POWERTIP TECH. CORP.

DISPLAY DEVICES FOR BETTER ELECTRONIC DESIGN

Specification For Approval

Customer : _____

Model Type : LCD Module

Sample Code : PG320240LRF-HNN-H-A1-S0

Mass Production Code : _____

Edition : 0

Customer Sign	Sales Sign	Approved By	Prepared By

CONTENTS

1. SPECIFICATIONS

1.1 Features

- Full dot-matrix structure with 320 dots *240 dots
- 1/240 Duty, 1/15 bias
- FSTN LCD, positive, black and white display
- Transflective LCD, 6 o'clock viewing angle
- 4 bits parallel data input
- With LED backlight and touch panel

1.2 Mechanical Specifications

- Outline dimension : 92.0mm(W)*71.7mm(H)*13.5mm max.(D)
- Viewing area : 78.78mm*59.58mm
- Active area : 76.78mm*57.58mm
- Dot size : 0.22mm*0.22mm
- Dot pitch : 0.24mm*0.24mm
- Interface connector : 16-pin flat ribbon connector with 1mm pitch
- Driver ICs : TCP type

1.3 Absolute Maximum Ratings

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Power supply Voltage	V_{DD}	Reference to V_{SS}(0V)	-0.3		7	V
	$V_{(B/L)}$	$I_{(B/L)}$=175mA max	-	4.1	4.4	V
Input voltage	V_{IN}	-	-0.3		V_{DD}+0.3	V
Operating temperature	T_{OPR}	-	0		50	°C
Storage temperature	T_{STG}	-	-20		70	°C
Humidity	-	-	20		70	%RH

1.4 DC Electrical Characteristics

V_{DD}=+5V±10%, V_{SS}=0V, T_A=25°C

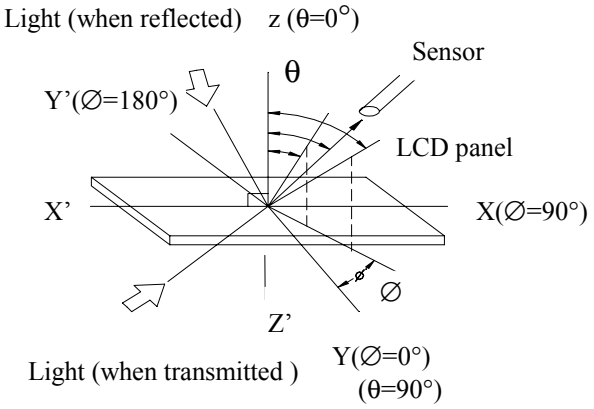
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Logic Supply voltage	V_{DD}	-	4.5	5	5.5	V
"H" input voltage	V_{IH}	-	0.8 V_{DD}	-	-	V
"L" input voltage	V_{IL}	-	-	-	0.2 V_{DD}	V
"H" output voltage	V_{OH}	I_{OH}=-0.4mA	V_{DD}-0.4	-	-	V
"L" output voltage	V_{OL}	I_{OL}=+0.4mA	-	-	+0.4	V
Supply current	I_{OP}	V_{DD}=5V	-	22	-	mA
LCD driving voltage	V_{LCD}	T_A=-20°C	-	23.79	-	V
		T_A=25°C	-	18.6	-	
		T_A=70°C	-	15.31	-	

1.5 Optical Characteristics

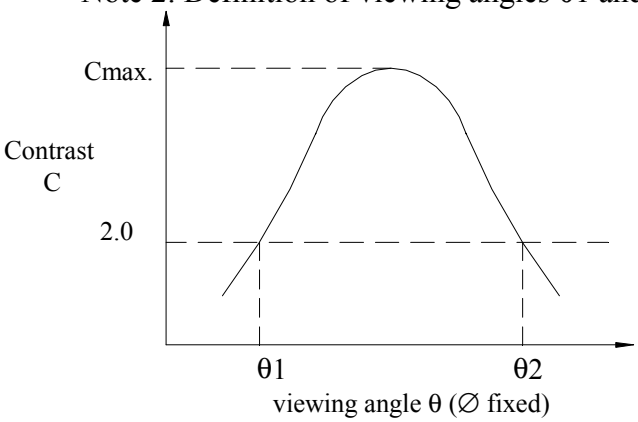
V_{OPR}=23V, 1/240 duty, 1/15 bias, Ta=25°C

Item	Symbol	Conditions	Min.	Typ.	Max	Reference
Viewing angle	θ2-θ1	C≥4.0, ∅=±25° θ1=-20° θ2=+30°	50°	-	-	Notes 1 & 2
Contrast	C	θ=25° θ=15° ∅=±25° θ=0°	4 5 6	-	-	Note 3
Response time(rise)	Tr	θ=25° ∅=±25° θ=-5° θ=-10°	-	-	300ms 1250ms 1900ms	Note 4
Response time(fall)	Tf	θ=25° ∅=±25° θ=-5° θ=-10°	-	-	400ms 2500ms 3750ms	Note 4

Note 1: Definition of angles θ and ∅



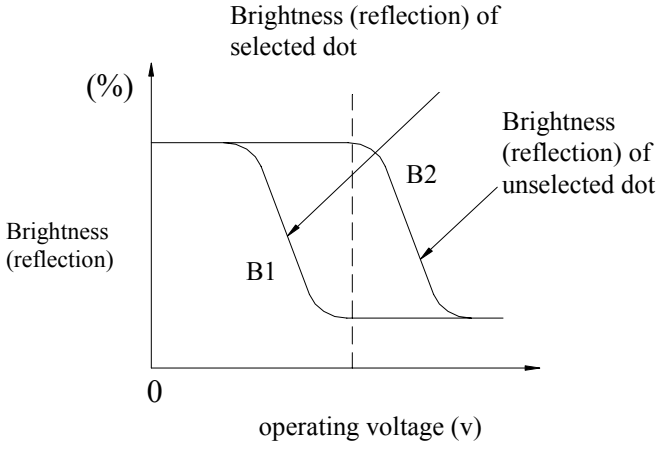
Note 2: Definition of viewing angles θ1 and θ2



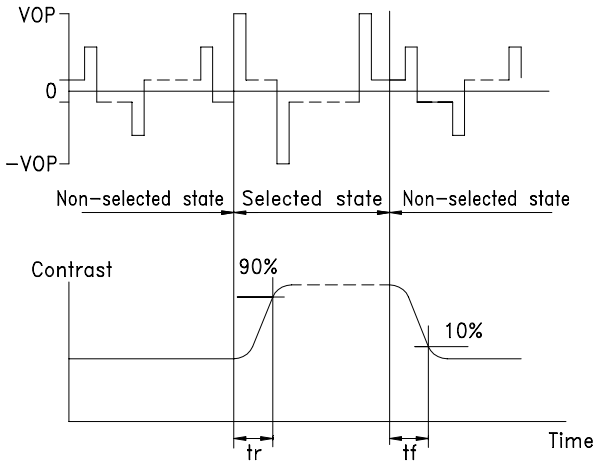
Note : Optimum viewing angle with the naked eye and viewing angle θ at Cmax. Above are not always the same

Note 3: Definition of contrast C

$$C = \frac{\text{Brightness (reflection) of unselected dot (B2)}}{\text{Brightness (reflection) of selected dot (B1)}}$$



Note 4: Definition of response time



Note: Measured with a transmissive LCD panel which is displayed 1 cm^2

V_{OPR} : Operating voltage f_{FRM} : Frame frequency
t_{ON} : Response time (rise) t_{OFF} : Response time (fall)

1.6 Backlight Characteristic

The LCD Module is built-in a LED backlight.

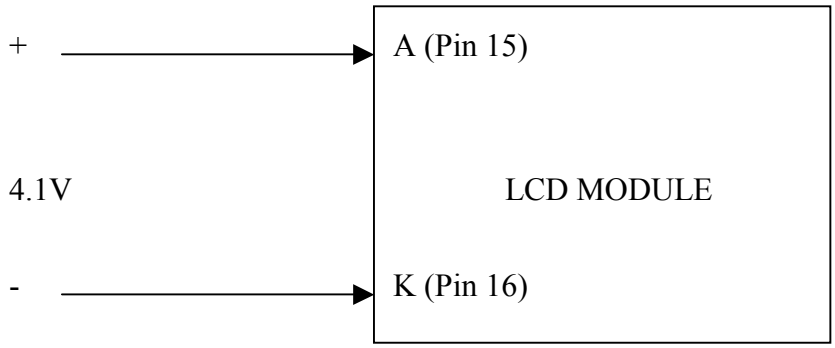
Absolute Maximum Ratings: (Ta=25°C)

Item	Symbol	Ratings	Unit
Peak forward current	IF	175	mA
Reverse voltage	VR	8	V
Power dissipation	Po	0.77	W
Operating temperature	Topr	-20 to +70	°C
Storage temperature	Tstg	-40 to +80	°C
Soldering temperature: 3 sec.		260	°C

Electrical/Optical specifications:

Item	Symbol	Condition	Min.	Typ	Max.	Unit
Forward Voltage	VF	IF=70*2 mA TA=25°C		4.1	4.4	V
Luminous intensity (Without LCD)	IV		7	9		cd/m^2
Luminous intensity (With LCD & Touch Panel)	IV		0.7	1.2		cd/m^2
Peak emission wavelength	Hue		569	-	576	nm
Spectral line half width	Δλ			30		nm
Reverse current	IR	VR=8 V			0.2	mA
Color	Yellow-green					

● Light the LED backlight

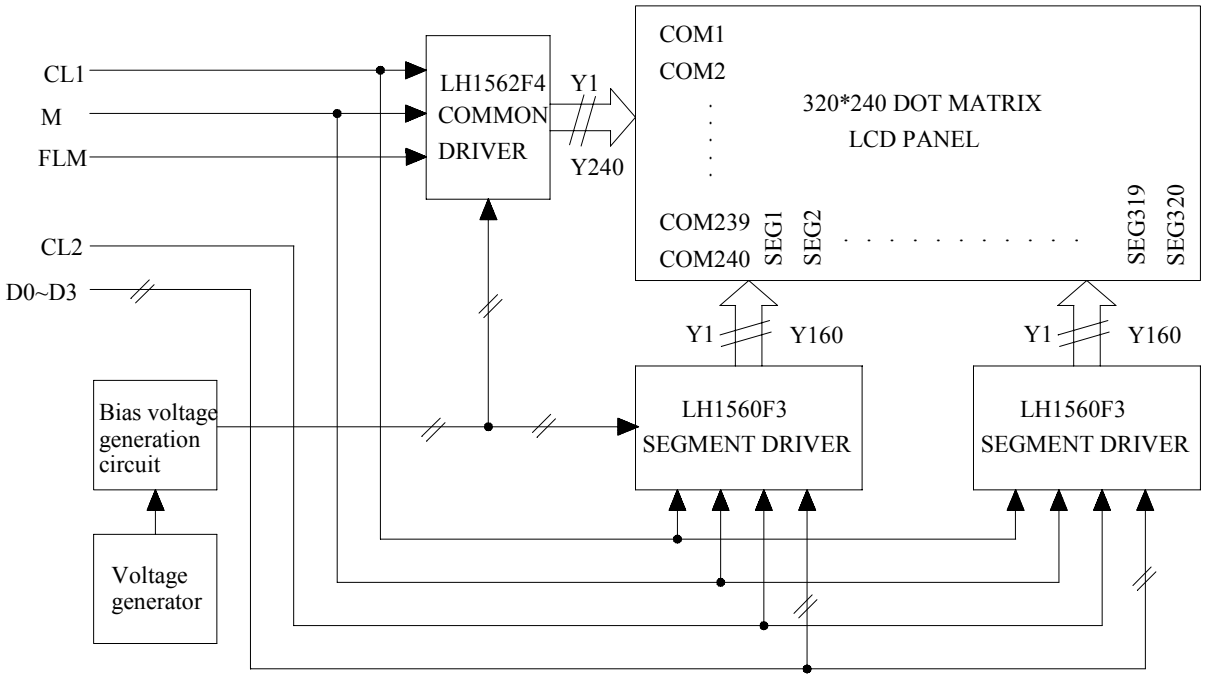


2.MODULE STRUCTURE

The PG320240-H includes a common driver, two segment drivers, a bias voltage generation circuit, a LCD voltage generation circuit, and an edge type LED backlight.

2.1 Driver ICS

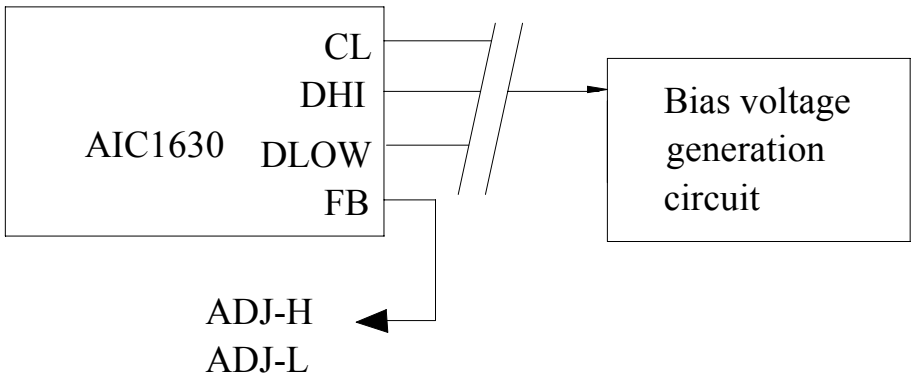
- Segment driver : LH1560F3*2 (SHARP)
- Common driver : LH1562F4*1 (SHARP)
- Block diagram



2.2 LCD Voltage Generator

The bias voltage of the LCD display shall be generated on the LCD module. AN ADVANCE INFORMATION AIC1630 voltage regulator circuit generates the voltage needed to properly driver the LCD.

- Block diagram



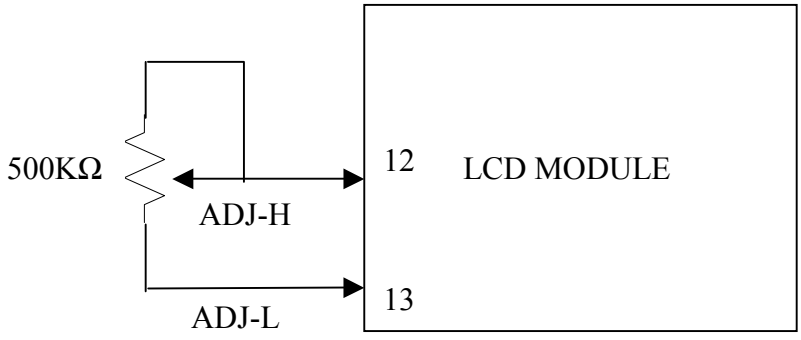
2.3 Interface Pin Description

PIN	SIGNAL NAME	DESCRIPTION
1	FLM	Indicates the beginning of each display cycle.
2	M	AC signal input for LC driving waveform
3	CL1	Bi-directional shift register shift clock pulse input pin.
4	CL2	Clock input pin for taking display data
5	/D-OFF	Control input pin for output deselect level
6	DB0	Display data input pin
7	DB1	Display data input pin
8	DB2	Display data input pin
9	DB3	Display data input pin
10	VDD	Logic system power supply pin
11	VSS	Ground pin
12	ADJ-H	Contrast adjust(1)
13	ADJ-L	Contrast adjust(2)
14	NC	No connection
15	A	Power supply for Backlight (+)
16	K	Power supply for Backlight (-)

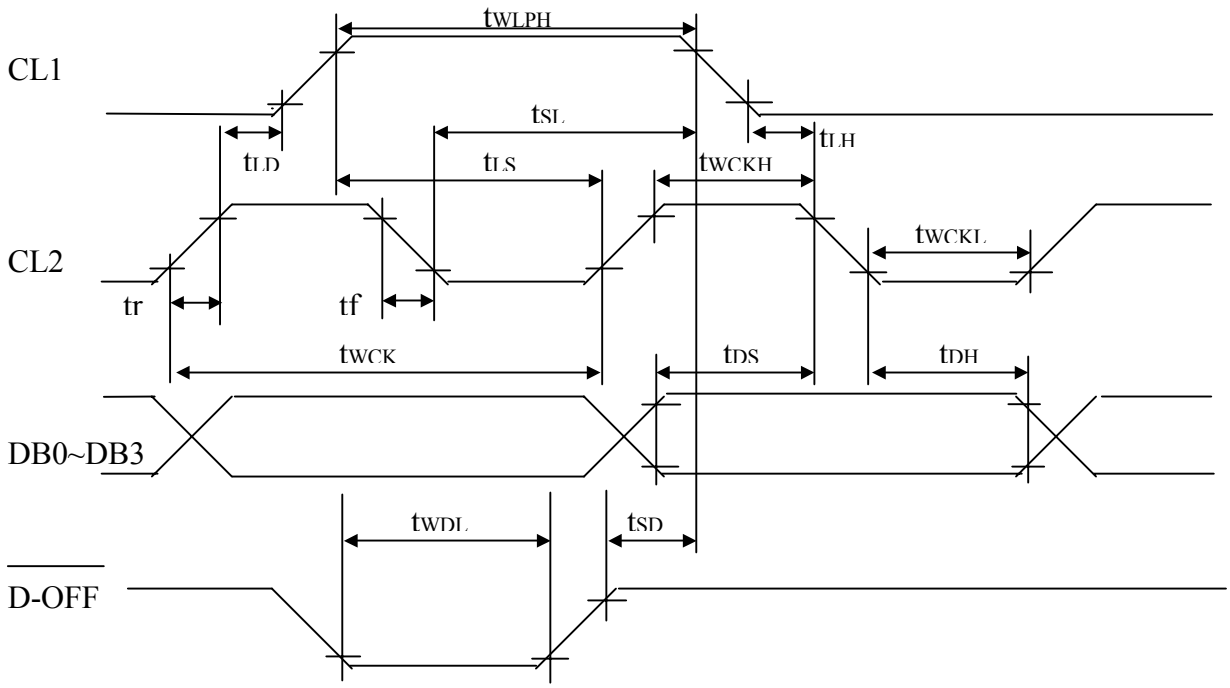
Touch Panel

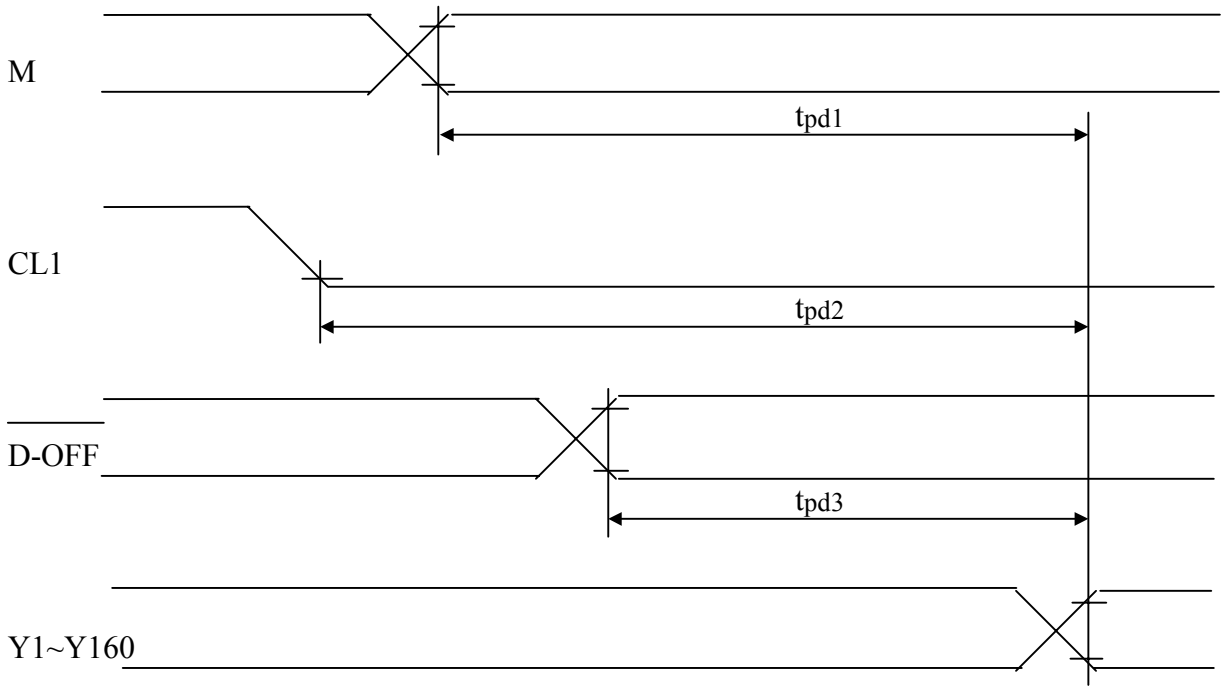
PIN	SIGNAL NAME	DESCRIPTION
1	YU	Linearity Up Y axis
2	XR	Linearity Right X axis
3	YD	Linearity Down Y axis
4	XL	Linearity Left X axis

● Contrast Adjust



2.4 Timing Characteristics





Vss=0V, Vdd=+4.5V to +5.5V, Ta=25℃

Parameter	Symol	Condition	Min.	Typ.	Max.	Unit
Shift clock period	t_{WCK}	t_r,t_f≦10 ns	71			ns
Shift clock “H” pulse width	t_{WCKH}		23			ns
Shift clock “L” pulse width	t_{WCKL}		23			ns
Data setup time	t_{DS}		10			ns
Data hold time	t_{DH}		20			ns
Latch pulse “H” pulse width	t_{WLPH}		23			ns
Shift clock rise to Lath pulse rise time	t_{LD}		0			ns
Shift clock fall to Lath pulse fall time	t_{SL}		25			ns
Latch pulse rise to Shift clock rise time	t_{LS}		25			ns
Latch pulse fall to Shift clock fall time	t_{LH}		25			ns
Input signal rise time	t_r				50	ns
Input signal fall time	t_f				50	ns
/Dispoff removal time	t_{SD}		100			ns
/Dispoff “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

2.5 Touch Panel

● Touch panel style

Style:	Analog resistance

● Dimension Specifications

Dimension Outline:	92.00 ± 0.3 * 71.70 ± 0.3	
Viewable area:	82.00 * 63.00	
Active area:	78.00 * 59.00	unit: mm
PET thickness:	Max. 200μm	
Glass thickness:	1.1	

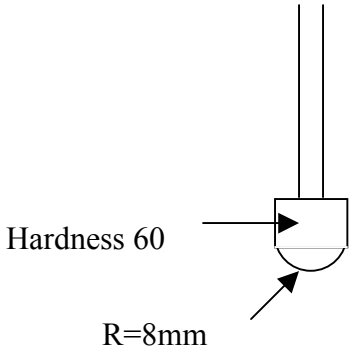
● Absolute Maximum Ratings

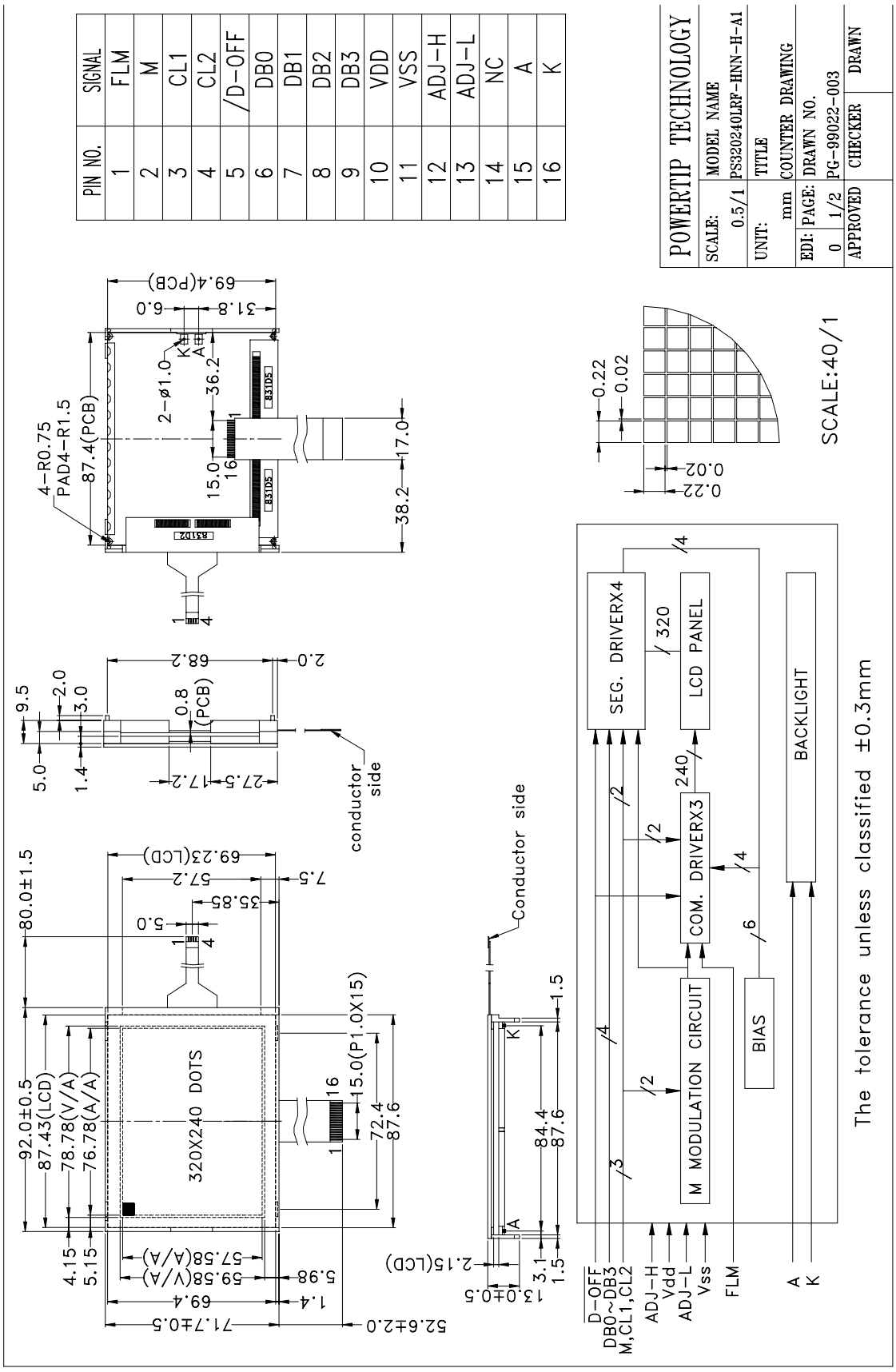
Operating temperature:	0°C ~ 50°C
Operating Humidity:	20% ~ 70% RH
Storage temperature:	-20°C ~ 70°C
Storage Humidity:	10% ~ 90% RH

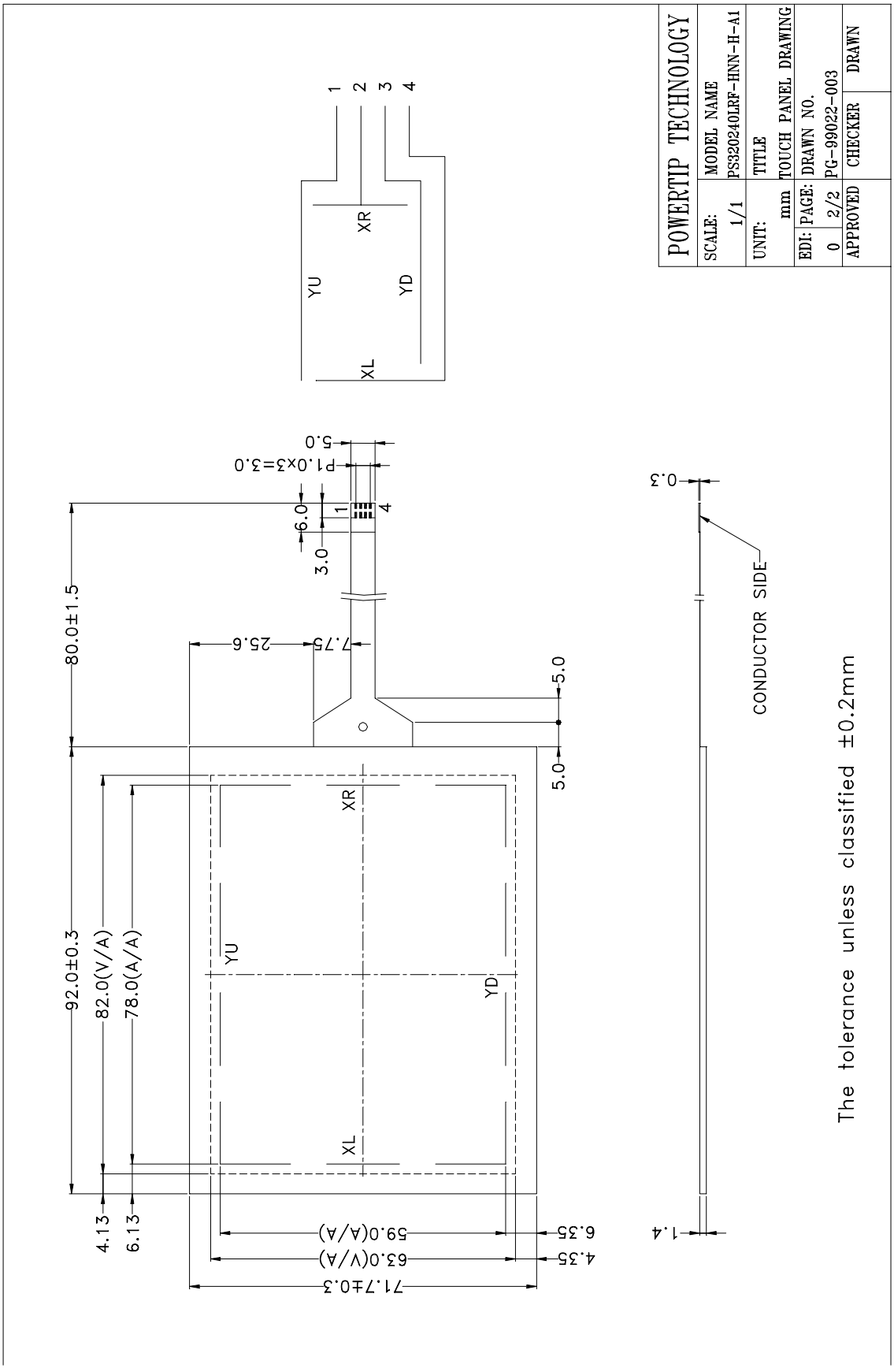
● Electrical Characteristics

Operating voltage:	DC 5V
Film resistance between leads:	150 ~ 1300Ω
Glass resistance between leads:	150 ~ 1300Ω
Insulation resistance:	Over 20MΩ (DC 25V)
Operative resistance:	Less than 2KΩ
Linearity deviation:	Less than 1.5%

● Touching bar: Operative force less than 40g
Forehead R=8mm, hardness 60




PIN NO. SIGNAL
1 FLM
2 M
3 CL1
4 CL2
5 /D-OFF
6 DB0
7 DB1
8 DB2
9 DB3
10 VDD
11 VSS
12 ADJ-H
13 ADJ-L
14 NC
15 A
16 K
POWERTIP TECHNOLOGY
SCALE: 0.5/1
MODEL NAME PS320240LRF-HNN-H-A1
UNIT: mm
TITLE COUNTER DRAWING
EDI: PAGE: 0 1/2
DRAWN NO. PG-99022-003
APPROVED CHECKER DRAWN
SCALE:40/1
The tolerance unless classified ±0.3mm
SEG. DRIVERX4
LCD PANEL
COM. DRIVERX3
M MODULATION CIRCUIT
BIAS
BACKLIGHT
320X240 DOTS
Conductor side
D-OFF
DB0~DB3
M,CL1,CL2
ADJ-H
Vdd
ADJ-L
Vss
FLM
A
K


POWERTIP TECHNOLOGY
SCALE: 1/1
MODEL NAME
PS320240LRF-HNN-H-A1
UNIT: mm
TITLE
TOUCH PANEL DRAWING
EDI: 0
PAGE: 2/2
DRAWN NO.
PG-99022-003
APPROVED
CHECKER
DRAWN
1
2
3
4
XR
YU
YD
XL
5.0
P1.0x3=3.0
6.0
3.0
80.0±1.5
7.75
25.6
5.0
5.0
92.0±0.3
82.0(V/A)
78.0(A/A)
4.13
6.13
59.0(A/A)
63.0(V/A)
71.7±0.3
6.35
4.35
0.3
1.4
CONDUCTOR SIDE
The tolerance unless classified ±0.2mm