



OUR GLOBAL
COMPETENCE
CENTRES

 APOLLO DISPLAY
TECHNOLOGIES



 DISTEC



 DISPLAY
TECHNOLOGY



Datasheet

Kyocera

TCG070WVLRxPCx-GDx118

KY-01-018

The information contained in this document has been carefully researched and is, to the best of our knowledge, accurate. However, we assume no liability for any product failures or damages, immediate or consequential, resulting from the use of the information provided herein. Our products are not intended for use in systems in which failures of product could result in personal injury. All trademarks mentioned herein are property of their respective owners. All specifications are subject to change without notice.

SPEC

Spec No.	TQ3C-8EAF0-E1YAA152-01
Date	October 17, 2014

TYPE : TCG070WVLR*PC*-GD*118

< 7.0 inch WVGA transmissive color TFT with LED backlight and constant current circuit for LED backlight and touch panel >

CONTENTS

1. Application
2. Construction and outline
3. Mechanical specifications
4. Absolute maximum ratings
5. Electrical characteristics
6. Specification of function
7. Optical characteristics
8. Interface signals
9. Input timing characteristics
10. Lot number identification
11. Warranty
12. Precautions for use
13. Reliability test data
14. Outline drawing



KYOCERA DISPLAY CORPORATION

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
April 5, 2014	<i>S. Ohtaka</i>	<i>Y. Yamazaki</i>	<i>W. Yano</i>	<i>D. Sato</i>	<i>I. Hamada</i>

Spec No. TQ3C-8EAF0-E1YAA152-01	Part No. TCG070WVLR*PC*-GD*118	Page -
------------------------------------	-----------------------------------	-----------

:

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.**

Spec No. TQ3C-8EAF0-E1YAA152-01	Part No. TCG070WVLR*PC*-GD*118	Page -
------------------------------------	-----------------------------------	-----------

Revision record

Date		Designed by : Engineering dept.			Confirmed by : QA dept.	
		Prepared	Checked	Approved	Checked	Approved
Oct 17,2014		<i>S. Ohtaka</i>	<i>Y. Yamazaki</i>	<i>W. Yano</i>	<i>O. Sato</i>	<i>I. Hamada</i>
Rev.No.	Date	Page	Descriptions			
01	Oct 17,2014	1	2.Construction and outline ~Change the contents			
			3. Mechanical specifications ~Change the contents			
		5	5-2. Constant current circuit for LED Backlight ~Change Operating life time Typ."70,000h" → "100,000h"			
		7	6.Specification of function ~Change the contents			
		8	7. Optical characteristics ~Change the contents			
		22	12. Precautions for use ~Change the contents			

1. Application

This document defines the specification of TCG070WVLR*PC*-GD*118. (RoHS Compliant)

2. Construction and outline

LCD	: Transmissive color dot matrix type TFT
Backlight system	: LED
Polarizer	: Glare treatment
LCD Interface	: LVDS
Additional circuit	: Timing controller, Power supply (3.3V input) With Constant current circuit for LED Backlight
Touch panel	: Projected capacitive touch panel
Touch panel Interface	: USB(Equipped Touch panel IC)
Surface film	: Anti-Glare Anti-finger print treatment

3. Mechanical specifications

Item	Specification	Unit
Outline dimensions 1)	169.8(W)×109.7(H)×(9.2)(D)	mm
Active area (LCD)	152.4(W)×91.44(H) (17.8cm/7.0 inch(Diagonal))	mm
Active area (Touch panel)	152.4(W)×91.44(H)	mm
Dot format	800×(R,G,B)(W)×480(H)	dot
Dot pitch	0.0635(W)×0.1905(H)	mm
Base color 2)	Normally Black	-
Surface hardness 3)	3H	-
Mass	(260)	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.

3) Conforms to JIS K54000 8-4

4. Absolute maximum ratings

4-1. Electrical absolute maximum ratings

Item	Symbol	Min.	Max.	Unit	
Supply voltage(+3.3V)	V _{DD}	-0.3	4.0	V	
Supply voltage(+12V)	V _{IN}	-0.3	14.0	V	
Input signal voltage 2)	RxIN _i +, RxIN _i - 1)	V _{I1}	-0.3	2.8	V
	CK IN+, CK IN-	V _{I2}	-0.3	2.8	V
	SELLVDS, BITSEL, SC	V _{I3}	-0.3	V _{DD} +0.5	V
	BLBRT, BLEN	V _{I4}	-0.3	V _{IN}	V
Supply voltage for touch panel	V _{TP}	-0.3	(5.25)	V	

- 1) i=0,1,2,3
- 2) V_{DD} must be supplied correctly within the range described in 5-1.

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.)
- 4) Non-condensing
- 5) 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/s ²)
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

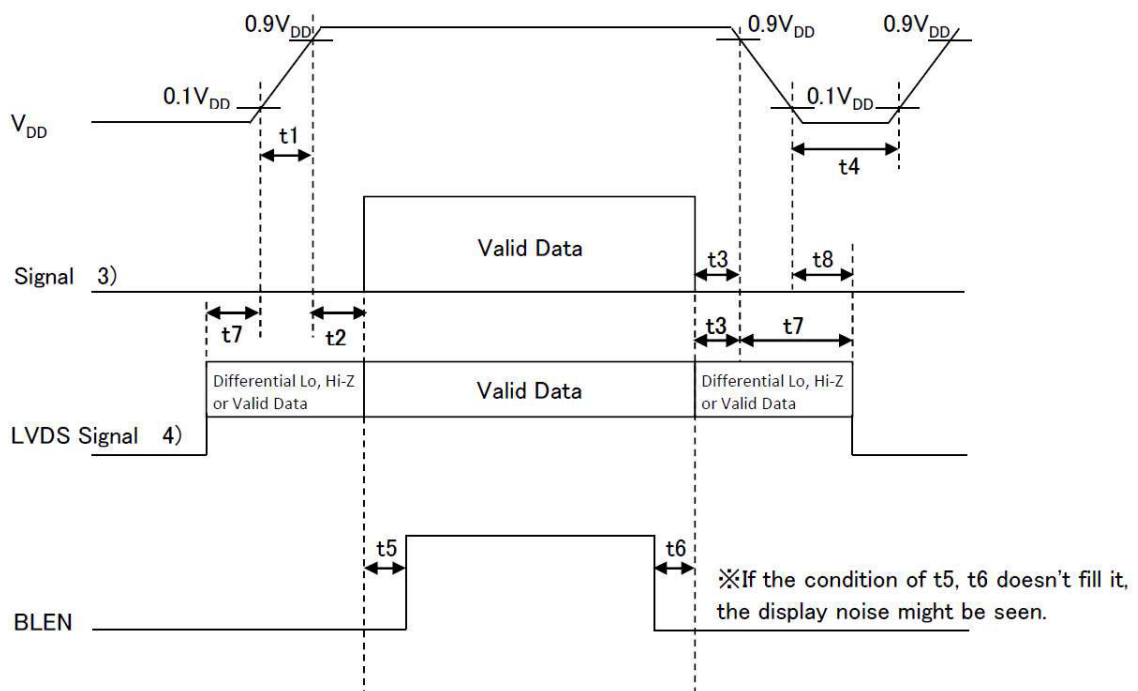
5. Electrical characteristics

5-1. LCD

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)	-	200	260	mA
Permissible input ripple voltage	V_{RP}	$V_{DD}=3.3V$	-	-	100	mVp-p
Input signal voltage 3)	V_{IL}	"Low" level	0	-	0.8	V
	V_{IH}	"High" level	2.0	-	V_{DD}	V
Input leak current	I_{OL}	$V_{I3}=0V$	-10	-	10	μA
	I_{OH}	$V_{I3}=3.3V$	-	-	400	μA
LVDS Input voltage 4)	V_L	-	0	-	1.9	V
Differential input voltage 4)	V_{ID}	-	250	350	450	mV
Differential input threshold voltage 4) 5)	V_{TL}	"Low" level	$V_{CM}-100$	-	-	mV
	V_{TH}	"High" level	-	-	$V_{CM}+100$	mV
Terminator	R_1	-	-	100	-	Ω
V_{DD} -turn-on conditions 1) 6)	t_1	-	0.1	-	10	ms
	t_2	-	0	-	-	ms
	t_3	-	0	-	-	ms
	t_4	-	1.0	-	-	s
	t_5	-	200	-	-	ms
	t_6	-	200	-	-	ms
	t_7	-	0	-	10	s
	t_8	-	0	-	-	ms

1) V_{DD} -turn-on conditions

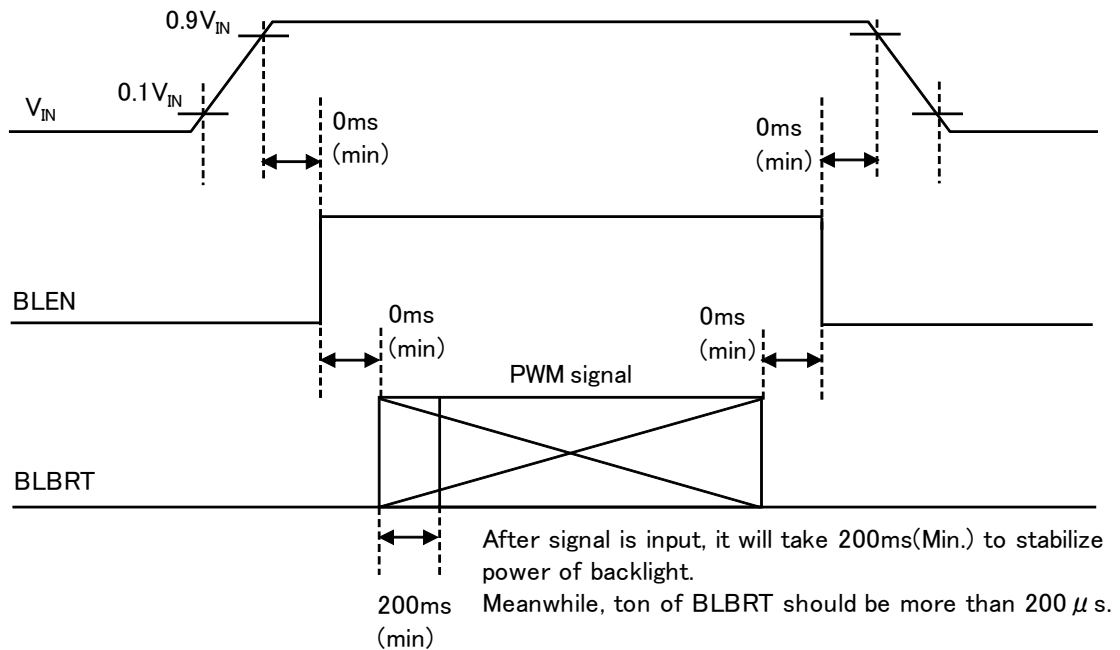


5-2. Constant current circuit for LED Backlight

Temp. = -20~70°C

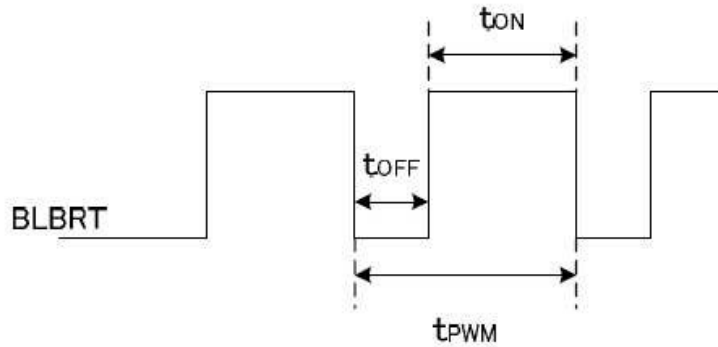
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage 1)	V_{IN}	-	10.8	12.0	13.2	V
Current consumption	I_{IN}	2)	-	235	400	mA
Permissive input ripple voltage	V_{RP_BL}	$V_{IN}=12.0V$	-	-	100	mVp-p
BLBRT Input signal voltage	V_{IL_BLBRT}	"Low" level	0	-	0.8	V
	V_{IH_BLBRT}	"High" level	2.3	-	V_{IN}	V
BLBRT Input pull-down resistance	R_{IN_BLBRT}	-	100	300	500	k Ω
BLEN Input signal voltage	V_{IL_BLEN}	"Low" level	0	-	0.8	V
	V_{IH_BLEN}	"High" level	2.3	-	V_{IN}	V
BLEN Input pull-down resistance	R_{IN_BLEN}	-	100	300	500	k Ω
PWM Frequency 3)	f_{PWM}	-	200	-	10k	Hz
PWM Duty ratio 3)	D_{PWM}	$f_{PWM}=200Hz$	1	-	100	%
		$f_{PWM}=2kHz$	10	-	100	%
		$f_{PWM}=10kHz$	50	-	100	%
Operating life time 4), 5)	T	Temp.=25°C	-	100,000	-	h

1) V_{IN} -turn-on conditions



2) $V_{IN} = 12V$, Temp. = $25^{\circ}C$, $D_{PWM} = 100\%$

3) PWM Timing Diagram



$t_{ON}, t_{OFF} \geq 50 \mu s$.

In case of lower frequency, the deterioration of the display quality, flicker etc., may occur.

- 4) When brightness decrease 50% of minimum brightness.
The average life of a LED will decrease when the LCD is operating at higher temperatures.
- 5) Life time is estimated data. (Condition : $I_F=60mA$, $T_a=25^{\circ}C$ in chamber).

5-3. Touch panel

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	V_{TP}	—	(4.75)	(5.0)	(5.25)	V
Current consumption	I_{TP}	1)	—	(40)	(52)	mA
Input signal voltage 2)	V_{TPSL}	"Low" level	(-0.3)	—	(0.3 V_{TP})	V
	V_{TPSH}	"High" level	(0.7 V_{TP})	—	($V_{TP}+0.3$)	V

- 1) Condition : $V_{TP}=5.0V$
Temp. = $25^{\circ}C$, 2 point touch
- 2) Accommodation : D-, D+

6 . Specification of function

Item	Description	Note
Resolution	800 × 480	-
Starting point	upper left	1)
Input 2)	finger	-
Recommended touch sensor area	φ10.0 mm	-
Number of touch point	2 point	-
Linearity	less than ±2.0mm	3) 4)
Interface	USB	-
OS	Windows 7, Linux, Android	-

- 1) Please refer to outline drawing in details.
- 2) As for input with gloves, separate discussion for feasibility is needed.
- 3) Performance of linearity is under the environment of no noise.
- 4) Linearity is not guaranteed. It is for reference only.
- 5) Structure which has common GND for touch panel and LCD is recommended.

7. Optical characteristics

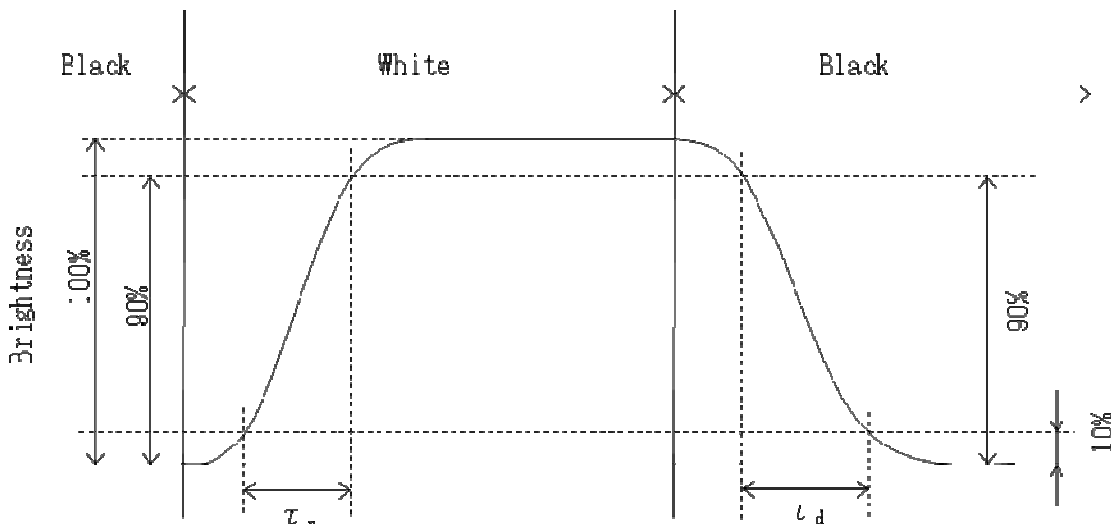
Measuring spot = ϕ 6.0mm, Temp. = 25°C

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Response time	Rise	τ_r	$\theta = \phi = 0^\circ$	-	(18)	-	ms
	Down	τ_d	$\theta = \phi = 0^\circ$	-	(12)	-	ms
Viewing angle range View direction		θ_{UPPER}	CR \geq 10	-	(85)	-	deg.
		θ_{LOWER}		-	(85)	-	
		ϕ_{LEFT}		-	(85)	-	deg.
		ϕ_{RIGHT}		-	(85)	-	
Contrast ratio		CR	$\theta = \phi = 0^\circ$	(450)	(650)	-	-
Brightness		L	IF=60mA/Line	(350)	(500)	-	cd/m ²
Chromaticity coordinates	Red	x	$\theta = \phi = 0^\circ$	(0.550)	(0.600)	(0.650)	-
		y		(0.300)	(0.350)	(0.400)	
	Green	x	$\theta = \phi = 0^\circ$	(0.285)	(0.335)	(0.385)	
		y		(0.520)	(0.570)	(0.620)	
	Blue	x	$\theta = \phi = 0^\circ$	(0.100)	(0.150)	(0.200)	
		y		(0.070)	(0.120)	(0.170)	
	White	x	$\theta = \phi = 0^\circ$	(0.270)	(0.320)	(0.370)	
		y		(0.295)	(0.345)	(0.395)	

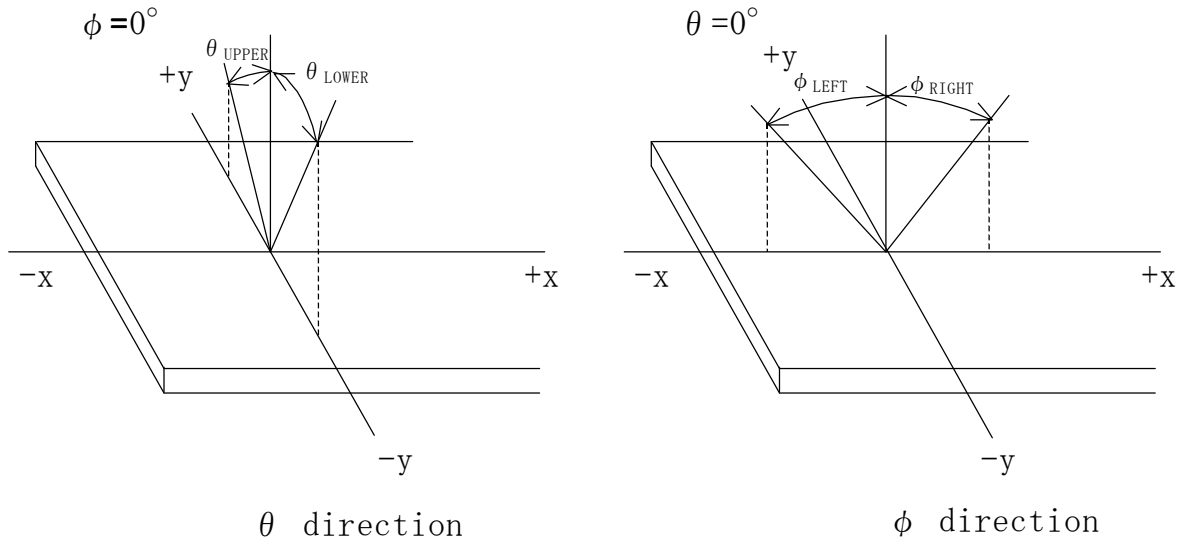
7-1. Definition of contrast ratio

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

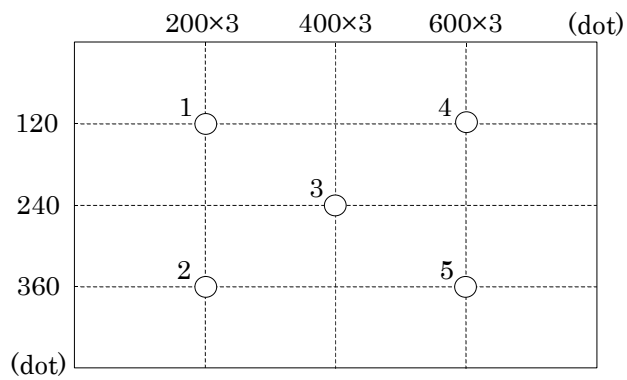
7-2. Definition of response time



7-3. Definition of viewing angle



7-4. Brightness measuring points



- 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°C)

8. Interface signals

8-1. Interface signals

No.	Symbol	Description	Note
1	BITSEL	Bit data select signal(GND or Open: 8bit mode、High: 6bit mode)	
2	SELLVDS	Mode select signal(LVDS Data mapping)	
3	GND	GND	
4	GND	GND	
5	RxIN3+	LVDS receiver signal CH3(+)	LVDS
6	RxIN3-	LVDS receiver signal CH3(-)	LVDS
7	GND	GND	
8	CK IN+	LVDS receiver signal CK(+)	LVDS
9	CK IN-	LVDS receiver signal CK(-)	LVDS
10	GND	GND	
11	RxIN2+	LVDS receiver signal CH2(+)	LVDS
12	RxIN2-	LVDS receiver signal CH2(-)	LVDS
13	GND	GND	
14	RxIN1+	LVDS receiver signal CH1(+)	LVDS
15	RxIN1-	LVDS receiver signal CH1(-)	LVDS
16	GND	GND	
17	RxIN0+	LVDS receiver signal CH0(+)	LVDS
18	RxIN0-	LVDS receiver signal CH0(-)	LVDS
19	GND	GND	
20	GND	GND	
21	V _{DD}	+3.3V power supply	
22	V _{DD}	+3.3V power supply	
23	SC	Scan direction control(High or Open: Normal、 GND: Reverse)	1)
24	BLBRT	PWM signal(Brightness adjustment)	
25	BLEN	ON/OFF terminal voltage	
26	NC	NC	
27	V _{IN}	+12V power supply	
28	V _{IN}	+12V power supply	
29	GNDB	GND (Backlight)	
30	GNDB	GND (Backlight)	

LCD connector : FI-X30SSLA-HF (JAE)
 Matching connector : FI-X30HL (JAE)
 FI-X30HL-T (JAE)
 FI-X30C2L-NPB (JAE)
 FI-X30C2L-T-NPB (JAE)

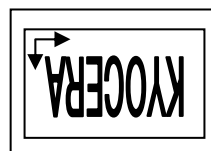
LVDS receiver : Embedded in ASIC
 Matching LVDS transmitter : THC63LVDM83R(THine Electronics) or compatible

1) Scanning

SC : High or Open



SC : GND

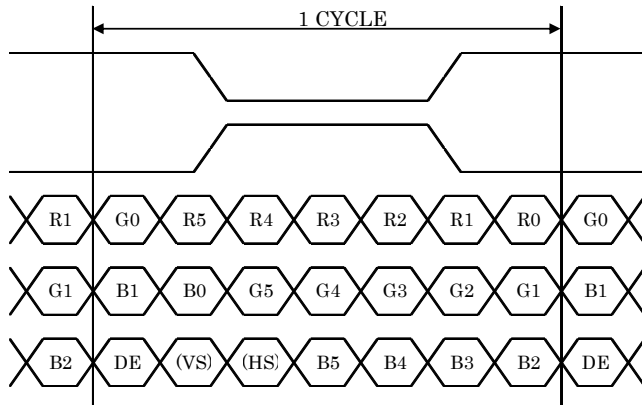


8-2. Data mapping (6bit input / 8bit mode)

1) Location of BITSEL, SELLVDS (THC63LVDM83R(THine Electronics) or compatible)

Transmitter		1Pin BITSEL = "L" or OPEN 2Pin SELLVDS = "L" or OPEN	1Pin BITSEL = "L" or OPEN 2Pin SELLVDS = "H"
Pin No.	Data		
51	TA0	—	R0(LSB)
52	TA1	—	R1
54	TA2	—	R2
55	TA3	—	R3
56	TA4	—	R4
3	TA5	—	R5(MSB)
4	TA6	—	G0(LSB)
6	TB0	—	G1
7	TB1	—	G2
11	TB2	—	G3
12	TB3	—	G4
14	TB4	—	G5(MSB)
15	TB5	—	B0(LSB)
19	TB6	—	B1
20	TC0	—	B2
22	TC1	—	B3
23	TC2	—	B4
24	TC3	—	B5(MSB)
27	TC4	—	(HS)
28	TC5	—	(VS)
30	TC6	—	DE
50	TD0	—	GND
2	TD1	—	GND
8	TD2	—	GND
10	TD3	—	GND
16	TD4	—	GND
18	TD5	—	GND
25	TD6	—	GND

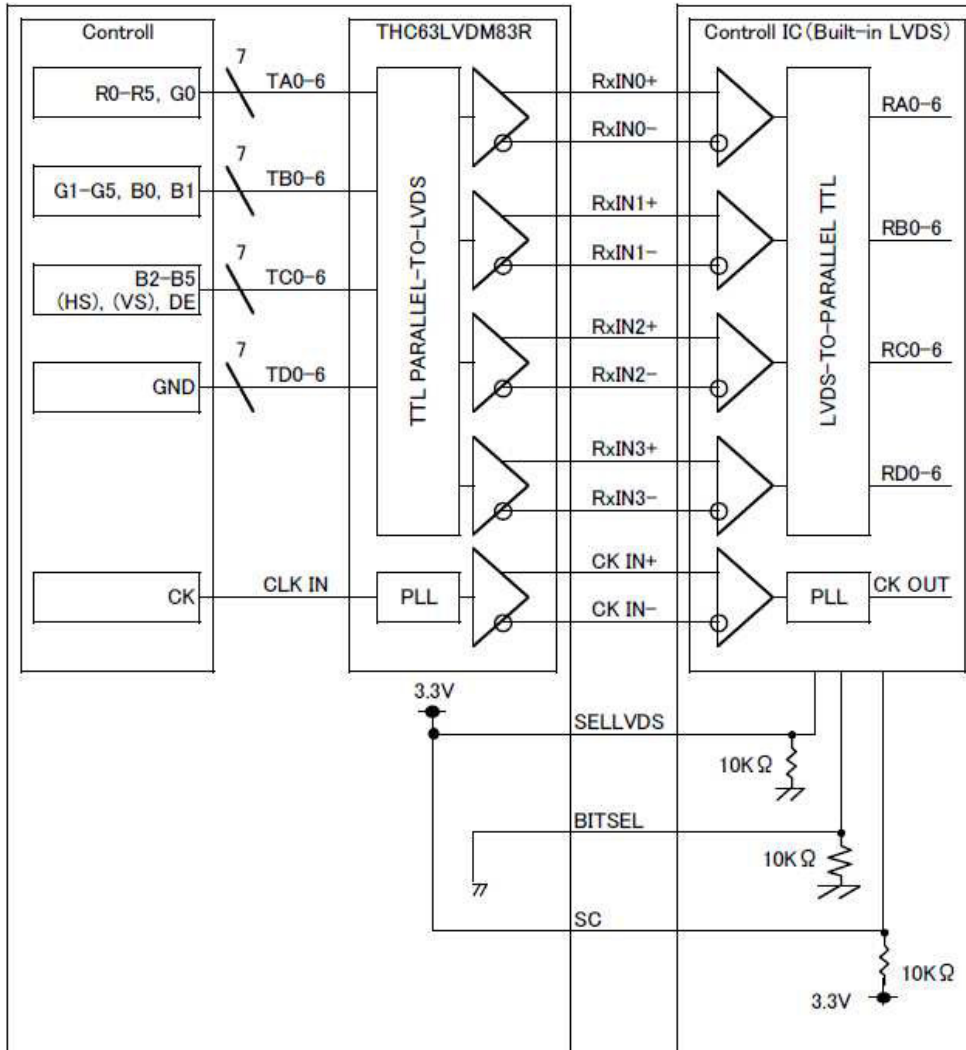
BITSEL=L(GND) or OPEN
 SELLVDS=H(3.3V)



DE : DATA ENABLE
 HS : H_{SYNC}
 VS : V_{SYNC}

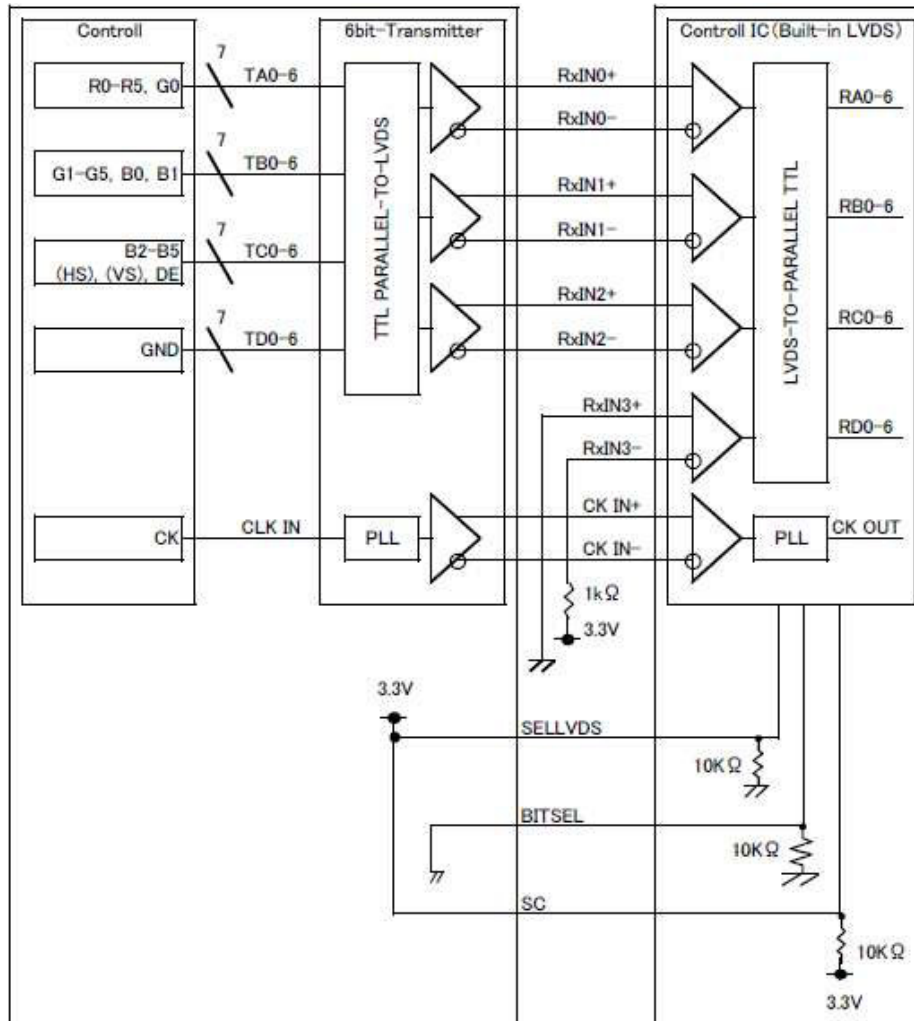
2) Block Diagram

BITSEL=L(GND) or OPEN
SELLVDS=H(3.3V)



※SELLVDS signal line has 10 k Ω pulldown resister.

When using “6-bit Transmitter”, please connect the unused channel of the control IC receiver as described in the diagram below.



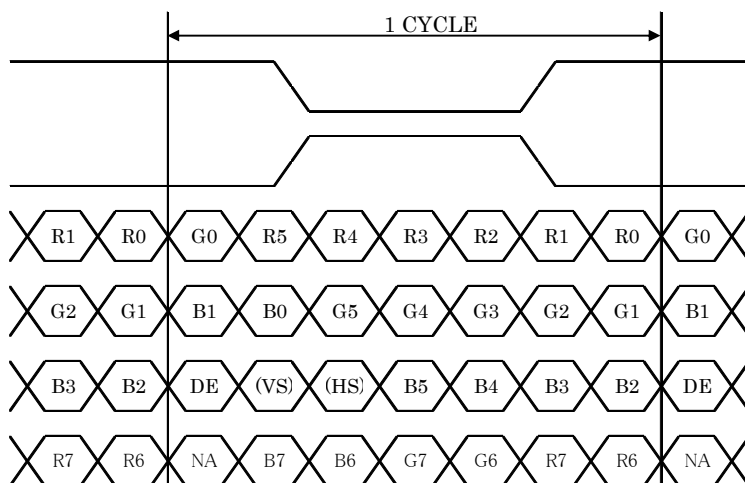
※SELLVDS signal line has 10 k Ω pull-down resistor.

8-3. Data mapping (8bit input / 8bit mode)

1) Location of BITSEL, SELLVDS (THC63LVDM83R(THine Electronics) or compatible)

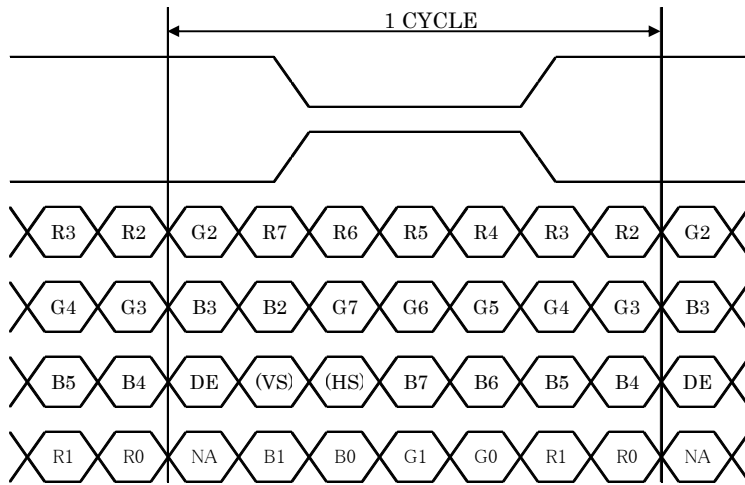
Transmitter		1Pin BITSEL = "L" or OPEN 2Pin SELLVDS = "L" or OPEN	1Pin BITSEL = "L" or OPEN 2Pin SELLVDS = "H"
Pin No.	Data		
51	TA0	R0(LSB)	R2
52	TA1	R1	R3
54	TA2	R2	R4
55	TA3	R3	R5
56	TA4	R4	R6
3	TA5	R5	R7(MSB)
4	TA6	G0(LSB)	G2
6	TB0	G1	G3
7	TB1	G2	G4
11	TB2	G3	G5
12	TB3	G4	G6
14	TB4	G5	G7(MSB)
15	TB5	B0(LSB)	B2
19	TB6	B1	B3
20	TC0	B2	B4
22	TC1	B3	B5
23	TC2	B4	B6
24	TC3	B5	B7(MSB)
27	TC4	(HS)	(HS)
28	TC5	(VS)	(VS)
30	TC6	DE	DE
50	TD0	R6	R0(LSB)
2	TD1	R7(MSB)	R1
8	TD2	G6	G0(LSB)
10	TD3	G7(MSB)	G1
16	TD4	B6	B0(LSB)
18	TD5	B7(MSB)	B1
25	TD6	(NA)	(NA)

BITSEL=L(GND) or OPEN
SELLVDS=L(GND) or OPEN



DE : DATA ENABLE
HS : H_{SYNC}
VS : V_{SYNC}

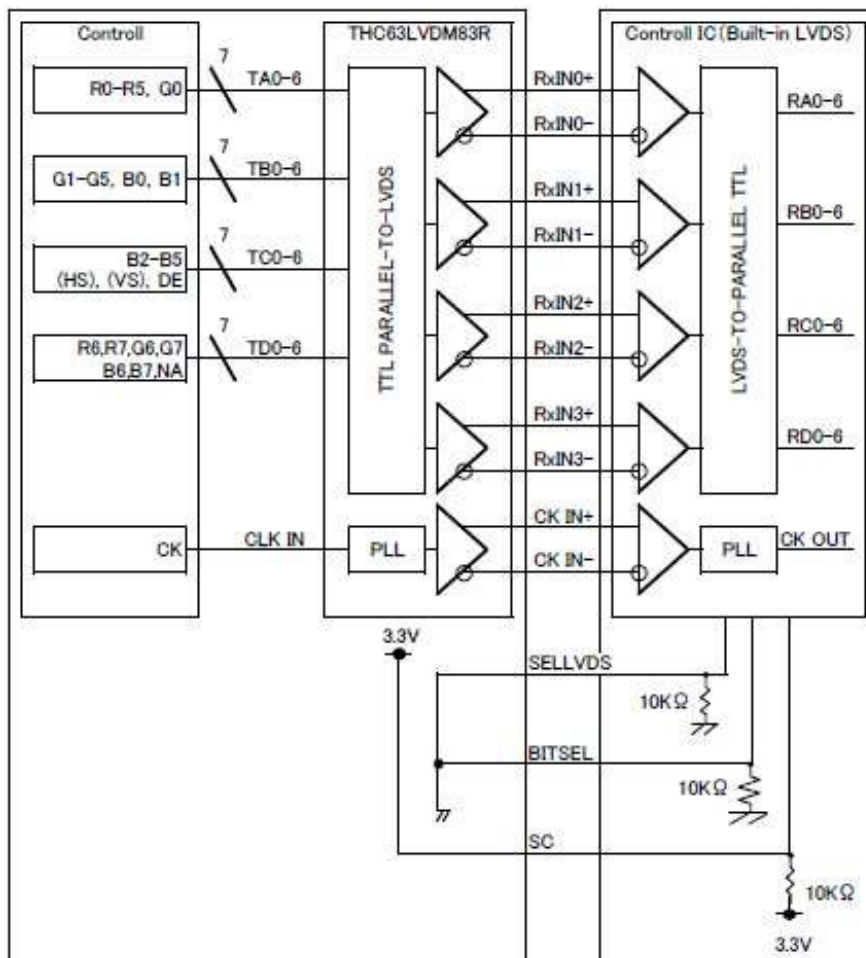
BITSEL=L(GND) or OPEN
SELLVDS=H(3.3V)



DE : DATA ENABLE
HS : H_{SYNC}
VS : V_{SYNC}

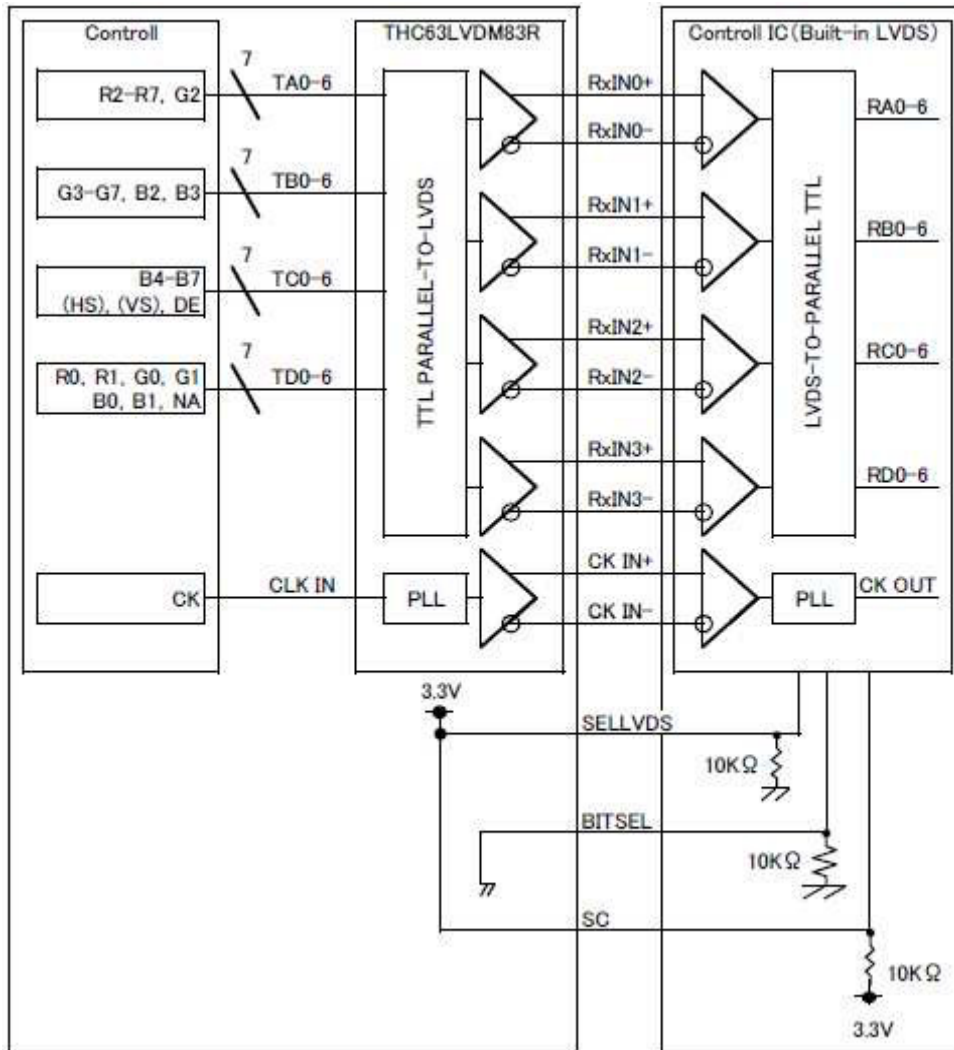
2) Block Diagram

BITSEL=L(GND) or OPEN
SELLVDS=L(GND) or OPEN



※SELLVDS signal line has 10 k Ω pulldown resistor.

BITSEL=L(GND) or OPEN
SELLVDS=H(3.3V)



※SELLVDS signal line has 10 k Ω pulldown resistor.

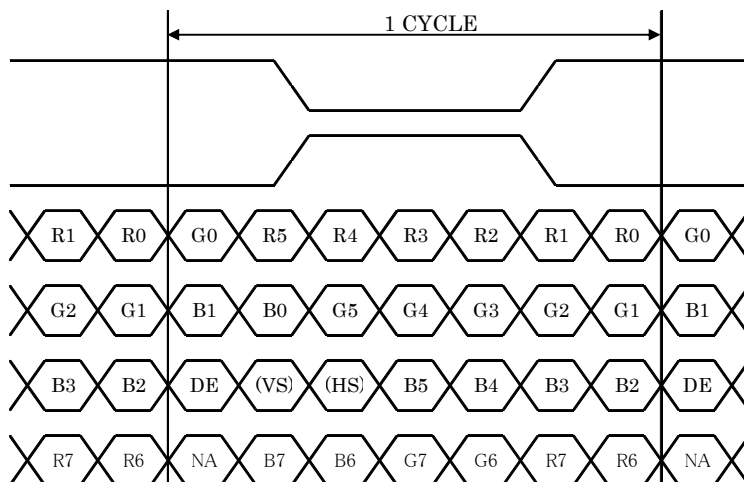
8-4. Data mapping (6bit input / 6bit mode)

1) Location of BITSEL, SELLVDS (THC63LVDM83R(THine Electronics) or compatible)

Transmitter		1Pin BITSEL = "H" 2Pin SELLVDS = "L" or OPEN	1Pin BITSEL = "H" 2Pin SELLVDS = "H"
Pin No.	Data		
44	TA0	R0(LSB)	—
45	TA1	R1	—
47	TA2	R2	—
48	TA3	R3	—
1	TA4	R4	—
3	TA5	R5(MSB)	—
4	TA6	G0(LSB)	—
6	TB0	G1	—
7	TB1	G2	—
9	TB2	G3	—
10	TB3	G4	—
12	TB4	G5(MSB)	—
13	TB5	B0(LSB)	—
15	TB6	B1	—
16	TC0	B2	—
18	TC1	B3	—
19	TC2	B4	—
20	TC3	B5(MSB)	—
22	TC4	(HS)	—
23	TC5	(VS)	—
25	TC6	DE	—

BITSEL=H(3.3V)

SELLVDS=L(GND) or OPEN



DE : DATA ENABLE

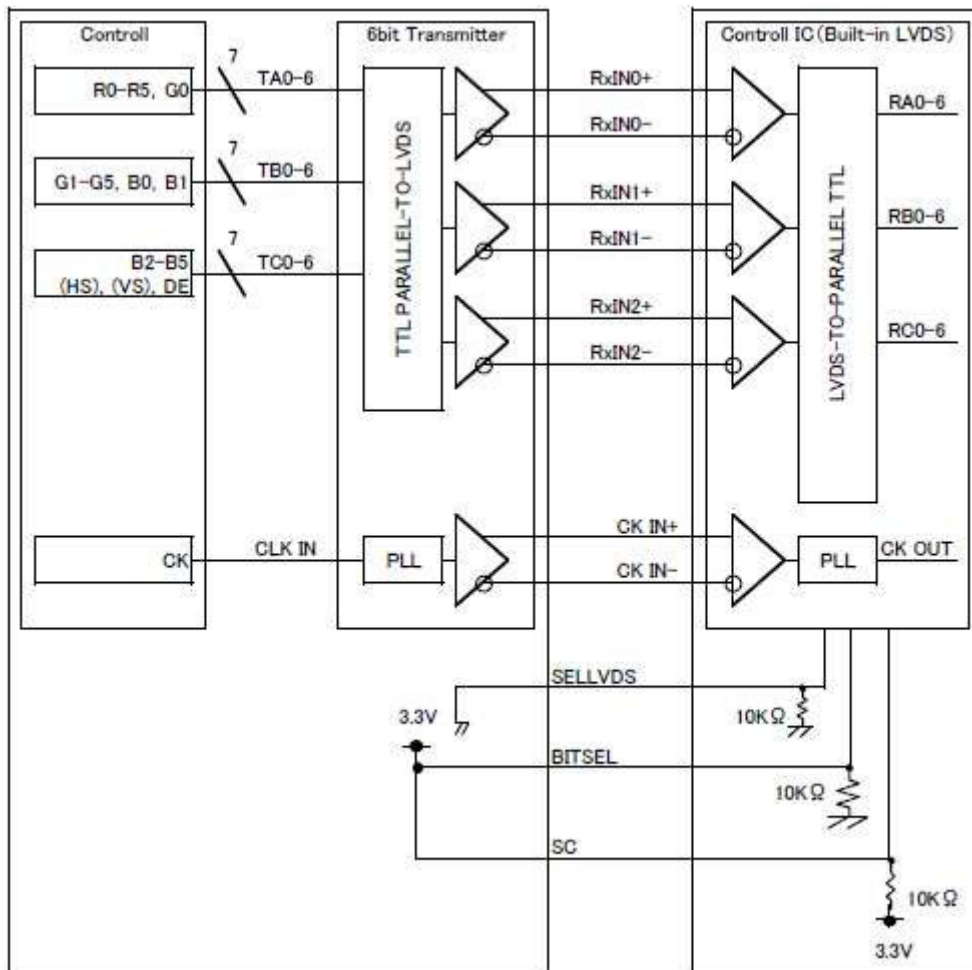
HS : H_{SYNC}

VS : V_{SYNC}

2) Block Diagram

BITSEL=H(3.3V)

SELLVDS=L(GND) or OPEN



※SELLVDS signal line has 10 k Ω pull-down resistor.

8-5. Touch panel

No.	Symbol	Description	Note
1	V _{TP}	Supply voltage(+5.0V)	-
2	D-	USBDM	-
3	D+	USBDP	-
4	NC	No connect	-
5	GND	GND	-

1) Please contact to us for the detail such as timing.

Touch panel connector : DF57H-5P-1.2V (HIROSE)

Matching connector : DF57H-5S-1.2C (HIROSE)

9. Input timing characteristics

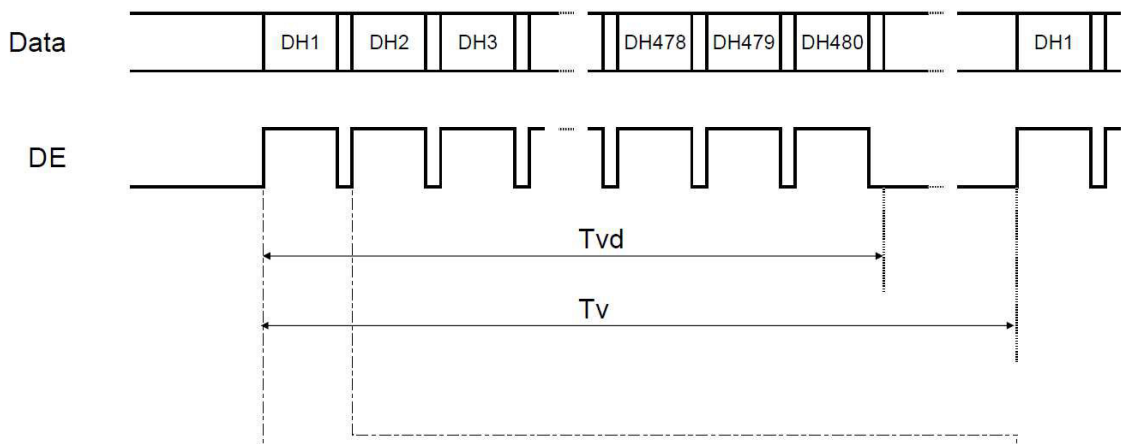
9-1. Timing characteristics

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Clock (CK)	Frequency	1/Tc	29.88	33.20	36.52	MHz	
Enable signal (DE)	Horizontal Period	Th	1,024	1,056	1,088	Tc	
			-	31.8	-	μs	1)
	Horizontal display period	Thd	800			Tc	
	Vertical Period	Tv	487	525	550	Th	
	Vertical display period	Tvd	480			Th	
Refresh rate		fv	50	60	70	Hz	2)

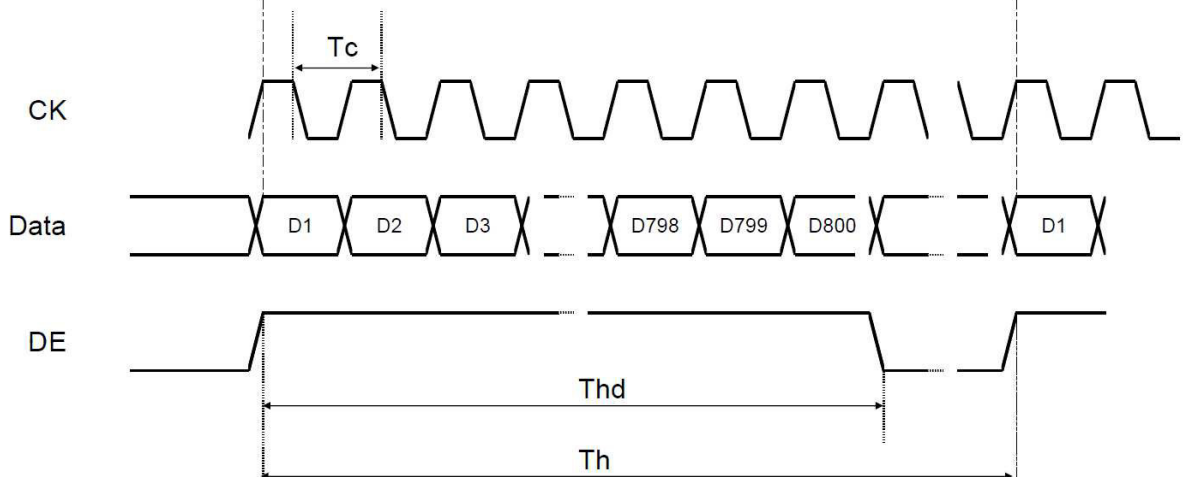
1) Please set a clock frequency, a vertical dormant period, and the horizontal dormant period so that the Horizontal Period should not reach less than Min. value.

2) If the refresh rate reach less than Min. value, the deterioration of the display quality, flicker etc., may occur.($fv=1/Tv$)

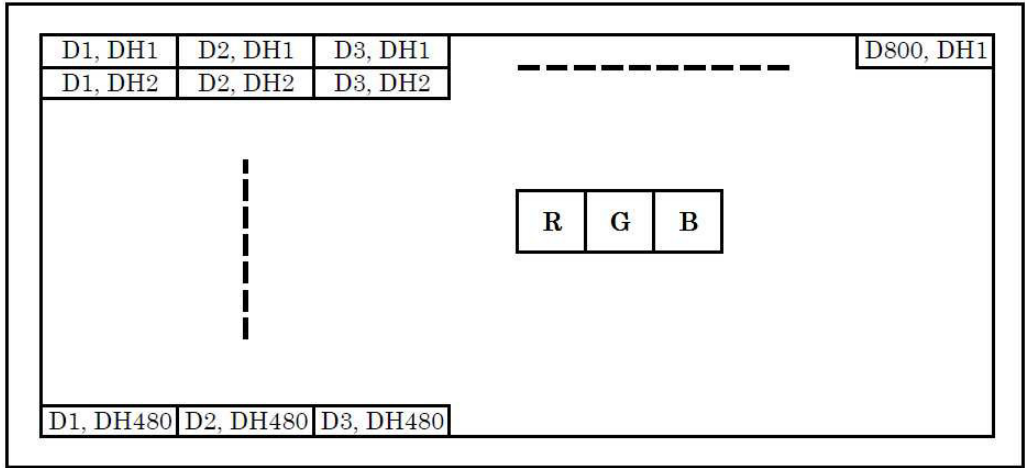
Vertical Timing Diagram



Horizontal Timing Diagram



9-2. Input Data Signals and Display position on the screen



10. Lot number identification

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

TCG070WVLR*PC*-GD*118 - □□ - □□ - □ 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	2014	2015	2016	2017	2018	2019
Code	4	5	6	7	8	9

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.

Spec No.	Part No.	Page
TQ3C-8EAF0-E1YAA152-01	TCG070WVLR*PC*-GD*118	22

12. Precautions for use

12-1. Installation of the LCD

- 1) The product shall be installed so that there is no pressure on the LSI chips.
- 2) When LCD is installed, power shall be put off. Same applies to plug in/out of FFC/FPC/Cable.
- 3) When handling connector, please do not make any excessive pressure than needed. It may damage the LCD.
- 4) Since this product is wide viewing product, occurrence level of in-plane unevenness by the external stress is different compared to current normal viewing product. So there is a possibility that in-plane unevenness will be occurred by over twist, strain giving by attaching to LCD, and over pressure to touch panel. Please be careful of stress when designing the housing.
- 5) A transparent protection sheet is attached to the touch panel. Please remove the protection film slowly before use, paying attention to static electricity.
- 6) Touch location is detected by the change of capacitance. Therefore, if there is any factor close to LCD which may change electric field, malfunction may be caused as it may give adverse effect on coordinate detecting mechanism.
- 7) When designing your case, using material composed with insulating resin is recommended for bezel of touch panel. When metal plate is used, malfunction may be caused by the occurrence of capacitance coupling on the periphery of active area.
- 8) The Bezel on the upper part of Touch-Panel recommends using the material which consists of "Insulating Resin", when designing the housing. Otherwise, Malfunction may be caused by occurring "capacitive coupling with sheet metal" in the perimeter part of active area if sheet metal is used.

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 product shall be operated within the limits specified. Operation at values outside of these limits may shorten life, and/or harm display images.
- 2) This product shall be operated in the atmosphere free from high temperature, high humidity, condensation and chemical atmospheres such as salt, acid and alkaline, which may cause gas corrosion, in order to prevent damage of this product and electrification.
- 3) Please select the best display pattern based on your evaluation because flicker, lines or nonuniformity or unevenness can be visible depending on display patterns.
- 4) There is possibility to cause malfunction by using the touch panel with droplets or conductive this product on the surface of touch panel, please design the software with having discussion between both companies.
- 5) It is simulated that input for this product will be done by fingers. Please let us know if the input will be done except by fingers since it needs to change the setting.

12-4. Storage

- 1) The product shall be stored within the temperature and humidity limits specified.
Store in a dark area, and protect the product from direct sunlight or fluorescent light.
- 2) Always store the product so that it is free from external pressure onto it.
- 3) Please store the product board in a location that is free of dust, corrosive elements, or environmental gas (such as acid and alkali salts).

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.

Spec No.	Part No.	Page
TQ3C-8EAF0-E1YAA152-01	TCG070WVLR*PC*-GD*118	23

- 2) Do not push or rub the panel's surface with hard to sharp objects such as knives, or the touch panel may be scratched.
- 3) In case a surface of touch panel gets dirty, please wipe gently with soft cotton by soaking in a neutral detergent or small amount of ethyl alcohol. Please exercise caution in when handling hazardous chemicals.
- 4) The product is made of glass. It may break when dropped, or vibrated excessively. Usually there is a film on the surface of the glass which would prevent broken glass from scattering, but nevertheless handle it carefully during assembly and treat it gently during use. Please take extra caution to the edge due to less strength than surface can cause glass to break.
- 5) Please implement protective countermeasures against high voltage surges such as lightning strikes. Damaged may be caused by abnormal voltage.
- 6) The product is not designed as anti-radiation product.
- 7) Always keep the product free from condensation during testing. Condensation may permanently spot or stain the polarizer and film.
- 8) Do not make over circuit board because it will result in damage.
- 9) This product 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 product is supposed to be used in a special environment, evaluate the product thoroughly beforehand and do not expose the product to chemicals such as an active gas.
- 10) 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.
- 11) Liquid crystal may leak when the product 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

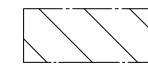
- 1) For shelf test (including temperature cycling), after leaving this LCD for predefined time under each environment, leaving back to room temperature and make measurement after 2 hours.
- 2) Under each operating test for touch panel, after leaving touch panel conducting with 5.0V or 3.3V under each environment (without pushing touch panel active area), leaving back to room temperature and make measurement after 2 hours.
- 3) Each test item uses a test only once. The tested LCD is not used in any other tests.
- 4) The LCD is tested in circumstances in which there is no condensation.
- 5) The reliability test is not an out-going inspection.
- 6) The result of the reliability test is for your reference purpose only.
The reliability test is conducted only to examine the LCD's capability.

TENTATIVE

It is possible to change some dimensions.
(本図記載の形状・及び寸法値は変更の可能性があります)

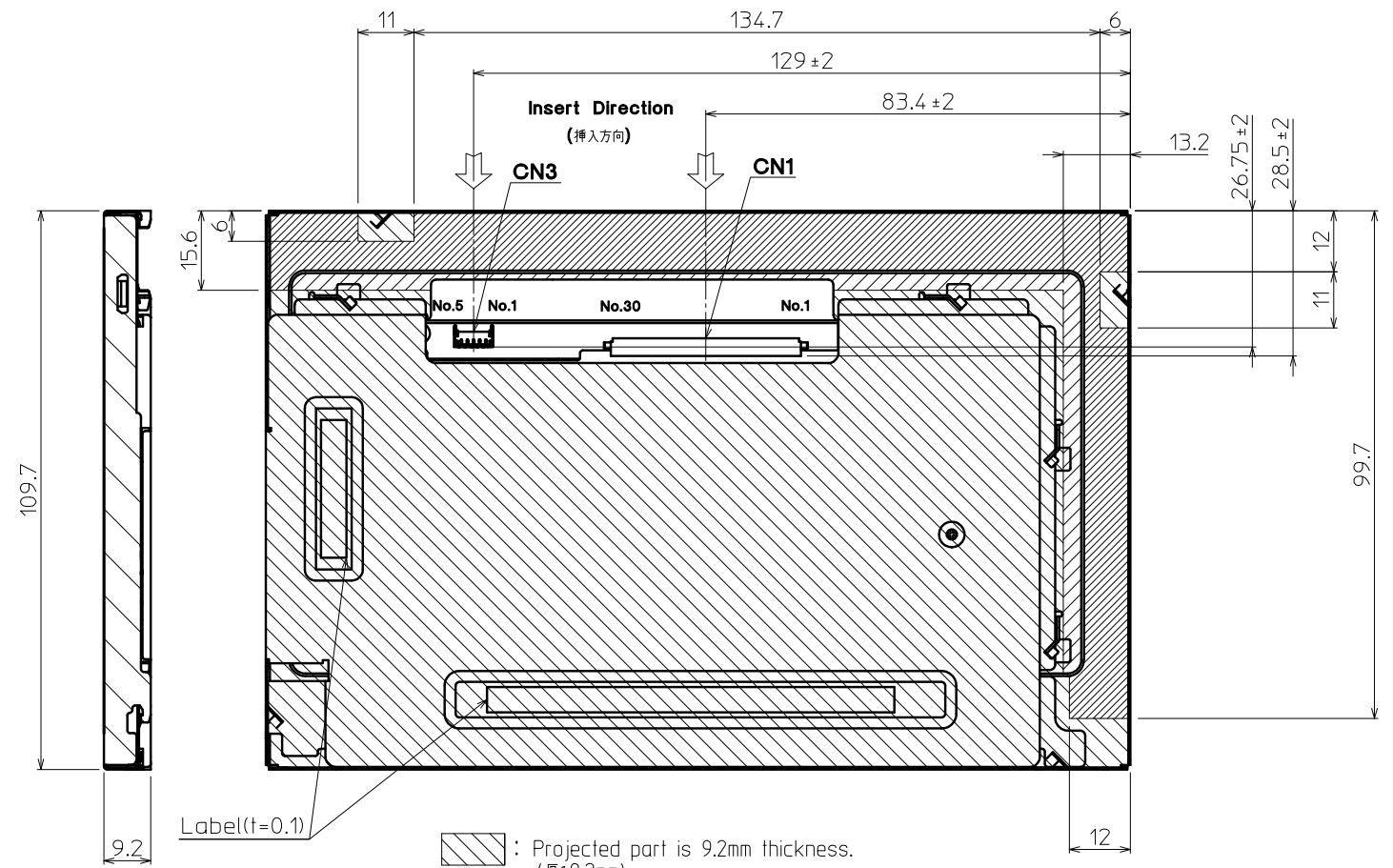
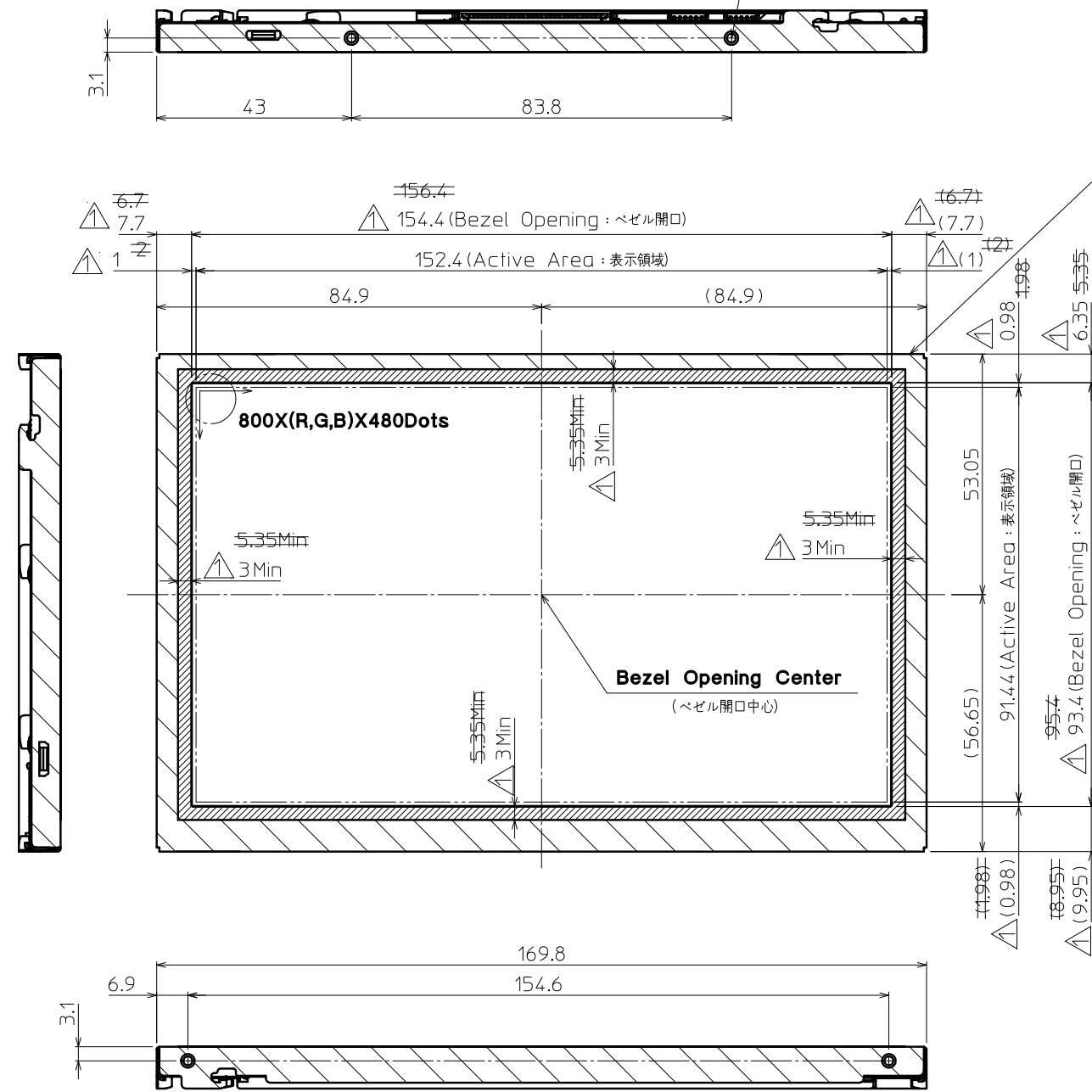
No	Description	Drawn	Checked	Checked	Approved
▲	-Change Bezel Opening.(開口寸法変更) -Change Painted black Guaranteed area. (黒塗装保証エリア変更) -Change Hook Shape. (カフマ形状変更) -Change Title.(品名変更)	'14.03.03 蔭山	'14.03.04 倉元		'14.03.04 朝倉



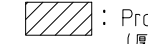
4-M2 USER HOLE
MIN DEPTH : 2.5mm
MAX TORQUE : 2.0kgf・cm

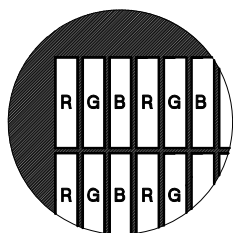
 Scattering of paint is not asked
(塗料の飛散は不問とする)

 Painted black Guaranteed area.
(黒塗装処理保証エリア)

▲ Around Bezel Opening (154.4×93.4) Min.3 (156.4×95.4) Min.5.35
And Edge of Bezel Opening.
(ベゼル開口周辺 Min.3、開口部端面含む)
Min.5.35



-  : Projected part is 9.2mm thickness. (厚み9.2mm)
-  : Projected part is 6.6mm thickness. (厚み6.6mm)
-  : Projected part is 6.1mm thickness. (厚み6.1mm)





DETAIL A (Dot Size)
(NTS)

Note. (注記)

1. Connector CN1: FI-X30SSLA-HF (JAE)
Connector CN2: DF57H-5P-1.2V (HIROSE)
(コネクタ)
2. Matching Connector CN1: FI-X30HL, FI-X30HL-T
FI-X30C2L-NPB, FI-X30C2L-T-NPB (JAE)
Matching Connector CN2: DF57H-5S-1.2C (HIROSE)
(適合コネクタ)

3. 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。)
4. Tolerance without indication : ±0.5
(指示無き公差)
5. There is a possibility that in-plane unevenness will be occurred by over twist, stress giving by attaching to LCD, and over pressure to touch panel.
Please be careful of stress when designing the housing.
(過度な捻じり(ひずみ)、LCD固定時での応力発生、タッチパネルでの過度な押し圧によっては、パネル面内にムラが発生することがありますので、筐体設計において、事前に十分確認願います。)

Material 材質	Treatment 処理	Approved '13.11.07	Checked	Checked '13.11.07	Drawn	Scale 1:1(NTS)	Title ▲ TCG070WVLR*PC*-GD*118 109		Year-Month-Day '13.11.07	Size 2
Quantity 製作数	Description; 備考	朝倉	倉元	蔭山		Outline Dimensions	Drawing No. 13349-08048-1			

Spec No.	TQ3C-8EAF0-E2YAA152-01
Date	October 17, 2014

KYOCERA INSPECTION STANDARD

TYPE : TCG070WVLR*PC*-GD*118

KYOCERA DISPLAY CORPORATION

Original Issue Date	Designed by : Engineering dept.			Confirmed by : QA dept.	
	Prepared	Checked	Approved	Checked	Approved
April 5, 2014	<i>S. Ohtaka</i>	<i>Y. Yamazaki</i>	<i>W. Yano</i>	<i>O. Sato</i>	<i>I. Hamada</i>

Spec No.
TQ3C-8EAF0-E2YAA152-01

Part No.
TCG070WVLR*PC*-GD*118

Page
-

Revision record

Date	Designed by : Engineering dept.			Confirmed by : QA dept.	
	Prepared	Checked	Approved	Checked	Approved
Oct 17,2014	<i>S. Ohtaka</i>	<i>Y. Yamazaki</i>	<i>W. Yano</i>	<i>O. Sato</i>	<i>I. Hamada</i>

Rev.No.	Date	Page	Descriptions
01	Oct 17,2014	1	Change "Definition of inspection item" Bright dot defect

--	--	--	--

Visuals specification

1) Note

		Note		
General	<p>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.</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. Inspection conditions</p> <p>Luminance : 500 Lux min.</p> <p>Inspection distance : 300 mm.</p> <p>Temperature : 25 ± 5°C</p> <p>Direction : Directly above</p>			
Definition of inspection item	Dot defect	Bright dot defect	<p>The dot is constantly “on” when power applied to the LCD, even when all “Black” data sent to the screen.</p> <p>Inspection tool: 5% Transparency neutral density filter.</p> <p>Count dot: If the dot is visible through the filter.</p> <p>Don't count dot: If the dot is not visible through the filter.</p>	
		Black dot defect	<p>The dot is constantly “off” when power applied to the LCD, even when all “White” data sent to the screen.</p> <p>Similar size compared to bright dot.</p>	
		White dot (Circular/foreign particle)	<p>Pixel works electrically, however, circular/foreign particle makes dot appear to be “on” even when all “Black” data is sent to the screen.</p>	
		Adjacent dot	<p>Adjacent dot defect is defined as two or more bright dot defects or black dot defects.</p>	
	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.	
	Others	CFL wires	Damaged to the CFL wires, connector, pin, functional failure or appearance failure.	
Definition of size	<p>Definition of circle size</p> <p>$d = (a + b) / 2$</p>		<p>Definition of linear size</p>	

2) Standard

Classification		Inspection item	Judgement standard																
Defect (in LCD glass)	Dot defect	Bright dot defect	Acceptable number : 4 Bright dot spacing : 5 mm or more																
		Black dot defect	Acceptable number : 5 Black dot spacing : 5 mm or more																
		2 dot join	Bright dot defect	Acceptable number : 2															
			Black dot defect	Acceptable number : 3															
		3 or more dots join	Acceptable number : 0																
		Total dot defects	Acceptable number : 5 Max																
	Others	White dot, Dark dot (Circle)	<table border="1"> <thead> <tr> <th>Size (mm)</th> <th>Acceptable number</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.2$</td> <td>(Neglected)</td> </tr> <tr> <td>$0.2 < d \leq 0.4$</td> <td>5</td> </tr> <tr> <td>$0.4 < d \leq 0.5$</td> <td>3</td> </tr> <tr> <td>$0.5 < d$</td> <td>0</td> </tr> </tbody> </table>			Size (mm)	Acceptable number	$d \leq 0.2$	(Neglected)	$0.2 < d \leq 0.4$	5	$0.4 < d \leq 0.5$	3	$0.5 < d$	0				
Size (mm)	Acceptable number																		
$d \leq 0.2$	(Neglected)																		
$0.2 < d \leq 0.4$	5																		
$0.4 < d \leq 0.5$	3																		
$0.5 < d$	0																		
External inspection (Defect on Polarizer or between Polarizer and LCD glass)	Polarizer (Scratch)	<table border="1"> <thead> <tr> <th>Width (mm)</th> <th>Length (mm)</th> <th>Acceptable number</th> </tr> </thead> <tbody> <tr> <td>$W \leq 0.1$</td> <td>—</td> <td>(Neglected)</td> </tr> <tr> <td rowspan="2">$0.1 < W \leq 0.3$</td> <td>$L \leq 5.0$</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> </tbody> </table>			Width (mm)	Length (mm)	Acceptable number	$W \leq 0.1$	—	(Neglected)	$0.1 < W \leq 0.3$	$L \leq 5.0$	(Neglected)	$5.0 < L$	0	$0.3 < W$	—	0	
		Width (mm)	Length (mm)	Acceptable number															
		$W \leq 0.1$	—	(Neglected)															
		$0.1 < W \leq 0.3$	$L \leq 5.0$	(Neglected)															
	$5.0 < L$		0																
	$0.3 < W$	—	0																
	Polarizer (Bubble)	<table border="1"> <thead> <tr> <th>Size (mm)</th> <th>Acceptable number</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.2$</td> <td>(Neglected)</td> </tr> <tr> <td>$0.2 < d \leq 0.3$</td> <td>5</td> </tr> <tr> <td>$0.3 < d \leq 0.5$</td> <td>3</td> </tr> <tr> <td>$0.5 < d$</td> <td>0</td> </tr> </tbody> </table>			Size (mm)	Acceptable number	$d \leq 0.2$	(Neglected)	$0.2 < d \leq 0.3$	5	$0.3 < d \leq 0.5$	3	$0.5 < d$	0					
		Size (mm)	Acceptable number																
		$d \leq 0.2$	(Neglected)																
		$0.2 < d \leq 0.3$	5																
$0.3 < d \leq 0.5$	3																		
$0.5 < d$	0																		
Foreign particle (Circular shape)	<table border="1"> <thead> <tr> <th>Size (mm)</th> <th>Acceptable number</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.2$</td> <td>(Neglected)</td> </tr> <tr> <td>$0.2 < d \leq 0.4$</td> <td>5</td> </tr> <tr> <td>$0.4 < d \leq 0.5$</td> <td>3</td> </tr> <tr> <td>$0.5 < d$</td> <td>0</td> </tr> </tbody> </table>			Size (mm)	Acceptable number	$d \leq 0.2$	(Neglected)	$0.2 < d \leq 0.4$	5	$0.4 < d \leq 0.5$	3	$0.5 < d$	0						
	Size (mm)	Acceptable number																	
	$d \leq 0.2$	(Neglected)																	
	$0.2 < d \leq 0.4$	5																	
$0.4 < d \leq 0.5$	3																		
$0.5 < d$	0																		
Foreign particle (Linear shape) Scratch	<table border="1"> <thead> <tr> <th>Width (mm)</th> <th>Length (mm)</th> <th>Acceptable number</th> </tr> </thead> <tbody> <tr> <td>$W \leq 0.03$</td> <td>—</td> <td>(Neglected)</td> </tr> <tr> <td rowspan="3">$0.03 < W \leq 0.1$</td> <td>$L \leq 2.0$</td> <td>(Neglected)</td> </tr> <tr> <td>$2.0 < L \leq 4.0$</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> </tbody> </table>			Width (mm)	Length (mm)	Acceptable number	$W \leq 0.03$	—	(Neglected)	$0.03 < W \leq 0.1$	$L \leq 2.0$	(Neglected)	$2.0 < L \leq 4.0$	3	$4.0 < L$	0	$0.1 < W$	—	(According to circular shape)
	Width (mm)	Length (mm)	Acceptable number																
	$W \leq 0.03$	—	(Neglected)																
	$0.03 < W \leq 0.1$	$L \leq 2.0$	(Neglected)																
		$2.0 < L \leq 4.0$	3																
$4.0 < L$		0																	
$0.1 < W$	—	(According to circular shape)																	

Our company network supports you worldwide with offices in Germany, Austria, Switzerland, the UK and the USA. For more information please contact:

Headquarters

Germany



FORTEC Elektronik AG
Lechwiesenstr. 9
86899 Landsberg am Lech

Phone: +49 8191 91172-0
E-Mail: sales@forteca.de
Internet: www.forteca.de

Fortec Group Members

Austria



FORTEC Elektronik AG
Office Vienna

Nuschinggasse 12
1230 Wien

Phone: +43 1 8673492-0
E-Mail: office@fortec.at
Internet: www.fortec.at

Germany



Distec GmbH

Augsburger Str. 2b
82110 Germering

Phone: +49 89 894363-0
E-Mail: info@distec.de
Internet: www.distec.de

Switzerland



ALTRAC AG

Bahnhofstraße 3
5436 Würenlos

Phone: +41 44 7446111
E-Mail: info@altrac.ch
Internet: www.altrac.ch

United Kingdom



Display Technology Ltd.

Osprey House, 1 Osprey Court
Hichingbrooke Business Park
Huntingdon, Cambridgeshire, PE29 6FN

Phone: +44 1480 411600
E-Mail: info@displaytechnology.co.uk
Internet: www.displaytechnology.co.uk

USA



Apollo Display Technologies, Corp.

87 Raynor Avenue,
Unit 1 Ronkonkoma,
NY 11779

Phone: +1 631 5804360
E-Mail: info@apolloDisplays.com
Internet: www.apolloDisplays.com