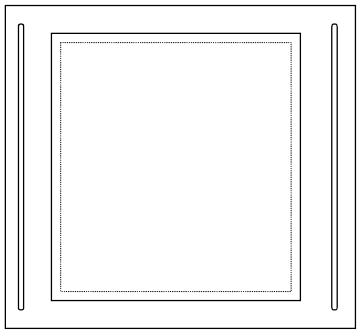
HANTRONIX

PRODUCT SPECIFICATION

HDM160GS16

160x160 GRAPHICS
LCD DISPLAY MODULE



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	**Q.A.:** JK	**REV.:** 1.1	HDM160GS16	SHEET 1 OF 16 **DATE:** 4/9/02

1. MECHANICAL DATA

(1) Part Name		HDM160GS16
(2) Module Size		70.5(W)mm X90.5(H)mm X 10.8(D)mm (EL B/L)
(3) Dot Size		0.335 (W)mm x 0.335 (H)mm
(4) Dot Pitch		0.350 (W)mm x 0.350 (H)mm
(5) Number of Dots		160 (W) x 160 (H)Dots
(6) Duty		1/160
(7) LCD Display Mode	STN:	☐ Normally White
		☐ Normally White(Special Lighter Background Color)
	Rear Polarizer:	☐ Transflective(Normal)
		☐ Transflective(3M)
(8) Viewing Direction		6 O'clock
(9) Controller		Excluded
(10) Backlight		EL B/L (BLUE GREEN)
(11) Weight		47.9 g (approx)

2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

Vss=0V Standard

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	7.0	V	
Power Supply For LC Drive	VEE-VSS	-0.3	30	V	
Input Voltage	VI	-0.3	VDD+0.3	V	
Static Electricity	-	-	-	-	Note 1

Note 1 : LCM should be grounded during handling LCM.

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	0	50	-20	70
Humidity (Without Condensation)	Note 2,4		Note 3,4	

Note 2 : Ta≦50°C : 85%RH max
Ta>50°C : Absolute humidity must be lower than the humidity of 85%RH at 50°C

Note 3 : Ta at -20°C will be < 48hrs,at 70°C will be < 120 hrs

Note 4 : Background color will change slightly depending on ambient temperature. That phenomenon is reversible.

3. ELECTRICAL CHARACTERISTICS

(VDD= 3.3V ± 5%)

ITEM		SYMBOL		CONDITION		MIN.	TYP.	MAX.	UNIT
Input Voltage		VIH		H level		0.8VDD	–	VDD	V
		VIO		L level		0	–	0.2VDD	V
Recommended LC Driving Voltage		VEE−VSS (Vop)		1/160 Duty 1/13 Bias	0°C	20.7	21.0	21.3	V
					25°C	20.2	20.5	20.8	
					50°C	19.3	19.6	19.9	
Power Supply Current		IDD		VDD=3.3V VSS=0V VEE=20.5V FLM=70Hz		–	0.03	0.05	mA
		IEE				–	1.0	1.5	
Power Supply Current For EL		$I_{BATTERY+}$		BATTERY+= 3.3V EL_ON= 3.3V (VEL=55V,125Hz)		–	17.5	26.3	mA
LCM	Surface Luminance	L	VDD= 3.3V VSS= 0V VEE−VSS= 20.5V BATTERY+= 3.3V EL_ON= 3.3V	S403J	PATTERN: (Dots All On)	–	0.11	–	cd/m^2
				M403L		–	0.99	–	
				S403J	PATTERN: (Dots All Off)	–	0.53	–	
				M403L		–	0.12	–	

4. OPTICAL CHARACTERISTICS

AT V_{OP}

ITEM / MODE		Cr(Contrast Ratio)						θ(Viewing Angle)		ø(Viewing Angle)	
		0°C		25°C		50°C		25°C		25°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
S	J	2	10	2	12	2	8	–	83	–	38
M	L	7.6	7.9	8.3	8.6	6.2	6.5	–	83	–	38
Note		NOTE 6						NOTE 5			

NOTE :

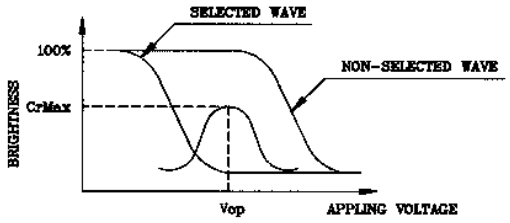
S: TRANSFLECTIVE
M: TRANSFLECTIVE(3M)
J: NORMALLY WHITE
L: NORMALLY WHITE(SPECIAL LIGHTER BACKGROUND COLOR)

AT ø=0° θ=0°

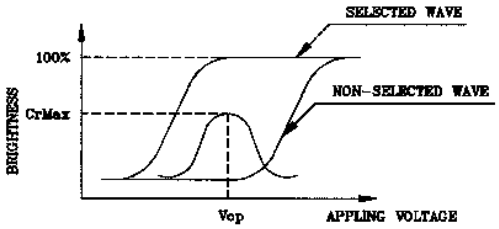
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0°C	350	700	1100	ms	NOTE 2
		25°C	120	250	380		
		50°C	50	100	150		
Response Time (fall)	Tf	0°C	150	300	450	ms	NOTE 2
		25°C	50	100	150		
		50°C	20	40	60		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



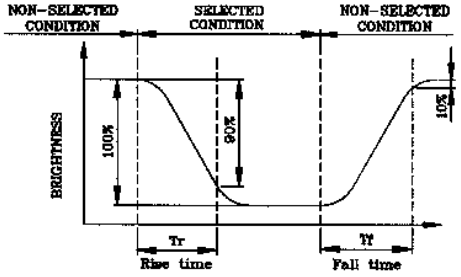
(negative type)

*Conditions

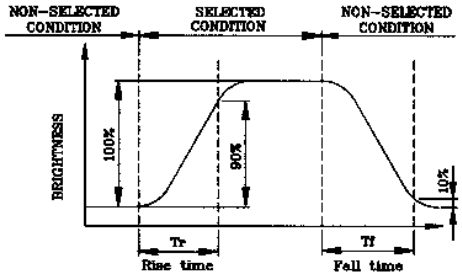
Viewing Angle : 0
Frame Frequency : 70Hz
Appling Waveform : I/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



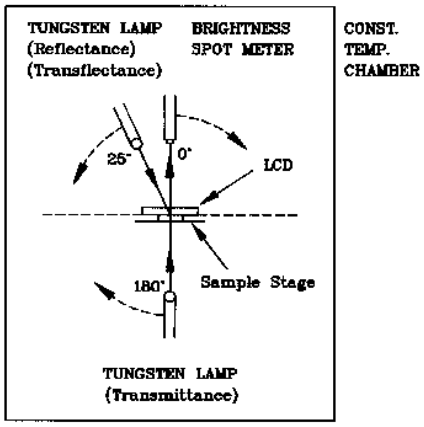
(negative type)

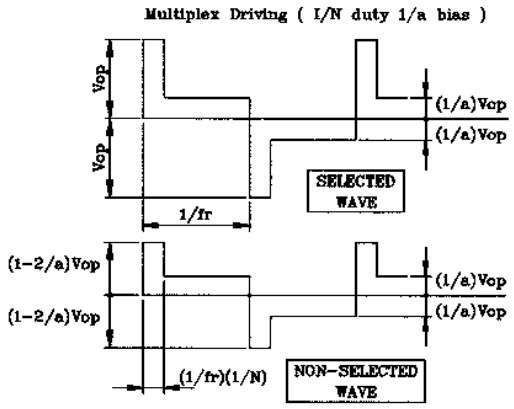
*Conditions

Operating Voltage : Vop
Viewing Angle (ϕ,θ) : (0,0)
Frame Frequency : 70Hz
Appling Waveform : I/N duty 1/a bias

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms





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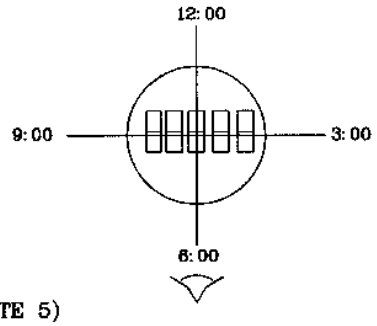
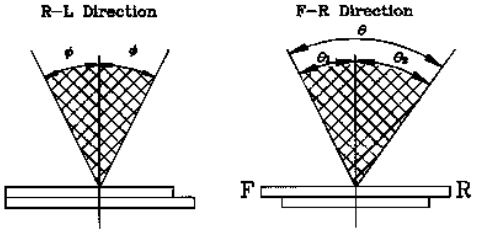
(NOTE 4)

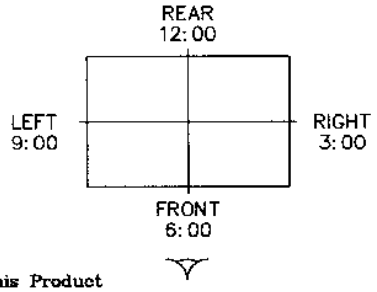
Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle





*For This Product

The Viewing Direction Is 6 O'clock

So $\theta 1 > \theta 2$

$\theta = \theta_1 + \theta_2$

*Conditions

Operating Voltage : Vop

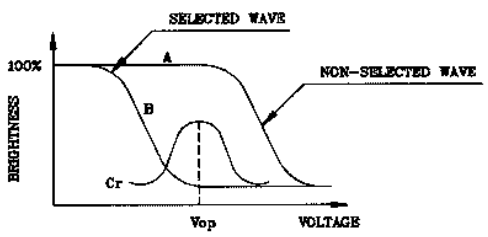
Frame Frequency : 70Hz

Appling Waveform : 1/N duty 1/a bias

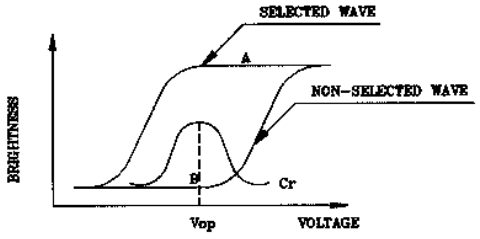
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



(negative type)

Contrast Ratio : Cr=A/B

*Conditions

Viewing Angle : 0

Frame Frequency : 70Hz

Appling Waveform : 1/N duty 1/a bias

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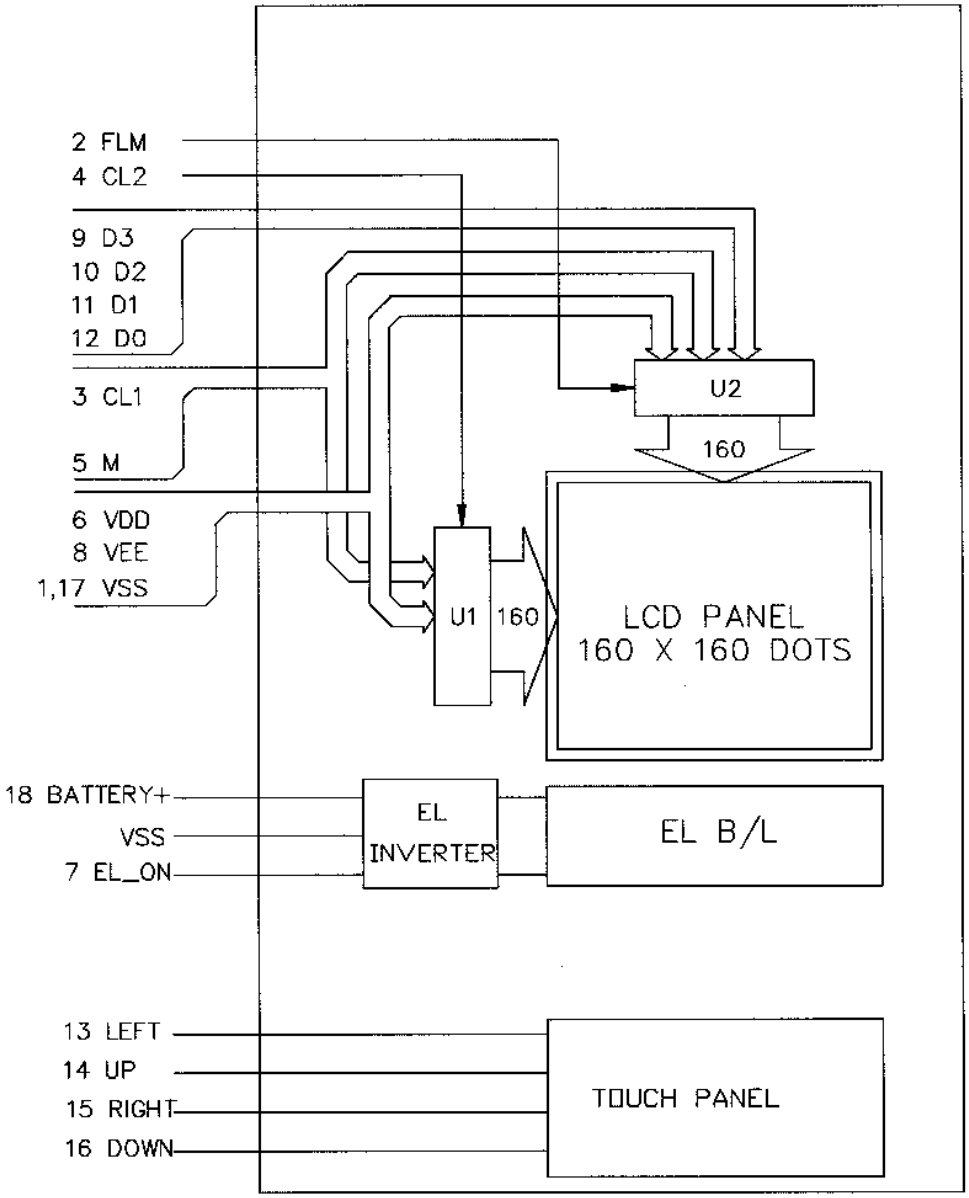
5. BLOCK DIAGRAM



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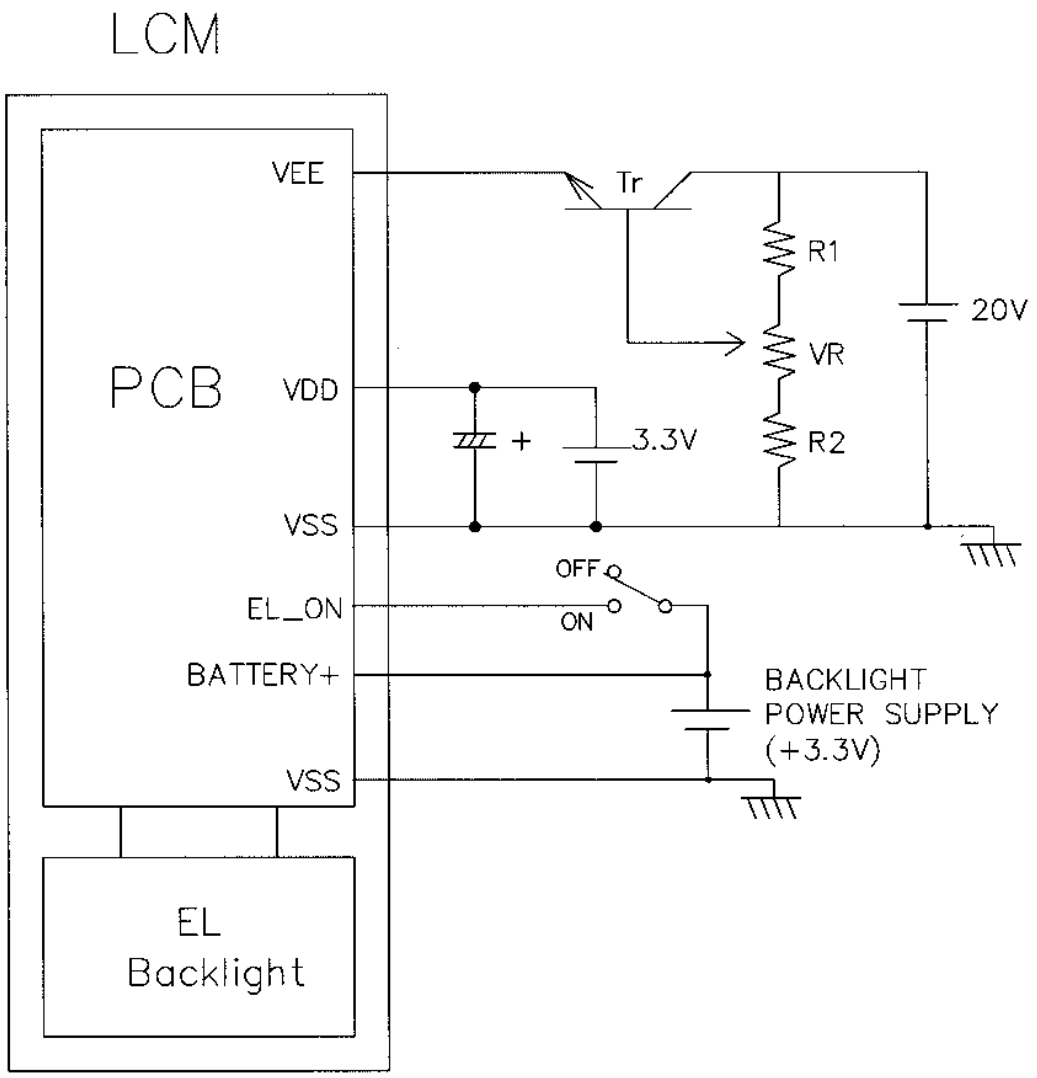
6. INTERNAL PIN CONNECTION

FFC,18Pins,Pitch 1.0 mm

Pin No.	Symbol	Function
1	VSS	Power Supply (0V)
2	FLM(EIO2)	First Line Mark for Common Scan
3	CL1(LP)	H → L DATA Latch Pulse
4	CL2(XCK)	Clock Pules for Segment shift regieter
5	M(FR)	H/L Frame Reverse Signal
6	VDD	H/L Supply for logic (+3.3V)
7	EL ON	EL Back Light ON/OFF ("H"=ON,"L"=OFF)
8	VEE	Power Supply for LCD
9	D3	H/L Display Data
10	D2	H/L Display Data
11	D1	H/L Display Data
12	D0	H/L Display Data
13	LEFT	Touch Panel Connection
14	UP	
15	RIGHT	
16	DOWN	
17	VSS	Power Supply (0V)
18	BATTERY+	Power Supply For EL Backlight

Mating Connector : MOLEX 52807-1810 or COMPATIBLE

7. POWER SUPPLY



NOTE :

1. R1+R2+VR=10~20KΩ

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8. TIMING CHARACTERISTICS

8-1. INTERFACE TIMING

@ VDD=3.0V±5%, Ta=-20~85 ℃

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
CL2 Cycle Time	tC	Fig.a	125	–	–	ns
CL2 Pulse Width	tSWH,tSWL	Fig.a	51	–	–	ns
CL2 Rise/Fall Time	tCR,tCF	Fig.a	–	–	50	ns
Data Set Up Time	tDSU	Fig.a	30	–	–	ns
Data Hold Time	tDHD	Fig.a	40	–	–	ns
CL1 Cycle Time	tL	Fig.b	250	–	–	ns
CL1 "H" Pulse Width	tLWH	Fig.a , Fig.b	51	–	–	ns
CL1 Rise/Fall Time	tLR,tLF	Fig.b	–	–	50	ns
CL2 To CL1 Delay Time	tCL	Fig.a	51	–	–	ns
CL1 To CL2 Delay Time	tLC	Fig.a	51	–	–	ns
FLM TO CL1 SETUP TIME	tFLS	Fig.b	30	–	–	ns
FLM TO CL1 HOLD TIME	tFLH	Fig.b	50	–	–	ns

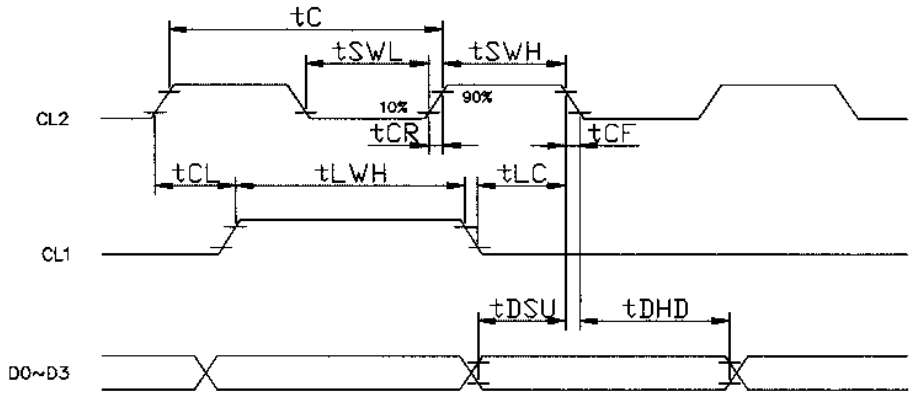


Fig . a Interface timing (SEGMENT)

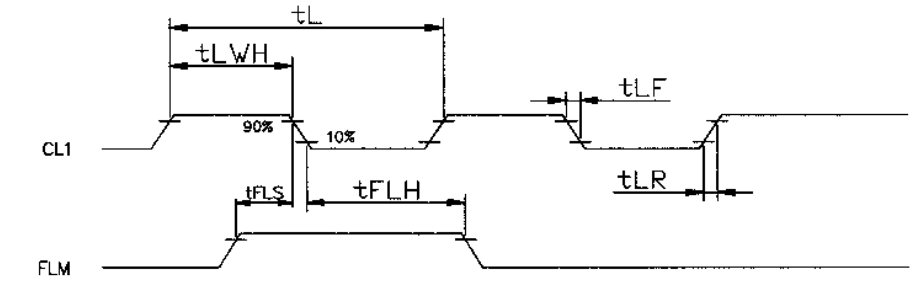
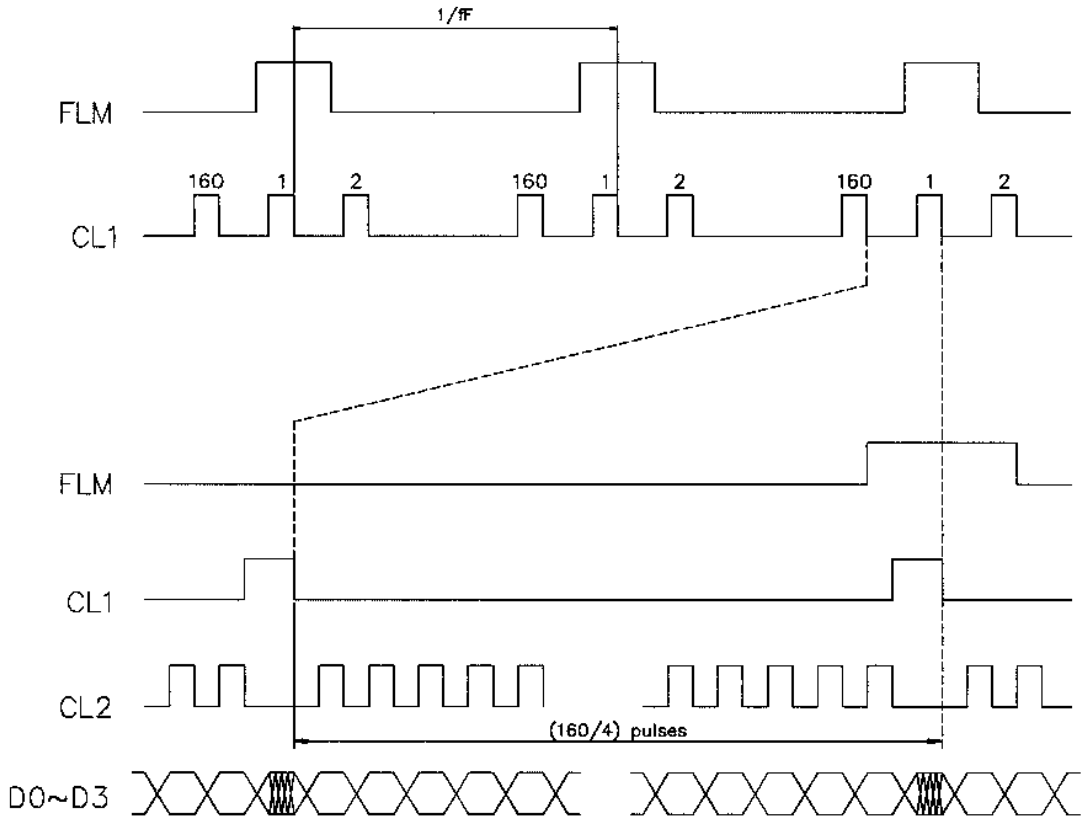


Fig . b Interface timing (COMMON)

8-2. TIMING CHART OF INPUT SIGNAL



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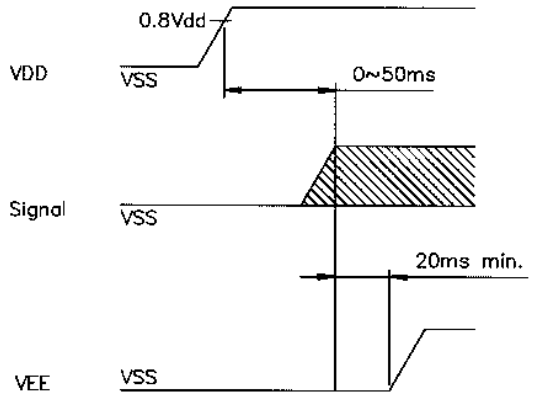
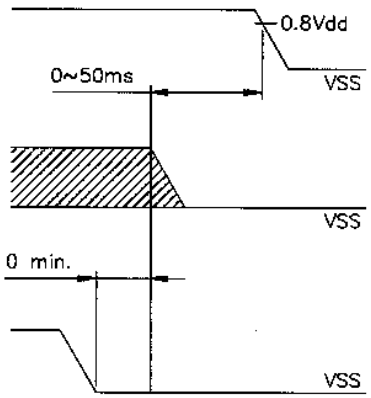
8-3. POWER ON/OFF TIMING



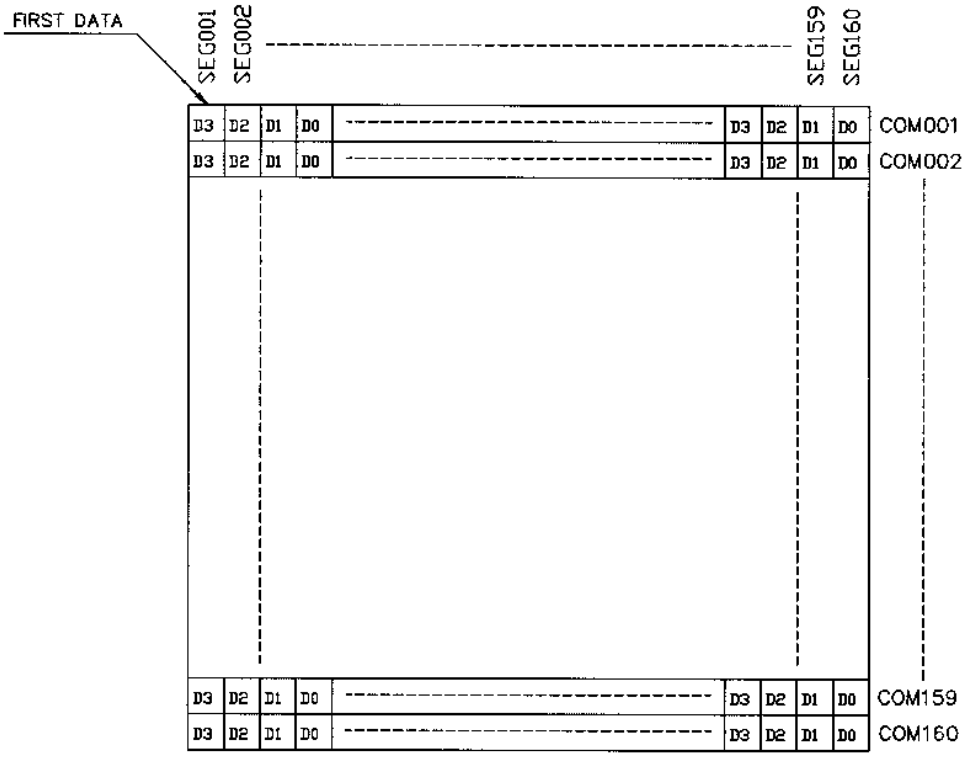
POWER ON



POWER OFF

The missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

8-4. DISPLAY PATTERN



D0: (1•4)、(1•8) •••••(160•160)
D1: (1•3)、(1•7) •••••(160•159)
D2: (1•2)、(1•6) •••••(160•158)
D3: (1•1)、(1•5) •••••(160•157)

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NOTICE:

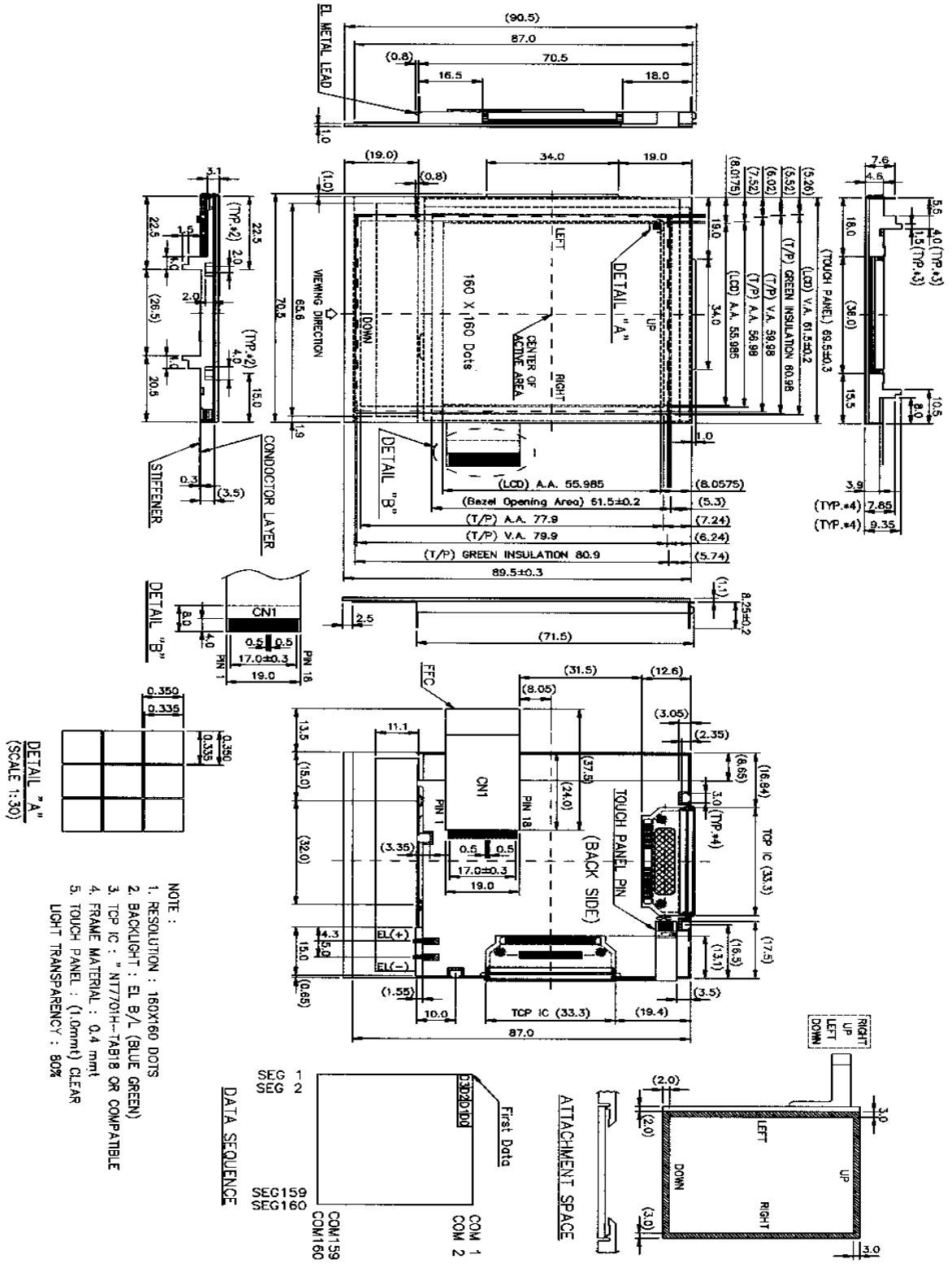
- SAFETY
  1. If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.
  2. If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.

- HANDLING
  1. Avoid static electricity which can damage the CMOS LSI.
  2. Do not remove the panel or frame from the module.
  3. The polarizing plate of the display is very fragile. So, please handle it very carefully.
  4. Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
  5. Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.

- STORAGE
  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.
  2. Do not place the module near organics solvents or corrosive gases.
  3. Do not crush, shake, or jolt the module.

- TERMS OF WARRANT
  1. Acceptance inspection period
     The period is within one month after the arrival of contracted commodity at the buyer's factory site.
  2. Applicable warrant period
     The period is within twelve months since the date of shipping out under normal using and storage conditions.

- THE OPERATING LIFE TIME OF BACK LIGHT
  EL : 1000hrs for AC 100Vrms, 400Hz, 20°C, 60%RH
  (Operating life time is defined as follows : The final brightness is at 50% of original brightness.)



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