SPEC

Spec No.	TQ3C-8EAF0-E1YAE36-00
Date	March 16, 2013

TYPE : TCG084VGLACANN-AN00

< 8.4 inch VGA transmissive color TFT with LED backlight>

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Issued
Date: Mar 21, 2013
KYOCERA
Hayato LCD Division

KYOCERA CORPORATION
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
March 16, 2013	R. Nakao	Y. Yamazaki	M. Fujitani	I. Hamada	

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.

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 TCG084VGLACANN-AN00. (RoHS Compliant)

2. Construction and outline

LCD	: Transmissive color dot matrix type TFT
Backlight system	: LED
Polarizer	: Anti-Glare treatment
Additional circuit	: Power supply (3.3V input) (without constant current circuit for LED Backlight)

3. Mechanical specifications

Item	Specification	Unit
Outline dimensions 1)	199.5(W)×(147.4)(H)×9(D)	mm
Active area	170.88(W)×128.16(H) (21.3cm/8.4 inch(Diagonal))	mm
Dot format	640×(R,G,B)(W)×480(H)	dot
Dot pitch	0.089(W)×0.267(H)	mm
Base color 2)	Normally White	-
Mass	300	g

1) Projection not included. Please refer to outline for details.
2) 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		V_{DD}	0	V_{DD}+0.3	V
Input signal voltage	1)	V_{IN}	-0.3	6.0	V
LED forward current	2) 3)	IF	-	(100)	mA

1) Input signal : CK, R0～R5, G0～G5, B0～B5, H_{SYNC}, V_{SYNC}, ENAB, R/L, U/D
2) For each "AN-CA"
3) Do not apply reversed voltage.

4-2. Environmental absolute maximum ratings

Item		Symbol	Min.	Max.	Unit
Operating temperature	1)	T_{OP}	-20	70	°C
Storage temperature	2)	T_{STO}	-30	80	°C
Operating humidity	3)	H_{OP}	10	4)	%RH
Storage humidity	3)	H_{STO}	10	4)	%RH
Vibration		-	5)	5)	-
Shock		-	6)	6)	-

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. = -30°C＜48h , Temp. = 80°C＜168h
Store LCD at normal temperature/humidity. Keep them free from vibration and shock.
An LCD 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) 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	Acceleration value (0.3～9 m/s²)
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

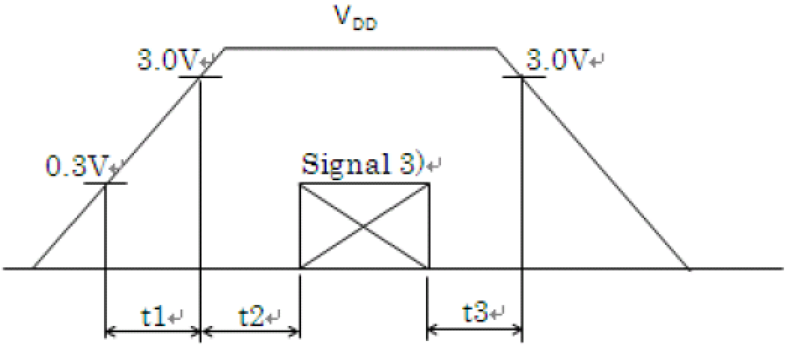
6) Acceleration: 490 m/s², Pulse width: 11 ms
3 times in each direction: ±X, ±Y, ±Z
EIAJ ED-2531

5. Electrical characteristics

Temp. = -20～70°C

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	1)	V_{DD}	-	3.0	3.3	3.6	V
Current consumption		I_{DD}	2)	-	160	240	mA
Permissive input ripple voltage		V_{RP}	-	-	-	100	mVp-p
Input signal voltage	3)	V_{IL}	"Low" level	0	-	$0.3V_{DD}$	V
		V_{IH}	"High" level	$0.7V_{DD}$	-	V_{DD}	V

1) V_{DD}-turn-on conditions



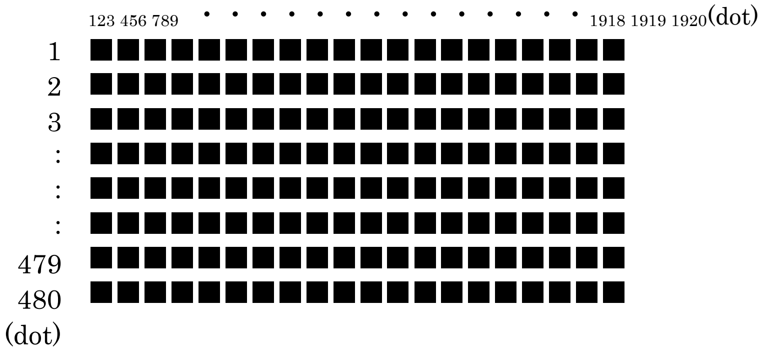
VDD
3.0V
3.0V
0.3V
Signal 3)
t1
t2
t3

0<t1≦20ms

0<t2≦50ms

0<t3≦1s

2) Display pattern:
V_{DD} = 3.3V, Temp. = 25°C



123 456 789 · · · · · · · · · · · · · · 1918 1919 1920(dot)
1
2
3
:
:
:
479
480
(dot)

3) Input signal : CK, R0～R5, G0～G5, B0～B5, H_{SYNC}, V_{SYNC}, ENAB, R/L, U/D

6. Optical characteristics

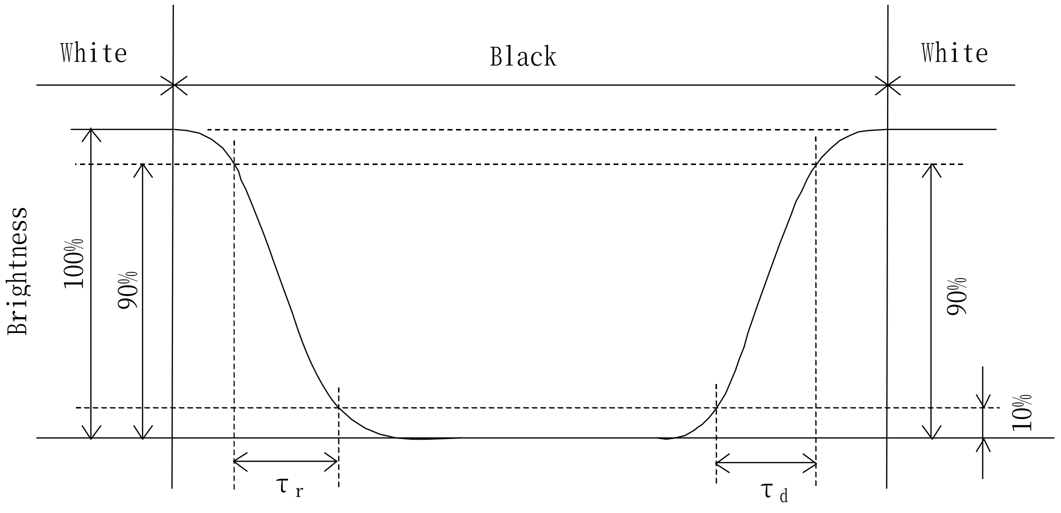
Measuring spot = ϕ6.0mm, Temp. = 25°C

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Response time	Rise	τ_r	$\theta=\phi=0°$	-	10	-	ms
	Down	τ_d	$\theta=\phi=0°$	-	20	-	ms
Viewing angle range View direction : 6 o'clock (Gray inversion)		θ_{UPPER}	$CR \geqq 10$	-	60	-	deg.
		θ_{LOWER}		-	70	-	
		ϕ_{LEFT}		-	70	-	deg.
		ϕ_{RIGHT}		-	70	-	
Contrast ratio		CR	$\theta=\phi=0°$	350	500	-	-
Brightness		L	IF=60mA/Line	385	550	-	cd/m^2
Chromaticity coordinates	Red	x	$\theta=\phi=0°$	0.530	0.580	0.630	-
		y		0.270	0.320	0.370	
	Green	x	$\theta=\phi=0°$	0.275	0.325	0.375	
		y		0.505	0.555	0.605	
	Blue	x	$\theta=\phi=0°$	0.105	0.155	0.205	
		y		0.050	0.100	0.150	
	White	x	$\theta=\phi=0°$	0.235	0.285	0.335	
		y		0.255	0.305	0.355	

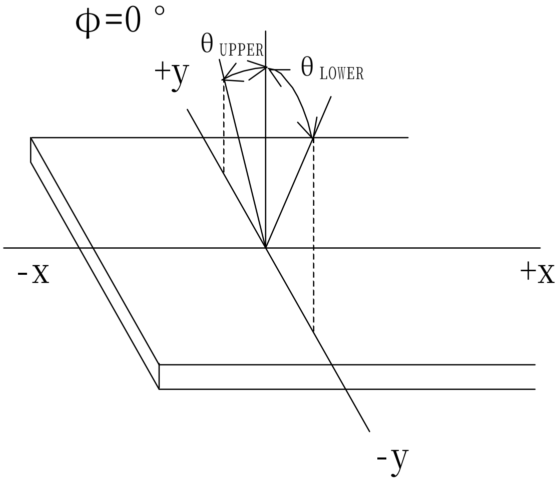
6-1. Definition of contrast ratio

$$\text{CR(Contrast ratio)} = \frac{\text{Brightness with all pixels "White"}}{\text{Brightness with all pixels "Black"}}$$

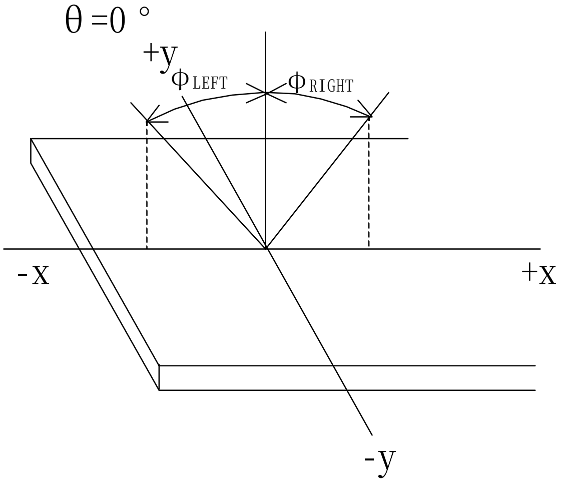
6-2. Definition of response time



6-3. Definition of viewing angle

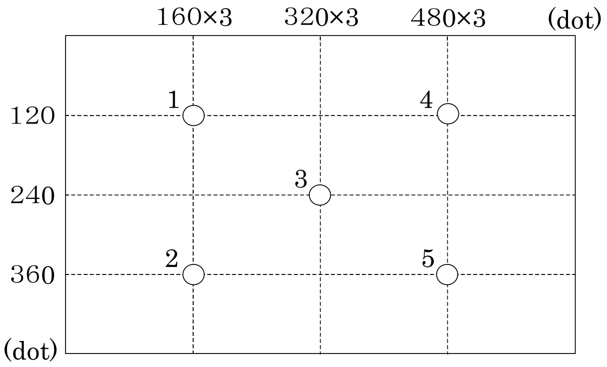

φ=0 °
θ UPPER
θ LOWER
+y
-x
+x
-y

θ direction


θ =0 °
+y
φ LEFT
φ RIGHT
-x
+x
-y

φ direction

6-4. Brightness measuring points


160×3
320×3
480×3
(dot)
120
240
360
(dot)
1
2
3
4
5

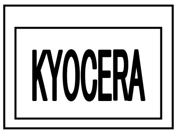
1) Rating is defined as the white brightness at center of display screen(3).
2) 5 minutes after LED is turned on. (Ambient Temp.=25℃)

7. Interface signals

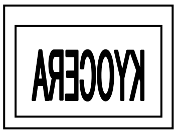
No.	Symbol	Description	I/O	Note
1	NC	No connect	-	
2	NC	No connect	-	
3	AN2	Anode 2	-	
4	AN1	Anode 1	-	
5	NC	No connect	-	
6	NC	No connect	-	
7	CA2	Cathode 2	-	
8	CA1	Cathode 1	-	
9	NC	No connect	-	
10	U/D	Vertical display mode select signal H : Normal , L : Up / Down reverse mode	I	1)
11	R/L	Horizontal display mode select signal L : Normal , H : Left / Right reverse mode	I	1)
12	V_{DD}	3.3V power supply	-	
13	V_{DD}	3.3V power supply	-	
14	ENAB	Signal to settle the horizontal display position (positive)	I	2)
15	GND	GND	-	
16	B5	BLUE data signal (MSB)	I	
17	B4	BLUE data signal	I	
18	B3	BLUE data signal	I	
19	B2	BLUE data signal	I	
20	B1	BLUE data signal	I	
21	B0	BLUE data signal (LSB)	I	
22	GND	GND	-	
23	G5	GREEN data signal (MSB)	I	
24	G4	GREEN data signal	I	
25	G3	GREEN data signal	I	
26	G2	GREEN data signal	I	
27	G1	GREEN data signal	I	
28	G0	GREEN data signal (LSB)	I	
29	GND	GND	-	
30	R5	RED data signal (MSB)	I	
31	R4	RED data signal	I	
32	R3	RED data signal	I	
33	R2	RED data signal	I	
34	R1	RED data signal	I	
35	R0	RED data signal (LSB)	I	
36	GND	GND	-	
37	V_{SYNC}	Vertical synchronous signal (negative)	I	
38	H_{SYNC}	Horizontal synchronous signal (negative)	I	
39	CK	Clock signal for sampling each data signal	-	3)
40	GND	GND	-	

LCD connector	:	04 6240 040 023 846+ (ELCO)
Recommended matching FFC or FPC	:	0.5mm pitch

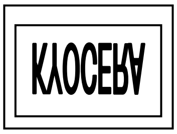
1)



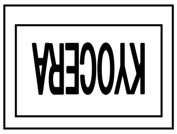
R/L = L
U/D = H



R/L = H
U/D = H



R/L = L
U/D = L



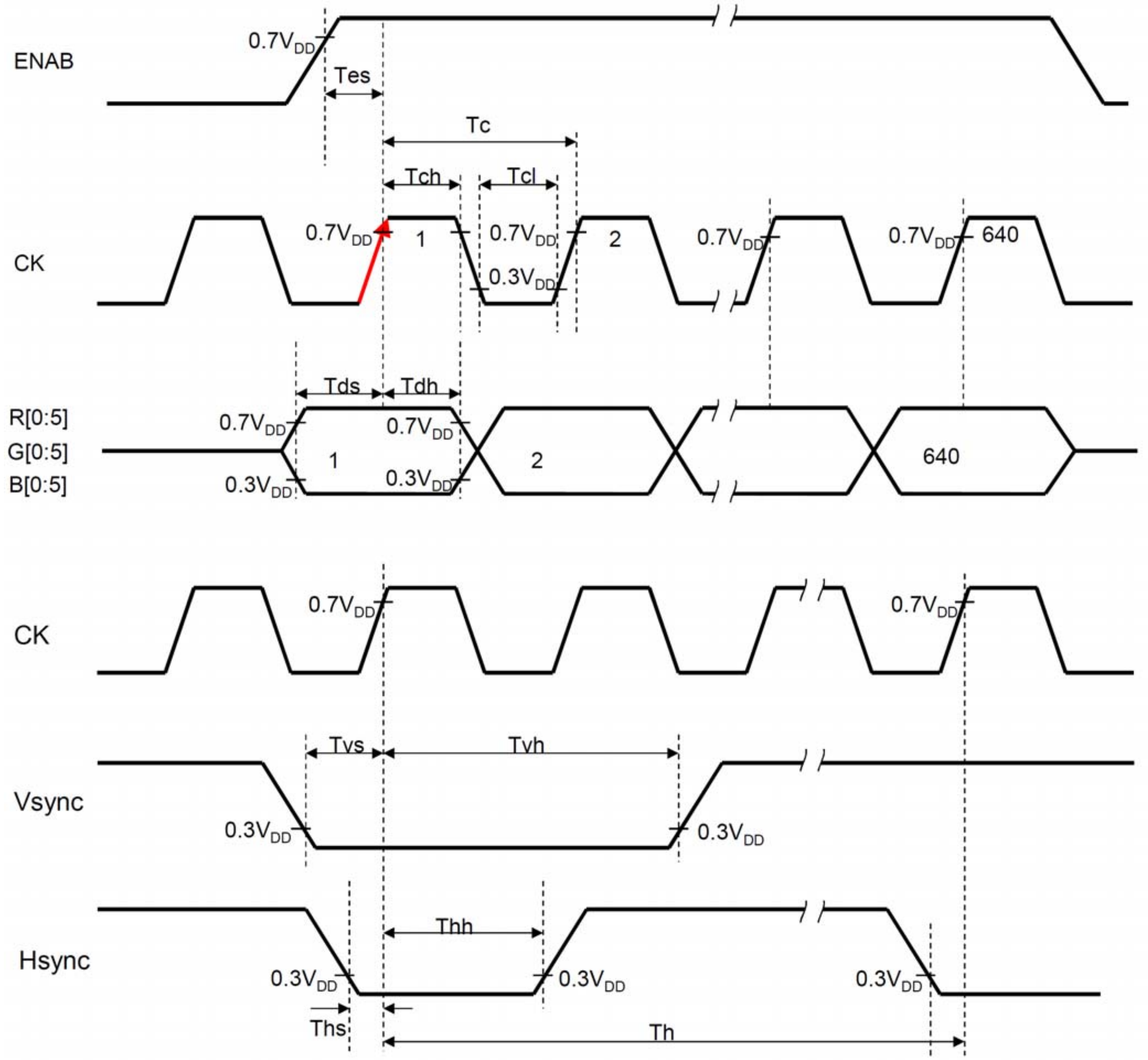
R/L = H
U/D = L

2) For input data format, both Sync mode and ENAB mode are supported.
If ENAB signal is fixed low, Sync mode is used.
Otherwise, ENAB mode is used.

3) Image data is sampled with CK rising edge.

8. Input timing characteristics

8-1. Input timing characteristics

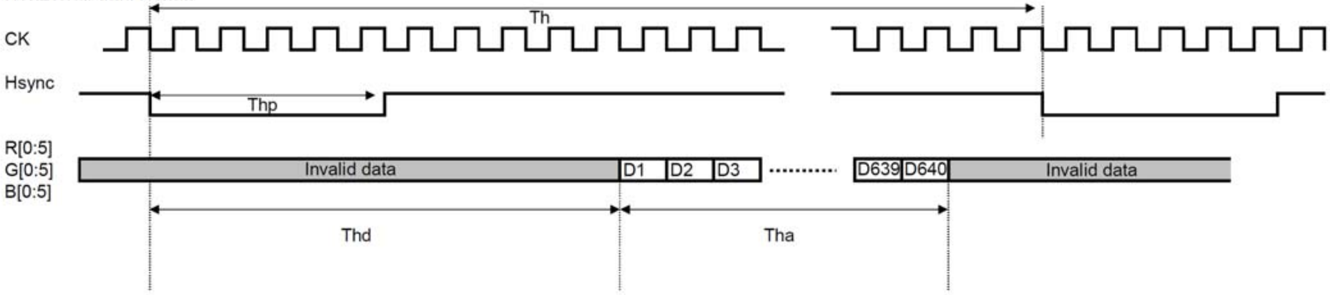

ENAB
0.7VDD
Tes
Tc
Tch
Tcl
CK
0.7VDD
1
0.7VDD
0.3VDD
2
0.7VDD
0.7VDD
640
Tds
Tdh
R[0:5]
G[0:5]
B[0:5]
0.7VDD
0.3VDD
1
0.7VDD
0.3VDD
2
640
CK
0.7VDD
0.7VDD
Tvs
Tvh
Vsync
0.3VDD
0.3VDD
Thh
Hsync
0.3VDD
0.3VDD
0.3VDD
Ths
Th

]

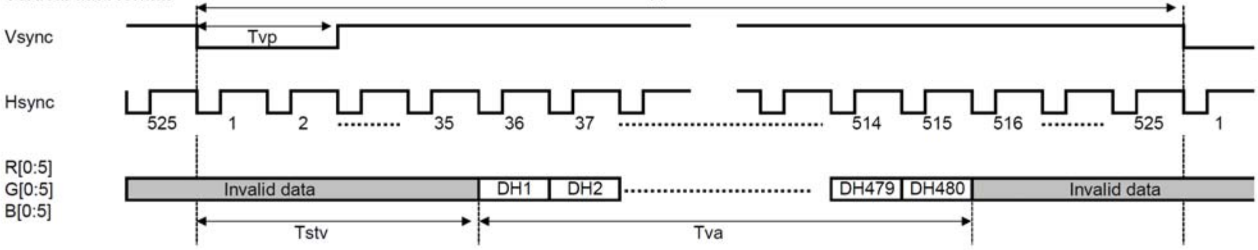
8-2. Sync mode (ENAB signal is fixed “Low”)

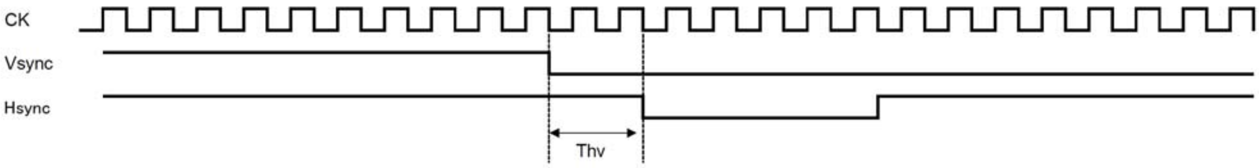
Item		Symbol	Min	Typ	Max	Unit	Note
Clock	Frequency	1/Tc	22.66	25.175	27.69	MHz	
	Period	Tc	36.11	39.7	44.13	ns	
	Duty ratio	Tch/Tc	40	50	60	%	
Data	Set up time	Tds	10	-	-	ns	
	Hold time	Tdh	10	-	-	ns	
Horizontal sync. signal	Set up time	Ths	10	-	-	ns	
	Hold time	Thh	10	-	-	ns	
	Cycle	Th	750	800	850	Tc	
	Pulse width	Thp	5	30	-	Tc	
Hsync.-first horizontal data time		Thd	144			Tc	
Horizontal active data area		Tha	640			Tc	
Vertical sync. signal	Set up time	Tvs	10	-	-	ns	
	Hold time	Tvh	10	-	-	ns	
	Cycle	Tv	515	525	535	Th	
	Pulse width	Tvp	1	3	5	Th	
First Line Data input time		Tstv	35			Th	
Vertical active data area		Tva	480			Th	
Vsync. falling to Hsync. falling time		Thv	-4	-	4	Tc	

Horizontal data format


Th
CK
Hsync
Thp
R[0:5]
G[0:5]
B[0:5]
Invalid data
D1
D2
D3
D639
D640
Invalid data
Thd
Tha

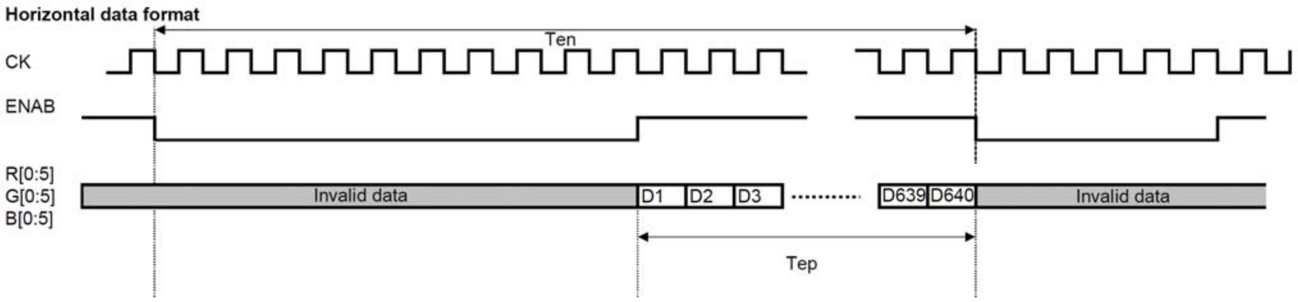
Vertical data format

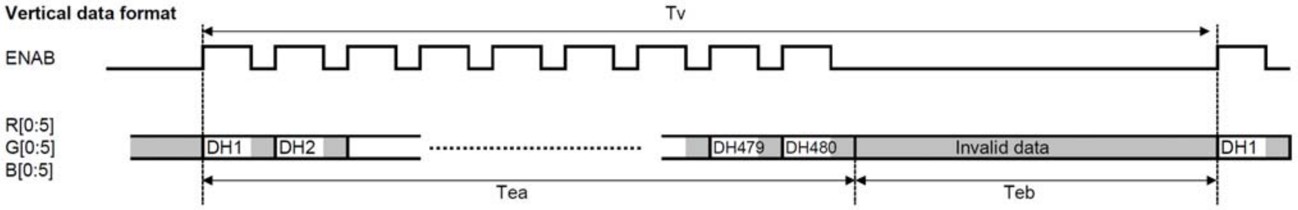

Tv
Vsync
Tvp
Hsync
525
1
2
35
36
37
514
515
516
525
1
R[0:5]
G[0:5]
B[0:5]
Invalid data
DH1
DH2
DH479
DH480
Invalid data
Tstv
Tva


CK
Vsync
Hsync
Thv

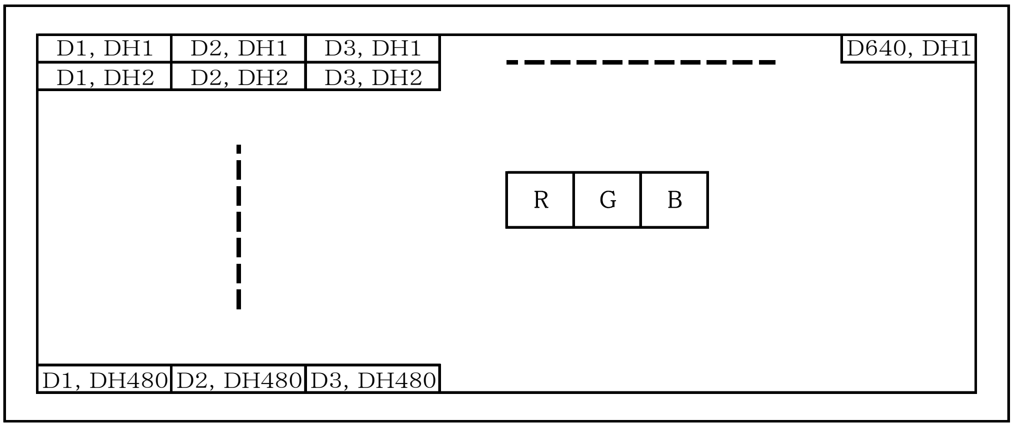
8-3. ENAB mode

Item		Symbol	Min	Typ	Max	Unit	Note
Clock	Frequency	1/Tc	22.66	25.175	27.69	MHz	
	Period	Tc	36.11	39.7	44.13	ns	
	Pulse Duty	Tch/Tc	40	50	60	%	
Enable signal	Set up time	Tes	10	-	-	ns	
	Period	Ten	750	800	850	Tc	
	Pulse width	Tep		640		Tc	
	Frame active time	Tea		480		Th	
	Frame blanking time	Teb	10	45	110	Th	


Horizontal data format
Ten
CK
ENAB
R[0:5]
G[0:5]
B[0:5]
Invalid data
D1
D2
D3
D639
D640
Invalid data
Tep


Vertical data format
Tv
ENAB
R[0:5]
G[0:5]
B[0:5]
DH1
DH2
DH479
DH480
Invalid data
DH1
Tea
Teb

8-4. Input Data Signals and Display position on the screen


D1, DH1
D2, DH1
D3, DH1
D640, DH1
D1, DH2
D2, DH2
D3, DH2
R
G
B
D1, DH480
D2, DH480
D3, DH480

9. Backlight characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward current 1)	IF	-	60	-	mA	Ta=-20～70°C
Forward voltage 1)	VF	-	22.3	25.8	V	IF=60mA, Ta=-20°C
		-	21.2	24.7	V	IF=60mA, Ta=25°C
		-	20.2	23.7	V	IF=60mA, Ta=70°C
Operating life time 2), 3)	T	-	50,000	-	h	IF=60mA, Ta=25°C

1) For each “AN-CA”
2) When brightness decrease 50% of minimum brightness.
   The average life of a LED will decrease when the LCD is operating at higher temperatures.
3) Life time is estimated data.(Condition : IF=60mA, Ta=25°C in chamber).
4) An input current below 15mA 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.

10. Lot number identification

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

TCG084VGLACANN-AN00 - □□ - □□ - □ 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	2013	2014	2015	2016	2017	2018
Code	3	4	5	6	7	8

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

11. Warranty

11-1. Incoming inspection

Please inspect the LCD within one month after your receipt.

11-2. 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.

12. Precautions for use

12-1. Installation of the LCD

1) Please ground either of the mounting (screw) holes located at each corner of an LCD, in order to stabilize brightness and display quality.
2) A transparent protection plate shall be added to protect the LCD and its polarizer
3) The LCD shall be installed so that there is no pressure on the LSI chips.
4) The LCD shall be installed flat, without twisting or bending.

12-2. 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.

12-3. 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.

12-4. 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.

12-5. Usage

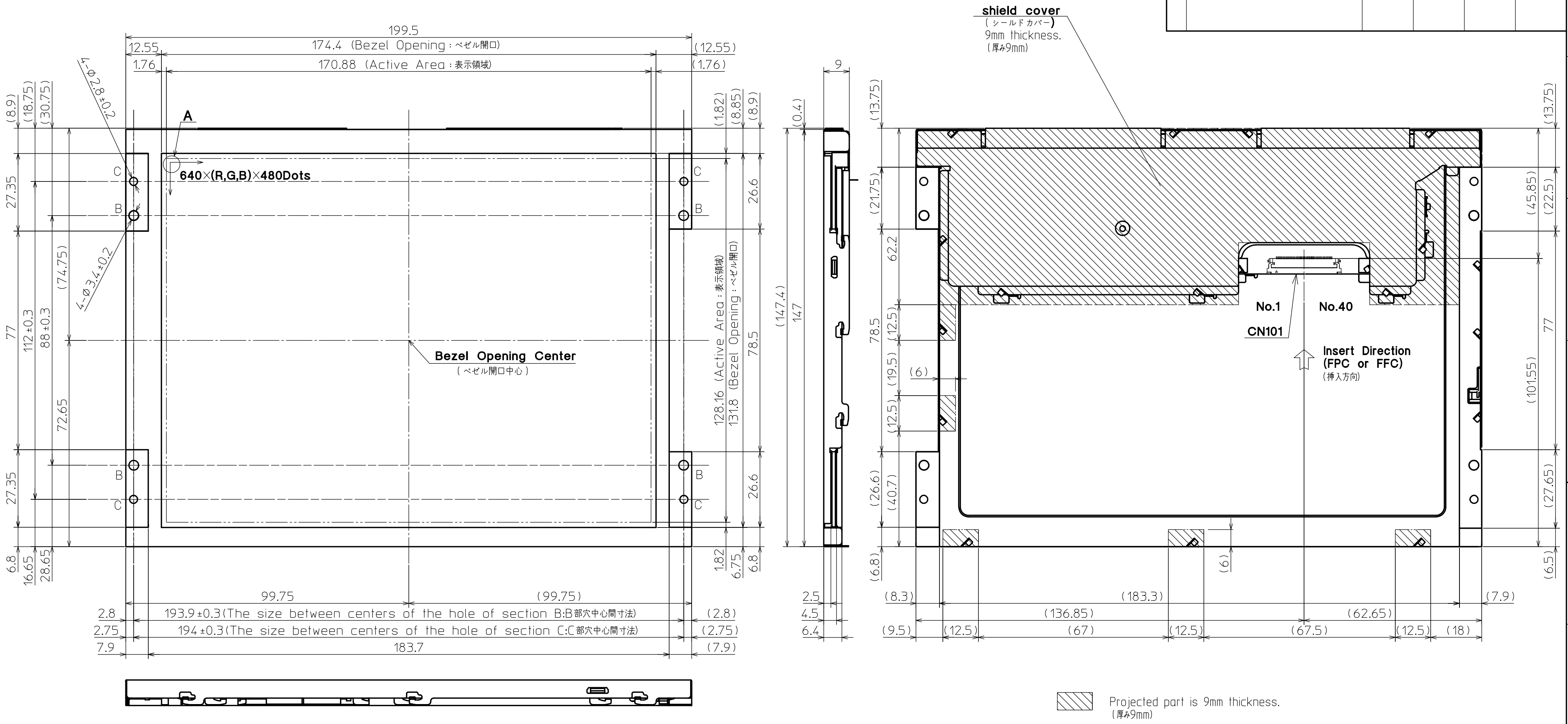
1) DO NOT store in a high humidity environment for extended periods. Polarizer degradation bubbles, and/or peeling off of the polarizer may result.
2) The front polarizer is easily scratched or damaged. Prevent touching it with any hard material, and from being pushed or rubbed.
3) The LCD screen may 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 disassemble LCD because it will result in damage.
7) This Kyocera LCD 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.
8) 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.
9) Liquid crystal may leak when the LCD 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.

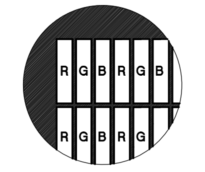
13. Reliability test data

Test item	Test condition	Test time	Judgement
High temp. atmosphere	80°C	240h	Display function : No defect Display quality : No defect Current consumption : No defect
Low temp. atmosphere	-30°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	-30°C 0.5h R.T. 0.5h 80°C 0.5h	10cycles	Display function : No defect Display quality : No defect Current consumption : No defect
High temp. operation	70°C	500h	Display function : No defect Display quality : No defect Current consumption : No defect

1) Each test item uses a test LCD only once. The tested LCD is not used in any other tests.
2) The LCD is tested in circumstances in which there is no condensation.
3) The reliability test is not an out-going inspection.
4) The result of the reliability test is for your reference purpose only.
The reliability test is conducted only to examine the LCD's capability.

No	Description	Drawn	Checked	Checked	Approved
⚠	·Change Productus name.（製品名変更） ·Change connector maker's company name.（コネクタメーカーの社名変更）	'12.08.17 倉元	'12.08.20 車		'12.08.21 朝倉


shield cover
（シールドカバー）
9mm thickness.
（厚み9mm）
199.5
174.4 (Bezel Opening：ベゼル開口)
170.88 (Active Area：表示領域)
12.55
(12.55)
1.76
(1.76)
2-φ2.8±0.2
4-φ3.4±0.2
A
640×(R,G,B)×480Dots
Bezel Opening Center
（ベゼル開口中心）
128.16 (Active Area：表示領域)
131.8 (Bezel Opening：ベゼル開口)
C
B
99.75
(99.75)
193.9±0.3(The size between centers of the hole of section B:B部穴中心間寸法)
194±0.3(The size between centers of the hole of section C:C部穴中心間寸法)
183.7
2.8
(2.8)
2.75
(2.75)
7.9
(7.9)
(8.9)
(18.75)
(30.75)
27.35
(74.75)
77
112±0.3
88±0.3
72.65
6.8
16.65
28.65
(1.82)
(8.85)
(8.9)
26.6
78.5
1.82
6.75
9
(0.4)
(147.4)
147
2.5
4.5
6.4
(13.75)
(21.75)
62.2
78.5
(12.5)
(19.5)
(6)
(26.6)
(40.7)
(6.8)
(45.85)
(22.5)
(101.55)
(27.65)
(6.5)
No.1
No.40
CN101
Insert Direction
(FPC or FFC)
（挿入方向）
(8.3)
(183.3)
(7.9)
(136.85)
(62.65)
(9.5)
(12.5)
(67)
(67.5)
(18)
Projected part is 9mm thickness.
（厚み9mm）


R G B R G B
R G B R G

DETAIL A (Dot Size)
(NTS)

Note.（注記）
1. Connector CN101： 04 6240 040 023 846+ ⚠~~KYOCERA ELCO~~ (KYOCERA Connector Products)
（コネクター）
2. 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。）
3. Tolerance without indication：±0.5
（指示無き公差）

Material 材質	Treatment 処理	Approved	Checked	Checked	Drawn	Scale	Title	KYOCERA	Year-Month-Day	Size
		'12.03.02 朝倉	'12.03.02 倉元	'12.02.28 阿部	陳	1:1 (NTS)	⚠~~TCG084VGLA*ANN-AN*17~~ TCG084VGLACANN Outline Dimensions		'12.02.27	2
Quantity 製作数	Description; 備考 RoHS							Drawing No.	121A8055500-1	

Spec No.	TQ3C-8EAF0-E2YAE36-00
Date	March 16, 2013

KYOCERA INSPECTION STANDARD

TYPE : TCG084VGLACANN-AN00

KYOCERA CORPORATION
LCD DIVISION

Original Issue Date	Designed by：Engineering dept.			Confirmed by：QA dept.	
	Prepared	Checked	Approved	Checked	Approved
March 16, 2013	R.Nakao	Y. Yamazaki	M.FujiTani	I.Hamada	

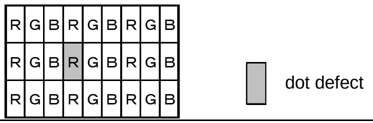
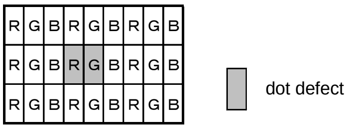
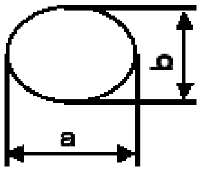
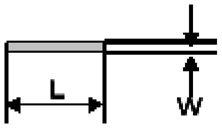
Revision record

Date	Designed by：Engineering dept.			Confirmed by：QA dept.	
	Prepared	Checked	Approved	Checked	Approved

Rev.No.	Date	Page	Descriptions

Visuals specification

1) Note

	Note		
General	1. Customer identified anomalies not defined within this inspection standard shall be reviewed by Kyocera, and an additional standard shall be determined by mutual consent. 2. This inspection standard about the image quality shall be applied to any defect within the active area and shall not be applicable to outside of the area. 3. Inspection conditions Luminance : 500 Lux min. Inspection distance : 300 mm. Temperature : 25 ± 5℃ Direction : Directly above		
Definition of inspection item	Dot defect	Bright dot defect	The dot is constantly "on" when power applied to the LCD, even when all "Black" data sent to the screen. Inspection tool: 5% Transparency neutral density filter. Count dot: If the dot is visible through the filter. Don't count dot: If the dot is not visible through the filter.  R G B R G B R G B R G B R G B R G B R G B R G B R G B dot defect
		Black dot defect	The dot is constantly "off" when power applied to the LCD, even when all "White" data sent to the screen.
		Adjacent dot	Adjacent dot defect is defined as two or more bright dot defects or black dot defects.  R G B R G B R G B R G B R G B R G B R G B R G B R G B dot defect
	External inspection	Bubble, Scratch, Foreign particle (Polarizer, Cell, Backlight)	Visible operating (all pixels "Black" or "White") and non operating.
		Appearance inspection	Does not satisfy the value at the spec.
	Definition of size	Definition of circle size  d＝(a＋b)/2	Definition of linear size 

2) Standard

<table>
<tr><th colspan="2">Classification</th><th colspan="2">Inspection item</th><th>Judgement standard</th></tr>
<tr><td rowspan="7">Defect (in LCD glass)</td><td rowspan="6">Dot defect</td><td colspan="2">Bright dot defect</td><td>Acceptable number : 4
Bright dot spacing : 5 mm or more</td></tr>
<tr><td colspan="2">Black dot defect</td><td>Acceptable number : 5
Black dot spacing : 5 mm or more</td></tr>
<tr><td rowspan="2">2 dot join</td><td>Bright dot defect</td><td>Acceptable number : 2</td></tr>
<tr><td>Black dot defect</td><td>Acceptable number : 3</td></tr>
<tr><td colspan="2">3 or more dots join</td><td>Acceptable number : 0</td></tr>
<tr><td colspan="2">Total dot defects</td><td>Acceptable number : 5 Max</td></tr>
<tr><td>Others</td><td colspan="2">White dot, Dark dot (Circle)</td><td><table>
<tr><th>Size (mm)</th><th>Acceptable number</th></tr>
<tr><td>d ≦ 0.2</td><td>(Neglected)</td></tr>
<tr><td>0.2 ＜ d ≦ 0.4</td><td>5</td></tr>
<tr><td>0.4 ＜ d ≦ 0.5</td><td>3</td></tr>
<tr><td>0.5 ＜ d</td><td>0</td></tr>
</table></td></tr>
<tr><td colspan="2" rowspan="4">External inspection (Defect on Polarizer or between Polarizer and LCD glass)</td><td colspan="2">Polarizer (Scratch)</td><td><table>
<tr><th>Width (mm)</th><th>Length (mm)</th><th>Acceptable number</th></tr>
<tr><td>W ≦ 0.1</td><td>—</td><td>(Neglected)</td></tr>
<tr><td rowspan="2">0.1 ＜ W ≦ 0.3</td><td>L ≦ 5.0</td><td>(Neglected)</td></tr>
<tr><td>5.0 ＜ L</td><td>0</td></tr>
<tr><td>0.3 ＜ W</td><td>—</td><td>0</td></tr>
</table></td></tr>
<tr><td colspan="2">Polarizer (Bubble)</td><td><table>
<tr><th>Size (mm)</th><th>Acceptable number</th></tr>
<tr><td>d ≦ 0.2</td><td>(Neglected)</td></tr>
<tr><td>0.2 ＜ d ≦ 0.3</td><td>5</td></tr>
<tr><td>0.3 ＜ d ≦ 0.5</td><td>3</td></tr>
<tr><td>0.5 ＜ d</td><td>0</td></tr>
</table></td></tr>
<tr><td colspan="2">Foreign particle (Circular shape)</td><td><table>
<tr><th>Size (mm)</th><th>Acceptable number</th></tr>
<tr><td>d ≦ 0.2</td><td>(Neglected)</td></tr>
<tr><td>0.2 ＜ d ≦ 0.4</td><td>5</td></tr>
<tr><td>0.4 ＜ d ≦ 0.5</td><td>3</td></tr>
<tr><td>0.5 ＜ d</td><td>0</td></tr>
</table></td></tr>
<tr><td colspan="2">Foreign particle (Linear shape)
Scratch</td><td><table>
<tr><th>Width (mm)</th><th>Length (mm)</th><th>Acceptable number</th></tr>
<tr><td>W ≦ 0.03</td><td>—</td><td>(Neglected)</td></tr>
<tr><td rowspan="3">0.03 ＜ W ≦ 0.1</td><td>L ≦ 2.0</td><td>(Neglected)</td></tr>
<tr><td>2.0 ＜ L ≦ 4.0</td><td>3</td></tr>
<tr><td>4.0 ＜ L</td><td>0</td></tr>
<tr><td>0.1 ＜ W</td><td>—</td><td>(According to circular shape)</td></tr>
</table></td></tr>
</table>