TEXAS INSTRUMENTS

RF37S114

SCBS907 –NOVEMBER 2015

RF37S114 Tag-it™ HF-I Type 5 NFC, ISO/IEC 15693 Transponder, 4 mm x 4 mm

1 Device Overview

1.1 Features

- ISO/IEC 15693-2, ISO/IEC 15693-3, ISO/IEC 18000-3, NFC Tag Type 5
- Integrated Antenna
- 13.56-MHz Operating Frequency

- 256-Bit User Memory in Eight 32-Bit Blocks
- Application Family Identifier (AFI)
- Fast Simultaneous Identification (Anticollision)

1.2 Applications

- Product Authentication
- Supply Chain Management

- Asset Management
- Medical

1.3 Description

The TI Tag-it™ HF-I Type 5 NFC transponder is compliant with the ISO/IEC 15693 and ISO/IEC 18000-3 global open standards. This product offers a user-accessible memory of 256 bits, organized in 8 blocks, and an optimized command set. This transponder product comes with an integrated antenna and, therefore, is ready for application without the need for an external antenna.

Device Information [(1)]

PART NUMBER	PACKAGE	BODY SIZE
RF37S114HTFJB	RFIDP (0)	4 mm x 4 mm x 0.66 mm

(1) For the most current device, package, and ordering information, see the *Package Option Addendum* in Section 6.
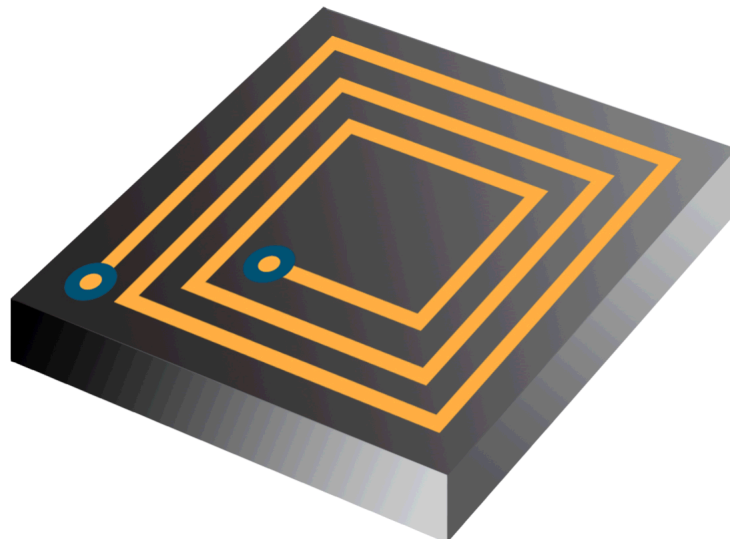
Figure 1-1 shows the transponder.

Figure 1-1. RF37S114HTFJB Transponder

Table of Contents

2 Revision History

DATE	REVISION	NOTES
November 2015	*	Initial Release

3 Specifications

3.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)

		MIN	MAX	UNIT
T_A	Operating temperature	–25	70	°C
T_{STG}	Storage temperature	–40	85	°C

3.2 ESD Ratings

Device is fully encapsulated and protected. No ESD classification applies.

3.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)

		MIN	MAX	UNIT
T_A	Operating temperature	–25	70	°C

3.4 Electrical Characteristics

over operating free-air temperature range (unless otherwise noted)

PARAMETER	RF37S114HTFJB
Supported standard	ISO/IEC 15693-2, ISO/IEC 15693-3, ISO/IEC 18000-3
Recommended operating frequency	13.56 MHz
Typical read activation field strength (at 25°C)	136.0 dBµA/m
Typical write activation field strength (at 25°C)	136.0 dBµA/m
Factory programmed read-only number	64 bits
Memory (user programmable)	256 bits organized in eight 32-bit blocks
Typical programming cycles (at 25°C)	100000
Data retention time (at 55°C)	>10 years
Simultaneous identification of tags	Up to 50 tags per second (reader and antenna dependent)

3.5 Physical Characteristics

over operating free-air temperature range (unless otherwise noted)

PARAMETER	RF37S114HTFJB
Dimensions	4 mm x 4 mm x 0.66 mm ±0.1 mm

4 Detailed Description

4.1 Supported Command Set

Table 4-1 summarizes the ISO/IEC 15693 mandatory and optional commands that are supported by this transponder.

Table 4-1. Supported Command Set (ISO/IEC 15693 Mandatory and Optional Commands)

REQUEST	REQUEST MODE [1]					
	REQUEST CODE	INVENTORY	ADDRESSED	NONADDRESSED	AFI	OPTIONAL FLAG
Inventory	0x01	✓	✗	✗	✓	0/–
Stay Quiet	0x02	✗	✓	✗	✗	0/–
Read_Single_Block	0x20	✗	✓	✓	✗	–/1
Write_Single_Block	0x21	✗	✓	✓	✗	–/1
Lock_Block	0x22	✗	✓	✓	✗	–/1

(1) ✓ = Implemented, ✗ = Not applicable

4.2 Memory Organization

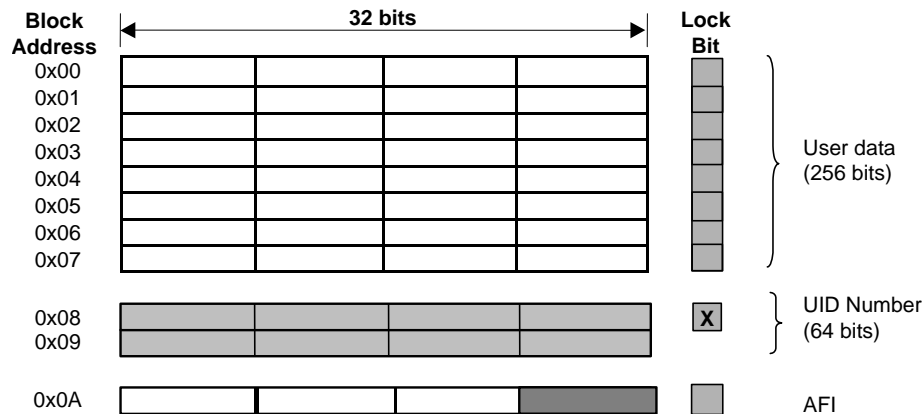Figure 4-1 shows the organization of the user-accessible memory on this transponder.

Figure 4-1. Memory Organization

5 Device and Documentation Support

5.1 Device Support

5.1.1 Development Support

5.1.1.1 Getting Started and Next Steps

RFID products from TI provide the ultimate solution for a wide range of applications. With its patented HDX technology, TI RFID offers unmatched performance in read range, read rate, and robustness. TI offers one-stop-shopping of transponders, inlays, reader modules, and reader ICs. For more information, see the Overview for NFC / RFID page.

5.1.2 Device Nomenclature

To designate the stages in the product development cycle, TI assigns prefixes to the part numbers of devices. Each commercial family member has one of three prefixes: x, p, or no prefix (for example, xRF37S114HTFJB).These prefixes represent evolutionary stages of product development from engineering prototypes (with prefix x) through fully qualified production devices (with no prefix).

Device development evolutionary flow:

xRF... – Experimental device that is not necessarily representative of the electrical specifications of the final device

pRF... – Final device that conforms to the electrical specifications of the final product but has not completed quality and reliability verification

RF... – Fully qualified production device

Devices with a prefix of **x** or **p** are shipped against the following disclaimer:

"Developmental product is intended for internal evaluation purposes."

Production devices have been characterized fully, and the quality and reliability of the device have been demonstrated fully. TI's standard warranty applies.

Predictions show that prototype devices have a greater failure rate than the standard production devices. TI recommends that these devices not be used in any production system because their expected end-use failure rate still is undefined. Only qualified production devices are to be used.

TI device nomenclature also includes a suffix with the device family name. This suffix indicates the package type (for example, TEL) and, optionally, the temperature range (for example, T). Figure 5-1 provides a legend for reading the complete device name for any family member.
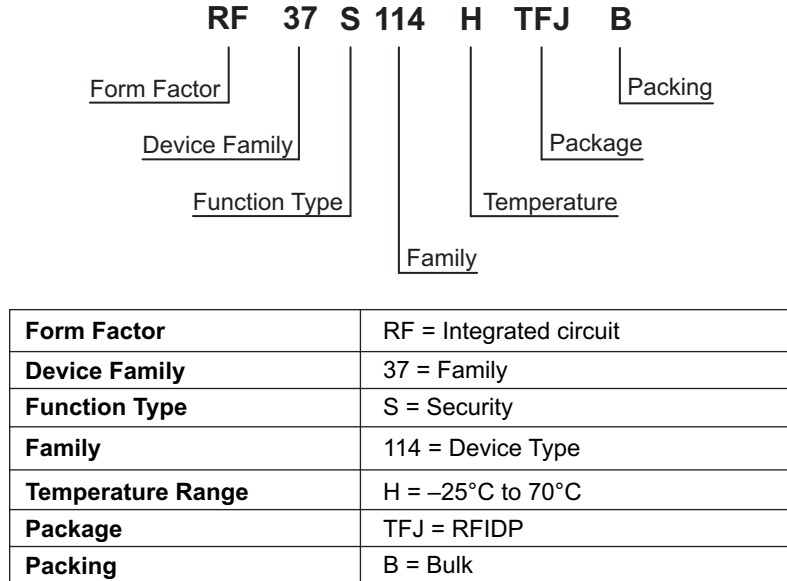
```
RF   37  S  114   H   TFJ    B
```

Form Factor

Device Family

Function Type

Family

Temperature

Package

Packing

Form Factor	RF = Integrated circuit
Device Family	37 = Family
Function Type	S = Security
Family	114 = Device Type
Temperature Range	H = –25°C to 70°C
Package	TFJ = RFIDP
Packing	B = Bulk

Figure 5-1. Device Nomenclature

5.2 Documentation Support

The following documents describe the RF37S114HTFJB device. Copies of these documents are available on the Internet at www.ti.com.

SPAT178 *RFID Systems Product Specifications.* Texas Instruments Radio Frequency Identification Systems is an industry leader in RFID technology, and the world's largest integrated manufacturer of TI-RFid™ tags, TI-RFid smart labels, and TI-RFid reader systems. With more than 1 billion RFID tags manufactured, TI-RFid technology is used in a broad range of RFID applications worldwide. TI is an active member of many standards bodies, including ISO, ISO/IEC, ECMA International, ETSI, and several national standardization bodies working to drive the adoption of global standards for RFID technology.

5.3 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

TI E2E™ Online Community *TI's Engineer-to-Engineer (E2E) Community.* Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

5.4 Trademarks

Tag-it, TI-RFid, E2E are trademarks of Texas Instruments.

5.5 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.

5.6 Export Control Notice

Recipient agrees to not knowingly export or re-export, directly or indirectly, any product or technical data (as defined by the U.S., EU, and other Export Administration Regulations) including software, or any controlled product restricted by other applicable national regulations, received from disclosing party under nondisclosure obligations (if any), or any direct product of such technology, to any destination to which such export or re-export is restricted or prohibited by U.S. or other applicable laws, without obtaining prior authorization from U.S. Department of Commerce and other competent Government authorities to the extent required by those laws.

5.7 Glossary

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

6 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.

Mechanical Data

⌐ 0.10 C (2X)

4.00

A

B

TERMINAL A1 CORNER
INDEX AREA

4.00

⌐ 0.10 C (2X)

// 0.10 C

C

0.45±0.05

0.66±0.10

TOP VIEW

SIDE VIEW

PACKAGE OPTION ADDENDUM
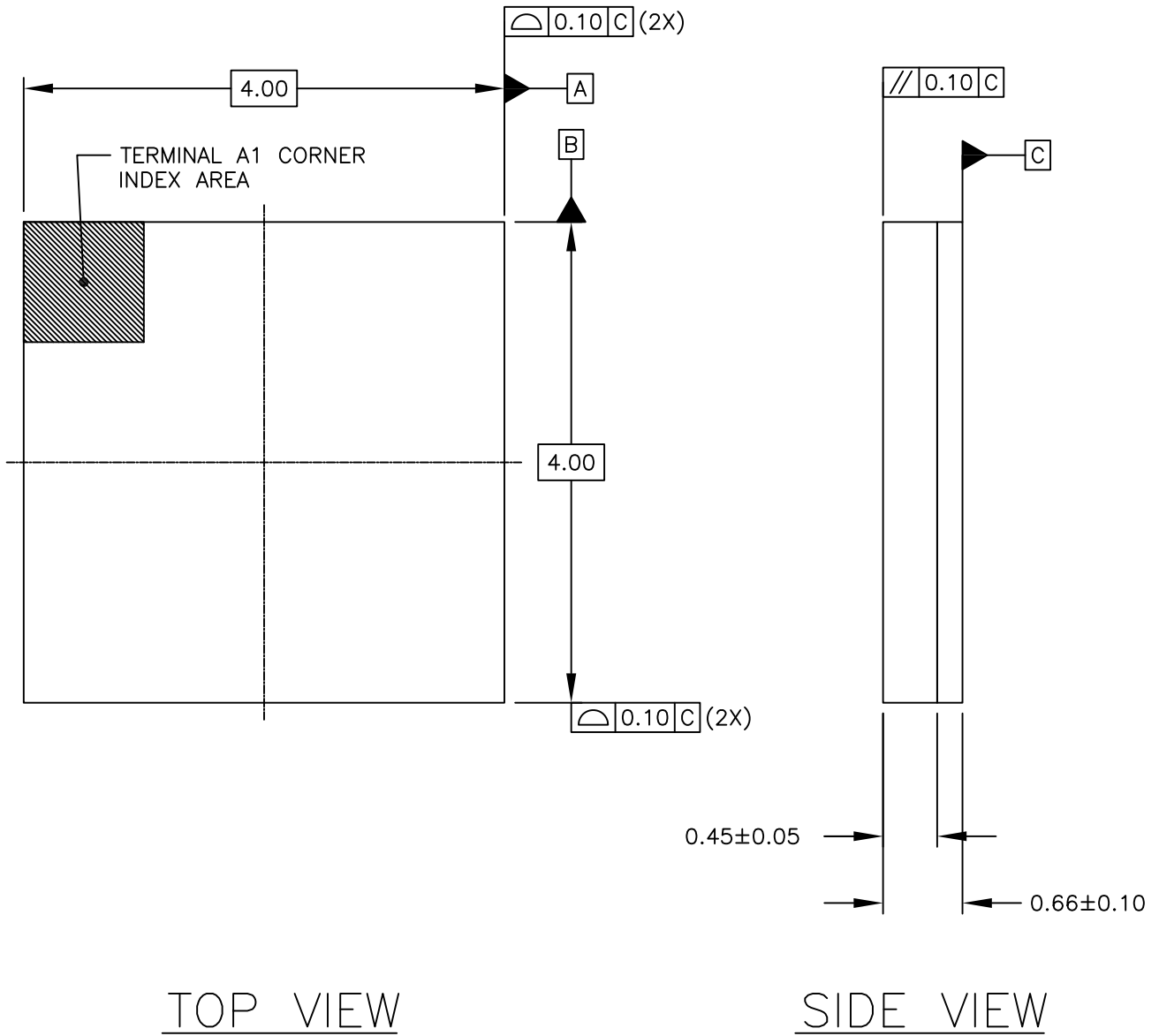
PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
RF37S114HTFJB	ACTIVE	RFIDN	TFJ	0	5000	RoHS & non-Green	Call TI	Level-1-260C-UNLIM	-25 to 70		Samples

(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) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

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 AND DISCLAIMER