◆ HYDIS

TITLE : 8inch AFFS+ for automotive

Preliminary Product Specification

Rev. P2

HYDIS TECHNOLOGIES

SPEC. NUMBER	PRODUCT GROUP TFT-LCD PRODUCTS	REV. P2	ISSUE DATE 2010. 10. 27	PAGE 1 OF 28

B2005-C001-B(1/3) | A4(210 X 297)

REVISION HISTORY

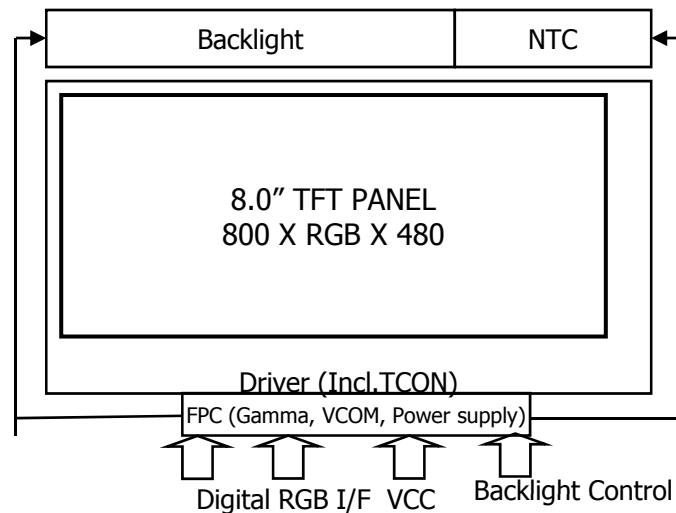| REV.	ECN NO.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0		Initial Release	10.10.12	SW KANG
P1		Modify the information of pin assignment (Page 10. & 28)	10.10.12	SW KANG
P2		Update response time at low temperature (Page 8)	10.10.27	SW KANG

CONTENS

1.0 GENERAL DESCRIPTION

1.1 Introduction

 8.0" AFFS+ TFT-LCD is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as active switching devices. This module has a 8.0 inch diagonally measured active area with WVGA resolutions (800 horizontal by 480 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16,777,216 colors. The TFT-LCD panel used for this module is a low reflection and higher color type.

```
┌──────────────────────────────┬──────────────┐
│         Backlight            │     NTC      │
├──────────────────────────────┴──────────────┤
│  ┌────────────────────────────────────────┐ │
│  │                                        │ │
│  │          8.0" TFT PANEL                │ │
│  │        800 X RGB X 480                 │ │
│  │                                        │ │
│  └────────────────────────────────────────┘ │
│           Driver (Incl.TCON)                 │
│      FPC (Gamma, VCOM, Power supply)         │
└──────────────────────────────────────────────┘
         ⇧       ⇧        ⇧         ⇧
    Digital RGB I/F  VCC    Backlight Control
```

1.2 Features

- AFFS+ Technology
- Digital RGB 24bits Interface
- 6-bit+FRC color depth, Display 16,777,216 colors
- High luminance and contrast ratio, low reflection and wide viewing angle
- Support DE (Data Enable) mode and SYNC mode
- SLG (Single Level Gate) function use
- Rear Mounting Frame
- SMD LED (27EA) Array (Bottom Side/Horizontal Direction)
- Operation Temp. / Storage Temp. (-30℃~85℃ / -40℃~95℃)

1.3 Application

- Automotive display

1.4 General Specifications

PARAMETER	SPECIFICATION	UNIT	REMARK
Active area	174.0(H) X 104.4(V)	mm	
Number of pixels	800(H) × RGB × 480(V)	pixels	
Pixel pitch	0.2175(H) × 0.2175(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	16,777,216	colors	
Display mode	Normally Black		
Dimensional outline	190.0 ±0.3(H) X 120.0 ±0.3(V) X 10.0 ±0.3(D)	mm	Note : 1.
Weight	300 Typ	gram	
Back-light	SMD LED(27 EA) Array		
Color Gamut	58% (typ)	%	
Surface treatment	AG 13% / AG 13%		

Note : 1. At FPCB Side

2.0 ABSOLUTE MAXIMUM RATINGS

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

PARAMETER		SYMBOL	MIN.	MAX.	UNIT	REMARK
Logic Power Supply		V_{DD}	VSS-0.3	4.0	V	Ta = 25 $\pm$2 ℃
Logic Input Voltage		V_{IN}	VSS-0.3	V_{DD}+0.3	V	
Back-light Power Supply Voltage		HV_{DD}	-0.3	40	V	
Back-light LED Current	25℃	I_{LED}	-	70	mA	
	95℃	I_{LED}	-	33	mA	
Back-light LED Reverse Voltage		V_R	-	5	V	
Operating Temperature		T_{OP}	-30	+85	℃	Note 1.
Storage Temperature		T_{SP}	-40	+95	℃	

Note 1. Operating temperature range on panel surface
Note 2. Temperature and relative humidity range are shown in the figure below.
　　　 90% RH Max. (40℃ ≥ Ta)
　　　 Maximum wet - bulb temperature at 39℃ or less. (> 40℃) No condensation.

3.0 ELECTRICAL SPECIFICATIONS

Ta = 25±2℃

PARAMETER		MIN.	TYP.	MAX.	UNIT	REMARK
Logic Power Supply Voltage	V_{DD}	3.0	3.3	3.6	V	Note 1
Logic Power Supply Current	I_{DD}	-	240	-	mA	Note 1
Back-light PWM Frequency	F_{PWM}	100	-	500	Hz	
High Level Input Signal Voltage	V_{IH}	$0.7V_{DD}$	3.3	-	V	
Low Level Input Signal Voltage	V_{IL}	-	0	$0.3V_{DD}$	V	
Back-light LED Voltage / Back-light LED Total Voltage	V_{BL}	-	3.2/ 28.8	3.6/ 32.4	V	
Back-light LED Current / Back-light LED Total Current	I_{LED}	-	40 /120	42/ 126	mA	
Lamp Life		20,000	-	-	hrs	Note 6
Power Consumption	P_D	-	0.8	1.0	W	Note 1
	P_{BL}	-	3.46	4.1	W	Note 4,5
	P_{Total}	-	4.26	5.1	W	Note 1, 4
Power Consumption (EBL)	P_{EBL}	-		-	W	Note 1, 2, 3

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 3.3V at 25℃.
   a) Typ : Window XP pattern
   b) Max : Vertical Sub line pattern
   c) EBL : Mosaic pattern (32 x 32)
2. The power supply voltage and current is measured and specified at the interface connector of LCM including LED Driver.
3. Reference value, which is measured with LED Driver for 12V.
4. Reference value, which is measured without LED Driver.
5. Calculated value for reference ($V_{BL} \times I_{LED} \times$ # of LED Array (27ea)).
6. End of Life shall be determined by the time when any of the following is satisfied under continuous lighting at 25℃ and I_{LED} = 40mA.
   - Intensity drops to 50% of the Initial Value (Luminance Spec.)
   - Based on LED

4.0 OPTICAL SPECIFICATION

The test of Optical specifications shall be measured in a dark room (ambient luminance $\leq$ 1 lux and temperature = 25±2℃) with the equipment of Luminance meter system (Goniometer system and TOPCONE BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. We refer to $\theta_{\emptyset=0}$ (=θ_3) as the 3 o'clock direction (the "right"), $\theta_{\emptyset=90}$ (= θ_{12}) as the 12 o'clock direction ("upward"), $\theta_{\emptyset=180}$ (= θ_9) as the 9 o'clock direction ("left") and $\theta_{\emptyset=270}$ (= θ_6) as the 6 o'clock direction ("bottom"). While scanning θ and/or Ø, the center of the measuring spot on the Display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement... VDD shall be 3.3+/- 0.3V at 25°C. Optimum viewing angle direction is 6 o'clock.

PARAMETER		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
Viewing Angle Range	Horizontal	Θ_3	CR > 10	-	89	90	Deg.	Note 1
		Θ_9		-	89	90	Deg.	
	Vertical	Θ_{12}		-	89	90	Deg.	
		Θ_6		-	89	90	Deg.	
Luminance Contrast ratio		CR	Θ = 0°	700	-	-		Note 2
Luminance of White	Center	Y_w	Θ = 0°	400	-	-	cd/m^2	Note 3
White Luminance Uniformity	9 Points	ΔY9		80	-	-		Note 4
White Chromaticity		x_w	Θ = 0°	0.284	0.314	0.344		Note 5
		y_w		0.286	0.316	0.346		
Reproduction of Color	Red	x_R	Θ = 0°	0.592	0.622	0.652		
		y_R		0.332	0.362	0.392		
	Green	x_G		0.277	0.307	0.337		
		y_G		0.540	0.570	0.600		
	Blue	x_B		0.115	0.145	0.175		
		y_B		0.070	0.100	0.130		
Response Time		$T_r + T_d$	Ta= 25° C Θ = 0°	-	-	30	ms	Note 6
			Ta= -20° C Θ = 0°	-	-	140		
Cross Talk		CT	Θ = 0°	-	-	2.0	%	Note 7

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 and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface . (see FIGURE 1)

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)
Luminance Contrast Ratio (CR) is defined mathematically.

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

3. Luminance of white is defined as a luminance value of a point across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

4. The White luminance uniformity on LCD surface is then expressed. (See FIGURE 2)

$$\text{Uniformity } \Delta Y = \frac{\text{Minimum Luminance of 9 points}}{\text{Maximum Luminance of 9 points}} \quad X \ 100 \ (\%)$$

5. The color chromaticity coordinates specified in Table 4 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.

6. The electro-optical response time measurements shall be made as FIGURE 3 by switching the "data" input signal OFF and ON. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

7. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (YB) of that same area when any adjacent area is driven dark. (See FIGURE 4).

SPEC. NUMBER	SPEC. TITLE 8inch AFFS+ for automotive Preliminary Specification	PAGE 9 OF 28

5.0 INTERFACE CONNECTION.

5.1 Electrical Interface Connection

User side Connector : 9686S-50B-GF(IRISO)
. Refer to appendix.15 (Figure 7.) for PIN Drawing and shift function

PIN NO. ZIF	PIN NO. FPC	SYMBOL	FUNCTION
1	1	B/L_AN	Back Light(ANODE)
2	1	BL_AN	Back Light(ANODE)
3	-	NC	Not connected
4	2	BL_CA_1	Back Light chain 1(cathode)
5	-	NC	Not connected
6	3	BL_CA_2	Back Light chain 2(cathode)
7	-	NC	Not connected
8	4	BL_CA_3	Back Light chain 3(cathode)
9	-	NC	Not connected
10	5	NTC	Thermal sensor of BL
11	6	NTC	Thermal sensor of BL
12	7	VCC	+3.3V Power Supply
13	8	VCC	+3.3V Power Supply
14	9	GROUND	GROUND
15	10	Blue Data Signal 7	Blue Data Signal 7
16	11	Blue Data Signal 6	Blue Data Signal 6
17	12	Blue Data Signal 5	Blue Data Signal 5
18	13	Blue Data Signal 4	Blue Data Signal 4
19	14	Blue Data Signal 3	Blue Data Signal 3
20	15	Blue Data Signal 2	Blue Data Signal 2
21	16	Blue Data Signal 1	Blue Data Signal 1
22	17	Blue Data Signal 0	Blue Data Signal 0
23	18	GROUND	GROUND
24	19	Green Data Signal 7	Green Data Signal 7
25	20	Green Data Signal 6	Green Data Signal 6
26	21	Green Data Signal 5	Green Data Signal 5
27	22	Green Data Signal 4	Green Data Signal 4
28	23	Green Data Signal 3	Green Data Signal 3
29	24	Green Data Signal 2	Green Data Signal 2
30	25	Green Data Signal 1	Green Data Signal 1
31	26	Green Data Signal 0	Green Data Signal 0
32	27	GROUND	GROUND
33	28	Red Data Signal 7	Red Data Signal 7
34	29	Red Data Signal 6	Red Data Signal 6
35	30	Red Data Signal 5	Red Data Signal 5
36	31	Red Data Signal 4	Red Data Signal 4
37	32	Red Data Signal 3	Red Data Signal 3
38	33	Red Data Signal 2	Red Data Signal 2
39	34	Red Data Signal 1	Red Data Signal 1
40	35	Red Data Signal 0	Red Data Signal 0
41	36	GROUND	GROUND
42	37	VSYNC	Vertical Sync
43	38	HSYNC	Horizontal Sync
44	39	ENAB	Data Enable (DE)
45	40	GROUND	GROUND
46	41	CLK	CLOCK
47	42	GROUND	GROUND
48	43	L/R	Shift Direction Control (left/right) ,NOTE 1
49	44	U/D	Shift Direction Control (up/down), NOTE 1
50	45	BITS	Bit Selection (6bit/8bit)

5.2. Data Input Format

(1,1)　　(1,2)　　　　　　　　　　　　　　　　(799,1)　(800,1)

R G B R G B　　　　　　　　R G B R G B

1 Pixel = 3 Dots

R G B

R G B R G B　　　　　　　　R G B R G B

(1,480)　(2,480)　　　　　　　　　　　　(799,480)　(800,480)
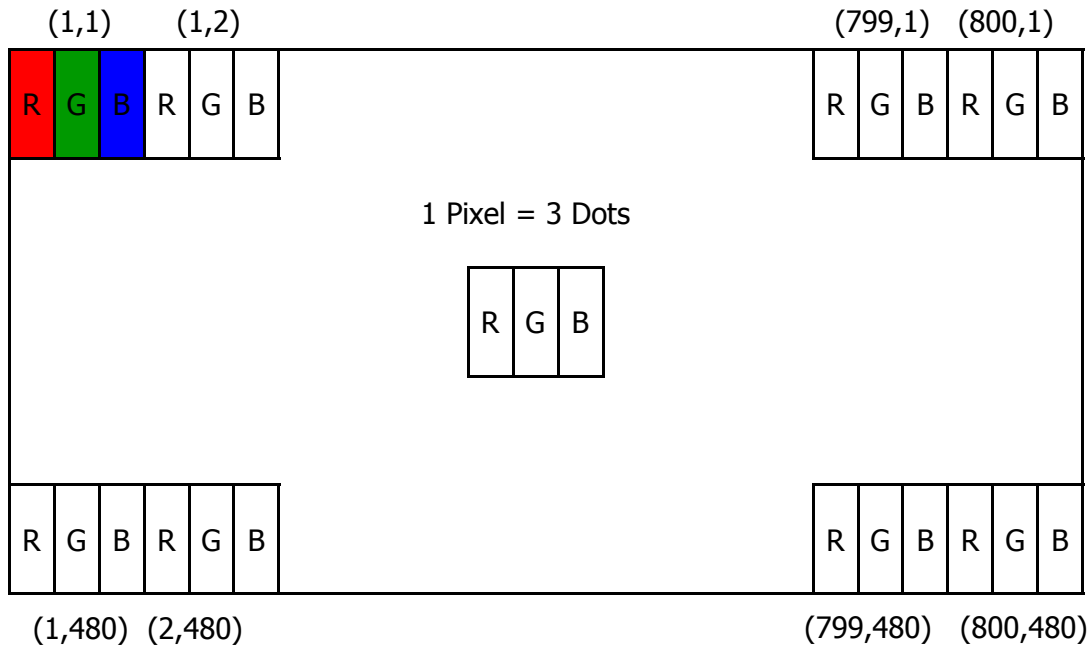
< Display position of input data >

6.0. SIGNAL TIMING SPECIFICATIONS

6.1 TTL Input Timing Specifications

The 8.0″ AFFS+ TFT-LCD is operated by the DE (Data enable) mode or SYNC mode.

| ITEM		SYMBOL	MIN	TYP	MAX	UNIT
Clock Frequency		1/T1	27.0	33.3	35.0	MHz
Clock Pulse Duty		T2	40	50	60	%
Horizontal Sync	Total	T3	870	1056	1088	Clocks
	Active	T4	800	800	800	Clocks
	Pulse Width	T5	-	128	-	Clocks
	Back Porch	T6	-	88	-	Clocks
	Front Porch	T7	-	40	-	Clocks
	Setup Time	T8	8	-	-	ns
	Hold Time	T9	8	-	-	ns
Vertical Sync	Total	T10	486	525	550	Lines
	Active	T11	480	480	480	Lines
	Pulse Width	T12	-	2	-	Lines
	Back Porch	T13	-	33	-	Lines
	Front Porch	T14	-	10	-	Lines
	Setup Time	T15	8	-	-	ns
	Hold Time	T16	8	-	-	ns
Data Setup Time		T17	8	-	-	ns
Data Hold Time		T18	8	-	-	ns
DE Setup Time		T19	8	-	-	ns
DE Hold Time		T20	8	-	-	ns

7.0 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL

7.1 Vertical Input Timing Waveform
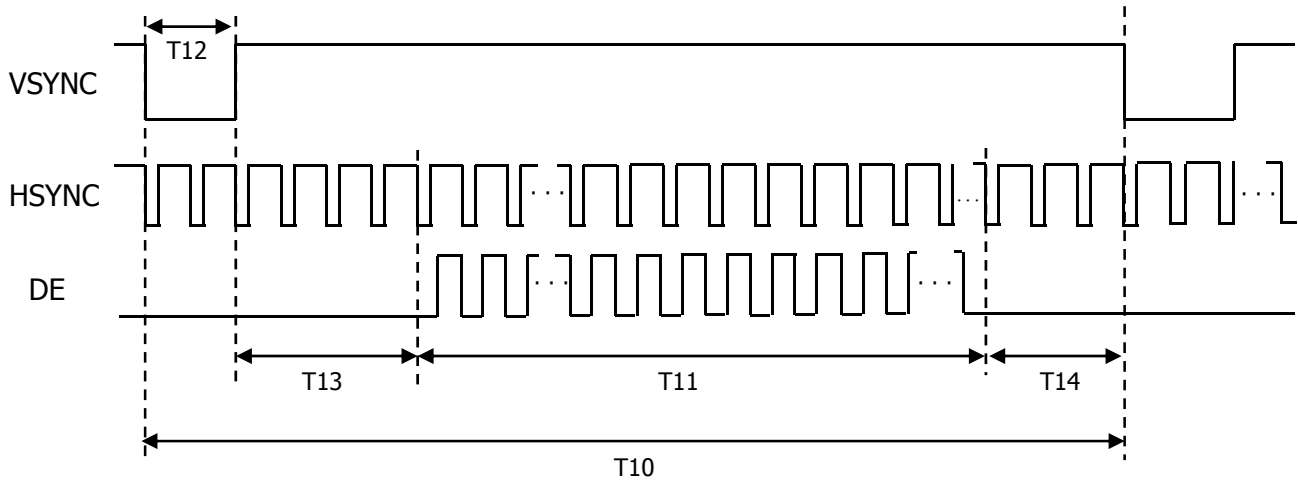
7.2 Horizontal Input Timing Waveform
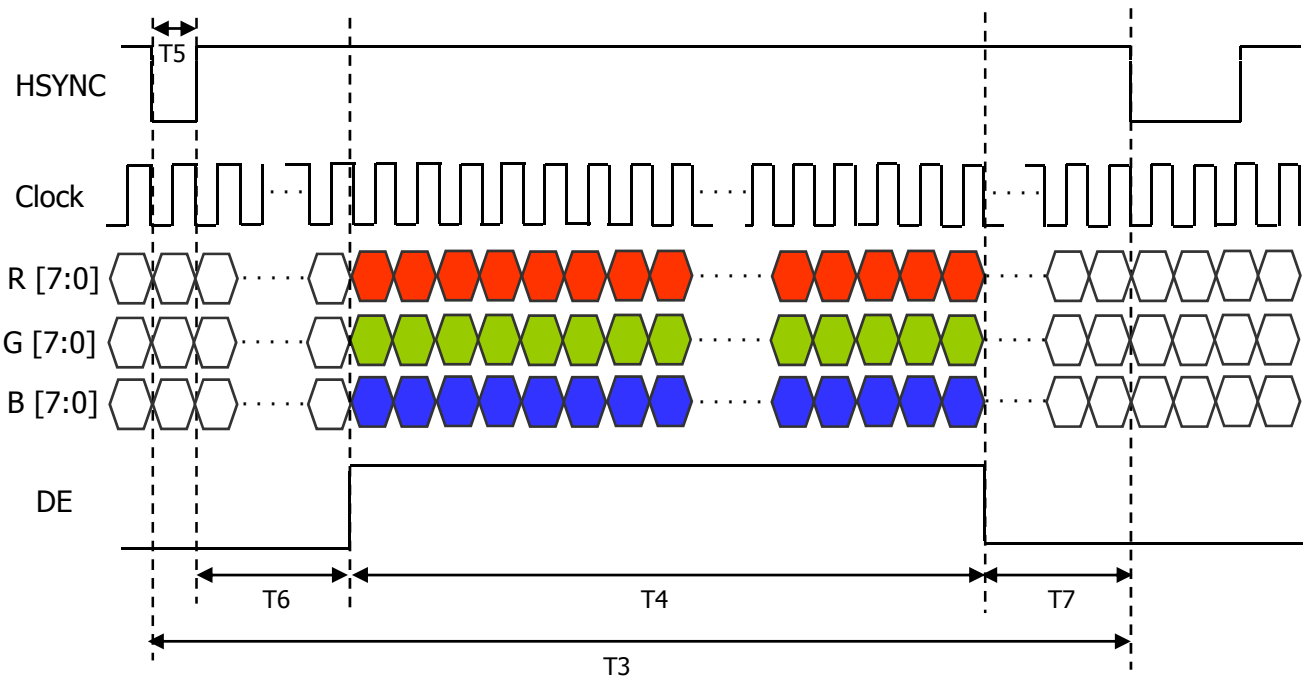
7.3 Clock and Data Input Timing Waveform
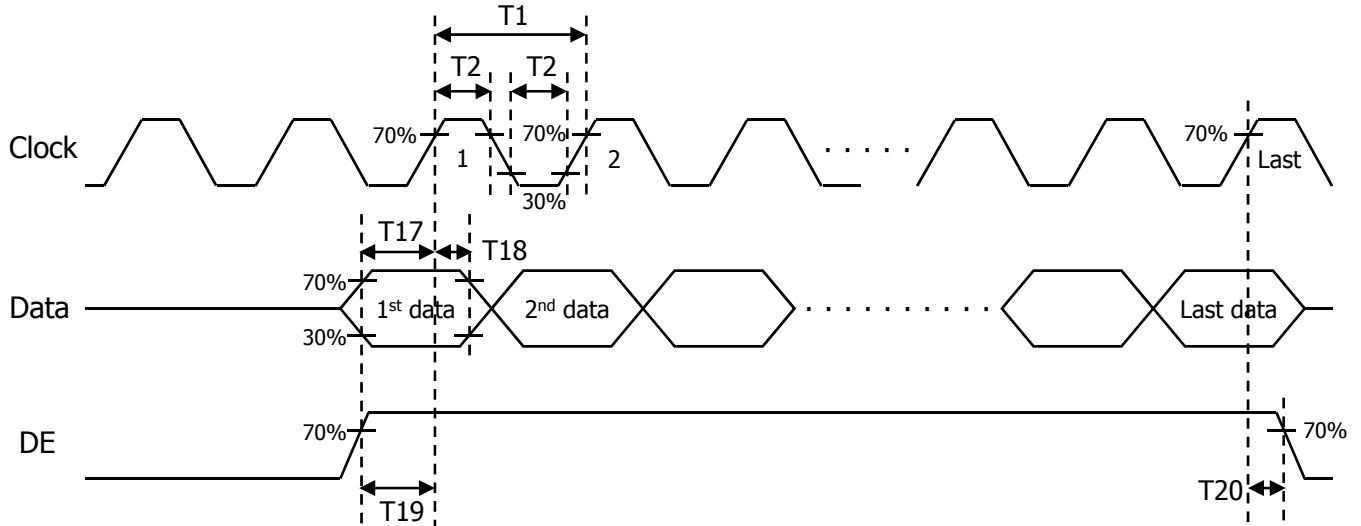
7.4 Clock and SYNC Signal Input Timing Waveform
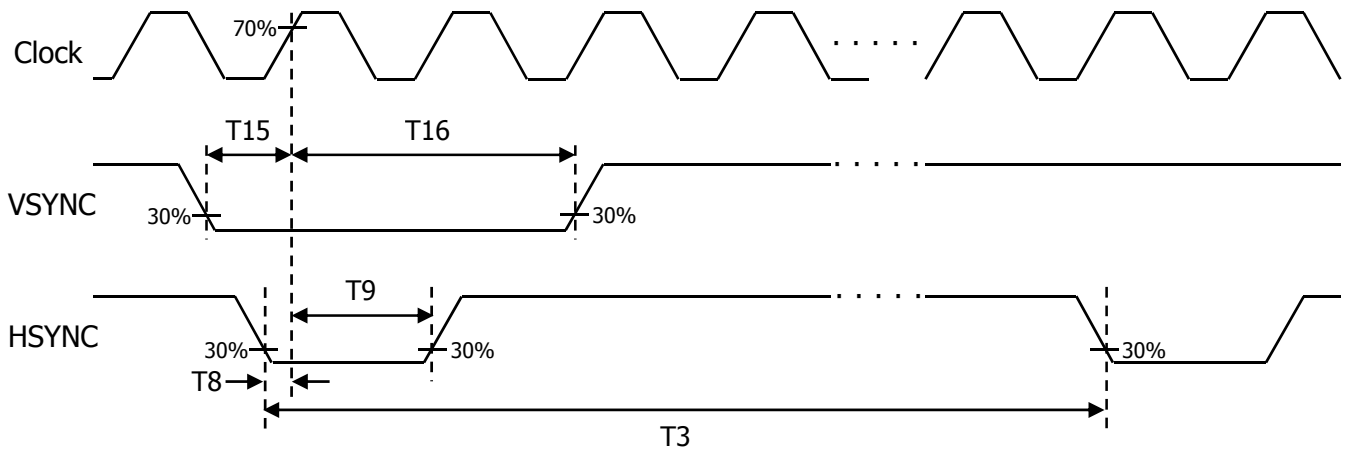
8.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

Each color is displayed in 256 gray scales from a 8 bit data signal input. A total of 16,777,216 colors are derived from the resultant 24 bit data.

Colors & Gray Scale		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
				Red	Data							Green	Data							Blue	Data				
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
	△	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	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△				↓								↓								↓				
	▽				↓								↓								↓				
	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
	▽	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
	△	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
	△				↓								↓								↓				
	▽				↓								↓								↓				
	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
	▽	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
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	△				↓								↓								↓				
	▽				↓								↓								↓				
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	▽	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	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	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
	△				↓								↓								↓				
	▽				↓								↓								↓				
	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
	▽	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

9.0 POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below
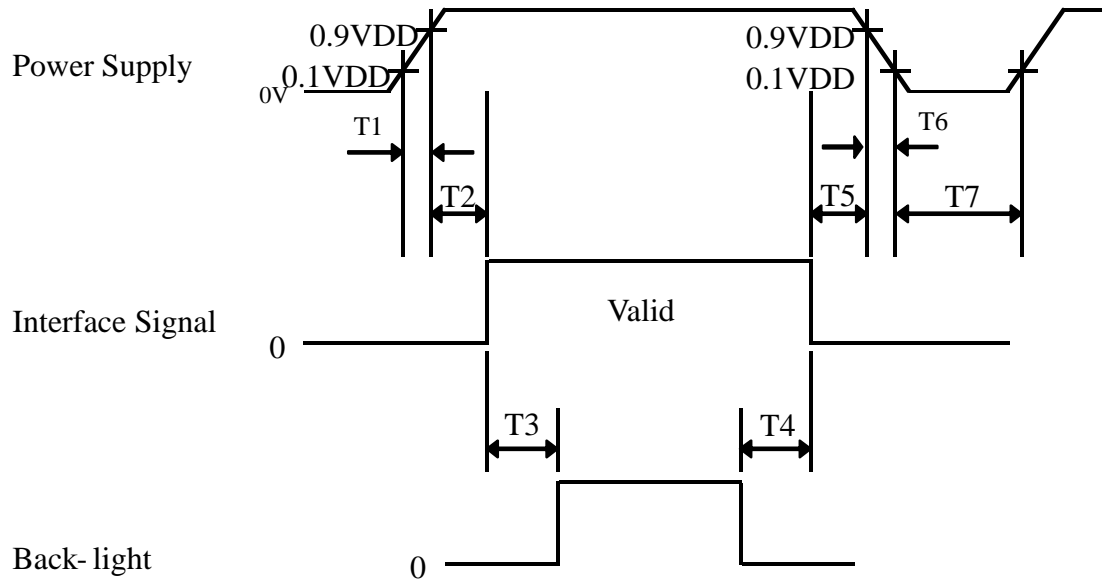
- $0 < $ T1, T6 $\leq$ 10 ms
- $0 < $ T2, T5 $\leq$ 50 ms
- 100 ms $\leq$ T3, T4
- 400 ms < T6

Notes:

1. When the power supply VDD is 0V, Keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on.
3. Back Light must be turn on after power for logic and interface signal are valid.

10.0 MECHANICAL CHARACTERISTICS

10.1 Dimensional Requirements

FIGURE 5, 6 shown in appendix shows mechanical outlines for the model.

PARAMETER	SPECIFICATION	UNIT
Active area	174.0 (H) × 104.4 (V)	mm
Number of pixels	800 (H) × 480 (V) (1 pixel = R + G + B dots)	pixels
Pixel pitch	0.2175 (H) × 0.2175 (V)	mm
Pixel arrangement	RGB Vertical stripe	
Display colors	16,777,216	colors
Display mode	Normally Black	
Dimensional outline	190.0±0.3 (H) X 120.0±0.3 (V) X 10.0 ±0.3(D)	mm
Weight	300 Typ	g
Back-light	SMD LED Array(27EA)	

10.2 Mounting
See FIGURE 5. (shown in Appendix)

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

10.4 Light Leakage
There shall not be visible light from the back-lighting system around the edges of the screen as seen from a distance 50 cm from the screen with an overhead light level of 150lux. The manufacture shall furnish limit samples of the panel showing the light leakage acceptable.

11.0 Reliability Test

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

No	Test Item	Condition	Duration
1	HTO	85℃	750Hrs
2	THO	60℃ 90%	240Hrs
3	LTO	-30℃	240Hrs
4	HTS	90℃	500Hrs
5	LTS	-40℃	500Hrs
6	TST	-30℃↔85℃10cyc,3Hrs	60Hrs
	Damp Heat .	25℃ 90~98% ↔55℃ 90~98% 6cyc	144Hrs
7	Humidity Resistance	65℃93%	500Hrs
8	VIB	3 direction X,Y,Z axes 6 repeats Sweep time 1min Peak acceleration 10G Frequency 10 to 150Hz Peak to peak sine wave	
9	SHK	3 direction X,Y,Z axes 6repeats Peak acceleration 100G Pulse duration 6ms sine wave	
10	ESD	330pF 330Ω Air ±25kV 18point 330pF 330Ω Contact ±8kV 10point	
11	Image sticking	5X5 Checker 1Hr (25℃) Level 2 (Initial), Level 1 (After 3min) @L127	
		5X5 Checker 1Hr (65℃) Level 1 (After 30m) @L127	

11.2 Extent of testing

All qualifications and tests of this automotive products have to be done in accordance with automotive general standard

•Functional Test (2parts)
  - All parameters from component specification
•Dimensional Check (2part)

•Appearance (all parts)
  - visual inspection for characteristics, which may impair the function, durability, installation or reliability.
  - visual inspection for characteristics, which may disturb the appearance of the visible area.
  - visual inspection of the powered unit with light source color of the target application and minimum intensity of the target application.

12.0 HANDLING & CAUTIONS

12.1 Cautions when taking out the module
- Pick the pouch only, when taking out module from a shipping package.

12.2 Cautions for handling the module
- As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- As the LCD panel and backlight element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
- As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
- Do not pull the interface connector in or out while the LCD module is operating.
- Put the module display side down on a flat horizontal plane.
- Handle connectors and cables (FPC) with care.

12.3 Cautions for the operation
- When the module is operating, do not lose MCLK, DE signals. If any one of these signals were lost, the LCD panel would be damaged.
- Obey the supply voltage sequence. If wrong sequence were applied, the module would be damaged.

12.4 Cautions for the atmosphere
- Dewdrop atmosphere should be avoided.
- Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer-packing pouch and under relatively low temperature atmosphere is recommended.

12.5 Cautions for the module characteristics
- Do not apply fixed pattern data signal to the LCD module at product aging.
- Applying fixed pattern for a long time may cause image sticking.
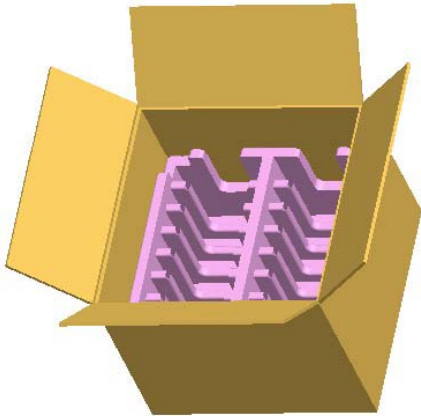
12.6 Other cautions
- Do not disassemble and/or re-assemble LCD module.
- Do not re-adjust variable resistor or switch etc.
- When returning the module for repair or etc, please pack the module not to be broken. We recommend using the original shipping packages.
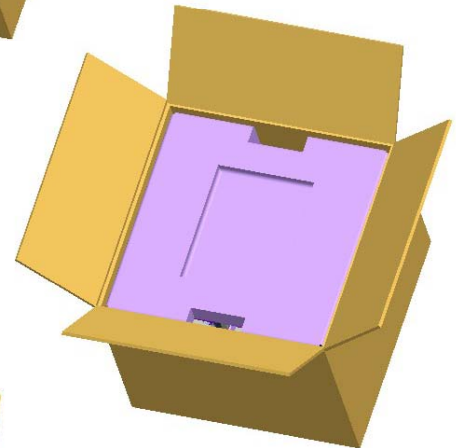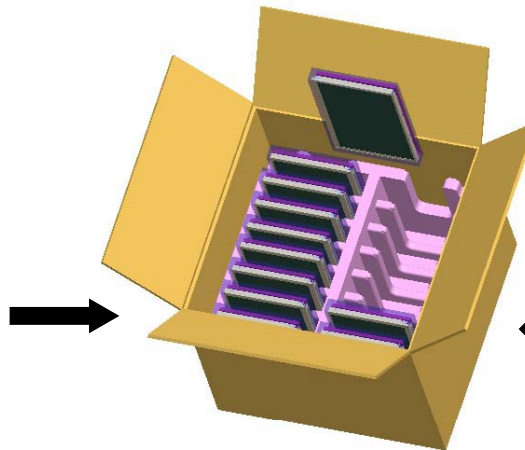
13.0 PACKING

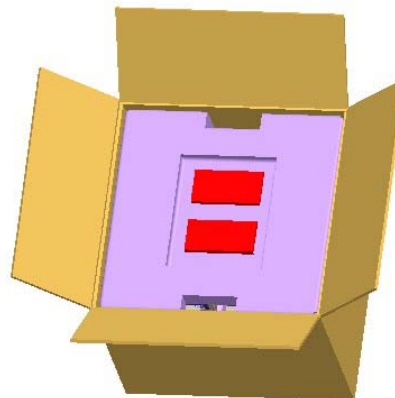### 13.1 Packing Order

Put Pad into the box.

As shown in the figure, put the module bundled by conductive bag in the box.
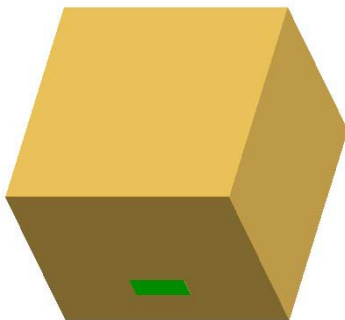
After sealing the box, attach Packing label on the attach position sign area of the box.
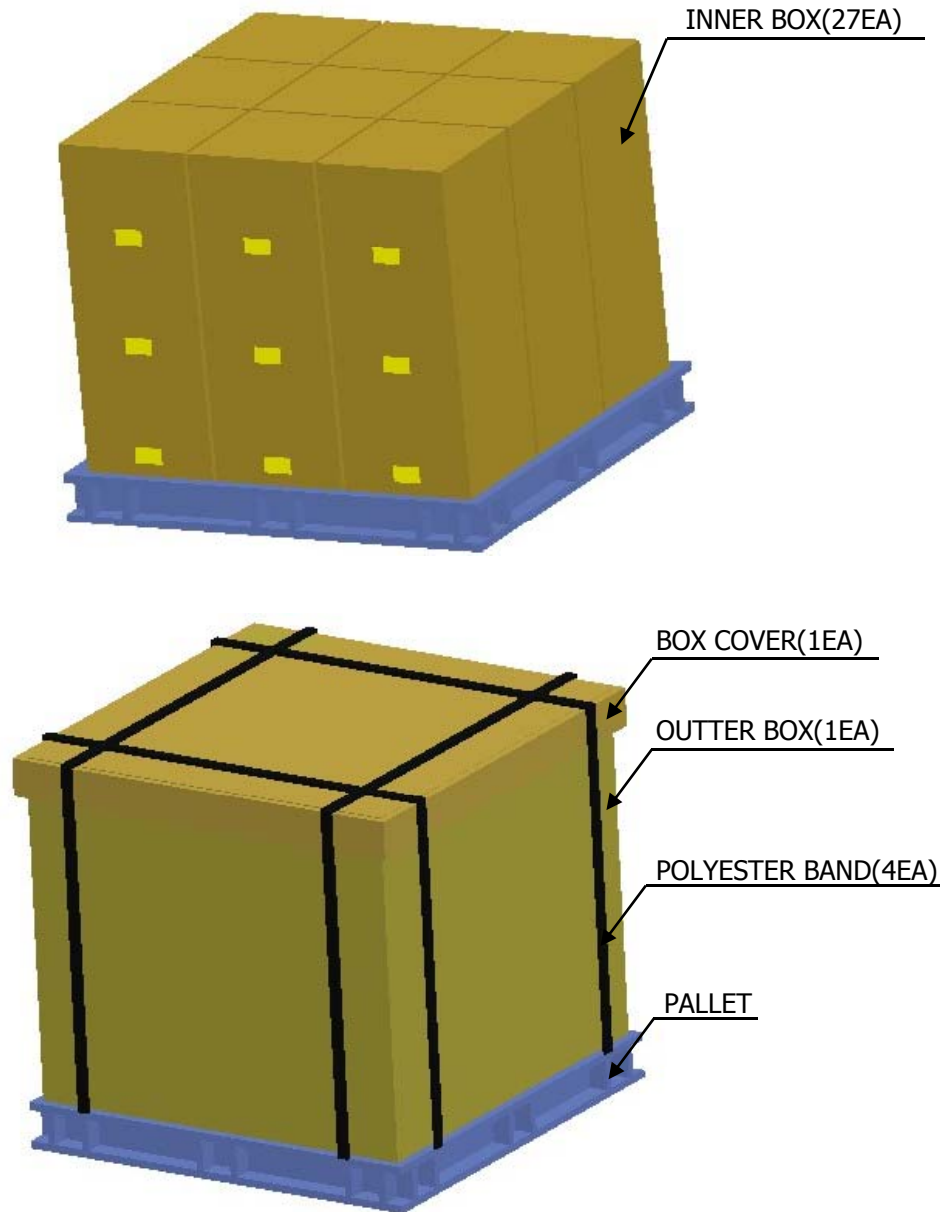
Put silica gels on the Cushion cover.

Put Cushion cover on the box.

Notes

- Box Dimension: 333mm(W) X 333mm(D) X 271mm(H)
- Package Quantity in one Box: 16pcs

SPEC. NUMBER	SPEC. TITLE 8inch AFFS+ for automotive Preliminary Specification	PAGE 21 OF 28
B2005-C001-B(3/3)		A4(210 X 297)

13.2 Pallet Packing

INNER BOX(27EA)

BOX COVER(1EA)

OUTTER BOX(1EA)

POLYESTER BAND(4EA)

PALLET

* Note

- Pallet Dimension : : 1100 mm (L) × 1100 mm (W) × 120 mm (H)
- Package Quantity in one Box : 16pcs
- Box Quantity in one Pallet : 27ea

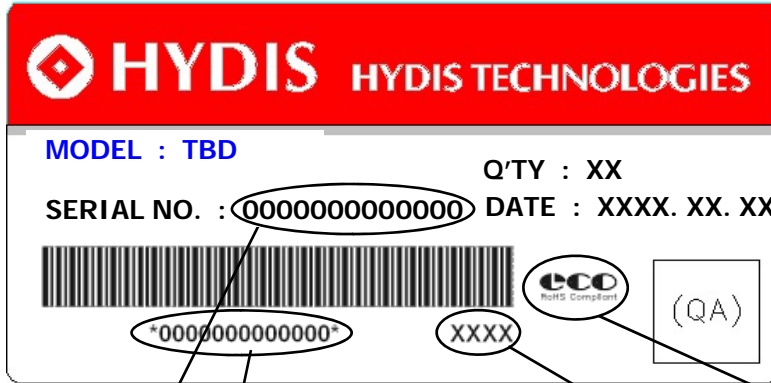| SPEC. NUMBER	SPEC. TITLE 8inch AFFS+ for automotive Preliminary Specification	PAGE 22 OF 28
B2005-C001-B(3/3)		A4(210 X 297)

14.0 Environment & Safety
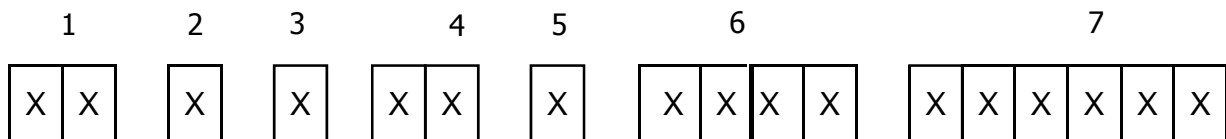
14.1 Packing Label

Size : 108 x 56
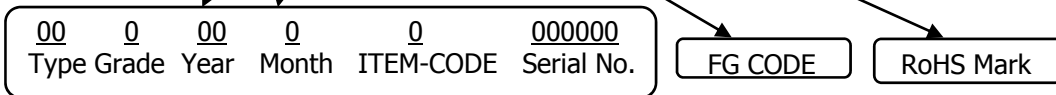
14.2 Product Label

HYDIS Barcode

No 1. Control Number

No 2. Rank / Grade

No 3. Line Classification (HYDIS : H)

No 4. Year (5 : 2005, 6 : 2006, …)

No 5. Month (1, 2, 3,…, 9, X, Y, Z)

No 6. FG Code

No 7. Serial Number
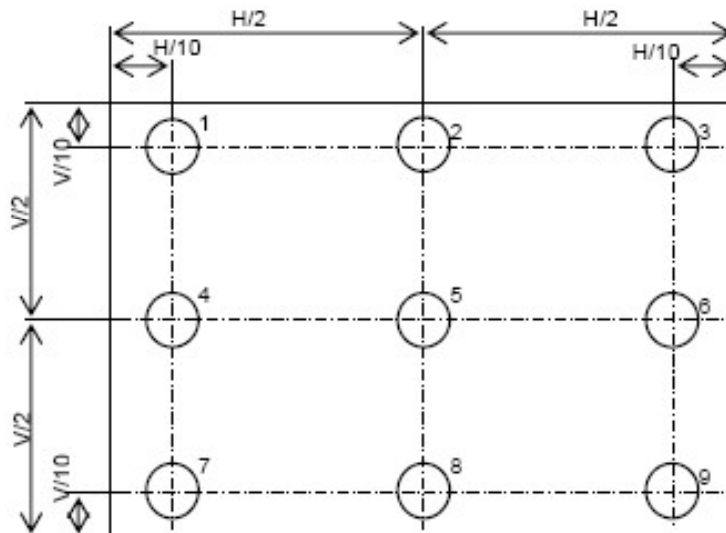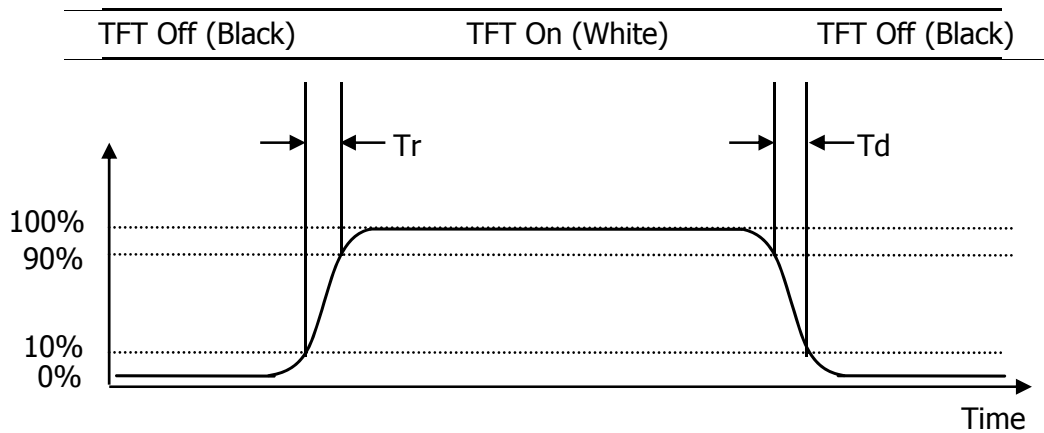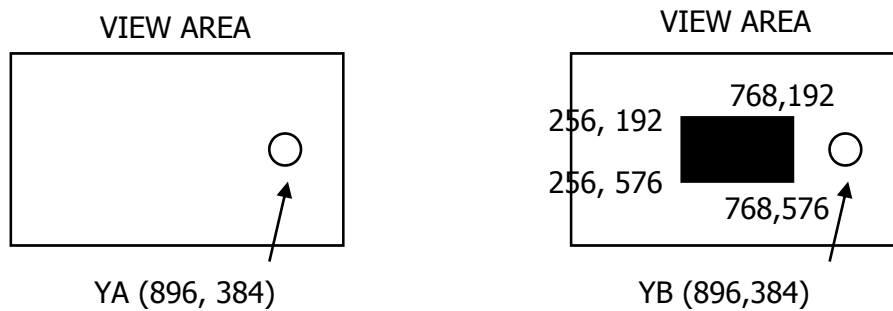
15.0 APPENDIX

Figure 1. Measurement Set Up

<Indoor>

<Outdoor>
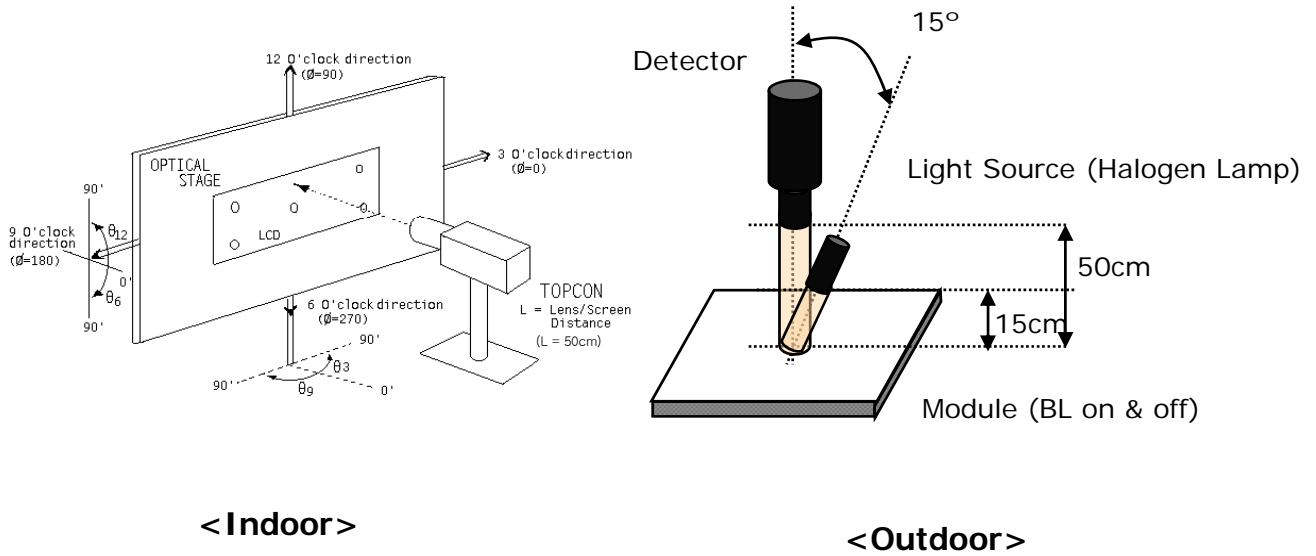
Figure 2. Average Luminance Measurement Locations & Uniformity Measurement Locations

Figure 3. Response Time Testing

TFT Off (Black)	TFT On (White)	TFT Off (Black)

Tr — Td

100%
90%

10%
0%

Time

Figure 4. Cross Modulation Test Description

VIEW AREA

VIEW AREA

256, 192   768,192

256, 576   768,576

YA (896, 384)

YB (896,384)

$$\text{Cross-Talk} = \left| \frac{YB - YA}{YA} \right| \times 100$$

Where:
Y_A = Initial luminance of measured area (cd/m^2)
Y_B = Subsequent luminance of measured area (cd/m^2)
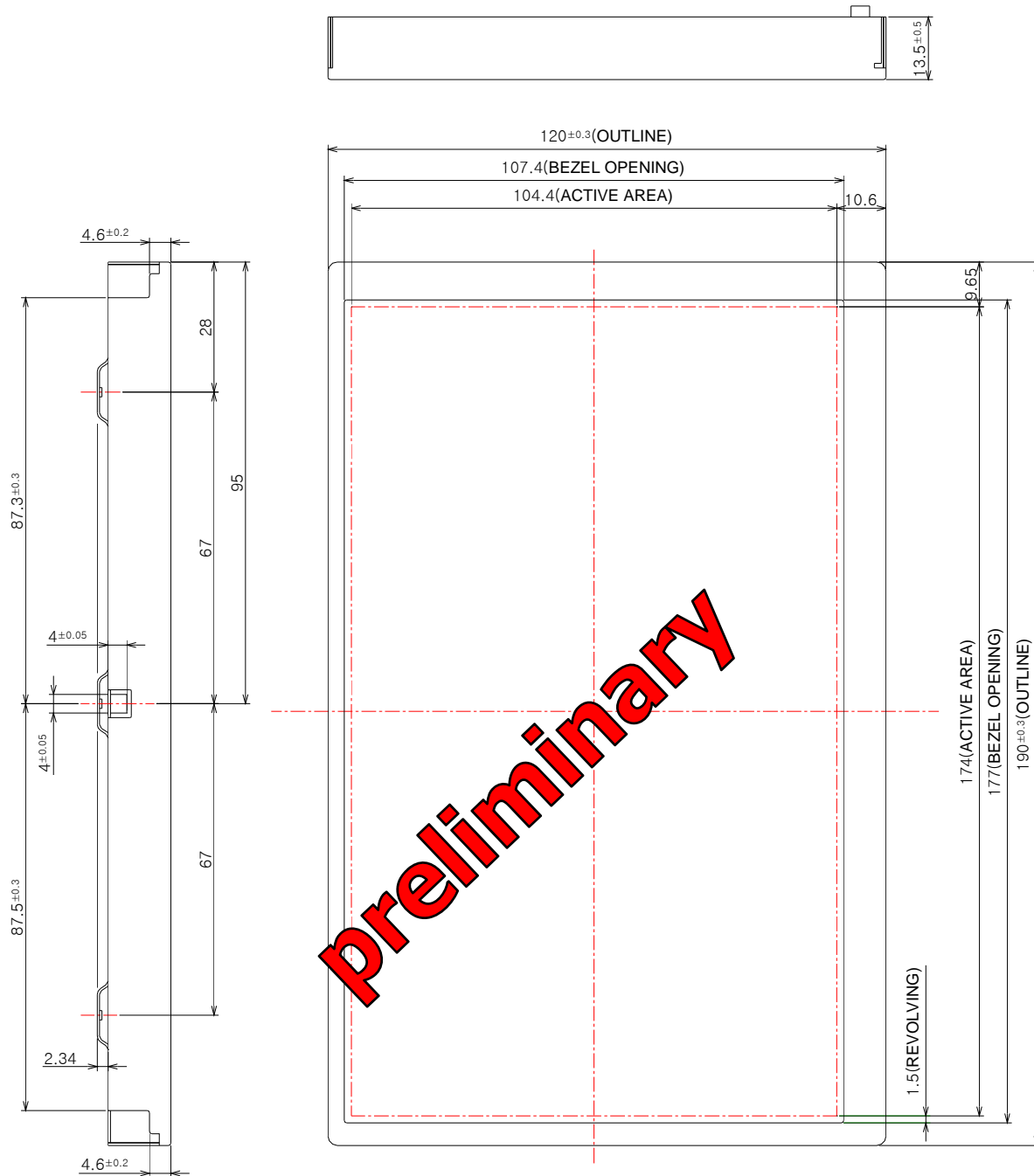The location measured will be exactly the same in both patterns.

Figure 5. TFT-LCD Module Outline Dimensions (Front View)

Figure 6. TFT-LCD Module Outline Dimensions (Rear View)

Figure 7. TFT-LCD Module Section for FPC

DETAIL "C" (S: 2/1)

Contact side

0.3 ± 0.05

9.5 ± 1.5 (STIFFENER) BLACK color

FPC-Contacts Au-plated 0.06~0.1um thick:
below Au-Layer:Ni-plated 3~7um thick

Connector : IRISO IMSA-9686S-50B-GF (50pin:pitch 0.5)

SECTION C-C (S: 2/1)

26.5 ± 0.05
1 ± 0.1
24.175 ± 0.05
Pitch 0.5x(41-1)=20 ± 0.05
5.5 ± 0.1
Pitch1 x3 =3 ± 0.05(3x)
0.65 ± 0.05
Pitch1.175 ± 0.1(1x)
Pitch0.5 ± 0.05(40x)
1 ± 0.05
3MIN.
1.5 ± 0.05
1 ± 0.05
0.35 ± 0.03
$R0.2\pm0.05$(2x)
7 ± 0.1
$R0.2\pm0.05$(2x)
No.45
5
0.5 ± 0.1
22 ± 0.05(2x)
1 2 3 4
0.6 ± 0.05
0.6 ± 0.05
17.75 ± 0.1
4.25 ± 0.1

*1) L/R(PIN 36) & U/D(PIN 37) Direction setting

*2) BITS(PIN 38)
H : 6Bit In/Output (262K colors)
L : 8Bit In/Output (16.7M colors)