FCC Operational Description

Product Name: SmartFill OPT

Contains Certified Module: Telit LE910C1-WWXD (FCC ID: RI7LE910CXWWX)

NFC Functionality: Based on NXP PN532 (Part 15.225-compliant)

1. Overview of Radio Operation

This product integrates two RF subsystems:

1. 4G LTE communication, handled by a pre-certified Telit LE910C1-WWXD module

2. NFC using the NXP PN532 transceiver for short-range wireless interaction at 13.56 MHz

The 4G module operates within its certified configuration and is not modified. The PN532 operates under FCC Part 15.225 for unlicensed use in the 13.56 MHz ISM band.

2. Frequency Control & Stabilization

- The Telit LE910C1-WWXD uses an internal crystal oscillator and PLL for frequency synthesis across LTE bands.

- The PN532 NFC transceiver uses an external 27.12 MHz crystal oscillator, internally divided to generate the 13.56 MHz carrier.

- All frequency sources are fixed, trimmed, and not user-configurable.

3. Suppression of Spurious Emissions

- The 4G module is fully shielded, with emissions verified in its original certification.

- The NFC section uses a low-pass filter at its RF output, and PCB layout techniques (e.g., grounded guard traces) are employed to minimize coupling and radiated emissions.

- Power lines include ferrite beads and decoupling capacitors to suppress conducted noise.

4. Power Limiting

- The 4G module's output power is managed by its internal baseband processor and not altered by the host system.

- The PN532 output power is limited via an onboard driver stage and external passive tuning network.

- No user-accessible method exists to change RF power output on either radio subsystem.

5. Transmission Duty Cycle

- The 4G LTE module transmits intermittently, triggered by data sessions initiated by network polling.

- The NFC subsystem transmits short bursts (<10 ms) during polling cycles when checking for tag presence.

- The system never transmits continuously and meets duty cycle expectations for unlicensed operation.

6. NFC modulation scheme

- Modulation Type

   ASK (10% modulation index) with Load Modulation for passive tags.

- Modulating Signal

   Digital data only.

- Data Encoding

Miller coding (ISO/IEC 14443 Type A default).

- Max Data Rate

106 kbps (PN532 default, compliant with ISO/IEC 14443 Type A).

- Transmit Time

≤5 ms per packet, duty cycle <10% within any 100 ms window.

7. NFC tag

Passive tag only.

8. Communication Interfaces & Clock Summary

Component	Interface	Clock Frequency
Telit LE910C1	UART	921.6 kbps
PN532 NFC	I²C	27.12 MHz XTAL (internal use)

9. Antenna

- The primary LTE antenna is an external, pre-certified monopole antenna connected via a U.FL connector. The host device does not implement any internal antenna tuning or modification, and the antenna installation strictly follows the original configuration approved under the module certification.

- For operational flexibility, the following optional antenna configurations are supported:

- If enhanced receive signal quality is required for specific customer applications, an optional second LTE antenna may be connected for diversity reception. This second antenna is identical in brand, model, and electrical characteristics to the primary LTE antenna.

- If GPS functionality is required for specific customer applications, an optional GPS antenna may be connected. The GPS antenna is also identical in brand, model, and electrical characteristics to the primary LTE antenna.

- The LTE and GPS functionality are both managed internally by the integrated Telit LE910C1 module. The GPS signal originates from the Telit module's internal GPS receiver and is output via a dedicated GPS antenna port. No independent GPS transmitter or additional radio is incorporated into the host device.
- The NFC antenna is a PCB loop matched via passive components to the PN532 TX/RX pins. It's tuned to resonate at 13.56 MHz.

10. FCC Compliance Notes

The Telit LE910C1-WWXD is integrated without modification in accordance with its FCC certification.
The NFC subsystem operates within the 13.56 MHz ISM band under FCC Part 15.225, using low field strength, short-range transmissions.