Spec Code	S C – 010005510

EPSON

S P E C I F I C A T I O N S

E G 2 4 0 2 S – A R

Item No	I t e m	S h e e t C o d e
1	Basic Specification Outline Dimensions	1 1 – 010005510 1 2 – 24006400 1 3 – 20000001 S D – 0 1 0 1 5 0
2	Absolute Maximum Ratings	2 1 – Z0000000
3	Electrical Characteristics	3 1 – 010005510 3 2 – A0000003 3 3 – A0000003
4	Optical Characteristics	4 1 – SA648L03 4 2 – AN000002 4 3 – P0000000 4 4 – P0000000
5	Reliability	5 1 – S0000001 5 2 – S0000000
6	Package Specifications	6 1 – 010005510 6 2 – 010005510
7	Others	A 1 – S0000006(1~2) A 2 – S0000003
8	Handling Precautions	B – PNMN0001-A(1~3)
9	Revision Sheet	0 0 – 010005510

S E I K O E P S O N C O R P O R A T I O N
L C D D I V I S I O N

LD DESIGN Dep.		
K.Ushikoshi		M. Miyashita

1. Basic Specifications

1-1 Display Specifications

(1) STN Mode Positive Display type Reflective Model

(2) Display Color

Display Color : Display Data"1" : Dark Blue
Background Color : Display Data"0" : Gray

(3) Viewing Angle : 6 O'clock direction

(4) Driving Duty : 1/64 Duty

*1) Color tone is slightly changed by temperature and driving voltage.

1-2 Mechanical Specifications

(1) Outline Dimensions : Refer to attached Outline Dimensions figure SD-010150

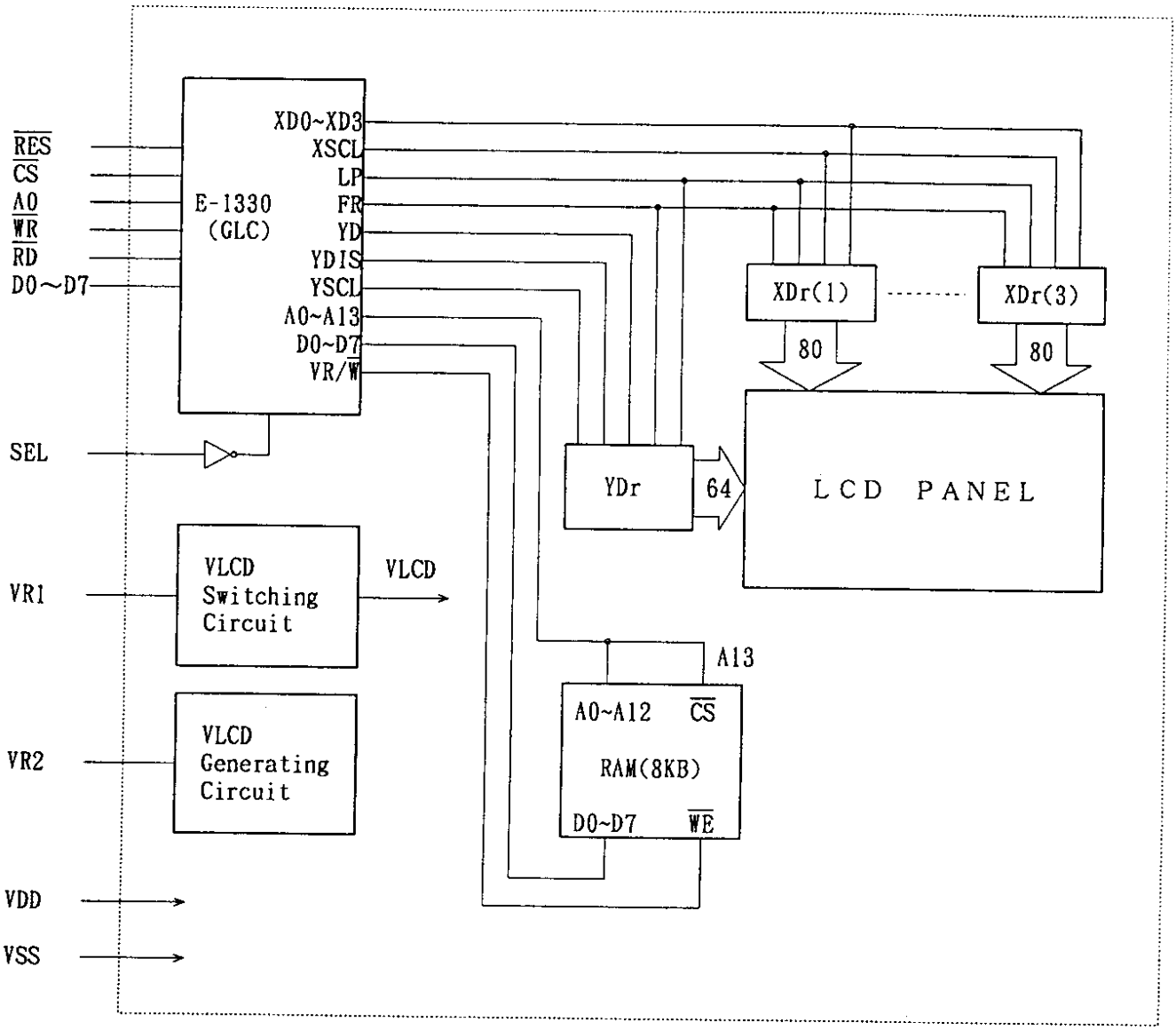
(2) Dot Matrix : 240 dots × 64 dots

(3) Dot Size : 0.58 (W) × 0.82 (H) (mm)

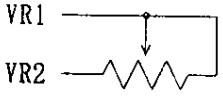
(4) Dot Pitch : 0.62 (W) × 0.86 (H) (mm)

(5) Weight : 220 g (Approx.)

1-3 Block Diagram



1-4 Terminal Functions

Pin No.	Symbol	I/O	Function
1	VDD	-	Power Supply
2	VSS	-	Ground
3	NC	-	——
4	$\overline{RES}$	I	Reset
5	$\overline{CS}$	I	Chip Select
6	A0	I	Data Type Select
7	$\overline{WR}$(R/$\overline{W}$)	I	Write Signal (Read/Write Signal)
8	$\overline{RD}$(E)	I	Read Signal (Enable Clock)
9～16	D0～D7	I/O	Data bus
17	SEL	I	MPU Select "H" = 8080family, "L" = 6800famliy
18	VR1	-	VLCD Adjusting Terminal VR1  5~10KΩ
19	VR2	-	
20	NC	-	——

( ) : Signals for 6800family

Interface for 8080family

A0	$\overline{RD}$	$\overline{WR}$	Function
0	0	1	Status flag Read
1	0	1	Display data and Cursor address Read
0	1	0	Display data and Parameter Write
1	1	0	Command Write

Interface for 6800family

A0	R/$\overline{W}$	E	Function
0	1	1	Status flag Read
1	1	1	Display data and Cursor address Read
0	0	1	Display data and Parameter Write
1	0	1	Command Write

2. Absolute Maximum Ratings

Item	Symbol	Standard Value	Unit	Condition
Power supply Voltage	VDD－VSS	0 ～ ＋7．0		
Input Voltage	VIN	VSS≦ VIN ≦VDD		
Operating Temperature Range	TOP	0 ～ ＋50	℃	Not to be dewy
Storage Temperature Range	TST	－20 ～ ＋60		

3. Electrical Characteristics

3-1 DC Characteristics

Module DC Characteristics

Ta = 0 ~ 50 °C, VDD = 5 V ± 5 %

Item	Symbol	Standard Value			Unit	Applicable Terminal	Condition
		MIN	TYP	MAX			
Power Supply Voltage	VDD	4.75	5.0	5.25	V	VDD	
"1" Input Voltage	VIH1	2.2	–	VDD		A0, $\overline{CS}$, $\overline{RD}$ $\overline{WR}$ D0~D7	
"0" Input Voltage	VIL1	0	–	0.8			
"1" Input Voltage	VIH2	0.8VDD	–	VDD		SEL	
"0" Input Voltage	VIL2	0	–	0.2VDD			
"1" Output Voltage	VOHT	2.4	–	–		D0~D7	IOH=-5mA
"0" Output Voltage	VOLT	–	–	0.4			IOL=5mA
Rising-edge threshold voltage	VT+	0.5VDD	0.7VDD	0.8VDD	V	$\overline{RES}$	
Falling-edge threshold voltage	VT-	0.2VDD	0.3VDD	0.5VDD			
Input Leak Current	ILI	–	0.05	2.0	μA	A0, $\overline{CS}$, $\overline{RD}$ $\overline{WR}$, D0~D7	
Output Leak Current	ILO	–	0.1	5.0		D0~D7	
Power Supply Current	IDD	–	15	50	mA	VDD	

3-2 AC Characteristics

3-2-1 Sytem bus timing for 8080family

VDD = 5.0 V ± 5 %

Signal	Parameter	Symbol	MIN	MAX	Unit	Condition
A0, $\overline{CS}$	Address hold time	tAH8	10	–	ns	CL=100pF+1TTL
	Address setup time	tAW8	30	–	ns	
$\overline{WR}$, $\overline{RD}$	System cycle time	tCYC8	*1	–	ns	
	Strobe pulse width	tcc	220	–	ns	
D0~D7	Data setup time	tDS8	120	–	ns	
	Data hold time	tDH8	10	–	ns	
	$\overline{RD}$ access time	tACC8	–	120	ns	
	Output disable time	tOH8	10	50	ns	

*1 : For Memory control and System control commands;
tCYC8 = 4tc+tcc-45 > 3tc+125 (ns)
For all other commands;
tCYC8 = 4tc+tcc+30 (ns)

3-2-2 Sytem bus timing for 6800family

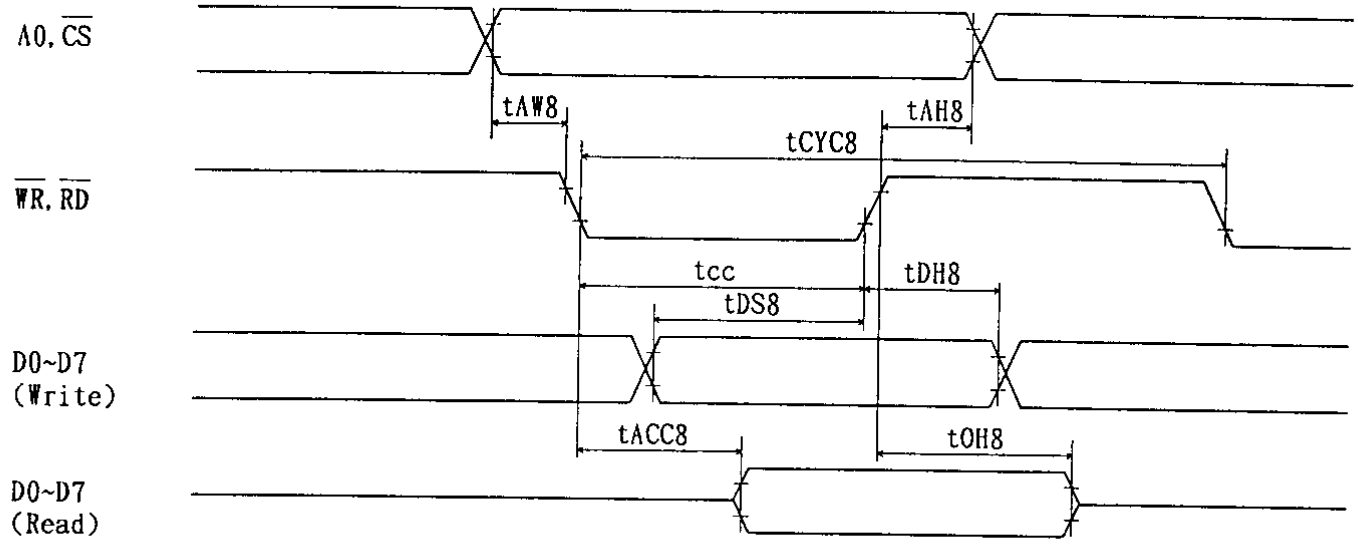
VDD = 5.0 V ± 5 %

Signal	Parameter	Symbol	MIN	MAX	Unit	Condition
A0, $\overline{CS}$_ R/W	System cycle time	tCYC6	*2	–	ns	CL=100pF+1TTL
	Address setup time	tAW6	30	–	ns	
	Address hold time	tAH6	10	–	ns	
D0~D7	Data setup time	tDS6	120	–	ns	
	Data hold time	tDH6	10	–	ns	
	Output disable time	tOH6	10	50	ns	
	Access time	tACC6	–	120	ns	
E	Enable pulse width	tEW	220	–	ns	

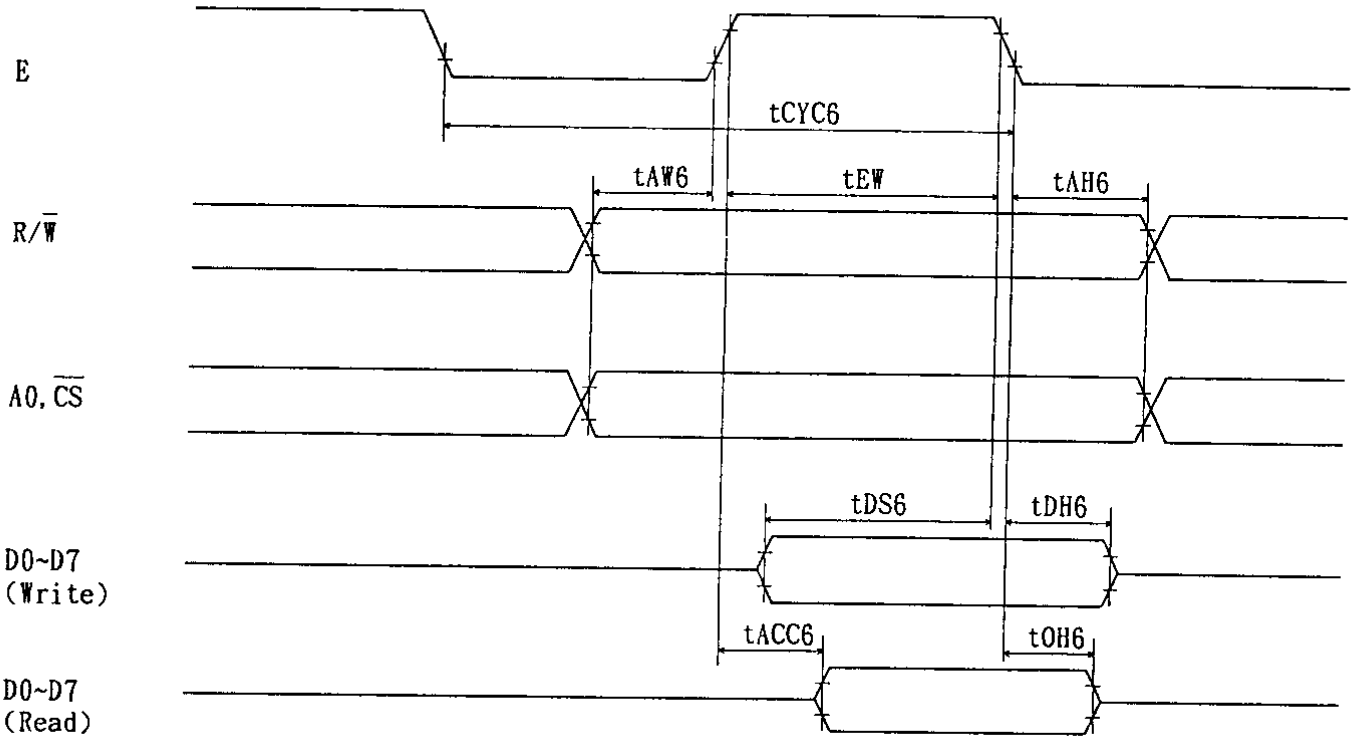
*2 : For Memory control and System control commands;
tCYC8 = 4tc+tEW-45 > 3tc+125 (ns)
For all other commands;
tCYC8 = 4tc+tEW+30 (ns)

3-3 Timing Chart

3-3-1 Timing chart for 8080family



3-3-2 Timing chart for 6800family



4. Optical Characteristics

4-1 Optical Characteristics

fFR＝７５Ｈｚ

Ｉｔｅｍ	Symbol	Temp ℃	Standard Value			Unit	Condition
			ＭＩＮ	ＴＹＰ	ＭＡＸ		
Driving Voltage	VOP	０	－	１４．６	１５．６	Ｖ	
		２５	－	１３．６	－		
		５０	１１．３	１２．３	－		
Response Time	Ｔｒ	０	－	３００	６００	ｍｓ	
		２５	－	１００	２００		
	Ｔｆ	０	－	５００	１０００		
		２５	－	１５０	３００		
Viewing Angle	θＹ１	２５	２０	－	－	ＤＥＧ	Ｋ≧２
	θＹ２		３０	－	－		
	θＸ１		２５	－	－		
	θＸ２		２５	－	－		
Contrast	Ｋ	２５	－	３	－		

*1) Vop=LCD Driving Voltage getting maximum contrast
=VDD-VLCD

7. Others

7-1 Function specification

7-1-1 Command Set

Class	Command	CODE											HEX	Description
		$\overline{RD}$	$\overline{WR}$	A0	D7	D6	D5	D4	D3	D2	D1	D0		
System control	SYSTEM SET	1	0	1	0	1	0	0	0	0	0	0	40	Initialize device and display
	SLEEP IN *1	1	0	1	0	1	0	1	0	0	1	1	53	Enter stanby mode
Display control	DISP ON/OFF	1	0	1	0	1	0	1	1	0	0	D	58, 59	Enable and disable display and display flashing
	SCROLL	1	0	1	0	1	0	0	0	1	0	0	44	Set display start address and display regions
	CSRFORM	1	0	1	0	1	0	1	1	1	0	1	5D	Set cursor type
	CGRAM ADR	1	0	1	0	1	0	1	1	1	0	0	5C	Set start address of CG-RAM
	CSRDIR	1	0	1	0	1	0	0	1	1	CD1	CD0	4C ~4F	Set direction of cursor movement
	HDOT SCR	1	0	1	0	1	0	1	1	0	1	0	5A	Set holizontal scroll position
	OVLAY	1	0	1	0	1	0	1	1	0	1	1	5B	Set display overlay format
Drawing control	CSRW	1	0	1	0	1	0	0	0	1	1	0	46	Set cursor address
	CSRR	1	0	1	0	1	0	0	0	1	1	1	47	Read cursor address
Memory control	MWRITE	1	0	1	0	1	0	0	0	0	1	0	42	Write to display memory
	MREAD	1	0	1	0	1	0	0	0	0	1	1	43	Read from display memory

•DISP ON/OFF

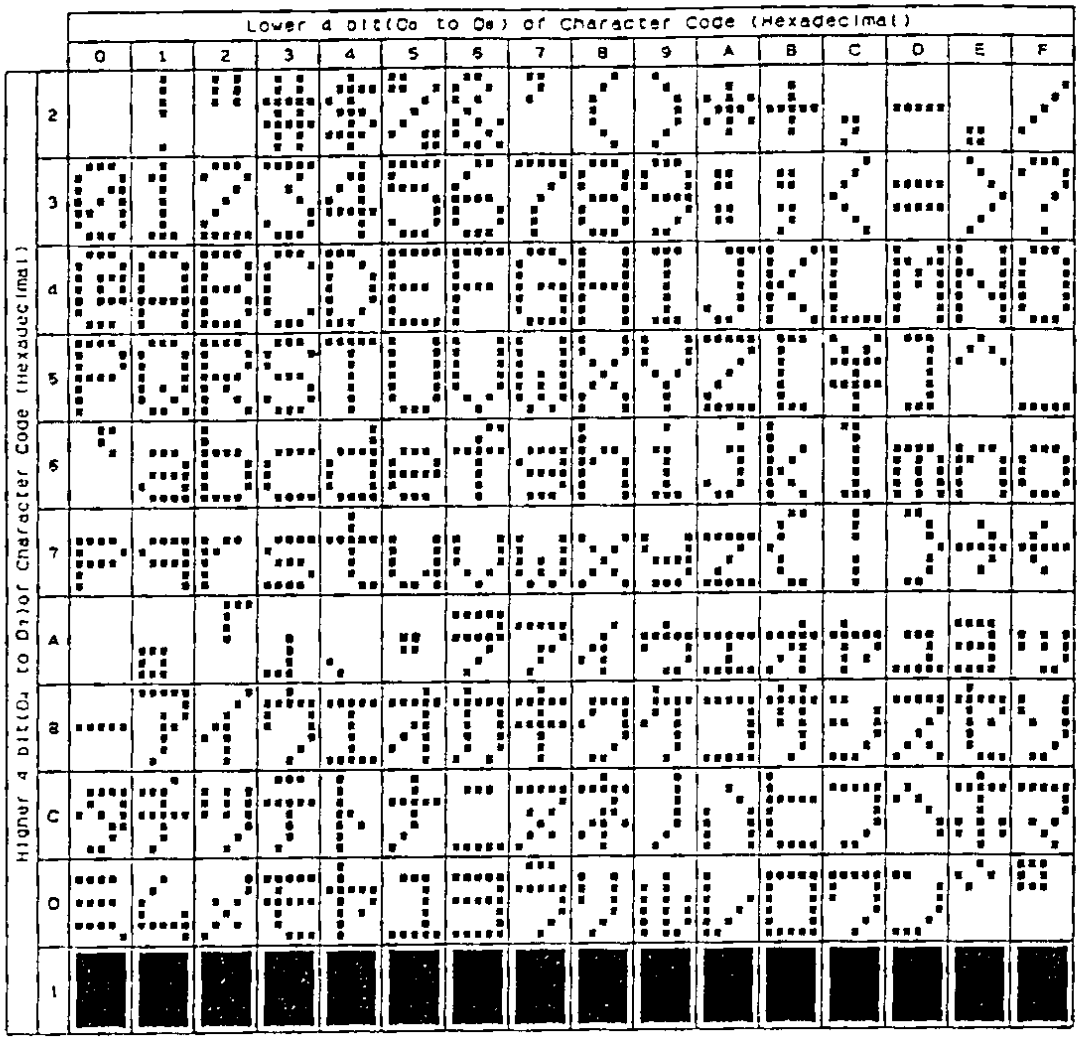
D	Function	HEX
0	Display OFF	58
1	Display ON	59

•CSRDIR

CD1	CD0	Shift direction	HEX
0	0	Right	4C
0	1	Left	4D
1	0	Up	4E
1	1	Down	4F

*1) "SLEEP IN" command is not available for EG2402-Series and EG2403-Series.

7-1-2 Charactor font (E-1330)

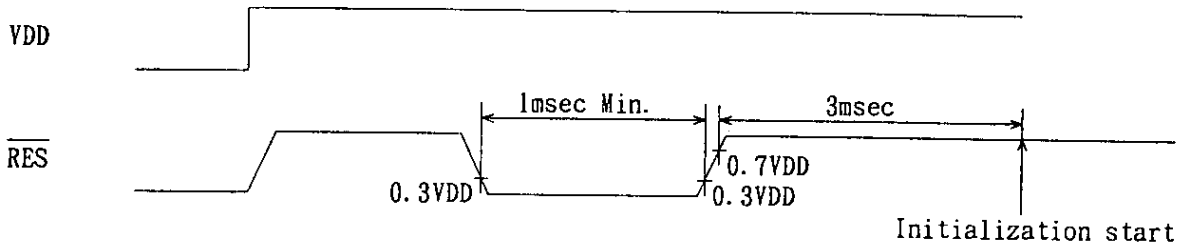


Note: The shaded positions indicate characters that have the whole 6x8-pixel.

7-2. Initialization

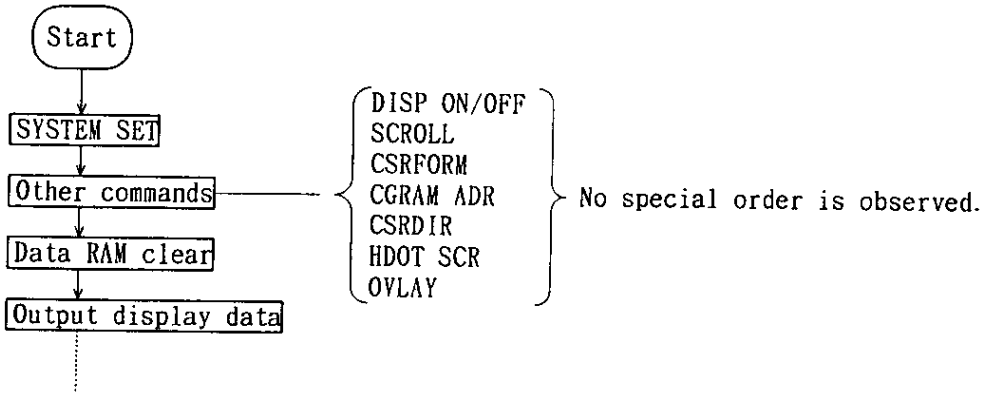
7-2-1 Reset

The E-1330 requires a reset pulse at least 1 msec long after power-on in order to re-initialize its internal state.
The E-1330 cannot receive commands while it is being reset.
Commands to initialize the internal registers should be issued soon after a reset.
A delay of 3 msec is required following the rising edge of RES to allow for system stabilization.

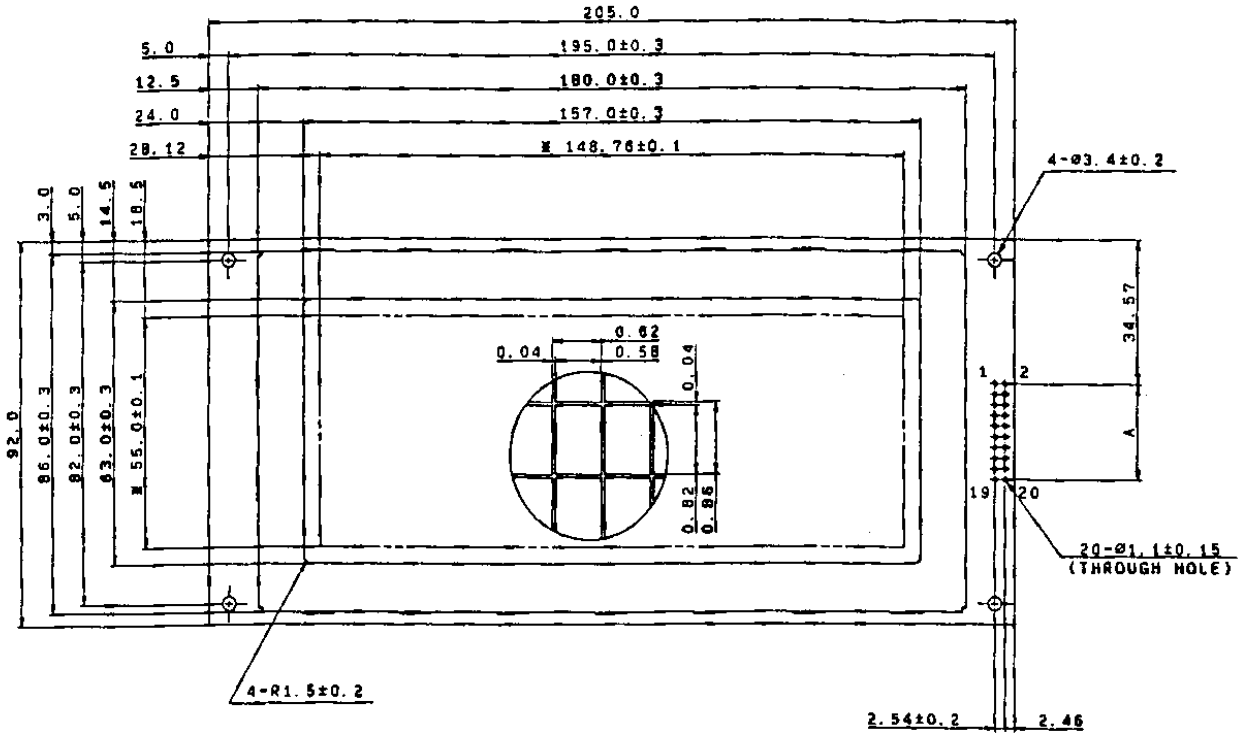


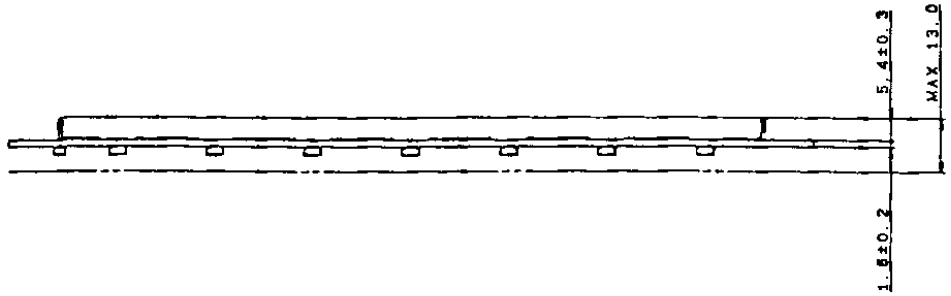
7-2-2 Initialization

The E-1330 can be initialized into some modes.
In each case, the command of "SYSTEM SET" is should be written into the E-1330 first.



About details of commands and parameters for initialization, refer to "E-1330 Application Manual".





NOTES

1. B : ACTIVE AREA

2. A : PITCH 2.54±0.2×(10-1)=22.86±0.2

E				
D				
C				
B				
A				
RELEASE TO PROD.	96/4/1 KR			
DESIGN RELEASE	96/3/28			

MODEL: EG2402*-AR

TITLE: OUTWARD DWG.

DWG NO: SD-010150

PART NO:

SCALE	UNIT	TOL.	DATE
1/1	MM	±0.5	96/3/29

MDD	CHIEF	CHECK	DRAWN
			HIRATA

シート 1