

## 20-Channel Serial-Input Vacuum-Fluorescent Display Driver for Anode/Grid

### Ordering Information

Device	Package Options			
	28 Pin Plastic DIP	28 Pin Plastic Chip Carrier	SOW-28	Die
HV5812	HV5812P	HV5812PJ	HV5812WG	HV5812X

### Features

- Operating voltage of to up to 80V
- HVCMOS<sup>®</sup> technology for high performance
- High speed source driver
- Up to 3.3MHz data input rate
- 5.0V CMOS logic circuitry
- Excellent noise immunity
- Flexible high voltage supplies

### General Description

The Supertex HV5812 is a 20-channel serial input vacuum fluorescent display driver. It combines a 20-bit CMOS shift register, data latches, and control circuitry with high voltage MOSFET outputs. The HV5812 is primarily designed for vacuum-fluorescent displays.

The CMOS shift register and latches allow direct interfacing with microprocessor-based systems. Data input rates are typically over 5.0MHz with 5V logic supply. Especially useful for inter-digit blanking, the BLANKING input disables the output source drives and turns on the sink drivers. Use with TTL may require external pull-up resistors to ensure an input logic high.

### Absolute Maximum Ratings<sup>1</sup>

$V_{DD}$ logic power supply voltage	-0.5V to +7.5V	
$V_{PP}$ positive high voltage supply	-0.5V to +90V	
Logic input voltages	-0.3V to $V_{DD} + 0.3V$	
Operating junction temperature range	-40°C to +150°C	
Storage temperature	-55°C to +150°C	
Power dissipation	28-pin PLCC	1.9 Watt
	SOW-28	1.7 Watt
	28-pin DIP	2.0 Watt

#### Notes:

1. All voltages are referenced to ground. Absolute maximum ratings are those values at which damage to the device may occur. Functional operation under these conditions is not implied. Continuous operation of the device at the absolute rating level may affect device reliability.

## Electrical Characteristics

**DC Characteristics** (Over recommended operating conditions,  $T_A = 25^\circ\text{C}$ , unless otherwise noted)

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$I_{DSS}$	Output leakage current		-5.0	-15	$\mu\text{A}$	$V_{OUT} = 0\text{V}$ , $T_A = +70^\circ\text{C}$
$HV_{OH}$	Output voltage	78	78.5		V	$I_{OUT} = -25\text{mA}$ , $V_{PP} = 80\text{V}$ $T_A = +25^\circ\text{C}$
$HV_{OH}$	Output Voltage	77	78		V	$I_{OUT} = -25\text{mA}$ , $V_{PP} = 80\text{V}$ $T_A = +125^\circ\text{C}$
$HV_{OL}$	Output Voltage		1.5	3.0	V	$I_{OUT} = 1.0\text{mA}$ , $T_A = +25^\circ\text{C}$
$HV_{OL}$	Output Voltage		2.3	4.0	V	$I_{OUT} = 1.0\text{mA}$ , $T_A = +125^\circ\text{C}$
$I_{SINK}$	Output pull-down current		2.0	3.5	mA	$V_{OUT} = 5.0\text{V}$ to $V_{PP}$
$V_{IH}$	Logic input voltage		3.5	5.3	V	
$V_{IL}$	Logic input voltage		-0.3	0.8	V	
$I_{IH}$	Logic input current		0.05	0.5	$\mu\text{A}$	$V_{IN} = V_{DD}$
$I_{IL}$	Logic input current		-0.05	-0.5	$\mu\text{A}$	$V_{IN} = 0.8\text{V}$
$V_{OH}$	Serial data out		4.5	4.7	V	$I_{OUT} = -200\mu\text{A}$
$V_{OL}$	Serial data out		200	250	mV	$I_{OUT} = 200\mu\text{A}$
$f_{CLK}$	Maximum clock frequency		8.0		MHz	$T_J = +25^\circ\text{C}$
			5.0		MHz	$T_J = +125^\circ\text{C}$
$I_{DDQ}$	Supply current		100	300	$\mu\text{A}$	All outputs high
			100	300	$\mu\text{A}$	All outputs low
$I_{PPQ}$	Supply current		10	100	$\mu\text{A}$	Outputs high, no Load
			10	100	$\mu\text{A}$	Outputs low, no Load

## Recommended Operating Conditions

Symbol	Parameter	Min	Nom	Max	Units
$V_{DD}$	Supply voltage	4.5		5.5	V
$V_{PP}$	Supply voltage	20		80	V
$T_J$	Operating junction temperature	-40		+125	$^\circ\text{C}$

Power-up sequence should be the following:

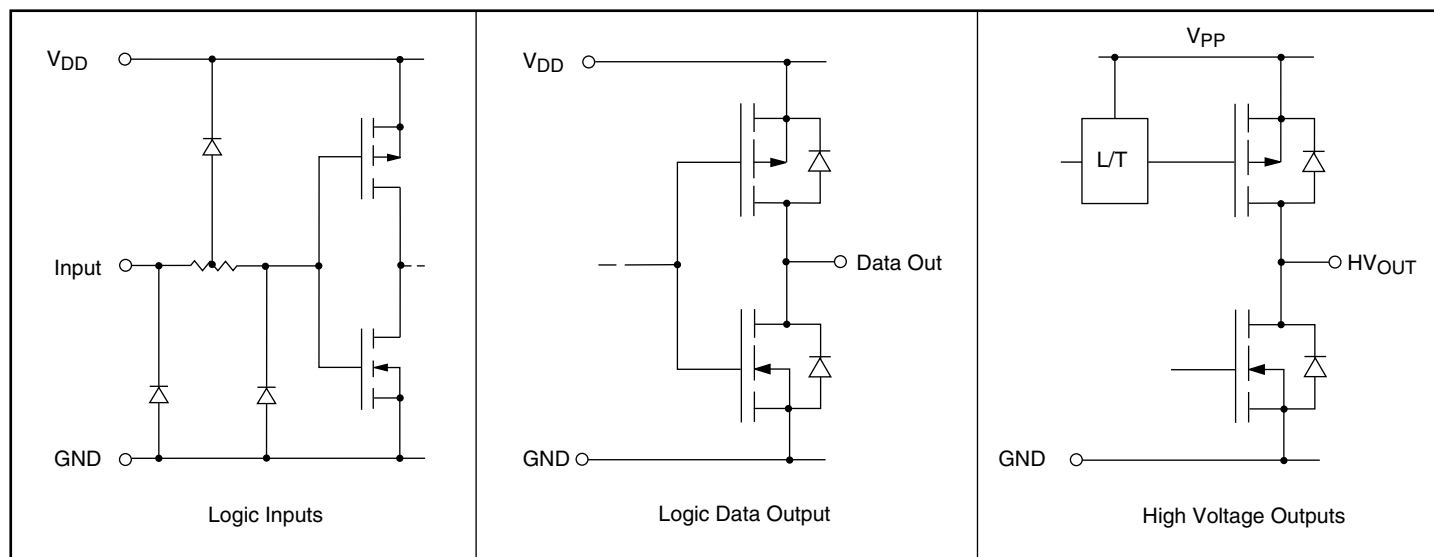
1. Connect ground.
2. Apply  $V_{DD}$ .
3. Set all inputs (Data, CLK, etc.) to a known state.
4. Apply  $V_{PP}$ .
5. The  $V_{PP}$  should not drop below  $V_{DD}$  or float during operation.

Power-down sequence should be the reverse of the above.

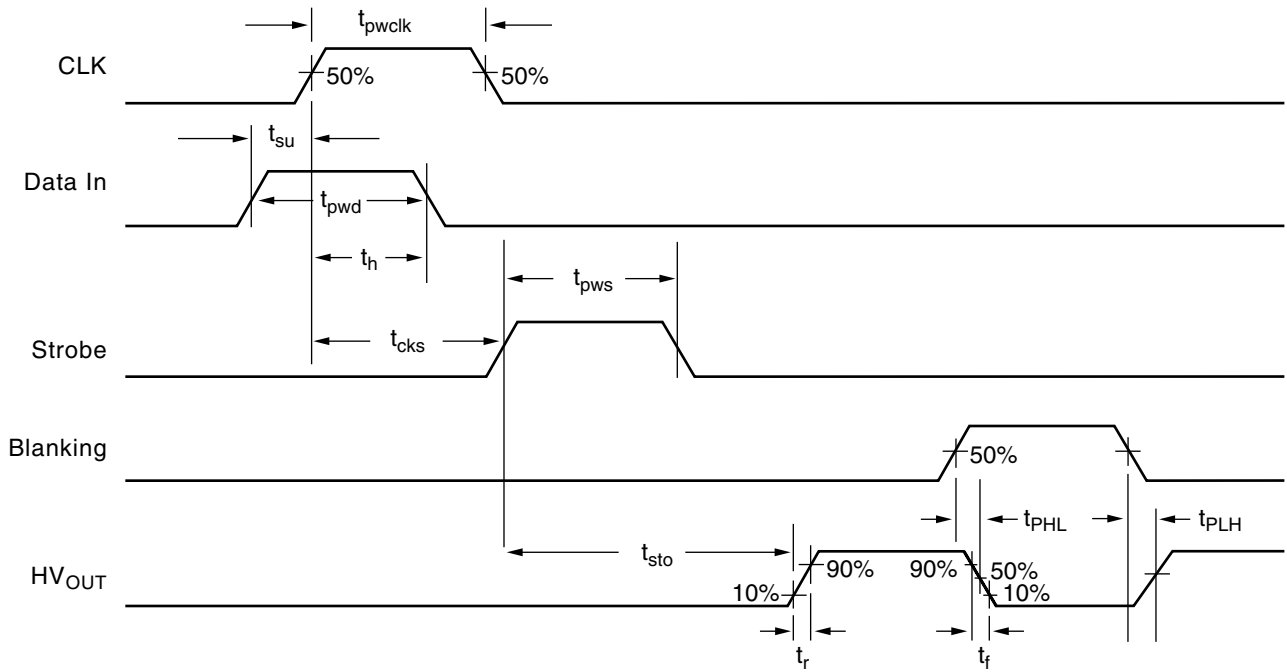
**AC Characteristics** ( $T_A = 25^\circ\text{C}$ , over operating conditions unless otherwise noted)

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$t_{PHL}$	Blanking to output delay	$V_{DD} = 5V$	2000		ns	$C_L = 30pF$ , 50% to 50%
$t_{PLH}$	Blanking to output delay	$V_{DD} = 5V$	1000		ns	$C_L = 30pF$ , 50% to 50%
$t_f$	Output fall time	$V_{DD} = 5V$	1450		ns	$C_L = 30pF$ , 90% to 10%
$t_r$	Output rise time	$V_{DD} = 5V$	650		ns	$C_L = 30pF$ , 10% to 90%
$t_{su}$	Data set-up time	75			ns	See timing diagram
$t_h$	Data hold time	75			ns	See timing diagram
$t_{pwd}$	Minimum data pulse width	150			ns	See timing diagram
$t_{pwclk}$	Minimum clock pulse width	150			ns	See timing diagram
$t_{cks}$	Minimum time between clock activation and strobe	300			ns	See timing diagram
$t_{pws}$	Minimum strobe pulse width	100			ns	See timing diagram
$t_{sto}$	Typical time between strobe activation and output transition		500		ns	See timing diagram

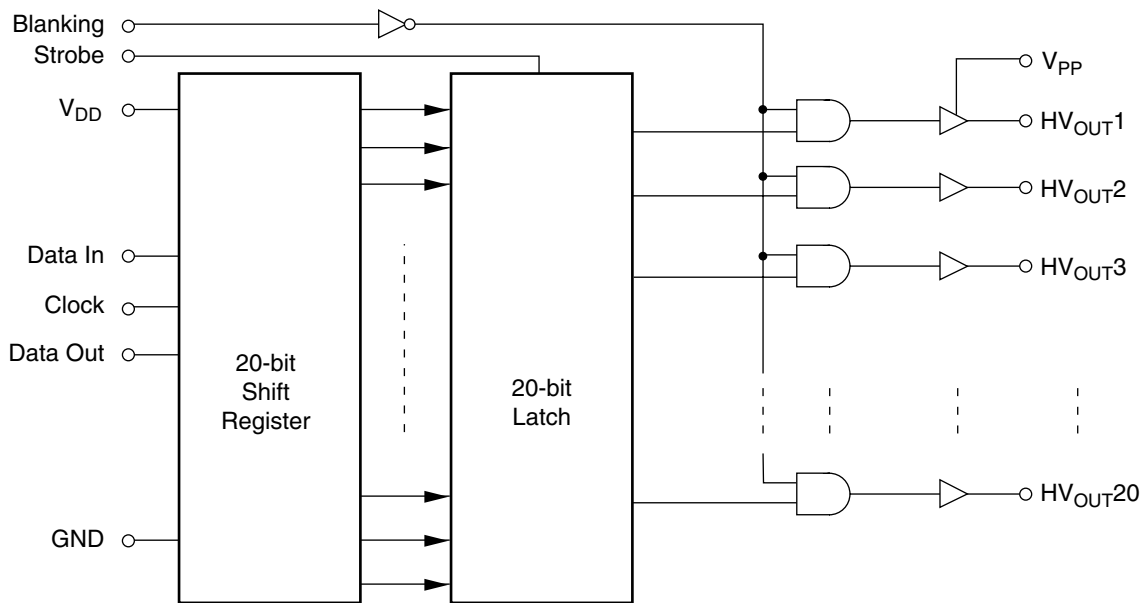
**Input and Output Equivalent Circuits**



# Timing Diagram



# Block Diagram



# Function Table

Serial Data Input	Clock Input	Shift Register Contents					Serial Data Output	Strobe Input	Latch Content					Blanking	Output Content							
		I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	...	I <sub>N-1</sub>			I <sub>N</sub>	I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	...		I <sub>N-1</sub>	I <sub>N</sub>	I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	...	I <sub>N-1</sub>	I <sub>N</sub>
H	L to H	H	R <sub>1</sub>	R <sub>2</sub>	...	R <sub>N-2</sub>	R <sub>N-1</sub>	R <sub>N-1</sub>														
L	L to H	L	R <sub>1</sub>	R <sub>2</sub>	...	R <sub>N-2</sub>	R <sub>N-1</sub>	R <sub>N-1</sub>														
X	H to L	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	...	R <sub>N-1</sub>	R <sub>N</sub>	R <sub>N</sub>														
		X	X	X	...	X	X	X	L	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	...	R <sub>N-1</sub>	R <sub>N</sub>							
		P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	...	P <sub>N-1</sub>	P <sub>N</sub>	P <sub>N</sub>	H	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	...	P <sub>N-1</sub>	P <sub>N</sub>	L	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	...	P <sub>N-1</sub>	P <sub>N</sub>
					...					X	X	X	...	X	X	H	L	L	L	...	L	L

Note: L = Low Logic Level    H = High Logic Level    X = Irrelevant    P = Present State    R = Previous State

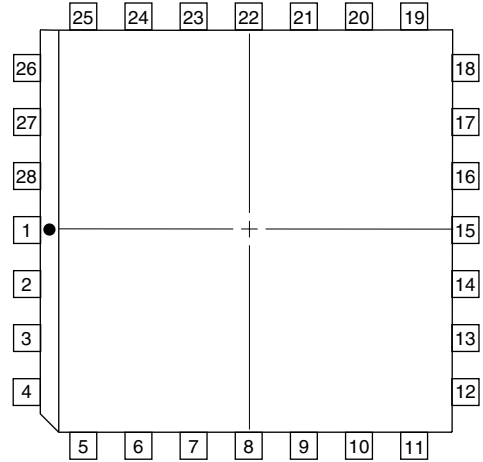
# Pin Configuration

# Package Outlines

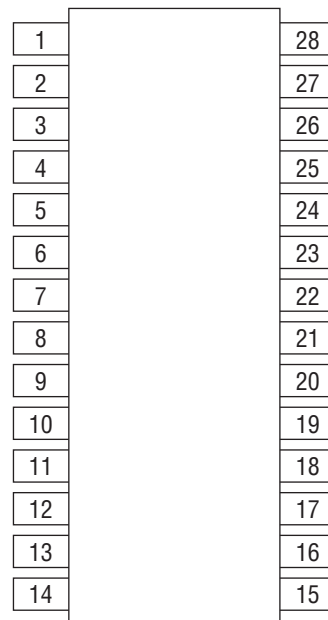
## HV5812

28-pin PLCC, 28-pin DIP, and SOW-28

Pad	Function
1	V <sub>PP</sub>
2	Data Out
3	HV <sub>OUT</sub> 20
4	HV <sub>OUT</sub> 19
5	HV <sub>OUT</sub> 18
6	HV <sub>OUT</sub> 17
7	HV <sub>OUT</sub> 16
8	HV <sub>OUT</sub> 15
9	HV <sub>OUT</sub> 14
10	HV <sub>OUT</sub> 13
11	HV <sub>OUT</sub> 12
12	HV <sub>OUT</sub> 11
13	Blank
14	GND
15	Clock
16	Strobe
17	HV <sub>OUT</sub> 10
18	HV <sub>OUT</sub> 9
19	HV <sub>OUT</sub> 8
20	HV <sub>OUT</sub> 7
21	HV <sub>OUT</sub> 6
22	HV <sub>OUT</sub> 5
23	HV <sub>OUT</sub> 4
24	HV <sub>OUT</sub> 3
25	HV <sub>OUT</sub> 2
26	HV <sub>OUT</sub> 1
27	Data In
28	V <sub>DD</sub>



top view  
28-pin PLCC



top view  
28-pin DIP and SOW-28

