





Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	1 / 24

LIQUID CRYSTAL DISPLAY MODULE
MODEL: MTF-TY43SP131-LB
Customer's No.:

Acceptance

Microtips Technology Inc.
12F. No.31 Lane 169, Kang Ning St.,
Hsi-Chih, Taipei Hsien, Taiwan
FAX: 886-2-26958625

Approved and Checked by

Approved by	Checked by		Made by
			



Microtips Technology Inc.

Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	3 / 24

Contents

1. GENERAL SPECIFICATIONS	4
2. ABSOLUTE MAXIMUM RATINGS	5
2.1 Absolute Ratings of Environment	5
2.2 Typical Operating Conditions	6
2.3 LED driving conditions	6
2.4 Power Sequence	7
3. OPTICAL CHARACTERISTIC	8
4. DC CHARATERISTICS	12
4.1 AC Timing Characteristics	12
4.2 Timing Diagram	13
4.3 Electrical Characteristics	14
4.4 Mechanical & Reliability Characteristics	14
4.5 Linearity Definition	15
5. INTERFACE	16
5.1 LCM PIN Definition	16
5.2 Touch Screen Panel Section	17
6. HOUSING DESIGN GUIDE	18
7. QUALITY ASSURANCE	19
8. PRECAUTIONS	20
9. WARRANTY	23
10. DIMENSIONAL OUTLINES	23



Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	4 / 24

1. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit
Display format	480X R.G.B x 272	dot
Active area	95.04 (W) x 53.856 (H)	mm
Screen size	4.3 (Diagonal)	inch
Pixel pitch	0.066 (W) x 0.198(H)	mm
Pixel configuration	R.G.B. Stripe	--
Outline dimension	105.5 (W) x 67.2 (H) x 4.05 (D)	mm
Weight	59	g
Surface treatment	Anti – Glare	--
View Angle direction	6 o'clock	--
Backlight Power Consumption	0.558 W	Typ
Panel Power Consumption	0.056 W	Typ

Note 1: Refer to Mechanical Drawing.



Microtips Technology Inc.

Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	5 / 24

2. ABSOLUTE MAXIMUM RATINGS

2.1 Absolute Ratings of Environment

Item	Symbol	Values		Unit	Note
		Min	Max		
Power Voltage	VDD	-0.5	5.0	V	--
Input Signal Voltage	Logic input	-0.5	5.0	V	--
Operation Temperature	T _{OP}	-20	70	°C	3, 4
Storage Temperature	T _{ST}	-30	80	°C	3, 4
LED Reverse Voltage	V _R	--	1.2	V	Each LED 2
LED Forward Current	I _F	--	25	mA	Each LED

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times.

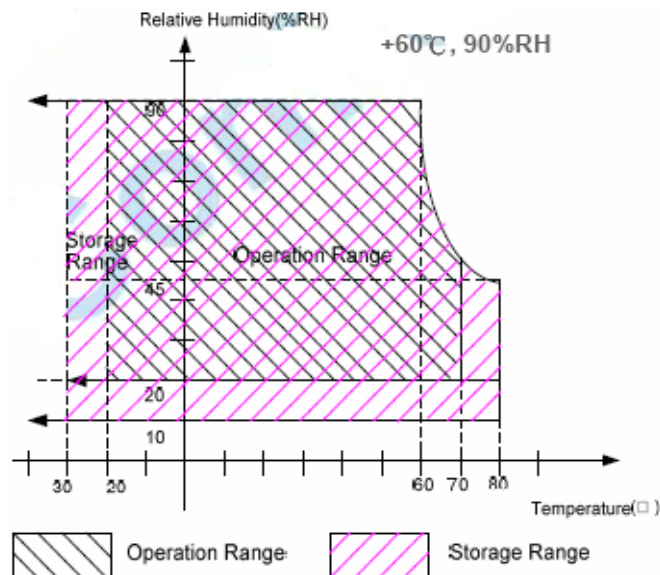
A module should be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme condition, the module may not be permanently destroyed.

Note 2: V_R Conditions: Zener Diode 20mA

Note 3: 90% RH Max. (Max wet temp. is 60°C)

Maximum wet – bulb temperature is at 60°C or less.

And No condensation (no drops of dew)



Note 4: In case of temperature below 0°C, the response time of liquid crystal (LC) becomes slower and the color of panel darker than normal one.



Microtips Technology Inc.

Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	6 / 24

2.2 Typical Operating Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power Voltage	V _{DD}	3.1	3.3	3.5	V	--
Current for Driver	I _{VDD}	--	17	25	mA	V _{DD} = 3.3V
Input Logic High Voltage	V _{IH}	0.8V _{DD}	--	V _{DD}	V	Note 1
Input Logic Low Voltage	V _{IL}	GND	--	0.2V _{DD}	V	

Note 1: CLK, DE, R0 ~ R7, G0 ~ G7, B0 ~ B7

2.3 LED driving conditions

T_a = 25°C

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V _L	25.2	27.9	31.5	V	Note 2
Current for LED Backlight	I _L	18	20	22	mA	--
LED Life Time	--	20,000	--	--	Hr	Note 1

Note 1: The "LED life time" is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25°C and I_L = 20mA. The LED lifetime could be decreased if operating I_L is larger than 20 mA.

Note 2: The LED Supply Voltage is defined by the number of LED at T_a=25°C and I_L = 20mA.

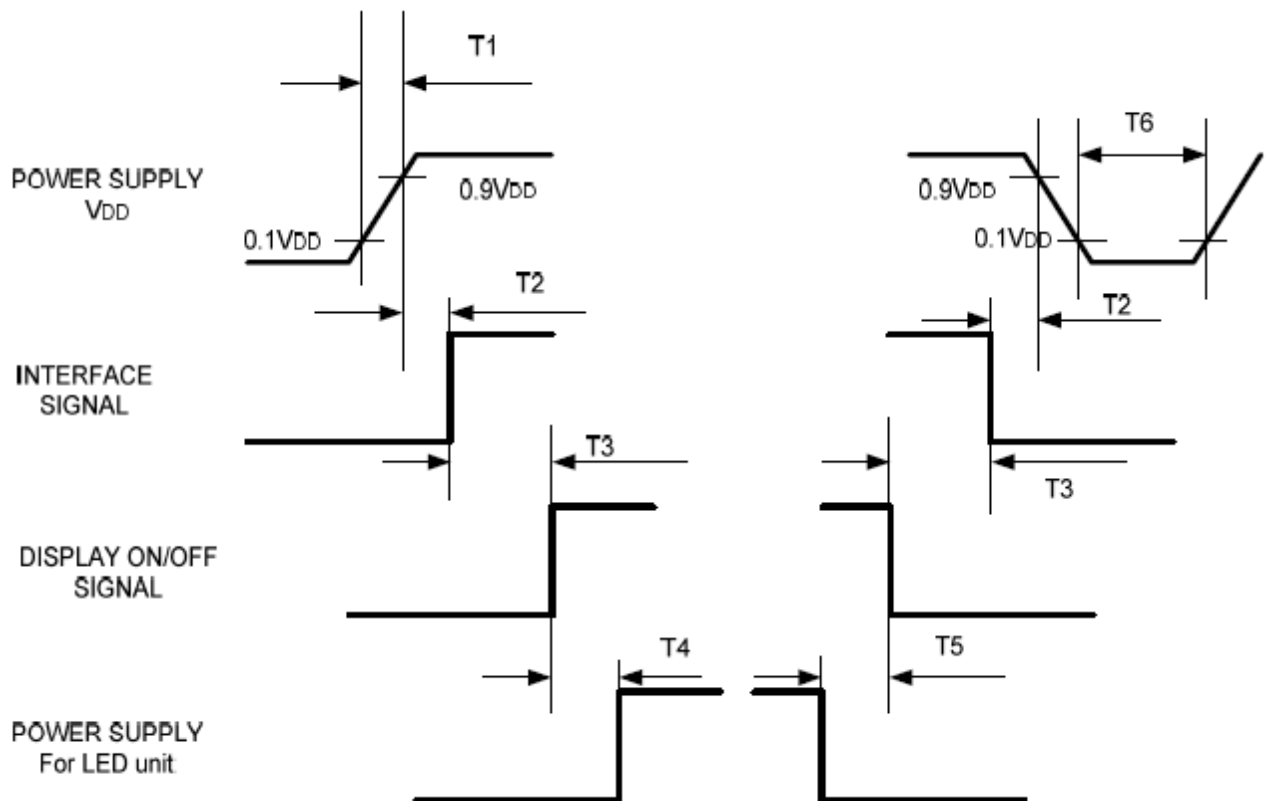


Microtips Technology Inc.

Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	7 / 24

2.4 Power Sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence should be as the diagram below.



Symbol	Specification	Symbol	Specification
T1	$0 \leq T1 \leq 10 \text{ msec}$	T4	$160 \text{ msec} \leq T4$
T2	$0 \leq T2 \leq 100 \text{ msec}$	T5	$160 \text{ msec} \leq T5$
T3	$0 \leq T3 \leq 200 \text{ msec}$	T6	$1 \text{ msec} \leq T6$



Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	8 / 24

3. OPTICAL CHARACTERISTIC

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR \geq 10)	θ_L	$\Phi=180^\circ$ (9 o'clock)	60	70	-	degree	Note 1 Note 7
	θ_R	$\Phi=0^\circ$ (3 o'clock)	60	70	-		
	θ_T	$\Phi=90^\circ$ (12 o'clock)	40	50	-		
	θ_B	$\Phi=270^\circ$ (6 o'clock)	60	70	-		
Response time	T_{ON}	Normal $\theta=\Phi=0^\circ$	-	10	20	msec	Note 3
	T_{OFF}		-	15	30	msec	Note 3
Contrast ratio	CR		400	500	-	-	Note 4
Color chromaticity	W_X		0.26	0.31	0.36	-	Note 2 Note 5 Note 6 Note 7
	W_Y		0.28	0.33	0.38	-	
Luminance	L		350	400	-	cd/m ²	Note 6
Luminance uniformity	Y_U		70	75	-	%	Note 8

Test Conditions:

1. $V_{DD}=3.3V$, $I_L=20mA$ (Backlight current), the ambient temperature is $25^\circ C$.
2. The test systems refer to Note 2.



Microtips Technology Inc.

Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	9 / 24

Note 1: Definition of viewing angle range

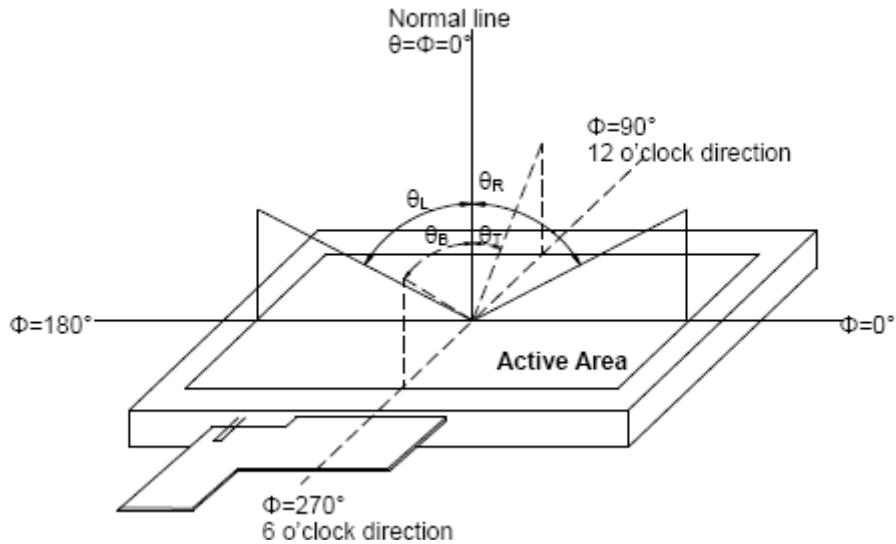


Fig. 3 – 1 Definition of viewing angle

Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)

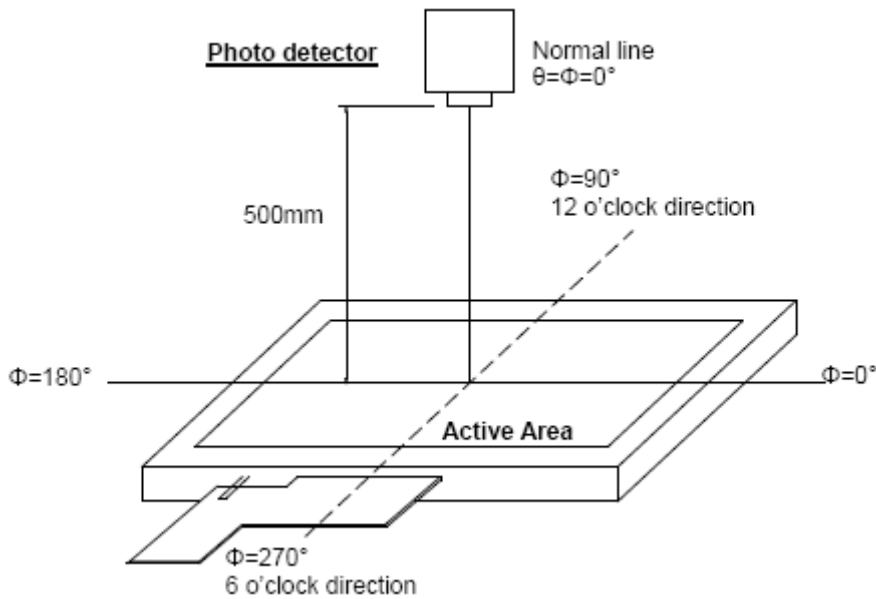


Fig. 3-2 Optical measurement system setup



Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	10 / 24

Note 3: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

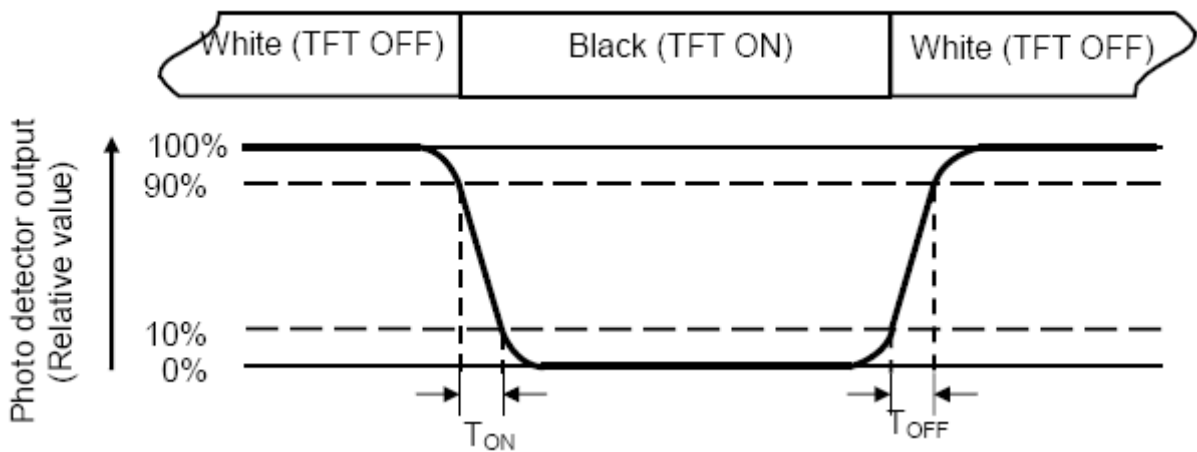


Fig. 3-3 Definition of response time

Note 4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is $I_L=20\text{mA}$.

Note 7: The values shall be measured without Touch Screen Panel.



Microtips Technology Inc.

Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	11 / 24

Note 8: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to Fig. 4-4).Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{min}}{B_{max}}$$

L-----Active area length W----- Active area width

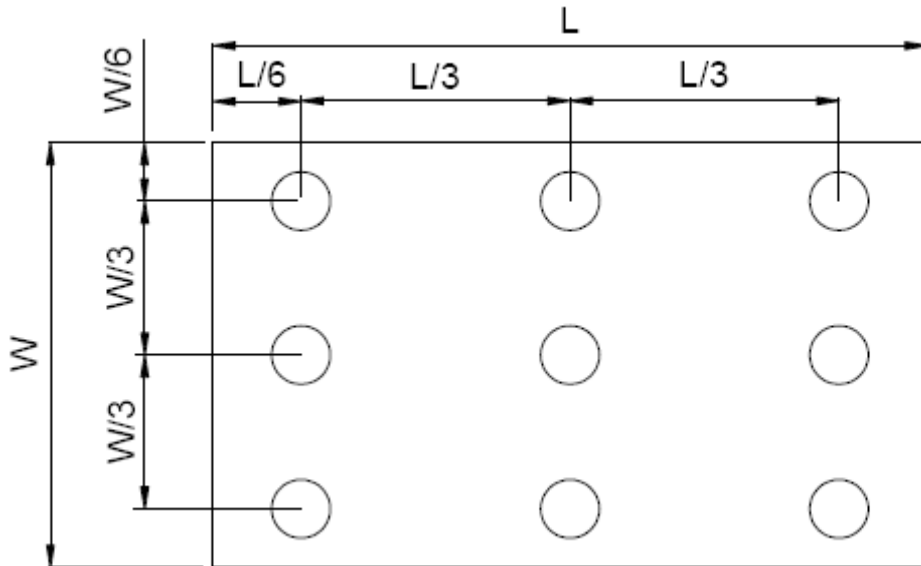


Fig. 3-4 Definition of measuring points

B_{max} : The measured maximum luminance of all measurement position.

B_{min} : The measured minimum luminance of all measurement position.



Microtips Technology Inc.

Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	12 / 24

4. AC CHARACTERISTICS

4.1 AC Timing Characteristics

Parallel DE mode RGB input timing table

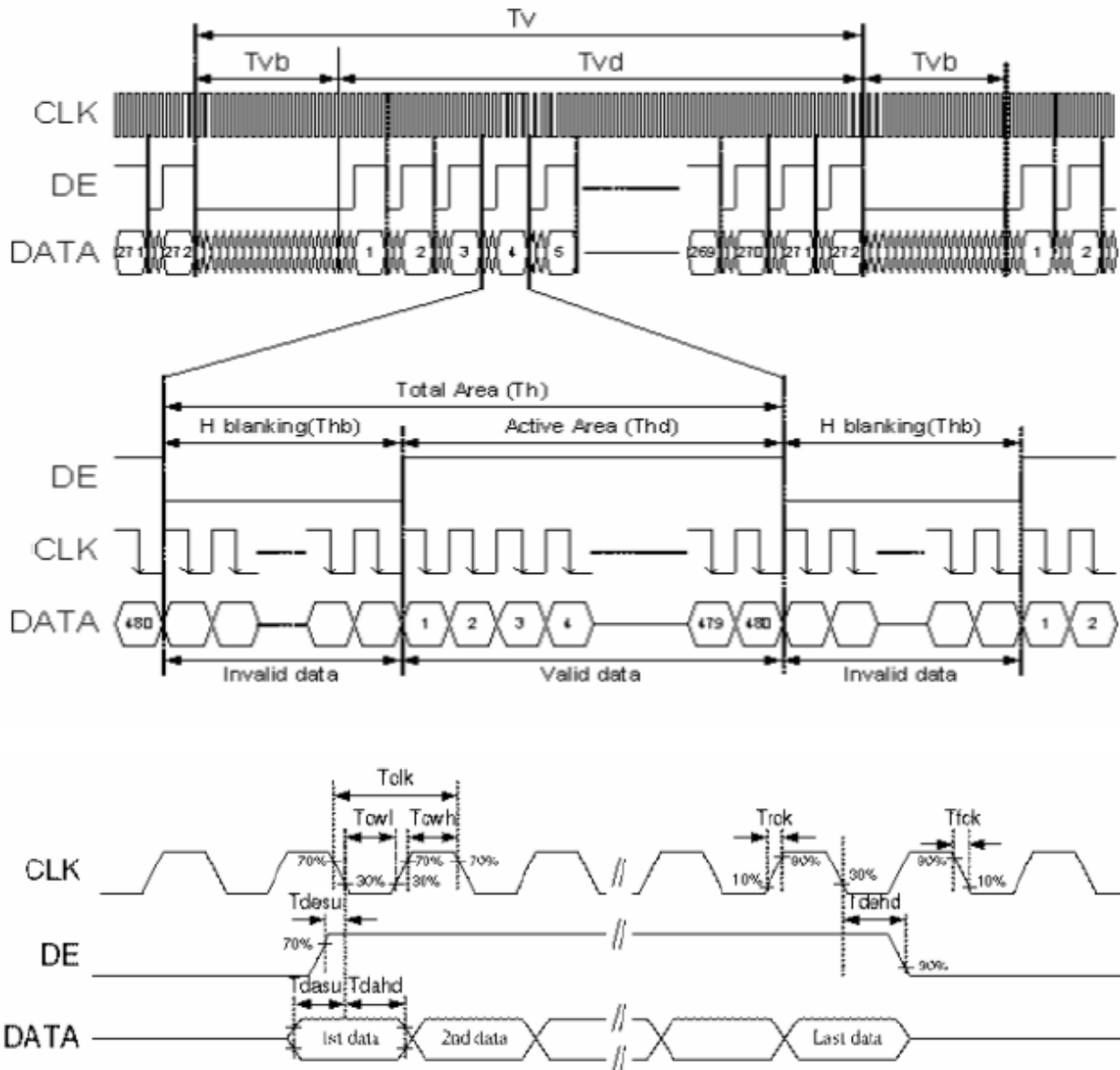
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
CLK frequency	fclk	7	9	12	MHz
DEV period time	Tv	277	288	400	H
DEV display area	Tvd	272			H
DEV blanking	Tvb	5	16	128	H
DEH period time	Th	520	525	800	CLK
DEH display area	Thd	480			CLK
DEH blanking	Thb	40	45	320	CLK
CLK cycle time	Tclk	83	110	143	ns
Clock width of high level	Tcwh	40	50	60	%
Clock width of low level	Tcwl	40	50	60	%
Clock rising time	t _{rck}		-	9	ns
Clock falling time	t _{rck}		-	9	ns
Data Setup Time	t _{desu}	10	-	-	ns
Data Hold Time	t _{dahd}	10	-	-	ns
DE Setup Time	t _{desu}	10	-	-	ns
DE Hold Time	t _{dehd}	10	-	-	ns



Messrs.

Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	13 / 24

4.2 Timing Diagram



Microtips Technology Inc.

Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	14 / 24

4.3 Electrical Characteristics

Item	MIN.	Typ.	MAX.	Unit	Note
Linearity	-1.5	--	1.5	%	Analog X and Y directions
Terminal Resistance	300	--	1500	Ω	X (Film side)
	100	--	900	Ω	Y (Film side)
Insulation Resistance	25	--	--	M Ω	At DC 25V, 60sec
Voltage	--	5	7	V	DC
Chattering	--	--	10	ms	100K Ω pull – up
Transparency	80	--	--	%	JIS K7105

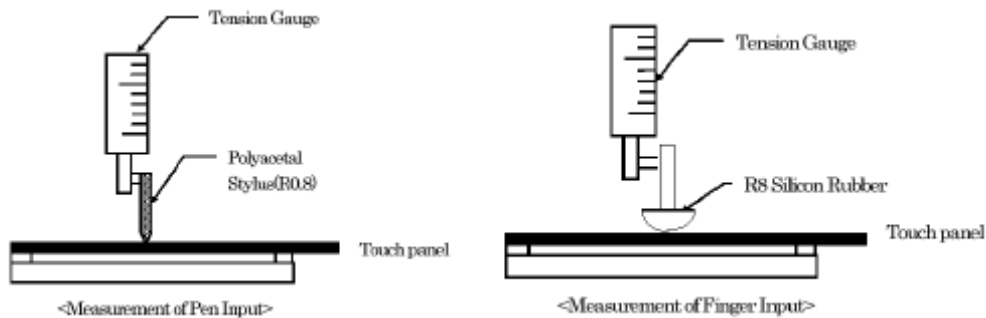
Note: Avoid operating with hard or sharp material such as a ball point pen or a mechanical pencil except a polyacetal pen (tip R0.8mm or less) or a finger.

4.4 Mechanical & Reliability Characteristics

Item	Min.	Typ.	Max.	Unit	Note
Activation force	80	--	--	g	Note 1
Durability – surface scratching	Write 100,000	--	--	characters	Note 2
Durability – surface pitting	1,000,000	--	--	touches	Note 3
Surface hardness	3	--	--	H	JIS K5400

Note 1: Activation force test condition

- (1) Input DC 5V on X direction, Drop off Polyacetal Stylus (R0.8), until output voltage stabilize, then get the activation force.
- (2) R8.0mm Silicon rubber for finger Activation force test
- (3) Test point: 9 points



Microtips Technology Inc.

Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	15 / 24

Note 2: Measurement for surface area.

-Scratch 100,000 times straight line on the film with a stylus change every 20,000 times.

-Force: 250gf.

-Speed: 60mm/sec.

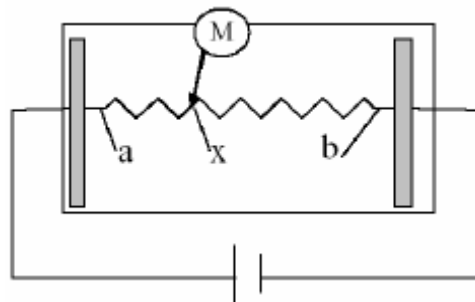
-Stylus: R0.8 polyacetal tip.

Note 3: Pit 1,000,000 times on the film with a R0.8 silicon rubber.

-Force: 250gf.

-Speed: 2times/sec.

4.5 Linearity Definition



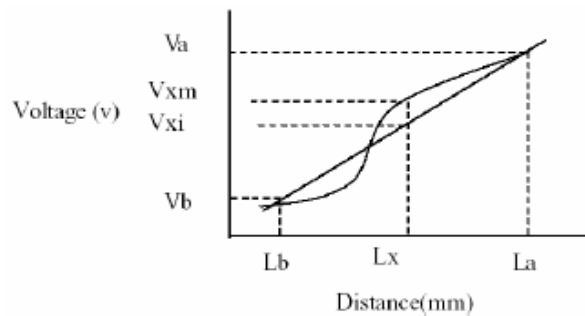
Va: maximum voltage in the active area of touch panel

Vb: minimum voltage in the active area of touch panel

X: random measuring point

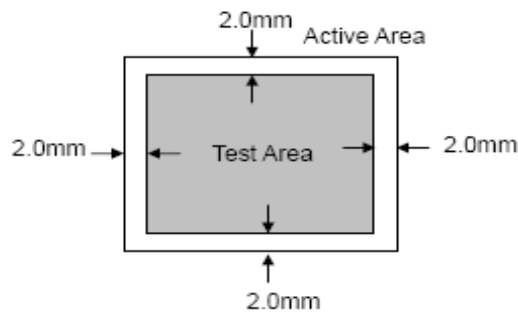
Vxm: actual voltage of Lx point

Vxi: theoretical voltage of Lx point



$$\text{Linearity} = \frac{|V_{xi} - V_{xm}|}{(V_a - V_b)} * 100\%$$

Note: Test area is as follows and operation force is 150gf.



Microtips Technology Inc.

Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	16 / 24

5. INTERFACE

5.1 LCM PIN Definition

FPC Connector is used for the module electronics interface.

The recommended model is “ FH19SC – 40S – 0.5SH “ manufactured by HIROSE.

Pin No	Symbol	I/O	Function	Remark
1.	VLED -	P	Power for LED Backlight Cathode	--
2.	VLED +	P	Power for LED Backlight Anode	--
3.	GND	P	Power Ground	--
4.	VDD	P	Power Supply : +3.3V	--
5.	R0	I	Red Data Bit 0 (LSB)	--
6.	R1	I	Red Data Bit 1	--
7.	R2	I	Red Data Bit 2	--
8.	R3	I	Red Data Bit 3	--
9.	R4	I	Red Data Bit 4	--
10.	R5	I	Red Data Bit 5	--
11.	R6	I	Red Data Bit 6	--
12.	R7	I	Red Data Bit 7 (MSB)	--
13.	G0	I	Green Data Bit 0 (LSB)	--
14.	G1	I	Green Data Bit 1	--
15.	G2	I	Green Data Bit 2	--
16.	G3	I	Green Data Bit 3	--
17.	G4	I	Green Data Bit 4	--
18.	G5	I	Green Data Bit 5	--
19.	G6	I	Green Data Bit 6	--
20.	G7	I	Green Data Bit 7 (MSB)	--
21.	B0	I	Blue Data Bit 0 (LSB)	--
22.	B1	I	Blue Data Bit 1	--
23.	B2	I	Blue Data Bit 2	--
24.	B3	I	Blue Data Bit 3	--
25.	B4	I	Blue Data Bit 4	--
26.	B5	I	Blue Data Bit 5	--
27.	B6	I	Blue Data Bit 6	--
28.	B7	I	Blue Data Bit 7 (MSB)	--
29.	GND	P	Power Ground	--
30.	DCLK	I	Dot Data Clock	--
31.	DISP	I	Display ON/OFF	Note 1
32.	HSYNC	--	Horizontal synchronous signal	--
33.	VSYNC	--	Vertical synchronous signal	--
34.	DE	I	Data Enable Control	Note 2



Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	17 / 24

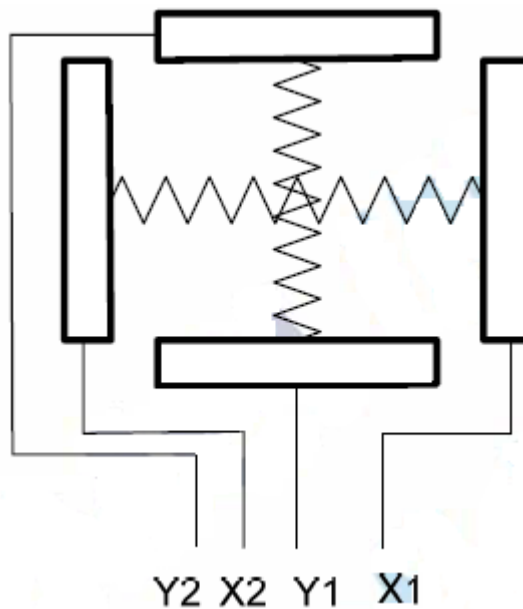
Pin No	Symbol	I/O	Function	Remark
35.	NC	--	No Connect	--
36.	GND	P	Power Ground	--
37.	X1	I / O	Right Electrode – Differential Analog	--
38.	Y1	I / O	Bottom Electrode – Differential Analog	--
39.	X2	I / O	Left Electrode – Differential Analog	--
40.	Y2	I / O	Top Electrode – Differential Analog	--

I: Input, O: Output, P: Power

5.2 Touch Screen Panel Section

Pin No	Symbol	I/O	Function	Remark
1.	X1	Right	Right Electrode – Differential Analog	--
2.	Y1	Bottom	Bottom Electrode – Differential Analog	--
3.	X2	Left	Left Electrode – Differential Analog	--
4.	Y2	Top	Top Electrode – Differential Analog	--

Note: Touch Screen Panel Block



Microtips Technology Inc.

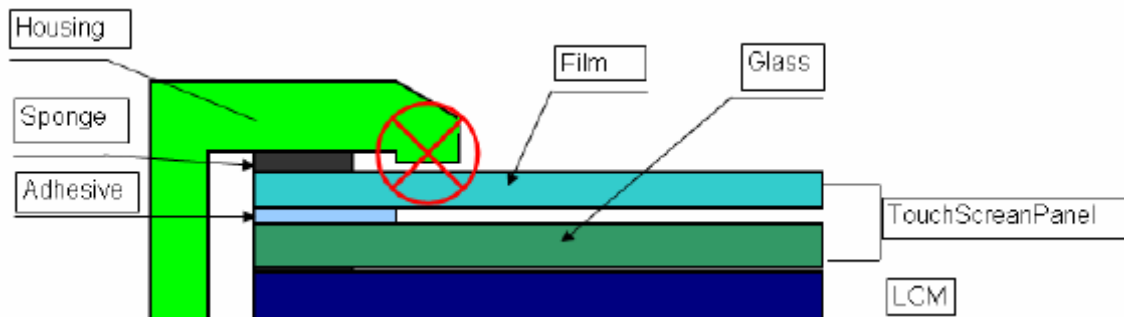
Messrs.

Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	18 / 24

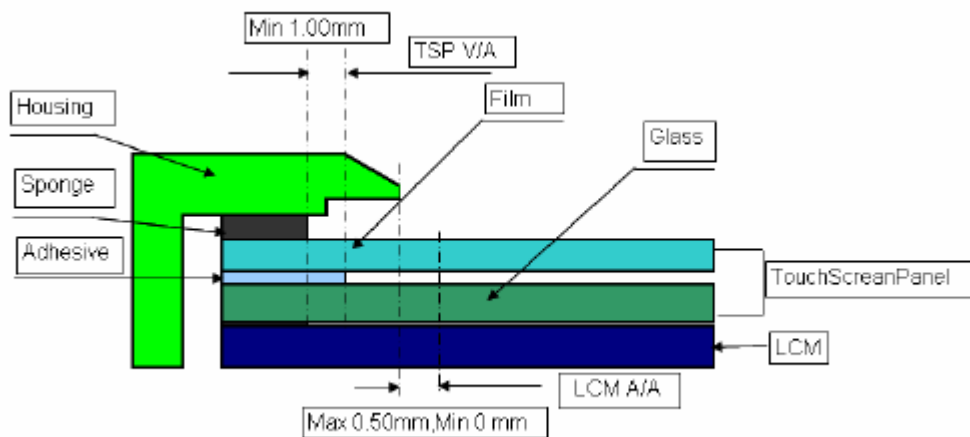
6. HOUSING DESIGN GUIDE

Housing design follow as below

- 1) Avoid the design that housing overlap and press on the active area of the LCM
- 2) Give enough gap(over 0.5mm at compressed) between the housing and TSP to protect wrong operating.



- 3) Use a buffer material(Gasket) between the TSP and housing to protect damage and wrong operating
- 4) Avoid the design that buffer material overlap and press on the inside of TSP view area.



Microtips Technology Inc.

Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	19 / 24

7. QUALITY ASSURANCE

No.	Test Items	Test Condition	Remark
1.	High Temperature Storage Test	Ta = 80°C Dry 240hrs	1, 4
2.	Low Temperature Storage Test	Ta = -30°C Dry 240hrs	1, 4
3.	High Temperature Operation Test	Ta = 70°C Dry 240hrs	2, 4
4.	Low Temperature Operation Test	Ta = -20°C Dry 240hrs	1, 4
5.	High Temperature and High Humidity Operation Test	+ 60°C, 90%RH 240hrs	5
6.	Thermal Shock Test	-30°C/30 min ~ +80°C/30 min for a total 100 cycles, Start with cold temperature and end with high temperature	4
7.	Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	--
8.	Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	--
9.	Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	--
10.	Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	--
11.	Electro Static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω	--

Note 1: Ta is the ambient temperature of samples.

Note 2: Ts is the temperature of panel's surface.

Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but doesn't guarantee all the cosmetic specification.

Note 4: Before cosmetic and function tests, the product must have enough recovery time, at least 2 hours at room temperature.

Note 5: Before cosmetic and function tests, the product must have enough recovery time, at least 24 hours at room temperature.



Microtips Technology Inc.

Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	20 / 24

8. PRECAUTIONS





8.1 Operation

Burn-in sometimes happens when the same character was displayed at along time. Therefore, to prevent Burn-in, it is recommended to set up a Screen-saver function.

8.2 Safety

The liquid crystal in the LCD is poisonous, DO NOT put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.





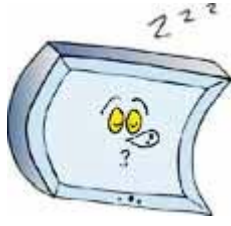

8.3 Handling

	<p>a. The LCD module shall be installed flat, without twisting or bending. b. COF or FPC has narrow pattern width, so easily become open circuit by external force. DO NOT apply pressure to COF or FPC especially in bending area.</p>
	<p>c. To avoid damage in appearance or malfunction, DO NOT subject the module to mechanical shock or to excessive force on its surface.</p>
	<p>d. The polarizer attached to the display is very easy to damage, handle it with care to avoid scratching.</p>
	<p>e. To avoid contamination on the display surface, DO NOT touch the display surface with bare hands. f. Provide a space so that the LCD module does not come into contact with other components.</p>



Messrs.

Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	21 / 24


	<p>g. To protect the LCD panel from external pressure, put covering glass (acrylic board or similar board) to keep appropriate space between them.</p>
	<p>h. Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.</p>
	<p>i. Property of semiconductor devices may be affected when they are exposed to light possibly resulting in malfunctioning of the ICs. To prevent such malfunctioning of the ICs, your design and mounting layout done are so that the IC is not exposed to light in actual use.</p>
	<p>j. Strong light exposure causes degradation of color filter. It may not recover</p>
	<p>k. DO NOT contact with water to avoid Metal corrosion. l. When it is not in use, the screen must be turned off or the pattern must be frequently changed by a screen saver. If it displays the same pattern for a long period of time, brightness down/image sticking may develop due to the LCD structure.</p>
	<p>m. Never disassemble LCD product under any circumstances. If unqualified operators or users assemble the product after disassembling it, it may not function or its operation may be seriously affected.</p>




Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	22 / 24

8.4 Static electricity


Since a module is composed of electronic circuits, it is not strong to electrostatic discharge.

	<ol style="list-style-type: none"> The LCD module shall be installed flat, without twisting or bending. Ground soldering iron tips, tools and testers when they operate. Ground your body when handling the products. DO NOT apply voltage to the input terminal without applying power supply. DO NOT apply voltage that exceeds the absolute maximum rating. Store the products in an anti-electrostatic container. Peel off protect tape, attached to polarizer, slowly to minimize ESD damage.
---	--


8.5 Storage

	<p>Store the products in a dark place at +5 ~ +25 degree C, low humidity (50%RH or less). DO NOT store the products in an atmosphere containing organic solvents or corrosive gases.</p>
---	--

8.6 Cleaning

	<ol style="list-style-type: none"> DO NOT wipe the polarizer with dry cloth, as it might cause scratch. Wipe the polarizer with a soft cloth soaked with petroleum IPA, other chemical might damage.
---	--

8.7 Waste

	<p>When dispose of LCD module, manage it at the production waste according to the relevant laws and regulations.</p>
---	--



Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	23 / 24

9. WARRANTY

This product has been manufactured to your company's specifications as a part for use in your This product has been manufactured to your company's specifications as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we cannot take responsibility if the product is used in medical devices, nuclear power control equipment, aerospace equipment, fire and security systems, or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required. If the product is to be used in any of the above applications, we will need to enter into a separate product liability agreement.

- 1 13 months guarantee starts from the date code.
- 2 We cannot accept responsibility for any defect, which may arise from additional manufacturing of the product (including disassembly and reassembly), after product delivery.
- 3 We cannot accept responsibility for any defect, which may arise after the application of strong external force to the product.
- 4 We cannot accept responsibility for any defect, which may arise due to the application of static electricity after the product has passed your company's acceptance inspection procedures.
- 5 We cannot accept responsibility for industrial property, which may arise through the use of your product, with exception to those issues relating directly to the structure or method of manufacturing of our product. Microtips-origin longer than one year from Microtips production.

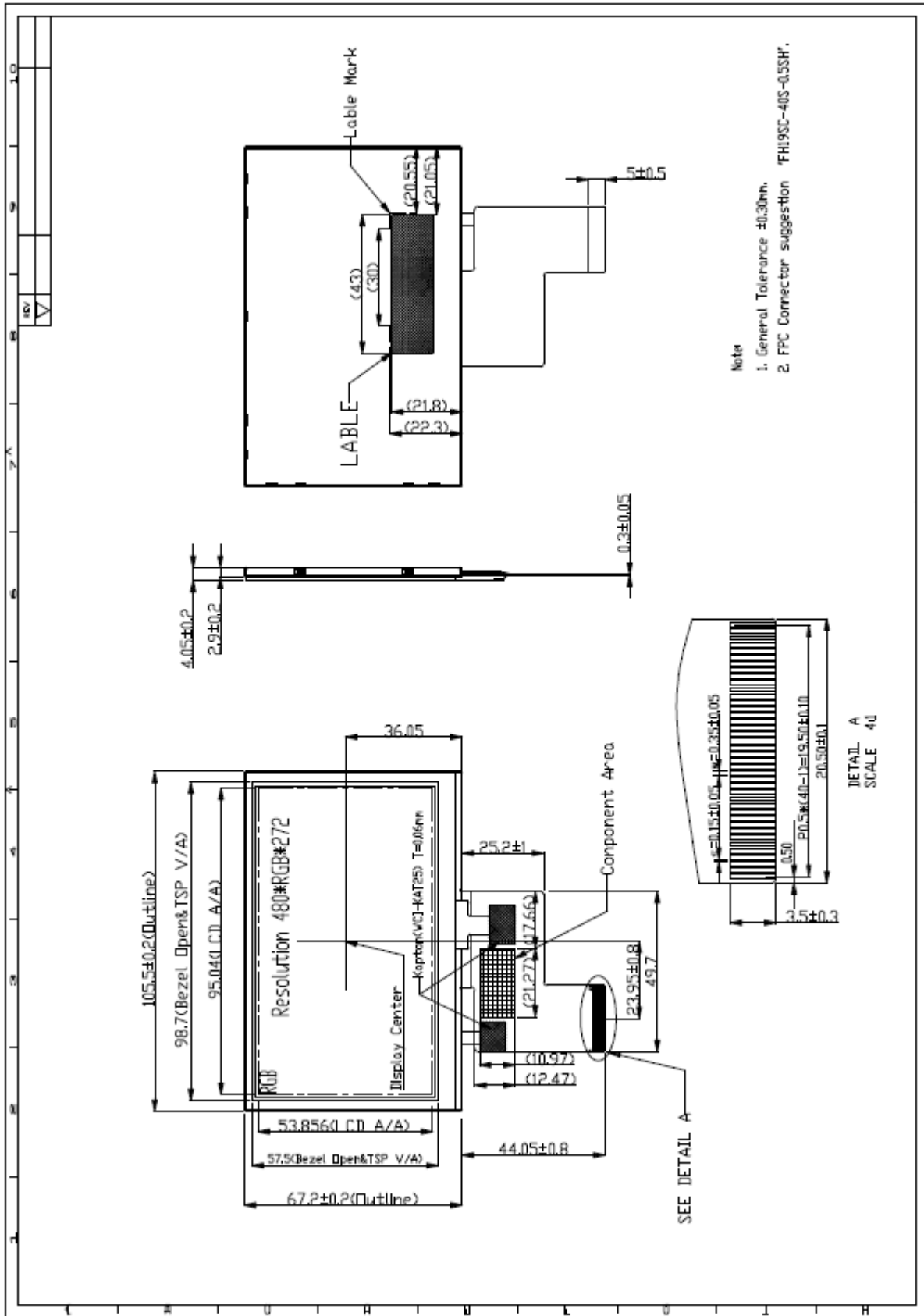
10. DIMENSIONAL OUTLINES

See next page.....



Microtips Technology Inc.

Messrs.					
Product Specification	Model:	MTF-TY43SP131-LB	Rev. No.	Issued Date.	Page.
			A	July.13, 11	24 / 24



Microtips Technology Inc.