

First Workshop on Contactless Card Interoperability
Mutual European and Japanese Initiative for Interoperability
in Paris on October 24, 2001

Proximity IC Cards Interoperability

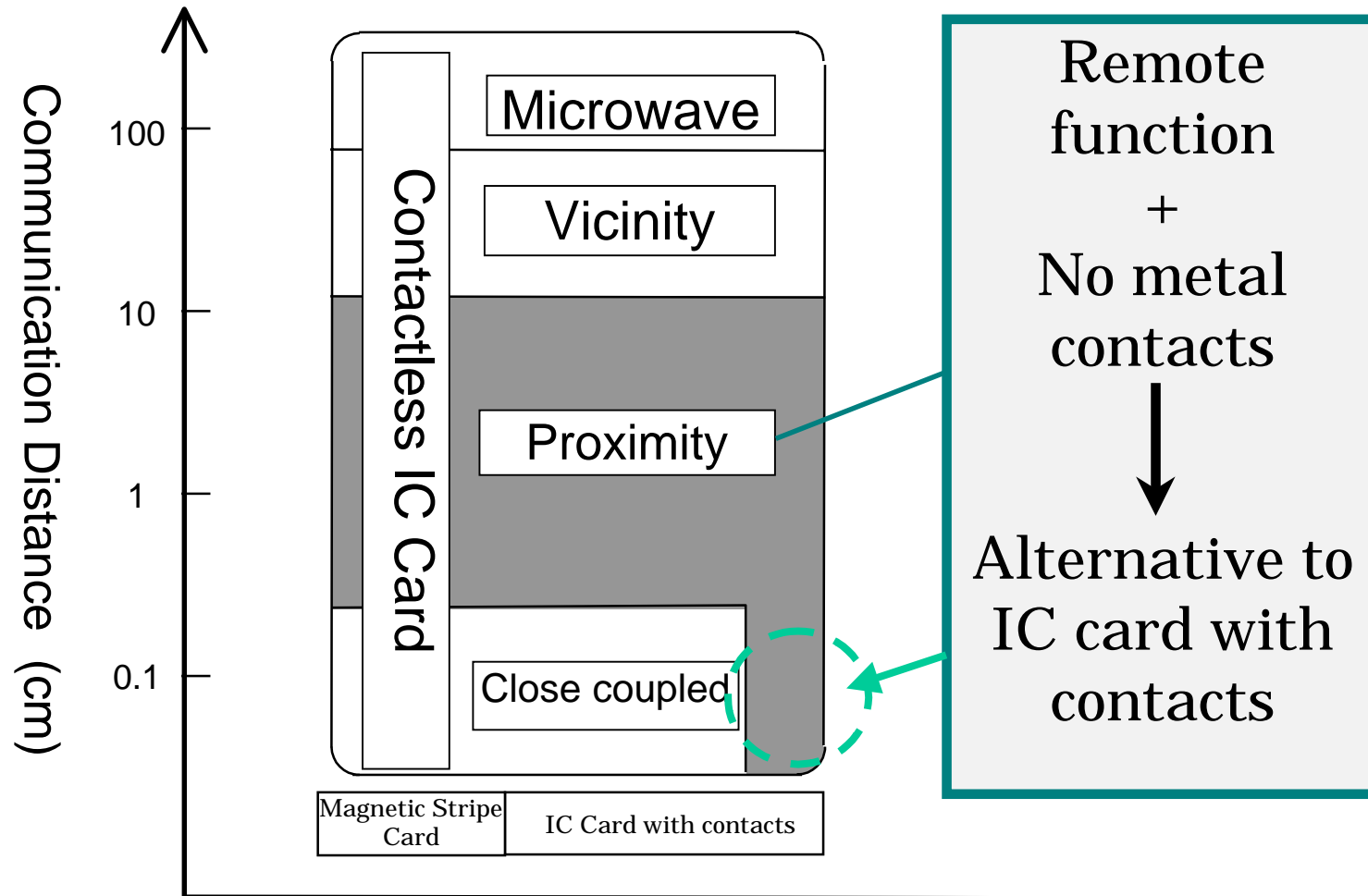
*Implementation Standards & Development
by NMDA*

Atsushi WATANABE

DENSO
DENSO WAVE

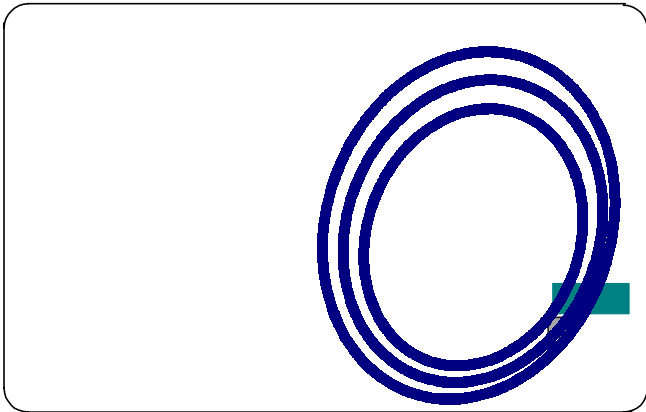
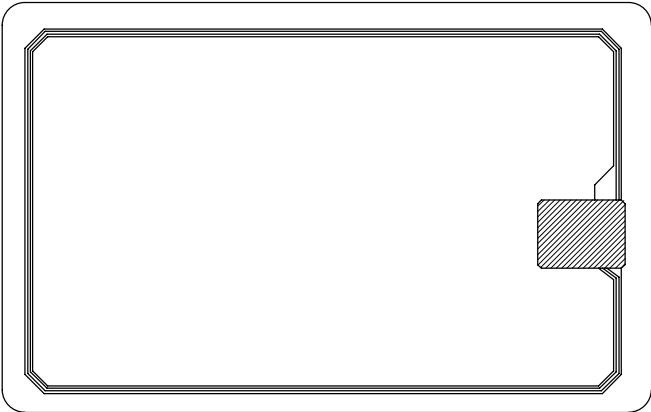
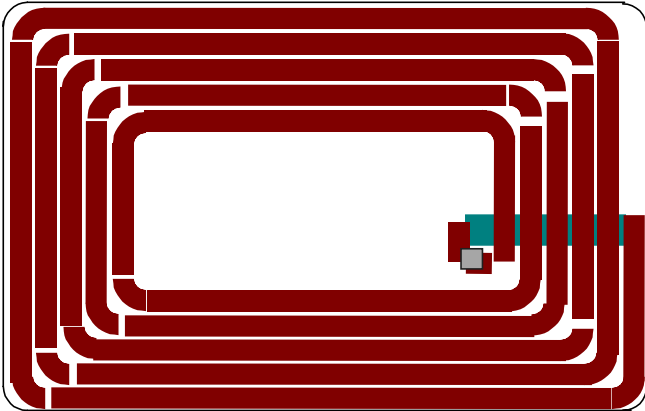
NMDA : New Media Development Association

Features of Proximity IC Cards

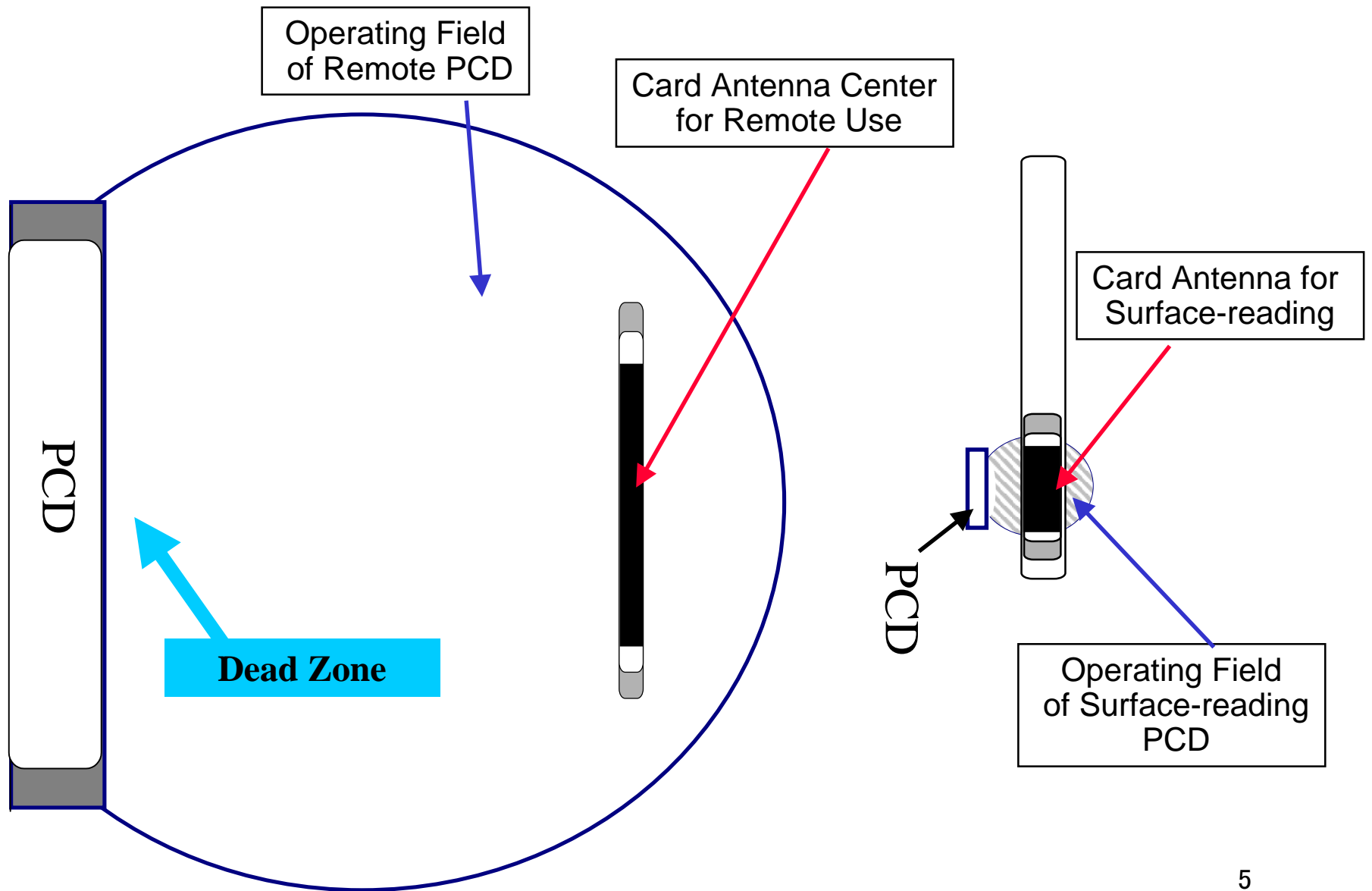


- 1. Remote operation**
- with the user's intention
- 2. No metal contacts**
- 3. 13.56MHz worldwide availability**
- 4. 106 kb/s high-speed**
- 5. *Card antenna designing flexibility***
- operable between 1.5 A/m~ 7.5 A/m

Variety of ISO Proximity Cards



Variety of Proximity PICCs & PCDs



- 1. Encryption coprocessor embedded in PICC**
 - support public key encryption (ex. RSA)

- 2. Single card operation and/or Two cards operation**
 - considering adjacent cards in PCD or a wallet

- 3. Open type PCD or Slot-in type PCD**
 - support user's requirement

- 4. Obtaining interoperability & preventing interference**

Set the conditions to PICC

1. PICC Antenna size

- considering surface-reading

2. PICC Resonance frequency

- considering adjacent cards in a wallet or R/W

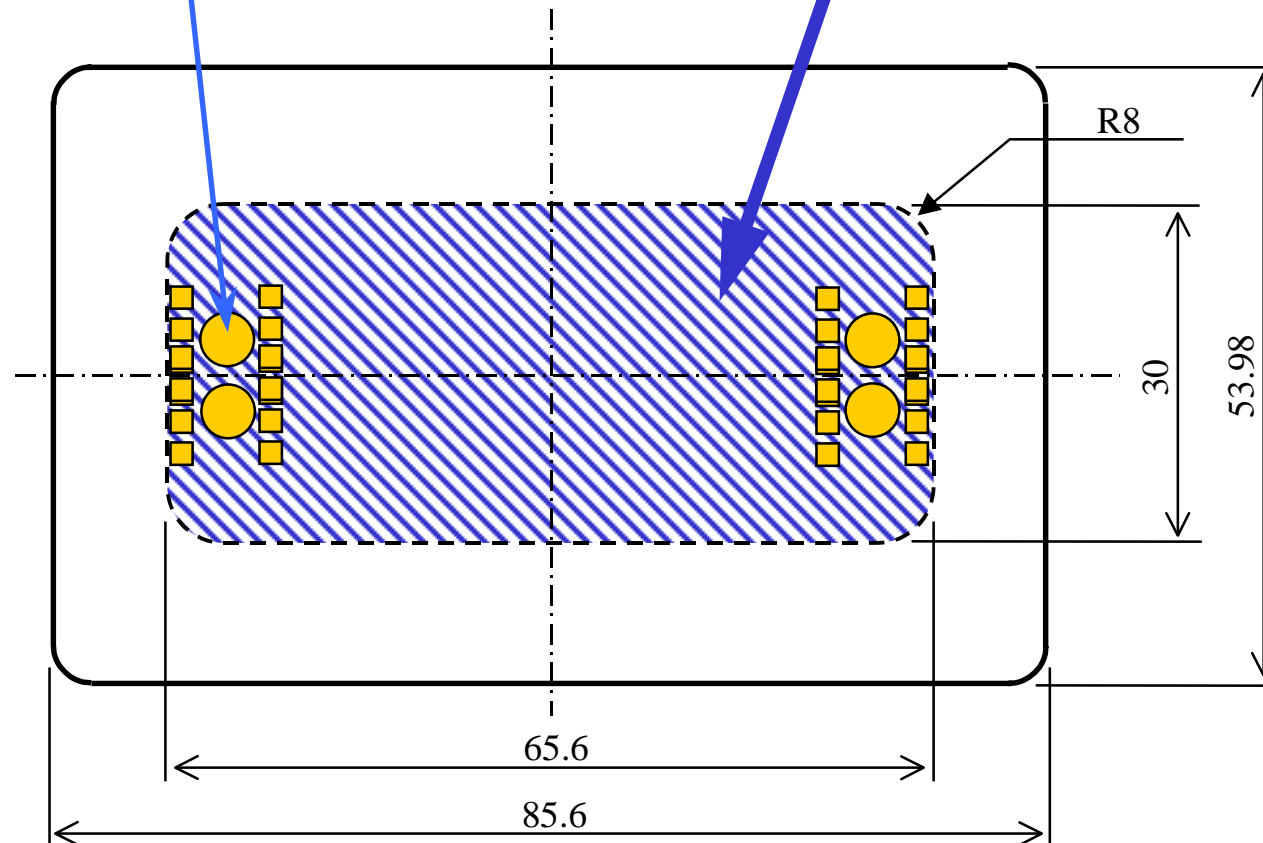
Add Evaluation tools to ISO/IEC 10373-6

3. Two Reference PICCs added

PICC Antenna Area

Minimal PICC Antenna
R= 5mm
in ISO/IEC 14443-2

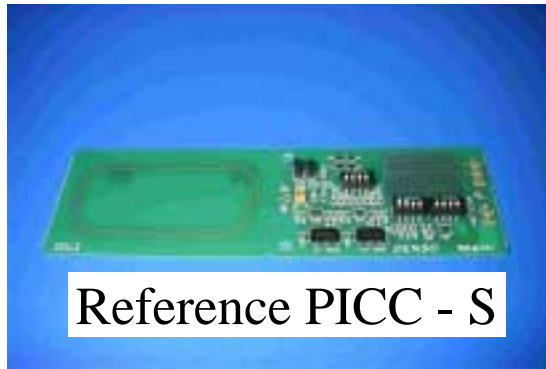
*PICC Antenna shall encircle
Shadow area*



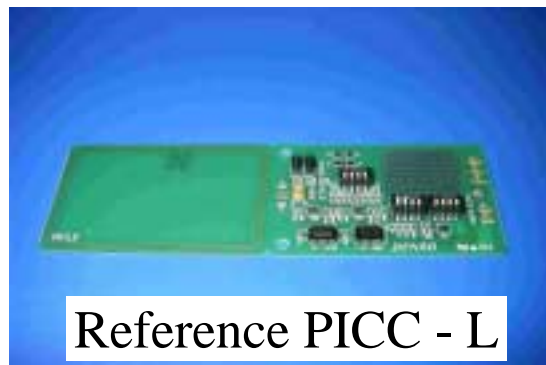
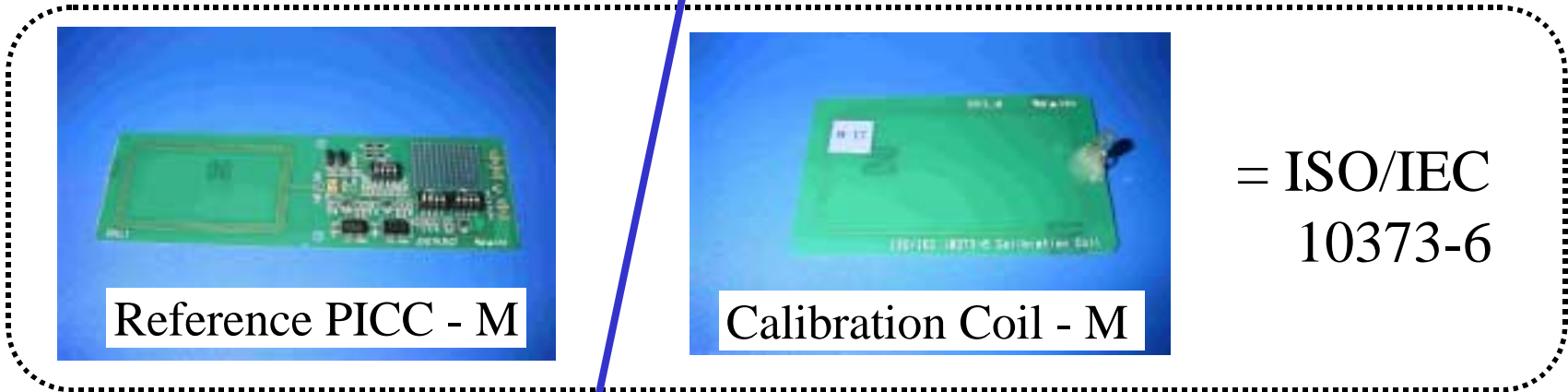
Resonance frequency

- (1) One PICC alone:
> 19MHz recommended**

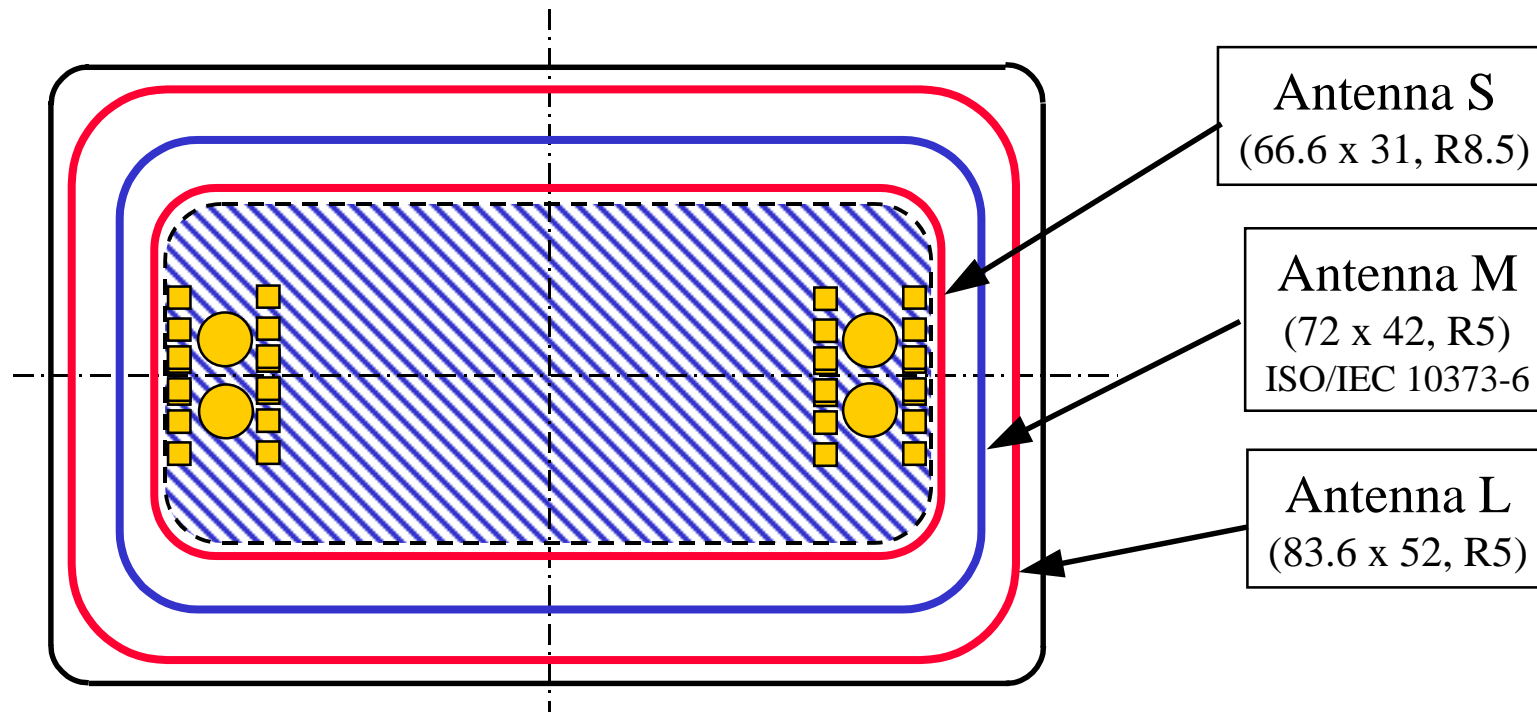
- Two PICCs coexistence:
> 13.56MHz recommended**



Two Reference PICCs added



Reference PICC Antenna Size



NMDA Implementation Standards : Version up from 1.0 to 1.1

Version Item	Version 1.0 December 2000	Version 1.1 July 2001
PICC	<ul style="list-style-type: none"> • One or two cards operation 	<ul style="list-style-type: none"> • One or two cards operation • Single card operation
PCD	<ul style="list-style-type: none"> • Slot-in type 	<ul style="list-style-type: none"> • Slot-in type • Open type
Referenced ISO/IEC	14443-1 FDIS 14443-2 FDIS 14443-3 FCD 14443-4 FCD 10373-6 FCD	14443-1 1st edition 14443-2 FDIS 14443-3 1st edition 14443-4 1st edition 10373-6 FDIS

Functional Test - PICC

ISO/IEC	Item	Measuring conditions		Specification	Card type	
		card	conditions		one	one / two
10373-6 7	Operating field	one	-	4 ~ 7.5A/m rms	✓	✓
		two	card + card			✓
			card + Reference PICC M/S/L			✓
14443-1 4.3.5	Maximum Applied Magnetic Field	one	-	10A/m rms 12A/m rms (30 seconds)	✓	✓
		two	card + card			✓
			card + Reference PICC M/S/L			✓
10373-6 7	Load modulation	one	-	> 30/H ^{1.2} mV peak	✓	✓
		two	card + card			✓
			card + Reference PICC M/S/L			✓
-	Influence to Other card	two	card + Reference PICC M/S/L	Supply power to Reference PICC > 50mW (6.8V at R _L =910Ω)		✓

Functional Test - PCD

ISO/IEC	Item	Measuring conditions	Specification	PCD type	
				Slot-in	Open
10373-6 8.1	Field strength	Reference PICC M/S/L	4 ~ 7.5A/m rms	✓	✓
		Calibration coil		✓	
10373-6 8.2	Power transfer PCD to PICC	One Reference PICC M/S/L	6.8V at $R_L=910\ \Omega$ (50mW)	✓	✓
		Two Reference PICCs M/S/L		✓	
10373-6 8.3	Modulation index and waveform	Calibration coil	> 30/H ^{1.2} mV peak	✓	✓
		One Reference PICC M/S/L		✓	✓
		Two Reference PICCs M/S/L		✓	
10373-6 8.4	Load modulation reception	Reference PICC M/S/L	Correct reception	✓	✓

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