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CUSTOMER'S ACCEPTANCE SPECIFICATIONS

Customer	STD
Product	2.0" TFT LCD Module
Module Name	OSD05N013A*30
Date	2006/07/19
Doc. No.	-
Revision	1.3

CUSTOMER					
Approved	Checked	Checked	Approved	Checked	Design

RECORDS OF REVISION

DATE	REVISED NO.	REVISED DESCRIPTIONS	APPROVED	CHECKED	DESIGN
2006/05/18	0.0	Initial Issued	Brian Lin	Brian Lin	Louis Liu
2006/05/29	1.0	Modify all page	Brian Lin	Brian Lin	Louis Liu
2006/06/02	1.1	Add 18.7 Transportation Precautions	Brian Lin	Brian Lin	Louis Liu
2006/07/03	1.2	Modify p.4/30 ivdd , VCC-GND →VDD-GND Modify Istdby→istby_VCI, VCI-GND(MAX:10uA) & istby_VDD, VDD-GND(MAX:150uA)	Brian Lin	Brian Lin	Louis Liu
2006/07/03	1.2	Modify p.6/30 symbol mark “√” →Φ	Brian Lin	Brian Lin	Louis Liu
2006/07/03	1.2	Modify p.7/30 Note 5. DEFINITION OF CONTRAST RATIO & Note 6. DEFINITION OF RESPONSE TIME	Brian Lin	Brian Lin	Louis Liu
2006/07/03	1.2	Modify p.10/30 Pin No.33,34 LED description	Brian Lin	Brian Lin	Louis Liu
2006/07/03	1.2	Revised p.23/30 13.MECHANICAL DRAWING	Brian Lin	Brian Lin	Louis Liu
2006/07/03	1.2	Modify p.24/30 high temperature 70℃ → 80℃; cancel reliability test Note2	Brian Lin	Brian Lin	Louis Liu
2006/07/03	1.2	Add p.26/30 Applied Zone “B” zone	Brian Lin	Brian Lin	Louis Liu
2006/07/03	1.2	Revised p.27/30 17.PACKAGE Drawing	Brian Lin	Brian Lin	Louis Liu
2006/07/19	1.3	Modify p.23/30 13. MECHANICAL DRAWING (Thickness 3.15max→3.3max) and chang BLU-FPC soldering position.	Brian Lin	Brian Lin	Louis Liu

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1. APPLICATIONS

1-1SCOPE:

This specification covers the delivery requirements for the liquid crystal display delivered by OSD Displays. to the Customer

1-2PRODUCTS:

Liquid Crystal Display Module (LCM)

1-3MODULE NAME:

OSD05N013A*30

2. FEATURES

- (1) Resolution Dot :176(RGB)x220(116160 dots)
- (2) Viewing Direction:12 o'clock
- (3) Display Color: 262K / 65 K

3. GENERAL SPECIFICATIONS

Item	Specifications	Unit
Screen Size(Diagonal)	2.0"	in
Display Mode	Transmissive, Normally White	—
Display Technology	a-Si TFT-LCD Active Matrix	—
Signal interface	34pin, 18 bits CMOS 80 System	—
Number of dots	176(RGB)(H) x 220(V)	dots
Outline Dimensions(typ)	38.5(H) x 52.8(V) x 2.7 (t)	mm
Active Area	31.68(H) x 39.6(V)	mm
Dot Pitch	0.06(RGB)(H) x 0.18(V)	mm
Pixel Arrangement	RGB - Stripe	—
Surface Treatment	Glare treatment, UV cut	—
Built-in controller	S6D0118	—
Driving Method	1/220 duty	—
Surface Treatment	Glare treatment, UV cut	—
LED drive circuit	Built-in	—
Backlight	Light Emitting Diode (White LED)x3	—
Weight	About 8	g

4. ABSOLUTE MAXIMUM RATINGS

(Ta=25°C GND=0V)

Item	Symbol	Min	Max	Unit
Supply Voltage	VDD	-0.3	5.0	V
Supply Voltage for step-up circuit	VCI	-0.3	5.0	V
LCD Supply Voltage range	IVGH-VGLI	-0.3	35	V
Input Voltage range	Vin	-0.3	VDD+0.3	V
Operating Temperature	Top	-20	+70	°C
Storage Temperature	Tst	-30	+80	°C

Note: LCM should be grounded during handling LCM

5. ELECTRICAL CHARACTERISTICS

(Ta=25°C GND=0V)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note	
Operating Voltage	VDD	-	2.5	2.8	3.3	V	(1)	
Internal Power Supply Voltage	VCI	-	2.5	-	3.3	V		
LCD driving voltage	VGH		7.0	-	16.5	V		
	VGL		-13.5	-	-5.25	V		
	VCL		-2.75	-	-1.75	V		
	AVDD		3.5	-	5.5	V		
	GVDD		3	-	5.0	V		
Input Voltage "H" Level	V _{IH}	-	0.8VDD	-	VDD	V	(2)	
Input Voltage "L" Level	V _{IL}	-	0	-	0.2VDD	V	(2)	
Output Voltage "H" Level	V _{OH}	I _{OH} =-0.5mA	0.7VDD	-	VDD	V	(3)	
Output Voltage "L" Level	V _{OL}	I _{OL} =0.5mA	0.0-	-	0.3VDD	V	(3)	
Operating Frequency	Fosc	Frame freq=60Hz,240Line	221.4	246	270.6	KHz	(4)	
Current Consumption	Normal operation	I _{vdd}	VDD-GND	-	-	200	uA	
	Normal operation	I _{vci}	VCI-GND	-	-	3	mA	
	Standby Mode	I _{stby_VCI}	VCI-GND	-	-	10	uA	
		I _{stby_VDD}	VDD-GND	-	-	150	uA	

REMARK: The Current Consumption Value is without backlight circuit.

NOTE:

(1)V_{ss}=0V.

(2)Applied pins; IM3-0, CSB, E_RDB, RW_WRB, RS, DB0 to DB17, PD0 to PD17, RESETB.

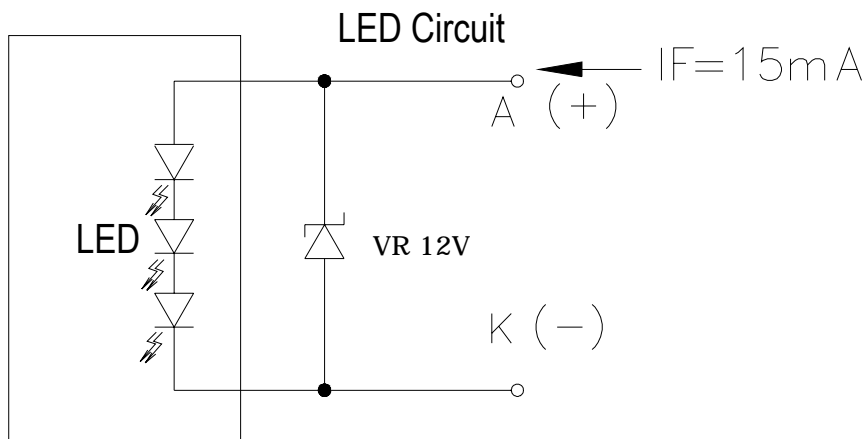
(3)Applied pins;DB0 to DB17

(4)Target frame frequency = 60Hz, Display line = 240, Back porch = 8, Front porch =8

RTN1-0 = "00", DIV1-0 ="00" (measure OSC2(fosc) or cl1 (fosc/16))

6. LED BACKLIGHT

6.1 POWER SUPPLY LED BACKLIGHT



6.2 ABSOLUTE MAXIMUM RATINGS

($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Min	Typ	Max	Unit
Power Consumption	Pbl	-	150	-	mW
Current	If	-	15	20	mA

7. ELECTRO-OPTICAL CHARACTERISTICS

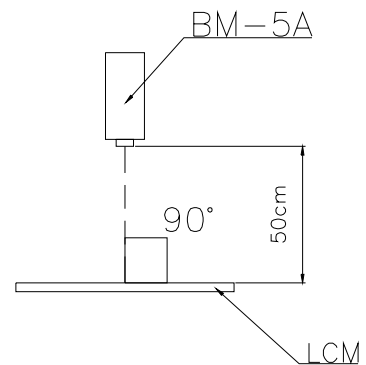
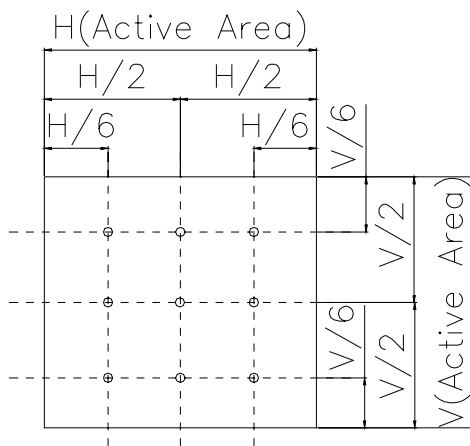
(BACKLIGHT ON , Ta=25°C)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note		
Brightness	B	$\phi=0^\circ \quad \theta=0^\circ$	(150)	(200)	-	cd/m ²	1,3		
Uniformity	-		70	(83)	-	%	2,3		
Viewing Angle	Hor.	$Cr \geq 10.0$		$\phi=0^\circ$	(45)	deg	4		
				$\phi=180^\circ$	(45)				
	Ver.			$\phi=90^\circ$	-			(35)	-
				$\phi=270^\circ$	-			(15)	-
Contrast Ratio	Cr	(150)	(200)	-	-	5			
Response Time (rise-fall)	tr+tf	-	(50)	85	ms	6			
Color Chromaticity	Red	$\phi=0^\circ; \quad \theta=0^\circ$		x	(0.633)	-	-	3	
				y	(0.336)	-	-		
	Green			x	(0.335)	-	-		
				y	(0.580)	-	-		
	Blue			x	(0.141)	-	-		
				y	(0.066)	-	-		
	White			x	(0.315)	-	-		
				y	(0.321)	-	-		

Note 1 Driving Condition
 Display Pattern : White Raster
 LED Current : 15mA / Part
 Measurement of the following
 9 places on the display.

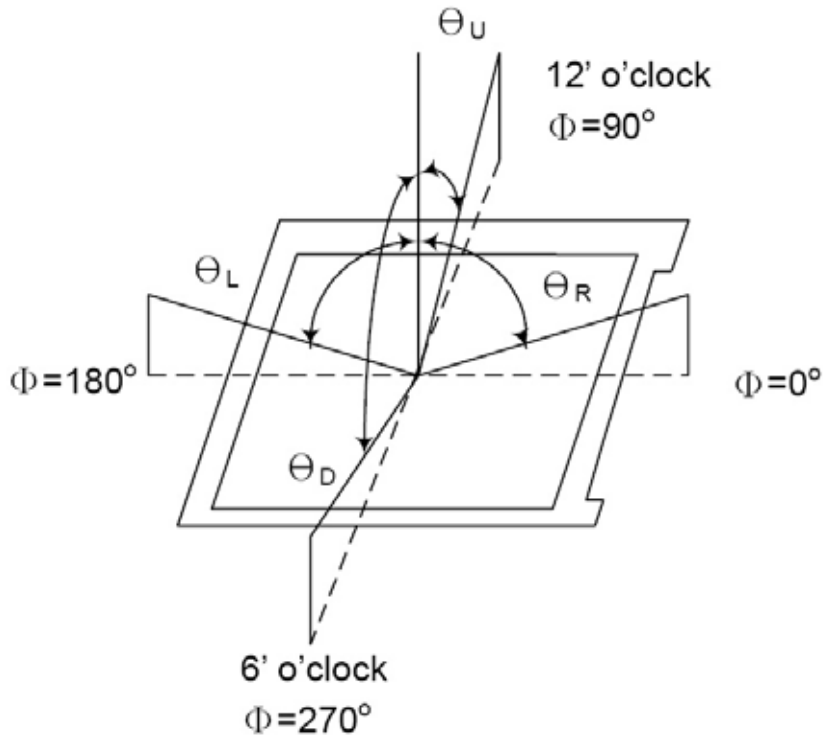
Note2

Note 3 Measurement Condition



$$\text{Uniformity} = (\text{Min. brightness} / \text{Max. brightness}) \times 100\%$$

Note 4. DEFINITION OF VIEWING ANGLE



Note 5. DEFINITION OF CONTRAST

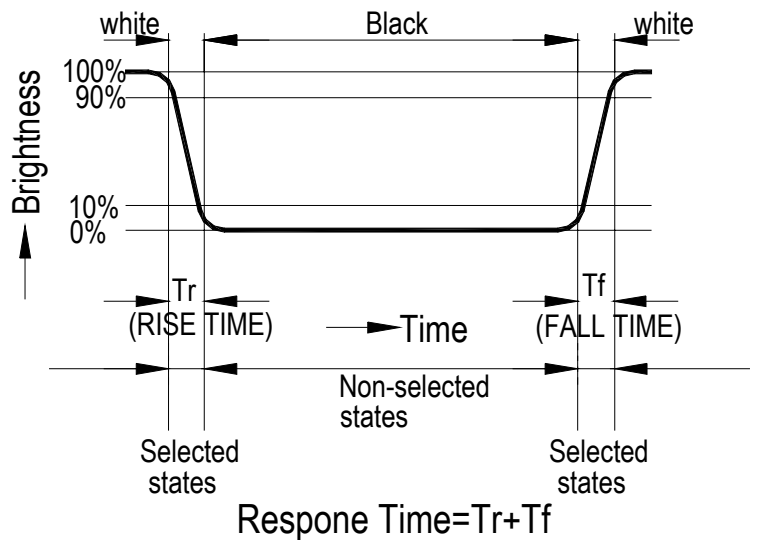
Ratio of gray max(B2) & gray min(B1) of the average all measurement point at Note 2:

$$CR = \frac{\text{Luminance when LCD is white (B2)}}{\text{Luminance when LCD is black (B1)}}$$

B2: Luminance with all pixels white

B1: Luminance with all pixels black

Note 6. DEFINITION OF RESPONSE TIME

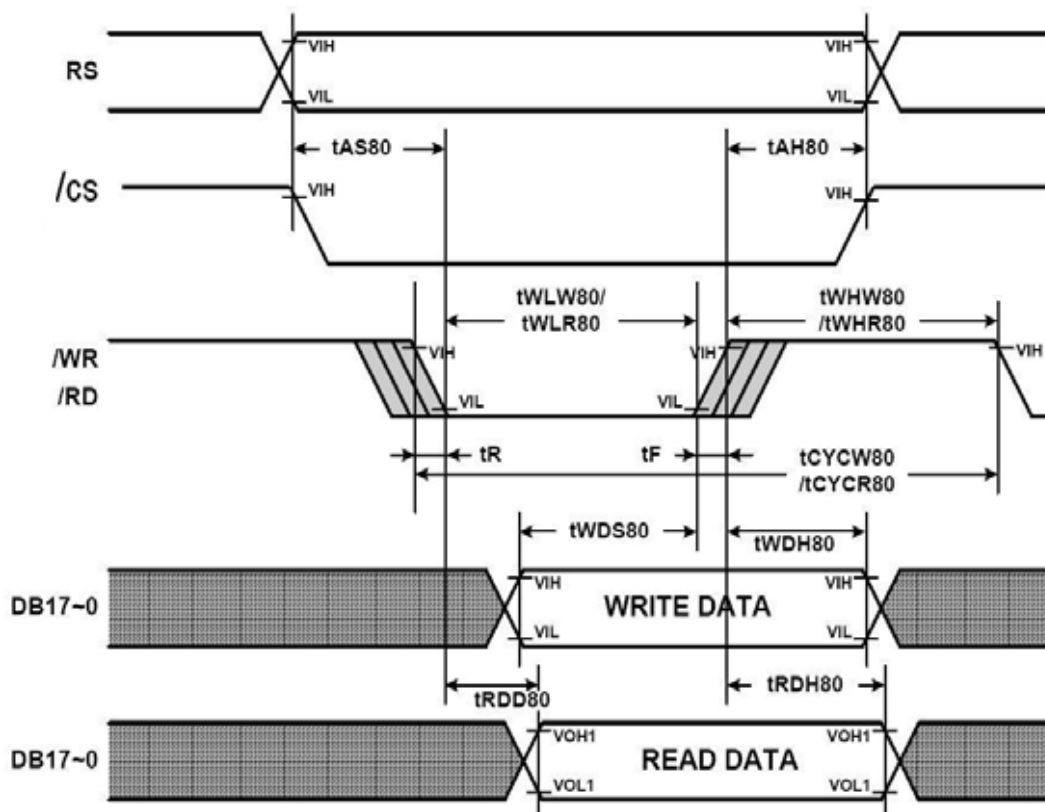


8. AC CHARACTERISTICS

8.1 PARALLEL WRITE INTERFACE CHARACTERISTICS (80 MODE)

(VDD=2.5~3.3V, TA=-20 to +70°C)

Characteristic		Symbol	Specification		Unit
			Min.	Max.	
Cycle time	Write	tCYCW80	100	-	ns
	Read	tCYCR80	500	-	
Pulse rise / fall time		tR, tF	-	2	
Pulse width low	Write	tWLW80	40	-	
	Read	tWLR80	250	-	
Pulse width high	Write	tWHW80	40	-	
	Read	tWHR80	200	-	
RW, RS and CSB setup time		tAS80	10	-	
RW, RS and CSB hold time		tAH80	2	-	
Write data setup time		tWDS80	60	-	
Write data hold time		tWDH80	15	-	
Read data delay time		tRDD80	-	200	
Read data hold time		tRDH80	5	-	



8.2 RESET TIMING CHARACTERISTICS

(VDD=2.5~3.3V, TA=-20 to +70°C)

Characteristic	Symbol	Min.	Max.	Unit
Reset low pulse width	tRES	1	-	US



9.INTERFACE PIN DESCRIPTION

Pin No.	Symbol	Description
1	GND	logical GND: 0V
2	ENABLE	Data enable signal pin (Reserve for RGB Mode)
3	IM3	(Reference 9.1.1 system Interface pin description)
4	IM0	
5	/RESET	System Reset
6	DB17	<p>Data Bus</p> <p>(Unused pins must be fixed to the VDD or GND)</p> <p>(Reference 9.1.3~9.1.6 Interface description)</p>
7	DB16	
8	DB15	
9	DB14	
10	DB13	
11	DB12	
12	DB11	
13	DB10	
14	DB9	
15	DB8	
16	DB7	
17	DB6	
18	DB5	
19	DB4	
20	DB3	
21	DB2	
22	DB1	
23	DB0	
24	DOTLK	Input pin for clock signal of external interface
25	HSYNC	Synchronous signal of line (Reserve for RGB Mode)
26	VSYNC	Synchronous signal of frame (Reserve for RGB Mode)
27	/CS	Chip select signal for TFT-LCD driver
28	RS	Register select signal
29	/WR	Write strobe signal
30	/RD	Read strobe signal
31	VCI	Internal Power Supply for logic circuit
32	VDD	Power Supply for logic circuit
33	LED-	LED cathode=GND
34	LED+	LED anode input

9.1 Interface Description

The S6D0118 has nine high-speed system interfaces: an 80-system 18-/16-/9-/8-bit bus, a 68-system 18-/16-/9-/8-bit bus, and a serial interface (SPI: Serial Peripheral Interface). The IM3-0pins select the interface mode.

The S6D0118 has three 18-bit registers: an index register (IR), a write data register (WDR), and a read data register (RDR). The IR stores index information for control register control register and GRAM. The WDR temporarily stores data to be written into control register and GRAM. The RDR temporarily stores data read from GRAM. Data written into the GRAM from MPU is initially written to the WDR and then written to the GRAM automatically. Data is read through the RDR when reading from the GRAM, and the first read data is invalid and the second and the following data are valid. Execution time for instruction, except oscillation start, is 0-clock cycle so that instructions can be written in succession.

9.1.1 System Interface pin description (Selects the MPU interface mode)

S6D0118 is enabling to set instruction and access to RAM by selecting IM3/2/1/0 PIN In the system interface mode.

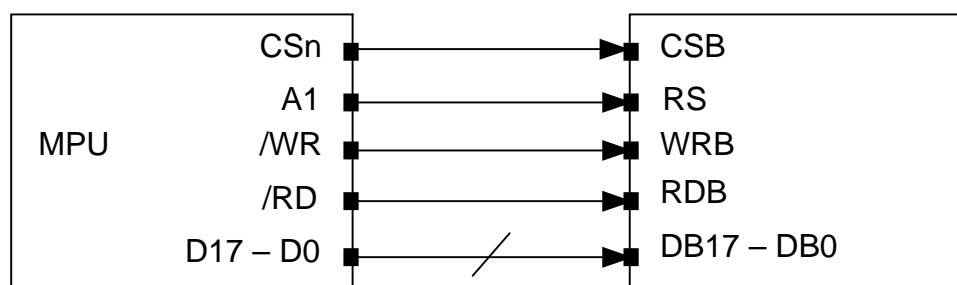
IM3	IM0/ID	MPU interface mode	DB pin assign
0	0	80-system 16bit bus interface	DB17 to 10, DB8 to 1
0	1	80-system 8bit bus interface	DB17 to 10
1	0	80-system 18bit bus interface	DB17 to 0
1	1	80-system 9bit bus interface	DB17 to 9

9.1.2 Register selection (16-bit/8-bit parallel interface)

/WR	/RD	RS	Operations
0	1	0	Write index into IR
1	0	0	Read internal status
0	1	1	Write to control registers or GRAM through the WDR
1	0	1	Read from GRAM through the RDR

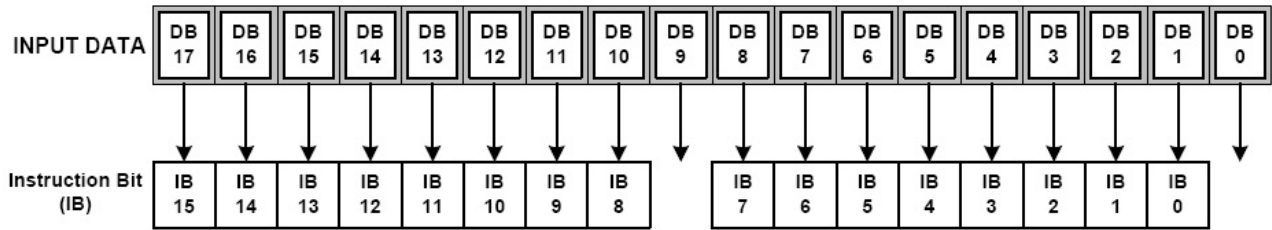
9.1.3 80-system 18-bit Bus Interface

Setting the IM3/2/1/0 to the VDD/VSS/VDD/VSS level allows 80-system 18-bit parallel data transfer.

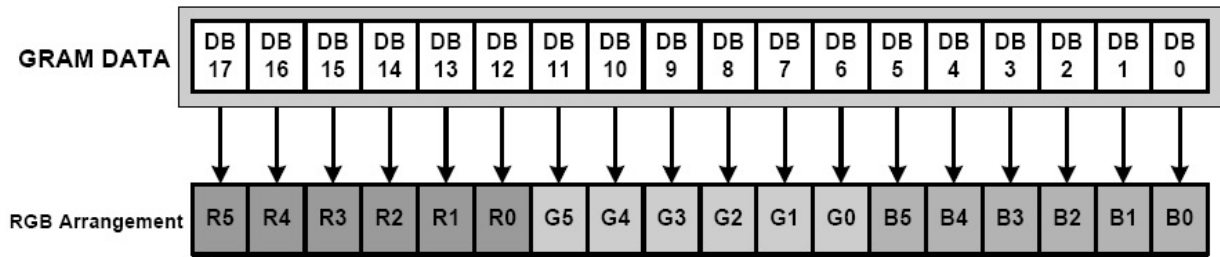


Example of Interface with 18-bit Microcomputer

● Instruction format for 18-bit Interface

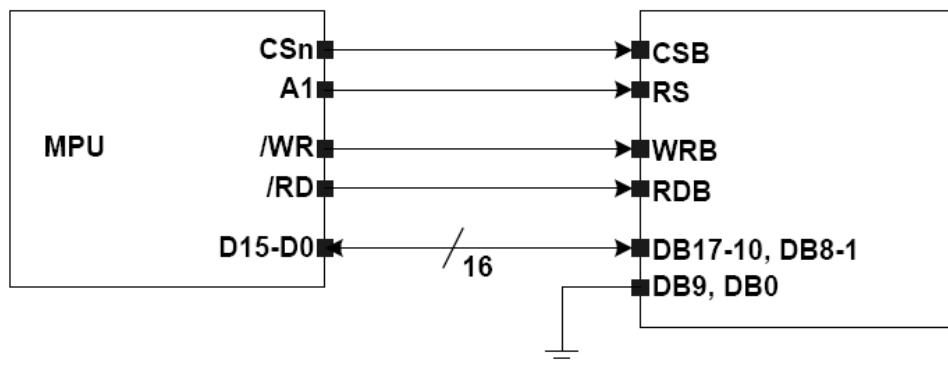


● RAM data write format for 18-bit Interface



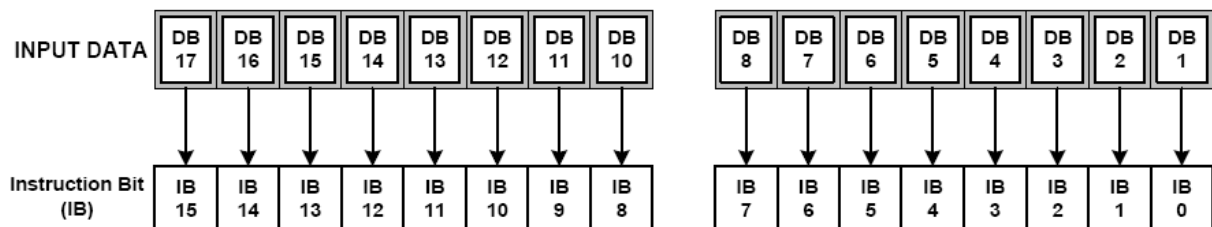
9.1.4 80-system 16-bit Bus Interface

Setting the IM3/2/1/0 to the VSS/VSS/VDD/VSS level allows 80-system 16-bit parallel data transfer.

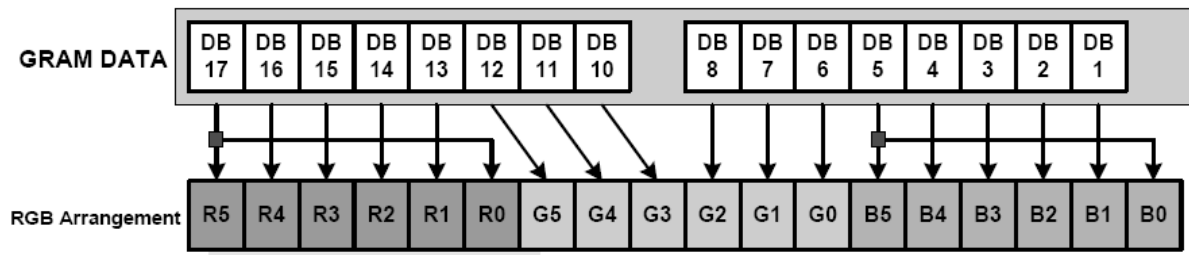


Example of Interface with 16-bit Microcomputer

● Instruction format for 16-bit Interface

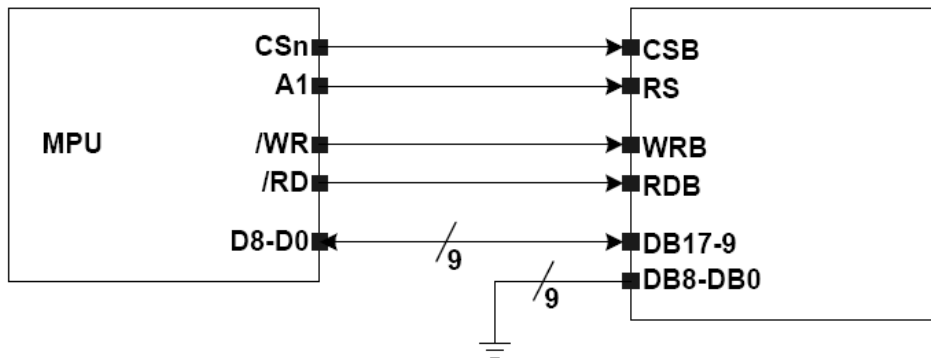


● RAM data write format for 16-bit Interface



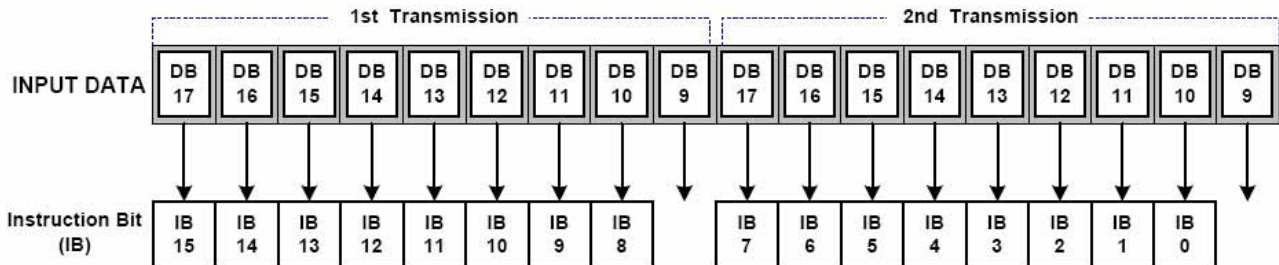
9.1.5 80-system 9-bit Bus Interface

Setting the IM3/2/1/0 to the VDD/VSS/VDD/VDD level allows 80-system 9-bit parallel data transfer.

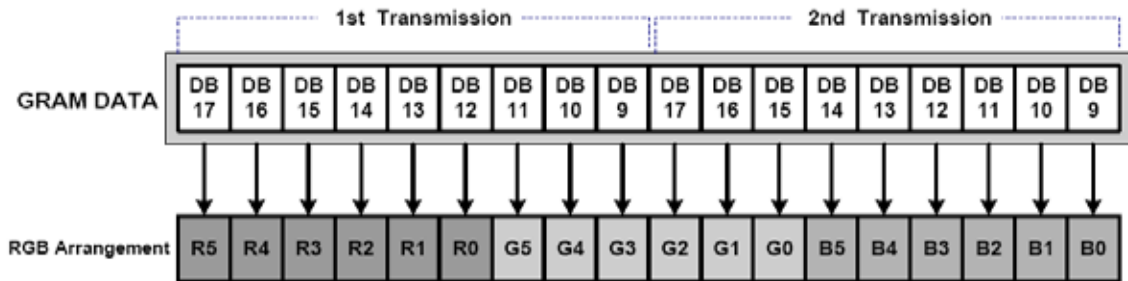


Example of Interface with 9-bit Microcomputer

● Instruction format for 9-bit Interface

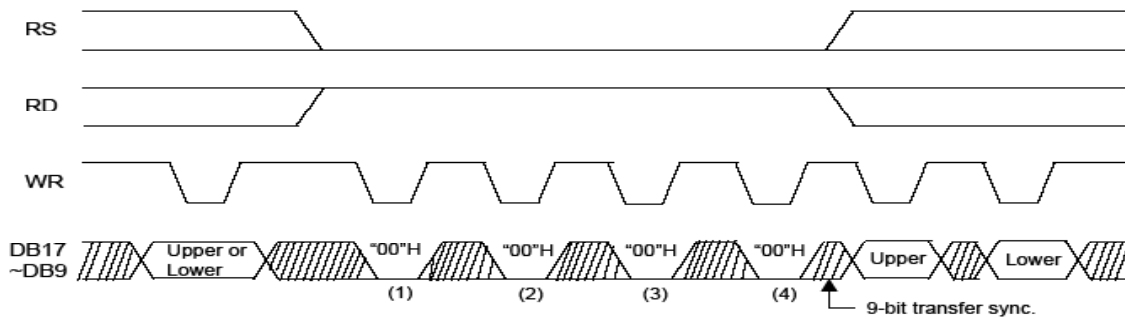


● RAM data write format for 9-bit Interface



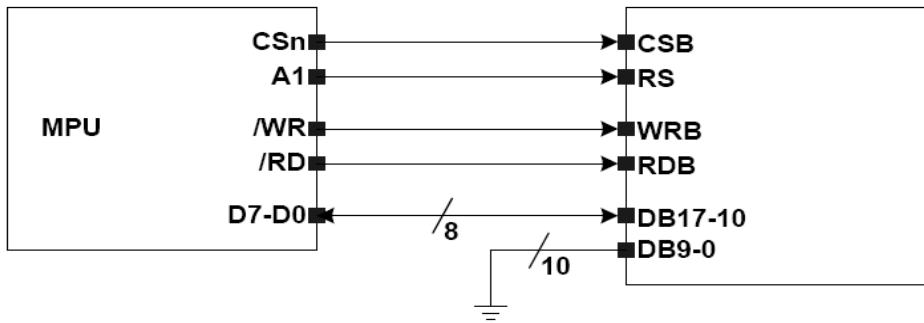
NOTE: Transfer synchronization function for a 9-bit bus interface

The S6D0118 supports the transfer synchronization function, which resets the upper/lower counter to count upper/lower 9-bit data transfer in the 9-bit bus interface. Noise causing transfer mismatch between the nine upper and lower bits can be corrected by a reset triggered by consecutively writing a "00"H instruction four times. The next transfer starts from the upper nine bits. Executing synchronization function periodically can recover any runaway in the display system.



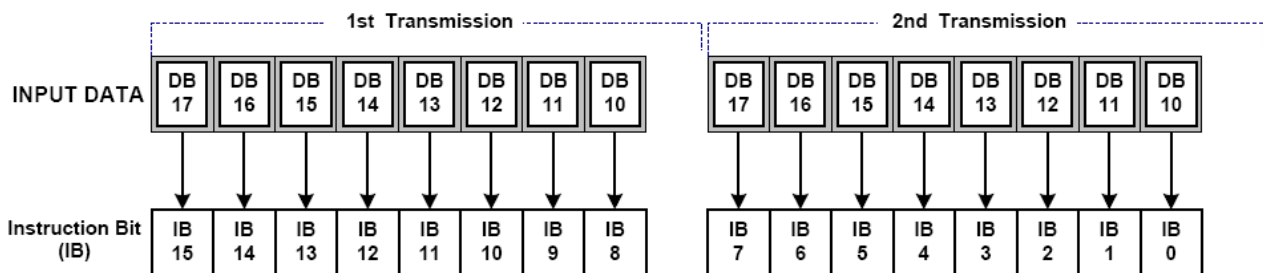
9.1.6 80-system 8-bit Bus Interface

Setting the IM3/2/1/0 to the VSS/VSS/VDD/VDD level allows 80-system 8-bit parallel data transfer.

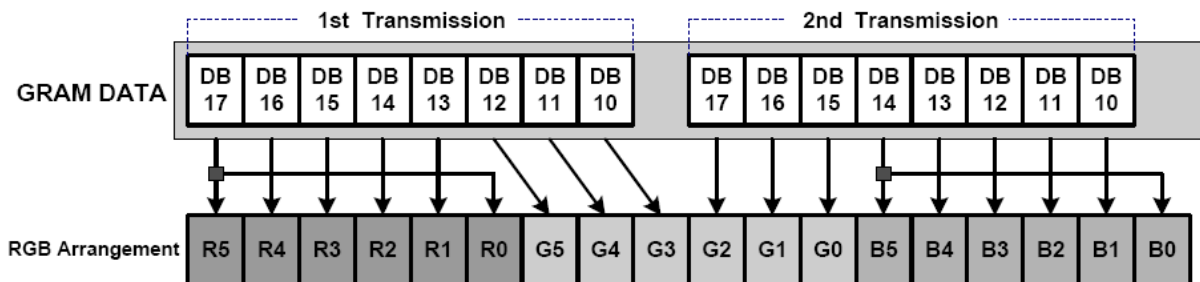


Example of Interface with 8-bit Microcomputer

● Instruction format for 8-bit Interface

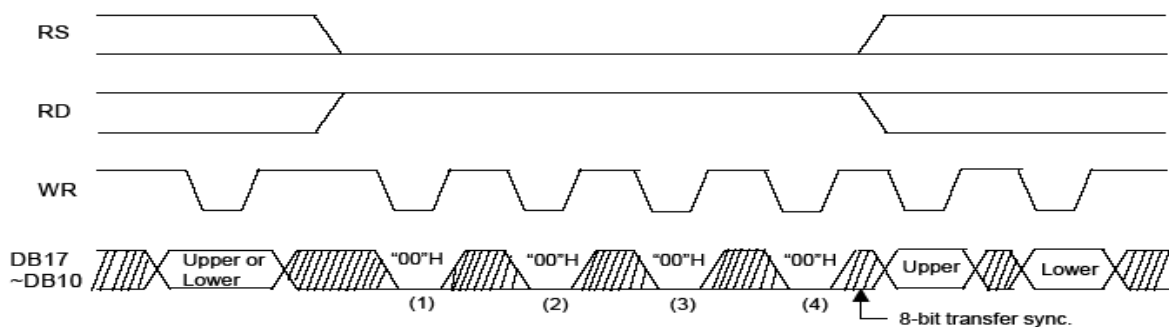


● RAM data write format for 8-bit Interface



NOTE: Transfer synchronization function for an 8-bit bus interface

The S6D0118 supports the transfer synchronization function, which resets the upper/lower counter to count upper/lower 8-bit data transfer in the 8-bit bus interface. Noise causing transfer mismatch between the eight upper and lower bits can be corrected by a reset triggered by consecutively writing a "00"H instruction four times. The next transfer starts from the upper eight bits. Executing synchronization function periodically can recover any runaway in the display system.



9.1.7 Reset Function

The S6D0118 is internally initialized by RESET input. The reset input must be held for at least 1 ms. Do not access the GRAM nor initially set the instructions until the R-C oscillation frequency is stable after power has been supplied (10 ms).

Instruction Set Initialization

1. Start oscillation executed
2. Driver output control (NL4-0 = 11101, SS = 0, GS = 0, SM = 0, EPL=0, VSPL=0, HSPL=0, DPL=0)
3. LCD driving AC control (FLD1-0 = 01, B/C = 0, EOR = 0)
4. Entry mode set (TRI = 0, DFM1-0 = 00, I/D1-0 = 11: Increment by 1, AM = 0: Horizontal move, BGR=0)
5. Display control 1 (PT1-0 = 00, VLE2-1 = 00: No vertical scroll, SPT = 0, GON = 0, DTE = 0, CL = 0: 260K-color mode, REV = 0, D1-0 = 00: Display off)
6. Display control 2 (FP3-0 = 1000, BP3-0 = 1000)
7. Display control 3 (PTG1-0= 00, ISC3-0 = 0000)
8. Frame cycle control (NO1-0 = 00, SDT1-0 = 00, ECS1-0 = 00: no charge sharing, DIV1-0 = 00: 1-divided clock, RTN3-0 = 0000: 16 clock cycle in 1H period)
9. External display interface (RIM1-0=00:18-bit RGB interface, DM1-0=00: operated by internal clock, RM=0: system interface)
10. Power control 1 (SAP2-0 = 000, BT2-0 = 000, DC2-0 = 011, SLP = 0, STB = 0: Standby mode off)
11. Power control 2 (GVD5-0 = 000000, VC2-0 = 000)
12. Power control 3 (PON = 0, PON1 = 0, AON = 0)
13. Power control 4 (VCMR = 0, VCM5-0 = 000000, VML5-0 = 000000)
14. RAM address set (AD15-0 = 0000h)
15. Gamma control
(PKP02-00 = 000, PKP12-10 = 000, PKP22-20 = 000, PKP32-30 = 000,
PK42-40 = 000, PKP52-50 = 000, PRP02-00 = 000, PRP12-10 = 000)
(PKN02-00 = 000, PKN12-10 = 000, PKN22-20 = 000, PKN32-30 = 000,
PKN42-40 = 000, PKN52-50 = 000, PRN02-00 = 000, PRN12-10 = 000)
VRP14-00 = 00000, VRP03-00 = 0000, VRN14-00 = 00000, VRN03-00 = 0000)
16. Gate scanning starting position (SCN4-0 = 00000)
17. Vertical scroll (VL7-0 = 0000000)
18. 1st screen division (SE17-10 = 11111111, SS17-10 = 00000000)
19. 2nd screen division (SE27-20 = 11111111, SS27-20 = 00000000)
20. Horizontal RAM address position (HEA7-0 = 10101111, HSA7-0 = 00000000)
21. Vertical RAM address position (VEA7-0 = 11101111, VSA7-0 = 00000000)

GRAM Data Initialization

GRAM is not automatically initialized by reset input but must be initialized by software while display is off (D1-0 = 00).

Output Pin Initialization

1. LCD driver output pins (Source output) : Output VSS level (Gate output) : Output VGL level
2. Oscillator output pin (OSC2): Outputs oscillation sign

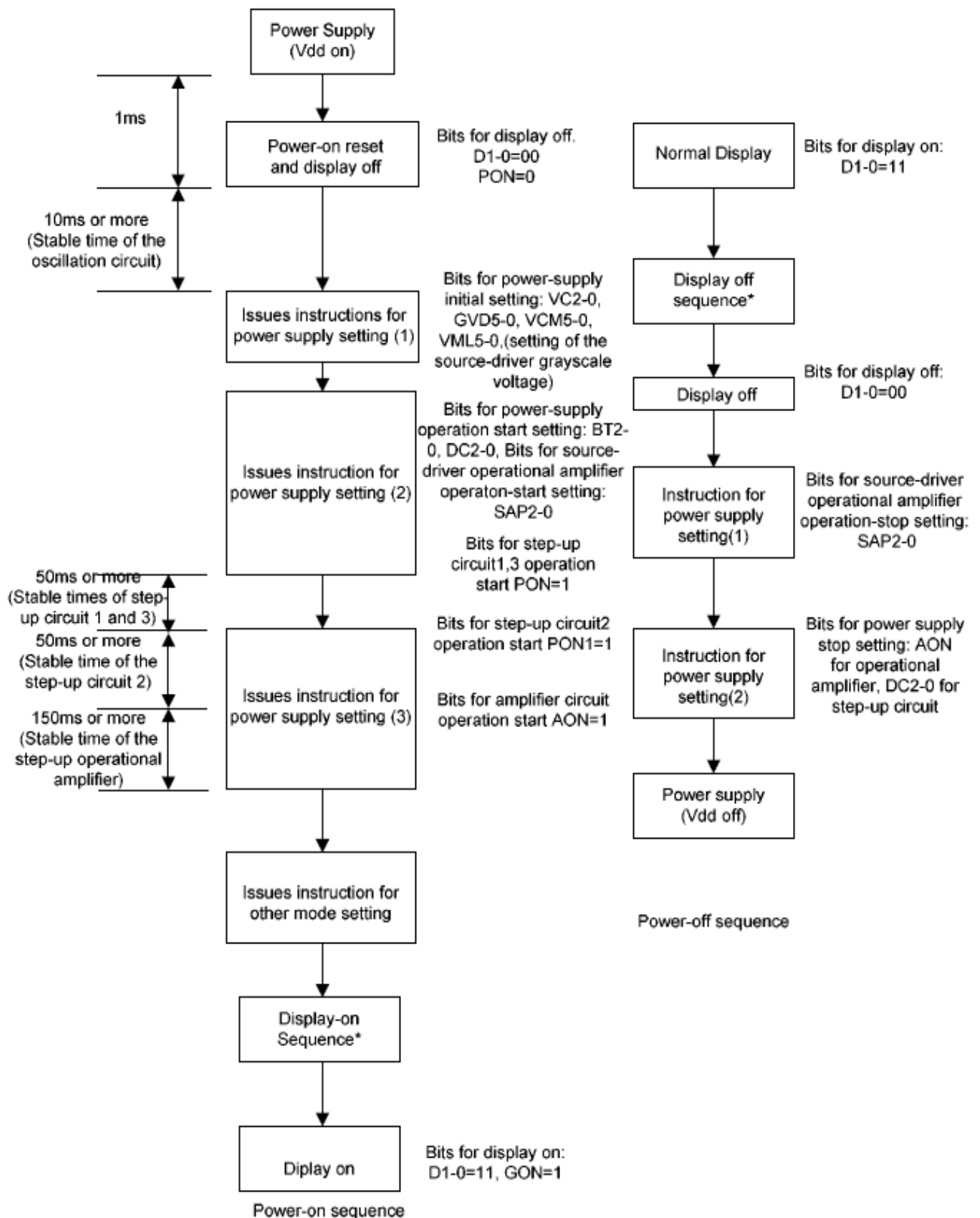
10.DRIVER CONTROL ALGORITHMS

10.1 Function setting

If the /RESET input becomes L or the reset command is input, the each register to its default value. These default values are listed in the table below.

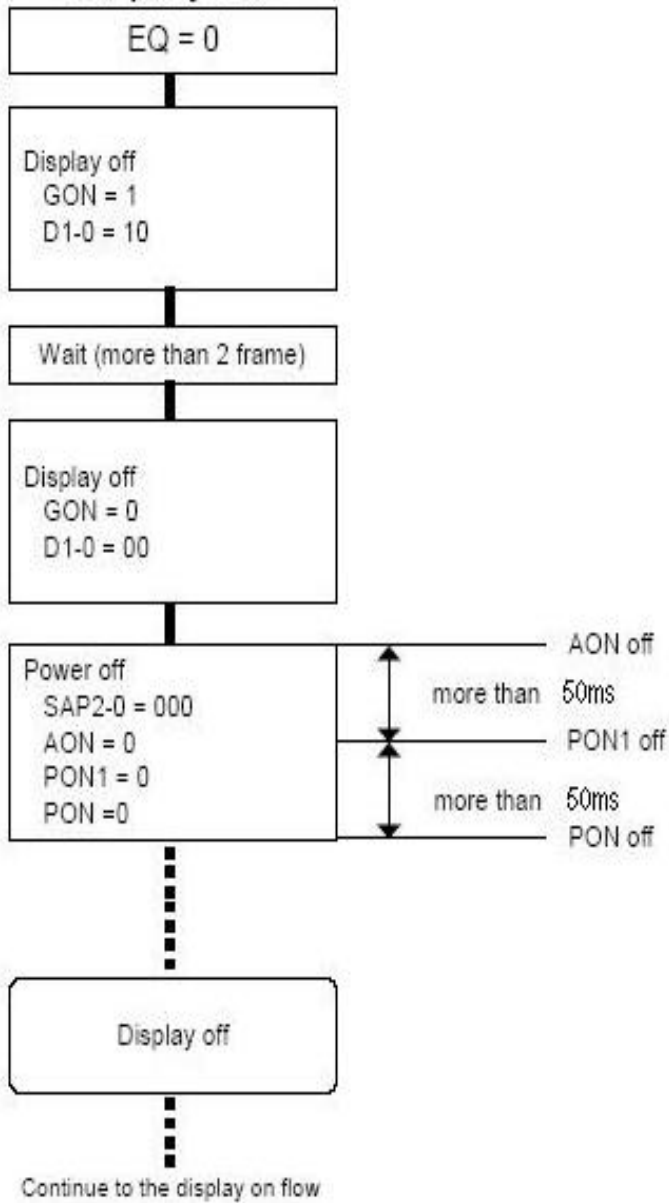
Register	Index	Default Value	Remark
Start oscillation	&H 00	&H 0001	
Power control 2	&H 11	&H 3004	
Power control 4	&H 14	&H 1C19	
Power control 1	&H 10	&H 2D00	
Power control 3	&H 13	&H 0040	
Power control 3	&H 13	&H 0060	
Power control 3	&H 13	&H 0070	
Driver output control	&H 01	&H 011B	
LCD-Driving-waveform control	&H 02	&H 0700	
Entry mode	&H 03	&H 1030	
Blank period control 1	&H 08	&H 0808	
Gate scan position	&H 40	&H 0000	
Gate non display area control	&H 09	&H0000	
Gate non display area control	&H 0B	&H F000	
Horizontal window address	&H 44	&H AF00	
Vertical window Address	&H 45	&H DB00	
Gamma control 1	&H 30	&H 0000	
Gamma control 2	&H 31	&H 0000	
Gamma control 3	&H 32	&H 0000	
Gamma control 4	&H 33	&H 0000	
Gamma control 5	&H 34	&H 0000	
Gamma control 6	&H 35	&H 0000	
Gamma control 7	&H 36	&H 0000	
Gamma control 8	&H 37	&H 0000	
Gamma control 9	&H 38	&H 0000	
Gamma control 10	&H 39	&H 0000	
Display control	&H 07	&H 0012	
Display control	&H 07	&H 0017	
RAM address set	&H 21	&H 0000	

10.2 Power Setting Function(Vci =2.8V for example)

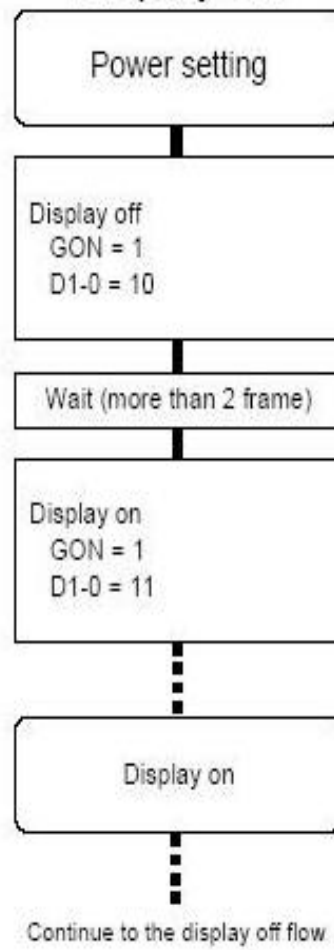


10.3 Display ON/OFF

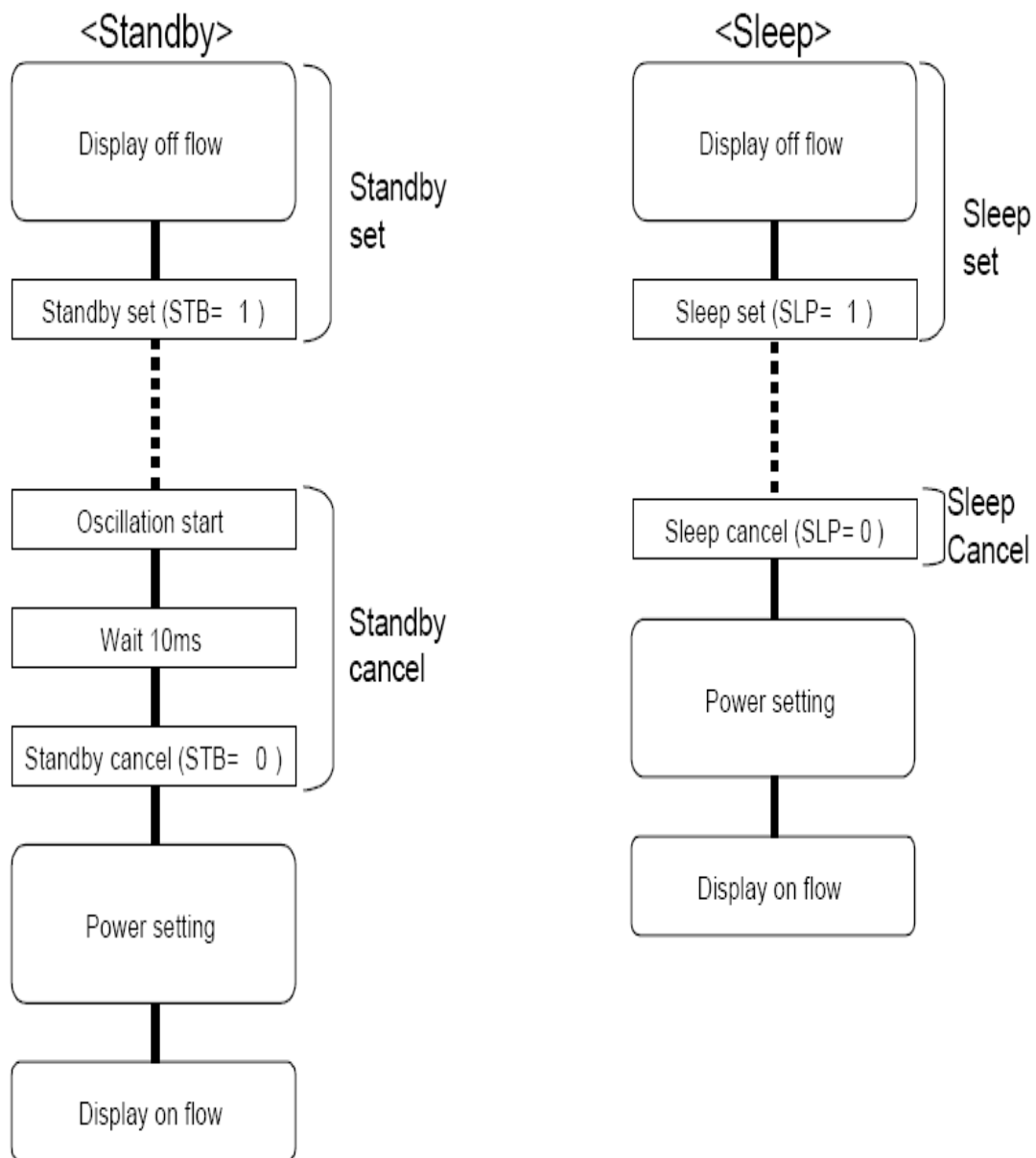
<Display off>



<Display on>



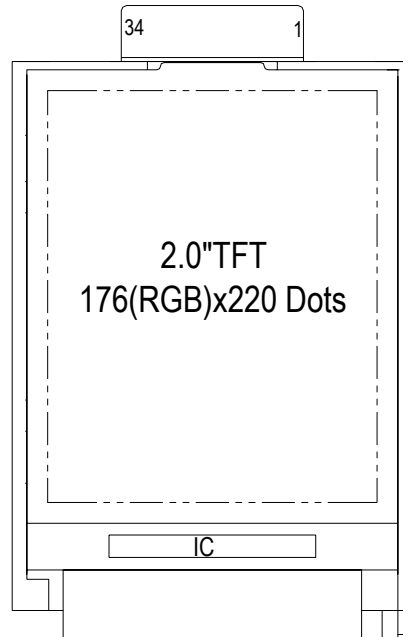
10.4 Standby, Sleep mode set/release



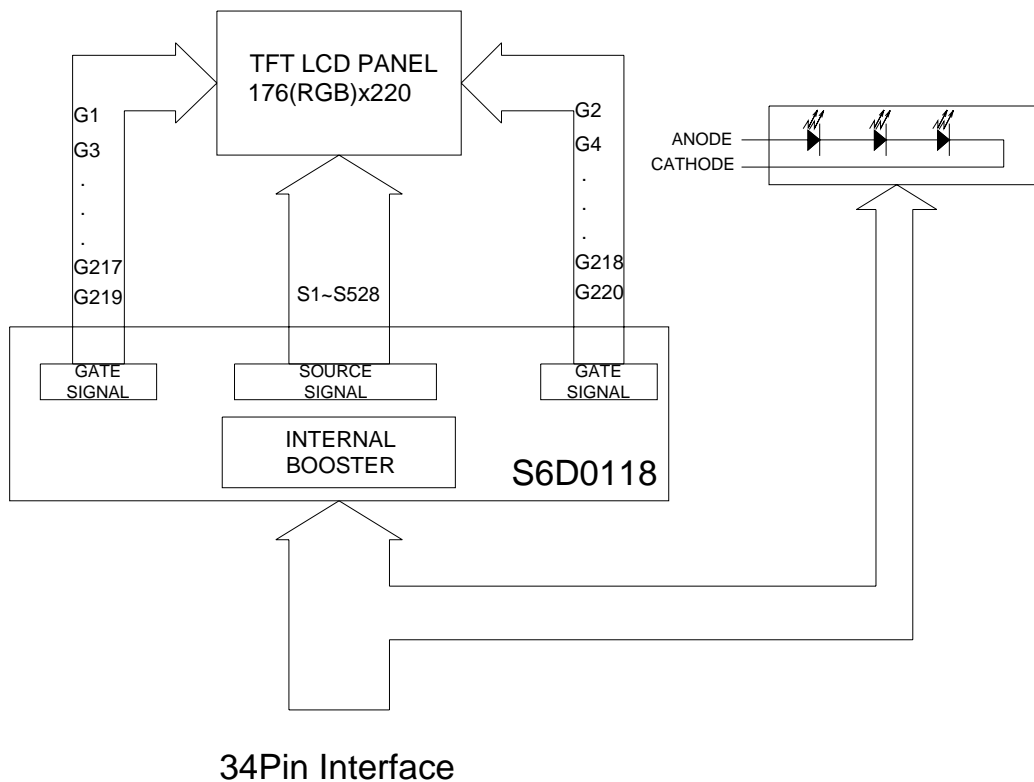
10.5 LCD Initial code

	ID	Index	Value
1	Delay	10	msec
2	Register	&H 00	&H 0001
3	Delay	10	msec
4	Register	&H 11	&H 3004
5	Delay	10	msec
6	Register	&H 14	&H 1C19
7	Delay	10	msec
8	Register	&H 10	&H 2D00
9	Delay	10	msec
10	Register	&H 13	&H 0040
11	Delay	50	msec
12	Register	&H 13	&H 0060
13	Delay	50	msec
14	Register	&H 13	&H 0070
15	Delay	192	msec
16	Register	&H 01	&H 011B
17	Register	&H 02	&H 0700
18	Register	&H 03	&H 1030
19	Register	&H 08	&H 0808
20	Register	&H 40	&H 0000
21	Register	&H 09	&H 0000
22	Register	&H 0B	&H F000
23	Register	&H 44	&H AF00
24	Register	&H 45	&H DB00
25	Delay	5	msec
26	Register	&H 30	&H 0102
27	Register	&H 31	&H 0707
28	Register	&H 32	&H 0101
29	Register	&H 33	&H 0200
30	Register	&H 34	&H 0506
31	Register	&H 35	&H 0707
32	Register	&H 36	&H 0304
33	Register	&H 37	&H 0200
34	Register	&H 38	&H 1802
35	Register	&H 39	&H 0800
36	Register	&H 07	&H 0012
37	Delay	240	msec
38	Register	&H 07	&H 0017
39	Delay	40	msec
40	Register	&H 21	&H 0000
41	END		

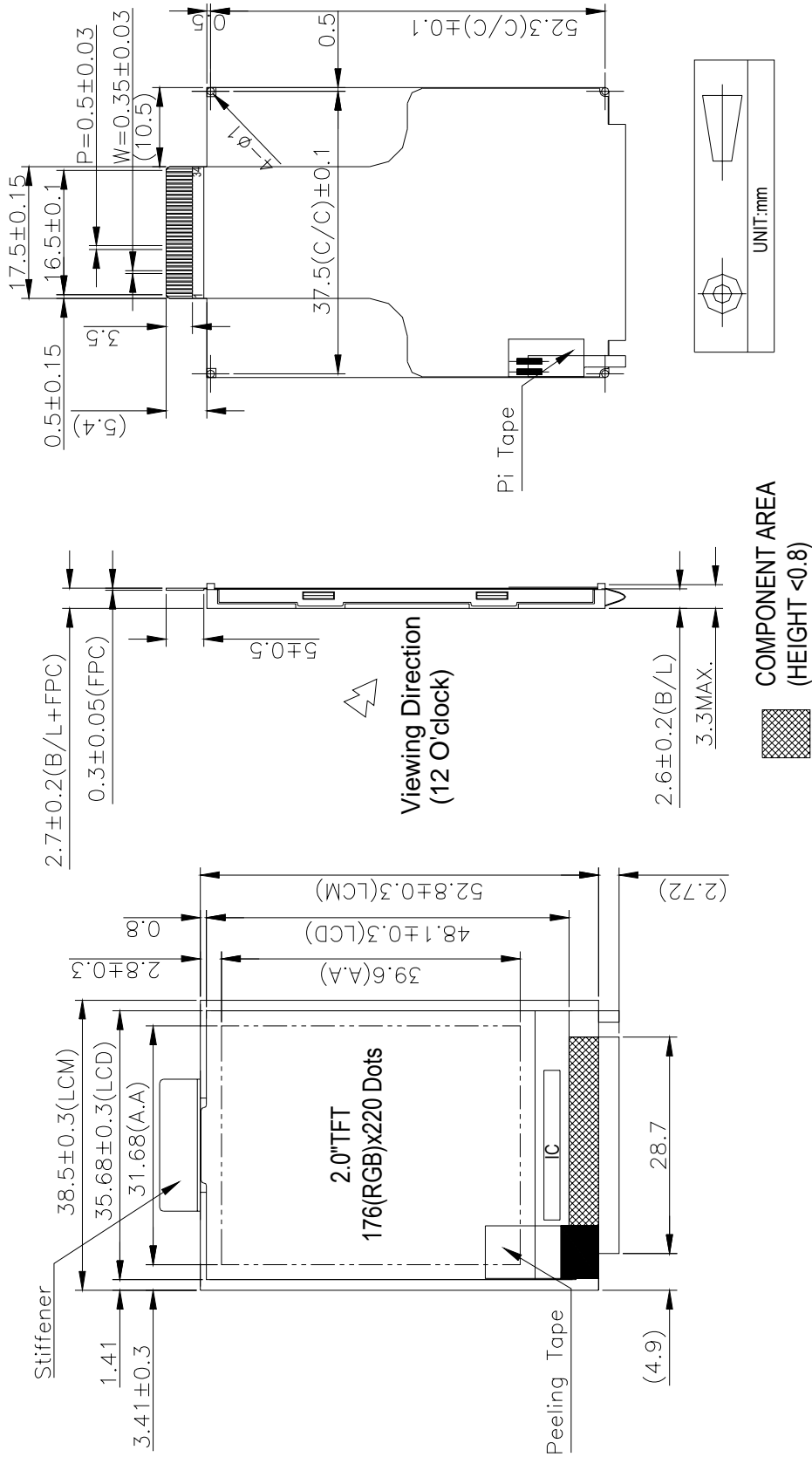
11.PIN NO.



12.BLOCK DIAGRAM



13.MECHANICAL DRAWING



14. ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Conditions	Criterion
Operating Temperature	TOPR	-20°C ~ +70°C	No defect displaying and operational function
Storage Temperature	TSTG	-30°C ~ +80°C	No defect displaying and operational function
Humidity	—	See Note(1)(2)	Without condensation
Vibration note(operating)	—	Max.4.9m/s ²	10-300Hz XYZ directions 1Hr each
Vibration note(storage)	—	Max.19.6m/s ²	10-300Hz XYZ directions 1Hr each
Shock note(operating)	—	Max.29.4m/s ²	10msec. XYZ directions 1time each
Shock note(storage)	—	Max.49.0m/s ²	10msec. XYZ directions 1time each
Corrosive Gas	—	Not accrptable	—

Note:

(1) $T_a \leq 40^\circ\text{C}$, 90%RH Max.

(2) $T_a > 40^\circ\text{C}$, Absolute humidity must be lower than the humidity of 90%RH at 40°C

15. RELIABILITY

15.1 RELIABILITY TEST

Item		Conditions	Criteria
High temperature operation (LCD MODULE)		+70 °C for 240 Hr	No defect in displaying and operational functions.
Low temperature operation (LCD MODULE)		-20 °C for 240 Hr	
High humidity		60 °C, 90 % RH for 240 Hr	
High temperature		80 °C for 240 Hr	
Low temperature		-30 °C for 240 Hr	
Temperature cycling (Non-operation)		-20 °C (30 min) ↑ ↓ 25 °C (1 min) ↑ ↓ 70 °C (30 min) Cycles: 50	No defect in displaying and operational functions.
Vibration		15~55Hz amplitude, 1.5mm 1hr for each direction	No defect in displaying and operational functions. (Note 1)
Static Electricity	Panel	150pF, 330Ω, ±8KV, 10 times air discharge	No defect in displaying and operational functions.
	Terminals	200pF, 0Ω, ±200V contact	
Packing Drop Test.		75cm for 1 corner, 3 edges ,6 faces	No defect in displaying and operational functions.

15.2 LIFE TIME

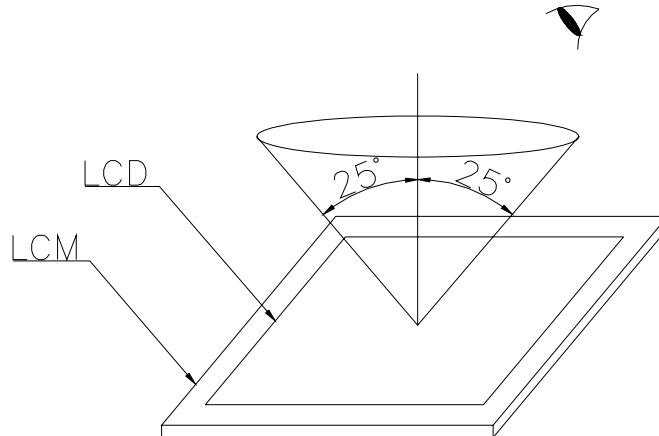
Expected life is more then 50,000 hours under normal operating condition ($25 \pm 5^\circ\text{C}$, $45 \pm 20\% \text{RH}$)

16. APPEARANCE STANDARD

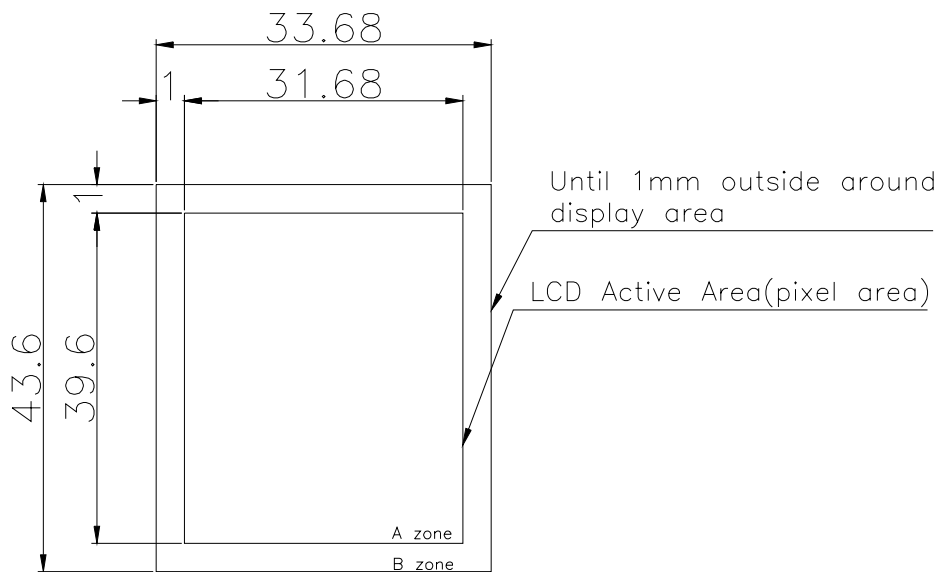
16.1 APPEARANCE INSPECTION CONDITION

Visual inspection should be done under the following condition.

- (1) The inspection should be done in a dark room.(Between 350 Lux ~800 Lux and non-directive).
- (2) The distance between eyes of an inspector and the LCD module is 20cm ~ 40cm.
- (3) The viewing zone is shown in the figure.
Viewing angle $\leq 25^\circ$



16.2 DEFINITION OF ZONE



16.3 APPEARANCE SPECIFICATION

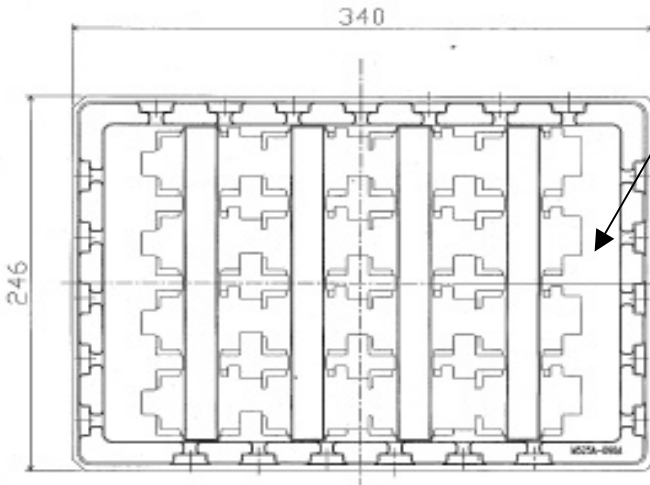
LCD inspection items and criteria for appearance defects

No.	ITEM	CRITERIA			APPLIED ZONE
L C D	Scratches	Length L(mm)	Width W(mm)	Maximum number acceptable	A,B
		$L \leq 2.0$	$W \leq 0.03$	ignored	
		$L \leq 2.0$	$0.03 < W \leq 0.05$	4	
		$L > 2.0$	$0.05 < W$	none	
	Dent	Distinguished one is acceptable (To be judged by OSD Displays Standard)			A
	Wrinkles in Polarizer	Same as above			A
	Bubbles	Average diameter D(mm)		Maximum number acceptable	A
		$D \leq 0.3$		2	
		$0.3 < D$		none	
	Stains Foreign Materials	Filamentous (Line shape)			A,B
		Length L(mm)	Width W(mm)	Maximum number acceptable	
	Dark spot	$L < 2.0$	$W \leq 0.05$	4	
		$L \leq 1.0$	$0.05 < W \leq 0.1$	2	
		Round(Dot shape)			A,B
		Average diameter D(mm)		Maximum number acceptable	
		$D \leq 0.15$		6	
		$0.15 < D \leq 0.2$		4	
		$0.2 < D$		none	
		The total number		Filamentous + Round=9	
	Those wiped out easily are acceptable				
Color Tone	To be judged by OSD Displays Standard A				
Color Uniformity	Same as above			A	
Dot Defect	Item	Defect dot	Maximum number acceptable	A,B	
	Sparkle mode	1 dot	4		
		2 dots	2(sets)		
		Total	4		
	Black mode	1 dot	4		
		2 dots	2(sets)		
		Total	4		
Sparkle mode & Black mode	2 dots	2(sets)			
Total	6				

17.PACKAGE

17.1PACKAGE STEP

A. Tray size(unit:mm)



Antistatic tray(PS)

One tray have module quality
(4x4=16pcs/tray)



B.Stack up tray and used form plate



On top have one empty tray

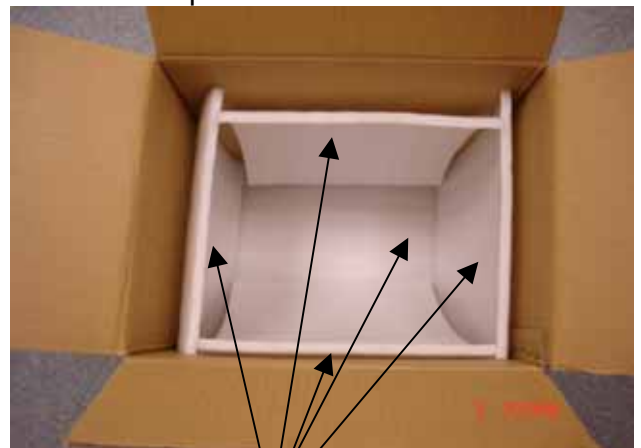
One stacked tray have layer quality:9 layers
(module quality:16x9=144pcs)

C.Put stacked tyay in inner carton



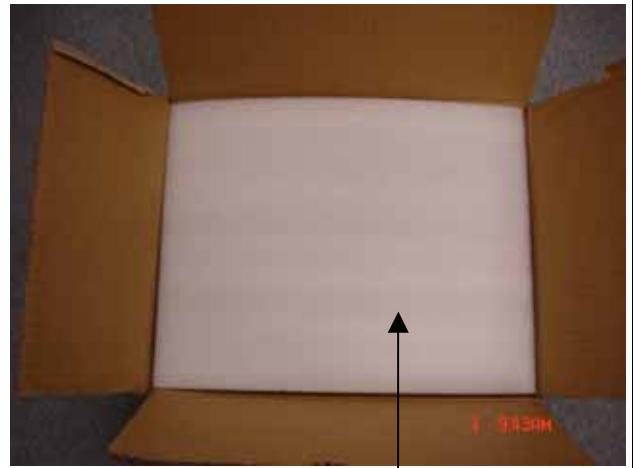
EPE Plate(sponge)

D.Put EPE plate in outside carton



EPE Plate(sponge)

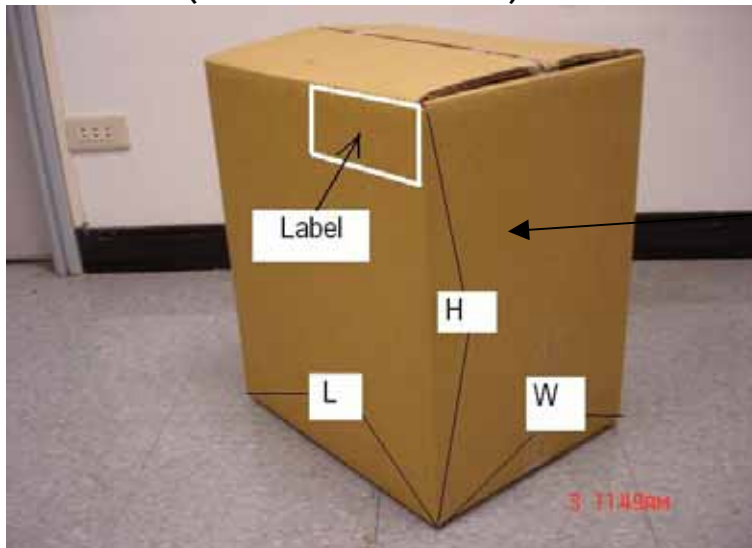
E. Carton protection form



One outside carton(include 3 sets inner carton)
have module quality:144x3=432pcs

EPE Plate(Top sponge)

17.2 Label(adhere on carton)



The outside carton dimension:
398(L)x315(W)x475(H)
(unit:mm)

Label		Explain
RoHS Conform	DESCRIPTION	2.0"TFT OSD05N013A
	PO.NO.	605029
	C/P/N	
	M/P/N	WT31111040001
	QTY	PCS N/W Kgs G/W Kgs
	M/D	#### - ## - ##
		DESCRIPTION : Product name PO.NO. :Product Order NO. C/P/N: Custom Product No. M/P/N: Manufacturing Product No. M/D: Manufacturing Date.

18. PRECAUTIONS

18.1 Static charge

Since this LCD module contains CMOS LSIs that are sensitive to static charge, care must be taken when handling it.

18.2 Power on sequence

1. If the logic circuit power is off, do not apply the input signals.
2. If power supply on, connecting the LCD driving voltage then connecting the logic system voltage.
3. If power supply off, disconnect the logic system voltage then off the LCD driving voltage.

18.3 Operation

1. Display may turn black at temperatures above its operational range; this is (however not pressing on the viewing area) may cause the segments to appear "fractured".
2. Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear "fractured".
3. To avoid the open terminals connection an electrochemical reaction which the relative humidity should be less than 50%, if the environmental temperature is higher than 40°C.

18.4 Packaging

1. To avoid any contact with materials that have a hardness of more than 2H.
2. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
3. The desirable cleaners don't use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemicals reaction.
4. Wipe off saliva or water droplets immediately. If you leave the droplets for a long time, Staining and discoloration may occur.
5. Moisture deposited on the display surface and contact terminals due to low temperatures will be a cause for polarizer damage, stains, and dirt. Before use, such panels should be slowly warmed up to a temperature that is higher than room temperature.
6. Touching the display area and contact terminals with bare hands is harmful to polarizer, it may lead to poor insulation at the terminals.
7. Glass can be easily chipped or cracked from rough handling, especially at corners and edges.

18.5 Long-term storage

1. Do not leave the product in high temperature, and high humidity for a long time. The LCD modules should be stored under the storage temperature range. Our recommend condition is: Temperature: 0°C~35°C; Relatively humidity less than 80%.
2. Do not store the LCD modules in direct sunlight or to the light of fluorescent lamps.
3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

18.6 Cleaning of the product

If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents: Isopropyl Alcohol, Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following: Water, Ketone, Aromatic solvents

18.7 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, damp and sunshine

19. FINAL REMARKS

- 1.The above specifications are the binding criteria for OSD Displays outgoing quality inspection.
- 2.The customer is kindly requested to inform OSD Displays as soon as possible on any Questions remarks, and disagreements regarding these specifications.
3. OSD Displays is not responsible for damage to its products due to neglect of the precautions as described in the previous chapter.