HY-LINE®
COMPUTER COMPONENTS

TFT-Display Datasheet

DATA IMAGE
Model: FG1001LODSSWMG01

Brief spec.:

Main Feature	Landscape
	Normally Black
	Wide Viewing Angle

Active Screen Area	216.96 x 135.6 (mm)
Diagonal | Format	10.1" | 16:10
Resolution	1280 X 800
Colors	8 Bit
Backlight	Black
Brightness	500 cd/m²
LED Life Time	50K(h)
Interface	LVDS
Viewing Angle	85/85 L/R 85/85
Touchscreen	no
Power Supply	2.5 V (Typ.)
Module Outline	229.46 x 149.1 x 4.8 (mm)
Operation Temperature	-20 ... +70 °C
Storage Temperature	-30... +80 °C
Surface Treatment	HC

HY-LINE Computer Components Vertriebs GmbH
Inselkammerstr. 10, 82008 Unterhaching bei München
Tel.: +49 89 614 503 40 | Fax: +49 89 614 503 50
computer@hy-line.de | www.hy-line.de/computer

DATA IMAGE CORPORATION

TFT Module Specification

Preliminary

ITEM NO.: FG1001L0DSSWMG01

Table of Contents

Customer Companies	R&D Dept.	Q.C. Dept.	Eng. Dept.	Prod. Dept.
	ALEX	JOE	GARY	KEN
Approved by	Version:	Issued Date:	Sheet Code:	Total Pages:
	1	23/OCT/14’		21

2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	23/OCT/14’			Initial PRELIMINARY

3. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit
Screen Size	10.1 (diagonal)	inch
Display Format	1280(H) x (R,G,B) x 800(V)	dot
Active Area	216.96(W) × 135.60(H)	mm
Dot Pitch	0.0565(W) × 0.1695(H)	mm
Pixel Configuration	RGB-Stripe	
Outline Dimension	229.46(W) ×149.1(H) ×4.8(D)	mm
Surface treatment	HC	
Interface	LVDS	
Weight	TBD	g
Display mode	Normally Black, Transmissive	

4. ABSOLUTE MAXIMUM RATINGS

(Note 1)

Parameter	Symbol	MIN.	MAX.	Unit	Remark
Power voltage	V_{DD}	-0.3	3.9	V	
	AV_{DD}	-0.3	14	V	
	V_{GH}	-0.3	42	V	
	V_{GL}	-19	0.3	V	
	V_{GH}-V_{GL}	12	40	V	
Operating temperature	T_{OP}	-20	70	°C	
Storage temperature	T_{ST}	-30	80	°C	

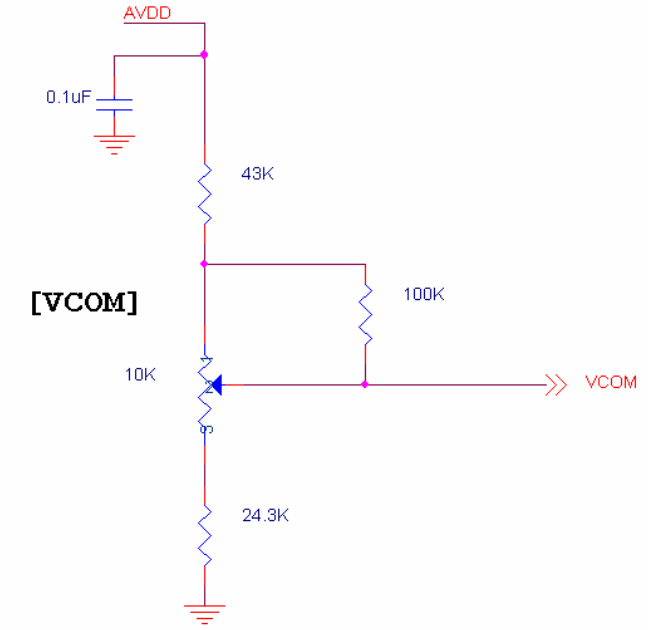
Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

5. ELECTRICAL CHARACTERISTICS

5.1 Typical Operation Conditions

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Power voltage	V_{DD}	2.3	2.5	2.7	V	Note 2
	AV_{DD}	8.0	8.2	8.4	V	
	V_{GH}	21.7	22	22.3	V	
	V_{GL}	-7.3	-7	-6.7	V	
Input signal voltage	V_{COM}	2.7	3.0	3.3	V	Note 3
Input logic high voltage	V_{IH}	0.8V_{DD}	-	3.6	V	Note 2
Input logic low voltage	V_{IL}	0	-	0.2 V_{DD}	V	

Note 1: Be sure to apply V_{DD} and V_{GL} to the LCD first, and then apply V_{GH}.
Note 2: V_{DD} setting should match the signals output voltage of customer's system board.
Note 3: Typ. VCOM is only a reference value; it must be optimized according to each LCM. Be sure to use VR.



5.2 Current Consumption

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Unit
Current for Driver	I_{GH}	-	705	1000	uA	V_{GH}=22V
	I_{GL}	-	705	1000	uA	V_{GL}=-7V
	IV_{DD}	-	95	120	mA	V_{DD}=2.5V
	IAV_{DD}	-	45	70	mA	AV_{DD}=8.2V

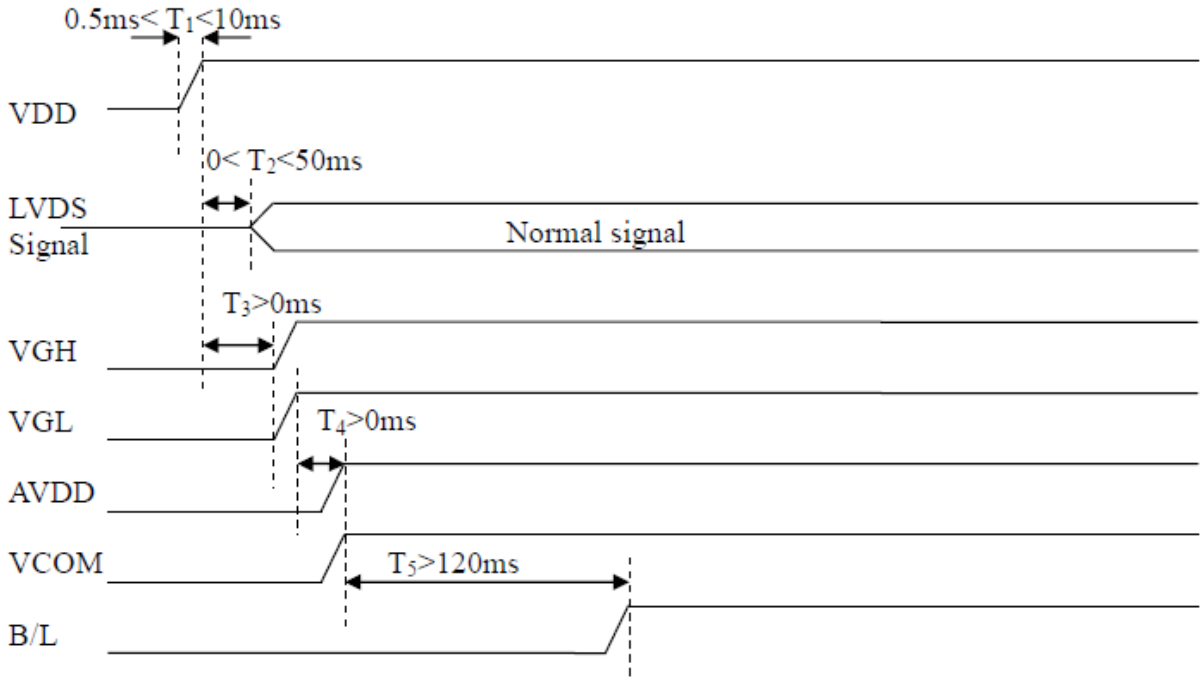
5.3 Backlight Driving Conditions

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Unit
Voltage for LED backlight	V_L	16.8	(19.5)	21	V	Note1
Current for LED backlight	I_L	200	240	280	mA	
LED life time	-	50,000		-	Hr	Note2

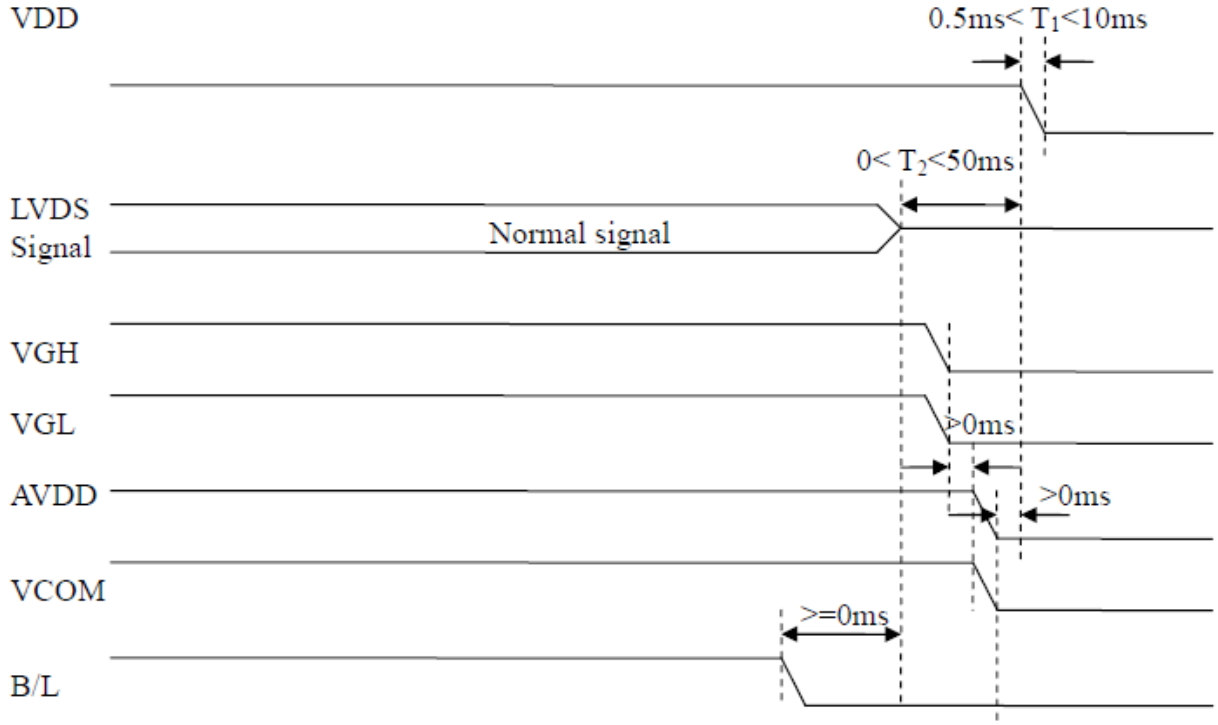
Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25°C and I_L =240mA.
Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and I_L =240mA. The LED lifetime could be decreased if operating I_L is lager than 240mA.

5.4 Power Sequence

a. Power on:



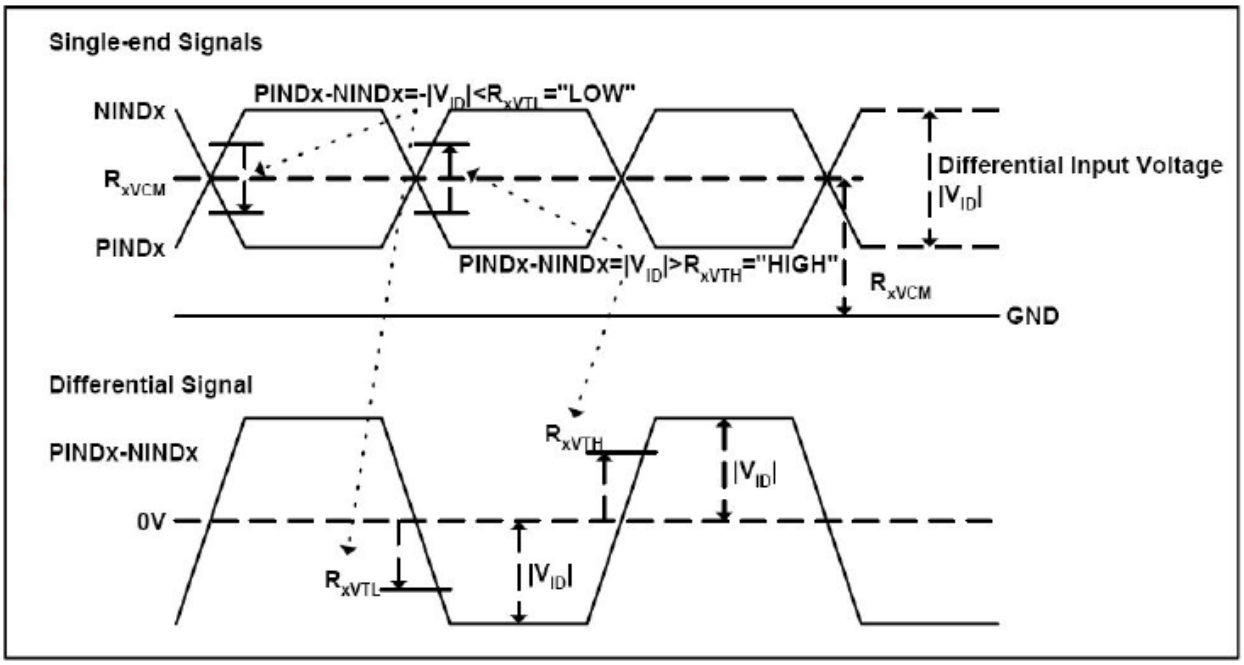
b. Power off:



6. INPUT SIGNAL CHARACTERISTICS

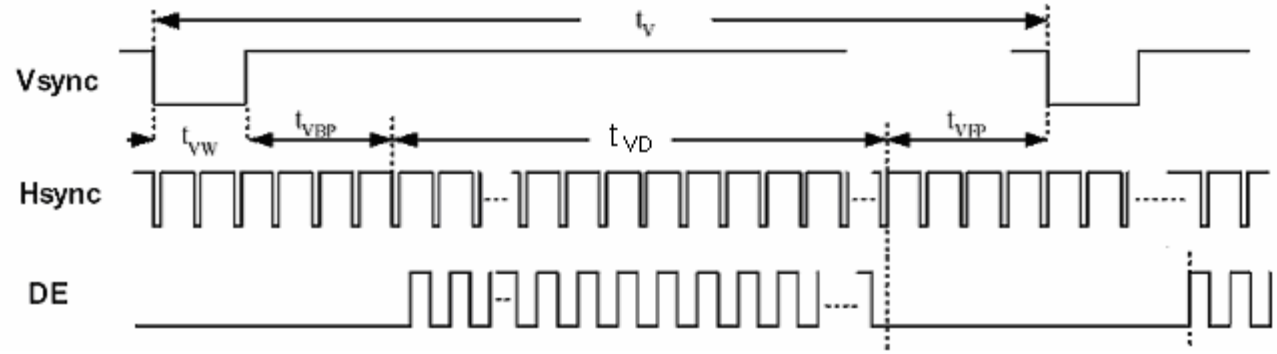
6.1 AC Characteristics

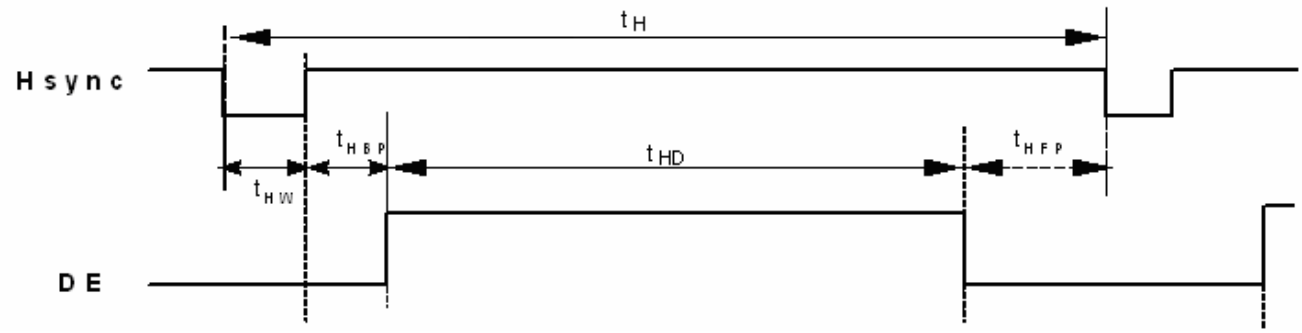
Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Differential input high Threshold voltage	R_{XVTH}	-	-	+100	mV	R_{XVCM}=1.2V
Differential input low Threshold voltage	R_{XVTL}	-100	-	-	mV	
Differential input common mode voltage	R_{XVCM}	0.7	-	1.6	V	
Differential voltage	$\|V_{ID}\|$	200	-	600	mV	



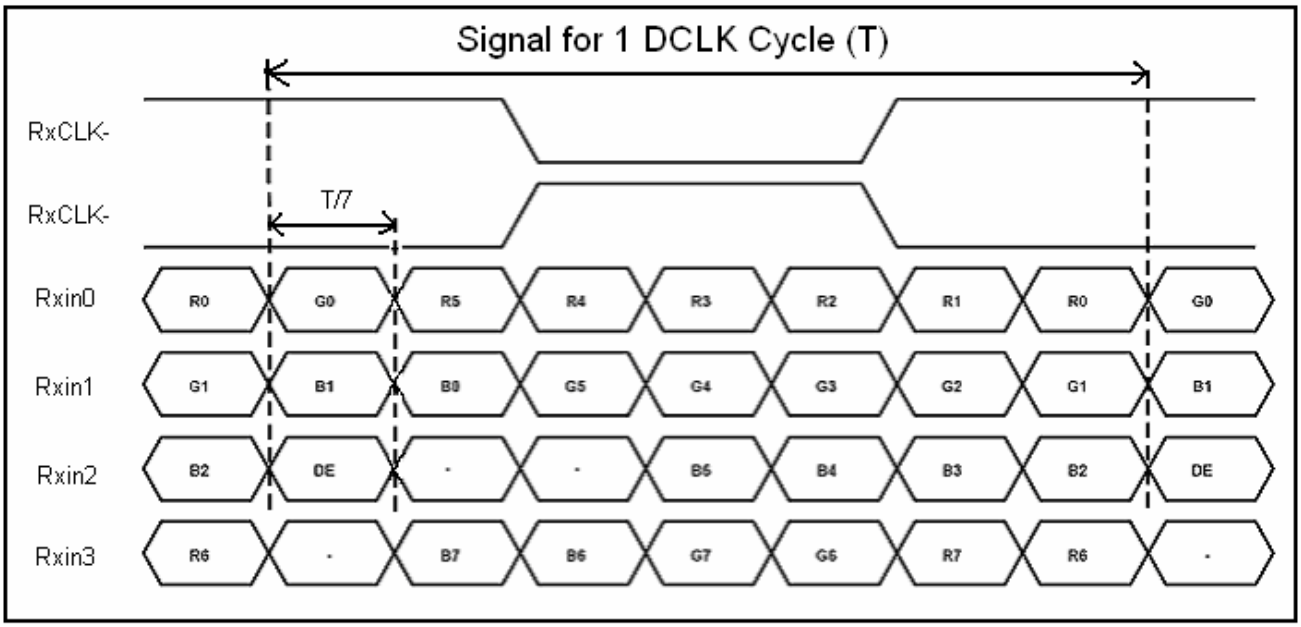
6.2 Timing

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Clock Frequency	1/Tc	68.9	71.11	73.4	MHz	Frame rate=60Hz
Horizontal display area	t_{HD}		1280		Tc	
HS period time	t_H	1410	1440	1470	Tc	
HS Width +Back Porch+Front Porch	$t_{HW}+t_{HBP}+t_{HFP}$	130	160	190	Tc	
Vertical display area	tvd		800		t_H	
VS period time	tv	815	823	833	t_H	
VS Width +Back Porch +Front Porch	$t_{VW}+t_{VBP}+t_{VFP}$	15	23	33	t_H	





6.3 LVDS Data Input Format



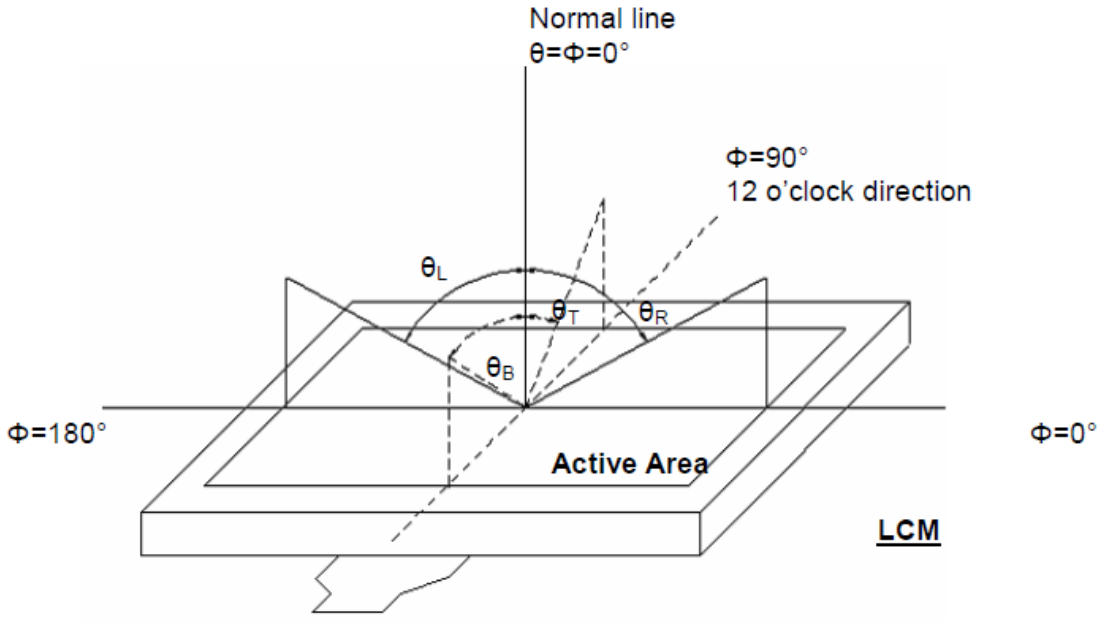
7. OPTICAL CHARACTERISTIC

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle (CR≥10)	θ_L	Φ=180°(9 o'clock)	75	85	-	deg	Note 1
	θ_R	Φ=0°(3 o'clock)	75	85	-		
	θ_T	Φ=90°(12 o'clock)	75	85	-		
	θ_B	Φ=270°(6 o'clock)	75	85	-		
Contrast Ratio	CR	Normal θ=Φ=0°	600	800	-		Note 4
Response time	T_{ON}		-	10	20	ms	Note 3
	T_{OFF}		-	15	30	ms	
Color chromaticity	W_X		0.28	0.31	0.34	-	Note 2,5,6
	W_Y		0.29	0.32	0.35	-	
Luminance	L		-	500	-	cd/㎡	Note 6
Luminance uniformity	Y_U		75	80	-	%	Note 7

Test Conditions:

1. V_{DD}=2.5V, I_L=240mA (Backlight current), the ambient temperature is 25°C.
2. The test systems refer to Note 2.

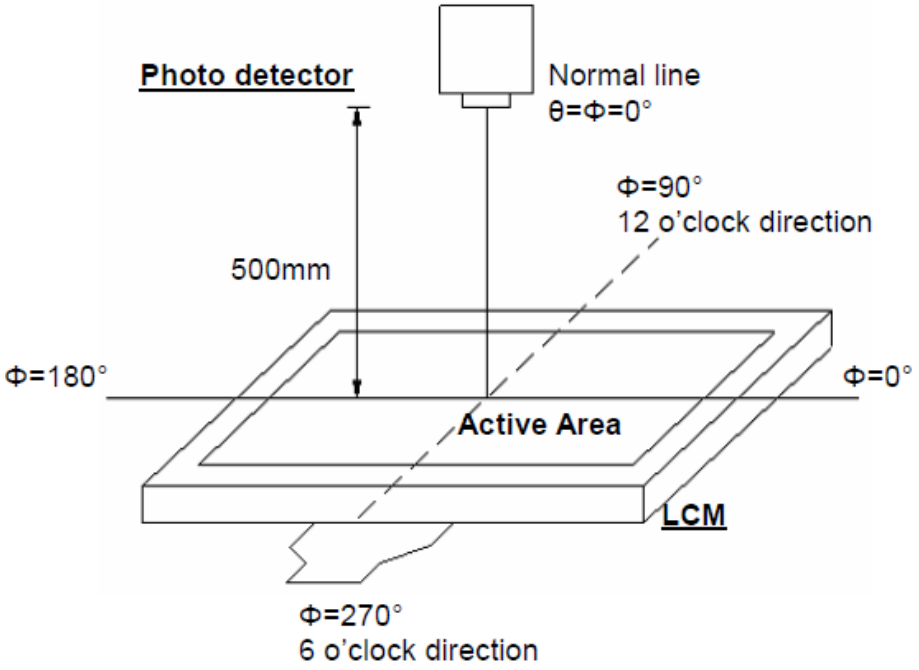
Note 1: Definition of viewing angle range



Definition of viewing angle

Note 2: Definition of optical measurement system.

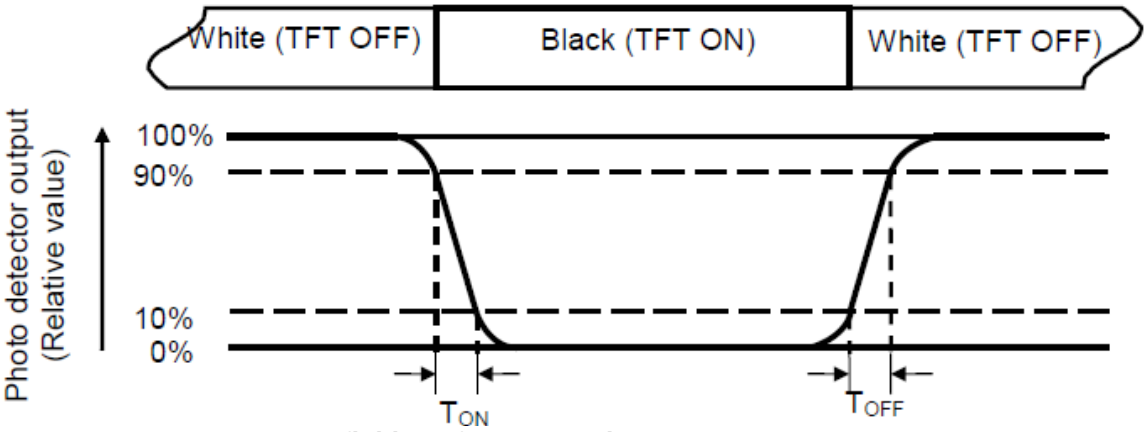
The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Viewing angle is measured by ELDIM-EZ contrast/Height :1.2mm, Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/ Field of view: 1° /Height: 500mm.)



Optical measurement system setup

Note 3: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.



Definition of response time

Note 4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

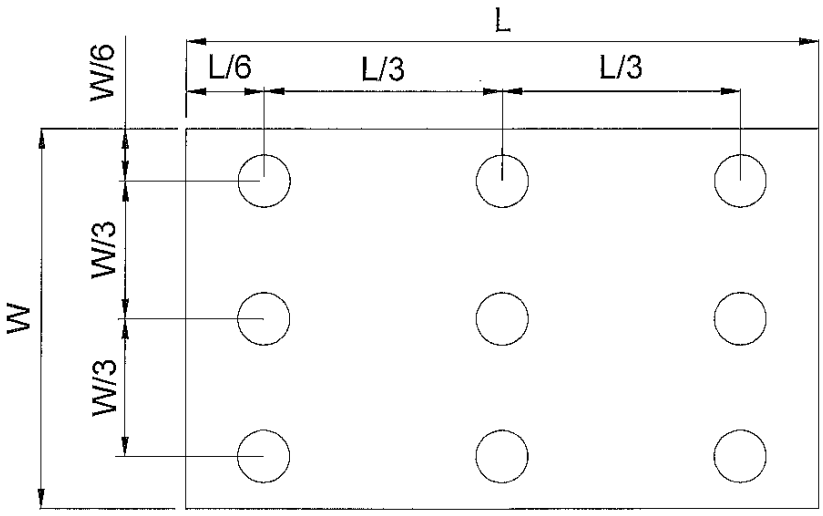
Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.

Note 6: Measuring the center area of the panel. The LED driving condition is IL=200mA .

Note 7: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas. Every measuring point is placed at the center of each measuring area.

$$Luminance\ \ Uniformity\ (Yu) = \frac{B_{min}}{B_{max}}$$

L-------Active area length W----- Active area width



8. PIN CONNECTIONS

FPC Connector is used for the module electronics interface. The model is F62240-H1210A manufactured by Vigorconn.

Pin No	Symbol	I/O	Function	Remark
1	VCOM	P	Common Voltage	
2	VDD	P	Power Voltage for digital circuit	
3	VDD	P	Power Voltage for digital circuit	
4	NC	-	No connection	
5	NC	-	No connection	
6	NC	-	No connection	
7	GND	P	Ground	
8	RIN0-	I	-LVDS differential data input	R0~R5,G0
9	RIN0+	I	+LVDS differential data input	
10	GND	P	Ground	
11	RIN1-	I	-LVDS differential data input	G1~G5,B0,01
12	RIN1+	I	+LVDS differential data input	
13	GND	P	Ground	
14	RIN2-	I	-LVDS differential data input	B2~B5,HS,VS,DE
15	RIN2+	I	+LVDS differential data input	
16	GND	P	Ground	
17	RXCLKIN-	I	-LVDS differential clock input	LVDS CLK
18	RXCLKIN+	I	+LVDS differential clock input	
19	GND	P	Ground	
20	RXIN3-	I	-LVDS differential data input	R6,R7,G6,G7,B6,B7
21	RXIN3+	I	+LVDS differential data input	
22	GND	P	Ground	
23	NC	-	No connection	
24	NC	-	No connection	
25	GND	P	Ground	
26	NC	-	No connection	
27	LED_PWN	O	Backlight CABC controller signal output	Note2

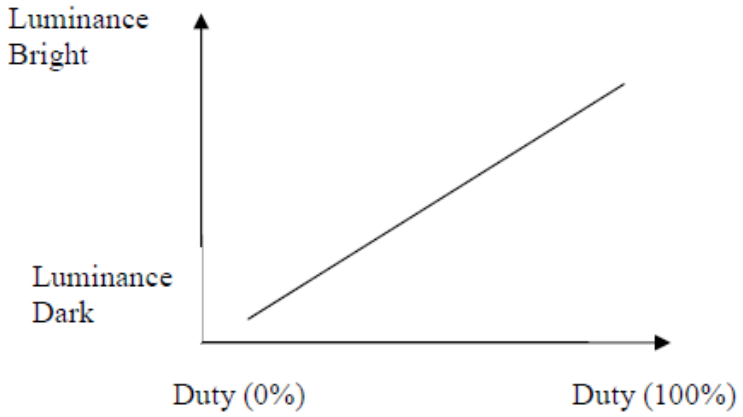
28	NC	-	No connection	
29	AVDD	P	Power for Analog Circuit	
30	GND	P	Ground	
31	LED-	P	LED Cathode	
32	LED-	P	LED Cathode	
33	NC	-	No connection	
34	NC	-	No connection	
35	VGL	P	Gate OFF Voltage	
36	NC	-	No connection	
37	CABC_EN	I	CABC Enable Input	Note1
38	VGH	P	Gate ON Voltage	
39	LED+	P	LED Cathode	
40	LED+	P	LED Cathode	

I: input, O: output, P: Power

Note1: The setting of CABC function are as follows.

Pin	Enable	Disable
CABC_EN	High Voltage	Low Voltage or open

Note2: LED_PWM is used to adjust backlight brightness.



9. QUALITY ASSURANCE

9.1. Test Conditions

9.1.1 Temperature and Humidity(Ambient Temperature)

Temperature : 25 ± 5°C
Humidity : 65 ± 5%

9.1.2 Operation

Unless specified otherwise, test will be conducted under function state.

9.1.3 Container

Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.

9.1.4 Test Frequency

In case of related to deterioration such as shock test. It will be conducted only once.

9.1.5 Test Method

No.	Item	Test Conditions	Remark
1	High Temperature Storage Test	Ta = 80°C 120hrs	Note 1,4 (IEC68-2-2)
2	Low Temperature Storage Test	Ta = -30°C 120hrs	Note 1,4 (IEC68-2-1)
3	High Temperature Operation Test	Ts = 70°C 120hrs	Note 2,4 (IEC68-2-2)
4	Low Temperature Operation Test	Ta = -20°C 120hrs	Note 1,4 (IEC68-2-1)
5	Operate at High Temperature and Humidity	+40°C, 90%RH 120hrs	Note 4 (IEC68-2-2)
6	Thermal Shock	-30°C /30 min ~ +80°C /30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	Note 4 (IEC68-2-14)
7	Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	(IEC68-2-6)
8	Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
9	Package Vibration Test	Random Vibration : ISTA-3A 1Hz~200Hz,Grms=0.53 Half hours for direction of Z	
10	Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	

Note 1: Ta is the ambient temperature of samples.
Note 2: Ts is the temperature of panel's surface.
Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.
Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

9.2 Inspection condition

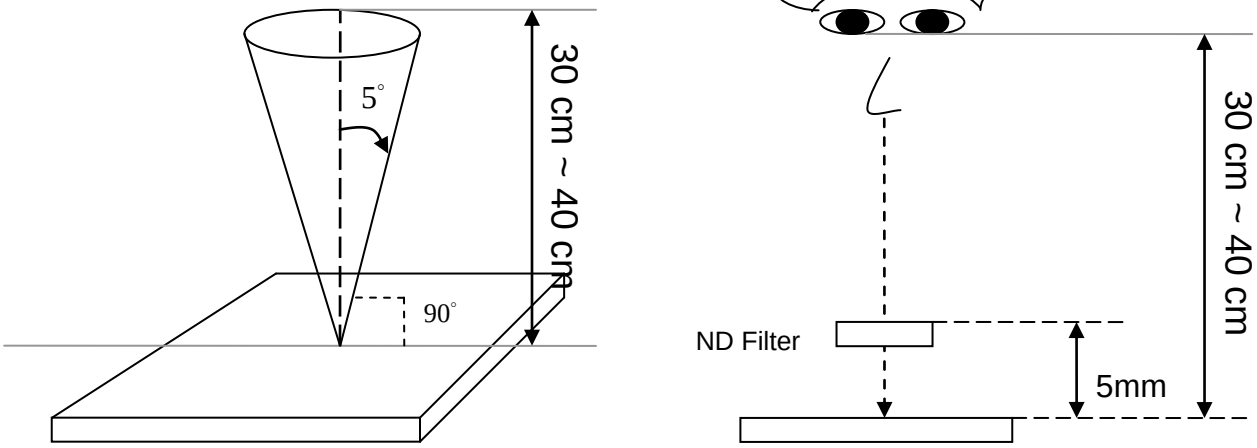
9.2.1 Inspection conditions

9.2.1.1 Inspection Distance : 35 ± 5 cm

9.2.1.2 View Angle :

(1) Inspection under operating condition : ±5°

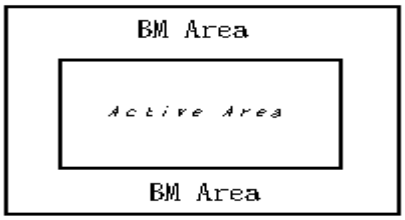
(2) Inspection under non-operating condition : ± 45°



9.2.2 Environment conditions :

Ambient Temperature :		25±5℃
Ambient Humidity :		65±5%
Ambient Illumination	Cosmetic Inspection	400 ~ 600lux
	Functional Inspection	300 ~ 500lux

9.2.3 Definition of applicable Zones



9.2.4 Inspection Parameters

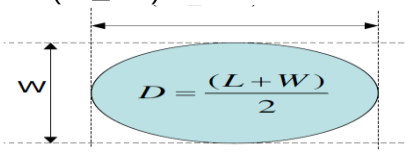
<table>
<tr><th>No.</th><th>Parameter</th><th>Criteria</th></tr>
<tr><td rowspan="5">1</td><td rowspan="5">Operating</td><td>Display function: No Display malfunction (Major)</td></tr>
<tr><td>Line Defect: No obvious Vertical and Horizontal line defect in bright, dark and colored.</td></tr>
<tr><td>Point Defect: Active area ≦ 6 dots (Minor) (Note:1)
<table>
<tr><th colspan="2" rowspan="2">Item</th><th>Acceptable number</th><th rowspan="2">Total</th></tr>
<tr><th>Active Area</th></tr>
<tr><td rowspan="2">Bright</td><td>Random</td><td>3</td><td rowspan="4">6</td></tr>
<tr><td>Two dots adjacent</td><td>1</td></tr>
<tr><td rowspan="2">Dark</td><td>Random</td><td>4</td></tr>
<tr><td>Two dots adjacent</td><td>2</td></tr>
</table></td></tr>
<tr><td>Non-uniformity: Visible through 2%ND filter White , R , G ,B and gray 50% pattern.</td></tr>
<tr><td>Foreign material in Black or White spots shape (W>1/4L)
<table>
<tr><th>Zone / Dimension</th><th>Acceptable number</th><th>Class of Defects</th></tr>
<tr><td>D> 0.5</td><td>0</td><td rowspan="3">Minor</td></tr>
<tr><td>0.3 ＜ D ≦ 0.5</td><td>5</td></tr>
<tr><td>0.3≦ D</td><td>*</td></tr>
</table>
D = (Long + Short) / 2 *: Disregard</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">External Inspection (non-operating)</td><td>Foreign Material in Line or spiral shape (W ≦1/4L) (Note: 4)
<table>
<tr><th>Zone / L (mm)</th><th>Zone / W(mm)</th><th>Acceptable number</th><th>Class of Defects</th></tr>
<tr><td>L ＞10</td><td>W>0.1</td><td>0</td><td rowspan="3">Minor</td></tr>
<tr><td>L ≦10</td><td>0.07 ＜W≦ 0.1</td><td>5</td></tr>
<tr><td>L ≦10</td><td>W≦ 0.07</td><td>*</td></tr>
</table>
L : Length W : Width * : Disregard</td></tr>
<tr><td>Dimension: Outline (Major)
Bezel appearance: uneven (Minor)
Scratch on the polarize: (Note:2)
<table>
<tr><th>Zone / L (mm)</th><th>Zone / W(mm)</th><th>Acceptable number</th><th>Class of Defects</th></tr>
<tr><td>L ＞10</td><td>W>0.1</td><td>0</td><td rowspan="2">Minor</td></tr>
<tr><td>L ≦10</td><td>0.05 ＜W≦ 0.1</td><td>5</td></tr>
</table></td></tr>
</table>

		L ≦10 | W≦ 0.05 | * | L : Length W : Width * : Disregar
		Dent or bubble on the polarize (Note:2) Zone / Dimension | Acceptable number | Class of Defects D> 0.5 | 0 | Minor 0.3 ＜ D ≦ 0.5 | 5 | Minor 0.3≦ D | * | Minor D = (Long + Short) / 2 *: Disregard
		Polarizer flaw or leak out resin : Defect is defined as the active area.
3	Others	Issues which is not defined defect :defect must be visible through 2% ND Filter.

Class of defects	Definition	
	AQL 0.65%	It is a defect that is likely to result in failure or to reduce materially the usability of the product for the intended function.
	AQL 1.5%	It is a defect that will not result in functioning problem with deviation classified.

Note:1.(a)Bright point defect is defined as point defect of R,G,B with area >1/2 dot respectively
(b)Dark point defect is defined as visible in full white pattern.
(c)Definition of distribution of point defect is as follows:
-minumum separation between dark point defects should be larger than 5mm.
-minumum separation between bright point defects should be larger than 5mm.
Note:2 The external inspection should be conducted at the distance 35± 5cm between the eyes of inspctor and the panel .
Note:3 Luminance measurement for contrast ratio is at the distance 50± 5cm between the detective head and the panel with ambient illuminance less than 1 lux. Contrast ratio is obtained at optimum view angle.
Note:4 W-Width in mm , L-length of Max.(L1,L2) in mm.

Note:5 Spot Foreign Material (W≧L/4)

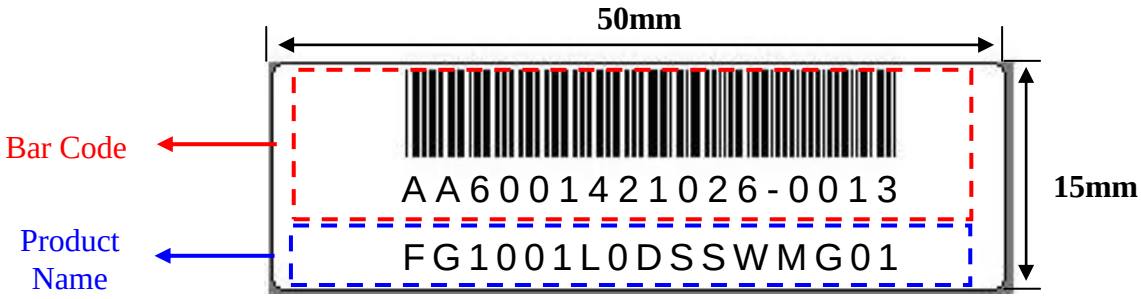


9.2.5 Sampling Condition
Unless otherwise agree in written, the sampling inspection shall be applied to the incoming inspection of customer.
Lot size: Quantity of shipment lot per model.
Sampling type: normal inspection, single sampling
Sampling table: MIL-STD-105E

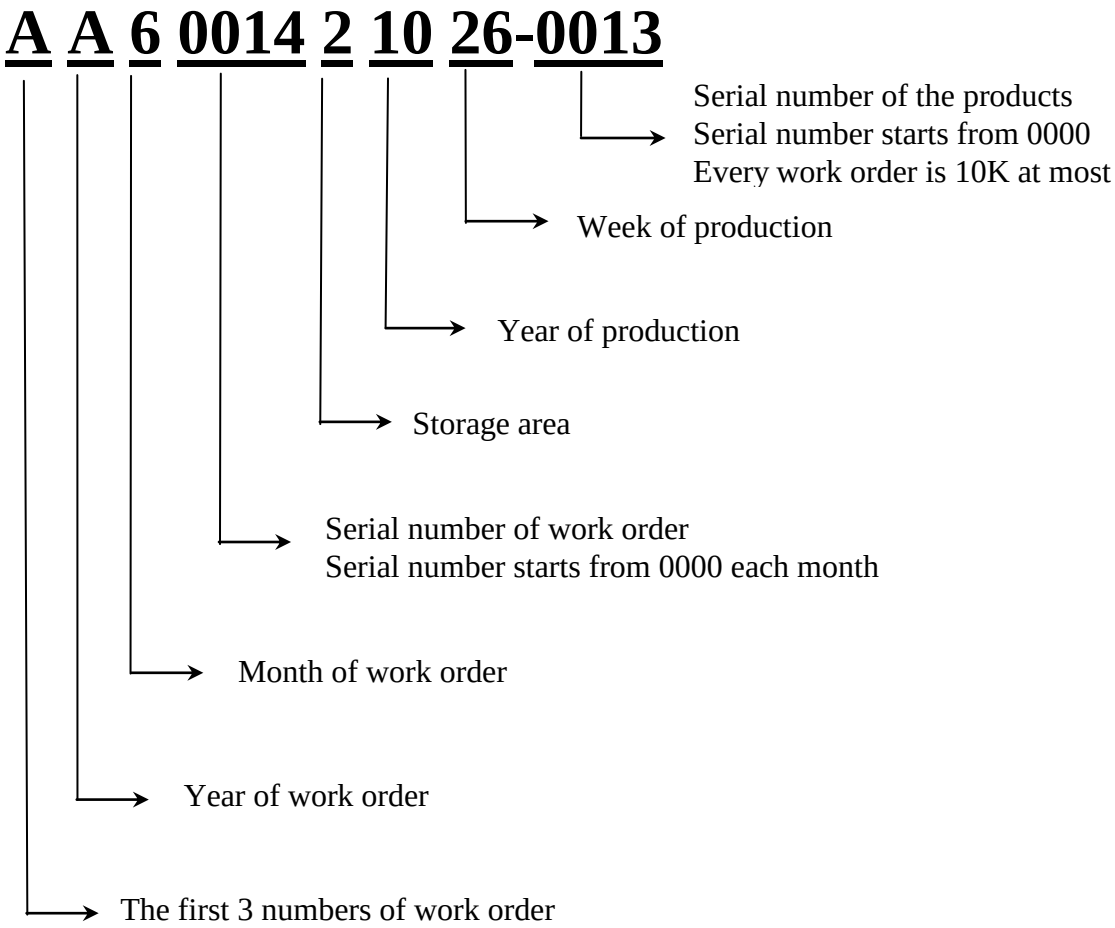
Inspection level: Level II

10. LCM PRODUCT LABEL DEFINE

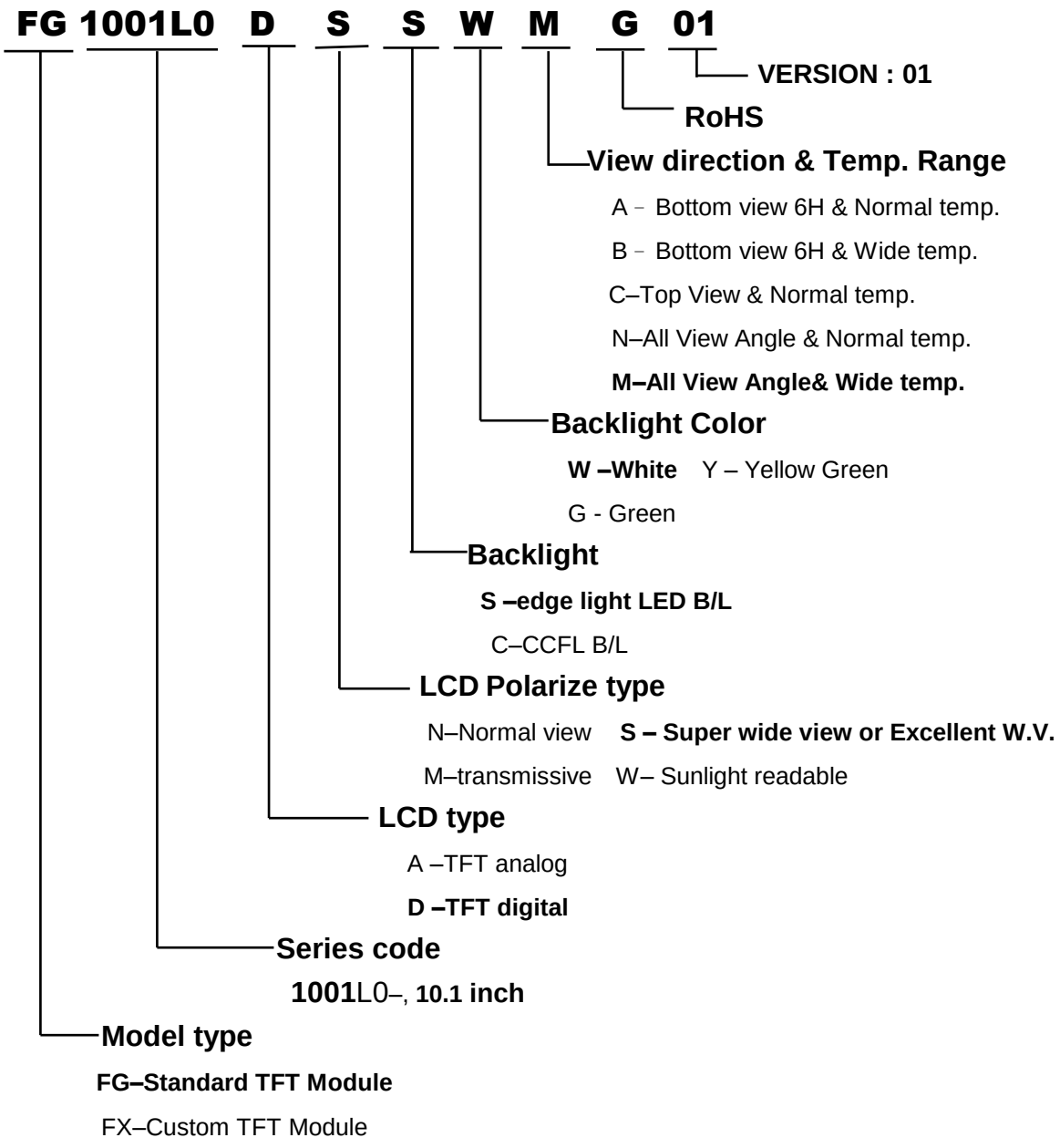
Product Label style:



BarCode Define:



Product Name Define:



12. PRECAUTIONS IN USE LCM

1. ASSEMBLY PRECAUTIONS
   (1) You must mount a module using holes arranged in four corners or four sides.
   (2) You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
   (3) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
   (4) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
   (5) Do not open the case because inside circuits do not have sufficient strength.
   (6) Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.
   (7) Please do not touch metal frames with bare hands and soiled gloves. A color change of the metal frames can happen during a long preservation of soiled LCD modules.
   (8) Please pay attention to handling lead wire of backlight so that it is not tugged in connecting with inverter.

2. OPERATING PRECAUTIONS
   (1) Please be sure to turn off the power supply before connecting and disconnecting signal input cable.
   (2) Please do not change variable resistance settings in LCD module. They are adjusted to the most suitable value. If they are changed, it might happen LCD does not satisfy the characteristics specification
   (3) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
   (4) When fixed patterns are displayed for a long time, remnant image is likely to occur.
   (5) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.
   (6) Please consider that LCD backlight takes longer time to become stable of radiation characteristics in low temperature than in room temperature.

3. ELECTROSTATIC DISCHARGE CONTROL
   (1) The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such the copper leads on the PCB and the interface terminals with any parts of the human body.
   (2) The modules should be kept in antistatic bags or other containers resistant to static for storage.
   (3) Only properly grounded soldering irons should be used.
   (4) If an electric screwdriver is used, it should be well grounded and shielded from commutator sparks.
   (5) The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended
   (6) Since dry air is inductive to statics, a relative humidity of 50-60% is recommended.

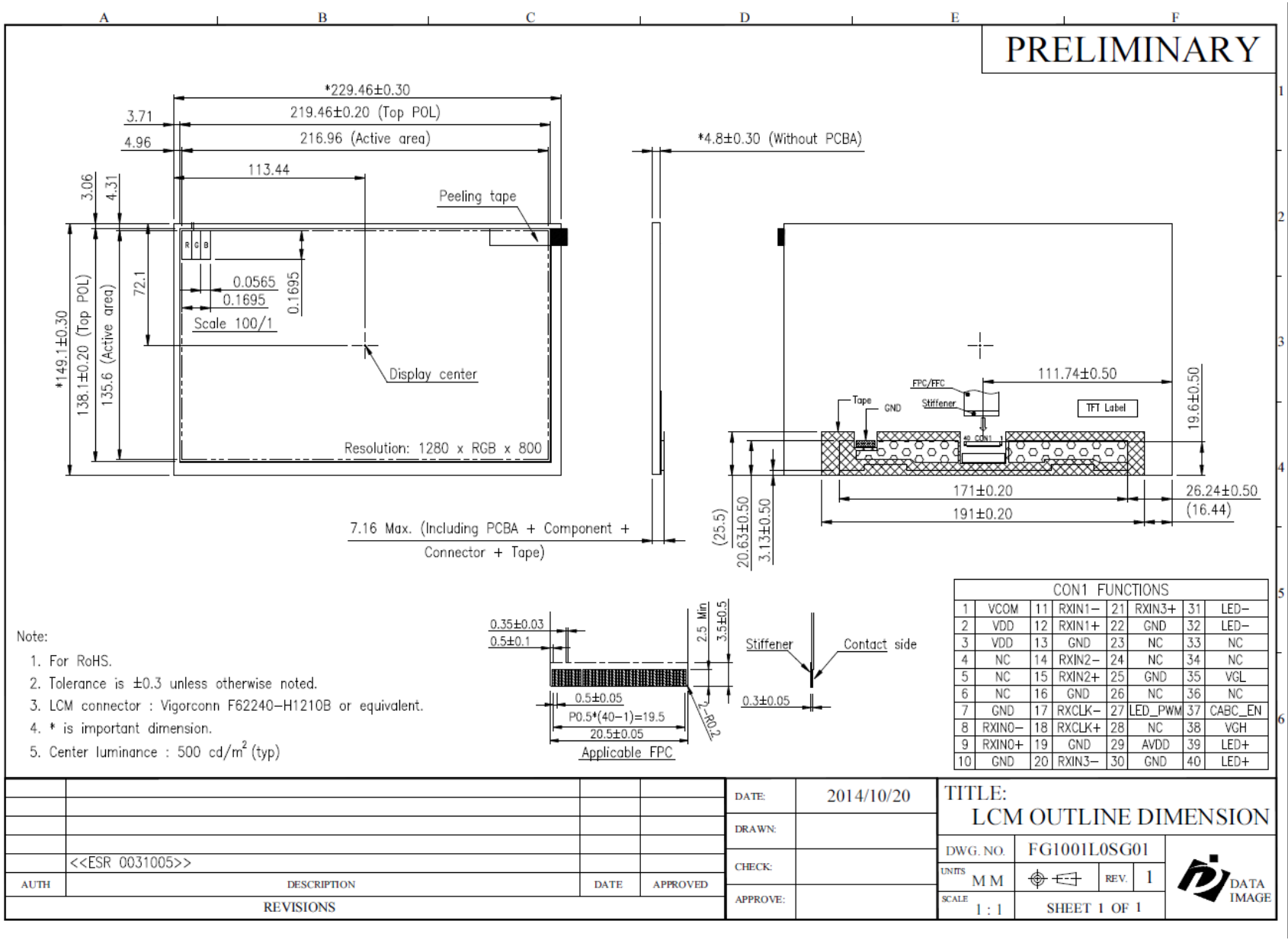
4. STORAGE PRECAUTIONS
   (1) When you store LCDs for a long time, it is recommended to keep the temperature between 0°C-40°C without the exposure of sunlight and to keep the humidity less than 90%RH.
   (2) Please do not leave the LCDs in the environment of high humidity and high temperature such as 60°C 90%RH
   (3) Please do not leave the LCDs in the environment of low temperature; below -20°C.

5. OTHERS
   (1) A strong incident light into LCD panel might cause display characteristics' changing inferior because of polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight Land strong UV rays
   (2) Please pay attention to a panel side of LCD module not to contact with other materials in preserving it alone.
   (3) For the packaging box, please pay attention to the followings:
      a. Please do not pile them up more than 5 boxes. (They are not designed so.) And please do not turn over.
      b. Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
      c. Packing box and inner case for LCDs are made of cardboard. So please pay attention not to get them wet. (Such like keeping them in high humidity or wet place can occur getting them wet.)

6. LIMITED WARRANTY

Unless otherwise agreed between DATA IMAGE and customer, DATA IMAGE will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with DATA IMAGE acceptance standards, for a period on one year from date of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of DATA IMAGE is limited to repair and/or replacement on the terms set forth above. DATA IMAGE will not responsible for any subsequent or consequential events.

13. OUTLINE DRAWING



Note:

1. For RoHS.
2. Tolerance is ±0.3 unless otherwise noted.
3. LCM connector : Vigorconn F62240-H1210B or equivalent.
4. * is important dimension.
5. Center luminance : 500 cd/m^2 (typ)

CON1 FUNCTIONS

1	VCOM	11	RXIN1−	21	RXIN3+	31	LED−
2	VDD	12	RXIN1+	22	GND	32	LED−
3	VDD	13	GND	23	NC	33	NC
4	NC	14	RXIN2−	24	NC	34	NC
5	NC	15	RXIN2+	25	GND	35	VGL
6	NC	16	GND	26	NC	36	NC
7	GND	17	RXCLK−	27	LED_PWM	37	CABC_EN
8	RXIN0−	18	RXCLK+	28	NC	38	VGH
9	RXIN0+	19	GND	29	AVDD	39	LED+
10	GND	20	RXIN3−	30	GND	40	LED+

AUTH	DESCRIPTION	DATE	APPROVED
	<<ESR 0031005>>		

REVISIONS

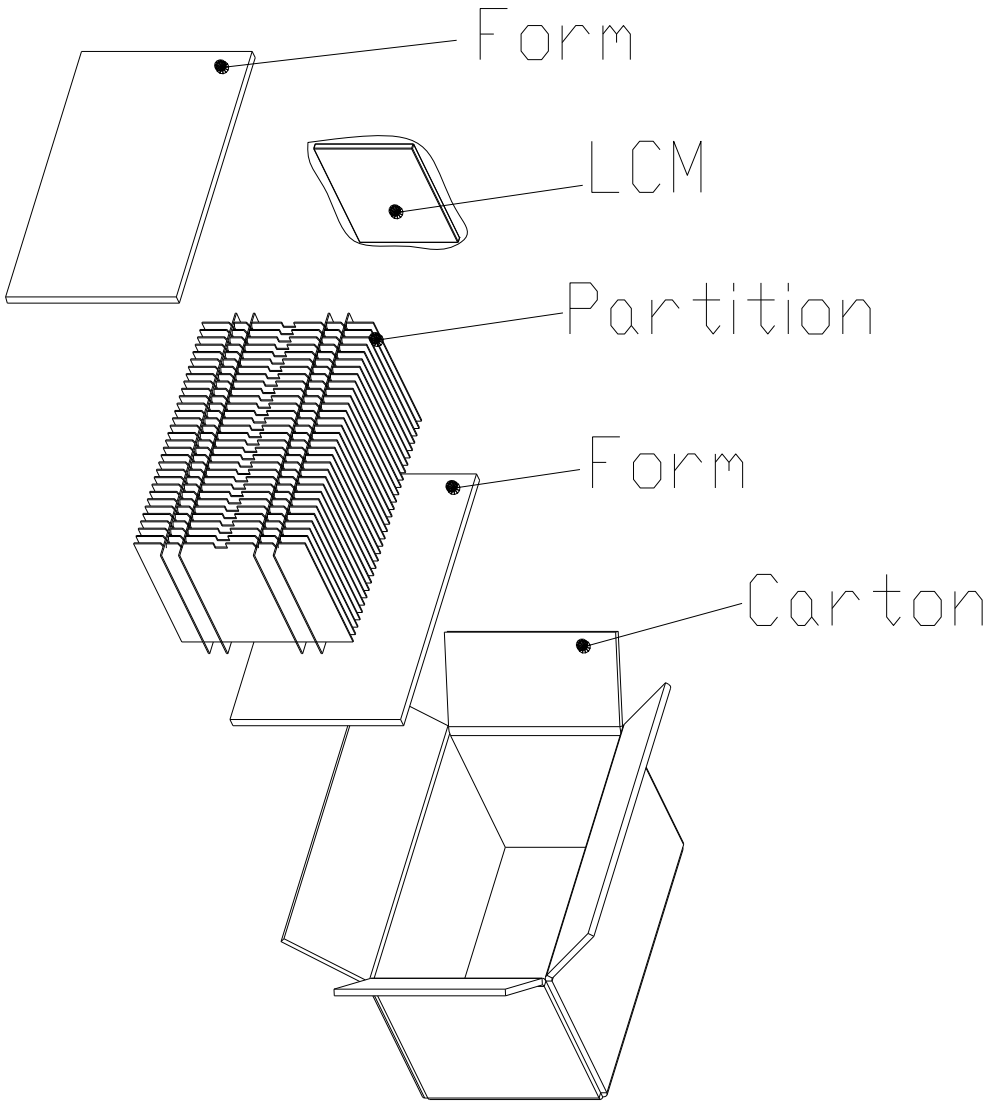
DATE:	2014/10/20
DRAWN:	
CHECK:	
APPROVE:	

TITLE: LCM OUTLINE DIMENSION

DWG. NO.	FG1001L0SG01		
UNITS M M		REV.	1
SCALE 1 : 1	SHEET 1 OF 1		

DATA IMAGE

14. PACKAGE INFORMATION



1 Carton = 16 PCS

Carton size : 482L x 282W x 279H (mm)