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Bob Hu		ISSUE : FEB.08,2006
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MS Huang		VERSION : 1

CUSTOMER	ACCEPTANCE	SPECIFICATIONS
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MODEL NO . :

24D70 (CCFL TYPES)
(RoHS)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

EMERGING DISPLAY
TECHNOLOGIES CORPORATION

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24D70 (CCFL TYPES) (RoHS)	1	0-1

RECORDS OF REVISION

DOC . FIRST ISSUE
FEB.08,2006

DATE	REVISED PAGE NO.	SUMMARY

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	CCFL	D
Transmissive	CCFL	C

Backlight Color	Code Value
White	W

E	W	2	4	D	7	0	N	C	W
---	---	---	---	---	---	---	---	---	---

LCD type + 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 B

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 .

1.4 MATERIAL SAFETY DESCRIPTION

ASSEMBLIES SHALL COMPLY WITH EUROPEAN ROHS REQUIREMENTS, INCLUDING PROHIBITED MATERIALS/COMPONENTS CONTAINING LEAD, MERCURY, CADMIUM, HEXAVALENT CHROMIUM, POLYBROMINATED BIPHENYLS (PBB) AND POLYBROMINATED DIPHENYL ETHERS (PBDE)

2. MECHANICAL SPECIFICATIONS

- | | | |
|--------------------|-------|--|
| (1) NUMBER OF DOTS | ----- | 240W * 128H DOTS |
| (2) MODULE SIZE | ----- | 170.0W * 93.5H * 14.0D mm
(CCFL B/L excluded) |
| (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	- 2 0 °C	7 0 °C	- 3 0 °C	8 0 °C	NOTE (1) , (3)
HUMIDITY	NOTE (2)		NOTE (2)		WITHOUT CONDENSATION
VIBRATION	—	2.45 m / s ² (0.25 G)	—	11.76 m / s ² (1.2 G)	10~100 Hz XYZ DIRECTIONS 1 Hr. EACH
SHOCK	—	29.4 m / s ² (3 G)	—	490.0 m / s ² (5 0 G)	10 mSECONDS XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (1) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT
TEMPERATURE THIS PHENOMENON IS REVERSIBLE .

NOTE (2) : Ta ≤ 60°C : 90%RH MAX. (96HRS MAX.)

Ta > 60°C : ABSOLUTE HUMIDITY MUST BE

LOWER THAN THE HUMIDITY OF 90%RH AT 60°C.(96HRS MAX.)

NOTE (3) : Ta AT -30°C : WILL BE < 48hrs

80°C : WILL BE < 168hrs

4 . ELECTRICAL CHARACTERISTICS

$T_a = 25\text{ }^{\circ}\text{C}$ $V_{DD}-V_{SS} = 5.0 \pm 0.5\text{ V}$

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	$V_{DD} - V_{SS}$	—	4.5	5.0	5.5	V
POWER SUPPLY VOLTAGE FOR LCD DRIVE	$V_{EE} - V_{SS}$	—	—	-13.5	-22.5	V
INPUT VOLTAGE NOTE (1)	V_{IH}	H LEVEL	$V_{DD}-2.2$	—	V_{DD}	V
	V_{IL}	L LEVEL	0	—	0.8	V
OUTPUT VOLTAGE NOTE (1)	V_{IH}	H LEVEL	$V_{DD}-0.3$	—	V_{DD}	V
	V_{IL}	L LEVEL	0	—	0.3	V
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	I_{DD}	$V_{DD} - V_{SS}$ = 5.0 V $V_{EE} - V_{SS}$ = -13.5 V	—	9.0	24.0	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)	I_{EE}	$V_{DD} - V_{SS}$ = 5.0 V $V_{EE} - V_{SS}$ = -13.5 V	—	2.0	5.0	mA
RECOMMENDED LCD DRIVING	$V_{DD} - V_{EE}$ $\theta_y = 10^{\circ}$ $\theta_x = 0^{\circ}$	$T_a = -20\text{ }^{\circ}\text{C}$	17.7	18.7	19.7	V
		$T_a = 25\text{ }^{\circ}\text{C}$	17.7	18.7	19.7	V
		$T_a = 70\text{ }^{\circ}\text{C}$	14.7	15.7	16.7	V
CLOCK OSCILLATION FREQUENCY	f_{osc}	—	—	6.0	—	MHz
POWER SUPPLY FOR CCFL	VOLTAGE	V_{CCFL}	—	—	300	V _{rms}
	FREQUENCY	f_{CCFL}	—	—	35K	Hz
	CURRENT	I_L	—	—	5	mA
	LIFE TIME	L	$I_L=5.0\text{mA}$	35K	50K	Hrs

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

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

5. OPTICAL CHARACTERISTICS

				Ta = 2 5 °C		VDD-VSS = 5.0 ± 0.5 V			
I T E M	SYMBOL		CONDITION		MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	θy+		K*	θx = 0°	26	31	—	d e g .	1
	θy-				36	41	—		
	θx+			θy = 0°	25	30	—		
	θx-				30	35	—		
CONTRAST RATIO	K	STN	θx = 0° , θy- = 10°		2.0	3.0	—	—	1
		FSTN			2.5	3.8	—		
RESPONSE TIME	tr (rise)		θy- = 10° θx = 0°	Ta = -20°C	—	6130	7970	ms	1
				Ta = 25°C	—	240	310		
				Ta = 70°C	—	60	80		
	tf (fall)			Ta = -20°C	—	3730	4850		
				Ta = 25°C	—	140	180		
				Ta = 70°C	—	60	80		
AVERAGE BRIGHTNESS OF MODULE	L		—		78	85	—	cd / m ²	2 , 3 , 5
					117	127.5	—		2 , 3 , 6
RISE TIME OF BACKLIGHT	TC		—		—	5	—	MINUTE	—
BRIGHTNESS UNIFORMITY	—		—		75	80	—	%	4 , 5

K* : STN : K ≥ 1.5 , FSTN : K ≥ 2.0

NOTE (1) : PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS : E U - 0 0 2 B

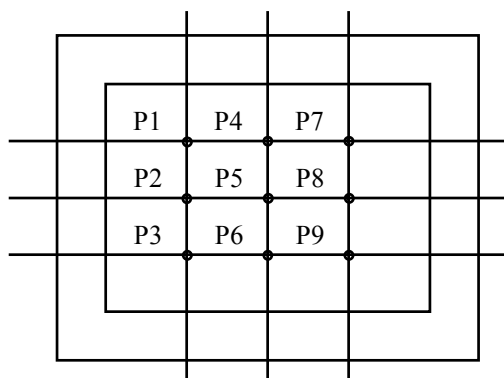
NOTE (2) : MEASUREMENT AFTER 10 MINUTES OF CCFL OPERATING .

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) : POLARIZER MODE : TRANSFLECTIVE

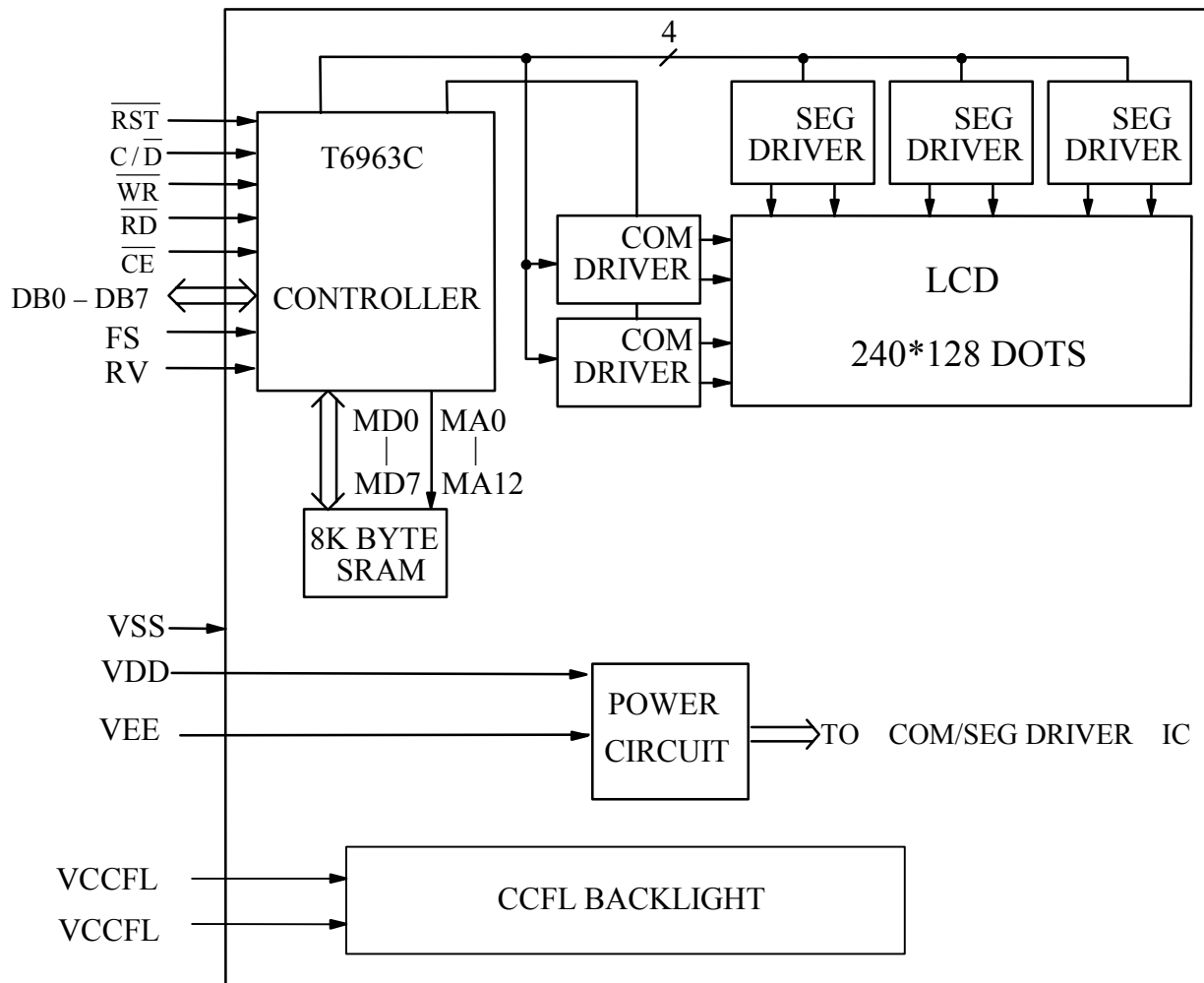
NOTE (6) : POLARIZER MODE : TRANSMISSIVE



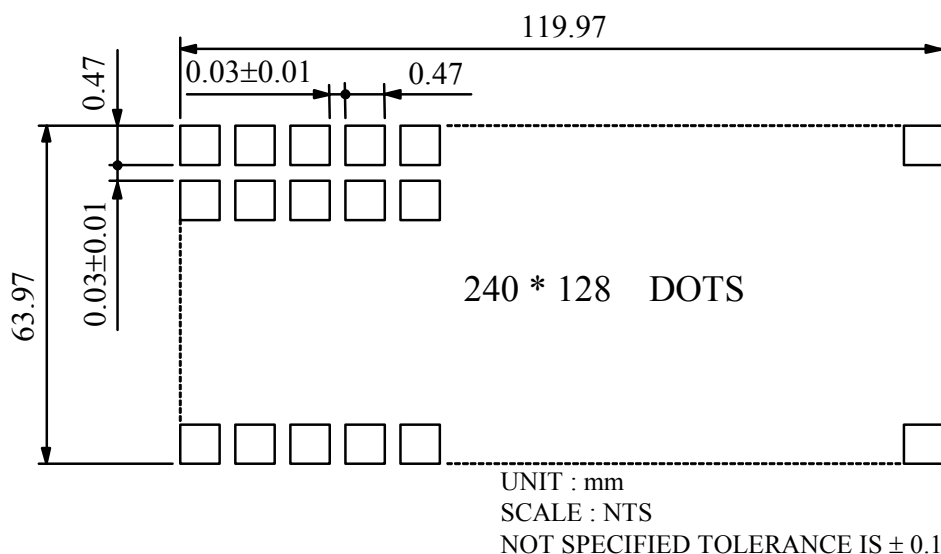
NOTE (5) : BRIGHTNESS UNIFORMITY IS DEFINED AS FOLLOWING

$$\Sigma_x = \left[\frac{\text{MINIMUM BRIGHTNESS}}{\text{MAXIMUM BRIGHTNESS}} \right] \times 100\%$$

7. BLOCK DIAGRAM



8. DETAIL DRAWING OF DOT MATRIX

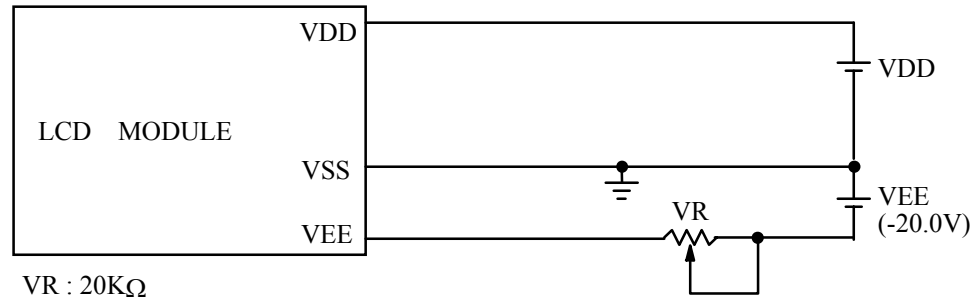


9. INTERFACE SIGNALS

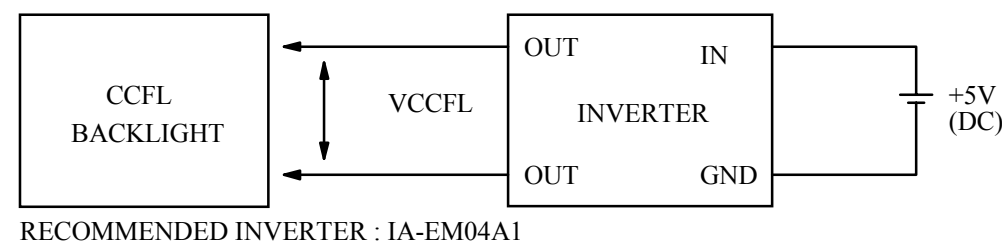
PIN NO	SYMBOL	LEVEL	FUNCTION
1	FGND	—	FRAME GROUND
2	VSS	—	GROUND
3	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
4	VEE	—	POWER SUPPLY FOR LCD DRIVING
5	$\overline{\text{WR}}$	L	DATA WRITE
6	$\overline{\text{RD}}$	L	DATA READ
7	$\overline{\text{CE}}$	H	CHIP ENABLE
8	C / $\overline{\text{D}}$	H/L	$\overline{\text{WR}}$ ="L", C / $\overline{\text{D}}$ ="H" : COMMAND WRITE C / $\overline{\text{D}}$ ="L" : DATA WRITE $\overline{\text{RD}}$ ="L", C / $\overline{\text{D}}$ ="H" : STATUS READ C / $\overline{\text{D}}$ ="L" : 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



10.2 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

