



# SPECIFICATIONS FOR LCD MODULE

CUSTOMER	STD
MODEL	WM-F2432V1-6FLWe VER. 1
CUSTOMER APPROVED	

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**History of Version**

<b>Version</b>	<b>Contents</b>	<b>Date</b>	<b>Note</b>
<b>e1</b>	<b>NEW VERSION</b>	<b>21.SEP.2006</b>	<b>SPEC.</b>

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## (1) Electronic Units

### 1.1 Absolute Maximum Ratings

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Operating Temperature	$T_{OP}$	-20	-	+70		-
Storage Temperature	$T_{ST}$	-30	-	+80		-
Input power supply	$IOV_{CC}$	-0.3	-	4.6	V	-
Input power supply	$V_{Ci}$	-0.3	-	4.6	V	
Supply voltage for step-up circuit	$V_{Ci}$	-0.3	-	4.6	V	-
Logic input voltage range	$IOV_{CC}$	-0.3	-	$V_{CC}+0.3$	V	-
Static Electricity	Be sure that you are grounded when handing LCM					

### 1.2 Electrical Characteristics

( $T_a=25$  VSS=0V)

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	Remark
Operating voltage	$IOV_{CC}$	-	2.7	2.8	2.9	V	-
DC/DC power voltage	$V_{Ci}$	-	2.7	2.8	2.9	V	-
Input Signal Voltage	H Level	$IOV_{CC}=1.65 \sim 3.3V$	$0.8 \times IOV_{CC}$	-	$IOV_{CC}$	V	-
	L Level	$IOV_{CC}=1.65 \sim 3.3V$	-0.3	-	$0.2 \times IOV_{CC}$	V	
Output Signal Voltage	H Level	$I_{OH}=-0.1mA$	$0.8 \times IOV_{CC}$	-	-	V	-
	L Level	$I_{OH}=0.1mA$	-	-	$0.2 \times IOV_{CC}$	V	
Supply Current	$IOI_{CC+}$ $I_{Ci}$	-	-	8	10	mA	-
Display color	262,144 colors						

\*  $I_{CC}$  Measurement condition is for all pixels on display.

To avoid image residual, the same picture could not display to exceed one hour.

### 1.3 Interface Pin function

CN1:

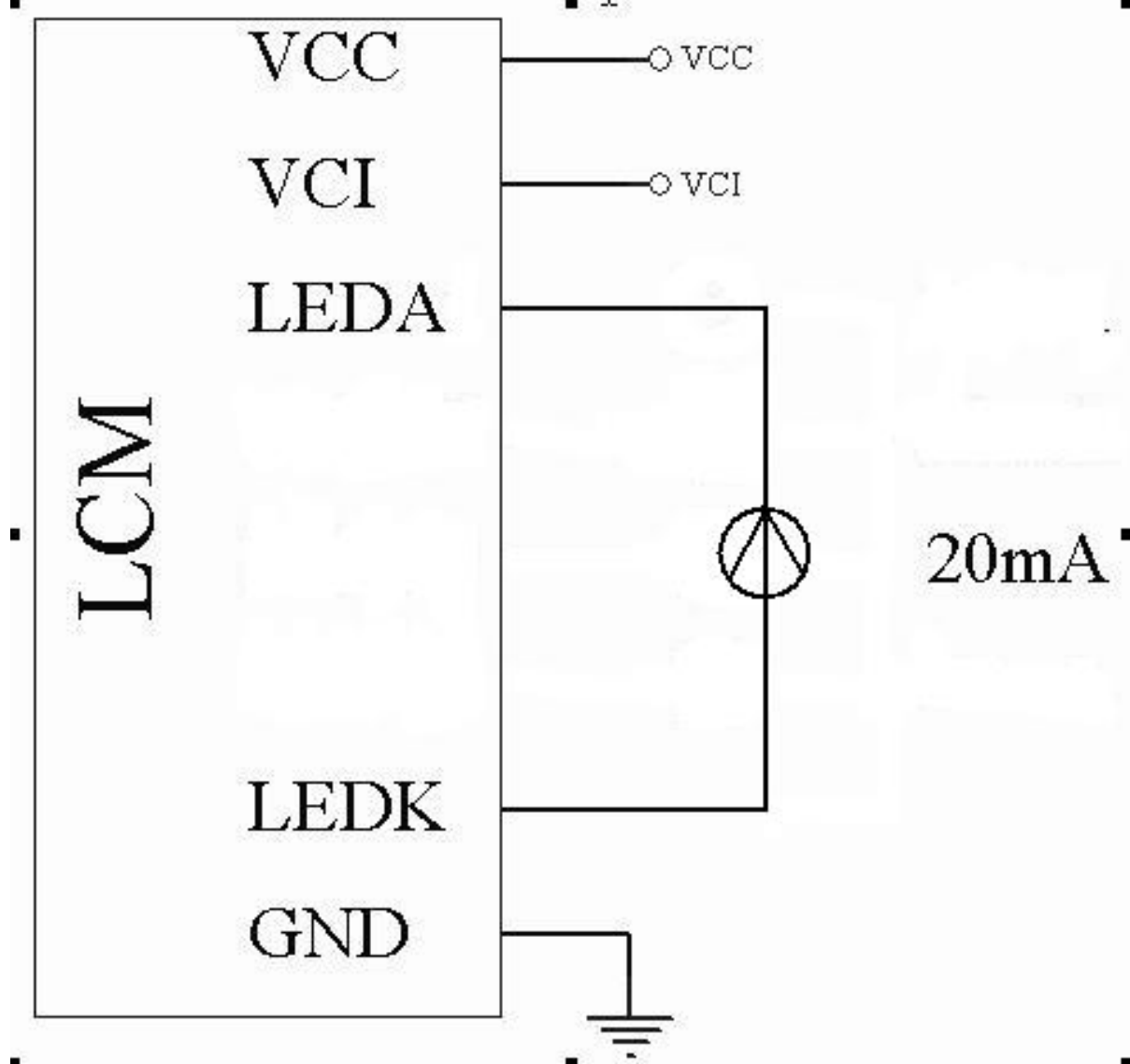
NO.	SYMBOL	I/O	FUNCTION
1	LEDA	P	Anode of LED back light
2	LEDK	P	Cathode of LED back light
3	GND	P	Ground pin
4	VCI	P	Power supply for analog
5	IOVCC	P	Power supply for logic
6	/CS	I	Input pin for chip selection signal.
7	ENABLE	I	ENABLE
8	SDI	I	For a serial peripheral interface (SPI), input data is fetched at the rising edge of SCL signal.
9	SDO	O	For a serial peripheral interface (SPI), DB1/SDO serves as the serial data output pin. Successive bits are output at the falling edge of the SCL signal.
10	/RS	I	Selects data or command
11	WR/SCL	I	Write enable signal / The synchronous clock signal.(Input pin)
12	/RD	I	Read enable signal
13	PD0(B0)	I/O	18-Bit bi-directional data bus
14	PD1(B1)	I/O	
15	PD2(B2)	I/O	
16	PD3(B3)	I/O	
17	PD4(B4)	I/O	
18	PD5(B5)	I/O	
19	PD6(G0)	I/O	
20	PD7(G1)	I/O	
21	PD8(G2)	I/O	
22	PD9(G3)	I/O	
23	PD10(G4)	I/O	
24	PD11(G5)	I/O	
25	PD12(R0)	I/O	

26	PD13(R1)	I/O	18-Bit bi-directional data bus
27	PD14(R2)	I/O	
28	PD15(R3)	I/O	
29	PD16(R4)	I/O	
30	PD17(R5)	I/O	
31	DOTCLK	I	Dot-clock for RGB i/f circuit
32	HSYNC	I	Raster-row synchronization signal
33	VSYNC	I	Frame synchronization signal
34	/RESET	I	Reset pin. Initializes the IC, when this signal is low. Must be reset after power is stable.
35	IM1	I	Selects the interface mode
36	IM2	I	
37	IM3	I	

Selects the serial interface mode

IM1	IM2	IM3	Mode
1	0	1	80-System 18-bit interface DB17-0
1	0	0	80-System 16-bit interface DB17-10 DB8-1
0	1	0	RGB-Interface 6bit/18bit RGB interface

### 1.4 Power Supply for LCD Module

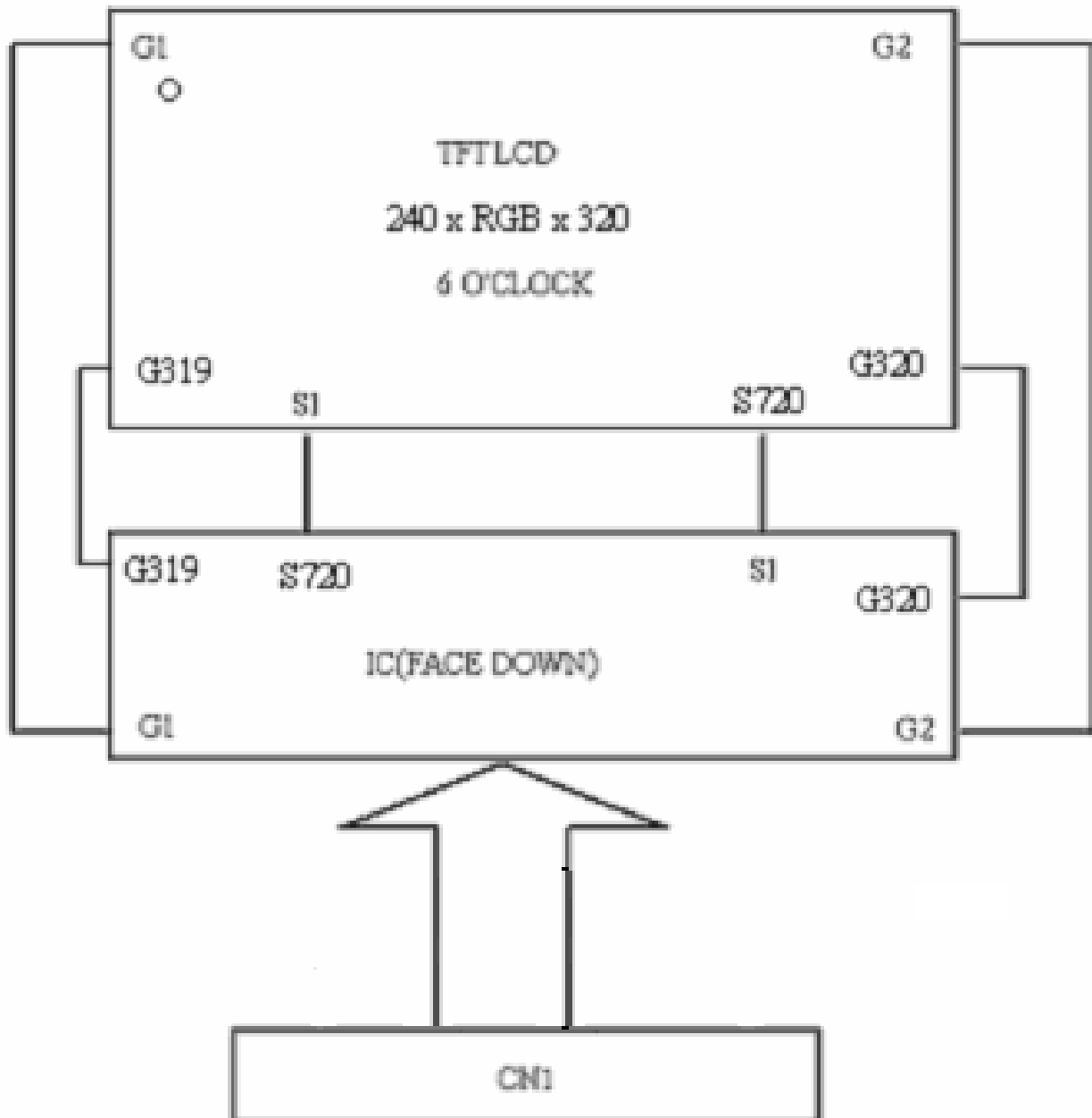


**Note1: Using Internal Voltage Generator  $V_{CC}=2.8V$ ,  $V_{CI} = 2.8V$ .**

**Note2: LED Back Light VAK 17.6 ,  $I_{LED}= 20 \text{ mA}$**

## 1.5 Block Diagram with Display RAM Address

### 1.5.1 Block Diagram



## 1.5.2 IC GRAM Addressing

**Table 15 GRAM address and display position on the panel (SS = 0, BGR = 0)**

S/G pin		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	.....	S709	S710	S711	S712	S713	S714	S715	S716	S717	S718	S719	S720			
GS=0	GS=1	WD[17:0]			WD[17:0]			WD[17:0]			WD[17:0]			.....	WD[17:0]			WD[17:0]			WD[17:0]			WD[17:0]					
G1	G320	h00000			h00001			h00002			h00003			.....	h000EC			h000ED			h000EE			h000EF					
G2	G319	h00100			h00101			h00102			h00103			.....	h001EC			h001ED			h001EE			h001EF					
G3	G318	h00200			h00201			h00202			h00203			.....	h002EC			h002ED			h002EE			h002EF					
G4	G317	h00300			h00301			h00302			h00303			.....	h003EC			h003ED			h003EE			h003EF					
G5	G316	h00400			h00401			h00402			h00403			.....	h004EC			h004ED			h004EE			h004EF					
G6	G315	h00500			h00501			h00502			h00503			.....	h005EC			h005ED			h005EE			h005EF					
G7	G314	h00600			h00601			h00602			h00603			.....	h006EC			h006ED			h006EE			h006EF					
G8	G313	h00700			h00701			h00702			h00703			.....	h007EC			h007ED			h007EE			h007EF					
G9	G312	h00800			h00801			h00802			h00803			.....	h008EC			h008ED			h008EE			h008EF					
G10	G311	h00900			h00901			h00902			h00903			.....	h009EC			h009ED			h009EE			h009EF					
G11	G310	h00A00			h00A01			h00A02			h00A03			.....	h00AEC			h00AED			h00AEE			h00AEF					
G12	G309	h00B00			h00B01			h00B02			h00B03			.....	h00BEC			h00BED			h00BEE			h00BEF					
G13	G308	h00C00			h00C01			h00C02			h00C03			.....	h00CEC			h00CED			h00CEE			h00CEF					
G14	G307	h00D00			h00D01			h00D02			h00D03			.....	h00DEC			h00DED			h00DEE			h00DEF					
G15	G306	h00E00			h00E01			h00E02			h00E03			.....	h00EEC			h00EED			h00EEE			h00EEF					
G16	G305	h00F00			h00F01			h00F02			h00F03			.....	h00FEC			h00FED			h00FEE			h00FEF					
G17	G304	h01000			h01001			h01002			h01003			.....	h010EC			h010ED			h010EE			h010EF					
G18	G303	h01100			h01101			h01102			h01103			.....	h011EC			h011ED			h011EE			h011EF					
G19	G302	h01200			h01201			h01202			h01203			.....	h012EC			h012ED			h012EE			h012EF					
G20	G301	h01300			h01301			h01302			h01303			.....	h013EC			h013ED			h013EE			h013EF					
:	:	:			:			:			:			:	:			:			:			:			:		
G305	G16	h13000			h13001			h13002			h13003			.....	h130EC			h130ED			h130EE			h130EF					
G306	G15	h13100			h13101			h13102			h13103			.....	h131EC			h131ED			h131EE			h131EF					
G307	G14	h13200			h13201			h13202			h13203			.....	h132EC			h132ED			h132EE			h132EF					
G308	G13	h13300			h13301			h13302			h13303			.....	h133EC			h133ED			h133EE			h133EF					
G309	G12	h13400			h13401			h13402			h13403			.....	h134EC			h134ED			h134EE			h134EF					
G310	G11	h13500			h13501			h13502			h13503			.....	h135EC			h135ED			h135EE			h135EF					
G311	G10	h13600			h13601			h13602			h13603			.....	h136EC			h136ED			h136EE			h136EF					
G312	G9	h13700			h13701			h13702			h13703			.....	h137EC			h137ED			h137EE			h137EF					
G313	G8	h13800			h13801			h13802			h13803			.....	h138EC			h138ED			h138EE			h138EF					
G314	G7	h13900			h13901			h13902			h13903			.....	h139EC			h139ED			h139EE			h139EF					
G315	G6	h13A00			h13A01			h13A02			h13A03			.....	h13AEC			h13AED			h13AEE			h13AEF					
G316	G5	h13B00			h13B01			h13B02			h13B03			.....	h13BEC			h13BED			h13BEE			h13BEF					
G317	G4	h13C00			h13C01			h13C02			h13C03			.....	h13CEC			h13CED			h13CEE			h13CEF					
G318	G3	h13D00			h13D01			h13D02			h13D03			.....	h13DEC			h13DED			h13DEE			h13DEF					
G319	G2	h13E00			h13E01			h13E02			h13E03			.....	h13EEC			h13EED			h13EEE			h13EEF					
G320	G1	h13F00			h13F01			h13F02			h13F03			.....	h13FEC			h13FED			h13FEE			h13FEF					

**Table 16 GRAM address and display position on the panel (SS = 1, BGR = 1)**

S/G pin		S720	S719	S718	S717	S716	S715	S714	S713	S712	S711	S710	S709	.....	S12	S11	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1			
GS=0	GS=1	WD[17:0]			WD[17:0]			WD[17:0]			WD[17:0]			.....	WD[17:0]			WD[17:0]			WD[17:0]			WD[17:0]					
G1	G320	h00000			h00001			h00002			h00003			.....	h000EC			h000ED			h000EE			h000EF					
G2	G319	h00100			h00101			h00102			h00103			.....	h001EC			h001ED			h001EE			h001EF					
G3	G318	h00200			h00201			h00202			h00203			.....	h002EC			h002ED			h002EE			h002EF					
G4	G317	h00300			h00301			h00302			h00303			.....	h003EC			h003ED			h003EE			h003EF					
G5	G316	h00400			h00401			h00402			h00403			.....	h004EC			h004ED			h004EE			h004EF					
G6	G315	h00500			h00501			h00502			h00503			.....	h005EC			h005ED			h005EE			h005EF					
G7	G314	h00600			h00601			h00602			h00603			.....	h006EC			h006ED			h006EE			h006EF					
G8	G313	h00700			h00701			h00702			h00703			.....	h007EC			h007ED			h007EE			h007EF					
G9	G312	h00800			h00801			h00802			h00803			.....	h008EC			h008ED			h008EE			h008EF					
G10	G311	h00900			h00901			h00902			h00903			.....	h009EC			h009ED			h009EE			h009EF					
G11	G310	h00A00			h00A01			h00A02			h00A03			.....	h00AEC			h00AED			h00AEE			h00AEF					
G12	G309	h00B00			h00B01			h00B02			h00B03			.....	h00BEC			h00BED			h00BEE			h00BEF					
G13	G308	h00C00			h00C01			h00C02			h00C03			.....	h00CEC			h00CED			h00CEE			h00CEF					
G14	G307	h00D00			h00D01			h00D02			h00D03			.....	h00DEC			h00DED			h00DEE			h00DEF					
G15	G306	h00E00			h00E01			h00E02			h00E03			.....	h00EEC			h00EED			h00EEE			h00EEF					
G16	G305	h00F00			h00F01			h00F02			h00F03			.....	h00FEC			h00FED			h00FEE			h00FEF					
G17	G304	h01000			h01001			h01002			h01003			.....	h010EC			h010ED			h010EE			h010EF					
G18	G303	h01100			h01101			h01102			h01103			.....	h011EC			h011ED			h011EE			h011EF					
G19	G302	h01200			h01201			h01202			h01203			.....	h012EC			h012ED			h012EE			h012EF					
G20	G301	h01300			h01301			h01302			h01303			.....	h013EC			h013ED			h013EE			h013EF					
:	:	:			:			:			:			:	:			:			:			:			:		
G305	G16	h13000			h13001			h13002			h13003			.....	h130EC			h130ED			h130EE			h130EF					
G306	G15	h13100			h13101			h13102			h13103			.....	h131EC			h131ED			h131EE			h131EF					
G307	G14	h13200			h13201			h13202			h13203			.....	h132EC			h132ED			h132EE			h132EF					
G308	G13	h13300			h13301			h13302			h13303			.....	h133EC			h133ED			h133EE			h133EF					
G309	G12	h13400			h13401			h13402			h13403			.....	h134EC			h134ED			h134EE			h134EF					
G310	G11	h13500			h13501			h13502			h13503			.....	h135EC			h135ED			h135EE			h135EF					
G311	G10	h13600			h13601			h13602			h13603			.....	h136EC			h136ED			h136EE			h136EF					
G312	G9	h13700			h13701			h13702			h13703			.....	h137EC			h137ED			h137EE			h137EF					
G313	G8	h13800			h13801			h13802			h13803			.....	h138EC			h138ED			h138EE			h138EF					
G314	G7	h13900			h13901			h13902			h13903			.....	h139EC			h139ED			h139EE			h139EF					
G315	G6	h13A00			h13A01			h13A02			h13A03			.....	h13AEC			h13AED			h13AEE			h13AEF					
G316	G5	h13B00			h13B01			h13B02			h13B03			.....	h13BEC			h13BED			h13BEE			h13BEF					
G317	G4	h13C00			h13C01			h13C02			h13C03			.....	h13CEC			h13CED			h13CEE			h13CEF					
G318	G3	h13D00			h13D01			h13D02			h13D03			.....	h13DEC			h13DED			h13DEE			h13DEF					
G319	G2	h13E00			h13E01			h13E02			h13E03			.....	h13EEC			h13EED			h13EEE			h13EEF					
G320	G1	h13F00			h13F01			h13F02			h13F03			.....	h13FEC			h13FED			h13FEE			h13FEF					

### 1.5.3 Initialization Table

**Note:** The command is use serial interface to set register

Instruction		Code	Description
1	Device code read	0000H 1505H	Reading out this register forcibly.
2	Driver Output Control	0001H 0100H	The source driver output shift from S720 to S1.
3	LCD Driving Wave Control	0002H 0700H	Line inversion waveform is selected.
4	Entry Mode	0003H D220H	18-bit RAM data is transferred in two transfers. Write data in the order of BGR to the GRAM. Writes data in high speed with low power consumption. The origin address is not moved. AM = "0", sets the horizontal direction.
5	Resizing Control	0004H 0000H	No resizing. Remainder 0 Pixels in Horizontal and Vertical Direction.
6	Display Control 1	0007H 0021H 0061H 0173H	The partial image is turned off. BASEE = 1: A base image is displayed on the screen. Set output level from G1~G320: VGH/VGL. VCOMH, VCOML, VCOM amplitude signal output. Display color: 262,144.
7	Display Control 2	0008H 0303H	Number of lines for a front porch: 3. Number of lines for a back porch: 3.
8	Display Control 3	0009H 0001H	Grayscale amplifier in operation: V0 to V31. Scan mode in non-display area: Normal scan.
9	Display Control 4	000AH 0008H	Outputting FMARK signal from the FMARK pin. Output interval: 1 frame.
10	External Display Interface Control 1	000CH 5000H	RAM Write Cycle (frame periods): 6 frame. Display Interface: Internal clock operations. RAM Access interface: System. RGB Interface: 18bit RGB, single transfer.
11	Frame Marker Position	000DH 0000H	FMARK output position: 0 <sup>th</sup> line.
12	Power Control 1	0010H 1690H	Grayscale voltages are generated. Liquid crystal power supply circuit: Operate. Grayscale voltage generating circuit: Operate. Out of sleep mode. Out of deep standby mode.
13	Power Control 2	0011H 0114H	Step-up circuit 2, step-up frequency (fDCDC2): $f_{osc} / 32$ . Step-up circuit 1, step-up frequency (fDCDC1): $f_{osc} / 2$ . VCIOUT (Reference Voltage) (VCI1 Voltage): $0.76 \times VCILVL$ .
14	Power Control 3	0012H 011BH 0139H	VREG1OUT from External: $VCILVL * 1.75$ . Starts the step-up operation to generate VLOUT3. VCOMH Electrical Potential: Internal electronic volume.
15	Power Control 4	0013H 1300H	VCOM Amplitude: $VREG1OUT * 0.96$ .

16	Power Control 5	0017H 0001H	Power supply is started.
17	RAM Address Set (Horizontal Address)	0020H 0000H	GRAM Address: Bitmap data on the first line.
18	RAM Address Set (Vertical Address)	0021H 0000H	GRAM Address: Bitmap data on the first line.
19	Write Data to GRAM	0022H	18 bits internally in write operation.
20	NVM read data 2	0029H 000AH	VCOMH voltage: VREG1OUT*0.79.
21	Control 1	0030H 0000H	fine-adjustment register for positive polarity.
22	Control 2	0031H 0101H	fine-adjustment register for positive polarity.
23	Control 3	0032H 0202H	fine-adjustment register for positive polarity.
24	Control 4	0033H 0303H	fine-adjustment register for positive polarity.
25	Control 5	0034H 0404H	fine-adjustment register for positive polarity.
26	Control 6	0035H 0505H	gradient-adjustment register for positive polarity.
27	Control 7	0036H 0606H	amplitude-adjustment register for positive polarity.
28	Control 8	0037H 0707H	fine-adjustment register for positive polarity.
29	Control 9	0038H 0707H	fine-adjustment register for positive polarity.
30	Control 10	0039H 0F0FH	fine-adjustment register for positive polarity.
31	Control 11	003AH	fine-adjustment register for positive polarity.
32	Control 12	003BH	fine-adjustment register for positive polarity.
33	Control 13	003CH	gradient-adjustment register for positive polarity.
34	Control 14	003DH	amplitude-adjustment register for positive polarity.
35	Window Horizontal RAM Address Start	0050H 0000H	Data line start: S1.
36	Window Horizontal RAM Address End	0051H 00EFH	Data line end: S240.

37	Window Vertical RAM Address Start	0052H 0000H	Gate line start: G1.
38	Window Vertical RAM Address End	0053H 013FH	Gate line end: G320.
39	Driver Output Control	0060H 2700H	Gate line scan start position: G1. Number of Lines: 320.
40	Base Image Display Control	0061H 0001H	Enables the grayscale inversion of the image.
41	Vertical Scroll Control	006AH 0000H	Scrolling of the base image amount:0.
42	Panel interface control	0090H 0011H	Clock per line: 17clocks. Division Ratio: 1/1. Internal operation clock unit: 1 OSC.
43	Setting disabled instruction	0091H 0200H	Setting inhibited registers.
44	NVM access control 1	00A0H 0011H	Data written in NVM: VCM1 [4:0]. NVM control: Write.
45	Calibration control	00A4H 0001H 0000H	Data written to NVM is read out to internal register.

## 1.6 Timing Characteristic

### 1.6.1 Timing Characteristic

#### 2. 80-System Bus Interface Timing Characteristics (18-/ 16- bit interface)

**Table 93 Normal write operation (HWM=0), IOVCC=1.65V~3.30V**

Item	Symbol	Unit	Timing Diagram	Min.	Typ.	Max.	
Bus cycle time	Write	tCYCW	ns	Figure 93	125	-	-
	Read	tCYCR	ns	Figure 93	450	-	-
Write low-level pulse width	PWLW	ns	Figure 93	45	-	-	
Read low-level pulse width	PWLR	ns	Figure 93	170	-	-	
Write high-level pulse width	PWHW	ns	Figure 93	70	-	-	
Read high-level pulse width	PWHR	ns	Figure 93	250	-	-	
Write/Read rise/ fall time	tWRr, WRf	ns	Figure 93	-	-	25	
	Write (RS to CS*,WR*)	tAS	ns	Figure 93	0	-	-
Read (RS to CS*, RD*)	ns		Figure 93	10	-	-	
Address Hold Time	tAH	ns	Figure 93	2	-	-	
Write data setup time	tDSW	ns	Figure 93	25	-	-	
Write data hold time	tH	ns	Figure 93	10	-	-	
Read data delay time	tDDR	ns	Figure 93	-	-	150	
Read data hold time	tDHR	ns	Figure 93	5	-	-	

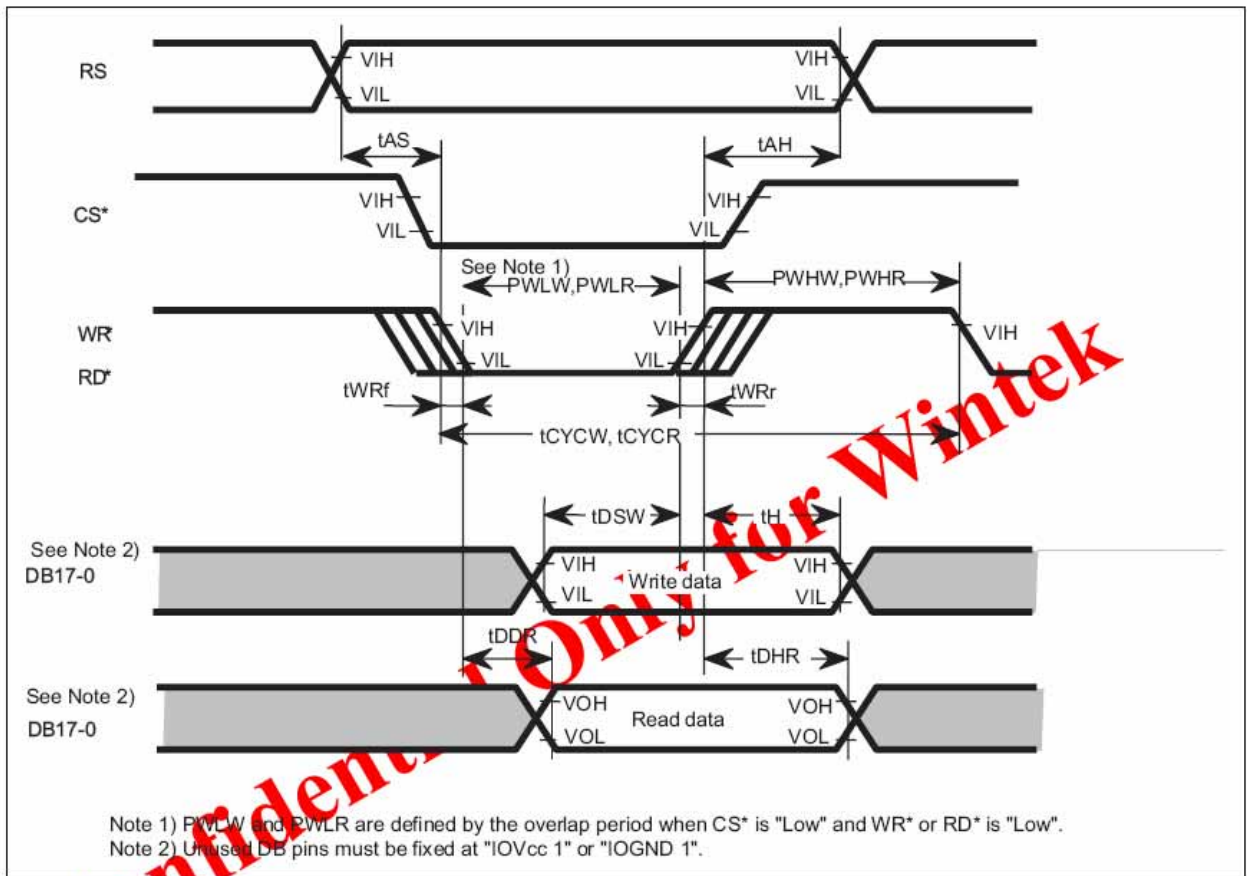
**Table 98 18-/ 16- bit RGB interface (HWM=1), IOVCC=1.65~3.30V**

Item	Symbol	Unit	Timing Diagram	Min.	Typ.	Max.
VSYNC/HSYNC Setup time	tSYNCS	clock	Figure 96	0	-	1
ENABLE Setup time	tENS	ns	Figure 96	10	-	-
ENABLE Hold time	tENH	ns	Figure 96	20	-	-
DOTCLK low-level pulse width	PWDL	ns	Figure 96	40	-	-
DOTCLK high-level pulse width	PWDH	ns	Figure 96	40	-	-
DOTCLK cycle time	tCYCD	ns	Figure 96	100	-	-
Data setup time	tPDS	ns	Figure 96	10	-	-
Data hold time	tPDH	ns	Figure 96	40	-	-
DOTCLK, VSYNC and HSYNC rise/fall time	trgbr, trgbf	ns	Figure 96	-	-	25

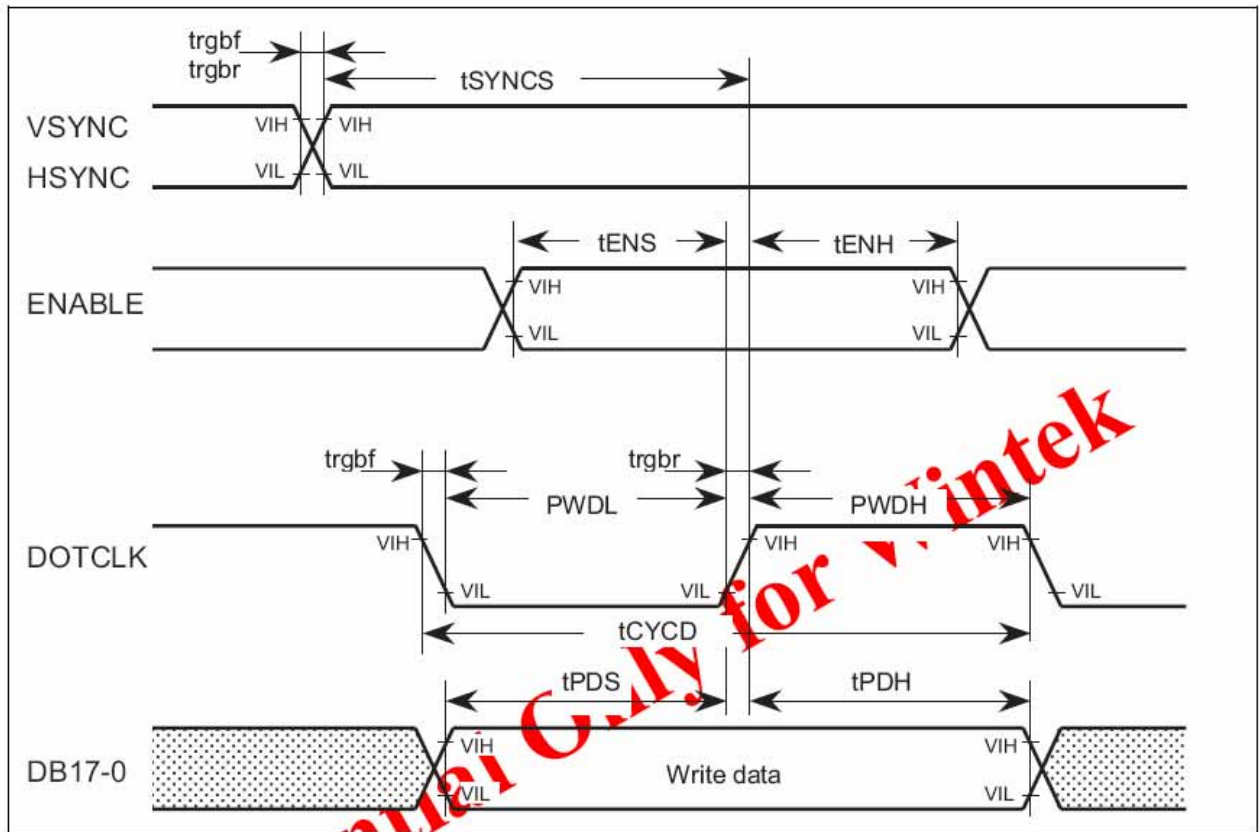
Table 99 6-bit RGB interface (HWM=1), IOVCC=1.65~3.30V

Item	Symbol	Unit	Timing Diagram	Min.	Typ.	Max.
VSYNC/HSYNC setup time	tSYNCS	clock	Figure 96	0	-	1
ENABLE setup time	tENS	ns	Figure 96	10	-	-
ENABLE hold time	tENH	ns	Figure 96	25	-	-
DOTCLK low-level pulse width	PWDL	ns	Figure 96	25	-	-
DOTCLK high-level pulse width	PWDH	ns	Figure 96	25	-	-
DOTCLK cycle time	tCYCD	ns	Figure 96	60	-	-
Data setup-time	tPDS	ns	Figure 96	10	-	-
Data hold time	tPDH	ns	Figure 96	25	-	-
DOTCLK, VSYNC, and HSYNC rise/fall time	trgbr, trgbf	ns	Figure 96	-	-	25

### 80-System Bus Interface

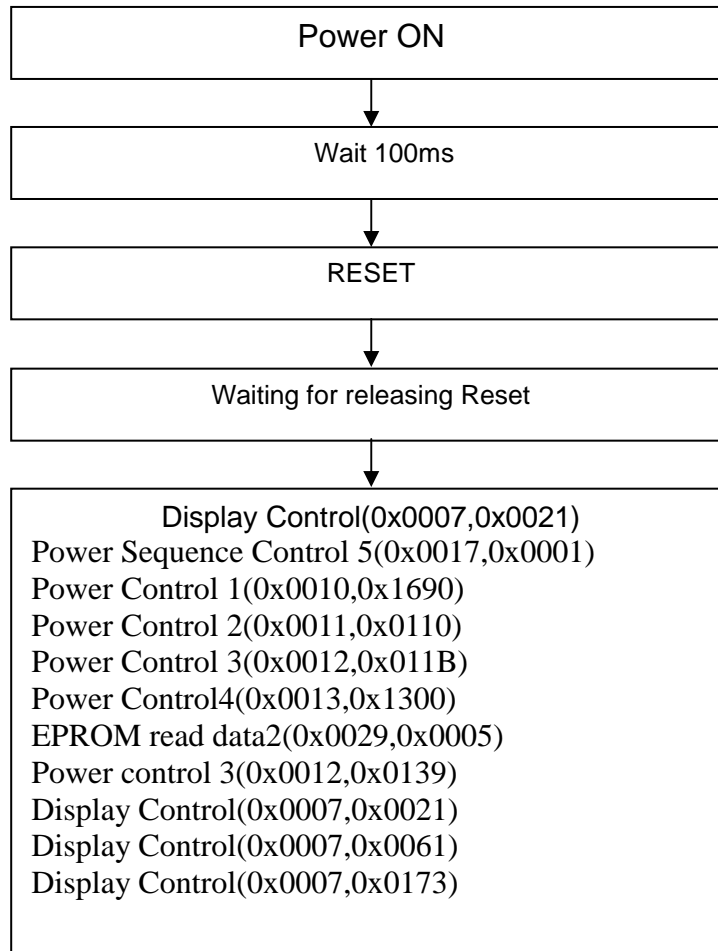


### RGB Interface

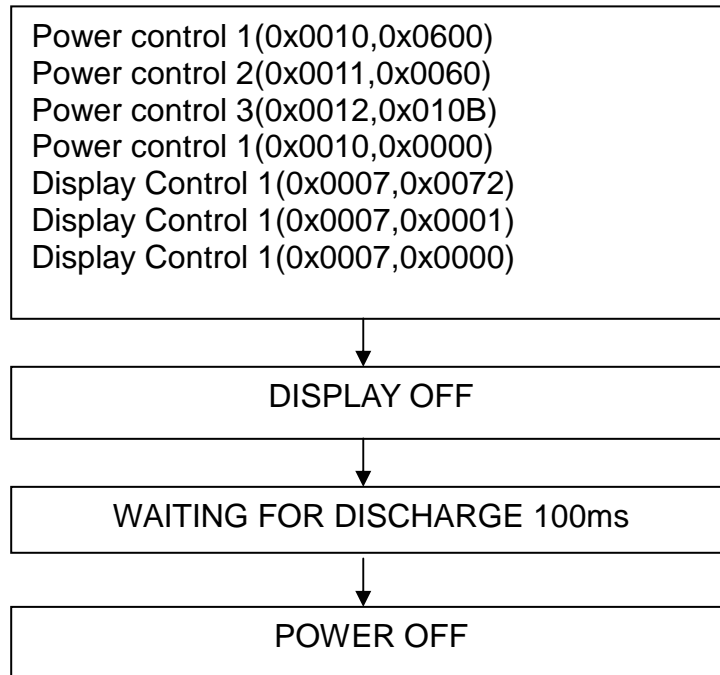


## 1.7 Power ON/OFF SEQUENCE

### 1.7.1 Power ON Sequence



### 1.7.2 Power OFF Sequence



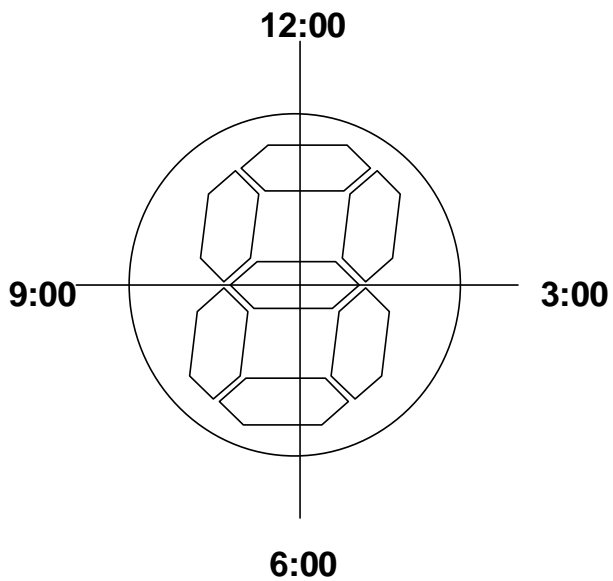
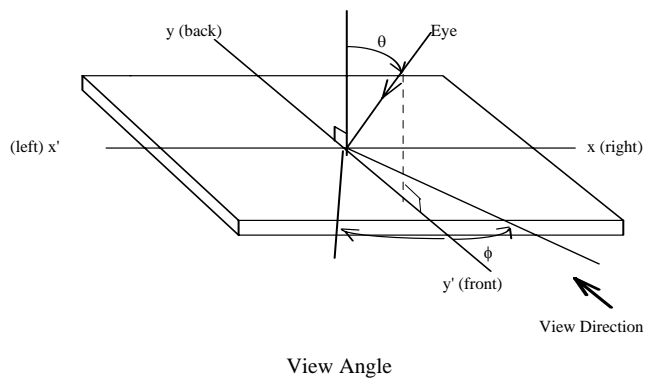
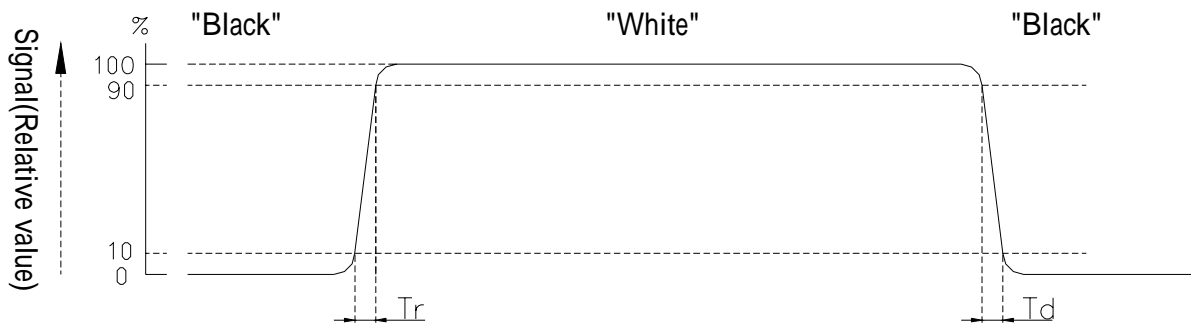
## (2) Electro-optical Units

### 2.1 Electro-optical Characteristics

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
VIEW ANGLE	Top		CR 10	45	-	-	deg.
	Bottom			15	-	-	deg
	Left			45	-	-	deg
	Right			45	-	-	deg.
CONTRAST RATIO		CR	Transmissive(Ta=25 )	150	250	-	-
RESPONSE TIME		Tr+Td	Ta=25	-	24	-	ms
Red x-coord		Rx	Ta=25	-	0.63	-	-
Red y-coord		Ry		-	0.34	-	
Green x-coord		Gx		-	0.30	-	
Green y-coord		Gy		-	0.56	-	
Blue x-coord		Bx		-	0.14	-	
Blue y-coord		By		-	0.15	-	
White x-coord		Wx		-	0.31	-	
White y-coord		Wy		-	0.36	-	
LCD TYPE		TFT( Positive /Transmissive)					
VIEWING DIRECTION		6 O'CLOCK					

## 2.2 Optical Definitions

### Response time for TFT panel



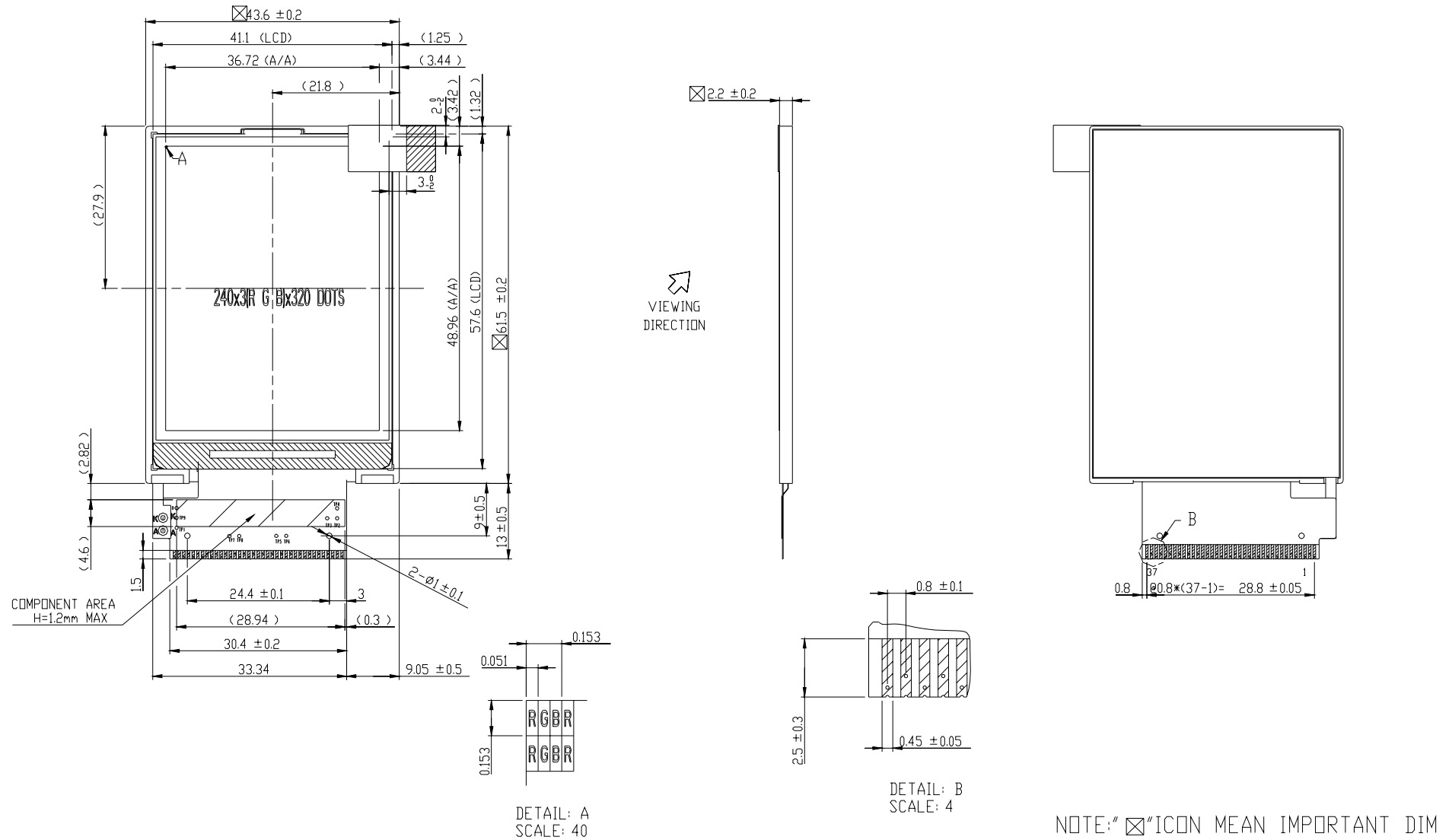
### (3) Mechanical Units

#### 3.1 Mechanical Specification

---

ITEM	STANDARD VALUE	UNIT
MODULE DIMENSION	43.6(W) × 61.5 (H) × 2.2 (T)	mm
APPROX. WEIGHT	12	g
BACK LIGHT	LED (white)	
NUMBER OF DOTS	240(RGB) × 320	dots
ACTIVE AREA	36.72 (W) × 48.96 (H)	mm
DOT PITCH	0.051 (W) × 0.153 (H)	mm
PIXEL PITCH	0.153 (W) × 0.153 (H)	mm

### 3.2 Mechanical Diagram



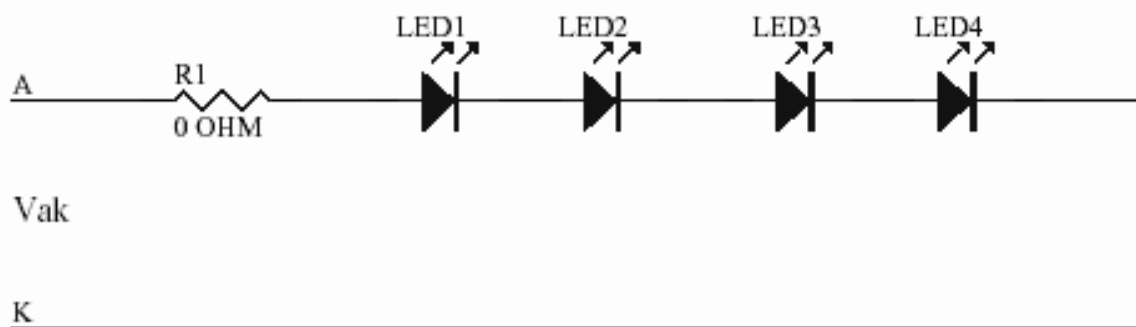
### 3.3 Back-light Specification

#### 1. Data About LED Backlight :

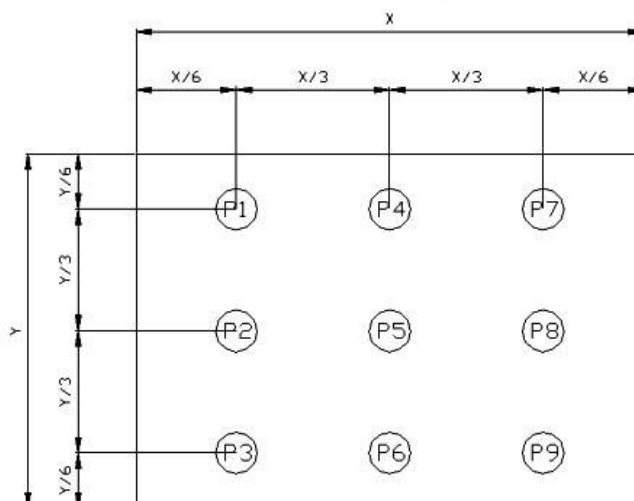
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
Supply Current (Single chip)	$I_F$	-	20	-	mA	-	$V_{AK}$ 17.6V
Reverse Voltage (Single chip)	$V_R$	-	-	5	V	-	-
Luminous Intensity	$I_V$	160	200	-	$cd/m^2$	$I_F=20mA$	1 (With LCD)
Luminous Intensity Ratio	-	-	-	28	%	$I_F=20mA$	2

#### NOTE :

1. Average Luminous Intensity Of P1 – P9
2. Luminous Intensity Ratio =  $(MAX-MIN / MAX) \times 100\%$
3. Internal Circuit Diagram :



#### 4. MEASURED METHOD : (X\*Y:Light Area)



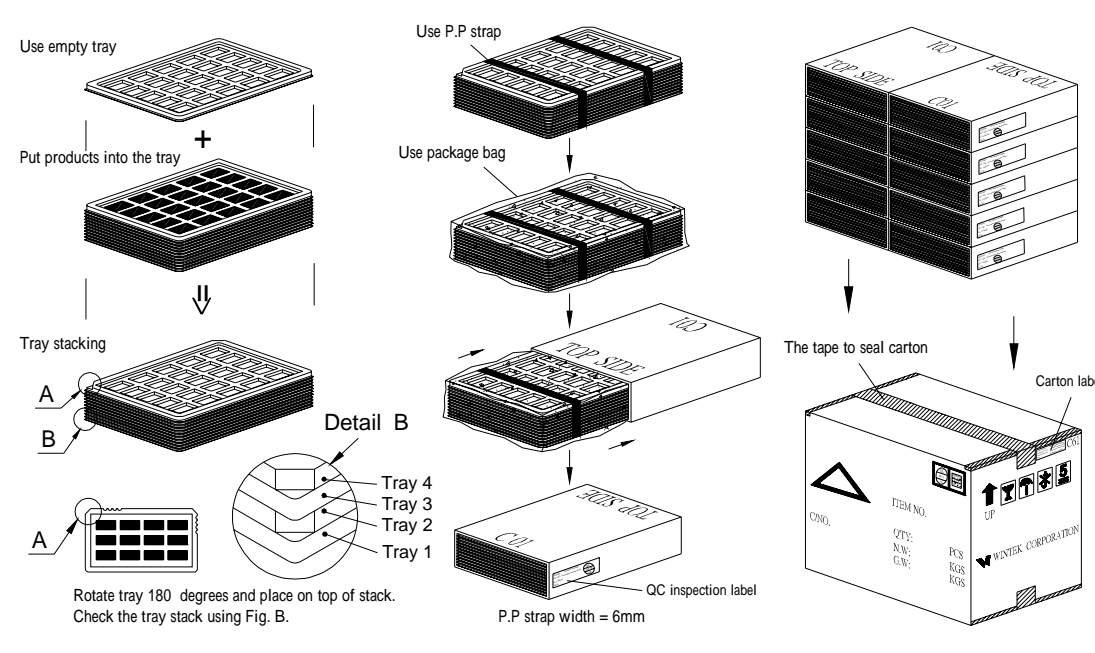
Hole Diameter 3mm; 1 to 9 per Position Measured Luminous Intensity

### 3.4 Packing Method

1. Packaging Material : ( per carton )						
NO.	Item	Model	Dimensions (mm)	Unit Weight (Kg)	Quantity	
1	LCM Module	WM-F2432V1-6FLWe	61.5*43.6	0.012	800	
2	Tray	V174	PS	320*217*12*0.6	0.06	90
3	Product Box	C01	320*219*70	0.131	10	
4	Carton	C61	475*345*389	1.208	1	
5	Package Bag	C5	467*321*0.08	0.023	10	
6	Total Weight	17.7	Kg± 5%			

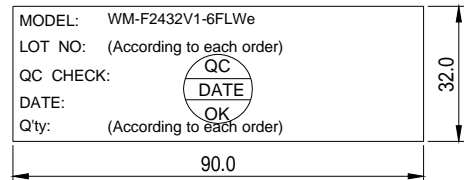
2. Packaging Specifications and Quantity :					
(1) LCM quantity per tray :	quantity per row	5	x quantity per column	2	= 10
(2) LCM quantity per box :	quantity per tray	10	x quantity of trays	8	= 80
(3) Total LCM quantity in carton :	quantity per box	80	x quantity of boxes	10	= 800

Use empty tray + Put products into the tray → Tray stacking (Detail B: Tray 4, Tray 3, Tray 2, Tray 1) → Rotate tray 180 degrees and place on top of stack. Check the tray stack using Fig. B. → Use P.P strap (P.P strap width = 6mm) → Use package bag → QC inspection label → The tape to seal carton → Carton label

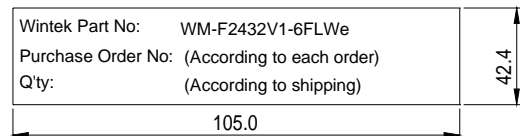
### 3. Label Specifications :

#### (1) QC Inspection Label



Label Color----Green

#### (2) Carton Label



Label Color----White

### Remark

## (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 Z1.4-1993.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

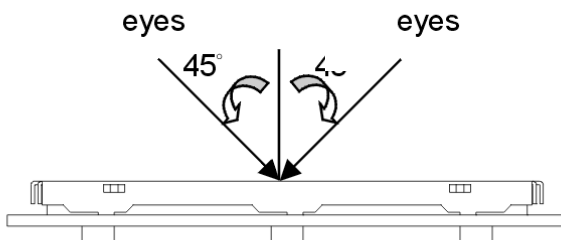
Both sides should discuss together when the following problems happen.

- 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.

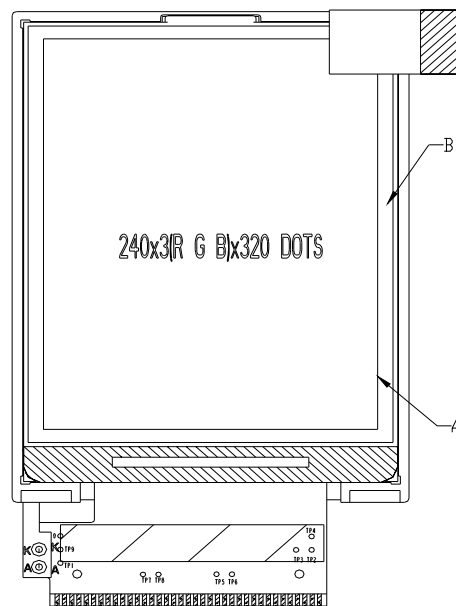
#### 4.1-5. Standard of The Product Appearance Test

a. Manner of appearance test:

- (i) The test must be under **15W(800~2000lux)** fluorescent light, and the distance of view must be at 30 cm.
- (ii) When test the model of transmissive product must add the reflective plate.
- (iii) The test direction is base on about around  $45^\circ$  of vertical line.



(iv) Definition of area:



A Area : Viewing area.

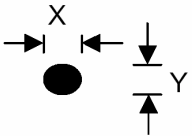
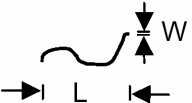
B Area : Out of viewing area.  
(Outside viewing area)

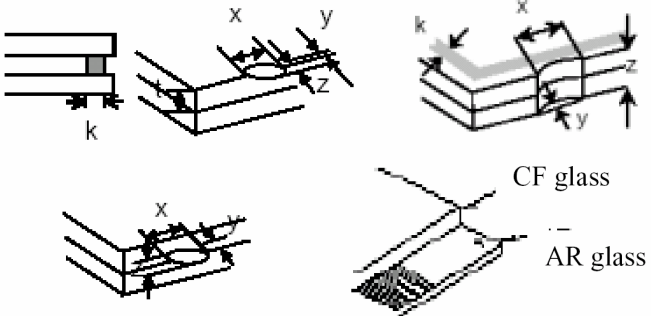
b. Basic principle:

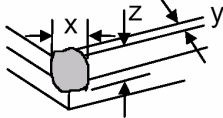


- (i) It will accord to the AQL when the standard can not be described.
- (ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.
- (iii) Must add new item on time when it is necessary.

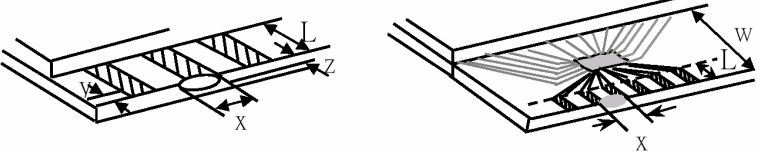
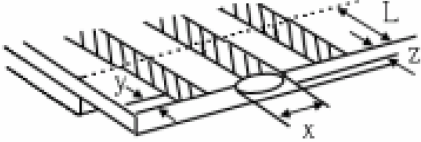
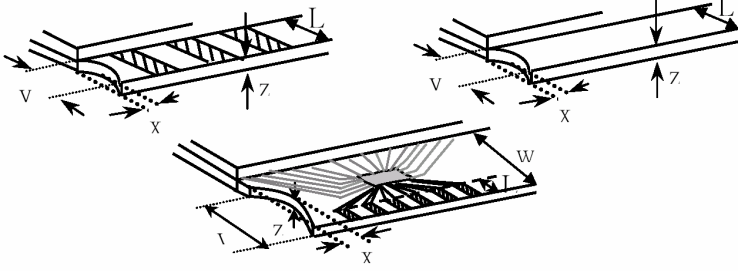
c. Standard of inspection:( Unit: mm)

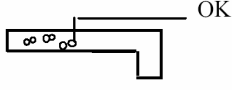
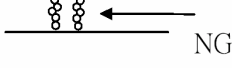
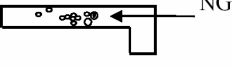
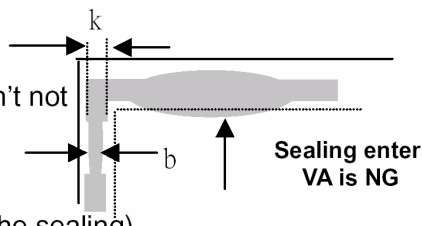
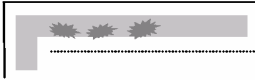
#### 4.1-6. Inspection specification

NO	Item	Criterion	AQL																
01	Electrical Testing	1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character, dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle defect. 1.7 Mixed product types. 1.8 Contrast defect.	0.65																
02	White spots on LCD (display only)	Round type : As following drawing <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>SIZE</th> <th>Acceptable Q'TY</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">-</td> <td style="text-align: center;">0</td> </tr> </tbody> </table>	SIZE	Acceptable Q'TY	-	0	2.5												
SIZE	Acceptable Q'TY																		
-	0																		
03	LCD black spots, (display and non-display)	3.1 Round type : As following drawing <div style="text-align: center; margin: 10px 0;"> <math display="block">\phi = (x + y) / 2</math>  </div> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>SIZE</th> <th>Acceptable Q'TY</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\phi \leq 0.1</math></td> <td style="text-align: center;">Accept no dense</td> </tr> <tr> <td style="text-align: center;"><math>0.1 &lt; \phi \leq 0.2</math></td> <td style="text-align: center;"><math>\leq 3</math></td> </tr> <tr> <td style="text-align: center;"><math>0.2 &lt; \phi \leq 0.25</math></td> <td style="text-align: center;"><math>\leq 1</math></td> </tr> <tr> <td style="text-align: center;"><math>\phi &gt; 0.25</math></td> <td style="text-align: center;">0</td> </tr> </tbody> </table> <p>⊙ Each cell acceptable Q'TY is 2 (space must over 10mm)</p>	SIZE	Acceptable Q'TY	$\phi \leq 0.1$	Accept no dense	$0.1 < \phi \leq 0.2$	$\leq 3$	$0.2 < \phi \leq 0.25$	$\leq 1$	$\phi > 0.25$	0	2.5						
		SIZE	Acceptable Q'TY																
$\phi \leq 0.1$	Accept no dense																		
$0.1 < \phi \leq 0.2$	$\leq 3$																		
$0.2 < \phi \leq 0.25$	$\leq 1$																		
$\phi > 0.25$	0																		
3.2 Line type : (As following drawing) <div style="text-align: center; margin: 10px 0;">  </div> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acceptable Q'TY</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">----</td> <td style="text-align: center;"><math>W \leq 0.03</math></td> <td style="text-align: center;">Accept no dense</td> </tr> <tr> <td style="text-align: center;"><math>L \leq 3.0</math></td> <td style="text-align: center;"><math>0.03 &lt; W \leq 0.05</math></td> <td style="text-align: center;"><math>\leq 2</math></td> </tr> <tr> <td style="text-align: center;"><math>L \leq 2.0</math></td> <td style="text-align: center;"><math>0.05 &lt; W \leq 0.1</math></td> <td style="text-align: center;"><math>\leq 2</math></td> </tr> <tr> <td colspan="3" style="text-align: center;">Above acceptable number are 2 (space 10 mm)</td> </tr> <tr> <td style="text-align: center;">----</td> <td style="text-align: center;"><math>W &gt; 0.1</math></td> <td style="text-align: center;">As round type</td> </tr> </tbody> </table> <p>⊙ When line type defect exceed 1/2 circle, judgment is base on round type.</p>	Length	Width	Acceptable Q'TY	----	$W \leq 0.03$	Accept no dense	$L \leq 3.0$	$0.03 < W \leq 0.05$	$\leq 2$	$L \leq 2.0$	$0.05 < W \leq 0.1$	$\leq 2$	Above acceptable number are 2 (space 10 mm)			----	$W > 0.1$	As round type	2.5
Length	Width	Acceptable Q'TY																	
----	$W \leq 0.03$	Accept no dense																	
$L \leq 3.0$	$0.03 < W \leq 0.05$	$\leq 2$																	
$L \leq 2.0$	$0.05 < W \leq 0.1$	$\leq 2$																	
Above acceptable number are 2 (space 10 mm)																			
----	$W > 0.1$	As round type																	

NO	Item	Criterion	AQL																				
04	Polarizer bubbles	If bubbles are visible, judge using black spot specifications ,not easy To find, must check in specify direction <table border="1" data-bbox="788 344 1283 645" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Size <math>\phi</math></th> <th>Acceptable Q'TY</th> </tr> </thead> <tbody> <tr> <td><math>\phi \leq 0.15</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>0.15 &lt; \phi \leq 0.25</math></td> <td>2</td> </tr> <tr> <td><math>0.25 &lt; \phi \leq 0.40</math></td> <td>1</td> </tr> <tr> <td><math>\phi &gt; 0.40</math></td> <td>0</td> </tr> <tr> <td>Total Q'TY</td> <td>2</td> </tr> </tbody> </table>	Size $\phi$	Acceptable Q'TY	$\phi \leq 0.15$	Accept no dense	$0.15 < \phi \leq 0.25$	2	$0.25 < \phi \leq 0.40$	1	$\phi > 0.40$	0	Total Q'TY	2	2.5								
Size $\phi$	Acceptable Q'TY																						
$\phi \leq 0.15$	Accept no dense																						
$0.15 < \phi \leq 0.25$	2																						
$0.25 < \phi \leq 0.40$	1																						
$\phi > 0.40$	0																						
Total Q'TY	2																						
05	Scratches	Follow NO.3 LCD black spots, white spots, contamination																					
06	Chipped glass	<p>Symbols : x : chip length y : chip width z : chip thickness            k : SP width t : glass thickness a : LCD size length            L : electrode pad length w : interface PIN length</p> <p>6.1 General glass chip :            6.1.1 Chip on panel surface and crack between panel :</p> <div style="text-align: center;">  </div> <table border="1" data-bbox="475 1279 1257 1563" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Area</th> <th>z : chip thickness</th> <th>y : chip width</th> <th>x : chip length</th> </tr> </thead> <tbody> <tr> <td>CF,AR glass</td> <td><math>z \leq 1/2t</math></td> <td><math>y \leq 1.0</math></td> <td>ignore</td> </tr> <tr> <td>CF,AR glass</td> <td><math>1/2t &lt; z &lt; t</math></td> <td>At least (k) 2/3 of sp must remain</td> <td>ignore</td> </tr> <tr> <td>CF glass</td> <td><math>z = t</math></td> <td><math>y \leq 0.5</math></td> <td>ignore</td> </tr> <tr> <td>AR glass</td> <td><math>z = t</math></td> <td><math>y \leq 0.3</math></td> <td>ignore</td> </tr> </tbody> </table> <p>⊙ If chip width <math>\leq 0.10\text{mm}</math> ,then the length and width don't care .            ⊙ Can't damage electrode pad .            ⊙ At least (k) 2/3 of SP must remain</p>	Area	z : chip thickness	y : chip width	x : chip length	CF,AR glass	$z \leq 1/2t$	$y \leq 1.0$	ignore	CF,AR glass	$1/2t < z < t$	At least (k) 2/3 of sp must remain	ignore	CF glass	$z = t$	$y \leq 0.5$	ignore	AR glass	$z = t$	$y \leq 0.3$	ignore	2.5
Area	z : chip thickness	y : chip width	x : chip length																				
CF,AR glass	$z \leq 1/2t$	$y \leq 1.0$	ignore																				
CF,AR glass	$1/2t < z < t$	At least (k) 2/3 of sp must remain	ignore																				
CF glass	$z = t$	$y \leq 0.5$	ignore																				
AR glass	$z = t$	$y \leq 0.3$	ignore																				

NO	Item	Criterion	AQL																		
06	Chipped glass	<p>6.1.2 Conner chip :</p>  <table border="1" data-bbox="592 432 1286 622"> <tr> <td>z : chip thickness</td> <td>y : chip width</td> <td>x : chip length</td> </tr> <tr> <td><math>z \leq 1/2t</math></td> <td><math>y \leq 1.5</math></td> <td><math>x \leq 1.5</math></td> </tr> <tr> <td><math>1/2t &lt; z \leq 2t</math></td> <td>At least (k) 2/3 of sp must remain</td> <td><math>x \leq 1.5</math></td> </tr> </table> <p>⊙ If chip width <math>\leq 0.10\text{mm}</math> ,then the length and width don't care ◦</p>	z : chip thickness	y : chip width	x : chip length	$z \leq 1/2t$	$y \leq 1.5$	$x \leq 1.5$	$1/2t < z \leq 2t$	At least (k) 2/3 of sp must remain	$x \leq 1.5$	2.5									
		z : chip thickness	y : chip width	x : chip length																	
		$z \leq 1/2t$	$y \leq 1.5$	$x \leq 1.5$																	
$1/2t < z \leq 2t$	At least (k) 2/3 of sp must remain	$x \leq 1.5$																			
<p>6.1.3 Chapped crack :</p>  <table border="1" data-bbox="501 891 1302 1220"> <thead> <tr> <th>Area</th> <th>z : chip thickness</th> <th>y : chip width</th> <th>x : chip length</th> </tr> </thead> <tbody> <tr> <td>CF,AR glass</td> <td><math>z \leq 1/2t</math></td> <td><math>y \leq 1.0</math></td> <td>ignore</td> </tr> <tr> <td>CF,AR glass</td> <td><math>1/2t &lt; z &lt; t</math></td> <td>At least (k) 2/3 of sp must remain</td> <td>ignore</td> </tr> <tr> <td>CF glass</td> <td><math>z = t</math></td> <td><math>y \leq 0.5^*</math></td> <td>ignore</td> </tr> <tr> <td>AR glass</td> <td><math>z = t</math></td> <td><math>y \leq 0.3^*</math></td> <td>ignore</td> </tr> </tbody> </table> <p>⊙ If chip width <math>\leq 0.10\text{mm}</math> ,then the length and width don't care ◦  * At least (k) 2/3 of SP must remain ◦</p>	Area	z : chip thickness	y : chip width	x : chip length	CF,AR glass	$z \leq 1/2t$	$y \leq 1.0$	ignore	CF,AR glass	$1/2t < z < t$	At least (k) 2/3 of sp must remain	ignore	CF glass	$z = t$	$y \leq 0.5^*$	ignore	AR glass	$z = t$	$y \leq 0.3^*$	ignore	2.5
Area	z : chip thickness	y : chip width	x : chip length																		
CF,AR glass	$z \leq 1/2t$	$y \leq 1.0$	ignore																		
CF,AR glass	$1/2t < z < t$	At least (k) 2/3 of sp must remain	ignore																		
CF glass	$z = t$	$y \leq 0.5^*$	ignore																		
AR glass	$z = t$	$y \leq 0.3^*$	ignore																		
<p>6.2 Glass cracks :</p>  <p>⊙ No cracks of any kind permitted ( including gradual cracks ) ◦</p>	2.5																				

NO	Item	Criterion	AQL										
06	Chipped glass	<p>6.3 Glass bump chip :</p> <p>6.3.1 Electrode pad ( track) chip :</p>  <table border="1" data-bbox="534 510 1193 589"> <tr> <td>z : chip thickness</td> <td>y : chip width</td> <td>x : chip length</td> </tr> <tr> <td><math>z \leq t</math></td> <td><math>y \leq 1/5L</math></td> <td>ignore</td> </tr> </table> <p>⊙ If chip width <math>\leq 0.10\text{mm}</math> ,then the length and width don't care ◦</p>	z : chip thickness	y : chip width	x : chip length	$z \leq t$	$y \leq 1/5L$	ignore	0.65				
		z : chip thickness	y : chip width	x : chip length									
		$z \leq t$	$y \leq 1/5L$	ignore									
<p>6.3.2 Back of electrode terminal chipped:</p>  <table border="1" data-bbox="510 1034 1297 1184"> <thead> <tr> <th>Type</th> <th>z : chip thickness</th> <th>y : chip width</th> <th>x : chip length</th> </tr> </thead> <tbody> <tr> <td>Hot Bar</td> <td><math>z \leq 1/2t</math></td> <td><math>y \leq L/3</math></td> <td>ignore</td> </tr> <tr> <td>COG</td> <td><math>z \leq 1/2t</math></td> <td><math>y \leq L/3</math></td> <td>ignore</td> </tr> </tbody> </table> <p>⊙ If chip width <math>\leq 0.10\text{mm}</math> ,then the length and width don't care ◦</p>	Type	z : chip thickness	y : chip width	x : chip length	Hot Bar	$z \leq 1/2t$	$y \leq L/3$	ignore	COG	$z \leq 1/2t$	$y \leq L/3$	ignore	2.5
Type	z : chip thickness	y : chip width	x : chip length										
Hot Bar	$z \leq 1/2t$	$y \leq L/3$	ignore										
COG	$z \leq 1/2t$	$y \leq L/3$	ignore										
<p>6.3.3 Corner crack (corner chipped over glass bump)</p>  <table border="1" data-bbox="502 1624 1297 1783"> <thead> <tr> <th>TYPE</th> <th>z : chip thickness</th> <th>y : chip width</th> <th>x : chip length</th> </tr> </thead> <tbody> <tr> <td>general</td> <td><math>z \leq t</math></td> <td><math>y \leq L^*</math></td> <td>ignore*</td> </tr> <tr> <td>COG</td> <td><math>z \leq t</math></td> <td><math>y \leq w</math></td> <td>ignore*</td> </tr> </tbody> </table> <p>* Can't not damage the electrical track and pad ◦</p>	TYPE	z : chip thickness	y : chip width	x : chip length	general	$z \leq t$	$y \leq L^*$	ignore*	COG	$z \leq t$	$y \leq w$	ignore*	2.5
TYPE	z : chip thickness	y : chip width	x : chip length										
general	$z \leq t$	$y \leq L^*$	ignore*										
COG	$z \leq t$	$y \leq w$	ignore*										

NO	Item	Criterion	AQL
07	Cracked glass	The LCD with extensive crack is not acceptable.	1.5
08	Backlight elements	8.1 Illumination source flickers when lit. 8.2 Spots or scratches that appear when lit must be judged . using LCD spot, lines and contamination standards. 8.3 Backlight doesn't light or color is wrong.	0.65 1.5 0.65
09	LCD sealing	<p>9.1 No bubble align in a line and LC residue find in the sealing area. If bubble scattered in the sealing area, will judge ok</p> <p>⊙scattered bubble is OK  </p> <p>⊙aligned bubble NG  </p> <p>⊙LC residue NG  </p> <p>9.2 : Spec of the sealing            (1)Widening of the sealing can't not enter the view area.            (2)Condensing of the sealing must keep.            Ex: <math>b \geq 1/2k</math>. ( k = width of the sealing)</p> <p>9.3:Sealing explosion, residue in the sealing (include fiber).            (1)Sealing must keep it's 1/2 width.</p>  	2.5
10	Soldering	10.1 No unmelted solder paste may be present on the PCB. 10.2 No cold solder joints, missing solder connections, oxidation or icicle. 10.3 No residue or solder balls on PCB. 10.4 No short circuits in components on PCB.	1.5 1.5 1.5 0.65

NO	Item	Criterion	AQL
11	PCB · COB	11.1 COB seal may not have pinholes larger than 0.2mm or contamination. 11.2 COB seal surface may not have pinholes through to the IC. 11.3 The height of the COB should not exceed the height indicated in the assembly diagram. 11.4 There may not be more than 2mm of sealant outside the seal area on the PCB. And there should be no more than three places. 11.5 No oxidation or contamination PCB terminals. 11.6 Parts on PCB must be the same as on the production characteristic chart. There should be no wrong parts, missing parts or excess parts. 11.7 The jumper on the PCB should conform to the product characteristic chart. 11.8 If solder gets on bezel tab pads, LED pad, zebra pad or screw hole pad, make sure it is smoothed down.	1.5 1.5 0.65 1.5 1.5 0.65 0.65 1.5
12	General appearance	12.1 No oxidation, contamination, curves or, bends on interface Pin (OLB) of TCP. 12.2 No cracks on interface pin (OLB) of TCP. 12.3 No contamination, solder residue or solder balls on product. 12.4 The IC on the TCP may not be damaged, circuits. 12.5 The uppermost edge of the protective strip on the interface pin must be present or look as if it cause the interface pin to sever. 12.6 The residual rosin or tin oil of soldering (component or chip component) is not burned into brown or black color. 12.7 Sealant on top of the ITO circuit has not hardened 12.8 Pin type must match type in specification sheet. 12.9 LCD pin loose or missing pins. 12.10 Product packaging must the same as specified on packaging specification sheet. 12.11 Product dimension and structure must conform to product specification sheet . 12.12 The appearance of Heat Seal should not admit any dirt and break.	1.5 0.65 1.5 1.5 1.5 1.5 0.65 0.65 0.65 0.65

## 4.2 Standard Specification for Reliability

### 4.2-1. Standard Specifications for Reliability of LCD Module

No	Item	Description
01	High temperature operation	The sample should be allowed to stand at 70 °C for 240 (-0, +48) hours under driving condition.
02	Low temperature operation	The sample should be allowed to stand at -20 °C for 240 (-0, +48) hours under driving condition.
03	High temperature resistance	The sample should be allowed to stand at 80 °C for 240 (-0,+48) hours under no-load condition, and then returning it to normal temperature condition, and allowing it stand for 30 minutes.
04	Low temperature resistance	The sample should be allowed to stand at -30 °C for 240 (-0,+48) hours under no-load condition, then returning it to normal temperature condition, and allowing it stand for 24 hours.
05	Moisture resistance	The sample should be allowed to stand at 60 °C, 90 % RH MAX for 240 (-0,+48) hours under no-load condition excluding the polarizer, then taking it out and drying it at normal temperature.
06	Thermal shock resistance	The sample should be allowed to stand the following 10 cycles of operation: -30 for 30 minutes → normal temperature for 5 minutes → +80 for 30 minutes → normal temperature for 5 minutes , as one cycle.

#### 4.2-2. Testing Conditions and Inspection Criteria

For the final test the testing sample must be stored at room temperature for 24 hours, after the tests listed in Table 4.2, Standard specifications for Reliability have been executed in order to ensure stability.

NO	Item	Test Model	Inspection Criteria
01	Current Consumption	Refer To Specification	The current consumption should conform to the product specification.
02	Contrast	Refer To Specification	After the tests have been executed, the contrast must be larger than half of its initial value prior to the tests.
03	Appearance	Visual inspection	Defect free.

#### 4.2-3. Life Time

Life time	Functions, performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature ( $25 \pm 10^{\circ}\text{C}$ ), normal humidity ( $45 \pm 20\% \text{ RH}$ ), and in area not exposed to direct sun light. (Life time of backlight, please refer to Data about backlight.)
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Note: From our experience the life time of high humidity operation and high temperature operation as above mentioned could be achieved.

## 4.3 Precautions in Use of LCM

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### 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: No higher than 300 and less than 5 sec during Hand 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.