



Duobond Display Technology Co.,Ltd

PRODUCT SPECIFICATION

MODEL NAME: DBT070CTV50R9

Date: 2016/6/6

Version: 1.0

- Preliminary Specification
- Final Specification

FOR CUSTOMER	
CUSTOMER APPROVED	

PREPARED BY	CHECKED BY	APPROVED BY	DATE

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Revision History

Version	Content	Page	Date
1.0	Generation first version	All	2016-06-18

**Note : The Product and specifications are subject to change without any notice.
Please ask for the latest Product Standards to guarantee the satisfaction of
our product requirements.**

2. General Specifications

DBT070CTV50R9 is a color active matrix LCD module incorporating amorphous silicon TFT(Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs, FPC and a backlight unit. The 7.0" display area contains 800 (RGB) x 480 pixels and can display up to 16.7M colors.

2.1. Features

High brightness, readable in the sun.

2.2. Display Characteristics

No.	Item	Specification	Remark
1	LCD size	7.0 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	800 × 3(RGB) × 480	
4	Display mode	Normally White, Transmissive	
5	Dot pitch	0.0642(W) × 0.1790(H) mm	
6	Active area	154.08(W) × 85.92(H) mm	
7	Module size	165.0(W) × 100.0(H) × 5.8(D) mm	Note 1
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	Digital	
11	Backlight power consumption	2.82W (Typ.)	
12	Panel power consumption	0.226W (Typ.)	
13	Weight	TBD	

Note 1: Refer to Mechanical Drawing.

3. Pin Assignment

FPC Connector is used for the module electronics interface. The recommended model is FH12A-50S-0.5SH manufactured by Hirose.

Pin No.	Symbol	I/O	Function	Remark
1	V _{LED+}	P	Power for LED backlight (Anode)	
2	V _{LED+}	P	Power for LED backlight (Anode)	
3	V _{LED-}	P	Power for LED backlight (Cathode)	
4	V _{LED-}	P	Power for LED backlight (Cathode)	
5	GND	P	Power ground	
6	V _{COM}	I	Common voltage	
7	DV _{DD}	P	Power for Digital Circuit	
8	MODE	I	DE/SYNC mode select	Note 1
9	DE	I	Data Input Enable	
10	VS	I	Vertical Sync Input	
11	HS	I	Horizontal Sync Input	
12	B7	I	Blue data(MSB)	
13	B6	I	Blue data	
14	B5	I	Blue data	
15	B4	I	Blue data	
16	B3	I	Blue data	
17	B2	I	Blue data	
18	B1	I	Blue data	Note 2
19	B0	I	Blue data(LSB)	Note 2
20	G7	I	Green data(MSB)	
21	G6	I	Green data	
22	G5	I	Green data	
23	G4	I	Green data	
24	G3	I	Green data	
25	G2	I	Green data	
26	G1	I	Green data	Note 2

27	G0	I	Green data(LSB)	Note 2
28	R7	I	Red data(MSB)	
29	R6	I	Red data	
30	R5	I	Red data	
31	R4	I	Red data	
32	R3	I	Red data	
33	R2	I	Red data	
34	R1	I	Red data	Note 2
35	R0	I	Red data(LSB)	Note 2
36	GND	P	Power Ground	
37	DCLK	I	Sample clock	Note 3
38	GND	P	Power Ground	
39	L/R	I	Left / right selection	Note 4,5
40	U/D	I	Up/down selection	Note 4,5
41	V _{GH}	P	Gate ON Voltage	
42	V _{GL}	P	Gate OFF Voltage	
43	AV _{DD}	P	Power for Analog Circuit	
44	RESET	I	Global reset pin.	Note 6
45	NC	-	No connection	
46	V _{COM}	I	Common Voltage	
47	DITHB	I	Dithering function	Note 7
48	GND	P	Power Ground	
49	NC	-	No connection	
50	NC	-	No connection	

I: input, O: output, P: Power

Note 1: DE/SYNC mode select. Normally pull high.

When select DE mode, MODE="1", VS and HS must pull high.

When select SYNC mode, MODE="0", DE must be grounded.

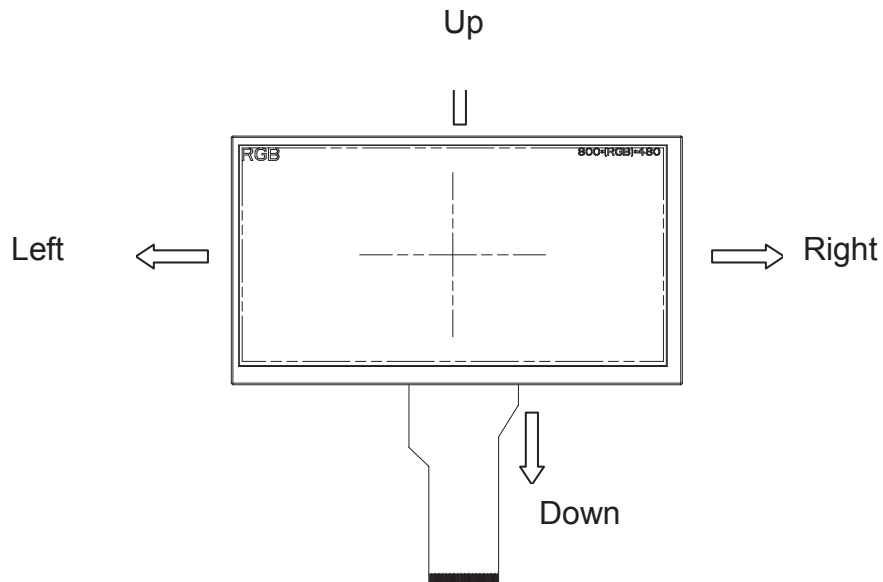
Note 2: When input 18 bits RGB data, the two low bits of R,G and B data must be grounded.

Note 3: Data shall be latched at the falling edge of DCLK.

Note 4: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	L/R	
GND	DV _{DD}	Up to down, left to right
DV _{DD}	GND	Down to up, right to left
GND	GND	Up to down, right to left
DV _{DD}	DV _{DD}	Down to up, left to right

Note 5: Definition of scanning direction.
Refer to the figure as below:



Note 6: Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high.

Note 7: Dithering function enable control, normally pull high.
When DITHB="1", Disable internal dithering function,
When DITHB="0", Enable internal dithering function,

4. Operation Specifications

4.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	DV_{DD}	-0.3	5.0	V	
	AV_{DD}	6.5	13.5	V	
	V_{GH}	-0.3	40.0	V	
	V_{GL}	-20.0	0.3	V	
	$V_{GH}-V_{GL}$	-	40.0	V	
Operation Temperature	T_{OP}	-20	70	°C	
Storage Temperature	T_{ST}	-30	80	°C	
LED Reverse Voltage	V_R	-	5	V	Each LED Note 2
LED Forward Current	I_F	-	35	mA	Each LED

Note 1: 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.

Note 2: V_R Conditions: Zener Diode 30mA

4.1.1. Typical Operation Conditions

(Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	DV_{DD}	3.0	3.3	3.6	V	Note 2
	AV_{DD}	10.2	10.4	10.6	V	
	V_{GH}	15.3	16.0	16.7	V	
	V_{GL}	-7.7	-7.0	-6.3	V	
Input signal voltage	V_{COM}	3.6	3.8	4.0	V	
Input logic high voltage	V_{IH}	0.7 DV_{DD}	-	DV_{DD}	V	Note 3
Input logic low voltage	V_{IL}	0	-	0.3 DV_{DD}	V	

Note 1: Be sure to apply DV_{DD} and V_{GL} to the LCD first, and then apply V_{GH} .

Note 2: DV_{DD} setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note 3: DCLK,HS,VS,RESET,U/D, L/R,DE,R0~R7,G0~G7,B0~B7,MODE,DITHB.

4.1.2. Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I_{GH}	-	0.2	1.0	mA	$V_{GH} = 16.0V$
	I_{GL}	-	0.2	1.0	mA	$V_{GL} = -7.0V$
	IDV_{DD}	-	4.0	10	mA	$DV_{DD} = 3.3V$
	$I_{AV_{DD}}$	-	20	50	mA	$AV_{DD} = 10.4V$

4.1.3. Backlight Driving Conditions

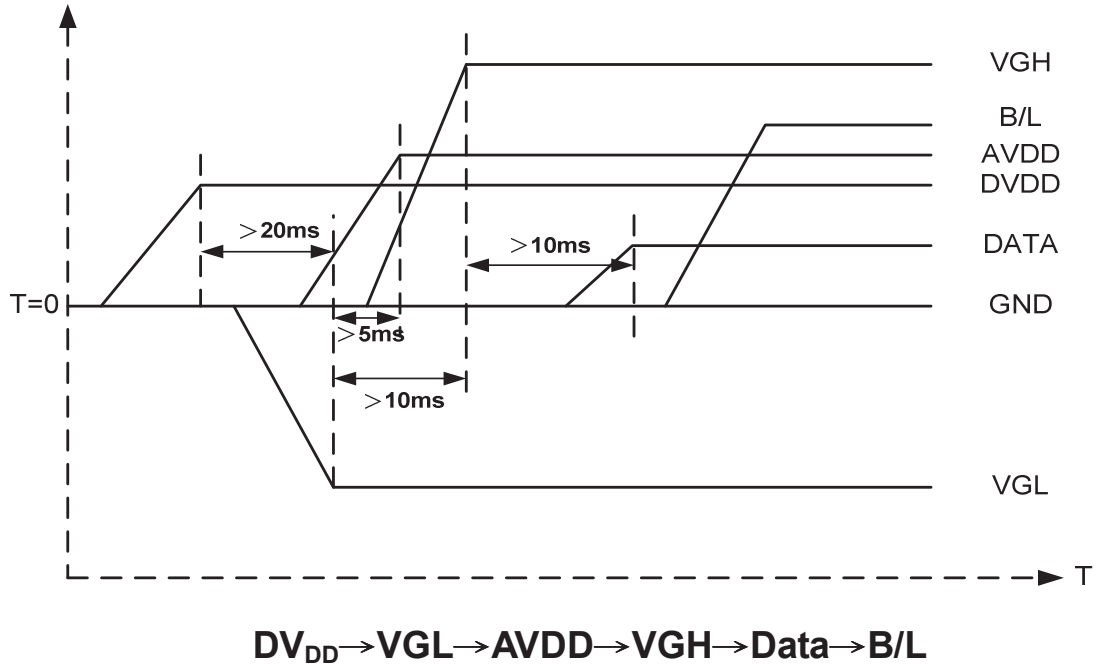
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V_L	8.4	9.4	10.5	V	Note 1
Current for LED backlight	I_L	280	300	320	mA	
LED life time	-	20,000	-	-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at $T_a = 25^\circ C$ and $I_L = 300mA$.

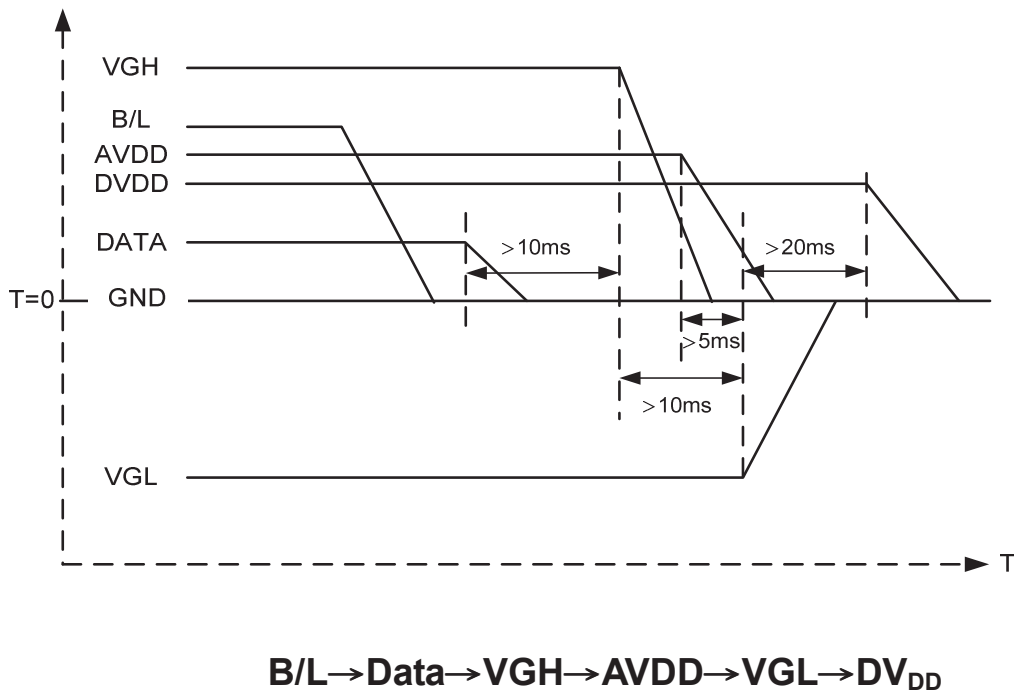
Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at $T_a = 25^\circ C$ and $I_L = 300mA$. The LED lifetime could be decreased if operating I_L is larger than 300mA.

4.2. Power Sequence

a. Power on:



b. Power off:



Note: Data include R0~R7, B0~B7, GO~G7, U/D, L/R, DCLK, HS, VS, DE.

4.3. Timing Characteristics

4.3.1. AC Electrical Characteristics

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
HS setup time	T_{hst}	8	-	-	ns	
HS hold time	T_{hhd}	8	-	-	ns	
VS setup time	T_{vst}	8	-	-	ns	
VS hold time	T_{vhd}	8	-	-	ns	
Data setup time	T_{dsu}	8	-	-	ns	
Data hole time	T_{dhd}	8	-	-	ns	
DE setup time	T_{esu}	8	-	-	ns	
DE hole time	T_{ehd}	8	-	-	ns	
DV _{DD} Power On Slew rate	T_{POR}	-	-	20	ms	From 0 to 90% DV _{DD}
RESET pulse width	T_{Rst}	1	-	-	ms	
DCLK cycle time	T_{coh}	20	-	-	ns	
DCLK pulse duty	T_{cwh}	40	50	60	%	

4.3.2. Timing

Horizontal Timing

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	26.4	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	

Vertical Timing

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	

4.3.3. Data Input Format

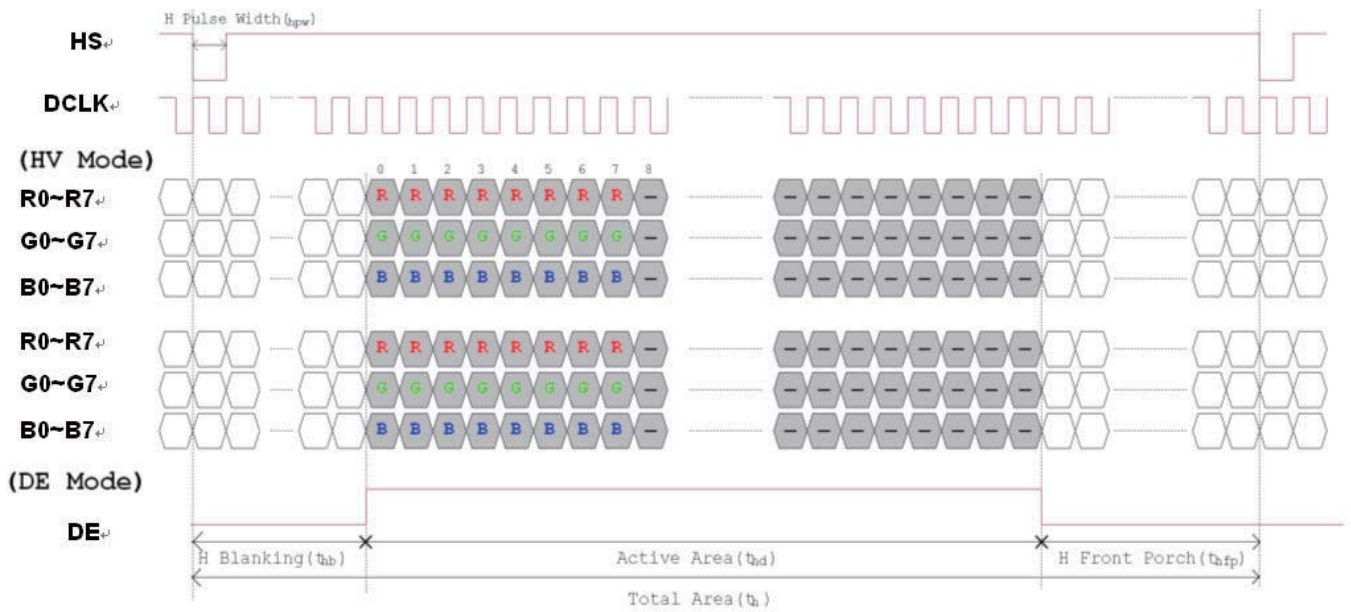


Figure 3. 1 Horizontal input timing diagram.

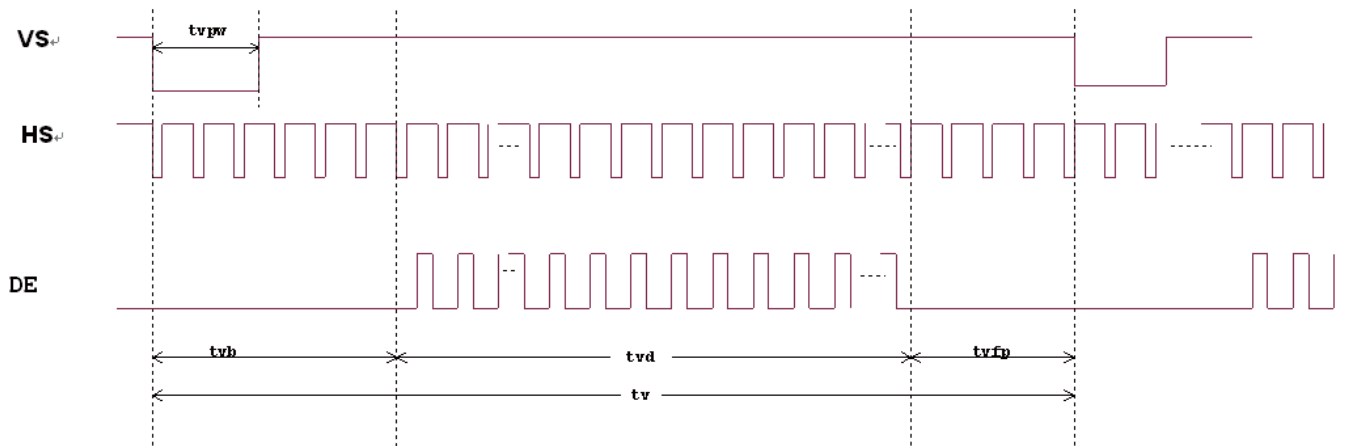


Figure 3. 2 Vertical input timing diagram.

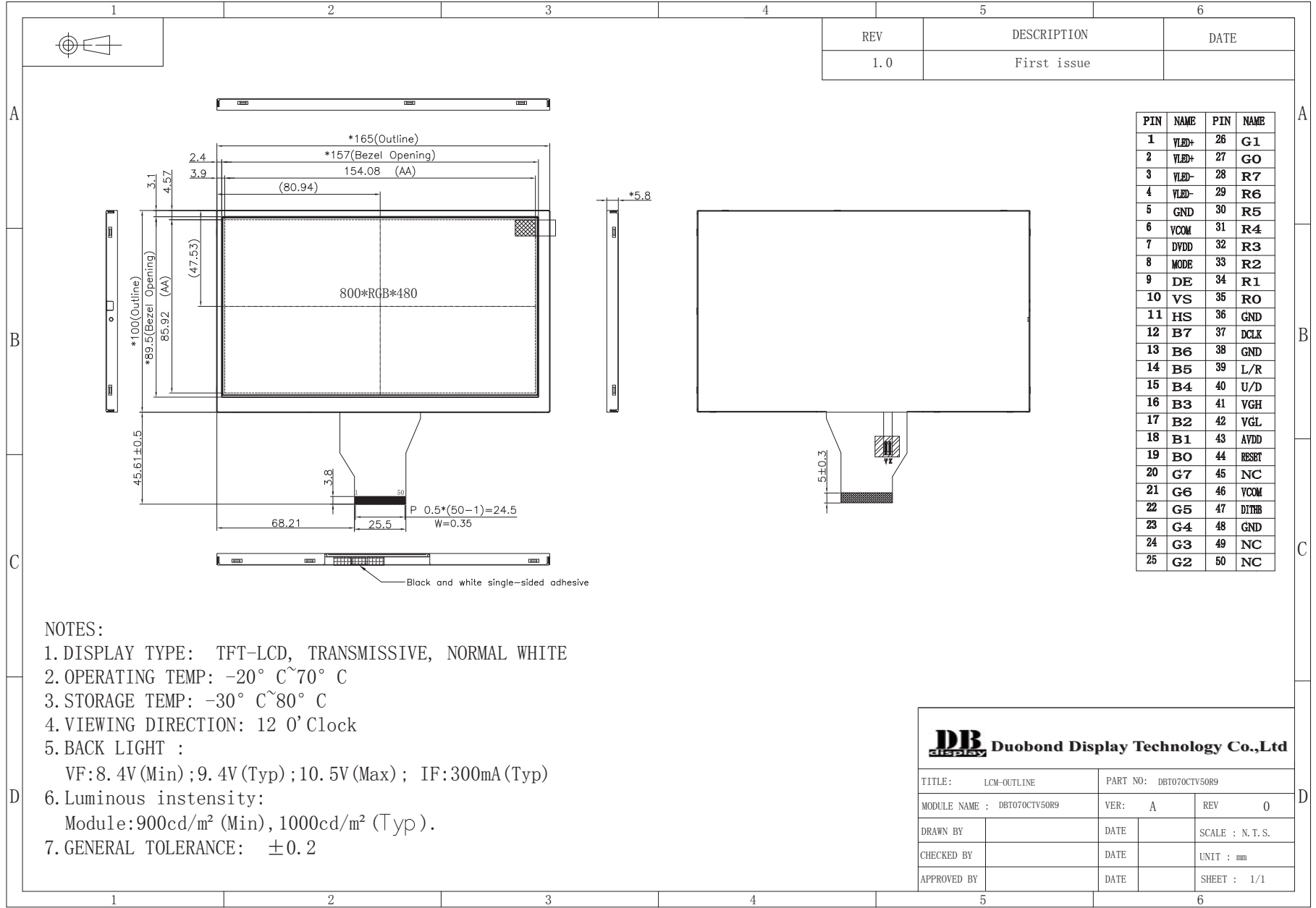
5. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	$\Phi=180^\circ$ (9 o'clock)	60	70	-	degree	
	θ_R	$\Phi=0^\circ$ (3 o'clock)	60	70	-		
	θ_T	$\Phi=90^\circ$ (12 o'clock)	40	50	-		
	θ_B	$\Phi=270^\circ$ (6 o'clock)	60	70	-		
Response time	T_{ON}	Normal	-	10	20	msec	
	T_{OFF}		-	15	30	msec	
Contrast ratio	CR		400	500	-	-	
Color chromaticity	W_X		0.27	0.31	0.35	-	
	W_Y		0.28	0.32	0.36	-	
Luminance	L		900	1000	-	cd/m ²	
Luminance uniformity	Y_U			75	-	%	

Test Conditions:

1. $DV_{DD}=3.3V$, $I_L=300mA$ (Backlight current), the ambient temperature is 25°C.
2. The test systems refer to Note 2.

7. Outline Dimension



REV	DESCRIPTION	DATE
1.0	First issue	

PIN	NAME	PIN	NAME
1	VLED+	26	G1
2	VLED+	27	GO
3	VLED-	28	R7
4	VLED-	29	R6
5	GND	30	R5
6	VCOM	31	R4
7	DVDD	32	R3
8	MODE	33	R2
9	DE	34	R1
10	VS	35	RO
11	HS	36	GND
12	B7	37	DCLK
13	B6	38	GND
14	B5	39	L/R
15	B4	40	U/D
16	B3	41	VGH
17	B2	42	VGL
18	B1	43	AVDD
19	BO	44	RESET
20	G7	45	NC
21	G6	46	VCOM
22	G5	47	DITB
23	G4	48	GND
24	G3	49	NC
25	G2	50	NC

DB display Duobond Display Technology Co.,Ltd	
TITLE: LCM-OUTLINE	PART NO: DBT070CTV50R9
MODULE NAME : DBT070CTV50R9	VER: A REV 0
DRAWN BY	DATE SCALE : N. T. S.
CHECKED BY	DATE UNIT : mm
APPROVED BY	DATE SHEET : 1/1

8. Packaging Form

LCM quantity per Carton: 2Rows x 30quantity per Row = 60 pcs

9. General Precautions

9.1 Safety

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

9.2 Handling

- A. The LCD and touch panel is made of plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
- B. Do not handle the product by holding the flexible pattern portion in order to assure the reliability
- C. Transparency is an important factor for the touch panel. Please wear clear finger sacks, gloves and mask to protect the touch panel from finger print or stain and also hold the portion outside the view area when handling the touch panel.
- D. Provide a space so that the panel does not come into contact with other components.
- E. To protect the product from external force, put a covering lens (acrylic board or similar board) and keep an appropriate gap between them.
- F. Transparent electrodes may be disconnected if the panel is used under environmental conditions where dew condensation occurs.
- G. Property of semiconductor devices may be affected when they are exposed to light, possibly resulting in IC malfunctions.
- H. To prevent such IC malfunctions, your design and mounting layout shall be done in the way that the IC is not exposed to light in actual use.

9.3 Static Electricity

- A. Ground soldering iron tips, tools and testers when they are in operation.
- B. Ground your body when handling the products.
- C. Power on the LCD module before applying the voltage to the input terminals.
- D. Do not apply voltage which exceeds the absolute maximum rating.
- E. Store the products in an anti-electrostatic bag or container.

9.4 Storage

- A. Store the products in a dark place at $+25^{\circ}\text{C}\pm 10^{\circ}\text{C}$ with low humidity (40% RH to 60% RH). Don't expose to sunlight or fluorescent light.
- B. Storage in a clean environment, free from dust, active gas, and solvent.

9.5 Cleaning

- A. Do not wipe the touch panel with dry cloth, as it may cause scratch.
- B. Wipe off the stain on the product by using soft cloth moistened with ethanol. Do not allow ethanol to get in between the upper film and the bottom glass. It may cause peeling issue or defective operation. Do not use any organic solvent or detergent other than ethanol.