

INDUSTRIAL STRENGTH... Start Your Application From YOURITECH

Integration support

Obsolescence Management

PCAP

Embedded Systems

Human Machine Interface

Touch Solutions

Software

Quality Management

Open Frame Monitors

LCD Controller

Research & Development

Firmware

EMC tests

on-site service

Optical Bonding

In-house Manufacturing

Cover glass

System solutions

OEM Solutions

Custom Display

Production Custom designs Installation

Mechanical design



MODEL NO : ET070WQ01-TT

MODEL VERSION: 01

SPEC VERSION : 1.0

ISSUED DATE: 2022-12-21

☐ 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 280xRGBx1424

As to basic specification of the driver IC, refer to the IC (OTA7290B) 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;

ALL Viewing Type LCD

280 dot-segment and 1424 dot-common outputs;

16.7M Color can be selected by software;

White LED back light;

4lane MIPI interface

1.3 Applications:

2. LCM General specification

ITEM	Standard value	Unit
LCD Type	Normally Black	--
Drive element	TFT active matrix	--
Number of pixels	280*3RGB(H)X1424(V)	Dots
Pixel arrangement	RGB Vertical Stripe	--
Pixel Pitch (W*H)	0.12(H) X 0.12(V)	mm
Active area	33.60(H) x 170.88(V)	mm
Viewing direction	ALL O'CLOCK	-
TFT Driver IC	OTA7290B	
TFT interface	4lane MIPI interface	-
Approx. Weight	TBD	g
LCM Size(W*H*T)	38.20(W) ×181.47(H) ×3.45(T)	mm
LCM+CTP Size(W*H*T)	47.20(W) ×195.88(H) ×5.50(T)	mm
Touch structure	G+G	
Touch Driver IC	GT911	-
Touch Interface	I2C	



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	VDDIO	--	--	--	V
Supply Voltage for(DC/DC)	VDD	2.5	2.8	3.6	V
Current Consumption	I _{DD}	--	--	--	mA
	I _{DD-SLEEP}	--	--	--	uA

4.2 Back-Light Unit Characeristics

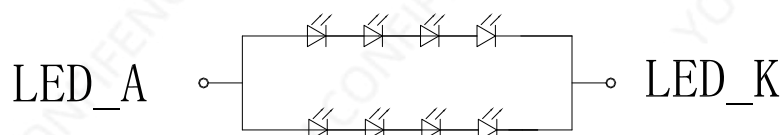
The back-light system is an edge-lighting type with 8 white LEDs. The characteristics of the back-light are shown in the following tables.

Characteristics	Symbol	Min.	Type	Max.	Unit	Notes
Forward Voltage	V _F	11.2		12.8	V	-
Forward current	I _F	--	80	-	mA	-
Luminance(With LCD+CTP)	L _v		650	--	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=40mA/LED. The LED life time could be decreased if operating I_L is larger than 50mA/LED.

Backlight circuit diagram shown in below:



5. Module Function Description

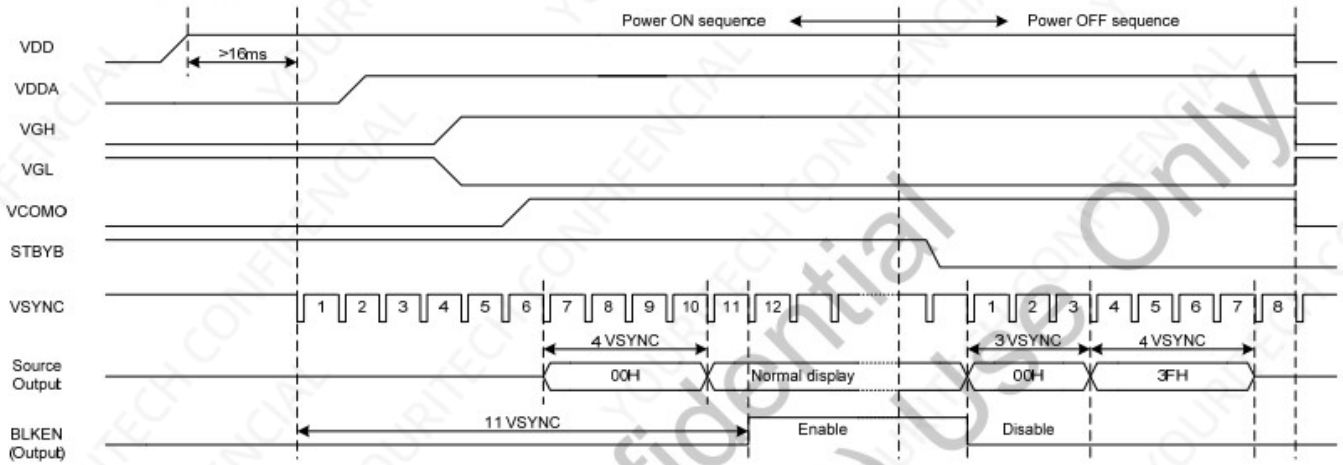
Pin No.	Symbol	LCM Functional	Notes
1	GND	Power Ground	
2	VCI	power supply for DC/DC circuit(2.7~3.6V)	
3	VCI	power supply for DC/DC circuit(2.7~3.6V)	
4	VCI	power supply for DC/DC circuit(2.7~3.6V)	
5	GND	Power Ground	
6	RESET	Reset pin. Setting either pin low initializes the LSI	
7	TE	Serves TE (Tearing Effect) pin on MPU interface	
8	GND	Power Ground	
9	GND	Power Ground	
10	D3N	MIPI-DSI Data differential signal input pins	
11	D3P	MIPI-DSI Data differential signal input pins	
12	GND	Power Ground	
13	D2N	MIPI-DSI Data differential signal input pins	
14	D2P	MIPI-DSI Data differential signal input pins	
15	GND	Power Ground	
16	CLKN	MIPI-DSI CLOCK differential signal input pins	
17	CLKP	MIPI-DSI CLOCK differential signal input pins	
18	GND	Power Ground	
19	D1N	MIPI-DSI Data differential signal input pins	
20	D1P	MIPI-DSI Data differential signal input pins	
21	GND	Power Ground	
22	D0N	MIPI-DSI Data differential signal input pins	
23	D0P	MIPI-DSI Data differential signal input pins	
24	GND	Power Ground	
25	NC	NC	
26	NC	NC	
27	LEDK	Power supply for backlight cathode input terminal.	
28	LEDK	Power supply for backlight cathode input terminal.	
29	LEDA	Power supply for backlight anode input terminal.	
30	LEDA	Power supply for backlight anode input terminal.	

CTP PIN Description:

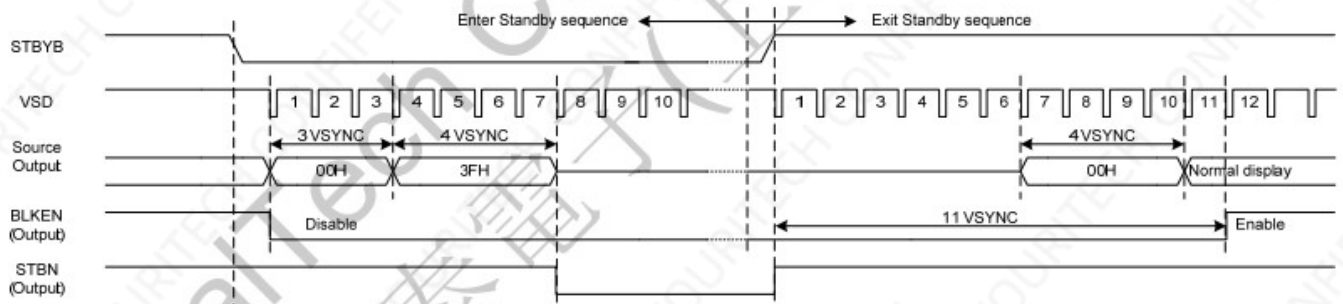
Pin No.	Symbol	CTP Functional	Notes
1	CTP_RST 2.8V	Touch panel reset	
2	CTP_INT 2.8V	Touch panel interrupt output	
3	GND	Power Ground	
4	CTP_SDA 2.8V	Touch panel I2C data	
5	CTP_SCL 2.8V	Touch panel I2C clock	
6	CTP_VCC 2.8-3.3V	Touch panel Power supply 2.8~3.3V	

6. Timing Characteristics

Power-On/Off Timing Sequence:



Enter and Exit Standby Mode Sequence:

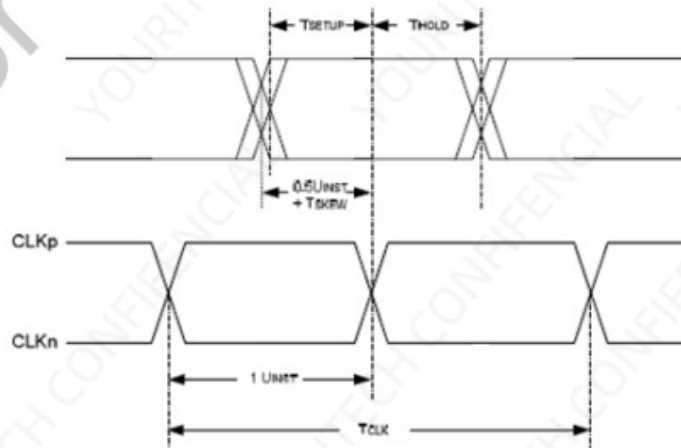


HS Receiver AC Timing Characteristics

Parameter	Symbol	Rating			Unit	Note
		Min	Typ	Max		
Bandwidth per lane	-	-	-	1000	Mbps	Bandwidth selected by register 'speedup' Speedup=0 → Max=550Mbps Speedup=1 → Max=1000Mbps
Operation frequency	-	-	-	500	MHz	
UI instantaneous	U_{INST}	1	-	12.5	ns	1
Data to Clock Skew	T_{skew}	-0.15	-	0.15	U_{INST}	
Inter-lane static skew	$T_{skew-lane}$	-	-	$U_{INST}/50$	U_{INST}	
Data to Clock Setup Time	T_{SETUP}	0.25	-	-	U_{INST}	2
Data to Clock Hold Time	T_{HOLD}	0.25	-	-	U_{INST}	
Common-mode interference beyond 450MHz	$\Delta V_{CMRX(HF)}$	-	-	100	mV	4
Common-mode interference 50MHz- 450MHz	$\Delta V_{CMRX(LF)}$	-50	-	50	mV	3,6
Common-mode termination	C_{CM}	-	-	60	pF	5

Note:

- (1) Total silicon and package delay budget of $0.3 \cdot U_{INST}$
- (2) Total setup and hold window for receiver of $0.3 \cdot U_{INST}$
- (3) Excluding 'static' ground shift of 50mV
- (4) $\Delta V_{CMRX(HF)}$ is the peak amplitude of a sine wave superimposed on the receiver input
- (5) For higher bit rates a 14pF capacitor will be needed to meet the common-mode return loss specification.
- (6) Voltage difference compared to the DC average common-mode potential.



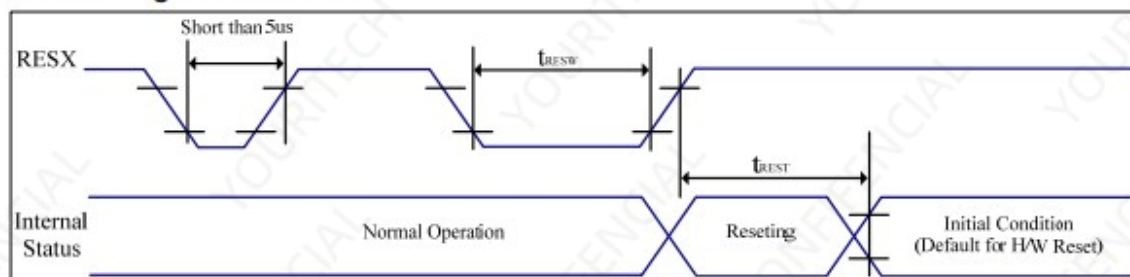
LP Receiver AC Timing Characteristics

Parameter	Symbol	Rating			Unit	Note
		Min	Typ	Max		
Input pulse rejection	e_{SPIKE}	-	-	300	V-ps	1,2,3
Minimum pulse width response	T_{MIN-RX}	20	-	-	ns	
Peak interference amplitude	V_{INT}	-	-	200	mV	
Interference frequency	f_{INT}	450	-	-	MHz	
Logic 1 input voltage	V_{IH}	880	-	-	mV	
Logic 0 input voltage, not in ULP State	V_{IL}	-	-	550	mV	
Logic 0 input voltage, ULP State	$V_{IL-ULPS}$	-	-	300	mV	
Input Hysteresis	V_{HYST}	25	-	-	mV	
Logic 1 contention threshold	V_{IHCD}	450	-	-	mV	
Logic 0 contention threshold	V_{ILCD}	-	-	200	mV	

Note:

- (1) Time-voltage integration of a spike above V_{IL} when being in LP-0 state or below V_{IH} when being in LP-1state.
- (2) An impulse less than this will not change the receiver state.
- (3) In addition to the required glitch rejection, implementers shall ensure rejection of known RF-interferers.

Reset timing characteristics



VSS=0V, IOVCC=1.65V to 3.6V, VCI=2.5V to 6.0V, Ta = -30°C to 70°C

Symbol	Parameter	Related Pins	MIN	TYP	MAX	Note	Unit
T_{resw}	*1) Reset low pulse width	RESX	10	-	-	-	us
T_{rest}	*2) Reset complete time	-	-	-	5	When reset applied during Sleep in mode	ms
		-	-	-	120	When reset applied during Sleep out mode	ms

Table: Reset input timing

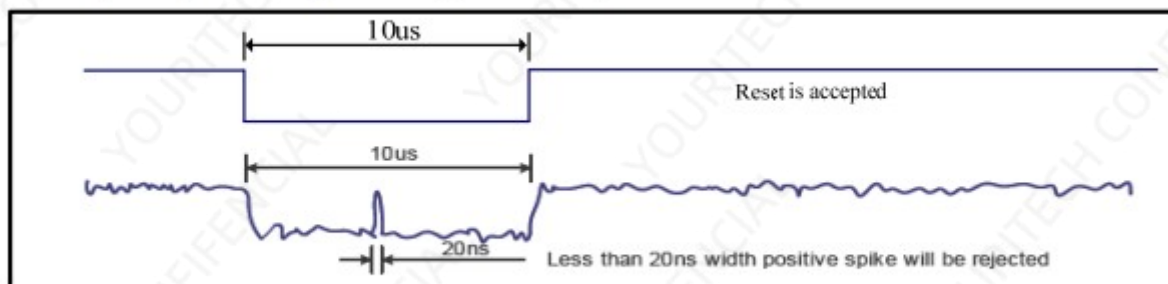
Note 1: Due to an electrostatic discharge on RESX line, spike does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 10us	Reset
Between 5us and 10us	Reset starts (It depends on voltage and temperature condition.)

Note 2: During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120ms, when Reset Starts in Sleep Out mode. The display remains the blank state in Sleep In mode), then return to default condition for H/W reset.

Note 3: During Reset Complete Time, ID1/ID2/ID3 and VCOM value in OTP will be latched to internal register. After a rising edge of RESX, there is a H/W reset complete time (Trest) which lasted 5ms. The loading operation will be done every time during this reset.

Note 4: Spike Rejection also applies during a valid reset pulse as shown below:



Note 5: It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120 msec.

7. Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (with Polarizer)		T (%)	Θ=0 Normal viewing angle	4.03	4.53	—	%	Measuring with normal polarizer , Reference Only Base on Vop=5.5V
Transmittance (without Polarizer)		T (%)		(10.9)	(12.2)	—	%	
Contrast Ratio		CR		800	1000	—	—	(1)(2)
Response Time		T _R +T _F		—	30	40	msec	(1)(3)
Color Gamut	(%)				60	—	%	C-light
Color Chromaticity (CIE1931)	White	W _x		-0.02	(0.319)	+0.02	—	(1)(4) CF glass C-light
		W _y			(0.343)			
	Red	R _x			(0.644)		—	
		R _y			(0.332)			
	Green	G _x			(0.324)		—	
		G _y	(0.566)					
	Blue	B _x	(0.137)		—			
		B _y	(0.125)					
Viewing Angle	Hor.	Θ _L	CR>10	75	80	—	—	(1)(4) Measuring with normal polarizer , Reference Only
		Θ _R		75	80	—		
	Ver.	Θ _U		75	80	—		
		Θ _D		75	80	—		
Optima View Direction		Free						(5)

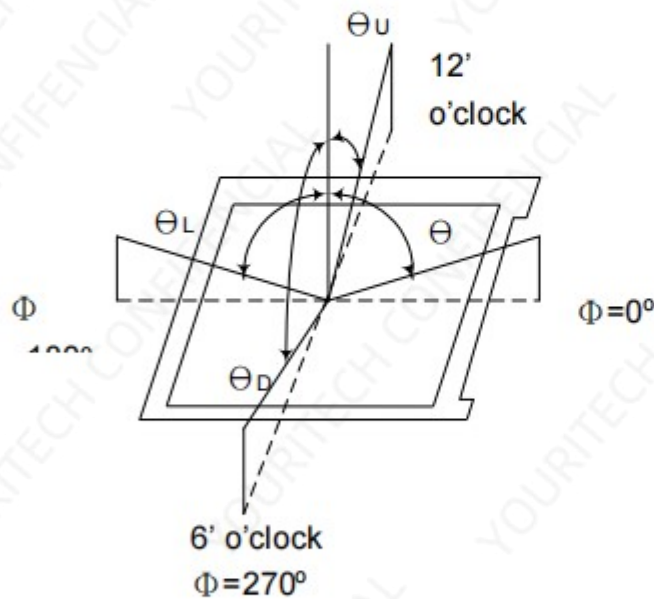
Measuring Condition

- Measuring surrounding : dark room
- Ambient temperature : $25 \pm 2^\circ\text{C}$
- 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.

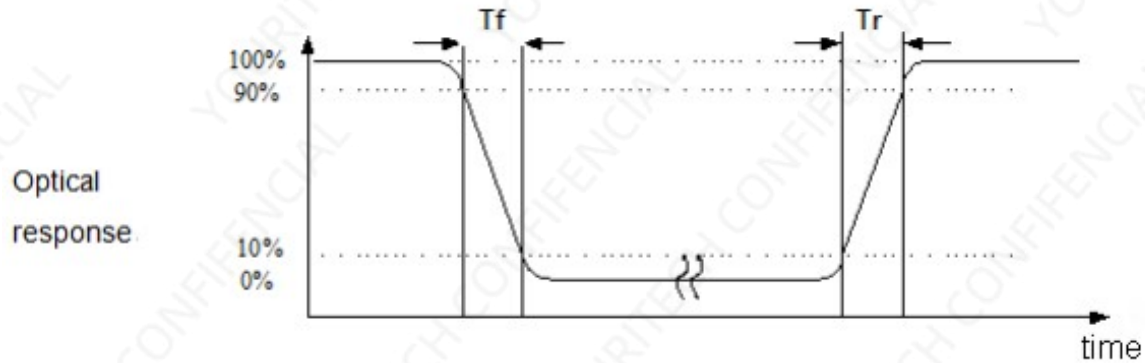
Note (1) Definition of Viewing Angle:



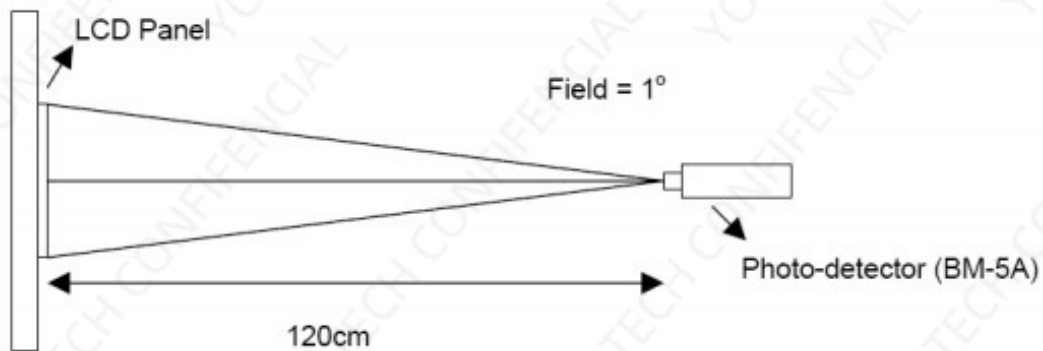
Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

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

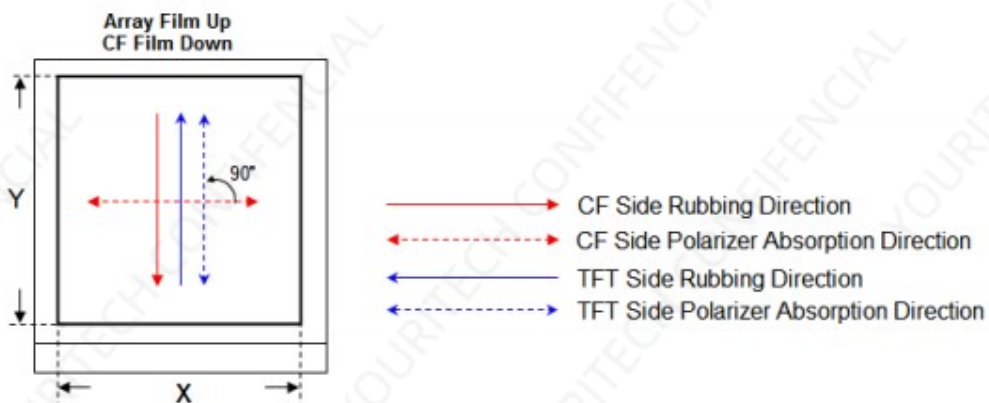
Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



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



Item	Specifications	Unit	Note
Rubbing Direction	90° (TFT) / -90° (CF)	degree	2-domain IPS-pro
Absorption axis of Polarizer	90° (TFT) / 0° (CF)	degree	Array Film Up CF Film Down

8. Reliability Test Item

No.	Test Item	Test Condition	Notes
1	High Temp. Storage	+80°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	+70°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°C (30min) ~70°C (30min) , 50 cycles	

9. Packing Method----TBD

- END -