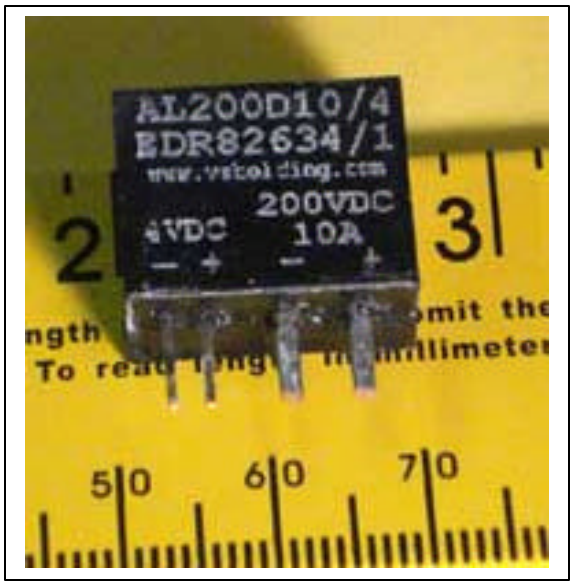
A family of "AL" Solid-State Relays rated at 100°C



A miniature, 200VDC/10 amperes
1-Form A, SPST-N.O. (normally opened) Solid-State Relay

Electronic Design & Research Inc

Under management

Vs Holding LLC

www.vsholding.com

Electronic Design & Research *is a pioneer in developing and manufactures high-speed, high-power relays/switches. Starting 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
Super-high Power, fast Switches
H-bridge or Full-bridge Drivers
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 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.

For your unique application that required a different voltage, current or speed, Ordering Instruction (on the last page) could be rather useful in creating 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.
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Series "AL"- Solid State Relay

Miniature Solid-State Relay, rated at 100°C

Electronic Design & Research
http://www.vsholding.com

Technology for people's ideas

Features:
- Utilizes only .28 sq. in. of PCB area and only .625" tall
- 10 Amp continues or up to 100 Amp-max in miniature size
- High sensitivity, even at a high switching frequency
- 200 A surge current and only 20 mill-Ohms low on-state resistance
- Available in DIP24 and a miniature SIP4 packages
- Please specify input control voltage: control voltage

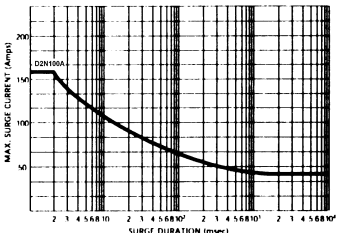
Input Specifications:

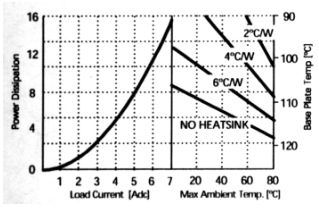
Input DC Voltage	3.8VDC
Nominal Current	40 mA

Typical Output Specifications (AL200D10):

Operating DC voltage range	0 to 200 VDC
Maximum continuous current (IDMnt)	14 A/25^0 C
Maximum continues current (IDMht)	10 A/100^0 C
Maximum surge current (IDM) - 2mS	200 A
Continues current (ID)	100 A/2mS
Maximum on-state resistance	.020 Ohm
Rising time	100 µS
Delay-on time	275 µS
Falling time	2.7 µS
Delay-off time	17 µS
Maximum switching frequency	40 Hz

*** Test performed at the input current equal to 40 mA**



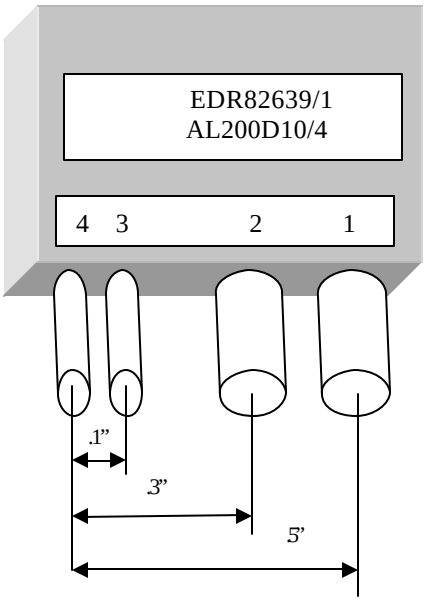


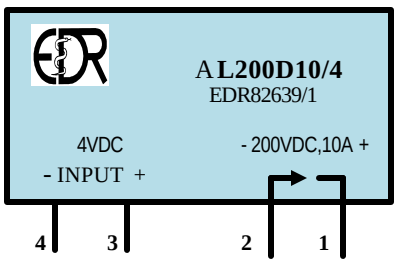
General Specifications:

Ambient operating temperature range	-40^0 C to 100^0 C
Ambient storage temperature range	-55^0 C to 125^0 C
Dialectic Strength input-to-output	4000 VAC 60 SEC

Mechanical Specifications:

Weight (oz)	.01
Encapsulation	ResTech 10207/053
Dimensions for DML package	0.625"H x 0.750.L x 0.3759"W
Terminals/solder for SIP4m package	control - 0.030", power – 0.06"





Transient Protection: All loads are inductive, even ones that are not so obvious or labeled. An inductive load produces a harmful transient voltage, which is much higher than the applied voltage, when it is turned on and off. A SSR built with a MOSFET output acts as an ideal switch and can produce a seemingly "non-inductive" load, which can cause damage if not suppressed. A transient voltage suppressor, which is bi-directional for an AC applied voltage and unidirectional for a DC applied voltage, should be used to clamp excessive spikes.

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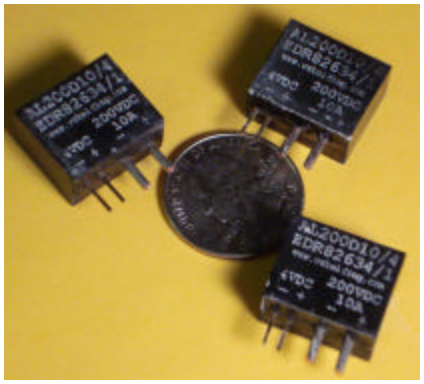
Input Electrical Characteristics (Ta = 25^{0}C) for xxx\3.8 model, DIP24 & SIP4

Characteristic	Test Condition	Min	Typ.	Max.	Unit
Forward Voltage		3.6	3.8	4.0	V
Forward Current		30	40	45	mA
Reverse Current	Reverse Voltage = 5V			10	µA
Forward Current (max)				50	mA
Reverse voltage (max)				10	V



I. Switching time test – Load - 100VDC & 10A, Control Signal – 3.8 VDC & current 35 mA

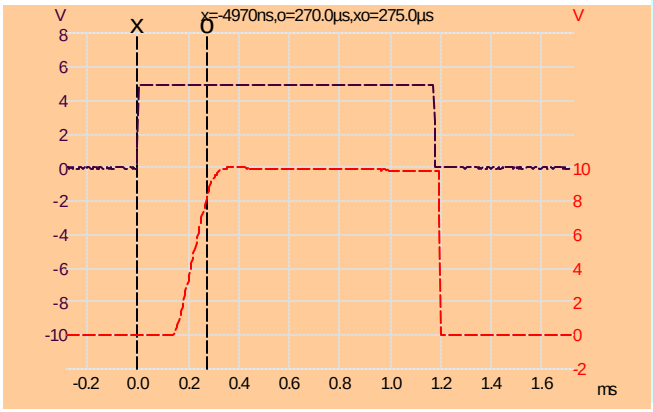


Figure 1. Turn-on delay is 275 µS

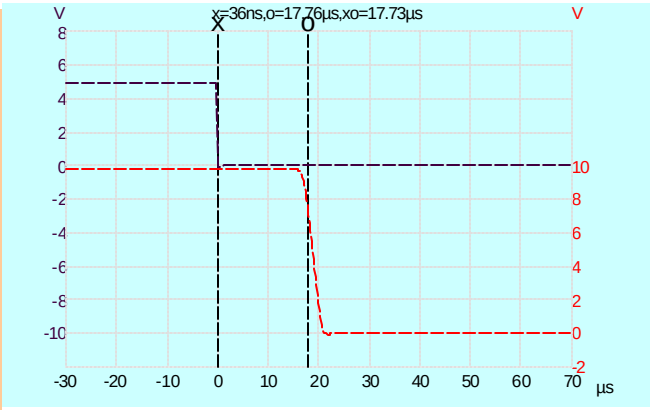


Figure 2. Turn-off delay is 17.73 µS

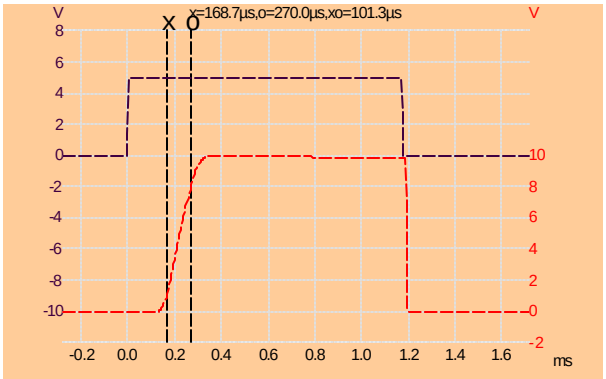


Figure 3. Rising Time is 101.3 µS

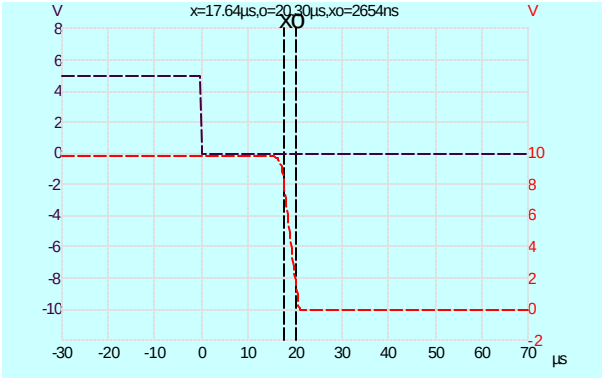


Figure 4. Fall Time is 2.654 µS

Choosing R3 for the control voltage that is above 3.8 VDC

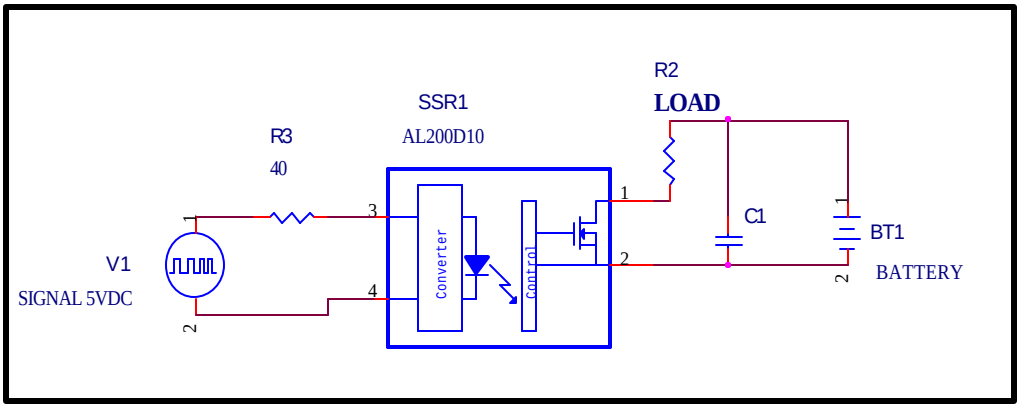


Figure 5

It is easy to select a proper value for R3 to insure a maximum performance of the relay. In most cases, similar to an electromechanical relay, the switching cycle occurs no more than 10Hz and a current of 30mA is sufficient to control the relay. The current must be increased to 40mA if the delay or rising slope must be improved. The following equation should be used to calculate the value of the T1 to meet requirements for a proper control current:

R3 = (Vcc – 3.8) / .03 = 40 Ohm

Where is R3 – required resistor; Vcc – Control Voltage

Control current and means to decrease it.

The AL-series relays are needed not much current for maintaining its turn-on state, of only 10mA, but much more current required for proper switching from the OFF to the ON state. Figures FIG 6 and 7 shown a simple way for decreasing a current consumption by using energy collected in a capacitor C2 during a stand-by time. A surge of current is required for a short period only, or about a millisecond.

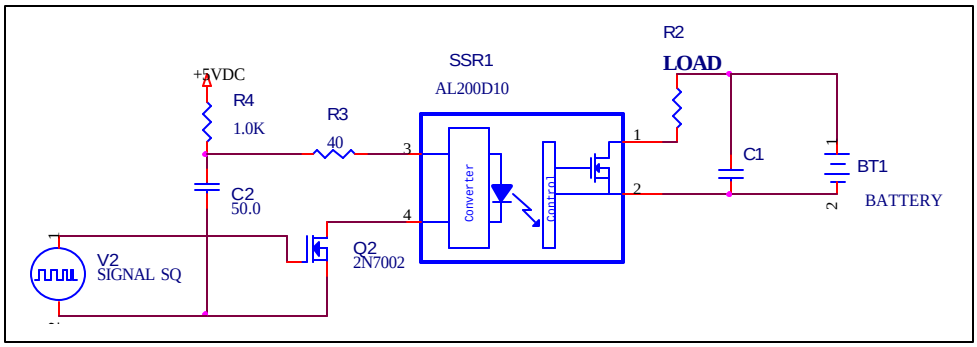


Figure 6

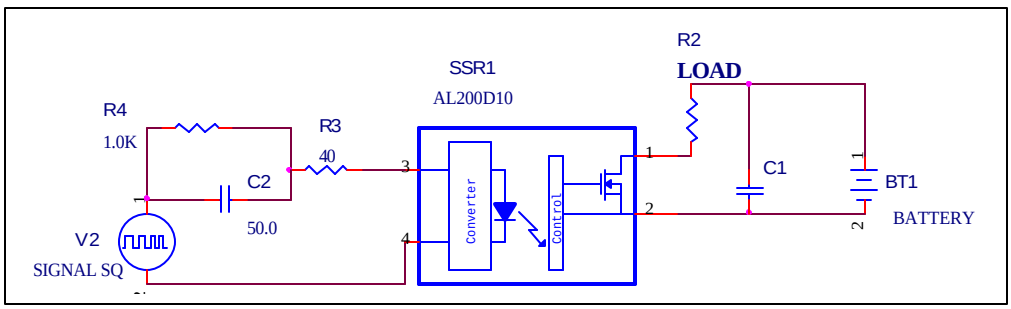


Figure 7

Solid State Relay to replace an electromechanical relay

1-Form A, SPST-NO Solid State Relays to replace electromechanical relays

Model Number	Package	Operating Voltage	Id (A) cont.	Idm (A)	Ic (mA)	p/n
D1L30D12/xx	SIP4, mini	0 – 30 VDC	12 A rms	300	85	EDR82549/x
D1L30D05/x	SIP4, mini	0 – 30 VDC	1 A rms	6.8	4	EDR82582/x
D1L55D10/xx	SIP4, mini	0 – 55 VDC	10 A rms	200	80	EDR82586/x
D1L60D5/xx	SIP4, mini	0 – 60 VDC	5 A rms	120	40	EDR82635/x
D1L60D3/xx	SIP4, mini	0 – 60 VDC	3 A rms	60	10	EDR82653/x
D1L60D04/xx	SIP4, mini	0 – 60 VDC	0.4 Arms	5	3	EDR82654/x
D1L100D2/xx	SIP4, mini	0 – 100 VDC	2 A rms	100	30	EDR82637/x
D2L100D10/xx	SIP4	0 – 100 VDC	10 A rms	180	60	EDR82991/x
D1L200D2/xx	SIP4, mini	0 – 200 VDC	2 A rms	96	28	EDR82639/x
D2L500D1/xx	SIP4	0 – 500VDC	1.3 A rms	30	20	EDR82630/x
D1L30A11/xx	SIP4, mini	+/- 30VDC (21 VAC)	11 A rms	120	50	EDR82634/x
D1L55A8/xx	SIP4, mini	+/- 55VDC (38 VAC)	8 A rms	160	60	EDR82587/x
D1L60A3/xx	SIP4, mini	+/- 60 VDC (42 VAC)	3 A rms	70	25	EDR82636/x
D1L75A4/xx	SIP4, mini	+/- 75 VDC (52 VAC)	4 A rms	120	20	EDR82647/x
D1L100A2/xx	SIP4, mini	+/- 100 VDC (70 VAC)	2 A rms	50	20	EDR82638/x
D2L100A5/xx	SIP4	+/- 100 VDC (70 VAC)	5 A rms	80	30	EDR82992/x
D1L200A2/xx	SIP4, mini	+/- 200 VDC (140 VAC)	2 A rms	48	20	EDR82640/x
D1L350A08/xx	SIP4	+/- 350VDC (225 AVC)	0.8Arms	4	1.7	EDR82655/x
D2L500A1/xx	SIP4	+/- 500 VDC (350 VAC)	1.1 A rms	25	21	EDR82631/x
D2L500D8/xx	SIP4	0 – 500VDC	8A rms	100	60	EDR82503/x
D3L500A6/xx	SIP4	+/- 500 VDC (350 VAC)	6 A rms	100	40	EDR82499/x
D1L600D06/xx	SIP4 mini	0 – 600 VDC	0.6A	3	.9	EDR82990/x
D1L650D09/xx	SIP4 mini	0 – 650 VDC	0.9 A rms	6.8	2	EDR82991/x

1-Form B, SPST-NC Solid State Relays to replace electromechanical relays

Model Number	Package	Operating Voltage	Id (A) cont.	p/n
D1L30D6/xx/C	SIP4, mini	0 – 30 VDC	6 A rms	EDR82486/x/C
D1L55D2/xx/C	SIP4, mini	0 – 55 VDC	2.3 A rms	EDR82487/x/C
D1L100D06/xxC	SIP4, mini	0 – 100 VDC	0.65 A rms	EDR82488/x/C
D1L250D04/xx/C	SIP4 mini	0 -- 250VDC	0.4 A rms	EDR82480/x/C
D1L150A02/xx/C	SIP4 mini	150AVC	0.2 A rms	EDR82479/x/C

All relays can be made in a panel mount box (0.82"H x 2.7"L x 2.0"W), please replace "D1" or "D2" with "D7"

The speed and frequency properties of many D1N-types relays very much resembled the p/n EDR82549. There is some differences for varies relays and all depended on the output power. Please request a specific data sheet if that is important for your application.

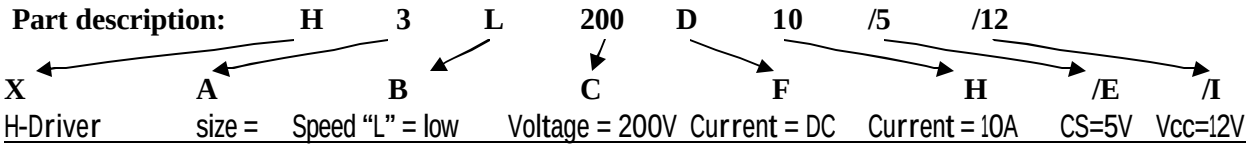
In the same packages, we manufacture a family of miniature, low power Solid State Relays, built with MOSFETs. Those relays designed for an extremely small input control current. Only 3.0 mA @ 2.6 VDC required to operate. Please request a data sheet 7090 for p/n EDR82804. Relays were designed as a replacement of a SSR with a TRAIC or SCR output in applications where a low power consumption and low leakage current are must.

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, they are 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 to a control voltage, "1" if for 3VDC 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 Full-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).



"X" module type

D	Solid State Relay, SPST-NO and SPST-NC switches
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	1.15"H x 1.75"L x 0.4"W
3	1.15"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, 1.82"H x 6.0"L x 3.3"W
8	DIN type enclosure, 2.36"H x 2.36" x 1.5"W, for 35mm DIN Rail
9	panel mount 3"H x 10"L x 8"W
P	panel mount, 2.275" x 1.75" x .8"

"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 replace with required voltage and we offer t he closest and highest value available.
Note: In an "AC"-relay a voltage specified a peak-to-peak maximum voltage and the maximum VAC can 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

A maximum current limited to a size of the enclosure (box). We can produce a device for any required current in a customer enclosure.

"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

"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

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