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DLC Display Co., Limited

德爾西顯示器有限公司



MODEL No: DLC0400JZG-4

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Record of Revision

Date	Revision No.	Summary
2015-10-08	1.0	Rev 1.0 was issued

1. Scope

This data sheet is to introduce the specification of DLC0400JZG-4 active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC and a backlight unit. The 4.00'' display area contains 480(RGB) x 800 pixels.

2. Application

Digital equipments which need color display, mobile phone, mobile navigator/video systems.

3. General Information

Item	Contents	Unit
Size	4.00	inch
Resolution	480(RGB) x 800	/
Interface	RGB	/
Technology type	a-Si	/
Pixel Configuration	R.G.B. Vertical Stripe	
Outline Dimension (W x H x D)	57.14x96.85x2.1	mm
Active Area	51.84X86.40	mm
Display Mode	NORMALLY BLACK	/
Backlight Type	LED	/
Driver IC	NT35512S	/
Weight	TBD	g

4. Outline Drawing

PIN DEFINITION:	
1	GND
2	LED A
3	LED K
4	VCC
5	DMOC
6	SIO
7	S01
8	GND
9	SEC-R/R
10	CS
11	TM3
12	RSET
13	R0
14	R1
15	R2
16	R3
17	R4
18	R5
19	R6
20	R7
21	G0
22	G1
23	G2
24	G3
25	G4
26	G5
27	G6
28	G7
29	B0
30	B1
31	B2
32	B3
33	B4
34	B5
35	B6
36	B7
37	B8
38	PLK
39	RS
40	VS
41	IC=ID
42	V0(NG)
43	AL(NG)
44	V1(NG)
45	3K(NG)

3.97" WVGA
DOTS: 480*RGB*800
View direction: All

LED A
LED K
4*2=8EA If=40mA

LEDK

LED CIRCUI T DIAGRAM:

4*2=8EA If=40mA

DETAIL A (4:1)

NOTES:

1. DISPLAY TYPE: 3.97TFT, NORMALLY BLACK
2. VIEWING DIRECTION : U/L/D/R 80/80/80/80
3. Driver IC : NT35512S
4. Top : -20° C ~ 70° C, Tst : -30° C ~ 80° C
5. GENERAL TOLERANCE: ±0.2
6. RoHS Compliancy

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DRAWN BY:	TTITLE: DLC0400JZG-4
CHECKED BY:	SCALE:
APPROVED BY:	DWG NO:
CONFIRMED BY:	DWG NAME:
	SHEET NO: OF

5. Interface signals

Pin No.	Symbol	Function
1	GND	Ground
2	LED_A	Backlight LED Power
3	LED_K	Backlight LED Ground
4	VCC	Power for analog voltage.
5	IOVCC	Power for logic voltage.
6	SDO	SPI interface Data output.
7	SDI	SPI interface Data input.
8	GND	Ground
9	SCL-WR	serial interface clock
10	CS	Chip select pin.
11	IM3	serial interface model select
12	RESET	Reset pin, This is an active low signal
13-20	R0-R7	Red data pin
21-28	G0-G7	Green data pin
29-36	B0-B7	Bule data pin
37	DE	Data Enable Input
38	PLK	Dot Data Clock
39	HS	Horizontal Sync Input
40	VS	Vertical Sync Input
41	IC-ID	Read ID pin
42	YD(NC)	No connection
43	XL(NC)	No connection
44	YU(NC)	No connection
45	XR(NC)	No connection

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{CC}	-0.3	5.5	V	1 , 2
Logic Signal Input /Output Voltage	V_{IOVCC}	-0.3	5.5	V	

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
2. $V_{CC} > V_{SS}$ must be maintained.

6.2. Environment Conditions

Item	Symbol	MIN	MAX	Unit	Remark
Operating Temperature	TOPR	-20	70	°C	
Storage Temperature	TSTG	-30	80	°C	

Note:

1. The response time will become lower when operated at low temperature.
2. Background color changes slightly depending on ambient temperature.
The phenomenon is reversible.
3. $T_a \leq 40^\circ\text{C}$: 85%RH MAX.
 $T_a > 40^\circ\text{C}$: Absolute humidity must be lower than the humidity of 85%RH at 40°C .

7. Electrical Specifications

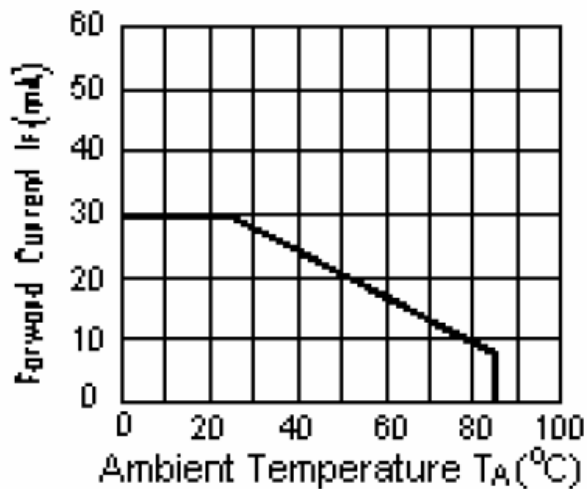
7.1 Electrical characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note	
Power supply	VCC	Ta=25°C	2.6	2.8	3.3	V		
Power supply	IOVCC	Ta=25°C	1.65	2.8	3.3	V		
Input voltage	'H'	V _{IH}	V _{CC} =2.8V	0.7V _{CC}	-	V _{CC}	V	
	'L'	V _{IL}	V _{CC} =2.8V	0	-	0.3V _{CC}	V	
Current Consumption	I _{CC1}	Normal mode	-	20	30	mA	1	
	I _{CC2}	Sleep mode	-	0.03	0.09	mA	1	
Clock Frequency	f _{CLK}	-	-	9	12	MHz		

Note: Tested in 1×1 chessboard pattern.

7.2 LED Backlight

Item	Symbol	Min	Typ	Max	Unit	Note
Supply voltage	V _f	-	12.8	-	V	
Supply current	I _f	-	40	-	mA	
LED life time	-	-	(25,000)	-	Hrs	



I_{LED} VS TEMP

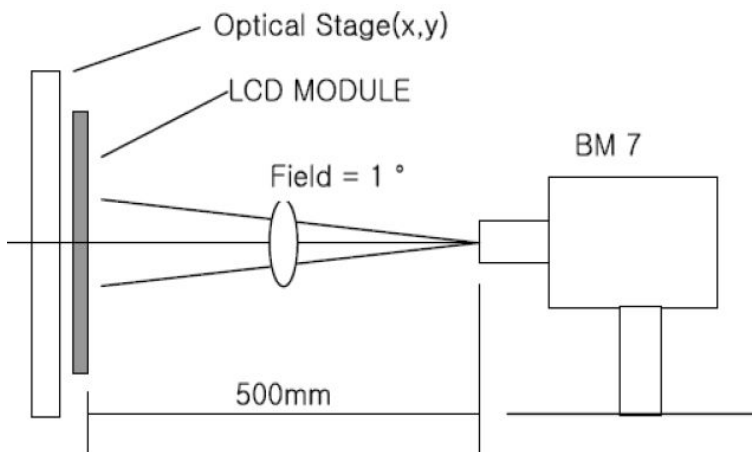
8. Optical Specification

Ta=25°C

Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio	CR	$\theta=0^\circ$	500	700	-		Note1 Note2
Response Time	Tr	25°C	-	25	-	ms	Note1
	Tf		-	25	-	ms	Note3
View Angles	θT	$CR \geq 10$	-	80	-	Degree	Note 4
	θB		-	80	-		
	θL		-	80	-		
	θR		-	80	-		
Chromaticity	White	x	-	0.30	-	Note5, Note1	
		y	-	0.34	-		
	Red	x	-	0.60	-		
		y	-	0.32	-		
	Green	x	-	0.30	-		
		y	-	0.57	-		
	Blue	x	-	0.14	-		
		y	-	0.17	-		
NTSC	S		50	60	--	%	Note5
Luminance	L		--	300	--	cd/m ²	Note1 Note6
Uniformity	U		--	80	--	%	Note1 Note7

Note 1: Definition of optical measurement system.

Temperature = 25°C(±3°C); LED back-light: ON, Environment brightness < 150 lx

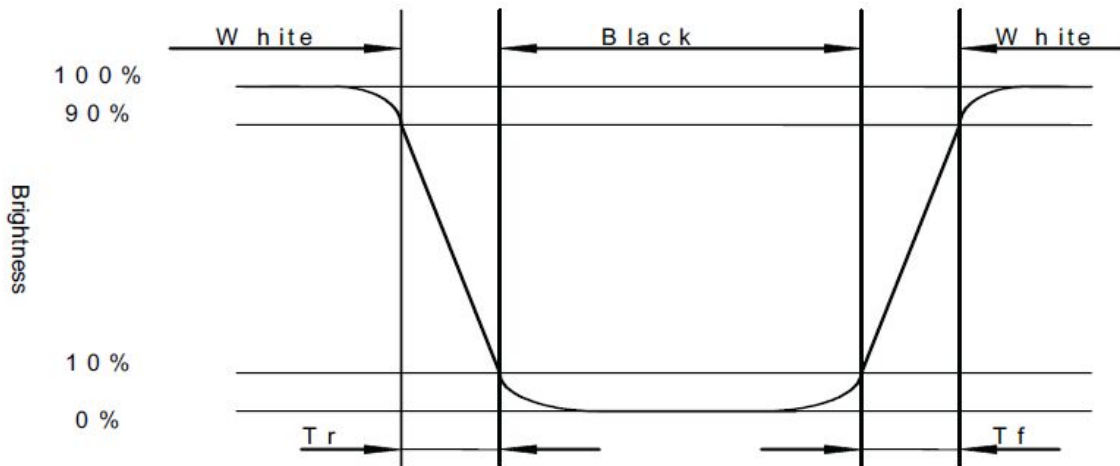


Note 2: Contrast ratio is defined as follow:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

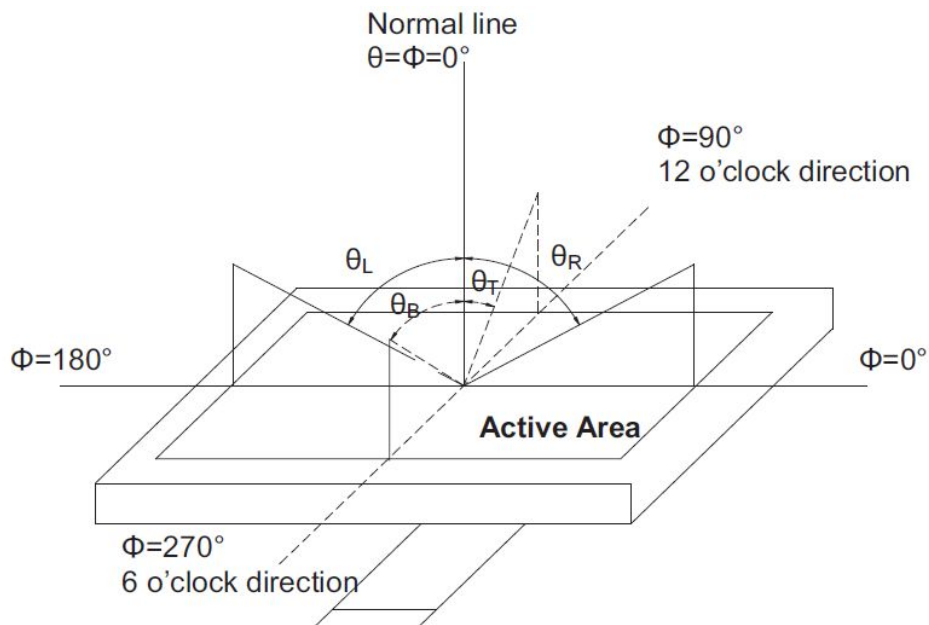
Note 3: Response time is defined as follow:

Response time is the time required for the display to transition from black to white (Rise Time, T_r) and from white to black (Decay Time, T_f).



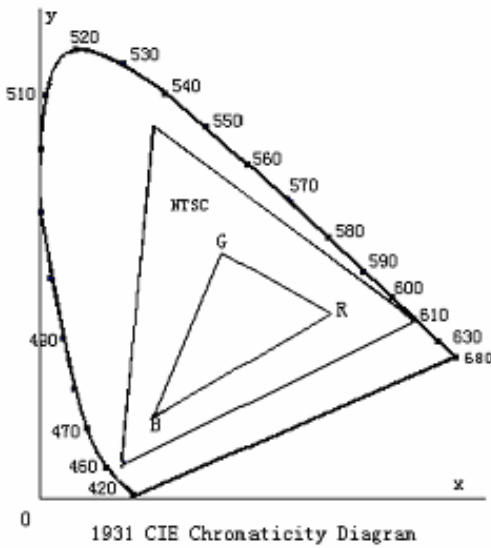
Note 4: Viewing angle range is defined as follow:

Viewing angle is measured at the center point of the LCD.



Note 5: Color chromaticity is defined as follow: (CIE1931)

Color coordinates measured at center point of LCD.



$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 6: Luminance is defined as follow:

Luminance is defined as the brightness of all pixels “White” at the center of display area on optimum contrast.

Note 7: Luminance Uniformity is defined as follow:

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Uniformity (U)} = \frac{\text{Minimum Luminance(brightness) in 9 points}}{\text{Maximum Luminance(brightness) in 9 points}}$$

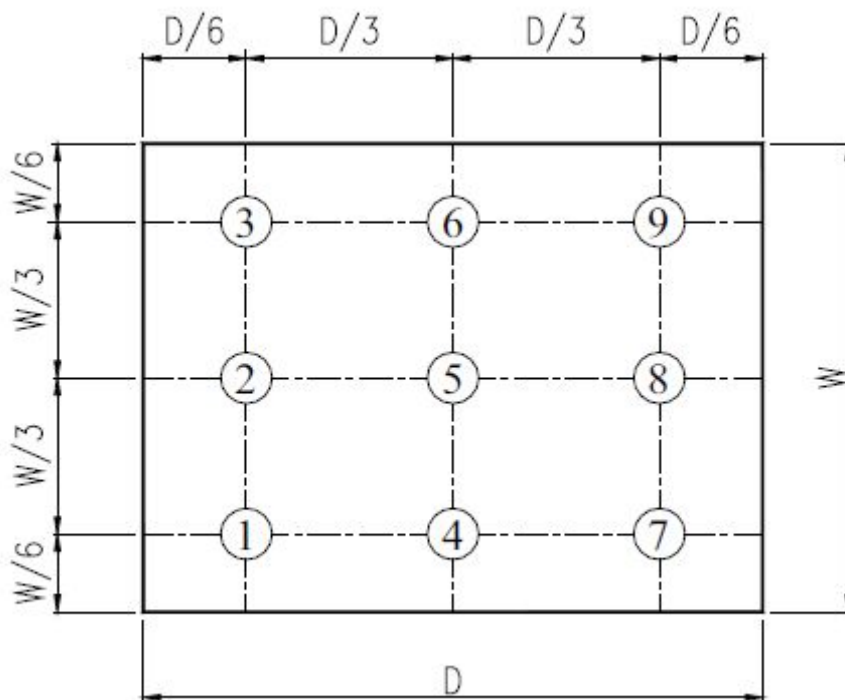


Fig. 2 Definition of uniformity

9. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+70°C, 96hrs	Per table in below
2	Low Temp Operation	Ta=-20°C, 96hrs	Per table in below
3	High Temp Storage	Ta=+80°C, 96hrs	Per table in below
4	Low Temp Storage	Ta=-30°C, 96hrs	Per table in below
5	High Temp & High Humidity Storage	Ta=+60°C, 90% RH 96 hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-30°C 30 min~+80°C 30 min, Change time:5min, 5 Cycles	Per table in below
7	ESD (Operation)	C=150pF, R=330Ω , 5points/panel Air:±8KV, 5times; Contact:±4KV, 5 times;	Per table in below
8	Vibration (Non-operation)	10Hz~150Hz, 100m/s ² , 120min	Per table in below
9	Shock (Non-operation)	Half- sine wave,300m/s ² ,11ms	Per table in below
10	Package Drop Test	Height:80 cm, 1 corner, 3 edges, 6 surfaces	Per table in below

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. Precautions for Use of LCD Modules

10.1 Safety

The liquid crystal in the LCD is poisonous. Do not put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

10.2 Handling

- A. The LCD and touch panel is made of plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
- B. Do not handle the product by holding the flexible pattern portion in order to assure the reliability
- C. Transparency is an important factor for the touch panel. Please wear clear finger sacks, gloves and mask to protect the touch panel from finger print or stain and also hold the portion outside the view area when handling the touch panel.
- D. Provide a space so that the panel does not come into contact with other components.
- E. To protect the product from external force, put a covering lens (acrylic board or similar board) and keep an appropriate gap between them.
- F. Transparent electrodes may be disconnected if the panel is used under environmental conditions where dew condensation occurs.
- G. Property of semiconductor devices may be affected when they are exposed to light, possibly resulting in IC malfunctions.
- H. To prevent such IC malfunctions, your design and mounting layout shall be done in the way that the IC is not exposed to light in actual use.

10.3 Static Electricity

- A. Ground soldering iron tips, tools and testers when they are in operation.
- B. Ground your body when handling the products.
- C. Power on the LCD module before applying the voltage to the input terminals.
- D. Do not apply voltage which exceeds the absolute maximum rating.
- E. Store the products in an anti-electrostatic bag or container.

10.4 Storage

- A. Store the products in a dark place at $+25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ with low humidity (40% RH to 60% RH). Don't expose to sunlight or fluorescent light.
- B. Storage in a clean environment, free from dust, active gas, and solvent.

10.5 Cleaning

- A. Do not wipe the touch panel with dry cloth, as it may cause scratch.
- B. Wipe off the stain on the product by using soft cloth moistened with ethanol. Do not allow ethanol to get in between the upper film and the bottom glass. It may cause peeling issue or defective operation. Do not use any organic solvent or detergent other than ethanol.

10.6 Cautions for installing and assembling

Bezel edge must be positioned in the area between the Active area and View area. The bezel may press the touch screen and cause activation if the edge touches the active area. A gap of approximately 0.5mm is needed between the bezel and the top electrode. It may cause unexpected activation if the gap is too narrow. There is a tolerance of 0.2 to 0.3mm for the outside dimensions of the touch panel and tail. A gap must be made to absorb the tolerance in the case and connector.

