

SPEC

Spec No.	
Date	

TENTATIVE

TYPE : TCG084XGLAAPNN-AN20-S

< 8.4 inch XGA transmissive color TFT with LED backlight >

CONTENTS

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

KYOCERA CORPORATION
DONGGUAN SHILONG KYOCERA Co., Ltd.
DISPLAY DIVISION

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

Original Issue Date	Designed by: Design Development dept.			Confirmed by: QA dept.	
	Prepared	Checked	Approved	Checked	Approved

Spec No.

Part No.

Page

TCG084XGLAAPNN-AN20-S

2

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.	Part No. TCG084XGLAAPNN-AN20-S	Page 3
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Revision record

Date	Designed by : Design Development dept.			Confirmed by : QA dept.	
	Prepared	Checked	Approved	Checked	Approved

Rev. No.	Date	Page	Descriptions

Spec No.	Part No. TCG084XGLAAPNN-AN20-S	Page 4
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1. Application

This document defines the specification of TCG084XGLAAPNN-AN20-S. (RoHS Compliant)

2. Construction and outline

LCD	: Transmissive color dot matrix type TFT
Backlight system	: LED
Polarizer	: Anti-Glare treatment
Interface	: LVDS
Additional circuit	: Timing controller, Power supply (3.3V input) With the constant current circuit for LED Backlight(12V input)

3. Mechanical specifications

Item	Specification	Unit
Outline dimensions 1)	199.5(W)×149 (H)×10.5(D)	mm
Active area	170.8 (W)×128.1 (H) (21.3cm/8.4inch(Diagonal))	mm
Dot format	1,024×(B,G,R)(W)×768(H)	dot
Dot pitch	(0.1668)(W)×(0.1668)(H)	mm
Base color 2)	Normally Black	-
Mass	TBD	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.

Spec No.	Part No. TCG084XGLAAPNN-AN20-S	Page 5
----------	-----------------------------------	-----------

4. Absolute maximum ratings

4-1. Electrical absolute maximum ratings

Item		Symbol	Min.	Max.	Unit
Supply voltage(+3.3V)		V _{DD}	-0.5	5.0	V
Supply voltage(+12V)		V _{IN}	-0.5	14.0	V
Input signal Voltage 1)	R _x IN _i +, R _x IN _i - (i=0,1,2,3)	V _{I1}	-0.3	V _{DD} +0.3	V
	CK IN+, CK IN-	V _{I2}	-0.3	V _{DD} +0.3	V
	MODE, SC	V _{I3}	-0.3	V _{DD} +0.3	V
	BLBRT, BLEN	V _{I4}	-0.3	V _{IN}	V

1) 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 (Ambient) 1)		T _{OP} (Ambient)	-30	80	°C
Operating temperature (Panel) 2)		T _{OP} (Panel)	-30	80	°C
Storage temperature 3)		T _{STO}	-30	80	°C
Operating humidity 4)		H _{OP}	10	5)	%RH
Storage humidity 4)		H _{STO}	10	5)	%RH
Vibration		-	6)	6)	-
Shock		-	7)	7)	-

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

2) Panel surface temperature (all the surface).

3) 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.

6)

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

7) Acceleration: 490 m/s², Pulse width: 11 ms

3 times in each direction: ±X, ±Y, ±Z

EIAJ ED-2531

Spec No.

Part No.

Page

TCG084XGLAAPNN-AN20-S

6

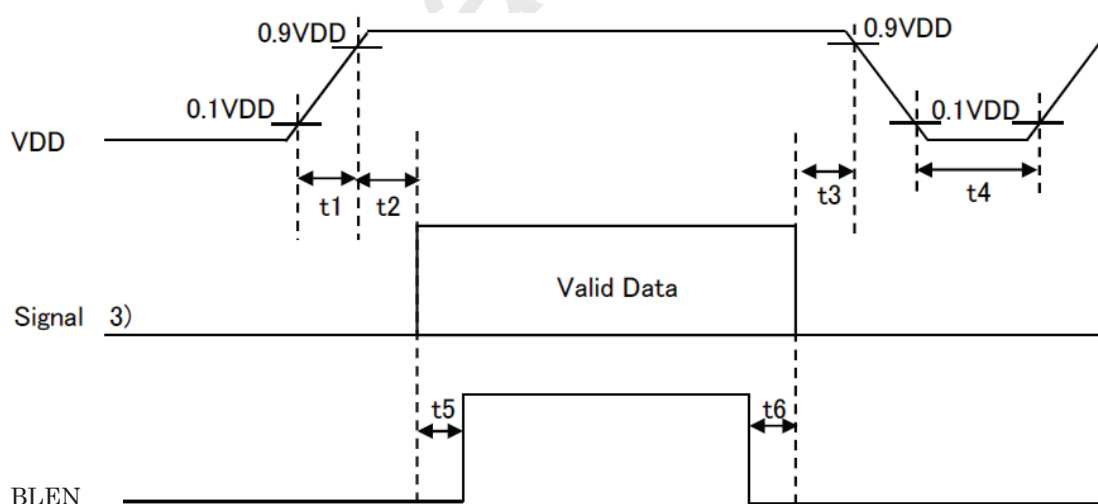
5. Electrical characteristics

5-1. LCD

Temp. = -30~80°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)	-	330	430	mA
Permissible input ripple voltage	V_{RP}	$V_{DD}=3.3V$	-	-	100	mV
Input signal voltage 3)	V_{IL}	"Low" level	0	-	$0.3V_{DD}$	V
	V_{IH}	"High" level	$0.7V_{DD}$	-	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	-	0.2	-	2.2	V
Differential input voltage	V_{ID}	-	200	-	600	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	-	1.5	-	3	ms
	t_2	-	2	-	80	ms
	t_3	-	120	-	-	ms
	t_4	-	200	-	-	ms
	t_5	-	200	-	-	ms
	t_6	-	200	-	-	ms

1) V_{DD} -turn-on conditions

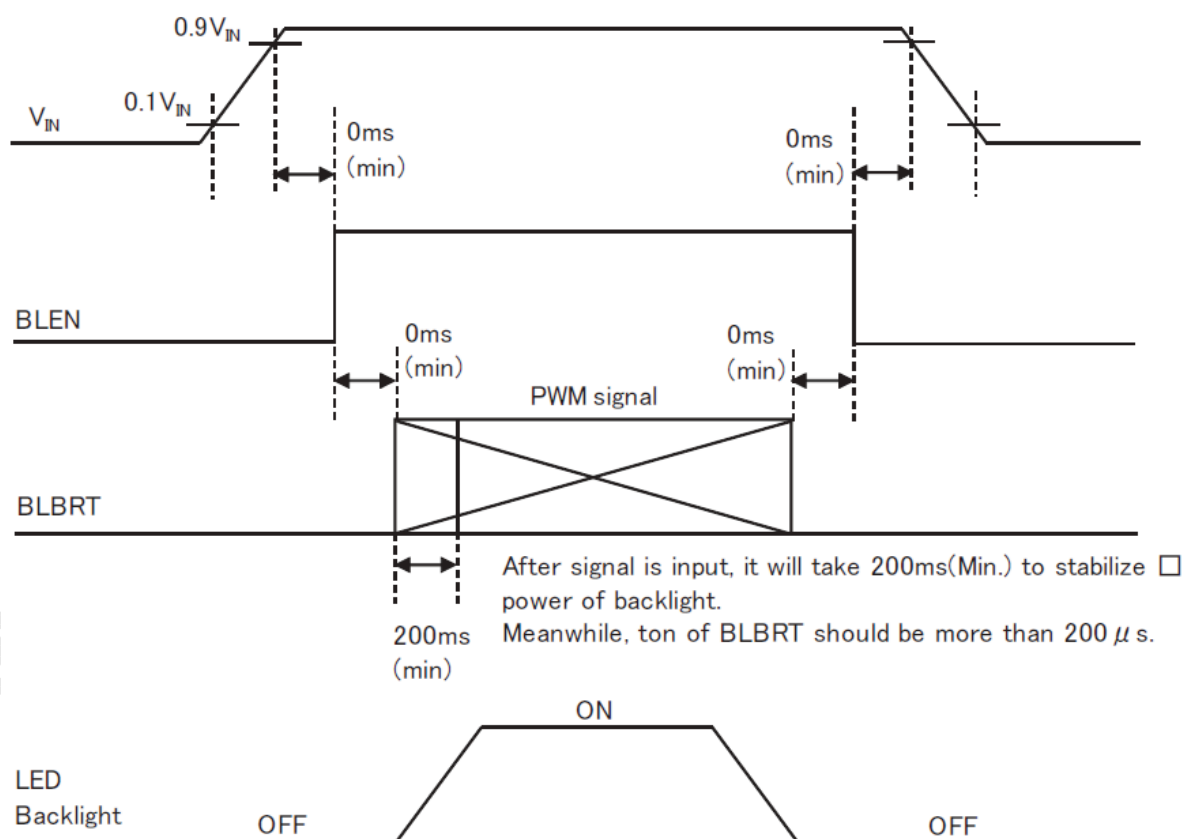


Spec No.	Part No. TCG084XGLAAPNN-AN20-S	Page 8
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5-2. Constant current circuit for LED Backlight

Temp. = -40~80°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)	-	(TBD)	(TBD)	mA
Permissible 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	-	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	-	k Ω
PWM Frequency 3)	f_{PWM}	-	200	-	20k	Hz
PWM Duty ratio 3)	D_{PWM}	$f_{PWM}=200Hz$	1	-	100	%
		$f_{PWM}=2kHz$	1	-	100	%
		$f_{PWM}=20kHz$	10	-	100	%
Operating life time 4), 5)	T	Temp.=25°C	-	50,000	-	h

1) V_{IN} -turn-on conditions2) $V_{IN} = 12V$, Temp. = 25°C, $D_{PWM} = 100\%$

Spec No.

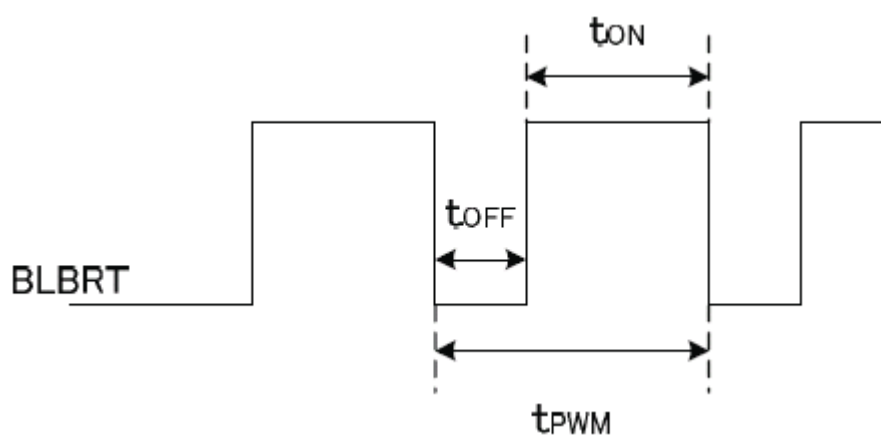
Part No.

Page

TCG084XGLAAPNN-AN20-S

9

3) PWM Timing Diagram



$t_{PWM} \cong 50\mu s$, $t_{ON} \cong 5\mu s$ ($f_{PWM} = 1/t_{PWM}$).

Please do not set t_{OFF} with $0\mu s < t_{OFF} < 1\mu s$.

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 : $D_{PWM} = 100\%$, $T_a = 25^\circ C$ in chamber).

Spec No.

Part No.

Page

TCG084XGLAAPNN-AN20-S

10

6. Optical characteristics

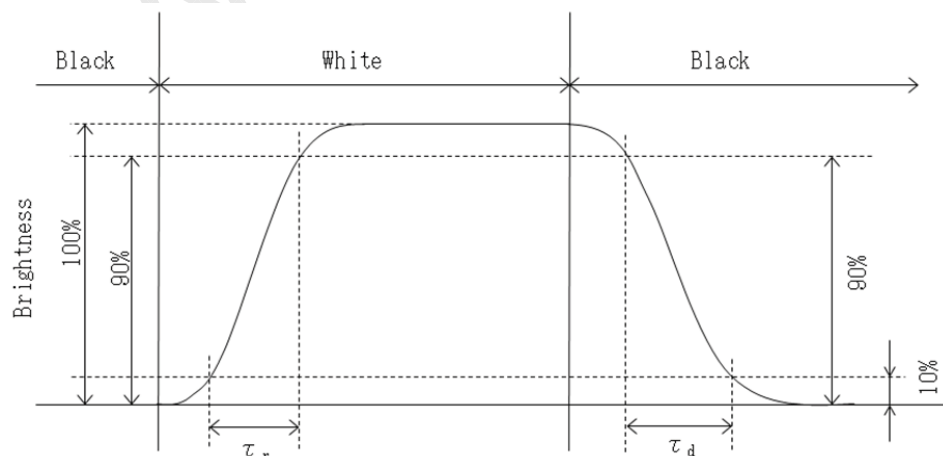
Measuring spot = $\phi 6.0\text{mm}$, Temp. = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	
Response time	Rise	τ_r	$\theta = \phi = 0^{\circ}$	-	12	-	ms
	Down	τ_d	$\theta = \phi = 0^{\circ}$	-	11	-	ms
Viewing angle range View direction	θ_{UPPER}	$\text{CR} \geq 10$	-	85	-	deg.	
	θ_{LOWER}		-	85	-		
	ϕ_{LEFT}		-	85	-	deg.	
	ϕ_{RIGHT}		-	85	-		
Contrast ratio	CR	$\theta = \phi = 0^{\circ}$	390	600	-	-	
Brightness	L	$\text{DPWM} = 100\%$	700	1,000	-	cd/m^2	
Chromaticity coordinates	Red	x	$\theta = \phi = 0^{\circ}$	0.569	0.619	0.669	-
		y		0.306	0.356	0.406	
	Green	x	$\theta = \phi = 0^{\circ}$	0.236	0.286	0.336	
		y		0.529	0.579	0.629	
	Blue	x	$\theta = \phi = 0^{\circ}$	0.094	0.144	0.194	
		y		0.041	0.091	0.141	
	White	x	$\theta = \phi = 0^{\circ}$	0.253	0.303	0.353	
		y		0.274	0.324	0.374	

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



Spec No.

Part No.

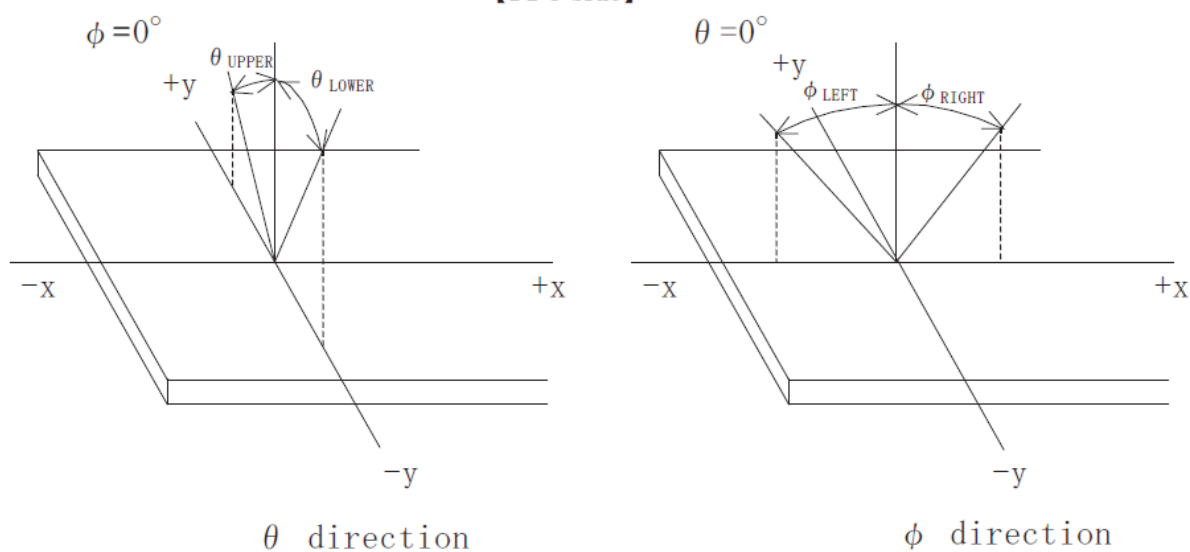
Page

TCG084XGLAAPNN-AN20-S

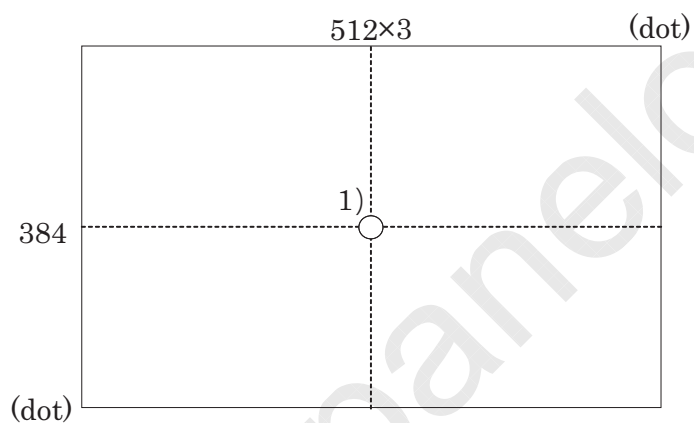
11

6-3. Definition of viewing angle

【FPC side】



6-4. Brightness measuring points



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

Spec No.

Part No.

Page

TCG084XGLAAPNN-AN20-S

12

7. Interface signals

7-1. Interface signals

No.	Symbol	Description	Note
1	V _{DD}	+3.3V power supply	
2	V _{DD}	+3.3V power supply	
3	GND	GND	
4	GND	GND	
5	RxIN0-	LVDS receiver signal CH0(-)	LVDS
6	RxIN0+	LVDS receiver signal CH0(+)	LVDS
7	GND	GND	
8	RxIN1-	LVDS receiver signal CH1(-)	LVDS
9	RxIN1+	LVDS receiver signal CH1(+)	LVDS
10	GND	GND	
11	RxIN2-	LVDS receiver signal CH2(-)	LVDS
12	RxIN2+	LVDS receiver signal CH2(+)	LVDS
13	GND	GND	
14	CK IN-	LVDS receiver signal CK(-)	LVDS
15	CK IN+	LVDS receiver signal CK(+)	LVDS
16	GND	GND	
17	RxIN3-	LVDS receiver signal CH3(-)	LVDS
18	RxIN3+	LVDS receiver signal CH3(+)	LVDS
19	MODE	Bit data select signal(GND: 6bit mode, High: 8bit mode)	
20	SC	Scan direction control(GND: Normal, High: Reverse)	1)

LCD connector : 20186-020E-11F (I-PEX)

Matching connector : 20197-020U-F (I-PEX)

20197-T20U-F (I-PEX)

LVDS receiver : Embedded in ASIC

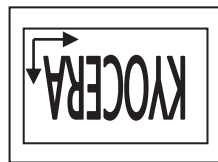
Matching LVDS transmitter : THC63LVDM83D(THine Electronics) or compatible

1) Scanning

SC : GND



SC : High



Spec No.

Part No.

Page

TCG084XGLAAPNN-AN20-S

13

7-2. LED

1)

No.	Symbol	Description	Note
1	V _{IN}	+12V power supply	
2	V _{IN}	+12V power supply	
3	GND	GND	
4	GND	GND	
5	BLN	ON/OFF terminal voltage	
6	BLBRT	PWM signal(Brightness adjustment)	

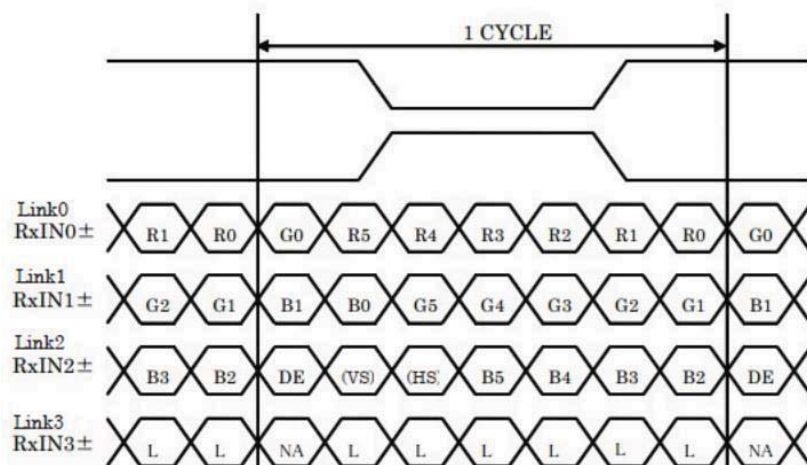
LCD connector : SM06B-SHLS-TF(LF)(SN) (JST)

Matching connector : SHLP-06V-S-B (JST)

Spec No.	Part No. TCG084XGLAAPNN-AN20-S	Page 14
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7-3. Data mapping(6bit input)

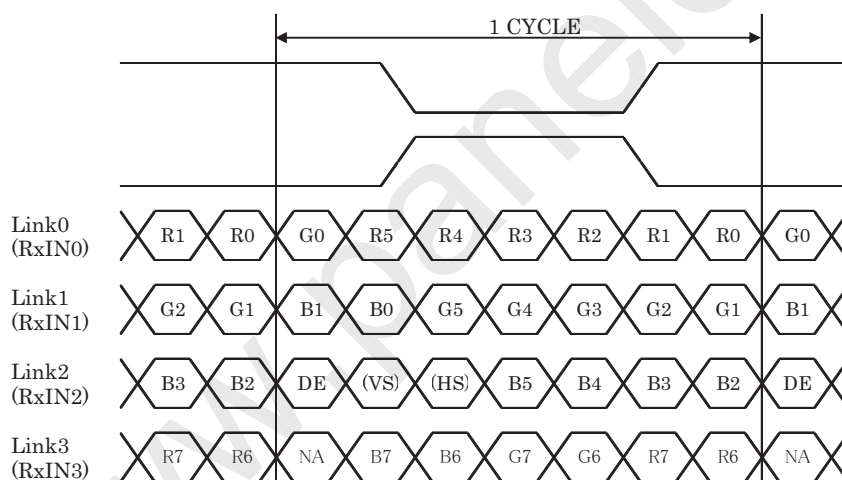
MODE=L(GND)



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

7-4. Data mapping(8bit input)

MODE= H(3.3V)



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

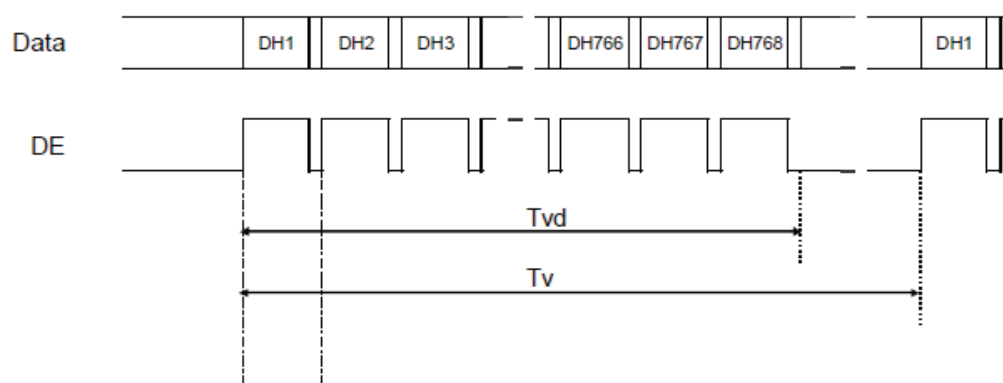
8. Input timing characteristics

8-1. Timing characteristics

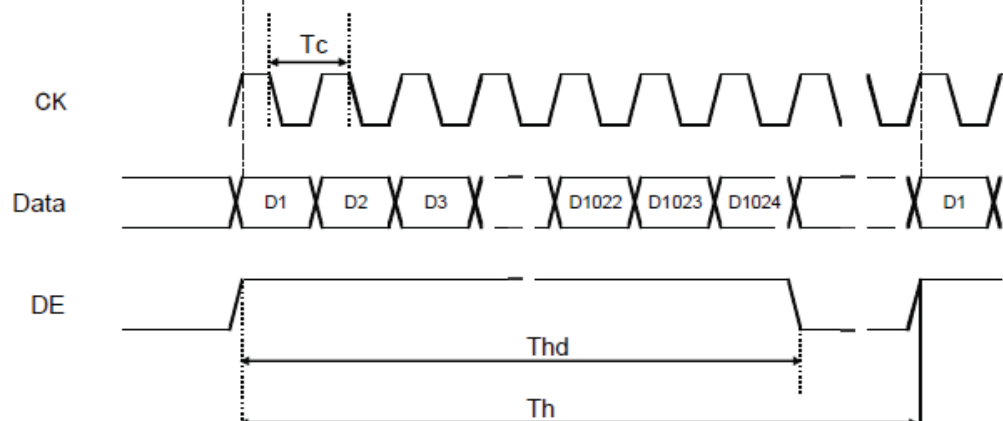
Item		Symbol	Min.	Typ.	Max.	Unit	Note
Clock (CK)	Frequency	1/Tc	48.4	52.4	59.5	MHz	2)
Enable signal (DE)	Horizontal Period	Th	1,044	1,080	1,204	Tc	
			17.5	20.6	24.9	μs	
	Horizontal display period	Thd	1,024			Tc	
	Vertical Period	Tv	773	808	851	Line	
	Vertical display period	Tvd	768			Th	
Refresh rate		fv	55	60	68	Hz	3)

- 1) If the display is used under the condition which is out of specifications such as higher clock frequency than specified value, there is a possibility phenomenon such as display error including white display, malfunction and no image may occur.
- 2) 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.
- 3) 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

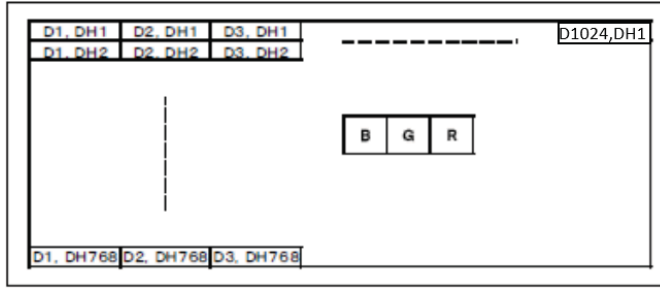


Horizontal Timing Diagram



Spec No.	Part No. TCG084XGLAAPNN-AN20-S	Page 16
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8-2. Input Data Signals and Display position on the screen



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11. Precautions for use

11-1. Installation of the LCD

- 1) A transparent protection plate shall be added to protect the LCD and its polarizer.
- 2) The LCD shall be installed so that there is no pressure on the LSI chips.
- 3) 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.
- 4) A transparent protection sheet is attached to the polarizer. Please remove the protection film slowly before use, paying attention to static electricity.

11-2. 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.

11-3. LCD operation

- 1) The LCD shall be operated within the limits specified. Operation at values outside of these limits may shorten life, and/or harm display images.
- 2) Please select the best display pattern based on your evaluation because flicker, lines or nonuniformity or unevenness can be visible depending on display patterns.

11-4. 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.

11-5. Usage

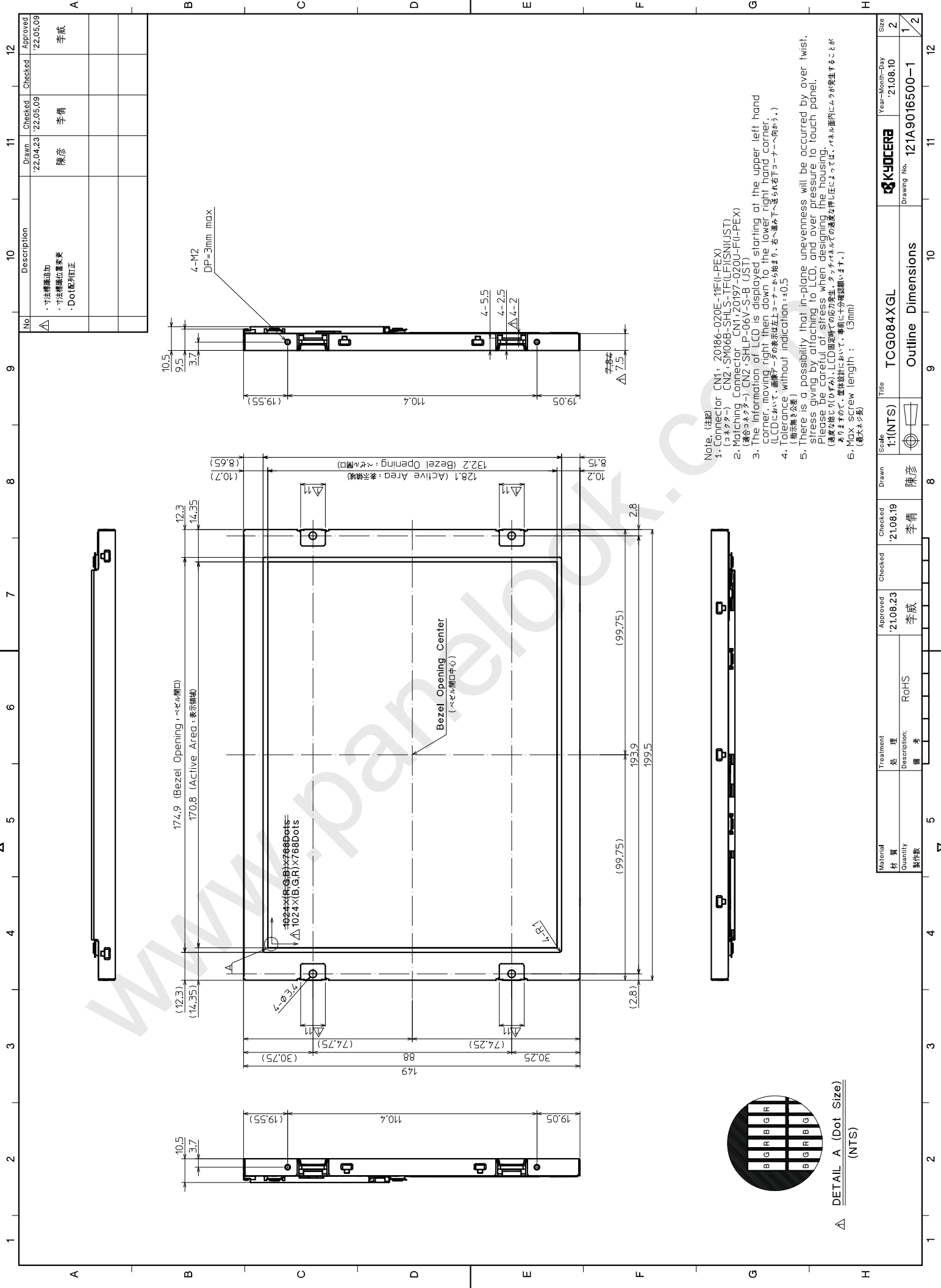
- 1) **DO NOT** store in a high humidity environment for extended periods. Polarizer degradation bubbles, and/or peeling off of the polarizer may result.
- 2) The front polarizer is easily scratched or damaged. Prevent touching it with any hard material, and
from being pushed or rubbed.
- 3) The LCD 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.

Spec No.	Part No. TCG084XGLAAPNN-AN20-S	Page 19
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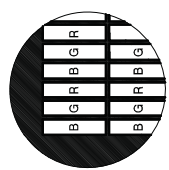
12. Reliability test data

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	80°C	240h	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.
- 5) After the reliability test, the LCD must be restored to 25°C for the inspection.



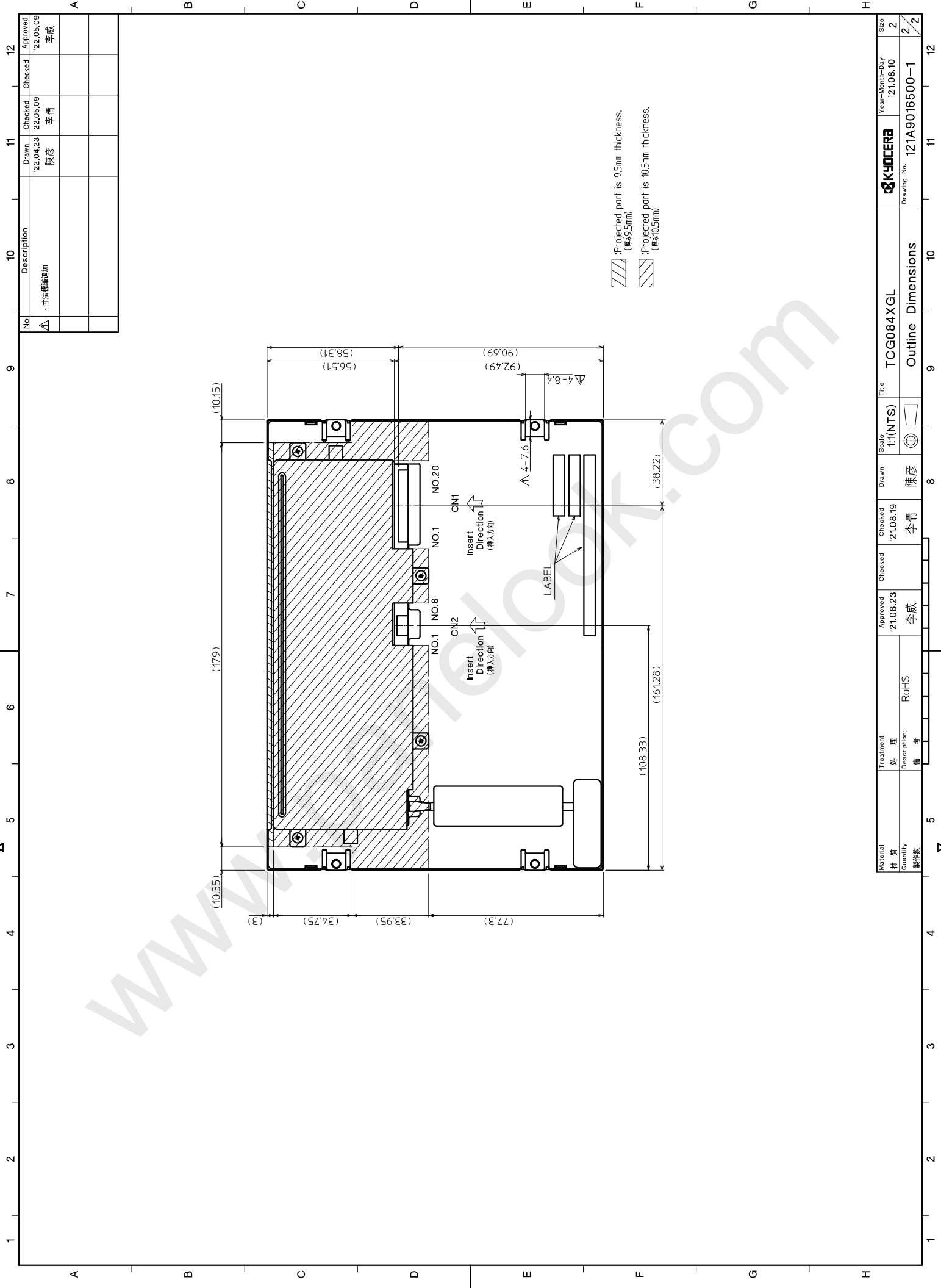
Note: (注) 1. Connector CNI1: 20186-020E-11F(I-PEX) (コネクタ) CNI2: SM06B-SHLS-TFLF(SNIJST) 2. Matching Connector CNI1: 20197-020U-F(I-PEX) (適合コネクタ) CNI2: SHLP-06V-S-B (JST) 3. The information of LCD is displayed starting at the upper left hand corner, moving right then down to the lower right hand corner. (LCDにおいて、画素データの表示は左上コーナーから始まり、右へ進み下へ進み右下コーナーへ向かう。) 4. Tolerance without indication: ±0.5 (指示無公差) 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固定時の応力が発生、タッチパネルの過度な押し圧によって、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: (3mm) (最大ネジ長)



DETAIL A (Dot Size) (NTS)

No.	Description	Drawn	Checked	Approved
1	寸法補強追加 寸法補強位置変更 Dot配列訂正	'22.04.23	'22.05.09	'22.05.09
		陳彦	李倩	李威

Material	Treatment	Approved	Checked	Checked	Drawn	Title	Scale	Size
材質	処理	'21.08.23	'21.08.19	'21.08.19	陳彦	TCG084XGL	1:1(NTS)	2
Quantity	Description	李威	李倩	李倩	陳彦	Outline Dimensions		1/2
製作数	備考							12
								11
								10
								9
								8
								7
								6
								5
								4
								3
								2
								1
								Year-Month-Day
								'21.08.10
								Drawing No.
								121A9016500-1



No.	Description	Drawn	Checked	Checked	Approved
△	寸法標準追加	'22.04.23 陳彥	'22.05.09 李楷	'22.05.09 李威	

: Projected part is 9.5mm thickness. (厚9.5mm)
 : Projected part is 10.5mm thickness. (厚10.5mm)

Material	Treatment	Approved	Checked	Checked	Drawn	Scale	Title	Year-Month-Day	Size
材質	處理	'21.08.23 李威	'21.08.19 李楷		陳彥	1:1(NTS)	TCG084XGL	'21.08.10	2
Quantity	Description:	備考	備考				Outline Dimensions	Drawing No.	2/2
製作數								121A9016500-1	