



SPECIFICATION FOR LCM+CTP Module

MODULE No:	KD030NHFPN017-C015A
CUSTOMER:	

STARTEK	INITIAL	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

CUSTOMER	INITIAL	DATE
APPROVED BY		



Revision History

[illegible]

Part. No	KD030NHFPN017-C015A	REV	V1.0	Page 2 of 32
常 备 库 存 Stock For Sale	长 期 供 货 Long Time supply	支持小量 NO MOQ	品 种 齐 全 In Full Range	

Contents

1. Block Diagram	5
2. Outline dimension	6
3. Input terminal Pin Assignment	7
3.1 LCM Interface	7
3.2 CTP Interface	8
4. LCD Optical Characteristics	9
4.1 Optical specification	9
5. Electrical Characteristics	12
5.1 Absolute Maximum Rating	12
5.2 DC Electrical Characteristics	12
5.3 LED Backlight Characteristics	13
6. AC Characteristics	15
6.1 Serial Interface Characteristics (3-line serial):	15
6.2 RGB Interface Characteristics	16
6.3 Reset timing	17
7. CTP Specification	19
7.1 Electrical Characteristics	19
7.1.1 Absolute Maximum Rating	19
7.1.2 DC Electrical Characteristics (Ta=25°C)	19
7.1.3 AC Characteristics	20
7.2 POWER ON/Reset Sequence	21
8. LCD Module Out-Going Quality Level	23
8.1 VISUAL & FUNCTION INSPECTION STANDARD	23
8.1.1 Inspection conditions	23
8.1.2 Definition	23
8.1.3 Sampling Plan	24
8.1.4 Criteria (Visual)	25
9. Reliability Test Result	30
10. Cautions and Handling Precautions	31
10.1 Handling and Operating the Module	31
10.2 Storage and Transportation	31
11. Packing	32

Part. No	KD030NHFPN017-C015A	REV	V1.0	Page 3 of 32
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	

*** Description**

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This module is composed of a Transmissive type TFT-LCD Panel, driver circuit, back-light unit. The resolution of a 3.0 " TFT-LCD contains 360x640 pixels, and can display up to 16.7M colors.

*** Features**

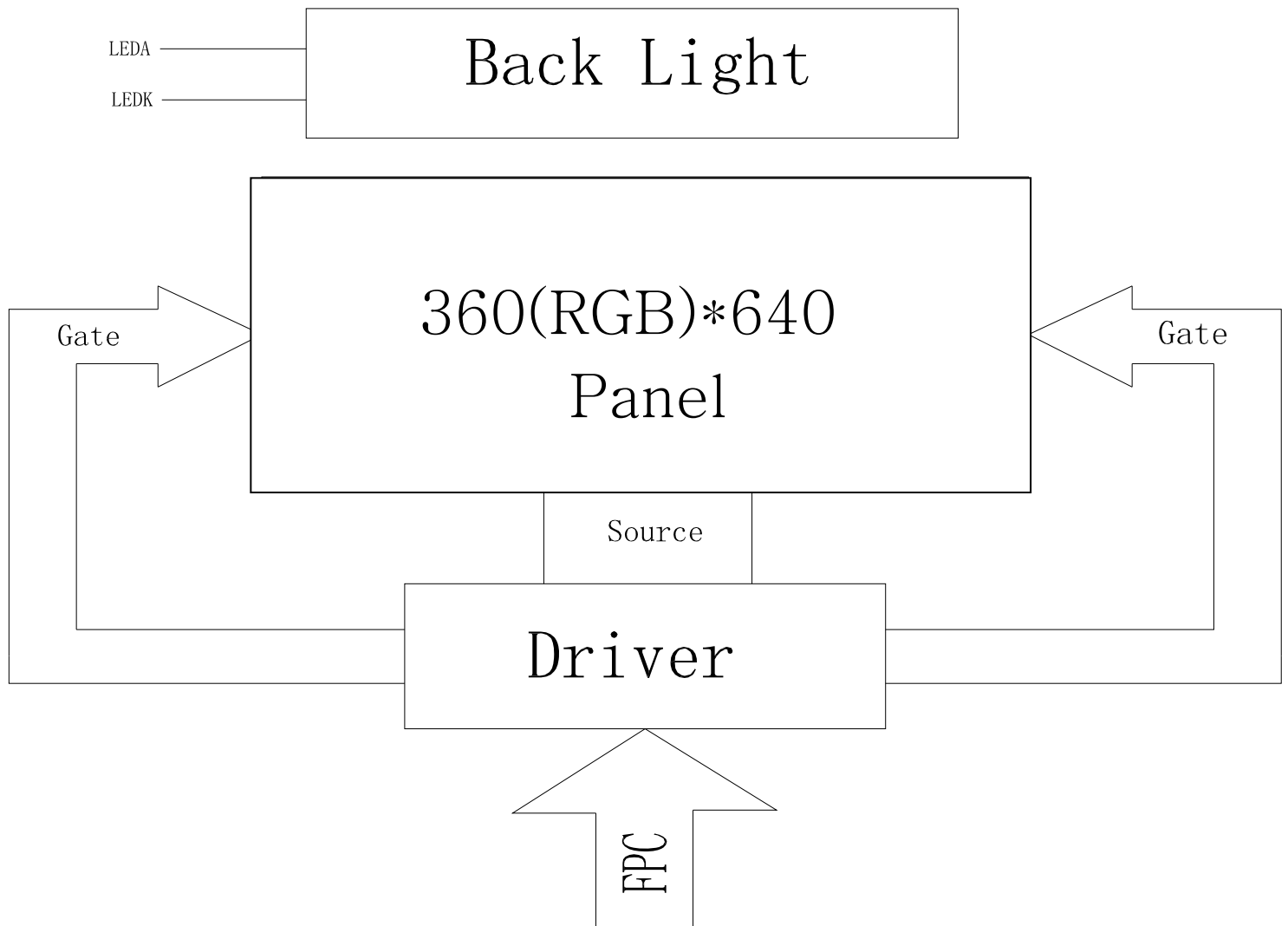
General Information	Items	Specification	Unit	Note
		Main Panel		
	Display area (AA)	36.72(H)*65.28(V) (3.0 inch)	mm	
	CTP area (AA)	37.52(H)*66.08(V)		
	Driver element	TFT active matrix	-	
	Display colors	16.7M	colors	
	Number of pixels	360(RGB)*640	dots	
	Pixel arrangement	RGB vertical stripe	-	
	Pixel pitch	0.102(H)*0.102(V)	mm	
	Viewing angle	ALL	o'clock	
	Controller IC	ST7701S	-	
	CTP Driver IC	FT5436	-	-
	LCM Interface	3-Line SPI+24-BIT RGB	-	
	Display mode	Transmissive /Normally Black	-	
	CTP And LCM Bonding Technology	Optical Bonding	-	
	Operating temperature	-20~+70	℃	
	Storage temperature	-30~+80	℃	

*** Mechanical Information**

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	52.57	-	mm	
	Vertical(V)	-	83.28	-	mm	
	Depth(D)	-	4.22	-	mm	
Weight		-	30	-	g	

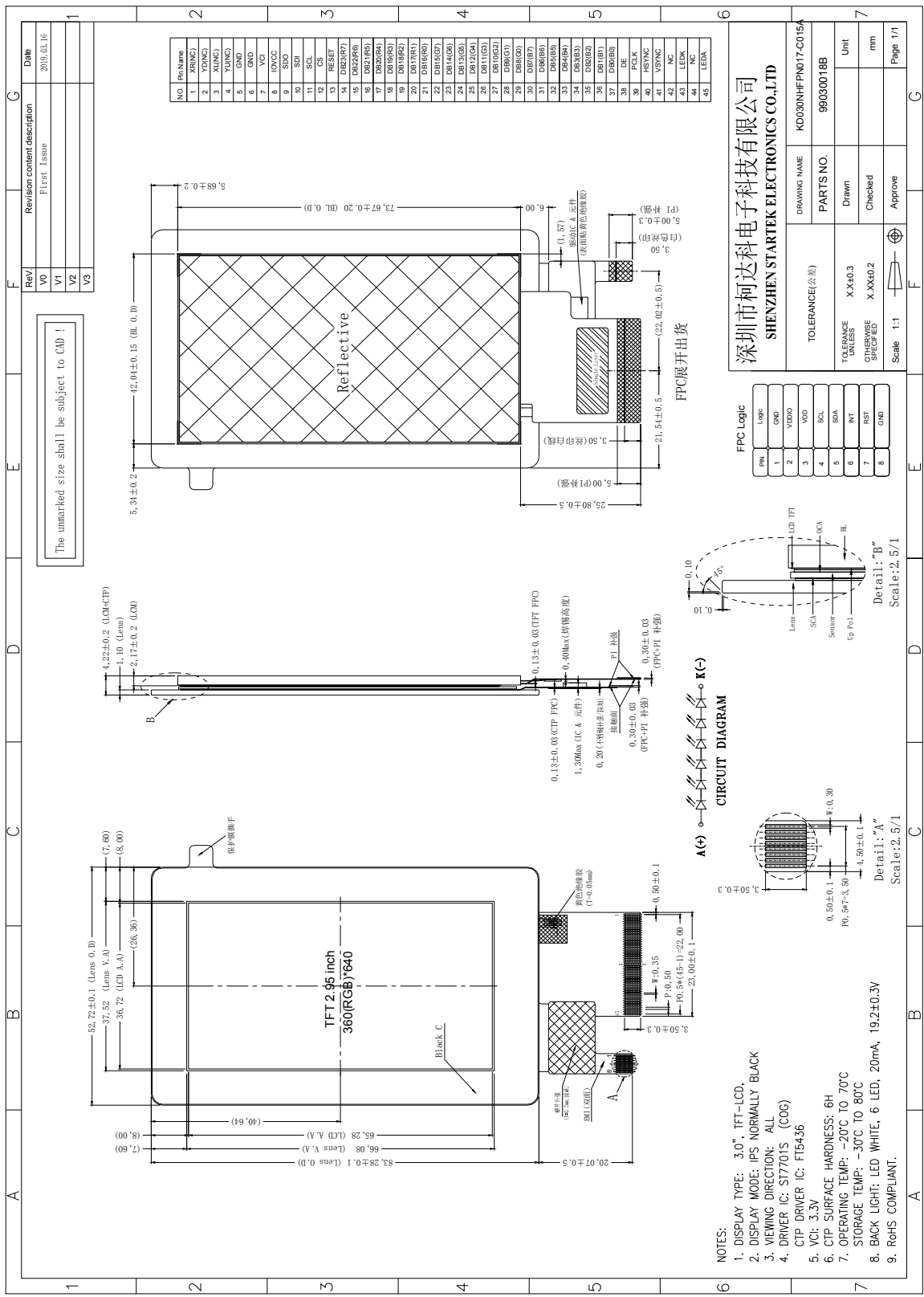
Part. No	KD030NHFPN017-C015A	REV	V1.0	Page 4 of 32
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	

1. Block Diagram



Part. No	KD030NHFPN017-C015A	REV	V1.0	Page 5 of 32
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	

2. Outline dimension



3. Input terminal Pin Assignment

3.1 LCM Interface

NO.	SYMBOL	DISCRIPTION	I/O
1	NC(XR)	No connection	--
2	NC(YD)	No connection	--
3	NC(XL)	No connection	--
4	NC(YU)	No connection	--
5	GND	Ground	P
6	GND	Ground	P
7	VCI	Supply Voltage 3.3V.	P
8	IOVCC	Supply Voltage(I/O) 1.8V.	P
9	SDO	Serial data output pin used for the SPI Interface. Leave the pin open when not in use.	O
10	SDI	SDA: Serial data input/output bidirectional pin for SPI Interface. Fix to IOVCC level when not in use.	I
11	SCL	SCL: Serial clock input for SPI interface. Fix to IOVCC or DGND level when not in use.	I
12	CS	A chip select signal. Low: the chip is selected and accessible. High: the chip is not selected and not accessible Fix to IOVCC or DGND level when not is use.	I
13	RESET	The external reset input.	I
14-37	DB23-DB0	A 24-bit parallel data bus for RGB Interface.	I/O
38	DE	Data enable signal for RGB interface operation Low: access enabled High: access inhibited Fix to IOVCC or DGND level when not in use.	I
39	PCLK	Dot clock signal for RGB interface operation Fix to IOVCC or DGND level when not in use.	I
40	HSYNC	Line synchronizing signal for RGB interface operation Fix to IOVCC or DGND level when not in use.	I
41	VSYNC	Frame synchronizing signal for RGB interface operation Fix to IOVCC or DGND level when not in use.	I

42	NC	No connection	--
43	LEDK	Cathode pin of backlight	P
44	NC	No connection	--
45	LED A	Anode pin of backlight	P

3.2 CTP Interface

No.	SYMBOL	DISCRIPTION	I/O
1	GND	Ground.	P
2	VDDIO	Supply voltage.	P
3	VDD	Supply voltage.	P
4	SCL	I2C clock input.	I
5	SDA	I2C data input and output	I/O
6	INT	External interrupt to the host.	I
7	RST	External Reset, Low is active.	I
8	GND	Ground.	P

4. LCD Optical Characteristics

4.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio		CR	$\Theta=0$ Normal viewing angle	600	800	--		
Response time	Rising	T_R+T_F		--	30	45	msec	
	Falling							
Uniformity		S(%)		54	60	--	%	
Color Filter Chromaticity	White	W_X		0.2483	0.2883	0.3283		
		W_Y		0.2739	0.3139	0.3539		
	Red	R_X		0.5702	0.6102	0.6502		
		R_Y		0.3224	0.3624	0.4024		
	Green	G_X		0.2713	0.3113	0.3513		
		G_Y		0.5146	0.5546	0.5946		
	Blue	B_X		0.1064	0.1464	0.1864		
		B_Y		0.0463	0.0863	0.1263		
Viewing angle	Hor.	Θ_L	CR>10	--	80	--		
		Θ_R		--	80	--		
	Ver.	Θ_U		--	80	--		
		Θ_D		--	80	--		
		Option View Direction		ALL				

4.2 Measuring Condition

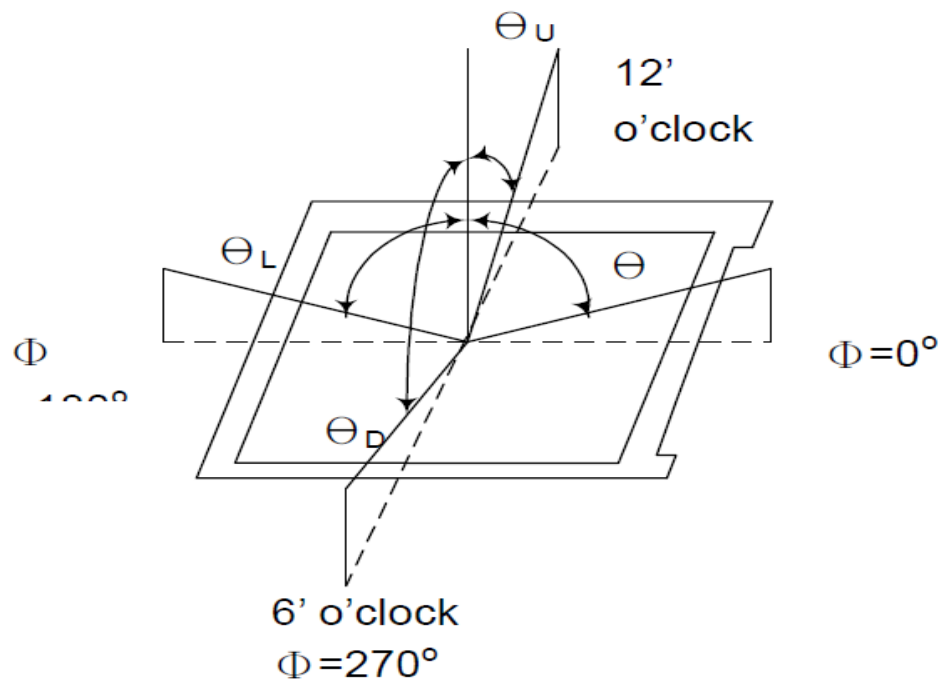
- Measuring surrounding : dark room
- Ambient temperature : $25\pm 2^{\circ}\text{C}$
- 15min. warm-up time.

4.3 Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

Part. No	KD030NHFPN017-C015A	REV	V1.0	Page 9 of 32
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	

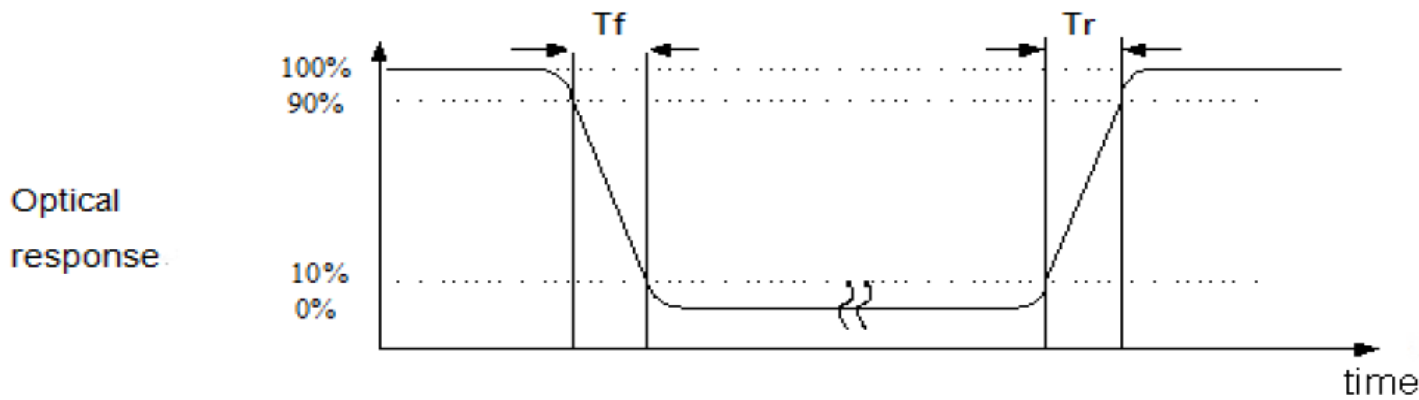
Note (1) Definition of Viewing Angle:



Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

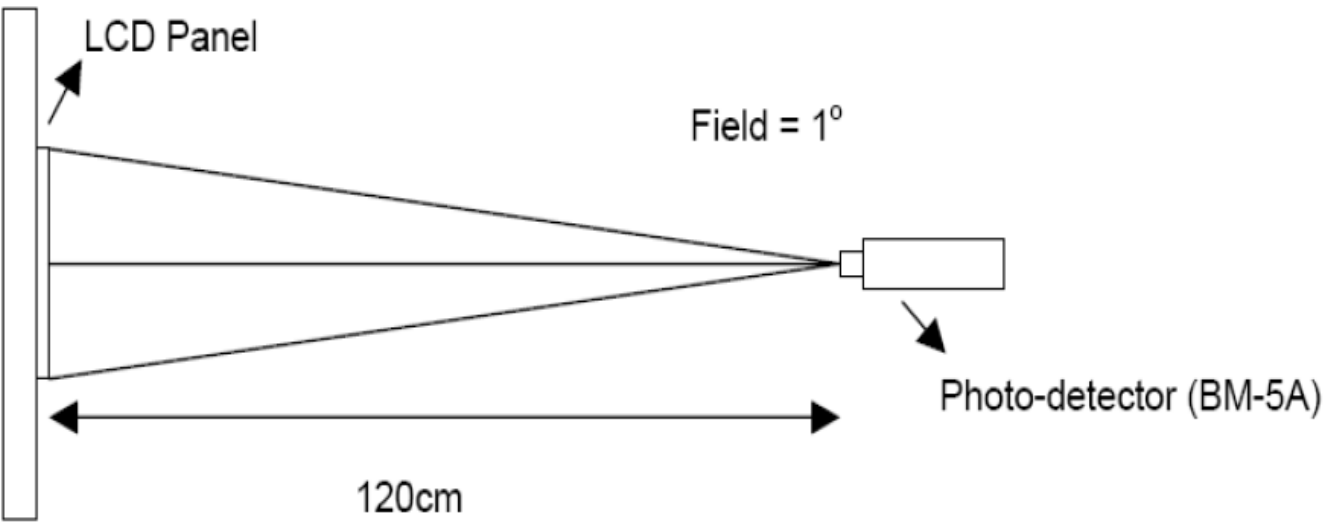
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note (3) Definition of Response Time : Sum of T_R and T_F

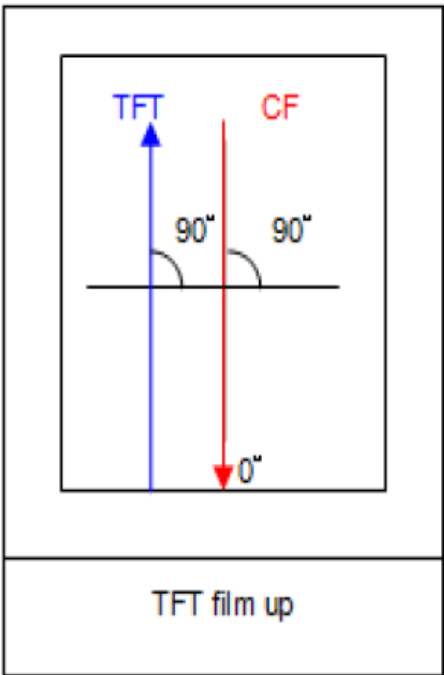


Part. No	KD030NHFPN017-C015A	REV	V1.0	Page 10 of 32
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	

Note (4) Definition of optical measurement setup



Note (5) Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.)



5. Electrical Characteristics

5.1 Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	V _{CI}	-0.3	4.8	V	Note1
Supply Voltage (Logic)	IOVCC	-0.3	4.6	V	
Operating temperature	T _{OP}	-20	+70	°C	
Storage temperature	T _{ST}	-30	+80	°C	

NOTE1: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

5.2 DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	V _{CI}	2.5	3.3	3.6	V	
Supply Voltage (Logic)	IOVCC	1.65	1.8	3.3		
Normal mode Current	IDD	--	32	--	mA	
Level input voltage	V _{IH}	0.7*IOVCC	--	IOVCC	V	
	V _{IL}	GND	--	0.3*IOVCC	V	
Level output voltage	V _{OH}	0.8*IOVCC	--	IOVCC	V	
	V _{OL}	GND	--	0.2*IOVCC	V	

Part. No	KD030NHFPN017-C015A	REV	V1.0	Page 12 of 32
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	

5.3 LED Backlight Characteristics

The back-light system is edge-lighting type with 6 chips LED

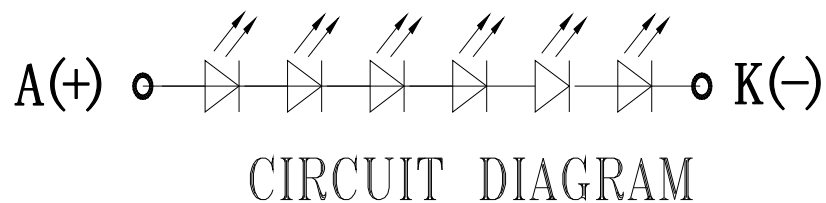
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I _F	15	20	--	mA	
Forward Voltage	V _F	--	19.2	--	V	
LCM Luminance	LV	250	300	--	cd/m2	Note3
LED life time	Hr	--	50000	--	Hour	Note1,2
Uniformity	Avg	80	--	--	%	Note3

Note1: LED life time (Hr) can be defined as the time in which it continues to operate under the condition:

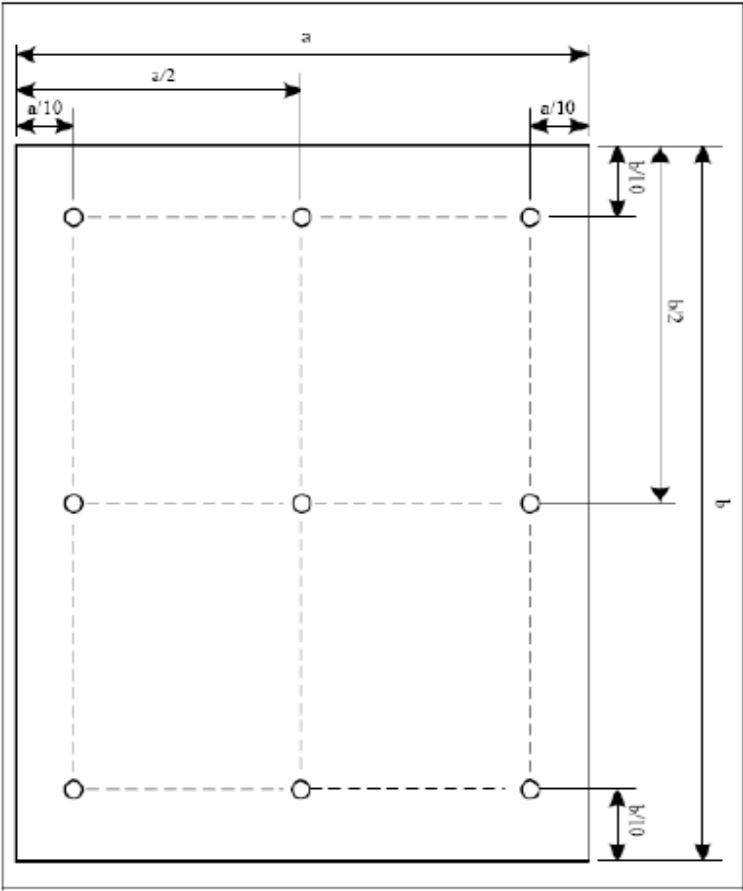
Ta=25±3 °C, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at

Ta=25℃ and IL=20mA. The LED lifetime could be decreased if operating IL is larger than 20mA. The constant current driving method is suggested.



Note (3) Luminance Uniformity of these 9 points is defined as below:

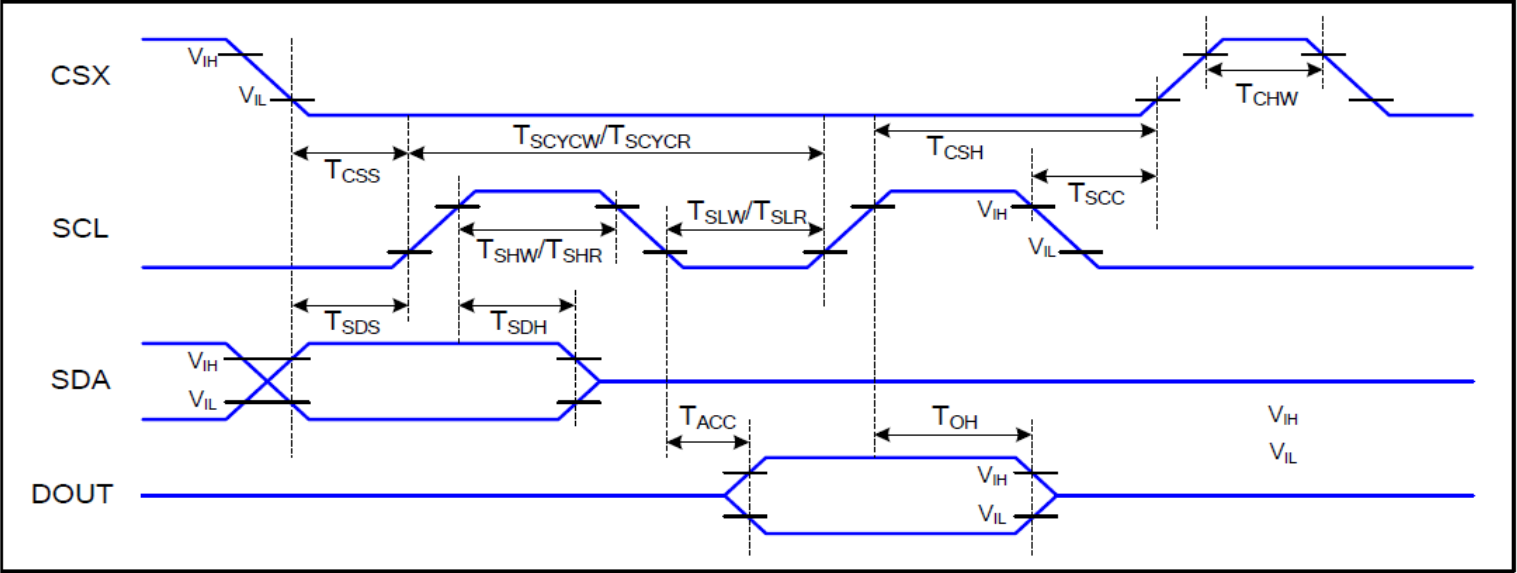


$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

$$\text{Luminance} = \frac{\text{Total Luminance of 9 points}}{9}$$

6. AC Characteristics

6.1 Serial Interface Characteristics (3-line serial):



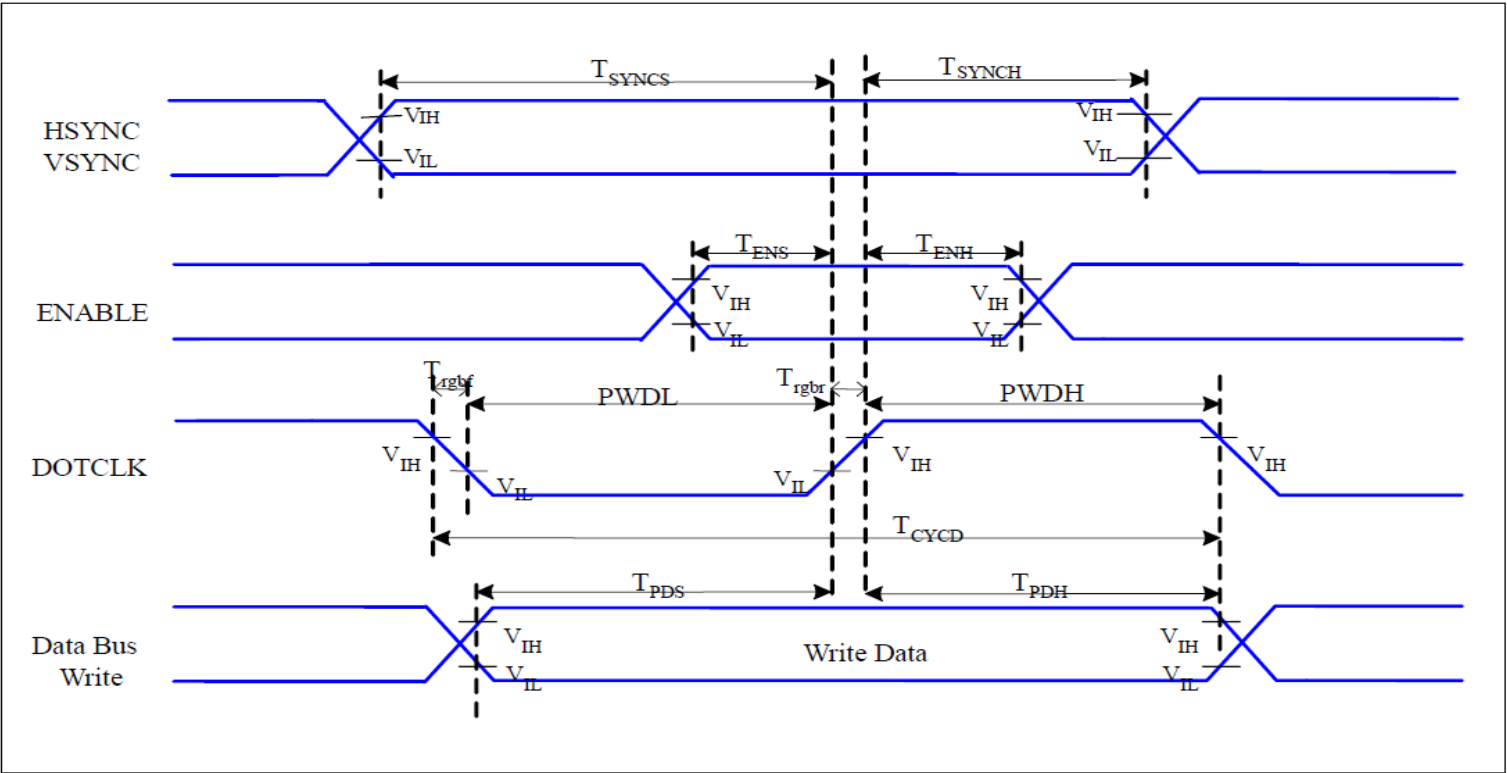
VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	T _{CSS}	Chip select setup time (write)	15		ns	
	T _{CSH}	Chip select hold time (write)	15		ns	
	T _{CSS}	Chip select setup time (read)	60		ns	
	T _{SCC}	Chip select hold time (read)	60		ns	
	T _{CHW}	Chip select "H" pulse width	40		ns	
SCL	T _{SCYCW}	Serial clock cycle (Write)	66		ns	
	T _{SHW}	SCL "H" pulse width (Write)	15		ns	
	T _{SLW}	SCL "L" pulse width (Write)	15		ns	
	T _{SCYCR}	Serial clock cycle (Read)	150		ns	
	T _{SHR}	SCL "H" pulse width (Read)	60		ns	
	T _{SLR}	SCL "L" pulse width (Read)	60		ns	
SDA (DIN)	T _{SDS}	Data setup time	10		ns	
	T _{SDH}	Data hold time	10		ns	

Table 4 3-line serial Interface Characteristics

Note : The rising time and falling time (Tr, Tf) of input signal are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

6.2 RGB Interface Characteristics



VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 °C

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
HSYNC, VSYNC	T_{SYNCS}	VSYNC, HSYNC Setup Time	5	-	ns	
ENABLE	T_{ENS}	Enable Setup Time	5	-	ns	
	T_{ENH}	Enable Hold Time	5	-	ns	
DOTCLK	PWDH	DOTCLK High-level Pulse Width	15	-	ns	
	PWDL	DOTCLK Low-level Pulse Width	15	-	ns	
	T_{CYCD}	DOTCLK Cycle Time	33	-	ns	
	Trghr, Trghf	DOTCLK Rise/Fall time	-	15	ns	
DB	T_{PDS}	PD Data Setup Time	5	-	ns	
	T_{PDH}	PD Data Hold Time	5	-	ns	

6.3 Reset timing

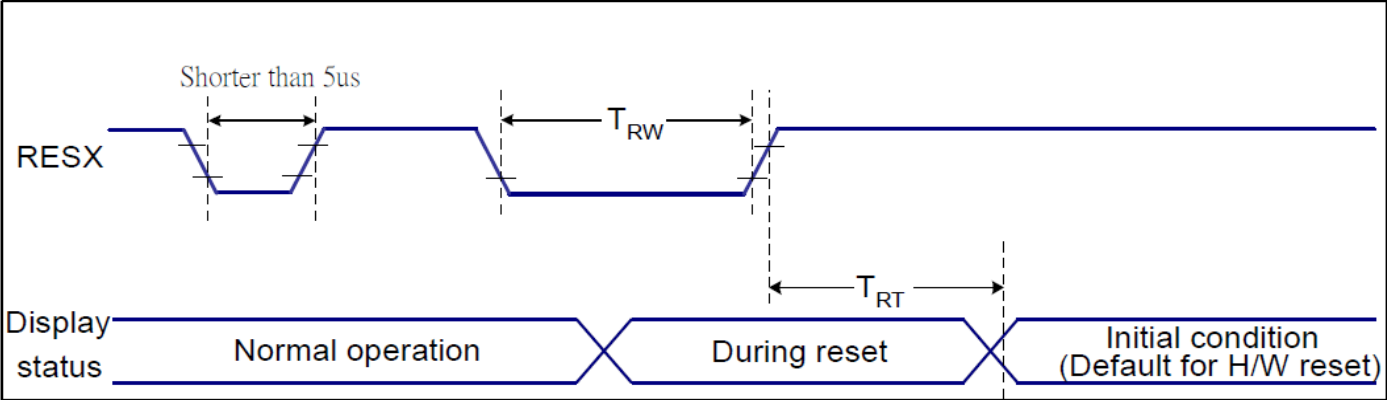


Figure 10 Reset Timing

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃

Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120(Note 1, 6, 7)	ms

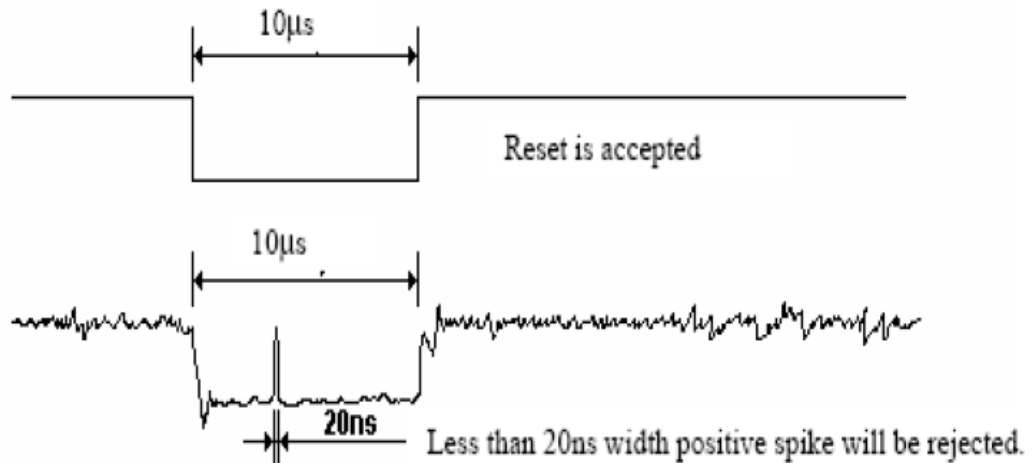
Notes:

1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.
2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

3. During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode.) and then return to Default condition for Hardware Reset.
4. Spike Rejection also applies during a valid reset pulse as shown below:

Part. No	KD030NHFPN017-C015A	REV	V1.0	Page 17 of 32
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	



5. When Reset applied during Sleep In Mode.

6. When Reset applied during Sleep Out Mode.

7. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

Part. No	KD030NHFPN017-C015A	REV	V1.0	Page 18 of 32
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	

7. CTP Specification

7.1 Electrical Characteristics

7.1.1 Absolute Maximum Rating

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	VDD	2.7	3.6	V	--
Operating temperature	T _{OP}	-40	+85	°C	--
Storage temperature	T _{ST}	-55	+150	°C	--

7.1.2 DC Electrical Characteristics (Ta=25°C)

(Ambient temperature:25°C , AVDD=2.8V, VDDIO=1.8V or VDDIO=AVDD)

Item	Symbol	Unit	Test Condition	Min.	Typ.	Max.	Note
Input high-level voltage	VIH	V		0.7 x IOVCC	--	IOVCC	
Input low -level voltage	VIL	V		-0.3	--	0.3 x IOVCC	
Output high -level voltage	VOH	V	IOH=3mA	0.7 x IOVCC	--	--	
Output low -level voltage	VOL	V	IOL=4.5mA	--	--	0.3 x IOVCC	
I/O leakage current	ILI	uA	Vin=0~VDD3	-1	--	1	
Current consumption (Normal operation mode)	Iopr	mA	VDD3 = 3V Ta=25°C	--	11	--	
Current consumption (Monitor mode)	Imon	mA	VDD3 = 3V Ta=25°C	--	0.43	--	
Current consumption (Sleep mode)	Islp	uA	VDD3 = 3V Ta=25°C	--	42	--	
Step-up output voltage	VDD5	V	VDD3= 2.8V		0.25		
Step-up output voltage	VDD10	V	VDD3= 2.8V		0.5		
Power Supply voltage	VDD3	V		2.7	--	3.6	

Notes: This sample data is intended for design guidance only. Values shown are typical for a 15Tx × 24Rx sensor configured at 80 Hz report rate.Actual current will depend on the particular sensor design and firmware options.

Part. No	KD030NHFPN017-C015A	REV	V1.0	Page 19 of 32
常 备 库 存 Stock For Sale	长 期 供 货 Long Time supply	支持小量 NO MOQ	品 种 齐 全 In Full Range	

7.1.3 AC Characteristics

AC Characteristics of Oscillators

Item	Symbol	Unit	Test Condition	Min.	Typ.	Max.	Note
OSC clock 1	fosc1	MHz	VDD3 = 2.8V; Ta=25°C	49	50	51	

Table 3-3 AC Characteristics of TX & RX

Item	Symbol	Test Condition	Min	Typ	Max	Unit	Note
TX acceptable clock	ftx		50	150	400	KHz	
TX output rise time	Ttxr		--	210	--	nS	
TX output fall time	Ttxf		--	210	--	nS	
RX input voltage	Trxi		1.2	--	1.6	V	



7.2 POWER ON/Reset Sequence

Reset should be pulled down to be low before powering on and powering down. I2C shouldn't be used by other devices during Reset time after VDD powering on (T_{rtp}). INT signal will be sent to the host after initializing all parameters and then start to report points to the host. If Power is down, the voltage of supply must be below 0.3V and T_{pdt} is more than 1ms.

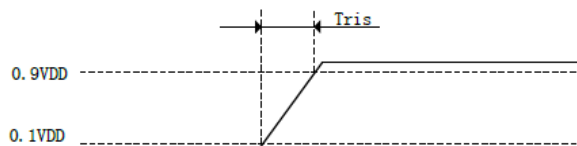


Figure 3-3 Power on time

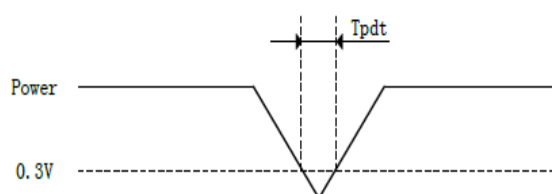


Figure 3-4 Power Cycle requirement

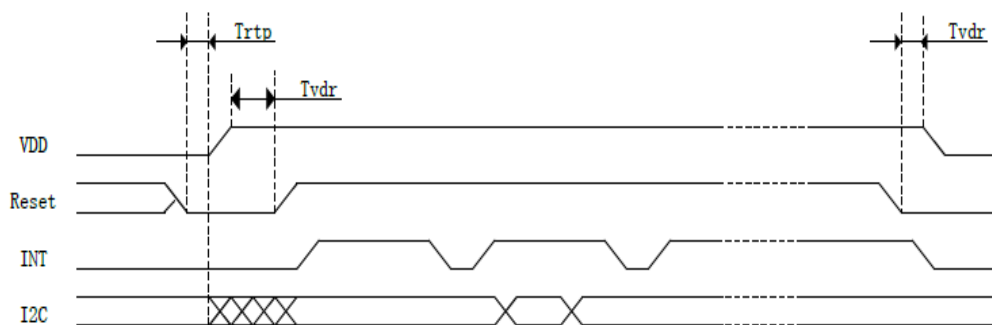
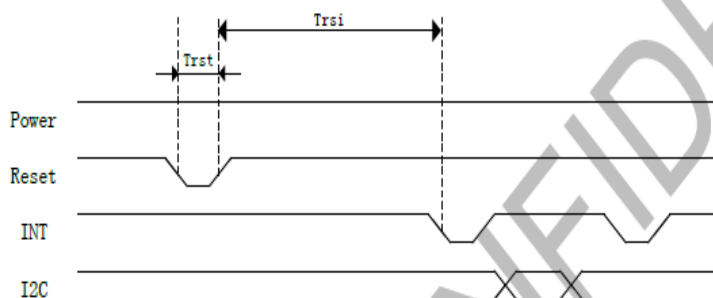


Figure 3-5 Power on Sequence

Reset time must be enough to guarantee reliable reset, the time of starting to report point after resetting approach to the time of starting to report point after powering on.



Part. No	KD030NHFPN017-C015A	REV	V1.0	Page 21 of 32
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	

Table 3-5 Power on/Reset Sequence Parameters

Parameter	Description	Min	Max	Units
Tris	Rise time from 0.1VDD to 0.9VDD	--	5	ms
Tpdt	Time of the voltage of supply being below 0.3V	5	--	ms
Trtp	Time of resetting to be low before powering on	100	--	μs
Tvdr	Reset time after VDD powering on	1	--	ms
Trsi	Time of starting to report point after resetting	--	200	ms
Trst	Reset time	1	--	ms

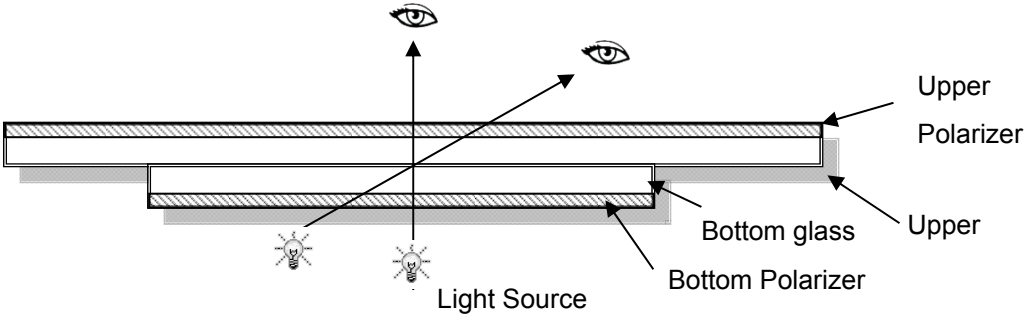
8. LCD Module Out-Going Quality Level

8.1 VISUAL & FUNCTION INSPECTION STANDARD

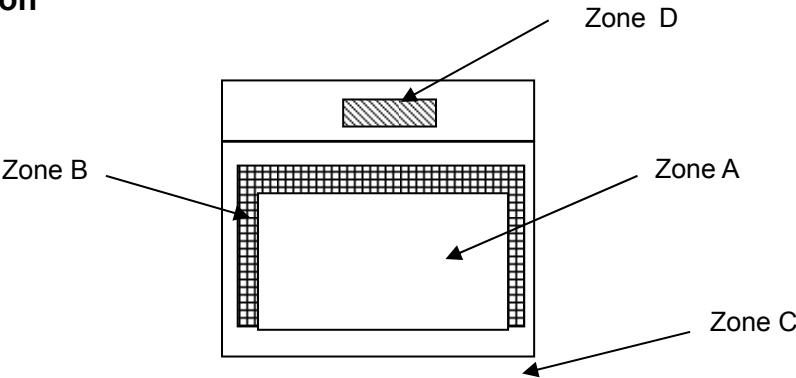
8.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

- Temperature : 25±5℃
- Humidity : 65%±10%RH
- Viewing Angle : Normal viewing Angle.
- Illumination: Single fluorescent lamp (300 to 700Lux)
- Viewing distance:30-50cm



8.1.2 Definition



- Zone A : Effective Viewing Area(Character or Digit can be seen)
- Zone B : Viewing Area except Zone A
- Zone C Cover (Zone A+Zone B) which can not be seen after assembly by customer .)
- Zone D : IC Bonding Area

Note: As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer

Part. No	KD030NHFPN017-C015A	REV	V1.0	Page 23 of 32
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	

8.1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class II

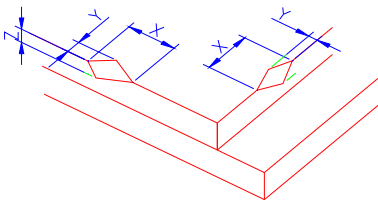
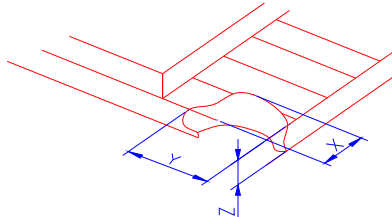
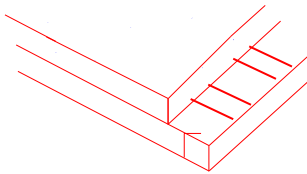
AQL:

Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

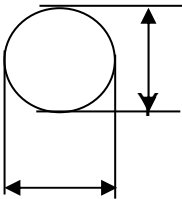
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Spot Line defect	Light dot , Dim spot , Polarizer Bubble ; Polarizer accidented spot.	
6	Soldering appearance	Good soldering , Peeling off is not allowed.	
7	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

8.1.4 Criteria (Visual)

Number	Items	Criteria(mm)						
1.0 LCD Crack/Broken NOTE: X: Length Y: Width Z: Height L: Length of ITO, T: Height of LCD	(1) The edge of LCD broken	<div></div> <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr></table>	X	Y	Z	≤3.0mm	<Inner border line of the seal	≤T
	X	Y	Z					
	≤3.0mm	<Inner border line of the seal	≤T					
(2)LCD corner broken	<div></div> <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr></table>	X	Y	Z	≤3.0mm	≤L	≤T	
X	Y	Z						
≤3.0mm	≤L	≤T						
(3) LCD crack	<div><p>Crack Not allowed</p></div>							

2.0

Spot defect



X

Φ=(X+Y)/2

① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain)

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.10	Ignore		Ignore
0.10<Φ≤0.20	3(distance ≥ 10mm)		
0.20<Φ≤0.25	2		
Φ>0.3	0		

②Dim spot (LCD/TP/Polarizer dim dot, light leakage、 dark spot)

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.1	Ignore		Ignore
0.10<Φ≤0.20	3(distance ≥ 10mm)		
0.20<Φ≤0.25	2		
Φ>0.3	0		

③ Polarizer accidented spot

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.3<Φ≤0.5	2(distance ≥ 10mm)		
Φ>0.5	0		

④Pixel bad points (light dot, Dim dot, color dot)

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.1	Ignore		Ignore
0.15<Φ≤0.2	2(distance ≥ 10mm)		
Φ>0.2	0		

⑤ Polarizer Bubble

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.3<Φ≤0.4	3(distance ≥ 10 m)		
0.5<Φ≤0.6	2		
0.6<Φ	0		

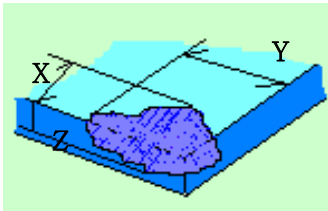
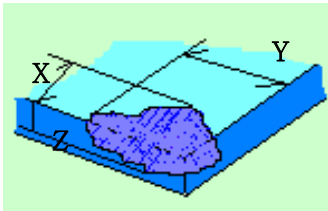
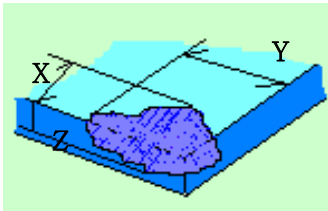
3.0	Line defect (LCD/TP /Polarizer backlight black/white line, scratch, stain)	Width(mm)	Length(m m)	Acceptable Qty		
				A	B	C
		$\Phi \leq 0.03$	Ignore	Ignore		Ignore
		$0.03 < W \leq 0.04$	$L \leq 3.0$	$N \leq 2$		
		$0.04 < W \leq 0.05$	$L \leq 2.0$	$N \leq 1$		
		$0.05 < W$	Define as spot defect			

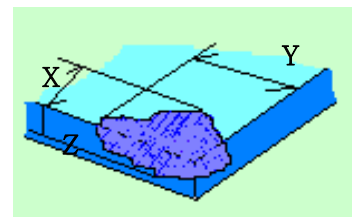
4.0	Electronic Comp onents SMT	Not allow missing parts, solderless connection, cold solder joint, mis match, The positive and negative polarity opposite
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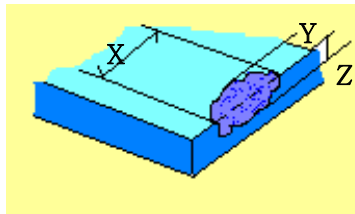
5.0	Display color& B rightness	1. Color: Measuring the color coordinates, The measurement standar d according to the datasheet or samples. 2. Brightness: Measuring the brightness of White screen, The meas urement standard according to the datasheet or Samples.
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6.0	LCD Mura	By 5% ND filter invisible.
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7.0	CTP Related	CTP Cover sensor accidented black/white spot				
			Size Φ (mm)	Acceptable Qty		
				A	B	C
			$\Phi \leq 0.1$	Ignore		Ignore
			$0.1 < \Phi \leq 0.2$	3 (distance ≥ 10 mm)		
			$0.20 < \Phi \leq 0.25$	2		
$\Phi > 0.3$	0					

		<table><tr><td rowspan="6">CTP Cover scratch</td><td><table><tr><td>Width(mm)</td><td>Ignore(mm)</td><td colspan="3">Acceptable Qty</td></tr><tr><td></td><td></td><td>A</td><td>B</td><td>C</td></tr><tr><td>$\Phi \leq 0.03$</td><td>Ignore</td><td colspan="3">Ignore</td></tr><tr><td>$0.03 < W \leq 0.04$</td><td>$L \leq 3.0$</td><td colspan="3">$N \leq 2$</td></tr><tr><td>$0.04 < W \leq 0.05$</td><td>$L \leq 2.0$</td><td colspan="3">$N \leq 1$</td></tr><tr><td>$0.05 < W$</td><td colspan="4">Define as spot defect</td></tr></table></td></tr><tr><td>CTP Cover Pinhole/ Lack of ink</td><td><table><tr><td rowspan="6"><div>Zone Size (mm)</div><div>$\Phi \leq 0.1$ $0.1 < \Phi \leq 0.2$ $0.2 < \Phi \leq 0.25$ $\Phi > 0.3$</div></td><td colspan="4">Acceptable Qty</td></tr><tr><td colspan="4">C</td></tr><tr><td colspan="4">Ignore</td></tr><tr><td colspan="4">3(distance $\geq 10\text{mm}$)</td></tr><tr><td colspan="4">2</td></tr><tr><td colspan="4">0</td></tr></table></td></tr><tr><td>CTP Bonding bubble/ accident spot</td><td><table><tr><td rowspan="6">Size Φ(mm)</td><td colspan="2">Acceptable Qty</td></tr><tr><td>A</td><td>B</td></tr><tr><td colspan="2">Ignore</td></tr><tr><td colspan="2">2(distance $\geq 10\text{mm}$)</td></tr><tr><td colspan="2">1</td></tr><tr><td colspan="2">0</td></tr></table></td></tr><tr><td>Assembly deflection</td><td colspan="5">beyond the edge of backlight $\leq 0.2\text{mm}$</td></tr><tr><td>TP cover broken X : length Y : width Z : height</td><td><table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>$X \leq 0.5\text{mm}$</td><td>$Y \leq 0.5\text{mm}$</td><td>$Z < \text{cover thickness}$</td></tr></table><div><p>Circuitry broken is not allowed.</p></div></td><td colspan="3"></td></tr></table>	CTP Cover scratch	<table><tr><td>Width(mm)</td><td>Ignore(mm)</td><td colspan="3">Acceptable Qty</td></tr><tr><td></td><td></td><td>A</td><td>B</td><td>C</td></tr><tr><td>$\Phi \leq 0.03$</td><td>Ignore</td><td colspan="3">Ignore</td></tr><tr><td>$0.03 < W \leq 0.04$</td><td>$L \leq 3.0$</td><td colspan="3">$N \leq 2$</td></tr><tr><td>$0.04 < W \leq 0.05$</td><td>$L \leq 2.0$</td><td colspan="3">$N \leq 1$</td></tr><tr><td>$0.05 < W$</td><td colspan="4">Define as spot defect</td></tr></table>	Width(mm)	Ignore(mm)	Acceptable Qty					A	B	C	$\Phi \leq 0.03$	Ignore	Ignore			$0.03 < W \leq 0.04$	$L \leq 3.0$	$N \leq 2$			$0.04 < W \leq 0.05$	$L \leq 2.0$	$N \leq 1$			$0.05 < W$	Define as spot defect				CTP Cover Pinhole/ Lack of ink	<table><tr><td rowspan="6"><div>Zone Size (mm)</div><div>$\Phi \leq 0.1$ $0.1 < \Phi \leq 0.2$ $0.2 < \Phi \leq 0.25$ $\Phi > 0.3$</div></td><td colspan="4">Acceptable Qty</td></tr><tr><td colspan="4">C</td></tr><tr><td colspan="4">Ignore</td></tr><tr><td colspan="4">3(distance $\geq 10\text{mm}$)</td></tr><tr><td colspan="4">2</td></tr><tr><td colspan="4">0</td></tr></table>	<div>Zone Size (mm)</div> <div>$\Phi \leq 0.1$ $0.1 < \Phi \leq 0.2$ $0.2 < \Phi \leq 0.25$ $\Phi > 0.3$</div>	Acceptable Qty				C				Ignore				3(distance $\geq 10\text{mm}$)				2				0				CTP Bonding bubble/ accident spot	<table><tr><td rowspan="6">Size Φ(mm)</td><td colspan="2">Acceptable Qty</td></tr><tr><td>A</td><td>B</td></tr><tr><td colspan="2">Ignore</td></tr><tr><td colspan="2">2(distance $\geq 10\text{mm}$)</td></tr><tr><td colspan="2">1</td></tr><tr><td colspan="2">0</td></tr></table>	Size Φ (mm)	Acceptable Qty		A	B	Ignore		2(distance $\geq 10\text{mm}$)		1		0		Assembly deflection	beyond the edge of backlight $\leq 0.2\text{mm}$					TP cover broken X : length Y : width Z : height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>$X \leq 0.5\text{mm}$</td><td>$Y \leq 0.5\text{mm}$</td><td>$Z < \text{cover thickness}$</td></tr></table> <div><p>Circuitry broken is not allowed.</p></div>	X	Y	Z	$X \leq 0.5\text{mm}$	$Y \leq 0.5\text{mm}$	$Z < \text{cover thickness}$			
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		TP cover broken X : length Y : width Z : height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>$X \leq 0.3\text{mm}$</td><td>$Y \leq 0.3\text{mm}$</td><td>$Z < \text{LCD thickness}$ s</td></tr></table>	X	Y	Z	$X \leq 0.3\text{mm}$	$Y \leq 0.3\text{mm}$	$Z < \text{LCD thickness}$ s	
X	Y	Z								
$X \leq 0.3\text{mm}$	$Y \leq 0.3\text{mm}$	$Z < \text{LCD thickness}$ s								
* Circuitry broken is not allowed.										

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	TP no function	Not allowed

9. Reliability Test Result

Item	Condition	Inspection after test
High Temperature Operating	70°C, 96H	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Non-display; 3.Missing segments/line; 4.Glass crack; 5.Current IDD is twice higher than initial value.
Low Temperature Operating	-20°C, 96HR	
High Temperature Storage	80°C, 96HR	
Low Temperature Storage	-30°C, 96HR	
High Temperature & High Humidity Operating	+60°C, 90% RH ,96 hours.	
Thermal Shock (Non-operation)	-30°C, 30 min ↔ 80°C, 30 min, Change time: 5min 20CYC.	
ESD test	C=150pF, R=330, 5points/panel Air: ±8KV, 5times; Contact: ±6KV, 5 times; (Environment: 15°C~35°C, 30%~60%).	
Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.5mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total) (Package condition).	
Box Drop Test	1 Corner 3 Edges 6 faces, 80cm (MEDIUM BOX)	

Remark:

- 1.The test samples should be applied to only one test item.
- 2.Sample size for each test item is 5~10pcs.
- 3.For Damp Proof Test, Pure water(Resistance > 10MΩ) should be used.
- 4.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.
- 5.Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

Part. No	KD030NHFPN017-C015A	REV	V1.0	Page 30 of 32
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	

10. Cautions and Handling Precautions

10.1 Handling and Operating the Module

- (1) When the module is assembled, it should be attached to the system firmly.
Do not warp or twist the module during assembly work.
- (2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
- (3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.
- (4) Do not allow drops of water or chemicals to remain on the display surface.
If you have the droplets for a long time, staining and discoloration may occur.
- (5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
- (6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.
Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
- (7) 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.
- (8) Protect the module from static; it may cause damage to the CMOS ICs.
- (9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (10) Do not disassemble the module.
- (11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
- (12) Pins of I/F connector shall not be touched directly with bare hands.
- (13) Do not connect, disconnect the module in the "Power ON" condition.
- (14) Power supply should always be turned on/off by the item 6.1 Power On Sequence & 6.2 Power Off Sequence

10.2 Storage and Transportation.

- (1) 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%
- (2) Do not store the TFT-LCD module in direct sunlight.
- (3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
- (4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.
In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.
- (5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.

Part. No	KD030NHFPN017-C015A	REV	V1.0	Page 31 of 32
常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	

11. Packing

----TBD-----

Part. No	KD030NHFPN017-C015A	REV	V1.0	Page 32 of 32
常 备 库 存 Stock For Sale	长 期 供 货 Long Time supply	支持小量 NO MOQ	品 种 齐 全 In Full Range	