7,0" Display touch module - BrightBond

LVDS

This 7,0" multi-touch display panel impresses with its particularly high brightness of 1000 cd/m² in combination with optical bonding and 10 finger detection.

EP Electronic Print assumes no responsibility for damage to this device resulting from improper use not specified in this specification. Please check all parameters mentioned in this specification before use.

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Revision	Description	page	Date
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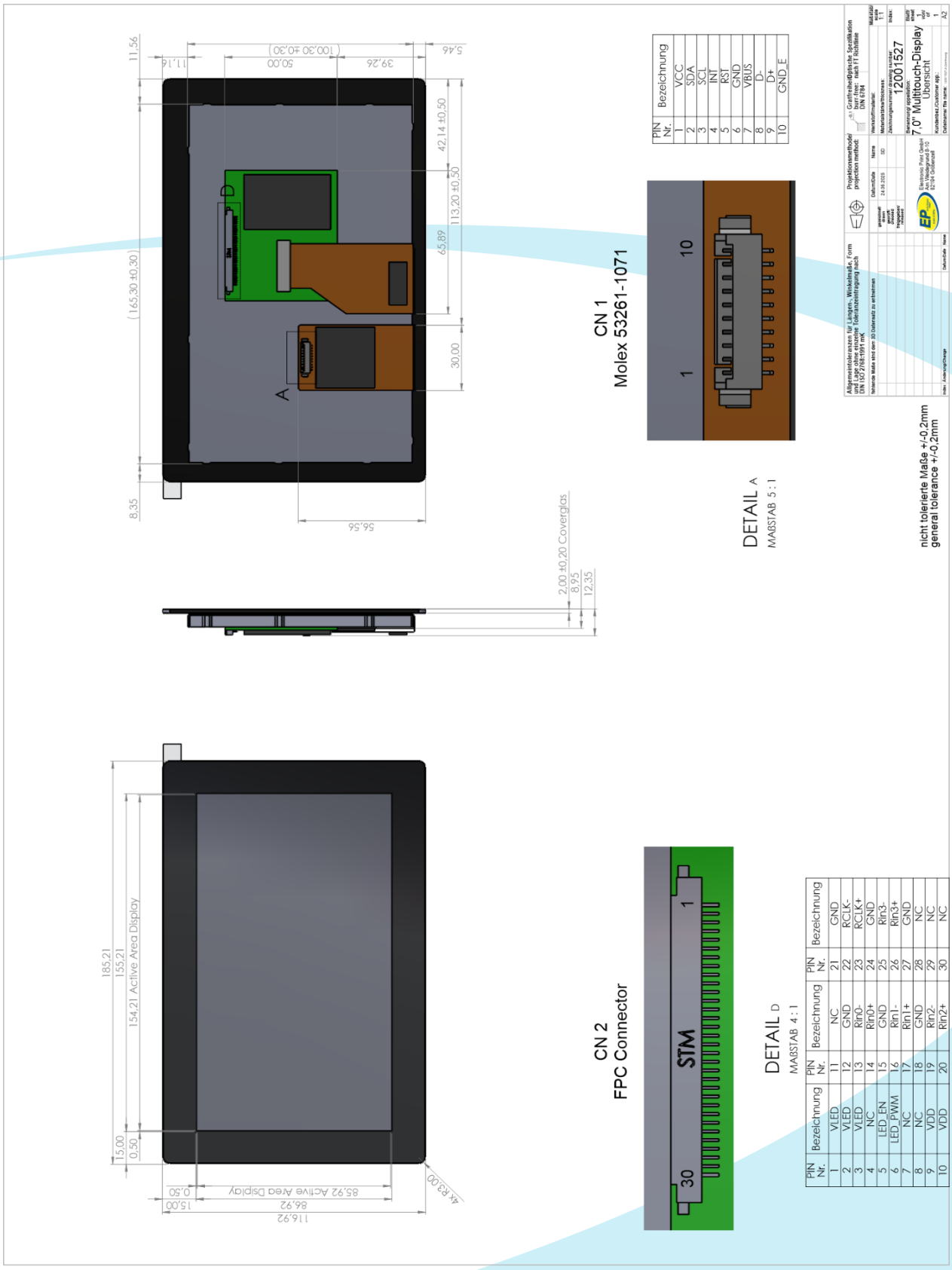
1 General specification

1.1 Features and general description

General	Description		Unit	remark
module size	7,0		inch	diagonal
structure	GG+LCD, Optical Bonding			
resolution	1024(RGB) x 600			
display mode	normally black, transmissive			
pixel pitch	0,1506(W) x 0,1432(H)		mm	
pixel arrangement	RGB stripe			
viewing direction	ALL			
outline dimensions	185.21(W) × 116.92(H) × 8.35(D)		mm	W/O PCBA
active area	154.21(W) × 85.92(H)		mm	
LCD interface	LVDS			
CTP Interface	USB or I²C			
CTP IC	EXC81W32			
Surface hardness	6		H	
Touch point	10			
Usability	cotton gloves	full functionality available		
	latex gloves	full functionality available		
	welding gloves	not usable		
	water	liquid is detected, no ghosting on pcap		
	electrolyte	liquid is detected, no ghosting on pcap		
	disinfectant	liquid is detected, no ghosting on pcap		
	oil	no impairment, full functionality available		

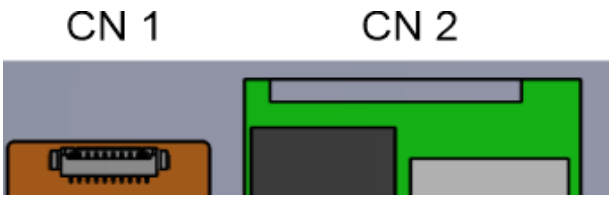
2 Mechanical drawing



PIN Nr.	Bezeichnung
1	VCC
2	SDA
3	SCL
4	INT
5	RST
6	GND
7	VBUS
8	D-
9	D+
10	GND_E

PIN Nr.	Bezeichnung	PIN Nr.	Bezeichnung	PIN Nr.	Bezeichnung
1	VLED	11	NC	21	GND
2	VLED	12	GND	22	RCLK-
3	VLED	13	Rin0-	23	RCLK+
4	NC	14	Rin0+	24	GND
5	LED_EN	15	GND	25	Rin3-
6	LED_PWM	16	Rin1-	26	Rin3+
7	NC	17	Rin1+	27	GND
8	NC	18	GND	28	NC
9	VDD	19	Rin2-	29	NC
10	VDD	20	Rin2+	30	NC

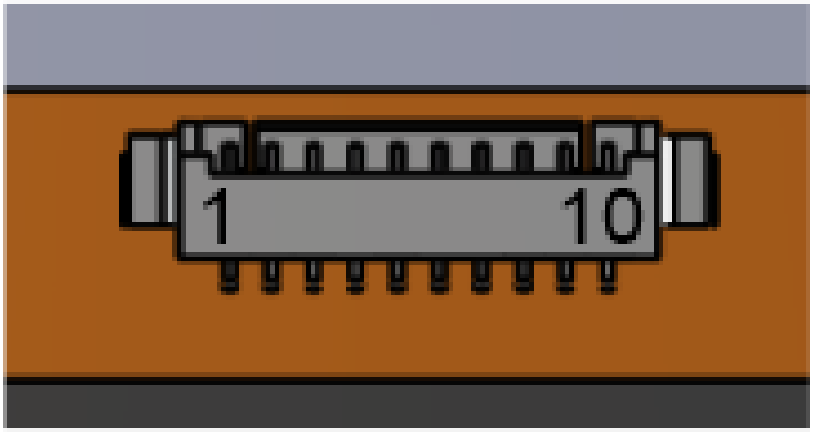
3 Pin assignment



CN 1	I²C, USB	
CN 2	LVDS	

3.1 CTP Pin assignment

CN1: module side connector: Molex 53216-1071 or Compatible
user side connector Molex 51021-1000



PIN	Symbol	Description
1	VCC	I²C power supply: +3,3V
2	SDA	I²C data signal
3	SCL	I²C clock signal
4	INT	I²C interrupt signal
5	RST	Reset pin, active low
6	GND	Power Ground
7	VBUS	USB Power Supply: +5V
8	D-	USB data port minus
9	D+	USB data port plus
10	GND_E	Power Ground

3.2 LCD Pin assignment

CN2: module side connector: STM MSBKT2407P30 or Compatible
user side connector JAE FI-X30H

PIN	Symbol	Description
1	V_{LED}	Backlight power supply: +12V
2	V_{LED}	Backlight power supply: +12V
3	V_{LED}	Backlight power supply: +12V
4	NC	Not connected
5	LED_EN	Backlight on/off control
6	LED_PWM	Backlight dimming control
7	NC	Not connected
8	NC	Not connected
9	VDD	LCD power supply: +3,3V
10	VDD	LCD power supply: +3,3V
11	NC	Not connected
12	GND	Ground
13	RXIN0-	Negative LVDS differential data input (0)
14	RXIN0+	Positive LVDS differential data input (0)
15	GND	Ground
16	RXIN1-	Negative LVDS differential data input (1)
17	RXIN1+	Positive LVDS differential data input (1)
18	GND	Ground
19	RXIN2-	Negative LVDS differential data input (2)
20	RXIN2+	Positive LVDS differential data input (2)
21	GND	Ground
22	RXCLKIN-	Negative LVDS differential clock input
23	RXCLKIN+	Positive LVDS differential clock input
24	GND	Ground
25	RXIN3-	Negative LVDS differential data input (3)
26	RXIN3+	Positive LVDS differential data input (3)
27	GND	Ground
28	NC	Not connected
29	NC	Not connected
30	NC	Not connected

4 Absolute maximum rating

The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

Parameter	Symbol	MIN	MAX	UNIT
power supply voltage	VDD	-0,3	4,0	V
	VCC	-0,3	3,6	V
	VBUS	-0,5	5,5	V

Parameter	MIN	MAX	UNIT
operation temperature	-30	+80	°C
storage temperature	-40	+85	°C
relative humidity (non-condensing)		90	%RH

5 Electrical characteristics

5.1 Driving LCD panel

Parameter	Symbol	Values			Unit	Remark
		min	typ	max		
power supply voltage	VDD	3,0	3,3	3,6	V	Ta= 25°C
power supply current	I_{VDD}	-	100	-	mA	white picture

Note 1: VDD setting should match the signals output voltage of customer's system board.

5.2 CTP recommended operating condition

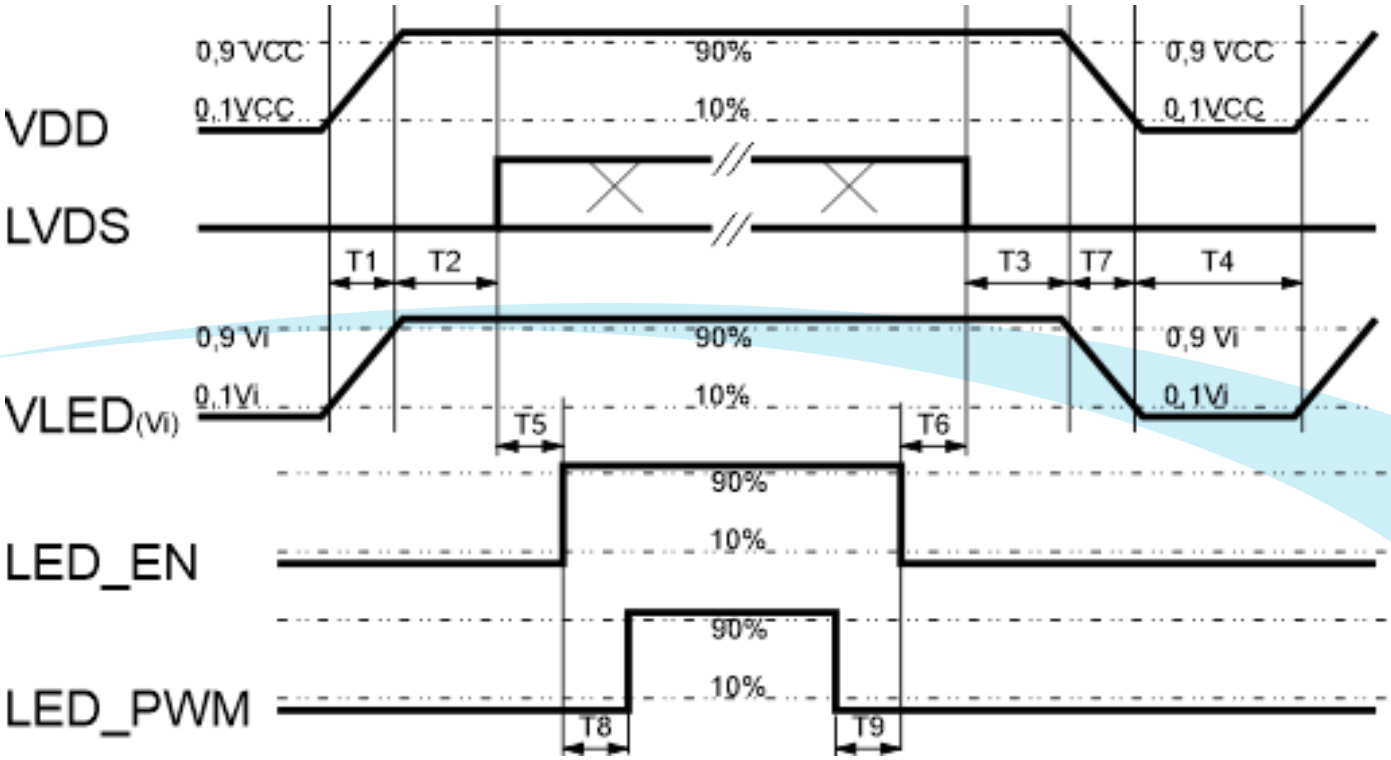
Parameter	Symbol	Values			Unit	Remark
		min	typ	max		
power supply voltage	VCC	3,0	3,3	3,6	V	Ta= 25°C
	Vbus	4,7	5,0	5,3	V	

5.3 Driver LCD backlight

Parameter		Symbol	min	Typ	Max	Unit	Remark
power supply voltage		V_{LED}	10	12	15	V	Ta= 25°C
power supply current		I_{VLED}	-	400	500	mA	
EN signal voltage	High level	-	1,65	-	5,25	mA	
	Low level		0	-	0,4	V	
PWM contr. level	High level	-	1,65	-	5,25	V	
	Low level		0	-	0,4	V	
PWM frequency		F_{PWM}	100	-	20000	Hz	
PWM dimming duty		-	5	-	100	%	
LED Life time		-	30000	-	-	Hour	Note 1
power consumption		P_{LED}	-	6	-	W	

Note 1: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and 1/2 rated current . The LED lifetime could be decreased if operating IL is larger than 80 mA.

5.4 Power on sequence



Parameter	Value			Unit
	min.	typ.	max.	
T1	0,5	-	10	ms
T2	0	-	50	ms
T3	0	-	50	ms
T4	500	-	-	ms
T5	200	-	-	ms
T6	20	-	-	ms
T7	5	-	300	ms
T8	10	-	-	ms
T9	10	-	-	ms

Note 1: Please avoid floating state of interface signal at invalid period.
Note 2: When the interface signal is invalid, be sure to pull down the power supply of LCD VDD to 0V
Note 3: The backlight converter power must be turned on after power supply for the logic and interface signal is valid the backlight converter power must be torned off before power supply for the logic and the interface signal is invalid.

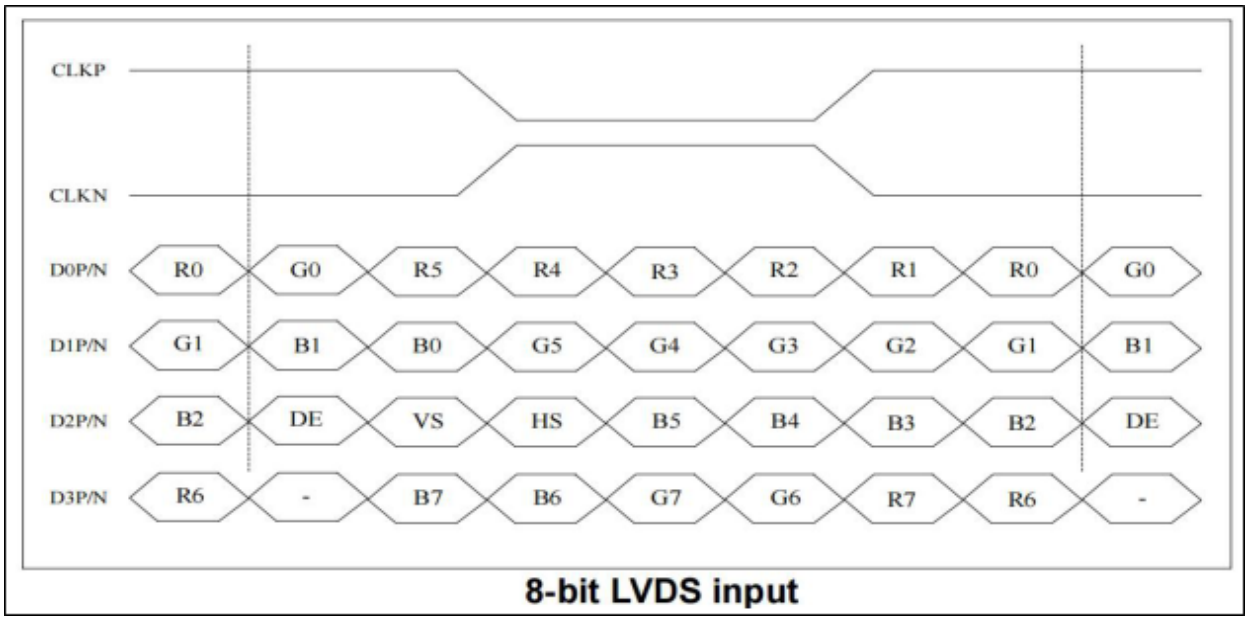
6 Signal timing specification

6.1 Timing controller

Parallel 24-bit RGB Input timing (PVDD=VDD=VDDI=3,3V/AGND=0V/ TA=25°C)

Parallel 24-bit RGB interface timing table							
Item		Symbol	min	Typ	Max	Unit	remark
DCLK frequency		Fclk	23	25	27	MHz	
HSYNC	period time	Th	808	816	848	DCLK	
	display time	Thdisp		800		DCLK	
	back porch	Thbp	4	8	24	DCLK	
	front porch	Thfp	4	8	24	DCLK	
	pulse width	Thw	2	4	8	DCLK	
VSYNC	period time	Tv	496	512	528	HSYNK	
	display time	Tvdisp		480		HSYNK	
	back porch	TVbp	8	16	24	HSYNK	
	front porch	Tvfp	8	16	24	HSYNK	
	pulse width	Tvw	2	4	8	HSYNK	

6.2 Data input format

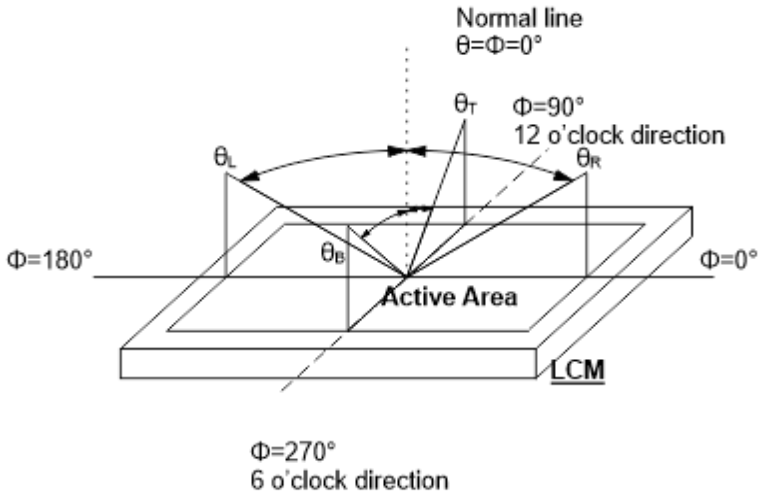


8-bit LVDS input

7 Optical characteristics

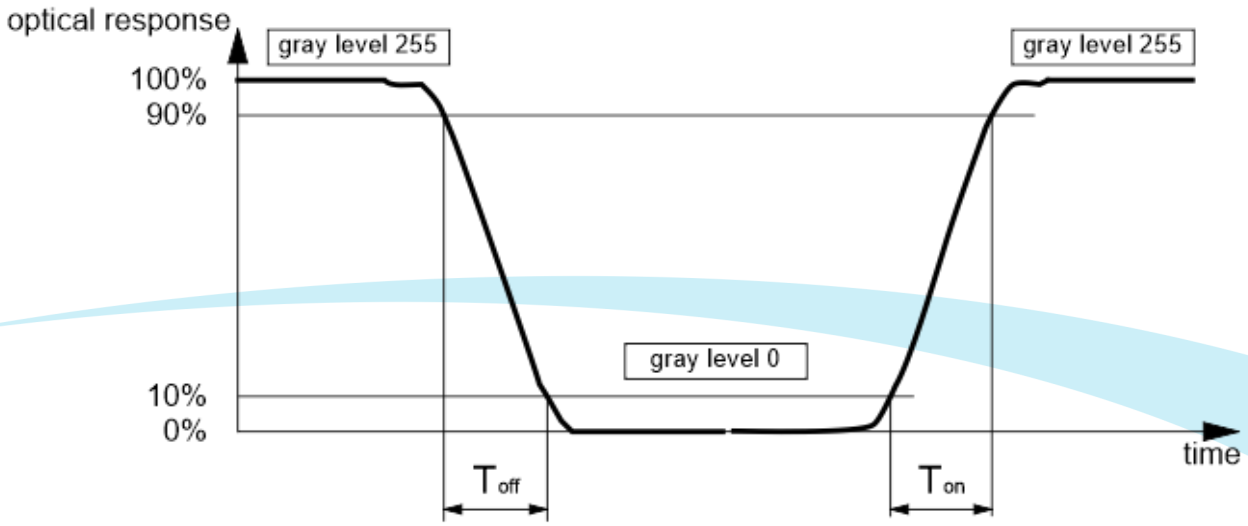
Item		Symbol	Cond.	min.	typ.	max.	Unit	Note
viewing angle (CR≥10)	horizontal	θ_{x+}	Φ=180° (9 o`clock)	80	-	-	°	1, 5
		θ_{x-}	Φ=0° (3 o`clock)	80	-	-	°	
	vertical	θ_{y+}	Φ=90° (12 o`clock)	80	-	-	°	
		θ_{y-}	Φ=270° (6 o`clock)	80	-	-	°	
luminance (W/CTP)		L_v	θx=0 θy=0	750	850	-	cd/m²	4, 5
uniformity		ΔY9		70	-	-	%	5, 6
contrast ratio		CR		900	1000	-		2, 5
color chromaticity (CIE1931)	white	W_x	θx=0 θy=0	0,3	0,35	-		1, 5
		W_y		0,33	0,38	-		
	red	R_x		-	-	-		
		R_y		-	-	-		
	green	G_x		-	-	-		
		G_y		-	-	-		
	blue	B_x		-	-	-		
		B_y		-	-	-		
repose time		T_R+T_F		-	25	35	ms	3

Note 1: Definition of viewing angle (θx=0, θy=0)



Note 2: Definition of contrast ratio (CR)
The contrast ration can be calculated by following expression:
Contrast ratio (CR) = L255/L0
with
L255: luminance of gray level 255
L0: luminance of gray level 0
CR= CR (5)
CR(X) is corresponding to the contrast ration of point X at figure in note 6

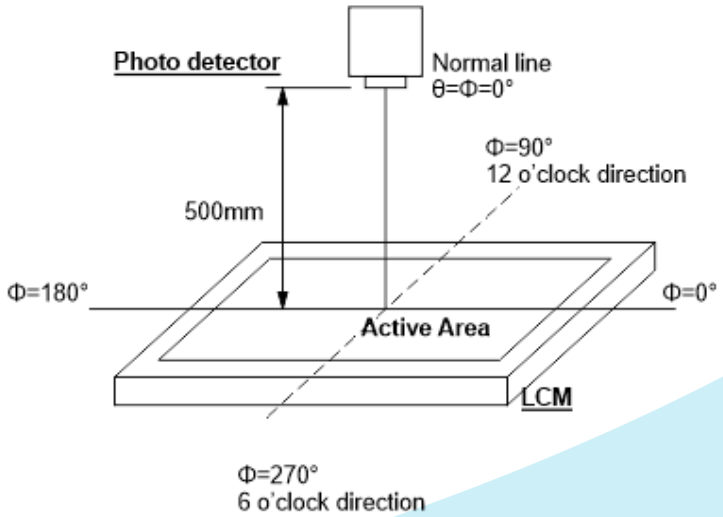
Note 3: Definition of reponse time (T_{on},T_{off})



The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.

Note 4: Definition of luminance of white (LC)
measure luminance of gray level 255 at center point
LC= L(5)
L(x) is corresponding to luminace of point X at figure in note 6.

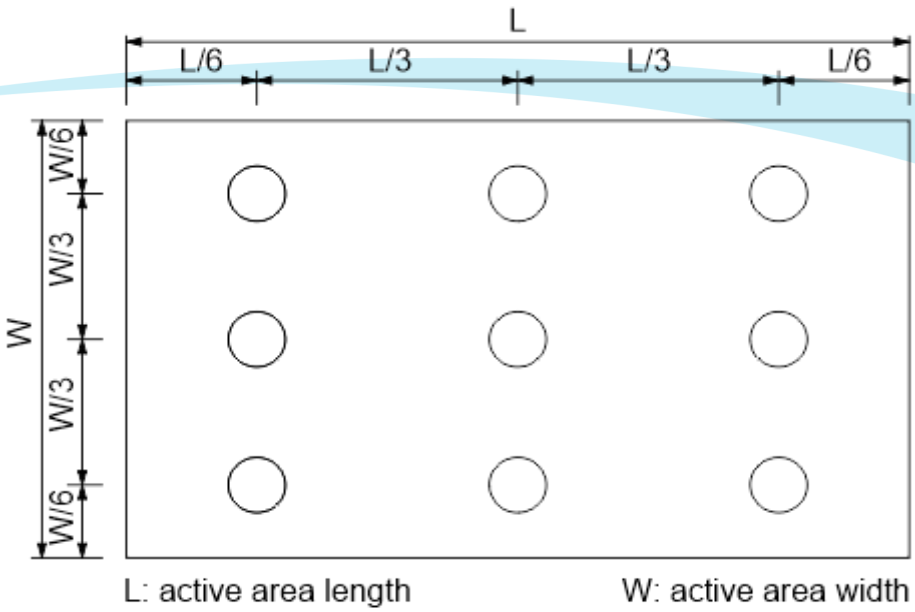
Note 5: Measurement setup:
The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize luminance, measurement should be executed after lighting backlight for 30 minutes in a windless room.



Note 6: Definition of Luminance Uniformity:

Active area is divided into 9 measuring areas(Refer to Fig. 4-4). Every measuring point is placed at the center of each measuring area

$$\text{Luminance uniformity (Yu)} = \frac{B_{min}}{B_{max}}$$



B_{min}: The measured minimum luminance of all measurement position.

B_{max}: The measured maximum luminance of all measurement position.

8 Reliability test

Test Item	Test conditions	Note
High temperatur storage test	85°C, 240 hours	1,3,4,5
Low temperatur storage test	-40°C, 240 hours	1,3,4
High temperatur operation test	80°C, 240 hours	2,3,4,5
Low temperatur operation test	-30°C, 240 hours	1,3,4
High temperature and high humidity operation test	60°C, 90%RH, 240 hours	3,4,5
Thermal shock (no operation)	-30°C/30 min ~ +80°C/30 min, change time: 5 min, for a total of 100 cycles. Starting with low temperature and ending with high temperature.	3,4,5
ESD	Contact: ±4kV, Air: ±8kV (R=330R, C=150pF)	EN 61000-4-2

Note 1: Ta is the ambient temperature of samples

Note 2: Ts is the temperature of panel's surface

Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification

Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note 5: A certain level of Mura (non-uniformity) of dark / black image will happen several days after high temperature testing (H.T.T.). There is a slowly part recovery over a long time (several months). Such a long exposure time like in H.T.T. will normally not happen in a real application. Therefore the test H.T.T. was introduced to simulate cycles with normal conditions in-between but with the same total exposure time what show a significant reduced Mura. The root cause is related to tension generated due to different amount of shrinking
in the stack of layers in the polarizer sheet. The effect is more significant on larger displays like this size. An investigation into alternative polarizer material showed that there is no better alternative currently available.

9 Appearence inspection

9.1 Classification of defects

Defects are classified two types, major defect and minor defect according to the defect. And, the definition of defects is classified as below

Major defect:	Any defect may result in functional failure, or reduce the usability of product for ist purpose. For example, electrical failure, deformation and etc..
Minor defect.	A defect that is not to reduce the usability of product for its intended purpose and un-uniformity, dot defect and etc

The criteria on major or minor judgment will be according with the classification of defects.

9.2 Inspection conditions

The environmental condition and visual inspection shall be conducted as below.

Light:	Panel visual inspection on the operation condition for cosmetic shall be conducted at the distance 30~40cm or more between the LCD module and inspectors eyes Ambient Illumination：500~600Lux for external appearance inspection Ambient Illumination：200~500 Lux for light on inspection
Inspection background:	black and white board below product
Inspection distance:	20-30 cm between inspectors eye and inspected surface
Inspection angle:	a）±45 degree to the front surface of display panel in verticaldirection. b) ±45 degree to the front surface of display panel in horizontaldirection.
Ambient temoeratur:	25±5 ℃
Humidity:	25~75 % RH

9.3 Defect code comparison table

Code	Name (unit)	Code	Name (unit)
N	number	D	diameter (mm)
L	length (mm)	H	depth (mm)
W	width (mm)	S	distance (mm)
S	area (mm²)		

9.4 Inspection precaution

1. Inspector must wear finger gloves and electrostatic bracelets
2. Product in front of inspector
3. Product must be handle d carfully, use both hands
4. Do not bend product

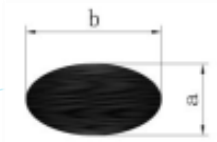
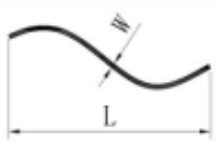
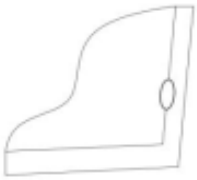
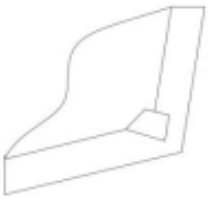
9.5 Product region division

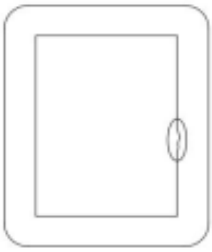
Divide the product into 9 parts. The centerpart is defined as area A, surrounding areas as B

B	B	B
B	A	B
B	B	B

9.6 Inspection standards for modules

CTP and LCD fitting components

Items		Standard	Conclusion	inspection tool
Dot (whithe, black, heterochromatic)  D=(a+b)/2	A	D≤0,15	D≤0,15 can be disregarded	visual inspection
		0,15<D≤0,3	allowed, if distance to another dent or bubble is bigger 15 mm	
		D>0,3	ng	
	B	D≤0,2	D≤0,2 can be disregarded	
		0,2≤D≤0,5	allowed, if distance to another dent or bubble is bigger 15 mm	
		D>0,5	ng	
Linear defects (fibers/ foreign bodies/ scratches, etc)  	A	W≤0,04	W≤0,04 can be disregarded	visual inspection
		0,04<W≤0,06	allowed, if L≤6 and distance to another scratch or impurity is bigger than 15 mm	
		0,06<W≤0,09	allowed, if L≤6 and distance to another scratch or impurity is bigger than 15 mm	
		W>0,09, L>6	ng	
	B	W≤0,05	W≤0,05 can be disregarded	
		0,05<W≤0,07	allowed, if L≤7 and distance to another scratch or impurity is bigger than 15 mm	
		0,07<W≤0,1	allowed, if L≤7 and distance to another scratch or impurity is bigger than 15 mm	
		W>0,125, L>8	ng	
bubble	A	inspection according to point standard		visual inspection
	B	inspection according to point standard		
broken edge loss 	B	1. sensor edge craeks without damaging the line, funktion test passed and front side is not visible after fitting 2. Edge creak on front of coverglas: ng 3. Back: X<1,5 mm, Y<1,5 mm, Z<GT (GT= thickness of coverglas), without affecting functionality: one allowed each side, maxi. two in total.		visual inspection
broken corner loss 	B			

Items		Standard	Conclusion	inspection tool
creak	A + B		ng	visual inspection
Newton`s rings	A		less than 1/3 of display area, light up invisible. If there are special requirements, a limited sample should be revaild	
panel color	A + B		consistent with sample, no serious color diffence	
size			product drawings	
Inkhole 	B	D≤0,25	Distance bigger than 15 mm: paint can be repaired with paint pen of the same color as Color of coverglas	
Ink sawtooth 	A + B	W>0,2, L>1	distance between two serrations near VA is bigger than 50 mm, two serrations are allowed.	
circular white mura, lummination mura, black/white mura, etc.	B	less than 50% should be perceived refering to 5% ND filter, or a limited sample should be revaild		visual inspection

10 Notices

10.1 Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

10.2 Storage

Store in dark rooms! Storage temperature must beu kept at 25±10°C and 65%RH (or less).
Do not store in surroundings containing organic solvent or corrosive gas.
Store in an anti-electrostatic container or bag.

10.3 Handling

Do not put heavy, hard or sharp objekts on the product!
Do not bend in order to assure flexibility of the product!
Do not put a product on an other! Products might be scratched or damaged.
Do not leave module in direct sunlight to avoid malfunction of the ICs

10.4 Operation

Light transmission is an important factor of the product. Please wear clean finger sacks, gloves and mask to protect surface from fingerprint or stain attach. Please ensure to touch the product outside viewing area, when handling the panel.

10.5 Cleaning

Do not use any organic solvent acid or alkali solution to clean the surface.
Use dry and soft foot-free cloths and Ethanol to clean the surface.

10.6 Others

1. Please note, that dew gathering inside the panel due to aprupt temperature or humidity change may cause deterioration of performance.
2. Although full care is taken, to ensure product quality, failure modes as degradiation, short circuits or open circuits might be caused. Therfore please study effects of any single failure of the panel and consider the safety of the product configuration.