



Microtips

TECHNOLOGY

Model No: AWK-800480T70PC04A

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Revision Record

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1. Scope

This specification defines general provisions as well as inspection standards for TFT module supplied by Microtips Technology. If the event of unforeseen problem or unspecified items may occur naturally shall negotiate and agree to solution.

2. General Information

LCM

Item	Standard Values	Units
LCD type	7.0" TFT	--
Dot arrangement	800 (RGB)×480	dots
Color filter array	RGB vertical stripe	--
Display mode	Normally Black IPS	-
Eyes Viewing Direction	ALL	
Driver IC	RM53C0+RM577C1	--
Module size	175.70(W)×115.20(H)×6.05(T)	mm
Active area	152.40(W)×91.44(H)	mm
Dot pitch	0.1905(W)×0.1905(H)	mm
Interface	24-bit Parallel RGB Interface	--
Operating temperature	-30 ~ +80	°C
Storage temperature	-30 ~ +85	°C
Back Light	27 White LEDS	--

CTP

Item	Standard Values	Units
CTP type	Glass + Glass + FPC	--
CTP Driver IC	ILI2117A	--
Surface hardness	6H	--
Transmittance	≥83%	--
Operation Voltage	2.8V-3.6 V	--
CTP size	175.70(W)×115.20(H)×2.55(T)	mm(with adhesive)
LENS Viewing area	151.80(W)×90.84(H)	mm
CTP Interface	IPC	-
Pointing Stick	5	-

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4. Interface Description

LCM

Pin	Pin Name	Description
1	LEDA	LED backlight (Anode).
2	LEDA	
3	LEDK	LED backlight (Cathode).
4	LEDK	
5	GND	Power ground
6	VCOM	Not connect.(No voltage supply is required)
7	DVDD	Digital Power.
8	MODE	DE/SYNC mode select. Normally pull high. L: DE mode. H: HSD/VSD mode.
9	DE	Data Enable signal.
10	VS	Vertical sync input. Negative polarity.
11	HS	Horizontal sync input. Negative polarity.
12	B7	Blue Data Input (MSB).
13	B6	Blue Data Input.
14	B5	Blue Data Input.
15	B4	Blue Data Input.
16	B3	Blue Data Input.
17	B2	Blue Data Input.
18	B1	Blue Data Input.
19	B0	Blue Data Input (LSB).
20	G7	Green Data Input (MSB).
21	G6	Green Data Input.
22	G5	Green Data Input.
23	G4	Green Data Input.
24	G3	Green Data Input.
25	G2	Green Data Input.
26	G1	Green Data Input.
27	G0	Green Data Input (LSB).
28	R7	Red Data Input (MSB).
29	R6	Red Data Input.
30	R5	Red Data Input.
31	R4	Red Data Input.
32	R3	Red Data Input.
33	R2	Red Data Input.
34	R1	Red Data Input.

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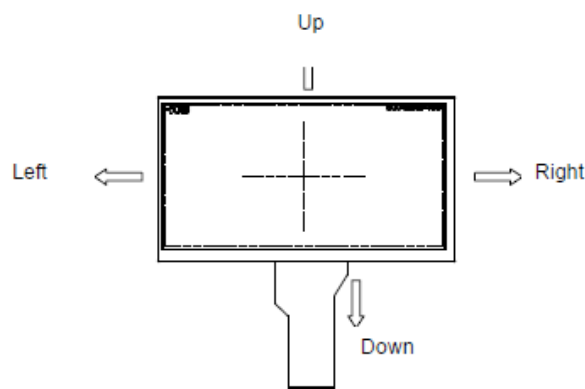
35	R0	Red Data Input (LSB).
36	GND	Power ground.
37	DCLK	Clock input.
38	GND	Power ground.
39	SHLR	Left or Right Display Control.
40	UPDN	Up / Down Display Control.
41	VGH	Positive Power for TFT.
42	VGL	Negative Power for TFT.
43	AVDD	Not connect. (No voltage supply is required)
44	RESET	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high.(R=10K Ω , C=1 μ F)
45	NC	Not connect.
46	VCOM	Not connect. (No voltage supply is required)
47	DITHB	Not connect.
48	GND	Power ground.
49	NC	Not connect.
50	NC	Not connect.

【Note1】 SHLR : left or right setting

UPDN : up or down setting

L/R	U/D	Data Shifting
DVDD	GND	Left → Right , Up → Down(default)
GND	GND	Right → Left , Up → Down
DVDD	DVDD	Left → Right , Down → Up
GND	DVDD	Right → Left , Down → Up

Definition of scanning direction:



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CTP

Pin	Pin Name	Description
1	GND	Ground.
2	GND	Ground.
3	VCC	CTP Digital Power.
4	INT	CTP interruption signal.
5	RESET	CTP reset pin. Active low to enter reset state.
6	SCL	CTP I ² C_clock.
7	SDA	CTP I ² C_data
8	GND	Ground.

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5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Digital Supply Voltage	DVDD	-0.3	5.0	V
Gate On Voltage	VGH	15	23	V
Gate Off Voltage	VGL	-16	-6.8	V
Operating Temperature	TOP	-30	80	°C
Storage Temperature	TST	-30	85	°C
Storage Humidity	HD	20	90	%RH

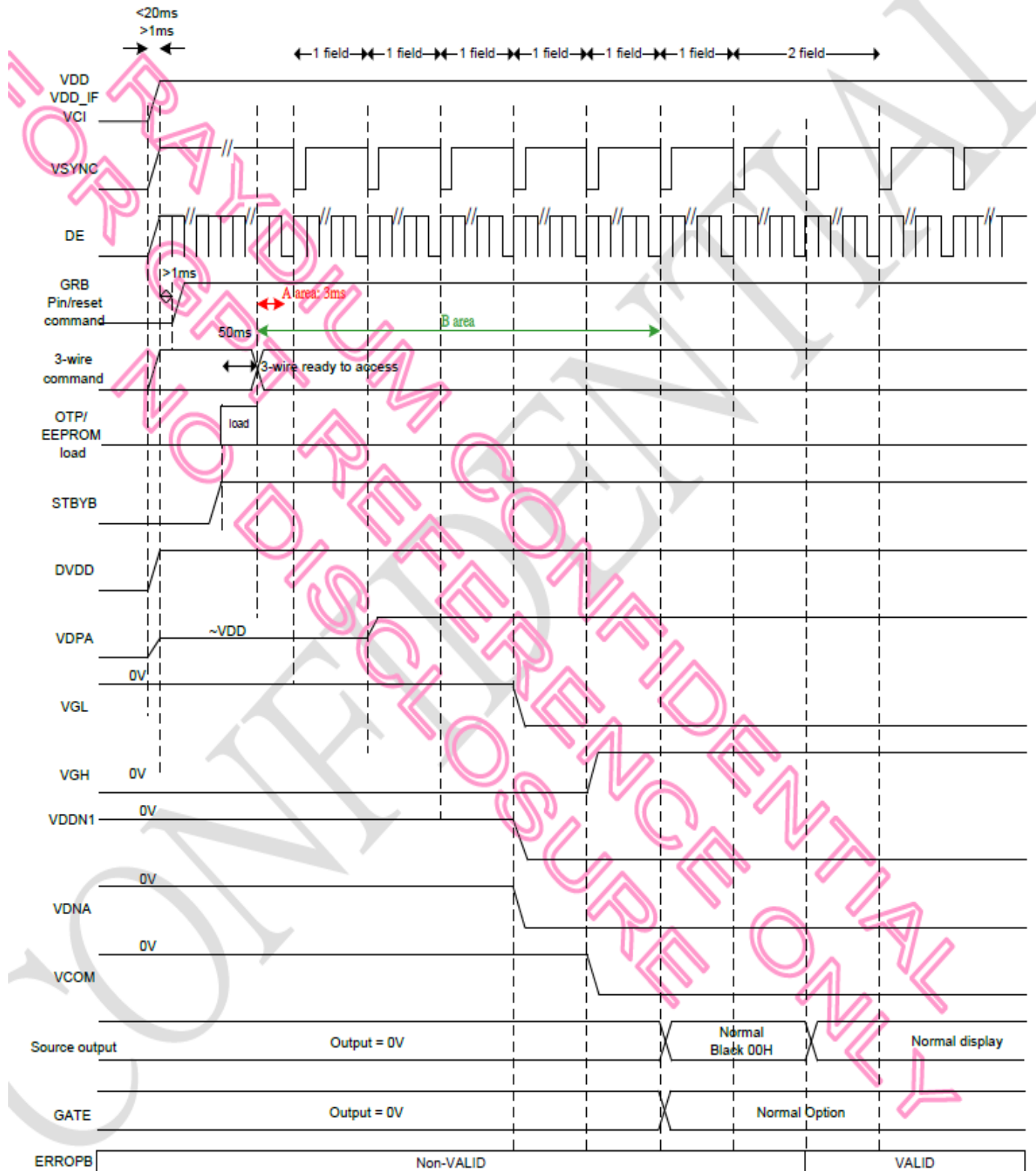
6. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Digital Supply Voltage	DVDD	2.7	3.3	3.6	V	-
Digital Supply Current	IVDD	85	150	200	mA	
CTP Supply Voltage	VCC	2.8	-	3.6	V	
Gate On Voltage	VGH	15	18	21	V	-
Gate Off Voltage	VGL	-15	-10.9	-6.8	V	
Logic Input Voltage	VIH	0.7DVDD	-	DVDD	V	-
	VIL	GND	-	0.3DVDD	V	-

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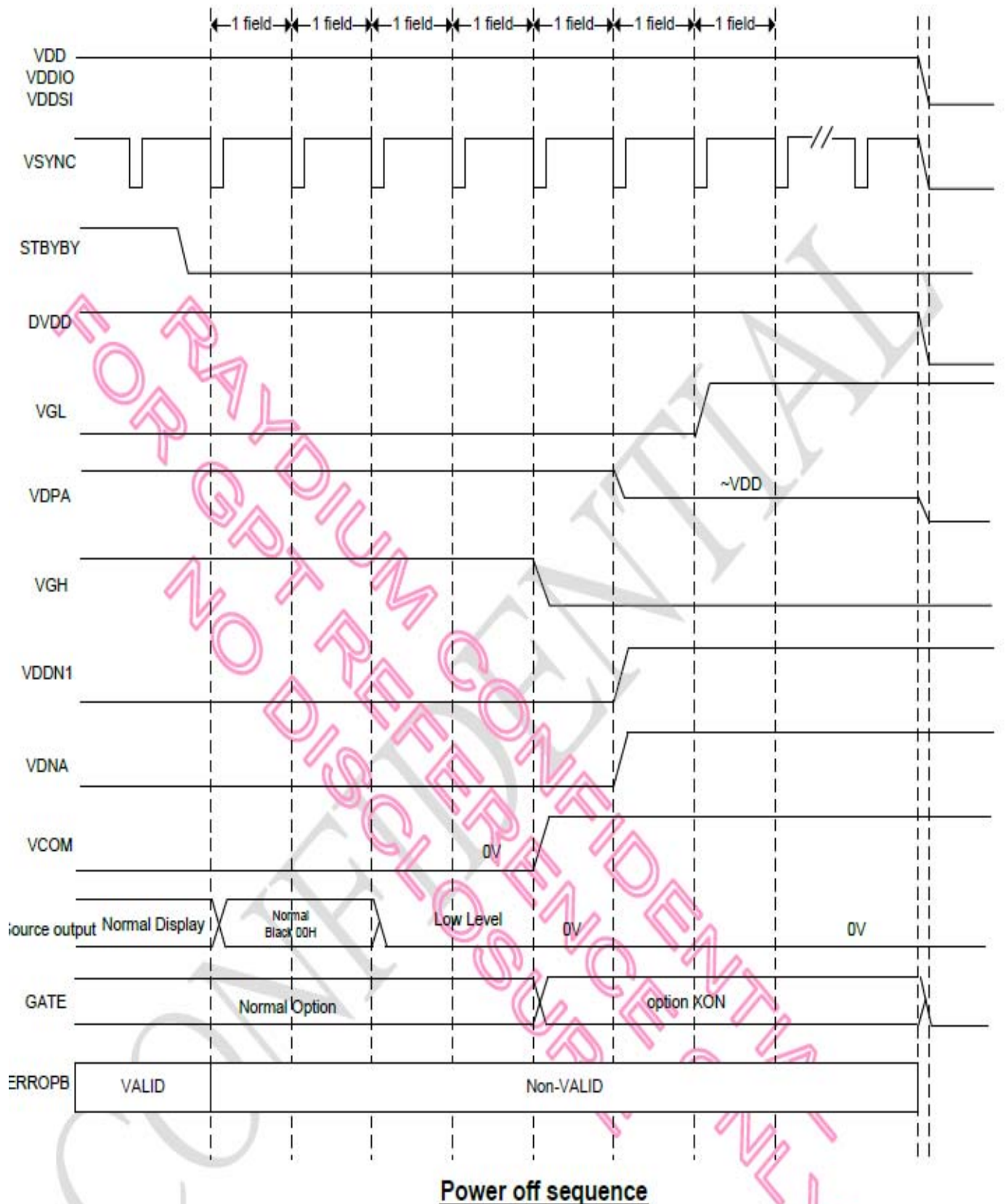
7. Timing Characteristics

7.1. Power ON/OFF Sequence



Power on sequence

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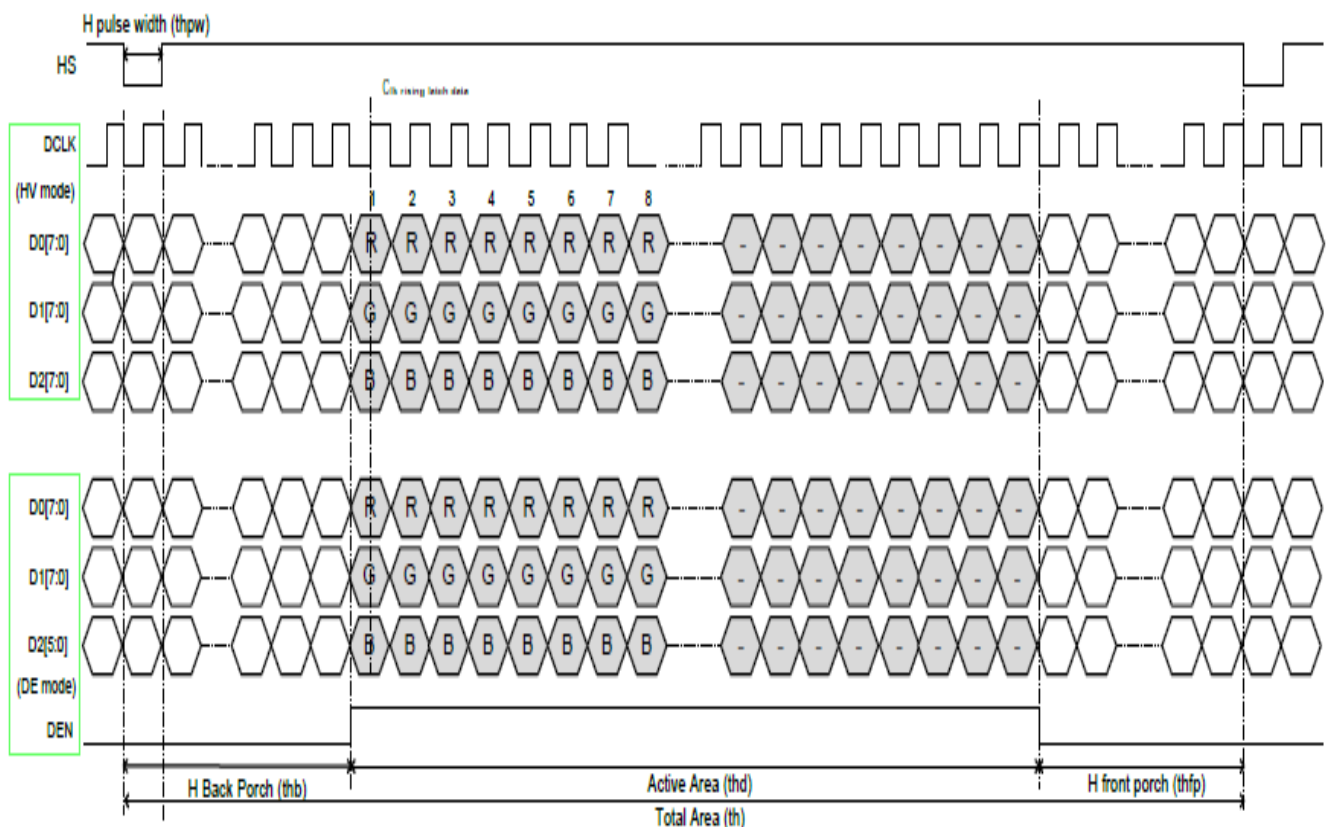
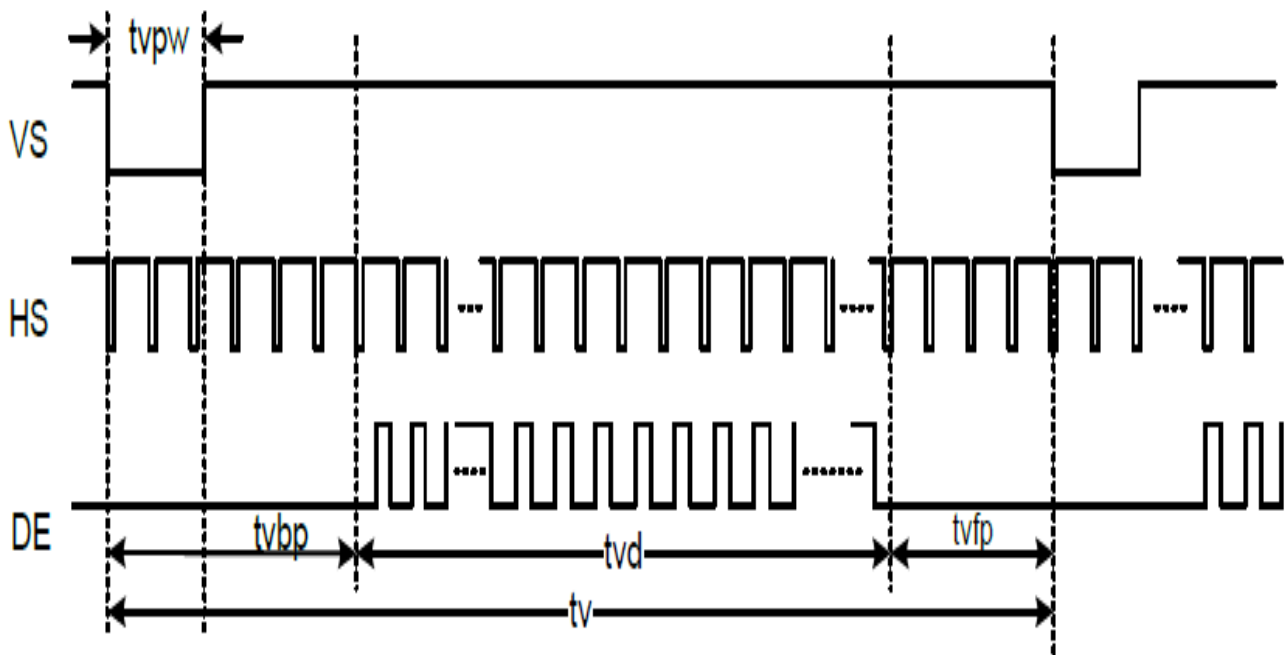


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7.2 Data Input Format for TTL(for IC as source driver with timing controller)

TTL_HVDE (with HV or DE) with TCON mode timing diagram

◆ Vertical input timing

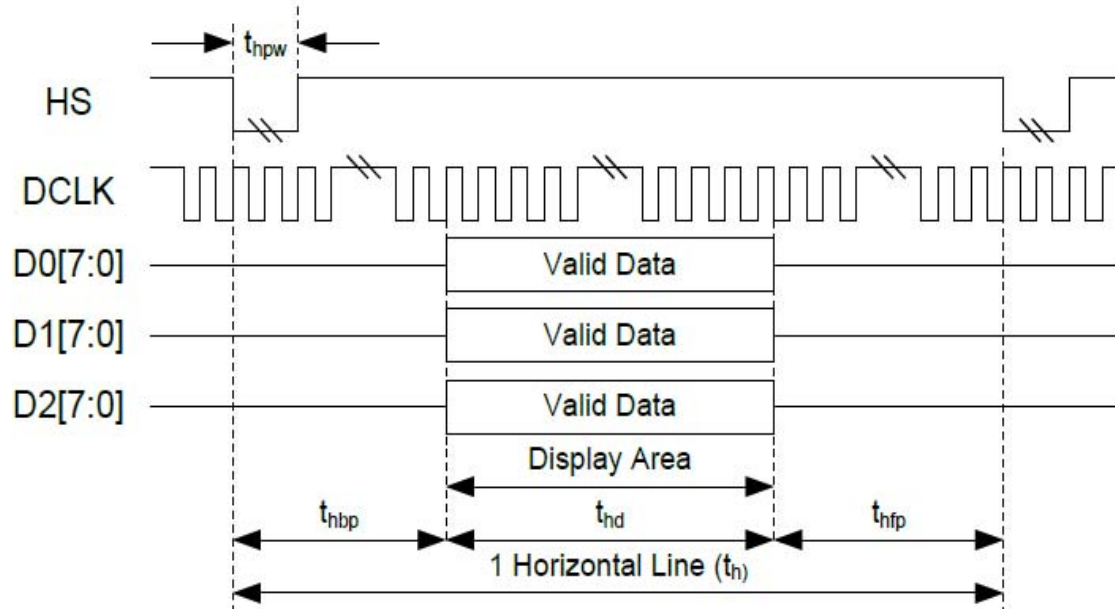


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7.3 TIMING CHARACTERISTIC

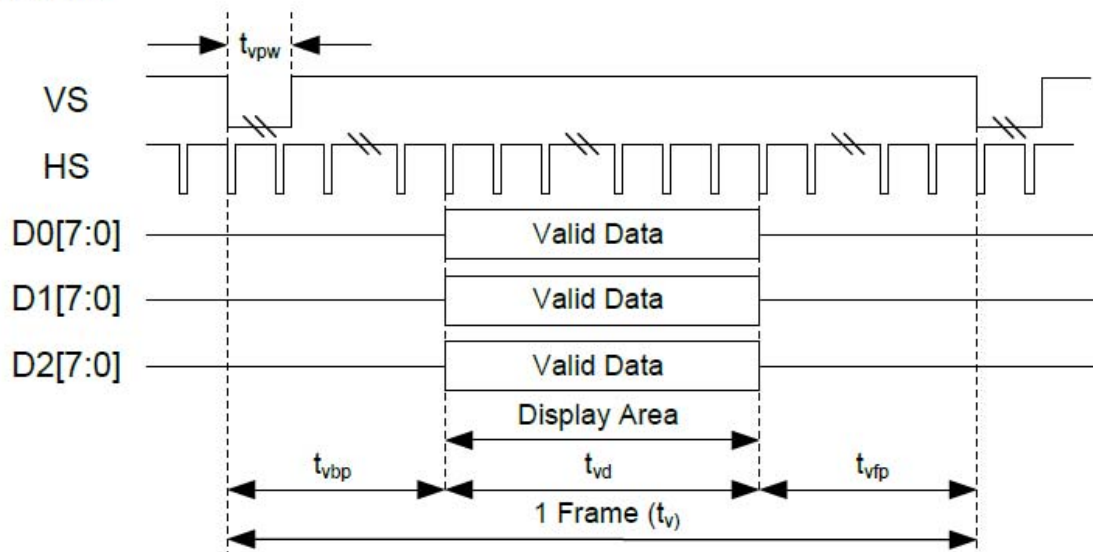
HV Mode Data Input Format for IC as source driver with timing controller

◆ Horizontal



Horizontal input timing at Sync mode

◆ Vertical

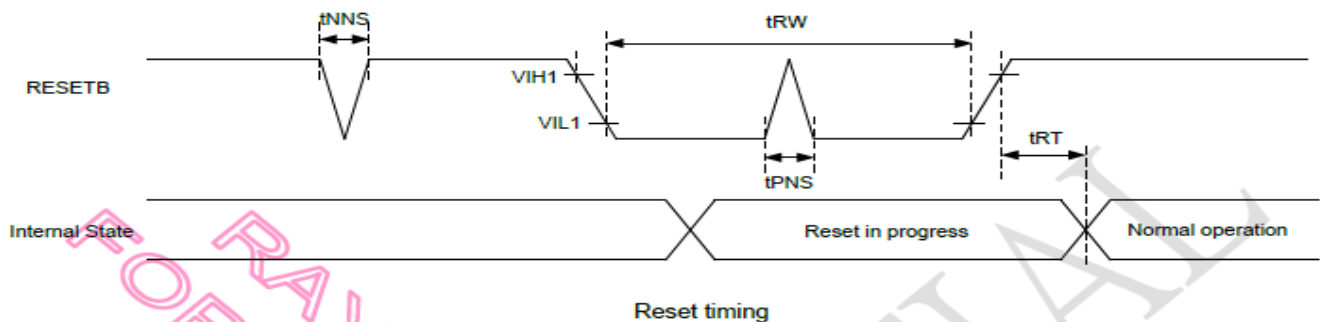


Vertical input timing at Sync mode

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Parameter	Symbol	800×RGB×480 (RES[3:0]=0x6h)			Unit
		Min.	Typ.	Max.	
DCLK Frequency	FDCLK	25.2	27.2	30.5	MHz
Horizontal valid data	thd	800			DCLK
Hsync Pulse Width	thpw	1	2	110	DCLK
Hsync back porch	thbp	5	16	101	DCLK
Hsync front porch	thfp	19	44	115	DCLK
1 Horizontal Line	th	856	860	920	DCLK
Vertical valid data	tvd	480			H
Vsync Pulse Width	tvpw	1	2	66	H
Vsync back porch	tvbp	5	5	67	H
Vsync front porch	tvfp	2	43	67	H
1 Vertical field	tv	490	528	552	H
Frame rate	FR	60			Hz

7.4 Reset Timing



Signal	Parameter	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
RESETB	Reset pulse width	tRW	150	-	-	us
	Reset complete time	tRT	-	-	150	us
	Positive spike noise width	tPNS	-	-	30	us
	Negative spike noise width	tNNS	-	-	30	us

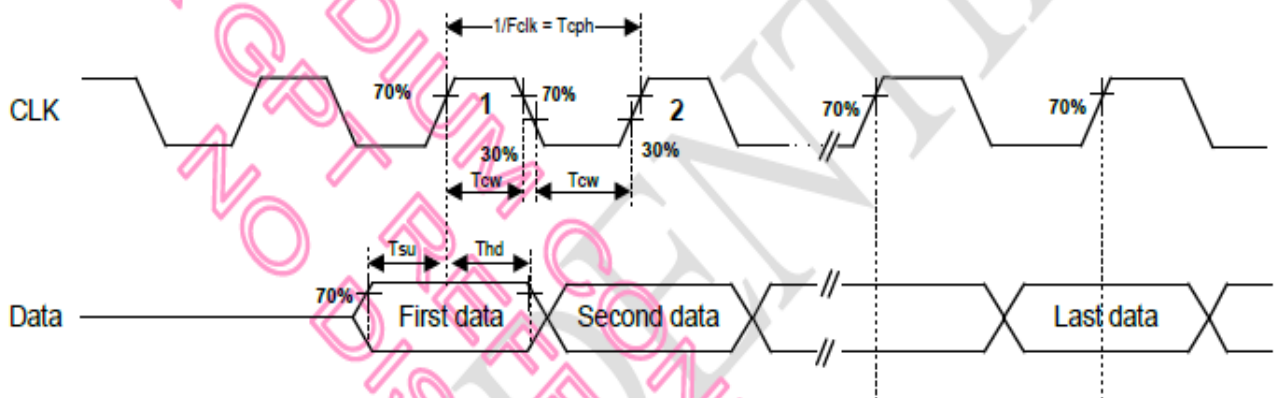
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7.5AC Electrical Characteristics

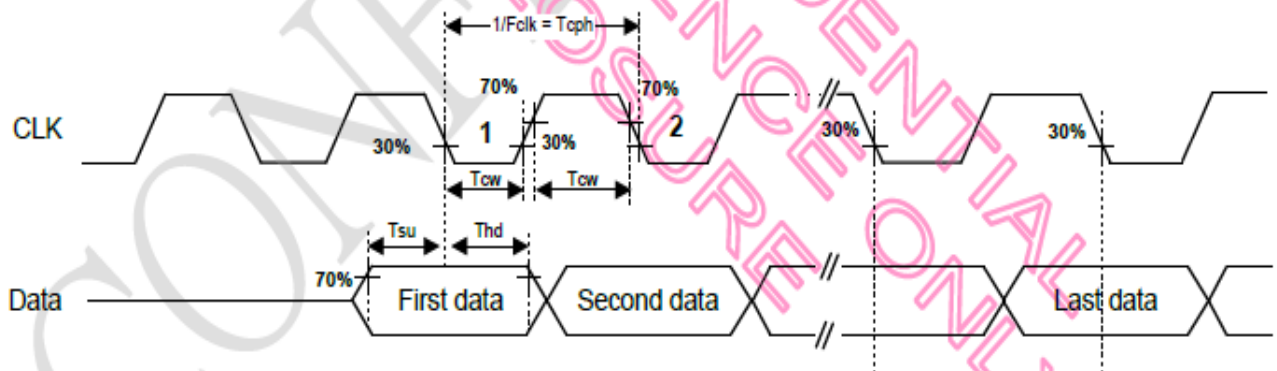
(TTL mode)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK frequency	Fclk	-	16	55	MHz	
CLK pulse width	Tcw	40%	-	60%	Tcph	
Data set-up time	Tsu	6	-	-	ns	D00 ~ D27
						to CLK
Data hold time	Thd	6	-	-	ns	D00 ~ D27
						to CLK

CLKPOL = L:



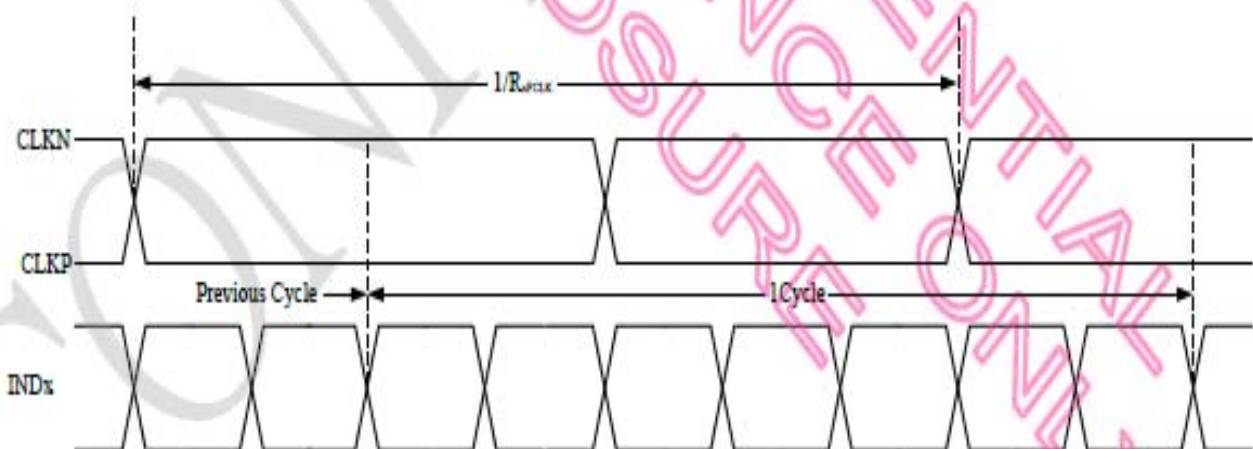
CLKPOL = H:



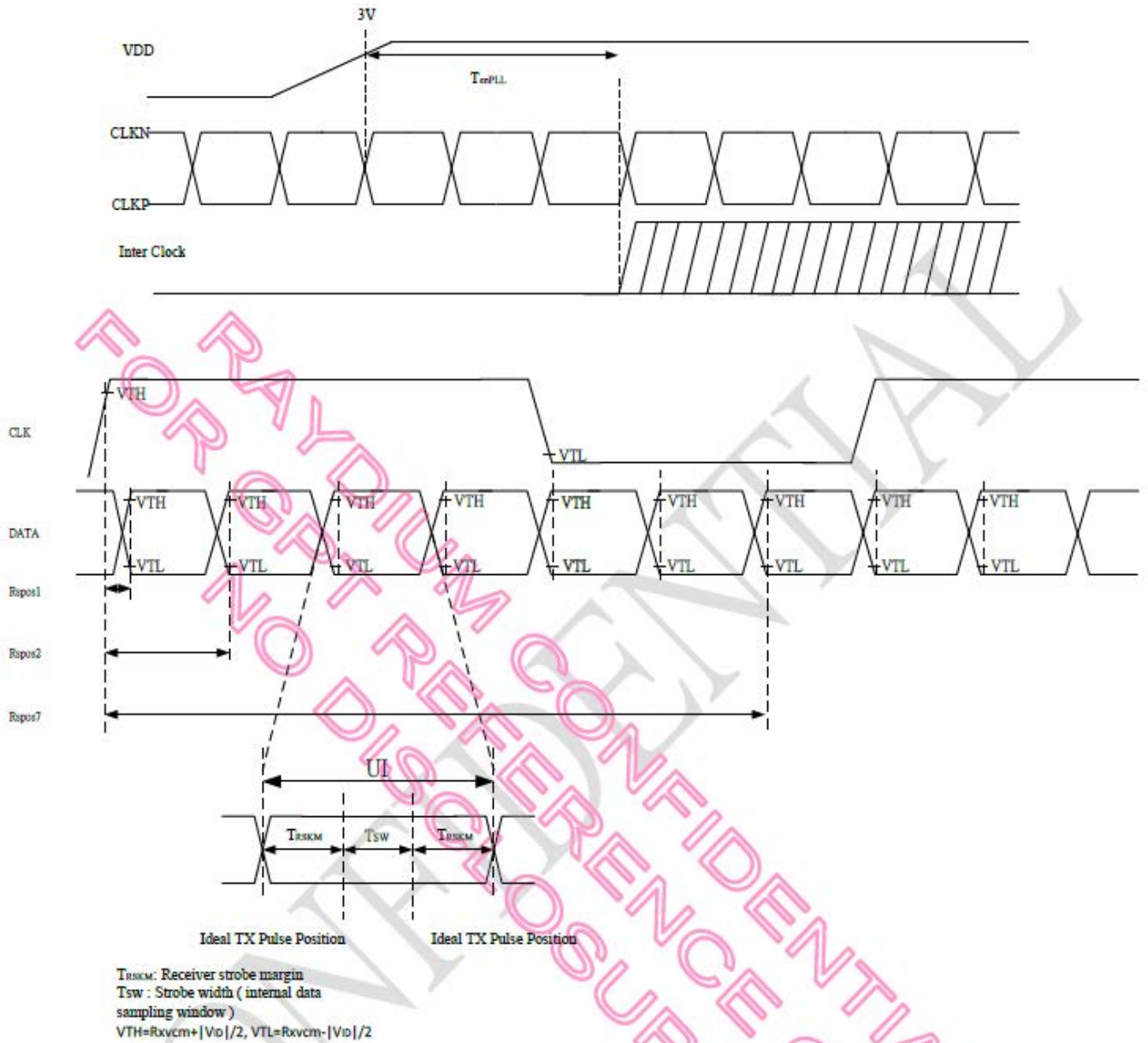
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(LVDS mode)

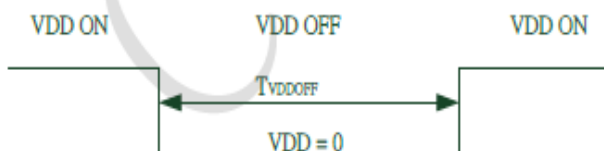
Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency	RXFCLK	20	-	85	MHz	$H_{total} * V_{total} > 330000$
Clock frequency	RXFCLK	2	-	30	MHz	$500000 > H_{total} * V_{total} > 34000$
1 data bit time	UI		1/7		1/ RxFCLK	
Position 1	Rspos1	-0.21	0	0.21	UI	
Position 2	Rspos2	0.79	1	1.21	UI	
Position 3	Rspos3	1.79	2	2.21	UI	
Position 4	Rspos4	2.79	3	3.21	UI	
Position 5	Rspos5	3.79	4	4.21	UI	
Position 6	Rspos6	4.79	5	5.21	UI	
Position 7	Rspos7	5.79	6	6.21	UI	
Input data skew margin	TRSKM	-	-	400	ps	$ VID =400mV$ $RXVCM=1.2V$ $RXFCLK=85MHz$
Clock high time	TLVCH	-	$4/(7 * RxFCLK)$	-	ns	
Clock low time	TLVCL	-	$3/(7 * RxFCLK)$	-	ns	
PLL wake-up time	TemPLL	-	-	150	us	



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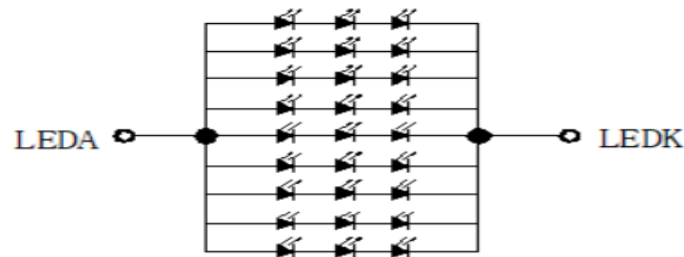
VDD power off spec.



Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
VDD OFF Time	T_{VDDOFF}	300	-	-	ms	

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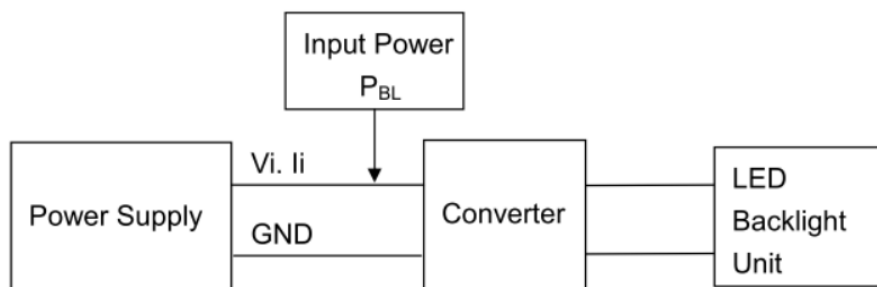
8. Backlight Characteristic



Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	8.4	9.6	10.5	V	Note 1
Supply Current	If	-	180	-	mA	Note 2
Life Time	-	-	20000	-	Hr	Note 3,4
Backlight Color	White					

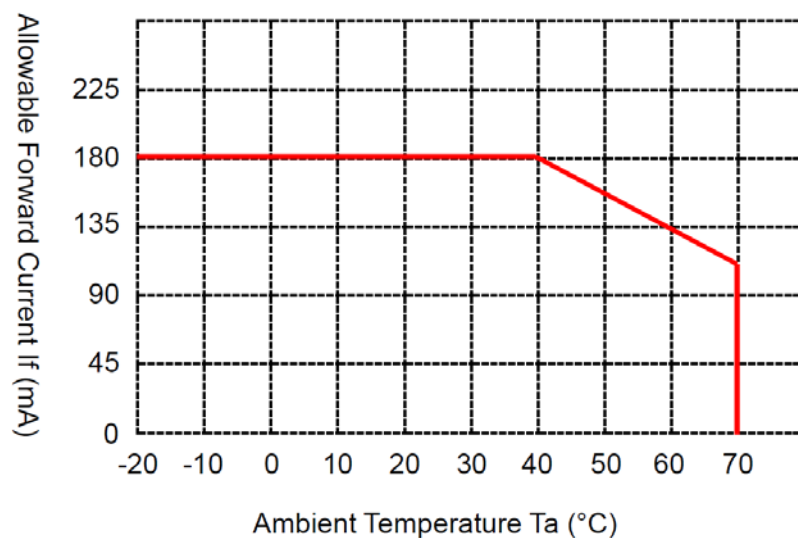
Note 1: The LED Supply Voltage is defined by the number of LED at $T_a=25^{\circ}\text{C}$ and $I_f=180\text{mA}$.

Note 2: LED current is measured by utilizing a high frequency current meter as shown below:



Note 3: The “LED life time” is defined as the module brightness decrease to 50% original brightness at $T_a=25^{\circ}\text{C}$ and $I_f=180\text{mA}$. The LED lifetime could be decreased if operating I_f is larger than 180mA.

Note 4: LED light bar circuit:

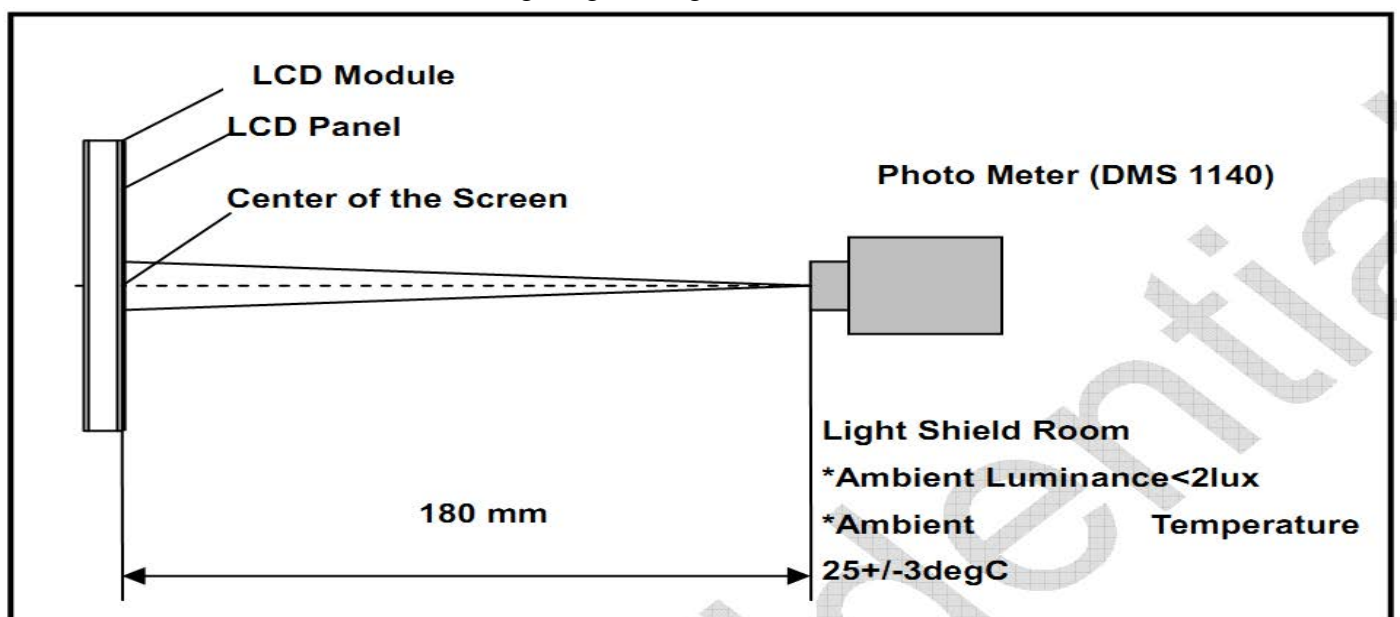


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9. Optical Characteristics

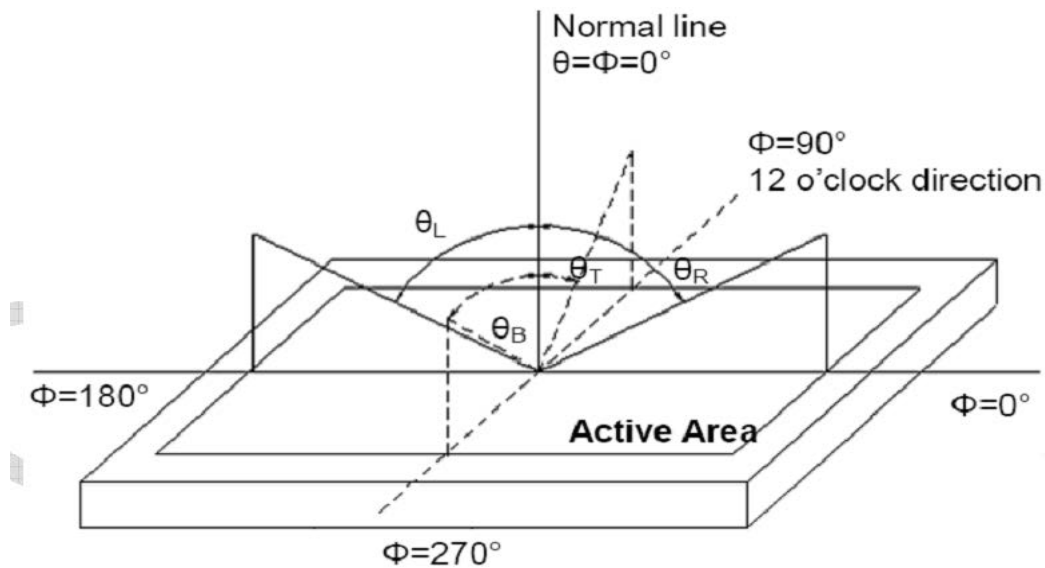
Item	Conditions	Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θL	-	80	-	(1),(2),(6)
		θR	-	80	-	
	Vertical	θT	-	80	-	
		θB	-	80	-	
Luminous Intensity for LCM	-	350	400	-	cd/m2	
Uniformity for LCM	-	75	80	-	%	
Contrast Ratio	Center	600	800	-	-	(1),(3),(6)
Response Time	25°C , θ = 0	-	25	(30)	ms	(1),(4),(6)
	-30°C , θ = 0	-	(350)	(500)	ms	(1),(4),(6)
CF Color Chromaticity (CIE1931)	White x	0.230	0.280	0.330	-	(1), (6)
	White y	0.261	0.311	0.361	-	
	Red x	0.554	0.604	0.654	-	
	Red y	0.291	0.341	0.391	-	
	Green x	0.288	0.338	0.388	-	
	Green y	0.519	0.569	0.619	-	
	Blue x	0.083	0.133	0.183	-	
	Blue y	0.012	0.062	0.112	-	
NTSC		-	61.	-	%	(1),(6)

Note (1) Measurement Setup: The LCD module should be stabilized at given temp. 25°C for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.



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Note (2) Definition of Viewing Angle



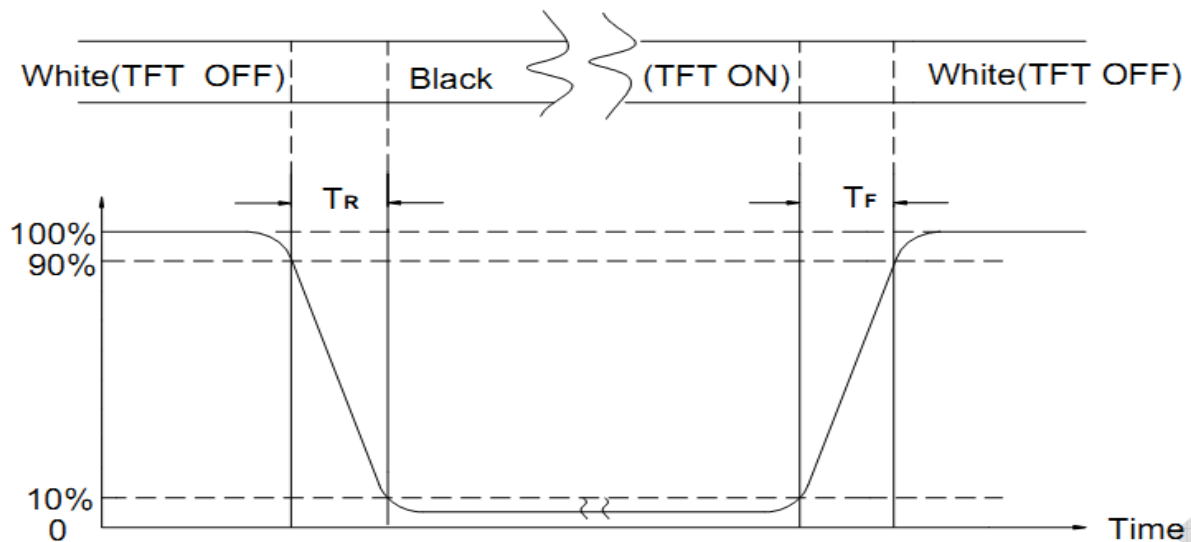
Note (3) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

$$\text{Contrast Ratio (CR)} = L_{63} / L_0$$

L63: Luminance of gray level 63, L0: Luminance of gray level 0

Note (4) Definition of response time



Note (5) Definition of Transmittance (Module is without signal input)

$$\text{Transmittance} = \text{Center Luminance of LCD} / \text{Center Luminance of Back Light} \times 100\%$$

Note (6) Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD

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10. Reliability Test Conditions and Methods

No.	Test Items	Test Condition	Inspection After Test
①	High Temperature Storage	85°C±2°C×96Hours	Inspection after 2~4hours storage at room temperature, the samples should be free from defects: 1, Air bubble in the LCD. 2, Seal leak. 3, Non-display. 4, Missing segments. 5, Glass crack. 6, Current IDD is twice higher than initial value. 7, The surface shall be free from damage. 8, The electric characteristic requirements shall be satisfied.
②	Low Temperature Storage	-30°C±2°C×96Hours	
③	High Temperature Operating	80°C±2°C×96Hours	
④	Low Temperature Operating	-30°C±2°C×96Hours	
⑤	Temperature Cycle(Storage)	-30°C (30min) ↔ 25°C (5min) ↔ 80°C (30min) 1 cycle Total 10cycle	
⑥	Damp Proof Test (Storage)	50°C±5°C×90%RH×96Hours	
⑦	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5mm X,Y,Z direction for total 3hours (packing condition test will be tested by a carton)	
⑧	Drooping Test	Drop to the ground from 1M height one time every side of carton. (packing condition test will be tested by a carton)	
⑨	ESD Test	Voltage:±8KV,R:330Ω,C:150PF,Air Mode,10times	

REMARK:

- 1, The Test samples should be applied to only one test item.
- 2, Sample side for each test item is 5~10pcs.
- 3, For Damp Proof Test, Pure water(Resistance > 10MΩ) should be used.
- 4, In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.
- 5, EL evaluation should be accepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
- 6, Failure Judgment Criterion: Basic Specification Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

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11. Inspection Standard

11.1 Scope

Specifications contain

11.1.1 Display Quality Evaluation

11.1.2 Mechanics Specification

11.2 Sampling Plan

Unless there is other agreement, the sampling plan for incoming inspection shall follow MIL-STD-105E.

11.2.1 Lot size: Quantity per shipment as one lot (different model as different lot).

11.2.2 Sampling type: Normal inspection, single sampling.

11.2.3 Sampling level: Level II.

11.2.4 AQL: Acceptable Quality Level

Major defect: AQL=0.65

Minor defect: AQL=1.5

11.3 Panel Inspection Condition

11.3.1 Environment:

Room Temperature: $25\pm 5^{\circ}\text{C}$.

Humidity: $65\pm 5\%$ RH.

Illumination: 300 ~ 700 Lux.

11.3.2 Inspection Distance:

35 ± 5 cm

11.3.3 Inspection Angle:

The vision of inspector should be perpendicular to the surface of the Module.

11.3.4 Inspection time :

Perceptibility Test Time: 20 seconds max.

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11.4 Inspection Plan

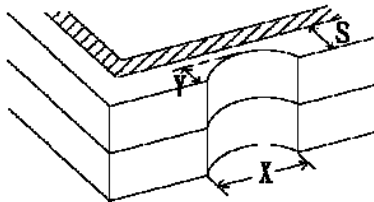
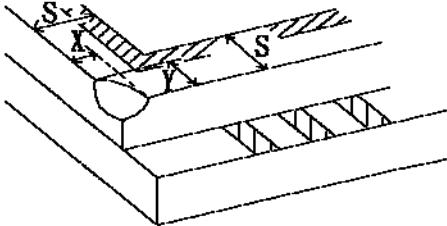
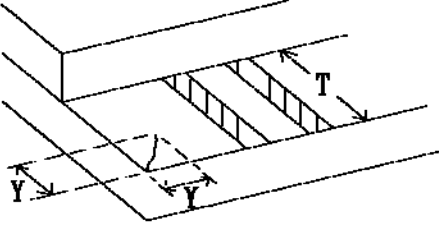
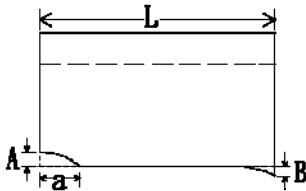
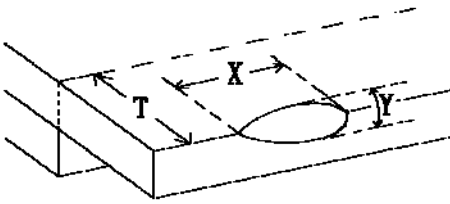
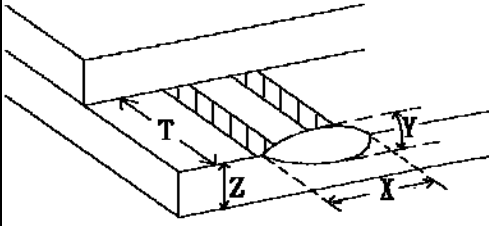
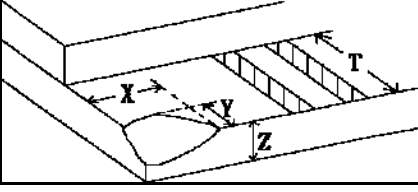
Class	Item	Judgment	Class
Packing & Indicate	1. Outside and inside package.	"MODEL NO.", "LOT NO." and "QUANTITY" should indicate on the package.	Minor
	2. Model mixed and quantity.	Other model mixed.....Rejected. Quantity short or over.....Rejected.	Critical
	3. Product indication.	"MODEL NO." should indicate on the product.	Major
Assembly	4. Dimension, LCD glass scratch and scribe defect.	According to specification or drawing.	Major
Appearance	5. Viewing area.	Polarizer edge or LCD's sealing line is visible in the viewing area.....Rejected.	Minor
	6. Blemish, black spot, white spot in the LCD and LCD glass cracks.	According to standard of visual inspection.(inside viewing area)	Minor
	7. Blemish, black spot, white spot and scratch on the polarizer.	According to standard of visual inspection.(inside viewing area)	Minor
	8. Bubble in polarizer.	According to standard of visual inspection.(inside viewing area)	Minor
	9. LCD's rainbow color.	Strong deviation color (or newton ring) of LCD.....Rejected. Or according to limited sample.(if needed, and inside viewing area)	Minor
Electrical	10. Electrical and optical characteristics.(contrast Vop chromaticity....etc)	According to specification or drawing.(inside viewing area)	Critical
	11. Missing line.	Missing dot line character.....Rejected.	Critical
	12.Short circuit. Wrong pattern display.	No display, wrong pattern display, current consumption. Out of specification.....Rejected.	Critical
	13. Dot defect.(for color and TFT)	According to standard of visual Inspection.	Minor

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11.5 Standard Of Visual Inspection

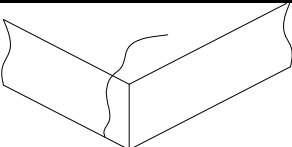
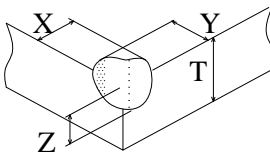
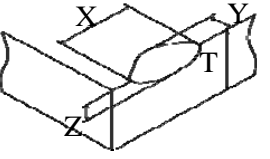
No.	Class	Item	Judgment																				
11.5.1	Minor	Black and white spot. Foreign materiel. Dust. Blemish. Scratch.	<div>(A) Round type:Unit: mm<table><tr><td>Diameter (mm.)</td><td>Acceptable Q'ty</td></tr><tr><td>$\Phi \leq 0.2$</td><td>Disregard</td></tr><tr><td>$0.2 < \Phi \leq 0.5$</td><td>3(Distance>5mm)</td></tr><tr><td>$0.5 < \Phi$</td><td>0</td></tr></table>Note: $\Phi = (\text{length}+\text{width})/2$ (B) Linear type:Unit: mm<table><tr><td>Length</td><td>Width (mm.)</td><td>Acceptable Q'ty</td></tr><tr><td>--</td><td>$W \leq 0.03$</td><td>Disregard</td></tr><tr><td>$L \leq 5.0$</td><td>$0.03 < W \leq 0.07$</td><td>3(Distance>5mm)</td></tr><tr><td>--</td><td>$0.07 < W$</td><td>FOLLOW ROUND TYPE</td></tr></table></div>	Diameter (mm.)	Acceptable Q'ty	$\Phi \leq 0.2$	Disregard	$0.2 < \Phi \leq 0.5$	3(Distance>5mm)	$0.5 < \Phi$	0	Length	Width (mm.)	Acceptable Q'ty	--	$W \leq 0.03$	Disregard	$L \leq 5.0$	$0.03 < W \leq 0.07$	3(Distance>5mm)	--	$0.07 < W$	FOLLOW ROUND TYPE
Diameter (mm.)	Acceptable Q'ty																						
$\Phi \leq 0.2$	Disregard																						
$0.2 < \Phi \leq 0.5$	3(Distance>5mm)																						
$0.5 < \Phi$	0																						
Length	Width (mm.)	Acceptable Q'ty																					
--	$W \leq 0.03$	Disregard																					
$L \leq 5.0$	$0.03 < W \leq 0.07$	3(Distance>5mm)																					
--	$0.07 < W$	FOLLOW ROUND TYPE																					
11.5.2	Minor	Dent on polarizer.	<div>Unit: mm.<table><tr><td>Diameter</td><td>Acceptable Q'ty</td></tr><tr><td>$\Phi \leq 0.2$</td><td>Disregard</td></tr><tr><td>$0.2 < \Phi \leq 0.5$</td><td>3(Distance>5mm)</td></tr><tr><td>$0.5 < \Phi$</td><td>0</td></tr></table></div>	Diameter	Acceptable Q'ty	$\Phi \leq 0.2$	Disregard	$0.2 < \Phi \leq 0.5$	3(Distance>5mm)	$0.5 < \Phi$	0												
Diameter	Acceptable Q'ty																						
$\Phi \leq 0.2$	Disregard																						
$0.2 < \Phi \leq 0.5$	3(Distance>5mm)																						
$0.5 < \Phi$	0																						
11.5.3	Minor	Bubble in polarizer.	<div>Unit: mm.<table><tr><td>Diameter</td><td>Acceptable Q'ty</td></tr><tr><td>$\Phi \leq 0.2$</td><td>Disregard</td></tr><tr><td>$0.2 < \Phi \leq 0.5$</td><td>3(Distance>5mm)</td></tr><tr><td>$0.5 < \Phi$</td><td>0</td></tr></table></div>	Diameter	Acceptable Q'ty	$\Phi \leq 0.2$	Disregard	$0.2 < \Phi \leq 0.5$	3(Distance>5mm)	$0.5 < \Phi$	0												
Diameter	Acceptable Q'ty																						
$\Phi \leq 0.2$	Disregard																						
$0.2 < \Phi \leq 0.5$	3(Distance>5mm)																						
$0.5 < \Phi$	0																						
11.5.4	Minor	Dot defect	<div><table><tr><td>Items</td><td>Acceptable Q'ty</td></tr><tr><td>Bright dot</td><td>$N \leq 2$</td></tr><tr><td>Dark dot</td><td>$N \leq 3$</td></tr><tr><td>Total dot</td><td>$N \leq 4$</td></tr></table><div>Pixel define :<div><div>Pixel</div><div><div>R</div><div>G</div><div>B</div></div><div><div>Dot</div><div>Dot</div><div>Dot</div></div></div></div><div>Note1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot. Note 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern. Note 3: The bright dot defect must be visible through 2% ND filter Note 4: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue pattern.</div></div>	Items	Acceptable Q'ty	Bright dot	$N \leq 2$	Dark dot	$N \leq 3$	Total dot	$N \leq 4$												
Items	Acceptable Q'ty																						
Bright dot	$N \leq 2$																						
Dark dot	$N \leq 3$																						
Total dot	$N \leq 4$																						

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No.	Class	Item	Judgment
11.5.5	Minor	LCD glass chipping.	 $Y > S$ Reject
11.5.6	Minor	LCD glass chipping.	 $X \text{ or } Y > S$ Reject
11.5.7	Major	LCD glass crack.	 $Y > (1/2) T$ Reject
11.5.8	Major	LCD glass scribe defect.	 <p>1. $a > L/3$, $A > 1.5\text{mm}$ Reject 2. B : According to dimension</p>
11.5.9	Minor	LCD glass chipping. (on the terminal area)	 $\Phi = (x+y)/2 > 2.5\text{mm}$ Reject
11.5.10	Minor	LCD glass chipping. (on the terminal surface)	 $Y > (1/3) T$ Reject
11.5.11	Minor	LCD glass chipping.	 $Y > T$ Reject

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11.6. Inspection Standard Of Touch Panel

No.	Class	Items		Judgment	
11.6.1	Major	Touch panel crack.		 Reject	
11.6.2	Minor	Touch panel chipping.	Corner.	 <div>$X \leq 1\text{mm}, Y \leq 1\text{mm}, Z \leq 1/2T$</div> Accept	1) Corner fragment in the golden finger that seriously affects the product function is regarded as a defect. 2) Corner fragment in the circuit that seriously affects product function is regarded as a defect.
			Edge.	 <div>$X \leq 1\text{mm}, Y \leq 1\text{mm}, Z \leq 1/2T$</div> Accept	1) Side fragment in the golden finger that seriously affects the product function is regarded as a defect. 2) Side fragment in the circuit that seriously affects product function is regarded as a defect.
11.6.3	Minor	Scratch. Dust and foreign materiel. (linear type)		$W \leq 0.03$	Accept
				$0.03\text{mm} < W \leq 0.07\text{mm}, L \leq 5.0\text{mm}$ (Distance>5mm)	Accept 3 ea Max.
				$W > 0.07\text{mm}$	Reject
11.6.4	Minor	Scratch. Dust and foreign materiel (round type: $\phi = (\text{length} + \text{width}) / 2$)		$\Phi \leq 0.2\text{mm}$	Accept
				$0.2\text{mm} < \Phi \leq 0.3\text{mm}$ (Distance>5mm)	Accept 3 ea Max.
				$\Phi > 0.3\text{mm}$	Reject
11.6.5	Minor	Touch panel dent / fish eyes.		$\Phi \leq 0.2\text{mm}$	Accept
				$0.2\text{mm} < \Phi \leq 0.5\text{mm}$ (Distance>5mm)	Accept 3 ea Max.
				$\Phi > 0.5\text{mm}$	Reject
11.6.6	Minor	Touch panel air bubble.		$\Phi \leq 0.2\text{mm}$	Accept
				$0.2\text{mm} < \Phi \leq 0.5\text{mm}$ (Distance>5mm)	Accept 3 ea Max.
				$\Phi > 0.5\text{mm}$	Reject
11.6.7	Minor	Touch panel printing area scratch.		$W \leq 0.03\text{mm}$	Accept
				$0.03\text{mm} < W \leq 0.07\text{mm}, L \leq 5.0\text{mm}$ (Distance>5mm)	Accept 3 ea Max.
				$W > 0.07$ (W>0.07 follow 11.6.4 round type)	Reject
11.6.8	Minor	Touch panel white haze mark / dust.		Can not be removed Reject	

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12. Handling Precautions

12.1 Mounting Method

The LCD panel of Microtips TFT module consists of two thin glass plates with polarizes which easily be damaged. And since the module is so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

12.2 Caution of LCD Handling And Cleaning

When cleaning the display surface, Use soft cloth with solvent

[Recommended below] and wipe lightly

- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated:

- Soldering flux
- Chlorine (Cl) , Sulfur (S)

If goods were sent without being silicon coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happens by miss-handling or using some materials such as Chlorine (Cl), Sulfur (S) from customer, Responsibility is on customer.

12.3 Caution Against Static Charge

The LCD module uses C-MOS LSI drivers, so we recommend that you:

Connect any unused input terminal to power or ground, do not input any signals before power is turned on, and ground your body, work/assembly areas, and assembly equipment to protect against static electricity.

12.4 Packing

- Module employs LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

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12.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage than the limit causes the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- Slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the maximum operating temperature, 50%Rh or less is required.

12.6 Storing

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it. And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by anything else.

[It is recommended to store them as they have been contained in the inner container at the time of delivery from us]

12.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

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13. Precaution for Use

13.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

13.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported to Microtips TFT , and some problem is arisen in this specification due to the change
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

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