

## Dual 1 of 4 High Voltage Analog Switch

### Ordering Information

V <sub>PP</sub> -V <sub>NN</sub>	Package Options	
	28-Lead Plastic Chip Carrier	Die
200V	HV20720PJ	HV20720X

### Features

- HVCMOS® technology for high performance
- Operating voltage of up to 200V
- Very low quiescent current-10µA
- Low parasitic capacitances
- Over 20MHz bandwidth
- 58dB typical output off isolation at 5MHz
- 5.0V CMOS logic circuitry
- Excellent noise immunity
- Flexible high voltage supplies

### General Description

The Supertex HV207 is an 8-channel high-voltage analog switch integrated circuit (IC) configured as a dual 1 of 4 analog switch. The 2 sets of 4 analog switches are controlled independently with the 2 independent 1:4 decoders. The addressed switches are turned ON and the unaddressed switches are turned OFF. A logic high on the input clear pin will turn OFF all output switches regardless of the address input states.

### Absolute Maximum Ratings\*

V <sub>DD</sub> Logic power supply voltage	-0.5V to +7.5V
V <sub>PP</sub> - V <sub>NN</sub> Supply voltage	+220V
V <sub>PP</sub> Positive high voltage supply	-0.5V to +200V
V <sub>NN</sub> Negative high voltage supply	+0.5V to -200V
Logic input voltages	-0.5V to V <sub>DD</sub> +0.3V
V <sub>SIG</sub> Analog Signal Range	V <sub>NN</sub> to V <sub>PP</sub>
Peak analog signal current/channel	3.0A
Storage temperature	-65°C to +150°C
Power dissipation, 28 pin PLCC	1.2W

\* All voltages are referenced to ground. Absolute maximum ratings are those values 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** ( $V_{PP} = +100V$ ,  $V_{NN} = -100V$ ,  $V_{DD} = +5.0V$ ,  $T_A = +25^\circ C$ )

Characteristics	Sym	min	typ	max	Units	Test Conditions
Small Signal Switch (ON) Resistance	$R_{ONS}$		22	27	$\Omega$	$V_{SIG} = 0V$ , $I_{SW} = 5mA$
Small Signal Switch (ON)Resistance Matching	$\Delta R_{ONS}$		5.0	20	%	$V_{SIG} = 0V$ , $I_{SW} = 5mA$
Voltage Drop Across SW at Large Positive $V_{SIG}$	$\Delta V_{SW}$			15	V	$V_{SIG} = +90V$ , $R_L = 200\Omega$
Voltage Drop Across SW at Large Negative $V_{SIG}$	$\Delta V_{SW}$			8.0	V	$V_{SIG} = -90V$ , $R_L = 200\Omega$
Switch Off Leakage Per Switch	$I_{SOL}$		1.0	10	$\mu A$	$V_{SIG} = V_{pp} - 10V$ and $V_{NN} + 10V$
DC Offset Switch OFF			100	300	mV	$R_L = 100K\Omega$
DC Offset Switch ON			100	500	mV	$R_L = 100K\Omega$
Pos. HV Supply Current	$I_{PPQ}$		10	50	$\mu A$	All SWs OFF
Neg. HV Supply Current	$I_{NNQ}$		-10	-50	$\mu A$	All SWs OFF
Pos. HV Supply Current	$I_{PPQ}$		10	50	$\mu A$	All SWs ON, $I_{SW} = 5 mA$
Neg. HV Supply Current	$I_{NNQ}$		-10	-50	$\mu A$	All SWs ON, $I_{SW} = 5 mA$
Switch Output Peak Current			3.0	2.0	A	$V_{SIG}$ duty cycle $\leq 0.1\%$
Output Switch Frequency	$f_{SW}$			50	Khz	Duty Cycle = 50%
$I_{PP}$ Supply Current	$I_{PP}$		3.5	5.0	mA	4 SWs turning ON and OFF at 50KHz.
$I_{NN}$ Supply Current	$I_{NN}$		-3.5	-5	mA	
Logic Supply Quiescent Current	$I_{DDQ}$			10	$\mu A$	

## Electrical Characteristics

**AC Characteristics** ( $V_{PP} = +100V$ ,  $V_{NN} = -100V$ ,  $V_{DD} = +5.0V$ ,  $T_A = +25^\circ C$ )

Characteristics	Sym	min	typ	max	Units	Test Conditions
Turn On Time	$t_{ON}$			5.0	$\mu s$	$V_{SIG} = V_{PP} - 10V$ , $R_{LOAD} = 10K\Omega$
Turn Off Time	$t_{OFF}$			5.0	$\mu s$	$V_{SIG} = V_{PP} - 10V$ , $R_{LOAD} = 10K\Omega$
Maximum $V_{SIG}$ Slew Rate	$dv/dt$			13	V/ns	
Off Isolation	KO	-45	-58		dB	$f = 5.0MHz$ , $R_{LOAD} = 50\Omega$
Switch Crosstalk	$K_{CR}$	-60			dB	$f = 5.0MHz$ , $R_{LOAD} = 50\Omega$
Output Switch Isolation Diode Current	$I_{ID}$			300	mA	300ns pulse width, 2.0% duty cycle

# Operating Conditions

Symbol	Parameter	Value
$V_{PP} - V_{NN}$	Maximum differential voltage	+200V
$V_{PP}$	Positive high voltage supply <sup>1</sup>	+40V to $V_{NN} + 200V$
$V_{NN}$	Negative high voltage supply <sup>1</sup>	-40V to -160V
$V_{DD}$	Logic power supply voltage <sup>1</sup>	+4.75V to +5.25V
$V_{IH}$	High-level input voltage	$V_{DD} - 1.5V$ to $V_{DD}$
$V_{IL}$	Low-level input voltage	0V to 1.5V
$V_{SIG}$	Analog signal voltage peak-to-peak <sup>2</sup>	$V_{NN} + 10V$ to $V_{PP} - 10V$
$T_A$	Operating free air-temperature	0°C to 70°C

**Notes:**

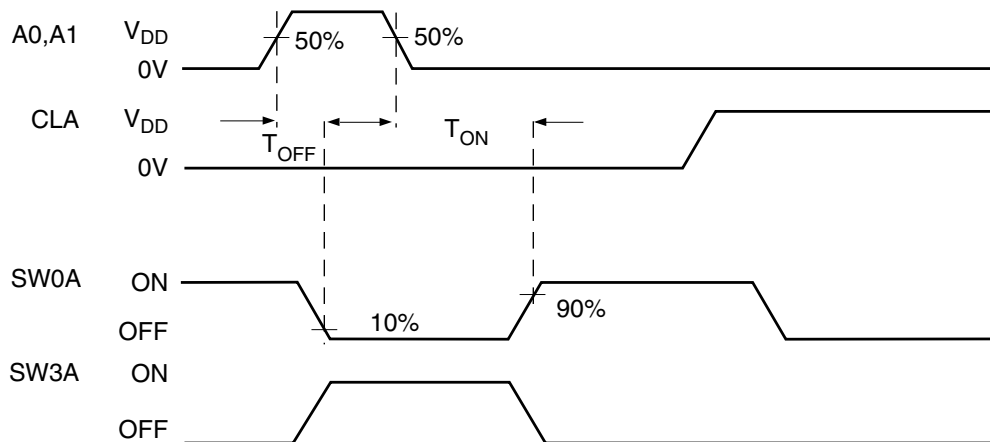
1 Power up/down sequence is arbitrary except GND must be powered-up first and powered-down last.

2  $V_{SIG}$  must be  $V_{NN} \leq V_{SIG} \leq V_{PP}$  or floating during power up/down transition.

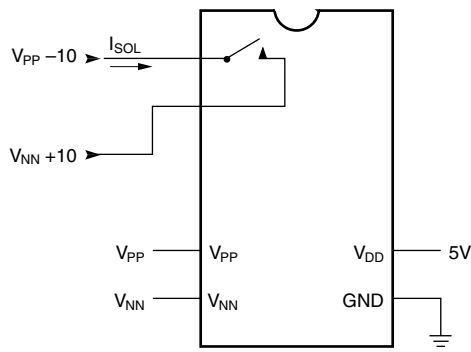
## Truth Table

A1	A0	CLA	B1	B0	CLB	SW0A	SW1A	SW2A	SW3A	SW0B	SW1B	SW2B	SW3B
L	L	L	L	L	L	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
L	H	L	L	H	L	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
H	L	L	H	L	L	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
H	H	L	H	H	L	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
X	X	H	X	X	H	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

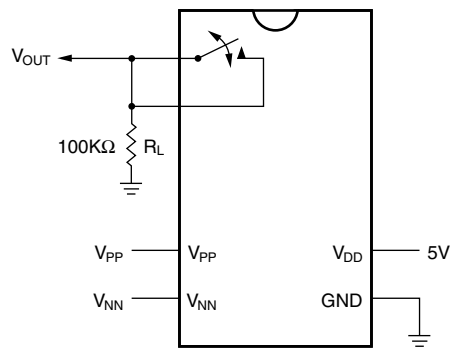
## Logic Timing Waveforms



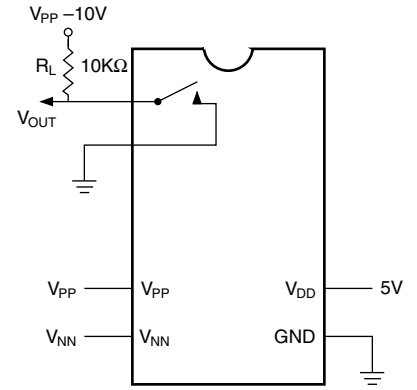
# Test Circuits



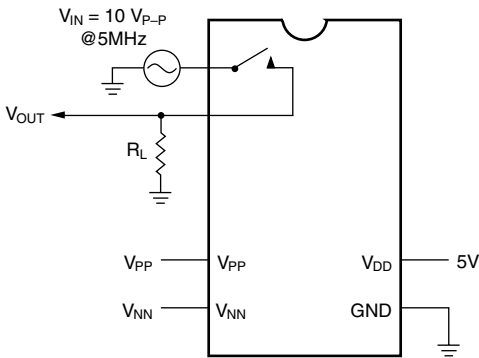
Switch OFF Leakage



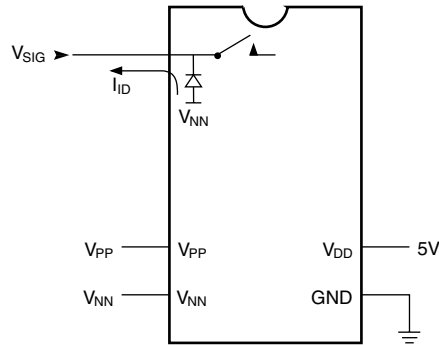
DC Offset ON/OFF



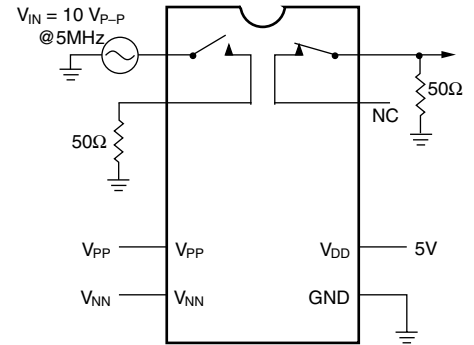
T<sub>ON</sub>/T<sub>OFF</sub> Test Circuit



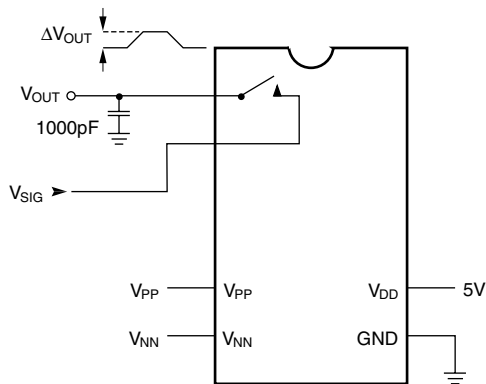
$K_O = 20 \text{Log} \frac{V_{OUT}}{V_{IN}}$   
OFF Isolation



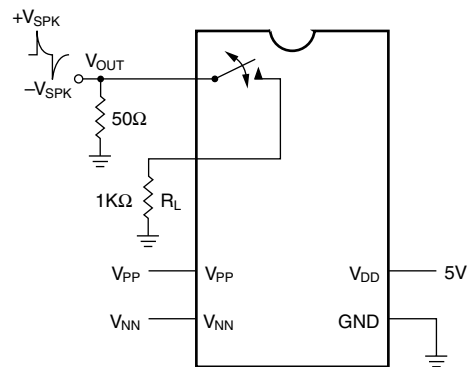
Isolation Diode Current



$K_{CR} = 20 \text{Log} \frac{V_{OUT}}{V_{IN}}$   
Crosstalk

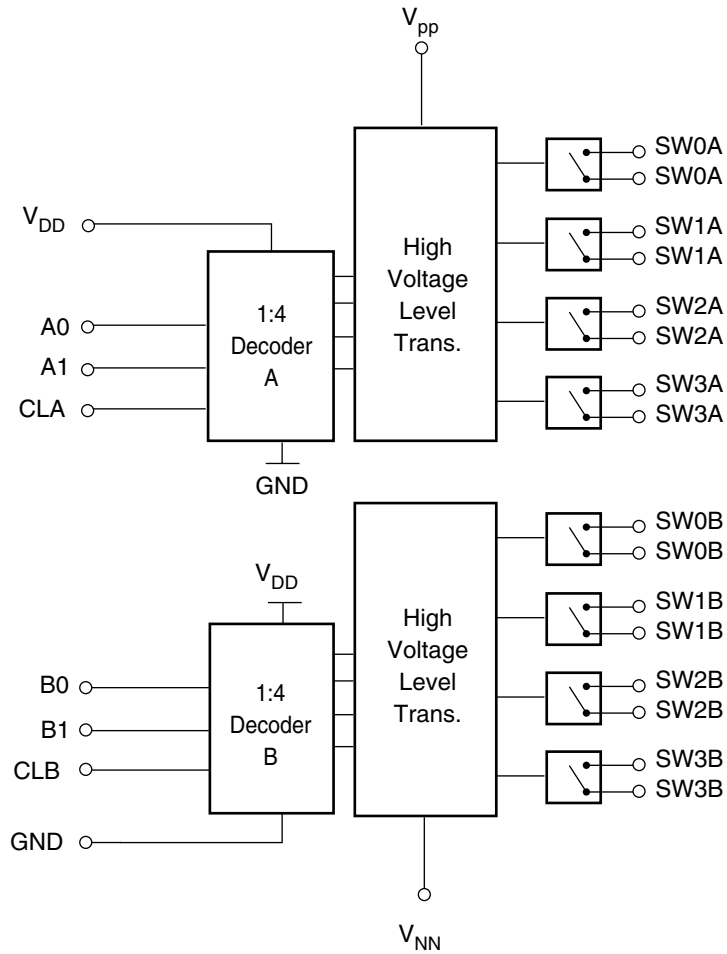


$Q = 1000\text{pF} \times \Delta V_{OUT}$   
Charge Injection



Output Voltage Spike

# Block Diagram

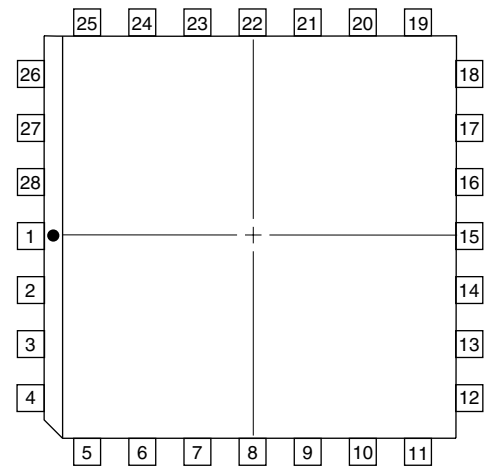


# Pin Configuration

# Package Outline

## HV207 28-Pin J-Lead

Pin	Function	Pin	Function
1	SW3A	15	B1
2	SW2A	16	A0
3	SW2A	17	A1
4	SW1A	18	CLB
5	SW1A	19	CLA
6	SW0A	20	SW0B
7	SW0A	21	SW0B
8	N/C	22	SW1B
9	V <sub>PP</sub>	23	SW1B
10	N/C	24	SW2B
11	V <sub>NN</sub>	25	SW2B
12	GND	26	SW3B
13	V <sub>DD</sub>	27	SW3B
14	B0	28	SW3A



top view  
28-pin J-Lead Package