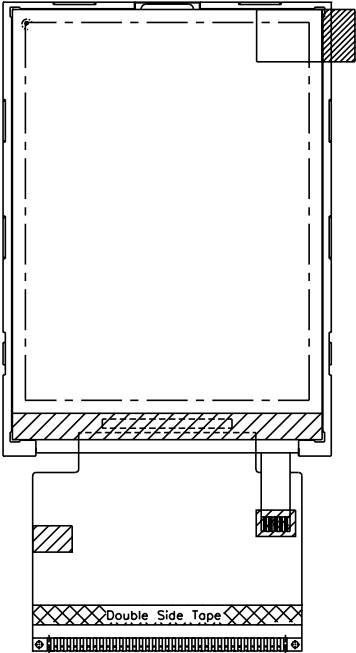




PRODUCT SPECIFICATION

HDA280-2

240X320 , TFT COLOR GRAPHICS
LCD DISPLAY MODULE



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA280-2	SHEET 1 OF 19 DATE: 9/13/11
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GENERAL SPECIFICATION

ITEM	CONTENTS
Module Size	50.0 (W)mm * 98.95 (H)mm *3.0(D) mm
Display Size	2.8 inch
Display Format	240(RGB)* 320 Pixels
Active Area	43.2 (W) * 57.6 (H) mm
Pixel Pitch	0.18 * 0.18 mm
LCD Type	TFT / Transmissive / Positive(Micro Reflective)
View Angle	12 O'clock (The Gray Inversion will appear at this direction)
Controller IC	HX8347A
Backlight Driver type	External Power
DC to DC circuit	Build-In
Approx. Weight	18g

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ABSOLUTE MAXIMUM RATING(Ta=25□ VSS=0V)

Item	Symbol	Min.	Type	Max.	Unit	Humidity
Supply Voltage for Logic	IOVCC-GND	-0.3	-	+4.6	Volt	-
Supply Voltage for Analog	VCI-GND	-0.3	-	+4.6	Volt	-
Operating Temperature	Top	-20	-	+70		Note1,2
Storage Temperature	Tst	-30	-	+80		Note1,3

Note1: Background color changes slightly depending on ambient temperature.
This phenomenon is reversible.

Note2: Ta≤70°C: 75%RH max.

Note3: Please refer to item of RELIABILITY.

ELECTRO-OPTICAL CHARACTERISTICS (Ta = 25□)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply for Analog	VCI-GND	-	-	2.8	-	Volt
Power Supply for interface	IOVCC-GND	-	-	2.8	-	Volt
Power Supply Current for LCM	IDD	VCI= IOVCC =2.8V	-	6	8.5	mA

OPTICAL CHARACTERISTICS

The optical characteristics should be measured in a dark environment (1 lux) or equivalent state with the methods shown in Note (4).

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$	-	300	-	-	(2)
Response Time		T_{R+T_F}	Viewing Normal Angle	-	25	-	ms	(3)
Viewing angle	Horizontal	θ_{x+}	CR \geq 10	-	60	-	Degree	(1),(4)
		θ_{x-}		-	60	-		
	Vertical	θ_{y+}		-	60	-		
		θ_{y-}		-	45	-		

Color of CIE coordinate:

Item		Symbol	Condition	Min.	Typ.	Max.
Chromaticity Coordinates (Transmissive)	Red	x	$\theta = \phi = 0^\circ$ LED Backlight Color Degree	0.63	0.68	0.73
		y		0.27	0.32	0.37
	Green	x		0.32	0.37	0.42
		y		0.55	0.60	0.65
	Blue	x		0.09	0.14	0.19
		y		0.07	0.12	0.17
	White	x		0.30	0.35	0.36
		y		0.31	0.36	0.41

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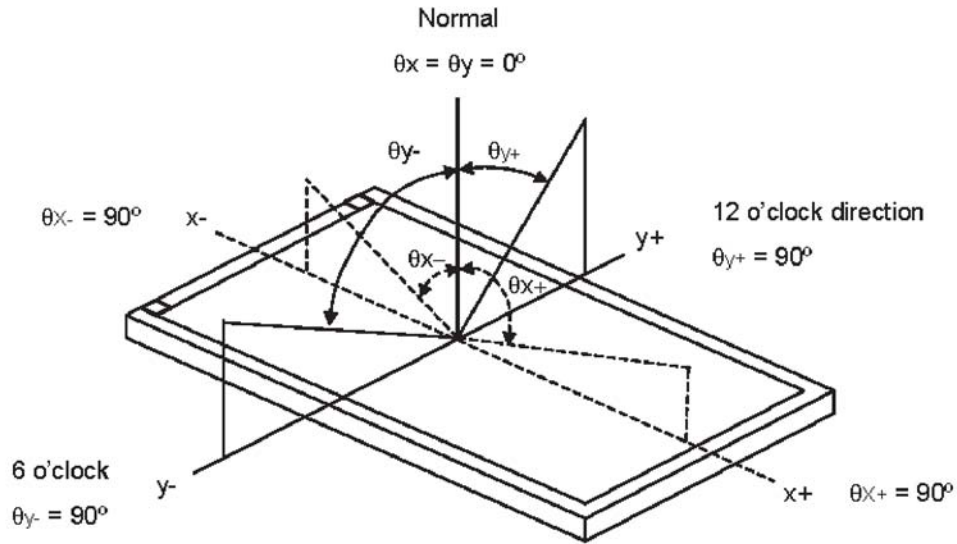
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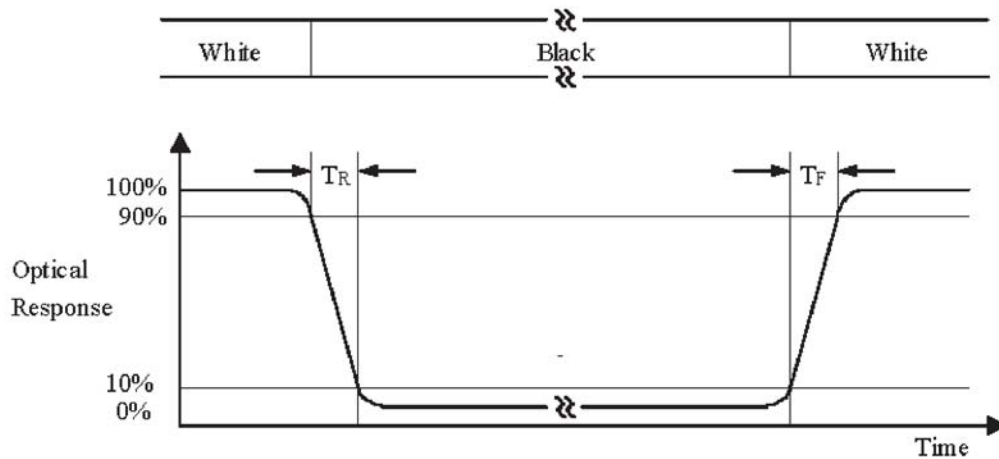
Note (1). Definition of Viewing Angle (θ_x , θ_y):



Note (2). Definition of Contrast Ratio (CR):

$$CR = \frac{\text{Luminance (brightness) all pixels "White"}}{\text{Luminance (brightness) all pixels "dark"}}$$

Note (3). Definition of Response Time (T_R , T_F):



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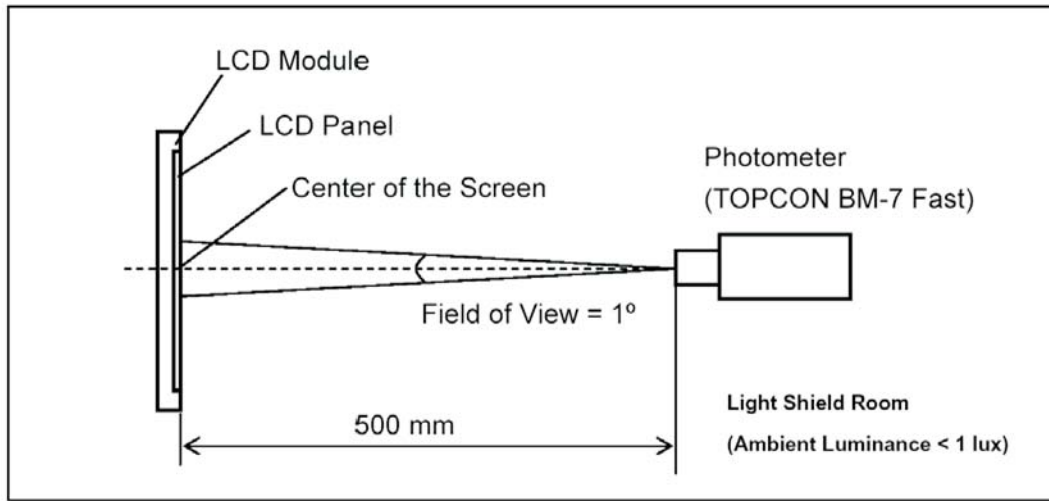
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Note (4). Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.



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INTERFACE PIN ASSIGNMENT

No.	Symbol	Function												
1	D0	A data bus pin.												
2	D1	A data bus pin.												
3	D2	A data bus pin.												
4	D3	A data bus pin.												
5	GND	Ground												
6	IOVCC	A voltage to the interface pins.												
7	nCS	Chip select signal. Low: chip can be accessed; High: chip cannot be accessed. Must be connected to GND if not in use.												
8	DNC	The signal for command OR parameter select under parallel mode. Low: command. High: parameter.												
9	nWR	I80 system: Serves as a write signal and writes data at the rising edge.												
10	nRD	I80 system: serves as a read signal and read at the low level.												
11	BS1	Select the MPU system interface mode.												
		<table border="1"> <thead> <tr> <th>BS2</th> <th>BS1</th> <th>Interface mode</th> <th>DB Pins</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>16-bit bus interface, 80-system, 65K color</td> <td>D15-D0 :data</td> </tr> <tr> <td>0</td> <td>1</td> <td>8-bit bus interface, 80-system, .262K color</td> <td>D7-D0: data</td> </tr> </tbody> </table>	BS2	BS1	Interface mode	DB Pins	0	0	16-bit bus interface, 80-system, 65K color	D15-D0 :data	0	1	8-bit bus interface, 80-system, .262K color	D7-D0: data
		BS2	BS1	Interface mode	DB Pins									
0	0	16-bit bus interface, 80-system, 65K color	D15-D0 :data											
0	1	8-bit bus interface, 80-system, .262K color	D7-D0: data											
12	NC	No connect.												
13	NC	No connect.												
14	NC	No connect.												
15	NC	No connect.												
16	LED_A	LED Anode												
17	LED_K1	LED Cathode												
18	LED_K2	LED Cathode												
19	LED_K3	LED Cathode												
20	LED_K4	LED Cathode												

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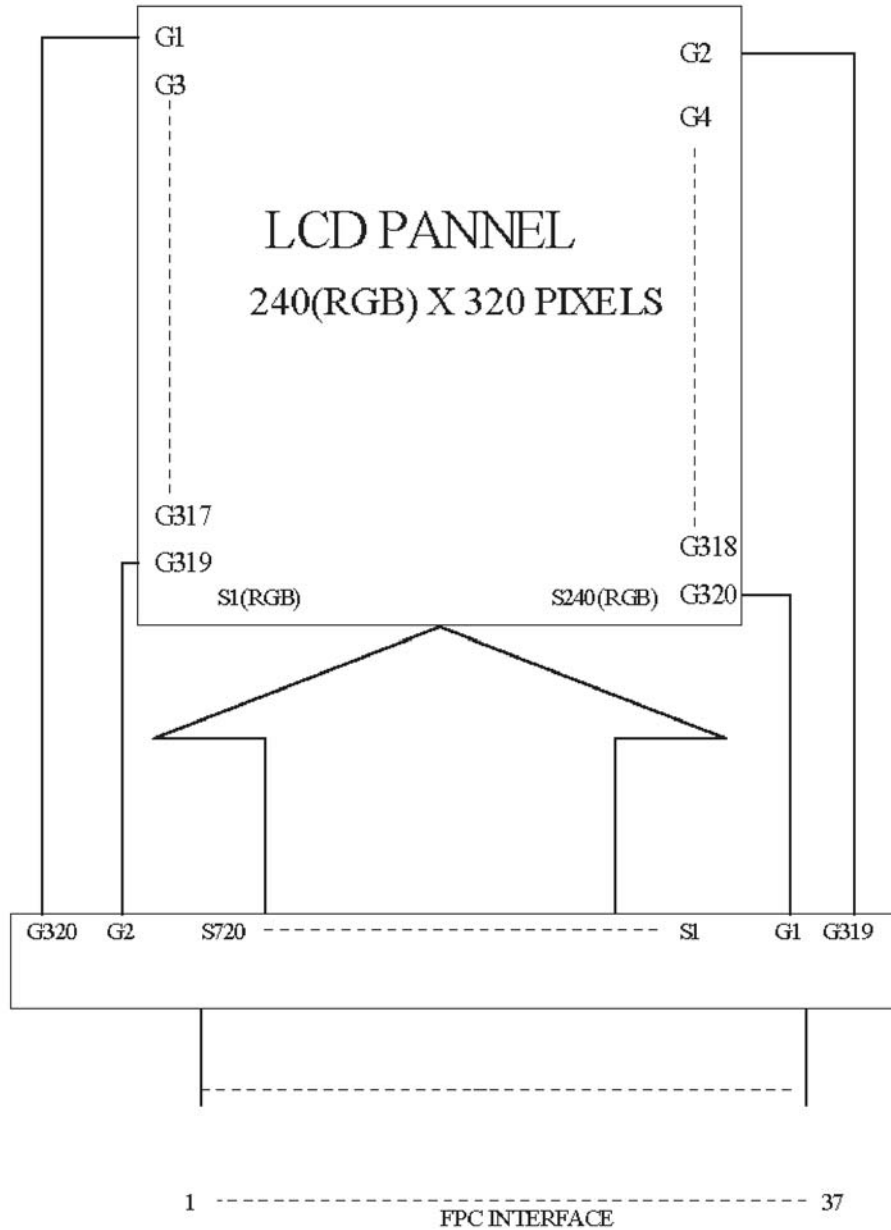
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No.	Symbol	Function			
21	BS2	Select the MPU system interface mode.			
		BS2	BS1	Interface mode	DB Pins
		0	0	16-bit bus interface,80-system,65K color	D15-D0 :data
		0	1	8-bit bus interface,80-system, ,262K color	D7-D0:data
22	D4	A data bus pin.			
23	D8	A data bus pin.			
24	D9	A data bus pin.			
25	D10	A data bus pin.			
26	D11	A data bus pin.			
27	D12	A data bus pin.			
28	D13	A data bus pin.			
29	D14	A data bus pin.			
30	D15	A data bus pin.			
31	nRESET	Reset pin. Setting either pin low initializes the LSI. Must be reset after power is supplied.			
32	VCI	A supply voltage to the analog circuit.			
33	IOVCC	A voltage to the interface pins.			
34	GND	Ground			
35	D5	A data bus pin.			
36	D6	A data bus pin.			
37	D7	A data bus pin.			

BLOCK DIAGRAM



P68	BS2	BS1	BS0	Interface mode	DB Pins
0	0	0	0	16-bit bus interface,80-system,65K color	D15-D0 :data
0	0	1	1	8-bit bus interface,80-system, ,262K color	D7-D0:data

BACKLIGHT

1. Standard Lamp Styles (Edge Lighting Type):

The LED chips are distributed over the edge light area of the illumination unit, which gives the less power consumption:

2. The Main Advantages of the LED Backlight are as Following:

- 2.1 The brightness of the backlight can simply be adjusted.
By a resistor or a potentiometer.

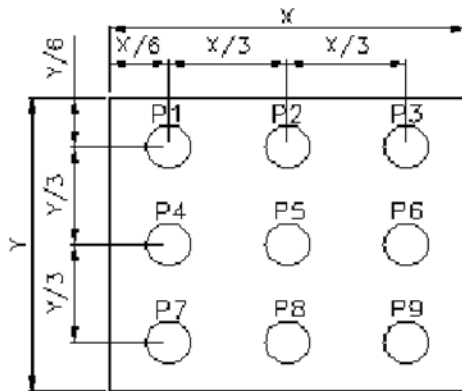
3. Data About LED Backlight:

PARAMETER	Sym.	Min.	Typ.	Max.	Unit	Test Condition	Note
Supply Current	I _f	-	80	-	mA	V=3.3V	-
Supply Voltage	V	-	(3.3)	-	V	I _f =80mA	-
Reverse Voltage	V _R	-	-	5	V	I _f =80mA	-
Luminous Intensity for LCM	I _v	280	350	-	Cd/m ²	I _f =80mA	1
Uniformity for LCM	-	80	-	-	%	I _f =80mA	2
Color	White						

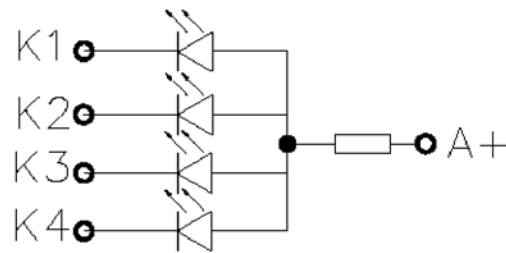
NOTE:

- Average Luminous Intensity of P1-P9
- Uniformity = Min/Max * 100%

Measured Method: (X*Y: Light Area)



Internal Circuit Diagram



(Effective spatial Distribution)

Hole Diameter ϕ 3mm ; 1 to 9 per Position Measured Luminous

RELIABILITY**Environmental Test**

NO.	Test Item	Test Condition	Test Time	Note
1	Low temperature storage	-30±2°C	240H	-
2	High temperature storage	80±2°C	240H	-
3	Low temperature operation	-20±2°C	240H	-
4	High temperature operation	70±2°C	240H	-
5	High temperature/ Humidity storage	60±2°C 90%±5%RH	240H	Without dewing
6	Thermal shock storage	-30°C(30min)→25°C(5min)→ +80°C(30min)	10 cycles	-

Mechanical Test

NO.	Test Item	Test Condition	Note
1	Vibration test	Sweep for 1 min at 10Hz , 55Hz , 10Hz , amplitude 1.5mm 15 minutes each in the X , Y and Z directions(Total 45 minutes)	Non operation state
2	Drop test	One angle, three edges and six sides. 75cm above the ground(no weight difference)	Non operation state

LIFE TIME

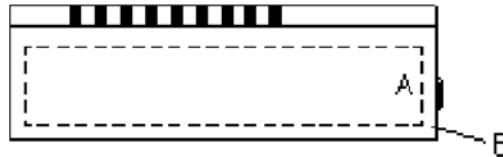
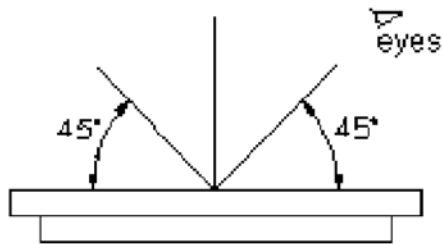
Item	Description
1.	Functions, Performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature (25±10°C) , normal humidity(45±20%RH),and in area not exposed to direct sun light. (Except backlight)

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1.5 Standard of the product appearance test

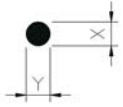
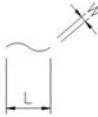
1.5.1 Manner of appearance test

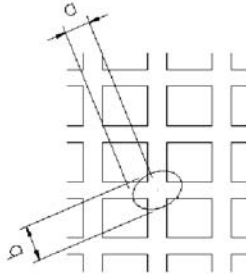
- The test must be under 20W×2 or 40W fluorescent light , and the distance of view must be at 30cm.
- When test the model of transmissive product must add the reflective plate.
- The test direction is base on about 45° of vertical line.

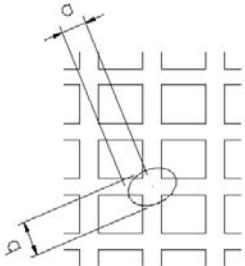


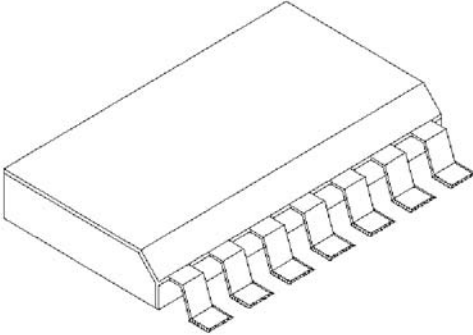
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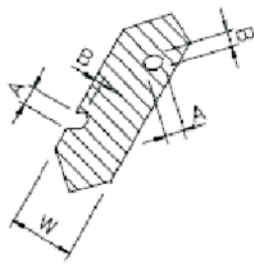
1.5.2 Standard of appearance inspection : Unit: mm

Name:LCM	Inspection Specification																																			
Scope	LCM																																			
Item	Criterion																																			
1.Electronic	(1)Display scanned must be complete. (2)Can not non-display (3)The consumer current can not over the specification (4)Test result as the following must be reject: 1.Display incomplete 2.Occur high current 3.Display defect																																			
2.Black spot , white spot , dust in LCD	<p>1)Round type : As following drawing $\Psi=(X+Y) / 2$</p>  <table border="1" data-bbox="662 747 1383 1062"> <thead> <tr> <th>Size</th> <th colspan="2">Acceptable Q'TY</th> </tr> <tr> <th>Area</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>$\Psi < 0.1$</td> <td>Accept no dense</td> <td rowspan="4">Accept No Dense</td> </tr> <tr> <td>$0.1 < \Psi < 0.2$</td> <td>2</td> </tr> <tr> <td>$0.2 < \Psi < 0.25$</td> <td>1</td> </tr> <tr> <td>$0.25 < \Psi$</td> <td>0</td> </tr> </tbody> </table> <p>(2)Line type : (As following drawing)</p>  <table border="1" data-bbox="646 1171 1390 1539"> <thead> <tr> <th>Length</th> <th>Width</th> <th colspan="2">Acceptable</th> </tr> <tr> <th colspan="2">Area</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>Accept</td> <td>0.02</td> <td>Accept no dense</td> <td rowspan="4">Accept No Dense</td> </tr> <tr> <td>3.0</td> <td>0.03</td> <td rowspan="2">2</td> </tr> <tr> <td>2.5</td> <td>0.05</td> </tr> <tr> <td>---</td> <td>0.05</td> <td>As round type</td> </tr> </tbody> </table> <p>Total acceptable Q'TY (1) + (2) <input type="checkbox"/></p>	Size	Acceptable Q'TY		Area	A	B	$\Psi < 0.1$	Accept no dense	Accept No Dense	$0.1 < \Psi < 0.2$	2	$0.2 < \Psi < 0.25$	1	$0.25 < \Psi$	0	Length	Width	Acceptable		Area		A	B	Accept	0.02	Accept no dense	Accept No Dense	3.0	0.03	2	2.5	0.05	---	0.05	As round type
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Name:LCM	Inspection Specification												
Scope	LCM												
Item	Criterion												
3.Segmenter transfigure(Digit, word , sign)	<p>c.Alignment layer defect :</p> $\Psi = (a+b) / 2$  <table border="1" data-bbox="609 787 1274 1081"> <thead> <tr> <th>Size Ψ</th> <th>Acceptable Q'TY</th> </tr> </thead> <tbody> <tr> <td>$\Psi \leq 0.4$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.4 < \Psi \leq 1.0$</td> <td>5</td> </tr> <tr> <td>$1.0 < \Psi \leq 1.5$</td> <td>3</td> </tr> <tr> <td>$1.5 < \Psi \leq 2.0$</td> <td>2</td> </tr> <tr> <td>Total acceptable Q'TY</td> <td>7</td> </tr> </tbody> </table>	Size Ψ	Acceptable Q'TY	$\Psi \leq 0.4$	Accept no dense	$0.4 < \Psi \leq 1.0$	5	$1.0 < \Psi \leq 1.5$	3	$1.5 < \Psi \leq 2.0$	2	Total acceptable Q'TY	7
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$1.0 < \Psi \leq 1.5$	3												
$1.5 < \Psi \leq 2.0$	2												
Total acceptable Q'TY	7												
4.Color	Sample of the lowest acceptable quality level.												
5.Back-light	<p>(1)The color of backlight should correspond its specification.</p> <p>(2)Not allow flash and unlighten on backlight.</p> <p>(3)Not allow larger than 0.25mm dust on backlight.</p>												
6.COB	<p>(1)Not allow the PAD of wire bond exposed.</p> <p>(2)Not allow the line type of wire bond on resin.</p> <p>(3)Not allow bubble and dust on resin.</p>												

Name:LCM	Inspection Specification												
Scope	LCM												
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Total acceptable Q'TY	7												
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5.Back-light	<p>(1)The color of backlight should correspond its specification. (2)Not allow flash and unlighten on backlight. (3)Not allow larger than 0.25mm dust on backlight.</p>												
6.COB	<p>(1)Not allow the PAD of wire bond exposed. (2)Not allow the line type of wire bond on resin. (3)Not allow bubble and dust on resin.</p>												

Name:LCM	Inspection Specification
Scope	LCM
Item	Criterion
7.PCB	<p>(1)Not allow dirty and reminded solder on PCB.</p>  <p>(2)Not allow scratch on pin PAD.</p>

Name:LCM	Inspection Specification																			
Scope	LCM																			
Item	Criterion																			
1.Polarizer scratch	Following the dust specification of time type.																			
2.Polarizer ripple	Not allow get in side Viewing Area .																			
3.Polarizer bubble	<p>(1)Bubble could be seen by eyes exigently to be judged According to black spot specification.</p> <p>(2)Not allow polarize jutting glass outside.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Size</th> <th colspan="2">Acceptable Q'TY</th> </tr> <tr> <th>Area</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>$\Psi < 0.2$</td> <td>Accept no dense</td> <td rowspan="4">Accept No Dense</td> </tr> <tr> <td>$0.2 < \Psi < 0.5$</td> <td>3</td> </tr> <tr> <td>$0.5 < \Psi < 1.0$</td> <td>2</td> </tr> <tr> <td>$1.0 < \Psi$</td> <td>0</td> </tr> <tr> <td>Total acceptable Q'TY</td> <td>3</td> <td></td> </tr> </tbody> </table>		Size	Acceptable Q'TY		Area	A	B	$\Psi < 0.2$	Accept no dense	Accept No Dense	$0.2 < \Psi < 0.5$	3	$0.5 < \Psi < 1.0$	2	$1.0 < \Psi$	0	Total acceptable Q'TY	3	
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4.Segmenter transfigure(Digit, word , sign)	<p>(1)PIN hole , transfigure : (See below)</p> <p>a. Segment display:</p>  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Width</th> <th>Acceptable</th> </tr> </thead> <tbody> <tr> <td>$W \leq 0.4$</td> <td>$\Psi \leq 0.2$ and $\Psi \leq 1/2w$</td> </tr> <tr> <td>$W \geq 0.4$</td> <td>$\Psi \leq 0.25$ and $\Psi \leq 1/3w$</td> </tr> </tbody> </table> <p>Note: W : Segment width Ψ : (A+B)/2 Only allow one defect in one segment. Ψ under 0.10mm is acceptable.</p>		Width	Acceptable	$W \leq 0.4$	$\Psi \leq 0.2$ and $\Psi \leq 1/2w$	$W \geq 0.4$	$\Psi \leq 0.25$ and $\Psi \leq 1/3w$												
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$W \leq 0.4$	$\Psi \leq 0.2$ and $\Psi \leq 1/2w$																			
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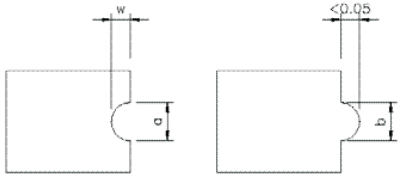
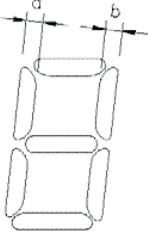
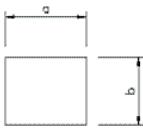
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10080 BUBB RD.
CUPERTINO, CA 95014

Q.A.:
Z.W.

REV.:
1.0

HDA280-2

SHEET 17 OF 19
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Name:LCM	Inspection Specification														
Scope	LCM														
Item	Criterion														
5.Segmenter transfigure(Digit, word , sign)	<p>b.dot Matrix display:</p>  <table border="1" data-bbox="597 615 1234 905"> <thead> <tr> <th>Size</th> <th>Acceptable Q'TY</th> </tr> </thead> <tbody> <tr> <td>$a, b \leq 0.1$</td> <td>Accept no dense</td> </tr> <tr> <td>$(a + b) / 2 \leq 0.1$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.5 < \Psi < 1.0$</td> <td>3</td> </tr> <tr> <td>Total acceptable Q'TY</td> <td>7</td> </tr> </tbody> </table> <p>(2)a.Segment are not same width</p>  <table border="1" data-bbox="946 1056 1310 1236"> <tbody> <tr> <td>$a \geq b$</td> <td>$a / b \leq 4 / 3$</td> </tr> <tr> <td>$a < b$</td> <td>$a / b > 4 / 3$</td> </tr> </tbody> </table> <p>b.Segment are not equal no length and size within $\pm 15\%$ of production specification.</p> 	Size	Acceptable Q'TY	$a, b \leq 0.1$	Accept no dense	$(a + b) / 2 \leq 0.1$	Accept no dense	$0.5 < \Psi < 1.0$	3	Total acceptable Q'TY	7	$a \geq b$	$a / b \leq 4 / 3$	$a < b$	$a / b > 4 / 3$
Size	Acceptable Q'TY														
$a, b \leq 0.1$	Accept no dense														
$(a + b) / 2 \leq 0.1$	Accept no dense														
$0.5 < \Psi < 1.0$	3														
Total acceptable Q'TY	7														
$a \geq b$	$a / b \leq 4 / 3$														
$a < b$	$a / b > 4 / 3$														

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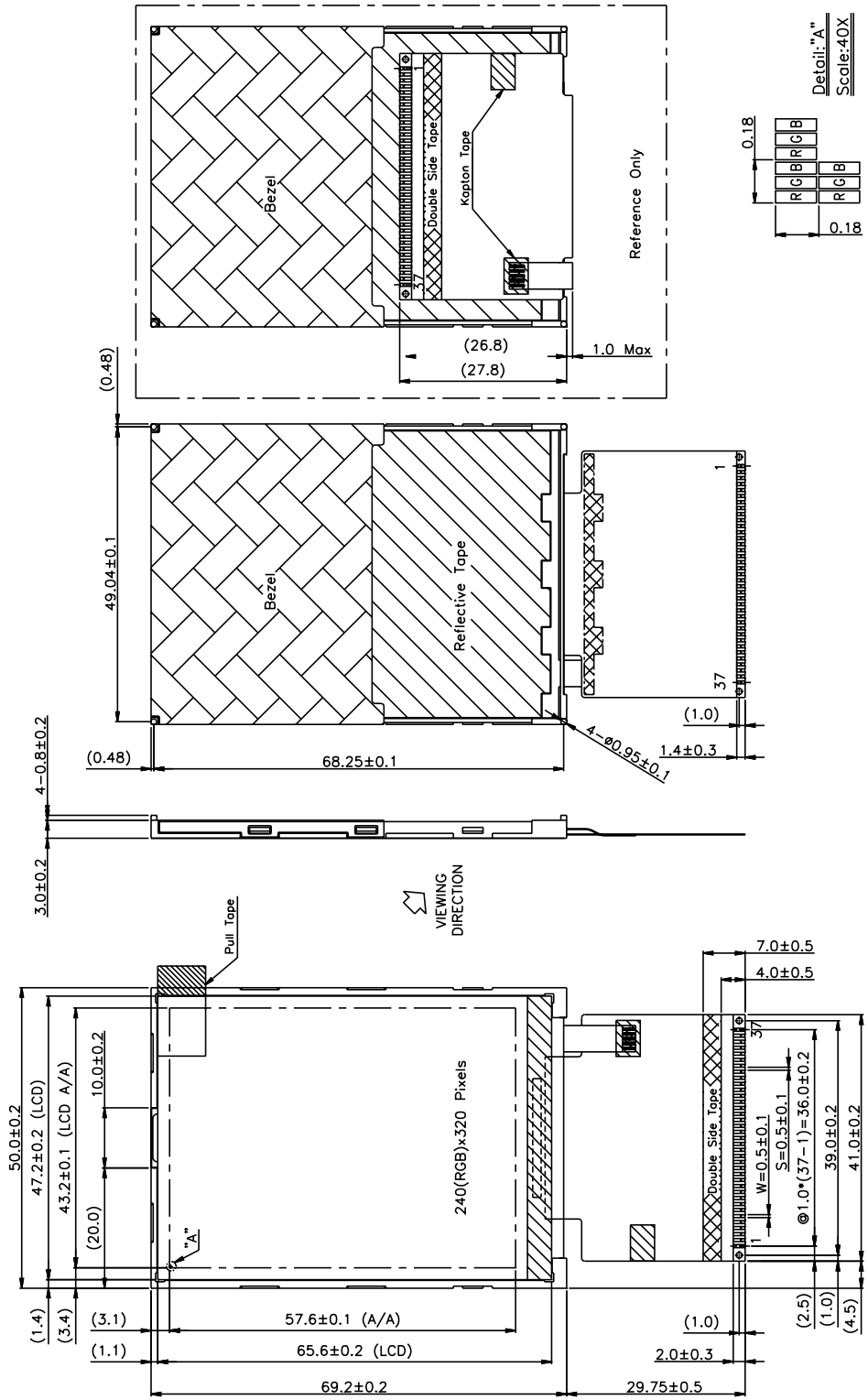
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LCM DRAWING



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