POWERTIP TECH. CORP.

SPECIFICATIONS

CUSTOMER	:	CKR001
SAMPLE CODE	:	SC2004LRS-DMA-BC1Q
MASS PRODUCTION CODE	:	PC2004LRS-DMA-BC1Q
SAMPLE VERSION	:	01
SPECIFICATIONS EDITION	:	004
DRAWING NO. (Ver.)	:	JLMD-PC2004LRS-DMA-BC1Q_002
PACKAGING NO. (Ver.)	:	JPKG-PC2004LRS-DMA-BC1Q_001

Customer Approved

Date:

Approved	Checked	Designer
閆偉 Ryan Yan	劉進	WUZHIJUN

□ Preliminary specification for design input

■ Specification for sample approval

POWERTIP TECH. CORP.

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History of Version

Date (mm / dd / yyyy)	Ver.	Edi.	Description	Page	Design by
10/08/2010	01	001	New Drawing	-	WUZHIJUN
10/20/2010	01	002	Change the Description of Interface Pin.	13	WUZHIJUN
12/16/2010	01	003	New sample	-	WUZHIJUN
12/22/2010	01	004	Modify the Interface and Interface Pin Description	4/13	WUZHIJUN

Total: 29 Pages

Contents

1. SPECIFICATIONS

1.1 Features

Item	Standard Value
Display Type	20*4 Characters
LCD Type	STN ,Positive , Transflective ,Extended Temp.
Driver Condition	LCD Module : 1/33Duty ,1/6.7Bias
Viewing Direction	6 O'clock
Backlight	Y/G LED
Weight	19.3g
Interface	4bit parallel interface
Other(controller / driver IC)	RW1067
ROHS	THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer web side : http://www.powertip.com.tw/news/LatestNews.asp

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	65.0 (L) * 28.4 (W) *8.2(H)MAX	mm
Viewing Area	46.0(L) * 18.4 (W)	mm
Active Area	42.7 (L) * 15.9(W)	mm
Characters Size	0.33 (L) * 0.35 (W)	mm
Characters Pitch	0.38 (L) * 0.40 (W)	mm

Note：For detailed information please refer to LCM drawing

1.3 Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Power Supply Voltage	V_{DD}	—	-0.3	5.5	V
LCD Driver Supply Voltage	V_{LCD}	—	Vss-0.3	Vss +7.0	V
Input Voltage	V_{IN}	—	-0.3	Vcc+0.3	V
Operating Temperature	T_{OP}	—	-20	70	℃
Storage Temperature	T_{ST}	—	-30	80	℃
Storage Humidity	H_D	Ta＜60 ℃	-	90	%RH

1.4 DC Electrical Characteristics

V_{DD} = 5.0V±0.5V, Vss= 0V, Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Logic Supply Voltage	V_{DD}	-	4.5	5.0	5.5	V
"H" Input Voltage	V_{IH}	-	VDD-1	-	VDD	V
"L" Input Voltage	V_{IL}	-	-	-	1	V
"H" Output Voltage	V_{OH}	IOH=-0.1mA	3.9	-	VDD	V
"L" Output Voltage	V_{OL}	IOL=0.1mA	-	-	0.4	V
Supply Current	I_{DD}	VDD=5.0V;VOP=6.22V; Pattern= Full display	-	2.19	--	mA
		VDD=5.0V;VOP=6.22; Pattern= Horizontal line*1	-	2.30	3.5	
LCM Driver Voltage	V_{OP} *2	-20℃	-	-	-	V
		25℃	6.02	6.22	6.42	
		70℃	-	-	-	

NOTE: *1 The Maximum current display.

*2 The VOP test point is V_O-Vss.

1.5 Optical Characteristics

LCD Panel：1/32Duty，1/6.7Bias，V_{LCD} =6.3V，Ta =25℃

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Reference
Response Time	Rise	tr	C≥2.0, ∅ =270°	-	89	134	Ms	Note2
	Fall	tf		-	204	306		
● Viewing angle range	Top	ΘY+		-	45	-	Deg.	Notes 1
	Bottom	ΘY-		-	35	-		
	Left	ΘX-		-	35	-		
	Right	ΘX+		-	35	-		
Contrast Ratio*2		C	θ = 0°, ∅ = 270°	-	6	-		Note 4
Average Brightness (with LCD) *2		IV	IF=40mA	-	10.80	-	cd/m^2	
Uniformity *1		△B		70	-	-	%	

Note 4 ：

1：△B=B(min) / B(max) * 100%

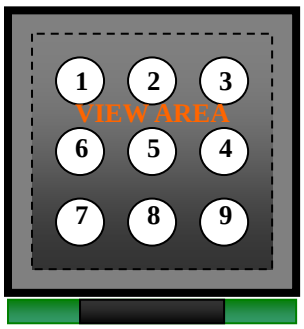
2：Measurement Condition for Optical Characteristics:

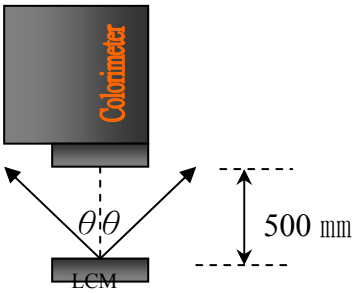
a：Environment: 25℃±5℃ / 60±20%R.H，no wind，dark room below 10 Lux at typical lamp current and typical operating frequency.

b：Measurement Distance: 500 ± 50 ㎜ ，(θ= 0°)

c：Equipment: TOPCON BM-7 fast，(field 1°)，after 10 minutes operation.

d：The uncertainty of the C.I.E coordinate measurement ±0.01，Average Brightness ± 4%



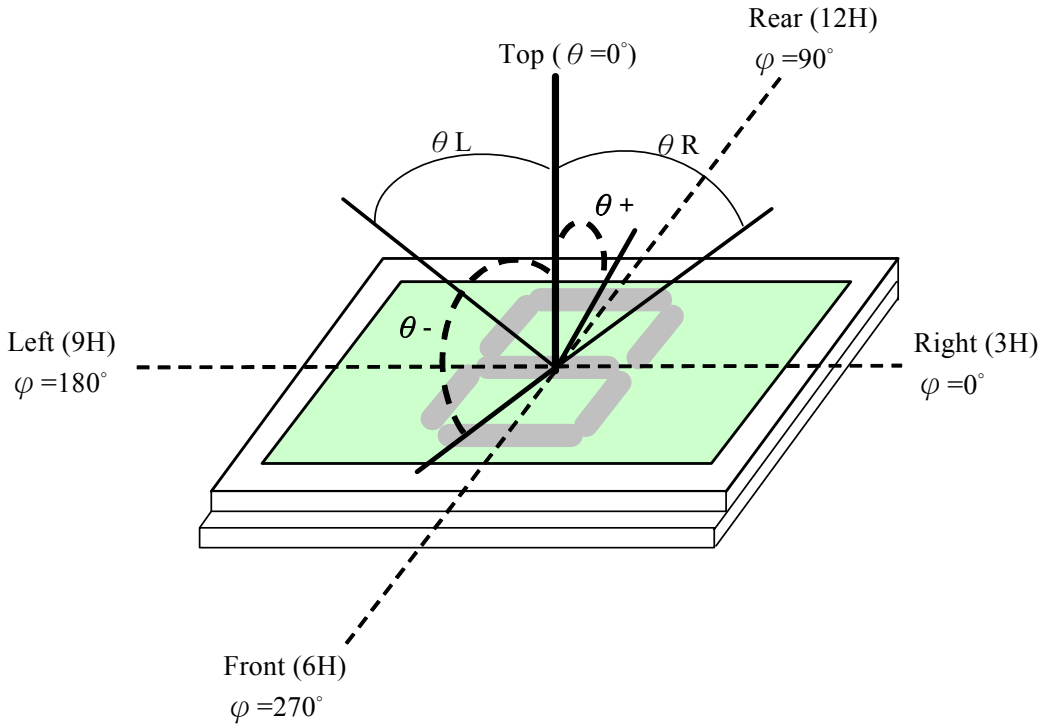


Colorimeter=BM-7 fast

Note 1.

Optical characteristics-2

Viewing angle

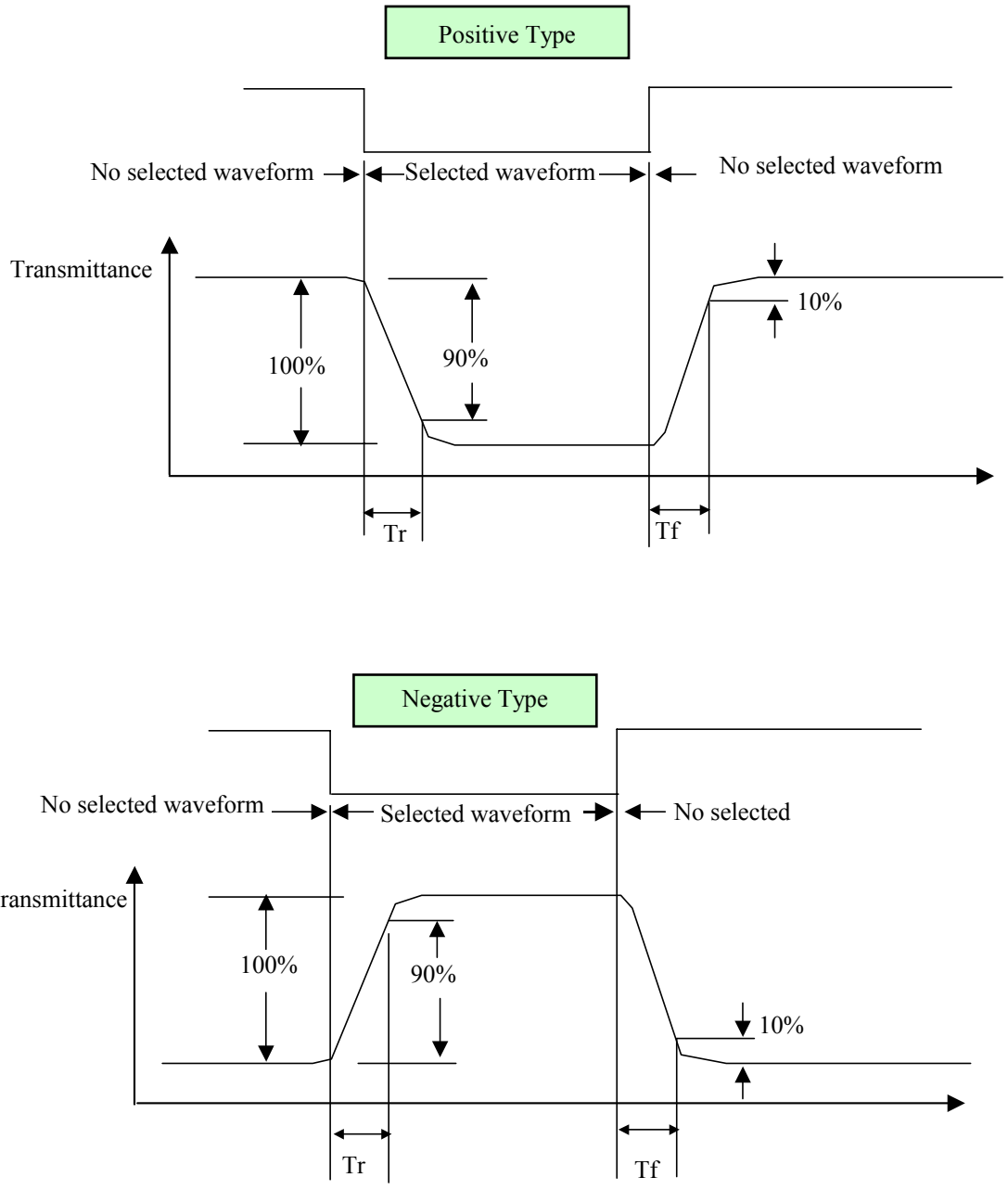


Viewing angle

Note 2.

Optical characteristics-3

Fig.2 Definition of response time



Electrical characteristics-2

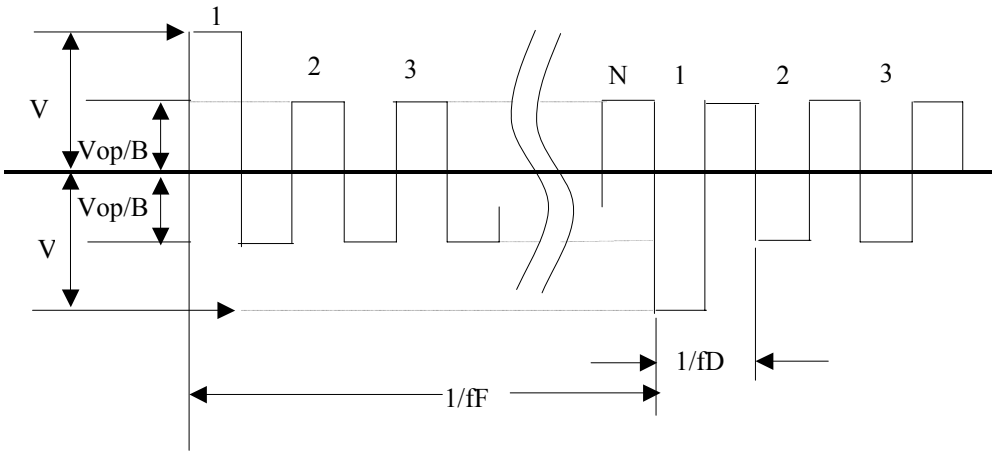
※2 Drive waveform

Vop: Drive voltage　　fF: Frame frequency

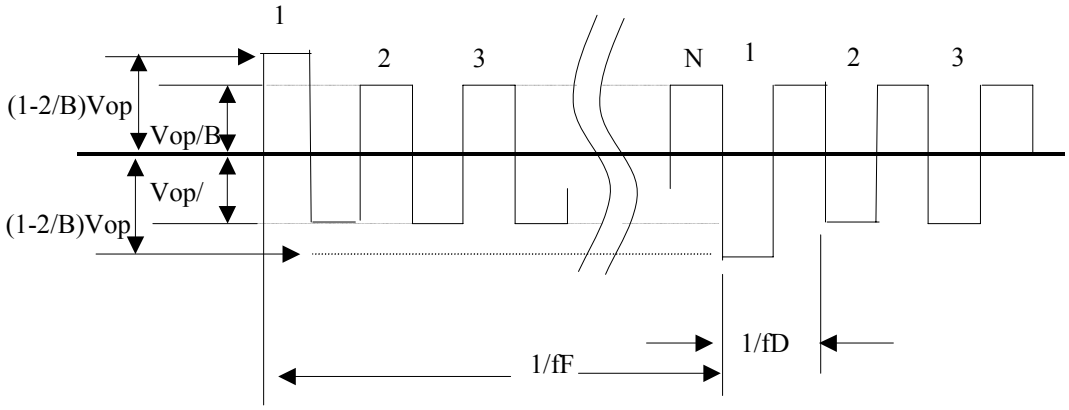
1/B: Bias　　fD: Drive frequency

N: Duty

(1) Selected waveform



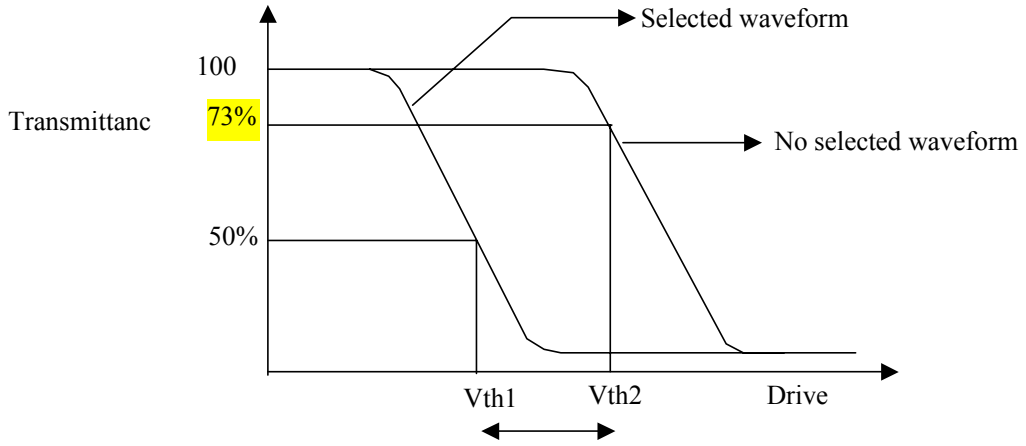
(2) Non- Selected wave form



Note:

Frame frequency is defined as follows: Common side supply voltage peak - to - peak /2 = 1 period

Note 3. : Definition of Vth

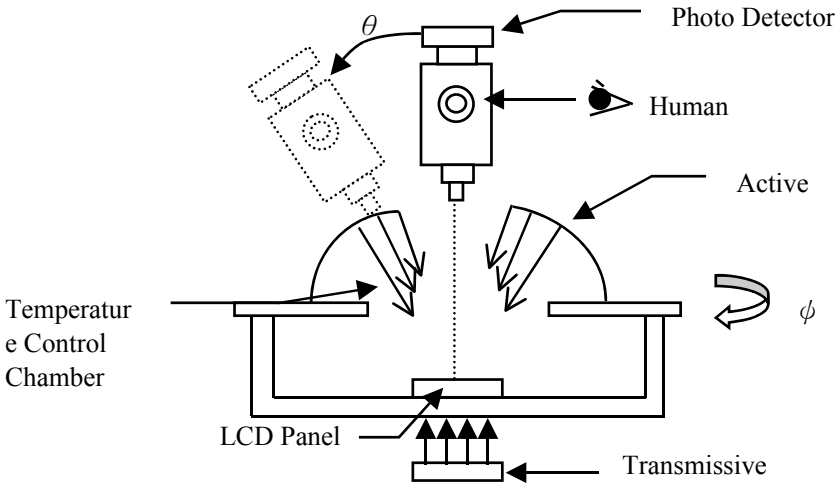


Active voltage range

	Vth1	Vth2
View direction	10°	40°
Drive waveform	(Selected waveform)	(No selected waveform)
Transmittance	50%	73%

※1 Contrast ratio
= (Brightness in OFF state) / (Brightness in ON state)

Outline of Electro-Optical Characteristics Measuring System



Measuring System: Autronic DMS-803

1.6 Backlight Characteristics

LCD Module with LED Backlight

Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta =25℃	-	100	mA
Reverse Voltage	VR	Ta =25℃	-	10	V
Reverse Current	IR	VR=10V	-	40	uA
Power Dissipation	PO	Ta =25℃	-	0.46	W

Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF= 40mA	-	4.2	4.6	V
Average Brightness (without LCD)	IV		-	6	-	cd/m^2
Color	Yellow-green					

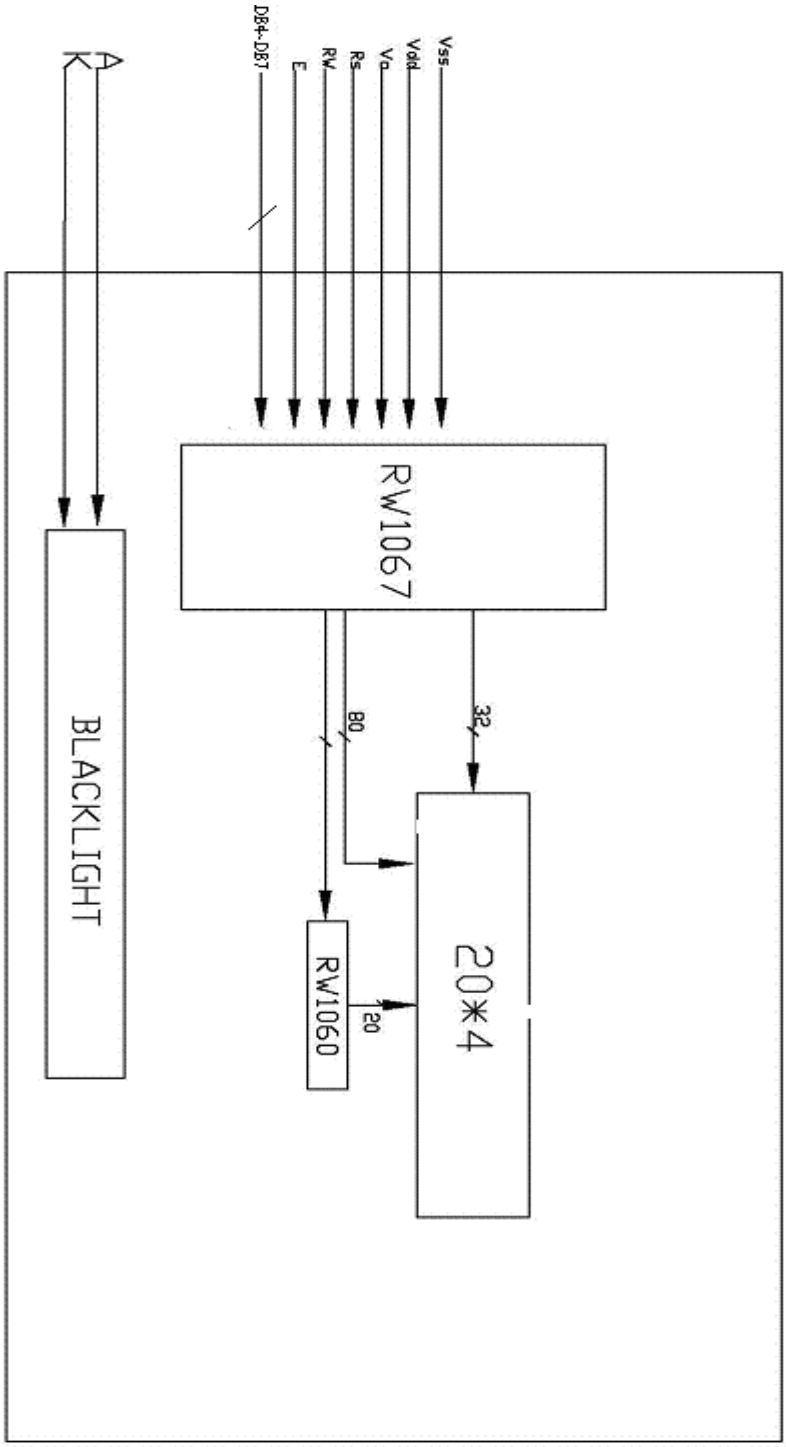
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram



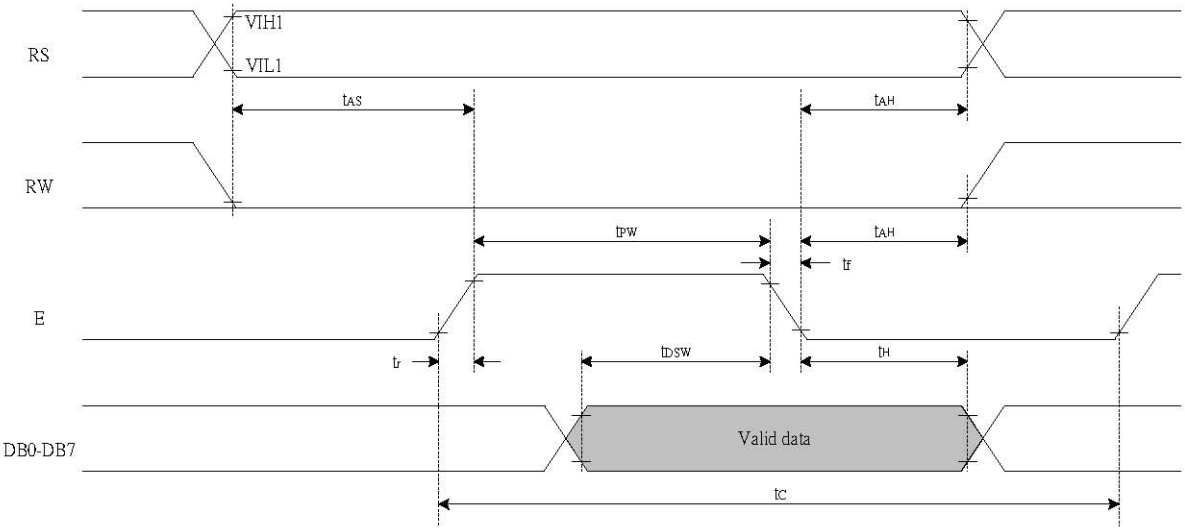
2.2 Interface Pin Description

Pin No.	Symbol	Function
1	Vss	Power Supply (Vss=0)
2	V_{dd}	Power Supply (V_{dd}>V_{SS})
3	Vo（NC）	Open this Pin.Test pin.VOP=Vo-Vss.
4	RS	Register Selection input High=Data register Low=Instruction regisrer(for write)
5	R/W	Read/write signal input is used to select the read/write mode High=Read mode, Low=Write mode
6	E	Start enable signal to read or write the data
7~10	NC	Open these Pins.
11	DB4	In case of 4-bit bus mode, used as both high and low order.
12	DB5	In case of 4-bit bus mode, used as both high and low order.
13	DB6	In case of 4-bit bus mode, used as both high and low order.
14	DB7	In case of 4-bit bus mode, used as both high and low Order. DB7 used for Busy Flag out put.
15	A	Power supply for LED BL (+)
16	K	Power supply for LED BL (-)

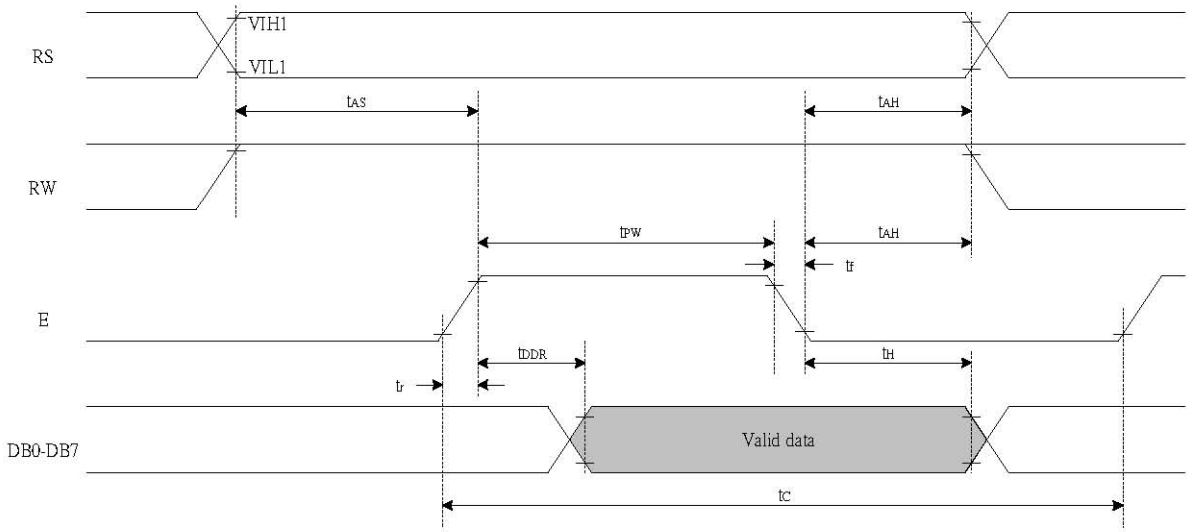
2.3 Timing Characteristics

■ Timing Characteristics

● Writing data from MPU to RW1067(parallel)

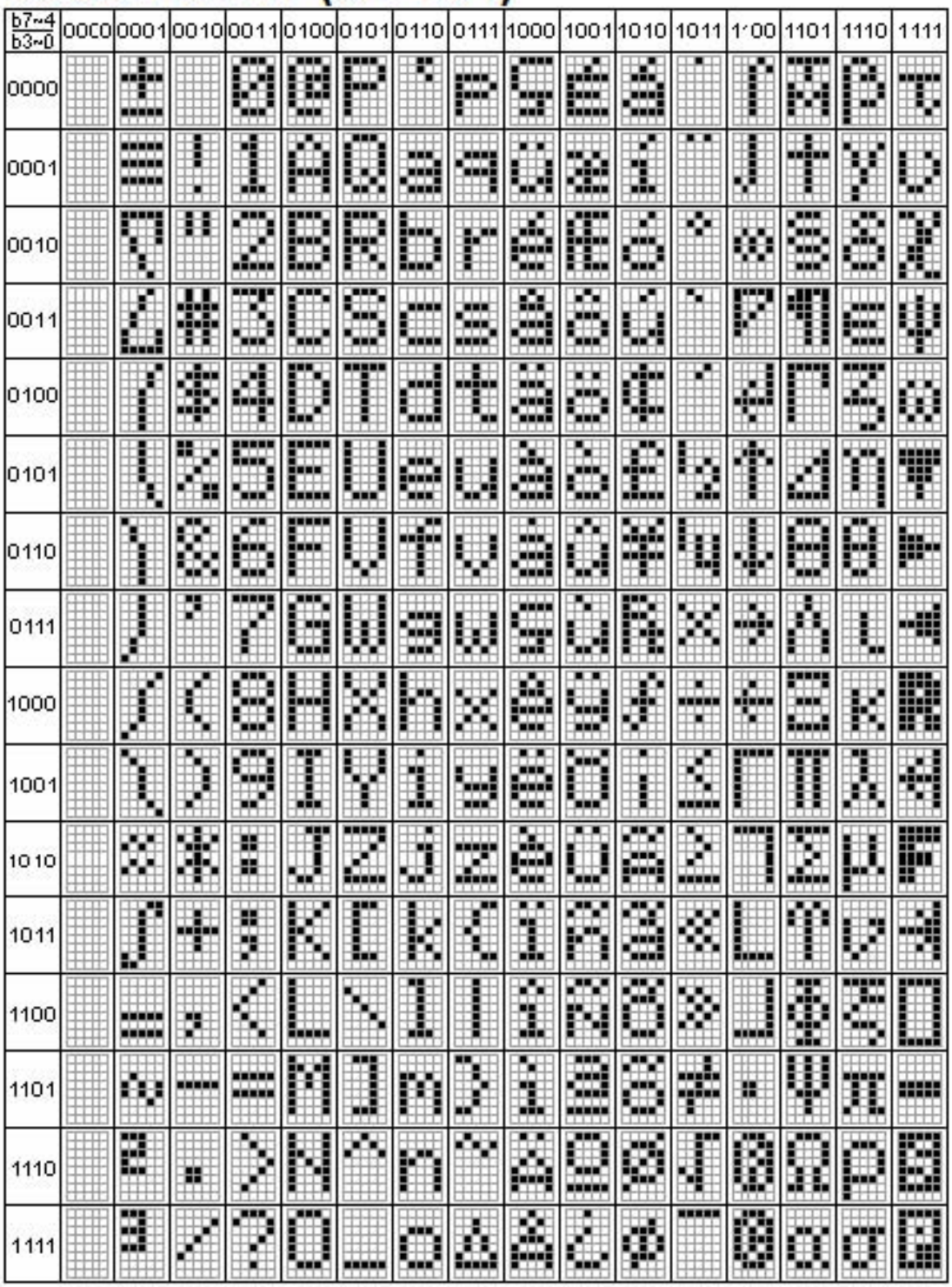


● Reading data from RW1067 to MPU(parallel)

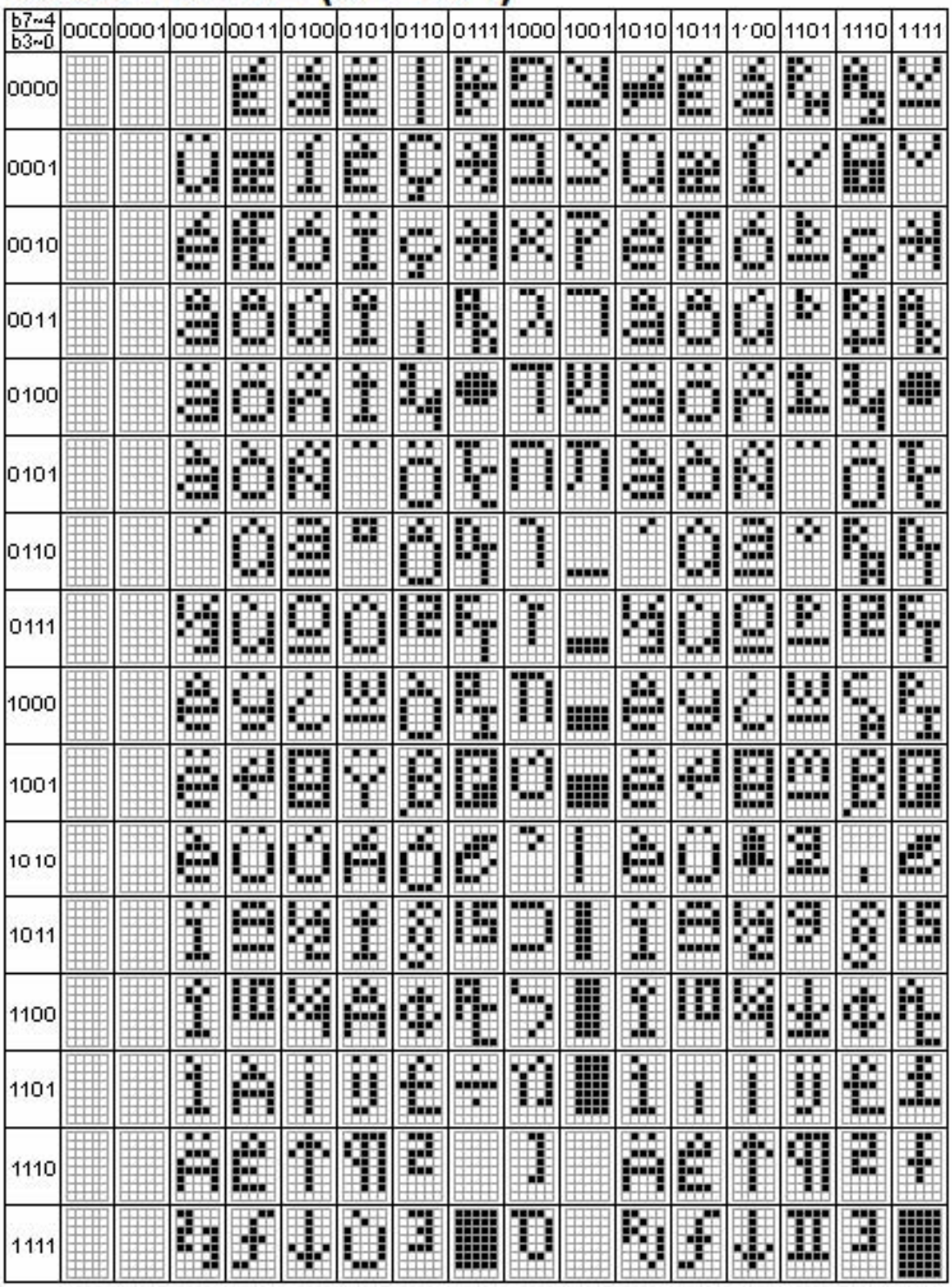


2.4 Character Pattern

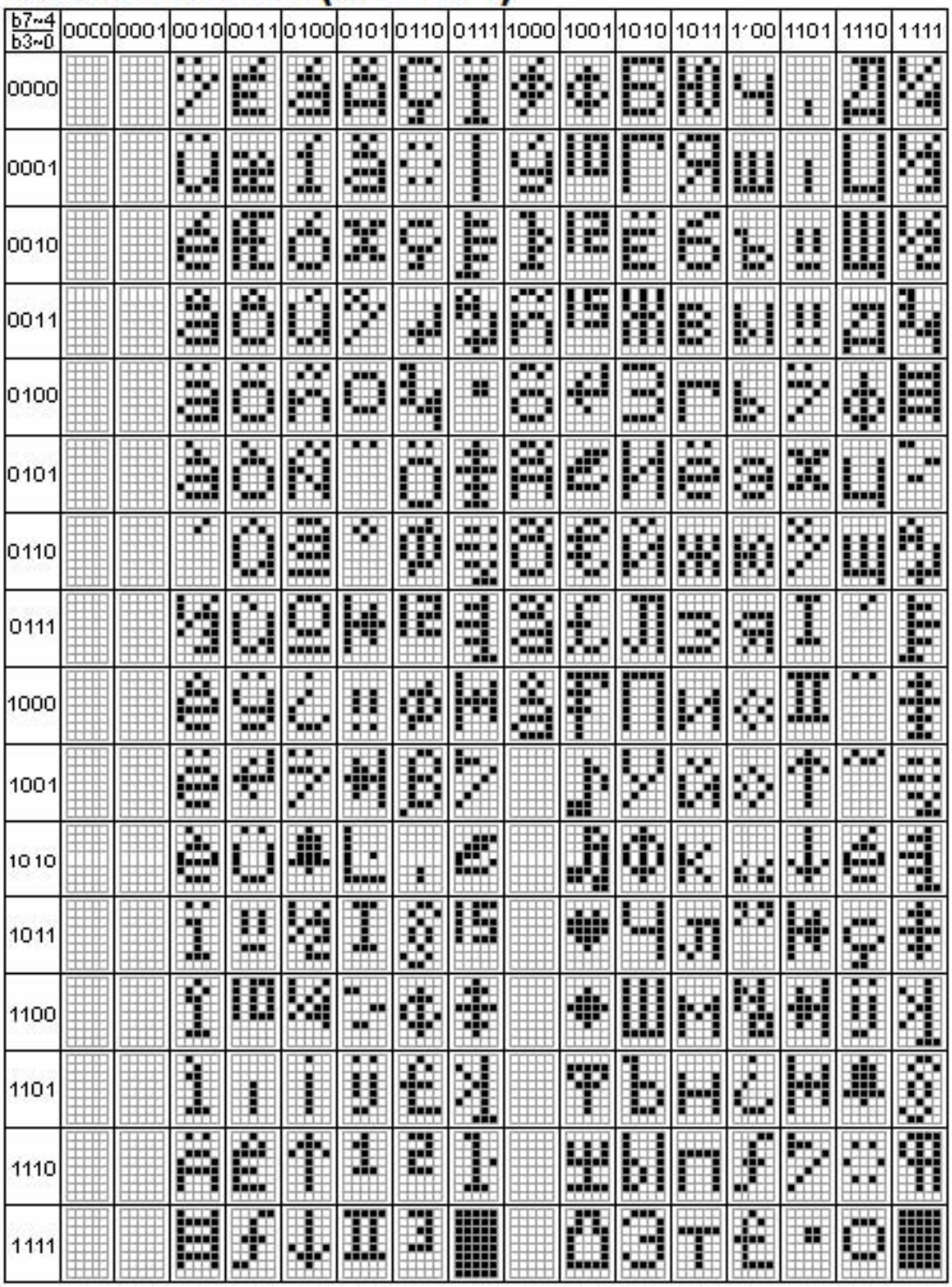
Code Bank1 (0D-004)



Code Bank2 (0D-004)

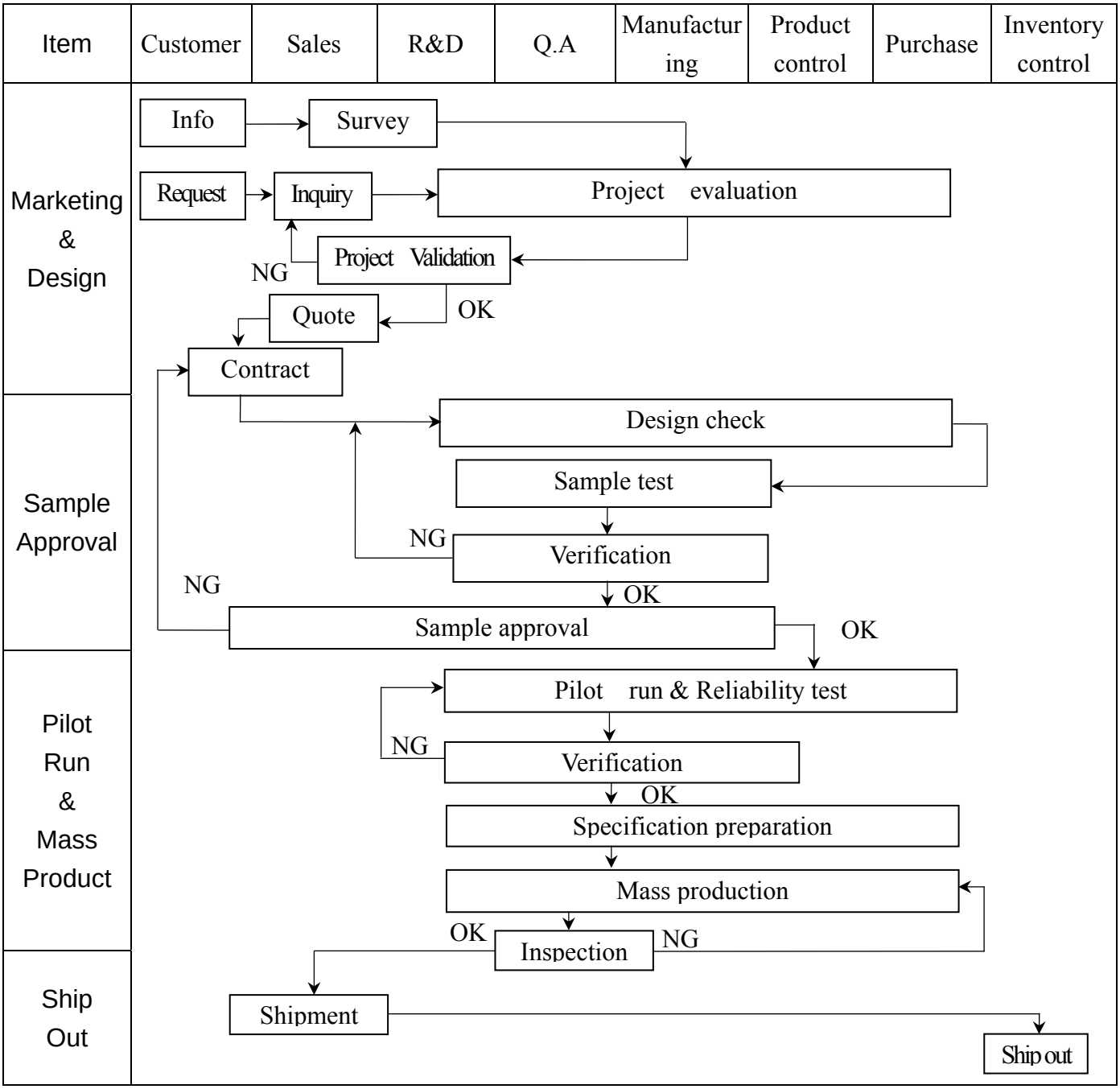


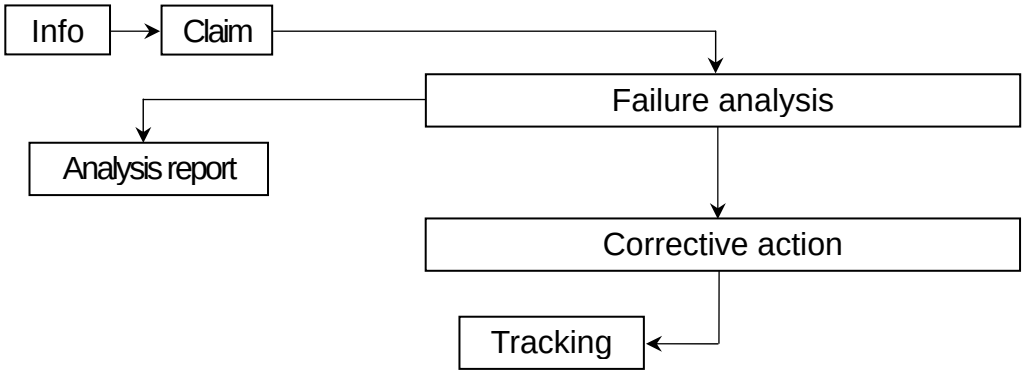
Code Bank3 (0D-004)



3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart



Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service								
Q.A Activity	1. ISO 9001 Maintenance Activities 2. Process improvement proposal 3. Equipment calibration 4. Education And Training Activities 5. Standardization Management							

3.2 Inspection Specification

◆Scope : The document shall be applied to LCD Module for Monotype and Color STN(Ver. B01).

◆Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level Ⅱ .

◆Equipment : Gauge、MIL-STD、Powertip Tester、Sample

◆Defect Level : Major Defect AQL：0.4 ; Minor Defect：AQL： 1.5 .

◆OUT Going Defect Level : Sampling .

◆Manner of appearance test :

(1). The test be under 20W×2 fluorescent light ' and distance of view must be at 30 cm.

(2). Standard of inspection： (Unit：mm)

(3). The test direction is base on about around 45° of vertical line. (Fig. 1)

(4). Definition of area . (Fig. 2)

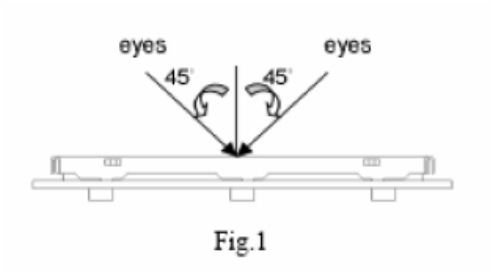


Fig.1

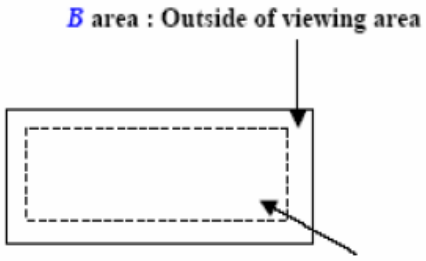


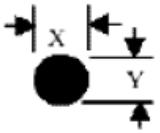
Fig. 2 A area : viewing area

◆ Specification:

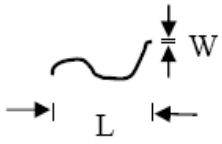
NO	Item	Criterion	Level
01	Product condition	1.1 The part number is inconsistent with work order of Production.	Major
		1.2 Mixed production types.	Major
		1.3 Assembled in inverse direction.	Major
02	Quantity	2.1 The quantity is inconsistent with work order of production.	Major
03	Outline dimension	3.1 Product dimension and structure must conform to Structure diagram.	Major
04	Electrical Testing	4.1 Missing line character and icon.	Major
		4.2 No function or no display.	Major
		4.3 Output data is error.	Major
		4.4 LCD viewing angle defect.	Major
		4.5 Current consumption exceeds product specifications.	Major

◆Specification For Monotype and Color STN：　(Ver. B01)

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td>05</td><td>Black or white dot、scratch、contamination

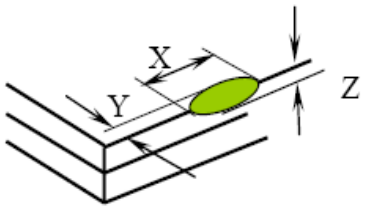
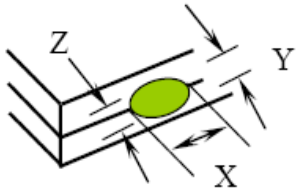
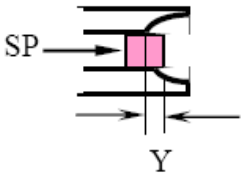
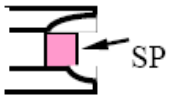
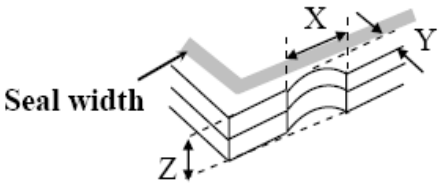
Round type
 

Φ=(x+y)/2

Line type
 
</td><td>5. 1 Round type:
5. 1. 1 display only :
• White and black spots on display ≦ 0. 30 mm , no more than 4 white or black spots present.
• Densely spaced : NO more than two spots or lines within 3 mm.

5. 1. 2 Non-display :
<table>
<tr><th rowspan="2">Dimension (diameter : Φ)</th><th colspan="2">Acceptance (Q'ty)</th></tr>
<tr><th>A area</th><th>B area</th></tr>
<tr><td>Φ ≦ 0. 10</td><td>Accept no dense</td><td rowspan="4">Ignore</td></tr>
<tr><td>0. 10 ＜ Φ ≦ 0. 20</td><td>3</td></tr>
<tr><td>0. 20 ＜ Φ ≦ 0. 30</td><td>2</td></tr>
<tr><td>Total quantity</td><td>4</td></tr>
</table>
5. 1. 3 Line type:
<table>
<tr><th colspan="2">Dimension</th><th colspan="2">Acceptance (Q'ty)</th></tr>
<tr><th>Length (L)</th><th>Width (W)</th><th>A area</th><th>B area</th></tr>
<tr><td>---</td><td>W ≦ 0. 03</td><td>Accept no dense</td><td rowspan="3">Ignore</td></tr>
<tr><td>L ≦ 3. 0</td><td>0. 03 ＜ W ≦ 0. 05</td><td rowspan="2">4</td></tr>
<tr><td>L ≦ 2. 5</td><td>0. 05 ＜W ≦ 0. 075</td></tr>
<tr><td>---</td><td>W ＞0. 075</td><td colspan="2">As round type</td></tr>
</table></td><td>Minor</td></tr>
<tr><td>06</td><td>Polarizer Bubble</td><td>
<table>
<tr><th rowspan="2">Dimension (diameter : Φ)</th><th colspan="2">Acceptance (Q'ty)</th></tr>
<tr><th>A area</th><th>B area</th></tr>
<tr><td>Φ ≦ 0. 20</td><td>Accept no dense</td><td rowspan="5">Ignore</td></tr>
<tr><td>0. 20 ＜Φ ≦ 0. 50</td><td>3</td></tr>
<tr><td>0. 50 ＜Φ ≦ 1. 00</td><td>2</td></tr>
<tr><td>Φ ＞ 1. 00</td><td>0</td></tr>
<tr><td>Total quantity</td><td>4</td></tr>
</table>
</td><td>Minor</td></tr>
</table>

◆Specification For Monotype and Color STN：　(Ver. B01)

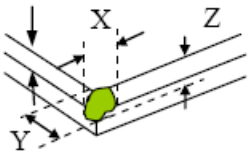
NO	Item	Criterion	Level
07	The crack of glass	Symbols： X : The length of crack　Y : The width of crack. Z : The thickness of crack　W : terminal length t : The thickness of glass　a : LCD side length 7.1 General glass chip： 7.1.1 Chip on panel surface and crack between panels:    【OK】  【NG】  	Minor

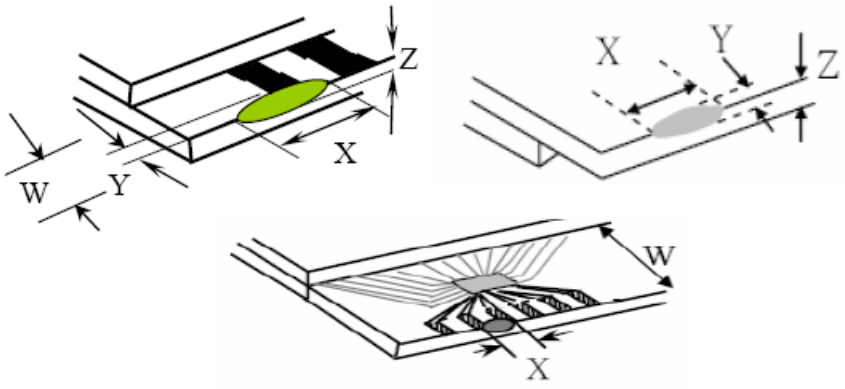
X	Y	Z
≦ a	Crack can't enter viewing area	≦1/2 t
≦ a	Crack can't exceed the half of SP width.	1/2 t < Z ≦2 t

◆Specification For Monotype and Color STN：　(Ver. B01)

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td>07</td><td>The crack of glass</td><td>
Symbols：

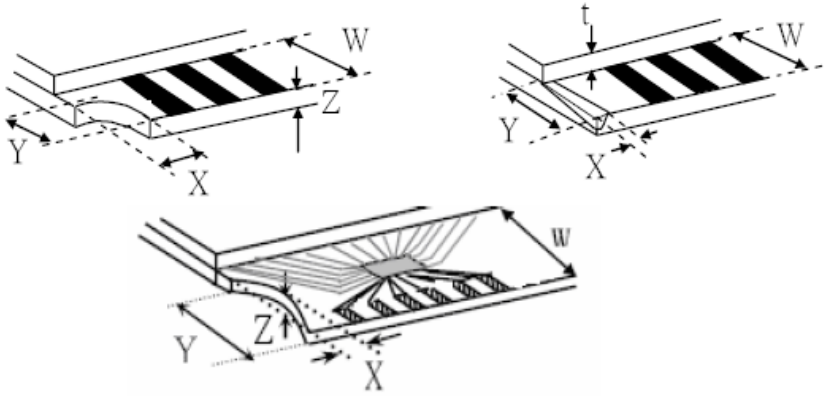
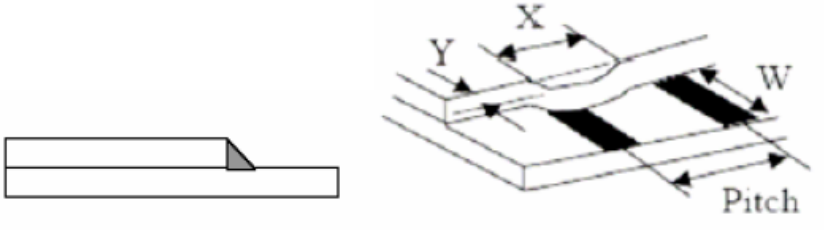
X : The length of crack　　Y : The width of crack.
Z : The thickness of crack　　W : terminal length
t : The thickness of glass　　a : LCD side length

7.1.2 Corner crack：


<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≦1/5 a</td><td>Crack can’t enter viewing area</td><td>Z ≦ 1/2 t</td></tr>
<tr><td>≦1/5 a</td><td>Crack can’t exceed the half of SP width.</td><td>1/2 t < Z ≦ 2 t</td></tr>
</table>
7.2 Protrusion over terminal：
7.2.1 Chip on electrode pad：


<table>
<tr><th></th><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>Front</td><td>≦ a</td><td>≦ 1/2 W</td><td>≦ t</td></tr>
<tr><td>Back</td><td colspan="3">Neglect</td></tr>
</table>
</td><td>Minor</td></tr>
</table>

◆Specification For Monotype and Color STN：　(Ver. B01)

NO	Item	Criterion	Level
07	The crack of glass	Symbols： X : The length of crack　Y : The width of crack. Z : The thickness of crack　W : terminal length t : The thickness of glass　a : LCD side length 7.2.2 Non-conductive portion：  X ≦1/3 a　Y ≦W　Z ≦t ⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications. 7.2.3 Glass remain：  X ≦ a　Y ≦ 1/3 W　Z ≦ t	Minor

◆Specification For Monotype and Color STN：　(Ver. B01)

NO	Item	Criterion	Level
08	Backlight elements	8. 1 Backlight can't work normally.	Major
		8. 2 Backlight doesn't light or color is wrong.	Major
		8. 3 Illumination source flickers when lit.	Major
09	General appearance	9. 1 Pin type must match type in specification sheet.	Major
		9. 2 No short circuits in components on PCB or FPC.	Major
		9. 3 Product packaging must the same as specified on packaging specification sheet.	Minor
		9. 4 The folding and peeled off in polarizer are not acceptable.	Minor
		9. 5 The PCB or FPC between B/L assembled distance (PCB or FPC) is ≦1. 5 mm.	Minor

4. RELIABILITY TEST

4.1 Reliability Test Condition (Ver.B01)

NO.	TEST ITEM	TEST CONDITION
1	High Temperature Storage Test	Keep in +80℃ 96 hrs Surrounding temperature, then storage at normal condition 4hrs.
2	Low Temperature Storage Test	Keep in -30℃ 96 hrs Surrounding temperature, then storage at normal condition 4hrs.
3	High Temperature / High Humidity Storage Test	Keep in +60℃/ 90% R.H duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs. (Excluding the polarizer)
4	Temperature Cycling Storage Test	-30℃→ +25℃ → +80℃→ +25℃ (30mins) (5mins) (30mins) (5mins) 10 Cycle Surrounding temperature, then storage at normal condition 4hrs.
5	ESD Test	Air Discharge: Apply 2 KV with 5 times Discharge for each polarity +/- Contact Discharge: Apply 250 V with 5 times discharge for each polarity +/- 1. Temperature ambiance : 15℃～35℃ 2. Humidity relative : 30%～60% 3. Energy Storage Capacitance(Cs+Cd) : 150pF±10% 4. Discharge Resistance(Rd) : 330Ω±10% 5. Discharge, mode of operation : Single Discharge (time between successive discharges at least 1 sec) (Tolerance if the output voltage indication : ±5%)
6	Vibration Test (Packaged)	1. Sine wave 10～55 Hz frequency (1 min/sweep) 2. The amplitude of vibration :1.5 mm 3. Each direction (X、Y、Z) duration for 2 Hrs
7	Drop Test (Packaged)	Packing Weight (Kg) / Drop Height (cm): 0 ~ 45.4 — 122 45.4 ~ 90.8 — 76 90.8 ~ 454 — 61 Over 454 — 46 Drop Direction :※1 corner / 3 edges / 6 sides each 1time

5. PRECAUTION RELATING PRODUCT HANDLING

5.1 SAFETY

5.1.1 If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.

5.1.2 If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

5.2 HANDLING

5.2.1 Avoid any strong mechanical shock which can break the glass.

5.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module , be sure to ground your body and any electrical equipment you may be using.

5.2.3 Do not remove the panel or frame from the module.

5.2.4 The polarizing plate of the display is very fragile. So , please handle it very carefully, do not touch , push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)

5.2.5 Do not wipe the polarizing plate with a dry cloth , as it may easily scratch the surface of plate.

5.2.6 Do not touch the display area with bare hands , this will stain the display area.

5.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.

5.2.8 To control temperature and time of soldering is 320 ± 10°C and 3-5 sec.

5.2.9 To avoid liquid (include organic solvent) stained on LCM

5.3 STORAGE

5.3.1 Store the panel or module in a dark place where the temperature is 25°C ± 5°C and the humidity is below 65% RH.

5.3.2 Do not place the module near organics solvents or corrosive gases.

5.3.3 Do not crush , shake , or jolt the module.

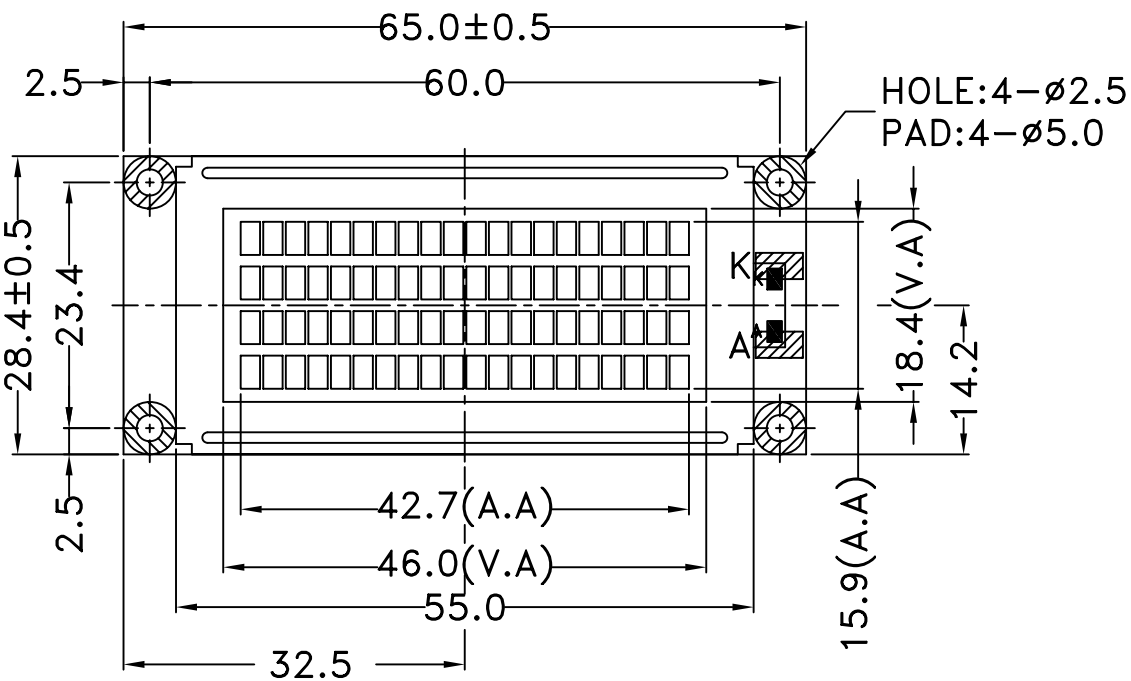
5.4 TERMS OF WARRANTY

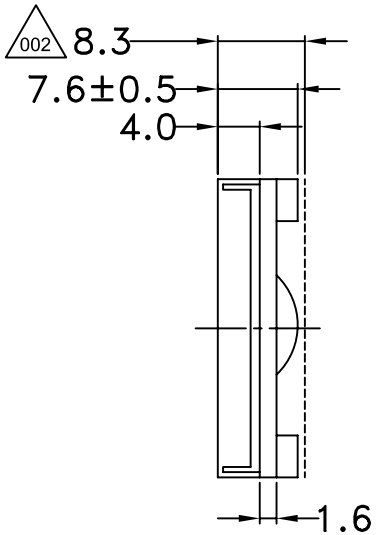
5.4.1 Applicable warrant period

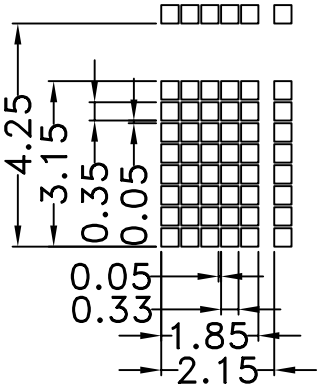
The period is within thirteen months since the date of shipping out under normal using and storage conditions.

5.4.2 Unaccepted responsibility

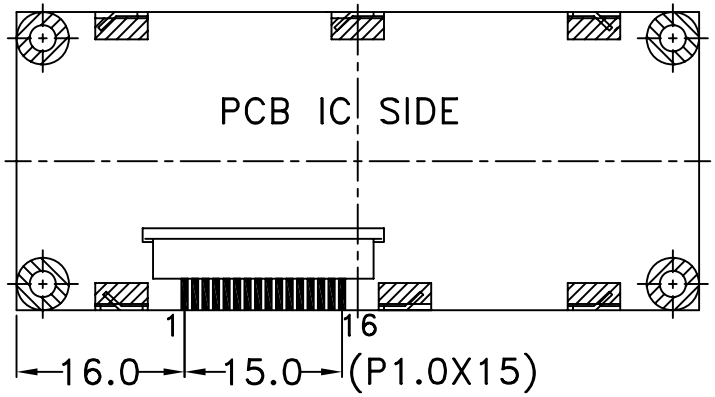
This product has been manufactured to your company's specification as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we cannot take responsibility if the product is used in 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.







SCALE:5X



NOTES:
1.LCD type:STN Gray,Positive,Transflective,6H
002 2.Top=0°C~50°C,Tst=−20°C~70°C
3.The tolerance unless classified ±0.3mm;
4.This product conforms ROHS;

REV	REV BY	REVISER	DATE
007			
006			
005			
004			
003			
002	MODIFY DIMENSION AND ADD NOTES	Terry	2010/12/03
001	NEW DRAWING	Sally Hu	2010/09/27

PART NO: PC2004LRS-DMA-BC1Q

DRAWING NAME : JLMD-PC2004LRS-DMA-BC1Q

TITLE: LCD Module Drawing

久正光電股份有限公司
POWERTIP TECHNOLOGY CORPORATION

Design	Terry	⟨3⟩	Surface		
Check	Eddy	Unit	MM	Material	
Approve	Ryan	Scale	1:1	Thickness	
		Page	1/1	Quantity	

公差精度等級 / 最小長度 (mm)	精級
1 ~ 4	-
4 ~ 16	-
16 ~ 63	-
63 ~ 250	-
250 ~ 1000	-

Ver.001

Documents NO.	JPKG-PC2004LRS-DMA-BC1Q

LCM包裝規格書
LCM Packaging Specifications

Approve	Check	Contact
Ryan	Eddy	Terry

1.包裝材料規格表 (Packaging Material) : (per carton)

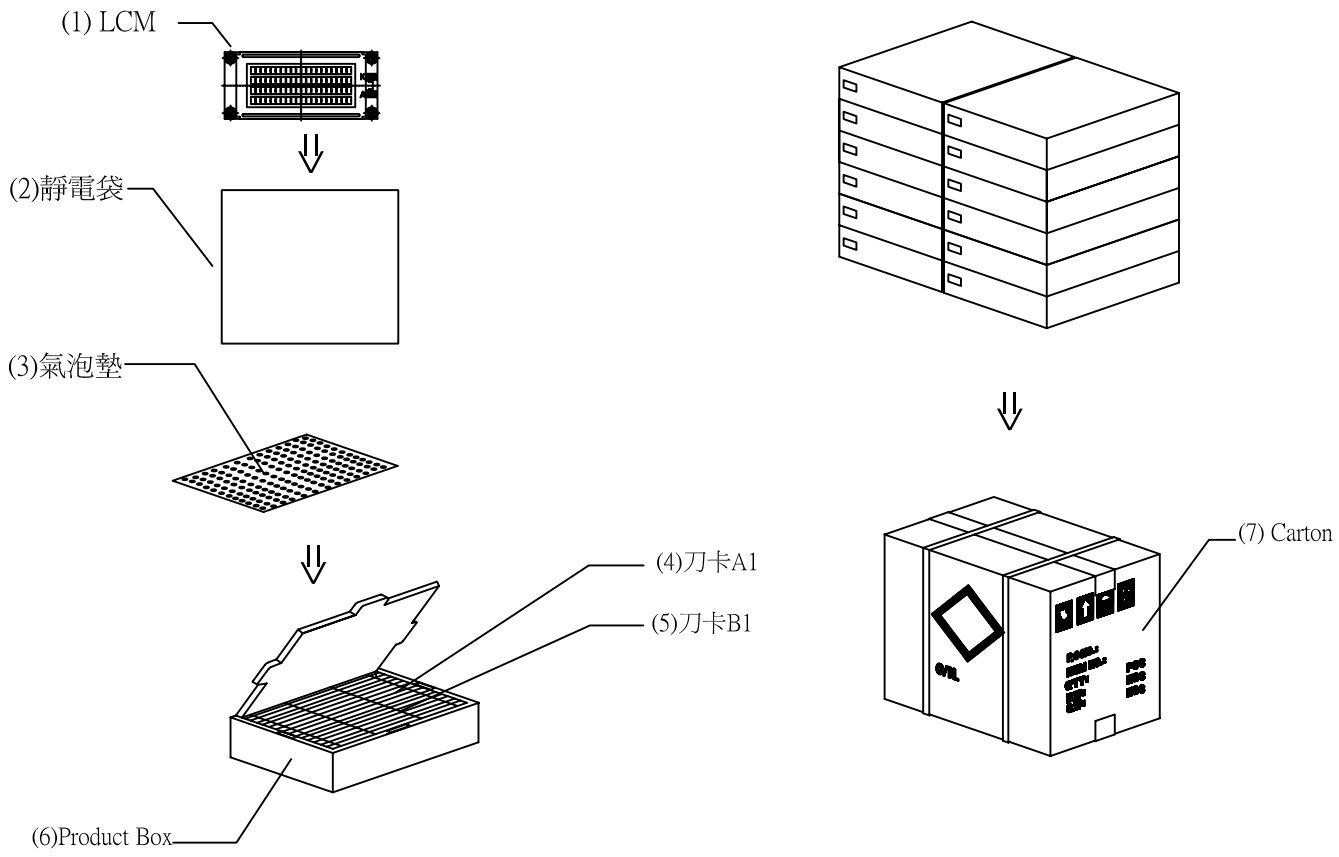
No.	Item	Model	Dimensions (mm)	1Pcs Weight	Quantity	Total Weight
1	成品(1)LCM	PC2004LRS-DMA-BC1Q	65*28.4*8.2	0.0197	468	9.2196
2	靜電袋 (2)BAG	BAG100100ARABA	100*100*0.05	0.0012	468	0.5616
3	氣泡墊(3)BAG	BAG290240BRBBA	240*290*5	0.0029	24	0.0696
4	刀卡A1(4)BX	BX29500047BZBA	295*47*4	0.011	168	1.848
5	刀卡B1(5)BX	BX24500047BZBA	245*47*4	0.01	48	0.48
6	C1內盒(6)Product Box	BX31025555AABA	310*255*55	0.221	12	2.652
7	外紙箱(7)Carton	BX52532536CCBA	525*325*360	1.092	1	1.092
8						
9						

2.一 整箱總重量 (Total LCD Weight in carton) : 15.92 Kg±10%

3.單箱數量規格表 (Packaging Specifications and Quantity) :

(1)Quantity Of Spacer : A1刀卡 X 14 , B1刀卡 X 3

(2)Total LCM quantity in carton : quantity per box 39 x no. of boxes 12 = 468



特 記 事 項 (REMARK)

1. Label Specifications :

MODEL:
LOT NO:
QUANTITY:
CHECK:

啤盒前,,后各空一格