3.7 inch E-paper Display Series

GooDisplay®

GDEQ037T31

Dalian Good Display Co., Ltd.

Product Specifications

Customer	**Standard**
Description	**3.7” E-PAPER DISPLAY**
Model Name	GDEQ037T31
Date	**2022/11/11**
Revision	1.0

	Design Engineering		
	Approval	**Check**	**Design**
			

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1 Application Filed

Common Application

2 Overview

TFT active matrix electrophoretic display, with interface and a reference system design. The 3. 7" active area contains 240×416 pixels, and has 1-bit white/black display capabilities. An integrated circuit contains gate buffer, source buffer, interface, timing control logic, oscillator, DC-DC, SRAM, LUT, VCOM, and border are supplied with each panel.

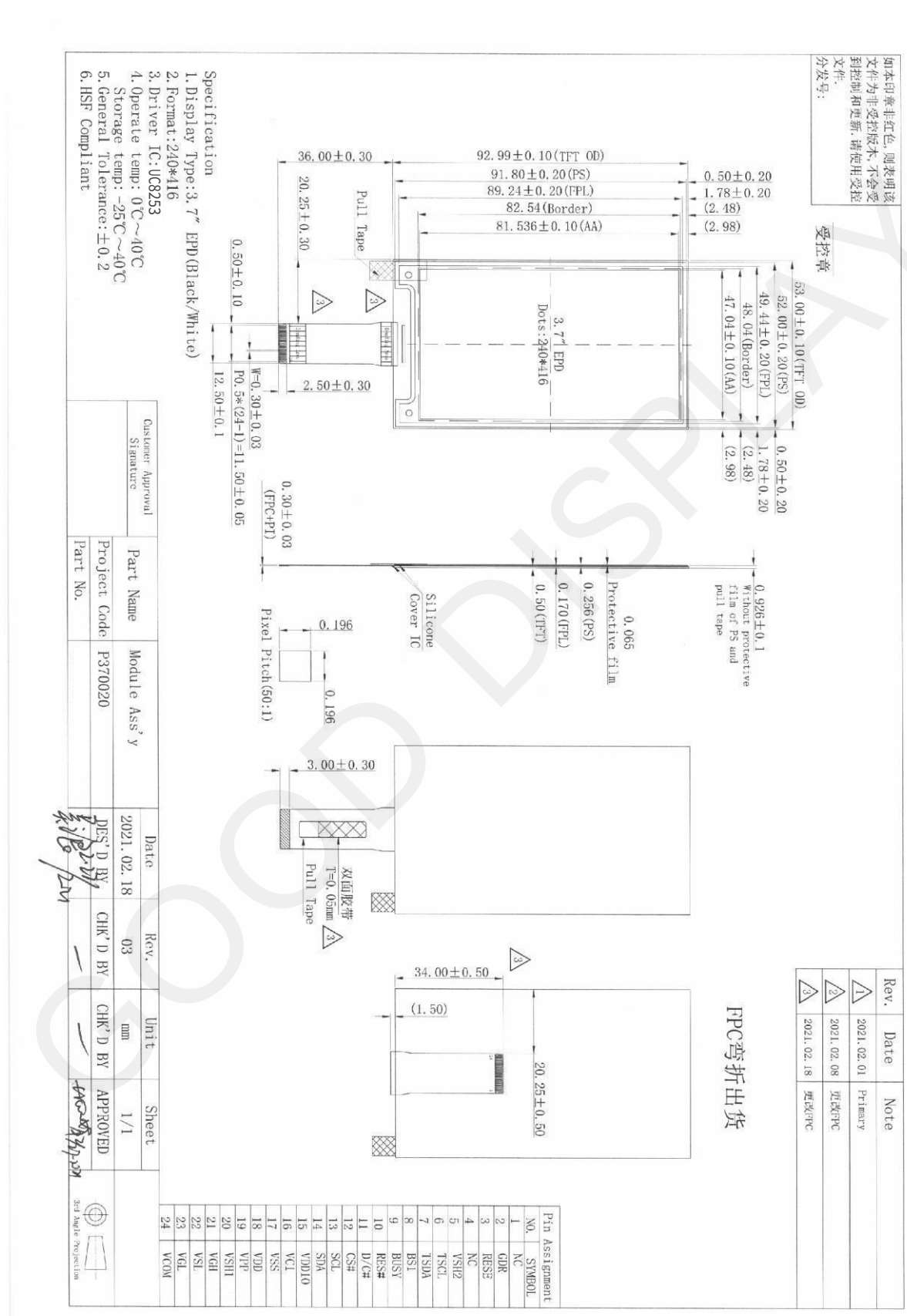
Features

- Ultra low power consumption
- Ultra wide viewing angle
- On chip display RAM
- Interface: 4-Wire SPI or 3-Wire SPI
- Wide range of operating temperature: 0℃ to 40℃
- Wide range of Storage temperature: -25℃ to 40℃
- High reflectance and contrast TFT electrophoretic.
- I2C Signal Master Interface to read external temperature sensor.

3 Mechanical Data

NO.	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	416(H)×240(V)	-
2	Screen Size	3.7	Inch
3	Active Area	81.536(H)×47.04(V)	mm
4	Pixel Pitch	0.196×0.196	mm
5	Pixels Per Inch	130	–
6	TFT Area	92.99(H)× 53.00(V)	mm
7	Outline Dimension	128.99(H)×53.00(V) ×0.912(D)	mm
8	Pixel Configuration	Square	-
9	Driver IC	UC8253	-
10	Module Weight	TBD±10%	gram

4 Mechanical Drawing



5 Module Interface

PIN NO.	PIN NAME	DESCRIPTION
1	NC	No Connection
2	GDR	This pin is N-Channel MOSFET gate drive control pin.
3	RESE	Current Sense Input for the control loop
4	NC	No Connection
5	VSH2	This pin is Positive Source driving voltage, VSH2 connect a stabilizing capacitor between VSH2 and VSS in the application circuit.
6	TSCL	This pin is I^2C Interface to digital temperature sensor Clock pin. External pull up resistor is required when connecting to I^2C slave.
7	TSDA	This pin is I^2C Interface to digital temperature sensor Data pin. External pull up resistor is required when connecting to I^2C slave.
8	BS1	This pin is for selecting 3-wire(H active) or 4-wire(L active) SPI interface.
9	BUSY	This pin indicates the driver status. BUSY= ”0” : Driver is busy, data/VCOM is transforming. BUSY= ”1” : non-busy. Host side can send command/data to driver.
10	RES#	This pin is reset signal input (Active Low).
11	D/C#	This pin is Data/Command control pin connecting to the MCU
12	CS#	This pin is the chip select input connecting to the MCU.
13	SCL	This pin is serial clock pin for interface.
14	SDA	This pin is serial data pin for interface.
15	VDDIO	Power input pin for the Interface. Connect to VCI in the application circuit.
16	VCI	Power input pin for the chip.
17	VSS	Ground
18	VDD	Core logic power pin VDD can be regulated internally from VCI. A capacitor should be connected between VDD and VSS under all circumstances
19	VPP	Power Supply for OTP Programming.
20	VSH1	This pin is Positive Source driving voltage, VSH1 Connect a stabilizing capacitor between VSH1 and VSS in the application circuit.
21	VGH	This pin is Positive Gate driving voltage. Connect a stabilizing capacitor between VGH and VSS in the application circuit.
22	VSL	This pin is Negative Source driving voltage. Connect a stabilizing capacitor between VSL and VSS in the application circuit.
23	VGL	This pin is Negative Gate driving voltage. Connect a stabilizing capacitor between VGL and VSS in the application circuit.
24	VCOM	This pins is VCOM driving voltage Connect a stabilizing capacitor between VCOM and VSS in the application circuit.

6 Absolute Maximum Ratings

ITEM	SYMBOL	MIN	MAX	UNIT	REMARK
Logic supply voltage	VCI/VDD	-0.3	+6.0	V	-
I/O supply voltage	VDDIO	-0.3	+6.0		
OTP Program voltage	VPP	-0.5	+8.5	V	-
Logic Input voltage	V_{IN}	-0.3	VDDIO+0.3	V	-
Operating Temp.	Top	0	+40	C	-
Storage Temp	Tstg	-25	+40	C	-

Note (1): All of the voltages are on the basis of "VSS = 0V" .

Note (2): Maximum ratings are those values beyond which damages to the device may occur. Functional operation should be restricted to the limits in the Panel DC Characteristics tables.

7 Electrical Characteristics

7.1 DC Characteristics

The following specifications apply for: VSS=0V, VCI=3.3V, TOPR =25ºC.

Parameter	Symbol	Condition	Applicable	Min.	Typ.	Max.	Unit
Logic supply voltage	V_{CI}	-	VCI	2.3	3.3	3.6	V
High level input voltage	V_{IH}	-	-	$0.7V_{VDDIO}$	-	VDDIO	V
Low level input voltage	V_{IL}	-		0	-	$0.3V_{VDDIO}$	V
High level output voltage	V_{OH}	IOH = 400uA	-	VDDIO-0.4	-	-	V
Low level output voltage	V_{OL}	IOL = -400uA	-	0	-	0.4	V
OTP Program voltage	V_{PP}	-	VPP	8	8.25	8.5	V
Typical power panel	P_{TYP}	-	-	-	TBD		mW
Standby power panel	P_{STPY}	-	-	-	TBD		mW
Typical operating current(white state)	Iopr_VCI	-	-	-	TBD	-	mA
Full update time	-	25℃	-	-	4	-	sec
Partial update time	-	25℃	-	-	0.5	-	sec
Fast update time	-	25℃	-	-	1.5	-	sec
Sleep mode current	Islp_VCI	VCI=3.3V DC/DC OFF No clock No output load Ram data	VCI	-	TBD	-	uA
Deep sleep mode current	Idslp_VCI	VCI=3.3V DC/DC OFF No clock No output load Ram	VCI	-	TBD	-	uA

Note: The VPP, VCI, VDDIO input must be kept in a stable value; ripple and noise are not allowed.

7.2 Panel DC Characteristics (Driver IC Internal Regulators)

The following specifications apply for: VSS=0V, VCI=3.3V, TOPR =25℃.

Parameter	Symbol	Condition	Applicable pin	Min.	Typ.	Max.	Unit
VCOM output voltage	VCOM	-	VCOM	-	-2.0	-	V
Positive Source output voltage	V_{SH}	-	S_0~S_{239}	-	+15	-	V
Negative Source output voltage	V_{SL}	-	S_0~S_{239}	-	-15	-	V
Positive gate output voltage	Vgh	-	G_0~G_{415}	-0.3	-	22	V
Negative gate output voltage	Vgl	-	G_0~G_{415}	-22	-	0.3	V

7.3 Optical Specification

Measurements are made with that the illumination is under an angle of 45 degree, the detection is perpendicular unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ.	Max	Units	Notes
R	White Reflectivity	White	-	36.55	-	%	8-1
CR	Contrast Ratio	indoor	-	15.52	-		8-2
T update	Image update time	25 ℃	-	4	-	sec	
Tlife	Life	Topr	-	1000000 times or 5years	-		

Notes: 7-1. Luminance meter: Eye-One Pro Spectrophotometer.

7-2.CR=Surface Reflectance with all white pixel/Surface Reflectance with all black pixels.

7.4 AC Electrical Characteristics

(1) Serial Peripheral Interface for 3-SPI

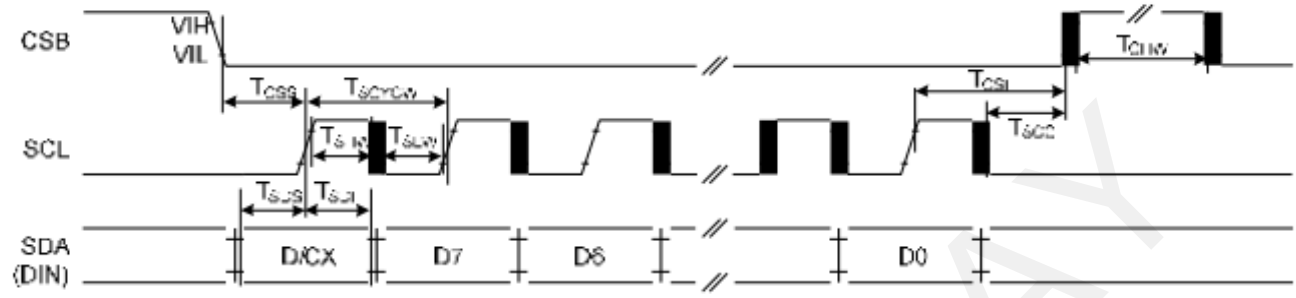


Figure: 3-wire Serial Interface Characteristics (Write mode)

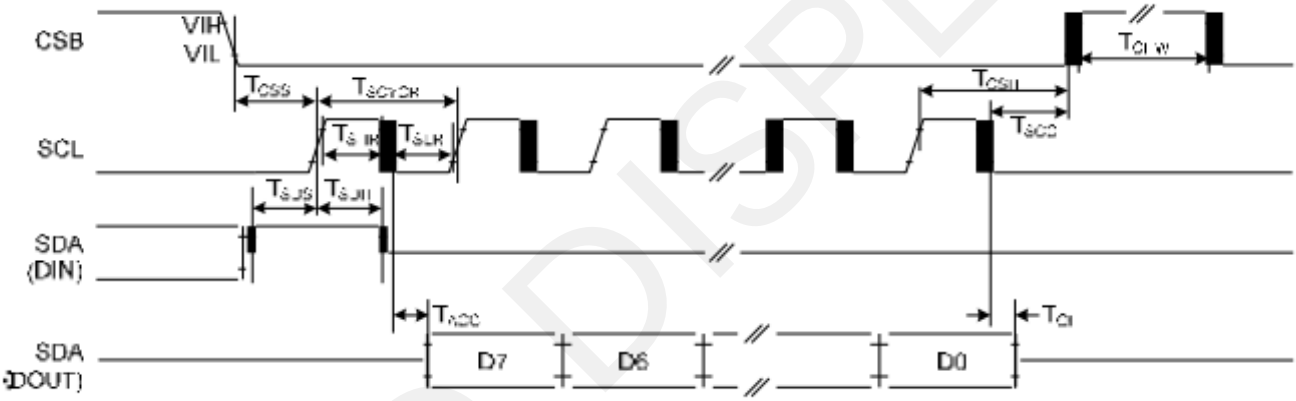


Figure: 3-wire Serial Interface Characteristics (Read mode)

Symbol	Signal / Parameter	Conditions	Min.	Typ.	Max.	Unit
T_{CSS}	CSB	Chip select setup time	60			ns
T_{CSH}		Chip select hold time	65			ns
T_{SCC}		Chip select setup time	20			ns
T_{CHW}		Chip select setup time	40			ns
T_{SCYCW}	SCL	Serial clock cycle (Write)	100			ns
T_{SHW}		SCL "H" pulse width (Write)	35			ns
T_{SLW}		SCL "L" pulse width (Write)	35			ns
T_{SCYCR}		Serial clock cycle (Read)	150			ns
T_{SHR}		SCL "H" pulse width (Read)	60			ns
T_{SLR}		SCL "L" pulse width (Read)	60			ns
T_{SDS}	SDA	Data setup time	30			ns
T_{SDH}	(DIN)	Data hold time	30			ns
T_{ACC}	SDA	Access time			50	ns
T_{OH}	(DOUT)	Output disable time	15			ns

(2) Serial Peripheral Interface for 4-SPI

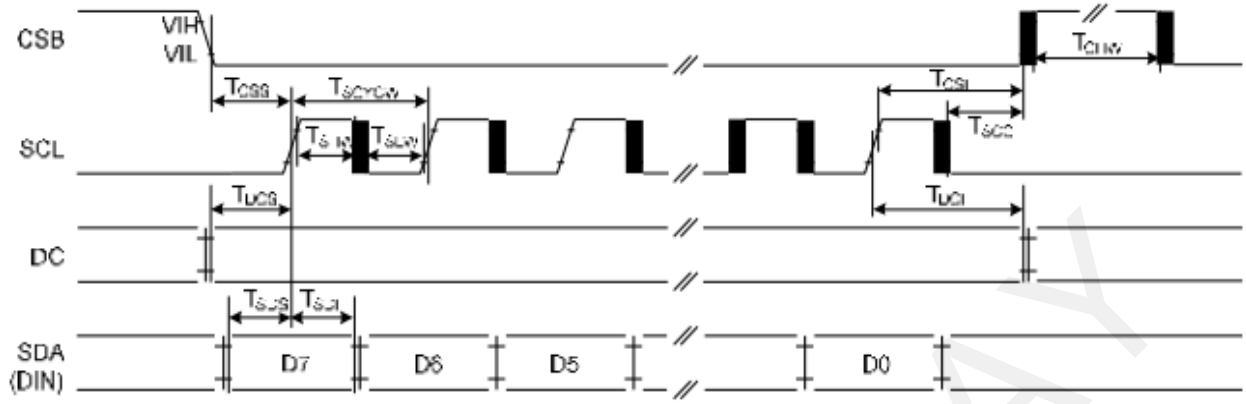


Figure: 4-wire Serial Interface Characteristics (Write mode)

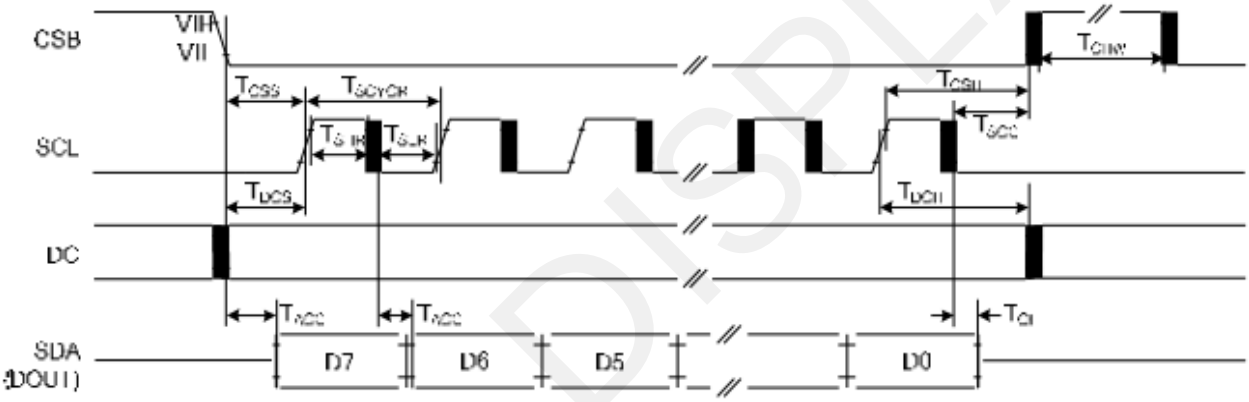


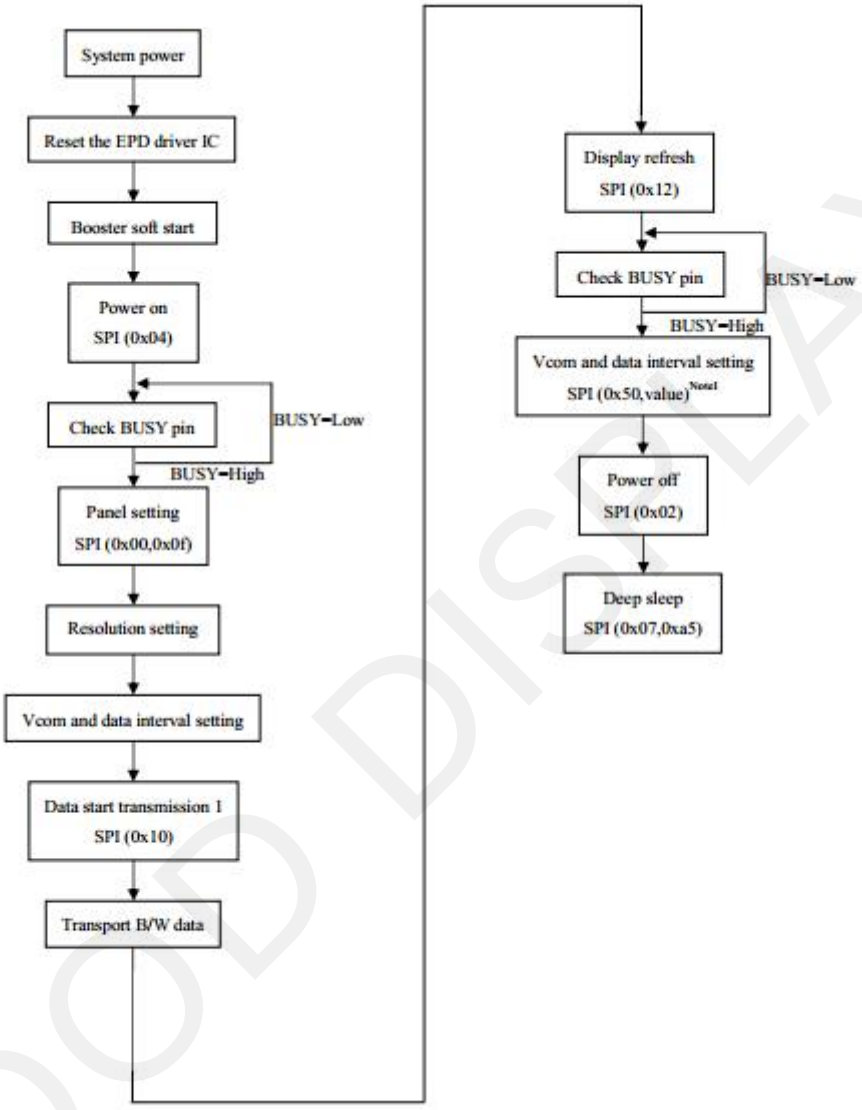
Figure: 4-wire Serial Interface Characteristics (Read mode)

Symbol	Signal / Parameter	Conditions	Min.	Typ.	Max.	Unit
T_{CSS}	CSB	Chip select setup time	60			ns
T_{CSH}		Chip select hold time	65			ns
T_{SCC}		Chip select setup time	20			ns
T_{CHW}		Chip select setup time	40			ns
T_{SCYCW}	SCL	Serial clock cycle (Write)	100			ns
T_{SHW}		SCL "H" pulse width (Write)	35			ns
T_{SLW}		SCL "L" pulse width (Write)	35			ns
T_{SCYCR}		Serial clock cycle (Read)	150			ns
T_{SHR}		SCL "H" pulse width (Read)	60			ns
T_{SLR}		SCL "L" pulse width (Read)	60			ns
T_{DCS}	DC	Data setup time	30			ns
T_{DCH}		Data hold time	30			ns
T_{SDS}	SDA (DIN)	Access time			50	ns
T_{SDH}		Output disable time	15			ns
T_{ACC}	SDA (DOUT)	Serial clock cycle (Read)	150			ns
T_{OH}		SCL "H" pulse width (Read)	60			ns

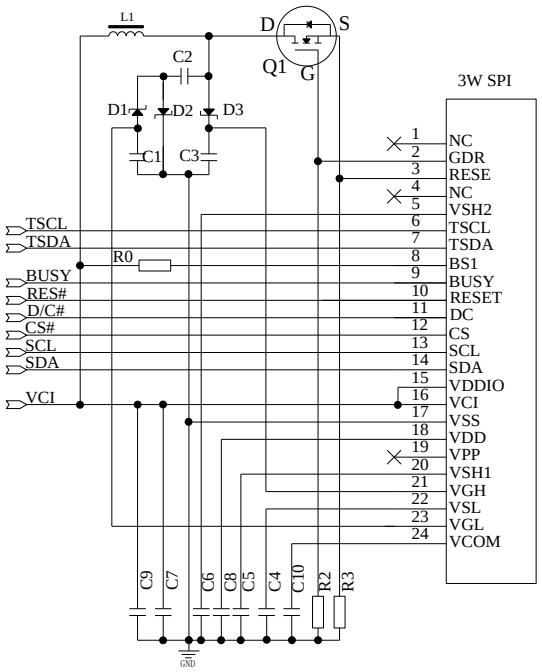
8 Functional Specification and Application Circuit

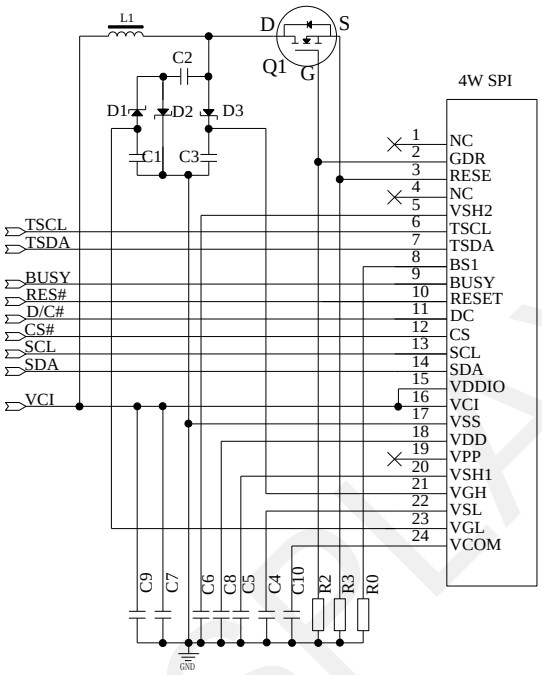
8.1 Operation Flow and Code Sequence

General operation flow to drive display panel



8.2 Typical Application Circuit with SPI Interface





Component list for application circuit:

Part Name	Description	Reference Part/Requirement
C4-C8,C10	Chip Ceramic Capacitor	1uF 50V X5R/X7R ±10%
C1-C3	Chip Ceramic Capacitor	1uF 25V X5R/X7R ±10%
C9	Chip Ceramic Capacitor	10uF 10V X5R/X7R ±10%
R3	Chip Resistor	2.2ohm 1% 1/20W ±10%
R0,R2	Chip Resistor	10 K ohm 1% 1/20W ±10%
D1-D3	Schottky Rectifier Diode	OnSemi MBR0530 (V_R > 25V, I_F > 500mA, I_R < 1mA @ V_R=15V, Ta=100℃)
Q1	N-Channel MOSFET	Vishay Si1308EDL (V_{DS} > 25V, I_D > 500mA, V_{GS}(th) < 1.5V, C_{iss} < 200pF, R_{DS}(on) < 400mΩ)
L1	Chip Inductor	47uH±30% Io≤1A

8.3 Display Control Instruction

Refer to U C 8 2 5 3 IC Specification.

8.4 Recommended Software Initialization

In order to ensure the reliability and stability of the module, the module must initialized use the following code, Malfunctioning of the module may occur and the reliability of the module may deteriorate if the module is used beyond the initialize code.

```
void Init_IC()
{
   TBD
}
```

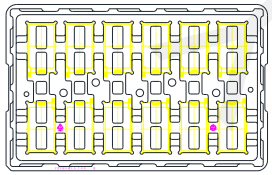
Controlled Seal

9 Package Specification

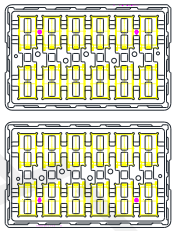
Packing Process(1)~(12)

(1) TRAY Type:

P370020-MT1-A

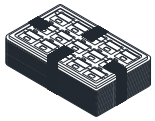


(2)

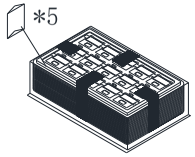


TRAY

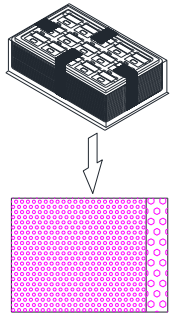
(3) order ①、②、①、②
fix trays with tape
420 pcs of 1 carton
1 tray contain 12 pcs
35 contained trays, 1 empty tray



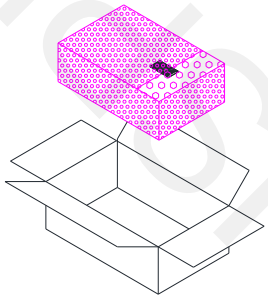
(4) package with plastic bags
add five desiccants
create a power vacuum



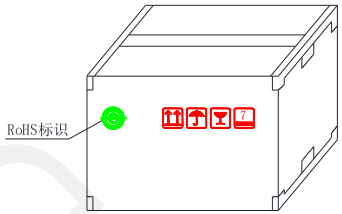
(5) After tray be packed, wrap the package in a bubble bag and seal with scoth tape.



(6)

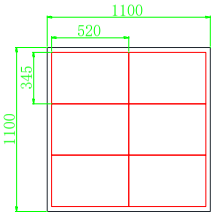


(7) 35 contained trays, 1 empty
Package quantity products:
420 pcs of 1 carton.



Package finished

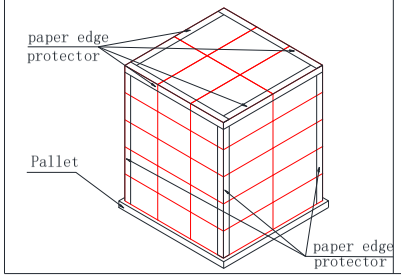
(8) Pallet stack
Pallet Type: 1100*1100*150mm
Plastic Pallet



一、The six carton is of one layer, maximum stack offive layers.
二、If the shipment is less than the full container, empty container shall be used to fill the current floor for shipmen.
三、Each carton layer should be centered on the pallet.

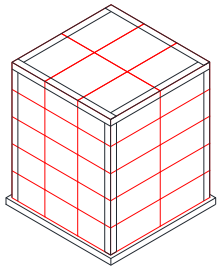
(9) Use paper edge protector

Top face paper edge protector type : P213010-MC4-A
Size: 1035*50*50mm, T=5mm
Side face paper edge protector type : P213010-MC5-A
Size: 1000*50*50mm, T=5mm



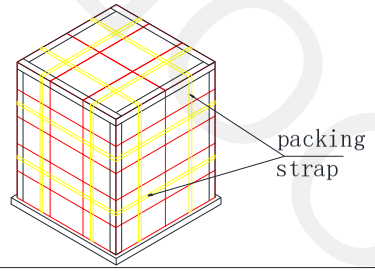
(10) Enwind stretch film

Wrap 3 layers of stretch film around the paper sheath (All around and on top), Wrap paper pallets, pallets, and boxes underneath



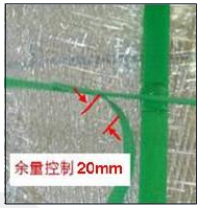
(11) Pack packing strap

The packing tape should be tied to the carton;
If Stack height greater than or equal to 3 layers, 2 turns in length, width and height;
If the stack height is less than 3 layers, the height direction is not used pack.



(12) Pack packing strap

The surface of the packing belt shall not be twisted, skewed or cracked; After the packaging is completed, the tightness of the packaging belt is suitable. Use the packing iron buckle to fix the belt and cut off the excess packaging belt. The remaining amount is less than or equal to 20mm

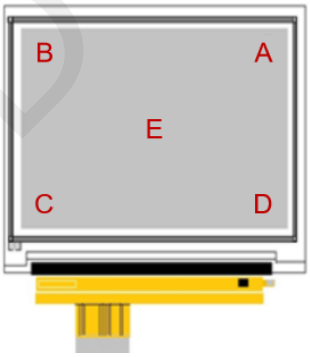


NOTE:1、The inner cartoster carton must be sealed with adhesive tape.
2、Fill up the gap with empty tray.
3、If the customer has special needs with the RoHS making, the inner carton and master carton need adhesive new RoHS marking at ♻.
4、Packaging materials are not recommended for recycling.

10 Reliability

NO	Test items	Test condition	QUANTITY
1	Low-Temperature Storage	T = -25℃ , low temperature film T= -30℃; White screen state, for 240h.	5pcs
2	Low-Temperature Operation	T = 0 ℃, 240 h; Put the product into the experimental procedure, run it in the temperature box, and check it every 24 hours.	5pcs
3	High-Temperature Operation	T = 40 ℃, RH = 35%, 240 h; Put the product into the experimental procedure, run it in the temperature box, and check it every 24 hours.	5pcs
4	High-Temperature Storage	T=60 ℃， RH=35%; White screen state, for 240h.	5pcs
5	Temperature Cycle	1 cycle:[-25°C 30min]→[+60 ℃ 30 min]; 100 cycles.	5pcs
6	High-Temperature/ High- humidity Storage	T=50 ℃， RH=90%; White screen state, for 240h.	5pcs
7	UV exposure Resistance	765W/m ²for 168hrs,T = 40 ℃, RH=35%;	5pcs
8	ESD Contact discharge	±200V, Test 5 point; Each point discharge 10 times. Time interval is not less than 1 second.	5pcs

ESD test location



Test and measurement conditions

After the end of the experiment, the sample was taken out of the temperature chamber, and stood at room temperature for 1h, and then the sample was inspected for appearance, function and optical inspection.

Criteria for qualification (pass the test if all qualified) :

(1) The product can be normal refresh.

(2) There are no new point defects or line defects in the display screen.

(3) No discoloration, blurred handwriting and barcode can be read on the complex screen.

11 Outgoing Quality Control Specifications

11.1 Sampling Method

(1) GB/T 2828.1, inspection level II, normal inspection, single sample inspection

(2) AQL: Major 0.65; Minor 1.0

11.2 Inspection Conditions

The environmental conditions for test and measurement are performed as follows.

Temperature: 23±3°C

Humidity: 55±15%R.H

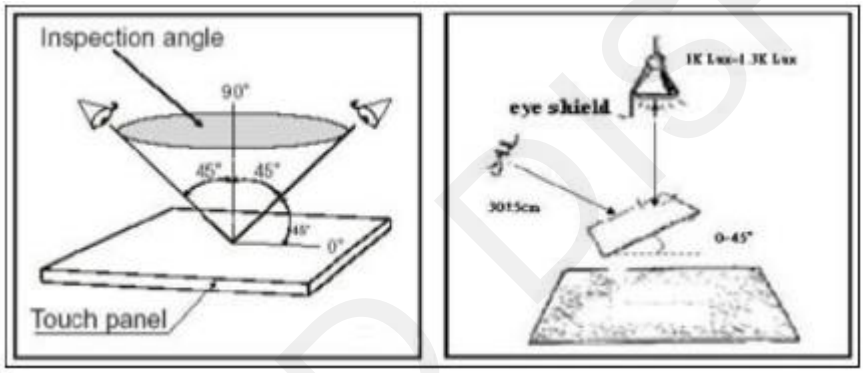
Inspection of illuminance: 800~1200Lux

Inspection time: signal face 5S-10S

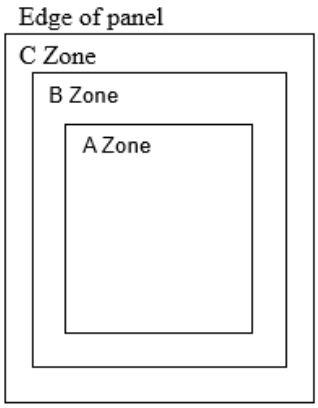
Distance between the Panel & Eyes: 30±10cm

Viewing angle from the vertical in each direction: ±45°

(See the sketch below)



11.3 Quality Assurance Zones



Zone A：Active Area

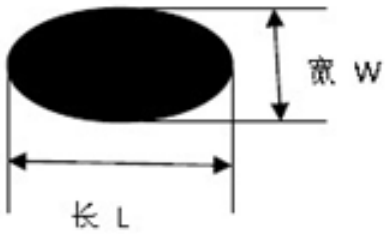
Zone B: Black Frame Area

Zone C: Outside Black Frame Area

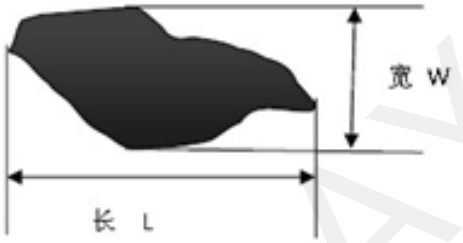
11.4 Inspection Standard

Defects Definition of Φ&L&W (Unit: mm)

11.4.1 Dot defects:

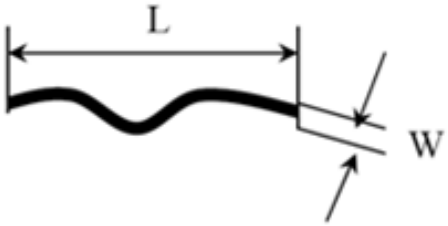


ΦD=Max(L,W)

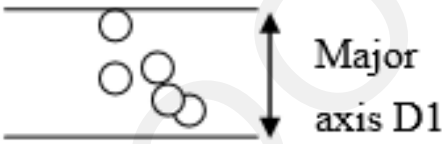


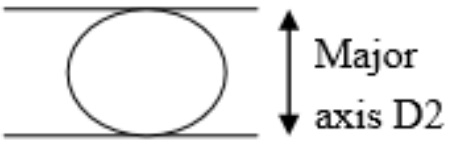
ΦD=Max(L,W)

11.4.2 line defect:

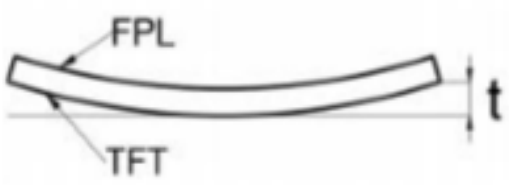


11.4.3 Small bubble aggregation and large bubble definition:



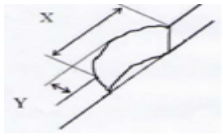
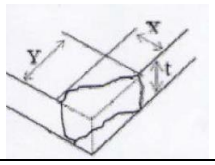


11.4.4 TFT warpage:



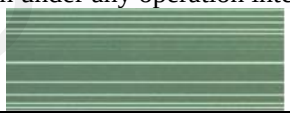
I. Appearance Defects

NO.	ITEM	CRITERIA	Acceptable range	Method	Defect level	Area
1	3.5inches below Dot defects (Black or White spot, Dirty spot, Foreign matter, Bubble)	D≦0.25mm	Ignore	Film Card	Minor	Zone A
		0.25mm < D≦0.4 mm, Distance≥5mm	N≦4			
		D>0.4 mm	N=0			
	3.5~7.5inches Dot defects (Black or White spot, Dirty spot, Foreign matter, Bubble)	D≦0.25mm	Ignore	Film Card	Minor	Zone A
		0.25mm < D≦0.4 mm, Distance≥5mm	N≦4			
		0.4mm < D≦0.5 mm, Distance≥5mm (Black and white module)	N≦1			
		D>0.4 mm, D>0.5 mm(Black and white module)	N=0			
	7.5inches above Dot defects (Black or White spot, Dirty spot, Foreign matter, Bubble)	D≦0.3mm	Ignore	Film Card	Minor	Zone A
		0.3mm < D≦0.5 mm, Distance≥5mm	N≦4			
		D>0.5 mm	N=0			
2	3.5inches below Line defect (Foreign material,Scratch)	L≦2mm, W≦0.2mm	Ignore	Film Card	Minor	Zone A
		2mm<L≦5mm, 0.2<W≦0.3mm	N≦2			
		L>5mm, W>0.3mm	N=0			
	3.5~7.5inches Line defects (Foreign material, Scratch)	L≦2mm, W≦0.2mm	Ignore	Film Card	Minor	Zone A
		2mm<L≦8mm, 0.2<W≦0.5mm	N≦2			
		L>8mm, W>0.5mm	N=0			
	7.5inches above Line defects (Foreign material, Scratch)	L≦2mm, W≦0.2mm	Ignore	Film Card	Minor	Zone A
		2mm<L≦8mm, 0.2<W≦0.5mm	N≦5			
		L>8mm, W>0.5mm	N=0			
3	Glass Crack	Extensional cracks are not allowed 	N=0	Sight Check	Major	Zone B,C

NO.	ITEM	CRITERIA	Acceptable range	Method	Defect level	Area
4	Edge breakage	X≤3mm,Y≤0.5mm, It does not affect the electrode 	N≦2	Sight Check/ Microscope	Minor	Zone C
5	Chip Package Chip Off	X≤2mm · Y≤2mm, It does not affect the electrode(FPC edge) X≤1mm · Y≤1mm, It does not affect the electrode((Not FPC edge) 	N≦2	Sight Check/ Microscope	Minor	Zone C
6	Squalidity	Can wipe dirt.	Ignore	Sight Check	Minor	Zone A,B
7	Silicone	The maximum diameter of a single bubble cannot exceed 2mm	N≤2	Sight Check/ Film card	Minor	Zone C
		Crack is not allowed and there are no visible impurities in the glue of the lead part (Determination of impurities outside IC region by point deficiency)	N=0			
		The adhesive must completely cover the ACF, lead area and IC and should be applied evenly	N=0			
		No glue leakage, no obvious lack of glue in the lead area	N=0			
		Glue height exceeds PS surface	N=0			
		FPC Front overflow glue width>0.5mm or Back side overflow glue width>1mm	N=0			
8	Edge Sealing Adhesive	No glue leakage	N=0	Sight Check/ Film card	Major	Zone C
		The height of sealant exceeds PS surface	N=0		Minor	
		Bubbles 0.2mm<D1,D2≦0.5mm	N=3		Minor	
9	Protective film	Foreign body in protective film	N=0	Sight Check	Minor	Zone A
		The protective film punctures and injures FPL	N=0			
10	Pull Tape	Attachment position is wrong Cannot tear up the protective film	N=0	Sight Check	Minor	Zone C
11	FPC	FPC has break, scratch, gold finger stripping or oxidation, dirty, residual glue	N=0	Sight Check	Major	Zone C
12	Glass edge bulge	X≤3mm · Y≤0.3mm	N≦1	Sight Check	Minor	Zone C

NO.	ITEM	CRITERIA	Acceptable range	Method	Defect level	Area
13	Warping	t > 1mm （3.5inch below） t > 1.5mm （3.5inch~7.5inch） t > 2mm （7.5inch above）	N=0	Plug Gage	Minor	Zone C
14	Chromatism	Color difference in silver paste area (Not in Zone A)	Ignore	Sight Check	Minor	Zone C
		FPL Peeling occurs, chromatic aberration occurs	N=0	Sight Check	Major	Zone A,B
15	Silver pulp point	FPL and TFT substrate conduction, silver point <1.0mm	N=0	Film card	Major	Zone C

II. Displaying Defects

NO.	ITEM	CRITERIA	Acceptable range	Method	Defect level	Area
1	3.5inches below Dot defects （Black or White spot）	D≦0.25mm	Ignore	Film Card	Major	Zone A
		0.25mm < D≦0.4 mm, Distance≥5mm	N≦4			
		D>0.4 mm	N=0			
	3.5~7.5inches Dot defects （Black or White spot）	D≦0.25mm	Ignore	Film Card	Major	Zone A
		0.25mm < D≦0.4 mm, Distance≥5mm	N≦4			
		0.4mm < D≦0.5 mm, Distance≥5mm (Black and white module)	N≦1			
		D>0.4 mm, D>0.5 mm(Black and white module)	N=0			
	7.5inches above Dot defects （Black or White spot）	D≦0.3mm	Ignore	Film Card	Major	Zone A
		0.3mm < D≦0.5 mm, Distance≥5mm	N≦4			
		D>0.5 mm	N=0			
2	Line defects	White or black lines running through the entire screen under any operation interface 	N=0	Sight Check	Major	Zone A
3	ghost	Ghosts appear only during screen switching	Ignore	Sight Check	Major	Zone A
4	Flash Point	Flash point occurs during screen switching only	Ignore	Sight Check	Major	Zone A
5	Display screen error	Unable to display a fixed screen correctly	N=0	Sight Check	Major	Zone A
6	Display abnormal	No display, The red matrix darkens, Note fuzzy, bar code can not be scanned, After refresh, the previous template remains	N=0	Sight Check	Major	Zone A

Ⅲ. Identification and packaging inspection

NO.	ITEM	CRITERIA	Method	Defect level
1	Package	(1). The products are completely placed in the anti-static tray without overlapping. (2). Products with different models cannot be mixed in one internal packaging bag. (3) There is a desiccant in the packaging bag, with good internal packaging and no expansion of the packaging bag. (4) The Tray model, quantity and way used for packaging meet the requirements of product specifications.	Sight Check	Minor
2	Inner and outer packing	(1) There is no obvious deformation or damage in the packing case; (2) The type, quantity and method of the packing case used shall meet the requirements of the product specification. (3) There is no font or unclear design in the outer packing box.	Sight Check	Minor
3	Labels for inner and outer cases	(1). Any unnecessary marks or marks are not allowed to exist; (2). The label information such as model, specification, quantity, weight, material number, month label and environmental protection label should be clear and correct, which should be in line with product specifications or marked according to customer requirements.	Sight Check	Minor

12 Handling, Safety, and Environment Requirements

Warning
The display glass may break when it is dropped or bumped on a hard surface. Handle with care. Should the display break, do not touch the electrophoretic material. In case of contact with electrophoretic material, wash

Caution
The display module should not be exposed to harmful gases, such as acid and alkali gases, which corrode electronic components. Disassembling the display module.
Disassembling the display module can cause permanent damage and invalidates the warranty agreements.

Observe general precautions that are common to handling delicate electronic components. The glass can break and front surfaces can easily be damaged. Moreover the display is sensitive to static electricality and other rough environmental conditions.

Data sheet status	
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

Storage conditions
Under the conditions of temperature 10~30℃ and humidity 30~70%, The storage time was 12 months.