



RVA35HI-NUCLEO144A

## HB, IPS 3.5" LCD TFT DATASHEET

Rev.1.0

2024-06-19

ITEM	CONTENTS	UNIT
LCD Type	TFT/Transmissive/Normally black/IPS	/
Size	3.5	Inch
Viewing Direction	Free	/
Outside Dimensions (W x H x D)	93.95 x 70.45 x 19.80	mm
Active Area (W x H)	73.44 x 48.96	mm
Pixel Pitch (W x H)	0.153 x 0.153	mm
Resolution	320 (RGB) x 480	/
Brightness	1200	cd/m <sup>2</sup>
LCD Interface Type	RGB / SPI	/
LCD Driver	ILI9488	
Color Depth	262K	/
Pixel Arrangement	RGB Vertical Stripe	/
With/Without Touch	With Projected Capacitive Touch Panel	/
CTP Driver	ILI2130	/
Touch Interface Type	I2C	/
Bonding Technology	Optical Bonding	/
Weight	170	g

**Note 1.** RoHS3 compliant

**Note 2.** LCM weight tolerance:  $\pm 5\%$ .



## 1. REVISION RECORD

REV NO.	REV DATE	CONTENTS	REMARKS
1.0	2024-06-19	First Release	



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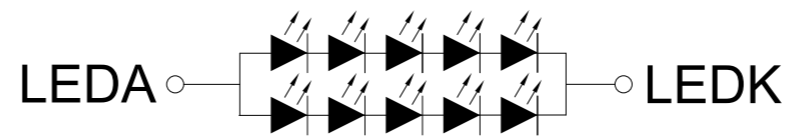
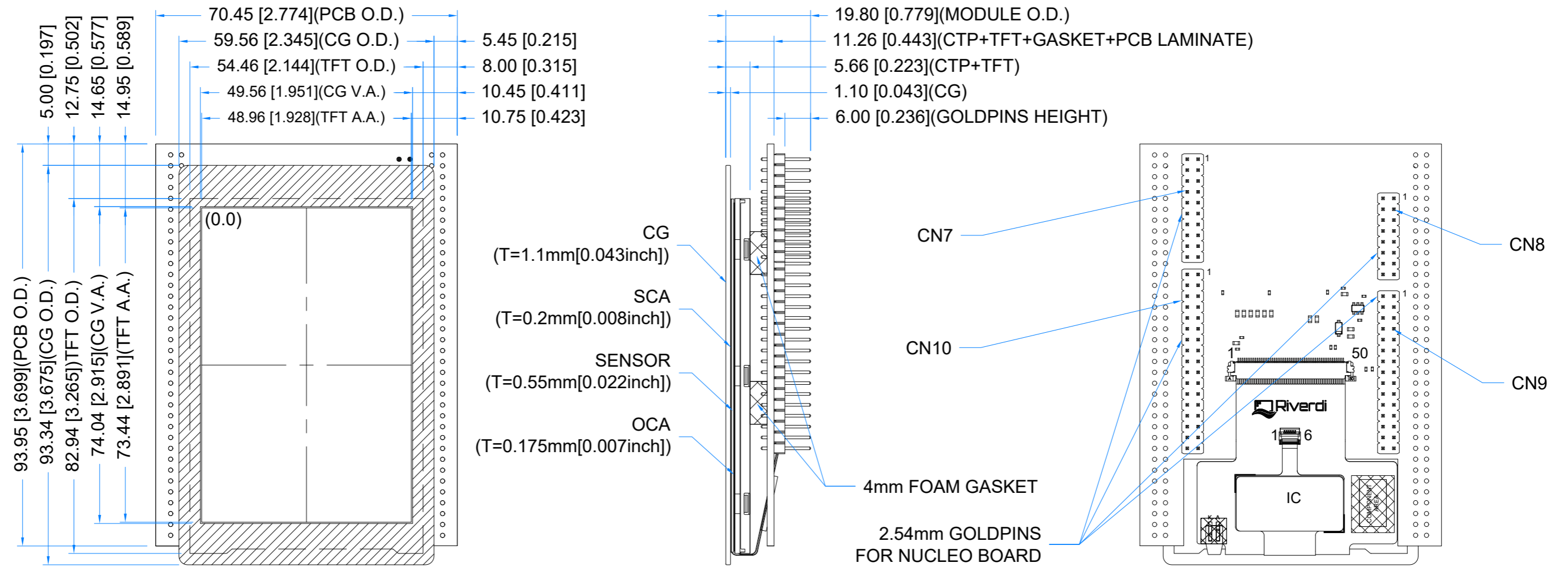


### 3. MODULE CLASSIFICATION INFORMATION

RV	A	35	H	I	NUCLEO	144	A
1.	2.	3.	4.	5.	6.	7.	8.

NO.	PARAMETER	SYMBOL
1.	BRAND	RV – Riverdi
2.	PRODUCT TYPE	A – Accessories
3.	DISPLAY SIZE	35 – 3.5"
4.	MODEL SERIAL NO.	H – High Brightness, IPS
5.	RESOLUTION	I – 320 x 480 px
6.	INTERFACE	Nucleo – goldpins for Nucleo board, RGB - display, I2C – touch panel
7.	NUMBER OF PINS	144
8.	VERSION	A – 8MB NOR Flash memory

Revision:	Changes:	Date:
1.0	Initial Case	2024.06.19



Backlight Circuit Diagram

**TFT NOTES:**

1. DISPLAY TYPE: TFT, TRANSMISSIVE, NORMALLY BLACK
2. RESOLUTION: 320x480
3. VIEWING ANGLE: FREE
4. SURFACE LUMINANCE: 1200cd/m<sup>2</sup>
5. BACKLIGHT: 10 LEDS

**TP NOTES:**

1. TP STRUCTURE: G+G
2. DRIVER IC: ILI2130
3. SURFACE HARDNESS:>6H

**GENERAL NOTES:**

1. OPERATING TEMPERATURE: -20°C ~ 70°C
2. STORAGE TEMPERATURE: -30°C ~ 80°C
3. WITHOUT INDIVIDUAL TOLERANCE: ±0.3mm
4. RoHS COMPLIANT

PN: RVA35HI-NUCLEO144A

SN:

DRAWN: M.Natywa

2024.06.19

1:1.00

CHECKED: M.Wierzbowski

2024.06.19

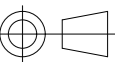
[mm]

APPR: T.Soldat

2024.06.19

ISO A3

P. 1 of 1





## 5. ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Supply Voltage for Module	VDD	-0.3	3.3	V	Note 1
Digital I/O signals (SPI/QSPI/GPIO) Voltage	IOVCC	-0.3	3.3		
Supply voltage for Backlight	BLVDD	-0.3	6.0		
Operating Temperature	T <sub>OP</sub>	-20	70	°C	
Storage Temperature	T <sub>ST</sub>	-30	80	°C	
Storage Humidity (@ 25 ± 5°C)	H <sub>ST</sub>	10	-	% RH	
Operating Ambient Humidity (@ 25 ± 5°C)	H <sub>OP</sub>	10	-	% RH	

**Note 1.** The absolute maximum rating values must not be exceeded at any times. The module MUST NOT be used when any of the absolute maximum ratings is exceeded. The characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

## 6. ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Supply Voltage	VCC	2.5	2.8	3.3	V
Supply Current	ICC	-	50	-	mA
Interface Supply Voltage	IOVCC	1.7	1.8	3.3	V
Input High Voltage for LCD	VIH	0.7*IOVCC	-	IOVCC	V
Input Low Voltage for LCD	VIL	-0.3	-	0.3*IOVCC	V
Output High Voltage for LCD	VOH	0.8*IOVCC	-	IOVCC	V
Output Low Voltage for LCD	VOL	-0.3	-	0.3*IOVCC	V

## 7. BACKLIGHT ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Backlight Driving Voltage	VLED	2.7	5	5.5	V	
Backlight Driving Current	ILED	-	200	-	mA	Note 3
LED Lifetime	-	-	30,000	-	hours	Note 1,2

**Note 1.** Optical performance should be evaluated at T<sub>a</sub>=25 °C only.

**Note 2.** Operating life means the period in which the LED brightness goes down to 50% of the initial brightness. Typical operating lifetime is the estimated parameter.

**Note 3.** Current measured with 100% backlight intensity.



## 8. ELECTRO-OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	RMK	NOTE
Response Time	Tr+Tf	θ=0° φ=0° Ta=25 °C	-	30	-	ms	FIG 1.	4
Contrast Ratio	Cr		-	700	-	---	FIG 2	1
Surface Luminance	Lv		-	1200	-	cd/m <sup>2</sup>		2
Viewing Angle Range	θ	θ = 90° θ = 270° θ = 0° θ = 180°	-	80	-	deg	FIG 3.	6
			-	80	-	deg		
			-	80	-	deg		
			-	80	-	deg		
CIE (x, y) Chromaticity	Rx	θ=0° φ=0° Ta=25 °C	-	0.660	-	-	FIG 2.	5
	Ry		-	0.325	-	-		
	Gx		-	0.277	-	-		
	Gy		-	0.568	-	-		
	Bx		-	0.145	-	-		
	By		-	0.072	-	-		

**Note 1.** Contrast Ratio (CR) is defined mathematically as below, for more information see Figure 2.

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P3, P4, P5)}}$$

**Note 2.** Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see Figure 2.

$$L_v = \text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}$$

**Note 3.** The uniformity in surface luminance δ WHITE is determined by measuring luminance at each test position 1 through 5, and then dividing the minimum luminance of 5 points luminance by maximum luminance of 5 points luminance. For more information see Figure 2.

$$\delta \text{ WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Maximum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}$$

**Note 4.** Response time is the time required for the display to transition from white to black (Rise Time, Tr) and from black to white (Decay Time, Tf). For additional information see Figure 1. The test equipment is BM-7A.

**Note 5.** CIE (x, y) chromaticity, the x, y value is determined by measuring luminance at each test position 1 through 5, and then make average value.

**Note 6.** For TFT module the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to LCD surface. For more information see Figure 3.

**Note 7.** Viewing angle is measured at the center point of the LCD by CONOSCOPE (ergo-80). For response time testing, the testing data is based on BM-7A. Instruments for Contrast Ratio, Surface Luminance, Luminance Uniformity, Chromaticity the test data is based on SR-3A.

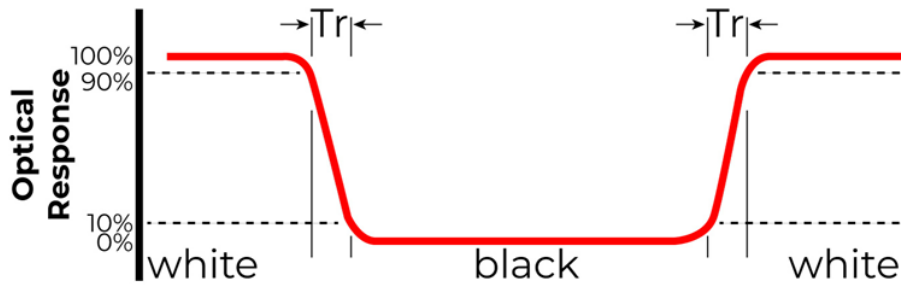
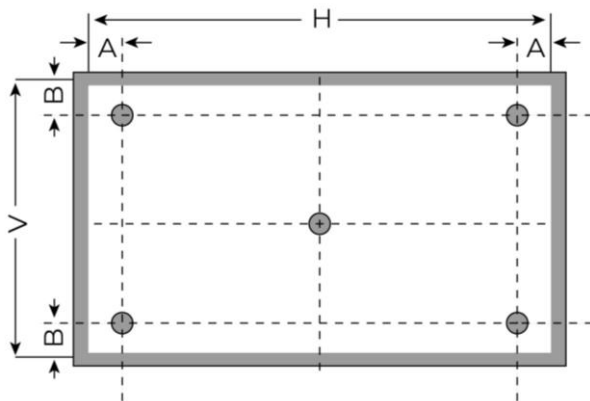


Figure 1. The definition of response time



A: 5mm

B: 5mm

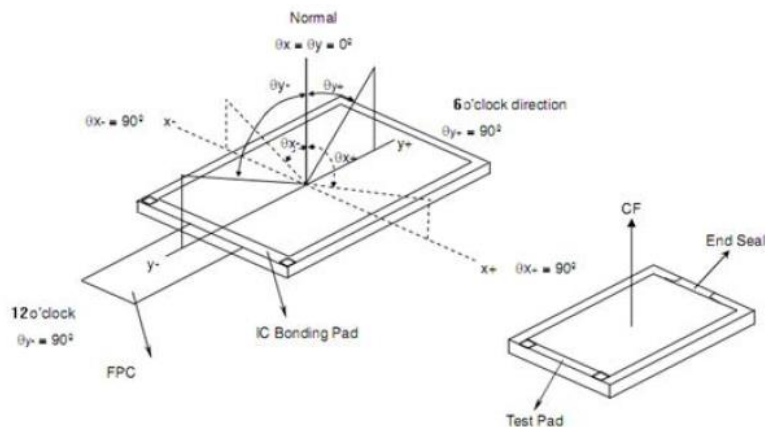
H, V: Active Area

Light spot size  $\varnothing=5\text{mm}$ , 500mm distance from the LCD surface to detector lens.

Measurement instrument is TOPCON'S luminance meter BM-5

Figure 2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity

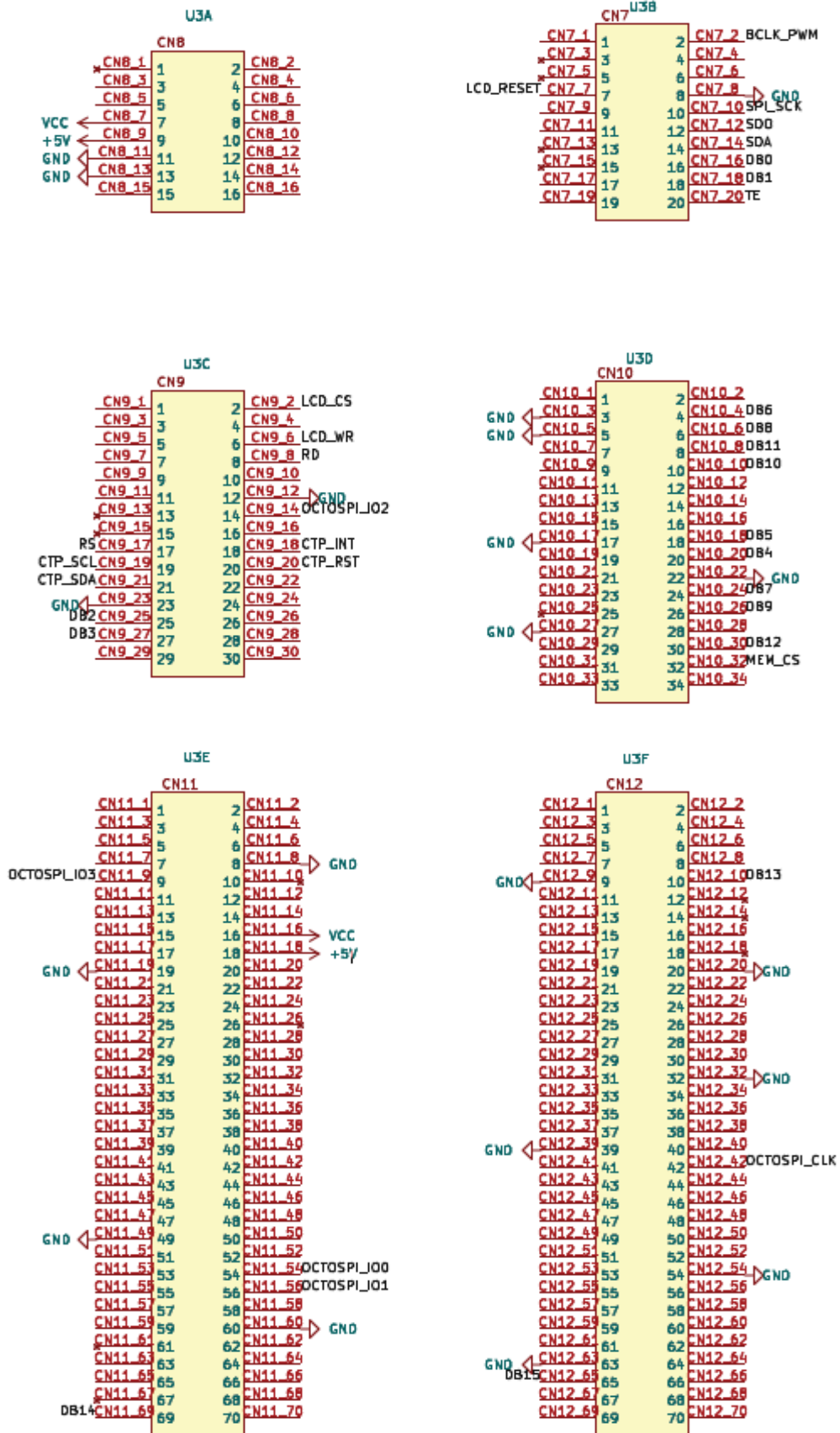
Figure 3. The definition of viewing angle







## 9. INTERFACES DESCRIPTION





### 9.1 CN7

NO.	SYMBOL	DESCRIPTION	I/O
2	BCLK_PWM	Backlight PWM	I
7	LCD_RESET	LCD RESET	I
8	GND	Ground	P
10	SPI_SCK	SPI serial clock	I
12	SDO	SPI serial data output	O
14	SDA	SPI serial data	I/O
16	DB0	Data bus 0	I/O
18	DB1	Data bus 1	I/O
20	TE	Tear effect signal	O

### 9.2 CN8

NO.	SYMBOL	DESCRIPTION	I/O
7	VCC	Power Supply 3.3V	P
9	VLED	Backlight Power Supply	P
11	GND	Ground	P
13	GND	Ground	P

### 9.3 CN9

NO.	SYMBOL	DESCRIPTION	I/O
2	LCD_CS	LCD chip select signal	I
6	LCD_WR	LCD WRITE ENALBE	I
8	LCD_RD	LCD OUTPUT ENABLE	I
12	GND	Ground	P
14	OCTOSPI_IO2	OCTOSPI data 2	I/O
17	LCD_RS	LCD DATA/COMMAND	I
18	CTP_INT	CTP Interrupt	O
19	CTP_SCL	CTP Serial clock	I
20	CTP_RST	CTP Reset	I
21	CTP_SDA	CTP Serial data	I/O
23	GND	Ground	P
25	DB2	Data bus 2	I/O
27	DB3	Data bus 3	I/O



## 9.4 CN10

NO.	SYMBOL	DESCRIPTION	I/O
3	GND	Ground	P
4	DB6	Data bus 6	I/O
5	GND	Ground	P
6	DB8	Data bus 8	I/O
8	DB11	Data bus 11	I/O
10	DB10	Data bus 10	I/O
17	GND	Ground	P
18	DB5	Data bus 5	I/O
20	DB4	Data bus 4	I/O
22	GND	Ground	P
24	DB7	Data bus 7	I/O
26	DB9	Data bus 9	I/O
27	GND	Ground	P
30	DB12	Data bus 12	I/O
32	MEM_CS	Memory chip select	I

## 9.5 CN11

NO.	SYMBOL	DESCRIPTION	I/O
8	GND	Ground	P
9	OCTOSPI_I03	OCTOSPI data 3	I/O
16	VCC	Power supply 3.3V	P
18	VLED	Backlight Power Supply	P
19	GND	Ground	P
49	GND	Ground	P
54	OCTOSPI_I00	OCTOSPI data 0	I/O
56	OCTOSPI_I01	OCTOSPI data 1	I/O
60	GND	Ground	P
69	DB14	Data bus 14	I/O

**Note** CN11 header is not soldered by default.

## 9.6 CN12

NO.	SYMBOL	DESCRIPTION	I/O
9	GND	Ground	P
10	DB13	Data bus	I/O
20	GND	Ground	P
32	GND	Ground	P
39	GND	Ground	P
42	OCTOSPI_CLK	OCTOSPI clock	I/O
54	GND	Ground	P
63	GND	Ground	P
65	DB15	Data bus	I/O

**Note** CN12 header is not soldered by default.



## 10. EXTERNAL MEMORY

ITEM	DESCRIPTION
Flash	NOR Flash
Size	64Mbit/8Mbyte
Interface	OCTOSPI

## 11. CAPACITIVE TOUCH SCREEN PANEL SPECIFICATIONS

### 11.1 Mechanical characteristics

DESCRIPTION	SPECIFICATION	REMARK
Touch Panel Size	3.5 inch	
Outline Dimension of CTP	59.56 mm x 93.34 mm	
Glass Thickness	1.1 mm	
CTP View Area	49.56 mm x 74.04 mm	
Sensor Active Area	48.96mm x 73.44 mm	
Surface Hardness	6H	

### 11.2 Electrical characteristics

DESCRIPTION	SPECIFICATION	REMARK
Controller	ILI2130	
Resolution	320 x 480	
Device address 7-bit	0x41	

## 12. INSPECTION

Standard acceptance/rejection criteria for TFT module

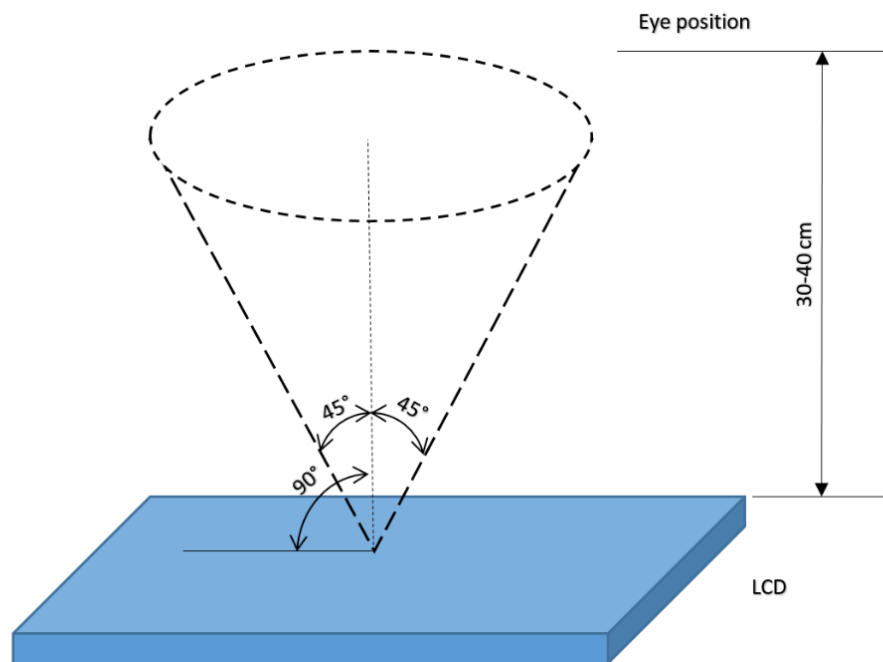
### 12.1 Inspection condition

Ambient conditions:

- Temperature:  $25 \pm 2^{\circ}\text{C}$
- Humidity:  $(60 \pm 10) \%RH$
- Illumination: Single fluorescent lamp non-directive (300 to 700 lux)

Viewing distance:  $35 \pm 5\text{cm}$  between inspector bare eye and LCD.

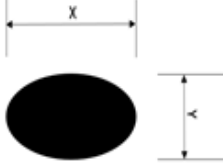

Viewing Angle: U/D:  $45^{\circ}/45^{\circ}$ , L/R:  $45^{\circ}/45^{\circ}$





### 12.2 Inspection standard

The LCD TFT has zero bad pixels. Please refer the item “Bright/Dark dots”.

ITEM		CRITERION		
Black spots, white spots, light leakage, Foreign Particle (round Type)	 <p><math>D=(x+y)/2</math> Spots density: 10 mm</p>	Size < 5"		
		Average Diameter	Qualified Qty	
		$D \leq 0.2$ mm	Ignored	
		$0.2 \text{ mm} < D \leq 0.3$ mm	N = 0	
		$0.5\text{mm} < D$	N = 0	
LCD black spots, white spots, light leakage (line Type)	 <p>Spots density: 10 mm</p>	Size < 5"		
		Length	Width	Qualified Qty
		$L \leq 1.8$	$W \leq 0.05$	Ignored
		$L \leq 0.8$	$0.05 < W \leq 0.1$	N ≤ 3
		-	$W > 0.1$	Not allowed
Bright/Dark Dots	Size < 5"			
	Item	Qualified Qty		
	Bright dots	1		
	Dark dots	1		
Total Bright and Dark Dots	1			
Clear spots	Size < 5"			
	Average Diameter	Qualified Qty		
	$D < 0.2$ mm	Ignored		
	$0.2 \text{ mm} < D < 0.3$ mm	4		
	$0.3 \text{ mm} < D < 0.5$ mm	2		
	$0.5 \text{ mm} < D$	0		
Spots density: 10 mm				
Touch panel spots	Size < 5"			
	Average Diameter	Qualified Qty		
	$D < 0.025$ mm	N ≤ 2		
	$0.025 \text{ mm} < D < 0.5$ mm	N ≤ 1		
$0.5 \text{ mm} < D$	Not allowed			
Touch panel white line scratch	Size < 5"			
	Length	Width	Qualified Qty	
	-	$W \leq 0.025$	N ≤ 2	
	$L \leq 5.0$	$0.025 < W < 0.05$	N ≤ 1	
-	$0.05 < W$	Not allowed		



### 13.LEGAL INFORMATION

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