



CUSTOMER APPROVAL SHEET

Company Name	ALPINE
MODEL	C065VW01 V0
CUSTOMER APPROVED	Title : Name :

- ☐ **APPROVAL FOR SPECIFICATIONS ONLY (Spec. Ver. ____)**
- ☐ **APPROVAL FOR SPECIFICATIONS AND ES SAMPLE (Spec. Ver. ____)**
- ☐ **APPROVAL FOR SPECIFICATIONS AND CS SAMPLE (Spec. Ver. ____)**
- ☐ **CUSTOMER REMARK :**

1 Li-Hsin Rd. 2. Science-Based Industrial Park
Hsinchu 300, Taiwan, R.O.C.
Tel: +886-3-500-8899
Fax: +886-3-577-2730

Doc. Version	0.9
Total Page	17
Date	2010/7/1

Product Specification

6.5" COLOR TFT-LCD MODULE

MODEL NAME: C065VW01 V0

< > Preliminary Specification

< ◆ > Final Specification

Note: The content of this specification is subject to change.

© 2010 AU Optonics
All Rights Reserved,
Do Not Copy.

Record of Revision

Version	Revise Date	Page	Content
0.0	2008/12/19		First draft.
0.1	2008/12/26	7/8	Add (MSB)/(LSB) Wording
		8	Electrical Characteristics →a. TFT-LCD Panel
		10	Power On/Off Sequence description→
			VDD→Reset→DCLK(Hsync,Vsync,Data)→STBYB→ LED UNIT
			LED UNIT→STBYB →DCLK(Hsync,Vsync,Data)→ VDD
		11	b. Timing Condition
		12	Horizontal Timing of Input
			→VDD→Reset→DCLK(Hsync,Vsync,Data)→STBYB→ LED UNIT
		13	Optical Specifications, Note 1→ BL current modified to “100mA”
0.2	2008/12/31	10	Power On/Off sequence → Description/ Timing chart
0.3	2009/6/26	8	Delete Absolute max. rating (LED portion)
		9	BL Driving Condition
		13	Brightness Update
		15	Reliability test : LED current is driven base on 80mA
		16	Packing Form update (Tentative)
0.4	2009/9/30	13	Brightness update
	2009/11/23	10	Power On/Off sequence, Defined DEN signal.
0.5	2010/01/29	8	Fill in VGH, VGL, AVDD voltage.
		13	Add Maximum value of response time
0.6	2010/03/02	6	Update Outline drawing
		9	Update Maximum value of LED supply current
		10	Update power on sequence description
		13	Update optical specifications
0.7	2010/03/17	8	Modify VDD, VGH, VCOM voltage
0.8	2010/03/23	8	Add Note2 description
		13	Add contrast ratio spec at specific angle
		14	Modify Note10 luminance definition
		15	Update Electrostatic discharge test conditions
	2010/05/04	6	Revise weight data
0.9	2010/07/01	17	Add label format
1.0	2010/08/09	10	Revise Note 4 of backlight driving condition

Contents

A. General Description	5
B. Features	5
C. Physical Specifications.....	6
D. Outline Dimension.....	7
E. Electrical Specifications	8
1. Pin Assignment	8
Connector=HRS- FH28- 60S- 0.5SH (05)	8
2. Absolute Maximum Ratings.....	9
3. Electrical Characteristics	9
a. TFT- LCD Panel	9
b. Backlight Driving Conditions (Note 1)	10
4. AC Timing	11
a. Power on/off sequence.....	11
b. Timing Condition	12
c. Timing Diagram	13
F. Optical specifications (Note 1, 2).....	14
G. Reliability Test Items (Note 2).....	16
H. Packing Form	17

A. General Description

C065VW01 V0 is an a-Si type Thin Film Transistor Liquid crystal Display (TFT-LCD) with AMVA-Mobile (Advanced MVA) technology. This model is composed of a TFT-LCD, a driver, an FPC (flexible printed circuit), and a backlight unit. TCON (timing controller) is also embedded in source driver.

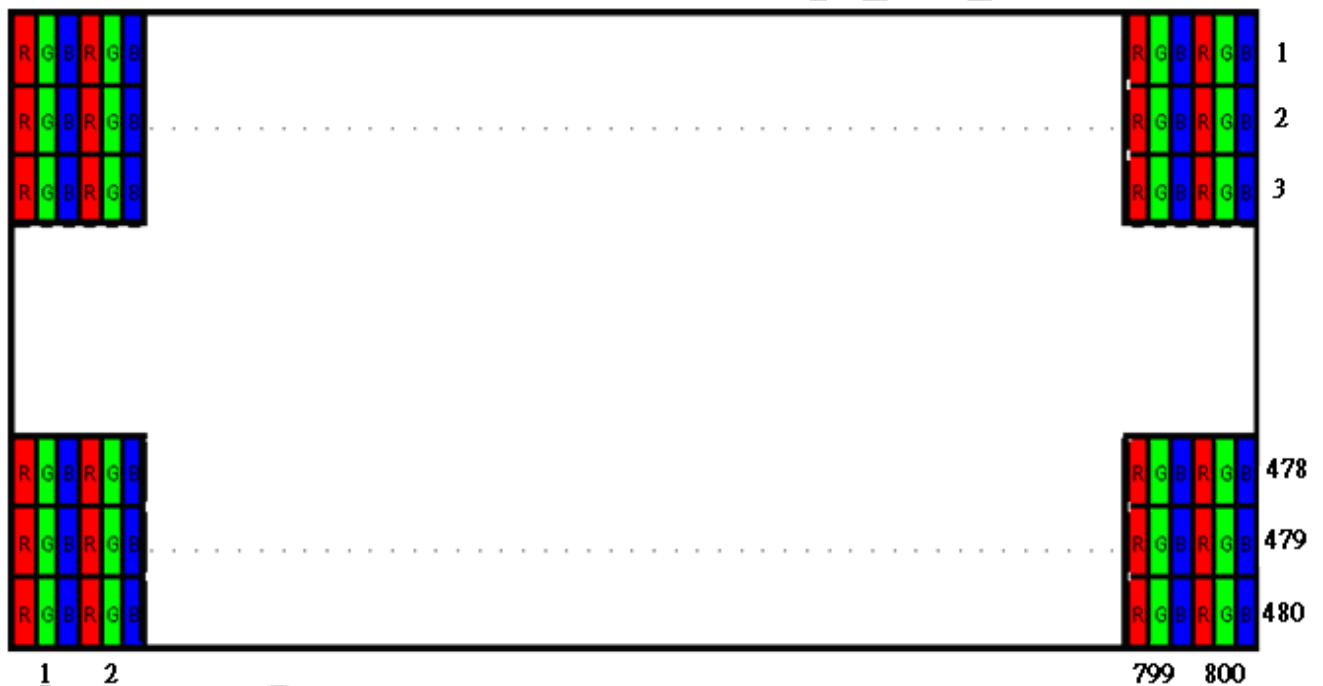
B. Features

- 6.5-inch (16:9) display
- 800RGB x 480 resolution in RGB stripe dot arrangement
- High brightness
- Interfaces: parallel RGB 18-bit
- Advanced MVA -- wide view technology
- RoHs compliance

C. Physical Specifications

NO.	Item	Unit	Specification	Remark
1	Display Resolution	dot	800 RGB (H)×480(V)	
2	Active Area	mm	143.4(H)×79.2(V)	
3	Screen Size	inch	6.5(Diagonal)	
4	Dot Pitch	mm	0.17925(H)×0.1650(V)	
5	Color Configuration	--	R. G. B. Stripe	Note 1
6	Color Depth	--	262K Colors	
7	Overall Dimension	mm	157(H) × 94.4(V) × 6.5(T)	Note 2
8	Weight	g	(138+/-10%)	
9	Display Mode	--	Normally Black	
10	Surface Treatment		AG	

Note 1: Below figure shows dot stripe arrangement.



Note 2: Not including FPC and BOSS. Please refer to the drawing in page 6 for further information.

ALL RIGHTS STRICTLY RESERVED. ANY PORTION OF THIS PAPER SHALL NOT BE REPRODUCED, COPIED, OR TRANSFORMED TO ANY OTHER FORMS WITHOUT PERMISSION FROM AU OPTRONICS CORP.

E. Electrical Specifications

1. Pin Assignment

Connector=HRS- FH28- 60S- 0.5SH (05)

No.	Pin Name	I/O	Description	Remarks
1	VCOM	PI	Common electrode driving voltage	
2	VGH	PI	Positive power supply voltage for TFT	
3	VGL	PI	Negative power supply voltage for TFT	
4	VDD	PI	Digital power supply voltage.	
5	GND	PI	Ground	
6	GND	PI	Ground	
7	V1	I	Gamma correction voltage	
8	V2	I	Gamma correction voltage	
9	V3	I	Gamma correction voltage	
10	V4	I	Gamma correction voltage	
11	V5	I	Gamma correction voltage	
12	V6	I	Gamma correction voltage	
13	V7	I	Gamma correction voltage	
14	V8	I	Gamma correction voltage	
15	V9	I	Gamma correction voltage	
16	V10	I	Gamma correction voltage	
17	V11	I	Gamma correction voltage	
18	V12	I	Gamma correction voltage	
19	V13	I	Gamma correction voltage	
20	V14	I	Gamma correction voltage	
21	GND	PI	Ground	
22	AVDD	PI	Analog power supply voltage	
23	GND	PI	Ground	
24	GND	PI	Ground	
25	GND	PI	Ground	
26	RSTB	I	Global reset pin. (low active)	
27	STBYB	I	Standby mode. "H" for normal operation. "L" for standby mode.	
28	GND	PI	Ground	
29	DB5	I	Blue data Input (MSB)	
30	DB4	I	Blue data input	
31	DB3	I	Blue data input	
32	GND	PI	Ground	
33	DB2	I	Blue data input	
34	DB1	I	Blue data input	
35	DB0	I	Blue data input (LSB)	
36	GND	PI	Ground	
37	DG5	PI	Green data input (MSB)	
38	DG4	I	Green data Input	
39	DG3	I	Green data Input	
40	GND	PI	Ground	
41	DG2	I	Green data Input	
42	DG1	I	Green data Input	
43	DG0	I	Green data Input (LSB)	
44	GND	I	Ground	
45	DR5	I	Red data input (MSB)	
46	DR4	PI	Red data input	
47	DR3	I	Red data Input	
48	GND	PI	Ground	
49	DR2	I	Red data Input	
50	DR1	I	Red data Input	

51	DR0	I	Red data Input (LSB)	
52	GND	PI	Ground	
53	DCLK	I	Data clock Input	
54	GND	PI	Ground	
55	DE	I	Data enable Input (Low active)	
56	GND	PI	Ground	
57	GND	PI	Ground	
58	AVDD	PI	Analog power supply voltage	
59	GND	PI	Ground	
60	VCOM	PI	Common electrode driving voltage	

I: Digital signal input, O: Digital signal output, G: GND, PI: Power input

2. Absolute Maximum Ratings

Items	Symbol	Values		Unit	Condition
		Min.	Max.		
Power Voltage	VDD	-0.3	4.5	V	
	AVDD	-0.5	13.5	V	
	VGH	-0.3	20	V	
	VGL	-15	0.3	V	
	VGH-VGL	0	35	V	
Input Signal Voltage	Vi	-0.3	Vdd+ 0.3	V	
	Vref(V1~V7)	0.4AVDD	AVDD-0.3	V	
	Vref(V8~V14)	0.1	0.6AVDD	V	
	VCOM	-0.3	10	V	
Operation Temperature	Topa	-30	+85	°C	Ambient
Storage Temperature	Tstg	-40	+95	°C	Ambient

Note 1: Functional operation should be restricted under normal ambient temperature.

Note 2: Short time operation between -40°C ~ -30°C doesn't provide complete performance but a correct image on the LCD. The LCD is guaranteed no permanent damage.

3. Electrical Characteristics

The following items are measured under stable condition and suggested application circuit.

a. TFT- LCD Panel

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Power Supply	VDD	3.0	3.3	3.6	V	
	AVDD	V1+0.1	12.6	13.5	V	
	VGH	14.5	15.5	16.65	V	
	VGL	-9.7	-9	-8.5	V	
	VCOM		5.27		V	
Input Signal Voltage	Vi	-0.3	-	Vdd+ 0.3	V	
	Vref(V1~V7)	0.4AVdd	-	AVdd-0.3	V	
	Vref(V8~V14)	0.1	-	0.6AVdd	V	
Input high voltage	Vh	0.7Vdd	-	Vdd	V	
Input low voltage	Vi	0	-	0.3Vdd	V	
Vertical cycle	f _V	55	60	80	Hz	
Horizontal cycle	f _H	28.9	31.5	42	kHz	
Dot Frequency	f _{DCLK}		33.3	45	MHz	

b. Backlight Driving Conditions (Note 1)

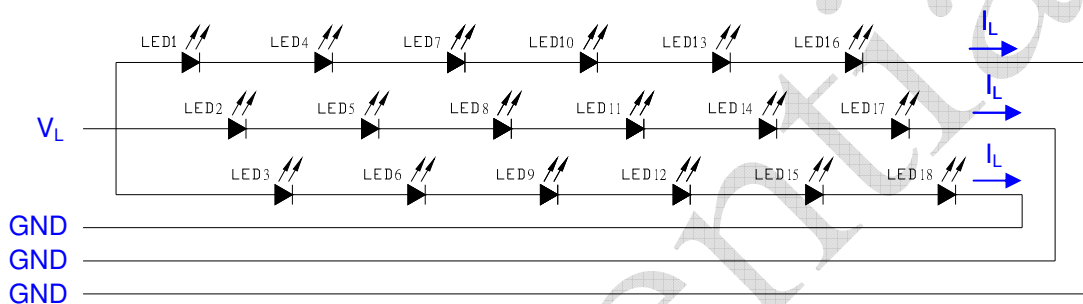
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED Supply Current	I_L	-	80	90	mA	single serial (Note 3)
LED Supply Voltage	V_L	-	(21)	24	V	$I_L=80\text{mA}, 25^\circ\text{C}$ Note 3
LED Life Time	L_L	10000	---	---	Hr	Note 2

Note 1: LED backlight is 18 LEDs (3 strings, 6pcs for each string).

Note 2: The LED lifetime 10000hrs means , after normal use at 80mA, under $+25^\circ\text{C}$, the brightness decreases to 50% of original level.

Note 3: The LED supply power is for 3 string of LED

Note 4: Assure your system can provide enough voltage driving capability(larger than 24V is recommended) to provide 80mA for each LED or the brightness is possible to meet spec.



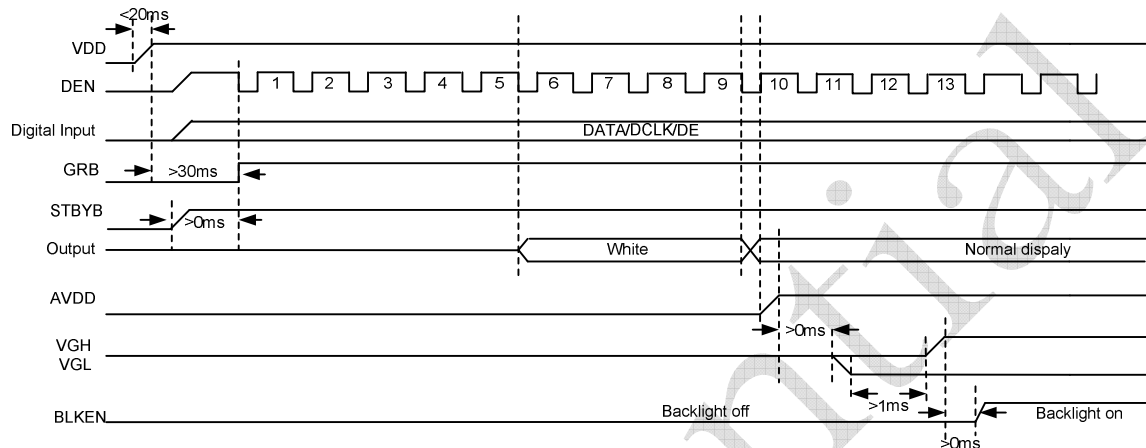
4. AC Timing

a. Power on/off sequence

The LCD adopts high voltage driver IC, so it could be permanently damaged under a wrong power on/off sequence. The suggested LCD power sequence is below:

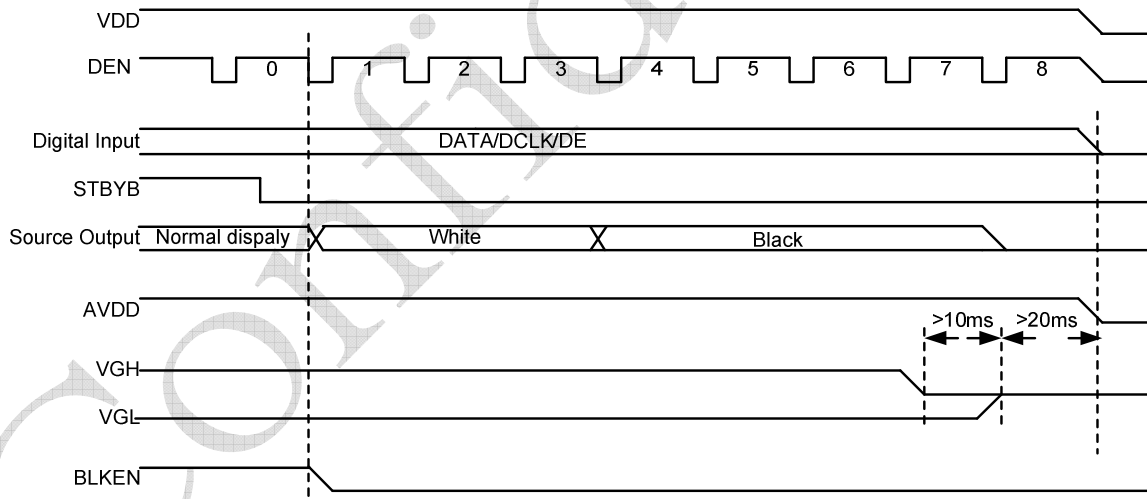
Power on sequence:

VDD -> STBYB -> Digital input (Data/DCLK/DE) -> GRB -> AVDD -> VGL -> VGH -> BLKEN



Power-Off

STBYB -> BLKEN -> VGH -> VGL -> Digital input (Data/DCLK/DE)&Power(VDD/AVDD)



DEN : Defined a frame period and created internally by DE. It is similar vertical sync.

GRB : Global reset ,normally pulled high.

Suggest to connecting with an RC reset circuit for stability .Normally pull high.

STBYB : Standby mode, normally pulled high.

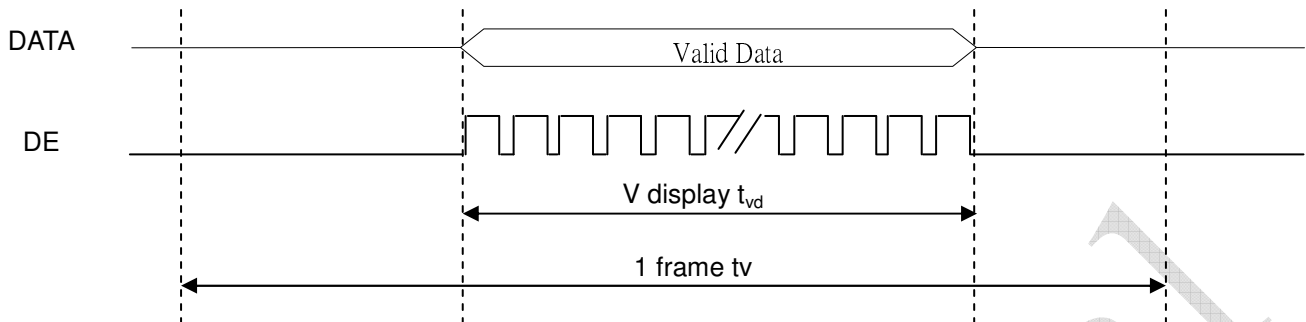
STBYB ="1" , normal operation

STBYB="0",timing controller, source driver will turn off, all output are High-Z

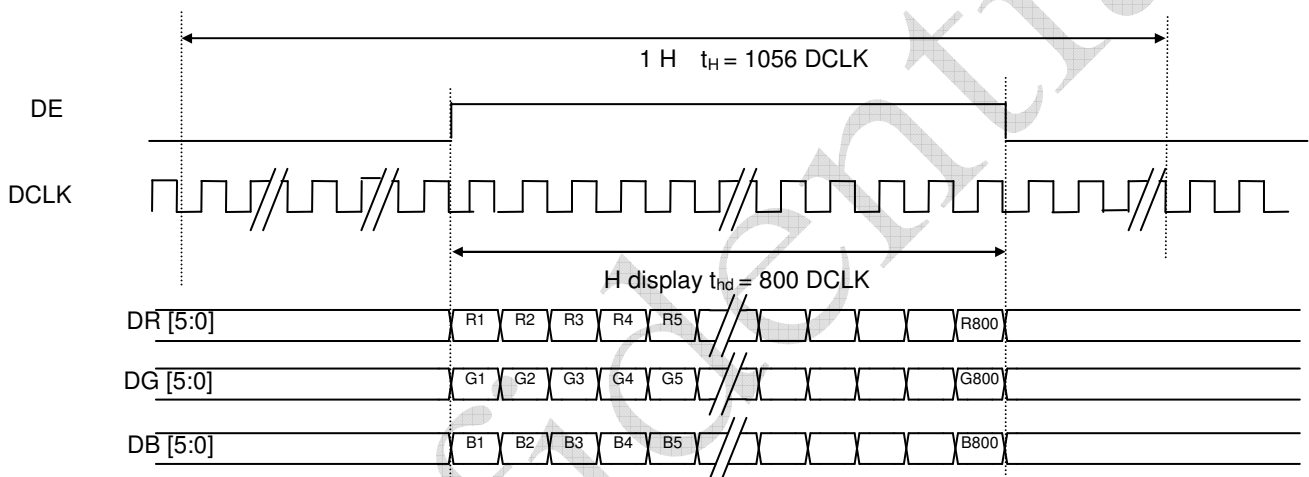
b. Timing Condition

Item	Symbol	Min	Typ	Max	Unit	Remark
Clock frequency	dclk	-	33.3	45	MHZ	
DCLK cycle time	Tdclk	22	30	-	ns	
DCLK pulse duty	Tcwh	40	50	60	%	
Vertical display area	Tvd	480	480	480	H	
Vertical period area	Tv	505	525	780	H	
Vertical blanking area	Tvb	25	45	300	H	
Horizontal display area	Thd	800	800	800	dclk	
Horizontal period area	Th	890	1056	1300	dclk	
Horizontal blanking area	Thb	90	256	500	dclk	
Data setup time	Tds	8	-	-	ns	
Data hold time	Tdh	8	-	-	ns	

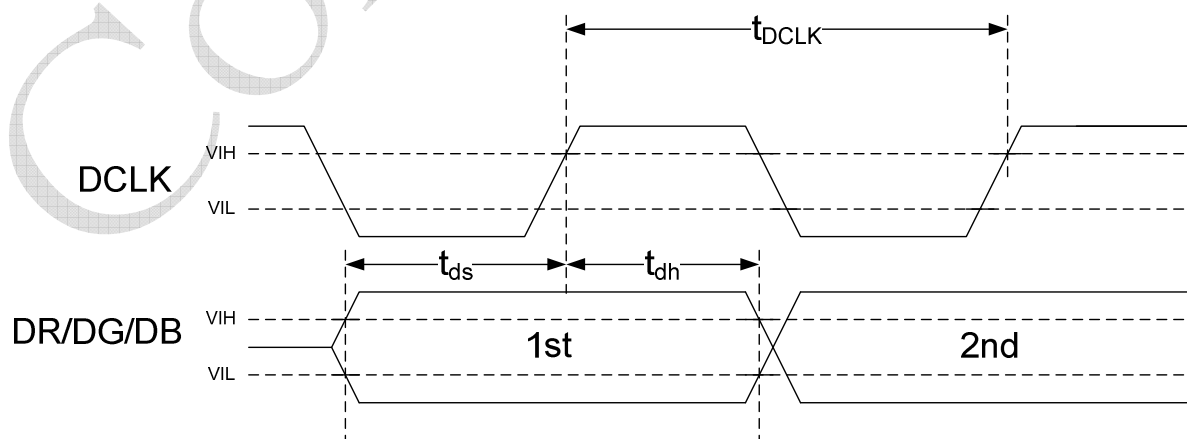
c. Timing Diagram Vertical Timing of Input



Horizontal Timing of Input



Clock and Data Timing of Input



F. Optical specifications (Note 1, 2)

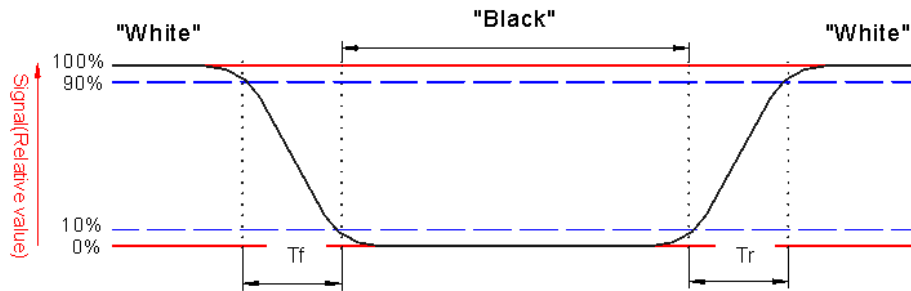
Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response Time Rise Fall	Tr Tf	$\theta = 0^\circ$	- -	20 15	30 25	ms ms	Note 3
Contrast ratio	CR	Perpendicular	800	-	-		Note 4, 5, 6, 7
		$\theta = 40^\circ$ $\phi = 0^\circ / 90^\circ / 180^\circ$ / 270°	100	-	-		
Viewing Angle Top Bottom Left Right		$CR \geq 10$	70 70 70 70	80 80 80 80	- - - -	deg.	Note 7, 8
Brightness	Y_L	$\theta = 0^\circ$	520	700	-	cd/m ²	Note 9
White Chromaticity	X	$\theta = 0^\circ$	0.298	0.328	0.358		Note 8
	Y	$\theta = 0^\circ$	0.298	0.328	0.358		
Red Chromaticity	X	$\theta = 0^\circ$	0.550	0.600	0.650		
	Y	$\theta = 0^\circ$	0.285	0.335	0.385		
Green Chromaticity	X	$\theta = 0^\circ$	0.262	0.312	0.362		
	Y	$\theta = 0^\circ$	0.527	0.577	0.627		
Blue Chromaticity	X	$\theta = 0^\circ$	0.099	0.149	0.199		
	Y	$\theta = 0^\circ$	0.057	0.107	0.157		
NTSC Ratio			-	50	-	%	
Uniformity		-	70	80	-	%	Note 10

Note 1: Measurement should be performed in the dark room, optical ambient temperature $\approx 25^\circ\text{C}$, and backlight current $I_L = 80\text{ mA}$

Note 2: To be measured on the center area of panel with a field angle of 1° by Topcon luminance meter BM-7, after 10 minutes operation.

Note 3: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from “black” to “white” (Ton, Rising time) and from “white” to “black” (Toff, Falling time), respectively.



Note 4. From liquid crystal characteristics, response time will become slower and the color of panel will become darker when ambient temperature is below 25°C.

$$\text{Contrast ratio} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

Note 5. Contrast ratio is calculated with the following formula.

Note 6. White $V_i = V_{i50} \pm 1.5V$

Black $V_i = V_{i50} \pm 2.0V$

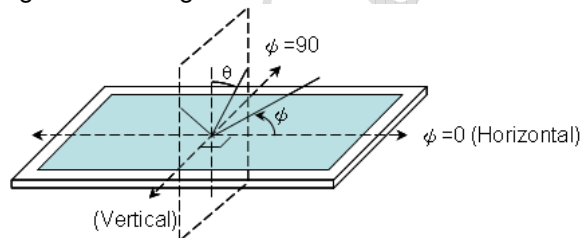
“±” means that the analog input signal swings in phase with COM signal.

“∓” means that the analog input signal swings out of phase with COM signal.

V_{i50} :The analog input voltage when transmission is 50%

The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

Note 7. Definition of viewing angle: refer to figure as below.

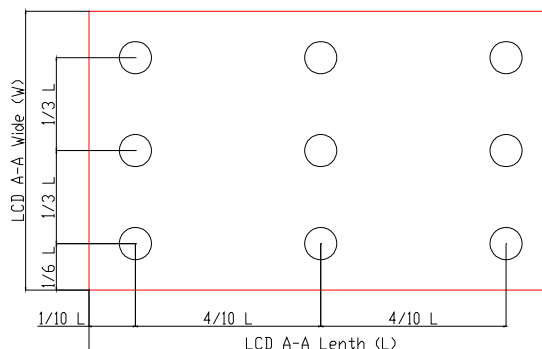


Note 8. The viewing angles are measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Note 9. Brightness is measured at the center of the display.

Note 10. Luminance Uniformity is defined as following within the 9 measurements (L1~L9).

$$\text{Luminance Uniformity(\%)} = \frac{\text{Minimum luminance(brightness)}}{\text{Maximum luminance(brightness)}}$$



G. Reliability Test Items (Note 2,4)

No.	Test items	Conditions		Remark
1	High temperature storage	Ta= 95℃	240Hrs	Note1
2	Low temperature storage	Ta= -40℃	240Hrs	
3	High temperature operation	Ta= 85℃	240Hrs	
4	Low temperature operation	Ta= -30℃	240Hrs	Note1, 3
5	High temperature and high humidity	Ta= 60℃, 90% RH	240Hrs	Operation
6	Heat shock	-30℃~85℃/100 cycles 1Hrs/cycle		Non-operation
7	Electrostatic discharge	HBM :±2000V, R= 1.5KΩ , C=100pF, once for each terminal MM: ±200V,, R= 0Ω , C=200pF, once for each terminal		Non-operation
8	Vibration	Frequency range	8~33.3Hz	JIS D1601,A10 Condition A
		Stoke	1.3mm	
		Sweep	2.9G, 33.3~400Hz	
		Cycle	15min.	
		2 hours for each direction of X, Z 4 hours for Y direction		
9	Mechanical shock	100G, 6ms, ±X,±Y,±Z 3 times for each direction		
10	Vibration (with carton)	Random vibration: 0.015G ² /Hz from 5~200Hz -6dB/Octave from 200~500Hz		IEC 68-34
11	Drop (with carton)	Height: 60cm 1 corner, 3 edges, 6 surfaces		

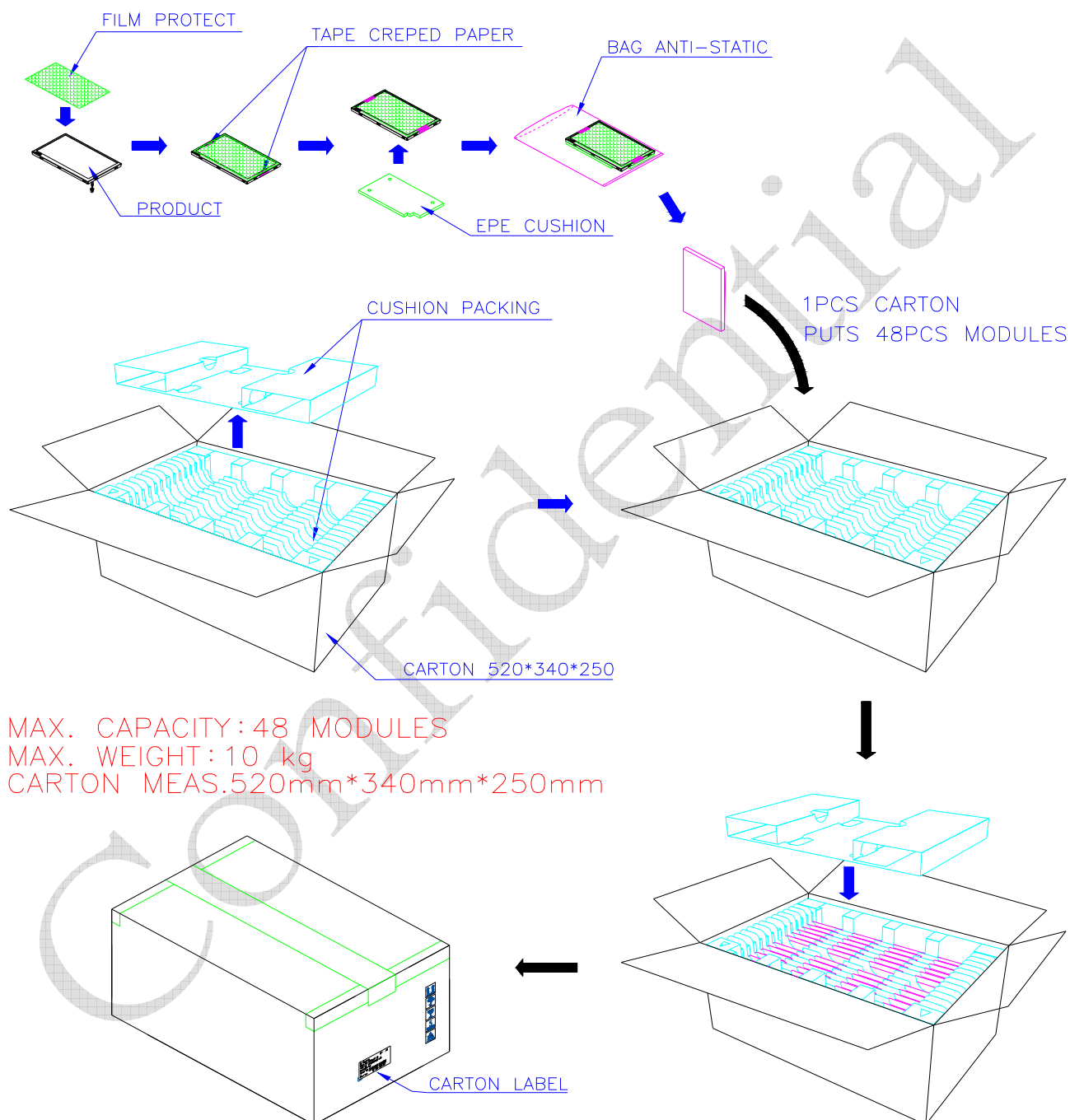
Note 1: Ta: Ambient temperature.

Note 2: In the standard condition, there is not display function NG issue occurred. All the cosmetic specification is judged before the reliability stress.

Note 3: Short time operation between -40℃~-30℃ doesn't provide full performance but a correct image on the LCD. The LCD is guaranteed to suffer no permanent damage.

Note 4: I_L=80mA

H. Packing Form – (Tentative)



I. Label Format



文件編號 Document No. : AVQA-10-051

作者 Author : Lina Rieng

版次 Version : 0

文件中文名稱 Document Chinese Title : C065VW01 模組進料檢驗規範

生效日 Effective Date : 2010/7/13

文件英文名稱 Document English Title : Incoming Inspection Standard for C065VW01 TFT-LCD Modules

Module/Panel Label Information

The module/panel (collectively called as the "Product") will be attached with a label of Shipping Number which represents the identification of the Product at a specific location. Refer to the Product outline drawing for detailed location and size of the label. The label is composed of a 22-digit serial number with the following definition:

ABCDEFGHIJKLMNOPQRSTUY

- For internal system usage and production serial numbers.
- AUO Module or Panel factory code, represents the final production factory to complete the Product
- Product version code, ranging from 0~9 or A~Z (for Version after 9)
- Week Code, the production week when the product is finished at its production process

Example:

501M06ZL06123456781Z05:

Product Manufacturing Week Code: WK50

Product Version: Version 1

Product Manufacturing Factory: L3A (The manufacturing site at Taiwan)

Note:

1. M06: The manufacturing site in Taiwan
2. S16: The manufacturing site in Xiamen

Carton Label Information

The packing carton will be attached with a carton label where packing Q'ty, AUO Model Name, AUO Part Number, Customer Part Number (Optional) and a series of Carton Number in 13 or 14 digits are printed. The Carton Number is appearing in the following format:

ABC-DEFG-HIJK-LMN

- DEFG appear after first "-" represents the packing date of the carton
- Date from 01 to 31
- Month, ranging from 1~9, A~C. A for Oct, B for Nov and C for Dec.
- A.D. year, ranging from 1~9 and 0. The single digit code represents the last number of the year

Refer to the drawing of packing format for the location and size of the carton label.