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

Part 1:
**RFID-enabled labels and packaging
supporting ISO/IEC 18000-6C**

*Technologies de l'information — Identification radiofréquentielle de
gestion d'article — Lignes directrices de mise en application —*

*Partie 1: Étiquettes adaptées à RFID et emballage contenant
l'ISO/CEI 18000-6C*

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Contents

Page

Foreword	vii
Introduction	viii
1 Scope	1
2 Normative references	1
3 Terms and definitions	3
4 Passive RFID transponder selection	4
4.1 General	4
4.2 Passive UHF transponder frequency considerations	4
4.3 UHF transponder design factors	5
4.4 Transponder life and failure modes	5
4.4.1 Flexure and minimum bending radius of the passive RFID transponders media.....	5
4.4.2 Environmental considerations	5
5 Media incorporating passive RFID transponders	5
5.1 General	5
5.2 Media configurations	6
5.2.1 Pressure-sensitive labels	6
5.2.2 Dry-gum (water-activated) adhesive labels.....	6
5.2.3 Passive RFID transponders tickets used in carrier envelopes	6
5.2.4 Tie-on tags	6
5.3 Environmental considerations in media design	6
5.3.1 General	6
5.3.2 Operating and storage temperature ranges of applied passive RFID transponders labels.....	7
5.3.3 Storage of media incorporating passive RFID	7
5.4 Media printable facestocks.....	7
5.5 Printing method and ink compatibility	7
5.6 Permanent label and inlay adhesives	7
5.6.1 General	7
5.6.2 Adhesive RF properties and transponder compatibility.....	8
5.6.3 Hygroscopic adhesives	8
5.7 Removable label adhesives	8
5.8 Release liners (backing) for pressure-sensitive labels and inlays.....	8
5.8.1 Purpose	8
5.8.2 Adhesive compatibility and release level.....	8

- 5.8.3 Removing the passive RFID transponders label and inlays from the release liner8
- 5.8.4 RF properties of release liners9
- 5.9 Avoiding electrostatic discharge (ESD)9
 - 5.9.1 Overview9
 - 5.9.2 Peeling as a source of static electricity9
 - 5.9.3 Conveyors as sources of static electricity 10
 - 5.9.4 ESD compliance testing 10
 - 5.9.5 Printer-encoder considerations 10
- 6 Printing and encoding labels with passive RFID transponders 10
 - 6.1 Printing methods 10
 - 6.2 Label edge start sensing issues 11
 - 6.3 Encoding and/or verifying transponder data 11
 - 6.4 Dealing with defective transponders 11
- 7 Placement and attachment of media and inlay with passive RFID transponders 11
 - 7.1 RF influence of the transport unit and its contents on the transponder 11
 - 7.2 Visual inspection method for determining label or inlay placement 12
 - 7.3 Transponders for objects primarily acting as RF reflectors 13
 - 7.4 Transponders for objects primarily acting as RF absorbers 14
 - 7.5 Some common packaging problems 14
- 8 RFID labelling of conveyable cases and containers 15
 - 8.1 Overviews 15
 - 8.2.1 Transport units 16
 - 8.2.2 Reusable plastic totes, delivery trays, etc. 17
 - 8.2.3 Other conveyable goods 17
 - 8.3 RFID reader assumptions 17
 - 8.4 Label format and transponder data structure 17
 - 8.4.1 Printed label format 17
 - 8.4.2 ISO data structures 18
 - 8.4.3 EPCglobal data structures 18
 - 8.4.4 Use and reuse of transport unit transponders 19
 - 8.5 Use of multiple passive RFID transponders 19
 - 8.5.1 Use of multiple passive ISO RFID transponders 19
 - 8.5.2 Use of multiple passive EPC RFID transponders 20
- 9 Passive RFID transponders and labelling of palletized unit loads 20
 - 9.1 Overview 20
 - 9.2 RFID reader assumptions 20
 - 9.2.1 Portal readers 20

9.2.2	Forklift-mounted readers.....	21
9.2.3	Pallet conveyor readers.....	21
9.2.4	Handheld readers	21
9.3	Passive RFID transponders label usage and placement on pallet unit loads	21
9.3.1	General rules for unit load passive RFID transponders label location.....	21
9.3.2	General rules for active RFID transponders used on returnable transport items (RTIs).....	22
9.3.3	Transponder data structure	22
9.3.4	Wooden and plastic pallets.....	23
9.3.5	Special considerations for bin, cage, and tub pallet containers.....	23
9.4	Permanent RFID transponders on pallets compliant to ISO 17364.....	23
9.5	Permanent RFID transponders on pallets compliant to EPCglobal	24
10	Non-conveyable and non-palletized materiel	24
10.1	General.....	24
10.2	RFID reader assumptions	24
10.3	Guidelines for some common types of objects and transport units	24
10.4	Label printed format and transponder data structure	25
10.5	Use of multiple passive RFID transponders.....	25
11	Representing EPCglobal data structures in bar codes	25
11.1	Unique Item Identifier (UII) representation	25
11.1.1	Background.....	25
11.1.2	Recommended representations	25
11.1.3	Bar code Application Identifiers and Data Identifier needs.....	26
11.1.4	Flag Character	27
11.1.5	EPCglobal tag data memory organization.....	28
11.2	EPCglobal UHF Gen 2 bar code backup of binary UII data.....	29
11.2.1	EPCglobal UHF Gen 2 data memory organization	29
11.2.2	Full backup of UHF Gen 2 binary UII data structures	30
11.2.3	Supplemental Backup of UHF Gen 2 binary UII data structures	30
11.3	Optional backup of Gen 2 mixed binary/alphanumeric UII data	31
11.4	Regenerating or updating RFID-enabled labels	32
11.4.1	Regenerating failed tags.....	32
11.4.2	Use of the tag identification field (TID).....	32
11.4.3	Modified UII data structure	33
11.4.4	Replacing bad RFID enabled labels	33
12	Human readable interpretation (HRI) backup	33
12.1	Need for HRI	33
12.2	Manual data entry considerations.....	33
12.3	HRI for EPCglobal UHF Gen 2 UII data	34

13	Data for bar code and human readable backup examples	34
13.1	SGTIN-96 example	34
13.2	UHF Gen 2 tag backup	35
14	Linear bar code recommendation	36
14.1	General.....	36
14.2	UHF Gen 2 backup using GS1-128 bar codes.....	36
14.2.1	Full Backup of UHF Gen 2 Ull data	36
14.2.2	Supplemental Backup of UHF Gen 2 Ull data	37
14.3	Partial backup.....	39
14.4	Linear bar code printing recommendations.....	39
15	Two-dimensional bar code symbol backup.....	39
15.1	GS1 supported symbologies	39
15.1.1	Use of Data Matrix.....	39
15.1.2	Use of EAN.UCC Composite	40
15.2	Other ISO/IEC 2D symbologies	40
15.3	The Military Shipping Label	40
Annex A	(informative) Design terms for passive RFID transponders inlays or labels	41
Annex B	(informative) AIM RFID Emblem for passive RFID transponders	43
Annex C	(informative) Optimizing passive RFID transponders placement	45
Annex D	(informative) UHF Gen 2 tag data memory map	53
Annex E	(informative) ISO/IEC 18000-6c tags, ASCII, and AFIs.....	55
Annex F	(informative) Recovering the Ull from pre-existing bar codes	57
Annex G	(informative) Summary and Examples.....	59
Bibliography	61

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

In exceptional circumstances, the joint technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when the joint technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC TR 24729-1, which is a Technical Report of type 2, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 31, *Automatic identification and data capture techniques*.

ISO/IEC TR 24729 consists of the following parts, under the general title *Information technology — Radio frequency identification for item management — Implementation guidelines*:

- *Part 1: RFID-enabled labels and packaging supporting ISO/IEC 18000-6C*
- *Part 2: Recycling and RFID tags*

Introduction

This Part of ISO/IEC TR 24729 provides background, reference information, and practical knowledge in the selection and application of passive RFID transponders to transport units and pallets (see Layers 2 and 3 of Figure 1) used to move and distribute commercial packaged goods. This may be accomplished with inlays or conventional labels, tickets and tags *with embedded or attached RFID transponders*. This document does not address applications where the transponder is embedded in the container itself.

The assumptions for this document are:

1. RFID transponders may be placed separately from human- and machine-readable labels or information on to the transport unit or pallet. However, if RFID is to be supplied, it is important to have all three on the transport unit or pallet.
2. RFID transponders will increase in reliability therefore non-reads will be minimized.
3. ISO/IEC TR 24729-2 will describe the disposition of non-readable transponders.

The performance of RFID devices, particularly those operating at UHF frequencies (860-960 MHz) are strongly influenced by the construction of the RFID-enabled label, where it is applied to the object, and the RF characteristics of the underlying object or objects. In this regard, much more care has to be taken in selection and placement of the RFID-enabled label on the object than with a conventional bar code label. This, in turn, requires the additional knowledge and practical guidelines for RFID-enabled label selection and usage provided herein.

Information technology — Radio frequency identification for item management — Implementation guidelines —

Part 1: RFID-enabled labels and packaging supporting ISO/IEC 18000-6C

1 Scope

This Part of ISO/IEC TR 24729 provides guidance on the use of RFID enabled labels and packaging in the supply chain. Guidance is provided for transponder selection, as well as the selection of media, adhesives, facestocks, and inks. Techniques are described to minimize electrostatic discharge and transponder damage. Methods are described to verify transponder data. Placement and attachment guidance is provided for inlays, conveyable cases and containers, palletized/unit load material, as well as non-conveyables and non-palletized materials.

One type of RFID referred to within this document is the EPCglobal Class 1 Generation 2 technology. The “Class” structure originally embraced by EPCglobal has, for the most part, been overtaken by events. Consequently, this technology may be referred to as UHF Gen 2 or by its ISO designation, ISO/IEC 18000, Part 6C.

2 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 646, *Information technology — ISO 7-bit coded character set for information interchange*

ISO/IEC 13239, *Information technology — Telecommunications and information exchange between systems — High-level data link control (HDLC) procedures*

ISO/IEC 15417, *Information technology — Automatic identification and data capture techniques — Code 128 bar code symbology specification*

ISO/IEC 15418, *Information technology — EAN/UCC Application Identifiers and Fact Data Identifiers and Maintenance*

ISO 15394, *Packaging — Bar code and two-dimensional symbols for shipping, transport and receiving labels*

ISO/IEC 15434, *Information technology — Automatic identification and data capture techniques — Syntax for high-capacity ADC media*

ISO/IEC 15438, *Information technology — Automatic identification and data capture techniques — PDF417 bar code symbology specification*

ISO/IEC 15459-5, *Information technology — Unique identifiers — Part 5: Unique identifier for returnable transport items (RTIs)*

ISO/IEC 15961, *Information technology — Radio frequency identification (RFID) for item management — Data protocol: application interface*

ISO/IEC 15962, *Information technology — Radio frequency identification (RFID) for item management — Data protocol: data encoding rules and logical memory functions*

ISO/IEC 16022, *Information technology — Automatic identification and data capture techniques — Data Matrix bar code symbology specification*

ISO/IEC TR 24729-1:2008(E)

ISO/IEC 16388, *Information technology — Automatic identification and data capture techniques — Code 39 bar code symbology specification*

ISO 17363, *Supply chain applications of RFID – Freight containers*

ISO 17364, *Supply chain applications of RFID – Returnable transport items (RTIs)*

ISO 17365, *Supply chain applications of RFID – Transport units*

ISO 17366, *Supply chain applications of RFID – Product packaging*

ISO 17367, *Supply chain applications of RFID – Product tagging*

ISO/IEC 18000-6, *Information technology — Radio frequency identification for item management — Part 6: Parameters for air interface communications at 860 MHz to 960 MHz*

ISO/IEC 18000-7, *Information technology — Radio frequency identification for item management — Part 7: Parameters for active air interface communications at 433 MHz*

ISO/IEC 18004, *Information technology — Automatic identification and data capture techniques — QR Code 2005 bar code symbology specification*

ISO/IEC 18046, *Information technology — Automatic identification and data capture techniques — Radio frequency identification device performance test methods*

ISO/IEC 18047-6, *Information technology — Radio frequency identification device conformance test methods — Part 6: Test methods for air interface communications at 860 MHz to 960 MHz*

ISO/IEC 19762 (all parts), *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary*

ISO 21067, *Packaging — Vocabulary*

ISO 22742, *Packaging — Linear bar code and two-dimensional symbols for product packaging*

ISO/IEC 24723, *Information technology — Automatic identification and data capture techniques — EAN.UCC Composite bar code symbology specification*

ISO/IEC 24724, *Information technology — Automatic identification and data capture techniques — Reduced Space Symbology (RSS) bar code symbology specification*

ISO/IEC 24728, *Information technology — Automatic identification and data capture techniques — MicroPDF417 bar code symbology specification*

IEC 61000-4-2 Ed. 1.2 b:2001, *Electromagnetic compatibility (EMC) — Part 4-2: Testing and measurement techniques — Electrostatic discharge immunity test*

ITU Recommendation X.25, *Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit*

FCC Part 15.247, *U.S. Code, Title 47 — Telecommunication Chapter I — Federal Communications Commission, Part 15 — Radio Frequency Devices — Section 15.247 — Operation within the Bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz*

ETSI EN 302 208-1 V1.1.1, *European Standard (Telecommunications series), Electromagnetic compatibility and Radio spectrum Matters (ERM); Radio Frequency Identification Equipment operating in the band 865 MHz to 868 MHz with power levels up to 2 W; Part 1: Technical requirements and methods of measurement*

AIM Global NASAG-0401, v1.4, *AIM Global Standard for the use of the AIM RFID Emblem™ and Index to identify RFID-enabled labels*

GS1 General Specifications

EPC™ Radio-Frequency identity protocols, Class-1 Generation-2 UHF RFID, Protocol for communications at 860 MHz – 960 MHz, Version 1.0.9

EPC Tag Data Standards version 1.3

EPC Tag Data Standards version 1.1, Rev 1.27

MIL-STD-129P, Military Marking for Shipment and Storage

Department of Defense Guide to Uniquely Identifying Items, v1.5