

# SED1230 Series

## LCD DRIVER-CONTROLLER

### DESCRIPTION

The SED1230 Series are intelligent CMOS LCD controller-drivers with the ability to display characters (5 × 7) and icons. The SED1230 Series communicates with a high-speed microprocessor such as the Intel 80XX or 68XX family through a serial or 4/8-bit parallel interface.

These devices incorporate an internal DC/DC converter to generate the negative voltage needed for the LCD contrast. The controller features software contrast adjustment by command setting.

The device has internal CGROM with the maximum capacity of 256 characters (5 × 7 dots). The user can store four different characters in the CGRAM area. The device has built-in display data RAM which is capable of displaying up to 48 characters.

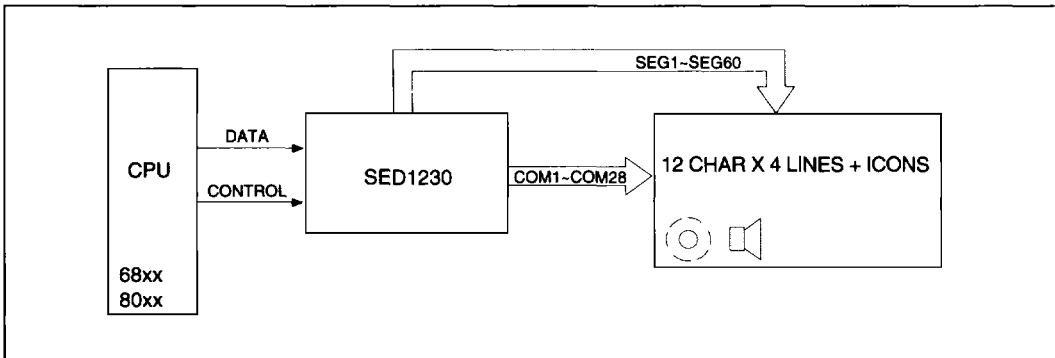
The SED1230 Series has a symbol register which can be set to generate the on-screen symbol display. The symbol capacity is 64 bits.

### FEATURES

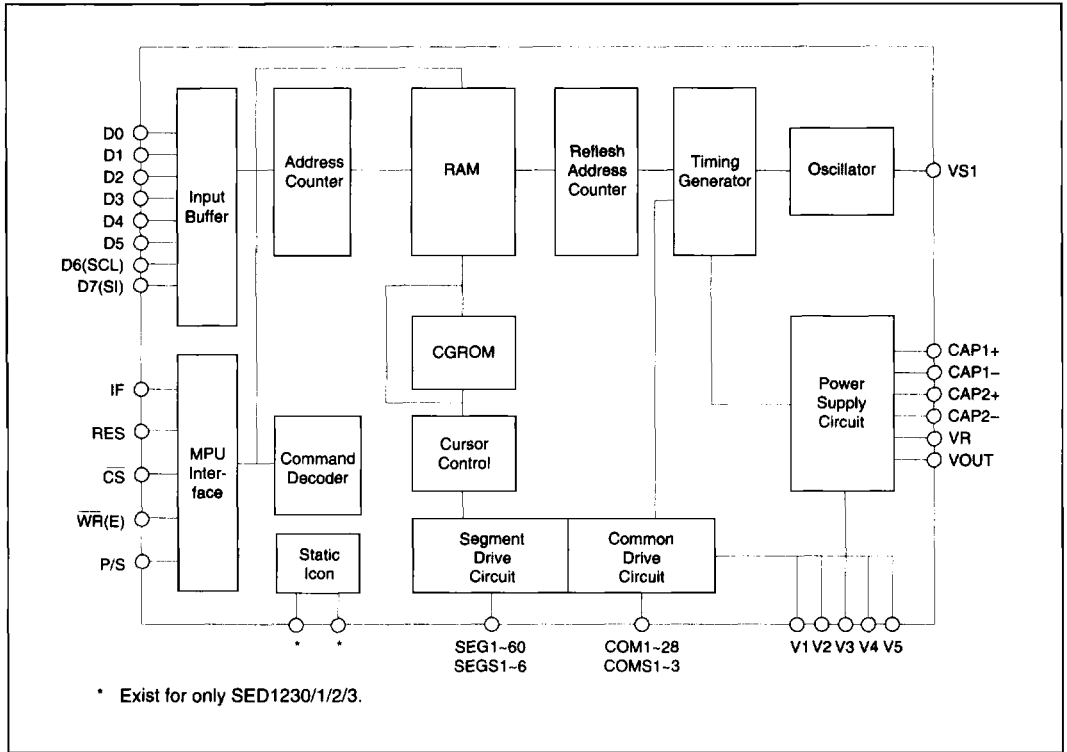
- Built-in display data RAM ..... 48 characters
- CGRAM ..... 4 characters
- CGROM ..... 256 characters (5 × 7) max.
- Symbol registers ..... 64 bits
- Static mode is supported
- Built-in CR oscillator circuit
- On-chip DC/DC converter for the LCD voltage
- Supports two power save modes
- Voltage regulator, low-power voltage follower
- -0.17%/°C temperature gradient
- Low power CMOS process
- 100 μA (operation)
- 16-level contrast adjustment by software
- 2.4 to 3.6V supply voltage
- -4.5 to -11V LCD voltage
- Package ..... Au bump (DoB) TAB

Models	Duty Ratio	Display Character
SED1230	1/30	12 char × 4 lines + 1 Static Icon + 52 symbols
SED1231	1/23	12 char × 3 lines + 1 Static Icon + 52 symbols
SED1232	1/16	12 char × 2 lines + 1 Static Icon + 52 symbols
SED1233	1/16	16 char × 2 lines + 1 Static Icon + 64 symbols
SED1234	1/30	12 char × 4 lines + 48 symbols
SED1235	1/16	12 char × 2 lines + 48 symbols

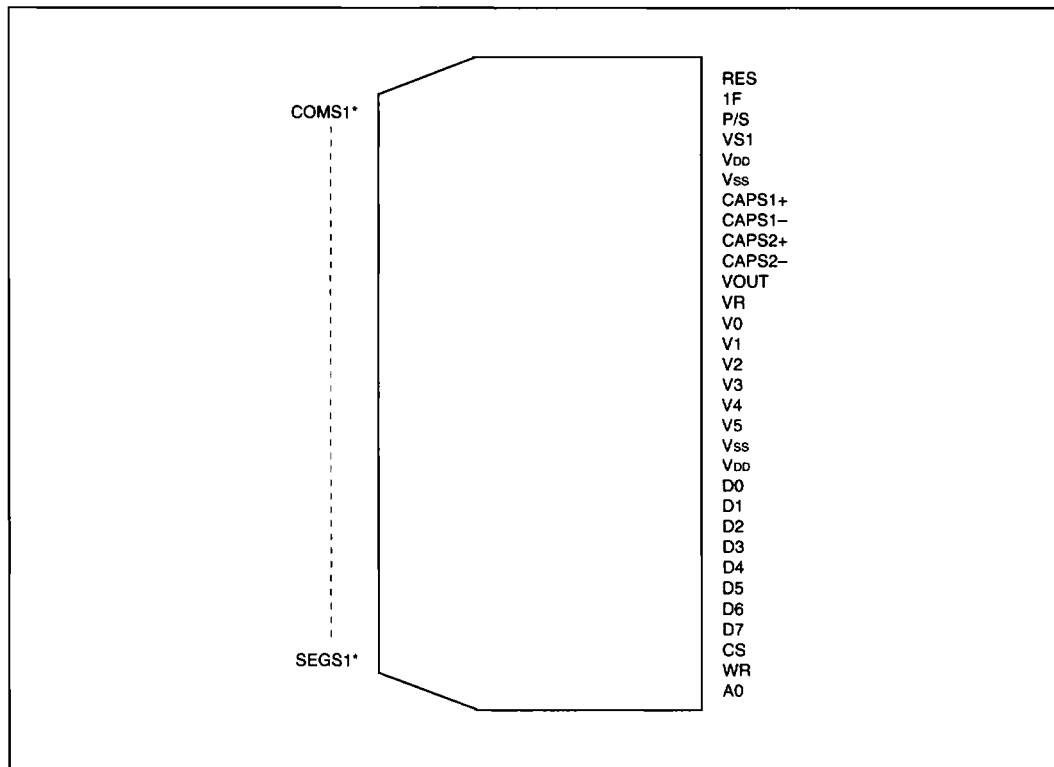
### SYSTEM BLOCK DIAGRAM



■ BLOCK DIAGRAM



■ PIN ASSIGNMENT



■ PIN DESCRIPTION

● Power Supply

Pin Name	I/O	Description	No. of Pins												
VDD	Power Supply	Common to MPU power supply pin VCC	2												
VSS	Power Supply	Ground	2												
V1, V2, V3, V4, V5	Power Supply	<p>LCD driver supply voltages. The voltages determined bthe LCD cell is impedance converted by resistive divider or an operational amplifier. These voltages should be determined on a V<sub>DD</sub>-basis so as to satisfy the following relationship:</p> $V_{DD} \geq V0 \geq V1 \geq V2 \geq V3 \geq V4 \geq V5$ <p>When the internal power supply is ON, the following voltages are generated on-chip.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">SED1232D**</th> <th colspan="2">SED1232D**</th> </tr> </thead> <tbody> <tr> <td>V1</td> <td>1/5 V5</td> <td>V3</td> <td>3/5 V5</td> </tr> <tr> <td>V2</td> <td>2/5 V5</td> <td>V4</td> <td>4/5 V5</td> </tr> </tbody> </table>	SED1232D**		SED1232D**		V1	1/5 V5	V3	3/5 V5	V2	2/5 V5	V4	4/5 V5	5
SED1232D**		SED1232D**													
V1	1/5 V5	V3	3/5 V5												
V2	2/5 V5	V4	4/5 V5												
VS1	O	Power supply and voltage output for crystal power circuit	1												

● LCD Driver Supply

Pin Name	I/O	Description	No. of Pins
CAP1+	O	DC/DC voltage converter capacitor 1 positive connect	1
CAP1-	O	DC/DC voltage converter capacitor 1 negative connect	1
CAP2+	O	DC/DC voltage converter capacitor 2 positive connect	1
CAP2-	O	DC/DC voltage converter capacitor 2 negative connect	1
V <sub>out</sub>	O	DC/DC voltage converter output. Capacitor must be connected between V <sub>out</sub> and V <sub>ss</sub> pad.	1
VR	I	Voltage adjustment pin. Applies voltage between V <sub>DD</sub> and V <sub>5</sub> using a resistive divider.	1

● Microprocessor Interface

Pin Name	I/O	Description	No. of Pins																		
D7 (SI), D6 (SCL), D5 to D0	I	Data input from the data bus of standard MPU (8-bit or 16-bit). D7 and D6 pins are used for serial data input and a serial clock input respectively when P/S = "L". <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>P/S</th> <th>D7</th> <th>D6</th> <th>D5 - D0</th> <th>CS</th> <th>A0</th> </tr> </thead> <tbody> <tr> <td>"L"</td> <td>SI</td> <td>SCL</td> <td>—</td> <td>CS</td> <td>A0</td> </tr> <tr> <td>"H"</td> <td>D7</td> <td>D6</td> <td>D5 - D0</td> <td>CS</td> <td>A0</td> </tr> </tbody> </table>	P/S	D7	D6	D5 - D0	CS	A0	"L"	SI	SCL	—	CS	A0	"H"	D7	D6	D5 - D0	CS	A0	8
P/S	D7	D6	D5 - D0	CS	A0																
"L"	SI	SCL	—	CS	A0																
"H"	D7	D6	D5 - D0	CS	A0																
A0	I	Control/display data flag input. This is connected to the LSB of the microprocessor address bus. When LOW, the data on D0 to D7 is command data. When HIGH, the data on D0 to D7 is display data.	1																		
RES	I	This pin is used to initialize the SED1230 and to select the MPU interface type. For a 68xx MPU interface, initialization occurs after a RES ↓ edge transition. For a 80xx MPU interface, initialization occurs after a RES ↑ edge transition. MPU interface type is selected by input level after the reset. "H" : 68xx MPU Interface "L" : 80xx MPU Interface	1																		
CS	I	Chip select signal	1																		
WR (E)	I	<80xx MPU Connection> Active "L" This is a pin for connecting the WR signal of the 80xx MPU. The signal on the data bus is fetched when WR signal rises to "H". <68xx MPU Connection> Active "L" This is the enable clock of the 68xx MPU.	1																		
P/S	I	Parallel/serial data input select. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>P/S</th> <th>Serial Clock</th> <th>Data</th> <th>Chip Select</th> <th>Data/Command</th> </tr> </thead> <tbody> <tr> <td>"L"</td> <td>SCL (D6)</td> <td>SI (D7)</td> <td>CS</td> <td>A0</td> </tr> <tr> <td>"H"</td> <td>—</td> <td>D7 ~ D0</td> <td>CS</td> <td>A0</td> </tr> </tbody> </table>	P/S	Serial Clock	Data	Chip Select	Data/Command	"L"	SCL (D6)	SI (D7)	CS	A0	"H"	—	D7 ~ D0	CS	A0				
P/S	Serial Clock	Data	Chip Select	Data/Command																	
"L"	SCL (D6)	SI (D7)	CS	A0																	
"H"	—	D7 ~ D0	CS	A0																	
IF	I	Interface data long select pin. "H" : 8-bit parallel input "L" : 4-bit parallel input (When P/S = "L", connect this pin to V <sub>DD</sub> or V <sub>ss</sub> .)																			

● LCD Drive Output Signals

○ SED1230, SED1231, SED1232

Pin Name	I/O	Description	No. of Pins
COM1 – COM28	O	Common Signal Output Pin (for character)	28*
COMS1 – COMS3	O	Common Signal Output Pin (static signal and symbol) COMS1 : Common output for static driver** COMS2, COMS3 : Common output for symbol display	3
SEG1 – SEG60	O	Segment Signal Output Pin (for character)	60
SEGS1 – SEGS6	O	Segment Signal Output Pin (static signal and symbol) SEGS1 : Segment output for static driver** SEGS2 – SEGS6 : Segment output for signal output	7

\* For SED1230, 28 pins. For SED1232, 14 pins. For SED1231, 21 pins.      \*\* Output in stand-by mode only.

○ SED1233

Pin Name	I/O	Description	No. of Pins
COM1 – COM14	O	Common Signal Output Pin (for character)	14
COMS1 – COMS3	O	Common Signal Output Pin (static signal and symbol) COMS1 : Common output for static driver** COMS2, COMS3 : Common output for symbol display	3
SEG1 – SEG80	O	Segment Signal Output Pin (for character)	80
SEGS1	O	Segment Signal Output Pin (for static driver) SEGS1 : Segment output for static driver**	1

\*\* Output in stand-by mode only.

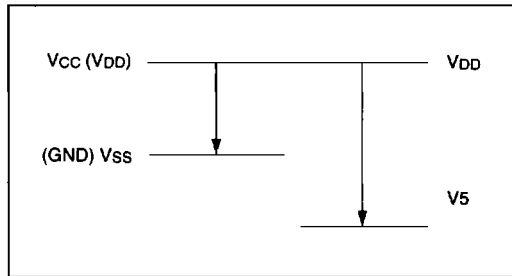
○ SED1234, SED1235

Pin Name	I/O	Description	No. of Pins
COM1 – COM28	O	Common signal output pin (for character)	28
COMS2 – COMS3	O	Common signal output pin (for symbol)	2
SEG1 – SEG60	O	Segment signal output pin (for character)	60
SEGS2, SEGS6	O	Segment signal output pin (for symbol)	2

■ ELECTRICAL CHARACTERISTICS

● Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Supply voltage	V <sub>SS</sub>	-5.0 to +0.3 -4.0 to +0.3	V
Driver supply voltage	V <sub>5</sub>	-16.0 to +0.3	V
Driver supply voltage	V <sub>1</sub> , V <sub>2</sub> , V <sub>3</sub> , V <sub>4</sub>	V <sub>5</sub> to +0.3	V
Input voltage	V <sub>IN</sub>	V <sub>SS</sub> - 0.3 to +0.3	V
Output voltage	V <sub>O</sub>	V <sub>SS</sub> - 0.3 to +0.3	V
Operating temperature	T <sub>OPR</sub>	-30 to +85	°C
Storage temperature	T <sub>CIP</sub>	T <sub>STR</sub>	-55 to +100
	Chip		-65 to +125




- Note:**
1. The voltages shown are based on V<sub>DD</sub> = 0V.
  2. Always maintain the LCD driving voltage condition such that: V<sub>DD</sub> ≥ V<sub>1</sub> ≥ V<sub>2</sub> ≥ V<sub>3</sub> ≥ V<sub>4</sub> ≥ V<sub>5</sub>.
  3. If these devices are used over their absolute maximum rating, they may be permanently damaged. To avoid a malfunction or degraded reliability these devices must be operated within the boundaries defined by the electrical characteristic conditions for general operation.

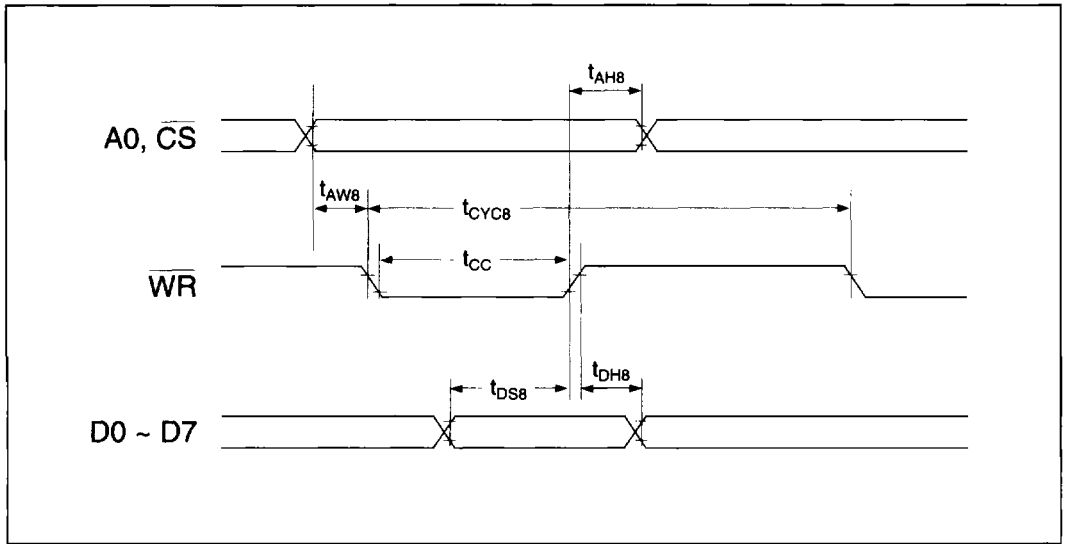
● DC Electrical Characteristics

(V<sub>SS</sub> = -3.6 to -2.4V, T<sub>a</sub> = -30 to 85°C, unless otherwise specified)

Parameter		Symbol	Conditions	Applicable Pin	Min	Typ	Max	Unit	
Power Voltage 1	Recommended Operation	V <sub>SS</sub>		V <sub>SS</sub> *1	-3.6	-3.0	-2.4	V	
	Operational				-5.5	-3.0	-2.0	V	
Power Voltage 2	Recommended Operation	V5		V5	-11.0	—	-5.0	V	
	Operational			*2	-11.0	—	-4.5	V	
	Operational	V1, V2		V1, V2	0.6 × V5	—	V <sub>DD</sub>	V	
	Operational	V3, V4		V3, V4	V <sub>DD</sub>	—	0.4 × V5	V	
Hi-level input voltage		V <sub>IHC</sub>		*3	0.2 × V <sub>SS</sub>	—	V <sub>DD</sub>	V	
Low-level input voltage		V <sub>ILC</sub>		*3	V <sub>SS</sub>	—	0.8 × V <sub>SS</sub>	V	
Input leakage current		I <sub>LI</sub>	V <sub>IN</sub> = V <sub>DD</sub> or V <sub>SS</sub>	*3	-1.0	—	1.0	μA	
LCD drive ON resistance		R <sub>ON</sub>	T <sub>a</sub> = 25°C ΔV = 0.1V	V5=7V COM, SEG *4	—	20	40	kΩ	
Static power consumption	I <sub>DD</sub>	During display V5 = -7V		V <sub>DD</sub> *5	—	—	100	μA	
		Stand-by	Power OFF OSC ON	V <sub>DD</sub> *6	—	—	20	μA	
				V <sub>DD</sub>	—	—	5	μA	
		During access f <sub>CYC</sub> = 200kHz		V <sub>DD</sub> *7	—	—	500	μA	
Input pin capacity		C <sub>IN</sub>	T <sub>a</sub> = 25°C f = 1MHz	*3	—	5.0	8.0	pF	
Reset time		t <sub>R</sub>		*8	1.0	—	—	μs	
Reset "L" pulse width		t <sub>rw</sub>		*9	10	—	—	μs	
Built-in supply circuit	Input voltage	V <sub>SS</sub>		*10	-3.6	—	-2.4	V	
	Raised output voltage	V <sub>OUT</sub>	Raising 2 times	V <sub>OUT</sub>	-7.2	—	-4.0	V	
			Raising 3 times		-10.8	—	-5.0	V	
	Voltage follower circuit	V5①	Applies to SED1230			-11.0	—	-4.5	V
		V5②	Applies to SED1231			-11.0	—	-4.5	V
V5③		Applies to SED1232			-11.0	—	-4.5	V	
Reference voltage	V <sub>REG</sub>	T <sub>a</sub> = 25°C			-3.5	-3.1	-2.7	V	

- \*1. Correct operation is assured over the recommended operating voltage range. However, during MPU access excessive voltage variation may degrade operation.
- \*2. Operating voltage range applies when an external power supply is used.
- \*3. D0 to D5, D6 (SCL), D7 (SI), A0, RES,  $\overline{CS}$ ,  $\overline{WR(E)}$ , P/S, IF
- \*4. This resistance value applies when 0.1V is applied between output "SEgn", "SEGSn", "COMn", "COMSn", and each power supply pin (V1, V2, V3, V4). R<sub>ON</sub> = ·1V/ΔI.
- \*5. This applies when the character  is displayed and the built-in oscillator and the built-in power supply is used.
- \*6. This applies when the built-in oscillator circuit is used and power supply are not used in stand-by mode.
- \*7. This indicates power consumption during writing of vertical bar patterns at constant f<sub>CYC</sub>. The power consumption during access is nearly proportional to the access frequency (f<sub>CYC</sub>). Only I<sub>DD</sub>(1) applies when there is no access.
- \*8. t<sub>R</sub> (reset time) indicates the interval between the rising edge of an RES signal and completion of the internal circuit reset. Therefore, the SED1230 Series does not start normal operation until after the lapse of t<sub>R</sub>.
- \*9. t<sub>rw</sub> is the minimum pulse width of the RES signal. For reset to occur, RES must pulse to "L" for a time period greater than t<sub>rw</sub>.
- \*10. Power supply V<sub>SS</sub> on the primary side is used within the input voltage range if the voltage is doubled or tripled in the built-in power supply circuit.

- AC Characteristics
  - System Bus: Write Characteristics 1 (8080-Series MPU)



(V<sub>SS</sub> = -3.6 to -2.4V, T<sub>a</sub> = -30 to 85°C)

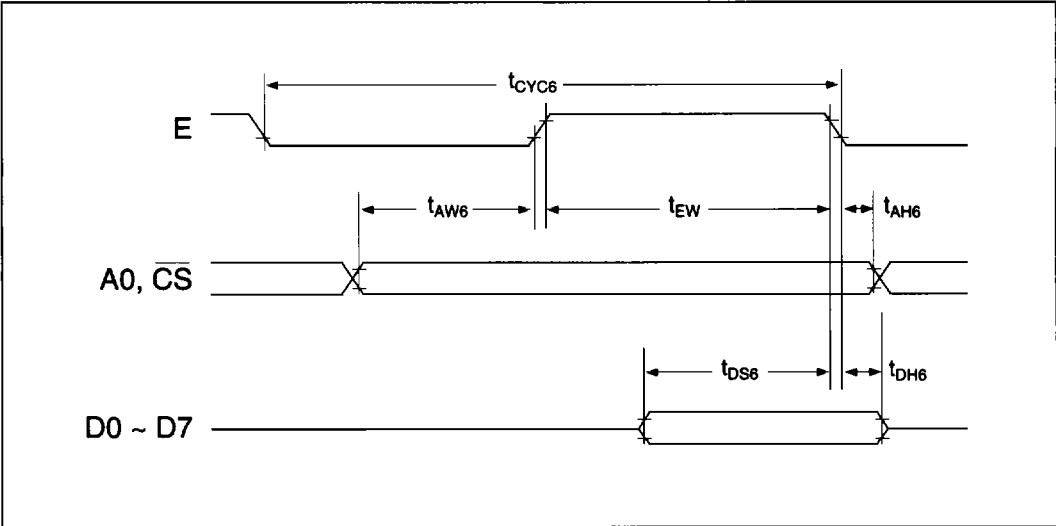
Parameter	Symbol	Condition	Applicable Pin	Min	Typ	Max	Unit
Address hold time	t <sub>AH8</sub> <sup>*3</sup>		A0, $\overline{CS}$	30	—	—	ns
Address setup time	t <sub>AW8</sub> <sup>*3</sup>			30	—	—	ns
System cycle time	t <sub>CYC8</sub>	V <sub>SS</sub> = -2.7V	$\overline{WR}$	500	—	—	ns
		V <sub>SS</sub> = -2.4V		650	—	—	ns
Control pulse width	t <sub>CC</sub>	V <sub>SS</sub> = -2.7V		100	—	—	ns
		V <sub>SS</sub> = -2.4V		150	—	—	ns
Data setup time	t <sub>DS8</sub>		D0 to D7	100	—	—	ns
Data hold time	t <sub>DH8</sub>			50	—	—	ns

\*1. The input signal rise time and fall time must both be 15ns or less.

\*2. Timing is based on 20% and 80% of V<sub>SS</sub>.

\*3. It is not necessary that A0 timing be the same as  $\overline{CS}$ .

o System Bus: Write Characteristics 2 (6800-Series MPU)

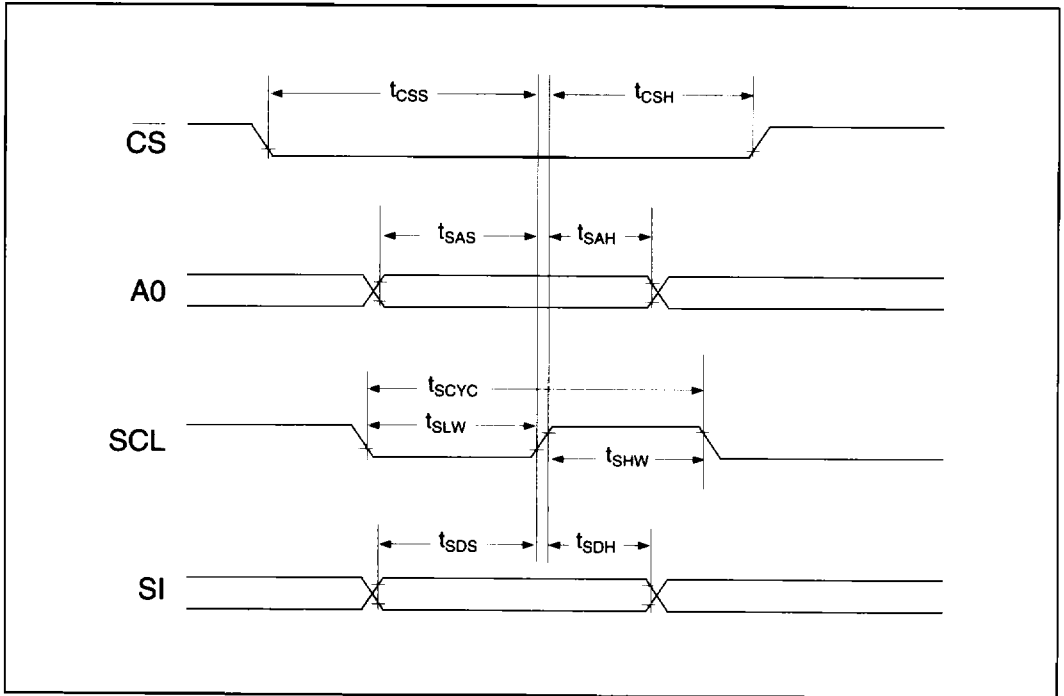


(V<sub>SS</sub> = -3.6 to -2.4V, T<sub>a</sub> = -30 to 85°C)

Parameter	Symbol	Condition	Applicable Pin	Min	Typ	Max	Unit
System cycle time	t <sub>Cyc6</sub>		A0, $\overline{CS}$	500 @ V <sub>SS</sub> = -2.7V	—	—	ns
				650 @ V <sub>SS</sub> = -2.4V			
Address setup time	t <sub>AW6</sub>			60	—	—	ns
Address hold time	t <sub>AH6</sub>			30	—	—	ns
Data setup time	t <sub>DS6</sub>		D0 to D7	100	—	—	ns
Data hold time	t <sub>DH6</sub>			50	—	—	ns
Enable pulse width	t <sub>EW</sub>		E	100 @ V <sub>SS</sub> = -2.7V	—	—	ns
				150 @ V <sub>SS</sub> = -2.4V			

- \*1. t<sub>Cyc6</sub> indicates E signal cycle when  $\overline{CS}$  is active. t<sub>Cyc6</sub> must be ensured after  $\overline{CS}$  becomes active.
- \*2. The input signal rise time and fall time must both be 15ns or less.
- \*3. Timing is based on 20% and 80% of V<sub>SS</sub>.
- \*4. It is not necessary that A0 have the same timing as  $\overline{CS}$ .

Serial Interface



(V<sub>SS</sub> = -3.6 to -2.4V, T<sub>a</sub> = -30 to 85°C)

Parameter	Symbol	Condition	Applicable Pin	Min	Typ	Max	Unit
System clock cycle	tscycs		SCL	1000	—	—	ns
SCL "H" pulse width	tshw			300	—	—	ns
SCL "L" pulse width	tslw			300	—	—	ns
Address setup time	tsas		A0	50	—	—	ns
Address hold time	tsah			300	—	—	ns
Data hold time	tsds			50	—	—	ns
	tsdh			50	—	—	ns
CS-SCL time	tcss		CS	150	—	—	ns
	tcsH			700	—	—	ns

\*1. The input signal rise time and fall time must both be 15ns or less.

\*2. Timing is based on 20% and 80% of V<sub>SS</sub>.



■ SED1230 SERIES COMMAND SUMMARY

Command	Code										Function	
	A0	WR	D7	D6	D5	D4	D3	D2	D1	D0		
(1) Cursor home	0	0	0	0	0	1	*	*	*	*	Moves cursor to Home position.	
(2) Static display control	0	0	0	0	1	0	*	*	SD1	SD0	Sets display mode of Symbol. (SD1, SD0) = (0, 0) (No display) (0, 1) (1~2Hz blink) (1, 0) (3~4Hz blink) (1, 1) (All display)	
(3) Display ON/OFF control	0	0	0	0	1	1	C	B	DC	D	Sets cursor ON/OFF (C), cursor blink ON/OFF (B), double cursor ON/OFF (DC), and display ON/OFF (D). C = 1 (cursor ON) = 0 (cursor OFF) B = 1 (blink ON) = 0 (blink OFF) DC = 1 (double cursor ON) = 0 (double cursor OFF) D = 1 (display ON) = 0 (display OFF)	
(4) Power save	0	0	0	1	0	0	*	*	0	PS	Sets power save ON/OFF (PS) and oscillator circuit ON/OFF (O). PS = 1 (power save ON) = 0 (power save OFF) O = 1 (oscillator circuit ON) = 0 (oscillator circuit OFF)	
(5) Power supply control	0	0	0	1	0	1	0	VC	VF	P	Sets internal feedback register ON/OFF (VR), voltage regulator ON/OFF (VC), voltage converter ON/OFF (P), and voltage follower ON/OFF (VF). VR = 1 (voltage regulator ON) = 0 (voltage regulator OFF) VC = 1 (voltage regulator ON) = 0 (voltage regulator OFF) VF = 1 (voltage follower ON) = 0 (voltage follower OFF) P = 1 (voltage converter ON) = 0 (voltage converter OFF)	
(6) System set	0	0	0	1	1	0	N2	N1	*	CG	Sets the CGRAM (CG) to USED/NOT USED and the number of display lines (N2, N1). CG = 1 (CGRAM USED) = 0 (CGRAM NOT USED) (N2, N1) = (0, 0) (2 lines) (0, 1) (3 lines) (1, 0) (4 lines)	
(7) Electronic volume register	0	0	0	1	1	4	MSB			LSB	Sets the value of electronic contrast control register.	
(8) RAM address set	0	0	1	ADDRESS								Sets the address of DDRAM, CGRAM or symbol register.
(9) RAM writing	1	0	DATA								Writes data to DDRAM, CGRAM or symbol register.	

■ DIE SPECIFICATION

SED1230D\*\* ..... 1/30 duty ..... 12 Characters × 4 Lines  
 SED1231D\*\* ..... 1/23 duty ..... 12 Characters × 3 Lines  
 SED1232D\*\* ..... 1/16 duty ..... 12 Characters × 2 Lines  
 SED1233D\*\* ..... 1/16 duty ..... 16 Characters × 2 Lines  
 SED1234D\*\* ..... 1/30 duty ..... 12 Characters × 4 Lines  
 SED1235D\*\* ..... 1/16 duty ..... 12 Characters × 2 Lines

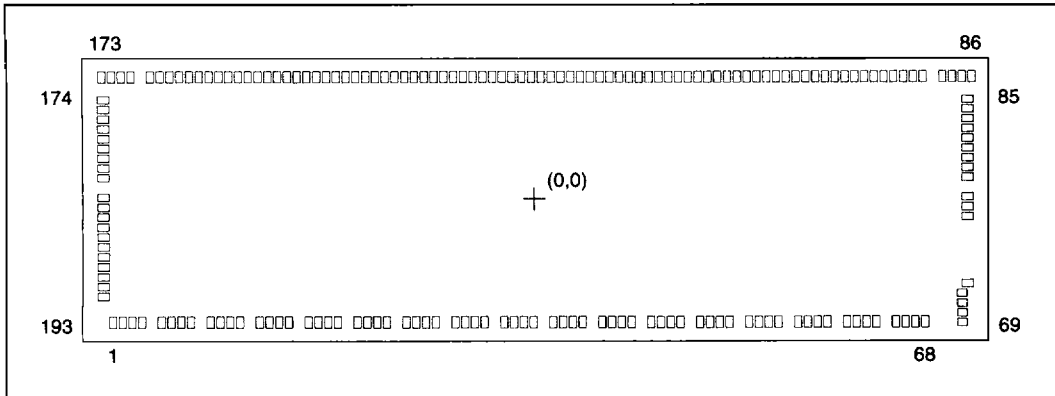
Chip Size : 10.23 × 3.11 mm  
 Pad Pitch : 110 μm (Min.) ..... SED1230/1/2/3  
 126μm (Min.) ..... SED1234/5  
 Chip Thickness : 625 ± 25 μm (SED123\*D\*A, SED123\*D\*B)  
 525 ± 25 μm (SED123\*D\*C, SED123\*D\*E)

1) Al Pad Spec. (SED123\*D\*A and SED123\*D\*C)

Pad Size : A 86 μm × 135 μm  
 B 135 μm × 86 μm

2) Au Bump Spec. (SED123\*D\*B and SED123\*D\*C) (for reference)

Bump Size : A 80 μm × 129 μm  
 B 129 μm × 80 μm  
 Bump Height : 22.5 μm ± 5.5 μm



■ SED1230D\*\* PAD COORDINATES

Unit: μm

No.	Pin Name	X Coord.	Y Coord.	No.	Pin Name	X Coord.	Y Coord.	No.	Pin Name	X Coord.	Y Coord.	No.	Pin Name	X Coord.	Y Coord.
1	NC	-4793	-1371	55	CAP1-	2693	-1371	109	SEG10	2253	1382	163	COM28	-3697	1382
2	NC	-4683	-1371	56	CAP1-	2803	-1371	110	SEG11	2143	1382	164	COM27	-3808	1382
3	NC	-4572	-1371	57	CAP1+	3024	-1371	111	SEG12	2033	1382	165	COM26	-3918	1382
4	NC	-4462	-1371	58	CAP1+	3134	-1371	112	SEG13	1923	1382	166	COM25	-4028	1382
5	V <sub>DD</sub>	-4242	-1371	59	CAP1+	3244	-1371	113	SEG14	1813	1382	167	COM24	-4138	1382
6	V <sub>DD</sub>	-4132	-1371	60	CAP1+	3354	-1371	114	SEG15	1702	1382	168	COM23	-4248	1382
7	V <sub>DD</sub>	-4021	-1371	61	V <sub>SS</sub>	3592	-1371	115	SEG16	1592	1382	169	COM22	-4359	1382
8	V <sub>DD</sub>	-3911	-1371	62	V <sub>SS</sub>	3702	-1371	116	SEG17	1482	1382	170	NC	-4627	1382
9	V <sub>SS</sub>	-3691	-1371	63	V <sub>SS</sub>	3812	-1371	117	SEG18	1372	1382	171	NC	-4738	1382
10	V <sub>SS</sub>	-3581	-1371	64	V <sub>SS</sub>	3923	-1371	118	SEG19	1262	1382	172	NC	-4848	1382
11	V <sub>SS</sub>	-3470	-1371	65	V <sub>DD</sub>	4143	-1371	119	SEG20	1151	1382	173	NC	-4958	1382
12	V <sub>SS</sub>	-3360	-1371	66	V <sub>DD</sub>	4253	-1371	120	SEG21	1041	1382	174	COM21	-4940	1136
13	V5	-3140	-1371	67	V <sub>DD</sub>	4363	-1371	121	SEG22	931	1382	175	COM20	-4940	1026
14	V5	-3030	-1371	68	V <sub>DD</sub>	4474	-1371	122	SEG23	821	1382	176	COM19	-4940	916
15	V5	-2919	-1371	69	NC	4883	-1343	123	SEG24	711	1382	177	COM18	-4940	806
16	V5	-2809	-1371	70	NC	4883	-1233	124	SEG25	600	1382	178	COM17	-4940	696
17	V4	-2589	-1371	71	NC	4883	-1123	125	SEG26	490	1382	179	COM16	-4940	585
18	V4	-2479	-1371	72	NC	4883	-1013	126	SEG27	380	1382	180	COM15	-4940	475
19	V4	-2368	-1371	73	VS1	4929	-902	127	SEG28	270	1382	181	COMS3	-4940	365
20	V4	-2258	-1371	74	P/S	4929	-186	128	SEG29	160	1382	182	SEGS1	-4940	255
21	V3	-2021	-1371	75	IF	4929	-76	129	SEG30	49	1382	183	A0	-4940	34
22	V3	-1910	-1371	76	RES	4929	34	130	SEG31	-61	1382	184	WR	-4940	-76
23	V3	-1800	-1371	77	COMS1	4929	255	131	SEG32	-171	1382	185	CS	-4940	-186
24	V3	-1690	-1371	78	COMS2	4929	365	132	SEG33	-281	1382	186	D7	-4940	-296
25	V2	-1453	-1371	79	COM1	4929	475	133	SEG34	-391	1382	187	D6	-4940	-406
26	V2	-1342	-1371	80	COM2	4929	585	134	SEG35	-502	1382	188	D5	-4940	-517
27	V2	-1232	-1371	81	COM3	4929	695	135	SEG36	-612	1382	189	D4	-4940	-627
28	V2	-1122	-1371	82	COM4	4929	806	136	SEG37	-722	1382	190	D3	-4940	-737
29	V1	-884	-1371	83	COM5	4929	916	137	SEG38	-832	1382	191	D2	-4940	-847
30	V1	-774	-1371	84	COM6	4929	1026	138	SEG39	-942	1382	192	D1	-4940	-957
31	V1	-664	-1371	85	COM7	4929	1136	139	SEG40	-1053	1382	193	D0	-4940	-1068
32	V1	-554	-1371	86	NC	4947	1382	140	SEG41	-1163	1382				
33	V0	-316	-1371	87	NC	4836	1382	141	SEG42	-1273	1382				
34	V0	-206	-1371	88	NC	4726	1382	142	SEG43	-1383	1382				
35	V0	-96	-1371	89	NC	4616	1382	143	SEG44	-1493	1382				
36	V0	14	-1371	90	COM8	4347	1382	144	SEG45	-1504	1382				
37	VR	235	-1371	91	COM9	4237	1382	145	SEG46	-1714	1382				
38	VR	345	-1371	92	COM10	4127	1382	146	SEG47	-1824	1382				
39	VR	455	-1371	93	COM11	4017	1382	147	SEG48	-1934	1382				
40	VR	565	-1371	94	COM12	3906	1382	148	SEG49	-2044	1382				
41	V <sub>OUT</sub>	803	-1371	95	COM13	3796	1382	149	SEG50	-2155	1382				
42	V <sub>OUT</sub>	913	-1371	96	COM14	3686	1382	150	SEG51	-2265	1382				
43	V <sub>OUT</sub>	1023	-1371	97	SEGS2	3576	1382	151	SEG52	-2375	1382				
44	V <sub>OUT</sub>	1133	-1371	98	SEGS3	3466	1382	152	SEG53	-2485	1382				
45	CAP2-	1354	-1371	99	SEGS4	3355	1382	153	SEG54	-2595	1382				
46	CAP2-	1464	-1371	100	SEG1	3245	1382	154	SEG55	-2706	1382				
47	CAP2-	1574	-1371	101	SEG2	3135	1382	155	SEG56	-2816	1382				
48	CAP2-	1684	-1371	102	SEG3	3025	1382	156	SEG57	-2926	1382				
49	CAP2+	1905	-1371	103	SEG4	2915	1382	157	SEG58	-3036	1382				
50	CAP2+	2015	-1371	104	SEG5	2804	1382	158	SEG59	-3146	1382				
51	CAP2+	2125	-1371	105	SEG6	2694	1382	159	SEG60	-3257	1382				
52	CAP2+	2235	-1371	106	SEG7	2584	1382	160	SEGS4	-3367	1382				
53	CAP1-	2473	-1371	107	SEG8	2474	1382	161	SEGS5	-3477	1382				
54	CAP1-	2583	-1371	108	SEG9	2364	1382	162	SEGS6	-3587	1382				

■ SED1231D\*\* PAD COORDINATES

Unit: μm

No.	Pin Name	X Coord.	Y Coord.
1	NC	-4793	-1371
2	NC	-4683	-1371
3	NC	-4572	-1371
4	NC	-4462	-1371
5	V <sub>DD</sub>	-4242	-1371
6	V <sub>DD</sub>	-4132	-1371
7	V <sub>DD</sub>	-4021	-1371
8	V <sub>DD</sub>	-3911	-1371
9	V <sub>SS</sub>	-3691	-1371
10	V <sub>SS</sub>	-3581	-1371
11	V <sub>SS</sub>	-3470	-1371
12	V <sub>SS</sub>	-3360	-1371
13	V5	-3140	-1371
14	V5	-3030	-1371
15	V5	-2919	-1371
16	V5	-2809	-1371
17	V4	-2589	-1371
18	V4	-2479	-1371
19	V4	-2368	-1371
20	V4	-2258	-1371
21	V3	-2021	-1371
22	V3	-1911	-1371
23	V3	-1800	-1371
24	V3	-1690	-1371
25	V2	-1453	-1371
26	V2	-1342	-1371
27	V2	-1232	-1371
28	V2	-1122	-1371
29	V1	-884	-1371
30	V1	-774	-1371
31	V1	-664	-1371
32	V1	-554	-1371
33	V0	-316	-1371
34	V0	-206	-1371
35	V0	-96	-1371
36	V0	14	-1371
37	VR	235	-1371
38	VR	345	-1371
39	VR	455	-1371
40	VR	565	-1371
41	VOUT	803	-1371
42	VOUT	913	-1371
43	VOUT	1023	-1371
44	VOUT	1133	-1371
45	CAP2-	1354	-1371
46	CAP2-	1464	-1371
47	CAP2-	1574	-1371
48	CAP2-	1684	-1371
49	CAP2+	1905	-1371
50	CAP2+	2015	-1371
51	CAP2+	2125	-1371
52	CAP2+	2235	-1371
53	CAP1-	2473	-1371
54	CAP1-	2583	-1371

No.	Pin Name	X Coord.	Y Coord.
55	CAP1-	2693	-1371
56	CAP1-	2803	-1371
57	CAP1+	3024	-1371
58	CAP1+	3134	-1371
59	CAP1+	3244	-1371
60	CAP1+	3354	-1371
61	V <sub>SS</sub>	3592	-1371
62	V <sub>SS</sub>	3702	-1371
63	V <sub>SS</sub>	3812	-1371
64	V <sub>SS</sub>	3923	-1371
65	V <sub>DD</sub>	4143	-1371
66	V <sub>DD</sub>	4253	-1371
67	V <sub>DD</sub>	4363	-1371
68	V <sub>DD</sub>	4474	-1371
69	NC	4883	-1343
70	NC	4883	-1233
71	NC	4883	-1123
72	NC	4883	-1013
73	VS1	4929	-902
74	P/S	4929	-186
75	IF	4929	-76
76	RES	4929	34
77	COMS1	4929	255
78	COMS2	4929	365
79	COM1	4929	475
80	COM2	4929	585
81	COM3	4929	696
82	COM4	4929	806
83	COM5	4929	916
84	COM6	4929	1026
85	COM7	4929	1136
86	NC	4947	1382
87	NC	4836	1382
88	NC	4726	1382
89	NC	4616	1382
90	COM8	4347	1382
91	COM9	4237	1382
92	COM10	4127	1382
93	COM11	4017	1382
94	COM12	3906	1382
95	COM13	3796	1382
96	COM14	3686	1382
97	SEGS2	3576	1382
98	SEGS3	3466	1382
99	SEGS4	3355	1382
100	SEG1	3245	1382
101	SEG2	3135	1382
102	SEG3	3025	1382
103	SEG4	2915	1382
104	SEG5	2804	1382
105	SEG6	2694	1382
106	SEG7	2584	1382
107	SEG8	2474	1382
108	SEG9	2364	1382

No.	Pin Name	X Coord.	Y Coord.
109	SEG10	2253	1382
110	SEG11	2143	1382
111	SEG12	2033	1382
112	SEG13	1923	1382
113	SEG14	1813	1382
114	SEG15	1702	1382
115	SEG16	1592	1382
116	SEG17	1482	1382
117	SEG18	1372	1382
118	SEG19	1262	1382
119	SEG20	1151	1382
120	SEG21	1041	1382
121	SEG22	931	1382
122	SEG23	821	1382
123	SEG24	711	1382
124	SEG25	600	1382
125	SEG26	490	1382
126	SEG27	380	1382
127	SEG28	270	1382
128	SEG29	160	1382
129	SEG30	49	1382
130	SEG31	-61	1382
131	SEG32	-171	1382
132	SEG33	-281	1382
133	SEG34	-391	1382
134	SEG35	-502	1382
135	SEG36	-612	1382
136	SEG37	-722	1382
137	SEG38	-832	1382
138	SEG39	-942	1382
139	SEG40	-1053	1382
140	SEG41	-1163	1382
141	SEG42	-1273	1382
142	SEG43	-1383	1382
143	SEG44	-1493	1382
144	SEG45	-1504	1382
145	SEG46	-1714	1382
146	SEG47	-1824	1382
147	SEG48	-1934	1382
148	SEG49	-2044	1382
149	SEG50	-2155	1382
150	SEG51	-2265	1382
151	SEG52	-2375	1382
152	SEG53	-2485	1382
153	SEG54	-2595	1382
154	SEG55	-2706	1382
155	SEG56	-2816	1382
156	SEG57	-2926	1382
157	SEG58	-3036	1382
158	SEG59	-3146	1382
159	SEG60	-3257	1382
160	SEGS4	-3367	1382
161	SEGS5	-3477	1382
162	SEGS6	-3587	1382

No.	Pin Name	X Coord.	Y Coord.
163	NC	-3697	1382
164	NC	-3808	1382
165	NC	-3918	1382
166	NC	-4028	1382
167	NC	-4138	1382
168	NC	-4248	1382
169	NC	-4359	1382
170	NC	-4627	1382
171	NC	-4738	1382
172	NC	-4848	1382
173	NC	-4958	1382
174	COM21	-4940	1136
175	COM20	-4940	1026
176	COM19	-4940	916
177	COM18	-4940	806
178	COM17	-4940	696
179	COM16	-4940	585
180	COM15	-4940	475
181	COMS3	-4940	365
182	SEGS1	-4940	255
183	A0	-4940	34
184	WR	-4940	-76
185	CS	-4940	-186
186	D7	-4940	-296
187	D6	-4940	-406
188	D5	-4940	-517
189	D4	-4940	-627
190	D3	-4940	-737
191	D2	-4940	-847
192	D1	-4940	-957
193	D0	-4940	-1068

■ SED1232D\*\* PAD COORDINATES

Unit: μm

No.	Pin Name	X Coord.	Y Coord.
1	NC	-4793	-1371
2	NC	-4683	-1371
3	NC	-4572	-1371
4	NC	-4462	-1371
5	V <sub>DD</sub>	-4242	-1371
6	V <sub>DD</sub>	-4132	-1371
7	V <sub>DD</sub>	-4021	-1371
8	V <sub>DD</sub>	-3911	-1371
9	V <sub>SS</sub>	-3691	-1371
10	V <sub>SS</sub>	-3581	-1371
11	V <sub>SS</sub>	-3470	-1371
12	V <sub>SS</sub>	-3360	-1371
13	V5	-3140	-1371
14	V5	-3030	-1371
15	V5	-2919	-1371
16	V5	-2809	-1371
17	V4	-2589	-1371
18	V4	-2479	-1371
19	V4	-2368	-1371
20	V4	-2258	-1371
21	V3	-2021	-1371
22	V3	-1910	-1371
23	V3	-1800	-1371
24	V3	-1690	-1371
25	V2	-1453	-1371
26	V2	-1342	-1371
27	V2	-1232	-1371
28	V2	-1122	-1371
29	V1	-884	-1371
30	V1	-774	-1371
31	V1	-664	-1371
32	V1	-554	-1371
33	V0	-316	-1371
34	V0	-206	-1371
35	V0	-96	-1371
36	V0	14	-1371
37	VR	235	-1371
38	VR	345	-1371
39	VR	455	-1371
40	VR	565	-1371
41	V <sub>OUT</sub>	803	-1371
42	V <sub>OUT</sub>	913	-1371
43	V <sub>OUT</sub>	1023	-1371
44	V <sub>OUT</sub>	1133	-1371
45	CAP2-	1354	-1371
46	CAP2-	1464	-1371
47	CAP2-	1574	-1371
48	CAP2-	1684	-1371
49	CAP2+	1905	-1371
50	CAP2+	2015	-1371
51	CAP2+	2125	-1371
52	CAP2+	2235	-1371
53	CAP1-	2473	-1371
54	CAP1-	2583	-1371

No.	Pin Name	X Coord.	Y Coord.
55	CAP1-	2693	-1371
56	CAP1-	2803	-1371
57	CAP1+	3024	-1371
58	CAP1+	3134	-1371
59	CAP1+	3244	-1371
60	CAP1+	3354	-1371
61	V <sub>SS</sub>	3592	-1371
62	V <sub>SS</sub>	3702	-1371
63	V <sub>SS</sub>	3812	-1371
64	V <sub>SS</sub>	3923	-1371
65	V <sub>DD</sub>	4143	-1371
66	V <sub>DD</sub>	4253	-1371
67	V <sub>DD</sub>	4363	-1371
68	V <sub>DD</sub>	4474	-1371
69	NC	4883	-1343
70	NC	4883	-1233
71	NC	4883	-1123
72	NC	4883	-1013
73	VS1	4929	-902
74	P/S	4929	-186
75	IF	4929	-76
76	RES	4929	34
77	COMS1	4929	255
78	COMS2	4929	365
79	COM1	4929	475
80	COM2	4929	585
81	COM3	4929	696
82	COM4	4929	806
83	COM5	4929	916
84	COM6	4929	1026
85	COM7	4929	1136
86	NC	4947	1382
87	NC	4836	1382
88	NC	4726	1382
89	NC	4616	1382
90	COM8	4347	1382
91	COM9	4237	1382
92	COM10	4127	1382
93	COM11	4017	1382
94	COM12	3906	1382
95	COM13	3796	1382
96	COM14	3686	1382
97	SEGS2	3576	1382
98	SEGS3	3466	1382
99	SEGS4	3355	1382
100	SEG1	3245	1382
101	SEG2	3135	1382
102	SEG3	3025	1382
103	SEG4	2915	1382
104	SEG5	2804	1382
105	SEG6	2694	1382
106	SEG7	2584	1382
107	SEG8	2474	1382
108	SEG9	2364	1382

No.	Pin Name	X Coord.	Y Coord.
109	SEG10	2253	1382
110	SEG11	2143	1382
111	SEG12	2033	1382
112	SEG13	1923	1382
113	SEG14	1813	1382
114	SEG15	1702	1382
115	SEG16	1592	1382
116	SEG17	1482	1382
117	SEG18	1372	1382
118	SEG19	1262	1382
119	SEG20	1151	1382
120	SEG21	1041	1382
121	SEG22	931	1382
122	SEG23	821	1382
123	SEG24	711	1382
124	SEG25	600	1382
125	SEG26	490	1382
126	SEG27	380	1382
127	SEG28	270	1382
128	SEG29	160	1382
129	SEG30	49	1382
130	SEG31	-61	1382
131	SEG32	-171	1382
132	SEG33	-281	1382
133	SEG34	-391	1382
134	SEG35	-502	1382
135	SEG36	-612	1382
136	SEG37	-722	1382
137	SEG38	-832	1382
138	SEG39	-942	1382
139	SEG40	-1053	1382
140	SEG41	-1163	1382
141	SEG42	-1273	1382
142	SEG43	-1383	1382
143	SEG44	-1493	1382
144	SEG45	-1504	1382
145	SEG46	-1714	1382
146	SEG47	-1824	1382
147	SEG48	-1934	1382
148	SEG49	-2044	1382
149	SEG50	-2155	1382
150	SEG51	-2265	1382
151	SEG52	-2375	1382
152	SEG53	-2485	1382
153	SEG54	-2595	1382
154	SEG55	-2706	1382
155	SEG56	-2816	1382
156	SEG57	-2926	1382
157	SEG58	-3036	1382
158	SEG59	-3146	1382
159	SEG60	-3257	1382
160	SEGS4	-3367	1382
161	SEGS5	-3477	1382
162	SEGS6	-3587	1382

No.	Pin Name	X Coord.	Y Coord.
163	NC	-3967	1382
164	NC	-3808	1382
165	NC	-3918	1382
166	NC	-4028	1382
167	NC	-4138	1382
168	NC	-4248	1382
169	NC	-4359	1382
170	NC	-4467	1382
171	NC	-4738	1382
172	NC	-4848	1382
173	NC	-4958	1382
174	COM14	-4940	1136
175	COM13	-4940	1026
176	COM12	-4940	916
177	COM11	-4940	806
178	COM10	-4940	696
179	COM9	-4940	585
180	COM8	-4940	475
181	COMS3	-4940	365
182	SEGS1	-4940	255
183	A0	-4940	34
184	WR	-4940	-76
185	CS	-4940	-186
186	D7	-4940	-296
187	D6	-4940	-406
188	D5	-4940	-517
189	D4	-4940	-627
190	D3	-4940	-737
191	D2	-4940	-847
192	D1	-4940	-957
193	D0	-4940	-1068

■ SED1233D\*\* PAD COORDINATES

Unit: μm

No.	Pin Name	X Coord.	Y Coord.	No.	Pin Name	X Coord.	Y Coord.	No.	Pin Name	X Coord.	Y Coord.	No.	Pin Name	X Coord.	Y Coord.
1	NC	-4793	-1371	55	CAP1-	2693	-1371	109	SEG20	2253	1382	163	SEG74	-3967	1382
2	NC	-4683	-1371	56	CAP1-	2803	-1371	110	SEG21	2143	1382	164	SEG75	-3808	1382
3	NC	-4572	-1371	57	CAP1+	3024	-1371	111	SEG22	2033	1382	165	SEG76	-3918	1382
4	NC	-4462	-1371	58	CAP1+	3134	-1371	112	SEG23	1923	1382	166	SEG77	-4028	1382
5	VDD	-4242	-1371	59	CAP1+	3244	-1371	113	SEG24	1813	1382	167	SEG78	-4138	1382
6	VDD	-4132	-1371	60	CAP1+	3354	-1371	114	SEG25	1702	1382	168	SEG79	-4248	1382
7	VDD	-4021	-1371	61	VSS	3592	-1371	115	SEG26	1592	1382	169	SEG80	-4359	1382
8	VDD	-3911	-1371	62	VSS	3702	-1371	116	SEG27	1482	1382	170	NC	-4627	1382
9	VSS	-3691	-1371	63	VSS	3812	-1371	117	SEG28	1372	1382	171	NC	-4738	1382
10	VSS	-3581	-1371	64	VSS	3923	-1371	118	SEG29	1262	1382	172	NC	-4848	1382
11	VSS	-3470	-1371	65	VDD	4143	-1371	119	SEG30	1151	1382	173	NC	-4958	1382
12	VSS	-3360	-1371	66	VDD	4253	-1371	120	SEG31	1041	1382	174	COM14	-4940	1136
13	V5	-3140	-1371	67	VDD	4363	-1371	121	SEG32	931	1382	175	COM13	-4940	1026
14	V5	-3030	-1371	68	VDD	4474	-1371	122	SEG33	821	1382	176	COM12	-4940	916
15	V5	-2919	-1371	69	NC	4883	-1343	123	SEG34	711	1382	177	COM11	-4940	806
16	V5	-2809	-1371	70	NC	4883	-1233	124	SEG35	600	1382	178	COM10	-4940	696
17	V4	-2589	-1371	71	NC	4883	-1123	125	SEG36	490	1382	179	COM9	-4940	585
18	V4	-2479	-1371	72	NC	4883	-1013	126	SEG37	380	1382	180	COM8	-4940	475
19	V4	-2368	-1371	73	VS1	4929	-902	127	SEG38	270	1382	181	COM3	-4940	365
20	V4	-2258	-1371	74	P/S	4929	-186	128	SEG39	160	1382	182	SEGS1	-4940	255
21	V3	-2021	-1371	75	IF	4929	-76	129	SEG40	49	1382	183	A0	-4940	34
22	V3	-1910	-1371	76	RES	4929	34	130	SEG41	-61	1382	184	WFR	-4940	-76
23	V3	-1800	-1371	77	COMS1	4929	255	131	SEG42	-171	1382	185	CS	-4940	-186
24	V3	-1690	-1371	78	COMS2	4929	365	132	SEG43	-281	1382	186	D7	-4940	-296
25	V2	-1453	-1371	79	COM1	4929	475	133	SEG44	-391	1382	187	D6	-4940	-406
26	V2	-1342	-1371	80	COM2	4929	585	134	SEG45	-502	1382	188	D5	-4940	-517
27	V2	-1232	-1371	81	COM3	4929	696	135	SEG46	-612	1382	189	D4	-4940	-627
28	V2	-1122	-1371	82	COM4	4929	806	136	SEG47	-722	1382	190	D3	-4940	-737
29	V1	-884	-1371	83	COM5	4929	916	137	SEG48	-832	1382	191	D2	-4940	-847
30	V1	-774	-1371	84	COM6	4929	1026	138	SEG49	-942	1382	192	D1	-4940	-957
31	V1	-664	-1371	85	COM7	4929	1136	139	SEG50	-1053	1382	193	D0	-4940	-1068
32	V1	-554	-1371	86	NC	4947	1382	140	SEG51	-1163	1382				
33	V0	-316	-1371	87	NC	4836	1382	141	SEG52	-1273	1382				
34	V0	-206	-1371	88	NC	4726	1382	142	SEG53	-1383	1382				
35	V0	-96	-1371	89	NC	4616	1382	143	SEG54	-1493	1382				
36	V0	14	-1371	90	SEG1	4347	1382	144	SEG55	-1504	1382				
37	VR	235	-1371	91	SEG2	4237	1382	145	SEG56	-1714	1382				
38	VR	345	-1371	92	SEG3	4127	1382	146	SEG57	-1824	1382				
39	VR	455	-1371	93	SEG4	4017	1382	147	SEG58	-1934	1382				
40	VR	565	-1371	94	SEG5	3906	1382	148	SEG59	-2044	1382				
41	VOUT	803	-1371	95	SEG6	3796	1382	149	SEG60	-2155	1382				
42	VOUT	913	-1371	96	SEG7	3686	1382	150	SEG61	-2265	1382				
43	VOUT	1023	-1371	97	SEG8	3576	1382	151	SEG62	-2375	1382				
44	VOUT	1133	-1371	98	SEG9	3466	1382	152	SEG63	-2485	1382				
45	CAP2-	1354	-1371	99	SEG10	3355	1382	153	SEG64	-2595	1382				
46	CAP2-	1464	-1371	100	SEG11	3245	1382	154	SEG65	-2706	1382				
47	CAP2-	1574	-1371	101	SEG12	3135	1382	155	SEG66	-2816	1382				
48	CAP2-	1684	-1371	102	SEG13	3025	1382	156	SEG67	-2926	1382				
49	CAP2+	1905	-1371	103	SEG14	2915	1382	157	SEG68	-3036	1382				
50	CAP2+	2015	-1371	104	SEG15	2804	1382	158	SEG69	-3146	1382				
51	CAP2+	2125	-1371	105	SEG16	2694	1382	159	SEG70	-3257	1382				
52	CAP2+	2235	-1371	106	SEG17	2584	1382	160	SEG71	-3367	1382				
53	CAP1-	2473	-1371	107	SEG18	2474	1382	161	SEG72	-3477	1382				
54	CAP1-	2583	-1371	108	SEG19	2364	1382	162	SEG73	-3587	1382				

■ SED1234D\*\*

Unit: μm

No.	Pin Name	X Coord.	Y Coord.	No.	Pin Name	X Coord.	Y Coord.	No.	Pin Name	X Coord.	Y Coord.	No.	Pin Name	X Coord.	Y Coord.
1	VDD	-4077	-1371	33	COM8	4896	1406	65	SEG25	837	1406	97	SEG57	-3221	1406
2	VSS	-3526	-1371	34	COM9	4769	1406	66	SEG26	710	1406	98	SEG58	-3348	1406
3	V5	-2975	-1371	35	COM10	4642	1406	67	SEG27	584	1406	99	SEG59	-3475	1406
4	V4	-2424	-1371	36	COM11	4515	1406	68	SEG28	457	1406	100	SEG60	-3602	1406
5	V3	-1855	-1371	37	COM12	4388	1406	69	SEG29	330	1406	101	SEGS6	-3729	1406
6	V2	-1287	-1371	38	COM13	4262	1406	70	SEG30	203	1406	102	COM28	-3855	1406
7	V1	-719	-1371	39	COM14	4135	1406	71	SEG31	76	1406	103	COM27	-3982	1406
8	V0	-151	-1371	40	SEGS2	4008	1406	72	SEG32	-51	1406	104	COM26	-4109	1406
9	VR	400	-1371	41	SEG1	3881	1406	73	SEG33	-177	1406	105	COM25	-4236	1406
10	VOUT	968	-1371	42	SEG2	3754	1406	74	SEG34	-304	1406	106	COM24	-4363	1406
11	CAP2-	1519	-1371	43	SEG3	3627	1406	75	SEG35	-431	1406	107	COM23	-4479	1405
12	CAP2+	2070	-1371	44	SEG4	3501	1406	76	SEG36	-558	1406	108	COM22	-4806	1405
13	CAP1-	2638	-1371	45	SEG5	3374	1406	77	SEG37	-685	1406	109	COM21	-4933	1405
14	CAP1+	3189	-1371	46	SEG6	3247	1406	78	SEG38	-812	1406	110	COM20	-4964	1094
15	VSS	3757	-1371	47	SEG7	3120	1406	79	SEG39	-938	1406	111	COM19	-4964	966
16	VDD	4308	-1371	48	SEG8	2993	1406	80	SEG40	-1065	1406	112	COM18	-4964	839
17	(NC)	4883	-1343	49	SEG9	2866	1406	81	SEG41	-1192	1406	113	COM17	-4964	712
18	(NC)	4883	-1233	50	SEG10	2740	1406	82	SEG42	-1319	1406	114	COM16	-4964	584
19	(NC)	4883	-1123	51	SEG11	2613	1406	83	SEG43	-1446	1406	115	COM15	-4964	457
20	(NC)	4883	-1013	52	SEG12	2486	1406	84	SEG44	-1572	1406	116	COMS3	-4964	330
21	VS1	4929	-903	53	SEG13	2359	1406	85	SEG45	-1699	1406	117	A0	-4964	202
22	P/S	4924	-184	54	SEG14	2232	1406	86	SEG46	-1826	1406	118	WR	-4964	75
23	IF	4924	-57	55	SEG15	2106	1406	87	SEG47	-1953	1406	119	CS	-4964	-52
24	RES	4924	70	56	SEG16	1979	1406	88	SEG48	-2080	1406	120	D7	-4964	-180
25	COMS2	4950	255	57	SEG17	1852	1406	89	SEG49	-2207	1406	121	D6	-4964	-307
26	COM1	4950	382	58	SEG18	1725	1406	90	SEG50	-2333	1406	122	D5	-4964	-434
27	COM2	4950	510	59	SEG19	1598	1406	91	SEG51	-2460	1406	123	D4	-4964	-562
28	COM3	4950	637	60	SEG20	1471	1406	92	SEG52	-2587	1406	124	D3	-4964	-689
29	COM4	4950	764	61	SEG21	1345	1406	93	SEG53	-2714	1406	125	D2	-4964	-816
30	COM5	4950	891	62	SEG22	1218	1406	94	SEG54	-2841	1406	126	D1	-4964	-943
31	COM6	4950	1019	63	SEG23	1091	1406	95	SEG55	-2968	1406	127	D0	-4964	-1071
32	COM7	4950	1146	64	SEG24	964	1406	96	SEG56	-3094	1406				

■ SED1235D\*\*

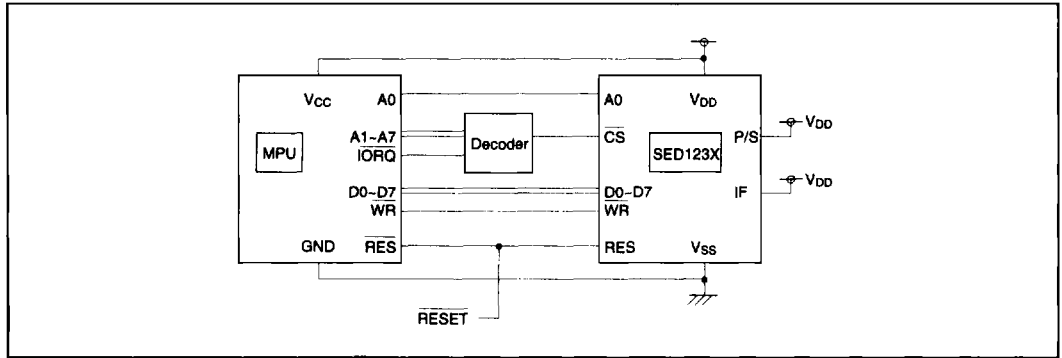
Unit: μm

No.	Pin Name	X Coord.	Y Coord.	No.	Pin Name	X Coord.	Y Coord.	No.	Pin Name	X Coord.	Y Coord.	No.	Pin Name	X Coord.	Y Coord.
1	VDD	-4077	-1371	33	COM8	4896	1406	65	SEG25	837	1406	97	SEG57	-3221	1406
2	VSS	-3526	-1371	34	COM9	4769	1406	66	SEG26	710	1406	98	SEG58	-3348	1406
3	V5	-2975	-1371	35	COM10	4642	1406	67	SEG27	584	1406	99	SEG59	-3475	1406
4	V4	-2424	-1371	36	COM11	4515	1406	68	SEG28	457	1406	100	SEG60	-3602	1406
5	V3	-1855	-1371	37	COM12	4388	1406	69	SEG29	330	1406	101	SEGS6	-3729	1406
6	V2	-1287	-1371	38	COM13	4262	1406	70	SEG30	203	1406	102	COM28	-3855	1406
7	V1	-719	-1371	39	COM14	4135	1406	71	SEG31	76	1406	103	COM27	-3982	1406
8	V0	-151	-1371	40	SEGS2	4008	1406	72	SEG32	-51	1406	104	COM26	-4109	1406
9	VR	400	-1371	41	SEG1	3881	1406	73	SEG33	-177	1406	105	COM25	-4236	1406
10	VOUT	968	-1371	42	SEG2	3754	1406	74	SEG34	-304	1406	106	COM24	-4363	1406
11	CAP2-	1519	-1371	43	SEG3	3627	1406	75	SEG35	-431	1406	107	COM23	-4679	1405
12	CAP2+	2070	-1371	44	SEG4	3501	1406	76	SEG36	-558	1406	108	COM22	-4806	1405
13	CAP1-	2638	-1371	45	SEG5	3374	1406	77	SEG37	-685	1406	109	COM21	-4933	1405
14	CAP1+	3189	-1371	46	SEG6	3247	1406	78	SEG38	-812	1406	110	COM20	-4964	1094
15	VSS	3757	-1371	47	SEG7	3120	1406	79	SEG39	-938	1406	111	COM19	-4964	966
16	VDD	4308	-1371	48	SEG8	2993	1406	80	SEG40	-1065	1406	112	COM18	-4964	839
17	(NC)	4883	-1343	49	SEG9	2866	1406	81	SEG41	-1192	1406	113	COM17	-4964	712
18	(NC)	4883	-1233	50	SEG10	2740	1406	82	SEG42	-1319	1406	114	COM16	-4964	584
19	(NC)	4883	-1123	51	SEG11	2613	1406	83	SEG43	-1446	1406	115	COM15	-4964	457
20	(NC)	4883	-1013	52	SEG12	2486	1406	84	SEG44	-1572	1406	116	COMS3	-4964	330
21	VS1	4929	-903	53	SEG13	2359	1406	85	SEG45	-1699	1406	117	A0	-4964	202
22	P/S	4924	-184	54	SEG14	2232	1406	86	SEG46	-1826	1406	118	WR	-4964	75
23	IF	4924	-57	55	SEG15	2106	1406	87	SEG47	-1953	1406	119	CS	-4964	-52
24	RES	4924	70	56	SEG16	1979	1406	88	SEG48	-2080	1406	120	D7	-4964	-180
25	COMS2	4950	255	57	SEG17	1852	1406	89	SEG49	-2207	1406	121	D6	-4964	-307
26	COM1	4950	382	58	SEG18	1725	1406	90	SEG50	-2333	1406	122	D5	-4964	-434
27	COM2	4950	510	59	SEG19	1598	1406	91	SEG51	-2460	1406	123	D4	-4964	-562
28	COM3	4950	637	60	SEG20	1471	1406	92	SEG52	-2587	1406	124	D3	-4964	-689
29	COM4	4950	764	61	SEG21	1345	1406	93	SEG53	-2714	1406	125	D2	-4964	-816
30	COM5	4950	891	62	SEG22	1218	1406	94	SEG54	-2841	1406	126	D1	-4964	-943
31	COM6	4950	1019	63	SEG23	1091	1406	95	SEG55	-2968	1406	127	D0	-4964	-1071
32	COM7	4950	1146	64	SEG24	964	1406	96	SEG56	-3094	1406				

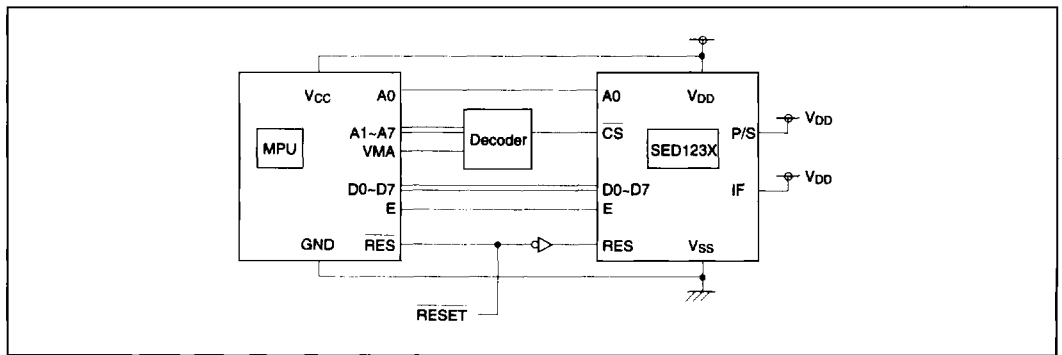
■ **MICROPROCESSOR INTERFACE**

The SED1230 Series interfaces to either 8080- or 6800- Series microprocessors. The number of connections to the microprocessor can be minimized by using a serial interface.

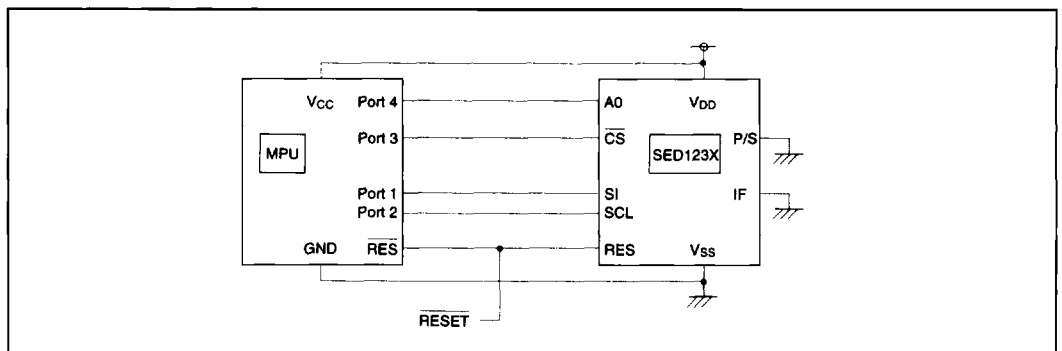
● **8080-Series Microprocessors**



● **6800-Series microprocessors**



● **Serial Interface**



■ CHARACTER CODES AND FONTS

		Lower 4 Bit															
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Higher 4 Bit	0																
	1																
	2	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/	
	3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
	4	a	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
	5	P	Q	R	S	T	U	V	W	X	Y	Z	[	]	^	_	
	6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
	7	P	a	r	s	t	u	v	w	x	y	z	(		)	+	+
	8																
	9																
	A	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/	
	B	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
	C	a	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
	D	P	Q	R	S	T	U	V	W	X	Y	Z	[	]	^	_	
	E	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
	F	P	a	r	s	t	u	v	w	x	y	z	(		)	+	+