ST25TB series tags
April 2017
• The ST25TB chip belongs to ST25 NFC / RFID Tags.

• The ST25TB product is HF Tag based on ISO14443 Type B standard with following main features:
  • ISO14443 RF interface
  • Up to 4kbit EEPROM memory with lock
  • 2*32-bit counters with anti-tearing mechanism
  • OTP locks
  • 40 years data retention & 1Mcycles erase/write
Main ST25TB market segments

Smart Industry
- Maintenance repair, Asset Tracking

Smart City
- Transport, Mass transit
Key use cases

Mass transit Ticketing

- One/multiple trip ticket

Event ticketing

Traceability
ST25TB RFID tags

- **Use cases**
  - Mass transit and **Transport**
  - Event ticketing
  - Asset tracking
  - Brand protection, identification

- **Key features**
  - Fast data transfer (ISO14443-B)
  - UID
  - Write-Protected memory blocks
  - One Time Programmable memory blocks

- **Key benefits**
  - Large and flexible counting capability with anti-tearing feature
  - Temperature range -40°C to +85°C
  - 40 years data retention, 1M cycles erase/write

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**ST25TB512 / ST25TB02K / ST25TB04K**

- **RF Tag**
  - ISO 14443-B
  - Short Range 106kb/s

- **EEPROM**
  - 512bit / 2K / 4K-bit
  - 64-bit UID
  - 32-bit counter x2

- **SBN12:** sawn and bumped inked 8” wafer, 120µm thickness
## ST25TB product features

<table>
<thead>
<tr>
<th>Contactless Interface</th>
<th>ISO14443B Proprietary (No NFC compliancy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF range</td>
<td>Short range, up to 10cm</td>
</tr>
<tr>
<td>RF speed</td>
<td>Up to 106kbps</td>
</tr>
<tr>
<td>Memory format</td>
<td>User EEPROM + Resettable OTP</td>
</tr>
<tr>
<td>Memory size</td>
<td>User EEPROM</td>
</tr>
<tr>
<td>Unique ID</td>
<td>64-bit</td>
</tr>
<tr>
<td>Memory size</td>
<td>512-bit / 2-Kbit / 4-Kbit</td>
</tr>
<tr>
<td>Memory size</td>
<td>512-bit</td>
</tr>
<tr>
<td>Counter</td>
<td>2x 32-bit counters</td>
</tr>
<tr>
<td>Security</td>
<td>OTP lock</td>
</tr>
<tr>
<td>Security</td>
<td></td>
</tr>
<tr>
<td>RF tuning capacitor</td>
<td>68pF²</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Package</td>
<td>SBN12</td>
</tr>
</tbody>
</table>

²: 68pF internal RF tuning capacitor, equivalent to the 64pF value of current SRI/SRT chips.
**ST25TB counters**

- **Two** 32-Bits Counter
  - means more than 4 billion events

- **Count down** only by step of 1 or more
  - can not be reloaded once reached 00000000h

- Anti-tearing mechanism ensures the consistency of the counter
  - **New value** only lower than the stored one.
  - Previous value **restored** in case of power loss

- **Write protected**
  - Once protected, cannot be unprotected

- **On ST25TBxxx-AC version**
  - one counter is used to Reset OTP pages
ST25TB Anti tearing mechanism

Write New value < Old value

Read

ST25TB Counter address Block 5 or 6
Old Value

Write New value (if < Old value)

Old value

FF

Read

ST25TB Counter address Block 5 or 6
New value

Write New value (if < Old value)

Old value

New value

Read After
Write
In Normal Conditions

Read After
Write
In tearing Conditions

Old value

??????

Tearing

Write New value (if < Old value)
RF tuning capacitance

- The internal RF tuning capacitance is 68pF which is allowing antenna design from Class 1 to Class 6 form factor.

<table>
<thead>
<tr>
<th></th>
<th>ST25TB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>ISO14443</td>
</tr>
<tr>
<td>Main carrier frequency</td>
<td>13.56MHz</td>
</tr>
<tr>
<td>Data sub-carrier frequency</td>
<td>848kHz</td>
</tr>
<tr>
<td>Optimal frequency tuning</td>
<td>14.2MHz</td>
</tr>
<tr>
<td>Internal capacitor</td>
<td>68pF</td>
</tr>
<tr>
<td>Targeted coil value</td>
<td>1.9uH</td>
</tr>
</tbody>
</table>
• Die form named SBN12
  • Sawn and Bumped wafer, 120µm thickness, inkless wafer format

• Assembly option on inlay

<table>
<thead>
<tr>
<th>Bump</th>
<th>Signal name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC0</td>
</tr>
<tr>
<td>2</td>
<td>AC1</td>
</tr>
<tr>
<td>3</td>
<td>NC</td>
</tr>
<tr>
<td>4</td>
<td>NC</td>
</tr>
</tbody>
</table>
ST25TB Chipbond

### News

<table>
<thead>
<tr>
<th></th>
<th>New subcon ChipBond</th>
<th>Previous subcon PacTech</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bump thickness (nom.)</strong></td>
<td>18 µm</td>
<td>20 µm</td>
</tr>
<tr>
<td><strong>Bump dimension (nom.)</strong></td>
<td>Passivation opening + 6 µm</td>
<td>Passivation opening + 40 µm</td>
</tr>
<tr>
<td><strong>Bump material</strong></td>
<td>Au</td>
<td>Ni (+ Au flash)</td>
</tr>
</tbody>
</table>

P is pad opening size, see BSA.
ST25TB support eco-system

Customer oriented

Documentation

Antenna Design suite

PC SW tools

e2e community
• 512-Bits 2K-Bits and 4K-Bits user memory with write protect features

• Large and flexible counting capability with anti-tearing feature

• Flexible and easy scalable solution
  • EEPROM / One Time Programmable memory
  • Counters
  • Protections

• Established chips compatible with most popular contactless ticketing systems
Thank You!