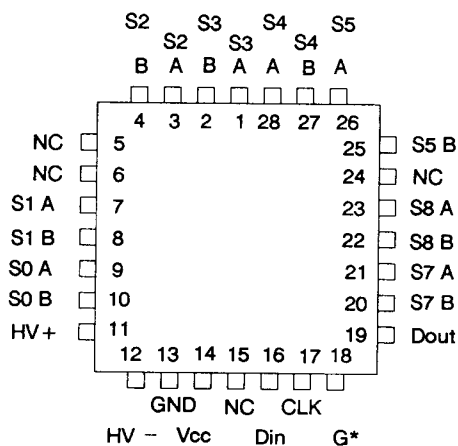
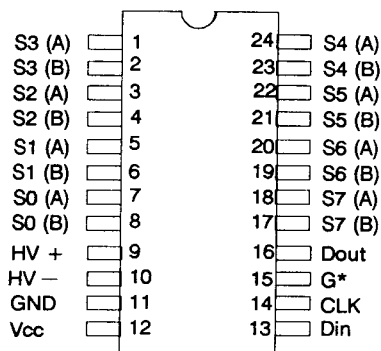


FEATURES

- 180V Analog Signal Switching
- DC to 10MHZ Analog Signal Frequency
- On Resistance 30 ohms
- Turn on / Turn off 2us
- RF Isolation 45 db at 10MHZ
- Push-Pull Driver
- Internal Level Shifters
- Silicon-Gate CMOS Logic
- Low Power Dissipation

PIN CONFIGURATION

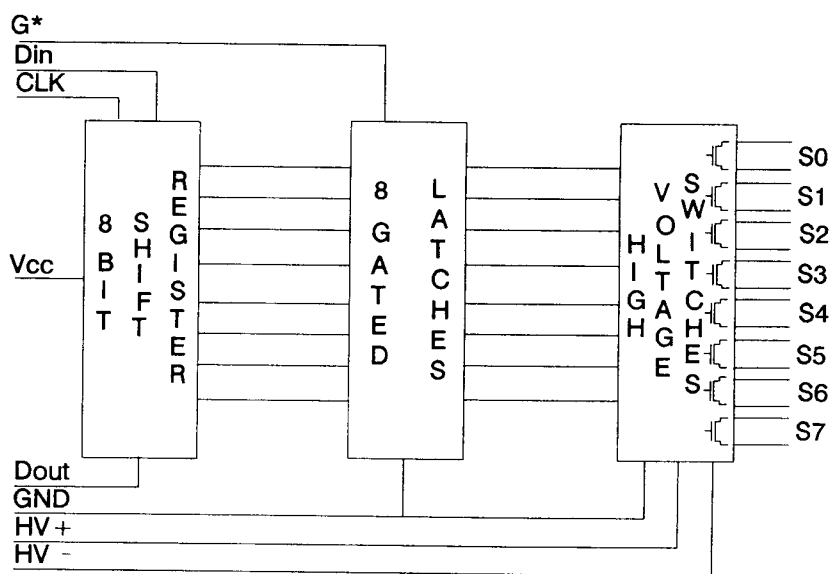


DESCRIPTION

The USH5008 is a High Voltage Integrated Circuit (HIVIC) designed for switching high voltage analog signals. This HIVIC can be used in ultrasound imaging systems and in other applications that require flexible high voltage switching controlled by internal CMOS logic signals.

The USH5008 combines high voltage bi-directional DMOS switches with low power CMOS logic to provide efficient control of high voltage analog signals. This HIVIC incorporates high voltage level shifters to interface the high voltage switches to the CMOS logic. The level shifters and push-pull drivers ensure high speed operation with minimal power dissipation.

BLOCK DIAGRAM



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ABSOLUTE MAXIMUM RATINGS

LEVEL	PARAMETER	SYMBOL	RATING	UNITS
HIGH VOLTAGE	Positive Supply Voltage	HV +	+110	V
	Negative Supply Voltage	HV-	-110	V
	Analog Signal Voltage	V _A	-110 to +90	V
	Analog Signal Current**	I _A	1.5	A
CMOS CONTROL	DC Supply Voltage	V _{CC}	5 to 16	VDC
	DC Supply Current	I _{CC}	20	mA
	DC Input Voltage	V _{IN}	-0.5 to V _{CC} + 0.5	VDC
PACKAGED DEVICE	Operating Temperature	T _{OP}	-55 to +125	°C
	Storage Temperature	T _{ST}	-55 to +150	°C
	Power Dissipation			
	Ceramic Package	P _D	2	W
	Plastic Package	P _D	800	mW

** 2% Duty Cycle ; f = 10 MHZ

DC ELECTRICAL CHARACTERISTICS

T_A = 25° C, V_{CC} = 15V, HV + = +100V, HV- = -100V (See note 1)

PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNITS
Analog Voltage Range	V _A	HV + = +100V	-100	+80	V
On Resistance of Switch	R _{ON}	V _{IN} = 0V; I _{JN} = 10mA	15	35	Ohms
Change in R _{ON}	△R _{ON}	-50V < V _{IN} < +50V	—	20	%
Switch Leakage Current	I _L	-80V < V _{IN} < +80V	—	500	nA
Max Switch DC Current ***	I _{MAX}	-80V < V _{IN} < +80V	—	300	mA
Quiescent Current V _{CC}	I _{CC}	—	—	1.5	mA
Quiescent Current HV +/-	I _{HV+} ; I _{HV-}	—	—	10	uA
Logic High Input Voltage	V _{IH}	V _{CC} = 15V	12	V _{CC} + 0.5V	V
Logic Low Input Voltage	V _{IL}	V _{CC} = 15V	-0.5	1.4	V
Logic High Input Current	I _{IH}	V _{IN} = 15V	—	1	uA
Logic Low Input Current	I _{IL}	V _{IN} = 0V	—	-1	uA
Logic High Output Voltage	V _{OH}	V _{CC} = 15V; I _{OUT} = 1.8mA	14	—	V
Logic Low Output Voltage	V _{OL}	V _{CC} = 15V; I _{OUT} = -1.8mA	—	0.7	V
Output Current DOUT pin	I _{OUT}	—	-10	+8	mA

NOTE 1: The recommended method for Power Supply turn-on is as follows:

1. GND ; 2. V_{CC} + 15V ; 3. HV- -100V ; 4. HV + +100V

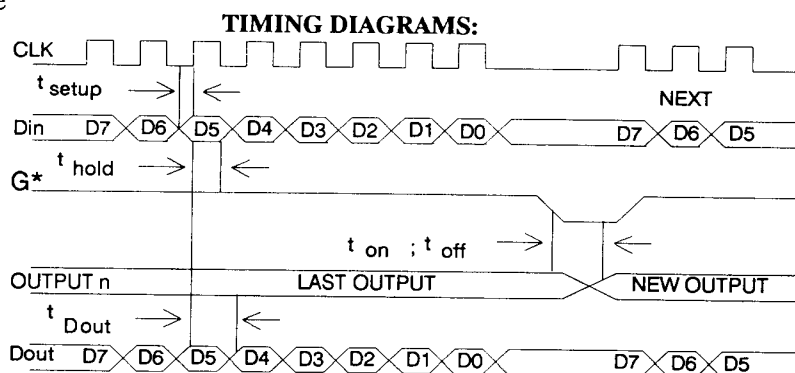
*** Current is per switch. Not to exceed the maximum power dissipation of package.



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PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNITS
Turn-On Time	$T_{(ON)}$	G^* to Output or CLK to Output	—	5	us
Turn-Off Time	$T_{(OFF)}$	G^* to Output or CLK to Output	—	5	us
Min Setup Time	T_{SETUP}	CLK to DIN	30	—	ns
Min Hold Time	T_{HOLD}	DIN to CLK	30	—	ns
Min Pulse Width, G^*	$T_{G \text{ Width}}$	G^* : low	50	—	ns
Clock Pulse Width	$T_{CLK \text{ Width}}$	—	50	—	ns
Chan'l Sw Capacitance	$CS_{(off)}$	Switch in Off Cond.; $f = 1\text{MHz}$	—	20	pf
Off Isolation**	—	$Z_L = 50 \text{ ohms}$	50	—	db
Chan'l to Chan'l Isolation**	—	$f = 10\text{MHz}$	45	—	db
Max Sw Pulse Current	I_A	1% duty cycle $f = 10\text{KHz}$	—	1.5	A
Max Clock Frequency	FCLK	—	—	10	MHZ

** Plastic DIP Package

**DESCRIPTION OF OPERATION**

The USH5008 is a High Voltage Integrated Circuit (HIVIC) that contains eight independent high voltage bi-directional switches and the CMOS logic necessary to interface them to a CMOS environment. This HIVIC is designed to switch 180V analog signals into capacitive loads, and it is designed to conduct current pulses of 1A.

The switches (S0-7) are controlled by the serial data on DIN, the shift register clock input (CLK), and the data transfer enable (G^*). (See Tables 1 and 2, and timing diagrams). Serial data on line DIN is clocked into the eight-staged static shift registers.

The data in the shift register is transferred to the latches by enable G^* . When G^* is low, the shift register data flows through the latch and controls the state of the switch.

TABLE 1 PIN DESCRIPTIONS

PIN	DESCRIPTION
DIN	Serial Data Input to Shift Register
CLK	Serial Shift Clock
G^*	Parallel Transfer Enable from Shift Register to Latches
Dout	Serial Data Out of Eighth Stage of Shift Register
S0-7 (A,B)	Eight Pairs of High Voltage Lines for Analog Signal Switching
HV +	Positive High Voltage Supply for the Level Shift Circuits
HV-	Negative High Voltage Supply for the Level Shift Circuits
VCC	+ 15V Logic Supply Pin
GND	Ground Reference Pin for both the Logic Supply and the High Voltage Supply

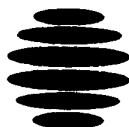
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TABLE 2 TRUTH TABLE

D0	D1	D2	D3	D4	D5	D6	D7	G*	S0	S1	S2	S3	S4	S5	S6	S7
L								L	OFF							
H								L	ON							
	L							L	OFF							
	H							L	ON							
		L						L	OFF							
		H						L	ON							
			L					L	OFF							
			H					L	ON							
				L				L	OFF							
				H				L	ON							
					L			L	OFF							
					H			L	ON							
						L		L	OFF							
						H		L	ON							
							L	L	OFF							
							H	L	ON							
								L	OFF							
								H	ON							
X	X	X	X	X	X	X	X	H	HOLD PREVIOUS STATE							

NOTES:

- 1) The eight switches operate independently.
- 2) Serial data is clocked in on the L / H transition of CLK.
- 3) The switches go to a state retaining their present condition at the rising edge of G*. When G* is low, the shift register data flows through the latch.
- 4) D_{OUT} is high when switch 7 is ON.
- 5) Shift register clocking has no effect on the switch states if G* is high.

ORDERING INFORMATION

PRODUCT NO.	PACKAGE	TEMP RANGE
USH5008-AI-P24	24 Pin Plastic Dip	0 to 70 °C
USH5008-AI-K28	28 Pin PLCC	0 to 70 °C
USH5008-AI-C24	24 Pin Cerdip	-25 to +85 °C
USH5008-AM-C24	24 Pin Cerdip	-55 to +125 °C
USH5008-AI-L28	28 Pin Ceramic Chip Carrier	-25 to +85 °C
USH5008-AM-L28	28 Pin Ceramic Chip Carrier	-55 to +125 °C

MIL-STD-883C Processing Available



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