PRODUCT SPECIFICATIONS

For Customer: _____

Module No. : **MC57T01G**

Date: 2002.10.30
Version : **1**

Table of Contents

For Customer's Acceptance :

Approved by	Comment
	Official UK Representative

This specification is proposed by Arima Display Corporation.

Presented by	Reviewed by	Organized by
Eric Chen	Eric Chen	Eali Cho

Arima Display Corporation

N0.248-47, Shin Sheng Rd., L.E.P.Z., Chian Jen Chiu, Kaohsiung 806, Taiwan, R.O.C.

TEL: +886-7-8130666 FAX: +886-7-8310555

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2. History of Specification Revision

Date	Rev.	Page	Contents

3. LCD Module

3.1 Main Data

No.	Item	Contents	Unit
(1)	Module size	167.0(W) x 109.0(H) x 10.0 (D)	mm
(2)	Viewing area	120.0 (W) x 90.0 (H)	mm
(3)	Dot Number	320 x 3 (R.G.B) (W) x 240 (H)	dots
(4)	Dot Size	0.10(W) x 0.34(H)	mm
(5)	Dot pitch	0.12(W) x 0.36(H)	mm
(6)	LCD type	•Color-STN (Negative type) • with Anti glare upper polarizer and transmissive rear polarizer . • 0.7mm thickness glass	-
(7)	Contrast ratio	40	-
(8)	Duty	1/242	-
(9)	Viewing direction	6 O'clock	-
(10)	Operating temperature	0 ~ +50	°C
(11)	Storage temperature	-20 ~ +60	°C
(12)	Backlight	Cold Cathode Fluorescent Lamp (CCFL) x 1	pcs
(13)	Power Supply Voltage	5.0 V	-
(14)	Touch Panel	Analog 4 Wire	-
(15)	Weight	230 (approx.)	g

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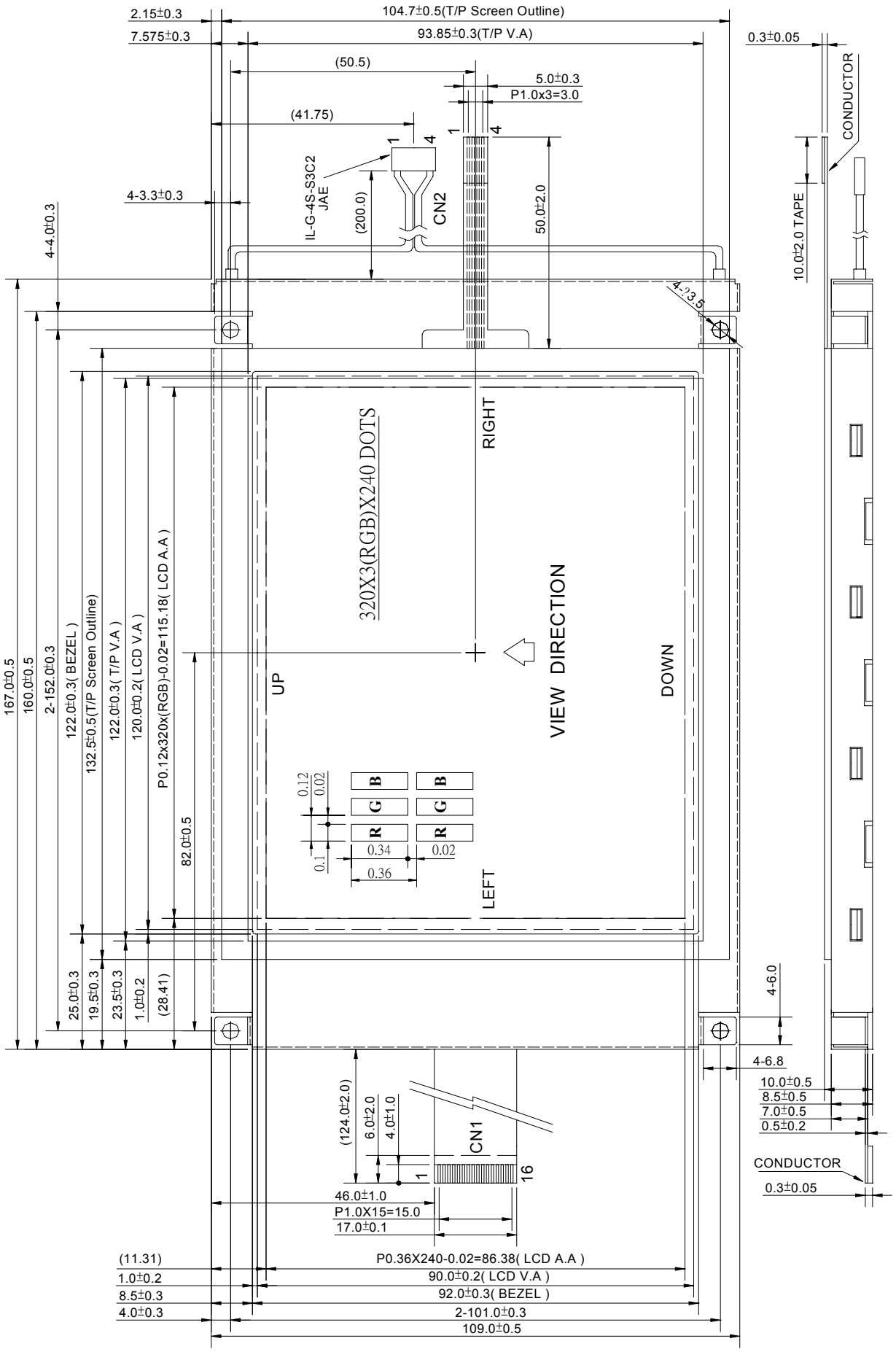
3.2 Outline Dimension



3.3 Interface Pin Connection

CN1: Suitable FFC : Pitch 1.0mm, width 17.0mm.

Pin No.	Signal	Pin Function
1	FLM	First Line Marker
2	CL1	Input data latch signal (LOAD)
3	CL2	Data shift clock (CP)
4	$\overline{\text{DISP OFF}}$	Display control signal H:ON L:OFF
5	VDD	Power supply for Logic
6	VSS	GND
7	VLCD	Power supply for LCD
8	D0	Display data
9	D1	Display data
10	D2	Display data
11	D3	Display data
12	D4	Display data
13	D5	Display data
14	D6	Display data
15	D7	Display data
16	VSS	GND

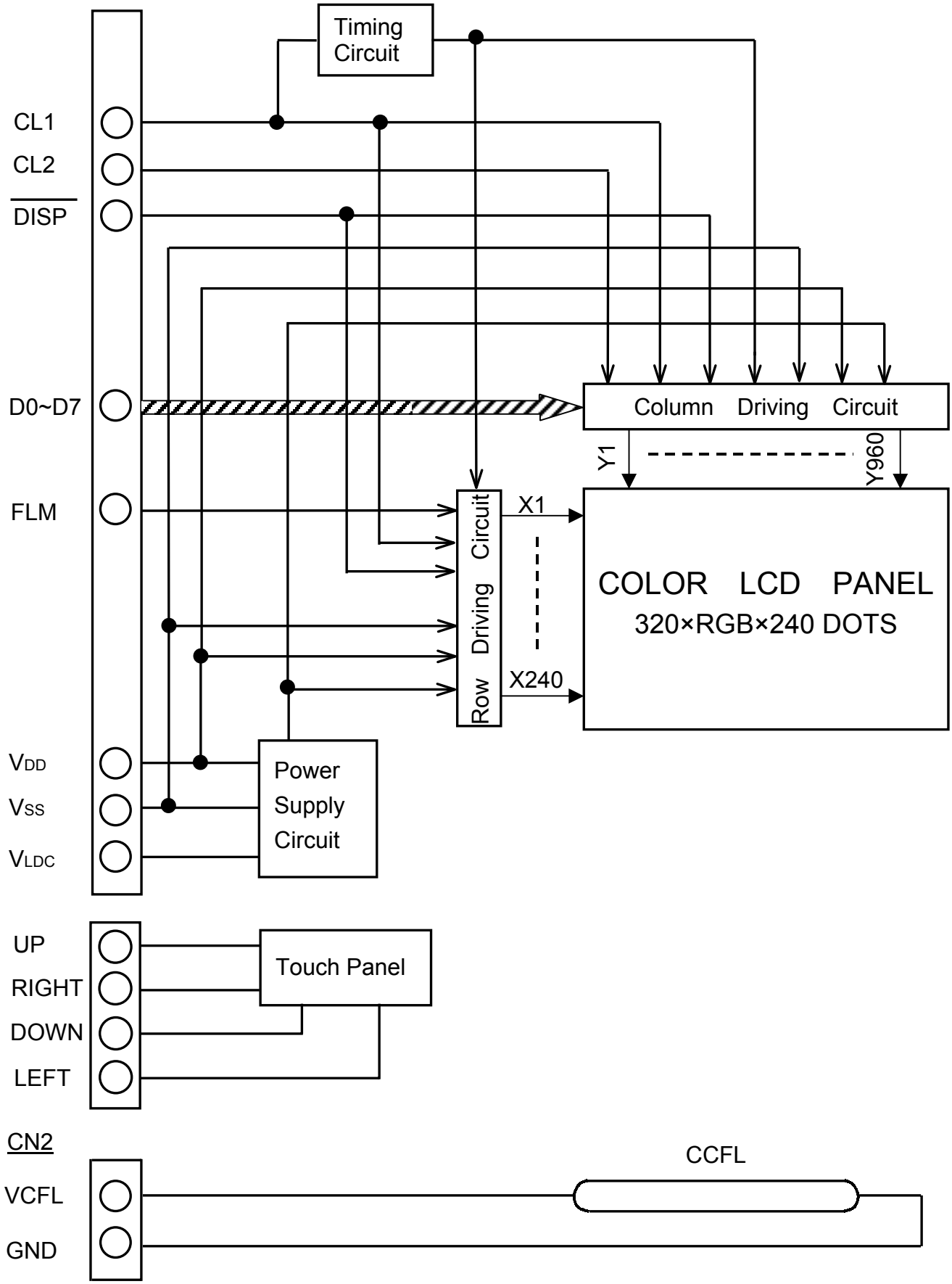
CN2 : JAE/IL-G-4S-S3C2 /

Pin No.	Signal	Function
1	VCFL	Power Supply for CCFL
2	-	----------
3	-	----------
4	GND	GND for CCFL

Touch Screen: Suitable FPC : Pitch 1.0mm, width 5.0mm.

Pin No.	Signal	Function
1	UP	UP Direction
2	RIGHT	RIGHT Direction
3	DOWN	DOWN Direction
4	LEFT	LEFT Direction

4. Block Diagram



5. Maximum Ratings

5.1 Electrical Absolute Maximum Ratings. (LCM)

(VSS=0V)

Item	Symbol	Min.	Max.	Unit
Power supply for Logic	V_{DD}-V_{SS}	-0.3	7.0	V
Contrast Adjustment Voltage	V_{LCD}-V_{SS}	0	45	V
Input voltage (Note 1)	Vi	-0.3	V_{DD}+0.3	V

Note 1. FLM,M,CL1,CL2,DISP,D0~D7.
Note 2. Ta=25°C
Note 3. Make certain you are grounded when handling LCM.

5.2 Environmental Absolute Maximum Ratings

Item	Storage		Operating		Remark
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-20°C	60°C	0°C	50°C	Note1,2,3
Humidity	Note 4		Note 4		No Condensation
Vibration	-	2.45m/s^2	-	11.76 m/s^2 Note 5	1h max Note 6
Shock	-	29.4m/s^2	-	490 m/s^2 Note 5	XYZ directions 11ms

Note 1. Ta at -20°C --------<48hours, at 60°C --------<168 hours.

Note 2. Background color changes slightly depending on ambient temperature.
The phenomenon is reversible.

Note 3. When LCM is operated at 5°C, the lift time of CCFL will be reduced.
Need to make sure of value of IL and characteristics of inverter.
The response time at 5°C will be slower.

Note 4. Ta<=40°C : 85%RH MAX.
Ta> 40°C : Absolute humidity must be lower than the humidity of 85% RH at 40°C.

Note 5. The module should be operated normally after the test is finished.

Note 6. 5Hz ~ 100Hz (Except resonance frequency).

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6. Electrical Characteristics

6.1 Electrical Characteristics of LCD

Item	Symbol	Condition		MIN.	Typ.	Max.	Unit
Power Supply for Logic	V_{DD}	V_{DD}-V_{SS}		4.5	5.0	5.5	V
Input Signal Voltage Note (1)	V_{IH}	"H" Level		0.8V_{DD}	—	V_{DD}	V
	V_{IL}	"L" Level		0	—	0.2V_{DD}	
Power supply current Logic	I_{DD}	V_{DD}=5.0V V_{LCD}=22.5V Note (3)		—	1.0	5.0	mA
Power supply current Lcd	I_{EE}			—	6.5	13.0	mA
Recommended LCD Driving Voltage	V_{LCD} -V_{SS}	Duty=1/242 Bias=1/13	Ta=0°C	—	(23.6)	—	V
			Ta=25°C	22.0	22.5	23.0	
			Ta=50°C	—	(21.4)	—	
Frame Freguency	fFLM	—		115	120	125	Hz

Note (1) FLM,M,CL1,CL2,DISP,D0~D7.
Note (2) fFLM=120Hz,Ta=25°C,Display pattern is Black/White cross pattern as below.
Note (3) At all CF pattern.

6.2 Electrical Characteristics of Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	NOTE
Lamp Voltage	VL	—	(325)	—	Vrms	Ta=25°C 5.5mA
Frequency	fL	40	(60)	80	kHz	Ta=25°C
Lamp Current	IL	5.0	5.5	6.0	mA	Ta=25°C
Starting Voltage	VS	—	(350)	—	Vrms	Ta=0°C
CCFL Life time	-	10000	20000	—	Hour	Ta=25°C

Note (1) Starting discharge voltage is increased when LCM is operating at low temperature.
Note (2) Average life time of CCFL will be decreased when LCM is operated at low temperature.

6.3 Electrical Characteristics of Touch panel

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Rating Voltage	V_R	-	-	-	7.0	V
Resistance of Electrodes	R_{ETD}	X - Electrode	400	-	900	Ω
		Y - Electrode	200	-	500	
Insulation Resistance	R_{OFF}	V_{DC}=25V	10	-	-	MΩ
Linearity	L	-	-	-	1.5	%
Activation Force	F_{ON}	NOTE (1)	5	-	50	g
Surface Hardness	S_H	-	3	-	-	H
Transparency	-	-	75	80	-	%
Chattering	-	NOTE (1)	-	-	20	ms

Note (1). Hold an R0.8 polyacetal stylus and tune it on/off with the same load and speed as Usual finger input.

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7. Optical Characteristics

7.1 Optical Characteristics of LCD

Ta= 25°C.(Backlight On)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range		ϕ1, ϕ2	θ=0°K≥2	-	(40)	-	Deg.	Note 1,2
Contrast Ratio		K	θ=0° ϕ=0°	20	40	-	-	Note 2
Response Time	Rise	tr	θ=0°,ϕ=0°	-	(250)	-	ms	Note 2
	Fall	tf	θ=0°,ϕ=0°	-	(200)	-	ms	
Color Tone (CIE Coordinate)	R	x	θ=0°,ϕ=0°	(0.44)	(0.49)	(0.54)	-	-
		y		(0.30)	(0.35)	(0.40)	-	-
	G	x		(0.28)	(0.33)	(0.38)	-	-
		y		(0.44)	(0. 49)	(0.54)	-	-
	B	x		(0.15)	(0. 20)	(0.25)	-	-
		y		(0.16)	(0.21)	(0.26)	-	-
	W	x		(0.27)	(0.32)	(0.37)	-	-
		y		(0.30)	(0.35)	(0.40)	-	-

7.2 Optical Characteristics of Backlight

Item	Min,	Typ.	Max.	Unit	Remark
Brightness	80	(120)	-	cd/m^2	Note 1,2
Brightness Uniformity	-	-	±30	%	Note 2

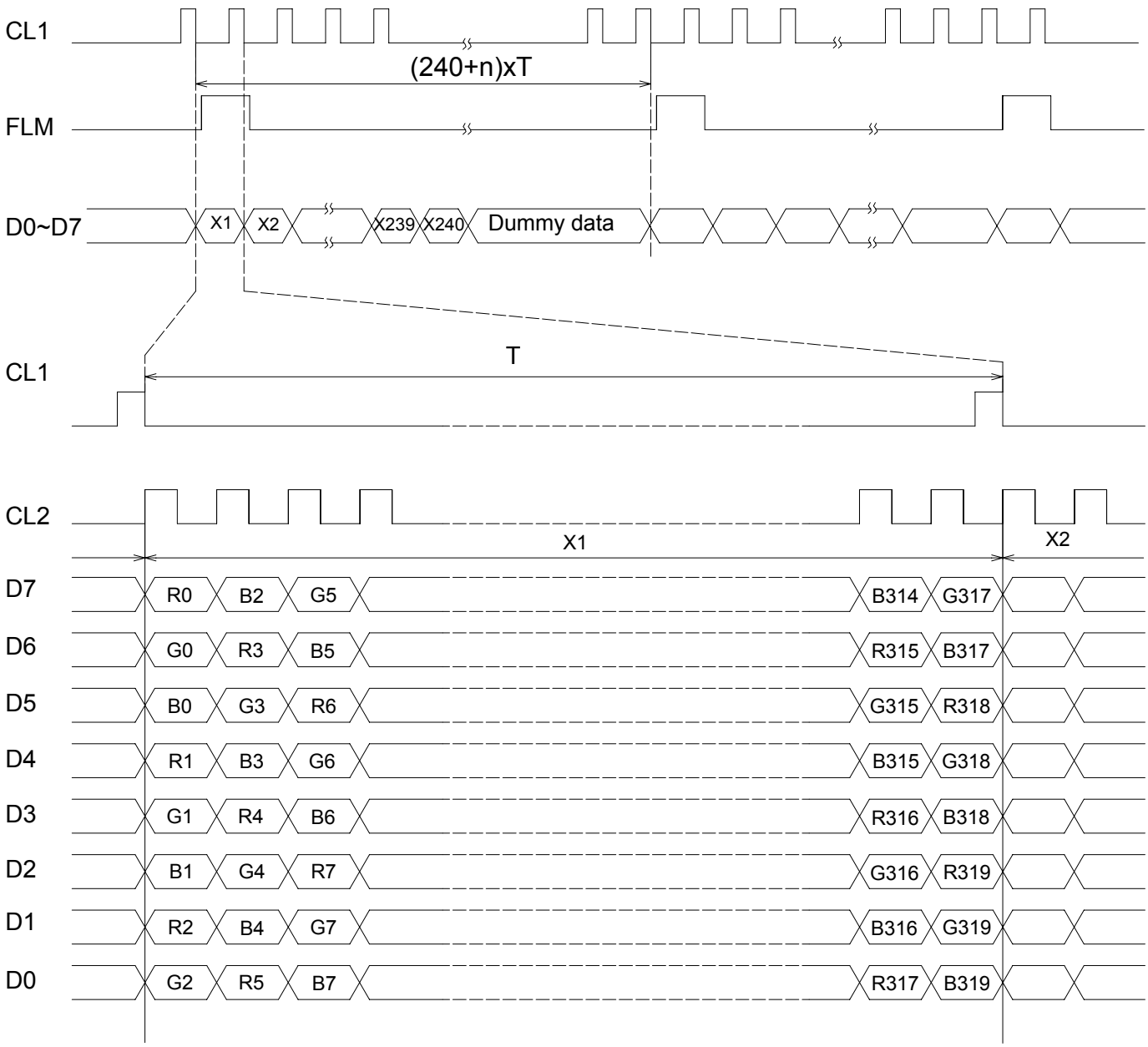
Note 1. Measurement Condition:

- The LCD driving voltage should be adjusted so as to obtain maximum contrast, when display pattern is all “ON”.

Note 2. About Definition and measurement . Please refer to STANDARD SPECIFICATIONS ADC-S01-1 .

8. Interface Timing Chart

8.1 Timing Chart



8.2. Electrical Characteristics

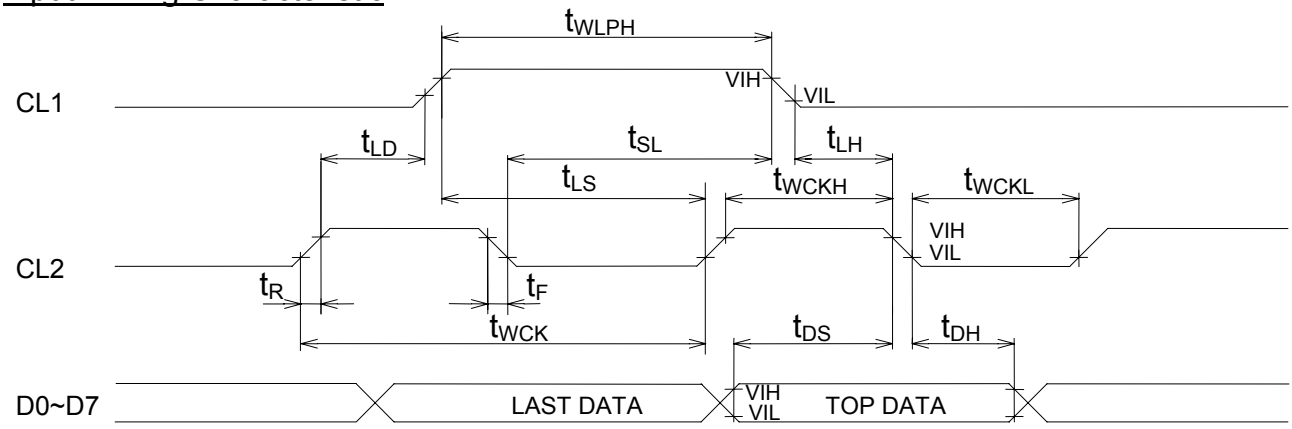
8.2.1 AC Characteristics

(V_{DD}=5.0± 0.5V, V_{SS}=0V, Ta=-20°C~+85°C)

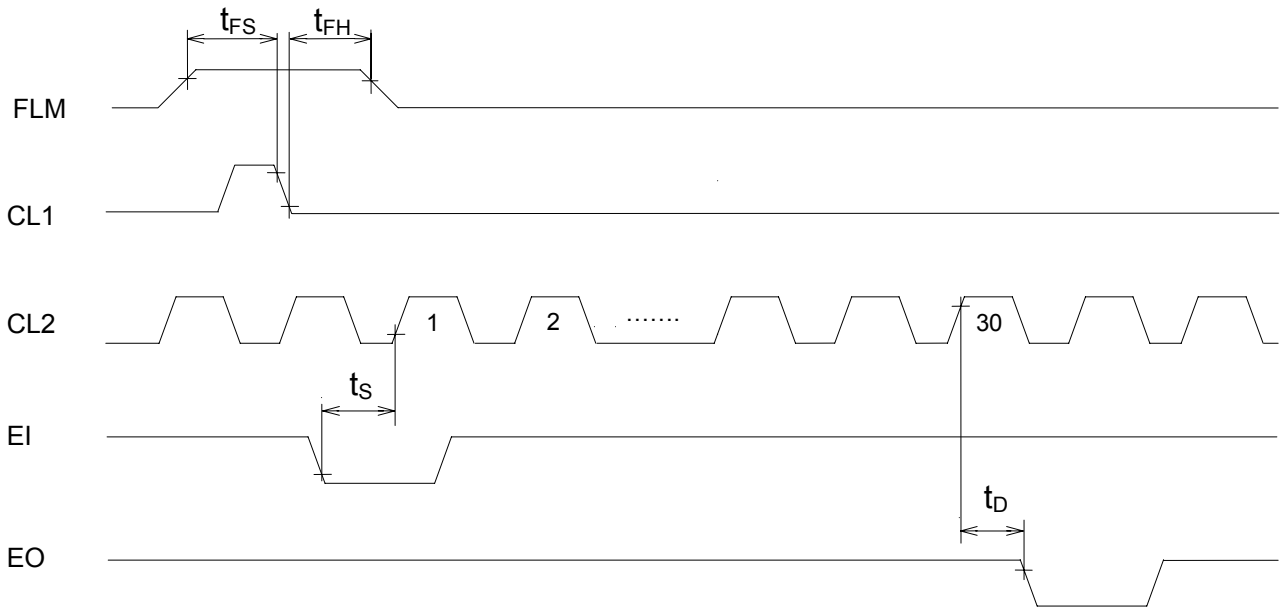
Item	Symbol	Min.	Typ.	Max.	Unit
Shift clock period	t_{WCK}	40	-	-	ns
Shift clock “H” pulse wide	t_{WCKH}	12	-	-	ns
Shift clock “L” pulse wide	t_{WCKL}	14	-	-	ns
Data setup time	t_{DS}	5	-	-	ns
Data hold time	t_{DH}	15	-	-	ns
Latch pulse “H” pulse wide	t_{WLPH}	15	-	-	ns
Shift clock rise to latch pulse rise time	t_{LD}	5	-	-	ns
Shift clock fall to latch pulse fall time	t_{SL}	25	-	-	ns
Latch pulse rise to shift clock rise time	t_{LS}	25	-	-	ns
Latch pulse fall to shift clock fall time	t_{LH}	25	-	-	ns
Enable setup time	t_{S}	5	-	-	ns
Input signal rise time	t_{R}	-	-	50	ns
Input signal fall time	t_{F}	-	-	50	ns
Out delay time (1)	t_{D}	-	-	28	ns
Out delay time (2)	t_{PD1}	-	-	1.2	µs
Out delay time (3)	t_{PD2}	-	-	1.2	µs
Out delay time (4)	t_{PD3}	-	-	1.2	µs
FLM setup time	t_{FS}	30	-	-	ns
FLM hold time	t_{FH}	50	-	-	ns

8.2.2 Timing Diagrams

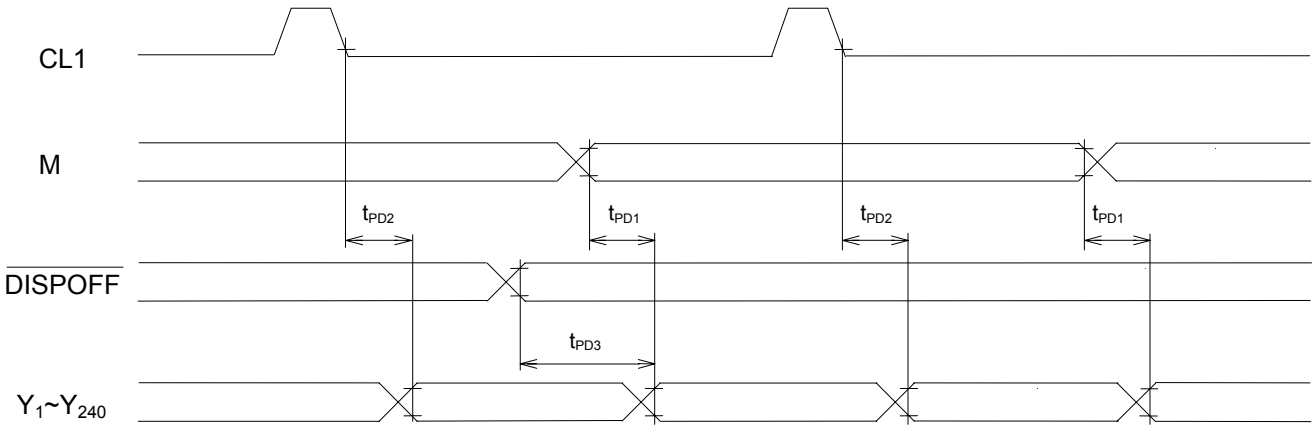
Input Timing Characteristic



Input/Output Timing Characteristic

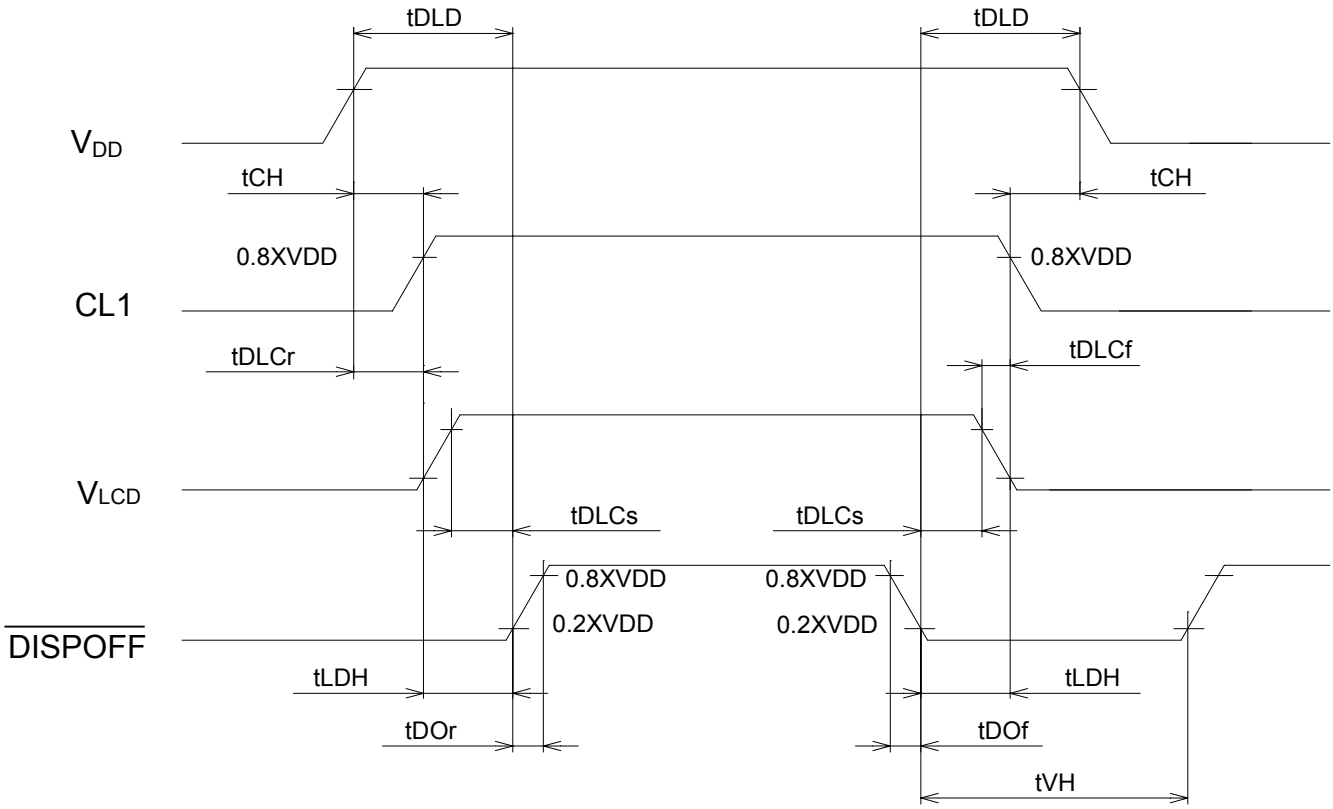


Input/Output Timing Characteristic



8.3 Power Supply and Signal Sequence

Do not apply DC voltage to the LCD panel because it will induce the electrochemical reaction and reduce its life time. Please follow the power supply ON/OFF sequence to prevent DC driving of LCD or latch-up of LCD driver, as shown below.



SYMBOL	MIN.	MAX.	UNIT	COMMENT
tDLD	200	-	ms	
tCH	0	-	ms	
tLDH	20	-	ms	
tDOr	-	100	ns	
tDOf	-	100	ns	
tDLCr	0	-	ms	
tDLCf	0	-	ms	
tDLCs	20	-	ms	
tVH	200	-	ms	

Note 1. Please keep the specified sequence because wrong sequence may cause permanent damage to the LCD panel.

Note 2. Please use $\overline{\text{DISPOFF}}$ function to set display off. Switch by others different from the $\overline{\text{DISPOFF}}$ function may cause display deterioration.

8.4 Input Data Allocation Table

Data Signal	D7	D6	D5	D4	D3	D2	D1	D0	D7	D6	D5	D4		D4	D3	D2	D1	D0
Y / X	1	2	3	4	5	6	7	8	9	10	11	12	-------	956	957	958	959	960
1	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
2	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
3	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
4	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
5	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
6	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
7	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
8	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
9	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
10	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
| | |	| | |	| | |	| | |	| | |	| | |	| | |	| | |	| | |	| | |	| | |		| | |	| | |	| | |	| | |	| | |
238	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
239	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
240	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B

R : RED
G : GREEN
B : BLUE

9. 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.

No	Test Item	Test Condition
1	High temperature and high humidity Under storage	40°C, 90%RH 120hrs
2	High temperature and high humidity Under operation	40°C, 90%RH 72hrs
3	High temperature under storage	60°C , 120hrs
4	Low temperature under storage	-20°C , 120hrs
5	Thermal shock (under storage)	-20°C ← 25°C ← 60°C 30min → 5min → 30min 1 cycle total 5 cycles
6	Drop test (Packing box with full samples inside)	(X,Y,Z) x2 total 6 directions drop from 1 meter to ground
7	ESD test (Electro Static Discharge test)	±2.0 kV 1 time for each terminal

- Judgment should be judged after leaving the product at room temperature for at least 2 hours.
- Please refer to STANDARD SPECIFICATIONS ADC-S01-1

10. Quality Assurance

◆ **Please refer to STANDARD SPECIFICATIONS ADC-S01-1 .**

11. Precautions for Operation and Storage

◆ **Please refer to STANDARD SPECIFICATIONS ADC-S01-1 .**

12. Printing

◆ **Please refer to STANDARD SPECIFICATIONS ADC-S01-1 .**