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	SPECIFICATION	APPLICABLE DIVISION ENGINEERING DEPARTMENT III MOBILE LCD DIVISION I MOBILE LCD GROUP

DEVICE SPECIFICATION for

TFT LCD Module

(272 × RGB × 480 dots)

Model No.

LQ036T1DG01

CUSTOMER'S APPROVAL

DATE

BY

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RECORDS OF REVISION

MODEL No: LQ036T1DG01

SPEC No.	Date	NO.	PAGE	SUMMARY	NOTE
LCP-2208006	2008.03.25	-	-	-	1st Issue
LCP-2208006A	2008.05.15	A	6	Resistant value between GND and bezel	Add
			23	Lot Number Marking	Change
			19	Activation force	Add
			24	Outline dimensions	Change
LCP-2208006B	2008.12.22	B	3	Unit outline dimensions	Change
			19	Activation force	Change
			21	11-5(7) cautions	Add
			24	Outline dimensions	Change
LCP-2208006C	2009.02.27	C	4,5	Pin#37 and #60 connect to DGND	Change
			17	NTSC ratio, Luminance of white	Add
			17	Minimum luminance of white	Change
			19	Activation force on touch panel	Change
			24	Outline dimensions	Change
LCP-2208006D	2009.10.15	D	24	Outline dimensions	Change

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1. Applicable Scope

This specification is applicable to TFT-LCD Module "LQ036T1DG01" only.

2. General Description

This module is a color active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, a driver IC, an input FPC, a back light unit and a touch panel. Graphics and texts can be displayed on a 272×3×480 dots panel, four timing signals, serial interface, supply voltages for TFT-LCD panel driving and supply voltage for back light.

3. Mechanical (Physical) Specifications

Item	Specifications	Unit
Screen size	9.02 (3.6" type) diagonal	cm
Active area	44.472(H)×78.48(V)	mm
Pixel format	272(H)×480(V)	Pixel
	1Pixel =R+G+B dots	
Pixel pitch	0.1635(H)×0.1635(V)	mm
Pixel configuration	R,G,B vertical stripes	
Display mode	Normally white	
Unit outline dimensions	51.8(W)×90(H)×3.3(D)	mm
Mass	35	g
Surface hardness	2H	
Surface treatment	Anti glare	

*The above-mentioned table indicates module sizes without some projections and FPC.
For detailed measurements and tolerances, please refer to Fig.1.

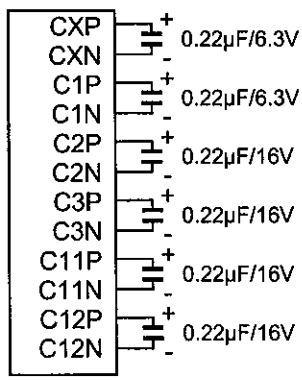
4. Input Terminal Names and Functions

Recommendation CN: [HIROSE] FH26G-67S-0.3SHBW(05) or [KYOCERA ELCO] 00 6281 067 2X2 829 +

Pin No.	Symbol	I/O	Description	Remarks
1	LED_C(-)	-	Power supply for LED (Low voltage)	
2	LED_A(+)	-	Power supply for LED (High voltage)	
3	DGND1	-	Digital Ground	
4	X1	O	Touch Panel Right Electrode	
5	Y2	O	Touch Panel Bottom Electrode	
6	X2	O	Touch Panel Left Electrode	
7	Y1	O	Touch Panel Top Electrode	
8	AGND1	-	Analog Ground	
9	V_{GH}	-	Connect to a Stabilizing capacitor	Note 2
10	C2P	-	Connect a Booster capacitor to C2N	Note 1
11	C2N	-	Connect a Booster capacitor to C2P	Note 1
12	C1P	-	Connect a Booster capacitor to C1N	Note 1
13	C1N	-	Connect a Booster capacitor to C1P	Note 1
14	V_{GL}	-	Connect a Stabilizing capacitor to GND	Note 2
15	C3P	-	Connect a Booster capacitor to C3N	Note 1
16	C3N	-	Connect a Booster capacitor to C3P	Note 1
17	AGND2	-	Analog Ground	
18	AVDD	-	Connect a Stabilizing capacitor to GND	Note 2
19	C11P	-	Connect a Booster capacitor to C11N	Note 1
20	C11N	-	Connect a Booster capacitor to C11P	Note 1
21	V_{CI}	-	Booster input voltage pin	Note 2
22	SDO	O	Data output pin in serial mode	Note 4
23	AGND3	-	Analog Ground	
24	V_{CIM}	-	Connect a Stabilizing capacitor to GND	Note 2
25	CXP	-	Connect a Booster capacitor to CXN	Note 1
26	CXN	-	Connect a Booster capacitor to CXP	Note 1
27	ID	O	MFG ID pin	Note 3
28	RESB	I	System reset	
29	DGND2	-	Digital Ground	
30	V_{DDIO}	-	Voltage input pin for logic I/O	
31	V_{CORE}	-	Connect a Stabilizing capacitor to GND	Note 2
32	DGND3	-	Digital Ground	
33	SHUT	I	Sleep mode control	
34	CSB	I	Chip select pin of serial interface	Note 4
35	SDI	I	Data input pin in serial mode	Note 4
36	SCK	I	Clock input pin in serial mode	Note 4
37	DGND6	-	Digital Ground	
38	DEN	I	Display enable	
39	B5	I	BLUE data signal(MSB)	
40	B4	I	BLUE data signal	
41	B3	I	BLUE data signal	

Pin No.	Symbol	I/O	Description	Remarks
42	B2	I	BLUE data signal	
43	B1	I	BLUE data signal	
44	B0	I	BLUE data signal(LSB)	
45	G5	I	GREEN data signal(MSB)	
46	G4	I	GREEN data signal	
47	G3	I	GREEN data signal	
48	G2	I	GREEN data signal	
49	G1	I	GREEN data signal	
50	G0	I	GREEN data signal(LSB)	
51	R5	I	RED data signal(MSB)	
52	R4	I	RED data signal	
53	R3	I	RED data signal	
54	R2	I	RED data signal	
55	R1	I	RED data signal	
56	R0	I	RED data signal(LSB)	
57	VSYNC	I	Frame synchronization signal	
58	HSYNC	I	Line synchronization signal	
59	DOTCLK	I	Dot-clock signal	
60	DGND7	-	Digital Ground	
61	DGND4	-	Digital Ground	
62	V_{LCD255}	-	Connect a Stabilizing capacitor to GND	Note 2
63	V_{COMH}	-	Connect a Stabilizing capacitor to GND	Note 2
64	V_{COML}	-	Connect a Stabilizing capacitor to GND	Note 2
65	DGND5	-	Digital Ground	
66	C12P	-	Connect a Booster capacitor to C12N	Note 1
67	C12N	-	Connect a Booster capacitor to C12P	Note 1

Note 1) Booster Capacitors

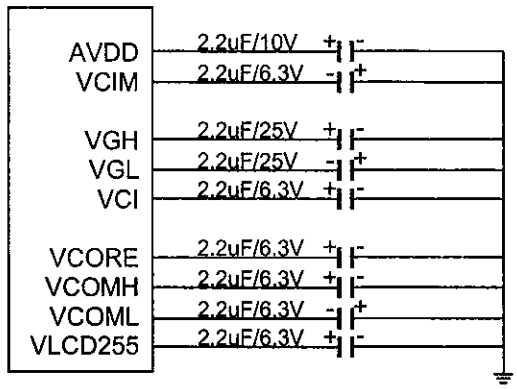


C1N/P, C2N/P, C3N/P, C11N/P, C12N/P, CXN/P are high voltage switching lines on FPC.

Surround/shield by AGND to avoid noise coupling to other pins.

Also aware the PCB design to avoid other components to be affected by noise on those dc/dc pins.

Note 2) Stabilization and charge sharing Capacitors



Note 3) ID is connected to V_{DDIO} via FPC.

Note 4) Serial transfer mode is 3 wires (24 bits).

Note 5) GND is connected to bezel under 1 Ω.

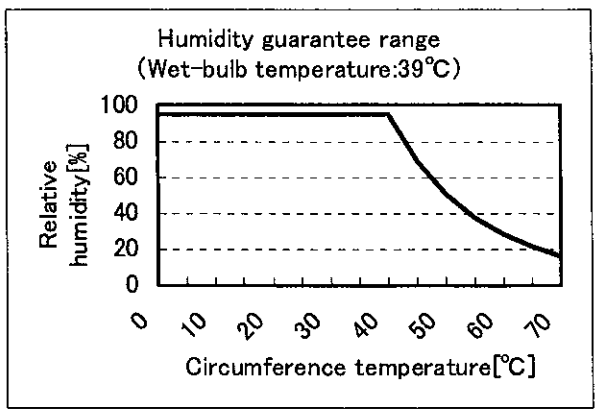
5. Absolute Maximum Ratings

Item	Symbol	Condition	Rated value	Unit	Remarks
Input voltage	V_I	Ta = 25°C	-0.3 to V_{DDIO}+0.3	V	Note 1
Logic I/O power supply voltage	V_{DDIO}	Ta = 25°C	-0.3 to +4.0	V	
Analog power supply voltage	V_{CI}	Ta = 25°C	AGND-0.3 to +5.0	V	
Temperature for storage	Tstg	-	-30 to +85	deg.	Note 2
Temperature for operation	Topr	-	-10 to +70	deg.	
LED input electric current	I_{LED}	Ta = 25°C	35	mA	Note 3
LED electricity consumption	P_{LED}	Ta = 25°C	123	mW	

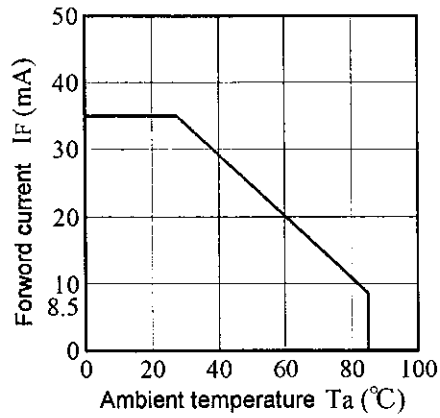
Note 1) RESB, SHUT, CSB, SDI, SCK, DEN, B5 to B0, G5 to G0, R5 to R0, VSYNC, HSYNC, DOTCLK

Note 2) Humidity: 80%RH Max. (Ta≤40°C)
Maximum bulb temperature under 39°C (Ta>40°C) See to it that no dew will be condensed.

Note 3) Power consumption of one LED (Ta = 25°C). (Use six pieces LED)
Ambient temperature and the maximum input are fulfilling the following operating conditions.



Humidity guarantee range



Ambient temperature and the maximum input

6. Electrical Characteristics

6-1. TFT LCD Panel Driving

Ta = 25°C

Item		Symbol	Min.	Typ.	Max.	Unit	Remarks
Logic I/O power supply	DC voltage	V_{DDIO}	+1.6	+1.8	+2.5	V	
	DC current	I_{VDDIO}	-	1	-	mA	Note 1
Analog power supply	DC voltage	V_{CI}	+2.3	+2.5	+3.0	V	
	DC current	I_{VCI}	-	50	-	mA	Note 1
Permissive input ripple voltage		$V_{RFVDDIO}$	-	-	50.	mVp-p	Note 2
		V_{RFVCI}	-	-	50	mVp-p	Note 2
Logic input voltage	High	V_{IH}	0.8 V_{DDIO}	-	V_{DDIO}	V	Note 3
	Low	V_{IL}	0	-	0.2 V_{DDIO}	V	Note 3
Logic input current		I_{IH} / I_{IL}	-1	-	1	μA	Note 3

Note 1) V_{DDIO} = +1.8V, V_{CI} = +2.5V

Current situation for I_{VDDIO}: Black and white checker flag pattern

Current situation for I_{VCI}: All black pattern

Note 2) V_{DDIO} = +1.8V, V_{CI} = +2.5V

Note 3) RESB, SHUT, CSB, SDI, SCK, DEN, B5 to B0, G5 to G0, R5 to R0, VSYNC, HSYNC, DOTCLK

6-2. Register setting

Reg. #	Register	Data (Gamma 2.2)	Remark
R01h	Driver output control	2BDFh	
R02h	LCD drive AC control	0600h	
R03h	Power control (1)	E19Eh	
R0Bh	Frame cycle control	DC08h	
R0Ch	Power control (2)	0005h	
R0Dh	Power control (3)	0000h	
R0Eh	Power control (4)	2800h	
R0Fh	Gate scan starting position	0000h	
R10h	Power Detector	02F4h	
R13h	Deep Sleep Mode	065Ah	
R16h	Horizontal Porch	8786h	Note1
R17h	Vertical Porch	0003h	Note2
R27h	VCOM bias current	0078h	
R2Ch	VCOM Charge sharing	9DDDh	
R1Eh	Power control (5)	0000 h	
RB0h	Gamma control (1)	0007h	
RB1h	Gamma control (1)	0206h	
RB2h	Gamma control (1)	0001h	
RB3h	Gamma control (1)	0705h	
RB4h	Gamma control (1)	0407h	
RB5h	Gamma control (1)	0302h	
RB6h	Gamma control (1)	0707h	
RB7h	Gamma control (1)	0307h	
RBAh	Gamma control (2)	1F06h	
RBBh	Gamma control (2)	0607h	

6-3. Back light driving

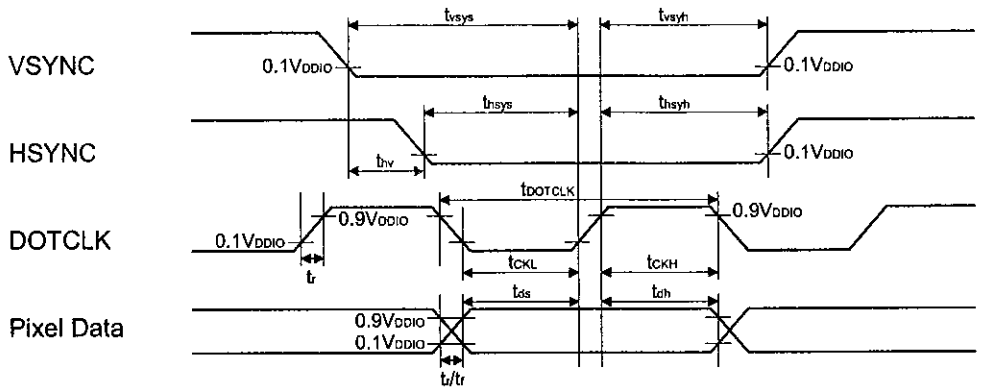
The back light system has 6 LEDs

[LED type: NSSW006]

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Rated Voltage	V_{BL}	-	19.2	21	V	
Rated Current	I_L	-	20	-	mA	Ta=25°C
Power consumption	W_L	-	384	-	mW	

7. Timing characteristics of input signals

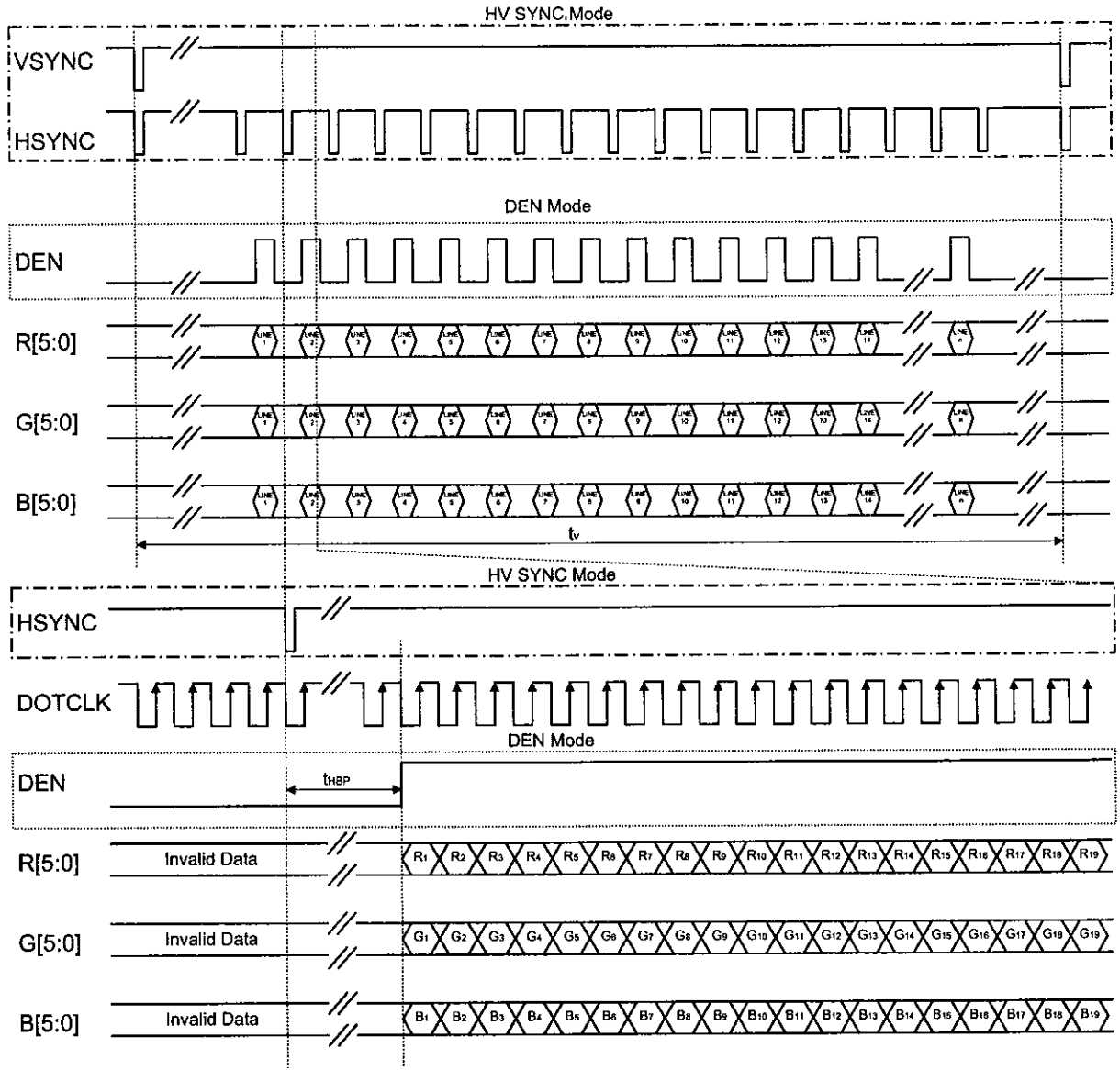
7-1. Pixel clock timing



Characteristics		Symbol	Target Min	Target Typ	Target Max	Units
DOTCLK Frequency	24 bits parallel	fDOTCLK	4.2	8.4	10	MHz
	8 bits serial without dummy		12.6	25.2	30	
DOTCLK Period	24 bits parallel	tDOTCLK	100	119	238	nsec
	8 bits serial without dummy		33	40	79	
Pixel Clock Period	24 bits parallel	tPIXCLK	-	1	-	tDOTCLK
	8 bits serial without dummy		-	3	-	
Pixel Clock Freq.	24 bits parallel	fPIXCLK	4.2	8.4	10	MHz
	8 bits serial without dummy					
Vertical Sync Setup Time		tvsys	5	-	-	nsec
Vertical Sync Hold Time		tvsyh	5	-	-	nsec
Horizontal Sync Setup Time		thsys	5	-	-	nsec
Horizontal Sync Hold Time		thsyh	5	-	-	nsec
Phase difference of Sync Signal Falling Edge		thv	0	-	320	tDOTCLK
DOTCLK Low Period		tCKL	16	-	-	nsec
DOTCLK High Period		tCKH	16	-	-	nsec
Data Setup Time		tds	10	-	-	nsec
Data hold Time		tdh	10	-	-	nsec
Reset pulse width		tRES	2.5	-	-	μsec
Rise / Fall time		tr / tf	5	-	25	nsec

Note: External clock source must be provided to DOTCLK pin. The driver will not operate if absent of the clocking signal.

7-2. Data Transaction Timing

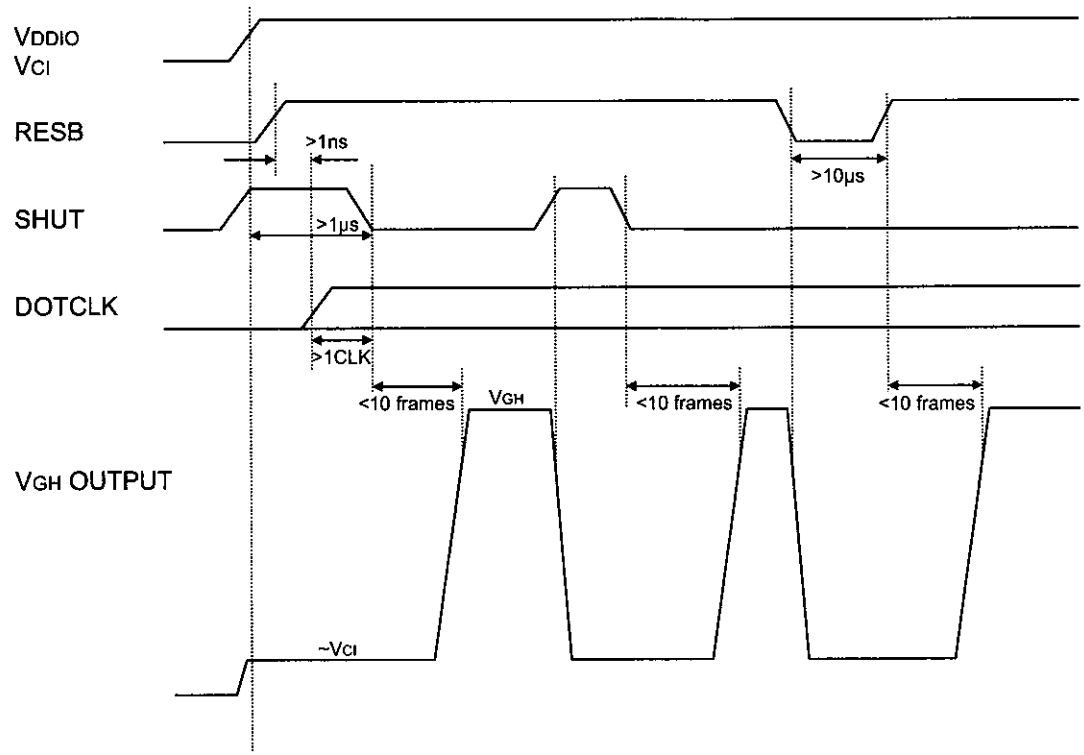


HV SYNC Mode Characteristics		Symbol	Min	Typ	Max	Unit
Serial Clock Frequency		1/tDOTCLK	4.2	8.4	10	MHz
Horizontal	One Line Period	tH	274	288	511	tDOTCLK
	Active Data Period	tdata	-	272	-	tDOTCLK
	Horizontal Back Porch	tHBP	1	8	238	tDOTCLK
	Horizontal Front Porch	tHFP	1	8	238	tDOTCLK
Vertical	One Field Period	tV	482	486	990	tH
	Active Line Period	tAL	-	480	-	tH
	Vertical Back Porch	tVBP	1	4	255	tH
	Vertical Front Porch	tVFP	1	2	255	tH

Note: $t_{HBP} + t_{DATA} + t_{HFP} \leq 511\ t_{DOTCLK}$

Characteristics		Symbol	DEN Mode	Unit
Serial Clock Frequency		1/tDOTCLK	8.74	MHz
Horizontal	One Line Period	tH	304	tDOTCLK
	Active Data Period	tdata	272	tDOTCLK
	Data Enable Period	tDEN	272	tDOTCLK
Vertical	One Field Period	tV	486	tH
	Active Line Period	tAL	480	tH
	Vertical Back Porch	tVBP	4	tH
	Vertical Front Porch	tVFP	2	tH

7-3. VGH output against SHUT and RESB



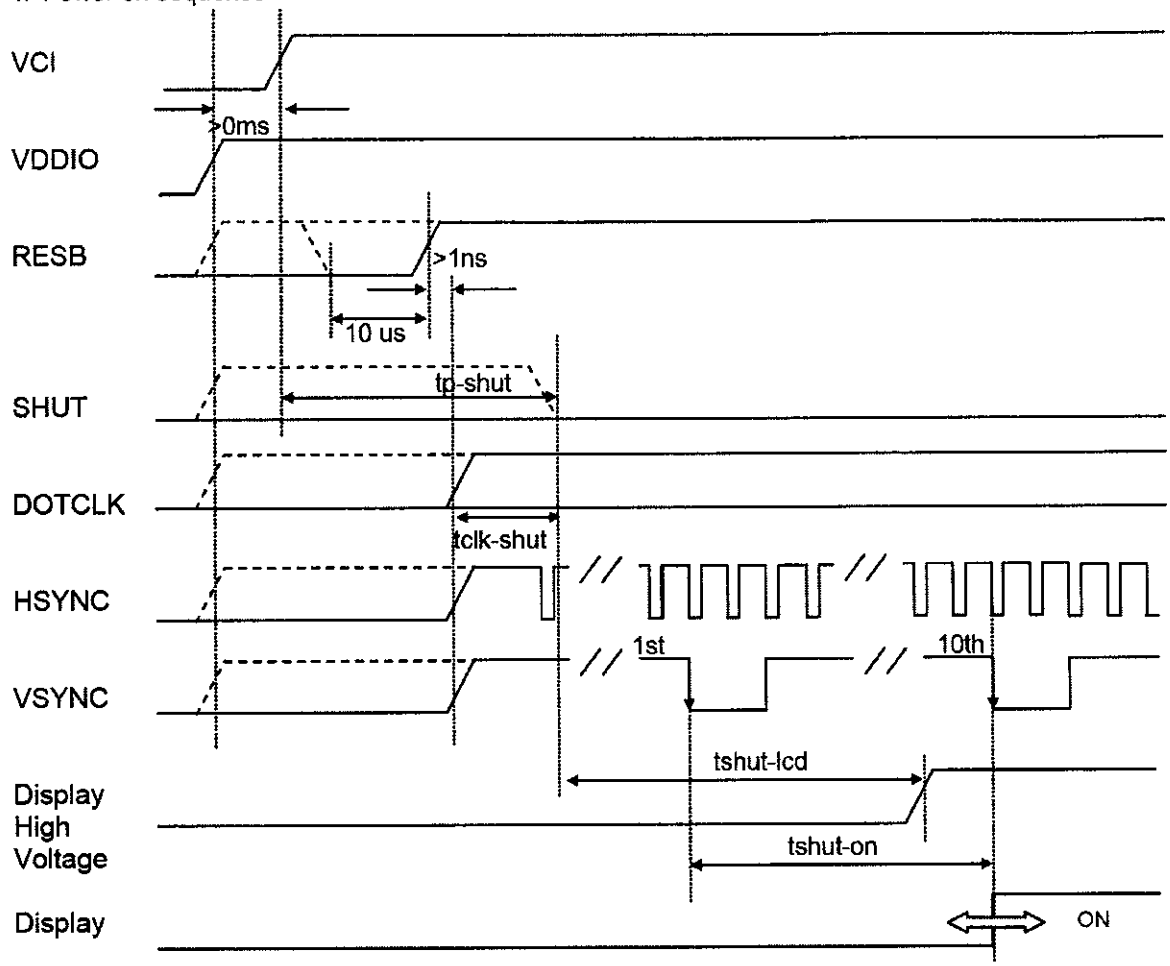
Note1: The minimum cycle time of SHUT is 10 + 2 frames.

Note2: DOTCLK must be provided for boosting of VGH. The above timing diagram assumed voltages and DOTCLK are continuous supplied after power on.

Note3: VGH will be forced to VCI at the low stage of RESB.

Note4: The minimum pulse width of RESET is 10μsec.

7-4. Power on sequence

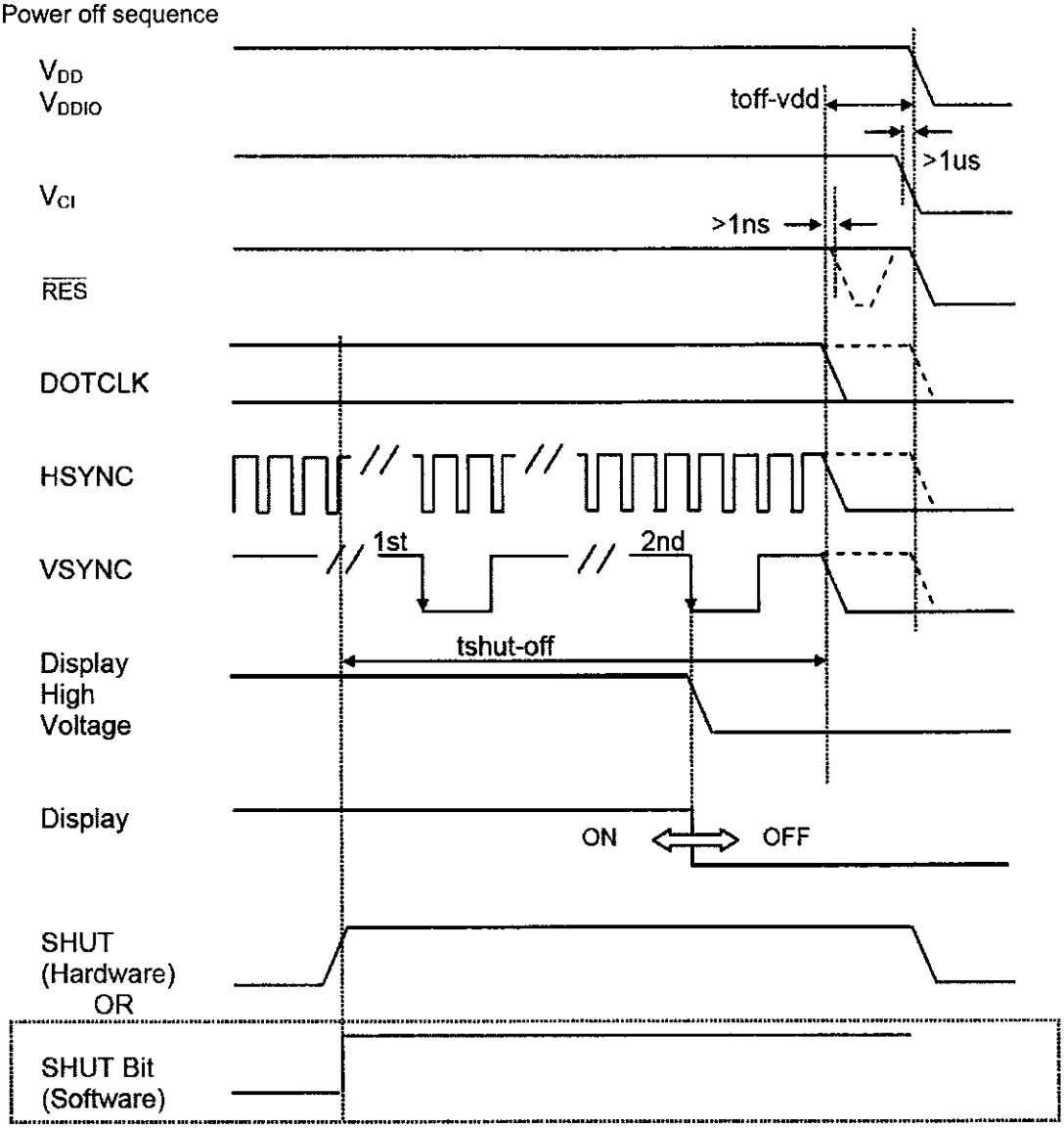


Characteristics	Symbol	Min	Typ	Max	Unit
VDDIO on to falling edge of SHUT	tp-shut	1	1000	-	msec
DOTCLK	tclk-shut	1	100	-	clock
Falling edge of SHUT to LCD power on	tshut-lcd	-	-	164	msec
Falling edge of SHUT to display start •1 line: 336 clk •1 frame: 244 line •DOTCLK = 5.0MHz	tshut-on	-	10	-	frame
		156	166	333	msec

Note1: It is necessary to input DOTCLK before the falling edge of SHUT.

Note2: Display starts at 10th falling edge of VSTNC after the falling edge of SHUT.

7-5. Power off sequence



Characteristics	Symbol	Min	Typ	Max	Unit
Rising edge of SHUT to display off •1 line: 336 clk •1 frame: 244 line •DOTCLK = 5.0 MHz	tshut-off	-	2	-	frame
		31	33.2	67	msec
Input-signal-off to VDDIO off	toff-vdd	1	-	-	μsec

Note1: DOTCLK must be maintained at lease 2 frames after the rising edge of SHUT.

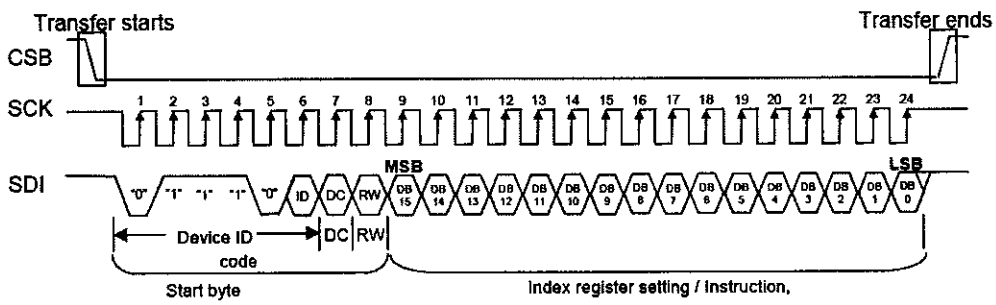
Note2: Display become off at the 2nd falling edge of VSTNC after the falling edge of SHUT.

Note3: If RESET signal is necessary for power down, provide it after the 2-frame-cycle of the SHUT period.

7-6. SPI Interface Timing Diagram & Transaction Example (24 bits)

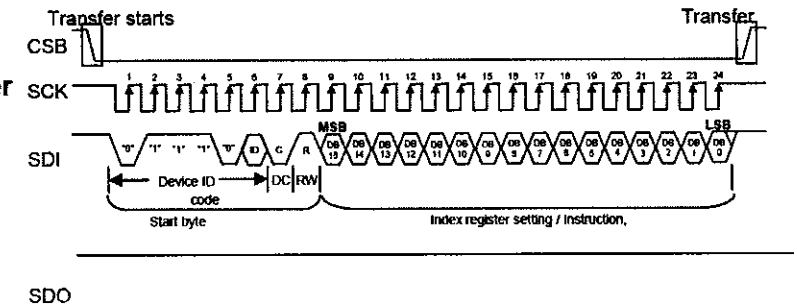
The clock synchronized serial peripheral interface (SPI) using the chip select line (CSB), serial transfer clock line (SCK), serial input data (SDI), and serial output data (SDO). The serial data transfer starts at the falling edge of CSB input and ends at the rising edge of CSB. DC bit determinate the data of SDI which is register or data. RW bit determinate the read / write operation.

Write

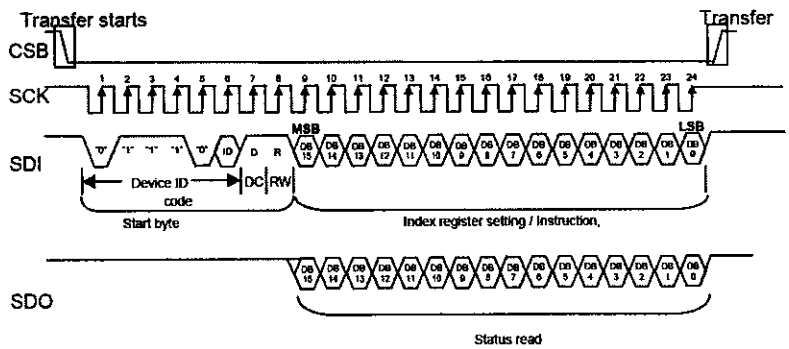


Read

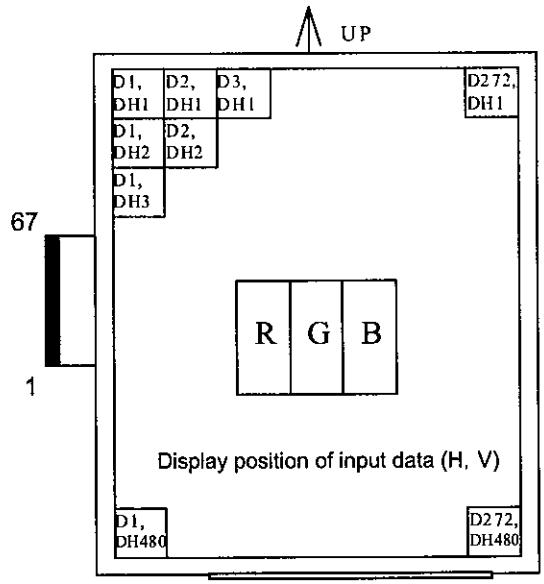
1st step read
- Index register



2nd step read
- Data at SDO



7-7. Input data signals and display position on the screen



8. Input signals, basic display colors and gray scale of each color

	Colors & Gray Scale	Gray Scale	Date signal																	
			R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
			LSB					MSB	LSB					MSB	LSB					MSB
Basic Color	Black	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	-	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	-	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	-	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	-	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	-	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	-	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of Red	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	↓				↓						↓						↓		
	⇩	↓				↓						↓						↓		
	Brighter	GS61	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	⇩	GS62	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red	GS63	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	⇧	↓				↓						↓						↓		
	⇩	↓				↓						↓						↓		
	Brighter	GS61	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0
	⇩	GS62	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	Green	GS63	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale of Blue	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	⇧	↓				↓						↓						↓		
	⇩	↓				↓						↓						↓		
	Brighter	GS61	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
	⇩	GS62	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Blue	GS63	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

0: Low level voltage, 1: High level voltage

Each basic color can be displayed in 64 gray scales from 6 bits data signals.
According to the combination of 18 bits data signals, the 262k color display can be achieved on the screen.

9. Optical characteristics

Module characteristics

Ta = 25°C, V_{DDIO} = +1.8V, V_{CI} = +2.5V

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angle range	Horizontal	θ21	CR>10	-	60	-	deg.	[Note1,4]
		θ22		-	40	-	deg.	
	Vertical	θ11		-	60	-	deg.	
		θ12		-	60	-	deg.	
Contrast ratio		CR	Optimum viewing angle	100	300	-		[Note2,4]
Response time	Rise	Tr	θ=0°	-	30	45	msec	[Note3,4]
	Decay	Td		-	30	45	msec	
Chromaticity of white		x		0.27	0.32	0.37		[Note4]
		y		0.30	0.35	0.40		
Chromaticity of red		x		0.54	0.59	0.64		[Note4]
		y		0.30	0.35	0.40		
Chromaticity of green		x		0.29	0.34	0.39		[Note4]
		y		0.54	0.59	0.64		
Chromaticity of blue		x		0.10	0.15	0.20		[Note4]
		y		0.09	0.14	0.19		
NTSC ratio		S		40	50			[Note4]
Luminance of white		X_{L1}		350	410	-	cd/m²	I_{LED}=20mA [Note6]
Uniformity		U		70	80		%	[Note5]

* The optical characteristics measurements are operated under a stable luminescence (I_{LED} = 20mA) and a dark condition. (Refer to Fig.3)

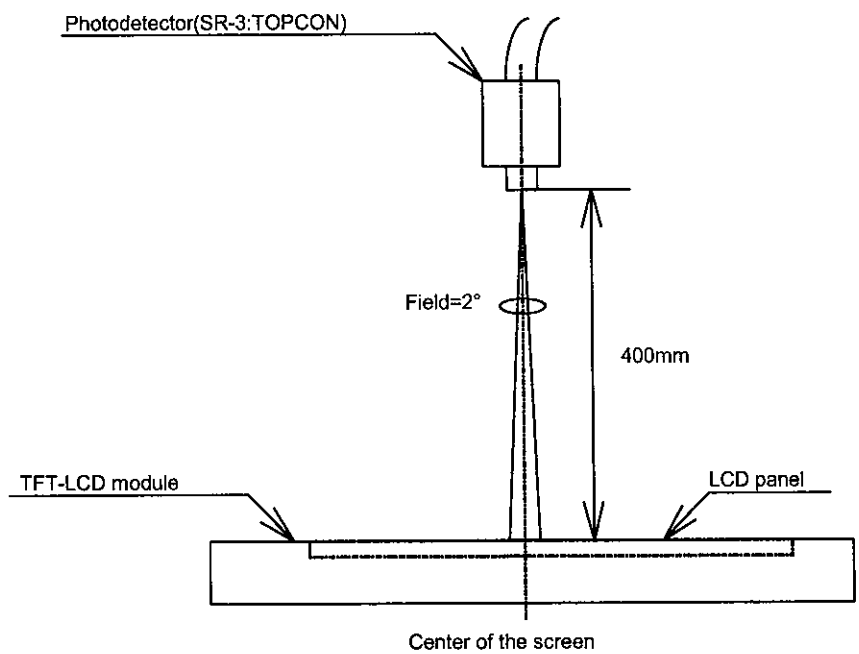
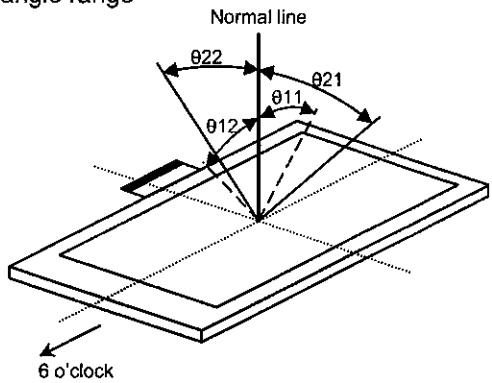


Fig.3 Optical characteristics measurement method

[Note1] Definitions of viewing angle range



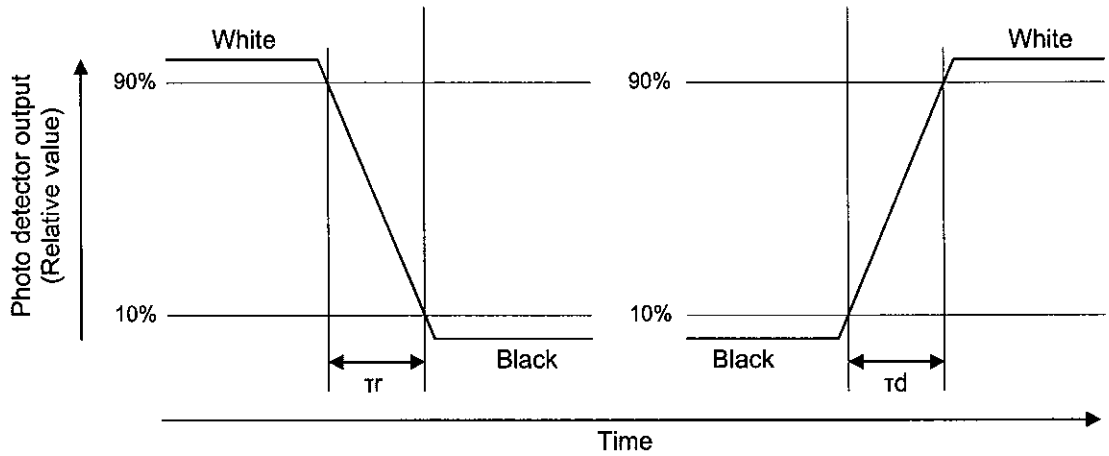
[Note2] Definition of contrast ratio

The contrast ratio is defined as the following:

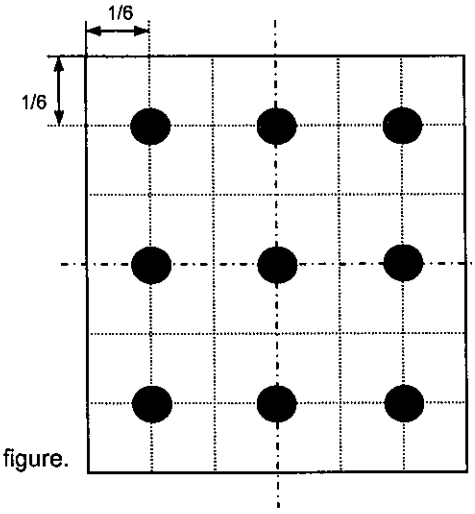
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance (brightness) with all pixels white}}{\text{Luminance (brightness) with all pixels black}}$$

[Note3] Definition of response time

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white"



[Note4] This shall be measured at center of the screen.



[Note5] Definition of Uniformity

$$\textit{Uniformity} = \frac{\text{Minimum Brightness}}{\text{Maximum Brightness}} \times 100\,(\%)$$

The brightness should be measured on the 9-point as shown in the right figure.

[Note6] This shall be measured on the 9-point as shown in the right figure.

$$\text{Luminance of white} = \frac{\text{Summation of the 9-point Brightness}}{9}$$

10. Touch panel characteristics

Parameter	Min.	Typ.	Max.	Unit	Remark
Input voltage	-	5.0	7.0	V	
Resistor between terminals(XL-XR)	100	300	700	Ω	Provisional specification
Resistor between terminals(YU-YD)	360	800	1600	Ω	
Line linearity(X direction)	-	-	1.5	%	
Line linearity(Y direction)	-	-	1.5	%	
Insulation resistance	20	-	-	MΩ	at DC25V
Minimum tension for detecting	-	-	0.8	N	
Activation force	-	-	50	g	Note 2

Note 1) for use of finger input

Note 2) 12mm inside of Active area edge with 0.8mm stylus pen point.

11. Handling of modules

11-1. Inserting the FPC into its connector and pulling it out.

1) Be sure to turn off the power supply and the signals when inserting or disconnecting the cable.
2) Please insert for too much stress not to join FPC in the case of insertion of FPC.

11-2. About handling of FPC

1) The bending radius of the FPC should be more than 1.4mm, and it should be bent evenly.
2) Do not dangle the LCD module by holding the FPC, or do not give any stress to it.

11-3. Mounting of the module

1) The module should be held on to the plain surface. Do not give any warping or twisting stress to the module.
2) Please consider that GND can ground a modular metal portion etc. so that static electricity is not charged to a module.
3) Design guidance for touch panel (T/P)

a) Example of housing design

(1) If a consumer will put a palm on housing in normal usage, care should be taken as follows.
(2) Keep the gap, for example 0.3 to 0.7mm, between bezel edge and T/P surface.
The reason is to avoid the bezel edge from contacting T/P surface that may cause a "short" with bottom layer. (See Fig.4)
(3) Insertion a cushion material is recommended.
(4) The cushion material should be limited just on the busbar insulation paste area.
If it is over the transparent insulation paste area, a "short" may be occurred.
(5) There is one where a resistance film is left in the T/P part of the end of the pole.
Design to keep insulation from the perimeter to prevent from miss-operation and so on.

b) Mounting on display and housing bezel

(1) In all cases, the T/P should be supported from the backside of the Plastic.
(2) Do not to use an adhesive-tape to bond it on the front of T/P and hang it to the housing bezel.
(3) Never expand the T/P top layer (PET-film) like a balloon by internal air pressure.
The life of the T/P will be extremely short.
(4) Top layer, PET, dimension is changing with environmental temperature and humidity.

Avoid a stress from housing bezel to top layer, because it may cause "waving".

(5) The input to the touch panel sometimes distorts touch panel itself.

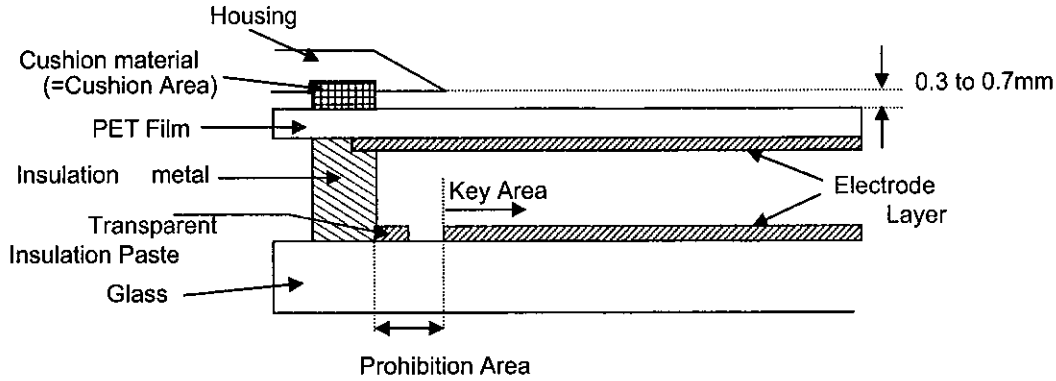


Fig.4

11-4. Cautions in assembly / Handling pre cautions

As the polarizer can be easily scratched, be most careful in handling it.

1) Work environments in assembly.

Working under the following environments is desirable:

a) Implement more than 1MΩ conductive treatment (by placing a conductive mat or applying conductive paint) on the floor or tiles.

b) No dusts come in to the working room. Place an adhesive, anti-dust mat at the entrance of the room.

c) Humidity of 50 to 70% and temperature of 15 to 27°C are desirable.

d) All workers wear conductive shoes, conductive clothes, conductive fingerstalls and grounding belts without fail.

e) Use a blower for electrostatic removal. Set it in a direction slightly tilt downward so that each Module can be well subjected to its wind. Set the blower at an optimum distance between the blower and the module.

2) How the remove dust on the polarizer

a) Blow out dust by the use of an N^2 blower with antistatic measures taken. Use of an ionized air gun is recommendable.

b) When the panel surface is soiled, wipe it with soft cloth.

3) In the case of the module's metal part (shield case) is stained, wipe it with a piece of dry, soft cloth. If rather difficult, give a breath on the metal part to clean better.

4) If water dropped, etc. remains stuck on the polarizer for a long time, it is apt to get discolored or cause stains. Wipe it immediately.

5) As a glass substrate is used for the TFT-LCD panel, if it is dropped on the floor or hit by something hard, it may be broken or chipped off.

6) Since CMOS LSI is used in this module, take care of static electricity and take the human earth into consideration when handling.

11-5. Others

1) Regarding storage of LCD modules, avoid storing them at direct sunlight situation.

You are requested to store under the following conditions:

(Environmental conditions of temperature/humidity for storage)

a) Temperature: 0 to 40°C

b) Relative humidity : 95% or less

- As average values of environments (temperature and humidity) for storing, use the following control guidelines:

  Summer season: 20 to 35°C, 85% or less Winter season: 5 to 15°C, 85% or less

- If stored under the conditions of 40°C and 95% RH, cumulative time of storage must be less than 240 hours.

2) If stored at temperatures below the rated values, the inner liquid crystal may freeze, causing cell destruction. At temperatures exceeding the rated values for storage, the liquid crystal may become isotropic liquid, making it no longer possible to come back to its original state in some cases.
3) If the LCD is broken, do not drink liquid crystal in the mouth. If the liquid crystal adheres to a hand or foot or to clothes, immediately cleanse it with soap.
4) If a water drop or dust adheres to the polarizer, it is apt to cause deterioration. Wipe it immediately.
5) Be sure to observe other caution items for ordinary electronic parts and components.
6) If local pressure joins T/P surface for a long time, it will become the cause of generating of Newton's ring.
7) Epoxy resin (amine series curing agent), silicone adhesive material (dealcoholization series and oxime series), tray forming agent (azo compound) etc, in the cabinet or the packing materials may induce abnormal display with polarizer film deterioration regardless of contact or noncontact to polarizer film.

   Be sure to confirm the component of them.

12. Reliability test items

No.	Test item	Condition
1	High temperature storage test	Ta = 85°C 240h
2	Low temperature storage test	Ta = -30°C 240h
3	High temperature & high humidity operation test	Ta = 40°C ; 95%RH 240h (No condensation)
4	High temperature operation test	Ta = 70°C 240h
5	Low temperature operation test	Ta = -10°C 240h
6	Vibration test (non-operating)	Frequency range: 10 to 55Hz Stroke: 1.5mm Sweep time: 1 minute Test period: 2 hours for each direction of X,Y,Z
7	Shock test	Direction: ±X, ±Y, ±Z, Time: Third for each direction. Impact value: 980m/s², Action time 6ms
8	Thermal shock test (non-operating)	Ta=-10°C to 70°C / 10 cycles (30 min) (30 min)
9	Point activation test (Touch panel)	Hit it 100,000 times with a silicon rubber. Hitting force : 2.4 N Hitting speed : 2 times per second
10	Electro static discharge test	±200V/200pF(0Ω) to Terminals(Contact) (1 time for each terminals) ±4kV/150pF(330Ω) to Housing bezel or T/P(Contact) ±8kV/150pF(330Ω) to Housing bezel or T/P(in Air)

Note: Ta = Ambient temperature, Tp = Panel temperature

[Check items]

(a)Test no.1 to no.8

In the standard condition, there shall be no practical problems that may affect the display function.

(b)Test no.9

The measurements after the tests are satisfied "10 Touch panel characteristics".

13. Display grade

The standard regarding the grade of color LCD displaying modules should be based on the delivery inspection standard.

14. Delivery form

14-1. Carton storage conditions

1) Carton piling-up: Max 8 rows
2) Environments

Temperature: 0 to 40°C

Humidity: 65% RH or less (at 40°C)

There should be no dew condensation even at a low temperature and high humidity.

3) Packing form: As shown in Figure 4.

*Cartons are weak against damp, and they are apt to be smashed easily due to the compressive pressure applied when piled up. The above environmental conditions of temperature and humidity are set in consideration of reasonable pile-up for storage.

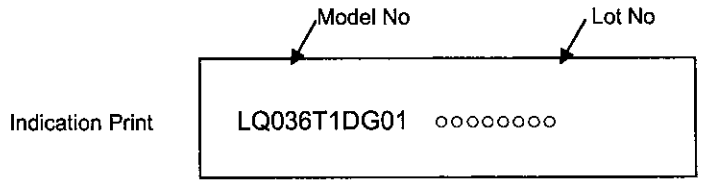
14-2. Packing composition

Name	quantity	Note
Carton size	1	525×360×225 (mm)
Tray	12	Material: Electrification prevention polypropylene
(The number of Module)		16 modules / tray; 160 modules / carton
Electrification prevention bag	2	Material: Electrification prevention polyethylene 680mm(length)×500mm(depth)×50μm(thin)

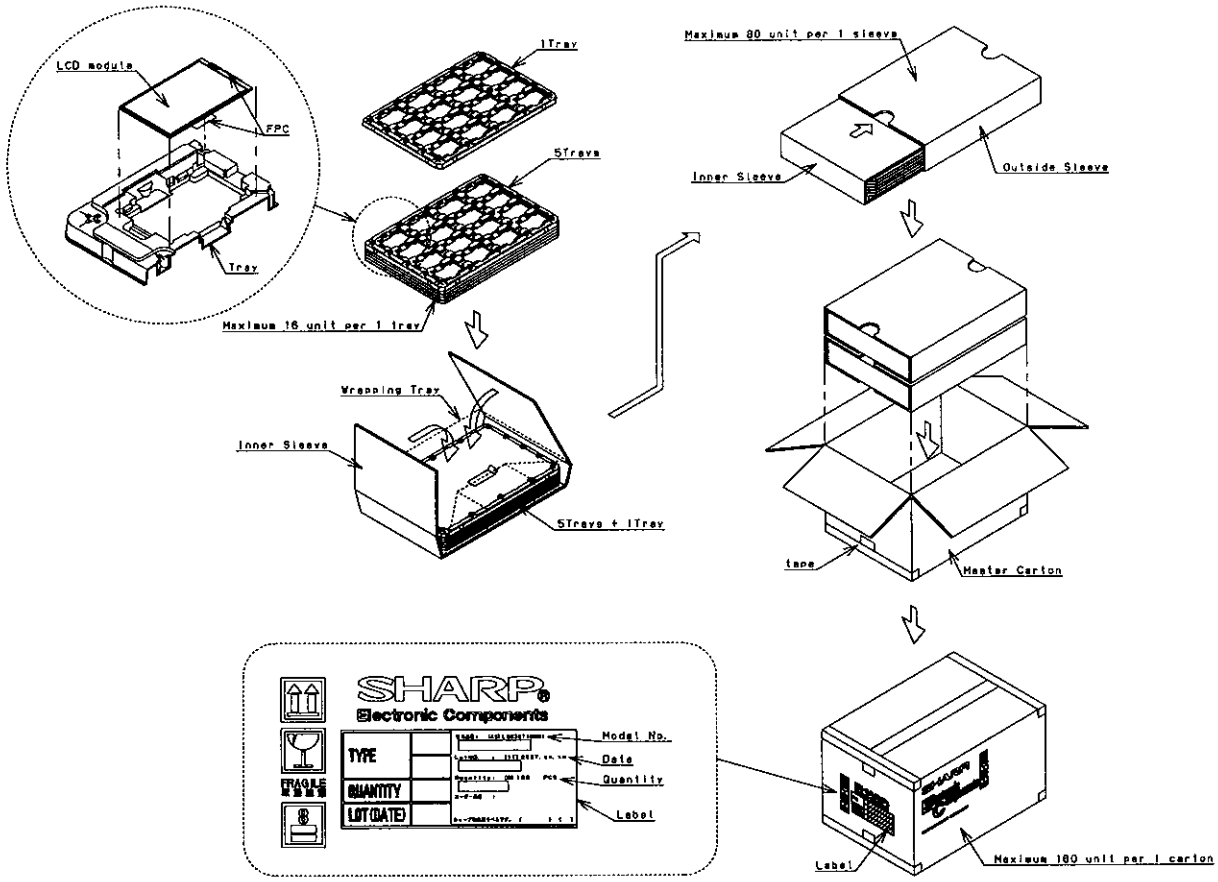
Carton weight (160 modules): Approx. 9.1 kg

15. Lot no. marking

The lot No. will be indicated on individual ink jet printing. The location is as shown



16. LCD module packing carton



17. Others

1) Disassembling the module can cause permanent damage and you should be strictly avoided.
2) Please be careful that you don't keep the screen displayed fixed pattern image for a long time, since retention may occur.
3) If you pressed down a liquid crystal display screen with your finger and so on, the alignment disorder of liquid crystal will occur. And then it will become display fault.
   Therefore, be careful not to touch the screen directly, and to consider not stressing to it.
4) If any problem arises regarding the items mentioned in this specification sheet or otherwise, it should be discussed and settled mutually in a good faith for remedy and/or improvement.

SHARP

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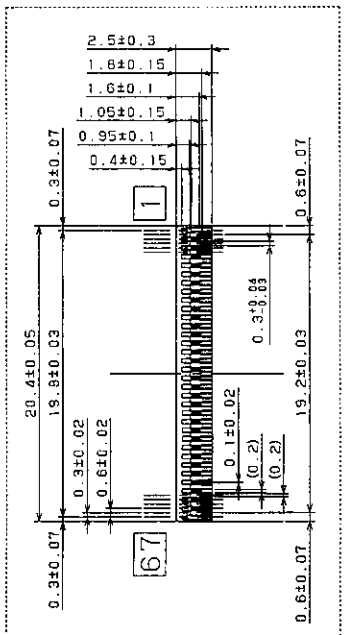
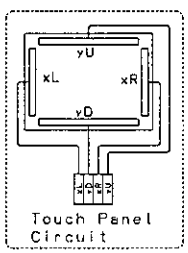
TENTATIVE

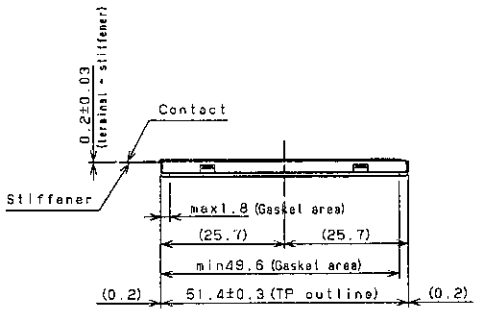


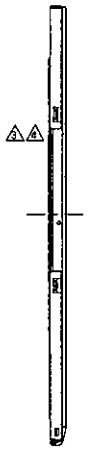
Detail of a

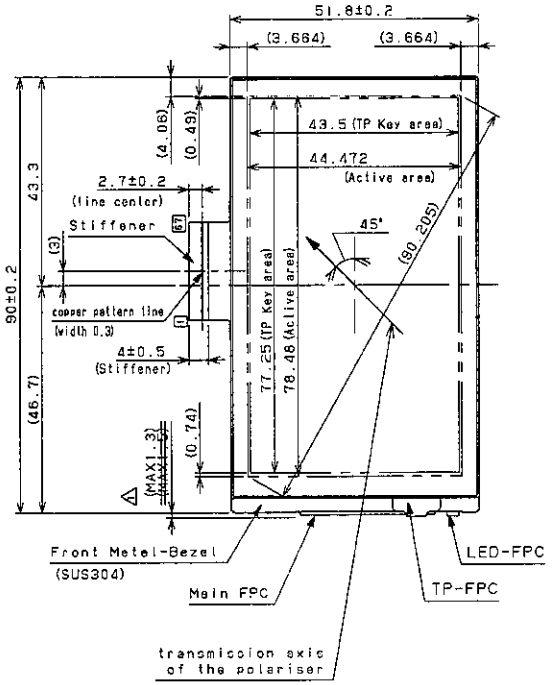
Fitting CN:HIROSE
FH26G-67S-0.3SHBW (05)

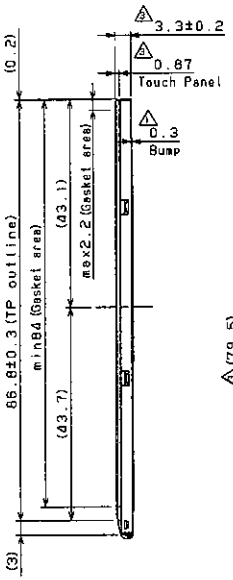


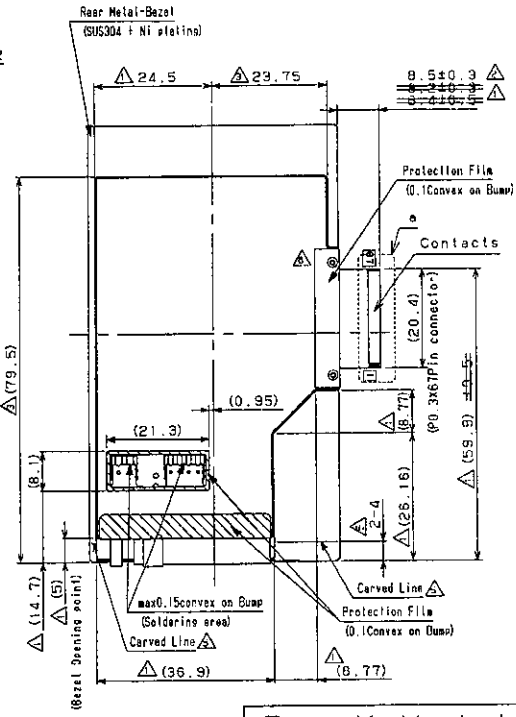
Touch Panel Circuit











Rev. K Model

TP Assy tolerance ±0.3.
Any foreign materials and contamination outside the Active Area are to be treated as "No-Count" at our inspections.
Guarantee of appearance-LCD Active Area
General tolerance is ±0.5.
LCD-FPC bend larger than 0.8 in radius.
Please design carefully to hide the polarizer and other frame areas, which are outside of the guaranteed area.
As the light from backlight may leak from the gap at outside of active area, which are outside of active area, please pay attentions to such leakage when designing the set.
The tolerances of the module width do not include warp of the case.

改訂	改訂記事 REVISION	担当
6	2009.10.14 Add Holes in Protection Film	M. Hibitani
5	2009. 5.28 Rear Bezel Carved Line added	M. Hibitani
4	2009. 1. 9 The shape change of the side of the Rear Bezel	M. Hibitani
3	2008.11.21 Rev. J→Rev. K (TP:Glass0.7t→0.5t, Rear Bezel:BossChange.) (Rear Bezel:Side Shape Change)	M. Hibitani
2	2008.07.16 FPC Length Changed	M. Hibitani
1	2008.07.11 FPC Length Changed, Bump Changed	M. Hibitani

設計 DESIGNER	製図 DRAFTER	検図 DSN CK	検図 DSN CK	承認 ENG APPD	シャープ株式会社 [MB液晶第2事業部] 第2開発部 SHARP CORPORATION		

ORIGINAL MODEL	LQ036T1DG01
画面サイズ ACTIVE AREA SIZE	P=0.1635mm 272RGBx480
尺度 SCALE	1/1
日付 DATE	04/Jul/2008
単位 Unit	mm
名称 NAME	3.55" Wide Module Outline dimensions
ユーザー USER	
原紙サイズ	A3
図番 DRAWING NO.	LDM-03338G