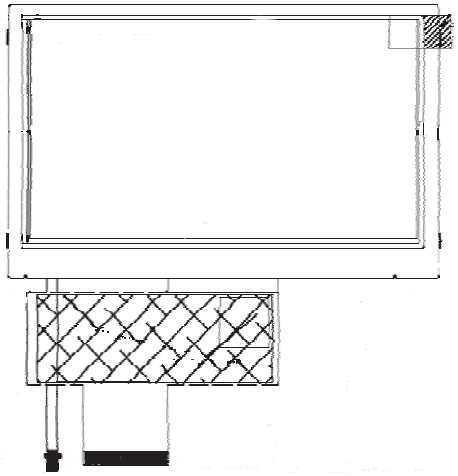
HANTRONIX

PRODUCT SPECIFICATION

HDA430-3SH-1

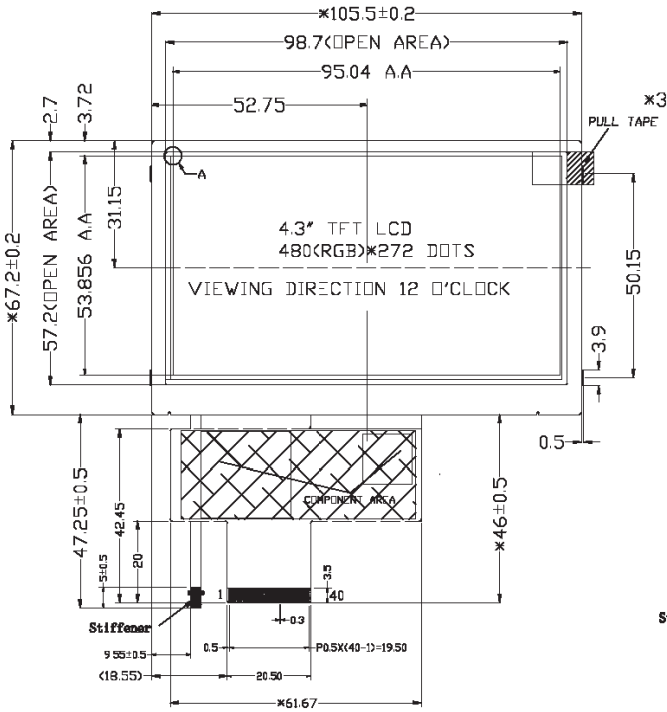
4.3', 480x272 TFT COLOR GRAPHICS LCD DISPLAY MODULE

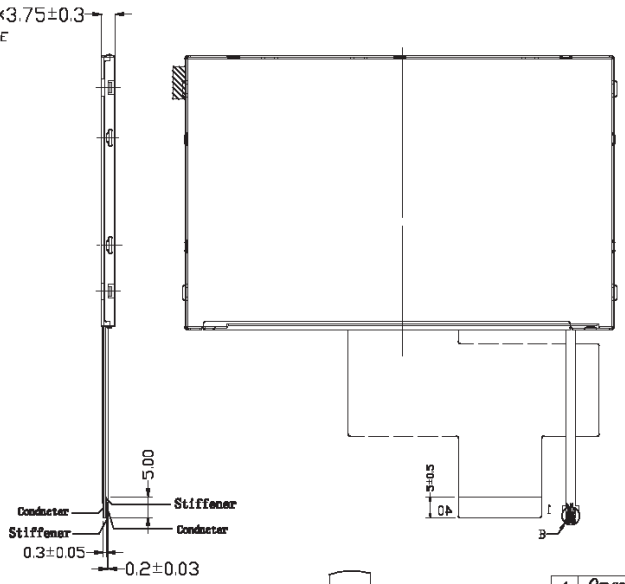


HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA430-3SH-1	SHEET 1 OF 17 DATE: 8/8/16

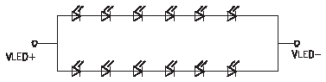
1. General Specifications

No	Item	Contents	Unit
1	Size	4.3	inch
2	Resolution	480RGB*272	
3	Interface	24-bits RGB	
4	Color Depth	16M	
5	Technology Type	a-Si TFT	
6	Pixel Pitch	0.066*0.198	mm
7	Display Mode	Transmissive	
8	Viewing Direction	12:00	o'clock
9	LCM (W x H x D)	105.5*67.2*3.75	mm
10	Active Area (W x H)	95.04*53.859	mm
11	With/Without TSP	Without TSP	
12	LED Numbers	12	

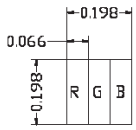




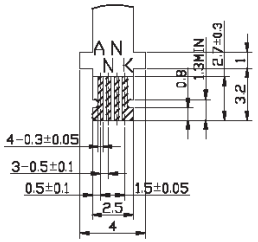
PIN	SYMBOL	PIN	SYMBOL
1	GND	21	B0
2	GND	22	B1
3	VCC	23	B2
4	VCC	24	B3
5	R0	25	B4
6	R1	26	B5
7	R2	27	B6
8	R3	28	B7
9	R4	29	GND
10	R5	30	DOTCLK
11	R6	31	DISPLAY
12	R7	32	HSYNC
13	G0	33	VSYNC
14	G1	34	ENABLE
15	G2	35	NC(XR)
16	G3	36	NC(YD)
17	G4	37	NC(XL)
18	G5	38	NC(YU)
19	G6	39	NC(K)
20	G7	40	NC(A)



LED circuit diagram



Detail A



Detail B Scale 5:1

1	Operating Voltage:	Vcc=3.3V typ.
2	Resolution:	480RGB*272
3	Color:	16M
4	Interface:	24-bits RGB
5	Display type:	Transmissive
6	Viewing Direction:	12:00
7	Operating Temp:	-20°C~70°C
8	Storage Temp:	-30°C~80°C
9	Driver IC:	HX8257
10	Backlight:	high brightness
11	LCD surface brightness	1000cd/m2(TYP.)
12	Unspecified tolerance:	±0.2

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DATE: 8/8/16

HDA430-3SH-1

REV.: 1.0

Q.A.: Z.W.

HANTRONIX, INC.
10080 BUBB RD.
CUPERTINO, CA 95014

3. PIN Assignment

Pin No	Symbol	I/O	Function	Remark
1	GND	P	Ground	
2	GND	P	Ground	
3	VCC	P	Logic power supply	
4	VCC	P	Logic power supply	
5-12	R0-R7	I	Data bit	
13-20	G0-G7	I	Data bit	
21-28	B0-B7	I	Data bit	
29	GND	P	Ground	
30	DOTCLK	I	Clock signal for data latching and internal counter	
31	DISPLAY	I	Display on/off mode control.	
32	HSYNC	I	Horizontal sync input with negative polarity.	
33	VSYNC	I	Vertical sync input with negative polarity.	
34	ENABLE	I	Input data enable control.	
35	NC(XR)	-	No connection	
36	NC(YD)	-	No connection	
37	NC(XL)	-	No connection	
38	NC(YU)	-	No connection	
39	NC(K)	-	No connection	
40	NC(A)	-	No connection	

4. Absolute Maximum Rating

AGND = GND = 0V , Ta = 25° C

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	VCC	-0.3	4.0	V	
Backlight Forward Current	I_{LED}		30	mA	For each LED
Operating Temperature	T_{OPR}	-20	70	° C	
Storage Temperature	T_{STG}	-30	80	° C	

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

5. Electrical Characteristics

5.1. Recommended Operating Condition

AGND = GND = 0V , Ta = 25° C

Item	Symbol	Min	Typ.	Max	Unit	Remark
Power Voltage	VCC	1.8	3.3	3.6	V	
Input logic high voltage	V_{IH}	0.7 VCC	-	VCC	V	
Input logic low voltage	V_{IL}	0	-	0.3 VCC	V	

5. 2.Rcommended Driving Condition for Backlight

Ta = 25° C

Item	Symbol	Min	Typ.	Max	Unit	Remark
Forward Voltage	Vf	-	19.8	21.0	V	
Forward Current	If		40		mA	
Operating Life Time	-	20000			Hours	

Note 1:The LED supply voltage is defined by the number of LED at Ta=25℃ and If =40mA.

Note 2:The "Operating Life Time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and If=40 mA. The LED lifetime could be decreased if operating If is lager than 40 mA.

6. Timing Characteristics

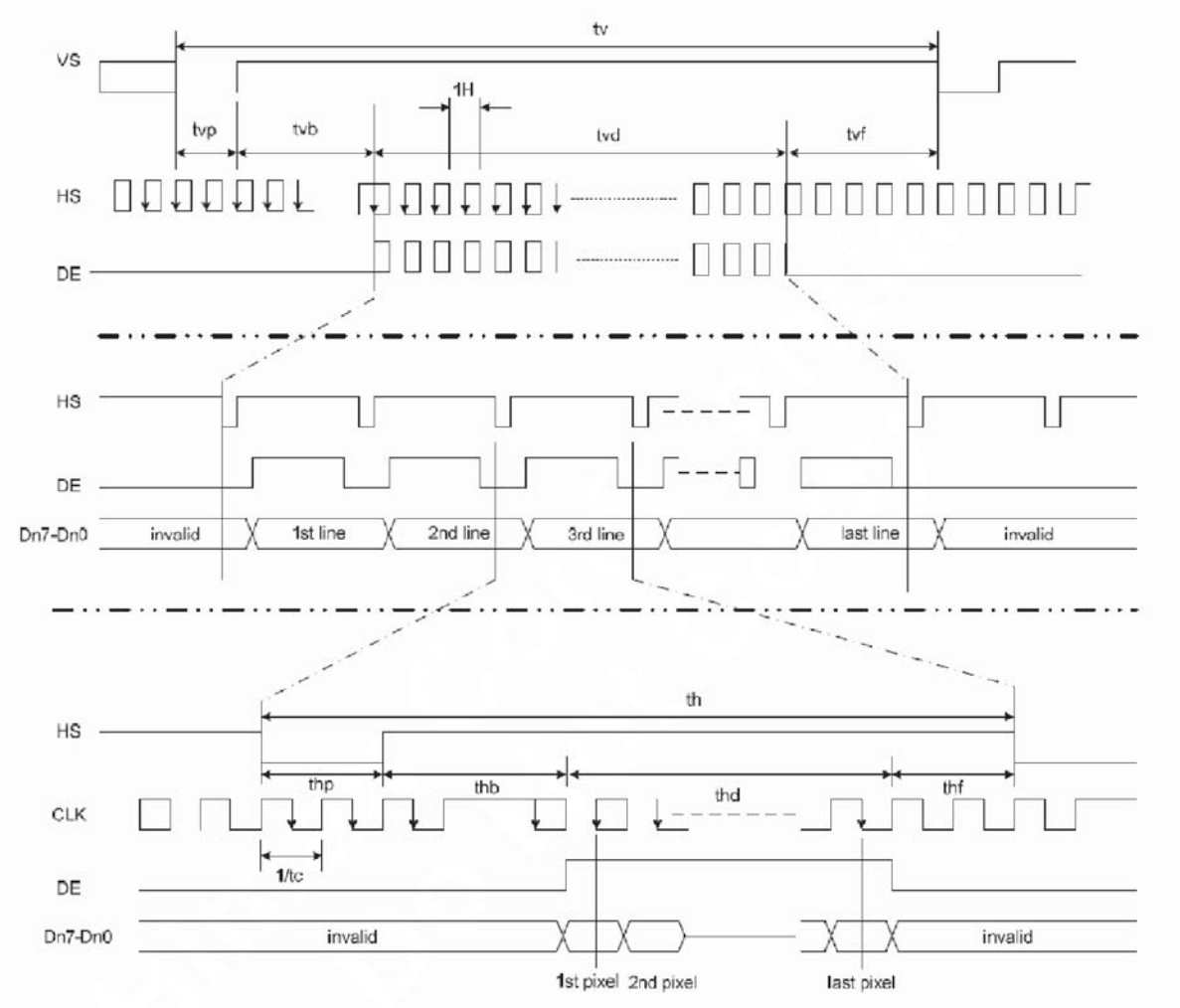
6.1. AC Electrical Characteristics

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Clock cycle	f_{CLK} (1)	-	9	15	MHz
Hsync cycle	1/th	-	17.14	-	KHz
Vsync cycle	1/tv	-	59.94	-	Hz
Horizontal Signal					
Horizontal cycle	th	525	525	605	CLK
Horizontal display period	thd	480	480	480	CLK
Horizontal front porch	thf	2	2	82	CLK
Horizontal pulse width	thp (2)	2	41	41	CLK
Horizontal back porch	thb (2)	2	2	41	CLK
Vertical Signal					
Vertical cycle	tv	285	286	399	H (1)
Vertical display period	tvd	272	272	272	H (1)
Vertical front porch	tvf	1	2	227	H (1)
Vertical pulse width	tvp (2)	1	10	11	H (1)
Vertical back porch	tvb (2)	1	2	11	H (1)

6. 2.DC Electrical Characteristics

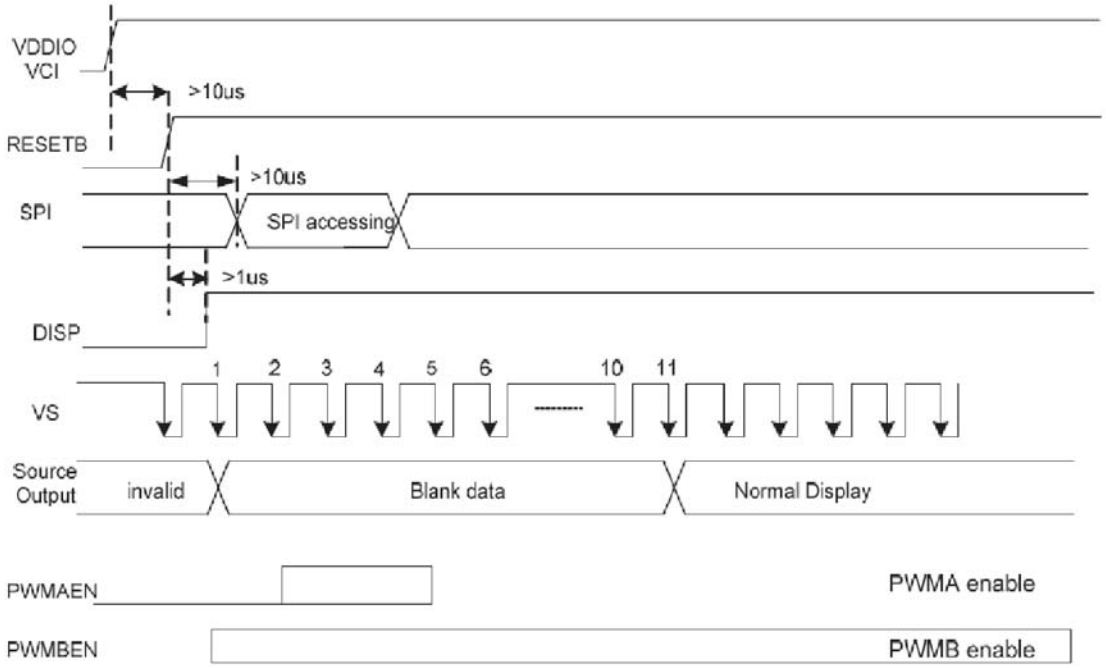
Symbol	Parameter	Test condition	Spec.			Unit
			Min.	Typ.	Max.	
VDDIO	Power supply pin of IO pins	Recommend Operating Voltage Possible Operating Voltage	1.8	-	3.6	V
VCI	Booster Reference Supply Voltage Range	Recommend Operating Voltage Possible Operating Voltage	≧VDDIO & ≧3	-	3.6	V
I_{sleep}	Sleep mode current	-	-	50		μA
I_{VCI}	VCI Operating mode current	VCI=3.3V、VDDIO=3.3V at Black Pattern with 4.3" Panel	-	13	16	mA
VCL	Negative V_{CI} Output Voltage	No panel loading	- VCI	-	- VCI+0.7	V
VCIX2	VCIX2 primary booster efficiency(3)	No panel loading, ITO for VCIX2,VCI and VCHS = 10 Ohm	5.2	5.4	5.6	V
VDC	VDC Output Voltage	VDC[3:0]=1011	4.9	5	5.1	V
VGH	Gate driver High Output Voltage Booster efficiency(1)	No panel loading; 3x booster	84	89.5	-	%
		No panel loading; 4x booster	80	88.5	-	%
VGL	Gate driver Low Output Voltage	VGL= -2 x VDC VDC[3:0]=1011	-10	-10	-9	V
COMH	VCOM High Output Voltage(2)	-	-3%	COMC+COMPP	3%	V
COML	VCOM Low Output Voltage(2)	-	-3%	COMC-COMPP	3%	V
VLCD	VLCD Output Voltage	VRH[5:0]=110011	5.0	5.1	5.2	V
V_{OH1}	Logic High Output Voltage	I out = -100μA	0.9*VDDIO	-	VDDIO	V
V_{VD}	Source Output Voltage Deviation	-	-	±20	±30	mV
V_{OS}	Source Output Voltage Offset	-	-	-	±30	mV
V_{OL1}	Logic Low Output Voltage	I out = 100μA	0	-	0.1*VDDIO	V
V_{IH1}	Logic High Input voltage	2.5V < VDDIO < 3.6V 1.8V < VDDIO ≦ 2.5V	0.7*VDDIO 0.8*VDDIO	-	VDDIO	V
V_{IL1}	Logic Low Input voltage	2.5V < VDDIO < 3.6V 1.8V < VDDIO ≦ 2.5V	0	-	0.3*VDDIO 0.2*VDDIO	V
I_{OH}	Logic High Output Current Source	V out = VDD – 0.4V	50	-	-	μA
I_{OL}	Logic Low Output Current Drain	V out = 0.4V	-	-	-50	μA
I_{OZ}	Logic Output Tri-state Current Drain Source	-	-1	-	1	μA
$I_{IL/IIH}$	Logic Input Current	-	-1	-	1	μA

6.3.Timing

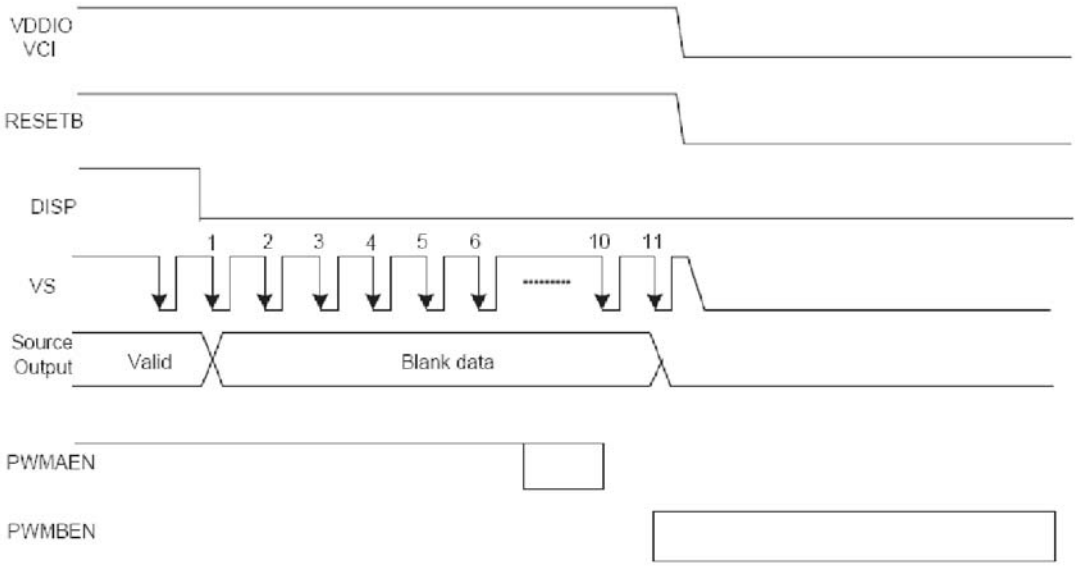

tv
VS
1H
tvp
tvb
tvd
tvf
HS
DE
HS
DE
Dn7-Dn0
invalid
1st line
2nd line
3rd line
last line
invalid
th
HS
thp
thb
thd
thf
CLK
1/tc
DE
Dn7-Dn0
invalid
invalid
1st pixel
2nd pixel
last pixel

6. 4.Power ON/OFF Sequence

Power On Sequence



Power Off Sequence



7. Optical Characteristics

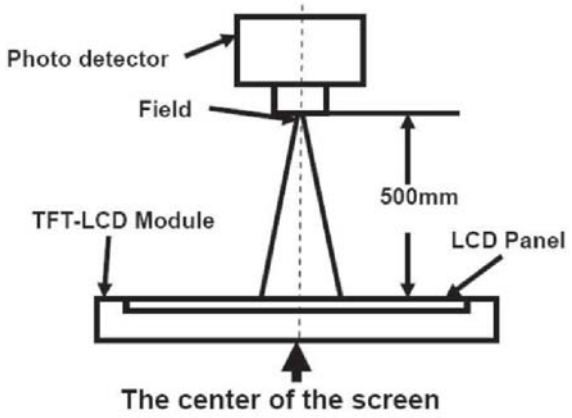
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θ T	CR≥10	-	50		Degree	Note 2
		θ B		-	60			
		θ L		-	65			
		θ R		-	65			
Contrast Ratio		CR	θ = 0°	-	250	-		Note 1 Note 3
Response Time		T_{ON}	25° C	-	5		ms	Note 1 Note 4
		T_{OFF}		-	15			
Chromaticity	W_x	x		0.281	0.311	0.341		Note 1 Note 5
	W_y	y		0.319	0.349	0.379		
Uniformity		U		75	-		%	Note 5
Luminance		L		900	1000		cd/m^2	Note 1 Note 5

Test Conditions:

1. If=40 mA(Backlight current), VCC =3.3 V,the ambient temperature is 25° C.
2. The test systems refer to Note 2.

Note 1: Definition of optical measurement system.

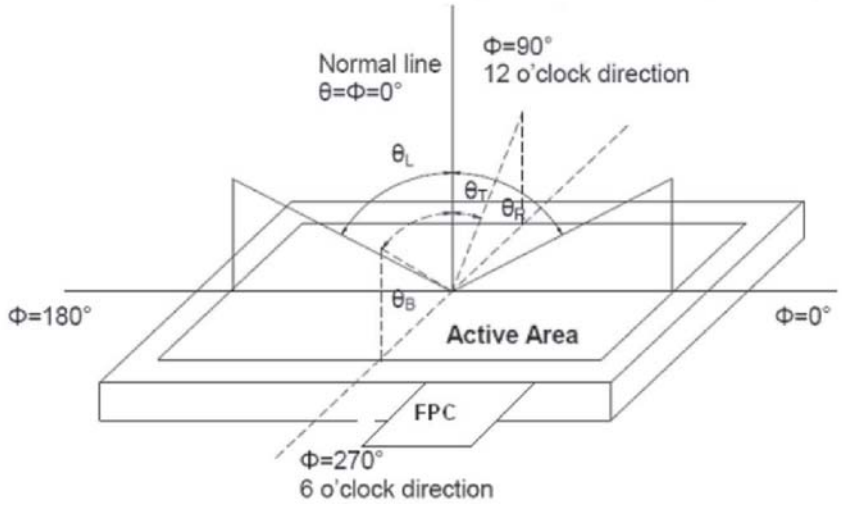
The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	BM-5A	1°
Luminance		
Lum Uniformity		
Chromaticity	SR-3A	
Response Time	TRD100	-

Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80)。



Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

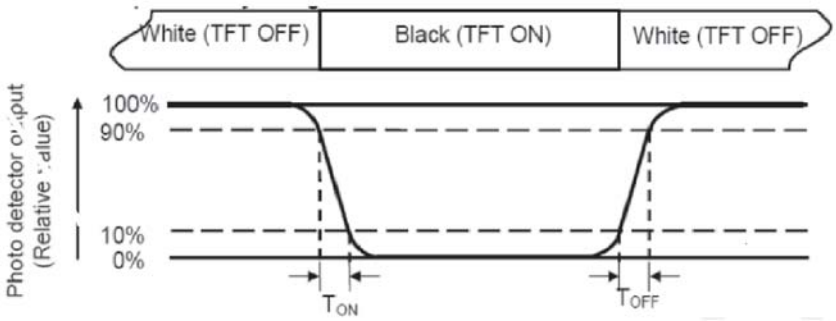
"White state ": The state is that the LCD should drive by Vwhite.

"Black state": The state is that the LCD should drive by Vblack.

Vwhite: To be determined Vblack: To be determined.

Note 4: Definition of Response time

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



Note 5: Definition of color chromaticity (CIE1931)

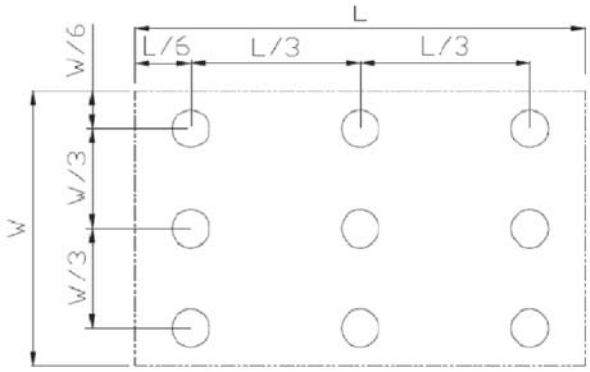
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Lmin/ Lmax

L-------Active area length W----- Active area width



Lmax: The measured Maximum luminance of all measurement position.

Lmin: The measured Minimum luminance of all measurement position.

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

8. Environmental/Reliability Test

No.	Test Item	Test Condition	Inspection after test
1	High Temperature Storage	80±2℃/240 hours	Inspection after 2~4hours storage at room temperature,the sample shall be free from defects: 1.Air bubble in the LCD; 2.Sealleak; 3.Non-display; 4.missing segments; 5.Glass crack; 6.Current Idd is twice higher than initial value.
2	Low Temperature Storage	-30±2℃/240 hours	
3	High Temperature Operating	70±2℃/240 hours	
4	Low Temperature Operating	-20±2℃/240 hours	
5	Temperature Cycle	-30℃~ 25℃~ 80℃ × 10cycles (30min.) (5min.) (30min.)	
6	Damp Proof Test	60℃±5℃×90%RH/240 hours	
7	Vibration Test	Frequency：10Hz~55Hz~10Hz Amplitude：1.5mm, X，Y，Z direction for total 3hours (Packing condition)	
8	Dropping test	Drop to the ground from 1m height, one time, every side of carton. (Packing condition)	

Remark:
1.The test samples should be applied to only one test item.
2.Sample size 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 excepted 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.
7.Please use automatic switch menu(or roll menu) testing mode when test operating mode.

10. Standard Specifications For Product Quality

10.1. Manner of test:

10.1.1 The test must be under 40W fluorescent light, and the distance of view must be at 30±10cm.

10.1.2 Room temperature 25±5℃ Humidity: (60±10)%RH.

10.2. Quality specification

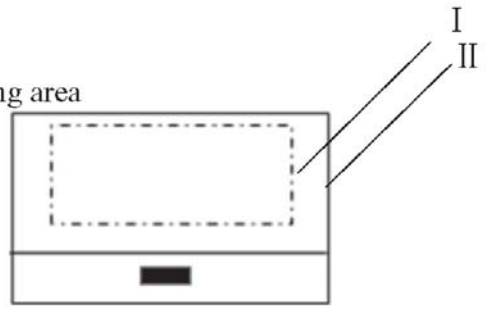
It shall be based on GB2828-87, inspection level II .

	IETM	CHECK LEVEL	AQL
MAJOR (MA)	1.Liquid crystal leakage 2.Wrong polarizer 3.Outside dimension 4. Bright dot、Dark dot 5. Display abnormal 6. Class crack	II	0.25
MINOR (MI)	1. Spot Defect (Including black spot、white spot、pinhole、foreign particle、bubbles、hurt) 2. fragment 3. Line Defect (Including black line、white line、cratch) 4. Incision defect 5. Newton's ring 6. Other visual defects	II	1.0

10.3. Definition of area:

10.3.1 Ⅰ area: viewing area

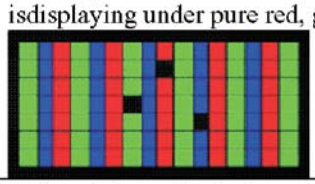
Ⅱ area: outside viewing area



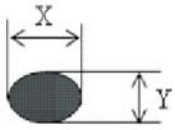
10.4.Standard of appearance test for Ⅰ area: (unit: mm)

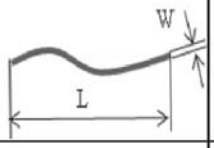
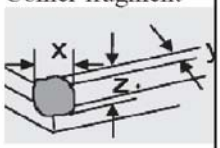
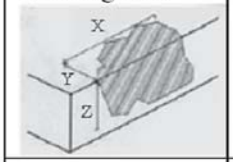
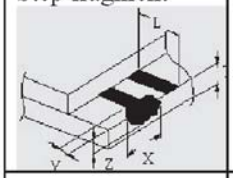
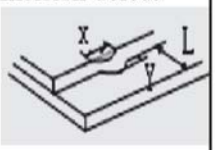
NOTE: Defect ignore for Ⅱ area .

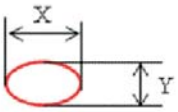
10.4.1 Bright/Dark Dots explain

Name	Explain	Definition
Bright dot	Dots appear bright and unchanged in size in which LCD panel isdisplaying under black pattern	The definition of dot: The size of a defective dot over 1/2 of single pixel dot is regarded as one defective dot . NOTE: One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)
Dark dot	Dots appear dark and unchanged in size in which LCD panel isdisplaying under pure red, green, blue pattern. 	
ADJACE NT DOT	Adjacent two sub-pixel are defect（define two dot defect）	

10.4.2 Inspection standard

№	Items	Criterion		Checking Manner	Defect Classes
1	Bright/dark dot	Under 6” (contain 6”)	Bright dot：2 Dark dot：N≤4 **Note:** be more than 5mm apart	Checking with eyes	MAJ
		6”-12”	Bright dot：N≤4 Dark dot：N≤5 Total Bright and Dark Dots：N≤8 **Note ：** 1.Two bright dot defects (red, green, blue, and white) should be larger than 15mm; 2.The distance between black dot defects or black and bright dot defects should be more than 5mm apart.		
2	Spot Defect (Including black spot.white spot. Pinhole.foreign particle.bubbles.hurt）  D=(X+Y)/2	Under 6” （contain 6”）	D≤0.1 Ignore 0.1＜D≤0.35 N≤3 0.35＜D N=0	Checking with eyes	MIN
		6”-12”	D≤0.3 Ignore 0.3＜D≤0.6 N≤4 0.6＜D N=0		

№	Items	Criterion		Checking manner	Defect classes
3	Line Defect (Including black Line.white line. scratch) 	Under 6" (contain 6")	W≤0.02 Ignore 0.02＜W≤0.04 L≤5 N≤2 0.04＜W≤0.06 L≤5 N≤1 W＞0.06 N=0	Checking with eyes	MIN
		6"-12"	W≤0.07 Ignore 0.07＜W≤0.1 L≤10 N≤4 W＞0.1 N=0		
4	Display abnormal	Not allowed		Checking with eyes	MAJ
5	Outside dimension	Accord with drawing		Callipers	MAJ
6	Class crack	Not allowed		Checking with eyes	MAJ
7	Leak	Not allowed		Checking with eyes	MAJ
8	Comer fragment 	X≤3 Y≤3 Z≤T Ignore Note ： 1.No hurt identifying .wire.seal 2.T：Glass thickness X: Length Y: Width Z: thickness		Checking with eyes	MIN
9	Side fragment 	Y≤1 Z≤T Ignore Note ： 1.No hurt identifying .wire.seal 2.T：Glass thickness X: Length Y: Width Z: thickness		Checking with eyes	MIN
	Step fragment 	Y≤1 and Y≤1/4 L		Checking with eyes	MIN
	Incision defect 	Y≤1 and accord with outside dimension		Checking with eyes	MIN

№	Items	Criterion		Checking manner	Defect classes
10	Newton's ring （CTP or Cover board）  D=(X+Y)/2	Under 6" (contain 6")	D≤25 N≤3 D＞25 N=0	Checking with eyes	MIN
		6"-12"	D≤70 N≤5 D＞70 N=0		