

SED1191

CMOS LCD 64-COMMON DRIVER

■ DESCRIPTION

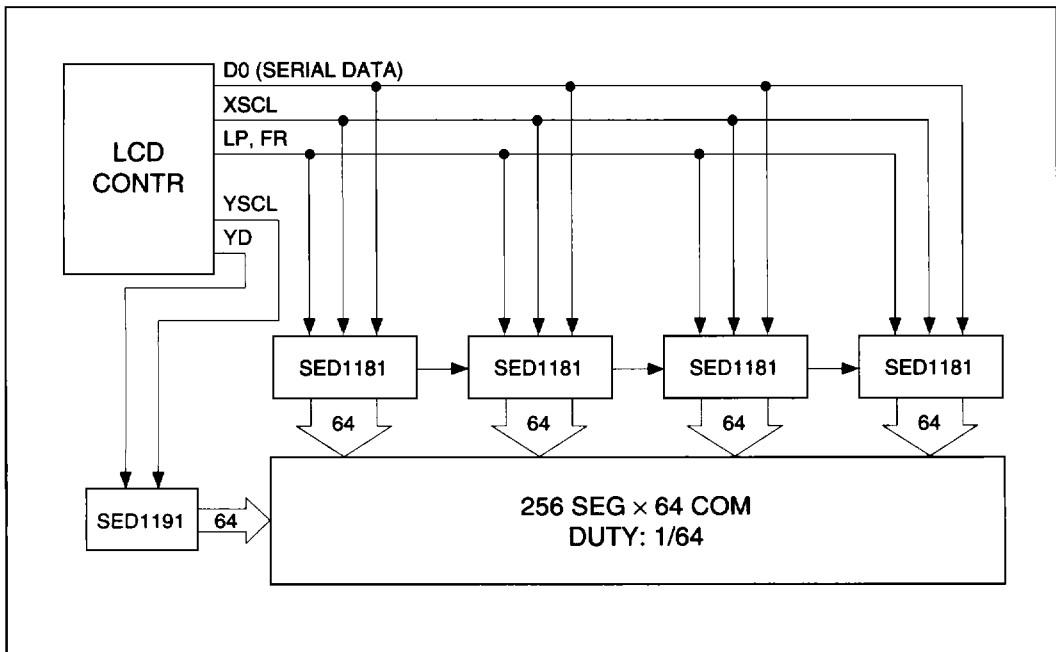
The SED1191 is a dot matrix LCD common (row) driver for driving high-capacity LCD panel at duty cycles higher than 1/64. The LSI uses two serially connected, 32-bit shift registers to hold the display data, and level shifter converts the TTL level 64-bit parallel data from the shift registers to levels suitable for use by the LCD drive circuitry. The SED1191 generates common drive signals using the voltages supplied to LCD drive voltages pins.

The SED1191 is used in conjunction with the SED1181 (64-bit row driver) to drive a large-capacity dot-matrix LCD panel.

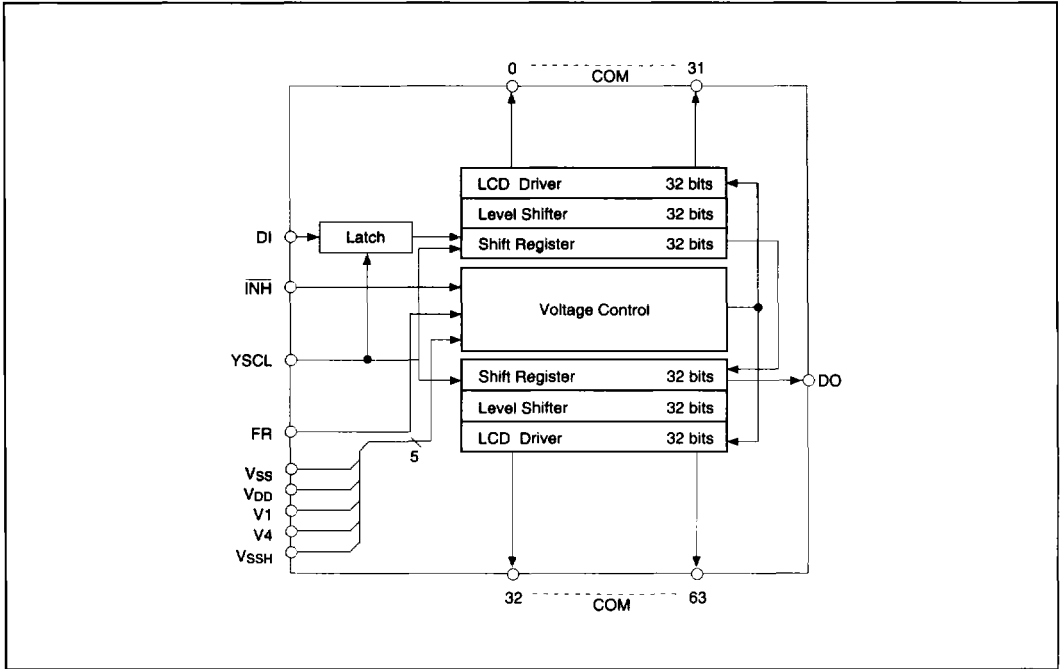
■ FEATURES

- Low-power CMOS technology
- 64-bit common (row) driver
- Display blanking
- Duty cycle: 1/64 to 1/128
- Daisy chain enable support
- Wide range of LCD voltage: -14V to -25V
- Supply voltage: 5.0V ± 10%
- Package: QFP1-80 pin (F0B)
QFP5-80 pin (F5B)
DIE: Al pad (D0A)

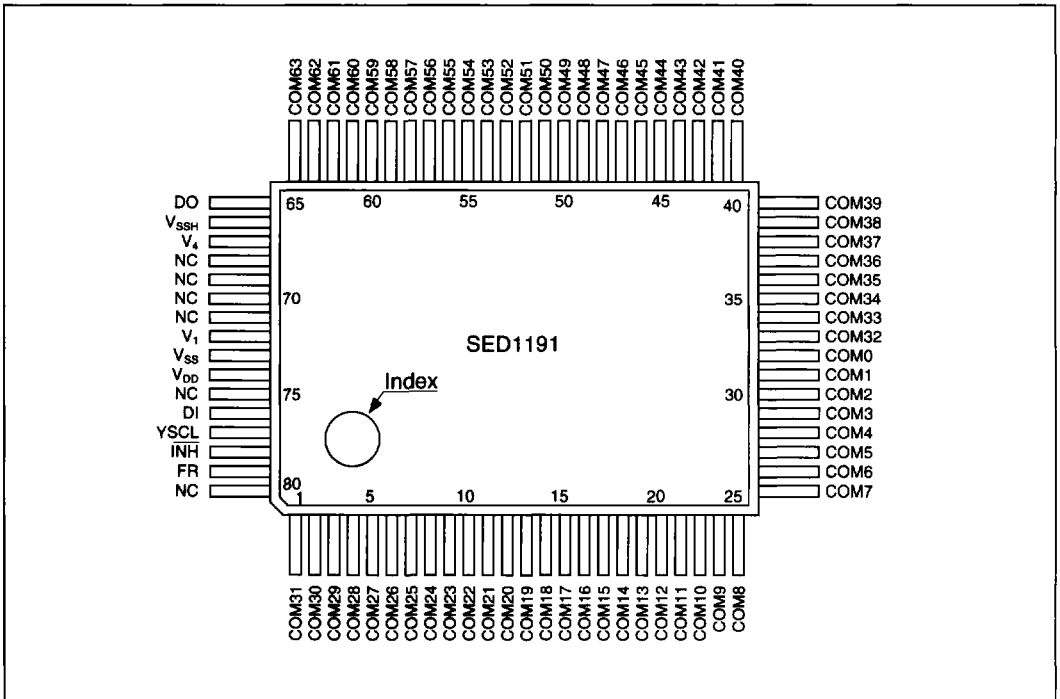
■ SYSTEM BLOCK DIAGRAM



■ BLOCK DIAGRAM



■ PINOUT



Number	Name	Number	Name	Number	Name	Number	Name
1	COM31	21	COM11	41	COM40	61	COM60
2	COM30	22	COM10	42	COM41	62	COM61
3	COM29	23	COM 9	43	COM42	63	COM62
4	COM28	24	COM 8	44	COM43	64	COM63
5	COM27	25	COM 7	45	COM44	65	DO
6	COM26	26	COM 6	46	COM45	66	Vssh
7	COM25	27	COM 5	47	COM46	67	V4
8	COM24	28	COM 4	48	COM47	68	NC
9	COM23	29	COM 3	49	COM48	69	NC
10	COM22	30	COM 2	50	COM49	70	NC
11	COM21	31	COM 1	51	COM50	71	NC
12	COM20	32	COM 0	52	COM51	72	V1
13	COM19	33	COM32	53	COM52	73	Vss
14	COM18	34	COM33	54	COM53	74	VDD
15	COM17	35	COM34	55	COM54	75	NC
16	COM16	36	COM35	56	COM55	76	DI
17	COM15	37	COM36	57	COM56	77	YSCL
18	COM14	38	COM37	58	COM57	78	$\overline{\text{INH}}$
19	COM13	39	COM38	59	COM58	79	FR
20	COM12	40	COM39	60	COM59	80	NC

■ PIN DESCRIPTION

Pin Name	Function
COM0 to COM63	LCD common drive outputs
DI	Serial data input
DO	Serial data output
YSCL	Serial data shift clock. Data is shifted through the controller on the falling edge of this clock
FR	LCD AC-drive signal input
$\overline{\text{INH}}$	Active-low blanking input
VDD, Vss	Logic power supply inputs
V1, V4, Vssh	LCD drive power supply inputs $V_{DD} \geq V1 \geq V4 \geq V_{SSH}$

■ ELECTRICAL CHARACTERISTICS

● Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Supply voltage (1)	V _{SS}	-7.0 to +0.3	V
Supply voltage (2)	V _{SSH}	-28.0 to +0.3	V
	V1, V4		
Input voltage	V _I	V _{SS} -0.3 to +0.3	V
Operating temperature	T _{opr}	-20 to +75	°C
Storage temperature	T _{stg}	-55 to +125	°C
Soldering temperature and time	T _{sol}	260, 10	°C, s

Notes:

1. All voltages referenced to a V_{DD} of 0 V.
2. V1 and V4 must satisfy the relationship $V_{DD} \geq V1, V4 \geq V_{SSH}$
3. Exceeding the absolute maximum ratings can cause permanent damage to the device. Functional operation under these conditions is not implied.
4. Moisture resistance of flat packages can be reduced by the soldering process. Care should be taken to avoid thermally stressing the package during board assembly.

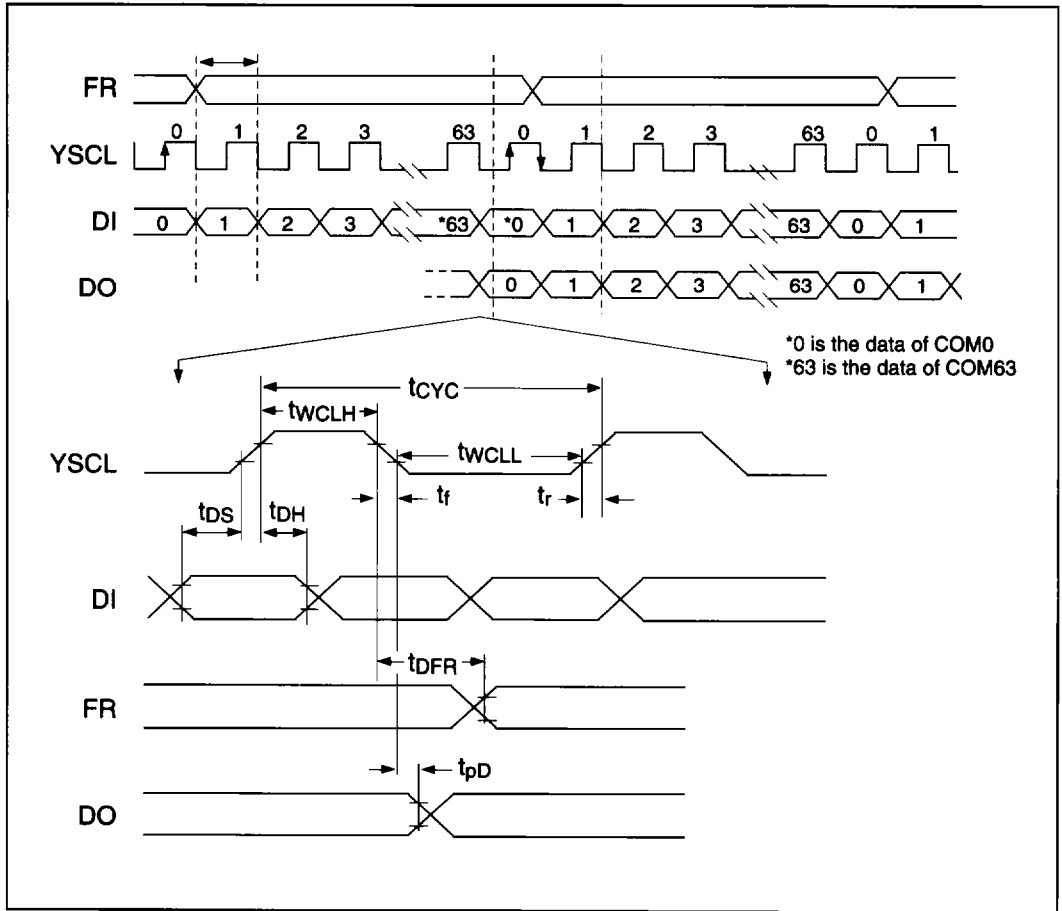
● DC Characteristics

(V_{DD} = 0V, V_{SS} = -5.0 V ±10%, T_a = -20 to 75°C)

Parameters	Symbol	Condition	Rating			Unit	
			Min	Typ	Max		
Supply voltage (1)	V _{SS}		-5.5	-5.0	-4.5	V	
Supply voltage (2)	V _I		V _{SSH}	—	V _{DD}	V	
	V ₄		V _{SSH}	—	V _{DD}	V	
	V _{SSH}		-25.0	—	-14.0	V	
High level input voltage	V _{IH}		0.2xV _{SS}	—	V _{DD} +0.3	V	
Low level input voltage	V _{IL}		V _{SS} -0.3	—	0.8xV _{SS}	V	
High level output voltage	V _{OH}	I _{OH} = -0.6 mA	-0.4	—	—	V	
Low level output voltage	V _{OL}	I _{OL} = 0.6 mA	—	—	V _{SS} +0.4	V	
Input leakage current	I _{LI}	0 V ≤ V _I ≤ V _{SS}	—	0.05	2.0	μA	
Output leakage current	I _{LO}	0 V ≤ V _O ≤ V _{SS}	—	0.05	5.0	μA	
Shift clock	YSCL		—	—	2.5	MHz	
Frame signal	FR		—	1/60	—	Sec	
Input capacitance	C _I	T _a = 25°C	—	5.0	8.0	pF	
COM output on resistance	R _{COM}	V _{SSH} = -14.0 V, V _{OH} = V _{DD} -0.5 V, V _{OL} = V _{SSH} +0.5 V COM./ bit	—	2.0	4.0	kΩ	
Quiescent current	I _Q	V _{SSH} = -18.0 V, V _{SS} = -5.5 V, V _I = V _{DD}	—	0.05	30.0	μA	
Operating current for the logic	I _{SSOP}	FR cycle = 130 μs	V _{SS} = -5.0 V, V _{IH} = V _{DD} , V _{IL} = V _{SS} , YSCL cycle = 130 μs (duty 50%), All "H" output terminals are opened at every data input all 1/128 duty.	—	3.0	8.0	μA
Operating current for LCD	I _{SSHOP}	FR cycle = 130 μs	V _{SS} = -4.5 V, V _I = -1.8 V, V ₄ = -16.2 V, V _{SSH} = -18.0 V, YSCL cycle = 130 μs (duty 50%), All "H" output terminals are opened at every data input of 1/128 duty.	—	70	100	μA

Note: Error free operation is guaranteed in this range but the output resistance of the LCD drivers is higher than in the recommended operating range. It is suggested that the driver is tested with the target LCD panel to determine if performance is acceptable.

- AC Characteristics
- I/O Signal

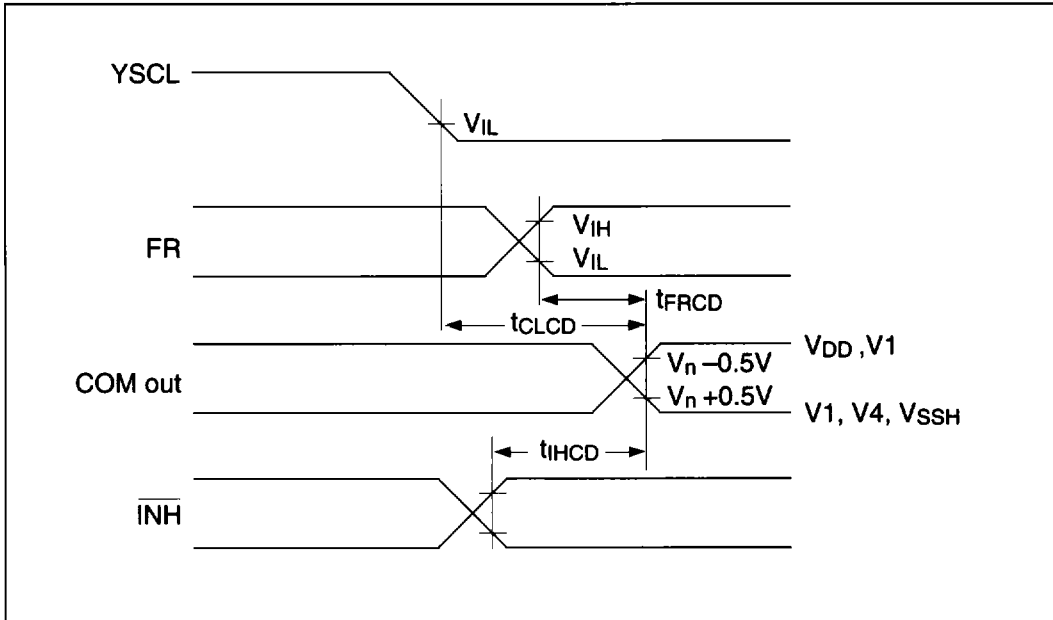


(VDD = 0V, VSS = -5.0 V ±10%, Ta = -20 to 75°C)

Parameter	Symbol	Conditions	Rating			Unit
			Min	Typ	Max	
Shift lock cycle time	tCYC		500	—	—	ns
Shift lock "H" width	twCLH		110	—	—	ns
Shift lock "L" width	twCLL		240	—	—	ns
Data setup time	tds		70	—	—	ns
Data hold time	tDH		30	—	—	ns
Permissible frame signal delay	tDFR		-500	0	500	ns
Input signal rise time	tr		—	—	50	ns
Input signal fall time	tr		—	—	50	ns
Data output delay time	tpD	CL = 15 pF	30	—	170	ns

Note: tr, tr = (tCYL - twLH - twLTL) / 2 where tr ≥ 50 ns.

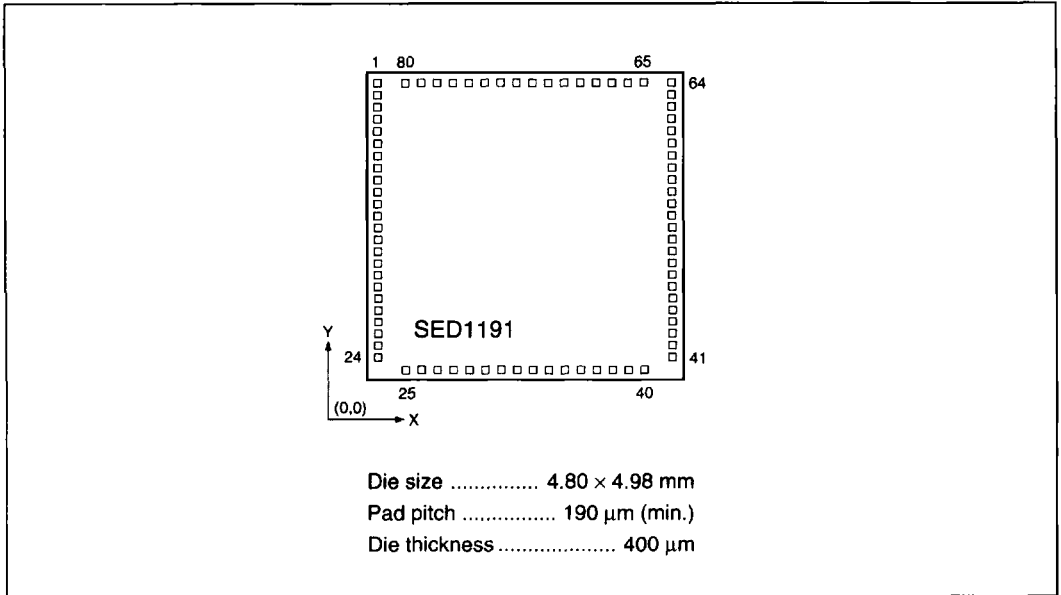
o Common Drive



$V_{IH} = 0.2 \times V_{SS}$; $V_{IL} = 0.8 \times V_{SS}$ ($V_{SS} = -5.0 \text{ V} \pm 10\%$, $T_a = -20 \text{ to } 75^\circ\text{C}$)

Parameter	Symbol	Conditions	Rating			Unit
			Min	Typ	Max	
YSCL-COM output delay time	t_{CLCD}	$V_{SSH} = -14.0 \text{ to } -18.0\text{V}$	—	—	3.0	μs
RF-COM output delay time	t_{FRCD}	$C_L = 100 \text{ pF}$	—	—	3.0	μs
INH-COM output delay time	t_{IHCD}		—	—	3.0	μs

■ PAD LAYOUT



■ PAD COORDINATES

No.	Name	X	Y
1	COM31	152	4826
2	COM30	152	4636
3	COM29	152	4446
4	COM28	152	4255
5	COM27	152	4065
6	COM26	152	3874
7	COM25	152	3684
8	COM24	152	3494
9	COM23	152	3303
10	COM22	152	3113
11	COM21	152	2922
12	COM20	152	2732
13	COM19	152	2542
14	COM18	152	2351
15	COM17	152	2181
16	COM16	152	1970
17	COM15	152	1780
18	COM14	152	1590
19	COM13	152	1399
20	COM12	152	1209
21	COM11	152	1018
22	COM10	152	828
23	COM9	152	570
24	COM8	152	379
25	COM7	516	155
26	COM6	762	155
27	COM5	1009	155

No.	Name	X	Y
28	COM4	1255	155
29	COM3	1502	155
30	COM2	1748	155
31	COM1	1995	155
32	COM0	2241	155
33	COM32	2488	155
34	COM33	2734	155
35	COM34	2981	155
36	COM35	3227	155
37	COM36	3474	155
38	COM37	3720	155
39	COM38	3967	155
40	COM39	4213	155
41	COM40	4645	379
42	COM41	4645	570
43	COM42	4645	828
44	COM43	4645	1018
45	COM44	4645	1209
46	COM45	4645	1399
47	COM46	4645	1590
48	COM47	4645	1780
49	COM48	4645	1970
50	COM49	4645	2161
51	COM50	4645	2351
52	COM51	4645	2542
53	COM52	4645	2732
54	COM53	4645	2922

No.	Name	X	Y
55	COM54	4645	3113
56	COM55	4645	3303
57	COM56	4645	3494
58	COM57	4645	3684
59	COM58	4645	3874
60	COM59	4645	4065
61	COM60	4645	4255
62	COM61	4645	4446
63	COM62	4645	4636
64	COM63	4645	4826
65	DO	4254	4826
66	VSSH	4008	4826
67	V4	3761	4826
68	NC	3515	4826
69	NC	3268	4826
70	NC	3022	4826
71	NC	2775	4826
72	V1	2529	4826
73	VSS	2282	4826
74	VDD	2036	4826
75	NC	1789	4826
76	DI	1543	4826
77	LAT	1296	4826
78	INH	1050	4826
79	FR	803	4826
80	YSCL	557	4826