

PRODUCT SPECIFICATIONS

For Customer: _____

Module No. : MC57T01G

Date: 2002.10.30

Version : 1

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For Customer's Acceptance :

| Approved by | Comment |
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Please verify this is the latest information. E&OE

This specification is proposed by Arima Display Corporation.

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2. History of Specification Revision

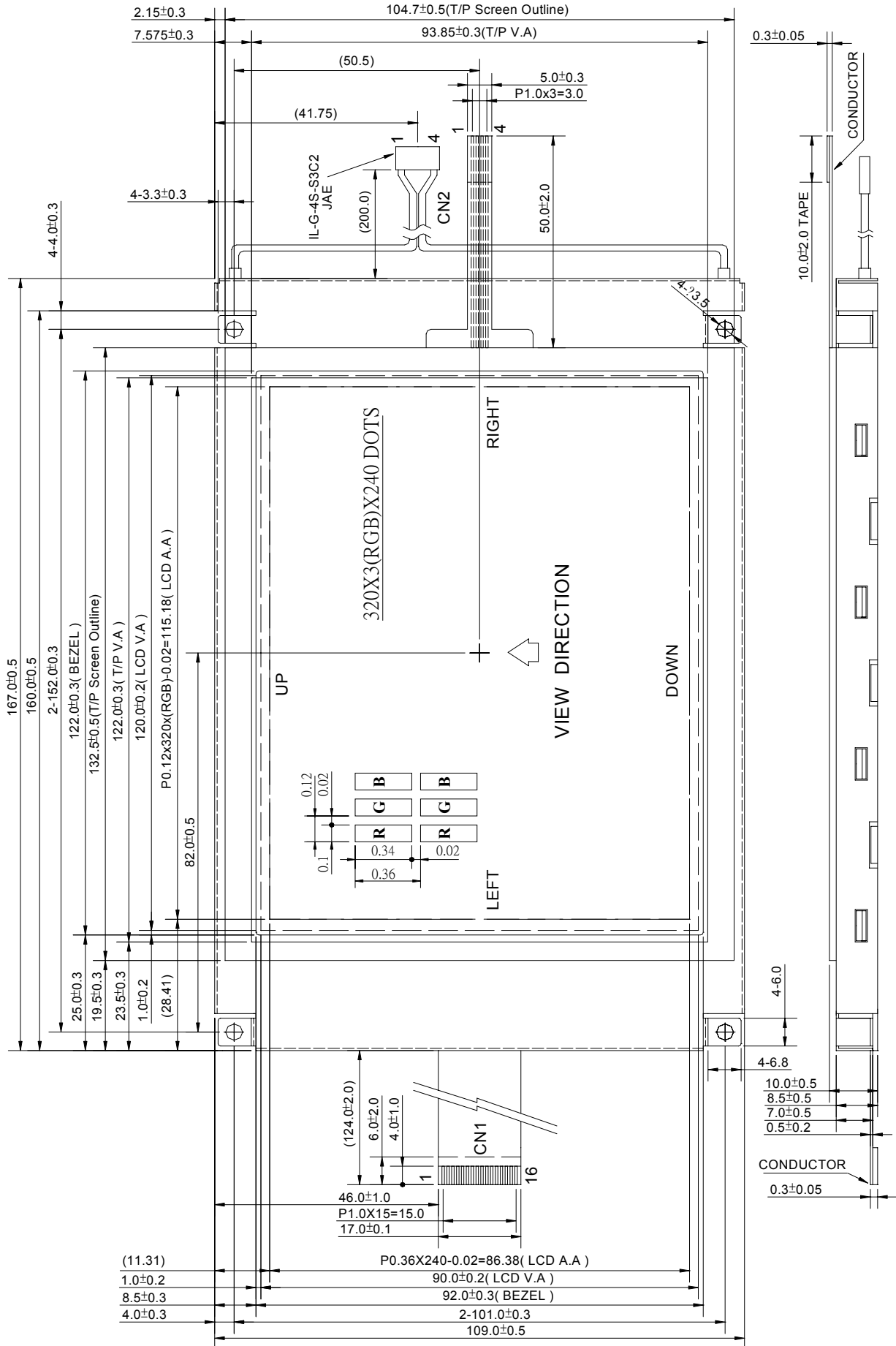
| Date | Rev. | Page | Contents |
|------|------|------|----------|
| | | | |

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 | <ul style="list-style-type: none"> •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 |

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 |

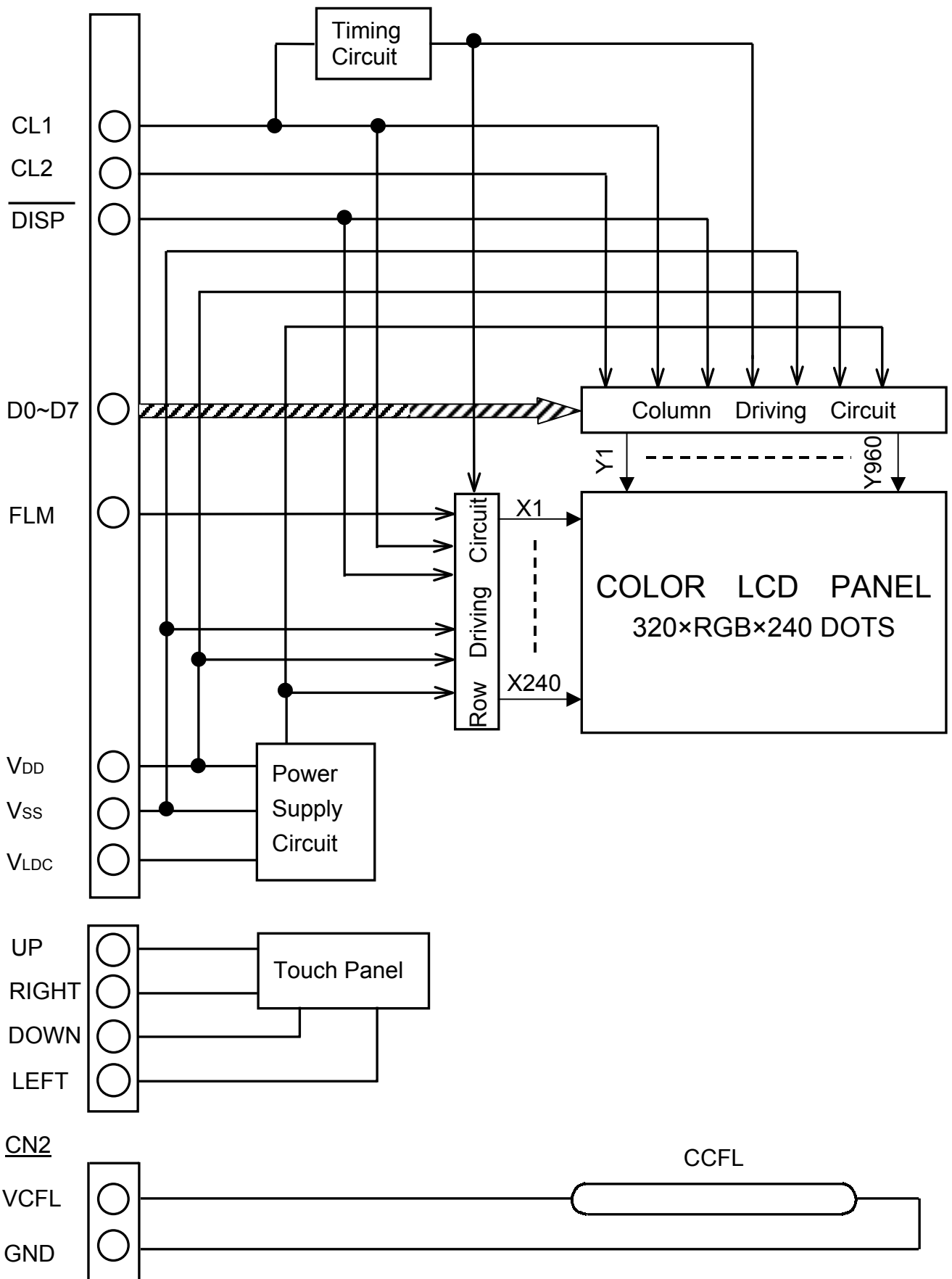
CN2 : JAE/IL-G-4S-S3C2 /

| 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) | V _i | -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).

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 Frequency | 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 | V _L | — | (325) | — | V _{rms} | Ta=25°C 5.5mA |
| Frequency | f _L | 40 | (60) | 80 | kHz | Ta=25°C |
| Lamp Current | I _L | 5.0 | 5.5 | 6.0 | mA | Ta=25°C |
| Starting Voltage | V _S | — | (350) | — | V _{rms} | 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.

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 | $\phi 1, \phi 2$ | $\theta=0^\circ K \geq 2$ | - | (40) | - | Deg. | Note 1,2 | |
| Contrast Ratio | K | $\theta=0^\circ \phi=0^\circ$ | 20 | 40 | - | - | Note 2 | |
| Response Time | Rise | $\theta=0^\circ, \phi=0^\circ$ | - | (250) | - | ms | Note 2 | |
| | Fall | $\theta=0^\circ, \phi=0^\circ$ | - | (200) | - | ms | | |
| Color Tone (CIE Coordinate) | R | x | $\theta=0^\circ, \phi=0^\circ$ | (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 |

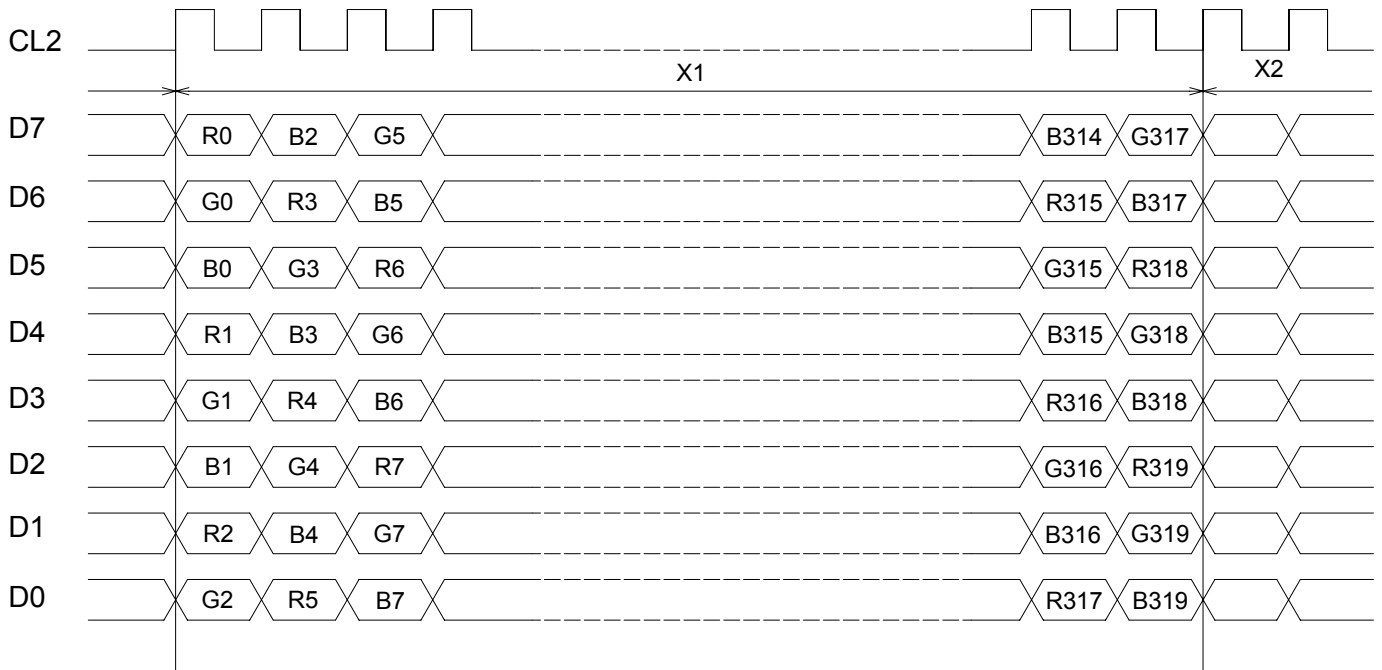
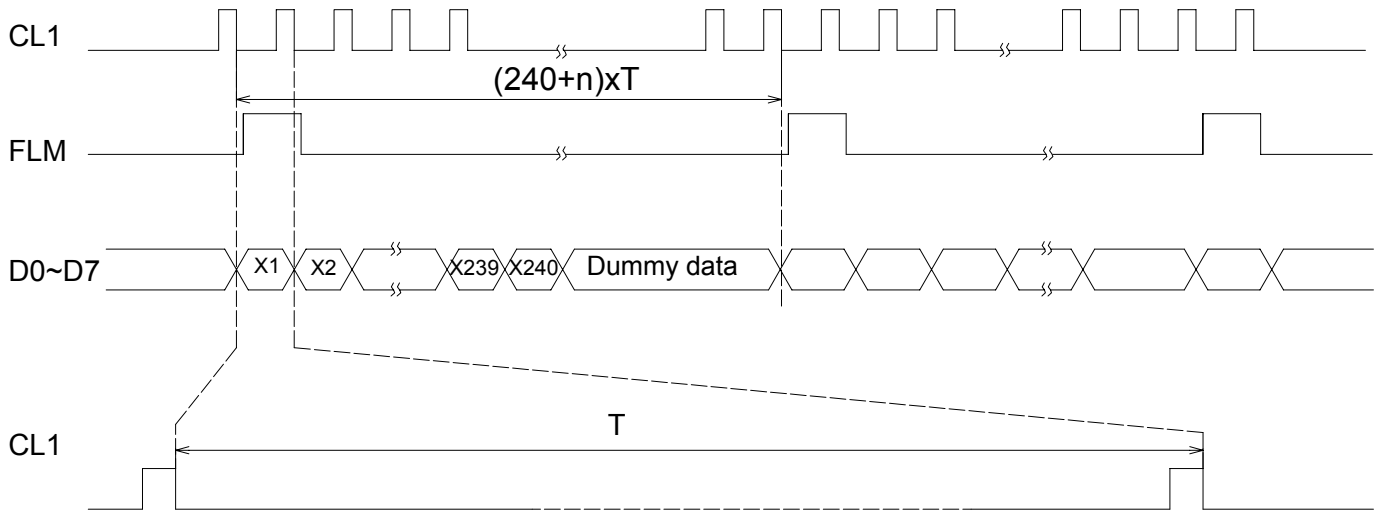
Note 1. Measurement Condition:

- 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

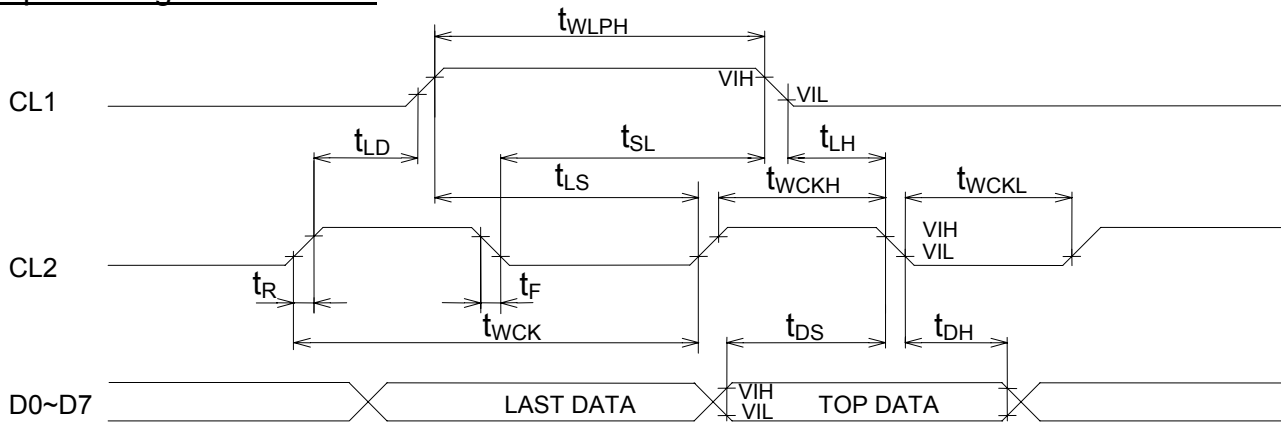
8.2.1 AC Characteristics

($V_{DD}=5.0\pm 0.5V$, $V_{SS}=0V$, $T_a=-20^{\circ}C\sim+85^{\circ}C$)

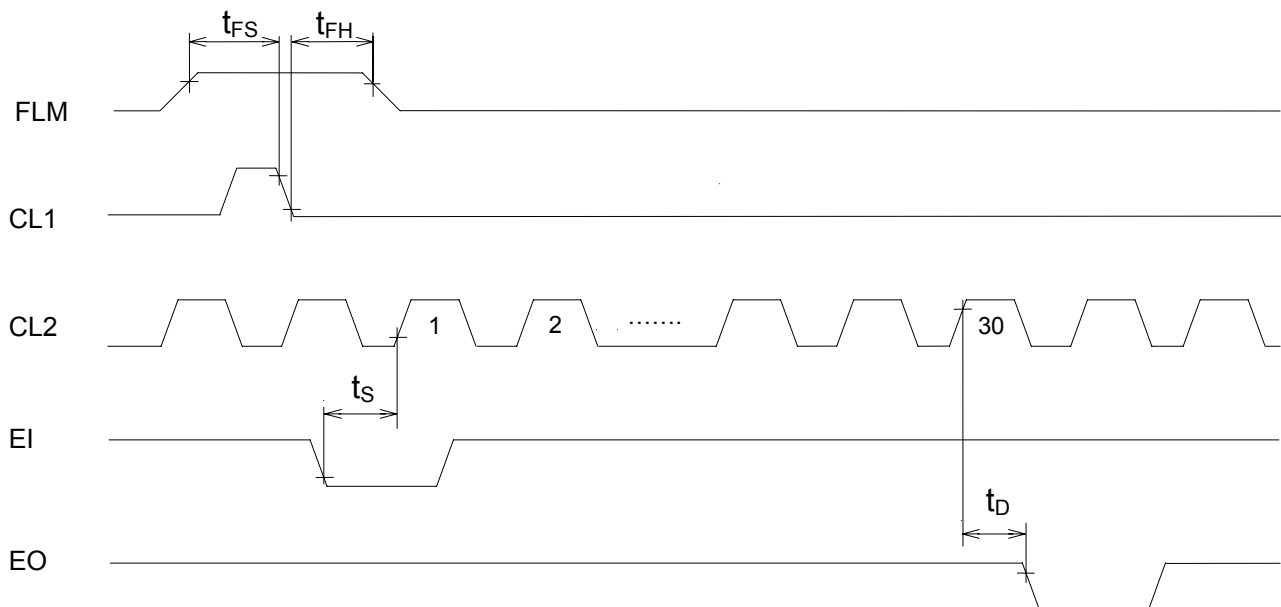
| Item | Symbol | Min. | Typ. | Max. | Unit |
|---|------------|------|------|------|---------|
| Shift clock period | t_{WCK} | 40 | - | - | ns |
| Shift clock "H" pulse wide | t_{WCKH} | 12 | - | - | ns |
| Shift clock "L" pulse wide | t_{WCKL} | 14 | - | - | ns |
| Data setup time | t_{DS} | 5 | - | - | 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

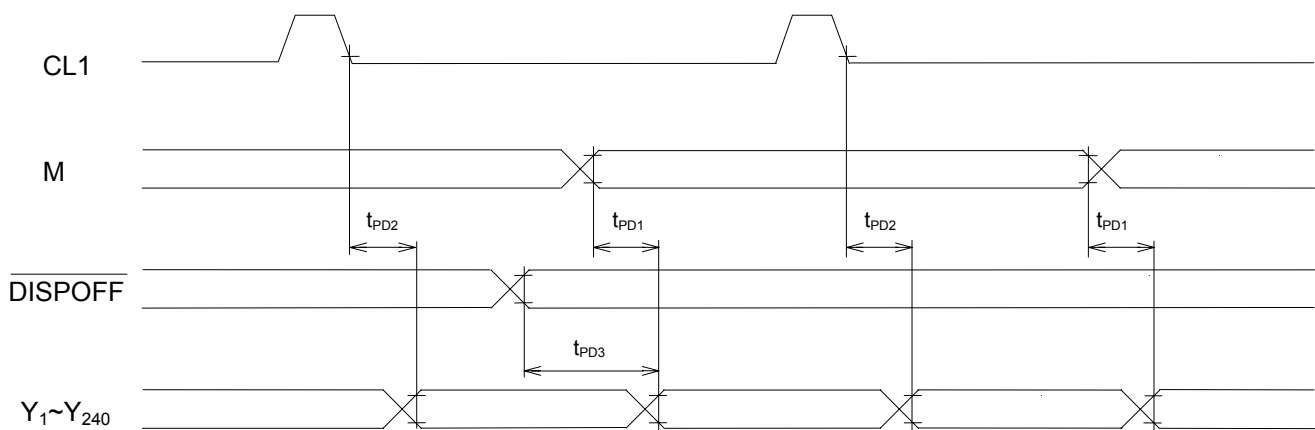
Input Timing Characteristic



Input/Output Timing Characteristic

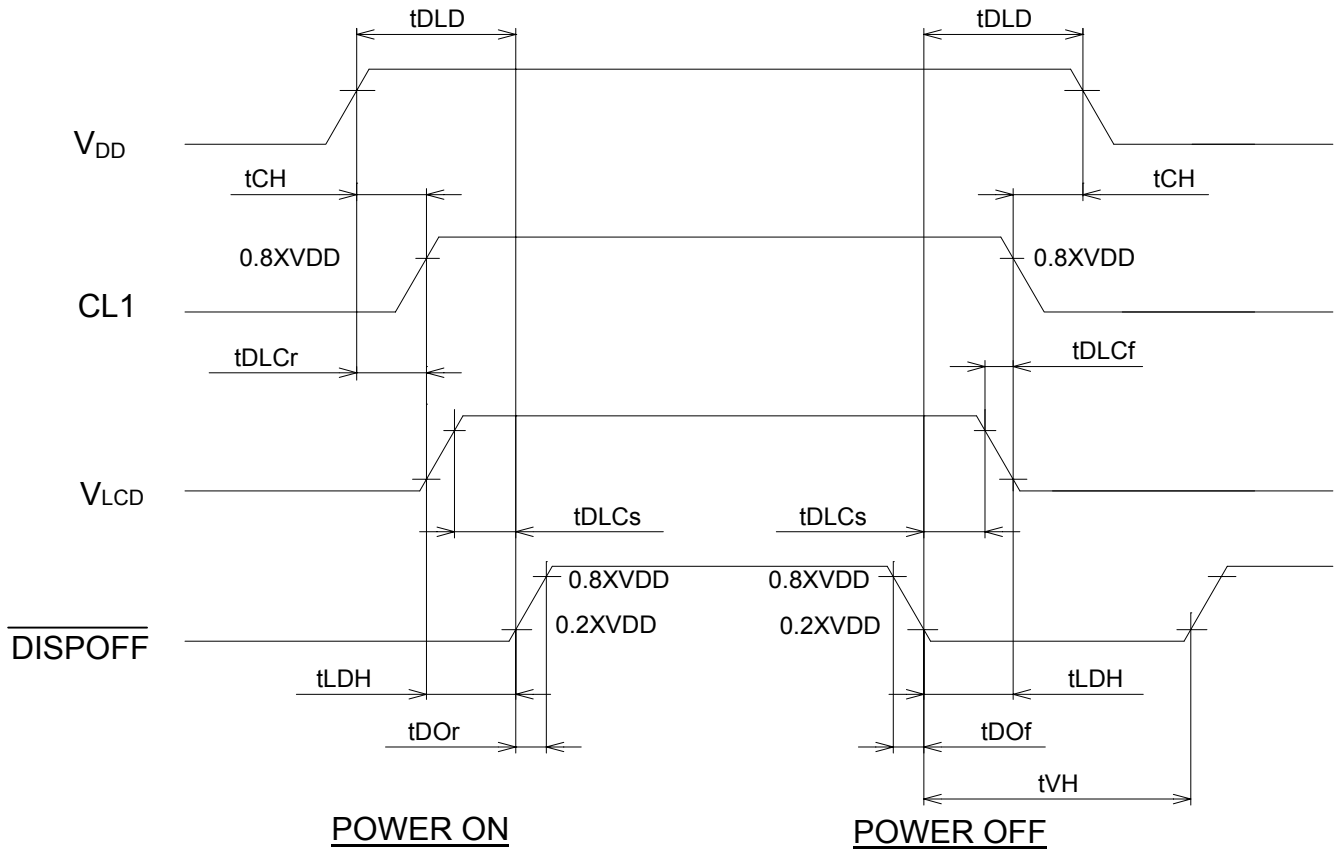


Input/Output Timing Characteristic



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

8.4 Input Data Allocation Table

| Data Signal | D 7 | D 6 | D 5 | D 4 | D 3 | D 2 | D 1 | D 0 | D 7 | D 6 | D 5 | D 4 | | D 4 | D 3 | D 2 | D 1 | D 0 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------------|-------------|-------------|-------------|-------------|
| Y \ X | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | ----- | 9 5 6 | 9 5 7 | 9 5 8 | 9 5 9 | 9 6 0 |
| 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) | <p style="text-align: center;"> -20°C ← 25°C ← 60°C 30min → 5min → 30min 1 cycle total 5 cycles </p> |
| 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 .