POWERTIP CORPORATION

SPECIFICATIONS

CUSTOMER : _____

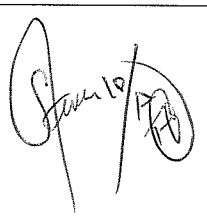
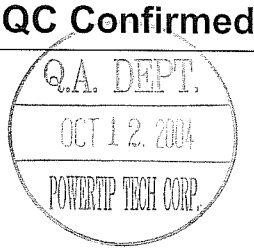
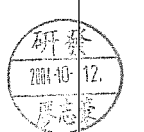
SAMPLE CODE (Ver.) : _____

(This Code will be changed while mass production)

MASS PRODUCTION CODE (Ver.) : **PG240160LRF-CNNHP1**

Customer Approved

Date:

Sales Sign	QC Confirmed	Checked	Designer
		 	

■ Approval For Specifications Only.

* This specification is subject to change without notice.

Please contact Powertip or it's representative before designing your product based on this specification.

☐ Approval For Specifications and Sample.

Powertip Corporation

Headquarters:

No.8, 6th Road, Taichung Industrial Park,

Taichung, Taiwan

台中市 407 工業區六路 8 號

TEL: 886-4-2355-8168

FAX: 886-4-2355-8166

E-mail: sales@powertip.com.tw

Http://www.powertip.com.tw

RECORDS OF REVISION

Date	Ver.	Description	Page	Design by
2004/10/11	0	Mass Production	-	Kerr

Total : 20 Page

Contents

Note : For detailed information please refer to IC data sheet : SITRONIX---ST8024-F4
SITRONIX---ST8016-F3

1. SPECIFICATIONS

1.1 Features

Item	Standard Value
Display Type	240*160 Dots
LCD Type	FSTN, Positive, Transflective
Driver Condition	LCD Module: 1/160 Duty , 1/13 Bias
Viewing Direction	6 O'clock
Backlight Type	LED Backlight
Weight	30g
Interface	4 bits parallel data input
Other(controller/driver IC)	Driver IC: SITRONIX---ST8024-F4、ST8016-F3

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	76.8 (L) * 57.1 (w) * 9.8 (H)(Max)	mm
Viewing Area	63.6 (L) * 43.9 (w)	mm
Active Area	57.585 (L) * 38.385 (w)	mm
Dot Size	0.225 (L) * 0.225 (w)	mm
Dot Pitch	0.24 (L) * 0.24 (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	7.0	V
LCD Driver Supply Voltage	V_{EE} -V_{SS}	-	-0.3	45	V
Input Voltage	V_{IN}	-	-0.3	V_{DD}+0.3	V
Operating Temperature	T_{OP}	-	-20	70	°C
Storage Temperature	T_{ST}	-	-30	80	°C
Storage Humidity	H_D	Ta < 40 °C	20	90	%RH

1.4 DC Electrical Characteristics

V_{DD}=3.3±0.3V , V_{SS} = 0V , Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Logic Supply voltage	V_{DD}	-	3.0	3.3	3.6	V
"H" input voltage	V_{IH}	-	0.8 V_{DD}	-	V_{DD}	V
"L" input voltage	V_{IL}	-	V_{SS}	-	0.2 V_{DD}	V
"H" output voltage	V_{OH}	-	V_{DD} -0.4	-	V_{DD}	V
"L" output voltage	V_{OL}	-	V_{SS}	-	+0.4	V
Supply current	I_{DD}	V_{DD}=3.3V	-	0.1	1.0	mA
	I_{OP}	V_{DD}=3.3V	-	1.8	5.0	mA
LCM driving voltage	Vop	V_{EE}-V_{SS} (-20°C)	18.2	18.5	18.8	V
		V_{EE}-V_{SS} (25°C)	17.4	17.7	18.0	
		V_{EE}-V_{SS} (70°C)	15.8	16.1	16.4	

Note : In our suggestion that FLM =70Hz, If there are some flicker and ripple Phenomenon.

Please setting the frame frequency in your set.

1.5 Optical Characteristics

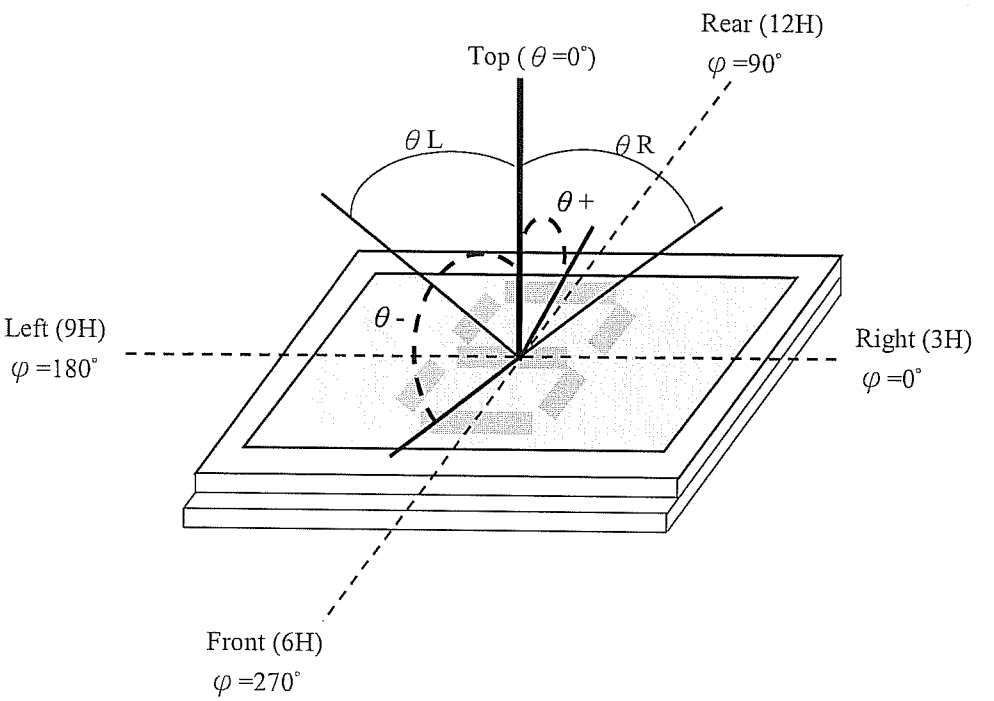
LCD Panel : 1/160 Duty , 1/13 Bias . V_{LCD} = 18.5V , Ta = 25°C

Item	Symbol	Conditions	Min.	Typ.	Max.	Reference
View Angle	θ	C≥2.0, ∅ = 270°	-40°	-	40°	Notes 1 & 2
Contrast Ratio	C	θ = -5°, ∅ = 270°	2	9	-	Note 3
Response Time(rise)	tr	θ = -5°, ∅ = 270°	-	130 ms	195 ms	Note 4
Response Time(fall)	tf	θ = -5°, ∅ = 270°	-	320 ms	480 ms	Note 4

Note 1.

Optical characteristics-2

Viewing angle

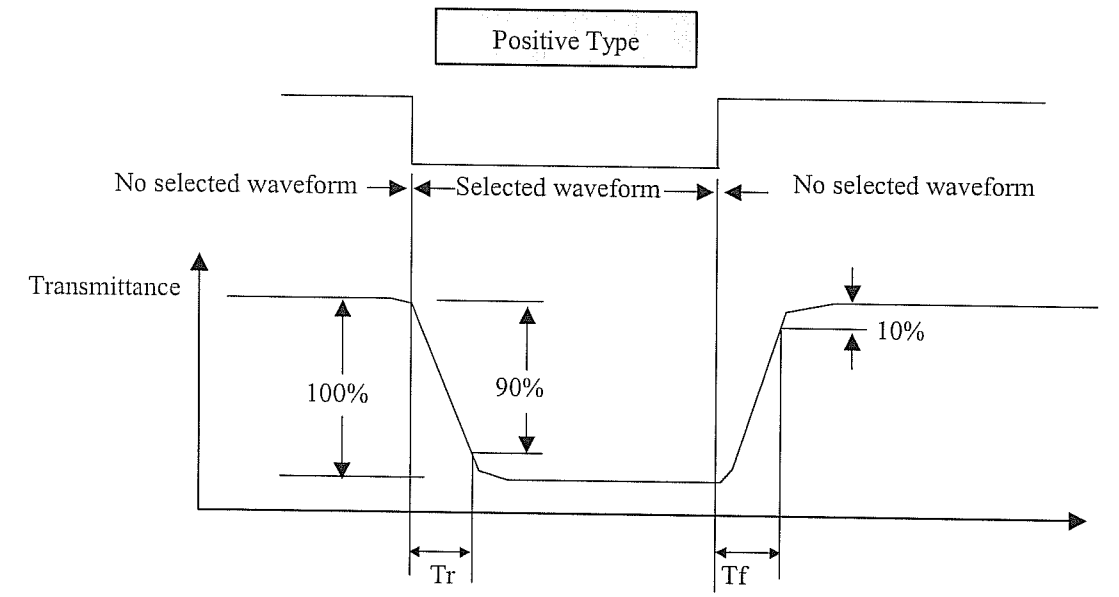


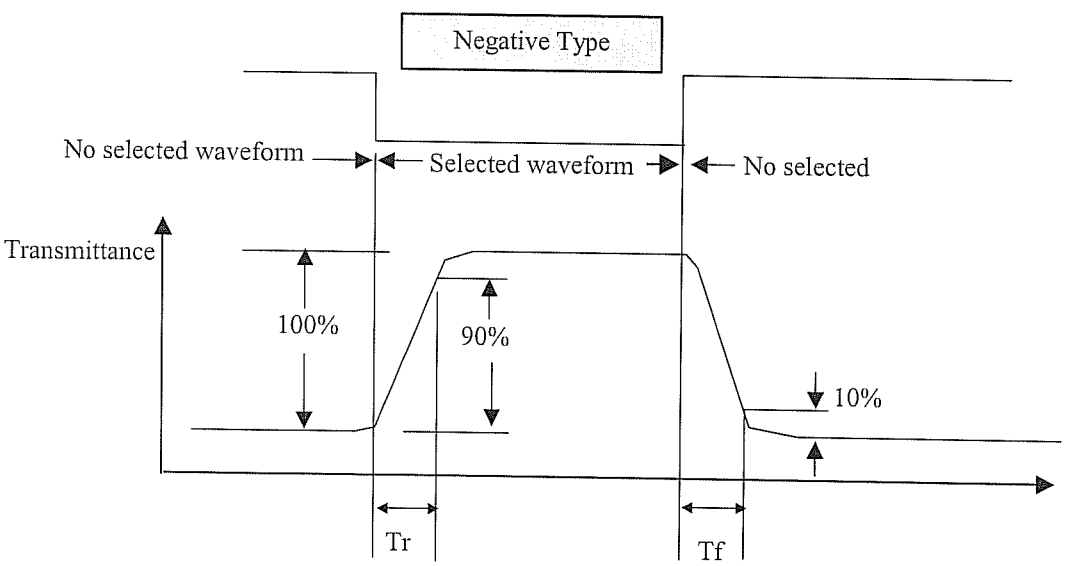
Viewing angle

Note 2.

Optical characteristics-3

Fig.2 Definition of response time





Electrical characteristics-2

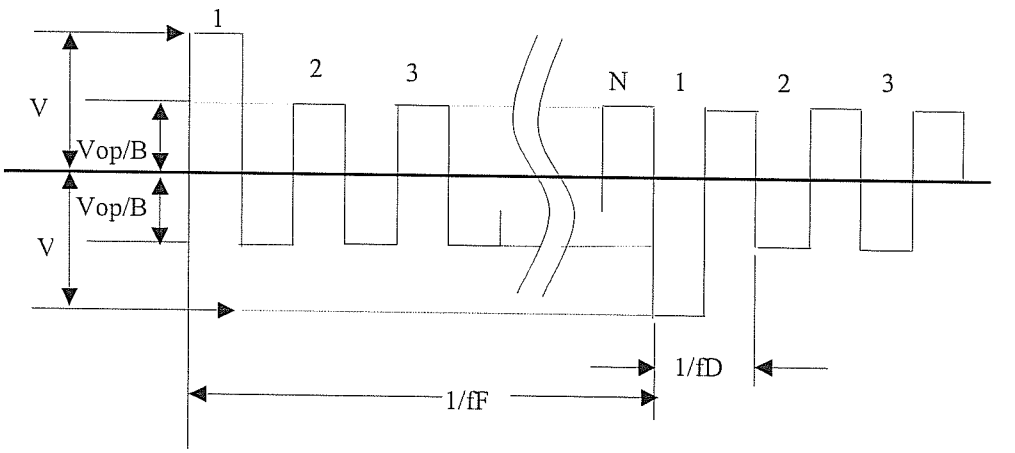
※2 Drive waveform

Vop: Drive voltage　　fF: Frame frequency

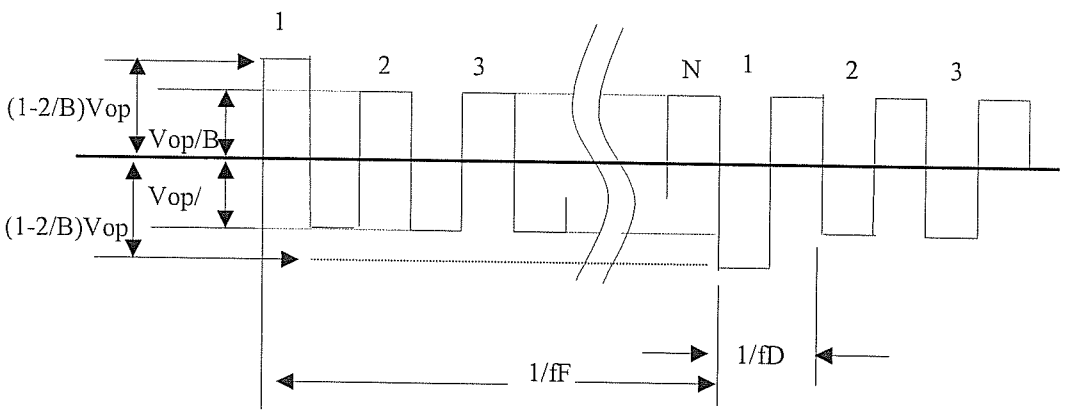
1/B: Bias　　fD: Drive frequency

N: Duty

(1) Selected waveform



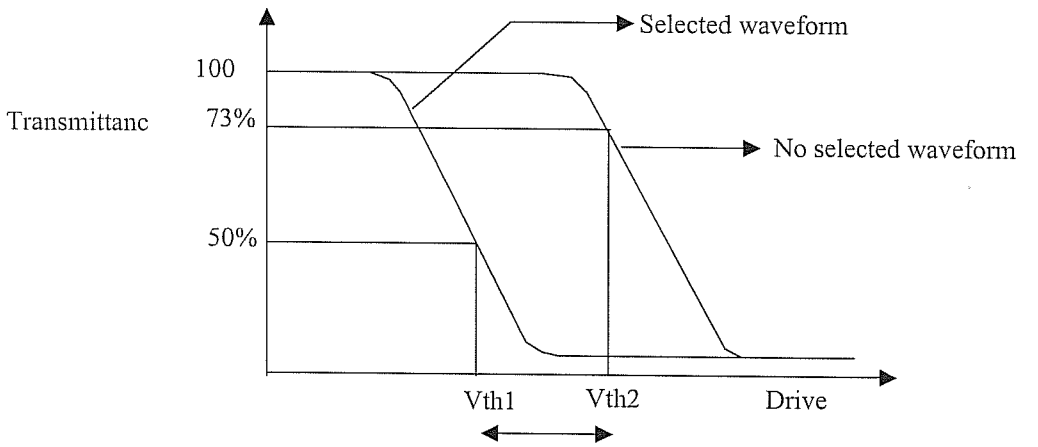
(2) Non- Selected wave form



Note:

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

Note 3. : Definition of Vth

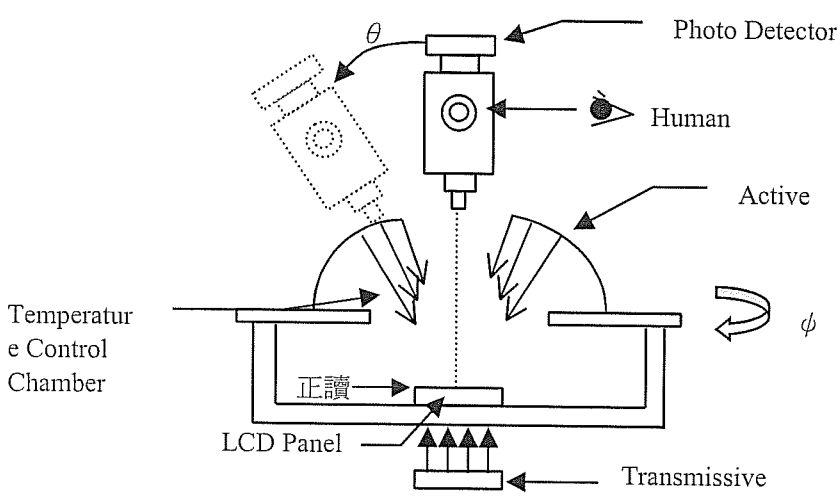


Active voltage range

	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°C	-	60	mA
Reverse Voltage	VR	Ta =25°C	-	20	V
Power Dissipation	PO	Ta =25°C	-	0.58	W
Operating Temperature	T_{OP}	-	-20	70	°C
Storage Temperature	T_{ST}	-	-30	80	°C

Electrical / Optical Characteristics

Ta =25°C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF= 30 mA	-	8.0	9.6	V
Reverse Current	IR	VR= 20 V	-	-	0.2	mA
Average Brightness (with LCD) *1	IV	IF= 30 mA	7.6	8.4	-	cd/m^2
Peak emission wavelength (without LCD) *1	λp	IF= 30 mA	569	-	576	nm
Backlig ht Uniformity (with LCD) *1	△EH	IF= 30 mA	70	-	-	*2
Color	Yellow Green					

*1 : This vaule will be changed while mass production.

*2 : △B=B(min) / B(max)

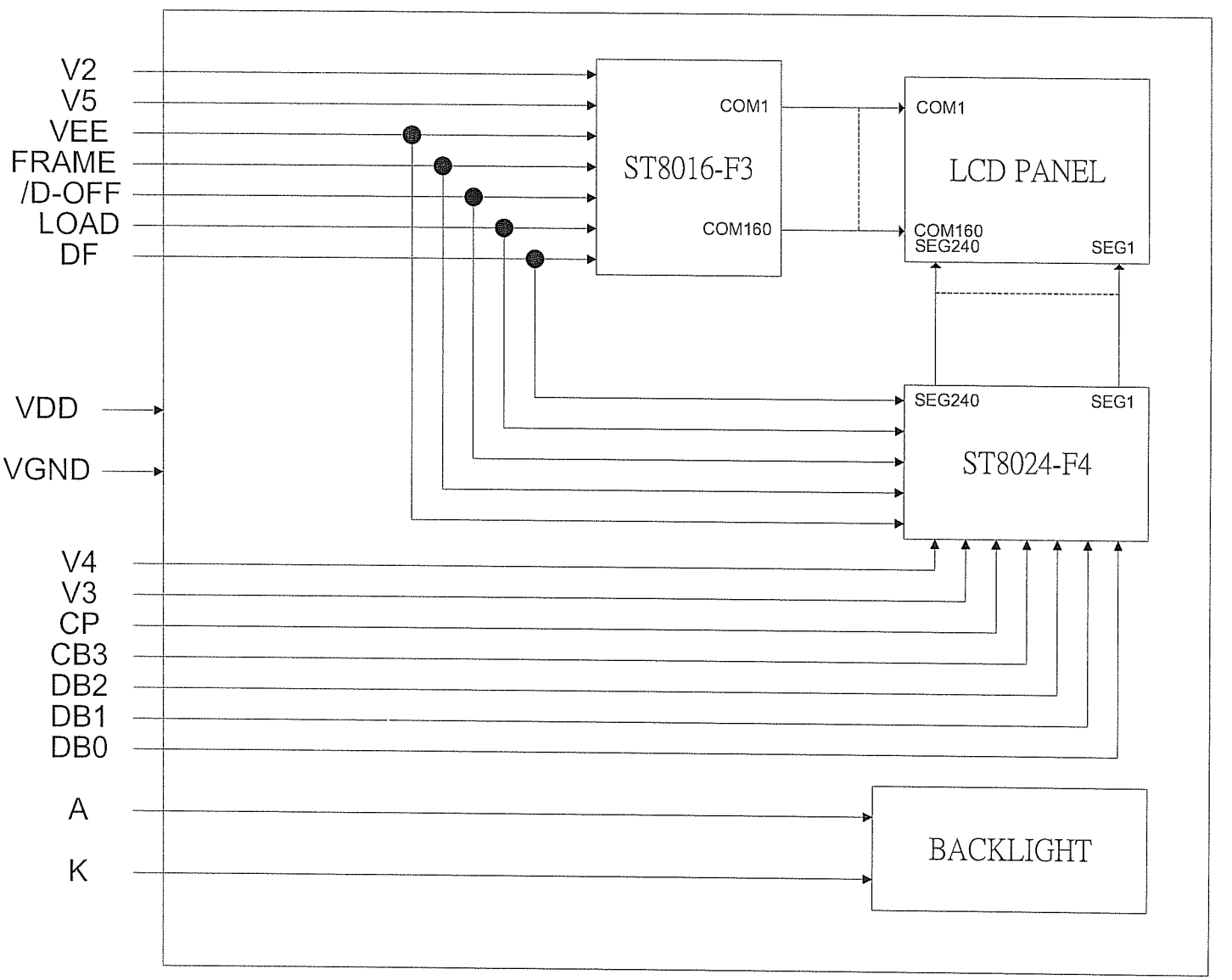
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

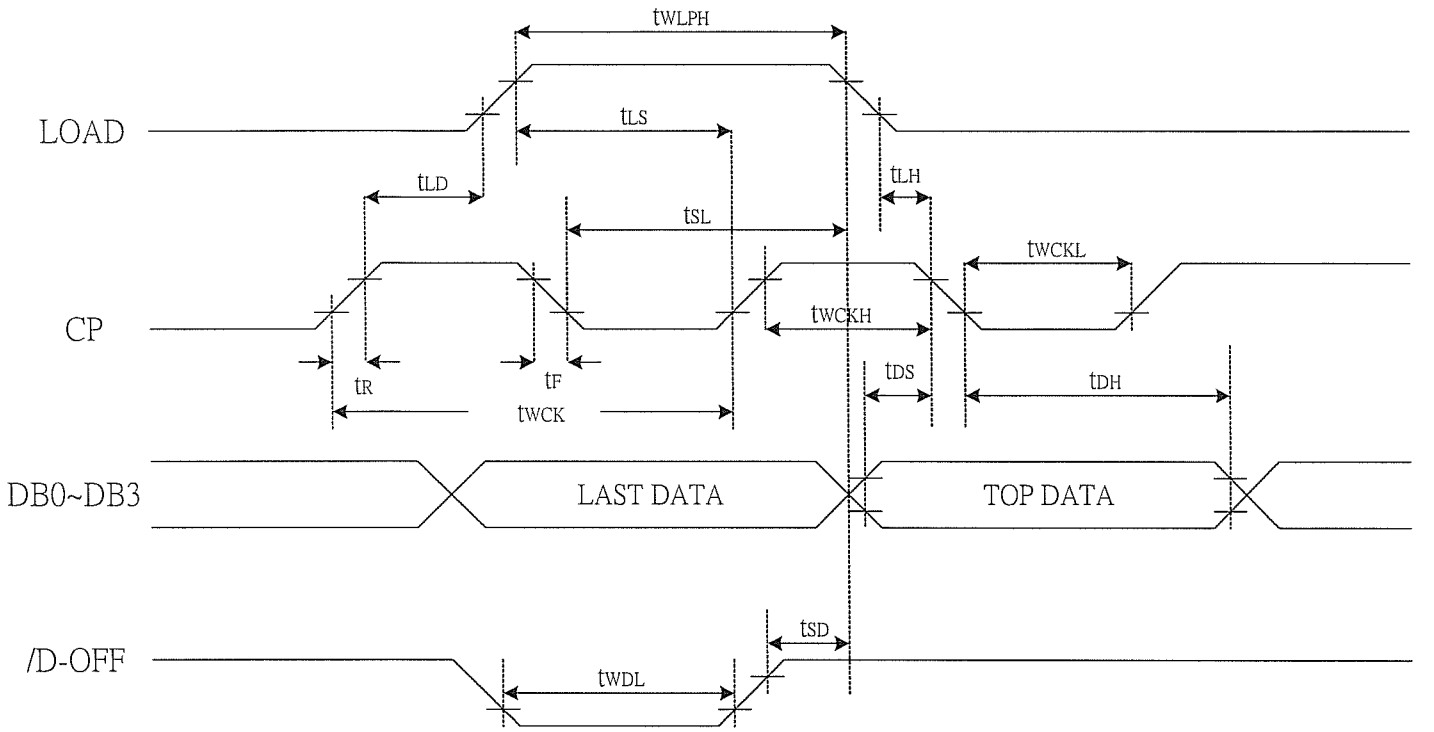
2.1.2 Block Diagram



2.2 Interface Pin Description

Pin No.	Symbol	Function
1	DF	Frame reverse signal (Alternate signal)
2	V5	Bias voltage for non-select (common driver)
3	V2	Bias voltage for non-select (common driver)
4	VEE	Power supply voltage for LCD (+V), select (segment / common driver)
5	VDD	Power supply voltage for logic. (3.3V)
6	FRAME	Scan start-up signal
7	VGND	Ground (0V), select (segment / common driver)
8	LOAD	Data latch pulse
9	DF	Frame reverse signal (Alternate signal)
10	/D-OFF	H : Display on L: Display off
11	CP	Data shift pulse
12	V4	Bias voltage for non-select (segment driver)
13	V3	Bias voltage for non-select (segment driver)
14	DB3	Data bus 3
15	DB2	Data bus 2
16	DB1	Data bus 1
17	DB0	Data bus 0
18	A	Power supply for LED B/L (+)
19	K	Power supply for LED B/L (-)
20	DF	Frame reverse signal (Alternate signal)

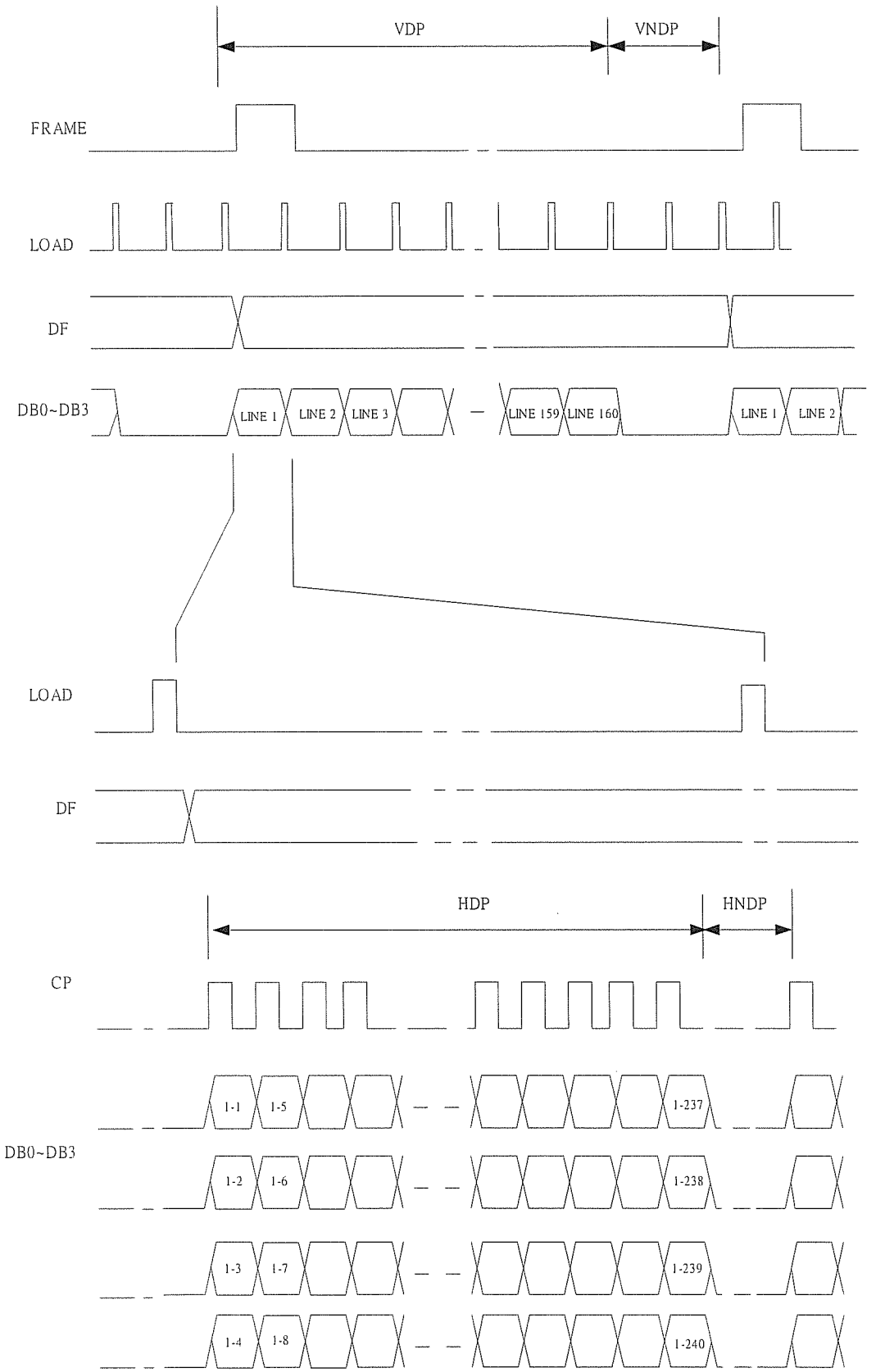
2.3 Timing Characteristics



Vss=0V, V_{DD}=3.0V to 3.6V, Ta=25℃

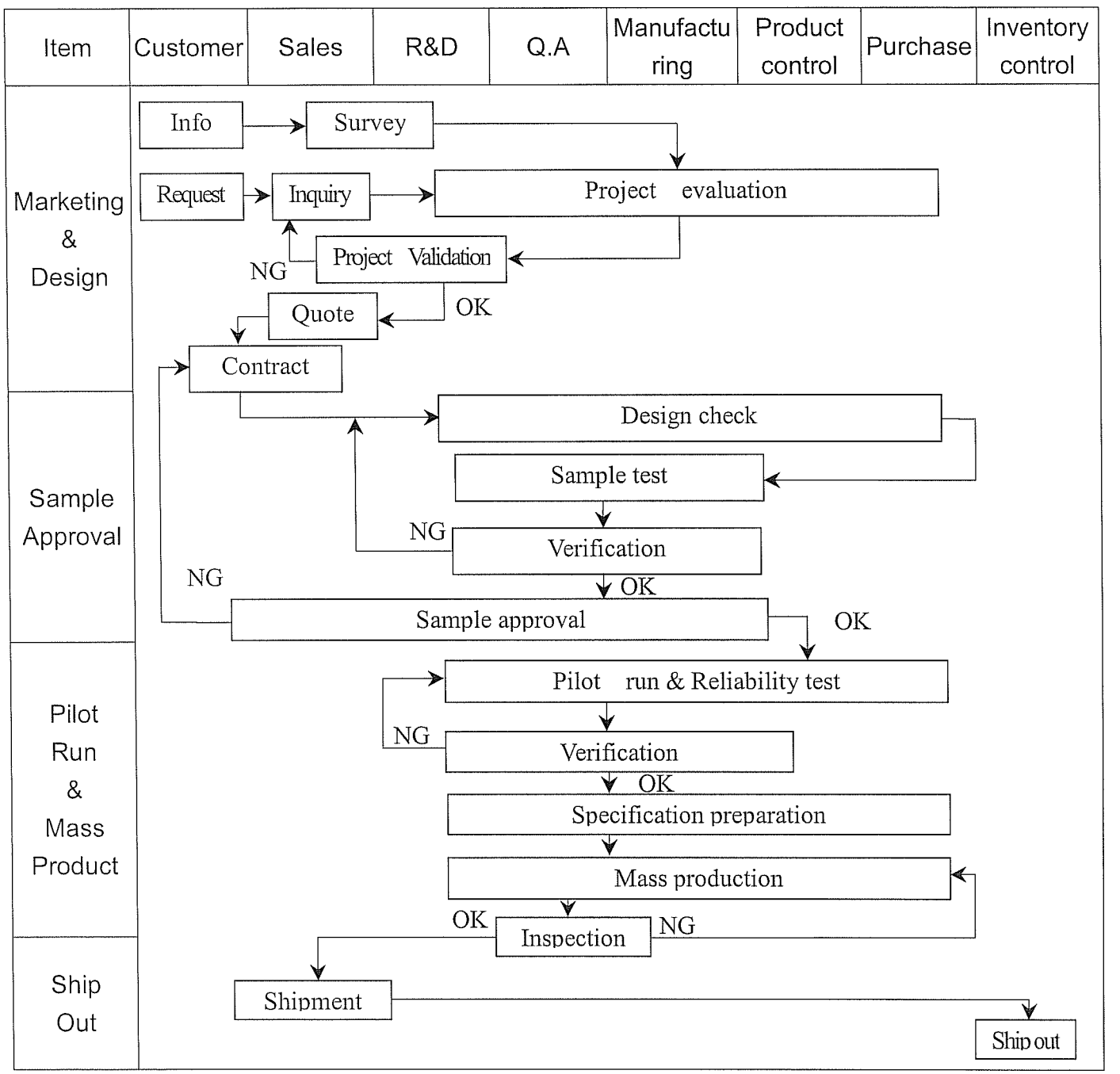
Parameter	Symol	Condition	Min.	Typ.	Max.	Unit
Shift clock period	t_{WCK}	t_r,t_f ≤11 ns	125	-	-	ns
Shift clock "H" pulse width	t_{WCKH}	-	51	-	-	ns
Shift clock "L" pulse width	t_{WCKL}	-	51	-	-	ns
Data setup time	t_{DS}	-	30	-	-	ns
Data hold time	t_{DH}	-	40	-	-	ns
Latch pulse "H" pulse width	t_{WLPH}	-	51	-	-	ns
Shift clock rise to Latch pulse rise time	t_{LD}	-	0	-	-	ns
Shift clock fall to Latch pulse fall time	t_{SL}	-	51	-	-	ns
Latch pulse rise to Shift clock rise time	t_{LS}	-	51	-	-	ns
Latch pulse fall to Shift clock fall time	t_{LH}	-	51	-	-	ns
Input signal rise time	t_r	-	-	-	50	ns
Input signal fall time	t_f	-	-	-	50	ns
/D-OFF removal time	t_{SD}	-	100	-	-	ns
/D-OFF "L" pulse width	t_{WDL}	-	1.2	-	-	us
Output delay time (1)	t_{pd1},t_{pd2}	CL=15 pF	-	-	1.2	us
Output delay time (2)	t_{pd3}	CL=15 pF	-	-	1.2	us

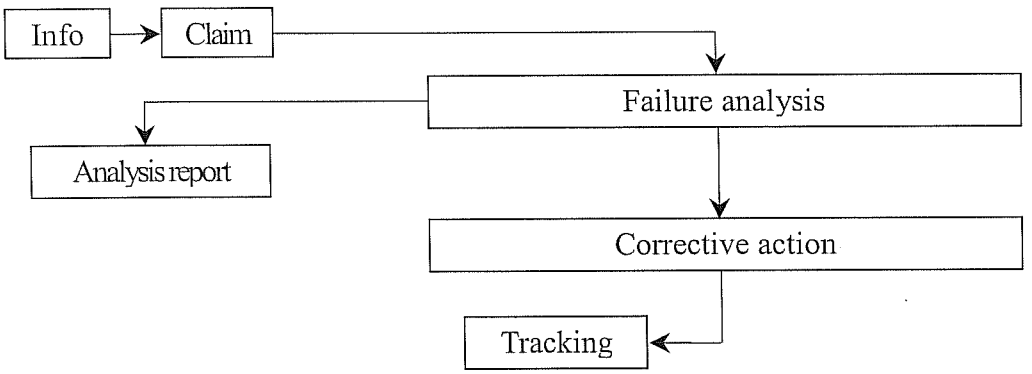
4 Bits Panel Timing



3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart

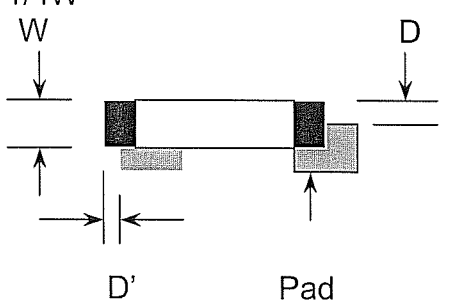


Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service								
Q.A Activity	1. ISO 9001 Maintenance Activities 3. Equipment calibration 5. Standardization Management				2. Process improvement proposal 4. Education And Training Activities			

3.2 Inspection Specification

Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II
Equipment : Gauge , MIL-STD , Powertip Tester , Sample
IQC Defect Level : Major Defect AQL 0.4; Minor Defect AQL 1.5
FQC Defect Level : 100% Inspection
OUT Going Defect Level : Sampling
Specification :

NO	Item	Specification	Judge	Level
1	Part Number	The part number is inconsistent with work order of production	N.G.	Major
2	Quantity	The quantity is inconsistent with work order of production	N.G.	Major
3	Electronic characteristics of LCM A=(L + W) 2	The display lacks of some patterns.	N.G.	Major
		Missing line.	N.G.	Major
		The size of missing dot, A is > 1/2 Dot size	N.G.	Major
		There is no function.	N.G.	Major
		Output data is error	N.G.	Major
4	Appearance of LCD A=(L + W) 2 Dirty particle (Including scratch、bubble)	Material is different with work order of production	N.G.	Major
		LCD is assembled in inverse direction	N.G.	Major
		Bezel is assembled in inverse direction	N.G.	Major
		Shadow is within LCD viewing area + 0.5 mm	N.G.	Major
		The diameter of dirty particle, A is > 0.4 mm	N.G.	Minor
		Dirty particle length is > 3.0mm, and 0.01mm < width ≤0.05mm	N.G.	Minor
		Display is without protective film	N.G.	Minor
		Conductive rubber is over bezel 1mm	N.G.	Minor
		Polarizer exceeds over viewing area of LCD	N.G.	Minor
		Area of bubble in polarizer, A > 1.0mm, the number of bubble is > 1 piece.	N.G.	Minor
		0.4mm < Area of bubble in polarizer, A < 1.0mm, the number of bubble is > 4 pieces.	N.G.	Minor
5	Appearance of PCB A=(L + W) 2	Burned area or wrong part number is on PCB	N.G.	Major
		The symbol, character, and mark of PCB are unidentifiable.	N.G	Minor
		The stripped solder mask , A is > 1.0mm	N.G.	Minor
		0.3mm < stripped solder mask or visible circuit, A < 1.0mm, and the number is ≥4 pieces	N.G.	Minor
		There is particle between the circuits in solder mask	N.G	Minor
		The circuit is peeled off or cracked	N.G	Minor
		There is any circuits risen or exposed.	N.G	Minor
		0.2mm < Area of solder ball, A is ≤0.4mm The number of solder ball is ≥3 pieces	N.G	Minor
		The magnitude of solder ball, A is > 0.4mm.	N.G	Minor

NO	Item	Specification	Judge	Level
6	Appearance of molding A=(L + W) 2	The shape of modeling is deformed by touching.	N.G.	Major
		Insufficient epoxy: Circuit or pad of IC is visible	N.G.	Minor
		Excessive epoxy: Diameter of modeling is > 20mm or height is > 2.5mm	N.G.	Minor
		The diameter of pinhole in modeling, A is > 0.2mm.	N.G.	Minor
7	Appearance of frame A=(L + W) 2	The folding angle of frame must be > 45°+ 10°	N.G.	Minor
		The area of stripped electroplate in top-view of frame, A is > 1.0mm.	N.G.	Minor
		Rust or crack is (Top view only)	N.G.	Minor
		The scratched width of frame is > 0.06mm. (Top view only)	N.G.	Minor
8	Electrical characteristic of backlight A=(L + W) 2	The color of backlight is nonconforming	N.G.	Major
		Backlight can't work normally.	N.G.	Major
		The LED lamp can't work normally	N.G.	Major
		The unsoldering area of pin for backlight, A is > 1/2 solder joint area.	N.G.	Minor
		The height of solder pin for backlight is > 2.0mm	N.G.	Minor
10	Assembly parts A=(L + W) 2	The mark or polarity of component is unidentifiable.	N.G.	Minor
		The height between bottom of component and surface of the PCB is floating > 0.7mm	N.G.	Minor
		D > 1/4W 	N.G.	Minor
		End solder joint width, D' is > 50% width of component termination or width of pad	N.G.	Minor
		Side overhang, D is > 25% width of component termination.	N.G.	Minor
		Component is cracked, deformed, and burned, etc.	N.G.	Minor
		The polarity of component is placed in inverse direction.	N.G.	Minor
		Maximum fillet height of solder extends onto the component body or minimum fillet height is < 0.5mm.	N.G.	Minor

4. RELIABILITY TEST

4.1 Reliability Test Condition

NO	Item	Test Condition	
1	High Temperature Storage	Storage at 80 ± 2°C 96~100 hrs Surrounding temperature, then storage at normal condition 4hrs	
2	Low Temperature Storage	Storage at -30 ± 2°C 96~100 hrs Surrounding temperature, then storage at normal condition 4hrs	
3	High Temperature /Humidity Storage	1.Storage 96~100 hrs 60 ± 2°C, 90~95%RH surrounding temperature, then storage at normal condition 4hrs. (Excluding the polarizer). or 2.Storage 96~100 hrs 40 ± 2°C, 90~95%RH surrounding temperature, then storage at normal condition 4 hrs.	
4	Temperature Cycling	-20°C → 25°C → 70°C → 25°C (30mins) (5mins) (30mins) (5mins) 10 Cycle	
5	Vibration	10~55Hz (1 minute) 1.5mm X,Y and Z direction * (each 2hrs)	
6	ESD Test	Air Discharge: Apply 6 KV with 5 times discharge for each polarity +/-	Contact Discharge: Apply 250V with 5 times discharge for each polarity +/-
		Testing location: Around the face of LCD	Testing location: 1.Apply to bezel. 2.Apply to Vdd, Vss.
7	Drop Test	Packing Weight (Kg)	Drop Height (cm)
		0 ~ 45.4	122
		45.4 ~ 90.8	76
		90.8 ~ 454	61
		Over 454	46

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 280 ± 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.

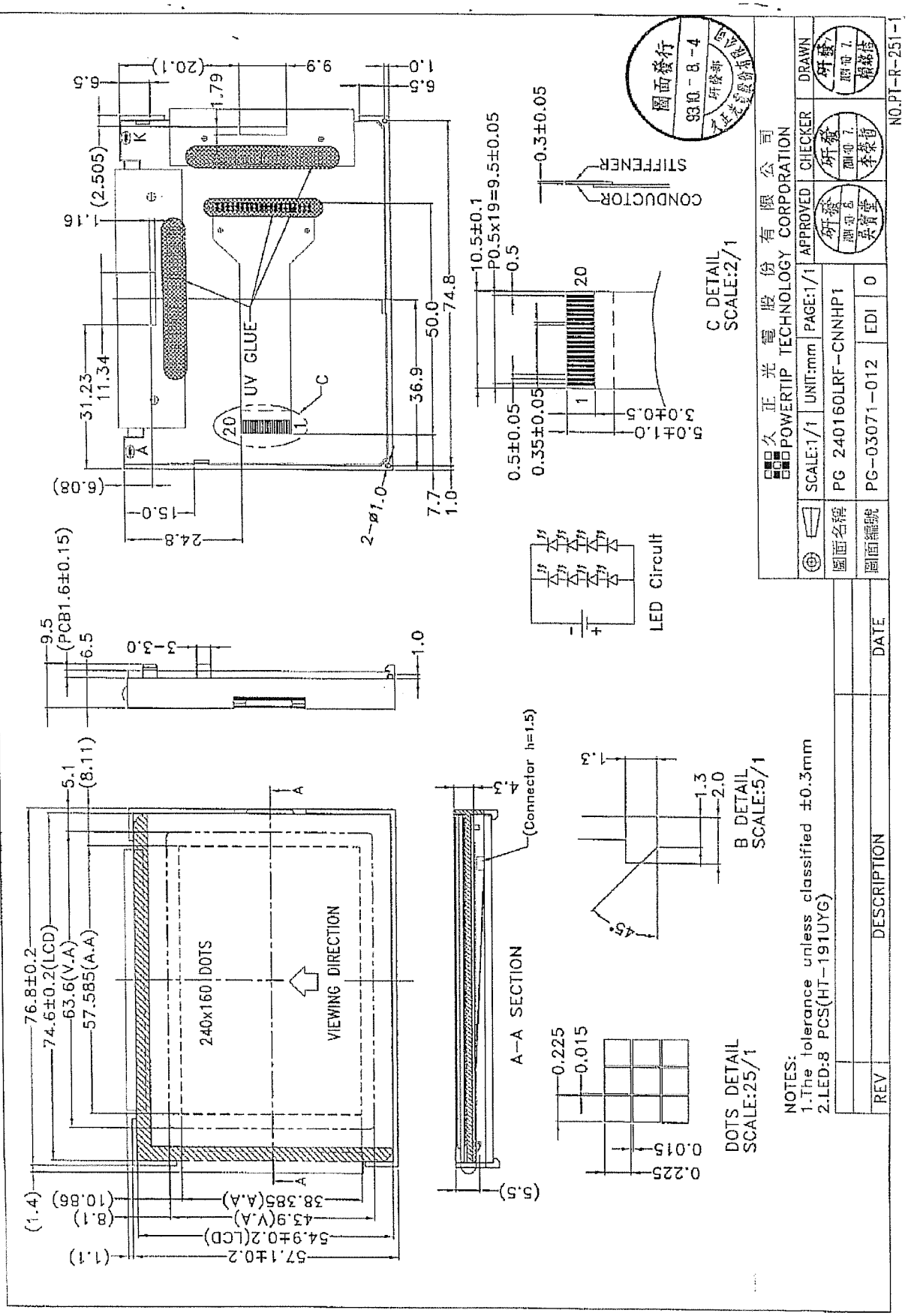
5.4 TERMS OF WARRANTY

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.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POWERTIP TECHNOLOGY CORPORATION
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PG 240160LRF-CNNHP1
圖面編號
PG-03071-012
EDI 0
APPROVED
CHECKER
DRAWN
NO.PT-R-251-1
REV
DESCRIPTION
DATE
UV GLUE
CONDUCTOR
STIFFENER
C DETAIL
SCALE:2/1
B DETAIL
SCALE:5/1
A-A SECTION
DOTS DETAIL
SCALE:25/1
LED Circuit
VIEWING DIRECTION
240x160 DOTS
NOTES:
1.The tolerance unless classified ±0.3mm
2.LED:8 PCS(HT-191UYG)