nominal).
Power Tolerance: ±2 dB typical (final value per accredited test report).
Frequency Tolerance: Derived from 26.000 MHz TCXO; overall carrier stability better than ±20 ppm over temperature/voltage (final per test report).

5. Operating Conditions and Controls

The MCU configures the transceiver via SPI, enabling TX/RX windows and channel selection within 902–928 MHz. Antenna port presents 50 Ω nominal. Output power is subject to power control and duty cycle consistent with Part 15 limits. The module does not support user-accessible RF tuning; all RF parameters are set by firmware.
Receiver employs integrated channel filtering and LNA. Transmitter chain includes digital baseband shaping and PA drive limiting to control spectral emissions.

6. Compliance Notes

This description accompanies the block diagram and label samples in the application. All final values (occupied bandwidth, conducted/ERP/EIRP output, spurious limits, and carrier stability) are verified in the accredited test report for FCC Part 15C (DTS) compliance.