SPECIFICATIONS FOR LCD MODULE

CUSTOMER	STD
MODEL	WM-F3248Y-NFLWa VER. 03
CUSTOMER APPROVED	

APPROVED BY	CHECKED BY	ORGANIZED BY
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☒ APPROVAL FOR SPECIFICATIONS ONLY

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History of Version

Version	Contents	Date	Note
a1	NEW VERSION	02.Aug.2010	SPEC.
a2	Change by Wintek 1. Modify 3.1 Mechanical Diagram	06.Sep.2010	SPEC.
a3	Change by Wintek 1. Modify 3.1 Mechanical Diagram a. Modify Tape Position	06.Dec.2010	SPEC.

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(1) Electronic Units

1.1 Absolute Maximum Ratings

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Operating Temperature	TOP	-20	-	+70	℃
Storage Temperature	TST	-30	-	+80	℃
Supply Voltage for Analog	VCI-VSS	-0.3	-	4.6	V
Supply Voltage for Digita	VDD-VSS	-0.3	-	4.6	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 Analog	VCI	-	2.3	2.8	3.3	V
Supply Voltage for Digital	VDD	-	1.65	2.8	3.3	V
Input Signal High Voltage	VIH	-	0.8VDD	-	VDD	V
Input Signal Low Voltage	VIL	-	-0.3	-	0.2VDD	V
Output Signal High Voltage	VOH	-	0.8VDD	-	-	V
Output Signal Low Voltage	VOL	-	-	-	0.2VDD	V
Supply Current for Analog	*ICI	-	-	-	32.5	mA
Supply Current for Digital	*IDD	-	-	-	1.2	mA
Used IC	ILI9481					
INTERFACE	18-bit parallel interface with 80-Series MPU					

*ICI Measurement condition is for all pixels on
*IDD Measurement condition is for all pixels on

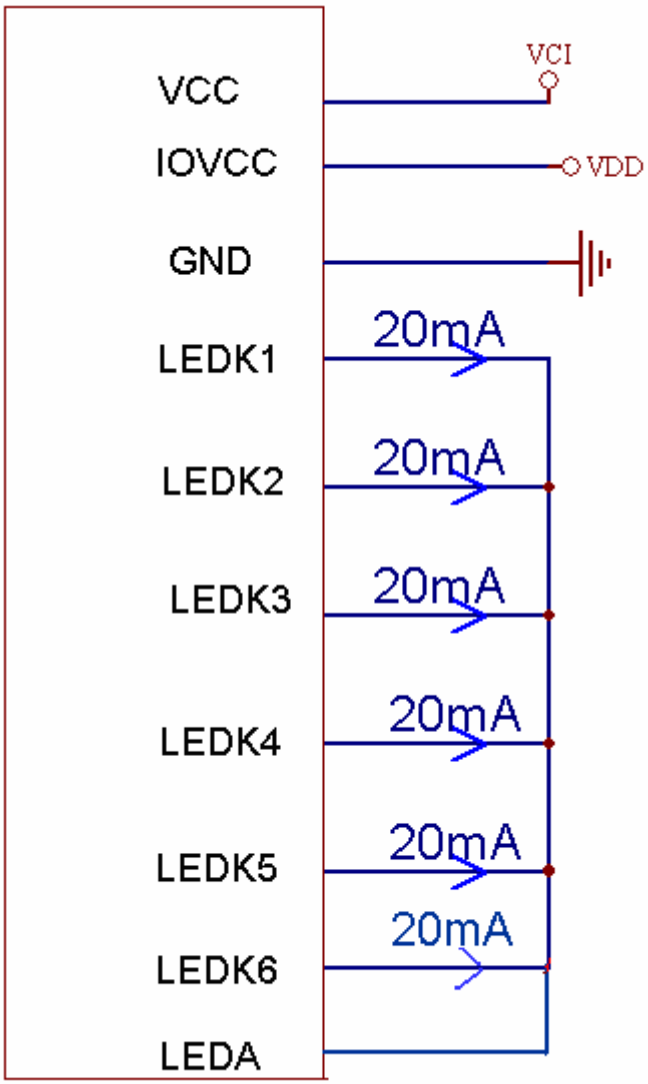
1.3 Interface Pin Function

CN1:

NO	SYMBOL	I / O	FUNCTION
1	FLM	O	Tearing effect output pin
2	GND	P	Ground
3	ENABLE	I	Data Enable Signal
4	DOTCLK	I	Dot Clock Signal
5	VSYNC	I	Vertical Sync.
6	GND	P	Ground
7	HSYNC	I	Horizontal Sync.
8	IM0	I	Select the MPU system interface mode
9	IM1	I	Select the MPU system interface mode
10	IM2	I	Select the MPU system interface mode
11	IOVCC	P	Logic Power supply.(2.8V Typ.)
12	VCC	P	Analog Power supply.(3.3V Typ.)
13	SDI	I/O	Serial Data Input
14	SDO	O	Serial data output pin
15	DB17	I/O	Data Bus
16	DB16	I/O	Data Bus
17	DB15	I/O	Data Bus
18	DB14	I/O	Data Bus
19	DB13	I/O	Data Bus
20	DB12	I/O	Data Bus
21	DB11	I/O	Data Bus
22	DB10	I/O	Data Bus
23	DB9	I/O	Data Bus
24	DB8	I/O	Data Bus
25	DB7	I/O	Data Bus
26	DB6	I/O	Data Bus
27	DB5	I/O	Data Bus
28	DB4	I/O	Data Bus
29	DB3	I/O	Data Bus
30	DB2	I/O	Data Bus
31	DB1	I/O	Data Bus
32	DB0	I/O	Data Bus
33	RESET	I	Reset signal
34	RD	I	Read control pin for the DBI interface.
35	WR/SCL	I	Write control pin for the DBI interface.
36	RS	I	Display data / Command selection pin
37	CS	I	Chip select input pin

38	LEDK6	P	LED6 Cathode
39	LEDK5	P	LED5 Cathode
40	LEDK4	P	LED4 Cathode
41	LEDK3	P	LED3 Cathode
42	LEDK2	P	LED2 Cathode
43	LEDK1	P	LED1 Cathode
44	LEDA	P	LED Anode
45	LCM_ID	O	Identify of LCM

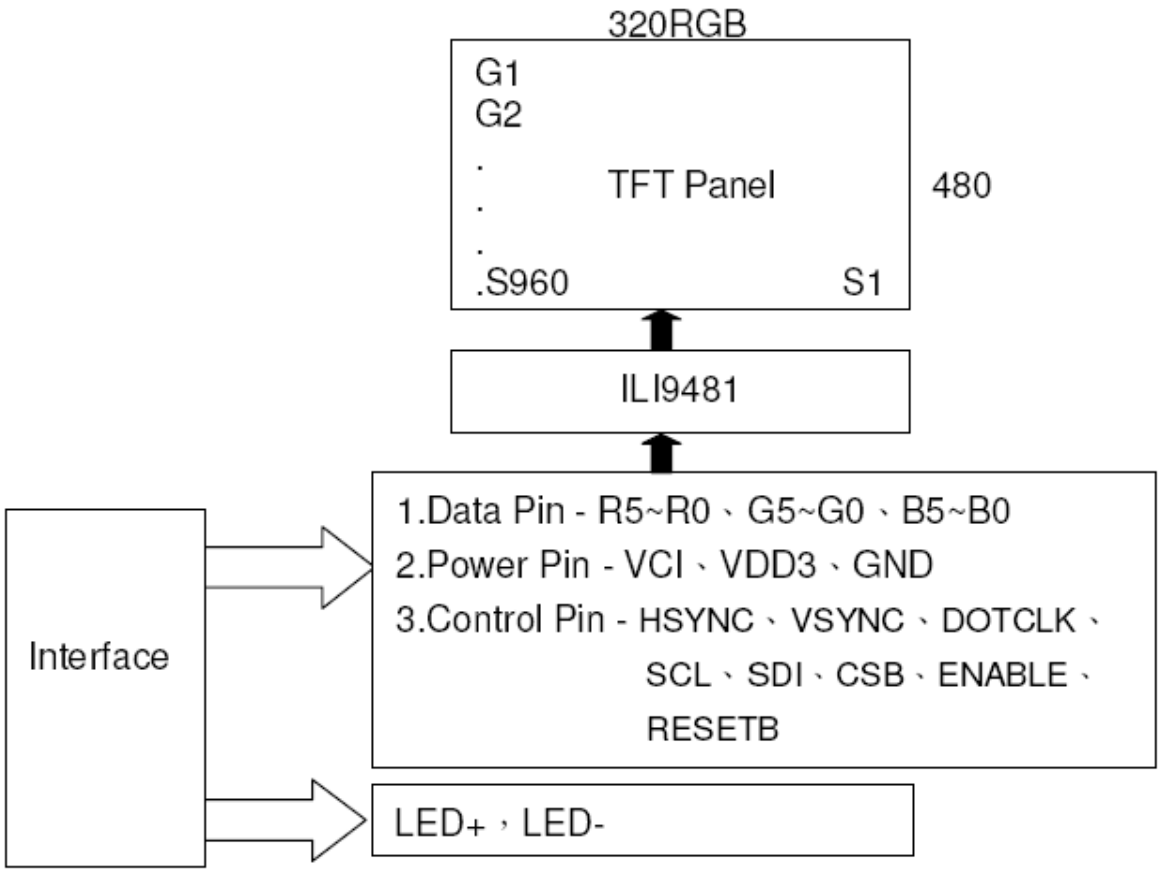
1.4 Power Supply for LCD Module



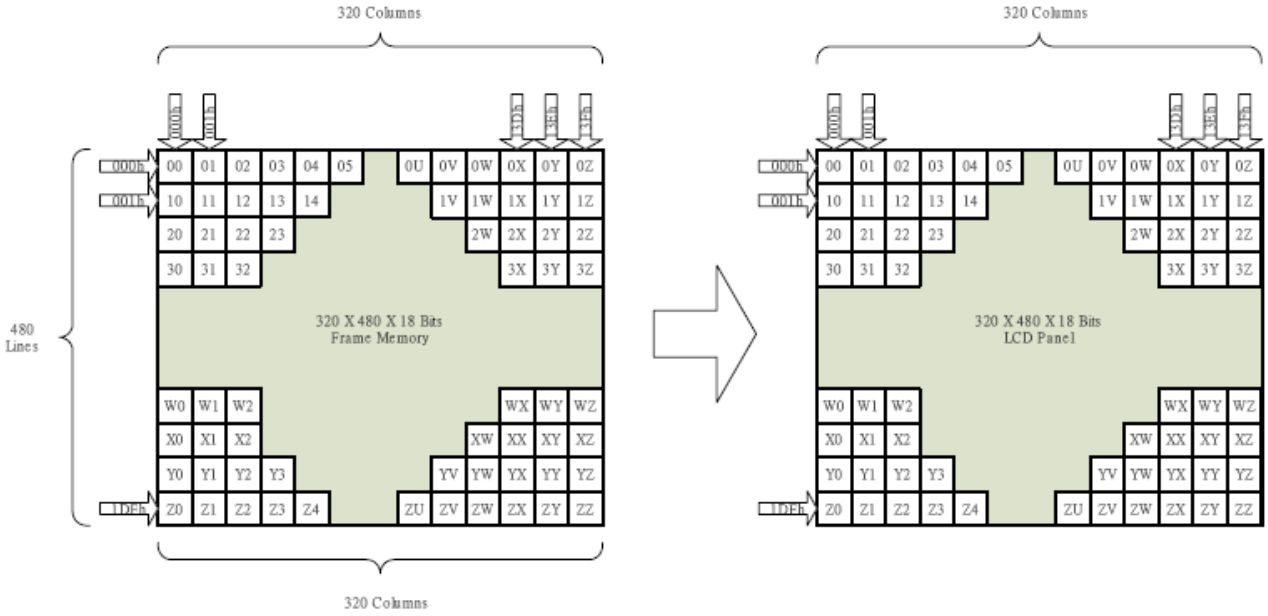
NOTE: 1.VCI=2.8V,VDD=2.8V
2. I_{LED} = 120mA, VAK≦3.5V

1.5 Block Diagram with Display RAM Address

1.5-1. Block Diagram



1.5-2. Display Data RAM:

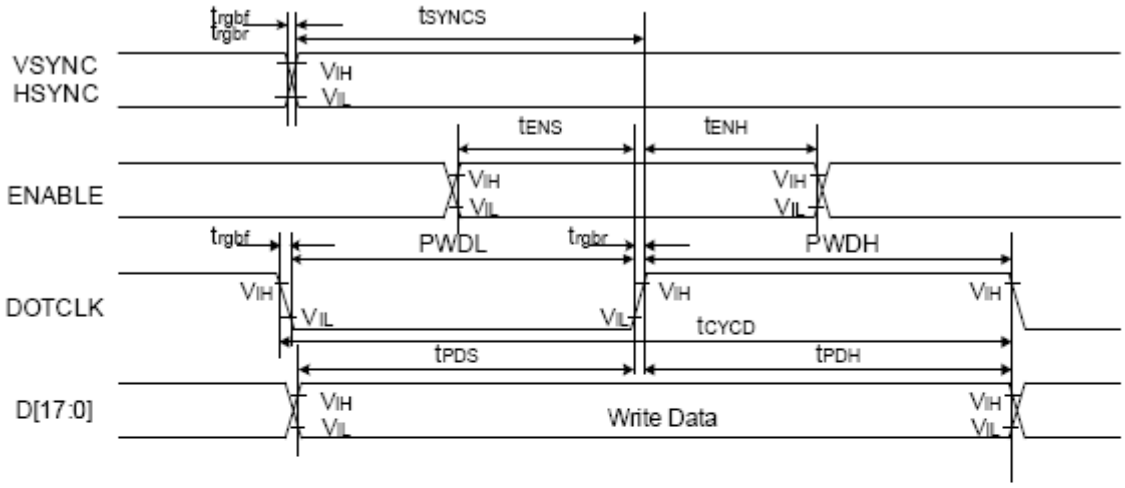


1.5-3. Initialization Table:

NO	Document Number	Attachment file
1	MF3248Y-IN1-102	

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

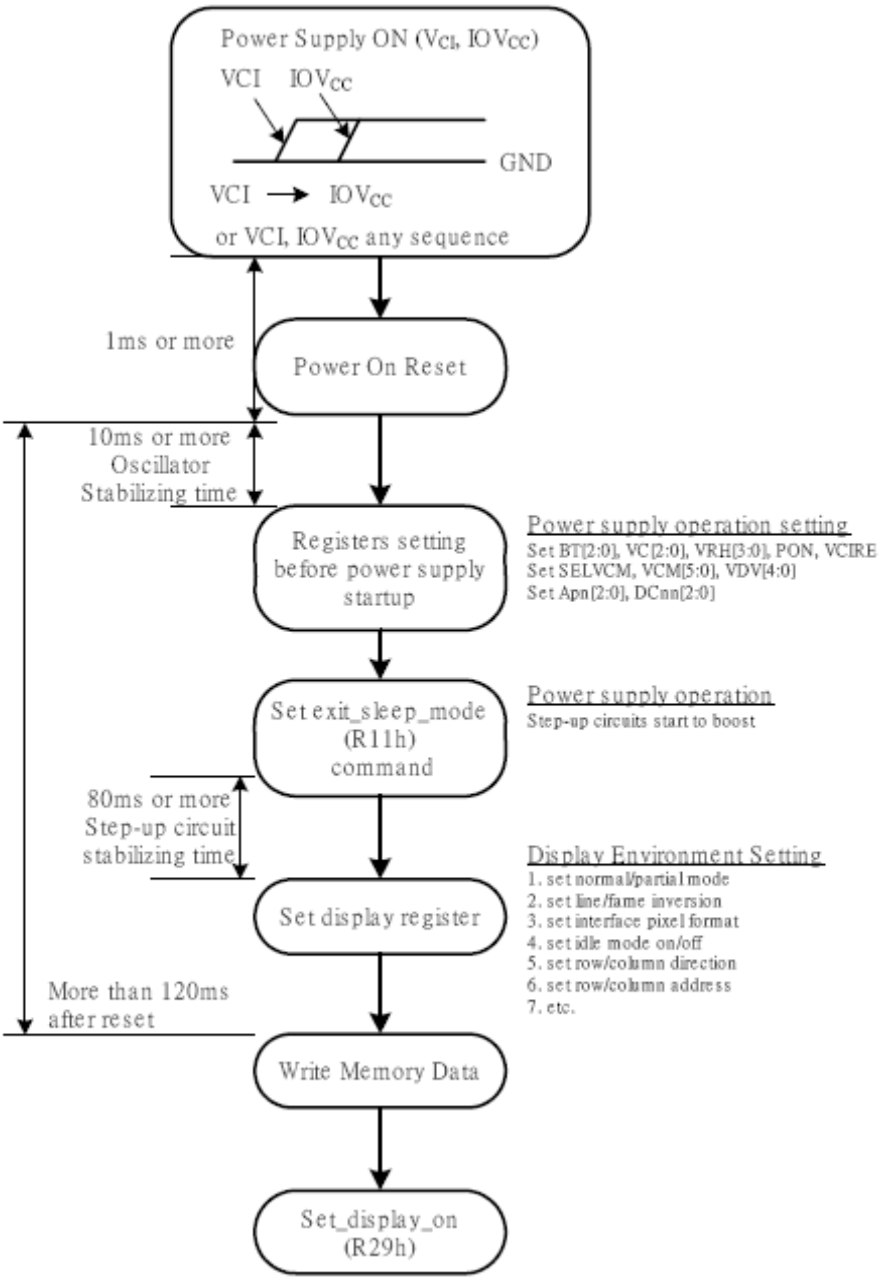
1.6 Timing Characteristic



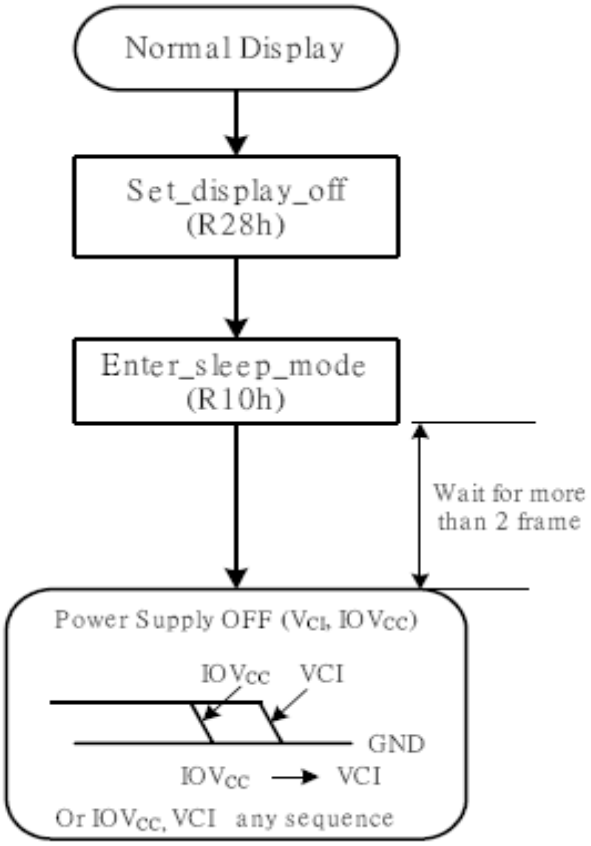
Signal	Symbol	Parameter	min	max	Unit
VSYNC / HSYNC	t_{SYNCS}	VSYNC/HSYNC setup time	15	-	ns
	t_{SYNCH}	VSYNC/HSYNC hold time	15	-	ns
ENABLE	t_{ENS}	ENABLE setup time	15	-	ns
	t_{ENH}	ENABLE hold time	15	-	ns
D[17:0]	t_{PDS}	Data setup time	15	-	ns
	t_{PDH}	Data hold time	15	-	ns
DOTCLK	PWDH	DOTCLK high-level period	15	-	ns
	PWDL	DOTCLK low-level period	15	-	ns
	t_{CYCD}	DOTCLK cycle time	104	-	ns
	t_{rgbr} , t_{rgbf}	DOTCLK,HSYNC,VSYNC rise/fall time	-	15	ns

1.7 Power ON/OFF SEQUENCE

1.7.1 Power ON Sequence



1.7.2 Power OFF Sequence



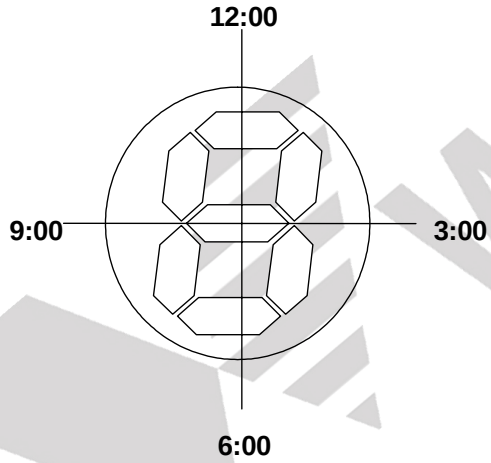
(2) Electro-optical Units

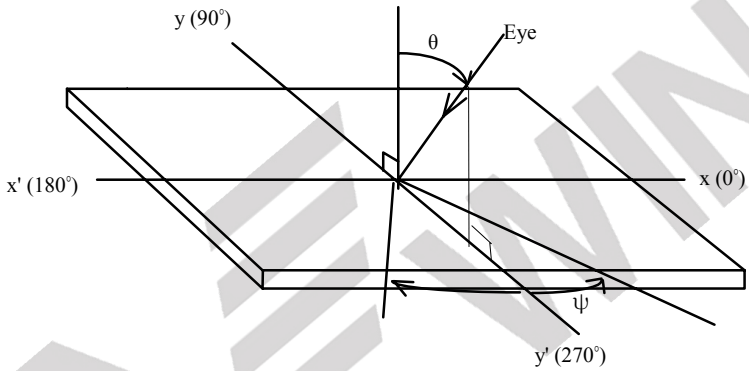
2.1 Electro-optical Characteristics

ITEM	SYMBOL		CONDITION	MIN.	TYP.	MAX.	UNIT
View Angle	ψ= 90 ° (12H)		CR>=10	65	80	-	deg.
	ψ= 270 ° (6H)			65	80	-	deg.
	ψ= 180 ° (9H)			65	80	-	deg.
	ψ= 0 ° (3H)			65	80	-	deg.
Contrast Ratio	CR		Ta=25℃	400	500	-	-
Response Time	Tr		Ta=25℃	-	10	-	ms
	Td			-	20	-	ms
Color Coordinate	Red	Rx	Ta=25℃	0.57	0.63	0.69	-
		Ry		0.285	0.345	0.405	
	Green	Gx		0.26	0.32	0.38	
		Gy		0.57	0.630	0.69	
	Blue	Bx		0.085	0.145	0.205	
		By		0	0.060	0.12	
	White	Wx		0.24	0.3	0.36	
		Wy		0.275	0.335	0.395	
	NTSC				70		%
LCD Type	TFT , (NEGATIVE / Transmissive)						
Viewing Direction	6:00						

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

2.2 Optical Definitions





View Angle

2.3 Touch Panel Absolute Maximum Ratings

ITEM		SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Operating Temperature		T_{OP}	-20	-	70	℃	-
Storage Temperature		T_{ST}	-30	-	80	℃	-
input voltage range		V_{DD_TP}	-0.3		3.6	V	V_{DD} to V_{ss}
ESD	(HBM test)				TBD	V	
Static Electricity		Be sure that you are grounded when handing TP					

Note1: If the module exceeds the absolute maximum ratings, it may be damaged permanently .Also, if the module operated with the absolute maximum ratings for a long time, its reliability may drop.

2.4 Touch Panel Electrical Characteristics

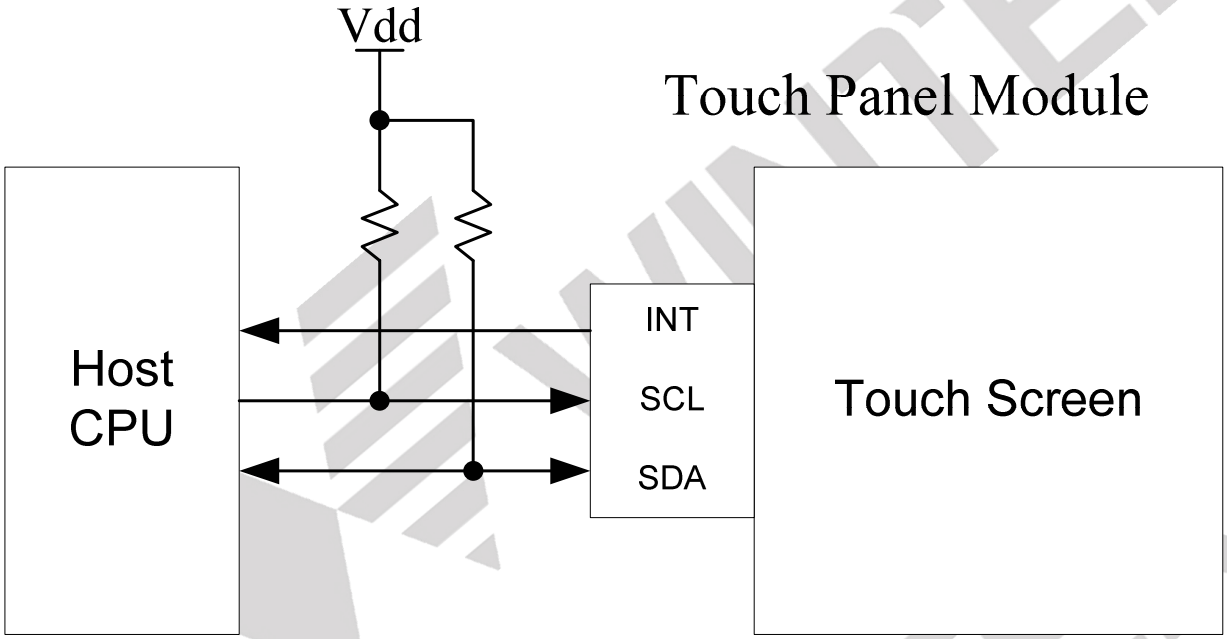
(Ta=25℃,V_{DD}=3.3V)

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	Remark
Input power voltage		V_{DD}	-	3.2	3.3	3.4	V	-
Input Signal Voltage	H Level	V_{IH}	-	0.7VDD	-	VDD	V	-
	L Level	V_{IL}	-	GND	-	0.3VDD	V	
Supply Current		*I_{DD}	-	-	-	TBD	mA	-

2.5 Touch Panel Interface Pin Function

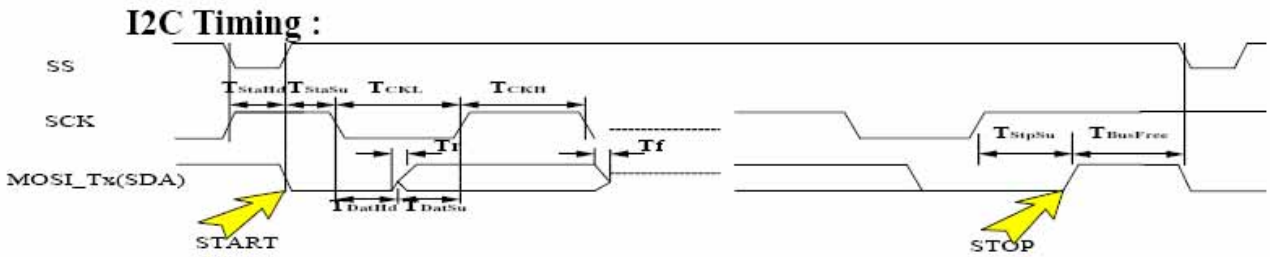
NO.	SYMBOL	I/O	FUNCTION
1	VDD	P	Touch panel power supply
2	GND	P	Ground
3	SAT	I	I2C request pad
4	SDA	I/O	I2C pin
5	SCL	I	I2C pin
6	XRES	I	Global reset input. (Low Active)

2.6 Touch Panel Interface Diagram



2.7 Touch Panel Timing Characteristic

2.7.1 I2C interface

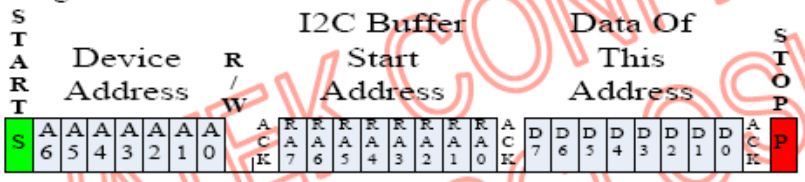


Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Working Frequency	Fclk	50		400	Khz	VDD=3.0V, T_A=25℃
I2C Clock Low	T_{CKL}	1250			nS	VDD=3.0V, T_A=25℃
I2C Clock High	T_{CKH}	1250			nS	VDD=3.0V, T_A=25℃
I2C Data rising time	T_r			300	nS	VDD=3.0V, T_A=25℃
I2C Data falling time	T_f			300	nS	VDD=3.0V, T_A=25℃
I2C Data hold time	T_{DatHd}	0			nS	V_{DD} = 3.0V, T_A=25℃
I2C Data setup time	T_{DatSu}	100			nS	V_{DD}= 3.0V, T_A=25℃
I2C Start Condition hold time	T_{StaHd}	600			nS	V_{DD}= 3.0V, T_A=25℃
I2C Start Condition setup time	T_{StaSu}	600			nS	V_{DD}= 3.0V, T_A=25℃
I2C Stop Condition setup time	T_{StpSu}	600			nS	V_{DD}= 3.0V, T_A=25℃
I2C Bus free time	$T_{BusFree}$	1300			nS	V_{DD}= 3.0V, T_A=25℃

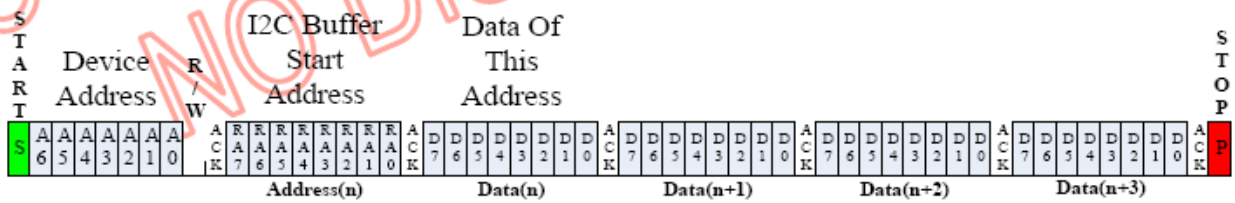
2.7.2 Protocol

I2C Bus Protocol:

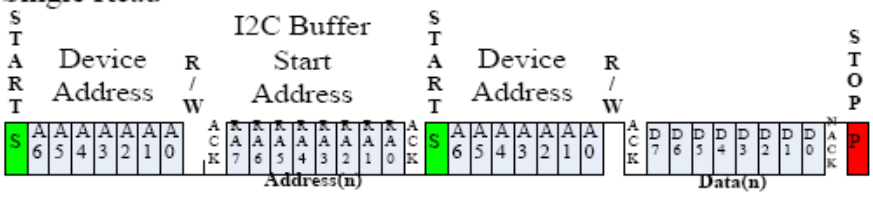
Single Write



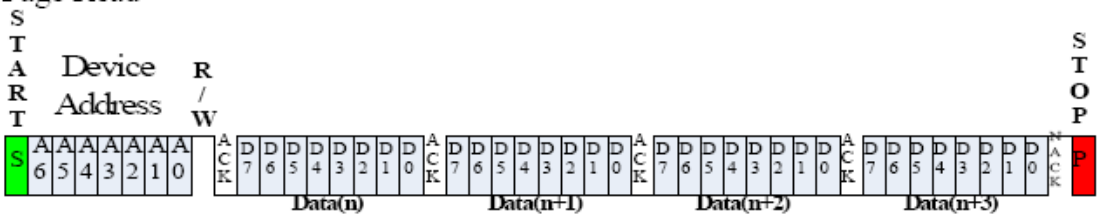
Page Write



Single Read



Page Read



2.8 Touch Panel Packet Transmission

I2C Buffer configuration

I2C Buffer Address	Function of this I2C Buffer	Status
0 H	Gesture ID Code	R
1 H	Gesture Data 1	R
2 H	Gesture Data 2	R
3 H	Gesture Data 3	R
4 H	Gesture Data 4	R
5 H	Gesture Data 5	R
6 H	Gesture Data 6	R
7 H	Gesture Data 7	R
8 H	Gesture Data 8	R
9 H	Reserve	-
A H	Reserve	-
B H	Reserve	-
C H	Sensor Operation Control 1	R/W
D H	Sensor Operation Control 2	R/W
E H	Chip ID	R
F H	Software Version	R

Motion Gesture

Gesture	I2C Buffer Address					
Moving	0H	1H	2H	3H	4H	5H
	10H	X[15:8]	X[7:0]	Y[15:8]	Y[7:0]	Image Number

Image Number:

Side Gesture

Gesture	I2C Buffer Address					
Slide	0H	1H	2H	3H	4H	5H
	11H	Slide Direction	X[15:8]	X[7:0]	Y[15:8]	Y[7:0]

Slide Direction:

01H → Slide Right.

A valid Slide Right gesture, keep two continual state of increased X direction and T_{Slide} must less than 500mS.

81H → Slide Left.

A valid Slide Left gesture, keep two continual state of decreased X direction and T_{Slide} must less than 500mS.

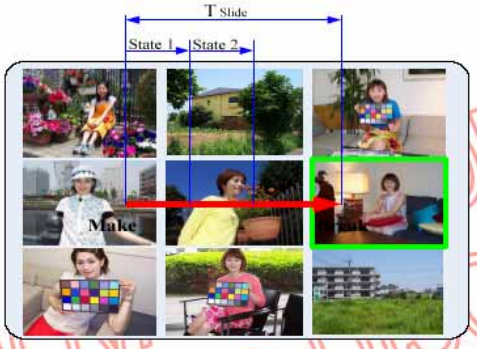
09H → Slide Up.

A valid Slide Up gesture, keep two continual state of decreased Y direction and T_{Slide} must less than 500mS.

89H → Slide Down.

A valid Slide Down gesture, keep two continual state of increased Y direction and T_{Slide} must less than 500mS.

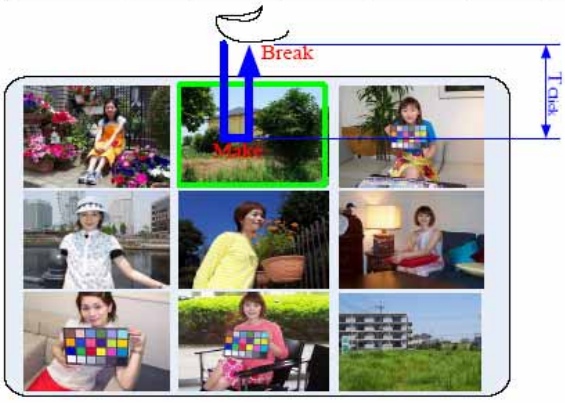
Behavior of Slide Right:



Behavior of Slide Down:

Click Gesture

Gesture	I2C Buffer Address					
Click	0H	1H	2H	3H	4H	5H
	12H	X[15:8]	X[7:0]	Y[15:8]	Y[7:0]	Image Number



A valid Click gesture, while finger click time (T_{Click}) is less 500mS.

Double Click Gesture

Gesture	I2C Buffer Address					
Double Click	0H	1H	2H	3H	4H	5H
	13H	X[15:8]	X[7:0]	Y[15:8]	Y[7:0]	Image Number

$T_{Double\ Click} = T1 + T2 + T3$

A valid Double Click gesture, while finger double click time ($T_{Double\ Click}$) are less 500mS and must keep same image area.

Zoom Gesture

Gesture	I2C Buffer Address					
Zoom	0H	1H	2H	3H	4H	5H
	20H	Zoom Direction	Don't care	Don't care	Don't care	Don't care

Zoom Direction:

01H → Zoom In.

A valid Zoom In gesture, while multi finger touch on touch screen and keep two continual state of increased X direction.

81H → Zoom Out.

A valid Zoom In gesture, while multi finger touch on touch screen and keep two continual state of decreased X direction.

Sensor Operation Control Register

Sensor Operation Control 1			
I2C Buffer Address	Bit	Function Description	Status
C	7	Data Packet Selector for multi touch gesture 0 : Report two point coordinate. 1 : Report gesture.	R/W
	6…2	Reserved	
	1…0	Sensor full running time after finger leave 00 : 1 second (Default) 01 : 2 second 10 : 3 second 11 : 5 second	R/W
Sensor Operation Control 2			
I2C Buffer Address	Bit	Function Description	Status
D	7	Sensor On/Off Control 0 : Disable Sensor 1 : Enable Sensor (Default)	R/W
	6	Doze Mode On/Off Control 0 : Disable Doze Mode 1 : Enable Doze Mode (Default)	R/W
	5…3	Doze Mode Wake Up Cycle 000 : With 2 ADC scan cycles. 001 : With 3 ADC scan cycles. 010 : With 4 ADC scan cycles. 011 : With 5 ADC scan cycles. (Default) 100 : With 6 ADC scan cycles 101 : With 10 ADC scan cycles 110 : With 15 ADC scan cycles 111 : With 30 ADC scan cycles	R/W
	2…0	Doze Mode Deep Sleep Time 000 : 32ms Deep Sleep Time 001 : 64ms Deep Sleep Time 010 : 128ms Deep Sleep Time (Default) 011 : 256ms Deep Sleep Time 100 : 512ms Deep Sleep Time 101 : 1025ms Deep Sleep Time 110 : 2048ms Deep Sleep Time 111 : 4096ms Deep Sleep Time	R/W

(3) Mechanical Units

3.1 Mechanical Diagram

NO	Document Number	Attachment file
1	MF3248Y-AS2-103	

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

3.2 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.

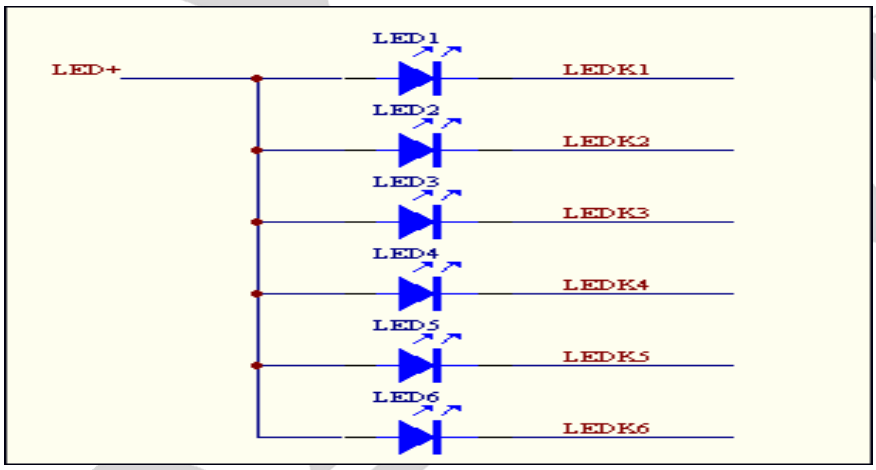
3.2-1. Data About LED Backlight

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
Backlight Type	LED / WHITE						-
Supply Voltage	VLED	-	3.5	5.0	V	IF= 120mA	-
Reverse Voltage (Single chip)	VR	-	-	3.55	V	-	-
Luminous Intensity	IV	220	270	-	cd/m2	-	-
Luminous Intensity Ratio	-			30	%	-	-

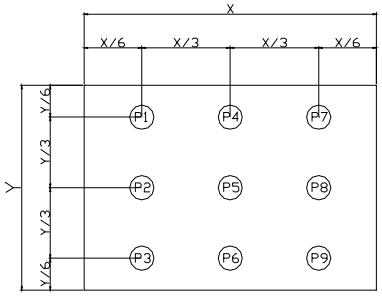
NOTE：1. Average Luminous Intensity of P1 – P9

2. Luminous Intensity Ratio = ((MAX. - MIN.)/ MAX.)*100%

3.2-2. Internal Circuit Diagram



3.2-3. MEASURED METHOD (X*Y: Light Area)



(Effective spatial Distribution)

Hole Diameter φ3mm;1 to 9 per Position Measured Luminous Intensity Ratio

3.3 Packing Method

NO	Document Number	Attachment file
1	DF3248VC-M1-01	

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

(4) Quality Units

4.1 Specification of Quality Assurance

4.1-1.Purpose

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

4.1-2.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 Ⅱ 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

4.1-3.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.

4.1-4. Agreement items

Both sides should discuss together when the following problems happen.

a. There is any problem of standard of quality assurance, and both sides think that it must be modified.

b. There is any argument item which does not record in the standard of quality assurance.

c. Any other special problem.

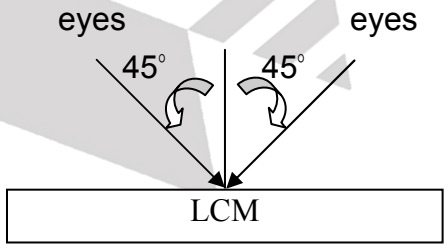
4.1-5. Standard of The Product Appearance Test

a. Manner of appearance test:

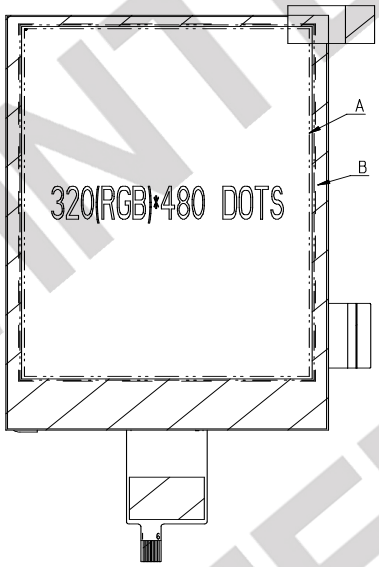
(i) The test must be under 20W ╳ 2 or 40W fluorescent light, and the distance of view must be at 30 cm.

(ii) When display on use front-light test, while display off use back-light test.

(iii)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:

(i) It will accord to the AQL when the standard can not be described.

(ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.

(iii) Must add new item on time when it is necessary.

c. Standard of inspection:(Unit: mm)

4.1-6. Inspection specification

NO	Document Number	Attachment file
1	M1L070012	

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

4.2 Standard Specification for Reliability

NO	Document Number	Attachment file
1	M3ET090001	

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

4.3 Precautions in Use of LCM

4.3-1 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.

4.3-2 Storage

- Store in an ambient temperature of 5℃ to 45℃, 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.

4.3-3 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.

4.3-4 Assembly

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

(5) Substance Management Units

5.1 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.