



# LC7570 LC7570E

CMOS LSI

## Static Drivers Vacuum Fluorescent Display for Frequency Display Applications

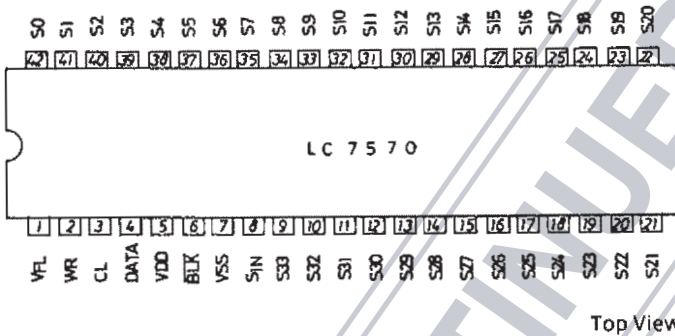
### Overview

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

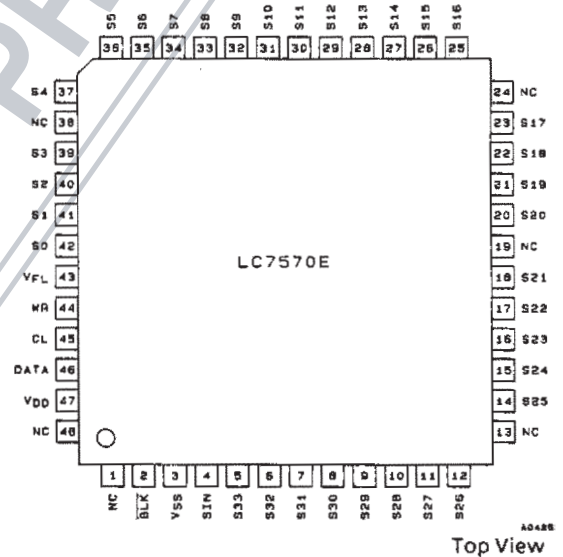
### Features

- 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

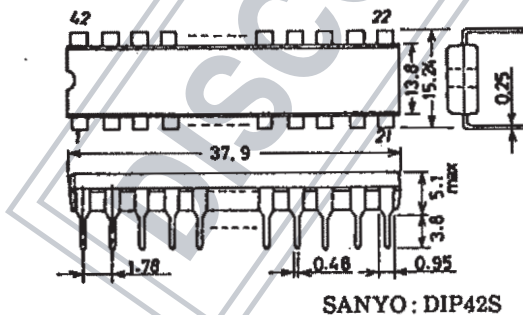


Top View



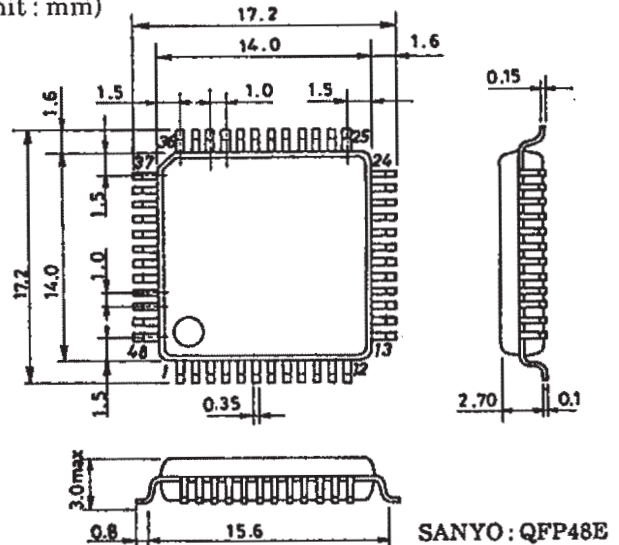
Top View

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



SANYO : DIP42S

Package Dimensions 3156 [LC7570E]  
(unit : mm)



SANYO : QFP48E

# LC7570,7570E

## Absolute Maximum Ratings at Ta = 25°C, VSS = 0V

Parameter	Symbol	Conditions	Value	Unit	
Maximum Supply Voltage	V <sub>DD</sub> max	V <sub>DD</sub>	-0.3 to +9.0	V	
Maximum Input Voltage	V <sub>IN</sub> max	CL, DATA, WR, SIN, $\overline{\text{BLK}}$	-0.3 to V <sub>DD</sub> + 0.3	V	
Maximum Output Voltage	V <sub>OUT</sub> max	S0 to S33, V <sub>FL</sub>	V <sub>DD</sub> - 28 to V <sub>DD</sub> + 0.3	V	
Maximum Output Current	I <sub>OUT</sub> max	S0 to S33	3.0	mA	
Allowable Power Dissipation	Pd max	Ta = 75°C	LC7570	500	mW
			LC7570E	480	mW
Operating Temperature	T <sub>opr</sub>		-30 to +75	°C	
Storage Temperature	T <sub>stg</sub>		-40 to +125	°C	

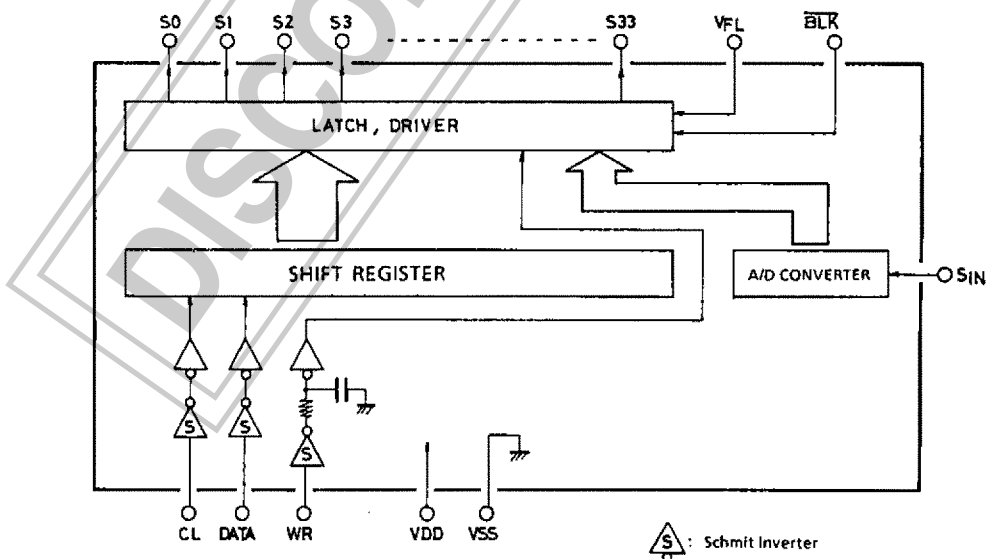
## Allowable Operating Ranges at Ta = -30 to +75°C, VSS = 0V

Parameter	Symbol	Conditions	min	typ	max	unit
Supply Voltage	V <sub>DD</sub>	V <sub>DD</sub>	4.5		8.0	V
Input High Level Voltage	V <sub>IH</sub>	$\overline{\text{BLK}}$	0.7V <sub>DD</sub>		V <sub>DD</sub>	V
Input Low Level Voltage	V <sub>IL</sub>	$\overline{\text{BLK}}$	0	0.3V <sub>DD</sub>		V
Rise Trigger Threshold Voltage	V <sub>P</sub>	CL, DATA, WR	0.8V <sub>DD</sub>		V <sub>DD</sub>	V
Fall Trigger Threshold Voltage	V <sub>N</sub>	CL, DATA, WR	0	0.2V <sub>DD</sub>		V
Output Voltage	V <sub>OUT</sub>	S0 to S33, V <sub>FL</sub>	V <sub>DD</sub> - 28		V <sub>DD</sub>	V
Write Pulse Width	Pw	WR	20			μs

## Electrical Characteristics in the Allowable Operating Ranges

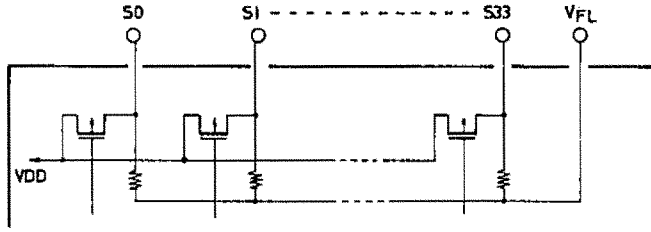
Parameter	Symbol	Conditions	min	typ	max	unit
Hysteresis Width	V <sub>H</sub>	CL, DATA, WR	0.15V <sub>DD</sub>	0.6V <sub>DD</sub>		V
Input High Level Current	I <sub>IH</sub>	CL, DATA, WR, SIN, $\overline{\text{BLK}}$ : V <sub>I</sub> = 8V			5.0	μA
Input Low Level Current	I <sub>IL</sub>	CL, DATA, WR, SIN, $\overline{\text{BLK}}$ : V <sub>I</sub> = 0V	-5.0			μA
Output High Level Voltage	V <sub>OH</sub>	S0 to S33 : I <sub>O</sub> = 2.5mA	V <sub>DD</sub> - 2.8			V
Output OFF-State Voltage	V <sub>OFF</sub>	S0 to S33 : V <sub>FL</sub> = V <sub>DD</sub> - 25V, output OFF		V <sub>DD</sub> - 24		V
Self-Contained Resistance in Output	r <sub>o</sub>	S0 to S33 : V <sub>DD</sub> = 5V, V <sub>FL</sub> = -20V	70	170	400	kΩ
<b>A/D Converter</b>						
1st Step Light-Up Voltage	AD1	SIN	0.1V <sub>DD</sub>			V
2nd Step Light-Up Voltage	AD2	SIN	0.2V <sub>DD</sub>			V
3rd Step Light-Up Voltage	AD3	SIN	0.3V <sub>DD</sub>			V
4th Step Light-Up Voltage	AD4	SIN	0.4V <sub>DD</sub>			V
5th Step Light-Up Voltage	AD5	SIN	0.5V <sub>DD</sub>			V
Supply Current	I <sub>DD</sub>	V <sub>DD</sub> : input = 0V, output = open			3.0	mA

## Equivalent Circuit Block Diagram



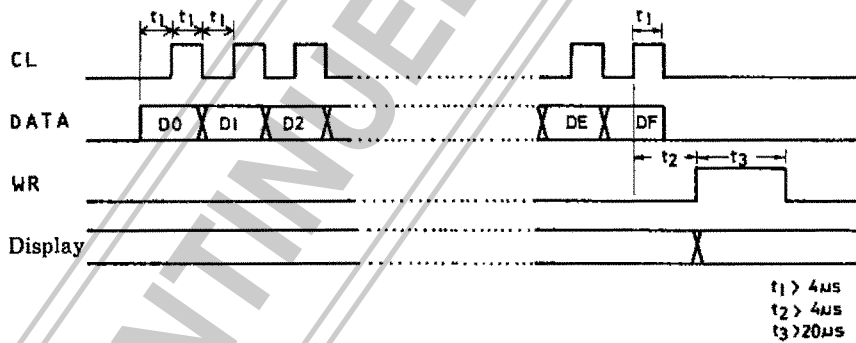
Pin Description

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



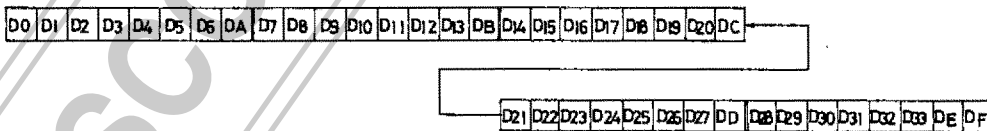
- $\overline{\text{BLK}}$  : Input for making display unlighted  
 $\overline{\text{BLK}} = \text{「 0 」 (V}_{\text{SS}})$  ..... Unlighted  
 $\overline{\text{BLK}} = \text{「 1 」 (V}_{\text{DD}})$  ..... Lighted
- CL, DATA, WR : Data input
- V<sub>DD</sub>, V<sub>SS</sub> : Power supply pin
- SIN : A/D 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



t<sub>1</sub> > 4μs  
 t<sub>2</sub> > 4μs  
 t<sub>3</sub> > 20μs

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

CONTINUED PRODUCT

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