APPROVAL SHEET

承　　認　　書

Customer 客户名稱	標準品
Model No. 產品型號	KGM281E0
Product type 產品內容	LCD MODE: TFT MODE Dots Matrix LCD Module:240xRGBx320 Screen Size:2.4(Diagonal)
Remarks 備註欄	

Signature by Customer:
客户確認簽章:

Issued by	Checked by	Approved by	
		PD	QA
2006.11.22	11/23-06	06.11.24	11/27 06

KUNSHAN GIANTPLUS OPTOELECTRONICS TECHNOLOGY CO., LTD
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1. GENERAL DESCRIPTION

KGM281E0 is a 240 x RGB x 320 dots matrix TFT LCD module. It has a TFT panel composed of 720 sources and 320 gates. The LCM can be easily accessed by micro-controller via parallel interface.

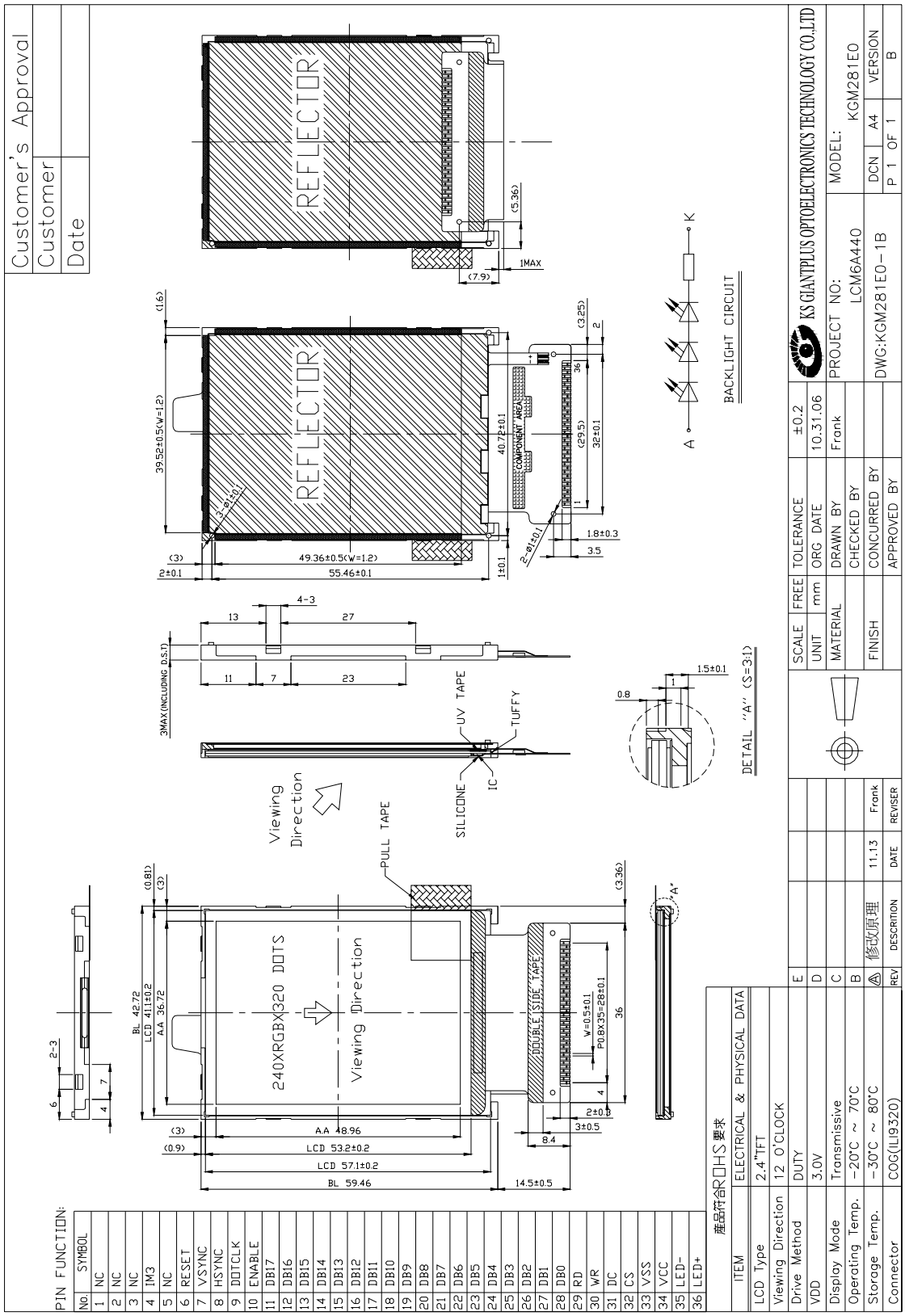
2. FEATURES

Display Mode	TFT-LCD Module
	Active matrix TFT, Transmissive type
Display Format	Graphic 240 x RGB x 320 Dot-matrix
Input Data	16/18 bit parallel interface by 80 MPU
Viewing Direction	12 O'clock
Drive	ILI9320

3. MECHANICAL SPECIFICATION

Item	Specifications	Unit
Dimensional outline	42.72(W)×73.96(H) ×3 (T)	mm
Resolution	240 x RGB x 320	dots
Active area	36.72(W)×48.96(H)	mm
Pixel Pitch	0.153(W)×0.153(V)	mm

4. MECHANICAL DIMENSION



5. MAXIMUM RATINGS

Item	Symbol	Min	Max	Unit	Note
Supply voltage	V_{cc}	-0.3	4.0	V	
Input Voltage	V_{IN}	-0.3	Vcc	V	
Operating temperature	T_{OPR}	-20	70	℃	
Storage temperature	T_{STR}	-30	80	℃	
Humidity	---	---	90	%RH	

6. ELECTRICAL CHARACTERISTICS

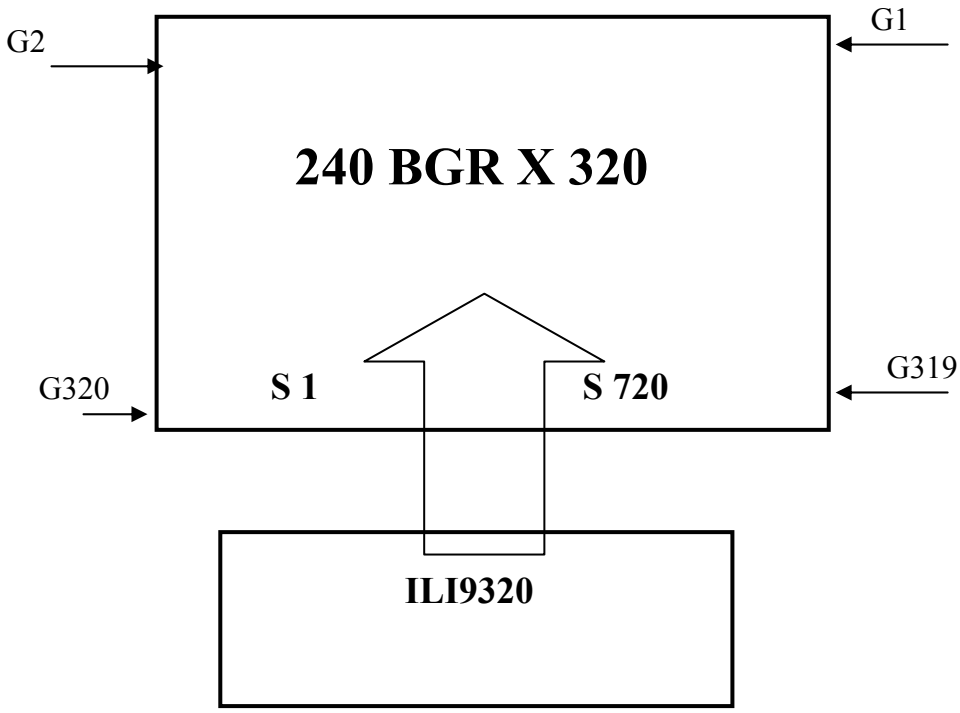
Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	Logic	Vcc	---	2.9	3.0	3.1	V
Input Voltage	H level	V_{IH}	---	$0.8V_{cc}$	---	V_{cc}	V
	L level	V_{IL}		0	---	$0.2V_{cc}$	
Current Consumption		I_{DD}	With internal voltage generation; V_{DD}=3.0V;T_{amb}=25℃;	---	2.70	---	mA

7. MODULE FUNCTION DESCRIPTION

7.1.PIN DESCRIPTION

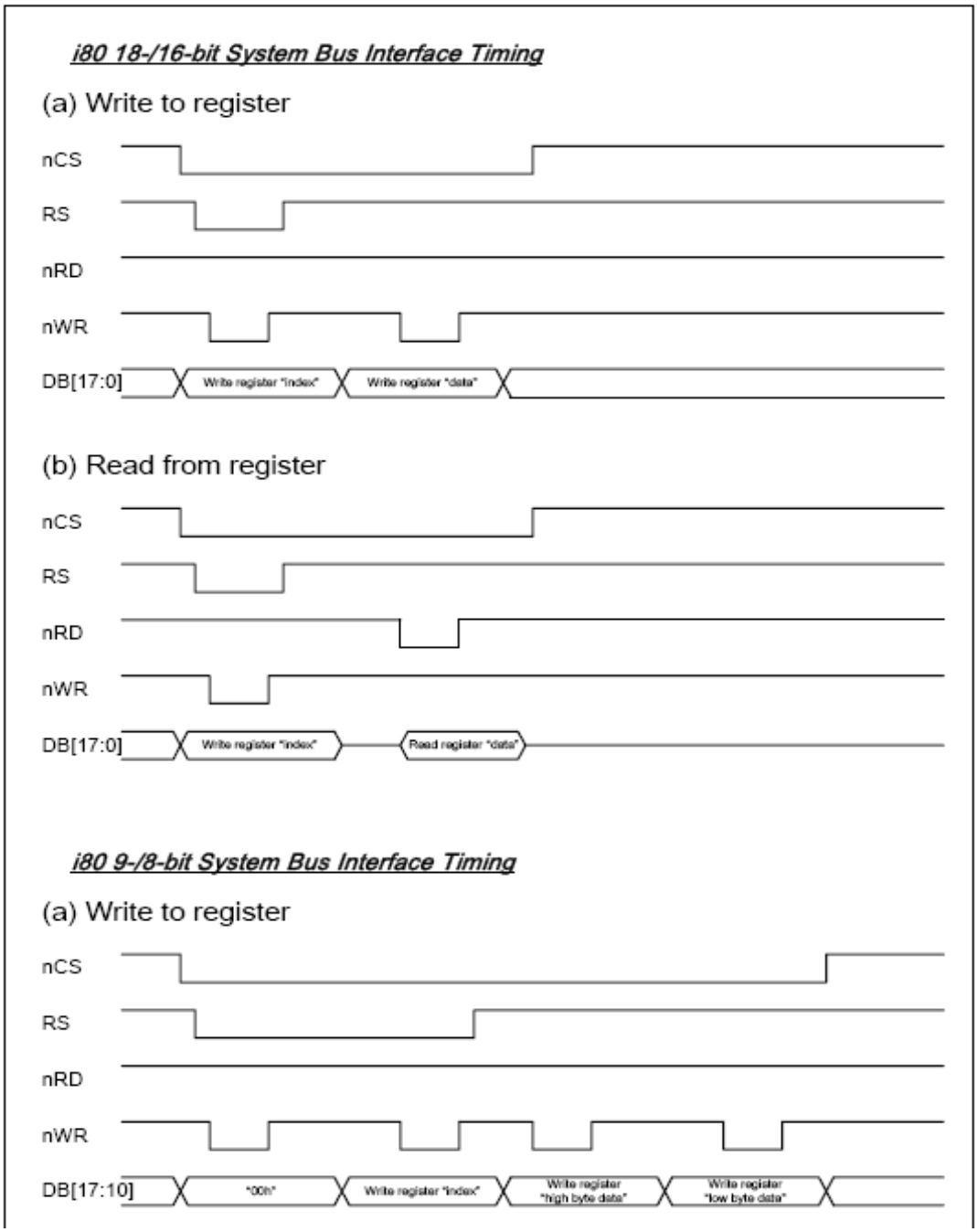
Pin No	Symbol	Function	Notes
1-3	NC	Not Connect	
4	IM3	16/18 bit select pin	
5	NC	Not Connect	
6	RESET	Reset pin.	
7	VSYNC	Vertical synchronization signal input pin	
8	HSYNC	Horizontal synchronization signal input pin	
9	DOTCLK	Dot clock signal input used in the RGB interface circuit	
10	DEN	Enable signal pin used in RGB interface circuit	
11-28	DB17-DB0	18-bit data bus	
29	RD	Read enable clock input pin	
30	WR	Write enable clock input pin	
31	DC	Command/Display data select pin	
32	CS	Chip select pin	
33	VSS	Gound	
34	VCC	Power supply	
35	LED-	The LED power supply (-)	
36	LED+	The LED power supply (+)	

7.2. BLOCK DIAGRAM OF LCM



7.3.TIMING CHARACTERISTICS

7.3.1.8/9/16/18-bit Parallel 8080-series Interface Timing Characteristics



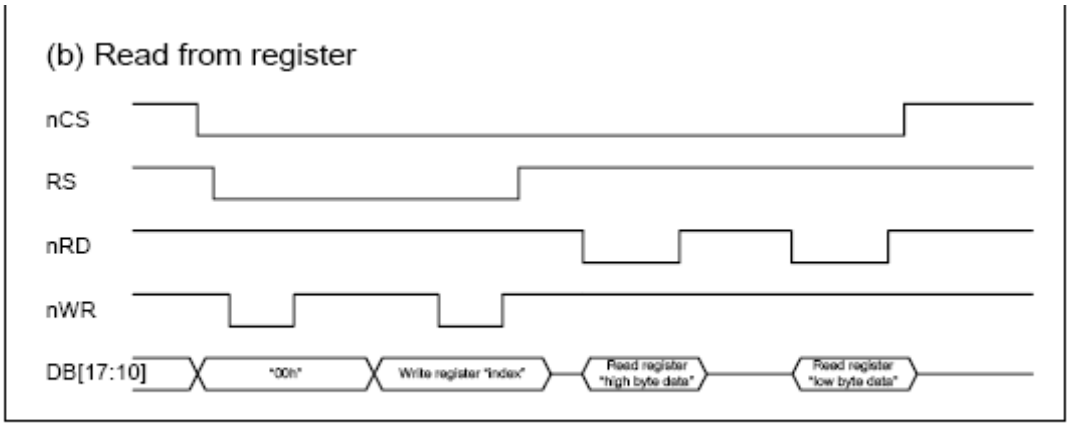


Figure 24 Register Read/Write Timing of i80 System Interface

8. BACKLIGHT CHARACETRISTIC

Item	Symbol	Min.	Typical	Max.	Unit
LED module Forward voltage	V_{LED}	9.0	----	10.2	V
LED module current	I_{LED}	----	20	----	mA
L/G Surface brightness Luminance ★1	L_S	2900	-----	4100	Cd/m^2
LCM Surface brightness uniform ★2	L_D	80	-----	----	%

★1 Test condition is：

(a) Center point on active area

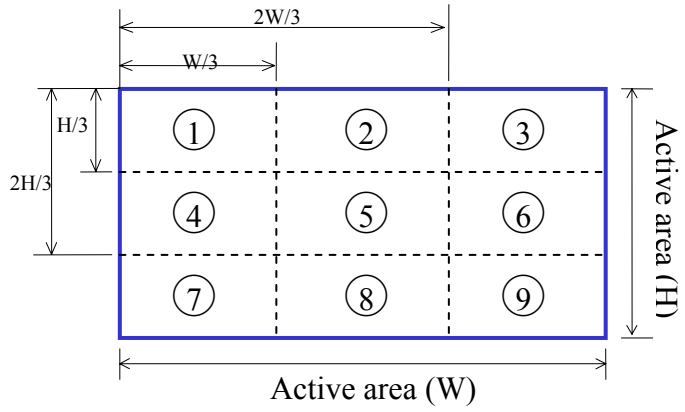
(b) Best Contrast

★2 Uniform measure condition：

(1)Measure 9 point. Measure location is show below：

(2)Uniform = (Min. brightness / Max. brightness)×100%

(3)Best Contrast.



9.ELECTRO-OPTICAL CHARACTERISTICS

(light source: C light, using CPT TN LC+ Normal Polarizer, reference only)Ta=25℃

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Contrast Ratio		CR	*1)		300	-	--
Response Time		Tr	*3)	-	10	30	ms
		Tf		-	30	40	ms
Viewing Angle	Vertical	θ *2)	CR≧10	30	40	-	°
				10	20	-	
	Horizontal	ϕ *2)		30	45	-	°
				30	45	-	
Color Filter Chromacicity	White	x	θ=ϕ= 0°	0.290	0.310	0.330	--
		y		0.321	0.341	0.361	
	Red	x	θ=ϕ= 0°	0.635	0.655	0.675	--
		y		0.309	0.329	0.349	
	Green	x	θ=ϕ= 0°	0.292	0.312	0.332	--
		y		0.555	0.575	0.595	
	Blue	x	θ=ϕ= 0°	0.114	0.134	0.154	--
		y		0.115	0.135	0.155	
	Gamut			-	61.5%	-	

*1) Definition of contrast ratio :

Measure contrast ratio on the below 5 points and take the average value.
Contrast ratio is calculated with the following formula :
Contrast Ratio (CR)= (White)Luminance of ON ÷ (Black)Luminance of OFF

*2) Definition of Viewing Angle(θ , ϕ),refer to Fig.2 as below :

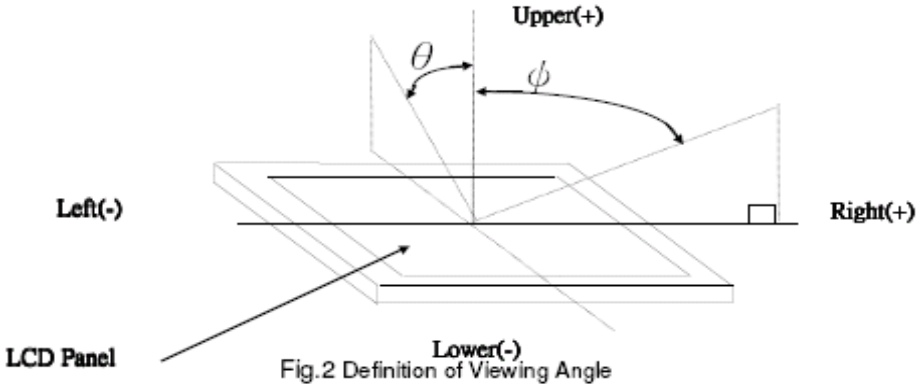


Fig.2 Definition of Viewing Angle

*3) Definition of Response Time.
The response time is defined as the time interval between the 10% and 90% amplitudes.Refer to figure 3 as below.

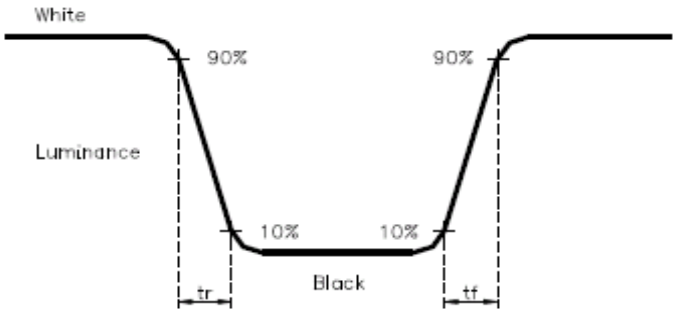


Fig.3 Definition of Response Time

10. RELIABILITY

9.1. MTBF

The LCD module shall be designed to meet a minimum MTBF value of 50000 hours with normal. (25°C in the room without sunlight)

9.2. Test condition

NO.	ITEM	CONDITION	CRITERION
1	High Temperature Non-Operating Test	80℃ * 240Hrs	◦ No Defect Of Operational Function In Room Temperature Are Allowable. ◦ IDD of LCM in Pre-and Post-Test Should Follow Specification
2	Low Temperature Non-Operating Test	-30℃ * 240Hrs	
3	High Temperature/Humidity Non-Operating Test	50℃ * 90%RH * 240 Hrs	
4	High Temperature Operating Test	70℃ * 240Hrs	
5	Low Temperature Operating Test	-20℃ * 240Hrs	
6	Thermal Shock Test	-30℃(30Min)↔ 80(30Min)* 10 Cycles	

Notes:
1. Judgments should be made after exposure in room temperature for two hours.
2. The distill water is used for the high temperature / humidity test.
3. The sample above is individually for every reliability tests condition.

11. Inspection standards

1. AQL(Acceptable Quality Level)

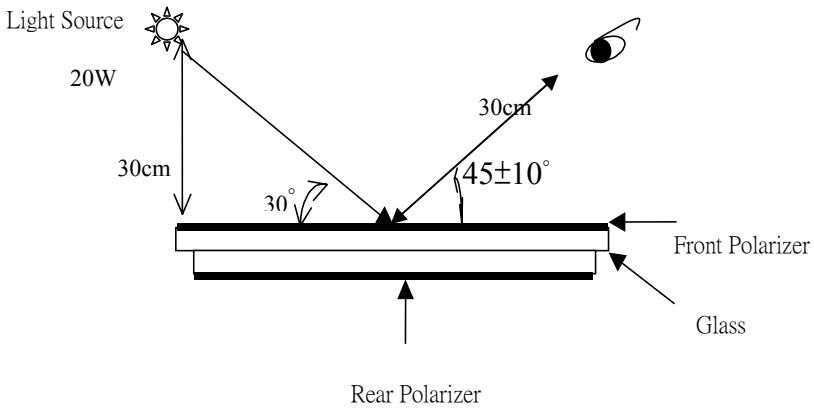
AQL of major and minor defect

	MAJOR DEFECT	MINOR DEFECT	MAJOR+MINOR
APPEARANCE	0.40%	1.0%	1.0%
ELECTRIC-OPTICAL	0.15%	0.15%	0.15%

2. Basic conditions for inspection

The LCM face to us,in normal environment, the lux is 1000±200.(Darkroom’ s lux: 100±50), About an angle of incidence 30,a distence of 30 cm with normal eye.with an angle of 45 degree to check the products without uncovering the film!

(As shown below).

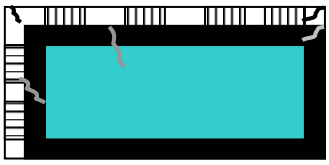
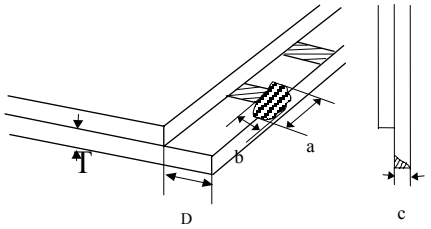
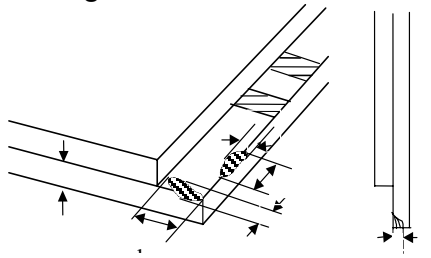


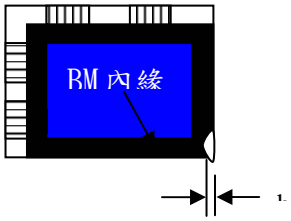
3. Inspection item and criteria

3.1 Visual inspection criterion in immobility

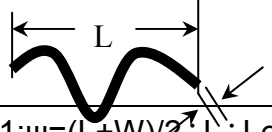
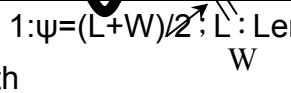
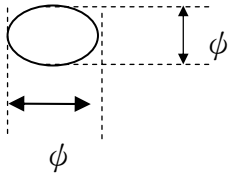
3.1.1 Glass defect

No	Defect item	Criteria	Remark
1	Dimension Unconformity (Major defect)	By Engineering Drawing	

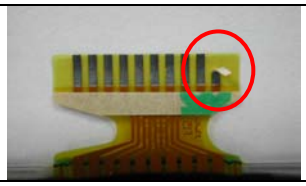
No	Defect item	Criteria	Remark
2	Cracks (Major defect)	1.Linear cracks on panel 【Reject】 2. Nonlinear crack contrast by limited sample	
3	Glass extrude the conductive area (minor defect)	a: disregards and no influence assemblage 1) b≦1/3Pin width(non bonding area) 【Accept】 2) bonding area≦0.5mm 【Accept】	a:Length, b:Width
4	Pin-side，conductive area damaged (minor defect)	(a c：disregards) b≦ 1/3 of effective length for bonding electrode 【Accept】	a:Length，b:Width，c:Thickness 
5	Pin-side，non-conductive area damaged (minor defect)	1) Damage area don't touch the ITO (Inclueling contraposition mark,except scribing mark) 【Accept】 2) c<T b≦BM 1/3 of width 【Accept】 3) c=T b not touch the seal glue 【Accept】 4) a disregards	a:Length，b:Width，c:Thickness 

No	Defect item	Criteria	Remark
6	Non-pin-side damage (minor defect)	c<T 1) b exceeds 1/3 BM 【Reject】 c=T b not touch the seal glue 【Reject】	c ： Thickness b: width of damage 

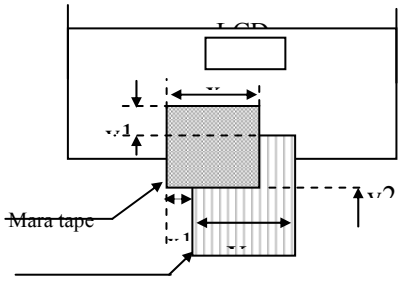
3.1.2 LCD appearance defect (View area)

No	Defect item	Criteria		Remark
1	Fiber、glass cratch、polarizer scratch/folded (minor defect)	Specification	Allowable	note1: L：Length，W：Width note2: disregard if out of AA 
		0.05mm<W≦0.1mm; L≦3.0mm	1	
		W>0.1mm ; L>3.0mm	0	
2	Polarizer bubble、concave and convex (minor defect)	ψ≦0.2mm	disregard	note 1:ψ=(L+W)/2；L：Length，W：Width  note2: disregard if out of AA
		0.2mm<ψ ≦ 0.3mm	2	
		0.3mm<ψ ≦ 0.5mm	1	
		0.5mm<ψ	0	
3	Black dots、dirty dots、impurities、eyewinker (Major defect)	ψ≦0.15mm	disregard	note2: disregard if out of AA 
		0.15mm<ψ ≦ 0.25mm	2	
		0.25mm<ψ ≦ 0.3mm	1	
		0.3mm<ψ	0	
4	Polarizer prick (Major defect)	ψ≦0.1mm	disregard	note1:ψ=(L+W)/2 ；L= Length，W=Width note2: the distance between two dots ＞5mm
		0.1mm<ψ≦0.25mm	3	
		ψ＞0.25mm	0	

3.1.3 .FPC

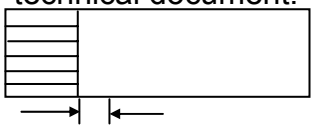
No	Defect item	Criteria		Remark
1	Copper screen peel (Major defect)	Copper screen peel 【Reject】		
2	No release tape or peel (Major defect)	No release tape or peel 【Reject】		
3	Dirty dot and impurity of FPC for customer using side (minor defect)	Specification	Allowable	note1: Cannot have stride ITO impurities
		ψ≦0.25mm	2	
		ψ>0.25	0	

3.1.4 Black tape & Mara tape

1	FPC or H/S black tape shift (minor defect)	1.shift spec: 1)glue to the polarize 【Reject】 2) IC bare 【Reject】 2. left-and-right spec: 1) exceed of FPC edge or H-S edge 【Reject】 2)IC bare 【Reject】	
2	No black tape (Major defect)	No black tape 【Reject】	
3	Tape position mistake (minor defect)	Not by engineering drawing 【Reject】	
4	Mara tape defect (minor defect)	Peel before pulling the protecting film. 【Reject】	

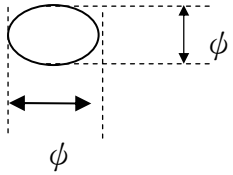
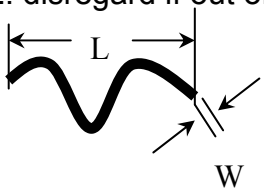
3.1.5 Silicon and Tuffy glue

No	Defect item	Criteria	Remark
1	Quantity of silicon (minor defect)	Uncover the ITO and circuit area. 【Reject】	note: compared by engineering drawing.

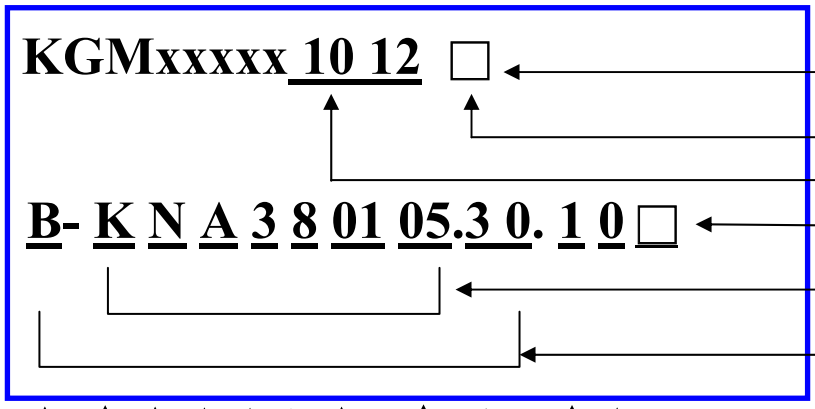
No	Defect item	Criteria	Remark
2	Tuffy glue (minor defect)	1. Uncover the reveal copper area 【Reject】 2. Cover layer 0.3mm(Min) ~ 3.0mm(Max) 【accept】	note:if customer has special requirement , refer to the technical document. 
3	Depth of glue covering (minor defect)	Depth of glue covering overtop front Polarizer 【Reject】	Except of the special requirement。

3.2 Electrical criteria

No	Defect item	Criteria	Remark
1	No display (Major defect)	No display 【Reject】	
2	Missing line (Major defect)	Missing line 【Reject】	
3	Seg-com light and dark (Major defect)	Seg-com light and dark 【Reject】	ND filter 2% test
4	No display in immobility (Major defect)	No display in immobility 【Reject】	
5	Flicker of Pattern (Major defect)	Flicker of Pattern 【Reject】	
6	Mura (Major defect)	ND filter 2% test	
7	Over current (Major defect)	Over current 【Reject】	
8	Voltage out of specification (Major defect)	Voltage out of specification 【Reject】	
9	Pattern blur ,error code (Major defect)	Pattern blur ,error code 【Reject】	
10	Dark light, Flicker (Major defect)	Dark light, Flicker 【Reject】	

No	Defect item	Criteria	Remark	
11	Black/White dots 、Dirty dots、eyewinker (Major defect)	Specification	Allowable	Note1: disregard if out of AA 
		ψ≦0.15mm	disregard	
		0.15mm<ψ ≦ 0.25mm	2	
		0.25mm<ψ ≦ 0.3mm	1	
		0.3mm<ψ	0	
12	Fiber、glass cratch、polarizer scratch/folded (minor defect)	W≦0.03mm	disregard	note1: L：Length，W：Width note2: disregard if out of AA 
		0.03mm<W≦0.05mm ; L≦3.0mm	2	
		0.05mm<W≦0.1mm; L≦3.0mm	1	
		W>0.1mm ; L>3.0mm	0	

12. ILLUSTRATION OF LCM DATE CODE



Coding of module for other (R is rework, etc)

Lot split or merged after module process：
0 is normal, 1,2,3…… is sub-lot No

From LCP back-end to LCM process：
1 is normal, 2 is split, 3 is merged, R is rework or others.

Flow No. that split from front-end to back-end:01~50

Lot No of LCP run card：01~99,A0~

Code of work order：01-99，A0-(Flow No.of panel rework:001-999)

Code of month：1~9,A~C

Last character of A.D. year：0~9

Front-end line：A is 1st line, B is 2nd line, C is panel rework

Module Characteristic：T –Trial run product
N – Normal product
P – other subcontractor
R－panel rework

K – Kunshan Giantplus

Version of panel：A,B,C

13. PRECAUTIONS FOR USING LCD MODULES

13.1 Safety

(1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
(2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
(3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

13.2 Storage Conditions

(1) Store the panel or module in a dark place where the temperature is 23±5°C and the humidity is
below 45±20%RH.
(2) Store in anti-static electricity container.
(3) Store in clean environment, free from dust, active gas, and solvent.
(4) Do not place the module near organics solvents or corrosive gases.
(5) Do not crush, shake, or jolt the module.

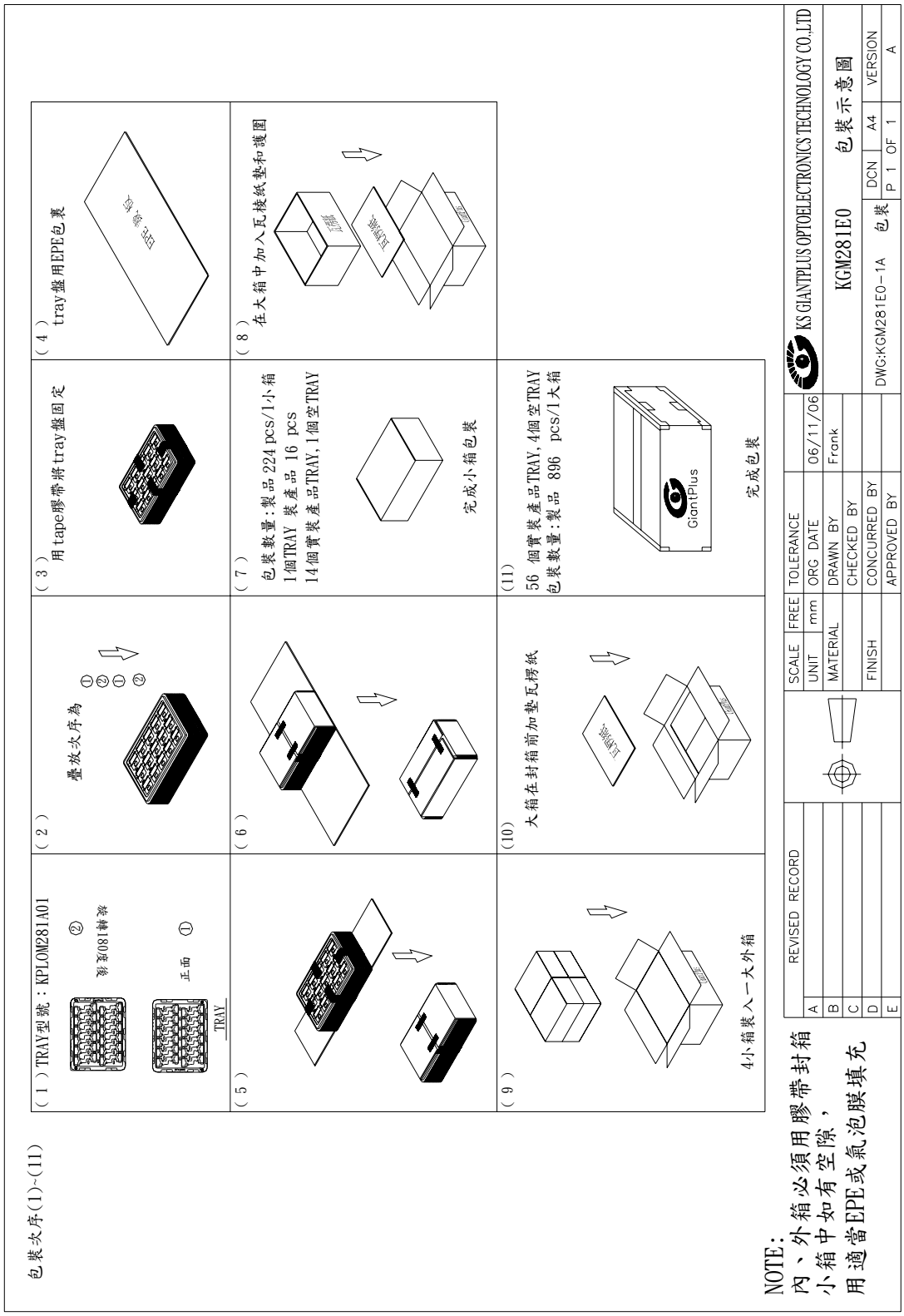
13.3 Handling Precautions

(1) Avoid static electricity, which can damage the CMOS LSI.
(2) The polarizin plate of the display is very fragile. so, please handle if very carefully.
(3) Do not give external shock.
(4) Do not apply excessive force on the surface.
(5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
(6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
(7) Do not operate it above the absolute maximum rating.
(8) Do not remove the panel or frame from the module.

13.4 Warranty

The period is within twelve months since the date of shipping out under normal using and storage conditions.

14. PACKAGE


包裝次序(1)~(11)
(1) TRAY型號：KPLOM281A01
正面 ①
TRAY
②
對到081轉來
(2)
疊放次序為
(3)
用tape膠帶將tray盤固定
(4)
tray盤用EPE包裹
(5)
(6)
(7)
包裝數量:製品 224 pcs/1小箱
1個TRAY 裝產品 16 pcs
14個實裝產品TRAY,1個空TRAY
完成小箱包裝
(8)
在大箱中加入瓦楞紙墊和護圖
(9)
4小箱裝入一大外箱
(10)
大箱在封箱前加墊瓦楞紙
(11)
56 個實裝產品TRAY,4個空TRAY
包裝數量:製品 896 pcs/1大箱
GiantPlus
完成包裝
NOTE:
內、外箱必須用膠帶封箱
小箱中如有空隙，
用適當EPE或氣泡膜填充
REVISED RECORD
A
B
C
D
E
SCALE FREE
UNIT mm
MATERIAL
FINISH
TOLERANCE
ORG DATE 06/11/06
DRAWN BY Frank
CHECKED BY
CONCURRED BY
APPROVED BY
KS GIANTPLUS OPTOELECTRONICS TECHNOLOGY CO.,LTD
KGM281E0 包裝示意圖
DWG:KGM281E0-1A 包裝
DCN A4 VERSION
P 1 OF 1 A

15. FACTORY

FACTORY NAME: KUNSHAN GIANTPLUS OPTOELECTRONICS TECHNOLOGY CO., LTD.

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16. REVISION HISTORY

Version	Revise record	Date
A	Original version	2006/11/22