

TFT-LCD Specification

Module Name: AML035VGA-006B

Customer's No. : _____

Approved By

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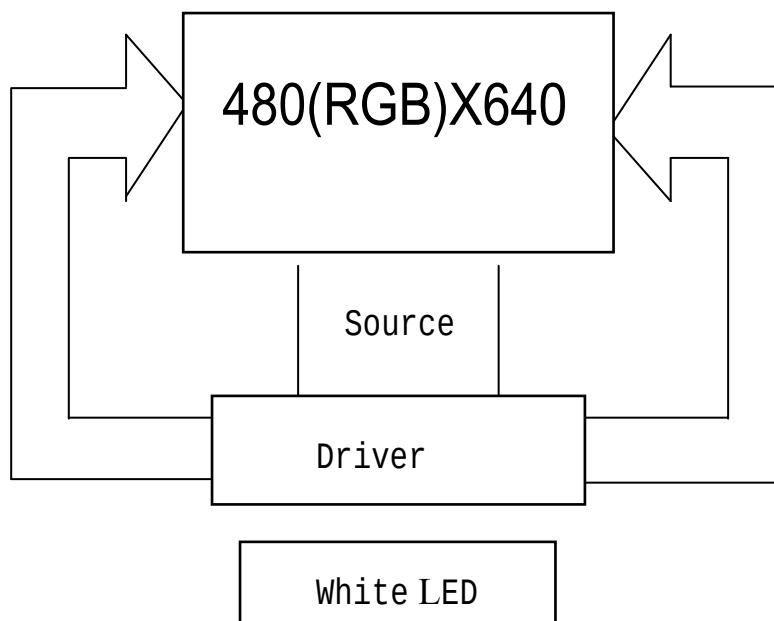
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1. General Description

The **AML035VGA-006B** is a transmissive type's TFT (Thin Film Transistor) active color liquid crystal display (LCD) comprising an amorphous silicon TFT attached to each signal electrode. This model is consisting of TFT-LCD module, a driver circuit and a back-light unit. The resolution of a 3.5" contains 480*640 pixels and can display up to 262K colors.

Items	Panel	Unit
LCD type	TFT-LCD	/
Display mode	Transmissive	/
Display mode	Normal Black	/
Display Size	3.5	Inch
Driving IC	ILI9805	/
Display Color	262K	color
Active Area	53.28 (H)*71.04(V)	mm
Number of Pixel	480(H)*RGB*640(V)	pixel
Pixel Pitch	0.108mm X 0.108mm (217 ppi)	mm
Viewing direction	12	o'clock

2. Block Diagram



3. INPUT / OUTPUT TERMINALS

N0.	Pin name	Description
1	VCC	Power Supply for Analog Circuit (TYP 2.8V)
2	IOVCC	Power Supply for Analog Circuit (TYP 1.8V)
3	DE	Data Input Enable Control in RGB Interface
4	RESET	Reset Signal (Low Active)
5	HSYNC	Horizontal Synchronizing Signal in RGB Interface
6	VSNC	Vertical Synchronizing Signal in RGB Interface
7	PCLK	Dot Clock Signal for Data Latch in RGB Interface
8	CS	Chip Select Signal (Low Active)
9	SDI	Data input in SPI mode
10	SCL	Synchronizing clock signal in SPI mode
11	SDO	Data Output in SPI mode
12~35	DB0-DB23	Data bus. DB23~DB18=R5~R0; DB15~DB10=G5~G0 DB7~DB2=B5~B0
36	GND	Power Ground.
37~40	NC	NO CONNECTION
41	GND	Power Ground.
42, 43	LEDA	LED+
44, 45	LEDK	LED-

4. OPTICAL CHARACTERISTICS(Ta=25 ±2℃)

4.1.Contrast ratio(center point)

Symbol	Min.	Typ.	Max.	Unit	Condition
C _R	--	500	-	-	Θ=0° Φ=0°

Contrast ratio is defined as follows

$$CR = \frac{\text{Luminance (brightness) all pixels "White"}}{\text{Luminance (brightness) all pixels "Dark"}}$$

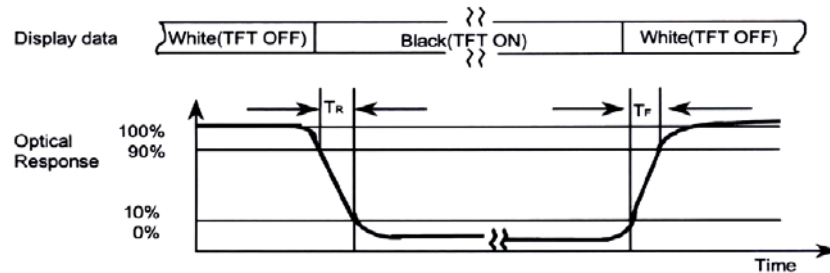
4.2. Luminance of white(Center point)

Symbol	Min.	Typ.	Max.	Unit	Condition
L _V	200	250	-	-	Θ=0° Φ=0°

4.3. Response time

Symbol	Min.	Typ.	Max.	Unit	Condition
T _R	-	10	-	ms	Θ=0° Φ=0°
T _F	-	20	-		

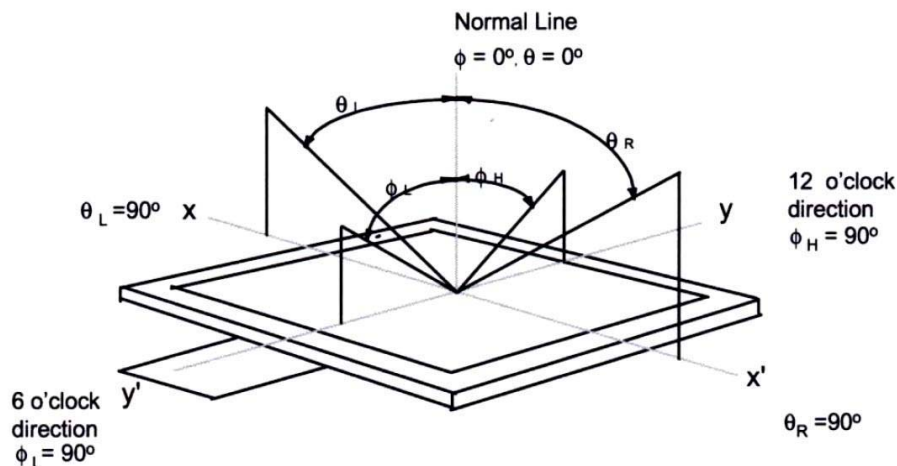
Response time is defined as follows



4.4. Viewing angle

Symbol	Min.	Typ.	Max.	Unit	Condition
9 o'clock	--	60	-	Degrees	C _R >10
3 o'clock	--	60	-		
12 o'clock	--	60	-		
6 o'clock	--	50	-		

Definition of Viewing Angle



4.5. Color chromaticity(CIE 1931)

Symbol		Min.	Typ.	Max.	Condition
White	W_X	0.287	0.307	0.327	$\Theta=0^\circ \quad \Phi=0^\circ$
	W_Y	0.306	0.326	0.346	
Red	R_X	0.636	0.656	0.676	
	R_Y	0.300	0.320	0.340	
Green	G_X	0.268	0.288	0.308	
	G_Y	0.569	0.589	0.609	
Blue	B_X	0.118	0.138	0.158	
	B_Y	0.059	0.079	0.099	

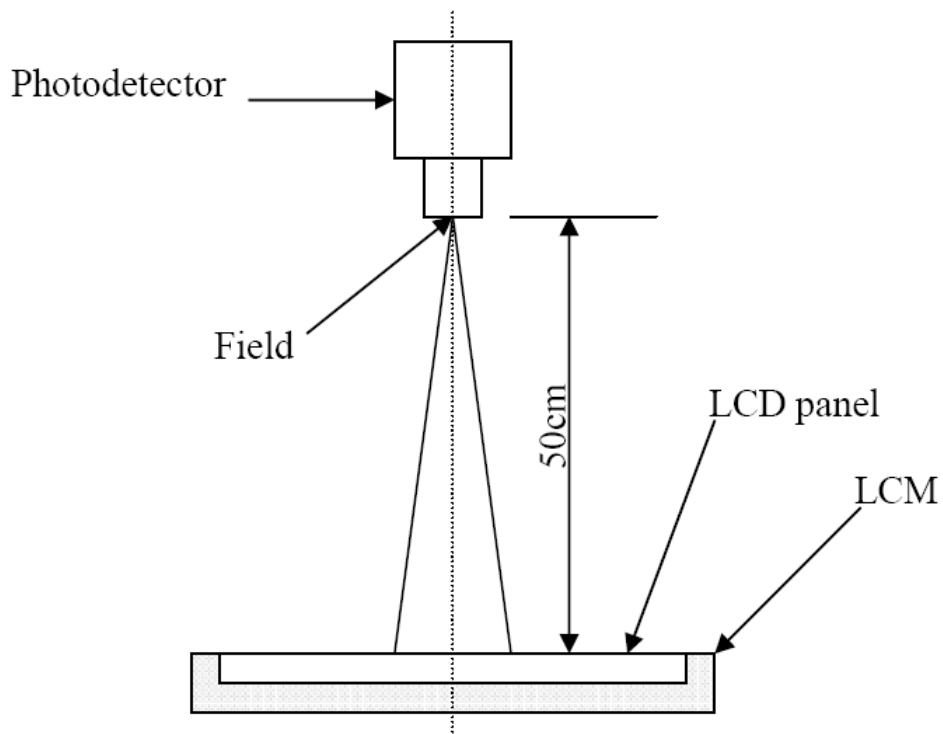
Optical measurement equipment setup

-Measurement should be executed in a stable, windless, and dark room. After lighting the backlight for 30mins.

-Environment condition : Common air conditioner cleanness 、 $T_a=23\pm5^\circ\text{C}$ 、
Humidity= $60\pm15\%$

-Distance : 50cm

-Photodetector : BM-7f (Field 2o)



5. ABSOLUTE MAXIMUM RATINGS

5.1. Absolute Ratings of Environment

Item	Symbol	Value	Unit	Note
Operating	T _{opr}	-20 to 70	°C	-
Storage temperature	T _{stg}	-30 to 80	°C	-

5.2. Electrical Absolute Ratings

5.2.1. TFT-LCD Module

Item	Symbol	Unit	Value	Note
Power Supply Voltage 1	IOVCC~VSSD	V	-0.3 to +4.6	Note ^{(1),(2)}
Power Supply Voltage 2	VCI ~ VSSA	V	-0.3 to +4.6	Note ⁽³⁾
Power Supply Voltage 3	DDVDH ~ VSSA	V	-0.3 to +6.6	Note ⁽⁴⁾
Power Supply Voltage 4	VSSA ~ VCL	V	-0.3 to +4.6	Note ⁽⁵⁾
Power Supply Voltage 5	DDVDH ~ VCL	V	-0.3 to +9	Note ⁽⁶⁾
Power Supply Voltage 6	VGH ~ VSSA	V	-0.3 to +18.5	Note ⁽⁷⁾
Power Supply Voltage 7	VSSA ~ VGL	V	0 to -16	Note ⁽⁸⁾
Logic Input Voltage	V _{IN}	V	-0.3 to IOVCC+0.5	-

5.2.2 Back-Light Unit

Item	Symbol	Min.	Max.	Unit	Note
Current	I _F	15	20	mA	(9)

Note:

- 1) IOVCC, VSSD must be maintained.
- 2) To make sure IOVCC $\geq$ VSSD.
- 3) To make sure VCI $\geq$ VSSA.
- 4) To make sure DDVDH $\geq$ VSSA.
- 5) To make sure VSSA $\geq$ VCL.
- 6) To make sure DDVDH $\geq$ VCL.
- 7) To make sure VGH $\geq$ VSSA.
- 8) To make sure VSSA $\geq$ VGL , VGH +|VGL| < 32V
- 9) One LED current maximum absolute ratings.

6. ELECTRICAL CHARACTERISTICS

6.1. DC characteristics (Ta=25 ±2℃)

Item	Symbol	Min	Typ	Max	Unit
IO Operating voltage	IOVCC	1.65	1.8	3.3	V
Driver Operating voltage	VCC	2.5	2.8	3.3	V
Input Current	I _{dd}	-	TBD	TBD	mA
High level input voltage	V _{IH}	0.8 IOVCC	-	IOVCC	V
Low level input voltage	V _{IL}	-0.3	-	0.2 IOVCC	V
High level output voltage	V _{OH}	0.8 IOVCC	-	IOVCC	V
Low level output voltage	V _{OL}	-0.3	-	0.2 IOVCC	V

6.2. Back-Light Characteristics (Ta=25 ±2℃)

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward Voltage	V _F	-	19.2	-	V	I _F =15mA
Power Consumption	PW _F	-	320	-	mW	-
Number of LED	-	6			Piece	-
Connection mode	p	Serial			-	-

7. TIMING CHAR

7.1. RGB interface characteristics

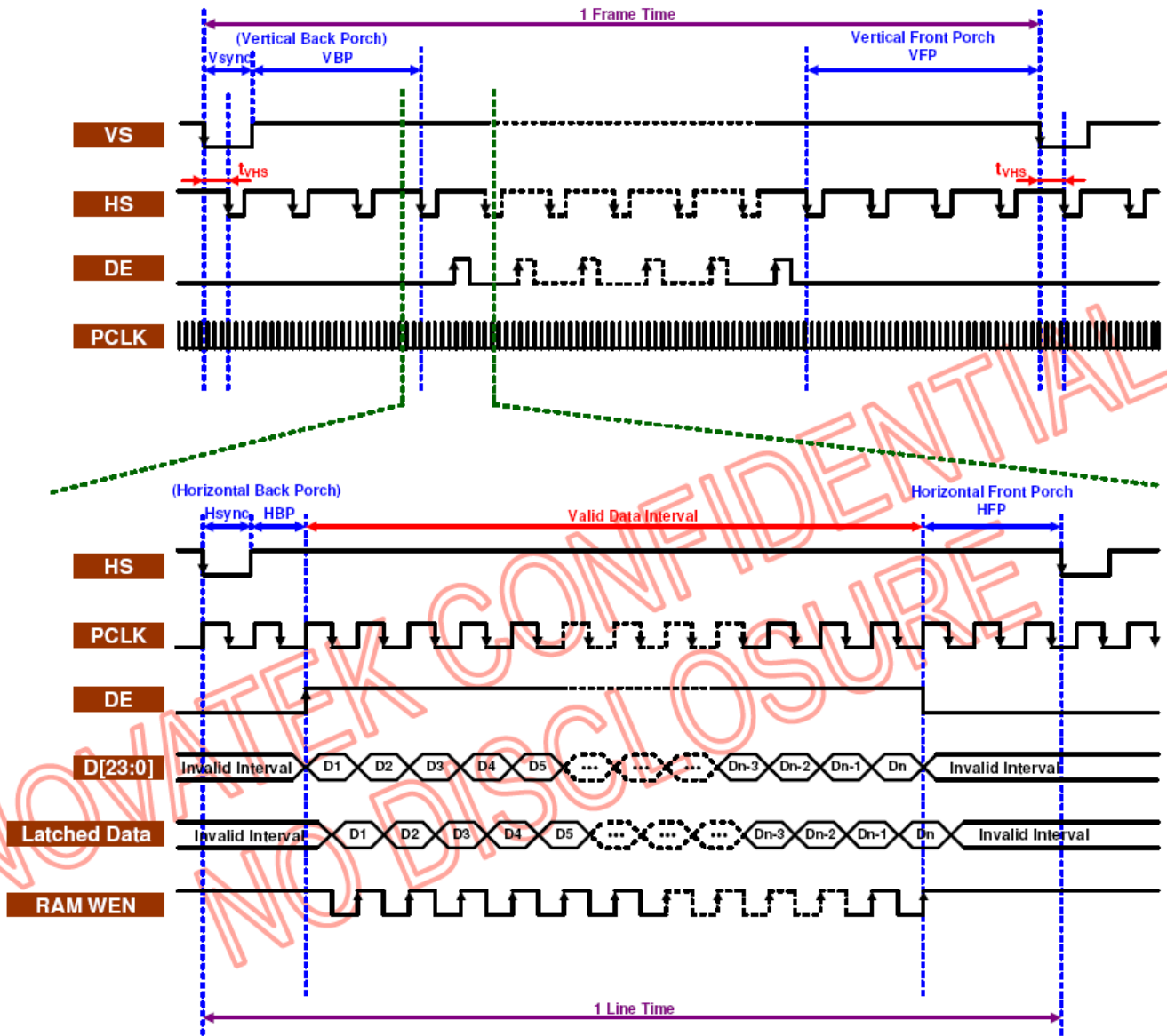


Fig. 5.6.2 Video signal data writing method in RGB Mode 1 Interface

Notes:

1. Constraint:

$V\text{-Back Porch (Vsync+VBP)} \geq 5 \text{ HS lines}$, $V\text{-Front-Porch (VFP)} \geq 2 \text{ HS lines}$

$V\text{sync+VBP+VFP (porch of RGB signal)} > \text{VBPA/B/C}[7:0]$ (internal display back porch)

$H\text{-Back Porch (Hsync+HBP)} \geq 5 \text{ PCLK clocks}$, $H\text{-Front-Porch (HFP)} \geq 2 \text{ PCLK clocks}$

2. $t_{VHS} \geq 400\text{ns}$

8. RELIABILITY

NO.	Item	S/S	Conditions	Criterion
1	High Temperature Storage	$\geq 5\text{pcs}$	$T_a=70\pm 2^{\circ}\text{C}$, 120 hours	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Sealleak; 3.Non-display; 4.missing segments; 5.Glass crack; 6.Current Idd is twice higher than initial value. 7. The surface shall be free from amage.
2	Low Temperature Storage	$\geq 5\text{pcs}$	$T_a=-20\pm 2^{\circ}\text{C}$, 120 hours	
3	High Temperature Operating	$\geq 5\text{pcs}$	$T_a=60\pm 2^{\circ}\text{C}$, 120 hours	
4	Low Temperature Operating	$\geq 5\text{pcs}$	$T_a=-10\pm 2^{\circ}\text{C}$, 120 hours	
5	Thermal Shock	$\geq 5\text{pcs}$	$-10^{\circ}\text{C}/30\text{ mins} \sim 25^{\circ}\text{C} /5\text{ mins} \sim 60^{\circ}\text{C}/30\text{ mins}$, 10 Cycles	
6	High Temperature / Humidity Storage	$\geq 5\text{pcs}$	$T_a = 50\pm 2^{\circ}\text{C}$, RH = $90\pm 2\%$, 120 hours	
7	ESD	$\geq 5\text{pcs}$	Voltage: $\pm 8\text{KV}$ R: 330Ω C: 150pF Air discharge, 10time	

9. GENERAL PRECAUTIONS

9.1. Handling

- (a) When the module is assembled, it should be attached to the system firmly. Be careful not to twist and bend the module.
- (b) Refrain from strong mechanical shock and / or any force to the module. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
- (c) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, Staining and discoloration may occur.
- (d) The desirable cleaners are water, Isopropyl Alcohol or Hexane.
- (e) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.
- (f) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (g) Do not disassemble the module.

9.2. Storage

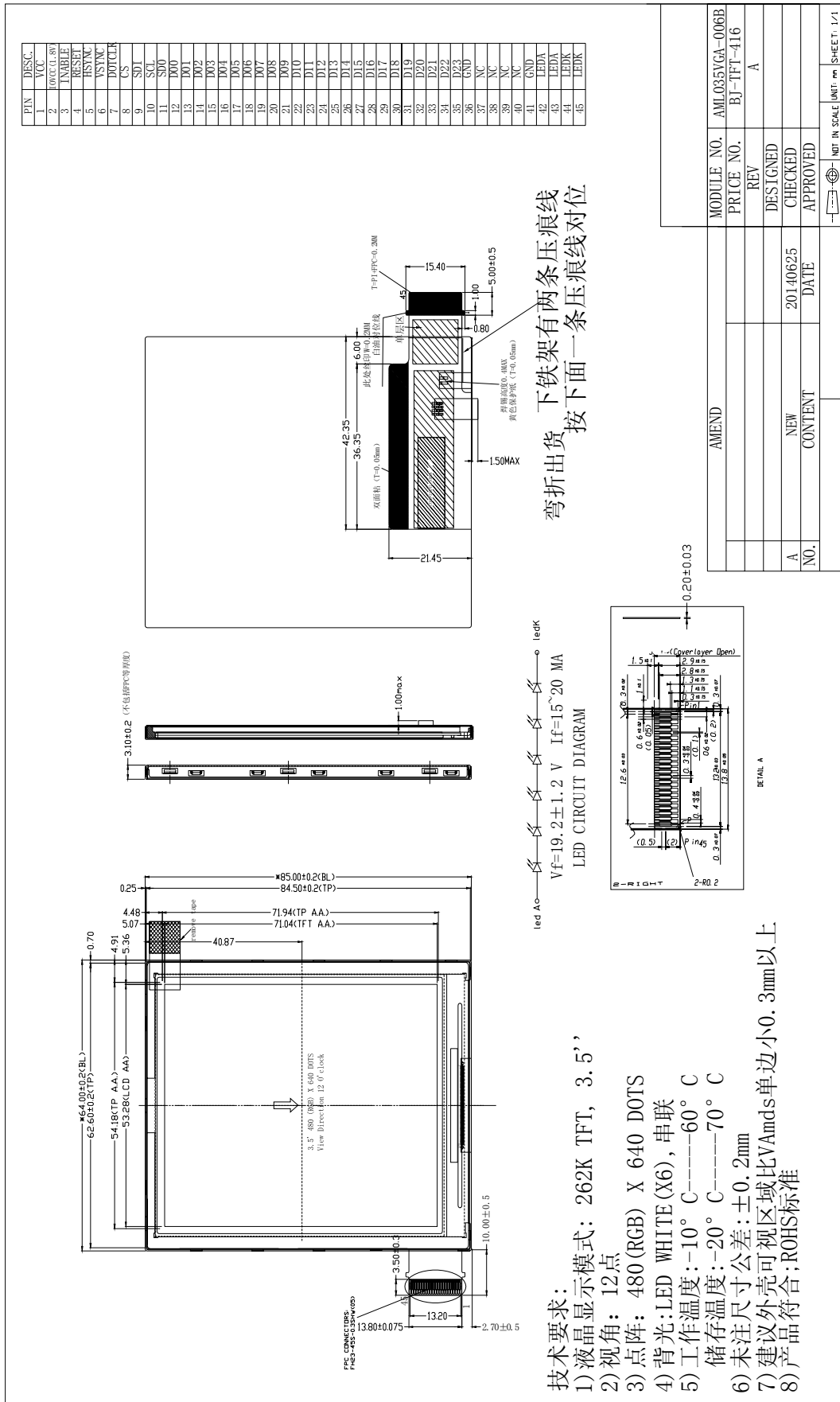
- (a) Do not leave the Panel in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35°C and relative humidity of less than 70%.
- (b) Do not store the TFT-LCD module in direct sunlight.
- (c) The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during the store.

9.3 Other

- (a) When in operations, do not connect; disconnect the module in the “Power on” condition.
- (b) The liquid crystal is deteriorated by ultraviolet; do not leave it in direct sunlight and strong ultraviolet ray for hours.
- (c) Avoid condensation of water. It may result in improper operation or disconnection of electrode.
- (d) Do not exceed the absolute maximum rating value. Otherwise the panel may be damaged.

- (e) If the panel displays the same pattern continuously for a long period of time, it can be the situation when the image “Stick” to the screen
- (f) The max temperature / continuous time of FPC soldering are 320℃ / 5 seconds.

10.MECHANICAL DRAWING



11.Record of Revision

Version	Revise Date	Content	Prepared
A	2016-05-24	First issue	wuxianyong