![Sankyo logo]

SPECIFICATION

Type Name :

ICT3Q8-3A0170

Spec. No.	ASR-NP-00425-01

Notes :

FOR
REFERENCE
JUN. 22 2001
ENG.DIV

		Sym.	Revision	Page	Cha. No.	Date	By	Appr.
						· ·		
						· ·		
						· ·		
		C	Spec change and addition	All	EB-01390-01	2000·07·26	H.Y	SN
		B	Spec change and correction	All	EB-01190-01	2000·05·19	H.Y	S.N
		Sym.	Revision	Page	Cha. No.	Date	By	Appr.

Reference Document

		Design	H.Yamamoto	Oct·14·1999	
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13. Notes

1. Product

Magnetic card and IC card reader Writer.

(hereafter refer as ICRW   Customer's main system as HOST)

ICRW is of a modular construction.

RS232C/D Interface.

The software interface is held in Flash PROM(F-ROM) and down-loadable from

the HOST.

The down loading software has the security.

INTERFACE SPECIFICATION : see   ASL-NP-00425-01

2. Model

ICT3Q8-3A0170

IC card Read / Write is handled by IFM0Q2-0200.

(IFM0Q2-0200 consists of hardware and software for IC card handling.)

3. Function

3.1   Card Feed

Round trip and capture

3.2   Mag-stripe Read / Write

ISO Track 1   : Read/Write

ISO Track 2   : Read/Write

ISO Track 3   : Read/Write

3.3   Interface

RS232C/D compatible

Interface connector   : 87203-6063 (MOLEX) or equivalent

3.4   Compatibility

The transport has compatibility with ISO standard cards.

Conform to ISO7811/6 high coercivity cards.

(provided 219kA/m(2750 Oe) only , Write is option)

EMV '96   ver 3.1.1

3.5   Pre-head detect

ISO Track 2   or   ISO Track 3

3.6   Shutter gate

　　　　　1peace, Normal closed

3.7   MM sensor bracket(option)

　　　　　Per appearance drawing

3.8   IC card Read / Write

　　　　IC contact location　　　　: ISO7816 Front side lower position

　　　　Communication circuit　　　: Exist

　　　　　　　Test condition　　　Temperature : 23　±3

　　　　　　　　　　　　　　　　humidity : 40% to 60%

　　　　　　　Vcc　　　　　　　 : DC+5V±5% or DC+3V±5%,

　　　　　　　　　　　　　　　　(selected by Command)

　　　　　　　　　　　　　　　　Max 80mA.

　　　　　　　Vpp　　　　　　　 : Open

　　　　　　　　<Option>　　　　Regarding the wording , "Option" , it means that a

　　　　　　　　　　　　　　　　different model is necessary and it is impossible to

　　　　　　　　　　　　　　　　add the function after the shipment.

　　　　　　　　　　　　　　　　Can select　5V±3% or 12V±2.5% or 21V±2.5%

　　　　　　　　　　　　　　　　or open(electrically isolated(note1) by using FET).

　　　　　　　　　　　　　　　　Max 50mA.

　　　　　　　　　note1　　　　The resistance:Min 10M　　with an applied voltage of

　　　　　　　　　　　　　　　　5V DC

　　　　　　　　　　　　　　　　condition:FET-OFF ,

　　　　　　　　　　　　　　　　　　　any other contact　　Vpp contact　course

　　　　　　　　　　　　　　　　(Vpp contact　　any other contact　course is not high

　　　　　　　　　　　　　　　　 imperdance for FET inner Diode)

　　　　　　　　　note2　　　　Rise time:Max 200μ s

　　　　　　　　　　　　　　　　Fall time:Max 10ms

　　　　　　　　　note3　　　　The rate of change:Max 32 volts/μ s

　　　　　　　CLK　　　　　　　: 3.58MHz(basis)

　　　　　　　　　　　　　　　　7.16MHz

　　　　　　　　　　　　　　　　(automatically selected by firmware.)

　　　　　　　Baud rate　　　　 : 9,600bps or 19,200bps

　　　　　　　　　　　　　　　　(automatically selected by firmware.)

　　　　I/O communication speed　: Communication speed is establishment of

　　　　　　　　　　　　　　　　global parameters F and D.

　　　　　　　　　　　　　　　　see　ASL-NP-00425-01

3.9   Security module (SIM1 , assembled on IC contact block)

Communication circuit   : Exist

Vcc   : DC+5V±5% or DC+3V±5%,

(selected by Command)

Max 80mA.

Vpp   : Connected with Vcc.

CLK   : 3.58MHz(basis)

7.16MHz

(automatically selected by firmware.)

Baud rate   : 9,600bps or 19,200bps

(automatically selected by firmware.)

I/O communication speed   : Communication speed is establishment of

global parameters F and D.

see   ASL-NP-00425-01

Unused terminal (C4,C8)   : Open.

Connector   : ID1A-6S-2.54SF(21) (HIROSE)

Available for SIM type.

pin No	Mean
1	C1 VCC
2	C2 RST
3	C3 CLK
4	C5 GND
5	C6 VPP
6	C7 I/O

3.10   Security modules (SIM2-5 , option , assembled SIM PCB)

Communication circuit   : Exist

Vcc   : DC+5V±5% or DC+3V±5%,

Max 60mA(per one module).

Vpp   : Connected with Vcc.

CLK   : 3.58MHz(basis)

7.16MHz

(automatically selected by firmware.)

Baud rate   : 9,600bps or 19,200bps

(automatically selected by firmware.)

I/O communication speed   : Communication speed is establishment of

global parameters F and D.

see   ASL-NP-00425-01

Unused terminal (C4,C8)　　: Open.

SIM2-5　Connector　　　　　　: ID1A-6S-2.54SF(21) (HIROSE)

Available for SIM type.

pin No	Mean
1	C1　VCC
2	C2　RST
3	C3　CLK
4	C5　GND
5	C6　VPP
6	C7　I/O

only SIM5

The under connector is available if requested.

Connector　52207-0790 (MOLEX)

For FPC. IC card connector is on the outside of this ICRW. IC card

connector is voluntary of user.

pin No	Mean
1	C1　VCC
2	C2　RST
3	C3　CLK
4	C5　GND
5	C7　I/O
6	SEIN　　*
7	SECON　**

* : OUTSIDE IC card connector insert switch signal

** : FPC Loop Back signal

Standard : SIM type connector　ID1A-6S-2.54SF(21) (HIROSE) is mounted.

Connector　52207-0790 (MOLEX) is not mounted.
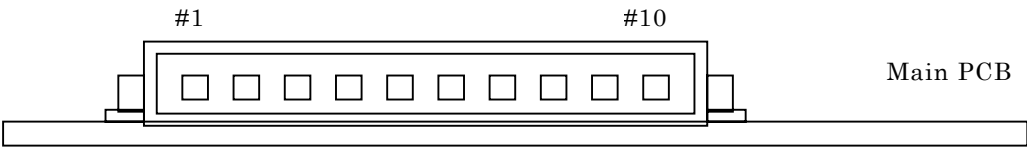
If　Connector　52207-0790 (MOLEX)　is mounted ,

SIM type connector　ID1A-6S-2.54SF(21) (HIROSE) is not mounted.

3.11　Retract counter

This is to count the card captured to the rear of ICRW.

(Software counter using F-ROM.)

3.12 Security and Spare Port

#1   #10

Main PCB

53261-1090(MOLEX) or equivalent

PIN	DESCRIPTION
1	Ground
2	External Output (OUT1).Transistor`s open collector output. Voh:30Vmax Iol:20mAmax
3	External Output (OUT2).Transistor`s open collector output. Voh:30Vmax Iol:20mAmax
4	External Output (OUT3).Transistor`s open collector output. Voh:30Vmax Iol:20mAmax
5	External Output (OUT4).Transistor`s open collector output. Voh:30Vmax Iol:20mAmax
6	External Input (IN1).
7	External Input (IN2).
8	External Input (IN3).
9	External Input (IN4).
10	Not used.

4. Usable card

  4.1   Magnetic card

        ISO 7810,7811/1-5

        ISO 7811/6(option)   Read is accept

  4.2   IC card

        ISO 7816 (see 13.5 Note 5   and   13.6 Note 6)

        (Contact position : Front side, lower position)

        EMV '96   ver 3.1.1

        EMV Standard is given higher priority than ISO Standard when there are any

        discrepancy between them.

  4.3   Cleaning card

        Specification #68-76-02-51-4 (Standard type)

        or #68-76-02-51-8 (With mag-stripe type. DWG.No.EGCMC01881)

5. Transport

  5.1   Appearance

        Appearance drawing No.   : TEA167301

  5.2   Circuit

        Block diagram   : TEB0013

  5.3   Mass

        Approximately   : 2.0 kg

  5.4   Power requirement

        Voltage   :   24   ± 10   DC

        Condition   : Security and Spare Port Connector are open.

        Ripple   : Less than 200 mVp-p

        Power consumption

          (1) With out solenoid current

                Peak current   : Less than 2.5 A ,

                                     : Less than 50 ms

                Card feed(380 mm/s)   : Less than 2.0 A

                Card feed(190 mm/s)   : Less than 1.0 A

                Waiting   : Less than 0.3 A

(2) Solenoid current

Shutter solenoid current   : Max 0.75 A   Increased when

Shutter gate is opened.

Contact solenoid current   : Max 0.9 A   Increased when

IC contact is loaded.

Connector type   : 5046-04A (MOLEX)

(Power supply for logic circuit is generated within ICRW using +24 V supply)

6. Basic functions

6.1   Card feed speed

At mag-stripe Read/Write   190 mm/s±3%

At card transport only   380 mm/s(typ.)

6.2   Card feed Time

Approx.   1.5 s (Round trip)

6.3   Card eject length

More than   20 mm

6.4   Dielectric strength

DC 200 V, 1 min   (Measured between PCB ground & frame)

6.5   Insulation resistance

More than 10 M   at DC 200 V (Measured between PCB ground & frame)

7. Environmental condition

7.1   Operating temperature/humidity

5   50 , 20%   80%RH

In 0   5   range,(except   "warped capability")

Wet bulb temperature : Less than 30

7.2   Storage temperature/humidity

20   70 , 20%   80%RH

Conditions:
Storing ICRW for 12 hours at the normal conditions (refer to 13.1 Note1) without
any operation after keeping it at the above storage temperature and humidity for
96 hours without operation, no functional error is found.

7.3   Maximum limit

40   ± 3 , 90%   95%RH, 96 hours

Conditions:
Storing ICRW for 12 hours at the normal conditions (refer to 13.1 Note1) without
any operation after keeping it at the above storage temperature and humidity for
96 hours without operation, no functional error is found.

7.4   Vibration durability

Range of frequency : 5   50Hz

Acceleration : 2 m/s^2 (0.2G)

Sweep method : Logarithmic sweep , 2 min/1 octave

X.Y.Z. each direction 30 minutes.

No functional error is found after vibration test.

7.5   Shock durability

294 m/s^2 (30G) , 11 ms

X.Y.Z. each direction one time.

No functional error is found after shock durability test.

(Direct shock to ICRW, without packaging.)

8. Life

8.1   ICRW Unit

1,000,000 card passes
One time card pass means the round pass with forward and backward movement.
IC contact movement is assumed 3 times out of 10 card passes.

1,000 passes/card maximum.

8.2   Major parts (Spare parts)

		q'ty/unit
Magnetic head R/W	1,000,000 passes	2 pieces
Pre head	1,000,000 passes	1
D.C. motor	1,500,000 passes	1
Timing belt	2,000,000 passes	2
Feed roller	1,500,000 passes	3
IC contacts	300,000 times	1

9. Reliability

   9.1   Mag-stripe read/write Error Rate

             Less than 1/1,000 cycles

             Condition :   at indoor normal condition ,Card : SANACARD-T5 Flat

             Card feed :   1 cycle/10 s

             1 cycle : one Mag-Track Write Command   and   one Mag-Track Read

                      Command   function

   9.2   IC contact connection Error Rate

             Less than 1/10,000 times

             Condition :   1 time=1 try + 2 retries

             1 try : To carry the card to IC contact position and set IC contact

   9.3   MTBF   (only for PCB)

             More than 200,000 hours

   9.4   ISO magnetic stripe cards

             The ICRW is equipped with several Read Methods.

             See   INTERFACE SPECIFICATION   : ASL-NP-00425-01 .

             The ICRW is capable of writing on both Hi-Co and Lo-Co magnetic stripe

             cards written to the ISO standards. This requires different magnetic head write

             currents for Hi-Co and Lo-Co write cycles. At the end of a Hi-Co write cycle

             when the write current is switched off , the remanence on the magnetic head not

             degrade the magnetic data written on a Lo-Co magnetic stripe card when passed

             over the write head.   (option)

   9.5   Other functions for Reliability

             1) Self diagnostics

                a.   At the time of   Power ON   or   Interface Reset

                b.   At the time of   Self Diagnostic command

                c.   At the time that   The ICRW was performing one command except for

                   Self Diagnostic command

             2) Photo sensor dirt / age detect using emission amount change of Sensor LED.

                See   INTERFACE SPECIFICATION   : ASL-NP-00425-01 .

9.6　　　　No adjustments at the ICRW maintenance

　　　　　　　1) Photo sensor sensitivity adjustment

　　　　　　　2) Card feed speed adjustment

10. Power down

In case of power down, a card under transaction can be conveyed to the card gate
by backup power supply which will be provided by the customer.

10.1　Definition of power down

Supply voltage　　　: 20 V DC or less

Duration time　　　: over 15 msec

10.2　Operation

The ICRW can offer the option of the added feature that when the power supplied to the
ICRW fails, the module can return the card to the customer. Two different variants of this
feature can be fitted to the ICRW.

a) If ICRW is initialized with Pd="3" under Initialize command, in the first variant the
ICRW will have a control/supply port which can supply sufficient power and control to
the ICRW for any ICRW function to have been completed, then offer the card back to the
customer and if the card is not taken by the customer after 30 seconds, capture the card,
if power is lost or a software reset is applied to the ICRW. If the card jams within the
ICRW during power failure there must be sufficient power provided to the ICRW for the
Module to attempt three retries at ejecting or capturing the card.

b) If ICRW is initialized with Pd="0" under Initialize command, the second cheaper
variant will use the same control/supply port to supply sufficient power and control to
the ICRW so that any card in the ICRW can be ejected when power to the ICRW fails.
Note that in　　this case there is no attempt to complete the card operation under
progress when the power fails.

c) During power down mode, DTR keeps low level ("OFF").
When the power down is happened during card handling, ICRW does compulsory carry the
card to the gate, ICRW turns DTR OFF after completion of carrying it to the gate.

d) When power down occurs during data writing on the mag-stripe, ICRW initialized with
Wv="1" carries the card to the gate after completion of the write operation.

The written data in this operation are not guaranteed because of no verify check.

e) If power down occurs during IC card processing, ICRW starts to eject the card after holding the IC contact to load onto the IC card for 1 sec. To enable HOST to detect the occurrence of the power down, send Status request command at least 200 msec cycle to ICRW.

f) When power failure occurred , ICRW is in Disable mode.

10.3   Recovery

When the main power recovers to be more than 20V, ICRW informs HOST of the recovery on the main power by turning DTR high level("ON").

It's necessary to initialize ICRW under Initialize command to return to normal operation mode.

10.4   Backup power supply (see 13.3 Note 3)

1) Capacitor   0.27   0.33 F charging from ICRW

               0.33   0.39 F is necessary when Pd ="3" or Wv ="1" is set on

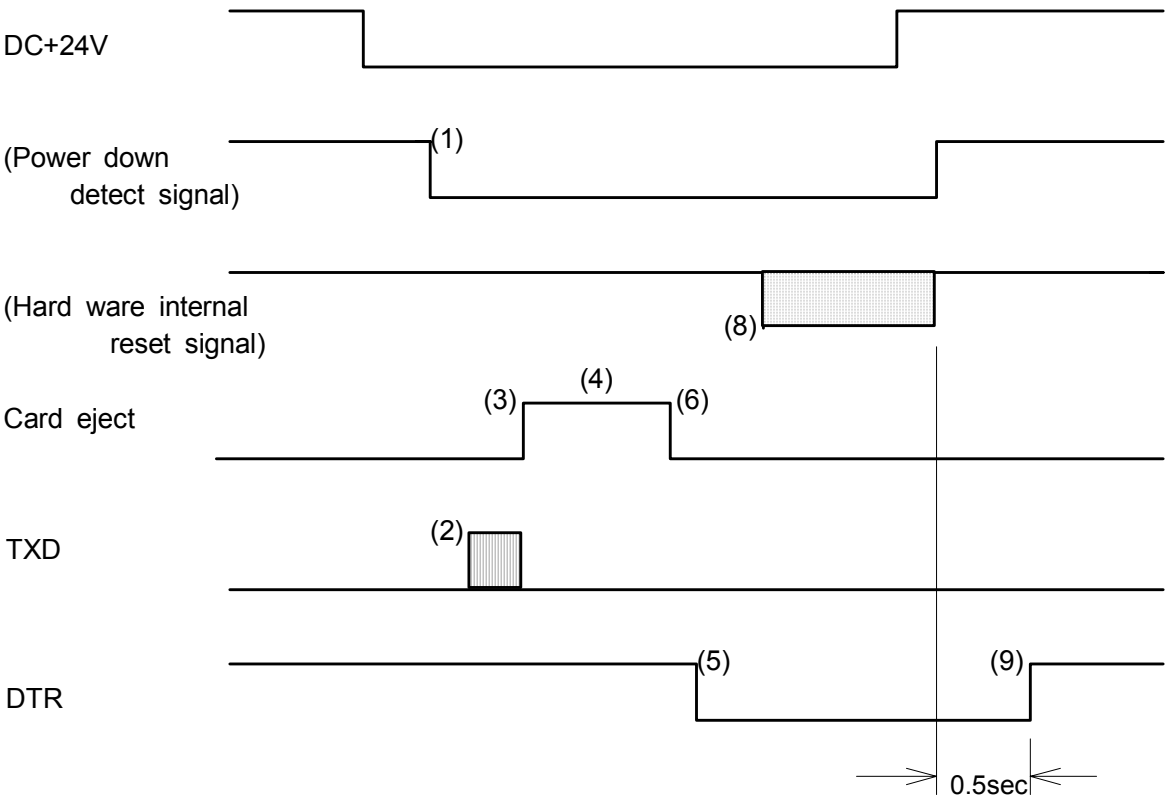   Initialize command.

 or

2) Supply 18   25V power, in 1.0A. Peak (2.0A) for 1 second.

10.5   Timing chart

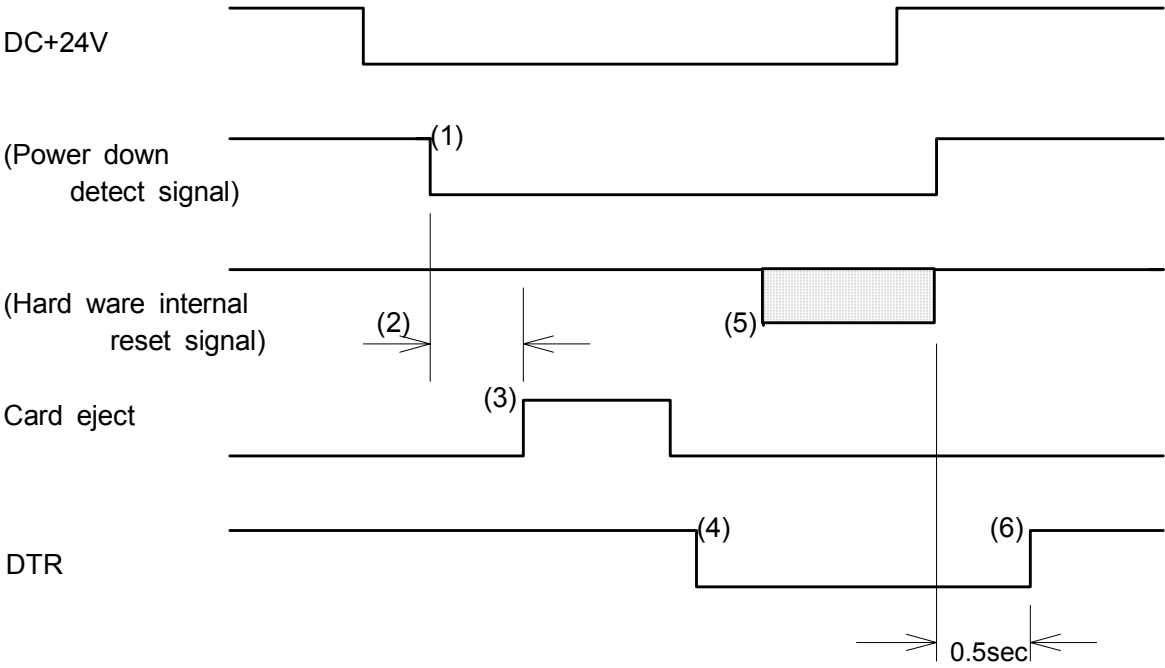　　　 Followings are the timing chart of ICRW initialized with Pd="0".

1) In case that power down occurs, while the card is inside ICRW.

　(In case of enough backup power supply;)

DC+24V

(Power down
　　detect signal)　(1)

(Hard ware internal
　　reset signal)　(8)

Card eject　(3)　(4)　(6)

TXD　(2)

DTR　(5)　(9)

0.5sec

　(1) When the main power (+24V DC) goes down less than 20V and such main power lasts for
　　　approx. 15msec, it activates the power down detect circuit.

　(2) If ICRW is executing a command, ICRW stops executing it and sends negative response
　　　(power down) to HOST.
　　　If ICRW is initialized with Wv="1" and if ICRW is executing a Write command, ICRW
　　　completes the write operation and sends negative response (power down) to HOST.
　　　If ICRW is initialized with Wv="3" and if ICRW is executing a command, ICRW completes the
　　　operation and sends negative response (power down) to HOST.(Except Entry command)


　(3) ICRW starts to carry the card to the gate.

(4) When ICRW is initialized with Pd="3", If the card jams within the ICRW during power failure, ICRW attempts three retries at ejecting the card. If ICRW is initialized with Pd="0", there is no jam retry.

(5) ICRW turns DTR OFF after completion of carrying the card to the gate.

(6) When ICRW is initialized with Pd="3", If the card is not taken by the customer after 30 seconds, ICRW captures the card. If ICRW is initialized with Pd="0", ICRW dose not capture the card.

(7) If the card jams within the ICRW during power failure, ICRW attempts three retries at capturing the card.

(8) If the backup power voltage decreases below 12V, hardware reset signal generates inside ICRW and CPU stops.

(9) ICRW turns DTR ON in approx. 0.5sec after recovery of the main power supply. Use Initialize command as the first command to ICRW after recovery of DTR.

2) Power down occurs in during IC card processing.

DC+24V

(Power down detect signal) (1)

(Hard ware internal reset signal) (2) (5)

Card eject (3)

DTR (4) (6)

0.5sec

(2) The IC contact keep on touching with the IC card until deactivating completes.

3) In case that power down processing is activated by immediate cut of the main power supply;

DC+24V

(Power down detect signal) (1)

Card eject (3)

TXD (2)

DTR (4) (5)
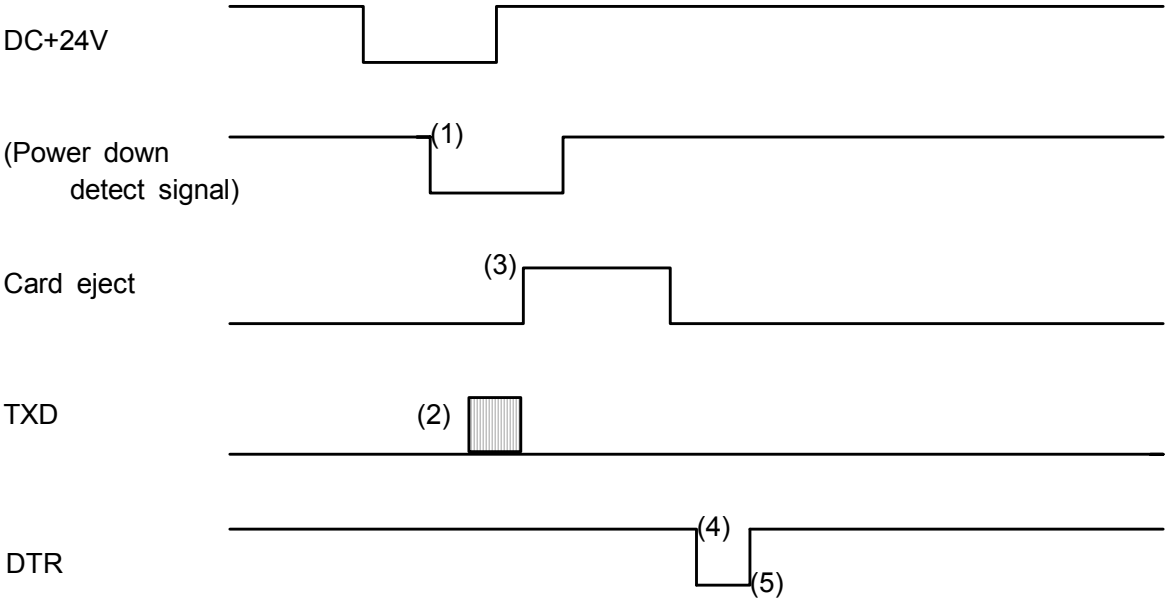
The actions in (1) - (3) are the same as those of section 1).

(4) DTR is turned OFF for approx. 15msec after completion of carrying the card to the gate.

(5) Use Initialize command as the first command to ICRW after recovery of DTR.

11. Warped Cards

This term refer to an evenly warped card having a height (from the top of the convex surface to the base of the warped edge)
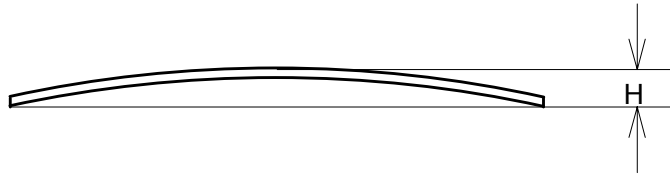
a) "H"   1.0 mm   for able to Card back entry.

b) "H"   2.5 mm   for able to Mag-stripe R/W(only low-slice read).

c) "H"   2.0 mm   for able to IC R/W.

d) "H" >   4.0mm   card jamming will be happened(include card eject in case of power down).

12. Physical level

  12.1 Explanation for signals and PIN assignments

   a. RS232C/D Interface connector   87203-6063 (MOLEX)   or equivalent

Pin No.	Signal name	I/O	Function
	I/F RST	I	Interface Reset H:reset
	RXD(RD)	I	Receive Data
	TXD(SD)	O	Transmit Data
	DTR(ER)	O	Data Terminal Ready
	SGN		Signal Ground (0V)
	DSR(DR)	I	Data Set Ready
	RTS(RS)	O	Request To Send
	CTS(CS)	I	Clear To Send
	NC		

  The shell portion of connector is connected to the flame of ICRW.
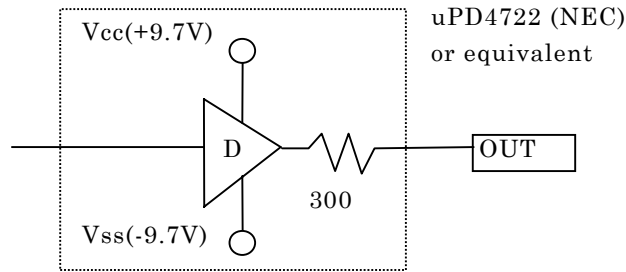

      b. Power connector   5046-04A   (MOLEX)

Pin No.	Signal name	I/O	Function
	24V	I	+24V DC (main power supply)
	PGN	O	Power Ground (0V)
	PGN	O	Power Ground (0V)
	BPS	I	Backup power supply

  SGN and PGN are connected inside ICRW.
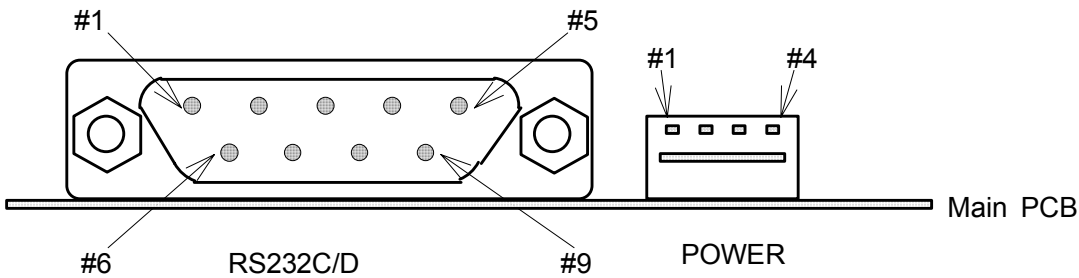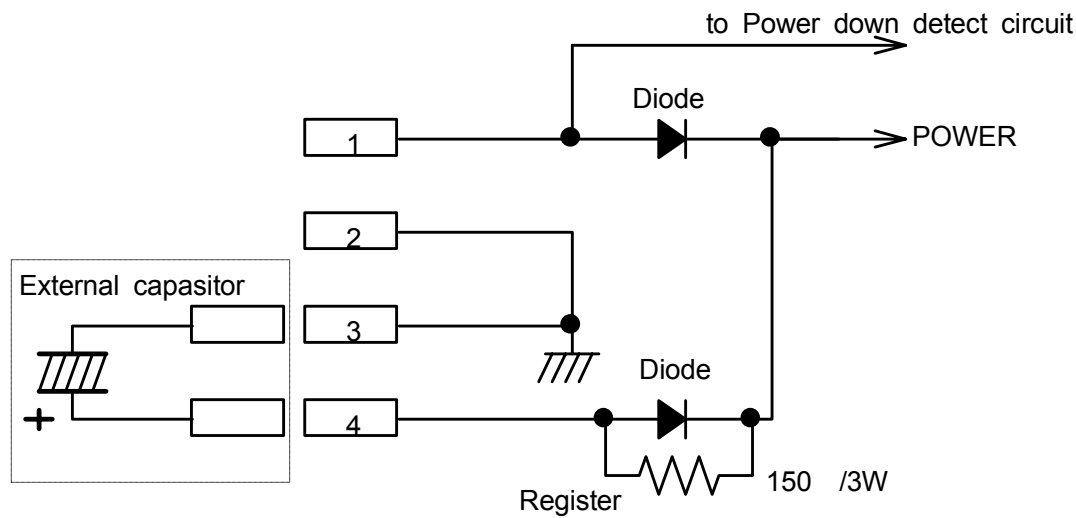
12.2   Electrical characteristics

  1)   Output condition (TXD,RTS,DTR)

Vcc(+9.7V)

uPD4722 (NEC)
or equivalent

D

OUT

300

Vss(-9.7V)

  2)   Input condition (I/F RST,RXD,CTS,DSR)

Vcc(+5V)

uPD4722 (NEC)
or equivalent

IN

R

5.5k

  3)   Power circuit

to Power down detect circuit

1

Diode

POWER

External capasitor

2

3

4

Diode

+

Register

150 /3W
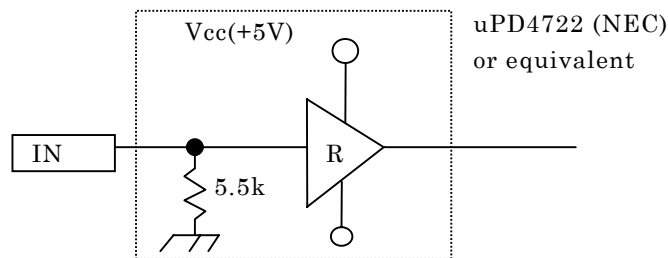
12.3 Voltage level

Name	Space	Mark	Conditon
Meaning	0/on	1/off	
Output condition	+5V +15V(+9.7Vtyp)	-15V -5V(-9.7Vtyp)	RL=3 K 7 K
Input condition	+3V	-3V	Rin=3 K 7 K

Notes

1) Input condition is average figure of voltage, to identify a given signal as Mark or Space.

2) Difference between Output & Input condition is due to taking account of signal to noise efficiency during transmission.

3) Maximum length of cable :   Max. 15 m

12.4 Connection Example

```
        HOST                              ICRW
      FG ─────────────────────────── FG
      TXD ──────────────╲╱────────── TXD
      RXD ◄─────────────╱╲─────────► RXD
      RTS ──────────────╲╱────────── RTS
      CTS ◄─────────────╱╲─────────► CTS
      DTR ──────────────╲╱────────── DTR
      DSR ◄─────────────╱╲─────────► DSR
      SGN ─────────────────────────── SGN
```
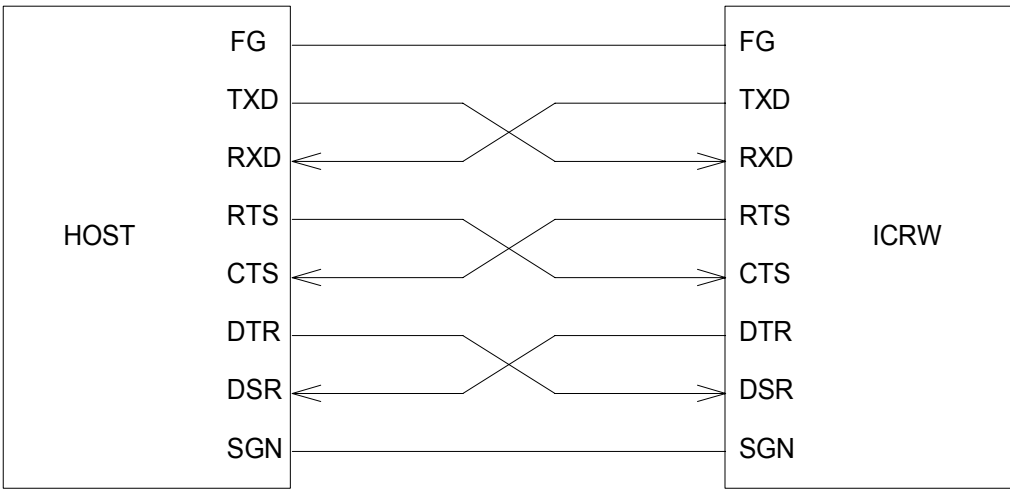
12.5　Protocol level

　　　　1) Synchronous method :　　Asynchronous

　　　　2) Transmission method :　　Half duplex

　　　　3) Baud rate :　　　9,600 bps, 19,200 bps or 38,400 bps (automatic recognition)

　　　　4) Data length :　　8bit + 1 parity

ST	b0	b1	b2	b3	b4	b5	b6	b7	P	SP

　　　　5) Stop bit :　　　　　1 bit

　　　　6) Character Code :　　　ASCII 8 bit code

　　　　7) Parity check method :　　Vertical (Even) parity check

12.5　Protocol level

13. Notes

13.1 Note1. Normal Conditions

Temperature   20 ± 5

Humidity   35% 60% RH

Mounting   Horizontal (Mounting plate on horizontal surface)

13.2 Note2.
Details of specific evaluation method for each characteristics are described in this document.

and details of quality assurance program are negotiated under separate agreement.

13.3 Note3.

Recovery of charging up takes approx. 3 minutes after power on in case capacitor is used
as backup power source.

13.4 Note4.

For location of the sensors, refer to the appearance drawing.

13.5 Note5.

The location of the card driving roller in ICRW and the area of IC chip are overlapped.

The card driving mechanism gives pad roller pressure onto IC card chip.

The pad roller is located in the opposing side of the card driving roller.

The IC cards must be endurable against the aforementioned pressure.

The pressure given onto the IC cards are as follows;

27.0mm typ.

IC chip

IC card

Emboss

20

Mag-stripe

Pad roller (polyacetal)
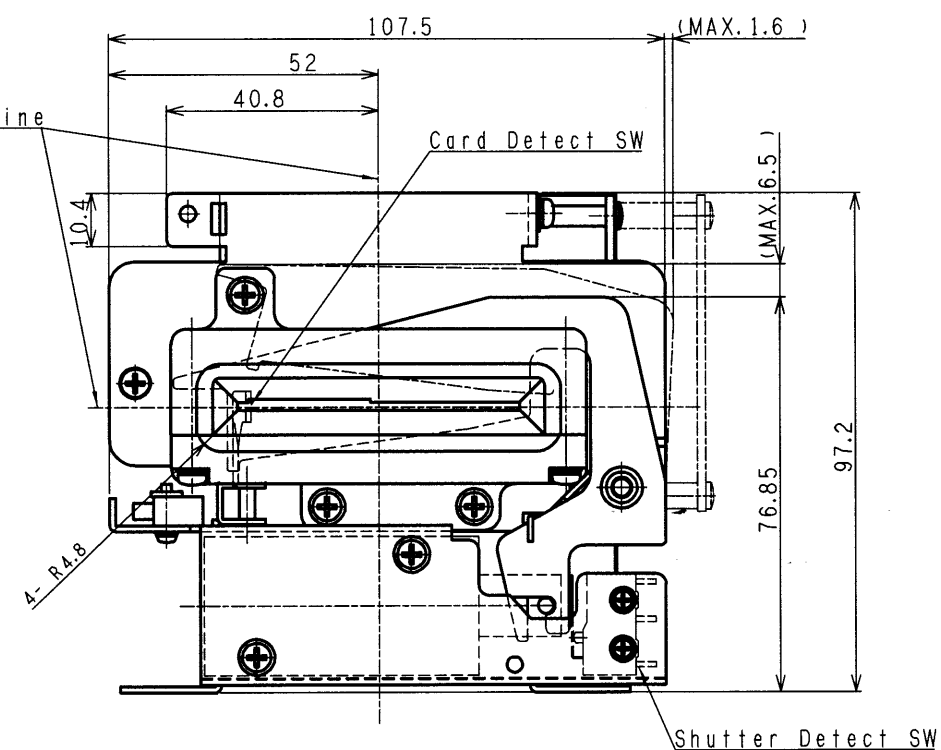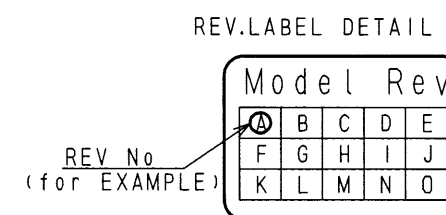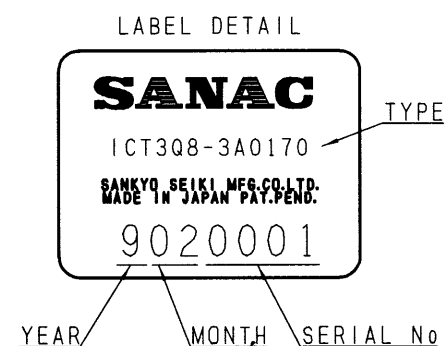
3.5mm typ.

19.6[N] typ.
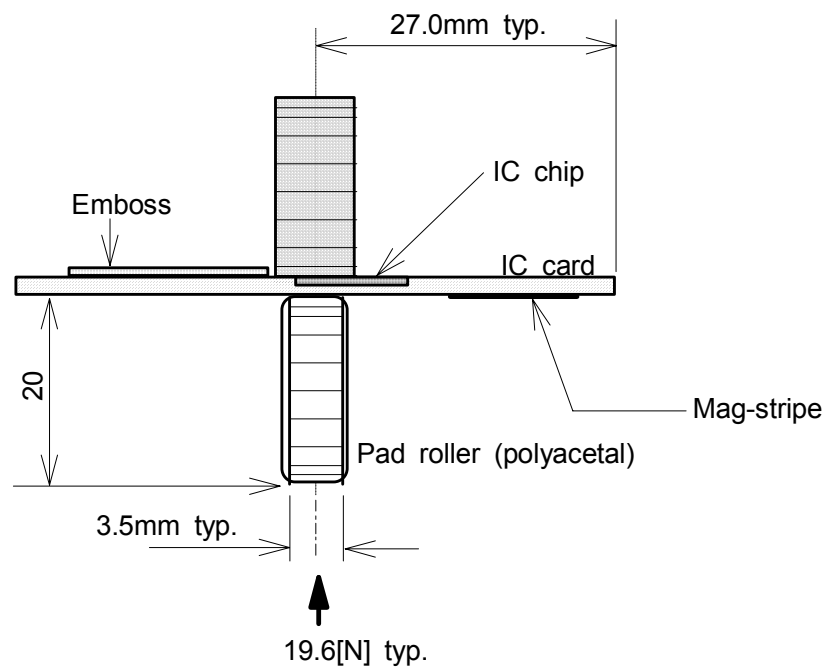
13.6 Note6

Care for handling the cards;

In case the cards are kept under the condition that ISO magnetic stripe on Low-Co card and Japanese domestic JIS 2 magnetic stripe on the card (ICRW does not support JIS 2 track read/write operation.) are laid so that those overlap each other , there is a possibility of the demagnetization of the data on ISO stripe.

In case Low-Co card and High-Co card is kept with overlapping each other , there is a possibility of the demagnetization of the data on Low-Co card. (option)

SIM PCB Option
MAIN PCB
SIM1
HIROSE ID1A-6S-2.54SF
Pre-head
COVER
R.5
R.2

5.5
211.8
7
40
Max 25
14.8
98.5
80
35
27.3
54.6
70.4 ±0.3
80.3

5
3.6
8
3-R1.8
110
2-144
4
71.3
2-66.3

MM Sensor Bracket Option
IC Contact(ISO)

LABEL DETAIL

SANAC
ICT3Q8-3A0170
SANKYO SEIKI MFG.CO.LTD.
MADE IN JAPAN PAT.PEND.
9020001
YEAR   MONTH   SERIAL No
TYPE

REV.LABEL DETAIL

Model Rev

A	B	C	D	E
F	G	H	I	J
K	L	M	N	O

REV No
(for EXAMPLE)

I/F Connector
Molex:87203-6063
or equivalent

Power Connector
Molex:5046-04A

Hi-Co PCB
Option

R/W-HD

22.1 (IC Contact Center)
16.9 (Card Detect SW, PreHead)
30.2 (Shutter)

SANAC

Model Rev

A	B	C	D	E
F	G	H	I	J
K	L	M	N	O

4
30.1
8.6
17.1 ±0.4
55.5

3.2
28.3

1(PD3)
73
7 (PDi)
9.5 (PD1)
69.8
55.5
PD2

107.5
52
40.8
(MAX.1.6)
Card Center Line
Card Detect SW
10.4
(MAX.6.5)
97.2
76.85
4-R4.8
Shutter Detect SW

REF.DRAWING
TEA156601
PROJECT NO.
TITLE
OUTSIDE DRAWING

SURFACE TEXTURE			MATERIAL		ICT3Q8-3A0170		1	Correction	EB-01718-01	Dec.4.2000	K.Oguchi	S.Nagata
				TYPE		4	Reconsider of Expand Function	EB-01490-01	Aug.24.2000	K.Ishikawa	S.Nagata
HEAT TREATMENT				UNLESS OTHERWISE NOTED, C=		3	CORRECTION	EB-01390-01	Jul.26.2000	K.Ishikawa	S.Nagata
SURFACE TREAMENT			No.PER UNIT	No.OF REQUIRED	SYM	No.OF REV.	DESCRIPTION	EC.No.	DATE	DESIGN	APPR

PROJECTION UNIT mm
SCALE 1:1
TOLERANCE ±1
SECTION SYSTEM MACHINE DIV.
APPR S.Nagata Apr.22.'99 CADCHK K.Yuzaki Apr.22.'99
DESIGN K.Ishikawa Jan.29.'98 CHECKD

DRAWING No. TEA167301
ID No. E01

株式会社 三協精機製作所
SANKYO SEIKI MFG.CO.,LTD. JAPAN

RELEASE OF DRAWING
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100A003BE01