



LC7583N

LCD Driver with Level Meter

Overview

The LC7583N is an LCD driver that can be microcomputer-controlled to provide segment display and level meter display.

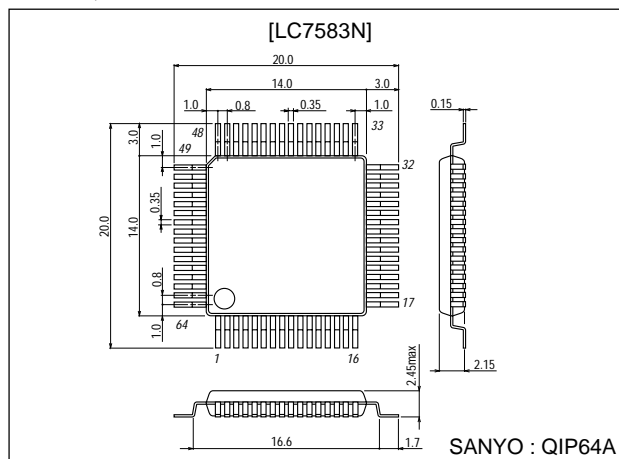
Features

- The serial data address is "5".
- 1/2duty, 1/2bias, 66 segments (max) (Except ADC output, DSP input display).
- 5-bit AD converter and three selections of level output shown below.
 - (1) 13 dots x 2ch Log scale
 - (2) 13 dots x 2ch Linear scale
 - (3) 26 dots x 1ch Linear scale
- 2 display (DSP) pins for direct display.
- Microcomputer-controlled data input using 3 pins for serial data input and control.
- The full scale of the AD converter is $31/48V_{ref}$. The V_{ref} is variable (with V_{ref} pin).
- Available for increased use in general-purpose applications because no decoder is required to display the segment data.
- Control bits used to cause the segment output and AD output to be lighted/unlighted.
- \overline{RES} pin used to cause the initial mode to be entered.

Package Dimensions

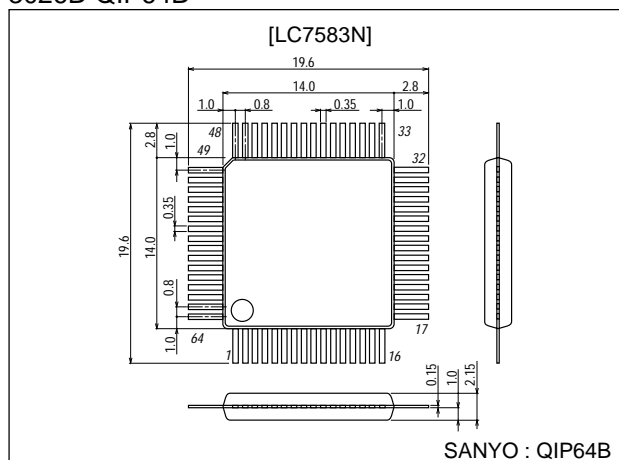
unit:mm

3057-QIP64A



unit:mm

3026B-QIP64B



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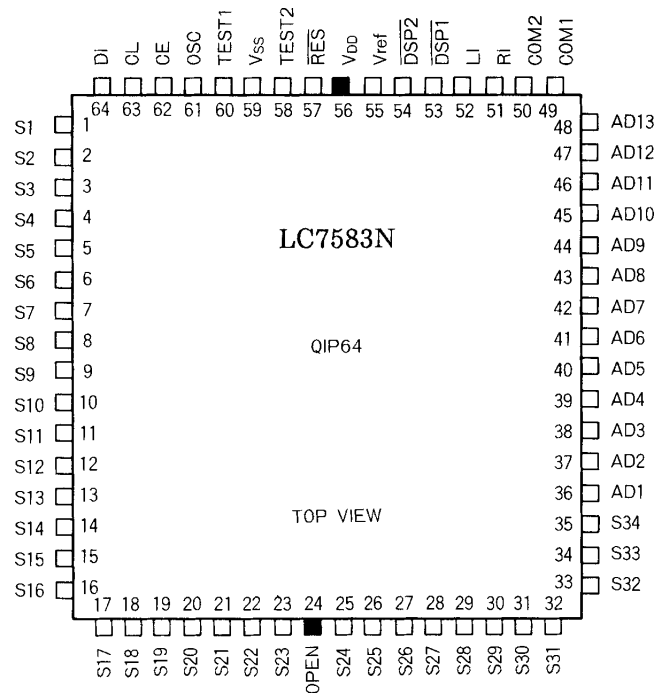
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Pin Assignment



Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$, $V_{SS}=0\text{V}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{DD\text{ max}}$	V_{DD}	-0.3 to +7.0	V
Input voltage	V_{IN1}	CE, CL, DI, RES, DSP1, DSP2	-0.3 to +7.0	V
	V_{IN2}	RI, LI	$V_{DD}+0.3$	V
	V_{IN3}	Vref	-0.3 to $V_{DD}+0.3$	V
	V_{IN4}	OSC output OFF	-0.3 to $V_{DD}+0.3$	V
Output voltage	V_{OUT}	OSC output OFF	-0.3 to $V_{DD}+0.3$	V
Output current	I_{OUT1}	S1 to S34, AD1 to AD13	500	μA
	I_{OUT2}	COM1, 2	1	mA
Allowable power dissipation	$P_d\text{ max}$	$T_a \leq 85^\circ\text{C}$	100	mW
Operating temperature	T_{opr}		-40 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-45 to +125	$^\circ\text{C}$

Allowable Operating Conditions at $T_a = -40$ to $+85^\circ\text{C}$, $V_{SS}=0\text{V}$

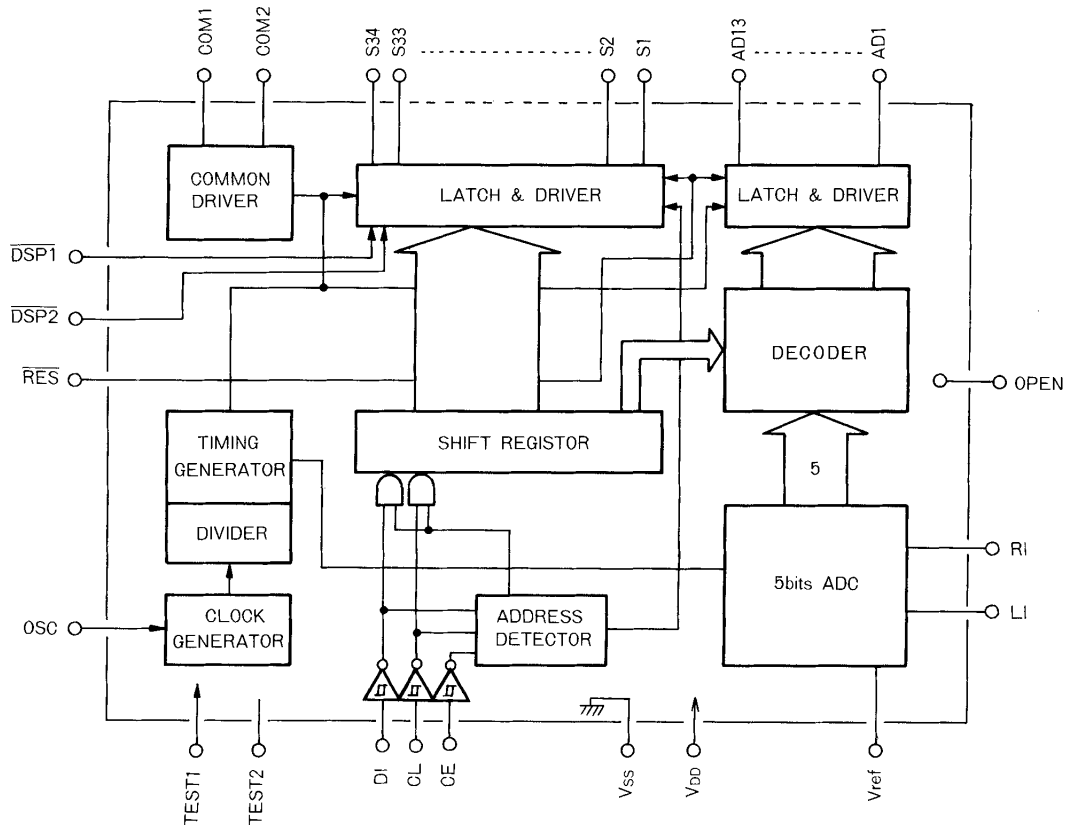
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply voltage	V_{DD}		4.5		6.5	V
Reference voltage	Vref	$V_{ref} \leq V_{DD}$	4.5		V_{DD}	V
Input high-level voltage	V_{IH1}	CE, CL, DI, RES, DSP1, DSP2	$0.7V_{DD}$		6.5	V
Input low-level voltage	V_{IL1}	CE, CL, DI, RES, DSP1, DSP2	0		$0.3V_{DD}$	V
Input hysteresis width	V_H	CE, CL, DI	$0.05V_{DD}$	$0.10V_{DD}$		V
Recommended external resistance	R	OSC		47		$k\Omega$
Recommended external capacitance	C	OSC		1000		pF
OSC guaranteed range	f_{OSC}	OSC	10	32	50	kHz
Low-level clock pulse width	$t_{\phi L}$	CL, DI	0.5			μs
High-level clock pulse width	$t_{\phi H}$	CL, DI	0.5			μs
Setup time	t_{sup}	CL, DI	0.5			μs
Serial data pulse width	t_1	CL, CE see fig. A.	2			μs
	t_2	See fig. A.			3	μs
Data hold time	t_{dh}	CL, DI	0.5			μs
AD conversion time	t_{CONV}	RI, LI, per channel	200			μs
Input voltage	V_{IN}	RI, LI/ $V_{IN} \leq V_{ref}$	0		V_{DD}	V

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Electrical Characteristics at Ta = 25°C, under Allowable Operating Conditions

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Input high-level current	I _{IH1}	CE, CL, DI, RI, LI, $\overline{\text{RES}}$, $\overline{\text{DSP1}}$, $\overline{\text{DSP2}}$, VI=6.5V			5	μA
Input low-level current	I _{IL1}	CE, CL, DI, RI, LI, $\overline{\text{RES}}$, $\overline{\text{DSP1}}$, $\overline{\text{DSP2}}$, VI=0V			5	μA
Output high-level voltage	V _{OH1}	S1 to S34, I _O =-10μA	V _{DD} -1.0			V
Output low-level voltage	V _{OL1}	AD1 to AD13, I _O =10μA			1.0	V
Output high-level voltage	V _{OH2}	COM1, COM2, I _O =-100μA	V _{DD} -0.6			V
Output low-level voltage	V _{OL2}	COM1, COM2, I _O =100μA			0.6	V
M-level voltage	V _{MID}	COM1, COM2, V _{DD} =6.5V, I _O =±100μA	2.65	3.25	3.85	V
M-level voltage	V _{MID}	COM1, COM2, V _{DD} =3.0V, I _O =±100μA	0.9	1.5	2.1	V
OSC frequency	f _{OSC}	OSC, R=47kΩ, C=1000pF		32		kHz
AD conversion linearity error	Err	V _{ref} =4.5 to 6.5V ≤ V _{DD}	-1/2		+1/2	LSB
Supply current	I _{DD}	f _{OSC} =32kHz, input=V _{OD} , output=open		2	4	mA
Reference supply current	I _{ref}	V _{ref}		0.3	1	mA

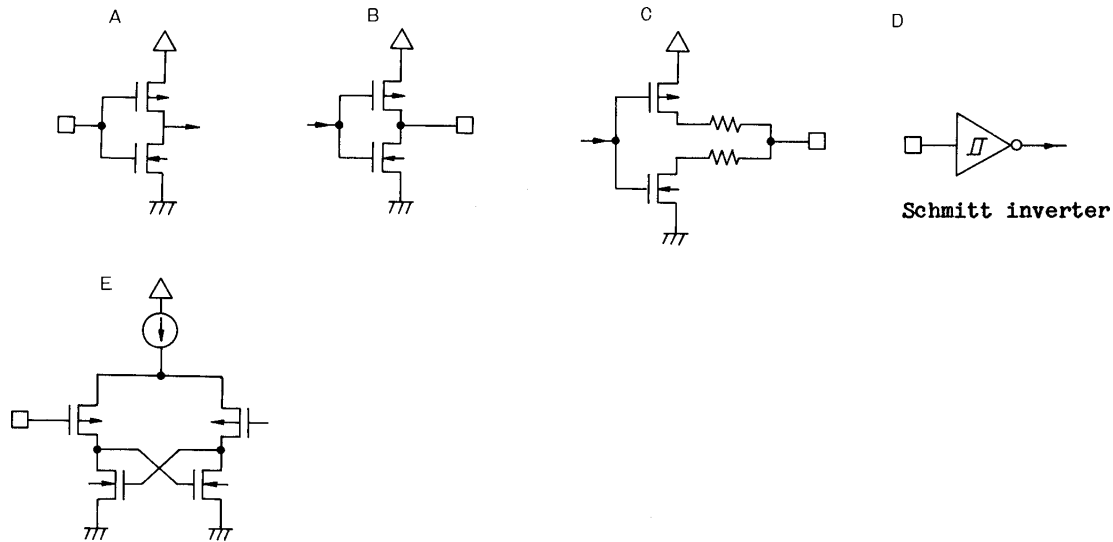
Block Diagram



Pin Function

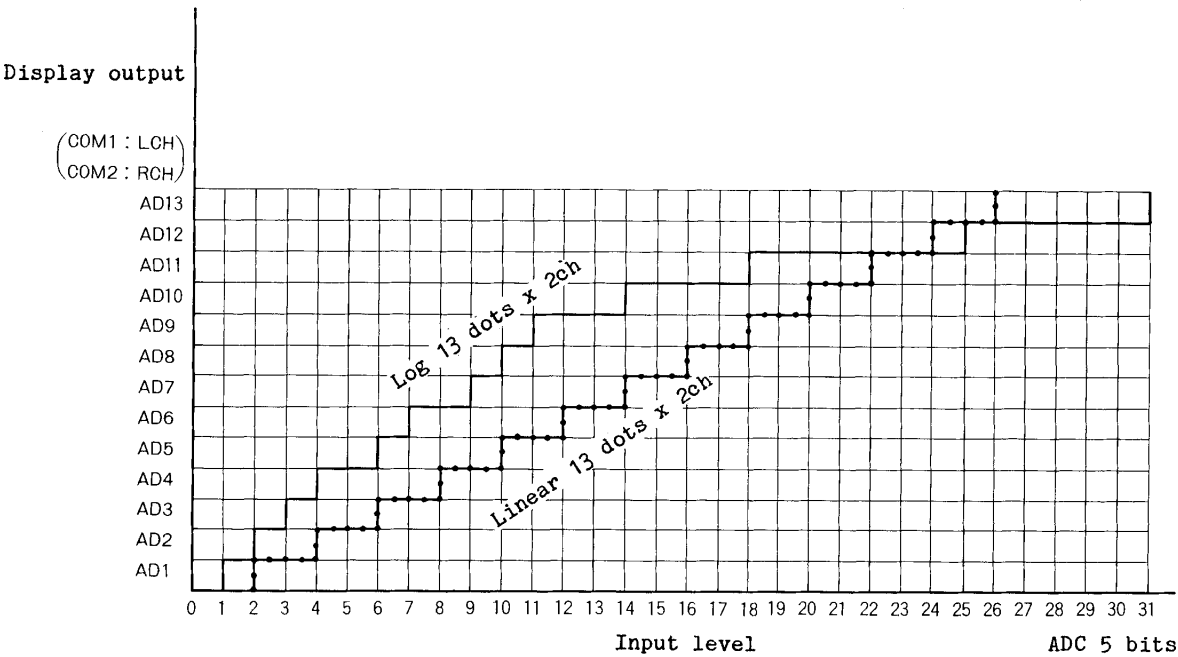
Pin Name	Pin No.	Description	Active	I/O	I/O Configuration
S1 to S33	1 to 34	Segment output pins used to display the data transferred from the serial data input pin.	–	O	B
S34	35	Segment output pin used to display the external input (DSP1, DSP2) data	–	O	
AD1 to AD13	36 to 48	Segment output pins used to display the ADC input (R1, L1) data. Control bits "A1", "A2" are used to provide 3 types of pattern. AD1 : Lowest lighting level, AD13 : Highest lighting level	–	O	
COM1 COM2	49 50	Common driver output pins. Frame frequency : $f_{OSC}/512\text{Hz}$	–	O	C
RI LI	51 52	AD converter input pins.	Analog	I	E
DSP1 DSP2	53 54	Direct (external input) display pins whose segment output is delivered at S34.	L	I	A
Vref	55	Pin used to supply the AD converter reference voltage.	–	–	–
V _{DD} V _{SS}	56 59	Power supply pin.	–	–	–
RES	57	Pin used to force the display to be unlighted at the initial mode.	L	I	A
TEST2	58	Open	–	O	–
TEST1	60	Open or connected to V _{SS} .	–	I	A
CE	62	Serial data transfer pin. Connected to a controller (microcomputer). CE : Chip enable CL : Sync clock DI : Transfer data	H	I	D
CL	63				
DI	64		–		
OPEN	24	No connection.	–	–	–

Equivalent Input/Output Configuration



ADC Display Mode

2ch (stereo) Display (shown for one channel only)

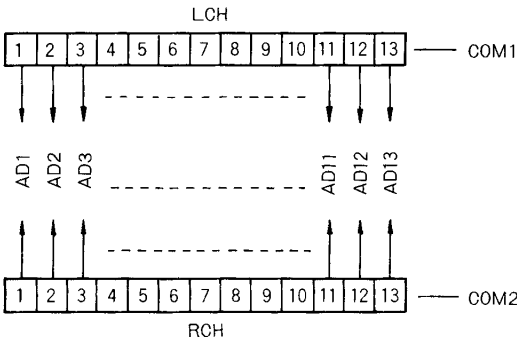


Lighting Level for Log Display

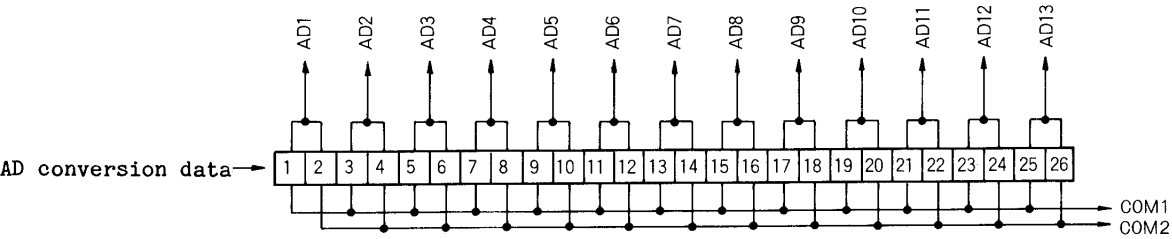
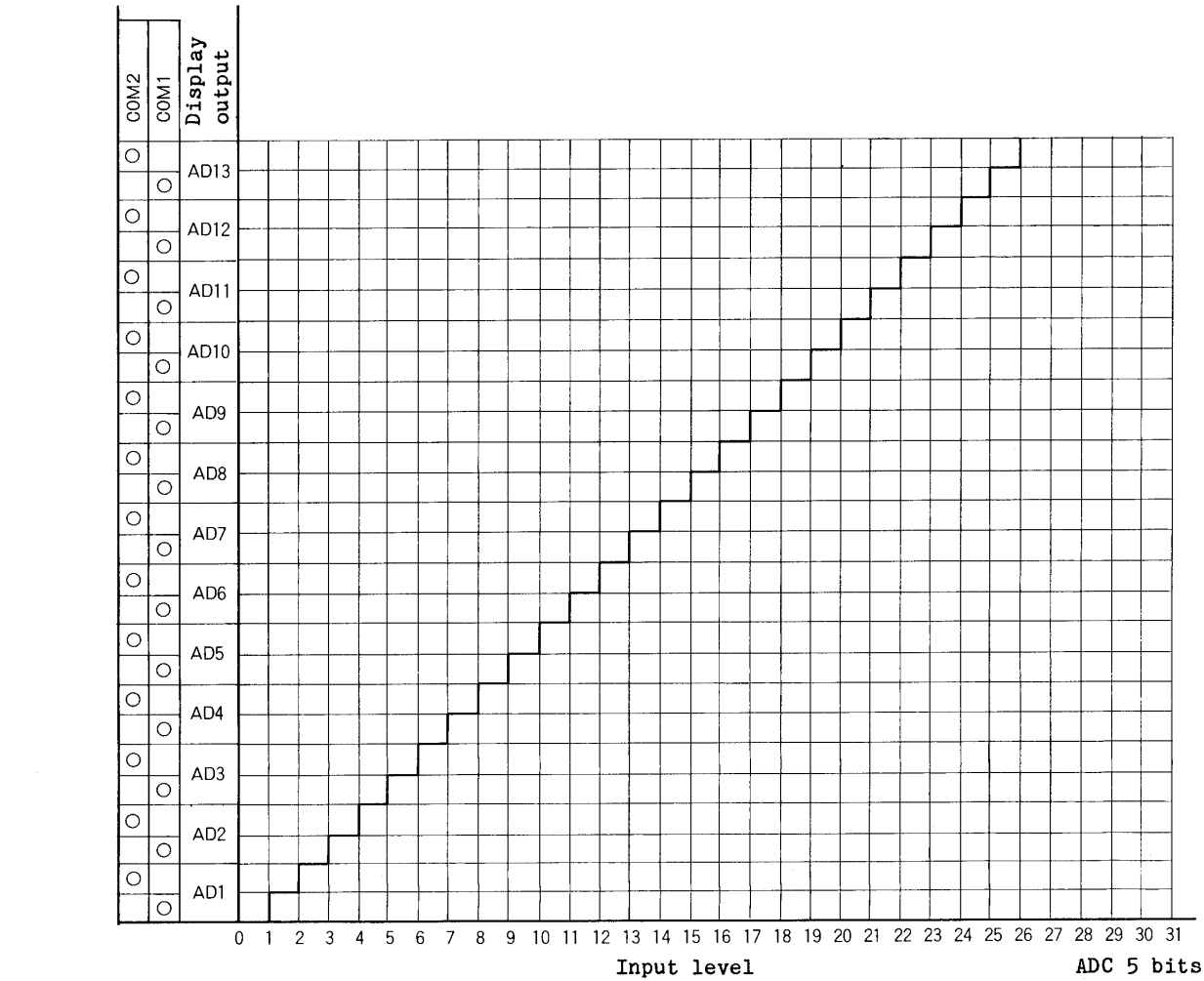
Display Output	dB Display (dB)	Display Output	dB Display (dB)
AD1	-20.0	AD8	0.0
AD2	-14.0	AD9	1.0
AD3	-10.5	AD10	3.0
AD4	-8.0	AD11	5.0
AD5	-4.5	AD12	8.0
AD6	-3.0	AD13	10.0
AD7	-1.0		

Note) The conversion error of the AD converter is $\pm 1/2\text{LSB}$.
When 0dB is taken as 1V (at $V_{\text{ref}}=4.95\text{V}$), a conversion error of approximately $\pm 3.5\text{dB}$ occurs at -20dB.

COMMON Connection



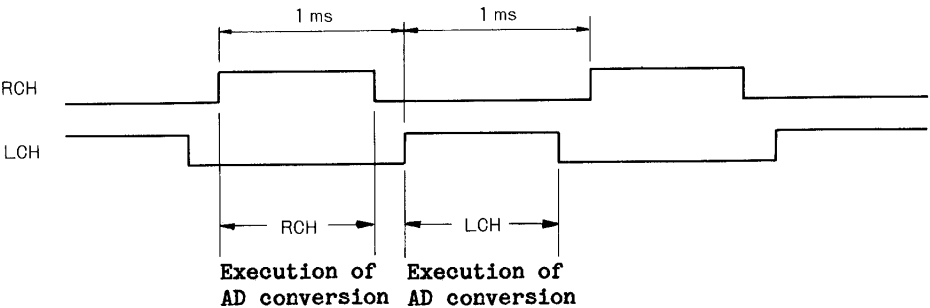
1ch (monaural) Display



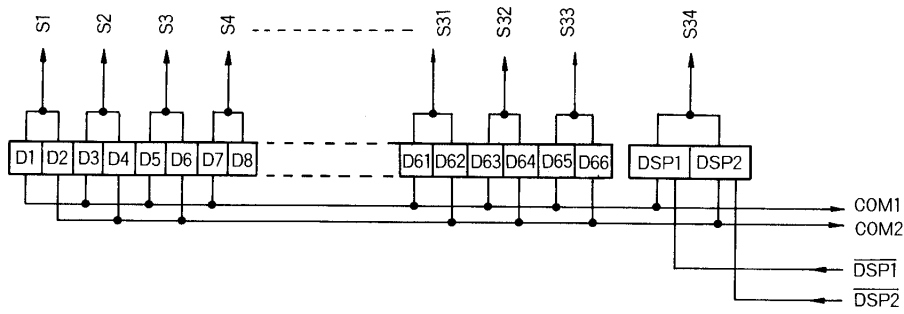
Connect the RI pin and LI pin at the monaural mode.

ADC Conversion Time

When the oscillation frequency is 32kHz, individual input signals at the RI pin, LI pin are sampling-processed alternately once every 1ms.

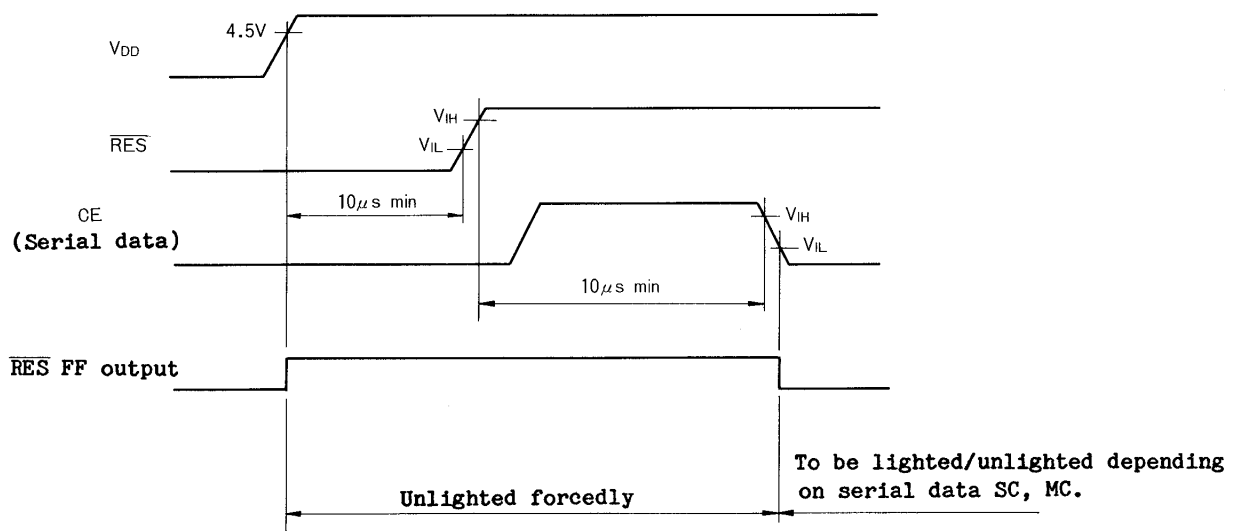
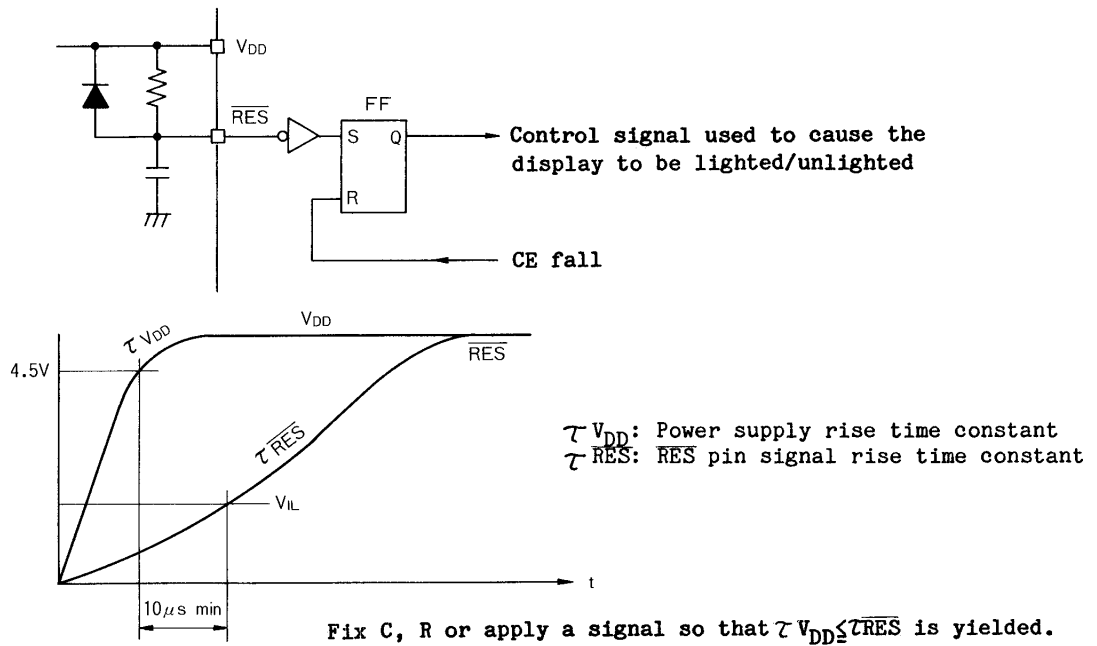


Connection of Serial Data, $\overline{\text{DSP}}$ Input Data



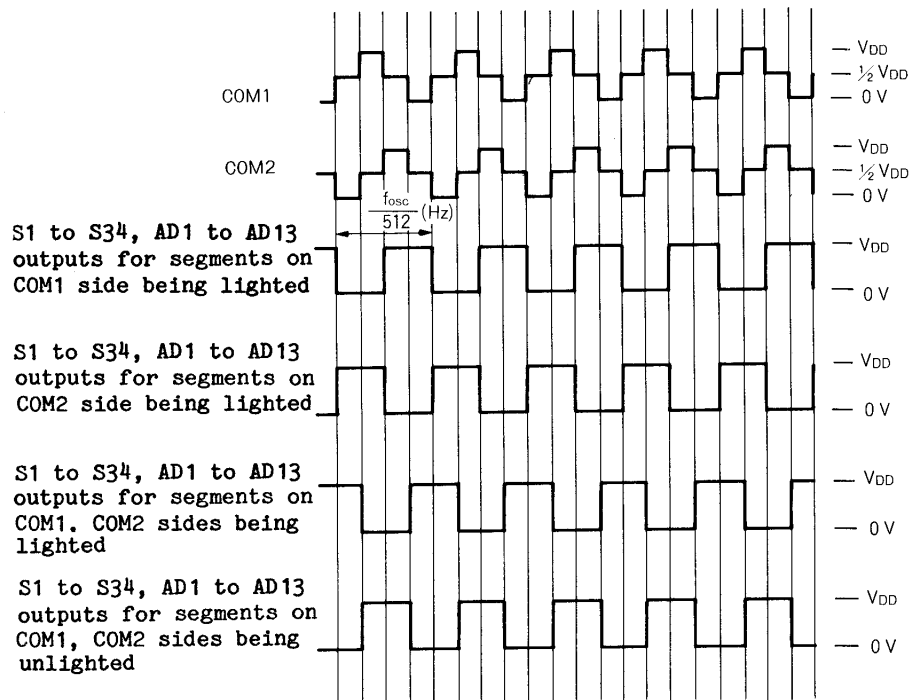
$\overline{\text{RES}}$ Pin and Display Control

The internal circuit of the $\overline{\text{RES}}$ pin is shown below.

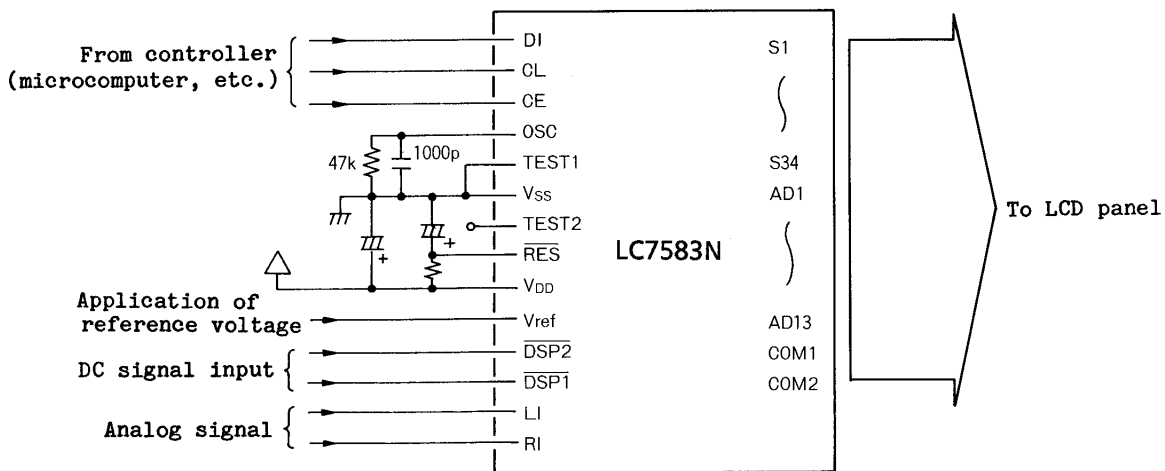


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Output Waveforms (S1 to S34, AD1 to AD13)



Sample Application Circuit



Unit (resistance: Ω , capacitance: F)

[Fig. A] : Data Transfer Mode (Transferred from a controller as shown below)

