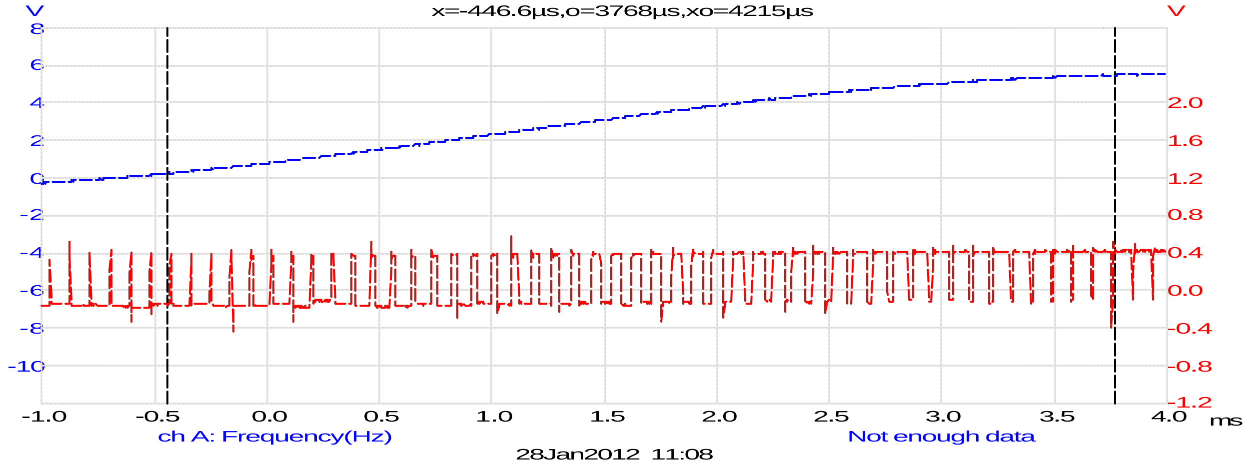
A third generation of

Isolated, Bidirectional with a break control Full Bridge Drivers

Rated from 24-VDC to 1,200-VDC

Brushed DC Motors, Bipolar Permanent Magnet Stepping Motors, Solenoids, Thermoelectric Cooler Elements, etc.

Qualified of delivering kilowatts of power in 400nS-pulses for an ultra-precision PWM control



Electronic Design & Research Inc

Under management

VS Holding LLC

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½ Bridge drivers
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H-bridge or Full-bridge Drivers
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Charge-Pump Wide-Band FM detectors
Low-Noise, High-Voltage DC/DC converters
DC-3phase AC resonance mode driver for EV
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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 Trout Relays and Switches, (SPST)
Power-distributing module for Motorcycles, US Patent
Single Pole, Double Trout Relays and Switches, (SPDT)
Double Pole, Single Trout 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**

We are working hard bringing new devices to the market to meet you 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. An inventory of available products exceed of several thousands. We keep a small number of popular devices in stock and ready to ship them at once. Our production capacities exceed 10,000 devices per months when two production robots programmed and working at a full speed.

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Thank you,

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

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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.

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 frequency is up to 500-KHz and a pulse width as short as 400-nS makes HS-FBI drivers capable of perform finest and highly precision power management tasks. There is 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.

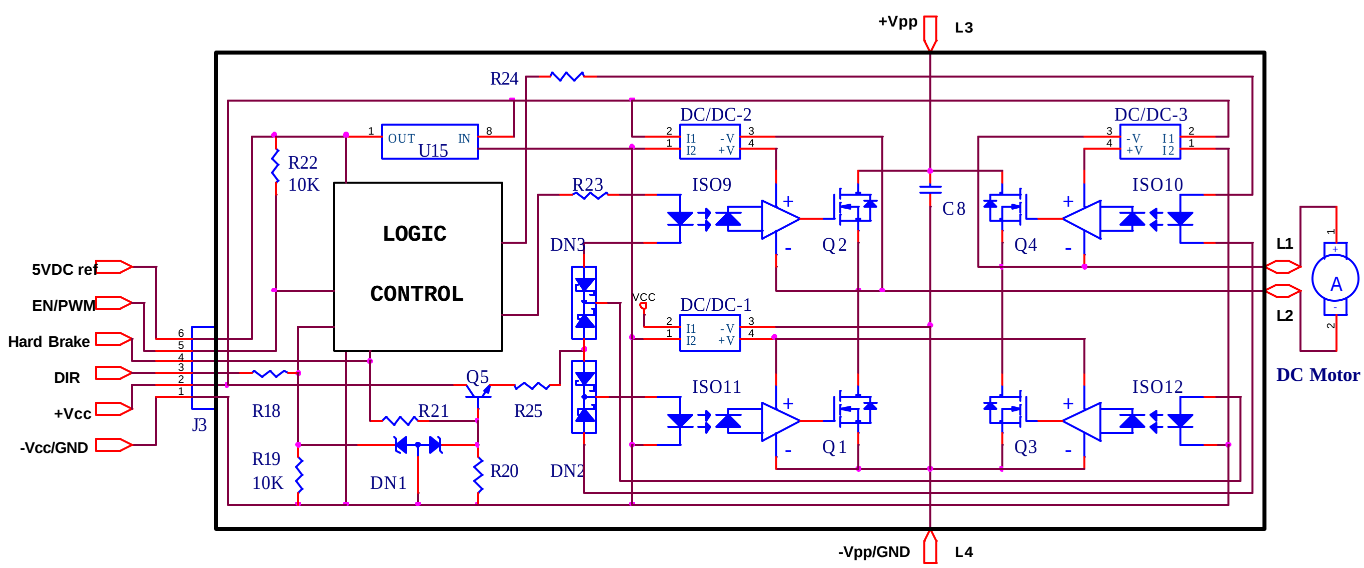

FIG-1. A simplified diagram of the HS-FBI driver

Introduction

A family of opt-isolated HS-FBI drivers designed for a motion control applications though they can be use 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, drivers were achieving 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 a high pulsing current 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 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

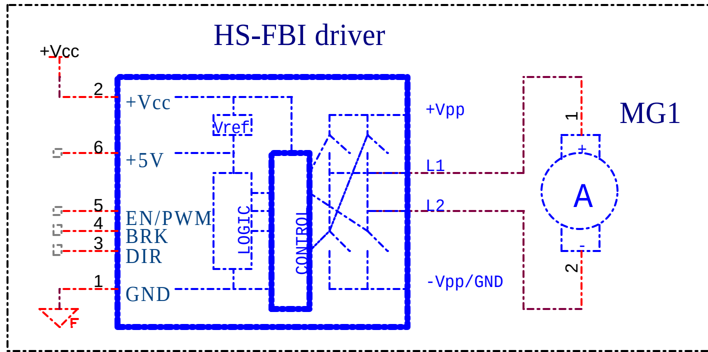

FIG-2. The HS-FBI driver

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 management 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 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 options.

NOTE: In general, the brake control can be applied at any time, though we recommend a prior 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 experimental trail will provide the best result.

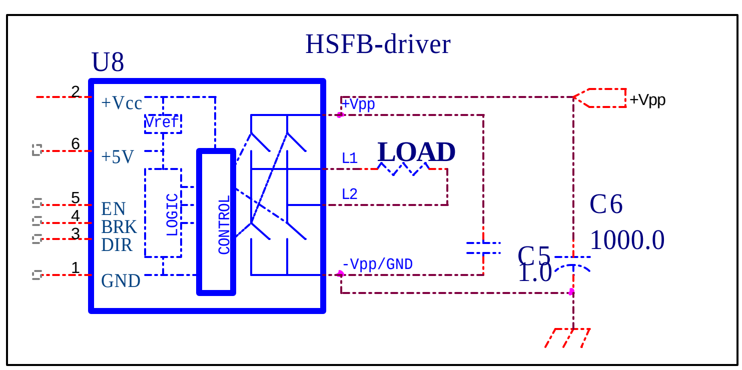

FIG-3. Capacitors C6 & C5 to "clean-up" the Vpp

Functions and Basic Operation

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 ready to perform various jobs just with a few external components for controlling the start/stop and directions of rotation. External components would expend 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).

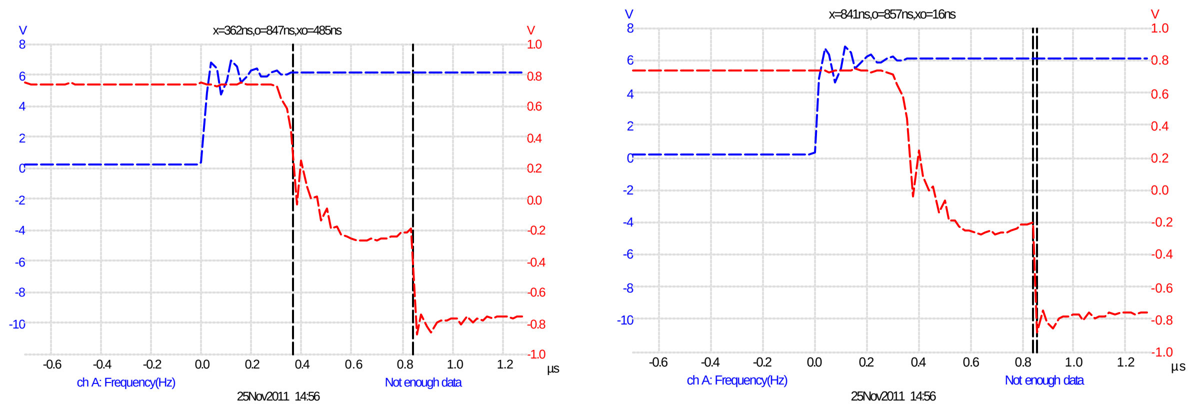

FIG-4. The highest alternated frequency limited in part by the duration of "dead" time. As it shown on recording the 'dead" time is equal to 485-nS. For a high-performance switch, 485-nS long "dead" time is excessive, and it was made just for a demonstration. It's usually set to 200-nS. It is a very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

Clock-wise (CW) and Counter clock-wise (CCW) rotations: 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.
Free continue rotation: As mentioned above, an applied power to a load (DC motor) can be interrupted and resumed at any time. That's 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 wrong direction, just re-connecting wires on the motor or output terminals (L1 and L2).

Braking (stop): 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 remained 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

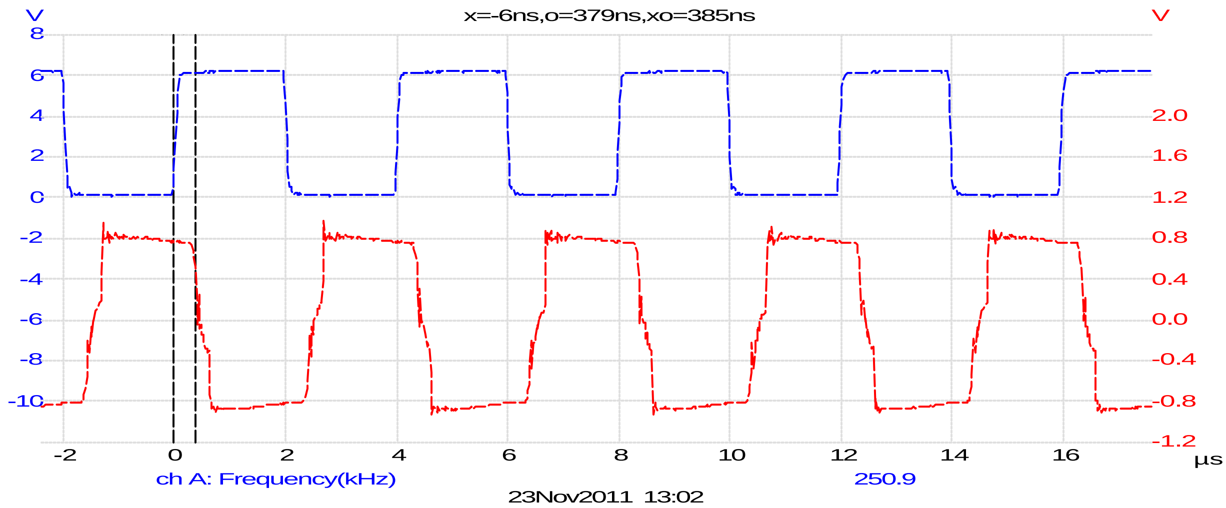

FIG-5. The top is a control signal and below is waveforms on a load at 250.9 KHz. With 80V voltage applied, the voltage on a load is 160V p-p. A control voltage scale is 1:1; the output scale is 1:100.

Driving a load with alternative power: The direction (DIR) input designed for changing current flow thru a load thus direction of DC Motor rotations, which performed not so frequently. Driving a high-speed solenoid for sure expends somewhat usefulness of the DIR input, but there is more. The DIR is a high-speed (frequency) input that allows "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.

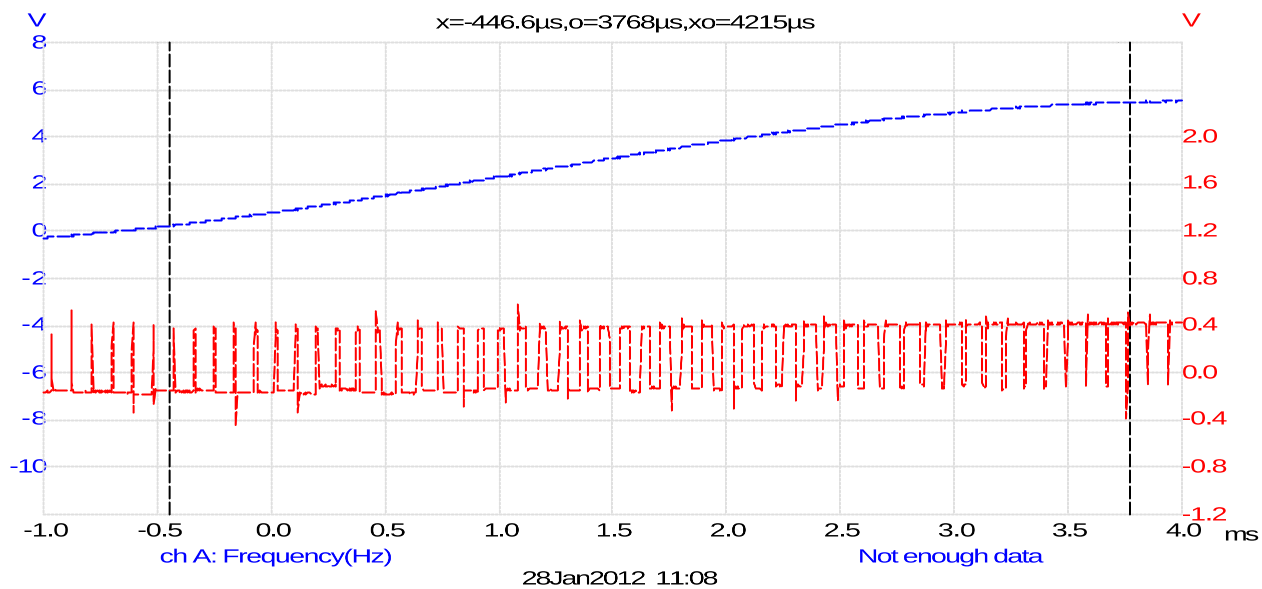

FIG-6. Applying pulses of various duration (top recording) on the EN/PWM input, made the HS-FBI delivering an output power accordingly

Pulse Width Modulation (PWM): The enable (EN) input was designed for disconnecting a load from the V pp (power supply). In reality, it manifests as applying a 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

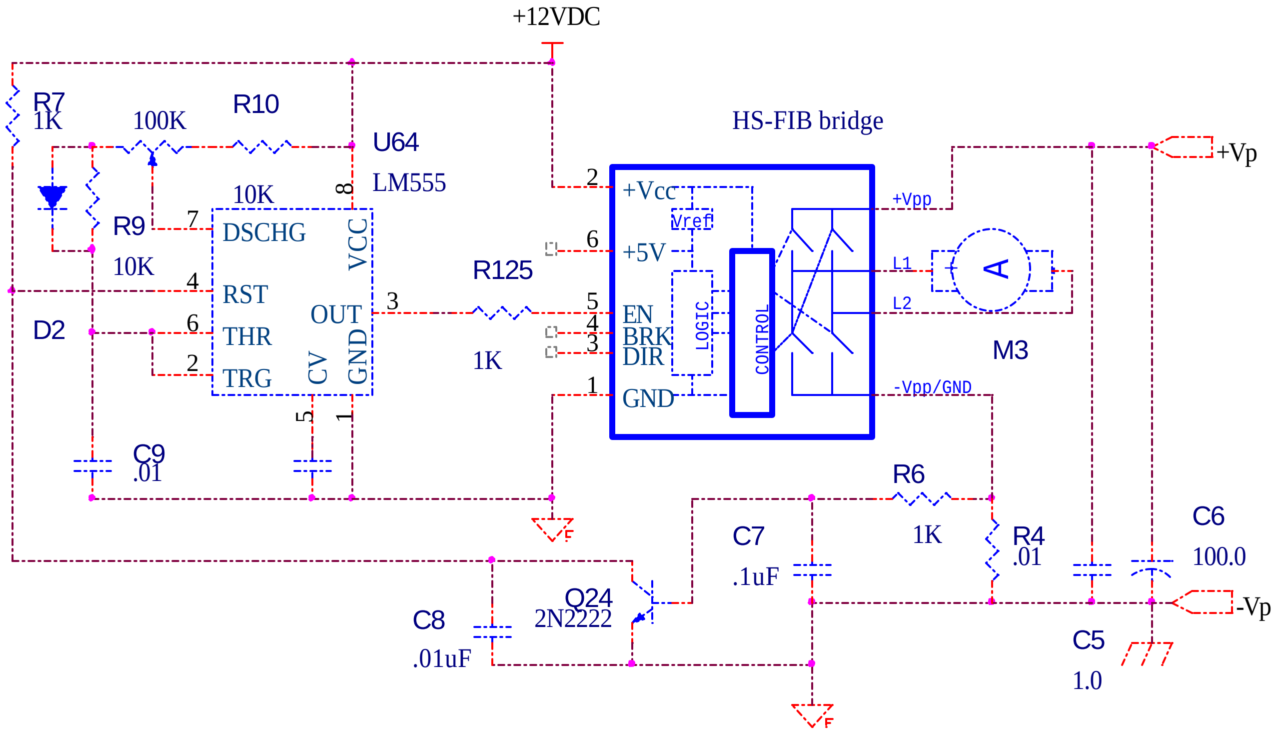

FIG-7. A simplified diagram of the HS-FI driver with overcorrect protection

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 accentual 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 protecting in a case of excessive current.

The above diagram shows employing 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 in 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 reached 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

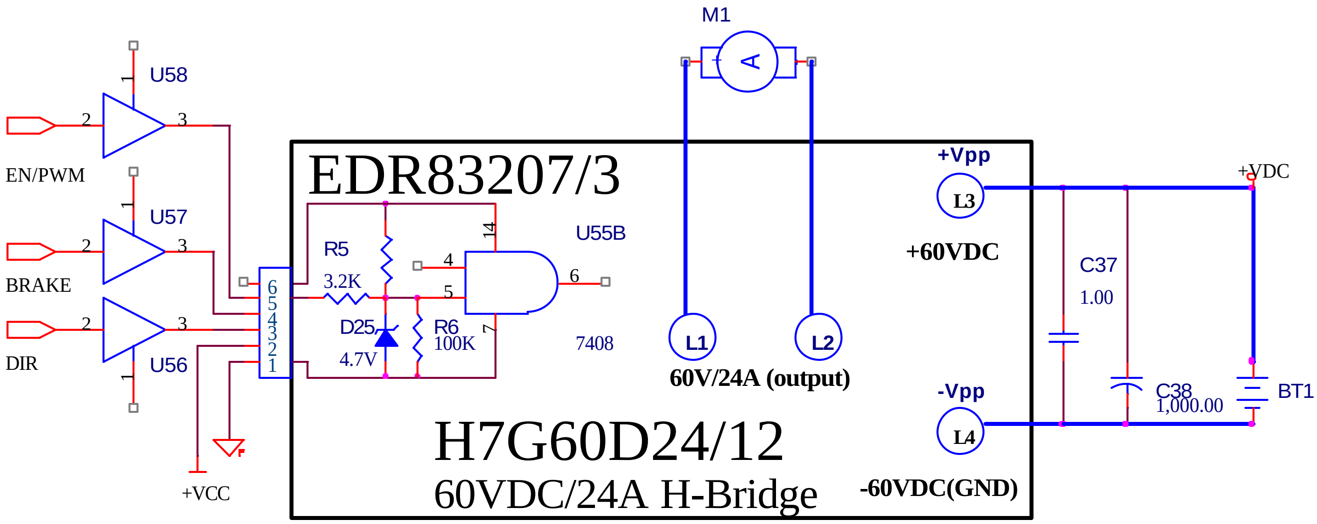

FIG-8. A typical connection of an external components to the HS-FBI driver

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 spicks. The best result obtained 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. The FIG-9 was prepared to demonstrate a current surge while a DC motor was stopping and rapidly accelerating rotation.

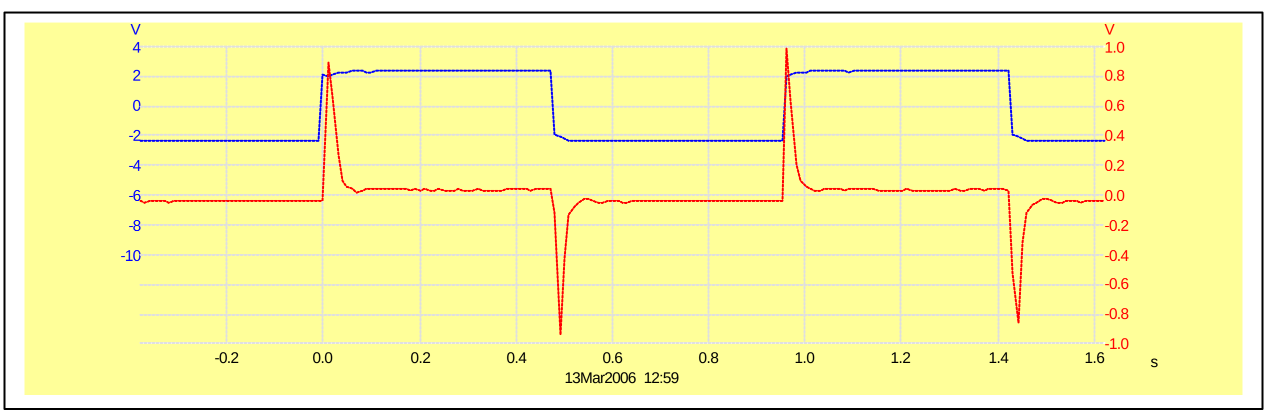

FIG-9. EDR's made H-drivers are capable of withstanding large current surges. The top recording is a voltage across DC Motor, and the bottom is a current flow through the motor. Polarity of applied voltage changed from -20V to +20V and back for creating CW and CCW rotations. At changing the polarity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

http://www.vsholding.com

Technology for people's ideas

1.4 kW, Isolated, Full-Bridge Driver (H-Switch)

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

General Description:

The EDR83207/3 belongs to the family of third generations of isolated Full Bridge Drivers designed for motion control applications, driving high-speed solenoids and thermo-cooling devices, etc. Utilizing advance processing technique and modern MOSFET power devices, the driver achieved extremely low-ON resistance while switching at a high speed. EDR's made device provides the designer with an extremely efficient and reliable device for use in a wide industrial, space, avionics and defense applications.

EDR83207/3 or H7G60D24/12

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 24A rms at 25 °C and 18 A at 85 °C
- Pulsed current 220A (PEAK), internal clamp diodes
- Five different modes (forward rotation, reverse rotation, PWM, disable, and hard brake)
- Low Rds (ON) typically, 0.002 Ohm per shoulder
- Wide range of Vpp (output) voltage, from 0V to 60V
- No problem with under-voltage and it can operate from 0-V to Vpp
- Input connector is

Applications:

- DC and Stepper Motor
- Bi-directional, high-speed solenoid
- Position and Velocity servomechanisms
- Factory and hobby robots
- Numerically controlled machinery
- Computer printers and plotters
- Directly interfaced to a low power CPU
- In any application where a load (motor) and its power supply must be isolated form a control circuitry
- Low-noise design allows it be located near 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)**

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 and power converging
-Vcc/GND	Return of the Vcc

Absolute Maximum Ratings for EDR83207/3 or D7G60D24/12

	Parameter	Max.	Units
Vpp	Power Supply for a DC Motor	60	V
Id @ Tc = 25 ^{o}C	Continuous Current (average)	24	A
Id @ Tc = 85 ^{o}C	Continuous Current (average)	18	A
Idm	Pulsed (PEAK) current, 0.1mS	240	A
Pd@ Tc = 25 ^{o}C	Power Dissipation at 24A current	1.1	W
Pd@ Tc = 85 ^{o}C	Power Dissipation at 12 A current	0.6	W
Ids @Tc = 25 ^{o}C	Surge Current	400	A
Vcc	Power Supply to the internal logic	13	V
Topr	Operating temperature	-40 to 85	^{o}C
Tstg	Storage Temperature	-55 to 135	^{o}C

Electrical Characteristics @ Tj = 25 ^{o}C (unless otherwise specified), V cc = 12V, V pp=56V

	Parameters	Min.	Typ.	Max	Units	Conditions
	INPUT					
Vcc	Supply voltage	11	12	13	V	
Icc	Supply current @ Vcc = 12V		40		mA	
Vih	High level input voltage (EN)	4.5	5	12	V	At corresponded Vcc
Vil	Low level input voltage (EN)	0.9	1.0	1.2	V	At corresponded Vcc
Vbrf	Brake control (BR) OFF	0	0	.5	V	
Vbron	Brake control (BR) ON	4.2	5	6	V	
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 50 Ohm					
Vpp	Supply to the motor	0	40	56	V	
Icc	Output Disable			2	μA	
Rds	Output Total resistance	0.0018	0.0026	0.003	Ohm	Either directions, CW & CCW
Ill	Output leakage current			2.0	μA	Vpp=55V
Tplh	Propagation delay turn-on time		400	420	nS	
Tphl	Propagation delay turn-off time		130	140	nS	
Trev	Propagation delay, phase reverse			1.8	nS	
Tdtm	“Dead” time		200		nS	
P	Pulse width (minimum)			400	nS	Load resistive
F	Maximum switching frequency			300	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 .1mF capacitor must be connected between this pin and –Vpp/GND
6	+5VDC	+5Vref out.
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.

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

Listed below model numbers assembled in a "7" – size enclosure for a panel mounting.

Model Number	**V min to V max**	**Id (A) cont.**	**I dm**	**p/n**
H7G24D42/E	0 – 24 VDC	42 A	500	EDR83014/I/E
H7G30D26/E	0 – 30 VDC	26 A	300	EDR83012/I/E
H7G30D14/E	0 – 30 VDC	14 A	180	EDR83009/I/E
H7G40D16/E	0 – 40 VDC	16 A	200	EDR82997/I/E
H7G40D28/E	0 – 40 VDC	28A	290	EDR83013/I/E
H7G60D5/E	0 – 60 VDC	5 A	50	EDR82985/I/E
H7G60D9/E	0 – 60 VDC	8.5 A	90	EDR82998/I/E
H7G60D24/E	0 – 60 VDC	24 A	240	EDR83207/E
H7G60D20/E	0 – 60 VDC	20 A	200	EDR83010/I/E
H7G75D18/E	0 – 75 VDC	18 A	200	EDR83011/I/E
H7G100D5/E	0 – 100 VDC	5 A	60	EDR82999/I/E
H7G100D12/E	0 – 100 VDC	12 A	140	EDR83000/I/E
H7G150D7/E	0 – 150 VDC	7 A	80	EDR83001/I/E
H7G200D4/E	0 – 200 VDC	4 A	50	EDR82986/I/E
H7G200D8/E	0 – 200 VDC	8 A	86	EDR82989/I/E
H7G400D2/E	0 – 400 VDC	2 A	30	EDR83002/I/E
H7G500D2/E	0 – 500 VDC	2 A	24	EDR83003/I/E
H7G600D2/E	0 – 600 VDC	2 A	20	EDR83004/I/E
H7G800D2/E	0 – 800 VDC	2 A	20	EDR83005/I/E
H7G900D07/E	0 – 900 VDC	.7A	10	EDR83006/I/E
H7G122D03/E	0 – 1200 VDC	.3 A	4	EDR83007/I/E

Above are just sample of drivers that were assembled in H7G-package. There are hundredth of additional drivers with a various voltage/current ratings can be manufactured in the same package. All drivers build with the same control circuitry and difference is only a 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 to you because transistors for assembling 30VDC/1A driver costs less than for a 30VDC/26A driver.

Our standard, off-shelves 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).

Second generation of all-voltage Full-bridge (H-bridge) drivers

Model numbers are listed below in a SIP-8 small enclosure for PC Board mounting. All equivalent parts are available in DIN enclosure, please replace "2" with "8" to order correct product and add the D at the end of the part number.
For a 60VDCD/5A and 24V control, the SIP-8 model is H2L60D5/24. Assembled in a DIN enclosure, it is a H2L60D5/24/D (p/n EDR92985/4/D).

Model Number Enable	Operating Voltage	Id (A) cont.	p/n
H2L24D42/I/E	0 – 24 VDC	42 A	EDR83014/I/E
H2L30D26/I/E	0 – 30 VDC	26 A	EDR83012/I/E
H2L30D14/I/E	0 – 30 VDC	14 A	EDR83009/I/E
H2L40D16/I/E	0 – 40 VDC	16 A	EDR82997/I/E
H2L40D28/I/E	0 – 40 VDC	28A	EDR83013/I/E
H2L60D5/I/E	0 – 60 VDC	5 A	EDR82985/I/E
H2L60D9/I/E	0 – 60 VDC	8.5 A	EDR82998/I/E
H2L60D16/I/E	0 – 60 VDC	16 A	EDR82799/I/E
H2L60D20/I/E	0 – 60 VDC	20 A	EDR83010/I/E
H2L75D18/I/E	0 – 75 VDC	18 A	EDR83011/I/E
H2L100D5/I/E	0 – 100 VDC	5 A	EDR82999/I/E
H2L100D12/I/E	0 – 100 VDC	12 A	EDR83000/I/E
H2L150D7/I/E	0 – 150 VDC	8 A	EDR83001/I/E
H2L200D4/I/E	0 – 200 VDC	4 A	EDR82986/I/E
H2L200D8/I/E	0 – 200 VDC	8 A	EDR82989/I/E
H2L400D2/I/E	0 – 400 VDC	2 A	EDR83002/I/E
H2L500D2/I/E	0 – 500 VDC	2 A	EDR83003/I/E
H2L600D2/I/E	0 – 600 VDC	2 A	EDR83004/I/E
H2L800D2/I/E	0 – 800 VDC	2 A	EDR83005/I/E
H2L900D07/ I/E	0 – 900 VDC	.7A	EDR83006/I/E
H2L1200D03/I/E	0 – 1200 VDC	.3 A	EDR83007/I/E

Above are just sample of drivers that were assembled in H2L-package. There are hundredth of additional drivers with a various voltage/current ratings can be manufactured in the same package. All drivers build with the same control circuitry and difference is only a 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 to you because transistors for assembling 30VDC/1A driver costs less than for a 30VDC/14A driver.

New parts added monthly and depend on available components and customers requirements. If you need a driver for a voltage and current, which is not listed above, please do not hesitate to email us (info@vsholding.com) your requirements.

Please specify the power supply voltage, as for example H2L30D12/v/x. Replace "E" with a 5, 12, 24, 48 they are for 5VDC, 12VDC, 24VDC, 48VDC and respectfully the control voltage represented by "I." For an example, EDR82997/3/2 and EDR82997/8/2 are almost the same, and only a control voltage is different, "3" if for 12VDC and "8" is for 18-38VDC;

Cost of a Solid State Relay is very much tied to an ordered volume, in most cases a relay costs in low teens in order of 1000 or more. *We charge no production set-up fee for an order of 100 and above for any type (input and output specifications) Solid State Relay/Switch and Solid State Breaker.*

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 stay 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