

HITACHI

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FOR MESSRS. : _____

DATE : May.28,2007

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

LMG7520RPFC CONTENTS

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* WHEN PRODUCT WILL BE DISCONTINUED, CUSTOMER WILL BE INFORMED BY HITACHI WITH TWELVE MONTHS PRIOR ANNOUNCEMENT.

ACCEPTED BY; _____

PROPOSED BY; Don Ching

| | | | | |
|--|------------|---------------------------|------|-------|
| KAOHSIUNG HITACHI ELECTRONICS CO.,LTD | Sh. No. | 7B64PS 2701-LMG7520RPFC-5 | PAGE | 1-1/1 |
|--|------------|---------------------------|------|-------|

RECORD OF REVISION

| DATE | SHEET No. | SUMMARY |
|------------|---|---|
| FEB.07,'96 | 7B64PS 2703 LMG7520RPFC-2 PAGE 3-1/1 | (11) WEIGHT (200g) → 110g |
| | 7B64PS 2704- LMG7520RPFC-2 PAGE 4-1/1 | POWER SUPPLY FOR LC DRIVE VDD-V0 → VDD-VEE |
| | 7B64PS 2705- LMG7520RPFC-2 PAGE 5-1/2 | POWER SUPPLY CURRENT FOR LOGIC (6.0) → 8.0 mA POWER SUPPLY CURRENT FOR LC DRIVING (5.0) → 6.0 mA RECOMMENDED LC DRIVING VOLTAGE TYP TYP Ta=10°C (23.1)→Ta= 0°C 24.1 Ta=25°C (22.7)→Ta=25°C 23.0 Ta=40°C (22.0)→Ta=40°C 21.6 FRAME FREQUENCY TYP. MAX TYP. MAX 75 80 → - (140) POWER SUPPLY FOR CFL DELETE NOTE 4 ADDED |
| | 7B64PS 2705- LMG7520RPFC-2 PAGE 5-2/2 | NOTE 1 ~ NOTE 4 ADDED |
| | 7B64PS 2706- LMG7520RPFC-2 PAGE 6-1/2 | 6.1 OPTICAL CHARACTERISTICS CONTRAST RATIO CONTRAST RATIO K=(12)→(20) RESPONSE TIME (RISE) tf→tr RESPONSE TIME (FALL) tr→tf |
| | 7B64PS 2706- LMG7520RPFC-2 PAGE 6-2/2 | MIN (TYP) BRIGHTNESS (40.0) (60.0) ↓ 80.0 (100.0) CFL INITAL VDD-V0=22.7V→VDD-VEE=23.0V |
| | 7B64PS 2709- LMG7520RPFC-2 PAGE 9-1/3 | ALL PAGE TOLERANCE ADDED IF1:53261-1590→52103-1217 |
| | 7B63PS 2709- LMG7524RPFC-2 PAGE 9-3/3 | CFL BACKLIGHT APPEARANCE SPECIFICATION DELETED |

RECORD OF REVISION

| DATE | SHEET No. | SUMMARY |
|------------|--|--|
| FEB.07,'96 | 7B63PS 2710- LMG7524RPFC-2 PAGE 10-3/3 | INTERNAL PIN CONNECTION CHANGED |
| MAY.13,'96 | 7B63PS 2706- LMG7524RPFC-3 PAGE 6-1/2 | 6.1 OPTICAL CHARACTERISTICS RESPONSE TIME MODIFIED tr 250ms → 160ms tf 350ms → 110ms |
| | 7B63PS 2708- LMG7524RPFC-3 PAGE 8-1/3 | 8.1 TIMING CHART LOAD FREQUENCY CHANGED $52.1\mu s \leq T \leq 59.5\mu s$ ↓ $29.8\mu s \leq T \leq 59.5\mu s$ |
| | 7B63PS 2708- LMG7524RPFC-3 PAGE 8-3/3 | 8.4 POWER SUPPLY FOR LCM AL CAPACTITOR ADDED (BETWEEN VEE AND VSS) |
| | 7B63PS 2709- LMG7524RPFC-3 PAGE 9-1/3 | 9.1 DIMENSIONAL OUTLINE MOUNTING HOLD MEASUREMENT ADDED |
| | 7B63PS 2709- LMG7524RPFC-3 PAGE 9-3/3 | 9.3 INTERNAL PIN CONNECTION SUITABLE FPC PITCH MODIFIED |
| | 7B63PS 2710- LMG7524RPFC-3 PAGE 10-3/3 | 10.2 APPEARANCE SPECIFICATION STAINS,FOREING MATERIALS DRAK,SPOT SPEC. MODIFIED SYMBOL OF PINHOLE DEFINITION MODIFIED |
| FEB.10,'98 | 7B63PS 2708- LMG7524RPFC-4 PAGE 8-1/3 | 8.1 TIMING CHART FRAME SET UP TIME 1.4 μ s min DELETED |
| | 7B63PS 2712- LMG7524RPFC-4 PAGE 12-1/1 | LOCATION OF LOT MARK CHANGED |
| May.28,'07 | 7B63PS 2709- LMG7524RPFC-5 PAGE 9-1/3 | 9. DIMENSIONAL OUTLINE Changed : CFL I / F : Mitsumi M63M83 - 04 → JAE IL-G-4S-S3C2-SA |
| | 7B63PS 2709- LMG7524RPFC-5 PAGE 9-3/3 | 9.3 INTERFACE PIN CONNECTION Changed : CFL I / F : Mitsumi M63M83 - 04 → JAE IL-G-4S-S3C2-SA |

RECORD OF REVISION

| DATE | SHEET No. | SUMMARY | | | | | | | | | |
|------------|---|---|---------|------|---------|---|---|---|---|---|-------|
| May.28,'07 | 7B63PS 2712- LMG7524RPFC-5 PAGE 12-1/1 | 12. DESIGNATION OF LOT MARK Added <table border="1" style="margin-left: 20px; border-collapse: collapse; width: 80%;"> <thead> <tr> <th style="width: 15%;">REV No.</th> <th style="width: 55%;">ITEM</th> <th style="width: 30%;">LOT No.</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td>CCFL tube diameter ($\phi 2.6 \rightarrow \phi 2.4$)</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">B</td> <td>CFL I/F Connector : Mitsumi M63M83-04 → JAE IL-G-4S-S3C2-SA</td> <td style="text-align: center;">7102T</td> </tr> </tbody> </table> | REV No. | ITEM | LOT No. | A | CCFL tube diameter ($\phi 2.6 \rightarrow \phi 2.4$) | - | B | CFL I/F Connector : Mitsumi M63M83-04 → JAE IL-G-4S-S3C2-SA | 7102T |
| REV No. | ITEM | LOT No. | | | | | | | | | |
| A | CCFL tube diameter ($\phi 2.6 \rightarrow \phi 2.4$) | - | | | | | | | | | |
| B | CFL I/F Connector : Mitsumi M63M83-04 → JAE IL-G-4S-S3C2-SA | 7102T | | | | | | | | | |
| | | | | | | | | | | | |

3. MECHANICAL DATA

- (1) PART NAME LMG7520RPFC
- (2) MODULE SIZE 129.6(W)mm×92.6(H)mm×7.5(D)mm
- (3) EFFECTIVE DISPLAY AREA 100.0 min × 75.5 min.
- (4) DOT SIZE 0.285(W)mm×0.285(H)mm
- (5) DOT PITCH 0.3 (W)mm × 0.3 (H)mm
- (6) NUMBER OF DOTS 320 (W) × 240 (H)DOTS
- (7) DUTY 1/240
- (8) LCD FILM TYPE BLACK/WHITE (NEGATIVE TYPE)
THE UPPER POLARIZER IS GLARE TYPE
(HARDNESS:3H)
THE BOTTOM POLARIZER IS TRANSMISSIVE
TYPE.
- (9) VIEWING DIRECTION 6 O'CLOCK
- (10) BACK LIGHT COLD CATHODE FLUORESCENT LAMP
- (11) WEIGHT 110g

4. ABSOLUTE MAXIMUM RATINGS

4.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS. VSS=0V:STANDARD

| ITEM | SYMBOL | MIN. | MAX. | UNIT | COMMENT |
|---------------------------|---------|------|---------|------|---------|
| POWER SUPPLY FOR LOGIC | VDD-VSS | 0 | 6.5 | V | |
| POWER SUPPLY FOR LC DRIVE | VDD-VEE | 0 | 27.5 | V | |
| INPUT VOLTAGE | V_i | -0.3 | VDD+0.3 | V | NOTE 1 |
| INPUT CURRENT | I_i | 0 | 1 | A | |
| STATIC ELECTRICITY | - | - | 100 | - | NOTE 2 |

NOTE 1 :DISP.OFF,FRAME,LOAD,CP,D0~D3.

NOTE 2 :.MAKE CERTAINS YOU ARE GROUNDED WHEN HANDLING LCM.

4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS.

| I T E M | OPERATING | | STORAGE | | COMMENT |
|---------------------|----------------|---------------------------------|----------------|---|--------------------------|
| | MIN. | MAX. | MIN. | MAX. | |
| AMBIENT TEMPERATURE | 0°C NOTE6 | 40°C | -20°C | 60°C | NOTE 2,3 |
| HUMIDITY | NOTE 1 | | NOTE 1 | | WITHOUT CONDENSATION |
| VIBRATION | - | 2.45m/s ² (0.25G) | - | 11.76m/s ² (1.2G) NOTE 5 | NOTE 4 |
| SHOCK | - | 29.4m/s ² (3G) | - | 490.0m/s ² (50G) | XYZ DIRECTIONS NOTE 5 |
| CORROSIVE GAS | NOT ACCEPTABLE | | NOT ACCEPTABLE | | |

NOTE 1 : $T_a \leq 40^\circ\text{C}$:85%RH max.

$T_a > 40^\circ\text{C}$:ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 85%RH AT 40°C.

NOTE 2 : T_a AT -20°C <48HRS,AT 60°C <168HRS.

NOTE 3 :BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT TEMPERATURE. THIS PHENOMENON IS REVERSIBLE.

NOTE 4 :5Hz~100Hz (EXCEPT RESONANCE FREQUENCY)

NOTE 5 :THIS MODULE SHOULD BE OPERATED NORMALLY AFTER FINISH THE TEST.

NOTE 6 :HIGHER STARTING VOLTAGE OF CFL AND HEIGHER LCD DRIVING VOLTAGE ARE NEEDED WHILE OPERATING AT 0°C. THE LIFE TIME OF CFL WILL BE REDUCED WHILE OPERATING AT 0°C. NEED TO MAKE SURE OF VALUE OF IL AND CHARACTERISTICS OF INVERTER. ALSO THE RESPONSE TIME AT 0°C WILL BE SLOWER.

5. ELECTRICAL CHARACTERISTICS

5.1 ELECTRICAL CHARACTERISTICS

| I T E M | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---------|----------------|--------|-------|--------|------|
| POWER SUPPLY VOLTAGE FOR LOGIC | VDD-VSS | — | 3.0 | 5.0 | 5.25 | V |
| POWER SUPPLY VOLTAGE FOR LC DRIVING | VEE-VSS | — | — | -22.0 | — | V |
| INPUT VOLTAGE NOTE 1 | VI | H LEVEL | 0.8VDD | — | VDD | V |
| | | L LEVEL | 0 | — | 0.2VDD | V |
| POWER SUPPLY CURRENT FOR LOGIC NOTE 2 | IDD | VDD-VSS=5.0V | — | 8.0 | — | mA |
| | | VEE-VSS=-22.0V | — | — | — | — |
| POWER SUPPLY CURRENT FOR LC DRIVING NOTE 2 | IEE | VDD-VSS=5.0V | — | 6.0 | — | mA |
| | | VEE-VSS=-22.0V | — | — | — | — |
| RECOMMENDED LC DRIVING VOLTAGE NOTE 3 | VDD-VEE | Ta= 0°C,φ=10° | — | 24.1 | — | V |
| | | Ta= 25°C,φ=10° | — | 23.0 | — | V |
| | | Ta=40°C,φ=10° | — | 21.6 | — | V |
| FRAME FREQUENCY NOTE4 | fFRAME | — | 70 | — | (140) | Hz |

NOTE 1 :DISP.OFF,FRAME,LOAD,CP,D0~D3.

NOTE 2 :fFRAME=75Hz,D0~UD3=0,1,0,1,...

VDD-VEE=23.0V,Ta=25°C

NOTE 3 :RECOMMENDED LC DRIVING VOLTAGE FLUCTUATE ABOUT ±1.0V BY EACH MODULE.

TEST PATTERN IS ALL "Q".

NOTE 4 :NEED TO MAKE SURE OF FLICKING AND RIPPLING OF DISPLAY WHEN SETTING THE FRAME FREQUENCY IN YOUR SET.

5.2 ELECTRICAL CHARACTERISTICS OF BACKLIGHT

| I T E M | SYMBOL | MIN. | TYP. | MAX. | UNIT | UNIT |
|----------------------------|--------------|--------|------|------|------|---------|
| LAMP VOLTAGE | VL | — | 300 | — | V | Ta=25°C |
| FREQUENCY | fL | — | 70 | 85 | KHz | Ta=25°C |
| LAMP CURRENT | IL | 4 | 5 | 6 | mA | Ta=25°C |
| STARTING DISCHARGE VOLTAGE | VS NOTE 2 | (1000) | — | — | V | Ta=25°C |

NOTE 1 :PLEASE CERTAINLY INFORM HITACHI BEFORE DESIGNING LAMP DRIVE CIRCUIT ACCORDING TO THE ABOVE SPECIFICATIONS.

NOTE 2 :STARING DISCHARGE VOLTAGE IS INCREASED WHEN LCM IS OPERATING AT LOWER TEMPERATURE.

PLEASE CHECK THE CHARACTERISTICS OF INVERTER BEFORE APPLING TO YOUR SET.

NOTE 3 :AVERAGE LIFE TIME OF CFL WILL BE DECREASED WHEN LCM IS OPERATING AT LOWER TEMPERATURE.

NOTE 4 :UNDER LOWER DRIVING FREQUENCY OF THE INVERTER , A CERTAIN BACKLIGHT (FROM CFL & CFL REFLECTION SHEET) MAY GENERATE SOUND NOISE. BEFORE DESIGNING THE INVERTER, PLEASE CONSIDER DRIVING FREQUENCY AND CHECK SOUND NOISE FROM THE BACKLIGHT SYSTEM

6. OPTICAL CHARACTERISTICS

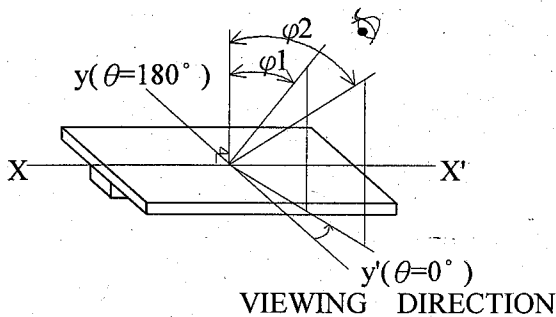
6.1 OPTICAL CHARACTERISTICS

Ta=25°C (BACKLIGHT ON)

| ITEM | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT | NOTE |
|----------------------|-------------------------|--|------|------|------|------|------|
| VIEWING ANGLE | $\varphi_2 - \varphi_1$ | $K \geq 2.0$ | - | 40 | - | deg | 1,2 |
| CONTRAST RATIO | K | $\varphi = 10^\circ, \theta = 0^\circ$ | - | (20) | - | - | 3 |
| RESPONSE TIME (RISE) | tr | $\varphi = 10^\circ, \theta = 0^\circ$ | - | 160 | - | ms | 4 |
| RESPONSE TIME (FALL) | tf | $\varphi = 10^\circ, \theta = 0^\circ$ | - | 110 | - | ms | 4 |

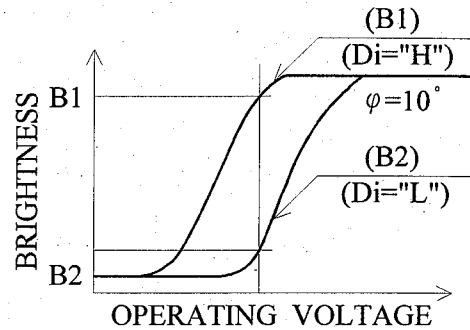
(MEASURE CONDITION BY HITACHI)

NOTE 1. DEFINITION OF θ AND φ (NORMAL)

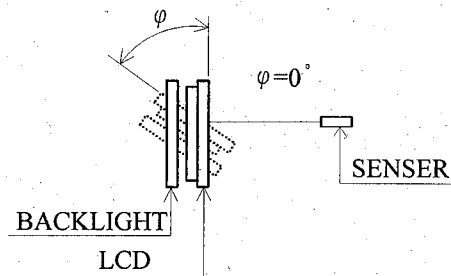
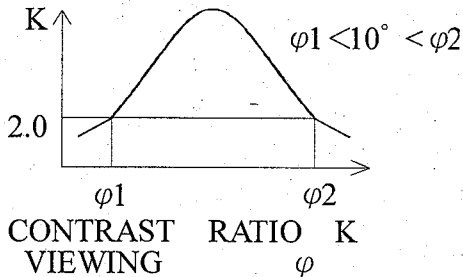


NOTE 3. DEFINITION OF CONTRAST "K"

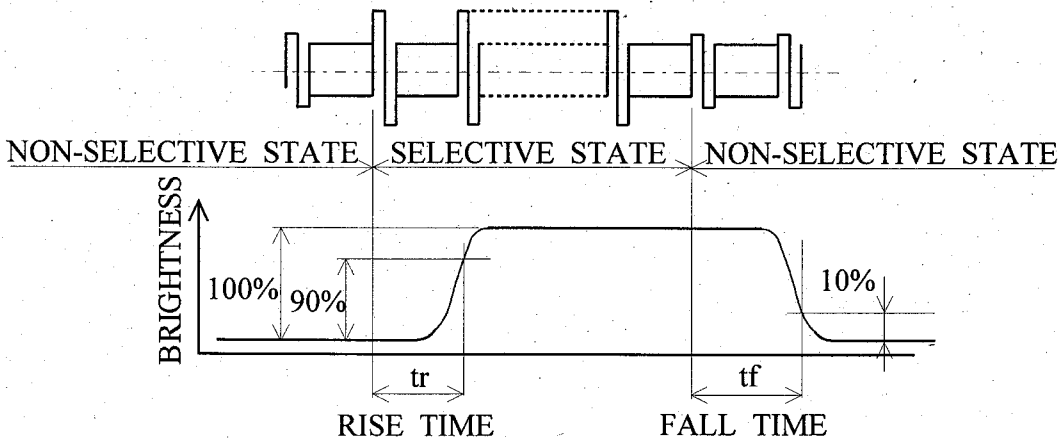
$$K = \frac{\text{BRIGHTNESS ON SELECTED DOT (B1)}}{\text{BRIGHTNESS ON NON-SELECTED DOT (B2)}}$$



NOTE 2. DEFINITION OF VIEWING ANGLE φ_1 AND φ_2



NOTE 4. DEFINITION OF OPTICAL RESPONSE



6.2 OPTICAL CHARACTERISTICS OF BACKLIGHT

(LCM, BACKLIGHT ON, Ta=25°C)

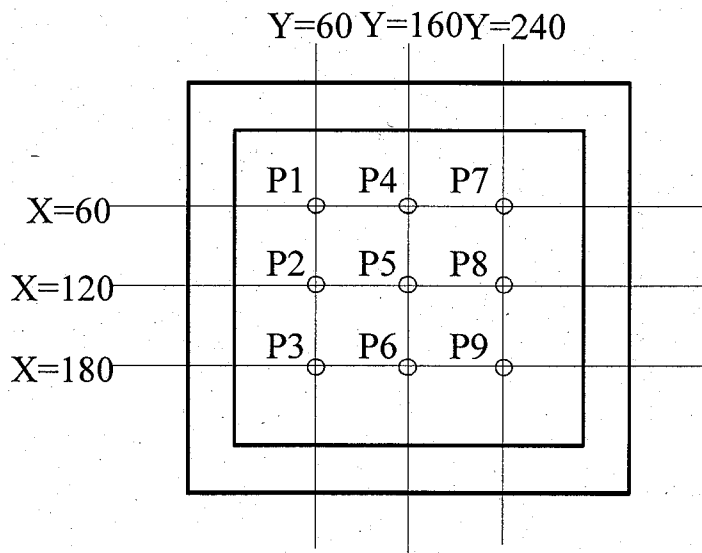
| ITEM | MIN. | TYP. | MAX. | UNIT | NOTE |
|-----------------------|------|---------|------|--------|----------------------------|
| BRIGHTNESS | 80.0 | (100.0) | - | cd/m | IL=5mA NOTE 1,2 |
| RISE TIME | - | 5 | - | MINUTE | IL=5mA BRIGHTNESS 80% |
| BRIGHTNESS UNIFORMITY | - | - | ±30 | % | UNDERMENTIONED NOTE 1,3 |

CFL : INITIAL, Ta=25°C, VDD-VEE=23.0V
DISPLAY DATA SHOULD BE ALL "ON".

NOTE 1 MEASUREMENT AFTER 10 MINUTES OF CFL OPERATING.

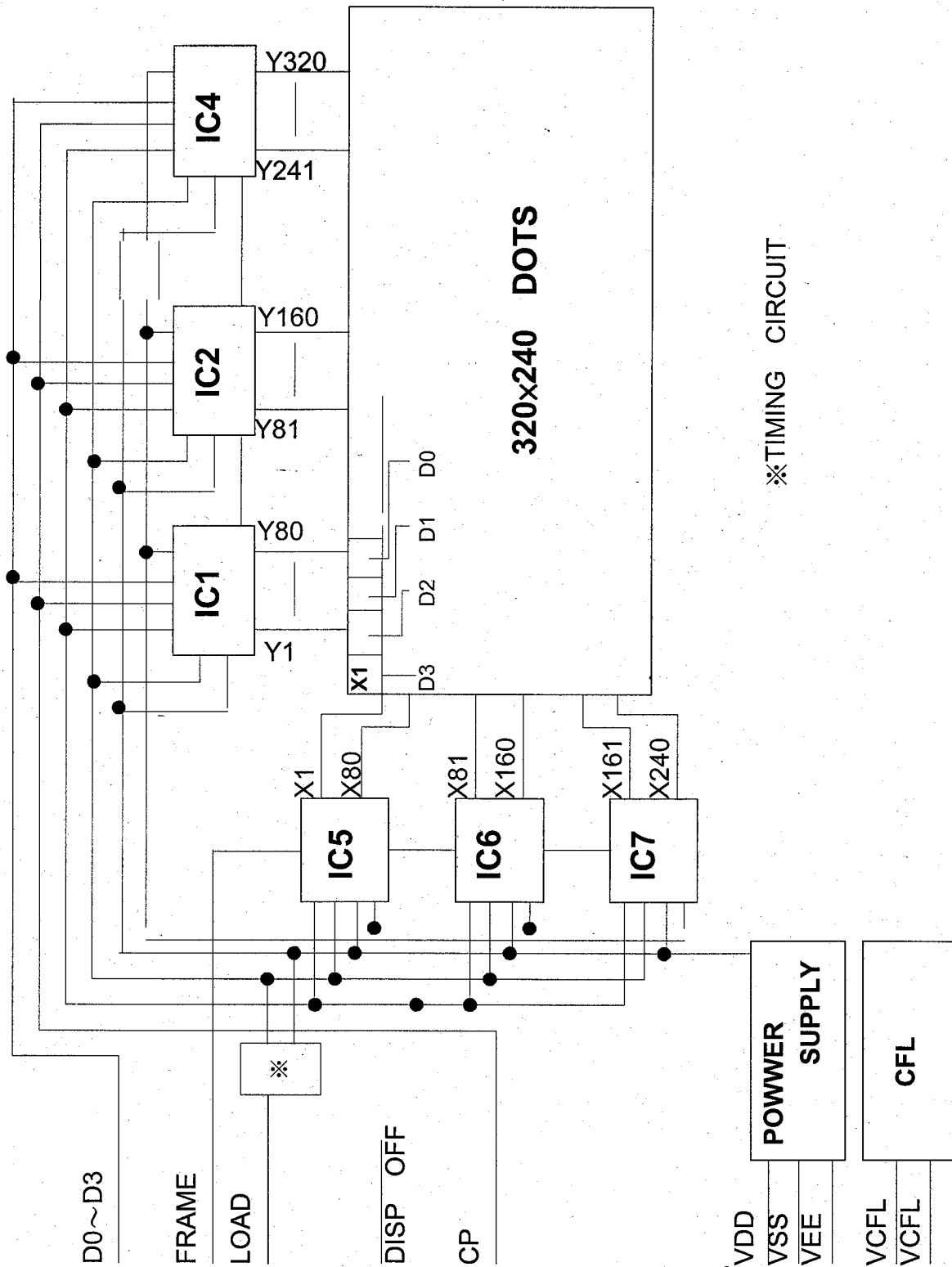
NOTE 2 BRIGHTNESS CONTROL :100%

NOTE 3 MEASUREMENT OF THE FOLLOWING 9 PLACES ON THE DISPLAY.
DEFINITION OF THE BRIGHTNESS TOLERANCE.



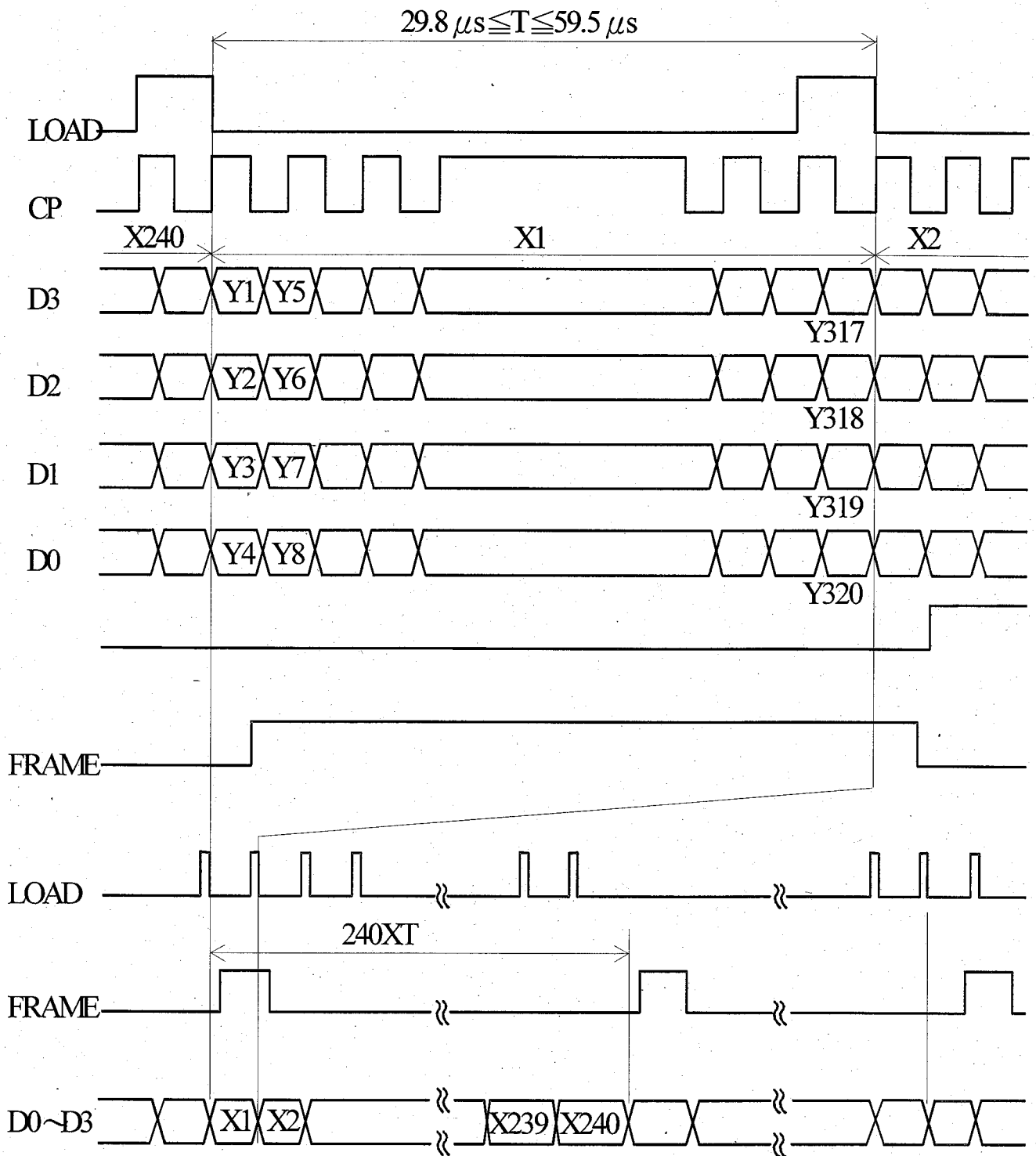
$$\left(\frac{\text{MAX BRIGHTNESS OR MIN BRIGHTNESS} - \text{AVERAGE BRIGHTNESS}}{\text{AVERAGE BRIGHTNESS}} \right) \times$$

7. BLOCK DIAGRAM



8. INTERFACE TIMING CHART

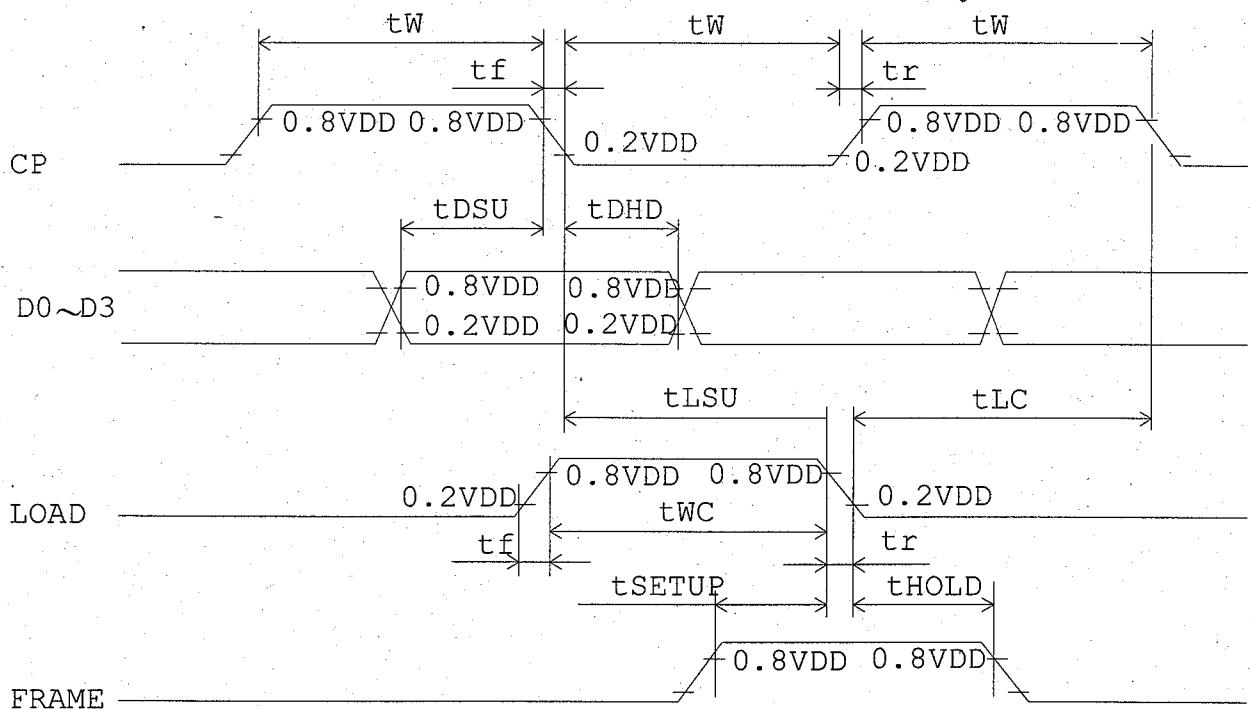
8.1 TIMING CHART



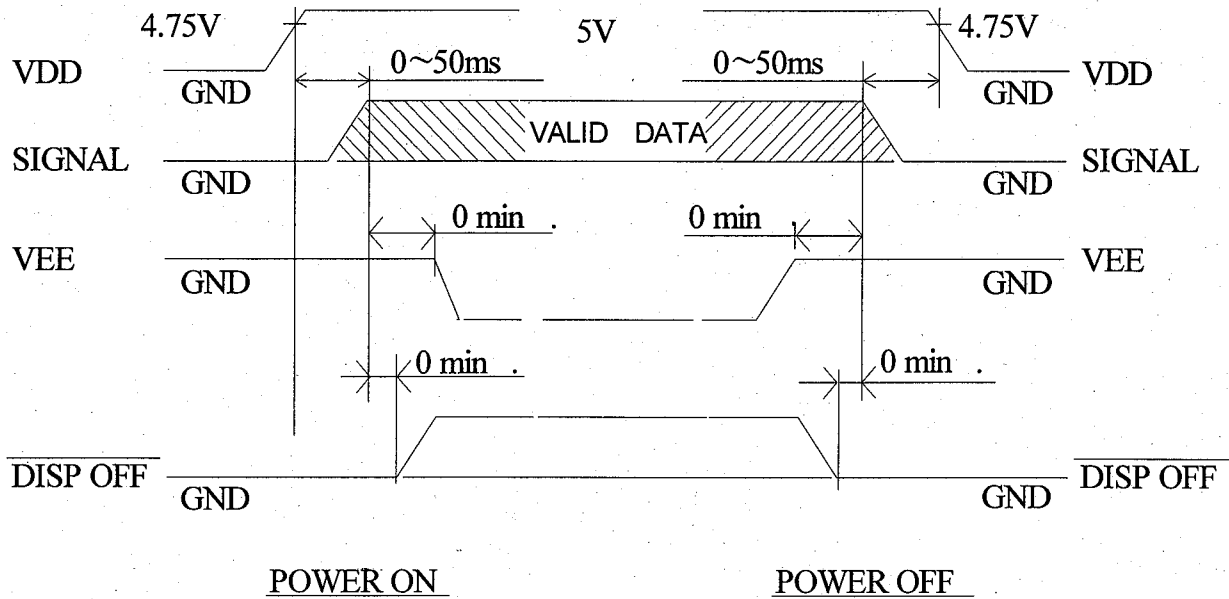
8.2 TIMING CHARACTERISTICS

$0^{\circ}\text{C} \leq T_a \leq 40^{\circ}\text{C}$
 $V_{DD} = 5V \pm 5\%$

| ITEM | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|----------------------|--------|------|------|------|------|
| CLOCK FREQUENCY | FCP | - | - | 6.5 | MHz |
| CLOCK PULSE WIDTH | tW | 63 | - | - | ns |
| CLOCK RISE,FALL TIME | tr,tf | - | - | 20 | ns |
| DATA SET UP TIME | tDSU | 50 | - | - | ns |
| DATA HOLD TIME | tDHD | 50 | - | - | ns |
| LOAD SET UP TIME | tLSU | 80 | - | - | ns |
| LOAD→CLOCK TIME | tLC | 80 | - | - | ns |
| "FRAME" SET UP TIME | TSETUP | 100 | - | - | ns |
| "FRAME" HOLD TIME | THOLD | 100 | - | - | ns |
| "LOAD" PULSE WIDTH | tWC | 125 | - | - | ns |

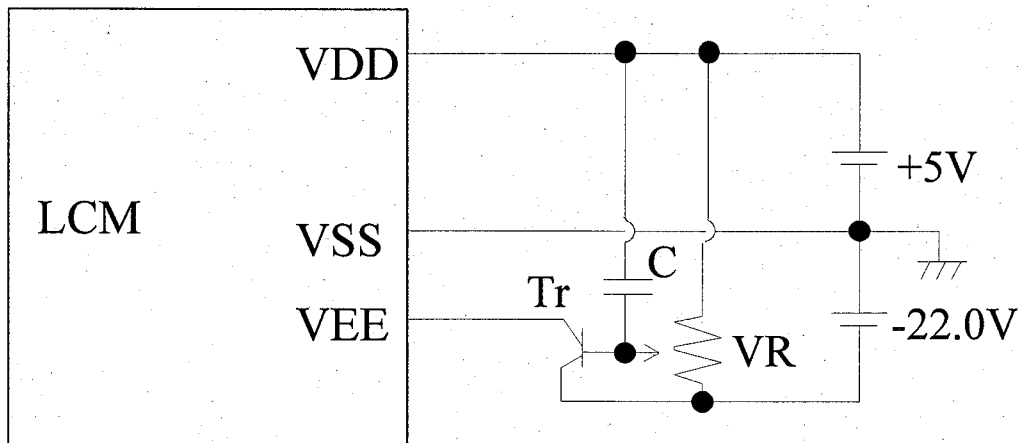


8.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL AND INTERFACE SIGNAL



THE MISSING PIXELS MAY OCCUR WHEN THE LCM IS DRIVEN EXCEPT ABOVE POWER INTERFACE TIMING SEQUENCE.

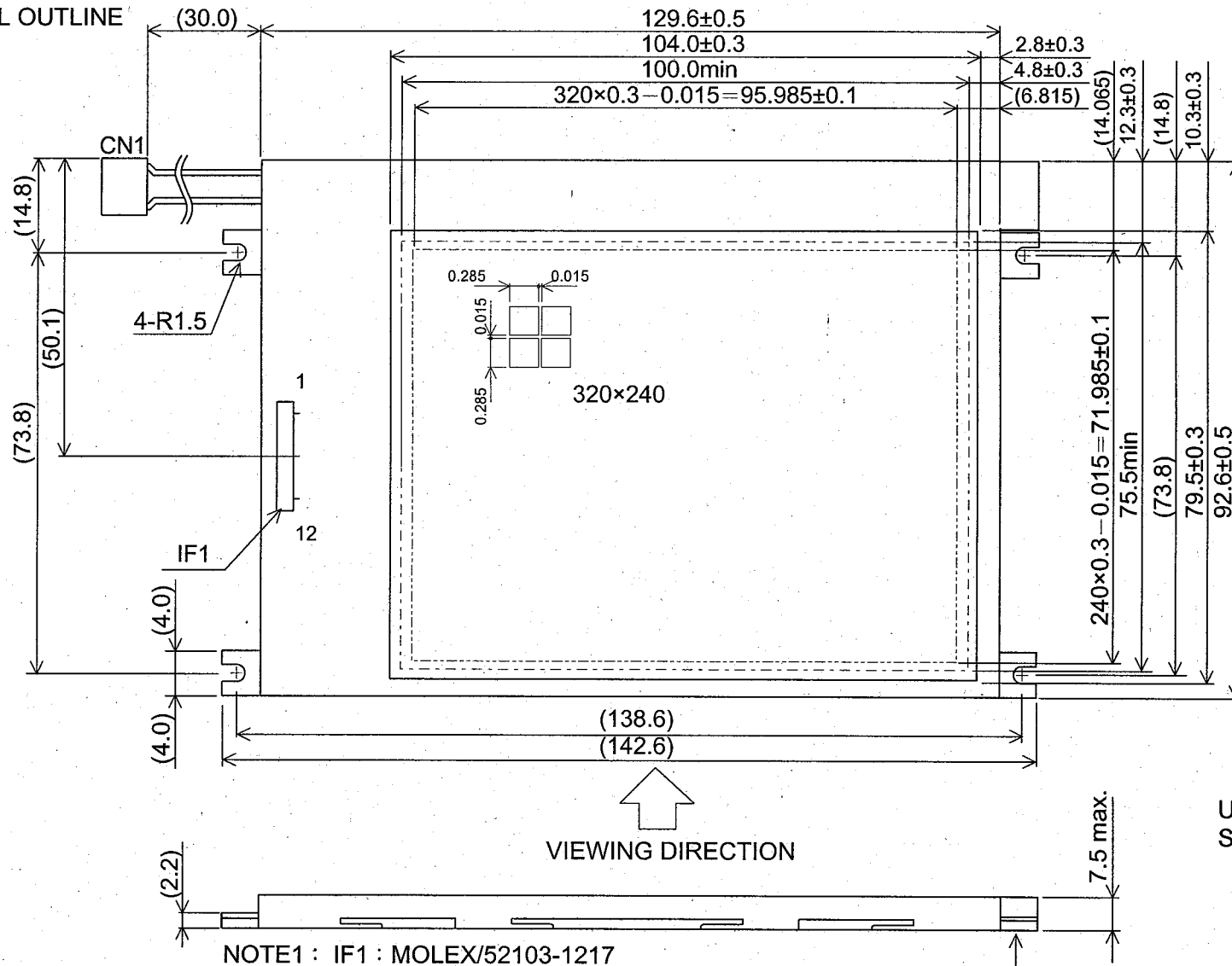
8.4 POWER SUPPLY FOR LCM



C :3.3 μ f(ALUMINUM ELECTROLYTIC CAPACITOR)
 VR:10~20K Ω
 Tr :2SA673APKC(hfe=100,IC=500mA)OR EQUIVALENT Tr.

9. DIMENSIONAL OUTLINE

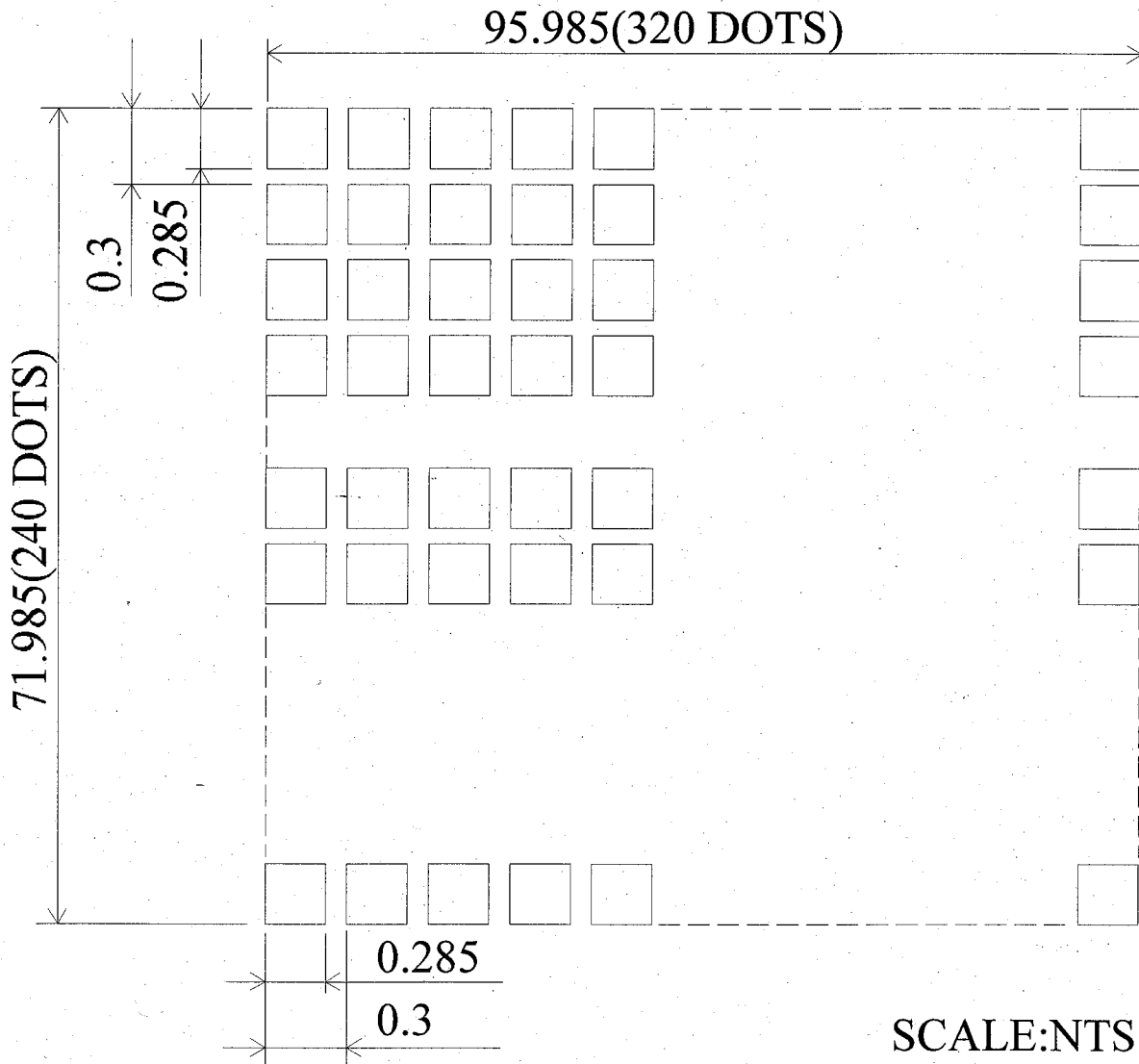
9.1 DIMENSIONAL OUTLINE



UNIT : mm
SCALE : NTS

- NOTE1 : IF1 : MOLEX/52103-1217
- CN1 : JAE IL-G-4S-S3C2-SA
- NOTE2 : THE COSMETIC INSPECTION SOULD BE NEGLECTED ON LCD WITH PROTECTIVE FILM.
- NOTE3 : THE PROTECTIVE FILM SHOULD BE TAKEN OFF BEFORE USE.

9.2 DISPLAY PATTERN



SCALE:NTS
 UNIT :mm
 MEASUREMENT TOLERANCE:±0.1

9.3 INTERNAL PIN CONNECTION

I/F1 : MOLEX/52103-1217

(SUITABLE FPC : 1.0 Pitch, 12 Pin, 0.3^t)

| INTERFACE | PIN NO. | SIGNAL | LEVEL | FUNCTION | |
|-----------|---------|--------|----------|----------|------------------------|
| LCM | I/F1 | 1 | FRAME | H | FIRST LINE MARKER |
| | | 2 | LOAD | H→L | DATA LATCH |
| | | 3 | CP | H→L | DATA SHIFT |
| | | 4 | VDD | - | POWER SUPPLY FOR LOGIC |
| | | 5 | VSS | - | GND |
| | | 6 | VEE | - | POWER SUPPLY FOR LC |
| | | 7 | D0 | | DISPLAY DATA |
| | | 8 | D1 | | |
| | | 9 | D2 | H/L | |
| | | 10 | D3 | | |
| | | 11 | DISP OFF | H/L | H:ON/L:OFF |
| | | 12 | NC | - | |

| INTERFACE | PIN NO. | SIGNAL | LEVEL | FUNCTION | |
|-----------|-------------|--------|-------|----------|--------------------|
| LCM | CFL I/F1 | 1 | H.V | - | CFL SUPPLY FOR CFL |
| | | 2 | N.C | - | - |
| | | 3 | N.C | - | - |
| | | 4 | GND | - | CFL GND |

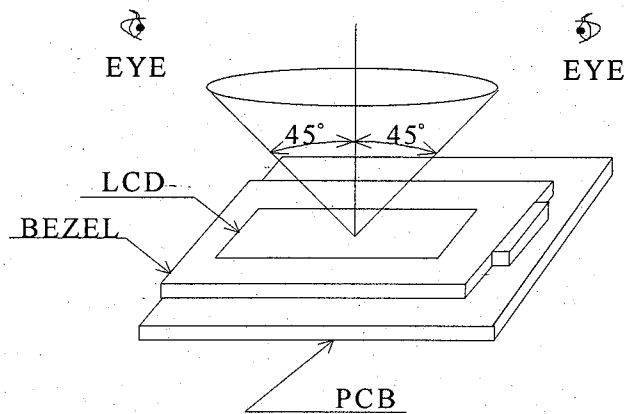
CFL I/F1 : JAE IL-G-4S-S3C2-SA

10 APPEARANCE STANDARD

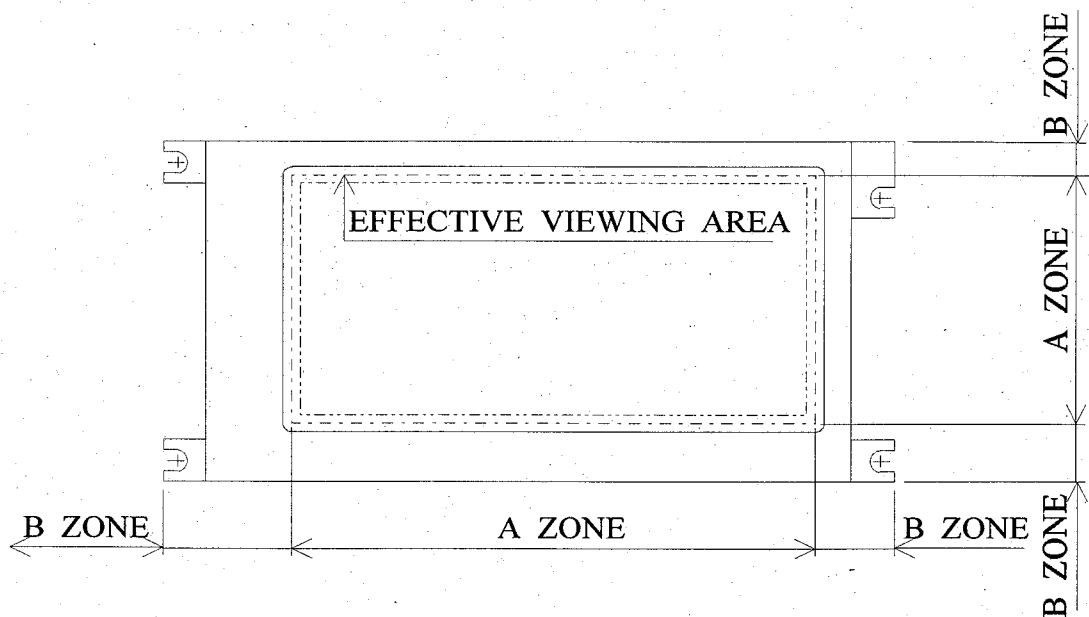
10.1 APPEARANCE INSPECTION CONDITION

VISUAL INSPECTION SHOULD BE DONE UNDER THE FOLLOWING CONDITION.

- (1) IN THE DARK ROOM
- (2) WITH CFL PANEL LIGHTED WITH PRESCRIBED INVERTER CIRCUIT.
- (3) WITH EYES 25cm DISTAND FROM LCM
- (4) VIEWING ANGLE WITHIN 45 DEGREES FROM THE VERTICAL LINE TO THE CENTER OF LCD



10.2 DEFINITION OF EACH ZONE



A ZONE: EFFECTIVE VIEWING AREA (REFER TO OUR DRAWING)

B ZONE: EXCEPT A ZONE

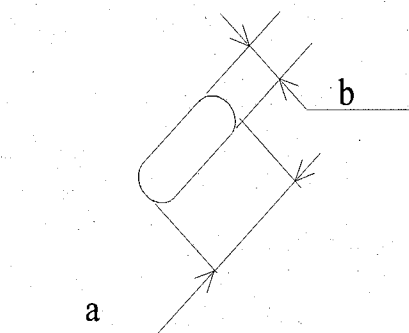
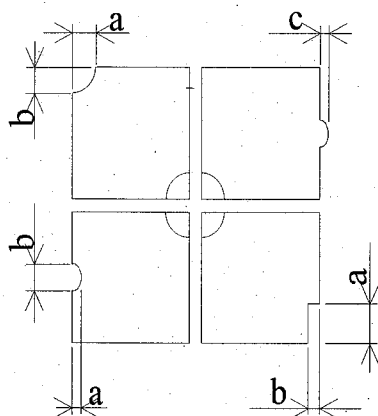
10.3 APPEARANCE SPECIFICATION

*) IF THE PROBLEM OCCURES, ABOUT THIS ITEM THE RESPONSIBLE PERSON OF BOTH PARTY (CUSTOMER AND HITACHI) WILL DISCUSS MORE DETAIL.

| No. | ITEM | CRITERIA | | A | B | |
|--------------------|---|--|----------------------------------|-----------------------------------|---|---|
| L | SCRATCHES | DISTINGUISHED ONE IS NOT ACCEPTABLE (TO BE JUDGE BY HITACHI LIMIT SAMPLE) | | * | — | |
| | DENT | SAME AS ABOVE | | * | — | |
| | WRINKLES IN POLARIZER | SAME AS ABOVE | | * | — | |
| | BUBBLES | AVERAGE DIAMETER D(mm) | MAXIMUM NUMBER ACCEPTABLE | | ○ | — |
| | | $D \leq 0.2$ | IGNORE | | | |
| $0.2 < D \leq 0.3$ | | 12 | | | | |
| $0.3 < D \leq 0.5$ | | 3 | | | | |
| NOTE(1) | $0.5 < D$ | NONE | | | | |
| C D | STAINS, FOREIGN MATERIALS | FILAMENTOUS | | | | |
| | | LENGTH L(mm) | WIDTH W(mm) | MAXIMUM NUM- BER ACCEPTABLE | | |
| | | $L \leq 2.0$ | $W \leq 0.03$ | IGNORE | | |
| | DARK SPOT | $L \leq 3.0$ | $0.03 < W \leq 0.05$ | 6 | ○ | * |
| | | - | $0.05 < W$ | NONE | | |
| | | ROUND | | | | |
| | | AVERAGE DIA- METER D(mm) | MAXIMUM NUM-BER ACCEPTABLE | SPACE | | |
| | | $D < 0.2$ | IGNORE | - | | |
| | | $0.2 \leq D < 0.33$ | 8 | 10 mm | | |
| | $0.33 \leq D$ | NONE | - | | | |
| | THE WHOLE NUMBER | FILAMENTOUS + ROUND = 10 | | | | |
| | THOSE WIPED OUT EASILY ARE ACCEPTABLE | | | ○ | ○ | |
| COLOR TONE | TO BE JUDGE BY HITACHI LIMIT SAMPLE | | ○ | — | | |
| COLOR UNIFORMITY | SAME AS ABOVE | | ○ | — | | |
| PINHOLE | $(a+b)/2 \leq 0.15$ MAX. NO. ACCEPTABLE | | IGNORE | ○ | — | |
| | $0.15 < (a+b)/2 \leq 0.3$ MAX. NO. ACCEPTABLE ≤ 10 | | | | | |
| | $C \leq 0.03$ | IGNORE | | | | |

| No. | ITEM | CRITERIA | | | A | B | |
|------------------|--|-------------------------------------|--------------|---------------------------|----------|---|----------|
| | | AVERAGE DIAMETER D(mm) | CONTRAST | MAXIMUM NUMBER ACCEPTABLE | | | DISTANCE |
| | CONTRAST IRREGULARITY (SPOT) NOTE(3) NOTE(2) | D < 0.25 | TO BE JUDGE | IGNORE | - | ○ | - |
| | | 0.25 < D ≤ 0.35 | BY HITACHI | ≤ 10 | 20mm | | |
| | | 0.35 < D ≤ 0.5 | LIMIT | ≤ 4 | 20mm | | |
| | | 0.5 < D | SAMPLE | NONE | - | | |
| L C | CONTRAST IRREGULARITY (A PAIR OF SCRATCH) NOTE(3) NOTE(2) RUBBING SCRATCH | THICKNESS T(mm) | LENGTH L(mm) | MAXIMUM NUMBER ACCEPTABLE | DISTANCE | ○ | - |
| | | T ≤ 0.25 | L ≤ 1.2 | ≤ 2 | 20mm | | |
| | | T ≤ 0.2 | L ≤ 1.5 | ≤ 3 | 20mm | | |
| | | T ≤ 0.15 | L ≤ 2.0 | ≤ 3 | 20mm | | |
| | | T ≤ 0.1 | L ≤ 3.0 | ≤ 4 | 20mm | | |
| THE WHOLE NUMBER | | ≤ 6 | | | | | |
| - | - | TO BE JUDGE BY HITACHI LIMIT SANPLE | | | | * | - |

NOTE(1)



$$\frac{a+b}{2} = D \cdots \text{AVERAGE DIAMETER 径}$$

$$C \cdots \text{SALIENT}$$

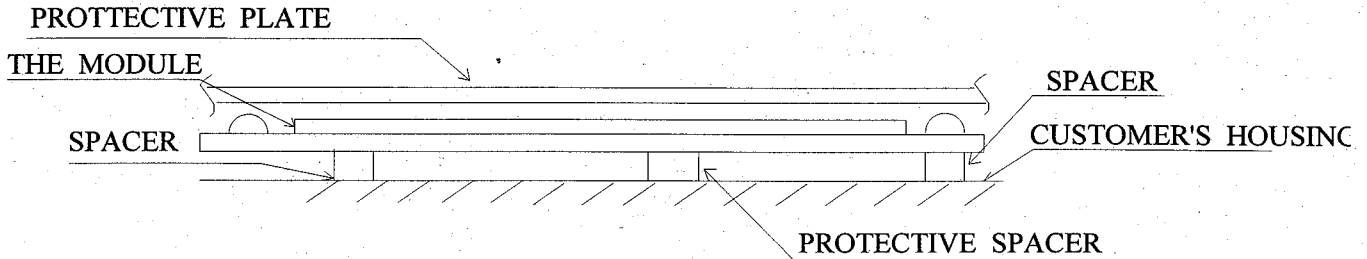
NOTE 2 LCM BACKLIGHT ON.

NOTE 3 THERE ARE TWO SCRATCHES IN A PAIR.

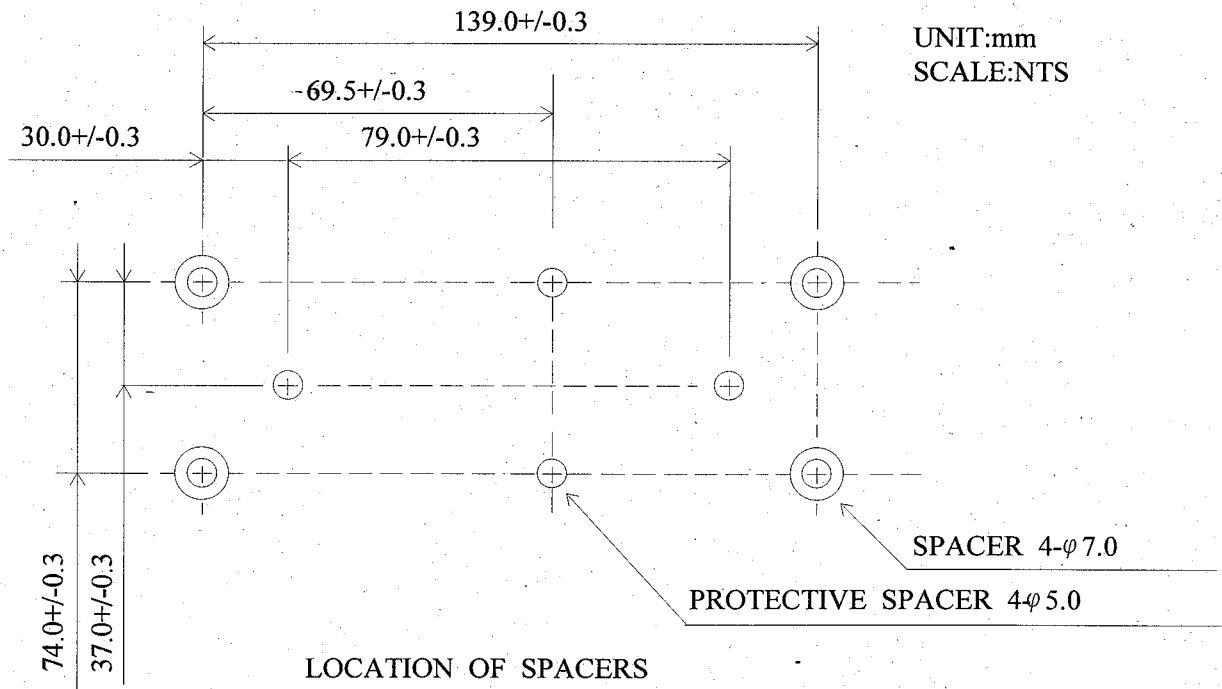
11 PRECAUTION IN DESIGN

11.1 MOUNTING METHOD

SINCE THE MODULE IS SO CONSTRUCTED AS TO BE FIXED BY UTILIZING FITTING HOLES IN THE PRINTED CIRCUIT BOARD AS SHOWN BELOW, IT IS NECESSARY TO TAKE CONSIDERATION THE FOLLOWING ITEMS ON ATTACHMENT TO A FRAME.



EXAMPLE OF MOUNTING



LOCATION OF SPACERS

- (1) USE OF PROTECTIVE PLATE, MADE OF AN ACRYLIC PLATE, ETC, IN ORDER TO PROTECT A POLARIZER AND LC CELL.
- (2) TO PREVENT THE MODULE COVER FROM BEING PRESSED, THE SPACERS BETWEEN THE MODULE AND THE FITTING PLATES SHOULD BE LONGER THAN 0.5mm.
- (3) WE RECOMMEND YOU TO USE PROTECTIVE SPACER AS FIGURE FOR PROTECTING LCD MODULE FROM ANY KIND OF SHOCK TO YOUR SET.

11.2 LC DRIVING VOLTAGE(V_{EE})AND VIEWING ANGLE RANGE.

SETTING V_{EE} OUT OF THE RECOMMENDED CONDITION WILL BE A CAUSE FOR A CHANGE OF VIEWING ANGLE RANGE.

11.3 CAUTION AGAINST STATIC CHARGE

AS THIS MODULE IS PROVIDED WITH C-MOS LSI, THE CARE TO TAKE SUCH A PRECAUTION AS TO GROUNDING THE OPERATOR'S BODY IS REQUIRED WHEN HANDLING IT.

11.4 POWER ON SEQUENCE

INPUT SIGNALS SHOULD NOT BE APPLIED TO LCD MODULE BEFORE POWER SUPPLY VOLTAGE IS APPLIED AND REACHES TO SPECIFIED VOLTAGE ($5\pm 0.25V$) IF ABOVE SEQUENCE IS NOT KEPT, C-MOS LSI OF LCD MODULES MAY BE DAMAGED DUE TO LATCH UP PROBLEM.

11.5 PACKAGING

- (1) NO. LEAVING PRODUCTS IS PREFERABLE IN THE PLACE OF HIGH HUMIDITY FOR A LONG PERIOD OF TIME. FOR THEIR STORAGE IN THE PLACE WHERE TEMPERATURE IS $35^{\circ}C$ OR HIGHER, SPECIAL CARE TO PREVENT THEM FROM HIGH HUMIDITY IS REQUIRED. A COMBINATION OF HIGH TEMPERATURE AND HIGH HUMIDITY MAY CAUSE THEM POLARIZATION DEGRADATION AS WELL AS BUBBLE GENERATION AND POLARIZER PEEL-OFF. PLEASE KEEP THE TEMPERATURE AND HUMIDITY WITHIN THE SPECIFIED RANGE FOR USE AND STORING.
- (2) SINCE UPPER POLARIZERS AND LOWER ALUMINUM PLATES TEND TO BE EASILY DAMAGED, THEY SHOULD BE HANDLED WITH FULL CARE SO AS NOT TO GET THEM TOUCHED, PUSHED OR RUBBED BY A PIECE OF GLASS. TWEEZERS AND ANYTHING ELSE WHICH ARE HARDER THAN A PENCIL LEAD 3H.
- (3) AS THE ADHESIVES USED FOR ADHERING UPPER/LOWER POLARIZES AND ALUMINUM PLATES ARE MADE OF ORGANIC SUBSTANCES WHICH WILL BE DETERIORATED BY A CHEMICAL REACTION WITH SUCH CHEMICALS AS ACETONE, TULUENE ETHANOLE AND ISOPROPYLALCOHIL. THE FOLLOWING SOLVENTS ARE RECOMMENDED FOR USE:
NORMAL HEXANE
PLEASE CONTACT US WHEN IT IS NECESSARY FOR YOU TO USE CHEMICALS OTHER THAN THE ABOVE.
- (4) LIGHTLY WIPE TO CLEAN THE DIRTY SURFACE WITH ABSORBENT COTTON WASTE OR OTHER SOFT MATERIAL LIKE CHAMOIS, SOAKED IN THE CHEMICALS RECOMMENDED WITHOUT SCRUBBING IT HARDLY.
TO PREVENT THE DISPLAY SURFACE FROM DAMAGE AND KEEP THE APPEARANCE IN GOOD STATE, IT IS SUFFICIENT, IN GENERAL, TO WIPE IT WITH ABSORBENT COTTON.

- (5) IMMEDIATELY WIPE OFF SALIVA OFF SALIVA OR WATER DROP ATTACHED ON THE DISPLAY AREA BECAUSE ITS LONG PERIOD ADHERENCE MAY CAUSE DEFORMATION OR FADED COLOR ON THE SPOT.
- (6) FOGY DEW DEPOSITED ON THE SURFACE AND CONTACT TERMINALS DUE TO COLDNESS WILL BE CAUSE FOR POLARIZER DAMAGE, STAIN AND DIRT ON PRODUCT. WHEN NECESSARY TO TAKE OUT THE PRODUCTS FROM SOME PLACE AT LOW TEMPERATURE FOR TEST, ETC. IT IS REQUIRED THEM TO BE WARMED UP IN A CONTAINER ONCE AT THE TEMPERATURE HIGHER THAN THAT OF ROOM.
- (7) TOUCHING THE DISPLAY AREA AND CONTACT TERMINALS WITH BARE HANDS AND CONTAMINATING THEM ARE PROHIBITED, BECAUSE THE STAIN ON THE DISPLAY AREA AND POOR INSULATION BETWEEN TERMINALS ARE OFTEN CAUSED BY BEING TOUCHED BY BARE HANDS.(THERE ARE SOME COSMETICS DETRIMENTAL TO POLARIZERS.)
- (8) IN GENERAL THE QUALITY OF GLASS IS FRAGILE SO THAT IT TENDS TO BE CRACKED OR CHIPPED IN HANDLING,SPECIALY ON ITS PERIPHERY DOWN, ECT.

11.6 CAUTION FOR OPERATION

- (1) IT IS AN INDISPENSABLE CONDITION TO DRIVE LCD'S WITHIN THE SPECIFIED VOLTAGE LIMIT SINCE THE HIGHER VOLTAGE THAN THE LIMIT CAUSES THE SHORTER LCD LIFE.AN ELECTROCHEMICAL REACTION DUE TO DIRECT CURRENT CAUSES LCD'S UNDESIRABLE DETERIORATION, SO THAT THE USE OF DIRECT CURRENT DRIVER SHOULD BE AVOIDED.
- (2) RESPONSE TIME WILL BE EXTREMELY DELAYED AT LOWER TEMPERATURE THAN THE OPERATING TEMPERATURE RANGE AND ON THE OTHER HAND AT HIGHER TEMPERATURE LCD'S SHOW DARK BLUE COLOR IN HEM.HOWEVER THOSE PHENOMENA DO NOT MEAN MALFUNCTION OR OUT OF ORDER WITH LCD'S WHICH WILL COME BACK IN THE SPECIFIED OPERATING TEMPERATURE RANGE.
- (3) IF THE DISPLAY AREA IS PUSHED HARD DURING OPERATION,SOME FONT WILL BE ABNORMALLY DISPLAYED BUT IT RESUMES NORMAL CONDITION AFTER TURNING OFF ONCE.

- (4) A SLIGHT DEW DEPOSITING ON TERMINALS IS A CAUSE FOR ELECTROCHEMICAL REACTION RESULTING IN TERMINAL OPER CIRCUIT. USAGE UNDER THE RELATIVE CONDITION OF 40°C 50%RH LESS IS REQUIRED.

11.7 STORAGE

IN CASE OF STORING FOR A LONG PERIOD TIME (FOR INSTANCE, FOR YEARS) FOR THE PURPOSE OF REPLACEMENT USE, THE FOLLOWING WAYS ARE RECOMMENDED.

- (1) STORAGE IN A POLYETHYLENE BAG WITH THE OPENING SEALED SO AS NOT TO ENTER FRESH AIR OUTSIDE IN IT, AND WITH NO DESICCANT.
- (2) PLACING IN A DARK PLACE WHERE NEITHER EXPOSURE TO DIRECT SUNLIGHT NOR LIGHT IS, KEEPING TEMPERATURE IN THE RANGE FOR 0°C TO 35°C.
- (3) STORING WITH NO TOUCH ON POLARIZER SURFACE BY ANYTHING ELSE.

(IT IS RECOMMENDED TO STORE THEM AS THEY HAVE BEEN CONTAINED IN THE INNER CONTAINER AT THE TIME OF DELIVERY FOR US.)

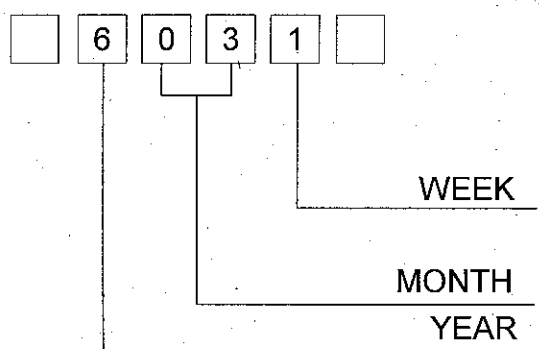
11.8 SAFETY

- (1) IT IS RECOMMENDABLE TO CRASH DAMAGED OR UNNECESSARY LCD'S INTO PIECES AND WASH OFF LIQUID CRYSTAL BY EITHER OF SOLVENTS SUCH AS ACETONE AND ETHANOL, WHICH SHOULD UP LATER.
- (2) WHEN ANY LIQUID LEAKED OUT OF A DAMAGED GLASS CELL IN CONTACT WITH YOUR HANDS, PLEASE WASH IT OFF WELL WITH SOAP AND WATER.

12. DESIGNATION OF LOT MARK

12.1 LOT MARK

LOT MARK IS CONSISTED OF 4 DIGIT NUMBER.



| YEAR | FIGURE IN LOT MARK |
|------|--------------------|
| 2007 | 7 |
| 2008 | 8 |
| 2009 | 9 |
| 2010 | 0 |
| 2011 | 1 |

| MONTH | FIGURE IN LOT MARK | MONTH | FIGURE IN LOT MARK |
|-------|--------------------|-------|--------------------|
| JAN. | 01 | JULY. | 07 |
| FEB. | 02 | AUG. | 08 |
| MAR. | 03 | SEPT. | 09 |
| APR. | 04 | OCT. | 10 |
| MAY. | 05 | NOV. | 11 |
| JUNE. | 06 | DEC. | 12 |

| WEEK (DAY IN CALENDAR) | FIGURE IN LOT MARK |
|------------------------|--------------------|
| 21~27 | 1 |
| 28~ 3 | 2 |
| 4~10 | 3 |
| 11~17 | 4 |
| 18~20 | 5 |

12.2 REVISION

| REV No. | ITEM | LOT No. |
|---------|---|---------|
| A | CCFL tube diameter ($\phi 2.6 \rightarrow \phi 2.4$) | - |
| B | CFL I/F Connector : Mitsumi M63M83-04 → JAE IL-G-4S-S3C2-SA | 7102T |

12.3 LOCATION OF LOT MARK

on the back side of LCM

6001T

T:MADE IN TAIWAN.

13. PRECAUTION FOR USE

- (1) A LIMIT SAMPLE SHOULD BE PROVIDED BY THE BOTH PARTIES ON AN OCCASION WHEN THE BOTH PARTIES AGREED ITS NECESSITY. JUDGMENT BY A LIMIT SAMPLE SHALL TAKE EFFECT AFTER THE LIMIT SAMPLE HAS BEEN ESTABLISHED AND CONFIRMED BY THE BOTH PARTIES.
- (2) ON THE FOLLOWING OCCASION, THE HANDLING OF THE PROBLEM SHOULD BE DECIDED THROUGH DISCUSSION AND AGREEMENT BETWEEN RESPONSIBLE PERSONS OF THE BOTH PARTIES.
 - (1) WHEN A QUESTION IS ARISEN IN THE SPECIFICATIONS.
 - (2) WHEN A NEW PROBLEM IS ARISEN WHICH IS NOT SPECIFIED IN THIS SPECIFICATIONS.
 - (3) WHEN AN INSPECTION SPECIFICATIONS CHANGE OR OPERATING CONDITION CHANGE IN CUSTOMER IS REPORTED TO HITACHI, AND SOME PROBLEM IS ARISEN IN THIS SPECIFICATION DUE TO THE CHANGE.
 - (4) WHEN A NEW PROBLEM IS ARISEN AT THE CUSTOMER'S OPERATING SET FOR SAMPLE EVALUATION IN THE CUSTOMER SITE.

THE PRECAUTION THAT SHOULD BE OBSERVED WHEN HANDLING LCM HAVE BEEN EXPLAIND ABOVE. IF ANY POINTS ARE UNCLEAR OF IF YOU HAVE ANY REQUESTS,PLEASE CONTACT HITACHI.