

Specification

Part Number:	MCT046A12W800320LML
Version:	26/02/2016
Date:	1

MIDAS



Revision History

VERSION	DATE	REVISED PAGE NO.	Note
0	2015/09/18		First issue
A	2016/01/21		Modify Static electricity test

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Midas Active Matrix Display Part Number System

MC T 057 A 6 * W 320240 L M L * *
1 2 3 4 5 6 7 8 9 10 11 12 13

- 1 = **MC:** Midas Components
- 2 = **T:** TFTA: Active Matrix OLED
- 3 = **Size**
- 4 = **Series**
- 5 = **Viewing Angle:** 6: 6 O'clock 12: 12 O'clock O: All Round Viewing Angle
- 6 = **Blank:** No Touch T: Resistive Touchscreen C: Capacitive Touchscreen
- 7 = **Operating Temp Range:** S: 0+50Deg C B: -20+60Deg C
W: -20+70Deg C E: -30+85Deg C
X: -30+80Deg C
- 8 = **No of Pixels**
- 9 = **Orientation:** P: Portrait L: Landscape
- 10 = **Mode:** R: Reflective M: Transmissive T: Transflective
S: Sunlight Readable (Transmissive) W: White on Black (Monochrome)
- 11 = **Backlight:** Blank: None L: LED C: CCFL
- 12 = **Blank:** No Module/board C: Controller board module (E-Tech)
- 13 = **Blank:** None OB: Optically Bonded IPS: In-plane switching

2.Summary

This technical specification applies to 4.6' color TFT-LCD panel. The 4.6' color TFT-LCD panel is designed for camcorder, digital camera application and other electronic products which require high quality flat panel displays. This module follows RoHS.

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3. General Specifications

- Size: 4.6 inch
- Dot Matrix: 800 x RGBx320(TFT) dots
- Module dimension: 120.7(W) x 56.16(H) x 3.1(D) mm
- Active area: 108 x 43.2 mm
- Dot pitch: 0.045(W)x 0.135(H) mm
- LCD type: TFT, Normally White, Transmissive
- View Direction: 12 o'clock
- Gray Scale Inversion Direction: 6 o'clock
- Backlight Type: LED, Normally White
- With /Without TP: Without TP
- Surface: Anti-Glare

*Color tone slight changed by temperature and driving voltage.

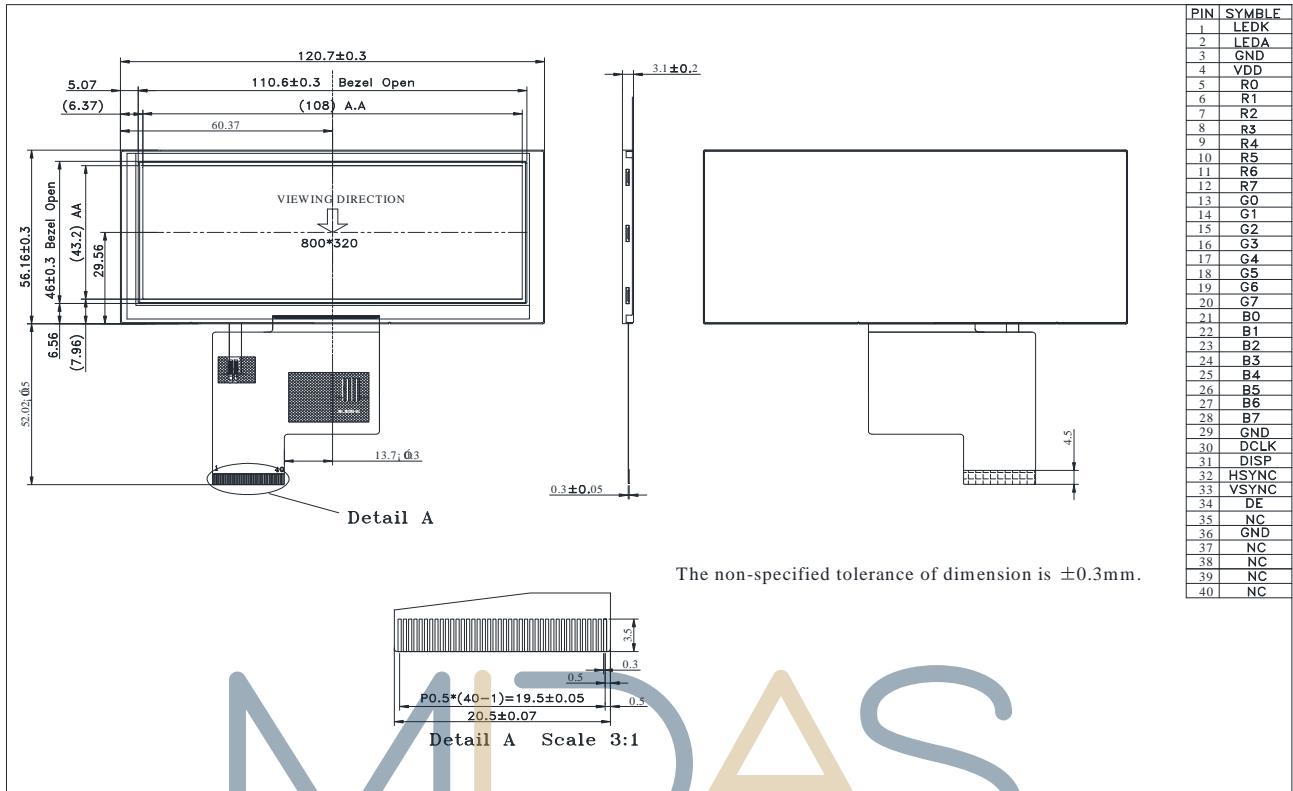
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4.Interface

4.1. LCM PIN Definition

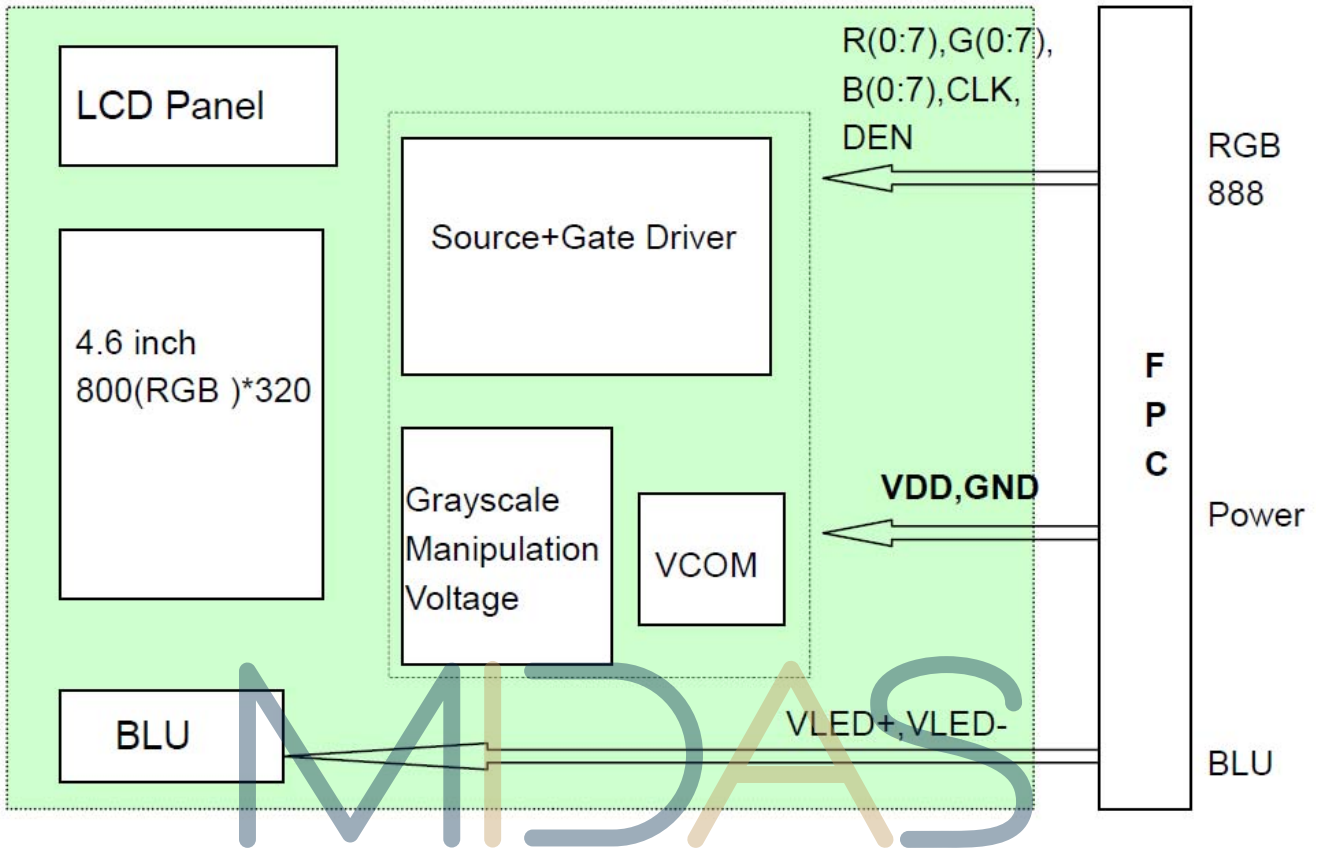
No.	Symbol	Description
1	VLEDK	Backlight LED Cathode
2	VLEDA	Backlight LED Anode.
3	GND	Ground
4	VDD	Power supply
5~12	R0~R7	Data bus
13~20	G0~G7	Data bus
21~28	B0~B7	Data bus
29	GND	Ground
30	DCLK	Clock for input data. Data latched at rising/falling edge of this signal. Default falling edge. Normally pull low.
31	DISP	Standby mode. Normally pulled high. DISP="1": Normally operation (Default) DISP="0": Timing controller, source driver will turn off ,all output are High-Z.
32	HSYNC	Horizontal Sync signal
33	VSYNC	Vrtical Sync signal
34	DE	Data input enable. Active high to enable the data input bus under "DE Mode". Normally pull low.
35	NC	No connected
36	GND	Ground
37	NC	No connected
38	NC	No connected
39	NC	No connected
40	NC	No connected

5. Contour Drawing



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6. Block Diagram

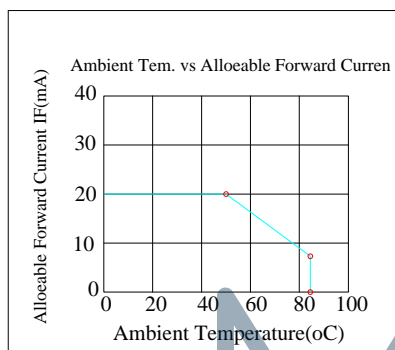


7. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-20	—	+70	□
Storage Temperature	TST	-30	—	+80	□

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

- Temp. $\leq 60^{\circ}\text{C}$, 90% RH MAX. Temp. $> 60^{\circ}\text{C}$, Absolute humidity shall be less than 90% RH at 60°C



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8. Electrical Characteristics

8.1. Operating conditions:

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Supply Voltage	V_{DD}	2.7	3.3	3.6	V	
Input Signal Voltage	Low Level	V_{IL}	GND	-	$0.3 \times V_{DD}$	V
	High Level	V_{IH}	$0.7 \times V_{DD}$	-	VDD	V

8.2. LED driving conditions

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	36	40	50	mA	
Forward Voltage	V_F	18	19.2	21	V	
Backlight life time		-	25000	-	hr	

Note 1 : There are 1 Groups LED



CIRCUIT DIAGRAM

Note 2 : $T_a = 25 \text{ }^\circ\text{C}$

Note 3 : Brightness to be decreased to 50% of the initial value

Note 4 : The single LED lamp case

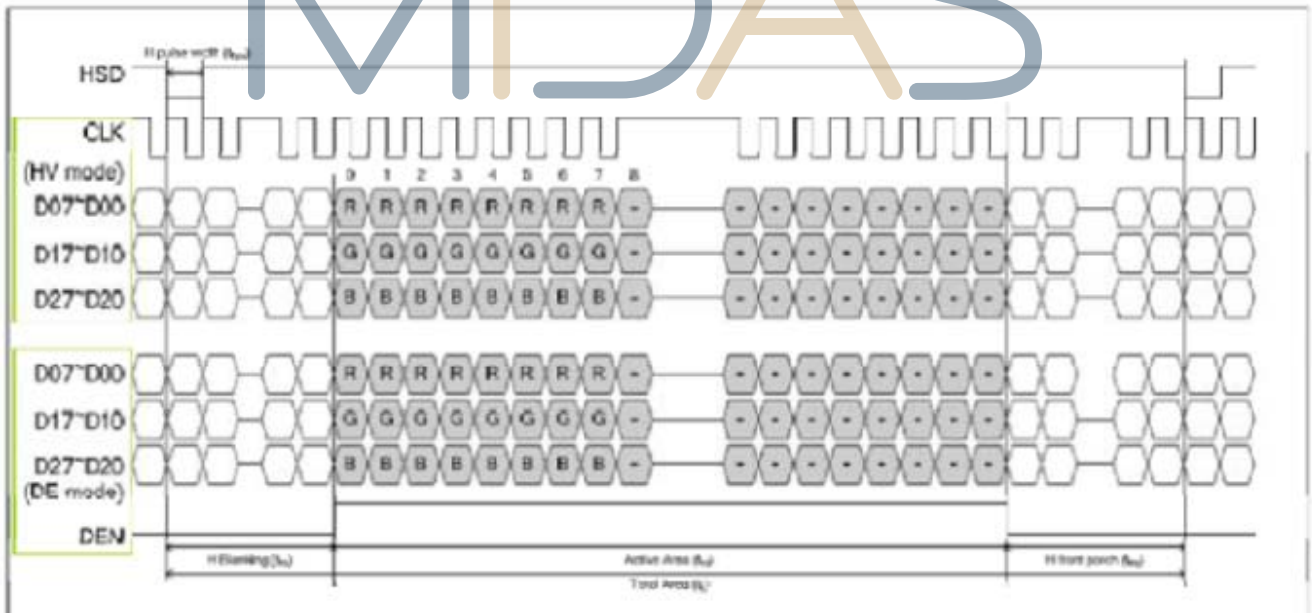
9. Interface Timing

9.1. AC electrical characteristics

Parameter	Symbol	Spec.			unit
		Min.	Typ.	max	
HS setup time	T_{hst}	8	-	-	ns
HS hold time	T_{hhd}	8	-	-	ns
VS setup time	T_{vst}	8	-	-	ns
VS hold time	T_{vhd}	8	-	-	ns
Data setup time	T_{dsu}	8	-	-	ns
Data hold time	T_{dhd}	8	-	-	ns
DE setup time	T_{esu}	8	-	-	ns
DE hole time	T_{ehd}	8	-	-	ns
VDD Power on Slew rate	T_{POR}	-	-	20	ms
RSTB pulse duty	T_{Rst}	10	-	-	us
CLKIN cycle time	T_{cph}	20	-	-	ns
CLKIN pulse duty	T_{cwh}	40	50	60	%
Output stable	T_{sst}	-	-	6	us

9.2. Data input format

Horizontal timing



Horizontal Input Timing Diagram

9.3. Horizontal timing

Parameter	Symbol	Spec.			unit
		Min.	Typ.	max	
Horizontal Display Area	thd	800			DCLK
DCLK frequency	fclk	-	30	50	MHZ
One Horizontal Line	th	862	1056	1200	DCLK
HS pulse width	thpw	1	-	40	DCLK
HS Back Porch(Blanking)	thb	88			DCLK
HS Front Porch	thfp	16	210	354	DCLK

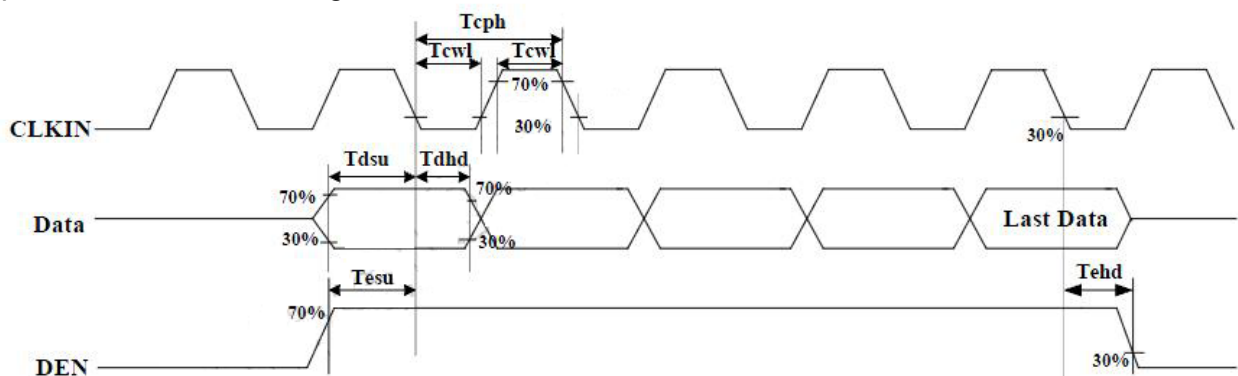
Vertical timing

Parameter	Symbol	Spec.			unit
		Min.	Typ.	max	
Vertical Display Area	tvd	320			T _H
VS period time	tv	353	365	490	T _H
020	tvpw	3	-	20	T _H
VS Back Porch (Blanking)	tvb	23			T _H
VS Front Porch	tvfp	7	22	147	T _H

24bit RGB mode

Parameter	Symbol	Spec.			unit	Conditions
		Min.	Typ.	max		
CLKIN Frequency	Fclk	-	40	50	MHZ	VDD=3.0V~3.6V
CLKIN Cycle Time	Tclk	20	25	-	ns	-
CLKIN Pulse duty	Tcwh	40	50	60	%	tclk
Time from HSD to source output	Thso	64			CLKIN	-
Time from HSD to LD	Thld	64			CLKIN	-
Time from HSD to STV	Thstv	2			CLKIN	-
Time from HSD to CKV	Thckv	20			CLKIN	-
Time from HSD to OEV	Thoev	4			CLKIN	-
LD Pulse width	Twld	10			CLKIN	-
CKV pulse width	Twckv	66			CLKIN	-
OEV pulse width	twoev	74			CLKIN	-

Input clock and data timing waveform



10. Optical Characteristics

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark	
Response time	T_r	$\theta=0^\circ$ 、 $\phi=0^\circ$	-	20	30	ms	Note 3	
	T_f							
Contrast ratio	CR	At optimized viewing angle	400	500	-	-	Note 4	
Color Chromaticity	White	$\theta=0^\circ$ 、 $\phi=0^\circ$	W_x	0.324	0.326	0.328	-	Note 2,5
			W_y	0.364	0.366	0.368	-	
Viewing angle (Gray Scale Inversion Direction)	Hor.	$CR \geq 10$	θ_R	60	70	-	Deg	Note 1
			θ_L	60	70	-		
	Ver.		ϕ_T	40	50	-		
			ϕ_B	60	70	-		
Brightness	-	-	300	350	-	cd/m ²	Center of display	

Ta=25±2°C,

Note 1: Definition of viewing angle range

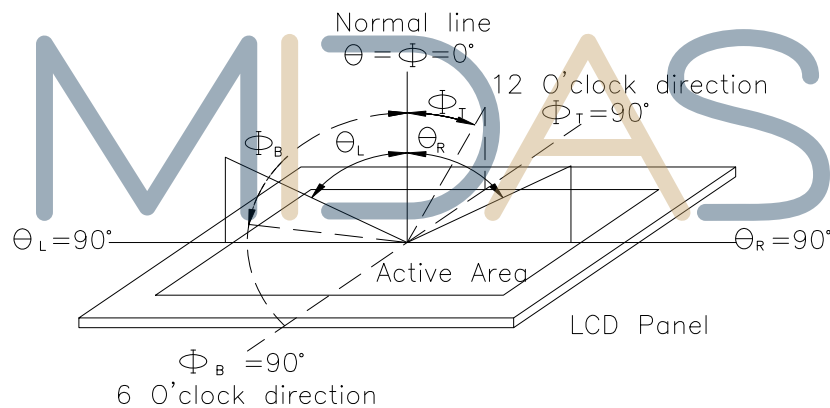


Fig. 10.1. Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7 or BM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

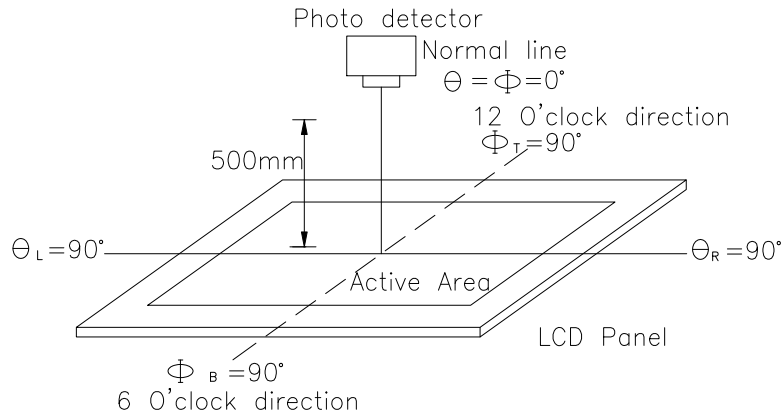
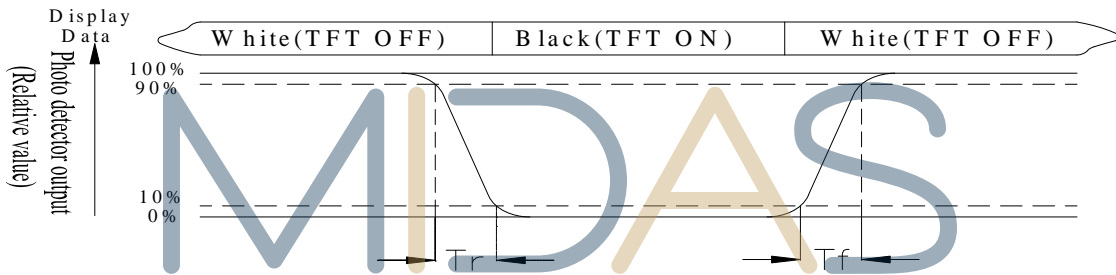


Fig. 10.2. Optical measurement system setup

Note 3: Definition of Response time:

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time, T_r , is the time between photo detector output intensity changed from 90% to 10%. And fall time, T_f , is the time between photo detector output intensity changed from 10% to 90%



Note 4: Definition of contrast ratio:

The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: White $V_i = V_{i50} \pm 1.5V$

Black $V_i = V_{i50} \pm 2.0V$

“±” means that the analog input signal swings in phase with VCOM signal.

“±” means that the analog input signal swings out of phase with VCOM signal.

The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

Note 6: Definition of color chromaticity (CIE 1931)

Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

11. Reliability

Content of Reliability Test (Wide temperature, -20°C~70°C)

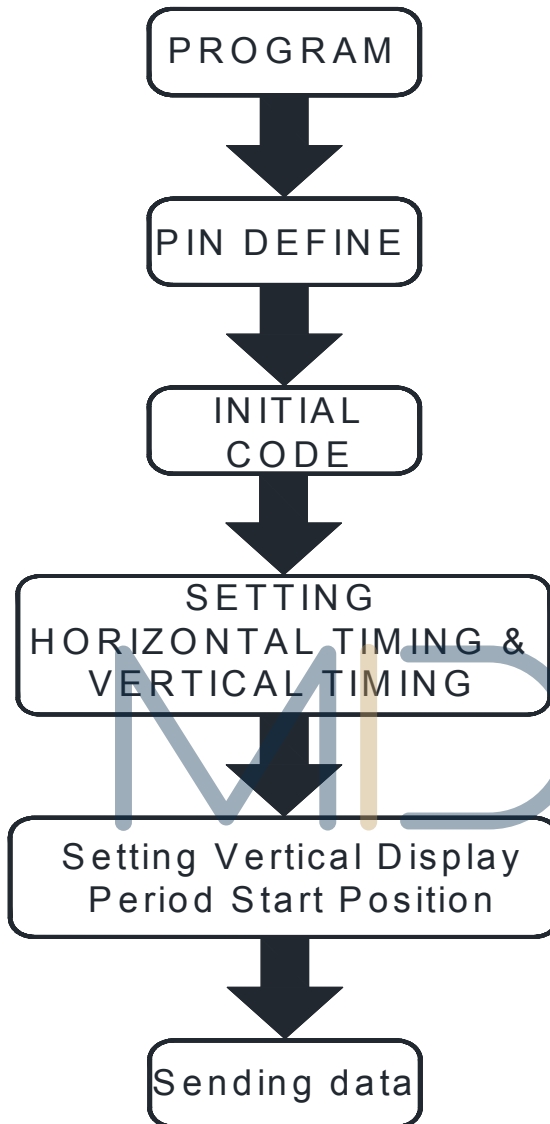
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70°C 200hrs	—
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60°C,90%RH max	60°C,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation <div style="text-align: center;"> <p style="text-align: center;">-20°C 25°C 70°C</p> <p style="text-align: center;">30min 5min 30min</p> <p style="text-align: center;">1 cycle</p> </div>	-20°C/70°C 10 cycles	—
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 3 15mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=±600V(contact) ,±800v(air), RS=330Ω CS=150pF 10 times	—

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

Note3: The packing have to including into the vibration testing.

12.Display start address setting



Ex.

One horizontal line=0x042

VS period time=0x016d

HS Blanking=0x58

VS Blanking=0x17

HS Front Porch=0xd2

VS Front Porch=0x16

Suggestion :

Vertical Display Period

Start Position=0xc5

Note :

For different Controller ICs, the value of vertical display period start position need to be adjusted accordingly.