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The LCD(M) Specialist

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PART NO. : COG12864G

FOR MESSRS. : _____

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ACCEPTED BY: _____ PROPOSED BY: _____

RECORD OF REVISION

DATE	PAGE	SUMMARY

3. General specifications

3.1 General specifications

PLEASE REFER TO:

"CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (MS-10-10000)".

3.2 Quality Assurance and Warranty

PLEASE REFER TO:

"QUALITY ASSURANCE MANUL (MS-10-10001)".

3.3 This individual specification is prior to general specifications

4. Features

* Display Model: FSTN Positive , Transmissive
* Color : Display dot : Black;
  Back ground : White;

* Display Format : 128 x 64 dots;
* IC : Samsung S6B0724A01;
* Interface Input Data : Parallel 8080 ;
* Driving Method : 1/65 Duty, 1/9 bias;
* Viewing Direction: 6 o'clock;
* Back light : NA

5. Mechanical Specs.

Item	Specification	Unit
Module Size	31.0(W) x 35.0(H) x 1.8MAX(T)	mm
Viewing Area	28MIN(W) x 18MIN(H)	mm
Effective Display Area	25.964(W) x 15.02(H)	mm
Character Font	128 x 64 Dots	-
Dot Size	0.183(W) X 0.215(H)	mm
Dot Pitch	0.203(W) X 0.235(H)	mm

6. Electrical characteristics

6.1 Absolute Max Rating

Item	Symbol	Standard Value			Unit
		Min.	Typ.	Max.	
Supply Voltage For Logic	V_{DD}-V_{SS}	-0.3	-	+7.0	V
Supply Voltage For LCD Drive	V_0-V_{ss}	-0.3	-	+17.0	V
Input Voltage	V_{IN}	-0.3	-	V_{DD}+0.3	V
Operating Temp.	T_{OP}	-10	-	+60	°C
Storage Temp.	T_{ST}	-20	-	+70	°C

Notes: Voltages $V0 \geq V1 \geq V2 \geq V3 \geq V4 \geq V_{ss}$ must always be satisfied.

6.2 Electrical characteristics;

Item		Symbol	Test Condition	Min.	Typ.	Max.	Unit
Logic Supply Voltage		$V_{DD} - V_{SS}$	Ta=0~50°C	2.4	3.0	3.6	V
Supply Voltage For LCD		V_0-V_{SS}	Ta=25℃	8.6	8.9	9.2	V
Input Voltage	"H" Level	V_{IH}	-	0.8V_{DD}	-	V_{DD}	V
	"L" Level	V_{IL}		VSS	-	0.2V_{DD}	V
Output Voltage	"H" Level	V_{OH}	IOH = -0.5mA	0.8V_{DD}	-	V_{DD}	V
	"L" Level	V_{OL}	IOL = 0.5mA	VSS	-	0.2V_{DD}	V
Current Consumption		I_{DD}	V_{DD}=3.0V ± 5%	-	0.21	1.0	mA

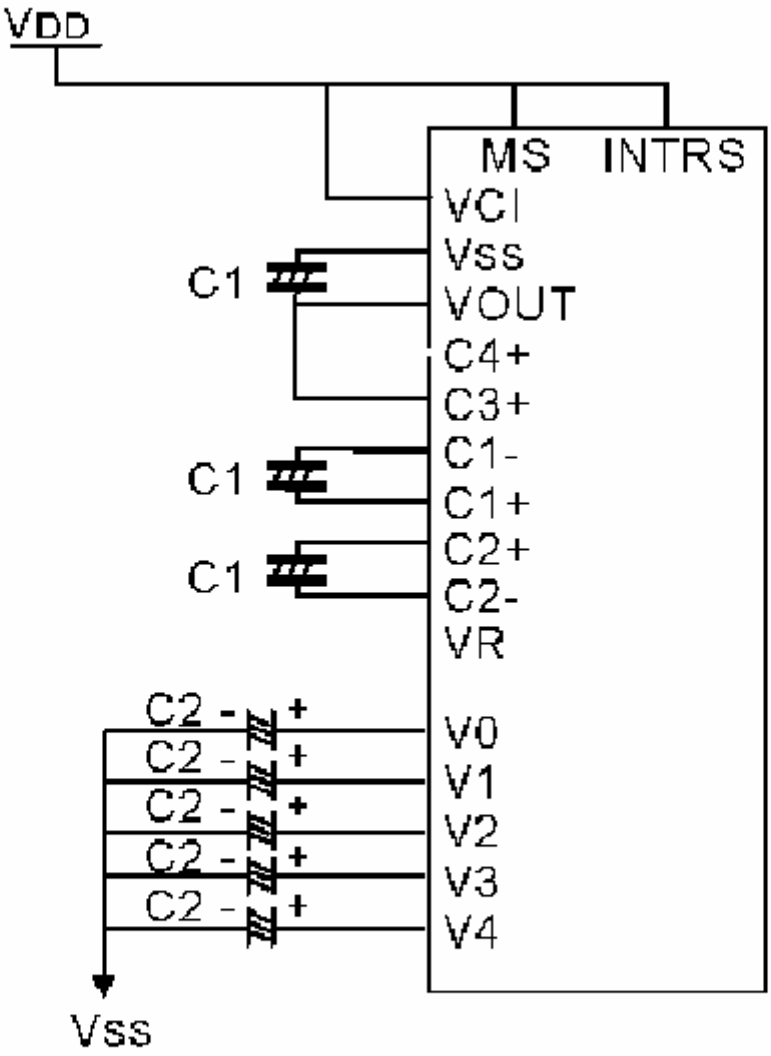
NOTE: 1) Duty Ratio=1/65, Bias Ratio=1/9

2) Measuring in Dots ON-state

7. Power supply and block diagram

7.1 Power supply

When using internal regulator resistors



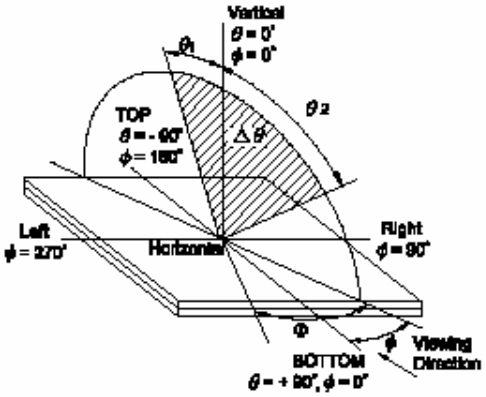
※ 1:when using all internal LCD power circuits(3-times,V/C:ON,V/R:ON,V/F:O

2:C1: 1.0 to 4.7uF; C2: 0.47 to 1.0uF

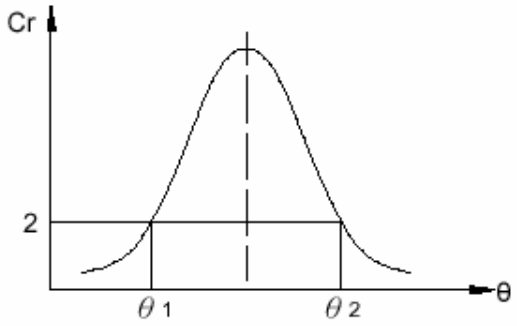
8. Electro – Optical Characteristics

Item	Symbol	Temp.	Min.	Typ.	Max.	Unit	Conditions	Note
Viewing Angle	Θ2 – Θ1	25℃	30	82	-	Deg.	-	1,2
	Φ		60	92	-			
Contrast Ratio	Cr	25℃	2.0	6.35	7.44	-	Θ=0° Φ=0°	3
Response Time(rise)	Tr	25℃	-	253	250	ms	Θ=0° Φ=0°	4
		0℃	-	950	1150			
Response Time(fall)	Tf	25℃	-	158	250	ms	Θ=0° Φ=0°	4
		0℃	-	950	1150			

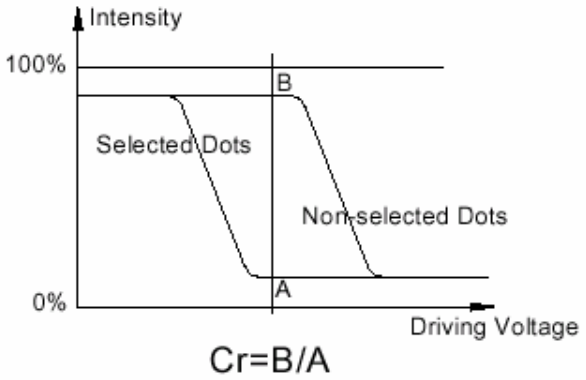
Note1 . Definition of Angle Θ&Φ



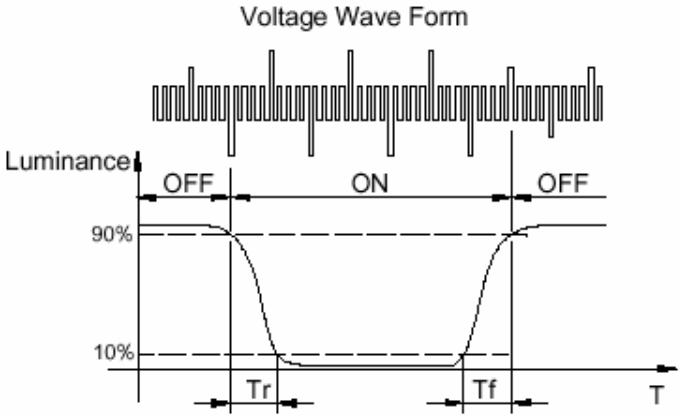
Note2. Definition of Viewing Angle Θ1&Θ2



Note3 . Definition of Contrast Cr



Note4. Definition of Optical Response



9.Interface Pin Assignment

Pin NO.	Symbol	I / O	Functions
1	C68	I	Microprocessor interface select input pin in parallel mode -C68 = "H": 6800-series MPU interface -C68 = "L": 8080-SERIES MPU interface
2	V0	I/O	LCD driver supply voltages
3	V4		
4	V3		
5	V2		
6	V1		
7	C2-	O	Capacitor 2 negative connection pin for voltage converter
8	C2+	O	Capacitor 2 positive connection pin for voltage converter
9	C1+	O	Capacitor 1 positive connection pin for voltage converter
10	C1-	O	Capacitor 1 negative connection pin for voltage converter
11	C3+	O	Capacitor 3 positive connection pin for voltage converter
12	VOUT	I/O	Voltage converter input/output pin
13	VSS	Supply	Ground
14	VDD	Supply	Power supply
15	D7	I/O	8-bit bi-directional data bus that is connected to the standard 8-bit microprocessor data bus.
16	D6		
17	D5		
18	D4		
19	D3		
20	D2		
21	D1		
22	D0		
23	/RD	I	Read enable clock input pin
24	/RW	I	Read / Write execution control pin
25	RS	I	Register select input pin.
26	/RST	I	Reset input pin.
27	/CS1	I	Chip select input pins Data /instruction I/O is enabled only when CS1B is "L"

10.Command

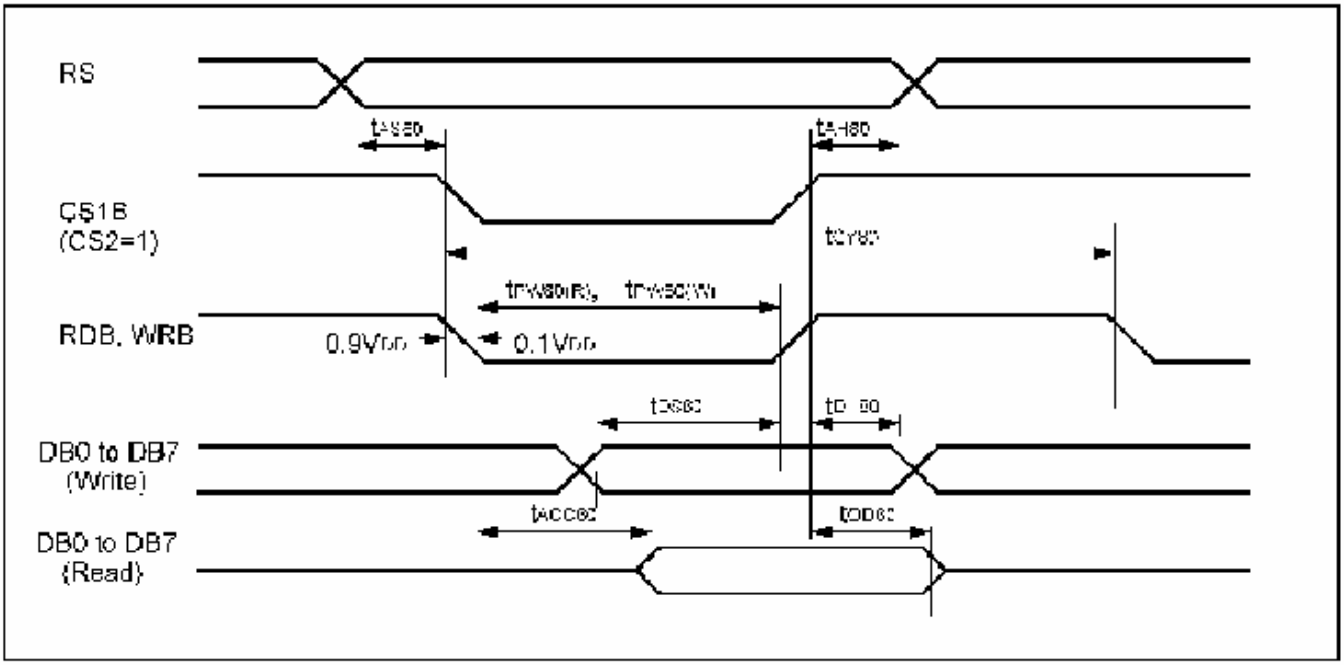
×: Don't care

Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
Display ON / OFF	0	0	1	0	1	0	1	1	1	DON	Turn on/off LCD panel When DON = 0: display OFF When DON = 1: display ON
Initial display line	0	0	0	1	ST5	ST4	ST3	ST2	ST1	ST0	Specify DDRAM line for COM0
Set page address	0	0	1	0	1	1	P3	P2	P1	P0	Set page address
Set column address MSB	0	0	0	0	0	1	Y7	Y6	Y5	Y4	Set column address MSB
Set column address LSB	0	0	0	0	0	0	Y3	Y2	Y1	Y0	Set column address LSB
Read status	0	1	BUSY	ADC	ONOFF	RESETB	0	0	0	0	Read the internal status
Write display data	1	0	Write data								Write data into DDRAM
Read display data	1	1	Read data								Read data from DDRAM
ADC select	0	0	1	0	1	0	0	0	0	ADC	Select SEG output direction When ADC = 0: normal direction (SEG0→SEG131) When ADC = 1: reverse direction (SEG131→SEG0)
Reverse display ON / OFF	0	0	1	0	1	0	0	1	1	REV	Select normal / reverse display When REV = 0: normal display When REV = 1: reverse display
Entire display ON / OFF	0	0	1	0	1	0	0	1	0	EON	Select normal/entire display ON When EON = 0: normal display. When EON = 1: entire display ON
LCD bias select	0	0	1	0	1	0	0	0	1	BIAS	Select LCD bias
Set modify-read	0	0	1	1	1	0	0	0	0	0	Set modify-read mode
Reset modify-read	0	0	1	1	1	0	1	1	1	0	release modify-read mode
Reset	0	0	1	1	1	0	0	0	1	0	Initialize the internal functions
SHL select	0	0	1	1	0	0	SHL	×	×	×	Select COM output direction When SHL = 0: normal direction (COM0→COM63) When SHL = 1: reverse direction (COM63→COM0)
Power control	0	0	0	0	1	0	1	VC	VR	VF	Control power circuit operation
Regulator resistor select	0	0	0	0	1	0	0	R2	R1	R0	Select internal resistance ratio of the regulator resistor
Set reference voltage mode	0	0	1	0	0	0	0	0	0	1	Set reference voltage mode
Set reference voltage register	0	0	×	×	SV5	SV4	SV3	SV2	SV1	SV0	Set reference voltage register
Set static indicator mode	0	0	1	0	1	0	1	1	0	SM	Set static indicator mode
Set static indicator register	0	0	×	×	×	×	×	×	S1	S0	Set static indicator register
Power save	-	-	-	-	-	-	-	-	-	-	Compound Instruction of display OFF and entire display ON

Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
NOP	0	0	1	1	1	0	0	0	1	1	*Non-Operation command*
Test Instruction_1	0	0	1	1	1	1	×	×	×	×	*Don't use this instruction*
Test Instruction_2	0	0	1	0	0	1	×	×	×	×	*Don't use this instruction*

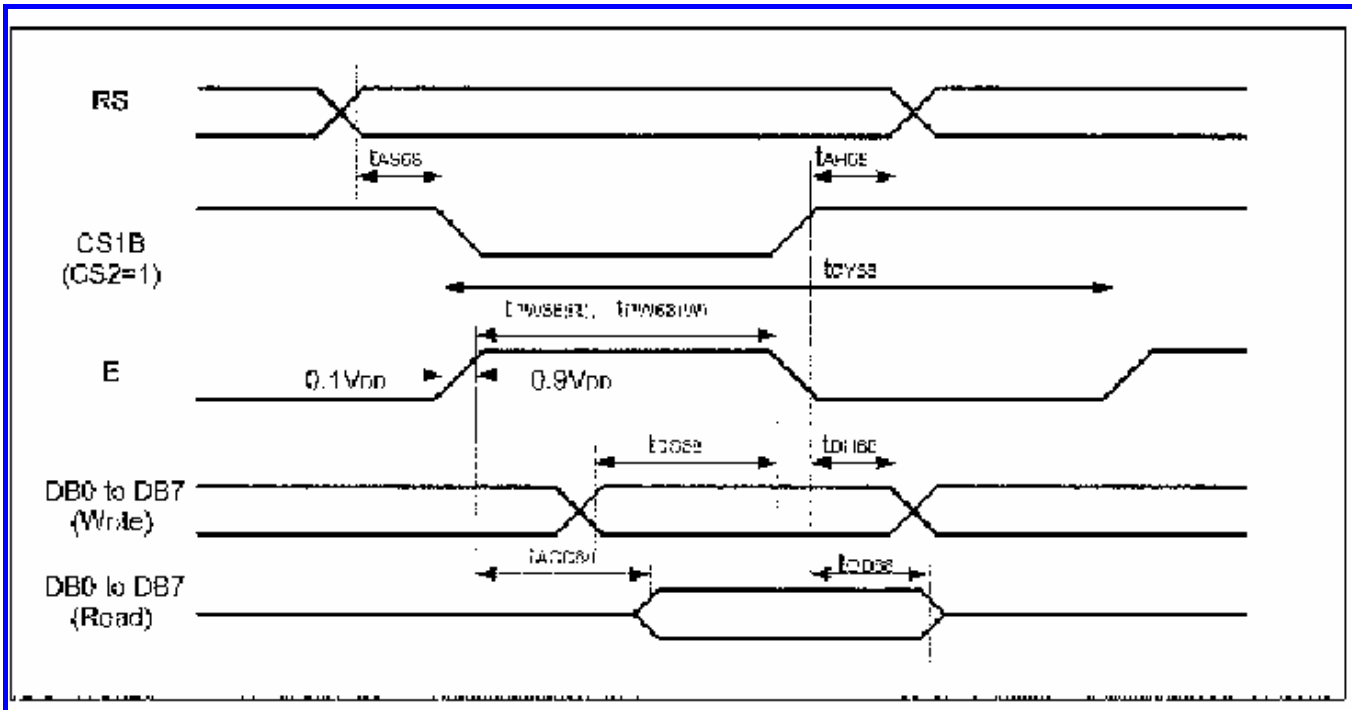
11. Timing Character

Read / Write Characteristics (8080-series MPU)



(VDD = 2.4 to 3.6V, Ta = -40 to +85°C)

Item	Signal	Symbol	Min.	Typ.	Max.	Unit	Remark
Address setup time Address hold time	RS	tASI80 tAH80	0 0	-	-	ns	
System cycle time	RS	tCYC80	300	-	-	ns	
Pulse width (WRB)	RW_WRB	tPWW80(W)	60	-	-	ns	
Pulse width (RDB)	E_RDB	tPWR80(R)	60	-	-	ns	
Data setup time Data hold time	DB7 to DB0	tDS80 tDH80	40 15	-	-	ns	
Read access time Output disable time		tACC80 tOD80	- 10	-	140 100	ns	CL = 100 pF

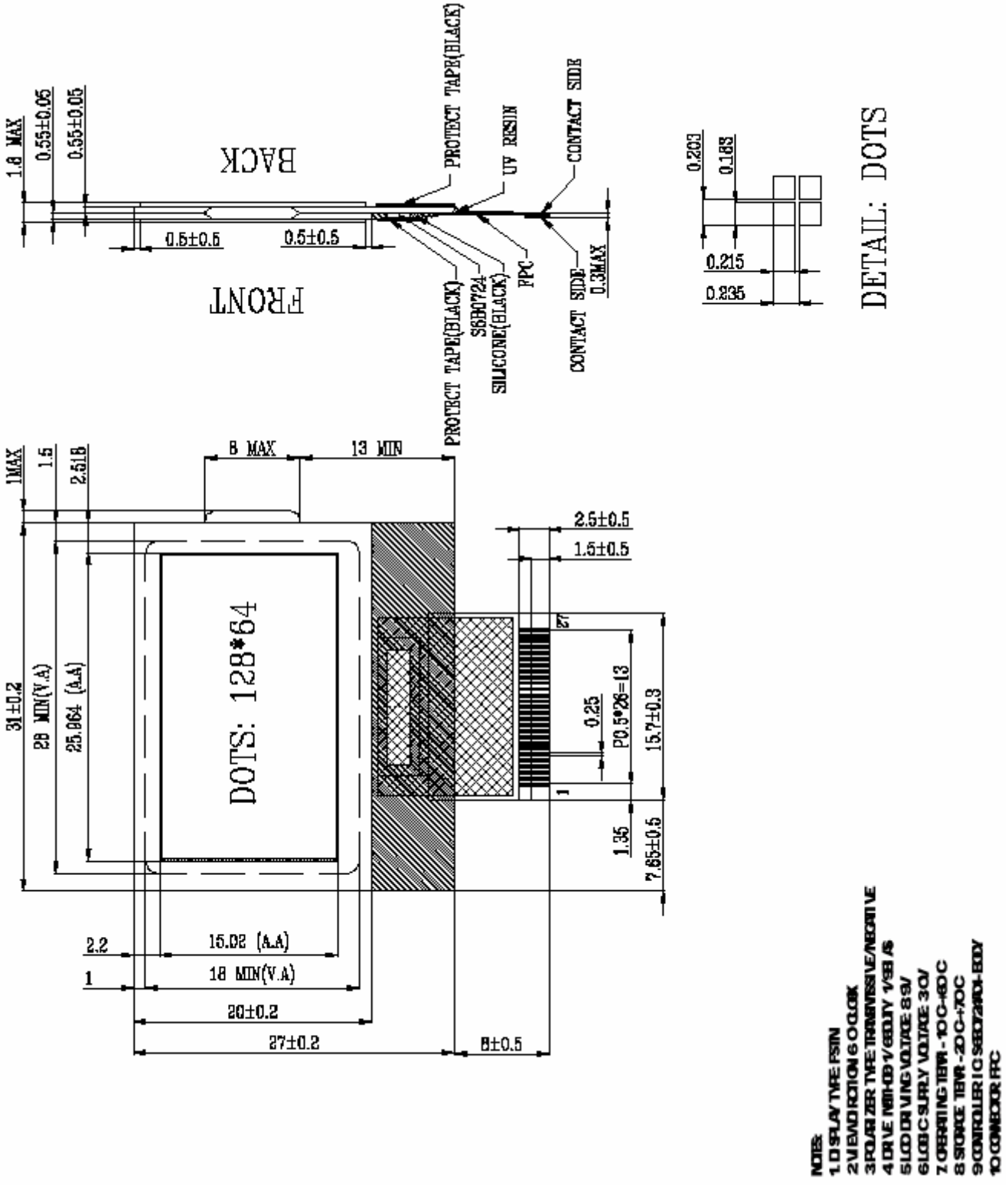


Read / Write Characteristics (6800-series Microprocessor)

(VDD = 2.4 to 3.6V, Ta = -40 to +85°C)

Item		Signal	Symbol	Min.	Typ.	Max.	Unit	Remark
Address setup time Address hold time		RS	tAS68 tAH68	0 0	-	-	ns	
System cycle time		RS	tCY68	300	-	-	ns	
Data setup time Data hold time		DB7 to DB0	tDS68 tDH68	40 15	-	-	ns	
Access time Output disable time		DB7 to DB0	tACC68 tOD68	* 10	-	140 100	ns	CL = 100 pF
Enable pulse width	Read Write	E RDB	tPWEB(R) tPWEB(W)	120 60	-	-	-	

12.Mechanical Drawing



NOTE:
1.DISPLAY TYPE: FSTN
2.VIEWING DIRECTION: 6 O'CLOCK
3.POLARIZER TYPE: TRANSMISSIVE/NEGATIVE
4.DRIVE METHOD: 1/65 DUTY, 1/9 BIAS
5.LCD DRIVING VOLTAGE: 8.3V
6.LCD CONTRAST VOLTAGE: 3.0V
7.OPERATING TEMP.: -10°C~60°C
8.STORAGE TEMP.: -20°C~70°C
9.CONTROLLER IC: SEDI2430A-B00Y
10.CONNECTOR: FPC