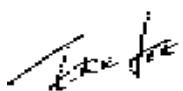


| | | |
|--|--|---------------------|
| EXAMINED BY :  | EMERGING DISPLAY TECHNOLOGIES CORPORATION | FILE NO . CAS-10240 |
| APPROVED BY: David Chang | | ISSUE : MAR.20,2001 |
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| | | VERSION : 1 |
| CUSTOMER | ACCEPTANCE | SPECIFICATIONS |
| <div style="border: 1px solid black; border-radius: 15px; padding: 20px; margin: 20px auto; width: 80%;"> <p>MODEL NO. :</p> <p><u>ES16201(TRANSFLECTIVE TYPES)</u></p> <p>FOR MESSRS :</p> <p>_____</p> </div> <p>CUSTOMER'S APPROVAL</p> <p>DATE : _____</p> <p>BY : _____</p> | | |

EMERGING DISPLAY
TECHNOLOGIES CORPORATION

MODEL NO .
ES16201(TRANSFLECTIVE TYPES)

VERSION
1

RECORDS OF REVISION

DOC . FIRST ISSUE

MAR.20,2001

DATE

REVISED
PAGE
NO.

S U M M A R Y

NUMBERING SYSTEM

| Polarizer | Mode | Backlight | Code value |
|---------------|------|-----------|------------|
| Transflective | | — | P |

Module type:

S : Chip on glass

E S 16 2 01 G P

| LCD type + color | Code Value |
|--------------------|------------|
| STN + Yellow-Green | Y |
| STN + Gray | G |

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1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - 0 0 2 A

1.2 APPLICATION NOTES FOR CONTROLLER / DRIVER : NT7603

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - N T 7 6 0 3

1.3 THIS INDIVIDUAL SPECIFICATIONS IS PRIOR TO GENERAL SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- (1) NUMBER OF CHARACTER ----- 16 CH * 2 LINE
- (2) MODULE SIZE ----- 69.0W * 30.0H * 3.0D (max.) mm
- (3) EFFECTIVE AREA ----- 63.0W * 18.0H mm
- (4) CHARACTER FONT ----- 5 * 7 DOTS + CURSOR
- (5) CHARACTER SIZE ----- 2.96W * 5.56H mm
- (6) CHARACTER PITCH ----- 3.55(W)*5.94 (H)
- (7) DOT SIZE ----- 0.56W * 0.66H mm
- (8) DOT PITCH ----- 0.60W * 0.70H mm
- (9) LCD TYPE *
- (10) DRIVING METHOD ----- 1 / 16 DUTY MULTIPLEX DRIVE

* PLEASE REFER TO NUMBERING SYSTEM

3. ABSOLUTE MAXIMUM RATINGS

3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS . (AT Ta = 25 °C)

| PARAMETER | SYMBOL | MIN . | MAX . | UNIT | REMARK |
|----------------------------|-----------|-------|-------|------|------------|
| POWER SUPPLY FOR LOGIC | VDD – VSS | 0 | 7 . 0 | V | |
| POWER SUPPLY FOR LCD DRIVE | VDD – VO | 0 | 5 . 0 | V | |
| INPUT VOLTAGE | VI | VSS | VDD | V | |
| STATIC ELECTRICITY | — | — | 1 0 0 | V | NOTE (1) |

NOTE (1) : TEST METHOD AND CONDITIONS :

AFTER CHARGING UP 200 PF CAPACITOR BY STATED VOLTAGE ,
THE CAPACITOR IS CONNECTED WITH INTERFACE PINS OF THE
MODULE .

3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS .

| I T E M | OPERATING | | STORAGE | | REMARK |
|---------------------|----------------|--|----------------|--|-------------------------|
| | MIN . | MAX . | MIN . | MAX . | |
| AMBIENT TEMPERATURE | - 2 0 °C | 7 0 °C | - 3 0 °C | 8 0 °C | NOTE (2) , (3) |
| HUMIDITY | — | 9 0 % RH | — | 9 0 % RH | WITHOUT CONDENSATION |
| VIBRATION | — | 4 . 9 m /s ² (0 . 5 G) | — | 1 9 . 6 m /s ² (2 G) | |
| SHOCK | — | 2 9 . 4 m /s ² (3 G) | — | 4 9 0 . 0 m /s ² (5 0 G) | XYZ DIRECTIONS |
| CORROSIVE GAS | NOT ACCEPTABLE | | NOT ACCEPTABLE | | |

NOTE (2) : Ta AT -30°C : 48HR MAX .
80°C : 168HR MAX .

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

4. ELECTRICAL CHARACTERISTICS

| | | Ta = 25°C | | VDD = 5.0 ± 0.5V | | | |
|---------------------------------|---|---------------|-------|------------------|-------|------|------|
| PARAMETER | SYMBOL | CONDITION | MIN . | TYP . | MAX . | UNIT | NOTE |
| H LEVEL INPUT VOLTAGE | VIH | — | 2.2 | — | VDD | V | 2 |
| L LEVEL INPUT VOLTAGE | VIL | — | -0.3 | — | 0.8 | V | — |
| H LEVEL OUTPUT VOLTAGE | VOH | -IOH = 0.2 mA | 2.4 | — | — | V | 2 |
| L LEVEL OUTPUT VOLTAGE | VOL | IOL = 1.2 mA | — | — | 0.4 | V | — |
| POWER SUPPLY CURRENT (LOGIC) | IDD | VDD = 5.0 V | — | 1.0 | 1.5 | mA | — |
| RECOMMENDED LCD DRIVING VOLTAGE | VDD - VO ∅ = 10° θ = 0° DUTY = 1/16 | Ta = -20 °C | — | 4.5 | — | V | — |
| | | Ta = 25 °C | — | 4.5 | — | | |
| | | Ta = 70 °C | — | 4.5 | — | | |
| CLOCK OSCILLATION FREQUENCY | FOSC | Ta = 25 °C | 380 | 540 | 700 | KHZ | — |

5. OPTICAL CHARACTERISTICS .

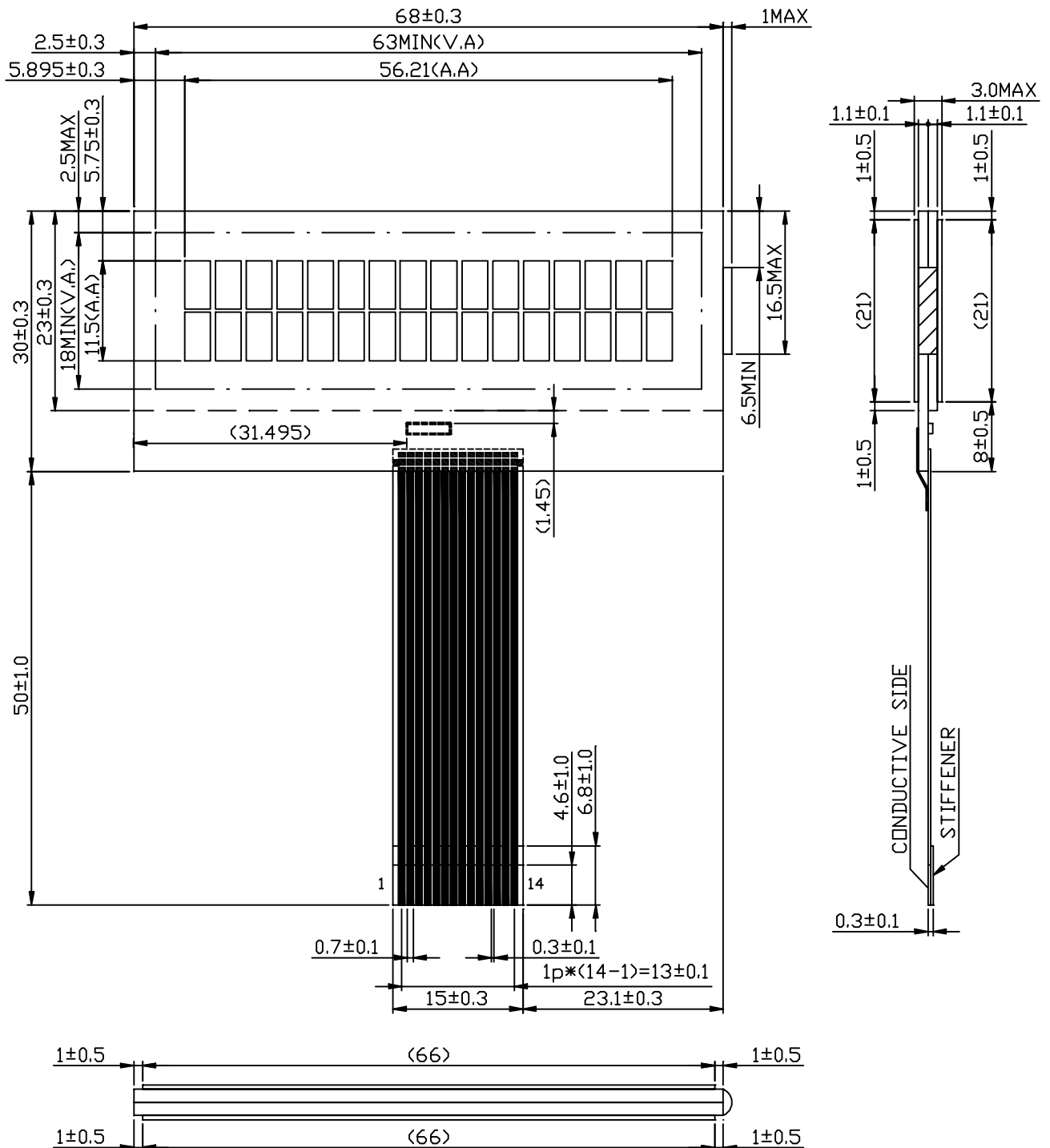
| | | | Ta = 25°C | | VDD = 5.0 V | | | |
|----------------|-------------|-------------------|------------|-------|-------------|------|------|---|
| I T E M | SYMBOL | CONDITION | MIN . | TYP . | MAX | UNIT | NOTE | |
| VIEWING AREA | Ø 2 - Ø 1 | K ≥ 1.4 | 3 0 | — | — | deg. | 1 | |
| CONTRAST RATIO | K | Ø = 10° θ = 0° | — | 5 | — | — | 1 | |
| RESPONSE TIME | tr (rise) | Ø =10° θ = 0° | Ta = -20°C | — | 5538 | — | ms | 1 |
| | | | Ta = 25°C | — | 228 | — | | |
| | | | Ta = 70°C | — | 104 | — | | |
| | tf (fall) | | Ta = -20°C | — | 2316 | — | | |
| | | | Ta = 25°C | — | 174 | — | | |
| | | | Ta = 70°C | — | 85 | — | | |

NOTE (1) : PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATION : E U - 002 A

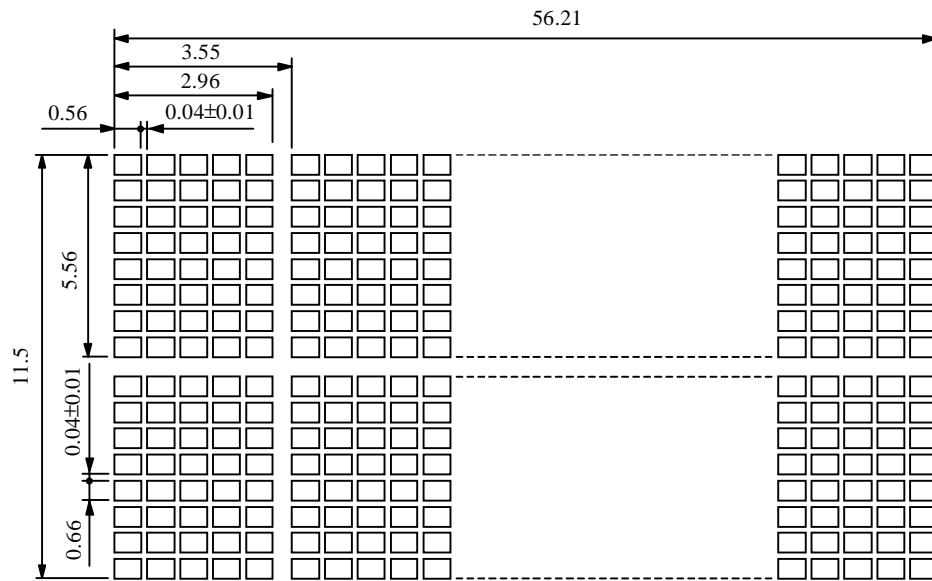
NOTE (2) : APPLICABLE : DB0 ~ DB7 , RS , R/W ,E

6. OUTLINE DIMENSION



UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.5

7. DETAIL DRAWING OF DOT MATRIX

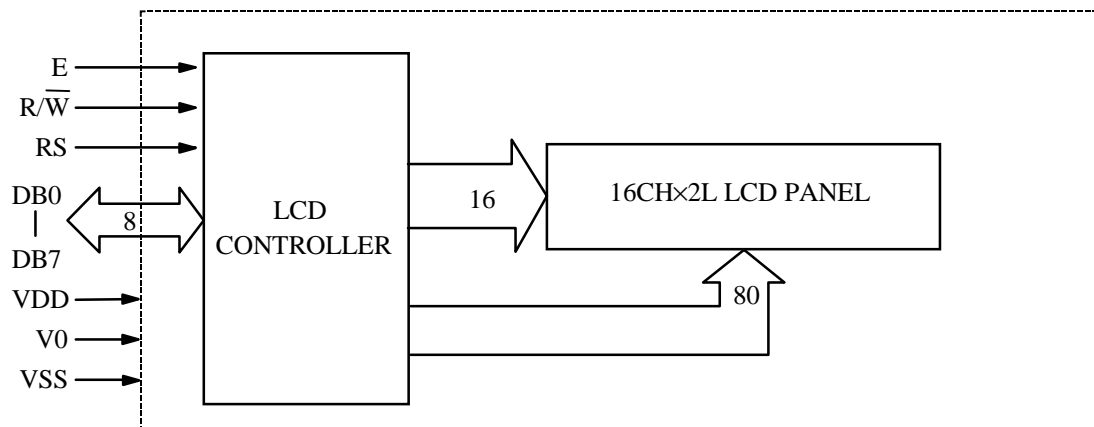


UNIT : mm

SCALE : NTS

NOT SPECIFIED TOLERANCE IS ± 0.1

8. BLOCK DIAGRAM

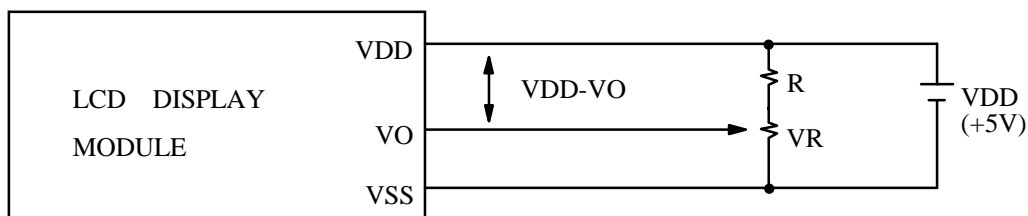


9. INTERFACE SIGNALS

| PIN NO. | SYMBOL | DESCRIPTION | FUNCTION |
|---------|------------------|-------------------------------------|---|
| 1 | VSS | GROUND | 0V (GND) |
| 2 | VO | LCD CONTRAST ADJUSTMENT | |
| 3 | VDD | POWER SUPPLY FOR LOGIC CIRCUIT | +5V |
| 4 | RS | INSTRUCTION/DATA REGISTER SELECTION | RS = 0 : INSTRUCTION REGISTER RS = 1 : DATA REGISTER |
| 5 | $\overline{R/W}$ | READ/WRITE SELECTION | $\overline{R/W}$ = 0 : REGISTER WRITE $\overline{R/W}$ = 1 : REGISTER READ |
| 6 | E | ENABLE INPUT | |
| 7 | DB0 | DATA INPUT/OUTPUT LINES | 4 BIT/8BIT SELECTABLE 4 BIT : DB4 - DB7 8 BIT : DB0 - DB7 |
| 8 | DB1 | | |
| 9 | DB2 | | |
| 10 | DB3 | | |
| 11 | DB4 | | |
| 12 | DB5 | | |
| 13 | DB6 | | |
| 14 | DB7 | | |

10. POWER SUPPLY

10.1 POWER SUPPLY FOR LCD MODULE



VDD - VO : LCD DRIVING VOLTAGE

VR : $10K \Omega \sim 20K \Omega$

RECOMMENDED RESISTOR R : $VDD - VO \geq 1.5 V$

11. DISPLAY DATA RAM ADDRESS

| CHARACTER | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|-----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| LINE 1 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 8A | 8B | 8C | 8D | 8E | 8F |
| LINE 2 | C0 | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | CA | CB | CC | CD | CE | CF |