

Specification				
Part Number:		MCCOG128064F6W-FPTLW		
Version:				
Date:				
Revision				
No.	Date	Description	Item	Page

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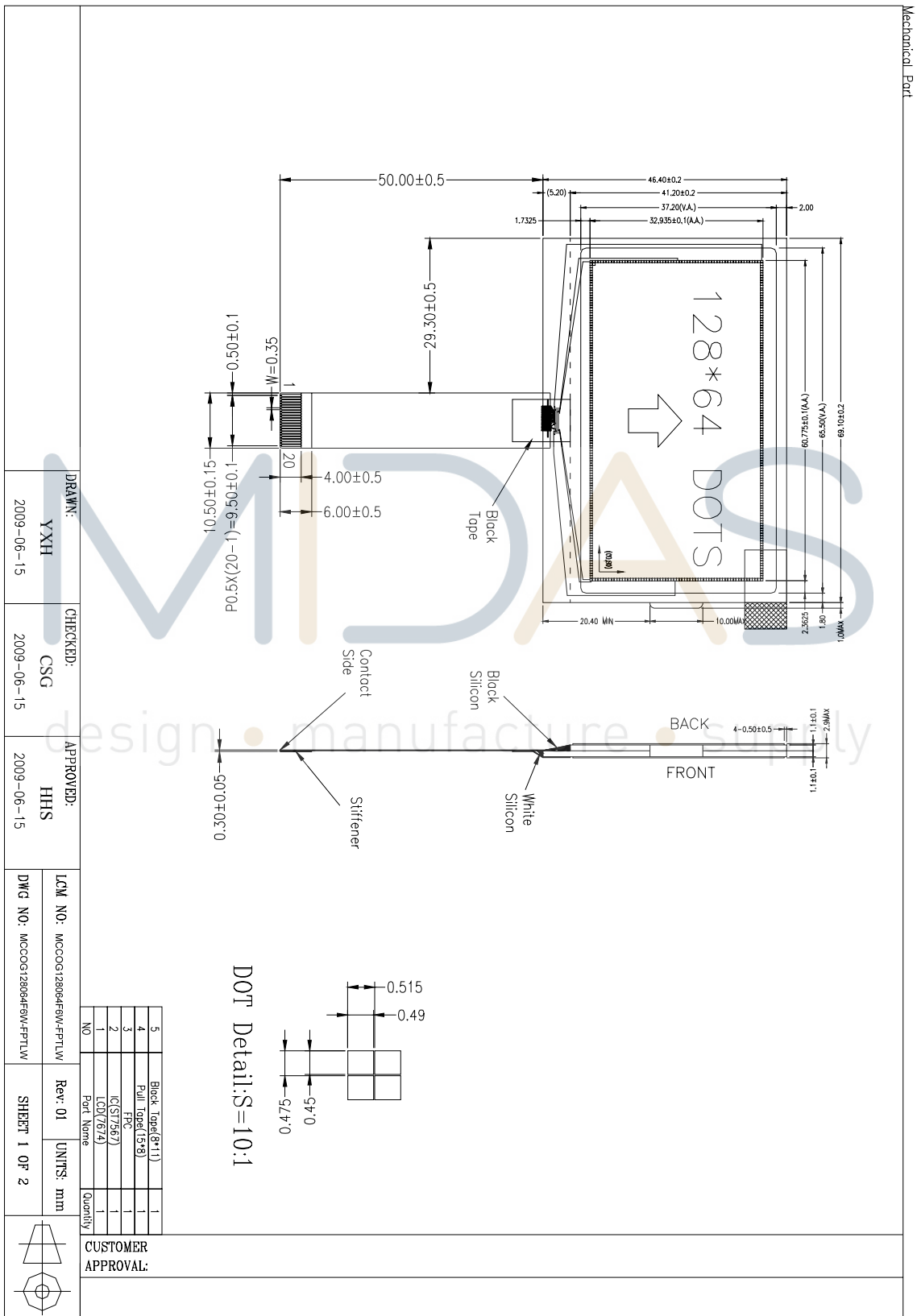
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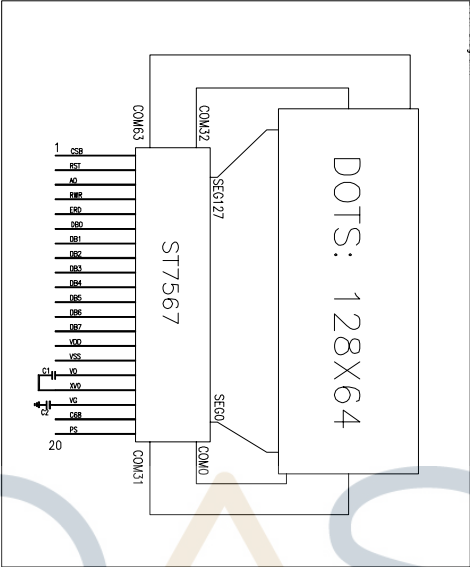
1 General Specifications

Item	☒ Standard Value	Unit
Display Pattern	☒ Graphic ☐ Character ☐ Segment ☐ _____ ☐ with ICON	
Color	☒ Mono. ☐ Grayscale ☐ _____	
Module Dimension (W x H x T)	69.10X46.40X2.9	mm
Viewing Area (W x H)	65.50X37.20	mm
Active Area (W x H)	60.775X32.935	mm
Character Size (W x H)	\	mm
Character Pitch (W x H)	\	mm
DOT Size (W x H)	0.45X0.49	mm
DOT Pitch (W x H)	0.475X0.515	mm
LCD Type	☐ TN, Positive ☐ TN, Negative ☐ HTN, Positive ☐ HTN, Negative ☐ STN, Yellow-Green ☐ STN, Gray ☐ STN, Blue ☒ FSTN, Positive ☐ FSTN, Negative ☐ GDV ☐ FM LCD ☐ Color STN	
Polarizer Type	☒ Transflective ☐ Transmissive ☐ Reflective ☐ Anti-Glare	
View Direction	☒ 6H ☐ 12H ☐ _____	
LCD Controller & Driver	ST7567 (or Equivalent)	
LCD Driving Method	1/65duty, 1/9bias	
Interface Type	Serial ☐ I ² C ☒ 4-line SPI ☐ 3-line SPI ☐ _____ Parallel ☒ 6800 ☒ 8080 ☐ 4-bit ☐ _____	
Backlight Type	☐ LED ☐ Bottom ☐ Single Side ☐ Dual Side ☐ _____ ☐ EL ☐ CCFL	
Backlight Color	☐ Yellow-Green ☐ White ☐ Amber ☐ Blue ☐ Red ☐ _____	
EL/CCFL Driver type	☐ Build-in ☐ External	
DC-DC Converter	☒ Build-in ☐ External	
Operation Temperature	T _{OPL} = -20 T _{OPH} = +70	°C
Storage Temperature	T _{STL} = -30 T _{STH} = +80	°C

2 Mechanical Diagram



Block Diagram:



Pin Description:

PIN	Symbol	Function Description
1	CSB	Chip select input pin
2	RST	Reset input pin
3	A0	Register select pin
4	RWR	Read/Write execution control pin
5	ERD	Read/Write execution control pin
6	DB0	8-bit parallel interface
7	DB1	8-bit parallel interface
8	DB2	8-bit parallel interface
9	DB3	8-bit parallel interface
10	DB4	8-bit parallel interface
11	DB5	8-bit parallel interface
12	DB6	8-bit parallel interface(SCL)
13	DB7	8-bit parallel interface(SDA)
14	VDD	Power supply
15	VSS	Ground
16	V0	Connect 1uF cap to the XVO PIN
17	XV0	Connect 1uF cap to the V0 PIN
18	VG	LCD driving voltage for segment circuits
19	CG8	Parallel interface mode(6800=1;8080=0)
20	PS	PSB selects the interface type

DISPLAY TYPE: **FSTN**, Transflective, Positive
VIEWING DIRECTION: 6:00
DRIVER IC: ST7567
LOGIC VOLTAGE: 3.2±0.1V
LCD DRIVE VOLTAGE(Vlcd): 9V
DRIVING METHOD: 1/65 DUTY, 1/9 BIAS
OPERATING TEMPRATURE: -20° ~ +70°C
STORAGE TEMPRATURE: -30° ~ +80°C
INTERFACE CONNECTOR: FPC
ALL UNMARKED TOLERANCE: ±0.3mm



A01: Modify display mode.
A00: Original Edition
Revision History:

CUSTOMER
APPROVAL:

DRAWN:

YXH

CHECKED:

WYH

APPROVED:

HHS

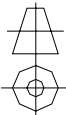
LCM NO: MCCOG128064FW-FPTLW

DWG NO: MCCOG128064FW-FPTLW

Rev: 01

UNITS: mm

SHEET 2 OF 2

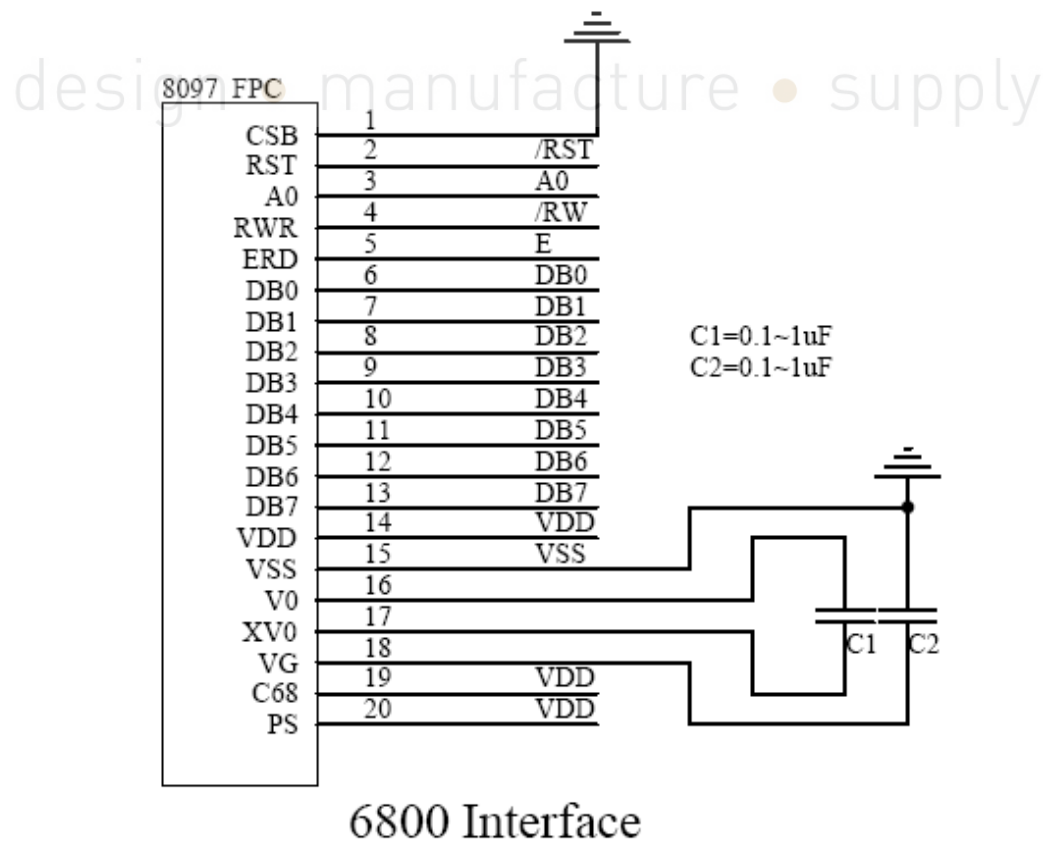
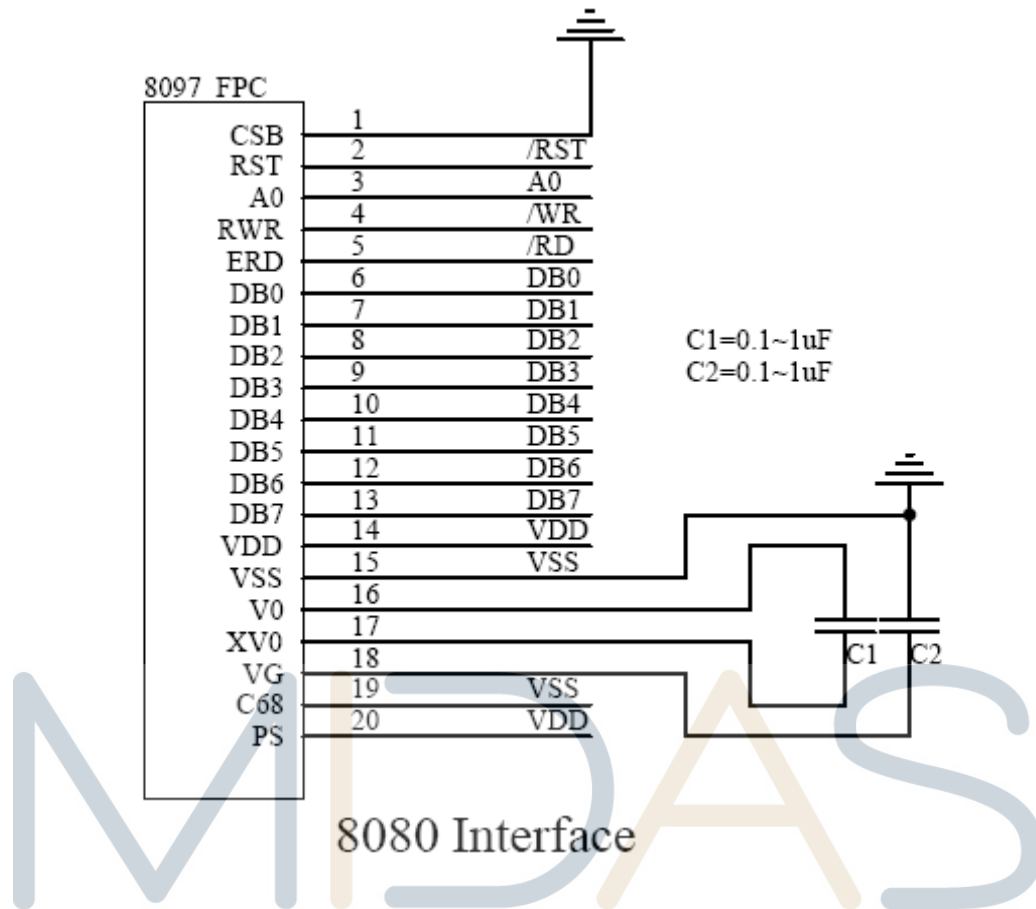


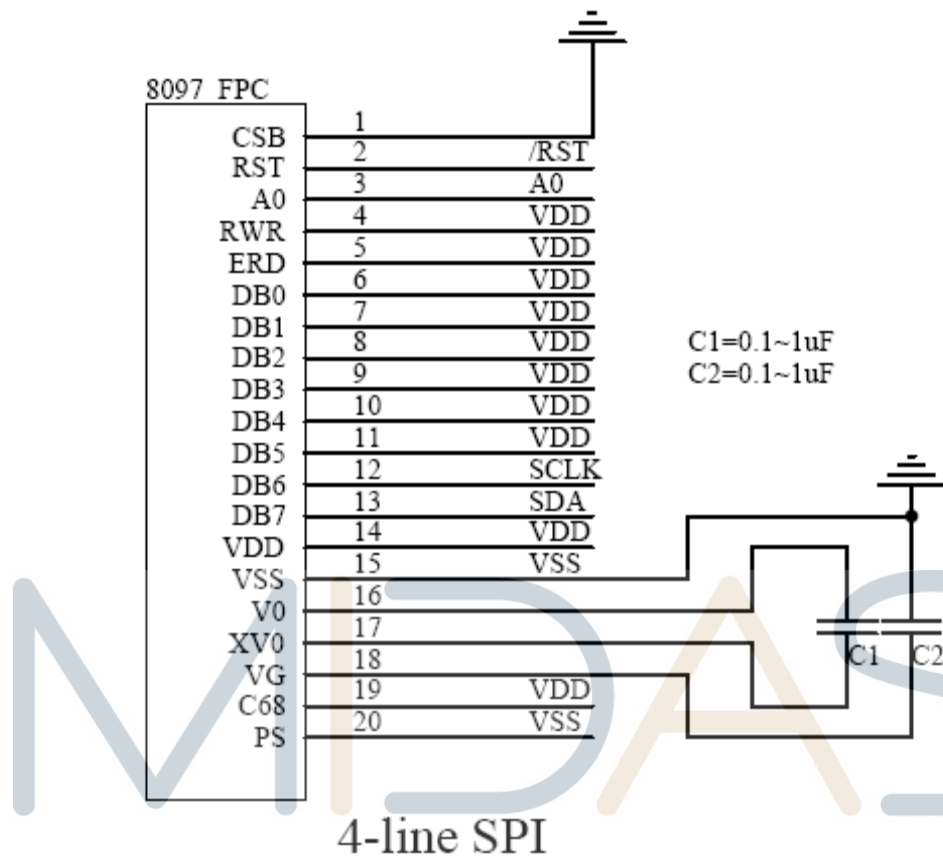
3 I/O Terminal

3.1 Pin Description

Pin NO.	Symbol	Function Description
1	CSB	Chip select pin (Active low)
2	RST	Reset pin(Active low)
3	A0	Data/command select pin.
4	RWR	Read/write control pin.
5	ERD	
6	DB0	Data bus.
7	DB1	
8	DB2	
9	DB3	
10	DB4	
11	DB5	
12	DB6	
13	DB7	
14	VDD	Power supply
15	VSS	Power ground
16	V0	LCD driver voltage for common circuit at positive frame.
17	XV0	LCD driver voltage for common circuit at positive frame.
18	VG	LCD driver voltage for segment circuit.
19	C68	Parallel interface mode(6800=1;8080=0)
20	PS	Parallel/Serial select pin.

3.2 Reference circuit





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4. Electro-optical Specifications

4.1 Absolute Maximum Ratings

Parameter	Symbol	Conditions	Unit
Digital Power Supply Voltage	VDD1	-0.3 ~ 3.6	V
Analog Power supply voltage	VDD2, VDD3	-0.3 ~ 3.6	V
LCD Power supply voltage	V0-XV0	-0.3 ~ 16	V
LCD Power supply voltage	VG	-0.3 ~ 3.6	V
LCD Power supply voltage	VM	-0.3 ~ VDD2	V
Input Voltage	Vi	-0.3 ~ VDD1+0.3	V

Note: Operating Temperature and Storage Temperature can be found in 1.General Specifications.

4.2 Optical Characteristics⁽¹⁾

No	Item	Symbol	Condition	Min.	Typ.	Max.	Unit
1	Contrast Ratio	Cr	Ta=23±3°C V _{LCD} = Typ. ⁽²⁾	-	4.69	-	-
2	Response time	T _{ON}	Ta=23±3°C	-	282	-	ms
3	Response time	T _{OFF}	Ta=23±3°C	-	170	-	ms
4	Viewing Angle	3H	Cr = 2 Ta=23±3°C	26		-	Deg.
5		9H		30		-	Deg.
6		6H		27		-	Deg.
7		12H		23		-	Deg.

Note:

(1) See Appendix Definition of Optical Characteristics for detail.

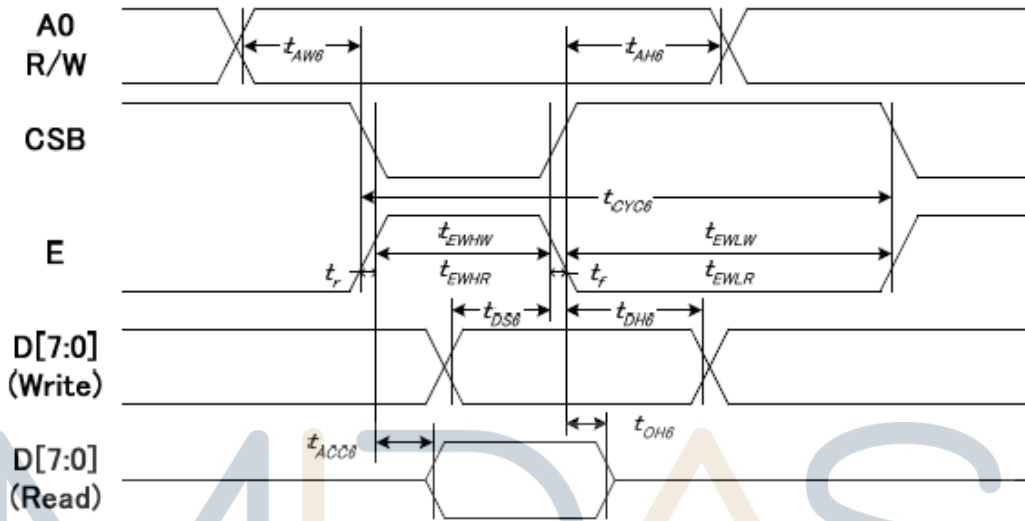
(2) V_{LCD} can be found in 4.3Electrical Characteristics *Supply Voltage for LCD Driver*

4.3 Electrical Characteristics

No	Item	Symbol	Condition	Min.	Typ.	Max.	Unit
1	Supply Voltage for Logic	V _{DD} -V _{SS}	-	3.1	3.2	3.3	V
2	Supply Voltage for LCD Driver	V _{LCD}	Ta=23±3°C	-	9.0	-	V
3	Supply Current for Logic	I _{DD}	-	-	-	1.0	mA
4	Frame Frequency	f _M	Ta=23±3°C	-	75	-	Hz
5	Input High Voltage	V _{IH}	-	0.8VDD	-	VDD	V
6	Input Low Voltage	V _{IL}	-	VSS	-	0.2VDD	V

4.4 Timing Characteristics

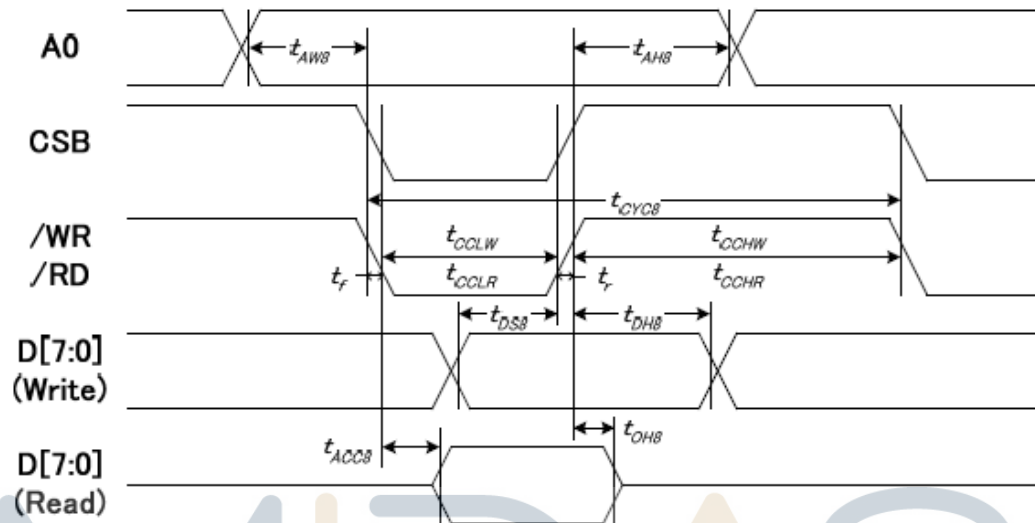
System Bus Timing for 6800 Series MPU



(VDD1 = 3.3V, Ta = 25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	t_{AW6}		0	—	ns
Address hold time		t_{AH6}		10	—	
System cycle time	E	t_{CYC6}		240	—	
Enable L pulse width (WRITE)		t_{EHLW}		80	—	
Enable H pulse width (WRITE)		t_{EHLR}		80	—	
Enable L pulse width (READ)		t_{EHWL}		80	—	
Enable H pulse width (READ)		t_{EHWL}		140	—	
Write data setup time	D[7:0]	t_{DS6}		40	—	
Write data hold time		t_{DH6}		10	—	
Read data access time		t_{ACC6}	CL = 16 pF	—	70	
Read data output disable time		t_{OH6}	CL = 16 pF	5	50	

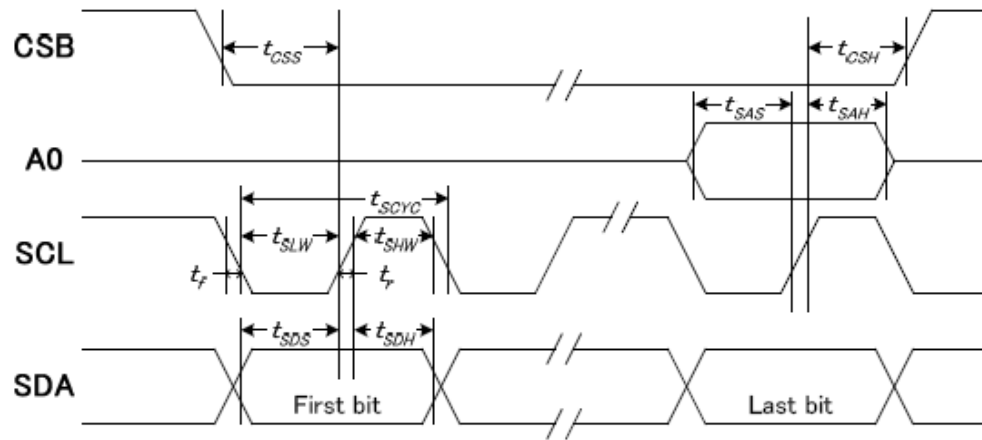
System Bus Timing for 8080 Series MPU



(VDD1 = 3.3V, Ta = 25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	t_{AW8}		0	—	ns
Address hold time		t_{AH8}		10	—	
System cycle time	/WR	t_{CYC8}		240	—	
/WR L pulse width (WRITE)		t_{CCLW}		80	—	
/WR H pulse width (WRITE)		t_{CCHW}		80	—	
/RD L pulse width (READ)		t_{CCLR}		140	—	
/RD H pulse width (READ)	RD	t_{CCHR}		80	—	
WRITE Data setup time		t_{DS8}		40	—	
WRITE Data hold time		t_{DH8}		20	—	
READ access time		t_{ACC8}	CL = 16 pF	—	70	
READ Output disable time		t_{OH8}	CL = 16 pF	5	50	

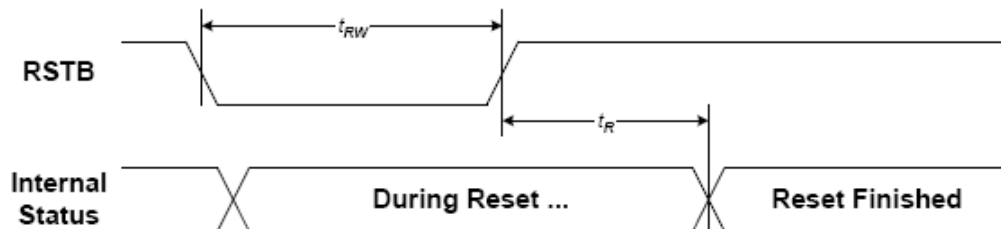
System Bus Timing for 4-Line Serial Interface



(VDD1 = 3.3V, Ta = 25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock period		tSCYC		50	—	ns
SCLK "H" pulse width	SCLK	tSHW		25	—	
SCLK "L" pulse width		tSLW		25	—	
Address setup time	A0	tSAS		20	—	
Address hold time		tSAH		10	—	
Data setup time	SDA	tSDS		20	—	
Data hold time		tSDH		10	—	
CSB-SCLK time	CSB	tCSS		20	—	
CSB-SCLK time		tCSH		40	—	

Hardware Reset Timing



(VDD1 = 3.3V, Ta = 25°C)

Item	Symbol	Condition	Min.	Max.	Unit
Reset time	tR		—	1.0	us
Reset "L" pulse width	tRW		1.0	—	

5 Programming

5.1 Instruction Table⁽¹⁾

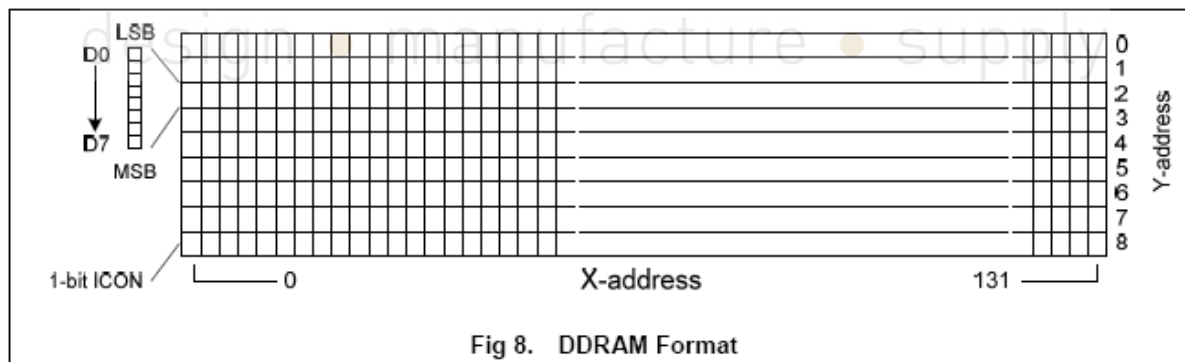
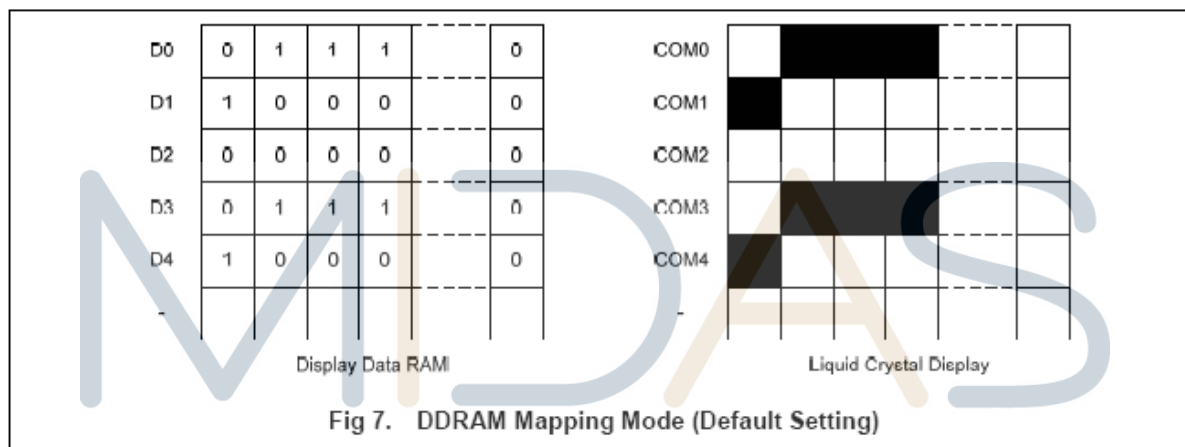
INSTRUCTION	A0	R/W (RWR)	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
(1) Display ON/OFF	0	0	1	0	1	0	1	1	1	D	D=1, display ON D=0, display OFF
(2) Set Start Line	0	0	0	1	S5	S4	S3	S2	S1	S0	Set display start line
(3) Set Page Address	0	0	1	0	1	1	Y3	Y2	Y1	Y0	Set page address
(4) Set Column Address	0	0	0	0	0	1	X7	X6	X5	X4	Set column address (MSB)
	0	0	0	0	0	0	X3	X2	X1	X0	Set column address (LSB)
(5) Read Status	0	1	0	MX	D	RST	0	0	0	0	Read IC Status
(6) Write Data	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write display data to RAM
(7) Read Data	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read display data from RAM
(8) SEG Direction	0	0	1	0	1	0	0	0	0	MX	Set scan direction of SEG MX=1, reverse direction MX=0, normal direction
(9) Inverse Display	0	0	1	0	1	0	0	1	1	INV	INV =1, inverse display INV =0, normal display
(10) All Pixel ON	0	0	1	0	1	0	0	1	0	AP	AP=1, set all pixel ON AP=0, normal display
(11) Bias Select	0	0	1	0	1	0	0	0	1	BS	Select bias setting 0=1/9; 1=1/7 (at 1/65 duty)
(12) Read-modify-Write	0	0	1	1	1	0	0	0	0	0	Column address increment: Read:+0, Write:+1
(13) END	0	0	1	1	1	0	1	1	1	0	Exit Read-modify-Write mode
(14) RESET	0	0	1	1	1	0	0	0	1	0	Software reset
(15) COM Direction	0	0	1	1	0	0	MY	-	-	-	Set output direction of COM MY=1, reverse direction MY=0, normal direction
(16) Power Control	0	0	0	0	1	0	1	VB	VR	VF	Control built-in power circuit ON/OFF
(17) Regulation Ratio	0	0	0	0	1	0	0	RR2	RR1	RR0	Select regulation resistor ratio
(18) Set EV	0	0	1	0	0	0	0	0	0	1	Double command!! Set
	0	0	0	0	EV5	EV4	EV3	EV2	EV1	EV0	electronic volume (EV) level
(19) Set Booster	0	0	1	1	1	1	1	0	0	0	Double command!!
	0	0	0	0	0	0	0	0	0	BL	Set booster level: BL=0: 4X BL=1: 5X
(20) Power Save	0	0	Compound Command								Display OFF + All Pixel ON
(21) NOP	0	0	1	1	1	0	0	0	1	1	No operation
(22) Test	0	0	1	1	1	1	1	1	1	-	Do NOT use. Reserved for testing.

(1)See Datasheet of LCD Driver for detail.

5.2 Display Data RAM⁽¹⁾

Display Data RAM (DDRAM)

ST7567 is built-in a RAM with 65X132 bit capacity which stores the display data. The display data RAM (DDRAM) store the dot data of the LCD. It is an addressable array with 132 columns by 65 rows (8-page with 8-bit and 1-page with 1-bit). The X-address is directly related to the column output number. Each pixel can be selected when the page and column addresses are specified (please refer to Fig 7 for detailed illustration). The rows are divided into: 8 pages (Page-0 ~ Page-7) each with 8 lines (for COM0~63) and Page-8 with only 1 line (COMS, for icon). The display data (D7~D0) corresponds to the LCD common-line direction and D0 is on top. All pages can be accessed through D[7:0] directly except icon page. Icon RAM uses only 1-bit of data bus (D0). Refer to Fig 8 for detailed illustration. The microprocessor can write to and read from (only Parallel interfaces) DDRAM by the I/O buffer. Since the LCD controller operates independently, data can be written into DDRAM at the same time as data is being displayed without causing the LCD flicker or data-conflict.

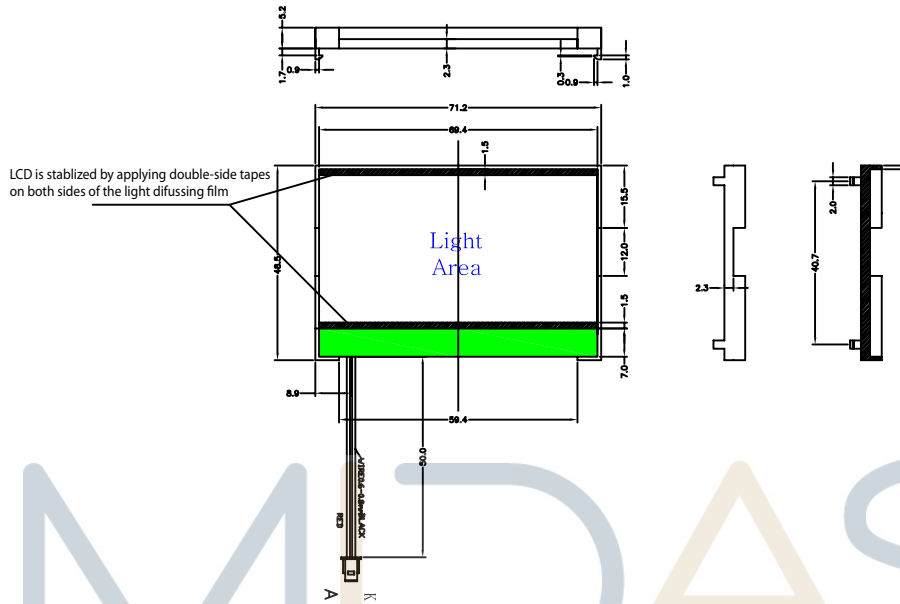
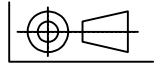


(1)See Datasheet of LCD Driver for detail.

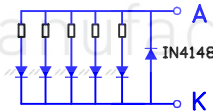
1. MECHANICAL OUTLINE

(Unspecified Tolerances is ± 0.3)

COLOR : WHITE



2. CIRCUIT DIAGRAM (LED 1X5=5 SMD dies)



3. STORAGE & SOLDERING CONDITIONS:

- Store with care. Storing the units in bad condition will cause the reflector sheet and decrease it's adhesive power. Storage the products under the condition: temperature ($25^{\circ}\text{C} \pm 10^{\circ}\text{C}$) and humidity ($65\%\text{RH} \pm 20\%\text{RH}$) our recommendation.
- The Soldering Temperature is $260 \pm 5^{\circ}\text{C}$ and Soldering Time should be less than 3 sec, and soldering iron power should be less than 30W.
- The soldering point should be farther than 1.6mm (1/10") from body .
- The product is sensitive to static electricity, So it's necessary to take proper steps when storing and soldering.

4. ABSOLUTE MAXIMUM RATINGS (SINGLE LED)

(Ta=25°C. Unless specified, The Ambient temperature Ta=25°C)

Item	Symbol	Conditions	Rating	
* Absolute maximum forward current	Ifm			
* Peak forward current	Ifp	1 msec ,1/10 1 msec Plus 10% Duty Cycle		
Reverse Voltage	Vr			
* Power dissipation	Pd		50	mW
Operating Temperature Range	Topr		-30~+70°C	°C
Storage Temperature Range	Tstg		-40~+80°C	°C

* For operation above 25°C, The Ifm Ifp & Pd must be derated, the Current derating is -0.36 mA/°C for DC drive and -0.86 mA/°C for Pulse drive, the Power dissipation is -0.75 mW/°C. The product working current must not more than the 60 % of the Ifm or Ifp according to the working temperature.

5. ELECTRICAL-OPTICAL CHARACTERISTICS

(Ta=25°C. Unless specified, The Ambient temperature Ta=25°C)

Item	Symbol	min.	typ.	max.	Unit	Condition
Forward Voltage	Vf		3.3		V	If= 100 mA
Reverse Current	Ir			10	Am	Vr= 0.8 V
Peak wave length	λ_p				nm	If= 100 mA
Spectral Line Half width	$\Delta\lambda$				nm	If= 100 mA
* Luminance	Lv				cd/m ²	If= 100 mA

* The luminance is the average value of 5 points, and, The Lvmax./Lvmin. is 1.3 max. The measurement instrument is ST-86LA luminance Colorimeter. The caperture is ϕ 5 mm.

