

Australian Standard[®]

**Information technology—Radio
frequency identification for item
management**

**Part 7: Parameters for active air
interface communications at 433 MHz**



This Australian Standard® was prepared by Committee IT-034, Automatic Identification and Data Capture Techniques. It was approved on behalf of the Council of Standards Australia on 15 November 2006.

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- Australian Custom Service
 - Australian Data Capture Association
 - Australian Electrical and Electronic Manufacturers Association
 - Australian Retailers Association
 - Australian Veterinary Association
 - Department of Communication, Information Technology and the Arts
 - Department of Defence
 - Department of Primary Industries, Vic
 - GS1 Australia
 - RFID Association of Australia
 - The University of Adelaide
-

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Information technology—Radio frequency identification for item management

Part 7: Parameters for active air interface communications at 433 MHz

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PREFACE

This Standard was prepared by the Standards Australia Committee IT-034, Automatic Identification and Data Capture Techniques.

The objective of this Standard is to provide a common technical specification for RFID devices operating as an active RF Tag in the 433 MHz band, used in item management applications.

This Standard is identical with, and has been reproduced from ISO/IEC 18000-7:2004, *Information technology—Radio frequency identification for item management—Part 7: Parameters for active air interface communications at 433 MHz*.

As this Standard is reproduced from an international standard, the following applies:

- (a) Its number appears on the cover and title page while the international standard number appears only on the cover
- (b) In the source text ‘part of ISO/IEC 18000’ should read ‘this Australian Standard.’
- (c) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

<i>Reference to International Standard</i>		<i>Australian Standard</i>	
ISO/IEC		AS ISO/IEC	
15963	Information technology—Radio frequency identification for item management—Unique identification for RF tags	15963	Information technology—Radio frequency identification for item management—Unique identification for RF tags
19762-1	Information technology—Automatic identification and data capture (AIDC) techniques—Harmonized vocabulary—Part 1: General terms relating to AIDC	19762.1	Information technology—Automatic identification and data capture (AIDC) techniques—Harmonized vocabulary—Part 1: General terms relating to AIDC
19762-3	Part 3: Radio frequency identification (RFID)	19762.3	Part 3: Radio frequency identification (RFID)

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INTRODUCTION

This part of ISO/IEC 18000 is intended to address RFID devices operating in the 433 MHz frequency band, providing an air interface implementation for wireless, non-contact information system equipment for Item Management applications. Typical applications operate at ranges greater than one meter.

The RFID system includes a host system and RFID equipment (interrogator and tags). The host system runs an application program, which controls interfaces with the RFID equipment. The RFID equipment is composed of two principal components: tags and interrogators. The tag is intended for attachment to an item, which a user wishes to manage. It is capable of storing a tag ID number and other data regarding the tag or item and of communicating this information to the interrogator. The interrogator is a device, which communicates to tags in its RF communication range. The interrogator controls the protocol, reads information from the tag, directs the tag to store data in some cases, and ensures message delivery and validity. This system uses an active tag.

RFID systems defined by this part of ISO/IEC 18000 provide the following minimum features:

- Identify tag in range
- Read data
- Write data or handle read only systems gracefully
- Selection by group or address
- Graceful handling of multiple tags in the field of view
- Error detection

AUSTRALIAN STANDARD

Information technology — Radio frequency identification for item management —**Part 7:
Parameters for active air interface communications at 433 MHz****1 Scope**

This part of ISO/IEC 18000 defines the air interface for radio frequency identification (RFID) devices operating as an active RF Tag in the 433 MHz band used in item management applications. The purpose of this part of ISO/IEC 18000 is to provide a common technical specification for RFID devices that may be used by ISO committees developing RFID application standards. This part of ISO/IEC 18000 is intended to allow for compatibility and to encourage inter-operability of products for the growing RFID market in the international marketplace. This part of ISO/IEC 18000 defines the forward and return link parameters for technical attributes including, but not limited to, operating frequency, operating channel accuracy, occupied channel bandwidth, maximum power, spurious emissions, modulation, duty cycle, data coding, bit rate, bit rate accuracy, bit transmission order, and where appropriate operating channels, frequency hop rate, hop sequence, spreading sequence, and chip rate. This part of ISO/IEC 18000 further defines the communications protocol used in the air interface.

2 Conformance

The rules for RFID device conformity evaluation will be given in a future Technical Report (ISO/IEC TR 18047-7).

3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 15963, *Information technology — Radio frequency identification for item management — Unique identification for RF tags*

ISO/IEC 19762-1, *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary — Part 1: General terms relating to AIDC*¹⁾

ISO/IEC 19762-3, *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary — Part 3: Radio frequency identification (RFID)*¹⁾

1) To be published.

4 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 19762-1 and ISO/IEC 19762-3 apply.

5 Symbols and abbreviated terms

For the purposes of this document, the symbols and abbreviated terms given in ISO/IEC 19762-1 and ISO/IEC 19762-3 apply.

6 433,92 MHz active narrowband specification

6.1 Physical layer

The RF communication link between interrogator and tag utilizes narrow band UHF frequency with the following characteristics:

Carrier Frequency	433,92 MHz $\pm$ 20 ppm
Modulation Type	FSK
Frequency deviation	$\pm$ 50 kHz
Symbol LOW	fc +50 kHz
Symbol HIGH	fc -50 kHz
Modulation rate	27,7 kHz
Wake up Signal	30 kHz

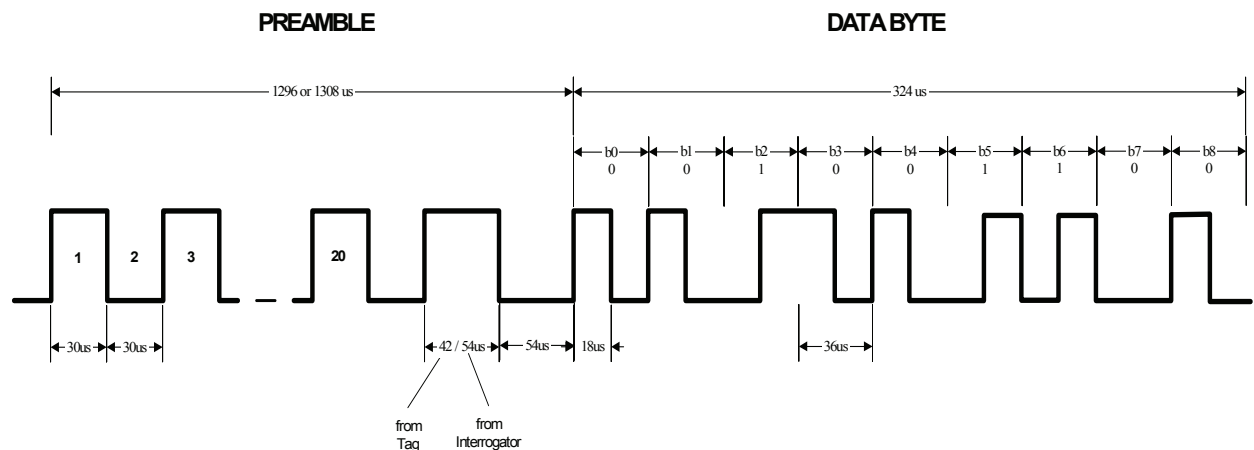
The Wake up signal is transmitted by interrogator for minimum of 2,5 seconds to wake up all tags within communication range. The wake up signal is a 30 kHz sub-carrier tone for 2,5 to 2,7 seconds. Upon detection of the Wake up signal all tags will enter into Ready state awaiting command from the interrogator.

The communication between interrogator and tag is of Master-Slave type, where the interrogator always initiates communications and then listens for response from a tag. Multiple response transmissions from the tags are controlled by collection algorithm described in section "Tag Collection and Collision Arbitration".

6.2 Data Link layer

6.2.1 General

Data between interrogator and tag is transmitted in packet format. A packet is comprised of a preamble, data bytes and a final logic low period. The end of preamble and beginning of the first data byte is indicated by the last two pulses of the preamble. The same two pulses of the preamble also indicate the originator of the data packet. Data bytes are sent in Manchester code format. Transmission order is most significant byte first; within a byte, the order is least significant bit first. Figure 1 illustrates the data communication timing of the preamble and the first byte of a packet.



Pulse width in microseconds. Data byte transmitted significant bit first. Byte shown is code 0x64.

Figure 1 — Data communication timing

6.2.2 Preamble

The preamble is comprised of twenty pulses of 60 μs period, 30 μs high and 30 μs low, followed by a final sync pulse which identifies the communication direction: 42 μs high 54 μs low (Tag to Interrogator); 54 μs high 54 μs low (Interrogator to Tag).

6.2.3 Data byte format

Data bytes are in Manchester code format, comprised of 8 data bits and one stop bit. The bit period is 36 μs, the total byte period is 324 μs. A falling edge in the center of the bit-time indicates a 0 bit, a rising edge indicates a 1 bit. The stop bit is coded as a zero bit.

6.2.4 CRC bytes

A CRC checksum is calculated as a 16-bit value, initialized with all ones ('FFFF'), over all data bytes (excluding preamble) according to the CCITT polynomial ($x^{16} + x^{12} + x^5 + 1$). The CRC is appended to the data as two bytes. Reference: "The CCITT Red Book", Volume VIII, International Telecommunications Union, Geneva, 1986. Recommendation V.41, "Code-Independent Error Control System."

6.2.5 Packet end period

A final period of 36 μs of continuous logic low is transmitted for each packet after the CRC bytes.

6.2.6 Interrogator to tag message format

Tags shall recognize the following message format: