Toshiba Matsushita Display Technology Co., Ltd.

PRODUCT INFORMATION

5.6cm VE-Transmissive COLOUR TFT-LCD MODULE
(2.2 TYPE)

LTM022A97B

TENTATIVE

FEATURES

(1) TFT-LCD for Mobile Phone
(2) QVGA 240(H) x 320(V) pixels
(3) VE-Transmissive type Mode
(4) Wide viewing Angle “ECB Type”
(5) 262,144 colors (18 bit color depth)
(6) RGB I/F(6 or 16 or 18 bit) + Serial I/F
(7) Cell + FPC + Backlight + Bezel

MECHANICAL SPECIFICATIONS

Item	Specifications
Dimensional Outline (TYP.)	39.6(*W*) x 56(*H*) x 2.3(T) mm(Typ.)
Number of Pixels	240(x RGB)(*W*) x 320 (*H*) pixels
Active Area	33.84 (*W*) x 45.12 (*H*) mm
Pixel Pitch	0.141(*W*) x 0.141(*H*)mm
Weight (approximately)	(TBD) g(Typ.)

ABSOLUTE MAXIMUM RATINGS

Item	Min.	Max.	Unit	Remarks
Logic Power Supply	-0.3	4.6	V	
Operating Temperature	-20	70	°C	
Storage Temperature	-30	80	°C	
Storage Humidity (Max. wet bulb temp. = 39°C)	10	90	%(RH)	

ELECTRICAL SPECIFICATION

Item		Min.	Typ.	Max.	Unit	Remarks
Supply Voltage	Analog	2.65	2.8	2.95	V	*2
	Digital	2.5	3.3	**3.6**	V	*2
Current Consumption		---	(4.8)	(6.3)	mA	*2 Normal mode

*2 : Final number will be specified with actual LCD samples

OPTICAL SPECIFICATION (*Ta*=25°C)

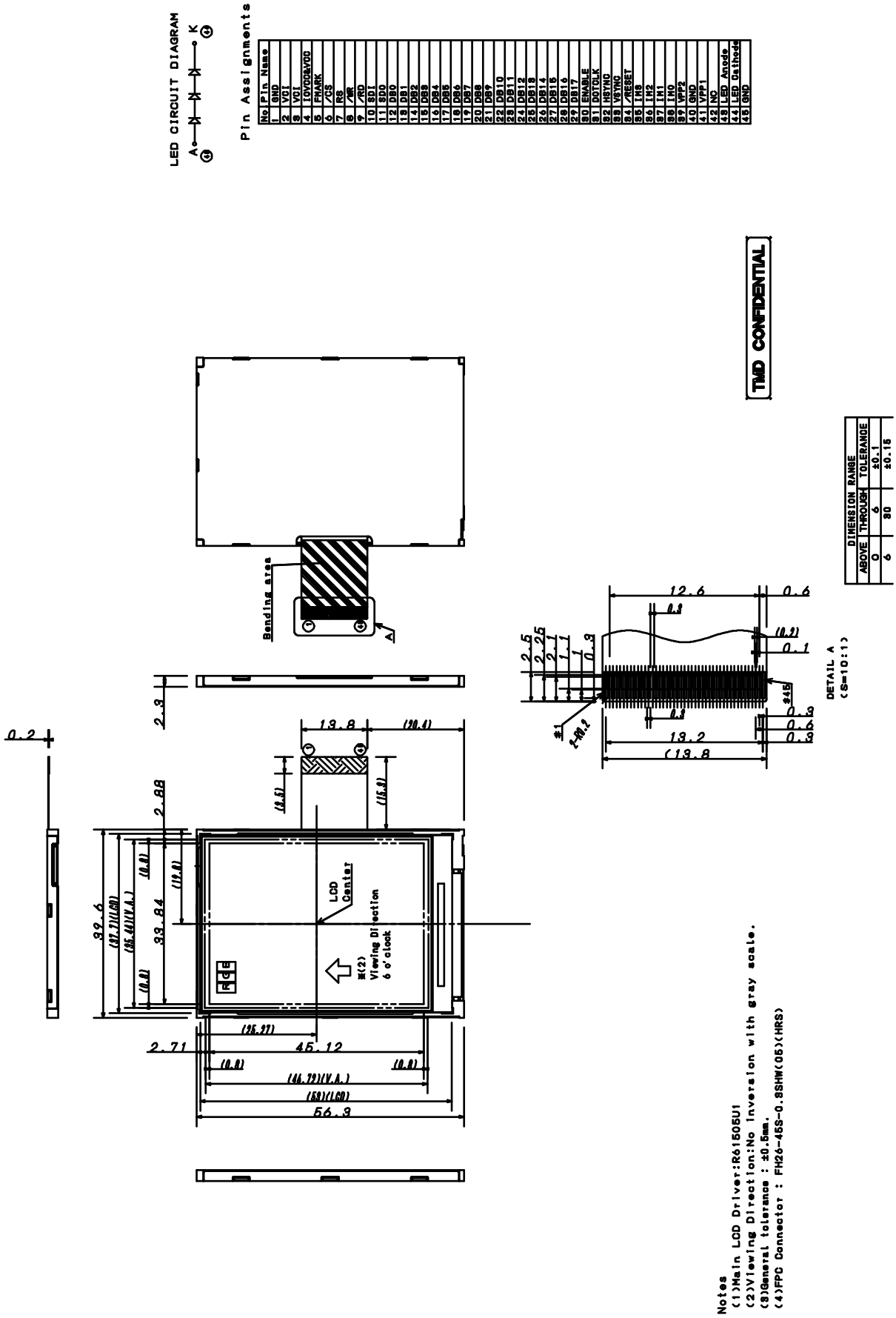
Item		Min.	Typ.	Max.	Unit	Remarks
Contrast Ratio (*CR*)		---	250	---	---	*3 Transmissive mode
Response Time	(t_{ON})	---	(10)	(20)	ms	*3
	(t_{OFF})	---	(25)	(40)	ms	*3
Luminance*4		150	200	---	cd/m^2	*3 Transmissive mode
NTSC ratio		---	60	---	%	*3 Transmissive mode
View angle U/D/L/R		---	80/80/80/80	---	---	

*3 : Final number will be specified with actual LCD samples
*4 : LED Current=15mA×3LED

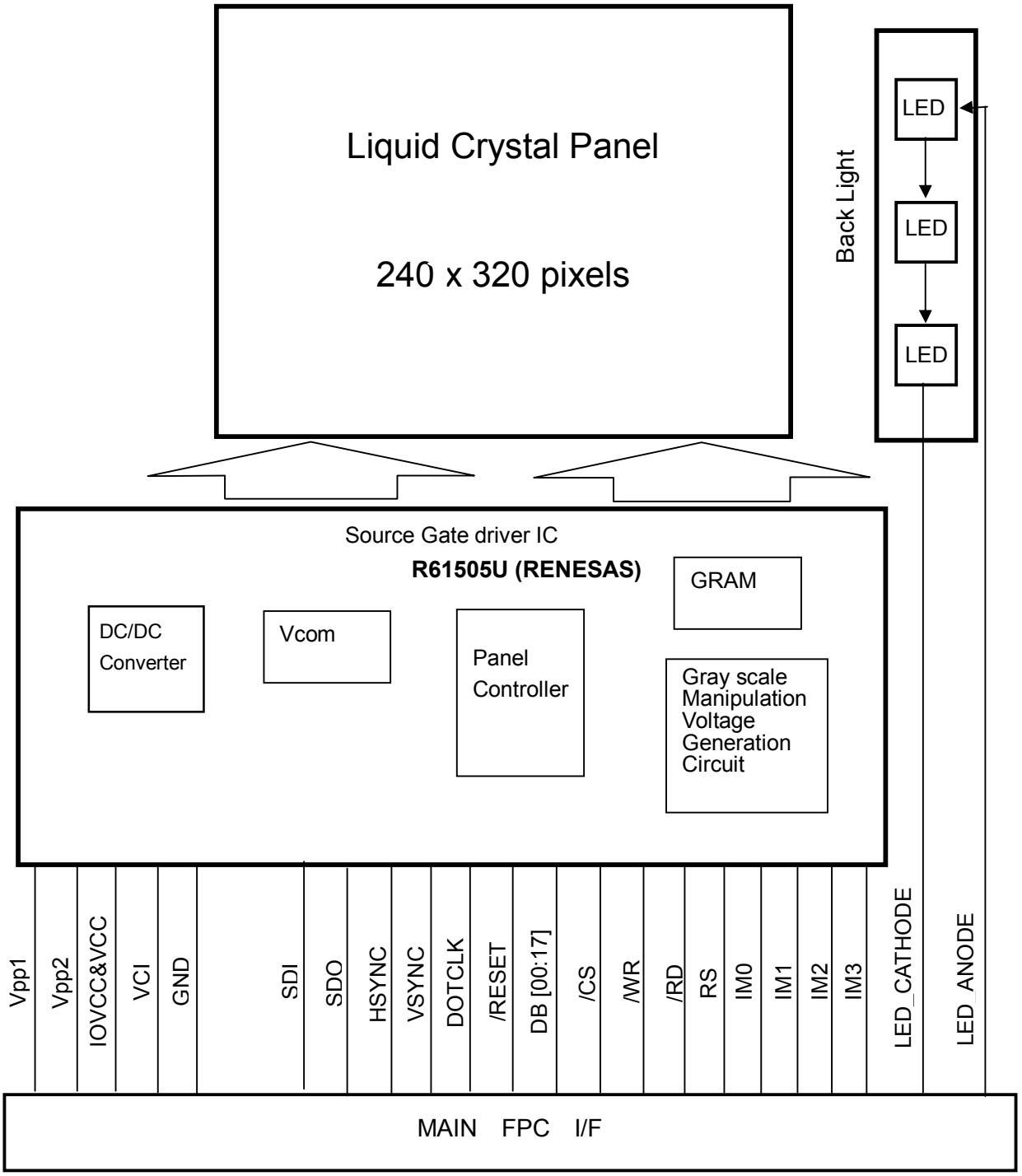
<Outline dimension>

Unit : mm

Standard tolerance : ±0.3



<Block diagram>



<Table of Pin Assignment>

I/F FPC

PIN	SYMBOL	I/O	SIGNAL
1	GND	–	0V
2	VCI	–	Analog voltage
3	VCI	–	Analog voltage
4	IOVCC&VCC	–	Digital voltage
5	FMARK	O	Vsync out
6	/CS	I	/Chip select signal
7	RS	I	Address/Data selecct signal
8	/WR	I	/write signal
9	/RD	I	/read signal
10	SDI	I	Serial data input
11	SDO	I/O	Serial data output
12	DB00	I/O	Data bus
13	DB01	I/O	Data bus
14	DB02	I/O	Data bus
15	DB03	I/O	Data bus
16	DB04	I/O	Data bus
17	DB05	I/O	Data bus
18	DB06	I/O	Data bus
19	DB07	I/O	Data bus
20	DB08	I/O	Data bus
21	DB09	I/O	Data bus
22	DB10	I/O	Data bus
23	DB11	I/O	Data bus
24	DB12	I/O	Data bus
25	DB13	I/O	Data bus
26	DB14	I/O	Data bus
27	DB15	I/O	Data bus
28	DB16	I/O	Data bus
29	DB17	I/O	Data bus
30	ENABLE	I	Dataenable
31	DOTCLK	I	Dot clock
32	HSYNC	I	Line synchronous
33	VSYNC	I	Frame synchronous
34	/RESET	I	/RESET signal
35	IM3	I	Interface mode
36	IM2	I	Interface mode
37	IM1	I	Interface mode
38	IM0	I	Interface mode
39	VPP2	I	NC(for Vcom adjustment)
40	GND	–	0V
41	VPP1	I	NC(for Vcom adjustment)
42	NC		No connection
43	LED A	–	LED Anode
44	LED K	–	LED Cathode
45	GND	–	0V

[the Serial interface mode]

CPU-IF type	Data bus	Colors	Times	1st time	2nd time	3rd time	DB Pins	Hard Set				Soft Set	
								IM3	IM2	IM1	IM0	TRIREG	DFM
i80	Serial data	65k	2time	8bit	8bit	-	SDI,SDO	0	1	0	*	-	-

[RGB interface mode]

RGB-IF type	Data bus	Colors	Times	1st time	2nd time	3rd time	DB Pins	Hard Set				Soft Set	
								IM3	IM2	IM1	IM0	RIM1	RIM0
RGB	6bit data bus	260k	3time	6bit	6bit	6bit	DB17-12	Don't care	Don't care	Don't care	Don't care	1	0
	16bit data bus	65k	1time	16bit	-	-	DB17-13,DB11-1	Don't care	Don't care	Don't care	Don't care	0	1
	18bit data bus	260k	1time	18bit	-	-	DB17-0	Don't care	Don't care	Don't care	Don't care	0	0

* 16 bit : Please connect DB0 with “L”,DB12 with “L”, RS,/WR,/RD with “H”

<Mating Connector>

FH26-45S-0.3SHW(05) (HIROSE)

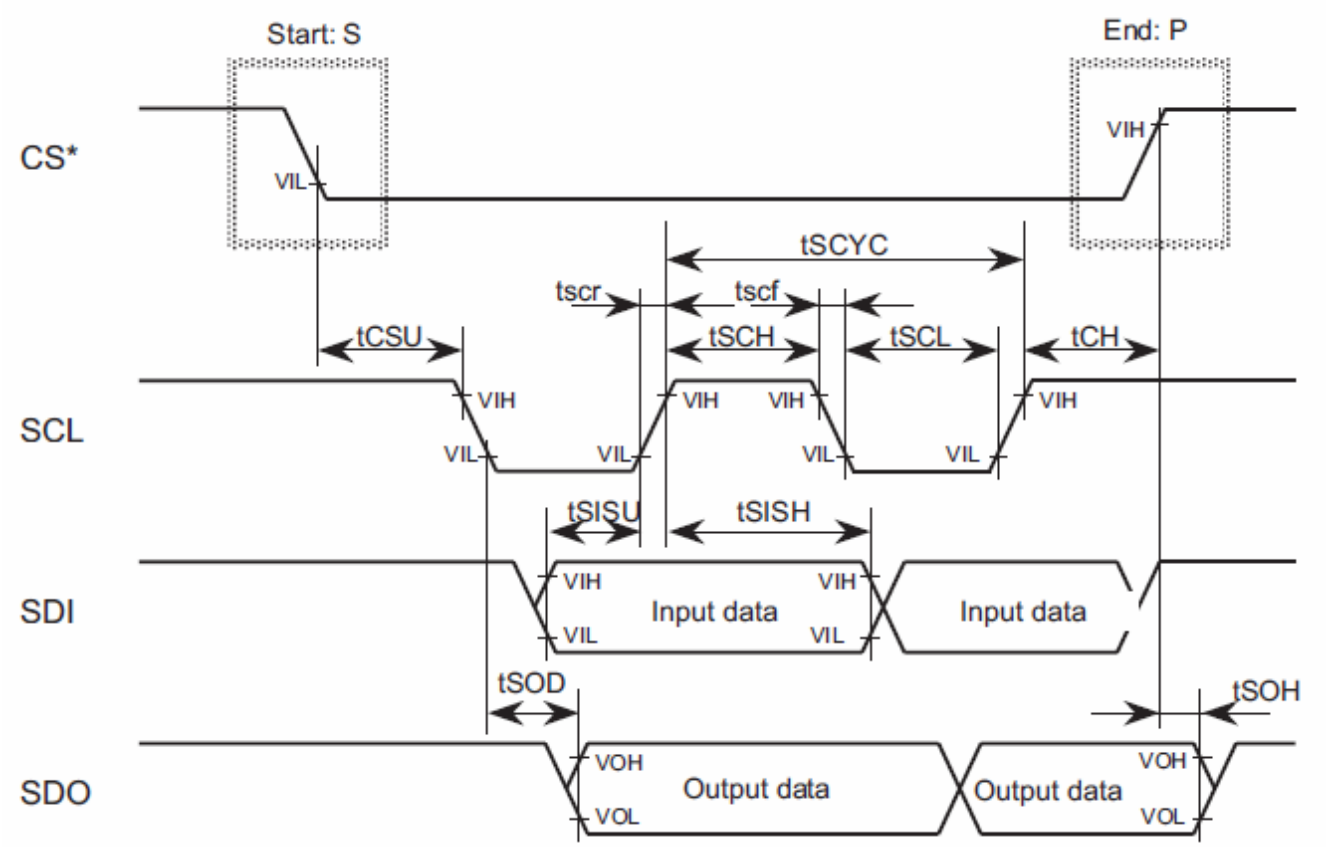
<Command/AC Timing>

Detail technical information of “command/data”, or “AC timing” can be available with following documents:

-IC specification of driver IC : R61505U made by RENESAS

[Clock synchronous Serial interface]

Item		Symbol	Unit	Min.	Typ.	Max.
Serial clock cycle time	Write	tSCYC	ns	100	–	20,000
	Read	tSCYC	ns	350	–	20,000
Serial clock high-level width	Write	tSCH	ns	40	–	–
	Read	tSCH	ns	150	–	–
Serial clock low-level width	Write	tSCL	ns	40	–	–
	Read	tSCL	ns	150	–	–
Serial clock rise/fall time		tSCr,tSCf	ns	–	–	20
Chip select setup time		tCSU	ns	20	–	–
Chip select hold time		tCH	ns	60	–	–
Serial input data setup time		tSISU	ns	30	–	–
Serial input data hold time		tSIH	ns	30	–	–
Serial output data delay time		tSOD	ns	–	–	130
Serial output data hold time		tSOH	ns	5	–	–



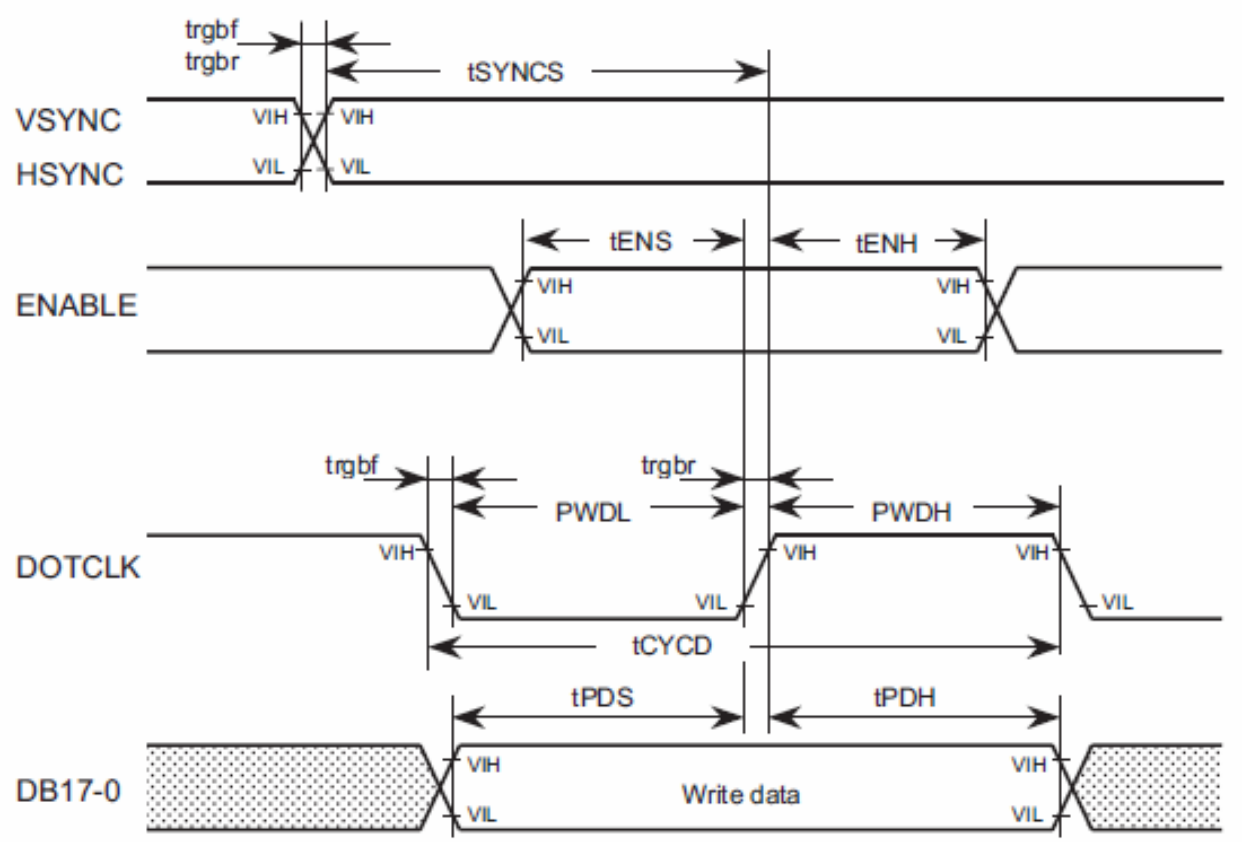
[RGB interface]

18-/16- bit RGB interface

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

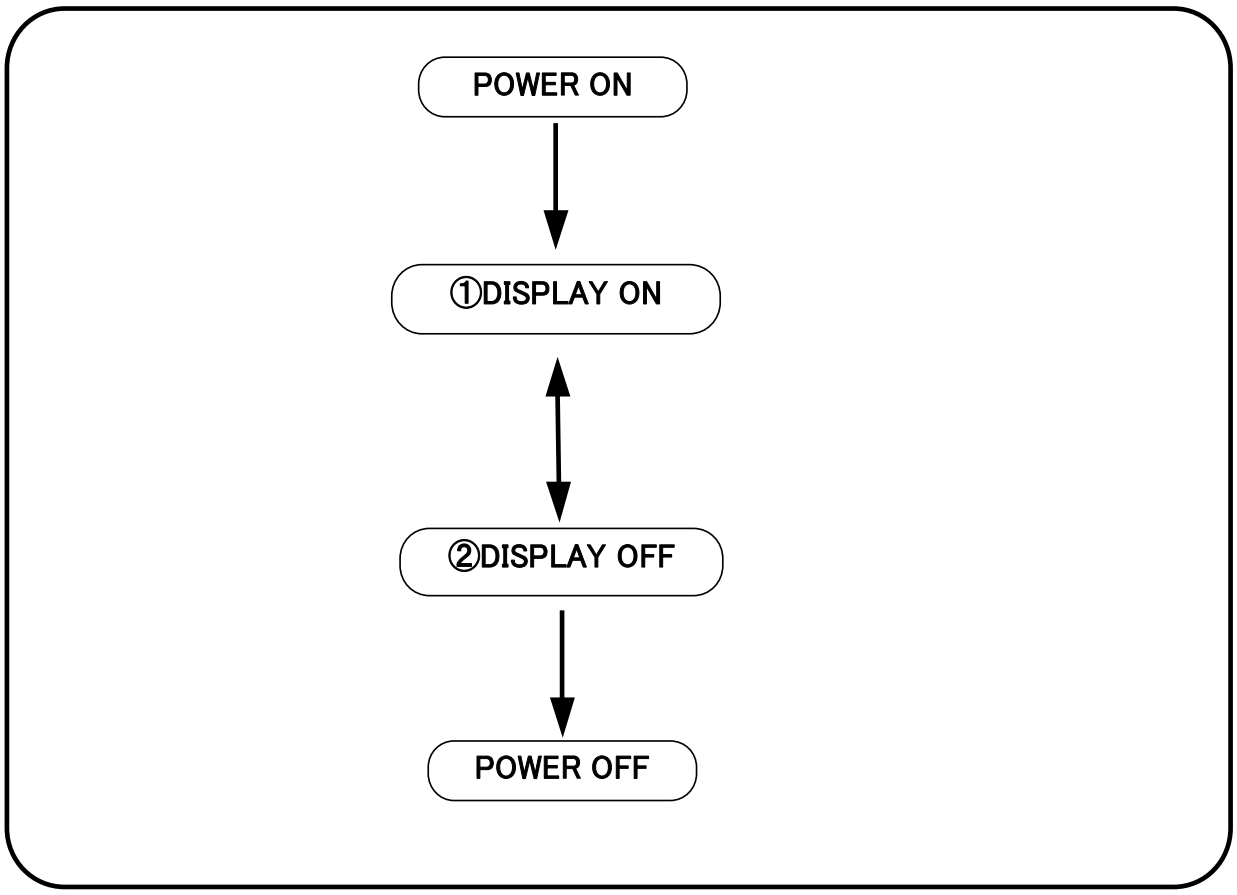
6- bit RGB interface

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



<Command Sequence (Tentative)>

Condition transfer diagram



Command sequence table(RGB interface mode)

TBD

For Safety

LCD module is generally designed with precise parts to achieve light weighted thin mechanical dimensions.
In using our Modules, make certain that you fully understand and put into practice the warnings and safety precautions
detailed in Engineering Information No.EE-N001,"CAUTIONS AND INSTRUCTIONS FOR TOSHIBA MATSUSHITA DISPLAY TECHNOLOGY CO.,LTD. LCD MODULES".
Refer to individual specifications and TECHNICAL DATA sheets (hereinafter called "TD") for more detailed technical information.

⚠ Warning

1) SPECIAL PURPOSES

a) Toshiba Matsushita Display Technology's Standard LCD modules have not been customized for operation in extreme environments or for use in applications where performance failures could be life-threatening or otherwise catastrophic.

b) Since they have not been designed for operation in extreme environments, they must never be used in devices that will be exposed to temperatures above 50 degrees Celsius or below 0 degrees Celsius, to X-ray or Gamma-ray radiation, or to abnormally high levels of vibration or shock which exceed Toshiba Matsushita Display Technology's specification limits.

c) In addition, since Toshiba Matsushita Display Technology's Standard LCD modules have not been designed for use in applications where performance failures could be life-threatening of catastrophic, they must never be installed in aircraft navigation control systems (such as, but not limited to Traffic Collision Avoidance System and Air Traffic Indicator), in military defense or weapons systems, in critical industrial process-control systems (e.g., those involved in the production of nuclear energy), or in critical medical device or patient life-support systems.

⚠ Caution

1) DISASSEMBLING OR MODIFICATION

DO NOT DISASSEMBLE OR MODIFY the modules.
Sensitive parts inside LCD module may be damaged, and dusts or scratches may mar the displays. Toshiba Matsushita Display Technology does not warrant the modules, if customer disassembled or modified them.

2) BREAKAGE OF LCD PANEL

DO NOT INGEST liquid crystal material, DO NOT INHALE this material, and DO NOT PERMIT this material to contact the skin, if glass of LCD panel is broken. If liquid crystal material contacts the skin, mouth or clothing, take the following actions immediately. In case contact to the eye or mouth, rinse with large amount of running water for more than 15 minutes. In case contact to the skin or clothing, wipe it off immediately and wash with soap and large amount of running water for more than 15 minutes. The skin or closing may be damaged if liquid crystal material is left adhered. In case ingestion, rinse out the mouth well with water. After spewing up by drinking large amount of water, get medical treatment.

3) GLASS OF LCD PANEL

BE CAREFUL WITH CHIPS OF GRASS that may cause injuring fingers or skin, when the glass is broken.

4) ABSOLUTE MAXIMUM RATINGS

DO NOT EXCEED the absolute maximum rating values under the worst probable conditions caused by the supply voltage variation, input voltage variation, variation in parts' constants, environmental temperature, etc., otherwise LCD module may be damaged.

5) POWER PROTECTION CIRCUIT

Employ protection circuit for power supply, whenever the specification specifies it. A suitable protection circuit should be applied, based on each system design. A fuse is not fitted to this module. Therefore, without a suitable power-supply protection device, dust or partial circuit failure may cause overheating and/or burning , which may lead to injury.

6) DISPOSAL

Always comply with all applicable environmental regulations, when disposing of the LCD.

7) EDGES OF PARTS

Be careful with edges of glass parts, it may cause injuring.
For designing the system, give special consideration that the wiring and parts do not touch those edges.

<Revision History>

Date	Rev.	Page (New)	Item	Old	New	Reason
2007-03-02	0.0					
2007-03-06	0.1					Change Interface Mode
2007-03-15	0.2	All	Part number	LTM022A97X	LTM022A97B	
		1	Digital Supply Voltage	3.5V max	3.6V max	
		2	Outline dimension			Change shape of FPC

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