INNOLUX DISPLAY CORPORATION

BT101IW01 V.0 LCD MODULE SPECIFICATION

(●) Tentative Specification
( ) Preliminary Specification
( ) Final Specification

Customer	Checked & Approved by

Approved by	Checked by	Prepared by
MKT	PD	PM

Date: 2009/02/09

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Version: 1

Record of Revision

Version	Revise Date	Page	Content
0	2009/01/09	All	First Edition issued
1	2009/02/09	22-23	Mechanical drawings

1. General Specifications

NO.	Item	Specification	Unit
1	Display resolution (pixel)	1024(H) X 600(V), SD resolution	
2	Active area	222.72(H) X 125.28(V)	mm
3	Screen size	10.1 inches diagonal	Inches
4	Pixel pitch	217.5x208.8	um
5	Color configuration	R, G, B vertical stripe	
6	Overall dimension	235 (W) X 143(H) X 5.2(D) (max)	mm
7	Weight	190Max.	Grams
8	Surface treatment	Glare	
9	Input color signal	6 bit LVDS	
10	Display colors	262K (6 bit)	
11	Optimum viewing direction	6 o'clock	
12	Backlight	W-LED	
13	RoHS	RoHS compliance	

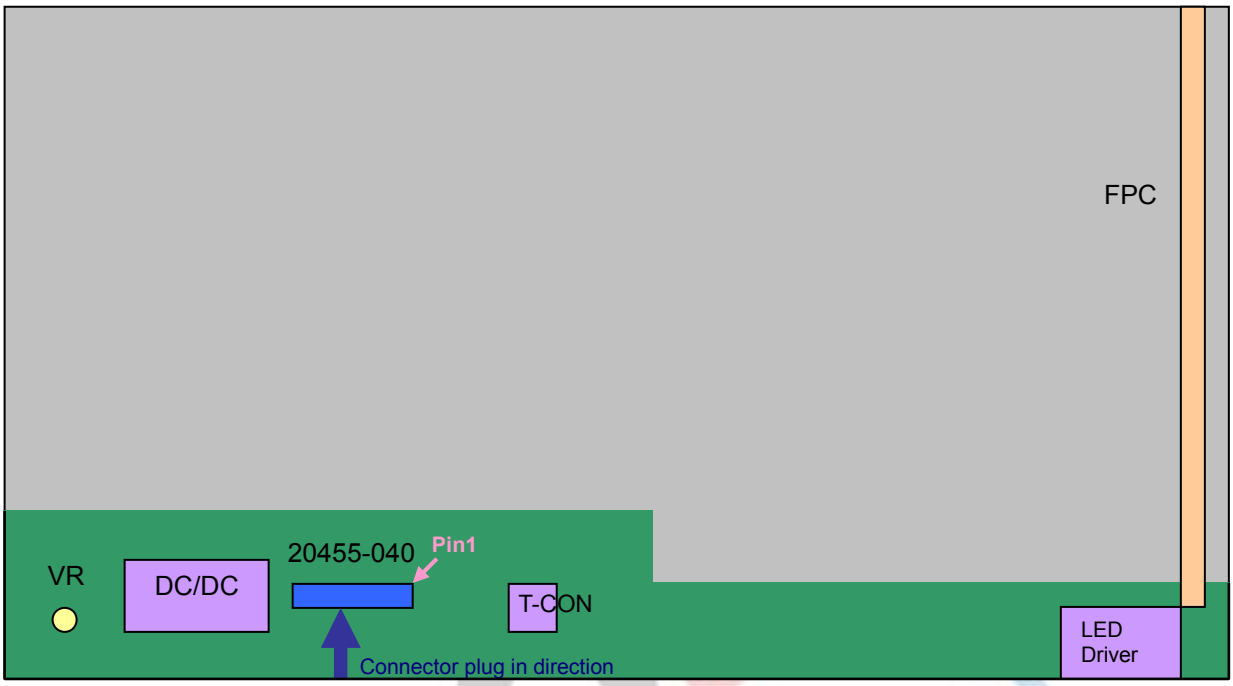
2. Electrical Specifications

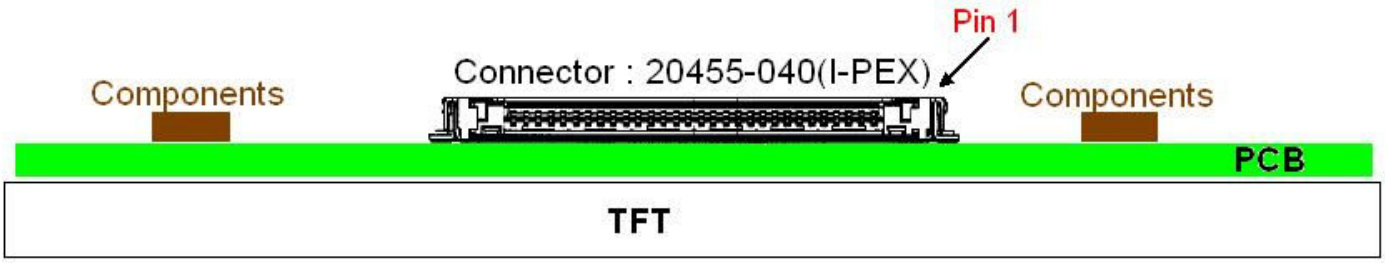
2-1 Pin Assignment

a. Panel connector
Connector Part No.: 20455-040E-0* or equivalent
User's connector Part No: 20455-040E-0* or equivalent

PIN NO	Symbol	Function
1	NC	NC
2	VDD	Power Supply, 3.3 V (typical)
3	VDD	Power Supply, 3.3 V (typical)
4	V EEDID	DDC 3.3V power
5	NC	NC
6	Clk EEDID	DDC Clock
7	DATA EEDID	DDC Data
8	Odd_Rin0-	- LVDS differential data input (R0-R5, G0) (odd pixels)
9	Odd_Rin0+	+ LVDS differential data input (R0-R5, G0) (odd pixels)
10	VSS	Ground – Shield
11	Odd_Rin1-	- LVDS differential data input (G1-G5, B0-B1) (odd pixels)
12	Odd_Rin1+	+ LVDS differential data input (G1-G5, B0-B1) (odd pixels)
13	VSS	Ground – Shield
14	Odd_Rin2-	- LVDS differential data input (B2-B5, HS, VS, DE) (odd pixels)
15	Odd_Rin2+	+ LVDS differential data input (B2-B5, HS, VS, DE) (odd pixels)
16	VSS	Ground – Shield
17	Odd_ClkIN-	- LVDS differential clock input (odd pixels)
18	Odd_ClkIN+	+ LVDS differential clock input (odd pixels)
19	VSS	Ground – Shield
20	NC	NC
21	NC	NC
22	VSS	Ground – Shield
23	NC	NC
24	NC	NC
25	VSS	Ground – Shield
26	NC	NC
27	NC	NC
28	VSS	Ground – Shield
29	NC	NC
30	NC	NC
31	VSSLED	Ground - LED
32	VSSLED	Ground - LED
33	VSSLED	Ground - LED
34	NC	NC
35	PWM	System PWM Signal Input (+3.3V Swing)
36	LED_EN	LED enable pin (+3.3V Input)
37	NC	NC
38	VDDLED	6V – 21V LED power
39	VDDLED	6V – 21V LED power
40	VDDLED	6V – 21V LED power

b. General Block Diagram



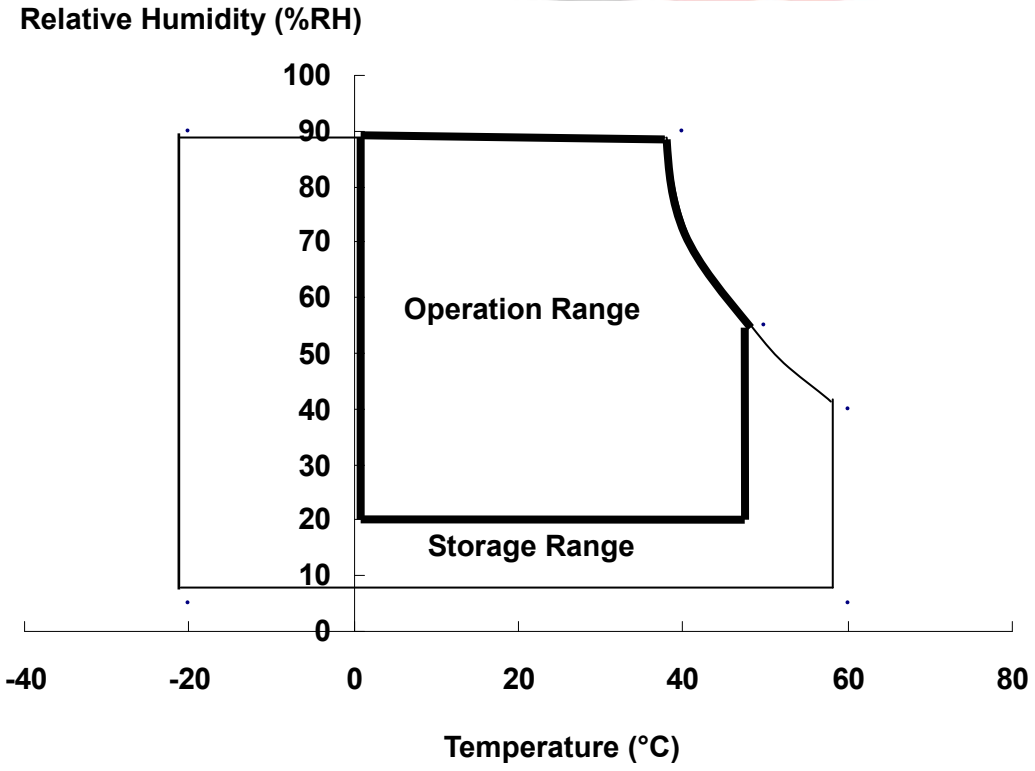


2-2. Absolute Maximum Ratings

Parameter	Symbol	Values		Unit	Remark
		Min.	Max.		
Power input voltage	V_{CC}	- 0.3	4.0	V	At 25°C
Input signal voltage	V_{IN}	- 0.3	4.0	V	At 25°C
Operating temperature	Top	0	50	°C	Note 1
Storage temperature	T_{ST}	- 20	60	°C	Note 2
Re-screw		-	5	Times	
Assured torque at side mount		-	2	kgf.cm	

Note 1: The relative humidity must not exceed 90% non-condensing at temperatures of 40°C or less. At temperatures greater than 40°C, the wet bulb temperature must not exceed 39°C.

Note 2: The unit should not be exposed to corrosive chemicals.



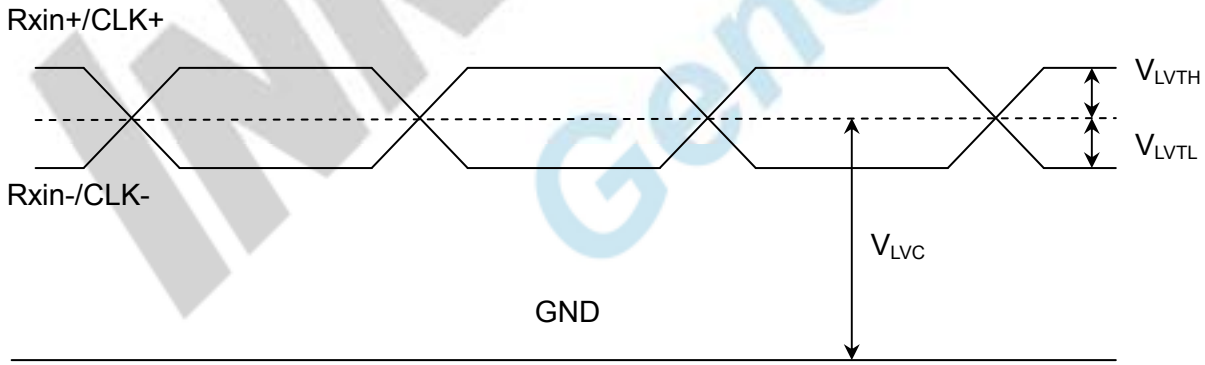
2-3. Electrical Characteristics

a. Typical operating conditions

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Power input voltage		V_{CC}	3	3.3	3.6	V	
Permissive power input ripple		V_{RF}	-	-	0.1	V	
Power input current		I_{CC}	-	(220)	400	mA	Note 1
Power consumption		P_C	-	(0.65)	1	Watts	Note 1
LVDS interface	Differential input high threshold voltage	V_{LVTH}	-	-	+100	mV	V_{LVC}=1.2V, Note 2
	Differential input low threshold voltage	V_{LVTL}	-100	-	-	mV	V_{LVC}=1.2V, Note 2
	Common input voltage	V_{LVC}	0.1	1.2	1.4	V	Note 2
	Terminating resistor	R_T	90	100	110	ohm	
Rush current		I_{Rush}	-	-	1.5	A	Note 3

Note 1: The specified input current and power consumption are under the V_{cc} =3.3 V, 25 ˚C, f_V=60Hz (frame frequency) condition whereas black pattern is displayed.

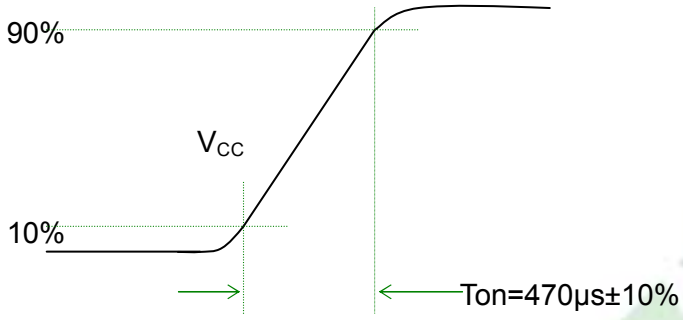
Note 2: LVDS waveform diagram



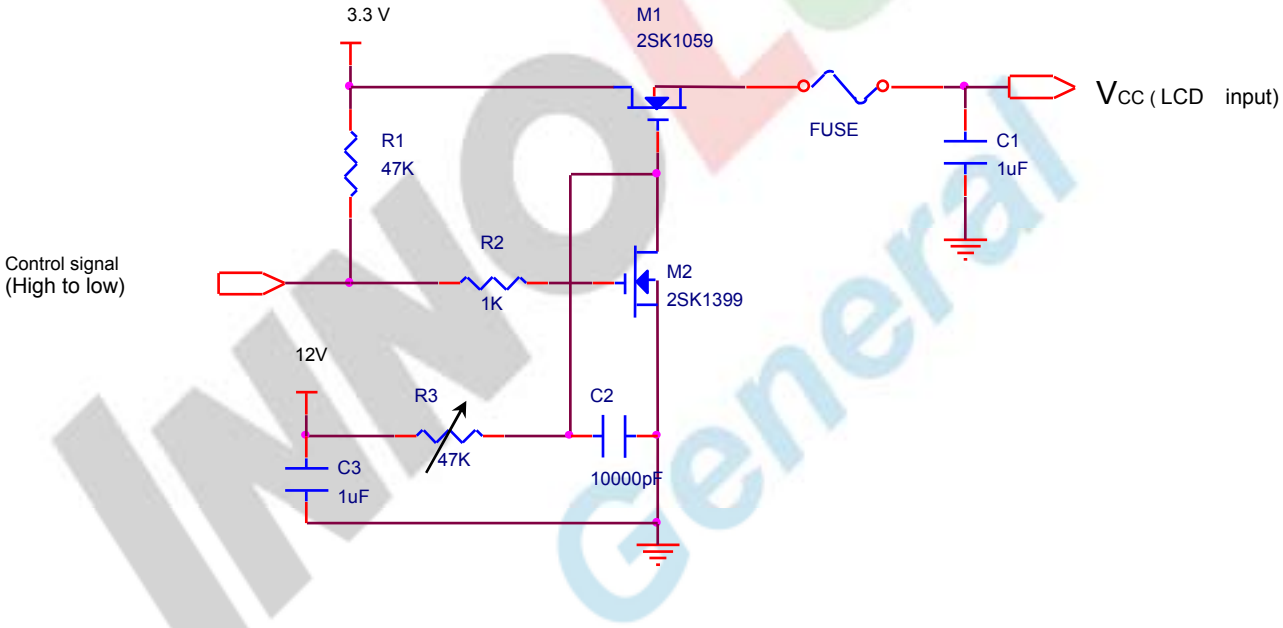
Note 3: Test condition

(1) Pattern: Black pattern

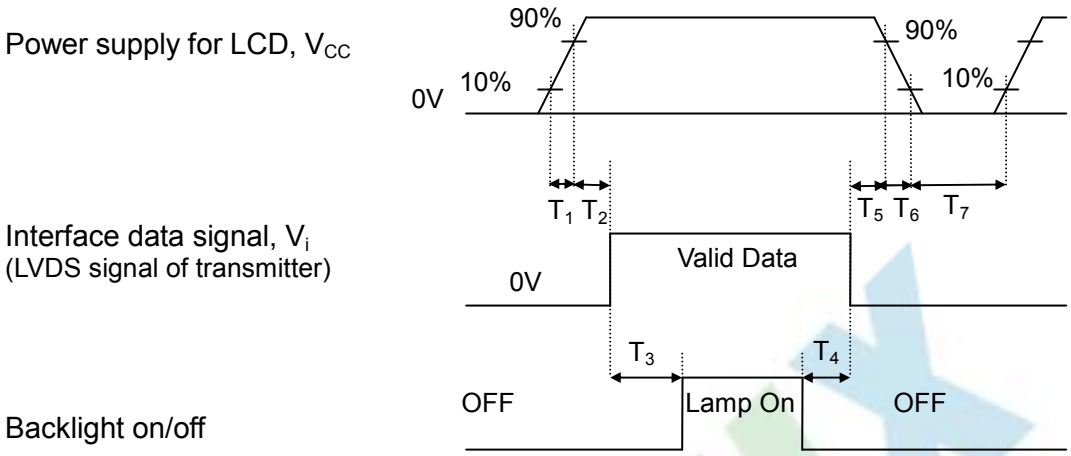
(2) V_{CC} = 3.3 V, V_{CC} rising time = 470 μs ± 10%



(3) Test circuit



b. Power sequence

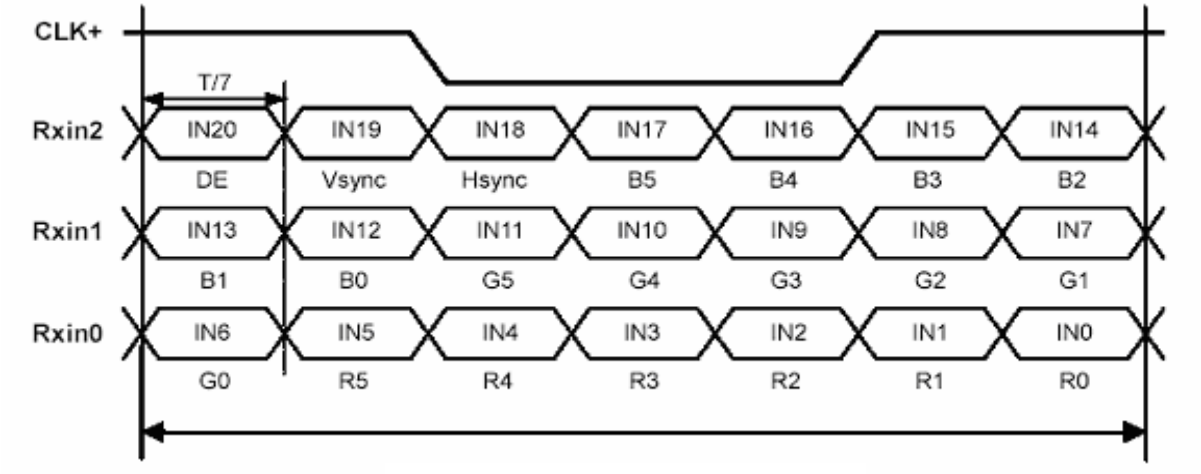


Power sequence timing table

Parameter	Value			Units
	Min.	Typ.	Max.	
T_1	0.5	-	10	ms
T_2	0	-	50	ms
T_3	200	-	-	ms
T_4	200	-	-	ms
T_5	0	-	50	ms
T_6	0	-	10	ms
T_7	400	-	-	ms

c. Display color vs. input data signals

Signal Name	Description	Remark
R5	Red Data 5 (MSB)	Red-pixel data. Each red pixel's brightness data consists of these 6 bits pixel data.
R4	Red Data 4	
R3	Red Data 3	
R2	Red Data 2	
R1	Red Data 1	
R0	Red Data 0 (LSB)	
	Red-pixel Data	
G5	Green Data 5 (MSB)	Green-pixel data. Each green pixel's brightness data consists of these 6 bits pixel data.
G4	Green Data 4	
G3	Green Data 3	
G2	Green Data 2	
G1	Green Data 1	
G0	Green Data 0 (LSB)	
	Green-pixel Data	
B5	Blue Data 5 (MSB)	Blue-pixel data. Each blue pixel's brightness data consists of these 6 bits pixel data.
B4	Blue Data 4	
B3	Blue Data 3	
B2	Blue Data 2	
B1	Blue Data 1	
B0	Blue Data 0 (LSB)	
	Blue-pixel Data	

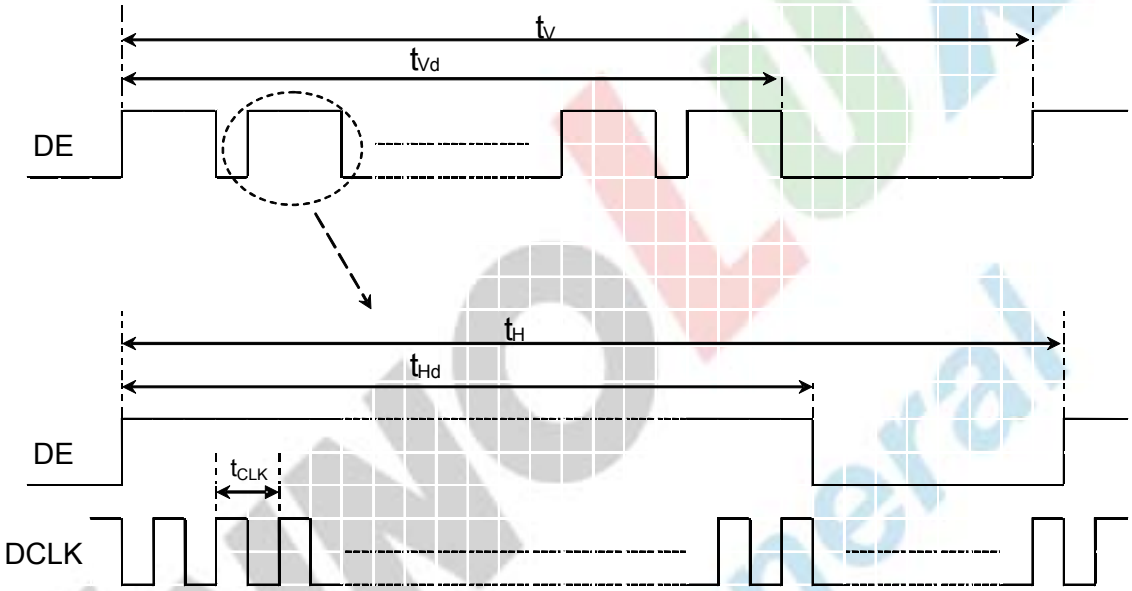


Signal for 1 DCLK cycle (t_{CLK})

d. Input signal timing

Timing table

Description	Symbol	Min	Typ	Max	Unit
Frame rate	--	---	60	--	Hz
Clock freq.	$1/t_{CLK}$	(40)	45	(51)	MHz
Line cycle time	t_H	(1160)	1344	(1240)	t_{CLK}
Line width-active	t_{Hd}	---	1024	---	t_{CLK}
Frame cycle time	t_V	(612)	638	(638)	t_H
V width-active	t_{Vd}	---	600	---	t_H



e. Display position

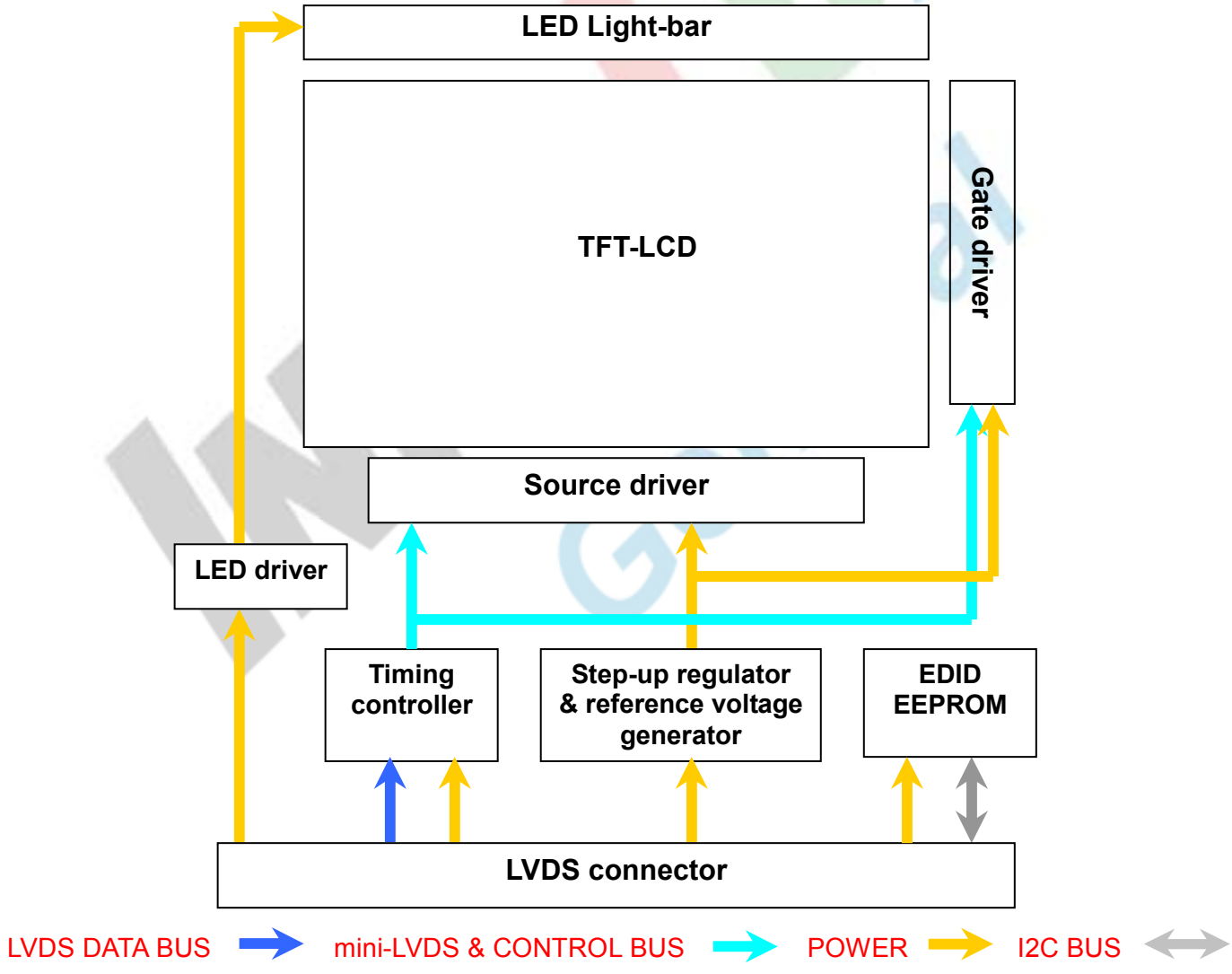
D(1, 1)	D(2, 1)	……	D(673, 1)	……	D(1023, 1)	D(1024, 1)
D(1, 2)	D(2, 2)	……	D(673, 2)	……	D(1023, 2)	D(1024, 2)
⋮		……	⋮	……	⋮	⋮
D(1, 384)	D(2, 300)	……	D(673, 384)	……	D(1023, 300)	D(1024, 300)
⋮		……	⋮	……	⋮	⋮
D(1, 767)	D(2, 599)	……	D(673, 599)	……	D(1023, 599)	D(1024, 599)
D(1, 768)	D(2, 600)	……	D(673, 600)	……	D(1023, 600)	D(1024, 600)

f. Backlight driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED Forward Voltage	V_F	3	3.2	3.4	V_{rms}	T = 25°C
LED Forward Current	I_F		20		mA_{rms}	T = 25°C
Power consumption	P_{LED}		(2.1)	(2.3)	W	T = 25°C
Output PWM frequency	F_{PWM}	200		20000	Hz	T = 25°C
Duty ratio	-	20		100	%	
LED life time	-	15,000			Hr	T = 25°C , Note 1

Note 1: LED life time definition is Brightness decrease to 50% of initial or abnormal lighting.

g. Module function block



h. EDID Code
(TBD)

3. Optical specifications

Item	Symbol	Condition	Specification			Unit	Remark
			Min.	Typ.	Max.		
Response time	Tr+Tf	θ= 0°		(8)	TBD	ms	Note 4
Contrast ratio	CR	θ= 0°		(500:1)			Note 3,5
Viewing angle	Top	CR≧10	15			deg	Note 3,5,7
	Bottom	CR≧10	30				
	Left	CR≧10	40				
	Right	CR≧10	40				
Brightness (5 points average)	Y_L		170	200		nit	Note 3,6
Color chromaticity (CIE)	W_x	θ= 0°	-0.03	0.313	+0.03		Note 3
	W_y			0.329			
	R_x			(0.559)			
	R_y			(0.326)			
	G_x			(0.341)			
	G_y			(0.568)			
	B_x			(0.146)			
	B_y			(0.102)			
Color Gamut	NTSC	CIE1931	40	45		%	-
White uniformity (5 points)	$\delta_{W(5)}$	%		80			Note 3,8
White uniformity (13 points)	$\delta_{W(13)}$	%	--	--	--		Note 3,8

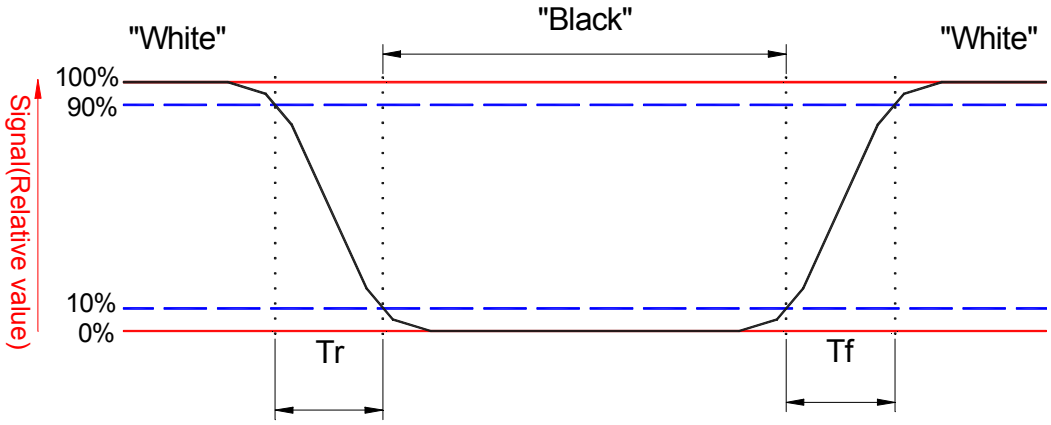
Note 1: Ambient temperature = 25°C.

Note 2: To be measured in dark room after backlight warm up 30 minutes in windless and dark room.

Note 3: To be measured with a viewing cone of 2°by Topcon luminance meter BM-5A.

Note 4: Definition of response time:

The output signals of BM-7 are measured when the input signals are changed from “Black” to “White” (falling time) and from “White” to “Black” (rising time), respectively. The response time interval is between 10% and 90% of amplitudes. Refer to figure as below.



Note 5: Definition of contrast ratio:

Contrast ratio is calculated with the following formula:

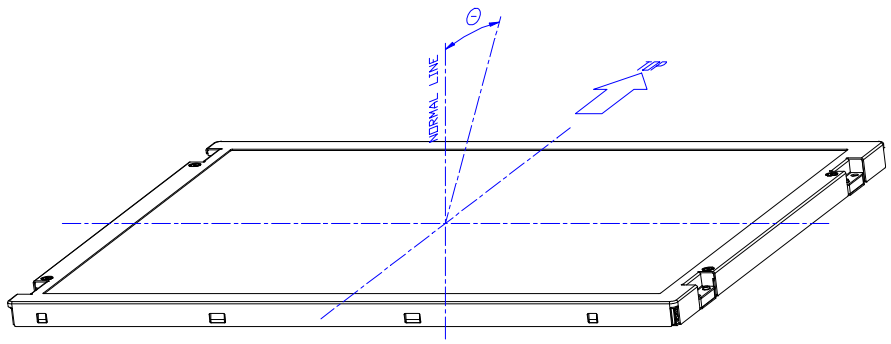
$$\text{Contrast ratio (Avg of 5pts)} = \frac{L_{\text{white (Avg of 5pts.)}}}{L_{\text{Black (Avg of 5pts.)}}}$$

Note 6: Driving current for LED should be 20 mA.

Luminance are measured at the following thirteen points (1~13):

$Y_L = (Y5+Y10+Y11+Y12+Y13) / 5$

Note 7: Definition of viewing angle



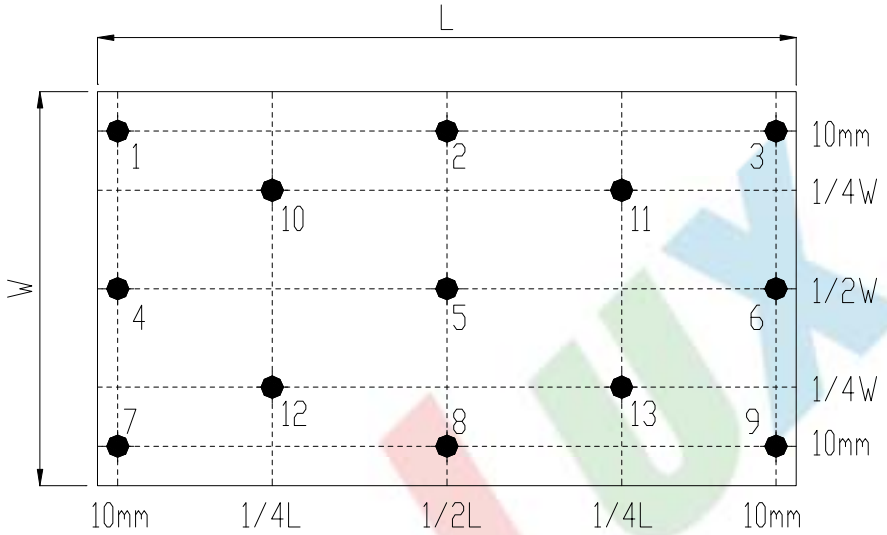
Note 8: Definition white uniformity:

Luminance are measured at the following thirteen points (1~13):

$$\delta_{W(13)} = \frac{\text{Minimum Brightness of thirteen points}}{\text{Maximum Brightness of thirteen points}}$$

$$\delta_{W(5)} = \frac{\text{Minimum Brightness of five points}}{\text{Maximum Brightness of five points}}$$

13 point measuring locations refer to the point 1,~13.
5 point measuring locations refer to the point 5,10~13.
L and W are active area dimensions. Active area center refer to attached drawing



4. Reliability test items

Test Item	Test Condition	Judgment	Remark
High temperature storage	60°C, 240 hours	Note 1	Note 2
Low temperature storage	-20°C, 240 hours	Note 1	Note 2
High temperature & high humidity operation	40°C, 90% RH, 240 hours (No condensation)	Note 1	Note 2
High temperature operation	50°C, 240 hours	Note 1	Note 2
Low temperature operation	0°C, 240 hours	Note 1	Note 2
Thermal Shock (Non-operation)	-25°C / 30 mins ~ 65°C / 30 mins 100 cycles	Note 1	Note 2
Electrostatic discharge (ESD)	150 pF, 330Ω, Contact: ±8kV, Air: ±15kV	Note 1	
Vibration (Non-operation)	1.5G, 10 to 500 Hz random ; 0.5hr in each perpendicular axes (X, Y, Z).	Note 1	Note 2
Mechanical shock (Non-operation)	220G/2ms, Half sine wave, ±X, ±Y, ±Z one time for each direction	Note 1	Note 2

Note 1: Pass: Normal display image with no obvious non-uniformity and no line defect.
Partial transformation of the module parts should be ignored.
Fail: No display image, obvious non-uniformity, or line defects.

Note 2: Evaluation should be tested after storage at room temperature for one hour.

5. Safety

5-1. Sharp edge requirements

There will be no sharp edges or corners on the display assembly that could cause injury.

5-2. Materials

a. Toxicity

There will be no carcinogenic materials used anywhere in the display module. If toxic materials are used, they will be reviewed and approved by the responsible InnoLux Toxicologist.

b. Flammability

All components including electrical components that do not meet the flammability grade UL94-V0 in the module will complete the flammability rating exception approval process. The printed circuit board will be made from material rated 94-V0 or better. The actual UL flammability rating will be printed on the printed circuit board.

c. Capacitors

If any polarized capacitors are used in the display assembly, provisions will be made to keep them from being inserted backwards.

6. Display quality

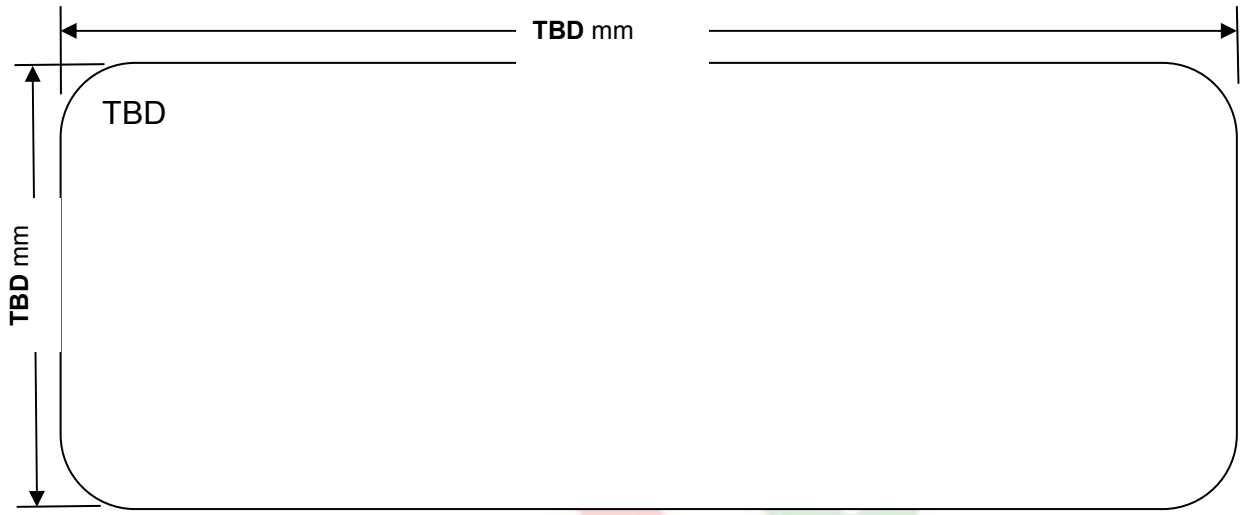
The display quality of the color TFT-LCD module should be in compliance with the InnoLux incoming inspection standard.

7. Handling precaution

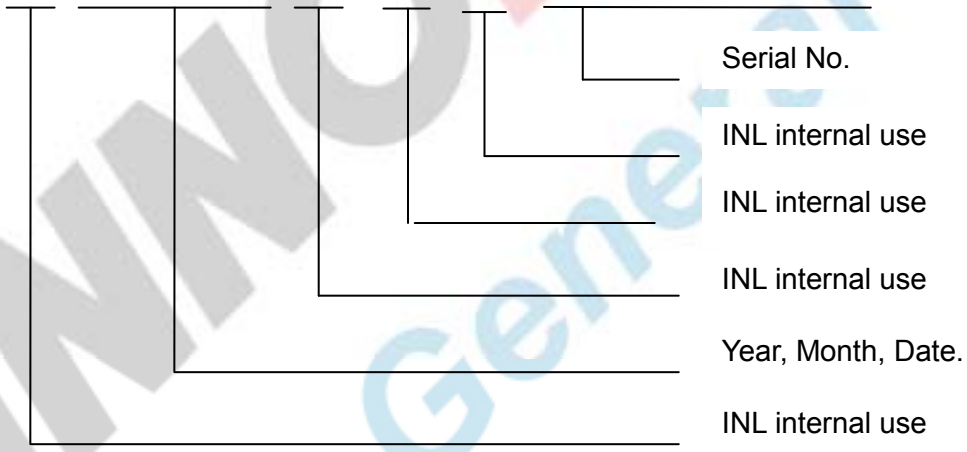
(1) Do not apply rough force such as bending or twisting to the module during assembly.
(2) To assemble or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
(3) It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.
(4) Always follow the correct power sequence when LCD module is connecting and operating.
(5) Do not pull the I/F connector in or out while the module is operating.
(6) Do not disassemble the module.
(7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
(8) It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.
(9) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.

8. Label Definition

8-1. Module label

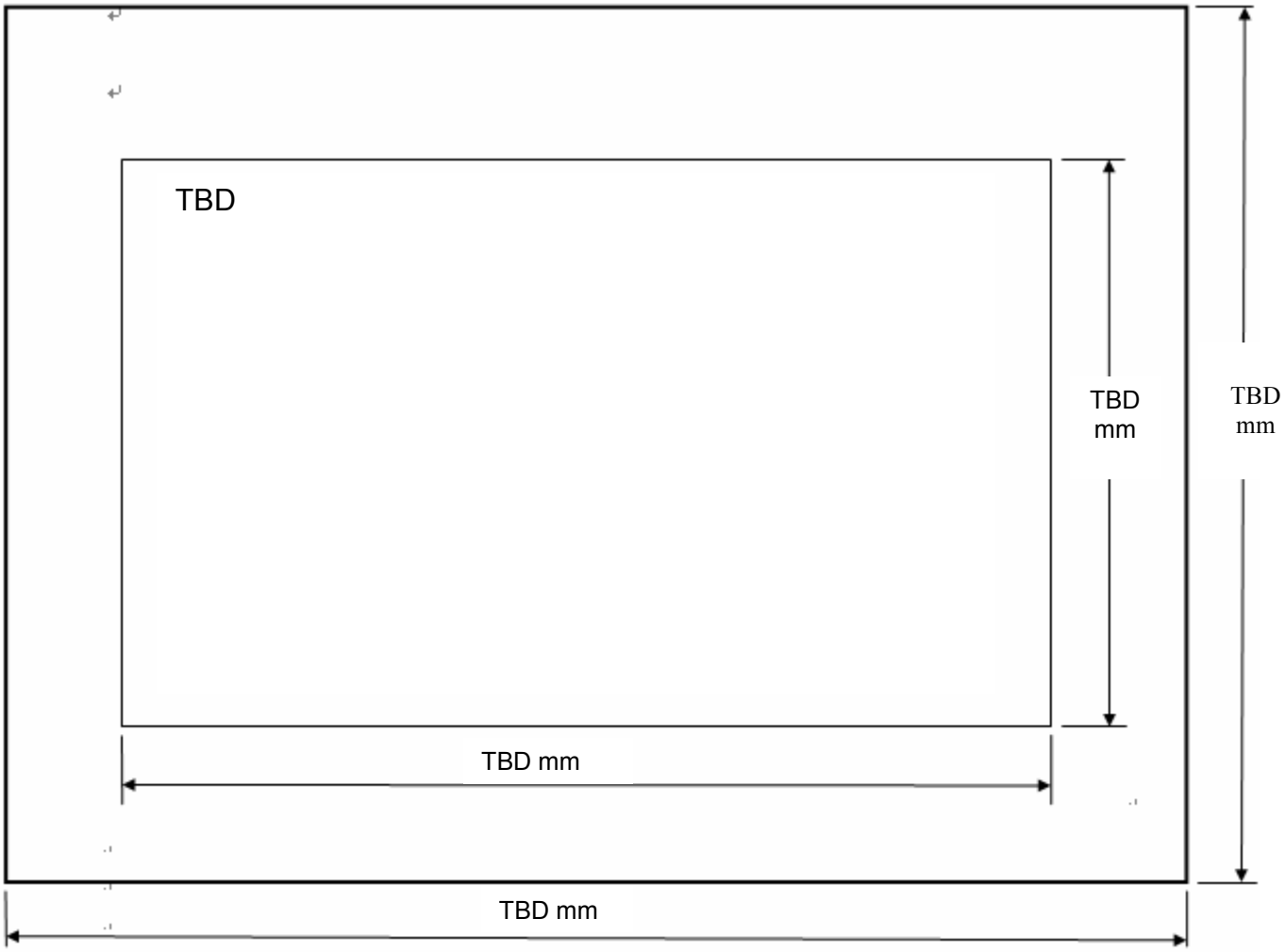


(a) Model Number : BT101IW01 V.0
(b) Product Number : AB101000100X
(c) Serial ID I : Z_1 Z_2 Z_3 Z_4 Z_5 Z_6 - Z_7 - Z_8 Z_9 Z_{10} Z_{11} Z_{12}



Serial ID includes the information as below:
Manufactured Date: Year: 0~9, for 2000~2009
Month: 1~9 & A~C for Jan.~Dec.
Date: 1~9 & A~Z (exclude I, O, Q, U) for 1th~31th
Serial No.: Module manufactures sequential number.

8-2. Carton label



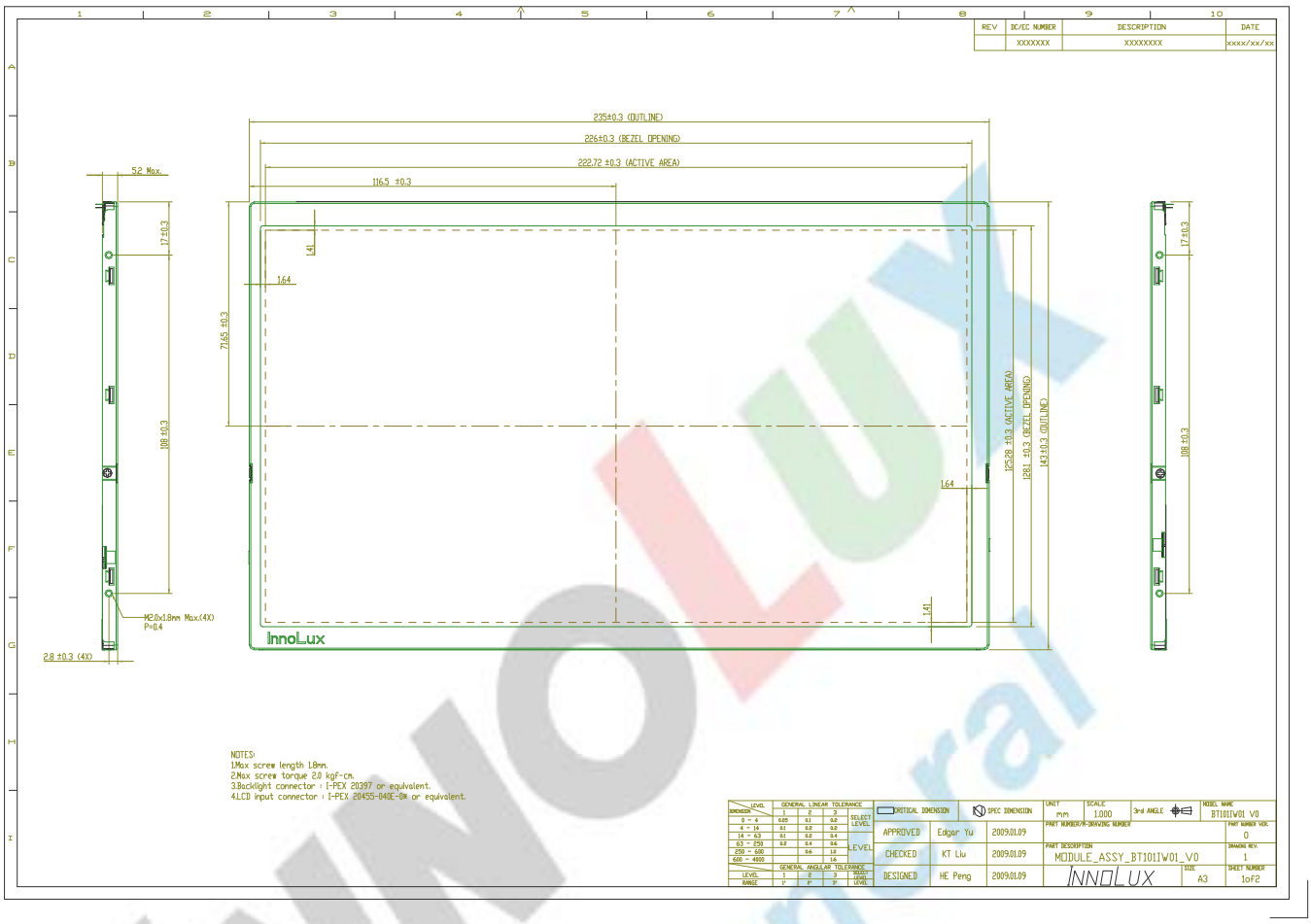
(a) BOX ID (INL internal use)：XXXX-X-XXXX
(b) Model Number：BT101IW01 V.0
(c) Product Number：AB101000100X

9. Packing Form

TBD

10. Mechanical drawings

10-1 Front Side



10-2 Rear Side