PRODUCT SPECIFICATIONS

SHARP

Mobile Liquid Crystal Displays Group

LQ038Q7DB03R

TFT-LCD Module

Spec. Issue Date: May 20, 2005

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S H A R P

MOBILE LIQUID CRYSTAL DISPLAY GROUP
SHARP CORPORATION

S P E C I F I C A T I O N

DEVICE SPECIFICATION FOR

T F T − L C D   m o d u l e

MODEL No. **LQ038Q7DB03R**

☐ CUSTOMER'S APPROVAL

DATA _____

BY _____

PRESENTED
BY 中辻晴雄
H. Nakatsuji
DIVISION DEPUTY GENERAL MANAGER &
DEPARTMENT GENERAL MANAGER
Development Department V
MOBILE LCD Design Center I
MOBILE LCD GROUP
SHARP CORPORATION

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(1) Application

   This literature applies to LQ038Q7DB03R.

(2) Overview

   This module is a color reflective and active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor), named AD-TFT(Advanced TFT). It is composed of a color TFT-LCD panel, driver ICs, an FPC, a back light, and a back sealed casing. It isn't composed control circuit. Graphics and texts can be displayed on a 240× 3× 320 dots panel with 262,144 colors by supplying.

   Optimum view angle is 6 o'clock. An inverted display mode is selective in the vertical or the horizontal direction.

3   Mechanical specifications

     Table 1

Parameter	Specifications	Units	Remarks
Screen size (Diagonal)	9.54 [3.78"] Diagonal	cm	
Display active area	57.6 H × 76.8 V	mm	
Touch panel active area	57.9 H × 77.8 V	mm	
Pixel format	240(H)× 320(V) (1 pixel = R+G+B dots)	pixels	
Pixel pitch	0.24 H × 0.24 V	mm	
Pixel configuration	R,G,B vertical stripe		
Unit outline dimension	69.0(W)× 88.6(H)× 3.4(D)	mm	Note3-1
Mass	42		
Surface hardness (Touch panel)	3H		

Note 3-1

Excluding FPC.   For detailed measurements and tolerances, please refer to Fig. 1.

(4)Pixel configuration
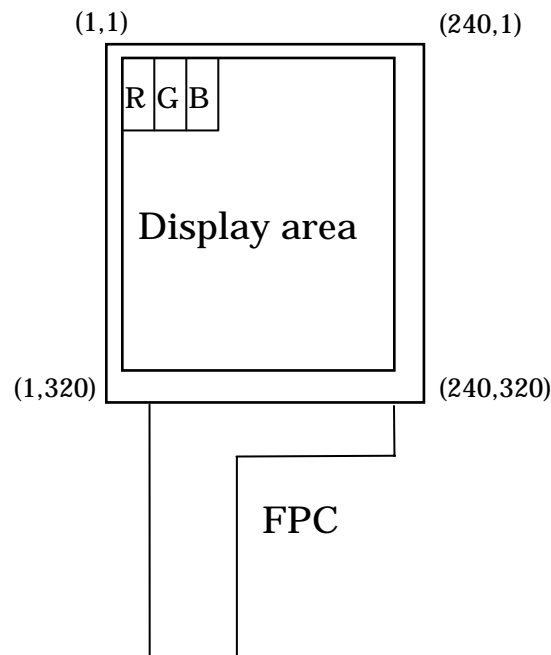
(5)Input/Output terminal

　5-1)TFT-LCD panel driving section

Table2

Pin No.	Symbol	I/O	Description	Remarks
1	DGND		Ground(digital)	
2	VSHA		Power supply(analog)	
3	NC			
4	VSHD		Power supply of digital	
5	VDD		Power supply of gate driver(high level)	
6	NC			
7	VEE		Power supply of gate driver(low level)	
8	NC			
9	VCOM	I	Common electrode driving signal	Note5-1
10	VCOM	I	Common electrode driving signal	Note5-1
11	VSS		Power supply of gate driver(logic low)	
12	VCC		Power supply of gate driver(logic high)	
13	NC			
14	R0	I	RED data signal(LSB)	
15	R1	I	RED data signal	
16	R2	I	RED data signal	
17	R3	I	RED data signal	
18	R4	I	RED data signal	
19	R5	I	RED data signal(MSB)	
20	G0	I	GREEN data signal(LSB)	
21	G1	I	GREEN data signal	
22	G2	I	GREEN data signal	
23	G3	I	GREEN data signal	
24	G4	I	GREEN data signal	
25	G5	I	GREEN data signal(MSB)	
26	B0	I	BLUE data signal(LSB)	
27	B1	I	BLUE data signal	
28	B2	I	BLUE data signal	
29	B3	I	BLUE data signal	
30	B4	I	BLUE data signal	
31	B5	I	BLUE data signal(MSB)	
32	V0	I	Standard voltage to generate gray scale voltage	
33	V1	I	Standard voltage to generate gray scale voltage	
34	V2	I	Standard voltage to generate gray scale voltage	
35	V3	I	Standard voltage to generate gray scale voltage	
36	V4	I	Standard voltage to generate gray scale voltage	
37	NC			

Pin No.	Symbol	I/O	Description	Remarks
38	NC			
39	NC			
40	AGND		Ground(Analog)	
41	NC			
42	NC			
43	NC			
44	DCLK	I	Data sampling clock signal	
45	SPL	I/O	Sampling start signal	
46	LP	I	Data latch signal of source driver	
47	CLS	I	Clock signal of gate driver	
48	SPS	I	Start signal of gate driver	
49	PS	I	Power save signal	
50	NC			
51	MOD	I	Control signal of gate driver	Note5-2
52	MOD	I	Control signal of gate driver	Note5-2
53	U/L	I	Selection for vertical scanning direction	Note5-3
54	LBR	I	Selection for horizontal scanning direction	Note5-4
55	DGND		Ground(digital)	
56	SPR	I/O	Sampling start signal	
57	LED+		Power supply for LED (High voltage)	
58	LED+		Power supply for LED (High voltage)	
59	LED		Power supply for LED (Low voltage)	
60	LED		Power supply for LED (Low voltage)	
61	AGND		Ground(Analog)	

Note5-1   See section(7-1)-(A) and   Note 7-8

Note5-2   See section(7-1)-(A) " Cautions when you turn on or off the power supply".

Note5-3   Selection for vertical scanning direction

U/L	Scanning direction (Pixel configuration)
High	Normal scanning (X , 1) (X , 320)
Low	Inverted scanning (X , 1) (X , 320)

Note5-4   Selection for horizontal scanning direction

LBR	SPL	SPR	Scanning direction (Pixel configuration)
High	Input	Output	Normal scanning (1,Y) (240,Y)
Low	Output	Input	Inverted scanning (1,Y) (240,Y)

(6)Absolute Maximum Ratings

Table 4

Parameter	Symbol	Condition	Ratings		Unit	Remark
Power supply(source/Analog)	VSHA	Ta=25	0.3	+7.0	V	
Power supply(source/Digital)	VSHD	Ta=25	0.3	+7.0	V	
Power supply (gate)	VDD	Ta=25	0.3	+35.0	V	
Power supply (gate)	VEE VSS	Ta=25	0.3	+35.0	V	
Power supply (gate)	VCC VSS	Ta=25	0.3	+7.0	V	
Power supply (gate)	VDD VEE (VSS)	Ta=25	0.3	+35.0	V	
Input voltage (Analog)	VIA	Ta=25	0.3	VSHA+0.3	V	[Terminal]
Input voltage (Digital)	VID	Ta=25	0.3	VSHD+0.3	V	[Terminal]
Operating temperature (panel surface	opp		0	50		Note6-1
Storage temperature	stg		25	70		Note6-1

[Terminal] V0,V1,V2,V3,V4

[Terminal] MOD,U/L,SPS,CLS,SPL,R0 R5,G0 G5,B0 B5,LP,DCLK,LBR,SPR,PS

  Note6-1 Humidity: 95%RH Max.(at Ta   40). Maximum wet-bulb temperature is less than 39 (at Ta > 40). Condensation of dew must be avoided.

(7)Electrical characteristics

  7-1)Recommended operating conditions

   A) TFT-LCD panel driving section

Table 6   GND=0V

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remarks
Supply voltage for source driver (Analog)		VSHA	+4.5	+5.0	+5.5	V	
Supply voltage for source driver (Digital)		VSHD	+3.0	+3.3	+3.6	V	
Standard input voltage		V0 V4	0		VSHA	V	Note 7-1
Supply voltage for gate driver	High voltage	VDD	+14.5	+15.0	+15.5	V	
	Logic high voltage	VCC	VSS+VSHD 0.1	VSS+VSHD	VSS+VSHD 0.1	V	Note 7-2
	Logic low voltage	VSS	14.3	15.0	15.7	V	
	Low voltage (AC)	VEEAC		VCOMAC		Vp-p	Note 7-3
	Low voltage (DC)	VEEDC	9.5	9.0	8.5	V	Note 7-3
Input voltage for Source driver (Low)		VILS	GND		0.2VSHD	V	Note 7-4
Input voltage for Source driver (High)		VIHS	0.8VSHD		VSHD	V	Note 7-4
Input current for Source driver (Low)		IILS			30	μA	Note 7-4
Input current for Source driver (High)		IIHS1			30	μA	Note 7-5
		IIHS2			1200	μA	Note 7-6
Input voltage for Gate driver (Low)		VILG	GND		0.2VSHD	V	Note 7-7
Input voltage for Gate driver (High)		VIHG	0.8VSHD		VSHD	V	Note 7-7
Input current for Gate driver (Low)		IILG			4	μA	Note 7-7
Input current for Gate driver (High)		IIHG			4	μA	Note 7-7
Common electrode driving signal	AC component	VCOMAC		± 2.5	± 2.6	Vp-p	Note 7-8
	DC component	VCOMDC	+0.1	+1.1	+2.1	V	Note 7-8

Cautions when you turn on or off the power supply

Turn on or off the power supply with simultaneously or the following sequence.

Turn on … VSHD VSHA   VSS   VCC   VEE   VDD

Turn off … VDD   VEE   VCC   VSS   VSHA   VSHD

The input signal of "MOD" Terminals(Pin No.51 and No.52) must be low voltage when turning on the power supply, and it is held until more than double vertical periods after VCC is turned on completely. After then, it must be held high voltage until turning off the power supply.(Connect Pin No.51 and No.52 terminals to the same signal.)

Note 7-1   These are standard input voltages for gray scale. When VCOM is alternated polarity, these voltage should be alternated polarity. V0(black) is different polarity alternating signal of VCOM. V4(white) is the same polarity alternating signal of VCOM. Center voltage of each standard input voltage shift positive way for LCD characteristics (V0 V1 V2 V3 V4). This sift amount is adjusted so as to no flicker of each standard

input voltage after

DC bias voltage of VCOM and V0 is adjusted.

Note 7-2   It must be kept that 3.0V (VCC-VSS) 3.6V.

Note 7-3   The same phase and amplitude with VCOM. VEEDC is center of VEE.

Note 7-4   DCLK,SPL,SPR,LBR,LP,PS,R0 R5,G0 G5 and B0 B5 terminals are applied.

Note 7-5   DCLK,SPL,SPR,LBR,LP,R0 R5,G0 G5 and B0 B5 terminals are applied.

Note 7-6   PS terminal is applied.

Note 7-7   MOD,CLS,SPS and U/L terminals are applied.

Note 7-8   VCOMAC should be alternated on VCOMDC every 1 horizontal period and 1 vertical period. VCOMDC bias is adjusted so as to minimize flicker or maximum contrast every each module .

B)   Back light driving section

Table 7   Ta=25

Parameter	Symbol	MIN	TYP	MAX	Units	Remarks terminal
LED voltage	VL		32.4	36.0	V	
LED current	IL		15	20	A	
Power consumption	WL		486	720	mW	Note 7-9

Note 7-9   Calculated reference value(IL× VL)

7-2) Timing Characteristics of input signals

Table 8   AC Characteristics (1)   (VSHA=+5V, VSHD=+3.3V, Ta=25)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Clock frequency of source driver		fCK	4.5		6.8	MHz	
Source driver	Rising time of clock	Tcr			20	ns	DCLK
	Falling time of clock	Tcf			20	ns	
	Pulse width (High level)	Tcwh	40			ns	
	Pulse width (Low level)	Tcwl	40			ns	
	Frequency of start pulse	fsp	16.5		28	kHz	SPL,SPR
	Setup time of start pulse	Tsusp	15			ns	
	Hold time of start pulse	Thsp	10			ns	
	Pulse width of start pulse	Twsp			1.5/fCK	ns	Note 7-10
	Setup time of latch pulse	Tsulp	20			ns	LP
	Hold time of latch pulse	Thlp	20			ns	
	Pulse width of latch pulse	Twlp	60			ns	
	Setup time of PS	Tsups	0			μs	PS
	Hold time of PS	Thps	0			μs	
Set up time of data		Tsud	15			ns	R0 R5,G0 G5 ,B0 B5
Hold time of data		Thd	10			ns	
Gate driver	Clock frequency	fcls	16.5		28	kHz	CLS
	Pulse width of clock(Low)	Twlcls	5		(1/fclk)-30	μs	
	Pulse width of clock(High)	Twhcls	30			μs	
	Rising time of clock	Trcls			100	ns	
	Falling time of clock	Tfcls			100	ns	
	Setup time of clock	Tsucls	3			μs	
	Hold time of clock	Thcls	0			μs	
	Frequency of start pulse	fsps	50		86	Hz	SPS
	Setup time of start pulse	Tsu	100			ns	
	Hold time of start pulse	Th	300			ns	
	Rising time of start pulse	Trsp			100	ns	
	Falling time of start pulse	Tfsp			100	ns	
Vcom	Setup time of Vcom	Tsuvcom	3			μs	Vcom
	Hold time of Vcom	Thvcom	1			μs	

Note 7-10   There must be only one up-edge of DCLK (includes Tsusp and Thsp time) in the period of
SPL="Hi".

CLK

LP

SPL

R5
G5
B5

CLS

PS

Vcom

T_{cr}
T_{ch}
80%
20%
T_{cwl}
T_{cwh}
80%
20%
1
2
240
T_{hlp}
T_{wp}

T_{wp}
T_{hsp}
T_{susp}
T_{sulp}
T_{wsp}
T_{sud}
T_{hd}

(1, n)
(2, n)
(240, n)
(1, n+1)

T_{wh}
T_{sucls}
T_{hcls}
T_{w}

T_{sups}
T_{hps}
T_{hvcom}
T_{suvcom}

Fig.(a) Horizontal timing chart

CLS

SPS

R5

G5

B5

T_{wcls} $\frac{1}{T_{fcls}}$ T_{whcls} 80% 20%

T_{rcls} T_{fcls} 80% 20% 20%

T_{wp}

1 2 8 9 327 1 2

T_{hlpck}

T_{fsps} 80% 20% T_{hsps} T_{rsps}

T_{susps} 80% 20%

$\frac{1}{T_{fsps}}$

Non-display period

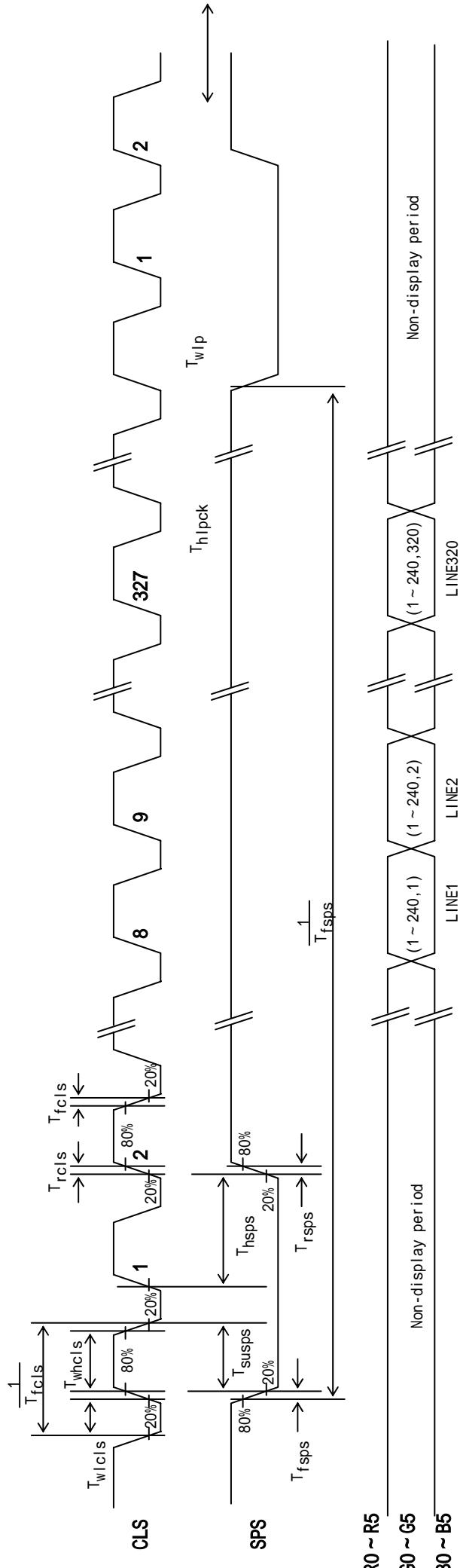LINE1 (1 240,1) LINE2 (1 240,2) LINE320 (1 240,320)

Non-display period

Fig.(b) Vertical timing chart

7-3)Power consumption

Measurement condition : SPS=60Hz,CLS=15.73kHz,SPL=15.73kHz,DCLK=6.3MHz

The term of PS="Lo" in one horizontal period … 37μ sec(234DCLK)

Ta=25

Table 9   when normal scan mode

Parameter		Sym	Conditions	MIN	TYP	MAX	Unit	Remarks
Source current	Analog	I_{SHA}	V_{SHA}=+5.0V		5.0	10	mA	Note 7-11
	Digital	I_{SHD}	V_{SHD}=+3.3V		1.8	3.6	mA	Note 7-11
Gate current	High	I_{DD}	V_{DD}=+15.0V		0.05	0.10	mA	Note 7-12
	Low	I_{EE}	V_{EE}= 9.0± 2.5V		0.03	0.06	mA	Note 7-12
	logic High	I_{CC}	V_{CC}= 11.7V		0.08	0.16	mA	Note 7-12
	logic Low	I_{SS}	V_{SS}= 15.0V		0.18	0.36	mA	Note 7-12
Power consumption		Pd1	Note 7-14		33	66	mW	Note 7-11
		Pd2			25	50	mW	Note 7-13

Note 7-11   Vertical stripe pattern alternating 21 gray scale (GS21) with 42 gray scale (GS42) every 1 dot.

Note 7-12   64-Gray-bar vertical pattern (GS0   GS63 for horizontal way)

Note 7-13   all black pattern (GS0)

Note 7-14   Voltage conditions

      V_{SHA}=+5.0V , V_{SHD}=+3.3V , V_{DD}=+15.0V

      V_{EE}= 9.0± 2.5V , V_{CC}= 11.7V , V_{SS}= 15.0V

.Input Signals, Basic Display Color and Gray Scale of Each Colornn

Table 10

Colors & Gray scale	Gray Scale	Data signal																	
		R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
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 bleu 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
Bleu	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 bit data signals. According to the combination of total 18 bit data signals, the 262,144-color display can be achieved on the screen.

(9)Optical characteristics

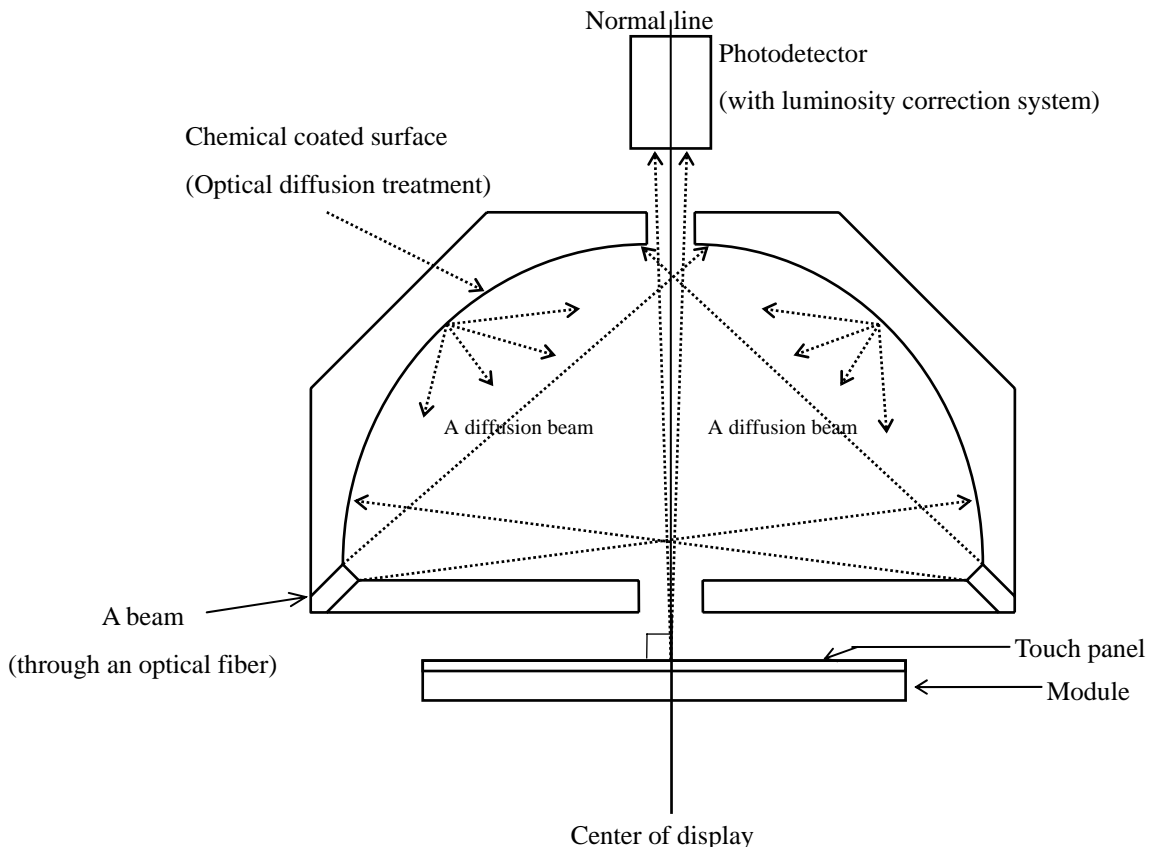9-1)Not driving the Back light condition

Table 12   Ta=25°C

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remarks
Viewing angle		θ21,22		40	50		degree	[Note 9-1,2]
Range		θ11	CR≥2	40	50		degree	
		θ12		40	50		degree	
Contrast ratio		CRmax	θ =0°	4	8			[Note 9-2,5]
Response	Rise	τ r	θ =0°		30	60	ms	[Note 9-4]
Time	Fall	τ d			50	100	ms	
Color chromaticity		White - x	θ =0°	0.25	0.30	0.35		[Note 9-5]
		White - y		0.28	0.33	0.38		
		Red - x		0.34	0.39	0.44		
		Red - y		0.25	0.31	0.35		
		Green - x		0.25	0.30	0.35		
		Green - y		0.34	0.39	0.44		
		Blue - x		0.15	0.20	0.25		
		Blue - y		0.21	0.26	0.31		
Reflection ratio		R	θ =0°	7	11		%	[Note 9-5,6]

* The measuring method of the optical characteristics is shown by the following figure.

* A measurement device is Otsuka luminance meter LCD5200.(With the diffusion reflection unit.)

Measuring method (a) for optical characteristics

Photodetector

(with luminosity correction system)

light source

30°

Module
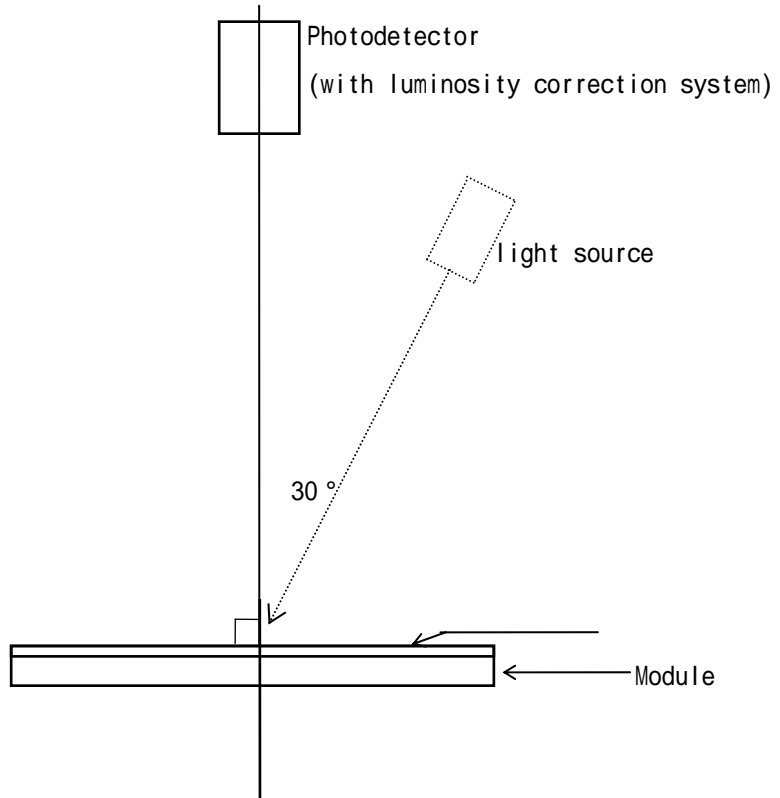
Measuring method (b) for optical characteristics

9-2)Driving the Back light condition

Table 13   Ta=25°C

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remarks
Viewing angle range		θ21,22		30	40		degree	[Note 9-1,2]
		θ11	CR≥2	30	40		degree	
		θ12		30	40		degree	
Contrast ratio		Crmax	θ = 0°	40	75			[Note 9-2]
Response time	Rise	τ r			30	60	ms	[Note 9-4]
	Fall	τ d			50	100	ms	
Color chromaticity		White - x		0.25	0.30	0.35		
		White - y		0.27	0.32	0.37		
		Red - x		0.43	0.48	0.53		
		Red - y	θ = 0°	0.27	0.32	0.37		
		Green - x		0.26	0.31	0.36		
		Green - y		0.38	0.43	0.48		
		Blue - x		0.11	0.16	0.21		
		Blue - y		0.15	0.20	0.25		
Brightness		Y	θ = 0°	75	90		cd/m²	IL=20mA
Lamp life time		LL	IL=20mA		10000		hour	[Note 9-7]
Uniformity				75	85		%	[Note 9-8]

* The measuring method of the optical characteristics is shown by the following figure.

* A measurement device is TOPCON luminance meter BM-5(A).(Viewing cone 1)

Photodetector(including luminosity facter)

Touch panel

LCD module

Center
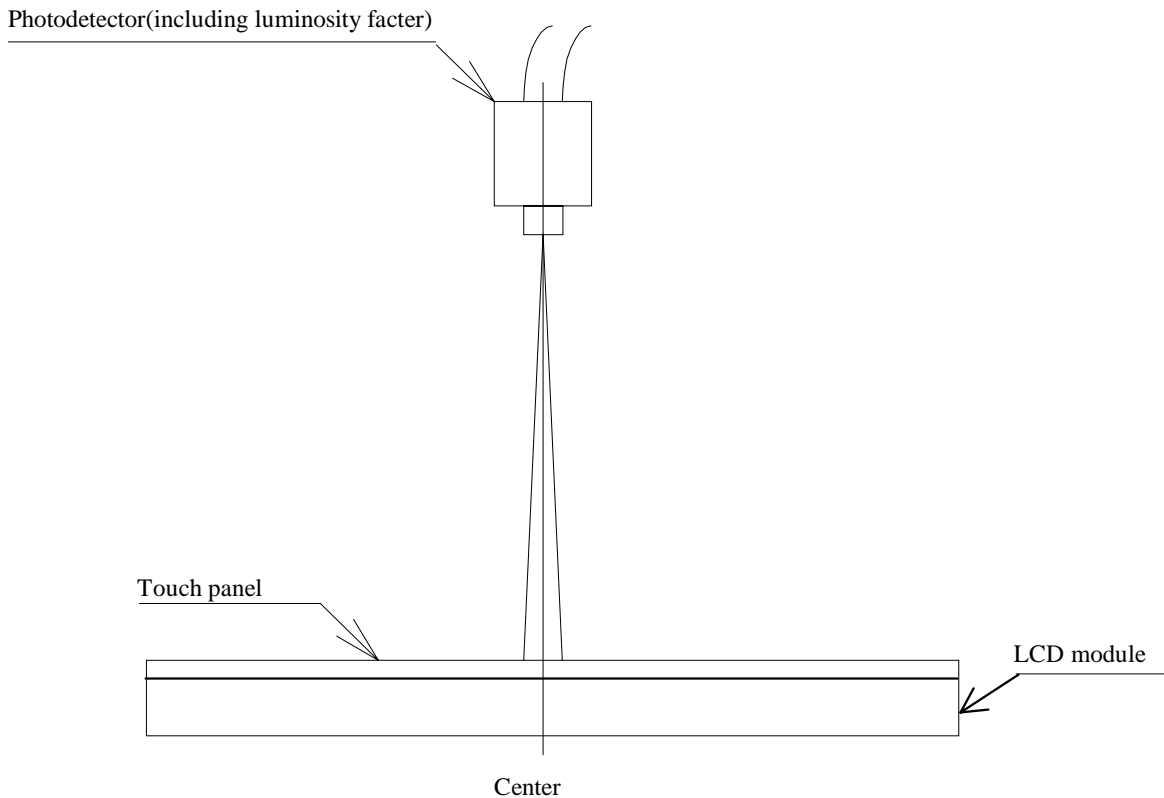
Measuring method (c) for optical characteristics

[Note 9-1] Viewing angle range is defined as follows.

Normal line

o'clock direction
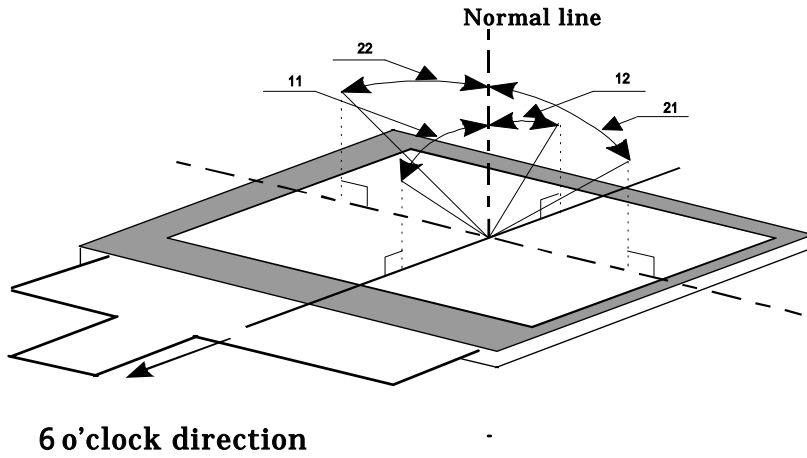
Definition for viewing angle

[Note 9-2]   Definition of contrast ratio:

The contrast ratio is defined as follows:

$$\text{Contrast ratio(CR)} = \frac{\text{Photodetecter output with all pixels white(GS63)}}{\text{Photodetecter output with all pixels black(GS0)}}$$

$V_{COMAC}=5.0Vp\text{-}p, V0=4.0Vp\text{-}p, V4=-4.0Vp\text{-}p$

[Note 9-3]   These values are under the condition of measuring method(b) with a point light source

(lighting angle = 30°).

[Note 9-4]   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".
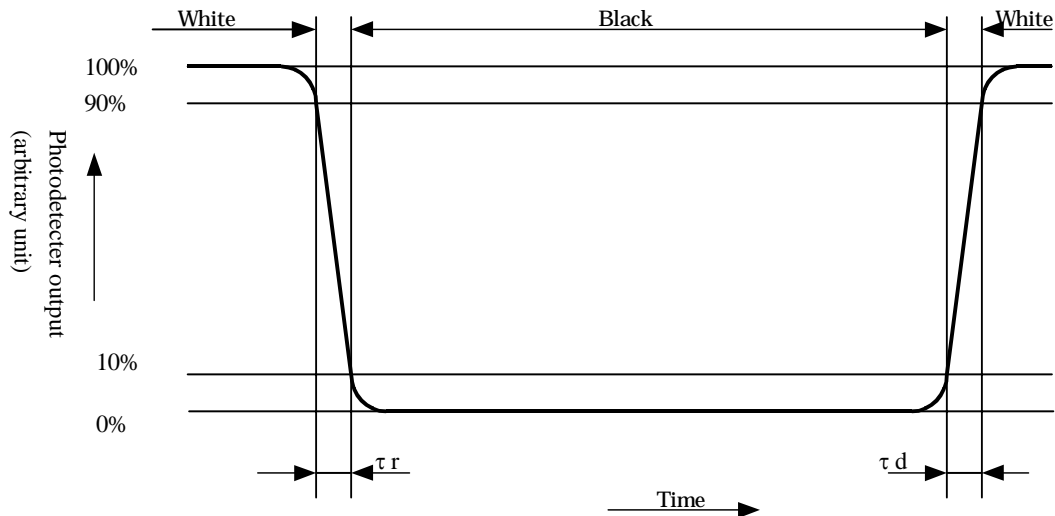
[Note 9-5] A measurement device is Minolta CM-2002.

[Note 9-6] Definition of reflection ratio

$$\text{Reflection ratio} = \frac{\text{Light detected level of the reflection by the LCD module}}{\text{Light detected level of the reflection by the standard white board}}$$

[Note 9-7] The White-LED life time is defined as a time when brightness not to become under 50% of the original value.(at Ta=25   )

[Note 9-8] Definition of Uniformity

$$\text{Uniformity}\quad=\quad\frac{\text{Minimum brightness}}{\text{Maximum brightness}}\quad\times\qquad(\quad)$$

The brightness should be measured on 9spots of the display as follows.

H

L

L 6

H 6
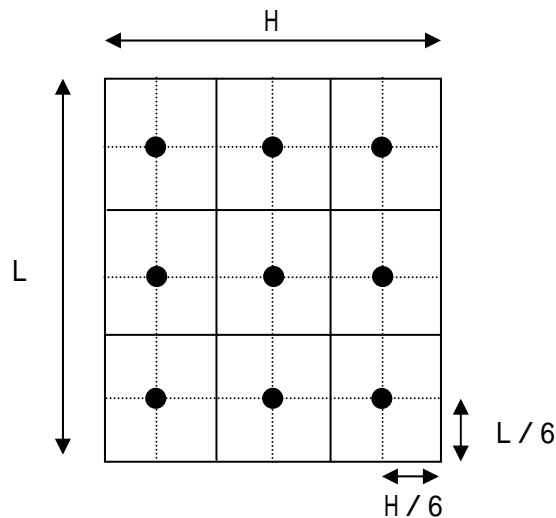
(10) Display quality

The display quality of the color TFT-LCD module shall be in compliance with the Incoming Inspection Standards for TFT-LCD..

(11) Mechanical characteristics

11-1) External appearance

See Fig. 1

11-2) FPC (for LCD panel) characteristics

(1) Specific connector

Hirose FH23-61S-0.3SHAW(05)

(2) Bending endurance of the bending slits portion

No line of the FPC is broken for the bending test (Bending radius=0.6mm and angle=90°) in 30 cycles.

(12)Handling Precautions

12-1) Insertion and taking out of FPCs

   Be sure insert and take out of the FPC into the connector of the set after turning off the power supply on the set side.

12-2) Handling of FPCs

   The FPC for LCD panel shall be bent only slit portion. The bending slit shall be bent uniformly on the whole slit portion with bending radius larger than 0.6mm ,and only inner side (back side of the module). Don't bend it outer side (display surface side).

   Don't give the FPCs too large force, for example, hanging the module with holding FPC.

12-3) Installation of the module

   On mounting the module, be sure to fix the module on the same plane. Taking care not to warp or twist the module.

12-4)Precaution when mounting

   (1) If water droplets and oil attaches to it for a long time, discoloration and staining occurs. Wipe them off immediately.

   (2) Glass is used for the TFT-LCD panel and touch panel. If it is dropped or bumped against a hard object, it may be broken. Handle it with sufficient care.

   (3)As the CMOS IC is used in this module, pay attention to static electricity when handling it. Take a measure for grounding on the human body.

12-5)Others

   (1) The liquid-crystal is deteriorated by ultraviolet rays. Do not leave it in direct sunlight and strong ultraviolet rays for many hours.

   (2) If it is kept at a temperature below the rated storage temperature, it becomes coagulated and the panel may be broken. Also, if it is kept at a temperature above the rated storage temperature, it becomes isotropic liquid and does not return to its original state. Therefore, it is desirable to keep it at room temperature as much as possible.

   (3) If the LCD breaks, don't put internal liquid crystal into the mouth. When the liquid crystal sticks to the hands, feet and clothes, wash it out immediately.

   (4) Wipe off water drop or finger grease immediately. Long contact with water may cause discoloration or spots.

   (5) Observe general precautions for all electronic components.

   (6) VCOM must be adjusted on condition of your final product. No adjustment causes the deterioration for display quality.

(13)Reliability Test Conditions for TFT-LCD Module

<div align="center">Table 14</div>

No.	Test items	Test conditions
1	High temperature storage test	Ta=+60 240h
2	Low temperature storage test	Ta= 20 240h
3	High temperature and high humidity operating test	Tp=+40 , 95%RH 240h (But no condensation of dew)
4	High temperature operating test	Tp=+50 240h
5	Low temperature operating test	Tp=0 240h
6	Electro static discharge test	$\pm$ 200V 200pF(0) 1 time for each terminals
7	Shock tset	980 m/s^2, 6 ms $\pm$ X,$\pm$ Y,$\pm$ Z 3 times for each direction (JIS C0041, A-7 Condition C)
8	Vibration test	Frequency range: 10Hz 55Hz Stroke: 1.5 mm Sweep: 10Hz 55Hz X,Y,Z 2 hours for each direction (total 6 hours) (JIS C0040,A-10 Condition A)
9	Heat shock test	Ta=-25 +70 / 5 cycles (1h) (1h)

Note   Ta = Ambient temperature, Tp = Panel temperature

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

(14) Others

14-1)Indication of lot number

 The lot number is shown on a label. Attached location is shown in Fig.1 (Outline Dimensions).
      Indicated contents of the label

LQ038Q7DB03R

      model No.   lot No.

14-2) Used Regulation of Chemical Substances Breaking Ozone Stratum

     Substances with the object of regulating : CFCS, Carbon tetrachloride, Halon
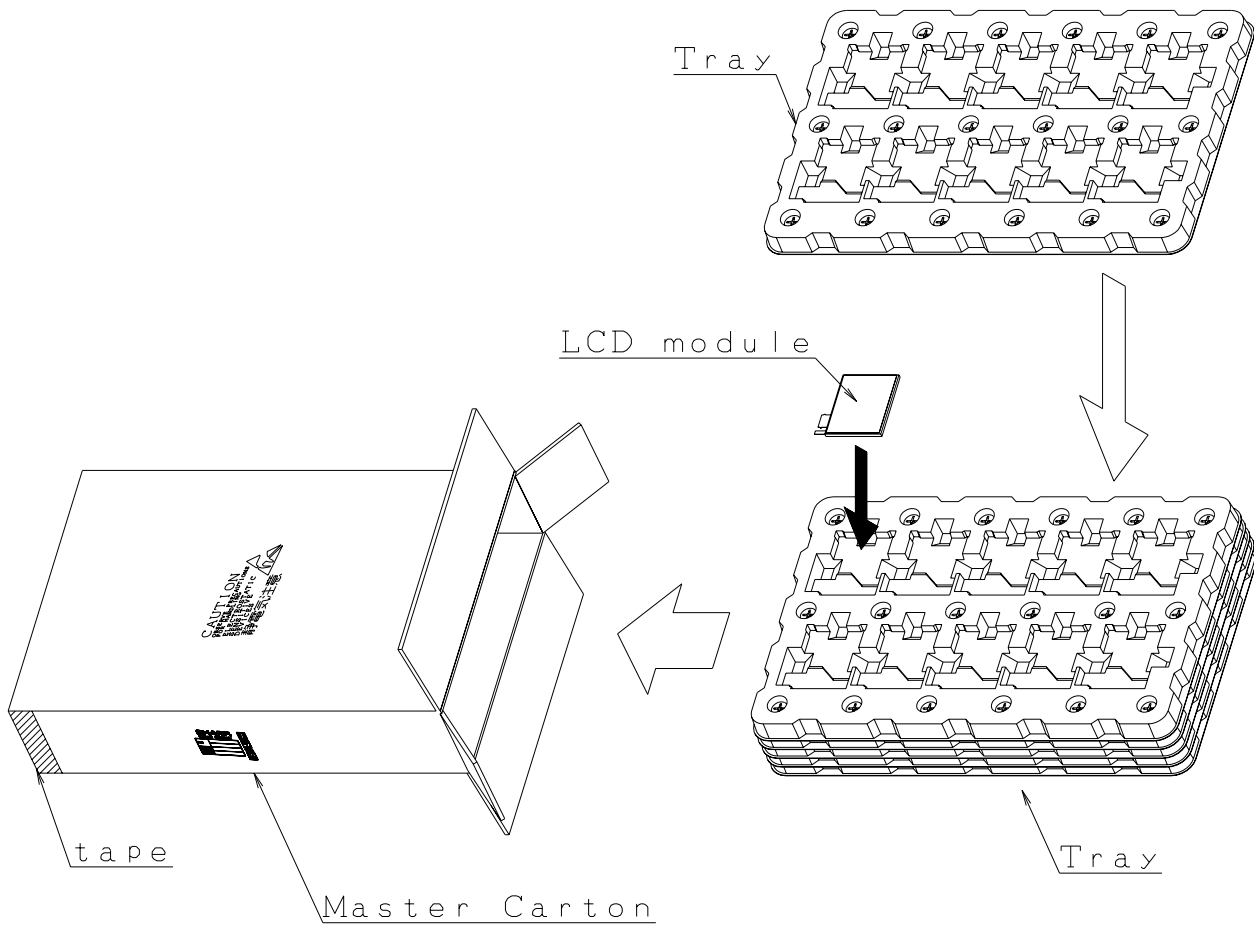
                    1,1,1-Trichloro ethane (Methyl chloroform)

   (a)   This LCD module, Constructed part and Parts don't contain the above substances.
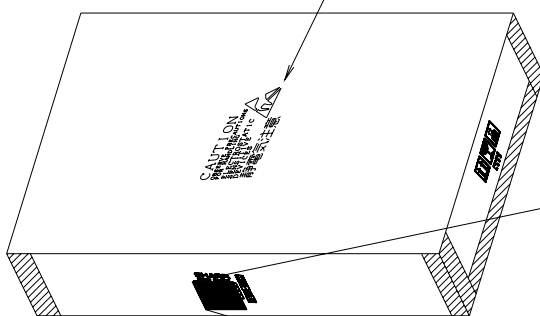
   (b)   This LCD module, Constructed part and Parts don't contain the above substances in processes
      of manufacture.

14-3) If some problems arise about mentioned items in this document and other items, the user of
    the TFT-LCD module and Sharp will cooperate and make efforts to solve the problems with mutual
    respect and good will.

SHARP

P2282

LED-FPC
LCD-FPC

cover film

Guarantee of appearance
=LCD Active Area

61.2(Bezel opening)
35.4 ±0.4
69 ±0.3
57.6(Active area)
76.8(Active area)
80.4(Bezel opening)
88.6 ±0.3
46.2 ±0.4
55.72
66.72
69.72
116.05

720H×320V dots
R G B R G
R G B R G

3.4 ±0.25

2-1.35
4-5
2-1.05

2-1.75
2-0.55

LED-FPC
(back soldering)
FPC bending area
LCD-FPC
FPC bending area

(9.52)
(23.52)
(40.83)
(69.85)

5.5 ±0.5 (stiffener)

0.2
30-0.3 +0.03
31-0.4 +0.04
P0.6 ±0.05
(P0.3×60)
18 ±0.07
0.3 +0.15
1.1 ±0.15
0.3 ±0.02

terminal side

LCD-FPC

Tray

LCD module

tape

Master Carton

Tray

Caution mark is upside.

社内品番　　LQ038Q7DB03R　　Model No.

LotNo. :2002.03.28　　date

Quantity :50　pcs　　Quantitiy

ユーザー品番 :*********************　User Model Name

シャープ物流用ラベルです。（*********）

Maximum 50 units
per 1 carton.