DISPLAY Elektronik GmbH

DATA SHEET

LCD MODULE

DEM 128160A CCH-PW-N

1,9” C-STN

Product specification ***Version: 1***

26-Jul-06

GENERAL SPECIFICATION

MODULE NO. :

DEM 128160A CCH-PW-N

CUSTOMER

VERSION NO.	CHANGE DESCRIPTION	DATE
0	ORIGINAL VERSION	02.02.2005
1	CHANGED DIMENSIONS	26.07.2006

PREPARED BY: ZXD DATE: 02.06.2006

APPROVED BY: MH DATE: 26.07.2006

CONTENTS

1. FUNCTIONS &FEATURES 2

2. MODULE ARTWORK 2

3. EXTERNAL DIMENSIONS 2

4. BLOCK DIAGRAM 3

5. PIN ASSIGNMENT 4

6. BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATIONS 5

7. ABSOLUTE MAXIMUM RATINGS 5

8. DC CHARACTERISTICS 6

9. AC CHARACTERISTICS 7

10. LCD MODULES HANDLING PRECAUTIONS 10

11. OTHERS 10

1. FUNCTIONS &FEATURES

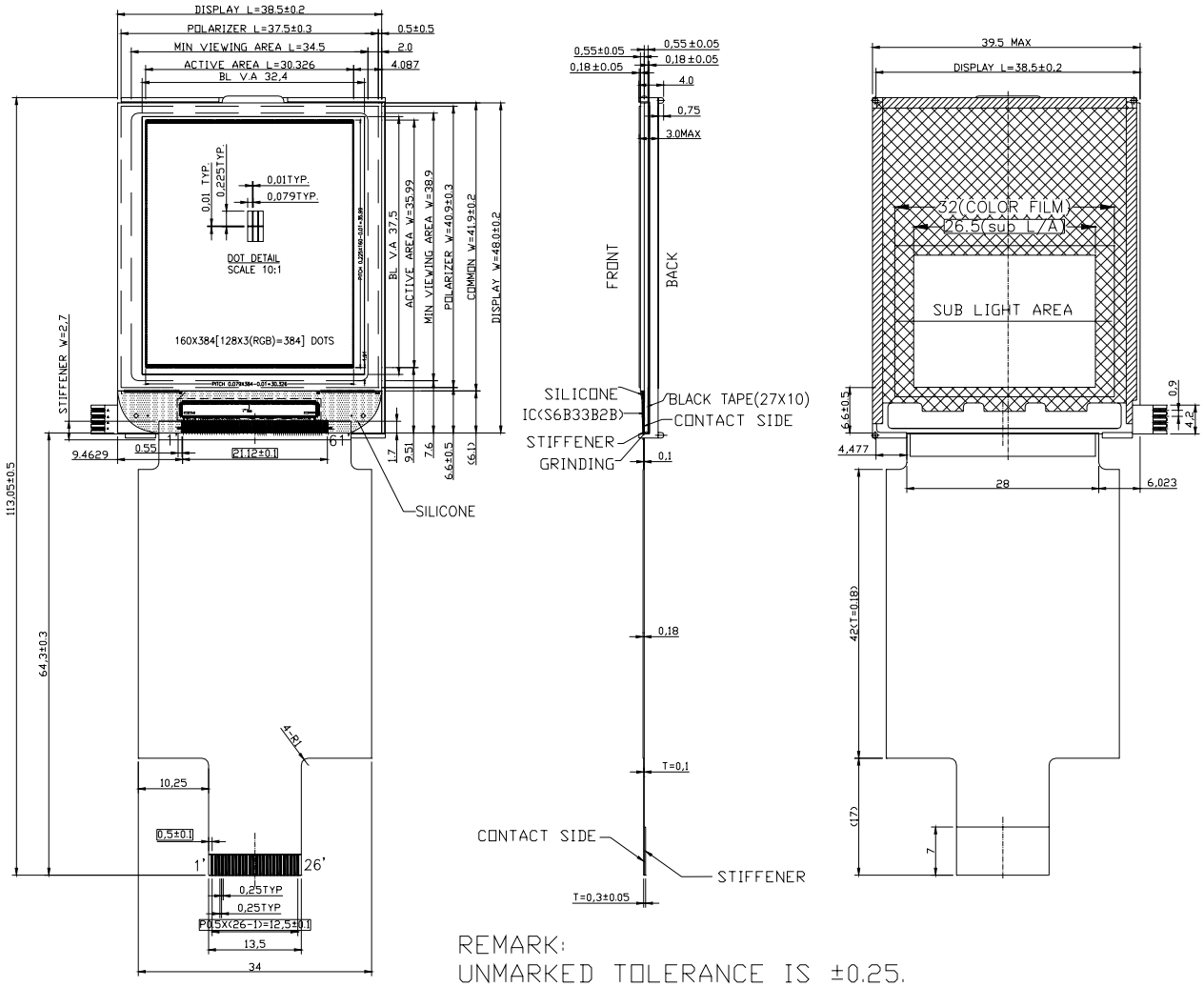
MODULE MODEL	LCD TYPE	POLARIZER MODE	BACKLIGHT
DEM 128160A CCH-PW-N	COLOR-STN	Transmissive Negative Mode	LED, WHITE

- isplay Size : 1,9” – COLOR-STN
- Display Colour : 65K colour
- IC Type : S6B33B2B (Samsung)
- Viewing Direction : 6 o’clock
- Driving Scheme : 1/162 Duty, 1/7Bias
- Power Supply voltage : 3.0 Volt (typ.)
- Lcd Voltage : 15.0 Volt (typ.)
- Backlight : White LED-Lightguide (3LEDs)
- Operating Temperature : -20ºC ~ 70ºC
- Storage Temperature : -30ºC ~ 80ºC

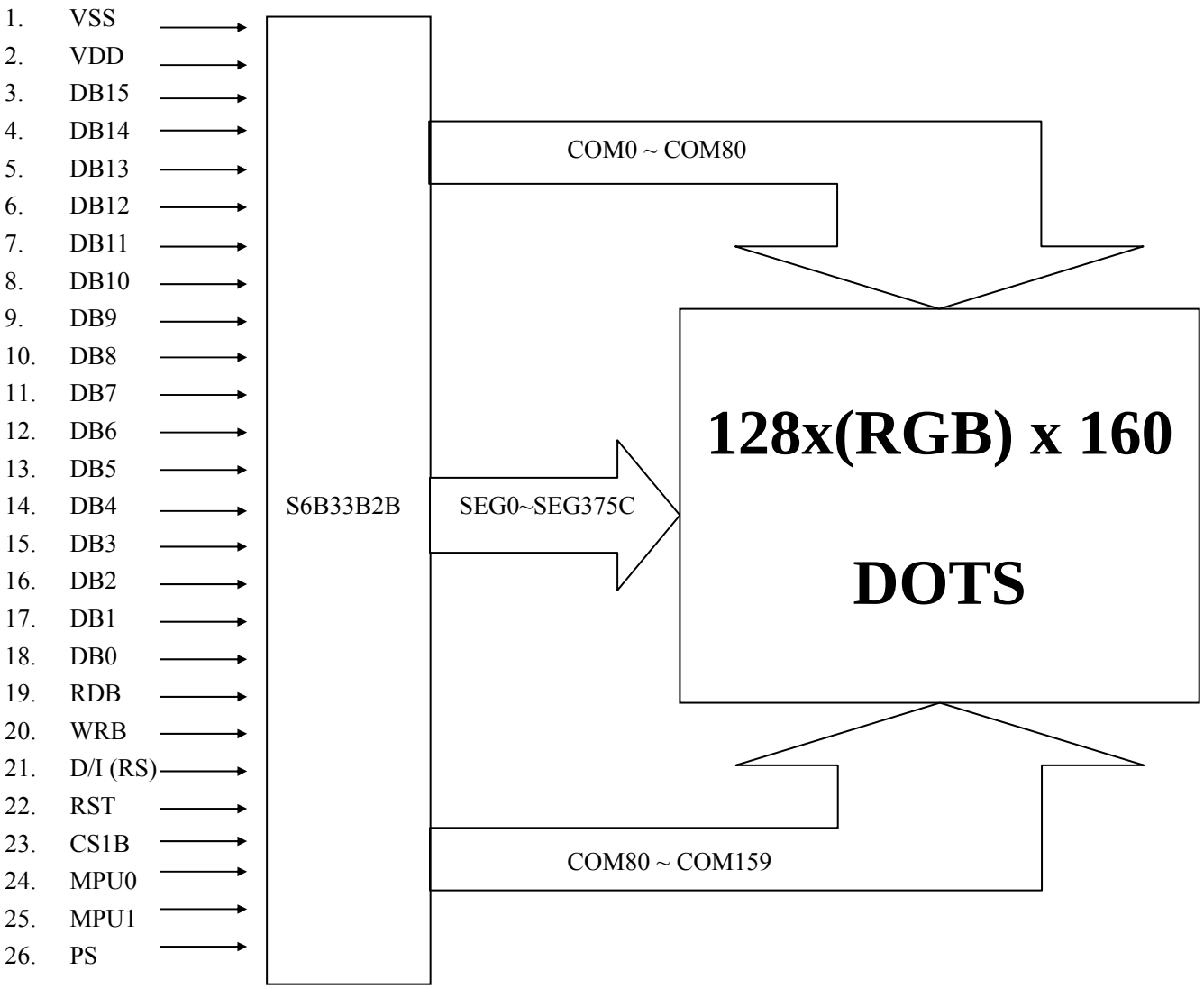
2. MODULE ARTWORK

- Module size : 39.5 × 48.0 × 3.0 mm (max.)
- Viewing Area : 34.5 × 38.9 mm
- Dot number : 128 × 3(RGB) × 160

3. EXTERNAL DIMENSIONS



4. BLOCK DIAGRAM



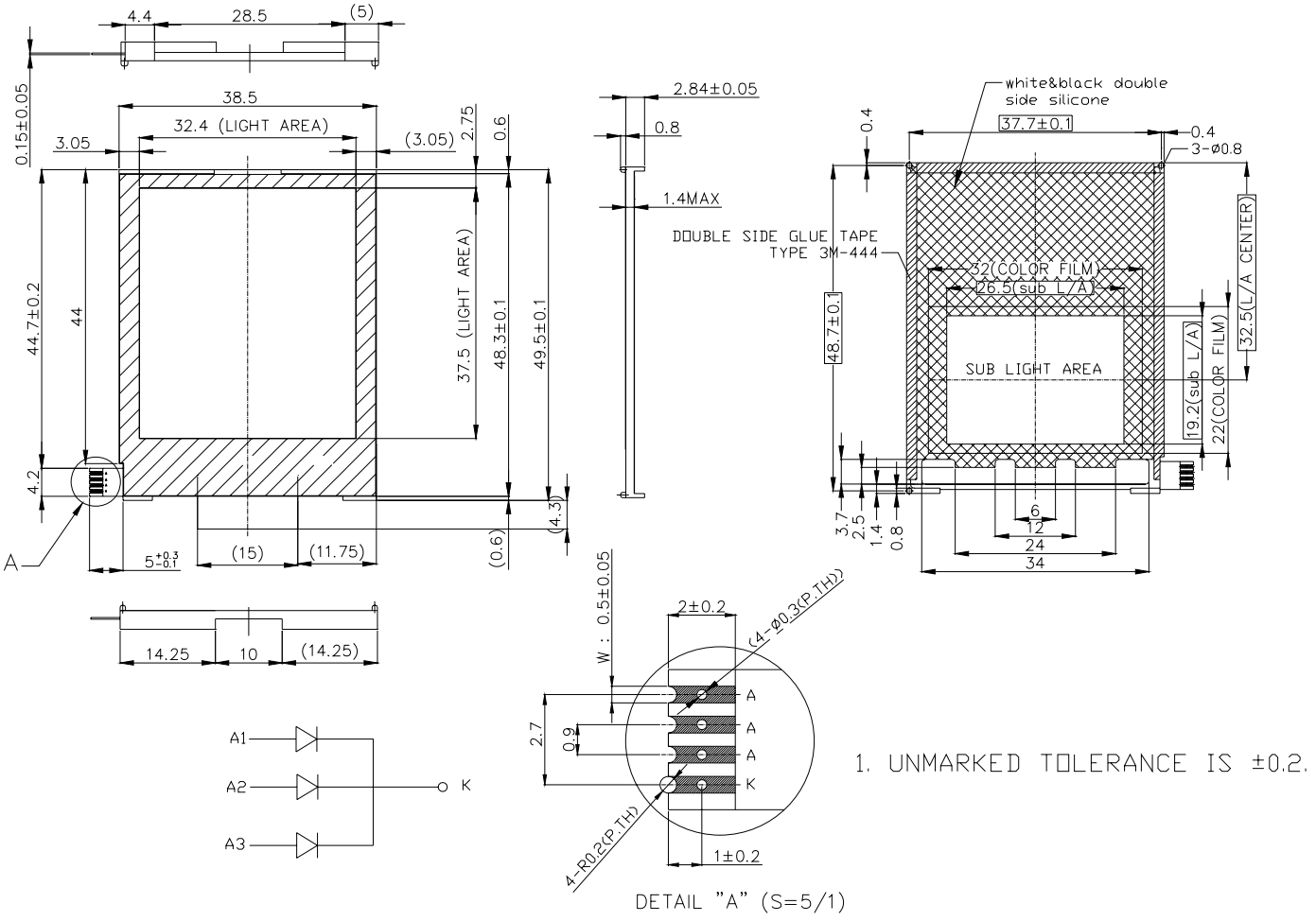
5. PIN ASSIGNMENT

<table>
<tr><th>Pin NO.</th><th>Symbol</th><th>Function</th></tr>
<tr><td>1</td><td>Vss</td><td>Ground</td></tr>
<tr><td>2</td><td>Vdd</td><td>Power supply</td></tr>
<tr><td>3~18</td><td>DB[15:8]
DB[7]/SDI
DB[6]/SCL
DB[5:0]</td><td>-DB[15:0]: 16-bit bi-directional data bus.
-SDI: Serial data input pin. The data is latched at the rising edge of SCL.
-SCL: Serial clock input pin.</td></tr>
<tr><td>19</td><td>RDB
(E)</td><td>Read / Write execution control pin
<table>
<tr><th>MPU[1]</th><th>MPU Type</th><th>RDB</th><th>Description</th></tr>
<tr><td>H</td><td>6800-series</td><td>E</td><td>Read / Write control input pin
− R/W = “H”: When E is “H”, DB0 to DB15 are in an output status.
− R/W = “L”: The data on DB0 to DB15 are latched at the falling edge of the E signal.</td></tr>
<tr><td>L</td><td>8080-series</td><td>RDB</td><td>Read enable clock input pin When RDB is “L”, DB0 to DB15 are in an output status.</td></tr>
</table></td></tr>
<tr><td>20</td><td>WRB
(R/W)</td><td>Read / Write execution control pin
<table>
<tr><th>PS</th><th>MPU</th><th>MPU Type</th><th>WRB</th><th>Description</th></tr>
<tr><td>H</td><td>H</td><td>6800-series</td><td>R/W</td><td>Read/Write control input pin
− R/W = “H”: read
− R/W = “L”: write</td></tr>
<tr><td>H</td><td>L</td><td>8080-series</td><td>WRB</td><td>Write enable clock input pin The data on DB0 to DB15 are latched at the rising edge of the WRB signal.</td></tr>
</table></td></tr>
<tr><td>21</td><td>D/I
(RS)</td><td>Data / Instruction select input pin
− D/I = “H”: DB0 to DB15 are display data
− D/I = “L”: DB0 to DB7 are instruction data</td></tr>
<tr><td>22</td><td>RSTB</td><td>Reset input pin. When RSTB is “L”, initialization is executed.</td></tr>
<tr><td>23</td><td>CS1B</td><td>Chip select input pins Data / instruction I/O is enabled only when CS1B is “L”. When chip select is non-active, DB0 to DB15 may be high impedance.</td></tr>
<tr><td rowspan="8">24~26</td><td>PS
MPU[1:0]</td><td>MPU interface select pin</td></tr>
<tr><td rowspan="7"></td><td>
<table>
<tr><th>PS</th><th>MPU[1]</th><th>MPU[0]</th><th>Description</th></tr>
<tr><td>H</td><td>L</td><td>L</td><td>8080-series 8bit interface</td></tr>
<tr><td>H</td><td>L</td><td>H</td><td>8080-series 16bit interface</td></tr>
<tr><td>H</td><td>H</td><td>L</td><td>6800-series 8bit interface</td></tr>
<tr><td>H</td><td>H</td><td>H</td><td>6800-series 16bit interface</td></tr>
<tr><td>L</td><td>L</td><td>X</td><td>3 pin SPI(Write only)</td></tr>
<tr><td>L</td><td>H</td><td>X</td><td>4 pin SPI(Write only)</td></tr>
</table></td></tr>
</table>

6. BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATIONS

	SYMBOL		MIN.	TYP.	MAX.	UNIT	CONDITIONS
Forward Voltage	Vf			3.3		V	If= 45 mA
Forward Current	If			45	60	mA	
Power Dissipation	Pd			0.15		W	If= 45 mA
Reverse Voltage	V_R			5.0		V	
Reverse Current	I_R			0.3		mA	V_R = 5 V
Luminous Intensity	I_V	MAIN		2000		cd/m^2	If= 45 mA
		SUB		300			
Luminous Uniformity			80			%	If= 45 mA
Color Chromaticity	X		0.283		0.330		If=15mA Ta=25℃ Each chip
	Y		0.276		0.339		

	SYMBOL	RATINGS
Operating Temperature	Topr	−30℃ to +70℃
	Tsty	−40℃ to +80℃



7. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Rating	Unit
Power supply for logic	VDD-VSS	-0.3 to +3.3	V
Power supply for LCD driver	|VCC – VEE|	22	V
Input Voltage	Vin	- 0.3 to VDD +0.3	V
Operating Temperature range	TOPR	-20 to +70	°C
Storage Temperature range	TSTR	-30 to +80	°C

8. DC CHARACTERISTICS

8.1 DC CHARACTERISTICS

(Vss = 0V, VDD3 = 1.8 to 3.3V, Ta = -30 to 70 °C)

Item		Symbol	Condition	Min	Typ	Max	Unit	Remarks
Operating voltage		VDD3		1.8		3.3	V	VDD3
Operating voltage		VIN1		2.4	-	3.6	V	VIN1,VIN1A
Operating voltage		VIN2		2.4	-	7.2	V	
Operating voltage		VIN45		2.4	-	7.2	V	VOUT45
Operating voltage		DC2IN	1/4 Bias	1.5	-	3.0	V	DC2OUT
			1/5 Bias	1.33	-	2.67		
			1/6 Bias	1.67	-	3.33		
			1/7 Bias	1.5	-	3.0		
Operating voltage		2Vr	2Vr = |(+VR)- (-VR)|	4.0	-	20	V	+VR, -VR
Driving voltage input range		VM	External power supply mode	1.0		2.0	V	VMOUT
		VCC		5.0		12.0	V	VRP
		VEE		-3.0		-8.0	V	VRN
Input voltage	High	VIH		0.8VDD	-	VDD	V	
	Low	VIL		VSS	-	0.2VDD		
Output voltage	High	VOH	IOH = 0.5mA	0.8VDD	-	VDD	V	
	Low	VOL	IOL = 0.5mA	VSS	-	0.2VDD		
Oscillator Frequency Tolerance	Normal or Partial 0	FOSC1	R1=90kOhm (fFR=100Hz target), DSG=1, 162 display lines	155.5	172.8	190.1	kHz	OSC1 - OSC2
	Partial 1	FOSC2	R1=300kOhm (fFR=77Hz target), 66 display lines	44.35	49.28	54.21	kHz	OSC3 - OSC4
Oscillator Frequency Range	Normal or Partial 0	FOSC1	(*1)	61.44		259.2	kHz	OSC1 - OSC2
	Partial 1	FOSC2	(*2)	29.44		88.32	kHz	OSC3 - OSC4
Driving voltage input range		V1 VM		2.0 1.0	-	4.0 2.0	V	

(*1) Minimum oscillator frequency range is defined at fFR=60Hz and display line number=96
Maximum oscillator frequency range is defined at fFR=150Hz and display line number=162

(*2) Minimum oscillator frequency range is defined at fFR=40Hz and display line number=69
Maximum oscillator frequency range is defined at fFR=120Hz and display line number=69

9. AC CHARACTERISTICS

9-1. Read / Write Characteristics (8080-series MPU)

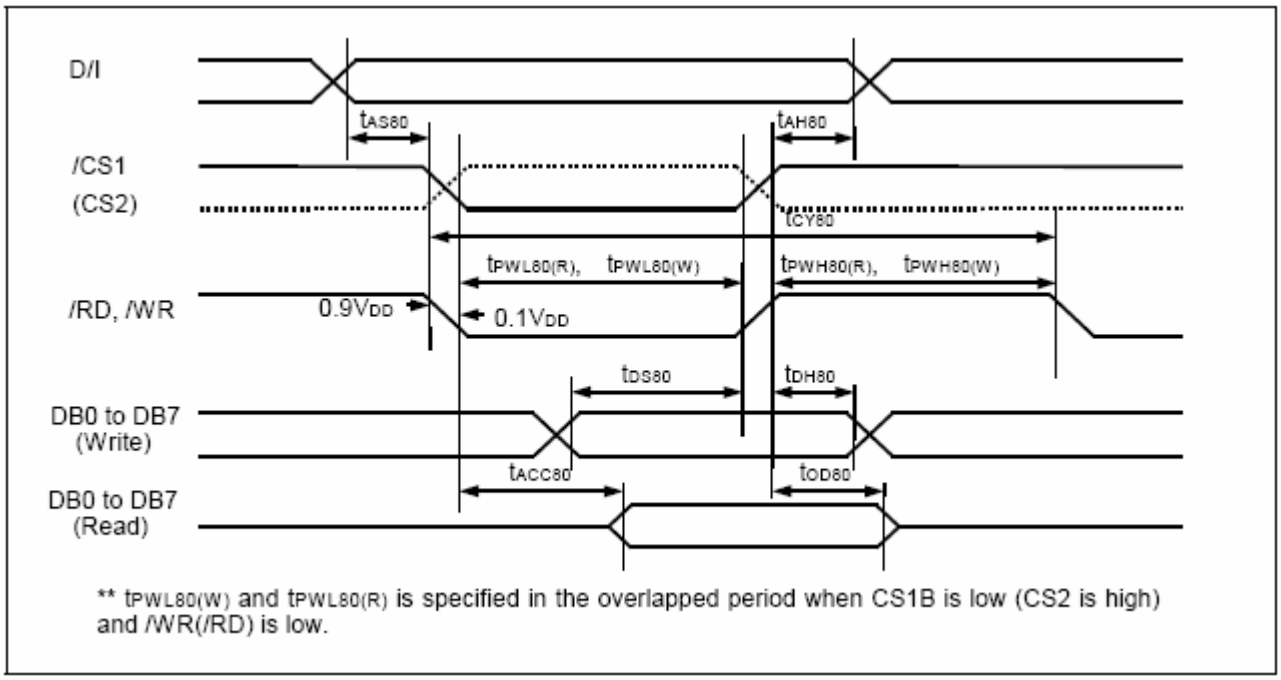


Figure. Parallel Interface (8080-series MPU) Timing Diagram

(V_{DD3} = 1.8 to 3.3V, Ta = -30 to +70°C)

Item	Signal	Symbol	Condition	Min.		Max. (3.3V/1.8V)	Unit
				3.3V	1.8V		
Address setup time Address hold time	D/I	t_{AS80} t_{AH80}		0 0	0 0	- -	ns
System cycle time		t_{CY80}		150	360	-	ns
Pulse width low for write Pulse width High for write	WRB (WRB)	t_{PWLW} t_{PWHW}		50 30	100 75	- -	ns
Pulse width low for read Pulse width high for read	RDB (RDB)	t_{PWLR} t_{PWHR}		5 28	10 54	- -	ns
Data setup time Data hold time	DB0 to DB15	t_{DS80} t_{DH80}		-		60 / 120	
Read access time Output disable time		t_{ACC80} t_{OD80}	CL = 100 pF	-		50 / 100	

Table. AC Characteristics (8080-series Parallel Mode)

NOTE:*1. The input signal rise time and fall time (t_r, t_f) is specified at 10 ns or less.

($t_r + t_f$) < (t_{CY80} - t_{PWLW} - t_{PWHW}) for write, ($t_r + t_f$) < (t_{CY80} - t_{PWLR} - t_{PWHR}) for read

9-2. Read / Write Characteristics (6800-series Microprocessor)

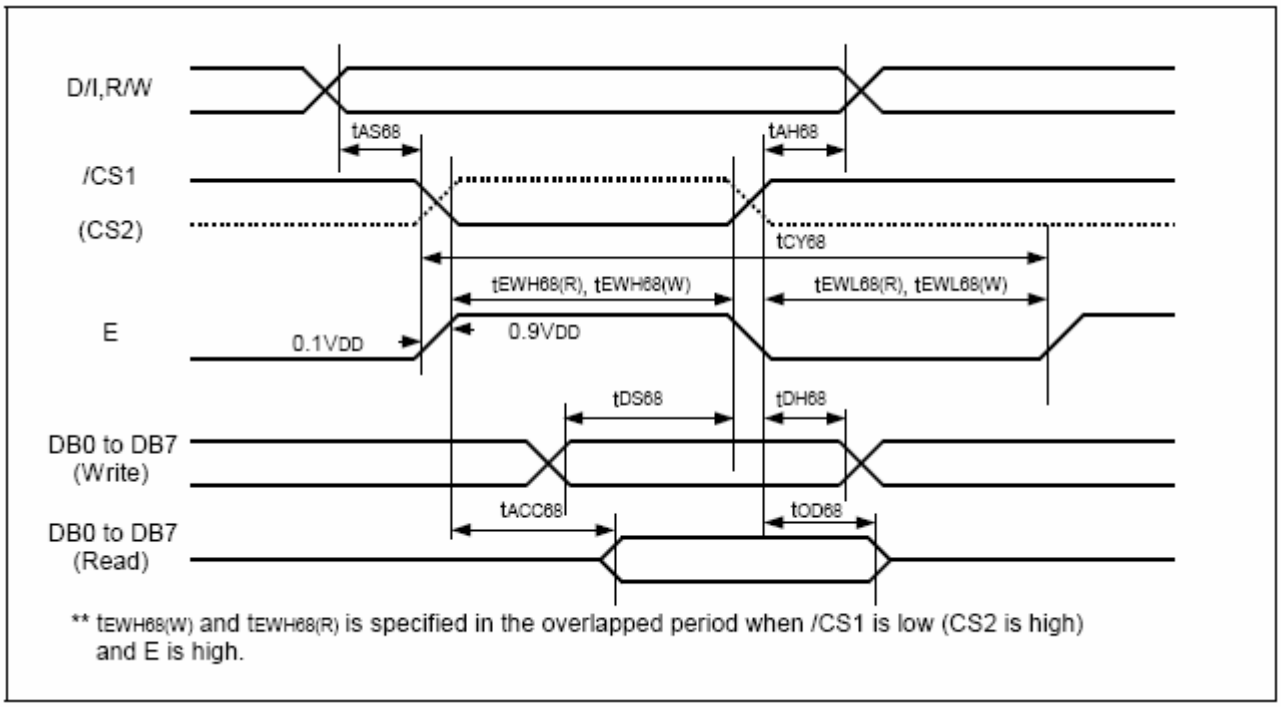


Figure. Parallel Interface (6800-series MPU) Timing Diagram

(V_{DD3} = 1.8 to 3.3V, Ta = -30 to +70°C)

Item	Signal	Symbol	Condition	Min.		Max. (3.3V/1.8V)	Unit
				3.3V	1.8V		
Address setup time Address hold time	D/I R/W	t_{AS68} t_{AH68}		0 0	0 0	- -	ns
System cycle time		t_{CY68}		150	360	-	ns
Enable width high for write Enable width low for write	RDB (E)	t_{EWHW} t_{EWLW}		50 30	100 75	- -	ns
Enable width high for read Enable width low for read	RDB (E)	t_{EWHR} t_{EWLR}		5 28	10 54	- -	ns
Data setup time Data hold time	DB0 to DB15	t_{DS68} t_{DH68}		-		60 / 120	
Read access time Output disable time		t_{ACC68} t_{OD68}	CL = 100 pF	-		50 / 100	

Table. AC Characteristics (6800-series Parallel Mode)

NOTE: *1. The input signal rise time and fall time (t_r, t_f) is specified at 10 ns or less.

$(t_r + t_f) < (t_{CY68} - t_{EWHW} - t_{EWLW})$ for write, $(t_r + t_f) < (t_{CY68} - t_{EWHR} - t_{EWLR})$ for read

9-3. Serial Data Interface Timing

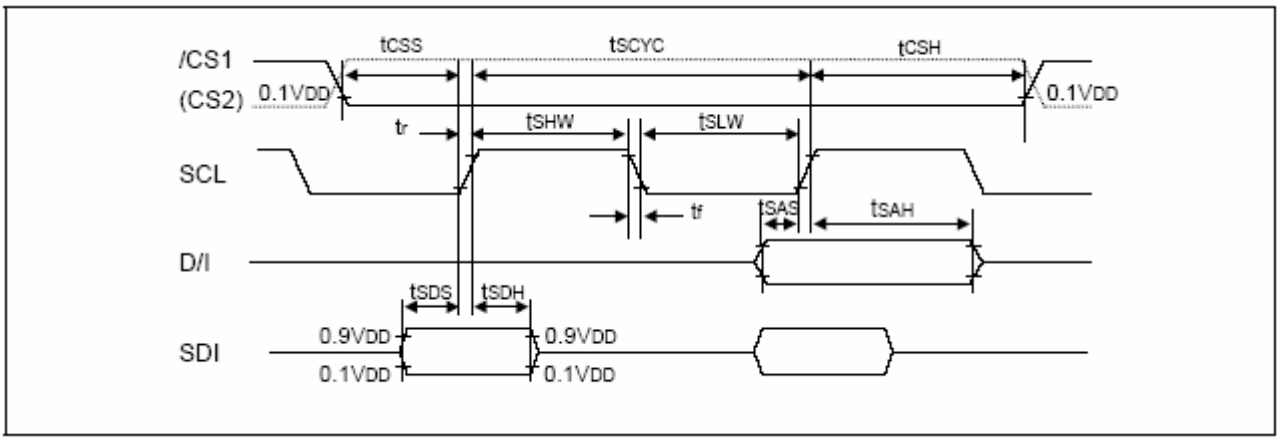


Figure . Serial Interface Timing Diagram

(V_{DD3} = 1.8 to 3.3V, Ta = -30 to +70°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
SCL Cycle Time	SCL	t_{SCYC}		120	-	ns
SCL High Pulse Width	SCL	t_{SHW}		60	-	ns
SCL Low Pulse Width	SCL	t_{SLW}		60	-	ns
SDI Setup time	SDI	t_{SDS}		60	-	ns
SDI Hold time	SDI	t_{SDH}		60	-	ns
D/I Setup time	D/I	t_{SAS}		60	-	ns
D/I Hold time	D/I	t_{SAH}		60	-	ns
Chip Select Setup time	CS1B(CS2)	t_{CSS}		60	-	ns
Chip Select Hold time	CS1B(CS2)	t_{CHS}		60	-	ns

Table . Serial Data Interface Timing

10. LCD MODULES HANDLING PRECAUTIONS

- The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

- If the display panel is damaged and the liquid crystal substance inside it leaks out, do not get any in your mouth. If the substance come into contact with your skin or clothes promptly wash it off using soap and water.

- Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

- The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarize carefully.

- To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
  -Be sure to ground the body when handling the LCD module.
  -Tools required for assembly, such as soldering irons, must be properly grounded.
  -To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
  -The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

- Storage precautions
  When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps. Keep the modules in bags designed to prevent static electricity charging under low temperature / normal humidity conditions (avoid high temperature / high humidity and low temperatures below 0°C). Whenever possible, the LCD modules should be stored in the same conditions in which they were shipped from our company.

11. OTHERS

- Liquid crystals solidify at low temperature (below the storage temperature range) leading to defective orientation of liquid crystal or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subjected to a strong shock at a low temperature.

- If the LCD modules have been operating for a long time showing the same display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. Abnormal operating status can be resumed to be normal condition by suspending use for some time. It should be noted that this phenomena does not adversely affect performance reliability.

- To minimize the performance degradation of the LCD modules resulting from caused by static electricity, etc. exercise care to avoid holding the following sections when handling the modules:
  - Exposed area of the printed circuit board
  - Terminal electrode sections.