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[Specification History of Modification]

<table>
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<th>Rev</th>
<th>Date</th>
<th>Page</th>
<th>Content</th>
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<tbody>
<tr>
<td>A</td>
<td>Oct 8, 2003</td>
<td></td>
<td>The first edition is created.</td>
</tr>
</tbody>
</table>
1. Abstract
This document provides the hardware specifications of Hybrid Manual Insertion Card Reader of V4KU-*** Series with USB interface. This equipment can read the data of Magnetic Card, and read/write the data of IC card.

2. Reference Standards
   Identification cards - Physical characteristics
   Identification cards -- Recording technique
   Identification cards -- Integrated circuit(s) cards with contacts
   Part 1: Physical characteristics
   Identification cards -- Integrated circuit(s) cards with contacts
   Part 2: Dimensions and location of contacts
   Identification cards -- Integrated circuit(s) cards with contacts
   Part 3: Electronic signals and transmission protocols
   Identification cards -- Integrated circuit(s) cards with contacts
   Part 4: Inter-industry commands for interchange
   Secure messaging on the structures of APDU messages
   Application Independent ICC to Terminal Interface Requirements
   Version 4.0 December, 2000
   Interjectors integrated circuit(s) cards additional formats Part 1. ID-000
   000 card size and physical characteristics
[10] USB 2.0
    Universal Serial Bus Specification, Compaq/Hewlett-Packard/Intel/Microsoft/NEC/Philips,
    Revision 2.0 April 27, 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

![Diagram with labels: LED, PCB, ICC contact, S1, S2, S3, LOCK, Mag. Head]
4. Applicable Module Name

<table>
<thead>
<tr>
<th>No</th>
<th>Module Name</th>
<th>Magnetic card read</th>
<th>ICC controller</th>
<th>SAM</th>
<th>Bezel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Track 1</td>
<td>Track 2</td>
<td>Track 3</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>V4KU-01JS-001</td>
<td>R*1</td>
<td>R</td>
<td>R</td>
<td>Y*2</td>
</tr>
<tr>
<td>2</td>
<td>V4KU-01JF-001</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>Y*3</td>
</tr>
</tbody>
</table>

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

5. Specifications

5.1 Mechanical Specification
[1] External dimensions  (See Outline Drawing)

<table>
<thead>
<tr>
<th></th>
<th>Width</th>
<th>Height</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>V4KU-01JS-001</td>
<td>80.0mm</td>
<td>50.0mm</td>
<td>133.0mm</td>
</tr>
<tr>
<td>V4KU-01JF-001</td>
<td>101.6mm</td>
<td>76.2mm</td>
<td>133.0mm</td>
</tr>
</tbody>
</table>

[2] Weight  Less than 250g
  (1) In case of using the Mounting Hole (V4KU-01JS-001, V4KU-01JF-001)
    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 (V4KU-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.

5. 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
[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 7816-2 figure 2.


(1) Asynchronous card
   1) Support ICC            In conformity to ISO/IEC 7816-1/2/3, EMV4.0 Level1
   2) Protocol               T=0 and T=1
   3) Data byte reading/writing Inverse convention (MSB first, negative logic) and direct
                                  convention (LSB first, positive logic)
   4) Clock during/after ATR  3.5712 MHz (Conform to ISO / IEC 7816-3)
   5) Communication speed     T=0: 1etu = 372 / (3.5712 x 10^6) sec (Constant Value)
                                  T=1: 1etu = (372/D) x 1/(3.5712 x 10^6) sec
                                  D=1 (Default), 2, 4
   6) Vpp                      Not connected
   7) Vcc                      5V / 3V (Type A and Type B)

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

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

5.4 SAM

[1] 1 SAM controller is equipped with shipment. 1 SAM socket is mounted on the PCB.

[2] SAM specification
   1) Support SAM chip        In conformity to ENV1375-1(ID000)
   2) Vpp                     Not connected
   3) Vcc                     5V/3V

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 21.6 - 26.4V DC (including ripple)

[2] Ripple of power supply 100mV (p-p) or less

[3] Power consumption (Input voltage: 24V DC)
   - In operation magnetic card 500mA or less
   - In operation IC card 1.0A or less
   - In Standby 100mA or less

[4] Power supply connector
   4 nodes, 2.54mm pitch in serial 5046-04A (Molex Japan) is used in PCB

Pin assignment of C/R

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Assigned power rails</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+24V: Power supply</td>
</tr>
<tr>
<td>2</td>
<td>GND: Power ground</td>
</tr>
<tr>
<td>3</td>
<td>NC</td>
</tr>
<tr>
<td>4</td>
<td>NC</td>
</tr>
</tbody>
</table>

(Cable with connector for Power supply is not included)

[5] Power failure
   1) Detection Voltage Less than 21.6V DC
   2) Power failure process
      In case of power failure, C/R deactivates the ICC and releases the Lock.

5.8 Electrical interface

[1] Interface specification
   (1) Protocol Version Compliance with USB Version 2.0 certified logo program
   (2) Power supply Self-powered
   (3) Device Class Human Interface Devices (HID) class
   (4) Transmission Speed Full Speed (12Mbps)
   (5) Transmission Type Interrupt Out for command
       Interrupt In for response

[2] USB interface connector
   Type B Connector
   (USB interface Cable between Host and C/R is not attached. You should use the cable meet
   the Universal Serial Bus Specification)

5.9 Software Interface

   (Document No. MTA-H-03022).

[2] Port to host Handling with a magnetic card and an IC card via single port

[3] Format A common APDU format is used for handling various ICC

[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
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
[2] C/R indicates the result of the diagnostics by using LED indicator. *1


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

6. Environmental Condition
[1] Temperature
(1) In operation 5 to 55 °C
(2) In storage -25 °C for 16 hours to 70 °C for 72 hours for non operation and transport
(1) In operation 5 to 85% RH, no condensation and absolute air humidity of 23 g/m³ or less
(2) In storage 5 to 90% RH, no condensation and absolute air humidity of 40 g/m³ 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 1 minute
Single vibration width 0.10mm
Acceleration 15mm/s²
Direction X,Y,Z
[4] Shock Endurance Acceleration 150mm/s²
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. Outline drawing

(1) V4KU-01JS-001
4. Number and locations of the contacts
This part of ISO 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.

Figure 2. Contacts location