32-Channel Serial To Parallel Converter With Open Drain Outputs

Ordering Information

Device	Package Options			
	44 J-Lead Quad Ceramic Chip Carrier	44 J-Lead Quad Plastic Chip Carrier	44 Lead Quad Plastic Gullwing	Die
HV5122	HV5122DJ	HV5122PJ	HV5122PG	HV5122X
HV5222	HV5222DJ	HV5222PJ	HV5222PG	HV5222X

Features

- ☐ Processed with HVCMOS® technology
- ☐ Output voltages to 225V using a ramped supply voltage
- ☐ Sink current minimum 100mA
- ☐ Shift register speed 8MHz
- ☐ Strobe and enable inputs
- ☐ CMOS compatible inputs
- ☐ Forward and reverse shifting options
- ☐ 44-lead ceramic surface mount package
- ☐ Hi-Rel processing available

General Description

The HV51 and HV52 are low voltage serial to high voltage parallel converters with open drain 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 sinking capabilities such as driving inkjet and electrostatic print heads, plasma panels, vacuum fluorescent, or large matrix LCD displays.

These devices consist of a 32-bit shift register and control logic to perform the Output Enable and All-ON functions. Data is shifted through the shift register on the high to low transition of the clock. The HV51 shifts in the counterclockwise direction when viewed from the top of the package and the HV52 shifts in the clockwise direction. A data output buffer is provided for cascading devices. This output reflects the current status of the last bit of the shift register. Operation of the shift register is not affected by the OE (Output Enable) or the STR (Strobe) inputs.

The HV51 and HV52 have been designed to be used in systems which either switch off the high voltage supply before changing the state of the high voltage outputs or which limit the current through each output.

Absolute Maximum Ratings[1]

Supply voltage, V_{DD}		-0.5V to +15V
Output voltage, V_{PP}		-0.5V to +250V
Logic input levels		-0.5V to V_{DD} + 0.5V
Ground current[2]		1.5A
Continuous total power dissipation[3]	Plastic	1200mW
	Ceramic	1500mW
Operating temperature range	Plastic	-40°C to +85°C
	Ceramic	-55 to +125°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. All voltages are referenced to GND.
2. Duty cycle is limited by the total power dissipated in the package.
3. For operation above 25°C ambient derate linearly to maximum operating temperature at 20mW/°C for plasitc and at 15mW/°C for ceramic.

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Electrical Characteristics (over recommended operating conditions unless noted)

DC Characteristics

Symbol	Parameter		Min	Typ	Max	Units	Conditions
I_{DD}	V_{DD} supply current				15	mA	f_{CLK} = 8MHz F_{DATA} = 4MHz
I_{DDQ}	Quiescent V_{DD} supply current				100	µA	All V_{IN} = 0V
$I_{O(OFF)}$	Off state output current				10	µA	All outputs high All SWS parallel
I_{IH}	High-level logic input current				1	µA	V_{IH} = 12V
I_{IL}	Low-level logic input current				-1	µA	V_{IL} = 0V
V_{OH}	High-level output data out		V_{DD} - 1.0V			V	I_{Dout} = -100µA
V_{OL}	Low-level output voltage	HV_{OUT}			15.0	V	I_{HVout} = +100mA
		Data out			1.0	V	I_{Dout} = +100µA
V_{OC}	HV_{OUT} Clamp Voltage				-1.5	V	I_{OL} = -100mA

AC Characteristics (V_{DD} = 12V, T_C = 25°C)

Symbol	Parameter	Min	Typ	Max	Units	Conditions
f_{CLK}	Clock frequency			8	MHz	
t_W	Clock width high or low	62			ns	
t_{SU}	Data set-up time before clock falls	25			ns	
t_H	Data hold time after clock falls	10			ns	
t_{ON}	Turn ON time, HV_{OUT} from strobe			500	ns	R_L = 2KΩ to 200V
t_{DHL}	Delay time clock to data high to low			100	ns	C_L = 15pF
t_{DLH}	Delay time clock to data low to high			100	ns	C_L = 15pF

Recommended Operating Conditions

Symbol	Parameter		Min	Typ	Max	Units
V_{DD}	Logic supply voltage		10.8	12	13.2	V
HV_{OUT}	High voltage output		-0.3		225	V
V_{IH}	High-level input voltage		V_{DD} - 2V		V_{DD}	V
V_{IL}	Low-level input voltage		0		2.0	V
f_{CLK}	Clock frequency				8	MHz
T_A	Operating free-air temperature	Plastic	-40		+85	°C
		Ceramic	-55		+125	°C

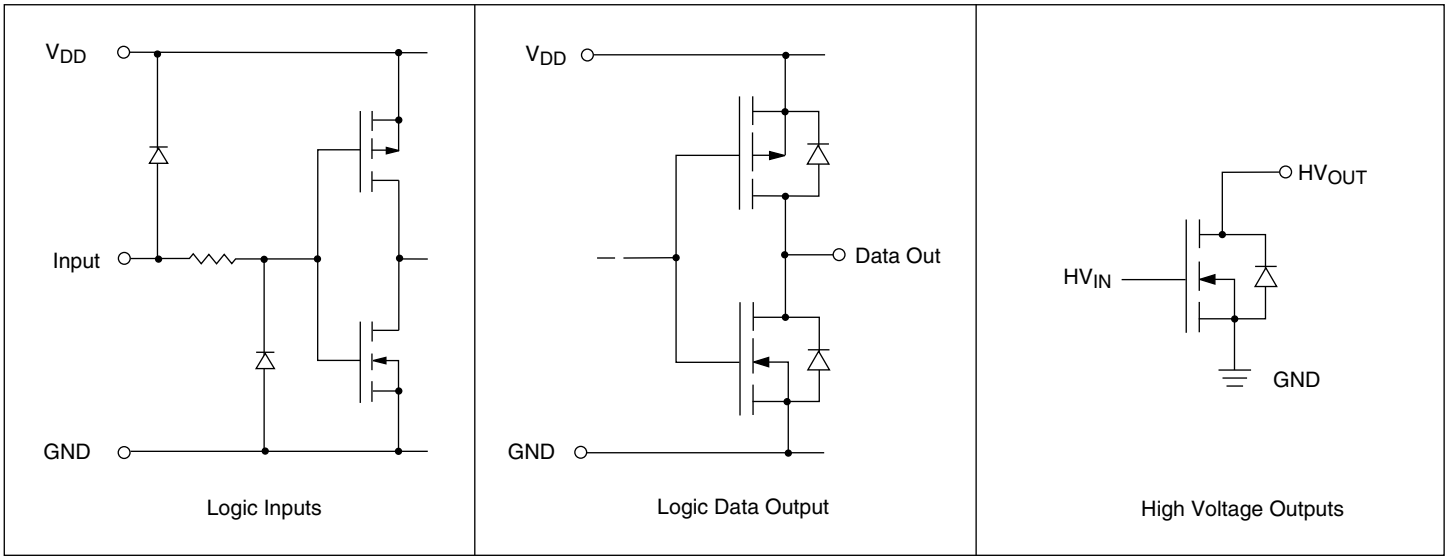
Notes:

Power-up sequence should be the following:

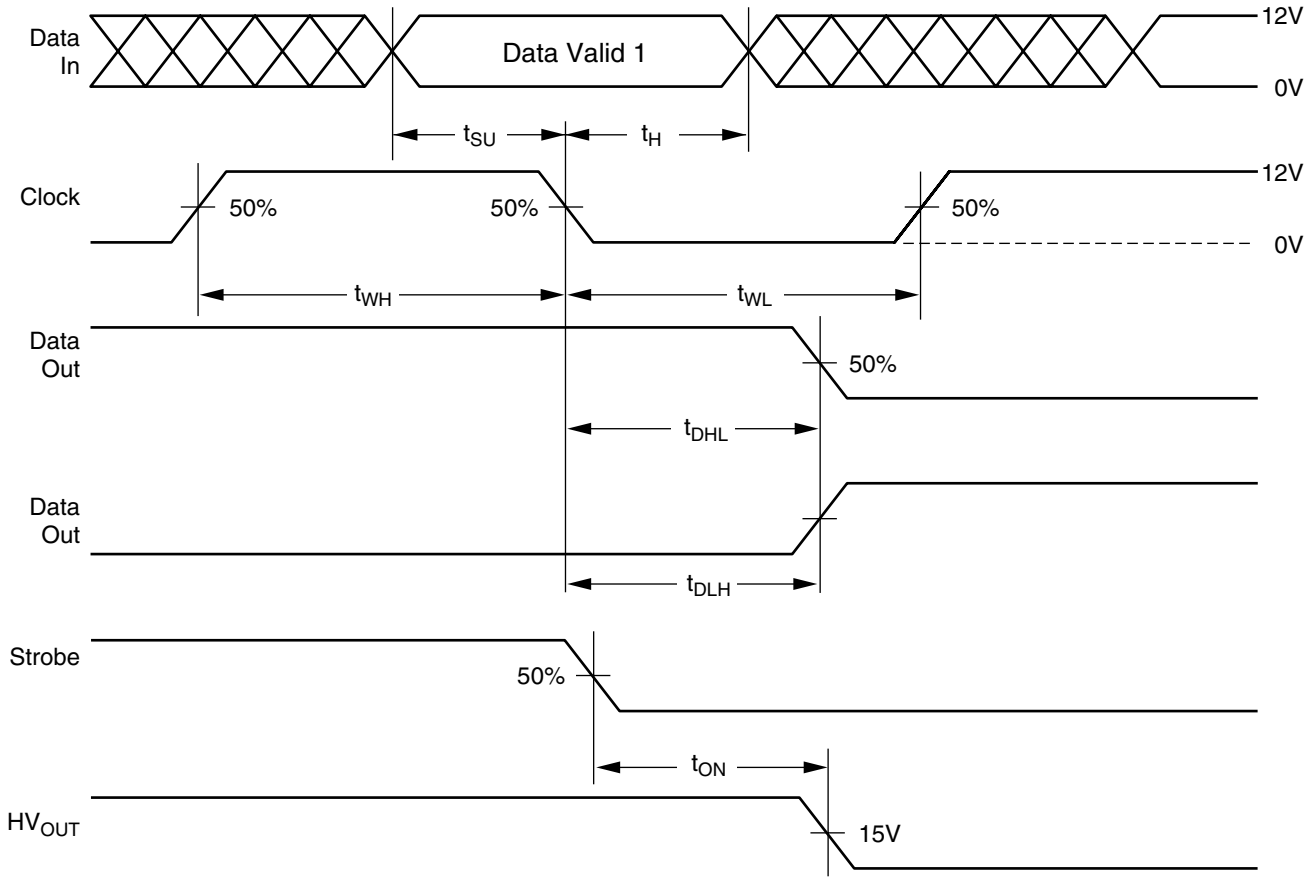
1. Connect ground.
2. Apply V_{DD}.
3. Connect all inputs to a known state.

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

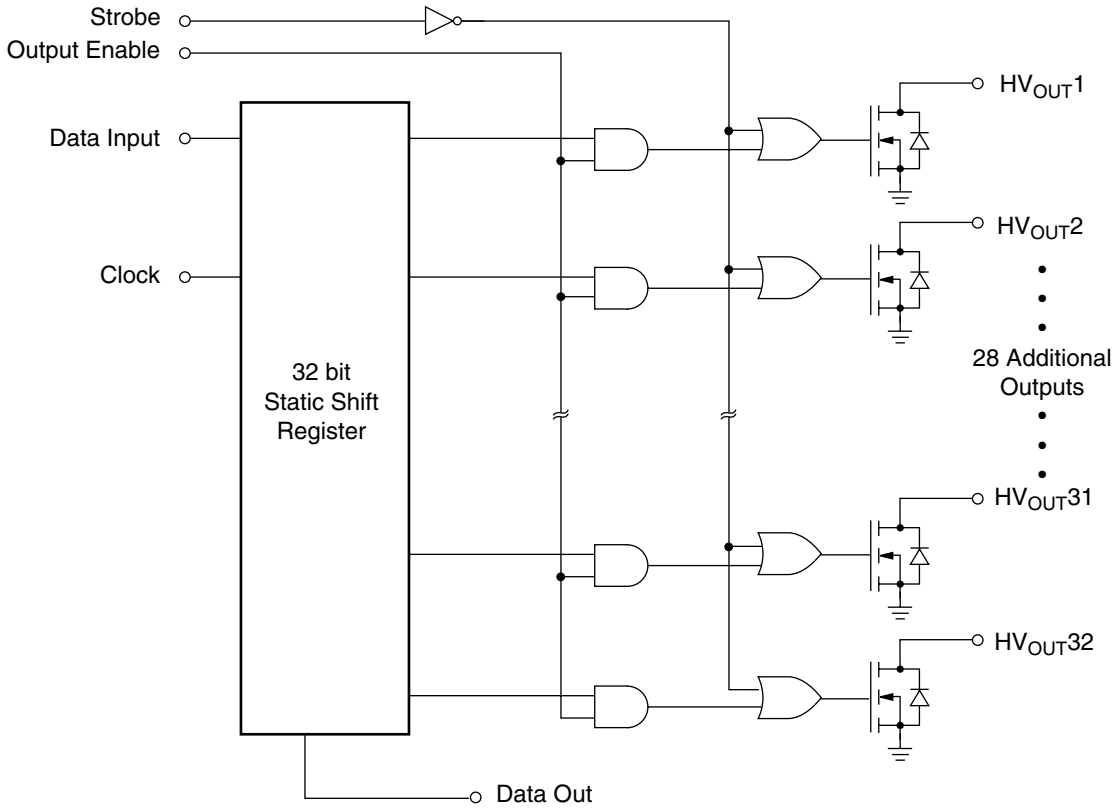
Input and Output Equivalent Circuits



Switching Waveforms



Functional Block Diagram



Function Table

Function	Inputs				Outputs		
	Data In	CLK	OE	Strobe	Shift Reg 1 2…32	HV Outputs 1 2…32	Data Out *
All on	X	X	X	L	* *…*	ON ON…ON	*
All off	X	X	L	H	* *…*	OFF OFF…OFF	*
Load S/R	H or L	↓	L	H	H or L *…*	OFF OFF…OFF	
Output enable	X	H or L	H	H	H or L *…*	ON or OFF *…*	*

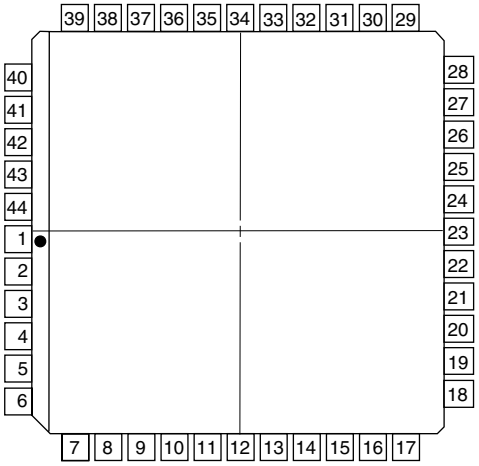
Notes:
X = Don't care
* = Dependent on previous stage's state before the last CLK : High to low transition.
↓ = High to low transition
H = High level
L = Low level

Pin Configurations

HV51
44 Pin J-Lead Package

Pin	Function	Pin	Function
1	HV_{OUT} 16	23	Output Enable
2	HV_{OUT} 17	24	Clock
3	HV_{OUT} 18	25	GND
4	HV_{OUT} 19	26	V_{DD}
5	HV_{OUT} 20	27	Stobe
6	HV_{OUT} 21	28	Data In
7	HV_{OUT} 22	29	N/C
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	N/C	41	HV_{OUT} 12
20	N/C	42	HV_{OUT} 13
21	N/C	43	HV_{OUT} 14
22	N/C	44	HV_{OUT} 15

Package Outline



top view

44-pin J-Lead Package

Pin Configurations

HV51

44-Pin Quad Plastic Package

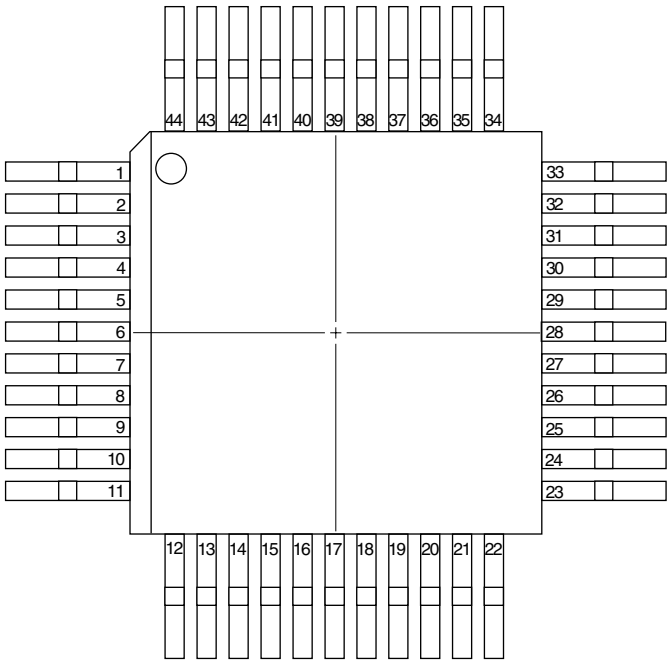
Pin	Function	Pin	Function
1	HV_{OUT} 11	23	Data Out
2	HV_{OUT} 12	24	N/C
3	HV_{OUT} 13	25	N/C
4	HV_{OUT} 14	26	N/C
5	HV_{OUT} 15	27	N/C
6	HV_{OUT} 16	28	Output Enable
7	HV_{OUT} 17	29	CLK
8	HV_{OUT} 18	30	GND
9	HV_{OUT} 19	31	V_{DD}
10	HV_{OUT} 20	32	Strobe
11	HV_{OUT} 21	33	Data In
12	HV_{OUT} 22	34	N/C
13	HV_{OUT} 23	35	HV_{OUT} 1
14	HV_{OUT} 24	36	HV_{OUT} 2
15	HV_{OUT} 25	37	HV_{OUT} 3
16	HV_{OUT} 26	38	HV_{OUT} 4
17	HV_{OUT} 27	39	HV_{OUT} 5
18	HV_{OUT} 28	40	HV_{OUT} 6
19	HV_{OUT} 29	41	HV_{OUT} 7
20	HV_{OUT} 30	42	HV_{OUT} 8
21	HV_{OUT} 31	43	HV_{OUT} 9
22	HV_{OUT} 32	44	HV_{OUT} 10

HV52

44-Pin Quad Plastic Package

Pin	Function	Pin	Function
1	HV_{OUT} 22	23	Data Out
2	HV_{OUT} 21	24	N/C
3	HV_{OUT} 20	25	N/C
4	HV_{OUT} 19	26	N/C
5	HV_{OUT} 18	27	N/C
6	HV_{OUT} 17	28	Output Enable
7	HV_{OUT} 16	29	CLK
8	HV_{OUT} 15	30	GND
9	HV_{OUT} 14	31	V_{DD}
10	HV_{OUT} 13	32	Strobe
11	HV_{OUT} 12	33	Data In
12	HV_{OUT} 11	34	N/C
13	HV_{OUT} 10	35	HV_{OUT} 32
14	HV_{OUT} 9	36	HV_{OUT} 31
15	HV_{OUT} 8	37	HV_{OUT} 30
16	HV_{OUT} 7	38	HV_{OUT} 29
17	HV_{OUT} 6	39	HV_{OUT} 28
18	HV_{OUT} 5	40	HV_{OUT} 27
19	HV_{OUT} 4	41	HV_{OUT} 26
20	HV_{OUT} 3	42	HV_{OUT} 25
21	HV_{OUT} 2	43	HV_{OUT} 24
22	HV_{OUT} 1	44	HV_{OUT} 23

Package Outline



top view
44-pin PQFP Package

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