

Control No. :	TR-S-025
Version No. :	2

SPECIFICATIONS

PRODUCT : LCD MODULE

MODEL NO. : GVD128064-522

CUSTOMER			GOLDENVIEWDISPLAYY		
APPROVED	CHECKED	CHECKED	APPROVED	CHECKED	PREPARED
			Kevin Mao	Steven Lai	Steven Lai

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1. GENERAL SPECIFICATIONS :

1-1 SCOPE:

This specification covers the delivery requirements for the liquid crystal display delivered by GVD to Customer .

1-2 PRODUCTS:

Liquid Crystal Display Module (LCM)

1-3 MODULE NAME:

GVD128064-52

2. FEATURES :

1-1 Display type: FSTN, Black & White, Transflective, 6o'clock, Positive

1-2 Driving Method: 1/65 duty , 1/9 bias

1-3 Built-in controller: S6B1713(KS0713BUM)

3. MECHANICAL SPECIFICATIONS :

ITEM	SPECIFICATIONS	UNIT
OUTLINE DIMENSIONS	65.33(W) x 53.23(H)x 4.10(T)	mm
VIEWING AREA	53.0(W) x 27.5(H)	mm
DISP. CONSTRUCTION	128 x 64 dots	—
NUMBER OF DOTS	128 x 64	Dots
DOT SIZE	0.34(W) x 0.34(H)	mm
DOT PITCH	0.37(W) x 0.37(H)	mm
ASSY. TYPE	COG	—
BACKLIGHT	EL Backlight	—
WEIGHT	10 (max)	g

4. ABSOLUTE MAXIMUM RATING

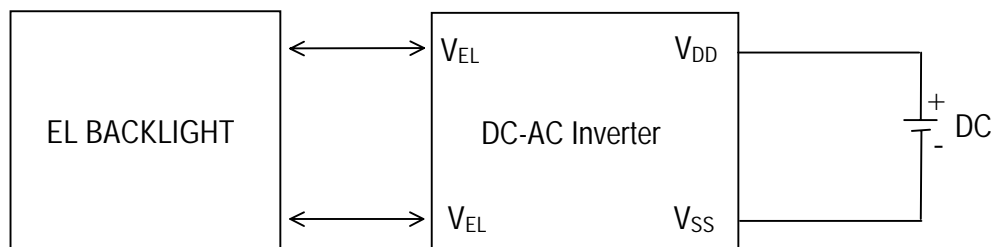
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
POWER SUPPLY FOR LOGIC	VDD—VSS	Ta=25°C	-0.3	—	+7.0	V
POWER SUPPLY FOR LCD DRIVING	VLCD	Ta=25°C	-0.3	—	+17.0	V
INPUT VOLTAGE	VIN	Ta=25°C	-0.3	—	VDD+0.3	V
OPERATION TEMPERATURE	TOPR	—	- 20	—	+70	°C
STORAGE TEMPERATURE	TSTG	—	- 30	—	+80	°C

NOTE : LCM SHOULD BE GROUNDED DURING HANDLING LCM

5. ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
POWER SUPPLY VOLTAGE	VDD—VSS	3x booster circuit	—	3.0	3.3	V
		4x booster circuit	2.76	2.85	2.93	
POWER SUPPLY FOR LCD DRIVING	VLCD	Ta=25°C	8.44	8.7	8.96	V
INPUT VOLTAGE "H" LEVEL	VIH	—	0.8VDD	—	VDD	V
INPUT VOLTAGE "L" LEVEL	VIL	—	0	—	0.2VDD	V
OUTPUT VOLTAGE "H" LEVEL	VOH	IOH=-0.5mA	0.8VDD	—	VDD	V
OUTPUT VOLTAGE "L" LEVEL	VOL	IOL=0.5mA	0	—	0.2VDD	V
POWER SUPPLY CURRENT	IDD	—	—	0.5	1.5	mA
	IEE	—	—	—	—	uA

6. EL BACKLIGHT CHARACTERISTICS



6-1 ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	BLUE COLOR			UNIT
		MIN	TYP	MAX	
VOLTAGE	V_{EL}	—	100	—	Vrms
SPECTRUM	F_{EL}	—	400	—	Hz
OPERATION TEMPERATURE SCOPE	T_{OPR}	-20	—	+70	°C
STORAGE TEMPERATURE SCOPE	T_{STG}	-30	—	+80	°C

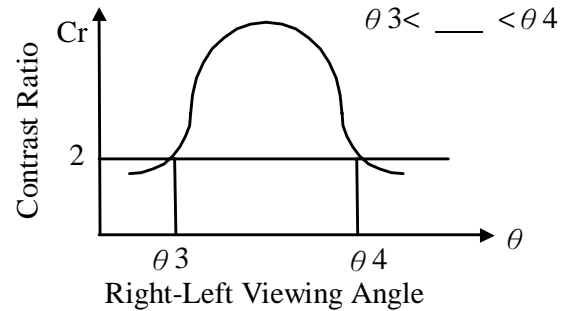
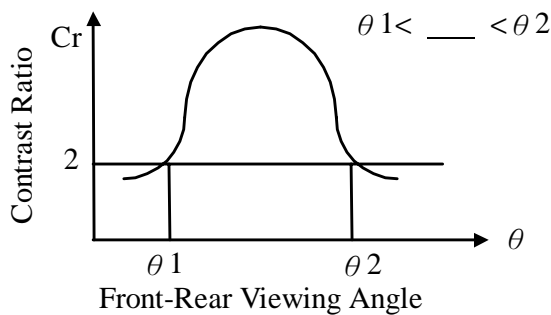
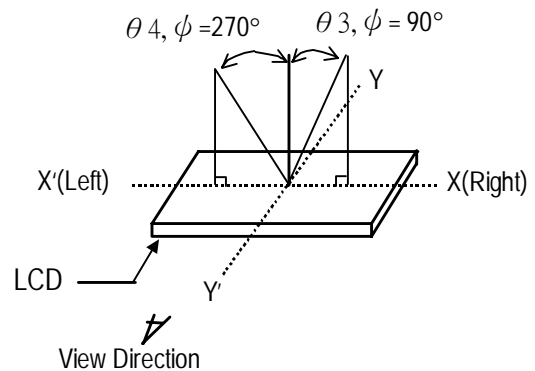
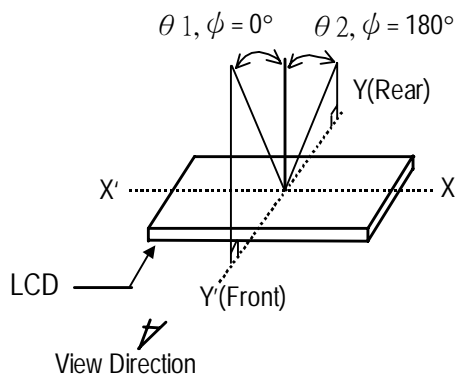
6-2 ELECTRICAL CHARACTERISTICS

PARAMETER		STANDARD VALUE			UNIT
		MIN	TYP	MAX	
EL OPERATING VOLTAGE		—	100	150	Vrms
SUPPLY SPECTRUM		—	400	1000	Hz
BRIGHTNESS		3.9	—	35	cd/m ²
BLUE COLORS	$X \pm 0.03$	—	$X = 0.16$	—	—
	$Y \pm 0.04$	—	$Y = 0.20$	—	—
CURRENT CONSUMPTION		—	0.15	—	mA
POWER CONSUMPTION		1.8	—	—	mW

7. OPTICAL CHARACTERISTICS

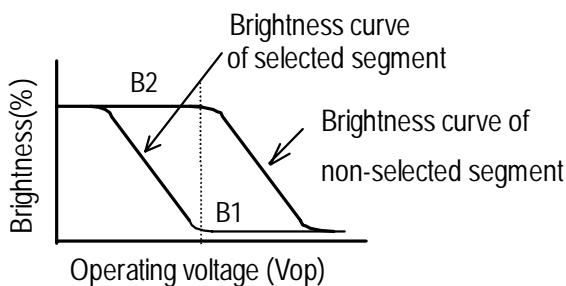
ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	NOTE
VIEWING ANGLE	$\theta 1$	$Cr \geq 2.0$ $Vop=8.7V$	—	35	—	Deg	(1)
	$\theta 2, \theta 3, \theta 4$		—	30	—		
CONTRAST RATIO	Cr	$Vop=8.7V$	5	8	—	—	(2)
RESPONSE TIME (rise)	Tr	$\theta 1=0^\circ \theta 2=0^\circ$	—	120	210	ms	(3)
RESPONSE TIME (fall)	Tf	$\theta 1=0^\circ \theta 2=0^\circ$	—	200	360	ms	(3)

(1) DEFINITION OF VIEWING ANGLE

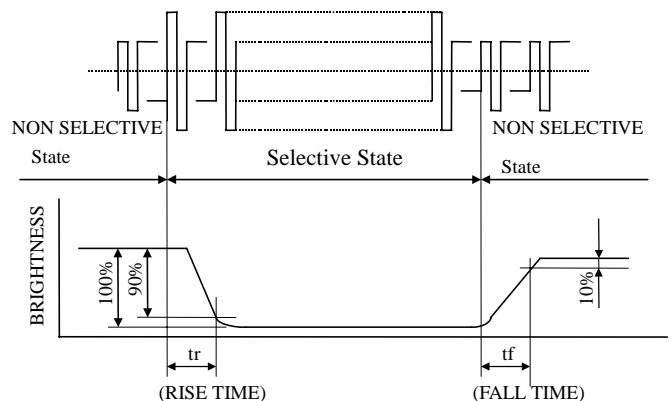


(2) DEFINITION OF CONTRAST RATIO

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

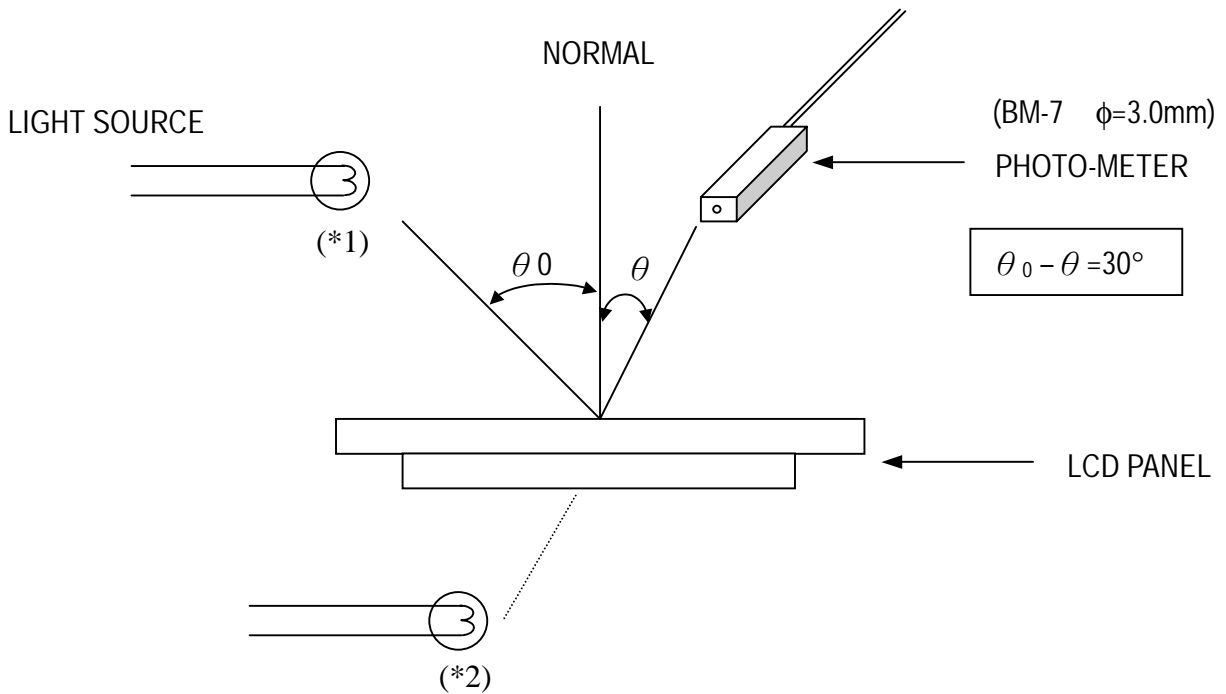


(3) DEFINITION OF RESPONSE TIME



STANDARD DOC.	PRODUCT SPEC.	MODEL		
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(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 transfective / transmissive types of LCD panel

8. TIMING CHARACTERISTICS
8-1 Parallel TIMING CHARACTERISTICS

($V_{DD}=2.4V\sim 3.6V$, $T_a=-40$ to $+85^{\circ}C$)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
ADDRESS SETUP TIME	t_{AS68}	13	—	—	ns
ADDRESS HOLD TIME	t_{AH68}	17	—	—	ns
SYSTEM CYCLE TIME	t_{CY68}	400	—	—	ns
DATA SETUP TIME	t_{DS68}	35	—	—	ns
DATA HOLD TIME	t_{DH68}	13	—	—	ns
ACCESS TIME	t_{ACC68}	—	—	125	ns
OUTPUT DISABLE TIME	t_{OD68}	10	—	90	ns
ENABLE PULSE	READ	$t_{PW68(W)}$	125	—	ns
WIDTH	WRITE	$t_{PW68(R)}$	55	—	ns

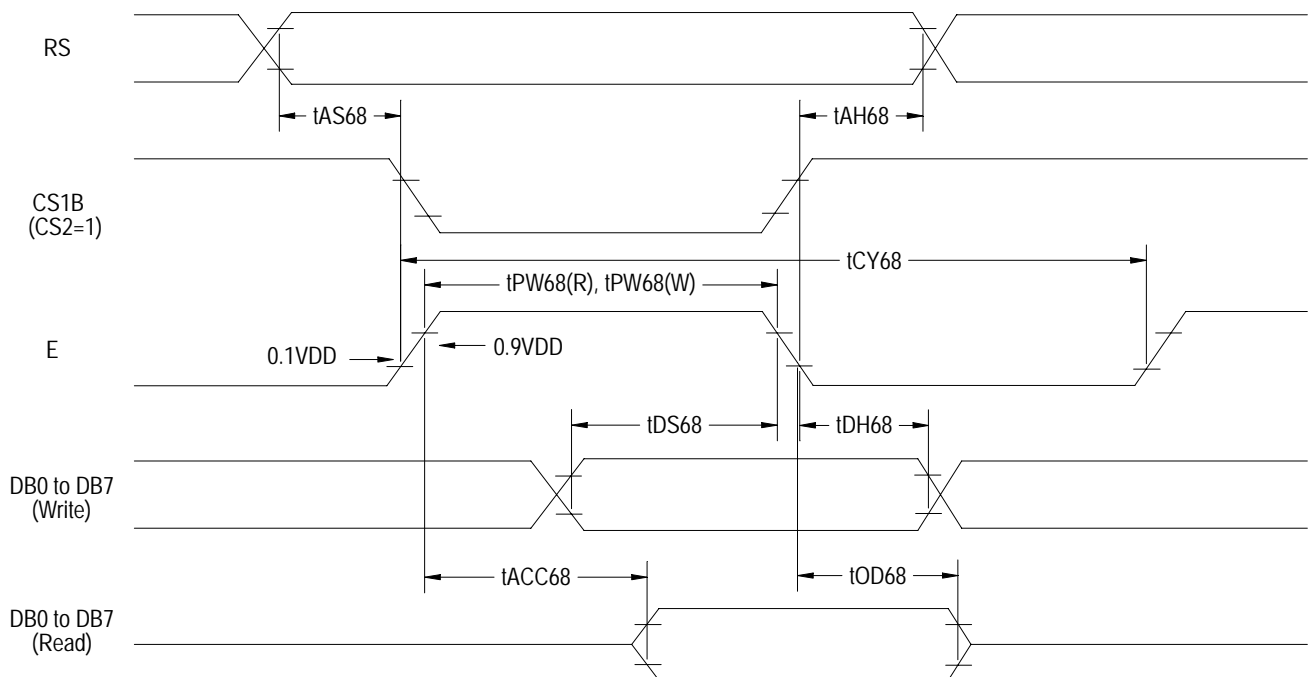


Figure 1. Parallel 6800-series interface Timing Characteristics

8-2 Parallel TIMING CHARACTERISTICS

 $(V_{DD}=2.4V\sim 3.6V, T_a=-40\text{ to }+85^{\circ}C)$

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
ADDRESS SETUP TIME	t_{AS80}	13	—	—	ns
ADDRESS HOLD TIME	t_{AH80}	17	—	—	ns
SYSTEM CYCLE TIME	t_{CY80}	400	—	—	ns
PULSE WIDTH (WR)	$t_{PW80(W)}$	55	—	—	ns
PULSE WIDTH (RD)	$t_{PW80(R)}$	125	—	—	ns
DATA SETUP TIME	t_{DS80}	35	—	125	ns
DATA HOLD TIME	t_{DH80}	13	—	90	ns
READ ACCESS TIME	t_{ACC80}	—	—	—	ns
OUTPUT DISABLE TIME	t_{OD80}	10	—	—	ns

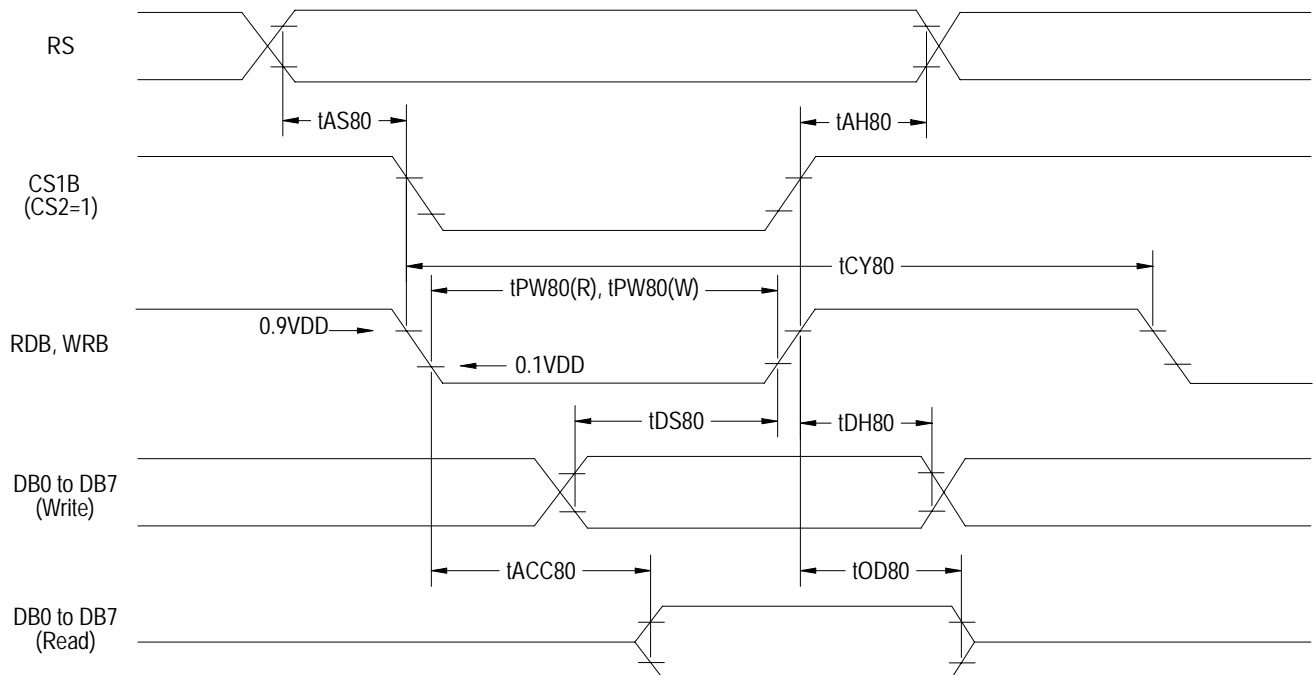


Figure 2. Parallel 8080-series interface Timing Characteristics

8-3. Serial -TIMING CHARACTERISTICS

 $(V_{DD}=2.4V-3.6V, T_a=-40 \text{ to } +85^\circ\text{C})$

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
SERIAL CLOCK CYCLE	t_{CYS}	450	—	—	ns
SCLK HIGH PULSE WIDTH	t_{WHS}	180	—	—	ns
SCLK LOW PULSE WIDTH	t_{WLS}	135	—	—	ns
ADDRESS SETUP TIME	t_{ASS}	90	—	—	ns
ADDRESS HOLD TIME	t_{AHS}	360	—	—	ns
DATA SET-UP TIME	t_{DSS}	90	—	—	ns
DATA HOLD TIME	t_{DHS}	90	—	—	ns
CS1B SETUP TIME	t_{CSS}	55	—	—	ns
CS1B HOLD TIME	t_{CHS}	180	—	—	ns

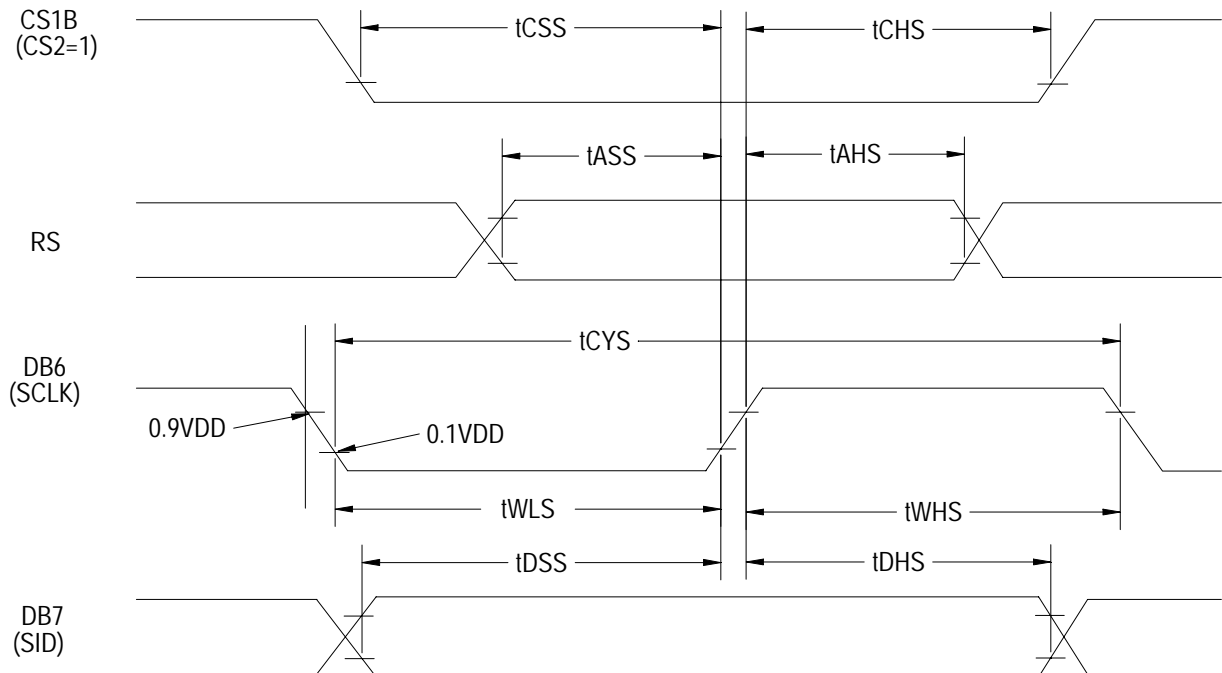


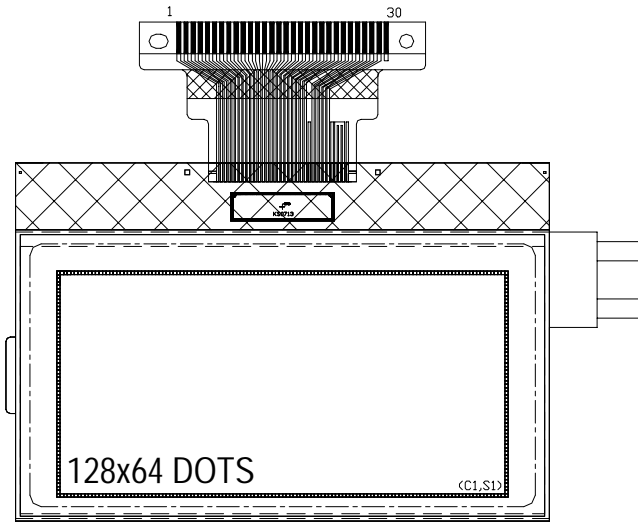
Figure 3. Serial interface Timing Characteristics

9. PIN ASSIGNMENT

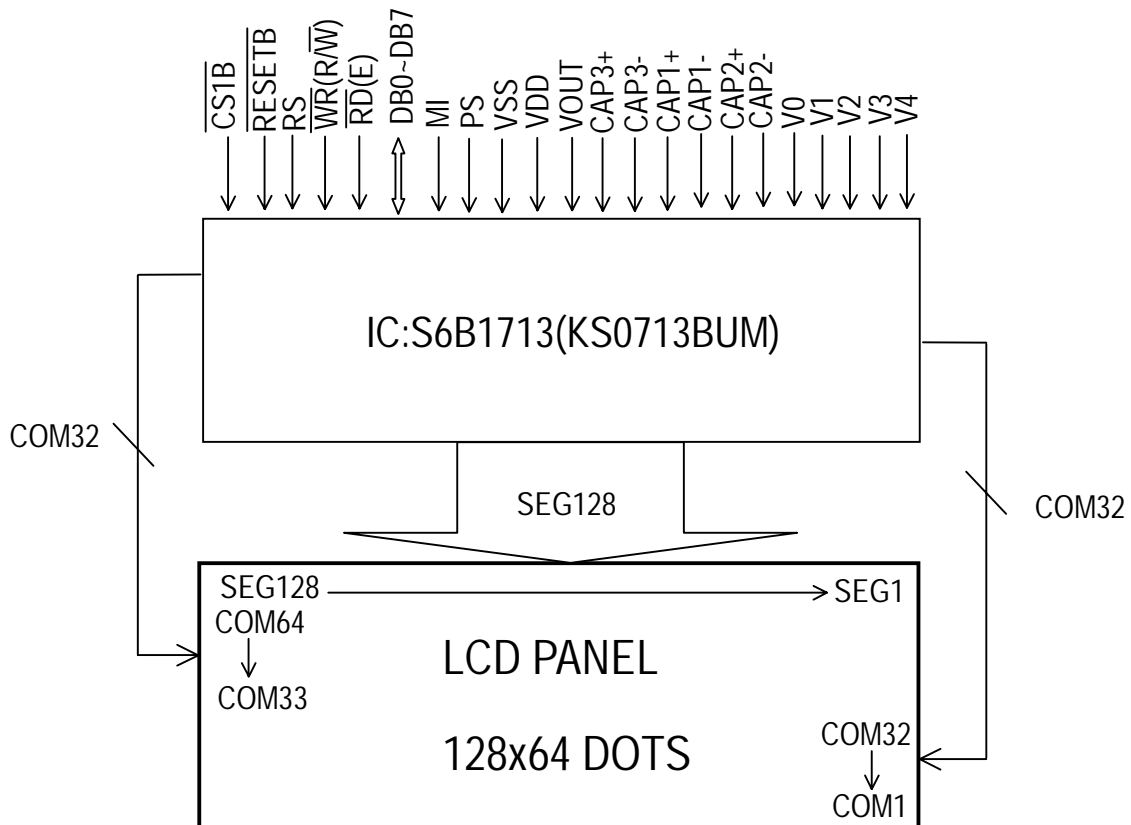
PIN NO.	FUNCTION	SYMBOL
1	Chip Select inputs	/CSIB
2	Hardware reset input	/RESETB
3	Register Select input	RS
4	Read/Write execution control pin	R/ \overline{W} (\overline{WR})
5	Enable signal	E(\overline{RD})
6	Data bus	DB0
7	Data bus	DB1
8	Data bus	DB2
9	Data bus	DB3
10	Data bus	DB4
11	Data bus	DB5
12	Data bus	DB6
13	Data bus	DB7
14	Microprocessor interface selects input pin	MI
15	Parallel/Serial data input select input	PS
16	Ground	VSS
17	Power Supply for Logic	VDD
18	Voltage converter output	V _{OUT}
19	Capacitor3+ connect for internal voltage converter	CAP3+
20	Capacitor3- connect for internal voltage converter	CAP3-
21	Capacitor1+ connect for internal voltage converter	CAP1+
22	Capacitor1- connect for internal voltage converter	CAP1-
23	Capacitor2+ connect for internal voltage converter	CAP2+
24	Capacitor2- connect for internal voltage converter	CAP2-
25	LCD driver supply voltage	V0
26	LCD driver supply voltage	V1
27	LCD driver supply voltage	V2
28	LCD driver supply voltage	V3
29	LCD driver supply voltage	V4
30	No Connection	NC

Note: In serial mode, The interface pin DB0-DB5 and E(RD) and R/W(WR) must be fixed to either "H" or "L" level.

10. PIN NO



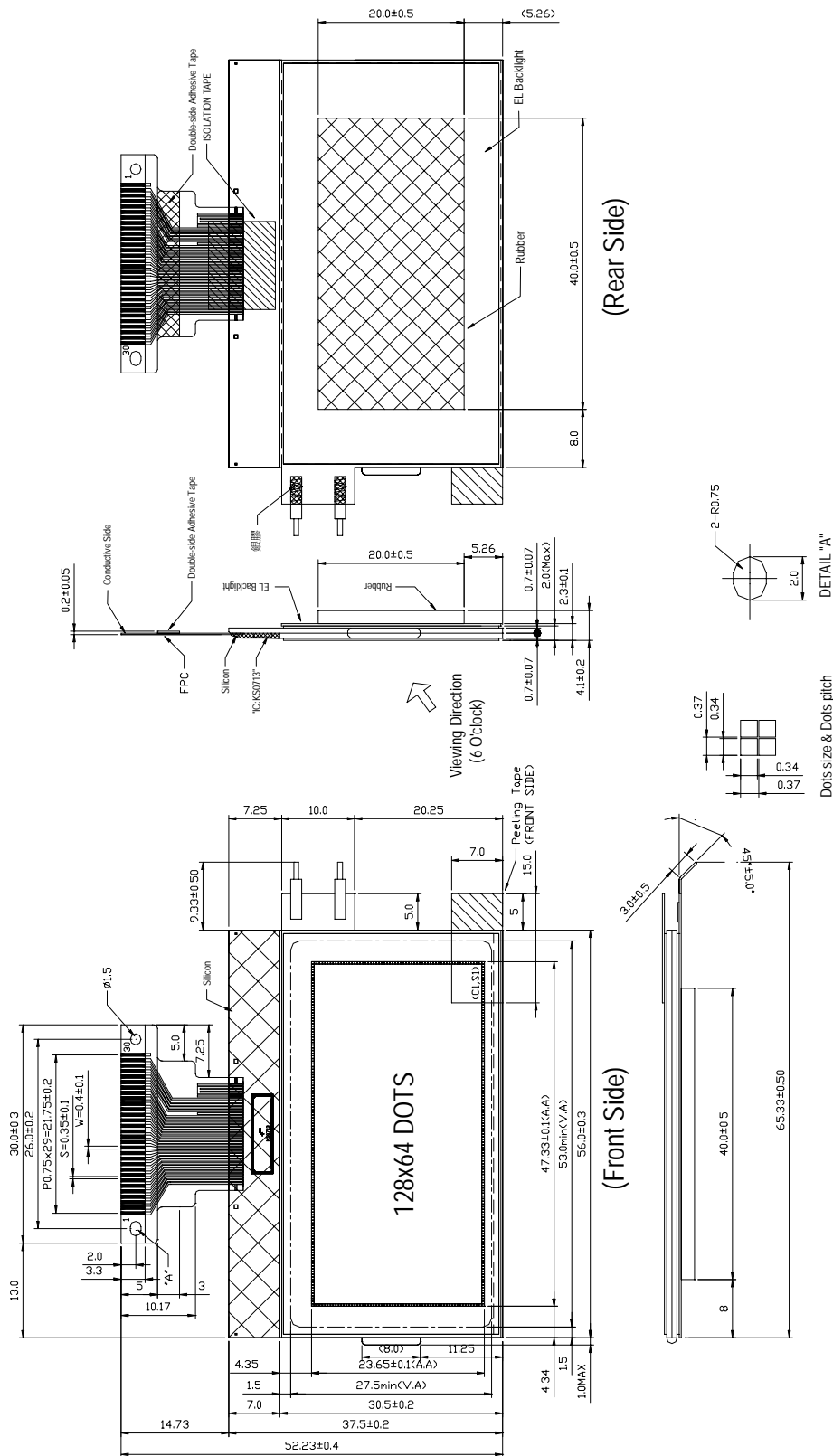
11. BLOCK DIAGRAM



Note:

1. The Internal Rb/Ra Ratio depending on 3-bit Data(R2 R1 R0) is setting "1 1 0"
2. Electronic volume level =9

12.OUTLINE DIMENSION



- (1)EL Backlight size:56.0x30.0x0.3(mm)
- (2)Rubber size:40.0x20.0x1.8(mm)
- (3)General Tolerance :± 0.20mm
- (4)Unit : mm

13. ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

13-1 TEMPERATURE RANGE

ITEM	SYMBOL	CONDITION	CRITERION
OPERATING TEMPERATURE	Topr	-20°C ~ 70°C	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
STORAGE TEMPERATURE	Tstg	-30°C ~ 80°C	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

13-2 TEMPERATURE RANGE

ITEM	CONDITION	CRITERION
OPERATING TEMPERATURE	HIGH TEMPERATURE + 70°C 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERATURE - 20°C 240HRS	
STORAGE TEMPERATURE	HIGH TEMPERATURE + 80°C 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERATURE - 30°C 240HRS	
HUMIDITY	40°C 90%RH 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
VIBRATION	<ul style="list-style-type: none"> • 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°C (30mins) ←→70°C (30mins) 10 cycles	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

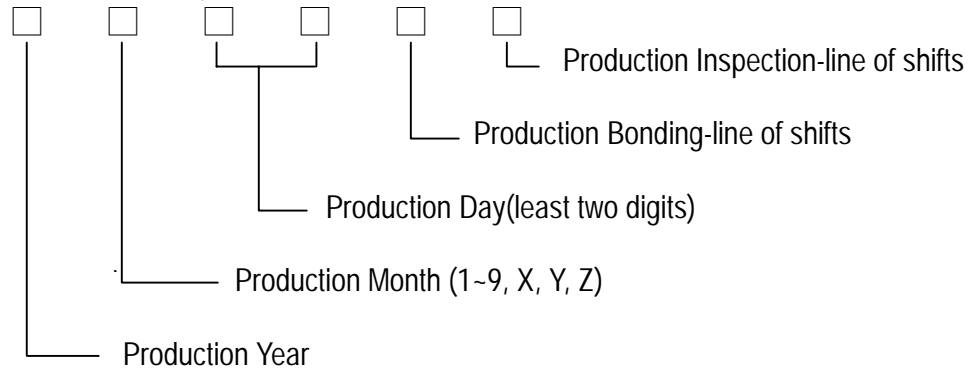
*NOTE: TEST CONDITION

(1) TEMPERATURE AND HUMIDITY: IF NO SPECIFICATION, TEMP. SET AT 25±2°C, HUMIDITY SET AT 60±5%RH

(2) OPERATING STATE: SAMPLES SUBJECT TO THE TESTS SHALL BE IN "OPERATING" CONDITION.

14. Code System of Production Lot

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



15. 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.