

# ISO/IEC 18000-2:2009-10 (E)

## Information technology - Radio frequency identification for item management - Part 2: Parameters for air interface communications below 135 kHz

---

<b>Contents</b>		<b>Page</b>
Foreword .....		vi
Introduction .....		vii
<b>1</b>	<b>Scope .....</b>	<b>1</b>
<b>2</b>	<b>Conformance .....</b>	<b>1</b>
2.1	RF emissions general population .....	2
2.2	RF emissions and susceptibility health care setting .....	2
<b>3</b>	<b>Normative references .....</b>	<b>2</b>
<b>4</b>	<b>Terms and definitions .....</b>	<b>2</b>
<b>5</b>	<b>Symbols and abbreviated terms .....</b>	<b>4</b>
5.1	Symbols .....	4
5.2	Abbreviated terms .....	5
<b>6</b>	<b>Physical layer .....</b>	<b>6</b>
6.1	Type A (FDX) .....	6
6.1.1	Power transfer .....	6
6.1.2	Frequency .....	6
6.1.3	Communication signal interface interrogator to tag .....	6
6.1.4	Communication signal interface tag to interrogator .....	9
6.1.5	General Protocol Timing Specifications .....	10
6.2	Type B (HDX) .....	12
6.2.1	Power transfer .....	12
6.2.2	Communication signal interface interrogator to tag .....	12
6.2.3	Communication Signal Interface tag to interrogator .....	15
6.2.4	General protocol Timing Specification .....	17
6.3	Physical and Media Access Control (MAC) Parameters .....	19
6.3.1	Interrogator to tag link .....	19
6.3.2	Tag to interrogator link .....	21
6.3.3	Protocol parameters .....	24
6.3.4	Anti-collision parameters .....	25
<b>7</b>	<b>Transmission Protocol .....</b>	<b>26</b>
7.1	Basic elements .....	26
7.2	IC Identifier and Unique Item Identifier (UII) .....	26
7.3	Request format .....	27
7.4	Response format .....	27
7.5	Request flags .....	28
7.5.1	AFI flag .....	29
7.5.2	NOS flag .....	29
7.5.3	SEL flag and ADR flag .....	29
7.5.4	CRCT flag .....	30
7.5.5	PEXT flag .....	30
7.6	Error flag .....	30
7.7	Error handling .....	31
7.8	Block security status .....	32
7.9	Start of frame pattern (SOF) .....	32

7.9.1	Interrogator request .....	32
7.9.2	Tag response .....	32
7.10	End of frame pattern (EOF) .....	32
7.10.1	Interrogator request .....	32
7.10.2	Tag response .....	32
7.11	CRC .....	32
7.12	Application family identifier (AFI) .....	33
7.13	Data storage format identifier (DSFID) .....	36
8	User memory organisation .....	36
8.1	User memory organisation (Page 0) .....	36
8.2	Extended User memory organisation (Page 1) .....	36
9	Tag states .....	37
9.1	RF-Off State .....	37
9.2	Ready State .....	37
9.3	Quiet State .....	37
9.4	Selected state .....	38
9.5	State diagram .....	38
10	Anti-collision .....	39
10.1	Request parameters .....	39
10.2	Request processing by the tag .....	39
10.3	Explanation of anti-collision sequences .....	42
10.3.1	Anti-collision sequence with 1 slot .....	42
10.3.2	Anti-collision sequence with 16 slots .....	42
10.3.3	Mixed population with tags of type A and B .....	44
11	Commands .....	44
11.1	Command classification .....	44
11.1.1	General .....	44
11.1.2	Mandatory commands .....	45
11.1.3	Optional commands .....	45
11.1.4	Custom commands .....	45
11.1.5	Proprietary commands .....	45
11.2	Command code structure .....	45
11.3	Command list .....	46
11.4	Mandatory commands .....	47
11.4.1	INVENTORY .....	47
11.4.2	READ UII .....	47
11.4.3	READ MULTIPLE BLOCKS .....	48
11.4.4	STAY QUIET .....	48
11.4.5	WRITE SINGLE BLOCK .....	49
11.4.6	LOCK BLOCK .....	49
11.5	Optional commands .....	50
11.5.1	READ SINGLE BLOCK .....	50
11.5.2	READ SINGLE BLOCK WITH SECURITY STATUS .....	50
11.5.3	READ MULTIPLE BLOCKS WITH SECURITY STATUS .....	51
11.5.4	WRITE MULTIPLE BLOCKS .....	51
11.5.5	GET SYSTEM INFORMATION .....	52
11.5.6	SELECT .....	53
11.5.7	RESET TO READY .....	54
11.5.8	WRITE SYSTEM DATA .....	54
11.5.9	LOCK SYSTEM DATA .....	55
11.5.10	READ EXTENDED MULTIPLE BLOCKS .....	56
11.5.11	WRITE EXTENDED MULTIPLE BLOCK .....	56
11.5.12	LOCK EXTENDED BLOCK .....	57
11.5.13	Optional command execution in Inventory mode .....	58
11.6	Custom commands .....	59
11.7	Proprietary commands .....	59
Annex A (informative)	CRC Check for Error Detection .....	60

<b>A.1</b>	<b>Description .....</b>	<b>60</b>
<b>A.2</b>	<b>CRC check source code example .....</b>	<b>61</b>
<b>Annex B (informative) Description of a typical anti-collision sequence with tags of types A and B ...</b>		<b>62</b>
<b>Annex C (informative) Optional anti-collision mechanism .....</b>		<b>63</b>
<b>C.1</b>	<b>Introduction .....</b>	<b>63</b>
<b>C.2</b>	<b>Description .....</b>	<b>63</b>
<b>C.3</b>	<b>Physical layer for the Multi-read command .....</b>	<b>63</b>
<b>C.3.1</b>	<b>Power transfer .....</b>	<b>64</b>
<b>C.3.2</b>	<b>Frequency .....</b>	<b>64</b>
<b>C.3.3</b>	<b>Interrogator to tag .....</b>	<b>64</b>
<b>C.3.4</b>	<b>Tag to interrogator .....</b>	<b>64</b>
<b>C.3.5</b>	<b>Parameters for optional Multi-read command .....</b>	<b>65</b>
<b>C.4</b>	<b>Multi-read command .....</b>	<b>68</b>
<b>C.4.1</b>	<b>Multi-read request format .....</b>	<b>68</b>
<b>C.4.2</b>	<b>Request flags .....</b>	<b>69</b>
<b>C.5</b>	<b>Anti-collision mechanism .....</b>	<b>70</b>
<b>C.5.1</b>	<b>Acknowledgement by the interrogator .....</b>	<b>70</b>
<b>C.5.2</b>	<b>Acknowledgement by the tag .....</b>	<b>70</b>
<b>C.5.3</b>	<b>Timing .....</b>	<b>70</b>
<b>C.5.4</b>	<b>Explanation of an anti-collision sequence .....</b>	<b>71</b>
<b>C.6</b>	<b>Protocol and anti-collision Parameters .....</b>	<b>76</b>
<b>C.6.1</b>	<b>Protocol Parameters .....</b>	<b>76</b>
<b>C.6.2</b>	<b>Anti-collision Protocol .....</b>	<b>78</b>
<b>Bibliography .....</b>		<b>79</b>