Hardware Specifications of
V4KF-*** Series
Hybrid Manual Insertion Card Reader

Rev. A	June 25, 2004
Rev. A1	July 24, 2004
Rev. A2	July 29, 2004
Rev. A3	Nov 02, 2004
Rev. B	Feb 10, 2005
Rev. B1	Feb 24, 2005
Rev. B2	May 20, 2005
Rev. C	July 05, 2006
Rev. D	Dec 14, 2006

RoHS Compliant

Hitachi-Omron Terminal Solutions, Corp.

Leadus

©Hitachi-Omron Terminal Solutions, Corp.   2004-2007
All Rights Reserved.

Table of Contents

[Specification History of Modification]

| Rev	Date	Page	Content
Draft	Dec 12, 2003	ALL	The draft version is created.
Draft2	Feb 27, 2004	Page 4, 6	Remove the standard ISO/IEC 7811-3
		Page 8	Add the signal HDRST
		Page 9	Correction the unit from mm/s^2 to m/s^2
A	June 10, 2004	Page 9	Correct the document number of the data transmission specification.
		Page 9	Correct the low temperature from 5℃ to 0℃.
A1	July 24, 2004	Page 6	Correct the supported card type to ISO/IEC 7810/ID-1.
		Page 7	Correct the description of the IC function and SAM.
		Page 8	Correct the Pin No.10 in Power supply connector from HDREST to NC.
		ALL	Correct from ISO to ISO/IEC
A2	July 29, 2004	Page 4	Correct ISO/IEC 7810 from 1995-08-15 to 2003-11-01.
		Page 4	Delete ENV1375-1: 1994
		Page 7	Add SLE4418 in Support ICC of Synchronous card.
		Page 7	Correct the standard of "Support SAM chip" in 5.4 SAM from ENV1375 to ISO/IEC7810.
A3	Nov 02, 2004	Page 1, 7	The company name is changed
B	Feb 10, 2005	Page 6, 7, 13	Add 5SAM Version (V4KF-01JS-002).
B1	Feb 25, 2005	Page 11, 12	Correction of drawing
B2	May 20, 2005	Page 6	Modify Drawing from "Mounting" to "Outline" in 5.1 [3].
		Page 7	Add 7.1412MHz in CLK of 5.3 [2] 4)
		Page 8	Add the SAM deactivation in 5.7 [5] 2).
		Page 9	Add the SAM in description of 5.9 [5] and 5.11
C	July 05,2006	Front page	Indication of 'RoHS Compliant'
D	Dec 14,2006	Page 10	Added Chapter 9 "Chapter No." is changed after "Chapter 9".

1. Abstract

This document provides the hardware specifications of Hybrid Manual Insertion Card Reader of V4KF-*** Series with RS232 interface. This equipment can read the data of Magnetic Card, and read/write the data of IC card.

2. Reference Standards

[1] ISO/IEC 7810: 2003-11-01

Identification cards - Physical characteristics

[2] ISO/IEC 7811-1:2002, ISO/IEC 7811-2, 6:2001

Identification cards -- Recording technique

[3] ISO/IEC 7816-1:1998

Identification cards -- Integrated circuit(s) cards with contacts

Part 1: Physical characteristics

[4] ISO/IEC 7816-2:1999

Identification cards -- Integrated circuit(s) cards with contacts

Part 2: Dimensions and location of contacts

[5] ISO/IEC 7816-3:1997

Identification cards -- Integrated circuit(s) cards with contacts

Part 3: Electronic signals and transmission protocols

[6] ISO/IEC 7816-4: 1995

Identification cards -- Integrated circuit(s) cards with contacts

Part 4: Inter-industry commands for interchange

[7] ISO/IEC 7816-4: 1995/Amd 1:1997

Secure messaging on the structures of APDU messages

[8] EMV2000 Integrated Circuit Card Specification for Payment Systems Book 1

Application Independent ICC to Terminal Interface Requirements

Version 4.0 December, 2000

3. Definition of Terminology

LED	Light-Emitting Diode
PCB	Printed-Circuit Board
S1	Positioning Sensor of Insertion slot
S2	Positioning Sensor of Rear End
S3	Sensor to detect the lock/release of Lock blade
ICC	Integrated Circuit Card
SAM	Secure Application Module
C/R	Card Reader
ATR	Answer to Reset
Etu	Elementary Time Unit
Vpp	Voltage at VPP
Vcc	Voltage at VCC
Host	HOST Terminal
APDU	Application Protocol Data Unit
FW	Firmware
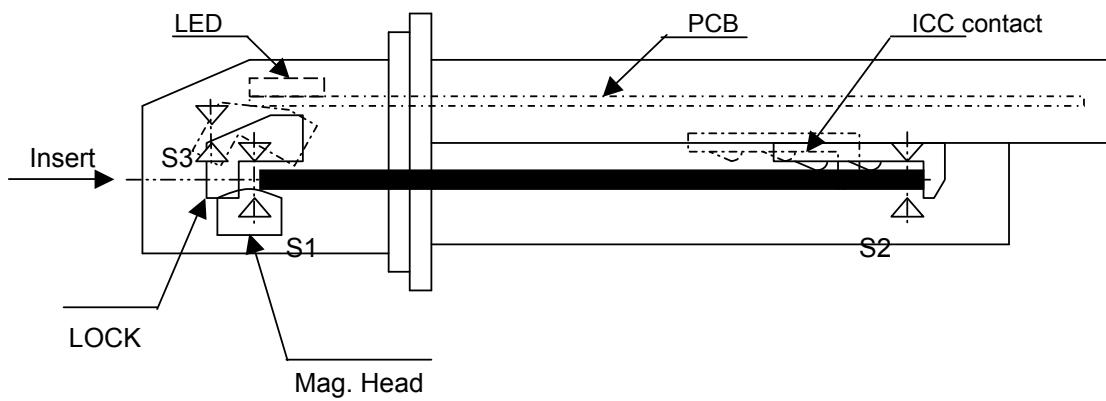
4. Applicable Module Name

No	Module Name	Magnetic card read			ICC controller	SAM	Bezel
		Track 1	Track 2	Track 3			
1	V4KF-01JS-001	R*1	R	R	Y*2	1SAM	Round Type
2	V4KF-01JF-001	R	R	R	Y	1SAM	Flat Type
3	V4KF-01JS-002	R	R	R	Y	5SAM	Round Type

*1 R : Magnetic reading function
*2 Y : 8 contacts for C1 to C8 are provided.

5. Specifications

5.1 Mechanical Specification

[1] External dimensions (See Outline Drawing)

	Width	Height	Length
V4KF-01JS-001	80.0mm	50.0mm	133.0mm (147.0 mm *1)
V4KF-01JF-001	101.6mm	76.2mm	133.0mm (147.0 mm *1)
V4KF-01JS-002	80.0mm	50.0mm	134.5mm (147.0 mm *1)

*1 Including connector's lock

[2] Weight   Less than 250g

[3] Mounting (See Outline Drawing)
   (1) In case of using the Mounting Hole (V4KF-01JS-001, V4KF-01JF-001, V4KF-01JS-002)
       1) Screw   M3
       2) Quantity   4 pieces
       3) Torque   Less than 0.79N·m
       <Notice>
       Design the mounting bases to keep the difference within +/-0.2mm in height among four mounting holes (refer to Outline drawing about location of these holes)
   (2) In case of using the Screw Hole of Bezel (V4KF-01JF-001)
       1) Screw   M4
       2) Quantity   4 pieces
       3) Torque   Less than 1.30N·m
       <Notice>
       Select the screw in order to keep the meshing length 4.0mm or less.

[4] Card position detection

   Two photo sensors (S1, S2) are provided in order to detect the card. The state of these sensors can be retrieved by the command and response.

5.2 Magnetic card function

[1] Magnetic card type   In conformity to ISO/IEC 7810/ID-1, ISO/IEC 7811-1/2/6
[2] Reading function   Read specified tracks simultaneously.
[3] Reading direction   Bi-directional capability (insert/pull out)
[4] Card speed   100-1000 mm/s capability (at flat card)

5.3 ICC function

[1] Number and location of contacts on ICC

Number and location of contacts on ICC are specified in ISO/IEC 7816-2 figure 2.

[2] Applicable ICC

(1) Asynchronous card

1)	Support ICC	In conformity to ISO/IEC 7816-1/2/3(Default), EMV4.0 Level1
2)	Protocol	T=0 and T=1 (Automatic protocol type selection via ATR detection is possible.)
3)	Data byte reading/writing	Inverse convention (MSB first, negative logic) and direct convention (LSB first, positive logic) are available.
4)	Clock during/after ATR *1	3.5712 MHz (F=372) (Default) / 7.1428 MHz (F=744) (Conform to ISO / IEC 7816-3)
5)	Communication speed	1etu = (F/D) x 1/f sec D=1: (Default) / 2, 4: (Changeable by PPS)
6)	Vpp	Not connected
7)	Vcc	5V / 3V (Type A and Type B) (Automatic selection via T=15 of ATR detection is possible.)
8)	EMV Approval	EMV4.0 Level 1 Approved (11757 0504 400 20 FIM)

(2) Synchronous card

1)	Support ICC	In conformity to ISO/IEC 7816-1/2/10, SLE4442/4432/4428/4418
2)	Vcc	5V
3)	Vpp	Not connected

*1 Answer To Reset

<Notice>

HITACHI-OMRON TERMINAL SOLUTIONS asks customers to check the performance of ICC with HITACHI-OMRON TERMINAL SOLUTIONS standard ICC controller and FW in advance, if ICC is special card. Because ISO standard and ICC(s) are subject to frequent modification. HITACHI-OMRON TERMINAL SOLUTIONS supports you for capability of performing customer's ICC, provided with ICC and its specification.

5.4 SAM

[1] The following SAM controller is equipped with shipment. 1 SAM socket is mounted on the Main PCB. And the additional 4 SAM socket are mounted on the additional PCB in V4KF-01JS-002 only.
- 1SAM : V4KF-01JS-001, V4KF-01JF-001
- 5SAM : V4KF-01JF-002

[2] SAM specification

1)	Support SAM chip	In conformity to ISO/IEC 7810(ID000), ISO/IEC 7816-1/2/3
2)	Protocol	T=0 and T=1 (Automatic protocol type selection via ATR detection is possible.)
3)	Data byte reading/writing	Inverse convention (MSB first, negative logic) and direct convention (LSB first, positive logic) are available.
4)	Clock during/after ATR *1	3.5712 MHz(Conform to ISO / IEC 7816-3)
5)	Communication speed	1etu = (372/D) x 1/(3.5712 x 10^6) sec D=1: (Default) / 2, 4: (Changeable by PPS)
6)	Vpp	Not connected
7)	Vcc	5V/3V (Automatic selection via T=15 of ATR detection is possible.)

5.5 Shutter function

[1] This shutter is equipped on the insertion slot of the C/R. It opens automatically by inserting the card. It prevents foreign objects like dusts and coins from intruding to inside.

[2] This shutter should open by inserting the card that is more than 53.92mm in width.

5.6   Lock function
[1] Pin type lock mechanism is equipped to hold the card during operation of ICC in response to command from host.
[2] This lock mechanism can be controlled by the command from the host.
[3] The condition of this lock mechanism can be checked by the command and response.
[4] This lock mechanism is released automatically at the power failure.
[5] This Lock mechanism works under the below conditions
      (1) The card is inserted completely.
      (2) The card does not exist inside of C/R.

5.7   Power Requirement
[1] Power supply voltage   10.8 – 13.2V DC (including ripple)
[2] Ripple of power supply   100mV (p-p) or less
[3] Power consumption (Input voltage: 12V DC)

	In operation	magnetic card	500mA or less
		IC card	1.5A or less
	In Standby		300mA or less

[4] Power supply connector
      HIF3BD-10PA-254DS02 (2.54mm pitch HIROSE Japan) or equivalent (MIL-C-83503) is mounted on C/R's PCB.

Pin assignment of C/R (in/out direction view from the reader)

Pin No.	Assigned signal	IN/OUT	Function
1	TXD	OUT	Transmit DATA
2	RXD	IN	Receive DATA
3	DTR	OUT	DATA Terminal Ready
4	CTS	IN	Clear to Send
5	SG	-	0V
6	12V	-	Power
7	GND	-	Ground
8	12V	-	Power
9	GND	-	Ground
10	NC	-	Not Connect

(Cable with connector for Power supply and RS232 interface is not included)

<Pin Layout of connector>

2	4	6	8	10
1	3	5	7	9
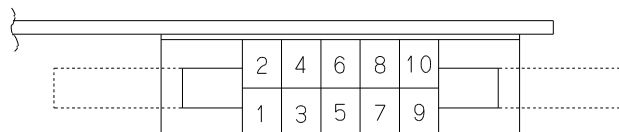
[5] Power failure
      1) Detection Voltage   Less than 10.8V DC
      2) Power failure process
        In case of power failure, C/R deactivates the ICC and SAM chip(s), and releases the Lock.

5.8   Electrical interface
[1] Interface specification
      (1) Electronic Interface   RS232 interface
      (2) Transmission Speed   1200, 2400, 4800, 9600, 19200, 38400 bps
      (3) Synchronous Method   Start-Stop synchronization Method
      (4) Communication Method   Half-duplex Method
      (5) Pin Assignment   Refer to the table in 5.7 Power Requirement

5.9   Software Interface

[1] Transmission protocols	V4KF Series Card Reader Data Transmission Specification (Document No. MTA-H-04015).
[2] Port to host	Handling with a magnetic card, an IC card and SAM via single port
[3] Format	A common APDU format is used for handling various ICC and SAM
[4] Downloadable	All software are supported to be downloaded.
[5] Module	Firmware is independently divided into every functional module (e.g. ICC handling module, SAM handling module, etc) and every module can be independently downloaded (regardless of order of download) respectively.

5.10   LED Indicator

[1] One LED is equipped to inform the state of C/R and the reading result of the magnetic data.
[2] This LED can be indicated the three colors (green, red and orange).
[3] The specification of LED indicator can be controlled by the command from the host. In detail, refer to V4KF Series Card Reader Data Transmission Specification (Document No. MTA-H-04015).

5.11 Diagnostics function

[1] C/R provides the following functions as diagnostics of each module in the C/R.
This function is performed by pressing the white button located on the top of C/R just near SAM socket.
The test card is required to perform diagnostics. This function reports the following. *1

        (1) OK/NG for Sensor Level
        (2) OK/NG for Magnetic card reading
        (3) OK/NG for LOCK mechanism
        (4) OK/NG for ICC function
The SAM function is not worked.
[2] C/R indicates the result of the diagnostics by using LED indicator. *1

*1 In detail, V4KF Series Card Reader Data Transmission Specification (Document No.MTA-H-04015).

 <Notice>
Make sure not to press this button, when the system is in operation.

6.   Environmental Condition

[1] Temperature
(1) In operation	0 to 55 $^\circ$C
(2) In storage	-25 $^\circ$C for 16 hours to 70 $^\circ$C for 72 hours for non operation and transport

[2] Humidity
(1) In operation	5 to 85% RH, no condensation and absolute air humidity of 23 g/m^3 or less
(2) In storage	5 to 90% RH, no condensation and absolute air humidity of 40 g/m^3 or less

7.   General performance

[1] Insulation Resistance	20MΩ or more at 100V DC (At normal temperature and humidity)	
[2] Dielectric Strength	500V AC for 1minute	
[3] Durable Vibration	Frequency	10-150 Hz
	Single vibration width	0.10mm
	Acceleration	15m/s^2
	Direction	X,Y,Z
[4] Shock Endurance	Acceleration	150m/s^2
	Direction	X,Y,Z

8. Life
[1] Card Reader life   800,000 passes or 5 years, whichever comes earlier.
[2] Magnetic head life *1   1,000,000 passes (minimum)
[3] IC contact unit life *2   300,000 operations
                                     (Contact unit should be replaced every 300,000 operations.)

    *1 One pass denotes forward and backward movement.
    *2 One operation denotes the movement of fully insertion and extraction.

9. Response to Regulated Chemical Substances
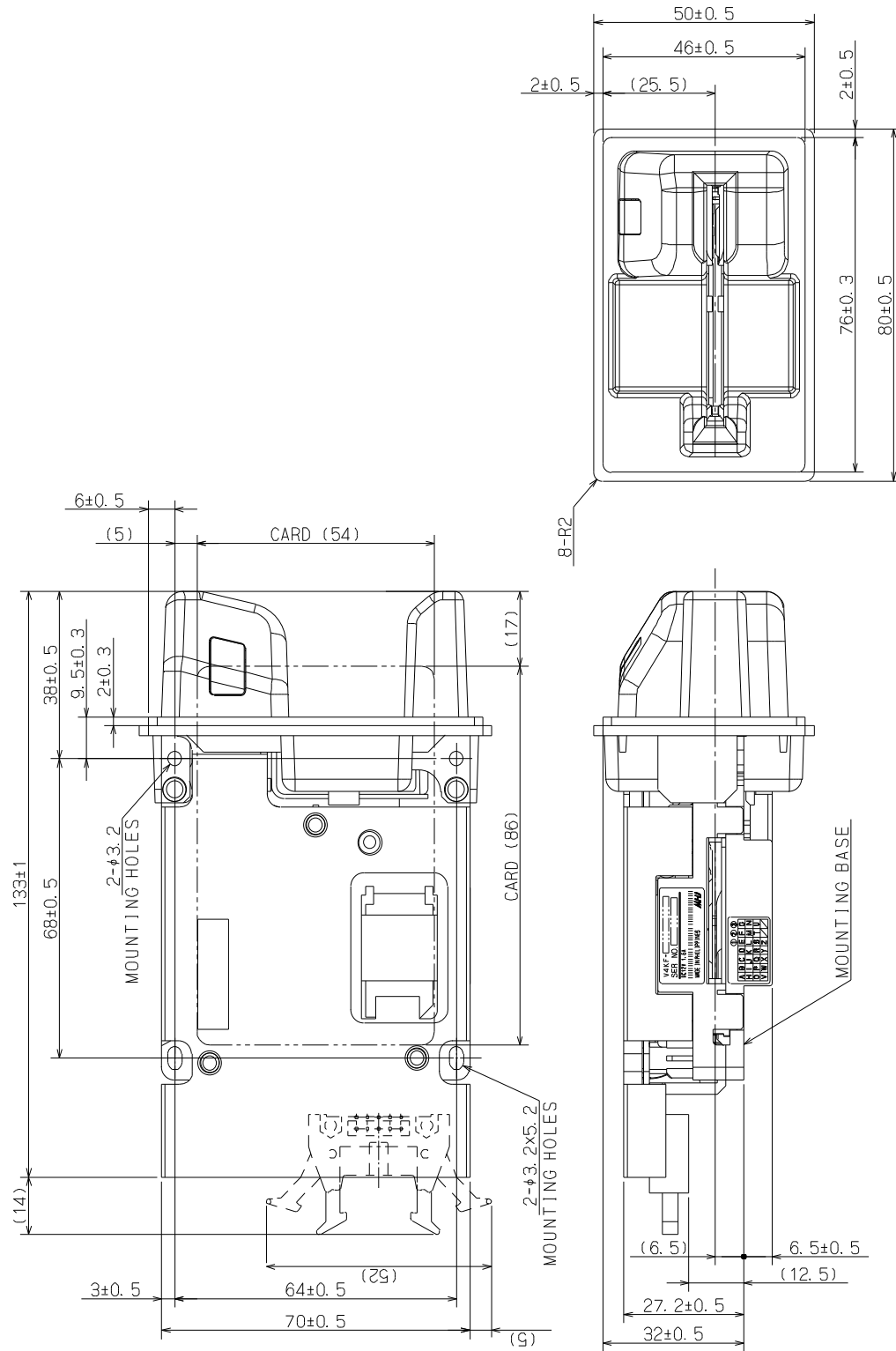[1] Response to RoHS: Conformed with RoHS Directive(2002/95/EC)
    "The restriction of the use of certain hazardous substances in electrical   and electronic equipment".

(Notice) In case the equipment mounting this card reader will be shipped to People's Republic
        of China,please consult our sales representatives.
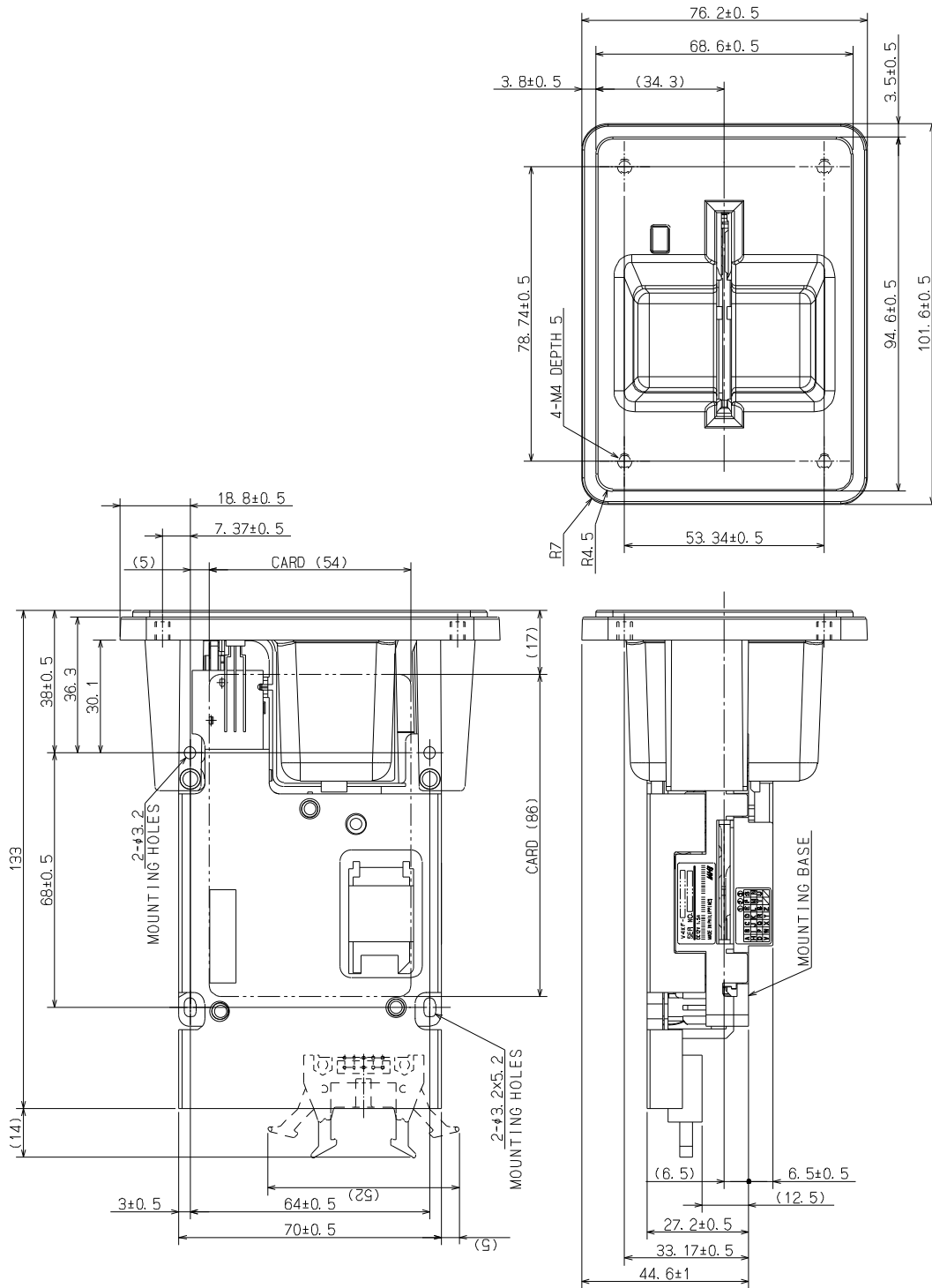
10. Outline drawing

(1) V4KF-01JS-001   Dimensions in millimeters

(2) V4KF-01JF-001

Dimensions in millimeters

76. 2±0. 5
68. 6±0. 5
3. 8±0. 5
(34. 3)
3. 5±0. 5
78. 74±0. 5
4-M4 DEPTH 5
94. 6±0. 5
101. 6±0. 5
R7
R4. 5
53. 34±0. 5

18. 8±0. 5
7. 37±0. 5
(5)
CARD (54)
(17)
38±0. 5
36. 3
30. 1
133
68±0. 5
2-φ3. 2
MOUNTING HOLES
CARD (86)
(14)
2-φ3. 2×5. 2
MOUNTING HOLES
3±0. 5
64±0. 5
(52)
70±0. 5
(5)

MOUNTING BASE
(6. 5)
6. 5±0. 5
(9)
(12. 5)
27. 2±0. 5
33. 17±0. 5
44. 6±1

(3) V4KF-01JS-002

Dimensions in millimeters

50±0.5
46±0.5
2±0.5
(25.5)
2±0.5
76±0.3
80±0.5
8-R2

6±0.5
(5)
CARD (54)
(17)
38±0.5
9.5±0.3
2±0.3
134.5±1
68±0.5
2-φ3.2 MOUNTING HOLES
SAM3
SAM2
SAM1
CARD (86)
SAM5
SAM4
2-φ3.2x5.2 MOUNTING HOLES
(12.5)
3±0.5
64±0.5
70±0.5
(52)
(5)

MOUNTING BASE
(6.5)
6.5±0.5
(12.5)
27.2±0.5
34.4±0.5
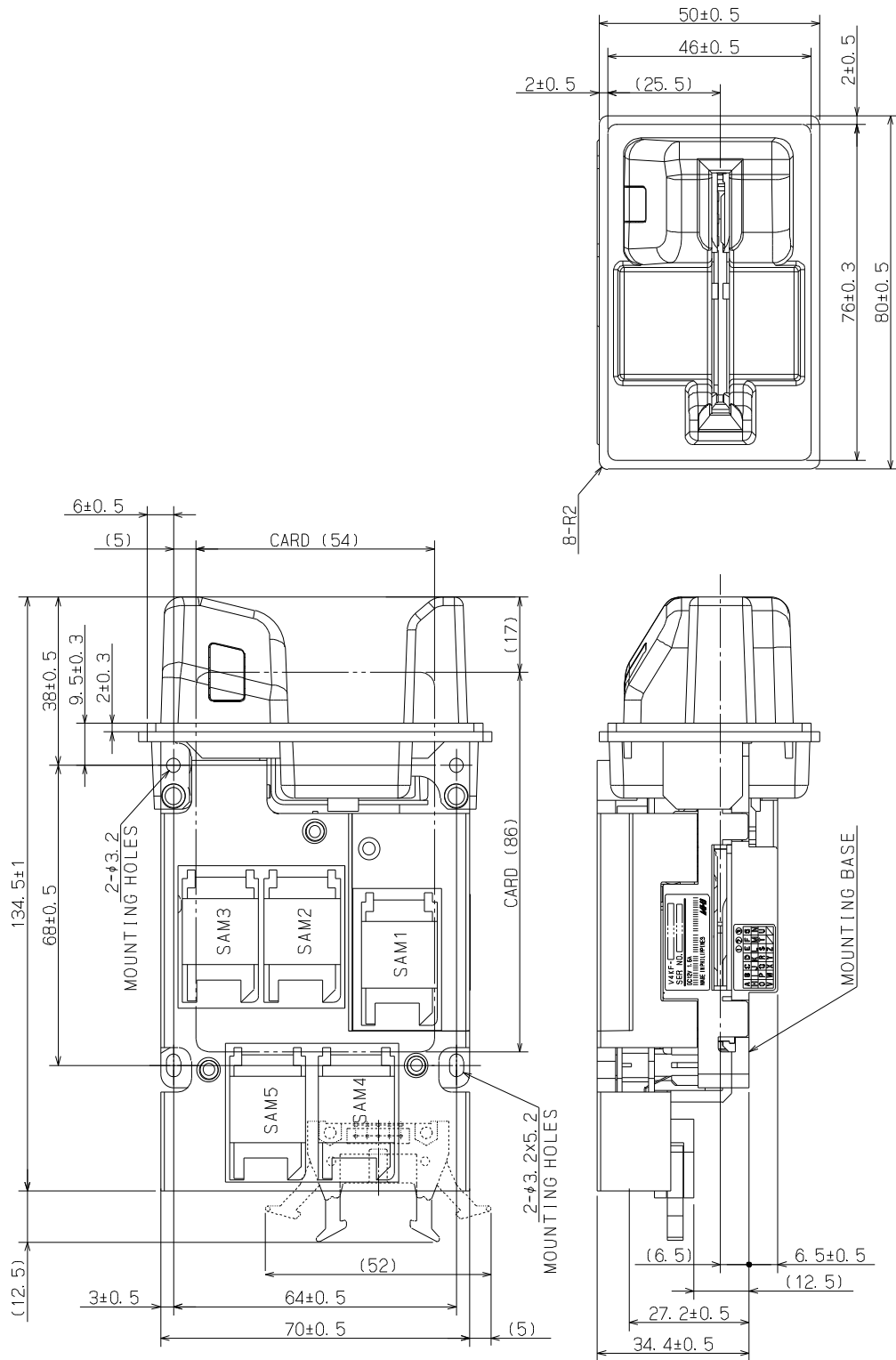
11.   Appendix A

Abstract from ISO/IEC 7816-2: 1999 (E)

4. Number and locations of the contacts
This part of ISO/IEC 7816 defines eight contacts referred to as C1 to C8.
The contacts are located as shown in figure 2.
 The contacts shall be located on the front of the card. The dimensions are referenced to the left and upper edges of the front surface of the end.

Dimensions in millimeters

Upper edge

19.23 max.

19.87 min.

20.93 min.

17.87 max.

21.77 max.

23.47 min.

12.25 min.

24.31 max.

10.25 max.

26.01 min.
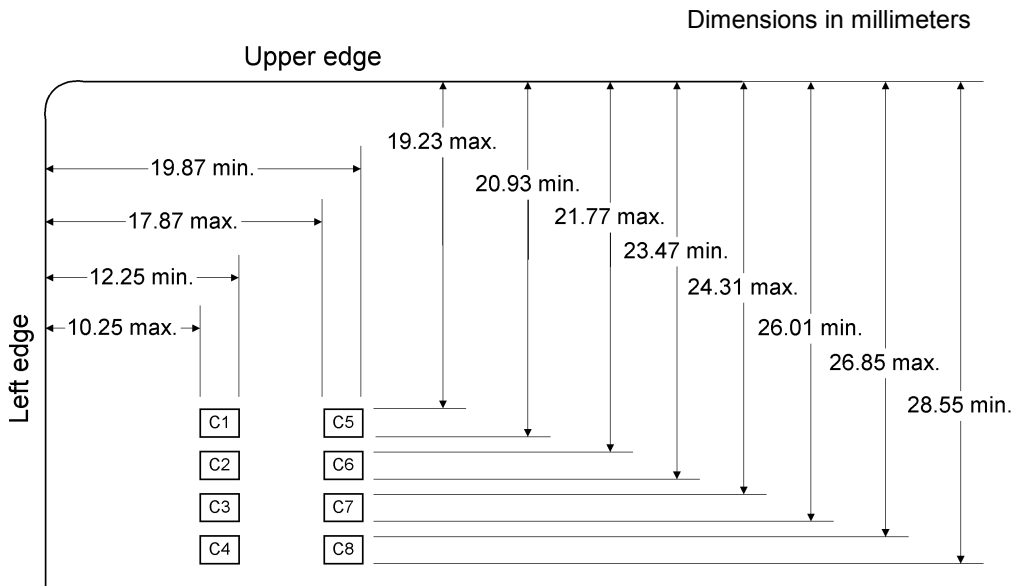
26.85 max.

28.55 min.

Left edge

C1	C5
C2	C6
C3	C7
C4	C8

Figure 2. Contacts location