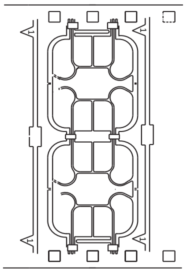
ST1331, ST1333
ST1353

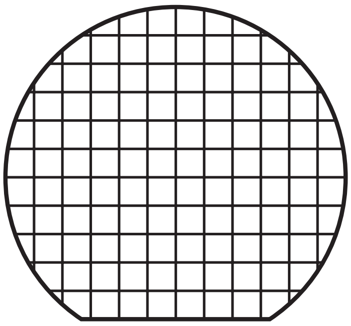
6-Contact Memory Card IC
272-bit EEPROM with Advanced Security Mechanisms

DATA BRIEFING

- 5 V Single Supply Voltage
- Counting Capability (two options)
  - up to 32767 (8^5 -1)
  - 8 times reloadable, up to 4095 (8^4-1)
- Active Authentication Function (ST1333/1353)
- Cipher Block Chaining Function (ST1353)
- Memory Divided into :
  - 16 bits of Circuit Identification
  - 48 bits of Card Identification
  - 40 bits of Count Data
  - 16 bits for Validation Certificate
  - 24 bits of Transport Code
  - 64 bits of Issuer Data (ST1331) or Authentication Secret Key (ST1333/1353)
  - 32 bits of Anti-tearing Flags (optional)
  - 56 bits of User data (optionally not erasable)
- 1 Million Erase/Write Cycle (minimum)
- 10 Year Data Retention (minimum)
- 3.5 ms Programming Time at 5 V (typical)
- 500 µA Supply Current at 5 V (typical)
- 250 µA Stand-by Current at 5 V (typical)



Micromodule (D10)



Wafer

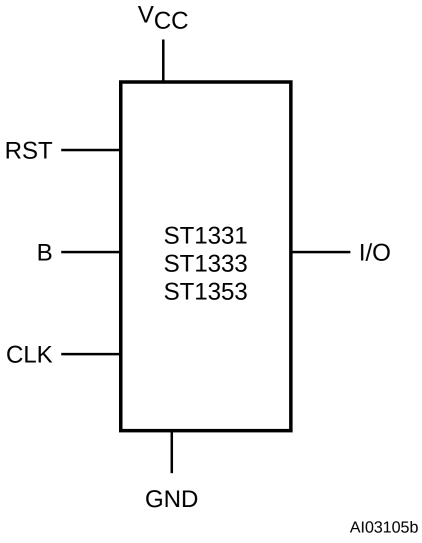
DESCRIPTION

The members of the ST1331/1333/1353 family are principally designed for use in prepaid Phonecard applications. Each is a 272-bit EEPROM device, with associated security logic and special fuses to control memory access. The memory is arranged as a matrix of 34 x 8 cells, accessed in a serial bit-wise fashion for reading and programming, and in

Table 1. Signal Names

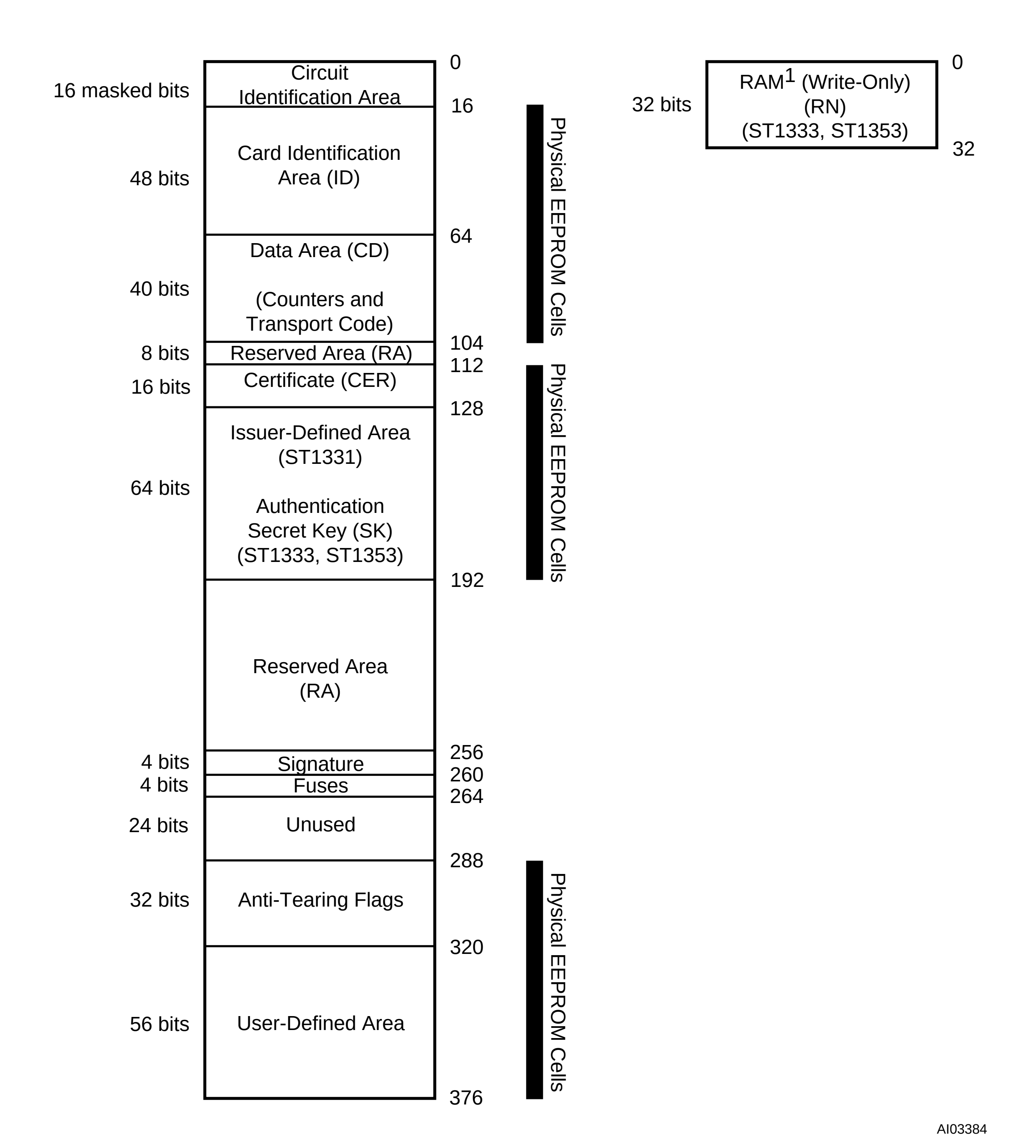
CLK	Clock
RST	Function code
B	
I/O	Data Input / Output
V_{CC}	Supply Voltage
GND	Ground

Figure 1. Logic Diagram



Complete data available under NDA.

Figure 2. Memory Map



Note: 1. The write-only RAM area (RN) is applicable only for the User Configuration.

a byte-wise fashion for internal erasing. An on-chip address counter provides an internal address space of up to 512 bits.

Each member of the ST1331/1333/1353 family has an identification data area, unit-counters (with an anti-tearing mechanism for reliable usage in open readers), a post validation certificate, an issuer area (ST1331) or an authentication secret key area (ST1333/1353), and a user area. This is summarized in Figure 2.

The validation certificate allows the recognition of the device by the appropriate security module.

The anti-tearing mechanism guards against extra, spurious count signals being executed when the card is unexpectedly extracted, while an operation is underway, in an open reader.

EXTERNAL COMMANDS

The device uses six contacts: V_{CC}, GND, I/O, CLK, RST, B. Four commands distinct can be composed using these external pins:

– RESET: to reset the internal address register to 000d

– READ: to increment the internal address register and read the data bit at the new address

– COMPARE: to allow comparison of the presented code against the internal transport code

– PROGRAM: to program the bit at the current address

CONFIGURATIONS

The device works in two distinct configurations:

– Issuer Configuration: for the card manufacturer. Customized data can be written to the chip, to initialize it before release to the end user.

– User Configuration: for use by the end user of the card, but with restricted access.

OPTIONS

Three options can be chosen on ordering the device:

– The anti-tearing mechanism can be disconnected. In this case, the anti-tearing flag area from bit 288d to bit 319d is unused (Figure 2).

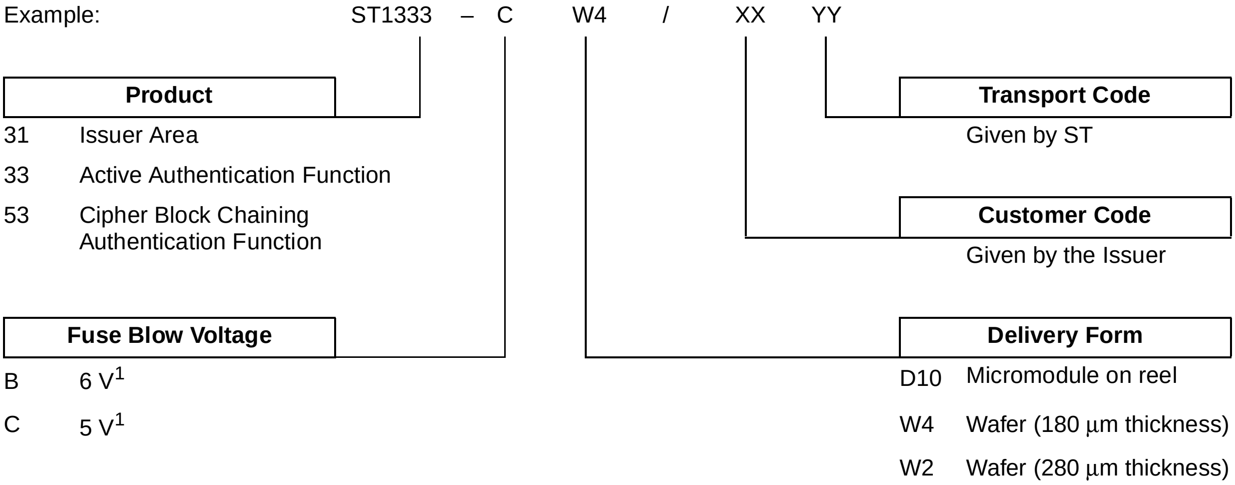
– The user area, from bit 320d to bit 375d, can be defined as “not erasable” in the User Configuration.

– The reload mechanism can be activated. In this case, erasing a bit in the reload counter refreshes the certificate (CER). At this time, the certificate can be programmed with a new value.

ORDERING INFORMATION

The notation used for the device number is as shown in Table 2. For a list of available options (speed, package, etc.) or for further information on any aspect of this device, please contact your nearest ST Sales Office.

Table 2. Ordering Information Scheme



Example: ST1333 – C W4 / XX YY

Product

31 Issuer Area

33 Active Authentication Function

53 Cipher Block Chaining Authentication Function

Fuse Blow Voltage

B 6 V[1]

C 5 V[1]

Transport Code

Given by ST

Customer Code

Given by the Issuer

Delivery Form

D10 Micromodule on reel

W4 Wafer (180 µm thickness)

W2 Wafer (280 µm thickness)

Note: 1. Please contact your nearest ST Sales Office to check on availability