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DV290FBM-N10

Product Specification

Rev. P1

HEFEI BOE Optoelectronics Technology CO., LTD

REVISION HISTORY

(√) preliminary specification

( ) Final specification

Revision No.	Page	Description of changes	Date	Prepared
P0		Initial Release	2019/06/04	Zhou Kun
P1		˜ À ʒ ˚ ó ̇ ţ	2019/07/20	Zhou Kun

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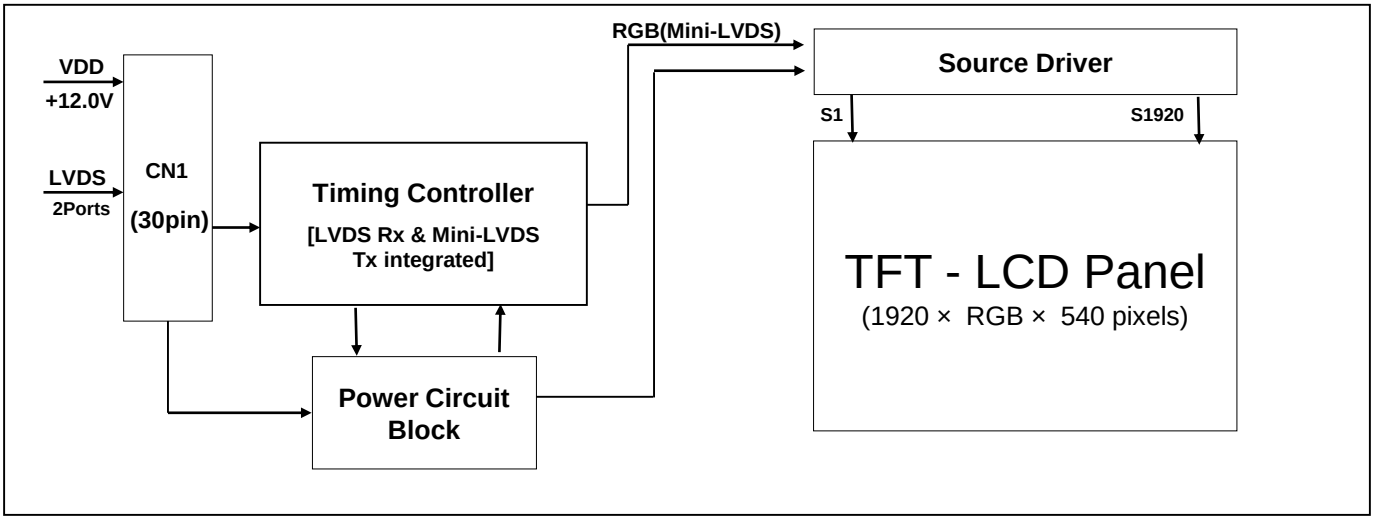
1.0 GENERAL DESCRIPTION

1.1 Introduction

DV290FBM-N10 is a color active matrix TFT LCD MDL using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This MDL has a 29inch diagonally measured active area with FHD resolutions (1920 horizontal by 540 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors. The TFT-LCD MDL panel is adapted for a low reflection and higher color type.



1.2 Features

- LVDS interface with 2 pixel / clock
- High-speed response
- Low color shift image quality
- 8-bit color depth, display 16.7M colors
- Wide viewing angle
- DE (Data Enable) only mode
- HADS technology is applied for high display quality
- RoHS compliant

1.3 Application

- Commercial Digital Display
- Display Terminals for Control System
- Landscape and Portrait Display

1.4 General Specification

< Table 1. General Specifications >

Parameter	Specification	Unit	Remarks
Active area	705.6(H)x198.45(V)	mm	
Number of pixels	1920(H) ×540(V)	pixels	
Pixel pitch	122.5(H) x367.5(V)	um	
Pixel arrangement	Pixels RGB Vertical stripe		
Display colors	16.7M	colors	8bits True
Display mode	Normally Black		
Dimensional outline	720.8(H)*226.25(V)*8.4(Body)	mm	Total thickness 21mm
Weight	2415±100	g	
Power Consumption	40.66	Watt	Typ.
Bezel width (L/R/U/D)	5.6/5.6/11.9/11.9	mm	
Surface Treatment	Haze 25% /3H		
Back-light	E-LED , 2ea LED bar-down side		
Possible display type	Landscape and Portrait Enabled		

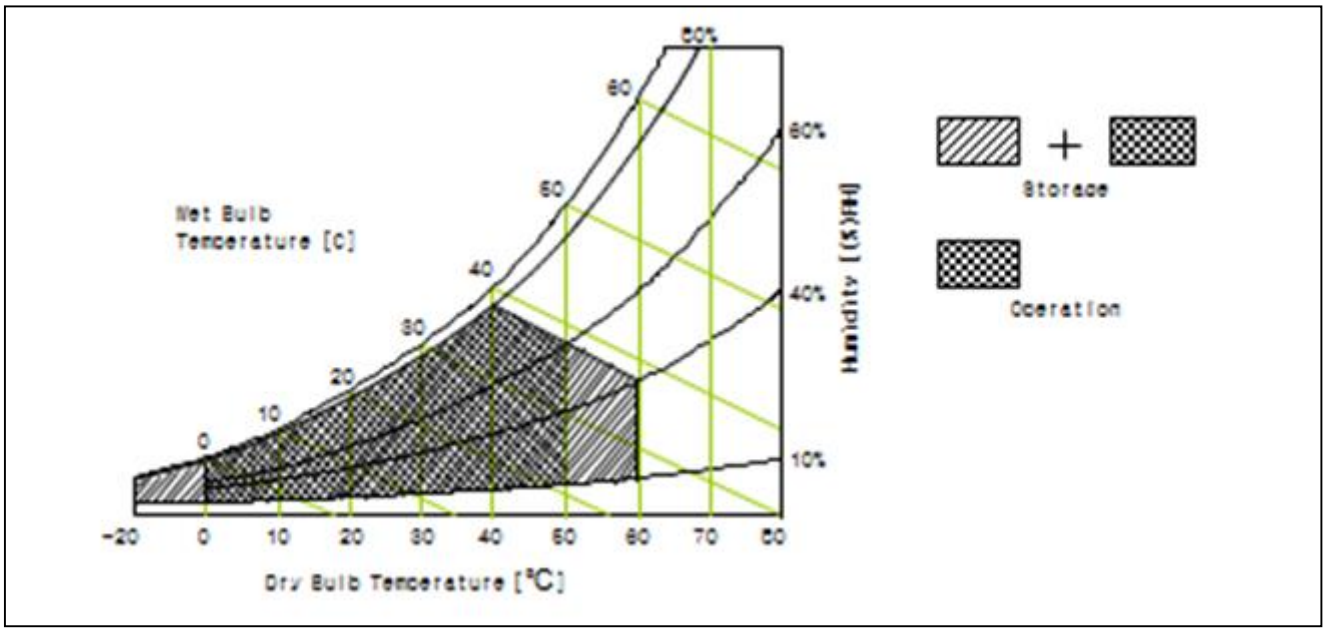
2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. MDL Electrical Specifications >

Parameter	Symbol	Min.	Max.	Unit	Remark
Power Supply Voltage	VDD	8	13.2	V	Ta = 25 ł
Operating Temperature	T_{OP}	0	+50	ł	
Storage Temperature	T_{SUR}	-20	+60	ł	Note 1
	T_{ST}	-20	+60	ł	
Operating Ambient Humidity	Hop	10	80	%RH	
Storage Humidity	Hst	10	80	%RH	

Note 1 : Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be 39 ł max. and no condensation of water.



3.0 ELECTRICAL SPECIFICATIONS

3.1 TFT LCD Open Cell

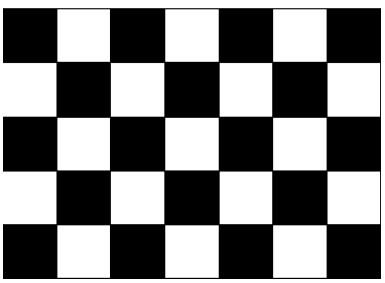
< Table 3. Open Cell Electrical Specifications >

[Ta =25±2 ł]

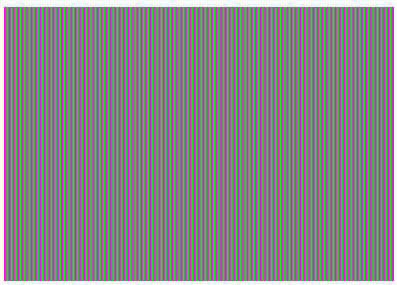
Parameter		Symbol	Values			Unit	Remark
			Min	Typ	Max		
Power Supply Input Voltage		VDD	10.8	12	13.2	Vdc	
Power Supply Ripple Voltage		VRP			400	mV	
Power Supply Current		IDD	-	250	500	mA	Note 1
Power Consumption		PDD	-	3	6.6	Watt	
Rush current		IRUSH	-	-	3.0	A	
LVDS Interface	Differential Input High Threshold Voltage	VTH	-		+100	mV	
	Differential Input Low Threshold Voltage	VTL	-100		-	mV	
	Common Input Voltage	VLC	0.7	-	1.6	V	
	LVDS swing voltage	VID	± 100		± 600	mV	
CMOS Interface	Input High Threshold Voltage	VIH	2.1	-	3.6	V	
	Input Low Threshold Voltage	VIL	0		1.1	V	
	Input current	IIN	-10	-	10	´A	
	Pull low resistor	RPD	50	100	150	Kq	

The current draw and power consumption specified is for VDD=12.0V,
Frame rate f_V=60Hz and Clock frequency = 74.25MHz.
Test Pattern of power supply current

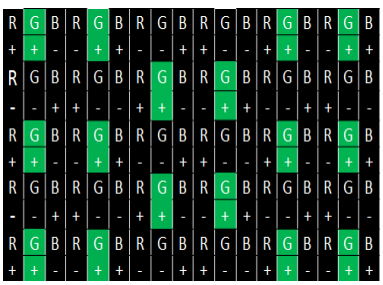
a) Typ : Mosaic 7X5 (L0/L255)



b) Max : Vline Subline (L255))



c) Flicker Pattern



Note 2 : The duration of rush current is about 2ms and rising time of Power Input is 1ms(min)

3.0 ELECTRICAL SPECIFICATIONS

3.2 Backlight Unit

< Table 3. Backlight Unit Electrical Specifications >

[Ta =25±2 ł]

Parameter			Min.	Typ.	Max.	Unit	Remarks
LED Forward Voltage		V_F	-	3.0	3.2	V	-
LED Forward Current		I_F	-	105	-	mA	-
LED Power Consumption		P_{LED}		32.76	34.95	W	BLU Power Consumption
LED Life-Time		N/A	50000	-	-	Hour	IF = 105mA
PWM Control Level	PWM High Level		-	-	-	V	
	PWM Low Level		-	-	-	V	
PWM Control Frequency		F_{PWM}	-	-	-	Hz	
Duty Ratio		-	-	-	-	%	

Notes : 1. LED Power Consumption Calculator Value for reference IF × VF ×104 = PLED
2. The LED Life-time define as the estimated time to 50% degradation of initial luminous.

3.3 Backlight Input Pin Assignments

Connector type : CI1406M1VL0-NH-6pin or equivalent

Pin No.	Symbol	Feature
1	CH1-	I Return CH1,White
2	CH2-	I Return CH2,White
3	CH3+	VLED OUT CH3,Blue
4	CH4+	VLED OUT CH4,Blue
5	CH5-	I Return CH5,White
6	CH6-	I Return CH6,White

DC Input specification

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
LED forward voltage per channel	VLED	36.4	39	41.6	V
LED forward current per channel	ILED	-	105	-	mA

4.0 INTERFACE CONNECTION

4.1 MDL Input Signal & Power

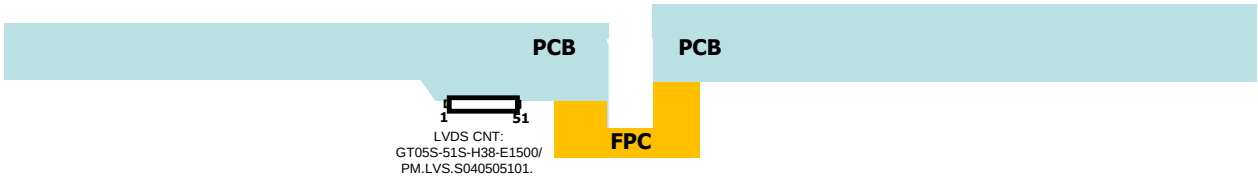
- LVDS Connector : GT05S-51S-H38-E1500/PM.LVS.S040505101.

< Table 4. MDL Input Connector Pin Configuration >

Pin No	Symbol	Description	Pin No	Symbol	Description
1	VDD	Power Supply (12V)	27	ELV1N	Negative Transmission data of Pixel 1 (EVEN)
2	VDD	Power Supply (12V)	28	ELV1P	Positive Transmission data of Pixel 1 (EVEN)
3	VDD	Power Supply (12V)	29	ELV2N	Negative Transmission data of Pixel 2 (EVEN)
4	VDD	Power Supply (12V)	30	ELV2P	Positive Transmission data of Pixel 2 (EVEN)
5	VDD	Power Supply (12V)	31	GND	Ground
6	NC	Not connection, this pin should be open	32	ELVCKN	Negative Transmission Clock(EVEN)
7	GND	Ground	33	ELVCKP	Positive Transmission Clock(EVEN)
8	GND	Ground	34	GND	Ground
9	GND	Ground	35	ELV3N	Negative Transmission data of Pixel 3 (EVEN)
10	OLV0N	Negative Transmission data of Pixel 0 (ODD)	36	ELV3P	Positive Transmission data of Pixel 3 (EVEN)
11	OLV0P	Positive Transmission data of Pixel 0 (ODD)	37	NC	Not connection, this pin should be open
12	OLV1N	Negative Transmission data of Pixel 1 (ODD)	38	NC	Not connection, this pin should be open
13	OLV1P	Positive Transmission data of Pixel 1 (ODD)	39	GND	Ground
14	OLV2N	Negative Transmission data of Pixel 2 (ODD)	40	NC	Not connection, this pin should be open
15	OLV2P	Positive Transmission data of Pixel 2 (ODD)	41	NC	Not connection, this pin should be open
16	GND	Ground	42	NC	Not connection, this pin should be open
17	OLVCKN	Negative Transmission Clock(ODD)	43	NC	Not connection, this pin should be open
18	OLVCKP	Positive Transmission Clock(ODD)	44	NC	Not connection, this pin should be open
19	GND	Ground	45	LVDS_SEL	LVDS format select
20	OLV3N	Negative Transmission data of Pixel 3 (ODD)	46	NC	Not connection, this pin should be open
21	OLV3P	Positive Transmission data of Pixel 3 (ODD)	47	NC	Not connection, this pin should be open
22	NC	Not connection, this pin should be open	48	NC	Not connection, this pin should be open
23	NC	Not connection, this pin should be open	49	SCL_PG	I2C_SCL used for BOE
24	GND	Ground	50	SDA_PG	I2C_SDA used for BOE
25	ELV0N	Negative Transmission data of Pixel 0 (EVEN)	51	NC	Not connection, this pin should be open
26	ELV0P	Positive Transmission data of Pixel 0 (EVEN)			

Notes : 1. NC(Not Connected) : This pins are only used for BOE internal operations.
2. Input Level of LVDS signal is based on the EIA-644 Standard.

TOP view of LCM PCB



BIST Pattern

4.2 LVDS Interface

- LVDS Receiver : Timing Controller (LVDS Rx merged) / LVDS Data : Pixel Data

< Table 5. MDL Input Connector Pin Configuration >

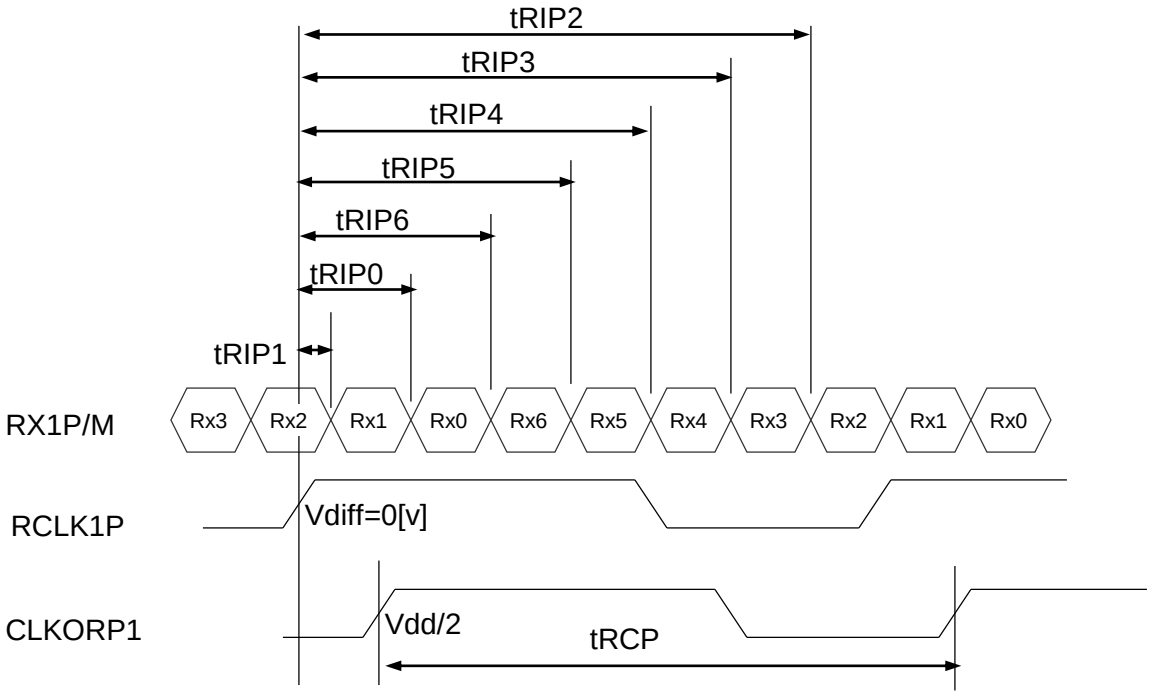
Channel No.	Data No.	8-bit LVDS Type	
		NS	JEIDA
0	Bit-0	R0	R2
	Bit-1	R1	R3
	Bit-2	R2	R4
	Bit-3	R3	R5
	Bit-4	R4	R6
	Bit-5	R5	R7
	Bit-6	G0	G2
1	Bit-0	G1	G3
	Bit-1	G2	G4
	Bit-2	G3	G5
	Bit-3	G4	G6
	Bit-4	G5	G7
	Bit-5	B0	B2
	Bit-6	B1	B3
2	Bit-0	B2	B4
	Bit-1	B3	B5
	Bit-2	B4	B6
	Bit-3	B5	B7
	Bit-4	HS	HS
	Bit-5	VS	VS
	Bit-6	DE	DE
3	Bit-0	R6	R0
	Bit-1	R7	R1
	Bit-2	G6	G0
	Bit-3	G7	G1
	Bit-4	B6	B0
	Bit-5	B7	B1
	Bit-6	-	-

4.3 LVDS Rx Interface Timing Parameter

The specification of the LVDS Rx interface timing parameter is shown in Table 6.

<Table 6. LVDS Rx Interface Timing Specification>

Item	Symbol	Min	Typ	Max	Unit	Remark
CLKIN Period	tRCP	9.09	T	40	nsec	
Receiver Data Input Margin	tRMG	-0.35	-	0.35	nsec	fCLKIN=110MHz
		-0.40	-	0.40	nsec	fCLKIN=95MHz
		-0.45	-	0.45	nsec	fCLKIN=85MHz
		-0.60	-	0.60	nsec	fCLKIN=65MHz
Input Data 0	tRIP1	-|tRMG|	0.0	|tRMG|	Clock	
Input Data 1	tRIP0	T/7-|tRMG|	T/7	T/7+|tRMG|	Clock	
Input Data 2	tRIP6	2 T/7-|tRMG|	2T/7	2T/7+|tRMG|	Clock	
Input Data 3	tRIP5	3T/7-|tRMG|	3T/7	3T/7+|tRMG|	Clock	
Input Data 4	tRIP4	4T/7-|tRMG|	4T/7	4T/7+|tRMG|	Clock	
Input Data 5	tRIP3	5T/7-|tRMG|	5T/7	5T/7+|tRMG|	Clock	
Input Data 6	tRIP2	6T/7-|tRMG|	6T/7	6T/7+|tRMG|	Clock	

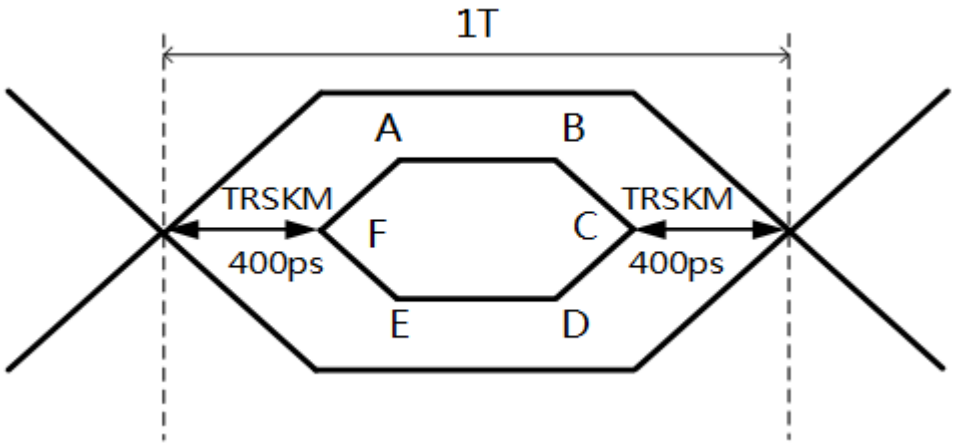


* Vdiff = (RXz+)-(RXz-) , é . , (RXCLKI +)

4.4 LVDS Rx Interface Eye Diagram

< Table 7. LVDS Rx Interface Eye Diagram>

Symbol	Min	Typ	Max	Unit	Note
A	-	150	-	mV	
B	-	150	-	mV	
C	-	0	-	mV	
D	-	-150	-	mV	
E	-	-150	-	mV	
F	-	0	-	mV	

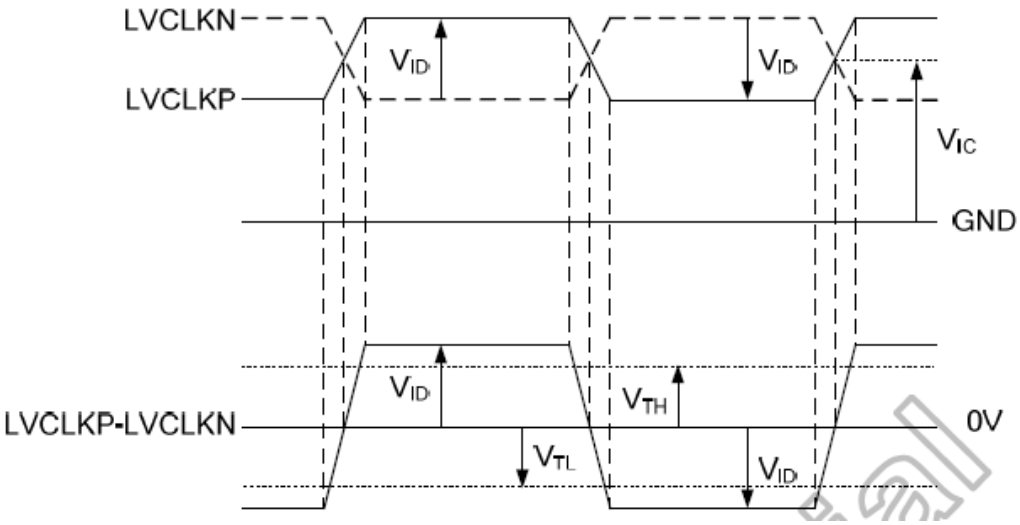


Notes: 1. Time F to A,B to C,C to D,E to F is 150p second.
2. LVDS clock=85Mhz.
3. The time A to B=1T-2*TRSKM-2*150ps.

4.5 LVDS Receiver Differential Input

< Table 7-1. LVDS Receiver Differential Input>

Symbol	Parameter	Min	Typ	Max	Unit	Condition
R_{xVTH}	Differential input high threshold voltage	-	-	+0.1	V	RxVCM =1.2V
R_{xVTL}	Differential input low threshold voltage	-0.1	-	-	V	
R_{XVIN}	Input voltage range (singled-end)	0.7		1.6	V	
$\lvert V_{ID} \rvert$	Differential input voltage	0.1		0.6	V	



5.0 SIGNAL TIMING SPECIFICATION

5.1 Timing Parameters (DE only mode)

< Table 8. Timing Table >

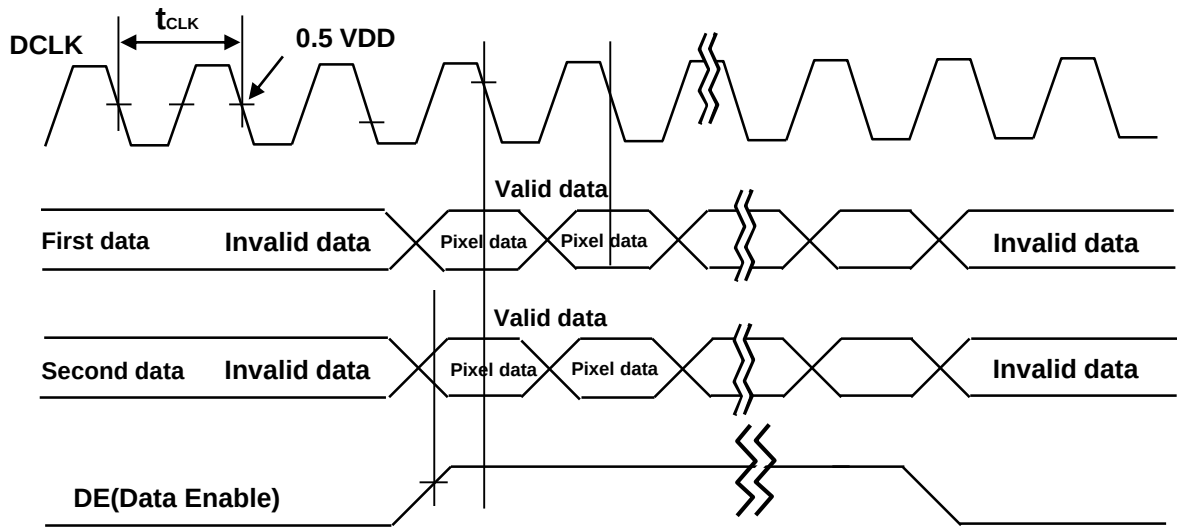
Item		Symbols		Min	Typ	Max	Unit
Clock	Frequency	1/Tc		60	74.25	78	MHz
	High Time	Tch		-	4/7Tc	-	
	Low Time	Tcl		-	3/7Tc	-	
Frame Period		Tv		1100	1125	1149	lines
				48.5	60	63	Hz
Horizontal Active Display Term		Valid	t_{HV}	-	960	-	t_{CLK}
		Total	t_{HP}	1050	1100	1200	t_{CLK}
Vertical Active Display Term		Valid	t_{VV}	-	1080	-	t_{HP}
		Total	t_{VP}	1100	1125	1149	t_{HP}

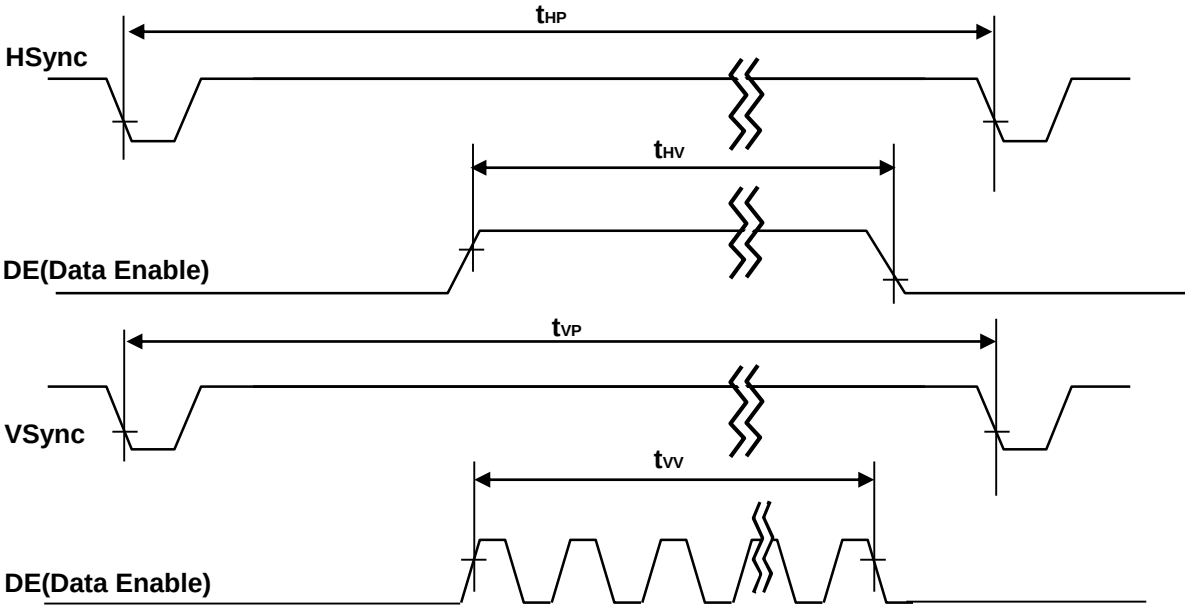
Notes: This product is DE only mode. The input of Hsync & Vsync signal does not have an effect on normal operation.

< Table 9. LVDS Input SSCG>

Symbol	Parameter	Condition	Min	Typ	Max	Unit
F	LVDS Input frequency	-	60	74.25	78	MHz
T_{LVSK}	LVDS channel to channel skew	F=100MHz V_{IC}=1.2V V_{ID}=± 400mV	-380	-	+380	ps
F_{LVMOD}	Modulating frequency of input clock during SSC		60	-	85	KHz
F_{LVDEV}	Maximum deviation of input clock frequency during SSC		-3	-	+3	%
T_{CY-CY}	Cycle to Cycle jitter		-	-	100	ps

5.2 Signal Timing Waveform





5.3 Input Signals, Basic Display Colors and Gray Scale of Colors

< Table 10. Input Signal and Display Color Table >

Color & Gray Scale		Input Data Signal																							
		Red Data								Green Data								Blue Data							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	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
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	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	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
Gray Scale of Red	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
	ڤ	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	ڤ	Ź								Ź								Ź							
	Brighter	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ڤ	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	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
	ڤ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
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	Brighter	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	ڤ	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of Blue	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
	ڤ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
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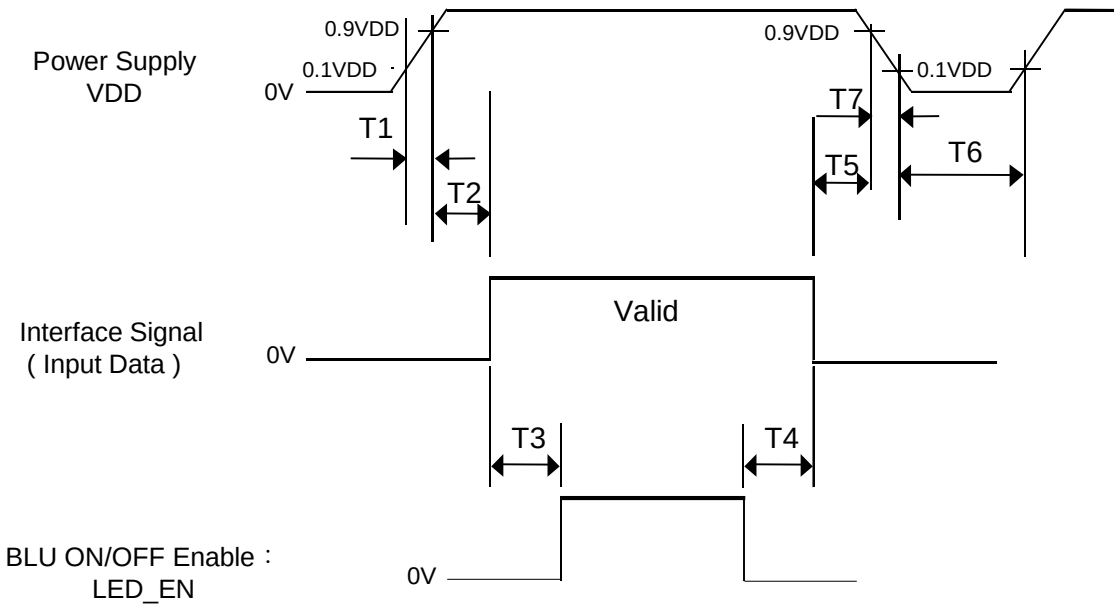
	ڤ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Gray Scale of White	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ڤ	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
	ڤ	ŷ								ŷ								ŷ							
	ڤ	Ź								Ź								Ź							
	Brighter	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1
	ڤ	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	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

5.4 Power Sequence

To prevent a latch-up or DC operation of the MDL, the power on/off sequence shall be as shown in below



< Table 11. Sequence Table >

Parameter	Values			Units
	Min	Typ	Max	
T1	0.5	-	20	ms
T2	10	-	100	ms
T3	200	-	-	ms
T4	200	-	-	ms
T5	0	-	-	ms
T6	1	-	-	s

Notes: 1. Back Light must be turn on after power for logic and interface signal are valid.
2. Even though T1 is out of SPEC, it is still ok if the inrush current of VDD is below the limit.
3. When VDD<0.9VDD(Typ.),Power off.
4. T7 decreases smoothly, if there were rebounding voltage, it must smaller than 5 volts.

6.0 OPTICAL SPECIFICATIONS

The test of optical specifications shall be measured in a dark room (ambient luminance≤1 lux and temperature=25±2 ł) with the equipment of Luminance meter system (Goniometer system and PR730) and test unit shall be located at an approximate distance 180cm from the LCD surface at a viewi°. We refer to Ø=0° as the 3 and o ô c l o c k d i r e c t i o n (Ø = 9 0 °) t o a s t h e 1 2 ò o ô c l o c k d i r e c t i o n (Ø = 1 8 0 °) e q u i v a l e n t t o a s t h e 9 o ô c l o c k d i r e c t i o n (Ø = 2 7 0 °) . C o n t r a s t i s m e a s u r e d a t t h e c e n t e r o f t h e s c r e e n a l o n g t h e n o r m a l d i r e c t i o n a n d s c a n n i n g d i r e c t i o n s a n d / o r Ï , t h e c e n t e r o f t h e m e a s u r e m e n t . The measurement shall be executed after 30 minutes warm-up period. VDD shall be 12.0V at 25°C. Optimum viewing angle direction is 6 ô c l o c k .

< Table 12. Optical Table >

[VDD = 12.0V, Frame rate = 60Hz, Ta =25± 2 ł]

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	$\bar{U}_3$	CR > 10	80	89	-	Deg.	Note 1
		$\bar{U}_9$		80	89	-	Deg.	
	Vertical	$\bar{U}_{12}$		80	89	-	Deg.	
		$\bar{U}_6$		80	89	-	Deg.	
Brightness		Lv	Ū =° 0 (Center) Normal Viewing Angle	560	700	-	nit	
Contrast ratio		CR		800:1	1200:1	-		Note 2
White luminance uniformity		¢pY		75	-	-	%	Note 3
Reproduction of color	White	W_x		TYP. - 0.03	0.271	TYP. + 0.03		Note 4
		W_y			0.292			
	Red	R_x			0.650			
		R_y			0.332			
	Green	G_x			0.287			
		G_y			0.616			
	Blue	B_x			0.145			
		B_y			0.082			
Color Gamut				69	72	-	%	
Response Time	G to G	T_g		-	15	-	ms	Note 5

Note :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction with respect to the optical axis which is normal to the LCD surface.
2. Contrast measurements shall be made at viewing angle of $\theta = 0°$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See Figure 1 shown in Appendix) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. The White luminance uniformity on LCD surface is then expressed as :
   δW = (Minimum 9 points / Maximum 9 points Luminance of 9 points) * 100
   (See Figure 5 shown in Appendix).
4. The color chromaticity coordinates specified in Table 12.shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel. The BLU is used by BOE.
5. Response time Tg is the average time required for display transition by switching the input signal as below table and is based on Frame rate fV =60Hz to optimize.
   Each time in below table is defined as Figure 2 and shall be measured by switching the

Measured Response Time		Target																
		0	15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255
Start	0																	
	15																	
	31																	
	47																	
	63																	
	79																	
	95																	
	111																	
	127																	
	143																	
	159																	
	175																	
	191																	
	207																	
	223																	
	239																	
	255																	

5. Definition of Transmittance (T%) :
   Module is with white(L255) signal input

$$Tr. = \frac{\text{Luminance of LCD Module}}{\text{Luminance of BLU}} \times 100\ \%$$

7.0 MECHANICAL CHARACTERISTICS

7.1 Dimensional Requirements

Figure 3(located in Appendix) shows mechanical outlines for the model DV290FBM-N10. Other parameters are shown in Table 13.

< Table 13. Dimensional Parameters >

Parameter	Specification	Unit
Dimensional outline	720.8*226.25*8.4(B)	mm
Weight	2415±100	gram
Active area	705.6(H)*198.45(V)	mm
Pixel pitch	122.5(H) ×367.5(V)	um
Number of pixels	1920(H) ×540(V)(1 pixel = R + G + B dots)	pixels
Back-light	E-LED , 2ea LED bar-down side	

7.2 Mounting

See FIGURE 5. (shown in Appendix)

7.3 Anti-Glare and Polarizer Hardness.

The surface of the LCD has an anti-glare coating to minimize reflection and a coating to reduce scratching.

8.0 RELIABILITY TEST

The Reliability test items and its conditions are shown in below.

< Table 14. Reliability Test Parameters >

No	Test Items	Conditions	
1	High temperature storage test	Wd @ 93 ł / 573 kuv	
2	Low temperature storage test	Ta = -53 ł / 573 kuv	
3	High temperature & high humidity operation test	Wd @ 83 ł / ;3 (UK/ 573kuv/ Operation	
4	High temperature operation test	Wd @ 93 ł / 573kuv	
5	Low temperature operation test	Ta = -8 ł / 573kuv	
6	8585	;8 ł , 85%, 240hr, Storage	
7	Ẃ□I/S	Chess 7*5, 168hr, L127	
8	Thermal shock	Ta = -53 ł ↔ 93 ł +3ł8 ku,/ 433 f|f0h	
9	Vibration test (non-operating)	Frequency	10 ~ 300 Hz, Sweep rate 30 min
		Gravity / AMP	1.5 G
		Period	X, Y, Z 30 min
10	Shock test (non-operating)	Gravity	50G
		Pulse width	11msec, half sine wave
		Direction	° X, ° Y, ° Z Once for each
11	On/Off	58 ł ı 1sec on / 1sec off ı 100times ψ 10sec on / 5sec off ı 30000times ı aging 240hr ı Operation	

This test condition is based on BOE module.

9.0 PRODCUT SERIAL NUMBER

‰ ¥ : 48mm × 12mm, 0.075mm

1. FG- CODE: DV290FBM- N10
2. MDL ID Ḿ Ẕ ̣ .
3. MDL ID

MDL ID Naming Rule:

序列号	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
代码	X	X	X	3	X	X	X	3	8	5	0	X	X	X	X	X	X
描述	GBN代码		等级	B3	年份		月	FG Code后四位				序列号					

10.0 PACKING INFORMATION

BOE provides the standard shipping container for customers, unless customer specifies their packing information. The standard packing method and Barcode information are shown in below.

10.1 Packing Order

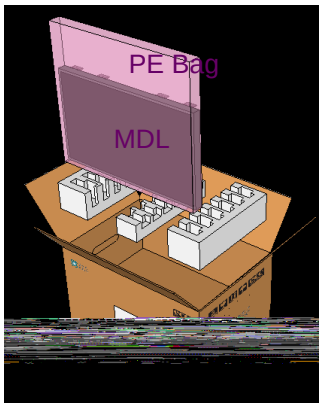
-. Ṅ 2ea EPE Bottom ώ ϶Inner Box ẕ ϑh

-. Ṅ MDL ˷ ϶PE Bag ª PCB ᵇ ï ϒ ´ ά ϶

- .Ṅ4pcs MDL ά ϶ ɹ Rsª ,

- ˷ ϑh ̇E ᵀ 2ea EPE bottom

-. 4pcs/Box



-. ⅛ Ѧ Pallet i ώ 3 Ṗ Box
1 Ṗ 4 ϒ ,Ηщ12ea Box

-. Pallet ᵘ ڤ Φ ₁ γ Ł

-. 48pcs LCM / Pallet