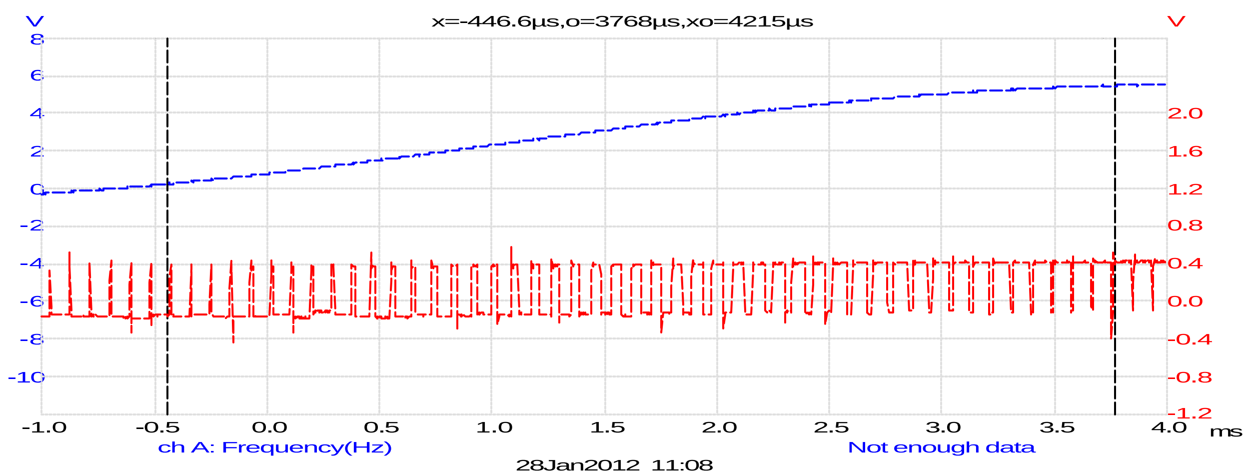
900VDC, up to 250 KHz, 10 nS rising slope, Isolated Full Bridge Driver

P/N **EDR83305** is rated 4.7-A (rms)/4.5kW, 30-A (short run), 70-A pulse/60kW, Rds= 170 mOhm

P/N **EDR83307** is rated at 9.2-A (rms)/8.3kW, 60-A (short run), 120-A pulse/110kW, Rds= 87 mOhm

For Power converters, Bipolar Permanent Magnet Stepping Motors, Piezo-transducers, etc

Qualified for delivering kilowatts of power in ultra-precision PWM applications



Electronic Design & Research Inc

Under management

VS Holding LLC

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__Electronic Design & Research__ is a pioneer in developing and manufactures high-speed, high-power relays/switches. Since 1998, we have produced vast varieties of Solid-State Modules and Devices. Our products have being used in thousand defense related and industrial applications.

Piezo Drivers
Video Switches
½ Bridge drivers
Q-type high-pass filters
Precision F-to-V Converters
Soft-Landing Solenoid Drivers
50Hz/60Hz Comb Notch filters
H-bridge or Full-bridge Drivers
Super-high Power, fast Switches
High-power, high-speed Switches
Universal Analog Building Module
Signal Switching Separating Network
Sockets for relays, switches and drivers
Charge-Pump Wide-Band FM detectors
Low-Noise, High-Voltage DC/DC converters
DC-3phase AC resonance mode driver for EV
DC-12phase AC resonance mode driver for EV
Perpetual Pulse-width Discriminator, US Patent
½ and H Fuzzy Logic sockets for various relays
Fuzzy-Logic SPDT Relays, Switches and ½ Drivers
Fully protected, Solid-State DPST Brake, US Patent
Single Pole, Single Throw Relays and Switches, (SPST)
Power-distributing module for Motorcycles, US Patent
Single Pole, Double Throw Relays and Switches, (SPDT)
Double Pole, Single Throw Relays and Switches, (DPST)
1-Form B, SPST-NC (normally closed) Solid State Relays
Charge-and-Add, Up/Down DC/DC Converters, US patent
1-Form B and 1-Form A DPST-NC/NO Solid State Relays
m**-Power Controller for Magnetic Latching Valves, US Patent**
High Voltage, Nana-Seconds Rise/Fall time, Push-Pull Drivers
Super-low noise preamplifiers for a low and high impedance sources
m**-control, High-Power SPST-NC, normally closed relays, US Patent**
High Speed Biases Switch (HSBS-600/601) for Magnetic Resonance Spectroscopy
High Speed Biases Generator (HSBG-602) for Magnetic Resonance Spectroscopy
Dynamic Disabling Switch (DDS-700/701/702) for Magnetic Resonance Spectroscopy

We are working diligently to bring new devices to the market and to meet your requests. Above is a list of family of devices we developed and manufacturing. Most of them covered by propriety technologies and some of them so unique that we filed and receive patents. We stock an inventory of available products that exceeds several thousands in our warehouse. We keep a small number of popular devices in stock and ready to ship immediately. Our production capacities exceed 10,000 devices per months with two production robots programmed and working at a full speed.

For your unique applications that required a different voltage, current or speed, ordering instruction (on the last page) could be useful in the creation a new part and summarizing what you needed. Do not hesitate to send us an email: info@vsholding.com for any additional information, delivery schedule, and prices.

Thank you,

Vladimir A. Shvartsman, Ph.D.
V_Shvartsman@vsholding.com

Electronic Design & Research Inc.

http://www.vsholding.com

Technology for people's ideas

A large number of HS-FBI drivers are available rated:
24VDC/50A,
75VDC/42A,
150VDC/40, 1,200VDC/2A,
and many others rated at various voltages/currents.

A more complete list is offered at the end of this datasheet.

A family of High-Speed, Full-Bridge, Isolated (HS-FBI) Drivers

A new family of EDR's third generation all-voltage, optical full-bridge (or H) drivers is a cost effective solution for automotive and other power control applications. Devices assembled in a small 1.95"W x 3.95"L x 1.2"H panel mounting enclosure, capable of delivering up to 6-kW of power. Full 3,000V input-output isolation allows safe interfacing directly to low-power CMOS (or TTL) logics. Essential three available controls (EN, DIR, and BR) offer design flexibilities while making it easily adaptable to a wide range of industrial solutions. An external MCU can control output functions of a HS-FBI by providing a PWM, direction, and brake signals to a load thus allowing using it in precision speed-control and power delivering applications. Switching frequencies up to 500-KHz and a pulse width as short as 400-nS makes HS-FBI driver capable of performing the finest and highly precision power management tasks. No extra heat sink is required for driving a load continuously at rated current.

HS-FBI drivers have found applications in controlling intelligent toys, robots, appliances, power tools, relays, high-speed solenoids, power converters, dc and bipolar stepping motors, TEC, and other power devices.

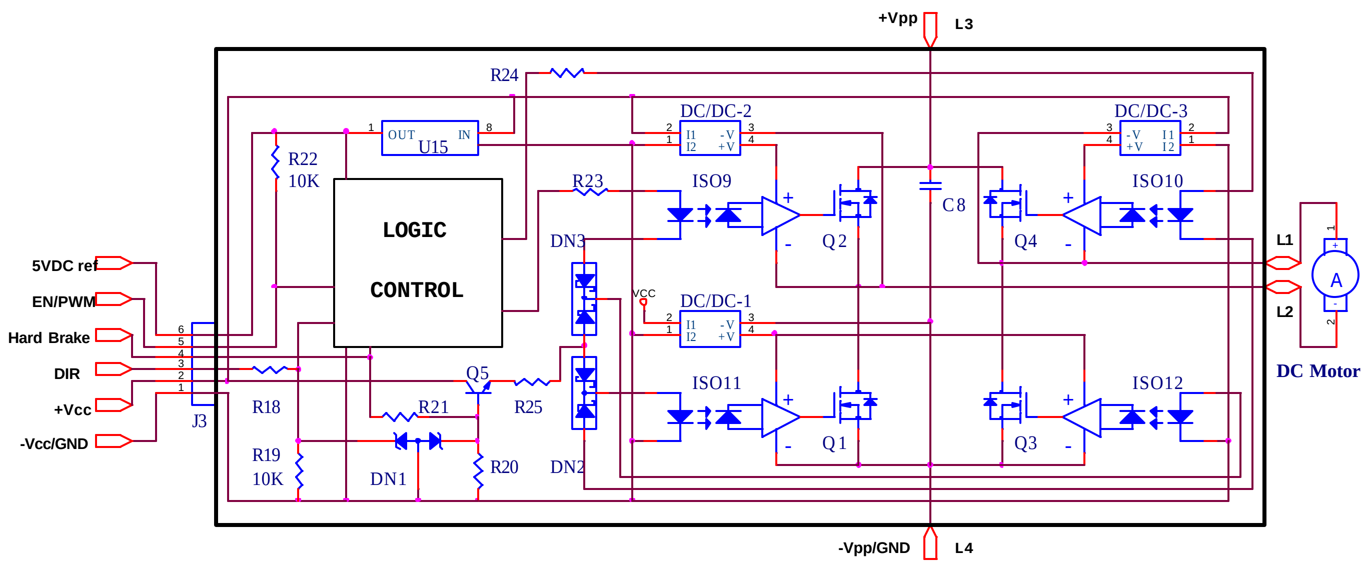

FIG-1. A simplified diagram of the HS-FBI driver

Introduction

A family of opt-isolated HS-FBI drivers designed for a motion control applications though they can be used as Class-D amplifiers, controlling the amount of power delivered to a load, driving a Piezo transducers and thermoelectric cooler (TEC) or Peltier devices, etc. Utilizing CMOS advance processing technique and modern MOSFET power devices, the drivers are able achieve an extremely low Rds. This benefit, combined with the fast switching speed provides EE designers with an extremely efficient and reliable device for use in a wide range of industrial, space, avionics and defense applications.

High Speed Full Bridge (HS-FBI) drivers can function with two independent power suppliers (V-pp and V-cc) or from a single power source. Definitely, two separate suppliers are preferable. It allows complete isolation of low-power controls from current a high pulsing caused by a load.

The HS-FBI drivers built with three controls; PIN# 3 is a DIR (direction), PIN#4 is a BRK (brake), and PIN#5 is an EN/PWM (enable/modulation). The EN/PWM input tied to the internal reference voltage (5V) vie 10K resistor, the DIR and BRK to the PIN# 1 (ground) via 10K. Either, a mechanical switch or any semiconductor (transistor or CMOS/TTL logic) could be used to control any of the inputs. Once power is applied, the driver is enabled unless the EN/PWM input is connected to the GND. Only the BRK control works at that stage. If the enable input connected to the GND, the driver goes to a FREE-RUN state. In that state, no current flows through the load and a motor stops rotating briefly.

The truth table

INPUTS			OUTPUTS	
DIR	EN	BRK	L1	L2
L	H	L	OL	OH
H	H	L	OH	OL
X	L	L	Z	Z
X	X	H	OL	OL

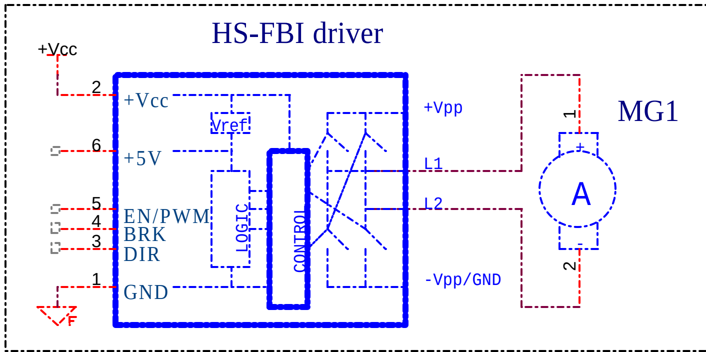

FIG-2. The HS-FBI driver

L = Low logic level; H = High logic level

Z = High Impedance (off state)

OH = Output High (sourcing current to the output terminal)

OL = Output Low (sinking current from the output terminal)

X = Don' t Care

OUTPUTS		Load (DC Motor)
L1	L2	
OL	OH	Moves right (CW)
OH	OL	Moves left (CCW)
Z	Z	Free runs
OL	OL	Brakes (sudden stop)

Two options are available for managing the output: (1) the EN is low, or (2) the BRK is high. Grounding (applying "low" onto) the EN effectively disconnects a load from Vpp. Applying "high" on the BRK shorts the output terminals. In this case, when the load is a DC Motor both command can be used for stopping the motor's rotation. The BRK stops suddenly or abruptly the motor's rotation, when the EN lets the motor 'free run' to a stop. The table on the left has summarized those

NOTE: In general, the brake control can be applied at any time, though we recommend prior to it executing the EN command for a short period. Once the BRK control applied a significant current rush flows through output transistors. The amount of current depends on the motor's speed and its mass, and the mass of a motor's load, in short the system inertia. As a rule, HS-FBI drivers were design withstanding a "rush current" at least 10x of the rated. Letting the system's friction to dispose some of that energy would be a wise solution.

Vpp (power supply)

Bypass capacitors must be connected to power supply terminals +Vpp/CND physically as close as possible for preventing local parasitic oscillation and overshoots. Depending on a maximum consumption current, a high-frequency electrolytic capacitor of at least 10µF and additional a ceramic capacitor 1.0µF or greater value directly soldered to power pins for high frequency bypassing. It is rather difficult to calculate required values and an experimental trail would provide the best result.

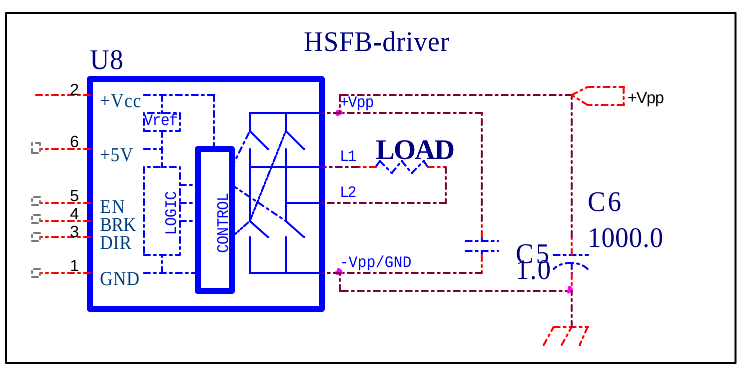

FIG-3. Capacitors C6 & C5 to "clean-up" the Vpp

<u>Functions and Basic Operation</u>

The HS-FBI drivers designed as full bridge drivers for delivering either: a steady, pulsing, or an alternative power onto a load. They are fast switches and made for broad range of applications including a high frequency PWM. Drives have only three control inputs (EN, DIR, and Brake) and are ready to perform various jobs just with a few external components for controlling the start/stop and directions of the rotation. External components would expand applications into delivering a precise amount of power. The EN and DIR controls are a high frequency inputs. The EN can be use for PWM and the DIR for driving a load with alternated voltage that is twice of an applied voltage (2xVpp). Since it's capable of delivering pulses with a resolution of 400-nS, the HS-FBI driver is best suited for maintaining DC Motor speed/torque precisely and delivering exact amount of power onto any other type of load.

NOTE: Once both powers (Vpp and Vcc) applied and controls (EN/PWM and BR) left unconnected, the power will be presented on the output terminals (L1 and L2).

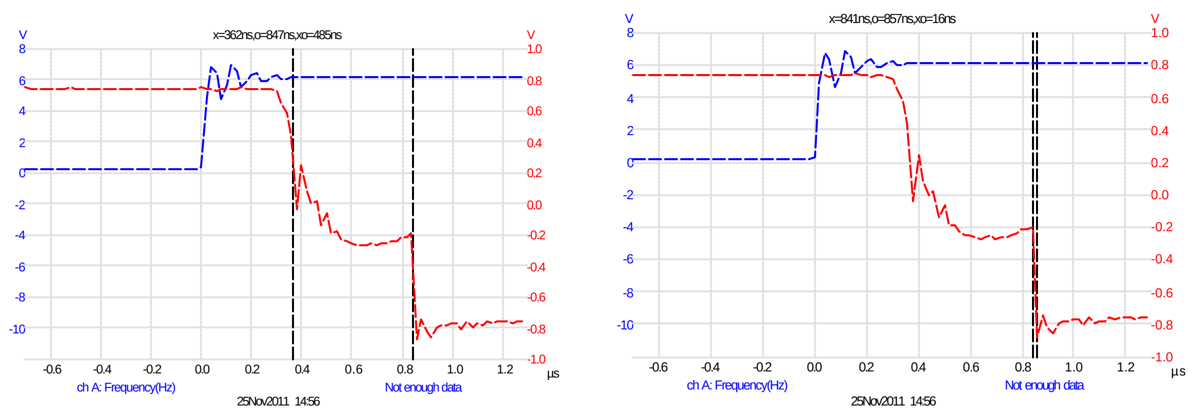

FIG-4. The highest alternated frequency limited in part by the duration of "dead" time. As it shown on recording the 'dead" time is equal to 485-nS. For a high-performance switch, 485-nS long "dead" time is excessive, and it was made just for a demonstration. It's usually set to 200-nS. It is a very efficient device having very high-speed of rising/falling slopes (less than 20-nS).

<u>Clock-wise (CW) and Counter clock-wise (CCW) rotations;</u> A required direction of rotation is easy to select by applying a proper voltage onto the DIR input (PIN#3), living it unconnected. For a small DC Motor where a sudden stop would cause no damage there is any requirements for stopping the motor prior changing the direction of its rotation, the DIR can be changed at any time. A heavy loaded and powerful motor required some time for stopping until the rotation is completed and can be reversed.
<u>Free continue rotation;</u> As mentioned above, an applied power to a load (DC motor) can be interrupted and resumed at any time. This is easily accomplished by connecting the EN (PIN# 5) to the CND (PIN# 1) and releasing again. Since the EN connected to +5VDC via 10K resistor any switch, relay, CMOS, TTL, or any transistors could remove a power from a load by connecting the EN to the ground.

If a motor turns the wrong direction, just re-connect the wires on the motor or output terminals (L1 and L2).

<u>Braking (stop);</u> The HS-FBI output terminals (L1 and L2) can be shorted by applying +5 VDC into PIN# 3. The BRAKE signal is simply overrides any other commands. As long as the brake signal is high, the output terminals remain short. When the BRAKE control is high, the gates of both output transistors Q1 and Q3 are driven to high (FIG.1) and at the same time blocking voltages to gates of Q2 and Q4 MOSFETs. Care should be taken to ensure that the maximum ratings of the device are not exceeded in worse case braking situations – high-speed and high-inertia loads

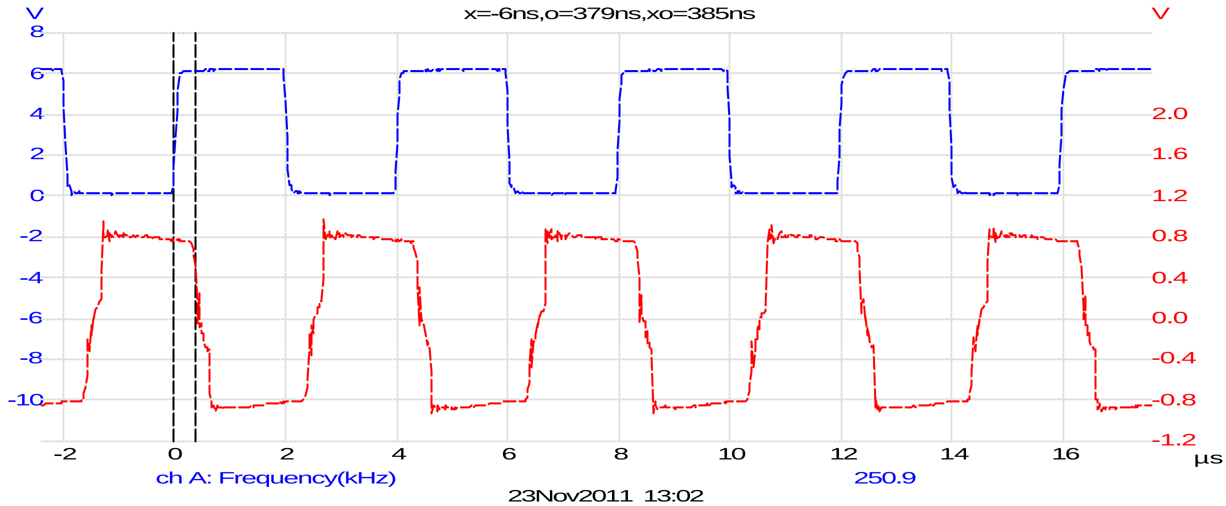

FIG-5. The top is a control signal and below is waveforms on a load at 250.9 KHz. With 80V voltage applied, the voltage on a load is 160V p-p. A control voltage scale is 1:1; the output scale is 1:100.

<u>Driving a load with alternative power;</u> The direction (DIR) input is designed to change current flow through a load thus helping to command a direction of DC Motor rotations, which is not performed frequently. Driving a high-speed solenoid certainly expends some usefulness of the DIR input, but there is more. The DIR is a high-speed (frequency) input that allows one to "change directions" of the current at extremely high frequencies, FIG.5. That expends applications in the field of DC/DC converging and especially make the HS-FBI driver useful for low-voltage power sources, like a fusion and photovoltaic cells.

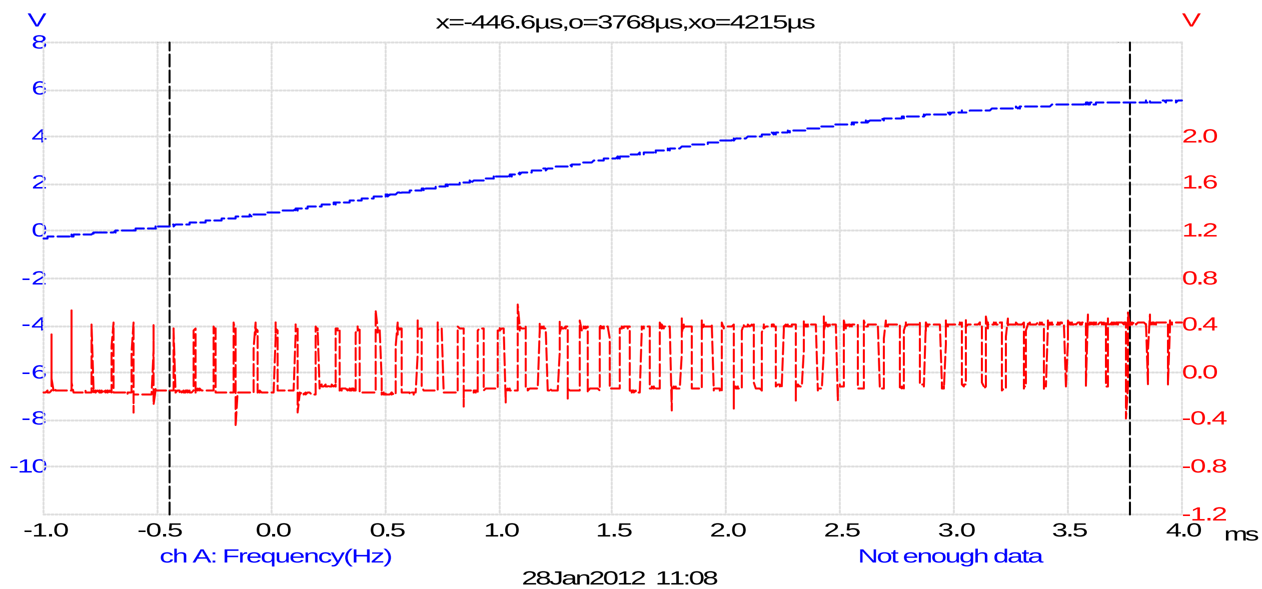

FIG-6. Applying pulses of various duration (top recording) on the EN/PWM input, made the HS-FBI delivering an output power accordingly

<u>Pulse Width Modulation (PWM);</u> The enable (EN) input was designed for disconnecting a load from the V pp (power supply). In reality, it manifests as applying power onto a load only during the enable time. Having a high-speed property, the EN input is useful for regulating an average load current by accepting an extremely long pulse to as short as a 400-nS pulse. Such flexibility allows controlling an average output current to be maintained with a high degree of accuracy.

Typical application

DC Motor Speed control with an over-current protection

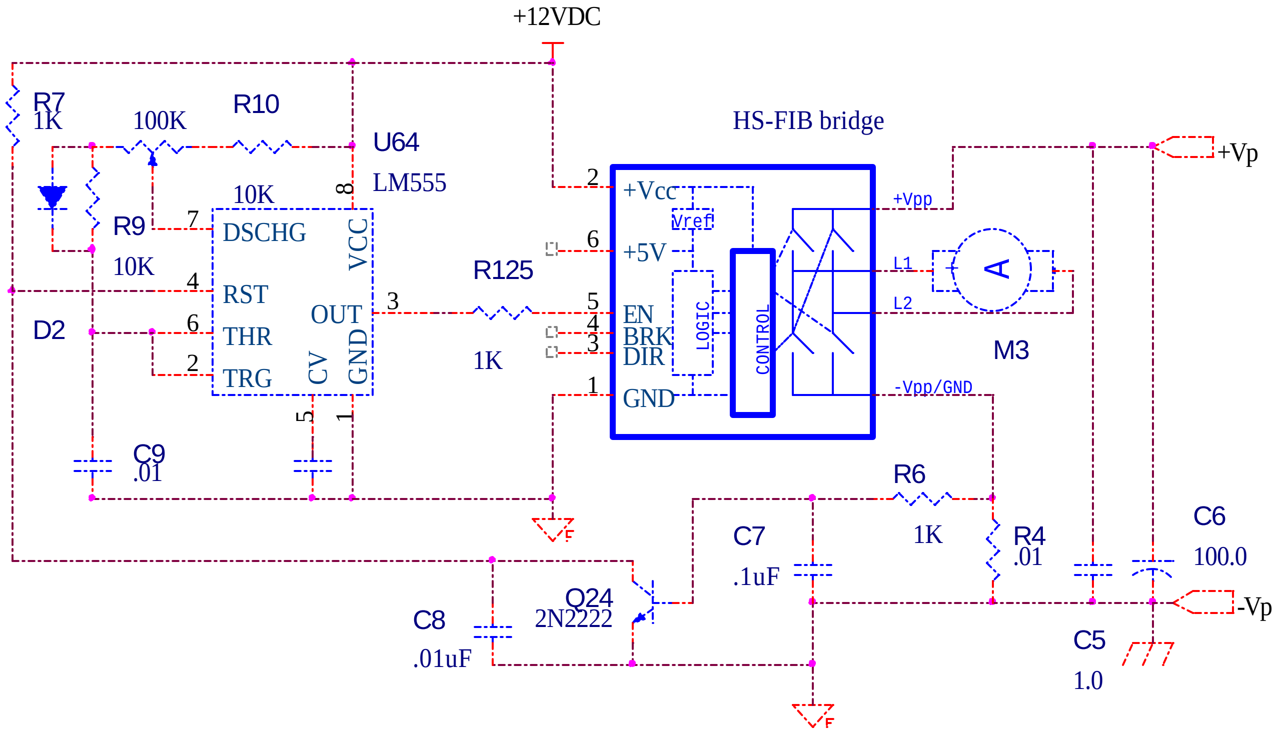

FIG-7 A simplified diagram of the HS-FI driver with overcorrect protection

DC brush motors are increasingly required for a broad range of applications including robotics, sporting equipment, portable electronics, appliances, medical devices, automotive applications, power tools and many others automotive fields. The motor itself is a preferred alternative because it is simple, reliable and low cost. Advanced and robust H-bridge driver is essential for components for controlling the motor's direction, speed, and braking. The EDR's HS-FBI drivers designed to do just that. With the addition of a few external components, the HS-FBI becomes a DC Motor controller for maintaining its precise speed and providing protection in a case of excessive current.

The above diagram demonstrates how to employ two controls. A speed control accomplished with an IC chip (LM555) with a few peripheral components. It generates a train of pulses of various widths for delivering power onto a load (DC Motor). A longer pulse width translates into a higher power on a load and that turns into a higher RPM. A pulse width and eventually the speed of the motor are controlled with a single 100K potentiometer.

A transistor Q24 controls the reset input of the LM555. When a voltage drops across the resistor R4 due to the current flows thru the load reaching the cut-in voltage, which is usually about 650mV for silicon NPN BJT, the transistor started conducting. Resulting, the voltage on the reset input, pin #4 drops and that in turns low voltage on the output pin #3. The pin #3 connected to the EN controls and low voltage on it disables the driver's output

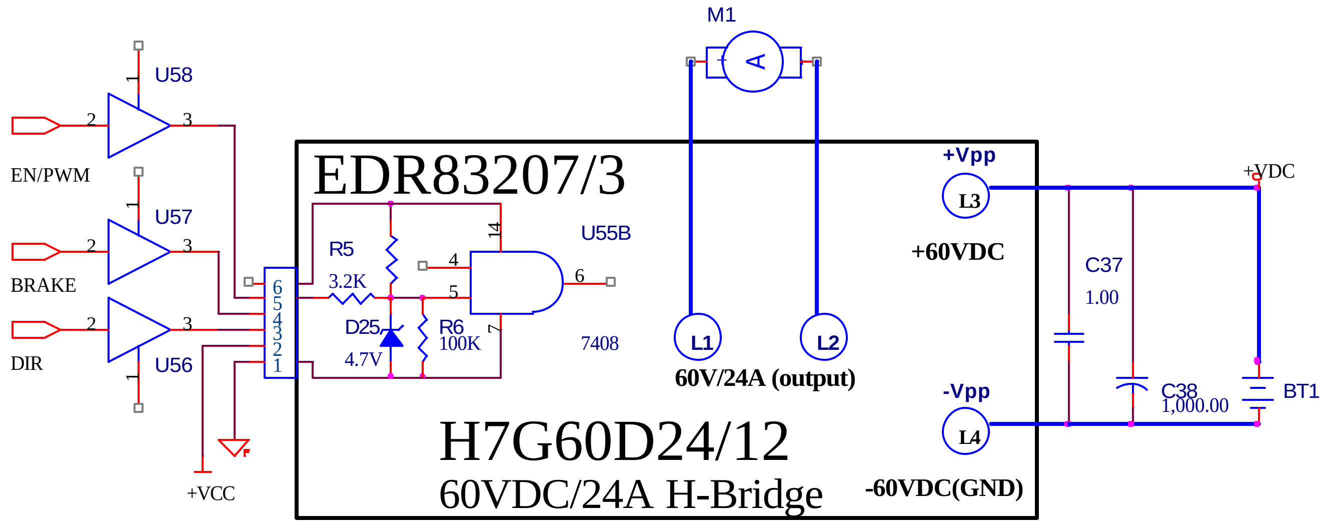

FIG-8. A typical connection of an external components to the HS-FBI driver

Family of HS-FBI drivers designed for extremely simple exploitation in mind and included minimum essential components for increasing its survivability. Three controlling inputs are a low power, high speed, and well protected against industrial environment voltage spikes. The best result obtained is when controls come from semiconductors. Many electromechanical devices can be use for controlling a driver and a simple de-bouncing circuitry recommended in such cases. Drivers designed to withstand pulsing current that is at least x10 above the rated current. From an example, P/N EDR83207 rated at 24-amperes and 240-amperes of pulsing current and more than 400-A of surge. Ability to withstand a high current surge is very useful during changing DC Motor's rotations and fast stopping. FIG-9 was prepared to demonstrate a current surge while a DC motor was stopping and rapidly accelerating rotation.

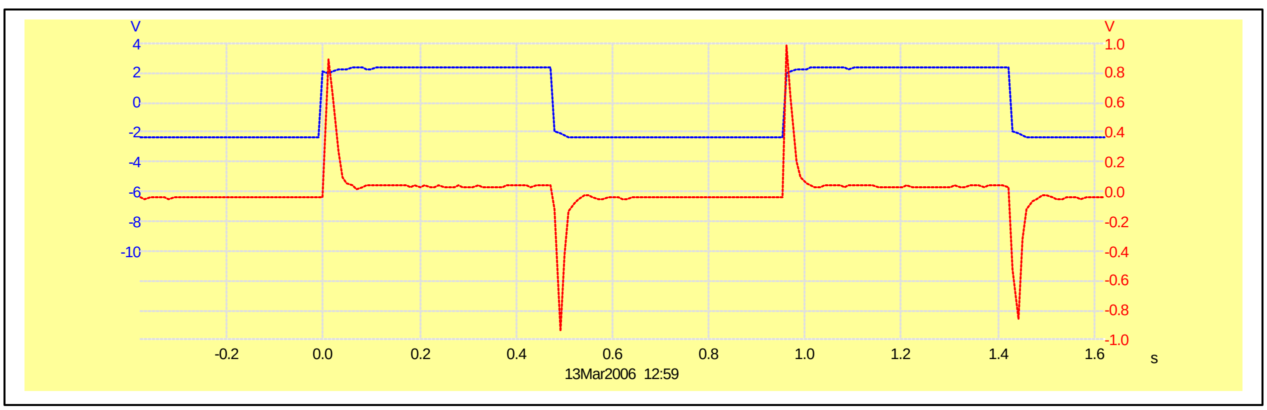

FIG-9. EDR's made H-drivers are capable of withstanding large current surges. The top recording is a voltage across DC Motor, and the bottom is a current flow through the motor. Polarity of applied voltage changed from -20V to +20V and back for creating CW and CCW rotations. At changing the polarity of applied voltage, a large current surge generated, which is combination of a brake and start-up currents.

HS-FBI drivers offer two controls for stopping DC Motor in a more orderly way thus reducing what could be generating a destructive current surge and potential structural damage. We recommend using the EN/OFF-BRAKE/ON sequence for stopping a motor and the DIR-BRAKE/OFF-EN/ON for changing a direction of its rotation. Surely, in a case of emergency the BRAKE could be applied.

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Technology for people's ideas

4.2 kW (rms) and 63 kW (pulse), Isolated, Full-Bridge Driver

H-driver module for DC motors, Solenoids, etc.

General Description:

The EDR83305 belongs to the family of Full Bridge Drivers designed for motion control applications, driving high-speed solenoids and thermo-cooling devices, piezo-transducers, etc. Utilizing advance processing technique and modern C3M™MOSFET power devices, drivers achieved an extremely low-ON resistance while switching at a high speed. EDR's made device provides designers with extremely efficient and reliable devices for use in wide industrial, space, avionics and defense applications.

EDR83305/c/cc or H7G900D5/Vcs/Vcc

Features:

- H-driver assembled in a panel mountable, aluminum die-casting box http://www.hammondmfg.com/pdf/1590P1.pdf
- TTL and CMOS compatible inputs
- Deliver up to 4.7-A rms at 25 °C and 3.2-A at 85 °C
- Pulsed current 70-A (PEAK)
- Five different modes (forward rotation, reverse rotation, PWM, disable, and hard brake)
- Low Rds (ON) typically, 0.14 Ohm per shoulder
- Wide range of Vpp (output) voltage, from 0V to 900V
- No problem with under-voltage and it can operate from 0-V to Vpp
- Input connector either screw-type terminals or a http://www.molex.com/pdm_docs/sd/901361206_sd.pdf
- Vcc (power supply) = from 7V to 18V
- Vcs (control signal) = TTL/CMOS compatible, 1mA
- Output terminals are M4 stand-offs (screws provided)

Applications for H-drivers:

- DC and Stepper Motor
- Bi-directional, high-speed solenoid
- Position and Velocity servomechanisms
- Factory and hobby robots
- Numerically controlled machinery
- Piezo-transducers / Doubling applied voltage
- Directly interfaced to a low power CPU
- In any application where a load (motor) and its power supply must be isolated from a control circuitry
- Low-noise (EMI) design allows it be located nearby to sensitive equipment
- It can be use for a precise and high-frequency PWM applications
- Push-Pull (bidirectional) control for electro-hydraulic valves
- **Thermoelectric cooler elements (TCE)**

FIG-10. H-Driver's top view

Pin Functions

Pin	Functional Description
+Vpp	**Supply voltage for a load**
L2	**Output terminal**
L1	**Output terminal**
–V pp/GND	**Supply voltage (return)**
+5VDC OUT	**A low power (less than 50mA) source**
EN/PWM	**it is normally high input via 10K pull-up resistor to +5VDC. It is a CMOS compatible, high-speed input and can be used for PWM.**
BRAKE	**brake input is normally low via 10K to the GND. Applying +5VDC enable both output transistors of low shoulders H-bridge to conduct simultaneously thus shorting a load.**
DIR	**it is normally high input via 10K pull-up resistor to +5VDC. It is a CMOS compatible, high-speed input.**
+Vcc	**Power Supply (12VDC or 5VDC) for the internal logic**
-Vcc/GND	**Return of the Vcc**

Absolute Maximum Ratings for EDR83305/2/3 or D7G900D5/5/12

	Parameter	Max.	Units
Vpp	Power Supply	900	V
Id @ Tc = 25 °C	Continuous Current (average)	4.7	A
Id @ Tc = 85 °C	Continuous Current (average)	3.2	A
I dm @ Tc = 25 °C	Maximum continues current / .1sec	20	A
Pd@ Tc = 25 °C	Power Dissipation at 4.7-A current @ 50 KHz	3.75	W
Pd@ Tc = 85 °C	Power Dissipation at 3.2-A current @ 50 KHz	2.8	W
Ids @Tc = 25 °C	Surge Current	70	A
Vcc	Power Supply to the internal logic	12	V
Topr	Operating temperature	-40 to 90	°C
Tstg	Storage Temperature	-55 to 135	°C

Electrical Characteristics @ Tj = 25 °C (unless otherwise specified), Vcc = 12V, Vpp=800V

	Parameters	Min.	Typ.	Max	Units	Conditions
	INPUT					
Vcc	Supply voltage	11	12	13	VDC	
Icc	Supply current, Vcc = 12V/10 KHz		40		mA	Up to 10 KHz
Icc	Supply current, Vcc = 12V/100 KHz		100		mA	Above 100 KHz
Vih	High level input voltage (EN)	3.2	5	7	V	Connected via 10K to +5VDC
Vil	Low level input voltage (EN)	0.9	1.0	1.2	V	
Vbrf	Brake control (BR) OFF	0	0	.5	V	Connected via 10K to GND
Vbron	Brake control (BR) ON	4.2	5	6	V	+5V ref. recommended
Vinl	Direction (DIR)			0.9		Low-level input voltage
Vinh	Direction (DIR)	3.15				High-level input voltage
Iinc	Input current to any control			1.0	mA	
	OUTPUT, Load is 300 Ohm					
Vpp	Supply	0	700	800	V	
Icc	Output Disable			2	μA	
Rds	Output Total resistance	0.16	0.17	0.18	Ohm	Either directions, CW & CCW
Ill	Output leakage current		1	100.0	μA	Vpp=900V
T r-slope	Rising slope		10		ns	
Tplh	Propagation delay turn-on time		300	310	ns	
Tphl	Propagation delay turn-off time		300	345	ns	
Trev	Propagation delay, phase reverse			40	ns	
Tdtm	"Dead" time		1500		ns	Can be set at 100nS and higher
P	Pulse width (minimum)			600	ns	Load resistive
F	Maximum switching frequency			250	KHz	Load resistive

PIN FUNCTIONS (refer to the block diagram)

PIN #	NAME	FUNCTION
10	-Vpp	Power Supply Return for the Output Stage (Vpp) ground
9	L1	Output L1 of the Bridge, the current flows through the load connected between and the second output L2.
8	L2	Output L1 of the Bridge, the current flows through the load connected between and the second output L2.
7	+Vpp	Supply Voltage for the Power Output Stage. A non-inductive <1.0mF capacitor must be connected between this pin and –Vpp/GND
6	+5VDC	+5Vref out., 20mA max
5	EN	CMOS/TTL Compatible input of the bridge, to enable/disable outputs and turn the driver in a stand-by state
4	BRAKE	CMOS/TTL Compatible input of shorting the load
3	DIR	CMOS/TTL Compatible input of the bridge, to set a direction of rotation
2	+Vcc	Supply Voltage for the internal Logic.
1	GND	Return of the Vcc.

Absolute Maximum Ratings for EDR83307/2/3 or D7G900D10/5/12

	Parameter	Max.	Units
Vpp	Power Supply	900	V
Id @ Tc = 25 ^{o}C	Continuous Current (average)	9.2	A
Id @ Tc = 85 ^{o}C	Continuous Current (average)	6.1	A
I dm @ Tc = 25 ^{o}C	Maximum continues current / .1sec	40	A
Pd@ Tc = 25 ^{o}C	Power Dissipation at 9.2-A current @ 50 KHz	3.9	W
Pd@ Tc = 85 ^{o}C	Power Dissipation at 6.1-A current @ 50 KHz	3.0	W
Ids @Tc = 25 ^{o}C	Surge Current	120	A
Vcc	Power Supply to the internal logic	12	V
Topr	Operating temperature	-40 to 90	^{o}C
Tstg	Storage Temperature	-55 to 135	^{o}C

Electrical Characteristics @ Tj = 25 ^{o}C (unless otherwise specified), Vcc = 12V, Vpp=800V

	Parameters	Min.	Typ.	Max	Units	Conditions
	INPUT					
Vcc	Supply voltage	11	12	13	VDC	
Icc	Supply current , Vcc = 12V/ 10 KHz		50		mA	Up to 10 KHz
Icc	Supply current, Vcc = 12V/100 KHz		140		mA	Higher than 100 KHz
Vih	High level input voltage (EN)	3.2	5	7	V	Connected via 10K to +5VDC
Vil	Low level input voltage (EN)	0.9	1.0	1.2	V	
Vbrf	Brake control (BR) OFF	0	0	.5	V	Connected via 10K to GND
Vbron	Brake control (BR) ON	4.2	5	6	V	+5V ref. recommended
Vinl	Direction (DIR)			0.9		Low-level input voltage
Vinh	Direction (DIR)	3.15				High-level input voltage
Iinc	Input current to any control			1.0	mA	
	OUTPUT, Load is 300 Ohm					
Vpp	Supply	0	700	800	V	
Icc	Output Disable			2	µA	
Rds	Output Total resistance	0.08	0.085	0.09	Ohm	Either directions, CW & CCW
Ill	Output leakage current		1	100.0	µA	Vpp=900V
T r-slope	Rising slope		10		ns	
Tplh	Propagation delay turn-on time		300	310	ns	
Tphl	Propagation delay turn-off time		300	345	ns	
Trev	Propagation delay, phase reverse			40	ns	
Tdtm	"Dead" time		1500		ns	Can be set as low as 100 nS
P	Pulse width (minimum)			600	ns	Load resistive
F	Maximum switching frequency			200	KHz	Load resistive

PIN FUNCTIONS (refer to the block diagram)

PIN #	NAME	FUNCTION
10	-Vpp	Power Supply Return for the Output Stage (Vpp) ground
9	L1	Output L1 of the Bridge, the current flows through the load connected between and the second output L2.
8	L2	Output L1 of the Bridge, the current flows through the load connected between and the second output L2.
7	+Vpp	Supply Voltage for the Power Output Stage. A non-inductive <1.0mF capacitor must be connected between this pin and –Vpp/GND
6	+5VDC	+5Vref out., 20mA max
5	EN	CMOS/TTL Compatible input of the bridge, to enable/disable outputs and turn the driver in a stand-by state
4	BRAKE	CMOS/TTL Compatible input of shorting the load
3	DIR	CMOS/TTL Compatible input of the bridge, to set a direction of rotation
2	+Vcc	Supply Voltage for the internal Logic.
1	GND	Return of the Vcc.

EDR83305 (H7G900D5) delivers a highly precision output power (pulse)

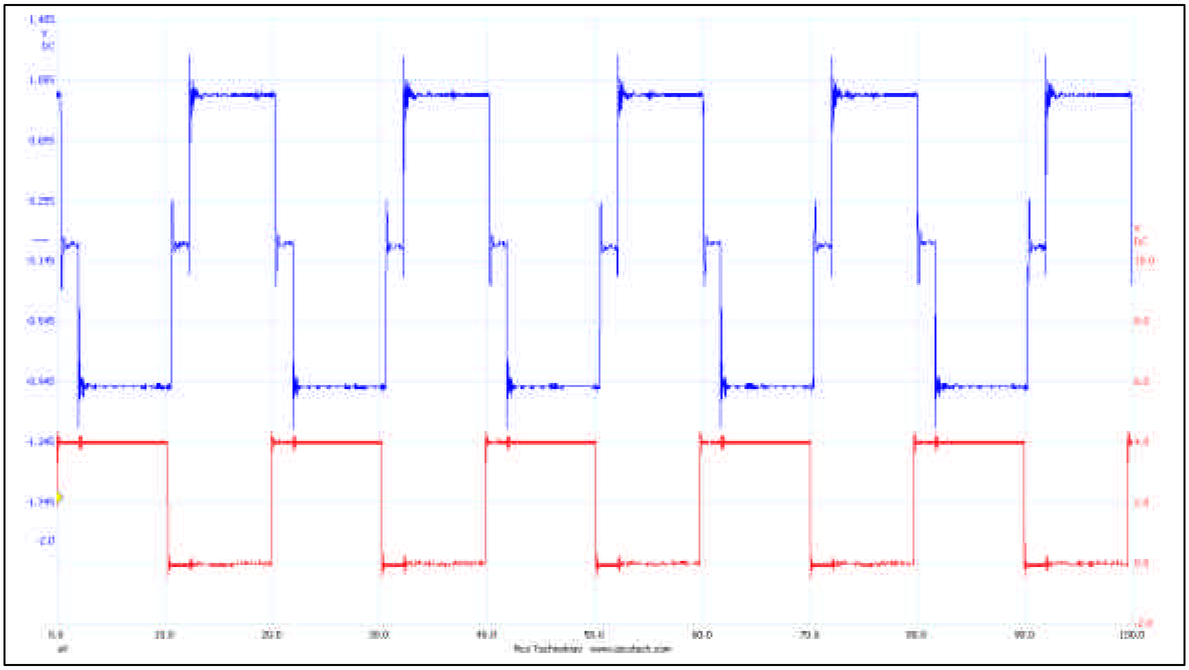

FIG-11
Applied signal is 50KH, Vpp = 100V, Load = 25 Ohm

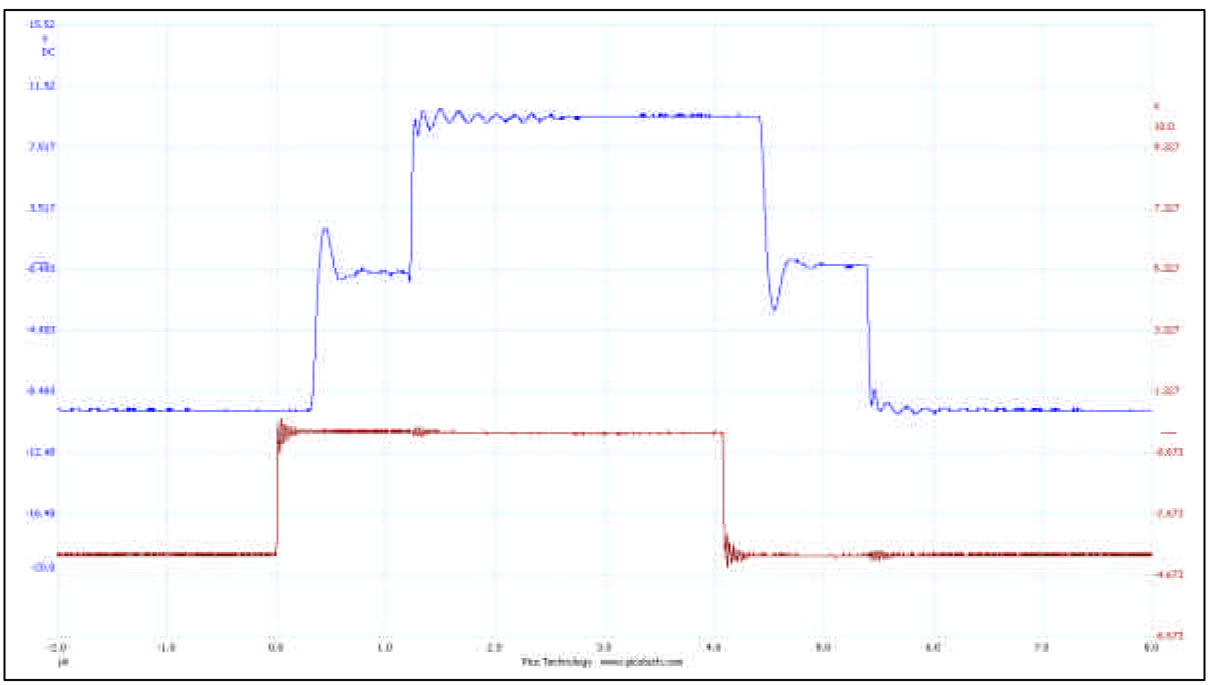

FIG-12
A similar to recording shown on FIG-11 accept, an applied frequency was 125 KHz

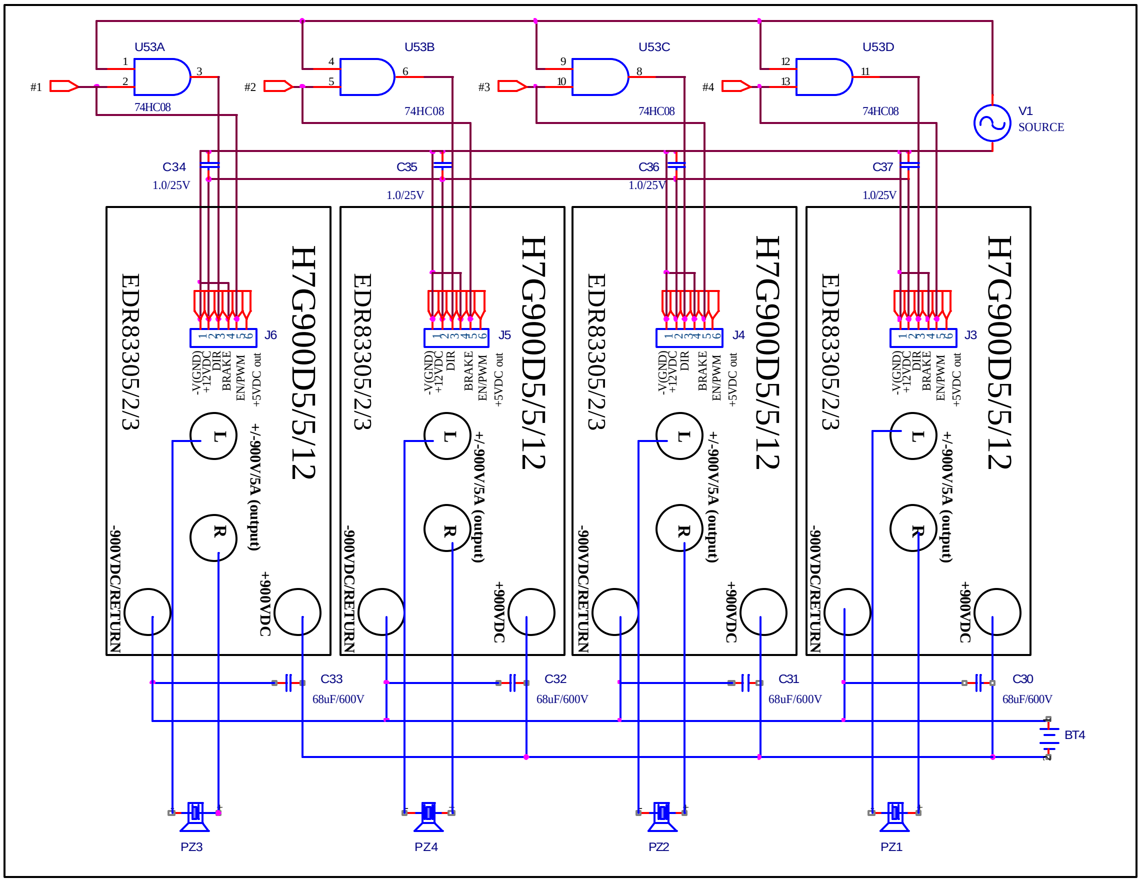

FIG-13

All controls, such as DIR, ENBLE and BRAKE were built for high-speed (frequency) operations. Depending on an application, the DIR control can be use for selecting clockwise or counterclockwise rotations while driving a DC motor, it is also can be use for a doubling an output voltage. A hooking-up, as it shown on FIG-13, doubles of an applied voltage, or V out = 2 x Vpp.

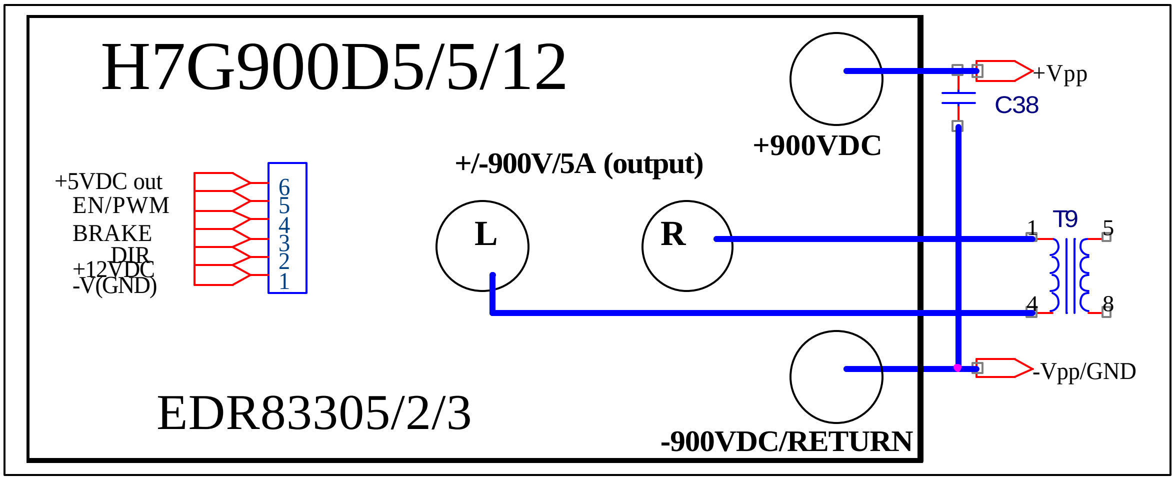

FIG-14

An H-driver can be used as DC/AC or DC/DC high-power converters by driving a transformer.

Mechanical Dimensions of the H7G-package (in inches)

Input connector is http://www.molex.com/pdm_docs/sd/901361206_sd.pdf
All power terminals are M4

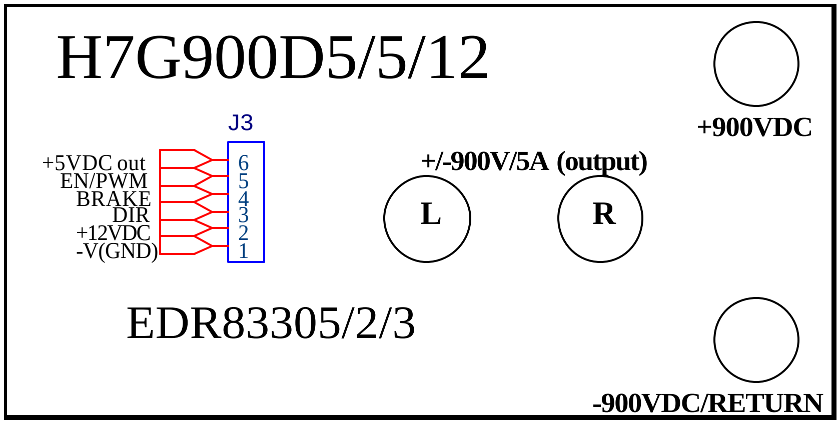

Figure 13

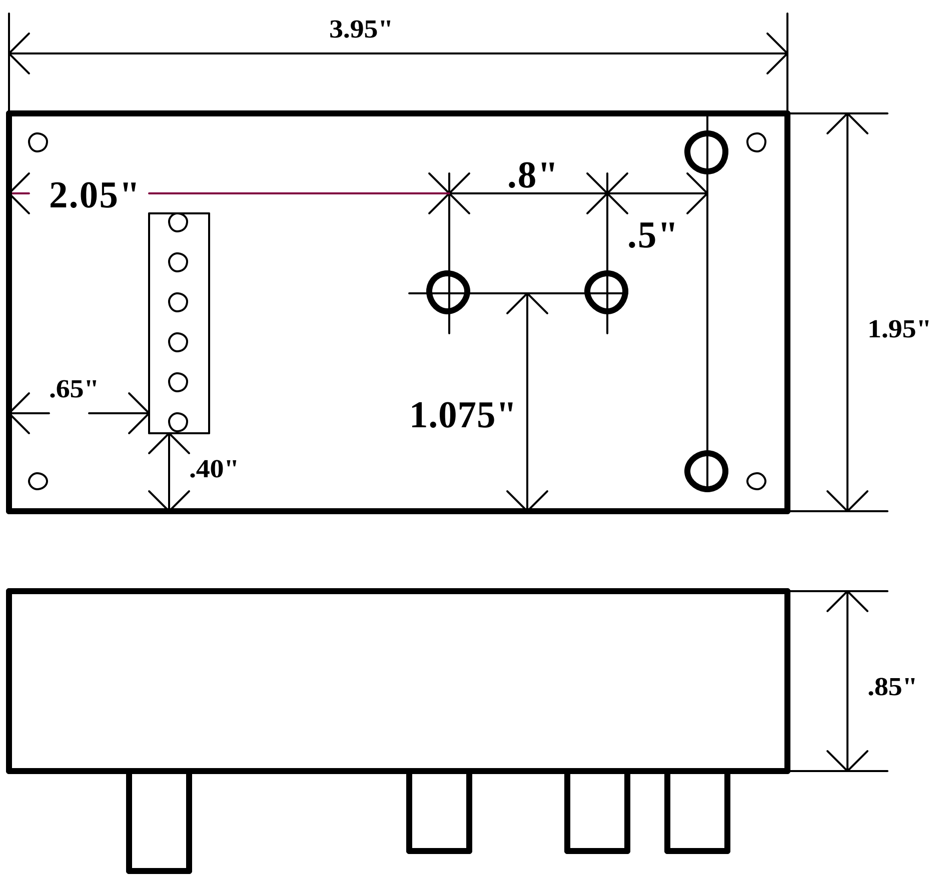

Figure 14

Third generation of all-voltage full-bridge (H-bridge) drivers

Listed below model numbers were assembled in a “7” – size enclosure for a panel mounting.

Model Number	V min to V max	Id (A) cont.	I dm	p/n
H7G24D22/v/x	0 – 24 VDC	22 A	250	EDR83200/I/E
H7G24D42/v/x	0 – 24 VDC	42 A	500	EDR83201/I/E
H7G30D26/v/x	0 – 30 VDC	26 A	300	EDR83012/I/E
H7G30D14/v/x	0 – 30 VDC	14 A	180	EDR83009/I/E
H7G40D16/v/x	0 – 40 VDC	16 A	200	EDR83202/I/E
H7G40D28/v/x	0 – 40 VDC	28A	290	EDR83204/I/E
H7G55D18/v/x	0 – 55 VDC	18A	200	EDR83205/I/E
H7G55D24/v/x	0 – 55 VDC	24A	280	EDR83206/I/E
H7G60D5/v/x	0 – 60 VDC	5 A	50	EDR82985/I/E
H7G60D9/v/x	0 – 60 VDC	8.5 A	90	EDR82998/I/E
H7G60D24/v/x	0 – 60 VDC	24 A	240	EDR83207/I/E
H7G60D40/v/x	0 – 60 VDC	40 A	440	EDR83221/I/E
H7G60D70/v/x	0 – 60VDC	70 A	500	EDR83304/I/E
H7G75D15/v/x	0 – 75 VDC	15 A	170	EDR83208/I/E
H7G75D22/v/x	0 – 75 VDC	22 A	250	EDR83209/I/E
H7G75D30/v/x	0 – 75 VDC	30 A	350	EDR83215/I/E
H7G100D10/v/x	0 – 100 VDC	10 A	140	EDR83210/I/E
H7G100D17/v/x	0 – 100 VDC	17 A	210	EDR83211/I/E
H7G100D30/v/x	0 – 100 VDC	30 A	350	EDR83212/I/E
H7G150D10/v/x	0 – 150 VDC	10 A	120	EDR83216/I/E
H7G150D13/v/x	0 – 150 VDC	13 A	150	EDR83217/I/E
H7G150D24/v/x	0 – 150 VDC	25 A	280	EDR83218/I/E
H7G150D24/v/x	0 – 150 VDC	24 A	300	EDR83219/I/E
H7G500D2/v/x	0 – 500 VDC	2 A	12	EDR83222/I/E
H7G600D2/v/x	0 – 600 VDC	2 A	12	EDR83223/I/E
H7G650D3/v/x	0 -- 650 VDC	3.2 A	20	EDR83306/I/E
H7G800D2/v/x	0 – 800 VDC	2 A	10	EDR83224/I/E
H7G900D07/v/x	0 – 900 VDC	.7A	7	EDR83225/I/E
H7G900D5/v/x	0 – 900 VDC	4.7 A	30	EDR83305/I/E
H7G900D10//v/x	0 -- 900VDC	9.3 A	60	EDR83307/I/E
H7G122D03/v/x	0 – 1200 VDC	.3 A	4	EDR83226/I/E

Above are just sample of drivers that were assembled in H7G-package. There are hundreds of additional drivers with a various voltage/current ratings available in the same package. All drivers are built with the same control circuitry and the difference is only in the type of output transistors (powerful MOSFETs). Do not hesitate to ask for a 30VDC/1A driver if you would need such that brings some saving due to the transistors used for assembling 30VDC/1A driver costs less than for a 30VDC/26A driver.

Our standard, off-shelf drivers offered with two standard Vcc = 5VDC and 12VDC. Please do not hesitate asking for other Vcc. In many cases, it would not add to the basic cost. The same applied for Vcs (control signals).

Selection and Ordering Instruction for EDR's made Solid State Modules such as Relays, Switches, Breakers, ½ and H-bridge Drivers, etc.

Notes: During past ten years rapid development of new and additional [products gave us no choice but to expend, modify and unify part descriptions. Below represent the third modification. Our modules description will be marked according to the specifications below but p/n EDRxxxxx will sta y the same for already items in circulation (already sold).

Part description: *H 3 L 200 D 10 /5 /12*

X	A	B	C	F	H	/E	/I
H-Driver	size =	Speed "L" = low	Voltage = 200V	Current = DC	Current = 10A	CS=5V	Vcc=12V

"X" module type

D	Solid-State Relay or Switch with output terminals: SPST-NO (normally open)
R	Solid-State Relay or Switch with output terminals: SPST-NC (normally closed)
W	Solid-State Relay or Switch with output terminals: DPST
T	Driver, such as ½-bridge or a SPDT relay which can work as a ½ driver
M	Driver, such as a switch with built-in PWM controller
H	Full-bridge (H-bridge) Driver
C	Relay with built-in de-bouncing or a turn-on/off delay
B	Solid State Breaker and brakes control modules

"A" package dimensions

1	0.615"H x 1.48"L x 0.290"W
2	1.75"H x 1.80"L x 0.595"W
3	1.125"H x 1.75"L x 0.8"W
4	1.15"H x 2.0"L x 0.92"W
5	1.15"H x 2.8"L x 1.15"W
6	DIP24, 0.375"H x 0.925"L x 0.53"W
7	panel mount, .82"H x 3.95"L x 1.96"W
8	.575"H x 1.1"L x .2"W
9	panel mount 3"H x 10"L x 8"W
0	DIN type enclosure, 2.36"H x 2.36"L x 1.5"W, for 35mm DIN Rail
P	panel mount, .8"H x 2.275" L x 1.75"W
R	panel mount, 1.82"H x 6.0"L x 3.3"W

"B" Speed - A device's ability to turn ON/OFF output terminal(s) times per second

L	a low speed relay/switch, rated DC - 200 Hz, direct driving control
A	a low speed relay/switch, AC input relays
N	a medium speed relay/switch, rated DC - 25 KHz, direct driving control
G	a medium speed relay/switch, rated DC - 25 KHz, low current control and power
F	a fast relay/switch, rated up to DC - 350 KHz, low current control and power
S	a super-fast relay/switch, rated DC - 1.4 MHz, low current control and power
U	a super-fast relay/switch, rated DC – 1.2 MHz, direct driving control
V	Fast, High Voltage Solid-State Switches with Nanoseconds rise time

"C" Output Voltage - a maximum allowed voltage between output terminals, up to 100kV

It must be replaced with required voltage and we offer the closest and highest value available.
Note: In an "AC"-relay a voltage specified a peak-to-peak maximum voltage and the maximum VAC could be calculated by multiplying, a maximum allowed voltage by factor of 0.7

"F" A relay can be use to control either AC, DC or AC/DC power

A	- a relay/switch designed to switch/chop an AC/DC power
D	- a relay/switch designed to switch/chop a DC power
"none"	- relay with a SCR or TRIAC on the output to control only AC power

"H" A maximum allowed RMS CURRENT (Ampere) without a heat sink

We can manufacture a device for any required current.

"I" Some of our products use an internal DC/DC converter no provide a power to the internal electronics. Varieties voltages are available: 5VDC+/-5%, 12VDC+/-5%, 24VDC+/-5% and 48VDC+/-5%. For a wider input power voltage swing, please add "W" after the voltage. For an example, 24W is for 24V +/-12V.

"E" We offer several standard control voltages 5VDC, 12VDC, 24VDC, 48VDC, 3-20VDC and 18-38VDC. Please specify the input control voltage, as for example D1L30D12/xx. Replace xx with a 3, 5, 12, 24, 48, 3-20 and 18-38 that is for 3VDC, 5VDC, 12VDC, 24VDC, 48VDC, 3-20VDC and 18-38VDC. Respectful control voltage represented at the end of part number in the following way, for an example EDR82653/1 and EDR82653/8. Both relays are almost the same and difference is only an applied control voltage, "1" if for 3VDC and "8" is for 18-38VDC;

Control Voltage	Representation	Control Voltage	Representation	Control Voltage	Representation
3VDC	1	5VDC	2	12VDC	3
24VDC	4	48VDC	5	26VDC	6
3-20VDC	7	18-38VDC	8	90-120VAC	9
74VDC	10				

"Z" A relay/switch built with following standard isolations

"L" or "none"	type relay is 2500 V
"N"	type relay is 3000V, 4000VDC ("H4") and 5200 ("H5") VDC.

"T" Turn-on delays; "S" for seconds, "M" for milliseconds, "U" for microseconds, M102 – 100 mS turn-off delay, 102M mS – turn-on delay