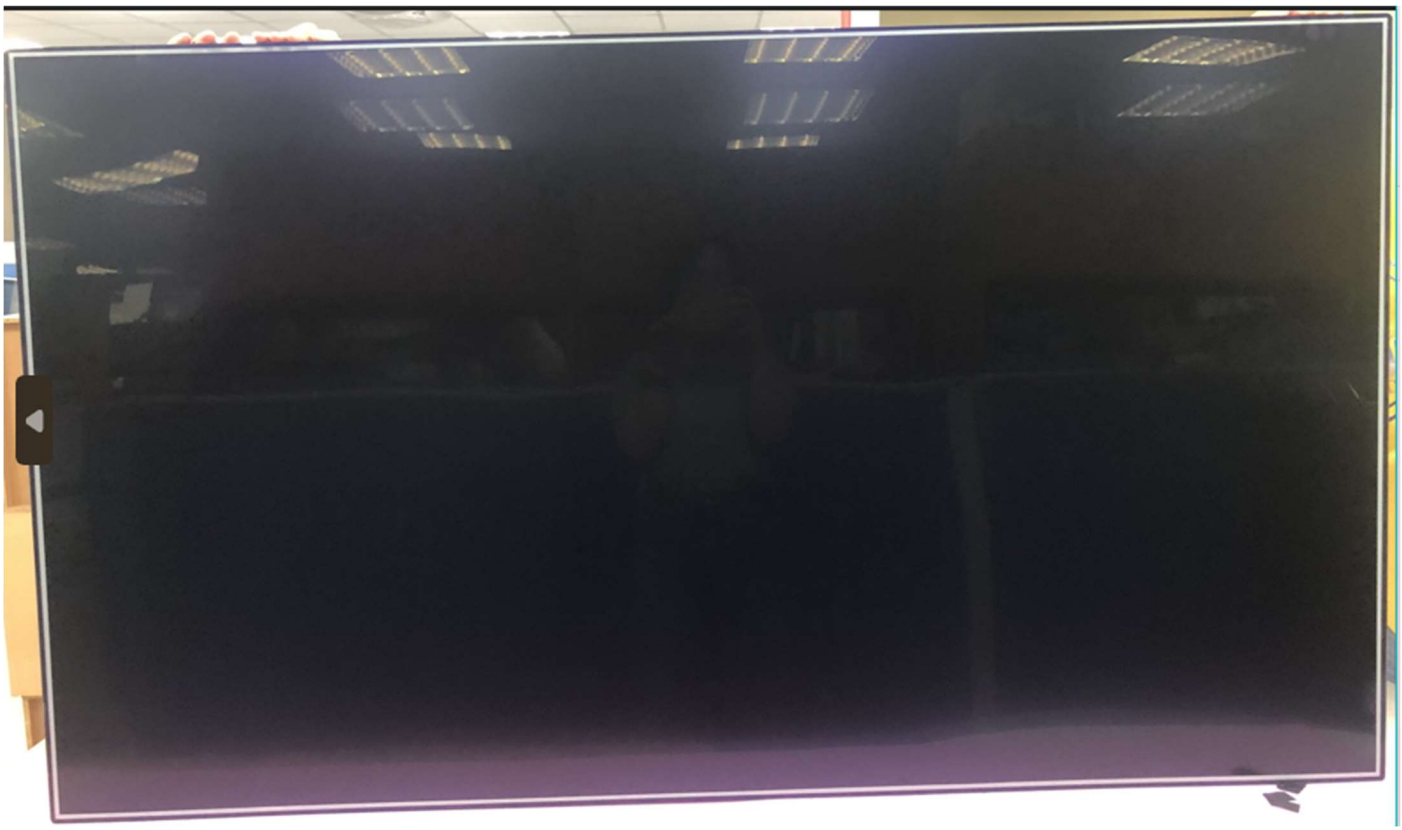



設計驗證
工程課
2024-06-27
發行

Product Specification Sheet
产品规格书

Customer 客户名称	DIVA
Model Name 产品型号	CCSF650-002A
Qisda P/N Qisda 物料号	EM.6ED10.00C
Diva P/N Diva 物料号	2AAD665023T (T0207)
LCM Model LCM 型号	G650ZVN01.0
Date 日期	20240626
Version 版本	V1.5

Customer's Approval		REHEO	
Approved By	Date	Approved By	Date
Approved By	Date	Approved By	Date
Approved By	Date	Approved By	Date

設計驗證 工程課 2024-06-27
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Revision History

Version	Revise Date	Page	Content	Author
V1.0	2024/03/05	-	Initial Release	Songlin. Pan
V1.1	2024/03/11	P4	Power Consumption Total=255.5W (typ.)	Songlin. Pan
		P7	Modify the Contrast Ratio MIN value to 2100:1.	
		P9	Add Note 6	
		P20	(3).VIH is standardized to 5.5V. The frequency range of F_EPWM is adjusted, and the specification of D-EPWM is revised to a minimum of 5%.	
V1.2	2024/03/28	P31	更新包装方案，由平放→竖放	Songlin. Pan
V1.3	2024/06/4	P26	更新 pixel highlight 规格	Weilong. Feng
V1.4	2024/06/12	P26/P27	模组料号更新，外观检验规格更新	Songlin. Pan Weilong. Feng
V1.5	2024/06/21	P26	外观检验规格更新，增加 LCM 背面螺柱监控规格	Weilong. Feng

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1. GENERAL DESCRIPTION

1.1 Introduction

This specification applies to the 64.5 inch Color TFT-LCD Module G650ZVN01.0. This LCD module has a TFT active matrix type liquid crystal panel 3840 x 2160 pixels, and diagonal size of 64.5 inch. This module supports 3840 x 2160 mode. Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with a 10-bit gray scale signal for each dot. G650ZVN01.0 has been designed to apply the 8 lane V by one interface method. It is intended to support displays where high brightness, wide viewing angle, high color saturation, and high color depth are very important.

1.2 General information

Table 1-1 General Specifications

Parameter	Specification	Unit	Remarks
Active Screen Size	64.5	Inch	
Display Area	1428.48(H)X803.52(V)	mm	
Outline Dimension	1450.38(H)X825.42(V)X31.1(D)	mm	
Driver Element	a-Si TFT active matrix		
Display Colors	8 bit + FRC (1.07 billion)	Colors	
Number of Pixels	3840(H)xRGBx2160(V)	pixels	
Pixel Pitch	0.372(H)X0.372(V)	mm	
Display Operation Mode	Normally Black,VA		
Nominal lnput Voltage VDD	12V	V	
Power Consumption	Total=255.5(TYP)	W	
Surface Treatment	(HCLR)	mm	
Rotate Function	Unachievable		Note 1
Display Orientation	Portrait/Landscape Enabled		Note 2
Frame Rate	60	Hz	
LED Lifetime	50K	Hours	

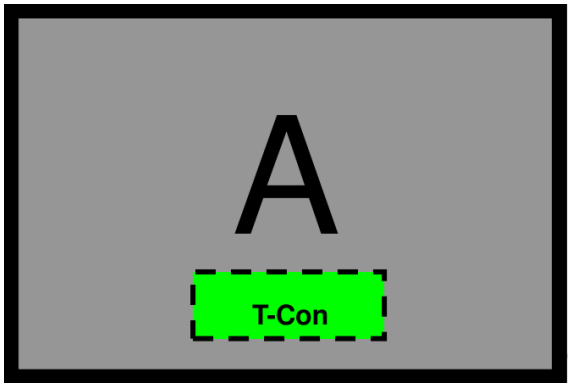
Note1: Rotate Function refers to LCD display could be able to rotate. This function does not work in this model.

Note2：

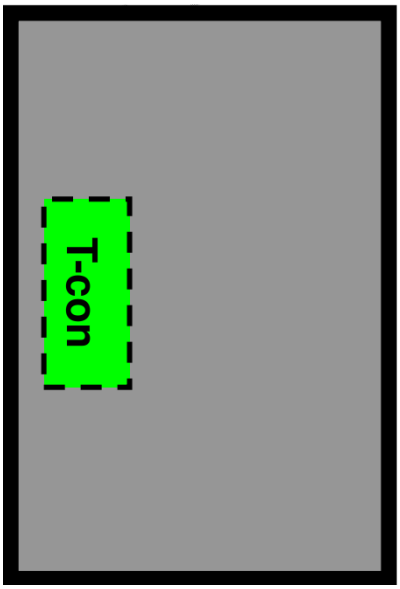
(1) Landscape Mode: The default placement is T-Con Side on the lower side and the image

is shown upright via viewing from the front.
(2) Portrait Mode: The default placement is that T-Con side has to be placed on the left side via viewing from the front.

Landscape (Front view)



Portrait (Front view)



2. Absolute Maximum Ratings

The followings are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

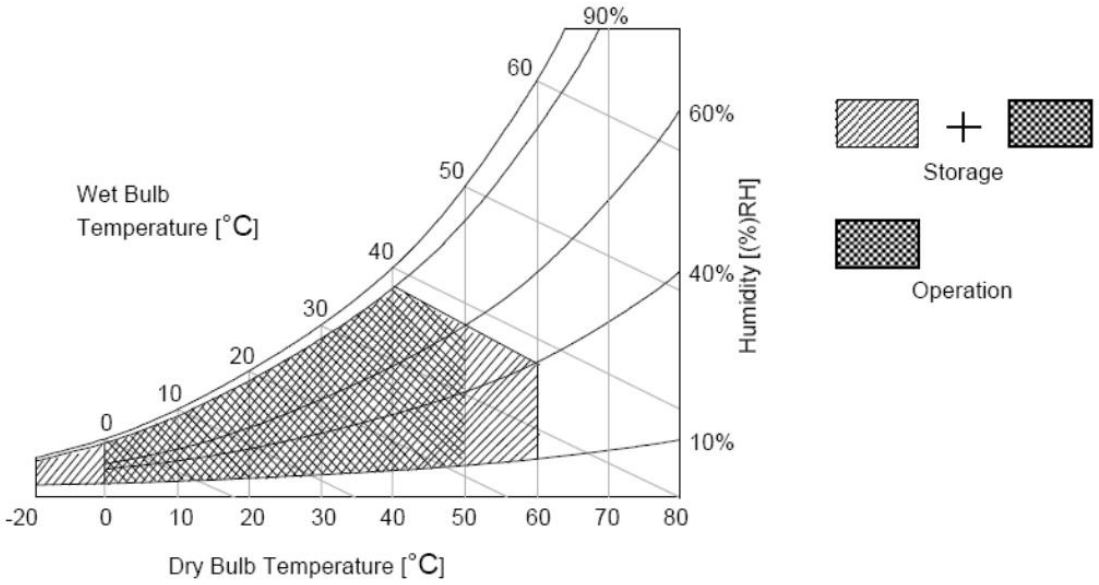
Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	VDD	-0.3	14	Volt	Note 1
Input Voltage of Signal	Vin	-0.3	4	Volt	Note 1
Operating Temperature	TOP	0	50	℃	Note 2
Operating Humidity	HOP	10	90	%RH	Note 2
Storage Temperature	TST	-20	+60	℃	Note 2
Storage Humidity	HST	10	90	%RH	Note 2
Panel Surface Temperature	PST		65	℃	Note 3

Note 1: Duration:50 msec.

Note 2 : Maximum Wet-Bulb should be 39℃ and No condensation.

The relative humidity must not exceed 90% non-condensing at temperatures of 40℃ or less. At temperatures greater than 40℃the wet bulb temperature must not exceed 39℃.

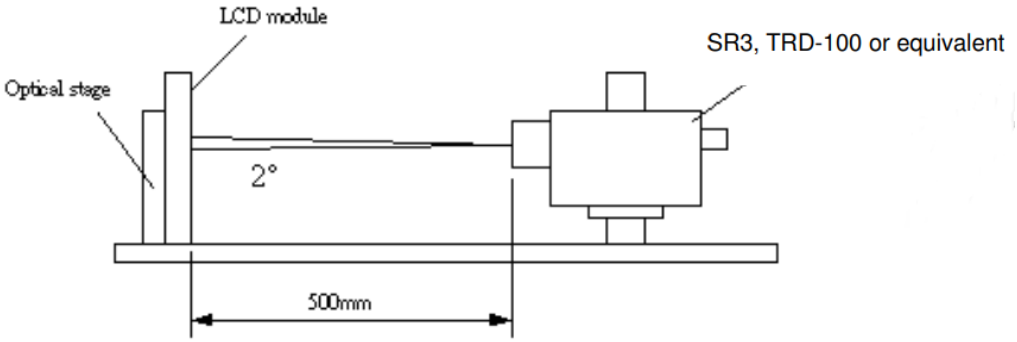
Note 3: Surface temperature is measured at 50℃ Dry condition.



3. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 45 minutes in a dark environment at 25°C. The values specified are at an approximate distance 500 mm from the LCD surface at a viewing angle of φ and θ equal to 0°.

Fig.1 presents additional information concerning the measurement equipment and method.



Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Contrast Ratio		CR	2100	3000	-		Note 1
Surface Luminance (White)		L_{WH}	650	800	-	cd/m2	Note 2
Luminance Variation		$\delta_{WHITE(9P)}$	-	-	1.33		Note 3
Response Time (G to G)		T_Y	-	8.5	16	ms	Note 4
Color Gamut		NTSC		72	-	%	
Gamma		Gma	1.9	2.2	2.5		
Color Coordinates		%		72	-		
White luminance uniformity		x_W	Typ-0.03	0.292	Typ+0.03		
		y_W		0.307			
Reproduction Of color	Red	x_R		0.649			
		y_R		0.336			
	Green	x_G		0.316			
		y_G		0.628			
	Blue	x_B		0.154			
		y_B		0.054			
Viewing Angle							Note 5 Note 6
x axis, right(φ=0°)		θr	-	88	-	Degree	
x axis, left(φ=180°		θl	-	88	-	Degree	
y axis, up(φ=90°)		θu	-	88	-	Degree	
y axis, down (φ=270°)		θd	-	88	-	Degree	

Note 1：Contrast Ratio (CR) is defined mathematically as:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance of } L_{on5}}{\text{Surface Luminance of } L_{off5}}$$

Note 2：Surface luminance is luminance value at point 5 across the LCD surface 50cm from the surface with all pixels displaying white. From more information see FIG 2. LED current IF = typical value (without driver board), LED input VDDB =24V, IDDB. = Typical value (with driver board), LWH=Lon5 where Lon5 is the luminance with all pixels displaying white at center 5 location.

Note 3：The variation in surface luminance, δWHITE is defined (center of Screen) as:

$\delta_{WHITE(9P)}$= Maximum(Lon1, Lon2,…,Lon9)/ Minimum(Lon1, Lon2,…Lon9)

Note 4：Response time Tγ is the average time required for display transition by switching the input signal for five luminance ratio (0%,25%,50%,75%,100% brightness matrix) and is based on Frame rate = 60Hz to optimize.

Measured Response Time		Target				
		0%	25%	50%	75%	100%
Start	0%					
	25%	25% to 0%				
	50%	50% to 0%	50% to 25%		50% to 75%	50% to 100%
	75%	75% to 0%	75% to 25%	75% to 50%		75% to 100%
	100%	100% to 0%	100% to 25%	100% to 50%	100% to 75%	

Tγ is determined by 10% to 90% brightness difference of rising or falling period. (As illustrated) The response time is defined as the following figure and shall be measured by switching the input signal for “any level of gray(bright) “ and “any level of gray(dark)”.

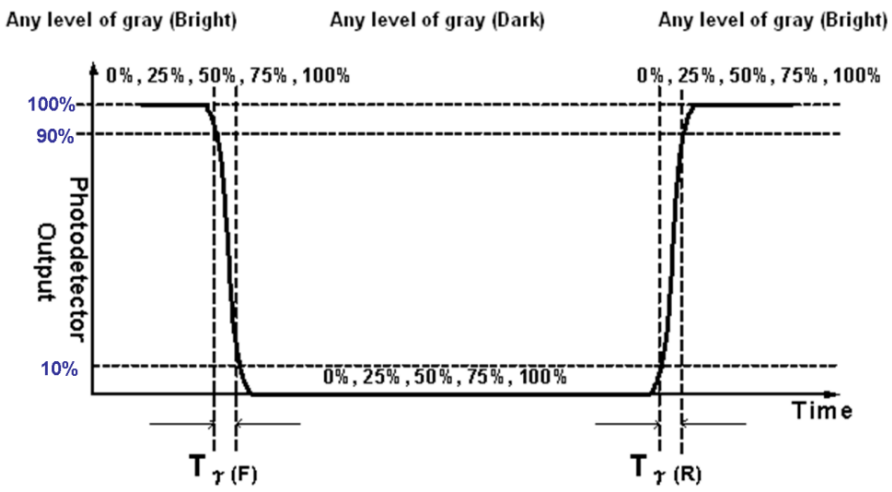
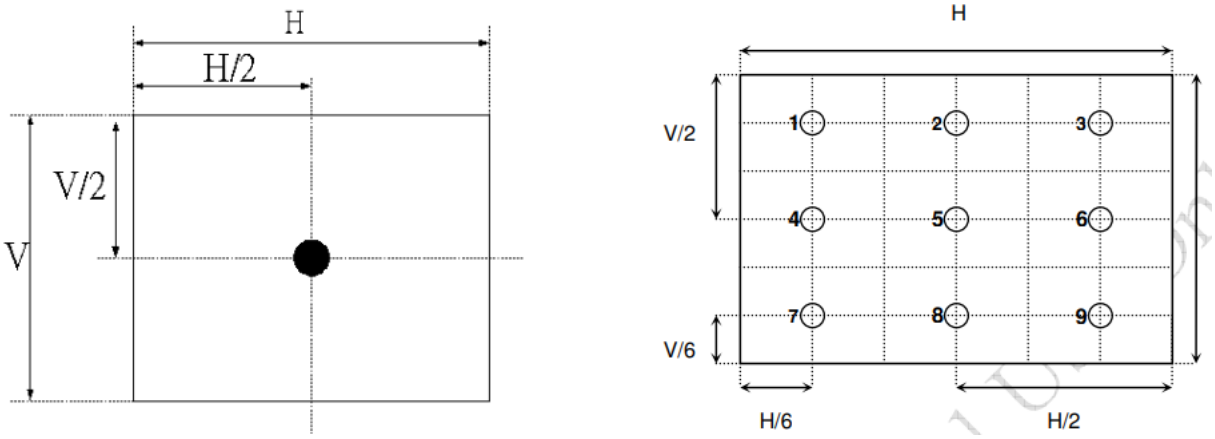
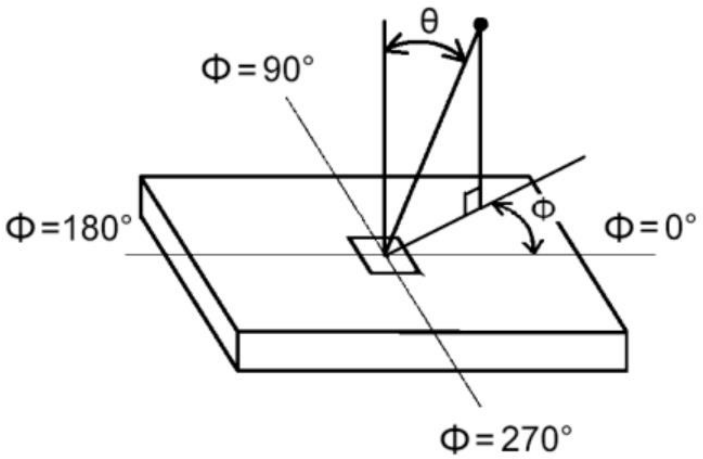


FIG. 2 Luminance



Note 5：Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG3.

FIG.3 Viewing Angle



Note 6：Contrast Ration (Specifications based on design Values and measurement

Data for 1 piece)
(@viewing angle of 40°)≥700：1
(@viewing angle of 20°)≥1800：1

4. Interface Specification

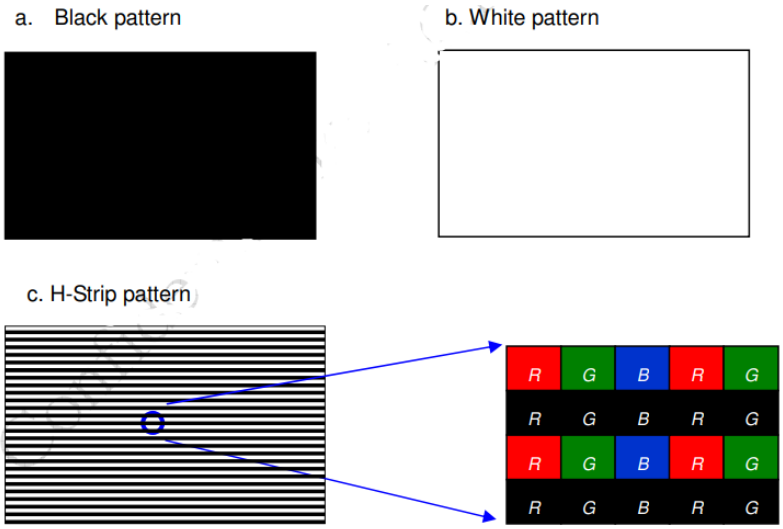
4.1 Input Power

The G650ZVN01.0 module requires power inputs which are employed to power the LCD electronics and to drive the TFT array and liquid crystal.

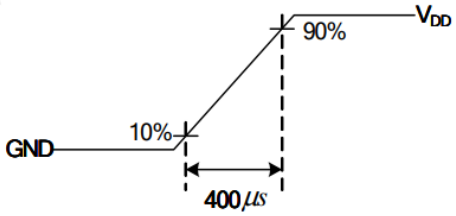
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Power Supply Input Voltage		V_{DD}	10.8	12	13.2	V	Note 1
Power Supply Input Current	White pattern	I_{DD}	-	1.5	1.8	A	Note 2
Power Consumption	White pattern	P_C	-	18	21.6	Watt	
Inrush Current		I_{RUSH}	-	-	5	A	Note 3

Note 1：The ripple voltage should be fewer than 5% of VDD.

Note 2：Test Condition:
(1) VDD = 12.0V, (2) Fv = 60Hz, (3) Fclk= 74.25MHz, (4) Temperature = 25 ℃
(5) Power dissipation check pattern. (Only for power design)



Note 3：Measurement condition : Rising time = 400us



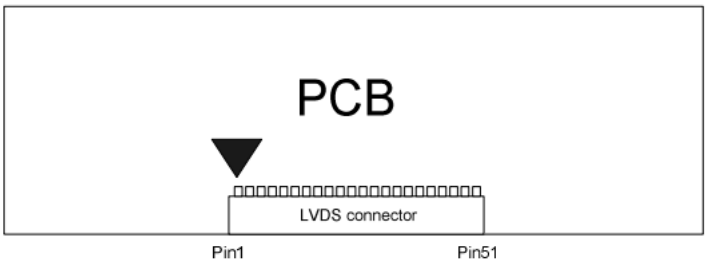
Note 4：Heavy Duty Pattern could be up to max power : 39.72(W)

4.2 Input Connection

LCD connector: (P-Two) 187059-51221 / (Starconn) 115E51-0000RA-M3-R / (JAE) SJ11346-FI-RTE51SZ-HF

Pin	Symbol	Description	Remark	Pin	Symbol	Description	Remark
1	V_{DD}	12Vin		27	GND	Ground	
2	V_{DD}	12Vin		28	RX0N	Vx1 lane 0	
3	V_{DD}	12Vin		29	RX0P	Vx1 lane 0	
4	V_{DD}	12Vin		30	GND	Ground	
5	V_{DD}	12Vin		31	RX1N	Vx1 lane 1	
6	V_{DD}	12Vin		32	RX1P	Vx1 lane 1	
7	V_{DD}	12Vin		33	GND	Ground	
8	V_{DD}	12Vin		34	RX2N	Vx1 lane 2	
9	N.C.	No connection	Note 2	35	RX2P	Vx1 lane 2	
10	GND	Ground		36	GND	Ground	
11	GND	Ground		37	RX3N	Vx1 lane 3	
12	GND	Ground		38	RX3P	Vx1 lane 3	
13	GND	Ground		39	GND	Ground	
14	GND	Ground		40	RX4N	Vx1 lane 4	
15	N.C.	No connection		41	RX4P	Vx1 lane 4	
16	N.C.	No connection		42	GND	Ground	
17	N.C.	No connection	Note 2	43	RX5N	Vx1 lane 5	
18	N.C.	No connection	Note 2	44	RX5P	Vx1 lane 5	
19	N.C.	No connection	Note 2	45	GND	Ground	
20	N.C.	No connection	Note 2	46	RX6N	Vx1 lane 6	
21	N.C.	No connection	Note 2	47	RX6P	Vx1 lane 6	
22	N.C.	No connection	Note 2	48	GND	Ground	
23	N.C.	No connection	Note 2	49	RX7N	Vx1 lane 7	
24	GND	Ground		50	RX7P	Vx1 lane 7	
25	HTPND	Vx1 HTPDN		51	GND	Ground	
26	LOCKN	Vx1 LOCK					

Note 1: Pin number start from the left side as the following figure.



Note 2: Please leave this pin unoccupied. It cannot be connected with any signal (Low/GND/High).

4.3 Input Data Format

4.3.1 V by one color data mapping

Mode	Packer input & Unpacker output		30bpp RGB / YCbCr444 (10bit)
4byte mode	Byte0	D[0]	R/Cr[2]
		D[1]	R/Cr[3]
		D[2]	R/Cr[4]
		D[3]	R/Cr[5]
		D[4]	R/Cr[6]
		D[5]	R/Cr[7]
		D[6]	R/Cr[8]
		D[7]	R/Cr[9]
	Byte1	D[8]	G/Y[2]
		D[9]	G/Y[3]
		D[10]	G/Y[4]
		D[11]	G/Y[5]
		D[12]	G/Y[6]
		D[13]	G/Y[7]
		D[14]	G/Y[8]
		D[15]	G/Y[9]
	Byte2	D[16]	B/Cb[2]
		D[17]	B/Cb[3]
		D[18]	B/Cb[4]
		D[19]	B/Cb[5]
		D[20]	B/Cb[6]
		D[21]	B/Cb[7]
		D[22]	B/Cb[8]
		D[23]	B/Cb[9]
	Byte3	D[24]	-

		D[25]	-
		D[26]	B/Cb[0]
		D[27]	B/Cb[1]
		D[28]	G/Y[0]
		D[29]	G/Y[1]
		D[30]	R/Cr[0]
		D[31]	R/Cr[1]

3.3.2 Color Input Data Reference

The brightness of each primary color (red, green and blue) is based on the 10 bit gray scale data input for the color; the higher the binary input, the brighter the color. The table below provides a reference for color versus data input.

COLOR DATA REFERENCE

Color		Input Color Data																													
		RED										GREEN										BLUE									
		MSB									LSB	MSB									LSB	MSB									LSB
		R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1023)	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1023)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
	Blue(1023)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
R	RED(000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(001)	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	RED(1022)	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1023)	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	GREEN(000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0

	GREEN(1022)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	GREEN(1023)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
B	BLUE(000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE(001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

	BLUE(1022)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0
	BLUE(1023)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1