EPSON

SED1570D0A

Dot Matrix High Duty LCD Driver

- 80 Output Segment Driver
- Built-in Display RAM 80×200 bits
- Self-refresh Function

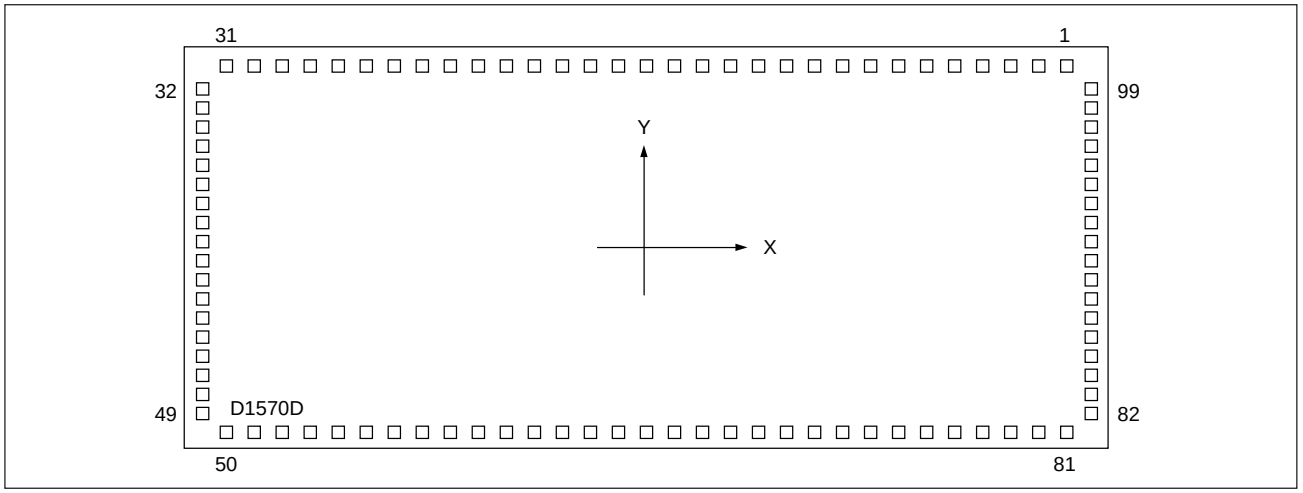
■ DESCRIPTION

The SED1570 is an 80 output segment (column) driver with an internal display RAM. This drive is suitable for driving a dot matrix LCD panel; from a mid-range capacity dot matrix LCD panel to a CGA class dot matrix LCD panel. This device is used with the SED1635.
The display data is stored in the internal display RAM and an LCD panel drive signal is generated. As a result, this device allows configuration of an ultra low power display system since the display data is not transferred unless the display is changed.
In addition, the logic power is low voltage; a wide range of applications is possible.

■ FEATURES

- Display duty cycle: 1/64 – 1/200
- LCD driver output: 80 out
- Internal display RAM: 200 × 80 bits
- Slim chip
- Ultra low power consumption
- Power $V_{DD} – V_{SS}$ 2.7 V to 5.5 V
  $V_{DD} – V_{EE}$ 8.0 V to 20 V
- High speed and low power date transfer by the 4-bit bus enables chain method
- Non-bias display off function
- Output shift direction-pin selection
- Adjustable LCD power offset bias for V_{DD} level
- Package: Die form SED1570D0A (Al pad)
  SED1570D0B (Au bump)

■ PAD DIMENSIONS



Chip Size	8.04 mm × 3.51 mm
Pad Center Size	100 µm × 100 µm
Pad Pitch	170 µm (Min.)
Chip Thickness	400 µm ±25 µm (Al Pad)
Bump Size	92 µm × 82 µm
Pump Pitch	170 µm (Min.)
Chip Thickness	525 µm
Bump Height	17 to 28 µm (reference)

■ PAD COORDINATES

SED1570 Pad Center Coordinates (Al-pad)

Unit: µm

PAD No	PIN Name	X	Y
1	X 75	3640	1595
2	X 76	3432	
3	X 77	3224	
4	X 78	3016	
5	X 79	2808	
6	X 80	2600	
7	EIO2	2340	
8	V_{DD}	2080	
9	SHL	1820	
10	D_0	1560	
11	D_1	1300	
12	D_2	1040	
13	D_3	780	
14	YD	520	
15	V_{EE}	260	
16	V_5	0	
17	V_3	–260	
18	V_2	–520	
19	V_0	–780	
20	FR	–1040	
21	XSCL	–1300	
22	$\overline{DOFF}$	–1560	
23	LP	–1820	
24	V_{SS}	–2080	
25	EIO1	–2340	
26	X 1	–2600	
27	X 2	–2808	
28	X 3	–3016	
29	X 4	–3224	
30	X 5	–3432	
31	X 6	–3640	
32	X 7	–3862	1452
33	X 8		1282
34	X 9		1112
35	X 10		942
36	X 11		772
37	X 12		602
38	X 13		432
39	X 14		262
40	X 15		92

PAD No	PIN Name	X	Y
41	X 16	–3862	–78
42	X 17		–248
43	X 18		–418
44	X 19		–588
45	X 20		–758
46	X 21		–928
47	X 22		–1098
48	X 23		–1268
49	X 24		–1438
50	X 25	–3641	–1595
51	X 26	–3406	
52	X 27	–3171	
53	X 28	–2936	
54	X 29	–2701	
55	X 30	–2466	
56	X 31	–2231	
57	X 32	–1996	
58	X 33	–1761	
59	X 34	–1526	
60	X 35	–1291	
61	X 36	–1056	
62	X 37	–821	
63	X 38	–586	
64	X 39	–351	
65	X 40	–116	
66	X 41	119	
67	X 42	354	
68	X 43	589	
69	X 44	824	
70	X 45	1059	
71	X 46	1294	
72	X 47	1530	
73	X 48	1765	
74	X 49	2000	
75	X 50	2235	
76	X 51	2470	
77	X 52	2705	
78	X 53	2940	
79	X 54	3175	
80	X 55	3410	

PAD No	PIN Name	X	Y
81	X 56	3645	–1595
82	X 57	3862	–1438
83	X 58		–1268
84	X 59		–1098
85	X 60		–928
86	X 61		–758
87	X 62		–588
88	X 63		–418
89	X 64		–248
90	X 65		–78
91	X 66		92
92	X 67		262
93	X 68		432
94	X 69		602
95	X 70		772
96	X 71		942
97	X 72		1112
98	X 73		1282
99	X 74		1452

(Au-bump)

Unit: µm

PAD No	PIN Name	X	Y
1	X 75	3640	1601
2	X 76	3432	
3	X 77	3224	
4	X 78	3016	
5	X 79	2808	
6	X 80	2600	
7	EIO2	2340	
8	V_{DD}	2080	
9	SHL	1820	
10	D_0	1560	
11	D_1	1300	
12	D_2	1040	
13	D_3	780	
14	YD	520	
15	V_{EE}	260	
16	V_5	0	
17	V_3	–260	
18	V_2	–520	
19	V_0	–780	
20	FR	–1040	
21	XSCL	–1300	
22	$\overline{DOFF}$	–1560	
23	LP	–1820	
24	V_{SS}	–2080	
25	EIO1	–2340	
26	X 1	–2600	
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72	X 47	1530	
73	X 48	1765	
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80	X 55	3410	

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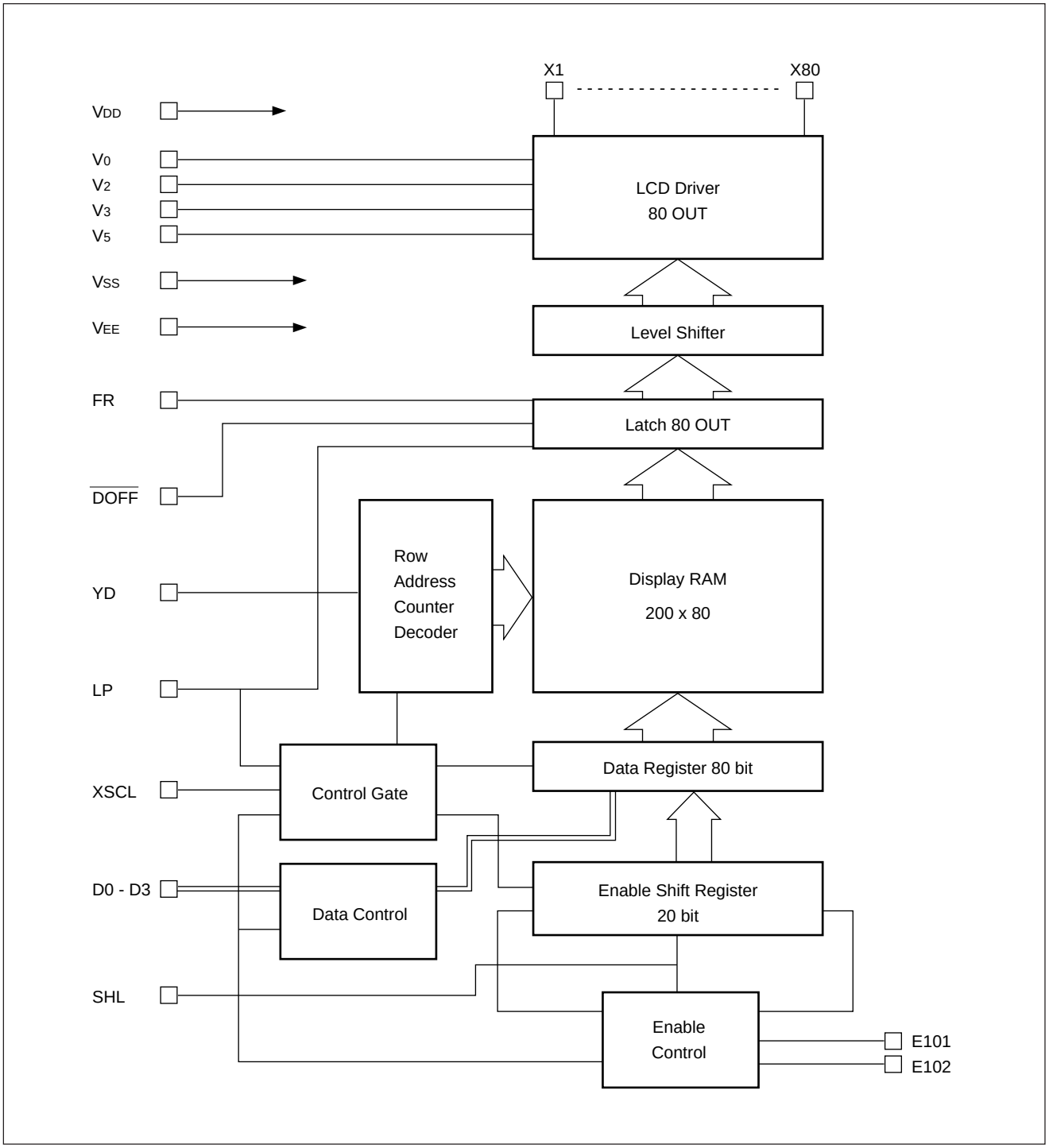
99	X 74		1452

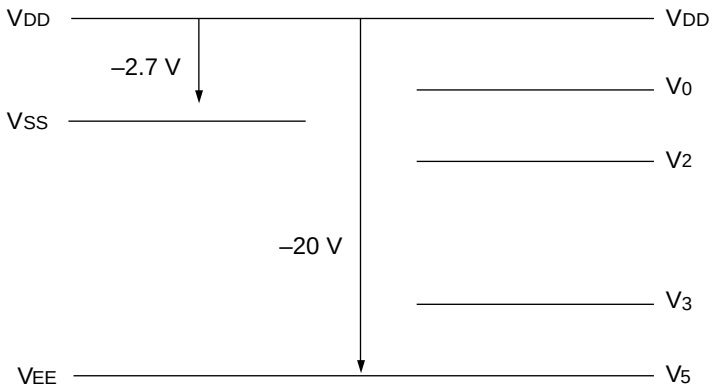
■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Supply voltage 1	V_{SS}	–7.0 to +0.3	V
Supply voltage 2	V_{EE}	–22.0 to +0.3	V
Supply voltage 3	V_0, V_2, V_3, V_5	V_{EE} –0.3 to V_{DD} +0.3	V
Input voltage	V_I	V_{SS} –0.3 to V_{DD} +0.3	V
Output voltage	V_O	V_{SS} –0.3 to V_{DD} +0.3	V
EIO output current	I01	20	mA
Operating temperature	Topr	–40 to +85	°C
Storage temperature 1	Tstg1	–65 to +150	°C
Storage temperature 2	Tstg2	–55 to +100	°C

Notes: 1. All voltages are given relative to V_{DD} = 0 V.
2. For storage temperature 1 – Plastic package
For storage temperature 2 – TAB mounted
3. V_0, V_2, V_3, and V_5 must satisfy the condition
$V_{DD} \geq V_0 \geq V_2 \geq V_3 \geq V_5 \geq V_{EE}$



4. If the logic power is being floated or if the Vss voltage exceeds -2.5 Vdc during LCD power-on, the LSI chips may be damaged permanently. Take care not to damage the chips especially in the system power on/off sequence.

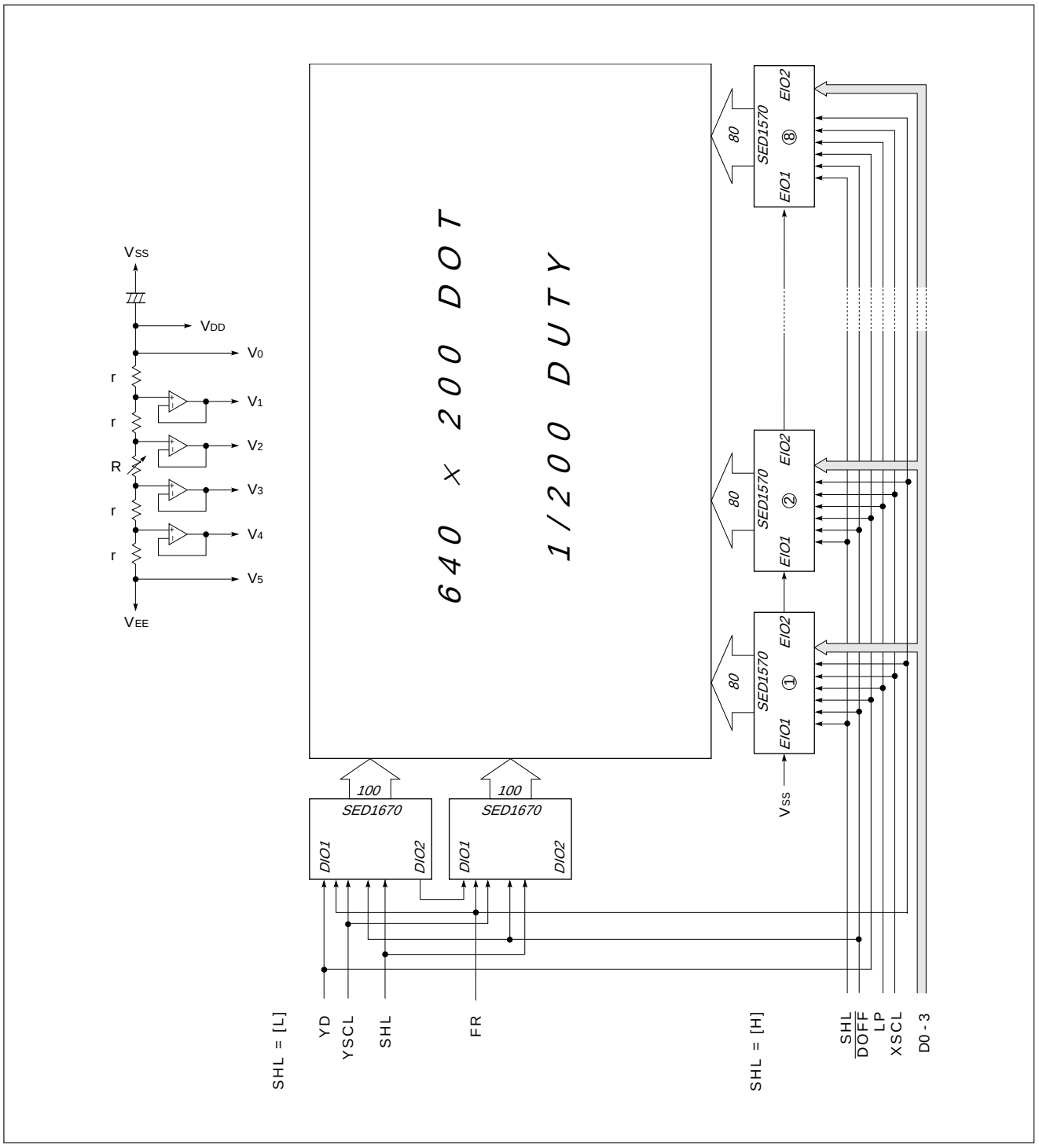
■ ELECTRICAL CHARACTERISTICS

● DC Characteristics

(V_{DD} = V_0 = 0 V, V_{SS} = –5.0 V ±10%, Ta = –40 to 85°C)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit	Pin
Supply voltage (1)	V_{SS}		–5.5	–5.0	–2.7	V	V_{SS}
Recommended operation voltage	V_{EE}	V_{SS} = –2.7 to –5.5V	–20.0		–8.0	V	V_{EE}
Supply voltage (2)	V_0	Recommended value	V_{DD} –2.5		V_{DD}	V	V_0
Supply voltage (3)	V_2	Recommended value	2/9 V_{EE}			V	V_2
Supply voltage (4)	V_3	Recommended value			7/9 V_{EE}	V	V_3
Supply voltage (5)	V_5	Recommended value	V_{EE}		V_{EE} +2.5	V	V_5
Input high voltage	V_{IH}	V_{SS} = –2.7 to –5.5V	0.2•V_{SS}			V	EIO1, EIO2, FR, D0 to D3, YD, LP, SHL, DOFF, XSCL
Input low voltage	V_{IL}				0.8•V_{SS}	V	
Output high voltage	V_{OH}	V_{SS} = –2.7 to –5.5 V, I_{OH} = –0.6mA	V_{DD} –0.4			V	EIO1, EIO2
Output low voltage	V_{OL}	V_{SS} = –2.7 to –5.5 V, I_{OL} = 0.6mA			V_{DD} +0.4	V	
Input leakage current	I_{LI}	$V_{SS} \le V_{IN} \le V_{DD}$			2.0	µA	D_0 to D_3, LP, FR, YD, XSCL, SHL, DOFF
I/O leakage current	$I_{LI/O}$	$V_{SS} \le V_{IN} \le V_{DD}$			5.0	µA	EIO1, EIO2
Static current	I_{SS}	V_5 = –20.0 to –10.0 V, V_{IH} = V_{DD}, V_{IL} = V_{SS}			25	µA	V_{SS}
On resistance	R_{SEG}	ΔV_{ON} = 0.5 V, V_0 = V_{DD}, V_3 = 7/9•V_{EE}, V_2 = 2/9•V_{EE}, V_{EE} = V_5 = –14.0 V		1.0	1.4	KΩ	X1 to X80
Average current consumption (1) Data transfer mode	I_{DDT}	V_{SS} = –5.0 V, V_{IH} = V_{DD}, V_{IL} = V_{SS}, f_{XSCL} = 4.0 MHz, f_{LP} = 14 kHz, f_{FR} = 70 Hz, Checkered pattern, non-burden, V_{DD} = V_0 = 0V, V_2 = –4 V, V_3 = –16 V, V_{EE} = V_5 = –20 V		0.3	0.8	mA	V_{DD}
Average current consumption (1) Self-refresh mode	I_{DDS}	f_{XSCL} = 0 Hz = V_{SS}, Another place is same as I_{DDT} item		70	200	µA	
Average current consumption (2)	I_{EE}	V_{SS} = –5.0 V, V_0 = 0.0 V, V_2 = –4 V, V_3 = –16 V, I_{EE} = V_5 = –20.0 V, Another place is same as I_{DDT} item		25	70	µA	V_{EE}
Input capacitance	C_I	Freq. = 1 MHz, Ta = 25°C, Simple substance of CHIP			8	pF	D_0 to D_3, LP, FR, YD, XSCL, SHL, DOFF
I/O capacitance	$C_{I/O}$				15	pF	EIO1, EIO2

■ LCD PANLE CONNECTION EXAMPLE



SEIKO EPSON CORPORATION
DEVICE MARKETING DEPARTMENT

IC Marketing & Engineering Group
421-8 Hino, Hino-shi, Tokyo 191, JAPAN
Phone: 0425-87-5816 FAX: 0425-87-5624

International Marketing Department I (Europe, U.S.A.)
421-8 Hino, Hino-shi, Tokyo 191, JAPAN
Phone: 0425-87-5812 FAX: 0425-87-5564

International Marketing Department II (ASIA)
421-8 Hino, Hino-shi, Tokyo 191, JAPAN
Phone: 0425-87-5814 FAX: 0425-87-5110

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