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Thin-Film-Transistor LCD Module  
Model: GVNS80SNAG3ED


Acceptance

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### Revise Records

Rev.	Date	Contents	Written	Approved
A	2013/03/26	First Specification	Alex	Roger

### Special Notes


Note1.	
Note2.	
Note3.	
Note4.	
Note5.	

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### 1. General Description and Features

GVNS80SNAG3ED is a transmissive type color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD module, a power circuit and a back-light driver unit. Graphics and texts can be displayed on a SVGA 800 (W) x RGB x 600 (H) dots (4:3 aspect ratio) with 262,144 colors. The following table described the features of GVNS80SNAG3ED.

#### 1.1 Features

- Transmissive and back-light with 27 LEDs are available.
- TN (Twisted Nematic) mode.
- Digital RGB 18 bit Interface.
- ROHS Compliance

#### 1.2 LCD Module


Item	Specification	Unit
Screen Size	8.0 inches	Diagonal
Display Resolution	800 (H) x 600 (V)	Pixel
Active Area	162 (H) x 121.5 (V)	mm
Outline Dimension	183 (H) x 141 (V) x 5.8 (T)	mm
Display Mode	Normally white mode/ Transmissive	--
Pixel Arrangement	R,G,B Vertical Stripe	--
Pixel Size	0.2025 x 0.2025	mm
Surface Treatment	Anti-Glare and Hard Coating(3H)	
Display Color	262K	--
Viewing Direction	6 o'clock	--
Input Interface	Digital RGB 18bit (6bits/each color) Data Transfer	--

### 2. Mechanical Information

Item	Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	--	183	--	mm
	Vertical (V)	--	141	--	mm
	Thickness (T)	--	5.8	--	mm (1)
Weight	--	(250)	--	g	--

Note (1) Not Include Component. Refer to the Outline Dimension Drawing as attached.

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### 3. Electrical Specifications

#### 3.1 Absolute Max. Ratings

##### 3.1.1 Absolute Ratings of Environment

If the operating condition exceeds the following absolute maximum ratings, the TFT LCD module may be damaged permanently.

(Ta=25±2°C, V<sub>SS</sub>=GND=0)

Item	Symbol	Min.	Max.	Unit	Note
Storage temperature	T <sub>STG</sub>	-30	80	°C	(1)
Operating temperature	T <sub>OPR</sub>	-20	70	°C	(1,2,3)

Note (1) 95 % RH Max. ( 40 °C ≥ Ta ). Maximum wet-bulb temperature at 39 °C or less. (Ta > 40 °C) No condensation.

Note (2) In case of below 0°, the response time of liquid crystal (LC) becomes slower and the color of panel becomes darker than normal one. Level of retardation depends on temperature, because of LC's character

Note (3) Only operation is guaranteed at operating temperature. Contrast, response time, another display quality are evaluated at +25°C.


#### 3.1.2 Electrical Absolute Maximum Ratings

##### 3.1.2.1 TFT-LCD Module

(V<sub>SS</sub>=GND=0)

Parameter	Symbol	Min.	Max.	Unit	Remark
Power supply Logic voltage	V <sub>CC</sub>	-0.3	4.0	V	
Power supply LED voltage	V <sub>LED</sub>	-0.3	6.0	V	
input voltage	V <sub>I</sub>	-0.3	V <sub>CC</sub> +0.3	V	--

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### 3.1.3 DC Electrical Characteristics of the TFT LCD

(Ta=25±2°C, V<sub>SS</sub>=GND=0)

Item	Symbol	Min.	Typ.	Max.	Unit	Remark	
Power supply Logic Voltage	VCC	3.0	3.3	3.6	V		
Power supply LED Voltage	VLED	4.5	5.0	5.5	V		
Input Voltage for logic	H Level	V <sub>IH</sub>	0.7xVCC	-	VCC	V	
	L Level	V <sub>IL</sub>	0	-	0.3xVCC	V	
Power Supply Logic current	ICC	-	(120)	(150)	mA	Note 1	
Power supply LED current	I <sub>LED</sub>		(450)	(550)	mA		

Note1: f<sub>v</sub> =60Hz , Ta=25°C , Display pattern : Black pattern



### 3.2 AC Timing Characteristic of The LCD

#### 3.2.1 Timing Condition

Signal	Parameter	Symbol	Min.	Typ.	Max.	Unit.	Remark
DCLK	CLK frequency	F <sub>clk</sub>	-	40	50	MHz	
	CLK period	T <sub>cph</sub>	20	-	-	ns	
	CLK pulse duty	T <sub>cwh</sub>	40	50	60	%	
HSYNC	Horizontal Line	T <sub>h</sub>	862	1056	1200	CLK	
	HS Display Area	T <sub>hd</sub>	-	800	-	CLK	
	HS Pulse Width	T <sub>hpw</sub>	1	-	40	CLK	
	HS Back Porch	T <sub>hb</sub>	-	46	-	CLK	
	HS Front Porch	T <sub>hfp</sub>	16	210	354	CLK	
VSYNC	VS Display Area	T <sub>vd</sub>	-	600	-	th	
	VS Period Time	T <sub>v</sub>	624	635	700	th	
	VS Pulse Width	T <sub>vpw</sub>	1	-	20	th	
	VS Back Porch	T <sub>vb</sub>	-	23	-	th	
	VS Front Porch	T <sub>vfp</sub>	1	12	77	th	

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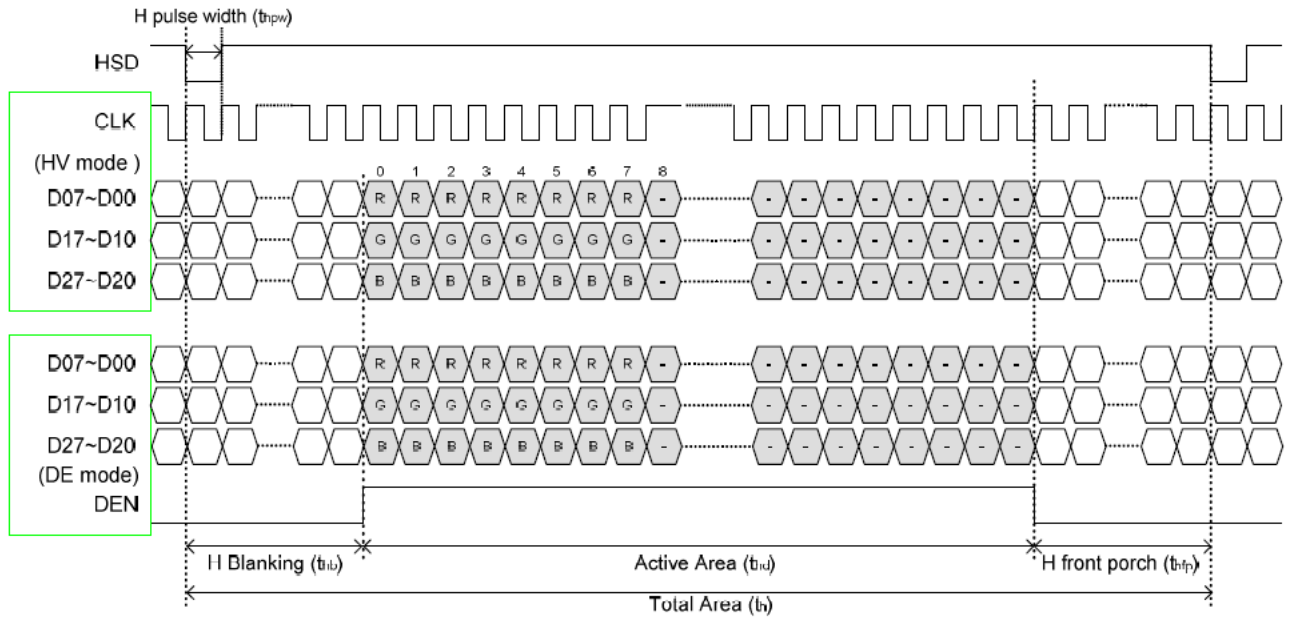
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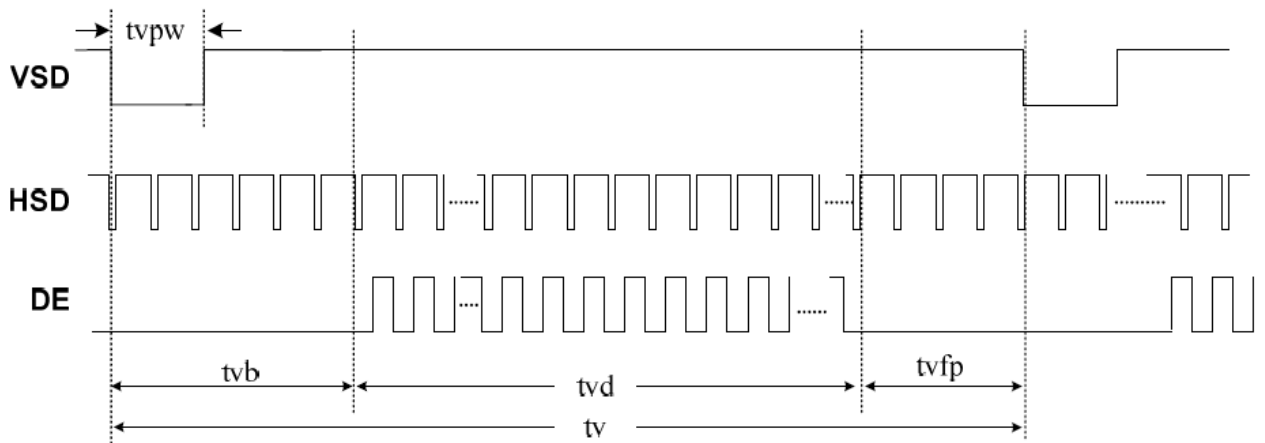
## 3.2.2 Timing Characteristic

### 3.2.2.1 Horizontal and Vertical input Timing


#### Horizontal input timing



#### Vertical input timing

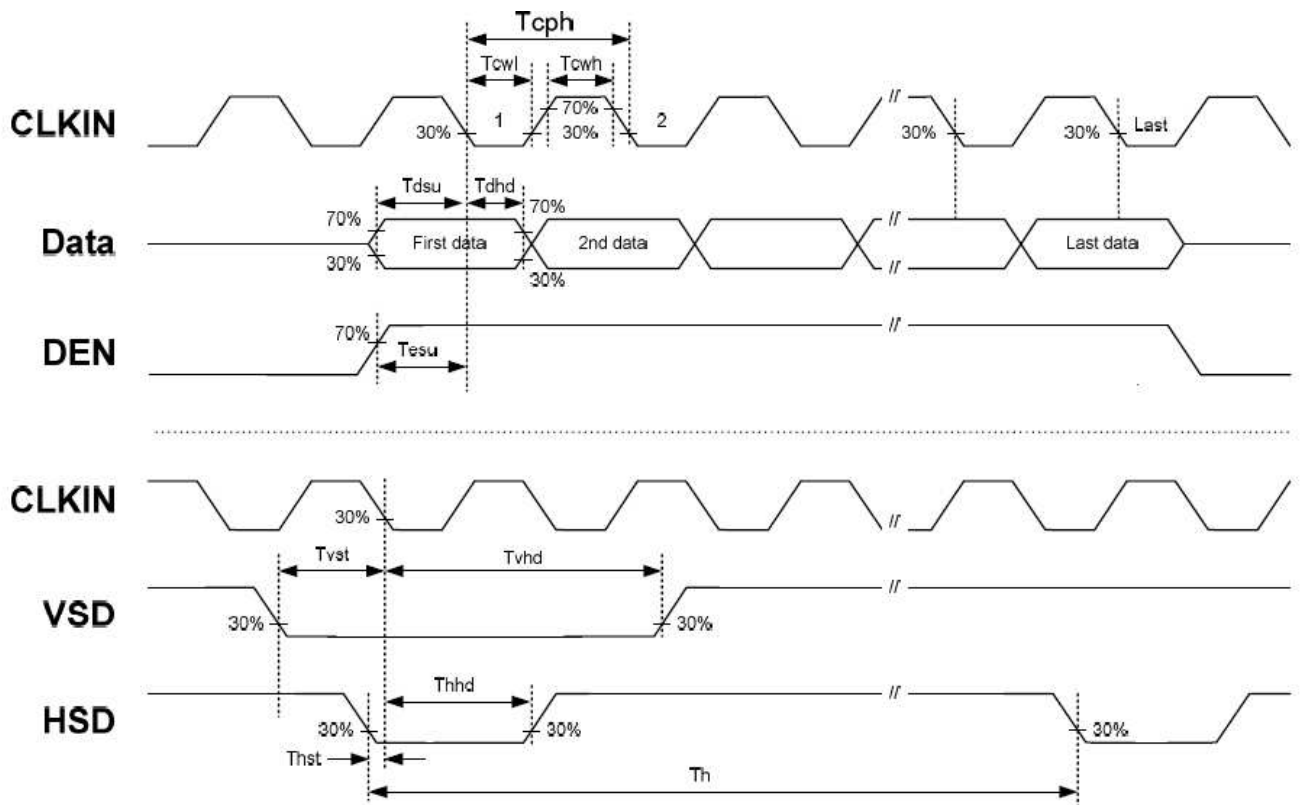


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### 3.2.2.2 Clock and Data input waveforms

Signal	Parameter	Symbol	Min.	Typ.	Max.	Unit.	Remark
HSYNC	HS setup time	$T_{hst}$	8	-	-	ns	
	HS hold time	$T_{hhd}$	8	-	-	ns	
VSYNC	VS setup time	$T_{vst}$	8	-	-	ns	
	VS hold time	$T_{vhhd}$	8	-	-	ns	
Data	Data setup time	$T_{dsu}$	8	-	-	ns	
	Data hold time	$T_{dhhd}$	8	-	-	ns	
DE	DEN setup time	$T_{vpw}$	8	-	-	ns	
	DEN hold time	$T_{vb}$	8	-	-	ns	





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### 4. Optical Characteristics


#### 4.1 Optical characteristic of the LCD

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods.

Measuring equipment: BM-7A

Item	Symbol	Condition	Min	Type	Max	Unit	Note
Brightness	B		(320)	(400)	--	cd/m <sup>2</sup>	
Response time	T <sub>r</sub>	θ=0°	--	10	--	ms	.
	T <sub>f</sub>		--	15	--	ms	
Contrast ratio	CR	At optimized viewing angle	(400)	(500)	--	--	
Color Gamut	NTSC %	--	--	(50)	--	%	
Luminance Uniformity	ΔL		70	75		%	
Color Chromaticity (CIE 1931)	White	W <sub>x</sub>	(0.260)	(0.310)	(0.360)	--	BM-7A
		W <sub>y</sub>	(0.280)	(0.330)	(0.380)		
Viewing Angle (6H)	Hor.	θ <sub>R</sub>	60	70	--	Degree	
		θ <sub>L</sub>	60	70	--		
	Ver.	θ <sub>U</sub>	40	50	--		
		θ <sub>D</sub>	60	75	--		

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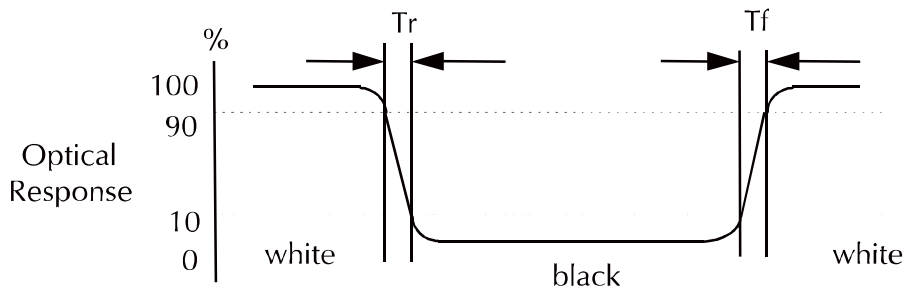
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a. Test equipment setup

After stabilizing and leaving the panel alone shall be warmed up for the stable operation of LCM, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7(fast) with a viewing angle of 2° at a distance of 50cm and normal direction.

b. Definition of response time: Tr and Tf

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".



c. Definition of contrast ratio:

$$\text{Contrast Ratio (CR)} = \frac{\text{Brightness measured when LCD is at "white state"}}{\text{Brightness measured when LCD is at "black state"}}$$

d. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

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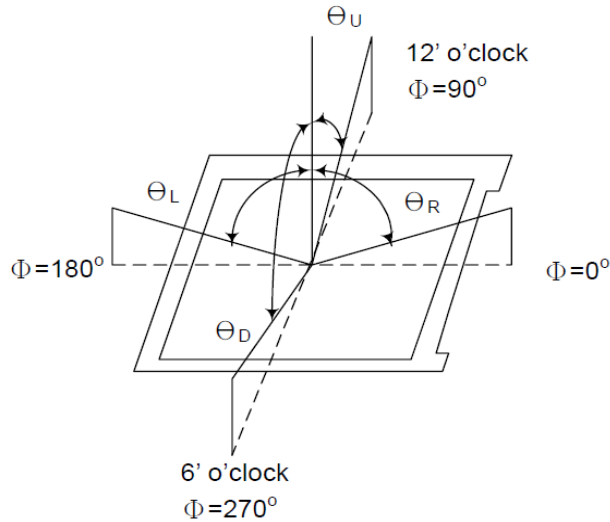
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e. View Angle



f. Definition of Luminance of White: Luminance of white at the center points

Light Source of Back-Light Unit	LED Type
---------------------------------	----------

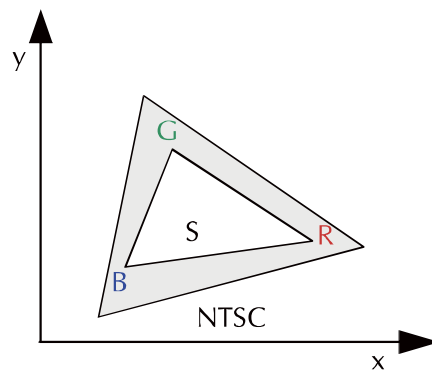
g. Definition of White Uniformity

$$\text{White Uniformity} = \frac{\text{Min. luminance of white among 9-points}}{\text{Max. luminance of white among 9-points}} \times 100\%$$


h. The definition of Color Gamut -Color Chromaticity CIE 1931

Color coordinate of white & red, green, blue at center point.

Color Gamut : NTSC(%) = ( RGB Triangle Area / NTSC Triangle Area ) x 100



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### 5. I/O Terminal

#### 5.1 Pin Assignment (connector part No: 5F2.2535E-A3821.140 or equivalent.)

Pin No.	Symbol	I/O	Function	Remark
1	GND	P	Ground	
2	GND	P	Ground	
3	ADJ	I	Back-light Dimming control	
4	VLED	P	Power Supply LED DRIVER voltage	
5	VLED	P	Power Supply LED DRIVER voltage	
6	VLED	P	Power Supply LED DRIVER voltage	
7	VCC	P	Power Supply Logic voltage	
8	VCC	P	Power Supply Logic voltage	
9	DE	I	Data Enable Timing Signal	
10	GND	P	Ground	
11	GND	P	Ground	
12	GND	P	Ground	
13	B5	I	Blue data signal (MSB)	
14	B4	I	Blue data signal	
15	B3	I	Blue data signal	
16	GND	P	Ground	
17	B2	I	Blue data signal	
18	B1	I	Blue data signal	
19	B0	I	Blue data signal (LSB)	
20	GND	P	Ground	
21	G5	I	Green data signal (MSB)	
22	G4	I	Green data signal	
23	G3	I	Green data signal	
24	GND	P	Ground	
25	G2	I	Green data signal	
26	G1	I	Green data signal	
27	G0	I	Green data signal (LSB)	
28	GND	P	Ground	
29	R5	I	Red data signal (MSB)	
30	R4	I	Red data signal	
31	R3	I	Red data signal	
32	GND	P	Ground	
33	R2	I	Red data signal	
34	R1	I	Red data signal	

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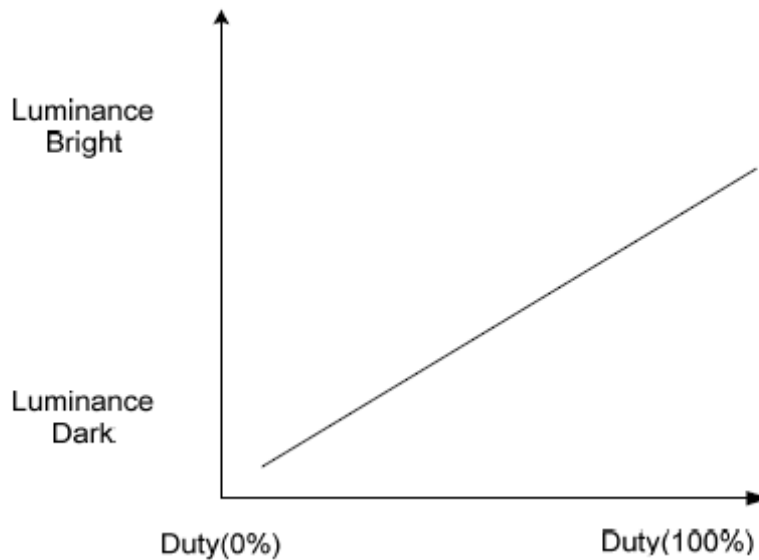
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35	R0	I	Red data signal (LSB)	
36	GND	P	Ground	
37	GND	P	Ground	
38	DCLK	I	Data Clock	
39	GND	P	Ground	
40	GND	P	Ground	

I: Input, P: Power

Notes:

- 1) GND Pin must ground contact, can't be floating.
- 2) ADJ signal=0~3.3V, Operating frequency:20KHz



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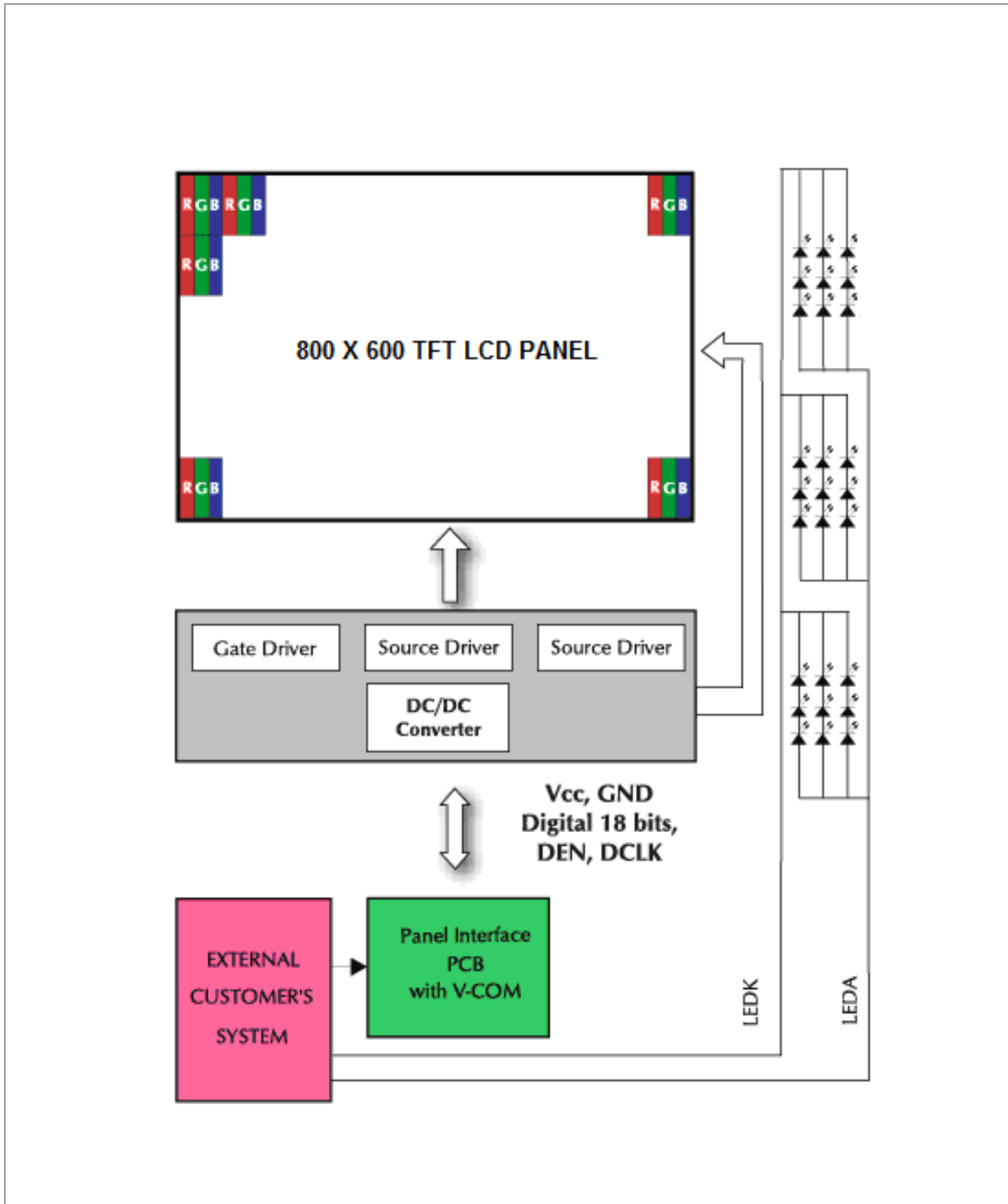
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## 5.2 Block Diagram



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### 6. Displayed Color and Input Data

	Color & Gray Scale	Data Signal																	
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	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
Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(31)	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(31)	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(31)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

0 : Low level voltage, 1 :High level voltage

Each basic color can be displayed in 64 gray scales from 6 bit data signals. With the combination of total 18 bit data signals, the 262,144-color display can be achieved on the screen.

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### 7. Reliability Condition

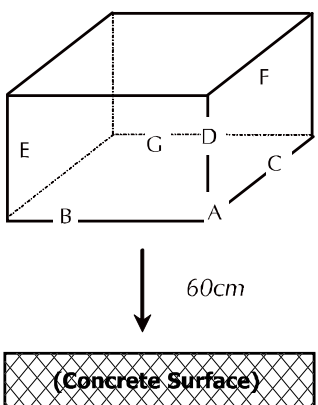
No change on display and in operation under the following test condition.

Condition: Unless otherwise specified, tests will be conducted under the following condition.

Temperature:  $20 \pm 5^\circ\text{C}$ .

Humidity:  $65 \pm 5\% \text{RH}$ .

Tests will be not conducted under functioning state.

No.	Parameter	Condition	Notes
1	High Temperature Operating	$70^\circ\text{C} \pm 2^\circ\text{C}$ , 240hrs (Operation state).	
2	Low Temperature Operating	$-20^\circ\text{C} \pm 2^\circ\text{C}$ , 240hrs (Operation state).	1
3	High Temperature Storage	$80^\circ\text{C} \pm 2^\circ\text{C}$ , 240hrs.	2
4	Low Temperature Storage	$-30^\circ\text{C} \pm 2^\circ\text{C}$ , 240hrs.	1,2
5	High Temperature and High Humidity Operation Test	$60^\circ\text{C} \pm 2^\circ\text{C}$ , 90%, 240hrs.	1,2
6	Electro Static Discharge (non-operating)	Panel Surface/Top Case: 150pF, 330 $\Omega$ Air: $\pm 15\text{kV}$ , Contact: $\pm 8\text{kV}$	
7	Vibration Test	Total fixed amplitude: 1.5mm. Vibration Frequency: 10~55Hz. One cycle 60 seconds to 3 direction of X, Y, Z each 15 minutes.	3
8	Drop Test	To be measured after dropping from 60cm high on the concrete surface in packing state.   <p style="margin-left: 20px;"><i>Dropping method corner dropping:</i></p> <p style="margin-left: 20px;"><i>A corner: Once edge dropping.</i></p> <p style="margin-left: 20px;"><i>B, C, D edge: Once face dropping.</i></p> <p style="margin-left: 20px;"><i>E, F, G face: Once.</i></p>	

- Notes:
1. No dew condensation to be observed.
  2. The function test shall be conducted after 4 hours storage at the normal temperature and humidity after removed from the test chamber.
  3. Vibration test will be conducted to the product itself without putting I in a container.



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## 8. Dimensional Outlines

REV	REVISION RECORD	DATE	APPROVED	NAME

$15.11 \pm 5$        $78.4$   
 $(64.55)$        $49.25 \pm 5$   
 $65$        $40$   
 CN1

CN1 : 5FZ.2535E-A3821.140  
(or equivalent)


$141$   
 $124.3(\text{Bezel opening})$   
 $121.5(\text{LCD A.A.})$   
 $(70.5)$   
 $9.75$        $8.35$   
 $9.75$   
 $183$   
 $164.8(\text{Bezel opening})$   
 $162(\text{LCD A.A.})$   
 $(91.5)$   
 RGB 800XRGB600  
 AA center  
 Viewing direction  
 (6 o'clock:Grt Inversion)

MODEL NAME: GVNS80SNAG3ED  
TITLE: OUTLINE  
FILE NAME:

No.	PIN NAME
1	GND
2	GND
3	AUJ
4	VLED_5V
5	VLED_5V
6	VLED_5V
7	VCC
8	VCC
9	DE
10	GND
11	GND
12	GND
13	B5
14	B4
15	B3
16	GND
17	B2
18	B1
19	B0
20	GND
21	G5
22	G4
23	G3
24	GND
25	G2
26	G1
27	G0
28	GND
29	R5
30	R4
31	R3
32	GND
33	R2
34	R1
35	R0
36	GND
37	GND
38	CLK
39	GND
40	GND

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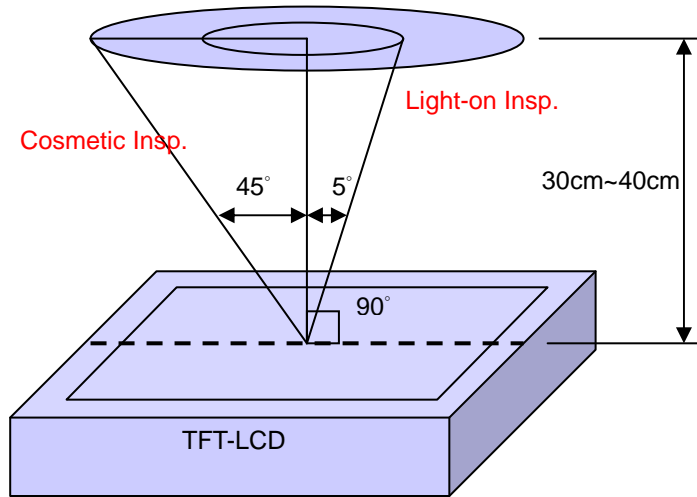
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### 9. Incoming Inspection Standards

#### 9.1 Inspection and Environment Conditions

##### 9.1.1 Inspection Conditions:

- (1) Inspection Distance: 35 cm±5cm
- (2) View Angle : Light-on Inspection Angle : ±5°  
Cosmetic Inspection Angle : ±45°



( perpendicular to LCD panel surface)

##### 9.1.2 Environment Conditions:

Ambient Temperature		23°C ±5°C
Ambient Humidity		55±10%RH
Ambient Illumination	Cosmetic Inspection	more than 600 Lux
	Functional Inspection	300~500 Lux


##### 9.1.3 Sampling Conditions:

- (1) Lot Size: Quantity of shipment lot per model
- (2) Sampling Method:

Sampling Plan		MIL-STD-105E
		Normal Inspection, Single Sampling
		Level II
AQL	Major Defect	1.0%
	Minor Defect	1.5%

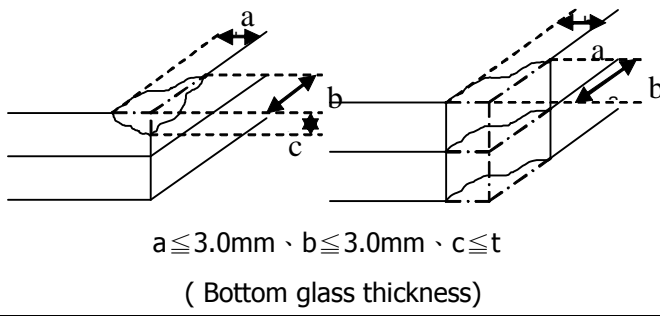
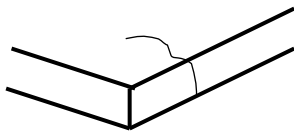
- (3) The classification of Major(MA) and Minor(MI) defects is shown as 3. Inspection Criteria.

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### 9.1.4 Inspection Criteria

#### 9.1.4.1 Cosmetic Inspection(Panel):

Item	Judgment Criteria	Classification
Chipping on Panel	 <p style="text-align: center;"><math>a \leq 3.0\text{mm}</math> · <math>b \leq 3.0\text{mm}</math> · <math>c \leq t</math> ( Bottom glass thickness)</p>	MA
Scratch on Panel *Note-2	$W \leq 0.05\text{mm}$ or $L < 5\text{mm}$ : Ignored $0.05\text{mm} < W \leq 0.1\text{mm}$ and $L \leq 5\text{mm}$ : $N \leq 5$ $W > 0.1\text{mm}$ or $L > 5\text{mm}$ : Not allowed	MI
Bubble or Dent on Panel *Note-3	$D \leq 0.2\text{mm}$ : Ignored $0.2\text{mm} < D \leq 0.3\text{mm}$ : $N \leq 5$ $D > 0.3\text{mm}$ : Not allowed	MI
Panel Crack	 <p style="text-align: center;">Not Allowed crack</p>	MA
Bezel Deformation	Obvious deformation is not allowed.	MI
Bezel Oxidation	Not allowed if it rusts continuously over 1 cm (It is out of warranty with rusted tin plate)	MI
Bezel Scratch	$L \leq 20\text{mm}$ , $W \leq 0.2$ , $N \leq 3$	MI
Metal Squash Dent /Flange(Front Side)	$D(W) \leq 1, L \leq 3, N \leq 3;$	MI
B/L High Voltage Wire Denudation	Not allowed	MA
Polarizer flaw or leak out resin	Defect is defined as the active area.	MI
Outline Dimension	Must in Spec, refer to related product spec.	MI

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### 9.1.4.2 Functional Inspection:

Item	Judgment Criteria			Classification
	Area(Note1)	I	O	
Point Defect	Bright dot	Random	2	
		2 dots adjacent	0	0
		3 dots adjacent or more	0	0
	Dark dot	Random	3	
		2 dots adjacent	1	
		3 dots adjacent or more	0	0
	Total Dot Defect		5	
	Distance	Distance between Bright and Bright dot	$L \geq 5\text{mm}$	
		Distance between Bright and Dark dot	$L \geq 5\text{mm}$	
		Distance between Dark dot	$L \geq 5\text{mm}$	
(1) It is defined as Point Defect if defect area $> 0.5\text{dot}$ (2) It is ignored if defect area $\leq 0.5\text{dot}$ (3) Weak point defect will be defined as Bright Dot if it can be observed through ND filter 5% ( Full Screen Black Inspection)				
Line Defect	Obvious vertical or horizontal line defect is not allowed.			MA
Mura	Not allowed if it can be observed through ND Filter 5 %			MI
Foreign Material in spot shape *Note-3	$D \leq 0.2\text{mm}$ : Ignored $0.2\text{mm} < D \leq 0.5\text{mm}$ : $N \leq 8$ $D > 0.5\text{mm}$ : Not allowed			MI
Foreign Material in line or spiral shape *Note-4	$W \leq 0.05\text{mm}$ or $L \leq 5\text{mm}$ : Ignored $0.05\text{mm} < W \leq 0.2\text{mm}$ and $L 1.0\text{mm} \leq 5\text{mm}$ : $N \leq 8$ $W > 0.2\text{mm}$ or $L > 5\text{mm}$ : Not allowed			MI
Display Function Abnormal	No Malfunction can be allowed			MA

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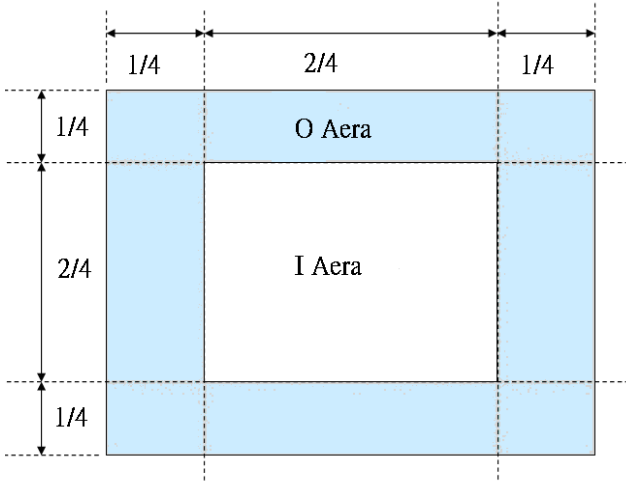
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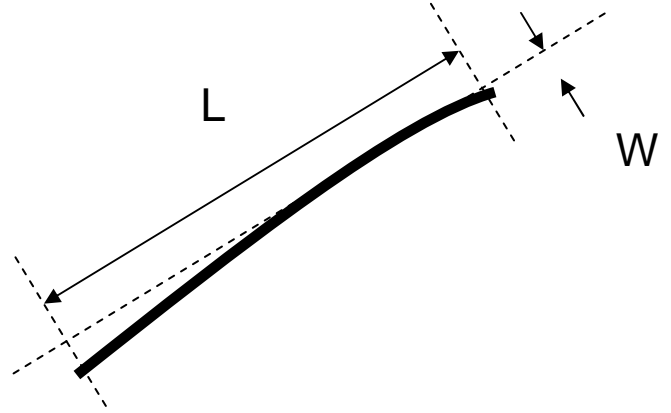
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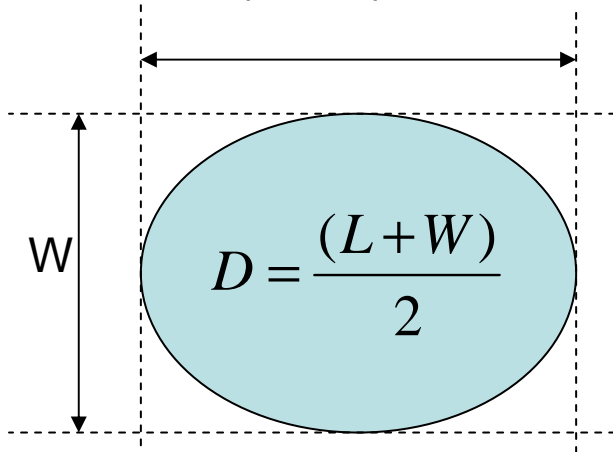
Note-1 : I/O Area Definition



Note-2 : Polarizer Scratch



Note-3 : Spot Foreign Material  
( $W \geq L / 4$ )



Note-4 : Line or Spiral Foreign Material  
( $W < L / 4$ )

