



SPECIFICATION FOR TFT LCD MODULE

CUSTOMER : _____

CUSTOMER MODULE : _____

HL MODEL : HG043HV005R01

Preliminary Specification

Final Specification

Customer Confirmation column:

Approved by : _____ Dept. : _____ Data : _____

Please return one of the copies of the specification with your signature to us within two weeks after you receive this document. If it is not returned, we will assume that you agree to the entire contents of this specification document.

Designed by	Checked by	Approved by



CONTENTS

No.	ITEM	PAGE
1.	GENERAL INFORMATION	4
2.	DIAGRAM FOR LCM	5
3.	I/O CONNECTION & BLOCK DIAGRAM	6~7
4.	ABSOLUTE MAXIMUM RATINGS	8
5.	ELECTRICAL CHARACTERISTICS	8~9
6.	ELECTRO-OPTICAL CHARACTERISTICS	10~12
7.	RELIABILITY TEST CONDITIONS	13
8.	INSPECTION STANDARDS	14~16
9.	PACKAGE DRAWING	16



1. GENERAL INFORMATION

1.1 features

- 1) Structure: TFT PANNEL+IC+FPC+BL+RTP
- 2) TN Type LCD 480 dot-segment and 272 dot-common outputs
- 3) 262K Color can be selected by software
- 4) White LED back light
- 5) RGB-24 interface
- 6) Operation Temperature : -20~60°C
- 7) Storage Temperature : -30~70°C
- 8) CTP cover lens : -/
- 9) CTP structure : -/
- 10) LED life time: -/

1.2 General specification

Item of	Contents	Unit
Panel Size	4.3	inch
LCD Type	a-si/TRANSMISSIVE	/
Display mode	Normally White	/
Pixel arrangement	480*3(RGB)*272	Dots
Pixel pitch (W*H)	0.198(H)*0.198 (V)	um
Active Area	95.04(H)*53.86(V)	Mm
Module area (W*H*T)	105.5 (H)*67.2(V)*4.15(T)	Mm
Recommended Viewing Direction	6	0' clock
IC	ST7282-G4-1B	/
Interface	RGB-24	/
Luminance for LCM+RTP	400	cd/m2
NTSC	50%	%
Weight	TBD	g



3. I/O CONNECTION & BLOCK DIAGRAM

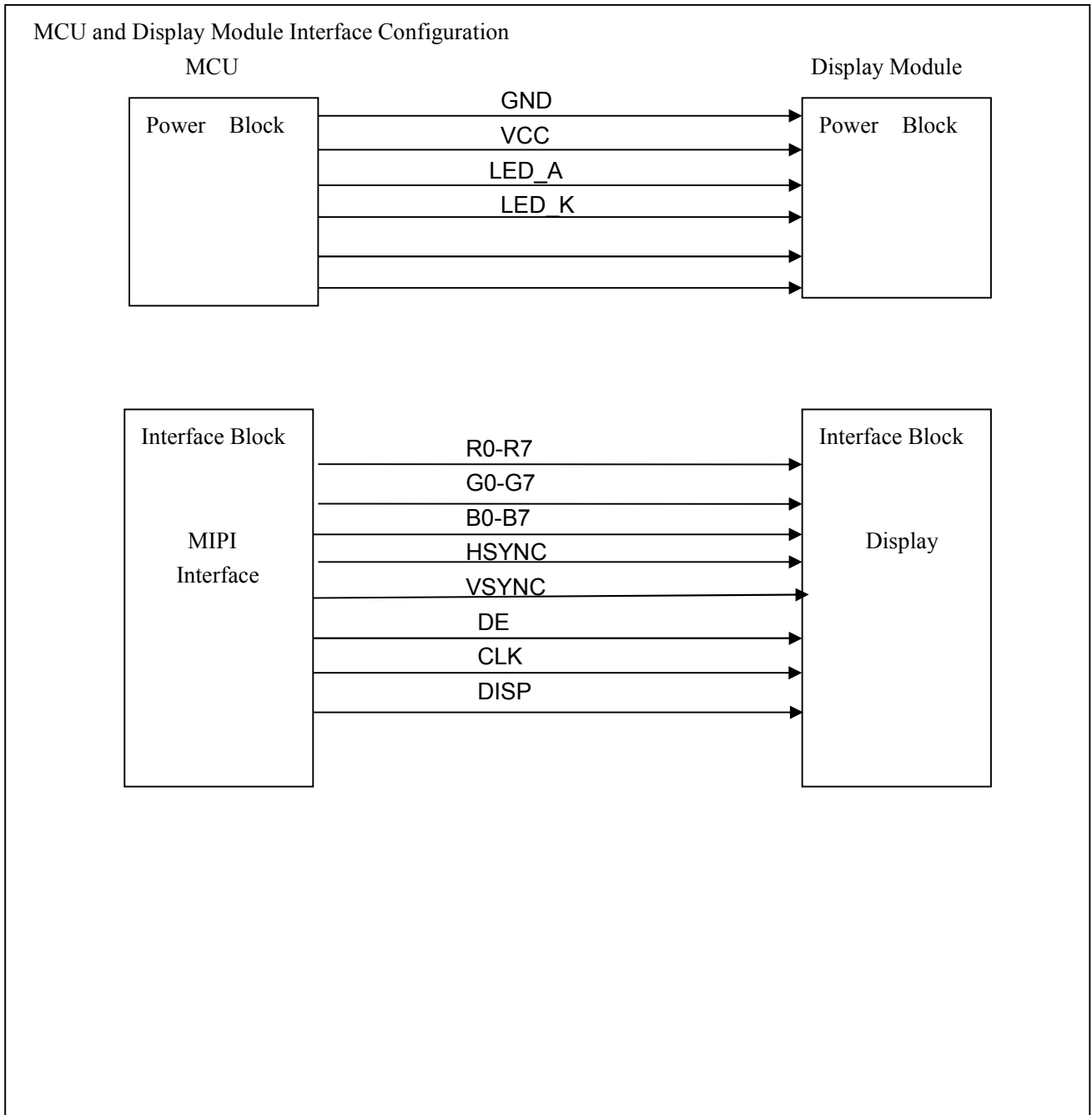
3.1 I/O connection

LCM Pin NO.	Symbol	I/O	Description
1	LEDK	P	LED Cathode
2	LEDA	P	LED Anode
3	GND	P	Ground
4	VCC	P	power input
5-12	R0~R7	I	Red data
13-20	G0~G7	I	Green data
21-28	B0~B7	I	Blue data
29	GND	P	Ground
30	CLK	I	Parallel RGB clock input
31	DISP	I	
32	HSYNC	I	Horizontal Synchronization
33	VSYNC	I	Vertical Synchronization
34	DE	I	DATA INPUT Enable
35	NC	-	
36	GND	P	Ground
37	XR		Touch panel Right
38	YD		Touch panel Down
39	XL		Touch panel Left
40	YU		Touch panel Up

I: Input; O: Output; P: Power



3.2 block diagram





4. ABSOLUTE MAXIMUM RATINGS

(GND=AGND=0V)

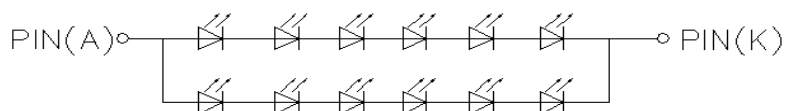
Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V _{DD}	-0.3	4.6	V	
Input Voltage	V _{in}	-0.3	V _{DD} +0.3	V	
Operating Temperature	Top	-20	+60	°C	
Storage Temperature	Tst	-30	+70	°C	

5. ELECTRICAL CHARACTERISTICS

5.1 Typical Operation Conditions

Item	Symbol	Values			Unit	Remarks
		Min.	Typ.	Max.		
Power Voltage Supply1	IOVCC(1.8V)	1.65	2.8	3.6	V	-
Backlight Forward Voltage	V _f	18	19.2	20.4	V	-
LED Forward Current	I _f	-	40	-	mA	Note

Note: The "LED life time" is defined as the module brightness decrease to 50% of original brightness at I_L=20mA (for each led). The LED life time could be decreased if operating I_L is larger than 20mA



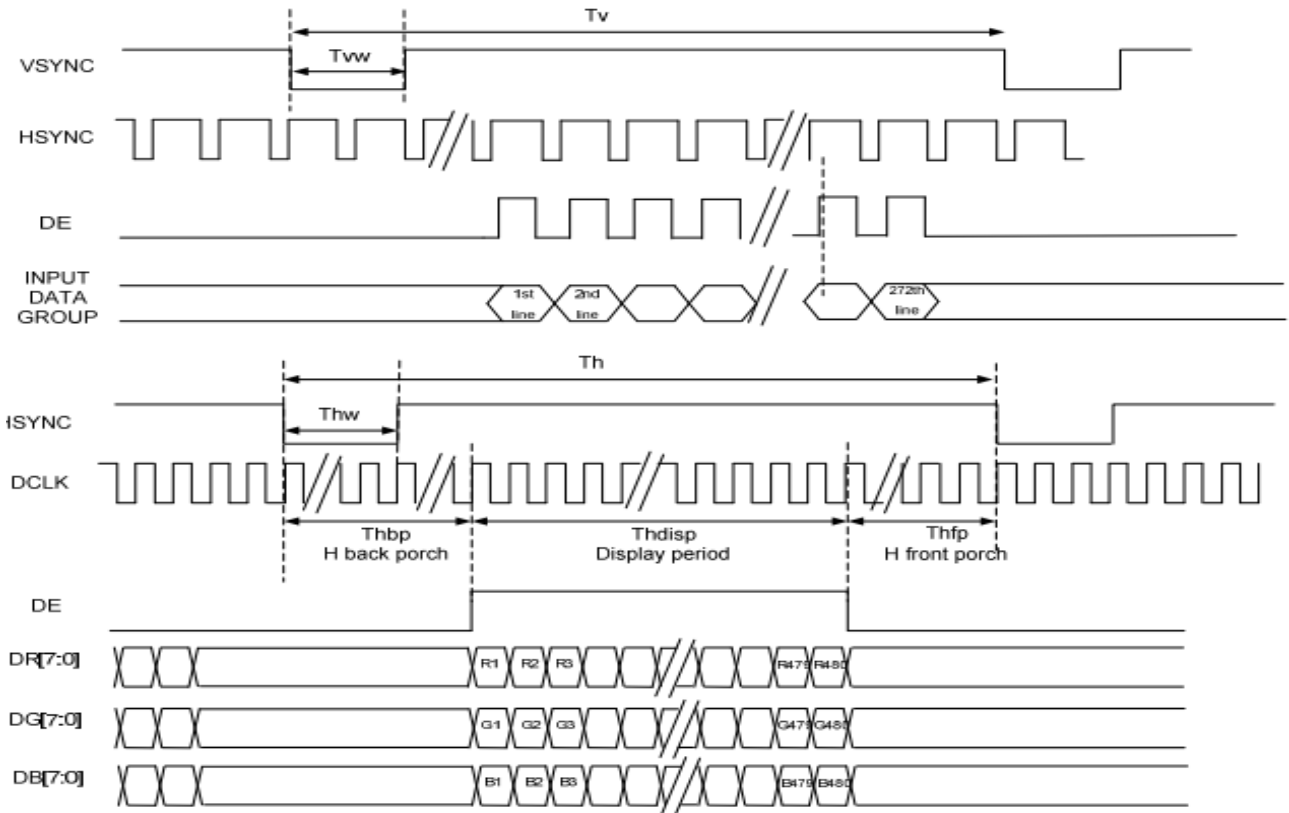
BACKLIGHT CIRCUIT DIAGRAM 20mA/LED (12LED)

LED V_f: 19.2V (TYP)

**背光电路图
(CIRCUIT DIAGRAM)**



5.2 DC CHARACTERISTICS



Item	Symbol	Min.	Typ.	Max.	Unit	Remark	
DCLK Frequency	Fclk	8	9	12	MHz		
DCLK Period	Tclk	83	111	125	ns		
HSYNC	Period Time	T_h	485	531	598	DCLK	
	Display Period	T_{hdisp}		480		DCLK	
	Back Porch	T_{hbp}	3	43	43	DCLK	By H_Blanking setting
	Front Porch	T_{hfp}	2	8	75	DCLK	
	Pulse Width	T_{hw}	2	4	75	DCLK	
VSYNC	Period Time	T_v	276	292	321	H	
	Display Period	T_{vdisp}		272		H	
	Back Porch	T_{vbp}	2	12	12	H	By V_Blanking setting
	Front Porch	T_{vfp}	2	8	37	H	
	Pulse Width	T_{vw}	2	4	37	H	



6. ELECTRO-OPTICAL CHARACTERISTICS

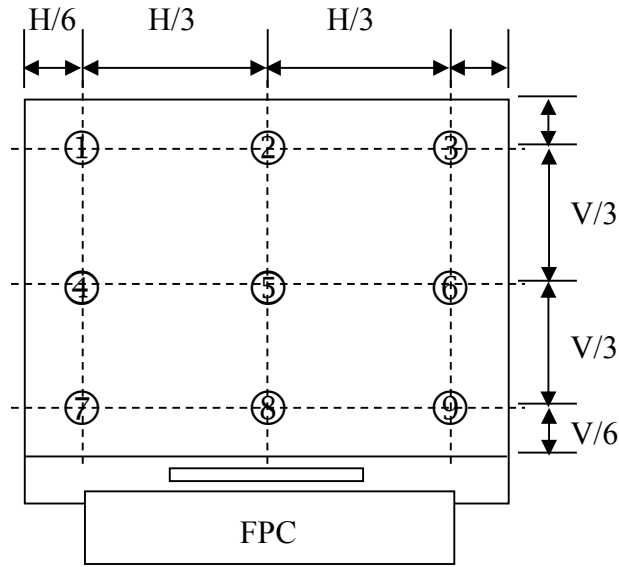
Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center point)		C/R	-	400	500	-	-	Note(1)
Luminance uniformity		U_w	$\theta = 0$. Normal viewing angle B/L On Note(1)	80	85	-	%	Note(2)
Response Time		$Tr + Tf$		-	12	36	ms	Note(3)
Color Chromaticity (CIE 1931)	White	W_x		0.273	0.293	0.313	参考值	Note(5)
		W_y		0.305	0.325	0.345		
	Red	R_x		0.616	0.636	0.656		
		R_y		0.308	0.328	0.348		
	Green	G_x		0.263	0.283	0.303		
		G_y		0.511	0.531	0.551		
	Blue	B_x		0.115	0.135	0.155		
		B_y		0.114	0.134	0.154		
Viewing Angle	Hor.	$\phi 3R$	$C/R \geq 10$	60	70	-	Deg	Note(4)
		$\phi 9L$		60	70	-		
	Ver.	$\phi 12U$		60	70	-		
		$\phi 6D$		50	60	-		



Note1 Definition of Contrast Ratio (CR):

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

Note2: 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.



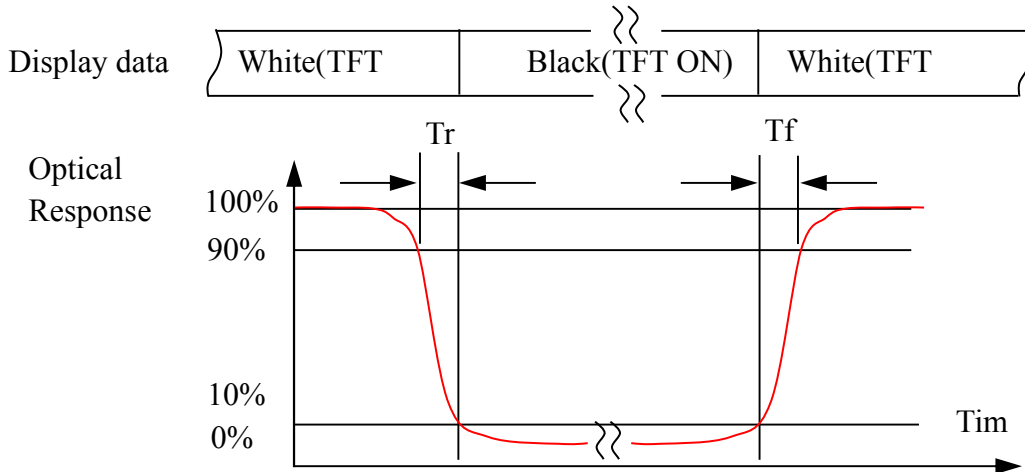
The spot locations for luminance measurement

$$\text{Luminance Uniformity} = \frac{H/6}{B_{\max}} \frac{V/6}{B_{\min}} \times 100\%$$

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

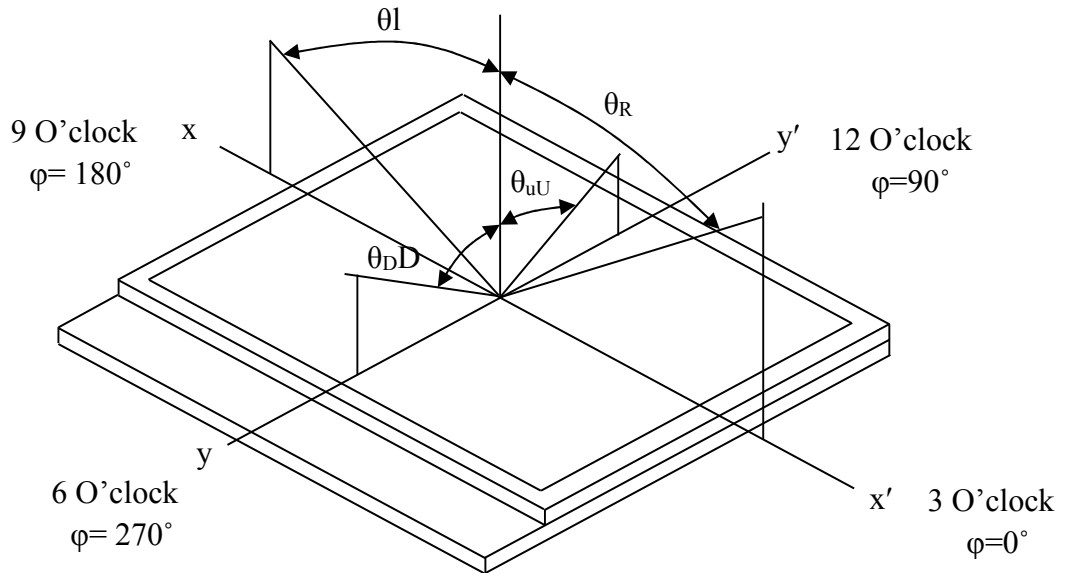
B_{\min} : The measured minimum luminance of all measurement position.

Note 3: Definition of Response time: Sum of T_r and T_f





Note4.Definition of Viewing Angle: The viewing angle range that the $CR \geq 10$



Note 5: Definition of Color Chromaticity (CIE 1931)

Color coordinate of white & red, green, blue at center point.



7. RELIABILITY TEST CONDITIONS

No	Test Item	Test Condition	STANDARD
1	High Temperature Storage	+70°C / 96Hours	1. Functional test is OK. Missing Segment, short, unclear segment, on-display, display abnormally and liquid crystal leak are un-allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temperature Storage	-30°C / 96Hours	
3	High Temperature Operating	+60°C / 96Hours	
4	Low Temperature Operating	-20°C / 96Hours	
5	Thermal and cold shock	0°C↔+50°C x 10cycles (30min) (5min) (30min)	
6	Operate at High Temperature and Humidity	60°C x 90%RH / 24H	
7	Vibration Test	Frequency: 10Hz~55Hz~10Hz Amplitude:1.5mm, 2 hours for each direction of X, Y, Z	1. Function test is OK. 2. No glass crack, chipped glass, end seal loose and fall, epoxy frame crack and so on. 3. No structure loose and fall.
8	Dropping test	Drop to the ground from 1m height, 1 corner, 3 edges, 6 surfaces.	
9	ESD test	Contact: ±6KV Air: ±10KV 150PF/330Ω,5Points/pa nel,5times	The test results shall be subject to the whole machine test.

NOTE:

1. The reliability items will be fully performed in new sample qualification,
2. The reliability status will be tested as monitor during mass production. Individual reliability test shall be performed by lot, Moreover, the individual reliability item shall be decided according to reliability plan.
3. All samples are inspected after keeping in the room with normal temperature and humidity for 2 hours or above.
4. Vibration test: It is not necessary to test for those products without assembly frame, backlight, PCB and so on.
5. Dropping test: It is necessary for affirming new package.
6. For the high temperature and high humidity test, pure water of over 10 MΩ.cm should be used.
7. Each test item applies for test LCM only once. Then tested LCM cannot be used again in any other test item.
8. The quantity of LCM examination for each test item is 5pcs to 10pcs.



8. INSPECTION STANDARDS

8.1 AQL Sampling inspection standard

使用 GB/T 2828-2003 一般 II 水平, 采用正常检查一次抽样方式; 具体抽检方式参照《成品检验管理程序》、《抽样管理规范》

缺陷区分	AQL 允收水准
严重缺陷	0 收 1 退
重缺	0.4
轻缺	1.0

8.2 Inspect the condition

8.2.1 在 20—40W 日光灯的照明条件下, 样品离检查者眼睛约 30cm 处进行检查。检验方向以垂直线前后左右 45° (以时钟 3 点、6 点、9 点、12 点)

8.2.2 检验者视力需达到标准视力 1.0 以上。

8.2.3 检验者需戴静电手环、两手八个手指套。

8.2.4 外观检验者以目视检查或以菲林对比卡比对。

8.2.5 电性测试使用电测测架, 主板, 电源线及单片机。

8.2.6 若标准与规格书不符时, 以产品发行之规格书特殊检验规格、工程变更为准

8.2.7 辉色度检测请参照样品, 检测方法依照辉色度检验标准。

8.2.8 电测检验环境: 照度为 200LUX 以下, 外观检验环境: 照度为 600LUX-1000LUX, 检验时间: 1 秒-3 秒。

8.2.9 检验工具: 电测测架, 主板, 电源线及单片机, 菲林对比卡, 游标卡尺, 放大镜, 实体显微镜 (必要时) 等等。

8.3 Judgment criterion

小尺寸点、线判定标准: (6.2 寸以内)

1	点状缺陷 (磨伤、异物、针孔、凹痕、缺膜、气泡、白点、彩点、脏点)		判定 (A /B/C 区)	$D \leq 0.10$, 忽略不计, 但密集型不允许 $0.1 < D \leq 0.15$, $ds \geq 10$ $0.15 < D \leq 0.2$, $ds \geq 10$ LCD 亮点: $0.15 < D$ $D > 0.2$	MI	OK
			判定 (D 区)	同背面丝印油墨区杂质判定标准		NG
注: 1) D 区的点状缺陷需在不影响 CTP 功能、客户组装及整机的外观的情况下, 判定 OK				MI		
2	线状缺陷 (磨伤、无感划伤、毛屑、纤维等)		判定 (A /B/C 区)	$W \leq 0.03mm$, $L \leq 3mm$, $ds \geq 10$	MI	$N \leq 2$
				$0.03mm < W \leq 0.05mm$, $L \leq 3mm$, $ds \geq 10$		$N \leq 1$
				$W > 0.05mm$ 或 $L > 3mm$		NG



中尺寸点、线判定标准：(6.2~8寸以内)

1	点状缺陷 (磨伤、异物、针孔、凹痕、缺膜、气泡、白点、彩点、脏点)		判定(A/B/C区)	$D \leq 0.10$, 忽略不计, 但密集型不允许	MI	OK
				$0.15 < D \leq 0.25$, $ds \geq 10$		$N \leq 2$
				$0.25 < D \leq 3$, $ds \geq 10$		$N \leq 1$
				LCD 亮点: $0.2 < D$		$N \leq 1$
				$D > 0.3$		NG
判定(D区)	同背面丝印油墨区杂质判定标准					
注: 1) D区的点状缺陷需在不影响CTP功能、客户组装及整机的外观的情况下, 判定OK					MI	
2	线状缺陷 (磨伤、无感划伤、毛屑、纤维等)		判定(A/B/C区)	$W \leq 0.03mm$, $L \leq 3mm$, $ds \geq 10$	MI	$N \leq 2$
				$0.03mm < W \leq 0.05mm$, $L \leq 3mm$, $ds \geq 10$		$N \leq 1$
				$W > 0.05mm$ 或 $L > 3mm$		NG

大尺寸点、线判定标准：(8.1~13.3寸以内)

1	点状缺陷 (磨伤、异物、针孔、凹痕、缺膜、气泡、白点、彩点、脏点)		判定(A/B/C区)	$D \leq 0.1$, 忽略不计, 但密集型不允许	MI	OK
				$0.15 < D \leq 0.3$, $ds \geq 10$		$N \leq 2$
				$0.3 < D \leq 0.35$, $ds \geq 10$		$N \leq 1$
				LCD 亮点: $0.25 < D$		$N \leq 1$
				$D > 0.35$		NG
判定(D区)	同背面丝印油墨区杂质判定标准					
注: 1) D区的点状缺陷需在不影响CTP功能、客户组装及整机的外观的情况下, 判定OK					MI	
2	线状缺陷 (磨伤、无感划伤、毛屑、纤维等)		判定(A/B/C区)	$W \leq 0.05mm$, $L \leq 5mm$, $ds \geq 10$	MI	$N \leq 2$
				$0.05mm < W \leq 0.07mm$, $L \leq 5mm$, $ds \geq 10$		$N \leq 1$
				$W > 0.07mm$ 或 $L > 5mm$		NG



9. PACKAGE DRAWING

