STS39230

boostedNFC analog front-end with active load modulation and active peer to peer

Data brief

Features
- Operating temperature: -25 °C to 85 °C
- Extended read range in card emulation mode with antennas below 100 mm²
  - boostedNFC technology, based on active load modulation
  - Internal timing defined by VCO locked to reader frequency
  - Delay compensation and synchronization to ensure transmission in phase with reader field
  - Adjustable initial phase
  - Low-impedance output driver
  - Automatic output power control to avoid communication holes
- EMVCo™, ISO/IEC 14443, JIS (X) 6319-4 compliance for full interoperability with existing payment and ticketing infrastructure.
  Card emulation supporting:
  - ISO/IEC 14443 Type A at 106 kbps, 212 kbps and 424 kbps
  - ISO/IEC 14443 Type B at 106 kbps, 212 kbps and 424 kbps
  - FeliCa™ at 212 kbps and 424 kbps
- Interface to NFC controller to boost card emulation performance
  - Digital NFC controller interface
- High noise immunity for improved interoperability
  - Input frequency check
- Direct connection of power supply to Li-Ion battery to simplify integration, reduce BoM and allow operation in the Power-off state
  - Supply voltage range from 2.7 V to 4.8 V
  - Mechanism to power the SE at field detection
- Compatibility to low-voltage interfacing devices
  - Peripheral communication supply voltage range from 1.62 V to 2.0 V
- Small footprint, low overall cost of ownership
  - Wafer-level chip-scale package (WLCSP) 20 bumps, 400 μm pitch
  - Minimum number of external components

Applications
The STS39230 is intended for two types of embedded applications:
- Applications that only support card emulation and active peer to peer. In these applications, the NFC antenna is connected to the STS39230 only.
- NFC applications in which the STS39230 is connected in parallel with the NFC IC to the NFC antenna to boost card emulation performance.
1 Description

The STS39230 is an advanced near-field communication (NFC) analog front-end utilizing ST's unique boostedNFC active load modulation (ALM) technology. ALM provides superior RF performance compared to traditional passive load modulation by generating an active response synchronous to the reader field. This allows for card-to-reader communication at coupling factors 10 times lower than conventional load modulation. Boosting the RF signal strength has a twofold advantage: the card-reader operating volume can rise up to 900% or, alternatively, the antenna size can be reduced down to 100 mm² or less for a given operating volume.

Additionally, the STS39230 features an active peer-to-peer (AP2P) communication mode. The STS39230 boosts card emulation and the AP2P functionality of the ST21NFCC. It acts as a replacement for the analog front-end while the ST21NFCC still manages NFC frame handling and chip-to-chip communication. As the STS39230 is usually inserted between the antenna and the NFC controller, it does not affect the overall system functionality and timing, thus allowing for easier integration.

By reducing the footprint and the costs, the STS39230 represents the ideal companion IC for the ST21NFCC for NFC payment applications in highly constrained designs such as mobile phones and wearables.

The STS39230 is provided in 20-bump wafer-length chip-scale package (WLCSP20).

In order to meet environmental requirements, ST offers this device in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.
Figure 1. Block diagram

- Control logic
- VSP regulator
- RFO regulator
- Antenna driver
- NFC controller interface
- PLL
- AUX Damp
- Receiver
- Demodulator
- POR
- ADC
- Frequency check
- Wakeup
- VSS
- Digital I/O
- RF_IF_VDD
- RF_DATA_IO
- RF_CLK_TX
- RF_CLK_RX
- GP_IO
- CL_SH
- CL_EXT
- SYS_ACT
- VDD
- VSP
- VDD_RF
- VSP_RF
- RFO1
- VSS_RF
- RFO2
- CDMP1
- VSS_DMP
- CDMP2
- RFI1
- RFI2
- MS42582V1
2 Software and hardware development package

ST provides a comprehensive development and design package to:

- Simplify software integration: ST lowers the cost for developers by providing multi-application support with optimized solutions including intuitive SDK platforms for integrating contactless services.
- Simplify hardware integration: ST provides a set of reference designs, expansion boards and design guidelines.
- Simplify deployment: ST provides turnkey solution partnership with OS vendors and recertification services to help to reduce the time to market as well as development costs.
3 Revision history

Table 1. Document revision history

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
<th>Changes</th>
</tr>
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<tbody>
<tr>
<td>29-Nov-2016</td>
<td>1</td>
<td>Initial release.</td>
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