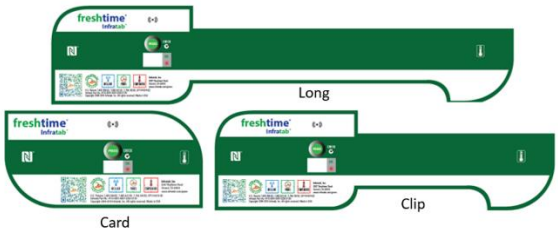
DATA SHEET: Infratab Freshtime™ Sensor-RFID-Dual RFID & NFC Tags	Infratab Part Number: 4400-tagSize
	
Intended Use	The Infratab Freshtime tag is intended to be used for monitoring and recording shelf life and temperature of temperature sensitive goods and the spaces in which these goods live. The tag, although encapsulated with FDA food compliant material, should not be placed in direct contact with food. Tags should be washed between uses to avoid cross contamination. They are not intended for any medical diagnostic use.
Summary Features	**Use**: Shelf-life/temperature monitoring or temperature logging **Communication**: RFID UHF EPC Class 1 Gen 2; NFC Forum Tag Type 2 **Sensing**: Time, Temperature, Shelf-life **Sensor Sampling Rate**: 1 minute to 4 hours **Temperature Range**: **Cold**: -30°C to +70°C; **SubFreeze**: -70°C to +30°C **Alerts**: 12; 5-Life Alerts, 4 Temperature Threshold Alerts, 2 Time Alerts, 1 Power Alert **Sensor Status**: Update sent to RFID chip user memory at each sensing **Intag Data**: 100-Point shelf-life/temperature log; temperature log for 2,880 temperatures sensed; histogram, 512-Byte database **Tag Sizes**: Card, Clip and Long. Clip and Long tags consist of two parts: communication including RFID, button-display and battery. Only Clip & Long tags operate in SubFreeze
Functional Components	A Freshtime™ Dual sensor tag integrates a commercially available RFID EPC Class 1 Gen2 contactless, passive tag IC with I^2C, an NFC Forum Tag Type 2 with I^2C and battery-powered sensor.
COMMUNICATIONS: RFID UHF-EPC AND NFC	
RFID Tag Type	Passive communication powered by RFID EPC Class 1 Gen2 reader. Manufacturer/Model: NXP UCode-I^2C.
NFC Tag Type	Passive RFID communication powered by NFC reader. Manufacturer/Model: NXP NTAG I^2C.
RFID and NFC Operation	The tag requires no in-tag power supply for communication. Its contactless interface generates power used for communications via the antenna circuit by propagative energy transmission from the reader. The tag can be operated using RFID-UHF communication without the need for line of sight when the tag is within the reader's operating range. Tag operation using NFC communication requires close proximity with an NFC reader.
RFID UHF-EPC Class 1 Gen 2	Compliant to EPCGlobal Radio-Frequency Identity Protocols Class-1 Generation-2 UHF RFID Protocol version 1.2.0 with anti-collision and collision arbitration functionality—allowing a reader to simultaneously operate multiple labels/tags within its antenna field. All mandatory EPC Gen2 v 1.2.0 commands are supported. Optional commands include: Access, Block Write.
RFID Frequency Band	Supports global operation in UHF Frequency Band from 860 MHz to 960 MHz

RFID UHF-EPC Interface	Features include: • -18 dBm READ sensitivity • -11 dBm WRITE sensitivity • -23 dBm READ & WRITE sensitivity with the chip powered • Wide RF interface temperature range: -40°C up to 85°C • Memory read protection • Interrupt output • RF – I2C bridge based upon SRAM memory
RFID UHF-EPC Memory	Features include • 3328-bit user memory • 160-bit EPC memory • 96-bit tag identifier (TID) including 48-bit unique serial number • 32-bit KILL password to allow a transition into the secured transmission state • Data retention: 20 years at 55°C • Write endurance: 50 kcycles at 85°C
NFC Key Features	Features include • Standards and protocols: Compliant with ISO/IEC 14443-A 2-3; NFC Forum Tag Type 2 • Operating Distance: up to 10 cm • Communication: two-way for peer-to-peer communications • Scan tags simultaneously: no • Identification: 7-Byte serial number/tag identifier (TID); • Memory: 888 bit-user memory • Read-only locking function • Write endurance (cycles): 200,000 • Data retention: 20 years • Get Version command for ID of chip type and supported features • I^2C Interface for communication with sensor supports standard (100kHz) and fast (400kHz) modes • Energy harvesting • Configurable Field Detection output signal for data transfer synchronization and device wake-up during low power mode

Sensor	
Temperature Measurement Range	Cold: -30ºC to 70ºC; SubFreeze (special tag option for Clip & Long tags): -70°C to 30°C
Temperature Accuracy	± 0.5ºC from -25ºC to -20ºC ± 0.3ºC from -20ºC to +50ºC ± 0.5ºC from +50ºC to +70ºC
Temperature Resolution	0.1ºC
Time Accuracy Standard	Time accurate (crystal on tag)
Sensing Interval	1 minute to 4 hours, programmable
Startup Delay	0 minutes to 4 hours, programmable
Shelf Life Status	Represented in Points from 100 to 0. Product freshness parameters can be entered as Arrhenius, 2 Reference Time/Temperatures, or as table with 32 temperature/life hour entries
Start Date/Time	Input by RFID reader
Alerts	12 Alerts, programmable Shelf life: 5 alerts Temperature threshold: 4 alerts Time: 2 alerts Power: 1 alert

Shelf Life (Points) Log	100 entries for each 1-point change in shelf life or logging duration. Log reports high/low temperature and time for each 1-point change
Temperature Histogram	11 temperature bins storing all temperature samples for a tag run (tag start to tag stop)
Temperature Log	2880 temperature samples
Database	512 bytes for user business data
Security	Tag passcodes for setting up sensor profile, starting and stopping tag Read/write fences for restricting which data can be read or written
Display	Green and red L.E.D. programmable alerts
Button	For starting and optionally stopping tag, checking status and adding checkpoints to log
Battery Life	3-volt lithium button Lifetime will vary depending upon amount of use and temperature; Storage life: 3 years (store in original packaging away from RF field); Idle time: 6µAh nominal current
Storage	Store tags in a clean, dry environment in non-condensing conditions. Store tags away from RFID UHF fields
Label Cover	Polyester FDA coated for food safety
Dimensions Mini Card Clip Long	Width – Length – Height - Weight 2.7237" x 5.0877" x 0.135" (6.9182cm x 12.9228cm x 0.3cm) 2.8437" x 5.7732" x 0.135" (7.223cm x 14.6638cm x 0.3cm) 3.1924" x 11.1111" x 0.135" (8.1087cm x 28.2222cm x 0.3cm) 3.1924" x 17.5553" x 0.135" (8.1087cm x 45.5905cm x 0.3cm)
Durability	Clip and Long tag bend radius of connector: 0.125” Ingress Protection (IP) against dust, moisture: IP57
Quality Verification	The Infratab Freshtime tags are individually tested for the relevant functional performances before release, utilizing a standardized statistical sampling plan to verify operational functionality and product performance.

Quality Assurance Certifications	FCC: complies with the limits for a Class B digital device, pursuant to part 15 of FCC rules. Operation is subject to two conditions: 1) the tag may not cause harmful interference, and 2) the tag must accept any interference received, including interference that may cause undesired operation. These limits are designed to provide reasonable protection against harmful interference in a residential installation. The tag generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. There is no guarantee that interference will not occur in a particular installation. If the tag does cause harmful interference to radio or television reception, the user is encouraged to try to correct the interference by reorienting the receiving antenna or changing the separation between the tag and the receiver. EMC Directive Conformance: The tag is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. The tag complies with the limits for Class B Equipment according to CISPR 22/European Standard EN 44022 on emissions, ad CISPR 24/European Standards EN 61000-4-3, EN 61000-4-2 on immunity. ROHS compliant: The tag is compliant with EU Directive 2002/95/EC-RoHS (Restriction of the use of certain hazardous substances in electrical and electronic equipment). Unless otherwise stated by Infratab in writing, Infratab's statement of compliance represents Infratab's knowledge and belief based on information provided by third party suppliers to Infratab. Temperature Verification: The tag undergoes a two-point temperature calibration and verification test which are traceable to the U.S. National Institute of Standards and Technology (NIST) to ensure the highest levels of accuracy. Temperature accuracy verification process includes random sample testing of production lots by an ISO/IEC 17025 accredited laboratory. Tag coatings are U.S. FDA food safe. For added protection when used in the food industry, seal in a plastic bag. Data Security: Tag software is secure and cannot be modified after tag has been started. Data is communicated from tag to RFID reader using standard RFID EPC Gen2 protocols. Security of the data from tag to reader is the same as all other RFID Gen 2 communications between tag and reader. Reader software used to communicate tag data from reader to a database is compliant with 21CFR Par 11, a standard that ensures data security when used according to software instructions provided for the intended use.
Tag Traceability	All tags are traceable via EPC number to production batch lots. Traceability includes key components batchLot, in-tag software version, calibration, initial profile.
Product Use	All technical statements and information contained in this document are based upon experience or tests that Infratab believes are reliable. However, many factors beyond Infratab's control can affect the use and performance of an Infratab Freshtime tag in a particular application, including the conditions under which the product is used and the time and environmental conditions in which the product is expected to perform. Since these factors are uniquely within the user's knowledge and control, it is essential that the user evaluate the product to determine whether it is fit for a particular purpose and suitable for the user's method of application. The tag is not intended for any medical diagnostic use. Any use of the tag that is inconsistent with the intended use statement is not recommended by Infratab.

Warranty and Limited	Unless stated otherwise in Infratab product literature, Infratab warrants that each Infratab tag meets the applicable specification at the time Infratab ships the product. This warranty is made solely to End User and not to any third party. This warranty does not apply to Products which Infratab determines, upon inspection, have failed, become defective or unworkable due to abuse, mishandling, misuse, alteration, negligence, improper installation, use which is not in accordance with the information and precautions described in the applicable use manual, or other causes beyond Infratab's control. This warranty does not apply to any aspect of the Products based on End User's perishable profile specification, unless End User has reviewed and approved such specification in writing. EXCEPT FOR THE FOREGOING WARRANTY, THE PRODUCTS AND ANY ASSOCIATED DATA OR ALGORITHMS ARE PROVIDED "AS IS" AND ALL RISKS OF USE AND APPLICATION ARE ON END USER. INFRATAB SPECIFICALLY DISCLAIMS AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING IMPLIED WARRANTIES OF NONINFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. INFRATAB MAKES NO WARRANTY AS TO THE RESULTS OR OUTPUT OBTAINED FROM THE PRODUCTS OR THE ACCURACY, SUFFICIENCY OR SUITABILITY OF THE PRODUCTS FOR END USER'S PARTICULAR APPLICATION. The End User is responsible for determining whether the Infratab product is fit for a particular purpose and suitable for the End User's application. If the Infratab product is defective within the warranty period, the End User's exclusive remedy and Infratab's and seller's sole obligation will be, at Infratab's option, to replace the product or refund the purchase price.
Limitation of Liability	IN NO EVENT WILL INFRATAB BE LIABLE FOR ANY INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF ANTICIPATED PROFITS OR BENEFITS, EVEN IF INFRATAB HAS BEEN INFORMED OF THE POSSIBILITY THEREOF IN ADVANCE. IN NO CASE WILL INFRATAB'S AGGREGATE LIABILITY TO END USER BE GREATER THAN THE PURCHASE PRICE PAID BY END USER TO INFRATAB FOR THE PRODUCTS WHICH ARE THE SUBJECT OF END USER'S CLAIM.