A **Nidec** Group Company
Sankyo

FOR REFERENCE OCT. 26 2010 ENG.DIV NIDEC SANKYO CORPORATION

SPECIFICATION

Type Name :

ASR-NP-17749-01

Spec. No.	ICT3K7-3R6940

Notes :

Distribution

No. of sheet

Custody

Sym.	Revision	Page	Cha. No.	Date	By	Appr.
				· ·		
				· ·		
				· ·		
C	Correction	5,8	EB-14010-01	2010.10.08	I.K	K.Higashi
B	EMV Approval Number registration	4	EB-12624	2009.07.13	K.Hoson	T.Shiomi

	I.Kuribayashi	2008.11.14	Reference Document
Design	S.Miyazawa	2009.04.15	
	S.Ozawa	2009.04.16	
Det-che	K.Ishikawa	2009.04.16	
Type Name Appro.	K.Higashi	2009.04.16	**NIDEC SANKYO CORPORATION**

REGISTERED APR.16.2009 ENG.DIV

No. S39Z-032-00-02E

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Document History

Rev.	Date	Name	Notes	Page
A	Nov.14.2008	I.Kuribayashi	Original	—
B	Jul.13.2009	K.Hoson	EMV Approval Number registration.	5
C	Oct.09.2010	I.Kuribayashi	EMV Approval Number registration. Add "DC1.8 V $\pm$ 10% (T.B.D.)" on section 12. Change "50 mA Max. at 3V operation" to "55 mA Max. at 3V operation" " on section 12. Add "35 mA Max. at 1.8V operation (T.B.D.)" on section 12.	5,8

1   Product

Motorized Magnetic stripe and IC Card Reader with Full Shutter Gate (Hereafter refer as ICR, customer's main system as HOST) 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-17749-01

This unit is compliant to "RoHS" Instruction

2   Model Name

ICT3K7-3R6940

3   Function

3.1   Card Transport

Round trip and capture

3.2   Read / Write

1) Magnetic stripe : Read only on ISO Track #1,#2 and #3
NOTE   It can read both lo-co and Hi-co.
          Read only in card run forward. Do not touch the card when it is reading.
          Automatic retry is impossible.

2) IC Card with contact : Read / Write
NOTE   Method of Read / Write depends on Terminal C1 to C3 and C5 to C7
          The specifications of IC card is Refer to "IC card control"
          Vpp is not supported.

3.3   Interface

RS232C compatible
Interface connector   : Ref. "Interface connector" section
Pin assignment   : Ref. "Interface connector" section

4   Useable card

4.1   Magnetic card

Conform to ISO/IEC 7810:2003, ISO/IEC7811-1:2002, ISO/IEC7811-2:2001
and ISO/IEC7811-6:2008

4.2   IC card

Conform to ISO/IEC 7816-1:1998, ISO/IEC 7816-2:2007, ISO/IEC 7816-3:2006
and/or EMV 2000 Ver.4.0
NOTE   EMV standard is given priority if there are some difference in same item between ISO/IEC
          and EMV.

5   Transport

5.1   Appearance

Appearance dimensions   : Drawing No. T08A866A01

5.2   Circuit

Show in block diagram refer as "Block diagram" section.

5.3   Mass

Approximately 480g

5.4 Power requirement
Voltage : + 12 V $\pm$ 10 % DC
Ripple : Max. 200 mVp-p
Current consumption

At starting and inverting	: 2.5 A or less	
At run	: 1.0 A or less	
At ready	: 500 mA or less	
At solenoid	: 1.7 A or less	Added when "Capture"
At solenoid	: 0.16 A or less	Added when "Shutter on"
At IC card	: 60 mA or less	

NOTE   Power supply for logic circuit is generated within ICR using +12V supply.

6   Basic Performance

6.1   Reading process
F/2F (FM)   bit to bit decoding

6.2   Data capacity
Data capacities are
          ISO track 1 : 79 characters X 7 bits
          ISO track 2 : 40 characters X 5 bits
          ISO track 3 : 107 characters X 5 bits

6.3   Card feeding speed
250 mm/s $\pm$ 20 %
NOTE   Except rising and falling time speed

6.4   Magnetic head
1) Number of track   : 3
2) Track width   : 1.0mm

6.5   Mechanical noise
Max. 70 dBA
NOTE   Except action of IC contact assembly and shutter operating noise.
          Measured with microphone over 150 mm of motor.

6.6   Dielectric strength
To be no failure at DC 250 V, 1min
NOTE   Measured between GND and frame

6.7   Insulation resistance
More than 10MΩ at DC 250V
NOTE   Measured between GND and frame

6.8   Compatibility
EMV Specifications,Book1,Version4.0 of December 2000.
Approval Number   : 12445 0910 400 21 BCT
IFM Identification   : IFM0K0-0500 Version A
Hardware   : S39A730A01 Version A
Software   : AAL-AA-02491-03 Version A
As Tested In   : ICT3K7-3R6940

7 Environment condition

7.1 Operating temperature and humidity
+5 to +50 °C, 30 to 80% RH
NOTE   The highest wet bulb temperature and humidity is 29 °C, no dewing

7.2 Storage temperature and humidity
-20 to +70 °C, 30 to 80% RH
NOTE   Storing ICR for 12 hours at the normal conditions 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 (high temperature and high humidity)
+40 $\pm$ 3 °C, 90 to 95%RH 96hours
NOTE   Storing ICR for 12 hours at the normal conditions 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
1) Operation
No functional failure at,
Max. 1.96 m/s^2 {0.2G}   X,Y and Z directions
Sweep : 10 to 50 Hz/min

2) Ready
No functional failure at,
after 3.92 m/s^2 {0.4G} constant   X,Y and Z directions 30 minutes
Sweep : 10 to 50 Hz/min

3) Storage
No functional failure at,
after 29.4 m/s^2 {3.0G} constant   X,Y and Z directions 30 minutes
Sweep : 10 to 50 Hz/min

7.5 Shock
No functional failure at,
after 294 m/s^2 {30G}   11ms Once in X,Y and Z directions

7.6 Mounting angle
No functional failure at,
Horizontal (To be sited at an angle of less than 10 degrees)

8 Life

8.1 Transport
600,000 passes or 7 years(earlier of each)
NOTE   One card pass is a forward and a reverse, at indoor environment.

8.2 Main parts
Magnetic head   :   600,000 Card passes (1 piece)
DC motor   : 1,000,000 Card passes (1 piece)
Rubber roller   :   600,000 Card passes (1 piece)
IC contact   :   300,000 ON/OFF (1 piece)

8.3 Card
1) Magnetic card : 1,000 times
2) IC card   : *3,000 times (Read / Write Life)
NOTE   * Ref. value depend on card specification

9 Reliability
9.1 Error rate
1) Magnetic stripe read   : Less than 5 errors per 5,000 cycles
NOTE   SANACARD-T5 flat
        Room temperature and humidity

2) IC R/W   : Less than 5 errors per 5,000 cycles
NOTE   Flat card
        Except an error caused by dirtiness

9.2 MTBF
More than 1.0×10^5 hrs (Electronic part only)
NOTE   250 times / day, 25 days / month, 250 hrs / month
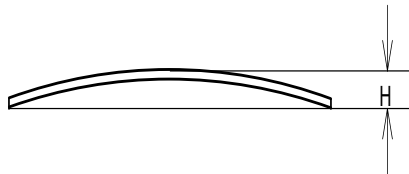
10 Warped card
This condition refers to an evenly warped card having a height , "H".
1) Possible to R/W IC data   : "H" = less than 2.5 mm
2) Possible to read Mag. Stripe   : "H" = less than 2.5 mm
3) Possible to capture   : "H" = less than 2.5 mm
4) Possible to run the Card   : "H" = less than 3.5 mm

11 Power down mode
11.1 Definition of power down
1) Supply voltage   : 9-10 V DC
2) Time out   : over 50 ms

11.2 Operation
ICR dose compulsory card eject (toward card throat portion) regardless of card presence within ICR.
Card eject is not available if ICR is in "disable" mode (pd=31H) under initialize command.
During power down mode, DTR keeps low level(Off).

11.3 Recovery
It's necessary to initialize ICR under "Initialize command" to return to normal operation mode.

11.4 Backup power supply Capacitor
More than 0.068F   : Operating temperature +20 to +30(flat card only)
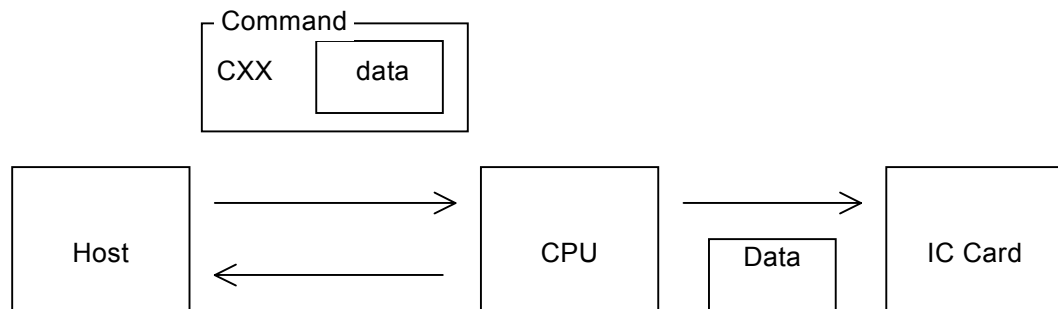More than 0.120F   : Operating temperature +20 to +30
More than 0.220 F   : Operating temperature +5 to +50
Charging a capacitor from ICR
NOTE   Battery is T.B.D.

12 IC card control

Vcc   : DC 5 V ± 8%
                : DC 3 V ± 8%
                : DC1.8 V ± 10% (T.B.D.)
                (selected by command)
Icc   : 60 mA Max. at 5V operation
                : 55 mA Max. at 3V operation
                : 35 mA Max. at 1.8V operation (T.B.D.)
Vpp   : C6 contact is isolated
CLK   : 3.58 MHz (basis), 7.16 MHz (automatically selected by software)
Unused terminal : C4, C8 contacts are isolated.

┌ Command ────────┐
│ CXX   ┌──────┐ │
│   │ data │ │
│   └──────┘ │
└─────────────────┘

┌────────┐   ┌────────┐   ┌─────────┐
│   │ ───────► │   │ ───────► │   │
│ Host │   │ CPU   │ ┌──────┐ │ IC Card │
│   │ ◄─────── │   │ │ Data │ │   │
└────────┘   └────────┘ └──────┘ └─────────┘

This magnetic / IC card reader (ICR) is designed to read and write an IC card which meets the standards defined by ISO/IEC 7816 part 1, 2 and 3. Although we have made many evaluations, we would like the customer to verify the card reader by using the vender's specific card, to avoid unexpected problem, which depend on the card.

Notes:
Recommendatory conditions
Temperature   : 20 ±5 °C
Humidity   : 35 -60 % RH
Mounting   : Horizontal (To be sited at an angle of less than 10 degrees)
+5 to-+35 °C temperature and 30 to 80 % humidity are the permissible on condition that no problem.

The details of evaluation, standard, guarantee for products etc. are specified by another contact.

The agreement concerning the industrial property, know-how etc. are specified by the general purchasing contact.

Basically, maintenance is to be done by the supplier. Exceptions are mode in anotheragreement.

13 Interface connector
13.1 Interface

Pin No.	Host/ICR	Signal
1	←	/DTR(ER)
2	→	/CTS(CS)
3	←	/TXD(SD)
4	←	/RTS(RS)
5	→	/RXD(RD)
6	→	/DSR(DR)
7	-	SGN
8	→	/RESET
9	-	FG
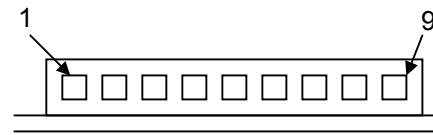
S9B-PH-SM4-TB or equivalent

RXD	Received Data from HOST
TXD	Output data to HOST
CTS	Executes transmission during ON
RTS	Request to send
DSR	Data set ready
DTR	Terminal ready
RESET	CPU reset (active Low)

Keep low level minimum 100ms when reset ICR

13.2 Power

Pin No.	Host/ICR	Signal
1	-	GND
2	-	GND
3	-	+12V
4	-	+12V
5	-	BACKUP
6	-	GND
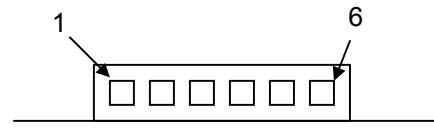
S6B-PH-SM4-TB or equivalent

+12V	Power
GND	Ground
BACKUP	Backup Power supply

14 Electrical characteristics of interface
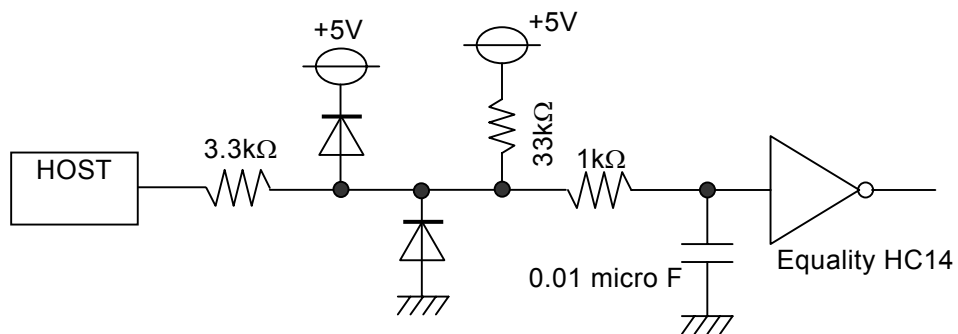### 14.1 TXD RXD RTX CTS DTR DSR
1) I/O Circuit

Output condition
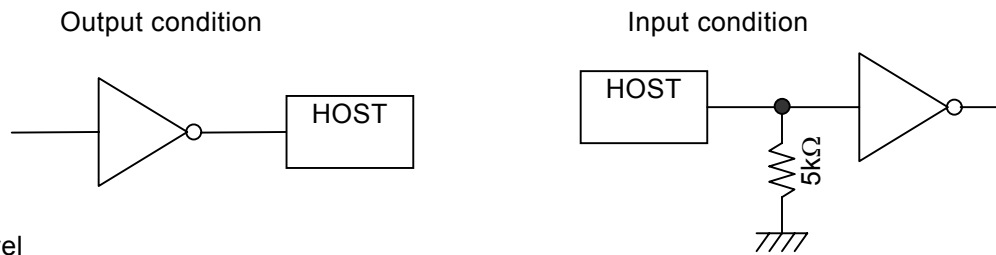
Input condition

2) Voltage level

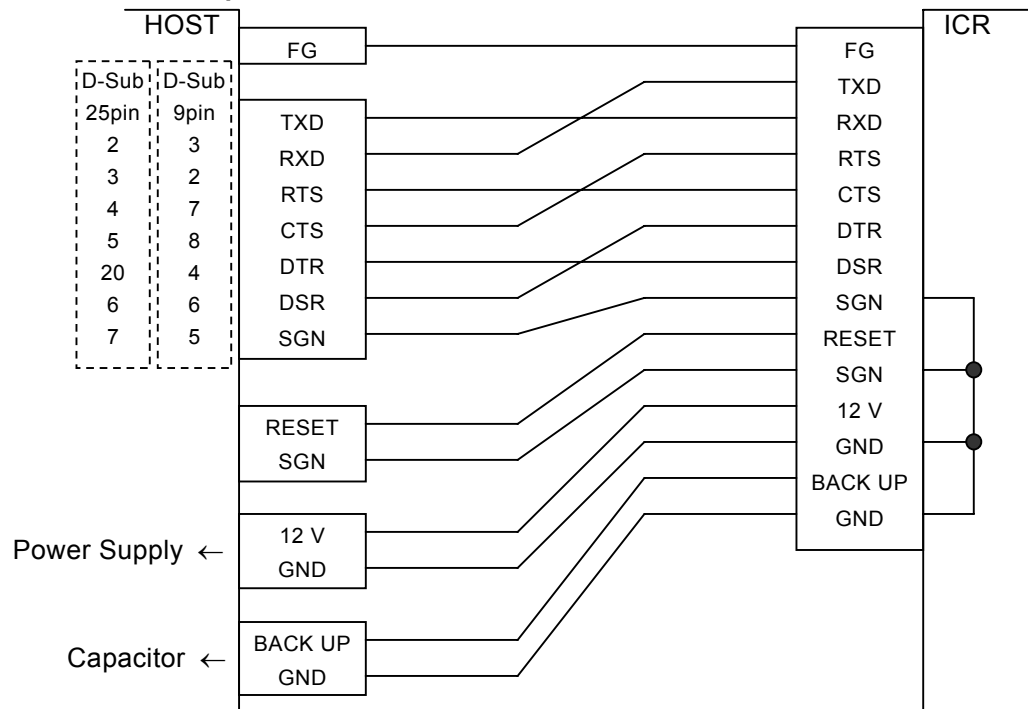| Name	Space	Mark	Condition
Meaning	0 / ON	1 / OFF	
Output condition	+5 to +15 V	-15 to -5 V	R_L= 3 to 7kΩ
Input condition	+3 to +30 V	-30 to -3 V	R_{IN}=3 to 7kΩ

14.2 RESET
1) Input condition

2) Voltage level
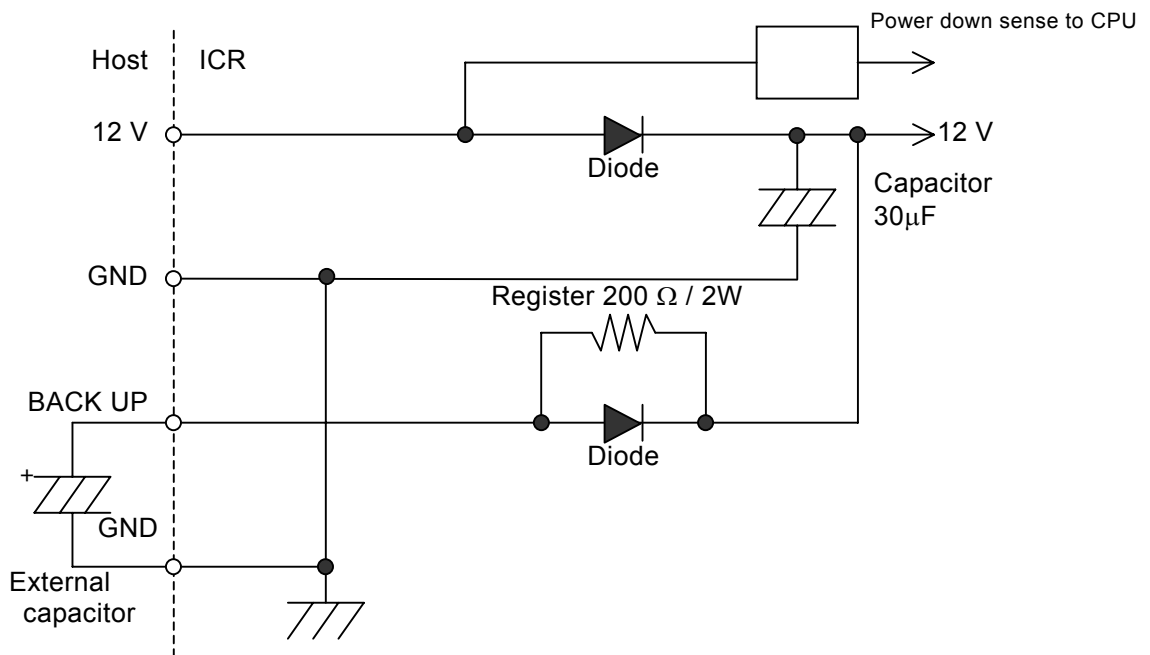
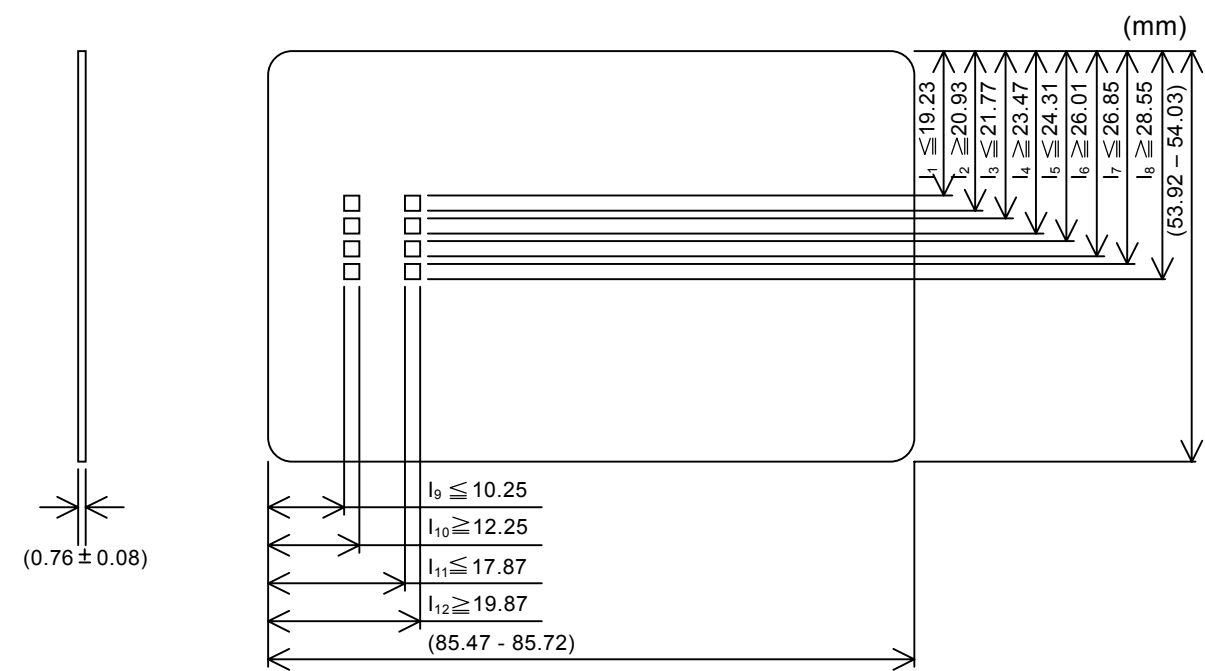| L	H
$\leq$ 0.8 V	$\geq$ 3.5 V

14.3 Connection example

14.4 Power down back up circuit

15 IC card connection point

Contacts on the front, in the position compliant with following figure of ISO/IEC7816-2.

(mm)

$l_1 \leqq 19.23$
$l_2 \geqq 20.93$
$l_3 \leqq 21.77$
$l_4 \geqq 23.47$
$l_5 \leqq 24.31$
$l_6 \geqq 26.01$
$l_7 \leqq 26.85$
$l_8 \geqq 28.55$
$(53.92 - 54.03)$

(0.76 ± 0.08)

$l_9 \leqq 10.25$
$l_{10} \geqq 12.25$
$l_{11} \leqq 17.87$
$l_{12} \geqq 19.87$
$(85.47 - 85.72)$

NOTE   No point of the IC contact surface shall be higher than 0.05mm above or lower than 0.1mm below the adjacent surface of the card.
Connections come to contact with terminals in the range of squares.
But there are no connections on terminal which contacts C4 and C8.

16 Block diagram

RS232C Driver

SW 1

Sensor 2

Sensor 3

Sensor 4

ISO Track #1
Read head → Decoder

ISO Track #2
Read head → Decoder

ISO Track #3
Read head → Decoder

Motor M → Motor Driver

Capture SOL → Solenoid Driver

Gate shutter → Solenoid Driver

Single Chip CPU

TXD DTR RTS

RXD DSR CTS

RESET

Reset IC

+ 5 V OUT

+ 12 V OUT

+ 12 V

CLK

RST

VCC

C1   C5   GND

C2   C6

C3   C7   I/O

C4   C8

IC Card R / W

GND
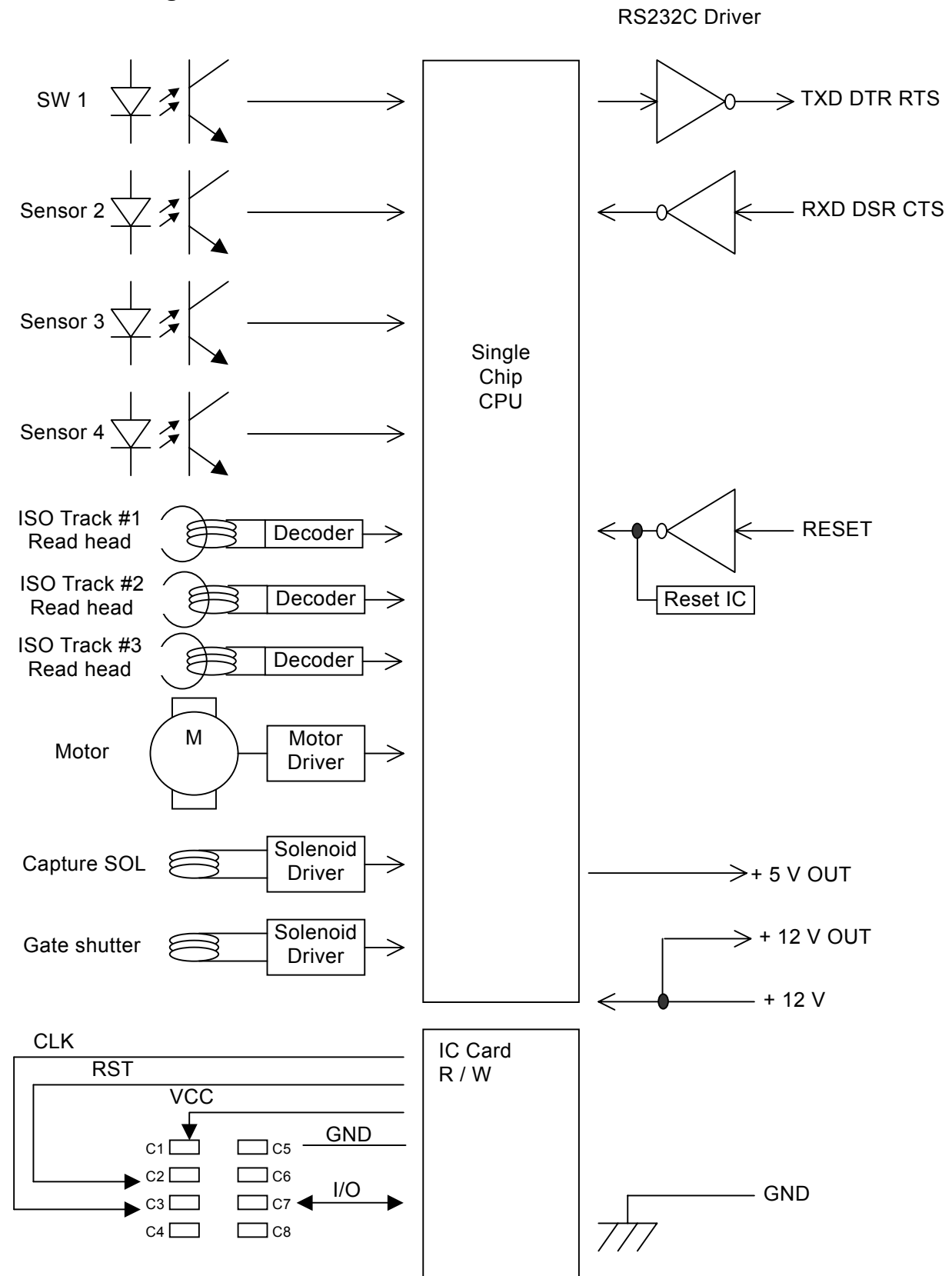
17 Periodical Maintenance

Dusts and oils on Magnetic Head, IC card contacts, rubber roller etc. may cause unexpected wrong motion and errors on magnetic / IC card readers. To prevent these, Sankyo recommend periodical cleaning on parts described below.

	Parts to be cleaned	Cleaning Frequency
1	Magnetic Read Head	Once par 2000 passes (Recommended)
2	Card Position Detect Sensor (S1-S4)	
3	IC Card Contact	
4	Rubber Roller	

"One pass" in this specification defines a forward and a reverse (a round transfer).
Maintenance shall be carried out at standard indoor environment.

17.1 Cleaning method

Cleaning by air blowing and/or by cleaning card.
If the cleaning by air blowing and/or by cleaning card is not effective and dirt remains on rollers, wipe rollers by cloth or cotton penetrated with a few cleaning liquid (Methanol etc.) on rotating rollers by hand. And, swipe cleaning liquid quickly.

17.2 Notes

1) Do not use cleaning cards shorter than standard when the card is transferred manually by rotating rollers with hand while the power is off. If a short card is inserted, it may be jammed in the ICR.
2) Do not use any cleaning liquid(Methanol etc.) on cleaning cards when the card is transferred by command control , such as "Entry" command or "Eject" command without sending "Mag. Read" command.
3) Check and confirm that ICR is well dried when ICR is operated after the cleaning.
4) Do not use cleaning cards which has breaks, cracks, separations of cleaning cloth, pills on surface, dirt etc. These may reduce cleaning effectiveness and may worsen situations.
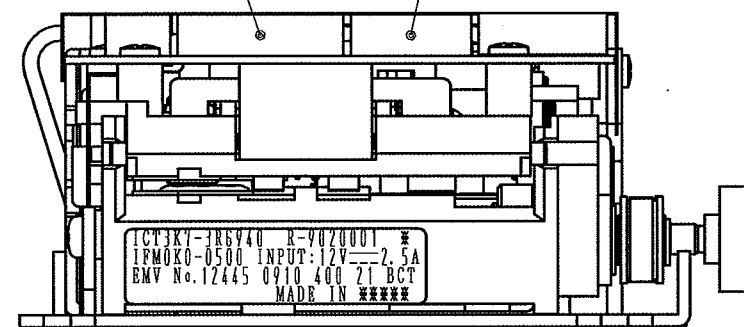
1   2   3   4   5   6

FOR REFERENCE
OCT. 26 2010
ENG.DIV
NIDEC SANKYO CORPORATION

Year   Month   REV No
TYPE   RoHS Compliance   Serial No   INPUT

ICT3K7-3R6940 R-9020001 *
IFM0K0-0500 INPUT:12V===2.5A
EMV No.12445 0910 400 21 BCT
MADE IN *****

IFM ID
EMVCo Approval No.   Production Country

⚠ LABEL DETAIL
(FREE)

I/F CONNECTOR
S9B-PH-SM4/JST

DC POWER SUPPLY CONNECTOR
S6B-PH-SM4/JST

ICT3K7-3R6940 R-9020001 *
IFM0K0-0500 INPUT:12V===2.5A
EMV No.12445 0910 400 21 BCT
MADE IN *****

⚠ View A

3-M3 (BACK SIDE)
DEPTH 3

R1.8

4-R1

Magnetic Head
ISO Track#1, #2 and #3

(SHIELDING COVER)

(FLAT CABLE)
43.5MAX
43.5±1.5

11.6   40   83
17.5   143.8
5

2.5   3   97   89   84   65   (54.4)   (5.5)   38   8.5   2.5   3
5   21.5   101
17.5   138
4
138

3.6   10   74   17.6   65   9   3.6   10   24.2
R1.8
6

φ14   φ15   (11.6)   (1.1)   (2)   1.6   (18)
27.4   4   5.6   35   22

149
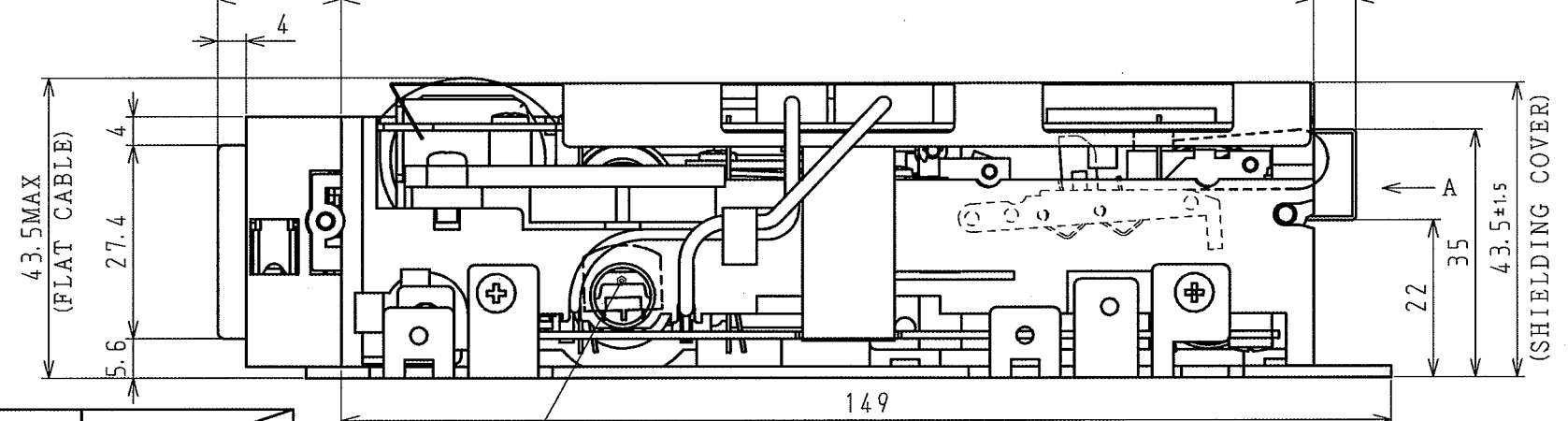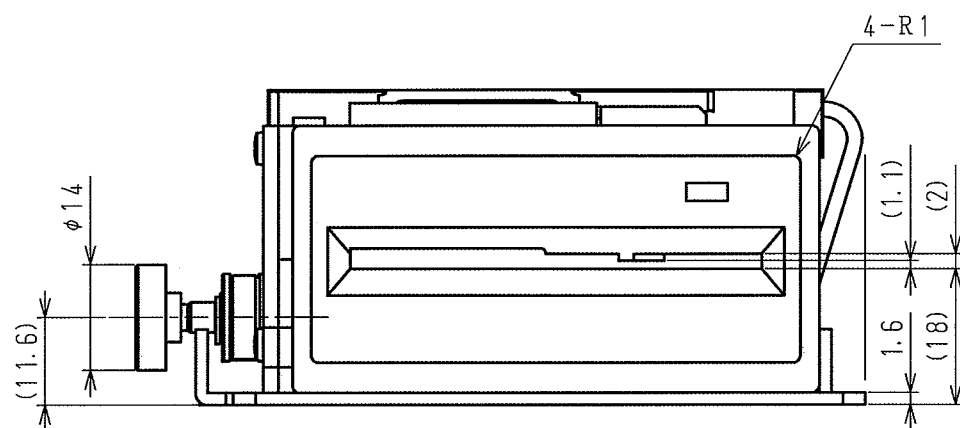
MATERIAL
SURFACE TEXTURE
HEAT TREATMENT
SURFACE TREATMENT

ICT3K7-3R6940
TYPE
UNLESS OTHERWISE NOTED, C=
No. PER UNIT   No. OF REQUIRED   SYM

6   Standard·Spec. Change 仕様変更   EB-14010-01   Oct. 21.2010   T.Watanabe   T.Tatai
No. OF REV.   DESCRIPTION   EC. No.   DATE   DESIGN   APPR

REF. DRAWING   PROJECT NO.   TITLE
OUTSIDE DRAWING

PROJECTION   UNIT   SCALE   TOLERANCE
mm   1:1   ±1

SECTION   CRD
APPR T. Tatai Apr. 08. 2009   CADCHK
DESIGN T. Watanabe Apr. 07. 2009   CHECKD K. Ishikawa Apr. 08. 2009

DRAWING No.
T08A866A01

ID No.
01/01

RELEASE OF DRAWING   SHEET

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