



No.1465D

# LC7570, 7570E

## Static Drivers for Vacuum Fluorescent Display for Frequency Display Applications

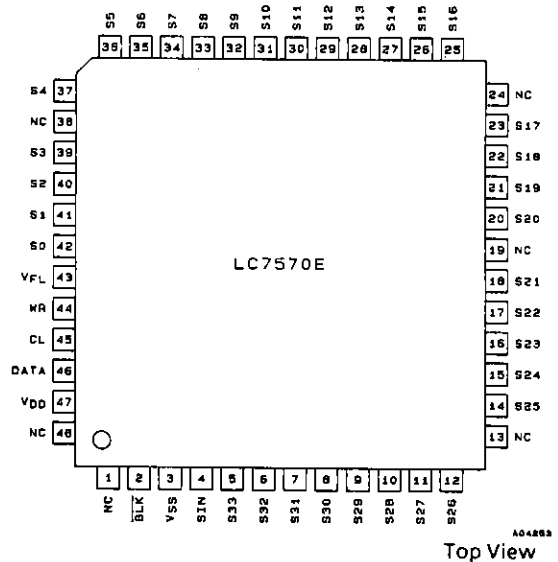
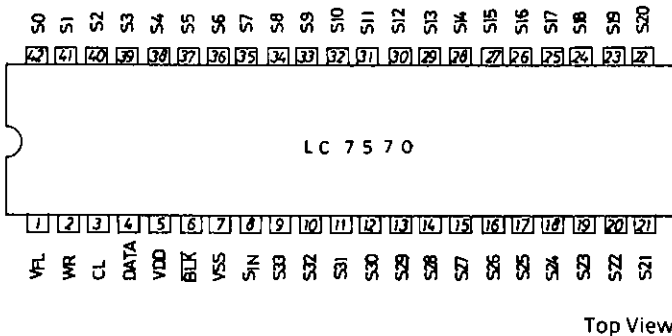
### Overview

The LC7570, LC7570E are controller-controlled static drivers for vacuum fluorescent display to be used in electronic tuning frequency indicator applications.

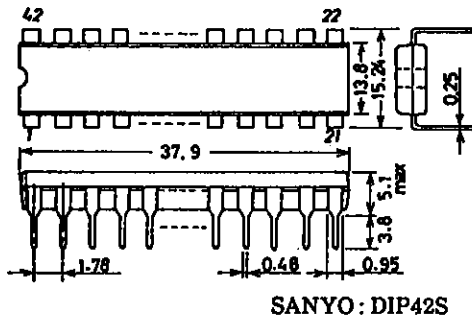
### Features

- 34-segment output (With pull-down resistor).
- 5-step A/D converter.
- The display can be forced to the off state with the  $\overline{BLK}$  pin.
- Data input : Serial input (CL, DATA, WR).
- The program of a controller can be used to suit the segment outputs to the pin assignment of a vacuum fluorescent display.

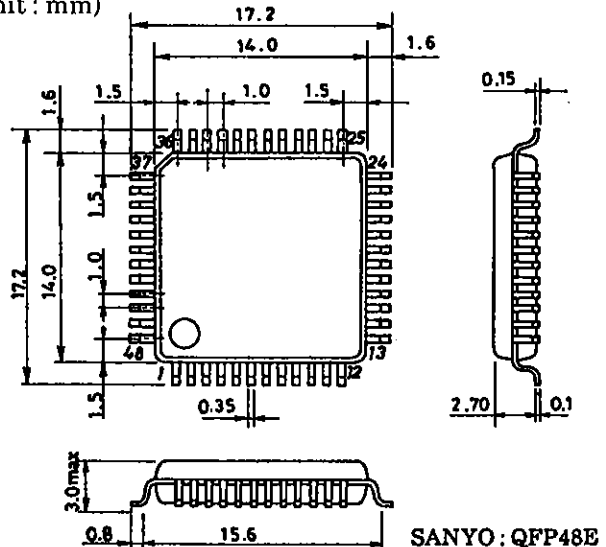
### Pin Assignments



Package Dimensions 3025B [LC7570]  
(unit: mm)



Package Dimensions 3156 [LC7570E]  
(unit: mm)



# LC7570,7570E

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

				unit	
Maximum Supply Voltage	$V_{DD \text{ max}}$	$V_{DD}$	-0.3 to +9.0	V	
Maximum Input Voltage	$V_{IN \text{ max}}$	CL, DATA, WR, SIN, $\overline{\text{BLK}}$	-0.3 to $V_{DD} + 0.3$	V	
Maximum Output Voltage	$V_{OUT \text{ max}}$	S0 to S33, $V_{FL}$	$V_{DD} - 28$ to $V_{DD} + 0.3$	V	
Maximum Output Current	$I_{OUT \text{ max}}$	S0 to S33	3.0	mA	
Allowable Power Dissipation	$P_d \text{ max}$	$T_a = 75^\circ\text{C}$	LC7570	500	mW
			LC7570E	480	mW
Operating Temperature	$T_{opr}$		-30 to +75	$^\circ\text{C}$	
Storage Temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$	

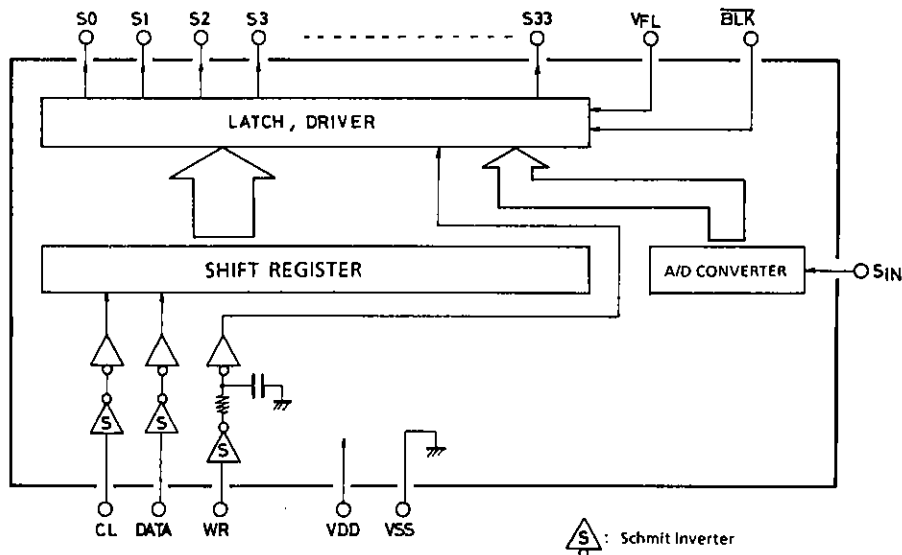
## Allowable Operating Ranges at $T_a = -30$ to $+75^\circ\text{C}, V_{SS} = 0\text{V}$

			min	typ	max	unit
Supply Voltage	$V_{DD}$	$V_{DD}$	4.5		8.0	V
Input High Level Voltage	$V_{IH}$	$\overline{\text{BLK}}$	$0.7V_{DD}$		$V_{DD}$	V
Input Low Level Voltage	$V_{IL}$	$\overline{\text{BLK}}$	0		$0.3V_{DD}$	V
Rise Trigger Threshold Voltage	$V_P$	CL, DATA, WR	$0.8V_{DD}$		$V_{DD}$	V
Fall Trigger Threshold Voltage	$V_N$	CL, DATA, WR	0		$0.2V_{DD}$	V
Output Voltage	$V_{OUT}$	S0 to S33, $V_{FL}$	$V_{DD} - 28$		$V_{DD}$	V
Write Pulse Width	$P_w$	WR	20			$\mu\text{s}$

## Electrical Characteristics in the Allowable Operating Ranges

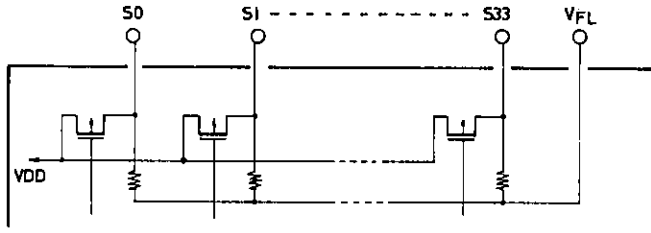
			min	typ	max	unit
Hysteresis Width	$V_H$	CL, DATA, WR	$0.15V_{DD}$		$0.6V_{DD}$	V
Input High Level Current	$I_{IH}$	CL, DATA, WR, SIN, $\overline{\text{BLK}}$ : $V_I = 8\text{V}$			5.0	$\mu\text{A}$
Input Low Level Current	$I_{IL}$	CL, DATA, WR, SIN, $\overline{\text{BLK}}$ : $V_I = 0\text{V}$	-5.0			$\mu\text{A}$
Output High Level Voltage	$V_{OH}$	S0 to S33 : $I_O = 2.5\text{mA}$	$V_{DD} - 2.8$			V
Output OFF-State Voltage	$V_{OFF}$	S0 to S33 : $V_{FL} = V_{DD} - 25\text{V}$ , output OFF			$V_{DD} - 24$	V
Self-Contained Resistance in Output	$r_o$	S0 to S33 : $V_{DD} = 5\text{V}$ , $V_{FL} = -20\text{V}$	70	170	400	k $\Omega$
A/D Converter						
1st Step Light-Up Voltage	AD1	SIN		$0.1V_{DD}$		V
2nd Step Light-Up Voltage	AD2	SIN		$0.2V_{DD}$		V
3rd Step Light-Up Voltage	AD3	SIN		$0.3V_{DD}$		V
4th Step Light-Up Voltage	AD4	SIN		$0.4V_{DD}$		V
5th Step Light-Up Voltage	AD5	SIN		$0.5V_{DD}$		V
Supply Current	$I_{DD}$	$V_{DD}$ : input = 0V, output = open			3.0	mA

## Equivalent Circuit Block Diagram



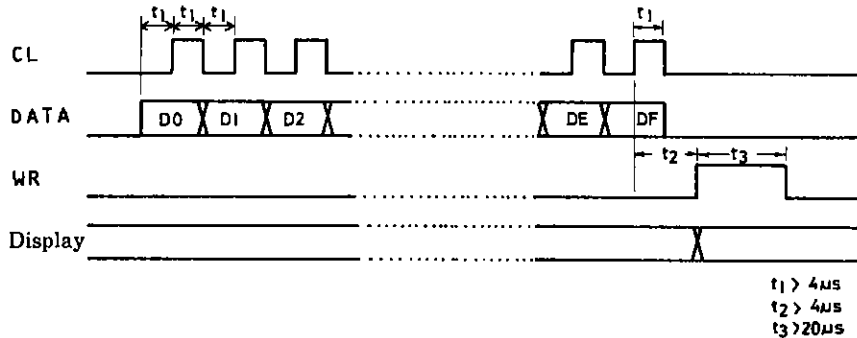
Pin Description

S0 to S33, V<sub>FL</sub> : Segment outputs and common pin for pull-down resistors.

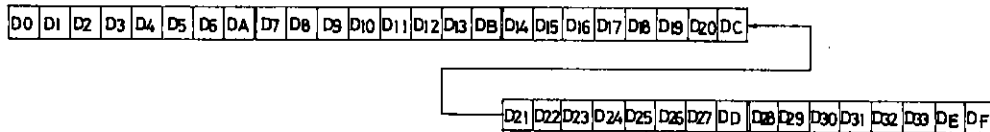


- $\overline{\text{BLK}}$  : Input for making display unlighted  
 $\overline{\text{BLK}} = \text{「 0 」} (V_{SS}) \dots\dots\dots$  Unlighted  
 $\overline{\text{BLK}} = \text{「 1 」} (V_{DD}) \dots\dots\dots$  Lighted
- CL, DATA, WR : Data input
- V<sub>DD</sub>, V<sub>SS</sub> : Power supply pin
- SIN : A/D converter input
  - 1st step light-up level ..... 0.1V<sub>DD</sub> (typ)
  - 2nd step light-up level ..... 0.2V<sub>DD</sub> (typ)
  - 3rd step light-up level ..... 0.3V<sub>DD</sub> (typ)
  - 4th step light-up level ..... 0.4V<sub>DD</sub> (typ)
  - 5th step light-up level ..... 0.5V<sub>DD</sub> (typ)
- NC : No connect

Data Input



Inputting starts at D0.



- D0 to D33 : Display data
- DA to DE : Dummy bit (don't care)
- DF : S29 to S33 select
- D<sub>n</sub> = 「 1 」 : S<sub>n</sub> = 「 1 」 (= V<sub>DD</sub>)
- D<sub>n</sub> = 「 0 」 : S<sub>n</sub> = 「 0 」 (= V<sub>FL</sub>)
- DF = 「 0 」 : D29 to D33 → S29 to S33
- DF = 「 1 」 : AD1 → S33  
 AD2 → S32  
 AD3 → S31  
 AD4 → S30  
 AD5 → S29

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