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Chapter 1 General Description

1.1 Description

AND-TFT-104TS is 10.4" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs, control circuit, and backlight.

The 10.4" screen produces a high resolution image that is composed of 1024×768 pixel elements in a stripe arrangement. Display 262K colors by 6 Bit R.G.B signal input.

1.2 General Specifications

Item	Specification	Unit
Panel Size	10.4"	Inch
Resolution	1024 (W) x RGB x 768 (H)	Pixels
Active Area	211.2 (W) × 158.4 (H)	mm
Pixel Pitch	0.20625 (W) x 0.20625(H)	mm
Outline Dimension	236 (W) × 174.3 (H) × 7.4 (T)	mm
Display Mode	Normally White	-
Display Colors	262,144	-
Pixel Configuration	RGB vertical stripe	-
Surface Treatment	Anti-Glare, Hardness 3H	-
Contrast Ratio	500 (Typical)	-
Luminance (cd/m ²)	400 (Typical)	nit
Interface	LVDS 6 bits	-
Backlight	LED	-
Weight	385	g

Chapter 2 Pin Description

2.1 Pin Description

LCD connector (30pin): STM, P/N: MSBK2407P30D or other of the same class

Pin No.	Symbol	Function	Remark
1	GND	Ground	
2	Vcc	+3.3V Power	
3	Vcc	+3.3V Power	
4	NC	NC	
5	NC	NC	
6	NC	NC	
7	GND	GND	
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	GND	Ground	
24	NC	NC	
25	NC	NC	
26	NC	NC	
27	NC	NC	
28	NC	NC	
29	NC	NC	
30	NC	NC	

Note1. GND Pin must be connected to ground. Don't be floating.

2. NC Pin must be floating.

Chapter 4 Absolute Maximum Ratings

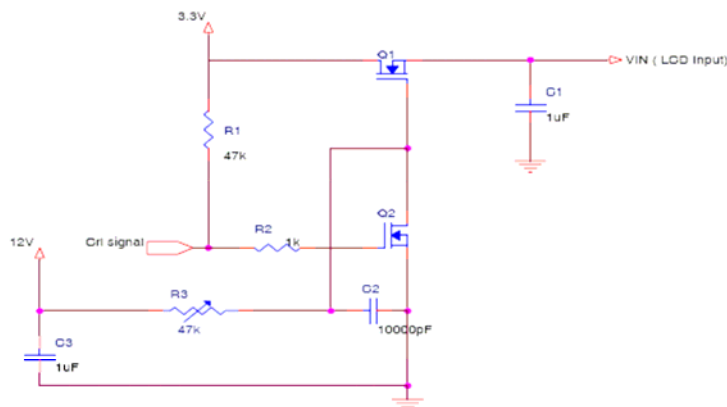
4.1 Absolute Maximum Ratings

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	V _{cc}	-0.3	4.0	V	
LED Supply Voltage	V _{LED}		10.65	V	
ICC Rush Current	IRUSH	-	1	A	Note 2
Operation Temperature	T _{op}	-20	70	°C	Note 1
Storage Temperature	T _{stg}	-30	80	°C	Note 1
Forward Current (per LED)	I _f		30	mA	
Reverse Voltage (per LED)	V _R		5	V	
Pulse Forward Current (per LED)	I _{fp}		100	mA	Note 3

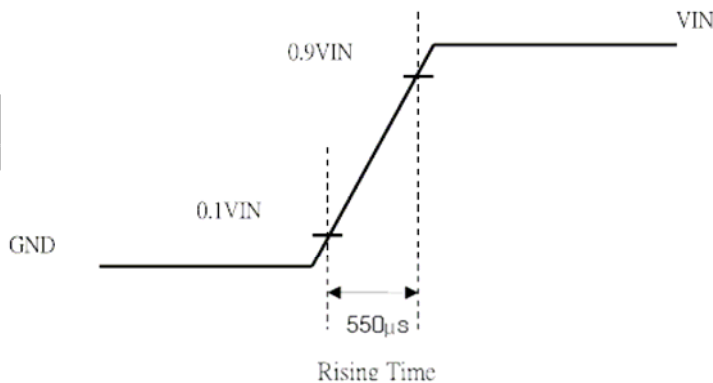
Note1.If users use the product out off the environment operation range(temperature and humidity,it will concern for visual quality.)

Note2.The input pulse-current measurement system as below:



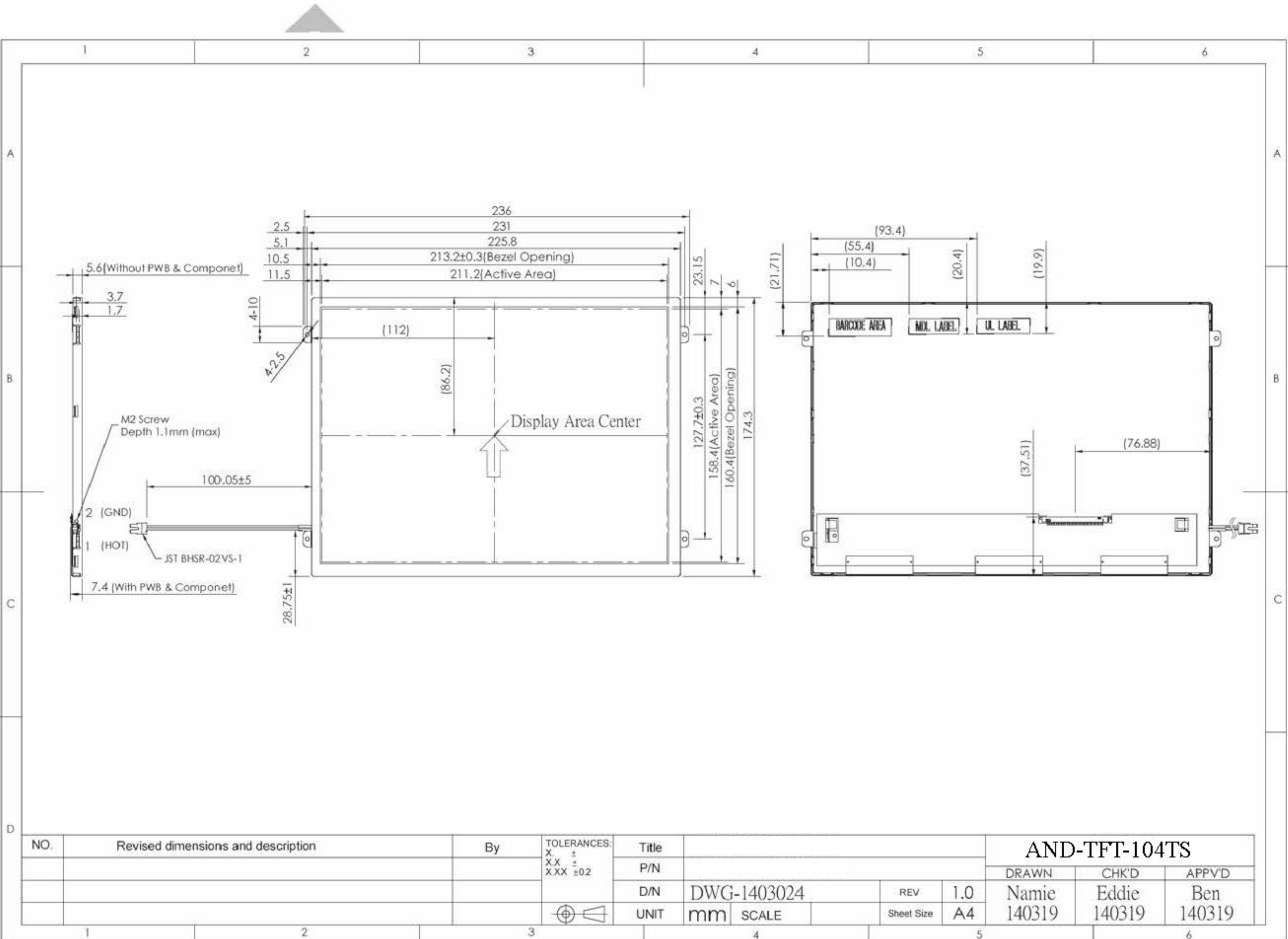
Control signal :High(+3.3V)→Low(GND)

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



Chapter 3 Mechanical Specification

3.1 Dimension Information



Chapter 5 Electrical Characteristics

5.1 TFT LCD Power Voltage

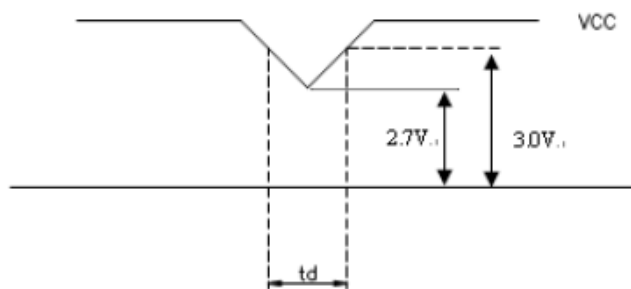
Ta=25°C

Item	Symbol	Min.	Typ.	Max.	Unit	Note	
Power Supply Voltage for LCD	V _{CC}	3.0	3.3	3.6	V	Note 1	
Logic Input Voltage (LVDS: IN+,IN-)	Common Mode Voltage	V _{CM}	1.08	1.2	1.32	V	Note 2
	Differential Input Voltage	V _{ID}	250	350	450	mV	Note 2
	Threshold Voltage (high)	V _{TH}	-	-	100	mV	Note 2
	Threshold Voltage (low)	V _{TL}	-100	-	-	mV	Note 2

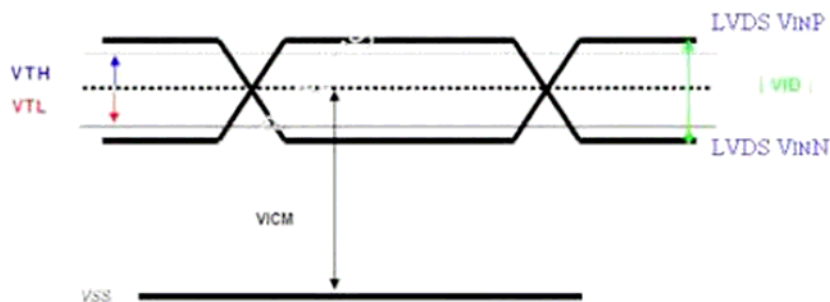
Note 1: V_{CC} -dip condition:

(1) When $2.7\text{V} \leq V_{CC} < 3.0\text{V}$, $t_d \leq 10\text{ms}$.

(2) $V_{CC} > 3.0\text{V}$, V_{CC}-dip condition should be same as V_{CC}-turn-on condition.



Note 2: LVDS signal



5.2 TFT LCD Current Consumption

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Power Current	I_{cc}	-	450	500	mA	Note 1

Note 1. (

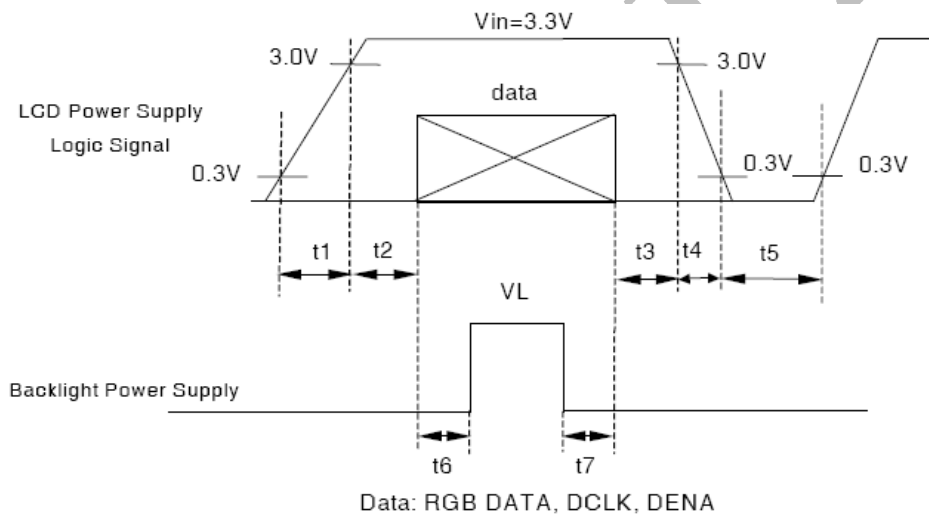


(a)64 Gray Pattern



(b)Black Pattern

5.3 Power · Signal Sequence

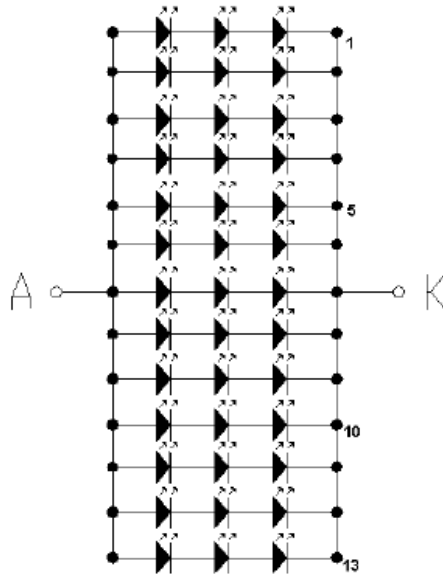


- $0.5 < t1 \leq 10\text{ms}$ $200\text{ms} \leq t5$
- $0 < t2 \leq 50\text{ms}$ $200\text{ms} \leq t6$
- $0 < t3 \leq 50\text{ms}$ $200\text{ms} \leq t7$
- $0 < t4 \leq 10\text{ms}$

5.4 Backlight

Parameters	Symbol	Condition	Min.	Typ.	Max.	Unit	Remarks
LED Current	IL	Ta=25°C (20mA/series)	-	260	-	mA	Note1.2
LED Voltage	VL	Ta=25°C (20mA/series)	8.55	9.6	10.65	V	Note1.2
Power Consumption	WL	Ta=25°C (20mA/series)	-	2.496	2.769	W	Note1.2
LED Life time	-	Ta=25°C IF=20mA	30000	-	-	Hr	Note3.4.5

Note 1. LED Circuit Diagram :



Note 2. A: Anode(+), K: Cathode(-)

Note 3. Suggestion: Using the constant current control to avoid the leakage light and brightness quality issue.

Note 4. Definition of LED Life Time: Luminance < Initial Luminance 50%

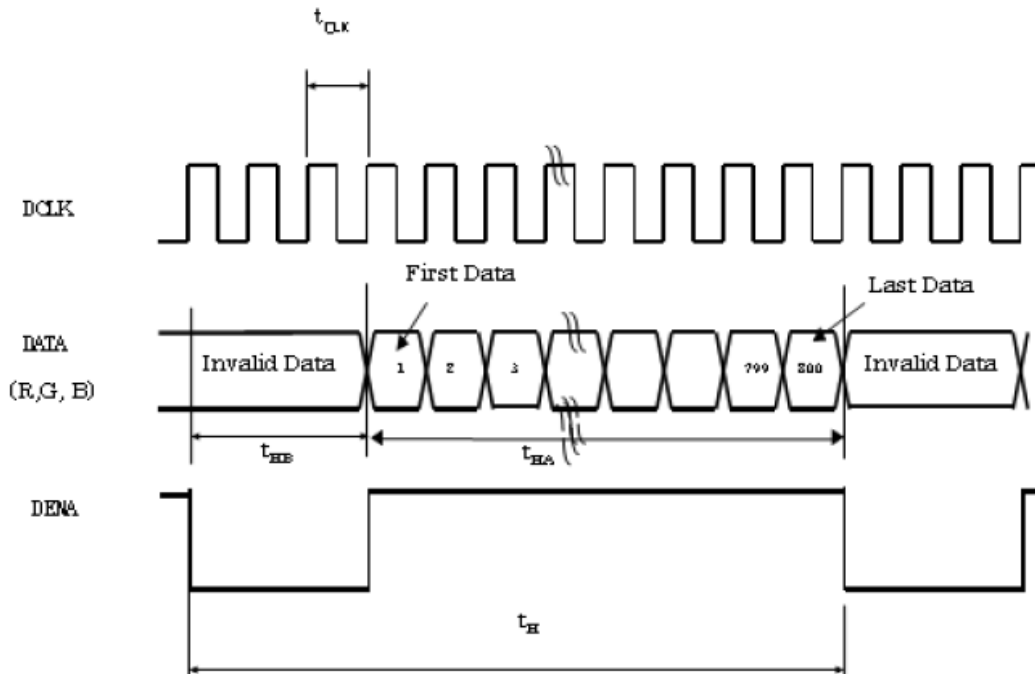
Chapter 6 Input Signal (DE Only Mode)

6.1 Timing Specification

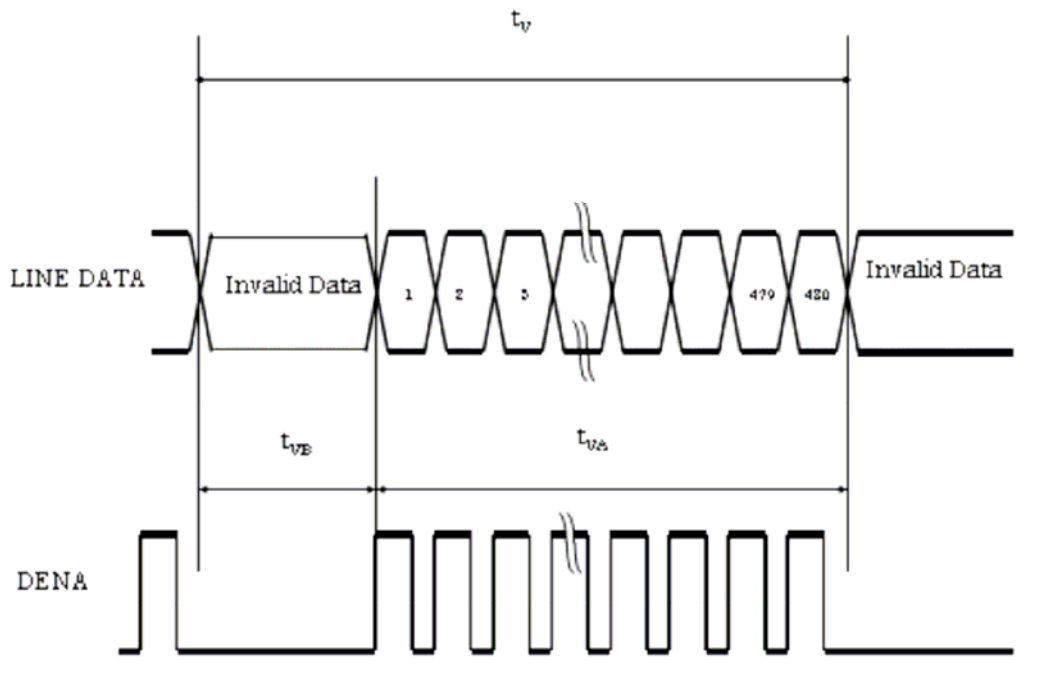
Item		Symbol	Min.	Typ.	Max.	Unit	
LVDS Input Signal Sequence	CLK Frequency	fCLKin	51	65	71	MHz	
LCD Input Timing	Horizontal	Horizontal Period	t _H	1160	1344	1350	tCLK
		Horizontal Valid	t _{HA}	1024			tCLK
		Horizontal Blank	t _{HB}	136	320	326	tCLK
	Vertical	Frame	f _V	55	60	65	Hz
		Vertical Period	t _V	790	806	810	t _H
		Vertical Valid	t _{VA}	768			t _H
		Vertical Blank	t _{VB}	22	38	42	t _H

6.2 Timing Sequence (Timing Chart)

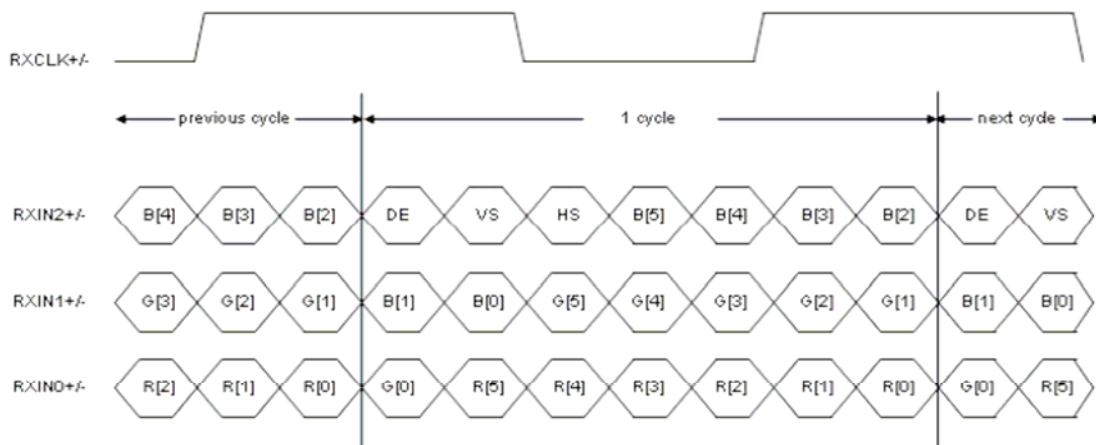
6.2.1 Horizontal Timing Sequence



6.2.2 Vertical Timing Sequence



6.2.3 LVDS Input Data Mapping



6.3 Color Data Assignment

COLOR	INPUT	R DATA						G DATA						B DATA					
	DATA	R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
		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

Note 1. Definition of Gray Scale

color(n): (n) means the level of gray scale, the larger (n) means the brighter level.

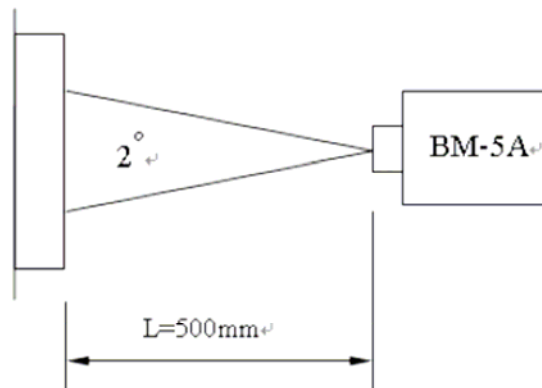
Note 2. Data:1-High, 0-Low

Chapter 7 Optical Characteristics

7.1 Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio	CR	Point-5	400	500	-	-	
Luminance	LW	Point-5	320	400	-	cd/m ²	
Luminance Uniformity	ΔL		70	80		%	
Response Time (White-Black)	Tr+Tf	Point-5		25	30	ms	
Viewing Angle	Left	Deg.	Point-5 CR \geq 10	65	75		1.2.3
	Right	Deg.		65	75		1.2.3
	Upper	Deg.		50	60		1.2.3
	Lower	Deg.		70	80		1.2.3
NTSC			42	47	-	%	
Color Coordinate	White	Wx	$\Theta = \phi = 0^\circ$ Point-5	0.273	0.313	0.353	-
		Wy		0.289	0.329	0.369	
	Red	Rx		0.528	0.568	0.608	
		Ry		0.287	0.327	0.367	
	Green	Gx		0.308	0.348	0.388	
		Gy		0.533	0.573	0.613	
	Blue	Bx		0.120	0.160	0.200	
		By		0.064	0.104	0.144	

NOTE 1: Measure condition: 25°C±2°C, 60±10%RH, under 10 Lux in the dark room. BM-5A (TOPCON), viewing angle 2°, IL=260mA, after 10 minutes operation.



NOTE 2: Definition of contrast ratio:

$$\text{Contrast Ratio (CR)} = (\text{White}) \text{ Luminance of ON} \div (\text{Black}) \text{ Luminance of OFF}$$

NOTE 3: Definition of Viewing Angle(θ, ψ), refer to Fig. 7-1 as below:

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

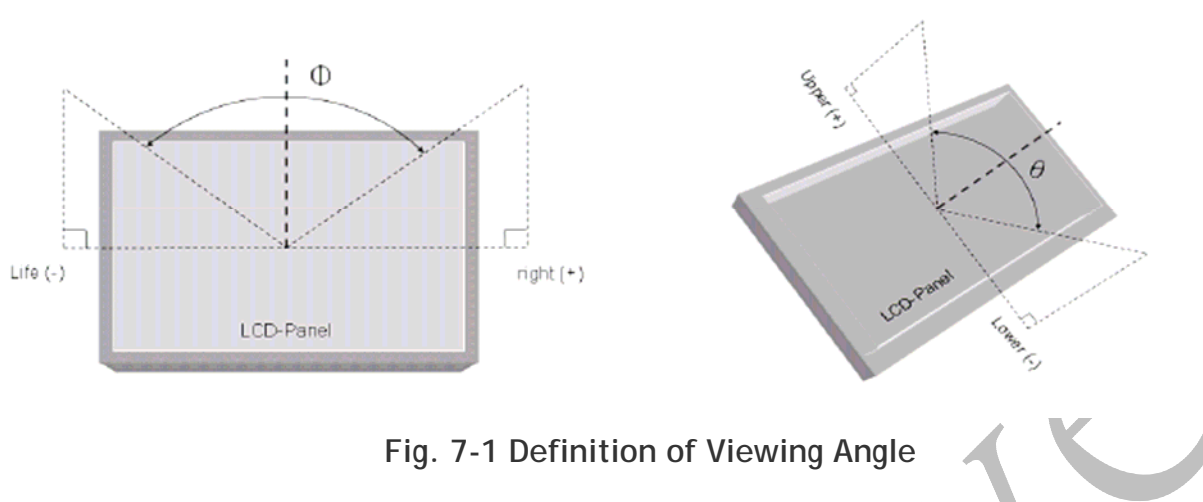


Fig. 7-1 Definition of Viewing Angle

Tentative

Chapter 8 Reliability Test

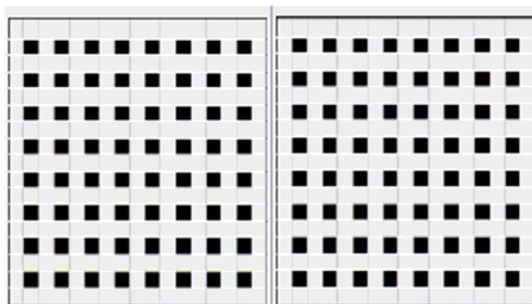
8.1 Temperature and Humidity

Test Items	Conditions	Note
High Temperature Operation	70°C, 240Hrs	
High Temperature Storage	80°C, 240Hrs	
High Temperature High Humidity Operation	60°C, 90%RH, 240Hrs	No condensation
Low Temperature Operation	-20°C, 240Hrs	
Low Temperature Storage	-30°C, 240Hrs	
Thermal Shock	-30°C (0.5Hr) ~ 80°C (0.5Hr) 200 Cycles	
Image Sticking	25°C, 4Hrs	
MTBF	20000Hrs	

NOTE: Condition of Image Sticking test: 25°C± 2°C

Operation with test pattern sustained for 4 hrs, then change to gray pattern immediately.

After 5 mins, the mura must be disappeared completely .



(a) Test Pattern (chess board Pattern)



(b) Gray Pattern

8.2 Shock and Vibration

Test Items	Conditions
Shock (Non-operation)	<ul style="list-style-type: none"> ● Shock level: 980m/s² (equal to 100G) ● Waveform: half sinusoidal wave,6ms. ● Number of shocks: one shock input in each direction of three mutually perpendicular axes for a total of three shock inputs.
Vibration (Non-operation)	<ul style="list-style-type: none"> ● Frequency range: 8~33.3Hz ● Stroke:1.3mm ● Vibration: sinusoidal wave, perpendicularaxis(both x, z axis:2Hrs, y axis 4Hrs). ● Sweep: 2.9G,33.3Hz-400Hz ● Cycle: 15min