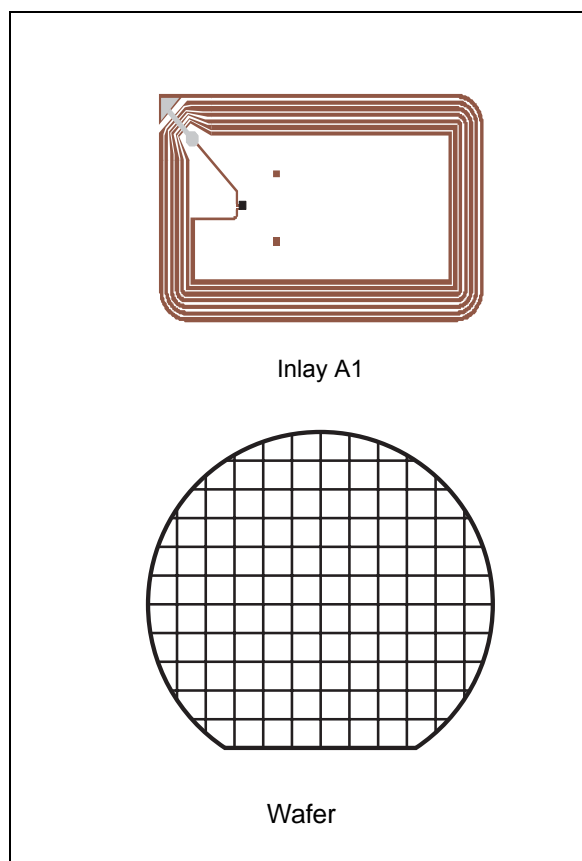# LRIS2K

## Memory TAG IC, 64 bit UID, 2048 bit EEPROM with Password 13.56MHz, ISO15693 and ISO18000-3 Mode 1 compliant

**Data Brief**

## Feature summary

- ISO15693 Standard Fully Compliant
- ISO18000-3 Mode 1 Standard Fully Compliant
- 13.56MHz ±7kHz Carrier Frequency
- To Tag: 10% or 100% ASK modulation using 1/4 (26Kbit/s) or 1/256 (1.6Kbit/s) pulse position coding
- From Tag: Load modulation using Manchester coding with 423KHz and 484KHz Sub-carriers in Low (6.6Kbit/s) or High (26Kbit/s) data rate mode. Supports the 53Kbit/s data rate with Fast commands
- Internal Tuning Capacitor (18.5pF, 26pF, 97pF)
- 1,000,000 Erase/Write Cycles (minimum)
- 40 Year Data Retention (minimum)
- 2048 bits EEPROM with Block Lock Feature
- 64-bit Unique Identifier (UID)
- Electrical Article Surveillance (EAS) capable (software controlled)
- KILL function
- Multi-password protection
- Read & Write (Block of 32 bits)
- 5ms Programming Time



Inlay A1

Wafer

For further information contact your local STMicroelectronics sales office.

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# 1 Summary description

The LRIS2K is a contactless memory powered by the received carrier electromagnetic wave. It is a 2048-bit Electrically Erasable Programmable Memory (EEPROM). The memory is organized as 64 blocks of 32 bits. The LRIS2K is accessed via the 13.56MHz carrier electromagnetic wave on which incoming data are demodulated from the received signal amplitude modulation (ASK: Amplitude Shift Keying). The received ASK wave is 10% or 100% modulated with a Data rate of 1.6Kbit/s using the 1/256 pulse coding mode or a Data rate of 26Kbit/s using the 1/4 pulse coding mode.

Outgoing data are generated by the LRIS2K load variation using Manchester coding with one or two sub-carrier frequencies at 423KHz and 484KHz. Data are transferred from the LRIS2K at 6.6Kbit/s in low data rate mode and 26Kbit/s high data rate mode. The LRIS2K supports the 53Kbit/s in high data rate mode in one subcarrier frequency at 423KHz.

The LRIS2K follows the ISO15693 recommendation for Radio frequency power and signal interface.
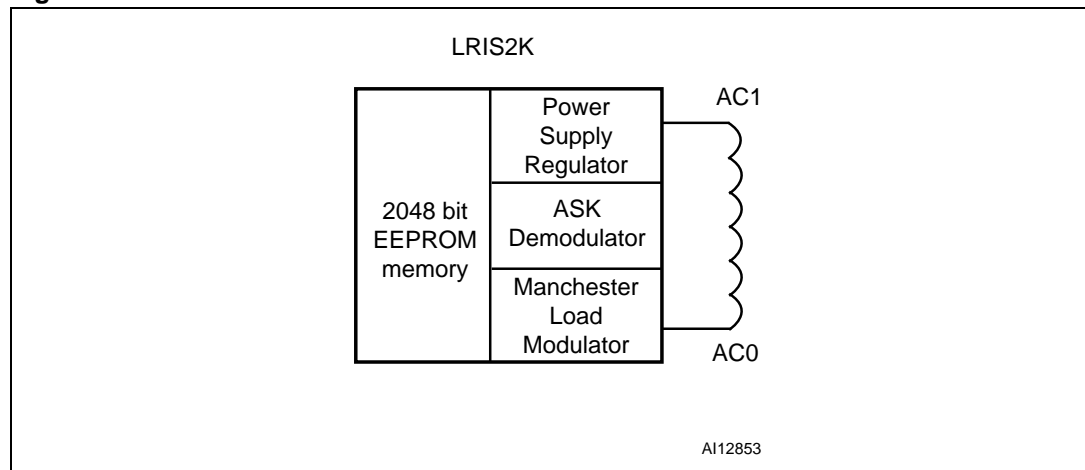
**Figure 1. Pad Connections**



**Table 1. Signal Names**

| AC1 | Antenna Coil |
| --- | --- |
| AC0 | Antenna Coil |

## 1.1 Memory mapping

The LRIS2K is divided into 64 blocks of 32 bits as shown in *Table 2*. Each block can be individually Read and/or Write Protected using a specific lock or password command.

The User Area consists of blocks that are always accessible. READ and WRITE operations are possible if the addressed block is not protected. During a WRITE, the 32 bits of the block are replaced by the new 32-bit value.

The LRIS2K also has a 64-bit block that is used to store the 64-bit Unique Identifier (UID). The UID is compliant with the ISO15963 description, and its value is used during the anti-collision sequence (INVENTORY). This block is not accessible by the user and its value is written by ST on the production line.

The LRIS2K also includes an AFI register in which the Application Family Identifier is stored, and a DSFID register in which the Data Storage Family Identifier used in the anti-collision algorithm is stored. The LRIS2K has four additional 32-bit blocks in which the KILL code and the Password codes are stored.

**Table 2. Memory map**

| Add | 0  7 8  15 16  23 24  31 | Protect status |
|---|---|---|
| 0 | User Area | 5 bits |
| 1 | User Area | 5 bits |
| 2 | User Area | 5 bits |
| 3 | User Area | 5 bits |
| 4 | User Area | 5 bits |
| 5 | User Area | 5 bits |
| 6 | User Area | 5 bits |
| 7 | User Area | 5 bits |
| 8 | User Area | 5 bits |
|   | User Area | 5 bits |
|   | User Area | 5 bits |
|   | User Area | 5 bits |
| 60 | User Area | 5 bits |
| 61 | User Area | 5 bits |
| 62 | User Area | 5 bits |
| 63 | User Area | 5 bits |

| | | | | |
|---|---|---|---|---|
| UID 0 | UID 1 | UID 2 | UID 3 | |
| UID 4 | UID 5 | UID 6 | UID 7 | |
| AFI | DSFID | | | |
| 0 | KILL code | | | 5 bits |
| 1 | Password code 1 | | | 5 bits |
| 2 | Password code 2 | | | 5 bits |
| 3 | Password code 3 | | | 5 bits |

## 1.2 Commands

The LRIS2K supports the following commands:

- ● *Inventory*, used to perform the anti-collision sequence.
- ● *Stay Quiet*, used to put the LRIS2K in quiet mode, where it does not respond to any inventory command.
- ● *Select*, used to select the LRIS2K. After this command, the LRIS2K processes all Read/Write commands with Select_Flag set.
- ● *Reset To Ready*, used to put the LRIS2K in the ready state.
- ● *Read Block*, used to output the 32 bits of the selected block and its locking status.
- ● *Write Block*, used to write the 32-bit value in the selected block, provided that it is not locked.
- ● *Lock Block*, used to lock the selected block. After this command, the block cannot be modified.
- ● *Write AFI*, used to write the 8-bit value in the AFI register.
- ● *Lock AFI*, used to lock the AFI register.
- ● *Write DSFID*, used to write the 8-bit value in the DSFID register.
- ● *Lock DSFID*, used to lock the DSFID register.
- ● *Get System Info*, used to provide the system information value
- ● *Get Multiple Block Security Status*, used to send the security status of the selected block.
- ● *Initiate*, used to trigger the tag response to the Inventory Initiated sequence.
- ● *Inventory Initiated*, used to perform the anti-collision sequence triggered by the Initiate command.
- ● *Kill*, used to definitively deactivate the tag.
- ● *Write PSWD*, used to write the 32 bits of the selected password.
- ● *Lock PSWD*, used to write the Protect Status bits of the selected block.
- ● *Present PSWD*, enables the user to present a password to unprotect the user blocks linked to this password.
- ● *Fast Initiate*, used to trigger the tag response to the Inventory Initiated sequence.
- ● *Fast Inventory Initiated*, used to perform the anti-collision sequence triggered by the Initiate command.
- ● *Fast Read Block*, used to output the 32 bits of the selected block and its locking status.

## 1.3        Initial dialogue for vicinity cards

The dialog between the Vicinity Coupling Device (VCD) and the Vicinity Integrated Circuit
Card or VICC (LRIS2K) takes place as follows:

●        activation of the LRIS2K by the RF operating field of the VCD.

●        transmission of a command by the VCD.

●        transmission of a response by the LRIS2K.

This technique is called RTF (Reader Talk First).

# 2 Part numbering

**Table 3. Ordering Information Scheme**

Example: LRIS2K - W4/22

**Device type**

LRIS2K

**Package**

W4 =180µm ± 15∞m Unsawn Wafer

SBN18 = 180µm ± 15µm Bumped and Sawn Wafer on 8-inch Frame

A1T = 45mm x 76mm Copper Antenna on Continuous Tape

A1S = 45mm x 76mm Copper Singulated Adhesive Antenna on Tape

For a full list of the available options, please see the current Memory Shortform Catalog.

For further information on any aspect of this device, please contact your nearest ST Sales Office.

# 3        Revision history

**Table 4.        Document revision history**

| Date | Revision | Changes |
|------|----------|---------|
| 28-Apr-2006 | 1 | Initial release. |

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