

# **Product Specification**

# 1. GENERAL DESCRIPTION

## 1.1 DESCRIPTION

this is a transmissive type color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD module (TFT-LCD panel, driver IC and FPC), a back-light unit and. The resolution of 7.84" contains 400RGB X1280 pixels and can display up to 16.7m colors.

## 1.2 GENERAL INFORMATION

Items	Specification	Unit	Note
Drive element	a-Si TFT	-	-
LCM outline size	67.8 (H) x 205.78(V)	mm	
Active area	59.4 (H) x190.08 (V)	mm	-
Number of pixels	400(H)X1280(V)	pixels	-
Pixel arrangement	RGB stripe	-	-
Pixel Pitch	64.8 (H) x 199.88(V)	um	-
Display color	16.7m color	color	-
Viewing direction	ALL	-	-
Controller / Driver	NV3051F	-	-
Data interface	MIPI	-	
Backlight	14 White LEDs In Parallels	-	
Weight	TBD	g	

## 2. ABSOLUTE MAXIMUM RATING

(Ta=25±2°C, Vss=GND=0V)

Characteristics	Symbol	Min.	Typ	Max.	Unit	Notes
Supply Voltage	IOVCC	-0.3	-	4.5	V	
	VCI	-0.3	-	6.6	V	
TFT Gate On voltage	VGH	-0.3	-	32	V	
TFT Gate Off voltage	VGL	-0.3	-	32	V	
Backlight Forward Current	I <sub>F</sub>	-		120	mA	
Operating Temperature	T <sub>OPR</sub>	-20		+70	°C	(1), (3)
Storage Temperature	T <sub>STG</sub>	-30		+80	°C	(2), (3)
Humidity	RH	-		90	%	Max. 60 °C

### Notes:

- (1) In case of below 0°C, the response time of liquid crystal (LC) becomes slower and the color of panel becomes darker than normal one. Level of retardation depends on temperature, because of the LC characteristics.
- (2) If product is exposed to high temperatures for extended time, there is a possibility of the polarizer film damage which could degrade the optical characteristics.
- (3) Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded.  
Functional operation should be restricted to the conditions described under normal operating conditions.

### 3. ELECTRICAL CHARACTERISTICS

#### 3.1 LCM DC CHARACTERISTICS

(Ta=25±2°C)

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage 1	IOVCC	1.65	1.8	3.6	V	
Power Supply Voltage 2	VCI	2.5	2.8	6.0	V	
Power Supply Voltage 3	-	-	-	-	V	
Power Supply for MTP	VPP	-	-	-	V	
Current Consumption	I <sub>DD</sub>	-	TBD	-	mA	Normal mode
	I <sub>DD-SLEEP</sub>		TBD		uA	Sleep mode
Input voltage "L" Level	V <sub>IL</sub>	GND	-	0.3IOVCC	V	IOVCC=1.65~3.3
Input voltage "H" Level	V <sub>IH</sub>	0.7IOVCC	-	IOVCC	V	
Output voltage "L" Level	V <sub>oL</sub>	GND	-	0.2IOVCC	V	I <sub>oL</sub> =1mA
Output voltage "H" Level	V <sub>oH</sub>	0.8IOVCC	-	IOVCC	V	I <sub>oH</sub> =-1mA

#### 3.2 BACK-LIGHT UNIT CHARACTERISTICS

The back-light system is an edge-lighting type with 4 white LEDs. The characteristics of the back-light are shown in the following tables.

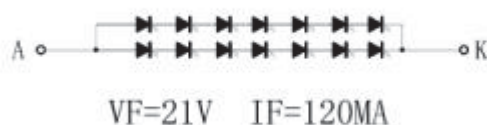
(Ta=25±2°C)

Characteristics	Symbol	Condition	Min.	Type	Max.	Unit	Notes
Forward Voltage	V <sub>f</sub>	I <sub>L</sub> =120mA	-	21	-	V	-
Forward current	I <sub>L</sub>		-	40	-	mA	-
Luminance	L <sub>v</sub>	I <sub>L</sub> =160mA	--	600	--	cd/m <sup>2</sup>	-
LED life time	-	I <sub>L</sub> =160mA	20,000	25,000	--	Hr	Note 1

Note:

- (1) The "LED life time" is defined as the module brightness decrease to 50% of original brightness at I<sub>L</sub>=20mA. The LED life time could be decreased if operating I<sub>L</sub> is larger than 20mA.

Bcklight circuit diagram shown in below:



## 4. OPTICAL CHARACTERISTICS

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room.

Measuring equipment: BM-5AS, BM-7, EZ-Contrast.

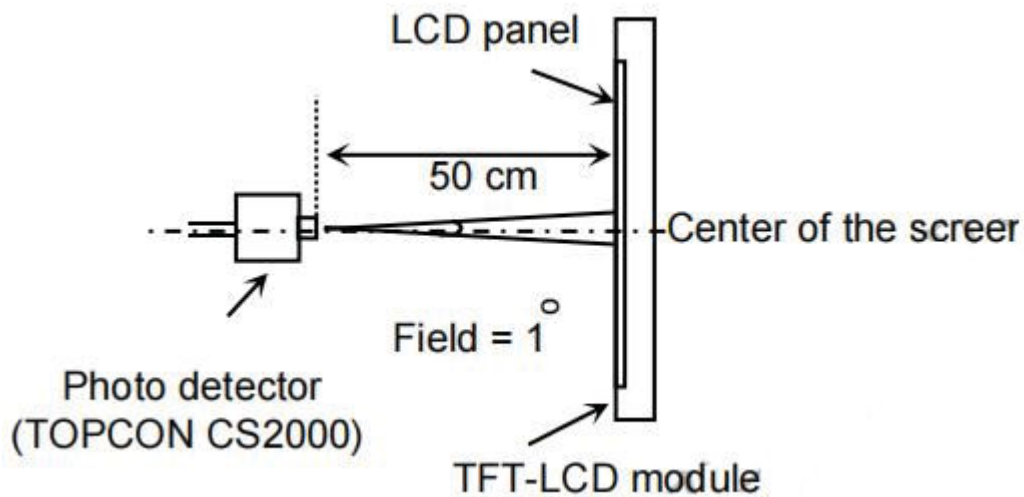
(Ta=25±2°C)

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center point)		C/R	-	-	550	600	-	BM-7 Note(2)
Luminance of white (Center point)		L <sub>w</sub>	B/L on	15%	TBD	15%	cd/m <sup>2</sup>	CA-210
Luminance uniformity		U <sub>w</sub>		83	-	-	%	BM-7 Note(3)
Response Time		Tr + Tf		-	30	35	ms	BM-5AS Note(4)
Color Chromaticity (CIE 1931)	White	W <sub>x</sub>	θ = 0. Normal viewing angle B/L On  Note(1)	0.270	0.300	0.330	-	CA-210 Note(5)
		W <sub>y</sub>		0.299	0.329	0.359		
	Red	R <sub>x</sub>		0.626	0.656	0.686		
		R <sub>y</sub>		0.288	0.318	0.348		
	Green	G <sub>x</sub>		0.225	0.255	0.285		
		G <sub>y</sub>		0.546	0.576	0.606		
	Blue	B <sub>x</sub>		0.107	0.137	0.167		
		B <sub>y</sub>		0.068	0.098	0.128		
Viewing Angle	Hor.	θ <sub>T</sub>	C/R≥10	70	80	-	Deg	EZ Contrast Note(6)
		θ <sub>B</sub>		70	80	-		
	Ver.	θ <sub>L</sub>		70	80	-		
		θ <sub>R</sub>		70	80	-		
Optima View Direction			ALL				Note(7)	

\* This condition will be changed by the evaluation circumstance. If product is exposed to high temperatures for extended time, there is a possibility of the polarizer film damage which could degrade the optical characteristics.

Notes:

- (1) Test Equipment Setup: After stabilizing and leaving the panel alone at a given temperature for 30min, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room 30min after lighting the back-light. This should be measured in the center of screen.

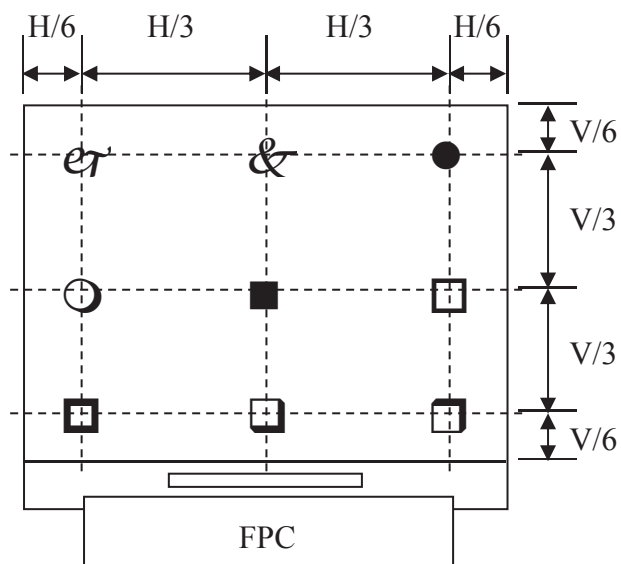


(2) Definition of Contrast Ratio (CR):

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance measured when LCD on the "white" state}}{\text{Luminance measured when LCD on the "black" state}}$$

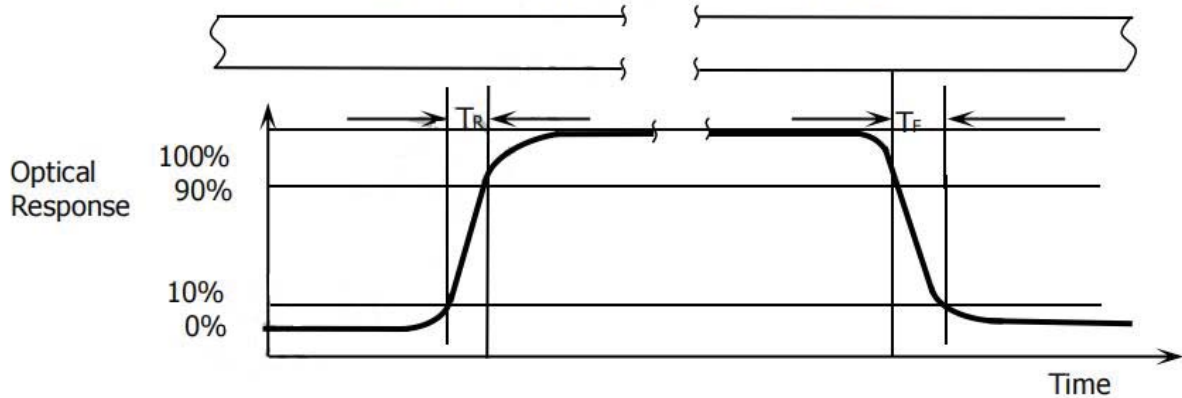
(3) Definition of Luminance Uniformity: Active area is divided into 9 measuring areas (Shown in below), every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity} = \frac{\text{Min Luminance of white among 9-points}}{\text{Max Luminance of white among 9-points}} \times 100\%$$

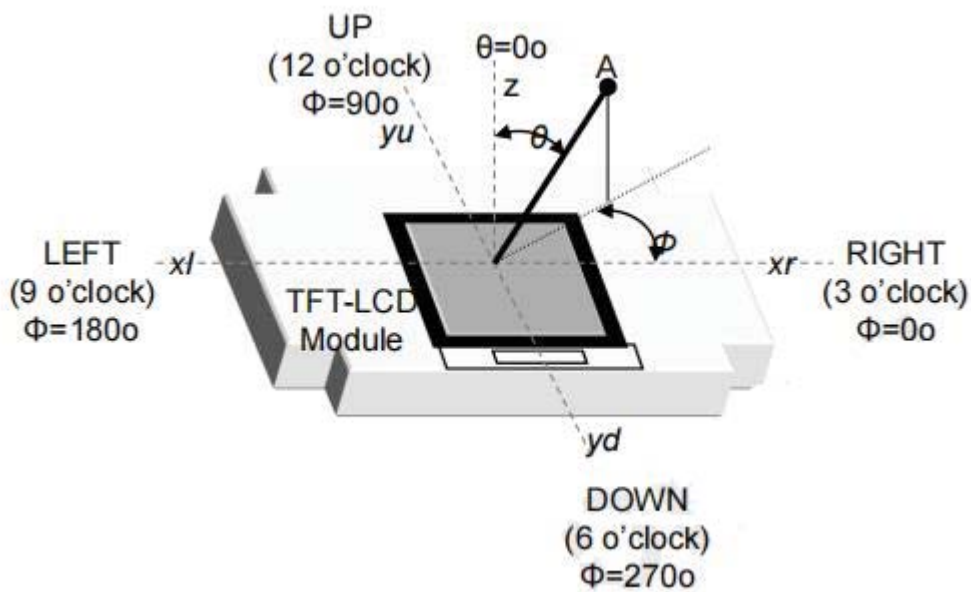


The spot locations for luminance measurement

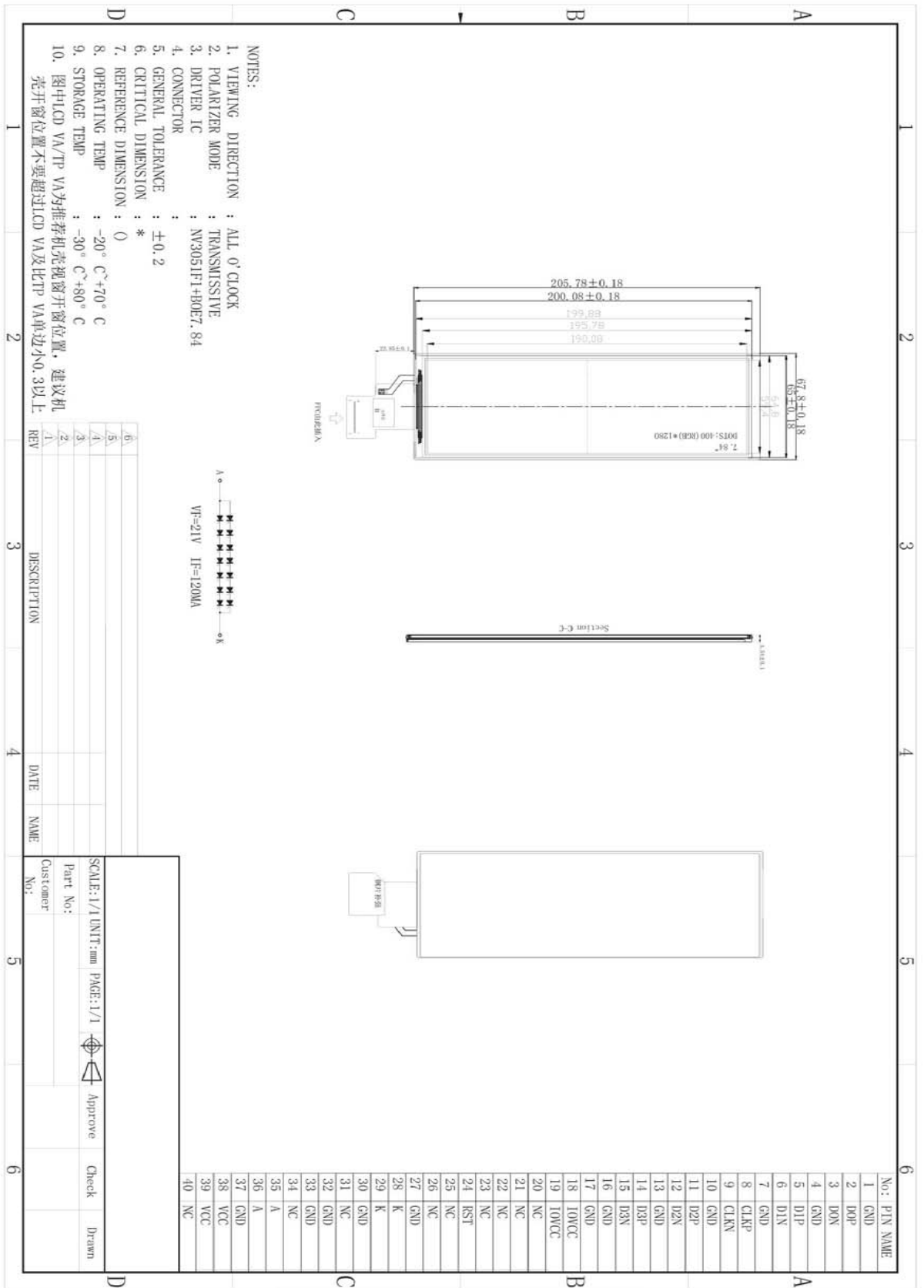
**Figure 2. Response Time Testing**



- (4) Definition of Color Chromaticity (CIE 1931)  
Color coordinate of white & red, green, blue at center point.
- (5) The different Rubbing Direction will cause the different optima view direction.



# 5. MODULE OUTLINE DIMENSION





## 6. MODULE INTERFACE DESCRIPTION

Pin No.	Symbol	Description
1	GND	Power Ground
2	D0P	MIPI-DSI DATE signal input
3	D0N	MIPI-DSI DATE signal input
4	GND	Power Ground
5	D1P	MIPI-DSI DATE signal input
6	D1N	MIPI-DSI DATE signal input
7	GND	Power Ground
8	CLKP	MIPI-DSI DATE signal input
9	CLKN	MIPI-DSI DATE signal input
10	GND	Power Ground
11	D2P	MIPI-DSI DATE signal input
12	D2N	MIPI-DSI DATE signal input
13	GND	Power Ground
14	D3P	MIPI-DSI DATE signal input
15	D3N	MIPI-DSI DATE signal input
16	GND	Power Ground
17	GND	Power Ground
18	IOVCC	Power supply for I/O block. 1.8V
19	IOVCC	Power supply for I/O block. 1.8V
20	NC	NC
21	NC	NC
22	NC	NC
23	NC	NC
24	REST	Reset input pin

25	NC	NC
26	NC	NC
27	GND	Power Ground
28	LEDK	Back-light Cathode
29	LEDK	Back-light Cathode
30	GND	Power Ground
31	NC	NC
32	GND	Power Ground
33	GND	Power Ground
34	NC	NC
35	LEDA	Back-light Anode
36	LEDA	Back-light Anode
37	GND	Power Ground
38	VCC	Power supply for I/O block. 2.8-3.3V
39	VCC	Power supply for I/O block. 2.8-3.3V
40	NC	NC

## 7.REFERENCE APPLICATION CIRCUIT

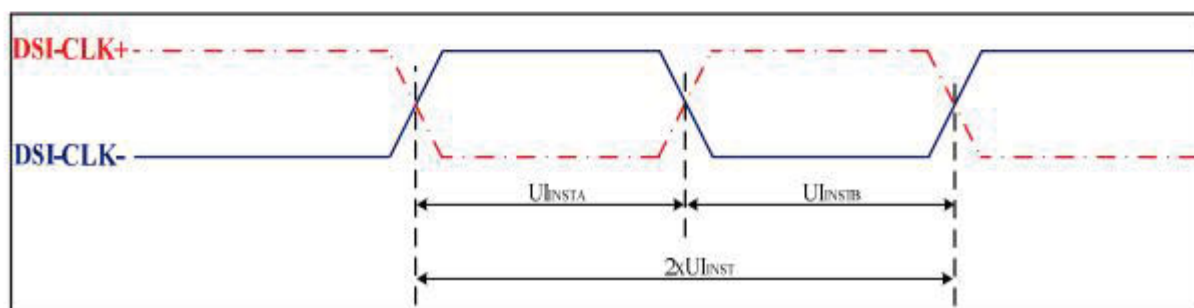
Please consult our technical department for detail information.

## 8. AC Characteristics

### 7.3.3. MIPI-DSI characteristics

#### 7.3.3.1. High speed mode

Parameter	Symbol	Parameter	Specification			Unit
			MIN	TYP	MAX	
<b>High Speed Mode</b>						
DSI-CLK+/-	$2XU_{inst}$	Double UI instantaneous	2.22	-	25	ns
DSI-CLK+/-	$U_{INSTA}, U_{INSTB}$	UI instantaneous Halfs	1.11	-	12.5	ns
DSI-Dn+/-	$T_{ds}$	Data to clock setup time	0.15	-	-	UI
DSI-Dn+/-	$T_{dh}$	Data to clock hold time	0.15	-	-	UI
DSI-CLK+/-	$T_{drclk}$	Differential rise time for clock	150	-	0.3UI	ps
DSI-Dn+/-	$T_{drdata}$	Differential rise time for data	150	-	0.3UI	ps
DSI-CLK+/-	$T_{dfclk}$	Differential fall time for clock	150	-	0.3UI	ps
DSI-Dn+/-	$T_{dfdata}$	Differential fall time for data	150	-	0.3UI	ps



## 9.RELIABILITY TEST CONDITIONS

No.	Test Item	Test Condition	Notes
1	High Temperature Storage	+80°C / 240H	Inspection after 2~4h 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. The surface shall be free from damage. 7. The electrical characteristics requirements shall be satisfied.
2	Low Temperature Storage	-30°C / 240H	
3	High Temperature Operating	+70°C / 240H	
4	Low Temperature Operating	-20°C / 240H	
5	Temperature Cycle	Ta=-10°C~+25~+50°C, 10 Cycle, per 30min	
6	High Temperature /Humidity storage	60°C ,90%RH / 240H	
7	ESD test	Open Cell , Air mode , + 2 KV	

### Remarks:

- (1) The test samples should be applied to only one test item.
- (2) Sample size for each test item is 5~10pcs.
- (3) For High Temperature/Humidity storage 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 judge as a good part.
- (5) Failure judgment criterion: basic specification, electrical characteristic, mechanical characteristic, optical characteristic.