

Specification

TFT-LCD
module

Module	
Customer	
Customer P/N (客户型号) :	

Approvedby	
Qualified ()	Unqualified () :

PREPARED	CHECKED	APPROVED

REVISION RECORD

<u>REV NO</u>	<u>REV DATE</u>	<u>CONTENTS</u>	<u>REMARKS</u>
1.0	2014-11-8	First Release	

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1.0 General Specifications

QD353728 is a color active matrix LCD module incorporating amorphous silicon **TFT** (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver IC, FPC and a back light unit. The module display area contains **320x 480pixels**. This product accords with RoHS environmental criterion.

Item	Contents	Unit
LCD Type	TFT TRANSMISSIVE	/
Viewing direction	12:00	O' Clock
Module outline (W x HxD)	55.5x84.96x2.5	mm
Active area (WxH)	73.44x48.96	mm
Number of Dots	320(RGB) x480	/
Driver IC	ILI9486/ILI9488L	/
Backlight Type	6chips white LEDS, Paralell	/
Interface Type	Parallel 16-bit	/
Input voltage	2.8~3.3	V

2.0 ABSOLUTE MAXIMUM RATINGS

<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Max</i>	<i>Unit</i>
Supply voltage for logic	Vcc	-0.3	4.6	V
Input voltage	Vin	-0.3	VCC+ 0.3	V
Operating temperatur	Top	-10	60	°C
Storage temperature	Tst	-20	70	°C
Humidity	RH	--	90%(Max60C)	RH

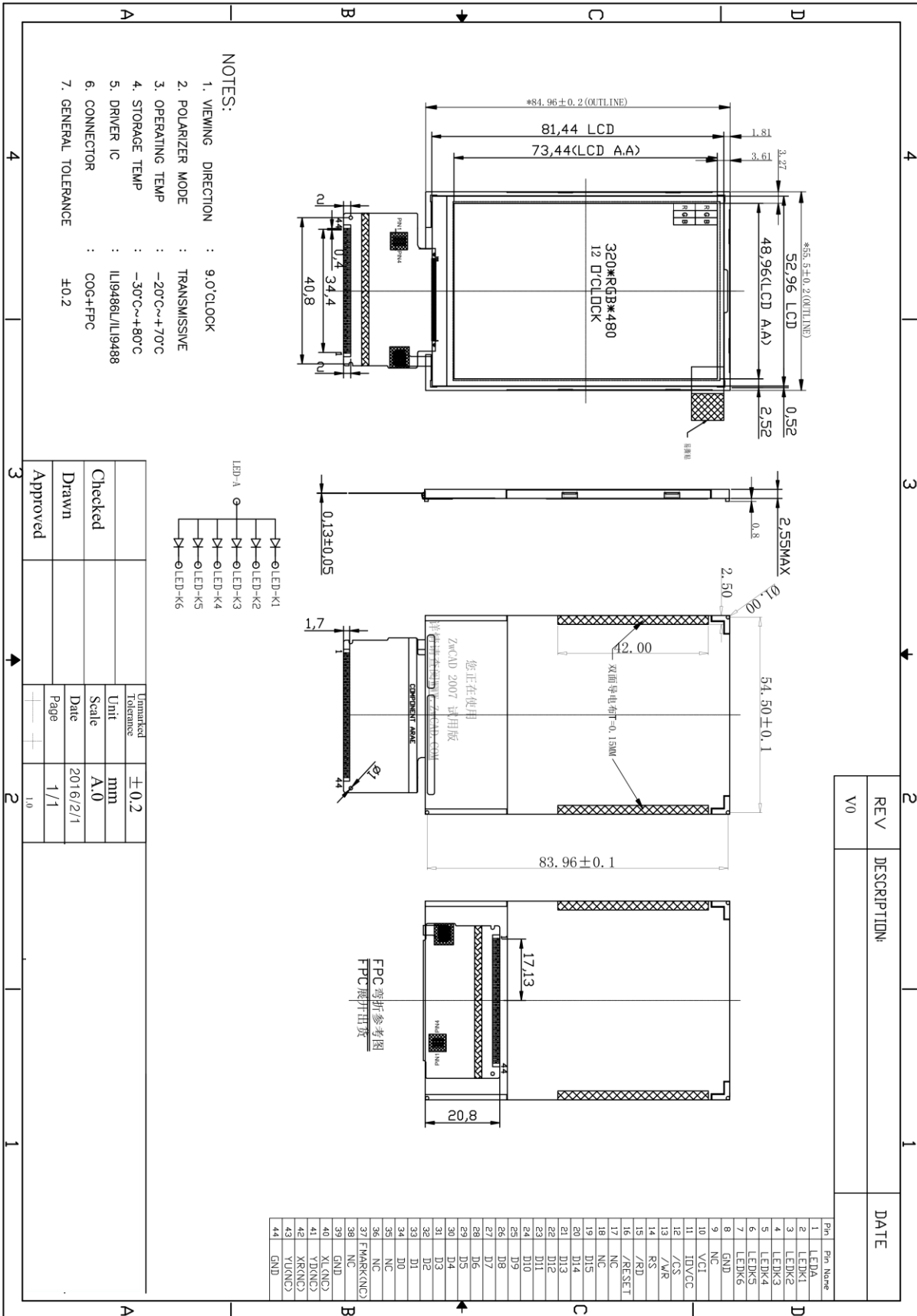
3.0 ELECTRICAL CHARACTERISTICS

<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
Supply voltage for logic	Vcc -Vss	2.6	2.8	3.3	V
Input Current	Idd	-	9.94	14.91	mA
Input voltage 'H' level	Vih	0.7 <i>lovcc</i>	--	<i>lovcc</i>	V
Input voltage 'L' level	Vil	0	--	0.3 <i>lovcc</i>	V
Output voltage 'H' level	Voh	0.8 <i>lovcc</i>	--	<i>lovcc</i>	V
Output voltage 'L' level	Vol	0	--	0.2 <i>lovcc</i>	V

4.0 BACKLIGHT CHARACTERISTICS

<i>Item</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Condition</i>
Forward voltage	<i>Vf</i>	2.9	3.2	3.5	V	<i>If=90mA</i>
Luminance	<i>Lv</i>	3500	-	-	cd/m2	<i>If=90mA</i>
Number of LED	--	6			Piece	--
Connection mode	<i>P</i>	<i>Paralell</i>			--	--

5.0 DIMENSIONAL DRAWING

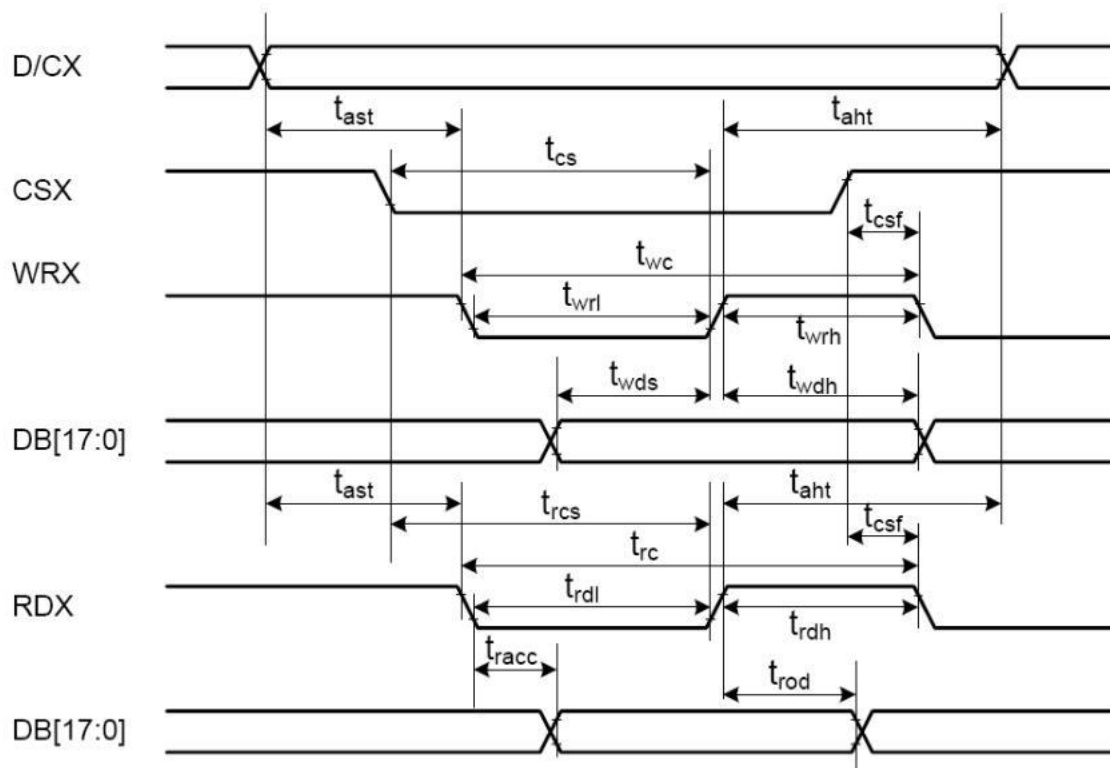


6.0 INTERFACE PIN CONNECTIONS

<i>Pin.No</i>	<i>Symbol</i>	<i>Function</i>
1	LEDA	back light power supply positive
2	LEDK1	back light power supply negative
3	LEDK2	back light power supply negative
4	LEDK3	back light power supply negative
5	LEDK4	back light power supply negative
6	LEDK5	back light power supply negative
7	LEDK6	back light power supply negative
8	GND	Ground
9	NC	No Connect
10	VCI	Power supply to liquid crystal power supply analog circuit(2.8V)
11	IOVCC	Power supply to interface pins (1.8V/2.8V)
12	/CS	Chip select input pin ("Low" enable)
13	/WR	Write control pin
14	RS	Display data/Command selection
15	/RD	Read control pin
16	/RESET	The reset pin, Signal is low active
17	NC	No Connect
18	NC	No Connect
19	DB15	Data Bus15
20	DB14	Data Bus14
21	DB13	Data Bus13
22	DB12	Data Bus12
23	DB11	Data Bus11
24	DB10	Data Bus10
25	DB9	Data Bus9
26	DB8	Data Bus8
27	DB7	Data Bus7
28	DB6	Data Bus6
29	Db5	Data Bus5
30	Db4	Data Bus4
31	DB3	Data Bus3
32	DB2	Data Bus2
33	DB1	Data Bus1
34	DB0	Data Bus0
35	NC	No Connect
36	NC	No Connect
37	NC/FMARK	No Connect/Synchronies MCU to frame rate
38	NC	No Connect
39	GND	Ground
40	XL	TP Interface For X-
41	YD	TP Interface For Y-
42	XR	TP Interface For X+
43	YU	TP Interface For Y+
44	GND	Ground

6.1 Timing characteristics

6.1.1 DBI Type B (18/16/9/8 bit) Interface Timing Characteristics

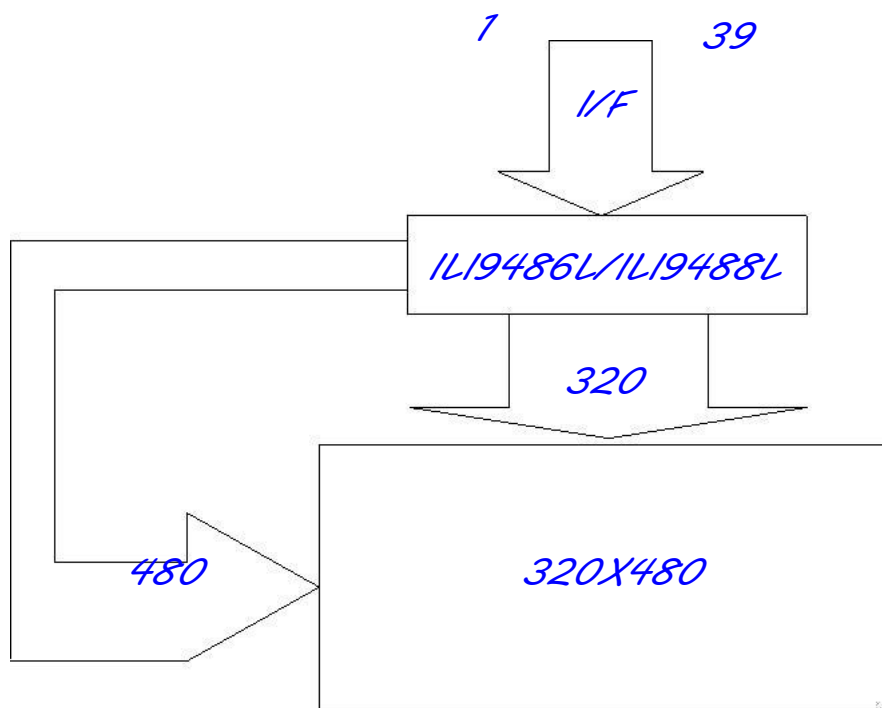


Signal	Symbol	Parameter	min	max	Unit	Description
D/CX	t _{ast}	Address setup time	10	-	ns	
	t _{ah}	Address hold time (Write/Read)	10	-	ns	
CSX	t _{cs}	Chip Select setup time (Write)	20	-	ns	
	t _{trcs}	Chip Select setup time (Read)	20	-	ns	
	t _{csf}	Chip Select Wait time (Write/Read)	20	-	ns	
WRX	t _{wc}	Write cycle	100	-	ns	
	t _{wrh}	Write Control pulse H duration	30	-	ns	
	t _{wrl}	Write Control pulse L duration	20	-	ns	
RDX	t _{rc}	Read cycle	450	-	ns	
	t _{rdh}	Read Control pulse H duration	250	-	ns	
	t _{rdl}	Read Control pulse L duration	170	-	ns	
DB[17:0], DB[15:0], DB[8:0], DB[7:0]	t _{wds}	Write data setup time	15	-	ns	For maximum CL=30pF For minimum CL=8pF
	t _{wdh}	Write data hold time	25	-	ns	
	t _{racc}	Read access time	10	340	ns	
	t _{rod}	Read output disable time	10	-	ns	

Note: Logic high and low levels are specified as 30% and 70% of IOVCC for input signals.

Note: T_a = -30 to 70 °C, IOVCC=1.65V to 3.3V, VCI=2.5V to 3.3V, GND=0V

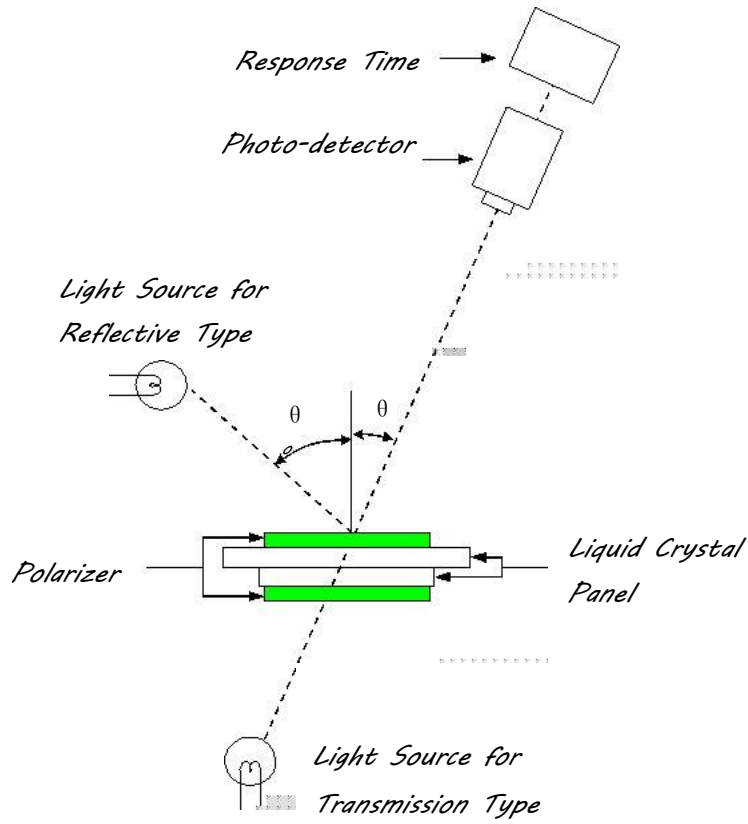
6.3 BLOCK DIAGRAM OF LCM



7. ELECTRO-OPTICAL CHARACTERISTICS

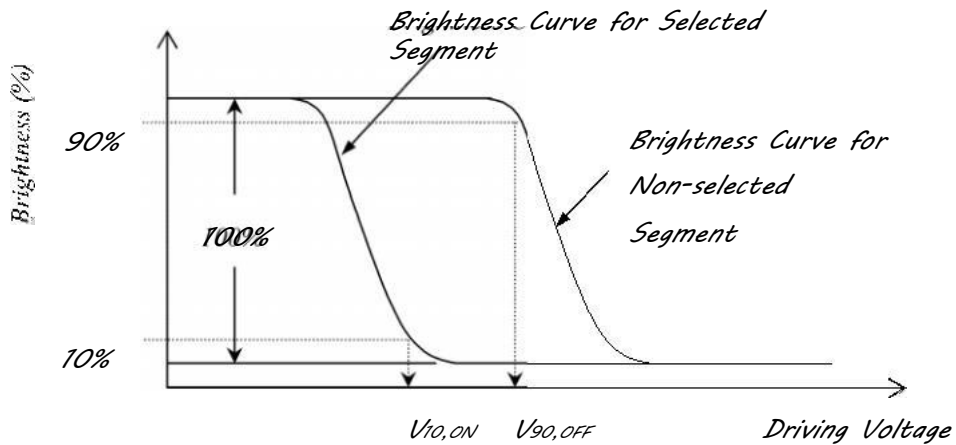
Item	Symbol	Condition	Temp	Min	Typ	Max	Units	Note
Operating Volt.	V_{LCD}	$\theta = \psi = 0$	-10°C	----	----	----	V	8.1
			25°C	----	8.5	----		
			60°C	----	----	----		
Response Time	Rise Time (T_r)	$\theta = \psi = 0$	-10°C	----	----	----	msec	8.2
	Decay Time (T_d)			----	----	----		
	Rise Time (T_r)		25°C	----	----	240		
	Decay Time (T_d)			----	----	240		
	Rise Time (T_r)		60°C	----	----	----		
	Decay Time (T_d)			----	----	----		
Viewing Angle Range	θ	$\psi = 0^\circ$	25°C	----	----	30	Deg	8.3 $CR \geq 2$
		$\psi = 90^\circ$		----	----	30		
		$\psi = 180^\circ$		----	----	30		
		$\psi = 270^\circ$		----	----	30		
Contrast Ratio	Cr	$\theta = \psi = 0$	25°C	3	4.5	----	---	8.4

7.1 ELECTRO-OPTICAL CHARACTERISTICS TEST METHOD

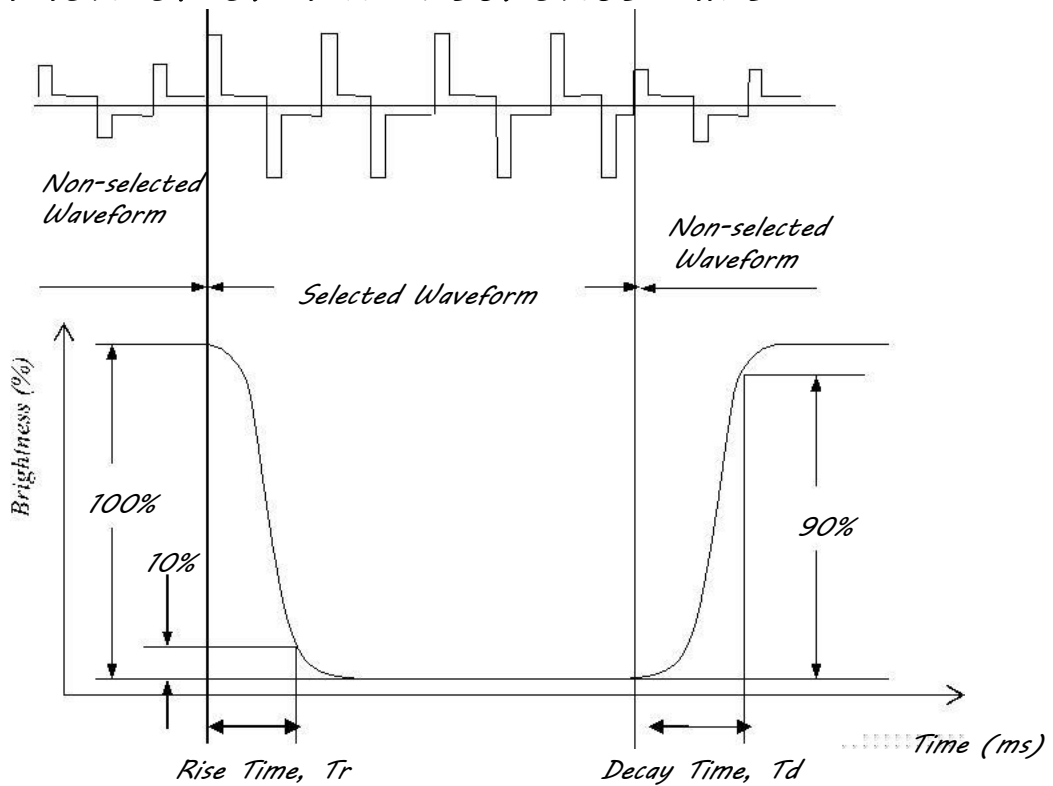


7.2 DEFINITION OF OPERATING VOLTAGE, VOP

$$V_{op} = (V_{10,ON} + V_{90,OFF}) / 2$$

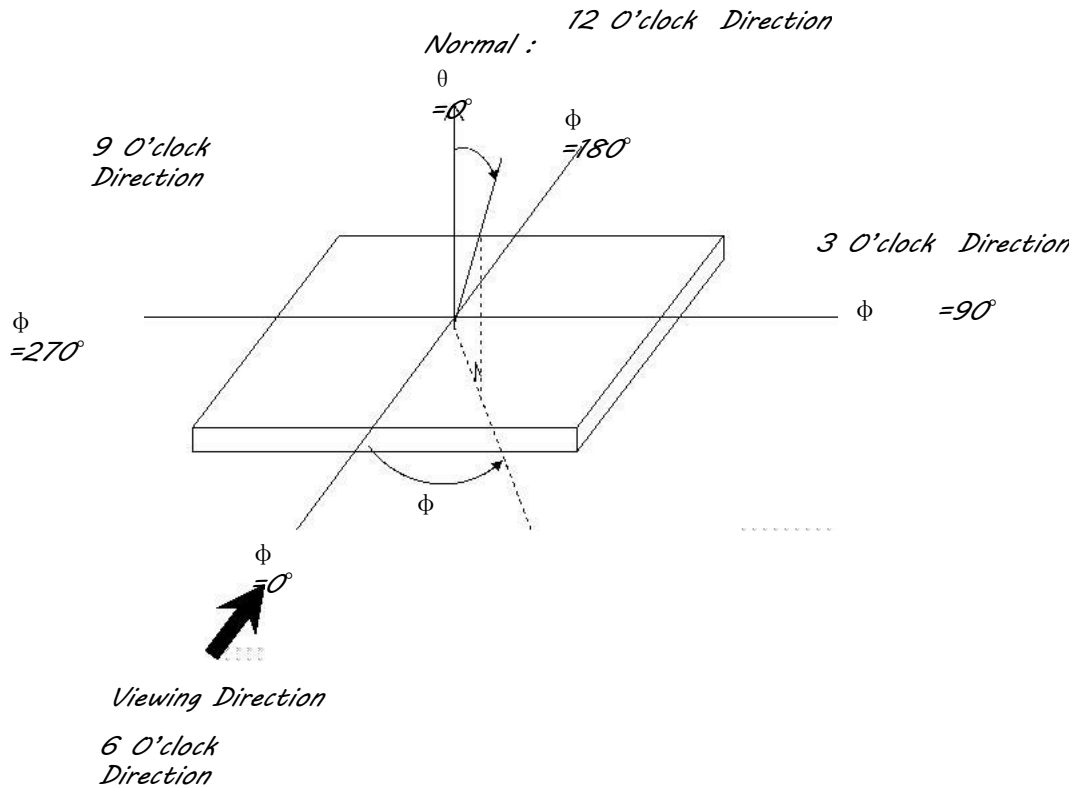


7.3 DEFINITION OF OPTICAL RESPONSE TIME



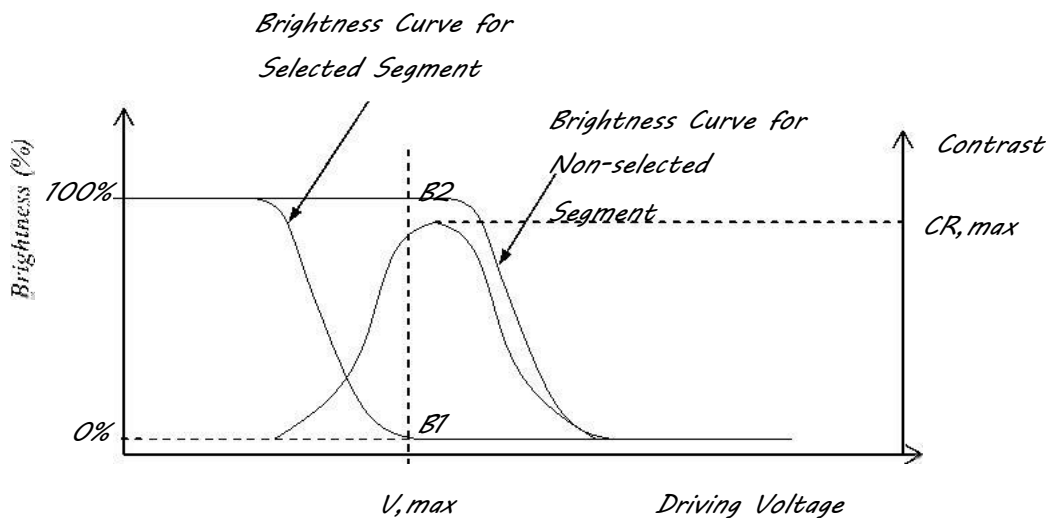
7.4 DEFINITION OF VIEWING ANGLE θ

AND



7.5 DEFINITION OF CONTRAST RATIO, CR

$$CR = \frac{\text{Brightness of Non-selected Segment (B2)}}{\text{Brightness of Selected Segment (B1)}}$$



8.INSPECTION CRITERIA

8.1 Inspection Conditions

8.1.1 Environmental conditions

The environmental conditions for inspection shall be as follows

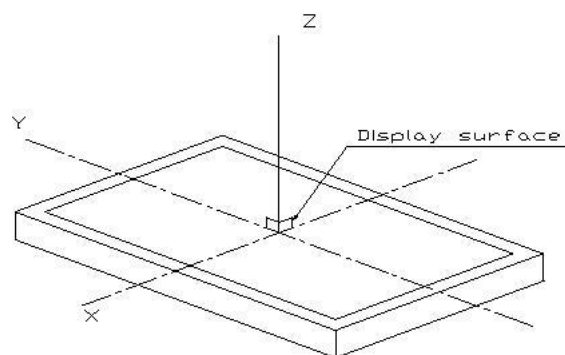
Room temperature: $20\pm 3^{\circ}\text{C}$

Humidity: $65\pm 20\%RH$

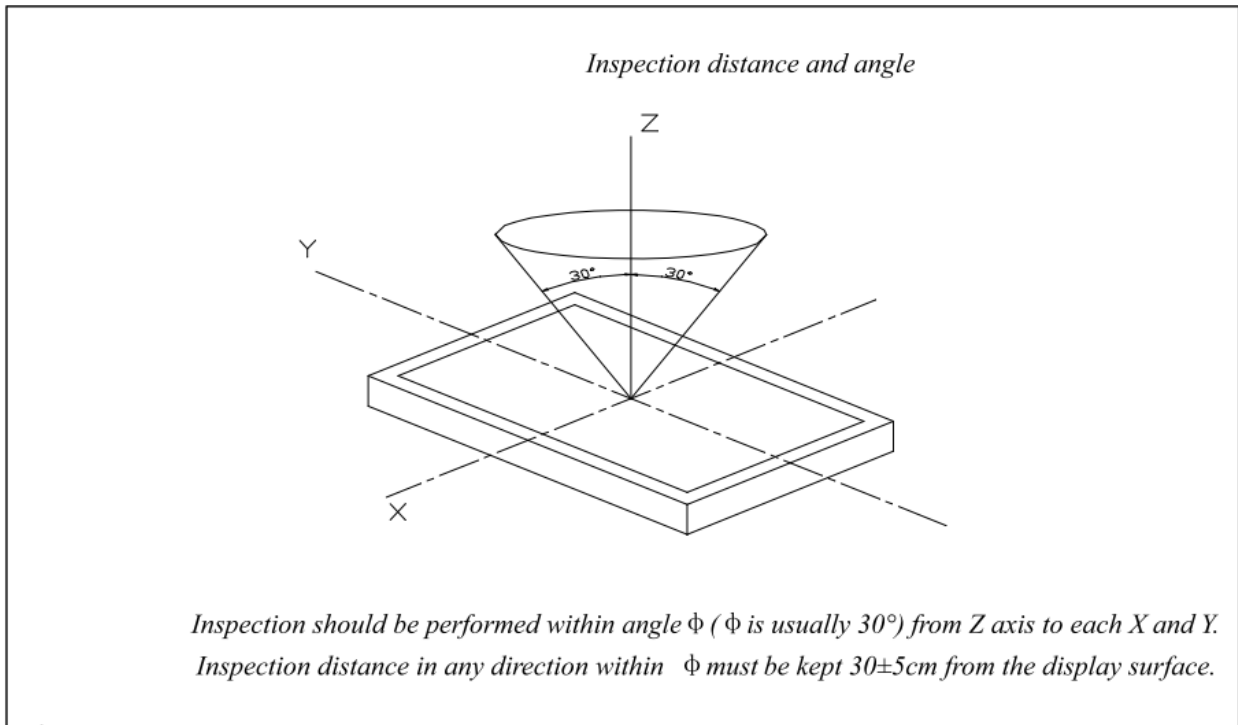
8.1.2 The external visual inspection

With a single 20-watt fluorescent lamp as the light source, the inspection was in the distance of 30cm or more from the LCD to the inspector's eyes .

8.2 LIGHT METHOD



Fluorescent lamp perpendicular to the display surface



8.3 Classification of defects

9.3.1 Major defect

A major defect refers to a defect that may substantially degrade usability for product applications.

9.3.2 Minor defect

A minor defect refers to a defect which is not considered to be able substantially degrade the product application or a defect that deviates from existing standards almost unrelated to the effective use of the product or its operation.