

Model No: AWK-800480T43N01

Approved By					

Tel: 1 (888) 499-8477

Fax: (407) 273-0771

E-mail: mtusainfo@microtipsusa.com

Web: www.microtipsusa.com



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Revision Record

Rev No.	Rev Date	Contents	Note
A	2018/08/23	New issue.	
В	2018/09/05	Page5, 3. External Dimensions: Modified FPCB dimension.	
С	2018/12/14	Page 12, 9. Optical Characteristics: Modified Color chromaticity.	
D	2019/07/10	Update: Page 4, 5, 7, 8, 9, 10, 11, 12, 13, 17, 2. General Information; 3. External Dimensions; 5. Absolute Maximum Ratings; 7. Timing Characteristics 10. Reliability Test Conditions and Methods Change the driver IC from EK to HX.And then modify the Timing & temperature(Top,Tst)	



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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

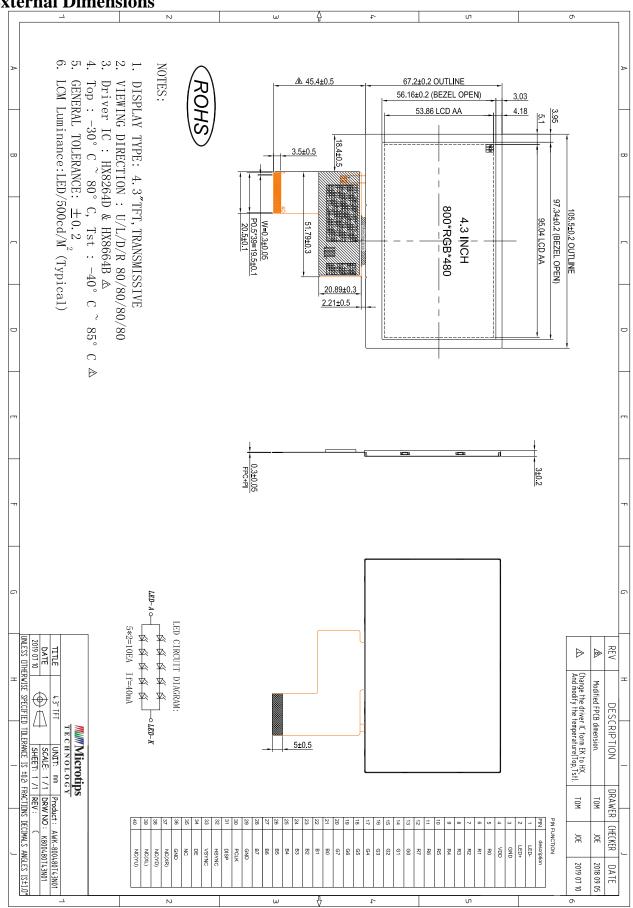
2. General Information

Item	Standard Values	Units
LCD type	4.3"TFT	
Dot arrangement	800 (RGB)×480	dots
Color filter array	RGB vertical stripe	
Display mode	Normally Black / IPS	-
Eyes Viewing Direction	ALL	
Driver IC	HX8264D+HX8664B	
Module size	105.5(W)×67.2(H)×3.0(T)	mm
Active area	95.04(W)×53.86(H)	mm
Dot pitch	0.1188(W)×0.1122(H)	mm
Interface	24-bit Parallel RGB Interface	
Operating temperature	-30 ~ +80	°C
Storage temperature	-40 ~ +85	°C
Back Light	10 White LEDS	



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3. External Dimensions





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4. Interface Description

4. Interrace De	Interface Description					
Pin No.	Pin Name	Description				
1	LEDK	LED backlight (Cathode).				
2	LEDA	LED backlight (Anode).				
3	GND	Ground.				
4	VDD	Power supply				
5~12	R0~R7	Red Data				
13~20	G0~G7	Green Data				
21~28	B0~B7	Blue Data				
29	GND	Ground.				
30	PCLK	Clock				
31	DISP	Display on/off				
32	HSYNC	Horizontal sync input in RGB mode.				
33	VSYNC	Vertical sync input in RGB mode.				
34	DE	Data enable input. Active high to enable the input data bus.				
35	NC	No connection.				
36	GND	Ground.				
37	NC(XR)	No connection.				
38	NC(YD)	No connection.				
39	NC(XL)	No connection.				
40	NC(YU)	No connection.				



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5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Power supply	VDD	-0.3	4.6	V
Input Voltage	Vin	GND	VDD	V
Operating Temperature	ТОР	-30	80	°C
Storage Temperature	TST	-40	85	°C
Storage Humidity	HD	20	90	%RH

6. DC Characteristics

Item	Symbol	Min.	Тур.	Max.	Unit	Remark
Power supply	VDD	2.5	3.3	3.6	V	-
Input High Voltage	$V_{ m IH}$	0.7VDD	-	VDD	V	-
Input Low Voltage	V _{IL}	GND	-	0.3 VDD	V	-
Output High Voltage	V _{OH}	VDD-0.4	-	VDD	V	-
Output Low Voltage	$V_{ m OL}$	GND	-	GND+0.4	V	-
I/O Leak Current	ILI	-1	-	1	uA	-

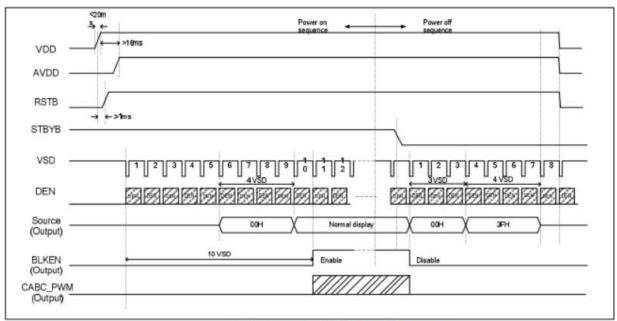
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7. Timing Characteristics

7.1. Power ON/OFF Sequence

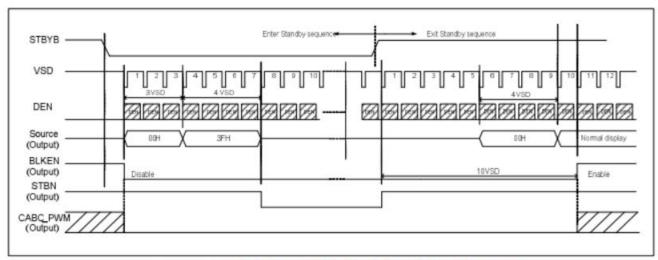
Power on/off control

HX8264-D03 has a power on/off sequence control function. In order to prevent IC from power on reset fail, the rising time (TPOR) of the digital power supply VDD should be maintained within the given specifications. Please refer to "AC Characteristics" for more detail on timing.



Power on/off Timing Sequence

Enter and exit standby mode sequence

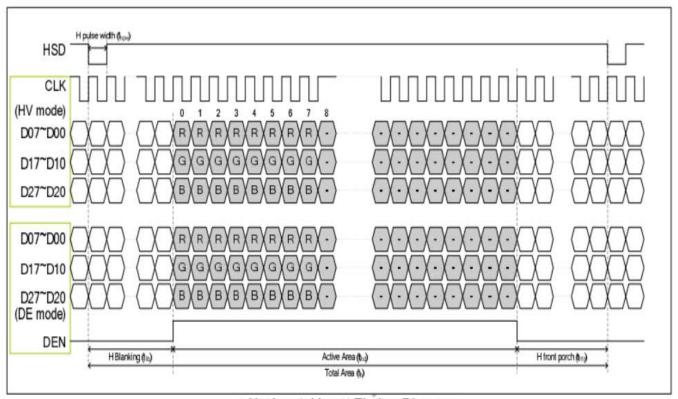


Enter and Exit Standby Mode Sequence

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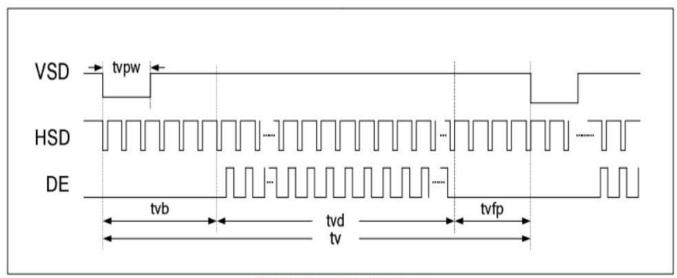
7.2 Data Input Format

Horizontal timing



Horizontal Input Timing Diagram

Vertical timing



Vertical Input Timing Diagram



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Resolution: 800x480

Horizontal timing

Parameter	Symbol		Unit		
rafameter	Symbol	Min.	Тур.	Max.	Unit
Horizontal Display Area	thd		800	9	DCLK
DCLK frequency	fclk	-	30	50	MHz
One Horizontal Line	th	889	928	1143	DCLK
HS pulse width	thpw	1	48	255	DCLK
HS Back Porch (Blanking)	thb		88		DCLK
HS Front Porch	thfp	1	40	255	DCLK
DE mode Blanking	th-thd	85	128	512	DCLK

Vertical timing

Parameter	Symbol		Unit		
raidilletei	Symbol	Min.	Тур.	Max.	Oill
Vertical Display Area	tvd		480		T _H
VS period time	tv	513	525	767	T _H
VS pulse width	tvpw	3	3	255	T _H
VS Back Porch (Blanking)	tvb		32		T _H
VS Front Porch	tvfp	1	13	255	T _H
DE mode Blanking	tv-tvd	4	45	255	T _H

7.3 Timing waveform table

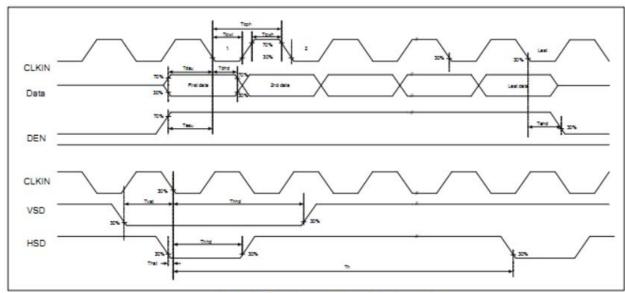
Parallel 24-bit RGB mode

Parameter	Symbol	Min.	Тур.	Max.	Unit	Conditions
CLKIN Frequency	Fclk	•	40	50	MHz	VDD=3.0V~3.6V
CLKIN Cycle Time	Tclk	20	25	-	ns	-
CLKIN Pulse Duty	Tcwh	40	50	60	%	Tclk
Time from HSD to Source Output	Thso		64		CLKIN	-
Time from HSD to LD	Thld		64		CLKIN	
Time from HSD to STV	Thstv		2		CLKIN	-
Time from HSD to CKV	Thckv		20		CLKIN	
Time from HSD to OEV	Thoev		4		CLKIN	-
LD Pulse Width	Twld		10	ĺ	CLKIN	
CKV Pulse Width	Twckv	66		CLKIN		
OEV Pulse Width	Twoev		74		CLKIN	•

Parallel 24-bit RGB mode

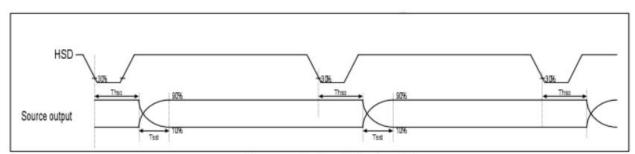


Input clock and data timing waveform



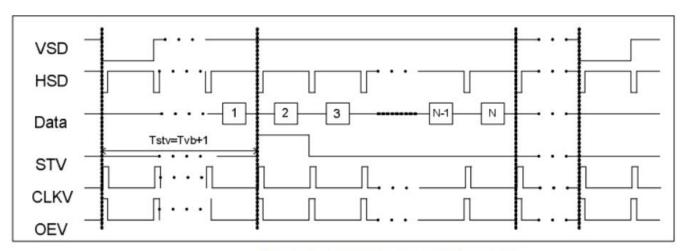
Input Clock and Data Timing Diagram

Source output timing waveform (Cascade)



Source Output Timing Diagram

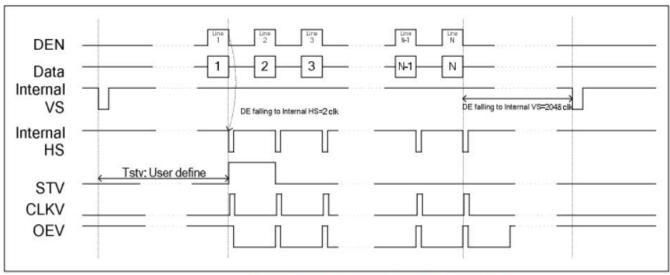
Vertical timing diagram HV (Cascade)



Vertical Timing Diagram HV (Cascade)

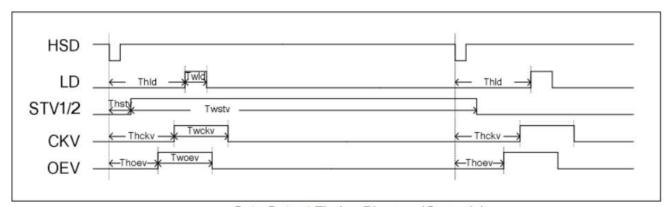


Vertical timing diagram DE (Cascade)



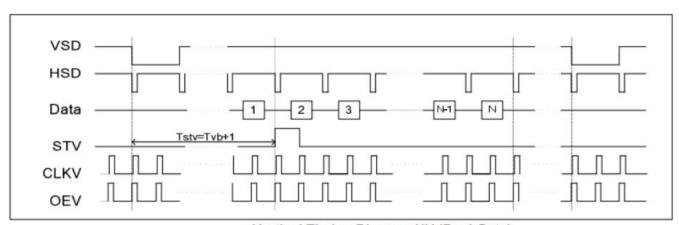
Vertical Timing Diagram DE (Cascade)

Gate output timing diagram (Cascade)



Gate Output Timing Diagram (Cascade)

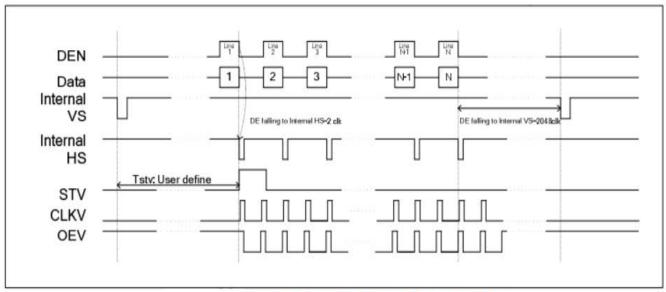
Vertical timing diagram HV (Dual gate)



Vertical Timing Diagram HV (Dual Gate)

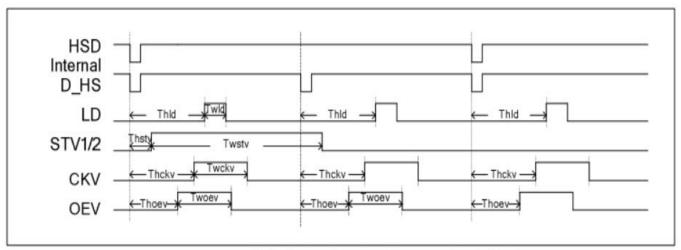


Vertical timing diagram DE (Dual gate)



Vertical Timing Diagram DE (Dual Gate)

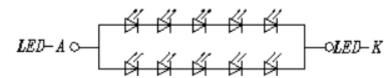
Gate output timing diagram (Dual gate)



Gate Output Timing Diagram (Dual Gate)

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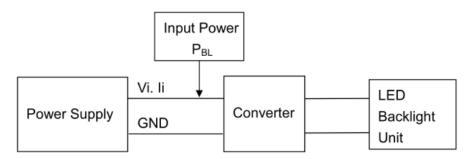
8. Backlight Characteristic



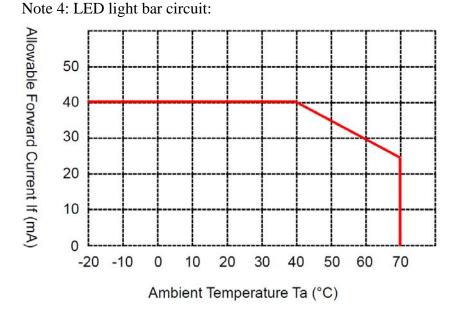
Item	Symbol	Min	Тур	Max	Unit	Test Condition	
Supply Voltage	Vf	14	16	18	V	Note 1	
Supply Current	If	-	40	-	mA	Note 2	
Luminous Intensity for LCM	-	400	500	-	cd/m ²		
Uniformity for LCM	-	80	-	-	%		
Life Time	-	-	20000	-	Hr	Note 3,4	
Backlight Color	White						

Note 1: The LED Supply Voltage is defined by the number of LED at $Ta=25^{\circ}$ C and If =40mA.

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 $Ta=25^{\circ}C$ and Ta=40mA. The LED lifetime could be decreased if operating If is larger than 40mA.



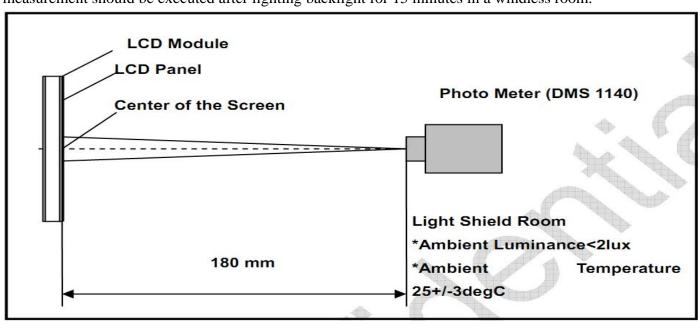


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9. Optical Characteristics

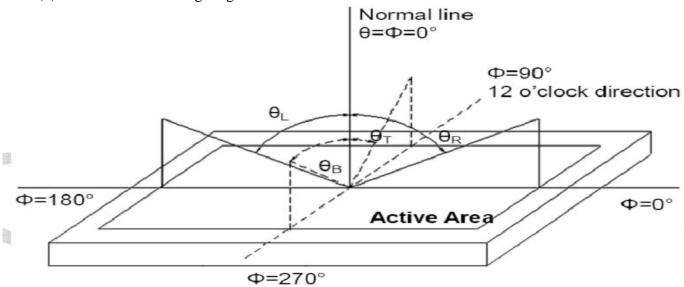
Item	Conditions		Min.	Typ.	Max.	Unit	Note
	Horizontal	θ L	-	80	-		
Viewing Angle	Horizontai	θR	ı	80	-	dograa	(1) (2) (6)
(CR>10)	Vertical	θТ	ı	80	-	degree	(1),(2),(6)
	Vertical	$\theta \mathbf{B}$	-	80	-		
Contrast Ratio	Center		600	800	-	-	(1),(3),(6)
Response Time	Rising + Fall	ing	-	30	40	ms	(1),(4),(6)
	Red x		0.533	0.583	0.633	-	
	Red y		0.307	0.357	0.407	-	
	Green x		0.314	0.364	0.414	-	
CF Color Chromaticity	Green y		0.535	0.585	0.635	-	(1),(6)
(CIE1931)	Blue x		0.089	0.139	0.189	-	(1),(0)
	Blue y		0.065	0.115	0.165	-	
	White x		0.275	0.325	0.375	-	
	White y		0.332	0.382	0.432	-	

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



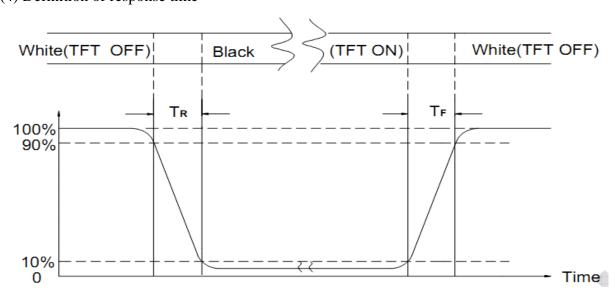
Note (3) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L63 / L0

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)

Transmittance = Center Luminance of LCD / Center Luminance of Back Light x 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	
2	Low Temperature Storage	-40°C±2°C×96Hours	
3	High Temperature Operating	80°C±2°C×96Hours	Inspection often 2. Aboves
4	Low Temperature Operating	-30°C±2°C×96Hours	Inspection after 2~4hours storage at room temperature, the samples should be free from defects:
5	Temperature Cycle(Storage)	-20°C (30min) (25°C (30min) 1cycle Total 10cycle	1, Air bubble in the LCD. 2, Seal leak. 3, Non-display. 4, Missing segments.
6	Damp Proof Test (Storage)	50°C±5°C×90%RH×96Hours	5, Glass crack. 6, Current IDD is twice higher than initial value.
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)	7, The surface shall be free from damage. 8, The electric characteristic requirements shall be satisfied.
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 $> 10 \text{M}\Omega$)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±5°C.

Humidity: 65±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
	Outside and inside package.	"MODEL NO.", "LOT NO." and "QUANTITY" should indicate on the package.	Minor
Packing & Indicate	2. Model mixed and quantity.	Other model mixedRejected. Quantity short or overRejected.	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 visable i the viewing areaRejected.		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 LCDRejected. Or according to limited sample.(if needed, and inside viewing area)	Minor
Electrical	10. Electrical and optical characteristics.(contrast Vop chromaticityetc)	According to specification or drawing.(inside viewing area)	
	11. Missing line.	Missing dot line characterRejected.	Critical
	12.Short circuit. Wrong pattern display.	No display, wrong pattern display, current consumption. Out of specificationRejected.	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	JUDGN	MENT	
			(A) Round type:	Unit: mm	
			Diameter (mm.)	Acceptable Q'ty	
			$\Phi \leq 0.2$	Disregard	
		Black and white spot.	0.2 < Φ≦0.25	2(Distance>5mm)	
		Foreign materiel.	$0.25 < \Phi$	0	
11.5.1	Minor	Dust.	Note: $\Phi = (length+width)/2$		
11.5.1	IVIIIIOI	Blemish.	(B) Linear type:	Unit: mm	
			Length Width (mm.)	Acceptable Q'ty	
		Scratch.	W≦0.03	Disregard	
			$L \le 5.0 0.03 < W \le 0.07$	2(Distance>5mm)	
			0.05 < W	FOLLOW ROUND TYPE	
				Unit: mm.	
			Diameter	Acceptable O'ty	
11.5.2 Minor	Dent on polarizer.	$\Phi \leq 0.2$	Disregard		
		T. T	$0.2 < \Phi \le 0.5$	2(Distance>5mm)	
			0.5 < Ф	0	
				Unit: mm.	
			Diameter	Acceptable Q'ty	
11.5.3 Minor	Bubble in polarizer.	$\Phi \leq 0.2$	Disregard		
		1	$0.2 < \Phi \le 0.5$	2(Distance>5mm)	
		0.5 < Ф	0		
		Items	Acceptable Q'ty		
		nor Dot defect	Bright dot	N ≦2	
			Dark dot	N ≦2	
			Total dot	N ≦3	
11.5.4 Minor	Minor		Pixel define: Pixel P	B de of a defective dot over 1/2 of the defective dot. In and unchanged in size in which the older black pattern. The visible through 2% ND filter	



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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 or Y>S Reject
11.5.7	Major	LCD glass crack.	Y>(1/2) T Reject
11.5.8	Major	LCD glass scribe defect.	1. a>L/3, A>1.5mm Reject 2. B : According to dimension
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



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 in 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 happen by miss-handling or using some materials such as Chlorine (CI), Sulfur (S) from customer, Responsibility is on customer.

12.3 Caution Against Static Charge

The LCD module use C-MOS LSI drivers, so we recommended 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



12.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause 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 then the operating temperature range and on the other hand at higher temperature LCD's how 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 the 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



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.

MICROTIPS TECHNOLOGY USA

3504 Lake Lynda Dr, Suite 110, Orlando, Florida, 32817, TEL: 407-273-0204, FAX: 407-273-0771

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