

SPECIFICATION

Customer: _____
Model Name: SAT050CP40H12B2-30076T051ZD-TP
SPEC NO.: _____
Date: _____
Version: _____

- Preliminary Specification
 Final Specification

Approved by	Comment

Prepared by	Reviewed by	Approved by

Record of Revision

Version	Revise Date	Page	Content
Pre-spec.A	2017/04/17		Initial Release

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1. General Specifications

No.	Item	Specification	Remark
1	LCD Size	5.0 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	0.045(W) X 0.135(H) mm	
6	Active area	108(W) X3(RGB)X 64.8(H) mm	
7	Outline dimensions	120.7(H) X 75.8(V) X 3.0(D) mm	
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	TTL RGB-24bit parallel interface	
11	Backlight Power consumption	TBD	
12	Panel Power consumption	TBD	
13	Weight	TBD	

2. Pin Assignment

FPC connector is used for electronics interface. The recommended model is FH19SC-40S-0.5SH (05) manufactured by HIROSE.

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

38	Y_B	I/O	Bottom electrode - differential analog
39	X_L	I/O	Left electrode - differential analog
40	Y_T	I/O	Top electrode - differential analog

I/O: I: input, O: output, P: power

3. Operation Specifications

3.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Supply voltage	V _{DD}	-0.3	4.5	V	
Operation Temperature	T _{OP}	-20	55	°C	
Storage Temperature	T _{ST}	-20	60	°C	
LED Reverse Voltage	V _R	-	5	V	Each LED Note 2
LED Forward Current	I _F	-	25	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 20mA

3.1.1. Typical Operation Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ	Max.		
Power voltage	V_{DD}	3.0	3.3	3.6	V	Note 2
Current for Driver	$I_{V_{DD}}$	-	17	25	mA	
Input logic high voltage	V_{IH}	$0.8 V_{DD}$	-	V_{DD}	V	Note 3
Input logic low voltage	V_{IL}	0	-	$0.2 V_{DD}$	V	

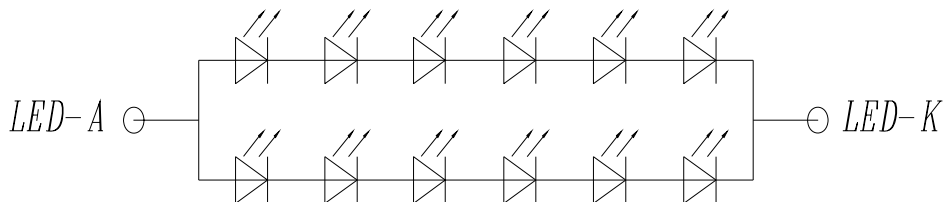
3.1.2. Backlight Driving Conditions (12 White Chips)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply voltage of white LED backlight	VL	17.4	19.8	21	V	Note 1
Curt for LED backlight	IL	30	40	50	mA	
Luminance (on the module surface, BM-7)		250	280	-	cd/m ²	
LED life time	-	50,000	-	-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at $T_a=25^{\circ}\text{C}$ and $I_L=40\text{mA}$.

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at $T_a=25^{\circ}\text{C}$ and $I_L=40\text{mA}$. The LED lifetime could be decreased if operating I_L is larger than 40mA.

LED CIRCUIT

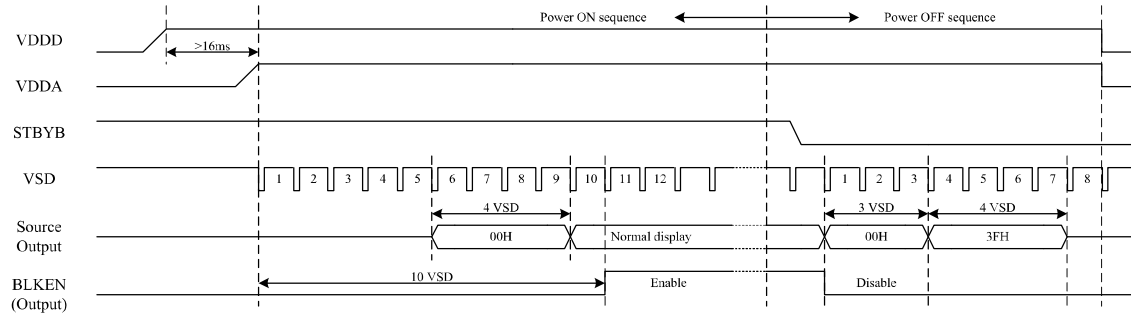


3.2. Power Sequence

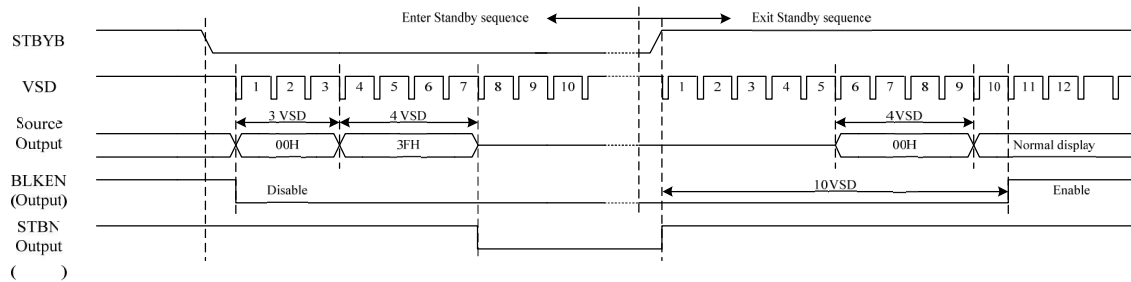
3.2.1 Power On/Off Sequence

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

Power-On/Off Timing Sequence:



Enter and Exit Standby Mode Sequence:



3.3. Timing Characteristics

3.3.1. AC Electrical Characteristics

(VDDD=2.3 to 3.6V,AVDD=6.5 to 13.5V, GND=AGND=0V,TA=-20 to +85°C)

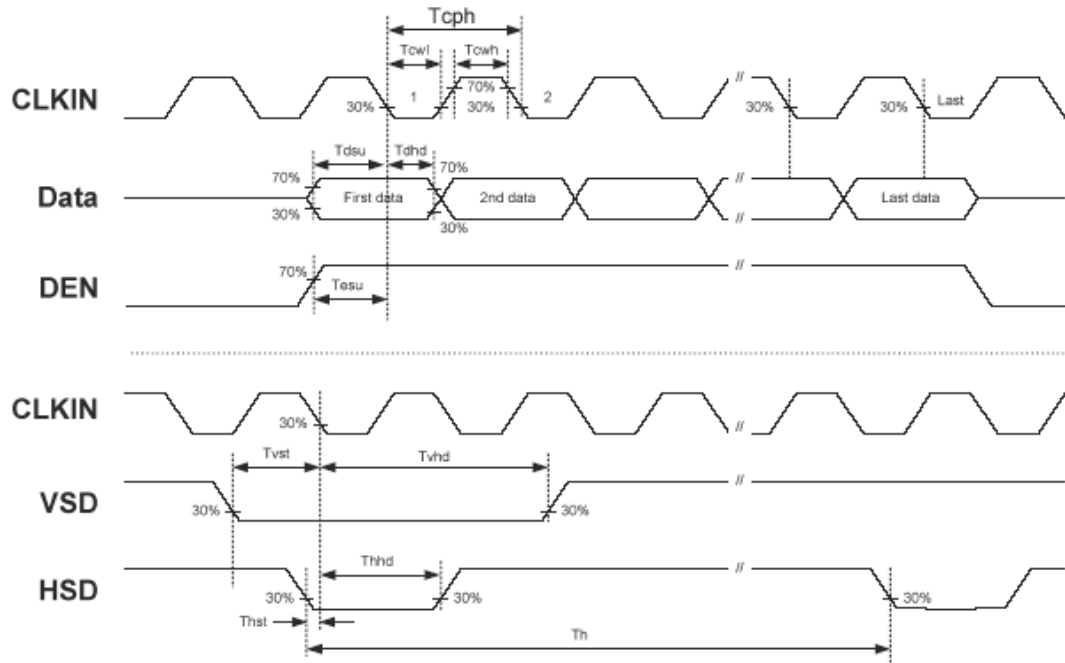
Parameter	Symbol	MIN.	Typ.	MAX.	UNIT	Conditions
VDD Power On Slew rate	T	-	-	20	ms	From 0V to 90% VDD
RSTB pulse width	T	10	-	-	us	CLKIN = 45MHz
CLKIN cycle time	Tcph	20	-	-	ns	
CLKIN pulse duty	Tcwh	40	50	60	%	
VSD setup time	Tvst	8	-	-	ns	
VSD hold time	Tvhd	8	-	-	ns	
HSD setup time	Thst	8	-	-	ns	
HSD hold time	Thhd	8	-	-	ns	
Data set-up time	Tdsu	8	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to CLKIN
Data hold time	Tdhd	8	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to CLKIN
DE set-up time	Tesu	8	-	-	ns	
DE hold time	Tehd	8	-	-	ns	
Output stable time	Tsst	-	-	6	us	10% to 90% target voltage. CL=120pF, R=10K ohm

Parallel RGB AC characteristics

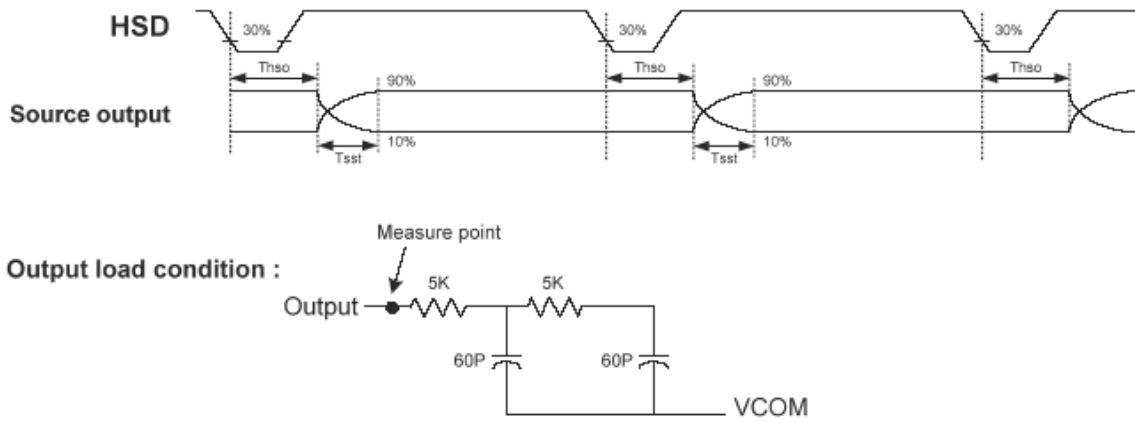
(VDDD=2.3 to 3.6V,AVDD=6.5 to 13.5V, GND=AGND=0V,TA=-20 to +85°C)

Parameter	Symbol	MIN.	Typ.	MAX.	UNIT	Conditions
CLKIN Frequency	Fclk	-	33	50	MHz	VDDD = 2.3V ~ 3.6V
CLKIN Cycle Time	Tclk	20	30	-	ns	
CLKIN Pulse Duty	Tcwh	40	50	60	%	Tclk
Time from HSD to Source Output	Thso	-	Tld		CLKIN	
Time from HSD to LD	Thld	-	Tld		CLKIN	
Time from HSD to STV	Thstv	-	2		CLKIN	
Time from HSD to CKV	Thckv	-	20		CLKIN	
Time from HSD to OEV	Thoev	-	4		CLKIN	
LD Pulse	Twld	-	10		CLKIN	
CKV Pulse Width	Twckv	-	66		CLKIN	
OEV Pulse Width	Twoev	-	Tld+10		CLKIN	

3.3.2. Input Clock and Data Timing Diagram



Source Output Timing Diagram (Single Gate)



3.3.3. Timing

Horizontal input timing

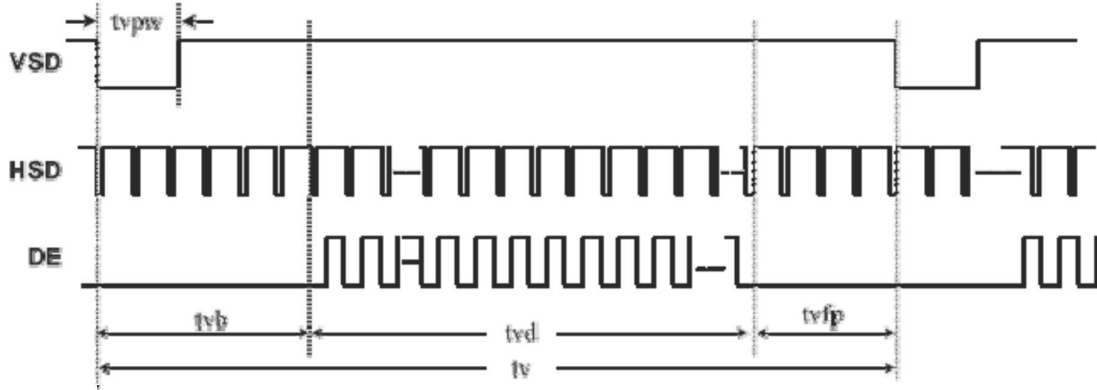
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Horizontal display area	thd	800			DCLK
DCLK frequency	fclk	-	30	50	MHz
1 Horizontal Line	th	928			DCLK
HSD pulse width	thpw	Min.			
		1			
		Typ.			
48					
Max.			-		
HSD Back Porch (Blanking)	thb	-	88	-	
HSD Front Porch	thfp	-	40	-	

Vertical input timing

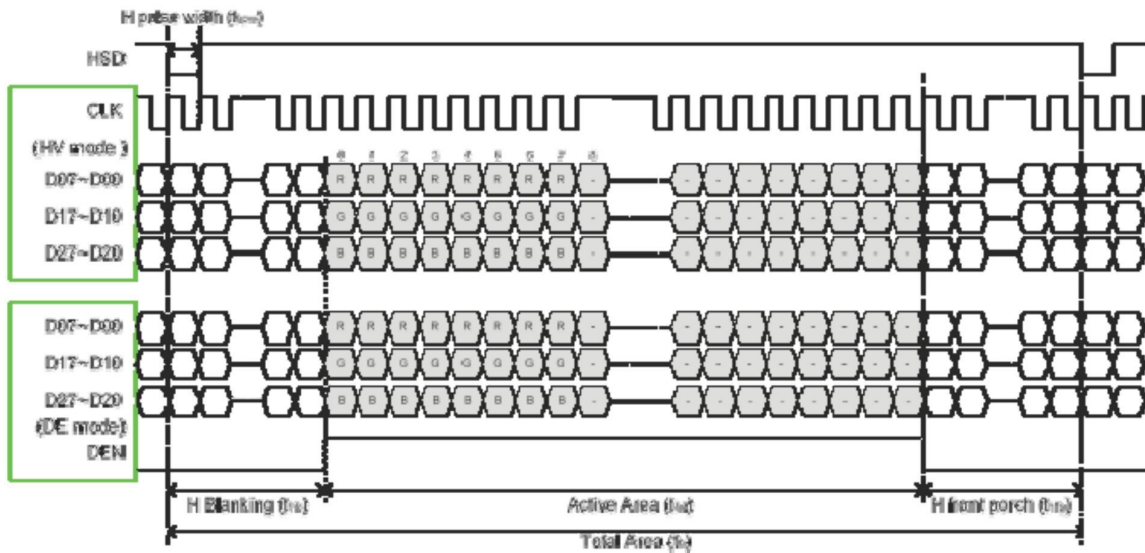
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd	480			H
VSD period time	tv	-	525	-	H
VSD pulse width	tvpw	-	3	-	H
VSD Back Porch (Blanking)	tvb	-	32	-	H
VSD Front Porch	tvfp	-	13	-	H

3.3.4. Data Input Format

Vertical input timing



Horizontal input timing



4. Optical Specifications

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
Transmittance (With polarize)	T		3.3	3.97		%	Note 1
Transmittance (Without polarize)	T		9.7	11.5		%	Note 2
Contrast Ratio	CR	*1)	-	350	-	--	Note 3
Response Time	Tr+ Tf	*3)	-	20	30	ms	Note 4
Viewing Angle	U	$\theta^{*2)}$	CR \geq 10	45	50	-	Note 5
	D			55	60	-	
	L	$\psi^{*2)}$		60	65	-	
	R			60	65	-	
Color Filter Chromaticity	White	x y	$\theta = \phi = 0^\circ$	0.257	0.277	0.297	Note 6
				0.283	0.303	0.323	
	Red	x y	$\theta = \phi = 0^\circ$	0.613	0.633	0.653	
				0.321	0.341	0.361	
	Green	x y	$\theta = \phi = 0^\circ$	0.304	0.324	0.344	
				0.531	0.551	0.571	
	Blue	x y	$\theta = \phi = 0^\circ$	0.133	0.153	0.173	
0.123				0.143	0.163		
NTSC			-	50%	-		

Test Conditions:

1. $V_{DD}=3.3V$, $I_L=40mA$ (Backlight current), the ambient temperature is $25^\circ C$.
2. The test systems refer to Note 2.

5. Mechanical Drawing

