

**AZ DISPLAYS, INC.**

**LCD MODULE SPECIFICATION**

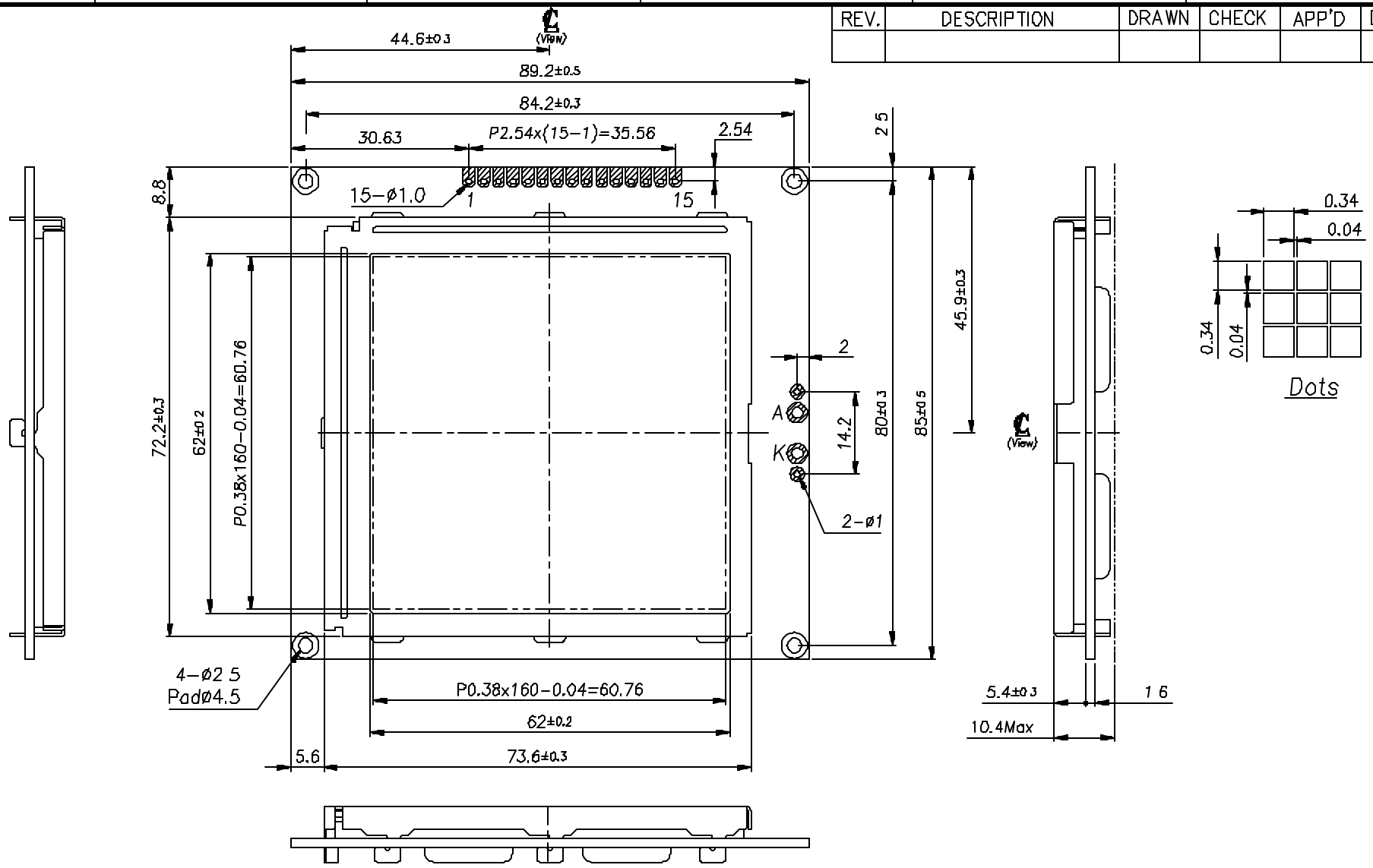
**MODULE TYPE : AGM1616A**

## SPECIFICATION FOR LIQUID CRYSTAL DISPLAY MODULE

View Direction	<input checked="" type="checkbox"/> 6 O'clock		<input type="checkbox"/> 12 O'clock		
LCD Type	<input type="checkbox"/> FSTN Positive		<input type="checkbox"/> FSTN Negative		
	<input checked="" type="checkbox"/> STN Gray	<input type="checkbox"/> STN Yellow Green		<input type="checkbox"/> STN Blue	
Rear Polarizer	<input type="checkbox"/> Reflective		<input checked="" type="checkbox"/> Transflective		<input type="checkbox"/> Transmissive
Backlight Type	<input type="checkbox"/> LED	<input type="checkbox"/> Internal Power		<input checked="" type="checkbox"/> EL	
		<input checked="" type="checkbox"/> External Power		<input type="checkbox"/> CCFL	
Backlight Color	<input type="checkbox"/> White		<input type="checkbox"/> Amber		<input checked="" type="checkbox"/> Blue Green
					<input type="checkbox"/> Yellow Green
Temperature Range	<input type="checkbox"/> Normal		<input checked="" type="checkbox"/> Wide		<input type="checkbox"/> Super Wide
EL Driver IC	<input type="checkbox"/> Build-in		<input checked="" type="checkbox"/> Not Build-in		
Touch Screen	<input type="checkbox"/> With		<input checked="" type="checkbox"/> Without		

The driver ICs are static sensitive. Make sure the user is grounded when handling the LCD.

REV.	DESCRIPTION	DRAWN	CHECK	APP'D	DATE



PIN ASSIGNMENT					
VSS	5.	CL2	9	DB0	13 DISPOFF
M	6.	DB3	10.	VEE	14. BKL -
FLM	7.	DB2	11.	VDD	15 BKL +
CL1	8.	DB1	12.	V0	16.

NO.	M-16160B	1	12-13-99'	MATERIAL	FINISH
	PART NAME	Q'TY	DATE:		
	DRAWN	CHECK	APP'D	UNIT:MM	SCALE: 1/1
				UNLESS OTHERWISE SPECIFIED TOLERANCE ON FRACTIONS DECIMALS ANGLES	PRODUCT: MTG-16160B
				0.10 0.5°	DWG NO.: G16160B
					FILE: DWG\MTG\G16160B
					SHEET 1/1
					Rev: X

6	5	4	3	2	1
6	5	4	3	2	1

## GENERAL SPECIFICATION

Item	Content
Display Resolution	160(H)× 160(W)
Dimensional Outline(mm)	89.2(H)× 85.0(W)× 11.0max(D)
Display mode	Transflective / Positive Mode
Circuit	Common-Driver IC, Segment-driver IC
Interface	Data (D0-D3), CL1, CL2, FRM, V <sub>EE</sub> , Vo

## ABSOLUTE MAXIMUM RATING

### (1) Electrical Absolute Ratings

Item	Symbol	Min.	Max.	Unit	Note
Power Supply for Logic	V <sub>DD</sub> -V <sub>SS</sub>	-0.3	7.0	Volt	
Power Supply for LCD	V <sub>DD</sub> -V <sub>EE</sub>	0	+30	Volt	
Input Voltage	V <sub>I</sub>	-0.3	V <sub>DD</sub>	Volt	
Supply Current for LED Backlight	I <sub>LED</sub>	-	1,000	mA	

### (2) Environmental Absolute Maximum Ratings

Item	Normal Temperature				Wide Temperature			
	Operating		Storage		Operating		Storage	
	Max,	Min.	Max,	Min.	Max,	Min.	Max,	Min.
Ambient Temperature	0	+50	-20	+70	-20	+70	-30	+80
Humidity(without condensation)	Note 2,4		Note 3,5		Note 4,5		Note 4,6	

Note 2 Ta less than or equal to 50C : 80% RH max

Ta greater than 50C : Absolute humidity must be lower than the humidity of 85%RH at 50C

Note 3 Ta at -20C will be less than 48hrs. At 70C, will be less than 120hrs when humidity is higher than 75%.

Note 4 Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Note 5 Ta less than or equal to 70C : 75RH max

Ta greater than 70C : absolute humidity must be lower than the humidity of 75%RH at 70

Note 6 Ta at -30 will be less than 48hrs. At 80C, will be less than 120hrs when humidity is higher than 75%.

## ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ	Max.	Unit	note
Power Supply for Logic	$V_{DD}-V_{SS}$	-	2.7	3.0	5.5	Volt	
Input Voltage	$V_{IL}$	L level	$V_{SS}$	$0.2 V_{DD}$	-	Volt	
	$V_{IH}$	H level	$0.8 V_{DD}$	$V_{DD}$	-	Volt	
Recommend LCD Module Driving Voltage	$V_{DD}-V_O$	Ta=0C	19.4	19.6	19.8	Volt	
		Ta=25C	18.7	19.0	19.2		
		Ta=50C	17.8	18.0	18.2		
Power Supply Current for LCM	$I_{DD}(EL\ B/L\ OFF)$	$V_{DD}=4.5V$ $V_{DD}-V_O=19.0V$ FLM=64Hz $V_{LED}=4.2V$	-	1.8	2.5	mA	
	$I_{EE}$		-	2.0	2.3		
	$I_{LED}$		-	500	-		
	$V_{EL}$		-	100VAC/ 400Hz	-		

## OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	note	
Viewing angle range	f(12 o'clock)	When Cr 2	-	34	-	Degree	9,10	
	b(6 o'clock)		-	41	-			
	l(9 o'clock)		-	30	-			
	r(3 o'clock)		-	35	-			
Rise Time/ Fall Time	Tr/Tf	0	$V_{EE}-V_{SS}$ =+19.6V	-	-	mS		
		25	$V_{EE}-V_{SS}$ =+19.0V	-	239/140	-	mS	
		50	$V_{EE}-V_{SS}$ =+18.0V	-	-	-	mS	
Frame frequency	Frm	Ta=25	-	64	-	Hz	8,10	
Contrast	Cr		-	7.3	-		7	

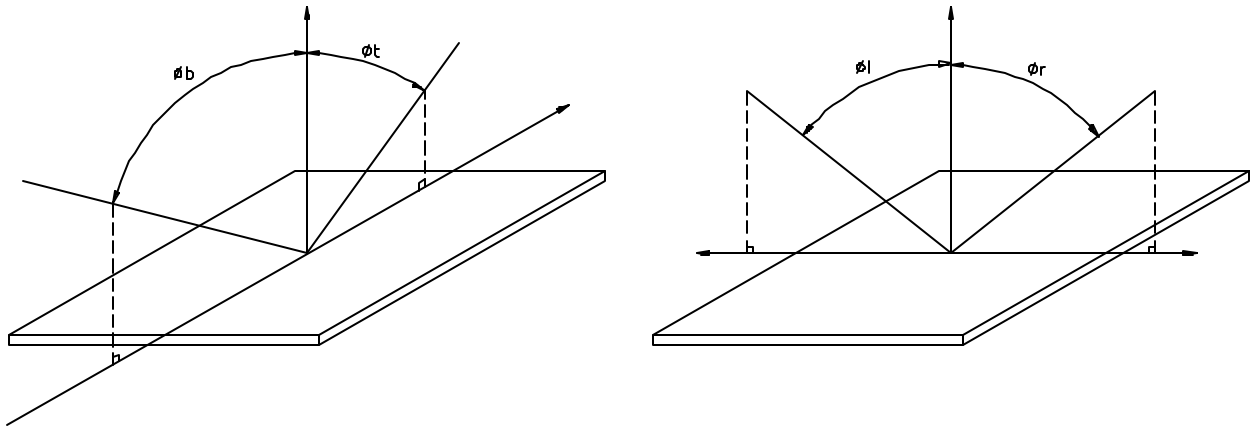
## MECHANICAL SPECIFICATION

Product No.		AGM1616A
Module Size		89.2(W)mm× 85.0(H)mm× 10.4(D)mm Max
Dot Size		0.34(W)mm× 0.34(H)mm
Dot Pitch		0.38(W)mm× 0.38(H)mm
Resolution		160(W)× 160(H) Dots Matrix
Duty Ratio		1/160 Duty
LCD Display Mode	STN	<input checked="" type="checkbox"/> Gray Mode <input type="checkbox"/> Yellow Mode <input type="checkbox"/> Blue Mode
	FSTN	<input type="checkbox"/> Black & White(Normally White/Positive Image) <input type="checkbox"/> Black & White(Normally White/Negative Image)
	Rear Polarizer:	<input type="checkbox"/> Reflective <input checked="" type="checkbox"/> Transflective <input type="checkbox"/> Transmissive <input type="checkbox"/> Transflective(High Transmissive)
Viewing Direction		<input checked="" type="checkbox"/> 6 O'clock <input type="checkbox"/> 12 O'clock <input type="checkbox"/> 3 O'clock <input type="checkbox"/> 9 O'clock
Backlight		<input type="checkbox"/> W/O <input type="checkbox"/> CCFL <input checked="" type="checkbox"/> EL <input type="checkbox"/> LED
Controller		Without
DC/DC Converter		Without
EL Driver		Without

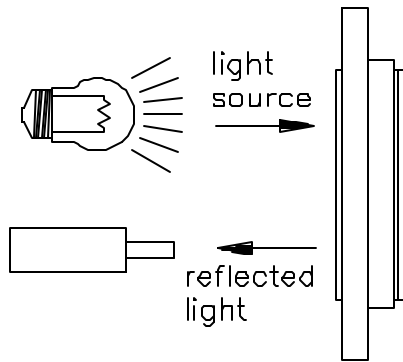
## INTERFACE PIN ASSIGNMENT

Pin No.	Pin Out	Description
1	V <sub>SS</sub>	GND
2	NC	No connection
3	FLM	Frame start signal (Data signal from the common driver shift register)
4	CL1	Common driver data shift signal: also latches the data of the line immediately above.
5	CL2	Clock pulse for segment shift register
6	D3	Data Bus
7	D2	
8	D1	
9	D0	
10	V <sub>EE</sub>	LCD driver supply voltage
11	V <sub>DD</sub>	Logic supply voltage
12	V <sub>o</sub>	Bias voltage for LCD panel, tuning from V <sub>DD</sub> -V <sub>EE</sub> .
13	/DispOff	Display off, active LOW.
14	BKL-K	Power Supply for backlight. 4.2V for LED backlight, 100VAC/400 Hz for EL backlight.
15	BKL-A	

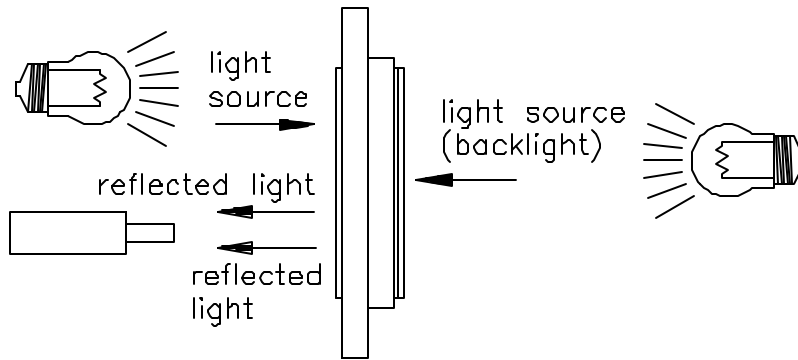
**[Note 10] Definition of viewing angle**



**[Note 11] Description of Measuring Equipment**



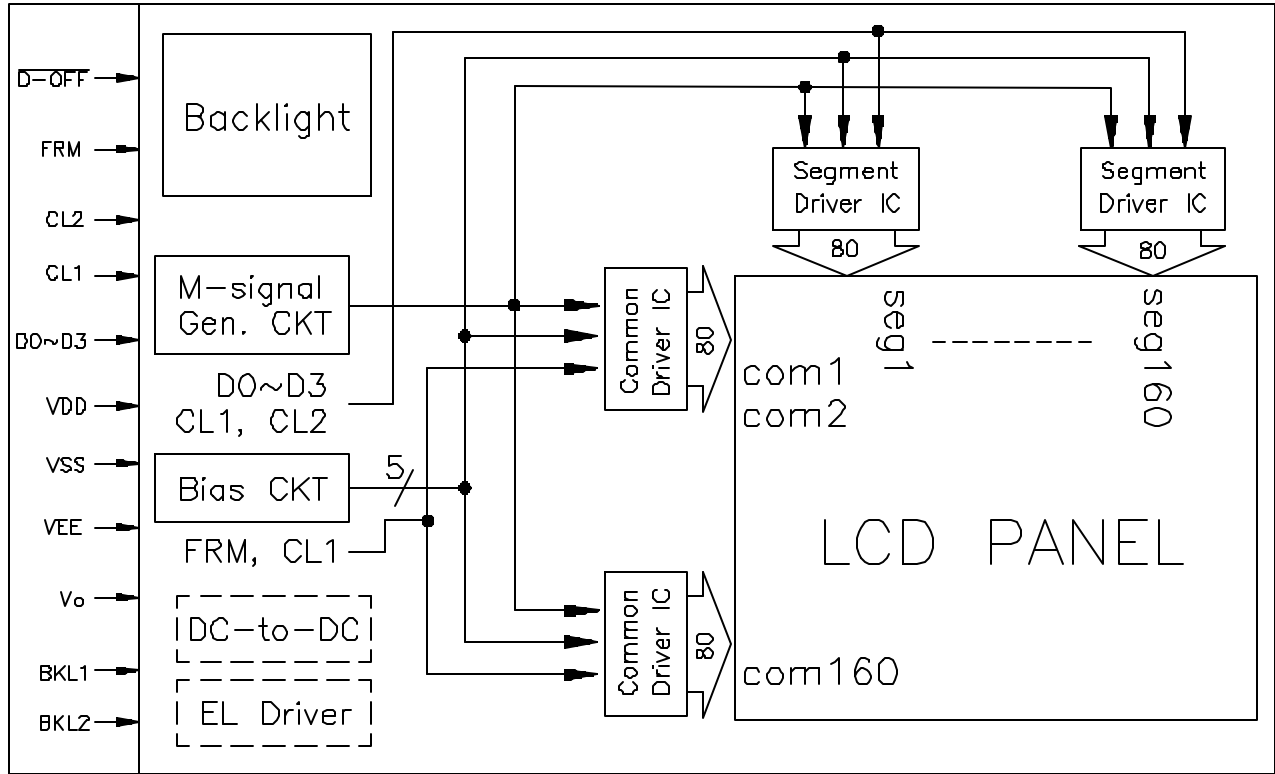
Reflective type



Transflective type  
Transmissive Type

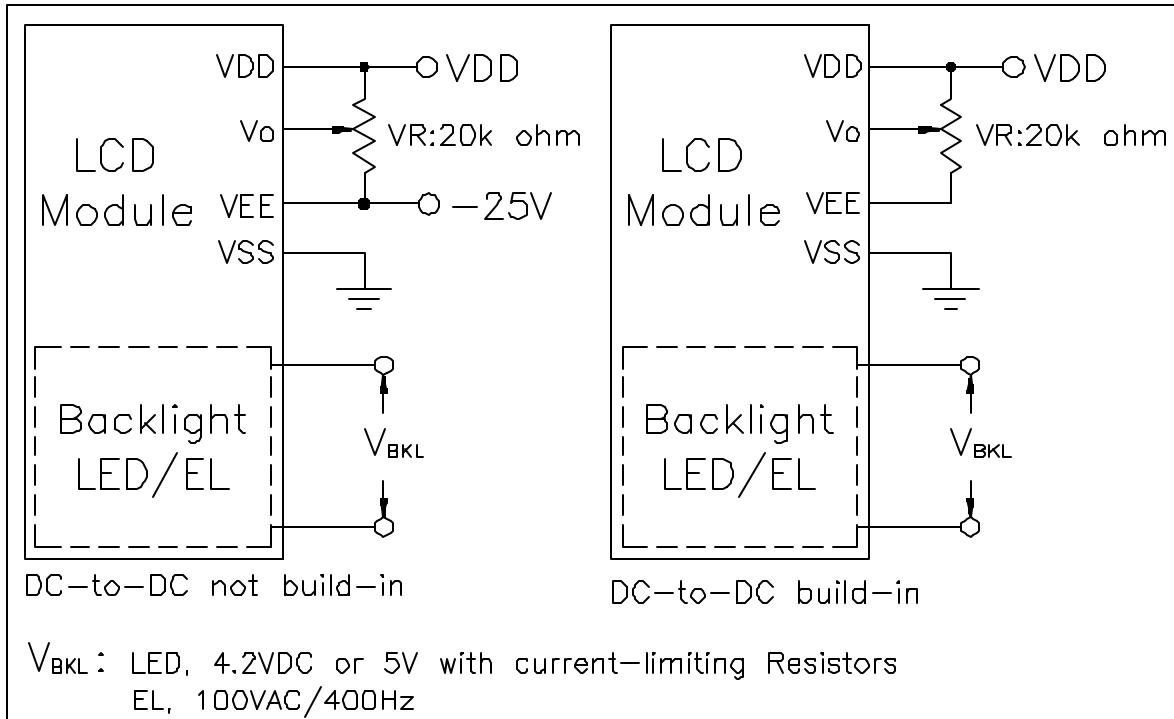


# BLOCK DIAGRAM



Built-in M-clock generating circuit, User does not need to supply M-clock.

# POWER SUPPLY

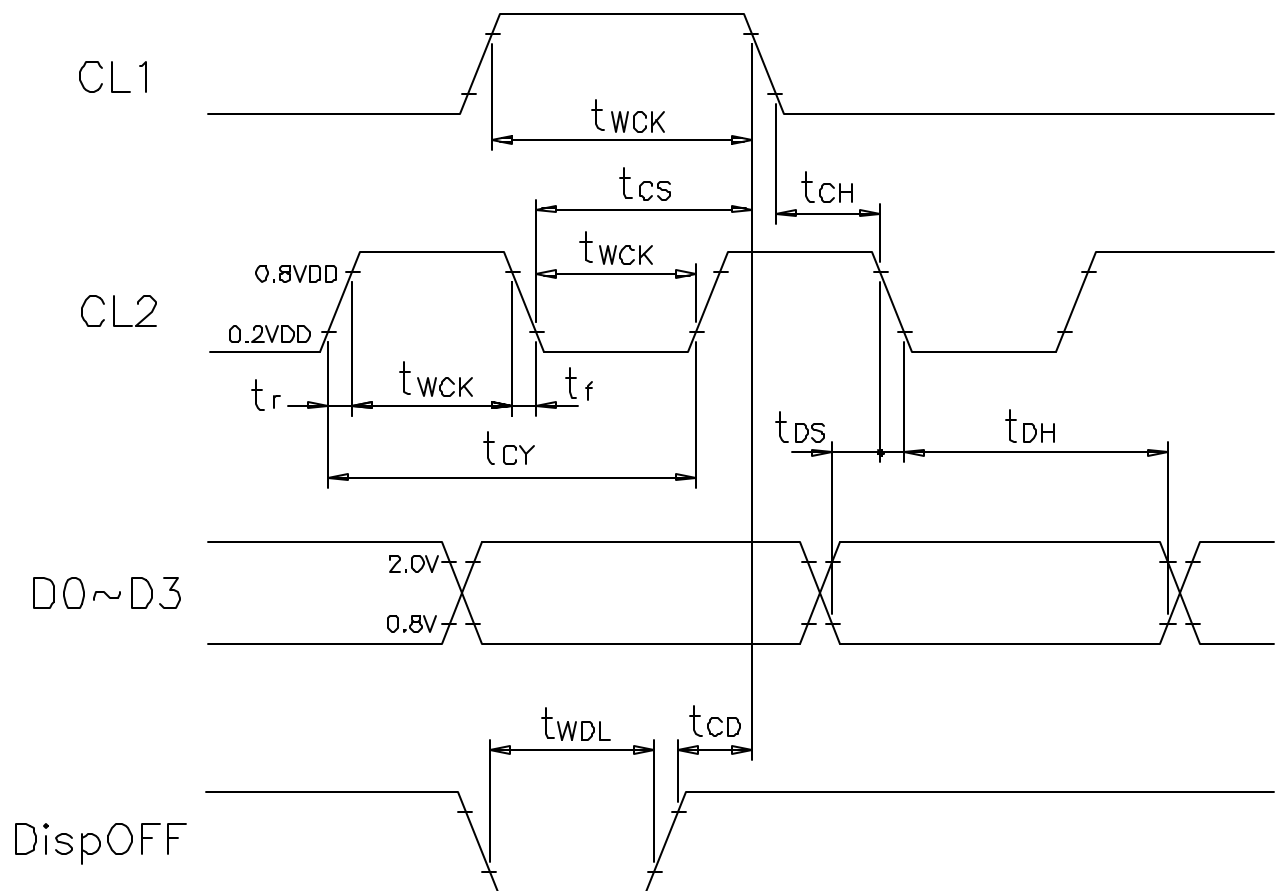


# TIMING CHARACTERISTICS

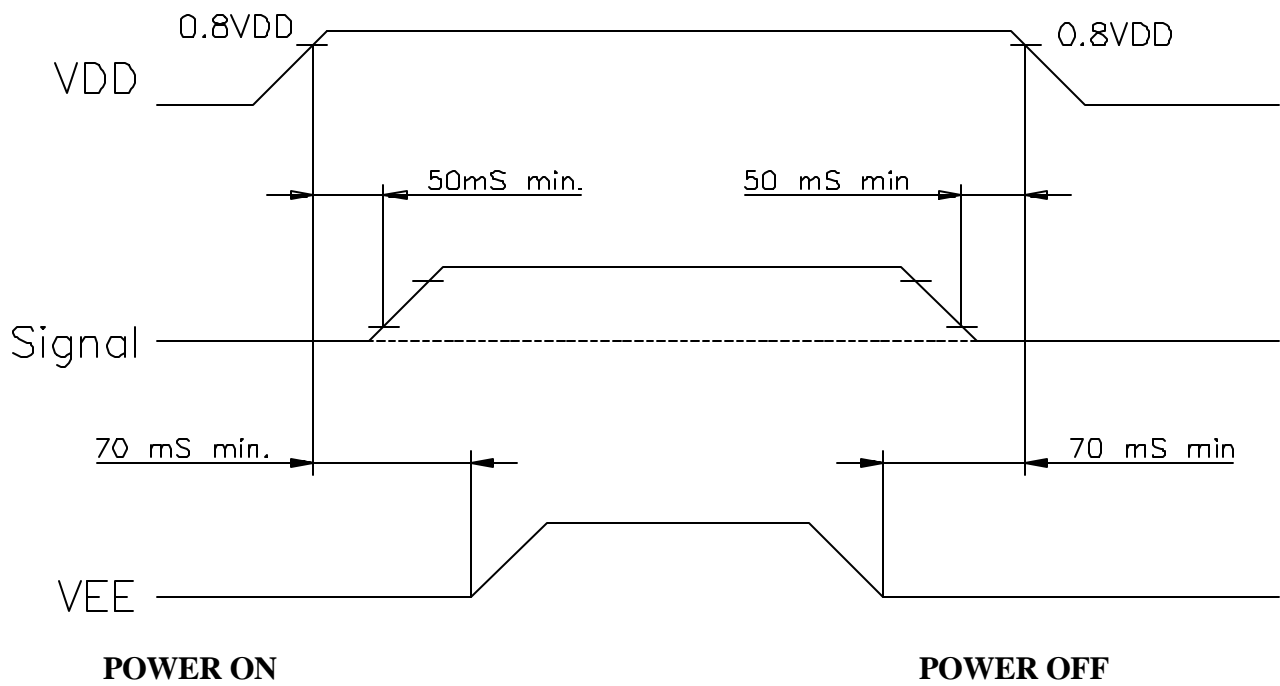
1 Segment interface timing: ( $V_{SS}=V_5=0V$ ,  $V_{DD}=2.5V$  to  $4.5V$ ,  $V_{EE}=+15.0$  to  $+24V$ ,  $T_a=0$  to  $50C$  )

Item	Symbol	Test Condition	Min.	Max.	Unit
Clock cycle time	$t_{CY}$	Duty = 50%	250	-	ns
Clock Pulse Width	$t_{WCK}$		95	-	ns
Data Set Up Time	$t_{DS}$		65	-	ns
Data Hold Time	$t_{DH}$		65	-	ns
Latch pulse 'H' width	$t_{WCK}$		95	-	ns
Input signal Rise/Fall Time	$t_r, t_f$		-	30	ns
Clock Set Up Time	$t_{CS}$		120	-	ns
Clock hold time	$t_{CH}$		120	-	ns
DispOFF clear time	$t_{CD}$		100	-	ns
DispOFF 'L' pulse width	$t_{WDL}$		1.2	-	us

Note: Latch:CL1, Shift: CL2



## 2 Power ON/OFF Timing



The missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

# DISPLAY PATTERN

## First Data

	SEG1	SEG2	SEG3	SEG4		SEG157	SEG158	SEG159	SEG160
COM1	D3	D2	D1	D0	.....	D3	D2	D1	D0
COM2	D3	D2	D1	D0	.....	D3	D2	D1	D0
COM159	D3	D2	D1	D0	.....	D3	D2	D1	D0
COM160	D3	D2	D1	D0	.....	D3	D2	D1	D0