LCD Module
Product Specification

Product: DT057ATFT
5.7'' TFT Display Module (640RGBx480DOTS)

15 November 2011.

1. REVISION RECORD

VERSION	CHANGES	DATE
1.0	Initial revision	15 November 2011

Table of Content

2. Introduction

DT057ATFT is a display module that contains a TFT display with a 480 * 640 RGB resolution. The driver used for this project is the Novatek **NT39413B** + **NT39207 or compatible** and can display 16.7M colors. The driver is mounted on the glass and the interconnection via FPC including components to drive the display module.

3. General Specifications

Item	Specification	Unit
LCD mode	Transmissive	---
Resolution	640(RGB)	Line
	480	Line
Diagonal Size	5.7	Inch
Overall Size	144.00	mm
	104.60	mm
Active area	115.20	mm
	86.40	mm
Optimum Viewing Direction	6 o'clock	---
Gray Scale Inversion Direction	12 o'clock	---
Driver IC	Novatek NT39413B + NT39207	---
Interface type	RGB 18-bit	---
Colours	262K	---
Operation temperature range	-30~85	°C
Storage temperature range	-30~85	°C

Remarks:

(1) Color tune may be changed slightly by temperature and driving voltage.
(2) RoHS compliant.

Component Life Cycle

1) Storage Life: min. 1 Year
2) Operation Life (*1): min. 43 x 10³ h (24hr/day x 7days/week x 52weeks/year x 5years)
   (Not include backlight)
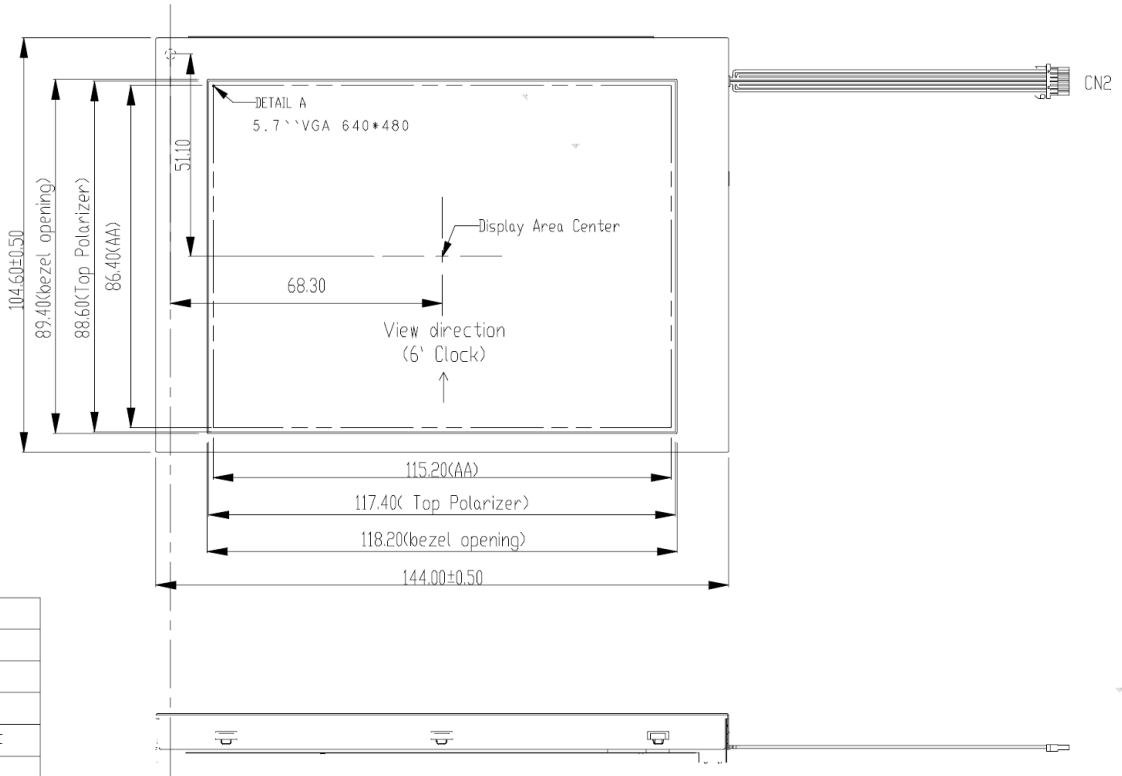3) Storage and Operation Life Times are defined for a temperature of +25°C

Notes:

*1. Operation life ends when one of the listed faults occurs:
- The on/off response-times reach 1.5 times of the max. value specified for a new display
- The contrast is reduced to 0.5 of the original contrast value
- Loss of function
- The number of cosmetic defects exceeds the maximum defined

4. Mechanical Drawing

- **DT057ATFT**

DETAIL A
5.7``VGA 640*480

Display Area Center

View direction
(6` Clock)

51.10

68.30

104.60±0.50
89.40(bezel opening)
88.60(Top Polarizer)
86.40(AA)

115.20(AA)
117.40(Top Polarizer)
118.20(bezel opening)
144.00±0.50

CN2

CN1 Pin Asign

Pin NO.	Symbol
1	GND
2	CK
3	Hsync
4	Vsync
5	GND
6	R0
7	R1
8	R2
9	R3
10	R4
11	R5
12	GND
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	GND
20	B0
21	B1
22	B2
23	B3
24	B4
25	B5
26	GND
27	ENAB
28	VCC
29	VCC
30	R/L
31	U/D
32	NC
33	GND

CN2 Pin Asign

PIN#	Symbol	Cable color
1	AN1	Red
2	AN2	Red
3	AN3	Red
4	CA1	White
5	CA2	Blue
6	CA3	Black

0.18
0.06
0.18

R G B

DETAIL A
60:1
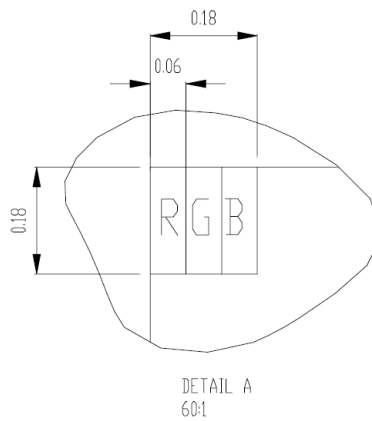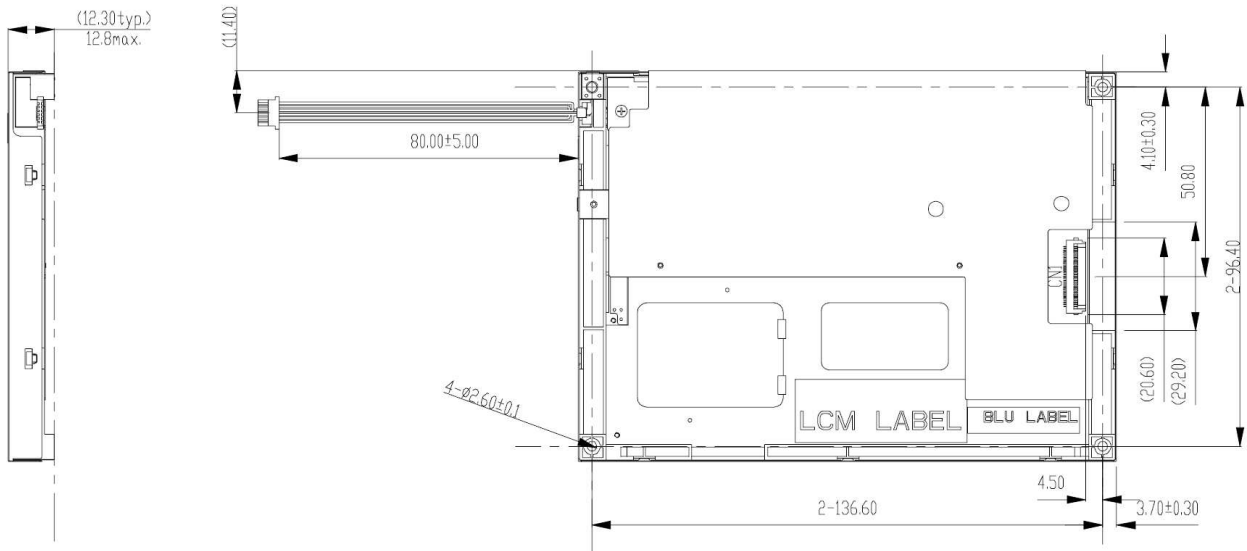
The hole for nominal size 3mm se lf-tapping
screw attachment depth 3.5mm(4 p oint)
Suggested applying torque 0.15~0 .2Nm

Notes:
1.unmarked tolerance:±0.50mm;
2.Display Type: a-Si TFT ;
3.Operating Temperature:-30℃~+85℃;
4.Storage Temperature:-30℃~+85℃;
5.Gray Scale Inversion: 12 o'clock;
  Viewing Direction: 6 o'clock;
6.CN2 LED Power source Connector:SHLP-06V-S-B(JST) or Compatible,
  Mating Connector:SM06B-SHLS-TF(JST) or Compatible;
7.CN1 Connector type: O89H33-000100-G2-R (STARCONN)
8.Requirement on Environment Protection: Q/S0002.

5. Interface Description

Connector CN1: STARCONN 089H33-000100-G2-R
- **Mating FPC/FFC: 33pins; 0.5mm pitch; thickness 0.3mm**

Pin no	Symbol	I/O	Description
1	GND	---	Power ground 0V
2	CK	I	Dot clock. Latch data at falling edge of CK.
3	Hsync	I	Horizontal sync signal in SYNC mode. Pull low or floating when DE mode.
4	Vsync	I	Vertical sync signal in SYNC mode. Pull low or floating when DE mode.
5	GND	---	Power ground 0V
6	R0	I	Red data (LSB)
7~10	R1~R4	I	Red data
11	R5	I	Red data (MSB)
12	GND	---	Power ground 0V
13	G0	I	Green data (LSB)
14~17	G1~G4	I	Green data
18	G5	I	Green data (MSB)
19	GND	---	Power ground 0V
20	B0	I	Blue data (LSB)
21~24	B1~B4	I	Blue data
25	B5	I	Blue data (MSB)
26	GND	---	Power ground 0V
27	ENAB	I	Data enable signal in DE mode. This pin must pull high when SYNC mode.
28~29	VCC	---	Power supply
30	R/L	I	Set horizontal scan direction: Low/NC: left to right; High: right to left
31	U/D	I	Set vertical scan direction: High/NC: up to down; Low: down to up
32	NC	---	No connection
33	GND	---	Power ground 0V

Connector CN2: JST SHLP-06V-S-B
- **Mating connector: JST SM06B-SHLS-TF**

Pin no	Symbol	Description	Wire colour
1	AN1	LED Anode terminal	Red
2	AN2	LED Anode terminal	Red
3	AN3	LED Anode terminal	Red
4	CA1	LED Cathode terminal	White
5	CA2	LED Cathode terminal	Blue
6	CA3	LED Cathode terminal	Black

6. Absolute Maximum Ratings

(AGND=GND=0V; Ta=25°C)

Item	Symbol	Min.	Max.	Unit
Power voltage	VCC	-0.5	+5.0	V
Input voltage	VIN	-0.5	+5.0	V
Operating Temperature	TOP	-30	+85	°C
Storage Temperature	TST	-30	+85	°C

Note:
- When temperature is below 0°C, the response time of liquid crystal (LC) will be slower and the color of panel will be darker.
- If module driving condition exceeds the absolute maximum ratings, permanent damaged may be resulted. If module is driven within the absolute maximum ratings but exceeded the DC characteristics, mal-function may be resulted.
- VDD/VCC > VSS

7. Electrical Characteristics

DC Characteristics

(GND=0V; Ta=25°C)

Item		Symbol	Min.	Typ.	Max.	Unit
Supply voltage		VCC	3.0	3.3	3.60	V
Permissive input ripple voltage		VRF	---	---	100	mVp-p
Input signal voltage	Low level	VIL	0	---	0.3xVCC	
	High level	VIH	0.7xVCC	---	VCC	V

## 8. Display Controller /Power Supply Timing

See Display Controller Specification: **Novatek NT39413B + NT39207**

9. Backlight specification

(Vcc=3.3V, GND=0V, Ta=25°C)

Item	Symbol	Min	Typ	Max	Unit	Remark
Series 1 Forward current	If1	---	25	---	mA	Note 1
Series 2 Forward current	If2	---	25	---	mA	
Series 3 Forward current	If3	---	25	---	mA	
Forward voltage	VBL	19.95	---	25.9	V	
Backlight power consumption	WBL	---	1732.5	---	mW	
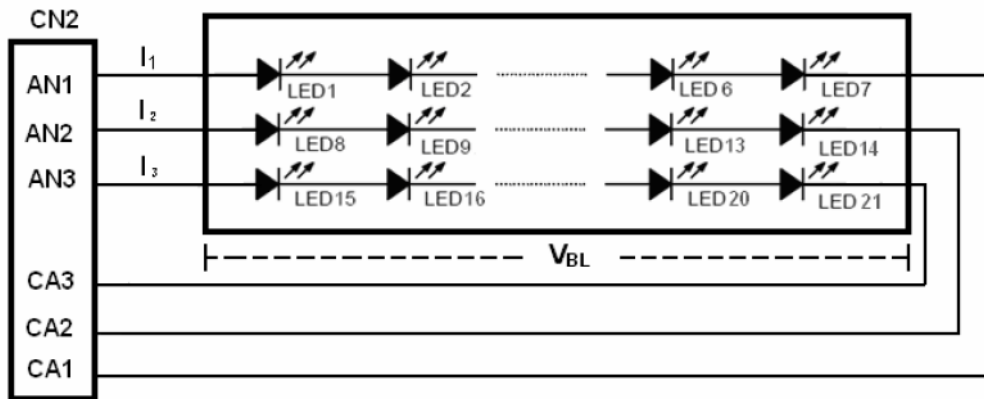
Notes:
1) IF is defined for one channel LED. There are total three LED channels in back light unit
2) Optical performance should be evaluated at Ta=25℃ only.

10. Optical Characteristics

(Vcc=3.3V, GND=0V, Ta=25°C)

Item		Symbol	Condition	Min	Typ	Max	Unit	Note
Luminance		L	θ=0º	320	400	---	cd/m²	1, 2
Uniformity		U	Φ=0º	75	80	---	%	1, 2
Viewing Angle		θT	Cr≥10	60	70	---	deg	3
		θB		50	60	---		
		θL		60	70	---		
		θR		60	70	---		
Contrast ratio		Cr		400	500	---	---	1, 4
Response Time		Tr	θ=0º	---	20	30	ms	1, 5
		Tf						
CIE (x,y) Chromaticity	**White**	x	θ=0º	0.252	0.302	0.352	---	1, 6
		y		0.279	0.329	0.379		
	Red	x		0.548	0.598	0.648		
		y		0.292	0.342	0.392		
	Green	x		0.284	0.334	0.384		
		y		0.535	0.585	0.635		
	Blue	x		0.092	0.142	0.192		
		y		0.052	0.102	0.152		
NTSC Ratio		S		---	50	---	%	

Note 1:   The data are measured after LEDs are turned on for 5 minutes. LCM displays full white.
          The brightness is the average value of 9 measured spots. Measurement equipment PR-705 (Φ8mm)

          Measuring condition:
          - Measuring surroundings: Dark room.
          - Measuring temperature: Ta=25°C.
          - Adjust operating voltage to get optimum contrast at the center of the display.

          Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.
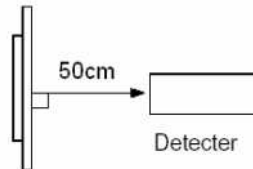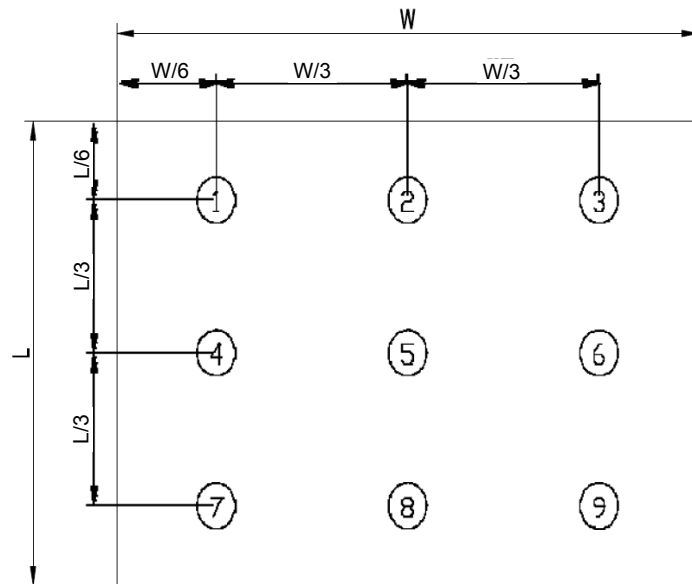

Note 2:   The luminance uniformity is calculated by using following formula.
          L = L (Min.) / L (Max.)×100 (%)
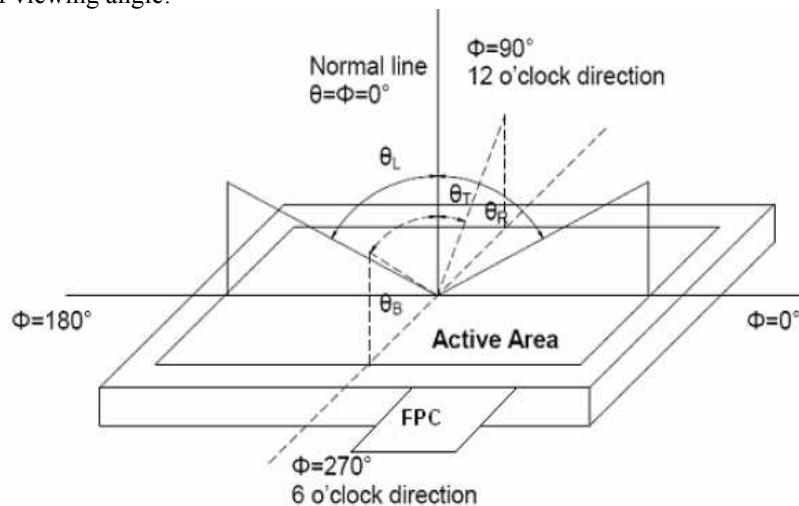   L (Max.) = Maximum brightness in 9 measured spots
          L (Min.) = Minimum brightness in 9 measured spots.

Measurement equipment PR-705 (Φ8mm)

Note 3:   The definition of viewing angle:

Note 4:   The definition of contrast ratio (Test LCM using PR-705):

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance When LCD is at "White" state}}{\text{Luminance When LCD is at "Black" state}}$$

(Contrast Ratio is measured in optimum common electrode voltage)

Note 5:   Definition of Response time. (Test LCD using DMS501):
The output signals of photo detector are measured when the input signals are changed from "black" to "white" (falling time) and from "white" to "black" (rising time), respectively.
The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.
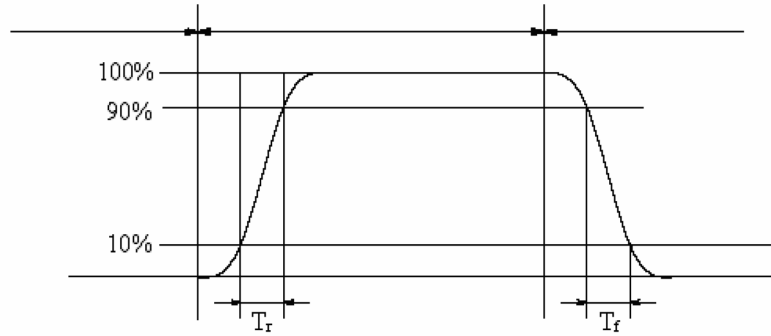
The definition of response time

Note 6:   Definition of Color of CIE Coordinate and NTSC Ratio.

1931 CIE Chromaticity Diagram
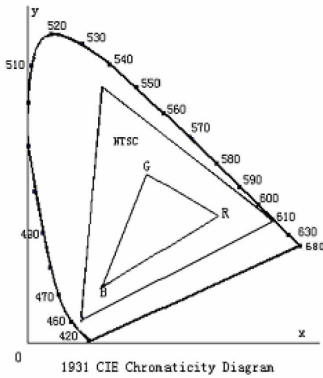
Color gamut:

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

11. Safety Precaution

Handling precautions:

- This device is susceptible to Electro-Static Discharge (ESD) damage. Observe Anti-Static precautions.

Power supply precautions:

- Identify and, at all times, observe absolute maximum ratings for both logic and LC drivers. Note that there is some variance between models.

- Prevent the application of reverse polarity to VCC and GND, however briefly.

- Use a clean power source free from transients. Power up conditions are occasionally "jolting" and may exceed the maximum ratings of the modules.

- The VCC power of the module should also supply the power to all devices that may access the display. Don't allow the data bus to be driven when the logic supply to the module is turned off.

Operating precautions:

- DO NOT plug or unplug the module when the system is powered up.

- Minimize the cable length between the module and host MPU.

- Operate the module within the limits of the modules temperature specifications.

Mechanical/Environmental precautions:

- Improper soldering is the major cause of module difficulty. Use of flux cleaner is not recommended as they may seep under the elastomeric connection and cause display failure.

- Mount the module so that it is free from torque and mechanical stress.

- Surface of the LCD panel should not be touched or scratched. The display front surface is an easily scratched, plastic polarizer. Avoid contact and clean only when necessary with soft, absorbent cotton dampened with petroleum benzene.

- Always employ anti-static procedure while handling the module.

- Prevent moisture build-up upon the module and observe the environmental constraints for storage temperature and humidity.

- Do not store in direct sunlight

- If leakage of the liquid crystal material should occur, avoid contact with this material, particularly ingestion. If the body or clothing becomes contaminated by the liquid crystal material, wash thoroughly with water and soap