Spec No.	TQ3C-8EAF0-E1YAA***-00
Config Ver.	E2
Date	December 20, 2016

TYPE : TCG070WVLSJPPA-GD20

< 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

DRAFT

KYOCERA DISPLAY CORPORATION

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Original Issue Date	Designed by: Engineering dept.			Confirmed by: QA dept.	
	Prepared	Checked	Approved	Checked	Approved
Dec 20, 2016					

:

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 TCG070WVLSJPPA-GD20. (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	: I^{2}C (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 -1995 5.4

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)	RxINi+, RxINi- 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	3.6	V
Input signal voltage for touch panel		V_{TPS}	-0.3	V_{TP}+0.3	V

1) i=0,1,2,3
2) V_{DD} must be supplied correctly within the range described in 5-1.
3) Accommodation: /RESET,SDA,SCL(Open drain, pull-up inside PCB)

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/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/s^2, Pulse width: 11 ms
3 times in each direction: ±X, ±Y, ±Z
EIAJ ED-2531

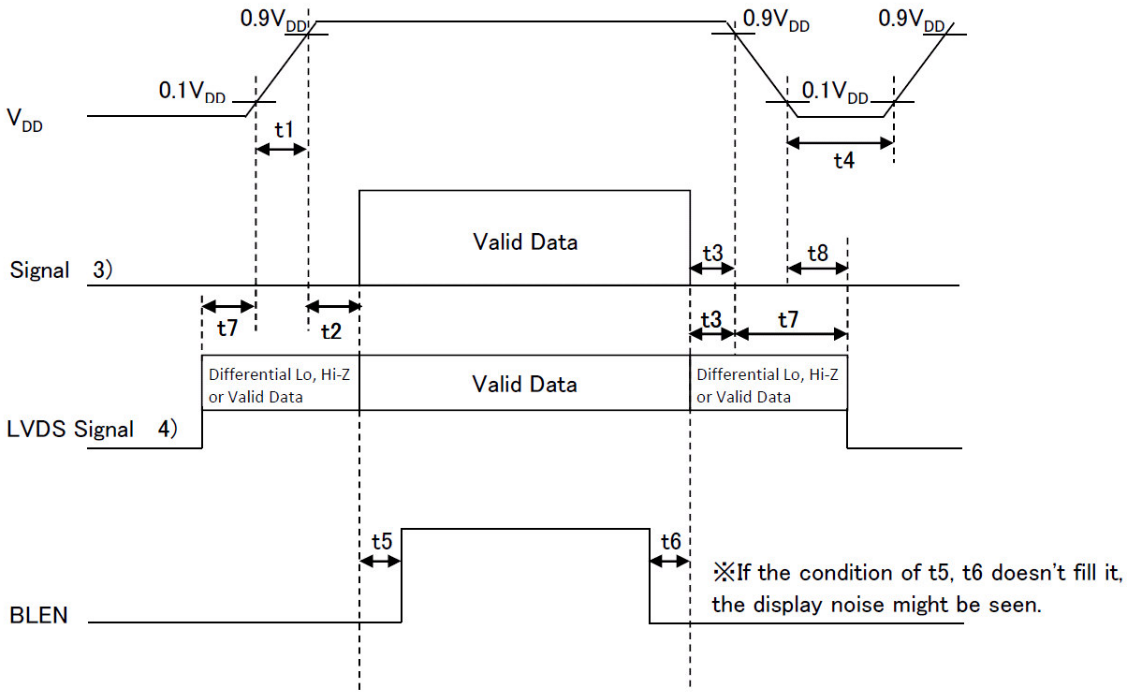
5. Electrical characteristics

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
Permissive 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)	t1	-	0.1	-	10	ms
		t2	-	0	-	-	ms
		t3	-	0	-	-	ms
		t4	-	1.0	-	-	s
		t5	-	200	-	-	ms
		t6	-	200	-	-	ms
		t7	-	0	-	10	s
		t8	-	0	-	-	ms

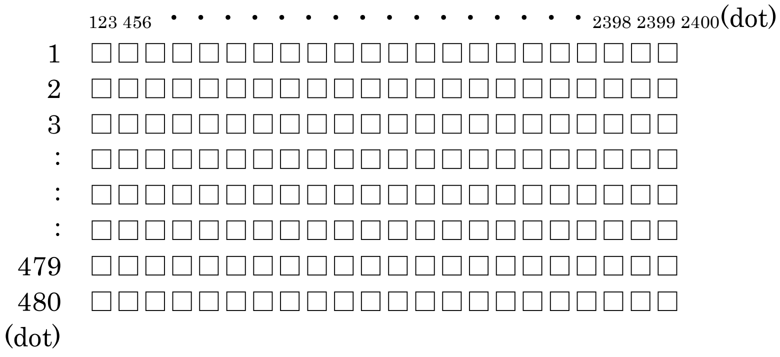
1) V_{DD}-turn-on conditions


0.9VDD
0.9VDD
0.9VDD
0.1VDD
0.1VDD
VDD
t1
t4
Valid Data
Signal 3)
t3
t8
t7
t2
t3
t7
Differential Lo, Hi-Z or Valid Data
Valid Data
Differential Lo, Hi-Z or Valid Data
LVDS Signal 4)
t5
t6
BLEN

※If the condition of t5, t6 doesn't fill it, the display noise might be seen.

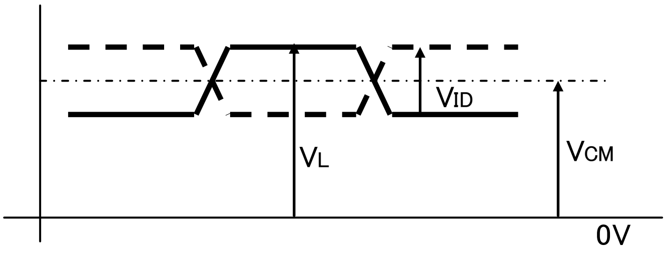
2) Display pattern:

V_{DD} = 3.3V, Temp. = 25°C


123 456 · · · · · · · · · · · · · · · · 2398 2399 2400(dot)
1
2
3
:
:
:
479
480
(dot)

3) Input signal : SELLVDS, BITSEL, SC

4) Input signal : RxIN3+, RxIN3-, RxIN2+, RxIN2-, RxIN1+, RxIN1-, RxIN0+, RxIN0-
CK IN+, CK IN-


VID
VL
VCM
0V

5) V_{CM} : LVDS Common mode voltage (V_{CM}=1.25V)

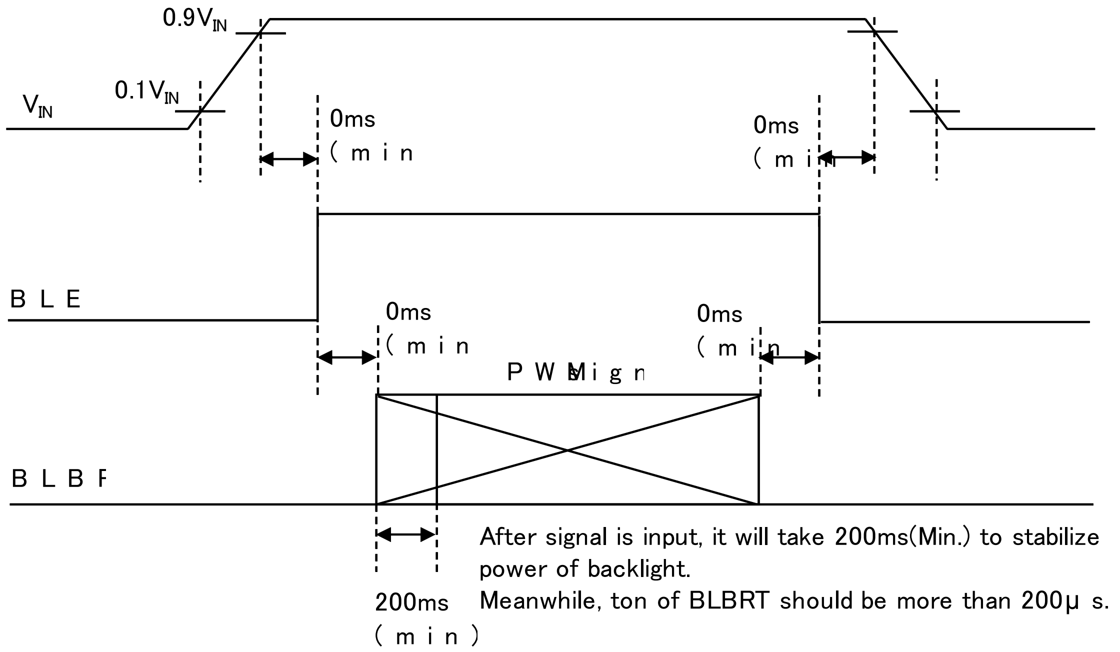
6) Please power on LVDS transmitter at the same time as VDD, or LVDS transmitter should be powered on first.

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)	-	(195)	(310)	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	kΩ
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	kΩ
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	-	70,000	-	h

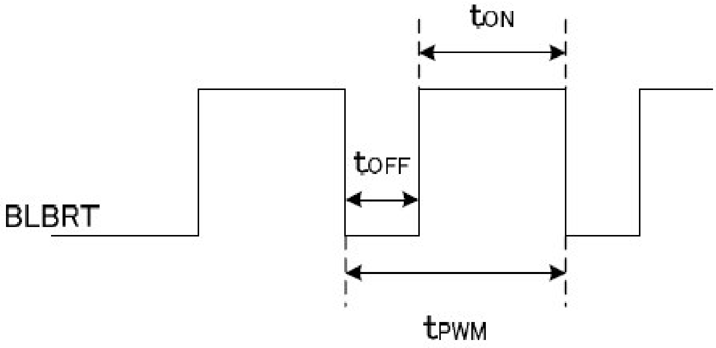
1) V_{IN}-turn-on conditions



After signal is input, it will take 200ms(Min.) to stabilize power of backlight.
Meanwhile, ton of BLBRT should be more than 200μ s.

2) V_{IN} = 12V, Temp. = 25℃, D_{PWM} = 100%

3) PWM Timing Diagram



t_{ON}, t_{OFF} ≧ 50 μ 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 : IF=60mA, Ta=25℃ in chamber).

5-3. Touch panel

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	V_{TP}	–	3.15	3.3	3.6	V
Current consumption	I_{TP}	1)	–	(15)	(20)	mA
Permissive input ripple voltage	V_{TPRP}	–	–	–	50	mVp-p
Input signal voltage 2)	V_{TPSIL}	"Low" level	-0.3	–	0.3V_{TP}	V
	V_{TPSIH}	"High" level	0.7V_{TP}	–	V_{TP}+0.3	V
Output signal voltage 3)	V_{TPSOL}	"Low" level	–	–	0.2V_{TP}	V
	V_{TPSOH}	"High" level	0.8V_{TP}	–	–	V

1) Condition : V_{TP}=3.3V
Temp. = 25℃, 1point touch

2) Accommodation : /RESET,SDA,SCL(Open-drain, Pull-up inside PCB)

3) Accommodation : /CHG(Output Open-drain, Pull-up inside PCB)

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) 5)
Interface	I²C(400kHz)	-
Device Address	0x4A	-

1) Please refer to outline for details.
2) As for input with gloves, separate discussion for feasibility is needed.
3) The performance of linearity is under the condition without noise.
4) Linearity value is not guaranteed but only for reference.
5) Standard is within 5mm for surrounding area.
   5mm in area of outer peripheral part is less than +/- 3.5mm.
6) We recommend you to take into considerations to
   design, using common GND for each touch panel and LCD panel.

7. Optical characteristics

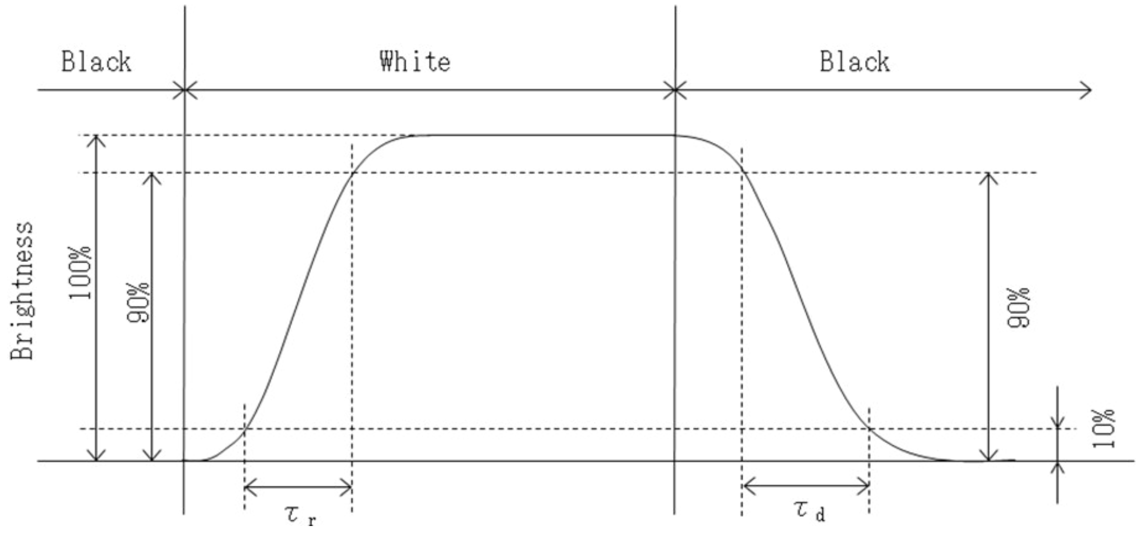
Measuring spot = ϕ 6.0mm, Temp. = 25°C

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

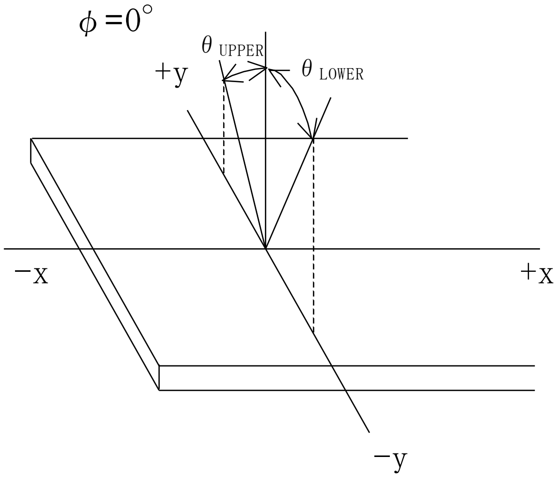
7-1. Definition of contrast ratio

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

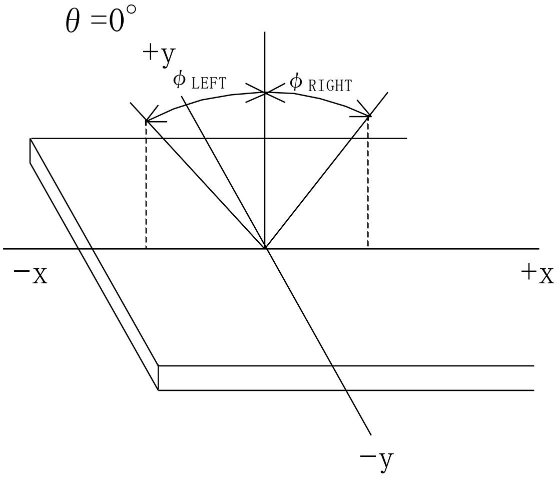
7-2. Definition of response time



7-3. Definition of viewing angle

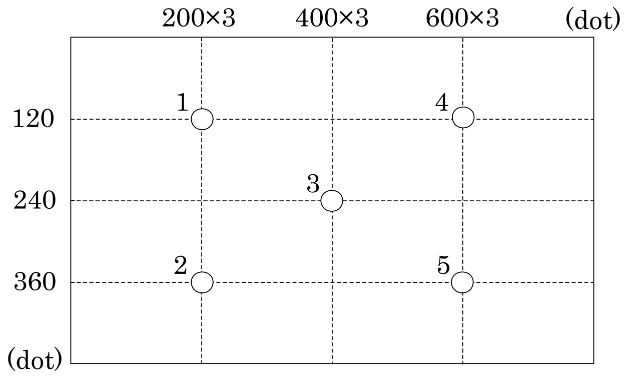

$\phi=0°$
θ UPPER
θ LOWER
+y
−x
+x
−y

θ direction


$\theta=0°$
+y
ϕ LEFT
ϕ RIGHT
−x
+x
−y

ϕ direction

7-4. Brightness measuring points


200×3
400×3
600×3
(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℃)

8. Interface signals

8-1. Interface signals

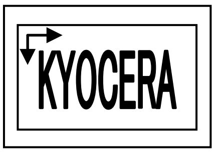
No.	Symbol	Description	Note
1	BITSEL	Bit data select signal(GND or Open: 8bit mode、High: 6bit mode)	
2	SELLVDS	Mode select signal(LVDS Data mapping)	
3	GND	GND	
4	GND	GND	
5	RxIN3+	LVDS receiver signal CH3(+)	LVDS
6	RxIN3-	LVDS receiver signal CH3(-)	LVDS
7	GND	GND	
8	CK IN+	LVDS receiver signal CK(+)	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)

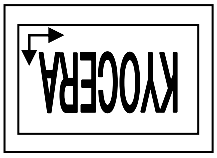
LVDS receiver : Embedded in ASIC
Matching LVDS transmitter : THC63LVDM83D(THine Electronics) or compatible
(For 8bit mode)
THC63LVDM63D(THine Electronics) or compatible
(For 6bit mode)

1) Scanning

SC : High or Open



SC : GND

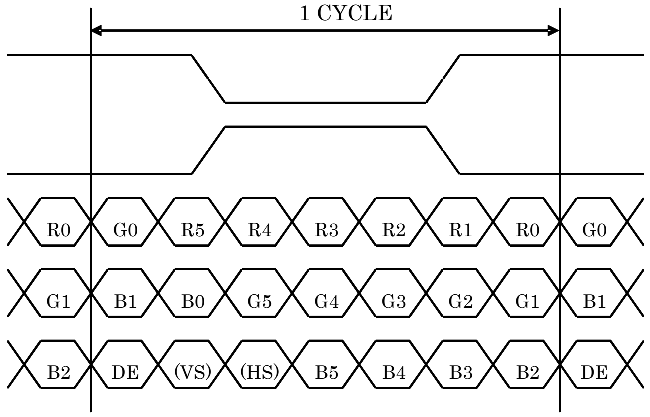


8-2. Data mapping (6bit input / 8bit mode)

1) Location of BITSEL, SELLVDS (THC63LVDM83D(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

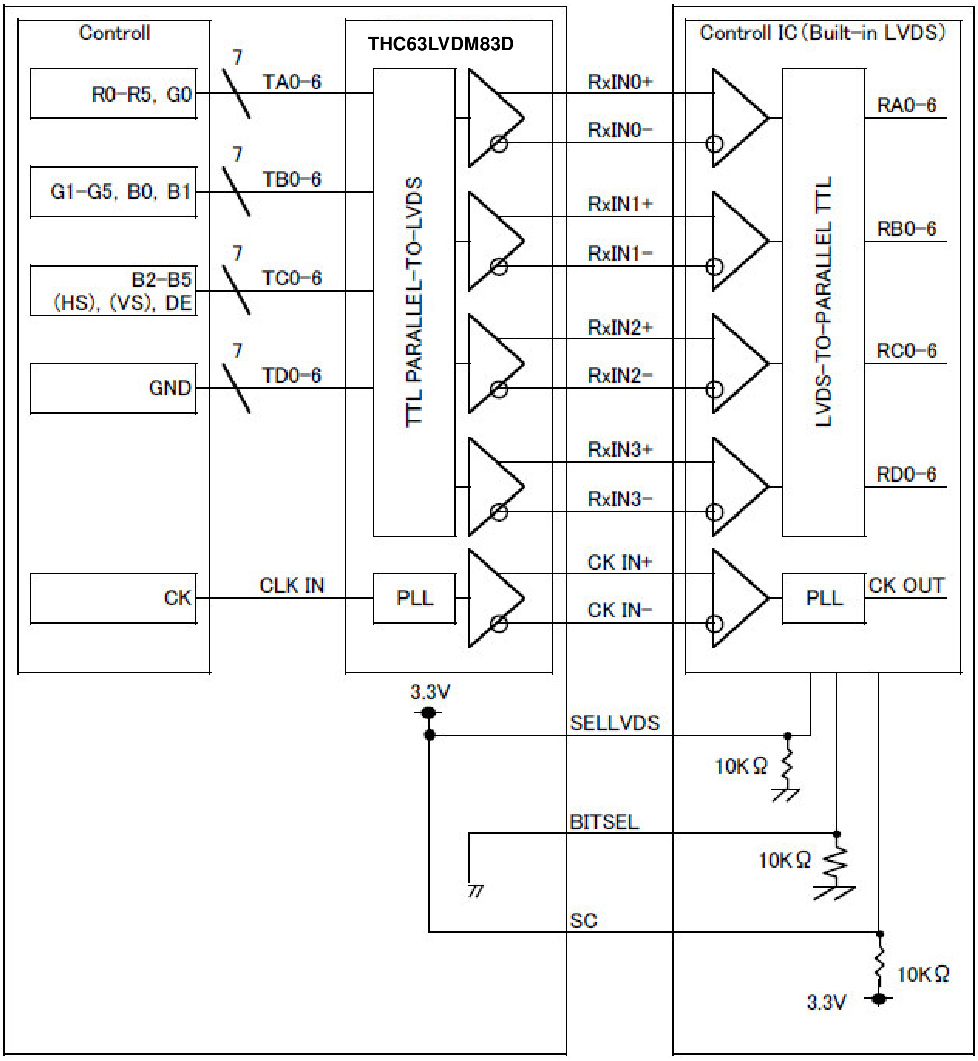
BITSEL=L(GND) or OPEN
SELLVDS=H(3.3V)


1 CYCLE
R0
G0
R5
R4
R3
R2
R1
R0
G0
G1
B1
B0
G5
G4
G3
G2
G1
B1
B2
DE
(VS)
(HS)
B5
B4
B3
B2
DE

DE : DATA ENABLE
HS : HSYNC
VS : VSYNC

2) Block Diagram

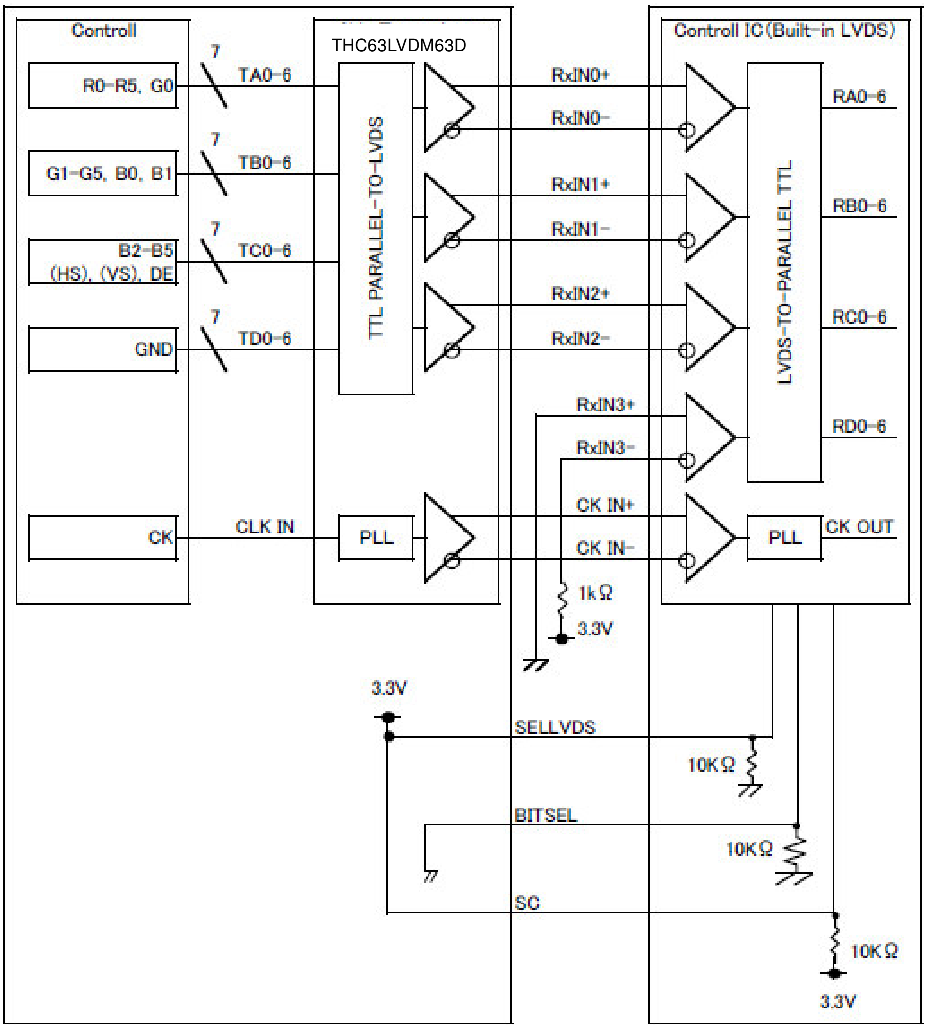
BITSEL=L(GND) or OPEN
SELLVDS=H(3.3V)



Controll
R0−R5, G0
G1−G5, B0, B1
B2−B5
(HS), (VS), DE
GND
CK
7
TA0−6
7
TB0−6
7
TC0−6
7
TD0−6
CLK IN
THC63LVDM83D
TTL PARALLEL−TO−LVDS
PLL
RxIN0+
RxIN0−
RxIN1+
RxIN1−
RxIN2+
RxIN2−
RxIN3+
RxIN3−
CK IN+
CK IN−
Controll IC (Built−in LVDS)
LVDS−TO−PARALLEL TTL
PLL
RA0−6
RB0−6
RC0−6
RD0−6
CK OUT
3.3V
SELLVDS
10KΩ
BITSEL
10KΩ
SC
10KΩ
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.



Controll
R0-R5, G0
G1-G5, B0, B1
B2-B5
(HS), (VS), DE
GND
CK
7
TA0-6
7
TB0-6
7
TC0-6
7
TD0-6
CLK IN
THC63LVDM63D
TTL PARALLEL-TO-LVDS
PLL
RxIN0+
RxIN0-
RxIN1+
RxIN1-
RxIN2+
RxIN2-
RxIN3+
RxIN3-
CK IN+
CK IN-
1kΩ
3.3V
Controll IC(Built-in LVDS)
LVDS-TO-PARALLEL TTL
RA0-6
RB0-6
RC0-6
RD0-6
PLL
CK OUT
3.3V
SELLVDS
10KΩ
BITSEL
10KΩ
SC
10KΩ
3.3V

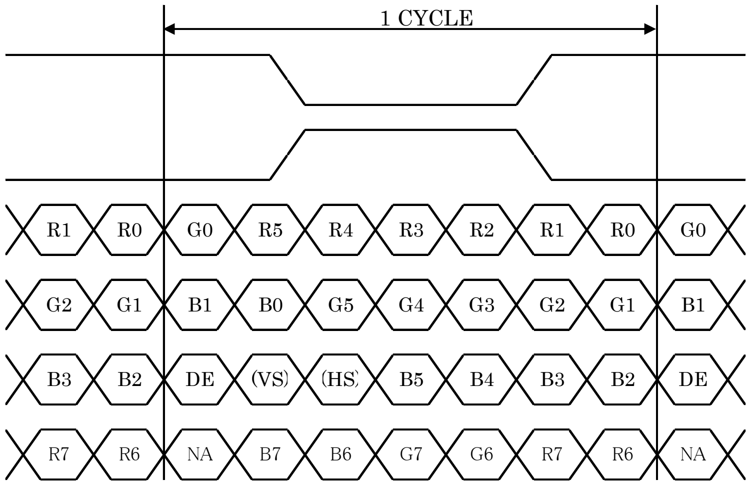
※SELLVDS signal line has 10 k Ω pulldown resister.

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

1) Location of BITSEL, SELLVDS (THC63LVDM83D(THine Electronics) or compatible)

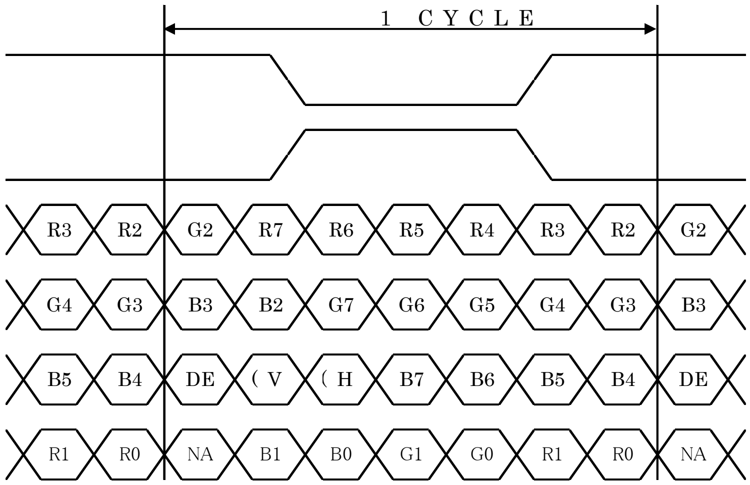
Transmitter		1Pin BITSEL = "L" or OPEN 2Pin SELLVDS = "L" or OPEN	1Pin BITSEL = "L" or OPEN 2Pin SELLVDS = "H"
Pin No.	Data		
51	TA0	R0(LSB)	R2
52	TA1	R1	R3
54	TA2	R2	R4
55	TA3	R3	R5
56	TA4	R4	R6
3	TA5	R5	R7(MSB)
4	TA6	G0(LSB)	G2
6	TB0	G1	G3
7	TB1	G2	G4
11	TB2	G3	G5
12	TB3	G4	G6
14	TB4	G5	G7(MSB)
15	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


1 CYCLE
R1
R0
G0
R5
R4
R3
R2
R1
R0
G0
G2
G1
B1
B0
G5
G4
G3
G2
G1
B1
B3
B2
DE
(VS)
(HS)
B5
B4
B3
B2
DE
R7
R6
NA
B7
B6
G7
G6
R7
R6
NA

DE : DATA ENABLE
HS : HSYNC
VS : VSYNC

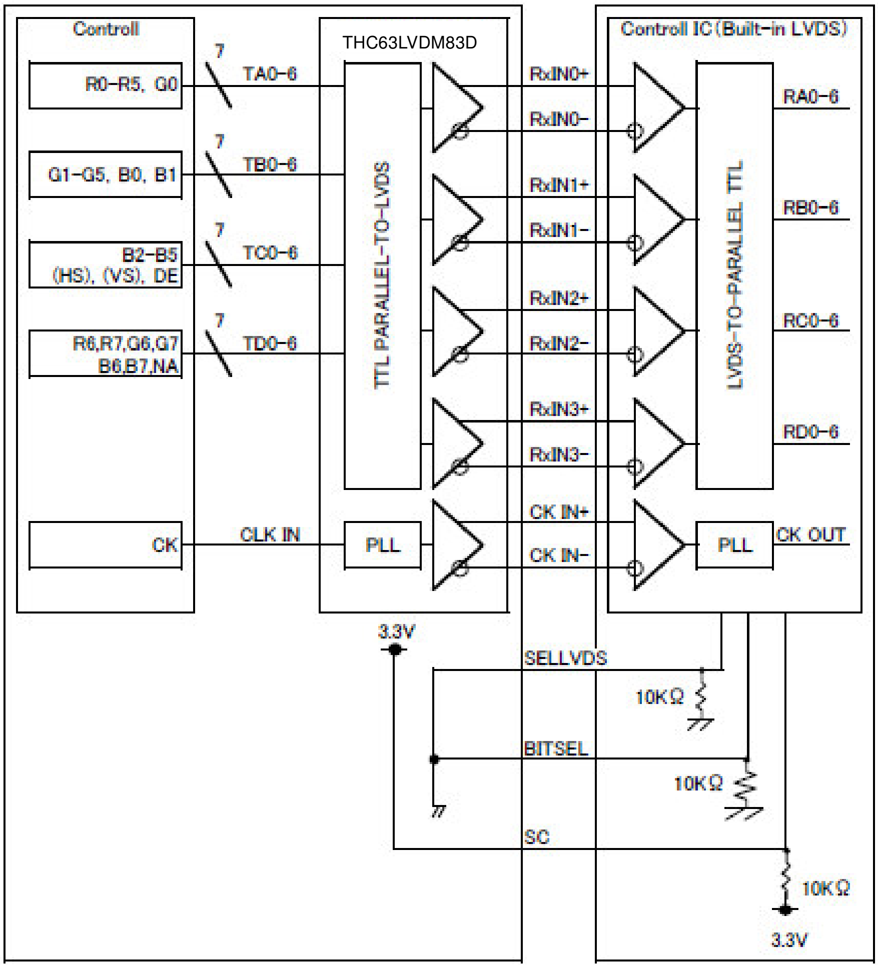
BITSEL=L(GND) or OPEN
SELLVDS=H(3.3V)


1 CYCLE
R3 R2 G2 R7 R6 R5 R4 R3 R2 G2
G4 G3 B3 B2 G7 G6 G5 G4 G3 B3
B5 B4 DE (V (H B7 B6 B5 B4 DE
R1 R0 NA B1 B0 G1 G0 R1 R0 NA

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

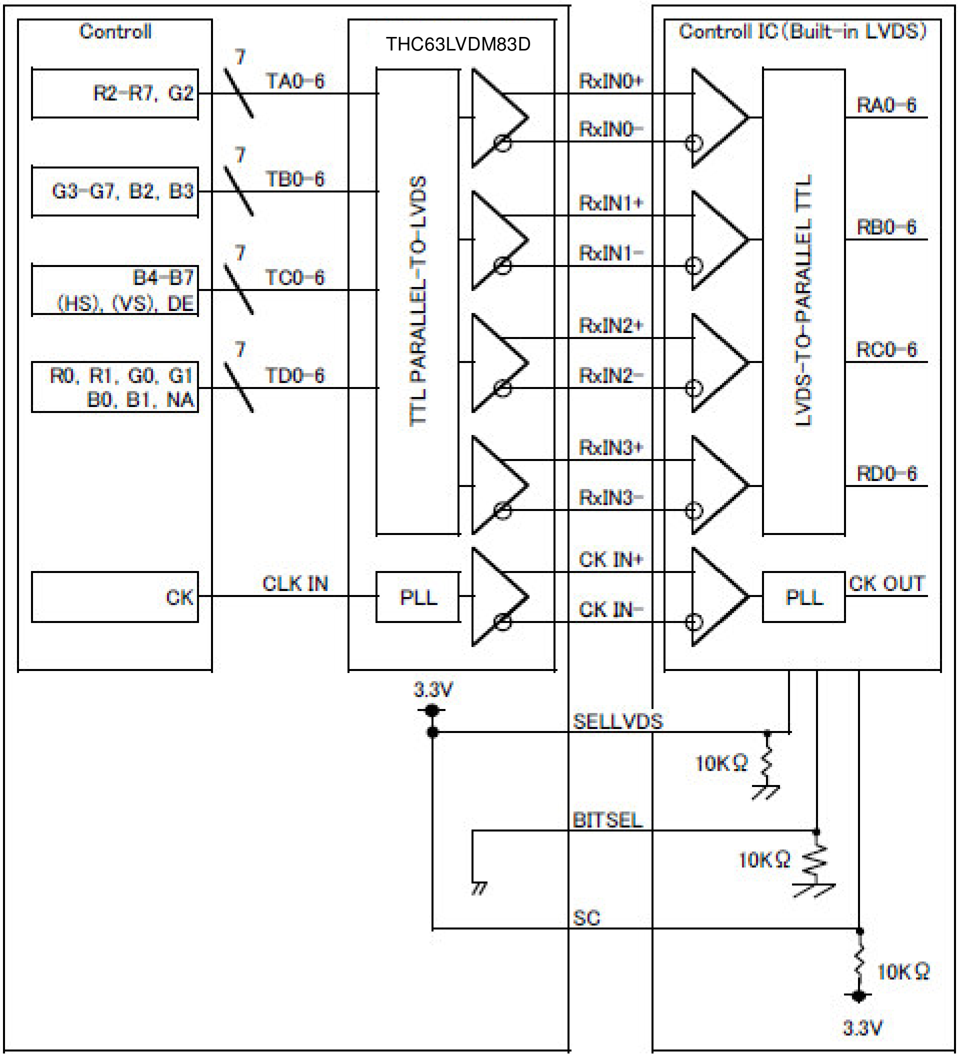
2) Block Diagram

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


Controll
R0–R5, G0
G1–G5, B0, B1
B2–B5
(HS), (VS), DE
R6,R7,G6,G7
B6,B7,NA
CK
7
TA0–6
TB0–6
TC0–6
TD0–6
CLK IN
THC63LVDM83D
TTL PARALLEL–TO–LVDS
PLL
RxIN0+
RxIN0–
RxIN1+
RxIN1–
RxIN2+
RxIN2–
RxIN3+
RxIN3–
CK IN+
CK IN–
Controll IC (Built–in LVDS)
LVDS–TO–PARALLEL TTL
RA0–6
RB0–6
RC0–6
RD0–6
CK OUT
3.3V
SELLVDS
10KΩ
BITSEL
10KΩ
SC
10KΩ
3.3V

※SELLVDS signal line has 10 k Ω pulldown resister.

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


Controll
R2-R7, G2
G3-G7, B2, B3
B4-B7
(HS), (VS), DE
R0, R1, G0, G1
B0, B1, NA
CK
7
TA0-6
7
TB0-6
7
TC0-6
7
TD0-6
CLK IN
THC63LVDM83D
TTL PARALLEL-TO-LVDS
PLL
RxIN0+
RxIN0-
RxIN1+
RxIN1-
RxIN2+
RxIN2-
RxIN3+
RxIN3-
CK IN+
CK IN-
Controll IC(Built-in LVDS)
LVDS-TO-PARALLEL TTL
PLL
RA0-6
RB0-6
RC0-6
RD0-6
CK OUT
3.3V
SELLVDS
10KΩ
BITSEL
10KΩ
SC
10KΩ
3.3V

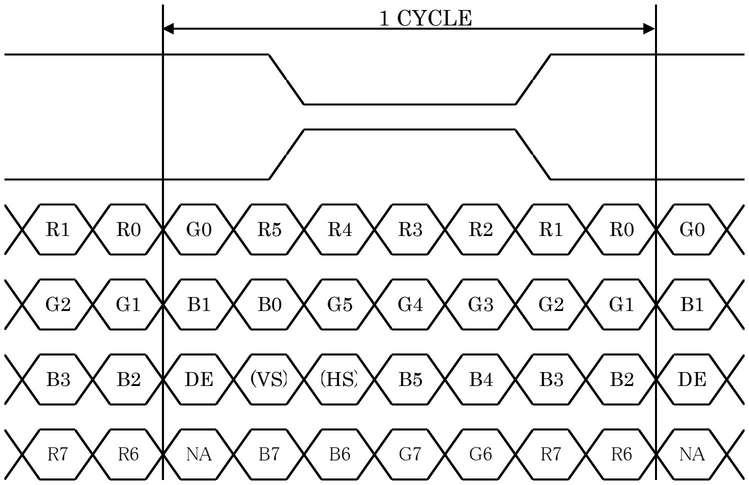
※SELLVDS signal line has 10ｋΩ pulldown resister.

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

1) Location of BITSEL, SELLVDS (THC63LVDM83D(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	—

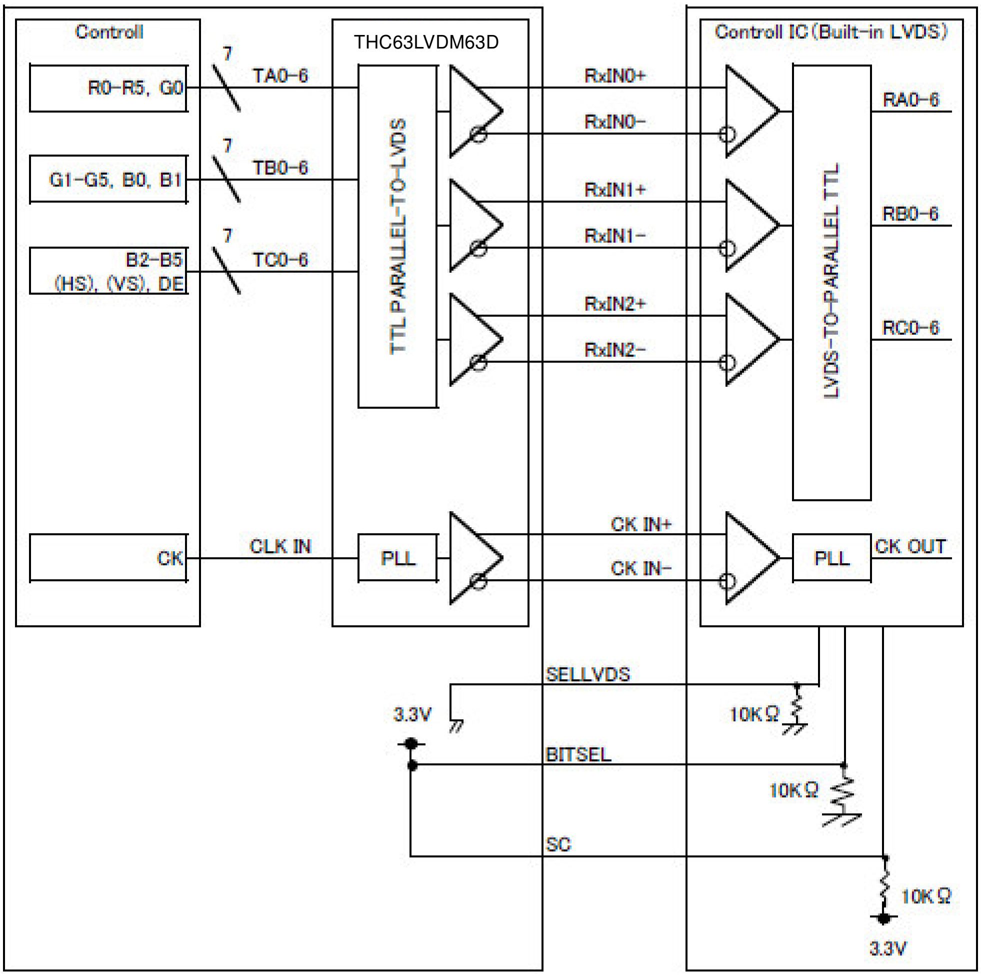
BITSEL=H(3.3V)
SELLVDS=L(GND) or OPEN


1 CYCLE
R1
R0
G0
R5
R4
R3
R2
R1
R0
G0
G2
G1
B1
B0
G5
G4
G3
G2
G1
B1
B3
B2
DE
(VS)
(HS)
B5
B4
B3
B2
DE
R7
R6
NA
B7
B6
G7
G6
R7
R6
NA

DE : DATA ENABLE
HS : HSYNC
VS : VSYNC

2) Block Diagram

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


Controll
R0–R5, G0
G1–G5, B0, B1
B2–B5
(HS), (VS), DE
CK
7
TA0–6
7
TB0–6
7
TC0–6
CLK IN
THC63LVDM63D
TTL PARALLEL–TO–LVDS
PLL
RxIN0+
RxIN0–
RxIN1+
RxIN1–
RxIN2+
RxIN2–
CK IN+
CK IN–
Controll IC (Built–in LVDS)
LVDS–TO–PARALLEL TTL
RA0–6
RB0–6
RC0–6
PLL
CK OUT
SELLVDS
3.3V
10KΩ
BITSEL
10KΩ
SC
10KΩ
3.3V

※SELLVDS signal line has 10 k Ω pulldown resister.

8-5. Touch panel

No.	Symbol	Description	I/O	Note
1	V_{TP}	Supply voltage(+3.3V)	P	
2	/RESET	Reset	I	4)
3	/CHG	State change interrupt	O	
4	SDA	Serial Interface Date	I/O	4)
5	SCL	Serial Interface Clock	I/O	4)
6	GND	GND	P	

1) Please contact to us for the detail such as timing.
2) /RESET : Pull-up inside PCB (10kΩ)
   SDA,SCL : Pull-up inside PCB (2kΩ)
   /CHG : Pull-up inside PCB (10kΩ)
3) For the reset of hardware, “L” pulse of higher than 90nsec in power on condition is needed.
4) Open drain

Touch panel connector : DF57H-6P-1.2V (HIROSE)
Matching connector : DF57H-6S-1.2C (HIROSE)

9. Input timing characteristics

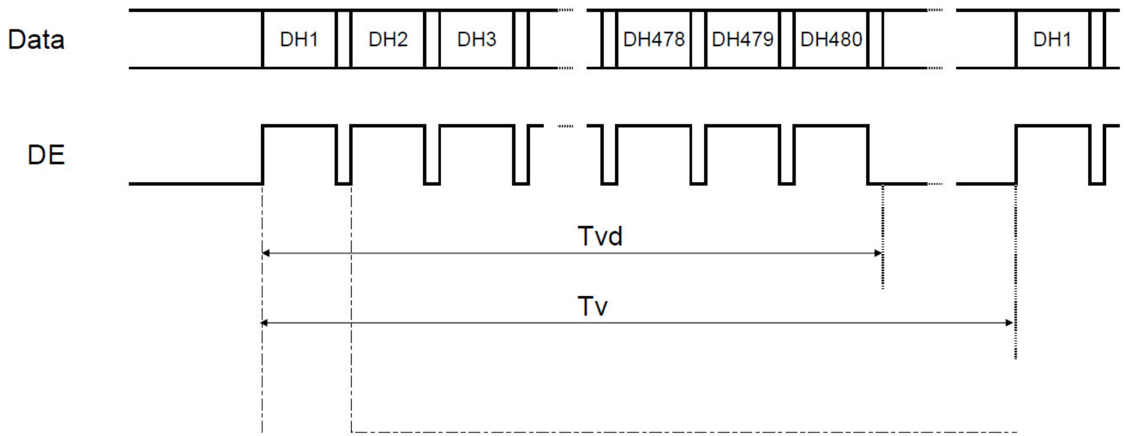
9-1. Timing characteristics

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	-	μ s	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)

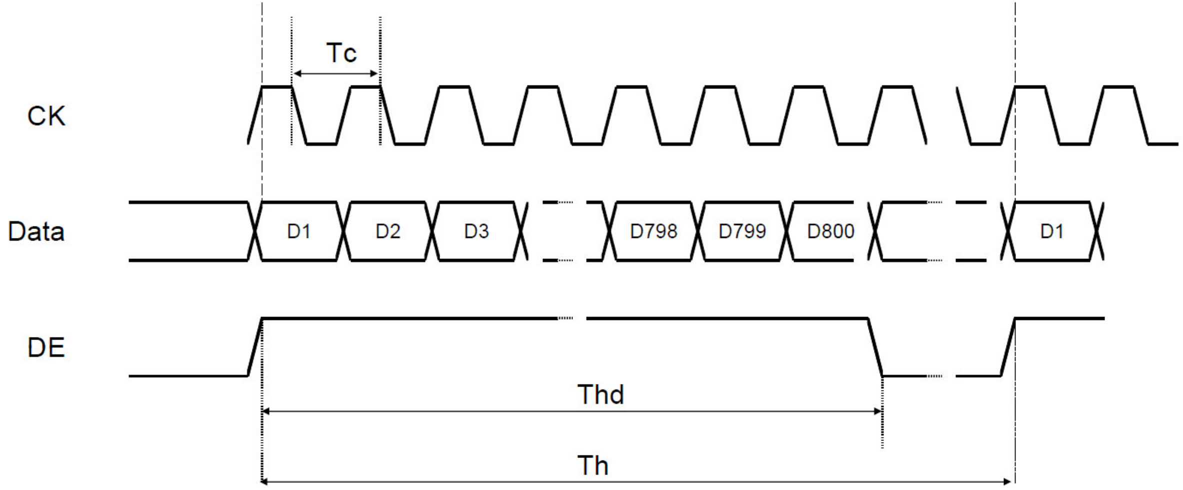
1) Please set a clock frequency, a vertical dormant period, and the horizontal dormant period so that the Horizontal Period should not reach less than Min. value.

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

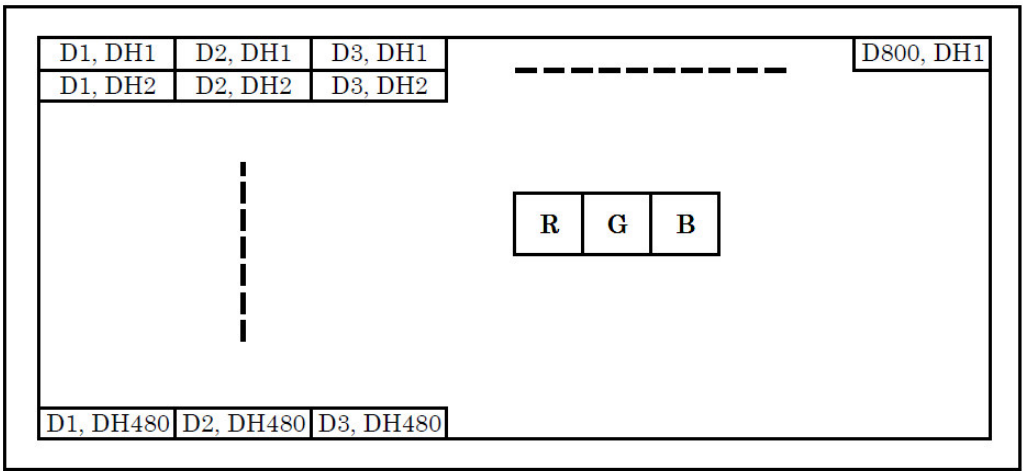
Vertical Timing Diagram


Data
DH1
DH2
DH3
DH478
DH479
DH480
DH1
DE
Tvd
Tv

Horizontal Timing Diagram


Tc
CK
Data
D1
D2
D3
D798
D799
D800
D1
DE
Thd
Th

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


D1, DH1
D2, DH1
D3, DH1
D800, DH1
D1, DH2
D2, DH2
D3, DH2
R
G
B
D1, DH480
D2, DH480
D3, DH480

10. Lot number identification

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

```
TCG070WVLSJPPA-GD20-E2   : □□ - □ - □ : □  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	2016	2017	2018	2019	2020	2021
Code	6	7	8	9	0	1

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) 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.

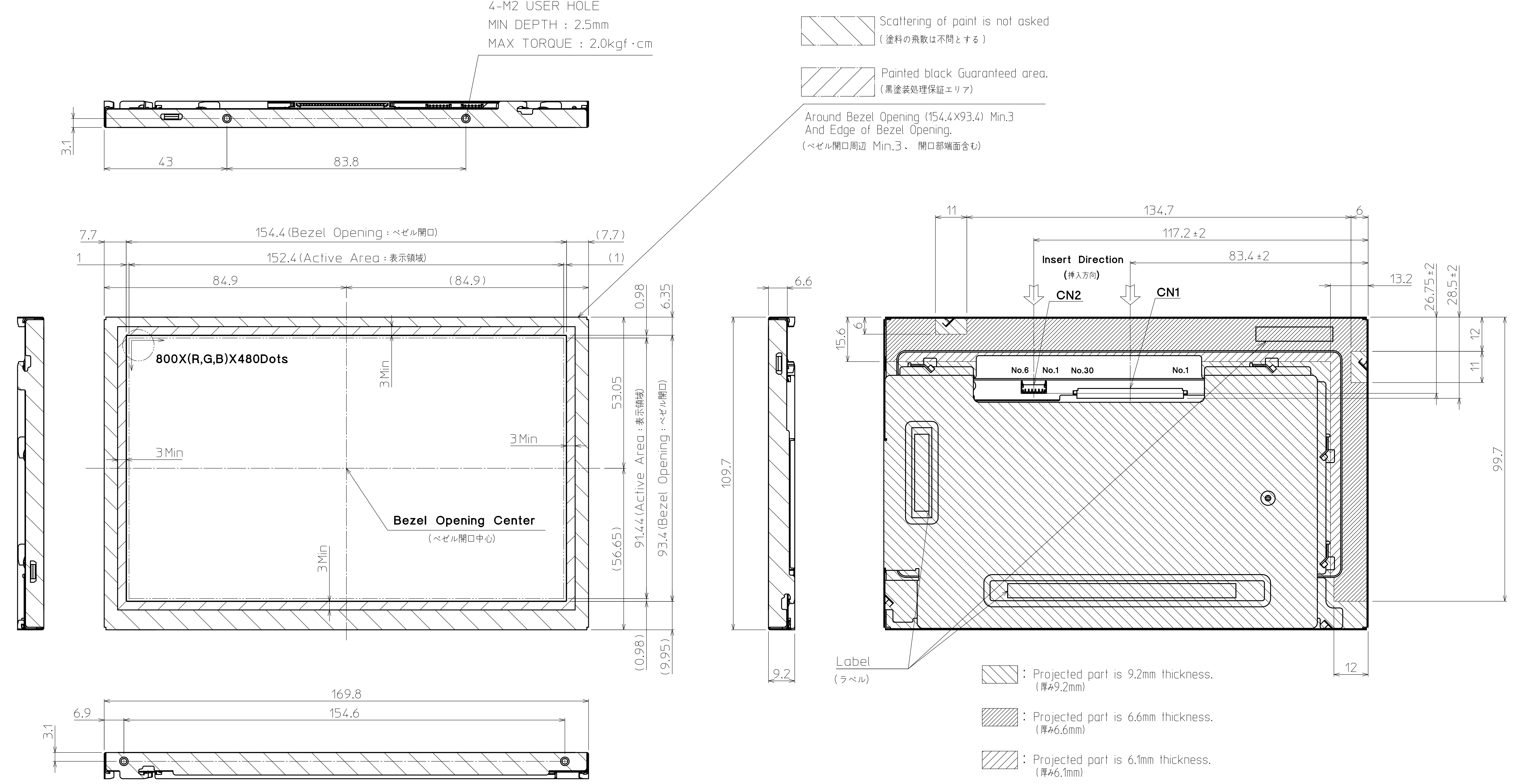
2) Do not push or rub the panel's surface with hard to sharp objects such as knives, or the touch panel may be scratched.
3) In case a surface of touch panel gets dirty, please wipe gently with soft cotton by soaking in a neutral detergent or small amount of ethyl alcohol. Please exercise caution in 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. Malfunction of touch panel may be caused. 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.

No	Description	Drawn	Checked	Checked	Approved
△1	Delete a part of the matching connector. 適合コネクタの一部を削除	'15.01.27 蔭山	'15.01.27 倉元		'15.01.28 加藤



4-M2 USER HOLE
MIN DEPTH : 2.5mm
MAX TORQUE : 2.0kgf·cm
3.1
43
83.8
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 (154.4X93.4) Min.3
And Edge of Bezel Opening.
（ベゼル開口周辺 Min.3、 開口部端面含む）
7.7
154.4（Bezel Opening：ベゼル開口）
(7.7)
1
152.4（Active Area：表示領域）
(1)
84.9
(84.9)
800X(R,G,B)X480Dots
3Min
3Min
3Min
3Min
Bezel Opening Center
（ベゼル開口中心）
0.98
6.35
53.05
(56.65)
91.44（Active Area：表示領域）
93.4（Bezel Opening：ベゼル開口）
(0.98)
(9.95)
109.7
6.6
9.2
169.8
6.9
154.6
3.1
11
134.7
6
117.2±2
83.4±2
Insert Direction
（挿入方向）
CN2
CN1
13.2
26.75±2
28.5±2
15.6
6
12
11
No.6
No.1
No.30
No.1
99.7
12
Label
（ラベル）
: 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）

Note.（注記）

1. Connector CN1: FI-X30SSLA-HF (JAE)
   Connector CN2: DF57H-6P-1.2V (HIROSE)
   （コネクター）

△1 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)
   （適合コネクター）

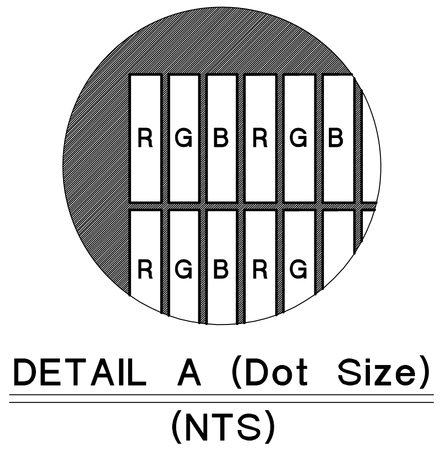
3. The Information of LCD is displayed starting at the upper left hand corner, moving right then down to the lower right hand corner.
   （LCDにおいて、画像データの表示は左上コーナーから始まり、右へ進み下へ送られ右下コーナーへ向かう。）

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。）

6. Max screw length：2.5mm
   （最大ネジ長）

7. Max screw torque：2.0kgf·cm
   （最大ネジ締め付けトルク）



R
G
B
R
G
B
R
G
B
R
G

DETAIL A (Dot Size)
(NTS)

Material 材質	Treatment 処理	Approved '14.12.12	Checked	Checked '14.12.12	Drawn	Scale 1:1(NTS)	Title TCG070WVLRJQPA	KYOCERA	Year-Month-Day '14.12.09	Size 2
Quantity 製作数	Description; 備考 RoHS	加藤		倉元	蔭山		Outline Dimensions	Drawing No. 121A8083500-1		

Spec No.	TQ3C-8EAF0-E2YAA206-00
Date	June 30, 2016

KYOCERA INSPECTION STANDARD

TYPE : TCG070WVLSJPPA-GD20

KYOCERA DISPLAY CORPORATION

Original Issue Date	Designed by : Engineering dept.			Confirmed by : QA dept.	
	Prepared	Checked	Approved	Checked	Approved
Dec 20, 2016					

KYOCERA

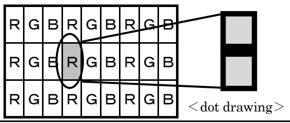
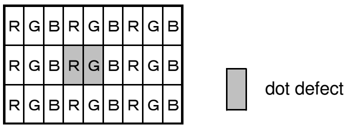
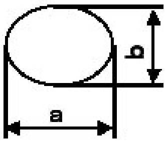
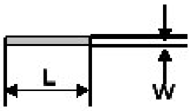
Revision record

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 effective 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.  There is an electrode in the middle of the dot and one dot is shown in the left drawing.
		Black dot defect	The dot is constantly "off" when power applied to the LCD, even when all "White" data sent to the screen. Similar size compared to bright dot.
		White dot (Circular/foreign particle)	Pixel works electrically, however, circular/foreign particle makes dot appear to be "on" even when all "Black" data is sent to the screen.
		Adjacent dot	Adjacent dot defect is defined as two or more bright dot defects or black dot defects. 
	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	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>