32-Channel Serial To Parallel Converter With High Voltage Push-Pull Outputs

Ordering Information

Device	Package Options	
	44 J-Lead Quad Plastic Chip Carrier	Die in waffle pack
HV9708	HV9708PJ	HV9708X
HV9808	HV9808PJ	HV9808X

Features

- ❏ Processed with HVCMOS® technology
- ❏ Output voltages up to 80V
- ❏ Low power level shifting
- ❏ Shift register speed 8MHz
- ❏ Latched data outputs
- ❏ Forward and reverse shifting options
- ❏ Diode to V_{PP} allows efficient power recovery
- ❏ 5V CMOS compatible inputs

General Description

The HV97 and HV98 are low-voltage serial to high-voltage parallel converters with push-pull outputs. These devices have been designed for use as drivers for AC-electroluminescent displays. They can also be used in any application requiring multiple output high-voltage current sourcing and sinking capabilities such as driving plasma panels, vacuum fluorescent displays, or large matrix LCD displays. The inputs are fully CMOS compatible.

These devices consist of a 32-bit shift register, 32 latches, and control logic to perform the polarity select and blanking of the outputs. $HV_{OUT}1$ is connected to the first stage of the shift register through the polarity and blanking logic. Data is shifted through the shift register on the logic low to high transition of the clock. The HV97 shifts data in the clockwise direction when viewed from the top of the package and the HV98 shifts in the counterclockwise direction. A data output buffer is provided for cascading devices. This output reflects the current status of the last bit of the shift register ($HV_{OUT}32$). Operation of the shift register is not affected by the $\overline{LE}$ (latch enable), $\overline{BL}$ (blanking), or the $\overline{POL}$ (polarity) inputs. Transfer of data from the shift register to the latch occurs when the $\overline{LE}$ (latch enable) input is high. The data in the latch is stored when $\overline{LE}$ is low.

Absolute Maximum Ratings[1]

Supply voltage, V_{DD}[2]	-0.5V to +7V
Output voltage, V_{PP}[2]	V_{DD} to +90V
Logic input levels[2]	-0.5V to V_{DD} +0.5V
Ground current[3]	1.5A
Continuous total power dissipation[4]	1200mW
Operating temperature range	-40°C to +85°C
Storage temperature range	-65°C to +150°C
Lead temperature 1.6mm (1/16 inch) from case for 10 seconds	260°C

Notes:

1. Device will survive (but operation may not be specified or guaranteed) at these extremes.
2. All voltages are referenced to GND.
3. Duty cycle is limited by the total power dissipated in the package.
4. For operation above 25°C ambient, derate linearly to 70°C at 12mW/°C.

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Electrical Characteristics (V_{PP} = 60V, V_{DD} = 5V, T_A =25°C)

DC Characteristics

Symbol	Parameter	Min	Max	Units	Conditions
I_{PP}	V_{PP} Supply Current		100	µA	HV_{OUT} outputs HIGH to LOW
I_{DDQ}	I_{DD} Supply Current (Quiescent)		100	µA	All inputs = V_{DD} or GND
I_{DD}	I_{DD} Supply Current (Operating)		15	mA	V_{DD} = V_{DD} max, f_{CLK} = 8 MHz
V_{OH} (Data)	Shift Register Output Voltage	V_{DD}-0.5		V	I_O = -100µA
V_{OL} (Data)	Shift Register Output Voltage		0.5	V	I_O = 100µA
I_{IH}	Current Leakage, any input		1	µA	Input = V_{DD}
I_{IL}	Current Leakage, any input		-1	µA	Input = GND
V_{OC}	HV_{OUT} Output Clamp Diode Voltage		-1.5	V	I_{OC} = -5mA
V_{OH}	HV_{OUT} Output when Sourcing	52		V	I_{OH} = -20mA, 0 to 70°C
V_{OL}	HV_{OUT} Output when Sinking		4	V	I_{OL} = 5mA, 0 to 70°C

AC Characteristics

Symbol	Parameter	Min	Max	Units	Conditions
f_{CLK}	Clock Frequency		8	MHz	
t_{WL} or t_{WH}	Clock width, HIGH or LOW	62		ns	
t_{SU}	Setup time before CLK rises	25		ns	
t_H	Hold time after CLK rises	10		ns	
t_{DLH} (Data)	Data Output Delay after L to H CLK		110	ns	C_L = 15pF
t_{DHL} (Data)	Data Output Delay after H to L CLK		110	ns	C_L = 15pF
t_{DLE}	$\overline{LE}$ Delay after L to H CLK	50		ns	
t_{WLE}	Width of $\overline{LE}$ Pulse	50		ns	
t_{SLE}	$\overline{LE}$ Setup Time before L to H CLK	50		ns	
t_{ON}	Delay from $\overline{LE}$ to HV_{OUT}, L to H		500	ns	
t_{OFF}	Delay from $\overline{LE}$ to HV_{OUT}, H to L		500	ns	

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Units	Comments
V_{DD}	Logic Voltage Supply	4.5	5.5	V	
V_{PP}	High Voltage Supply	8.0	80	V	
V_{IH}	Input HIGH Voltage	V_{DD}-0.5	V_{DD}	V	
V_{IL}	Input LOW Voltage	0	0.5	V	
f_{CLK}	Clock Frequency	0	8	MHz	
T_A	Operating free-air temperature	-40	+85	°C	

Notes:

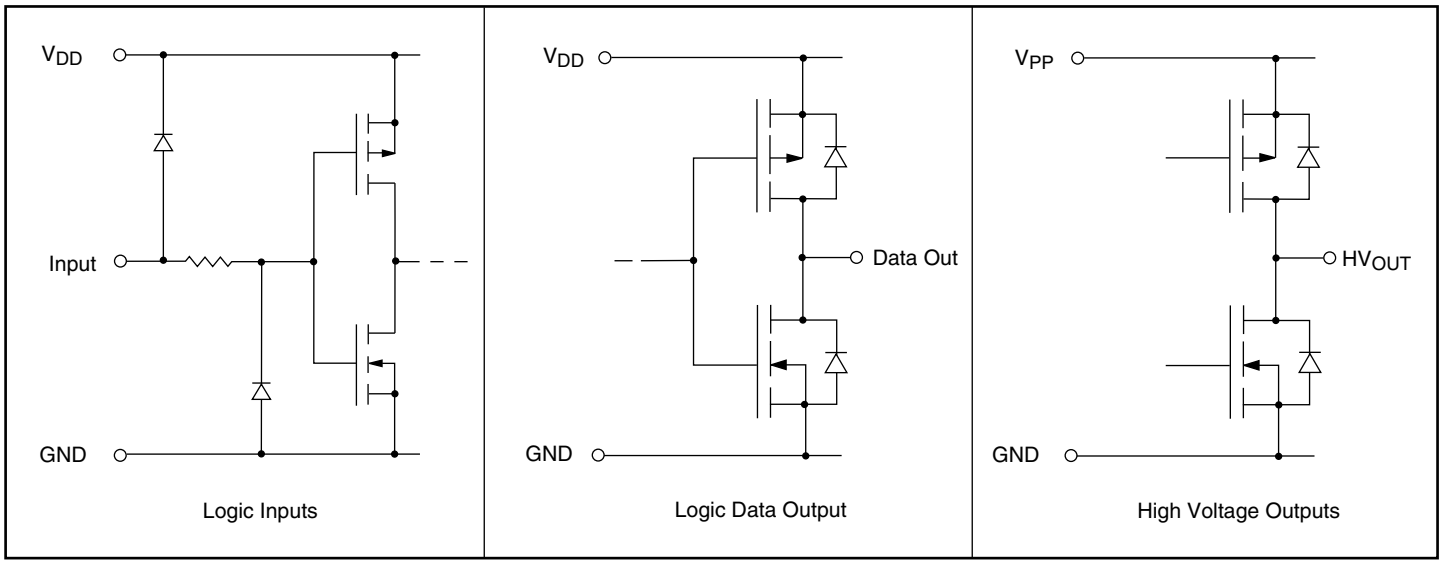
Power-up sequence should be the following:

1. Connect ground.
2. Apply V_{DD}.
3. Set all inputs (Data, CLK, Enable, etc.) to a known state.
4. Apply V_{PP}.

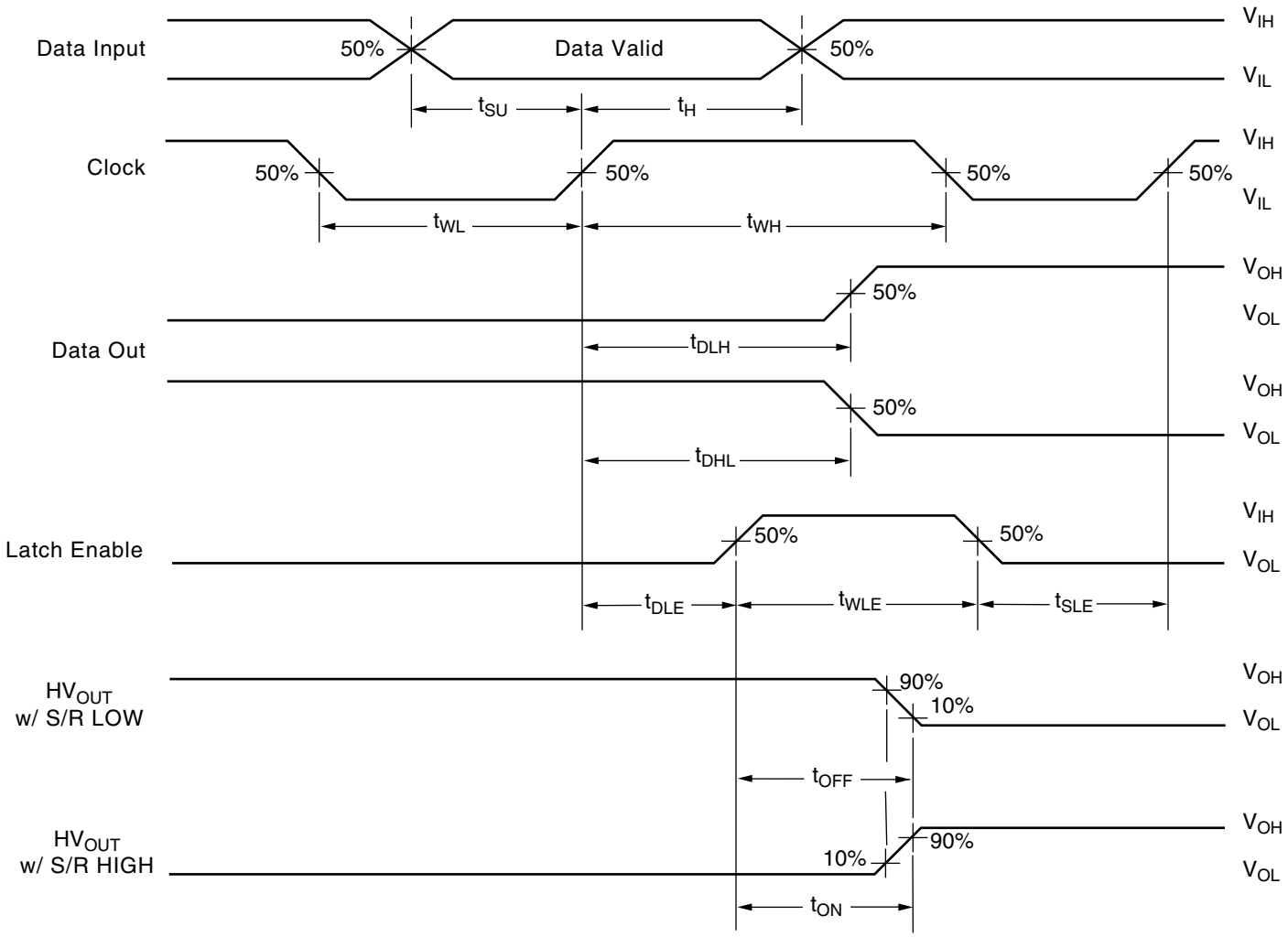
Power-down sequence should be the reverse of the above.

5. The V_{PP} should not drop below V_{DD} or float during operations.

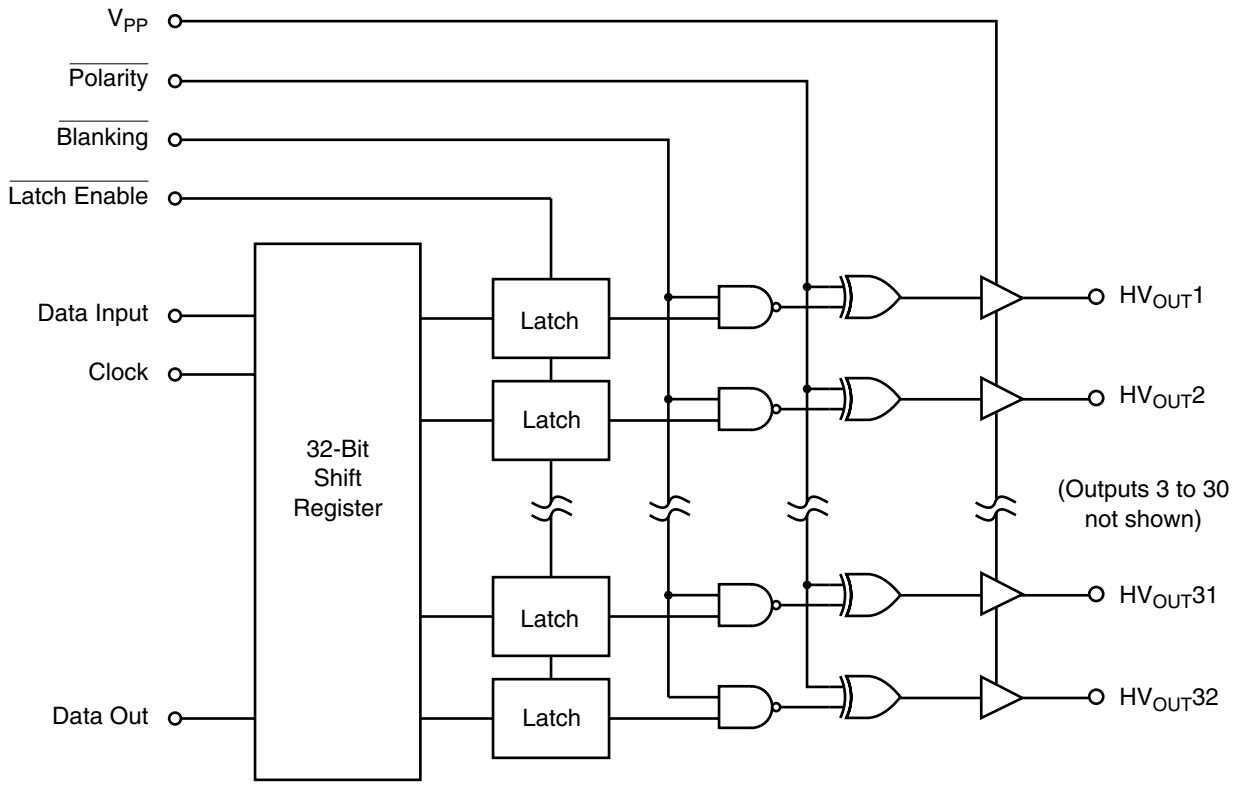
Input and Output Equivalent Circuits



Switching Waveforms



Functional Block Diagram



Function Table

Function	Inputs					Outputs				
						Shift Reg		HV Outputs		Data Out
	Data	CLK	$\overline{LE}$	$\overline{BL}$	$\overline{POL}$	1	2…32	1	2…32	*
All on	X	X	X	L	L	*	*…*	H	H…H	*
All off	X	X	X	L	H	*	*…*	L	L…L	*
Invert mode	X	X	L	H	L	*	*…*	$\overline{*}$	$\overline{*…*}$	*
Load S/R	H or L	↑	L	H	H	H or L	*…*	*	*…*	*
Load latches	X	H or L	↑	H	H	*	*…*	*	*…*	*
	X	H or L	↑	H	L	*	*…*	$\overline{*}$	$\overline{*…*}$	*
Transparent latch mode	L	↑	H	H	H	L	*…*	L	*…*	*
	H	↑	H	H	H	H	*…*	H	*…*	*

Notes:
H = high level, L = low level, X = irrelevant, ↑ = low-to-high transition.
* = dependent on previous stage's state before the last CLK or last $\overline{LE}$ high.

Pin Configurations

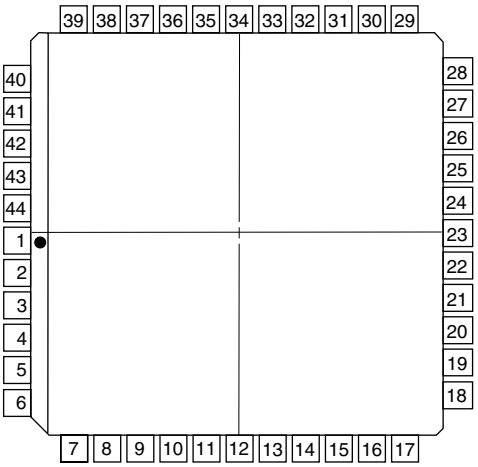
HV97
44 Pin J-Lead Package

Pin	Function	Pin	Function
1	HV_{OUT} 17	23	GND
2	HV_{OUT} 16	24	V_{PP}
3	HV_{OUT} 15	25	V_{DD}
4	HV_{OUT} 14	26	$\overline{\text{Latch Enable}}$
5	HV_{OUT} 13	27	Data In
6	HV_{OUT} 12	28	$\overline{\text{Blanking}}$
7	HV_{OUT} 11	29	NC
8	HV_{OUT} 10	30	HVout 32
9	HV_{OUT} 9	31	HV_{OUT} 31
10	HV_{OUT} 8	32	HV_{OUT} 30
11	HV_{OUT} 7	33	HV_{OUT} 29
12	HV_{OUT} 6	34	HV_{OUT} 28
13	HV_{OUT} 5	35	HV_{OUT} 27
14	HV_{OUT} 4	36	HV_{OUT} 26
15	HV_{OUT} 3	37	HV_{OUT} 25
16	HV_{OUT} 2	38	HV_{OUT} 24
17	HV_{OUT} 1	39	HV_{OUT} 23
18	Data Out	40	HV_{OUT} 22
19	NC	41	HV_{OUT} 21
20	NC	42	HV_{OUT} 20
21	$\overline{\text{Polarity}}$	43	HV_{OUT} 19
22	Clock	44	HV_{OUT} 18

HV98
44 Pin J-Lead Package

Pin	Function	Pin	Function
1	HV_{OUT} 16	23	GND
2	HV_{OUT} 17	24	V_{PP}
3	HV_{OUT} 18	25	V_{DD}
4	HV_{OUT} 19	26	$\overline{\text{Latch Enable}}$
5	HV_{OUT} 20	27	Data In
6	HV_{OUT} 21	28	$\overline{\text{Blanking}}$
7	HV_{OUT} 22	29	NC
8	HV_{OUT} 23	30	HV_{OUT} 1
9	HV_{OUT} 24	31	HV_{OUT} 2
10	HV_{OUT} 25	32	HV_{OUT} 3
11	HV_{OUT} 26	33	HV_{OUT} 4
12	HV_{OUT} 27	34	HV_{OUT} 5
13	HV_{OUT} 28	35	HV_{OUT} 6
14	HV_{OUT} 29	36	HV_{OUT} 7
15	HV_{OUT} 30	37	HV_{OUT} 8
16	HV_{OUT} 31	38	HV_{OUT} 9
17	HV_{OUT} 32	39	HV_{OUT} 10
18	Data Out	40	HV_{OUT} 11
19	NC	41	HV_{OUT} 12
20	NC	42	HV_{OUT} 13
21	$\overline{\text{Polarity}}$	43	HV_{OUT} 14
22	Clock	44	HV_{OUT} 15

Package Outline



top view

44-pin J-Lead Package

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