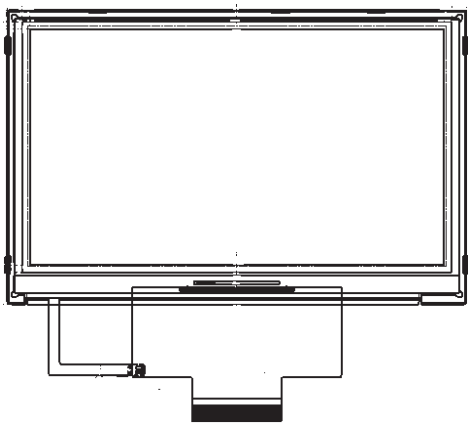
HANTRONIX

PRODUCT SPECIFICATION

HDA430M

4.3', 480x3x272 TFT MONOCHROME GRAPHICS LCD DISPLAY MODULE



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA430M	SHEET 1 OF 15 DATE: 5/12/11

1. GENERAL INFORMATION

Item	Contents	Unit
LCD Type	TFT TRANSMISSIVE	/
Viewing direction	12:00	O' Clock
Module Size (WX H)	105.5-67.2	mm^2
Active area (WXH)	95.04-53.86	mm^2
Number of Dots	480*3*272	/
Driver IC	ILI6480/NT39024	/
Colors	Monochrome	/
Backlight type	LED	/
Interface Type	24-bits RGB	/
Operating voltage	3.3	V
Surface luminance	450	cd/m^2

3.ABSOLUTE MAXIMUM RATINGS

Logic supply voltage, VDDIO	-0.5 to +5V
Analog supply voltage, AVDD	-0.3 to +7.0V
VGL	-16 to 0.3V
VGH~VGL	-0.3 to 35V

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied and exposed to absolute maximum rating conditions for extended periods may affect device reliability.

4.ELECTRICAL SPECIFICATION

Item	Input/Output	Symbol	MIN	TYP	MAX	Unit	Remarks
TFT gate on voltage	VGH	VGH	+10	-	+16	V	
TFT gate off voltage	VGL	VGL	-16	-	-9	V	
TFT common electrode voltage	VCOMH	VCOMH	+2.5	-	+5	V	
	VCOML	VCOML	-2.5	-	0	V	

Note: (1) Vcom must be adjusted to optimize display:cross_talk,contrast ratio and etc.
(2) VGH is TFT gate operating voltage.
(3) VGL is TFT gate operating voltage.
The storage capacitance structure of this product is Cs on common.
(4) Environmental condition:25±5℃.
(5) TFT frame frequency advise 60HZ.

5. BACKLIGHT CHARACTERISTICS

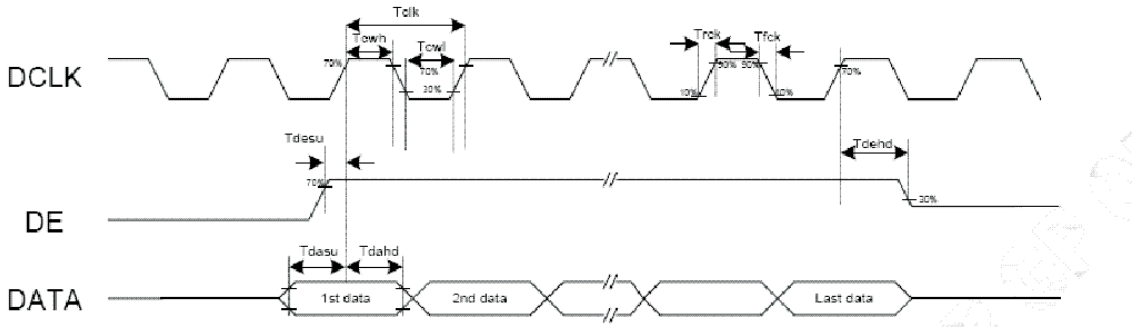
Item	Symbol	min.	typ.	max.	Unit	Condition
Forward Voltage	Vf	18.6	19.8	21.0	V	1. IF = 20 mA/LED
Reverse Current	Ir			15	μA	2.Aperture:1°,12 Point
Luminance	Lv	5200			cd/m^2	3.The Measurement instrument is:BM-7
Average		75			%	4.Average=min/max*100%
Colour Coordinate	X	0.245		0.295		
	Y	0.245		0.295		

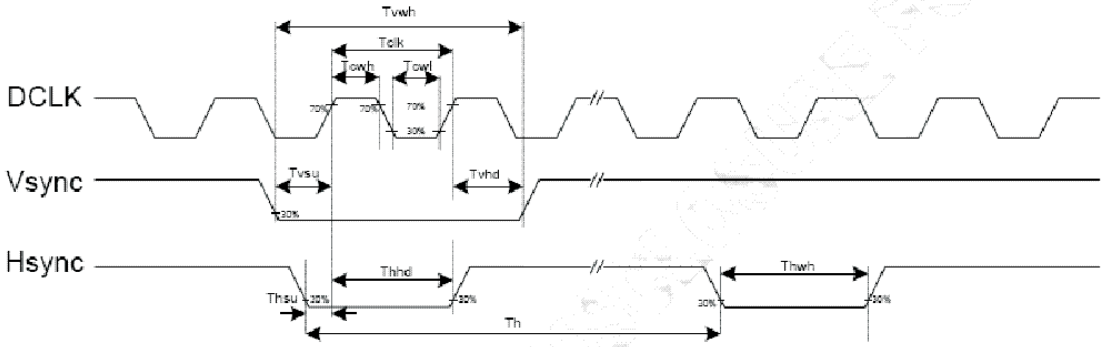
6.AC CHARACERISTICS

AC Electrical Characteristics (VDDIO=VDD=3.0 to 3.6v, GND=0V, TA=-20 to +85 ℃)

Parameters	Symbol	Min.	Typ.	Max.	Unit	Conditions
System operation timing						
VDD power source slew time	TPOR	-	-	20	ms	From 0V to 99% VDD
GRB pulse width	tRSTW	10	50	-	us	R=10Kohm, C=1uF
Input Output timing						
DCLK clock time	Tclk	33.3	-	-	ns	DCLK=30MHz
DCLK clock low period	Tcwl	40	-	60	%	
DCLK clock high period	Tcwh	40	-	60	%	
Clock rising time	Trck	9	-	-	ns	
Clock falling time	Tfck	9	-	-	ns	
HSD width	Thwh	1	-	-	DCLK	
HSD period time	Th	55	60	65	us	
HSD setup time	Thsu	12	-	-	ns	
HSD hold time	Thhd	12	-	-	ns	
VSD width	Tvwh	1	-	-	Th	
VSD setup time	Tvsu	12	-	-	ns	
VSD hold time	Tvhd	12	-	-	ns	
Data setup time	Tdasu	12	-	-	ns	
Data hold time	Tdahd	12	-	-	ns	
DE setup time	Tdesu	12	-	-	ns	
DE hold time	Tdehd	12	-	-	ns	
Source output setting time	Tsst	-	-	12	us	10% to 90% CL=60pF, RL=2Kohm
Gate output setting time	Tgst	-	-	1200	ns	10% to 90%, CL=60pF
VCOM output setting time	Tcst	-	-	12	us	10% to 90%, CL=40nF, RL=50ohm
Time from VSD to 1st line data input	Tvs	3	8	31	Th	HV mode By HDL[4:0] setting

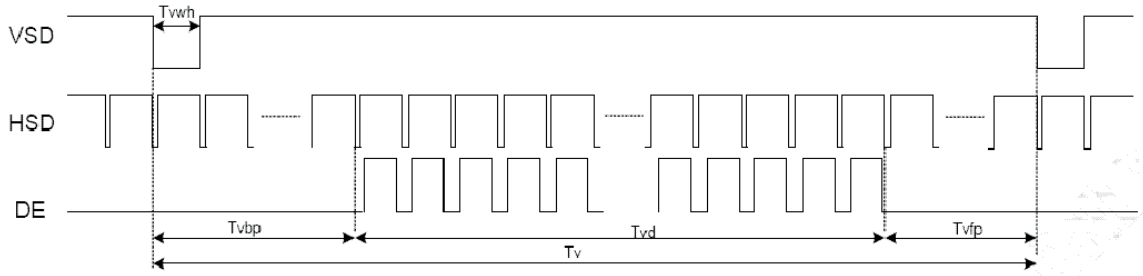
Clock and Data Input Waveforms





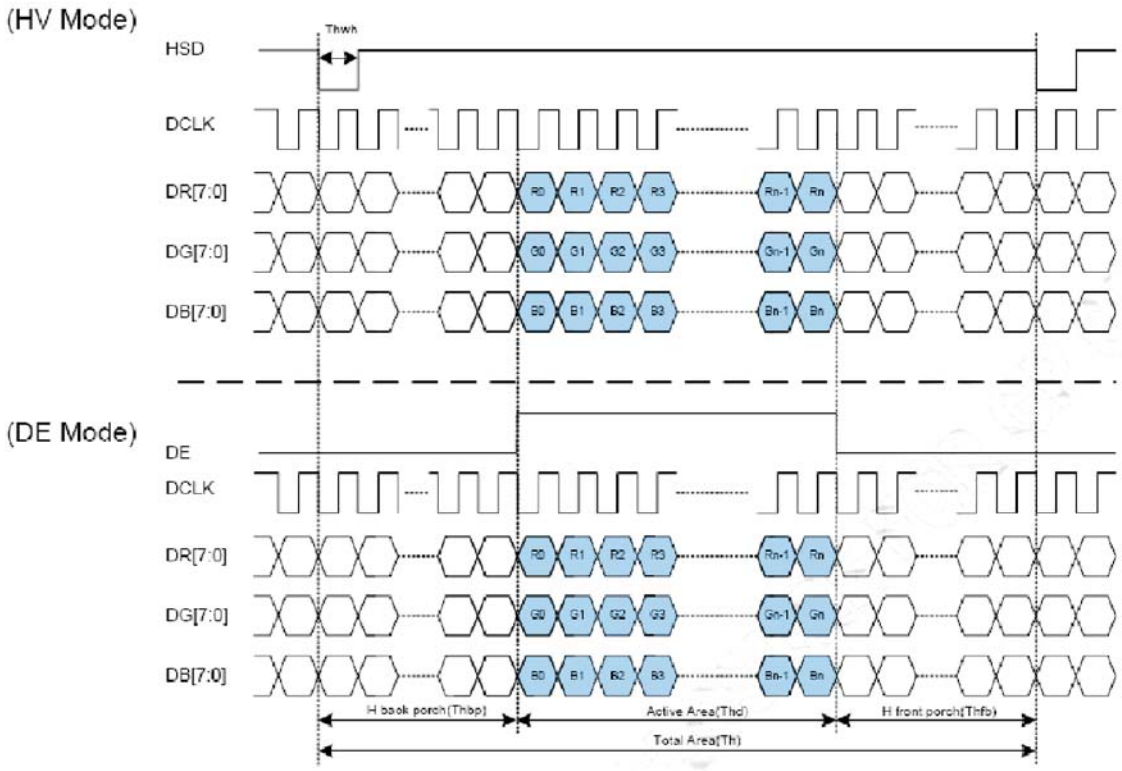
Data Input Format

Vertical input timing



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA430M	SHEET 5 OF 15 DATE: 5/12/11

Parallel RGB Mode Data format



Parallel RGB input timign table

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	5	9	12	MHz
VSD period time	Tv	277	288	400	H
VSD display area	Tvd		272		H
VSD back porch	Tvb	3	8	31	H
VSD front porch	Tvfp	2	8	97	H
HSD period time	Th	520	525	800	DCLK
HSD display area	Thd		480		DCLK
HSD back porch	Thbp	36	40	255	DCLK
HSD front porch	Thfp	4	5	65	DCLK

7. OPTICAL CHARACTERRISTICS

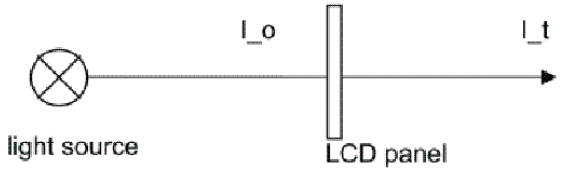
Parameters and specifications

Item	Symbol	Specifications			Unit	Note
		Min.	Typ.	Max.		
Transmittance (Without Polarizer)	T%	-	45	-	%	Here the transmittance and response time are design value. **Reference Only**
Contrast ratio	Cr (Θ=0°)	400	550	-		
Response time (25℃)	$T_r + T_f$	-	45	-	ms	
Viewing angle (Cr≥ 100)	Θ21	-	60	-	deg	
	Θ22	-	60	-		
	Θ12	-	60	-		
	Θ11	-	60	-		

Definitions and measuring methods

[1]Transmittance (T%)

The transmittance of the panel including polarizers is measured without electrical driving.



The Transmittance is defined as:

$$Tr = \frac{I\_t}{I\_o} \times 100\%$$

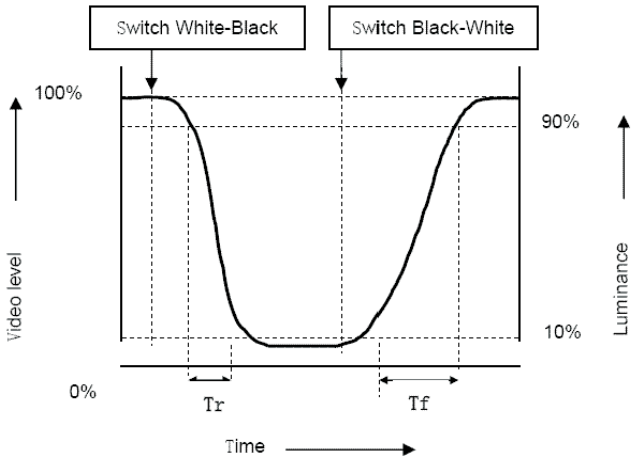
here,

I_o: the brightness of the light source.

I_t : the brightness after panel transmission.

[2] Response Time(Tr、Tf)

The rise time 'Tr' is defined as the time for luminance to change from 90% to 10% as a result of a change of the electrical condition. The fall time 'Tf' is defined as the time for luminance to change from 10% to 90% as a result of a change of the electrical condition.

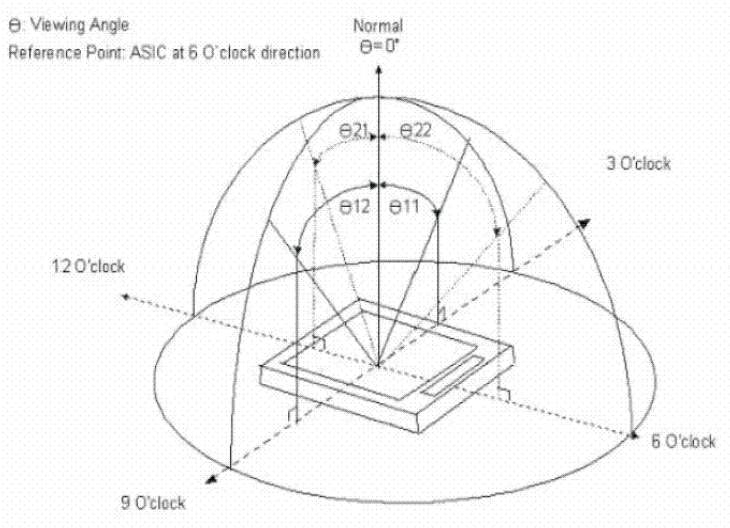


[3] Contrast ratio (Cr)

The contrast ratio (Cr), measured on a module, is the ratio between the luminance (L_w) in a full white area (R=G=B=1) and the luminance (L_d) in a dark area (R=G=B=0):

$$Cr = \frac{L\_w}{L\_d}$$

[4]Viewing angle diagram



8.INTERFACE DESCRIPTION

Pin No.	Symbol	Description
1-2	VSS	Ground
3-4	DVDD	Power supply
5-28	DB0-DB23	Data bus
29	VSS	Ground
30	PCLK	Clock signal for data
31	DEN	Input data enable control
32	HSYNC	Horizontal sync
33	VSYNC	Vertical sync
34-36	NC	No connection
37-38	A	LED power
39-40	K	LED power

9.APPLICATION CIRCUIT

Please consult our technical department for detail information.

10.INITIAL CODE

Please consult our technical department for detail information

11. RELIABILITY TEST

No.	Test Item	Test Condition	Inspection after test
1	High Temperature Storage	80±2℃/200 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℃/200 hours	
3	High Temperature Operating	70±2℃/120 hours	
4	Low Temperature Operating	-20±2℃/120 hours	
5	Temperature Cycle	-20 ℃ ~25~70 ℃ × 10cycles (30min.) (5min.) (30min.)	
6	Damp Proof Test	50℃±5℃×90%RH/120 hours	
7	Vibration Test	Frequency：10Hz~55Hz~10Hz Amplitude：1.5mm, X，Y，Z direction for total 3hours (Packing condition)	
8	Drooping test	Drop to the ground from 1m height, one time, every side of carton. (Packing condition)	
9	ESD test	Voltage:±8KV R: 330Ω C: 150pF Air discharge, 10time	

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.

This specification is made to be used as the standard acceptance/rejection criteria for Color mobile phone LCM.

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:

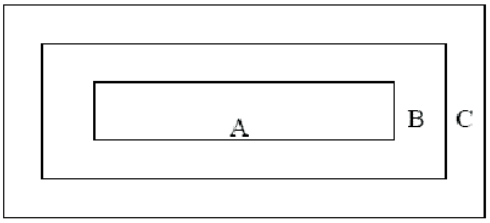
Major defect: AQL 0.65

Minor defect: AQL 1.5

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.

3. Definition of inspection zone in LCD.



Zone A: character/Digit area

Zone B: viewing area except Zone A (ZoneA+ZoneB=minimum Viewing area)

Zone C: Outside viewing area (invisible area after assembly in customer's product)

Fig.1 Inspection zones in an LCD.

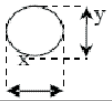
Note: As a general rule, visual defects in Zone C are permissible, when it is no trouble for quality and assembly of customer's product.

4. Inspection standards

4.1 Major Defect

Item No	Items to be inspected	Inspection Standard	Classification of defects
4.1.1	All functional defects	1) No display 2) Display abnormally 3) Missing vertical，horizontal segment 4) Short circuit 5) Back-light no lighting, flickering and abnormal lighting.	Major
4.1.2	Missing	Missing component	
4.1.3	Outline dimension	Overall outline dimension beyond the drawing is not allowed.	

4.2 Cosmetic Defect

Item No	Items to be inspected	Inspection Standard	Classification of defects
4.2.1	Clear Spots Black and white Spot defect Pinhole, Foreign Particle, Dirt under polarizer	For dark/white spot, size Φ is defined as Φ= $(x+y)/2$ 	Minor
		1.	

Size(mm) \ Zone	Acceptable Qty		
	A	B	C
Φ≤0.10	Ignore		Ignore
0.10<Φ≤0.15	2		
0.15<Φ≤0.20	1		
Φ>0.20	0		

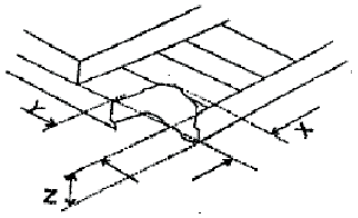
	Dim Spots Circle shaped and dim edged defects	2.	Minor

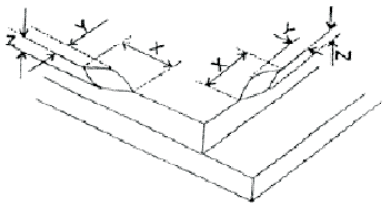
Size(mm) \ 2. Zone	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.20<Φ≤0.40	3		
0.40<Φ≤0.60	2		
0.60<Φ≤0.80	1		
0.80<Φ	0		

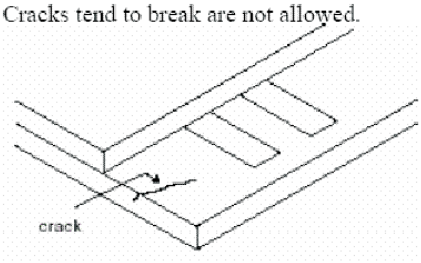
4.2. Cosmetic Defect

<table>
<tr><th>Item No</th><th>Items to be inspected</th><th>Inspection Standard</th><th>Classification of defects</th></tr>
<tr><td>4.2.2</td><td>Line defect
Black line,
White line,
Foreign material under polarizer,</td><td>
<table>
<tr><th colspan="2">Size(mm)</th><th colspan="4">Acceptable Qty</th></tr>
<tr><th rowspan="2">L(Length)</th><th rowspan="2">W(Width)</th><th colspan="3">Zone</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Ignore</td><td>W≤0.02</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>L≤3.0</td><td>0.02＜W≤0.03</td><td colspan="2">2</td></tr>
<tr><td>L≤2.0</td><td>0.03＜W≤0.05</td><td colspan="2">1</td></tr>
<tr><td></td><td>0.05＜W</td><td colspan="2">Define as spot defect</td></tr>
</table>
</td><td>Minor</td></tr>
<tr><td>4.2.3</td><td>Polarizer scratch</td><td>If the Polarizer scratch can be seen after mobile phone cover assembling or in the operating condition, judge by the line defect of 4.2.2.
If the Polarizer scratch can be seen only in non-operating condition or some special angle, judge by the following.
<table>
<tr><th colspan="2">Size(mm)</th><th colspan="4">Acceptable Qty</th></tr>
<tr><th rowspan="2">L(Length)</th><th rowspan="2">W(Width)</th><th colspan="3">Zone</th></tr>
<tr><th>A</th><th></th><th>B C</th></tr>
<tr><td>Ignore</td><td>W≤0.03</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>5.0＜L≤10.0</td><td>0.03＜W≤0.05</td><td colspan="2">2</td></tr>
<tr><td>L≤5.0</td><td>0.05＜W≤0.08</td><td colspan="2">1</td></tr>
<tr><td></td><td>0.08＜W</td><td colspan="2">0</td></tr>
</table>
</td><td>Minor</td></tr>
<tr><td>4.2.4</td><td>Polarize
Air bubble</td><td>Air bubbles between glass & polarizer
<table>
<tr><th>2. Zone
Size(mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.20＜Φ≤0.30</td><td colspan="2">2</td></tr>
<tr><td>0.30＜Φ≤0.50</td><td colspan="2">1</td></tr>
<tr><td>0.50＜Φ</td><td colspan="2">0</td></tr>
</table>
</td><td>Minor</td></tr>
</table>

4.3. Cosmetic Defect

<table>
<tr><th>Item No</th><th>Items to be inspected</th><th>Inspection Standard</th><th>Classification of defects</th></tr>
<tr><td rowspan="3">4.3.5</td><td rowspan="3">Glass defect</td><td>(i) Chips on corner
 

<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤2.0</td><td>≤S</td><td>Disregard</td></tr></table>Notes: S=contact pad length
Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal.</td><td>Minor</td></tr>
<tr><td>(ii)Usual surface cracks
 

<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0</td><td><Inner border line of the seal</td><td>Disregard</td></tr></table></td><td>Minor</td></tr>
<tr><td>(iii) Crack
Cracks tend to break are not allowed.
 
</td><td>Major</td></tr>
<tr><td>4.3.6</td><td>Parts alignment</td><td>1) Not allow IC and FPC/heat-seal lead width is more than 50% beyond lead pattern.
2) Not allow chip or solder component is off center more than 50% of the pad outline.</td><td>Minor</td></tr>
<tr><td>4.3.7</td><td>SMT</td><td>According to the <Acceptability of electronic assemblies> IPC-A-610C class 2 standard. Component missing or function defect are Major defect, the others are Minor defect.</td><td></td></tr>
</table>

PIN	SYMBOL
1	VSS
2	VSS
3	DVDD
4	DVDD
5	D30
6	D31
7	D32
8	D33
9	D34
10	D35
11	D36
12	D37
13	D38
14	D39
15	D310
16	D311
17	D312
18	D313
19	D314
20	D315

PIN	SYMBOL
21	DB16
22	DB17
23	DB18
24	DB19
25	DB20
26	DB21
27	DB22
28	DB23
29	VSS
30	PCLK
31	DEN
32	HSYNC
33	VSYNC
34	NC
35	NC
36	NC
37	A
38	A
39	K
40	K

1	*Operating Voltage:*	*Vcc=3.3V typ.*
2	*Resolution:*	*480*3*272*
3	*Color:*	*Monochrome*
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:*	*ILI6480C2/NT39024*
10	*Unspecified tolerance:*	*±0.2*

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA430M	SHEET 15 OF 15 DATE: 5/12/11