

PRODUCT SPECIFICATIONS

For Customer: _____

: APPROVAL FOR SPECIFICATION

Customer Model No. _____

: APPROVAL FOR SAMPLE

Module No.: 3.5" TFT with CTP and bezel

Date : 2020-02-28

Table of Contents

No.	Item	Page
1	Cover Sheet(Table of Contents)	P1
2	Revision Record	P2
3	General Specifications	P3
4	Outline Drawing	P4
5	Absolute Maximum Ratings	P5
6	Electrical Specifications	P6-P10
7	Optical Characteristics	P11-P14
8	Reliability Test Items and Criteria	P15
9	Precautions for Use of LCD Modules	P16-P17

For Customer's Acceptance:

Approved By	Comment

PREPARED	CHECKED	VERIFIED BY QA DEPT	VERIFIED BY R&D DEPT

2. Revision Record

Date	Rev.No.	Page	Revision Items	Prepared

3. General Specifications

3.5" TFT with Capacitive Touch Screen and bezel is composed of a TFT - LCD panel, driver IC, FPC, TP, a back light unit. The 3.5" display area contains 320 x 240pixels and can display up to 16.7M colors.

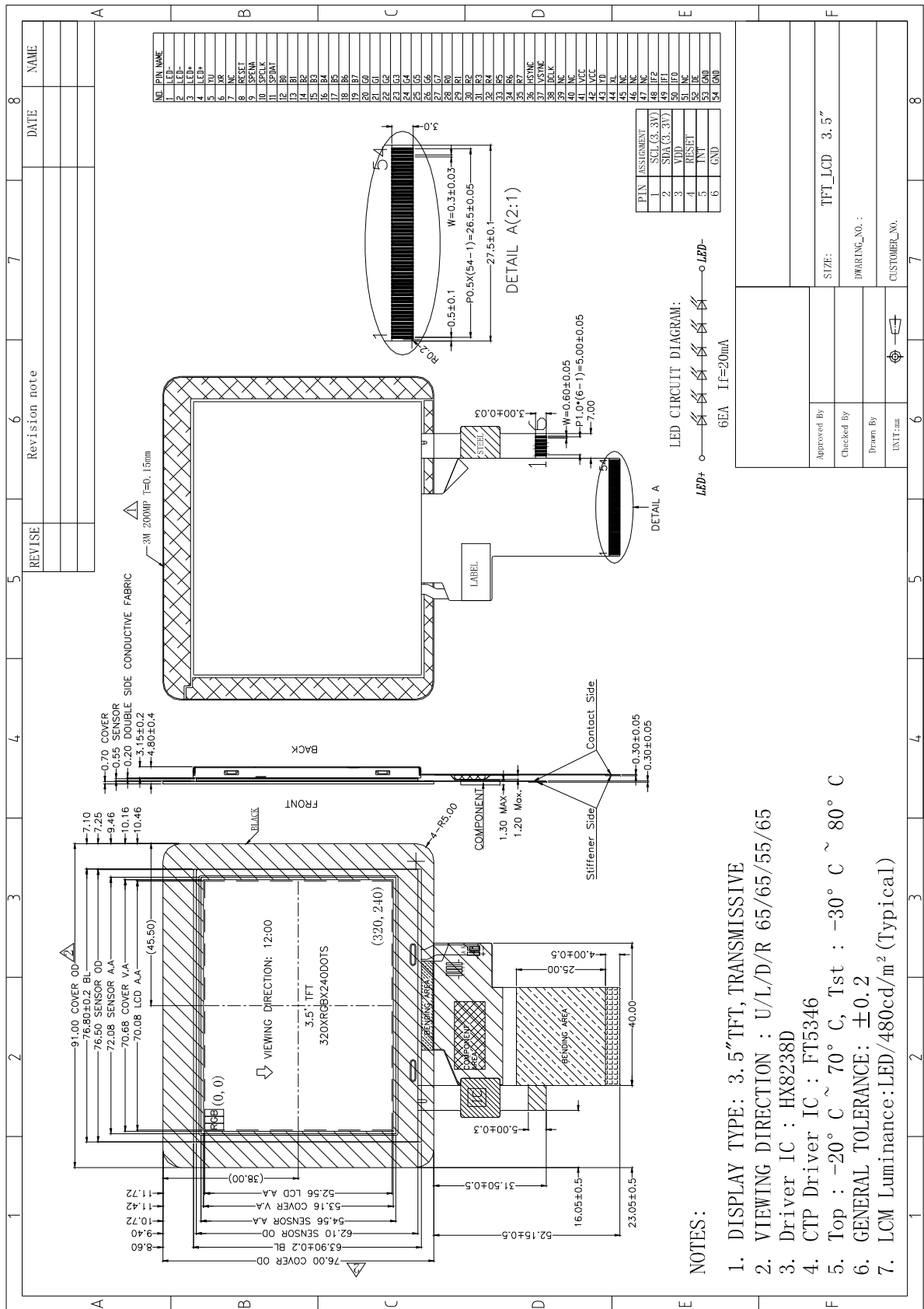
This product accords with RoHS environmental criterion.

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	16.7M		1
Viewing Direction	12	O'Clock	
Gray inversion	6	O'Clock	
Operating temperature	-20~+70	°C	
Storage temperature	-30~+80	°C	
Module size	91.0X76.0X4.8	mm	2
Active Area(W×H)	70.08X52.56	mm	
Number of Dots	320×240	dots	
TFT Controller	HX8238D	-	
CTP Driver	FT5346	-	
Power Supply Voltage	3.3	V	
Backlight	6S-LEDs (white)	pcs	
Weight	---	g	
Interface	RGB888	-	

Note 1: Color tune is slightly changed by temperature and driving voltage.

Note 2: Without FPC and Solder.With CTP.

4.Outline Drawing



5. Absolute Maximum Ratings($T_a=25\text{ }^\circ\text{C}$)

5.1 Electrical Absolute Maximum Ratings.($V_{ss}=0V, T_a=25\text{ }^\circ\text{C}$)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	VCC	-0.3	5.0	V	1, 2
Power Supply Voltage	VDD-CTP	2.7	3.6	V	1, 2

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.

2. $V_{CC} > V_{SS}$ must be maintained.

3. Please be sure users are grounded when handing LCD Module.

5.2 Environmental Absolute Maximum Ratings.

Item	Storage		Operating		Note
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	$-30\text{ }^\circ\text{C}$	$80\text{ }^\circ\text{C}$	$-20\text{ }^\circ\text{C}$	$70\text{ }^\circ\text{C}$	1,2
Humidity	-	-	-	-	3

Notes:

1. The response time will become lower when operated at low temperature.

2. Background color changes slightly depending on ambient temperature.

The phenomenon is reversible.

3. $T_a \leq 40\text{ }^\circ\text{C}$: 85%RH MAX.

$T_a > 40\text{ }^\circ\text{C}$: Absolute humidity must be lower than the humidity of 85%RH at $40\text{ }^\circ\text{C}$.

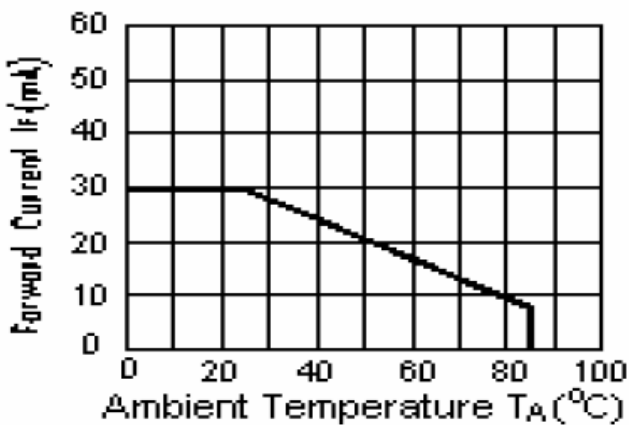
6. Electrical Specifications

6.1 Electrical characteristics ($V_{SS}=0V, T_a=25^\circ C$)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply	VCC	$T_a=25^\circ C$	3.0	3.3	3.6	V	
Power supply	VDD-C TP	$T_a=25^\circ C$	-	2.8	3.3	V	
Input voltage	'H'	V_{IH}	$VCC=3.3V$	$0.8*VCC$	-	VCC	V
	'L'	V_{IL}	$VCC=3.3V$	0	-	$0.2*VCC$	V

6.2 LED backlight specification ($V_{SS}=0V, T_a=25^\circ C$)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	V_f	$I_f=20mA$	16.2	18.0	19.8	V	
Uniformity	ΔB_p	$I_f=20mA$	75	80	-	%	
Life Time	time	$I_f=20mA$	20K	-	-	hours	1



Note 1: Brightness to be decreased to 50% of the initial value at ambient temperature $T_a=25^\circ C$

6.3 Interface signals

Pin No.	Symbol	I/O	Function
1-2	LED-	P	LED cathode
3-4	LED+	P	LED anode
5	YU	I	RTP control pin,no use please NC
6	XR	I	RTP control pin,no use please NC
7	NC	-	No connection.
8	RESET	I	Reset pin,active"L"
9	SPENA	I	Chip select pin of serial
10	SPCLK	I	Clock pin of serial interface.
11	SPDAT	I	Data input pin in serial mode.
12-19	B0-B7	I	Blue data bus
20-27	G0-G7	I	Green data bus
28-35	R0-R7	I	Red data bus
36	HSYNC	I	Horizontal synchronous signal
37	VSYNC	I	Vertical synchronous signal
38	DCLK	I	Dot-clock signal and oscillator source.
39-40	NC	-	NC
41-42	VCC	P	Power supply
43	YD	I	RTP control pin,no use please NC
44	XL	I	RTP control pin,no use please NC
45-47	NC	-	No connection.
48-50	IF2-IF0	I	Define the input interface mode.
51	NC	-	No connection.
52	DE	I	Data Enable
53-54	GND	P	Ground

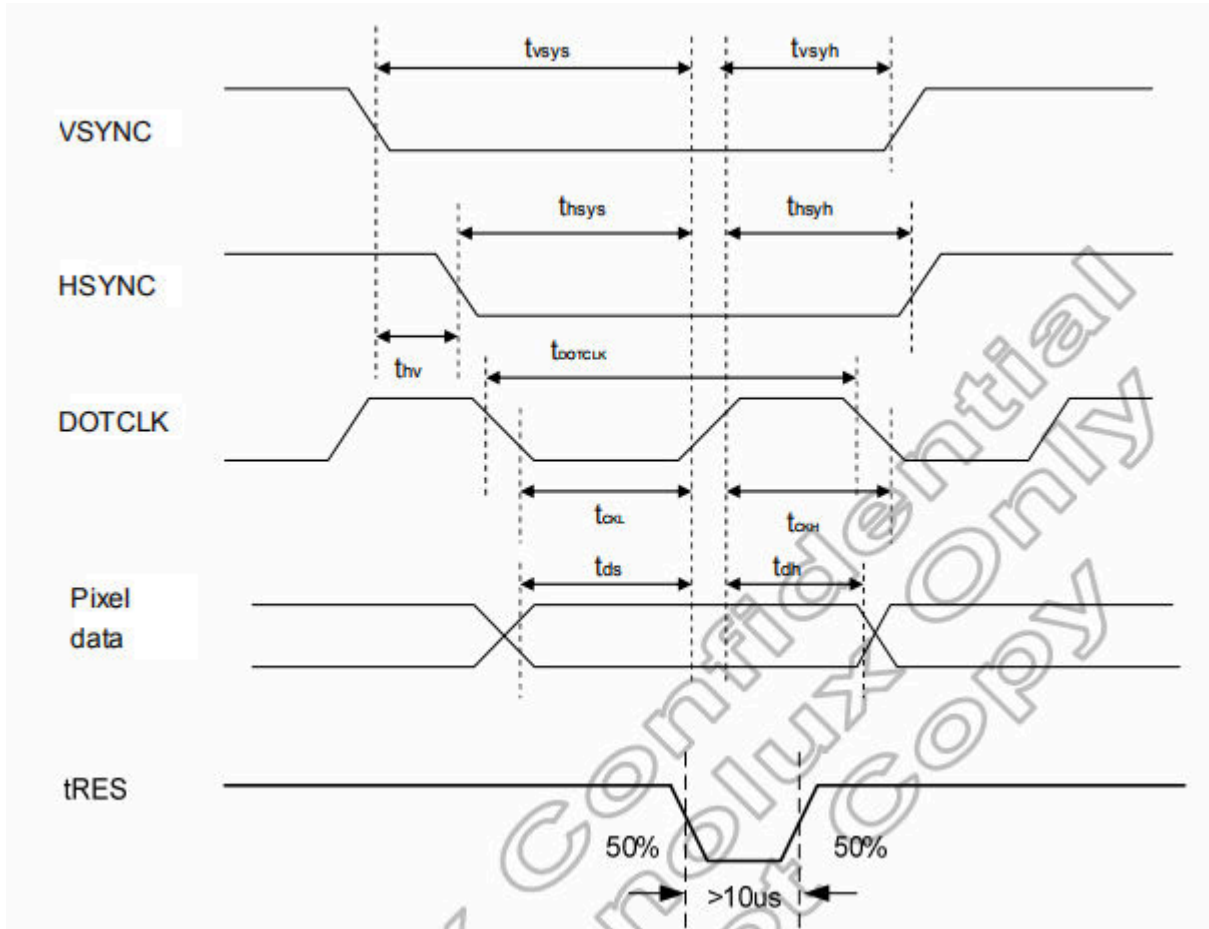
CTP interface

Pin No	Symbol	I/O	Function
1	SCL(3.3V)	I	I2C clock
2	SDA(3.3V)	I	I2C data
3	VDD	P	CTP Power supply
4	RESET	I	CTP Reset pin,active"L"
5	INT	I	External Interrupt to the IC of CTP
6	GND	P	Ground

Note:firmware DZ35-CG082_FT5346_320x240_Va2_D01_20190401_all

6.4 AC Characteristics

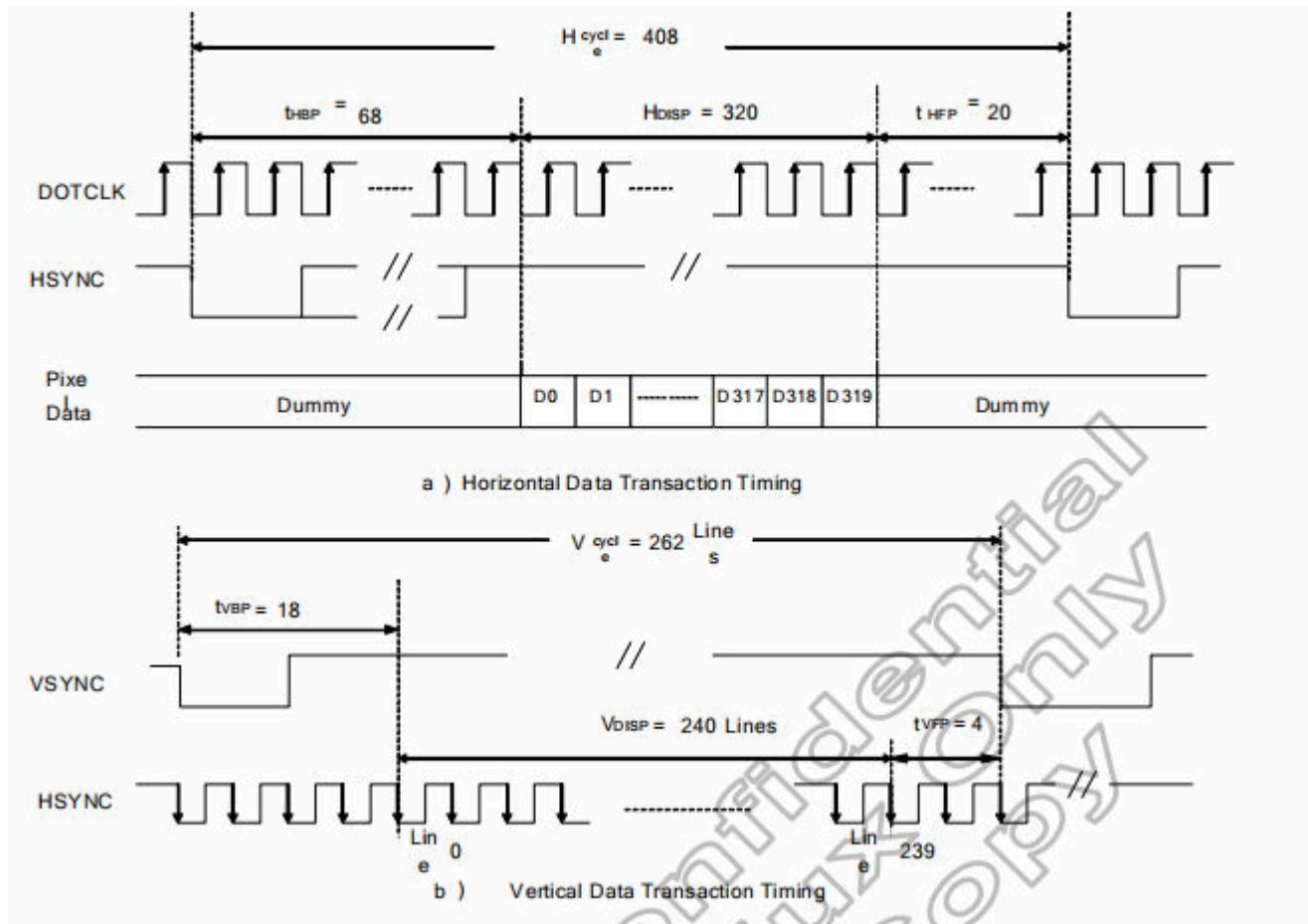
6.4.1 AC Characteristics



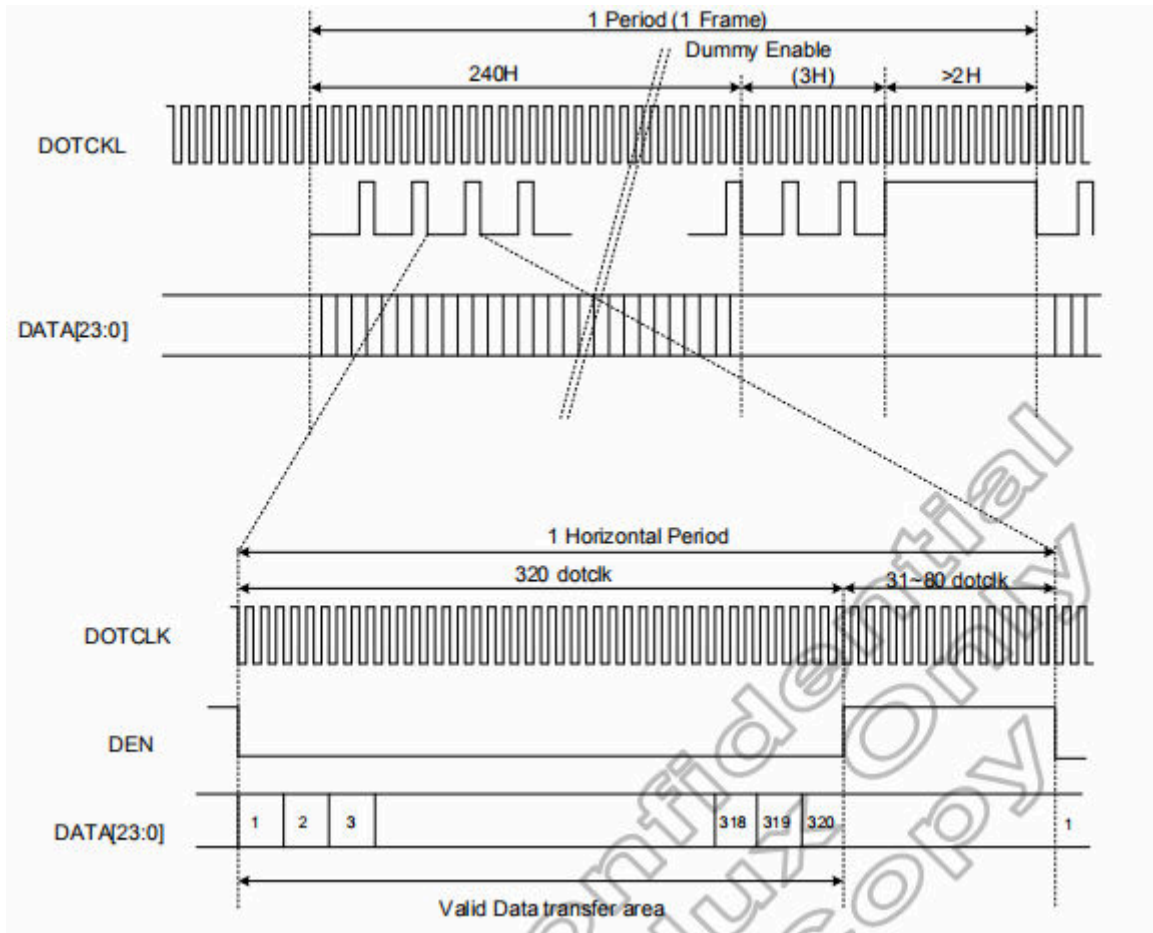
Characteristics	Symbol	Min.		Typ.		Max.		Unit
		24 bit	8 bit	24 bit	8 bit	24 bit	8 bit	
DOTCLK Frequency	fDOTCLK	-	-	6.5	19.5	10	30	MHz
DOTCLK Period	tDOTCLK	100	33.3	154	51.3	-	-	ns
Vertical Sync Setup Time	tvsys	20	10	-	-	-	-	ns
Vertical Sync Hold Time	tvsyh	20	10	-	-	-	-	ns
Horizontal Sync Setup Time	thsys	20	10	-	-	-	-	ns
Horizontal Sync Hold Time	thsyh	20	10	-	-	-	-	ns
Phase difference of Sync Signal Falling Edge	thv	1		-		240		tDOTCLK
DOTCLK Low Period	tCKL	50	15	-	-	-	-	ns
DOTCLK High Period	tCKH	50	15	-	-	-	-	ns
Data Setup Time	tds	12	10	-	-	-	-	ns
Data hold Time	tdh	12	10	-	-	-	-	ns
Reset pulse width	tRES	10		-		-		us

Note: External clock source must be provided to DOTCLK pin of HX8238-D. The driver will not operate if absent of the clocking signal.

6.4.2 Data Transaction Timing



Characteristics	Symbol	Min-		Typ.		Max.		Unit
		24 bit	8 bit	24 bit	8 bit	24 bit	8 bit	
DOTCLK Frequency	f _{DOTCLK}	-	-	6.5	19.5	10	30	MHz
DOTCLK Period	t _{DOTCLK}	100	33.3	154	51.3	-	-	ns
Horizontal Frequency (Line)	f _H	-	-	14.9		22.35		KHz
Vertical Frequency (Refresh)	f _V	-	-	60		90		Hz
Horizontal Back Porch	t _{HBP}	-	-	68	204	-	-	t _{DOTCLK}
Horizontal Front Porch	t _{HFP}	-	-	20	60	-	-	t _{DOTCLK}
Horizontal Data Start Point	t _{HBP}	-	-	68	204	-	-	t _{DOTCLK}
Horizontal Blanking Period	t _{HBP} + t _{HFP}	-	-	88	264	-	-	t _{DOTCLK}
Horizontal Display Area	H _{DISP}	-	-	320	960	-	-	t _{DOTCLK}
Horizontal Cycle	H _{cycle}	-	-	408	1224	450	1350	t _{DOTCLK}
Vertical Back Porch	t _{VBP}	-	-	18		-	-	Lines
Vertical Front Porch	t _{VFP}	-	-	4		-	-	Lines
Vertical Data Start Point	t _{VBP}	-	-	18		-	-	Lines
Vertical Blanking Period	t _{VBP} + t _{VFP}	-	-	22		-	-	Lines
Vertical Display Area	PAL	V _{DISP}	240		-		-	Lines
			280(PALM=0)					
			288(PALM=1)					
Vertical Cycle	NTSC	V _{cycle}	-		262		350	Lines
	PAL		313					



Signal Timing in DE Mode

7. Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Brightness	Bp	$\theta=0^\circ$ $\Phi=0^\circ$	-	480	-	Cd/m ²	1	
Uniformity	\triangle Bp		75	80	-	%	1,2	
Viewing Angle	3:00	Cr \geq 10	-	65	-	Deg	3	
	6:00		-	55	-			
	9:00		-	65	-			
	12:00		-	65	-			
Contrast Ratio	Cr	$\theta=0^\circ$ $\Phi=0^\circ$	200	300	-	-	4	
Response Time	T _r +T _f		-	50	80	ms	5	
Color of CIE Coordinate	W	x	$\theta=0^\circ$ $\Phi=0^\circ$	Typ -0.05	0.317	Typ +0.05	-	1,6
		y			0.322		-	
	R	x			0.639		-	
		y			0.344		-	
	G	x			0.294		-	
		y			0.587		-	
	B	x			0.132		-	
		y			0.136		-	

Note: The parameter is slightly changed by temperature, driving voltage and materiel

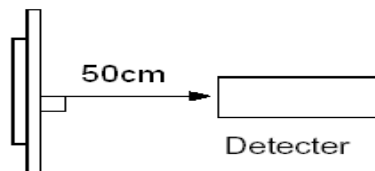
Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white.

The brightness is the average value of 9 measured spots. Measurement equipment BM-7 (Φ5mm)

Measuring condition:

- Measuring surroundings: Dark room.
- Measuring temperature: $T_a = 25^\circ\text{C}$
- Adjust operating voltage to get optimum contrast at the center of the display.

Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.

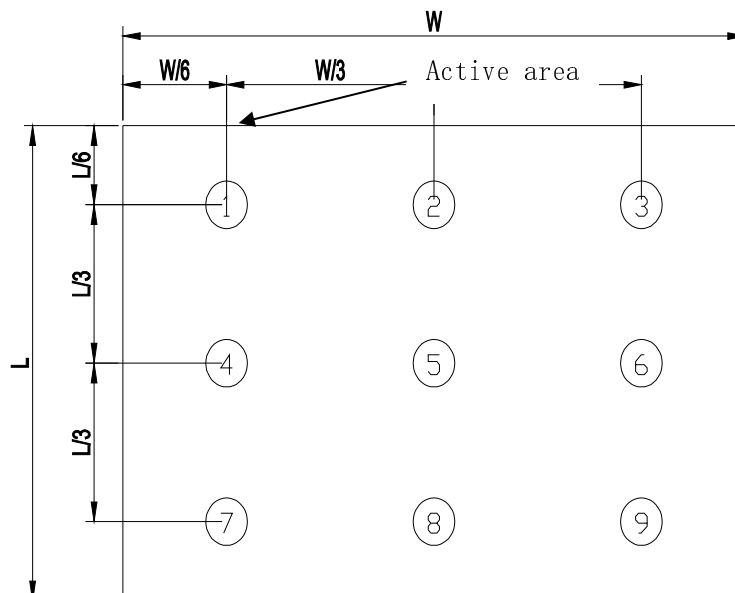


Note 2: The luminance uniformity is calculated by using following formula.

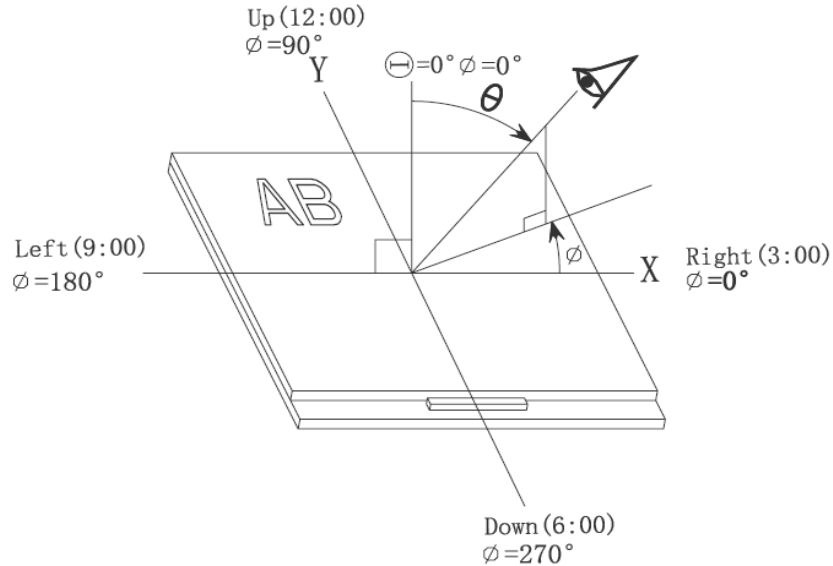
$$\Delta B_p = B_p (\text{Min.}) / B_p (\text{Max.}) \times 100 (\%)$$

$B_p (\text{Max.})$ = Maximum brightness in 9 measured spots

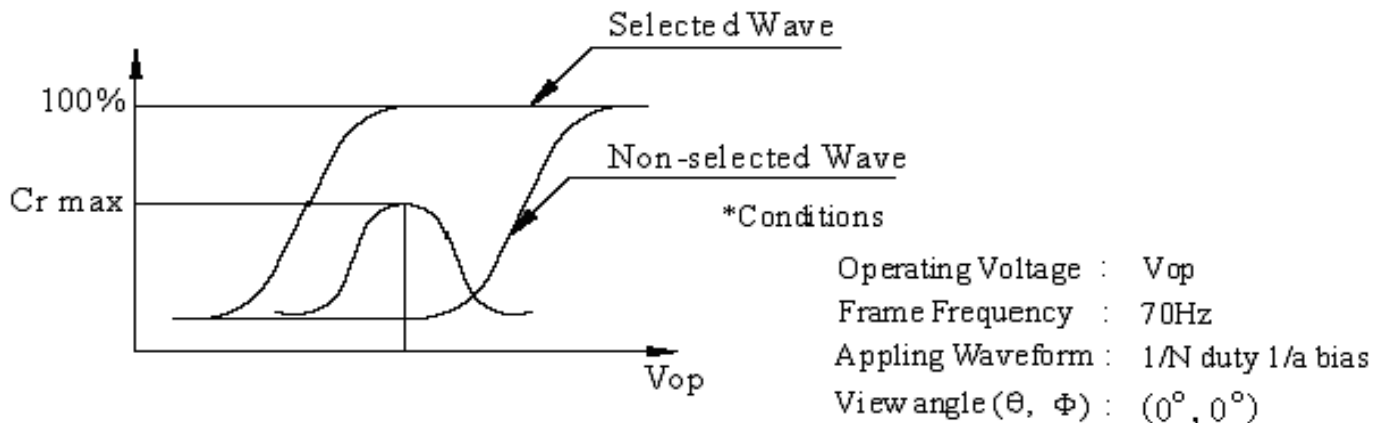
$B_p (\text{Min.})$ = Minimum brightness in 9 measured spots.



Note 3: The definition of viewing angle:
 Refer to the graph below marked by θ and Φ



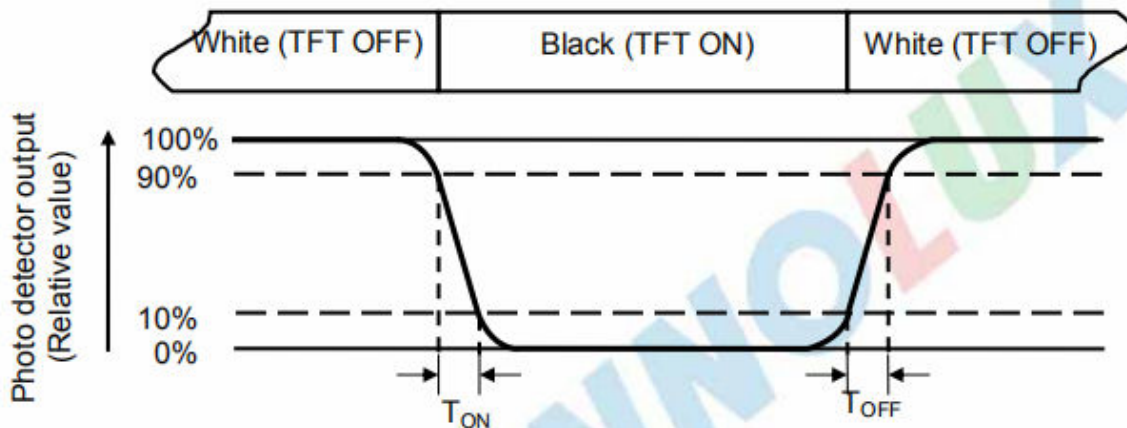
Note 4: Definition of contrast ratio. (Test LCD using DMS501)



$$\text{Contrast ratio}(Cr) = \frac{\text{Brightness of selected dots}}{\text{Brightness of non-selected dots}}$$

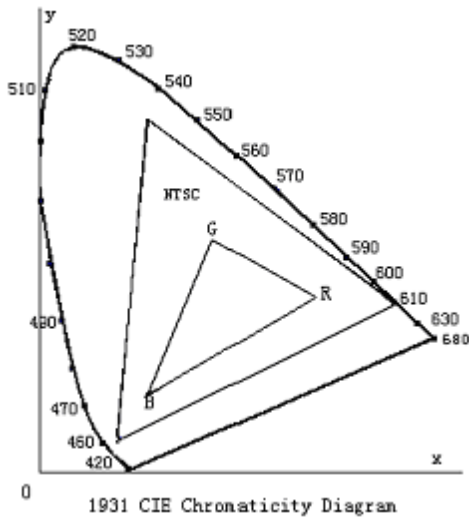
Note 5: Definition of Response time. (Test LCD using DMS501):

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{on}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{off}) is the time between phot detector output intensity changed from 10% to 90%.



The definition of response time

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.

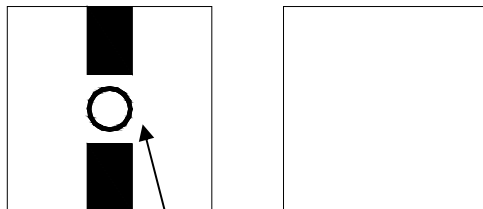


Color gamut:

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 7: Definition of cross talk.

Cross talk ratio(%) = $\frac{|\text{pattern A Brightness} - \text{pattern B Brightness}|}{\text{pattern A Brightness}} \times 100$



Pattern A

Pattern B

Measurement point(center)

Electric volume value = $3F \pm 3Hex$

8. Reliability Test Items and Criteria

Test Item	Test condition	Remark
High Temperature Storage	$T_a = 80^{\circ}\text{C}$ 96hrs	Note1,Note3, 4
Low Temperature Storage	$T_a = -20^{\circ}\text{C}$ 96hrs	Note1,Note3, 4
High Temperature Operation	$T_s = 70^{\circ}\text{C}$ 96hrs	Note2,Note3, 4
Low Temperature Operation	$T_s = -20^{\circ}\text{C}$ 96hrs	Note1,Note3, 4
Operation at High Temperature/Humidity	+60°C, 90%RH 96hrs	Note3, 4
Thermal Shock	-30°C/30 min ~ +80°C/30 min for a total 10 cycles, Start with cold temperature and end with high	Note3, 4
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)	
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	
Package Drop Test	Height:60cm 1 corner, 3 edges, 6 surfaces	
Electro Static Discharge	±2KV, Human Body Mode, 100pF/1500Ω	

Note 1: T_a is the ambient temperature of samples.

Note 2: T_s 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. Precautions for Use of LCD Modules

9.1 Handling Precautions

9.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

9.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

9.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

9.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

9.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

— Isopropyl alcohol — Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

— Water — Ketone — Aromatic solvents

9.1.6 Do not attempt to disassemble the LCD Module.

9.1.7 If the logic circuit power is off, do not apply the input signals.

9.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

a. Be sure to ground the body when handling the LCD Modules.

b. Tools required for assembly, such as soldering irons, must be properly ground.

c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

d. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

9.2 Storage precautions

9.2.1 *When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.*

9.2.2 *The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:*

Temperature : 0°C ~ 40°C

Relatively humidity: ≤80%

9.2.3 *The LCD modules should be stored in the room without acid, alkali and harmful gas.*

9.3 *The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.*

END