

EXAMINED BY:  <i>Jony Chen</i>	EMERGING DISPLAY  TECHNOLOGIES CORPORATION	FILE NO . CAS-10145
APPROVED BY:  <i>David Chang</i>		ISSUE : NOV.11,1999
		TOTAL PAGE : 8
		VERSION : 2

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :

24D70 (CCFL TYPES)

FOR MESSRS :

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CUSTOMER'S APPROVAL

DATE :

\_\_\_\_\_

BY :

\_\_\_\_\_

EMERGING DISPLAY  
TECHNOLOGIES CORPORATION

MODEL NO .  
24D70 ( CCFL TYPES )

VERSION  
2

RECORDS OF REVISION

DOC . FIRST ISSUE

OCT.06,1998

DATE	REVISED PAGE NO.	SUMMARY
NOV.11,1999	1 ~ 4	THE ENTIRE PAGES REVISED

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	CCFL	D
Transmissive	CCFL	C

Backlight Color	Code Value
White	W

E	W	24	D	70	N	C	W
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LCD type + LCD color	Code Value
STN + Gray	G
STN + Blue	B
FSTN + White	F
FSTN + Black	N

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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 : T6963C

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - T 6 9 6 3 C

1.3 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- (1) NUMBER OF DOTS ----- 240W \* 128H DOTS
- (2) MODULE SIZE ----- 170.0W \* 103.0H \* 14.0D mm
- (3) EFFECTIVE AREA ----- 126.0W \* 70.0H mm
- (4) ACTIVE AREA ----- 119.97W \* 63.97H mm
- (5) DOT SIZE ----- 0.47W \* 0.47H mm
- (6) DOT PITCH ----- 0.50W \* 0.50H mm
- (7) LCD TYPE\*
- (8) DRIVING METHOD ----- 1 / 128 DUTY MULTIPLEX DRIVE
- (9) BACKLIGHT ----- CCFL

\* PLEASE REFER TO NUMBERING SYSTEM.

### 3. ABSOLUTE MAXIMUM RATINGS

#### 3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS .

PARAMETER	SYMBOL	MIN .	MAX .	UNIT	REMARK
POWER SUPPLY FOR LOGIC	VDD - VSS	0	7.0	V	
LCD DRIVER CIRCUIT SUPPLY VOLTAGE	VDD - VEE	0	28.0	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	100	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	- 20 °C	70 °C	- 30 °C	80 °C	NOTE (2), (3), (4)
HUMIDITY	—	90 % RH	—	90 % RH	WITHOUT CONDENSATION
VIBRATION	—	2.45 m/s <sup>2</sup> (0.25 G)	—	11.76 m/s <sup>2</sup> (1.2 G)	10 ~ 100 HZ XYZ DIRECTIONS 1 Hr. EACH
SHOCK	—	29.4 m/s <sup>2</sup> (3 G)	—	490.0 m/s <sup>2</sup> (50 G)	10 mSECONDS 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 .

NOTE (4) CCFL BACKLIGHT IS NOT AVAILABLE TO FUNCTION BELOW 0°C .

#### 4 . ELECTRICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0 V

PARAMETER	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT	
POWER SUPPLY VOLTAGE FOR LOGIC	VDD - VSS	—	4.5	5.0	5.5	V	
POWER SUPPLY VOLTAGE FOR LCD DRIVE	VEE - VSS	—	—	-13.5	-22.5	V	
INPUT VOLTAGE NOTE (1)	VIH	H LEVEL	VDD-2.2	—	VDD	V	
	VIL	L LEVEL	0	—	0.8	V	
OUTPUT VOLTAGE NOTE (1)	VIH	H LEVEL	VDD-0.3	—	VDD	V	
	VIL	L LEVEL	0	—	0.3	V	
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD - VSS = 5.0 V VEE - VSS = -13.5 V	—	9.0	24.0	mA	
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)	IEE	VDD - VSS = 5.0 V VEE - VSS = -13.5 V	—	2.0	5.0	mA	
RECOMMENDED LCD DRIVING VOLTAGE NOTE (3)	VDD - VEE ∅ = 10° θ = 0°	Ta = -20 °C	—	18.5	—	V	
		Ta = 25 °C	—	18.5	—	V	
		Ta = 70 °C	—	15.5	—	V	
CLOCK OSCILLATION FREQUENCY	f <sub>osc</sub>	—	—	6.0	—	MHZ	
POWER SUPPLY FOR CCFL	VOLTAGE FREQUENCY CURRENT	VCCFL	—	—	300	—	V <sub>rms</sub>
		fCCFL	—	—	30K	—	HZ
		IL	—	—	5	—	mA

NOTE (1): APPLIED TO TERMINALS  $\overline{WR}$ ,  $\overline{RD}$ ,  $\overline{CE}$ ,  $\overline{C/D}$ ,  $\overline{RST}$ ,  $\overline{FS}$ ,  $\overline{DB0}$ ~ $\overline{DB7}$ .

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

NOTE (3): RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT ±1.0V BY EACH MODULE.

5. OPTICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0 V

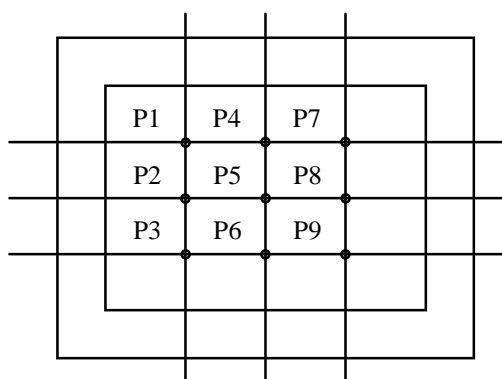
I T E M		SYMBOL	CONDITION	MIN .	TYP .	MAX.	UNIT	NOTE
VIEWING ANGLE	STN	∅ 2 - ∅ 1	K ≥ 1.4	—	40	—	deg .	1
	FSTN			—	50	—	deg .	1
CONTRAST RATIO	STN	K	∅ = 10° θ = 0°	—	10	—	—	1
	FSTN			—	20	—	—	1
RESPONSE TIME	tr ( rise )	∅ = 10° θ = 0°	Ta = -20°C	—	5538	—	ms	1
			Ta = 25°C	—	228	—		
			Ta = 70°C	—	104	—		
	tf ( fall )		Ta = -20°C	—	2316	—		
			Ta = 25°C	—	174	—		
			Ta = 70°C	—	85	—		
AVERAGE BRIGHTNESS OF BACKLIGHT	B	—	460	580	—	cd / m <sup>2</sup>	2, 3	
RISE TIME OF BACKLIGHT	TC	—	—	5	—	MINUTE		
BRIGHTNESS UNIFORMITY	—	—	—	—	—	25	%	4, 5

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

NOTE (2) : MEASUREMENT AFTER 10 MINUTES OF CCFL OPERATING .

NOTE (3) : BRIGHTNESS CONTROL : 100% AND DISPLAY ALL ON .

NOTE (4) : MEASUREMENT OF THE FOLLOWING 9 PLACES ON THE DISPLAY.  
DEFINITION OF THE BRIGHTNESS UNIFORMITY.

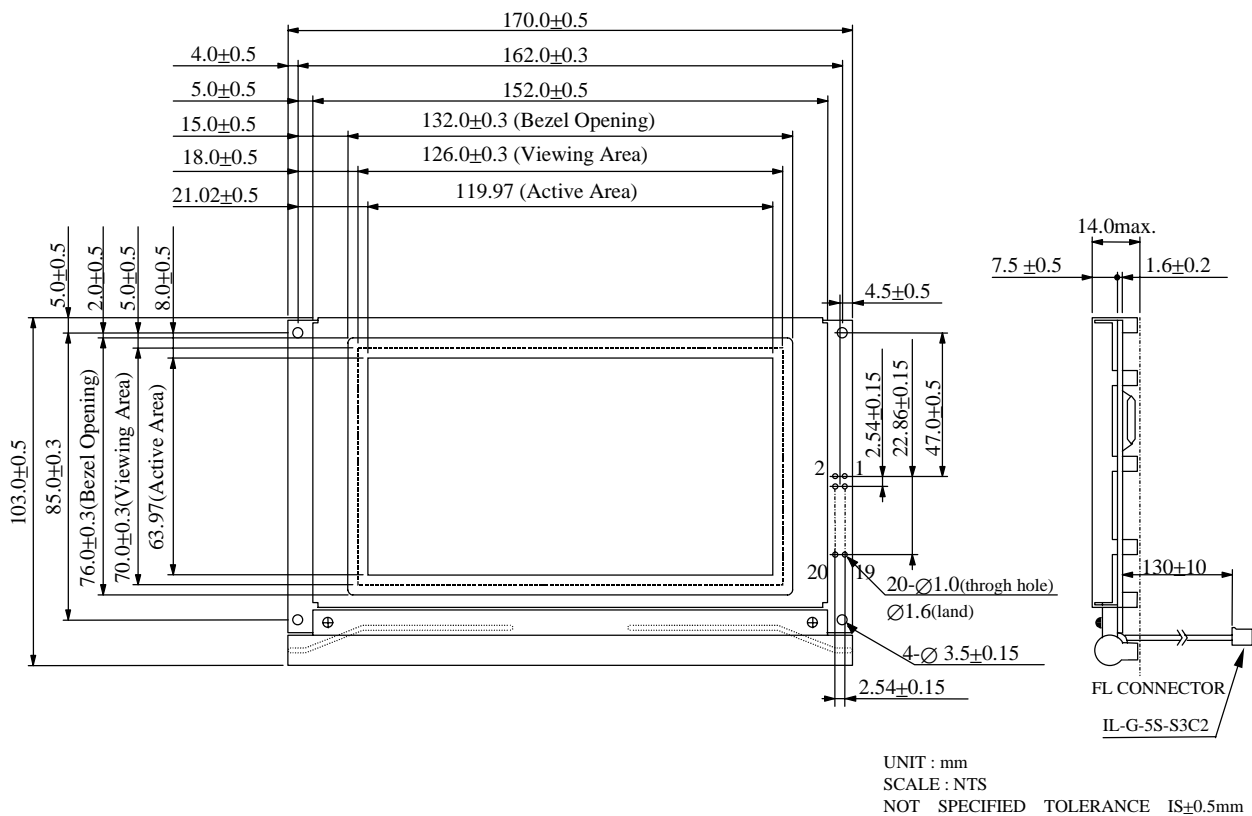


NOTE (5) : BRIGHTNESS UNIFORMITY IS DEFINED AS FOLLOWING

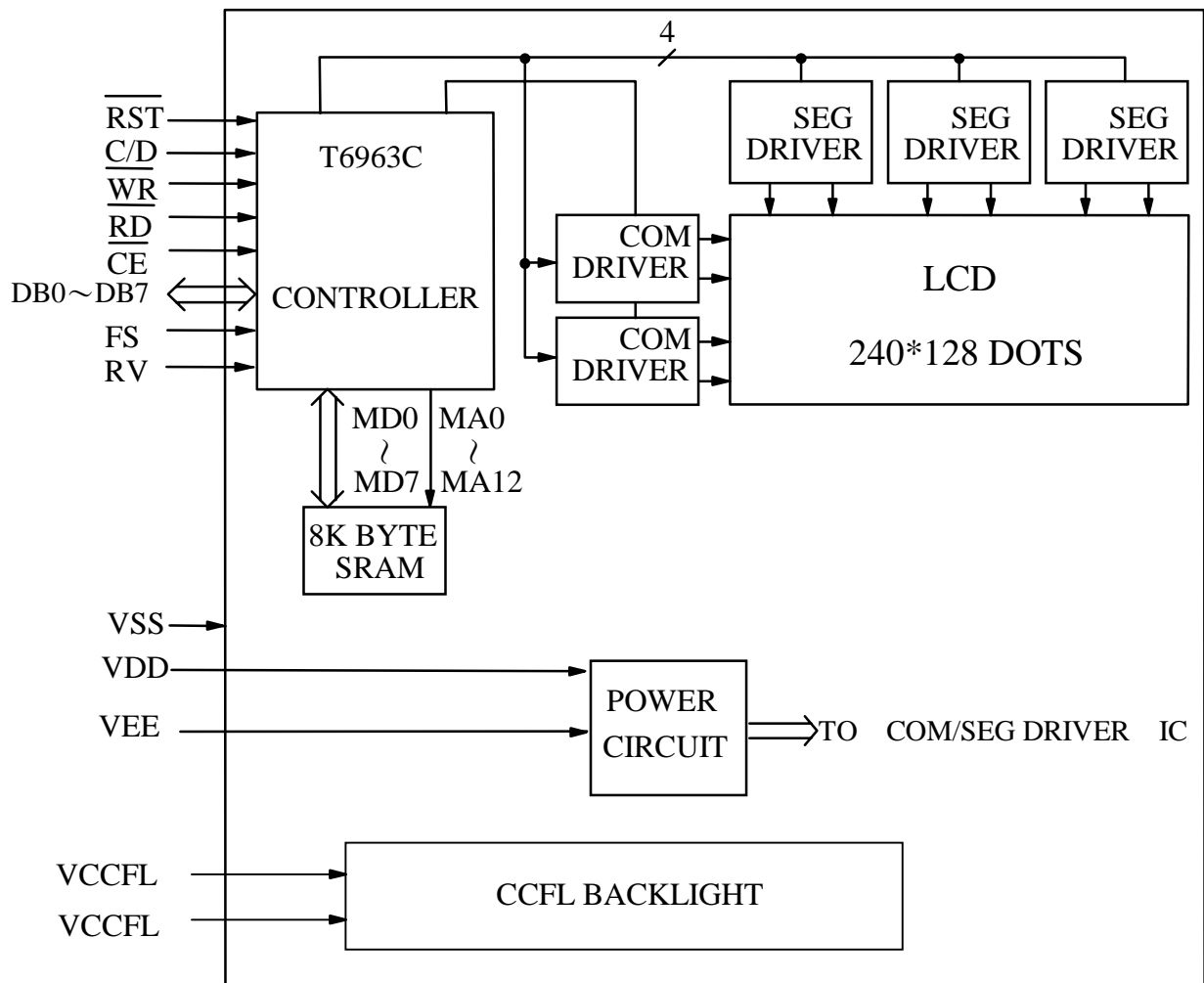
$$\sum_X = \left[ \frac{(\text{MAXIMUN BRIGHTNESS OR MINIMUN BRIGHTNESS}) - \text{AVERAGE BRIGHTNESS}}{\text{AVERAGE BRIGHTNESS}} \right] \times 100\%$$



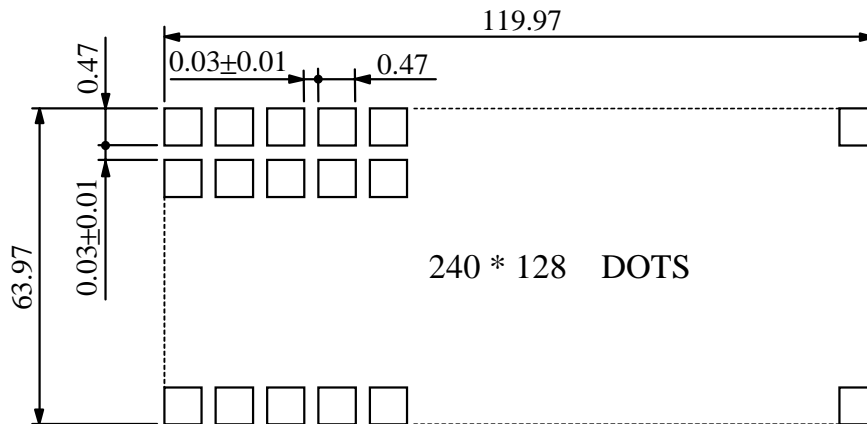
6. OUTLINE DIMENSION



7. BLOCK DIAGRAM



8. DETAIL DRAWING OF DOT MATRIX



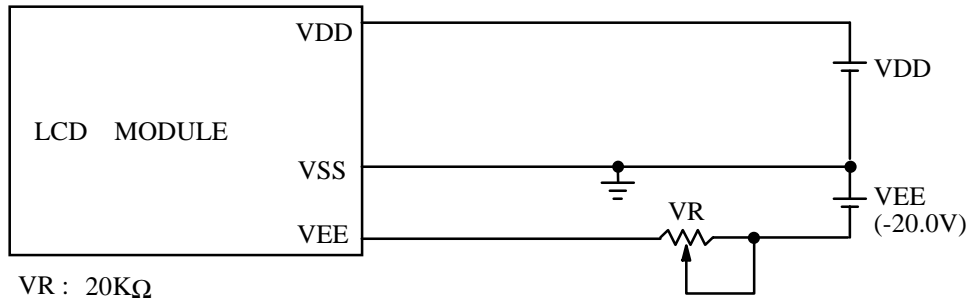
UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS  $\pm 0.1$

9. INTERFACE SIGNALS

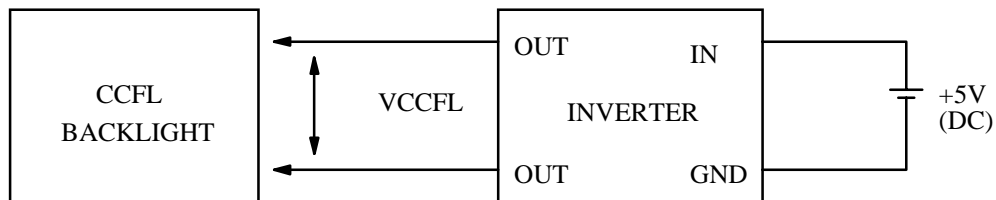
PIN NO	SYMBOL	LEVEL	FUNCTION
1	FGND	—	FRAME GROUND
2	GND	—	GROUND
3	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
4	VEE	—	POWER SUPPLY FOR LCD DRIVING
5	$\overline{\text{WR}}$	L	DATA WRITE
6	$\overline{\text{RD}}$	L	DATA READ
7	$\overline{\text{CE}}$	H	CHIP ENABLE
8	$\overline{\text{C/D}}$	H/L	$\overline{\text{WR}}=\text{"L"}, \overline{\text{C/D}}=\text{"H"} : \text{COMMAND WRITE}$ $\overline{\text{C/D}}=\text{"L"} : \text{DATA WRITE}$ $\overline{\text{RD}}=\text{"L"}, \overline{\text{C/D}}=\text{"H"} : \text{STATUS READ}$ $\overline{\text{C/D}}=\text{"L"} : \text{DATA READ}$
9	N.C.	—	NO CONNECTION
10	$\overline{\text{RST}}$	L	RESET
11   18	DB0   DB7	H/L	DATA BUS LINE
19	FS	H/L	SELECT : "H" : 6*8 PIXEL/FONT "L" : 8*8 PIXEL/FONT
20	RV	H/L	H: BLACK CHARACTERS L: WHITE CHARACTERS

10. POWER SUPPLY

10.1 POWER SUPPLY FOR LCM



10.2 POWER SUPPLY FOR CCFL BACK - LIGHT



RECOMMENDED INVERTER : IA-EM04A

10.2 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

