



# Chunghwa Picture Tubes, Ltd. Product Specification

Date : 090803

**TFT LCD**  
**CLAA116WA0BCW**

ACCEPTED BY : (V0.0)

Tentative

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## 1. OVERVIEW

CLAA116WA0BCW is 29.3 cm(11.6") color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs, control circuit and LED backlight. By applying 1366×768 images are displayed on the 11.6" diagonal screen. Display 262K colors by 6 Bit R.G.B signal input.

General specification are summarized in the following table:

ITEM	SPECIFICATION
Display Area (mm)	256.125 (H) x 144.00 (V) (11.6-inch diagonal)
Number of Pixels	1366(H) × 3(RGB) × 768(V)
Pixel Pitch (mm)	0.1875 (H) × 0.1875 (V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white, TN
Number of Colors	262K
Optimum Viewing Angle	6 o'clock
Brightness(cd/m <sup>2</sup> )	400 nit(typ)
Response Time (Tr+Tf)	10 ms (typ)
Viewing Angle(BL on,CR ≥ 10)	170 degree (Horizontal) ; 120 degree(Vertical)
Power Consumption ( W )	6.0W ( Max )
Electrical Interface(data)	LVDS
Module Size (mm)	268(W)typ × 161.5(H)typ × 5.4(D)max
Module Weight (g)	250 (Max.)
Backlight Unit	LED
Surface Treatment	Anti-Glare type , Hardness:3H

## 2. ABSOLUTE MAXIMUM RATINGS

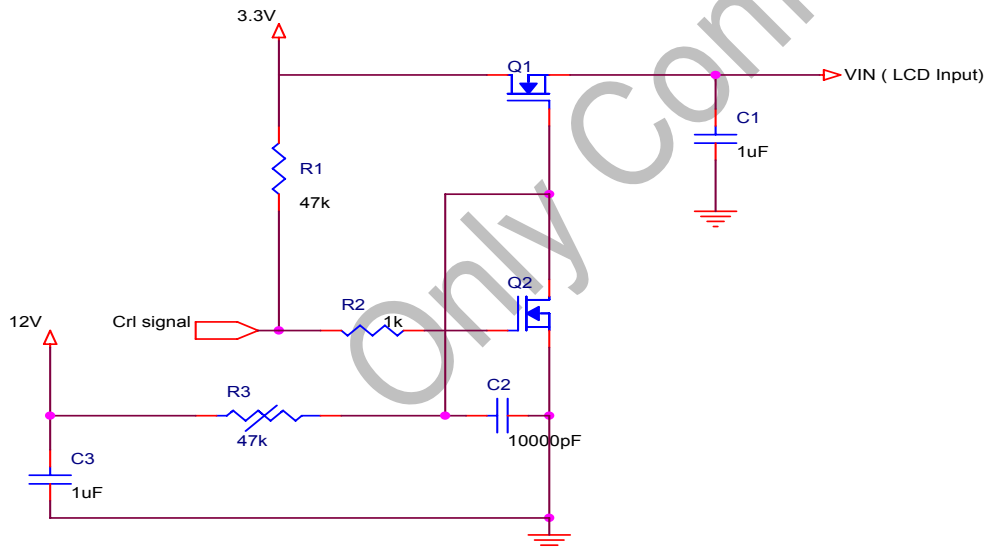
The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

ITEM	SYMBOL	MIN.	MAX.	UNIT	NOTE
Power Supply Voltage	Vcc	-0.3	4.0	V	
LED Supply Voltage	VLED	-0.3	25.0	V	
Control Signals	ADJ / LED_EN	-0.3	4.0	V	
Static Electricity	VESDc	-200	200	V	【Note2】
	VESDm	-15K	15K	V	
ICC Rush Current	IRUSH	-	1	A	【Note 3】
Operation Temperature	T <sub>op</sub>	-30	85	°C	【Note 1】
Storage Temperature	T <sub>stg</sub>	-40	90	°C	【Note 1】

【Note1】 If users use the product out off the environment operation range ( temperature and humidity ) ,it will concern for visual quality.

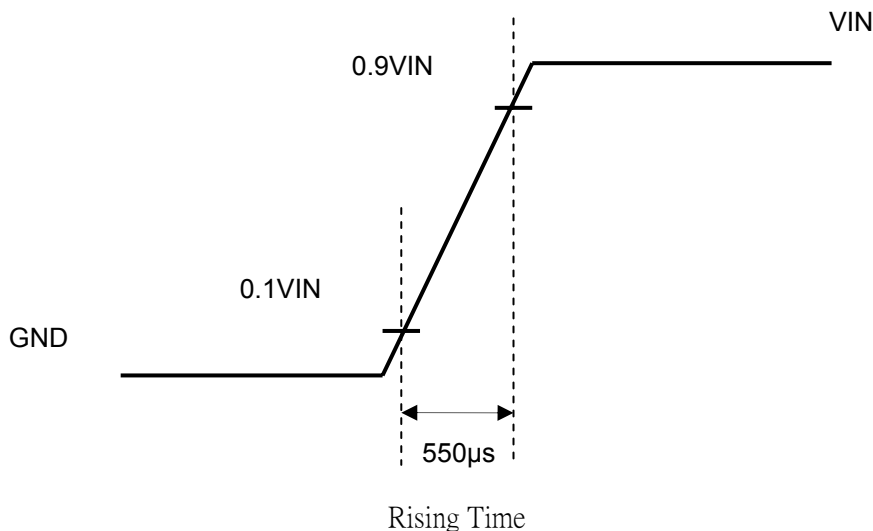
【Note2】 Test Condition: IEC 61000-4-2 ,  
 VESDc : Contact discharge to input connector  
 VESDm : Discontact discharge to module

【Note3】 The input pulse-current measurement system as below :



Control signal: High(+3.3V)→Low(GND)

Supply Voltage of rising time should be from R3 and C2 tune to 550 us.



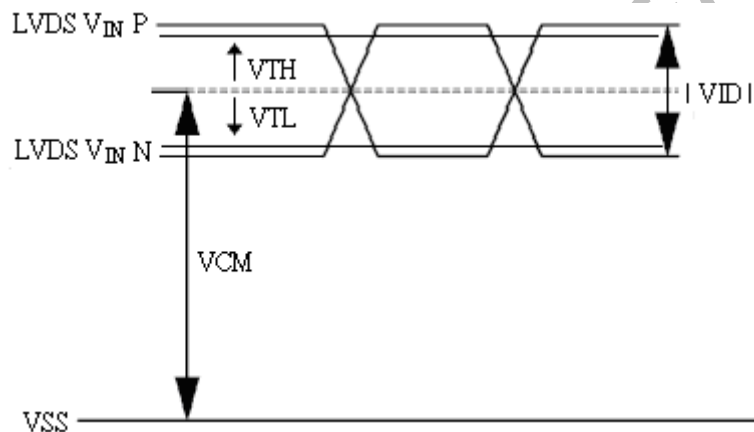
## 3. ELECTRICAL CHARACTERISTICS

## 3.1 TFT LCD Power Voltage

Ta=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE	
Power Supply Voltage For LCD	$V_{CC}$	3.0	3.3	3.6	V		
Power Supply Voltage For LED Driver	$V_{LED}$	11.5	12	12.5	V		
Logic Input Voltage (LVDS:IN+,IN-)	Input Voltage	$V_{IN}$	0	-	$V_{CC}$	V	【Note 1】
	Common Mode Voltage	$V_{CM}$	1.08	1.2	1.32	V	【Note 1】
	Differential Input Voltage	$ V_{ID} $	250	350	450	mV	【Note 1】
	Threshold Voltage(high)	$V_{TH}$	-	-	100	mV	【Note 1】
	Threshold Voltage(low)	$V_{TL}$	-100	-	-	mV	【Note 1】
ADJ / LED-EN LR / UD Voltage	Input Voltage(high)	$V_{IH}$	3.0	-	3.3	V	
	Input Voltage(low)	$V_{IL}$	GND	-	0.3	V	

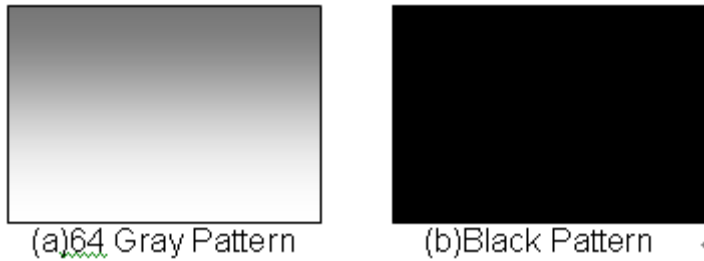
【Note1】 LVDS signal



3.2 TFT-LCD Current Consumption

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
LCD Power Current	$I_{CC}$	--	TBD	TBD	mA	【Note1】
LED BLU Power Current	$I_{LED}$	--	TBD	TBD	mA	【Note2】

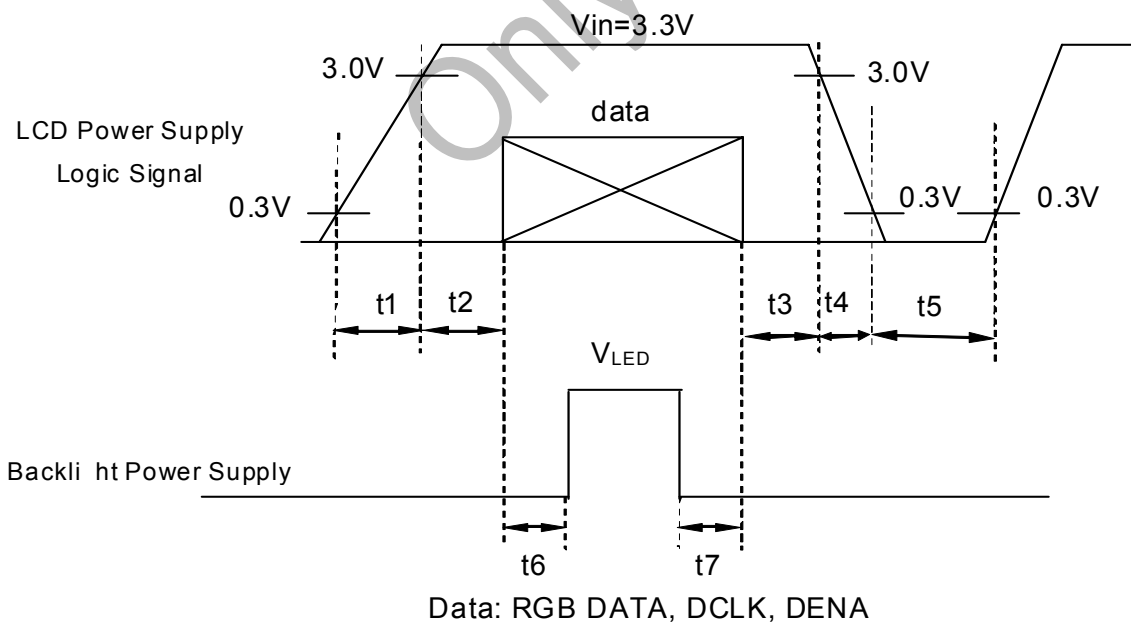
【Note1】 Typical: Under 64 gray pattern @  $V_{CC} = 3.3\text{ V}$  ( Frame rate is 60 Hz )  
 Maximum: Under black pattern @  $V_{CC} = 3.0\text{ V}$  ( Frame rate is 60 Hz )



【Note2】  $V_{LED} = 12\text{ V}$  ; ADJ high pulse is 100 %

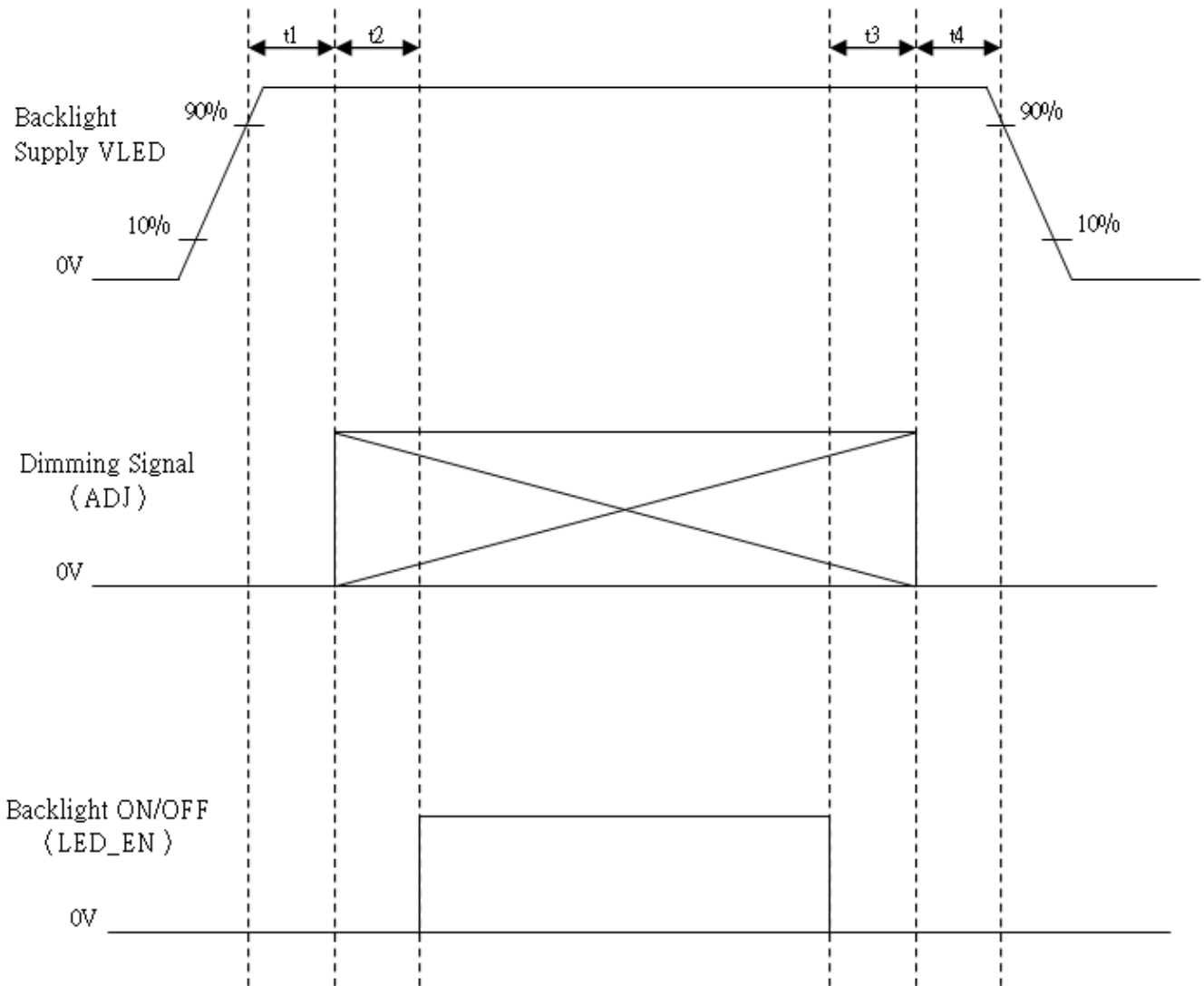
3.3 Power · Signal sequence

- $0.5 < t_1 \leq 10\text{ms}$
- $0 < t_2 \leq 50\text{ms}$
- $0 < t_3 \leq 50\text{ms}$
- $0 < t_4 \leq 10\text{ms}$
- $200\text{ms} \leq t_5$
- $200\text{ms} \leq t_6$
- $200\text{ms} \leq t_7$



3.4 LED BLU ON/OFF Sequence

- 10ms ≤ t1
- 10ms ≤ t2
- 0ms ≤ t3
- 10ms ≤ t4



【Note】 It is necessary that LED\_EN signal shouldn't be active until VLED is supplied.

3.5 Backlight Unit

Ta=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
LED Lift Time (MTBF)	IL	--	15000	--	Hrs	If=20mA



## 4. INTERFACE CONNECTION

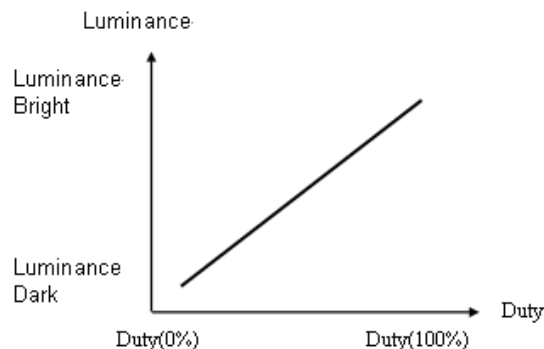
### 4.1 CN1

Connector type : I-PEX 20455-040E-12 or compatible

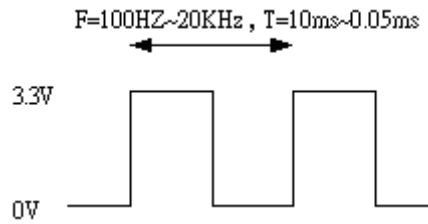
Pin No.	SYMBOL	FUNCTION
1	NC	NC
2	V <sub>CC</sub>	+3.3V Power
3	V <sub>CC</sub>	+3.3V Power
4	DVDD	EDID 3.3V Power
5	NC	NC
6	SCL	EDID Clock
7	SDA	EDID Data
8	RXIN0-	LVDS Signal(-)—channel 0
9	RXIN0+	LVDS Signal(+)—channel 0
10	GND	Ground
11	RXIN1-	LVDS Signal(-)—channel 1
12	RXIN1+	LVDS Signal(+)—channel 1
13	GND	Ground
14	RXIN2-	LVDS Signal(-)—channel 2
15	RXIN2+	LVDS Signal(+)—channel 2
16	GND	Ground
17	RXCLKIN-	LVDS Clock Signal(-)
18	RXCLKIN+	LVDS Clock Signal(+)
19	GND	Ground
20	NC	NC
21	NC	NC
22	GND	Ground
23	NC	NC
24	NC	NC
25	GND	Ground
26	LR	Shift left or right control
27	UD	Shift up or down control
28	GND	Ground
29	NC	NC
30	NC	NC
31	GND	Ground
32	GND	Ground
33	GND	Ground
34	NC	NC
35		Adjust for LED brightness
36	LED-EN	LED Enable pin(+3.3 V Input)
37	NC	NC
38	V <sub>LED</sub>	Power Supply for LED(V <sub>LED</sub> =12V)
39	V <sub>LED</sub>	Power Supply for LED(V <sub>LED</sub> =12V)
40	V <sub>LED</sub>	Power Supply for LED(V <sub>LED</sub> =12V)

#### 【Note】

1) ADJ adjust brightness to control Pin , Pulse duty the bigger the brighter.



2) ADJ signal=0~3.3V , operation frequency : 100HZ-20KHz. ADJ pin should not connect to GND, it should pull-high if not adjust brightness.



3) GND Pin must ground contact , can not be floating.

4) LR / UD :

LR	UD	Display mode
1	0	Normal Display
0	0	Left / Right Contrary
1	1	Up / Down Reverse
0	1	Left / Right Contrary , Up / Down Reverse

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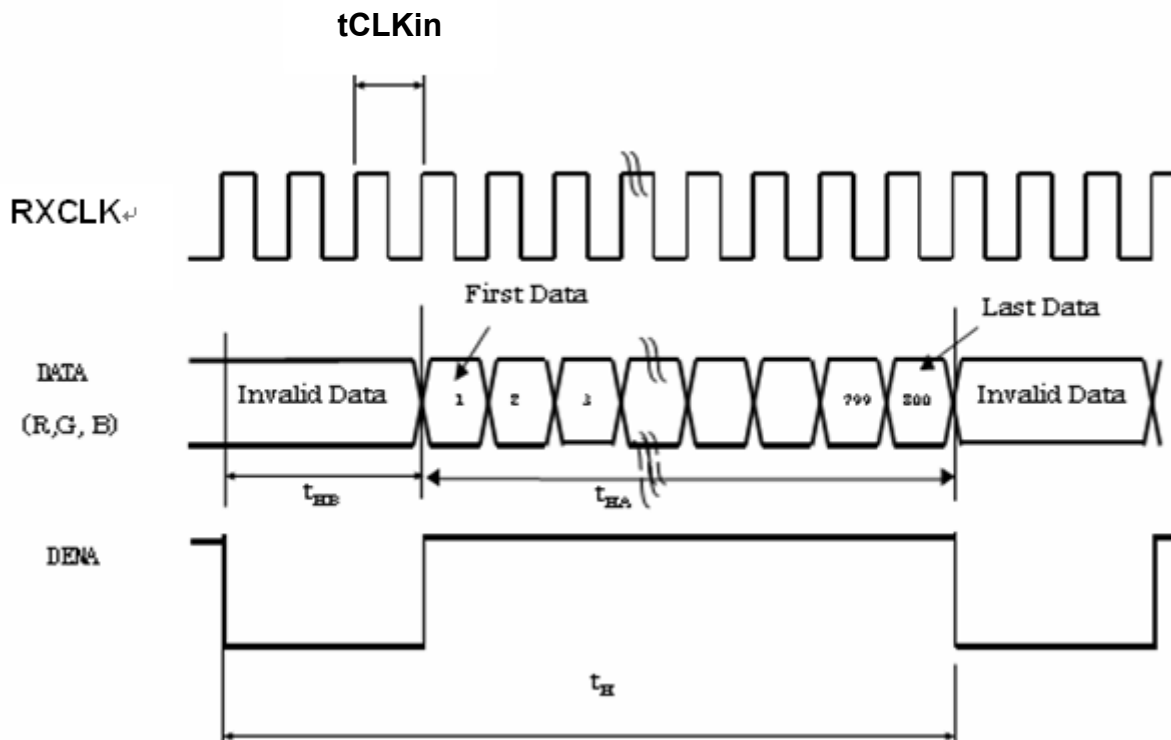
## 5. INPUT SIGNAL

### 5.1 Timing Specification

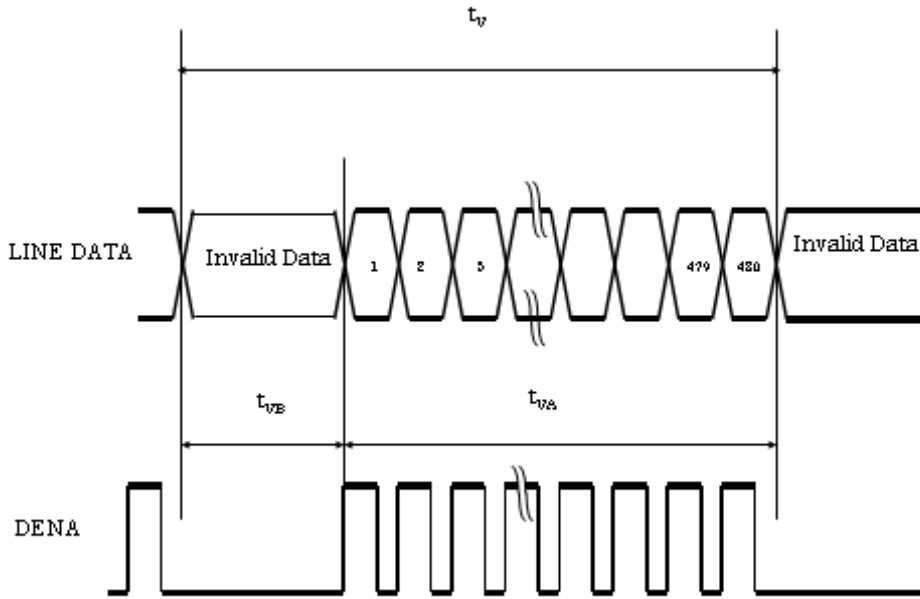
ITEM			SYMBOL	MIN.	TYP.	MAZ.	UNIT
LVDS input signal sequence	CLK Frequency		fCLKin	61.5	69.3	77.0	MHz
	CLK Period		tCLKin	13.0	14.3	16.2	ns
LCD input timing	Horizontal	Horizontal Total Time	$t_H$	TBD	1433	TBD	tCLK
		Horizontal Effective Time	$t_{HA}$	1366			tCLK
		Horizontal Blank Time	$t_{HB}$	TBD	67	TBD	tCLK
	Vertical	Frame	fV	50	60	70	Hz
		Vertical Total Time	$t_V$	TBD	806	TBD	$t_H$
		Vertical Effective Time	$t_{VA}$	768			$t_H$
		Vertical Blank Time	$t_{VB}$	TBD	38	TBD	$t_H$

### 5.2 Timing sequence (Timing chart)

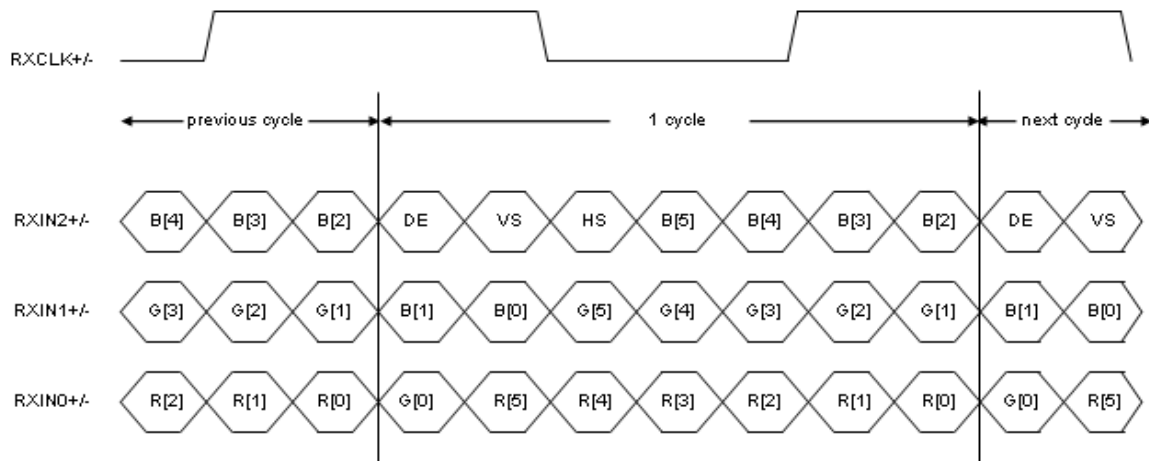
#### 5.2.1 Horizontal Timing Sequence



### 5.2.2 Vertical Timing Sequence



### 5.2.3 LVDS Input Data mapping



5.3 Color data assignment

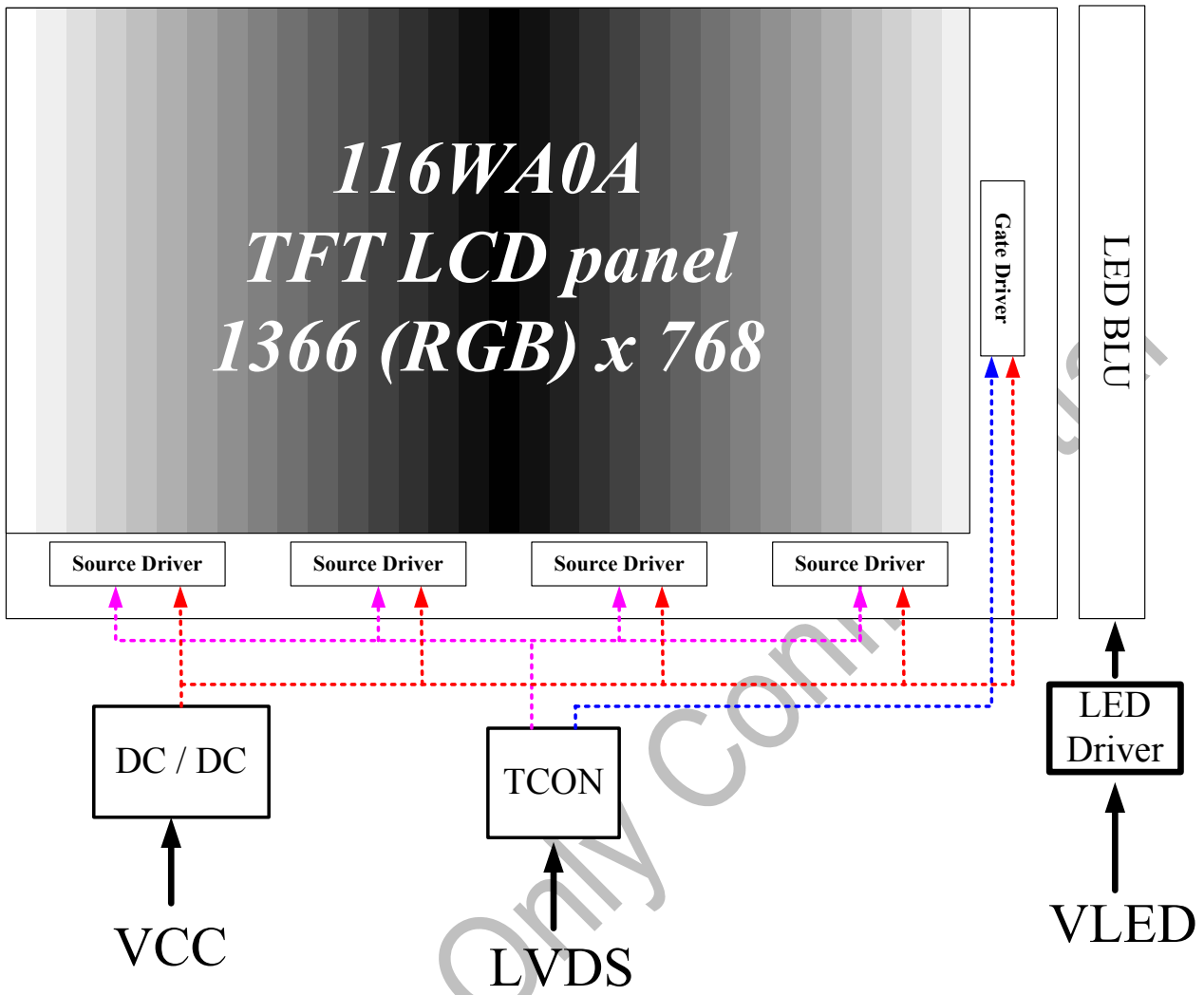
COLOR	INPUT	R DATA						G DATA						B DATA					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
	DATA	MSB					LSB	MSB					LSB	MSB					LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	BLUE(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	GREEN(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	GREEN(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
BLUE	BLUE(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	BLUE(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	BLUE(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

【Note1】 Definition of Gray Scale

color(n) : n is series of Gray Scale. The more n value is, the bright Gray Scale.

【Note2】 Data:1-High,0-Low

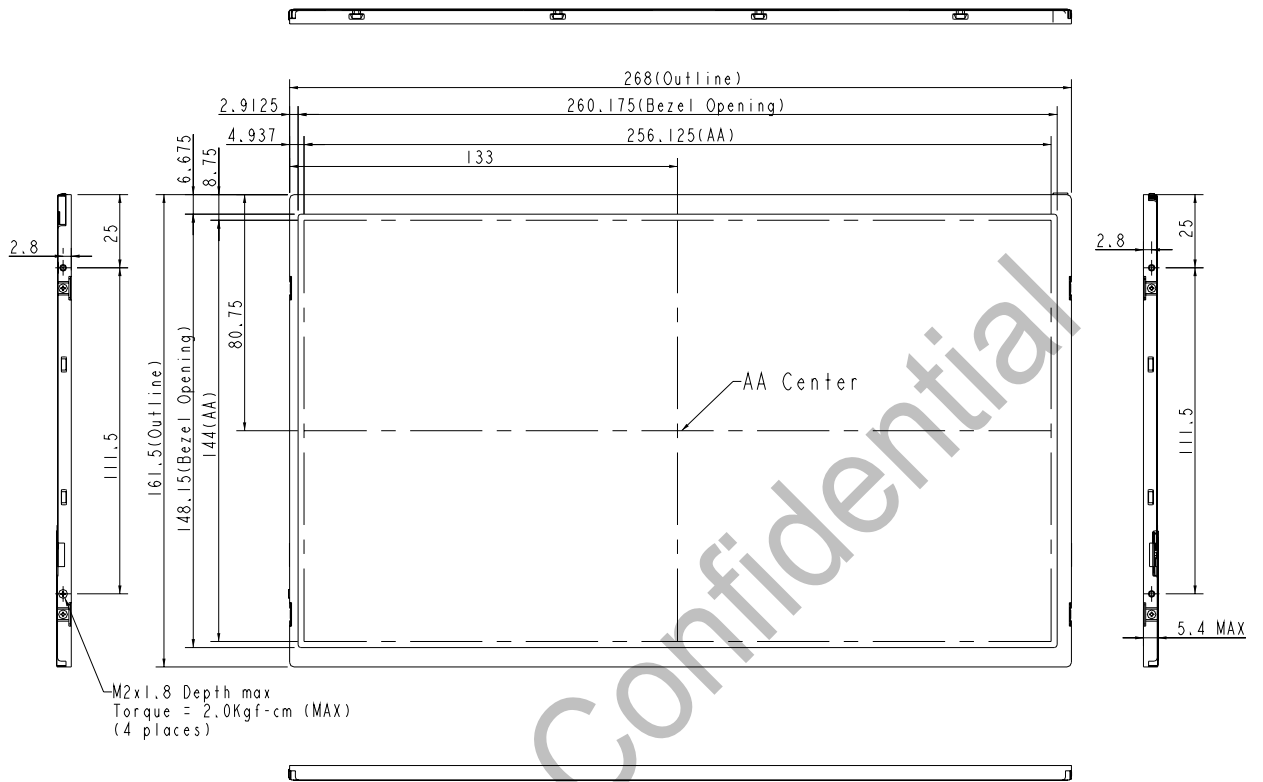
6. BLOCK DIAGRAM



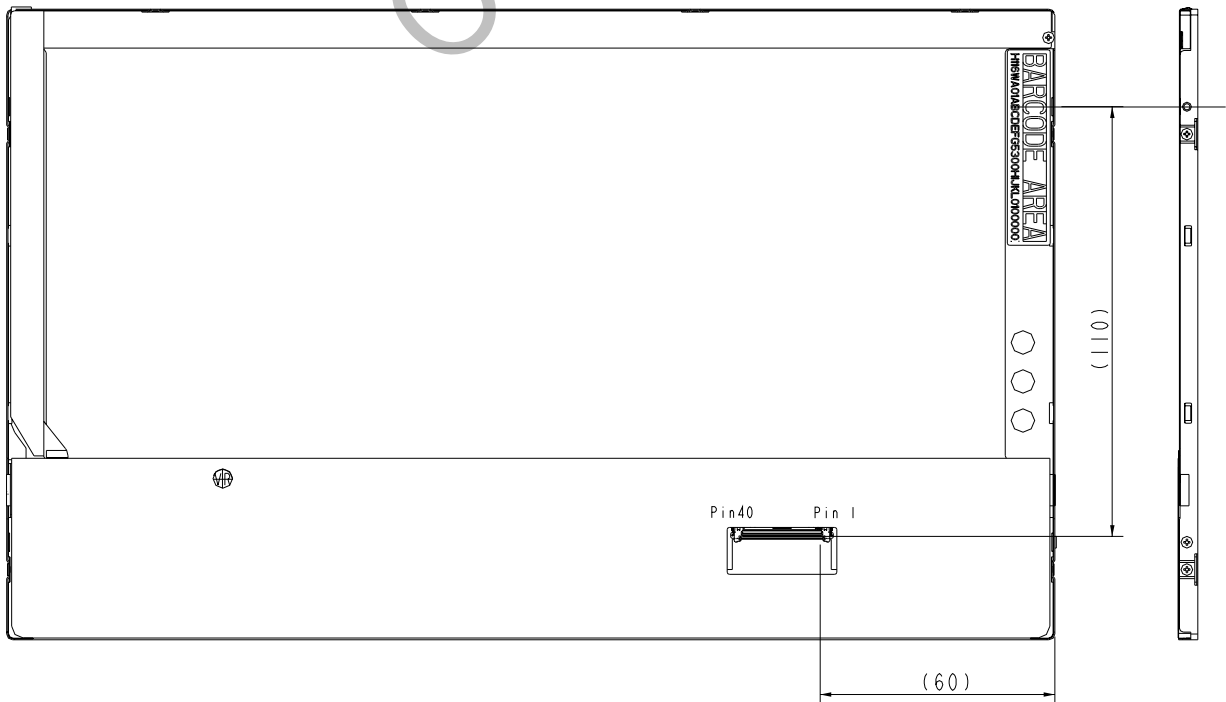
### 7. MECHANICAL DIMENSION

#### 7.1 Front Side

[Unit : mm]



#### 7.2 Rear Side



GENERAL TOLERANCE : ±0.3mm

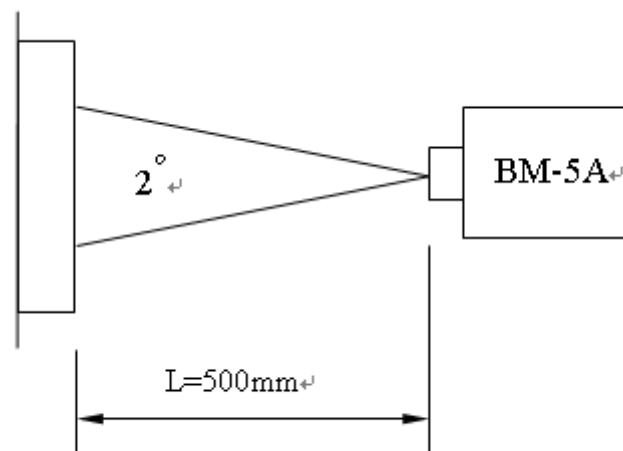
## 8. OPTICAL CHARACTERISTICS

Ta = 25°C, V<sub>CC</sub> = 3.3V

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE	
Constrast Ratio	CR	Point-5	320	400	--	--	*1)*2)*3)	
Luminance*)	Lw		320	400	--	cd/m <sup>2</sup>	*2)*3)	
Luminance Uniformity	ΔL		70	80	--	%	*2)*3)	
Response Time (White - Black)	Tr+ Tf		--	10	14	ms	*3)*4)	
Viewing Angle	Horizontal	ψ	CR ≥ 10 Point-5	150	170	--	°	*2)*3)
	Vertical	θ		100	120	--	°	*2)*3)
Color Coordinate	White	Wx Wy	θ = φ = 0° Point-7	0.283 0.299	0.313 0.329	0.343 0.359	--	*2)*3)
	Red	Rx Ry		TBD	TBD	TBD		
	Green	Gx Gy		TBD	TBD	TBD		
	Blue	Bx By		TBD	TBD	TBD		

## 【Note】

Measure condition : 25°C±2°C , 60±10%RH , under 10 Lux in the dark room. BM-5A (TOPCON) , viewing angle 2° , V<sub>CC</sub>=3.3V , V<sub>adj</sub>=3.3V. (ADJ Duty 100%).



\*1) Definition of contrast ratio :

Measure the point-5 as figure 8-1

Contrast Ratio (CR) = (White) Luminance of ON ÷ (Black) Luminance of OFF

\*2) Definition of luminance :

Measure white luminance on the point-5 as figure 8-1

Definition of Luminance Uniformity :

Measure white luminance on the point 1~9 as figure 8-1

$$\Delta L = L(\text{MIN})/L(\text{MAX}) \times 100\%$$



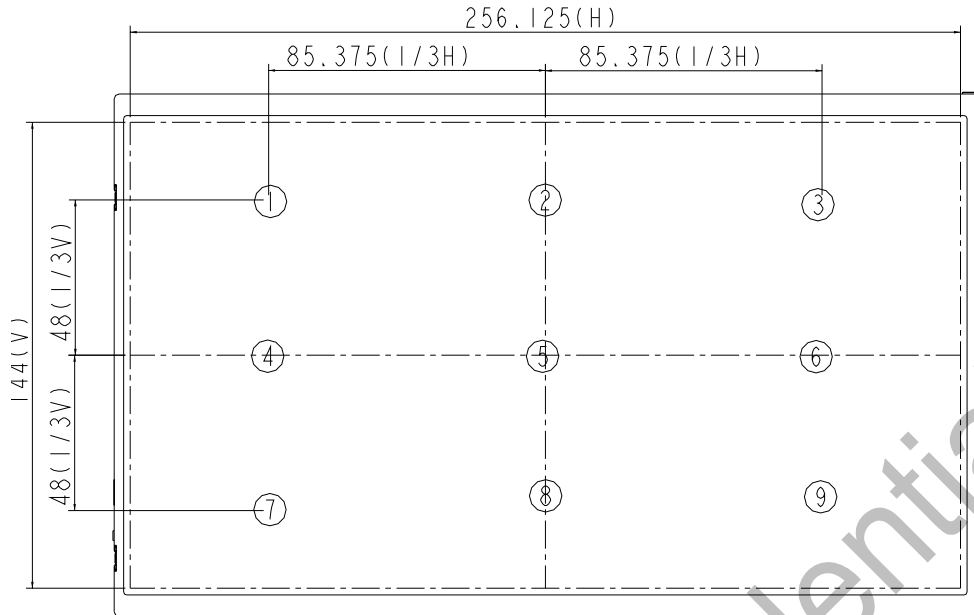


Fig8-1 Measuring point

\*3) Definition of Viewing Angle( $\theta, \psi$ ), refer to Fig8-2 as below :

These items are measured by EZ-CONTRAST (ELDIM) in the dark room. (no ambient light).

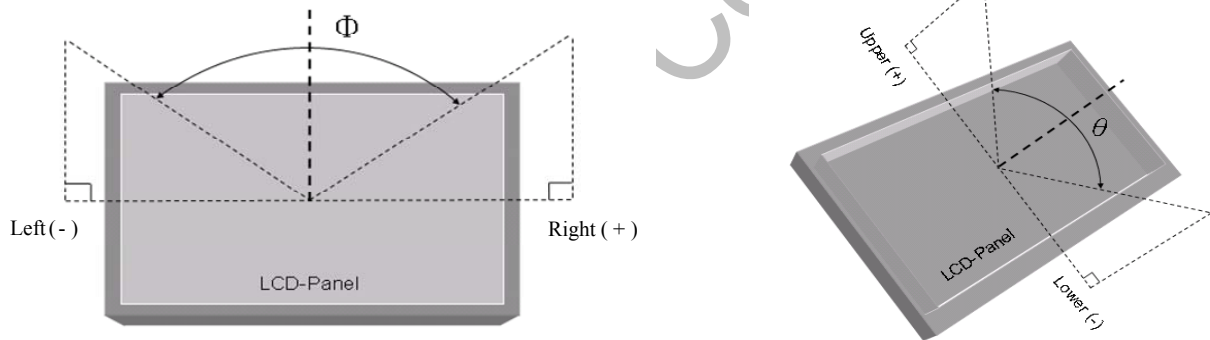


Fig8-2 Definition of Viewing Angle

\*4) Definition of Response Time.(White-Black)

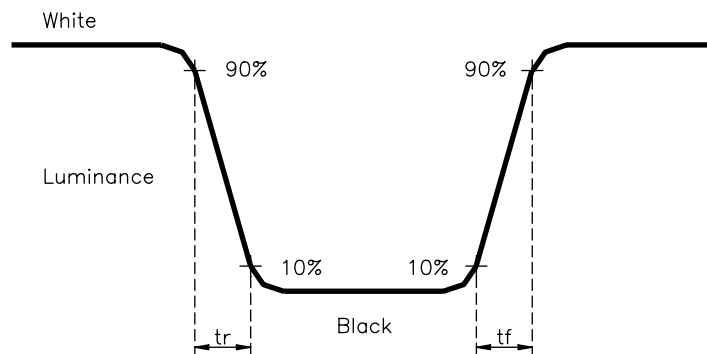


Fig8-3 Definition of Response Time(White-Black)

## 9. RELIABILITY TEST

### 9.1. Temperature and humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	85°C , 240Hrs	
High Temperature Storage	95°C , 240Hrs	
High Temperature High Humidity Operation	60°C , 90%RH , 240Hrs	No condensation
Low Temperature Operation	-30°C , 240Hrs	
Low Temperature Storage	-40°C , 240Hrs	
Thermal Shock	-30°C (0.5Hr) ~ 85°C(0.5Hr) 200 cycles	

### 9.2. Shock and Vibration

TEST ITEMS	CONDITIONS
Shock (Non-operation)	<ul style="list-style-type: none"> <li>■ 100G</li> <li>■ 6msec</li> <li>■ 1/2 Sine wave,.</li> <li>■ +X , +Y , +Z , each axis 3times</li> </ul>
Vibration (Non-operation)	<ul style="list-style-type: none"> <li>■ Frequency range : 8~33.3Hz</li> <li>■ Stroke : 1.3mm</li> <li>■ Sweep : 2.9G , 33.3~400Hz</li> <li>■ Sin wave, perpendicular axis(both X,Z axis : 2hrs , Y axis : 4hrs</li> <li>■ Cycle time : 15min</li> </ul>

### 9.3. ESD Test

ITEM	CONDITION	NOTE
ESD	150pF , 330Ω , ±8KV&±15KV air test	*1)
	200pF ±250V contact test	*2)

#### 【Note】

\*1) LCD glass and metal bezel

\*2) IF connector pins

### 9.4 Judgment Standard

The Judgment of the above test should be made as follow:

Pass:Normal display image with no obvious non-uniformity and no line defect.Partial transformation of the module parts should be ignored.

Fail:No display image,obvious non-uniform,or line defect.