



SPECIFICATIONS FOR LCD MODULE

MODEL	WM-F1216VG-6FLWc
CUSTOMER APPROVED	

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History of Version

Version	Contents	Date	Note
a1	NEW VERSION	11.JUL.2005	SPEC.
c1	Change as follow by Wintek: 1. Modify 2.1.1 Electro-optical Characteristics Cancel MIRCO Reflective	14.Sep.2005	SPEC.
c2	Change as follow by Wintek: 1. Modify 1.6 Timing Characteristics 2. Modify 3.3 Back-light Specification 3. Modify 4.1-6. Inspection specification	01.Dec.2005	SPEC.& SAMPLE
c3	Change as follow by Wintek: 1. Modify 1.5.3 Initialization Table	16.Dec.2005	SPEC.& SAMPLE

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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	°C	-
Storage Temperature	T_{ST}	-30	-	+80	°C	-
Input power supply	V_{CC}	-0.3	-	4.6	V	-
Supply voltage for step-up circuit	V_{Ci}	-0.3	-	4.6	V	-
Input voltage range	V_t	-0.3	-	$V_{CC}+0.3$	V	-
Static Electricity	Be sure that you are grounded when handing LCM					

1.2 Electrical Characteristics

($T_a=25^{\circ}\text{C}$, $V_{SS}=0\text{V}$)

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	Remark
Input power voltage	V_{CC}	-	2.75	2.8	2.85	V	-
Input Logic voltage	V_{Ci}	-	-	2.8	-	V	-
Input Signal Voltage	H Level	$V_{CC} = 2.4$ to 3.3 V	$0.8V_{CC}$	-	V_{CC}	V	-
	L Level		-	-	$0.18 V_{CC}$	V	
Output Signal Voltage	H Level	$I_{OH}=0.1$ mA	$0.9V_{CC}$	-	-	V	-
	L Level	$I_{OH}=0.1$ mA	-	-	$0.1V_{CC}$	V	
Supply Current for Logic	$*I_{DD}$	-	-	2.2	3.2	mA	-
Display color	65K colors						

* I_{DD} 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

NO.	SYMBOL	I/O	FUNCTION
1	GND	P	Ground
2	LED-	P	LED Cathode pin
3	LED+	P	LED Anode pin
4	GND	P	Ground
5	/CS	I	Chip select
6	RS	I	Resister Select
7	/WR	I	Write strobe signal input pin
8	RD	I	Read strobe signal input pin
9	DUMMY	-	DUMMY
10	DB0	I/O	Data transfer bus
11	DB1	I/O	Data transfer bus
12	DB2	I/O	Data transfer bus
13	DB3	I/O	Data transfer bus
14	DB4	I/O	Data transfer bus
15	DB5	I/O	Data transfer bus
16	DB6	I/O	Data transfer bus
17	DB7	I/O	Data transfer bus
18	DUMMY2	-	DUMMY
19	DB8	I/O	Data transfer bus
20	DB9	I/O	Data transfer bus
21	DB10	I/O	Data transfer bus
22	DB11	I/O	Data transfer bus
23	DB12	I/O	Data transfer bus
24	DB13	I/O	Data transfer bus
25	DB14	I/O	Data transfer bus
26	DB15	I/O	Data transfer bus

NO.	SYMBOL	I/O	FUNCTION
27	RESET	I	System reset
28	DUMMY3	-	DUMMY
29	DUMMY4	-	DUMMY
30	IM0	I	Ground (Note1)
31	VCC	P	Interface I/ O voltage
32	VCI	P	Power supply voltage
33	GND	P	Ground

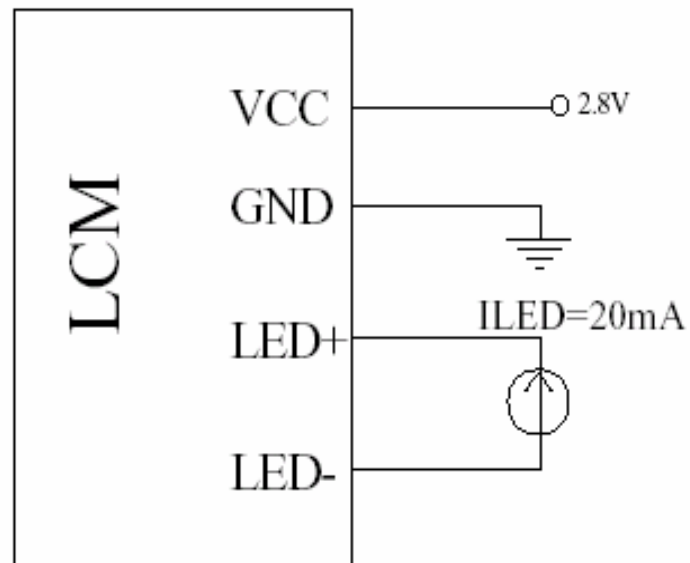
I : INPUT ; O : OUTPUT ; P : POWER

Note1:

16bit CPU Interface : Must contact to GND

8bit CPU Interface : Must contact to Vcc

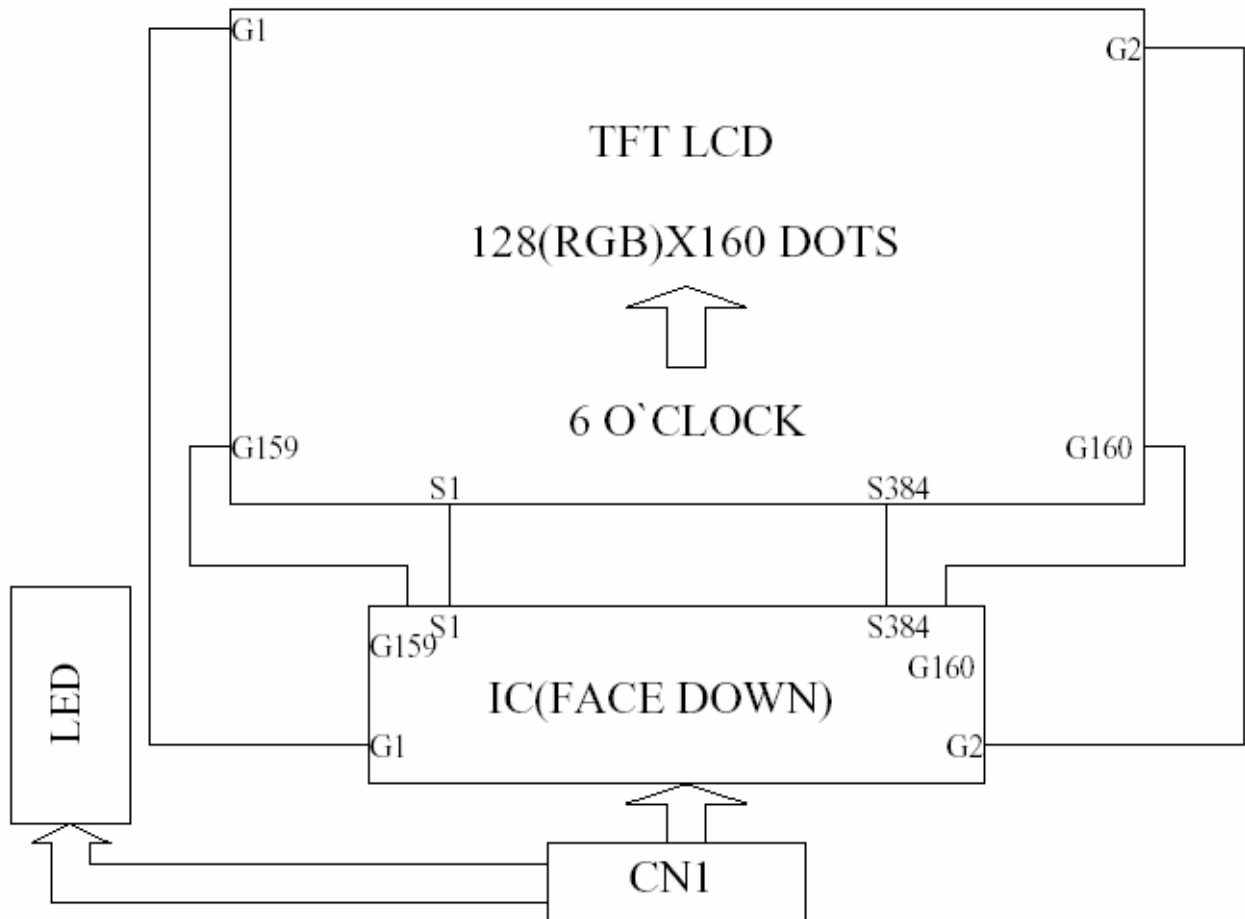
1.4 Power Supply for LCD Module



- Note: 1. VCC=2.8V
2. ILED=+20mA, $V_{AK} \leq 8.8V$

1.5 Block Diagram with Display RAM Address

1.5.1 Block Diagram



1.5.2 GRAM Addressing

S/G pins		S1	S2	S3	S4	S5	S6	S7	S8	S9	-----	S373	S374	S375	S376	S377	S378	S379	S380	S381	S382	S383	S384
GS=1	GS=0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	-----	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0	DB---DB 17 ---0
G160	G1	0000H	0001H	0002H	-----	007CH	007DH	007EH	007FH														
G159	G2	0100H	0101H	0102H	-----	017CH	017DH	017EH	017FH														
G158	G3	0200H	0201H	0202H	-----	027CH	027DH	027EH	027FH														
G157	G4	0300H	0301H	0302H	-----	037CH	037DH	037EH	037FH														
G156	G5	0400H	0401H	0402H	-----	047CH	047DH	047EH	047FH														
G155	G6	0500H	0501H	0502H	-----	057CH	057DH	057EH	057FH														
G154	G7	0600H	0601H	0602H	-----	067CH	067DH	067EH	067FH														
G153	G8	0700H	0701H	0702H	-----	077CH	077DH	077EH	077FH														
G152	G9	0800H	0801H	0802H	-----	087CH	087DH	087EH	087FH														
G151	G10	0900H	0901H	0902H	-----	097CH	097DH	097EH	097FH														
G150	G11	0A00H	0A01H	0A02H	-----	0A7CH	0A7DH	0A7EH	0A7FH														
G149	G12	0B00H	0B01H	0B02H	-----	0B7CH	0B7DH	0B7EH	0B7FH														
G148	G13	0C00H	0C01H	0C02H	-----	0C7CH	0C7DH	0C7EH	0C7FH														
G147	G14	0D00H	0D01H	0D02H	-----	0D7CH	0D7DH	0D7EH	0D7FH														
G146	G15	0E00H	0E01H	0E02H	-----	0E7CH	0E7DH	0E7EH	0E7FH														
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----														
G10	G151	9600H	9601H	9602H	-----	967CH	967DH	967EH	967FH														
G9	G152	9700H	9701H	9702H	-----	977CH	977DH	977EH	977FH														
G8	G153	9800H	9801H	9802H	-----	987CH	987DH	987EH	987FH														
G7	G154	9900H	9901H	9902H	-----	997CH	997DH	997EH	997FH														
G6	G155	9A00H	9A01H	9A02H	-----	9A7CH	9A7DH	9A7EH	9A7FH														
G5	G156	9B00H	9B01H	9B02H	-----	9B7CH	9B7DH	9B7EH	9B7FH														
G4	G157	9C00H	9C01H	9C02H	-----	9C7CH	9C7DH	9C7EH	9C7FH														
G3	G158	9D00H	9D01H	9D02H	-----	9D7CH	9D7DH	9D7EH	9D7FH														
G2	G159	9E00H	9E01H	9E02H	-----	9E7CH	9E7DH	9E7EH	9E7FH														
G1	G160	9F00H	9F01H	9F02H	-----	9F7CH	9F7DH	9F7EH	9F7FH														

S/G pins		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	-----	S376	S377	S378	S379	S380	S381	S382	S383	S384
GS=0	GS=1	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	-----	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0	DB---DB 17---0
G1	G160	007FH	007EH	007DH	007CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	0002H	0001H	0000H	0000H	0000H	0000H	0000H	0000H	0000H
G2	G159	017FH	017EH	017DH	017CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	0102H	0101H	0100H	0100H	0100H	0100H	0100H	0100H	0100H
G3	G158	027FH	027EH	027DH	027CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	0202H	0201H	0200H	0200H	0200H	0200H	0200H	0200H	0200H
G4	G157	037FH	037EH	037DH	037CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	0302H	0301H	0300H	0300H	0300H	0300H	0300H	0300H	0300H
G5	G156	047FH	047EH	047DH	047CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	0402H	0401H	0400H	0400H	0400H	0400H	0400H	0400H	0400H
G6	G155	057FH	057EH	057DH	057CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	0502H	0501H	0500H	0500H	0500H	0500H	0500H	0500H	0500H
G7	G154	067FH	067EH	067DH	067CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	0602H	0601H	0600H	0600H	0600H	0600H	0600H	0600H	0600H
G8	G153	077FH	077EH	077DH	077CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	0702H	0701H	0700H	0700H	0700H	0700H	0700H	0700H	0700H
G9	G152	087FH	087EH	087DH	087CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	0802H	0801H	0800H	0800H	0800H	0800H	0800H	0800H	0800H
G10	G151	097FH	097EH	097DH	097CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	0902H	0901H	0900H	0900H	0900H	0900H	0900H	0900H	0900H
G11	G150	0A7FH	0A7EH	0A7DH	0A7CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	0A02H	0A01H	0A00H	0A00H	0A00H	0A00H	0A00H	0A00H	0A00H
G12	G149	0B7FH	0B7EH	0B7DH	0B7CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	0B02H	0B01H	0B00H	0B00H	0B00H	0B00H	0B00H	0B00H	0B00H
G13	G148	0C7FH	0C7EH	0C7DH	0C7CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	0C02H	0C01H	0C00H	0C00H	0C00H	0C00H	0C00H	0C00H	0C00H
G14	G147	0D7FH	0D7EH	0D7DH	0D7CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	0D02H	0D01H	0D00H	0D00H	0D00H	0D00H	0D00H	0D00H	0D00H
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
G149	G12	947FH	947EH	947DH	947CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	9402H	9401H	9400H	9400H	9400H	9400H	9400H	9400H	9400H
G150	G11	957FH	957EH	957DH	957CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	9502H	9501H	9500H	9500H	9500H	9500H	9500H	9500H	9500H
G151	G10	967FH	967EH	967DH	967CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	9602H	9601H	9600H	9600H	9600H	9600H	9600H	9600H	9600H
G152	G9	977FH	977EH	977DH	977CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	9702H	9701H	9700H	9700H	9700H	9700H	9700H	9700H	9700H
G153	G8	987FH	987EH	987DH	987CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	9802H	9801H	9800H	9800H	9800H	9800H	9800H	9800H	9800H
G154	G7	997FH	997EH	997DH	997CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	9902H	9901H	9900H	9900H	9900H	9900H	9900H	9900H	9900H
G155	G6	9A7FH	9A7EH	9A7DH	9A7CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	9A02H	9A01H	9A00H	9A00H	9A00H	9A00H	9A00H	9A00H	9A00H
G156	G5	9B7FH	9B7EH	9B7DH	9B7CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	9B02H	9B01H	9B00H	9B00H	9B00H	9B00H	9B00H	9B00H	9B00H
G157	G4	9C7FH	9C7EH	9C7DH	9C7CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	9C02H	9C01H	9C00H	9C00H	9C00H	9C00H	9C00H	9C00H	9C00H
G158	G3	9D7FH	9D7EH	9D7DH	9D7CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	9D02H	9D01H	9D00H	9D00H	9D00H	9D00H	9D00H	9D00H	9D00H
G159	G2	9E7FH	9E7EH	9E7DH	9E7CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	9E02H	9E01H	9E00H	9E00H	9E00H	9E00H	9E00H	9E00H	9E00H
G160	G1	9F7FH	9F7EH	9F7DH	9F7CH	-----	-----	-----	-----	-----	-----	-----	-----	-----	9F02H	9F01H	9F00H	9F00H	9F00H	9F00H	9F00H	9F00H	9F00H

1.5.3 Initialization Table

Item	Instruction	Code	Description
1	Start Oscillator Register	0000H 0001H	Start Oscillator Register.
2	Driver Output Control Register	0001H 0113H	1.The shift direction from S384 to S1. 2.The shift direction from G1 to G160 Display Size: 128*160
3	LCD Driving Waveform Control Register	0002H 0300H	NW5-0=0: 1-line inversion is occurred
4	Entry Mode Register	0005H 1030H	1.The order of <R><G>dot color. 2.The data will be written horizontally or vertically (When AM=1,0). 3.The AC will incremented by 1 after data written to GRAM.
5	Display Control Register 1	0007H 0037H	1.D1=1,Display is on. 2.262k colors display 3.Partial screen display is off.(Determined by PT1-0)
6	Frame Cycle Control Register	000BH 0007H	1.Set the 23-line Clock Cycles per Line. 2.Division Ratio = 1,(DIV1-0 = 0). 3.Source output delay = 1 clock cycle 4.Set delay amount from falling edge of the gate output signal for the source outputs. 4.Non-overlap time between two adjacent gate output pulse = 0 clock cycle
7	Power Control Register1	0003H 0110H	1.Exit the standby mode, start the oscillation. 2.Exit the sleep mode. 3.Constant current of operation amplifier=1 4.VLCD= 2×VCI1, VCL= -1×VCI1, VGH = 6×VCI1, VGL= -4×VCI1
8	Power Control Register3	000CH 0000H	Internal reference voltage (REGP) of VGM1OUT and VCI1: 0.68×VCI
9	Power Control Register 4	000DH 001AH	1.Start the operation of step-up circuit3. 2.VGAM1OUT Voltage = REGP x 2.775 times.
10	Power Control Register 5	000EH 2D18H	1.VCOM Amplitude = VGAM1OUT× 1.02 2.VCOMH = VGAM1OUT × 0.98
11	RAM Address Register	0021H 0000H	Set GRAM addresses to the address counter (AC) = 0.
12	Display Control Register2	0008H D202H	1.The EPL = 1 2.VSPL and HSPL=1, VSYNC and HSYNC pin is High active. 2.Front porch (FP) = 2 lines 3.Back porch (BP) = 2 lines

Item	Instruction	Code	Description
13	Gate Scan Position Register	000FH 0000H	Scanning start position G1 to G160
14	Horizontal RAM Address Position Register	0016H 7F00H	Set the horizontal ram address from 0 to 127
15	Vertical RAM address Position Register	0017H 9F00H	Set the Vertical ram address from 0 to 159

1.6 Timing Characteristic

1.6.1 Timing Characteristic

80-system Bus Operation

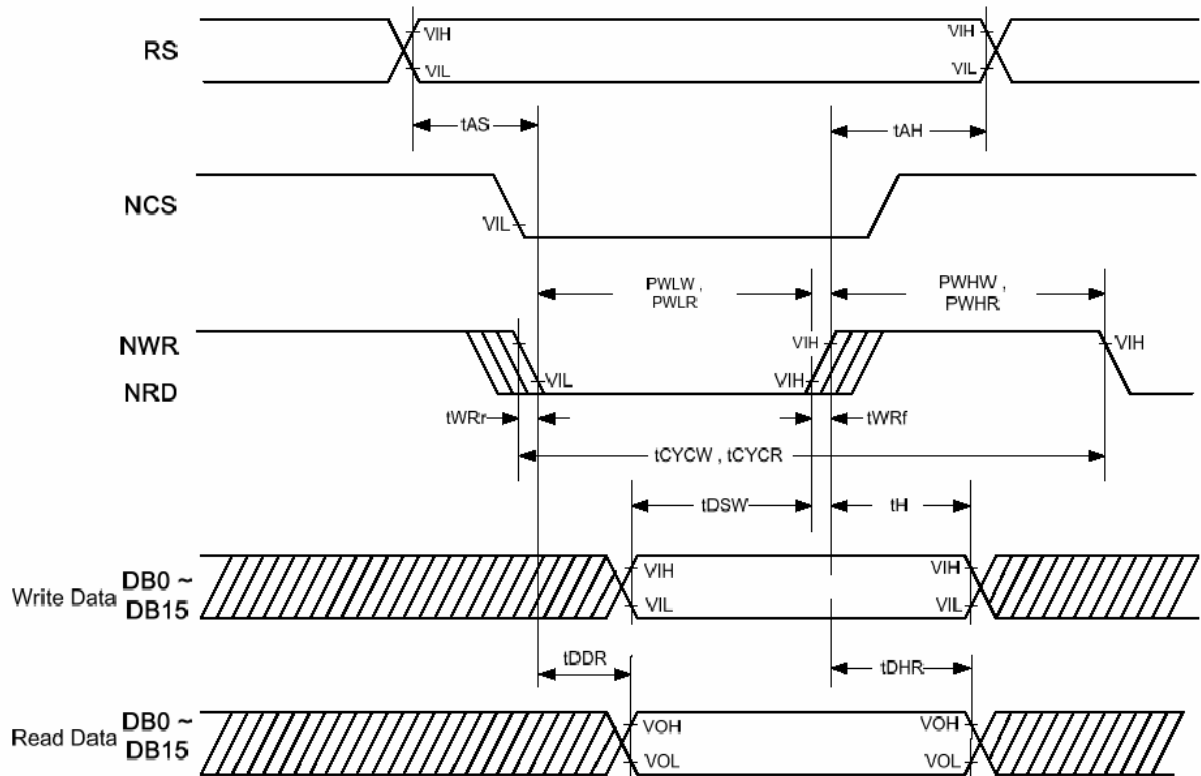


Table 6. 3. 1 80-System Normal Write Mode (HWM = 0) / (IOVCC = 1.65 ~ 3.3V, VCC=2.4~3.3V)

Item		Symbol	Unit	Min.	Typ.	Max.	Test Condition
Bus cycle time	Write	t_{CYCW}	ns	200	-	-	Figure 6.1
	Read	t_{CYCR}	ns	500	-	-	Figure 6.1
Write low-level pulse width		PW_{LW}	ns	50	-	-	Figure 6.1
Read low-level pulse width		PW_{LR}	ns	200	-	-	Figure 6.1
Write high-level pulse width		PW_{HW}	ns	100	-	-	Figure 6.1
Read high-level pulse width		PW_{HR}	ns	200	-	-	Figure 6.1
Write / Read rise / fall time		t_{WRr}, t_{WRf}	ns	-	-	25	Figure 6.1
Setup time	Write (RS to NCS, E_NWR)	t_{AS}	ns	10	-	-	Figure 6.1
	Read (RS to NCS, RW_NRD)			10	-	-	Figure 6.1
Address hold time		t_{AH}	ns	5	-	-	Figure 6.1
Write data set up time		t_{DSW}	ns	60	-	-	Figure 6.1
Write data hold time		t_H	ns	15	-	-	Figure 6.1
Read data delay time		t_{DDR}	ns	-	-	200	Figure 6.1
Read data hold time		t_{DHR}	ns	5	-	-	Figure 6.1

Table 6. 3. 2 80-System High-Speed Write Mode (HWM = 1) / (IOVCC = 1.65 ~ 3.3V, VCC=2.4~3.3V)

Item		Symbol	Unit	Min.	Typ.	Max.	Test Condition
Bus cycle time	Write	t_{CYCW}	ns	100	-	-	Figure 6.1
	Read	t_{CYCR}	ns	500	-	-	Figure 6.1
Write low-level pulse width		PW_{LW}	ns	40	-	-	Figure 6.1
Read low-level pulse width		PW_{LR}	ns	200	-	-	Figure 6.1
Write high-level pulse width		PW_{HW}	ns	40	-	-	Figure 6.1
Read high-level pulse width		PW_{HR}	ns	200	-	-	Figure 6.1
Write / Read rise / fall time		t_{WRr}, t_{WRf}	ns	-	-	25	Figure 6.1
Setup time	Write (RS to NCS, E_NWR)	t_{AS}	ns	10	-	-	Figure 6.1
	Read (RS to NCS, RW_NRD)			10	-	-	Figure 6.1
Address hold time		t_{AH}	ns	5	-	-	Figure 6.1
Write data set up time		t_{DSW}	ns	60	-	-	Figure 6.1
Write data hold time		t_H	ns	15	-	-	Figure 6.1
Read data delay time		t_{DDR}	ns	-	-	200	Figure 6.1
Read data hold time		t_{DHR}	ns	5	-	-	Figure 6.1

68-system Bus Operation

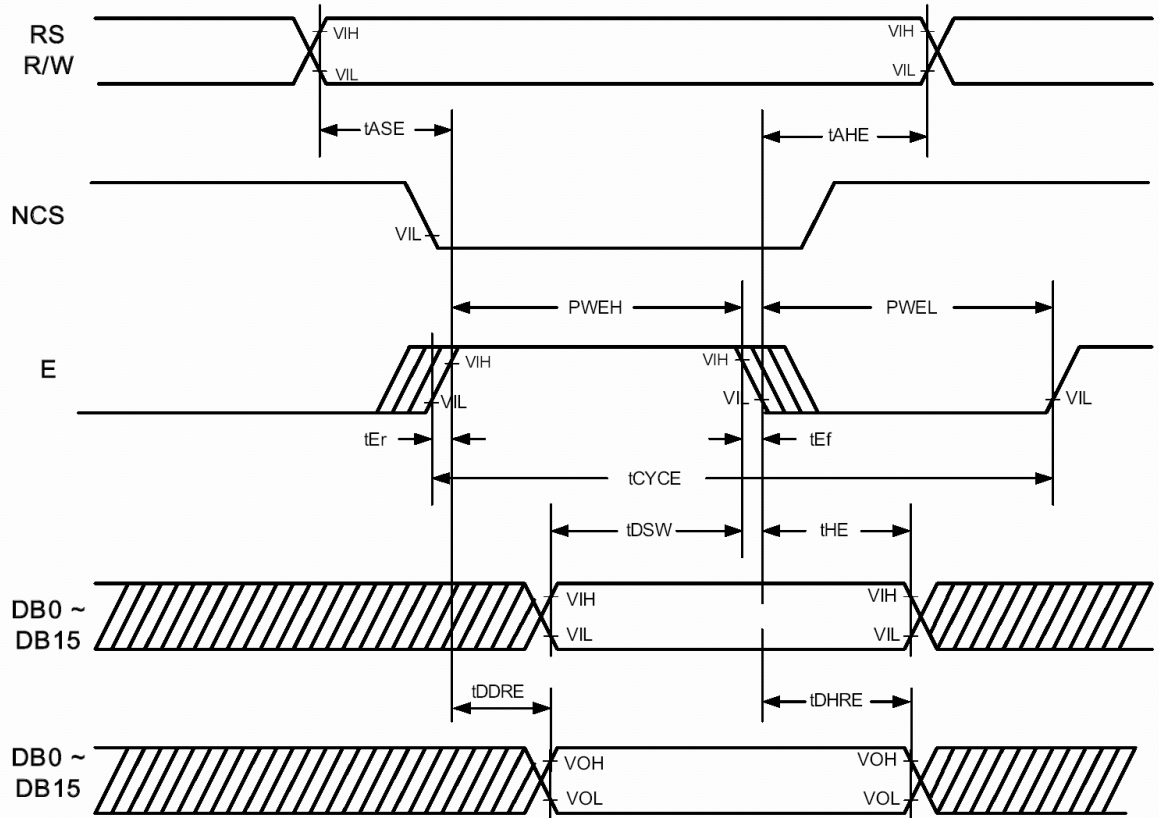


Table 6. 3. 3 68-System Normal Write Mode (HWM = 0) / (IOVCC = 1.65 ~ 3.3V, VCC=2.4~3.3V)

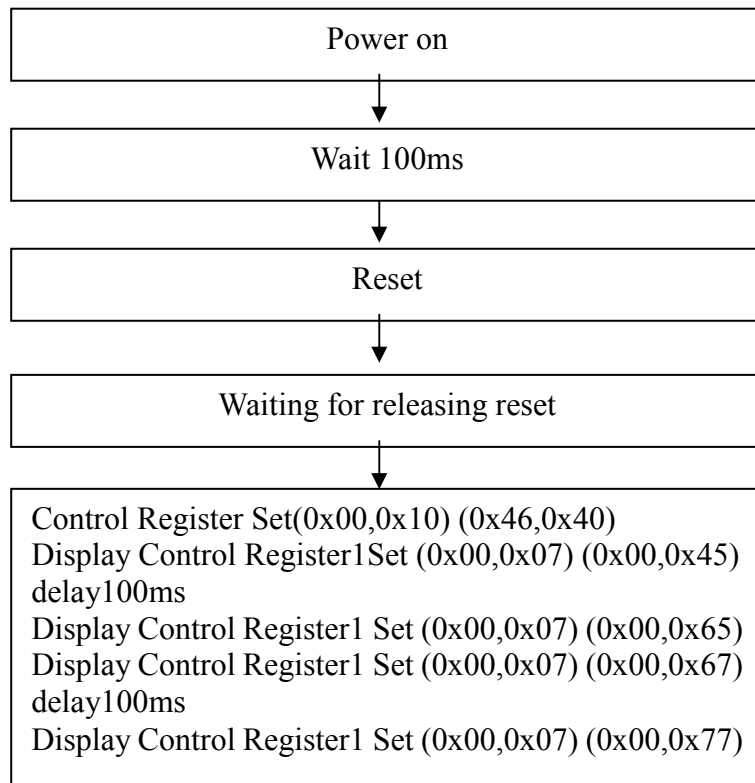
Item		Symbol	Unit	Min.	Typ.	Max.	Test Condition
Bus cycle time	Write	t_{CYCEW}	ns	200	-	-	Figure 6.2
	Read	t_{CYCER}	ns	500	-	-	Figure 6.2
Write low-level pulse width		PWE_{LW}	ns	50	-	-	Figure 6.2
Read low-level pulse width		PWE_{LR}	ns	200	-	-	Figure 6.2
Write high-level pulse width		PWE_{HW}	ns	100	-	-	Figure 6.2
Read high-level pulse width		PWE_{HR}	ns	200	-	-	Figure 6.2
Write / Read rise / fall time		t_{WRr}, t_{WRf}	ns	-	-	25	Figure 6.2
Setup time	Write (RS to NCS, E_NWR)	t_{ASE}	ns	10	-	-	Figure 6.2
	Read (RS to NCS, RW_NRD)			10	-	-	Figure 6.2
Address hold time		t_{AHE}	ns	5	-	-	Figure 6.2
Write data set up time		t_{DSWE}	ns	60	-	-	Figure 6.2
Write data hold time		t_{HE}	ns	15	-	-	Figure 6.2
Read data delay time		t_{DDR}	ns	-	-	200	Figure 6.2
Read data hold time		t_{DHR}	ns	5	-	-	Figure 6.2

Table 6. 3. 4 68-System High-Speed Write Mode (HWM = 1) / (IOVCC = 1.65 ~ 3.3V, VCC=2.4~3.3V)

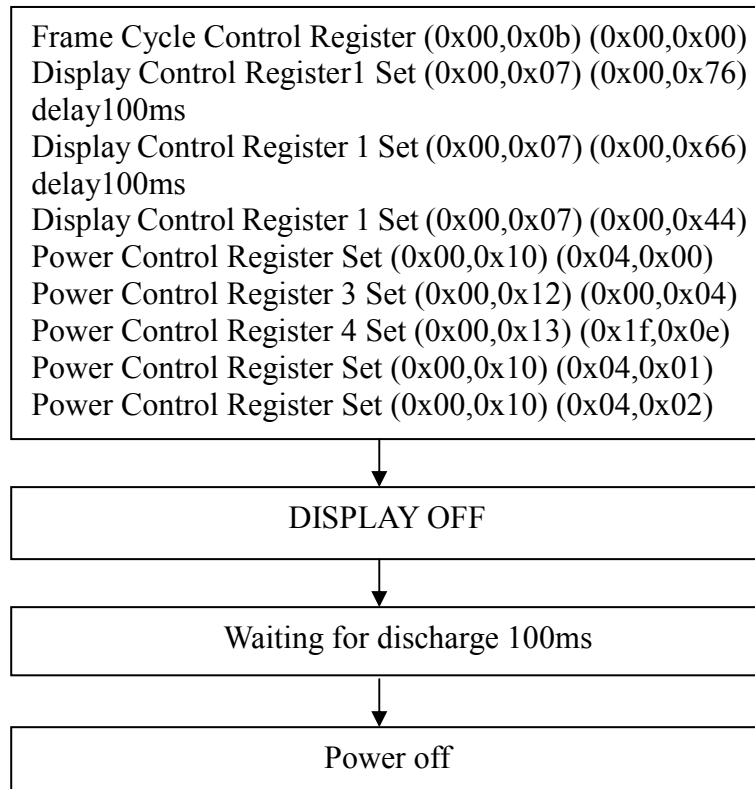
Item		Symbol	Unit	Min.	Typ.	Max.	Test Condition
Bus cycle time	Write	t_{CYCEW}	ns	100	-	-	Figure 6.2
	Read	t_{CYCER}	ns	500	-	-	Figure 6.2
Write low-level pulse width		PWE_{LW}	ns	40	-	-	Figure 6.2
Read low-level pulse width		PWE_{LR}	ns	200	-	-	Figure 6.2
Write high-level pulse width		PWE_{HW}	ns	40	-	-	Figure 6.2
Read high-level pulse width		PWE_{HR}	ns	200	-	-	Figure 6.2
Write / Read rise / fall time		t_{WRr}, t_{WRf}	ns	-	-	25	Figure 6.2
Setup time	Write (RS to NCS, E_NWR)	t_{ASE}	ns	10	-	-	Figure 6.2
	Read (RS to NCS, RW_NRD)			10	-	-	Figure 6.2
Address hold time		t_{AHE}	ns	5	-	-	Figure 6.2
Write data set up time		t_{DSWE}	ns	60	-	-	Figure 6.2
Write data hold time		t_{HE}	ns	15	-	-	Figure 6.2
Read data delay time		t_{DDR}	ns	-	-	200	Figure 6.2
Read data hold time		t_{DHR}	ns	5	-	-	Figure 6.2

1.7 Power ON/OFF SEQUENCE

1.7.1 Power ON Sequence



1.7.2 Display Power OFF Sequence



(2) Electro-optical Units

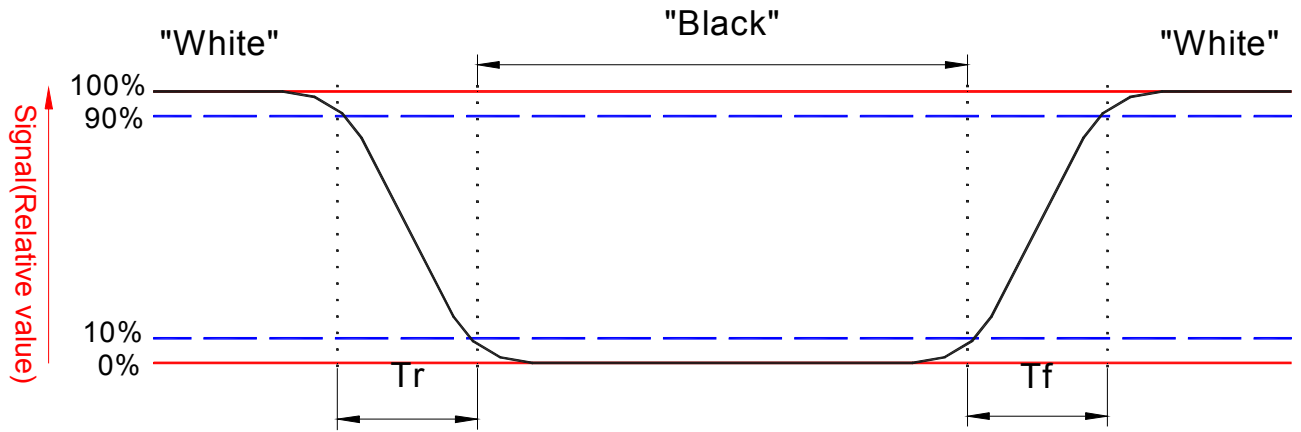
2.1 Electro-optical Characteristics

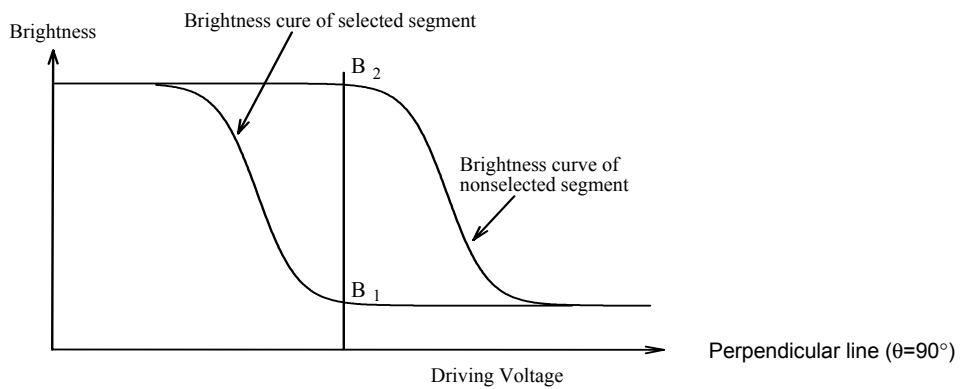
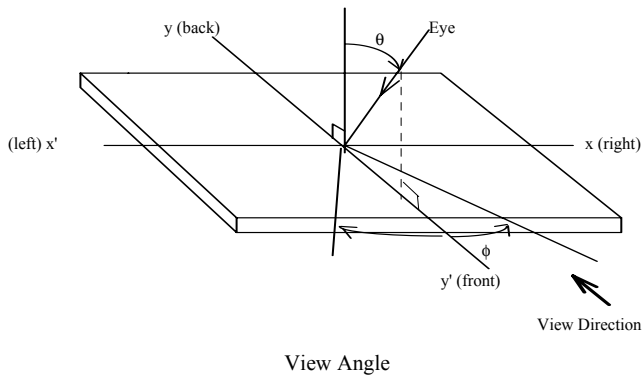
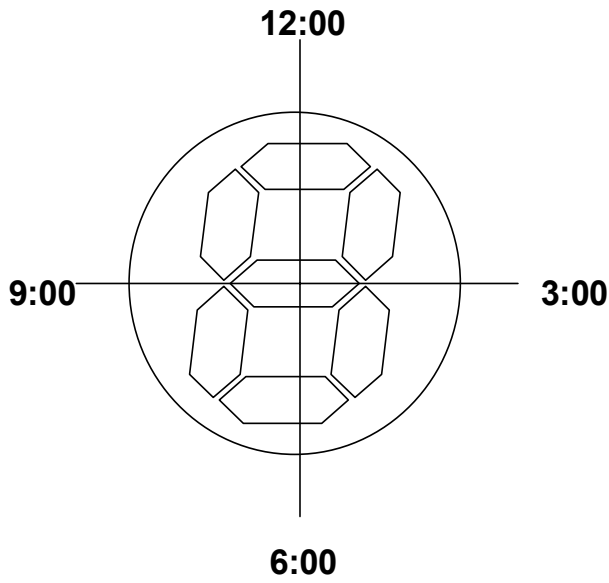
2.1.1 Electro-optical Characteristics

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
VIEW ANGLE	Top	θ	$CR \geq 10$	50	-	-	deg.
	Bottom			50	-	-	-
	Left	ϕ		40	-	-	-
	Right			55	-	-	deg.
CONTRAST RATIO		CR	Transmissive($T_a=25^\circ\text{C}$)	150	200	-	-
RESPONSE TIME		Tr	$T_a=25^\circ\text{C}$	-	10	-	ms
RESPONSE TIME		Td	$T_a=25^\circ\text{C}$	-	25	-	ms
Red x-coord		Rx	$T_a=25^\circ\text{C}$	0.54	0.60	0.66	-
Red y-coord		Ry		0.28	0.34	0.40	
Green x-coord		Gx		0.26	0.32	0.38	
Green x-coord		Gy		0.44	0.50	0.56	
Blue x-coord		Bx		0.07	0.13	0.19	
Blue x-coord		By		0.05	0.11	0.17	
White x-coord		Wx		0.24	0.30	0.36	
White x-coord		Wy		0.24	0.30	0.36	
LCD TYPE		TFT (Normally White / Transmissive)					
VIEWING DIRECTION		6 O'CLOCK					

2.2 Optical Definitions

2.2.1 Response time for panel





$$\text{Contrast ratio} = \frac{\text{Brightness at nonselected segment (B2)}}{\text{Brightness at selected segment (B1)}}$$

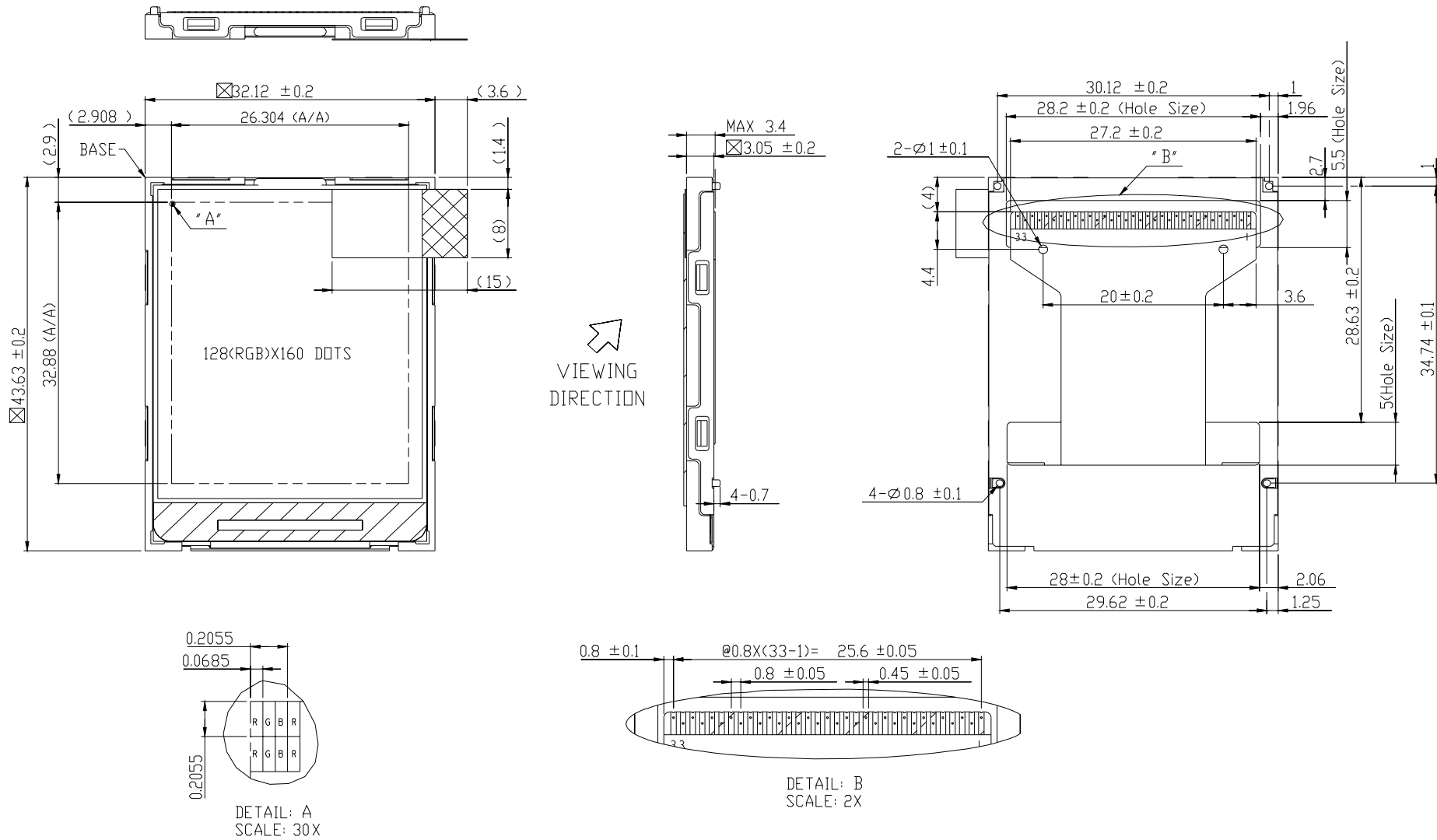
Contrast ratio (CR)

(3) Mechanical Units

3.1 Mechanical Specification

ITEM	STANDARD VALUE	UNIT
MODULE DIMENSION	32.12 (W) X 43.63 (H) X 3.4 (T)	mm
NUMBER OF DOTS	128(RGB) X 160	dots
ACTIVE AREA	26.304 (W) X 32.88 (H)	mm
DOT PITCH	0.0685 (W) X 0.2055 (H)	mm
PIXEL PITCH	0.2055 (W) X 0.2055 (H)	mm
BACK LIGHT	LED (white)	-
APPROX. WEIGHT	7.9	g

3.2 Mechanical Diagram



3.3 Back-light Specification

LED Backlight Styles:

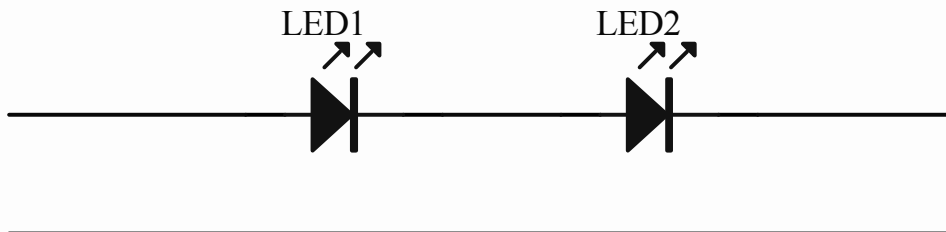
The LED chips are distributed over the whole light area of the illumination unit, which gives the most uniform light.

1. Data About LED Backlight :

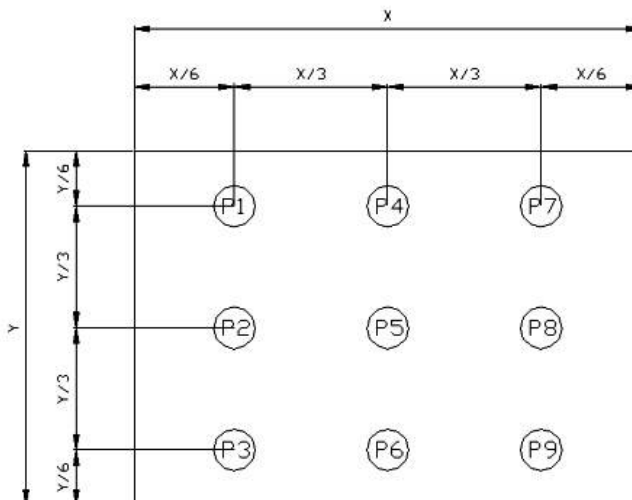
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
Supply Current	I_{AK}	-	20	-	mA	-	$V_{AK} \leq 8.8V$
Reverse Voltage (Single chip)	V_R	-	-	5.0	V	-	-
Luminous Intensity	I_V	200	220	-	cd/m ²	$I_{LED}=20mA$	1 (With LCD)
Luminous Intensity Ratio	-	-	-	30	%	-	2

NOTE : 1.Average Luminous Intensity Of P1 – P9 (With LCD panel)
2.Luminous Intensity Ratio = $(MAX - MIN/MAX) \times 100\%$

2.Internal Circuit Diagram



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

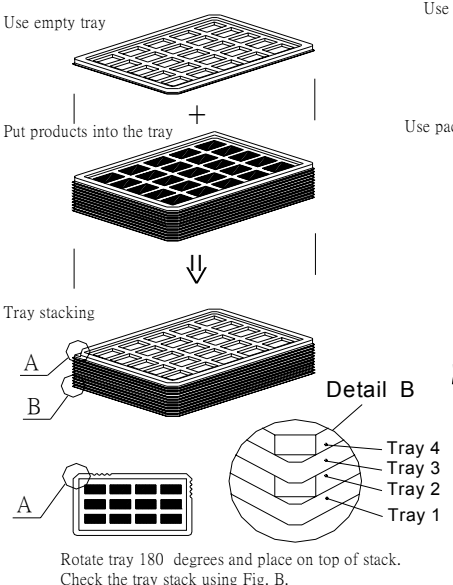


Hole Diameter ϕ 3mm; 1 to 9 per Position Measured Luminous Intensity

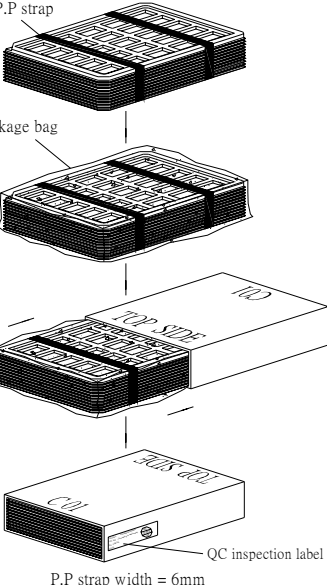
3.4 Packing Method

1. Packaging Material : (per carton)						
NO.	Item	Model		Dimensions (mm)	Unit Weight (Kg)	Quantity
1	LCM Panel	WM-F1216VG-6FLWc		32.12*43.63	0.0078	1600
2	Tray	VF90	PETA	320*217*12*0.4	0.04	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	18.8		Kg± 5%		

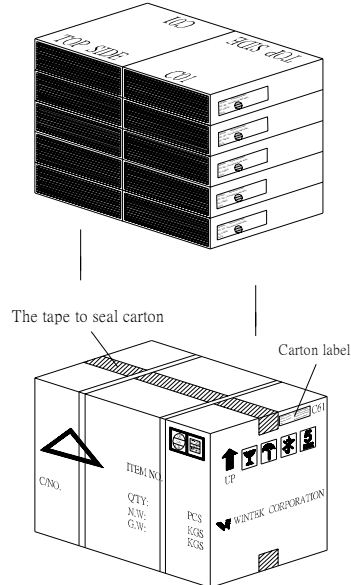
2. Packaging Specifications and Quantity :					
(1) LCM quantity per tray : quantity per row	4	x quantity per column	5	=	20
(2) LCM quantity per box : quantity per tray	20	x quantity of trays	8	=	160
(3) Total LCM quantity in carton : quantity per box	160	x quantity of boxes	10	=	1600




Tray stacking
A
B
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
Use package bag
QC inspection label
P.P strap width = 6mm



The tape to seal carton
Carton label

3. Label Specifications :		Remark
(1) QC Inspection Label		
MODEL: WM-F1216VG-6FLWc LOT NO: (According to each order) QC CHECK:  DATE: Q'ty: (According to shipping)	Label Color----Green	
90.0	32.0	
(2) Carton Label		
Wintek Part No: WM-F1216VG-6FLWc Purchase Order No: (According to each order) Q'ty: (According to shipping)	Label Color----White	
105.0	42.4	

(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

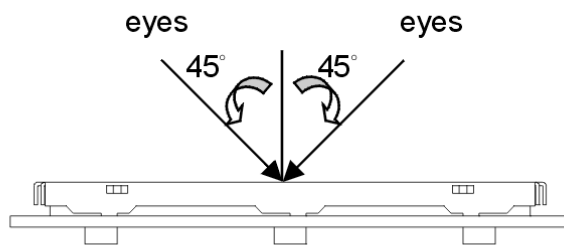
Both sides should discuss together when the following problems happen.

- 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.

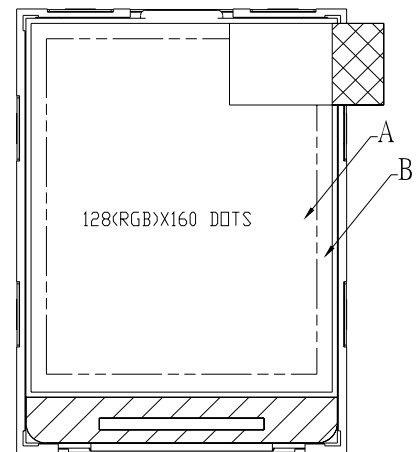
4.1-5. Standard of The Product Appearance Test

a. Manner of appearance test:

- (i) The test must be under 20W × 2 or 40W 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° of vertical line.



(iv) Definition of area:



A Area : Viewing area.

B Area : Out of viewing area.

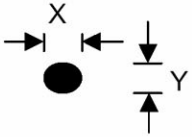
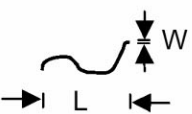
(Outside viewing area)

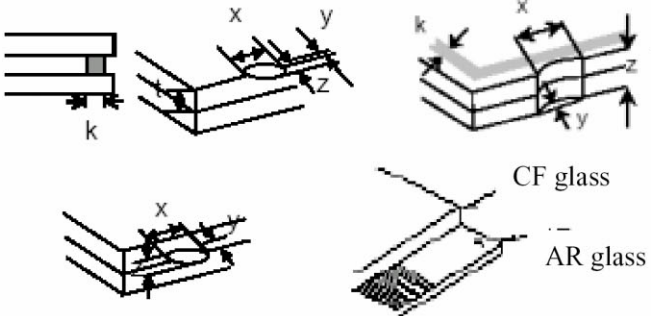
b. Basic principle:

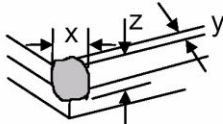
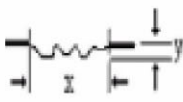

- (i) It will accord to the AQL when the standard can not be described.
- (ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.
- (iii) Must add new item on time when it is necessary.

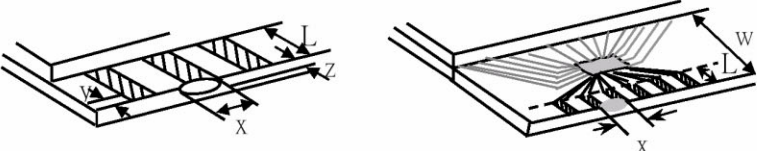
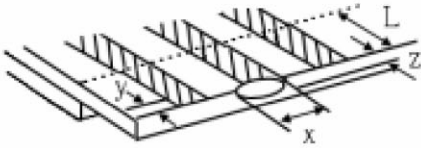
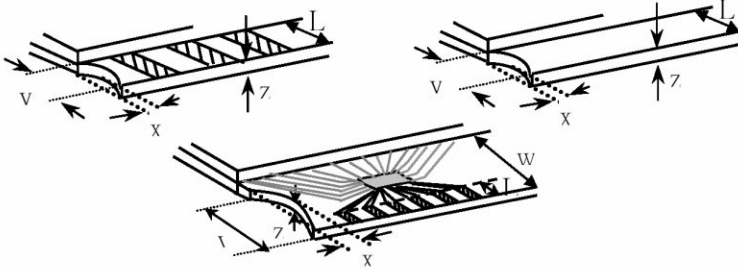
c. Standard of inspection:(Unit: mm)

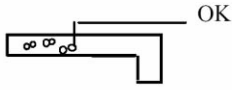
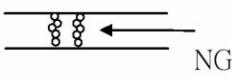
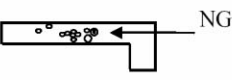
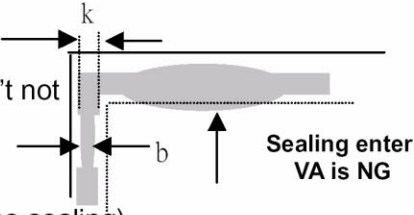
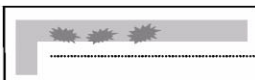
4.1-6. Inspection specification

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: 20px;"> <thead> <tr> <th>SIZE</th> <th>Acceptable Q'TY</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>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="display: flex; align-items: center; margin-top: 10px;"> $\phi = (x + y) / 2$  <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>SIZE</th> <th>Acceptable Q'TY</th> </tr> </thead> <tbody> <tr> <td>$\phi \leq 0.1$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.1 < \phi \leq 0.2$</td> <td>≤ 3</td> </tr> <tr> <td>$0.2 < \phi \leq 0.25$</td> <td>≤ 1</td> </tr> <tr> <td>$\phi > 0.25$</td> <td>0</td> </tr> </tbody> </table> </div> <p>⊙ Each cell acceptable Q'TY is 2 (space must over 10mm)</p>	SIZE	Acceptable Q'TY	$\phi \leq 0.1$	Accept no dense	$0.1 < \phi \leq 0.2$	≤ 3	$0.2 < \phi \leq 0.25$	≤ 1	$\phi > 0.25$	0	2.5						
		SIZE	Acceptable Q'TY																
$\phi \leq 0.1$	Accept no dense																		
$0.1 < \phi \leq 0.2$	≤ 3																		
$0.2 < \phi \leq 0.25$	≤ 1																		
$\phi > 0.25$	0																		
3.2 Line type : (As following drawing) <div style="display: flex; align-items: center; margin-top: 10px;">  <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acceptable Q'TY</th> </tr> </thead> <tbody> <tr> <td>-----</td> <td>$W \leq 0.03$</td> <td>Accept no dense</td> </tr> <tr> <td>$L \leq 3.0$</td> <td>$0.03 < W \leq 0.05$</td> <td>≤ 2</td> </tr> <tr> <td>$L \leq 2.0$</td> <td>$0.05 < W \leq 0.1$</td> <td>≤ 2</td> </tr> <tr> <td colspan="3" style="text-align: center;">Above acceptable number are 2 (space 10 mm)</td> </tr> <tr> <td>----</td> <td>$W > 0.1$</td> <td>As round type</td> </tr> </tbody> </table> </div> <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	$L \leq 3.0$	$0.03 < W \leq 0.05$	≤ 2	$L \leq 2.0$	$0.05 < W \leq 0.1$	≤ 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																	
$L \leq 3.0$	$0.03 < W \leq 0.05$	≤ 2																	
$L \leq 2.0$	$0.05 < W \leq 0.1$	≤ 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 ϕ</th> <th>Acceptable Q'TY</th> </tr> </thead> <tbody> <tr> <td>$\phi \leq 0.15$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.15 < \phi \leq 0.25$</td> <td>2</td> </tr> <tr> <td>$0.25 < \phi \leq 0.40$</td> <td>1</td> </tr> <tr> <td>$\phi > 0.40$</td> <td>0</td> </tr> <tr> <td>Total Q'TY</td> <td>2</td> </tr> </tbody> </table>	Size ϕ	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 ϕ	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 1281 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>$z \leq 1/2t$</td> <td>$y \leq 1.0$</td> <td>ignore</td> </tr> <tr> <td>CF,AR glass</td> <td>$1/2t < z < t$</td> <td>At least (k) 2/3 of sp must remain</td> <td>ignore</td> </tr> <tr> <td>CF glass</td> <td>$z = t$</td> <td>$y \leq 0.5$</td> <td>ignore</td> </tr> <tr> <td>AR glass</td> <td>$z = t$</td> <td>$y \leq 0.3$</td> <td>ignore</td> </tr> </tbody> </table> <p>⊙ If chip width $\leq 0.10\text{mm}$,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="590 481 1284 672"> <tr> <td>z : chip thickness</td> <td>y : chip width</td> <td>x : chip length</td> </tr> <tr> <td>$z \leq 1/2t$</td> <td>$y \leq 1.5$</td> <td>$x \leq 1.5$</td> </tr> <tr> <td>$1/2t < z \leq 2t$</td> <td>At least (k) 2/3 of sp must remain</td> <td>$x \leq 1.5$</td> </tr> </table> <p>⊙ If chip width $\leq 0.10\text{mm}$,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="502 940 1300 1265"> <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>$z \leq 1/2t$</td> <td>$y \leq 1.0$</td> <td>ignore</td> </tr> <tr> <td>CF,AR glass</td> <td>$1/2t < z < t$</td> <td>At least (k) 2/3 of sp must remain</td> <td>ignore</td> </tr> <tr> <td>CF glass</td> <td>$z = t$</td> <td>$y \leq 0.5^*$</td> <td>ignore</td> </tr> <tr> <td>AR glass</td> <td>$z = t$</td> <td>$y \leq 0.3^*$</td> <td>ignore</td> </tr> </tbody> </table> <p>⊙ If chip width $\leq 0.10\text{mm}$,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="534 555 1193 638"> <tr> <td>z : chip thickness</td> <td>y : chip width</td> <td>x : chip length</td> </tr> <tr> <td>$z \leq t$</td> <td>$y \leq 1/5L$</td> <td>ignore</td> </tr> </table> <p>⊙ If chip width $\leq 0.10\text{mm}$,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 1086 1300 1232"> <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>$z \leq 1/2t$</td> <td>$y \leq L/3$</td> <td>ignore</td> </tr> <tr> <td>COG</td> <td>$z \leq 1/2t$</td> <td>$y \leq L/3$</td> <td>ignore</td> </tr> </tbody> </table> <p>⊙ If chip width $\leq 0.10\text{mm}$,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 1668 1300 1825"> <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>$z \leq t$</td> <td>$y \leq L^*$</td> <td>ignore*</td> </tr> <tr> <td>COG</td> <td>$z \leq t$</td> <td>$y \leq w$</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	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 <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>⊙scattered bubble is</p>  <p>OK</p> </div> <div style="text-align: center;"> <p>⊙aligned bubble</p>  <p>NG</p> </div> </div> <div style="margin-top: 10px;"> <p>⊙LC residue</p>  <p>NG</p> </div> 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: $b \geq 1/2k$. (k = width of the sealing) <div style="margin-top: 10px;">  </div> 9.3:Sealing explosion, residue in the sealing (include fiber). (1)Sealing must keep it's 1/2 width. <div style="margin-top: 10px;">  </div>	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.	1.5
		11.2 COB seal surface may not have pinholes through to the IC.	1.5
		11.3 The height of the COB should not exceed the height indicated in the assembly diagram.	0.65
		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.	1.5
		11.5 No oxidation or contamination PCB terminals.	1.5
		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.	0.65
		11.7 The jumper on the PCB should conform to the product characteristic chart.	0.65
		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
12	General appearance	12.1 No oxidation, contamination, curves or, bends on interface Pin (OLB) of TCP.	1.5
		12.2 No cracks on interface pin (OLB) of TCP.	0.65
		12.3 No contamination, solder residue or solder balls on product.	1.5
		12.4 The IC on the TCP may not be damaged, circuits.	1.5
		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.	1.5
		12.6 The residual rosin or tin oil of soldering (component or chip component) is not burned into brown or black color.	1.5
		12.7 Sealant on top of the ITO circuit has not hardened	1.5
		12.8 Pin type must match type in specification sheet.	0.65
		12.9 LCD pin loose or missing pins.	0.65
		12.10 Product packaging must the same as specified on packaging specification sheet.	0.65
		12.11 Product dimension and structure must conform to product specification sheet .	0.65
		12.12 The appearance of Heat Seal should not admit any dirt and break.	

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°C for 30 minutes → normal temperature for 5 minutes → +80°C 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

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°C to 45°C, 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°C 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.