Electronic Design & Research Inc

We're at your service

7331 Intermodal Drive ** Louisville *** KY *** 40258

Tel: 502-933-8660 Fax: 502-933-3422 http://ww.vsholding.com

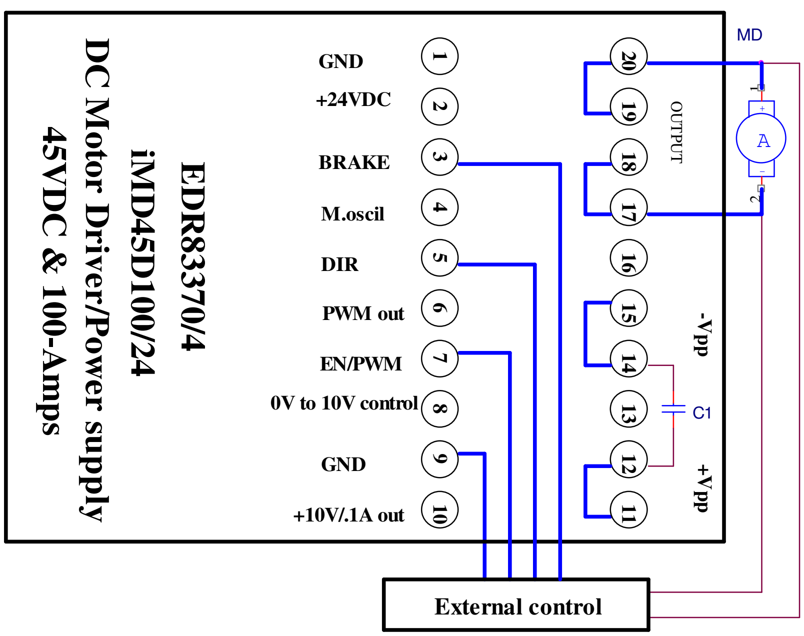
March 17, 2016

Advance new release

Isolated Brushed DC Motor / Piezo driver --- iMDxx's family

A new family of EDR's isolated Brushed DC Motor drivers based on H-bridge configuration can be used for driving Brushed DC motors, power converging or driving a Piezo transducer with doubling power. Devices assembled in a small DIN rail mountable box are capable of delivering up to 6-kW of power. A 3,000V input-output isolation allows safe interfacing directly to low-power CMOS (or TTL) logics. It's rated at 100-Amps for low output voltages and up to several Amps at 1,700V. A magnetic sensor reads an output current flow via a load and turns the output off (grounding the EN control, PIN 7 via an OR gate) if an rms current exceeds the maximum rating.

The iMDxx is devised around the "H7G" family of high-speed H- (or Full-Bridge) Isolated drivers. http://www.vsholding.com/datasheets/7158%20High%20Speed%20H-driver%203.pdf. It switches up to 500-KHz and generates a pulse-width as short as 400-nS, thus capable of performing the finest and highest precision power management tasks. No heat sink is required for driving a load at a rated current.



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

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)

FIG 1 shows a simplified hook-up diagram and the truth table of the iMDxx's functions while controlled by digital (logic) commands

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 commands can be used for stopping the motor's rotation. The BRK stops the motor's rotation suddenly or abruptly. The EN lets the motor 'free run' to a stop. The table on the left has summarized those.

The iMDxx incorporates a precision voltage-control pulse-width modulator (PWM) converter that is controlled by 0V to 1V analog input. Actual value of the required analog input voltage is set by EDR Inc at the customer's voltage range requirements. For an example, P/N EDR83570/4/10 was set for accepting an analog voltage from a low power source (from 0V to 10V) or a voltage divider (10Kohm potentiometer) of the 10V reference, pin #10, as it's shown on Fig 3. The PWM converter can be set to generate any frequency from 2.0Hz to 1.0MHz. Ordinarily, the main frequency was set to 10 KHz. An external resistor, the resistor R20 between pin #4 and GND (pin #1 or pin#9), can be installed if a high frequency is desired.

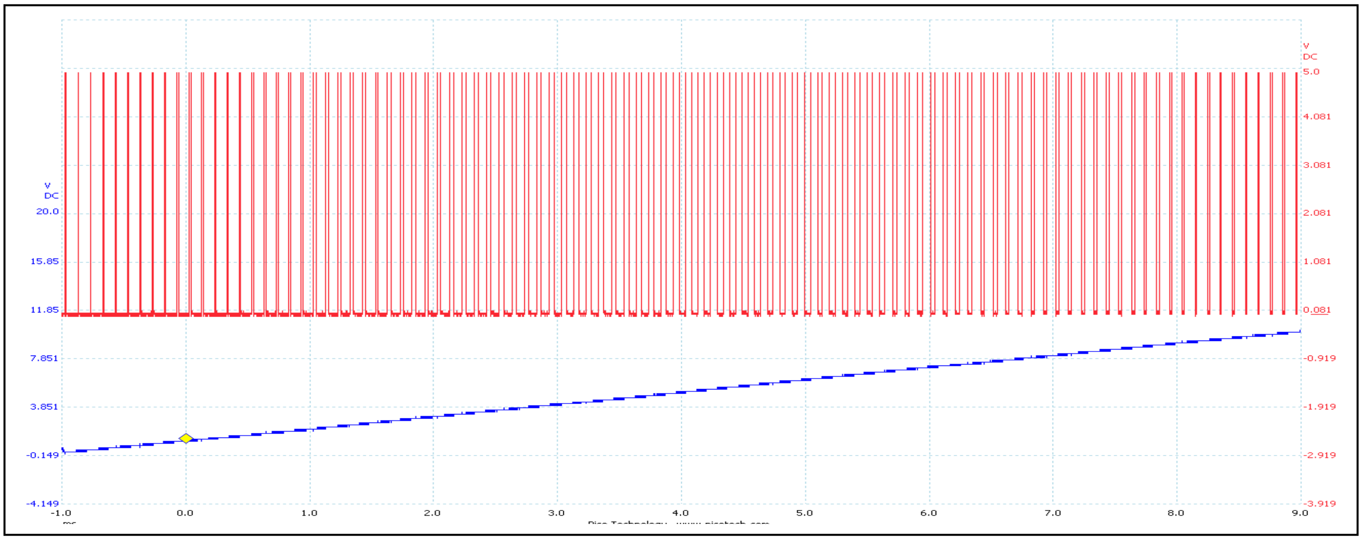


FIG 2 shows a typical V-to-PWM converter output (pin #6) with an input varying from 0V to +10V. The main frequency was set at 10 KHz. An external resistor R20 allows setting the frequency as high as 1MHz.

The iMDxx maintains precisely an output power (voltage) by providing a feedback to the PWM converter. Sample of the output voltage integrated and via a linier opt-coupler is applied onto a comparator where it is compared with an input control voltage. A resulting (feedback) is applied into the PWM in such a manner that it changes a duty cycle of PWM output and consequently the output voltage according to the input control voltage.

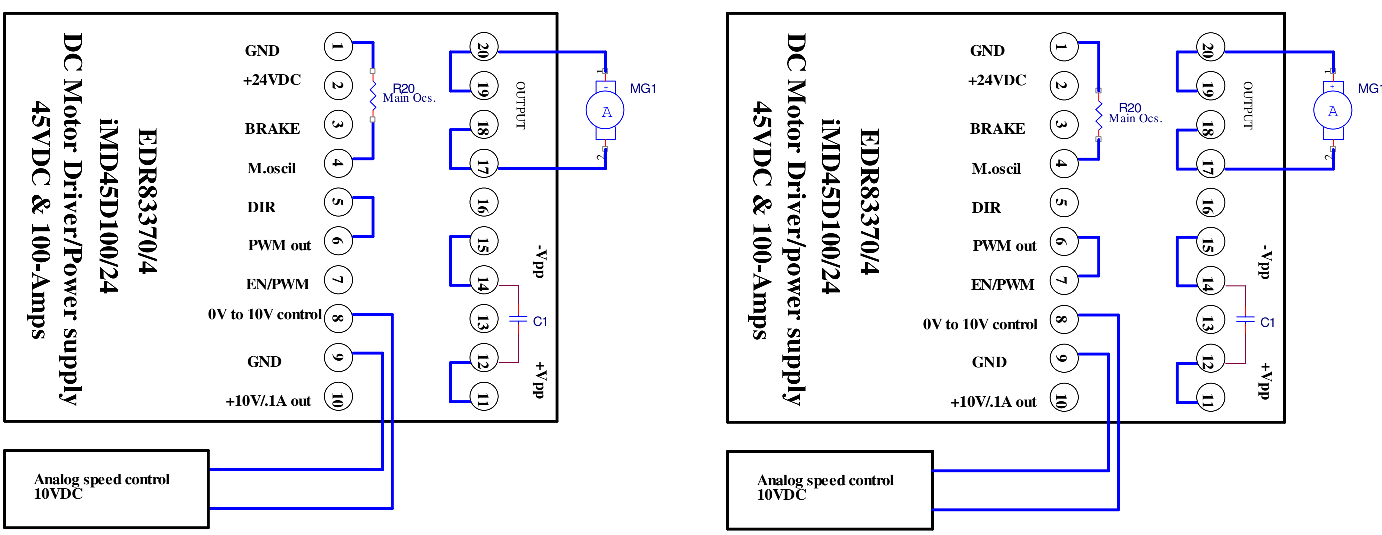


FIG 3, an iMDxx provides two options for bio-directional rotations of a DC Motor

As it is shown on FIG 3 on the right, the PWM converter's output (pin #6) can be jumped to the pin #7 for unidirectional rotation. An analog input voltage controls the full output power swing (0V is the lowest output power and +10V is the highest). If an application requires it, the direction of rotation can be changed via the DIR (Pin #5) according the truth table, FIG 1.

By jumping the PWM converter's output pin #6 to the pin #5, a bio-directional control is accomplished by an analog input voltage. In this case, 0V and 10V will force a DC motor to rotate at the maximum speed but in different directions and ½ of the input voltage is a zero speed.

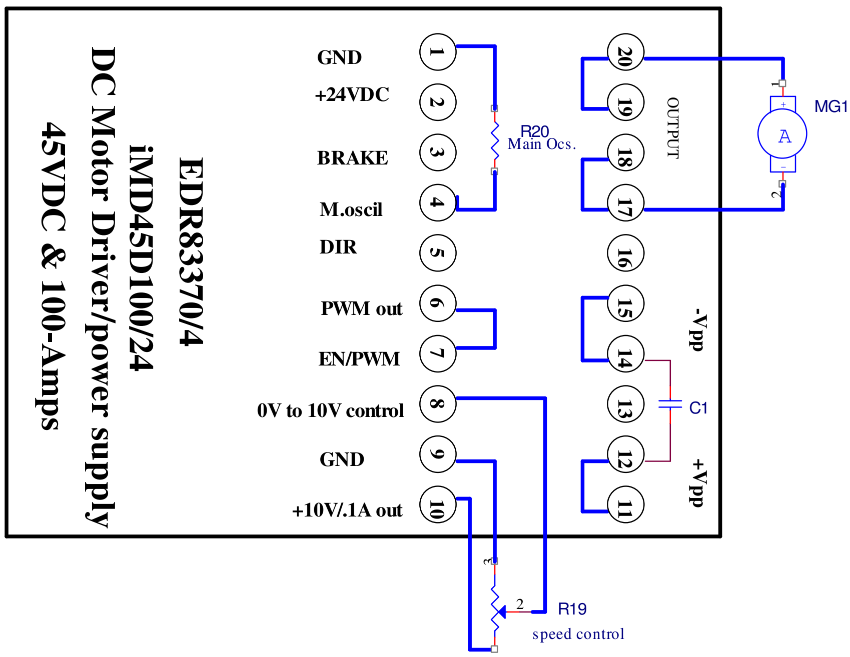


FIG 4, a single potentiometer R19 connected as it shown, will control an output power precisely.

The truth table (analog control)

Analog input, Pin #8	**PIN** **#5**	**#7**	**#3**	**PINs connected**	**Output** **L1**	**L2**
From 0 VDC to 10.0 VDC	L	#6	L	#6 & #7	clockwise	
From 0 VDC to 10.0 VDC	L	#6	L	#6 & #7	counterclockwise	
From 0 VDC to 4.99 VDC	#7	H	L	#6 & #5	counterclockwise	
At 5.0 VDC	#7	H	L	#6 & #5	no motion	
From 5.01 VDC to 10.0 VDC	#7	H	L	#6 & #5	clockwise	
X	X	X	H/5Vto24V	X	OL	OL

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

About the company:

Electronic Design & Research Inc. is a small high-tech company develops and manufactures high-performance solid-state modules, such as relays/switches, high-speed push-pull drivers, highly efficient Charge-and-Add DC/DC converters, high-current switching systems capable of delivering megawatts of power in 50 ns, power distribution switches for power back-up systems. For bio-medical applications, we offer a super-high resolution EKG for recording the His Bundle signal from a body surface on beat-by-beat basis, high-speed biases generator (DDS-701, HSBG-602, etc.) for MRI/MRS, etc. EDR's innovative solutions serve high-growth applications within the automotive market, thermo-electrical coolers/heaters, with additional focus on aviation, and industrial solutions, and various research facilities. Further information about EDR Inc. can be found at http://www.vsholding.com

Contact:
Vladimir A Shvartsman, Ph.D.
President & CEO
Tel: (502) 933-8660
V_Shvartsman@vsholding.com