

保管單位 Storage	PDM
保存年限 Retention Period	3 年

TFT-LCD FOG SPECIFICATION

FOG Name: MT190AW02V.W

Preliminary Specification

Final Specification

Customer	
Prepared by	
Approved by	

Century	
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REVISION STATUS

Revision	Description	Page	Revision Date
1.0	First Revision	22	2012/02/28
2.0	Normal POL change optical SPEC.	13	2012/7/14

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A. General Specifications

NO.	Item	Specification	
1	Display resolution (pixel)	1440(H) X 900(V), WXGA+ resolution	
2	Active area (mm)	408.24(H) X 255.15(V)	
3	Screen size (inch)	19 inches diagonal	
4	Pixel pitch (mm)	0.2835(H) X 0.2835 (V)	
5	Color configuration	R, G, B vertical stripe	
6	Overall dimension (mm)	428 (W) X 278 (H) X 16 (D) (Typ.)	
7	Surface treatment	Anti-Glare, Haze=25%, Hard coating (3H)	Note 1
8	Input color signal	8 bit LVDS	
9	Display colors	16.7M (6 bit with Hi-FRC)	
10	Color saturation	68% NTSC	
11	Optimum viewing direction	6 o'clock	
12	RoHS&HF	RoHS & HF compliance	
13	TCO'03	TCO'03 compliance	Note 2

Note 1: Glare Option available

Note 2: Only Anti-Glare model can meet TCO'03 compliance

B. Electrical specifications

1. Pin assignment connector

1.1TFT LCD Module

FOXCONN GS23302-0311S-7F or mechanical interface equivalent connector.

Pin No	Symbol	Description
Frame	VSS	Ground
1	RXinO0-	-LVDS differential data input, Chan 0-Odd
2	RXinO0+	+LVDS differential data input, Chan 0-Odd
3	RXinO1-	-LVDS differential data input, Chan 1-Odd
4	RXinO1+	+LVDS differential data input, Chan 1-Odd
5	RXinO2-	-LVDS differential data input, Chan 2-Odd
6	RXinO2+	+LVDS differential data input, Chan 2-Odd
7	VSS	Ground
8	RXOC-	-LVDS differential Clock input (Odd)
9	RXOC+	+LVDS differential Clock input (Odd)
10	RXinO3-	-LVDS differential data input, Chan 3-Odd
11	RXinO3+	+LVDS differential data input, Chan 3-Odd
12	RXinE0-	-LVDS differential data input, Chan 0-Even
13	RXinE0+	+LVDS differential data input, Chan 0-Even
14	VSS	Ground
15	RXinE1-	-LVDS differential data input, Chan 1-Even
16	RXinE1+	+LVDS differential data input, Chan 1-Even
17	VSS	Ground
18	RXinE2-	-LVDS differential data input, Chan 2-Even
19	RXinE2+	+LVDS differential data input, Chan 2-Even
20	RXEC-	-LVDS differential Clock input (Even)
21	RXEC+	+LVDS differential Clock input (Even)
22	RXinE3-	-LVDS differential data input, Chan 3-Even
23	RXinE3+	+LVDS differential data input, Chan 3-Even
24	VSS	Ground
25	NC	No Connection
26	NC	No Connection
27	NC	No Connection
28	VCC	+5.0V power supply
29	VCC	+5.0V power supply
30	VCC	+5.0V power supply
Frame	VSS	Ground

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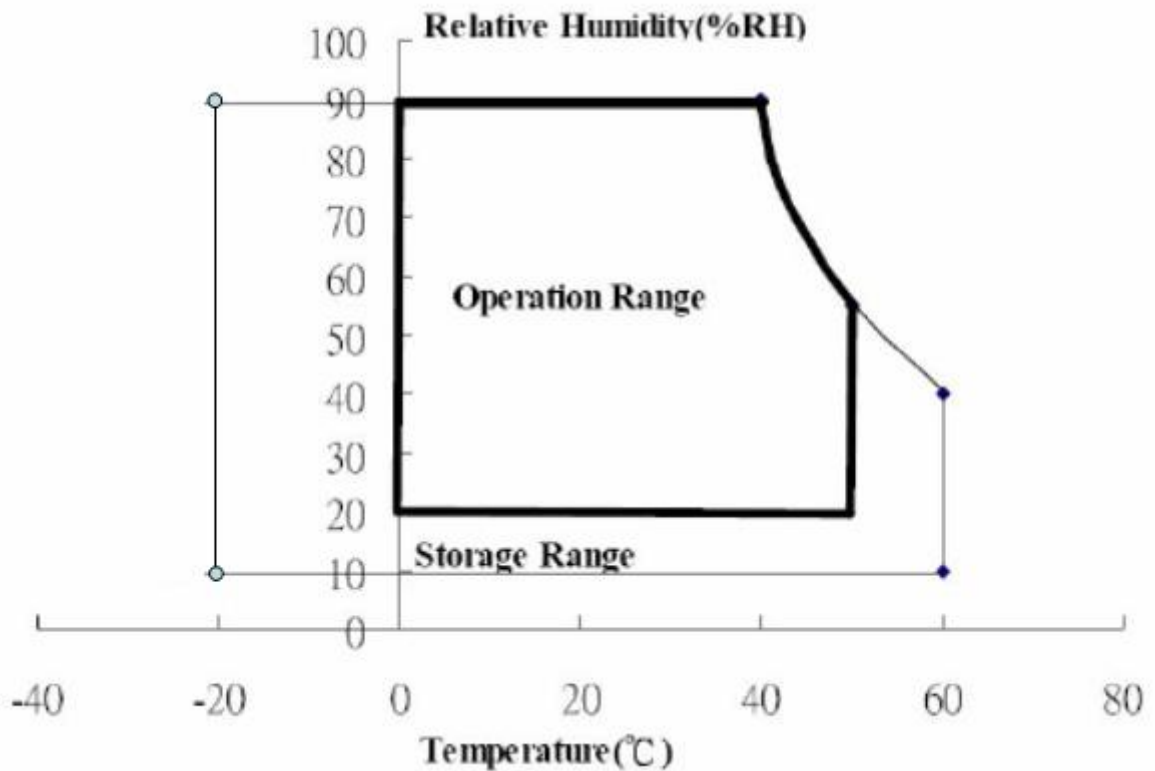
2. Absolute maximum ratings

Ta=25±2°C

Parameter	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
Power voltage	Vcc	-0.3	-	6.0	V	At25°C
Input signal voltage	VLH	-0.3	-	4.3	V	At25°C
Storage temperature	TST	-20	-	60	°C	(1)
Operating Ambient temperature	Top	0	-	50	°C	(2)

Note 1: The unit should not be exposed to corrosive chemicals.

Note 2: 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.



3. Electrical characteristics

a. Typical operating conditions

Item	Symbol	Min.	Typ.	Max.	Unit	Remark	
Input Voltage	V_{CC}	4.5	5	5.5	V		
Permissive Power Input Ripple	V_{RF}	-	-	0.15	V		
Input Current	Black	I_{CC}	-	700	1000	mA	Note 1
	White	I_{CC}	-	500	700		Note 2
	Mosaic	I_{CC}	-	700	1000		Note 3
Rush Current		I_{Rush}	-	1.6	3	A	Note 4
Logic Input Voltage LVDS : IN+, IN-	Common Mode Voltage	VCM	-	1.2		V	
	Differential Input Voltage	VID	100	-	600	mV	
	Threshold Voltage (High)	VTH	-	-	100	mV	Note 5
	Threshold Voltage (Low)	VTL	-100	-	-	mV	Note 5

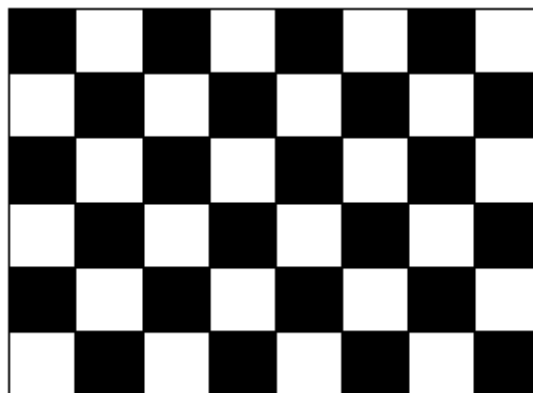
Note 1 : The specified current is under the $V_{CC} = 5V$, $25\text{ }^{\circ}C$, $f_v = 60Hz$ (frame frequency) condition whereas black pattern is displayed.

Note 2 : The specified current is under the $V_{CC} = 5V$, $25\text{ }^{\circ}C$, $f_v = 60Hz$ (frame frequency) condition whereas white pattern is displayed.

Note 3 : The specified current is under the $V_{CC} = 5V$, $25\text{ }^{\circ}C$, $f_v = 60Hz$ (frame frequency) condition whereas mosaic pattern (black & white [8*6]) is displayed.

White : 255 Gray

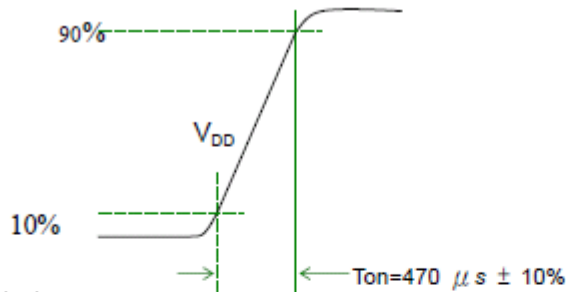
Black : 0 Gray



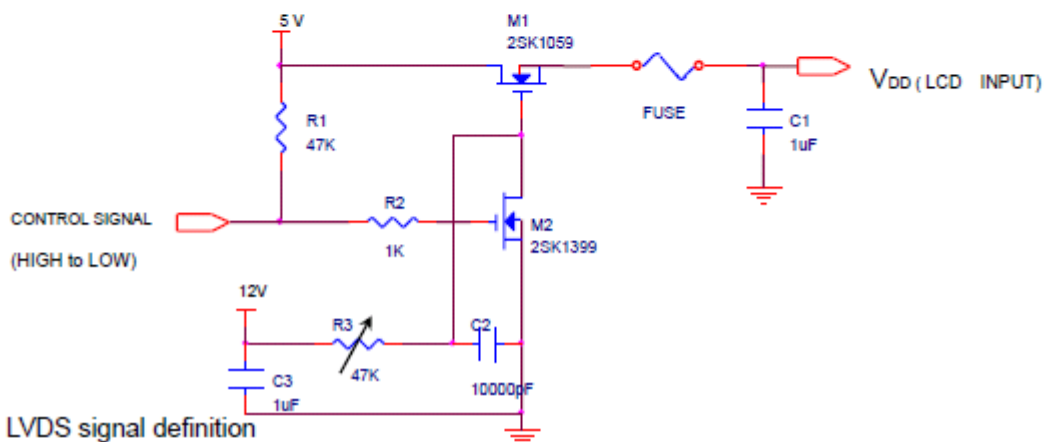
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Note 4 : test condition :

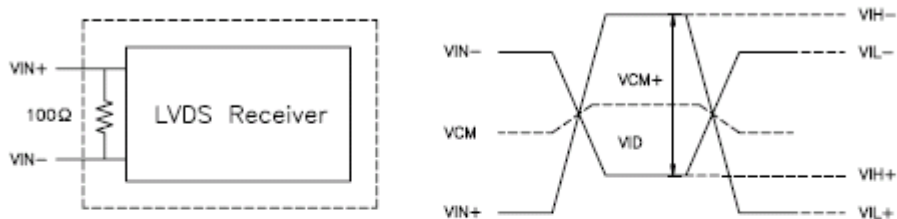
(1) $V_{DD} = 5\text{ V}$, V_{DD} rising time = $470\ \mu\text{s} \pm 10\%$



(2) Test Circle



Note 5: LVDS signal definition



VIN_+ = Positive differential DATA & CLK Input

VIN_- = Negative differential DATA & CLK Input

$VID = VIN_+ - VIN_-$,

$\Delta VCM = |VCM_+ - VCM_-|$,

$\Delta VID = |VID_+ - VID_-|$,

$VID_+ = |VIH_+ - VIH_-|$,

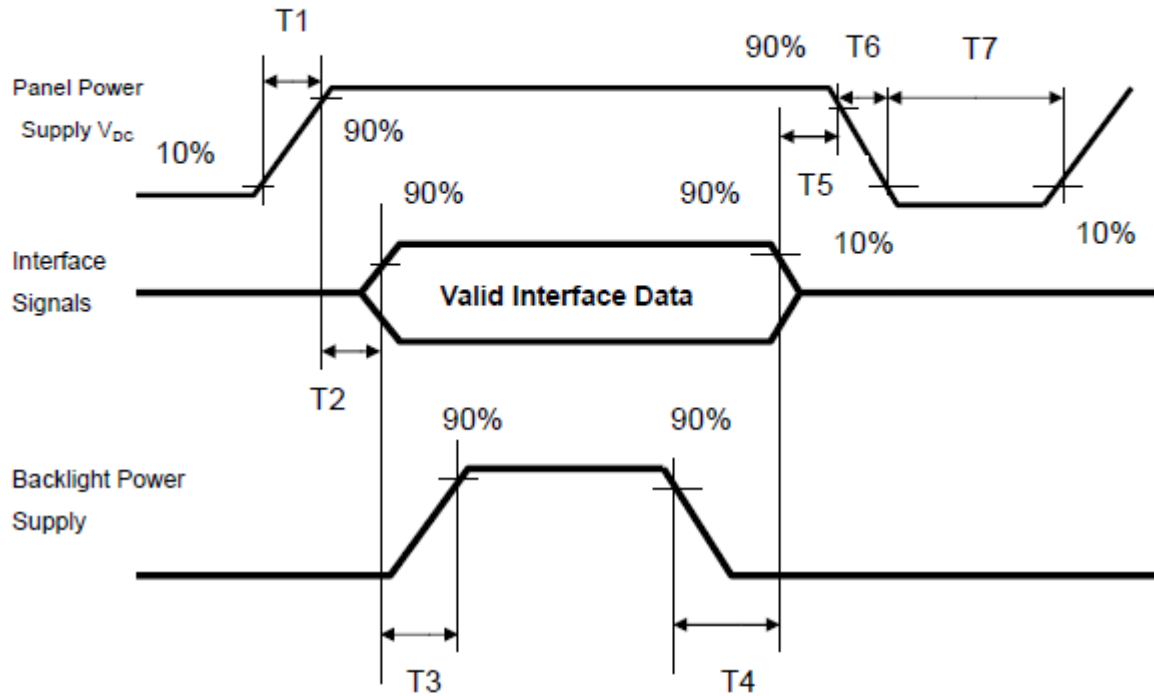
$VID_- = |VIL_+ - VIL_-|$,

$VCM = (VIN_+ + VIN_-)/2$,

$VCM_+ = (VIH_+ + VIH_-)/2$,

$VCM_- = (VIL_+ + VIL_-)/2$,

Note 6 : Power on sequence for LCD V_{DD}



Parameter	Value			Unit
	Min	Typ	Max	
T1	0.1	-	10	ms
T2	0	30	50	ms
T3	200	250	-	ms
T4	100	250	-	ms
T5	0	20	50	ms
T6	0.1	-	10	ms
T7	1000	-	-	ms

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b. Display color vs. input data signals

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color; the higher the binary input, the brighter the color. The table below provides a reference for color versus data input.

Color	Input color data																							
	Red								Green								Blue							
	MSB							LSB	MSB							LSB	MSB							LSB
	R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
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
	Red(255)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	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	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
Red	Red(000) dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(001)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(002)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255) bright	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green	Green(000)dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(002)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(253)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)bright	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Blue	Blue(000) dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(002)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255) bright	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

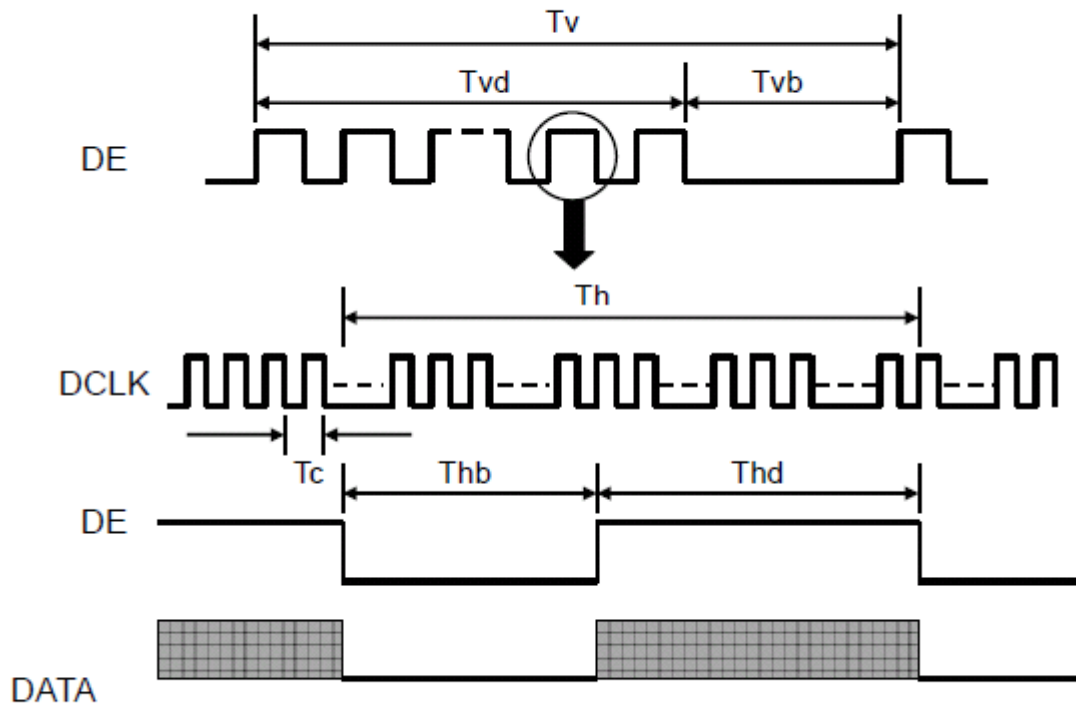
c. Input signal timing

Support Input Timing Table

	Item	Description	Min.	Typ.	Max.	Unit
Clock	Dclk	period	17.24	22.5	27	nS
		frequency	37	44.4	58	MHz
Vertical	T_{V_TOTAL}	V total line number	905	926	942	T_{H_TOTAL}
	T_{V_DATA}	Data duration	—	900	—	T_{H_TOTAL}
	T_{VB}	V-blank	5	26	—	T_{H_TOTAL}
	f_V	frequency	50	60	75	Hz
Horizontal	T_{H_TOTAL}	H total pixel number	752	800	968	DCIk
	T_{H_DATA}	Data duration	—	720	—	DCIk
	T_{HB}	H-blank	32	80	—	DCIk

Note: Because this module is operated by DE only mode, Hsync and Vsync input signals should be set to low Logic level or ground. Otherwise, this module would operate abnormally.

INPUT SIGNAL TIMING DIAGRAM



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d. Display Position

D(1, 1)	D(2, 1)	D(720, 1)	D(1439, 1)	D(1440, 1)
D(1, 2)	D(2, 2)	D(720, 2)	D(1439, 2)	D(1440, 2)
⋮		⋮	⋮	⋮
D(1, 450)	D(2, 450)	.....	D(720, 450)	.....	D(1439, 450)	D(1440, 450)
⋮		⋮	⋮	⋮
D(1, 899)	D(2, 899)	.....	D(720, 899)	.....	D(1439, 899)	D(1440, 899)
D(1, 900)	D(2, 900)	.....	D(720, 900)	.....	D(1439, 900)	D(1440, 900)

C. Optical specifications

Item	Symbol	Condition	Specification			Unit	Remark
			Min.	Typ.	Max.		
Response time	Tr	$\theta = 0^\circ$	-	1.5	4	ms	Note 3
	Tf		-	3.5	6		
	Tr+Tf		-	5	10		
Contrast ratio	CR	$\theta = 0^\circ$	500	700	-		Note 1,3
Viewing angle	Top	$CR \geq 10$	15	20	-	deg.	Note 1,3,4
	Bottom	$CR \geq 10$	30	40	-		
	Left	$CR \geq 10$	30	40	-		
	Right	$CR \geq 10$	30	40	-		
Color chromaticity(CIE)	Wx	$\theta = 0^\circ$	-0.03	0.308	+0.03		Note 1
	Wy			0.325			
	Rx			0.647			
	Ry			0.330			
	Gx			0.289			
	Gy			0.588			
	Bx			0.140			
	By			0.090			
Transmittance	Trans		5.0%	5.8%			Note6
Cross talk	Ct		-		2%		Note6

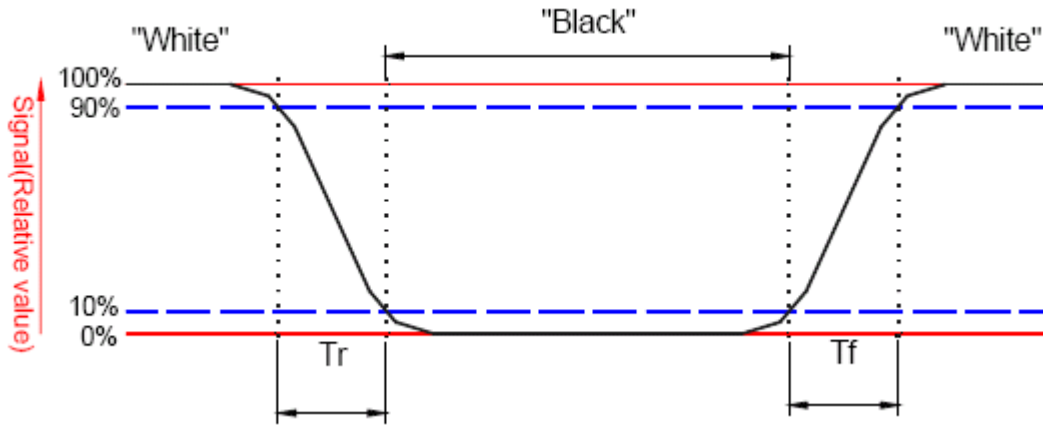
Note 1: Ambient temperature = 25°C.

To be measured in dark room after backlight warm up 30 minutes.

Note 2: Definition of response time:

The output signals of BM-5A are measured when the input signals are changed to "White" (falling time) and from "White" to "Black" (rising time), respectively. The interval is between the 10% and 90% of amplitudes. Refer to figure as below.

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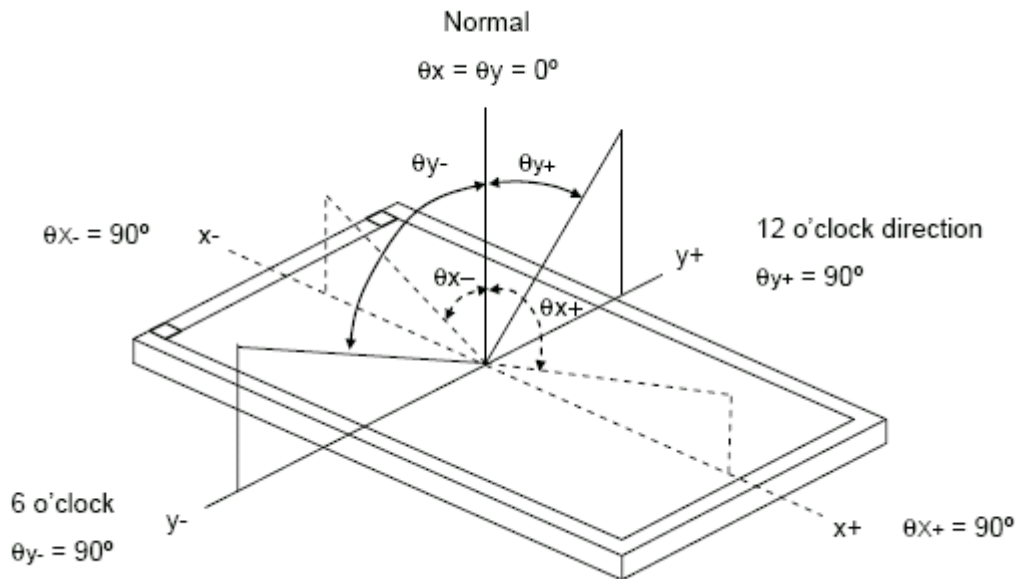


Note 3: Definition of contrast ratio:

Contrast ratio is calculated by the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "white" state}}{\text{Brightness on the "black" state}}$$

Note 4: Definition of viewing angle

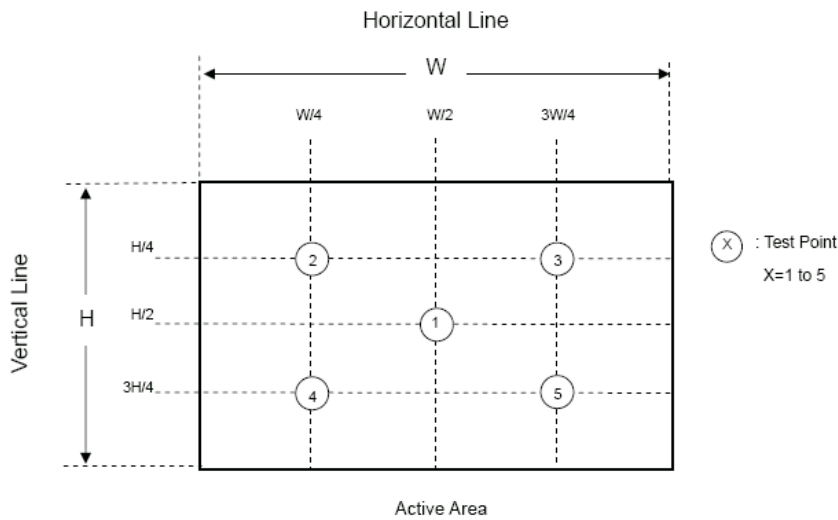


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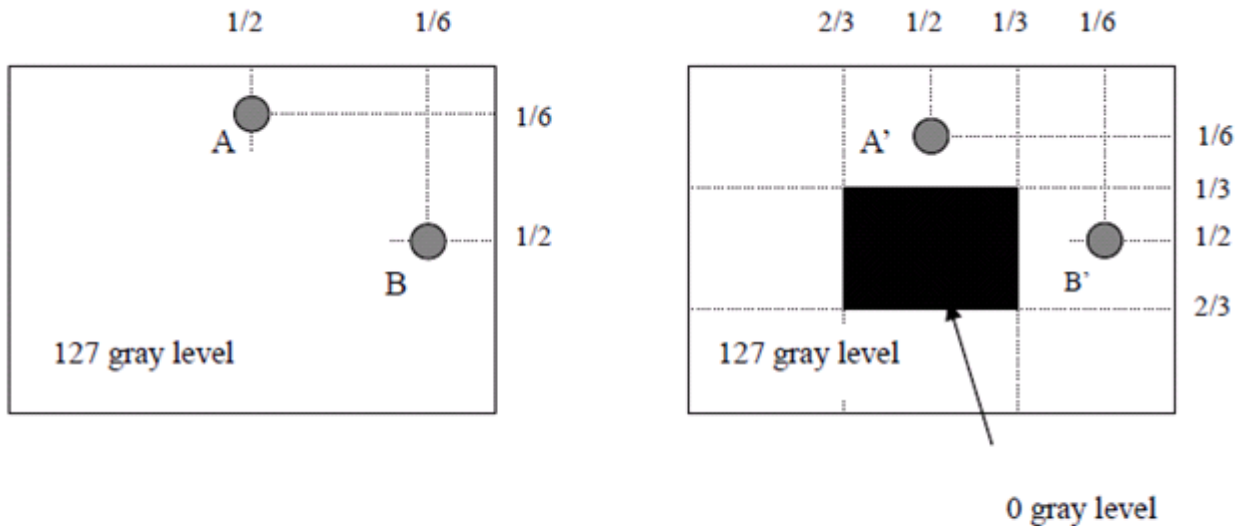
Note 5: Definition of Transmittance:

Panel is without signal input. Measure the Transmittance at 5 points. (at C light Source)

$$\text{Transmittance} = \frac{\text{Luminance of LCD module}}{\text{Luminance of backlight}} \times 100\%$$



Note 6:

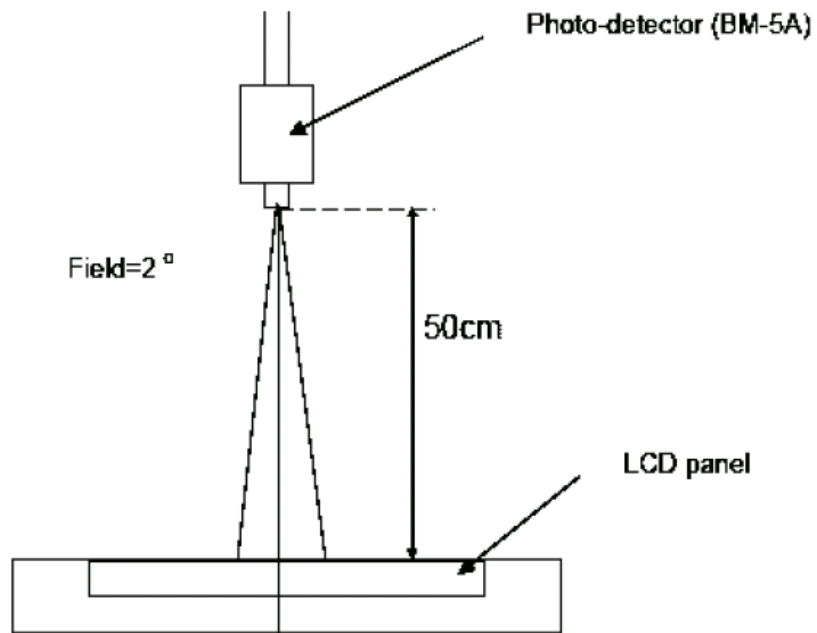


$|L_A - L_{A'}| / L_A \times 100\% = 2\% \text{ max.}$, L_A and $L_{A'}$ are brightness at location A and A'

$|L_B - L_{B'}| / L_B \times 100\% = 2\% \text{ max.}$, L_B and $L_{B'}$ are brightness at location B and B'

Note 10: Optical characteristic measurement setup.

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D. Reliability test item

Test Item	Test Condition	Judgment	Remark
High temperature storage	60°C, 240Hrs	Note 1	Note 2
Low temperature storage	-20°C, 240Hrs	Note 1	Note 2
High temperature & high humidity operation	40°C, 90%RH, 240Hrs (No condensation)	Note 1	Note 2
High temperature operation	50°C, 240Hrs	Note 1	Note 2
Low temperature operation	0°C, 240Hrs	Note 1	Note 2
Thermal Shock (non-operation)	-20°C~60°C 1Hr, 1Hr, 100cycles	Note 1	Note 2
Electrostatic discharge (ESD)	Contact: +/-8kV, 150pF(330ohms), 16points 10 times/1 point, 1 time/1 sec Air discharge: +/-15kV, 150pF(330ohms), 9 points, 10 times/1 point, 1 time/1 sec	Note 1	Note 2
Vibration (non-operation)	Vibration level : 1.5G Bandwidth : 10-300Hz Waveform : sine wave, sweep rate : 10min 30 min for each direction X, Y, Z (1.5 Hrs in total)	Note 1	Note 2
Mechanical Shock (non-operation)	Shock level : 50G, 11ms Waveform : Half sine wave Direction : ±X, ±Y, ±Z One time each direction	Note 1	Note 2
MTBF Demonstration	30,000 hours with confidence level 90%	Note 1	Note 3

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Note1: 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.

Note2: Evaluation should be tested after storage at room temperature for two hour.

Note3: The MTBF calculation is based on the assumption that the failure rate distribution meets the Exponential Model

E. Safety

(1) Sharp Edge Requirements

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

(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 customer Toxicologist.

b. Flammability

All components including electrical components that do not meet the flammability grade UL94-V1 in the module will complete the flammability rating exception approval process. The printed circuit board will be made from material rated 94-V1 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.

F. Display quality

The display quality of the color TFT-LCD module should be in compliance with the customer's Incoming inspection standard.

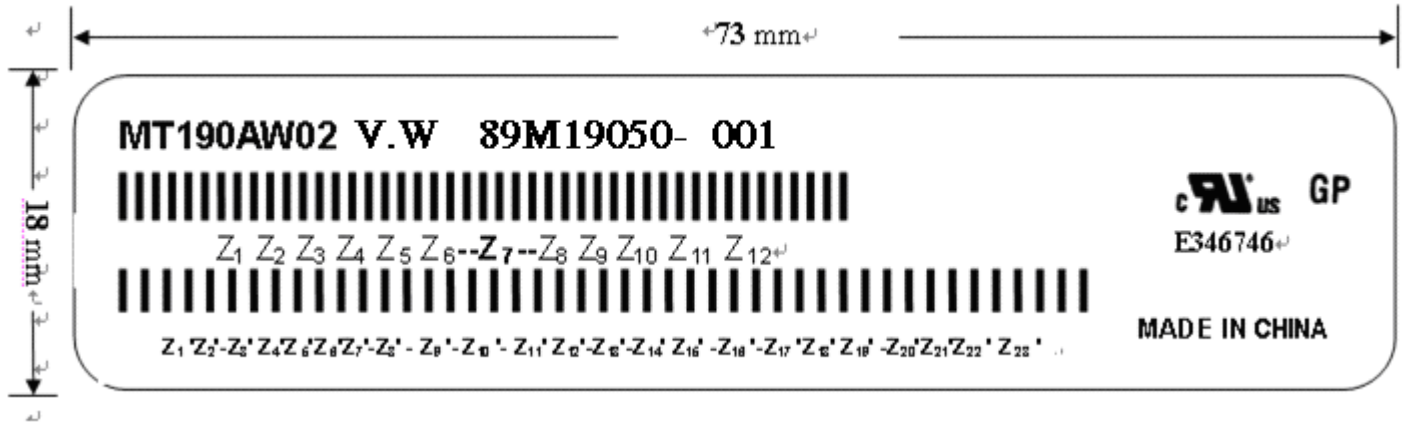
G. Handling precaution

The Handling of the TFT-LCD should be in compliance with the customer's handling principle standard.

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H. Label

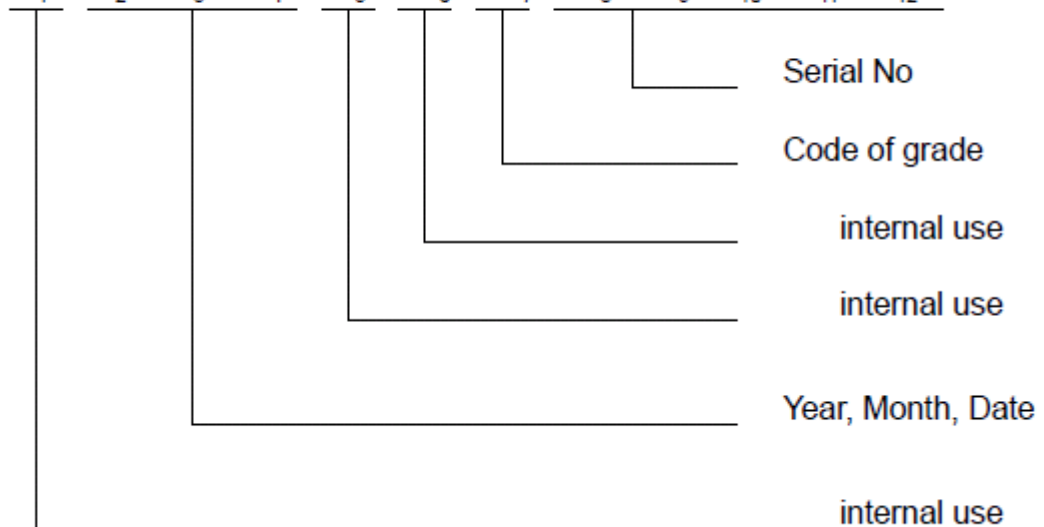
(1) FOG成品 Label



(a) Model Number: MT190AW02

(b) Version: V.W

(c) Serial ID I: Z₁ Z₂ Z₃ Z₄ Z₅ Z₆ Z₇ Z₈ Z₉ Z₁₀ Z₁₁ Z₁₂



Serial ID includes the information as below:

1. Manufactured Date: Year: 0~9, for 2010~2019
2. Month: 1~9 & A~C for Jan.~Dec.
3. Date: 1~9 & A~Z (exclude I, O, Q, U) for 1st~31th
4. Code of grade: 1, 2, 3, 5, E
5. Serial No: Module manufacture sequence no

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(2) Carton Label

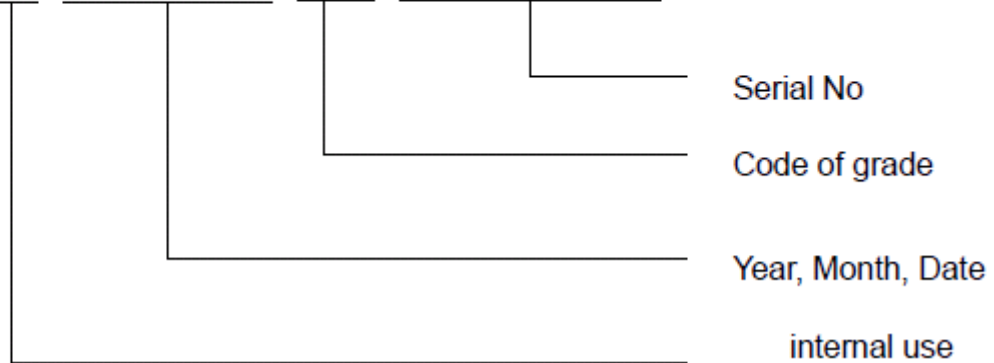


(a) Model Number: MT190AW02

(b) Version:

(c) Packing quantity:

(d) Serial ID: Z₁ Z₂ Z₃ Z₄ Z₅ Z₆ Z₇ Z₈ Z₉



Serial ID includes the information as below:

(a) Manufactured Date: Year: 0~9, for 2010~2019

Month: 1~9 & A~C for Jan.~Dec.

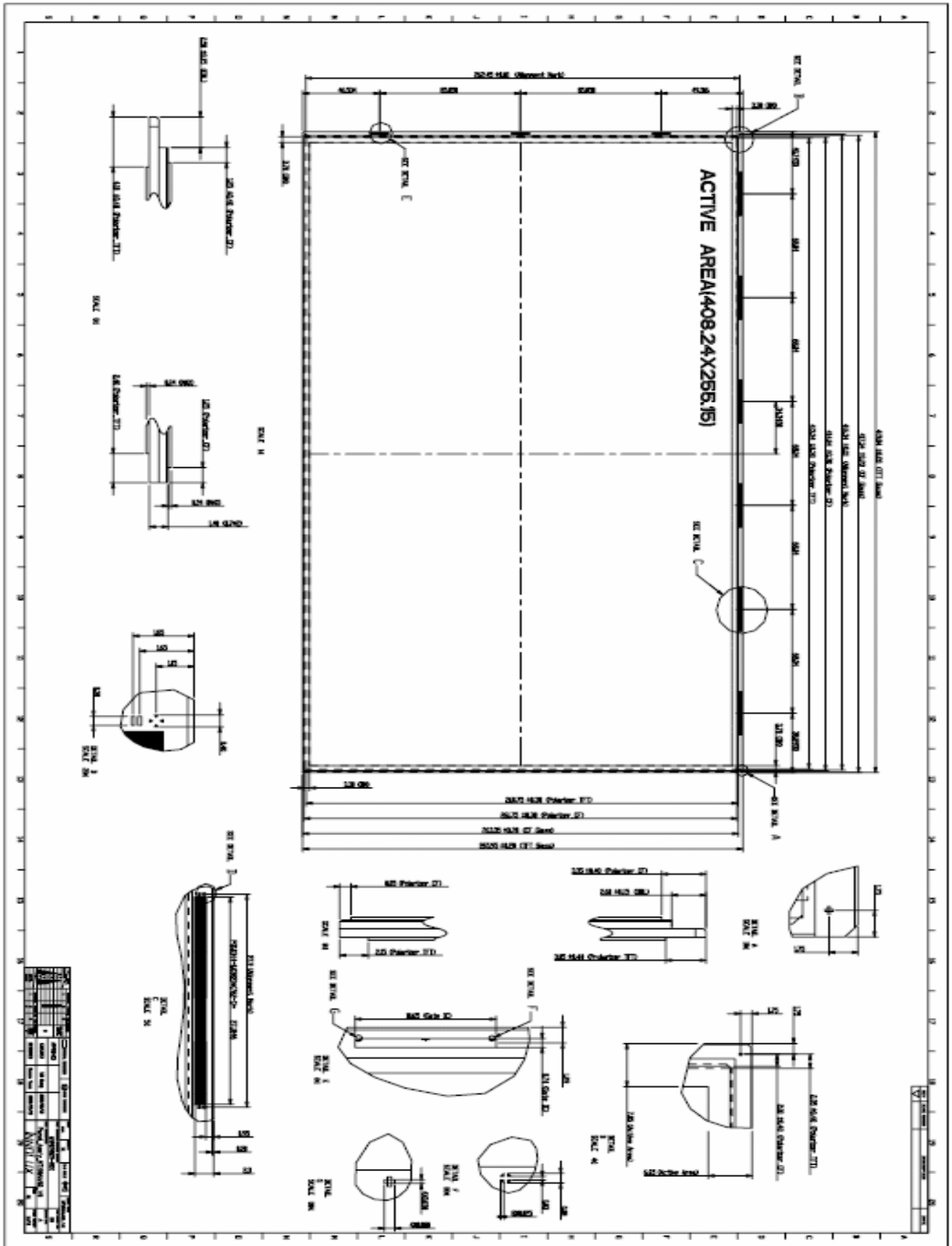
Date: 1~9 & A~Z (exclude I, O, Q, U) for 1st~31th

(b) Code of grade: 1,2, 3, 5, E

(c) Serial No: Module packing sequence no

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I. Mechanical Drawings



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