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| | | VERSION : 4 |

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO . :

24B00(LED TYPES)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

EMERGING DISPLAY
TECHNOLOGIES CORPORATION

| | |
|--------------------------------|--------------|
| MODEL NO . 24B00(LED TYPES) | VERSION 4 |
|--------------------------------|--------------|

| RECORDS OF REVISION | | DOC . FIRST ISSUE NOV.28,1997 |
|---------------------|------------------|---|
| DATE | REVISED PAGE NO. | SUMMARY |
| NOV.11, 1998 | 3 | 4. ELECTRICAL CHARACTERISTICS THE NUMBERS OF "RECOMMENDED LCD DRIVING VOLTAGE" REVISED AS BELOW : W.T. Ta = -20 °C 10.8 → 12.0 Ta = 25 °C 9.6 → 12.0 Ta = 70 °C 8.8 → 12.0 |
| MAR.25,1999 | 3 | 4. ELECTRICAL CHARACTERISTICS THE NUMBERS OF "RECOMMENDED LCD DRIVING VOLTAGE" REVISED AS BELOW : W.T. Ta = -20 °C 12.0 → 13.9 Ta = 25 °C 12.0 → 12.1 Ta = 70 °C 12.0 → 11.1 |
| JAN.24,2000 | 1~4 | THE ENTIRE PAGES REVISED. |
| | | |

NUMBERING SYSTEM

| Polarizer Mode | Backlight | Code value |
|----------------|-----------|------------|
| Transflective | LED | L |
| Transmissive | LED | M |

| Backlight Color | Code Value |
|-----------------|------------|
| Yellow-Green | Y |

E W 24 B 00 G L Y

| LCD type + LCD color | Code Value |
|----------------------|------------|
| STN + Yellow-Green | Y |
| STN + Gray | G |
| STN + Blue | B |
| FSTN + White | F |
| FSTN + Black | N |

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1. GENERAL SPECIFICATIONS

1.1 QUALITY SPECIFICATIONS
PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :
EU - 002 A

1.2 APPLICATION NOTES FOR CONTROLLER / DRIVER :
PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :
EU - T6963 C

1.3 THIS INDIVIDUAL SPECIFICATIONS IS PRIOR TO GENERAL
SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- | | | |
|--------------------|-------|------------------------------------|
| (1) NUMBER OF DOTS | ----- | 240W * 64H DOTS |
| (2) MODULE SIZE | ----- | 180.0W * 65.0H * 16.0D (max .) mm |
| (3) EFFECTIVE AREA | ----- | 133.0W * 40.0H mm |
| (4) ACTIVE AREA | ----- | 127.16W * 33.88H mm |
| (5) DOT SIZE | ----- | 0.49W * 0.49H mm |
| (6) DOT PITCH | ----- | 0.53W * 0.53H mm |
| (7) LCD TYPE * | | |
| (8) DRIVING METHOD | ----- | 1 / 64 DUTY MULTIPLEX DRIVE |
| (9) BACK LIGHT | ----- | LED, COLOR : YELLOW-GREEN |

* 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 - VEE | 0 | 22.0 | V | |
| INPUT VOLTAGE | VI | VSS | VDD | V | |
| STATIC ELECTRICITY | — | — | 100 | V | NOTE (1) |
| LED POWER DISSIPATION | PD | — | 7.4 | W | |
| LED FORWARD CURRENT | IF | — | 1625 | mA | |
| LED REVERSE VOLTAGE | VR | — | 8 | V | |

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 | - 20 °C | 70 °C | - 30 °C | 80 °C | NOTE (2), (3) |
| HUMIDITY | — | 85 % RH | — | 85 % RH | WITHOUT CONDENSATION |
| VIBRATION | — | 4.9 m/s ² (0.5 G) | — | 19.6 m/s ² (2 G) | 10~300 HZ XYZ DIRECTIONS 1 Hr EACH |
| SHOCK | — | 29.4 m/s ² (3 G) | — | 490.0 m/s ² (50 G) | 10 m SEC XYZ DIRECTIONS 1 TIME EACH |
| 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

| PARAMETER | SYMBOL | CONDITION | MIN . | TYP . | MAX . | UNIT |
|---|---|--|---------|-------|--------|------|
| POWER SUPPLY VOLTAGE FOR LOGIC | VDD-VSS | — | 4.75 | 5.0 | 5.25 | V |
| POWER SUPPLY VOLTAGE FOR LCD DRIVE | VEE-VSS | — | - 2.0 | — | - 10.0 | V |
| INPUT VOLTAGE NOTE (1) | VIH | H LEVEL | VDD-2.2 | — | VDD | V |
| | VIL | L LEVEL | 0 | — | 0.8 | V |
| OUTPUT VOLTAGE NOTE (1) | VOH | H LEVEL | VDD-0.3 | — | VDD | |
| | VOL | L LEVEL | 0 | — | 0.3 | |
| POWER SUPPLY CURRENT FOR LOGIC NOTE (2) | IDD | VDD – VSS = 5.0 V VDD – VEE = 8.7 V | — | 9.0 | — | mA |
| RECOMMENDED LCD DRIVING VOLTAGE NOTE (3) | VDD-VEE $\varnothing = 10^\circ \theta = 0^\circ$ DUTY=1/64 | Ta = -20 °C | — | 8.7 | — | V |
| | | Ta = 25 °C | — | 8.7 | — | V |
| | | Ta = 70 °C | — | 7.9 | — | V |
| CLOCK OSCILLATION FREQUENCY | f OSC | — | — | 3.58 | — | MHZ |
| LED FORWARD VOLTAGE | VF | IF = 650 mA | — | 4.2 | 4.6 | V |
| LED FORWARD CURRENT | IF | — | — | 650 | — | mA |
| LED REVERSE CURRENT | IR | VR = 8 V | — | — | 200 | µA |

NOTE (1) : APPLIED TO TERMINALS (WR, RD, CE, C/D, RST, FS, D0~D7)

NOTE (2) : THE DISPLAY PATTERN IS ALL "OFF"/"ON"

NOTE (3) : RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT ± 0.5 V BY EACH MODULE

5. OPTICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0 V

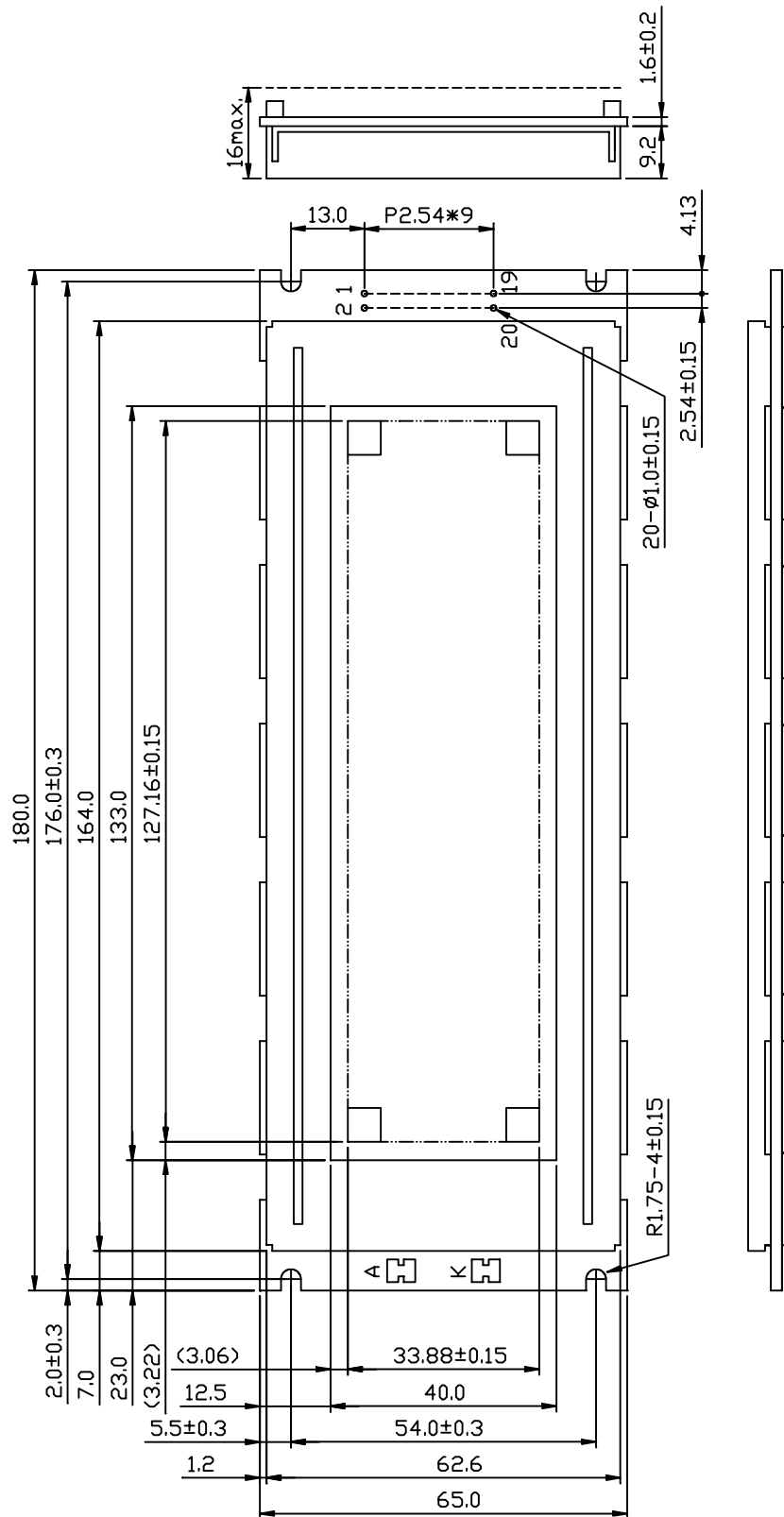
| I T E M | | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT | NOTE |
|------------------------------|-------------|--|--|------|------|-------------------|------|------|
| VIEWING AREA | STN | $\varnothing 2 - \varnothing 1$ | $K \geq 1.4$ | 40 | — | — | deg. | 1 |
| | FSTN | | | 50 | — | — | deg. | 1 |
| CONTRAST RATIO | STN | K | $\varnothing = 10^\circ$ $\theta = 0^\circ$ | — | 5 | — | — | 1 |
| | FSTN | | | 5 | — | — | — | 1 |
| RESPONSE TIME | tr (rise) | $\varnothing = 10^\circ$ $\theta = 0^\circ$ | Ta = -20°C | — | 3982 | — | ms | 1 |
| | | | Ta = 25°C | — | 228 | — | | |
| | | | Ta = 70°C | — | 83 | — | | |
| | tf (fall) | | Ta = -20°C | — | 3752 | — | | |
| | | | Ta = 25°C | — | 176 | — | | |
| | | | Ta = 70°C | — | 94 | — | | |
| THE BRIGHTNESS OF BACK-LIGHT | L | IF = 650 mA | — | 30 | — | cd/m ² | 1, 2 | |
| | | | — | 65 | — | | 1, 3 | |
| PEAK EMISSION WAVELENGTH | λP | IF = 650 mA | — | 572 | — | nm | 1 | |

NOTE (1) : PLEASE REFER TO :
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS.
EU-002A

NOTE (2) : POLARIZER MODE : TRANSFLECTIVE

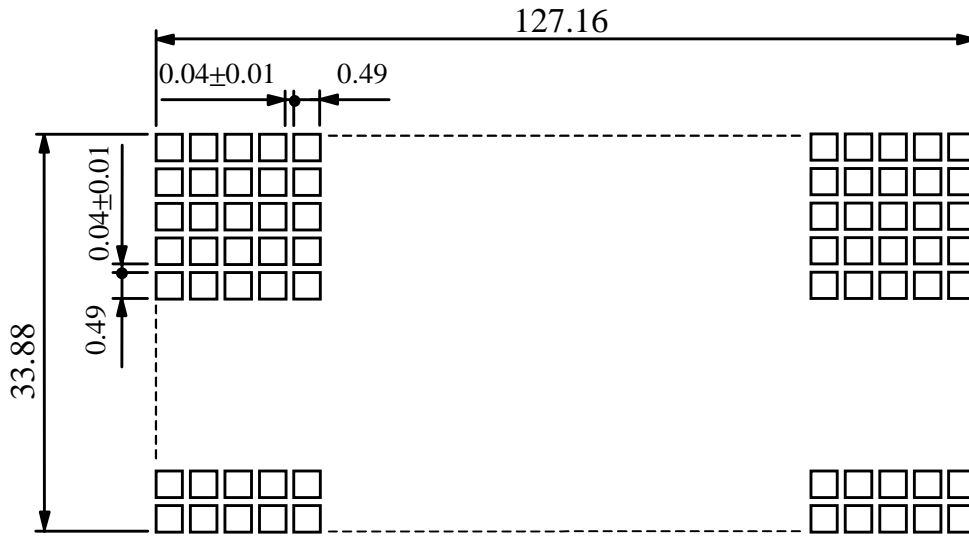
NOTE (3) : POLARIZER MODE : TRANSMISSIVE

6. OUTLINE DIMENSION



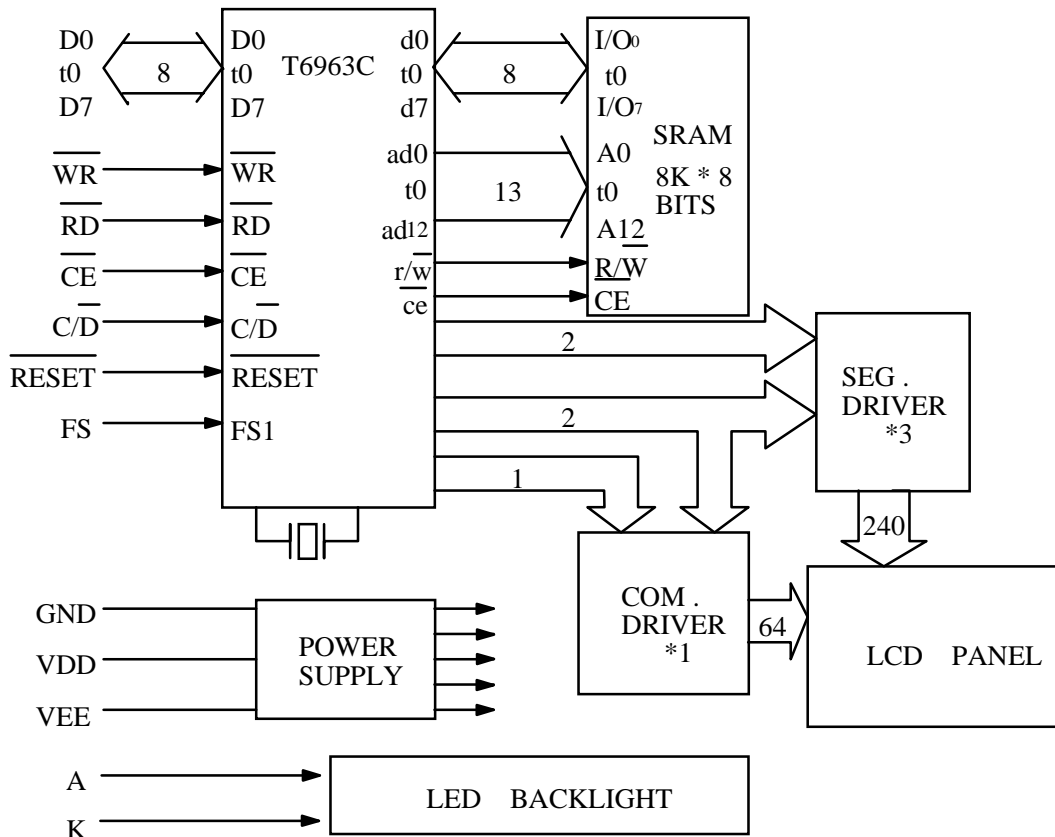
UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.5

7. DETAIL DRAWING OF DOT MATRIX



UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.1

8. BLOCK DIAGRAM

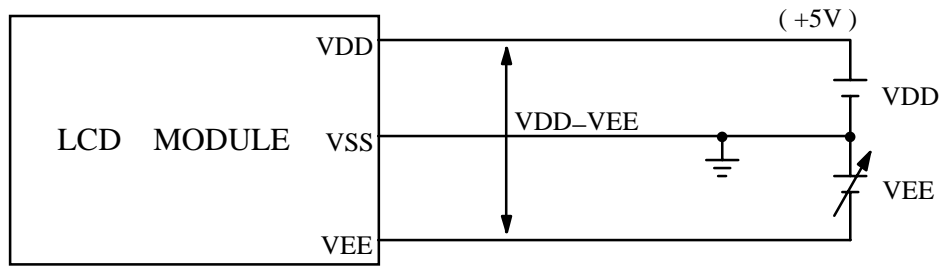


9. INTERFACE SIGNALS

| PIN NO. | SIGNAL | FUNCTION |
|---------|---------------------------|--|
| 1 | FGND | FRAME GROUND (0V) |
| 2 | GND | GROUND |
| 3 | VDD | POWER SUPPLY FOR LOGIC (+5V) |
| 4 | VEE | POWER SUPPLY FOR LCD DRIVER |
| 5 | $\overline{\text{WR}}$ | DATA WRITE |
| 6 | $\overline{\text{RD}}$ | DATA READ |
| 7 | $\overline{\text{CE}}$ | CHIP ENABLE |
| 8 | C/D | $\overline{\text{WR}} = "L", \overline{\text{C/D}} = "H" : \text{COMMAND WRITE}$ $\overline{\text{C/D}} = "L" : \text{DATA WRITE}$ $\text{RD} = "L", \text{C/D} = "H" : \text{STATUS READ}$ $\text{C/D} = "L" : \text{DATA READ}$ |
| 9 | NC | ————— |
| 10 | $\overline{\text{RESET}}$ | CONTROLLER RESET |
| 11~18 | D0~D7 | DATA INPUT/OUTPUT |
| 19 | FS | FONT SELECT : CONNECT TO VDD : 6*8 PIXEL/FONT CONNECT TO GND : 8*8 PIXEL/FONT |
| 20 | NC | ————— |
| A | VLED | POWER SUPPLY FOR LED BACKLIGHT (ANODE) |
| K | VLSS | POWER SUPPLY FOR LED BACKLIGHT (CATHODE) |

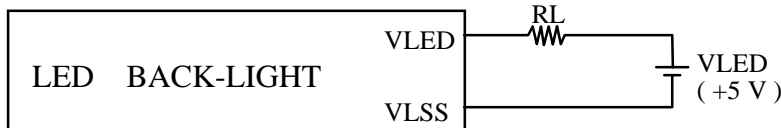
10. POWER SUPPLY

10.1 POWER SUPPLY FOR LCD MODULE



VDD-VEE : LCD DRIVING VOLTAGE

10.2 POWER SUPPLY FOR LED BACK-LIGHT



RECOMMENDED RESISTOR R_L : 1.2~2.5 Ω , 1 WATT (CONTROLLED BY USER)
* THE BRIGHTNESS WOULD BE ALTERED SUBJECT TO DIFFERENT VALUES OF R_L

10.3 POWER AND INTERFACE TIMING SEQUENCE

