



OKAYA Electric America, Inc.

SPECIFICATIONS

DRAWING CODE

SAMPLE CODE

(This Code will be changed while mass production)

MASS PRODUCTION CODE

RF320240T-3x5WP-A

Customer Approved

Date:

Sales Sign	QC Confirmed	Checked By	Designer

Approval for Specifications Only

This specification is subject to change without notice

Approval for Specifications and Sample



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Revision Status

[illegible]



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1. General Description

1.1 Description

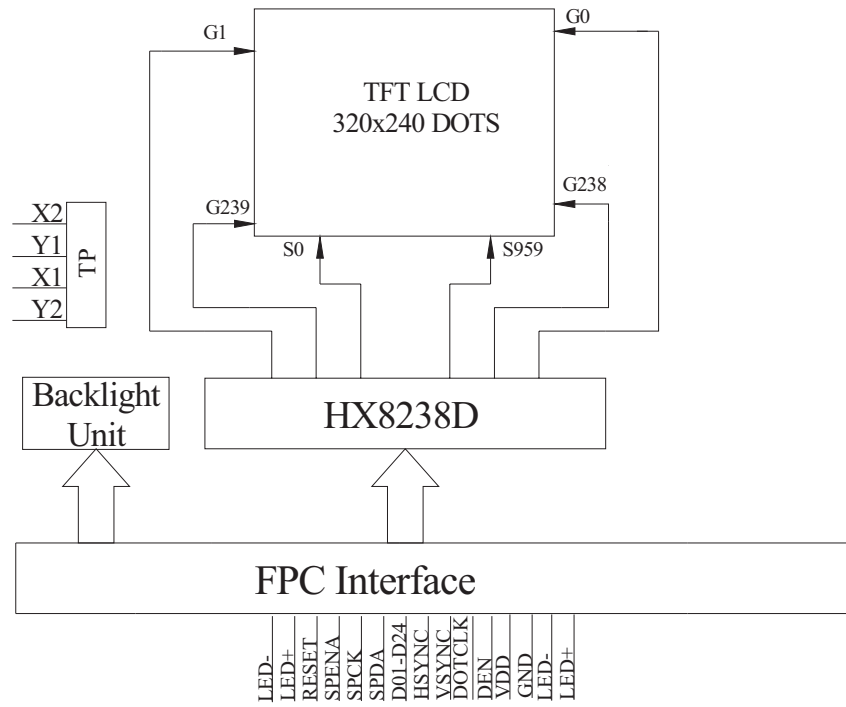
The specifications is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, driver ICs, FPC, RTP and a backlight unit. The following table described the features of RF320240T-3x5WP-A.

1.2 Features:

No.	Item	Specification	Unit
1	Panel Size	3.5	inch
2	Number of Pixels	320(H)×RGB×240(V)	pixels
3	Active Area	70.08(H) × 52.56(V)	mm
4	Pixel Pitch	0.219(H) x 0.219(V)	mm
5	Outline Dimension	76.9(H)×63.9(V)×4.3(D)	mm
6	Number of Colors	262K	-
7	Pixel Arrangement	RGB Vertical Stripe	-
8	Display Mode	Normally White TN	-
9	Brightness	240 (Typ.)	cd/m ²
10	Contrast Ratio	400 (Typ.)	-
11	Response time (Tr+Tf)	50(Typ.)	ms
12	Viewing Direction	6 o'clock	-
13	Input Interface	RGB Interface	-
14	Viewing Angle (H/V)	70/70/60/70	degree
15	Backlight unit	6 LED in Serial	-
16	Surface Treatment	Anti-Glare	-
17	Driver IC	HX8238D	-
18	Panel	CMO#F03507	
19	LC	JYG80500	
20	Touch Panel	Resistive TP	
21	Weight	TBD	g



2. Functional Block Diagram





4. Pin Description

4.1 Interface Pin Description

No.	Symbol	I/O	Function	Remark
1	LED_Cathode	P	LED_Cathode	
2	LED_Cathode	P	LED_Cathode	
3	LED_Anode	P	LED_Anode	
4	LED_Anode	P	LED_Anode	
5	NC	-	No Connect	
6	NC	-	No Connect	
7	NC	-	No Connect	
8	RESET	I	Reset	
9	SPENA	I	Serial port data enable signal	
10	SPCK	I	SPI Serial Clock	
11	SPDA	I	SPI Serial Data Input	
12	D00	I	Blue data B0	
13	D01	I	Blue data B1	
14	D02	I	Blue data B2	
15	D03	I	Blue data B3	
16	D04	I	Blue data B4	
17	D05	I	Blue data B5	
18	D06	I	Blue data B6	
19	D07	I	Blue data B7	
20	D08	I	Green data G0	
21	D09	I	Green data G1	
22	D10	I	Green data G2	
23	D11	I	Green data G3	
24	D12	I	Green data G4	
25	D13	I	Green data G5	
26	D14	I	Green data G6	
27	D15	I	Green data G7	
28	D16	I	Red data R0	
29	D17	I	Red data R1	
30	D18	I	Red data R2	
31	D19	I	Red data R3	
32	D20	I	Red data R4	
33	D21	I	Red data R5	
34	D22	I	Red data R6	
35	D23	I	Red data R7	
36	HSYNC	I	Horizontal Synchronous signal	
37	VSYNC	I	Vertical Synchronous signal	
38	CLK	I	Data Clock	
39	NC	-	No Connect	
40	NC	-	No Connect	
41	VDD	P	Power supply	



42	VDD	P	Power supply	
43	X2	I	Touch panel unit (X2)	
44	Y1	I	Touch panel unit (Y1)	
45	X1	I	Touch panel unit (X1)	
46	Y2	I	Touch panel unit (Y2)	
47	NC	-	No Connect	
48	NC	-	No Connect	
49	NC	-	No Connect	
50	NC	-	No Connect	
51	NC	-	No Connect	
52	DEN	I	data enabling signal	
53	GND	P	Ground	
54	GND	P	Ground	

5. Electrical Characteristics

5.1 Absolute Maximum Ratings

5.1.1 Electronic Absolute Maximum Ratings

Item	Symbol	Values		Unit	Remark
		Min	Max.		
Power Supply Voltages	VDD	-0.3	4.0	V	
LED Forward Current	I _F	20		mA	One LED
Storage Temperature	T _{ST}	-30	80	°C	
Operating Temperature (Ambient Temperature)	T _{opa}	-20	70	°C	

5.2 DC Electrical Characteristics

5.2.1 LCD DC Characteristics

Typical Operating Conditions (Ta=25°C)

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
Operating voltage	VDD	1.6	2.8	3.6	V	
Current Consumption	I _{VDD}	-	TBD		mA	VDD=2.8V
Power Consumption	P _{LCD}	-	TBD		mW	

Note.1: VcomH & VcomL: Adjust the color with gamma data.

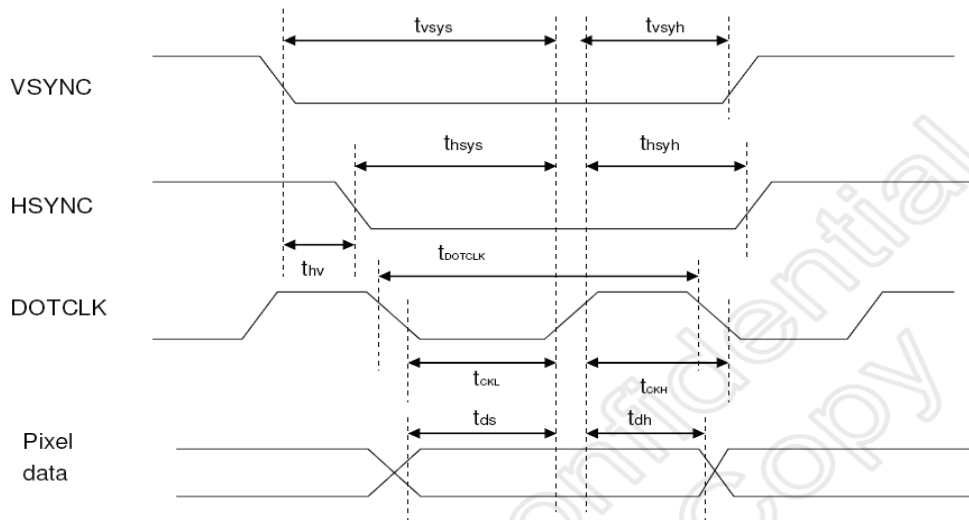
5.2.2 Backlight Unit (GND=0V)

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
LED Voltage	V _{LED}	-	19.2	-	V	
LED Current	I _F	-	20	-	mA	
Power Consumption	P _{LED}	-	396	-	mW	

5.3 AC Electrical Characteristics

5.3.1 AC Timing Diagrams

Characteristics	Symbol	Values			Unit	Remark
		Min	Typ	Max		
DOTCLK Frequency	f_{DOTCLK}	-	6.5	10	MHz	-
DOTCLK Period	t_{DOTCLK}	100	154	-	ns	-
Vertical Sync Setup Time	t_{vsys}	20	-	-	ns	-
Vertical Sync Hold Time	t_{vsyh}	20	-	-	ns	-
Horizontal Sync Setup Time	t_{hsys}	20	-	-	ns	-
Horizontal Sync Hold Time	t_{hsyh}	20	-	-	ns	-
Phase difference of Sync Signal Falling Edge	t_{hv}	1	-	240	t_{DOTCLK}	-
DOTCLK Low Period	t_{CKL}	50	-	-	ns	-
DOTCLK High Period	t_{CKH}	50	-	-	ns	-
Data Setup Time	t_{ds}	12	-	-	ns	-
Data hold Time	t_{dh}	12	-	-	ns	-
Reset pulse width	t_{RES}	10	-	-	us	-



6. Optical Characteristics

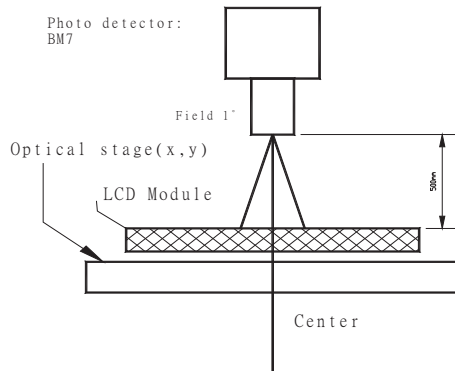
The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note.1.

6.1 Main LCD Optical Characteristics

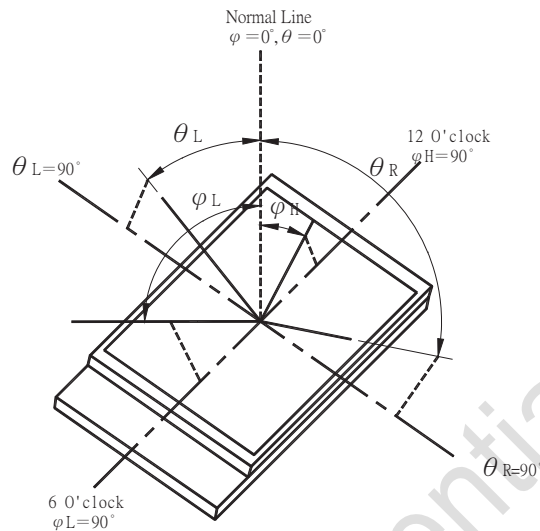
Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle	Top	ΦH	-	60	-	degree	Note.2
	Bottom	ΦL	-	70	-		
	Left	ΘL	-	70	-		
	Right	ΘR	-	70	-		
Response time(T_r+T_f)		$\Theta=0$	-	50	-	ms	Note.3
Uniformity	ΔB	$I_F=20mA$	-	80	-	%	Note.0
Brightness		Center	190	240	-	cd/m^2	
Contrast Ratio	CR	At optimized viewing angle	-	400	-	-	Note.4
Color Chromaticity	White	X_w	TBD	TBD	TBD	-	Note.5
		Y_w	TBD	TBD	TBD		
	Red	X_R	TBD	TBD	TBD	-	-
		Y_R	TBD	TBD	TBD		
	Green	X_G	TBD	TBD	TBD	-	-
		Y_G	TBD	TBD	TBD		
	Blue	X_B	TBD	TBD	TBD	-	-
		Y_B	TBD	TBD	TBD		

Note.0: $\Delta B=B(\min)/B(\max)$

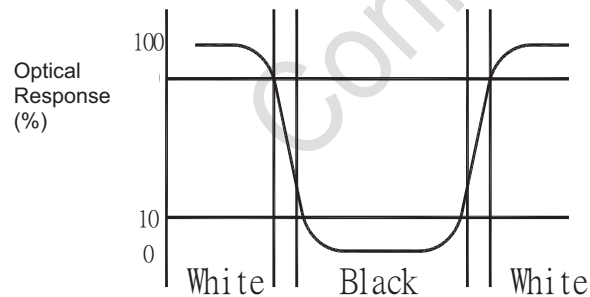
Note.1: After stabilizing and leaving the panel alone at a given temperature for 30 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7(fast) with a viewing angle of 1° at a distance of 50cm and normal direction.



Note.2: Definition of Viewing Angle: Refer to figure as below:



Note.3: Definition of Response Time: TR and TF
The figure below is the output signal of the photo detector.



Note.4: Definition of Contrast Ratio (CR)

Ratio of gray max (G max)& gray min(G min)
 $\text{Contrast ratio (CR)} = (G \text{ max}) / (G \text{ min})$
 (G max)=luminance with all pixel white
 (G min)=luminance with all pixel black

Note.5: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.



7. Reliability

T.B.D

8. Cosmetic Criteria of LCD Screen

T.B.D

9. Package

T.B.D

10. Precautions for Use

10.1 Safety

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

10.2 Storage Conditions

- (1) Store the panel or module in a dark place where the temperature is $23\pm5^{\circ}\text{C}$ and the humidity is below $50\pm 20\%\text{RH}$.
- (2) Store in anti-static electricity container.
- (3) Store in clean environment, free from dust, active gas, and solvent.
- (4) Do not place the module near organics solvents or corrosive gases.
- (5) Do not crush, shake, or jolt the module.

10.3 Handling Precautions

- (1) Avoid static electricity which can damage the CMOS LSI.
- (2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- (5) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (6) Do not operate it above the absolute maximum rating.
- (7) Do not remove the panel or frame from the module.
- (8) Please wear clean finger sacks, gloves and mask to protect the products from fingerprint or stain attach, and also hold the portion outside the view area when handling the panel.
- (9) Do not put one product on the other. Otherwise, it may cause the product to be scratched and/or change on cosmetic occur (ex. Newton ring).
- (10) Do not put a heavy, hard or sharp object on the product.

10.4 Warranty

- (1) The period is within twelve months since the data of shipping out under normal using and storage conditions.
- (2) All process and material comply ROHS.