

承 认 书

客户：_____

产品名称：微型显示模组

型号规格：SON-FL07-720P

品牌：无

主要配件原产地：美国

日期：2016年03月05日

拟制：尹蒲鑫

审核：吴文胜

客户承认印：

1. Scope

This specification covers the Electrical Viewfinder with a full color Ferroelectric Liquid Crystal (FLC) display module to be delivered from Sonicom electronics technology Co.,Ltd.

2. Specification summary

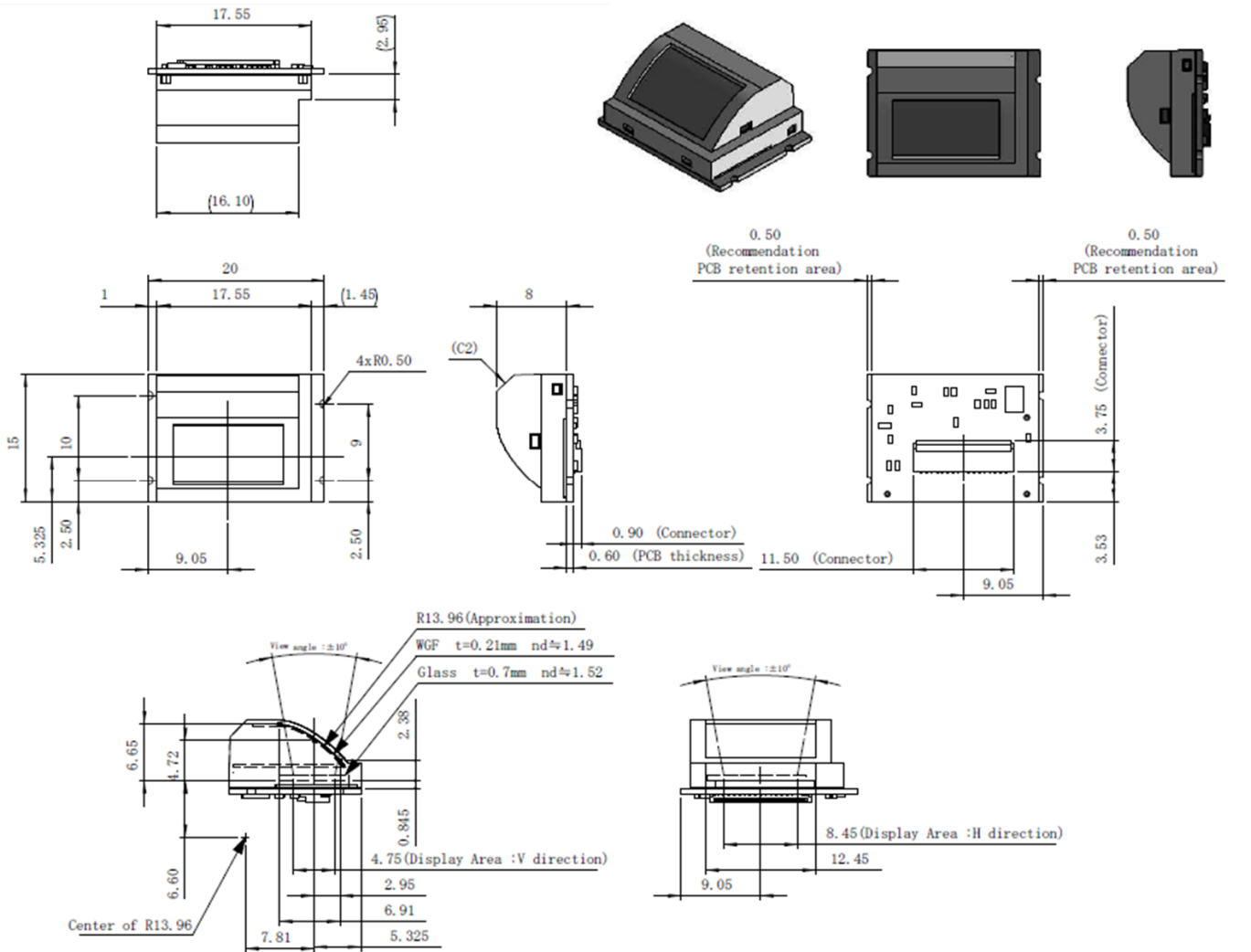
Parameter	Specification
Display Technology	Ferroelectric Liquid Crystal (FLC) on reflective CMOS
Display Mode	Field sequential color
Display Format	720p : 1280(H) x 720(V)
Display Panel Active Area	8.45 x 4.75mm
Display Area diagonal	9.69mm (0.38")
Input Grayscale	256 levels
Color Depth	4.2Million unique colors (YCrCb video interface)
Pixel Fill Factor	88%
Display Pixel Pitch	6.6um
Display Frame Rate	60 Hz/360Hz (NTSC), 50/300 Hz (PAL)
Data Clock Rate	25 MHz ~ 75 MHz
Minimum Brightness	800 cd/m ² Min.
Contrast Ratio	250:1 (Minimum)
White Point	(x,y)=(0.299, 0.315) Typical
Digital Display Interface	YCrCb(4:2:2)-parallel (16 data, Hd, Vd, Clock)
Control Interface	Industry-standard two-wire bidirectional serial (I2C Format)
Operating Supply Voltages	1.8 V (Core) 3.3 V (Core) 5V (Analog) VIO_serial (Serial interface I/O ; 1.8V ~ 3.3V)
Input Signal Level	CMOS 1.8V~3.3V
Power consumption (*1)	Approx. 290mW
Size (L×W×H)	15.0 x 20.0 x 9.5
Weight	Approx. 1.8g
Operating Temperature	-10deg.C~70deg.C (at Surface of Panel)
Storage Temperature	-30deg.C~83deg.C

*1 Typical value at 60 Hz NTSC (gamma correction of 2.1),
YCrCb(4:2:2)-parallel 16bit VCC=1.80V, VCCX=3.30V, AVCC=5.0V, VIO_serial=3.30V operation
with flat field video pattern (data=FFh) at room temperature.

Parameter	Specification
Gamma Correction	Register setting of Gamma ranging from 1.7 to 2.1 is available.
Cropping / Overscan	By setting the delay from H,V assertion, undisplayed area can be set.
Down Scaling / Up Scaling	It enables to down-scale and up-scale arbitrary input resolutions.
Color Space Conversion	Coefficient and Offset values of the color space conversion can be changed.
Dither	Spatial Dither, Temporal Dither or the combination can be set.
Brightness Adjustment	By adjusting a period of LED lighting, the brightness can be adjusted.
Sleep Mode	Low Power Consumption Mode can be set.

3. Product Appearance

3.1 Appearance Specifications



Unit : [mm]
 (Unless otherwise specified, tolerance : +/-0.2mm)

- *1 The cross-section curve of the WGF(Wire Grid Film) is not true circle and is confidential in details. Please refer to the proximate radius of the curve as R13.96.
- *2 The WGF consists of a multi-layered structure having any specific refraction index as whole film. As the main material is TAC, please refer to the refraction index of TAC (Approx. 1.49).
- *3 View angle is designed median. Not a guaranteed value.

Fig.1 Appearance Specifications

4. Electrical Characteristics

4.1 Digital Video Interface

4.1-1 Video Input Signal Format

Only the following input format is applicable to this product.

YCrCb 4:2:2 Format 16bit Parallel

4.1-2 Video Input Signal Timing

All video input signals must meet the timing requirements shown in the Fig.2, 3-1, 3-2 & Table2, 3.

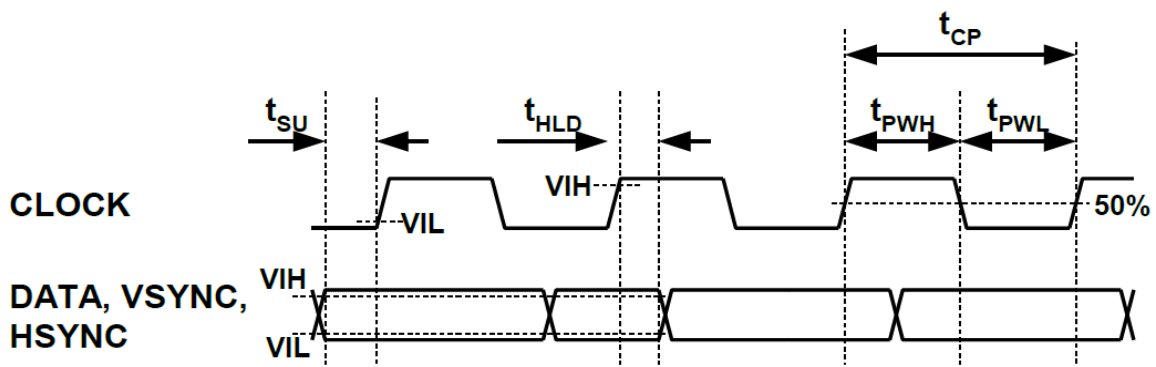


Fig.2 Video Input Signal Timing

Table2. AC Characteristics (Video Input Signal Timing)

Parameter	Symbol	Min.	Typ.	Max.	Unit
CLOCK, rate	$1/t_{CP}$	25		75	MHz
CLOCK, pulse width high	t_{PWH}	40% t_{CP}	50% t_{CP}	60% t_{CP}	NA
CLOCK, pulse width low	t_{PWL}	40% t_{CP}	50% t_{CP}	60% t_{CP}	NA
DATA, VSYNC, HSYNC setup time	t_{SU}	1.25			ns
DATA, VSYNC, HSYNC hold time	t_{HLD}	1.25			ns

6. Display Panel Specification

6.1 Optical Characteristics

Table 9. Optical Characteristics

Item	Conditions	Min.	Typ.	Max.	Unit	
Center Brightness	White Raster Image Measure the brightness of the center of the display.	800			cd/m ²	
Contrast Ratio	White Raster / Black Raster Image Measure the brightness ratio of the center of the panel.	250:1			-	
xy Chromaticity	White Raster Image Measure the chromaticity of the center of the panel.	x	0.289	0.299	0.309	-
		y	0.305	0.315	0.325	-

Note : Measurement conditions of the optical characteristics are as follows.

[Measurement Conditions]

Supply Voltage : VCC=1.80V, VCCX=3.30V, VIO_serial=3.30V, AVCC=5.00V

Video Signal Input : YCrCb 16bit / Resolution(1280 x 720)
White Y=FFh, Cr=80h, Cb=80h
Black Y=FFh, Cr=80h, Cb=80h

Gamma Correction : 2.1

LED brightness register : Setting at maximum

Clock / Field Frequency : Clock= 75MHz / Field Frequency=60Hz

Temperature : Room Temp. (25°C Typ.)

Luminance&Color Meter : CS-100A manufactured by Konica minolta

xy Chromaticity : Measured on white image

Brightness : Measured on white image

Contrast Ratio : Calculation by measured on white image / black image.

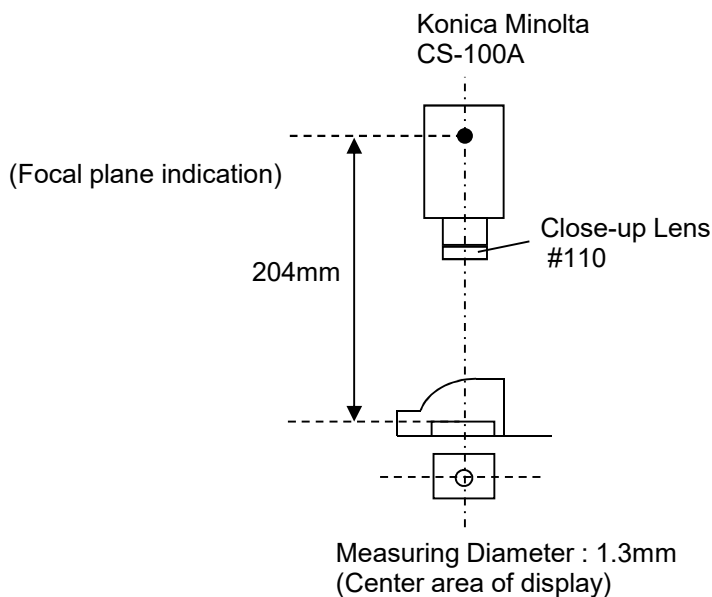


Fig.11 Optical Measurement

6.2 Visual Specifications

Conditions of inspection

At room temperature and normal humidity, inspect the display by microscope of 10 magnification focusing on the display focal plane.

Dither mode setting : 1/2bit spatial dither and 1/4bit time dither Gamma correction setting : 2.1

Color space/ Color offset register setting : 0h(All setting)

Input Signal Level 0%: (Y,Cr,Cb)=(00h,80h,80h), 100%: (Y,Cr,Cb)=(FFh,80h,80h)

Table 10. Display area visual defects

Subject Area	Defect Item	Defect Size (S) [Unit: pixel]	Allowable Quantity [Unit: pcs]
Display area	Bright/White Spot (Except for high bright spots)	$S \leq 1$ 1 pixel or smaller	Any quantity is allowable.
		$1 < S \leq 3$ Larger than 1 pixel & 3 pixels or smaller	3
		$3 < S \leq 6$ Larger than 3 pixels and 6 pixels or smaller	1
		$6 < S$ Larger than 6 pixels	Any quantity is NOT allowable.
Display area	Particle	$S \leq 1$ 1 pixel or smaller	Any quantity is allowable.
		$1 < S \leq 3$ Larger than 1 pixel & 3 pixels or smaller	3
		$3 < S \leq 6$ Larger than 3 pixels and 6 pixels or smaller	1
		$6 < S$ Larger than 6 pixels	Any quantity is NOT allowable.
Display area	Dark Spot	Any dark spot that degrades the quality of display is NOT allowable. Please refer to the following criteria only as a guide.	
		$S \leq 1$ 1 pixel or smaller	Any quantity is allowable.
		$1 < S \leq 3$ Larger than 1 pixel & 3 pixels or smaller	3
		$3 < S \leq 6$ Larger than 3 pixels and 6 pixels or smaller	1
		$6 < S$ Larger than 6 pixels	Any quantity is NOT allowable.
Display area	Bright Line		Any line is NOT allowable.
PBS Upper side/ Lower side	Contamination Scratch	None when focusing on the display focal plane	

Note 1) Definition of display area is shown in Figure 12.

Note 2) The Dark Spot means pixels which show fixed black or gray color due to electrical dysfunction.

Note 3) Each defect must not be mutually adjacent to other by at least 2 pixels regardless of the number of defects.

Note 4) Inspection condition is as below.

*Background image: White (FFh), Black (0h).

*Lens: x10 magnification.

*Inspected with focusing on the display panel.

*Use the ND filter (transmittance = 25%).

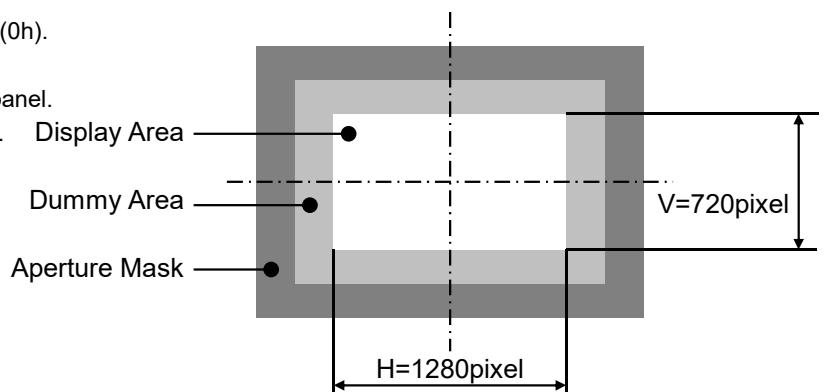
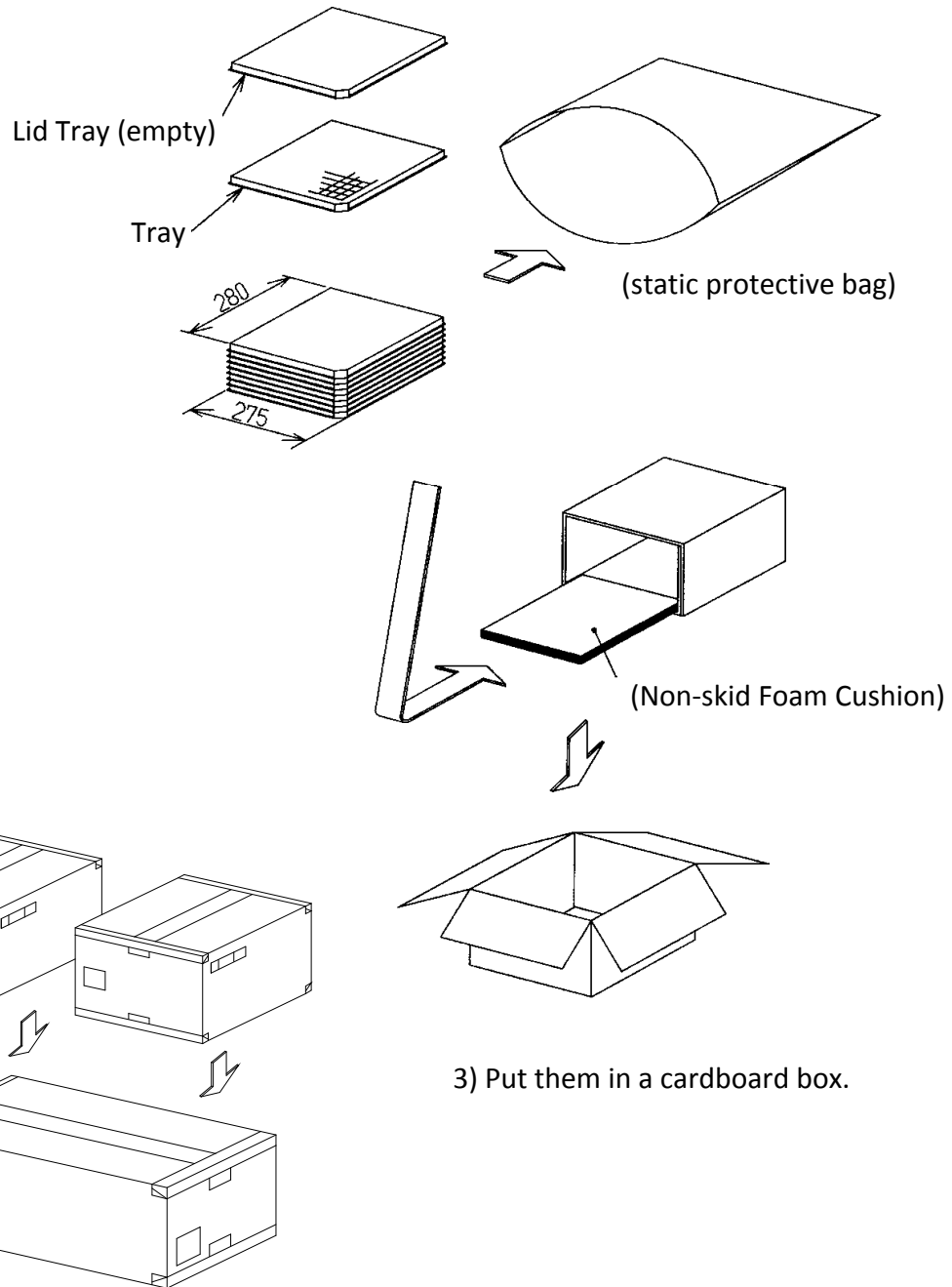


Fig.12 Display area

8. Packaging Specification

1) Put 50 products in a packaging tray.

2) Stack 10 trays amounting to 500 products with an empty lid tray, then put the stacked 11 trays into an ESD protection bag.



3) Put them in a cardboard box.

4) Two inner boxes are put into a outer box.
(One outer box contains 1,000 products.)

Fig.14 Packaging Specification

9. Reliability

9.1 Reliability Test

Item	Test Condition	Spec.
High Temperature Storage Test	Ta=83deg.C 240hrs * Ta : Ambient temperature of this product	Judgement is performed after an hour storage at room temp. Should not have any mechanical and electrical malfunction of product that affects normal product operation.
Low Temperature Storage Test	Ta= -30deg.C 240hrs	
High Temperature High Humidity Storage Test	Ta=60deg.C RH=90% 240hrs	
High Temperature Operating Test	Tp=70deg.C 240hrs * Tp : Surface temperature of panel glass	
Low Temperature Operating Test	Ta= -10deg.C 240hrs	
High Temperature High Humidity Operating Test	Ta=40deg.C RH=90% 240H	
Heat Shock Cycle Test	-30 ~ 80deg.C 30min/30min 10 cycles	

9.2 Electrostatic Discharge Test

Item	Test Condition	Spec.
Electrostatic discharge test Mechine Model	C=200PF R=0Ω V= +/- 200V Discharge between Power supply terminal and each signal pin 3 times for each.	Should not have any mechanical and electrical malfunction of product that affects normal product operation.

Note : The above tests are performed at room temperature and normal environment.

9.3 Mechanical Reliability Test

Item	Test Condition	Spec.
Vibration Test	Vibration amplitude : 1.5mm Frequency : 10-55Hz Duration time : each axis 30min(X, Y, Z)	Should not have any mechanical and electrical malfunction of product that affects normal product operation.
Drop Test	Height : 20cm Drop time : each axis 3 times(X, Y, Z) Let products drop to a hard wooden board or a concrete floor.	

Note : The above tests are performed at room temperature and normal environment.

9.4 Shipping Package Test

Item	Test Condition	Spec.
Vibration Test(in package)	Acceleration : 19.6m/s ² Frequency : 10-50-10Hz Duration time : each axis 30min(X, Y, Z)	Should not have any mechanical and electrical malfunction of product that affects normal product operation.
Drop Test(in package)	Drop Height : 75cm 1 corner 3 edges 6 planes Let products drop to a hard wooden board or a concrete floor.	

Note : The above tests are performed at room temperature and normal environment.

10. Special Handling Criteria

- * To prevent dust and particulate contamination, It is recommended to open the seal on these trays in a Class 10,000(or better) or equivalent room for incoming inspection or manufacturing integration.
- * Do not stack trays higher than 11 layers, or place other heavy material on the trays to prevent damage to the sensitive optical components on the display.
- * Do not touch the surface of the polarizing film with bare fingers.
When removing particulate contaminations on the film, wipe carefully the particulate contaminations off the film with alcohol-soaked soft cloth or cotton swab without any damage to the film.
- * Do not open or close the connector cover without inserting FPC into the slot.
It may break the connector cover.
- * Do not use air blow to remove particulate contaminations.
In case of strong air blow cleaning very close to the product, particles may intrude into the product.
- * During either integration or storage, do not allow any moisture or solvent to contact the polarizing film and do not allow condensation to form on the product.
- * When handling the product, please pay attention to keep the product static-free and non-chargeable, especially, do not touch the conductive work surface of the product.

11. Environmental Standards

- * The product is compliant with RoHS Directive[EUROPEAN DIRECTIVES 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment].

12.Others

When the issue that is not described in this document arises, the both parties will mutually solve it.