Digital Signature Transponder
With Integrated DST80 Authentication, EEPROM, and LF Immobilizer

1 Features

- Low-frequency (LF) immobilizer interface
  - 75-byte EEPROM
  - 80-bit DST80 security authentication coprocessor
  - Integrated batteryless immobilizer interface
  - Half duplex (HDX) immobilizer communication achieves up to 4-in (10-cm) read range
  - Special selective addressing mode allows reliable learn-in sequence
  - 80-bit authentication key length
  - Up to 8-kbit/s uplink data rate
  - 5- or 3-byte challenge/response algorithm
  - Fast authentication within 42 ms
  - Fast mutual authentication within 65 ms
  - 75-byte EEPROM
    - 48-bytes of available EEPROM user memory
    - 32-bit unique serial number
    - High EEPROM security and flexibility
    - Write-only authentication keys
    - Pages are irreversibly lockable and protectable
    - Protected pages programmable only through mutual authentication
  - Each user page is lockable
  - Resonant frequency: 134.2 kHz

2 Applications

- Immobilizer

3 Description

This security RFID transponder provides an 80-bit encryption algorithm. The 5-byte challenge and 3-byte response algorithm is backward compatible with existing TI products and provides, together with the burst length coding, short encryption telegram times.

The DST80 offers 65 bytes of free programmable user data stored in nine pages, each of them lockable for programming. Each of the two 80-bit encryption keys with can be programmed with a single telegram.

The DST80 comes in two versions, preprogrammed with either PWM or PPM communication formats, eliminating the need for the user to change this field.

For a higher security level, the DSTAES transponder with AES-128 encryption is recommended.

Device Information

PART NUMBER[1]	PACKAGE[2]	COMMUNICATION FORMAT	BODY SIZE
TMS37145TEAIE	Wedge	PWM	12 mm × 6 mm
TMS37145TEAIEG	Wedge	PPM	12 mm × 6 mm

(1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at www.ti.com.

(2) Package drawings, thermal data, and symbolization are available at www.ti.com/packaging.

Wedge Package

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4 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from May 25, 2012 to January 29, 2020	Page
• Added Applications	1
• Changed the first paragraph and added the last paragraph in Description	1
• Removed former *Ordering Information* table and added *Device Information* table	1
• Added Device and Documentation Support, *Device and Documentation Support*	4

5 Specifications

5.1 Operating Characteristics

Part Number	TMS37145TEAIE, TMS37145TEAIEG		
Features	Immobilizer plus microcontroller with integrated power management		
DST80 authentication logic	80-bit key length, 4-byte or 5-byte challenge, 3-byte signature		
DST80 encryption time	Mutual authentication: 65 ms Fast authentication: 42 ms		
Transponder			
Transmission principle	HDX (half duplex telegram protocol)		
Operating frequency	134.2 kHz Integrated resonant frequency trimming capability via LF or test interface		
Security	Challenge/response, mutual authentication		
Downlink	100% AM, PPM bit coding with 2 kbit/s (typ)		
Uplink	FSK modulation with 7.9 kbit/s (typ)		
Read time for an encryption	PPM: 60 ms (typ) (including 20-ms charge time)		
Read time for mutual authentication	PPM: 85 ms (typ) (including 20-ms charge time)		
Protocol transmission security	16-bit block check character		
Activation field strength	141.5 dBµA/m		
Minimum required operation Q-factor	30		
EEPROM memory	75 bytes	48-byte free available EEPROM user memory	
		32-bit unique serial number	
		Two 80-bit security keys	
EEPROM endurance	200 000 (min) write-erase cycles (T_A = 25°C)		
Key learn-in	Special selective addressing to provide secure learn-in procedure		
Storage temperature	-40°C to 100°C (175°C for 5 minutes)		
Operating temperature	-40°C to 85°C		
Case material	Plastic		
Protection class	IP 68		
EMC	Programmed code is not affected by natural electromagnetic interference or X-rays		
Mechanical shock	IEC 68-2-27, Test Ea; 200 g, half sine, 3 ms, 6 shocks per axis		
Vibration	IEC 68-2-6, Test Fc; 10 to 500 Hz, 1.65 mm peak to peak, 10 g, 4 hours per axis		
Dimensions	12.0 mm ± 0.2 mm x 6.0 mm ± 0.2 mm x 3.0 mm ± 0.05 mm		
Weight	0.4 g		
Packaging	Bulk (2000 units per box)		

Product Folder Links: TMS37145

6 Device and Documentation Support

6.1 Getting Started

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. For more information, see Overview for NFC / RFID.

6.2 Device Nomenclature

To designate the stages in the product development cycle, TI assigns prefixes to the part numbers of devices. Each device has one of three prefixes: X, P, or null (no prefix) (for example, TMS37145).

Device development evolutionary flow:

X – Experimental device that is not necessarily representative of the final device's electrical specifications and may not use production assembly flow.

P – Prototype device that is not necessarily the final silicon die and may not necessarily meet final electrical specifications.

null – Production version of the silicon die that is fully qualified.

X and P devices 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 (X or P) 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.

6.3 Documentation Support

The following documentation describes the transponder, related peripherals, and other technical collateral.

Receiving Notification of Document Updates

To receive notification of documentation updates—including silicon errata—go to the TMS37145 product folder. In the upper right corner, click the "Alert me" button. This registers you to receive a weekly digest of product information that has changed (if any). For change details, check the revision history of any revised document.

TMS3705 Range Extender Power Solution Using UCC27424-Q1

This application report provides supplementary information about the Texas Instruments 134.2-kHz RFID base station IC TMS3705x in combination with an external driver IC. In particular, the document shows a low cost and easy-to-implement solution to improve the communication distance between the transaction processor (TRP) and the reader unit.

6.4 Support Resources

TI E2E™ support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is 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.

6.5 Trademarks

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6.6 Glossary

SLYZ022 — *TI Glossary*.

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

7 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.

7.1 Mechanical Data
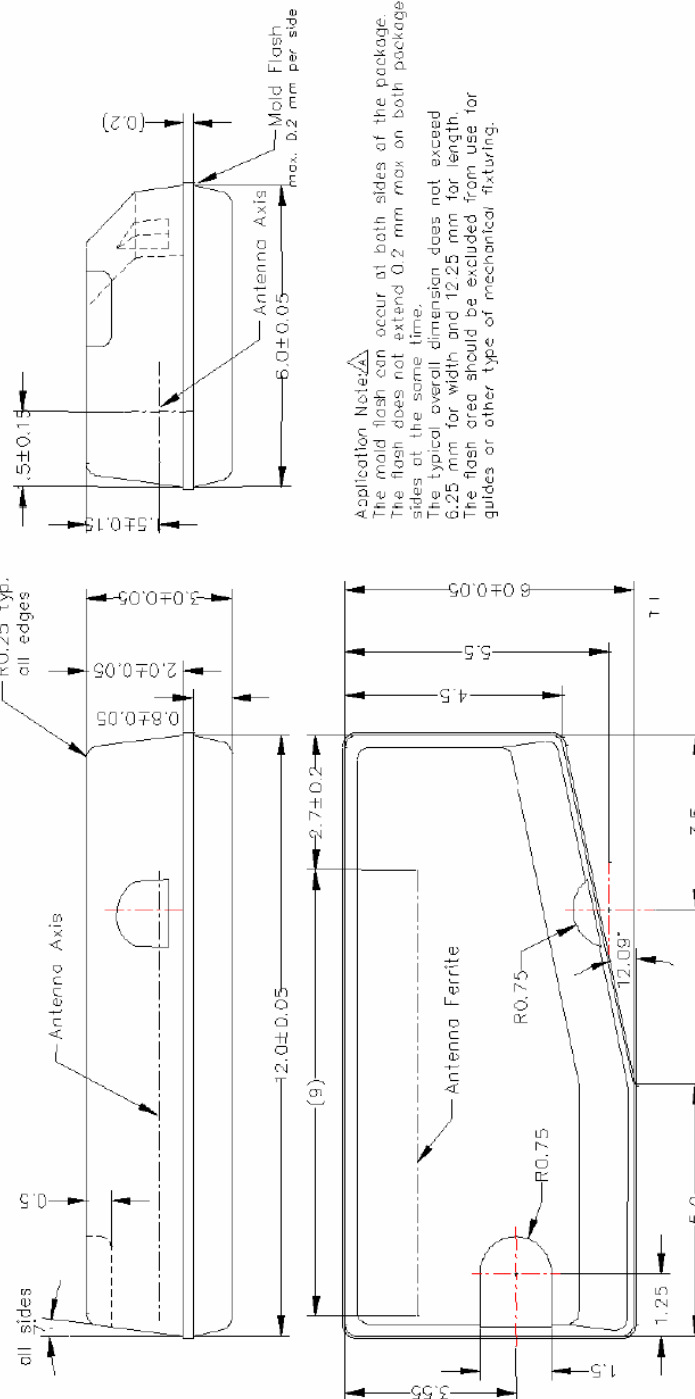
PACKAGING INFORMATION

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
TMS37145TEAIE	ACTIVE	RFIDP	TEA	0	2000	RoHS & Green	Call TI	Level-1-260C-UNLIM	-40 to 85		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.

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