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SPECIFICATION FOR CTP+LCD MODULE

MODEL NAME : TF121TM005

MODEL REV : V1

SPEC REV. : 2

ISSUED DATE : 2026/10/23

Customer	
Approved By	Comment

Supplier		
Prepared By	Checked By	Approved By
ZHU	JUN	JUN
2026/10/23	2026/10/23	2026/10/23

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Record of Revision

Rev.	Description	Page	Date
0	Preliminary specification released	/	2024/02/28
1	Update drawing	5	2025/03/24
2	Update operating and storage Temp.	5, 8, 21	2026/10/23

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1 General Specifications

1.1 Definition

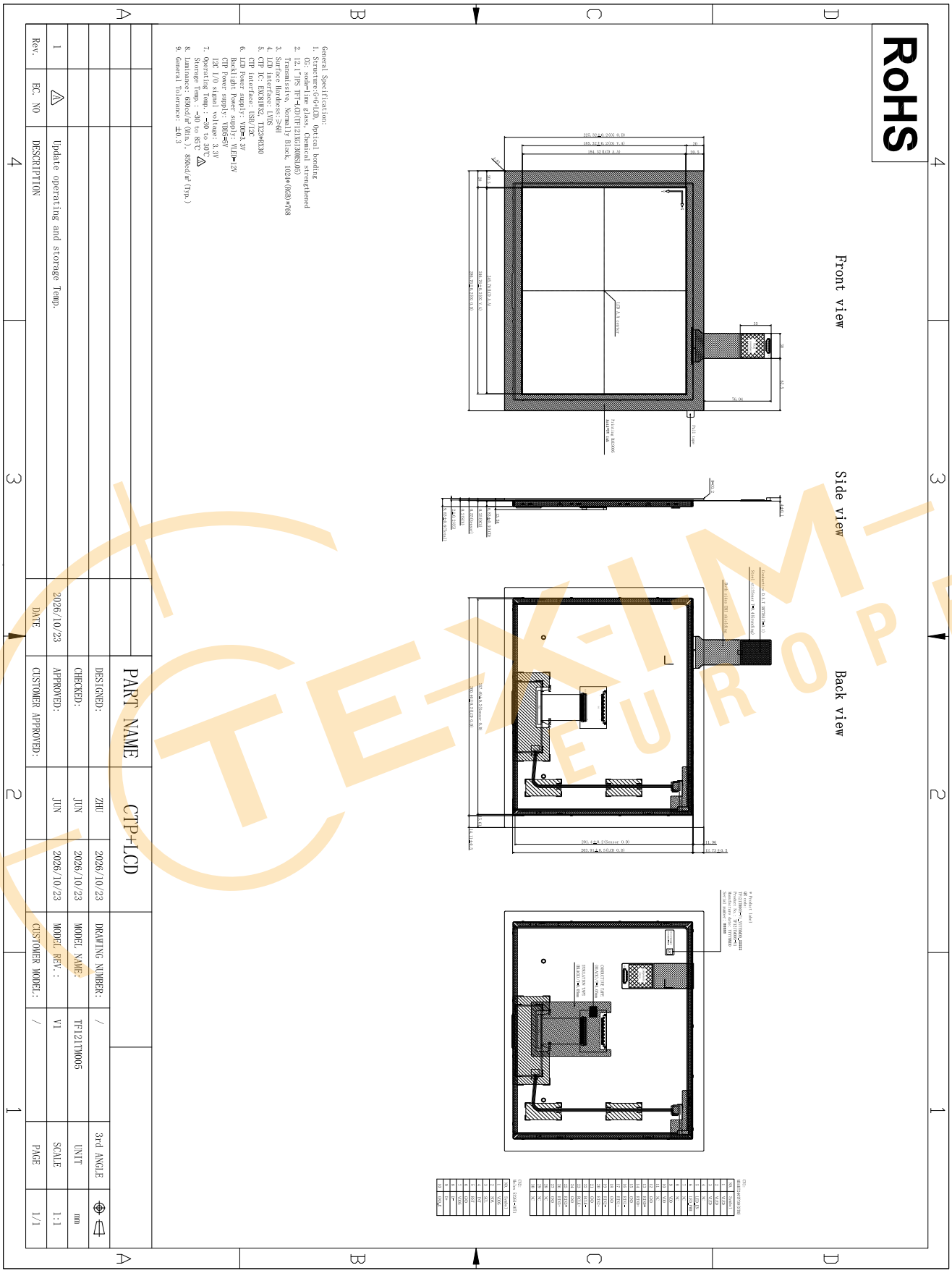
The specification is used for capacitive touch module with TFT LCD & Backlight Unit.

1.2 Features and General Description

General	Specification	Unit	Note
Module size	12.1	inch	diagonal
Structure	G+G+LCD, Optical Bonding		
Resolution	1024(RGB) × 768		
Display Mode	Normally Black. Transmissive		
Pixel Pitch	0.20625(W) × 0.20625(H)	mm	
Pixel Arrangement	RGB stripe		
Viewing direction	ALL	O'clock	
Outline dimensions	286.76(W) × 225.32(H) × 9.83(D)	mm	W/O PCBA
Active area	245.76(W) × 184.32(H)	mm	
LCD interface	LVDS		
CTP Interface	USB / I2C		
CTP IC	EXC81W32		
Touch point	10		
Surface hardness	6	H	

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2 Mechanical Drawing



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3 Pin assignment

3.1 LCD Pin assignment

CN1 Module Side Connector : STM MSAKT2407P30 or Compatible
User Side Connector : JAE FI-X30H

Pin No.	Symbol	Description
1	VLED	Backlight power supply : 12V
2	VLED	Backlight power supply : 12V
3	VLED	Backlight power supply : 12V
4	NC	Not connection
5	LED_EN	Backlight on/off control
6	LED_PWM	Backlight dimming control
7	NC	Not connection
8	NC	Not connection
9	VDD	LCD power Supply : 3.3V
10	VDD	LCD power Supply : 3.3V
11	NC	Not connection
12	GND	Power Ground
13	RXIN0-	Negative LVDS differential data input (0)
14	RXIN0+	Positive LVDS differential data input (0)
15	GND	Power Ground
16	RXIN1-	Negative LVDS differential data input (1)
17	RXIN1+	Positive LVDS differential data input (1)
18	GND	Power Ground
19	RXIN2-	Negative LVDS differential data input (2)
20	RXIN2+	Positive LVDS differential data input (2)
21	GND	Power Ground
22	RXCLKIN-	Negative LVDS differential clock input
23	RXCLKIN+	Negative LVDS differential clock input
24	GND	Power Ground
25	RXIN3-	Negative LVDS differential data input (3)
26	RXIN3+	Positive LVDS differential data input (3)
27	GND	Power Ground
28	NC	Not connection
29	NC	Not connection
30	NC	Not connection

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3.2 CTP Pin assignment

CN2 Module Side Connector : Molex 53216-1071 or Compatible
User Side Connector : Molex 51021-1000

Pin No.	Symbol	Description
1	VDD5	Power Supply : 5V
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	VDD5	Power Supply : 5V
8	D-	USB data port minus
9	D+	USB data port plus
10	GND_E	Power Ground

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4 Absolute Maximum Rating

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table

Parameter	Symbol	Min.	Max.	Unit
Power Supply Voltage	VDD	-0.3	4.8	V
	VDD5	-0.5	6	V
Operating Temperature	T_{OP}	-30	+80	℃
Storage Temperature	T_{ST}	-30	+85	℃

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5 Electrical Characteristic

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℃
Power Supply Current	I_{VDD}	-	156.5	-	mA	

5.2 CTP recommended Operating Condition

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power Supply Voltage	VDD5	3.3	5	6	V	Ta=25℃
Input Signal Voltage	VIN	3.0	3.3	3.6	V	

5.3 Driver LCD Backlight

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage		VLED	10	12	15	V	Ta=25℃
Power Supply Current		I_{VLED}	-	0.8	-	A	
EN Signal Voltage	High Level	-	3.0	-	5	V	
	Low Level		0	-	0.3	V	
PWM Control 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}	-	9.6	-	W	

Note 1: The lifetime is determined as the time at which luminance of LED become 50% of the initial brightness on condition of continuous operating at 25±2℃

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5.4 Power on sequence

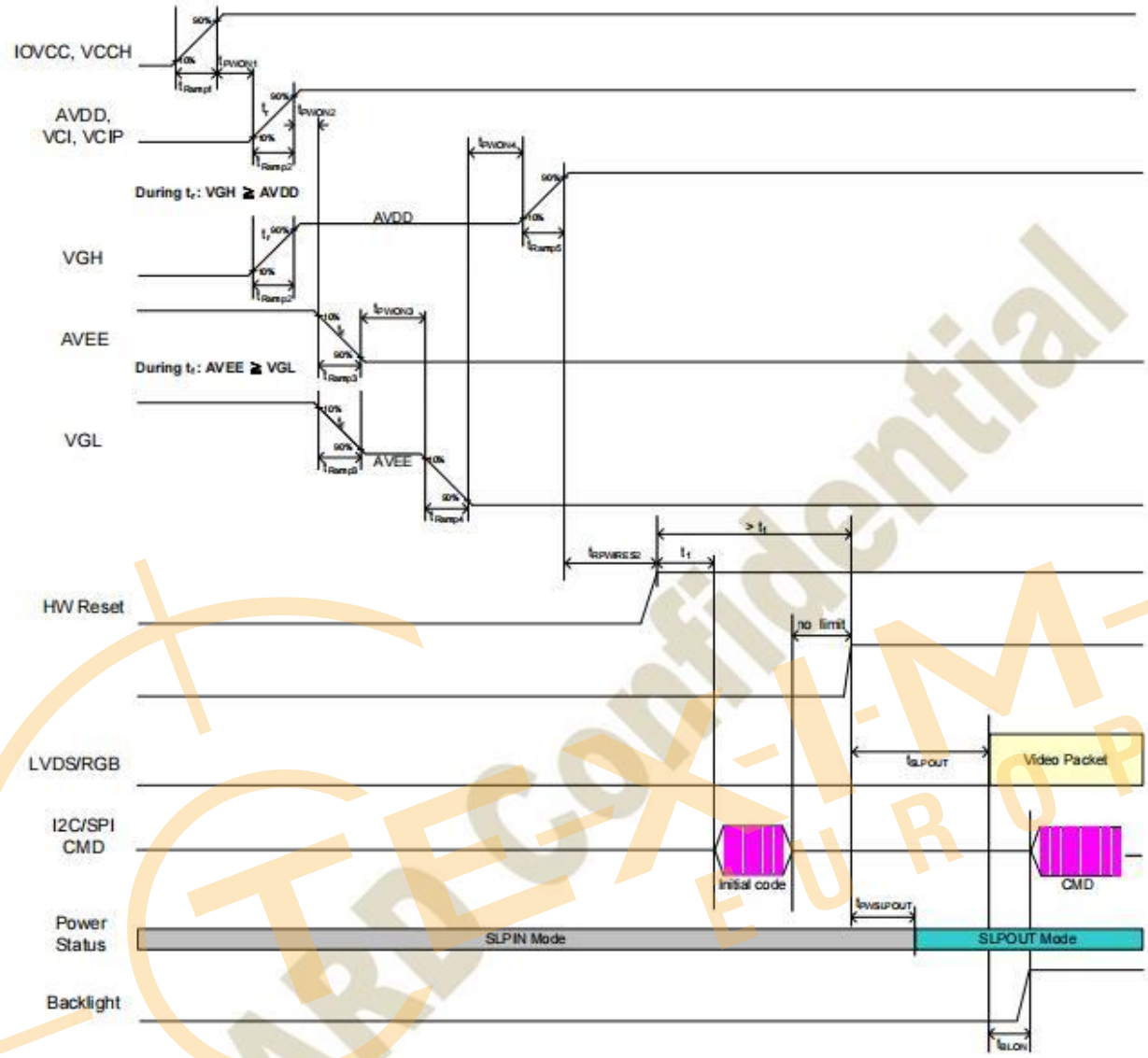
The power on sequence timing for different power input modes and interfaces are shown as below table.

Symbol	Value			Unit	Remark
	Min	Typ	Max		
t_{PWON1}	0	5	-	ms	
t_{PWON2}	0	5	-	ms	
t_{PWON3}	0	5		ms	
t_{PWON4}	0	5		ms	
t_{ramp1}	0.2	-	20	ms	IOVCC, VCCH
t_{ramp2}	0.2	-	20	ms	VCI, VCIP, AVDD
t_{ramp3}	0.2	-	20	ms	AVEE
t_{ramp4}	0.2	-	-	ms	VGL
t_{ramp5}	0.2	-	-	ms	VGH
$t_{RPWIRES1}$	10	-	-	ms	
$t_{RPWIRES2}$	1	-	-	ms	
t_{MIPI_LP11}	-	-	$t_{RPWIRES1}$	ms	
t_{RESETL}	20	-	-	µs	
t_1	5	-	-	ms	
t_{SLPOUT}	120	-	-	ms	
$t_{PWSLPOUT}$	-	45	-	ms	
t_{BLON}	2	-	-	VS	

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5 power mode power on sequence – LVDS, RGB:



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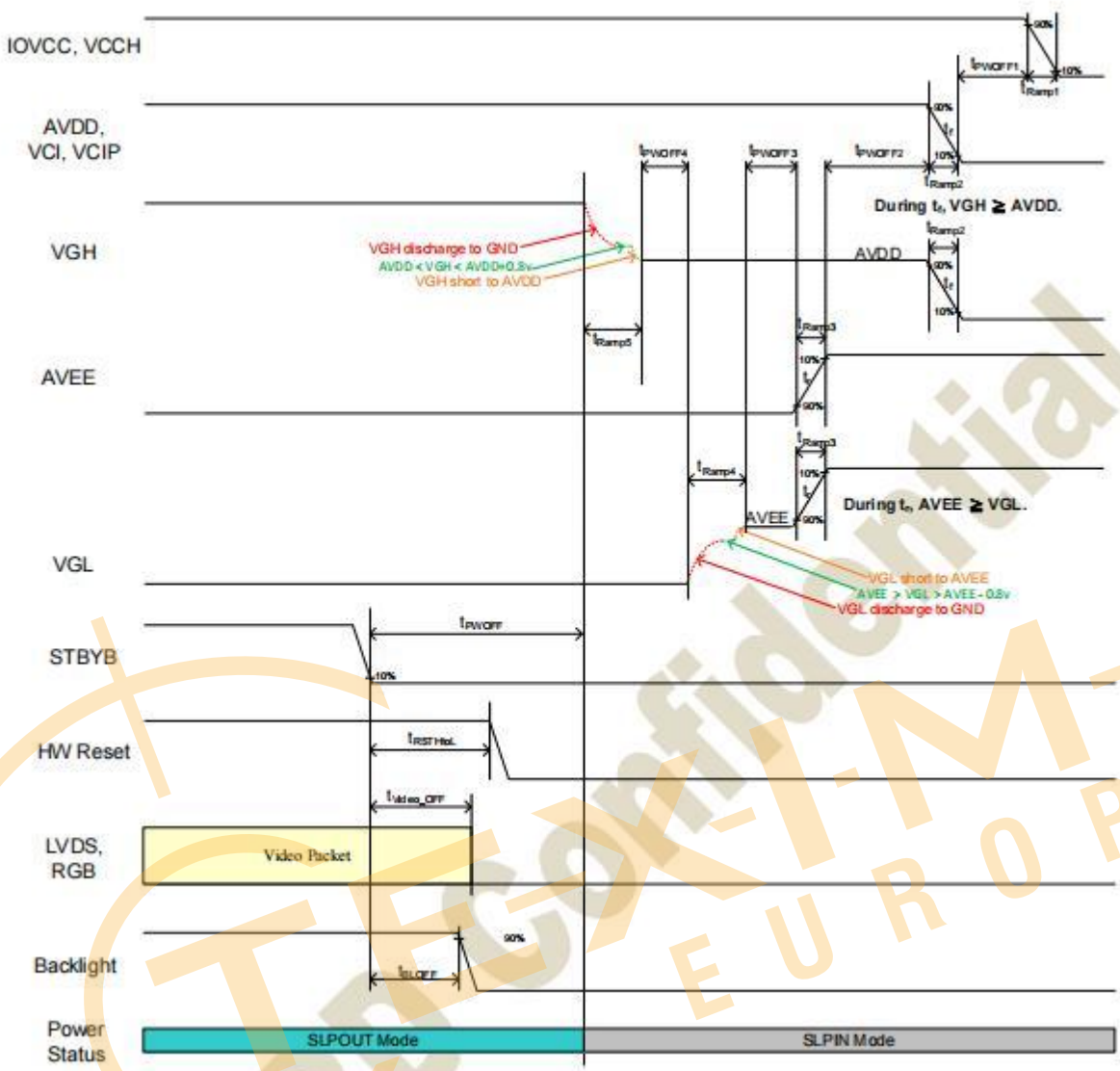
The power off sequence timing for different power input modes and interfaces are shown as below table.

Symbol	Value			Unit	Remark
	Min	Typ	Max		
t_{PWOFF1}	0	5	-	ms	
t_{PWOFF2}	0	5	-	ms	
t_{PWOFF3}	0	5	-	ms	
t_{PWOFF4}	0	5	-	ms	
t_{ramp1}	0.2	-	20	ms	IOVCC, VCCH
t_{ramp2}	0.2	-	20	ms	VCI, VCIP, AVDD
t_{ramp3}	0.2	-	20	ms	AVEE
t_{ramp4}	0.2	-	-	ms	5Power: VGL
t_{ramp5}	0.2	-	-	ms	5Power: VGH
t_{PWOFF}	120	-	-	ms	
t_{MIPI_LP11}	0	-	t_{PWOFF}	ms	
$t_{DISPOFF}$	50	-	t_{PWOFF}	ms	
$t_{RSTHtoL}$	50	-	t_{PWOFF}	ms	
t_{Video_OFF}	0	-	t_{PWOFF}	ms	
t_{BLOFF}	0	-	-	ms	

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5 power mode power off sequence – LVDS, RGB:



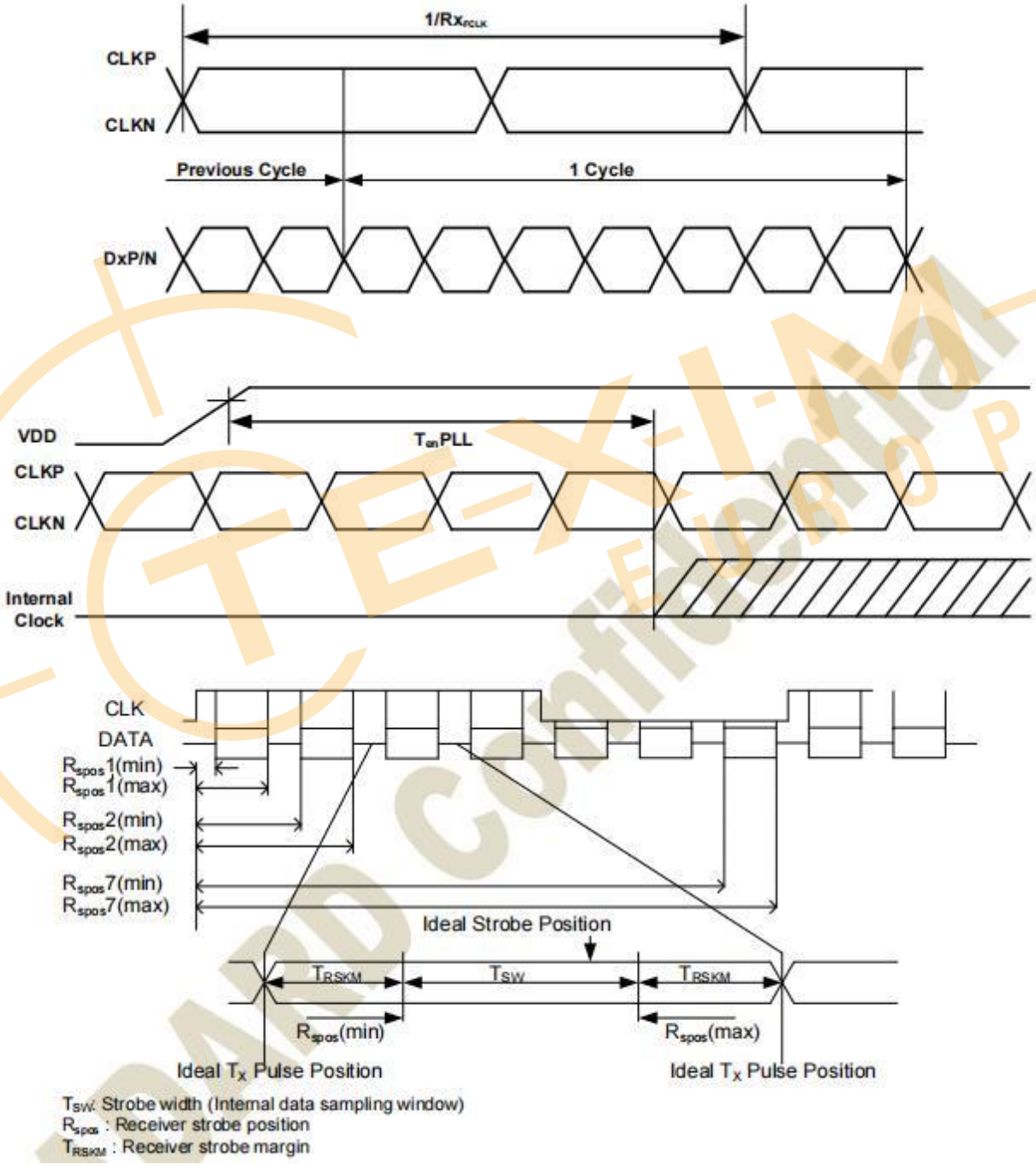
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6 LVDS Signal timing characteristics

6.1 AC Electrical Characteristics

Signal	Symbol	Min.	Typ	Max.	Unit	Description
Clock frequency	Rx_{FCLK}	30	-	75	MHz	-
Input data skew margin	T_{RSKM}	500	-	-	ps	|VID| = 200mV RxVCM = 1.2V @Rx_{FCLK}=75MHz
Clock high time	T_{LVCH}	-	4/(7x Rx_{FCLK})	-	ns	-
Clock low time	T_{LVCL}	-	3/(7xRx_{FCLK})	-	ns	-
PLL wake-up time	T_{en}PLL	-	-	150	us	-

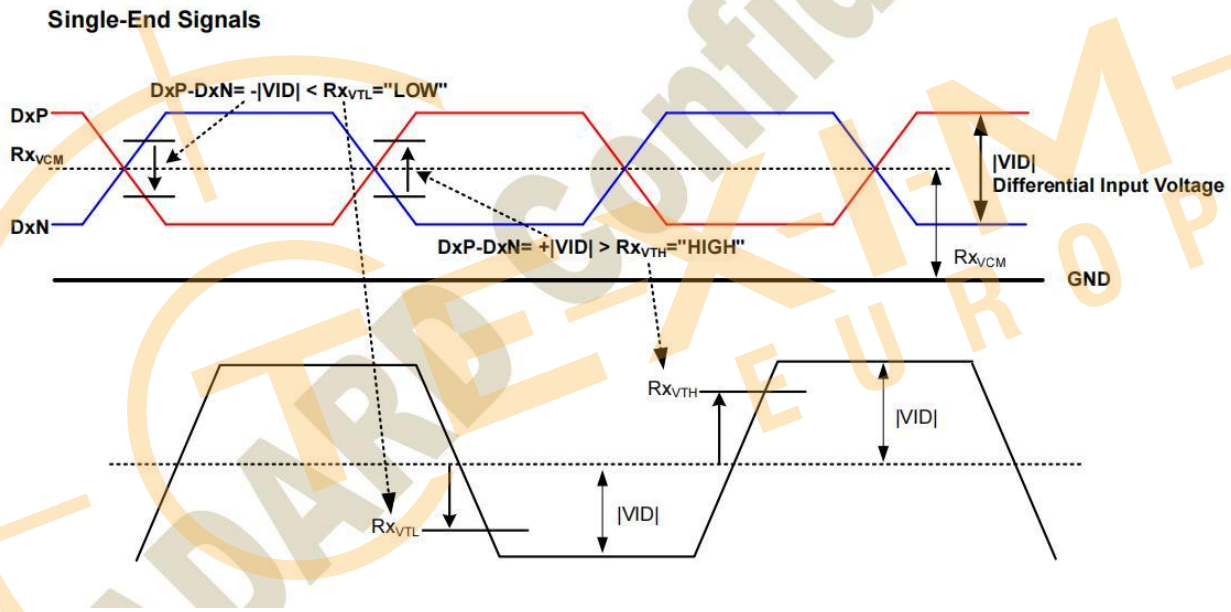


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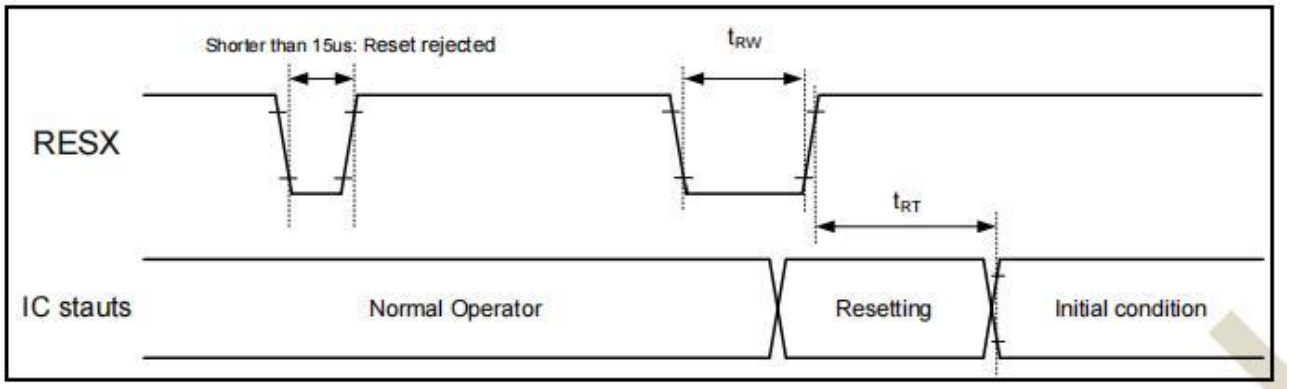
6.2 DC electrical characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Differential input high threshold voltage	Rx_{VTH}	Rx_{VCM}=1.2V	+0.1	+0.2	+0.3	V
Differential input low threshold voltage	Rx_{VTL}		-0.3	-0.2	-0.1	V
Input voltage range (singled-end)	Rx_{VIN}		0.7	-	1.7	V
Differential input common mode voltage	Rx_{VCM}	|VID|=0.2	1	1.2	1.4	V
Differential input impedance	ZID		80	100	125	ohm
Differential input voltage	|VID|		0.2	-	0.6	V
Differential input leakage current	I_{LCLVDS}		-10	-	+10	uA
LVDS Digital Stand-by Current	I_{STLVDS}	Clock & all Functions are stopped	-	TBD	-	uA



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6.3 Reset input timmings



Symbol	Parameter	Related pins	Min.	Max.	Unit
t_{RW}	Reset "L" pulse width(2)	RESX	20	-	µs
t_{RT}	Reset complete time(3)	-	-	5(5)	ms
		-	-	120(6) (7) (8)	ms

Note:

(1) The reset complete time also required time for loading ID bytes from OTP to registers. This loading is done every time when there is HW reset complete time (t_{RT}) within 5 ms after a rising edge of RESX.

(2) Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 15 µs	Reset Rejected
Longer than 20 µs	Reset
Between 15 µs and 20 µs	Reset Start

(3) During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode) and then returns to Default condition for H/W reset.

(4) Spike Rejection also applies during a valid reset pulse as shown below:

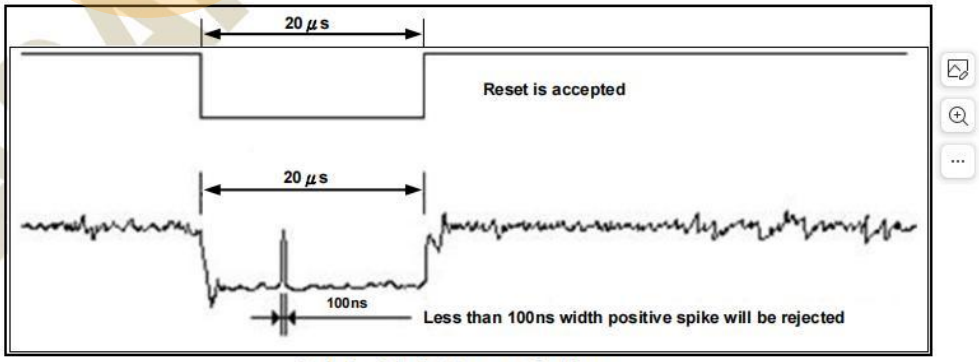


Table 11.4: Reset timings

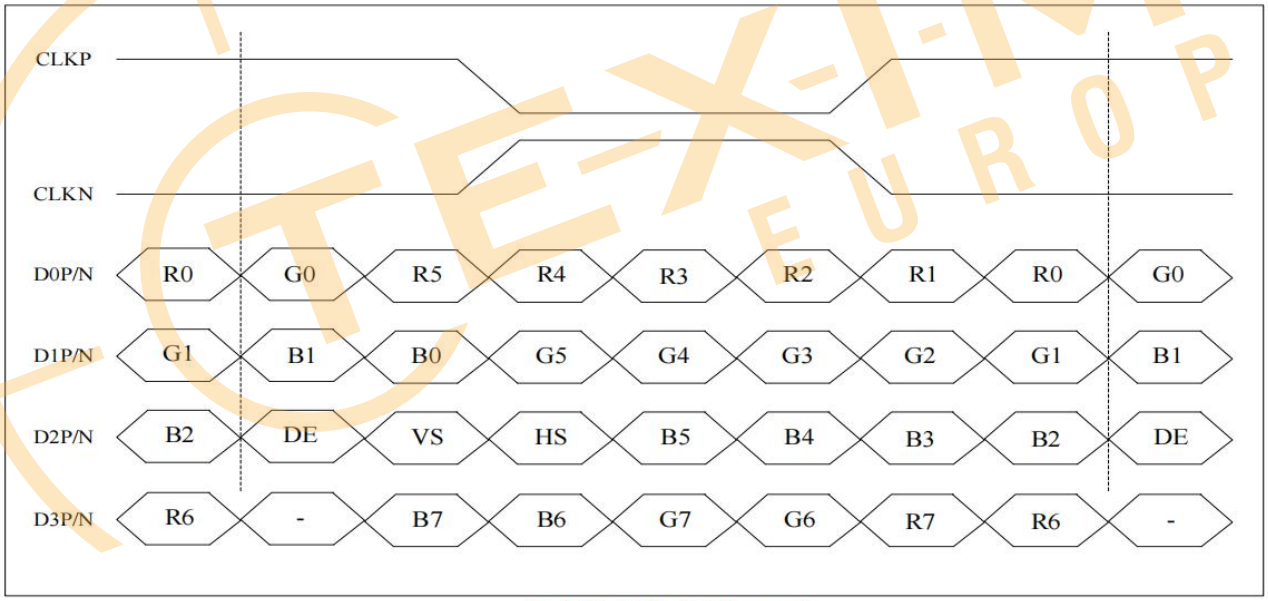
(5) When Reset is applied during Sleep In Mode.
(6) When Reset is applied during Sleep Out Mode.
(7) It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

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6.4 Data timing

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
DCLK frequency	fclk	-	51	-	MHz	Frame rate =51Hz
Horizontal valid data	thd		1024		DCLK	
Hsync pulse Width	thpw	-	20	-	DCLK	
Hsync back porch	thbp	-	20	-	DCLK	
Hsync front porch	thfp	-	20	-	DCLK	
Vertical valid data	tvd		768		H	
Vsync pulse width	tvpw	-	1	-	H	
Vsync back porch	tvbp	-	8	-	H	
Vsync front porch	tvfp	-	7	-	H	

6.5 LVDS data input format



8-bit LVDS input

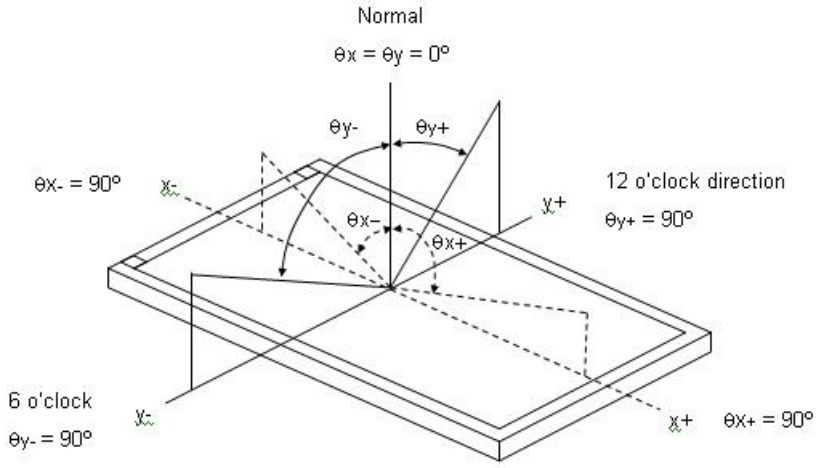
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7 Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle	Horizontal	θ_X+	CR≧10	75	85	-	Deg.	(1), (5)
		θ_X-		75	85	-	Deg.	
	Vertical	θ_Y+		75	85	-	Deg.	
		θ_Y-		75	85	-	Deg.	
Luminance (W/ CTP)		Lv	θ_X=0°, θ_Y=0°	650	850	-	nit	(4), (5)
Uniformity	9 points	ΔY9		70	-	-	%	(5), (6)
Contrast ratio		CR		900	1000	-		(2), (5)
Color Chromaticity (CIE 1931)	White	W_x	θ_X=0°, θ_Y=0° R=G=B=255 Gray scale	Typ-0.05	0.32	Typ+0.05	-	(1), (5)
		W_y			0.35		-	
	Red	R_x			-		-	
		R_y			-		-	
	Green	G_x			-		-	
		G_y			-		-	
	Blue	B_x			-		-	
		B_y			-		-	
Response Time	T_R+T_F			-	25	30	ms	(3)

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Note (1) Definition of Viewing Angle (θ_X, θ_Y):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L255 / L0

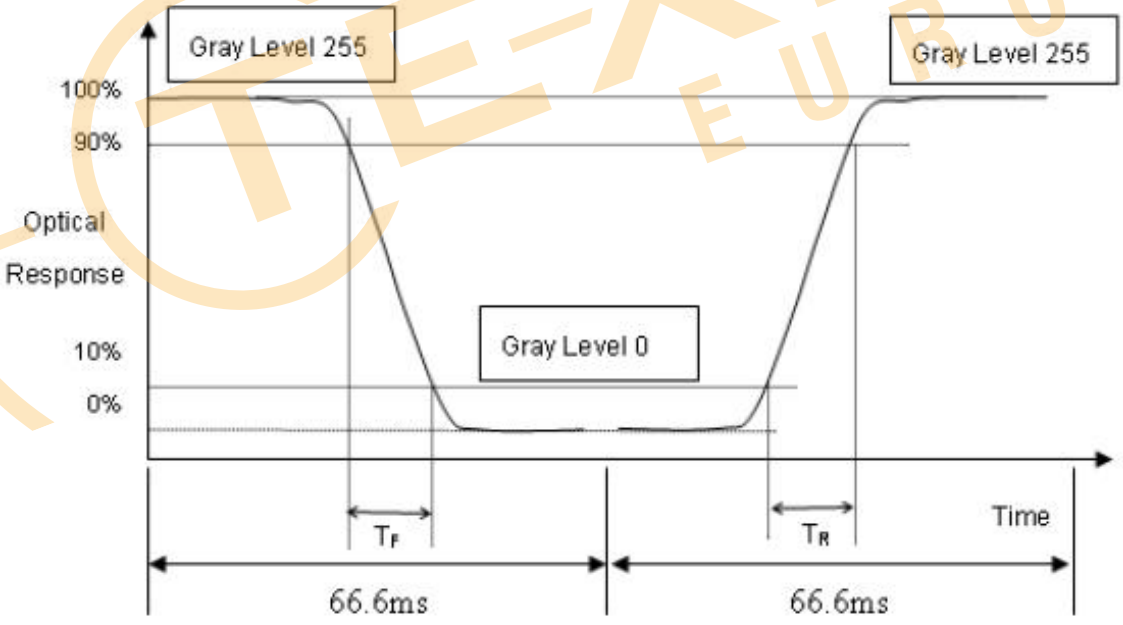
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (5)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (3) Definition of Response Time (T_R, T_F):



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Note (4) Definition of Luminance of White (LC):

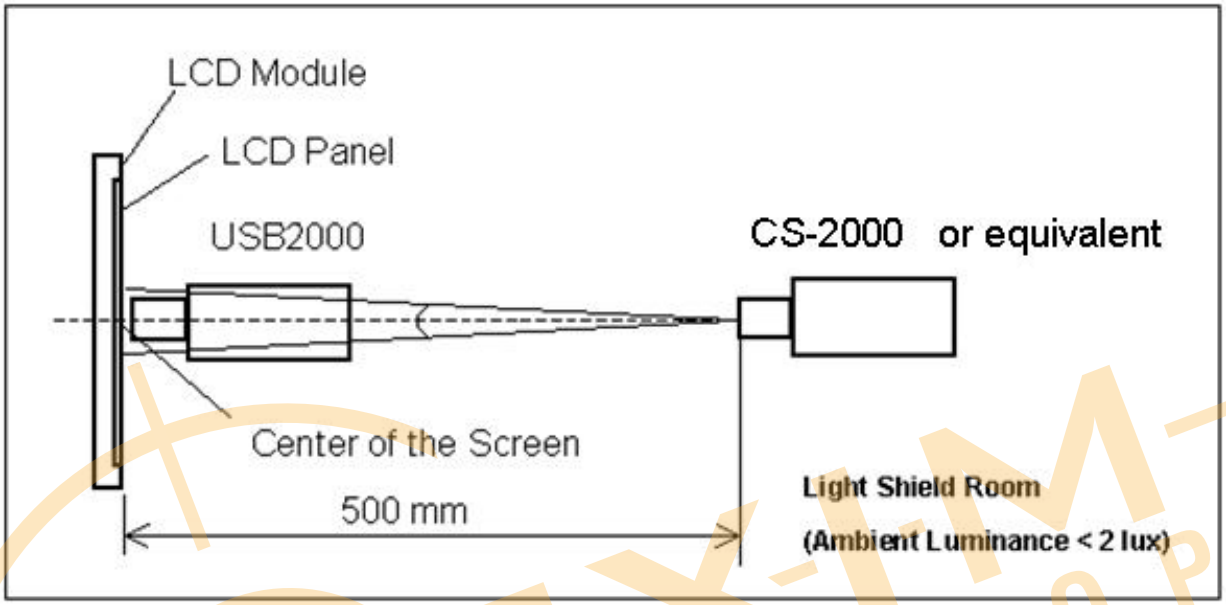
Measure the luminance of gray level 255 at center point

LC = L (5)

L (x) is corresponding to the luminance of the point X at Figure in Note (6).

Note (5) Measurement Setup:

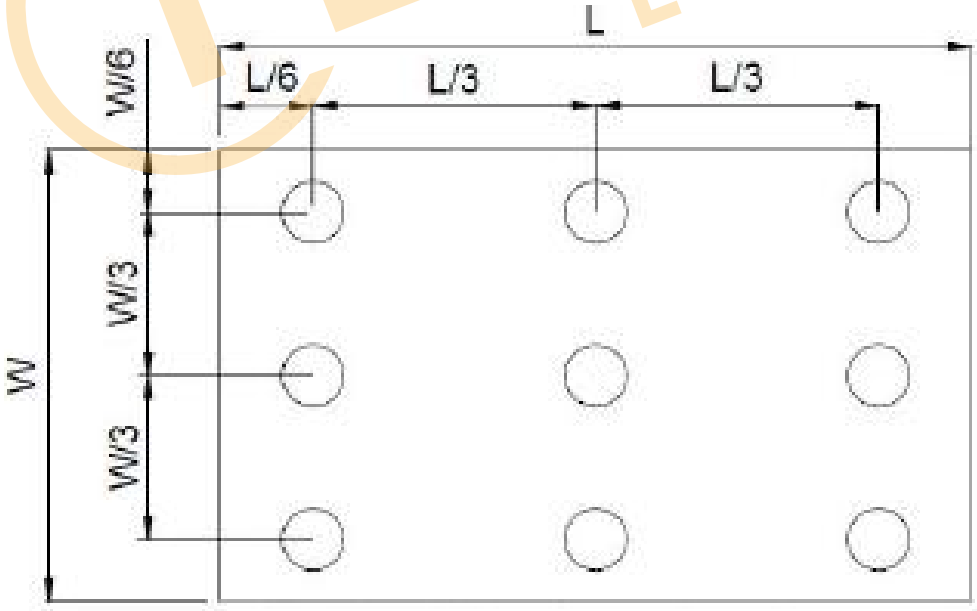
The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.



Note (6) Definition of White Variation (δ W):

Measure the luminance of gray level 255 at 9 points

δ W = (Minimum [L (1) ~ L (9)] / Maximum [L (1) ~ L (9)]) *100%



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8 Reliability Test

Test Item	Condition
High Temperature Storage Test	85℃, 240 hours
Low Temperature Storage Test	-30℃, 240 hours
High Temperature Operation Test	80℃, 240 hours
Low Temperature Operation Test	-30℃, 240 hours
High temperature & high humidity operation Test	60℃ , 90%RH, 240 hours
Thermal Shock(Non-operation)	-30℃/30 min ~ +80℃/30 min, change time:5min, for a total 100 cycles, Start with cold temperature and end with high temperature.
ESD	Contact ±4KV, Air ±8KV (R=330R,C=150pF)

Note 1: There should be no condensation on the surface of panel during test.

Note 2: Temperature of panel display surface area should be 85℃ Max.

Note 3: At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

Note 4: In the standard conditions, there is no function failure issue occurred. All the cosmetic specification is judged before reliability test.

Note 5: Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.

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9 Appearance Inspection

9.1 Inspection Sampling Method:

Unless there is other agreement, the sampling plan for incoming inspection shall follow GB2828.1-2012.

(1) Lot size: Quantity per shipment as one lot (different model as different lot).
(2) Sampling type: Normal inspection, single sampling.
(3) Sampling level: Level II.

9.2 Inspection Conditions

The environmental condition and visual inspection shall be conducted as below:
(1) Light: 800~1200Lux;
(2) Vision requirement: Naked or corrected vision of at least 1.0 and no color blindness;
(3) Inspection background: black and white board is used as the background below the product;
(4) Inspection distance: 20~30cm from human eyes to the measured surface;
(5) Inspection Angle: the detected surface is 90 degree from to line of sight, and the measured Object should be rotated 45 degree from side to side;
(6) Inspection time: 5~10s;

9.3 Inspection equipment

Secondary elements, calipers, feelers, filinka, petroleum ether, ND filter

9.4 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 (mm^2)		

9.5 Inspection precautions

(1) Inspectors must wear finger gloves and electrostatic bracelets.
(2) Place the inspected product in front of the inspector, and hold the edge of the product with both hands carefully. Do not bend the product.

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9.6 Product region division

Divide the products into nine parts. The center part is area A, and the surrounding part is area B, as shown in the figure below

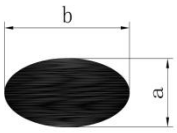
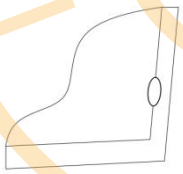
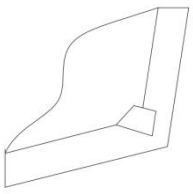
B	B	B
B	A	B
B	B	B

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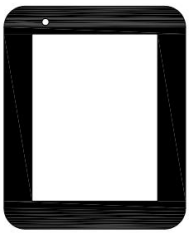
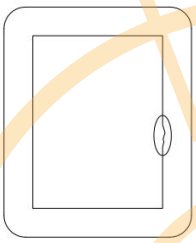
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9.7 Inspection Standards for Modules

CTP and LCD fitting components

Items		Standard	Conclusion	Inspection tools
Dot (white, black, heterochromatic)  D=(a+b)/2	A	D≤0.15	D≤0.15, it can be disregard.	Visual inspection
		0.15<D≤0.5	The distance with another dent or bubble is more than 15 mm, it allows to has two existence	
		D>0.3	NG	
	B	D≤0.2	D≤0.2, it can be disregard.	
		0.2<D≤0.5	The distance with another dent or bubble is more than 15 mm, it allows to has three existence	
		D>0.5	NG	
Linear defects (fibers/foreign bodies/ scratches, etc.)  	A	W≤0.04	W≤0.04, it can be disregard.	Visual inspection
		0.04<W≤0.06	L≤6, the distance with another scratch or impurity is more than 15 mm, it allows to has two existence	
		0.06<W≤0.09	L≤6, the distance with another scratch or impurity is more than 15 mm, it allows to has one existence	
		W>0.09, L>6	NG	
	B	W≤0.05	W≤0.05, it can be disregard.	
		0.05<W≤0.07	L≤7, the distance with another scratch or impurity is more than 15 mm, it allows to has three existence	
		0.07<W≤0.1	L≤7, the distance with another scratch or impurity is more than 15 mm, it allows to has two existence	
		W>0.125, L>8	NG	
Bubble	A	Zone A is judged according to the point standard		Visual inspection
	B	Zone B is judged according to the point standard		
Edge broken loss 	B	1. The sensor edge creaks, without damaging the line. The function test is OK for reception, and the front side is not visible after fitting. 2. Edge creak on front of cover plate: NG. 3. Back X<1.5mm; Y<1.5mm; Z<GT(GT= glass thickness), without affecting the functionality of the product, each side is allowed one, no more than two in total.		Visual inspection
Corner broken loss 	B			

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Items		Standard	Conclusion	Inspection tools
Creak	A + B	Creaks found at any location are not allowed		Visual inspection
Newton's rings	A	No more than 1/3 of the display area, light up invisible. If there are special requirements, the limited sample shall prevail.		
Panel color		Consistent with the sample, no serious color difference		
Size		Meet the requirements of finished product inspection drawings		
Ink pinhole 	B	D≤0.25	Distance of two pinholes greater than 15mm, the paint can be repaired with a paint pen of the same color as the cover plate.	
Ink sawtooth 	A + B	W≤0.2, L≤1	The distance between two serrations near the VA area is greater than or equal to 50mm, two serrations may be allowed.	
Circular White Mura, Lumination Mura, Black/White Mura, etc.	A	Refer to 5% ND filter in 50% Should not be perceived, If needed or limit sample		Visual inspection

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10 Notices

10.1Cautions for storage

Store the module in a dark room where must keep at 25±10℃ and 65%RH or less. Don't expose the products to the direct sunlight or stresses.

10.2 Cautions for operation

(1) Do not put a heavy, hard or sharp object on the product.
(2) Do not bend the product in order to assure the reliability.
(3) Do not put one product on the other. Otherwise, the product to may be scratched or be changed.
(4) Do not oile the touch panel, Do not put heavy goods on the touch panel.
(5) Do not use any organic solvent acid or alkali solution to clean the surface of the product. Please use dry clothes or soft clothes with ethanol to clean the surface.

10.3 Cautions for operation

Light transmission is an important factor for the product. So, please wear clean finger sacks, gloves and mask to protect the products from fingerprint or stain attach, and also must ensure the area where your finger touches is outside the view area when handing the panel.

10.4 Others

(1) Please note that dew gathering in the panel due to abrupt temperature or humidity change, etc. Which may cause deterioration of performance.
(2) When this product was built into the package, if there is vulcanization material such as vulcanized rubber which has a possibility of generating the salutation gas near the package since abnormalities will be caused to wring of the product and it will become the cause if functional degradation, please give a constitutional cations.
(3) Cation for product safety set

Although full care is taken to ensure product quality, failure modes such as degradation, short circuits, or open circuits might be caused, Therefore, to design a product set, please study the effects of any single failure of the panel in advance and consider the safety of product configuration.

Quality function livers for on year, outward appearance haves non-color variation in six months.

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Please contact us if you have any questions about the contents of the datasheet.

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