EXAMINED BY : Kevin Kun	EMERGING DISPLAY	FILE NO . CAS-10072
APPROVED BY: Eric Lew	TECHNOLOGIES CORPORATION	ISSUE : APR.12,2005
		TOTAL PAGE : 9
		VERSION : 5

CUSTOMER   ACCEPTANCE   SPECIFICATIONS

MODEL NO .:

13B30(LED TYPES)

FOR MESSRS :

_____

CUSTOMER'S APPROVAL

DATE :

_____

BY :

_____

02101300-01-02

E M E R G I N G D I S P L A Y	MODEL NO.		VERSION	PAGE
TECHNOLOGIES CORPORATION	13B30(LEDTYPES)		5	0-1

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		FEB.19,1998
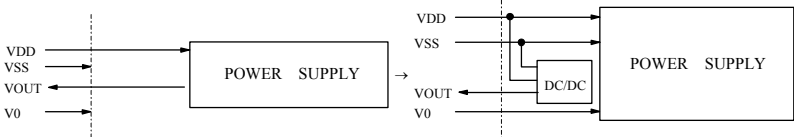
DATE	REVISED PAGE NO.	S U M M A R Y
OCT.21,1999	1~3 , 5	THE ENTIRE PAGES REVISED
OCT.31,2002	2	3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS . VIBRATION OPERATING : MAX. = 0.25 G → 0.4G , 2.45 m /s^2 → 3.92 m /s^2
JUL.30,2004	0-2	ADD NUMBERING SYSTEM

ADD

Backlight Color	Code Value
Yellow-Green	Y
RED	R

,

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

→

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

	1	2. MECHANICAL SPECIFICATIONS (9)BACKLIGHT*----------- LED , COLOR : YELLOW-GREEN → (9)BACKLIGHT*

| | 2 | 3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS |

PARAMETER	SYMBOL	MIN.	MAX.	UNIT	REMARK
LED POWER DISSIPATION	PD	—	3.6	W	

↓

PARAMETER	SYMBOL		MIN.	MAX.	UNIT	REMARK
LED POWER DISSIPATION	PD	Y-G	—	3.6	W	
		RED		3.3		

| | 3 | 4. ELECTRICAL CHARACTERISTICS |

VDD=5.0V

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD – VSS = 5.0 V VDD – VO = 9.2 V	—	7.0	—	mA
RECOMMENDED LCD DRIVING VOLTAGE NOTE (3)	VDD – VO ∅ = 10° θ = 0°	Ta = - 20 °C	—	9.2	—	V
		Ta = 25 °C	—	9.2	—	
		Ta = 70 °C	—	8.4	—	
LED FORWARD VOLTAGE	VF	IF = 360 mA	—	4.2	4.6	V

↓

PARAMETER	SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD – VSS = 5.0 V VDD – VO = 9.2 V		—	7.0	10	mA
RECOMMENDED LCD DRIVING VOLTAGE NOTE (3)	VDD – VO ∅ = 10° θ = 0°	Ta = - 20 °C		8.2	9.2	10.2	V
		Ta = 25 °C		8.2	9.2	10.2	
		Ta = 70 °C		7.4	8.4	9.4	
LED FORWARD VOLTAGE	VF	IF = 360mA	Y-G	—	4.2	4.6	V
			RED		3.7	4.6	

DELETE NOTE(3)

| | 5 | 6. OPTICAL CHARACTERISTICS |

ITEM	SYMBOL		CONDITION		MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING AREA	∅2 - ∅1	STN	K ≥ 1.4		30	—	—	deg.	1
		FSTN			40	—	—	deg.	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	—		
THE BRIGHTNESS OF BACK-LIGHT	L		IF =360 mA		—	40	—	cd/m^2	1 , 2
					—	75	—		1 , 3
PEAK EMISSION WAVELENGTH	λP		IF =360 mA		—	570	—	nm	1

↓

ITEM	SYMBOL		CONDITION		MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	∅2 - ∅1	STN	K ≥ 1.4		30	—	—	deg.	1
		FSTN			40	—	—	deg.	1
RESPONSE TIME	tr (rise)		∅=10° θ = 0°	Ta = -20 °C	—	5538	11076	ms	1
				Ta = 25 °C	—	228	456		
				Ta = 70 °C	—	104	208		
	tf (fall)			Ta = -20 °C	—	2316	4632		
				Ta = 25 °C	—	174	348		
				Ta = 70 °C	—	85	170		
THE BRIGHTNESS OF MODULE	L		IF =360mA	Y-G	15	25	—	cd/m^2	1 , 2
					22.5	37.5	—		1 , 3
				RED	8.5	10.5	—		1 , 2
					12.8	15.8	—		1 , 3
PEAK EMISSION WAVELENGTH	λP		IF =360mA	Y-G	—	570	—	nm	1
				RED	618	—	625		

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D A T E	REVISED PAGE NO.	S U M M A R Y
APR.12,2005	5	6. OPTICAL CHARACTERISTICS NOTE(1) : EU-001A→EU-002A
	7	8. BLOCK DIAGRAM

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	LED	L
Transmisstive	LED	M

Backlight Color	Code Value
Yellow-Green	Y
RED	R

E W 13 B 30 G L Y

LCD type + LCD color	Code Value
STN + Yellow-Green	Y
STN + Gray	G
FSTN + White	F
STN + Blue	B
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
     PLEASE REFER TO :

      CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

        E U - 1 0 0

  1 . 3 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL
     SPECIFICATIONS .

2 .   MECHANICAL SPECIFICATIONS

    (1) NUMBER OF DOTS -------------------------- 128W * 64H DOTS

    (2) MODULE SIZE --------------------------------- 93.0W * 70.0H * 14.0D(max) mm

    (3) EFFECTIVE AREA ---------------------------- 70.7W * 38.8H mm

    (4) ACTIVE AREA -------------------------------- 65.25W * 32.61H mm

    (5) DOT SIZE ------------------------------------- 0.48W * 0.48H mm

    (6) DOT PITCH ----------------------------------- 0.51W * 0.51H mm

    (7) LCD TYPE *

    (8) DRIVING METHOD --------------------------- 1 / 64 DUTY MULTIPLEX DRIVE

    (9) BACKLIGHT *

      * PLEASE REFER TO NUMBERING SYSTEM .

EMERGING DISPLAY	MODEL NO.	VERSION	PAGE
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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	
INPUT VOLTAGE	VI		VSS	VDD	V	
STATIC ELECTRICITY	—		—	100	V	NOTE (1)
LED POWER DISSIPATION	PD	Y-G	—	3.6	W	
		RED		3.3		
LED FORWARD CURRENT	IF		—	720	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		COMMENT
	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	—	3.92 m/s² (0.4G)	—	11.76 m/s² (1.2G)	10 ~ 100 HZ XYZ DIRECTIONS 1 Hr. EACH
SHOCK	—	29.4 m/s² (3G)	—	490.0 m/s² (50G)	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 .

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4 . ELECTRICAL CHARACTERISTICS

Ta = 2 5 °C

PARAMETER	SYMBOL	CONDITION		MIN .	TYP .	MAX .	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD – VSS	—		4 .75	5.0	5.25	V
INPUT VOLTAGE	VIH	H LEVEL		0.7*VDD	—	VDD	V
NOTE (1)	VIL	L LEVEL		GND	—	0.3*VDD	V
OUTPUT VOLTAGE	VOH	H LEVEL		VDD-0.4	—	—	V
NOTE (1)	VOL	L LEVEL		—	—	0.4	V
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD – VSS = 5 . 0 V VDD – VO = 9.2 V		—	7 . 0	10	mA
RECOMMENDED LCD DRIVING VOLTAGE NOTE (3)	VDD – VO $\varnothing$ = 10° θ = 0°	Ta =- 20 °C		8.2	9.2	10.2	V
		Ta = 25 °C		8.2	9.2	10.2	
		Ta = 70 °C		7.4	8.4	9.4	
LED FORWARD VOLTAGE	VF	IF = 360mA	Y-G	—	4 . 2	4 . 6	V
			RED		3.7	4.6	
LED FORWARD CURRENT	IF	—		—	360	—	mA
LED REVERSE CURRENT	IR	VR = 8V		—	—	200	μA

NOTE (1) :   APPLIED TO TERMINALS CS1, CS2, R / $\overline{W}$, D/I , DB0~DB7, E , $\overline{RET}$.

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

5. INTERFACE TIMING CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	FIG.
E cycle time	t_{CYC}	1000	—	—	nS	1,2
E high level	P_{WEH}	450	—	—	nS	1,2
E low level width	P_{WEL}	450	—	—	nS	1,2
E rise time	tr	—	—	25	nS	1,2
E fall time	t_f	—	—	25	nS	1,2
Address setup time	t_{AS}	140	—	—	nS	1,2
Address hold time	t_{AH}	10	—	—	nS	1,2
Data setup time	t_{DSW}	200	—	—	nS	1
Data delay time	t_{DDR}	—	—	320	nS	2
Data hold time (Write)	t_{DHW}	10	—	—	nS	1
Data hold time (Read)	t_{DHR}	20	—	—	nS	2
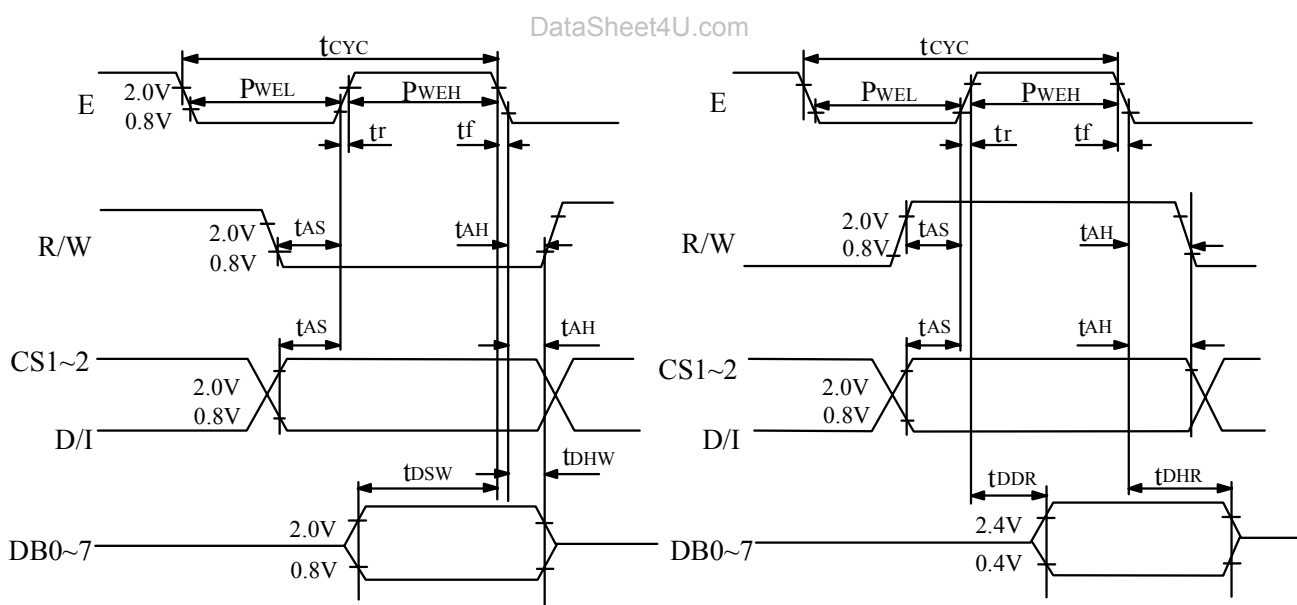
Fig . 1 CPU   Write   Timing

Fig . 1 CPU   Read   Timing

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6. OPTICAL CHARACTERISTICS

Ta = 2 5 °C   VDD = 5 . 0 V   VDD – V0 = 9.2 V

ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	STN	∅2 - ∅1	K ≥ 1.4		3 0	—	—	deg.	1
	FSTN				4 0	—	—	deg.	1
CONTRAST RATIO	STN	K	∅ = 10°		—	5	—	—	1
	FSTN		θ = 0°		—	8	—	—	1
RESPONSE TIME		tr (rise)	∅=10° θ = 0°	Ta = -20 °C	—	5538	11076	ms	1
				Ta = 25 °C	—	228	456		
				Ta = 70 °C	—	104	208		
		tf (fall)		Ta = -20 °C	—	2316	4632		
				Ta = 25 °C	—	174	348		
				Ta = 70 °C	—	85	170		
THE BRIGHTNESS OF MODULE		L	IF =360 mA	Y-G	15	25	—	cd/m²	1 , 2
					22.5	37.5			1 , 3
				RED	8.5	10.5	—		1 , 2
					12.8	15.8			1 , 3
PEAK EMISSION WAVELENGTH		λP	IF=360 mA	Y-G	—	5 7 0	—	nm	1
				RED	618	—	625		

NOTE (1) :   PLEASE REFER TO :

CUSTOMER   ACCEPTANCE   STANDARD   SPECIFICATIONS.

E U - 0 0 2 A

NOTE (2) :   POLARIZER MODE : TRANSFLECTIVE

NOTE (3) :   POLARIZER MODE : TRANSMISSIVE

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7.   OUTLINE DIMENSIONS

93.0
88.0±0.3
2.5
7.8   77.4
11.2   70.7±0.3
(2.725)   65.25±0.2

2.5
9.8
15.6
(3.095)

70.0
65±0.3
50.4
38.8
32.61±0.2

14max

21
22

20
1
14.0   2.54ᴾ±0.15
2.5

9.0   1.2±0.2

20−Ø1.0±0.15   4−Ø2.5±0.15
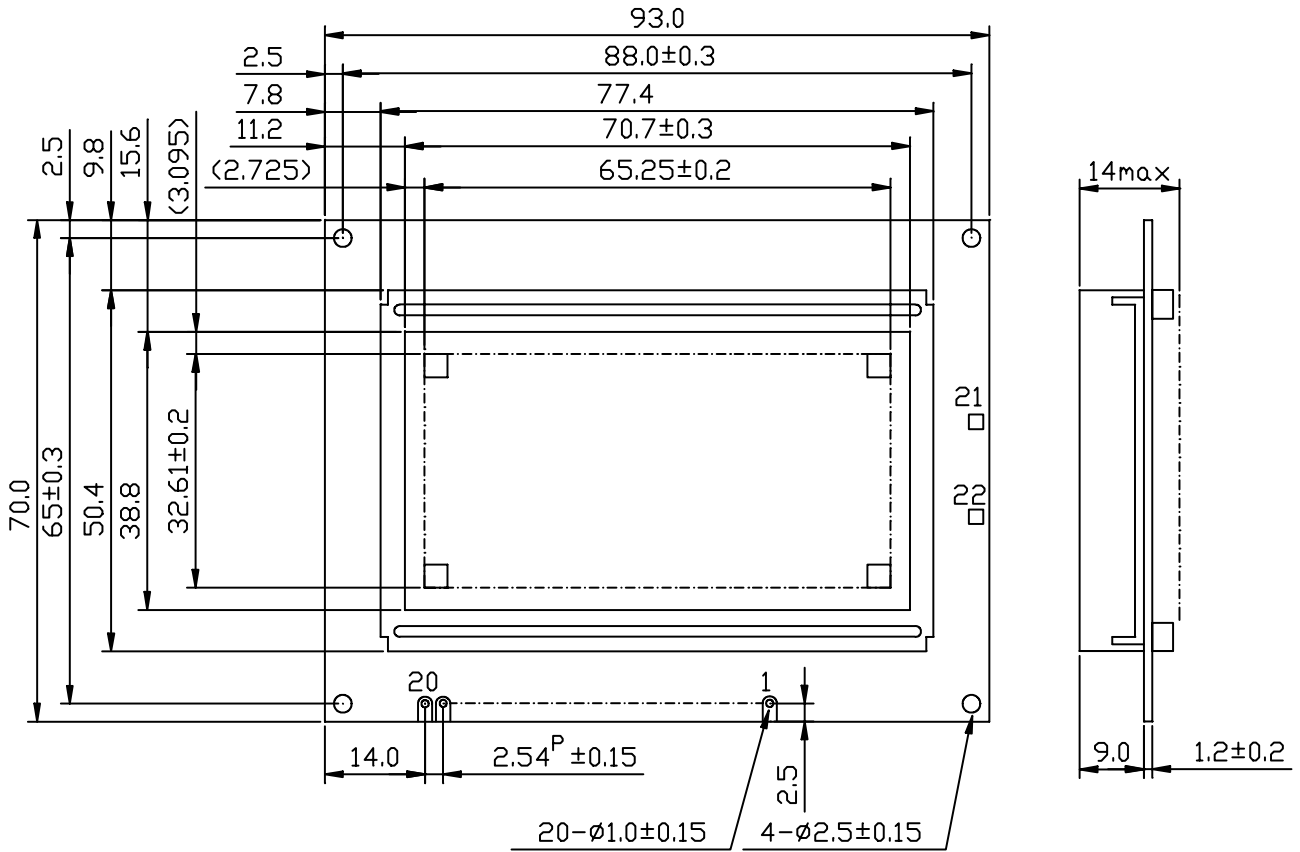
UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ±0.5mm

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8. BLOCK DIAGRAM
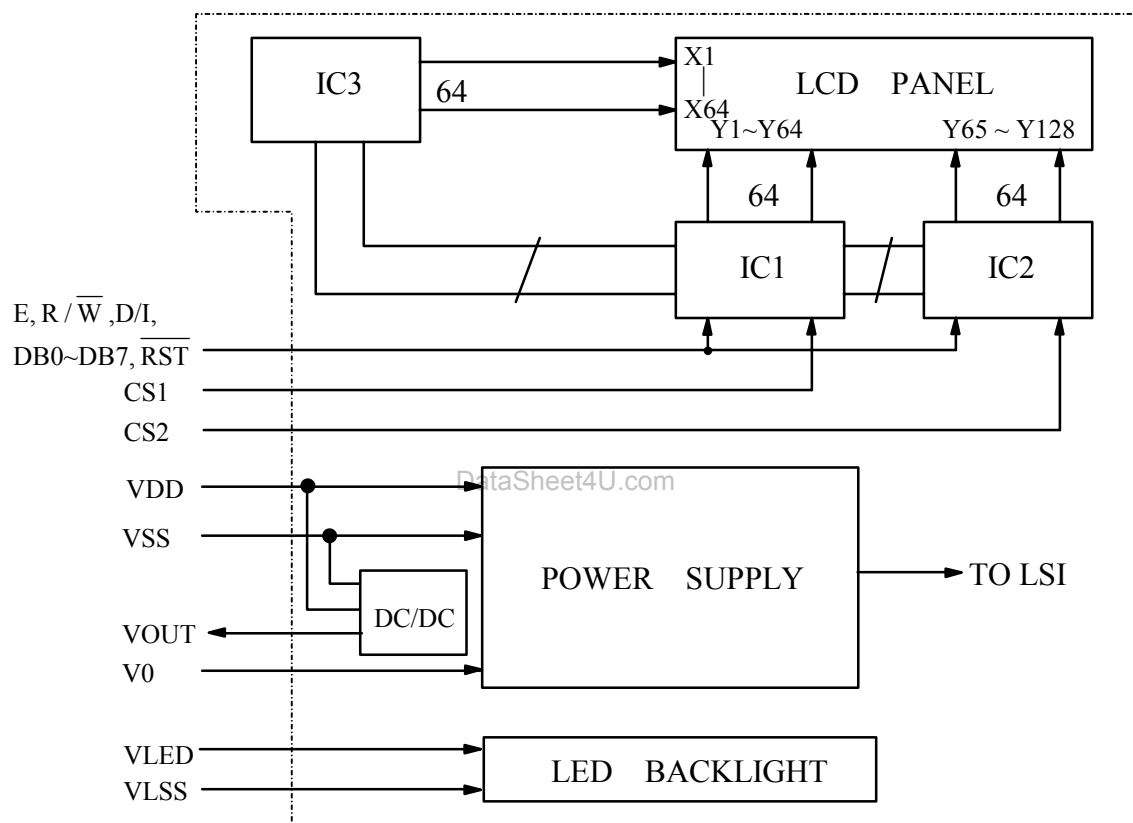
9. DETAIL DRAWING OF DOT MATRIX

65.25

0.03±0.01   0.48

0.03±0.01

32.61

0.48
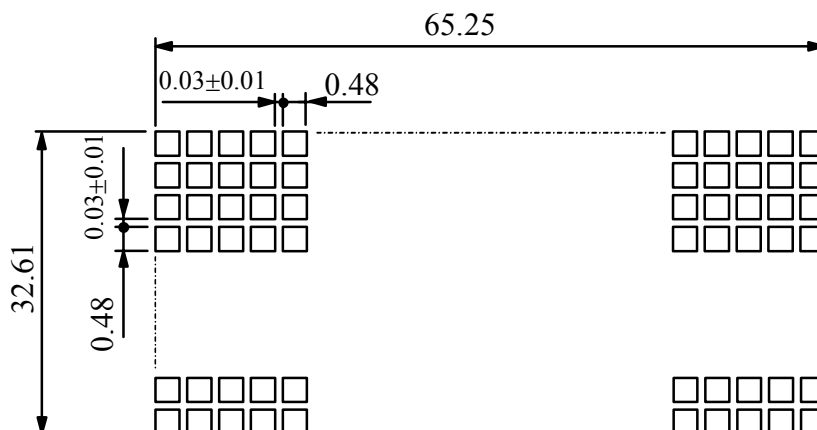
UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.1

10. INTERFACE SIGNALS

| PIN NO	SYMBOL	LEVEL	FUNCTION
1	VSS	—	GROUND
2	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
3	VO	—	OPERATING VOLTAGE FOR LCD DRIVING
4	D/I	H/L	H: DATA INPUT L: INSTRUCTION CODE INPUT
5	$R/\overline{W}$	H/L	H: DATA READ (LCD MODULE →MPU) L : DATA WRITE (LCD MODULE ←MPU)
6	E	H,H→L	ENABLE SIGNAL
7 | 14	DB0 | DB7	H/L	DATA BUS LINE
15	CS1	H	CHIP SELECTION FOR IC1
16	CS2	H	CHIP SELECTION FOR IC2
17	$\overline{RST}$	L	RESET
18	VOUT	—	POWER SUPPLY FOR LCD DRIVING
19	VLED	—	POWER SUPPLY FOR LED BACKLIGHT
20	VLSS	—	POWER SUPPLY FOR LED BACKLIGHT

11. POWER SUPPLY

11.1 POWER SUPPLY FOR LCM
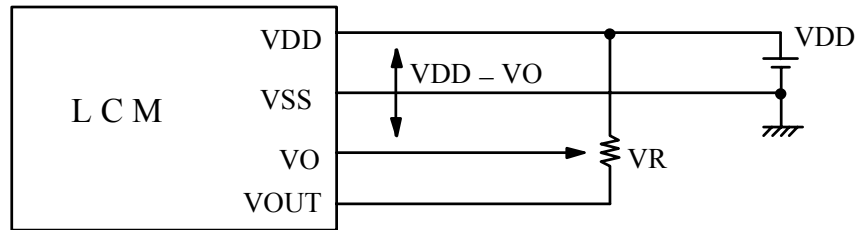
VDD – VO : LCD DRIVING VOLTAGE
VR : 10K ~ 20KΩ

11.2 POWER SUPPLY FOR LED BACK - LIGHT
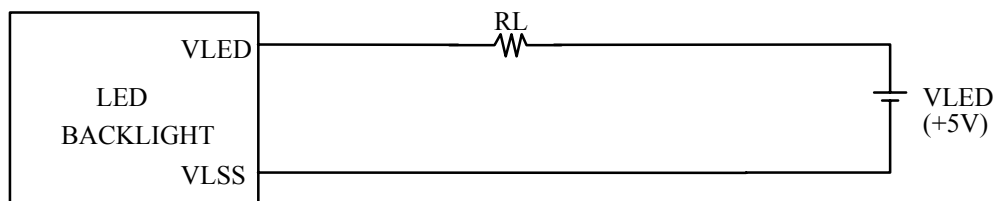
RECOMMENDED RESISTOR RL = 2.2 ~ 4.4Ω,1/2WATT(CONTROLLED BY USER)
* THE BRIGHTNESS WOULD BE ALTERED SUBJECT TO DIFFERENT VALUES OF RL

11.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

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