

# SPEC

Spec No.	TQ3C-8EAS0-E1DAR05-00
Date	January 21, 2008

## **TYPE : KG030AALAA-G00**

< 3.0 inch transfective monochrome with LED backlight STN  
MPU Interface >

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KYOCERA CORPORATION  
KAGOSHIMA HAYATO PLANT  
LCD DIVISION

This specification is subject to change without notice.  
Consult Kyocera before ordering.

Original Issue Date	Designed by: Engineering dept.			Confirmed by: QA dept.	
	Prepared	Checked	Approved	Checked	Approved
January 21, 2008	<i>D. Ajisaka</i>	<i>Y. Ichimaru</i>	<i>Y. Matsumoto</i>	<i>J. Sakaguchi</i>	<i>T. Ito</i>

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## **Warning**

1. This Kyocera LCD module has been specifically designed for use only in electronic devices and industrial machines in the area of audio control, office automation, industrial control home appliances, etc. The module should not be used in applications where the highest level of safety and reliability are required and module failure or malfunction of such module results in physical harm or loss of life, as well as enormous damage or loss. Such fields of applications include, without limitation, medical, aerospace, communications infrastructure, atomic energy control. Kyocera expressly disclaims any and all liability resulting in any way to the use of the module in such applications.
  
2. Customer agrees to indemnify, defend and hold Kyocera harmless from and against any and all actions, claims, damages, liabilities, awards, costs, and expenses, including legal expenses, resulting from or arising out of Customer's use, or sale for use, or Kyocera modules in applications.

## **Caution**

1. Kyocera shall have the right, which Customer hereby acknowledges, to immediately scrap or destroy tooling for Kyocera modules for which no Purchase Orders have been received from the Customer in a two-year period.

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**Revision record**

Date		Designed by : Engineering dept.			Confirmed by : QA dept.	
		Prepared	Checked	Approved	Checked	Approved
Rev.No.	Date	Page	Descriptions			

## 1. Application

This document defines the specification of KG030AALAA-G00. (RoHS Compliant)

## 2. Construction and outline

LCD	: Transflective monochrome dot matrix type STN
Duty ratio	: 1/160 duty
Backlight system	: LED
Polarizer	: Glare treatment
Oscillator	: Internal oscillator
MPU interface type	: 80 series 8-bit parallel

## 3. Mechanical specifications

Item	Specification	Unit
Outline dimensions	77.6 (W)× 58.6 (H) × 8.2 (D)(Projection not included.)	mm
Active area	65.01 (W) × 40.785 (H) (7.67cm / 3.0 inch (Diagonal))	mm
Effective viewing area	71 (W) × 46 (H)	mm
Dot format	255 (W) × 160 (H)	dot
Dot size	0.24 (W) × 0.24 (H)	mm
Dot pitch	0.255 (W) × 0.255 (H)	mm
Base color *1	Normally white	-
Viewing direction	12 O'clock	-
Mass	29	g

\*1 Due to the characteristics of the LCD material, the color varies with environmental temperature.

## 4. Absolute maximum ratings

### 4-1. Electrical absolute maximum ratings

Item	Symbol	Min.	Max.	Unit
Supply voltage for logic	V <sub>DD</sub>	-0.5	4.0	V
Supply voltage for LCD driving	*1*2	(0.3)	18.0	V
Input signal voltage *3	V <sub>IN</sub>	-0.5	V <sub>DD</sub> +0.5	V
LED forward current *4	IF	-	27	mA
Reversed voltage *4	VR	-	5	V

\*1 V<sub>0</sub>, V<sub>1</sub>, V<sub>2</sub>, V<sub>3</sub>, V<sub>4</sub>

\*2  $V_0 \geq V_1 \geq V_2 \geq V_3 \geq V_4 \geq (0.3V)$

\*3 Input signal : A0, D0~D7, RD, WR, XCS, RST

\*4 For "AN-CA"

### 4-2. Environmental absolute maximum ratings

Item	Symbol	Min.	Max.	Unit
Operating temperature *1	T <sub>OP</sub>	0	50	°C
Storage temperature *2	T <sub>STO</sub>	-10	60	°C
Operating humidity *3,*4	H <sub>OP</sub>	0	*5	%RH
Storage humidity *3,*4	H <sub>STO</sub>	0	*5	%RH
Vibration	-	*6	*6	-
Shock	-	*7	*7	-

\*1 Operating temperature means a temperature which operation shall be guaranteed. Since display performance is evaluated at 25°C, another temperature range should be confirmed.

\*2 Temp. = -10°C < 48h, Temp. = 60°C < 168h

Store LCD panels at normal temperature/humidity. Keep them free from vibration and shock. An LCD panel that is kept at a low or a high temperature for a long time can be defective due to other conditions, even if the low or high temperature satisfies the standard.

(Please refer to "Precautions for use" for details.)

\*3 Non-condensing

\*4 No question on rejection due to statistic electricity especially in condition of lower humidity.

\*5 Temp. ≤ 40°C, 85%RH Max. (The duration shall be less than 240h.)

Temp. > 40°C, Absolute humidity shall be less than 85%RH at 40°C.

(The duration shall be less than 240h.)

\*6

Frequency	10~55 Hz	Acceleration value (0.3~9 m/s <sup>2</sup> )
Vibration width	0.15mm	
Interval	10-55-10 Hz	1 minutes

2 hours in each direction X, Y, Z (6 hours total)

EIAJ ED-2531

\*7 Acceleration: 490 m/s<sup>2</sup>, Pulse width: 11 ms

3 times in each direction: ±X, ±Y, ±Z

EIAJ ED-2531

## 5. Electrical characteristics

$V_{DD} = +3.0V \pm 0.3V$ , Temp. = 0~50°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage for logic	$V_{DD} - V_{SS}$	—	2.7	3.0	3.3	V
Supply voltage for analog	$V_{DD1} - V_{SS}$	—	2.7	3.0	3.3	V
Input signal voltage (A0, D0~D7, RD, WR, XCS, RST)	$V_{IN}$	"High" level	$0.7V_{DD}$	—	$V_{DD}$	V
		"Low" level	$V_{SS}$	—	$0.3V_{DD}$	V
Output current (D0~D7)	$I_{out}$	$V_{out}=2.2V$	0.5	—	—	mA
		$V_{out}=0.5V$	—	—	-0.5	mA
Supply voltage for LCD driving *1	$V_0 - V_{SS} = V_{OP}$	0°C	14.9	15.4	15.9	V
		25°C	14.5	15.0	15.5	V
		50°C	14.0	14.5	15.0	V
Frame frequency *2	$f_{FRM}$	Clock frequency $F_{osc}=12.7kHz$	—	78	—	Hz
Power consumption for logic	$I_{DD}$	*3 *4	—	(TBD)	(TBD)	mA
Power consumption for analog	$I_{DD1}$		—	(TBD)	(TBD)	mA
Power consumption for LCD driving	$I_{EE}$		—	(TBD)	(TBD)	mA
Power consumption	$P_{DISP}$		—	(TBD)	(TBD)	mW

\*1 Maximum contrast ratio is obtained by adjusting the LCD supply voltage ( $V_0 - V_{SS} = V_{OP}$ ) for driving the LCD.

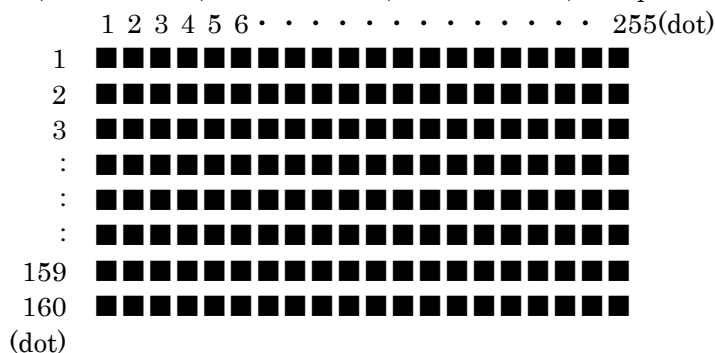
\*2 In consideration of display quality, it is recommended that frame frequency be set in 78Hz. When you have to use higher frame and clock frequencies, confirm the LCD's performance and quality prior to finalizing the frequency value. Generally, as frame and clock frequencies become higher current consumption increases and display quality will degrade. Also, if it is lower, flicker tends to be caused.

For flicker and polarization (image persistence), adjustment of inversion is effective. (Please refer to "Command [CAH] in Driver-IC ST7529 specifications")

\*3 Include recommended circuit. Please refer to "Recommended additional circuit of supply voltage for LCD driving" for details.

\*4 Display pattern

$V_{DD} = 3.0V$ ,  $V_{DD1} = 3.0V$ ,  $V_{EE} = (TBD)V$ ,  $f_{FRM} = (78)Hz$ , Temp. = 25°C



## 6. Optical characteristics

### 6-1. Reflective mode

Measuring spot =  $\phi$  6.0mm, Temp. = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	
Response time	Rise	$\tau_r$	$\theta = \phi = 0^\circ$	-	310	410	ms
	Down	$\tau_d$	$\theta = \phi = 0^\circ$	-	160	260	ms
Contrast ratio	CR	$\theta = \phi = 0^\circ$	10	21	-	-	
Reflectance	$\rho$	-	4.5	9.2	-	%	

Optimum contrast is obtained by adjusting the LCD driving voltage ( $V_{op}$ ) while at the viewing angle of  $\theta = \phi = 0^\circ$ .

### 6-2. Transmissive mode

Measuring spot =  $\phi$  6.0mm, Temp. = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	
Response time	Rise	$\tau_r$	$\theta = \phi = 0^\circ$	-	310	410	ms
	Down	$\tau_d$	$\theta = \phi = 0^\circ$	-	160	260	ms
Viewing angle range	$\theta_{UPPER}$	$CR \geq 2$	-	20	-	deg.	
	$\theta_{LOWER}$		-	30	-		
	$\phi_{LEFT}$		-	30	-	deg.	
	$\phi_{RIGHT}$		-	20	-		
Contrast ratio	CR	$\theta = \phi = 0^\circ$	2.0	4.0	-	-	
Brightness	L	IF=10mA/Line	77	110	-	cd/m <sup>2</sup>	
Chromaticity coordinates	White	x	$\theta = \phi = 0^\circ$	0.26	0.31	0.36	-
		y		0.27	0.32	0.37	
	Black	x	$\theta = \phi = 0^\circ$	0.24	0.29	0.34	
		y		0.22	0.27	0.32	

Optimum contrast is obtained by adjusting the LCD driving voltage ( $V_{op}$ ) while at the viewing angle of  $\theta = \phi = 0^\circ$ .

### 6-3. Definition of reflectance

$$\rho \text{ (Reflectance)} = \frac{\text{Measured reflectance brightness}}{\text{Reflectance brightness against standard white board}} \times 100[\%]$$

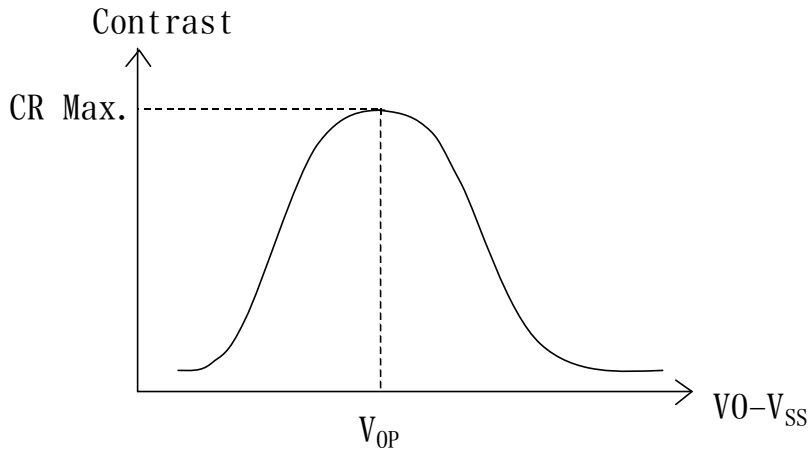
### 6-4. Definition of contrast ratio (Reflective mode)

$$CR(\text{Contrast ratio}) = \frac{\text{Reflectance at all pixel "white"}}{\text{Reflectance at all pixel "black"}} \times 100[\%]$$

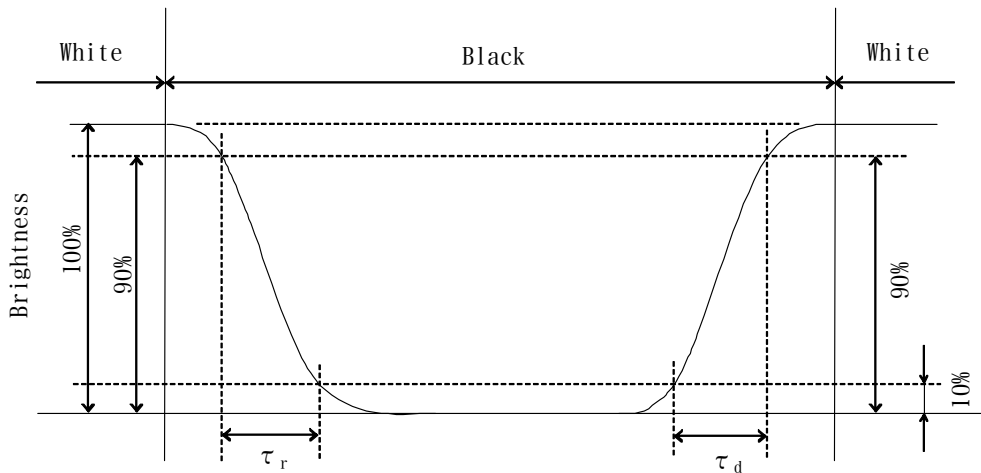
6-5. Definition of contrast ratio (Transmissive mode)

$$CR(\text{Contrast ratio}) = \frac{\text{Brightness at all pixel "white"}}{\text{Brightness at all pixel "black"}} \times 100[\%]$$

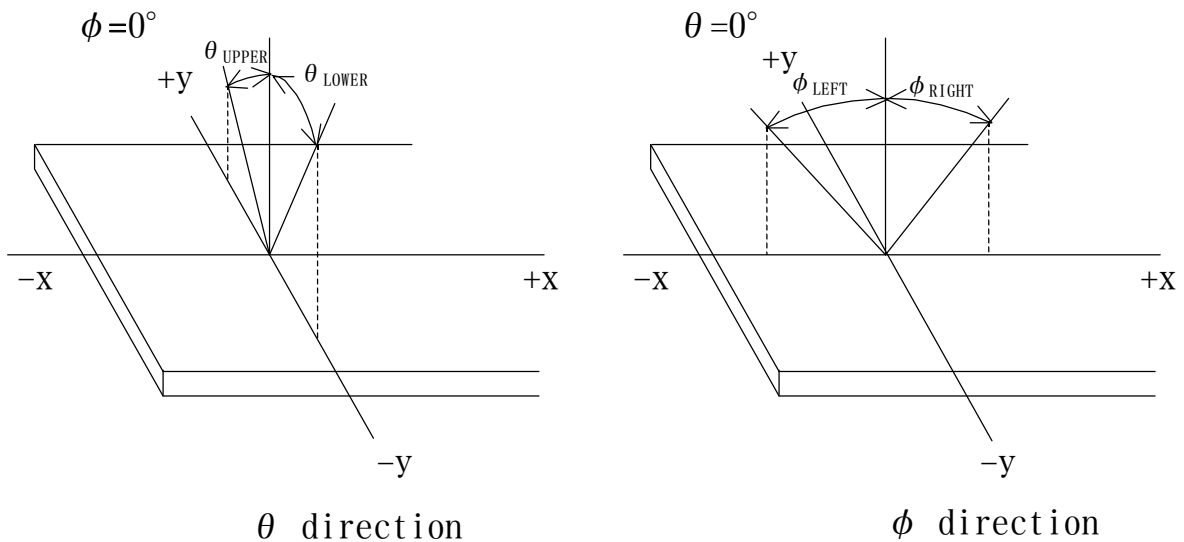
6-6. Definition of  $V_{OP}$



6-7. Definition of response time

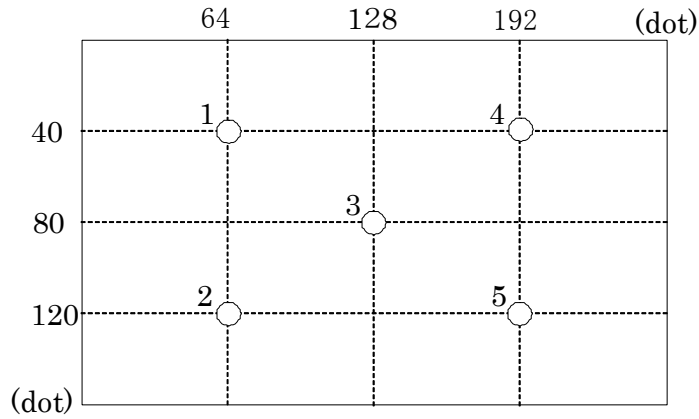


6-8. Definition of viewing angle



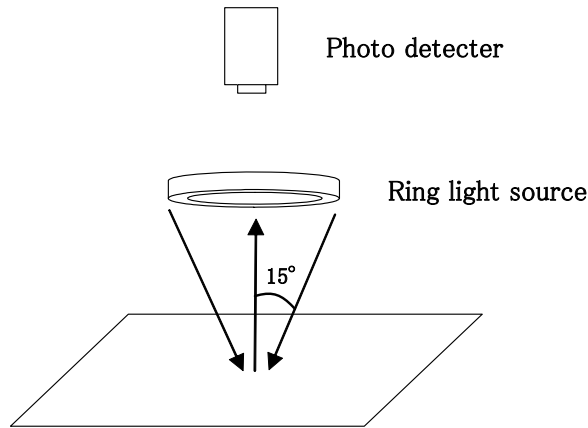


6-9. Brightness measuring points



- 1) The brightness is measuring by white brightness at center of display screen (3).
- 2) Measured 30 minutes after the LED is powered on. (Ambient temp. = 25°C)
- 3) Backlight : IF=10mA / 1 LED line

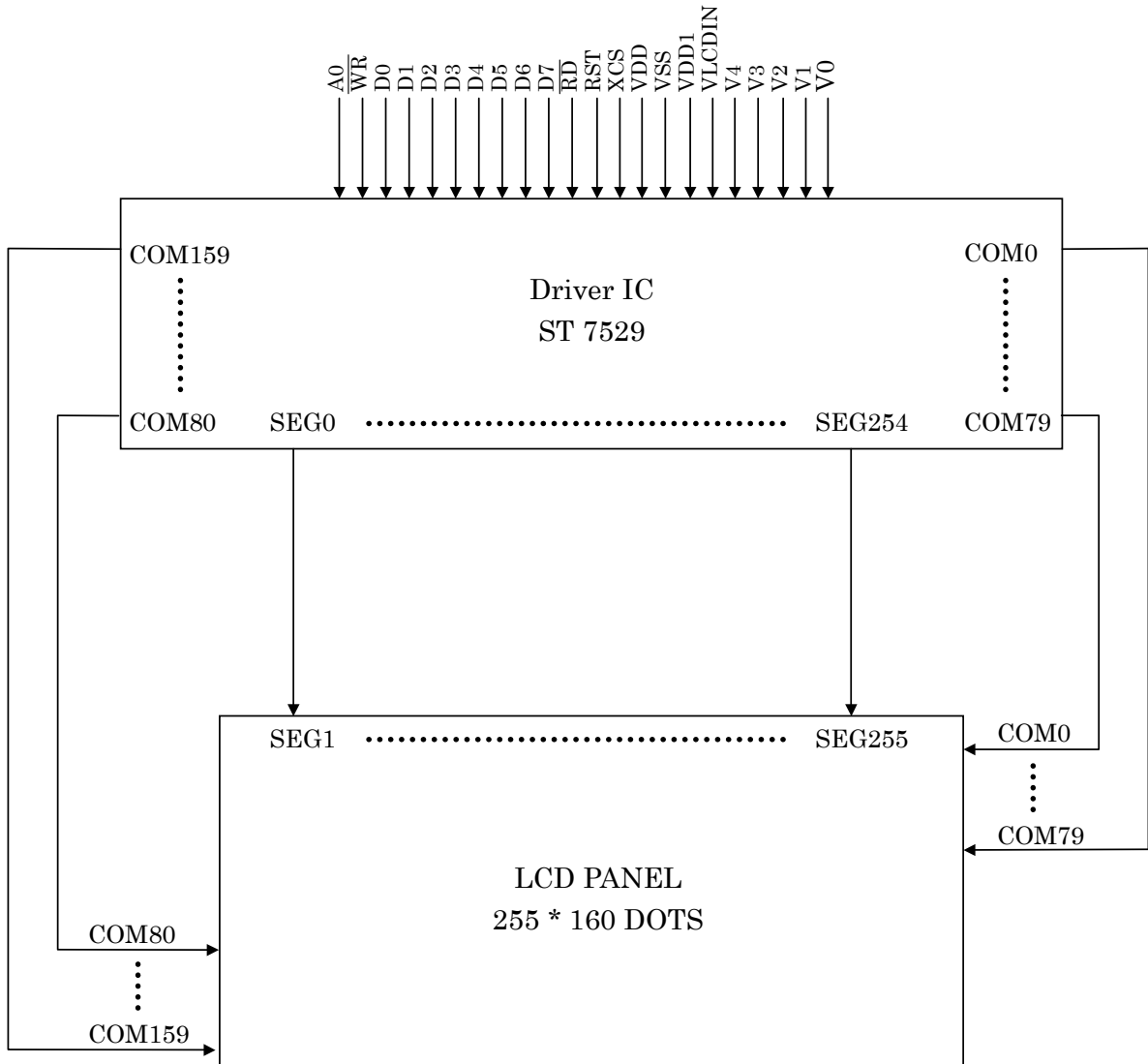
6-10. Measurement method of reflectance



Measurement : 52002 (YOKOGAWA)

## 7. Circuit block diagram

### 7-1. Block diagram





## 8. Interface signals

### 8-1. Pin assignment of LCD panel

Pin No.	Symbol	Description	I/O
1	V0	Supply voltage for LCD driving	—
2	V1		
3	V2		
4	V3		
5	V4		
6	NC	No Connect	—
7	V <sub>LCDIN</sub>	Connect the resistance(1MΩ) between V <sub>DD1</sub>	—
8	NC	No Connect	—
9	NC		
10	NC		
11	NC		
12	NC		
13	NC		
14	NC		
15	NC		
16	NC		
17	NC		
18	V <sub>DD1</sub>	Power supply for analog circuit	—
19	V <sub>SS</sub>	GND	—
20	V <sub>DD</sub>	Power supply for logic circuit	—
21	XCS	Chip selection signal	I
22	RST	Reset signal	I
23	RD	Read enable clock	I
24	D7	8 bit parallel data	I/O
25	D6		
26	D5		
27	D4		
28	D3		
29	D2		
30	D1		
31	D0		
32	WR	Write enable clock	I
33	A0	Resister data/Display data selection signal	I
34	NC	No Connect	—

LCD connector : 0.5mm pitch FPC  
 Recommended matching FFC or FPC : 51296-3494 (Molex)

8-2. Pin assignment of LED

No.	Symbol	Description
1	CA	Cathode
2	AN	Anode

LCD side connector : ZHR-2 (JST)

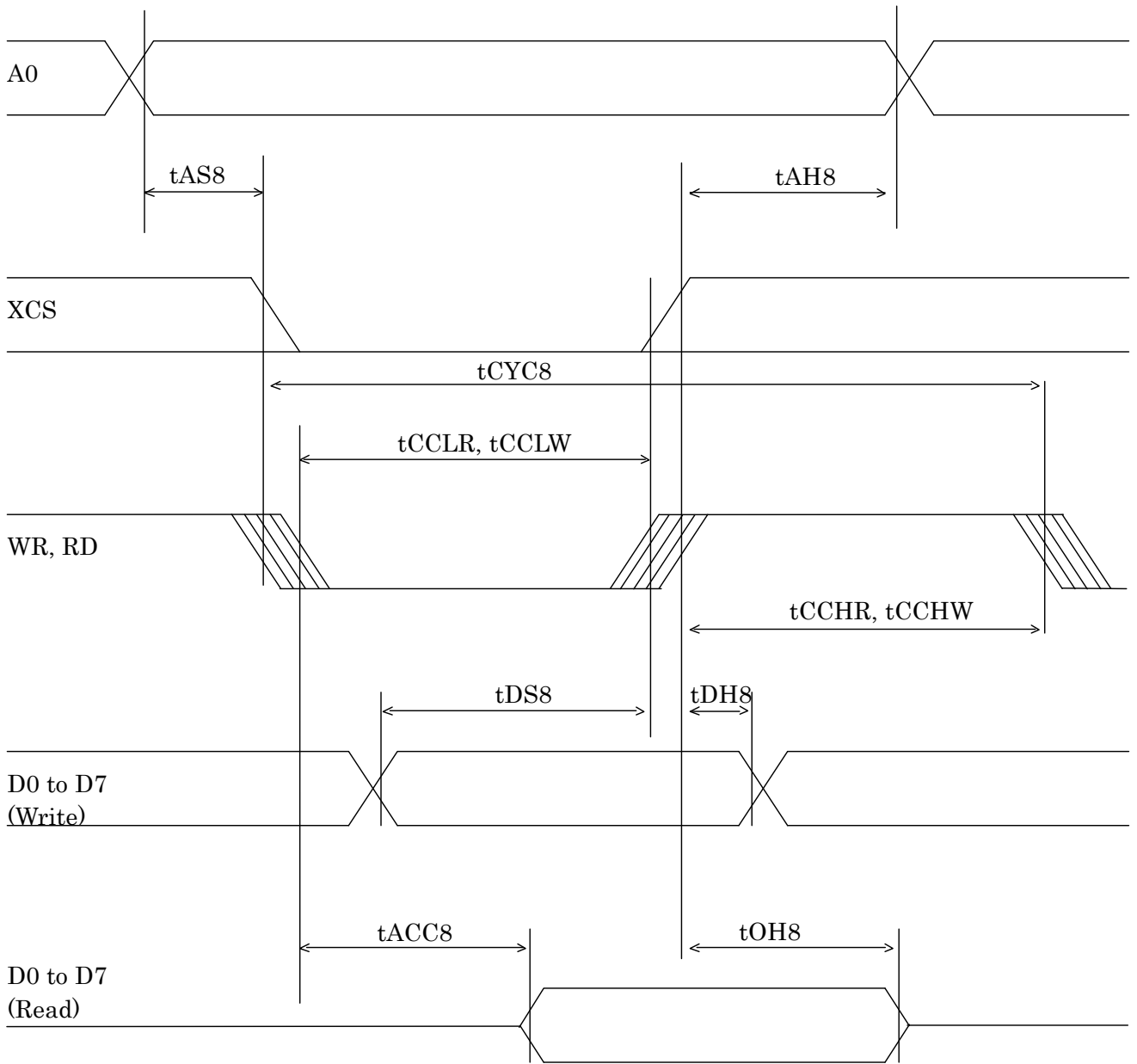
Recommended matching connector

: B2B-ZR-SM4-TF(LF)(SN) (JST)

: S2B-ZR-SM4A-TF(LF)(SN) (JST)

## 9. Interface timing chart

### 9-1. Interface timing (8080SERIES MPU)



9-1-1. Switching characteristics ( $V_{DD} = 3.3V$ )

Input characteristics :  $V_{DD} = +3.3V$ , Temp. =  $0\sim 50^{\circ}C$

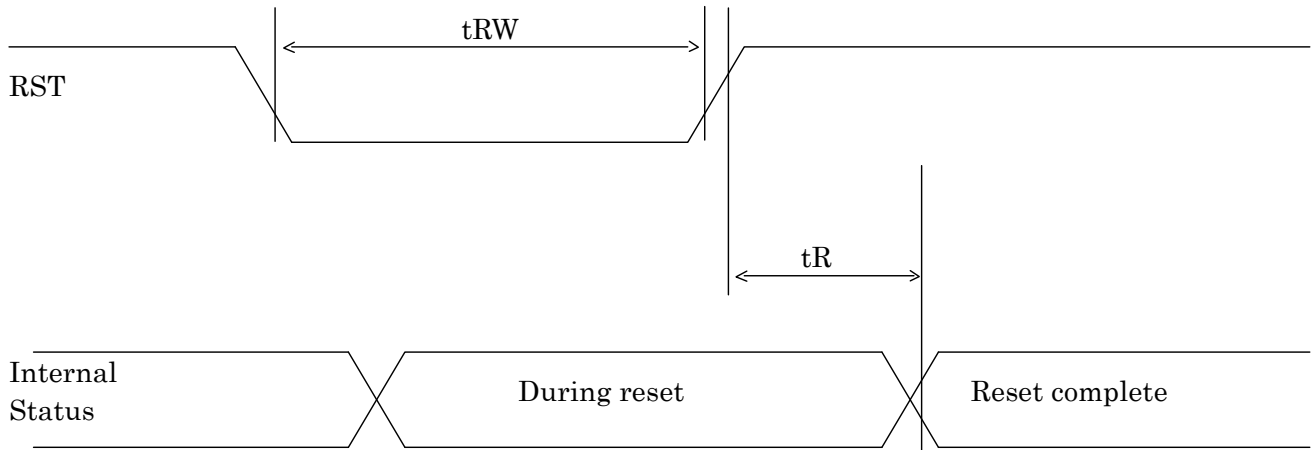
ITEM	Signal	Symbol	Condition	Min.	Max.	Unit
Address hold time	A0	tAH8	-	20	-	ns
Address setup time		tAS8	-	20	-	ns
System cycle time		tCYC8	-	200	-	ns
Enable L pulse width (Write)	WR	tCCLW	-	100	-	ns
Enable H pulse width (Write)		tCCHW	-	100	-	ns
Enable L pulse width (Read)	RD	tCCLR	-	100	-	ns
Enable H pulse width (Read)		tCCHR	-	100	-	ns
Write data setup time	D0~D7	tDS8	-	150	-	ns
Write address hold time		tDH8	-	20	-	ns
Read access time		tACC8	CL=100pF	-	40	ns
Read output disable time		tOH8	CL=100pF	-	30	ns

9-1-2. Switching characteristics ( $V_{DD} = 2.7V$ )

Input characteristics :  $V_{DD} = +2.7V$ , Temp. =  $0\sim 50^{\circ}C$

ITEM	Signal	Symbol	Condition	Min.	Max.	Unit
Address hold time	A0	tAH8	-	20	-	ns
Address setup time		tAS8	-	30	-	ns
System cycle time		tCYC8	-	250	-	ns
Enable L pulse width (Write)	WR	tCCLW	-	150	-	ns
Enable H pulse width (Write)		tCCHW	-	100	-	ns
Enable L pulse width (Read)	RD	tCCLR	-	150	-	ns
Enable H pulse width (Read)		tCCHR	-	100	-	ns
Write data setup time	D0~D7	tDS8	-	200	-	ns
Write address hold time		tDH8	-	20	-	ns
Read access time		tACC8	CL=100pF	-	40	ns
Read output disable time		tOH8	CL=100pF	-	30	ns

9-2. Reset timing



9-2-1. Switching characteristics ( $V_{DD} = 3.3V$ )

Input characteristics :  $V_{DD} = +3.3V$ , Temp. =  $0 \sim 50^{\circ}C$

ITEM	Signal	Symbol	Condition	Min.	Typ.	Max.	Unit
Reset time	-	$t_R$	-	-	-	1	$\mu s$
Reset L pulse width	RST	$t_{RW}$	-	1	-	-	$\mu s$

9-2-2. Switching characteristics ( $V_{DD} = 2.7V$ )

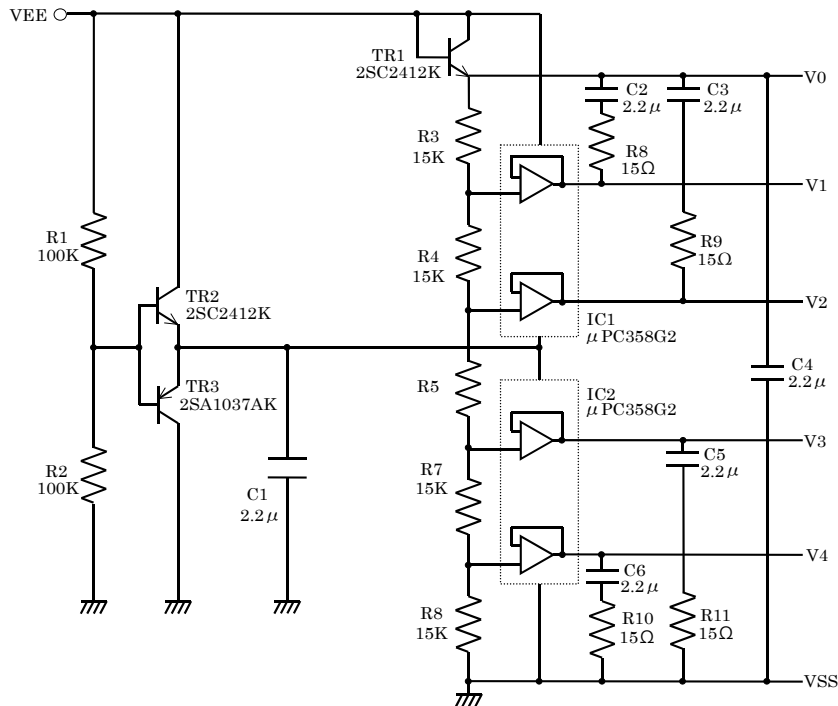
Input characteristics :  $V_{DD} = +2.7V$ , Temp. =  $0 \sim 50^{\circ}C$

ITEM	Signal	Symbol	Condition	Min.	Typ.	Max.	Unit
Reset time	-	$t_R$	-	-	-	1.5	$\mu s$
Reset L pulse width	RST	$t_{RW}$	-	1.5	-	-	$\mu s$



## 10. Recommended additional circuit of supply voltage for LCD driving

### 10-1. Circuit diagram



These value above are theoretically calculated. Fine tuning might be required in some cases. For fine tuning value of the resistor shall be adjusted to conform with the following equation.

$$|V0-V1| = |V1-V2| = |V3-V4| = |V4-V_{SS}|$$

### 10-2. Parts list

#### ①SEMI CONDUCTOR

Symbol No.	Type	Maker Name	note
IC1	μPC358G2	NEC	
IC2	μPC358G2	NEC	
TR1	2SC2412K	ROHM	
TR2	2SC2412K	ROHM	
TR3	2SA1037AK	ROHM	

#### ②RESISTOR

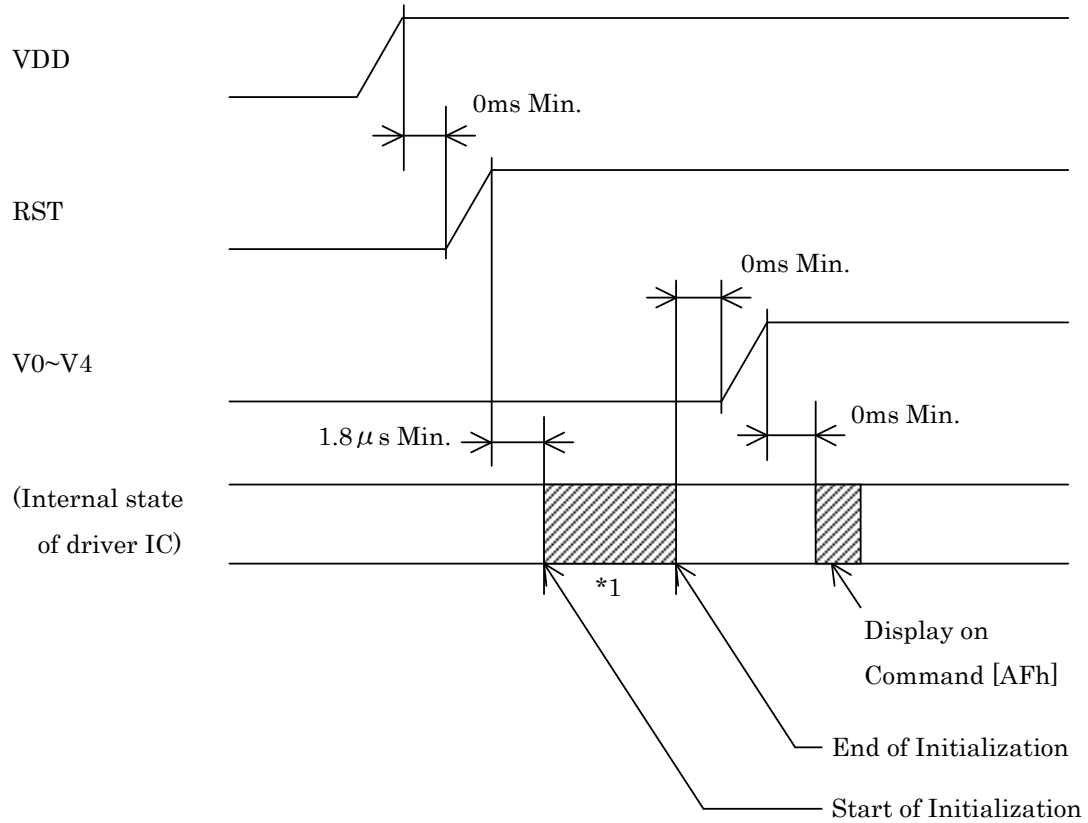
Symbol No.	Type	Maker Name	note
R1	100K/1608/J	CR10-104J (KYOCERA)	
R2	100K/1608/J	CR10-104J (KYOCERA)	
R3	15K/1608/D	RR0816R-153-D (SUSUMU)	
R4	15K/1608/D	RR0816R-153-D (SUSUMU)	
R5	120K/1608/F	RK73H1J-1203F (KOA)	
	15K/1608/F	RK73H1J-1502F (KOA)	
R6	15K/1608/D	RR0816R-153-D (SUSUMU)	
R7	15K/1608/D	RR0816R-153-D (SUSUMU)	
R8	15Ω/1608/J	CR10-150J (KYOCERA)	
R9	15Ω/1608/J	CR10-150J (KYOCERA)	
R10	15Ω/1608/J	CR10-150J (KYOCERA)	
R11	15Ω/1608/J	CR10-150J (KYOCERA)	

#### ③CAPACITOR

Symbol No.	Type	Maker Name	note
C1	B/2.2μF/25V/2125/M	TMK212BJ225MG	Ceramic Capacitor
C2	B/2.2μF/25V/2125/M	TMK212BJ225MG	Ceramic Capacitor
C3	B/2.2μF/25V/2125/M	TMK212BJ225MG	Ceramic Capacitor
C4	B/2.2μF/25V/2125/M	TMK212BJ225MG	Ceramic Capacitor
C5	B/2.2μF/25V/2125/M	TMK212BJ225MG	Ceramic Capacitor
C6	B/2.2μF/25V/2125/M	TMK212BJ225MG	Ceramic Capacitor

## 11. Supply voltage sequence condition

### 11-1. Power on sequence

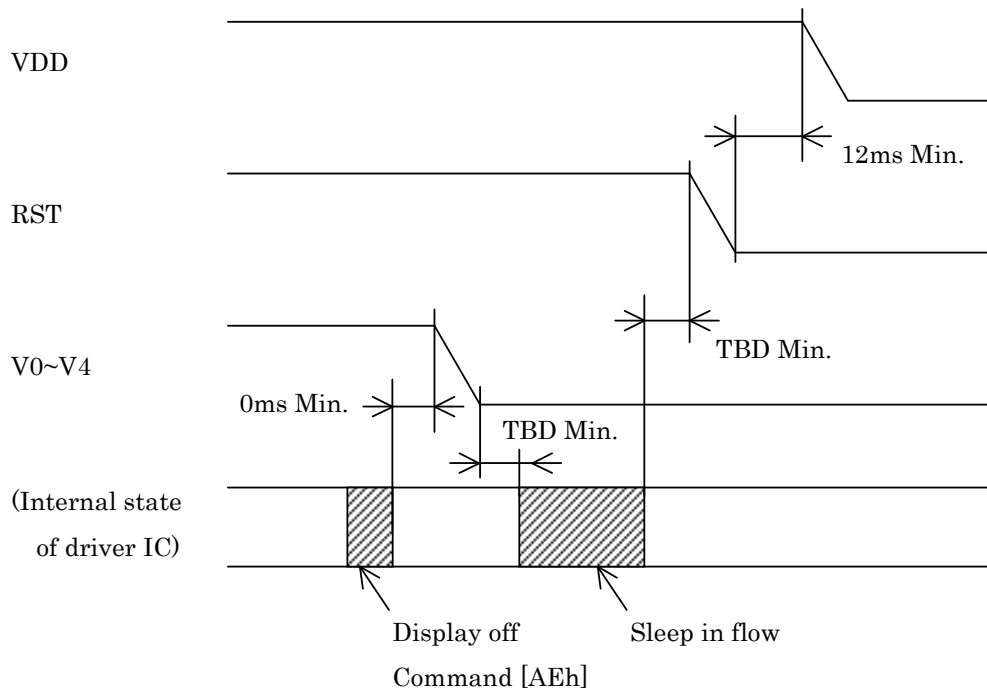


\*1 Please refer to "Example of initial cord" for details.

## Example of initial cord

Initial code	Description
Write( COMMAND, 0x0030 )	Ext=0
Write( COMMAND, 0x0094 )	Sleep out
Write( COMMAND, 0x00D1 )	Internal oscillation on
Write( COMMAND, 0x0020 )	Power control set
Write( DATA, 0x0000 )	– Internal power supply circuit on/off
Delay( 1ms )	
Write( COMMAND, 0x00CA )	Display control set
Write( DATA, 0x0000 )	– CL dividing ratio
Write( DATA, 0x0027 )	– Drive duty
Write( DATA, 0x0000 )	– Inversion
Write( COMMAND, 0x00A6 )	Normal display
Write( COMMAND, 0x00BB )	Common scan direction set
Write( DATA, 0x0002 )	– Common scan direction
Write( COMMAND, 0x00BC )	Data scan direction set
Write( DATA, 0x0000 )	– Normal/Inverse display of address scan direction
Write( DATA, 0x0000 )	– P1,P2,P3 arrangement
Write( DATA, 0x0001 )	– Gray-scale setup
Write( COMMAND, 0x0075 )	Line address set
Write( DATA, 0x0000 )	– Start line
Write( DATA, 0x009F )	– End line
Write( COMMAND, 0x0015 )	Column address set
Write( DATA, 0x0000 )	– Start column
Write( DATA, 0x0054 )	– End column
Write( COMMAND, 0x0031 )	Ext=1
Write( COMMAND, 0x0034 )	Software initial
Write( COMMAND, 0x0030 )	Ext=0

11-2. Power off sequence



## 12. LED Backlight characteristics

### LED ratings

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward current *1	IF	-	10	-	mA	Ta=0~50°C
Forward voltage *1	VF	-	9.1	10.0	V	IF=10mA, Ta=0°C
		-	8.9	9.7	V	IF=10mA, Ta=25°C
		-	8.7	9.5	V	IF=10mA, Ta=50°C
Operating life time *2	T	-	(10,000)*3	-	h	IF=10mA, Ta=25°C

\*1 For Anode-Cathode

\*2 When brightness decrease 50% of initial brightness.

\*3 Life time is estimated data.

\* An input current below 5.0mA may reduce the brightness uniformity of the LED backlight. This is because the amount of light from each LED chip is different. Therefore, please evaluate carefully before finalizing the input current.

### 13. Lot number identification

The lot number shall be indicated on the back of the backlight case of each LCD.

KG030AALAA-G00 - □□ - □□ - □ MADE IN □□□□□

↓↓   ↓   ↓   ↓   ↓  
 1 2   3   4   5

No1. - No5. above indicate

1. Year code
2. Month code
3. Date
4. Version Number
5. Country of origin (Japan or China)

Year	2008	2009	2010	2011	2012	2013
Code	8	9	0	1	2	3

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.
Code	1	2	3	4	5	6

Month	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Code	7	8	9	X	Y	Z

### 14. Warranty

#### 14-1. Incoming inspection

Please inspect the LCD within one month after your receipt.

#### 14-2. Production warranty

Kyocera warrants its LCD's for a period of 12 months from the ship date. Kyocera shall, by mutual agreement, replace or re-work defective LCD's that are shown to be Kyocera's responsibility.

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## 15. Precautions for use

### 15-1. Installation of the LCD

- 1) A transparent protection plate shall be added to protect the LCD and its polarizer.
- 2) The LCD shall be installed so that there is no pressure on the LSI chips.
- 3) The LCD shall be installed flat, without twisting or bending.
- 4) Please design the housing window so that its edges are between the active area and the effective area of the LCD screen.
- 5) A transparent protection sheet is attached to the polarizer. Please remove the protection film slowly before use, paying attention to static electricity.

### 15-2. Static electricity

- 1) Since CMOS ICs are mounted directly onto the LCD glass, protection from static electricity is required.
- 2) Workers should use body grounding. Operator should wear ground straps.

### 15-3. LCD operation

- 1) The LCD shall be operated within the limits specified. Operation at values outside of these limits may shorten life, and/or harm display images.
- 2) Adjust the "Supply voltage for LCD driving ( $V_0-V_{SS}$ )" to obtain optimum viewing angle and contrast ratio.

### 15-4. Storage

- 1) The LCD shall be stored within the temperature and humidity limits specified.  
Store in a dark area, and protect the LCD from direct sunlight or fluorescent light.
- 2) Always store the LCD so that it is free from external pressure onto it.

### 15-5. Usage

- 1) **DO NOT** store in a high humidity environment for extended periods. Polarizer degradation bubbles, and/or peeling off of the polarizer may result.
- 2) The front polarizer is easily scratched or damaged. Prevent touching it with any hard material, and from being pushed or rubbed.
- 3) The LCD screen may be cleaned by wiping the screen surface with a soft cloth or cotton pad using a little Ethanol.
- 4) Water may cause damage or discoloration of the polarizer. Clean condensation or moisture from any source immediately.
- 5) Always keep the LCD free from condensation during testing. Condensation may permanently spot or stain the polarizer.
- 6) Do not pull the LED lead wires and do not bend the root of the wires. Housing should be designed to protect LED lead wires from external stress.
- 7) Do not disassemble LCD module because it will result in damage.
- 8) This Kyocera LCD module has been specifically designed for use in general electronic devices, but not for use in a special environment such as usage in an active gas. Hence, when the LCD is supposed to be used in a special environment, evaluate the LCD thoroughly beforehand and do not expose the LCD to chemicals such as an active gas.
- 9) Please do not use solid-base image pattern for long hours because a temporary afterimage may appear. We recommend using screen saver etc. in cases where a solid-base image pattern must be used.
- 10) Liquid crystal may leak when the module is broken. Be careful not to let the fluid go into your eyes and mouth. In the case the fluid touches your body; rinse it off right away with water and soap.

## 16. Reliability test data

Test item	Test condition	Test time	Judgement
High temp. atmosphere	60°C	240h	Display function : No defect Display quality : No defect Current consumption : No defect
Low temp. atmosphere	-10°C	240h	Display function : No defect Display quality : No defect Current consumption : No defect
High temp. humidity atmosphere	40°C 90% RH	240h	Display function : No defect Display quality : No defect Current consumption : No defect
Temp. cycle	-10°C 0.5h R.T. 0.5h 60°C 0.5h	10cycles	Display function : No defect Display quality : No defect Current consumption : No defect
High temp. operation	50°C	500h	Display function : No defect Display quality : No defect Current consumption : No defect

\* Each test item uses a test LCD only once. The tested LCD is not used in any other tests.

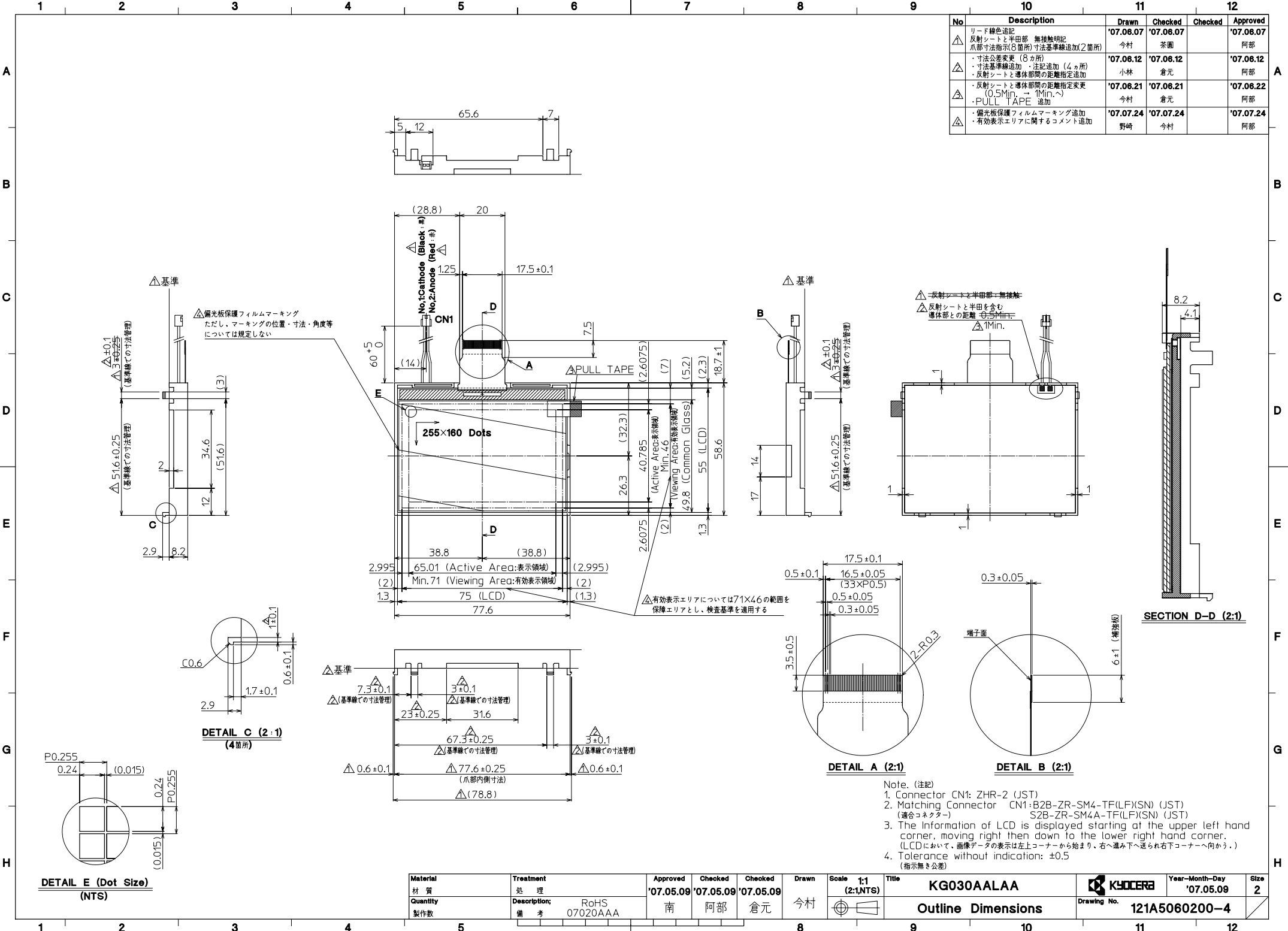
\* The LCD is tested in circumstances in which there is no condensation.

\* The reliability test is not an out-going inspection.

\* The result of the reliability test is for your reference purpose only.

The reliability test is conducted only to examine the LCD's capability.





Note. (注記)

- Connector CN1: ZHR-2 (JST)
- Matching Connector CN1: B2B-ZR-SM4-TF(LF)(SN) (JST)  
(適合コネクタ) S2B-ZR-SM4-TF(LF)(SN) (JST)
- The Information of LCD is displayed starting at the upper left hand corner, moving right then down to the lower right hand corner. (LCDにおいて、画像データの表示は左上コーナーから始まり、右へ進み下へ送られ右下コーナーへ向かう。)
- Tolerance without indication: ±0.5 (指示無き公差)

Material 材質	Treatment 処理	Approved '07.05.09	Checked '07.05.09	Checked '07.05.09	Drawn 今村	Scale 1:1 (2:1,NTS)	Title KG030AALAA	Year-Month-Day '07.05.09	Size 2
Quantity 製作数	Description: 備考	RoHS 07020AAA			南 阿部 倉元		Outline Dimensions	Drawing No. 121A5060200-4	

Spec No.	TQ3C-8EAS0-E2DAR05-00
Date	January 21, 2008

**KYOCERA INSPECTION STANDARD**

**TYPE : KG030AALAA-G00**

KYOCERA CORPORATION  
KAGOSHIMA HAYATO PLANT  
LCD DIVISION

Original Issue Date	Designed by : Engineering dept.			Confirmed by : QA dept.	
	Prepared	Checked	Approved	Checked	Approved
January 21, 2008	<i>D. Ajisaka</i>	<i>7d. Tokumaru</i>	<i>Y. Matsumoto</i>	<i>J. Sakaguchi</i>	<i>To. Aoki</i>

Spec No. TQ3C-8EAS0-E2DAR05-00	Part No. KG030AALAA-G00	Page -
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**Revision record**

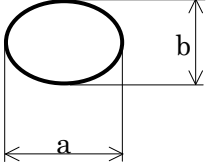
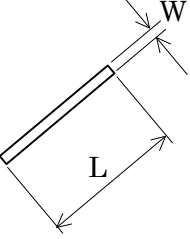
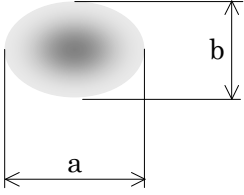
Date		Designed by : Engineering dept.			Confirmed by : QA dept.	
		Prepared	Checked	Approved	Checked	Approved
Rev.No.	Date	Page	Descriptions			

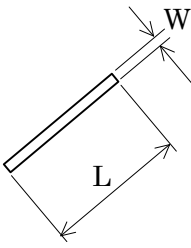
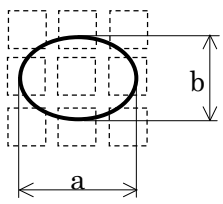
## Visuals specification

### 1) Note

Item	Note
General	<p>1. When defects specified in this Inspection Standards are inspected, operating voltage (V<sub>OP</sub>) shall be set at the level where optimized contrast is available. Display quality is applied up to effective viewing area. (Bi-level INSPECTION)</p> <p>2. This inspection standard about the image quality shall be applied to any defect within the effective viewing area and shall not be applicable to outside of the area.</p> <p>3. Should any defects which are not specified in this standard happen, additional standard shall be determined by mutual agreement between customer and Kyocera.</p> <p>4. Inspection conditions</p> <p style="margin-left: 40px;">Luminance : 500 Lux minimum.</p> <p style="margin-left: 40px;">Inspection distance : 300 mm (from the sample)</p> <p style="margin-left: 40px;">Temperature : 25±5°C</p> <p style="margin-left: 40px;">Direction : right above</p>
Definition of inspection item	<p>Pinhole, Bright spot Black spot, Scratch Foreign particle</p> <p>The color of a small area is different from the remainder. The phenomenon does not change with voltage.</p>
	<p>Contrast variation</p> <p>The color of a small area is different from the remainder. The phenomenon change with voltage.</p>
	<p>Polarizer (Scratch, Bubble, Dent)</p> <p>Scratch, Bubble and Dent in the polarizer which can be observed in on / off state.</p>

## 2)Standard

Inspection item	Judgement standard																						
Pinhole, Bright spot, Black spot, Foreign particle	 $d = (a + b) / 2$ <table border="1" data-bbox="608 573 1417 775"> <thead> <tr> <th>Category</th> <th>Size(mm)</th> <th>Acceptable number</th> </tr> </thead> <tbody> <tr> <td>A</td> <td><math>d \leq 0.2</math></td> <td>Neglected</td> </tr> <tr> <td>B</td> <td><math>0.2 &lt; d \leq 0.3</math></td> <td>5</td> </tr> <tr> <td>C</td> <td><math>0.3 &lt; d \leq 0.5</math></td> <td>3</td> </tr> <tr> <td>D</td> <td><math>0.5 &lt; d</math></td> <td>0</td> </tr> </tbody> </table>	Category	Size(mm)	Acceptable number	A	$d \leq 0.2$	Neglected	B	$0.2 < d \leq 0.3$	5	C	$0.3 < d \leq 0.5$	3	D	$0.5 < d$	0							
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C	$0.3 < d \leq 0.5$	3																					
D	$0.5 < d$	0																					
Scratch, Foreign particle	 <table border="1" data-bbox="608 1151 1417 1473"> <thead> <tr> <th></th> <th>Width (mm)</th> <th>Length (mm)</th> <th>Acceptable number</th> </tr> </thead> <tbody> <tr> <td>A</td> <td><math>W \leq 0.03</math></td> <td>-</td> <td>Neglected</td> </tr> <tr> <td>B</td> <td rowspan="3"><math>0.03 &lt; W \leq 0.10</math></td> <td><math>L \leq 2.0</math></td> <td>Neglected</td> </tr> <tr> <td>C</td> <td><math>2.0 &lt; L \leq 4.0</math></td> <td>3</td> </tr> <tr> <td>D</td> <td><math>4.0 &lt; L</math></td> <td>0</td> </tr> <tr> <td>E</td> <td><math>0.10 &lt; W</math></td> <td>-</td> <td>According to 'Circular'</td> </tr> </tbody> </table>		Width (mm)	Length (mm)	Acceptable number	A	$W \leq 0.03$	-	Neglected	B	$0.03 < W \leq 0.10$	$L \leq 2.0$	Neglected	C	$2.0 < L \leq 4.0$	3	D	$4.0 < L$	0	E	$0.10 < W$	-	According to 'Circular'
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D		$4.0 < L$	0																				
E	$0.10 < W$	-	According to 'Circular'																				
Contrast variation	 $d = (a + b) / 2$ <table border="1" data-bbox="608 1787 1417 1953"> <thead> <tr> <th>Category</th> <th>Size (mm)</th> <th>Acceptable number</th> </tr> </thead> <tbody> <tr> <td>A</td> <td><math>d \leq 0.5</math></td> <td>Neglected</td> </tr> <tr> <td>B</td> <td><math>0.5 &lt; d \leq 0.7</math></td> <td>3</td> </tr> <tr> <td>C</td> <td><math>0.7 &lt; d</math></td> <td>0</td> </tr> </tbody> </table>	Category	Size (mm)	Acceptable number	A	$d \leq 0.5$	Neglected	B	$0.5 < d \leq 0.7$	3	C	$0.7 < d$	0										
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C	$0.7 < d$	0																					

Inspection item	Judgement standard																			
Polarizer (Scratch, Bubble, Dent)	<p>(1) Scratch</p>  <table border="1" data-bbox="606 728 1417 1019"> <thead> <tr> <th></th> <th>Width (mm)</th> <th>Length (mm)</th> <th>Acceptable No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td><math>W \leq 0.1</math></td> <td>-</td> <td>Neglected</td> </tr> <tr> <td>B</td> <td rowspan="2"><math>0.1 &lt; W \leq 0.3</math></td> <td><math>L \leq 5.0</math></td> <td>Neglected</td> </tr> <tr> <td>C</td> <td><math>5.0 &lt; L</math></td> <td>0</td> </tr> <tr> <td>D</td> <td><math>0.3 &lt; W</math></td> <td>-</td> <td>0</td> </tr> </tbody> </table>		Width (mm)	Length (mm)	Acceptable No.	A	$W \leq 0.1$	-	Neglected	B	$0.1 < W \leq 0.3$	$L \leq 5.0$	Neglected	C	$5.0 < L$	0	D	$0.3 < W$	-	0
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C		$5.0 < L$	0																	
D	$0.3 < W$	-	0																	
<p>(2) Bubble (dent)</p>  $d = (a + b) / 2$ <table border="1" data-bbox="606 1579 1417 1848"> <thead> <tr> <th>Category</th> <th>Size (mm)</th> <th>Acceptable number</th> </tr> </thead> <tbody> <tr> <td>A</td> <td><math>d \leq 0.2</math></td> <td>Neglected</td> </tr> <tr> <td>B</td> <td><math>0.2 &lt; d \leq 0.3</math></td> <td>5</td> </tr> <tr> <td>C</td> <td><math>0.3 &lt; d \leq 0.5</math></td> <td>3</td> </tr> <tr> <td>D</td> <td><math>0.5 &lt; d</math></td> <td>0</td> </tr> </tbody> </table>	Category	Size (mm)	Acceptable number	A	$d \leq 0.2$	Neglected	B	$0.2 < d \leq 0.3$	5	C	$0.3 < d \leq 0.5$	3	D	$0.5 < d$	0					
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