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MODEL NO : ET032QV01-TT

MODEL VERSION: 01

SPEC VERSION : 1.0

ISSUED DATE: 2022-04-07

□Preliminary Specification

■Final Product Specification

Customer :_____

Approved by	Notes

Youri Confirmation

Prepared by	Reviewed by	Approved by
John	Johnny	Wang

1. Introduction

1.1 Scope of application

LCD specification: Dots 240xRGBx320.
As to basic specification of the driver IC, refer to the IC (Sitronix:ST7789V2) specification and data book.
All material & processing of the LCD module should be Lead Free.

1.2 TFT features:

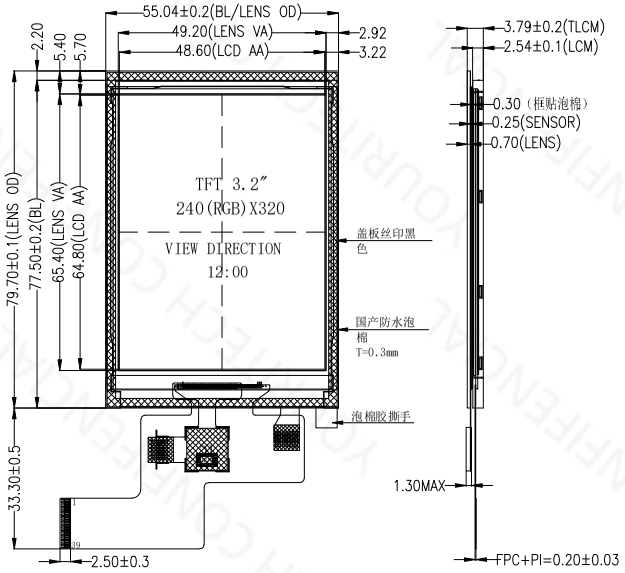
Structure: TFT PANNEL+IC +FPC+BL+CTP
12 O'clock Type LCD
240dot-segment and 320 dot-common outputs;
65/262K Color can be selected by software;
White LED back light;
16bit MCU interface

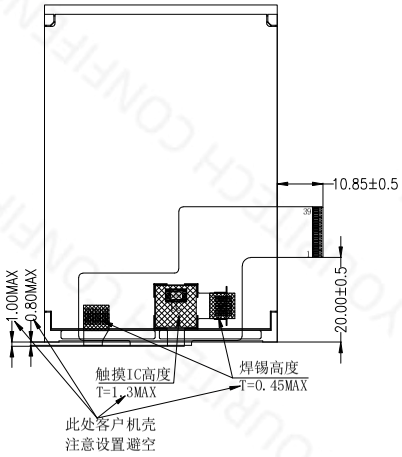
1.3 Applications:

2. LCM General specification

ITEM	Sandard value	Unit
LCD Type	Normally White	--
Drive element	TFT active matrix	--
Number of pixels	240*3RGB(H)X320(V)	Dots
Pixel arrangement	RGB Vertical stripe	--
Pixel Pitch (W*H)	0.2025(W) × 0.2025(H)	mm
Active area	48.60(W) × 64.80(H)	mm
Viewing direction	12 O'CLOCK	--
TFT Driver IC	ST7789V2	--
TFT interface	16bit MCU interface	--
Approx. Weight	TBD	g
LCM Size(W*H*T)	55.04W)x 77.50(H) x 2.54(T)	
LCM+CTP Size(W*H*T)	55.04(W) ×79.70H) ×3.79(T)	mm
Approx. Weight	TBD	g
Touch structure	G+F	--
Touch Driver IC	FT6336U	--
Touch Interface	I2C	--

REV	DESCRIPTION	DRG DATE	DRAWN BY
	First Desing	2022.03.04	





FPC弯折示意图

FPC弯折出货

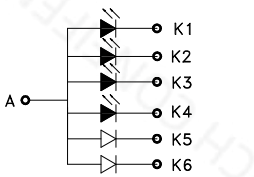
NO.	SYMBOL
1	LEDK
2	LEDA
3	GND
4	RESET
5	NC
6	NC
7	NC
8	GND
9	DB1
10	DB2
11	DB3
12	DB4
13	DB5
14	DB6
15	DB7
16	DB8
17	GND
18	DB10
19	DB11
20	DB12
21	DB13
22	DB14
23	DB15
24	DB16
25	DB17
26	GND
27	GND
28	NC
29	RD
30	WR
31	RS
32	CS
33	FMARK
34	LCD/CTP_VDD
35	IOVCC
36	CTP_RST
37	CTP_INT
38	CTP_SDA
39	CTP_SCL

CTP

PIN	SYMBOL
1	VDD2.8-3.3V
2	CTP_RST 3.3V
3	CTP_INT 3.3V
4	CTP_SDA 3.3V
5	CTP_SCL 3.3V
6	GND

NOTES:
1. DISPLAY TYPE: 3.2", 240*320 TFT LCD
2. DISPLAY MODE: transmissive Normally White
3. VIEWING DIRECTION: 12 O'clock
4. DRIVER IC:ST7789V2
5. LCM (White 9 AVG 1/9) :
   Brightness: 550cd/m2 (TYP)
   Uniformity:80%(MIN)
6. BACK LIGHT: 6 chip white LEDs If=120mA, Vf=2.8V-3.2V
7. OPERATING TEMP: -20° C TO 60° C, STORAGE TEMP: -30° C TO 70° C
8. * Critical Parameter, ( ) ref Parameter, [ ] cpk Parameter
   Unspecified Tolerances:±0.20mm
   Modification mark:
9. SUGGESTION:TP window size unilateral increase 0.3~0.5mm than LCM A.A
10. REQUIREMENTS ENVIRONMENTAL PROTECTION: RoHS

CIRCUIT DIAGRAM



chip White LED(Parallel)

CTP 技术参数：
1. 结构：G+F （单点+手势）
2. 工作电压：2.8-3.3 V IO电压：3.3V 坐标原点：左上角
3. IC:FT6336U
4. 透光率：≥85%
5. 表面硬度：6H
6. 工作环境：-20℃~+60℃，≤90%RH
7. 储存环境：-30℃~+70℃，≤90%RH
8. 未注尺寸公差按±0.2mm

深圳市优瑞泰克科技有限公司

PART NO.:	ET032QV01-TT			MODULE NO.:	00
DRAWN BY:	LIU	DATE:	2022.03.04	PROJECTION:	
CHECKED BY:		DATE:		SCALE:N.T.S	UNIT: mm
APPROVED BY:		DATE:		SHEET: 1 OF 1	

3.Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit
LCM Operating Temperature	T_{OPR}	-20	+60	°C
LCM Storage Temperature	T_{STG}	-30	+70	°C
TP Operating Temperature & Humidity(20% ~ 90%RH)	T_{OPR}	-20	+60	°C
TP SStorage Temperature & Humidity(20% ~ 90%RH)	T_{STG}	-30	+70	°C
Humidity	RH	--	90	%

4.Electrical Characteristics

4.1 TFT DC Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage for I/O	IOVCC	1.65	1.8	3.3	V
Supply Voltage for(DC/DC)	VDD	2.5	2.8	3.3	V
Supply Voltage for(DC/DC)	AVDD	--	--	--	V
Supply Voltage for(DC/DC)	AVEE	--	--	--	V

4.2 Back-Light Unit Characeristics

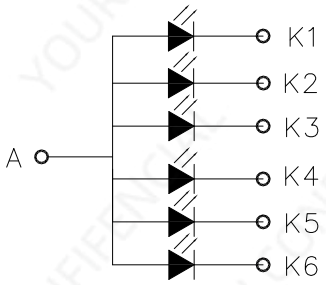
The back-light system is an edge-lighting type with 6 white LEDs. The characteristics of the back-light are shown in the following tables.

Characteristics	Symbol	Min.	Type	Max.	Unit	Notes
Forward Voltage	V_F	2.8	--	3.2	V	--
Forward current	I_F	--	120	--	mA	--
Luminance(With LCD)	Lv	--	550	--	cd/m^2	--
LED life time	N/A	--	30,000	--	Hr	Note 1

Note:

(1) The “LED life time” is defined as the module brightness decrease to 50% of original brightness at I_L=20mA/LED. The LED life time could be decreased if operating I_L is larger than 25mA/LED.

Backlight circuit diagram shown in below:



5. Module Function Description

Pin No.	Symbol	Functional	Notes
1	LEDK	Power supply for backlight cathode input terminal.	
2	LEDA	Power supply for backlight anode input terminal.	
3	GND	Power Ground	
4	RESET	Reset signal input terminal. Active at ‘L’.	
5~7	NC	NC	
8	GND	Power Ground	
9~16	DB1~DB8	MCU parallel interface data bus.	
17	GND	Power Ground	
18~25	DB10~DB17	MCU parallel interface data bus.	
26~27	GND	Power Ground	
28	NC	NC	
29	RD	Read enable in 8080 MCU parallel interface	
30	WR	Write enable in MCU parallel interface.	
31	RS	Display data/command selection pin in parallel interface	
32	CS	Chip select signal input pin	
33	FMARK	Tearing effect signal is used to synchronize MCU to frame memory	
34	LCD/CTP_VDD	Power Supply For LCD.(2.8-3.3V)	
35	IOVCC	Power Supply For I/O.	
36	CTP_RST 3.3V	CTP_Reset Signal input pin.	
37	CTP_INT 3.3V	CTP_STOP Singnal	
38	CTP_SDA 3.3V	CTP_Data Singnal	
39	CTP_SCL 3.3V	CTP_Clock Singnal	

6. Timing Characteristics

Power ON/OFF Sequence

VDDI and VDD can be applied in any order.

VDD and VDDI can be power down in any order.

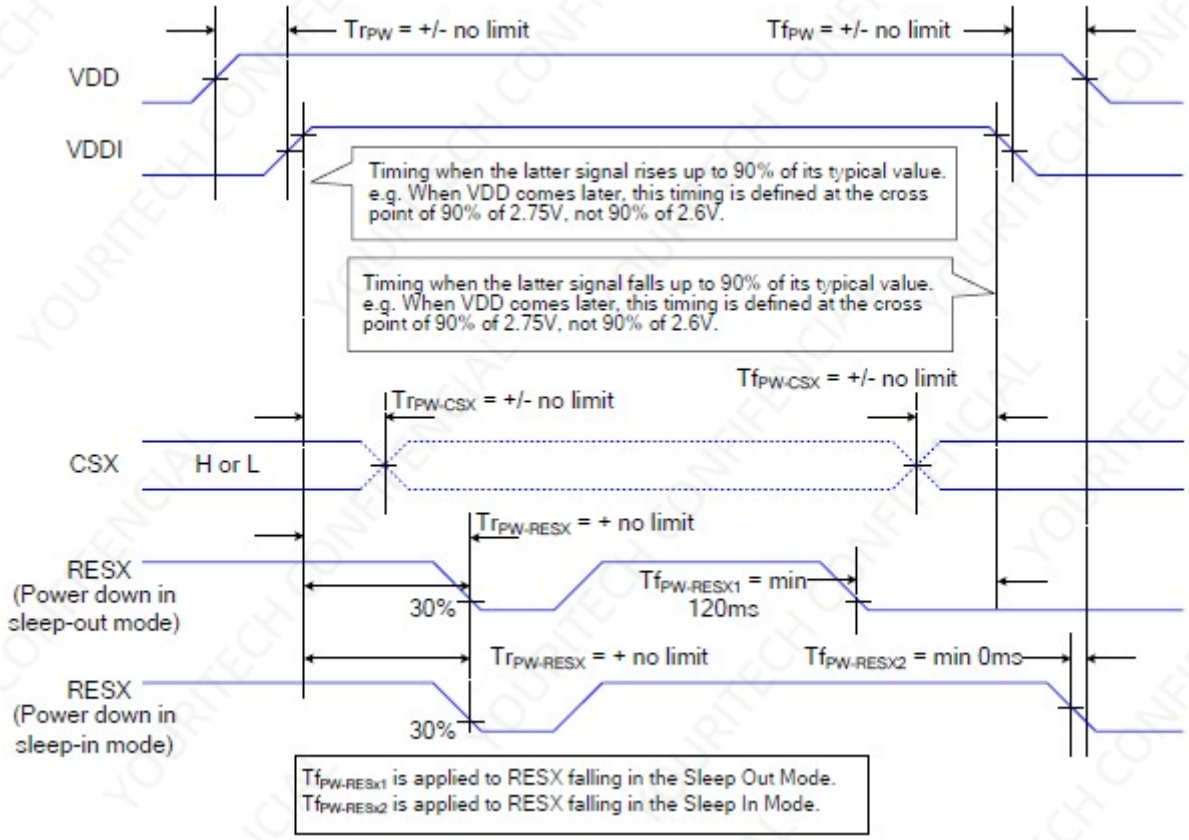
During power off, if LCD is in the Sleep Out mode, VDD and VDDI must be powered down minimum 120msec after RESX has been released.

During power off, if LCD is in the Sleep In mode, VDDI or VDD can be powered down minimum 0msec after RESX has been released.

CSX can be applied at any timing or can be permanently grounded. RESX has priority over CSX.

Note 1: There will be no damage to the display module if the power sequences are not met.
Note 2: There will be no abnormal visible effects on the display panel during the Power On/Off Sequences.
Note 3: There will be no abnormal visible effects on the display between end of Power On Sequence and before receiving Sleep Out command. Also between receiving Sleep In command and Power Off Sequence.
Note 4: If RESX line is not held stable by host during Power On Sequence as defined in the sequence below, then it will be necessary to apply a Hardware Reset (RESX) after Host Power On Sequence is complete to ensure correct operation. Otherwise function is not guaranteed.

The power on/off sequence is illustrated below



8080 Series MCU Parallel Interface Characteristics: 18/16/9/8-bit Bus

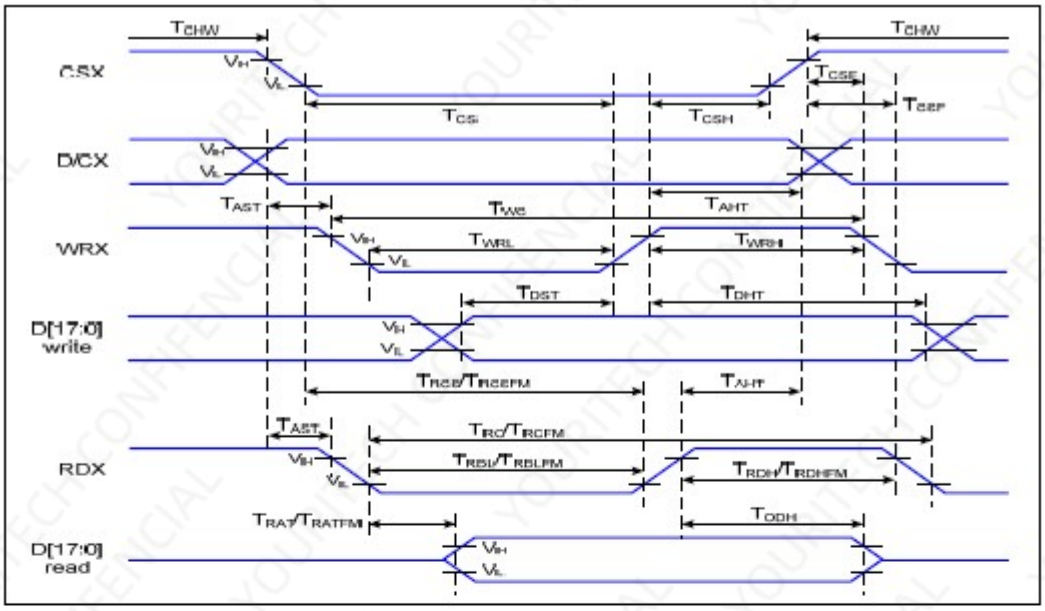


Figure 1 Parallel Interface Timing Characteristics (8080-Series MCU Interface)

VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=25℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	T_{AST}	Address setup time	0		ns	-
	T_{AHT}	Address hold time (Write/Read)	10		ns	
CSX	T_{CHW}	Chip select "H" pulse width	0		ns	-
	T_{CS}	Chip select setup time (Write)	15		ns	
	T_{RCS}	Chip select setup time (Read ID)	45		ns	
	T_{RCSFM}	Chip select setup time (Read FM)	355		ns	
	T_{CSF}	Chip select wait time (Write/Read)	10		ns	
	T_{CSH}	Chip select hold time	10		ns	
WRX	T_{WC}	Write cycle	66		ns	
	T_{WRH}	Control pulse "H" duration	15		ns	
	T_{WRL}	Control pulse "L" duration	15		ns	
RDX (ID)	T_{RC}	Read cycle (ID)	160		ns	When read ID data
	T_{RDH}	Control pulse "H" duration (ID)	90		ns	
	T_{RDL}	Control pulse "L" duration (ID)	45		ns	
RDX (FM)	T_{RCFM}	Read cycle (FM)	450		ns	When read from frame memory
	T_{RDHFM}	Control pulse "H" duration (FM)	90		ns	
	T_{RDLFM}	Control pulse "L" duration (FM)	355		ns	
D[17:0]	T_{DST}	Data setup time	10		ns	For CL=30pF

7.Optical Characteristics

Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (without Polarizer)		T(%)	—	—	18.0	—	—	
Contrast Ratio		CR	Θ=0	400	500	—	—	(1)(2)
Response time	Rising	T_R	Normal viewing angle	—	4	8	msec	(1)(3)
	Falling	T_F	—	—	12	24		
Color gamut		S(%)			60		%	
Color chromaticity (CIE1931)	White	W_x		0.283	0.303	0.323		(1)(4) CF glass (C-light)
		Wy		0.305	0.325	0.345		
	Red	Rx		0.606	0.626	0.646		
		Ry		0.314	0.334	0.354		
	Green	Gx		0.257	0.277	0.297		
		Gy		0.529	0.549	0.569		
	Blue	Bx		0.122	0.142	0.162		
		By		0.102	0.122	0.142		
Viewing angle	Hor.	Θ_L	CR>10	35	45	—		
		Θ_R		35	45	—		
	Ver.	Θ_U		35	50	—		
		Θ_D		10	20	—		
View Direction		12 O'clock						(5)

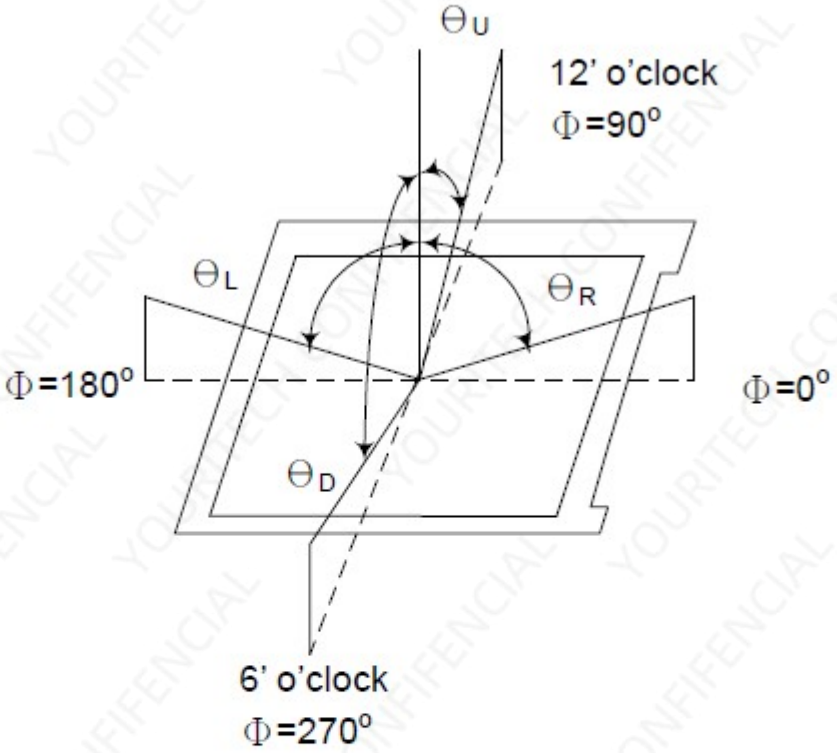
Measuring Condition

- Measuring surrounding : dark room
- Ambient temperature : 25±2°C
- 15min. warm-up time.

Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

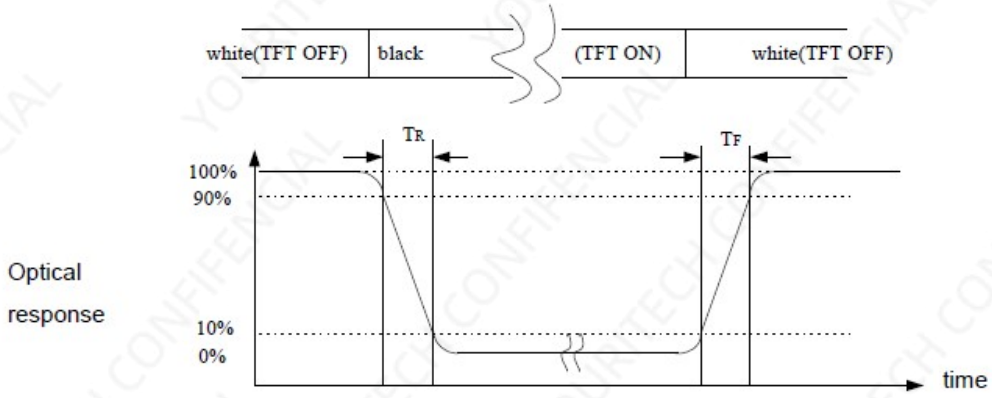
Note (1) Definition of Viewing Angle :



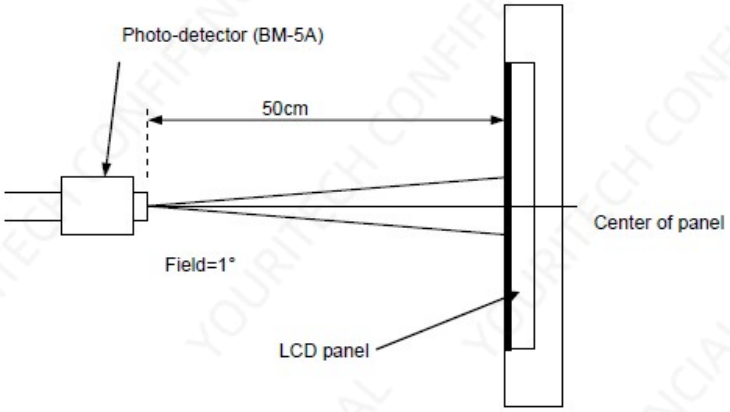
Note (2) Definition of Contrast Ratio(CR) :
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

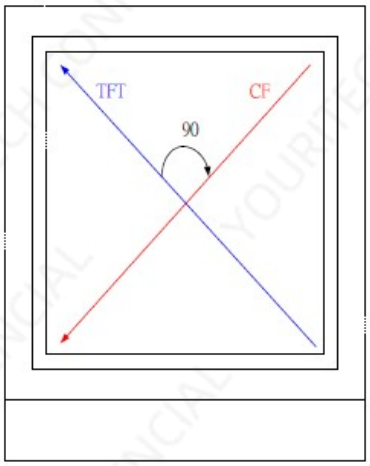
Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



Note (5) Rubbing Direction (The different Rubbing Direction will cause the different view direction.



TFT Face up

8. Reliability Test Item

No.	Test Item	Test Condition	Notes
1	High Temp. Storage	+70°C / 96H	1. Functional test isOK. Missing Segment,short, unclear segment non-display,display abnormally and liquid crystal leakare un-allowed. 2. No low temperature bubbles,end seal loose andfall, frame rainbow.
2	Low Temp. Storage	-30°C / 96H	
3	High Tempe. Operating	+60°C / 96H	
4	Low Tempe. Operating	-20°C / 96H	
5	High Temperature /Humidity storage	50°C x 90%RH /96H	
6	Thermal and cold shock	Static state， -20℃（30min） ~60℃（30min），50 cycles	

9. Packing Method----TBD

- END -