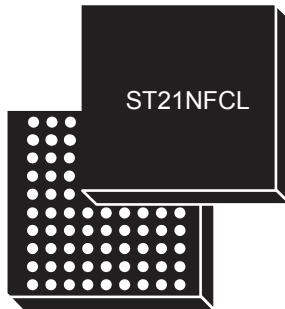
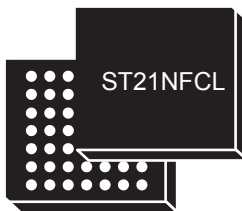


Near field communication controller



90 ball WLCSP (3.475 × 3.667)



49 ball WLCSP (2.559 × 2.581)

Product status link

[ST21NFCL](#)



Features

- NFC controller available in WLCSP49 and WLCSP90, ECOPACK-compliant packages

NFC controller

- Arm® Cortex®-M3 microcontroller
- 100% re-flashing capability for firmware update
- Enhanced active load modulation technology
- Enhanced Tx drive up to 2 W
- Support of external DC/DC up to 5.5 V
- Highest output power with optimized power transfer
- Optimized for extremely small or metal frame antennas
- Optimized low-power consumption modes
- Selectable ultralow power hibernate state
- Battery voltage monitoring
- Proprietary in-frame synchronization (IFS) in card emulation (CE) to ensure stability in battery low and switched off modes
- Improved XOR mode on all technologies
- OOFs with external reference clock in CE
- System clock
 - Fractional-N PLL input range of 19.2 to 76.8 MHz
 - Support of multiple external crystal oscillator (27.12 MHz and 54.24 MHz)
- 32.768 kHz, 16 MHz and 32 MHz support for EMC tests
- Automatic wakeup via communication interfaces, GPIO, RF field or tag detection and power supply detection

RF communications

- Active and passive peer-to-peer
 - ISO/IEC 18092 - NFCIP-1 initiator and target
- Reader/writer mode
 - NFC Forum™ Type 1/2/3/4/5 tags
 - FeliCa™
 - ISO/IEC 15693
 - MIFARE®(1)
- Card emulation mode
 - ISO/IEC 14443 Type A & B
 - FeliCa™
 - Intelligent card switching
 - MIFARE®

1. MIFARE R/W mode feature availability is pending on license conditions. Contact your local ST representative for further information.

Communication interfaces

- Up to three I3C interfaces depending on the package
- Up to two SPI interfaces depending on the package
- I²C interface supporting standard, fast, and fast+ modes.
- SWP master interfaces up to 1.695 Mbit/s:
 - 2 SWP UICC support
 - 1 SWP for external SE support
- GPIOs
- Dedicated Chip Enable pin

Electrical characteristics

- Battery voltage support from 2.4 V to 5.1 V
- I/O dedicated voltage level (V_{PS_IO}): 1.2 V and 1.8 V compatibility
- Supports Class B and C operating conditions for UICC – Class D ready
- Ambient operating temperature -30 to + 85 °C

Application

- Mobile devices
- Wearable devices
- Smartwatch

1 Description

The ST21NFCL is a contactless front-end (CLF) based on Arm® core and designed for integration in mobile devices and NFC-compliant products.

The ST21NFCL performs near-field communication (NFC) functions in the three operating modes: card emulation, reader/writer and peer-to-peer communication. It is based on an advanced Arm® Cortex®-M3 32-bit microcontroller. The ST21NFCL is designed to increase RF communication distances, ease NFC technology integration, and operate in efficient low power modes.

The ST21NFCL is best in class in terms of RF output power, working up to 2 W. Maximum power can be safely used to communicate thanks to a dynamic control: when a card is close, power is automatically reduced to ensure interoperability and standard compliance. To go with this outstanding output power, demodulation sensitivity is improved to maximize the communication distance with all types of cards.

The ST21NFCL card emulation mode does not require any external oscillator nor reference clock source. Thanks to active load modulation and automatic adjustments based on field strength, communication distance is maximized, and interoperability is ensured.

The ST21NFCL can operate in a very low power modes while detecting, thanks to an improved field detection sensitivity and a stable and efficient low power card detection mechanism, the presence of a reader, a card, or a tag beyond its rated communication distance.

The ST21NFCL exchanges data with the device application processor over the NCI 2.1 logical interface on top of the I²C connection. It features three external SWP master interfaces.

The ST21NFCL is manufactured in ECOPACK-compliant packages:

- 3.475 × 3.667 × 0.511 mm, 90-ball wafer-level chip-scale package (WLCSP), 0.35 mm pitch
- 2.559 × 2.581 × 0.455 mm, 49-ball wafer-level chip-scale package (WLCSP), 0.35 mm pitch.

To meet environmental requirements, ST offers the ST21NFCL devices in ECOPACK packages. ECOPACK specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

Note: Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.

Note: MIFARE, MIFARE4Mobile, DESFire, and MIFARE Classic are trademarks of NXP B.V. and are used under license.

Revision history

Table 1. Document revision history

Date	Revision	Changes
12-Jun-2024	1	Initial release

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