

APEX

APEX SCIENCE & ENGINEERING CORP

(OPTOELECTRONIC DIV.)

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TWVK700RETR40N

ROHS

DATA SHEET

Acceptance

ISSUE	VERSION	APPROVER	CHECKER	ENGINEER
	B			

Messrs.				
Product Specification	Model:	TWVK700RETR40N	Rev. NO.	Issued Date.
			B	Oct.25 ,18

Records of Revision

DATE	REF.PAGE PARAGRAPH DRAWING No.	REVISED No.	SUMMARY	REMARK
2018-06-13		A	First Issue	
2018-10-25		B	Update drawing	



Messrs.			
Product Specification	Model:	TWVK700RETR40N	Rev. NO.
			B
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1. General Specification

Item	Contents	Unit
LCD TYPE	TFT/TRANSMISSIVE	
MODULE SIZE (W*H*T)	164.80*99.80*5.5	MM
ACTIVE SIZE (W*H)	154.08*85.92	MM
PIXEL PITCH (W*H)	0.1926*0.1790	MM
NUMBER OF DOTS	800*480	
DRIVER IC	EK9713+EK73002	
INTERFACE TYPE	24-BIT RGB	
TOP POLARIZER TYPE	ANTI-GLARE	
RECOMMEND VIEWING DIRECTION	12	O'CLOCK
GRAY SCALE INVERSION DIRECTION	6	O'CLOCK
COLORS	16.7M	
BACKLIGHT TYPE	21-LED WHITE	
TOUCH PANEL TYPE	WITHOUT	

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2. Mechanical Drawing

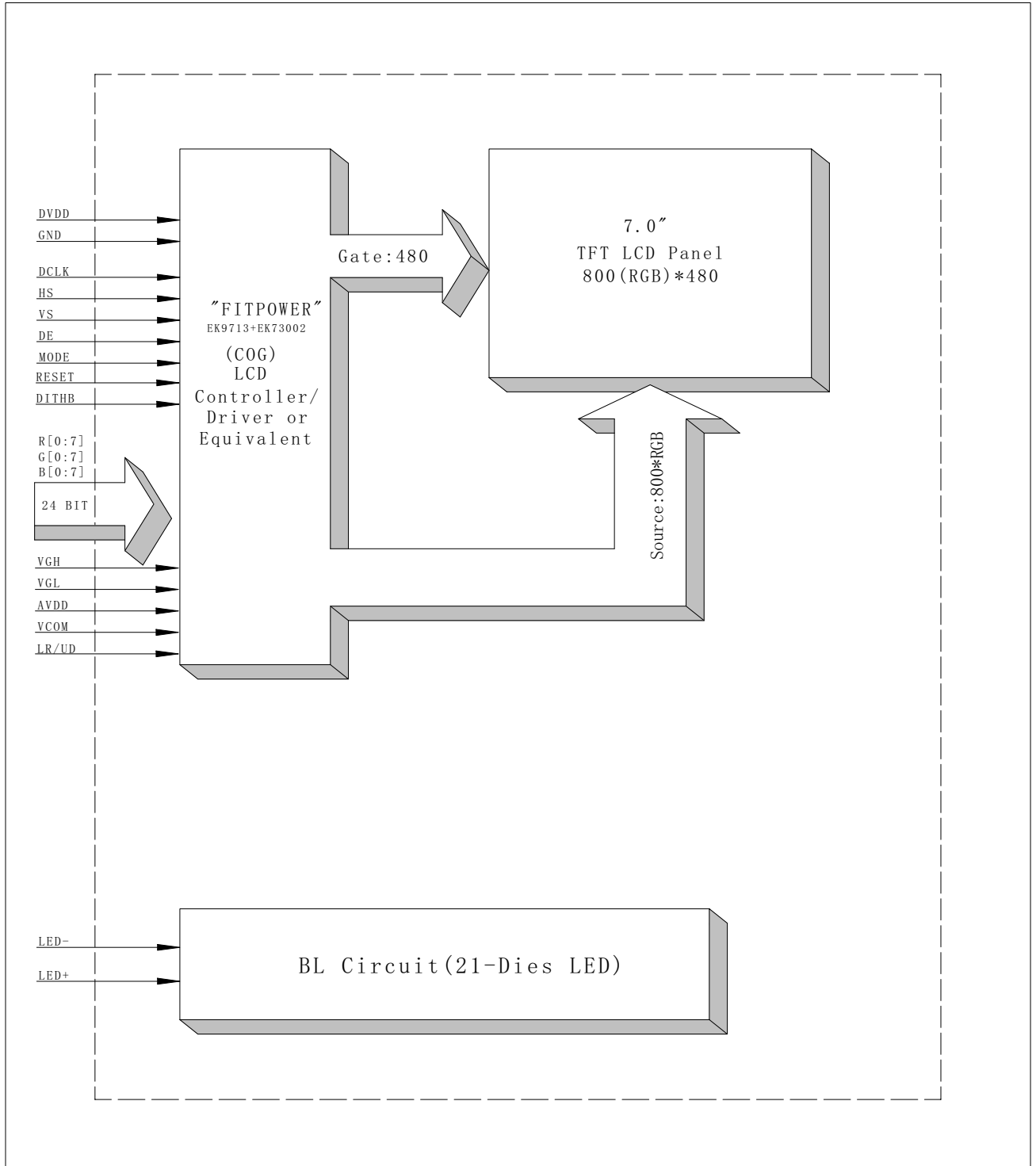
<p>PIPS ASSIGNMENTS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NO.</th> <th>SYMBOL</th> <th>NO.</th> <th>SYMBOL</th> </tr> </thead> <tbody> <tr><td>1</td><td>LED+</td><td>32</td><td>R3</td></tr> <tr><td>2</td><td>LED+</td><td>33</td><td>R2</td></tr> <tr><td>3</td><td>LED+</td><td>34</td><td>R1</td></tr> <tr><td>4</td><td>LED-</td><td>35</td><td>R0</td></tr> <tr><td>5</td><td>GND</td><td>36</td><td>GND</td></tr> <tr><td>6</td><td>VCOM</td><td>37</td><td>DCLK</td></tr> <tr><td>7</td><td>DVDD</td><td>38</td><td>GND</td></tr> <tr><td>8</td><td>MODE</td><td>39</td><td>L/R</td></tr> <tr><td>9</td><td>DE</td><td>40</td><td>U/D</td></tr> <tr><td>10</td><td>VS</td><td>41</td><td>VGH</td></tr> <tr><td>11</td><td>HS</td><td>42</td><td>VGL</td></tr> <tr><td>12</td><td>B7</td><td>43</td><td>AVDD</td></tr> <tr><td>13</td><td>B6</td><td>44</td><td>RESET</td></tr> <tr><td>14</td><td>B5</td><td>45</td><td>NC</td></tr> <tr><td>15</td><td>B4</td><td>46</td><td>VCOM</td></tr> <tr><td>16</td><td>B3</td><td>47</td><td>DTHB</td></tr> <tr><td>17</td><td>B2</td><td>48</td><td>GND</td></tr> <tr><td>18</td><td>B1</td><td>49</td><td>NC</td></tr> <tr><td>19</td><td>B0</td><td>50</td><td>NC</td></tr> <tr><td>20</td><td>G7</td><td></td><td></td></tr> <tr><td>21</td><td>G6</td><td></td><td></td></tr> <tr><td>22</td><td>G5</td><td></td><td></td></tr> <tr><td>23</td><td>G4</td><td></td><td></td></tr> <tr><td>24</td><td>G3</td><td></td><td></td></tr> <tr><td>25</td><td>G2</td><td></td><td></td></tr> <tr><td>26</td><td>G1</td><td></td><td></td></tr> <tr><td>27</td><td>G0</td><td></td><td></td></tr> <tr><td>28</td><td>R7</td><td></td><td></td></tr> <tr><td>29</td><td>R6</td><td></td><td></td></tr> <tr><td>30</td><td>R5</td><td></td><td></td></tr> <tr><td>31</td><td>R4</td><td></td><td></td></tr> </tbody> </table>	NO.	SYMBOL	NO.	SYMBOL	1	LED+	32	R3	2	LED+	33	R2	3	LED+	34	R1	4	LED-	35	R0	5	GND	36	GND	6	VCOM	37	DCLK	7	DVDD	38	GND	8	MODE	39	L/R	9	DE	40	U/D	10	VS	41	VGH	11	HS	42	VGL	12	B7	43	AVDD	13	B6	44	RESET	14	B5	45	NC	15	B4	46	VCOM	16	B3	47	DTHB	17	B2	48	GND	18	B1	49	NC	19	B0	50	NC	20	G7			21	G6			22	G5			23	G4			24	G3			25	G2			26	G1			27	G0			28	R7			29	R6			30	R5			31	R4			<p style="text-align: center;">800*RGB*480</p> <p style="text-align: center;">STIFFENER</p> <p style="text-align: center;">CONTACT SURF.</p> <p style="text-align: center;">Backlight LED Circuit: Vf=100mA, Vf=9.6V</p> <p style="text-align: center;">TFT</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Display Type</td><td>TRANSMISSIVE POSITIVE</td></tr> <tr><td>Viewing Angle</td><td>12:00 CLOCK</td></tr> <tr><td>Upper Polarizer Type</td><td>Anti-Glare</td></tr> <tr><td>LCD Driver IC</td><td>EK9713CA-EK73002ACGB</td></tr> <tr><td>Operating Voltage</td><td>DVDD=3.3V</td></tr> <tr><td>Operating Temperature</td><td>-20°C TO 70°C</td></tr> <tr><td>Storage Temperature</td><td>-30°C TO 80°C</td></tr> <tr><td>Interface</td><td>24-BIT RGB</td></tr> <tr><td>Backlight</td><td>21-CHIP WHITE LED</td></tr> <tr><td>Surface luminance</td><td>400 cd/m² (TYP)</td></tr> <tr><td>White X/Y</td><td>---</td></tr> </table>	Display Type	TRANSMISSIVE POSITIVE	Viewing Angle	12:00 CLOCK	Upper Polarizer Type	Anti-Glare	LCD Driver IC	EK9713CA-EK73002ACGB	Operating Voltage	DVDD=3.3V	Operating Temperature	-20°C TO 70°C	Storage Temperature	-30°C TO 80°C	Interface	24-BIT RGB	Backlight	21-CHIP WHITE LED	Surface luminance	400 cd/m ² (TYP)	White X/Y	---	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td rowspan="2">TITLE</td> <td>DRAWING NO.</td> <td>TWVK700RETR40N</td> </tr> <tr> <td>MODULE SPEC.</td> <td></td> </tr> <tr> <td>DRAWN</td> <td>ME. CHECKED</td> <td></td> </tr> <tr> <td>EE. CHECKED</td> <td>APPROVED</td> <td></td> </tr> <tr> <td>CUSTOMER'S APPROVAL</td> <td>DATE</td> <td>SIGN</td> </tr> <tr> <td></td> <td>2018.07.02</td> <td></td> </tr> <tr> <td>VER. SYMBOL</td> <td>AMENDMENT</td> <td></td> </tr> <tr> <td>V00</td> <td>First issue</td> <td></td> </tr> </table>	TITLE	DRAWING NO.	TWVK700RETR40N	MODULE SPEC.		DRAWN	ME. CHECKED		EE. CHECKED	APPROVED		CUSTOMER'S APPROVAL	DATE	SIGN		2018.07.02		VER. SYMBOL	AMENDMENT		V00	First issue	
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- NOTES:**
1. General Tolerance: ±0.2
 2. Recommended case open area should be less than module V.A
 3. Note must be compliant.



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3. Block Diagram



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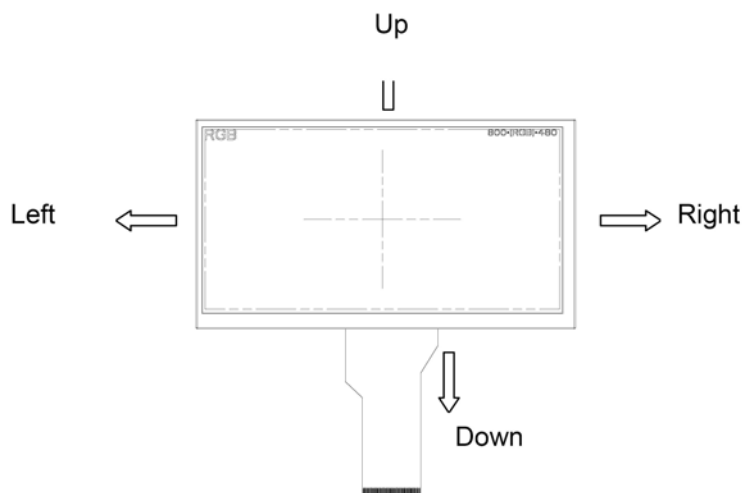
4. Interface Pin Function

Pin No.	Symbol	Description
1	LED+	Anode of LED backlight
2	LED+	Anode of LED backlight
3	LED-	Cathode of LED backlight
4	LED-	Cathode of LED backlight
5	GND	Power ground
6	VCOM	Common voltage
7	DVDD	Power for digital circuit
8	MODE	DE/SYNC mode select
9	DE	Data input enable
10	VS	Vertical sync input
11	HS	Horizontal sync input
12	B7	Blue data(MSB)
13	B6	Blue data
14	B5	Blue data
15	B4	Blue data
16	B3	Blue data
17	B2	Blue data
18	B1	Blue data
19	B0	Blue data(LSB)
20	G7	Green data(MSB)
21	G6	Green data
22	G5	Green data
23	G4	Green data
24	G3	Green data
25	G2	Green data
26	G1	Green data
27	G0	Green data
28	R7	Red data(LSB)
29	R6	Red data
30	R5	Red data
31	R4	Red data
32	R3	Red data
33	R2	Red data
34	R1	Red data
35	R0	Red data(LSB)
36	GND	Power Ground
37	DCLK	Sample clock
38	GND	Power Ground
39	L/R	Left / right selection
40	U/D	Up/down selection
41	VGH	Gate ON Voltage

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42	VGL	Gate OFF Voltage
43	AVDD	Power for Analog Circuit
44	RESE T	Global reset pin.
45	NC	No connection
46	VCOM	Common Voltage
47	DITHB	Dithering function
48	GND	Power Ground
49	NC	No connection
50	NC	No connection

Note1: When L/R="0", set right to left scan direction.
When L/R="1", set left to right scan direction.
When U/D="0", set top to bottom scan direction.
When U/D="1", set bottom to top scan direction.



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5. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply voltage for logic	DVDD	-0.3	5	V
Supply voltage for analog	AVDD	0.5	13.5	V
Power supply	VGH	0.3	40	V
Power supply	VGL	-20	0.3	V
Power supply	VGH- VGL	-	40	V
Supply current (One LED)	I _{LED}		30	mA
Operating temperature	T _{OP}	-20	+70	°C
Storage temperature	T _{ST}	-30	+80	°C

Note: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

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6. Electrical Characteristics

6.1 Input Power

Item	Symbol	Min	Typ.	Max	Unit	Applicable terminal
Supply Voltage for Logic	DVDD	3.0	3.3	3.6	V	
Supply Voltage for Analog	AVDD	10.2	10.4	10.6	V	
Power supply	VGH	15.3	16	16.7		
Power supply	VGL	-7.7	-7	-6.3		
Power supply	VCOM	2.6	3.6	4.6		
Input Voltage	V _{IL}	GND	-	0.3DVDD	V	
	V _{IH}	0.7 DVDD	-	DVDD		
Input leakage Current	I _{LKG}	-		-	μA	

6.2 Backlight Driving Conditions

Item	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	VF	8.4	9.3	10.2	V	I _L =140mA
Current for LED Backlight	I _L		140		mA	
Power Consumption	P		1.302		W	
LED Life Time		30,000	50000		Hr	Note

Note: Brightness to be decreased to 50% of the initial value at ambient temperature TA=25°C

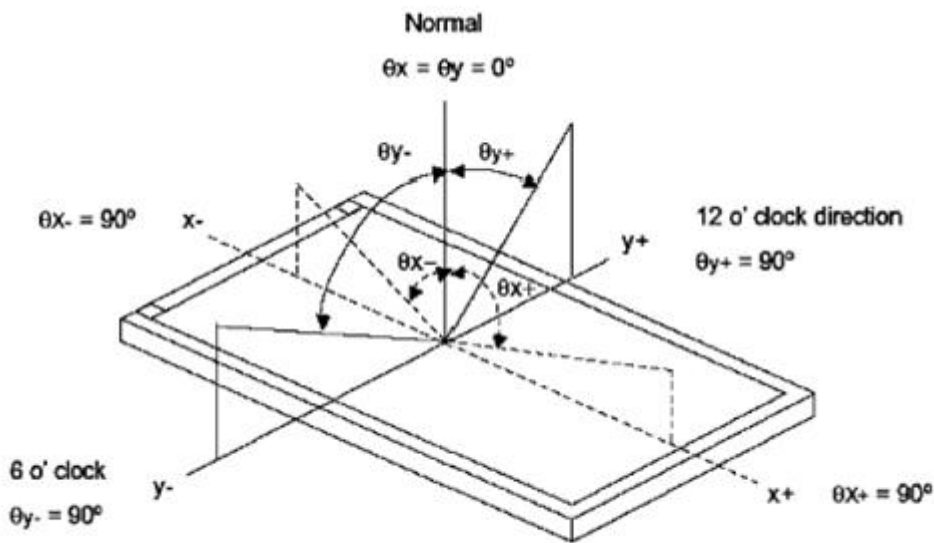
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7. Optical Characteristics

ITEM	SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
			MIN	TYP.	MAX		
Luminance	L	$I_L = 140\text{mA}$	320	400	480	Cd/m^2	
Contrast Ratio	CR	$\theta = 0^\circ$	400	500			
Response Time	T_{ON}	25°C		10	20	ms	
	T_{OFF}			15	30		
CIE Color Coordinate	Red	X_R	Viewing normal angle		TBD		
		Y_R			TBD		
	Green	X_G			TBD		
		Y_G			TBD		
	Blue	X_B			TBD		
		Y_B			TBD		
	White	X_W		0.28	0.30	0.32	
		Y_W		0.32	0.34	0.36	
Viewing Angle	Hor.	θ_{X+}	$CR \geq 10$	60	70	Degree	
		θ_{X-}		60	70		
	Ver.	θ_{Y+}		40	50		
		θ_{Y-}		60	70		
Uniformity	Un			70	75	%	

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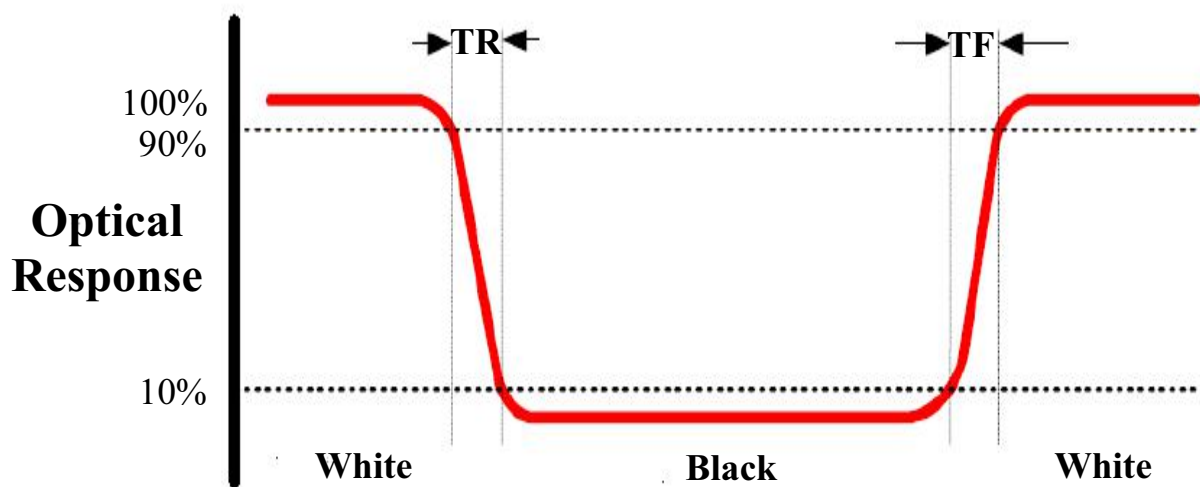
Note 1: Definition of Viewing Angle θ_x and θ_y :



Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Luminance of white state}}{\text{Luminance of black state}}$$

Note 3: Definition of Response Time (T_r, T_f)

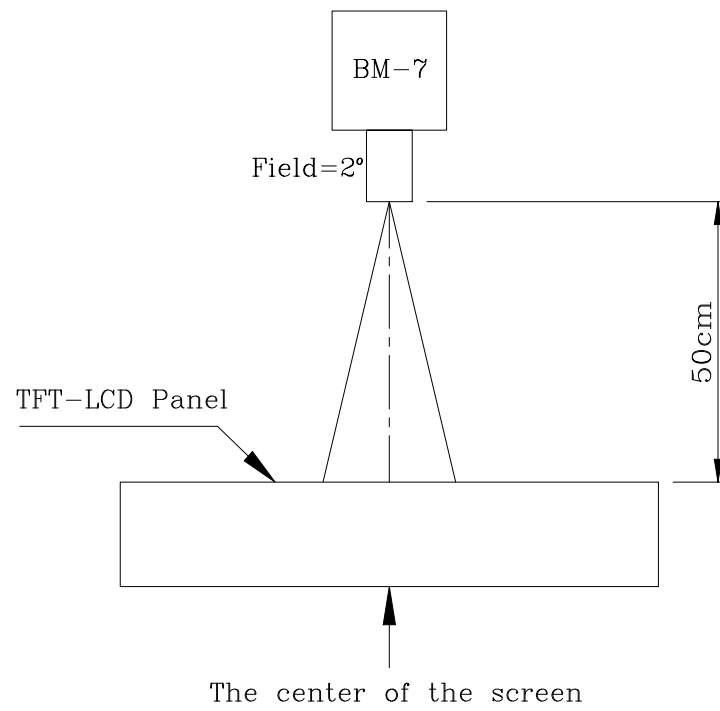


No

① The Brightness Test Equipment Setup

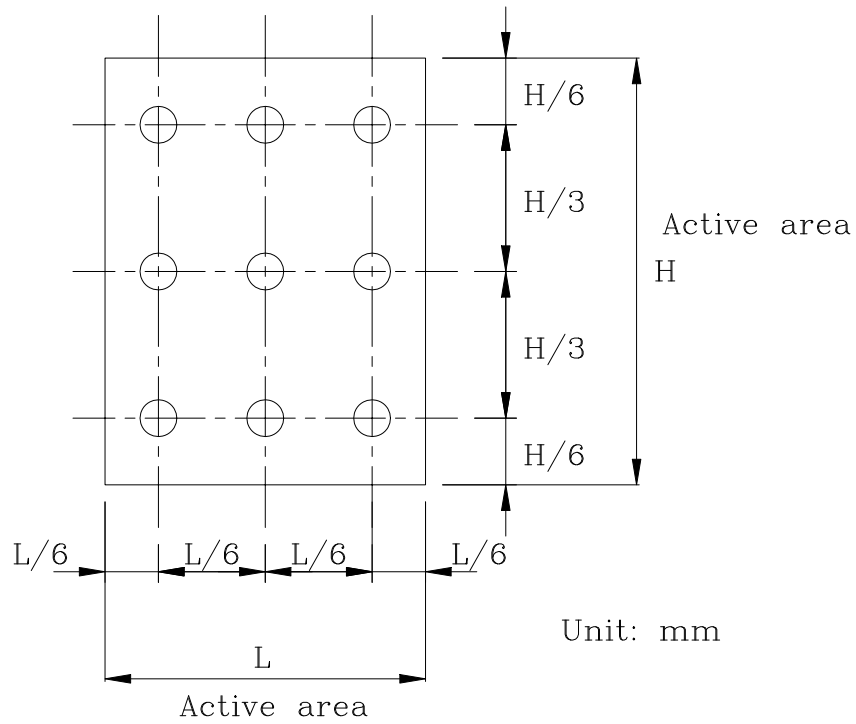
Field = 2° (As measuring "black" image, field = 2° is the best testing condition)

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②The Brightness Test Point Setup



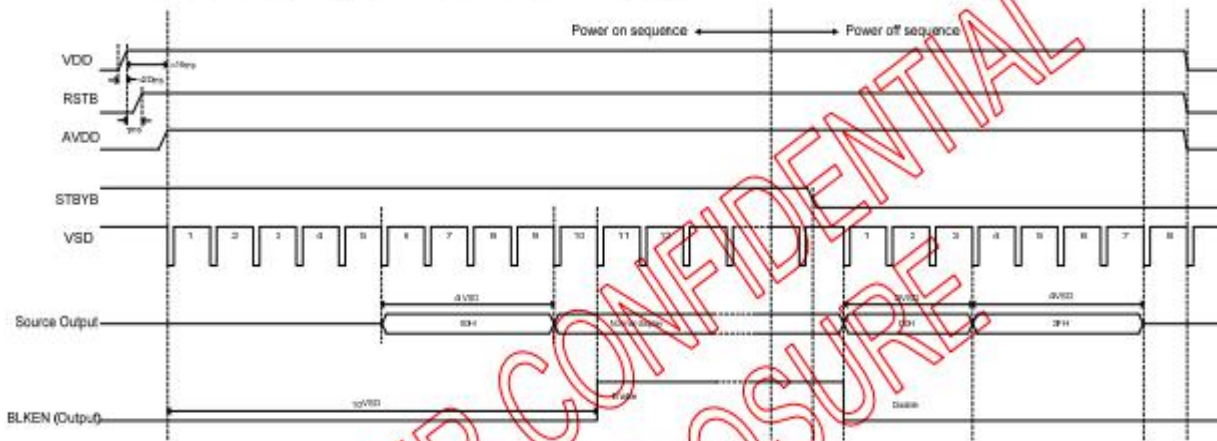
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8. Timing Characteristics

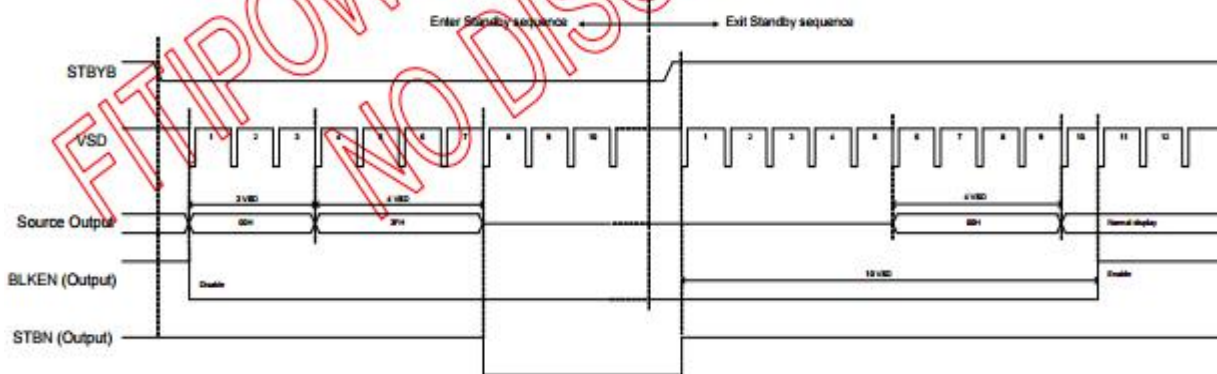
8.1 POWER SEQUENCE

In order to prevent IC from power on reset fail, the rising time (TPOR) of the digital power supply VDD should be maintained within the given specifications. Refer to "AC Characteristics" for more detail on timing.

This is another paragraph of sub-function description.



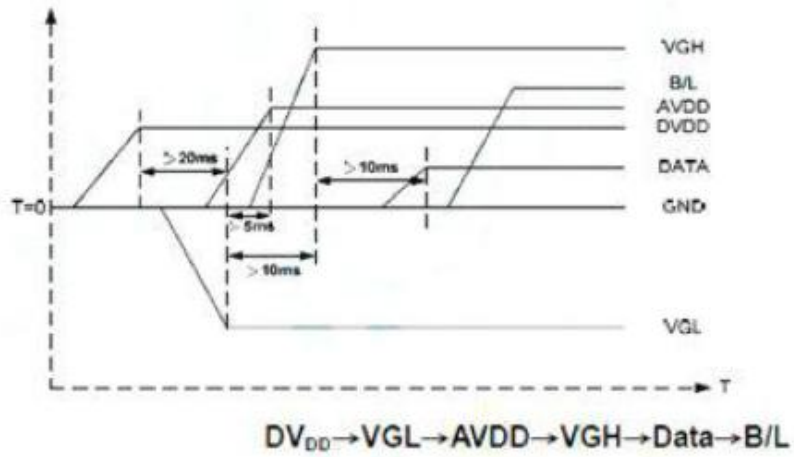
Power-On/Off Timing Sequence



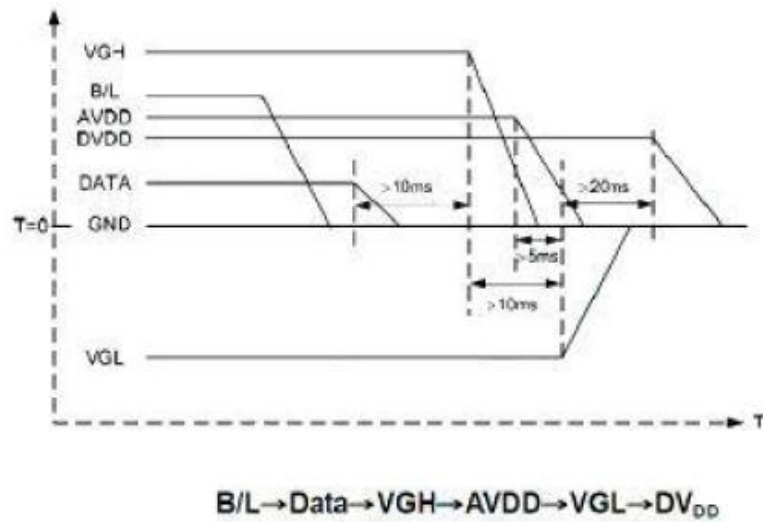
Enter and Exit Standby Mode Sequence

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Power on

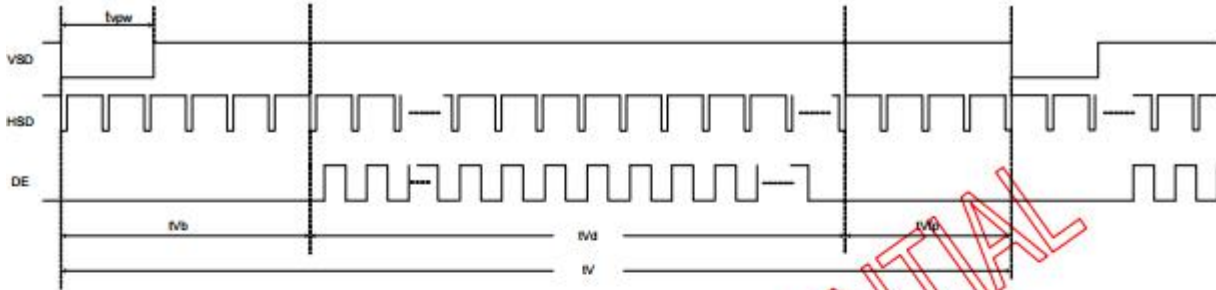


Power off

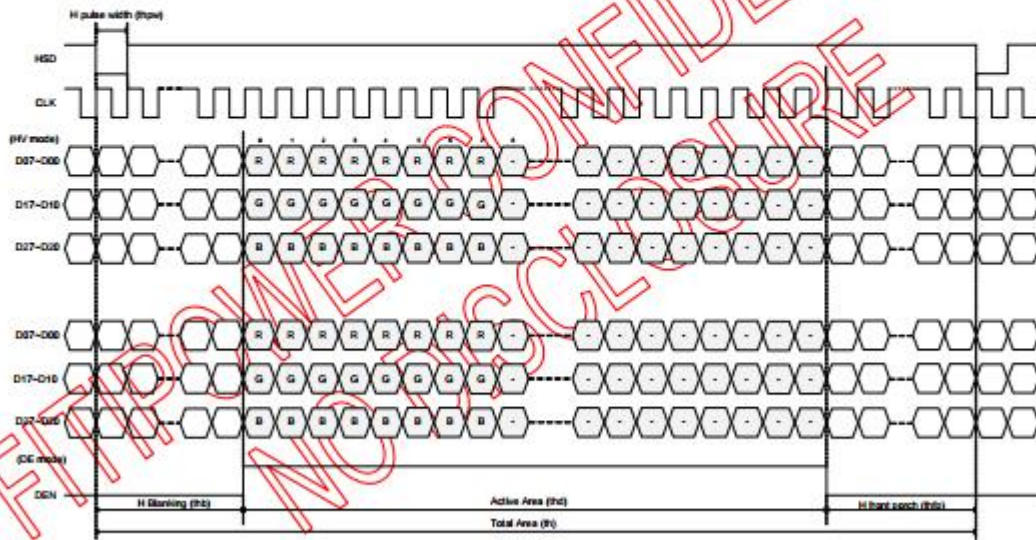


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8.2 Data input format



Vertical input timing



Horizontal input timing

Messrs.

Product Specification

Model:

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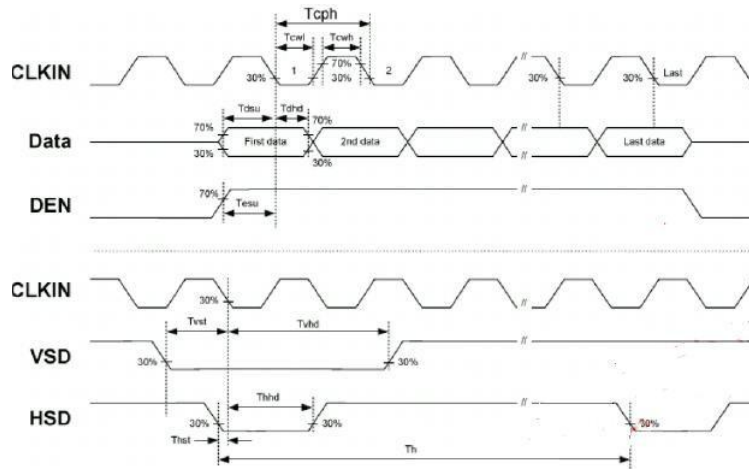
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8.3 RGB MODE TIMING DIAGRAM



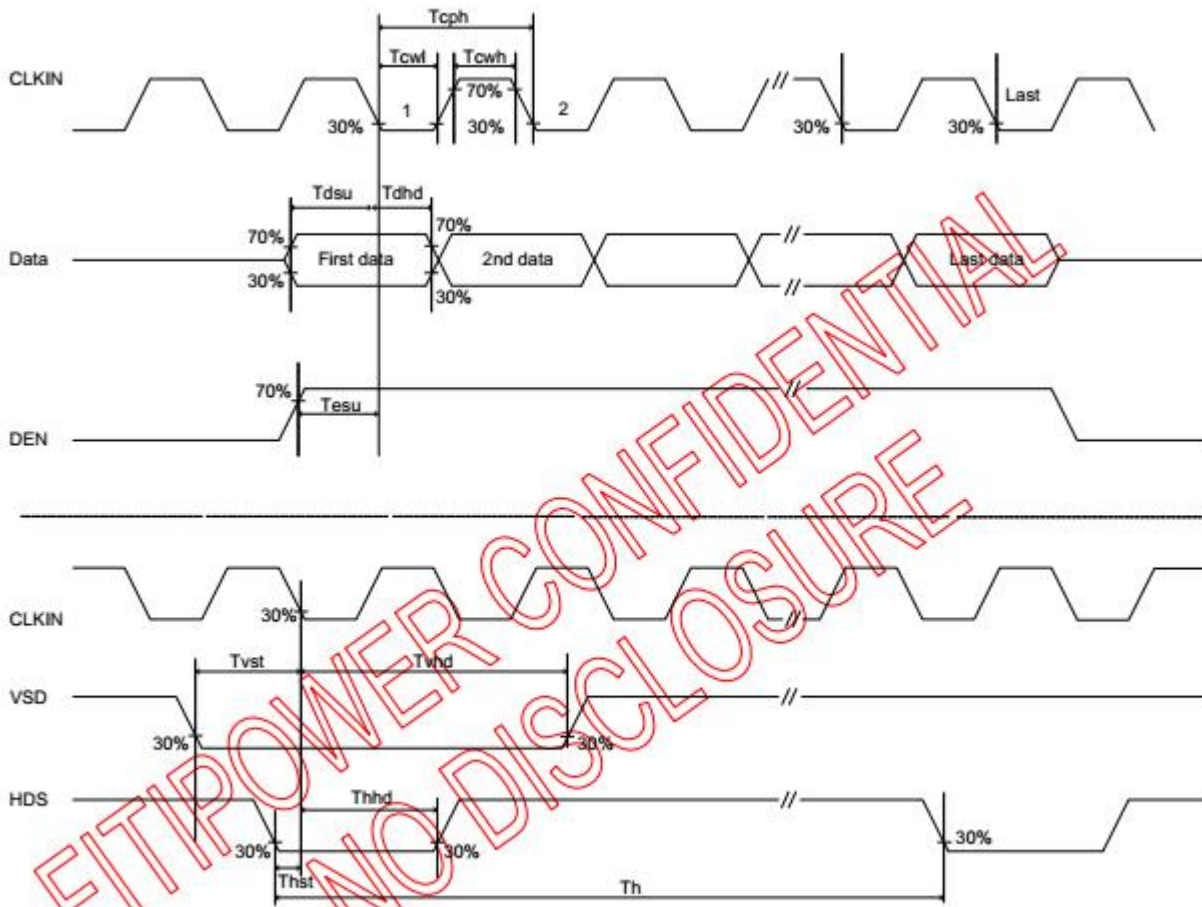
8.4 TIMING Characteristic

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd		800		DCLK	
DCLK Frequency	fclk	26.3	33.3	46.8	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	-	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	210	354	DCLK	

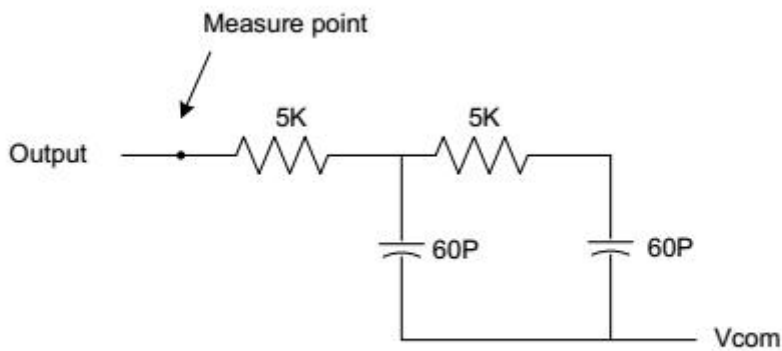
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Vertical Display Area	tvd		480		TH	
VS period time	tv	510	525	650	TH	
VS pulse width	tvpw	1		20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	7	22	147	TH	

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8.5 Timing waveform

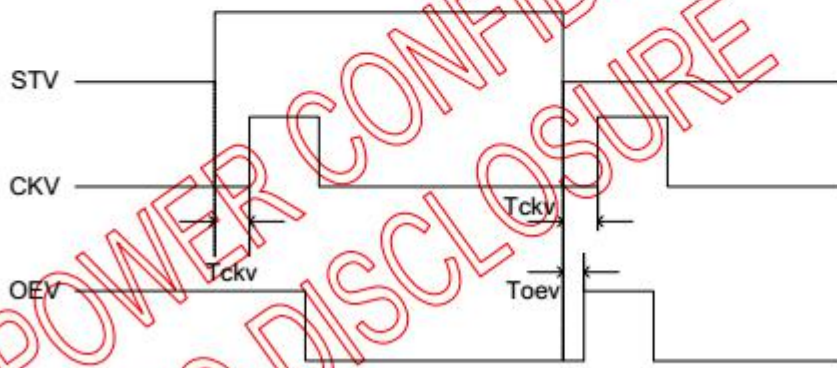
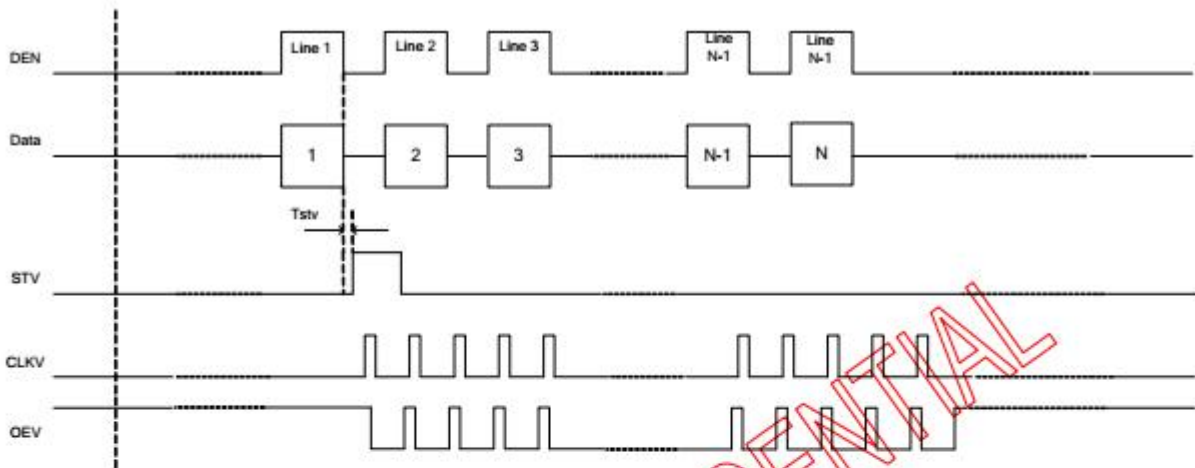


Input Clock and Data Timing Diagram

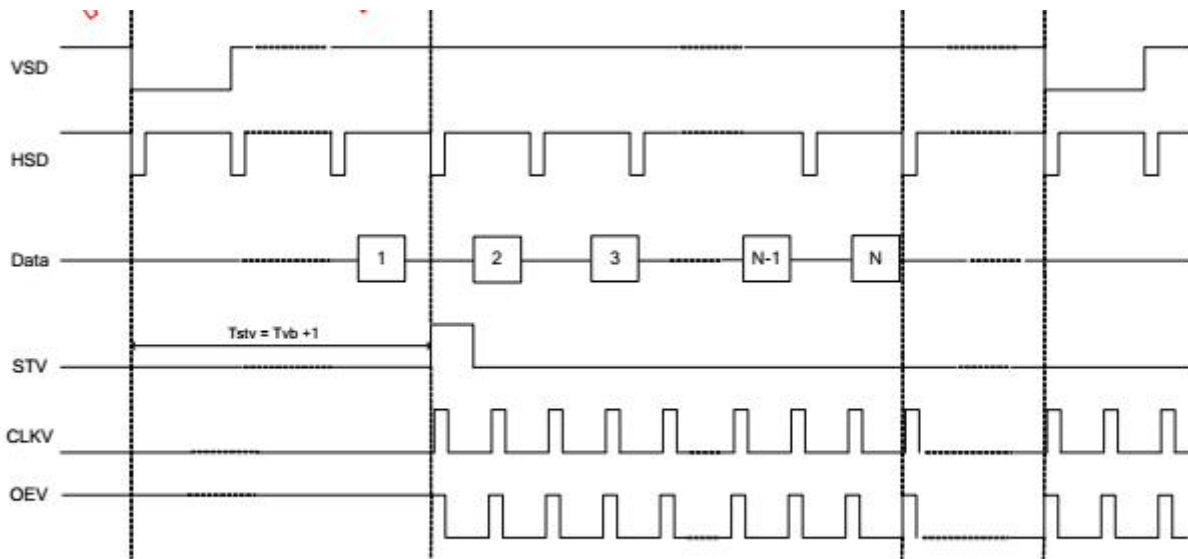


Output load condition

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Vertical Timing Diagram DE



Vertical Timing Diagram HV

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9. Standard Specification for Reliability

9.1 Standard Specification for Reliability of LCD Module

No.	Item	Description	Remarks
01	High temperature operation	Ts=+70°C , 240hrs.	Note1, IEC60068-2-2, GB2423.2—89
02	Low temperature operation	Ta=-20°C , 240hrs	Note2, IEC60068-2-1, GB2423.1—89
03	High temperature storage	Ta=+80°C , 240hrs	IEC 60068-2-2, GB2423.2-89
04	Low temperature storage	Ta=-30°C , 240hrs	IEC 60068-2-1, GB2423.1-89
05	High Temperature & High Humidity (NonOperation)	+60°C , 90% RH max, 240 hours	IEC60068-2-3, GB/T2423.3—2006
06	Thermal Shock (Nonoperation)	-30°C 30 min~+80°C 30 min, Change time:5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22—87
07	Electro Static Discharge (Operation)	C=150pF, R=330Ω, 5points/panel Air:±8KV, 5times; Contact:±4KV, 5 times; (Environment: 15°C ~35°C , 30%~60%, 86Kpa~106Kpa)	IEC 61000-4-2 GB/T17626.2-1998
08	Vibration (Nonoperation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z.(packagecondition)	IEC60068-2-6 GB/T2423.10—1995
09	Shock (Nonoperation)	60G 6ms, ±X,±Y,±Z 3times for each direction	IEC60068-2-27 GB/T2423.5—1995
10	Package Drop Test	Height:80 cm , 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8—1995
11	Image Sticking	25°C ; 1hrs 3mins	Note3

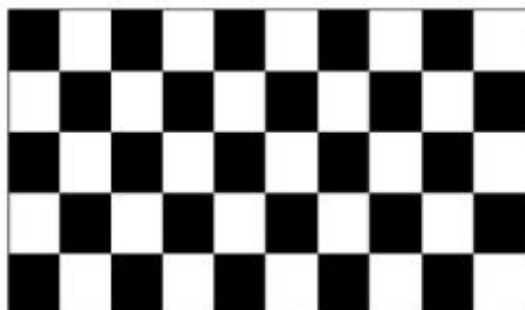
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Note1: Ts is the temperature of panel's surface.

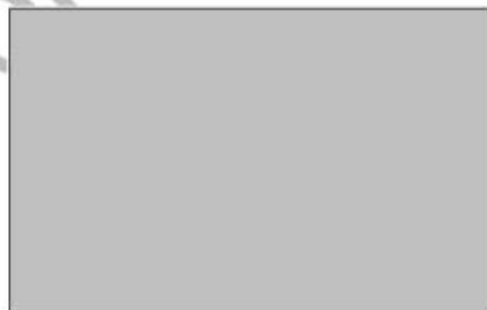
Note2: Ta is the ambient temperature of sample.

Note3: Condition of Image Sticking test : $25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$

Operation with test pattern sustained for 1 hrs, then change to gray pattern immediately. After 3 mins, the mura must be disappeared completely .



(a) Test Pattern (chess board Pattern)



(b) Gray Pattern

9.2 Testing Conditions and Inspection Criteria

For the final test, the testing sample must be stored at room temperature for 24 hours. After the tests listed in Table 9.2, standard specifications for reliability will be executed in order to ensure stability.

No.	Item	Test Model	In section Criteria
01	Current Consumption	Refer To Specification	The current consumption should conform to the product specification.
02	Contrast	Refer To Specification	After the tests have been executed, the contrast must be larger than half of its initial value prior to the tests.
03	Appearance	Visual inspection	Defect free.

9.3 MTBF

MTBF	Functions, performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature ($25\pm 5^{\circ}\text{C}$), normal humidity ($50\pm 10\%$ RH), and in area not exposed to direct sun light.
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10. General Precautions

10.1. Safety

- Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

10.2. Handling

- The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
- The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
- To avoid contamination on the display surface, do not touch the module surface with bare hands.
- Keep a space so that the LCD panels do not touch other components.
- Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
- Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
- Do not leave module in direct sunlight to avoid malfunction of the ICs.

10.3. Static Electricity

- Be sure to ground module before turning on power or operating module.
- Do not apply voltage which exceeds the absolute maximum rating value.

10.4. Storage

- Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ and 65%RH or less.
- Do not store the module in surroundings containing organic solvent or corrosive gas.
- Store the module in an anti-electrostatic container or bag.

10.5. Cleaning

- Do not wipe the polarizer with dry cloth. It might cause scratch.
- Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

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11. Specification of Quality Assurance

This standard of Quality Assurance confirms to the quality of LCD module products supplied by APEX.

11.1 Quality Test

Before delivering, the supplier should conduct the following tests to confirm the quality of products.

- Electrical-Optical Characteristics: According to the individual specification to test the product.
- Appearance Characteristics: According to the individual specification to test the product.
- Reliability Characteristics: According to the definition of reliability on the specification for testing products.

11.2 Delivery Test

Before delivering, the supplier should conduct the delivery test.

- Test method: According to MIL-STD105E. General Inspection Level II take a single Time.
- The defects classify of AQL as following:
Major defect: AQL = 0.65
Minor defect: AQL = 1.5
Total defects: AQL = 1.5

11.3 Non-conforming Analysis & Deal With Manners

11.3.1 Non-conforming Analysis

- Purchaser should provide the data detail of non-conforming sample and the non-conforming.
- After receiving the data detail from purchaser, the analysis of non-conforming should be finished within two weeks.
- If the analysis can't be finished on time, supplier must notice purchaser 3 days in advance.

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11.3.2 Disposition of non-conforming

- If any product defect be found during assembling, supplier must change the good for every defect after confirmation.
- Both supplier and customer should analyze the reason and discuss the disposition of non-conforming when the reason of nonconforming is not sure.

11.4 Agreement items

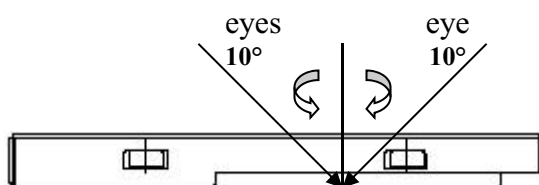
Both parties should negotiate together when the following problems happen.

- There is any problem of standard of quality assurance, and both sides should agree that it must be modified.
- There is any argument item which does not record in the standard of quality assurance.
- Any other special problem.

11.5 Standard of The Product Appearance Test

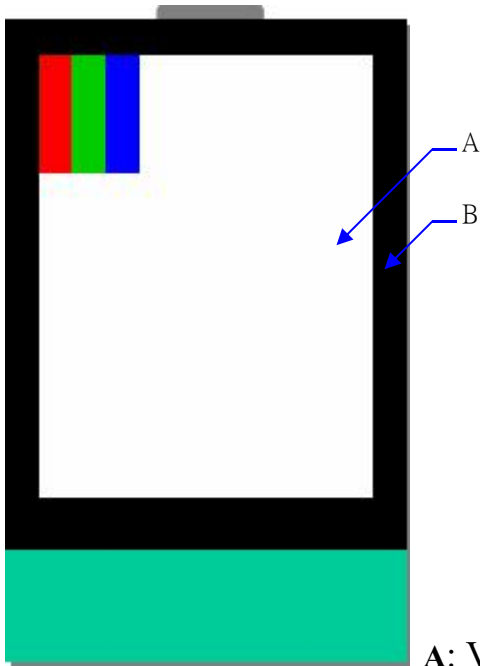
11.5.1 Manner of appearance test

- The test must be under 20W × 2 or 40W fluorescent light, and the distance of view must be at 30±5cm.
- When test the model of transmissive product must add the reflective plate.
- The test direction is base on around 10° of vertical line.
- Temperature: 25±5°C Humidity: 60±10%RH



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- Definition of area:



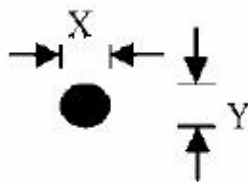
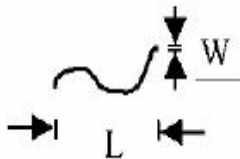
A: Viewing area B: Outside viewing area

11.5.2 Basic principle

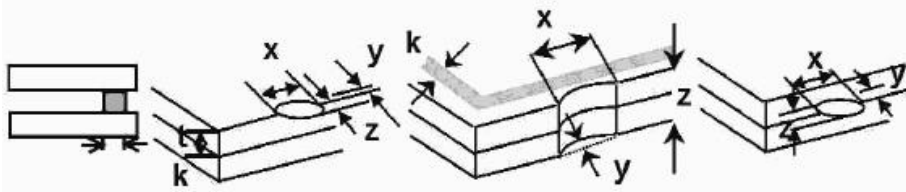
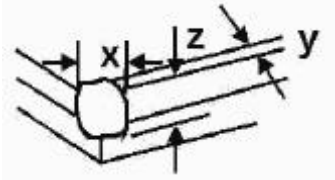
- When the standard can not be described, AQL will be applied.
- The sample of the lowest acceptable quality level must be negotiated by both supplier and customer when any dispute happened.
- New item must be added on time when it is necessary.

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11.6 Inspection Specification

NO.	Item	Criterion	AQL												
01	Electrical Testing	1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character, dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle defect. 1.7 Mixed product types. 1.8 Flicker	0.65												
02	Black or White spots or Bright spots or Color spots on LCD (Display only)	2.1 White and black or color spots on display $\leq 0.25\text{mm}$, no more than Five spots. 2.2 Densely spaced: No more than three spots within 3mm.	1.5												
03	LCD and Touch Panel black spots, white spots, contamination (non – display)	3.1 Round type: As following drawing $\Phi = (X+Y) / 2$  <table border="1" data-bbox="821 1086 1348 1332"> <thead> <tr> <th>Size(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.20$</td> <td>2</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.25$</td> <td>2</td> </tr> <tr> <td>$0.25 < \Phi \leq 0.30$</td> <td>1</td> </tr> <tr> <td>$0.30 < \Phi$</td> <td>0</td> </tr> </tbody> </table> <p>* Densely spaced: No more than two spots within 3mm.</p>	Size(mm)	Acceptable Q'ty	$\Phi \leq 0.10$	Accept no dense	$0.10 < \Phi \leq 0.20$	2	$0.20 < \Phi \leq 0.25$	2	$0.25 < \Phi \leq 0.30$	1	$0.30 < \Phi$	0	1.5
		Size(mm)	Acceptable Q'ty												
$\Phi \leq 0.10$	Accept no dense														
$0.10 < \Phi \leq 0.20$	2														
$0.20 < \Phi \leq 0.25$	2														
$0.25 < \Phi \leq 0.30$	1														
$0.30 < \Phi$	0														
3.2 Line type: (As following drawing)  <table border="1" data-bbox="726 1489 1348 1758"> <thead> <tr> <th>Length(mm)</th> <th>Width(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$W \leq 0.02$</td> <td>Accept no dense</td> </tr> <tr> <td>$L \leq 3.0$</td> <td>$0.02 < W \leq 0.05$</td> <td rowspan="2">2</td> </tr> <tr> <td>$L \leq 2.5$</td> <td>$0.03 < W \leq 0.08$</td> </tr> <tr> <td>---</td> <td>$0.08 < W$</td> <td>Rejection</td> </tr> </tbody> </table> <p>* Densely spaced: No more than two lines within 3mm.</p>	Length(mm)	Width(mm)	Acceptable Q'ty	---	$W \leq 0.02$	Accept no dense	$L \leq 3.0$	$0.02 < W \leq 0.05$	2	$L \leq 2.5$	$0.03 < W \leq 0.08$	---	$0.08 < W$	Rejection	1.5
Length(mm)	Width(mm)	Acceptable Q'ty													
---	$W \leq 0.02$	Accept no dense													
$L \leq 3.0$	$0.02 < W \leq 0.05$	2													
$L \leq 2.5$	$0.03 < W \leq 0.08$														
---	$0.08 < W$	Rejection													

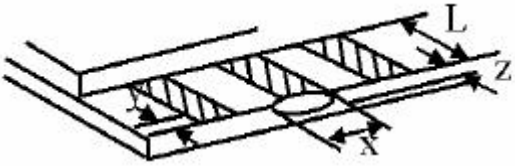
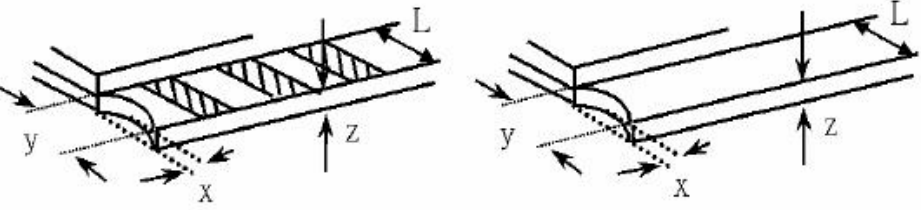
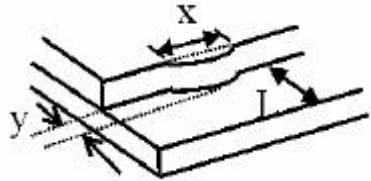
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NO.	Item	Criterion	AQL																		
04	Polarizer bubbles	If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction	Size Φ (mm)	Acceptable Q'ty																	
			$\Phi \leq 0.20$	Accept no dense																	
			$0.20 < \Phi \leq 0.50$	3																	
			$0.50 < \Phi \leq 1.00$	2																	
			$1.00 < \Phi$	0																	
			Total Q'ty	3																	
05	Scratches	Follow NO.3 -2 Line Type.																			
06	Chipped glass	<p>Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length</p> <p>6.1 General glass chip: 6.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="399 1131 1220 1288"> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td>$Z \leq 1/2t$</td> <td>Not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> <tr> <td>$1/2t < z \leq 2t$</td> <td>Not exceed 1/3k</td> <td>$x \leq 1/8a$</td> </tr> </table> <p>⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip</p> <p>6.1.2 Corner crack:</p>  <table border="1" data-bbox="399 1624 1220 1780"> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td>$Z \leq 1/2t$</td> <td>Not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> <tr> <td>$1/2t < z \leq 2t$</td> <td>Not exceed 1/3k</td> <td>$x \leq 1/8a$</td> </tr> </table> <p>⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip</p>	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	1.5
		z: Chip thickness	y: Chip width	x: Chip length																	
		$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$																	
		$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$																	
		z: Chip thickness	y: Chip width	x: Chip length																	
		$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$																	
		$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$																	

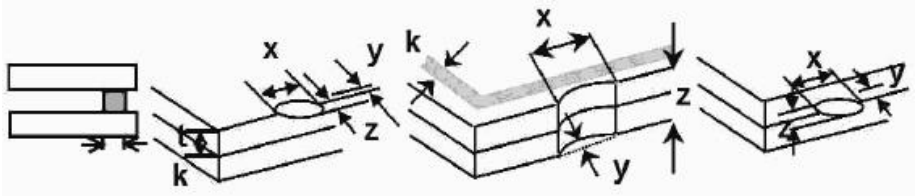
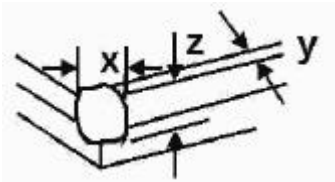
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NO.	Item	Criterion	AQL
08	Cracked glass	The LCD with extensive crack is not acceptable.	1.5
09	Backlight elements	9.1 Illumination source flickers when lit. 9.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. 9.3 Backlight doesn't light or color is wrong.	1.5 1.5 0.65
10	Bezel	Bezel must comply with product specifications.	1.5
11	PCB、COB	11.1 COB seal may not have pinholes larger than 0.2mm or contamination. 11.2 COB seal surface may not have pinholes through to the IC. 11.3 The height of the COB should not exceed the height indicated in the assembly diagram. 11.4 There may not be more than 2mm of sealant outside the seal area on PCB. And there should be no more than three places. 11.5 Parts on PCB must be the same as on the production characteristic chart, There should be no wrong parts, missing parts or excess parts. 11.6 The jumper on the PCB should conform to the product characteristic chart.	1.5 1.5 1.5 1.5 0.65 0.65
12	FPC	12.1 FPC terminal damage \cong 1/2 FPC terminal width and can not affect the function , we judge accept. 12.2 FPC alignment hole damage \cong 1/2 alignment area and can not affect the function , we judge accept.	1.5 1.5
13	Soldering	13.1 No cold solder joints, missing solder connections, oxidation or icicle. 13.2 No short circuits in components on PCB or FPC.	1.5 0.65

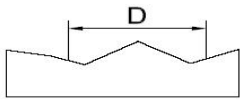
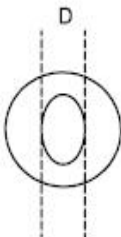
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NO.	Item	Criterion	AQL																
07	Glass crack	<p>Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length</p> <p>7.2 Protrusion over terminal: 7.2.1 Chip on electrode pad:</p>  <table border="1" data-bbox="560 757 1235 904"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td>$y \leq 0.5\text{mm}$</td> <td>$x \leq 1/8a$</td> <td>$0 < z \leq t$</td> </tr> </table> <p>7.2.2 Non-conductive portion:</p>  <table border="1" data-bbox="560 1272 1235 1420"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td>$y \leq L$</td> <td>$x \leq 1/8a$</td> <td>$0 < z \leq t$</td> </tr> </table> <p>⊙ If there chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications. ⊙ If the product will be heat sealed by the customer, the alignment mark must not be damaged.</p> <p>7.2.3 Substrate protuberance and internal crack</p>  <table border="1" data-bbox="887 1749 1323 1890"> <tr> <td>y: width</td> <td>x: length</td> </tr> <tr> <td>$y \leq 1/3L$</td> <td>$X \leq a$</td> </tr> </table>	y: Chip width	x: Chip length	z: Chip thickness	$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$	y: Chip width	x: Chip length	z: Chip thickness	$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$	y: width	x: length	$y \leq 1/3L$	$X \leq a$	1.5
y: Chip width	x: Chip length	z: Chip thickness																	
$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$																	
y: Chip width	x: Chip length	z: Chip thickness																	
$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$																	
y: width	x: length																		
$y \leq 1/3L$	$X \leq a$																		

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NO.	Item	Criterion	AQL												
14	Touch Panel Chipped glass	<p>Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Touch Panel Total thickness a: LCD side length L: Electrode pad length</p> <p>14.1 General glass chip: 14.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="448 752 1270 965"> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td>$Z \leq t$</td> <td>$\cong 1/2 k$ and not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> </table> <p>⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip</p> <p>14.1.2 Corner crack:</p>  <table border="1" data-bbox="448 1346 1270 1559"> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td>$z \leq t$</td> <td>$\cong 1/2 k$ and not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> </table> <p>⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip</p>	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq t$	$\cong 1/2 k$ and not over viewing area	$x \leq 1/8a$	z: Chip thickness	y: Chip width	x: Chip length	$z \leq t$	$\cong 1/2 k$ and not over viewing area	$x \leq 1/8a$	1.5
z: Chip thickness	y: Chip width	x: Chip length													
$Z \leq t$	$\cong 1/2 k$ and not over viewing area	$x \leq 1/8a$													
z: Chip thickness	y: Chip width	x: Chip length													
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Messrs.			
Product Specification	Model:	TWVK700RETR40N	Rev. NO.
			Issued Date.
			B
			Oct.25 ,18

NO.	Item	Criterion	AQL										
15	Touch Panel(Fish eye、dent and bubble on film)	<table border="1"> <thead> <tr> <th>SIZE(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.2$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.2 < D \leq 0.4$</td> <td>5</td> </tr> <tr> <td>$0.4 < D \leq 0.5$</td> <td>2</td> </tr> <tr> <td>$0.5 < D$</td> <td>0</td> </tr> </tbody> </table>  	SIZE(mm)	Acceptable Q'ty	$\Phi \leq 0.2$	Accept no dense	$0.2 < D \leq 0.4$	5	$0.4 < D \leq 0.5$	2	$0.5 < D$	0	1.5
SIZE(mm)	Acceptable Q'ty												
$\Phi \leq 0.2$	Accept no dense												
$0.2 < D \leq 0.4$	5												
$0.4 < D \leq 0.5$	2												
$0.5 < D$	0												
16	Touch Panel Newton ring	Newton ring dimension $\leq 1/2$ touch panel area and not affect font and line distortion($\leq 2.5\%$) , it is acceptable.	1.5										
17	Touch Panel Linearity	Less than 1.5% is acceptable.	1.5										
18	LCD Ripple	Touch the touch panel , can not see the LCD ripple. Pen: R 1.0mm silicon rubber. Operation Force: 80g	1.5										
19	General appearance	19.1 Pin type must match type in specification sheet. 19.2 LCD pin loose or missing pins. 19.3 Product packaging must the same as specified on packaging specification sheet. 19.4 Product dimension and structure must conform to product specification sheet.	0.65 0.65 0.65 0.65										

Messrs.			
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12.Packing Method

No.	Item	Dimensions(mm)	Quantity	Remark
1	LCM Module	164.80*99.80*5.5	40PCS	
2	PALLET	350*285*175 (include 40pcs products/one pallet)	1PCS	
3	LARGE CARTON	385*355*227 (include 40pcs products/one carton)	1PCS	