
Tag-it™ HF-I PLUS TRANSPONDER INLAYS SQUARE

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⁽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 \pm 200 kHz (includes frequency offset to compensate further integration into paper)	14.4 MHz \pm 200 kHz (includes frequency offset to compensate PVC lamination)
Typical required activation field strength to read (at 25°C)	98 dB μ A/m ⁽²⁾	98 dB μ A/m ⁽³⁾
Typical required activation field strength to write (at 25°C)	101 dB μ A/m ⁽²⁾	101 dB μ A/m ⁽³⁾
Factory-programmed read-only number	64 bits	
Memory (user programmable)	2k 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 45 mm (~1.77 in \times ~1.77 in)	
Foil width	48 mm \pm 0.5 mm (1.89 in \pm 0.02 in)	
Foil pitch	50.8 mm \pm 0.1 mm/–0.4 mm (2 in)	
Thickness	Chip area: 0.355 mm (~0.014 in) 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 Reel outer width: approximately 60 mm (~2.36 in) Reel inner width: approximately 50 mm (~1.97 in) 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

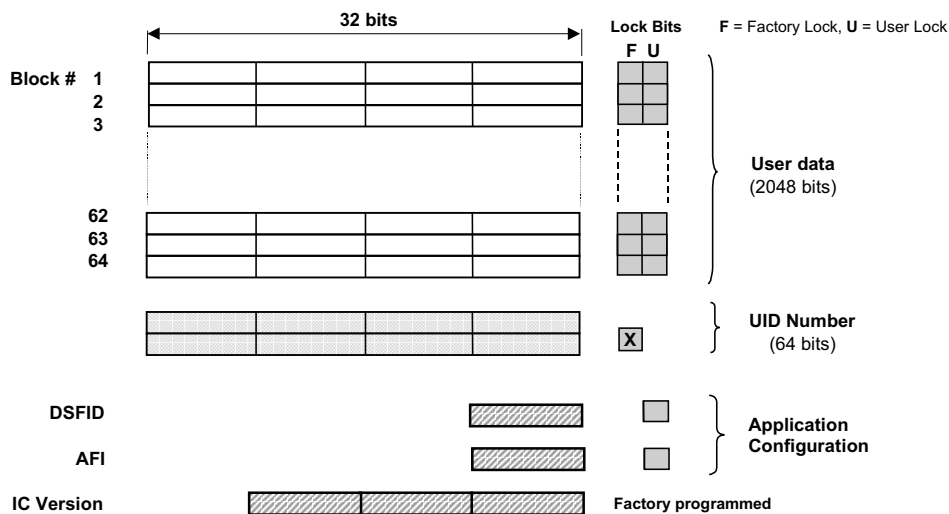
(3) After PVC lamination

SUPPORTED COMMAND SET

REQUEST	REQUEST MODE ⁽¹⁾					
	REQUEST CODE	INVENTORY	ADDRESSED	NON-ADDRESSED	SELECT	AFI
ISO 15693 Mandatory and Optional Commands						
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
TI Custom Commands						
Write_2_Blocks	0xA2	–	Ü	Ü	Ü	–
Lock_2_Blocks	0xA3	–	Ü	Ü	Ü	–

(1) Ü = Implemented, – = Not applicable

MEMORY ORGANIZATION



PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
RI-111-112A-03	ACTIVE	RFIDN	TFB	0	5000	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
RI-111-112B-03	ACTIVE	RFIDN	TFB	0	5000	Pb-Free (RoHS)	Call TI	N / A for Pkg Type

⁽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.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

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, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

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

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI 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 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. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

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

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

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

Applications

Audio	www.ti.com/audio
Automotive	www.ti.com/automotive
Broadband	www.ti.com/broadband
Digital Control	www.ti.com/digitalcontrol
Medical	www.ti.com/medical
Military	www.ti.com/military
Optical Networking	www.ti.com/opticalnetwork
Security	www.ti.com/security
Telephony	www.ti.com/telephony
Video & Imaging	www.ti.com/video
Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2009, Texas Instruments Incorporated