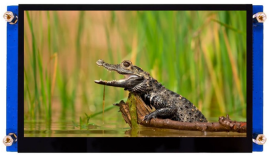


Surenoo SMC0430B-800480 Series MCU Interface IPS LCD Module User Manual

SMC0430B-800480 Series

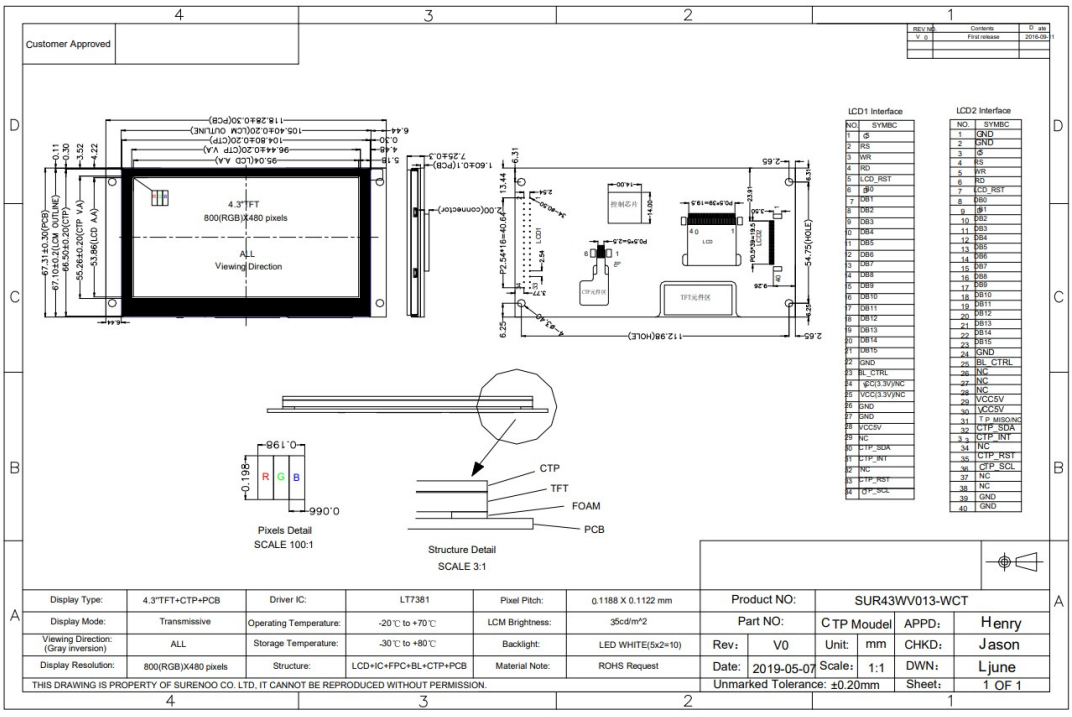
MCU Interface IPS LCD Module USER MANUAL Model No.: SMC0430B-800480

Please click the following image to buy the sample

Contents hide

GENERAL INFORMATION

Item of general information	Contents		Unit
LCD Display Size (Diagonal)	4.3		inch
Module Structure	LCD Display + CTP Touch + PCB		–
LCD Display Type	TFT/TRANSMISSIVE		–
LCD Display Mode	Normally Black		–
Recommended Viewing Direction	ALL		o'clock
Gray inversion Direction			o'clock
Module size (W×H×T)	118.28×67.31×7.25		mm
Active area (W×H)	95.04×53.68		mm
Number of pixels (Resolution)	800RGB×480		pixel
Pixel pitch (W×H)	0.1188×0.1122		mm
LCD Driver IC	–		–
Module Interface Type	LCD	MCU 16bit/8bit interface	–
	CTP	IIC interface	–
Module Input voltage	5.0V or 3.3V		V
Module Power consumption	–		mW
Color Numbers	16.7M		–
Backlight Type	White LED		–
LCM Controller	LT7381		–



ABSOLUTE MAXIMUM RATINGS

Parameter of absolute maximum ratings	Symbol	Min	Max	Unit
Operating temperature	Top	-20	70	℃
Storage temperature	TSgt	-30	80	℃
Humidity	RH	–	90%(Max 60℃)	RH

Note: Absolute maximum ratings means the product can withstand short-term, not more than 120 hours. If the product is a long time to withstand these conditions, the life time would be shorter.

ELECTRICAL CHARACTERISTICS(DC CHARACTERISTICS)

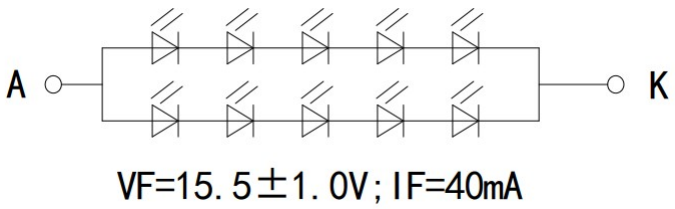
Parameter of DC characteristics	Symbol	Min.	Typ.	Max.	Unit
PCB operating voltage	VCC5V	–	5.0	–	V
LCD I/O operating voltage	VDD	3.0	3.3	3.6	V
Input voltage 'H' level	VIH	2	–	3.6	V
Input voltage 'L' level	VIL	-0.3	–	0.8	V
Output voltage 'H' level	VOH	2.4	–	–	V
Output voltage 'L' level	VOL	–	–	0.4	V

BACKLIGHT CHARACTERISTICS

Item of backlight characteristics	Symbol	Min.	Typ.	Max.	Unit	Remark
Forward Voltage	If	14	15.5	16.5	V	Note1
Forward Current	If	–	40	–	mA	–
Number of LED	–	–	5*2	–	Piece	–
LED Connection mode	P/S	–	5S*2P	–	–	–
Lifetime of LED	–	–	10000	–	hour	Note2

Note:

- Note1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and If=40mA.
- Note2: The LED lifetime define as the estimated time to 50% degradation of initial luminous. The LED lifetime could be decreased if operating If is larger than 20mA.
- Backlight circuit:



VF=15.5±1.0V;IF=40mA

ELECTRO-OPTICAL CHARACTERISTICS

Item of electro-optical characteristics		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	Note
Response time		Tr+Tf		–	30	40	ms	FIG 1.	4
Contrast Ratio		CR	θ=0 =0 Ta=25℃	640	800	–	–	FIG 2.	1
Luminance uniformity		WHITE		–	80	–	%	FIG 2.	3
Surface Luminance		Lv		–	350	–	cd/m2	FIG 2.	2
CIE (x, y) chromaticity	White	White x	θ=0 =0 Ta=25℃	0.309	0.313	0.315	–	FIG 2.	5
		White y		0.337	0.339	0.341			
	Red	Red x		0.629	0.631	0.633			
		Red y		0.327	0.329	0.331			
	Green	Green x		0.326	0.328	0.330			
		Green y		0.546	0.548	0.550			
	Blue	Blue x		0.134	0.136	0.138			
		Blue y		0.139	0.141	0.143			
Viewing angle range	=90(12 o'clock)		CR 10	70	80	–	deg	FIG 3.	6
	=270(6 o'clock)			70	80	–	deg		
	=0(3 o'clock)			70	80	–	deg		
	=180(9 o'clock)			70	80	–	deg		
NTSC ratio	–	–	–	–	50	–	%	–	–

Note 1. Contrast Ratio (CR) is defined mathematically by the following formula. For more information see FIG 2.:

$$\text{Contrast Ratio}(CR) = \frac{\text{Average Surface Luminance with all white pixels}(P1,P2,P3,P4,P5,P6,P7,P8,P9)}{\text{Average Surface Luminance with all black pixels}(P1,P2,P3,P4,P5,P6,P7,P8,P9)}$$

Note 2. Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see FIG 2.
Lb=Average Surface Luminance with all white pixels (P1,P2,P3,P4,P5,P6,P7,P8,P9)
Note 3. The uniformity in surface luminance Whitelist determined by measuring
Note 3. The uniformity in surface luminance WHITE is determined by measuring luminance at each test position 1 through 9, and then dividing the maximum luminance of 9points luminance by minimum luminance of 9 points luminance. For more information see FIG 2.

$$\delta\text{WHITE} = \frac{Minimum\ Surface\ Luminance\ with\ all\ white\ pixels\ (P1,P2,P3,P4,P5,P6,P7,P8,P9)}{Maximum\ Surface\ Luminance\ with\ all\ white\ pixels\ (P1,P2,P3,P4,P5,P6,P7,P8,P9)}$$

Note 4. Response time is the time required for the display to transition from White to black(Rise Time, Tr) and from black to white(Decay Time, Tf). For additional information see FIG 1.
Note 5. CIE (x, y) chromaticity ,The x,y value is determined by screen active area position 5.
For more information see FIG 2.
Note 6. Viewing angle is the angle at which the contrast ratio is greater than a specific value.
For TFT module, the specific value of contrast ratio is 10.The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 3.
Note 7. For Viewing angle and response time testing, the testing data is base on Autronic-Melchers's ConoScope. Series Instruments. For contrast ratio, Surface Luminance, Luminance uniformity and CIE the testing data is base on BM-7 photo detector.
Note 8. For TN type TFT transmissive module, Gray scale reverse occurs in the direction of panel viewing angle.

FIG.1. The definition of Response Time

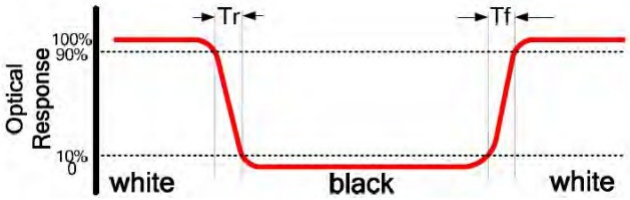


FIG.2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x , y) chromaticity
A : H/6 ;
B : V/6 ;
H,V : Active Area(AA) size
Measurement instrument: BM-7; Light spot size=5mm, 350mm distance from the LCD surface to detector lens.

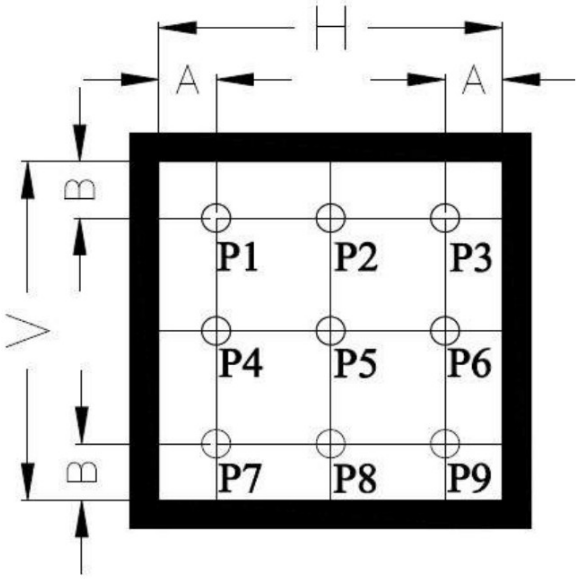
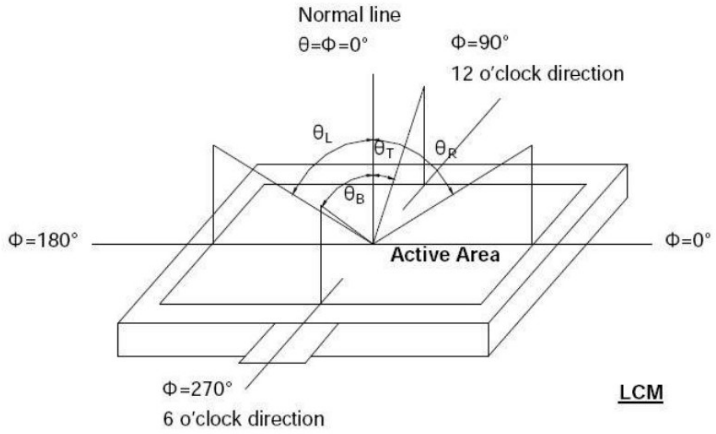


FIG.3. The definition of viewing angle



INTERFACE DESCRIPTION

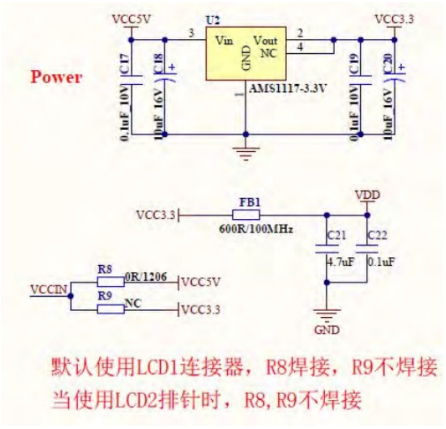
LCD1 Interface Description

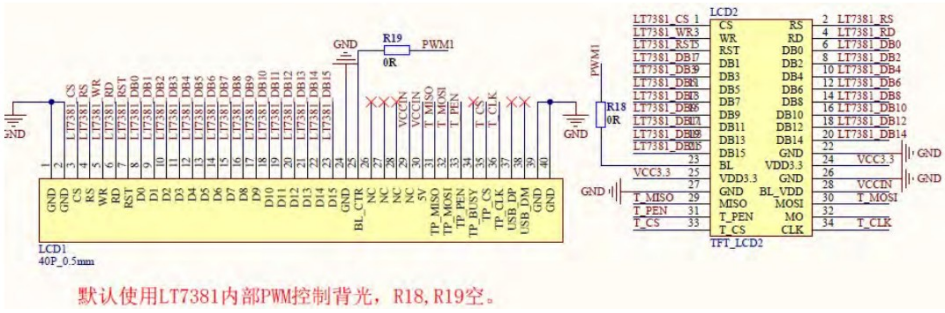
NO.	Symbol	I/O	DESCRIPTION
1	CS	I	Chip select
2	RS	I	Data/Command select
3	WR	I	Write strobe signal
4	RD	I	Read strobe signal
5	RST	I	LCD RESET signal, Low is active
6~21	DB0~ DB15	I/O	Data bus(D0:LSB; D15:MSB)
22	GND	Power supply	Power ground
23	BL_CTRL	I	Backlight control pin
24~25	VCC(3.3V)	Power supply	Module Power input(3.3V Typ.) (*note1)
26~27	GND	Power supply	Power ground
28	VDD5V	Power supply	Module Power input (5V Typ.) (*note1)
29	NC	O	RTP Serial Data Output
30	CTP_SDA	I	TP Serial Data Input
31	CTP_INT	I	TP INT Interrupt Output
32	NC	–	No connection
33	CTP_RST	I	TP Chip reset pin
34	CTP_SCL	I	TP Clock Input

LCD2 Interface Description

NO.	Symbol	I/O	DESCRIPTION
1~2	GND	Power supply	Power ground
3	CS	I	Chip select
4	RS	I	Data/Command select
5	WR	I	Write strobe signal
6	RD	I	Read strobe signal
7	RST	I	LCD RESET signal, Low is active
8~23	DB0~DB15	I/O	Data bus(D0:LSB; D15:MSB)
24	GND	Power supply	Power ground
25	BL_CTRL	I	Backlight control pin
26~28	NC	–	No connection
29~30	VDD5V	Power supply	Module Power input (5V Typ.) (*note1)
31	TP_MISO/NC	O	No connection
32	CTP_SDA	I	TP Serial Data Input
33	CTP_INT	I	TP INT Interrupt Output
34	NC	–	No connection
35	CTP_RST	I	TP Chip reset pin
36	CTP_SCL	I	TP Clock Input
37	NC	I	No connection
38	NC	I	No connection
39~40	NC	–	No connection

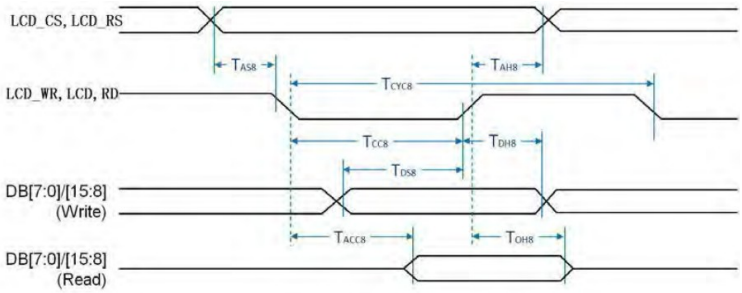
Note1:
Power supply of module ,when used for LCD1 and LCD2 interface , The following instructions:
a The power input pin is used for LCD1,R2 should be removed on the PCB.
b The power input pin is used for LCD1 and used for VCC3.3 power pins only,R2 should be removed and R4 should be used on the PCB.





INPUT TIMING

8080 Parallel Mode Interface Timing



Symbol	Parameter	Rating		Unit	Note
		Min.	Max.		
TCYC8	Cycle Time	50	—	ns	
TCC8	Strobe Pulse Width	20	—	ns	
TAS8	Address Setup Time	0	—	ns	
TAH8	Address Hold Time	10	—	ns	tic is one system clock period: tic = 1/SYS_CLK
TDS8	Data Setup Time	20	—	ns	
TDH8	Data Hold Time	10	—	ns	
TACC8	Data Output Access Time	0	20	ns	
TOH8	Data Output Hold Time	0	20	ns	

Register Write:

1. Address Write: Write the Register's Address. For example, 00h i.e. REG[00h], 01h i.e. REG[01h], 02h i.e. REG[02h] ……
2. Data Write: Write Data to the Register

Register Read:

1. Address Write: Write the Register's Address
2. Data Write: Read Data from the Register
   Displays Memory (Display RAM) is where the TFT screen image data is stored,. Host through interface and write data into Display RAM. The procedure of access Display RAM is as following:

Display RAM Write:

1. Set the Active Window Registers before writing any image data.
2. Perform an register write to Graphic R/W Position Register 0, REG[5Fh]).
3. Repeat step 2 until setup all the Active Window & Graphic R/W Position Coordinates.
4. Perform an address write to point to Memory Data Port Register (REG[04h])
5. Perform data writes to fill the window. Each write to the Memory Data Port will auto-increment the internal memory address.

RELIABILITY TEST CONDITIONS

No.	Test Item	Test Condition
1	High Temperature Storage	80℃/120 hours
2	Low Temperature Storage	-30℃/120 hours
3	High Temperature Operating	70℃/120 hours
4	Low Temperature Operating	-20℃/120 hours
5	Temperature Cycle Storage	-20℃(30min.)~25(5min.)~70℃(30min.)×10cycles

A Inspection after test:
Inspection after 2~4 hours storage at room temperature, the sample shall be free from defects:

- Air bubble in the LCD;
- Selleck; Non-display;
- Missing segments;
- Glass crack;
- Current is twice higher than initial value.

Premark:

- The test samples should be applied to only one test item.
- Sample size for each test item is 5~10pcs.
- Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

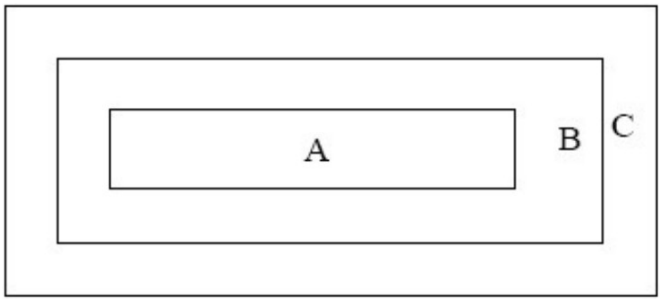
INSPECTION CRITERION

This specification is made to be used as the standard of acceptance/rejection criteria for TFT-LCD/IPS TFT-LCD module product, and this specification is applicable only in the case that the size of module equal to or exceed than 3.5 inch.

10.1 Sample plan
Sampling plan according to GB/T2828.1-2003/ISO 2859-1 1999 and ANSI/ASQC Z1.4-1993,normal level 2 and based on:
Major defect: AQL 0.65
Minor defect: AQL 1.5

10.2 Inspection condition
Viewing distance for cosmetic inspection is about 30cm with bare eyes, and under an environment of 20~40W light intensity, all directions for inspecting the sample should be within 45°against perpendicular line. (Normal temperature 20~25°Cand normal humidity 60 ±15%RH)

10.3 Definition of Inspection Item.
A Definition of inspection zone in LCD.



Zone A: character/Digit area
Zone B: viewing area except Zone A (Zone A + Zone B=minimum Viewing area)
Zone C: Outside viewing area (invisible area after assembly in customer's product)
Fig.1 Inspection zones in an LCD
Note: As a general rule, visual defects in Zone C are permissible, when it is no trouble for quality and assembly of customer's product.
B Definition of some visual defect

Bright dot	Because of losing all or part function, bad pixel dots appear bright and the size is more than 50% of one dot in which LCD panel is displaying under black pattern.
Dark dot	Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture, or pure whiter picture.

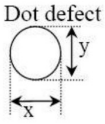
10.4 Major Defect

Item No.	Items to be inspected	Inspection standard	Classification of defects
1	Functional defects	1) No display 2) Display abnormally 3) Missing vertical, horizontal segment 4) Short circuit 5) Excess power consumption 6)Backlight no lighting, flickering and abnormal lighting	major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	

10.5 Minor Defect

Item No.	Items to be inspected	Inspection standard					Classification defects
			Acceptable Qty				
		Zone	A+B				
			3.5” 7”	7 10.1”	10.1”	C	
1	Bright dot /dark dot defect	Bright pixel dot	1	2	3		Minor
		Dark pixel dot	4	4	4		
		2bright dots adjacent	0	0	0	Acceptable	
		2dark dots adjacent	0	0	0		
		Total bright and dark dots	5	6	7		

Note: Minimum distance between defective dots is more than 5mm; Pixel dots’ function is normal, but bright dots caused by foreign material and other reasons are judged by the dot defect of 5.2.

			Acceptable Qty				
		Zone Size(mm)	A+B				
			3.5” 7”	7 10.1”	10.1”	C	
2		Φ≤0.2	Acceptable	Acceptable	Acceptable		Minor
	Φ=(x+y) /2	0.2 Φ≤0.5	4	5	6	Acceptable	
		Φ 0.5	0	0	0		

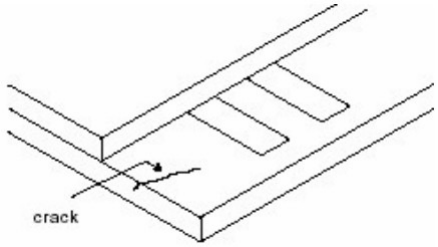
Note:
1. Minimum distance between defective dots is more than 5 mm;
2. The quantity of defect is zero in operating condition.

				Acceptable Qty				
		Zone Size (mm)		A+B				
							C	
		Length	Width	3.5” 7”	7 10.1”	10.1”		
3	Linear defect	Ignore	W≤0.05	Acceptable	Acceptable	Acceptable		Minor
		L≤5.0	0.05 W≤0.1	4	5	6	Acceptable	
		L 5.0	W 0.1	0	0	0		

5.4.1 Polarizer Position
(i) Shifting in position should not exceed the glass outline dimension.
(ii) Incomplete covering of the viewing area due to shifting is not allowed.
5.4.2 Dirt on polarizer
Dirt which can be wiped easily should be acceptable.
5.4.3 Polarizer Dent & Air bubble
5.4.4 Polarizer scratch
(i) If the polarizer scratch can be seen after cover assembling or in the operating condition, judge by the linear defect of 5.3. (ii)If the polarizer scratch can be seen only in non-operating condition or some special angle, judge by the following:

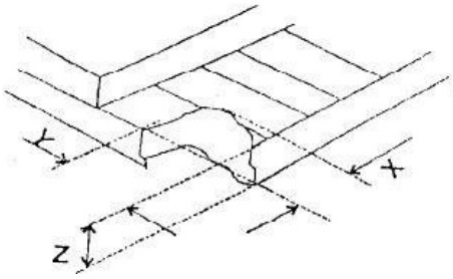
				Acceptable Qty			
		Zone Size (mm)					
				A+B			
4	Polarizer defect						Minor
		Length	Width	3.5” 7”	7 10.1”	10.1”	C
		Ignore	W≤0.05	Acceptable	Acceptable	Acceptable	
		1.0 L ≤5.0	0.05 W≤0.20	4	5	6	Acceptable
		L 5.0	W 0.2	0	0	0	
	MURA	Using 3% ND filter, it’s NG if it can be seen in R,G,B picture.					
5							Minor
	White/Black dot MURA	Visible under ND3% D≦0.15mm, Acceptable 0.15mm<D≦0.5mm, N≦4 D>0.5mm, Not allowable.					

(i) Crack Cracks are not allowed.



Minor

(ii) TFT chips on corner



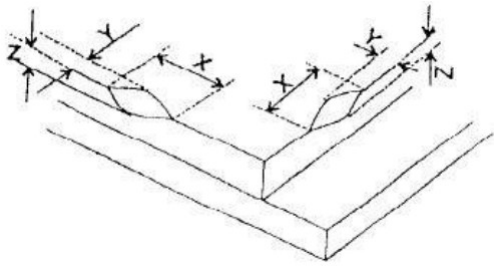
Minor

6 Glass defect

X	Y	Z	Acceptable
≤3.0	≤3.0	Not more than the thickness of glass	N≤3

Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal.

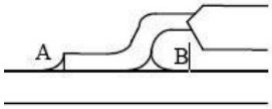
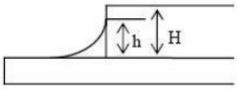
(iii) Usual surface crack



Minor

X	Y	Z	Acceptable
≤1.5	≤1.5	Not more than the thickness of glass	N≤4

It is only applicable to the upper glass of LCD.

Item No.	Items to be inspected	Inspection Standard	Classification of defects
1	Difference in Spec.	Not allowable	Major
2	Pattern peeling	No substrate pattern peeling and floating	Major
		No soldering missing	Major
3	Soldering defects	No soldering bridge	Major
		No cold soldering	Minor
4	Resist flaw on PCB	Visible copper foil (Φ0.5 mm or more) on substrate pattern is not allowed	Minor
5	FPC gold finger	No dirt, breaking, oxidation lead to black	Major
6	Backlight plastic frame	No deformation, crack, breaking, backlight positioning column breaking, obvious nick.	Minor
7	Marking printing effect	No dark marking, incomplete, deformation lead to unable to judge	Minor
8	Accretion of metallic Foreign matter	No accretion of metallic foreign matter (Not exceed Φ0.2mm)	Minor
9	Stain	No stain to spoil cosmetic badly	Minor
10	Plate discoloring	No plate fading, rusting and discoloring	Minor
	1. Lead parts	a. Soldering side of PCB Solder to form a 'Filet' all around the lead. Solder should not hide the lead form perfectly.	Minor
		b. Components side(In case of 'Through Hole PCB') Solder to reach the Components side of PCB.	Minor
	2. Flat packages	Either 'Toe'(A) or 'Seal'(B)of the lead to be covered by "Filet". Lead form to be assume over Solder. 	Minor
11			
	3. Chips	(3/2) H ≥h ≥(1/2) H 	Minor
	4. Solder ball/Solder splash	a. The spacing between solder ball and the conductor or solder pad h ≥0.13 mm. The diameter of solder ball d≤0.15 mm.	Minor
		b. The quantity of solder balls or solder splashes isn't beyond 5 in 600 mm2.	Minor
		c. Solder balls/Solder splashes do not violate minimum electrical clearance.	Major

Business Card

http://www.surenoo.com;EMAIL: info@surenoo.com

WhatsAPP

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카카오톡

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Shenzhen Sorento Technology Co.,Ltd.
www.surenoo.com
Skype: Surenoo365
Reference Controller Datasheet
MCU Interface LCD Module Selection Guide
LT7381

Documents / Resources

Surenoo SMC0430B-800480 Series MCU Interface IPS LCD Module [pdf] User Manual
SMC0430BA3-800480, SMC0430B-800480 Series, SMC0430B-800480 Series MCU Interface IPS LCD Module, MCU Interface IPS LCD Module, Interface IPS LCD Module, IPS LCD Module, LCD Module, Module

References

- Surenoo Tech: Professional LCD Module Supplier Since 2005