RI-I11-112x-03 Tag-it™ HF-I Plus Transponder Inlays Square

Not Recommended for New Designs

1 Features

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

2 Applications

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

3 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.

Device Information(1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
RI-I11-112A-03	TFB	45.00 mm x 45.00 mm
RI-I11-112B-03	TFB	45.00 mm x 45.00 mm

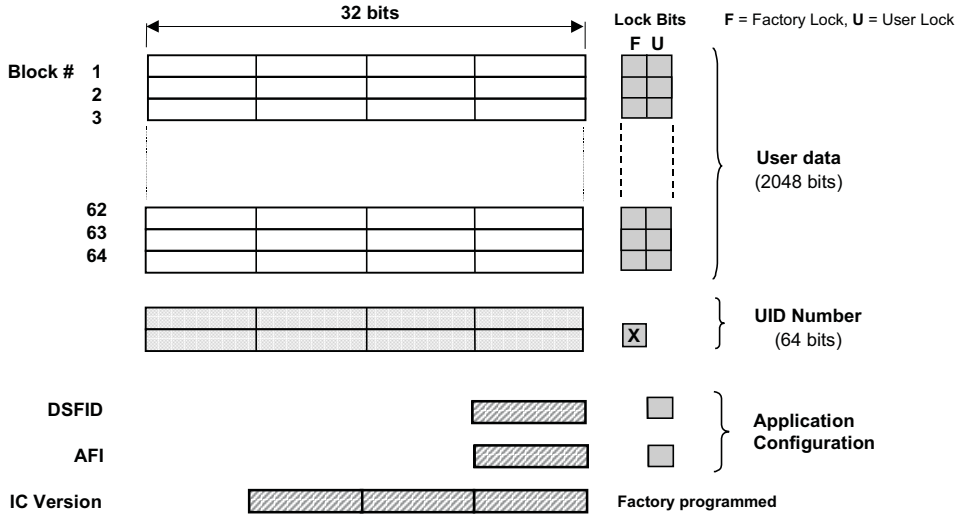
(1) For all available packages, see the orderable addendum at the end of the datasheet.

4 Revision History

Changes from Revision A (April 2010) to Revision B **Page**

5 Pin Configuration and Functions

Memory Organization



6 Specifications

Table 1. Specifications (1)

	PART NUMBER	
	RI-I11-112A-03	RI-I11-112B-03
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 ±200 kHz (includes frequency offset to compensate further integration into paper)	14.4 MHz ±200 kHz (includes frequency offset to compensate PVC lamination)
Typical required activation field strength to read (at 25°C)	98 dBµA/m (2)	98 dBµA/m (3)
Typical required activation field strength to write (at 25°C)	101 dBµA/m (2)	101 dBµA/m (3)
Factory-programmed read-only number	64 bits	
Memory (user programmable)	2k bits organized in 64 blocks × 32-Bit	
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 × 45 mm (~1.77 in × ~1.77 in)	
Foil width	48 mm ± 0.5 mm (1.89 in ± 0.02 in)	
Foil pitch	50.8 mm +0.1 mm/–0.4 mm (2 in)	
Thickness	Chip area: 0.34 mm ±0.02 Antenna area (Al both sides): 0.085 mm ±0.01 Antenna area (Al one side): 0.075 mm ±0.008	
Base material	Substrate: PET (polyethylenetherephtalate); 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	

(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

Table 1. Specifications(1) (continued)

	PART NUMBER	
	RI-I11-112A-03	RI-I11-112B-03
Delivery	Single-row tape wound on cardboard reel with 500-mm diameter Reel outer width: approximately 60 mm (about 2.36 inches) Reel inner width: approximately 50 mm (about 1.97 inches) Hub diameter: 76.2 mm (3 in)	
Typical quantity of good units per reel	5000	

Table 2. Supported Command Set

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

(1) ✓ = Implemented, – = Not applicable

7 Device and Documentation Support

7.1 Documentation Support

7.1.1 Related Links

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

Table 3. Related Links

PARTS	PRODUCT FOLDER	SAMPLE & BUY	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
RI-I11-112A-03	Click here	Click here	Click here	Click here	Click here
RI-I11-112B-03	Click here	Click here	Click here	Click here	Click here

7.2 Trademarks

Tag-it is a trademark of Texas Instruments.

7.3 Electrostatic Discharge Caution

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

7.4 Glossary

SLYZ022 — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

8 Mechanical, Packaging, and Orderable Information

The following pages include mechanical packaging and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
RI-I11-112A-03	OBSOLETE	RFIDN	TFB	0		TBD	Call TI	Call TI	-25 to 70		
RI-I11-112A-30	OBSOLETE	RFIDN	TFB	0		TBD	Call TI	Call TI			
RI-I11-112B-03	OBSOLETE	RFIDN	TFB	0		TBD	Call TI	Call TI	-25 to 70		

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as “components”) are sold subject to TI’s terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI’s terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers’ products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers’ products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have ***not*** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products		**Applications**	
Audio	www.ti.com/audio	Automotive and Transportation	www.ti.com/automotive
Amplifiers	amplifier.ti.com	Communications and Telecom	www.ti.com/communications
Data Converters	dataconverter.ti.com	Computers and Peripherals	www.ti.com/computers
DLP® Products	www.dlp.com	Consumer Electronics	www.ti.com/consumer-apps
DSP	dsp.ti.com	Energy and Lighting	www.ti.com/energy
Clocks and Timers	www.ti.com/clocks	Industrial	www.ti.com/industrial
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Security	www.ti.com/security
Power Mgmt	power.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com		
OMAP Applications Processors	www.ti.com/omap	**TI E2E Community**	e2e.ti.com
Wireless Connectivity	www.ti.com/wirelessconnectivity		

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265