EXAMINED BY :	EMERGING DISPLAY	FILE NO . CAS-10270
		ISSUE : DEC.15,2003
APPROVED BY:	TECHNOLOGIES CORPORATION	TOTAL PAGE : 8
		VERSION : 2

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO . :

24D31(WHITE LED TYPES)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

RECORDS OF REVISION

DOC . FIRST ISSUE

JAN.28,2002

DATE	REVISED PAGE NO.	SUMMARY
DEC.15,2003	3	4. ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD–VSS = 5 . 0 V VDD–VO = 16.6V	—	17.5	20	mA

↓

PARAMETER	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD–VSS = 5 . 0 V VDD–VO = 16.6V	—	17.5	35	mA

	4	5. OPTICAL CHARACTERISTICS

I T E M		SYMBOL	CONDITION	MIN .	TYP .	MAX.	UNIT	NOTE
VIEWING AREA	STN	∅2 – ∅1	K≥ 1.4	40	—	—	deg.	1
	FSTN			50	—	—	deg.	1
THE BRIGHTNESS OF BACK-LIGHT		L	IF = 120 mA	—	(20)	—	cd/m²	1

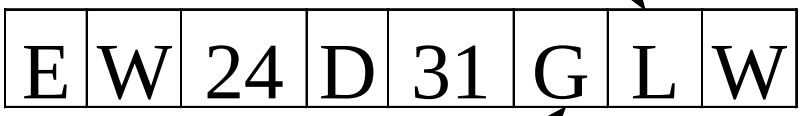
↓

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
THE BRIGHTNESS OF MODULE		L	IF = 120 mA	9	11	—	cd/m²	1 , 2
				13.5	16.5	—		1 , 3

ADD NOTE(2) , NOTE(3)

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	LED	L
Transmissive	LED	M



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

TABLE OF CONTENTS

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 :
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	144.0W * 104.0H * 12.0D(max) mm
(3)	EFFECTIVE AREA	114.0W * 64.0H mm
(4)	ACTIVE AREA	107.97W * 57.57H mm
(5)	DOT SIZE	0.42W * 0.42H mm
(6)	DOT PITCH	0.45W * 0.45H mm
(7)	LCD TYPE *	
(8)	DRIVING METHOD	1 / 128 DUTY MULTIPLEX DRIVE
(9)	BACKLIGHT	LED , COLOR : WHITE

* 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	-0.3	7.0	V	
INPUT VOLTAGE	VI	-0.3	VDD	V	
STATIC ELECTRICITY	—	—	100	V	NOTE (1)
LED FORWARD CURRENT	IF	—	180	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.

ITEM	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	—	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 (50 G)	1 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.

4. ELECTRICAL CHARACTERISTICS

Ta = 25 °C VDD = 5.0 V

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD – VSS	—	—	5.0	—	V
INPUT VOLTAGE NOTE (1)	VIH	H LEVEL	2.2	—	—	V
	VIL	L LEVEL	—	—	0.8	V
OUTPUT VOLTAGE NOTE (1)	VOH	H LEVEL	2.4	—	VCC	V
	VOL	L LEVEL	0	—	0.4	V
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD–VSS = 5.0 V VDD–VO = 16.6V	—	17.5	35	mA
RECOMMENDED LCD DRIVING VOLTAGE	VDD – V0 ∅ = 10° θ = 0°	Ta =- 20 °C	16.1	16.6	17.1	V
		Ta = 25 °C	16.1	16.6	17.1	
		Ta = 70 °C	12.1	13.6	14.1	
CLOCK OSCILLATION FREQUENCY	f osc	—	—	5	—	MHZ
LED FORWARD VOLTAGE	VF	IF = 120 mA	—	5	—	V
LED FORWARD CURRENT	IF	—	—	120	—	mA
LED REVERSE CURRENT	IR	VR = 8V	—	—	0.2	mA

NOTE (1): APPLIED TO TERMINALS FS, CE, $\overline{WR}$, $\overline{RD}$, C/D, DB0~DB7, $\overline{RES}$, MD2.

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

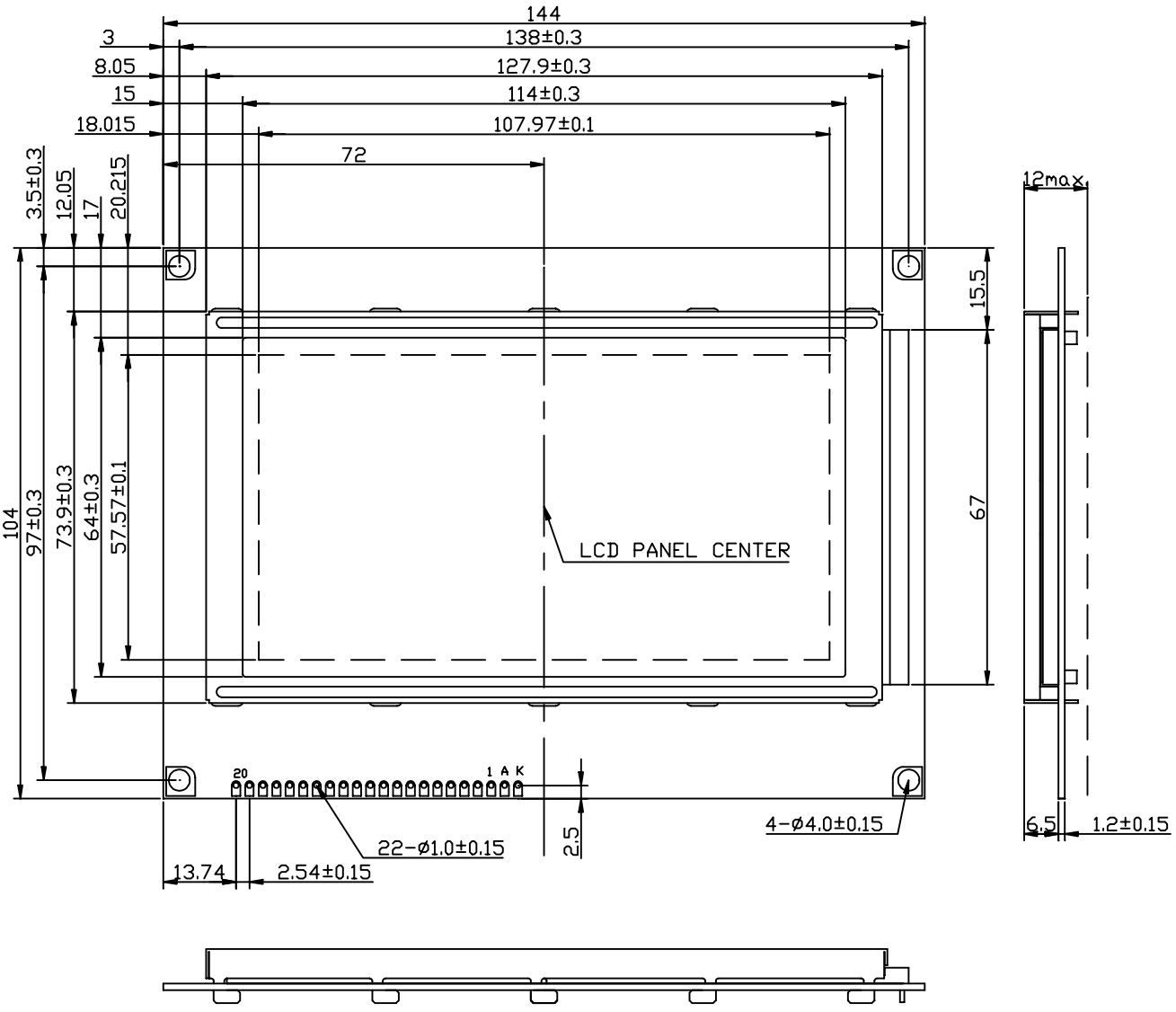
5. OPTICAL CHARACTERISTICS

Ta = 25 °C VDD = 5.0 V VDD-V0 = 16.6V

ITEM		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°		—	5	—	—	1
	FSTN		θ = 0°		5	—	—	—	1
RESPONSE TIME		tr (rise)	∅ =10° θ = 0°	Ta = -20°C	—	2866	—	ms	1
				Ta = 25°C	—	259	—		
				Ta = 70°C	—	156	—		
		tf (fall)		Ta = -20°C	—	2193	—		
				Ta = 25°C	—	177	—		
				Ta = 70°C	—	87	—		
THE BRIGHTNESS OF MODULE		L	IF = 120 mA		9	11	—	cd/m²	1 , 2
					13.5	16.5	—		1 , 3

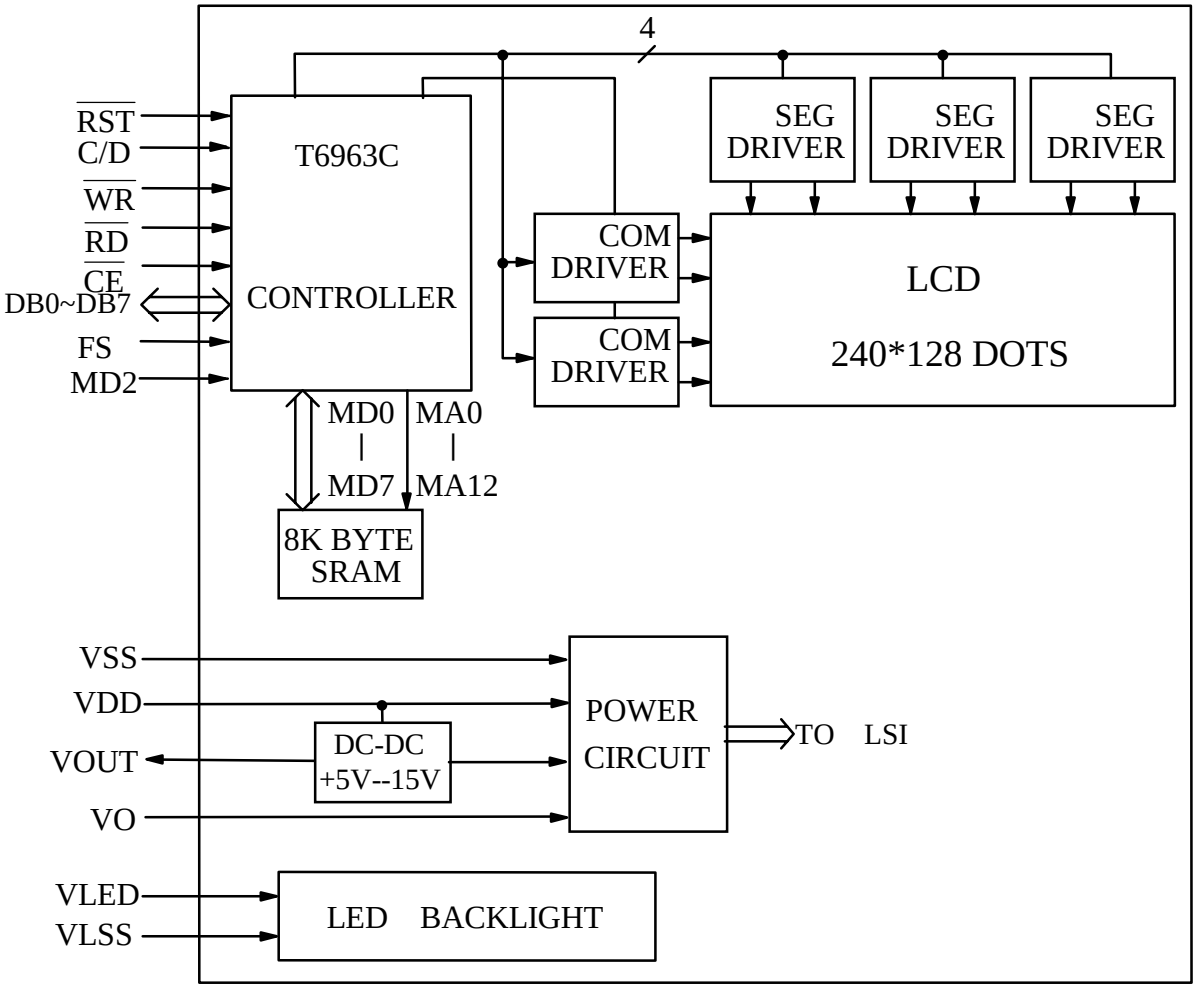
NOTE (1) : PLEASE REFER TO :
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS.
EU-002A
NOTE (2) : POLARIZER MODE : TRANSFLECTIVE
NOTE (3) : POLARIZER MODE : TRANSMISSIVE

6. OUTLINE DIMENSIONS

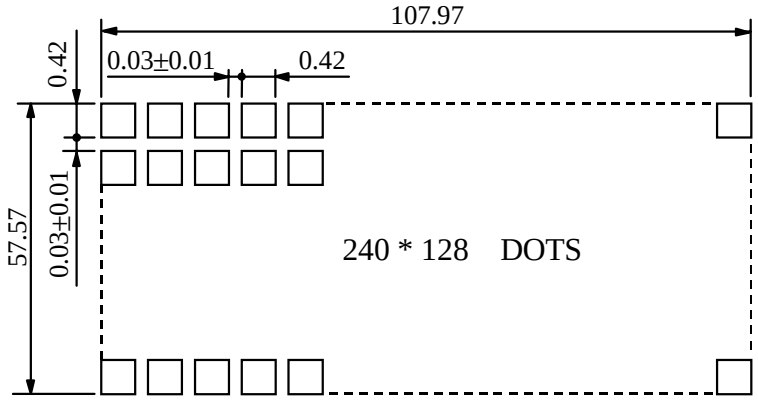


UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.5

7. BLOCK DIAGRAM



8. DETAIL DRAWING OF DOT MATRIX



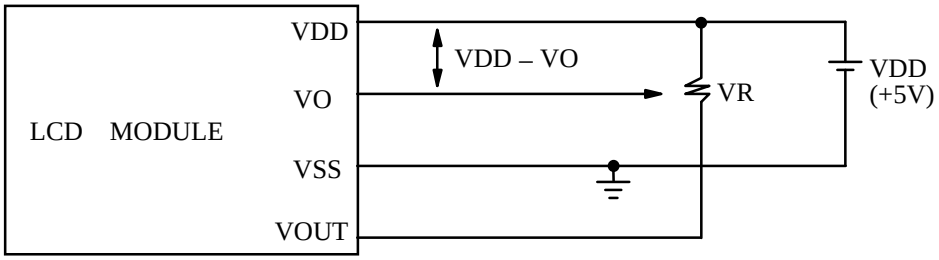
UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.1

9. INTERFACE SIGNALS

PIN NO	SYMBOL	LEVEL	FUNCTION
1	VSS	—	GROUND
2	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
3	V0	—	OPERATING VOLTAGE FOR LCD DRIVE
4	C/$\overline{D}$	H / L	$\overline{WR}$ = "L", C/$\overline{D}$ = "H" : COMMAND WRITE C/$\overline{D}$ = "L" : DATA WRITE $\overline{RD}$ = "L", C/$\overline{D}$ = "H" : COMMAND READ C/$\overline{D}$ = "L" : DATA READ
5	$\overline{RD}$	L	DATA READ
6	R/$\overline{W}$	L	DATA WRITE
7 | 14	DB0 | DB7	H/L	DATA BUS LINE
15	$\overline{CE}$	L	CHIP ENABLE
16	$\overline{RST}$	L	RESET
17	VOUT	—	POWER SUPPLY FOR LCD DRIVE
18	MD2	H/L	COLUMNS SELECT : "H" 32 COLUMNS "L" 40 COLUMNS
19	FS	H/L	SELECT : "H" 6*8 PIXEL /FONT "L" 8*8 PIXEL/FONT
20	N.C	—	—
A	VLED	—	POWER SUPPLY FOR LED BACKLIGHT (ANODE)
K	VLSS	—	POWER SUPPLY FOR LED BACKLIGHT (CATHODE)

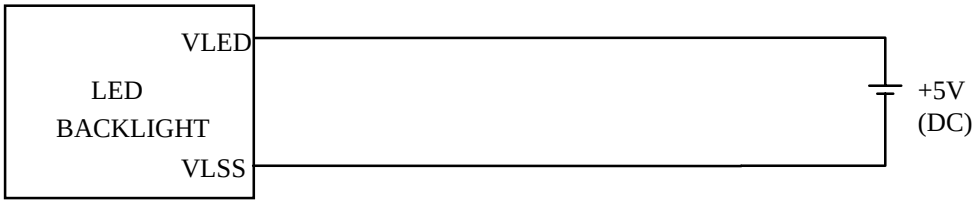
10. POWER SUPPLY

10.1 POWER SUPPLY FOR LCM



VDD – V0 : LCD DRIVING VOLTAGE
VR : 20KΩ

10.2 POWER SUPPLY FOR LED BACK - LIGHT



RECOMMENDED RESISTOR RL = 1.1Ω, (CONTROLLER BY USER)

10.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL