SPECIFICATIONS FOR LCD MODULE

MODEL	WM-G3224Z-1WLWa
CUSTOMER APPROVED	

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Reference Data :

Novatek NT7701 & NT7702 Specifications

(1) Electronic Units:

1.1 Absolute Maximum Ratings

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
OPERATING TEMPERATURE	T_{OP}	0	-	+50	°C
STORAGE TEMPERATURE	T_{ST}	-20	-	+70	°C
INPUT VOLTAGE	V_I	-0.3	-	V_{DD}+0.3	V
SUPPLY VOLTAGE FOR LOGIC	V_{DD}-GND	-0.3	-	7.0	V
SUPPLY VOLTAGE FOR LCD	V_{EE} –GND	-0.3	-	+30.0	V
STATIC ELECTRICITY	Be sure that you are grounded when handing LCM.				

1.2 Electrical Characteristics (Ta=25℃,V_{DD}=3.3V)

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
SUPPLY VOLTAGE FOR LOGIC	V_{DD} -GND	-	3.0	3.3	3.6	V
SUPPLY VOLTAGE FOR LCD	V_{EE} –GND (V_{LCD})	-	-	22.5	-	V
INPUT HIGH VOL	V_{IH}	-	0.8V_{DD}	-	-	V
INPUT LOW VOL	V_{IL}	-	-	-	0.2V_{DD}	V
OUTPUT HIGH VOL	V_{OH}	I_{OH}=-0.4mA	V_{DD}-0.4	-	-	V
OUTPUT LOW VOL.	V_{OL}	I_{OL}=+0.4mA	-	-	+0.4	V
SUPPLY CURRENT FOR LOGIC	*I_{DD}	-	-	1.46	2.2	mA
SUPPLY CURRENT FOR LCD	*I_{EE}	V_{LCD}=22.5V	-	0.11	0.17	mA
Frame Frequency	FLM	-	75	-	85	Hz
M signal Frequency	Fm	-	35	-	150	Hz
USED IC	NT7701 & NT7702					

*I_{DD} Measurement condition is for all pixels on display
*I_{EE} Measurement condition is for all pixels on display

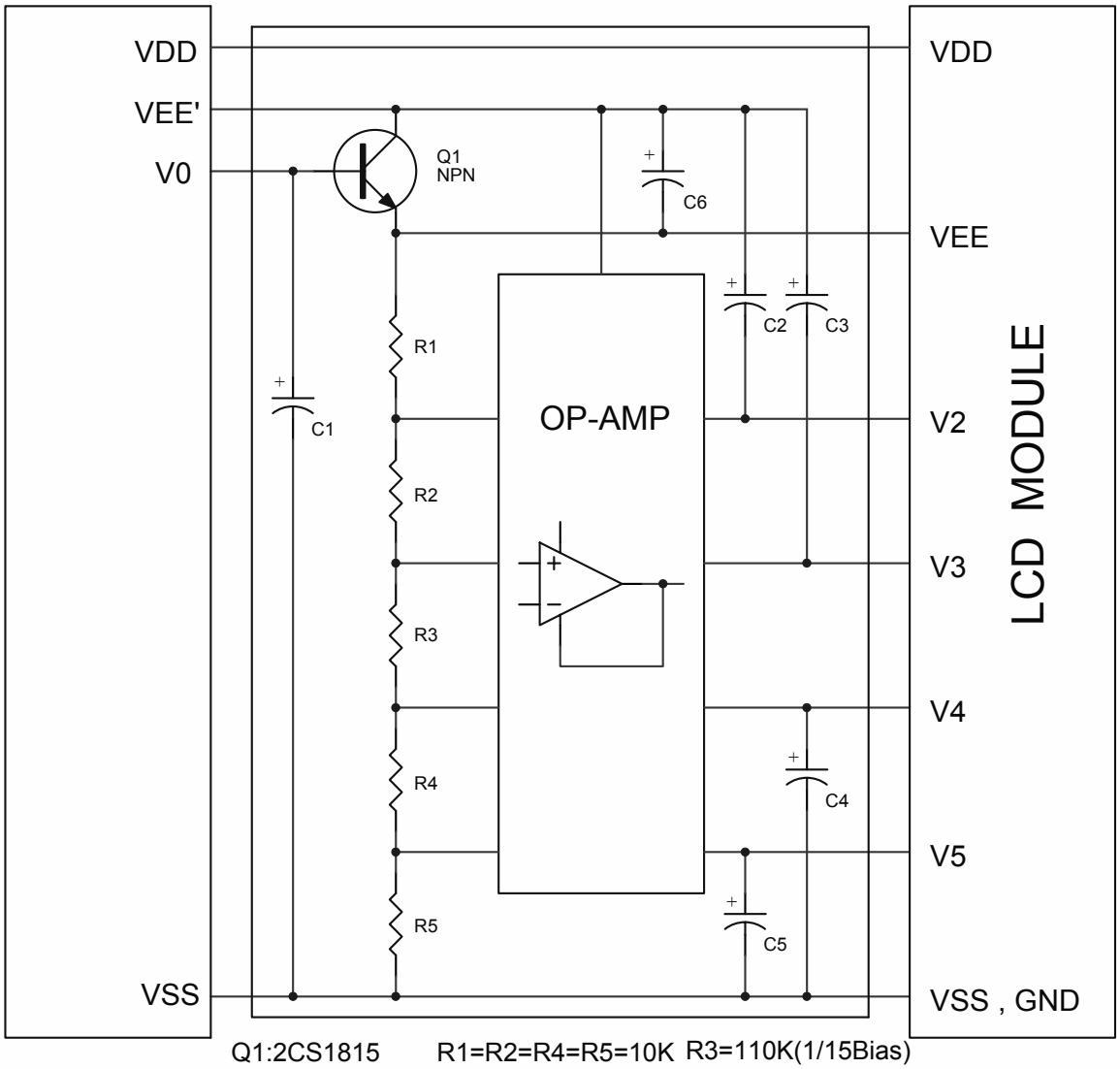
1.3 Interface Pin Function

CN1:

NO	SYMBOL	I / O	FUNCTION
1	LED+	P	Power Supply for LED (+3.5V)
2	LED-	P	Power Supply for LED (0V)
3	GND	P	Power Supply (0V,GND)
4	GND	P	
5	VEE	P	Power Supply for LCD
6	V1	I	Bias voltage for non-select(COM driver)
7	V2	I	Bias voltage for non-select(SEG driver)
8	V3	I	Bias voltage for non-select(SEG driver)
9	V4	I	Bias voltage for non-select(COM driver)
10	FRAME	I	First Line Mark for Common Scan
11	/DISPOFF	I	H:Display on L:Display off
12	D0	I/O	DATA BUS
13	D1	I/O	
14	D2	I/O	
15	D3	I/O	
16	M	I	Switch signal to convert LCD drive waveform into AC
17	CL2 (XCK)	I	Clock Pulse for Segment shift register
18	CL1 (LP)	I	Data latch
19	VDD	P	Power Supply for Logic (+3.3V)
20	GND	P	Power Supply (0V,GND)
21	YU	I	Touch Panel Pin Output Upper (Y Axis)
22	XR	I	Touch Panel Pin Output Right (X Axis)
23	YD	I	Touch Panel Pin Output Lower (Y Axis)
24	XL	I	Touch Panel Pin Output Left (X Axis)

1.4 Power Supply for LCD Module

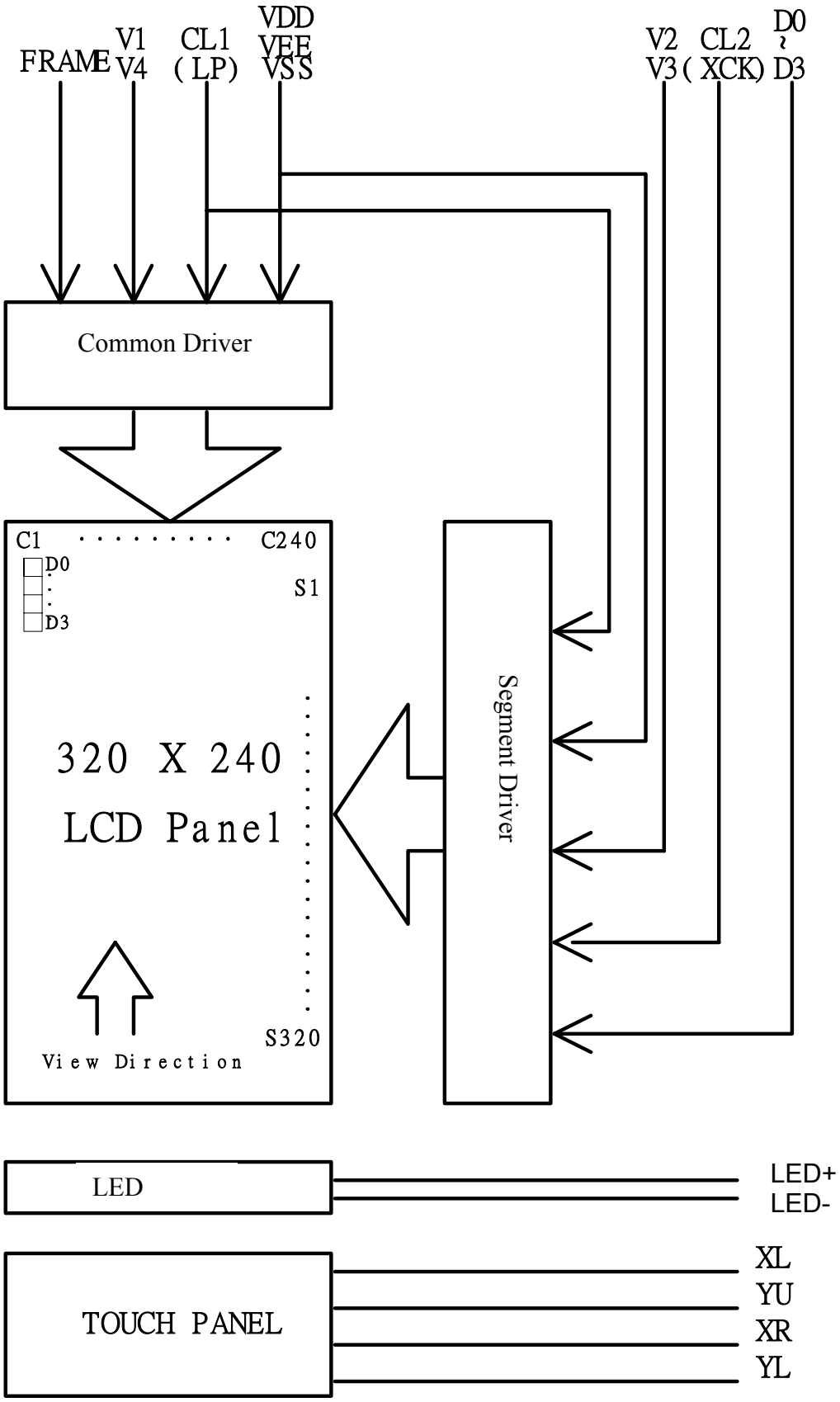
LCD Driving Source(1/15 Bias)



Q1:2CS1815 R1=R2=R4=R5=10K R3=110K(1/15Bias)
OP-AMP:LP324 C1=0.1uF,C2--C6=3.3uF

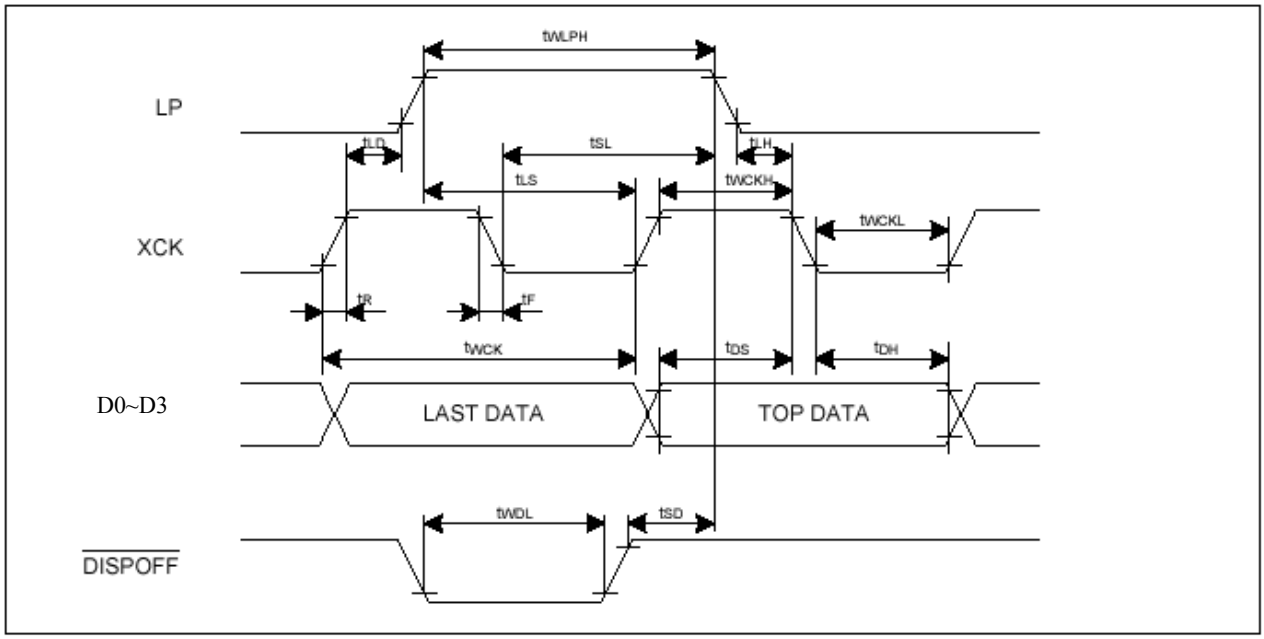
VEE = $\mathbf{V_{LCD}}$=22.5V
V1 = 14/15Vop
V2 = 13/15Vop
V3 = 2/15Vop
V4 = 1/15Vop

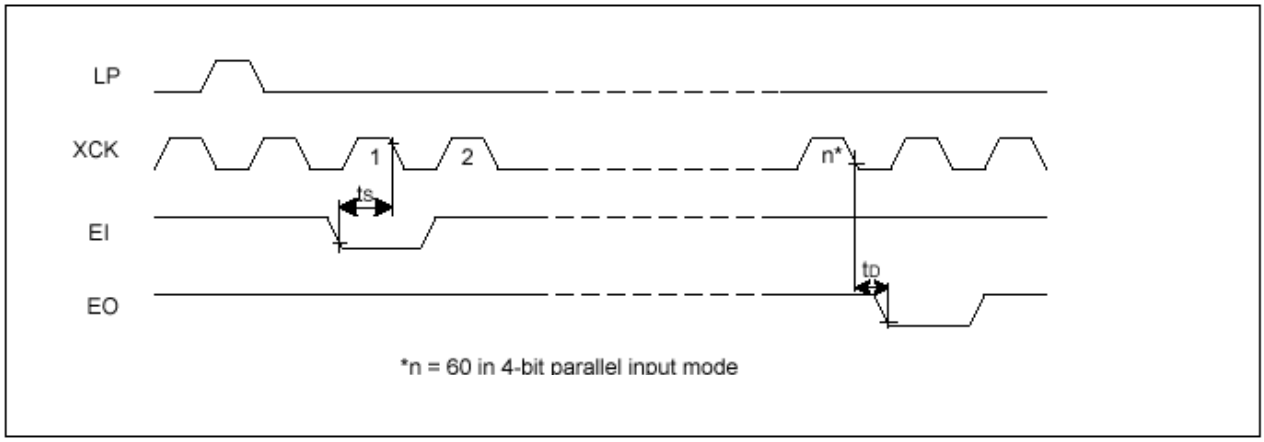
1.5 Block Diagram

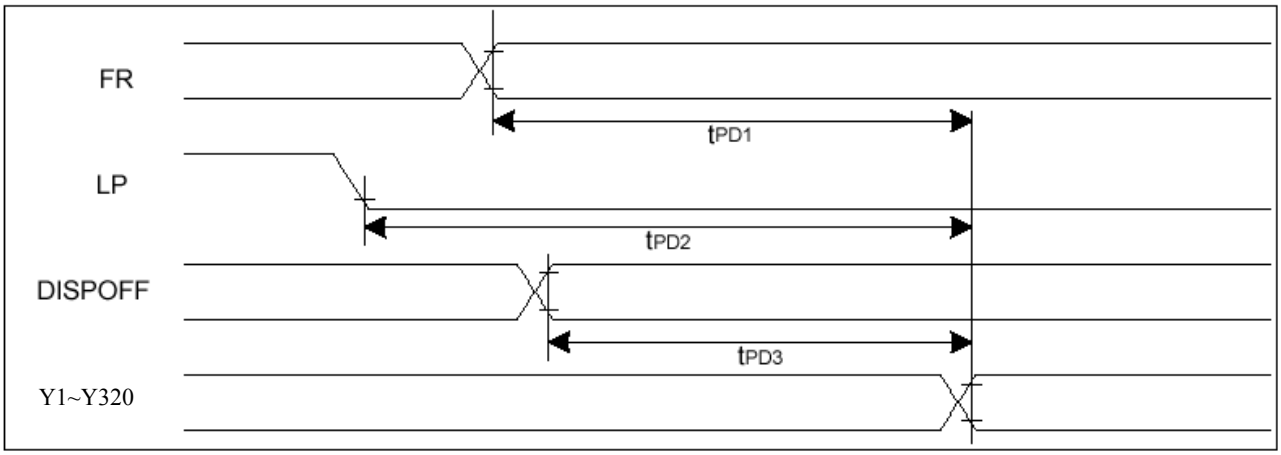


1.6 Timing Characteristic

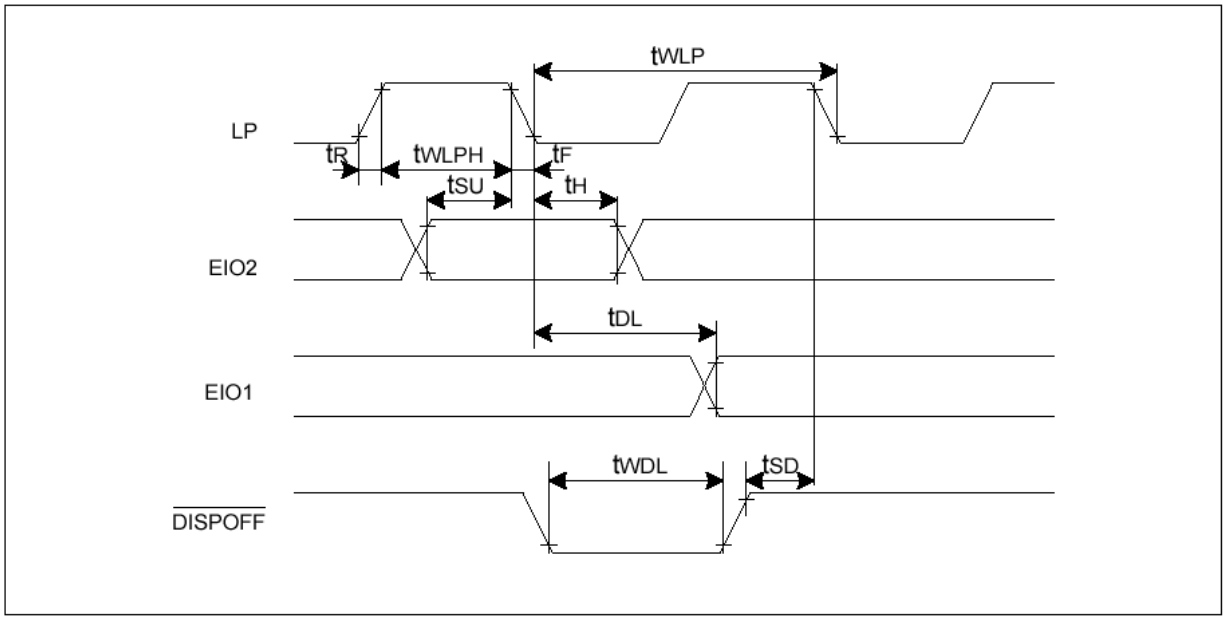
Timing Chart of Segment Mode

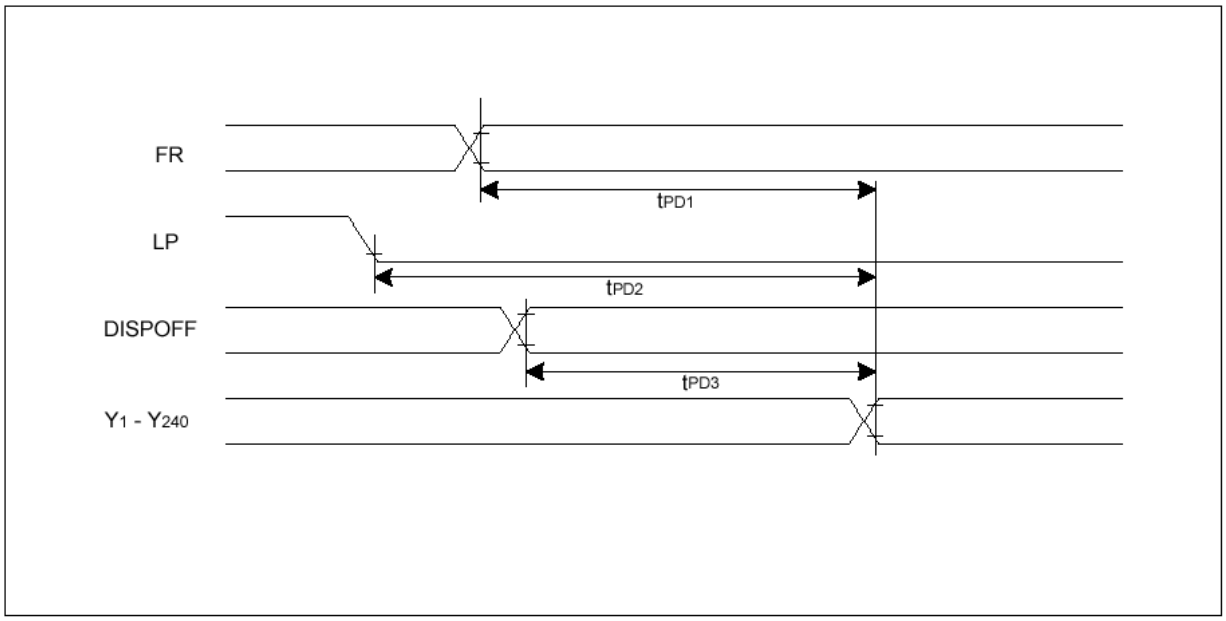






Timing Chart of Common Mode



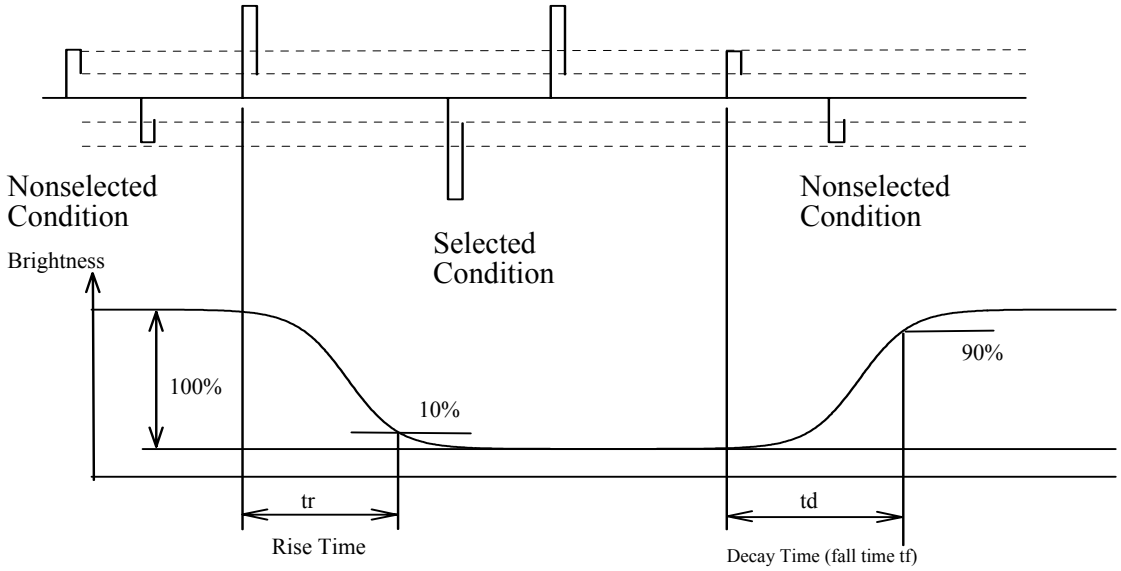


(2) Electro-optical Units

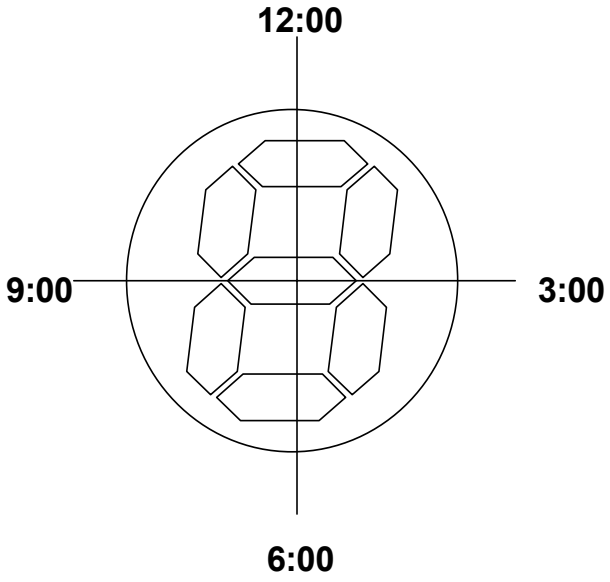
2.1 Electro-optical Characteristics

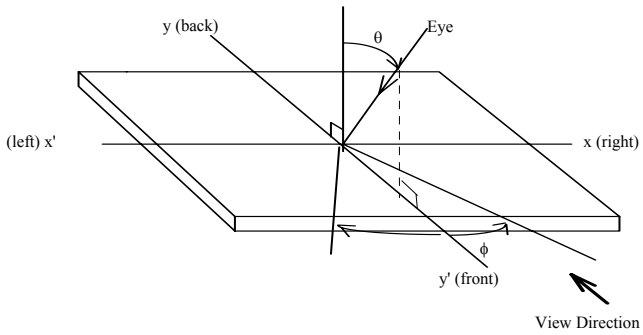
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
VIEW ANGLE (V)	θ	CR≧2	-40	-	+40	deg.
VIEW ANGLE (H)	ϕ	CR≧2	-40	-	+40	deg.
CONTRAST RATIO	CR	Ta=25℃	-	6.0	-	-
RESPONSE TIME	tr	Ta=25℃	-	150	225	ms
RESPONSE TIME	td	Ta=25℃	-	300	450	ms
OPERATING VOLTAGE FOR LCD	V_{LCD}	Ta=25℃	-	22.5	-	V
DRIVE METHOD	DUTY	1/240				
	BIAS	1/15				
LCD TYPE	FSTN (Positive / Transflective)					
VIEWING DIRECTION	6 O'CLOCK					

2.2 Optical Definitions

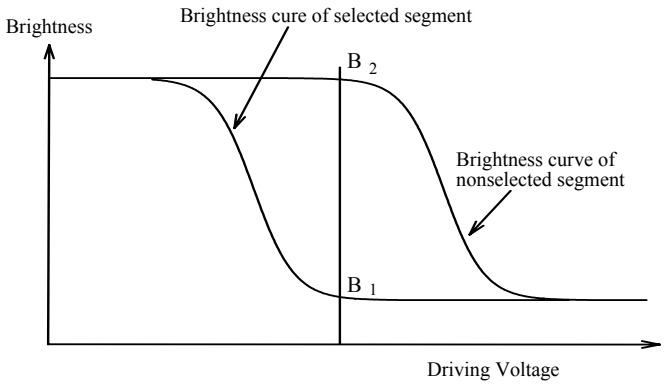


Response Time





View Angle



Perpendicular line (θ=90°)

$$\text{Contrast ration} = \frac{\text{Brightness at nonselected segment (B2)}}{\text{Brightness at selected segment (B1)}}$$

Contrast ration (CR)

2.3 Touch Panel Specification

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WT-AFN1062-FG-A (TOUCH PANEL)

- Film ON Glass Type
- Non-Glare Type

Electrical Characteristics :

Transmission:	JIS-K7105	80 or more	%
On Load	Pen Input	10-80	g
	Finger Input	50-130	g
Resistance Between Leads	X axis	260~650	Ω
	Y axis	260~680	Ω
Insulation Resistance	25V DC	20	MΩ
Knocking Life	250g,5Hz	1000000	Times

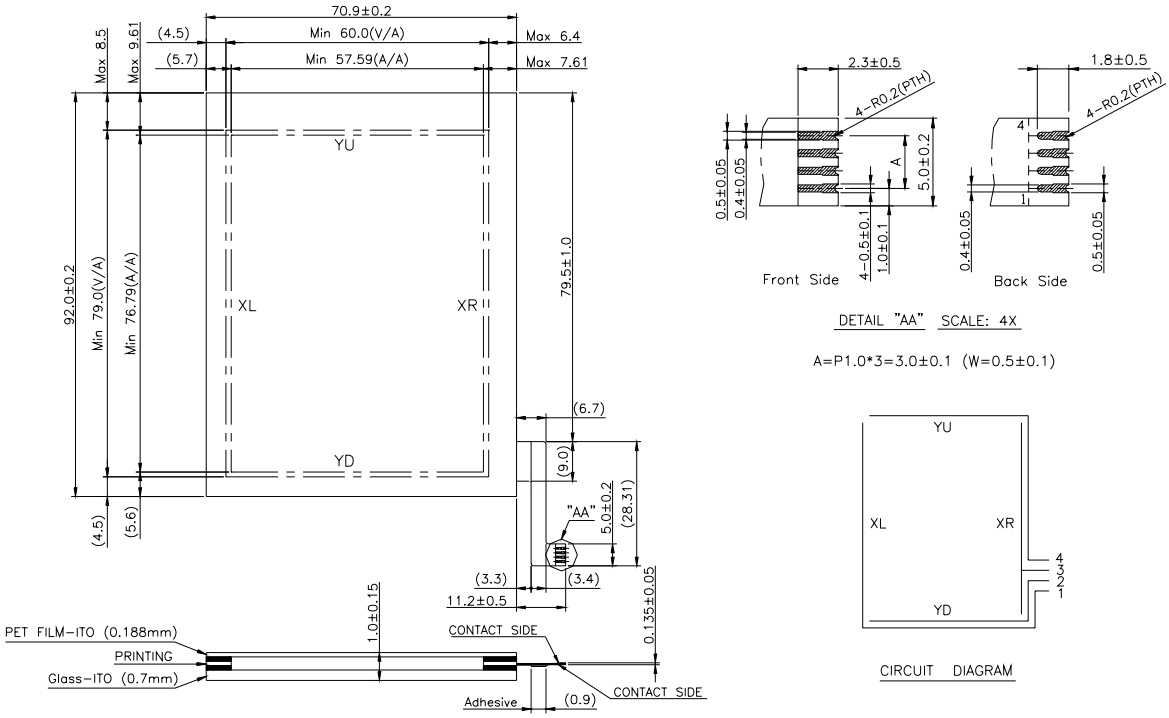
Mechanical Specification :

Dimension Outline	92.0 (W)x70.9(H) x1.0 (T)	mm
View Area	79.0 MIN.(W) x60.0 MIN.(H)	mm
Active Area	76.79MIN. (W) x57.59MIN. (H)	mm
Weight	14.2	g

Absolute Maximum Ratings:

Item	Min.	Typ.	Max.
Operation Temperature (T_{op})	0	-	+50
Storage Temperature (T_{st})	-20	-	+70
Input Voltage (VI)	-	-	5

Outline Dimension :

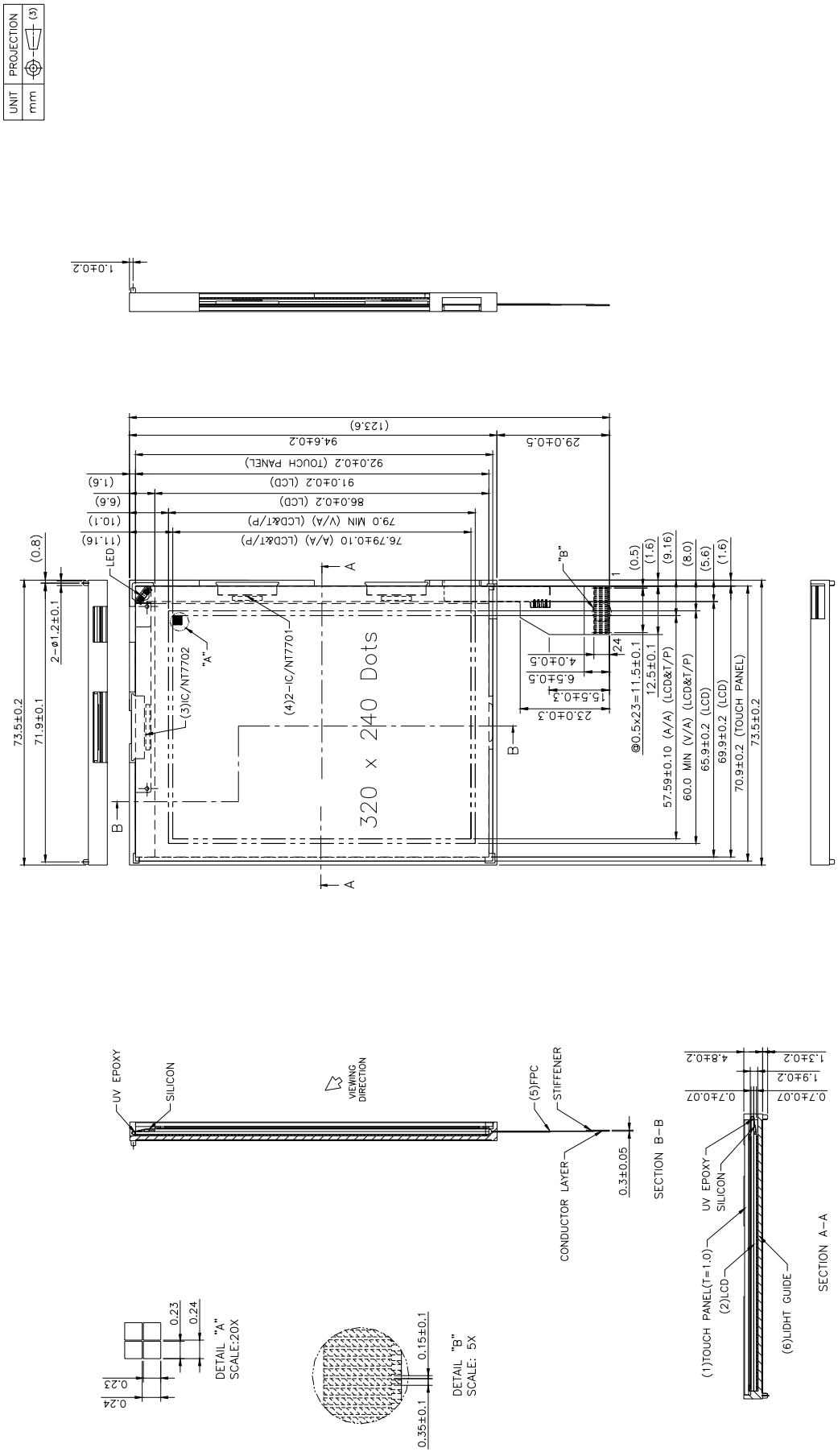


(3) Mechanical Units

3.1 Mechanical Specification

ITEM	STANDARD VALUE	UNIT
NUMBER OF DOTS	320 × 240	dots
MODULE DIMENSION	73.5(W) × 94.6 (H) × 6.1 (T)	mm
VIEWING AREA	60.0MIN.(W) ×79.0MIN. (H)	mm
ACTIVE AREA	57.59(W) ×76.79 (H)	mm
DOT SIZE	0.23 (W) × 0.23 (H)	mm
DOT PITCH	0.24 (W) × 0.24 (H)	mm
APPROX. WEIGHT	50.3	g
BACK LIGHT	LED(White)	

3.2 Mechanical Diagram



3.3 Back-light Specification

The LED chips are distributed over the whole light area of the illumination unit, which gives the most uniform light. :

1. Data About LED Backlight :

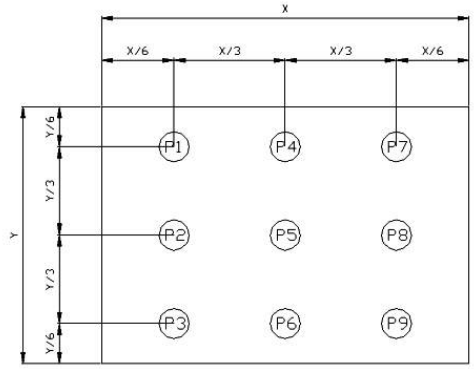
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION	NOTE
Supply Current	I	-	20	40	mA	-	-
Forward Voltage	V_F	-	3.5	-	V	I_F=20mA	-
Reverse Voltage	V_R	-	-	5	V	-	-
Luminous Intensity	I_V	1.5	2.0	-	cd/m^2	I_F=20mA	1 (with LCD)
Luminous Intensity Uniformity	-	-	-	50	%	I_F=20mA	2
LED Peak Emission Wavelength	X	0.31				I_F=20mA	-
	Y	0.32					
Life Time	-	-	20000	-	Hrs	I_F=20mA	-
Color	White						

NOTE：

1. Average Luminous Intensity Of P1 – P9
2. Luminous Intensity Ratio = （MAX- MIN ）/ MAX

2. Internal Circuit Diagram

3. MEASURED METHOD：(X*Y:Light Area)



(Effective spatial Destribution)

Hole Diameter φ3mm;1 to 9 per Position Measured Luminous Intensity