AGL   Product Specification   Applied Green Light, Inc.

4.3" WQVGA

High brightness color TFT-LCD Module

Model: VM04B1 V5

Date: Mar. 08th, 2021

**Note: This specification is subject to change
without notice**

Customer： _____
Date： _____

Approved	Prepared
Date:	Date:

Contents

RECORD OF REVISION

Version and Date	Page	Old description	New description	Remark
0.1 2021/03/08	All	First Edition for customer		

1. Handling Precautions

1) Since front polarizer is easily damaged, pay attention not to scratch it.

2) Be sure to turn off power supply when inserting or disconnecting from input connector.

3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.

4) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

5) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.

6) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.

7) Do not open or modify the Module Assembly.

8) Do not press the reflector sheet at the back of the module to any directions.

9) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.

10) After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.

2. General Description

2.1 Overview

This specification applies to the Color Active Matrix Liquid Crystal Display composed of a TFT-LCD display a LED backlight system. The screen format is intended to support 480(H) x 272(V) screen and 16.7M colors.

2.2 Features

- High brightness display, 1000nits by LED backlight.
- Wide operation temperature range
- Long operation lifetime BLU design
- RoHS Compliance

2.3 Application

Industrial applications.

2.4 Display specifications

| Items	Unit	Specification
Screen Diagonal	mm	4.3 inch
Active Area	mm	95.04(H) X 53.86(V)
Pixels H x V	pixels	480 x3(RGB) x 272
Pixels Pitch	um	198 (per one triad) x 198
Pixel Arrangement		RGB Vertical stripe
Display mode		Normally white, TN
White luminance (center)	Cd/m^2	1000 (Typ,)
Contrast ratio		TBD
Optical Response Time	msec	TBD
Normal Input Voltage VDD	Volt	3.3
Power Consumption (Vcc Line + LED backlight)	Watt	TBD TFT power：TBD ;BLU power：1.488W
Weight	Grams	TBD
Physical size	mm	105.5(W)×67.20(H)×2.95(D)
Electrical Interface		TTL, 24bit Parallel RGB
Support colors		16.7M colors
Surface Treatment		Anti-glare and hard-coating 3H
Driver IC		HX8257
View direction		12 O'clock
Temperature range Operating Storage	 ^{0}C ^{0}C	 -20 ~ 70 -30 ~ 80
RoHS Compliance		RoHS Compliance

2.5 Optical characteristics

The following optical characteristics are measured under stable condition at 25 °C

Items	Unit	Conditions	Min.	Typ	Max.	Note
Viewing angle	Deg.	Horizontal (Right)		70		2
		CR=10 (Left)		70		
		Vertical (Up)		50		
		CR=10 (Down)		70		
Contrast Ratio		Normal Direction		TBD		3
Response Time	msec	Raising + Falling		TBD		4
Color / Chromaticity Coordinates (CIE)		Red x	-0.05	TBD	+0.05	5
		Red y		TBD		
		Green x		TBD		
		Green y		TBD		
		Blue x		TBD		
		Blue y		TBD		
Color coordinates (CIE) White		White x		TBD		
		White y		TBD		
Center Luminance	Cd/m^2		800	1000		6
Luminance Uniformity	%		70	75		7
Crosstalk (in 60 Hz)	%				1.5	
Flicker	dB				-20	

Note 1: Measurement method

The LCD module should be stabilized at given temperature for 0.5 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.
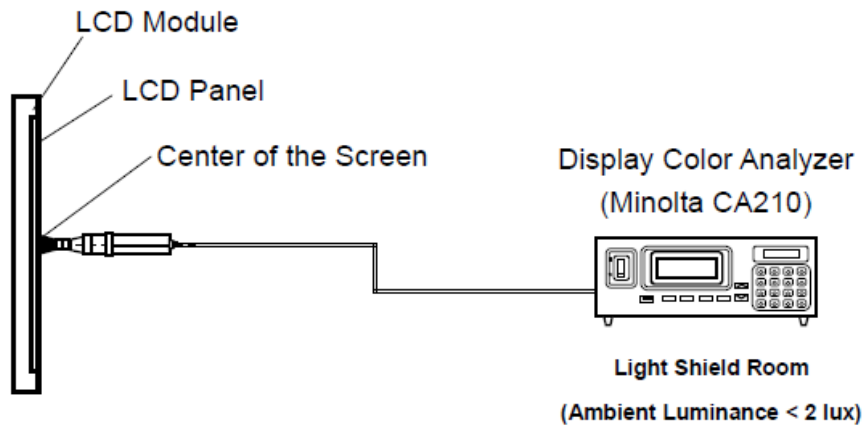

Note 2: Definition of viewing angle
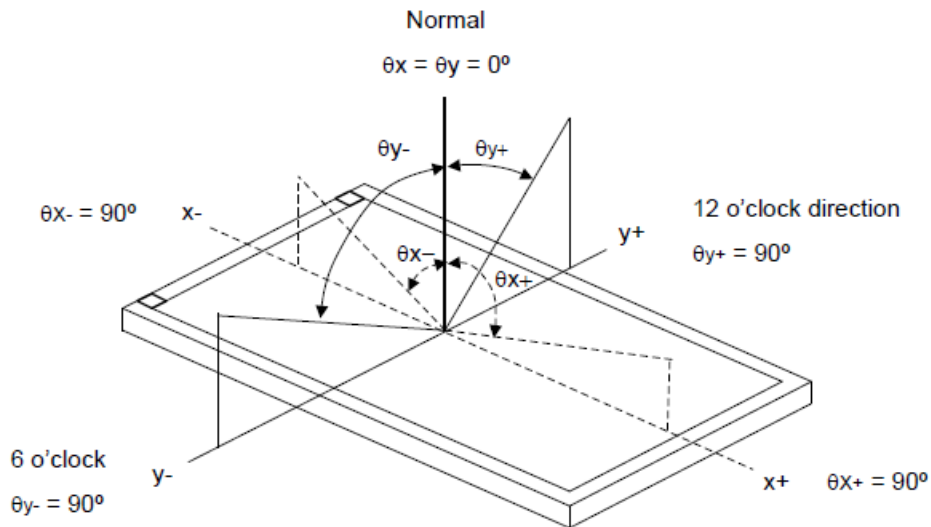
Note 3: Contrast ratio is measured by Minolta CA210

Note 4: Definition of Response time

The output signals of photo detector are measured when the input signals are changed from "Full Black" to "Full White" (rising time), and from "Full White" to "Full Black" (falling time), respectively. The response time is interval between the 10% and 90% of amplitudes. Please refer to the figure as below.
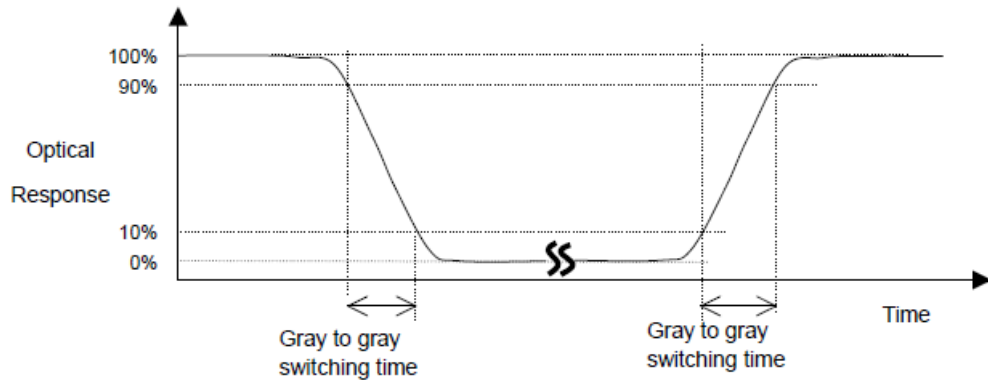
Note 5: Color chromaticity and coordinates (CIE) is measured by Minolta CA210

Note 6: Center luminance is measured by Minolta CA210

Note 7: Luminance uniformity of these 5 points is defined as below and measured by Minolta CA210
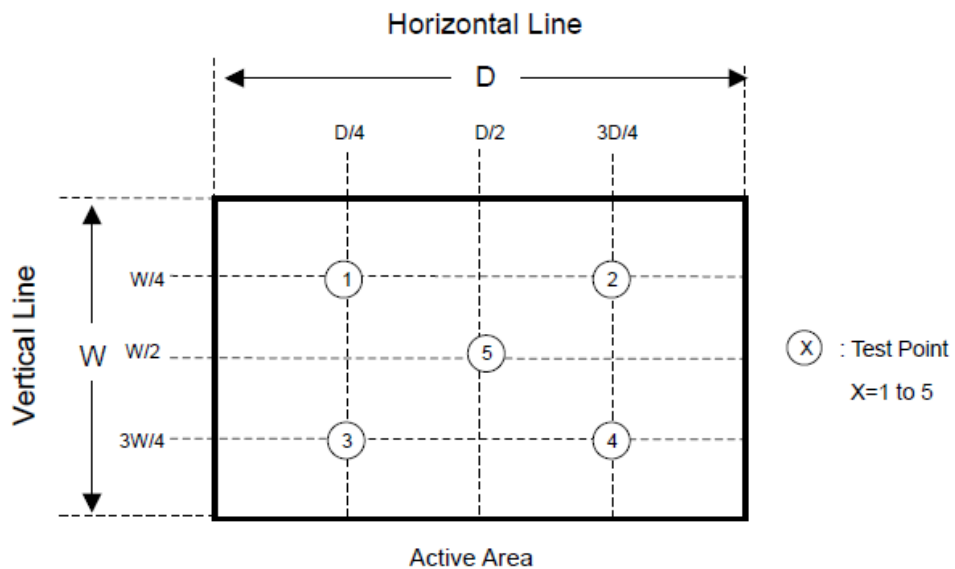
Uniformity = (Min. Luminance of 5 points) / (Max. Luminance of 5 points)

3. Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

3.1 TFT LCD module

Items	Symbol	Min	Max	Unit	Conditions
Logic supply voltage	V_{IN}	-0.3	4.0	Volt	Note 1, 2

3.2 Backlight unit

Items	Symbol	Min	Max	Unit	Conditions
LED forward Voltage			21.0	V	

3.3 Environment

Items	Symbol	Values			Unit	Conditions
		Min.	Typ.	Max.		
Operation temperature	T_{OP}	-20	-	70	^{0}C	
Operation Humidity	H_{OP}	10		85	%	Note 3
Storage temperature	T_{ST}	-30		80	^{0}C	
Storage Humidity	H_{ST}	5		90	%	

Note 1: With in Ta= 25℃

Note 2: Permanent damage to the device may occur if exceed maximum values

Note 3: For quality performance, please refer to IIS (Incoming Inspection Standard).

4. Electrical Characteristics

4.1 TFT LCD module

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power supply	VDD	2.8	3.3	3.3	V	-
Power supply Current	IVDD	TBD	TBD	TBD	mA	-
Input High Voltage	V_{IH}	0.7VDD	-	VDD	V	-
Input Low Voltage	V_{IL}	GND	-	0.3 VDD	V	-
Output High Voltage	V_{OH}	VDD-0.4	-	VDD	V	-
Output Low Voltage	V_{OL}	GND	-	GND+0.4	V	-
I/O Leak Current	ILI	-1	-	1	uA	-

4.2 Backlight unit
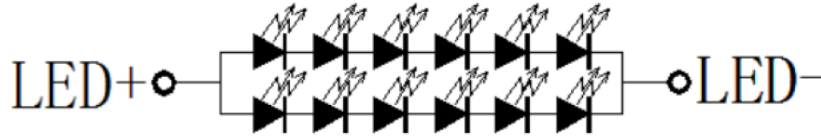
Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	16.2	18.6	21	V	If=40mA
Supply Current	If	-	40	-	mA	
Life Time	-	-	20000	-	Hr	If=40mA
Backlight Color	White					

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25°C and If =40mA.

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C and If =40mA. The LED lifetime could be decreased if operating If is larger than 40mA.
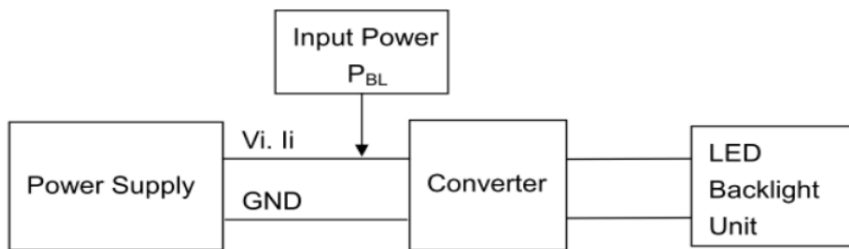
Note 3: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and If = 40mA.. The LED lifetime could be decreased if operating If is larger than 40mA.

Note 4: LED light bar circuit:
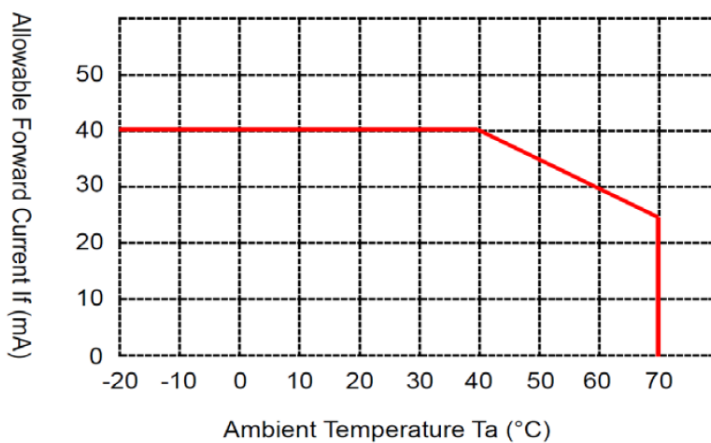
4.3 Interface connector

| PIN NO.	PIN NAME	DESCRIPTION
1	LED-	LED backlight (Cathode).
2	LED+	LED backlight (Anode).
3	GND	Ground.
4	VDD	Power supply& CTP Digital Power.
5~12	R0~R7	Red Data
13~20	G0~G7	Green Data
21~28	B0~B7	Blue Data
29	GND	Ground.
30	CLK	Clock
31	DISP	Display on/off
32	HSYNC	Horizontal sync input in RGB mode.
33	VSYNC	Vertical sync input in RGB mode.
34	DE	Data enable input. Active high to enable the input data bus.
35	NC	No connection
36	GND	Ground.
37	NC	No connection
38	NC	No connection
39	NC	No connection
40	NC	No connection

5. Timing characteristics

5.1 Parallel RGB interface timing characteristics

Hsync and Vsync timing

CCIR601 timing waveform VS_POL=H, HS_POL=L in Register R2)
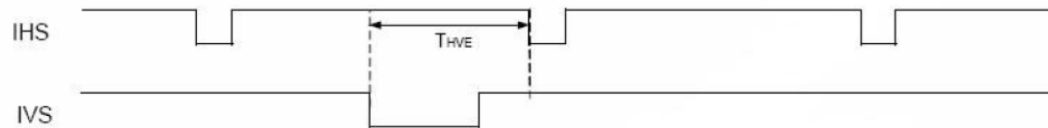
IHS and IVS timing

● Odd field
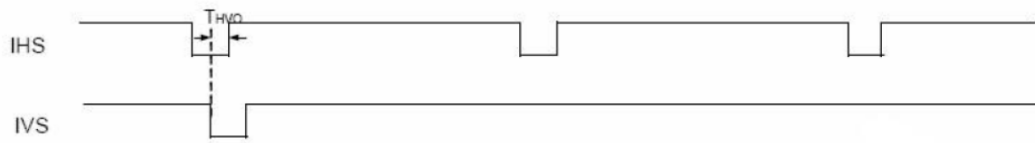
IHS and IVS waveforms in odd field

● Even field

IHS and IVS waveforms in even field

Hsync and horizontal control timing waveform
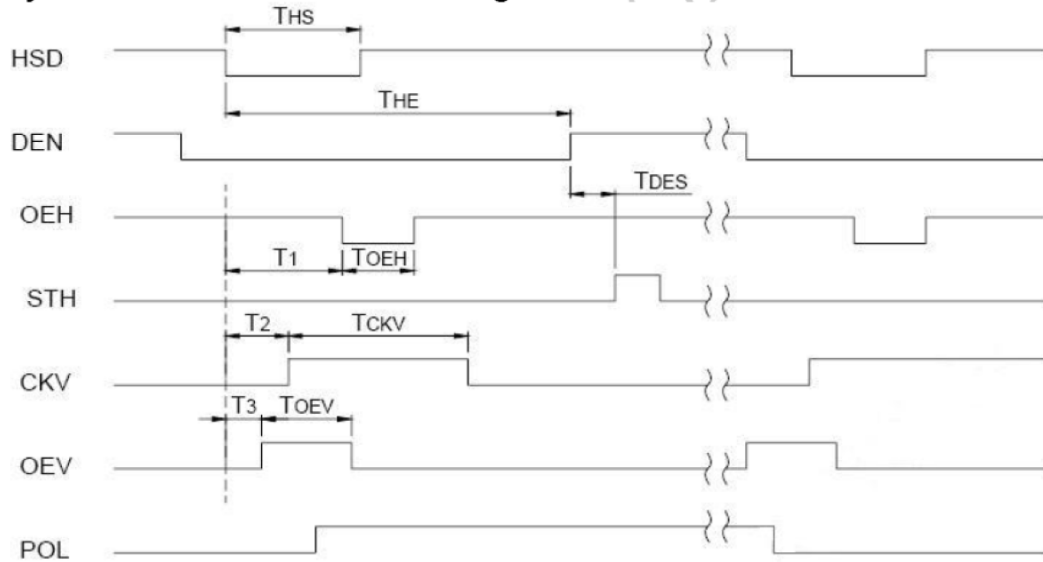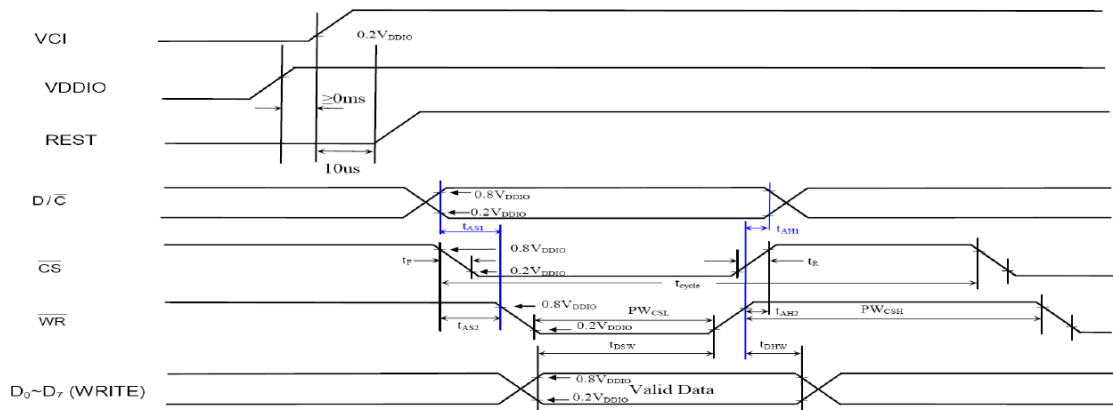
Hsync and vertical shift clock timing waveform
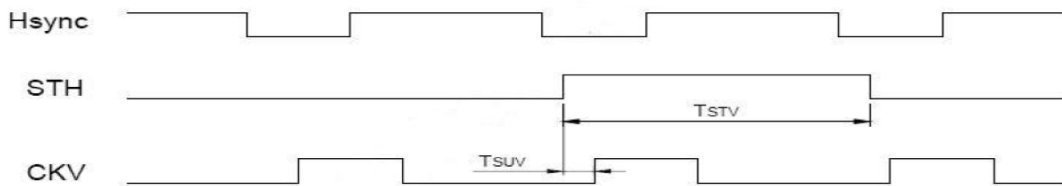
5.2 Reset timing characteristics
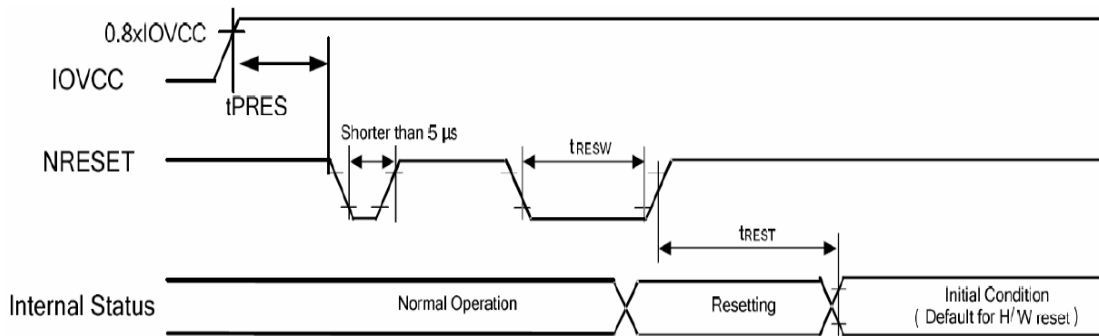
Symbol	Parameter	Related Pins	Spec.			Note	Unit
			Min.	Typ.	Max.		
tRESW	Reset low pulse width[1]	NRESET	10	-	-	-	µs
tREST	Reset complete time[2]	-	-	5	-	When reset applied during STB OUT mode	ms
		-	-	120	-	When reset applied during STB mode	ms
tPRES	Reset goes high level after Power on time	NRESET & IOVCC	1	-	-	Reset goes high level after Power on	ms

6. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta=40℃, 80%RH, 96hours	
High Temperature Operation (HTO)	Ta= 70℃, 50%RH, 96hours	
Low Temperature Operation (LTO)	Ta= -20℃, 96hours	
High Temperature Storage (HTS)	Ta= 80℃, 96hours	
Low Temperature Storage (LTS)	Ta= -30℃, 96hours	
Thermal Shock Test (TST)	-20℃/30min, 60℃/30min, 100 cycles	
ESD (ElectroStatic Discharge)	Air Discharge: ± 8KV, 150pF(330Ω) 10 times/ point.	

Note 1: The TFT-LCD module will not sustain damage after being subjected to 100 cycles of rapid temperature change. A cycle of rapid temperature change consists of varying the temperature from -10℃ to 50℃, and back again. Power is not applied during the test. After temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

Note 2: In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.

Note 3: EL evaluation should be accepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.

Note 4: Failure Judgment Criterion: Basic Specification Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

7. Shipping package
(TBD)

8. Mechanical Characteristics

NOTE:

1. DISPLAY TYPE:4.3"TFT, TRANSMISSIVE
2. DRIVER IC: HX8257A-M
3. VIEWING DIRECTION: 12'CLOCK
4. OPERATING TEMPERATURE:-20°C~+70°C.
5. STORAGE TEMPERATURE:-30°C~+80°C.
6. BACKLIGHT TYPE:12 WHITE LEDS.
7. LED:IF=20.0mA/LED (CONSTANT CURRENT).
8. MUST MEET THE REQUIREMENT OF ROHS

DETAIL. A

P=0.198
P=0.066
W=0.056
S=0.010
0.010
0.188
0.198

BACKLIGHT DIAGRAM
VF:18.6V;IF=40mA;1000nits(Typ)

FHI9SC-40S-0.5SH

45.98±0.5   *67.2±0.2 OUTLINE
56.6 BZ OPENING   2.85
53.86 LCD A.A   4.18
18.41±0.5
48.14±0.3
*105.5±0.2 OUTLINE
98.8 BZ OPENING
95.04 LCD A.A
(52.88)
-3.35
-5.36
4.3"TFT 480*RGB*272
12 o'clock
铺实体铜（GND）
TAPE(T0.05)
(1.29)
(9.88)
24.19±1   (36.1)

1.5 Max.   FRONT
BACK
-0.3±0.05   -2.95±0.2

铺实体铜（GND）
铺网格铜（GND）
5±0.5

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PIN	FUNCTION description
1	VLED-
2	VLED+
3	VLED+
4	GND
5	VDD
6	R0
7	R1
8	R2
9	R3
10	R4
11	R5
12	R6
13	R7
14	G0
15	G1
16	G2
17	G3
18	G4
19	G5
20	G6
21	G7
22	B0
23	B1
24	B2
25	B3
26	B4
27	B5
28	B6
29	B7
30	GND
31	CLK
32	DISP
33	HSYNC
34	VSYNC
35	DE
36	NC
37	GND
38	NC(XR)
39	NC(YD)
40	NC(XL)
40	NC(YU)

REV	DESCRIPTION	DRAWER	CHECKER	DATE