

# Product Specification

❖ **Product Name: AMOLED**

❖ **Model Name: DO0180FST01**

❖ **Description: 1.8 inch (368 x 448)**

Proposed by			Customer's Approval
Designed	Checked	Approved	

**Document Revision History**

Rev. No.	Date	Contents	Remark
0.0	2022-10-03	-.Initial issue	Preliminary

## 1.General Description:

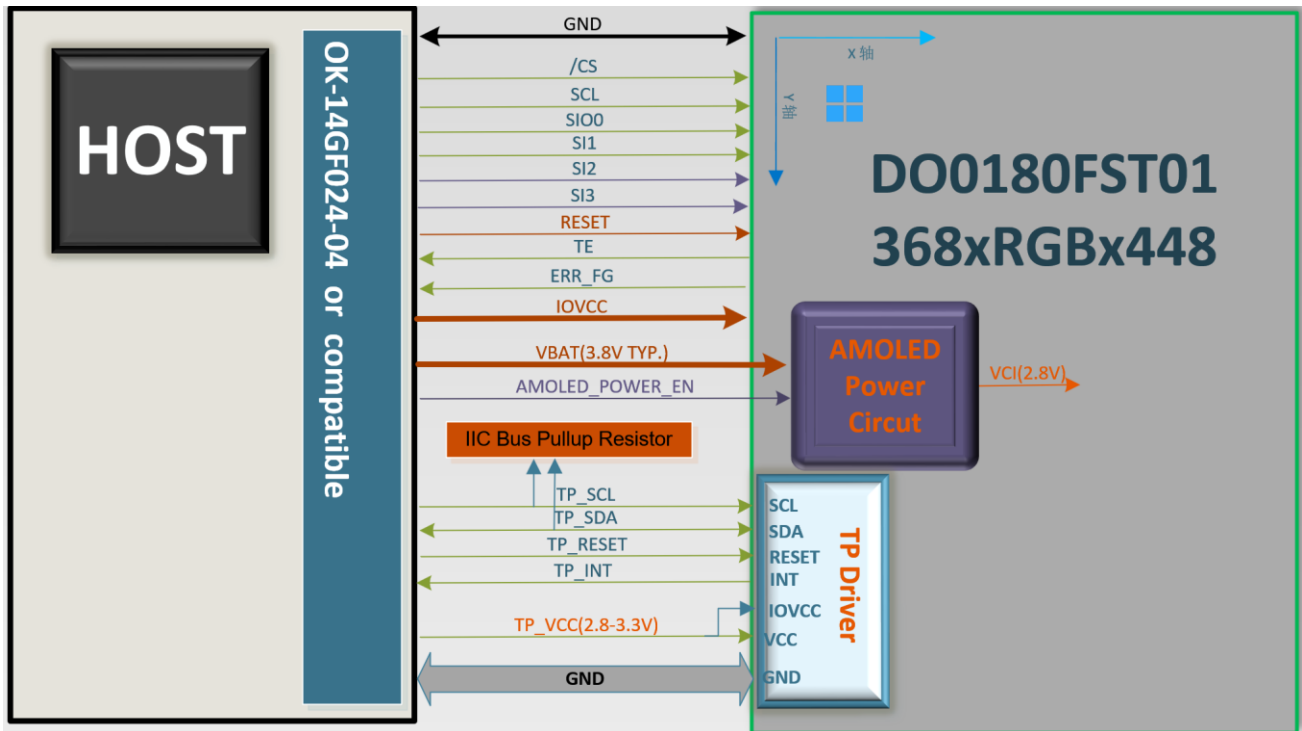
- Driving Mode: Active Matrix.
- Color Mode: Full Color (16.7M color)
- Display Format: 1.8" (368 x 448)
- Display Driver IC : SH8601A or Compatible
- Touch Driver IC : FT3168 or Compatible
- Display Interface: SPI 3-wire 4Lanes(QSPI)
- Touch Interface: IIC
- Application: Handheld & PDA
- RoHS Compatible

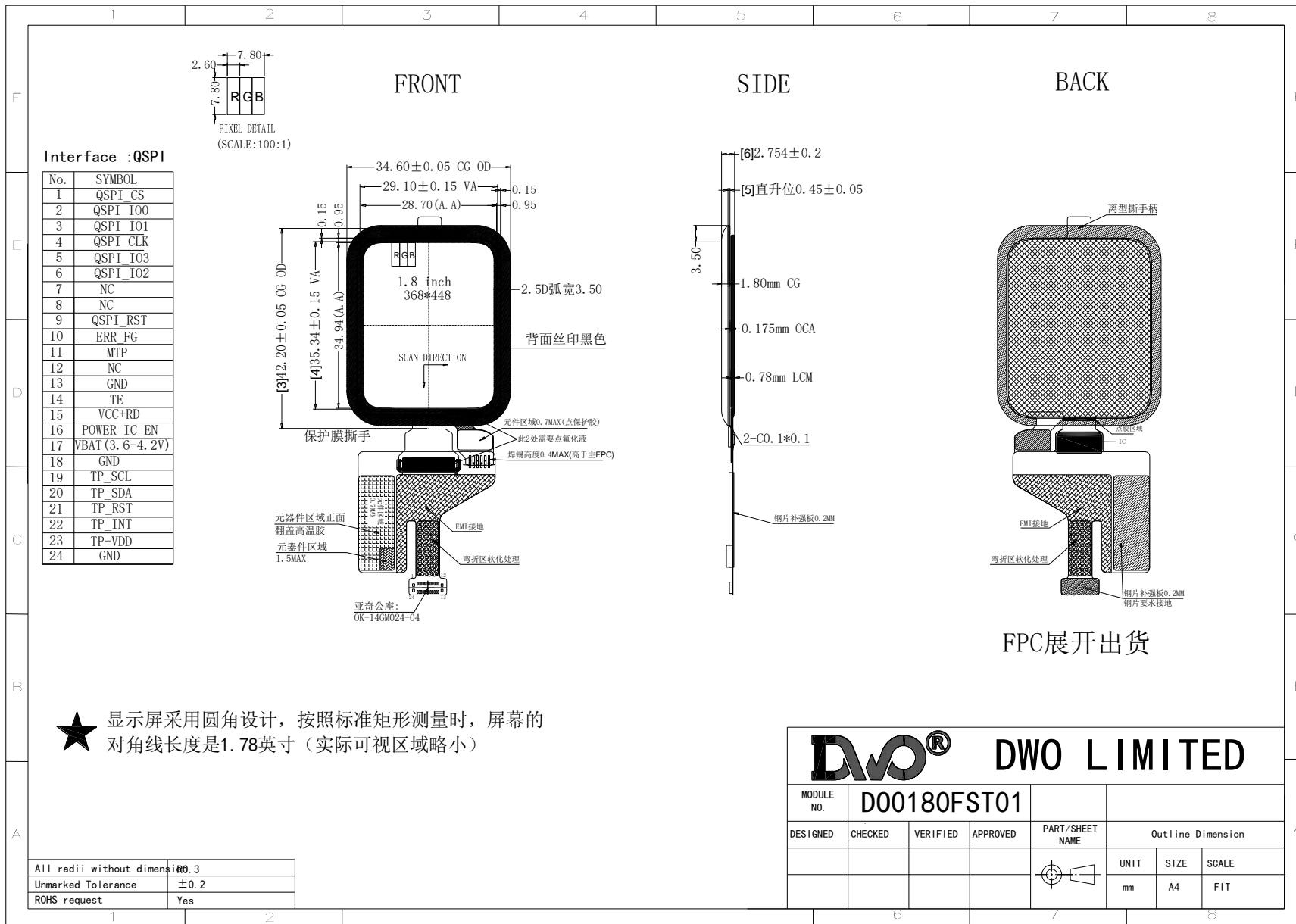
## 2.Mechanical Data

Item	Specification	unit
Display Mode	AMOLED	-
Dimensional outline With Cover Lens	34.6(W) x 42.2(H) x2.75(T)	mm
Number of dots	368(W) x RGB x 448(H)	dots
Active area	28.7(W) x 34.94(H)	mm
Diagonal Inch	1.8(1.78) (Excluding rounded corners area)	inch
Pixel pitch	78.0*78.0	μm
Weight	TBD	g

**\*See attached drawing for details.**

### 3. Block Diagram





## 4.Dimension



## 5.Pin Description

Recomend Connector : OK-14GF024-04.(OK-14GM024-04 on AMOLED)

NO.	Pin Name	I/O	Description
1	QSPI_CS	I	Chip select signal input (Low Active)
2	QSPI_IO0	I/O	Serial input & output signal in Q-SPI, data Lane 0
3	QSPI_I1	I	Serial Data Input in Q-SPI,data Lane 1
4	QSPI_CLK	I	Serial data transfer clock input pin in Q-SPI
5	QSPI_I3	I	Serial Data Input in Q-SPI,data Lane 3
6	QSPI_I2	I	Serial Data Input in Q-SPI,data Lane 2
7	NC	NC	No connect. Let it open
8	NC	NC	No connect. Let it open
9	QSPI_RST	I	Reset Signal (0: reset, 1: normal operation)
10	ERR_FG	O	Error Flag output pin (Active H). (0= Normal, 1= Error Occurred) If not used, please open this pin.
11	MTP/NC	P	For MTP,Let it open
12	NC	I	No connect. Let it open
13	GND	I	Ground Terminal
14	TE	I	Tearing effect output pin to synchronize MCU to frame writing, If not used, please open this pin.
15	IOVCC	O	Power supply for I/O <b>1.8V TYP.</b> (1.7-3.3V)
16	POWER_EN	I	DC-DC IC Enable.
17	VBAT	I	Battery Voltage <b>3.8V TYP.</b> (3.0-4.2V)
18	GND	I	Ground Terminal
19	TP_SCL	I	Touch Panel Clock Input. If not used, please open this pin.
20	TP_SDA	I/O	Touch Panel Data Input. If not used, please open this pin.
21	TP_RST	I	Touch Panel reset signal Input. If not used, please open this pin.
22	TP-INT	O	Touch Panel Interrupt Output. If not used, please open this pin.
23	TP-VDD	P	Touch Panel Analog Power Supply(2.8V) If not used, please open this pin.
24	GND	P	Ground Terminal

## 6. DC Characteristics

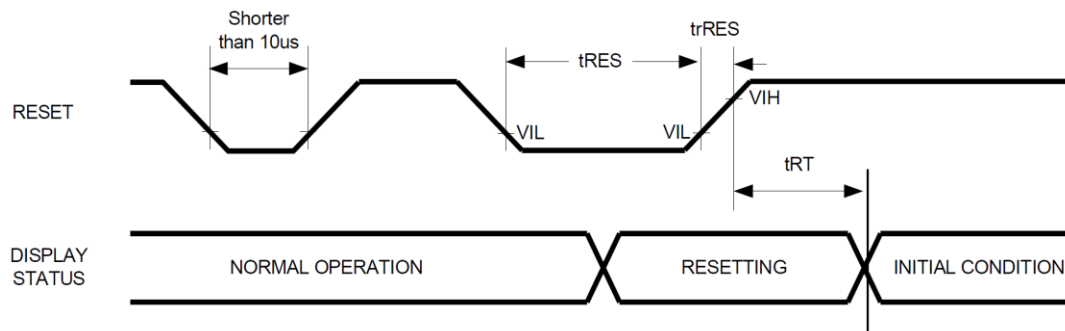
Test Conditions :Voltage Referenced to VSS=0V, IOVCC = 1.8V, TA = 25°C  
Unless otherwise specified

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Supply voltage (Display)		VCC		2.7	3.3	3.6	V
		IOVCC		1.65	1.8	3.3	V
		ELVDD	-	4.55	4.6	4.65	V
		ELVSS	-	-2.25	-2.2	-2.15	V
Input voltage	'L' level	VIL	IOVCC=1.65V ~3.3V	GND	-	0.2*IOVCC	V
	'H' level	VIH		0.8*IOVCC	-	IOVCC	V
Output voltage	'L' level	VOL	I(OH)=-1mA I(OL)=+1mA	GND	-	0.2*IOVCC	V
	'H' level	VOH		0.8*IOVCC	-	IOVCC	V
Current (Display)	Sleep out mode	I <sub>VCC</sub>	Full white display	-	2	4	mA
		I <sub>IOVCC</sub>		-	1.5	3	mA
		I <sub>ELVDD/ELVSS</sub>		-	13	19.5	mA
	Sleep in mode	I <sub>VCC</sub>		-	20	40	uA
		I <sub>IOVCC</sub>		-	50	100	uA
	Deep Standby Mode	I <sub>VCC</sub>		-	1	3	uA
		I <sub>IOVCC</sub>		-	1	3	uA
Frame Frequency		f <sub>FRM</sub>		-	45	-	Hz

## 7.AC characteristics

### 7-1 Reset Timing

Reset timing characteristic



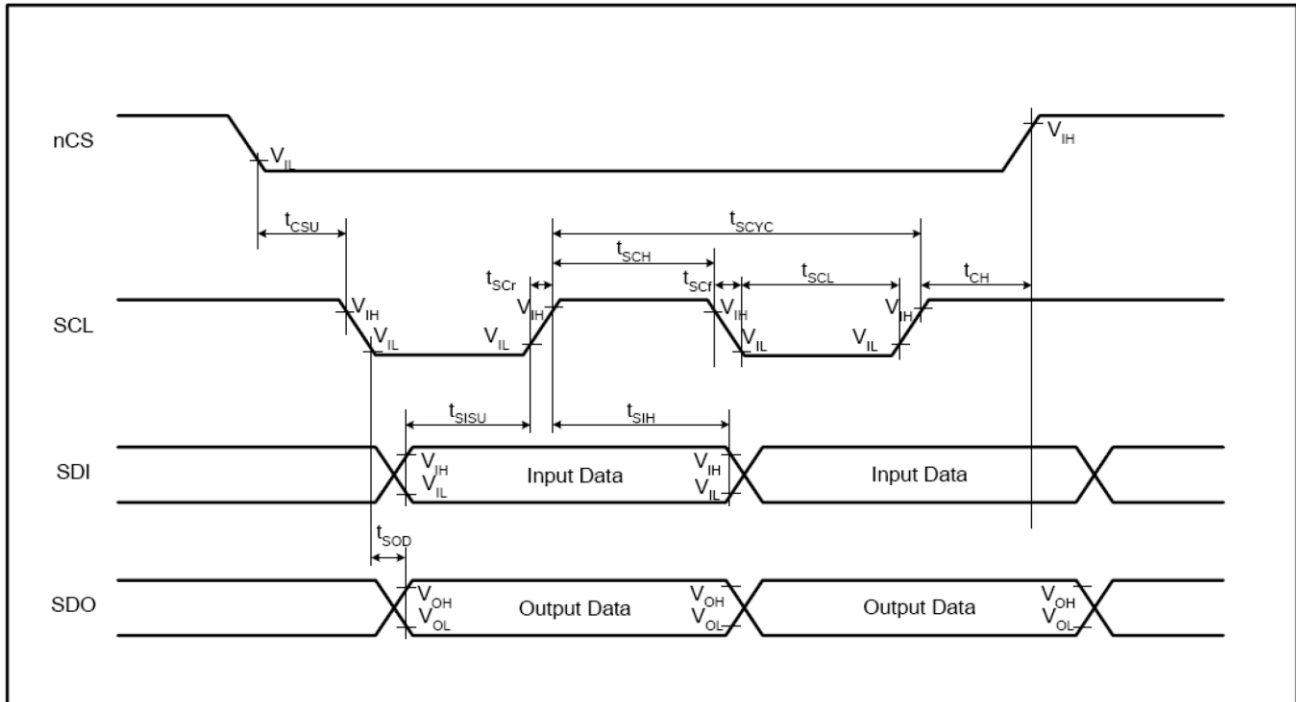
VSS=0V, VDDIO=1.7V to 3.3V, VCI=2.5V to 3.3V, Ta = -30 to 70°C

Item	Symbol	Unit	Min.	Typ.	Max.
Reset low-level width	tRES	us	10	-	-
Reset rise time	trRES	us	-	-	2
Reset cancel	tRT	ms			1

## 7-2 SPI Timing

### 3-Wire SPI Serial Interface Characteristics

For Command Write



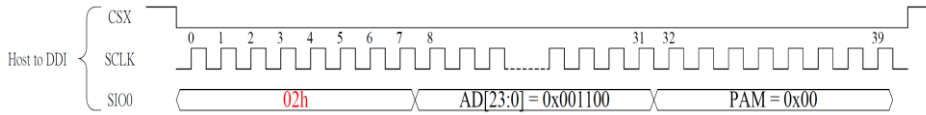
Signal	Symbol	Parameter	MIN	MAX	Unit	Description
SCL	$T_{SCYC}$	Clock cycle (Write)	20		ns	-
	$T_{SCYC}$	Clock cycle (Read)	300		ns	
	$T_{SCH}$	Clock "H" pulse width (Write)	9		ns	
	$T_{SCH}$	Clock "H" pulse width (Read)	140		ns	
	$T_{SCL}$	Clock "L" pulse width (Write)	9		ns	
	$T_{SCL}$	Clock "L" pulse width (Read)	140		ns	
	$T_{SCr}$	Clock rise time		2	ns	
	$T_{SCf}$	Clock fall time		2	ns	
nCS	$T_{CSU}$	Chip select setup time	10		ns	-
	$T_{CH}$	Chip select hold time	10		ns	
SDI (SDA)	$T_{SISU}$	Data input setup time	5		ns	-
	$T_{SIH}$	Data input hold time	5		ns	
SDO (SDA)	$T_{SOD}$	Data output setup time		120	ns	-
	$T_{SOH}$	Data output hold time	5		ns	

Command Write example:

#### SLPOUT (1100h): Sleep Out

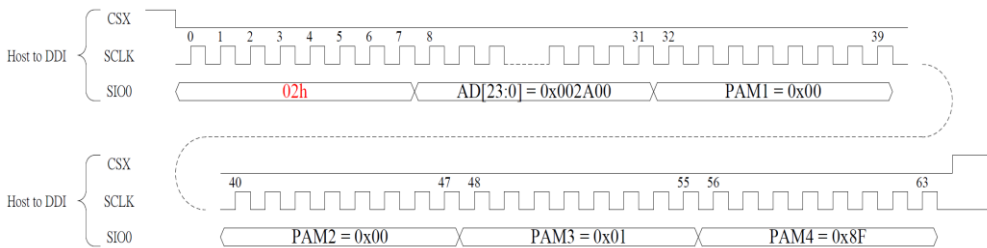
SLPOUT (Sleep Out)													
1100H		Address											
Inst/Para	R/W	Address		D15-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
		MIPI	Other										
SLPOUT	W	11h	1100h	No Argument									





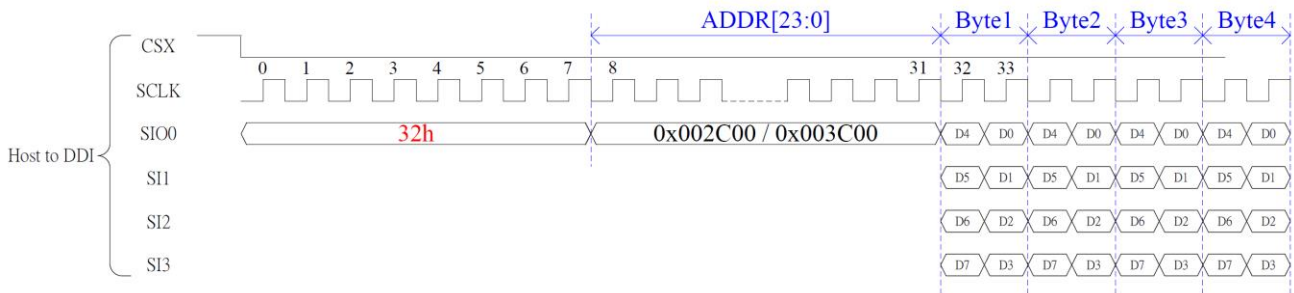
### CASET(2A00h~2A03h) : Set Column Start Address

	CASET												
Inst/Para	R/W	Address		D15-8	D7	D6	D5	D4	D3	D2	D1	D0	HEX
		MIPI	Other										
CASET	W/R	2Ah	2A00h	x	-	-	-	-	-	-	SC9	SC8	00
			2A01h	x	SC7	SC6	SC5	SC4	SC3	SC2	SC1	SC0	00
			2A02h	x	-	-	-	-	-	-	EC9	EC8	01
			2A03h	x	EC7	EC6	EC5	EC4	EC3	EC2	EC1	EC0	8F

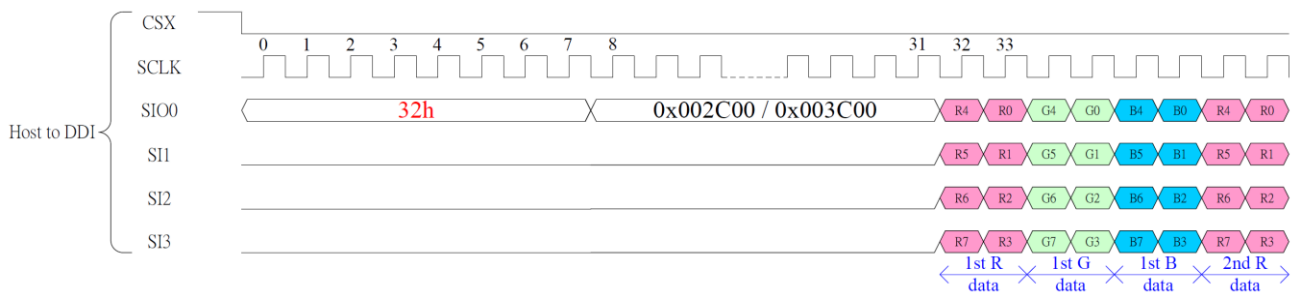


## 7-3 QSPI Timing

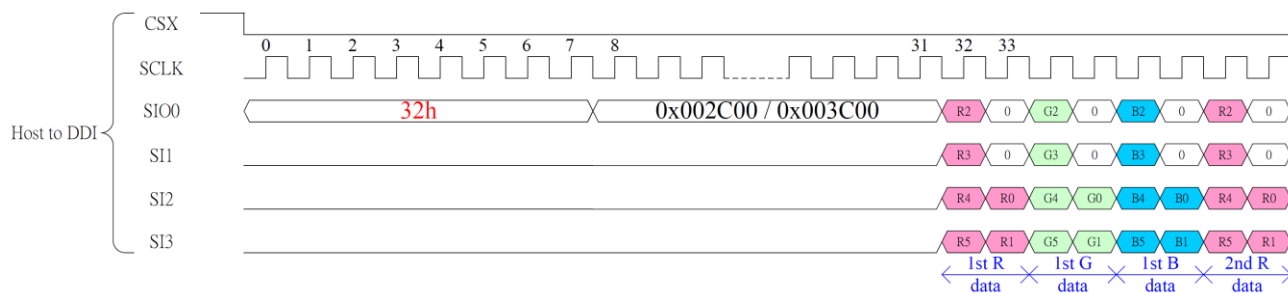
### SPI-4Lanes Pixel Write Data Waveform



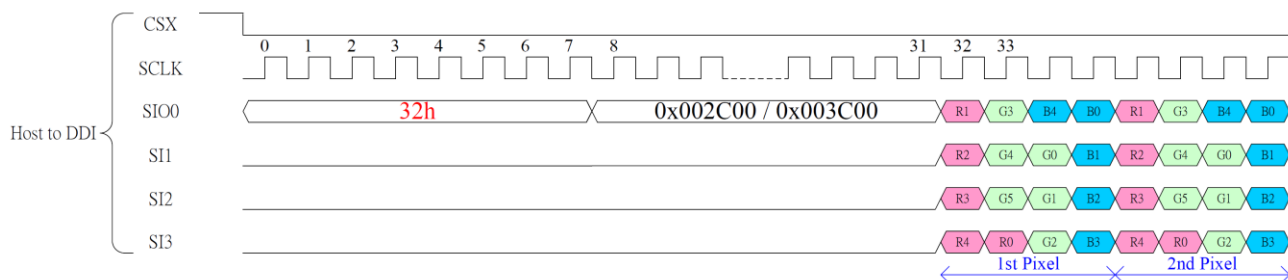
### RGB888 – 4-Lanes



### RGB666 – 4-Lanes



## RGB565 – 4-Lanes



## 7-4 Touch Panel I2C Timing Characteristics

TBD

## 7-5 Touch Specification

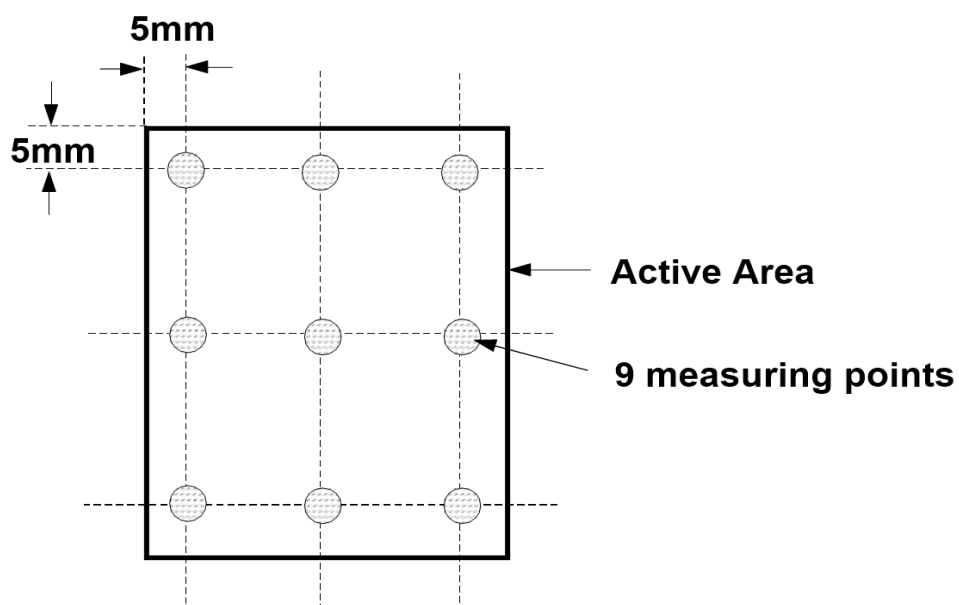
TBD

## 8. Electro-optical characteristics

Item	Symbol	Temp	Condition	Min.	Typ.	Max.	Unit	Note
Brightness		25°C	Normal (White Mode)	300	350	400	cd/m <sup>2</sup>	Center brightness
Uniformity		25°C	Normal (White Mode)	85	90	-	%	(1)
Contrast ratio	K	25°C	$\Phi=0^\circ, \theta=0^\circ$	60,000		-	-	(1),(2)
Color	White	x		0.275	0.295	0.315	-	
		y		0.295	0.315	0.335	-	
	Red	x		0.630	0.660	0.690	-	
		y		0.310	0.340	0.370	-	

of CIE coordinate	Green	x	25°C	$\Phi=0^{\circ}$ $\theta=0^{\circ}$	0.170	0.220	0.270	-	(1),(2),(3)
		y			0.680	0.730	0.780	-	
	Blue	x			0.115	0.140	0.165	-	
		y			0.025	0.050	0.075	-	
Color Gamut			25°C	vs. NTSC	85	100	-	%	
Life Time(5)			25°C	50% Brightness drop @250cd/m², Full White	-	30,000	-	Hr	(4)

Note 1): Uniformity Measuring Point

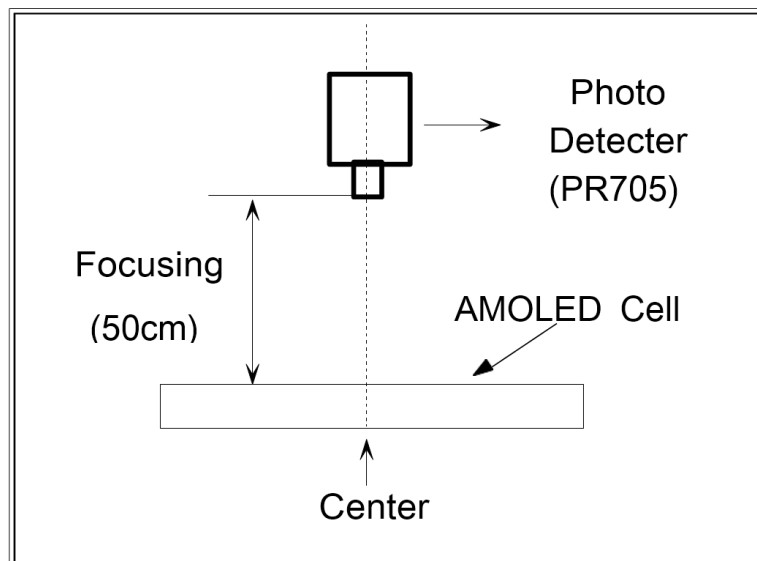


$$\text{Uniformity} = L_{\min} / L_{\max} * 100 \text{ [%]}$$

Note 2): Definition of contrast ratio (K)

$$\text{Contrast Ratio(K)} = \frac{\text{Brightness of selected dot (White patterned area) at } 250\text{cd/m}^2}{\text{Brightness of non-selected dot (Black patterned area) at } 250\text{cd/m}^2}$$

Note 3): Optical measuring system : temperature regulated chamber



Note 4): Life Time

The elapsed time that the full white brightness decreases to the half of initial value

## 9. Recommended Operating Sequence

Please refer to "DO0180FST01\_Demo\_Code.c"

## 10. Standard Specification For Reliability

No	Item	Condition	Cycles	Judgment Criterion
1	High Temperature Operation	80°C/ 240hours	10	1. No clearly visible defects or remarkable deterioration of display quality. However, any polarizer's deteriorations by the high temperature/ High humidity Storage test and the High temperature/ High humidity Operation test are permitted.  2. No function-related abnormalities.
2	Low Temperature Operation	-30°C/ 240hours	10	
3	High Temperature Storage	85°C/ 240hours	5	
4	Low Temperature Storage	-40°C/ 240hours	5	
5	High Temperature Humidity Operation	60°C/90%RH/ 240hours	5	
6	Thermal Shock	-40°C~85°C / 100cycles	5	

Note: The results must be measured after 2 hours later under room temperature keeping.

- END -