

SPEC. NO.	TQ3C-8EACO-E1FGYP15-00
DATE	April 23, 1999

S P E C

FOR : KICC

TYPE : KCB060VG1CB-A02

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KYOCERA CORPORATION
 KAGOSHIMA HAYATO PLANT
 LCD DIVISION

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

Original	Designed by :Engineering Dept.			Confirmed by :QA Dept.	
Issue Data	Prepared	Checked	Approved	Checked	Approved
April 23 , 1999	<i>S. Kagawa</i>	<i>R. Yama</i>	<i>M. Ishida</i>	<i>S. Hayashi</i>	<i>Y. Yoshida</i>

Revision Record

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

1. Application

This data sheet defines the specification for a (640×3)×480 dot, STN color dot matrix type Liquid Crystal Display with CFL backlight.

2. Construction and Outline

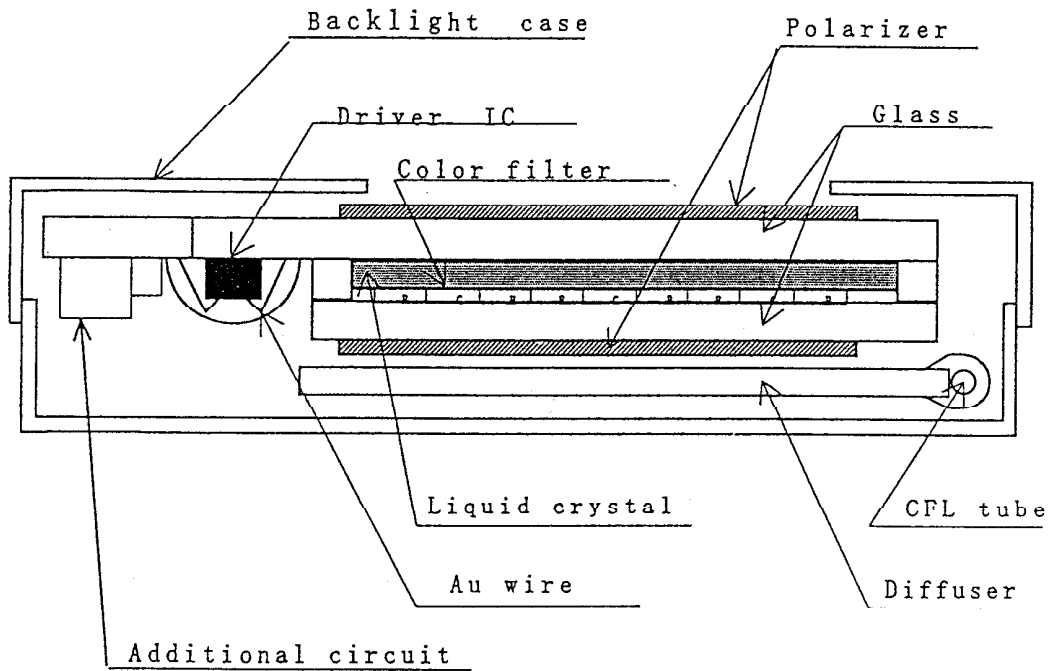
(640×3)×480 dots, COB type LCD with CFL backlight.

Backlight system : Side-edge type CFL (1 tube).

Inverter : Option.
PH-BLC08-K1 (HITACHI MEDIA ELECTRONICS)
or equivalent.

Polarizer : Non-Glare treatment.

Additional circuit : Bias voltage circuit, Randomizing circuit, DC/DC converter.



3. Mechanical Specifications

ITEM	SPECIFICATION	UNIT
Outline dimensions	154.5 (W) × 106.0 (H) × 6.7 (D)	mm
Effective viewing area	122.94 (W) × 92.70 (H)	mm
Dot number	(640×3) (W) × 480 (H)	Dots
Dot size	0.043 (W) × 0.169 (H)	mm
Dot pitch	0.063 (W) × 0.189 (H)	mm
Display color *1	White *2	—
Base color *1	Black *2	—
Weight	137	g

*1 Due to the characteristics of the LC material, the color vary with environmental temperature.

*2 Negative-type display

Display data "H" :R, G, B Dots ON : White

Display data "L" :R, G, B Dots OFF : Black

4. Absolute Maximum Ratings

4-1 Electrical absolute maximum ratings

Temp. = 25 °C

ITEM	SYMBOL	MIN.	MAX.	UNIT
Supply voltage for logic	VDD	0	6.0	V
Supply voltage for LCD driving	VCONT	0	VDD	V
Input voltage	Vin	-0.3	VDD+0.3	V

4-2 Environmental absolute maximum ratings

ITEM	SYMBOL	MIN	MAX	UNIT
Operating temperature *1	Top	0	50	°C
Storage temperature *2	T _{STO}	-20	60	°C
Operating humidity *3	H _{OP}	10	*4	%RH
Storage humidity *3	H _{STO}	10	*4	%RH
Vibration	—	*5	*5	—
Shock	—	*6	*6	—

*1 LCD's display quality shall not be guaranteed at the temperature range of : below 0°C and upper 40°C.

*2 Temp. = -20°C < 24 Hr. , Temp = 60°C < 24 Hr.
No vibration and shock.

*3 Non-condensation.

*4 Temp. ≤ 40°C, 85% RH Max.
Temp. > 40°C, Absolute Humidity shall be less than 85%RH at 40°C.

*5

Frequency	10~55 Hz	Converted to acceleration value : (0.03~0.91G)
Vibration width	0.15 mm	
Interval	10-55-10 Hz 1 minute	

2 hours in each direction X/Y/Z (6 hours as total)
EIAJ ED-2531.

*6 Acceleration: 50 G
Pulse width : 11 msec
3 times in each direction : ±X/±Y/±Z.
EIAJ ED-2531.

5. Electrical Characteristics

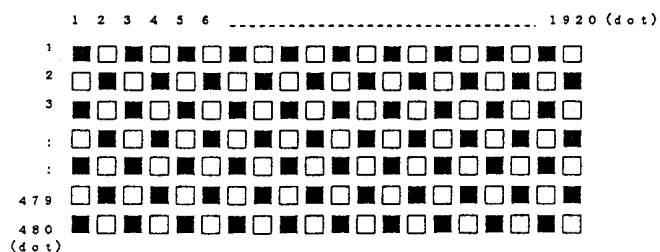
Temp. = 25°C, VDD = +3.3V ± 0.3V, 1/480duty

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Supply voltage for logic	VDD	—	3.0	3.3	3.6	V
LCD driving voltage *1	Vop= VCONT	0 °C	0.80	—	—	V
		25 °C	1.35	1.95	2.55	V
		40 °C	—	—	2.80	V
Input voltage	Vin	"H" level	0.8VDD	—	VDD	V
		"L" level	0	—	0.2VDD	V
Clock frequency	f _{CP}		4.03	4.32	12.0	MHz
Frame frequency *2	f _{FRM}		70	75	80	Hz
Current consumption for logic	IDD		—	92	138	mA
Power consumption	P _{disp}		—	303.6	455.4	mW

*1 Maximum contrast ratio is obtained by adjusting the LCD supply voltage (Vop= VCONT) for driving LCD.

*2 In consideration of display quality, it is recommended that frame frequency is set in the range of 70-80Hz. When you have to use higher frame and clock frequencies, confirm the LCD's performance and quality prior to finalizing the frequency values: Generally, as frame and clock frequencies become higher, current consumption will get bigger and display quality will be degraded.

*3 Display high frequency pattern, (see below).
 VDD = 3.3V , Vop = VCONT , f_{FRM} = 75 Hz , f_{CP} = 4.32MHz
 Pattern:



6. Optical Characteristics

Temp. = 25°C

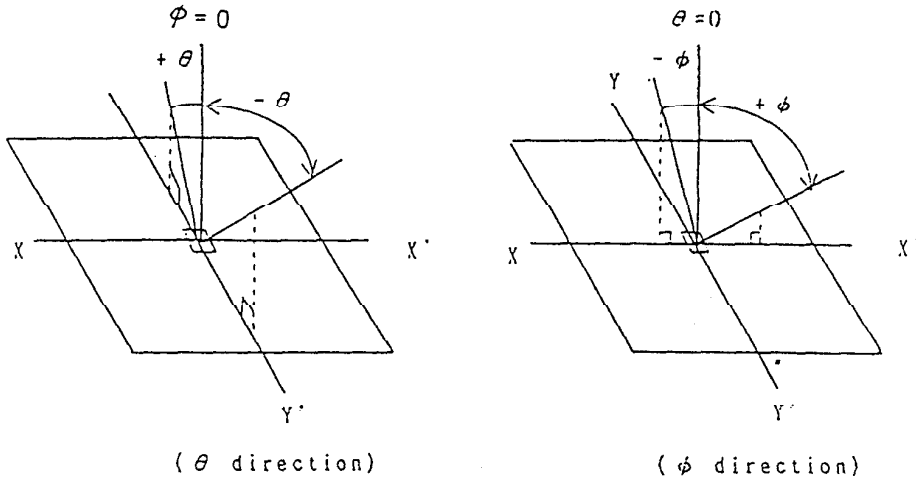
ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Response time	Rise	T _r	$\theta = \phi = 0^\circ$	—	250	350	ms
	Down	T _d	$\theta = \phi = 0^\circ$	—	250	350	ms
Viewing angle range		θ	CR ≥ 2	$\phi = 0^\circ$	-20	—	35 deg.
		ϕ		$\theta = 0^\circ$	-45	—	45 deg.
Contrast ratio		CR	$\theta = \phi = 0^\circ$	10.0	20.0	—	—
Chromaticity coordinates	Red	x	$\theta = \phi = 0^\circ$	0.46	0.51	0.56	—
		y		0.29	0.34	0.39	
	Green	x	$\theta = \phi = 0^\circ$	0.24	0.29	0.34	
		y		0.46	0.51	0.56	
	Blue	x	$\theta = \phi = 0^\circ$	0.12	0.17	0.22	
		y		0.10	0.15	0.20	
	White	x	$\theta = \phi = 0^\circ$	0.25	0.30	0.35	
		y		0.27	0.32	0.37	
	Black	x	$\theta = \phi = 0^\circ$	0.24	0.29	0.34	
		y		0.26	0.31	0.36	

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

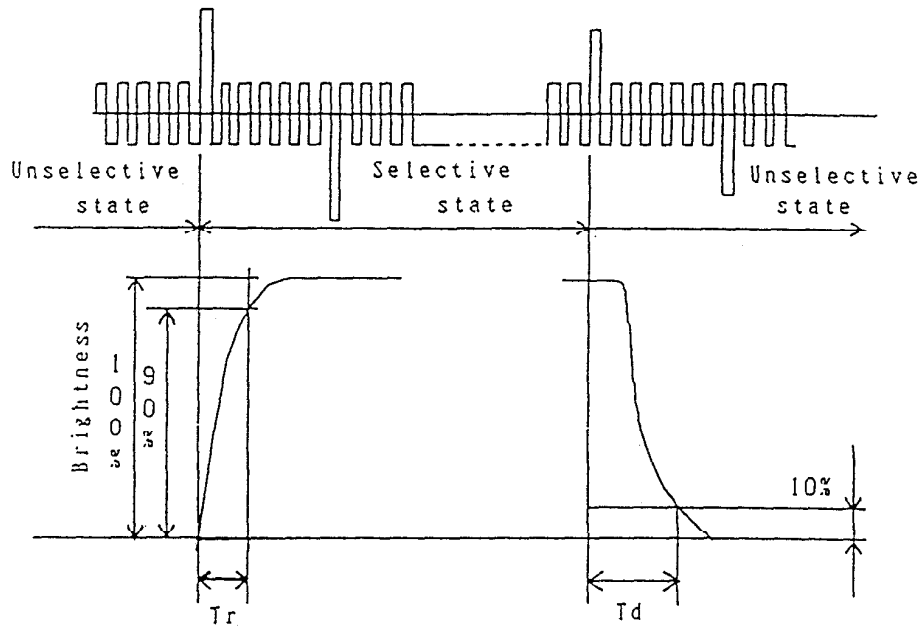
6-1 Contrast ratio is defined as follows:

$$CR = \frac{\text{Brightness all pixels "White"}}{\text{Brightness all pixels "Black"}}$$

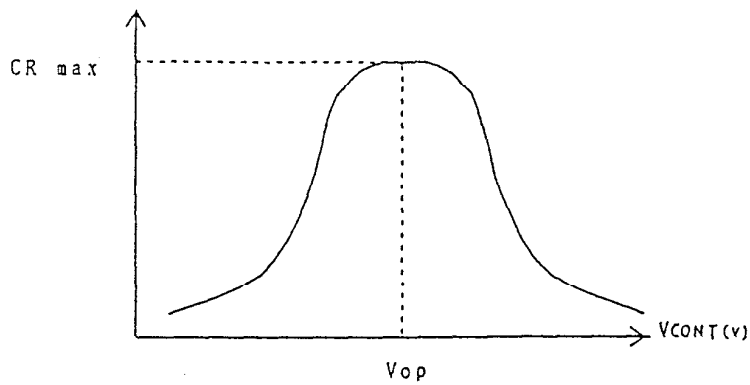
6-2. Definition of viewing angle



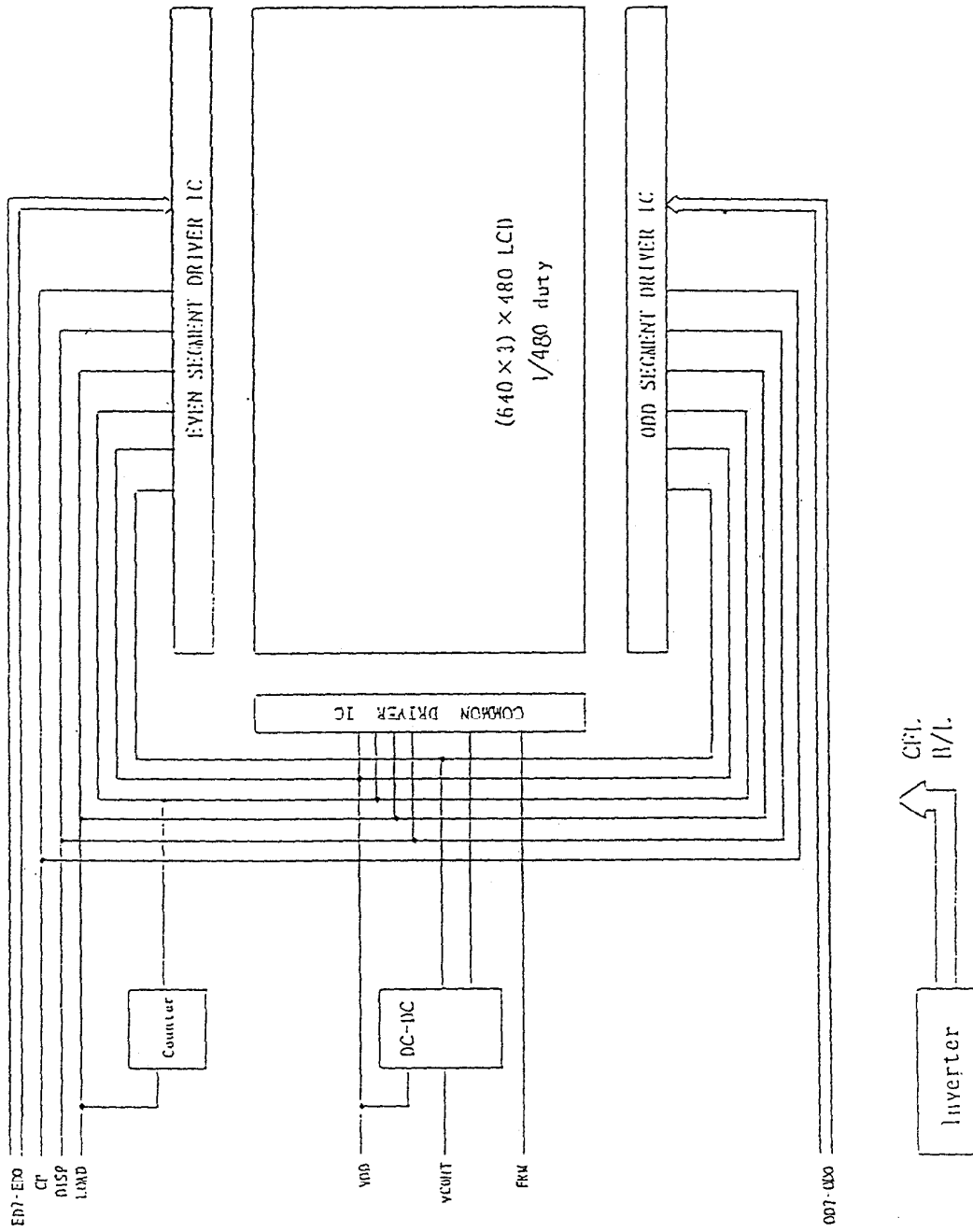
6-3. Definition of response time



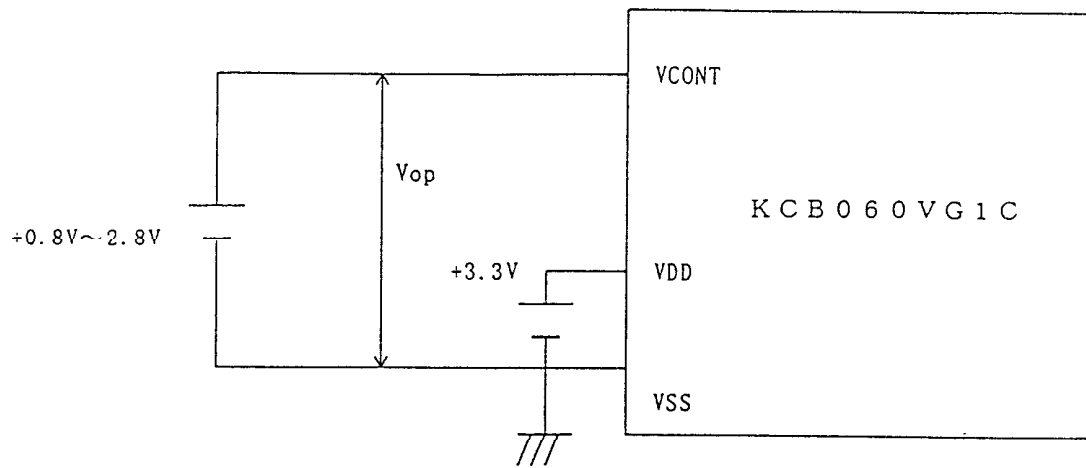
6-4. Definition of V_{op}



7. Circuit Block Diagram



7-1. Power supply



8. Interface Signals

8-1. LCD

PIN NO.	SYMBOL	DESCRIPTION	LEVEL
1	ED4	Even number display data	H(ON), L(OFF)
2	OD7	Odd number display data	H(ON), L(OFF)
3	VSS	GND	—
4	OD6	Odd number display data	H(ON), L(OFF)
5	VSS	GND	H(ON), L(OFF)
6	ED1	Even number display data	—
7	OD1	Odd number display data	H(ON), L(OFF)
8	OD2	Odd number display data	H(ON), L(OFF)
9	ED0	Even number display data	H(ON), L(OFF)
10	VSS	GND	—
11	ED3	Even number display data	H(ON), L(OFF)
12	OD0	Odd number display data	H(ON), L(OFF)
13	OD4	Odd number display data	H(ON), L(OFF)
14	OD3	Odd number display data	H(ON), L(OFF)
15	OD5	Odd number display data	H(ON), L(OFF)
16	ED2	Even number display data	H(ON), L(OFF)
17	DISP	Display control signal	H(ON), L(OFF)
18	ED5	Even number display data	H(ON), L(OFF)
19	VSS	GND	—
20	ED6	Even number display data	H(ON), L(OFF)
21	LOAD	Data signal latch	H → L
22	ED7	Even number display data	H(ON), L(OFF)
23	FRM	Synchronous signal for driving scanning line	H
24	VSS	GND	—
25	VSS	GND	—
26	VSS	GND	—
27	CP	Data signal shift clock	H → L
28	VDD	Power supply for logic	—
29	VCONT	LCD adjust voltage	—
30	VDD	Power supply for logic	—

LCD side connector : SD-54102-0301 (MOLEX)

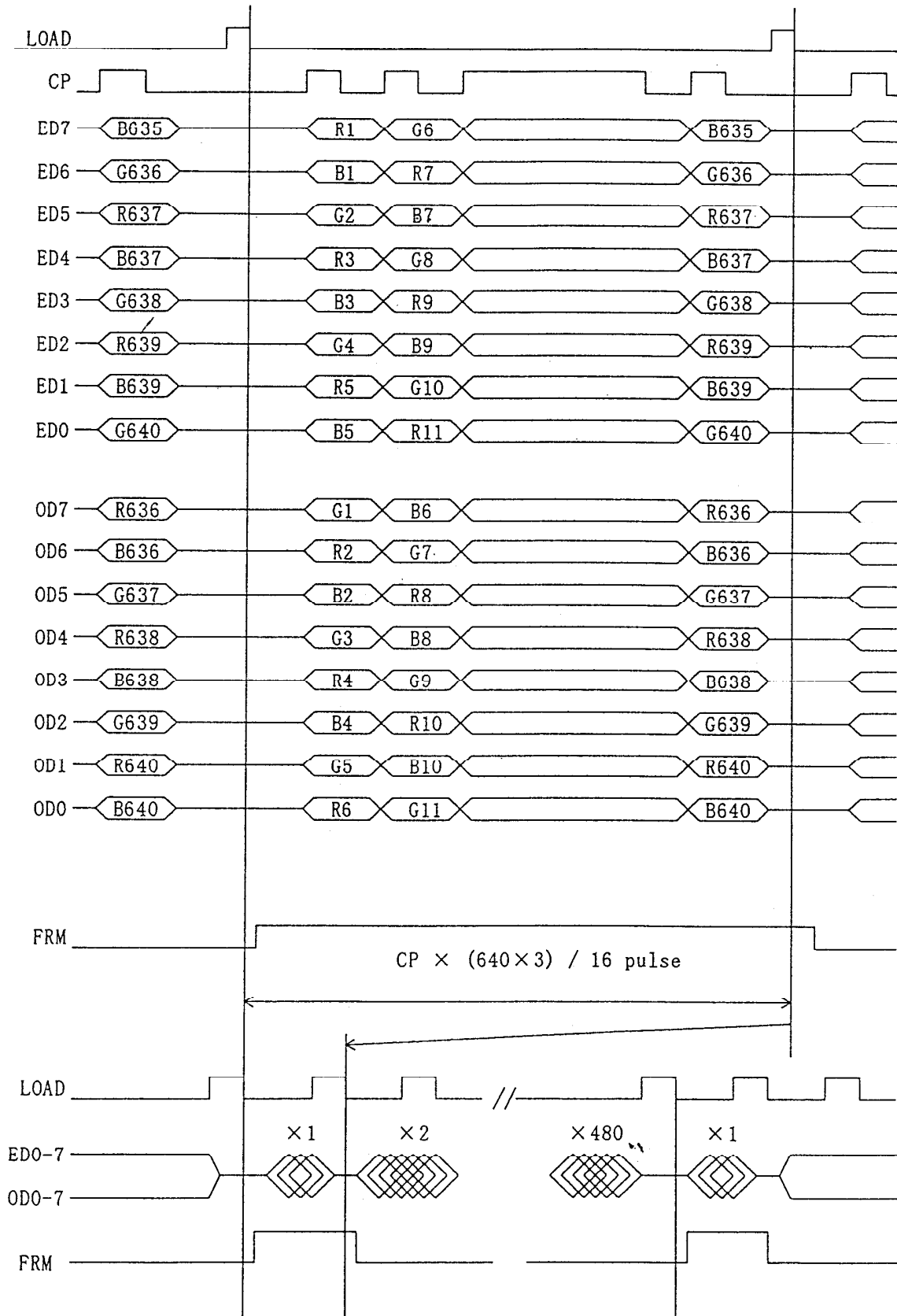
8-2. CFL

No.	SYMBOL	DESCRIPTION	LEVEL
1	GND	Ground line (from inverter)	—
2	NC	No connect	—
3	HV	Power supply for CFL	AC

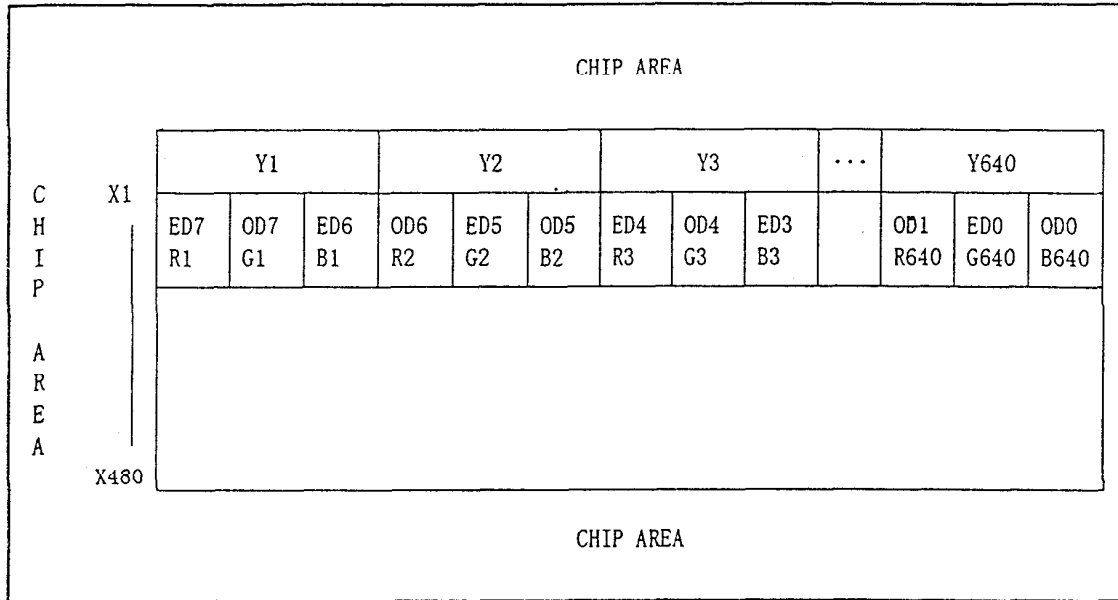
LCD side connector : QZ-19-3F01 (HONDA)

Recommended matching connector : QZ-19-A3MYL#02 (HONDA)

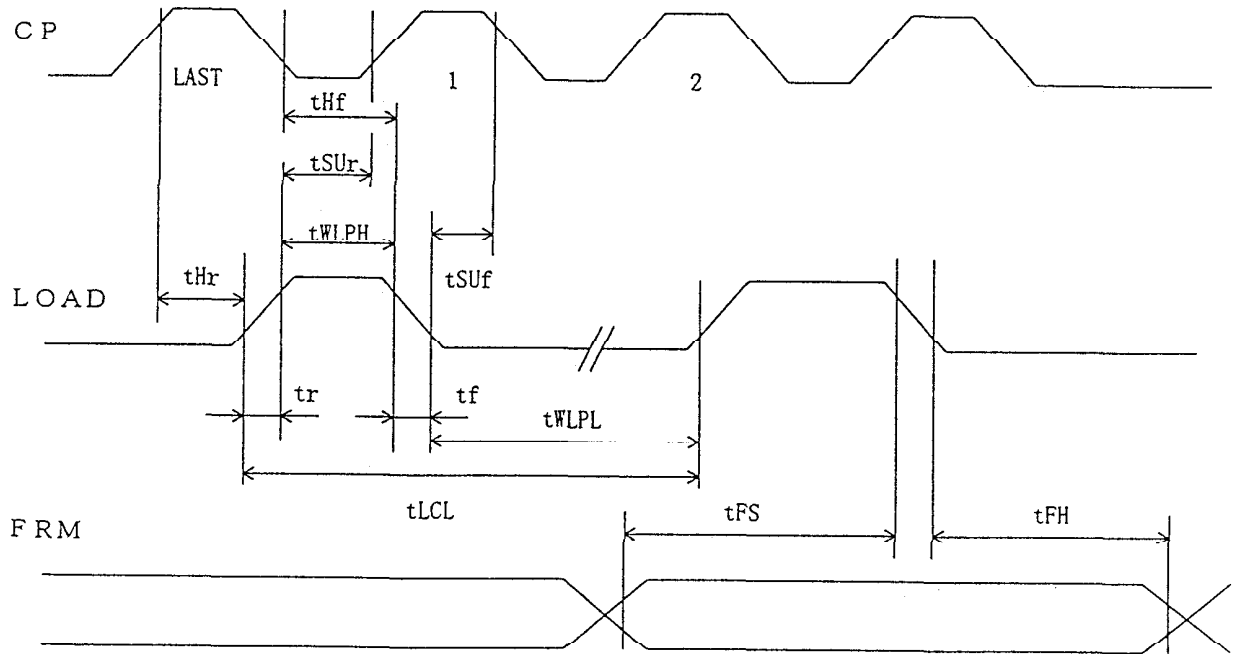
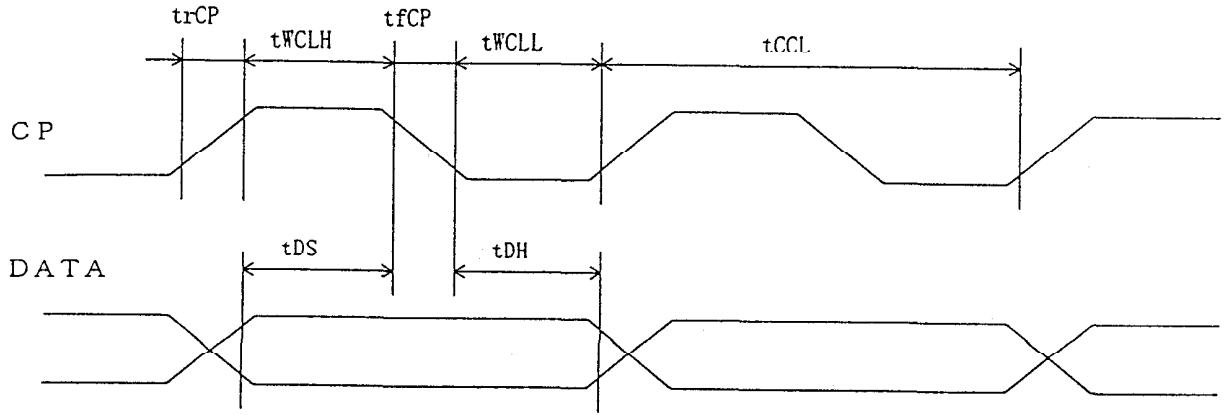
9. Interface Timing Chart



1 0 . Data and Screen



11. Input Timing Characteristics



11-1. Switching characteristics

Input characteristics ; VDD = +3.3V ± 0.3V

Temp. = 25°C

ITEM	SYMBOL	MIN.	MAX.	UNIT
CP Cycle *1	tCCL	77	—	ns
CP "H" Pulse Width	tWCLH	30	—	ns
CP "L" Pulse Width	tWCLL	30	—	ns
CP Rise Up Time *2	trCP	—	50	ns
CP Fall Down Time *2	tfCP	—	50	ns
Data Set Up Time	tDS	10	—	ns
Data Hold Time	tDH	20	—	ns
Load "H" Pulse Width	tWLPH	100	—	ns
Load "L" Pulse Width	tWLPL	990	—	ns
LOAD Cycle	tLCL	1	—	μs
Data Strobe Set Up Time	tSUr	38	—	ns
Data Strobe Set Up Time	tSUf	38	—	ns
Data Strobe Hold Time	tHr	0	—	ns
Data Strobe Hold Time	tHf	38	—	ns
Input Signal Rise Up Time	tr	—	50	ns
Input Signal Fall Down Time	tf	—	50	ns
FRM Data Set Up Time	tFS	100	—	ns
FRM Data Hold Time	tFH	100	—	ns

*1 CP Cycle is adjust so that FRM signal is 75 Hz.

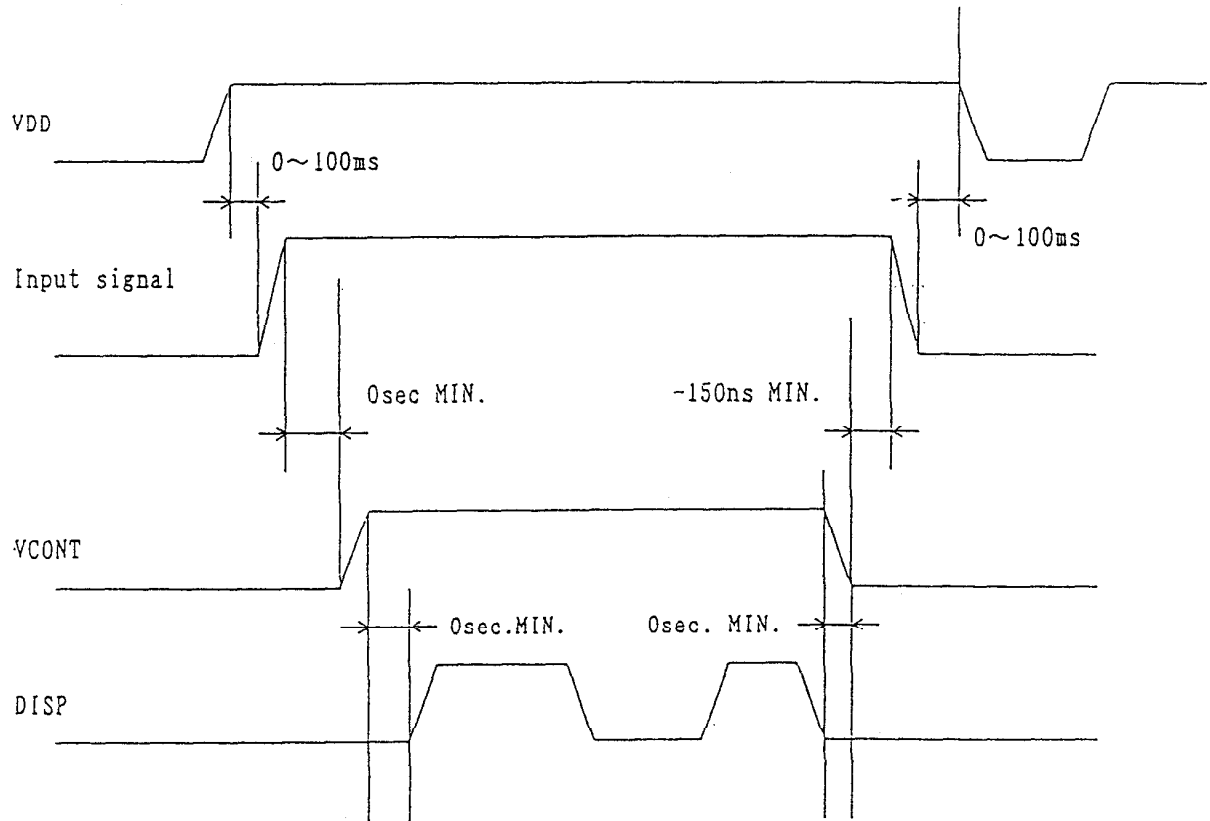
*2 The formula of condition

$$\textcircled{1} \quad tr_{CP}, tf_{CP} < (t_{CCL} - (t_{WCLH} + t_{WCLL})) / 2$$

Please use on condition that $\textcircled{1}$ is filled.

12. Supply Voltage Sequence Condition

DO NOT apply DC voltage to the LCD panel. DC voltage induce irreversible electrochemical reactions and reduce LCD life. Always follow the power supply ON/OFF sequence of VDD first, input signal second, VCONT third and finally DISP. This will prevent DC driving of the LCD or CMOS LSI latch-up as shown below.



- * Control the supply voltage sequence not to float all signal line when the LCD panel is driving.

13 . Backlight Characteristics

13-1. CFL ratings

Temp. = 25℃

ITEM	SYMBOL	MIN.	TYP.	MAX.	NOTE
Starting discharge Voltage *1	VS	—	—	770Vrms.	0 ℃
		—	—	515 Vrms.	25 ℃
Discharging tube current	IL	2.0 mArms.	3.5 mArms.	6.0 mArms.	—
Discharging tube voltage	VL	—	(350)Vrms.	—	—
Operating life *2 (IL=3.5 mArms.)	T	—	20,000 Hr.	—	—
Operating frequency	F	20 kHz	—	100 kHz	—

*1 The Non-load output voltage (VS) of the inverter should be designed to have some margin, because VS may increase due to the leak current which may be caused by wiring of CFL cables. (Reference value : 1000 Vrms MIN.)

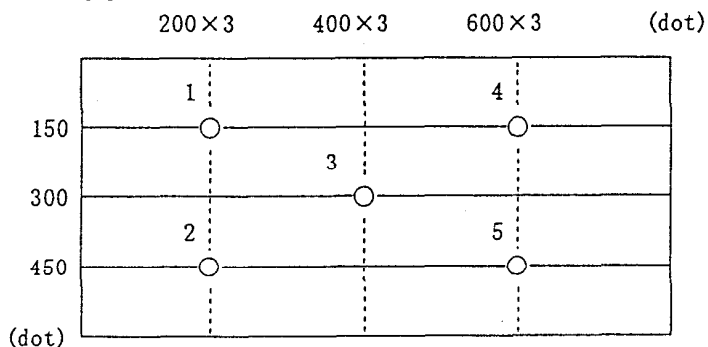
*2 When the illuminance or quantity of light has decreased to 50 % of the initial value.

13-2. Surface Brightness of LCD (IL = 3.5 mArms.)

Temp. =25℃

ITEM	MIN.	TYP.	MAX.	UNIT
Brightness	(50)	(70)	—	cd/m ²

(Measuring points)

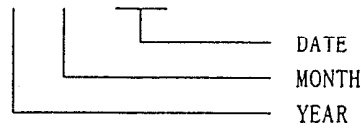


- 1) Rating is defined as the average brightness inside the viewing area.
- 2) 30 minutes after CFL is turned on. (Ambient Temp.=25℃)
- 3) The inverter should meet the eccentric conditions;
 - Sine, symmetric waveform without spike in positive and negative.

1 4 . Lot Number Identification

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

KCB060VG1CB-A02- □ □-□ □



YEAR	1998	1999	2000	2001	2002
CODE	8	9	0	1	2

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

1 5 . Warranty

15-1. Incoming inspection

Please inspect the LCD within one month after your receipt.

15-2. Production Warranty

Kyocera warrants its LCDs for a period of 12 months after receipt by the purchaser, and within the limits specified. Kyocera shall, by mutual agreement, replace or rework defective LCDs that are shown to be Kyocera's responsibility.

16. Precautions for use

16-1. Installation of the LCD

1. Please ground either of the mounting (screw) holes located at each corner of an LCD module, in order to stabilize brightness and display quality.
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. The display window size should be the same as the effective viewing area.
5. In case you use outside frame of effective viewing area as outward appearance of your product, unevenness of its outward appearance is out of guarantee.
6. Do not pull the CFL lead wires and do not bend the root of the wires. Housing should be designed to protect CFL lead wires from external stress.

16-2. Static Electricity

1. Since CMOS ICs are mounted directly onto the LCD glass, protection from static electricity is required. Operation should wear ground straps.

16-3. LCD Operation

1. The LCD shall be operated within the limits specified. Operation at values outside of these limits shorten life, and/or harm display images.
2. Vop must be adjusted to optimize viewing angle and contrast.
3. Operation of the LCD at temperature below the limit specified may cause image degradation and/or bubbles. It may also change the characteristics of the liquid crystal. This phenomenon may not recover. The LCD shall be operated within the temperature limits specified.

16-4. Storage

1. The LCD shall be stored within the temperature and humidity limits specified. Store in a dark area, and protected the LCD from direct sunlight or fluorescent light.
2. The LCD should be packaged to prevent damage.

16-5. Screen Surface

1. DO NOT store in a high humidity environment for extended periods. Image degradation, bubbles, and/or peeling off of 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 with a soft cloth or cotton pad. Methanol or Isopropyl Alcohol may be used, but insure that all solvent residue is removed.
4. Water may cause damage or discoloration of the polarizer. Clean any condensation or moisture from any source immediately.
5. Always keep the LCD free from condensation during testing. Condensation may permanently spot or stain the polarizers.

17. Reliability Data / Environmental Test

TEST ITEM	TEST CONDITION	TEST TIME	RESULT
High Temp. Atmosphere	70°C	240hr.	Display Quality : No defect Display Function : No defect Current Consumption: No defect
Low Temp. Atmosphere	-20°C	240hr.	Low Temp.Bubble : None Solid Crystallization of Liquid Crystal : None Display Quality : No defect Display Function : No defect Current Consumption: No defect
High Temp. Humidity Atmosphere	40°C 90%RH	240hr.	Display Quality : No defect Display Function : No defect Peel-off of Organic Sealing : None Current Consumption: No defect
Temp.Cycle	-20°C 0.5hr. R.T. 0.5hr. 70°C 0.5hr.	10 cycles	Display Quality : No defect Display Function : No defect Peel-off of Organic Sealing : None Bubble on Cell : None
High Temp. Operation	50°C Vop	500hr.	Display Quality : No defect Current Consumption: No defect

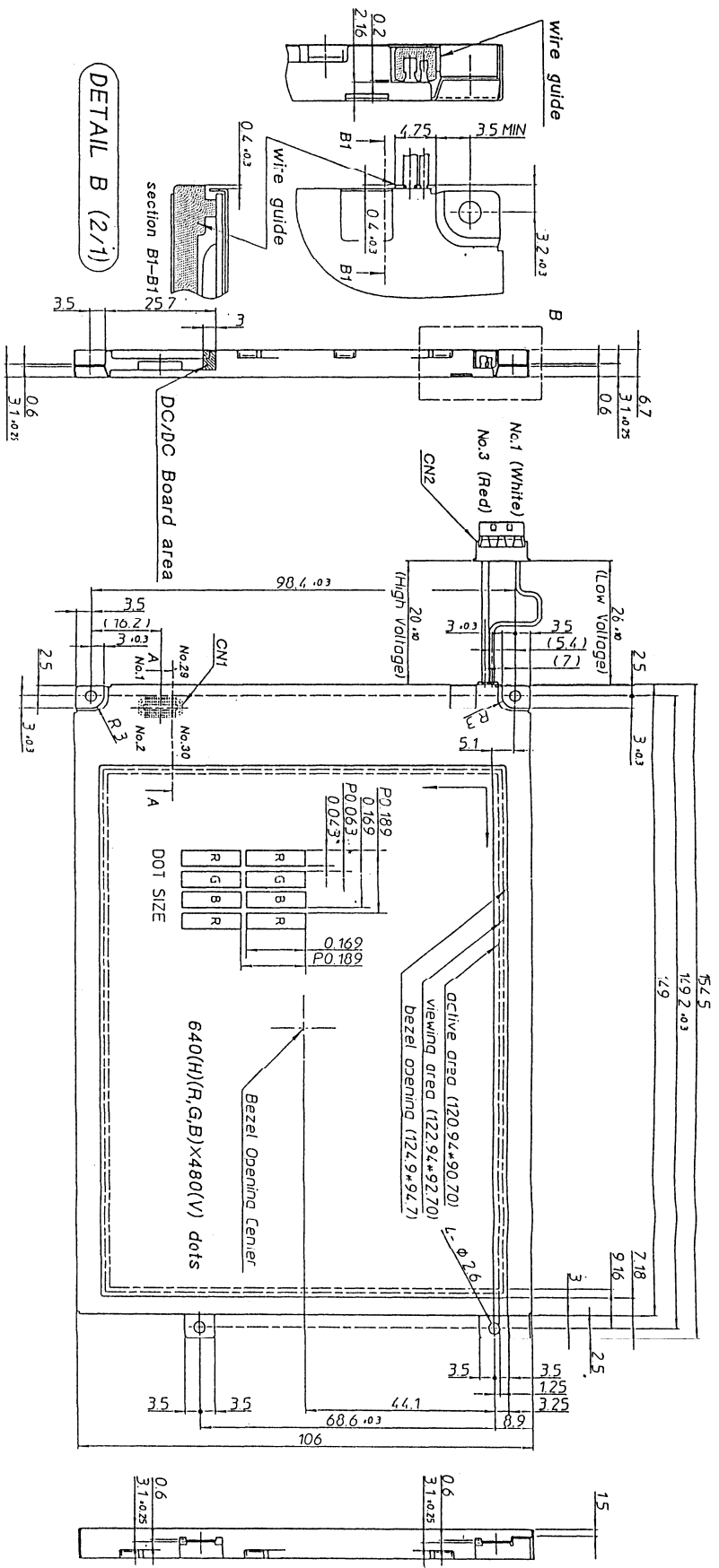
*Each test item uses a test LCD only once.The tested LCD is not used in any other tests.

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

*The tested LCD is inspected after 24 hours of storage at room temperature and room humidity after each test is finished.

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

*The results of the reliability test are for your reference purpose only.The reliability test is conducted only to examine the LCD's capability.



Note 1 Matching Connector : SD-53885-0301 (MOLEX)
OZ-19-A3MYL#02 (HONDA)

2 The drawing seen from the front, information is displayed on the screen in the direction of from the upper hand left corner to the right

* Connectors
CN1, SD-54102-0301 (MOLEX)
CN2, OZ-19-3F01 (HONDA)

* Tolerance without indication, ±0.5

SECTION A-A (2/1)

Approved	Checked	Drawn	Scale	Title	Drawing No.	Year-Month-Day	Size
98.11.11	98.11.10	Yamamura	1/1	KCB06CVG1CB	KJ01ERB	98-11-10	3
Outline dimensions							
				121A0085700			

1 2 3 6 7 8

Document NO.	TQ3C-8EAC0-E2FGYP15-00
DATE	April 23 , 1999

FOR:KICC

KYOCERA INSPECTION STANDARD

TYPE : KCB060VG1CB-A02

KYOCERA CORPORATION
KAGOSHIMA HAYATO PLANT
LCD DIVISION

Original	Designed by :Engineering Dept.			Confirmed by :QA Dept.	
Issue Data	Prepared	Checked	Approved	Checked	Approved
April 23 , 1999	S. Kojima	<i>[Signature]</i>	Whishio	S. Hayashi	T. Yoshida

Revision Record

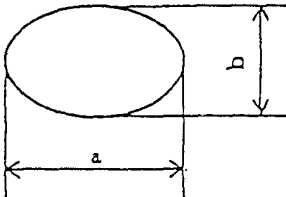
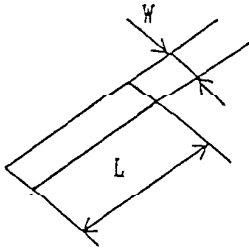
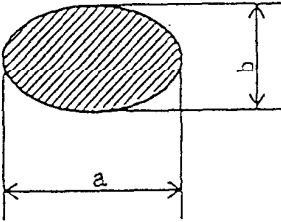
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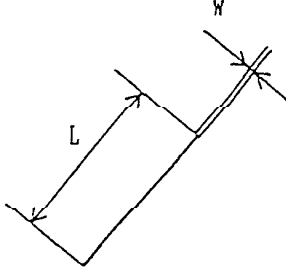
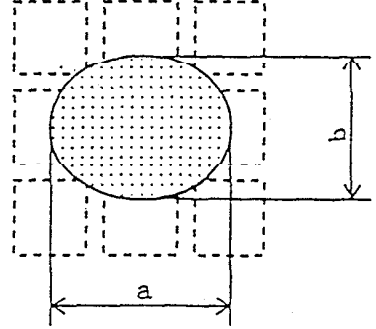
Visuals specification

1) Note

Item	Note						
General	<p>1. When defects specified in this Inspection Standards are inspected, operating voltage (Vop) 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>Luminance : 500 Lux minimum Inspection distance : 300 mm (from the sample) Temperature : 25 ± 5 °C Direction : right above</p>						
Definition of Inspection item	<table border="1"> <tr> <td data-bbox="586 1136 943 1423">Pinhole, Bright spot Black spot, Scratch Foreign particle</td> <td data-bbox="943 1136 1451 1423">The color of a small area is different from the remainder. The phenomenon does not change with voltage.</td> </tr> <tr> <td data-bbox="586 1423 943 1675">Contrast variation</td> <td data-bbox="943 1423 1451 1675">The color of a small area is different from the remainder. The phenomenon changes with voltage.</td> </tr> <tr> <td data-bbox="586 1675 943 1919">Polarizer (Scratch, Bubble, Dent)</td> <td data-bbox="943 1675 1451 1919">Scratch, Bubble and Dent in the polarizer which can be observed in on / off state.</td> </tr> </table>	Pinhole, Bright spot Black spot, Scratch Foreign particle	The color of a small area is different from the remainder. The phenomenon does not change with voltage.	Contrast variation	The color of a small area is different from the remainder. The phenomenon changes with voltage.	Polarizer (Scratch, Bubble, Dent)	Scratch, Bubble and Dent in the polarizer which can be observed in on / off state.
Pinhole, Bright spot Black spot, Scratch Foreign particle	The color of a small area is different from the remainder. The phenomenon does not change with voltage.						
Contrast variation	The color of a small area is different from the remainder. The phenomenon changes with voltage.						
Polarizer (Scratch, Bubble, Dent)	Scratch, Bubble and Dent in the polarizer which can be observed in on / off state.						

2) Standard

Inspection item	Judgement standard																						
Pinhole, Bright spot Black spot, Foreign particle.	 $d = (a + b) / 2$ <table border="1" data-bbox="657 537 1391 758"> <thead> <tr> <th>Category</th> <th>Size (mm)</th> <th>Acceptable number</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>$d \leq 0.2$</td> <td>neglected</td> </tr> <tr> <td>B</td> <td>$0.2 < d \leq 0.3$</td> <td>5</td> </tr> <tr> <td>C</td> <td>$0.3 < d \leq 0.5$</td> <td>3</td> </tr> <tr> <td>D</td> <td>$0.5 < d$</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							
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																					
Scratch, Foreign particle	 <table border="1" data-bbox="631 1104 1419 1388"> <thead> <tr> <th></th> <th>Width (mm)</th> <th>Length (mm)</th> <th>Acceptable No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>$W \leq 0.03$</td> <td>—</td> <td>neglected</td> </tr> <tr> <td>B</td> <td rowspan="3">$0.03 < W \leq 0.1$</td> <td>$L \leq 2.0$</td> <td>neglected</td> </tr> <tr> <td>C</td> <td>$2.0 < L \leq 4.0$</td> <td>3</td> </tr> <tr> <td>D</td> <td>$4.0 < L$</td> <td>0</td> </tr> <tr> <td>E</td> <td>$0.1 < W$</td> <td>—</td> <td>According to Circular</td> </tr> </tbody> </table>		Width (mm)	Length (mm)	Acceptable No.	A	$W \leq 0.03$	—	neglected	B	$0.03 < W \leq 0.1$	$L \leq 2.0$	neglected	C	$2.0 < L \leq 4.0$	3	D	$4.0 < L$	0	E	$0.1 < W$	—	According to Circular
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Contrast variation	 $d = (a + b) / 2$ <table border="1" data-bbox="662 1734 1393 1913"> <thead> <tr> <th>Category</th> <th>Size (mm)</th> <th>Acceptable number</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>$d \leq 0.5$</td> <td>neglected</td> </tr> <tr> <td>B</td> <td>$0.5 < d \leq 0.7$</td> <td>3</td> </tr> <tr> <td>C</td> <td>$0.7 < d$</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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Inspection item	Judgement standard																			
Polarizer (Scratch, Bubble, Dent)	<p>(1) Scratch</p>  <table border="1" data-bbox="630 661 1437 976"> <thead> <tr> <th></th> <th>Width (mm)</th> <th>Length (mm)</th> <th>Acceptable No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>$W \leq 0.1$</td> <td>—</td> <td>neglected</td> </tr> <tr> <td>B</td> <td rowspan="2">$0.1 < W \leq 0.3$</td> <td>$L \leq 5.0$</td> <td>neglected</td> </tr> <tr> <td>C</td> <td>$5.0 < L$</td> <td>0</td> </tr> <tr> <td>D</td> <td>$0.3 < W$</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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	<p>(2)Bubble (dent)</p>  <p style="text-align: center;">$d = (a + b) / 2$</p> <table border="1" data-bbox="657 1596 1404 1921"> <thead> <tr> <th>Category</th> <th>Size (mm)</th> <th>Acceptable number</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>$d \leq 0.2$</td> <td>neglected</td> </tr> <tr> <td>B</td> <td>$0.2 < d \leq 0.3$</td> <td>5</td> </tr> <tr> <td>C</td> <td>$0.3 < d \leq 0.5$</td> <td>3</td> </tr> <tr> <td>D</td> <td>$0.5 < d$</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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