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Custom Display

Production Custom designs Installation

Mechanical design



LCM FULL SPEC

PRODUCT NO. : ET018XV01-XC

CUSTOMER NO. : _____

CUSTOMER P/N : _____

DRAWING VERSION : A

SAMPLE NO. : _____

SPEC VERSION : V1.0

CUSTOMER APPROVED	
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☐ Preliminary specification

☒ Formal specification

APPROVED BY	CHECKED BY	PRERARED BY

CONTENT

1. General Spec
2. Mechanical drawing
3. Interface description
4. Absolute Maximum Rating
5. DC. Characteristics
6. Electron-optical Characteristics
7. System Block Diagram
8. AC characteristic& Power On/Off Sequence
9. High speed clock and data timing
10. Reliability test conditions and methods

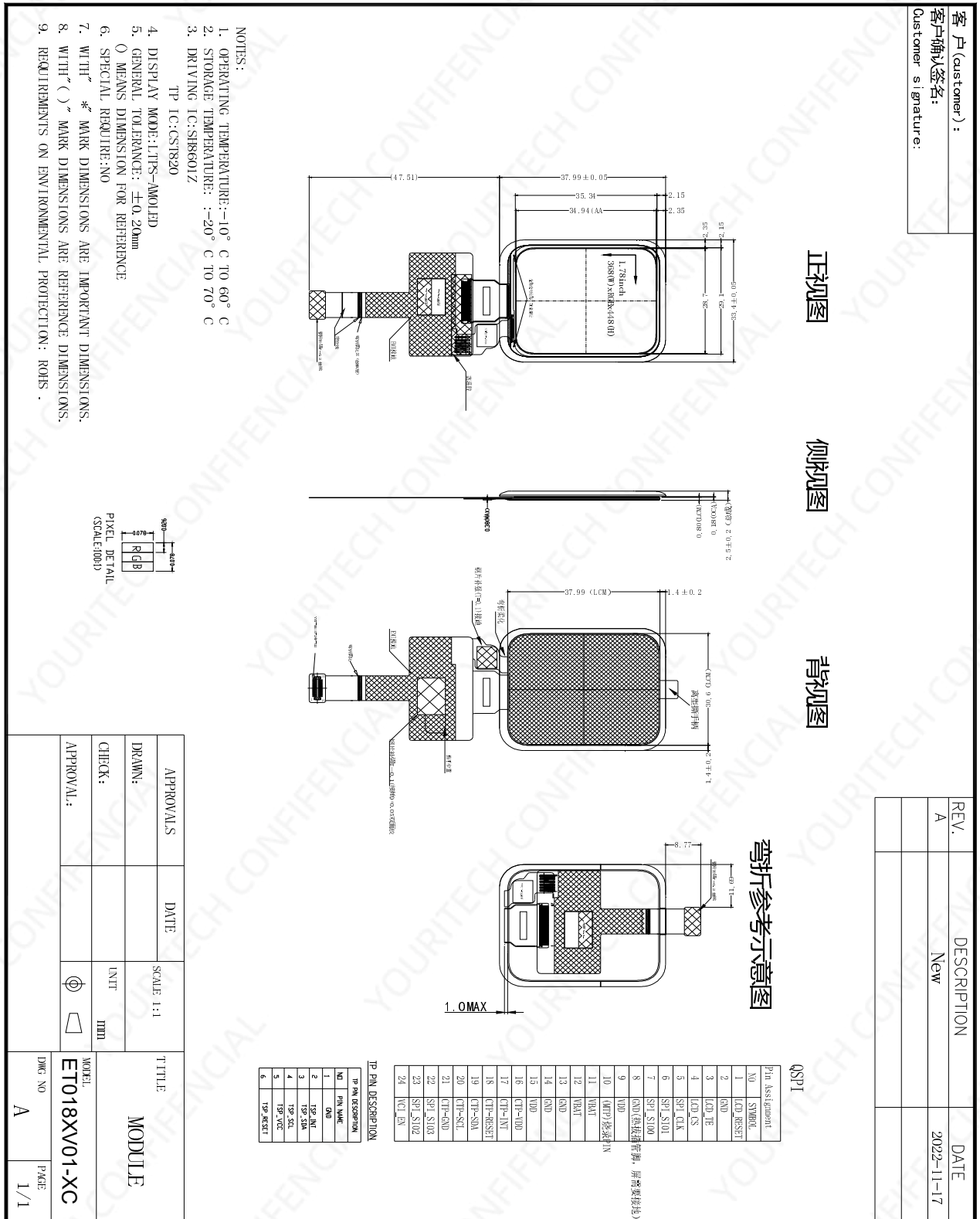
REVISION RECORD

Version	Revision Items	Page	Name	Date
1.0	First release			20221110

1.General Spec

Item	Standard values	Unit 单位
Diagonal Inch	1.78	inch
Dot arrangement	368(W) x RGB x 448(H)	dots
Pixel pitch	78 x 78	μ m
Display mode	AMOLED	/
Driver IC	SH8601	/
Module size	33.4(V) x 37.99(W) x 2.5(T)	mm
Active area	28.7x34.94	mm
Interface	QSPI	-
Operating temperature	-10~60	°C
Storage temperature	-20~70	°C

2.Mechanical drawing



3. Interface description

Pin No.	Symbol	Description
1	LCD-RST	Device reset signal (0 : Enable ; 1: Disable)
2	GND	Ground.
3	TE	Tearing effect output pin to synchronize MCU to frame
4	CS	Chip Select Signal in MIPI DBI Type-B(MPU) and Type-C(SPI) Active Low
5	SCL	Synchronous Clock Signal in MIPI DBI Type-B(MPU) and Type-C(SPI)
6	SD1	Serial Data Input in Quad-SPI
7	SD0	Serial Data Input in Quad-SPI
8	GND	Ground.
9	VDD	Power Supply for Analog Circuits VCI < 0.05V (When power is turned off)
10	MTP	External Voltage Input for OTP Data Program
11-12	VBAT	Analog Power Input for POWER IC Input Voltage Range: 3.4V to 5.5V
13	GND	Ground.
14	GND	Ground.
15	VDD	Power Supply for Analog Circuits VCI < 0.05V (When power is turned off)
16	TPVDD	Touch Panel 3.3V power supply
17	TPINT	Touch Panel interrupt
18	TPRST	Touch Panel Reset
19	TPSDA	Touch Panel Data
20	TPSCL	Touch Panel Clock
21	GND	Ground.
22	SD3	Serial Data Input in Quad-SPI
23	SD2	Serial Data Input in Quad-SPI
24	VCI_EN	Enable for POWER IC

4. Absolute Maximum Ratings

Item	Symbol	Min	Max	Unit
Supply voltage (Display)	VDD	-0.3	3.6	V
	IOVCC	-0.3	3.6	V
	ELVDD	4.6±0.05		V
	ELVSS	-2.4±0.05		V
Operating temperature range	Top	-10	+60	℃
Storage temperature range	Tst	-20	+70	℃
Storage humidity	HD	-	90	%RH

5. DC Characteristics

DC Characteristics for Interface

Table 7 DC Characteristic for Interface Signals

Parameter	Symbol	Condition	Specification			Pin	Unit
			Min.	Typ.	Max.		
Logic high level input voltage	VIH_IO1	—	$0.8 \times VDDI$	—	VDDI	RESX	V
Logic low level input voltage	VIL_IO1	—	0.0	—	$0.2 \times VDDI$		
Logic high level output voltage	VOH_IO1	IOUT = - 1 mA	$0.8 \times VDDI$	—	VDDI	TE	
Logic low level output voltage	VOL_IO1	IOUT = + 1 mA	0.0	—	$0.2 \times VDDI$		
Input high level leakage current	IIH	VIN = VDDI	—	—	1	RESX	μA
Input low level leakage current	IIL	VIN = VSS	- 1	—	—		

NOTE: TA = - 40 to 85 °C

Power Consumption

Table 8 Power Consumption

Parameter	Symbol	Condition	Specification			Unit	Note
			Min.	Typ.	Max.		
Operating current (DSI, dynamic display)	IVDDI _{op}	Frame frequency = 60 Hz	—	—	2.805	mA	(NOTE)
	IVCI _{op}	No load SR_SET = 5'b10110 SPR Function OFF	—	—	5.5		
Sleep current	IVDDI _{LP}	LP11 mode	—	—	850	uA	
	IVCI _{LP}		—	—	50		
	IVDDI _{ULPS}	ULPS mode	—	—	833	uA	
	IVCI _{ULPS}		—	—	50		
Deep standby current	IVDDI _{DSLP}		—	—	4	uA	
	IVCI _{DSLP}		—	—	2		

NOTE: The table above shows only driver IC's power consumption. (MIPI I/F @0.5Gbps, white pattern).
VCI = 2.8V, VDDI = 1.8V, TA = 25 °C.

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply voltage (Display)	VGL	-	-8	-6	-5	V
	VGH	-	6	6.5	8	V
	ELVDD	-	4.55	4.6	4.65	V
	ELVSS	-	-2.3	-2.2	-2.1	V
	VINIT	-	-	-3	-	V
Current (Display)	I _{ELVDD/ELVSS}	Full white display 350nits,60Hz	-	19	27	mA

Note:

VGH,VGL and VINIT must be adjusted to optimize display quality, Contrast Ratio and etc.

■ PIN ASSIGNMENT

◆ TOUCH FPC PIN ASSIGNMENT

Pad NO.	Pad Name	Pad NO.	Pad Name	Pad NO.	Pad Name
1	GND	9	X3	17	Y7
2	Y4	10	X4	18	Y8
3	Y3	11	X5	19	GND
4	Y2	12	X6	20	TRES1
5	Y1	13	X7	21	TRES2
6	GND	14	GND	22~27	DUMMY
7	X1	15	Y5		
8	X2	16	Y6		

6. Electron-optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Surface Luminance	Lv	$\theta=0^\circ$ $\phi=0^\circ$ $T_a=25^\circ\text{C}$	-	350	-	cd/m ²	Note1
Luminance uniformity	δ WHITE		85	-	-	%	Note2
Contrast Ratio	Cr		30000	-	-	-	Note3
Viewing Angle	θ	Up/Down/ Right/Left $Cr \geq 200$	88	-	-	deg	Note4
NTSC ratio	-	-	90	110	-	%	CIE1931
Life Time	T95	25 $^\circ\text{C}$	240	-	-	hours	-

Note4. Viewing Angle

- Measurement equipment: DMS803 or similar equipment.
- Measuring surroundings: Dark room.
- Measuring temperature: $T_a=25^\circ\text{C}$.
- The Viewing Angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the display surface.

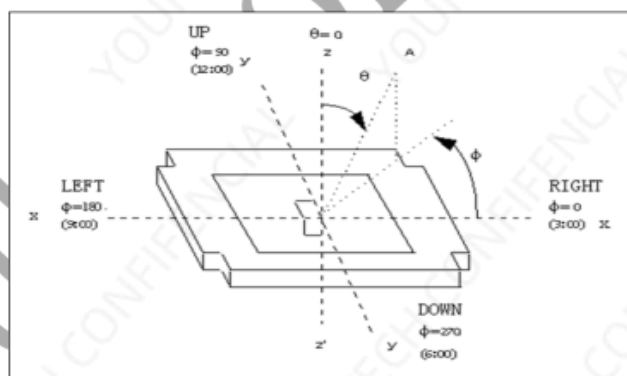


Fig-2

Note5. Color Coordinate of CIE1931

- Measurement equipment: CS2000 or similar equipment.
- Measuring surroundings: Dark room.
- Measuring temperature: $T_a=25^\circ\text{C}$.
- The x, y value of Color Coordinate is determined by measuring at center position of the display panel.

7. System Block Diagram

8. AC characteristic

3.3.1 Power On/Off Sequence

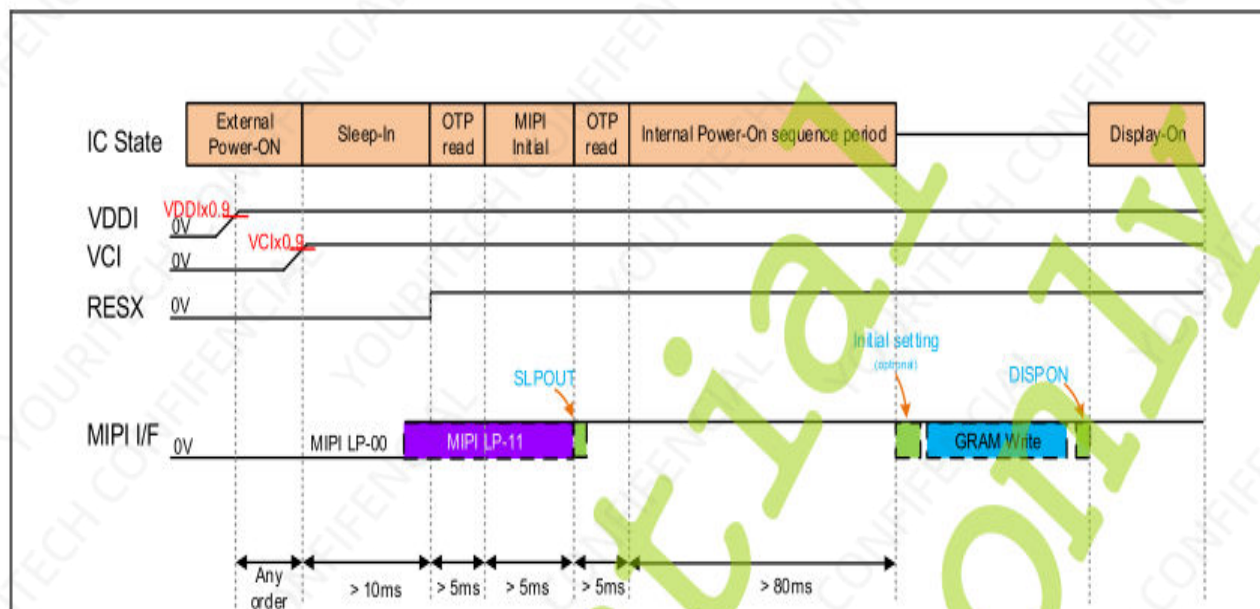
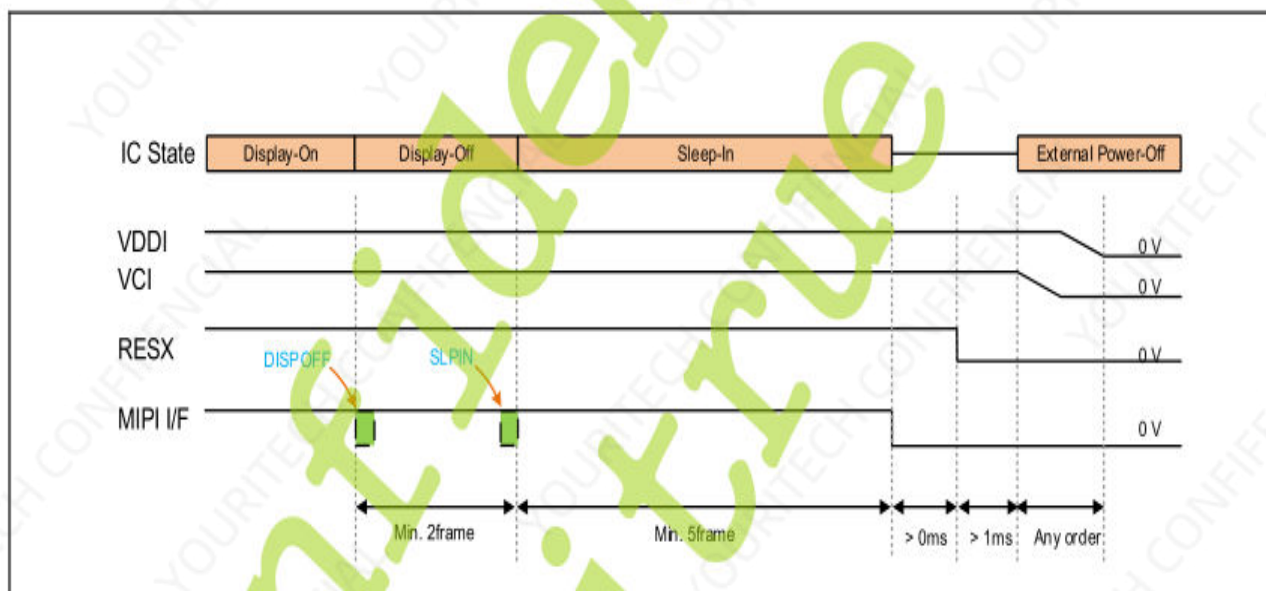


Figure 16 Power-On Sequence



3.1.1 Quad SPI

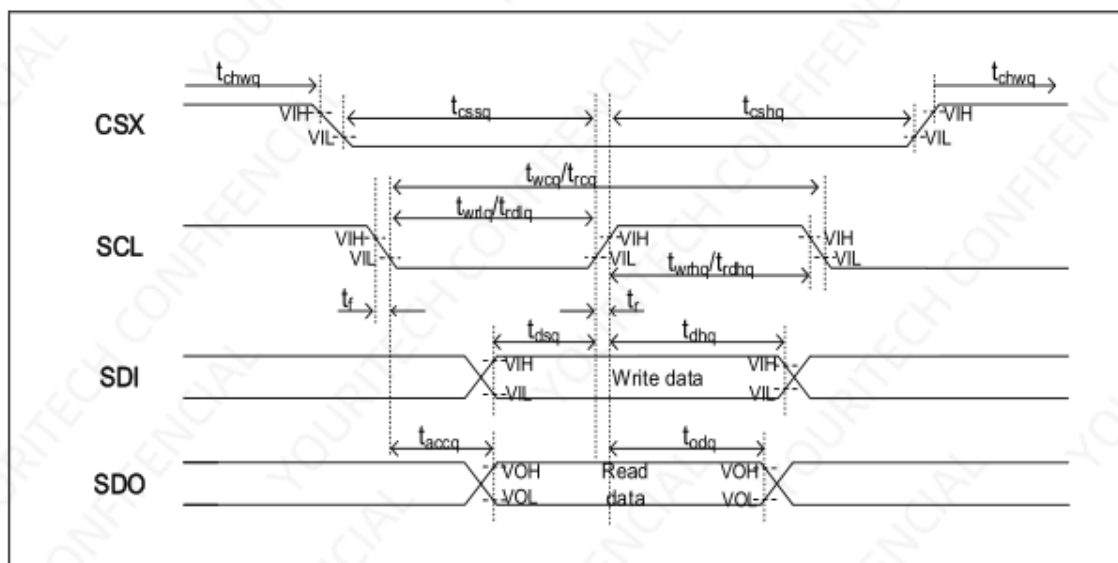


Figure 6 Quad Serial Interface Characteristics

Table 3 AC Characteristics of Quad SPI

Characteristic	Symbol		Specification		Unit
			Min.	Max.	
Chip select setup time	CSX	t_{cssq}	40	—	ns
Chip select hold time		t_{cshq}	40	—	ns
Chip select "High" pulse width		t_{chwq}	50	—	ns
Write cycle time	SCL (Write)	t_{wcq}	20	—	ns
SCL "High" period (Write)		t_{wrh}	25	—	ns
SCL "Low" period (Write)		t_{wrl}	25	—	ns
Read cycle time	SCL (Read)	t_{rcq}	100	—	ns
SCL "High" period (Read)		t_{rdh}	50	—	ns
SCL "Low" period (Read)		t_{rdl}	50	—	ns
Data setup time	SDI	t_{dsq}	15	—	ns
Data hold time		t_{dhq}	15	—	ns
Access time	SDO	t_{accq}	5	35	ns
Output disable time		t_{odq}	20	—	ns
Rise/Fall time	-	t_r/t_f	—	1	ns

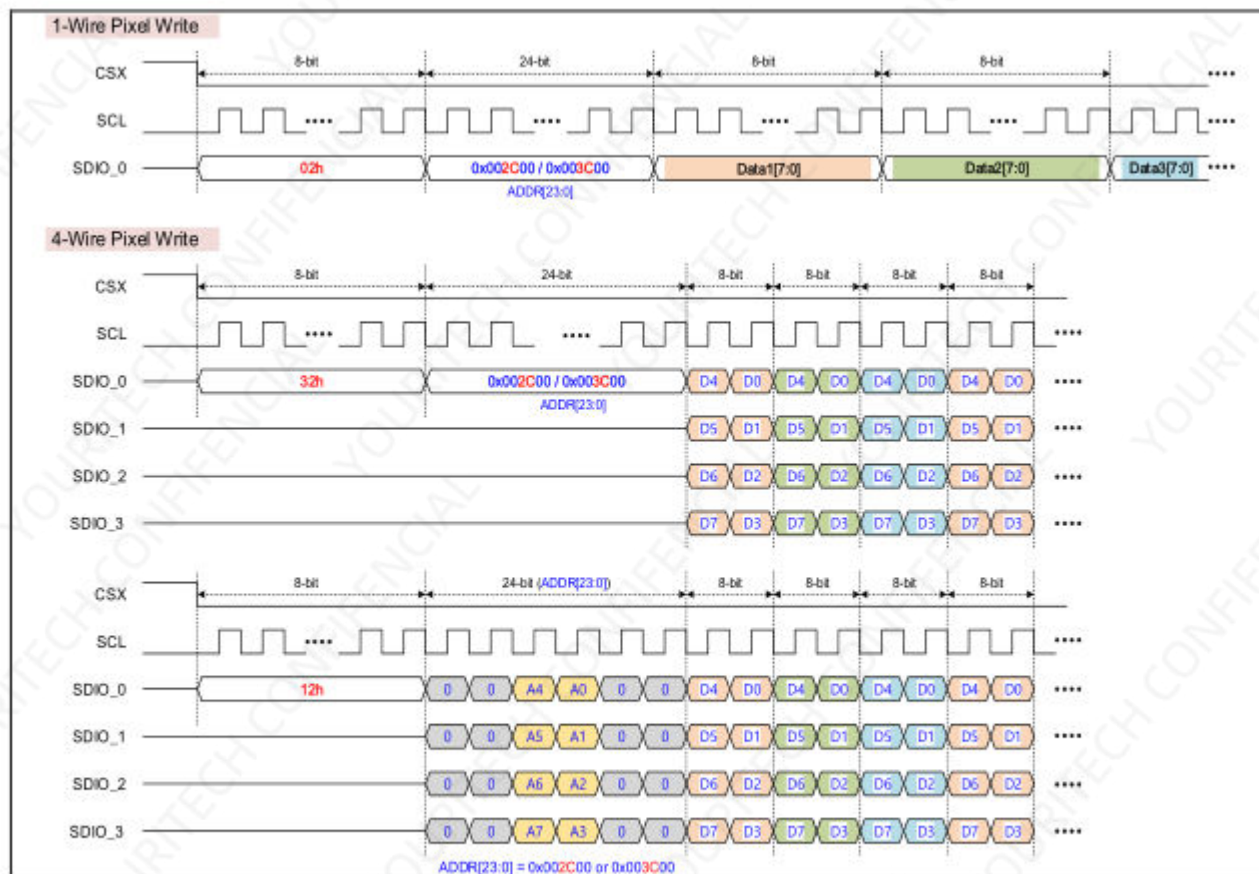


Figure 4 Quad SPI Interface Protocol – Pixel Interface

10. Reliability test conditions and methods

No	Test Item	Test condition	Criterion
1	High Temperature Storage	70℃±3℃ 48H Power off	Inspection after 4 hours storage at room temperature, the sample shall be free from defects: 1. Air bubble in the LCD; 2. Seal leak; 3. Non-display; 4. missing segments; 5. Glass crack; 6. Current Idd is twice higher than initial value. 7. The surface shall be free from damage. 8. The electric characteristic requirements shall be satisfied
2	Low Temperature Storage	-20℃±3℃ 48H Power off	
3	High Temperature Operation	60℃±3℃ 48H Power on	
4	Low Temperature Operation	-10℃±3℃ 48H Power on	
5	High Temperature & Humidity Operation	60℃±3℃ 90%RH 48H Power off	
6	Temperature Cycle	-20℃↔25℃↔70℃ 30min 5min 30min 5 cycle Power off	

Remark:

1. The test samples should be applied to only one test item.
2. Sample size for each test item is 3~5pcs.
3. For Damp Proof Test, Pure water (Resistance > 10MΩ) should be used.
4. In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.
5. EL evaluation should be excepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
6. Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.