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## Tag-it™ HF-I PLUS TRANSPONDER INLAYS LARGE RECTANGLE

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### FEATURES

- ISO/IEC 15693-2, -3; ISO/IEC 18000-3 Compliant
- 13.56-MHz Operating Frequency
- 2048-Bit User Memory in 64-Bit × 32-Bit Blocks
- User and Factory Lock Per Block
- Application Family Identifier (AFI)
- Data Storage Format Identifier (DSFID)
- Combined Inventory Read Block

### APPLICATIONS

- Product Authentication
- Library
- Supply-Chain Management
- Asset Management
- Ticketing/Stored Value

### DESCRIPTION

Texas Instruments Tag-it™ HF-I plus transponder inlays consist of 13.56-MHz high-frequency (HF) transponders that are compliant with the ISO/IEC 15693 and ISO/IEC 18000-3 global open standards. These products offer a user-accessible memory of 2048 bits, organized in 64 blocks, and an extensive command set available in six different antenna shapes, with frequency offset for integration into paper, PVC, or other substrates.

The Tag-it HF-I plus transponder inlays are manufactured with TI's patented laser tuning process to provide consistent read performance. Prior to delivery, the transponders undergo complete functional and parametric testing in order to provide the high quality that customers have come to expect from TI.

The Tag-it HF-I plus transponder inlays are well suited for a variety of applications including, but not limited to, product authentication, library, supply-chain management, asset management, and ticketing/stored value applications.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

Tag-it is a trademark of Texas Instruments.

**SPECIFICATIONS<sup>(1)</sup>**

|                                                               | <b>PART NUMBER</b>                                                                                                                                                                                   |                                                                                    |
|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|                                                               | <b>RI-I02-112A-03</b>                                                                                                                                                                                | <b>RI-I02-112B-03</b>                                                              |
| Supported standard                                            | ISO/IEC 15693-2, -3; ISO/IEC 18000-3                                                                                                                                                                 |                                                                                    |
| Recommended operating frequency                               | 13.56 MHz                                                                                                                                                                                            |                                                                                    |
| Passive resonance frequency (at 25°C)                         | 13.86 MHz $\pm$ 200 kHz<br>(includes frequency offset to compensate further integration into paper)                                                                                                  | 14.4 MHz $\pm$ 200 kHz<br>(includes frequency offset to compensate PVC lamination) |
| Typical required activation field strength to read (at 25°C)  | 94 dB $\mu$ A/m <sup>(2)</sup>                                                                                                                                                                       | 94 dB $\mu$ A/m <sup>(3)</sup>                                                     |
| Typical required activation field strength to write (at 25°C) | 97 dB $\mu$ A/m <sup>(2)</sup>                                                                                                                                                                       | 97 dB $\mu$ A/m <sup>(3)</sup>                                                     |
| Factory-programmed read-only number                           | 64 bits                                                                                                                                                                                              |                                                                                    |
| Memory (user programmable)                                    | 25k bits organized in 64-bit $\times$ 32-bit blocks                                                                                                                                                  |                                                                                    |
| Typical programming cycles (at 25°C)                          | 100,000                                                                                                                                                                                              |                                                                                    |
| Data retention time (at 55°C)                                 | >10 years                                                                                                                                                                                            |                                                                                    |
| Simultaneous identification of tags                           | Up to 50 tags per second (reader/antenna dependent)                                                                                                                                                  |                                                                                    |
| Antenna size                                                  | 45 mm $\times$ 76 mm (~1.77 in $\times$ ~2.99 in)                                                                                                                                                    |                                                                                    |
| Foil width                                                    | 48 mm $\pm$ 0.5 mm (1.89 in $\pm$ 0.02 in)                                                                                                                                                           |                                                                                    |
| Foil pitch                                                    | 96 mm +0.1 mm/–0.4 mm (~3.78 in)                                                                                                                                                                     |                                                                                    |
| Thickness                                                     | Chip area: 0.355 mm (~0.014 in)<br>Antenna area: 0.085 mm (~0.0033 in)                                                                                                                               |                                                                                    |
| Base material                                                 | Substrate: PET (polyethyleneterephthalate); Antenna: aluminum                                                                                                                                        |                                                                                    |
| Smallest bending radius allowed                               | 18 mm (~0.71 in)                                                                                                                                                                                     |                                                                                    |
| Operating temperature                                         | –25°C to 70°C                                                                                                                                                                                        |                                                                                    |
| Storage temperature (single inlay)                            | –40°C to 85°C (warpage may occur at upper temperature range)                                                                                                                                         |                                                                                    |
| Storage temperature (on reel)                                 | –40°C to 40°C                                                                                                                                                                                        |                                                                                    |
| Delivery                                                      | Single-row tape wound on cardboard reel with 500-mm diameter<br>Reel outer width: approximately 60 mm (~2.36 in)<br>Reel inner width: approximately 50 mm (~1.97 in)<br>Hub diameter: 76.2 mm (3 in) |                                                                                    |
| Typical quantity of good units per reel                       | 5,000                                                                                                                                                                                                |                                                                                    |

(1) For highest possible read-out coverage, operate readers at a modulation depth of 20% or higher.

(2) After integration into paper

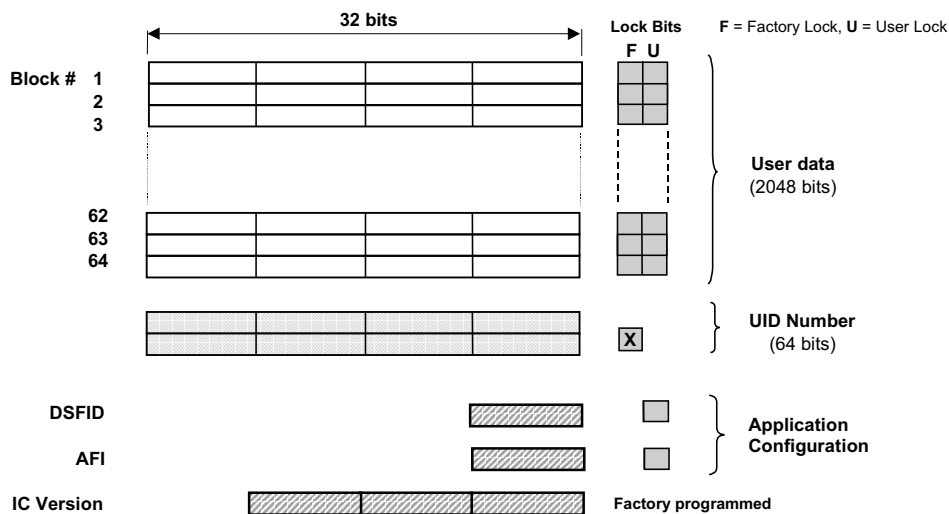
(3) After PVC lamination

## SUPPORTED COMMAND SET

| REQUEST                                          | REQUEST MODE <sup>(1)</sup> |           |           |               |        |     |
|--------------------------------------------------|-----------------------------|-----------|-----------|---------------|--------|-----|
|                                                  | REQUEST CODE                | INVENTORY | ADDRESSED | NON-ADDRESSED | SELECT | AFI |
| <b>ISO 15693 Mandatory and Optional Commands</b> |                             |           |           |               |        |     |
| Inventory                                        | 0x01                        | ü         | –         | –             | –      | ü   |
| Stay Quiet                                       | 0x02                        | –         | ü         | –             | –      |     |
| Read_Single_Block                                | 0x20                        | ü         | ü         | ü             | ü      | ü   |
| Write_Single_Block                               | 0x21                        | –         | ü         | ü             | ü      | –   |
| Lock_Block                                       | 0x22                        | –         | ü         | ü             | ü      | –   |
| Read_Multi_Blocks                                | 0x23                        | ü         | ü         | ü             | ü      | ü   |
| Write_Multi-Blocks                               | 0x24                        | –         | –         | –             | –      | –   |
| Select Tag                                       | 0x25                        | –         | ü         | –             | –      | –   |
| Reset to Ready                                   | 0x26                        | –         | ü         | ü             | ü      | –   |
| Write_AFI                                        | 0x27                        | –         | ü         | ü             | ü      | –   |
| Lock_AFI                                         | 0x28                        | –         | ü         | ü             | ü      | –   |
| Write DSFID                                      | 0x29                        | –         | ü         | ü             | ü      | –   |
| Lock DSFID                                       | 0x2A                        | –         | ü         | ü             | ü      | –   |
| Get_System_info                                  | 0x2B                        | ü         | ü         | ü             | ü      | ü   |
| Get_M_BLK_Sec_St                                 | 0x2C                        | ü         | ü         | ü             | ü      | ü   |
| <b>TI Custom Commands</b>                        |                             |           |           |               |        |     |
| Write_2_Blocks                                   | 0xA2                        | –         | ü         | ü             | ü      | –   |
| Lock_2_Blocks                                    | 0xA3                        | –         | ü         | ü             | ü      | –   |

(1) ü = Implemented, – = Not applicable

## MEMORY ORGANIZATION



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### Products

|                             |                                                                    |
|-----------------------------|--------------------------------------------------------------------|
| Amplifiers                  | <a href="http://amplifier.ti.com">amplifier.ti.com</a>             |
| Data Converters             | <a href="http://dataconverter.ti.com">dataconverter.ti.com</a>     |
| DLP® Products               | <a href="http://www.dlp.com">www.dlp.com</a>                       |
| DSP                         | <a href="http://dsp.ti.com">dsp.ti.com</a>                         |
| Clocks and Timers           | <a href="http://www.ti.com/clocks">www.ti.com/clocks</a>           |
| Interface                   | <a href="http://interface.ti.com">interface.ti.com</a>             |
| Logic                       | <a href="http://logic.ti.com">logic.ti.com</a>                     |
| Power Mgmt                  | <a href="http://power.ti.com">power.ti.com</a>                     |
| Microcontrollers            | <a href="http://microcontroller.ti.com">microcontroller.ti.com</a> |
| RFID                        | <a href="http://www.ti-rfid.com">www.ti-rfid.com</a>               |
| RF/IF and ZigBee® Solutions | <a href="http://www.ti.com/lprf">www.ti.com/lprf</a>               |

### Applications

|                    |                                                                          |
|--------------------|--------------------------------------------------------------------------|
| Audio              | <a href="http://www.ti.com/audio">www.ti.com/audio</a>                   |
| Automotive         | <a href="http://www.ti.com/automotive">www.ti.com/automotive</a>         |
| Broadband          | <a href="http://www.ti.com/broadband">www.ti.com/broadband</a>           |
| Digital Control    | <a href="http://www.ti.com/digitalcontrol">www.ti.com/digitalcontrol</a> |
| Medical            | <a href="http://www.ti.com/medical">www.ti.com/medical</a>               |
| Military           | <a href="http://www.ti.com/military">www.ti.com/military</a>             |
| Optical Networking | <a href="http://www.ti.com/opticalnetwork">www.ti.com/opticalnetwork</a> |
| Security           | <a href="http://www.ti.com/security">www.ti.com/security</a>             |
| Telephony          | <a href="http://www.ti.com/telephony">www.ti.com/telephony</a>           |
| Video & Imaging    | <a href="http://www.ti.com/video">www.ti.com/video</a>                   |
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