



Electronic Design & Research  
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*Technology for people's ideas*

## EDR82908 – Very-Slope Piezo Driver-200 (VSPD-200)

The VSPD-200 is an isolated push-pull or ½-bridge driver built around the Fuzzy-logic driver p/n EDR82909 to accommodate D3L-, D3G-, D3F-, and D3S- families of switches manufactured by EDR Inc.

Large varieties of switches offered with a various output voltage and current to satisfy various industrial applications, up to 1700V relays made with MOSFET's and up to 2500V with IGBT. Shoot-through protection is integrated to prevent both outputs from conducting simultaneously. The input does the best interfaces with three-state logic.

The EDR82908 has a built-in 200VDC high-speed discharging network with two resistors network for setting individual timing for rising and falling slopes.

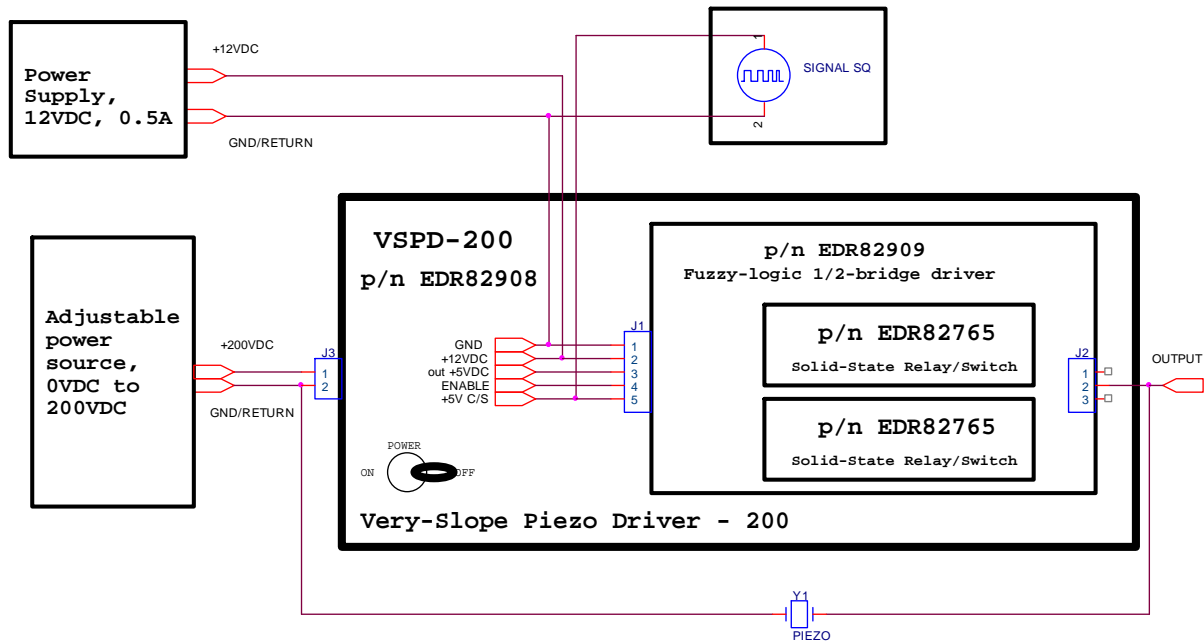
### Features:

- Chopping frequencies up to ..... 800 KHz
- High Current Capability, AC/DC switching
- D3S-package ..... up to 30 A
- Available -- Unidirectional and bi-directional relays/switches, or for a VDC or VAC power.
- Available – SPDT (3 pins) and DPST (NO/NC or 4 pins)
- Short propagation delay input-output ..... 550 nS
- Try-state outputs ..... input floating
- Break-Before-Make Delay (Typ.) ..... 220 nS
- Fast Switching Action:
- Ton ..... 100 nS
- Toff ..... 100 nS
- Input a TTL, CMOS and LMOS Compatible
- Three-State PWM input for OFF/OFF output terminals
- Single Power Supply ..... 5VDC, 12VDC or 24VDC
- Fussy Logic Input:
- ON for "NO2" ..... 0-1.7 V
- ON for "NO1" ..... 3.3V-5V
- High input-output isolation ..... 2,750 V
- A power supply switch fro an external power
- An easy selectable resistor networks
- Small size, only 6"L x 3"W x 3"H
- Reglated, low power 5VDC output that can be used to control thr ENABLE and others low-curretn loads

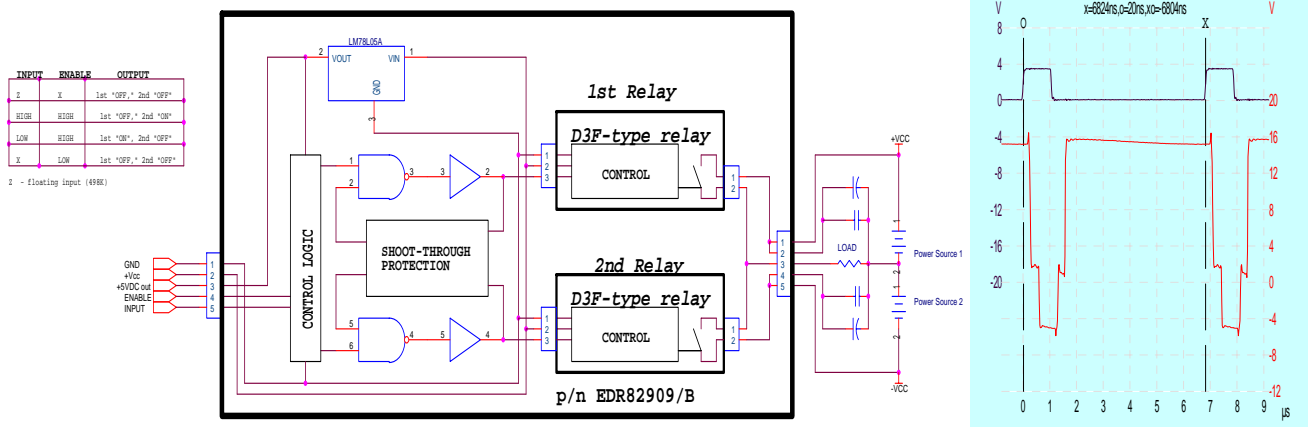
### Applications:

- Bi-directional switch
- ½ bridge driver for AC and DC motors
- Video signal termination
- High Energy pulse formation
- Two relays combined for H-bridge driver
- High power, High frequency driver
- Latch and High-speed solenoid driver
- High Frequency Analog Switch
- Audio Switching
- Automatic Test Equipment
- Communication Systems
- Analog Selector Switch
- AC and DC power switch
- Servo-Motor driver
- Pulse-Width modulation
- Flash-lamp supply for pumping solid-state laser
- Plasma and Electrostatic Paint
- Bi-polar pulse generation
- Piezo driver
- plasma driver and plasma actuation
- optical switching devices
- structural damping analysis
- flow actuation and control

**The EDR82908 designed to driver two of EDR's D3G- and D3F-types relays in a ½ bridge configurations. It used as a powerful analog, high frequency switch to provide a break-before-make commutation. The EDR82908 is a high frequency controller and optimized to drive two Solid State Relays/Switches in the break-before-make synchronized sequences. EDR has made switches and the EDR82908 allows creating a 30 A rms driver. The EDR82908 also features a three-state PWM input will prevent a negative transient on the output voltage when the input is being shut down. The EDR82908 has the capacity to switch efficiently at frequency up to 800 KHz. A dead time is adjustable by two capacitors, one of each cycle and set during the production at the best and a minimum time. The timing could the same or different based on the value of each capacitor to meet variety applications and R&D. We are welcome inquiry to set for you any timing that will insure a proper control.**



**Simplified block-diagram of the VSPD-200 with external controls designed to drive a PIEZO.**



**Simplified schematic of the EDR82909 and a load hook-up in a 1/2 bridge driver application**

### Functional Pin Description

**GND (pin 1)** GND is the ground pin. All control signal and power supply to relays are reference to this node.

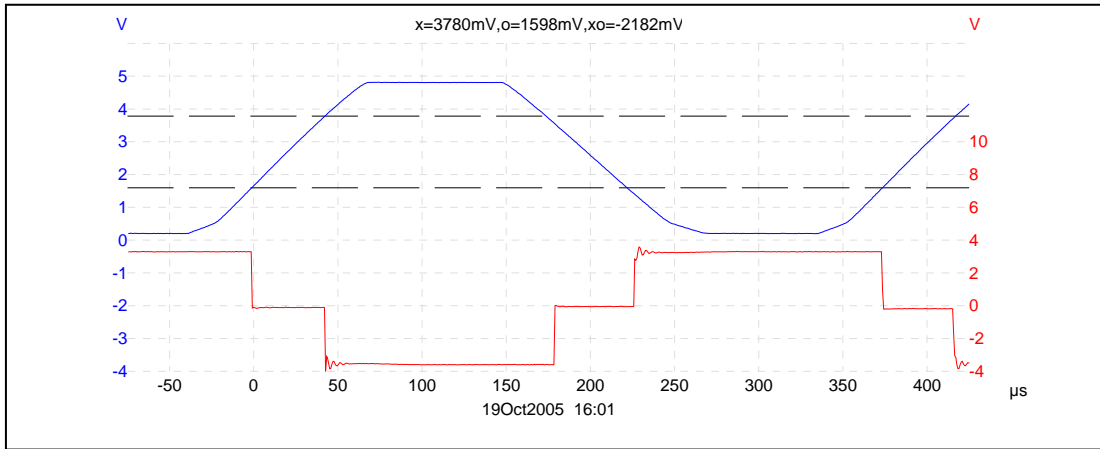
**Vcc (pin 2)** Connect the Vcc pin to a + of a bias supply. The Vcc depends on what type of relays being used. It could be 5VDC or 12VDC.

**+5VDC output (pin 3)** The +5VDC is the output from an internal voltage regulator when +12VDC applied onto Vcc (pin2). It is a low power source and can be used only for external applications. An aggregated load current cannot exceed 50 mA. There is no limit set for the current if Vcc (pin 2) is 5VDC because it passed through.

**Enable (pin 4), the low threshold is 1.0V and the high is 2.0V** It is a dual use control (enable) input. Connect this pin to HIGH (+5VDC) or left unconnected to enable the DIN-driver. The LOW is disabled the driver. This input can be use for PWM applications.

**INPUT (pin5), from 1.7V to 3.3V is off**

The INPUT is the fuzzy or three-state input and controls output relays. An applied signal can enter three distinct states during operation, 0V to 1.7V, 1.7V to 3.3V and 3.3V to Vcc, as it shown on the voltage diagram below. This input can be used to reverse polarity (direction) of a DC Motor.

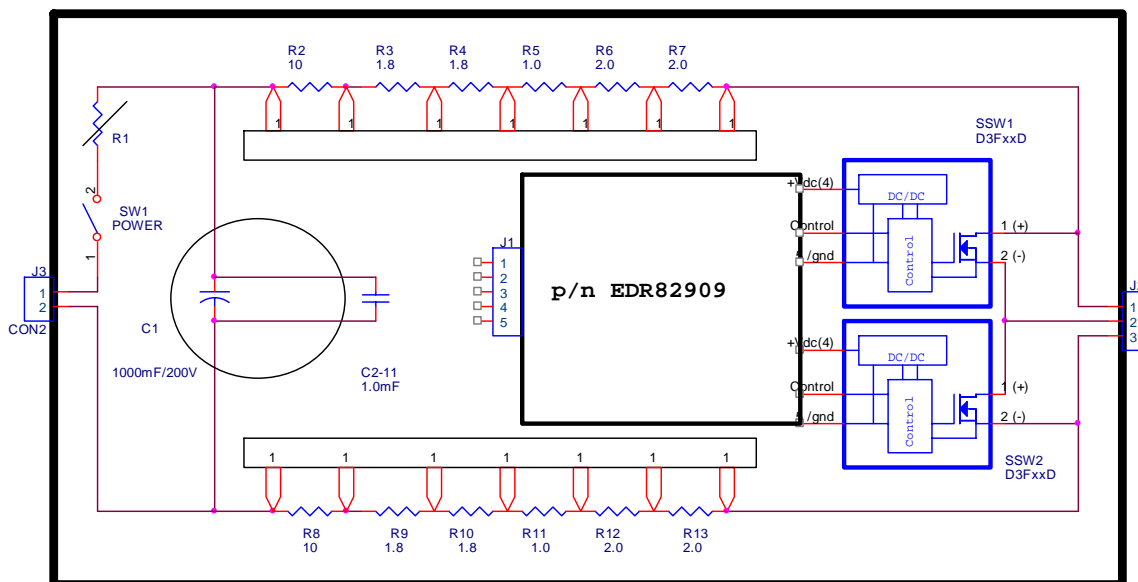


**Voltage-timing diagram of the INPUT signal (top) and relays output (bottom), for demonstrating purpose slopes of the input signal set to a slow rise and fall transitions**

### Recommended Operating Conditions

	MIN	TYP	MAX
Supply Voltage, Vcc for EDR82908		12VDC +/-5%	
Low Power, 5VDC output		50mA	
Ambient Temperature Range		-10°C to 90°C	
Input (pin 5) mA		0.25	
The first threshold (pin 5), V			1.7
The second threshold (pin 5), V	3.3		
Enable (pin 4), LOW threshold, V	1.0		
Enable (pin 4), HIGH threshold, V			2
Shoot-Trough Protection, adjustable and set by two capacitors, for 200µF		0.324 µS	

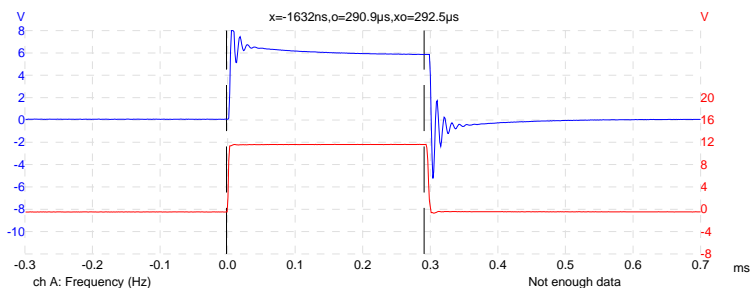
### Application note:



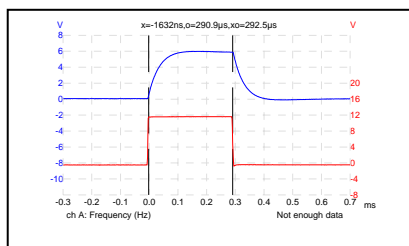
A simplified diagram/drawing of the EDR82908 (VSPD-200)

The EDR82908 (VSPD-200) can be used for various applications requesting high slew rate, high voltage and fast response in applications as: a plasma driver and plasma actuation, driver for piezo manipulator, optical switching devices, closed loop feedback systems, vibration control, structural damping analysis, flow actuation and control, etc. It is an ideal tool for research and prototyping.

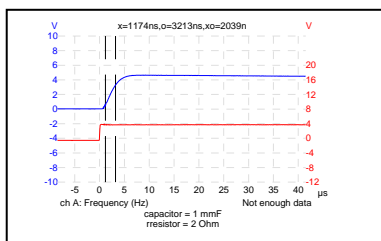
The VSPD-200 provides very inexpensive tool to study effect of the raising and falling slopes on a material under investigation and for optimization the amplification set-up. Both slopes (raise and fall) can be set individually by changing values of charging and discharging resistors. There are two set of resistors to set duration of the raising and the falling slopes.



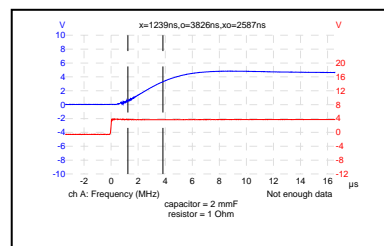
**The 2.0  $\mu\text{F}$  piezo was driving without any either raising or falling slopes resistor. Applied voltage is 60VDC. High-frequency oscillations at the pulse's edges were due to some inductance in connective wires (measurement was taken from the VSPD-200's output.)**



The resulting with 10 Ohm



Resulting with 20 Ohm and 1  $\mu\text{F}$



Resulting with 10 Ohm and 2  $\mu\text{F}$

The VSPD-200 assembled in a 2-piece small (6"L x 3"H x 3"W) enclosure, <http://www.hammondmfg.com/pdf/1411M.pdf>. All components mounted on one piece of the enclosure. Disassembling is easy and only four (4) screws hold the enclosure together. Once unscrewed, a two, screw-types terminals became visible and on it several resistors connected in series. During tests, any value of non-inductive resistor may be installing in series to set a required duration rising and falling slopes. Once test has determined the proper value, resistors may be replacing with a single, equivalent value and power dissipation, non-inductive resistor.

Technical Assistance Call Toll-Free: 1-800-337-1-EDR or [www.vsholding.com](http://www.vsholding.com)

The above is one of a solid-state module manufactured by EDR Inc. to satisfy a wide range of customers. We made solid-state relays/switches, input/output modules, intelligent breakers, etc.

About 32% of our product manufactured to customers specifications.

Email to [info@vsholding.com](mailto:info@vsholding.com) your input and output requirements and we'll offer you a part number, data sheet and the delivery schedule. A cost of a Solid State Device is very much tied to an ordered volume, in most cases a relay costs in low teens in order of 1000 or more.