

# PRODUCT SPECIFICATIONS

For Customer: STD

LCD No. : DT20G05A-A

Date: 2007.06.12

Version : 00

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## For Customer's Acceptance

Accepted by	Comment
Date:	

This specification is proposed by Arima Display Corporation.

Approved by	Checked by	Organized by

***Arima*** Display Corporation

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## 2. History of Specification Revision

Date	Rev.	Page	Contents
2007.06.12	Ver.00		First revision(Tentative)

### 3. LCD Panel

#### 3.1 General specification of Single Panel

No.	Item	Specification	Unit
(1)	Part Name	DT20G05A-A	-
(2)	Display Diagonal Size	2.0"	inch
(3)	Display Mode	Transmissive & Normally White	-
(4)	CF Glass Dimension	34.76(H) x 45.08(V) x 0.5(T)	mm
(5)	TFT Glass Dimension	34.76(H) x 49.52(V) x 0.5(T)	mm
(6)	Active Area Dimension	30.96(H) x 41.28(V)	mm
(7)	Resolution	240 x 3(RGB)(H) x 320(V)	dots
(8)	Pixel Pitch	0.129(H) x 0.129(V)	mm
(9)	Color Pixel Arrangement	RGB Vertical Stripe	-
(10)	Viewing Direction	12 o'clock	-
(11)	LCD Driver IC	ILI9320 / R61505U	-

#### 3.2 Environmental Absolute Maximum Ratings

Item	Storage		Operating		Remark
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-30°C	80°C	-20°C	70°C	Note1, 2,
Humidity	Note 3		Note 3		No Condensation

Note 1. The response time will become slow when operated at low temperature.

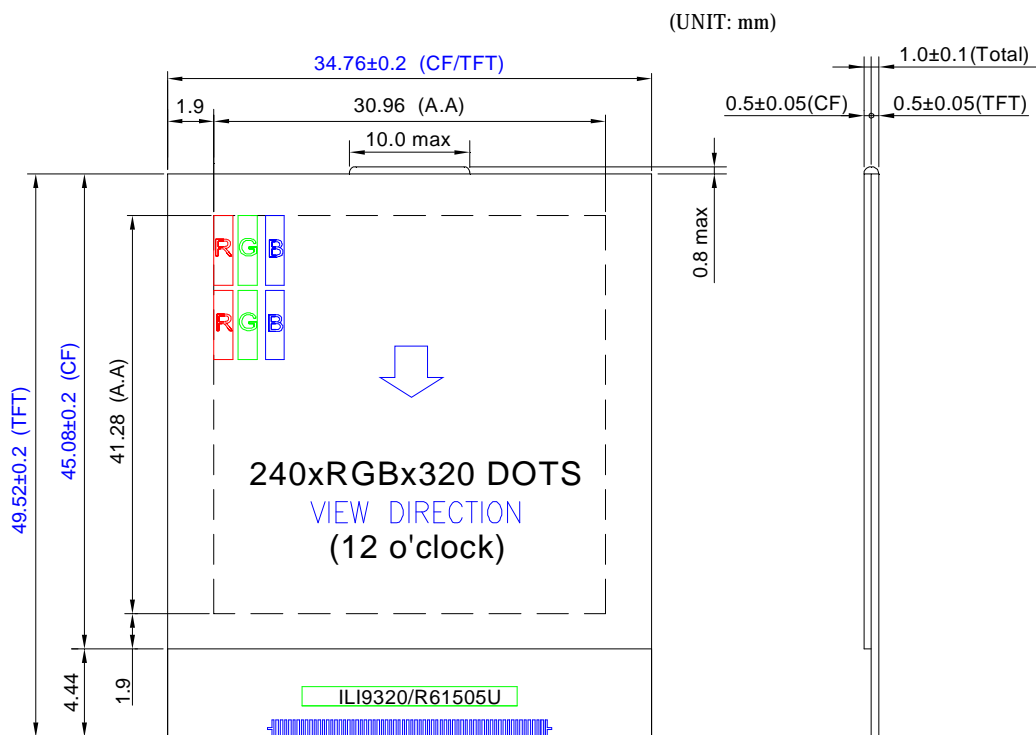
Note 2. Background color changes slightly depending on ambient temperature.

The phenomenon is reversible.

Note 3. Ta≤40°C : 85%RH MAX.

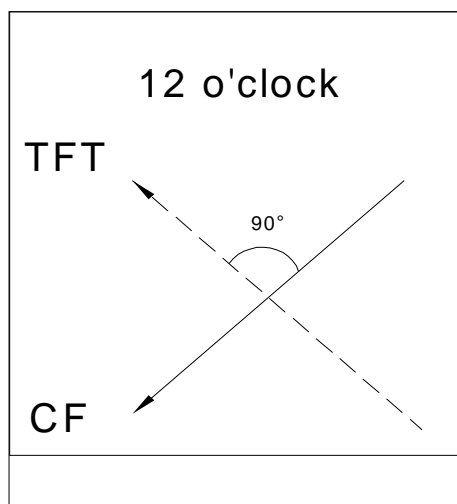
Ta > 40°C : Absolute humidity must be lower than the humidity of 85% RH at 40°C.

### 3.3 Outline Dimension

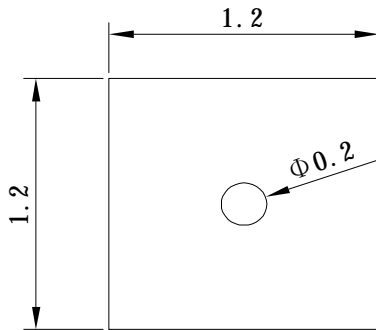
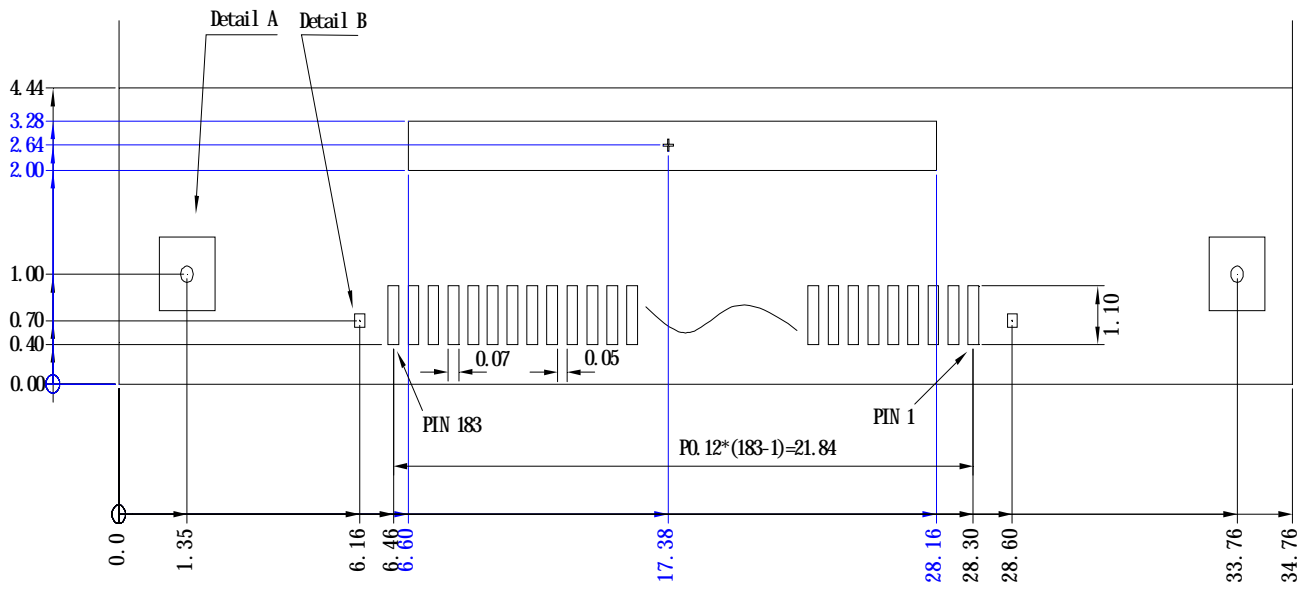


Item	Specification	Unit
Cell Gap	4.4±0.4	um

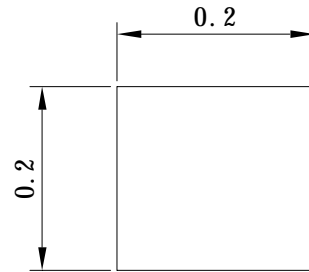
### 3.4 Rubbing Direction



### 3.5 FPC&IC Pad (Array)



Detail A



Detail B

### 3.6.1 FPC Pin Assignment (Renesas R61505U)

Pin NO.	SYMBOL	Pin NO.	SYMBOL	Pin NO.	SYMBOL
1	dummy(1)	41	DB4	81	TESTO15
2	dummy(2)	42	DB3	82	VREFC
3	Vcom-LCD(1)	43	DB2	83	TESTO16
4	Vcom-LCD(2)	44	DB1	84	VDDTEST
5	Vcom-LCD(3)	45	DB0	85	AGND-p1
6	DMY-R1	46	SDO	86	AGND(1)
7	DMY-R2	47	SDI	87	AGND(2)
8	VPP1	48	RD*	88	AGND-p2
9	VPP2(1)	49	WR*/SCL	89	GND-p1
10	VPP2(2)	50	RS	90	GND(1)
11	VPP3	51	CS*	91	GND-p2
12	TEST4	52	TESTO8	92	RGND-p1
13	TEST5	53	TESTO9	93	RGND(1)
14	TEST3	54	FMARK	94	RGND-p2
15	IM0/ID	55	TS8	95	TESTO17
16	IM1	56	OSC1DUM2	96	VTEST
17	IM2	57	OSC1	97	TESTO18
18	IM3	58	OSC1DUM3	98	VGS
19	TESTO4	59	OSC1DUM4	99	TESTO19
20	TESTO5	60	OSC2	100	V0T
21	RESET	61	OSC2DUM1	101	TESTO20
22	VSYNC	62	IOGND-p1	102	VMON
23	HSYNC	63	ioGND(1)	103	TESTO21
24	DOTCLK	64	IOGND-p2	104	V31T
25	ENABLE	65	IOVCC-p1	105	VCOM(1)
26	DB17	66	ioVcc(1)	106	VCOM(2)
27	DB16	67	IOVCC-p2	107	VCOMH(1)
28	DB15	68	VCC-p1	108	VCOMH(2)
29	DB14	69	Vcc(1)	109	VCOML(1)
30	DB13	70	Vcc(2)	110	VCOML(2)
31	DB12	71	VCC-p2	111	TESTO23
32	DB11	72	VDDOUT-p1	112	VREG1OUT
33	DB10	73	VDD(1)	113	TESTO24
34	DB9	74	VDD(2)	114	TESTO25
35	DB8	75	VDD(3)	115	VCOMR
36	TESTO6	76	VDD-p1	116	TESTO26
37	TESTO7	77	TESTO13	117	VCL-p1
38	DB7	78	VREFD	118	VCL-p1
39	DB6	79	TESTO14	119	VCL-p2
40	DB5	80	VREF	120	VLOUT1-p1

Pin NO.	SYMBOL	Pin NO.	SYMBOL
121	DDVDH(1)	161	C13-(2)
122	DDVDH(2)	162	C13+(1)
123	DDVDH(3)	163	C13+(2)
124	DDVDH-p1	164	C21-(1)
125	VciOUT-p1	165	C21-(2)
126	VCI1(1)	166	C21+(1)
127	VCI1(2)	167	C21+(2)
128	VCI1(3)	168	C22-(1)
129	VciOUT-p2	169	C22-(2)
130	VCILVL(1)	170	C22+(1)
131	VCILVL(2)	171	C22+(2)
132	Vci(1)	172	C23-(1)
133	Vci(2)	173	C23-(2)
134	Vci(3)	174	C23+(1)
135	C12-(1)	175	C23+(2)
136	C12-(2)	176	TESTO30
137	C12-(3)	177	DMY-R5
138	C12+(1)	178	DMY-R6
139	C12+(2)	179	Vcom-LCD(4)
140	C12+(3)	180	Vcom-LCD(5)
141	C11-(1)	181	Vcom-LCD(6)
142	C11-(2)	182	dummy(5)
143	C11-(3)	183	iPS-GND
144	C11+(1)		
145	C11+(2)		
146	C11+(3)		
147	AGNDDUM1		
148	VLOUT3-p1		
149	VGL(1)		
150	VGL(2)		
151	VGL(3)		
152	VGL(4)		
153	VGL-p1		
154	AGNDDUM2		
155	AGNDDUM4		
156	dummy(3)		
157	VGH(1)		
158	VGH(2)		
159	dummy(4)		
160	C13-(1)		

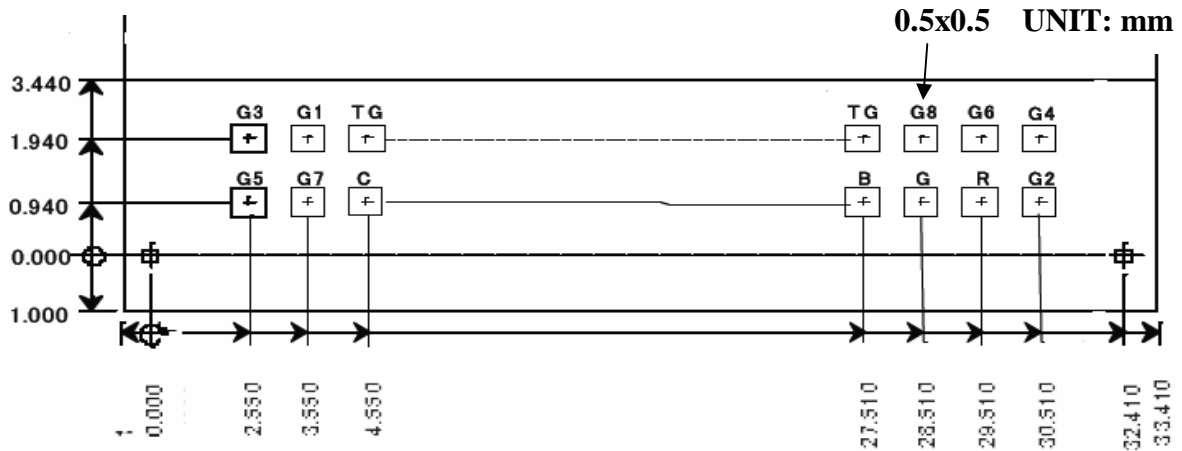
### 3.6.2 FPC Pin Assignment (ILITEK ILI9320)

Pin NO.	SYMBOL	Pin NO.	SYMBOL	Pin NO.	SYMBOL
1	DUMMY	41	DB4	81	TESTO15
2	DUMMY	42	DB3	82	VREFC
3	VCOMLCD	43	DB2	83	TESTO16
4	VCOMLCD	44	DB1	84	VDDTEST
5	VCOMLCD	45	DB0	85	AGND
6	DUMMYR1	46	SDO	86	AGND
7	DUMMYR2	47	SDI	87	AGND
8	VPP1	48	nRD	88	AGND
9	VPP2	49	nWR/SCL	89	GND
10	VPP2	50	RS	90	GND
11	VPP3	51	nCS	91	GND
12	TEST4	52	TESTO8	92	GND
13	TEST5	53	TESTO9	93	GND
14	TEST3	54	FMARK	94	GND
15	IM0/ID	55	TS8	95	TESTO17
16	IM1	56	OSC1DUM2	96	VTEST
17	IM2	57	OSC1	97	TESTO18
18	IM3	58	OSC1DUM3	98	VGS
19	TESTO4	59	OSC1DUM4	99	TESTO19
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21	nRESET	61	OSC2DUM1	101	TESTO20
22	VSYNC	62	IOGND	102	VMON
23	HSYNC	63	IOGND	103	TESTO21
24	DOTCLK	64	IOGND	104	V31T
25	ENABLE	65	IOVCC	105	VCOM
26	DB17	66	IOVCC	106	VCOM
27	DB16	67	IOVCC	107	VCOMH
28	DB15	68	VCC	108	VCOMH
29	DB14	69	VCC	109	VCOML
30	DB13	70	VCC	110	VCOML
31	DB12	71	VCC	111	TESTO23
32	DB11	72	VDD	112	VREG1OUT
33	DB10	73	VDD	113	TESTO24
34	DB9	74	VDD	114	TESTO25
35	DB8	75	VDD	115	VCOMR
36	TESTO6	76	VDD	116	TESTO26
37	TESTO7	77	TESTO13	117	VCL
38	DB7	78	VREFD	118	VCL
39	DB6	79	TESTO14	119	VCL
40	DB5	80	VREF	120	VLOUT1



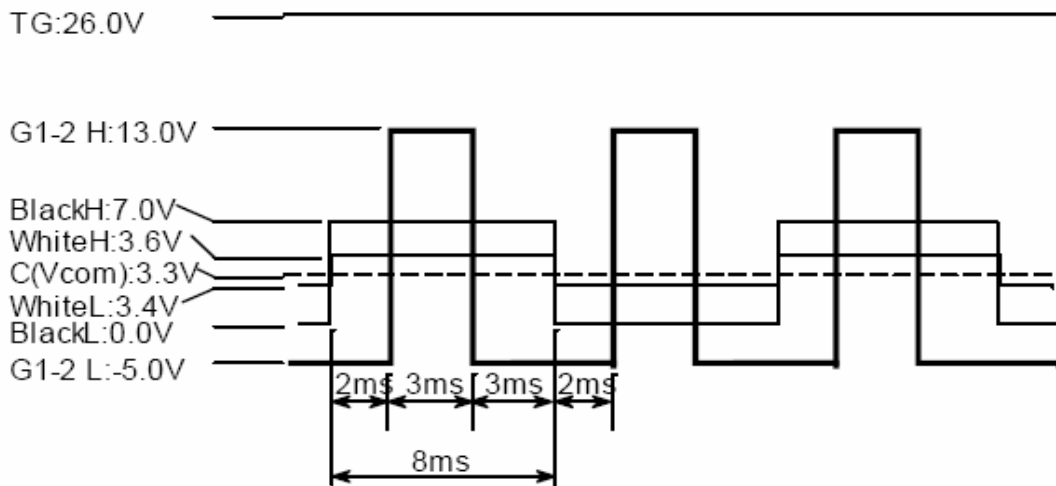
Pin NO.	SYMBOL	Pin NO.	SYMBOL
121	VLOUT1	161	C13-
122	DDVDH	162	C13+
123	DDVDH	163	C13+
124	DDVDH	164	C21-
125	VCIOUT	165	C21-
126	VCIOUT	166	C21+
127	VCI1	167	C21+
128	VCI1	168	C22-
129	VCI1	169	C22-
130	VCILVL	170	C22+
131	VCILVL	171	C22+
132	VCI	172	C23-
133	VCI	173	C23-
134	VCI	174	C23+
135	C12-	175	C23+
136	C12-	176	TESTO30
137	C12-	177	DUMMYR5
138	C12+	178	DUMMYR6
139	C12+	179	VCOMLCD
140	C12+	180	VCOMLCD
141	C11-	181	VCOMLCD
142	C11-	182	DUMMY
143	C11-	183	IPS-GND
144	C11+		
145	C11+		
146	C11+		
147	AGNDDUM1		
148	VLOUT3		
149	VLOUT3		
150	VGL		
151	VGL		
152	VGL		
153	VGL		
154	AGNDDUM2		
155	AGNDDUM4		
156	DUMMY		
157	VLOUT2		
158	VGH		
159	DUMMY		
160	C13-		

### 3.7 Test Pad and Test Pattern



unit:V	TG	C	R	G	B	G1~G8
Gray	26DC	3.3	5.5/1.5	5.5/1.5	5.5/1.5	13/-5
Black	26DC	3.3	7.0/0.0	7.0/0.0	7.0/0.0	13/-5
White	26DC	3.3	3.6/3.4	3.6/3.4	3.6/3.4	13/-5

### 3.8 LCD Cell test light on waveform

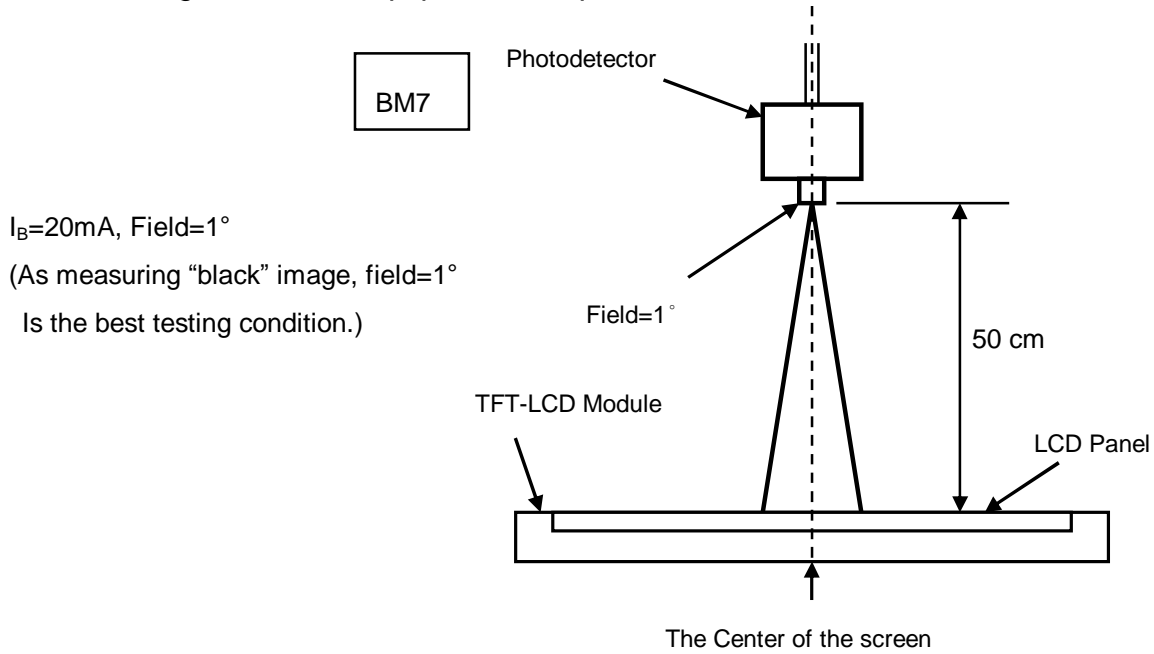


## 4. Optical Specification

1) Using Arima LCD+ TN Polarizer+ Corresponding Backlight, reference only

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta=0^\circ$	(150)	(200)	-	-	(1), (2)
Response Time		Rising: Tr Falling: Tf		Normal	-	(30)	(40)	ms
Transmittance		T	viewing angle	-	(5.5)	-	%	-
Color Chromaticity (CIE 1931)	White	Wx	At the center of panel Backlight On Equipment: BM7 Field=1°	(0.28)	(0.33)	(0.38)	-	-
		Wy		(0.29)	(0.34)	(0.39)		
	Red	Rx		(0.58)	(0.63)	(0.68)		
		Ry		(0.29)	(0.34)	(0.39)		
	Green	Gx		(0.28)	(0.33)	(0.38)		
		Gy		(0.51)	(0.56)	(0.61)		
	Blue	Bx		(0.11)	(0.16)	(0.21)		
		By		(0.07)	(0.12)	(0.17)		
Color Saturation		NTSC		-	(50)	-	%	-
Viewing Angle	Top	$\theta U$	CR $\geq$ 10 Backlight On Equipment: BM7 Field=1°	-	(45)	-	Degrees	(4)
	Bottom	$\theta D$		-	(15)	-		
	Left	$\theta L$		-	(35)	-		
	Right	$\theta R$		-	(35)	-		

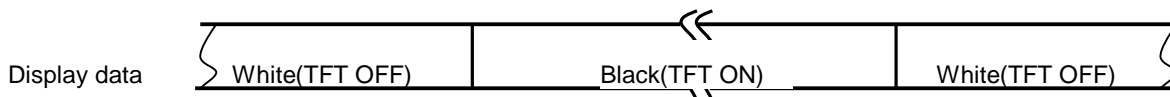
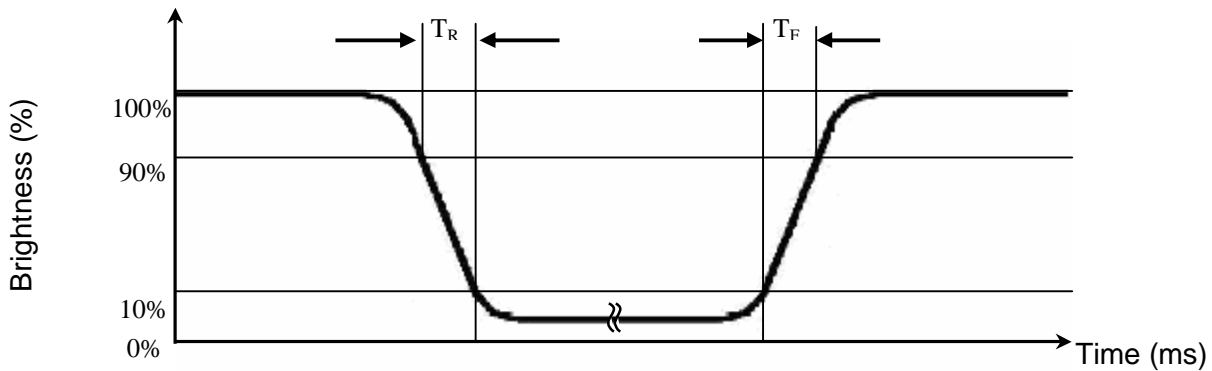
Note 1: The brightness test equipment setup



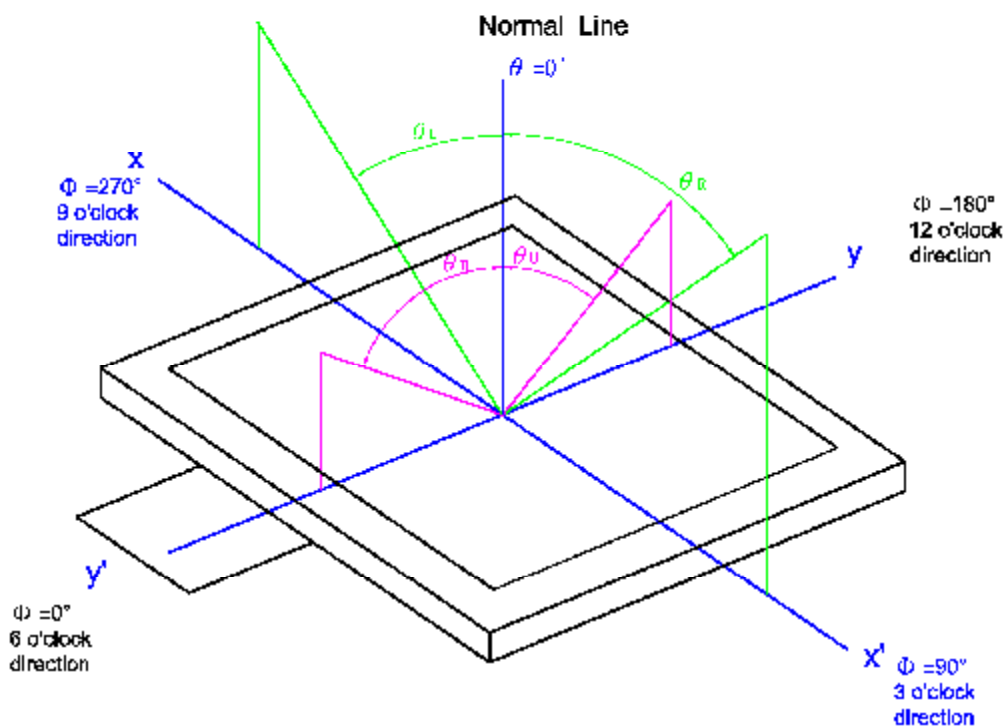
Note 2: Definition of contrast Ratio (C.R)

$$C.R = \frac{\text{Brightness When LCD is at "White" State}}{\text{Brightness When LCD is at "Black" State}}$$

Note 3: Definition of response time



Note 4: Definition of viewing angle

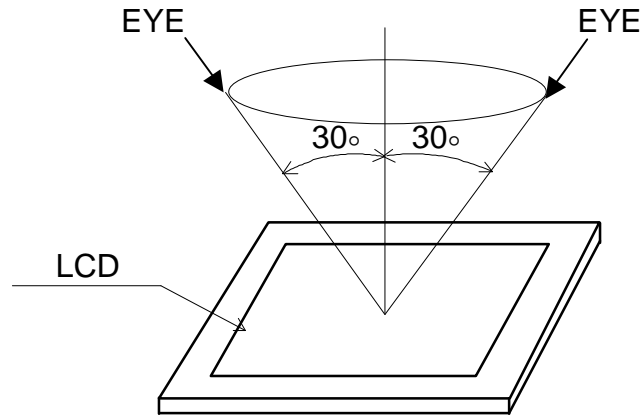


## 5. Quality Assurance

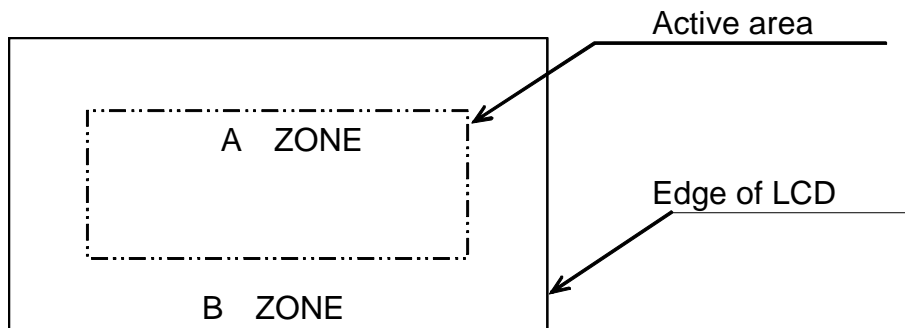
### 5.1 Appearance Inspection

Appearance inspection should be done under the following condition.

- (1) In the dark room. Done under a 20w fluorescent lamp, and the distance from lamp to LCD must be 30 cm.
- (2) The distance from eyes to LCD must be 30 cm.
- (3) Viewing direction must be within 30 degrees to vertical line of LCD center.



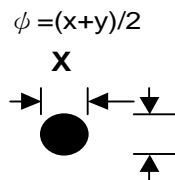
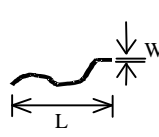
### 5.2 Definition of A zone and B zone



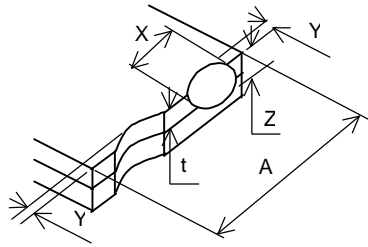
### 5.3 Appearance Criterion

Customer and supplier should hold a discussion when there is any problem about standard quality assurance or special quality assurance is needed.

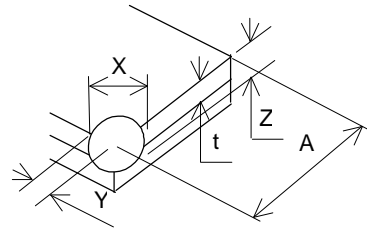
Inspection Standard: MIL-STD-105E normal inspection level II

No.	Item	Criterion	Zone	AQL																						
1	Scratches Black spots White spots Foreign particles	<p>Round shape:</p> <table border="1"> <thead> <tr> <th>Size</th> <th>Acceptable</th> </tr> </thead> <tbody> <tr> <td><math>\phi \leq 0.1</math></td> <td>ignore</td> </tr> <tr> <td><math>0.1 &lt; \phi \leq 0.3</math></td> <td>3</td> </tr> <tr> <td><math>0.3 &lt; \phi</math></td> <td>0</td> </tr> </tbody> </table>  <p>Line shape:</p> <table border="1"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acceptable</th> </tr> </thead> <tbody> <tr> <td>-</td> <td><math>W \leq 0.02</math></td> <td>ignore</td> </tr> <tr> <td><math>L \leq 2.5</math></td> <td><math>0.02 &lt; W \leq 0.05</math></td> <td>3</td> </tr> <tr> <td><math>2.5 \leq L</math></td> <td><math>0.05 &lt; W</math></td> <td>0</td> </tr> </tbody> </table>  <p>*Any defect wiped out easily is acceptable</p>	Size	Acceptable	$\phi \leq 0.1$	ignore	$0.1 < \phi \leq 0.3$	3	$0.3 < \phi$	0	Length	Width	Acceptable	-	$W \leq 0.02$	ignore	$L \leq 2.5$	$0.02 < W \leq 0.05$	3	$2.5 \leq L$	$0.05 < W$	0	A,B	2.5		
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2	Display quality	<table border="1"> <thead> <tr> <th>Item</th> <th>Criterion</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> <li>Viewing angle defect</li> <li>Missing dots or missing line</li> <li>Malfunction</li> <li>Contrast ratio defect</li> </ul> </td> <td>Not allowed</td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>Bright dot</li> </ul> </td> <td> <table border="1"> <thead> <tr> <th>Diameter</th> <th>Acceptable</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 0.1</math></td> <td>Disregard</td> </tr> <tr> <td><math>0.1 &lt; D</math></td> <td>0</td> </tr> </tbody> </table> </td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>Dark dot</li> </ul> </td> <td> <table border="1"> <thead> <tr> <th>Diameter</th> <th>Acceptable</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 0.1</math></td> <td>Disregard</td> </tr> <tr> <td><math>0.1 &lt; D \leq 0.15</math></td> <td>2 Distance <math>\geq 5\text{mm}</math></td> </tr> <tr> <td><math>0.15 &lt; D</math></td> <td>0</td> </tr> </tbody> </table> </td> </tr> </tbody> </table>	Item	Criterion	<ul style="list-style-type: none"> <li>Viewing angle defect</li> <li>Missing dots or missing line</li> <li>Malfunction</li> <li>Contrast ratio defect</li> </ul>	Not allowed	<ul style="list-style-type: none"> <li>Bright dot</li> </ul>	<table border="1"> <thead> <tr> <th>Diameter</th> <th>Acceptable</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 0.1</math></td> <td>Disregard</td> </tr> <tr> <td><math>0.1 &lt; D</math></td> <td>0</td> </tr> </tbody> </table>	Diameter	Acceptable	$D \leq 0.1$	Disregard	$0.1 < D$	0	<ul style="list-style-type: none"> <li>Dark dot</li> </ul>	<table border="1"> <thead> <tr> <th>Diameter</th> <th>Acceptable</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 0.1</math></td> <td>Disregard</td> </tr> <tr> <td><math>0.1 &lt; D \leq 0.15</math></td> <td>2 Distance <math>\geq 5\text{mm}</math></td> </tr> <tr> <td><math>0.15 &lt; D</math></td> <td>0</td> </tr> </tbody> </table>	Diameter	Acceptable	$D \leq 0.1$	Disregard	$0.1 < D \leq 0.15$	2 Distance $\geq 5\text{mm}$	$0.15 < D$	0	A	0.65
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(1) On panel surface



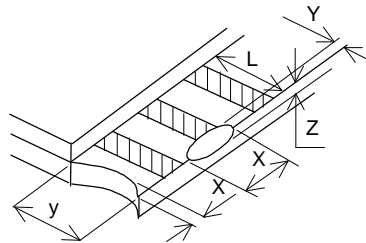
(2) On corner



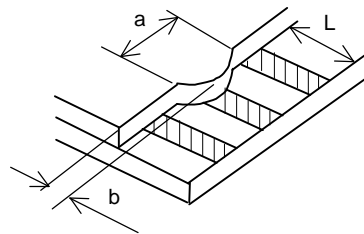
Z	Y	X
$Z \leq 1/2t$	Not injure	$X \leq 1/8A$
$1/2t < Z \leq 2t$	AU/Seal/mark	

\*X is total length if there are 2 or more chips.

(3) On electrode pad



(4) Substrate protuberance



Y	X	Z
$Y \leq 0.5$	$X \leq 1/8A$	$0 < Z \leq t$

a	b
$a \leq 3\text{mm}$	$b \leq 0.3\text{mm}$

y	X	Z
$y \leq L$	$X \leq 1/8A$	$0 < Z \leq t$

\* Extensive crack is not acceptable

3

Chips

2.5



## 6. Reliability Tests

This standard reliability test is done only for the first lot of MP products. Customer and supplier must hold a discussion if other reliability test is requested by customer.

1	Thermal shock (under storage)	$-30^{\circ}\text{C} \xleftarrow{\quad} 25^{\circ}\text{C} \xleftarrow{\quad} 80^{\circ}\text{C}$ $30\text{min} \xrightarrow{\quad} 5\text{min} \xrightarrow{\quad} 30\text{min}$ $\xleftarrow{\quad} \xrightarrow{\quad}$ 1 cycle total 30 cycles
2	High temperature and high humidity Under operation	60°C, 90%RH 240hrs
3	High temperature under storage	80°C, 240hrs
4	Low temperature under storage	-30°C, 240hrs
5	Drop test (Packing box with full samples inside)	(X,Y,Z) x2 total 6 directions drop from 80cm to ground

## 7. Precautions for Operation and Storage

### 7.1 Precautions for Operation

- (1) Since LCD panel is made of glass, in order to prevent from glass broken or color tone change, please do not apply any mechanical shock or impact or excessive force to it when installing the LCD module.
- (2) If LCD panel is broken and liquid crystal substance leaks out and contact your skin or clothes, please immediately wash it off by using soap and water.
- (3) If LCD surface becomes contaminated, please wipe it off gently by using moisten soft cloth with normal hexane, do not use acetone, ketone, ethanol, isopropyl alcohol or water. If there is saliva or water on the LCD surface, please wipe it off immediately.
- (4) When handling LCD panel, please be sure that the body and the tools are properly grounded. And do not touch ITO terminals with bare hands or contaminate ITO terminals.
- (5) LCD panel should be used under recommended operating conditions shown in chapter 4.
- (6) Response time will be extremely slower at lower temperature than at specified temperature and LCD will show different color when at higher temperature. The phenomenon will disappear when returning to specified condition.
- (7) It is a characteristic of LCD to maintain the displaying pattern when the pattern is applied for a long time. To prevent image retention, please do not apply the fixed pattern for a long time by pre-installing such programs at your side.
- (8) This phenomenon (image retention) is not deterioration of LCD. If it happens, you can remove it by applying different patterns.

### 7.2 Precautions for Storage

- (1) Please store LCD panel in a dark place, avoid exposure to sunlight, the light of fluorescent lamp or any ultraviolet ray.
- (2) Keep the environment temperature at between 10°C and 35°C and at normal humidity (about 60%RH). Avoid high temperature, high humidity or temperature below 0°C.
- (3) That keeps the LCD panel stored in the container shipped from supplier before using them is recommended.
- (4) Do not leave any article on the LCD surface for an extended period of time.