

APEX

APEX SCIENCE & ENGINEERING CORP

(OPTOELECTRONIC DIV.)




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TWV0500RBFH40N

ROHS

DATA SHEET

Acceptance

ISSUE	VERSION	APPROVER	CHECKER	ENGINEER
	A			

Messrs.				
Product Specification	Model:	TWV0500RBFH40N	Rev. NO.	Issued Date.
			A	May,15.20

Records of Revision

DATE	REF.PAGE PARAGRAPH DRAWING No.	REVISED No.	SUMMARY	REMARK
2020-05-15		A	First Issue	

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			May,15.20

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1. General Specification

Item	Contents	Unit
LCD TYPE	TFT/TRANSMISSIVE	
MODULE SIZE (W*H*T)	120.7*75.80*3.10	MM
ACTIVE SIZE (W*H)	108.00*64.80	MM
PIXEL PITCH (W*H)	0.135*0.135	MM
NUMBER OF DOTS	800*480	
LCD DRIVER IC	ST7262-E	
CTP DIVER IC	N/A	
INTERFACE TYPE	24-BIT RGB	
TOP POLARIZER TYPE	ANTI-GLARE	
RECOMMEND VIEWING DIRECTION	ALL	O'CLOCK
GRAY SCALE INVERSION DIRECTION	N/A	O'CLOCK
BACKLIGHT TYPE	18-DIES WHITE LED	
TOUCH PANEL TYPE	N/A	

Messrs.

Product Specification

Model:

TWV0500RBFH40N

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2. Mechanical Drawing

PIN DESCRIPTION	
PIN NO	SYMBOL
1	LED_K
2	LED_A
3	NC(GND)
4	VDD
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	R0
14	O1
15	O2
16	O3
17	O4
18	O5
19	O6
20	O7
21	R0
22	R1
23	R2
24	R3
25	R4
26	R5
27	R6
28	R7
29	R0
30	O1
31	O2
32	O3
33	O4
34	O5
35	O6
36	GND
37	NC(VE)
38	NC(VE)
39	NC(VE)
40	NC(VE)

FRONT VIEW DIMENSIONS:
 Total width: 120.7 (LCM O.D.)
 Bezel opening width: 110.70 (LCM O.D.)
 LCD V.A. width: 108.00 (LCD V.A.)
 LCD A.A. width: 108.00 (LCD A.A.)
 Bezel opening height: 67.40 (BEZEL OPENING)
 LCD V.A. height: 64.80 (LCD V.A.)
 LCD A.A. height: 64.80 (LCD A.A.)
 Component height: 26.100
 Pin height: 49.190
 Total height: 75.8 (LCM O.D.)
 Full viewing angle: 5.0° FT
 800(RGB)*800
 Component size: 80.00*40.00

BACK VIEW DIMENSIONS:
 Total length: 31.10±0.2
 Pin pitch: 5.00±0.5
 Pin width: 0.30±0.05
 Contact side length: 1.5 MAX

PINOUT DIAGRAM:
 LED_A, LED_K, R0-R7, O1-O7, GND, NC(VE), NC(VE), NC(VE), NC(VE)

DETAIL A (SCALE 3:1):
 P0.5(60-1)=19.5±0.05
 W=0.3±0.03
 40
 8±0.2
 0.540±0.1
 3.5±0.3
 PITCH DETAIL: 0.135, 0.135, R G B R, R G B R

Display Type	TRANSMISSIVE/INB
Optimum Viewing Direction	ALL VIEW
Upper Polarizer Type	Anti-Glare
LCD Driver IC	ST7262
Operating Voltage	VDD=3.3V
Storage Temperature	-30°C TO 85°C
Interface	24 Bit RGB
Backlight	18-CHIP WHITE LED
Surface luminance	600 cd/m ² (TYP.)
White X/Y	

BACKLIGHT CIRCUIT DIAGRAM
 IF=60mA, Vf=19.2V

TITLE	MODULE SPEC.		
DRAWN	ME. CHECKED	EE. CHECKED	APPROVED
CUSTOMER'S APPROVAL	2019.11.15A	FIRST ISSUE	AMENDMENT

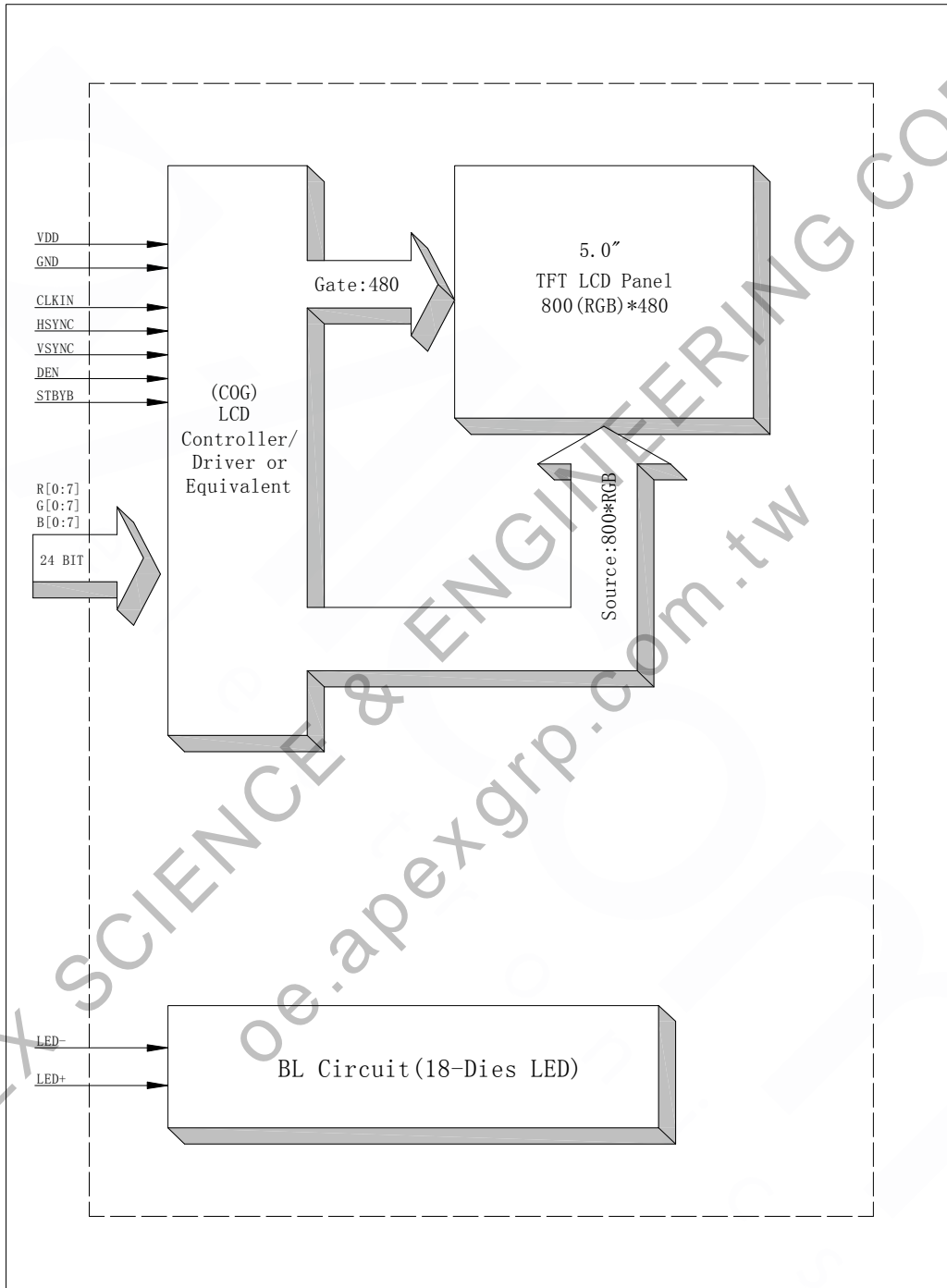
DRAWING NO. TWV0500RBFH40N
 UNIT: mm SCALE: FIT SHEET 1 OF 1
 3rd Angle

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ITF NOTES:
 1. General Tolerances: ±0.2
 2. Preference dimension.
 3. Recommended Case Open Area Should Be Less Than Module V.A
 4. ROHS MUST BE COMPLIANT

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3. Block Diagram



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4. Interface Pin Function

Pin No.	Symbol	Description
1	LED-	Cathode of LED backlight.
2	LED+	Anode of LED backlight.
3	GND	Power ground.
4	VDD	Power supply.
5~12	R0~R7	8-bit digital Red data input.
13~20	G0~G7	8-bit digital Green data input.
21~28	B0~B7	8-bit digital Blue data input.
29	GND	Power ground.
30	CLKIN	Clock signal; latching data at the falling edge.
31	STBYB	Display control / standby mode selection. STBYB = "Low" : Standby; STBYB = "High" : Normal display(Default)
32	HSD	Horizontal sync signal; negative polarity.
33	VSD	Vertical sync signal; negative polarity.
34	DEN	Data input enable. Active High to enable the data input.
35	NC	No connection.
36	GND	Power ground.
37	NC	No connection.
38	NC	No connection.
39	NC	No connection.
40	NC	No connection.

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5. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply voltage for analog	VDD	-0.3	4.5	V
Supply voltage for logic	VDD	-0.5	4.5	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 Analog	VDD	3.0	3.3	3.6	V	
Supply Voltage for Logic	VDD	3.0	3.3	3.6	V	
Input Voltage	V _{IL}	GND	-	0.2VDD	V	
	V _{IH}	0.8 VDD	-	VDD		
Input leakage Current	I _{LKG}	-1		1	μA	
Supply Current	IDD	75	102	114	mA	

6.2 Backlight Driving Conditions

Item	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V _F	16.8	19.2	20.4	V	I _L =60mA
Current for LED Backlight	I _L		60		mA	
Power Consumption	P		1.152		W	
LED Life Time		30,000	50,000		Hr	Note

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

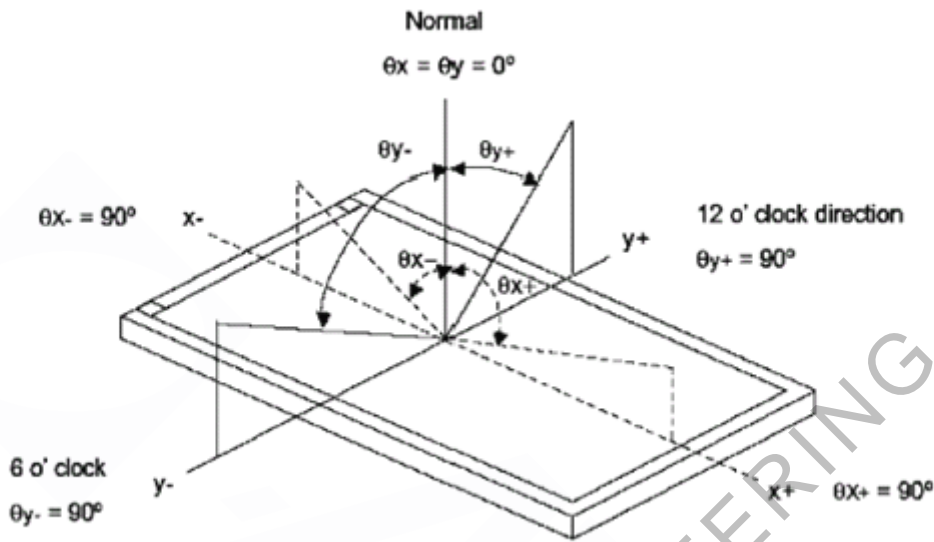
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7. Optical Characteristics

ITEM	SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE	
			MIN	TYP.	MAX			
Luminance	L	$I_L = 60\text{mA}$	480	600	840	Cd/m^2		
Contrast Ratio	CR	$\theta = 0^\circ$	1000	1500				
Response Time	T_{ON}	25°C		30	40	ms		
	T_{OFF}							
CIE Color Coordinate	Red	X_R						
		Y_R						
	Green	X_G	Viewing normal angle					
		Y_G						
	Blue	X_B						
		Y_B						
	White	X_W		0.294	0.334	0.374		
		Y_W		0.317	0.357	0.397		
Viewing Angle	Hor.	θ_{x+}		80	85	-	Degree	
		θ_{x-}		80	85	-		
	Ver.	θ_{y+}	80	85	-			
		θ_{y-}	80	85	-			
Uniformity	Un		75	80		%		

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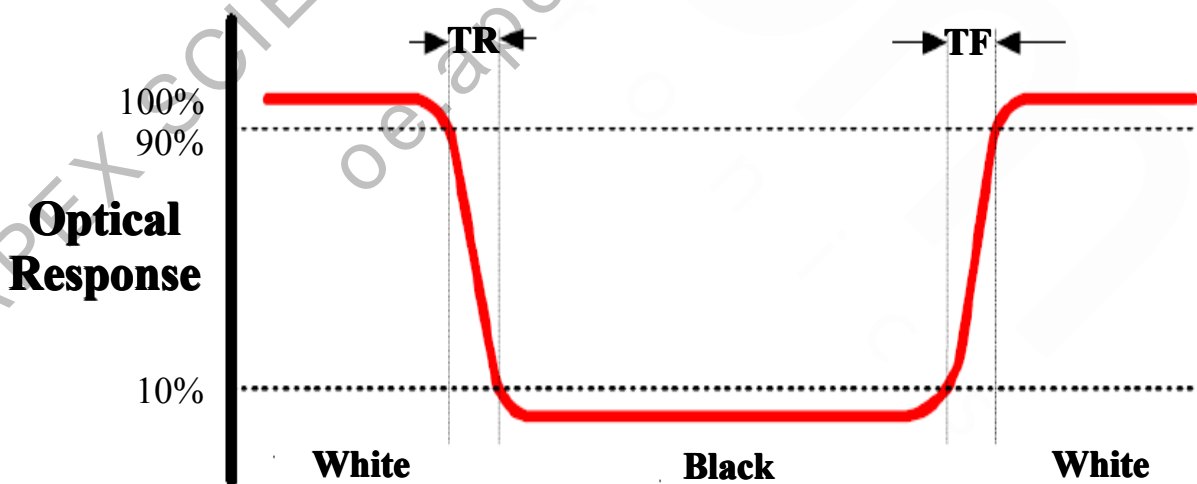
Note 1: Definition of Viewing Angle θ_x and θ_y :



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)

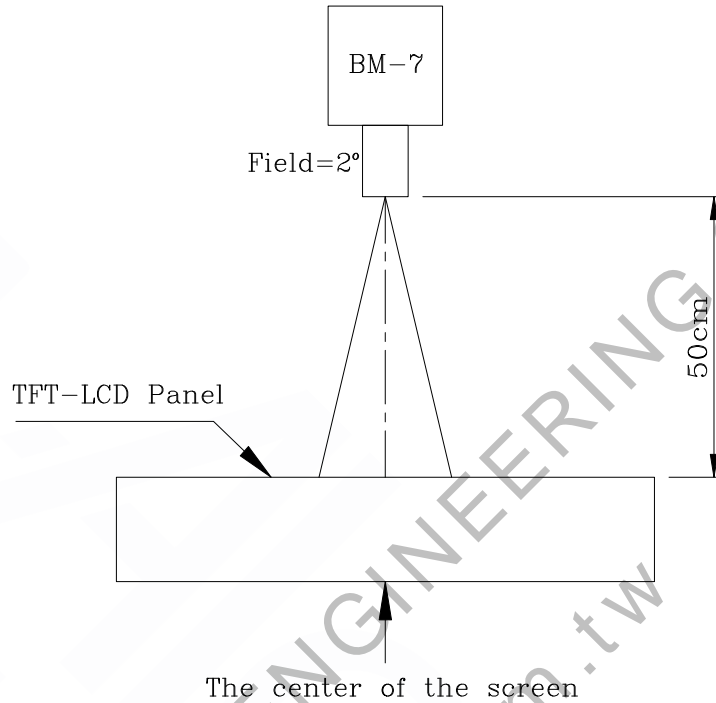


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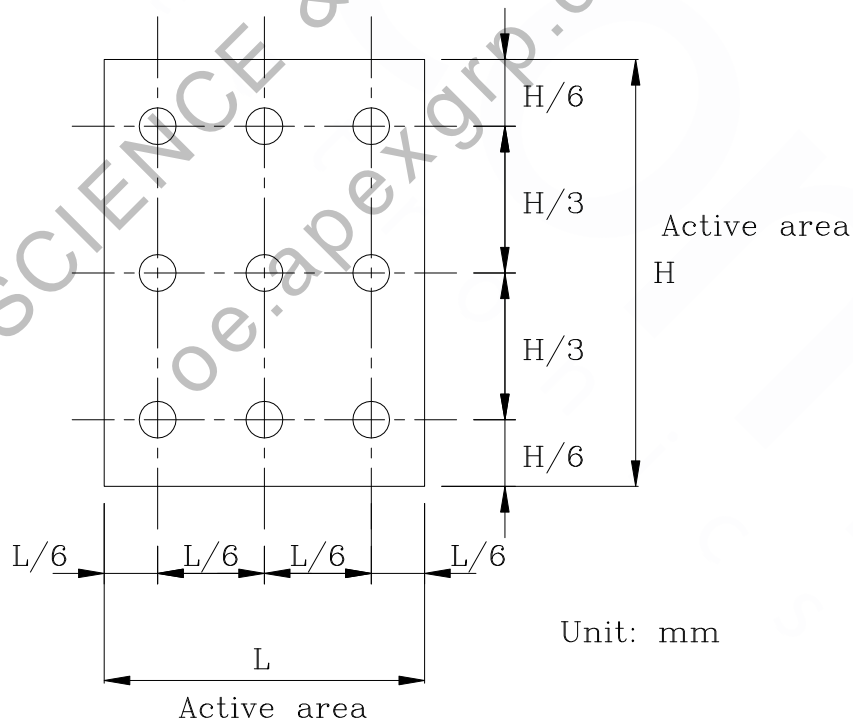
Note 4: Definition of Luminance

①The Brightness Test Equipment Setup

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



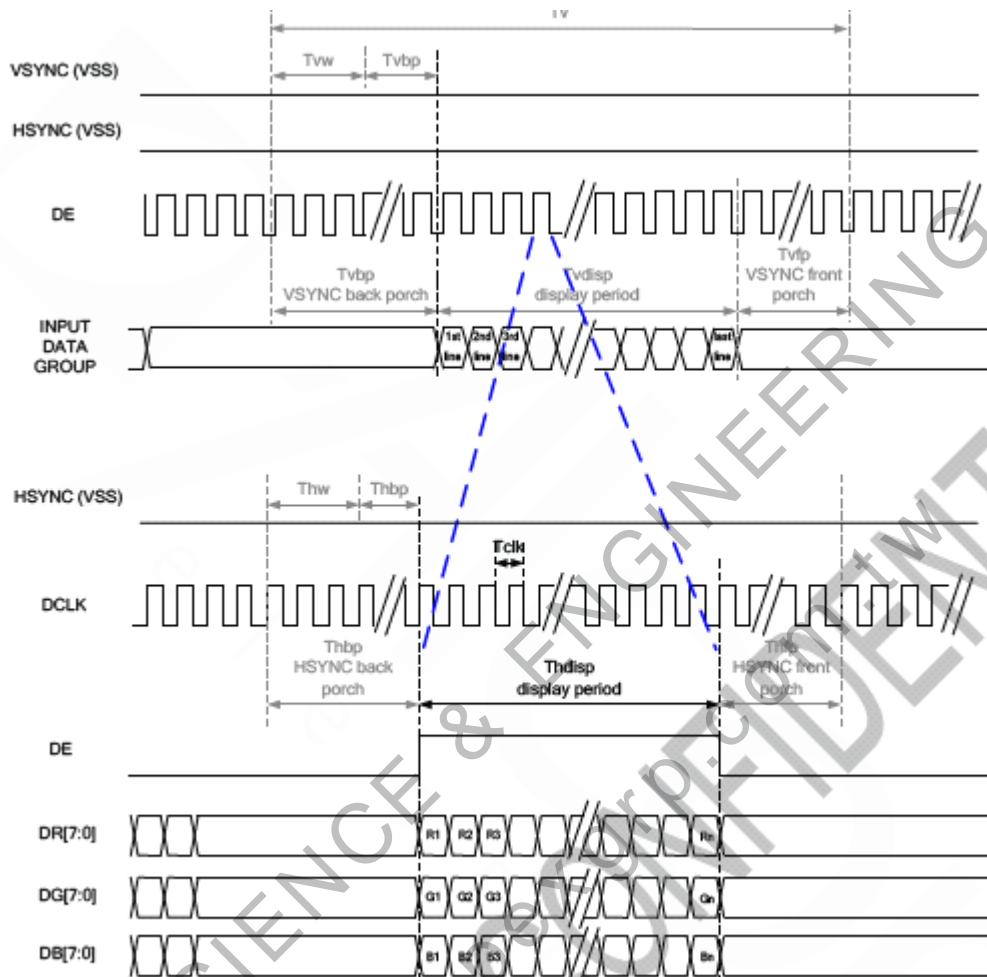
②The Brightness Test Point Setup



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8. Timing Characteristics

8.1 RGB Mode Timing Diagram



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8.2 RGB Timing Table

Parallel 24-bit RGB Interface Timing Table						
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency	Fclk	23	25	27	MHz	
HSYNC	Period Time	Th	808	816	896	DCLK
	Display Period	Thdisp	800			DCLK
	Back Porch	Thbp	4	8	48	DCLK
	Front Porch	Thfp	4	8	48	DCLK
	Pulse Width	Thw	2	4	8	DCLK
VSYNC	Period Time	Tv	488	496	504	HSYNC
	Display Period	Tvdisp	480			HSYNC
	Back Porch	Tvbp	4	8	12	HSYNC
	Front Porch	Tvfp	4	8	12	HSYNC
	Pulse Width	Tvw	2	4	8	HSYNC

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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	The sample should be allowed to stand at 70°C for 240 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.	Note 1 IEC60068-2-2, GB2423.2-89
02	Low temperature operation	The sample should be allowed to stand at -20°C for 240 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.	Note2 IEC60068-2-1 GB2423.1-89
03	High temperature storage	The sample should be allowed to stand at 80°C for 240 hours under no-load condition, and then returning it to normal temperature condition, and allowing it stand for 2 hours.	IEC60068-2-2 GB2423.2-89
04	Low temperature storage	The sample should be allowed to stand at -30°C for 240 hours under no-load condition, then returning it to normal temperature condition, and allowing it stand for 2 hours.	IEC60068-2-1 GB/T2423.1-89
05	Moisture storage	The sample should be allowed to stand at 60°C,90%RH MAX for 240 hours under no-load condition, then taking it out and drying it at normal temperature for 2 hours.	IEC60068-2-1 GB/T2423.3-2006
06	Thermal shock storage	The sample should be allowed to stand the following 10 cycles : -30°C for 30 minutes → normal temperature for 5 minutes → +80°C for 30 minutes → normal temperature for 5 minutes, as one cycle.	Start with cold temperature,end with high temperature IEC60068-2-14, GB2423.22-87
07	Packing vibration	Frequency range : 10Hz ~ 55Hz Amplitude of vibration : 1.5mm Sweep time: 12 min X,Y,Z 2 hours for each direction.	IEC61000-2-6 GB/T2423.5-1995
08	Packing drop test	According to ASTM-D-5327.	IEC60068-2-32 GB/T2423.8-1995
09	Electrical Static Discharge	Air: ±4KV 150pF/330Ω 5 times	IEC61000-4-2 GB/T17626.2-1998
		Contact: ±2KV 150pF/330Ω 5 time	

- Note:1. Ts is the temperature of panel's surface.
2. Ta is the ambient temperature of sample.
3. Sample size for each test item is 3~5pcs.

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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±5°C), normal humidity (50±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

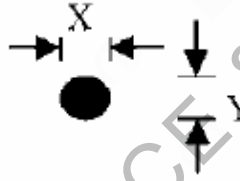
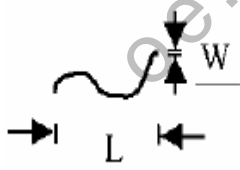
- Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ and 65%RH or less.
- Do not store the module in surroundings containing organic solvent or corrosive gas.
- Store the module in an anti-electrostatic container or bag.

10.5. Cleaning

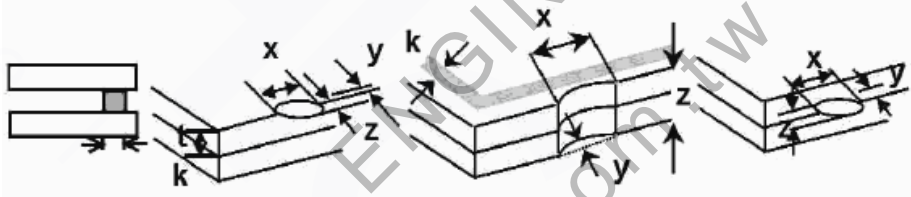
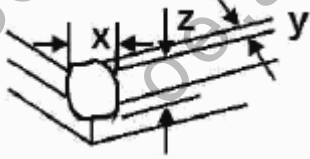
- Do not wipe the polarizer with dry cloth. It might cause scratch.
- Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

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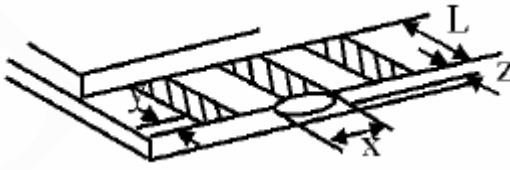
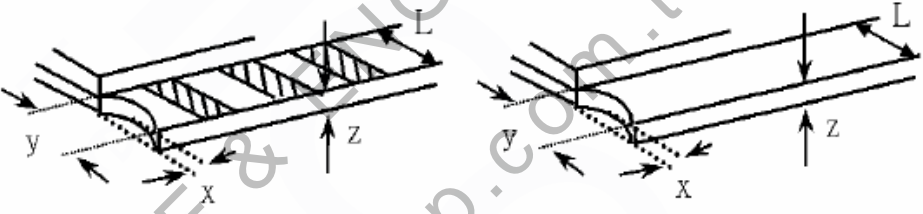
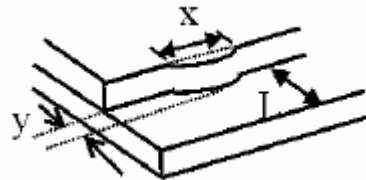
10.6 Inspection Specification

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 < 0.25mm, no more than one spots. 2.2 Densely spaced: No more than three spots within 3mm.	2.5												
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 1356 1344"> <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	2.5
		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 1356 1724"> <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>$L < 2.5$</td> <td>$W < 0.08$</td> <td>1</td> </tr> <tr> <td>---</td> <td>$0.08 \leq W$</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	$L < 2.5$	$W < 0.08$	1	---	$0.08 \leq W$	Rejection	2.5		
Length(mm)	Width(mm)	Acceptable Q'ty													
---	$W \leq 0.02$	Accept no dense													
$L < 2.5$	$W < 0.08$	1													
---	$0.08 \leq W$	Rejection													

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NO.	Item	Criterion	AQL																		
04	Polarizer bubbles	<p>If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction</p> <table border="1"> <thead> <tr> <th>Size Φ(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.30$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.30 < \Phi \leq 0.50$</td> <td>0</td> </tr> <tr> <td>$0.50 < \Phi \leq 1.00$</td> <td>0</td> </tr> <tr> <td>$1.00 < \Phi$</td> <td>0</td> </tr> <tr> <td>Total Q'ty</td> <td>0</td> </tr> </tbody> </table>	Size Φ (mm)	Acceptable Q'ty	$\Phi \leq 0.30$	Accept no dense	$0.30 < \Phi \leq 0.50$	0	$0.50 < \Phi \leq 1.00$	0	$1.00 < \Phi$	0	Total Q'ty	0	2.5						
Size Φ (mm)	Acceptable Q'ty																				
$\Phi \leq 0.30$	Accept no dense																				
$0.30 < \Phi \leq 0.50$	0																				
$0.50 < \Phi \leq 1.00$	0																				
$1.00 < \Phi$	0																				
Total Q'ty	0																				
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"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <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> </tbody> </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"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <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> </tbody> </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	$x \leq 1/8a$	2.5
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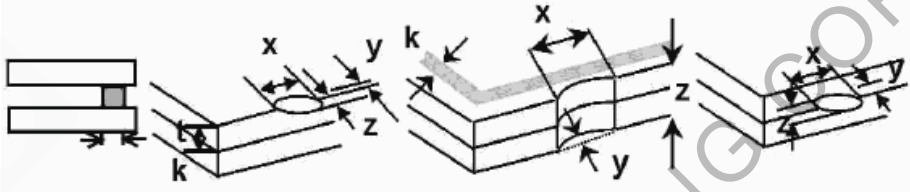

Messrs.			
Product Specification	Model:	TWV0500RBFH40N	Rev. NO.
			A
			Issued Date. May,15.20

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="558 761 1236 907"> <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="558 1276 1236 1422"> <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="885 1747 1324 1892"> <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	$y \leq 1/3L$	$X \leq a$	2.5
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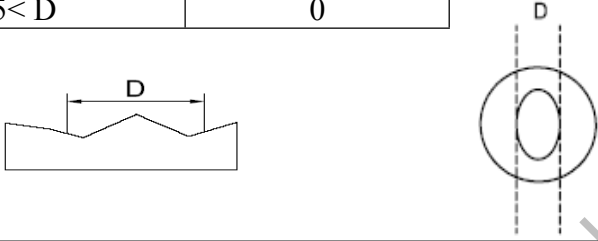
Messrs.			
Product Specification	Model:	TWV0500RBFH40N	Rev. NO.
			A
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NO.	Item	Criterion	AQL
08	Cracked glass	No crack is allowed.	2.5
09	Backlight elements	9.1 Illumination source flickers when lit. 9.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. 9.3 Backlight doesn't light or color is wrong.	2.5 2.5 0.65
10	Bezel	No scratches with W>0.1 and Length>2.5mm.	2.5
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.	2.5 2.5 2.5 2.5 0.65 0.65
12	FPC	FPC damage per IPC guidelines.(IPC-A-610) Nicks or damage along the edges of the flexible printed circuitry and cutouts, providing the penetration does not exceed 50% of the distance from the edge to the nearest conductor to 2.5mm[0.1in], Whichever is less.	2.5
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. 13.3 Soldering per IPC guidelines.(IPC-A-610)	2.5 0.65

Messrs.			
Product Specification	Model:	TWV0500RBFH40N	Rev. NO.
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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="451 766 1270 981"> <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="451 1359 1270 1574"> <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	$x \leq 1/8a$	2.5
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NO.	Item	Criterion	AQL										
15	Touch Panel(Fish eye, dent and bubble on film)	<table border="1"> <tr> <td>SIZE(mm)</td> <td>Acceptable Q'ty</td> </tr> <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> </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	2.5
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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.	2.5										
17	Touch Panel Linearity	Less than 2.5% is acceptable.	2.5										
18	LCD Ripple	Touch the touch panel, can not see the LCD ripple. Pen: R 1.0mm silicon rubber. Operation Force: 80g	2.5										
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.				
Product Specification	Model:	TWV0500RBFH40N	Rev. NO.	Issued Date.
			A	May,15.20

11. Packing Method

11.1 Handling of LCM

- Avoid external shock.
- Don't apply excessive force on the surface.
- Liquid in LCD is hazardous substance, do not lick or swallow. When the liquid is attaching to your hand, skin, cloth, etc., wash it thoroughly and immediately.
- Don't operate it above the absolute maximum rating.
- Don't disassemble the LCM.
- The operators should wear protections whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.
- The modules should be kept in antistatic bags or other containers resistant to static for storage.
- The module is coated with a film to protect the display surface, be careful when peeling off this protective film since static electricity may be generated.

11.2 Storage

- Store it in an ambient temperature of $25\pm 10^{\circ}\text{C}$, and in a relative humidity of $50\pm 10\%\text{RH}$. Don't expose to sunlight or fluorescent light.
- Store it in a clean environment, free from dust, active gas, and solvent.
- Store it in anti-static electricity container.
- Store it without any physical load.

11.3 Soldering

- Use only soldering irons with proper grounding and no leakage.
- Iron: no higher than $280\pm 10^{\circ}\text{C}$ and less than 3 sec during hand soldering.
- Rewiring: no more than 2 times.

Messrs.				
Product Specification	Model:	TWV0500RBFH40N	Rev. NO.	Issued Date.
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12. Packing Method

No.	Item	Dimensions(mm)	Quantity	Remark
1	LCM Module	120.70*75.8*4.6	100PCS	
2	PALLET	344*285*90 (include 50pcs products/one tray)	2PCS	
3	CARTON	385*315*227 (include 100pcs products/one carton)	1PCS	

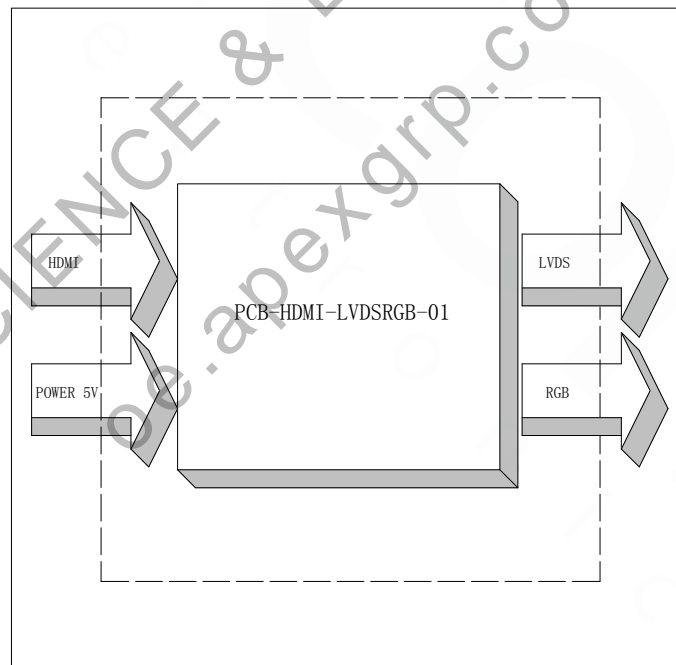
Messrs.				
Product Specification	Model:	TWV0500RBFH40N	Rev. NO.	Issued Date.
			A	May,15.20

13. HDMI Board

1. General Specification

Item	Contents	Unit
PCB size (W*H*T)	120*76*1.6	mm
INTERFACE TYPE	RGB / LVDS	mm
Power voltage	+5	V

2. Block Diagram



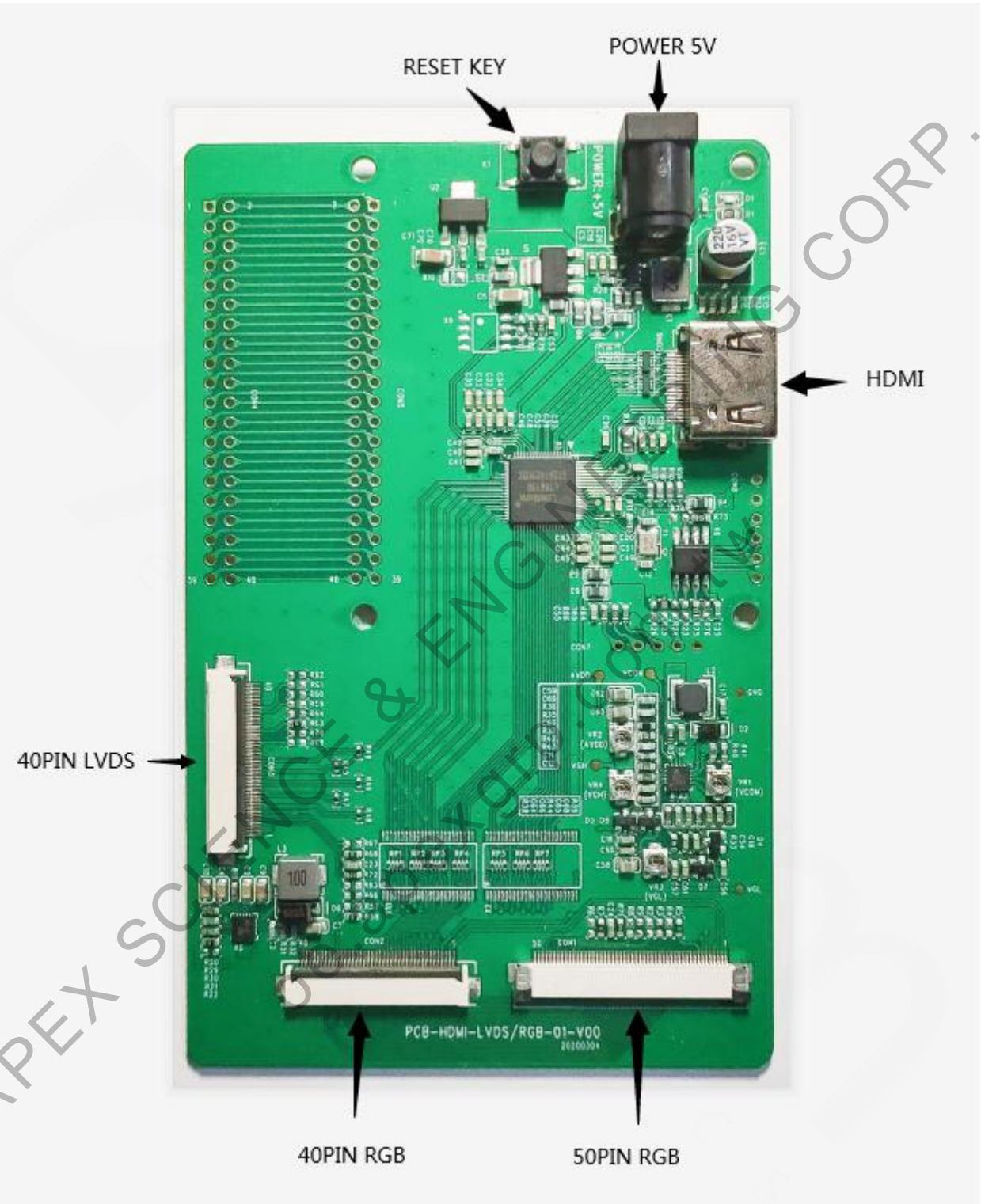
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Product Specification	Model:	TWV0500RBFH40N	Rev. NO.
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3. PCB Drawing

<p>CON3</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>1</td><td>VOM</td></tr> <tr><td>2</td><td>VDD(0.3V)</td></tr> <tr><td>3</td><td>VDD(0.3V)</td></tr> <tr><td>4</td><td>NC</td></tr> <tr><td>5</td><td>RESST</td></tr> <tr><td>6</td><td>STBYR</td></tr> <tr><td>7</td><td>GND</td></tr> <tr><td>8</td><td>RVNO-</td></tr> <tr><td>9</td><td>RVNO-</td></tr> <tr><td>10</td><td>GND</td></tr> <tr><td>11</td><td>RVNO-</td></tr> <tr><td>12</td><td>GND</td></tr> <tr><td>13</td><td>GND</td></tr> <tr><td>14</td><td>RVNO-</td></tr> <tr><td>15</td><td>RVNO-</td></tr> <tr><td>16</td><td>GND</td></tr> <tr><td>17</td><td>EXCLAIN-</td></tr> <tr><td>18</td><td>EXCLAIN-</td></tr> <tr><td>19</td><td>GND</td></tr> <tr><td>20</td><td>RVNO-</td></tr> <tr><td>21</td><td>RVNO-</td></tr> <tr><td>22</td><td>GND</td></tr> <tr><td>23</td><td>NC</td></tr> <tr><td>24</td><td>NC</td></tr> <tr><td>25</td><td>GND</td></tr> <tr><td>26</td><td>NC</td></tr> <tr><td>27</td><td>NC</td></tr> <tr><td>28</td><td>SELB</td></tr> <tr><td>29</td><td>RVNO-</td></tr> <tr><td>30</td><td>GND</td></tr> <tr><td>31</td><td>DCLK</td></tr> <tr><td>32</td><td>DSPK</td></tr> <tr><td>33</td><td>HSSVMC</td></tr> <tr><td>34</td><td>L7/R</td></tr> <tr><td>35</td><td>NC</td></tr> <tr><td>36</td><td>NC</td></tr> <tr><td>37</td><td>NC</td></tr> <tr><td>38</td><td>VH</td></tr> <tr><td>39</td><td>LDH*</td></tr> <tr><td>40</td><td>LDH*</td></tr> </table>	1	VOM	2	VDD(0.3V)	3	VDD(0.3V)	4	NC	5	RESST	6	STBYR	7	GND	8	RVNO-	9	RVNO-	10	GND	11	RVNO-	12	GND	13	GND	14	RVNO-	15	RVNO-	16	GND	17	EXCLAIN-	18	EXCLAIN-	19	GND	20	RVNO-	21	RVNO-	22	GND	23	NC	24	NC	25	GND	26	NC	27	NC	28	SELB	29	RVNO-	30	GND	31	DCLK	32	DSPK	33	HSSVMC	34	L7/R	35	NC	36	NC	37	NC	38	VH	39	LDH*	40	LDH*	<p>CON2</p> <table border="1" style="width: 100%; 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PCB-HDMI-LR-STD</p> <p>TITLE PCB SPEC.</p> <p>UNIT mm</p> <p>SCALE FIT</p> <p>3rd Angle </p> <p>SHEET OF 1</p> <p style="text-align: center;">APEX SCIENCE & ENGINEERING CORP.</p>
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<p>NOTES:</p> <p>1. All dimensions ±0.2</p> <p>2. RIS MUST BE COMPLIAN</p> <p>3. Connector COM-2500P05-2.54mmPitch 1, COM-2500P05-2.54mmPitch 1</p>																																																																																																																																																																																																																																																			



Messrs.			
Product Specification	Model:	TWV0500RBFH40N	Rev. NO.
			Issued Date.
			A May,15.20



Messrs.			
Product Specification	Model:	TWV0500RBFH40N	Rev. NO.
			A
			Issued Date. May,15.20

3.1 LVDS LCD CONNECTOR

Pin No.	Symbol	Description
1	VCOM	Common voltage
2	VDD	Power Voltage for digital circuit
3	VDD	Power Voltage for digital circuit
4	NC	No connection
5	Reset	Global reset pin
6	STBYB	Standby mode, Normally pulled high STBYB = "1", normal operation STBYB = "0", timing controller, source driver will turn off, all output are High-Z
7	GND	Ground
8	RXIN0-	-LVDS differential data input
9	RXIN0+	+ LVDS differential data input
10	GND	Ground
11	RXIN1-	-LVDS differential data input
12	RXIN1+	+ LVDS differential data input
13	GND	Ground
14	RXIN2-	-LVDS differential data input
15	RXIN2+	+ LVDS differential data input
16	GND	Ground
17	RXCLKIN-	-LVDS differential clock input
18	RXCLKIN+	+ LVDS differential data input
19	GND	Ground
20	RXIN3-	-LVDS differential data input
21	RXIN3+	+ LVDS differential data input
22	GND	Ground
23	NC	No connection
24	NC	No connection
25	GND	Ground
26	NC	No connection
27	NC	No connection
28	SELB	6bit/8bit mode select
29	AVDD	Power for Analog Circuit
30	GND	Ground
31	LED-	LED Cathode
32	LED-	LED Cathode
33	L/R	Horizontal inversion
34	U/D	Vertical inversion
35	VGL	Gate OFF Voltage
36	NC	No connection
37	NC	No connection
38	VGH	Gate ON Voltage

Messrs.				
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39	LED+	Anode of LED
40	LED+	Anode of LED

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Messrs.			
Product Specification	Model:	TWV0500RBFH40N	Rev. NO.
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3.2 HDMI CONNECTOR

PIN NO	Description
1	TMDS Data2+
2	TMDS Data 2 Shield
3	TMDS Data2-
4	TMDS Data1+
5	TMDS Data1 Shield
6	TMDS Data 1-
7	TMDS Data 0+
8	TMDS Data 0 Shield
9	TMDS Data 0-
10	TMDS Clock+
11	TMDS Clock shield
12	TMDS Clock-
13	CEC
14	Reserved (N C)
15	SCL
16	SDA
17	DDC/DEC Ground
18	+5V Power
19	Hot Plug Detect

Messrs.			
Product Specification	Model:	TWV0500RBFH40N	Rev. NO.
			A
			Issued Date. May,15.20

3.3 40PIN RGB CONNECTOR

Pin No.	Symbol	Description
1	VLED-	Cathode of LED backlight
2	VLED+	Anode of LED backlight
3	GND	Power ground
4	VDD	Power voltage
5	R0	Red data (LSB)
6	R1	Red data
7	R2	Red data
8	R3	Red data
9	R4	Red data
10	R5	Red data
11	R6	Red data
12	R7	Red data (MSB)
13	G0	Green data (LSB)
14	G1	Green data
15	G2	Green data
16	G3	Green data
17	G4	Green data
18	G5	Green data
19	G6	Green data
20	G7	Green data(MSB)
21	B0	Blue data(LSB)
22	B1	Blue data
23	B2	Blue data
24	B3	Blue data
25	B4	Blue data
26	B5	Blue data
27	B6	Blue data
28	B7	Blue data(MSB)
29	GND	Power ground
30	DCLK	Pixel clock
31	DISP	Display on/off
32	HSYNC	Horizontal sync signal
33	VSYNC	Vertical sync signal
34	DE	Data enable
35	NC	NO connect
36	GND	Power ground
37	NC	NO connect
38	NC	NO connect
39	NC	NO connect
40	NC	NO connect

Messrs.				
Product Specification	Model:	TWV0500RBFH40N	Rev. NO.	Issued Date.
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3.4 50PIN RGB CONNECTOR

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	Blue data(LSB)
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(LSB)
28	R7	Red data(MSB)
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

Messrs.			
Product Specification	Model:	TWV0500RBFH40N	Rev. NO.
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41	VGH	Gate ON Voltage
42	VGL	Gate OFF Voltage
43	AVDD	Power for Analog Circuit
44	RESET	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

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