



# SPECIFICATIONS FOR LCD MODULE

CUSTOMER	STD
MODEL	WM-M0101V-JFLWa VER. 1
CUSTOMER APPROVED	

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## History of Version

Version	Contents	Date	Note
a1	New version	Dec.6 2010	SPEC

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## (1) Electronic Units

### 1.1 Absolute Maximum Ratings

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Operating Temperature	TOP	0	-	+50	
Storage Temperature	TST	-25	-	+65	
Power Supply Voltage	VCC-VSS	0	-	4.0	V
Static Electricity	Be sure that you are grounded when handing LCM.				

### 1.2 Electrical Characteristics

(Ta=25 )

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage for System		VCC	-	3.0	3.3	3.6	V
Supply Current for System		*ICC	-	-	370	440	mA
Rush Current		Irush		-	-	2	A
Logic Input Voltage (LVDS: IN+,IN-)	Common Voltage	VCM		1.125	1.25	1.375	V
	Differential Input Voltage	VID		250	350	450	mV
	Threshold Voltage (HIGH)	VTH		-	-	100	mV
	Threshold Voltage (LOW)	VTL		-100			mV

\*ICC Measurement condition is for all pixels on

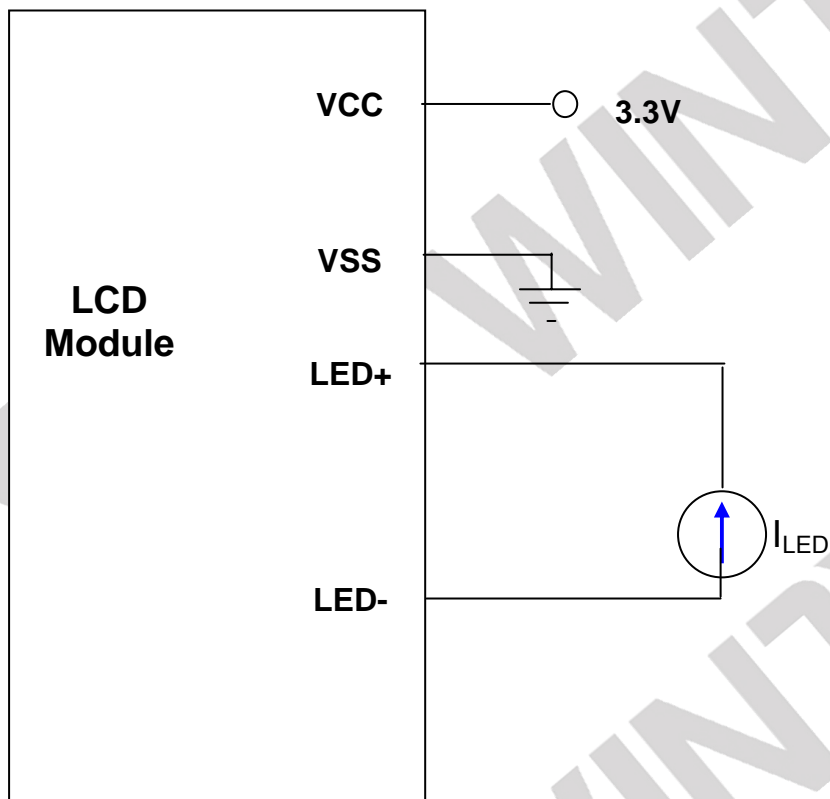
### 1.3 Interface Pin Function

#### CN1:

NO	SYMBOL	I / O	FUNCTION
1	NC	-	No connection
2	VCC	P	3.3V power supply
3	VCC	P	3.3V power supply
4	V_EDID	P	EDID 3.3V Power supply
5	NC	-	No connection
6	CLK_EDID	I/O	EDID clock input
7	DATA_EDID	I/O	EDID data input
8	RXIN0-	I/O	LVDS Signal(-)—channel 0
9	RXIN0+	I/O	LVDS Signal(+)—channel 0
10	GND	-	Ground
11	RXIN1-	I/O	LVDS Signal(-)—channel 1
12	RXIN1+	I/O	LVDS Signal(+)—channel
13	GND	-	Ground
14	RXIN2-	I/O	LVDS Signal(-)—channel 2
15	RXIN2+	I/O	LVDS Signal(+)—channel 2
16	GND	-	Ground
17	RXCLKIN-	I/O	LVDS Clock Signal(-)
18	RXCLKIN+	I/O	LVDS Clock Signal(+)
19	GND	-	Ground
20	NC	-	No connection
21	NC	-	No connection
22	GND	-	Ground
23	NC	-	No connection
24	NC	-	No connection
25	GND	-	Ground-Shield

26	NC	-	No connection
27	NC	-	No connection
28	GND	-	Ground-Shield
29	NC	-	No connection
30	NC	-	No connection
31	VSSLED	P	LED Ground
32	VSSLED	P	LED Ground
33	VSSLED	P	LED Ground
34	NC	-	No connection
35	PWM	I/O	System PWM Signal Input (+3.3V Swing)
36	VLED_EN	I/O	LED enable input (3.3V)
37	NC	-	No connection
38	VLED	P	Power Supply for LED(VLED =4.5V ~ 21V)
39	VLED	P	Power Supply for LED(VLED =4.5V ~ 21V)
40	VLED	P	Power Supply for LED(VLED =4.5V ~ 21V)

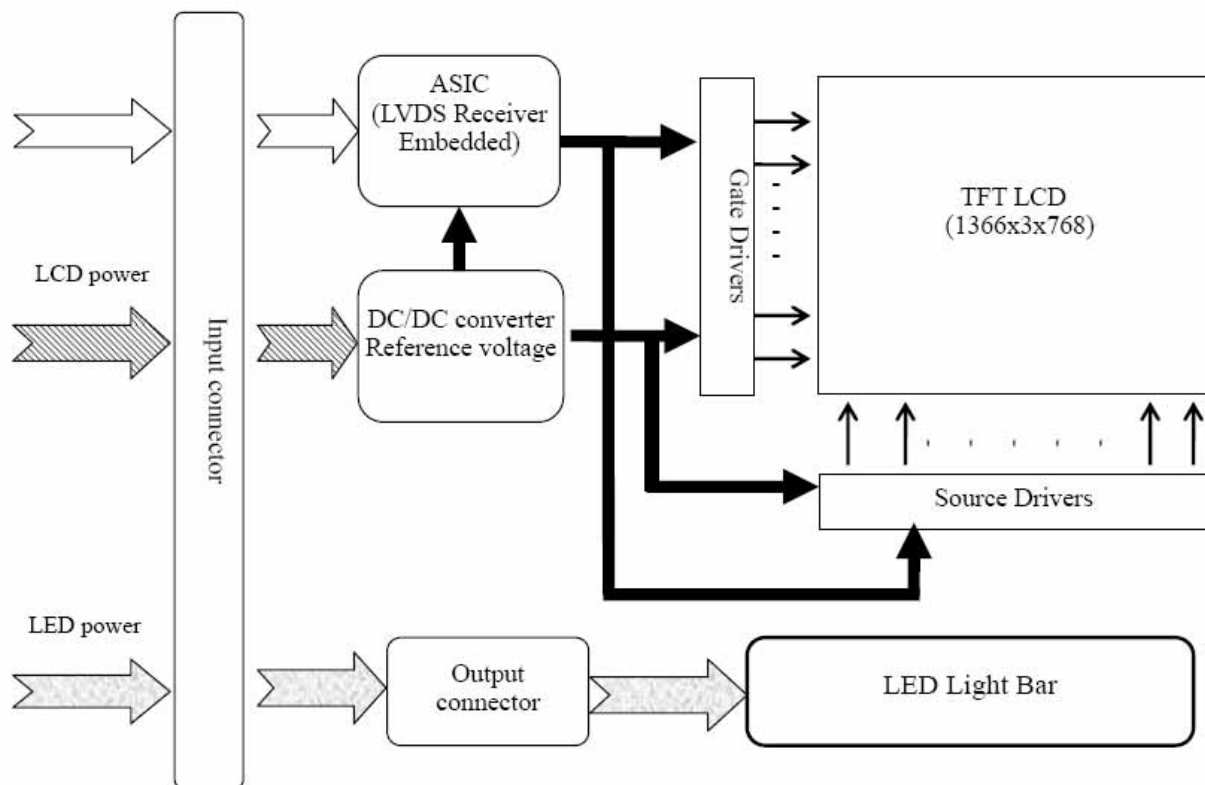
## 1.4 Power Supply for LCD Module



Note 1: Using Internal Voltage Generator VCC= 3.3V



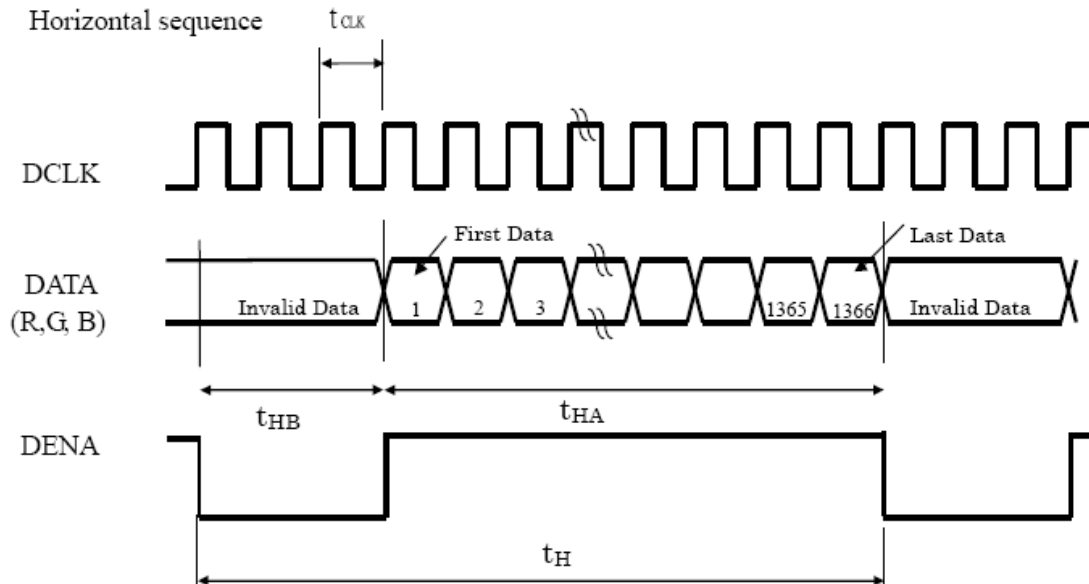
## 1.5 Block Diagram with Display RAM Address



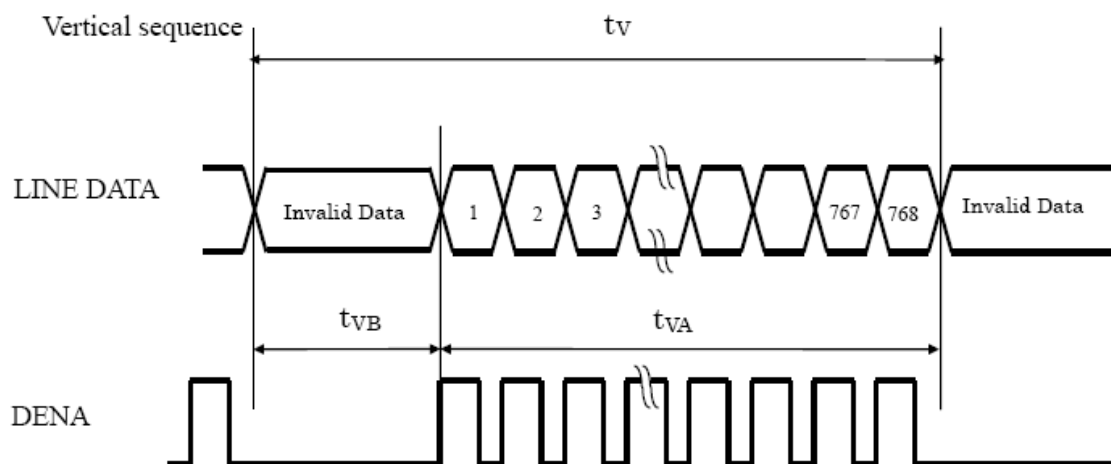


## 1.6 Timing Characteristic

### (1)(a) LVDS input time sequence



### (b) LCD input time sequence



## (2) Timing Chart

ITEM				SYMBOL	MIN	TYP	MAX	UNIT
LCD Timing	Frame Rate			-	(55)	60	(65)	Hz
	DCLK		Frequency	f <sub>CLK</sub>	(68.65)	75.44	(84.85)	MHz
			Period	t <sub>CLK</sub>	(14.52)	13.26	(11.79)	ns
	DENA	Horizontal	Horizontal Total time	t <sub>H</sub>	(1470)	1560	(1712)	t <sub>CLK</sub>
			Horizontal Active time	t <sub>HA</sub>	1366	1366	1366	t <sub>CLK</sub>
			Horizontal Blank time	t <sub>HB</sub>	(104)	194	(346)	t <sub>CLK</sub>
		Vertical	Vertical Total time	t <sub>V</sub>	(786)	806	(826)	t <sub>H</sub>
			Vertical Active time	t <sub>VA</sub>	768	768	768	t <sub>H</sub>
			Vertical Blank time	t <sub>VB</sub>	(18)	38	(58)	t <sub>H</sub>
LVDS Spread Spectrum Range *3)				-2		+2	%	

### 【Note】

- \*1) DENA (DATA ENABLE) usually is positive.
- \*2) During the whole blank period, DCLK should keep input.
- \*3) LVDS input clock is 85MHz and modulation rate is fixed 100kHz.

### (3) DATA mapping

Color	Input Data	R DATA						G DATA						B DATA					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
		MS B					LS B	MS B					LS B	MS B					LS B
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green	Green(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue	Blue(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

#### 【Note】

- 1) Gray level:  
Color(n) : n is level order; higher n means brighter level.
- 2) DATA:  
1: high , 0: low

## 1.7 Power ON/OFF SEQUENCE

\*1) Power Sequence :

$$0.50 \text{ ms} \leq t1 \leq 10 \text{ ms}$$

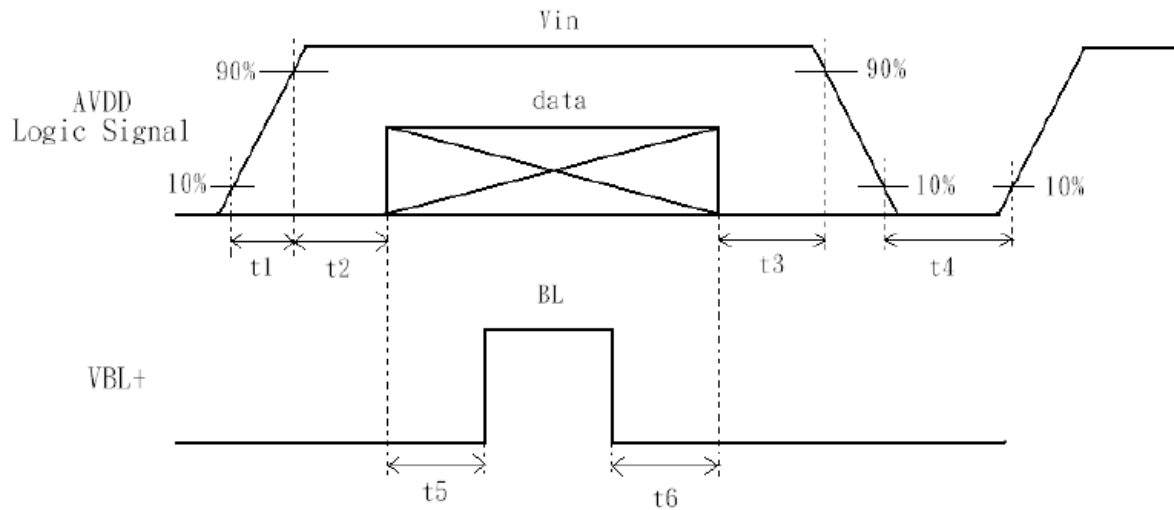
$$500 \text{ ms} \leq t4$$

$$0.01 \text{ ms} < t2 \leq 50 \text{ ms}$$

$$200 \text{ ms} \leq t5$$

$$0.01 \text{ ms} < t3 \leq 50 \text{ ms}$$

$$200 \text{ ms} \leq t6$$



data: RGB DATA, DCLK, HD, VD, DENA

## (2) ATT(Advanced Touch Technology )

### 2.1 ATT Electrical Characteristics

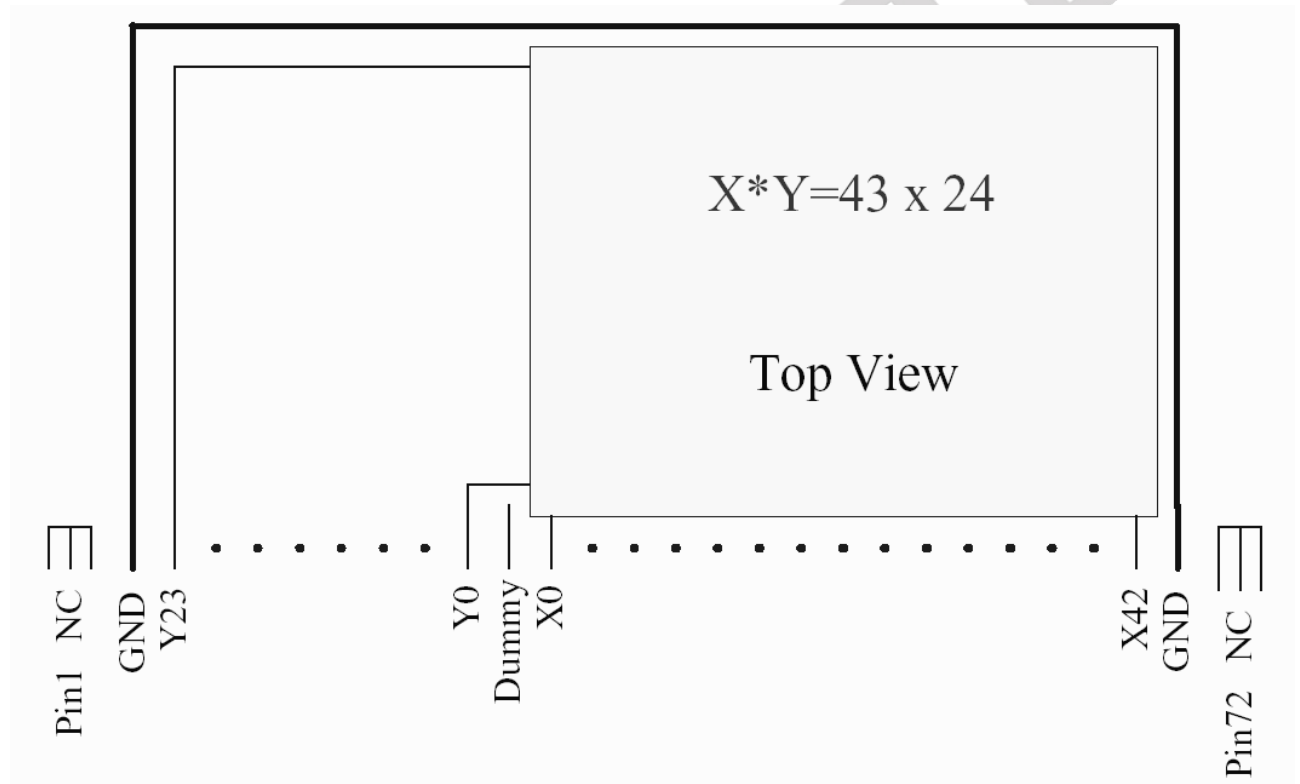
(Ta=25 )

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	Remark
Input Power Voltage	V <sub>DD_TP</sub>	-	3.2	3.3	3.4	V	-
Interface	-	-	I2C				
Touch Panel Resolution	-	-	4096*4096				
Supply Current	*IDD	V <sub>DD_TP</sub> =3.3			TBD	mA	
Input	Finger ( Real 10 points )						

### 2.2 ATT Interface Pin Function

NO.	SYMBOL	I/O	FUNCTION
1	I2C_DATA	I/O	I2C pin
2	I2C_CLK	I	I2C pin
3	RESETN	I	Reset pin
4	INT	O	Interrupt
5	GND	P	Ground
6	VCC	P	Touch panel power supply

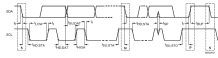
## 2.3 ATT Schematic





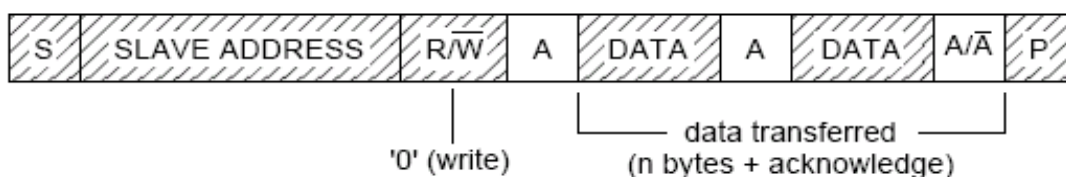
## 2.4 I2C communication


### 2.4.1 Timing Characteristic




Parameter	Symbol	Min.	Max.	Unit
SCL clock frequency	f <sub>SCL</sub>	0	100	kHz
Hold time(repeated START) condition. After this period, the first clock pulse is generated	t <sub>HD;STA</sub>	4.0		μs
Low period of the SCL clock	t <sub>LOW</sub>	4.8		μs
HIGH period of the SCL clock	t <sub>HIGH</sub>	4.8		μs
Set-up time for a repeated START condition.	t <sub>SU;STA</sub>	4.7		μs
Data hold time	t <sub>HD;DAT</sub>	300		ns
Data set-up time	t <sub>SU;DAT</sub>	300		ns
Set-up time for STOP condition	t <sub>SU;STO</sub>	4.0		μs
Bus free time between a STOP and START condition.	t <sub>BUF</sub>	4.7		μs

### 2.4.2 I2C Protocol



 from master to slave

 from slave to master

MBC605

A = acknowledge (SDA LOW)

A-bar = not acknowledge (SDA HIGH)

S = START condition

P = STOP condition



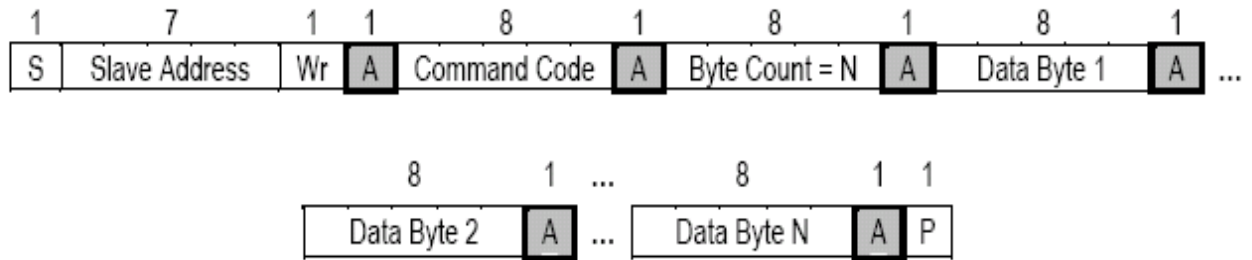


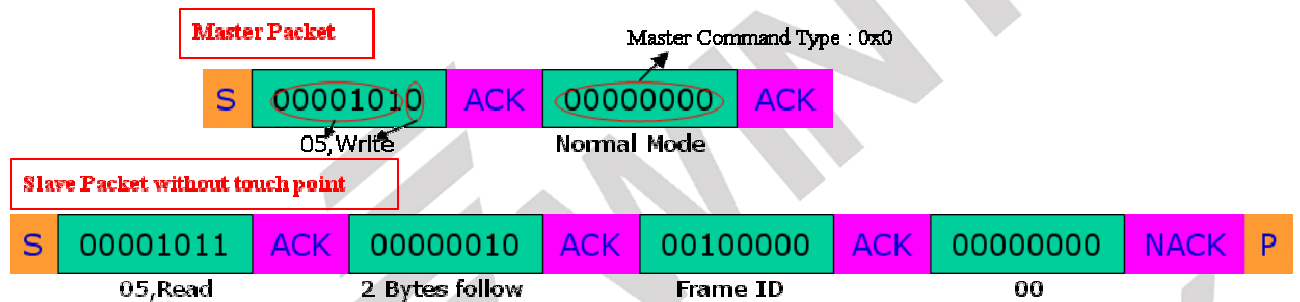
Figure 5-17: Block Write



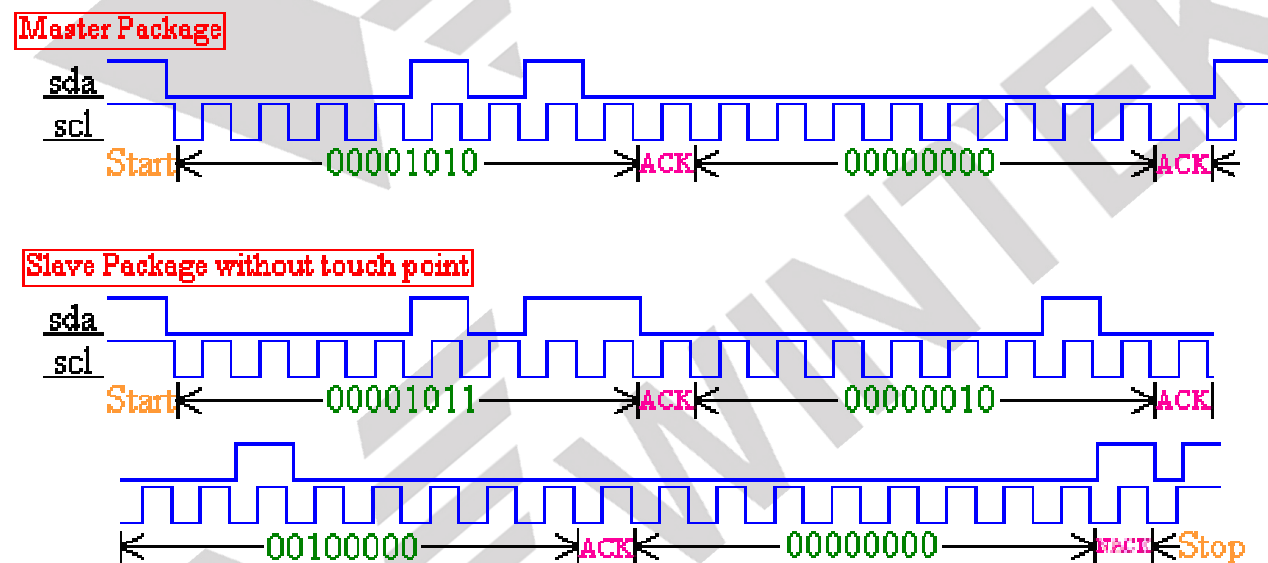
Figure 5-19: Block Read

### Example

Command Type: 0x00 (Real mode)  
Slave Address: 0x05



Timing Diagrams



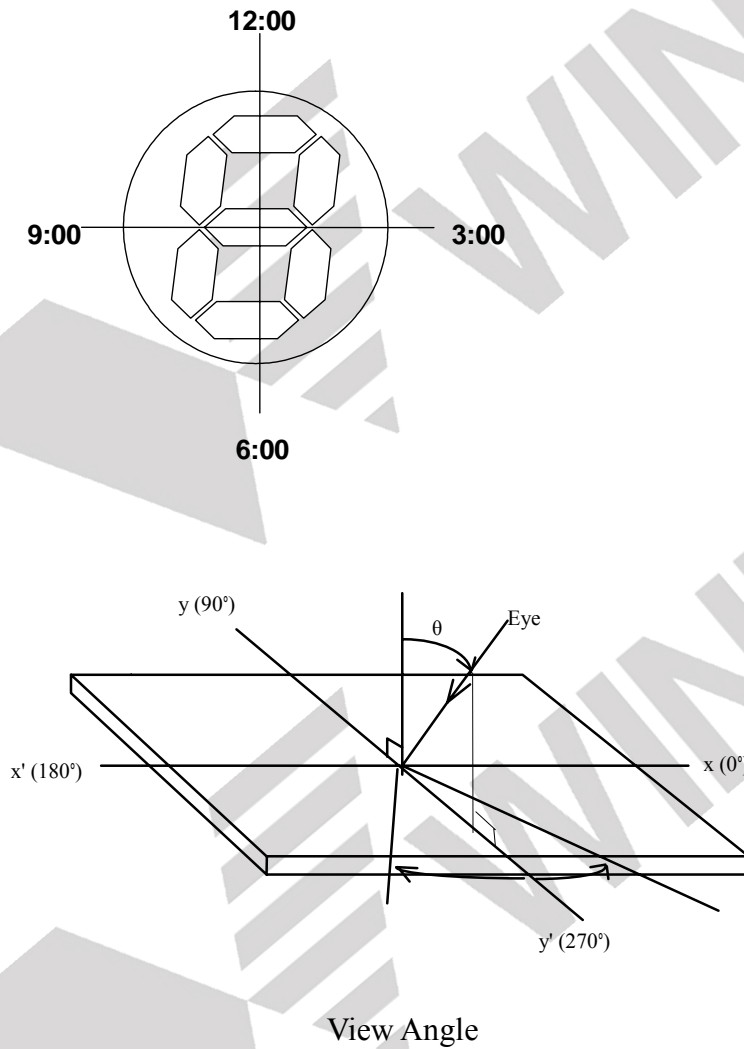
### (3) Electro-optical Units

#### 3.1 Electro-optical Characteristics

ITEM	SYMBOL		CONDITION	MIN.	TYP.	MAX.	UNIT
View Angle CR>10	ψ= 90 ° (12H)		-	70	-	-	deg.
	ψ= 270 ° (6H)			50	-	-	deg.
	ψ= 180 ° (9H)			75	-	-	deg.
	ψ= 0 ° (3H)			75	-	-	deg.
Contrast Ratio	CR		Ta=25	350	400	-	-
Response Time	Tr		Ta=25	-	16	25	ms
	Td						
Color Coordinate	Red	Rx	Ta=25	0.506	0.536	0.566	-
		Ry		0.299	0.329	0.359	
	Green	Gx		0.281	0.311	0.341	
		Gy		0.545	0.575	0.605	
	Blue	Bx		0.115	0.145	0.175	
		By		0.069	0.099	0.129	
	White	Wx		0.283	0.313	0.343	
		Wy		0.299	0.329	0.359	
	NTSC			-	45	-	%
LCD Type	TFT , ( POSITIVE / Transmissive )						


Notes : All the optical data should be measured when the display's driven under the TYP. condition.

## 3.2 Optical Definitions



## (4) Mechanical Units

### 4.1 Mechanical Diagram

NO	Document Number	Attachment file
1	MM0101V-AS1-101	

Double-Click the "Attachment Icon" above for opening attachment file.

## 4.2 Back-light Specification

### LED Backlight Styles:

The LED chips are distributed over the whole light area of the illumination unit, which gives the most uniform light.

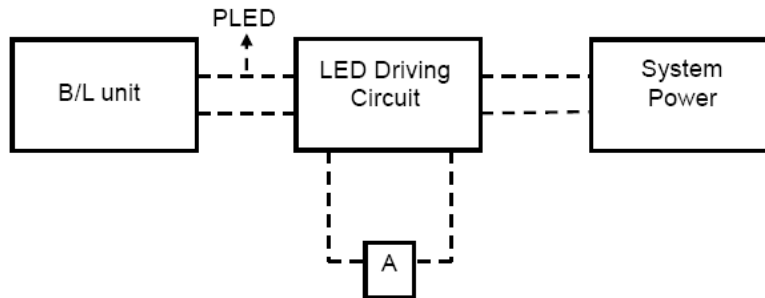
### 4.2-1. Data About LED Backlight

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Backlight Type	LED / WHITE					-
LED Driver Input Voltage	VBL+	4.5	12	21	V	-
Forward Voltage	VF	2.8	2.9	3.0	V	2 (IF=20mA)
Forward Current	IF	19.4	20	20.6	mA	2 (IF=20mA)
Power Consumption	PLED	1.78	1.84	1.91	W	2 & 3 (IF=20mA)
PWM Frequency	PWM_BL	180	200	220	HZ	-
Luminous Intensity (5P)	IV	-	260	-	cd/m2	4
Luminous Intensity Ratio(5P)	V	-	-	25	%	5
Luminous Intensity Ratio(13P)		-	-	40	%	

NOTE:1. Maximum LED Driver Input Current at 7V Input Voltage/PWM Duty 100%.

2. Measure method : a. LED current is measured by utilizing a current meter as show below.

b. System power PLED is measured at input voltage 12V.

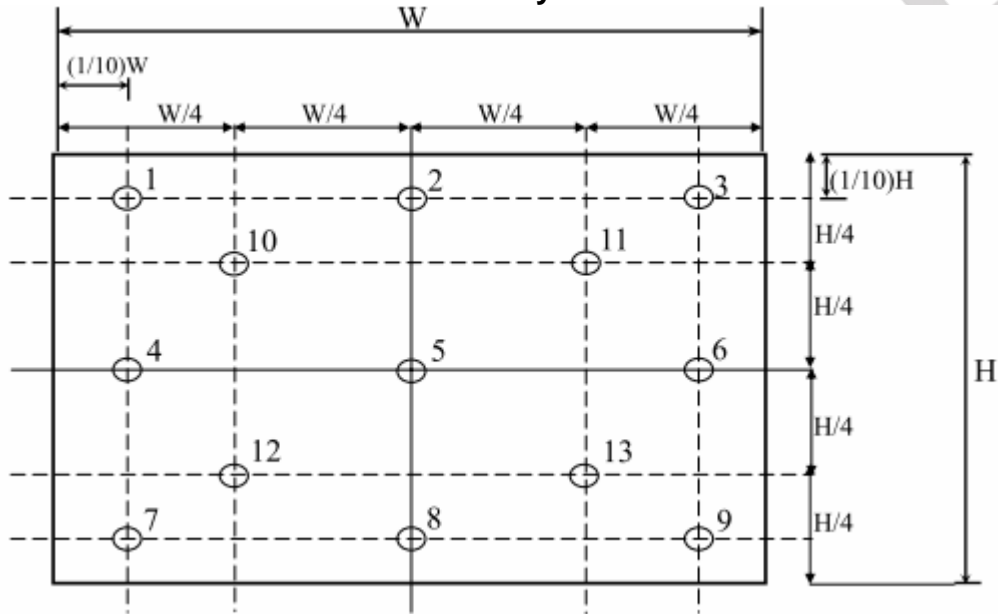


3. Calculator value for reference  $IF \times VF \times N = PLED$

4. 5P luminance (AVG.) : The measuring points are at 5、10、11、12、13.

5. Luminous Intensity Ratio =  $(MAX-MIN) ./ MAX$ .


#### 4.2-2. Definition of Luminous Intensity and Ratio



Note :

1. The measuring points of 5P are at 5、10、11、12、13.
2. The measuring points of 13P are at 1~13 .
4. Hole Diameter  $\phi 3\text{mm}$ ; 1 to 13 per Position Measured Luminous Intensity Ratio

### 4.3 Packing Method

NO	Document Number	Attachment file
1	MF0101Z-M1-02	

Double-Click the "Attachment Icon" above for opening attachment file.



## (5) Quality Units

### 5.1 Specification of Quality Assurance

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#### 5.1-1.Purpose

This standard for Quality Assurance should affirm the quality of LCD module products to supply to purchaser by WINTEK CORPORATION (Supplier).

#### 5.1-2.Standard for Quality Test

a. Inspection :

Before delivering, the supplier should take the following tests, and affirm the quality of product.

b. Electro-Optical Characteristics:

According to the individual specification to test the product.

c. Test of Appearance Characteristics:

According to the individual specification to test the product.

d. Test of Reliability Characteristics:

According to the definition of reliability on the specification for testing products.

e. Delivery Test:

Before delivering, the supplier should take the delivery test.

(i) Test method: According to **ANSI/ASQC Z1.4-2003.General Inspection Level      take a single time.**

(ii) The defects classify of AQL as following:

Major defect: AQL=0.65

Minor defect: AQL=2.5

Total defects: AQL=2.5

#### 5.1-3.Nonconforming Analysis & Deal With Manners

a. Nonconforming analysis:

(i) Purchaser should supply the detail data of non-conforming sample and the non-suitable state.

(ii) After accepting the detail data from purchaser, the analysis of nonconforming should be finished in two weeks.

(iii) If supplier can not finish analysis on time, must announce purchaser before two weeks.

b. Disposition of nonconforming:

(i) If find any product defect of supplier during assembly time, supplier must change the good product for every defect after recognition.

(ii) Both supplier and customer should analyze the reason and discuss the disposition of nonconforming when the reason of nonconforming is not sure.

#### 5.1-4. Agreement items

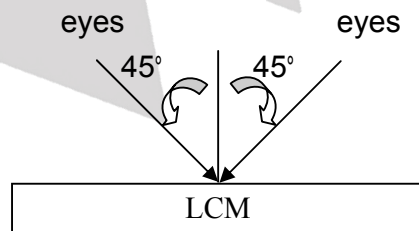
Both sides should discuss together when the following problems happen.

- There is any problem of standard of quality assurance, and both sides think that it must be modified.
- There is any argument item which does not record in the standard of quality assurance.
- Any other special problem.

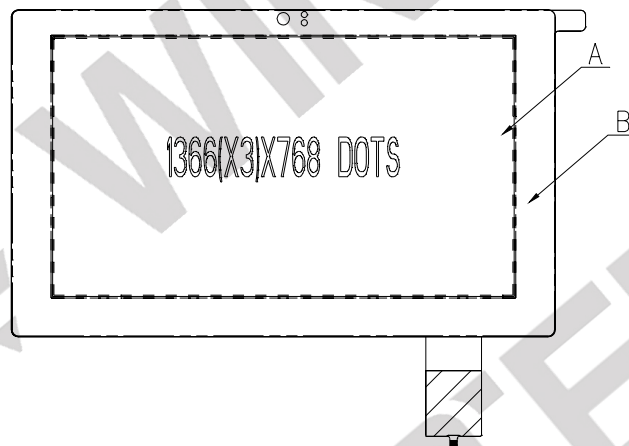
#### 5.1-5. Standard of The Product Appearance Test

a. Manner of appearance test:

- The test must be under 20W × 2 or 40W fluorescent light, and the distance of view must be at 30 cm.
- When display on use front-light test, while display off use back-light test.
- The test direction is base on about around 45° of vertical line.



(iv) Definition of area:



A Area : Viewing area.


B Area : Out of viewing area (Outside viewing area)

Any defect at area B could be ignored. If customer has particular requirement, this requirement should be clearly defined in inspection specification. If inspection specification has defined other criteria, the final judgement should follow the inspection specification .

b. Basic principle:


- It will accord to the AQL when the standard can not be described.
- The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.
- Must add new item on time when it is necessary.

#### 5.1-6. Inspection specification

NO	Document Number	Attachment file
1	M1L070012	

Double-Click the "Attachment Icon" above for opening attachment file.

#### 5.2 Standard Specification for Reliability

NO	Document Number	Attachment file
1	M3ET100001	

Double-Click the "Attachment Icon" above for opening attachment file.

## 5.3 Precautions in Use of LCM

### 5.3-1 Handling of LCM

- Don't give external shock.
- Don't apply excessive force on the surface.
- Liquid in LCD is hazardous substance. Must not lick and swallow. when the liquid is attach to your hand, skin, cloth etc. Wash it out thoroughly and immediately.
- Don't operate it above the absolute maximum rating.
- Don't disassemble the LCM.

### 5.3-2 Storage

- Store in an ambient temperature of  $25 \pm 5$  , and in a relative humidity of 40% to 60%. Don't expose to sunlight or fluorescent light.
- Storage in a clean environment, free from dust, active gas, and solvent.
- Store in anti-static electricity container.
- Store without any physical load.

### 5.3-3 Soldering


- Use the Sn-Ag-Cu (96.5, 3.0, 0.5) solder
- Iron : Temperature 300 and less than 5-6 sec during soldering.
- Rewiring : no more than 3 times.

### 5.3-4 Assembly

The front polarizer is covered with a protective foil which should be removed before use.

## (6) Substance Management Units

### 6.1 Product Substances Management Documentation

NO	Document Number	Attachment file
1	Environment management standard(EMS-P-017-01)	

Double-Click the "Attachment Icon" above for opening attachment file.