Control No. :	TR-S-789
Version No. :	1

Green Products

SPECIFICATIONS

PRODUCT ：LCD MODULE

MODEL NO.：G128064-MH

CUSTOMER			GW GROUP INC.		
APPROVED	CHECKED	CHECKED	APPROVED	CHECKED	PREPARED
			Tatis Liu	Tatis Liu	Jing Ming

□APPROVAL FOR SPECIFICATIONS ONLY

■APPROVAL FOR SPECIFICATIONS AND SAMPLE

GW GROUP INC.

RECORDS OF REVISION

STANDARD DOC.	PRODUCT SPEC.	MODULE NO.	G128064-MH		
DATE	REVISED NO.	REVISED DESCRIPTIONS	PREPARED	CHECKED	APPROVED
2008.6.6	1	INITIAL ISSUED	Jing Ming	Tatis Liu	Tatis Liu

CONTENTS

1. GENERAL SPECIFICATIONS：

1-1 SCOPE:

This specification covers the delivery requirements for the liquid crystal display delivered by GW Group Inc. to Customer。

1-2 PRODUCTS:

Liquid Crystal Display Module (LCM)

1-3 MODULE NAME:

G128064-MH

2. FEATURES：

2-1 Display type: FSTN, B/W, Transflective, 6o'clock, Positive
2-2 Driving Method: 1/65 duty, 1/9 bias
2-3 Built-in controller: ST7565R

3. MECHANICAL SPECIFICATIONS：

ITEM	SPECIFICATIONS	UNIT
OUTLINE DIMEMSIONS	72.0(W) x 75.0(H) x4.2(T)	mm
VIEWING AREA	66.0(W) x 32.7(H)	mm
ACTIVE AREA	61.41(W) x30.69(H)	mm
DISP. CONSTRUCTION	128 x 64	Dots
NUMBER OF DOTS	128 x 64	Dots
DOT SIZE	0.45(W) x 0.45(H)	mm
DOT PITCH	0.48(W) x 0.48(H)	mm
ASSY. TYPE	COG	—
BACKLIGHT	White	—
WEIGHT	About 18.0	g

4. ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	CONDITIONS	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
POWER SUPPLY FOR LOGIC	$V_{DD}-V_{SS}$	Ta=25℃	-0.3	—	3.6	V
POWER SUPPLY FOR LCD DRIVING	V0,Vout	Ta=25℃	-0.3	—	13.5	V
INPUT VOLTAGE	V_1, V_2,V3,V4	Ta=25℃	-0.3	—	V0	V
OPERATION TEMPERATURE	TOPR	—	- 20	—	+70	℃
STORAGE TEMPERATURE	TSTG	—	- 30	—	+80	℃

NOTE: LCM SHOULD BE GROUNDED DURING HANDLING LCM.

5. ELECTRICAL CHARACTERISTICS

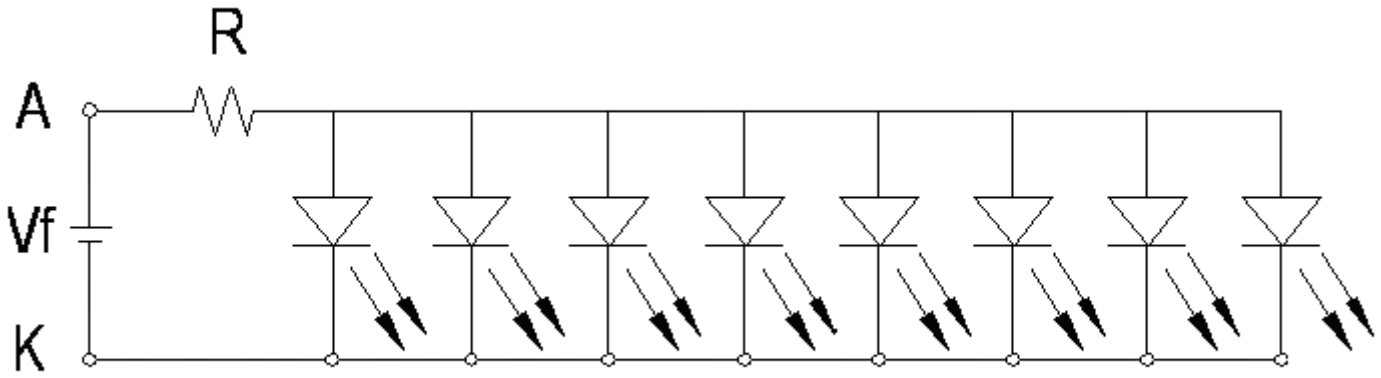
ITEM	SYMBOL	CONDITIONS	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
POWER SUPPLY VOLTAGE	$V_{DD}-V_{SS}$	Ta=25℃	—	—	3.3	V
POWER SUPPLY FOR LCD DRIVING	VOP	V_{DD}-V_{SS}=3.3V 4x boosting Circuit	9.3	9.6	9.9	V
INPUT VOLTAGE “H” LEVEL	VIH	—	0.8V_{DD}	—	V_{DD}	V
INPUT VOLTAGE “L” LEVEL	VIL	—	V_{SS}	—	0.2V_{DD}	V
OUTPUT VOLTAGE “H” LEVEL	VOH	I_{OH}=-0.5mA	0.8V_{DD}	—	V_{DD}	V
OUTPUT VOLTAGE “L” LEVEL	VOL	I_{OL}=0.5mA	V_{SS}	—	0.2V_{DD}	V
POWER SUPPLY CURRENT	IDD	V_{DD}-V_{SS}=3.3V 4x boosting Circuit	—	0.8	1.2	mA
	IEE	—	—	—	—	uA

NOTE :

1.The measure without backlight.

2.The test screen:

6. LED BACKLIGHT



6-1 ABSOLUTE MAXIMUM RATINGS (Ta=25℃)

PARAMETER	SYMBOL	SPECIFICATION			UNIT
		MIN	TYP	MAX	
POWER DISSIPATION	PAD		0.608		W
FORWARD CURRENT	IF		160		mA
REVERSE VOLTAGE	VR		5		V
OPERATION TEMPERATURE SCOPE	TOPR	-20	—	+70	℃
STORAGE TEMPERATURE SCOPE	TSTG	-30	—	+80	℃

6-2 ELECTRICAL CHARACTERISTICS

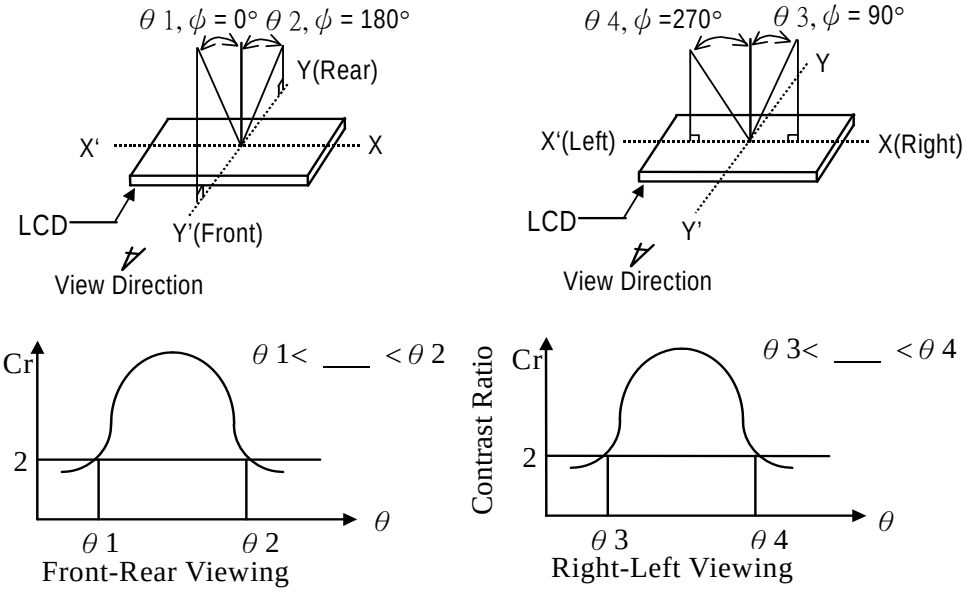
PARAMETER	SYMBOL	LIGHT SOURCE	CONDITION	STANDARD VALUE			UNIT
				MIN	TYP	MAX	
FORWARD VOLTAGE	VF	White	IF=160mA Ta=25℃	3.0	—	3.8	V
LUMINOUS INTENSITY(INCLUDE LCD)	IV			—	9.0	—	cd/m²
REVERSE CURRENT	IR		VR =5V	—	—	0.2	uA

7. ELECTRO-OPTICAL CHARACTERISTICS

(Ta=25℃)

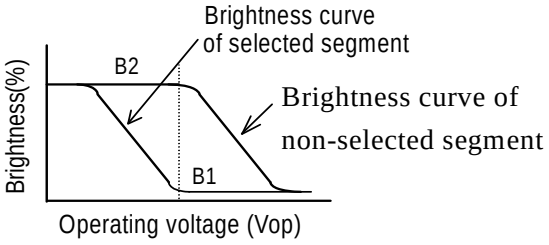
ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
VIEWING ANGLE	θ 1	Cr ≥ 2.0 VOP=9.6V	—	35	—	Deg.	(1)
	θ 2		—	30	—		
	θ 3		—	30	—		
	θ 4		—	30	—		
CONTRAST RATIO	Cr	VOP=9.6V	5	8.5	—	—	(2)
RESPONSE TIME (rise)	Tr	+25℃	—	120	—	ms	(3)
RESPONSE TIME (fall)	Tf	+25℃	—	200	—	ms	(3)

(1) DEFINITION OF VIEWING ANGLE

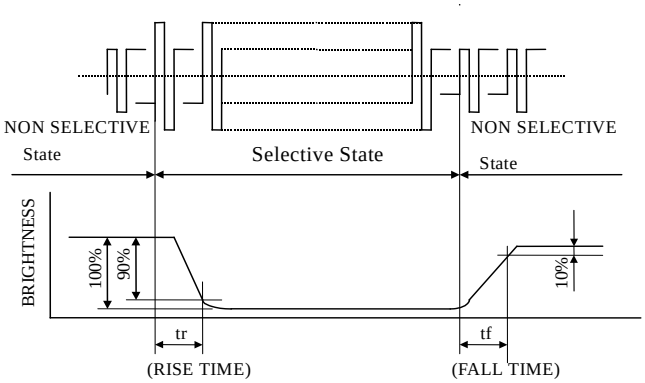


(2) DEFINITION OF CONTRAST

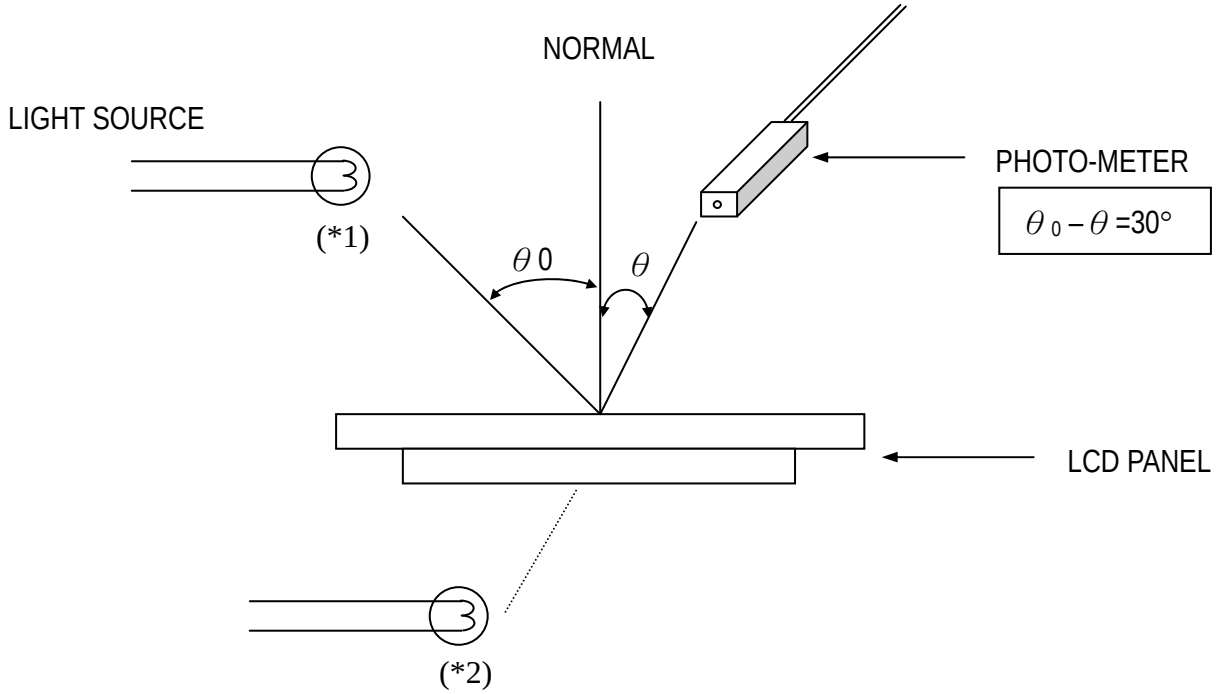
$$C.R = \frac{\text{Brightness of non-selected segment (B2)}}{\text{Brightness of selected segment (B1)}}$$



(3) DEFINITION OF RESPONSE



(4) Measuring Instruments For Electro-optical Characteristics



*1.Light source position for measuring the reflective type of LCD panel

*2.Light source position for measuring the transflective / transmissive types of LCD panel

8. TIMING CHARACTERISTICS (FOR ST7565R)

8-1 Parallel TIMING CHARACTERISTICS FOR 8080-SERIES

(V_{DD}=3.3V, Ta=-25℃)

ITEM		SIGNAL	SYMBOL	MIN.	TYP.	MAX.	UNIT	Remark
ADDRESS HOLD TIME		A0	t_{AH8}	0	—	—	ns	
ADDRESS SETUP TIME			t_{AW8}	0	—	—	ns	
SYSTEM CYCLE TIME			t_{CYC8}	240	—	—	ns	
WRITE DATA SETUP TIME		DB0～DB7	t_{DS8}	40	—	—	ns	
WRITE Address HOLD TIME			t_{DH8}	0	—	—	ns	
READ ACCESS TIME			t_{ACC8}	—	—	70	ns	C_L=100pF
READ OOUTPUT DISABLE TIME			t_{OH8}	5	—	50	ns	C_L=100pF
ENABLE ULSE WIDTH(WRITE)	L	WR	t_{CCLW}	80	—	—	ns	
	H		tcc_{HW}	80	—	—	ns	
ENABLE PULSE WIDTH(READ)	L	RD	tcc_{LR}	140	—	—	ns	
	H		tcc_{HR}	80	—	—	ns	

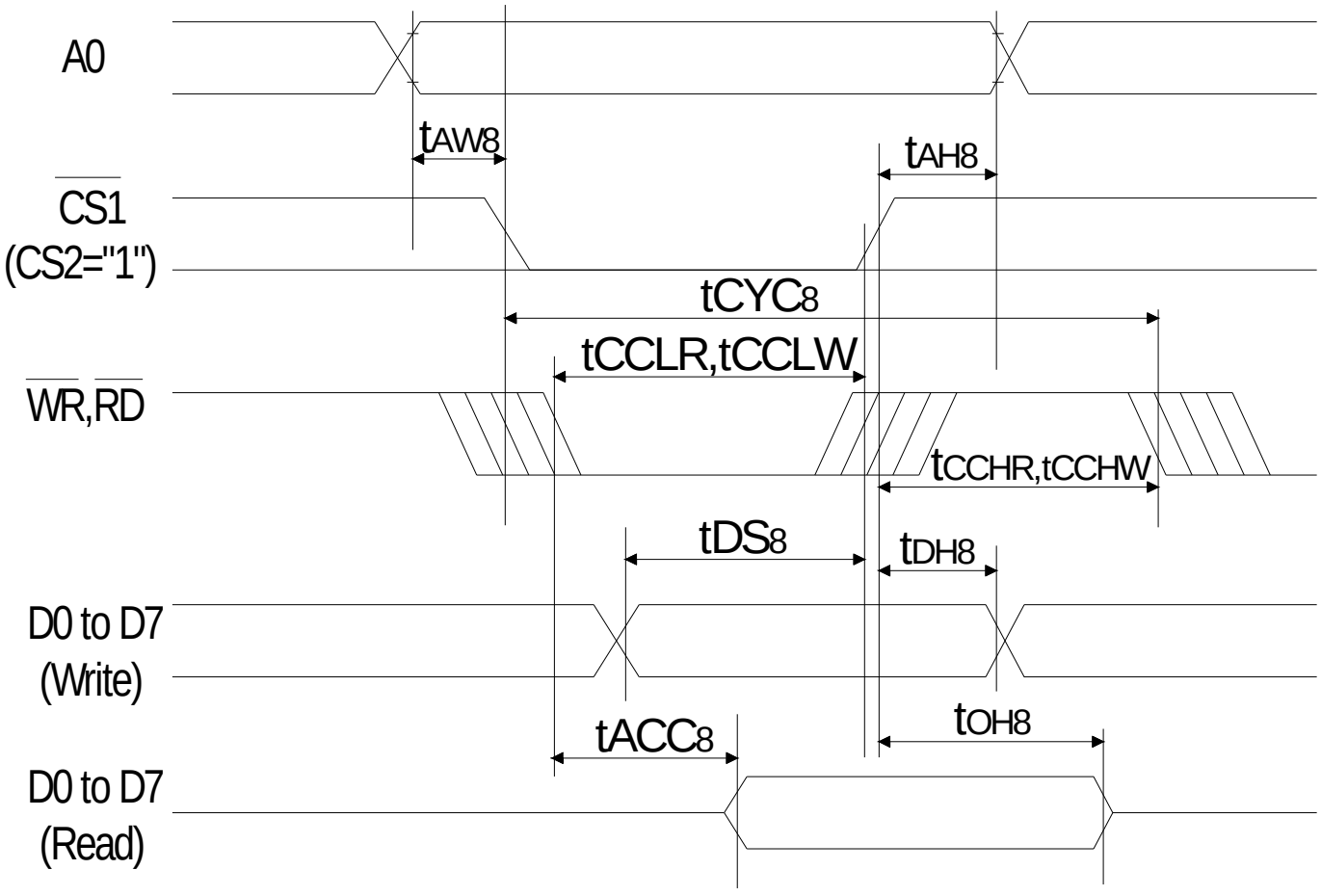
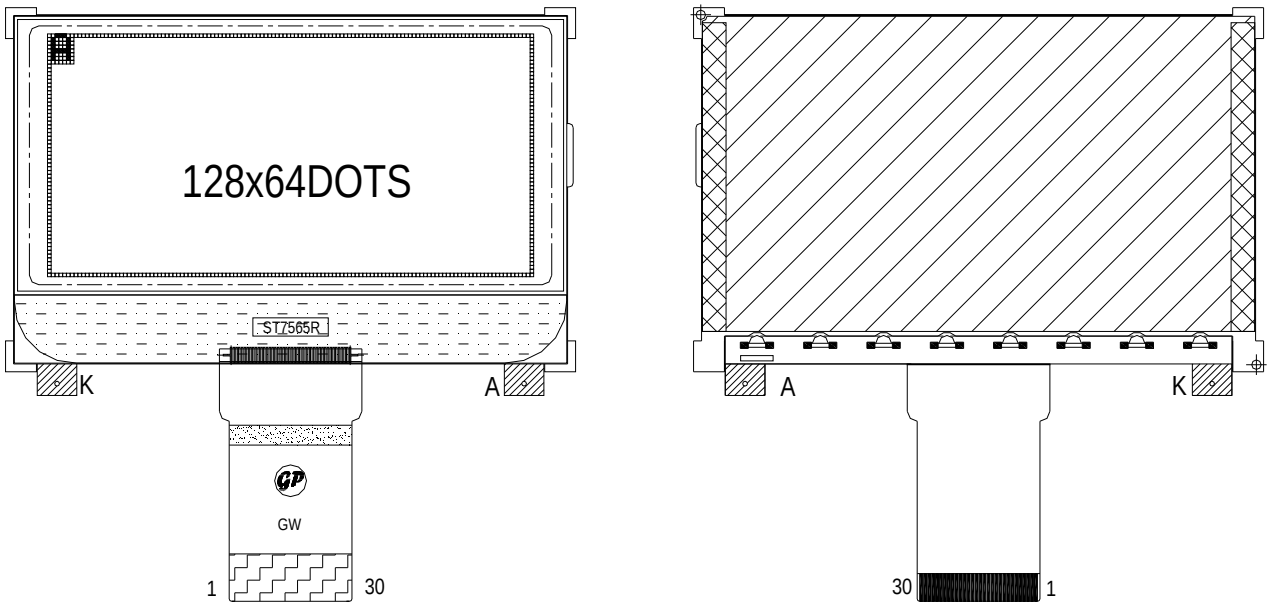


Figure 2. Parallel 8080-series interface Timing Characteristics

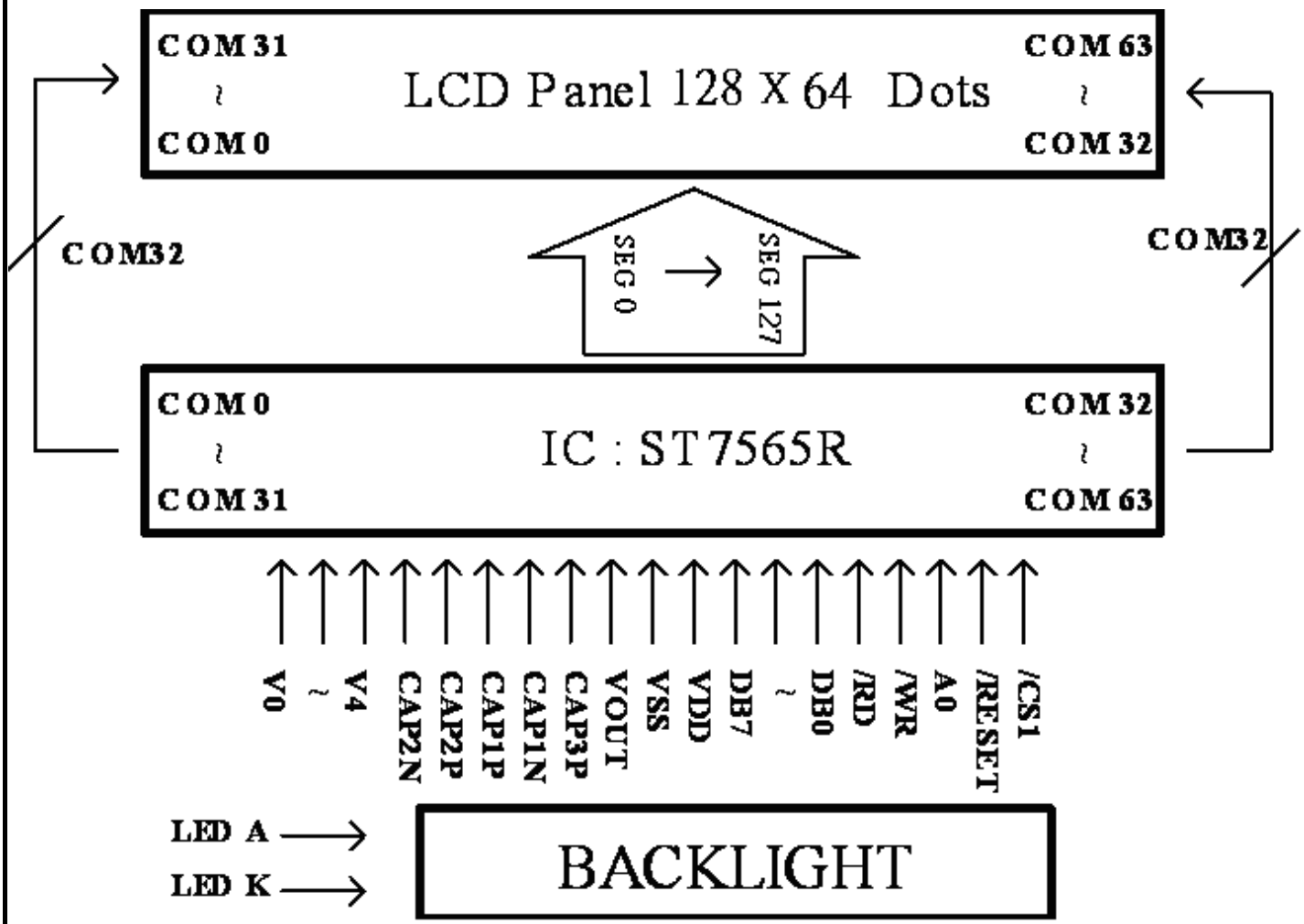
9. PIN ASSIGNMENT

PIN NO.	FUNCTION DESCRIPTIONS	SYMBOL
1	Ground	VSS
2	LCD driver supply voltage	V0
3	LCD driver supply voltage	V1
4	LCD driver supply voltage	V2
5	LCD driver supply voltage	V3
6	LCD driver supply voltage	V4
7	Step up capacitor connection terminal	CAP2N
8	Step up capacitor connection terminal	CAP2P
9	Step up capacitor connection terminal	CAP1P
10	Step up capacitor connection terminal	CAP1N
11	Step up capacitor connection terminal	CAP1N
12	Step up capacitor connection terminal	CAP3P
13	Voltage Converter Output	VOUT
14	Power supply	VDD
15	Ground	VSS
16	Parallel data input / 4-line SPI data input select	PS
17	MPU select	C86
18	Data bus	DB7
19	Data bus	DB6
20	Data bus	DB5
21	Data bus	DB4
22	Data bus	DB3
23	Data bus	DB2
24	Data bus	DB1
25	Data bus	DB0
26	8080 type: Read signal	/RD(E)
27	8080 type: Write signal	/WR(R/W)
28	Register Select input, H: display data L: control data	RS(A0)
29	Hardware reset input	/RESET
30	Chip Select inputs	/CS1

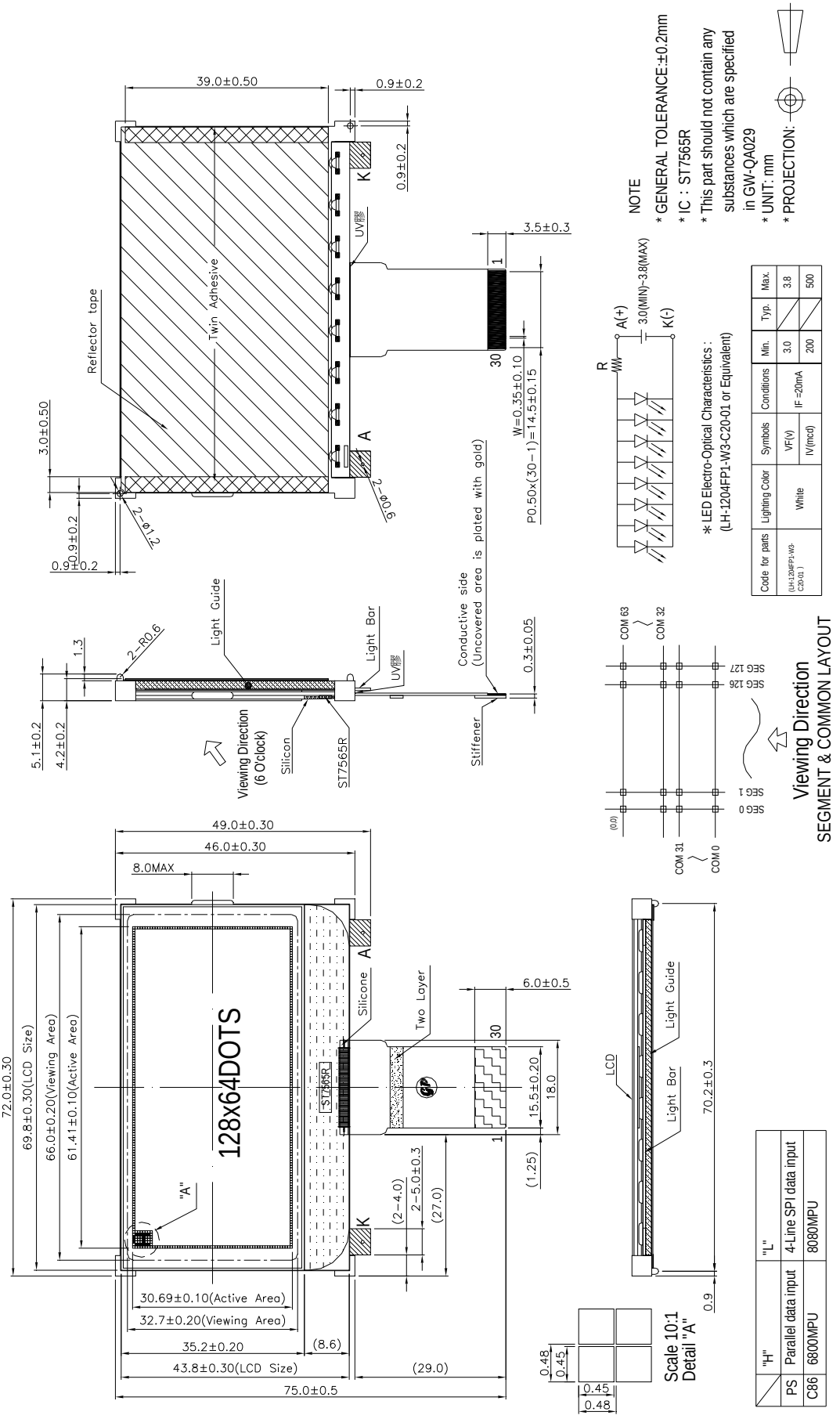
10.PIN NO.



11. BLOCK DIAGRAM



12.OUTLINE DIMENSIONS



13. ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITIONS	CRITERION
OPERATING TEMPERATURE	TOPR	-20℃～+70℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
STORAGE TEMPERATURE	TSTG	-30℃～+80℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
HUMIDITY	—	See Note	WITHOUT CONDENSATION

Note:

(1) Ta≦40℃, 90%RH Max.

(2) Ta＞40℃, Absolute humidity must be lower than the humidity of 90%RH at 40℃

14. RELIABITY

14-1 RELIABILITY TEST

ITEM	CONDITIONS	CRITERION
OPERATING TEMPERATURE	HIGH TEMPERTURE +70℃ 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERTURE - 20℃ 240HRS	
STORAGE TEMPERATURE	HIGH TEMPERTURE +80℃ 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERTURE - 30℃ 240HRS	
HUMIDITY	40℃ 90%RH 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
VIBRATION	• Operating Time: thirty minutes exposure for each direction (X,Y,Z) • Sweep Frequency: 10～55Hz (1 min) • Amplitude: 1.5mm	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
THERMAL SHOCK	-20℃(30mins) ←→+70℃(30mins) 10 cycles	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

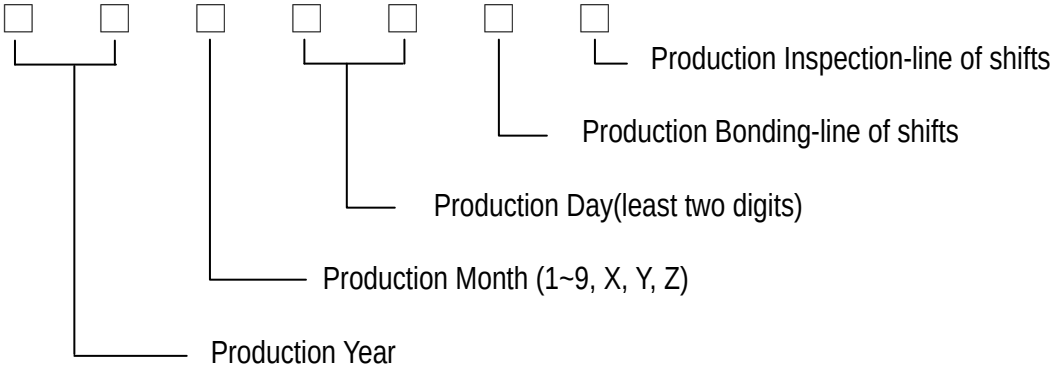
*NOTE:

Every test items shall meet following criteria:

(1) Evaluation should be made 4 hours after return to the room temperature(at 25±5℃, 60±5%RH).
(2) The samples subject to the tests must not have dew condensation.
(3) All of the dots should not be blurred.
(4) All dots should be usually displayed.
(5) The Current Consumption should be Twice than initial value or less.
(6) The Contrast Ratio should be more than 50% of initial value.

15. Code System of Production Lot

The production lot of module is specified on the back of FPC as follows;



16. Precaution for Use

The following precautions should be followed, since this module contains precise parts.

(1) Do not store module for an extended periods of time under the conditions of high temperature and high humidity.
(2) Avoid using or storing the module in areas that expose it to direct sunlight or ultraviolet rays.
(3) Use protective finger covers when handling the module to avoid scratching or staining the module.
(4) Care should be taken not to expose the module to static electricity, because the module contains C-MOS LSI's.
(5) The LSI is sensitive to light.
The user's product should be designed so that LSI is not exposed to any light during operation.
(6) During installation, cover the display area with acrylic protection plates to protect the polarizer plate and LCD cells.
(7) Do not apply any excessive shocks to the module because the module contains sensitive LCD cells.
Do not use a module, which has experienced strong mechanical shock.
(8) Care should be taken when the power supply turns on as following.
(a)Do not apply any input signals before the supplying voltage is applied.
(b)Do not turn off the power supply while any input signals are applied.

Caution

(1) Dangerous. Do not shock glass because glass can break.
(2) If module breaks, do not touch it directly.
(Glass could stick or cut skin.)
(3) Do not swallow Liquid Crystal.
(In case of broken LCD panel, do not swallow liquid crystal even if there is no proof that liquid crystal is poisonous.)
(4) If liquid crystal is exposed to skin, wash the area thoroughly with alcohol or soap.
(5) When disposing of the product, please observe industrial waste disposal laws in each country and district.
(6) In case of injury, give immediate treatment and consult with a doctor.
(7) This product is constructed precisely. Don't disassemble or modify.

※ Neglecting this mark can cause injury to humans and damage to materials.