



PRODUCT SPECIFICATION

KADI Model: **KD156WUHD03**

CUSTOMER Model: **-**

Description: **15.6' HDMI Display Module**

Version: **1.0**

KADI	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE	LXM	WHB	HZL
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CUSTOMER APPROVAL	SIGNATURE	DATE



Record of Revisions

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1. General Specifications

1.1 LCM General Information

Item	Specification	Unit
LCD Size	15.6	inch
Number of Pixels	1920 (H) RGB x 1080 (V)	pixels
Display Mode	Normally Black	-
Viewing Direction	Free	o' clock
Video Interface	HDMI 1.4a / Type-C 3.1	-
Display Colors	16.7M	colors
Outline Dimension	361.7 (H) x 217.7 (V) x 22.7 (D)	mm
Active Area	344.2 (H) x 193.6 (V)	mm
Pixel Pitch	0.17925 (H) x 0.17925 (V)	mm
Operation Temperature	-20~70	°C
Storage Temperature	-30~80	°C
Power Input	DC 6~27V	-

Note1: Requirements on environmental protection RoHS compliant.

1.2 Touch Panel Information

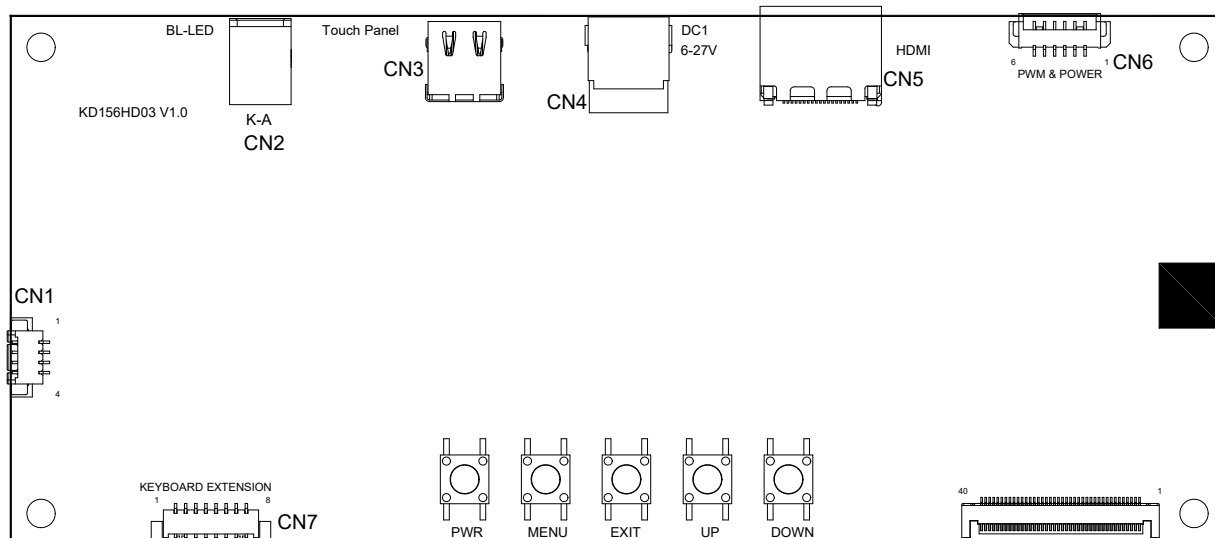
Item	Specification
Touch Structure	G+G
Bonding Type with LCM	OCA Optical Bonding
Driver IC	ILI2511
Interface	USB
Touch Count Max	10 Points
Surface treatment	3A(AG/AR/AF), UV-resistant
Surface hardness	3H



2. Interface

2.1 PCB overview

Picture below shows the connectors exact placement and their descriptions.



2.2 Connector Description

Item	Type	Description
CN1	CTP	USB (4P-1.25mm)
CN3	USB-C	Type C Video Signal and USB Touch
CN4	Power Jack	DC Jack (5.9mm OD/2.1mm ID)
CN5	HDMI	HDMI 1.4a
CN6	PWM & Power	PWM Control Signal and Power (6P-1.25mm)
CN7	External OSD keyboard	Power/Menu/Exit/Down/Up (8P-1.25mm)

2.3 CN1(CTP) 4PIN-1.25mm

Pin No.	Symbol	Description
1	VBUSIN	USB Power, 5V
2	DN	USB differential pair, position 1, negative
3	DP	USB differential pair, position 1, positive
4	GND	Ground



2.4 CN3(USB-C)

Pin No.	Symbol	Description
A1	GND	Ground
A2	TX1+	SuperSpeed differential signal, positive
A3	TX1-	SuperSpeed differential signal, negative
A4	VBUS	VBUS Power;5V
A5	CC1	Configuration channel
A6	D+(NC)	USB differential pair, position 1, positive
A7	D-(NC)	USB differential pair, position 1, negative
A8	SBU1	Sideband use
A9	VBUS	VBUS Power;5V
A10	RX2-	SuperSpeed differential signal, positive
A11	RX2+	SuperSpeed differential signal, negative
A12	GND	Ground
B1	GND	Ground
B2	TX2+	SuperSpeed differential signal, positive
B3	TX2-	SuperSpeed differential signal, negative
B4	VBUS	VBUS Power;5V
B5	CC2	Configuration channel
B6	D+(NC)	USB differential pair, position 2, positive
B7	D-(NC)	USB differential pair, position 2, negative
B8	SBU2	Sideband use
B9	VBUS	VBUS Power;5V
B10	RX1-	SuperSpeed differential signal, positive
B11	RX1+	SuperSpeed differential signal, negative
B12	GND	Ground

2.5 CN4(DC) 5.9mm OD/2.1mm ID

Pin No.	Symbol	Description
1	VDD	Power supply DC; 6~27V
2	GND	Ground



2.6 CN5(HDMI)

No.	Symbol	Description
1	TMDS_Data 2+	TMDS differential signal 2+
2	TMDS_Data 2_S	Data2 shielding ground
3	TMDS_Data 2-	TMDS differential signal 2-
4	TMDS_Data 1+	MDS differential signal 1+
5	TMDS_Data 1_S	Data1 shielding ground
6	TMDS_Data 1-	TMDS differential signal 1-
7	TMDS_Data 0+	TMDS differential signal 0+
8	TMDS_Data 0_S	Data0 shielding ground
9	TMDS_Data 0-	TMDS differential signal 0-
10	TMDS_CLK+	TMDS differential signal Clock+
11	TMDS_CLK_S	Clock shielding ground
12	TMDS_CLK-	TMDS differential signal clock-
13	CEC	Electronic protocol CEC
14	NC	No connection
15	SCL	IIC clock Line
16	SDA	IIC data Line
17	DDC/CEC_GND	Data display channel
18	+5V	HDMI 5V
19	HOT_PLUG_DET	Hot plug detect

2.7 CN6(PWM & Power)6P-1.25mm

Pin No.	Symbol	Description
1	GND	Ground
2	GND	Ground
3	PWM	PWM dimming control
4	EN	Backlight on/off control
5	VCC	Power for LED backlight
6	VCC	Power for LED backlight



2.8 CN7(External OSD keyboard) 8PIN-1.25mm

Pin No.	Symbol	Description
1	DOWN	Page down
2	UP	Page up
3	EXIT	Exit
4	MENU	Menu
5	PWR	Power on/off
6	LED_EN	LED Enable; Output signal 3.3V
7	GND	Ground
8	Keyboard VDD	Keyboard VDD, Output 3.3V



3. Electrical Characteristics

3.1 Recommended Operating Condition for TFT LCD

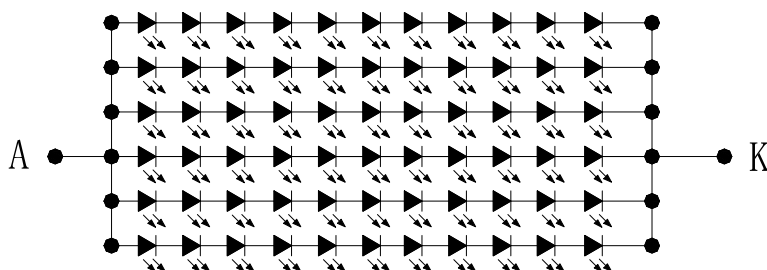
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Analog Supply voltage	VDD	3.0	3.3	3.6	V	

3.2 Recommended Driving Condition for Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Driving Current	I _{BLU}	-	420	-	mA	
Driving Voltage	V _{BLU}	29.7	-	37.4	V	
Power consumption	W _{BLU}	12.47	-	15.71	W	
LED Life-Time	N/A	-	50,000	-	Hours	Ta=25℃ Note 1

Note 1:LED lifetime is defined as the module brightness decay 50% of original brightness at Ta=25 degree, typical current.

Note 2:LED circuit :



CIRCUIT DIAGRAM

3.3 Touch Panel (USB-C)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply voltage	USB_VDD (5V)	-	5.0	-	V	



4. Optical Specifications

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR $\geq$ 10) B/L ON	θ_T	$\Phi=90^\circ$ (12 o'clock)	80	85	-	deg	Note2
	θ_B	$\Phi=270^\circ$ (6 o'clock)	80	85	-	deg	Note2
	θ_L	$\Phi=180^\circ$ (9 o'clock)	80	85	-	deg	Note2
	θ_R	$\Phi=0^\circ$ (3 o'clock)	80	85	-	deg	Note2
Response Time	$T_{ON}+T_{OFF}$	Normal $\theta=\Phi=0^\circ$	-	25	30	msec	Note4
Contrast Ratio	CR		700	800	-	-	Note1 Note3
Color Chromaticity	W_X		0.275	0.325	0.375	-	Note1 Note5
	W_Y		0.316	0.366	0.416	-	Note1 Note5
Luminance	L		-	1000	-	cd/m ²	Note1 Note7
NTSC	-		67	72	-	%	-

Note 1: Definition of optical measurement system

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.

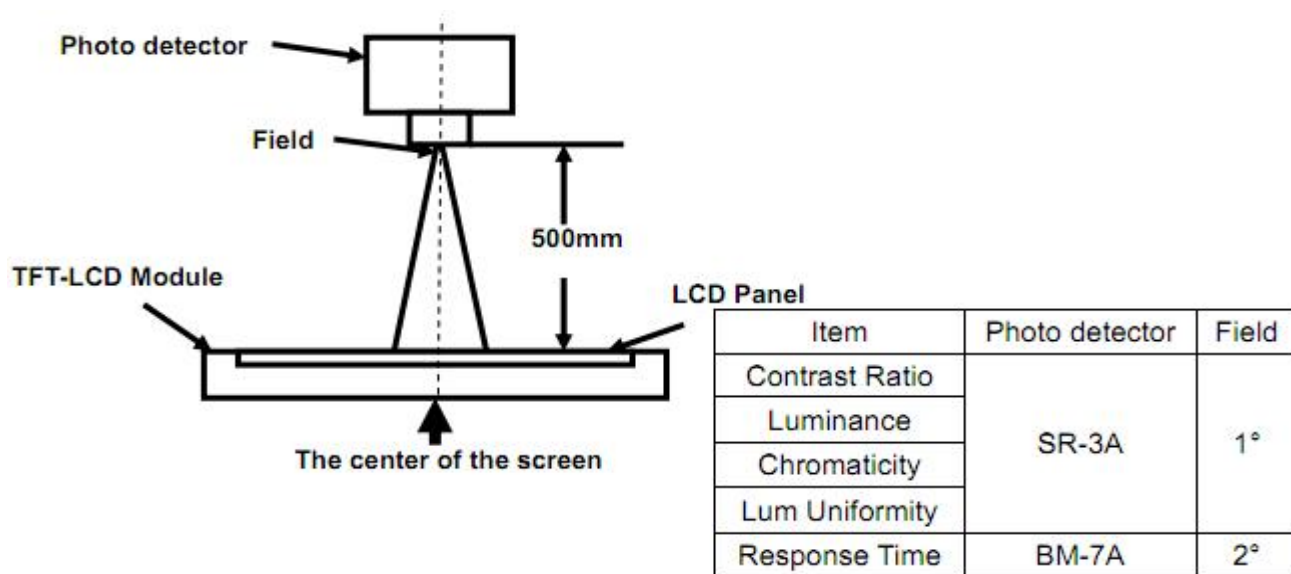


Fig 1

Note 2: Definition of viewing angle range and measurement system.
viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).

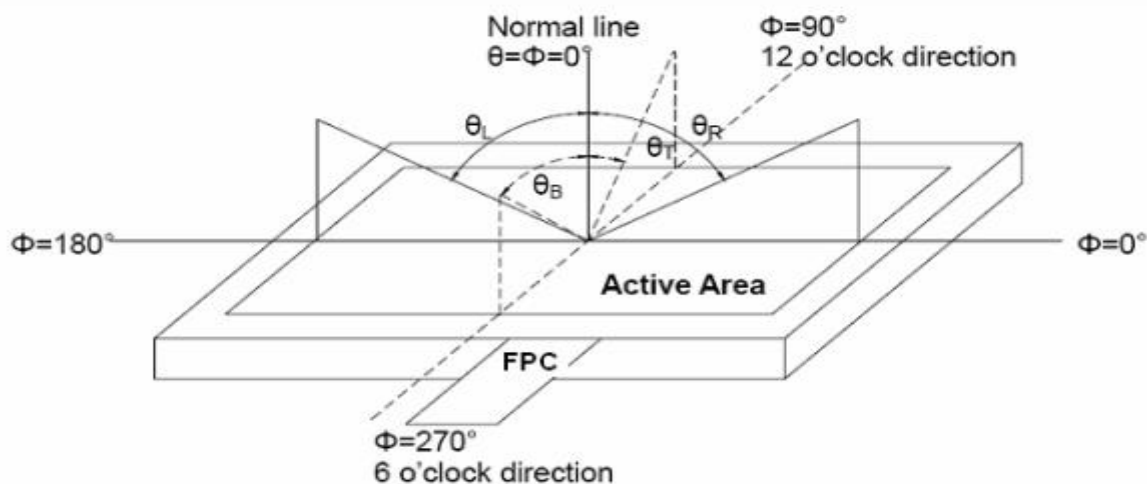


Fig 2 Definition of viewing angle

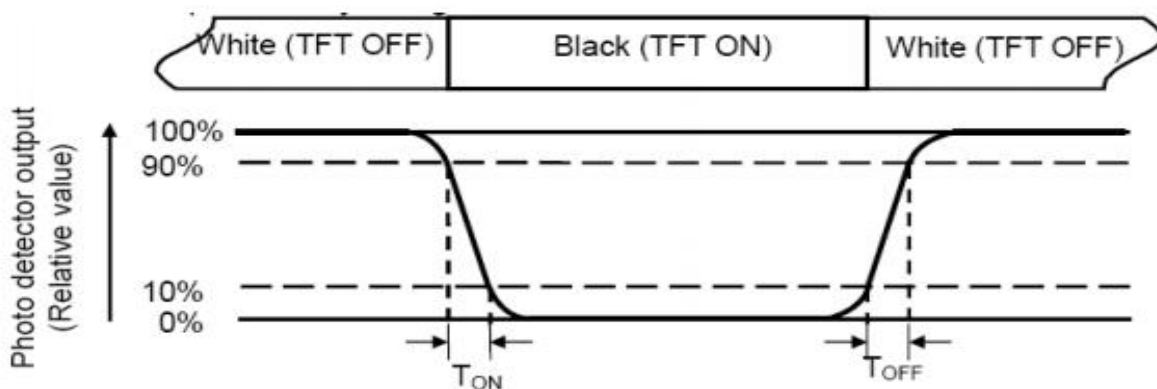
Note 3: Definition of contrast ratio

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$



Note 4: 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 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance. For more information see FIG.3-a/b

Note 7: Surface luminance is the luminance with all pixels displaying white.

L_v = Average Surface Luminance with all white pixels ($P_1, P_2, P_3, \dots, P_n$)

For more information see FIG.3-a/b

Note 8: Size : $S \leq 5"$ (see Figure a) A : 5 mm B : 5 mm. H, V : Active area

Light spot size $\varnothing = 5\text{mm}$ (BM-5) or $\varnothing = 7.7\text{mm}$ (BM-7) 50cm distance or test spot position : see Figure a.

measurement instrument : TOPCON's luminance meter SR-3A or BM-7 or compatible (see Figure 1).

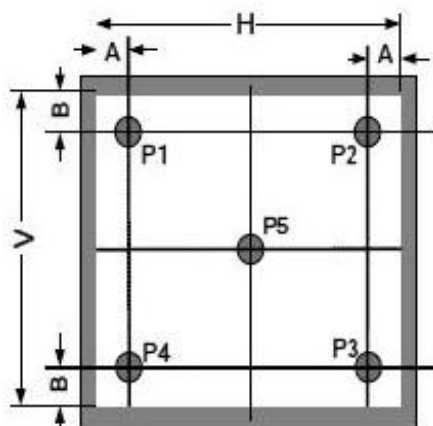


Fig. 3-a Definition of points



$5'' < S \leq 12.3''$ (see Figure b) . H,V : Active area

Light spot size $\varnothing = 5\text{mm}$ (BM-5) or $\varnothing = 7.7\text{mm}$ (BM-7) 50cm distance or compatible distance from the LCD surface to detector lens. test spot position : see Figure b.

measurement instrument : TOPCON's luminance meter SR-3A or BM-7 or compatible (see Figure 1).

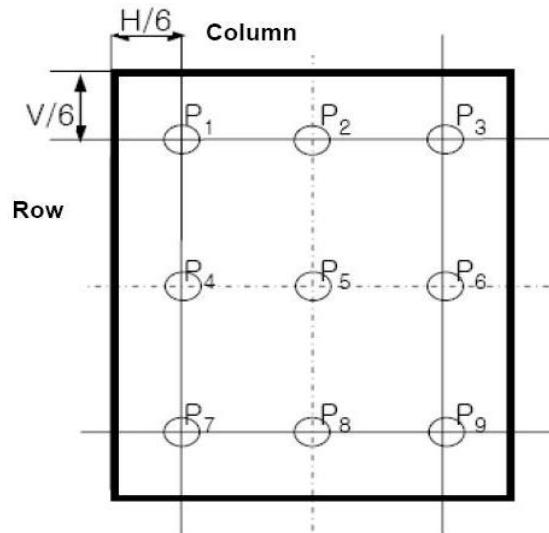


Fig. 3-b Definition of points



5. Reliability Test Items

Test Item	Test Conditions
High Temperature Storage	Ta= +70℃ 120hrs
Low Temperature Storage	Ta= -20℃ 120hrs
High Temperature Operation	Ta= +80℃ 120hrs
Low Temperature Operation	Ta= -30℃ 120hrs
High Temperature and Humidity Storage	Ta= +60℃, 90% RH 120hrs
Thermal Shock (Non-operation)	-30℃/30 min ~ +80℃/30 min for 20 cycles Start with cold temperature end with high temperature
Electro Static Discharge	Contact = ± 4 kV, class B Air = ± 8 kV, class B R=330Ω,C=150pF
Vibration	Sweep: 10Hz~55Hz~10Hz Stroke: 1.5mm 2 hrs for each direction of X .Y. Z.
Mechanical Shock	60G 6ms,±X,±Y,±Z 3 times for each direction
Package Drop Test	Height: 60 cm 1 corner, 3 edges, 6 surfaces

Notes: The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted. The sample will not be accepted if appear these defects:

- 1). Air bubble in the LCD
- 2). Seal leak or Glass crack
- 3). Non display or abnormal display
- 4). Brightness reduction >50%





7. Packing

Packing Method

Steps:

1. Put module into tray cavity
2. Tray stacking
3. Put 1 cardboard under the tray stack and 1 cardboard above
4. Fix the cardboard to the tray stack with adhesive tape
5. Put the tray stack into carton
6. Carton sealing with adhesive tape



8. Precautions for Use of LCD modules

8.1 Handling Precautions

8.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

8.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

8.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

8.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

8.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketene
- Aromatic solvents

8.1.6. Do not attempt to disassemble the LCD Module.

8.1.7. If the logic circuit power is off, do not apply the input signals.

8.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

8.1.8.1. Be sure to ground the body when handling the LCD Modules.

8.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

8.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

8.1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

8.2 Storage Precautions

8.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

8.2.2. The LCD modules should be stored under the storage temperature range if the LCD modules will be stored for a long time, the recommend condition is :

Temperature : 0℃ ~40℃ Relatively humidity: ≤80%

8.2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

8.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.