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 Office automation
 Telecommunication equipment
- Test and measurement equipment
 Industrial control
 Personal Digital Assistant

· Audio visual and multimedia equipment · Consumer electronics

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- Traffic signals
 Gas leakage sensor breakers
 Alarm equipment
 Various safety devices etc.

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1. APPLICABLE SCOPE

This specification is applicable to TFT-LCD Module "LQ050Y3DC01" only.

2. General Description

This module is a color active matrix LCD module incorporating amorphous silicon TFT (<u>Thin Film</u> <u>T</u>ransistor). It is composed of a color TFT-LCD panel, driver ICs, Input FPC, a back light unit. Graphics and texts can be displayed on a 800×RGB×480 dots panel, four timing signals, serial interface, (typ. +3.3V) supply voltages for TFT-LCD panel driving and supply voltage for back light.

3. Mechanical (Physical) Specifications

Item	Specifications	Unit
Screen size	5.0	inch
Active area	108 (H)×64.8(V)	mm
Divertification	800×480	Pixel
Pixel format	1Pixel =R+G+B dots	
Pixel pitch	0.135(H)×0.135(V)	mm
Pixel configuration	R,G,B vertical stripes	
Display mode	Normally white	
Unit outline dimensions	118.50(W)×77.55(H)×2.90(D)	mm
Mass	55.8	g

*The above-mentioned table indicates module sizes without some projections and FPC.

For detailed measurements and tolerances, please refer to 16. Outline Dimensions.

4. Input Terminal Names and Functions

Recommendation CN : FH19SC-40S-0.5SH(55) (HRS)(40pin/0.5mm pitch/Up contact)

Pin No.	Symbol	I/O	Description	Remarks
1	VLED-	Р	Power supply for LED (Low voltage)	
2	VLED+	P	Power supply for LED (High voltage)	
3	DGND	Р	Digital Ground	
4	VDD	Р	Power supply	
5	R0		RED data signal	
6	R1		RED data signal	
7	R2	1	RED data signal	
8	R3	I	RED data signal	
9	R4		RED data signal	
10	R5	1	RED data signal	
11	R6		RED data signal	
12	R7	1	RED data signal	
13	G0	l	GREEN data signal	
14	G1	I	GREEN data signal	
15	G2	I	GREEN data signal	
16	G3	I	GREEN data signal	
17	G4		GREEN data signal	
18	G5		GREEN data signal	
19	G6	l	GREEN data signal	
20	G7	1	GREEN data signal	
21	B0	-	BLUE data signal	
22	B1		BLUE data signal	
23	B2		BLUE data signal	
24	B3		BLUE data signal	
25	B4		BLUE data signal	
26	B5		BLUE data signal	
27	B6		BLUE data signal	
28	B7	I	BLUE data signal	
29	DGND	P	Digital Ground	
30	DCLK		Clock input pin in serial mode	
31	DISP	I	Display On/Off	High(VDD) normally operation
32	Hsync	I	Line synchronization signal	
33	Vsync		Frame synchronization signal	
34	DEN	1	Data input enable	High(VDD) enable
35	NC	I	No connection	
36	DGND	Р	Digital Ground	
37	XR	-	No connection	
38	YD	-	No connection	
39	XL	-	No connection	
40	YU	-	No connection	

Note1: I/O definition: I---Input

O---Output

P---Power/Ground

5. Absolute Maximum Ratings

Item	Symbol	Conditions	Rated value	Unit	Remarks
Digital power supply voltage	VDD	Та = 25 °С	-0.5~ +5.0	V	Note 1
Temperature for storage	Tstg	-	-30 ~ +80	പ	Note 2
Temperature for operation	Topr	-	-20 ~ +70	പ	Note 3
BL input electric current	I _{BL}	Ta = 25 °C	60	mA	Note 4
LED electricity consumption	PLED	Ta = 25 °C	105	mW	Note 4

Note 1) B7~B0, G7~G0, R7~R0, DISP, VSYNC, HSYNC, DEN, DCLK

Note 2) Ta > 60°C Absolute humidity shall be less than Ta=60°C /90 % RH.

- Note 3) Panel surface temperature prescribes. (Reliability is examined at ambient temperature of 50°C.)
- Note 4) Power consumption of one LED (Ta = 25°C). (use 14 pieces LED)
- 6. Electrical Characteristics
- 6-1. Electrical characteristics

Ta = 25**℃**

Parameter	Symbol	Conditions	Min.	Тур.	Max.	Unit	Applicable Pin
Supply voltage	VDD- GND	Operating voltage	2.7	3.3	3.6	V	(note 1)
"H" level input voltage	VIH		0.7xVDD	-	VDD	V	For digital
"L" level input voltage	VIL	-	0	-	0.3xVDD	V	circuit
Input leakage current	l _{LI}	VIN=VDD or VSS	-	-	±0.1	μA	(note 1,2)
"H" level output voltage	V _{OH}	IOL=-1.0mA	VDD-0.4	-	-	V	(noto 1.2)
"L" level output voltage	V _{OL}	IOL=1.0mA	-	-	VSS+0.4	V	(note 1,2)
Current consumption 1 (normal display)	I _{cc}	Ta=25 ℃	-	135	190	mA	(note 3)

(note 1) VDD=2.7 to 3.6V, GND=0V,Ta=-40 to 85°C

(note 2) B7~B0, G7~G0, R7~R0, DISP, VSYNC, HSYNC, DEN, DCLK.

(note 3) Following Conditions

Display Pattern: All OFF (black) Pattern.



*All OFF (black) Pattern

6-2. Back light driving 1

The back light system has fourteen LEDs.

The back light system has fourteen LEDs							
Parameter	Symbol	Min.	Тур.	Max.	Unit	Remark	
Rated Voltage	VBL	21.0	22.4	23.8	V		
Rated Current	I _{BL}	-	40	-	mA		
Power consumption	WL	-	896	-	mW		

*1 per one piece of Backlight

*Please consider Allowable Forward Current on used temperature

Ambient temperature and the maximum input of 1 per LED are fulfilling the following operating conditions.



Ambient temperature and the maximum input of 1 per LED

- 7. Timing characteristics of input signals
 - 7-1. Power on/off control



Figure 7. 1 Power on/off Timing Sequence

7-2. AC electrical characteristics

	Dumbal		linit		
Farameter	Symbol	Min.	Тур.	Max.	UIIIL
HS setup time	T _{hst}	8	-	-	ns
HS hold time	Thind	8			ns
VS setup time	T _{vst}	8	~		ns
VS hold time	T _{vind}	8	*		ns
Data setup time	T _{dsu}	8		·••	ns
Data hold time	T _{dhd}	8	-	**	ns
DE setup time	T _{esu}	8	*		ns
DE hold time	T _{ehć}	8	*	***	ns
VDD Power On Slew rate	T _{POR}	-		20	ms
RSTB putse width	T _{Rst}	10	*	-444	us
CLKIN cycle time	T _{coh}	20	-	~	ns
CLKIN pulse duty	Town	40	50	60	%
Output stable time	T _{sst}	~		6	us

7-3. Horizontal timing



Figure 7.3 Horizontal Input Timing Diagram

	Quantaral		[]6		
raiailietei	oyinooi	Min.	Тур.	Max.	UIIIC
Horizontal Display Area	thd		800		DCLK
DCLK frequency	fclk	*	30	50	MHz
One Horizontal Line	th	889	928	1143	DCLK
HS pulse width	thpw	1	48	255	DCLK
HS Back Porch (Blanking)	thb		88		DCLK
HS Front Porch	thfp	1	40	255	DCLK
DE mode Blanking	th-thd	85	128	512	DCLK

7-4. Vertical timing



Figure 7.4 Vertical Input Timing Diagram

Doromotor	Sumbol		llnit		
Faialletei	Symbol	Min.	Typ.	Max.	UIII
Vertical Display Area	tvd		480		Τ _Η
VS period time	tv	513	525	767	Т _н
VS pulse width	tvpw	3	3	255	T _H
VS Back Porch (Blanking)	tvb		32		Τ _Η
VS Front Porch	tvfp	1	13	255	Tμ
DE mode Blanking	tv-tvd	4	45	255	T _H

8. Optical Characteristics of Module

							Ta = 2	5 °C , VDD = +3.3V
Paran	neter	Symbol	Condition	Min.	Тур.	Max.	Unit	Remark
Viewing	Horizontal	θ21		60	70	-	deg.	
angle	nonzontar	θ22	CR>10	60	70	-	deg.	.
(Without	Vertical	θ11		60	70	-	deg.	[Note1,4]
Wide View)	ventical	θ12		40	50	-	deg.	
Contras	st ratio	CR	Optimum viewing angle	500	600	-	-	[Note2,4]
Response	Rise	Tr	0.00	-	12	-	ms	
Time	Decay	Td	θ=0°	ſ	4	-	ms	[Note3,4]
Chroma	ticity of	x		0.26	0.31	0.36	-	
Wh	ite	У		0.28	0.33	0.38	-	[Note4]
Luminance of white		X		240	200			ILED=20mA
		XL1		240	300	-	ca/m²	[Note6]
Unifo	rmity	U		70	80	-	%	[Note5

* The optical characteristics measurements are operated under a stable luminescence

(IBL = 40mA) and a dark condition. (Refer to Fig.1)



Fig.1 Optical characteristics measurement method

SHARP (Note 1) Definitions of viewing angle range



[Note 2] Definition of contrast ratio

The contrast ratio is defined as the following Contrast ratio (CR) = $\frac{\text{Luminance (brightness) with all pixels white}}{\text{Luminance (brightness) with all pixels black}}$

[Note 3] Definition of response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



[Note 4] This shall be measured at center of the screen.

[Note 5] Definition of Uniformity

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

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



[Note 6] This shall be measured on the 9-point as shown in the right figure.

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

9. Reliability test items

No.	Test	Condition	Judgment criteria
1	Temperature Cycling	-30deg.C(0.5h) ←→ 80 deg.C(0.5h) *1cycle	Per table in below
	Storage	200cycle	
2	High Temp. Storage	Ta=80 °C 240h	Per table in below
3	Low Temp. Storage	Ta=-30 °C 240h	Per table in below
4	High Temperature	Ta=60 °C 90%RH 240h	Per table in below
	& High Humidity		(polarizer discoloration is
	Storage		excluded)
5	High Temp. Operation	Ta=70 °C 240h	Per table in below
6	Low Temp. Operation	Ta=-20 °C 240h	Per table in below
7	ESD	Discharge resistance: 0 Ω	Per table in below
		Discharge capacitor: 200 pF	
		Discharge voltage: ±200 V Max	
		Discharge 1 time to each input line	
		※ "GND" of display module is connected	
		GND of test system ground.	

[Note] Ta = Ambient temperature

INSPECTION	CRITERION(after test)
Appearance	No Crack on the FPC, on the LCD Panel
Alignment of LCD Panel	No Bubbles in the LCD Panel
	No other Defects of Alignment in Active area
Electrical current	Within device specifications
Function / Display	No Broken Circuit, No Short Circuit or No Black line
	No Other Defects of Display

10. Packaging specifications

• (10-1) Details of packaging

1) Packaging materials:

	Parts name	Materials
1	Master carton	Corrugate card board
2	Storage case	Corrugate card board
3	Protective bag	Polyethylene with anti-static treatment
4	OPP tape	Polypropylene
5	Bar code label	Anti-static polyethylene

2) Packaging style:



- (10-2) Reliability
 - 1) Vibration test

Item	Test
Frequency range	10 Hz to 55 Hz
Stroke	1.5mm
Sweep	10 Hz \sim 55Hz \sim 10Hz (2 hours)
Direction	For each direction of X,Y,Z (6 hours for total)(Package condition)

2) Drop test

Drop height:800mmNumber of drop:10 times (Drop sequence: 1 corner, 3 edges, 6 faces)

- (10-3) Packaging quantities 76 modules per master carton
- (10-4) Packaging weight
 6.3kg
- (10-5) Packaging outline dimensions
 605mm×320mm×254mm

LQ050Y3DC01

12. Serial Number Label Identification

<u>1 4 11 00001 A Q</u>

123 4 56

Production Year (0~)
 Production Month (1~9,X,Y,Z)
 Production Day
 Serial No (00001~)
 Revision Code (A,B,C~)
 Production Plant Code

[Note] Production Year : 0(2010)、1(2011)、2(2012)、... Production Month : 1(Jan)、2(Feb)、...、9(Sep)、X(Oct)、Y(Nov)、Z(Dec)

13. Outline Dimensions



ouiside of active area, please pay attentions to such leakage when designing the set. •The tolerances of the module width do not include werp of the case. •FPC 1/F Connector:FH19SC-40S-0.5SH (55) (HRS)



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