Specifications for

Blanview TFT-LCD Monitor (4.3" WQVGA 480 x RGB x 272 Landscape)

Version 3.0 (Please be sure to check the specifications latest version.)

MODEL COM43H4N44ULC

Customer's Approval

Signature:

Name:

Section:

Title:

Date:

ORTUSTECH

TOPPAN PRINTING CO., LTD. **Electronics Division Ortus Subdivision**

Approved by

Checked by

f. Kuyayama

Prepared by

Version History

Ver.	Date	Page		Description			
0.0	Mar.1,2018	-	-	Tentative issue			
0.1	Apr.24,2018	8	correction	General tolerance $0.2 \rightarrow 0.5$			
•		12	add	Total LED current value IL1=IL2=(25) mA			
A ×3				Added LED VF value (reference value).			
				Note 1, IL1 = IL2 recommended comment added			
		18	correction	Number of LED lights changed. IL / IL 1 / IL 2 / VF 1 / VF 2.			
		10	CONECTION	IL1 = IL2 Recommended comments added.			
0.2	Aug 04 0010	00					
0.2	Aug.24,2018	23	امام م				
₿×1			add	Lightfastness			
	D = = 01 0010						
1.0	Dec.21,2018			First issue			
		3	correction	Serial Label (S-LABEL) \rightarrow Serial No. print (S-print)			
\wedge		7	add	Weight			
<u>/</u> ×13		11	add	LED direction current of order			
		12	add	Current consumption			
			correction	The backlight part			
		19	correction	Optical Characteristics			
		20	add	White Chromaticity Range			
			correction	Temperature Characteristics			
		21	add	Signal condition			
		23	add	Reliability Test			
		25	add	Packing Specifications			
		29	correction	Figure of Protective film			
		30					
0.0	I.I.1 0010		add	The backlight current value			
2.0	Jul.1.2019	All page	correction	It is a company name change from ORTUS TECHNOLOGY CO., LTD. to			
				TOPPAN PRINTING CO.,LTD.			
<u>∕</u> D_×3		4	correction	RoHS(2.0) directive			
		32	add	Measurement angle			
3.0	Mar. 31,2021	19	change	Measuring instruments			
A		20	change	Measuring instruments			
∠E\ _{×5}		23	change	Test condition (Vibration test)			
			correction	Temperature / humidity profile diagram			
		30	change	Measuring instruments			
		32	change	Measuring instruments			
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1. Application

This Specification is applicable to 109mm (4.3 inch) Blanview TFT-LCD monitor for non-military use.

- O TOPPAN PRINTING makes no warranty or assume no liability that use of this Product and/or any information including drawings in this Specification by Purchaser is not infringing any patent or other intellectual property rights owned by third parties, and TOPPAN PRINTING shall not grant to Purchaser any right to use any patent or other intellectual property rights owned by third parties. Since this Specification contains TOPPAN PRINTING's confidential information and copy right, Purchaser shall use them with high degree of care to prevent any unauthorized use, disclosure, duplication, publication or dissemination of TOPPAN PRINTING'S confidential information and copy right.
- If Purchaser intends to use this Products for an application which requires higher level of reliability and/or safety in functionality and/or accuracy such as transport equipment (aircraft, train, automobile, etc.), disaster-prevention/security equipment or various safety equipment, Purchaser shall consult TOPPAN PRINTING on such use in advance.
- This Product shall not be used for application which requires extremely higher level of reliability and/or safety such as aerospace equipment, telecommunication equipment for trunk lines, control equipment for nuclear facilities or life-support medical equipment.
- ◎ It must be noted as an mechanical design manner, especial attention in housing design to prevent arcuation/flexureor caused by stress to the LCD module shall be considered.
- O TOPPAN PRINTING assumes no liability for any damage resulting from misuse, abuse, and/or miss-operation of the Product deviating from the operating conditions and precautions described in the Specification.
- TOPPAN PRINTING is not responsible for any nonconformities and defects that are not specified in this specifications.
- \odot If any issue arises as to information provided in this Specification or any other information, TOPPAN PRINTING and Purchaser shall discuss them in good faith and seek solution.
- TOPPAN PRINTING assumes no liability for defects such as electrostatic discharge failure occurred during peeling off the protective film or Purchaser's assembly process.

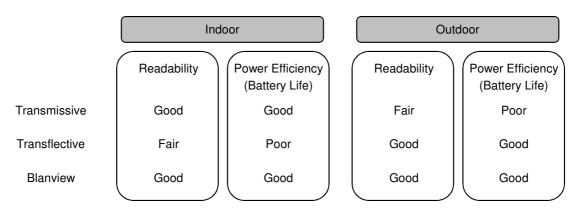
◎ This Product is compatible for RoHS(2.0) directive.

Object substance	Maximum content [ppm]
Cadmium and its compound	100
Hexavalent Chromium Compound	1000
Lead & Lead compound	1000
Mercury & Mercury compound	1000
Polybrominated biphenyl series (PBB series)	1000
Polybrominated biphenyl ether series (PBDE series)	1000
Bis(2-ethylhexyl)phthalate series(DEHP series)	1000
Butyl benzyl phthalate series(BBP series)	1000
Dibutyl phthalate series(DBP series)	1000
Diisobutyl phthalate series(DIBP series)	1000

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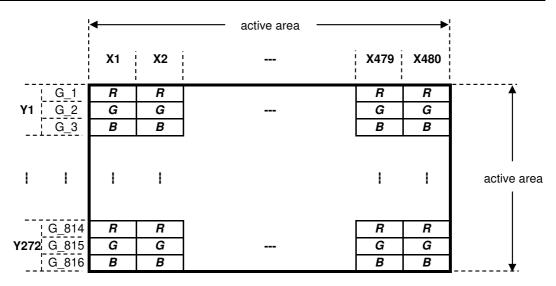
2. Outline Specifications

- 2.1 Features of the Product
 - 4.3 inch diagonal display, 480 [H] x 272RGB [V] dots.
 - 8-bit 16,777,216 color display capability.
 - Single power supply operation of 3.3V.
 - Built in Timing generator (TG), Counter-electrode driving circuitry and power supply circuit.
 - High bright white LED back-light.
 - Blanview TFT-LCD, improved outdoor readability.

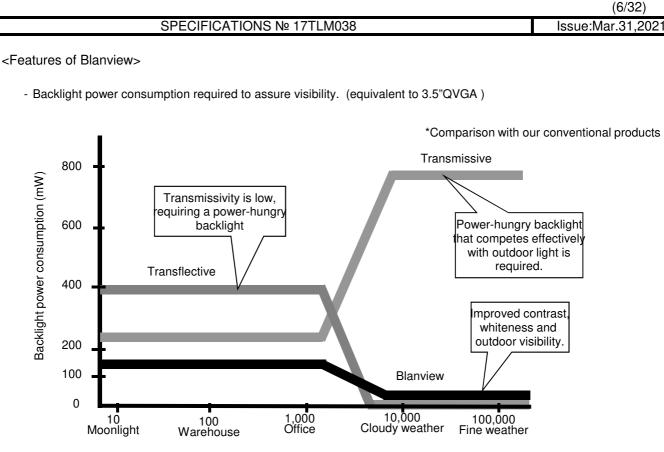


2.2 Display Method

Items	Specifications	Remarks
Display type	VA type 16,777,216 colors.	
	Blanview, Normally black.	
Driving method	a-Si TFT Active matrix.	
	Line-scanning, Non-interlace.	
Dot arrangement	RGB horizontal stripe arrangement.	Refer to "Dot arrangement".
Signal input method	8-bit RGB, parallel input.	
Backlight type	High bright white LED.	
NTSC ratio	50%	



Dot arrangement (FPC cable placed downside)

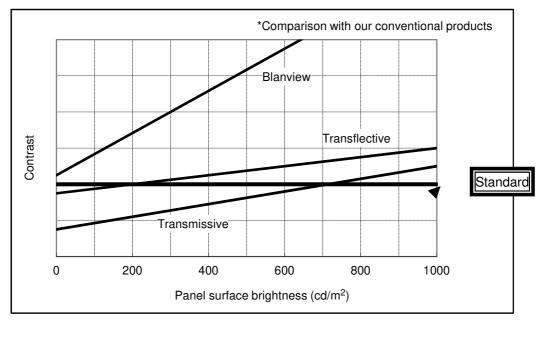


Surrounding illumination (lx)

- Contrast characteristics under 100,000lx. (same condition as direct sunlight.)

With better contrast (higher contrast ratio), Blanview TFT-LCD has the best outdoor readability in three different types of TFT-LCD.

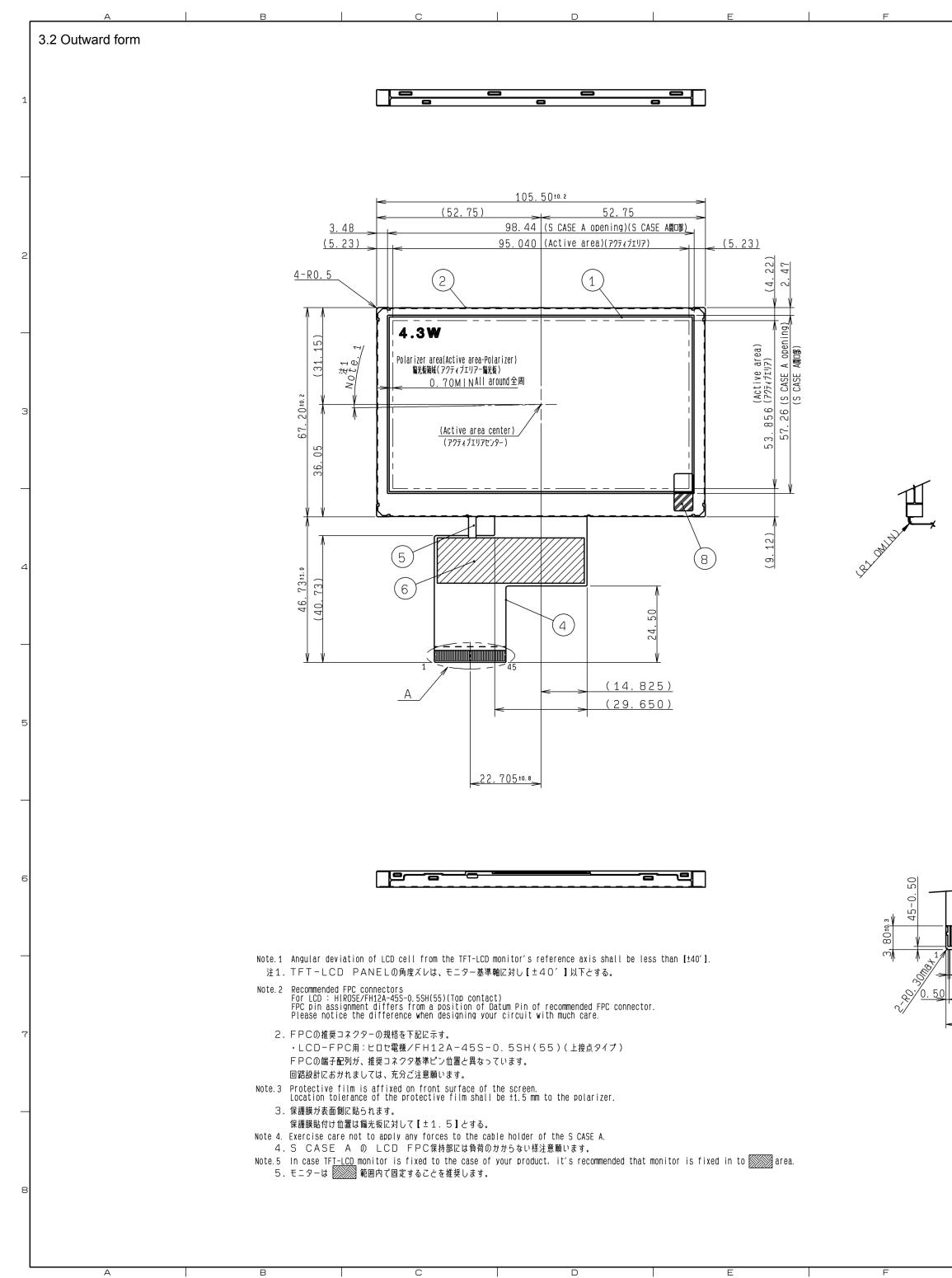
Below chart shows contrast value against panel surface brightness. (Horizontal: Panel surface brightness/ Vertical: Contrast value) LCD panel has enough outdoor readability above our Standard line. (TOPPAN PRINTING criteria)



3. Dimensions and Shape

3.1 Dimensions

Items	Specifications	Unit	Remarks
Outline dimensions	105.50[H] × 67.20[V] × 5.20[D]	mm	Exclude FPC cable.
Active area	95.04[H] × 53.86[V]	mm	109mm diagonal.
Number of dots	480[H] × 816[V]	dot	
Dot pitch	198.0[H] × 66.0[V]	μm	
Surface hardness of the polarizer	2	Н	Load:2.94N
Weight	62	g	Include FPC cable.



B1D4 4N44 RJD529744D210101EJ-T 03/29/19 20:03

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	EC NO. REV.NO. REVISE (PATE) APPROVED CHECKED PREPARED
	(8/32) 17TLM038
	Issue:Mar.31,2021
5.20±0.2	25. 25. 25. 25. 25. 25. 25. 25. 25. 25.
(FRAME-S CASE A)	注5 note5
	Serial code (inkjet)
	012345 YVW00
	1. B
(5)	Bending area
\rightarrow $< 1.50MAX$	
(Height of electronic parts and solder, FPC is not included.) (FPC上面より部品及び半田高さ:テープ除く)	
O. 30 ^{±0.05} (Thickness of contact point, including the reinforcing plate)	5. (Treinf 上 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一
(端子部厚さ(補強坂含む))	5
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<u>< 45−0. 35±0. 03</u>	
₽0. 50±0.05X44=22.00±0.05	
< 23.00±0.07 >	R TAPE 8 S CASE C 7
DETAIL A	I TAPE 6
(S=2/1)	LED FPC 5 LCD FPC 4
	FRAME 3 S CASE A 2
	TFT-LCD PANEL1Glass substrate thickness=0.5tPART NAMEITEMPART CODEMODEL NUMBERREMARK
	APPROVED尾木 GENERAL TOLERANCE ± 0.5 SCALE 1/1 UNIT TOLERANCE ± 0.5 L/1 UNIT TOLERANCE ± 0.5 LIVE TOPPAN
	CHECKED NAME DO NOT DUPLICATE, CONFIDENTIAL AND PROPRIETARY
	DESIGN前田創 OUTUINE DANAA DRAWING NO. REV. SHEET DIV.
G	UUILINE-D4N44 RJD529744D201
, G	П I U U К 2004. 2 DEVICE-TFT

1) Display Items

S-print indicates the least significant digit of manufacture year (1digit), manufacture month with below alphabet (1letter), model code (5characters), serial number (6digits).

* Contents of Display

<u>* * *****</u> <u>******</u> a b c d

	Contents of display									
а	The least significant	The least significant digit of manufacture year								
b	Manufacture month	Manufacture month Jan-A May-E Sep-I Feb-B Jun-F Oct-J Mar-C Jul-G Nov-K								
С	Apr-D Aug-H Dec-L Model code 43EQC (Made in Japan) 43ERC (Made in Malaysia) 43ERC									
d	Serial number									

* Example of indication of Serial № print (S-print)

•Made in Japan

8J43EQC000125

means "manufactured in October 2018, 4.3" EQ type, C specifications, serial number 000125"

•Made in Malaysia

8J43ERC000125

means "manufactured in October 2018, 4.3" ER type, C specifications, serial number 000125"

 Location of Serial № print (S-print) Refer to 3.2 "Outward Form".

3)Others

Please note that it is likely to disappear with an organic solvent about the Serial print.

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4. Pin Assignment

No.	Symbol	Function
1	VSS	GND.
2	VSS	GND.
3	VDD	Power supply.
4	VDD	Power supply.
5	D00	
6	D01	Display data(R).
7	D02	00h: Black
8	D03	D00:LSB D07:MSB
9	D04	
10	D05	Driver has internal gamma conversion.
11	D06	Connect unused pins to GND.
12	D07	
13	D10	
14	D11	Display data(G).
15	D12	00h: Black
16	D13	D10:LSB D17:MSB
17	D14	
18	D15	Driver has internal gamma conversion.
19	D16	Connect unused pins to GND.
20	D17	
21	D20	
22	D21	Display data(B).
23	D22	00h: Black
24	D23	D20:LSB D27:MSB
25	D24	
26	D25	Driver has internal gamma conversion.
27 28	D26	Connect unused pins to GND.
28 29	D27 VSS	GND.
30	CLK	Clock signal.Latching data at the falling edge.
30	STBYB	Standby signal input. (Hi:Normal operation, Lo:Standby operation)
32	HSYNC	Horizontal sync signal input. (Low active)
33	VSYNC	Vertical sync signal input. (Low active)
34	DE	Input data effective signal. (It is effective for the period of "Hi")
35	NC	OPEN.
36	VSS	GND.
37	NC	OPEN.
38	NC	OPEN.
39	NC	OPEN.
40	NC	OPEN.
41	BLL2	Backlight drive (cathode side)
42	BLL1	Backlight drive (cathode side)
43	BLH	Backlight drive (anode side)
44	LR	Left/Right Display reverse(Hi or OPEN:normal display, Low:inversion display)
45	UD	Up/Down Display reverse(Hi or OPEN:normal display, Low:inversion display)

- Recommended connector: HIROSE ELECTRIC FH12 series [FH12A-45S-0.5SH(55)]

- Please make sure to check a consistency between pin assignment in "3.2 Outward Form" and your connector pin assignment when designing your circuit. Inconsistency in input signal assignment may cause a malfunction.

- Since FPC cable has gold plated terminals, gilt finish contact shoe connector is recommended.

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5. Absolute Maximum Rating

						VSS=0V
Item	Symbol	Condition	Ra	ting	Unit	Applicable terminal
			MIN	MAX		
Supply voltage	VDD	Ta=25° C	-0.3	5.0	V	VDD
Input voltage for logic	VI		-0.3	VDD+0.3	V	CLK,VSYNC,HSYNC,DE
						D[27:20],D[17:10],D[07:00],
						STBYB,LR,UD
LED direction current	IL			70	mA	BLH - BLL1/BLL2
of order						
Storage temperature range	Tstg		-40	95	°C	
Storage humidity range Hstg		Non condensing in an environmental				
	moisture at or less than 40°C90%RH.					

6. Recommended Operating Conditions

							VSS=0V
Item	Symbol	Condition		Rating		Unit	Applicable terminal
			MIN	TYP	MAX		
Supply voltage	VDD		3.0	3.3	3.6	V	VDD
Input voltage for logic	VI	VDD=3.0 to	0		VDD	V	CLK,VSYNC,HSYNC,
		3.6V	,				DE,D[27:20],D[17:10],
							D[07:00],STBYB,LR,UD
Operating temperature	Тор	Note	-30	25	85	°C	Panel surface
range							temperature
Operating humidity		Ta≦40° C	20		85	%	
range Hop		Ta>40° C	Non conde	nsing in			
			an environmental moisture at or				
			less than 40°C85%RH.				

Note : This monitor is operatable in this temperature range. With regard to optical characteristics, refer to Item "10. CHARACTERISTICS".

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VSS=0V

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7. Characteristics

7.1 DC Characteristics

7.1.1 Display Module

	l, Ta=25°	°C,VDD=3.3V,VSS=0V)					
Item	Symbol	Condition		Rating		Unit	Applicable terminal
			MIN	TYP	MAX		
Input voltage for logic	VIH	VDD=3.0 to 3.6V	0.7×VDD		VDD	V	CLK,VSYNC,HSYNC, DE,D[27:20],D[17:10],
	VIL		0		0.3×VDD	V	D[07:00],STBYB, LR,UD
Pull up resister value	Rpu			100		kΩ	LR,UD
Current consumption		fCLK=9MHz Color bar display		30	60	mA	VDD

7.1.2 Backlight

Item	Symbol	Condition		Rating			Applicable terminal
			MIN	TYP	MAX		
Forward current	IL1	Ta=25° C		20	50	mA	BLH - BLL1
	IL2	Note1		20	50	mA	BLH - BLL2
Forward voltage	VF1	Ta=25° C		10.6	11.4	V	BLH - BLL1
*Reference value	VF2	IL1=IL2=20mA		10.6	11.4	V	BLH - BLL2
Estimated Life	LL	Ta=25°C		50,000		hrs	
of LED		IL1=IL2=20mA,Note2					

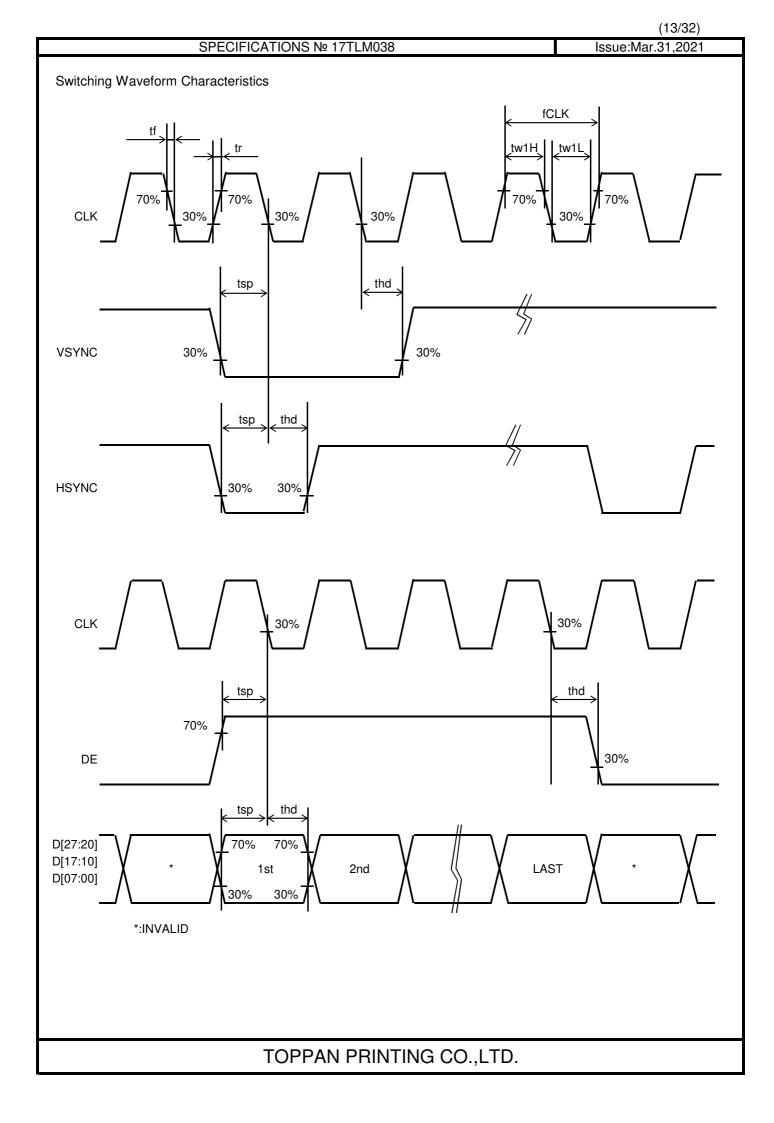
Note1: - Please control so that each current does not vary (IL1 = IL2).

- Note2: The lifetime of the LED is defined as a period till the brightness of the LED decreases to the half of its initial value.
 - This figure is given as a reference purpose only, and not as a guarantee.
 - This figure is estimated for an LED operating alone.
 - As the performance of an LED may differ when assembled as a monitor together with a TFT panel due to different environmental temperature.
 - Estimated lifetime could vary on a different temperature and usually higher temperature could reduce the life significantly.

7.2 AC Characteristics

(Unless otherwise noted, Ta=25°C,VDD=3.3V,VSS=0V)

				\		,	, , , ,
Item	Symbol	Condition		Rating			Applicable terminal
			MIN	TYP	MAX		
CLK frequency	fCLK		7.2	9.0	12.0	MHz	CLK
CLK rising time	tr				10	ns	
CLK falling time	tf				10	ns	
CLK Low period	tw1L	0.3×VDD or less.	26.4			ns	
CLK High period	tw1H	0.7×VDD or more.	26.4			ns	
Setup time	tsp		10.0			ns	CLK,VSYNC,HSYNC,
Hold time	thd		16.0			ns	DE,D[27:20],D[17:10],
							D[07:00]



7.3 Input Timing Characteristics

(Unless othe	erwise note	ed, Ta=25	°C,VDD=	3.3V,VSS	=0V)

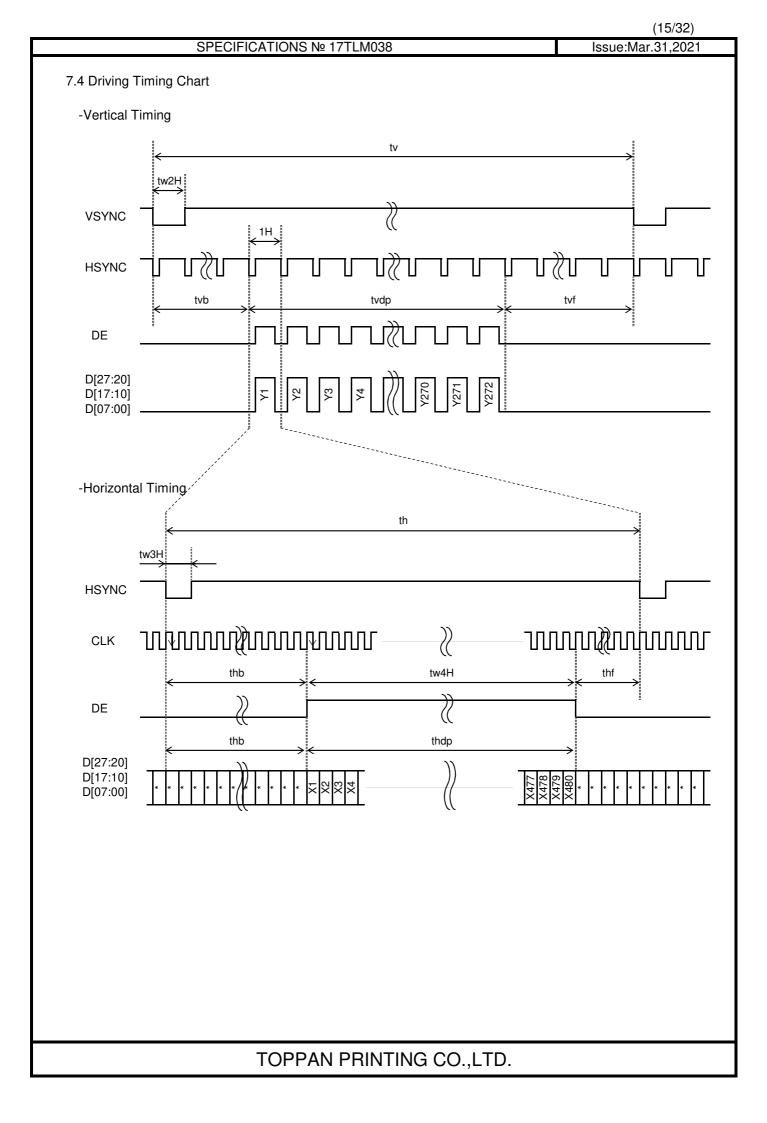
Item	Symbol	-	Rating	`	Unit	Applicable terminal
		MIN	TYP	MAX		
CLK frequency	fCLK	7.2	9.0	12.0	MHz	CLK
VSYNC frequency Note	fVSYNC	54	60	66	Hz	VSYNC
VSYNC signal cycle time	tv	277	288	396	Н	VSYNC,HSYNC
VSYNC pulse width	tw2H	1			Н	
Vertical back porch	tvb	tw2H + 2	8	31	Н	
Vertical front porch	tvf	2	8	93	Н	-
Vertical display period	tvdp		272		Н	VSYNC,HSYNC,DE,D[27:20], D[17:10],D[07:00]
HSYNC frequency	fHSYNC	15.38	16.67	18.18	kHz	HSYNC
HSYNC signal cycle time	th	521	525	734	CLK	HSYNC,CLK
HSYNC pulse width	tw3H	1			CLK	
Horizontal back porch	thb	tw3H + 1	40	127	CLK	HSYNC,DE,CLK
Horizontal front porch	thf	1	5	127	CLK	
Horizontal display period	thdp		480		CLK	DE,D[27:20],D[17:10],D[07:00], CLK
DE pulse width	tw4H		480		CLK	DE,CLK

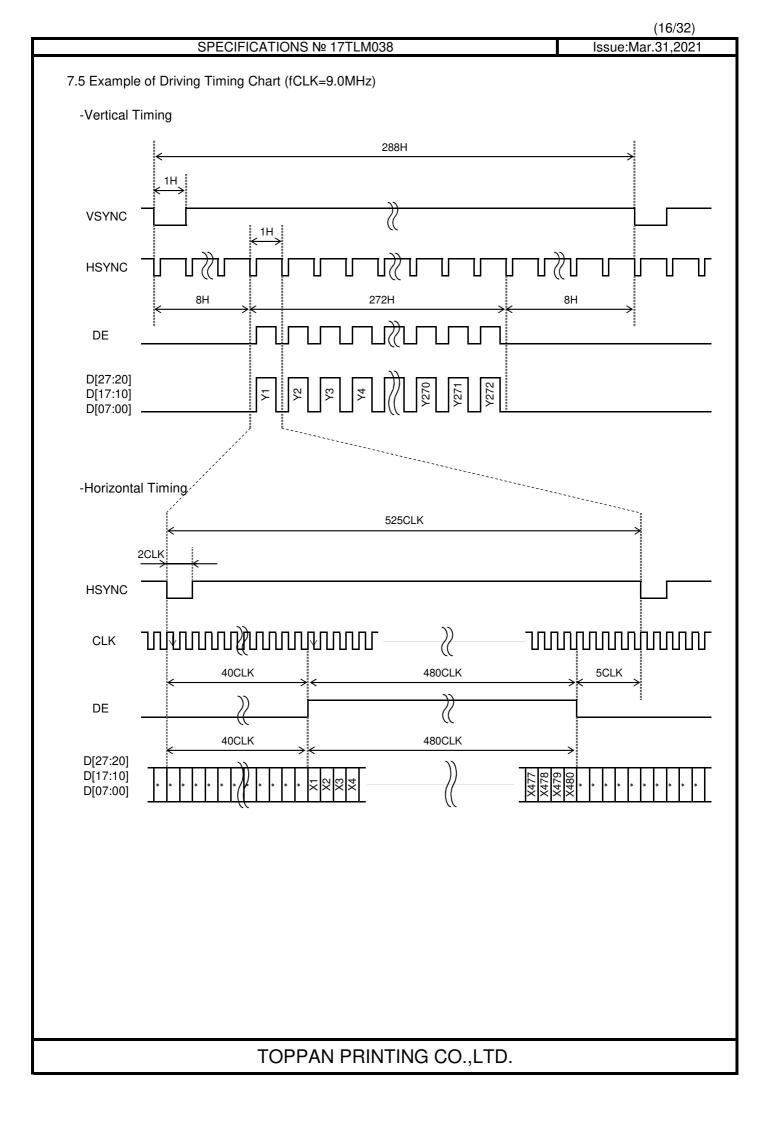
Note: The characteristic of this item is recommended standard.

Please use it after it confirms it enough like the display fineness etc. When it comes off from this characteristic and it is used.

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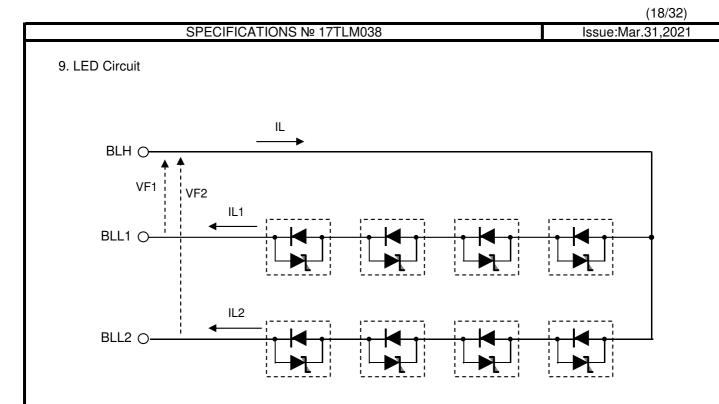
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8. Power ON/OFF S	13500.1011.01,2021						
8.1 Power ON Seq							
(U.Sm	ns -10) ms						
RESETB (internal signal)	1ms -30 ms						
VSYNC							
HSYNC/CLK/Data	→=10 ms						
STBYB	7 frame	1 frame					
Display	·	black Normal display					
Back Light	OFF	ON					
8.2 Standby / Powe	er OFF Sequence						
VDD	< ² frame → < > 100 ms →						
VSYNC							
HSYNC/CLK/Data							
STBYB							
Display	Normal display black standby state Internal power OFF	power-off state					
Back Light	ON OFF						
	SYNC signals are stopped or the power supply is turned off to a regulate ge might remain.	d frame or less,					
	TOPPAN PRINTING CO.,LTD.						



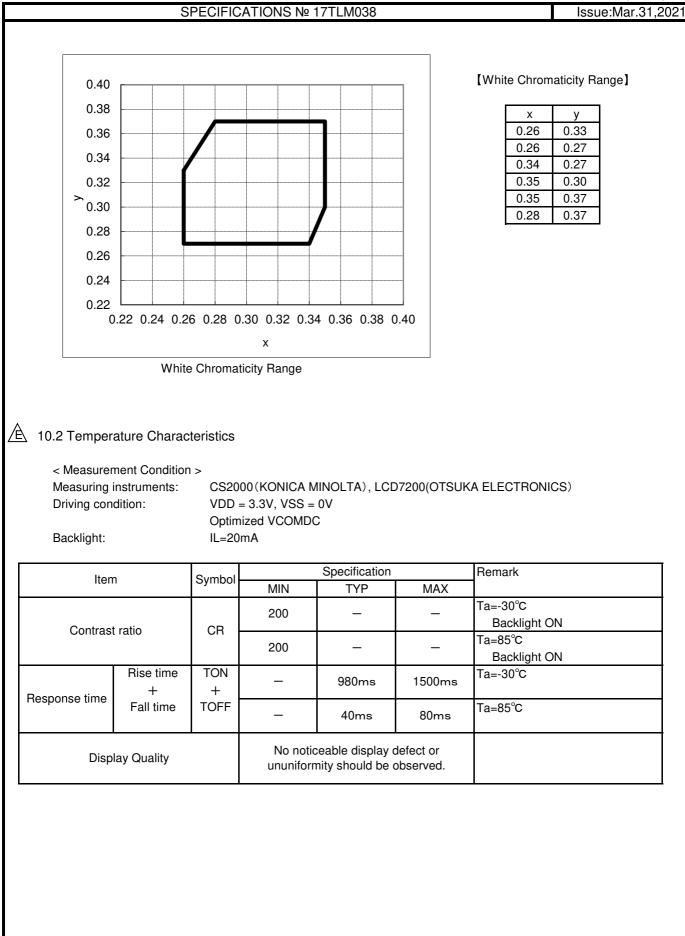
* It is recommended to control currents of BLL1 / BLL2 to equal current values (IL1 = IL2).

	SPECIFICATIONS № 17TLM038									- <i>)</i> 202
) Cha	. Characteristics									
. 0114										
< Mea	Optical Chara asurement Cor uring instrume	ndition >		/INOLTA), LCD72	00 (OTS	UKA ELI	ECTRON	ICS), EZcontrastXL88 (ELI	DIN
Drivin	g condition:		DD = 3.3V, VSS =							
		•	otimized VCOMDC	2						
Backl	-		=20mA							
Meas	ured temperati	ure: la	a=25° C							
	Item	Symbol	Condition	MIN	TYP	MAX	Unit	Note No.	Remark]
	D:	TON						-		
Ise	Rise time +	TON	[Data]=				ms	1		
Response time	+ Fall time	TOFF	00h→FFh [Data]=	-	50	100				
Ë		1011	FFh→00h							
÷		CR	[Data]=	400	800	_		2		
ontras ratio	Backlight ON		FFh/00h							
Contrast ratio	Backlight OFF				2	-				
	Left	θL	[Data]=	80	_	_	deg	3		
Viewing angle		θR	FFh/00h	80	—	_	deg	-		
/iew anç	Right Up	φU	CR≧10	80	—	_	deg			
^	Down	φD		80		_	deg			
White	Chromaticity	х		White ch	romatici	ty range		4		
	omoniationy	у								
	. .				eable bu			5		
	Burn-in				oserved a ndow pati					
Cente	er brightness		[Data]=FFh		1100 pail		ay. cd/m ²	6	ILED=35mA	
Oenic	er brightness				1100		cu/m	Ŭ		
				390	600	_			ILED=20mA	1
Bright	tness distributi	on	[Data]=FFh	70	_	_	%	7		-

* Note number 1 to 7: Refer to the APPENDIX of "Reference Method for Measuring Optical Characteristics".

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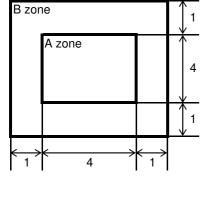
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			SPECIFICATIONS № 17TLM038	Issue:Mar.31,2021
11	. Criteria c	of Judgment		
	11.1 Defe	ctive Display a	nd Screen Quality	
Test Condition: Driving Signal Signal condition Observation distance Illuminance Backlight			Observed TFT-LCD monitor from front during ope with the following conditions Raster Patter (RGB, white, black) [Data]: 00h, 94h, FFh (3steps) 30 cm 200 to 350 lx IL=20mA	eration
D	efect item		Defect content	Criteria
	Line defect	Black, white or	color line, 3 or more neighboring defective dots	Not exists
Display Quality	Dot defect	TFT or CF, or c (brighter dot, da High bright dot: Low bright dot: Dark dot: Appe	ness on dot-by-dot base due to defective dust is counted as dot defect arker dot) : Visible through 2% ND filter at [Data]=00h Visible through 5% ND filter at [Data]=00h ear dark through white display at [Data]=94h gh 5% ND filter at [Data]=00h	Refer to table 1 Acceptable
	Dirt	-	ness (white stain, black stain etc)	Invisible through 5% ND filter at Black screen. Invisible through 1% ND filter at other screen.
Screen Quality	Point-like $0.25 \text{mm} < \varphi$ Foreign $\varphi \leq 0.25 \text{mm}$			N=0 N≦2 Acceptable
Screer	particle	Liner	3.0mm <length 0.08mm<width<br="" and="">length≦3.0mm or width≦0.08mm</length>	N=0 Acceptable
	Others		Use boundary sample for judgment when necessary	
				erage diameter = (major axis + minor axis)/2 e number: N

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Table I					
Area	High bright dot	Low bright dot	Dark dot	Total	Criteria
А	0	2	2	3	Permissible distance between same color bright dots (includes neighboring dots): 3 mm or more
В	2	4	4	6	Permissible distance between same color high bright dots (includes neighboring dots): 5 mm or more
Total	2	4	4	7	

<Landscape model>



Division of A and B areas B area: Active area Dimensional ratio between A and B areas: 1: 4: 1 (Refer to the left figure)

11.2 Screen and Other Appearance

Testing conditions

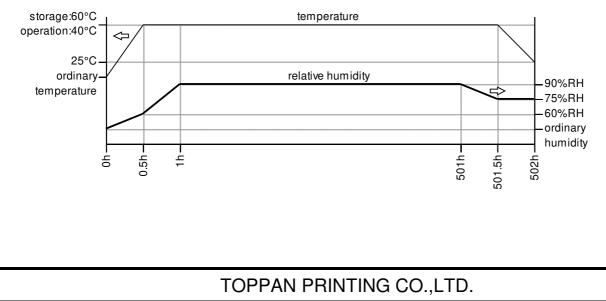
Observation distance Illuminance 30cm 1200∼2000 lx

	Item	Criteria	Remark
Polarizer	Flaw Stain Bubble Dust Dent	Ignore invisible defect when the backlight is on.	Applicable area: Active area only (Refer to the section 3.2 "Outward form")
S-ca	se	No functional defect occurs	
FPC	cable	No functional defect occurs	

	2. Reliability Test Test item	Test condition	number of failures /
			number of examinations
	High temperature storage	Ta = 95°C 500hrs	0/3
	Low temperature storage	Ta = -40°C 500hrs	0/3
	High temperature &	Ta = 60°C, RH = 90%, 500hrs	0 / 3
st	high humidity storage	non condensing X	
Durability test	High temperature operation	Tp = 85°C 500hrs	0/3
bilit	Low temperature operation	Tp = -30°C 500hrs	0 / 3
Jra	High temperature &	$Tp = 40^{\circ}C, RH = 90\%,$ 500hrs	0 / 3
ā	high humidity operation	non condensing X	
	Thermal shock storage	-40°C ↔ 85°C (30min / 30min) 100cycles	0 / 3
	Lightfastness	Xenon Blackpanel 63±3°C non-shower	0 / 3
		450W/m(300~700nm) non-operating Integral dose 800MJ/m	
	Electrostatic discharge test	Confirms to EIAJ ED-4701/300, C=200pF,R=0Ω,V=±200V	0 / 3
	(Non operation)	Each 3 times of discharge on and power supply	
		and other terminals.	
	Surface discharge test	C=250pF, R=100Ω, V=±12kV	0 / 3
	(Non operation)	Each 5 times of discharge in both polarities	
est		on the center of screen with the case grounded.	
al té	FPC tension test	Pull the FPC with the force of 3N for 10 sec.	0 / 3
Mechanical environmental test		in the direction - 90-degree to its original direction.	
Ĕ	FPC bend test	Pull the FPC with the force of 3N for 10 sec.	0/3
'iroi		in the direction -180-degree to its original direction.	
env		Reciprocate it 3 times.	
cal	Vibration test	Use TOPPAN PRINTING original jig (see next page)	0 / 3
ani	(Non operation)	Vibration Acceleration : 66.64 m/s ² (6.8 G)	
sch		Frequency : 20 ~ 500 Hz , Cycle : 10 min/sweep	
¥		Orientation : X,Y,Z-directions 10 hours per direction	
		(Total 30 hrs)	
	Impact test	Use TOPPAN PRINTING original jig (see next page) and	0 / 3
	(Non operation)	make an impact with peak acceleration of 1000m/s ² for 6 msec	
		with half sine-curve at 3 times to each X, Y, Z directions	
		in conformance with JIS C 60068-2-27-2011.	
Packing test	Packing vibration-proof test	Acceleration of 19.6m/s ² with frequency of $10 \rightarrow 55 \rightarrow 10$ Hz,	0 / 1 packing
		X,Y, Zdirection for each 30 minutes.	
bac te	Packing drop test	Drop from 75cm high.	0 / 1 packing
LTTT -		1 time to each 6 surfaces, 3 edges, 1 corner	

Note:Ta=ambient temperature Tp=Panel temperature

%~ The profile of high temperature/humidity storage and High Temperature/humidity operation (Pure water of over 10MQ·cm shall be used.)





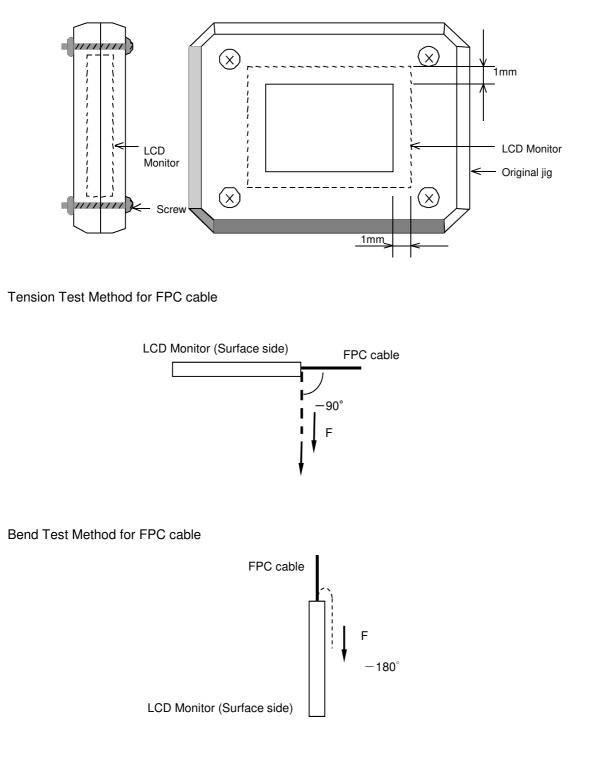
lssue:Mar.31,2021

Table2.Reliability Criteria

The parameters should be measured after leaving the monitor at the ordinary temperature for 24 hours or more after the test completion.

item	Standard	Remarks
Display quality	No visible abnormality shall be seen.	
	(Except for unevenness by Pol deterioration.)	
Contrast ratio	200 or more	Backlight ON

TOPPAN PRINTING Original Jig

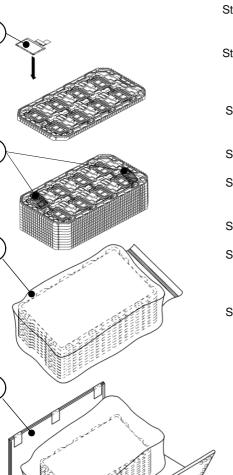


1

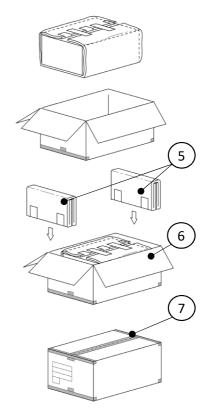
2

3

4



- Step 1. Each product is to be placed in one of the cut-outs of the tray with the display surface facing upward. (8products per tray)
- Step 2. Each tray is to be piled up in same orientation and the trays be in a stack of 9.One empty tray is to be put on the top of stack of 9 trays.
- Step3. 2 packs of moisture absorbers are to be placed on the top tray as shown in the drawing. Put piled trays into a sealing bag.
- Step4. Vacuum and seal the sealing bag with the vacuum sealing machine.
- Step5. The stack of trays in the sealing bag is to be wrapped with a bubble cushioning sheet.
- Step6. The wrapped trays are placed in the outer carton.
- Step7. Bubble cushioning sheets are to be inserted into the outer carton with same orientation. The outer carton is to be sealed in H-shape with packing tape as shown in the drawing.
- Step8. The model number, quantity of products, and shipping date are to be printed on the outer carton.If necessary, shipping labels or impression markings are to be put on the outer carton.



Dimension o	fouter carton	
D : Approx.	(356mm)	
W : Approx.	(664mm)	
H : Approx.	(182mm)	
Quantity of products pack	ed in one carton:	72
Gross weight : Appr	ΌΧ.	7.2Kg

Remark: The return of packing materials is not required.

	Packing item name		Specs., Material	
ſ	1	Tray	A-PET	
ſ	2	Drier	Moisture absorber	
ſ		Sealing bag		
ſ	4	B SHEET C	Antistatic air bubble sheet	
ſ	5	B SHEET D	Antistatic air bubble sheet	
ſ	6	Outer carton	Corrugated cardboard	
	\bigcirc	Packing tape		

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14. Handling Instruction

14.1 Cautions for Handling LCD panels

(2)	Do not make an impact on the LCD panel glass because it may break and you may get injured from it. If the glass breaks, do not touch it with bare hands.
	-
(3)	(Fragment of broken glass may stick you or you cut yourself on it.)
	If you get injured, receive adequate first aid and consult a medial doctor.
	Do not let liquid crystal get into your mouth. (If the LCD panel glass breaks, try not let liquid crystal get into your mouth even toxic property of liquid crystal has not been confirmed.
	If liquid crystal adheres, rinse it out thoroughly. (If liquid crystal adheres to your cloth or skin, wipe it off with rubbing alcohol or wash it thoroughly with soap. If liquid crystal gets into eyes, rinse it with clean water for at least 15 minutes and consult an eye doctor.
	If you scrap this products, follow a disposal standard of industrial waste that is legally valid in the community, country or territory where you reside.
(7)	Do not connect or disconnect this product while its application products is powered on.
(8)	Do not attempt to disassemble or modify this product as it is precision component.
	If a part of soldering part has been exposed, and avoid contact (short-circuit) with a metallic part of the case etc. about FPC of this model, please. Please insulate it with the insulating tape etc. if necessary. The defective operation is caused, and there is a possibility to generation of heat and the ignition.
	Since excess current protection circuit is not built in this TFT module, there is the possibility that LCD module or peripheral circuit become feverish and burned in case abnormal operation is generated. We recommend you to add excess current protection circuit to power supply.
	The devices on the FPC are damageable to electrostatic discharge, because the terminals of the devices are exposed. Wear grounded wrist-straps and use electrostatic neutralization blowers to prevent static charge and discharge when handling the TFT monitors. Designate an appropriate operating area, and set equipment, tools, and machines properly when handling this product.
L	Caution This mark is used to indicate a precaution or an instruction which, if not correctly observed, may result in bodily injury, or material damages alone.

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	SPECIFICATIONS № 17TLM038	lssue:Mar.31,2021
14.2 P	recautions for Handling	
1)	Wear finger tips at incoming inspection and for handling the TFT monitors to keep display quality and keep the working area clean. Do not touch the surface of the monitor as it is easily scratched.	
2)	Wear grounded wrist-straps and use electrostatic neutralization blowers to prevent static ch when handling the TFT monitors as the LED in this TFT monitors is damageable to electros Designate an appropriate operating area, and set equipment, tools, and machines properly when handling this product.	static discharge.
3)	Avoid strong mechanical shock including knocking, hitting or dropping to the TFT monitors for protecting their glass parts. Do not use the TFT monitors that have been experienced dropping or strong mechanical shock.	
4)	Do not use or storage the TFT monitors at high temperature and high humidity environment Particularly, never use or storage the TFT monitors at a location where condensation builds	
5)	Avoid using and storing TFT monitors at a location where they are exposed to direct sunlight or ultraviolet rays to prevent the LCD panels from deterioration by ultraviolet rays.	
6)	Do not stain or damage the contacts of the FPC cable . FPC cable needs to be inserted until it can reach to the end of connector slot. During insertion, make sure to keep the cable in a horizontal position to avoid an oblique in Otherwise, it may cause poor contact or deteriorate reliability of the FPC cable.	sertion.
7)	Do not bend or pull the FPC cable or carry the TFT monitor by holding the FPC cable. Especially, it will cause mechanical damage or critical defect if FPC is pull up or bent up to	short of display.
	Monitor DO NOT BEND UP	
	FPC	
8)	Peel off the protective film on the TFT monitors during mounting process. Refer to the section 14.5 on how to peel off the protective film. We are not responsible for electrostatic discharge failures or other defects occur when peeling off the protective film.	
14.3 P	recautions for Operation	
1)	Since this TFT monitors are not equipped with light shielding for the driver IC, do not expose the driver IC to strong lights during operation as it may cause functional failu	res.
2)	In case of powering up or powering off this LCD module, be sure to comply the sequence as instructed in this specification.	
3)	Do not plug in or out the FPC cable while power supply is switch on. Plug the FPC cable in and out while power supply is switched off.	
4)	Do not operate the TFT monitors in the strong magnetic field. It may break the TFT monitor	rs.
5)	Do not display a fixed image on the screen for a long time. Use a screen-saver or other measures to avoid a fixed image displayed on the screen for a Otherwise, it may cause burn-in image on the screen due the characteristics of liquid crysta	-

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14.4 Storage Condition for Shipping Cartons

Storage environment

 Temperature 	0 to 40°C
Humidity	60%RH or less
	No-condensing occurs under low temperature with high humidity condition.
Atmosphere	No poisonous gas that can erode electronic components and/or
	wiring materials should be detected.
 Time period 	1 year
 Unpacking 	To prevent damages caused by static electricity, anti-static precautionary measures
	(e.g. earthing, anti-static mat) should be implemented.
	After unpack, keep product in the appropriate condition,
	otherwise bubble seal of Protective film may be printed on Polarizer.
Maximum piling up	7 cartons

*Conditions to storage after unpacking

Storage environment

0	
Temperature	0 to 40°C
Humidity	60%RH or less
	No-condensing occurs under low temperature with high humidity condition.
Atmosphere	No poisonous gas that can erode electronic components and/or
	wiring materials should be detected.
Time period	1 year (Shelf life)
Others	Keep/ store away from direct sunlight
	Storage goods on original tray made by TOPPAN.

14.5 Precautions for Peeling off the Protective film

The followings work environment and work method are recommended to prevent the TFT monitors from static damage or adhesion of dust when peeling off the protective films.

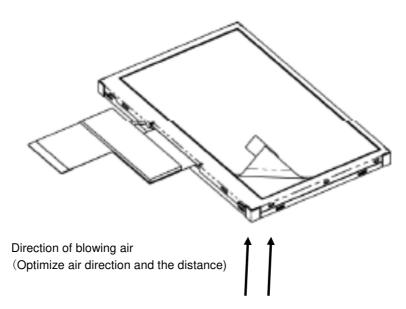
- A) Work Environment
 - a) Humidity: 50 to 70 %RH, Temperature15 to 27°C
 - b) Operators should wear conductive shoes, conductive clothes, conductive finger tips and grounded wrist-straps. Use an electrostatic neutralization blower.

Anti-static treatment should be implemented to work area's floor.

- c) Use a room shielded against outside dust with sticky floor mat laid at the entrance to eliminate dirt.
- B) Work Method

The following procedures should taken to prevent the driver ICs from charging and discharging.

- a) Use an electrostatic neutralization blower to blow air on the TFT monitors to its lower right when FPC is placed at the bottom.
 Optimize direction of the blowing air and the distance between the TFT monitors and the electrostatic neutralization blower.
- b) Put an adhesive tape (Scotch tape, etc) at the lower left corner area of the protective film to prevent scratch on surface of TFT monitors.
- c) Peel off the adhesive tape slowly (spending more than 2 secs to complete) by pulling it to opposite direction.



14.6 Warranty

TOPPAN PRINTING is only liable to defective goods which is stored and used under the condition complying with this specifications and returned within 1 (one) year.

Warranty caused by manufacturing defect shall be conducted by replacement of goods or refundment at unit price.

APPENDIX

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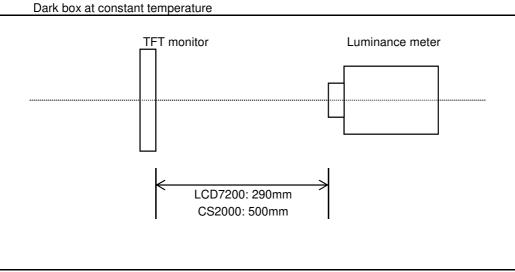
Reference Method for Measuring Optical Characteristics and Performance

1. Measurement Condition (Backlight ON)

Measuring instruments: CS2000 (KONICA MINOLTA), LCD7200 (OTSUKA ELECTRONICS), EZcontrastXL88 (ELDIM) Driving condition: Refer to the section "Optical Characteristics"

Measured temperature: 25°C unless specified

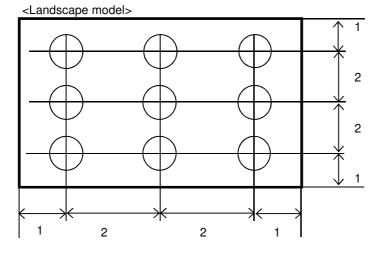
Measurement system: See the chart below. The luminance meter is placed on the normal line of measurement system. Measurement point: At the center of the screen unless otherwise specified



Measurement is made after 30 minutes of lighting of the backlight.

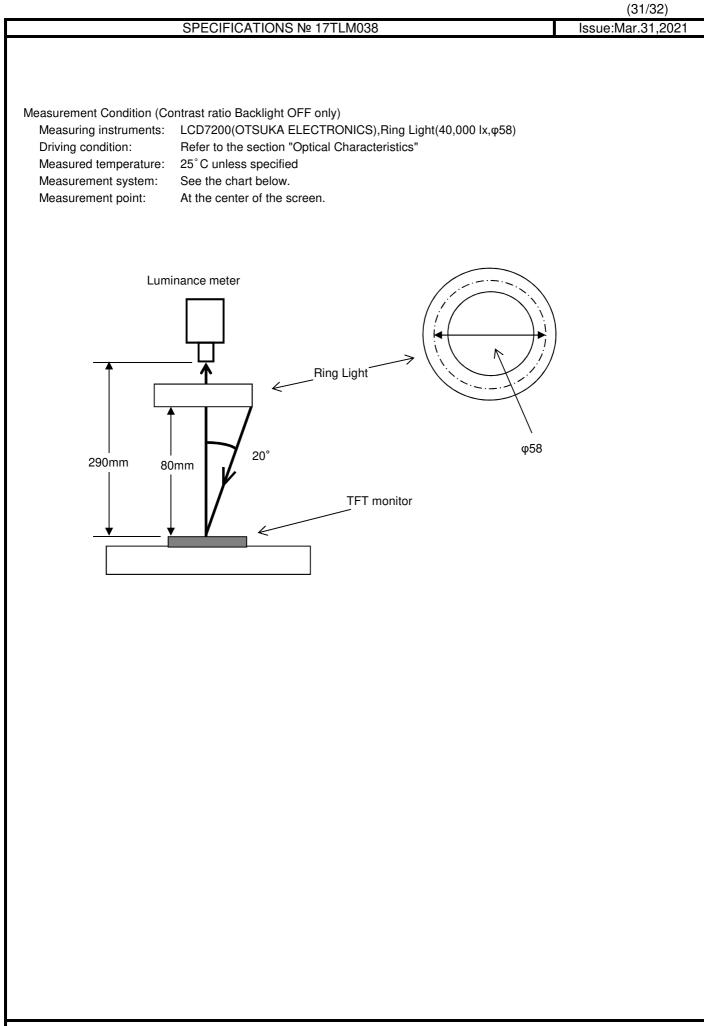
Measurement point:

At the center point of the screen Brightness distribution: 9 points shown in the following drawing.



Dimensional ratio of active area

Backlight IL=20mA



		SPECIFICATIONS № 17TLM038		Issue:Mar.
- oot 1 /	thad			
est Me Notice	thod Item	Test method	Measuring	Remark
Notice	item	rest method	instrument	nemark
1	Response	Measure output signal waves with a brightness meter	LCD7200	Black display
1	time	when the raster or window pattern is changed over from	LOD7200	
	ume			[Data]=00h
		white to black and from black to white		White displat
				[Data]=FFh
				TON
		Black White Black		Rise time
				TOFF
		White brightness		Fall time
		100%		
		90%		
		90 %		
		10%		
		$0\% \longleftrightarrow $		
		Black		
		brightness TON TOFF		
2	Contrast ratio	Measure maximum luminance Y1([Data]=FFh) and	CS2000	Backlight ON
		minimum luminance Y2([Data]=00h) at the center of	LCD7200	Backlight OF
		the screen by displaying raster or window pattern.		
		Then calculate the ratio between these two values.		
		Contrast ratio = $Y1/Y2$		
		Diameter of measuring point: 7.8mmφ(CS2000)		
		Diameter of measuring point: 3mmq(LCD7200)		
3	Viewing	Move the luminance meter from right to left and up	EZcontrastXL88	
	angle	and down and determine the angles where		
	Horizontal0	contrast ratio is 10.		
	Verticalφ			
4	White	Measure chromaticity coordinates x and y of CIE1931	CS2000	
	chromaticity	colorimetric system at [Data] = FFh		
		Color matching function: 2°view		
		Measurement angle: 1°		
5	Burn-in	Visually check burn-in image on the screen		
•		after 2 hours of "window display" ([Data]=00h/FFh).		
6	Center	Measure the brightness at the center of the screen.	CS2000	
U			002000	
7	brightness	(Drightnoop distribution) 100 x D/A 0/	00000	
1	Brightness	(Brightness distribution) = 100 x B/A %	CS2000	
	distribution	A : max. brightness of the 9 points		
	1	B : min. brightness of the 9 points		

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