ISO/IEC TR 24729-1:2008-04 (E)

Information technology - Radio frequency identification for item management - Implementat ion guidelines - Part 1: RFID-enabled labels and packaging supporting ISO/IEC 18000-6C

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 liner 8
5.8.4 RF properties of release liners 9
5.9 Avoiding electrostatic discharge (ESD) 9
5.9.1 Overview 9
5.9.2 Peeling as a source of static electricity 9
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 Definition of a conveyable object 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 UII data 36
14.2.2 Supplemental Backup of UHF Gen 2 UII 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 UII from pre-existing bar codes 57

Annex G (informative) Summary and Examples 59

Bibliography 61