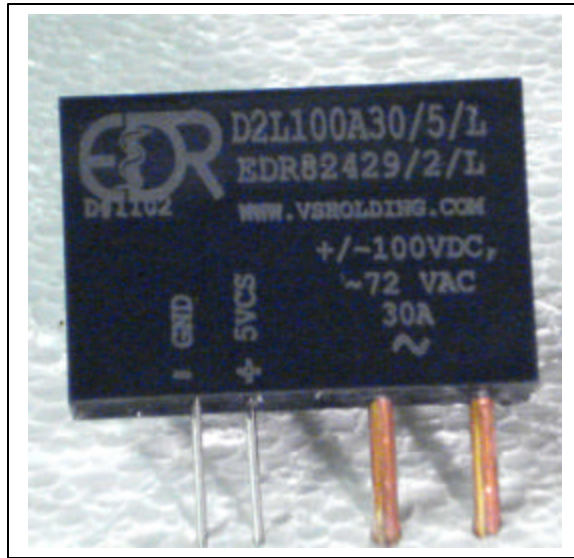


Normally closed relays for VAC and VDC applications



+/-100VDC(72VAC) at 30 amperes

1-Form B, SPST-N.C. (normally closed) 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.
V_Shvartsman@vsholding.com



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

Technology for people's ideas

Form B, SPST-NC, Solid State Relays

Normally Closed, Subminiature Solid State Relays

- Features:** Utilizes only .65 sq. in. of PCB area and only .6" tall
 Sealed Construction for Automatic Soldering and Cleaning
 High sensitivity, only 10 mA required
 Very high surge current tolerance
 Very low on-state resistance
 Standard 0.1" Pin Spacing
 Available for 3.3V, 5V, 12V, 15V and 24V input control voltages

Input Specifications:

Input DC Voltage see the Features
 Output Voltage & Current see the available selection

Typical Output Specifications (R1L30D6/3):

Operating DC voltage range	0 to 30 VDC
Maximum continuous current	6 A
Maximum surge current (IDM) - 1mS	120 A
Continues current (ID), 100mS	60 A
Maximum on-state resistance	.020 Ohm
Rising time	5.0 μ S
Delay-on time	5.0 μ S
Falling time	0.8 μ S
Delay-off time	110 μ S
Maximum switching frequency	250 Hz

Test performed at the input current equal to 10 mA

General Specifications :

Ambient operating temperature range	-40 ⁰ C to 105 ⁰ C
Ambient storage temperature range	-55 ⁰ C to 125 ⁰ C
Dialectic Strength input-to-output	2,500 V rms (MIN)

Mechanical Specifications:

Weight(oz)	.04
Encapsulation	ResTech 10207/053
Dimensions for D2L package	1.15"H x 1.75"L x 0.4"W
Dimensions for DIP24 package	0.375"H x 0.925"L x 0.53"W
Dimensions for D1L package	0.615"H x 1.485"L x 0.29"W
Terminals/solder for DIP24 package	.030" diameter
Terminals/solder for SIP4m package	control - 0.40", power - 0.6"

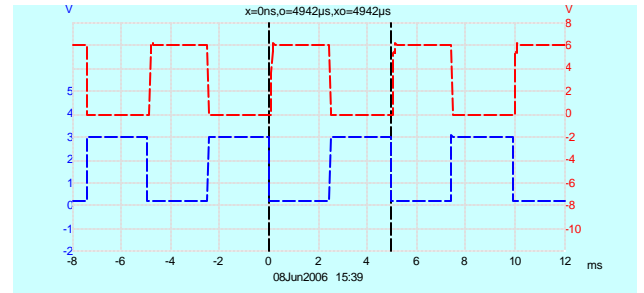
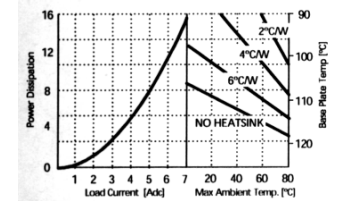
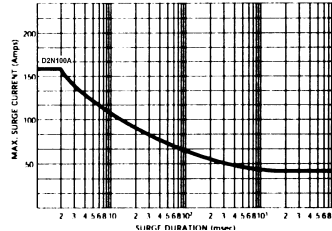
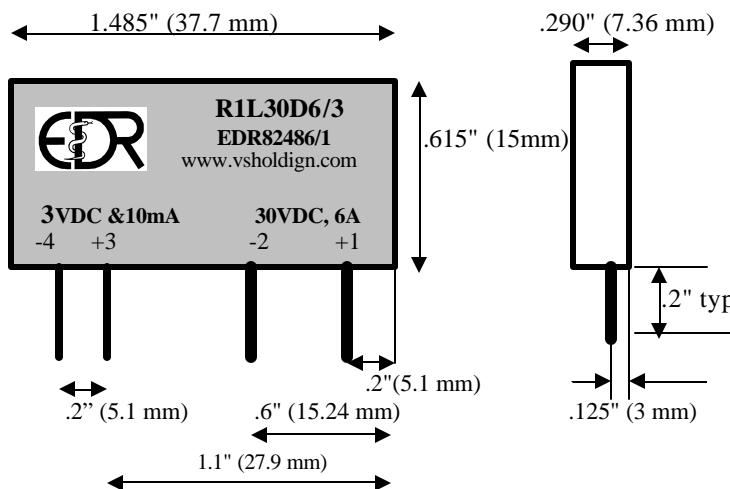


Figure 1

A relay chops a 6 Amp at about 200 Hz.
 A bottom line (blue) is a control signal.
 A top line (red) is an output voltage at a load.

Packaging information and pins-out for a mini SIP4



PIN 1: + LOAD;
PIN 2: -LOAD (return)
PIN 3: +DC CONTROL;
PIN 4: -DC (return) CONTROL
 All Dimensions are in inches (millimeters).

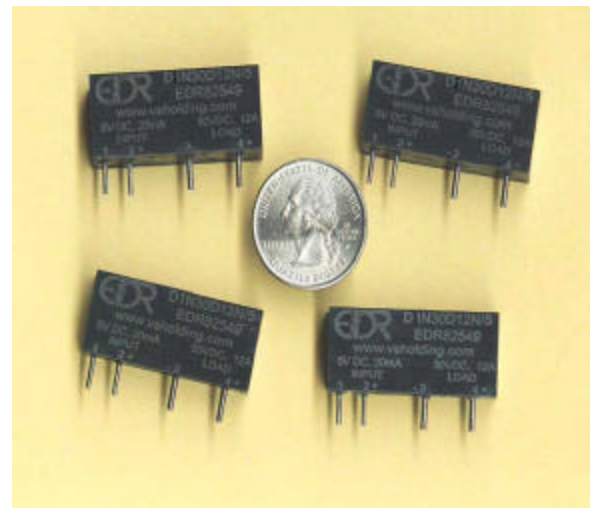


Figure 2

Input Electrical Characteristics (Ta = 25°C) for a R1L30D6/3 model

Characteristic	Test Condition	Min	Typ.	Max.	Unit
Forward Voltage	Input = 10 mA	2.6	3.0	3.3	V
Forward Current		8.3	11	12.54	mA
Reverse Current	Reverse Voltage = 5V			10	μA
Forward Current (max)				50	mA
Reverse voltage (max)				5	V

I. Switching time test – Load - 10VDC & 6.6A, Control Signal – 3.00 VDC & current 10.98 mA

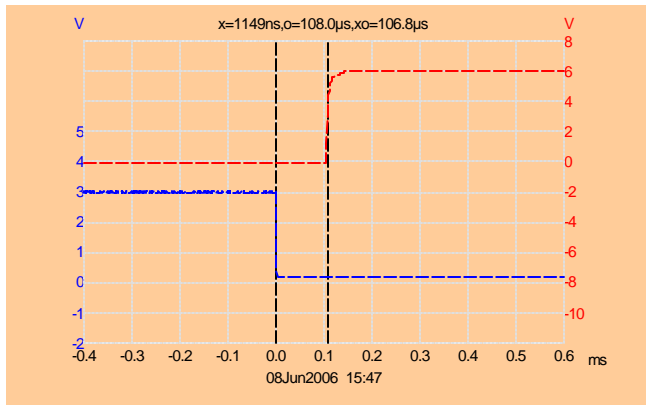


Figure 3. Turn-off delay time

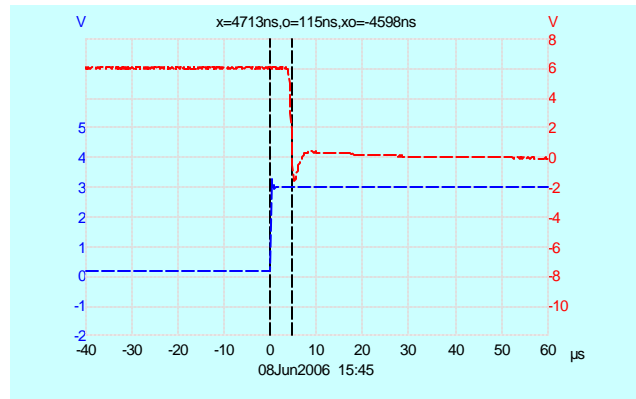


Figure 4. Turn-on delay is 4.598 μs

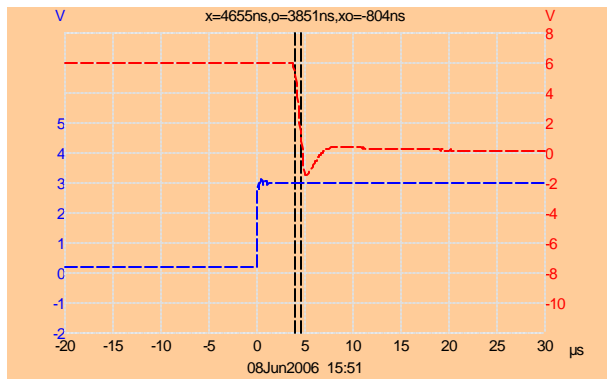


Figure 5. Fall time (turn-off) is 0.804 μs

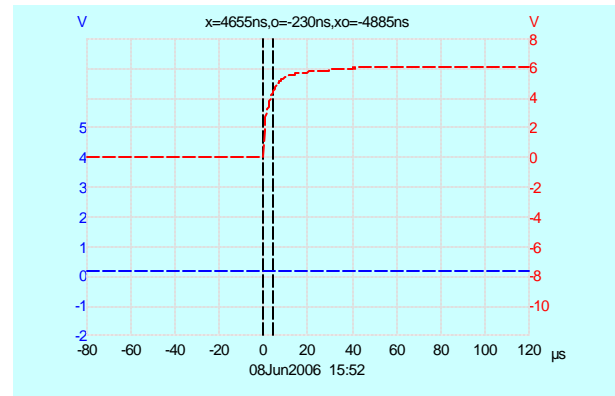


Figure 6. Rise time is 4.885 μs

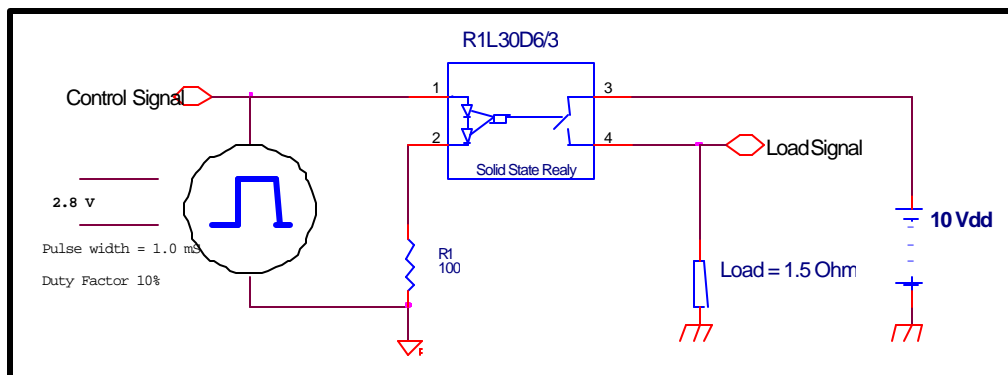


Figure 7. Switching Time Test Circuit



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Technology for people's ideas

1 Form B, SPST-NC, Low Power

15A Normally Closed, 6mA control Solid State Relay

- Features:** Utilizes only .65 sq. in. of PCB area and only 1.15" tall
 Sealed Construction for Automatic Soldering and Cleaning
 High sensitivity, only 6 mA required
 Very high surge current tolerance
 Very low on-state resistance
 Standard 0.1" Pin Spacing
 Available for 3.3V, 5V, 12V, 15V and 24V input control voltages

Input Specifications:

Input DC Voltage see the Features
 Output Voltage & Current see the available selection

Typical Output Specifications (R3L75D15/5):

Operating DC voltage range 0 to 75 VDC
 Maximum continuous current 15 A
 Maximum surge current (IDM) - 1mS 250 A
 Continues current (ID), 100mS 80 A
 Maximum on-state resistance .010 Ohm
 Rising time 7μS
 Delay-on time 5 μS
 Falling time 0.8μS
 Delay-off time 110 μS
 Maximum switching frequency 250 Hz

Test performed at the input current equal to 6 mA

General Specifications :

Ambient operating temperature range -30⁰ C to 105⁰ C
 Ambient storage temperature range -40⁰ C to 125⁰ C
 Dielectric Strength input-to-output 2,500 V rms (MIN)

Mechanical Specifications:

Weight(oz) .04
 Encapsulation ResTech 10207/053
 Dimensions for D3L package 1.15"H x 1.75"L x 0.8"W
 Terminals/pins for the input .030" diameter
 Terminals/pins for the output 0.6" diameter

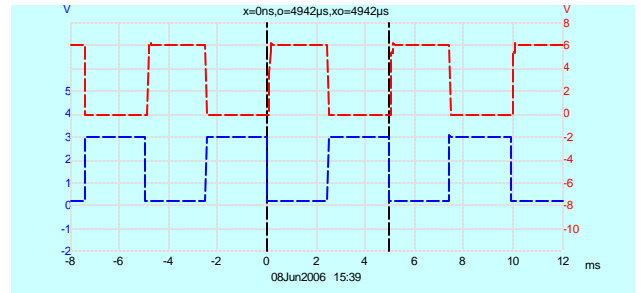
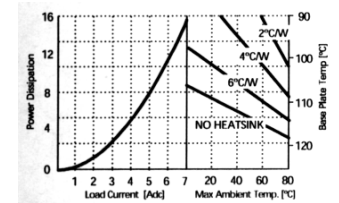
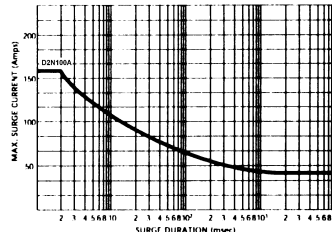
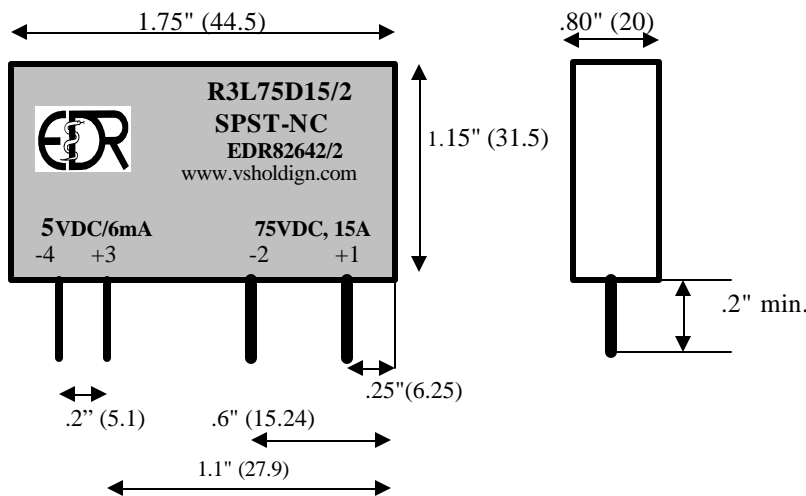


Figure 1
 A relay chops a 15 Amp at about 200 Hz.

Information and pins-out for a SIP4 package



- PIN 1: + LOAD
- PIN2: -LOAD (return)
- PIN 3: +DC CONTROL
- PIN4: -DC (return) CONTROL

All Dimensions are in inches (millimeters).

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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Technology for people's ideas

1 Form B, SPST-NC, Low Power SSR

18A/30A Normally Closed, 1mA controlled Solid State Relay

- Features:** Utilizes only .65 sq. in. of PCB area and only 1.15" tall
 Sealed Construction for Automatic Soldering and Cleaning
 High sensitivity, only 1 mA required
 Very high surge current tolerance
 Very low on-state resistance
 Standard 0.1" Pin Spacing
 Available for 3.3V, 5V, 12V, 3-36V input control voltages

Input Specifications:

Input DC Voltage see the Features
 Output Voltage & Current see the available selection

Typical Output Specifications (R2L100D18x/C^{xx})

Operating DC voltage range	+/-100VDC (70VAC)
Maximum continuous current	30A/18A rms
Maximum surge current (IDM) - 1mS	300 A
Continues current (ID), 100mS	110 A
Maximum on-state resistance	.010 Ohm
Rising time	0.67µS
Delay-on time	13 µS
Falling time	1.8µS
Delay-off time	60 µS
Maximum switching frequency	15 Hz

Test performed at the input current equal to 1 mA

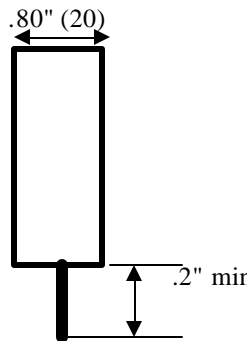
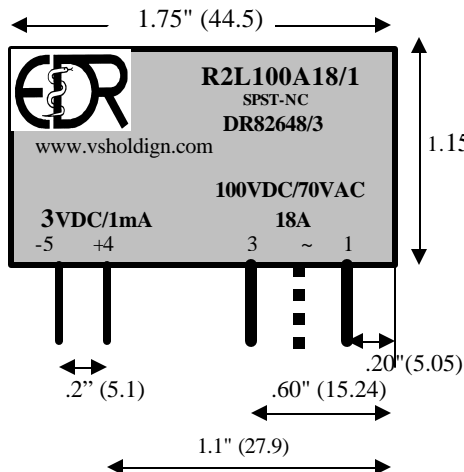
General Specifications :

Ambient operating temperature range	-30 ⁰ C to 105 ⁰ C
Ambient storage temperature range	-40 ⁰ C to 125 ⁰ C
Dialectic Strength input-to-output	3,500 V rms (MIN)

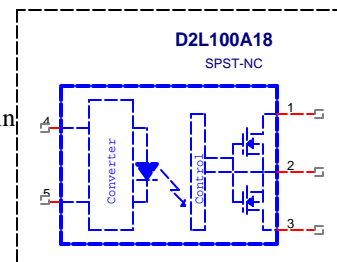
Mechanical Specifications:

Weight(oz)	.04
Encapsulation	ResTech 10207/053
Dimensions for D3L package	1.15"H x 1.75"L x 0.8"W
Terminals/pins for the input	.030" diameter
Terminals/pins for the output	0.6" diameter

Information and pins -out for a SIP4 package



- PIN 1: ~ LOAD
- PIN 3: ~ LOAD (return)
- PIN 4: +DC CONTROL
- PIN 5: -DC (return) CONTROL



All Dimensions are in inches (millimeters).

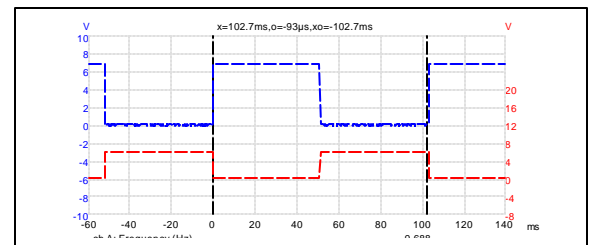
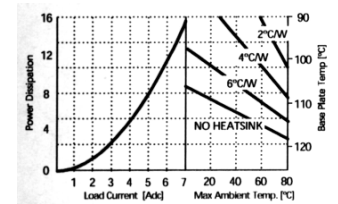
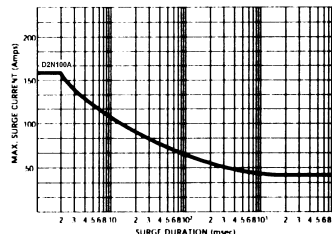
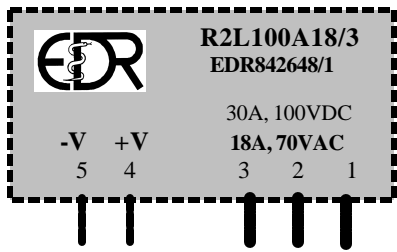


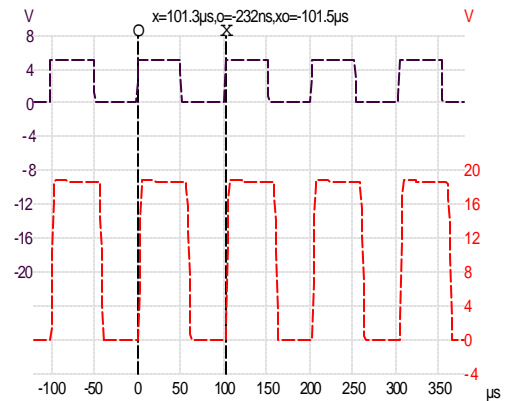
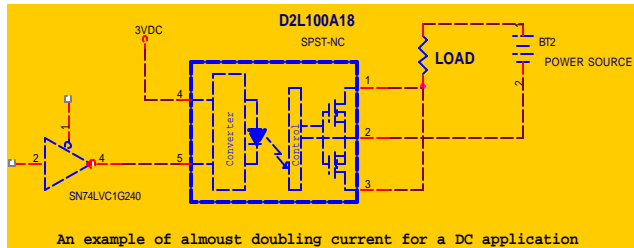
Figure 1
 A relay chops a 18 Amp at about 10 Hz.

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.

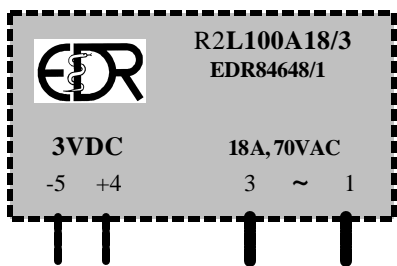
Application of a AC/DC Solid State Relay, p/n EDR82648 in controlling DC power



A relay manufactured for an AC/DC-power control made with pins #2 for larger DC output current.

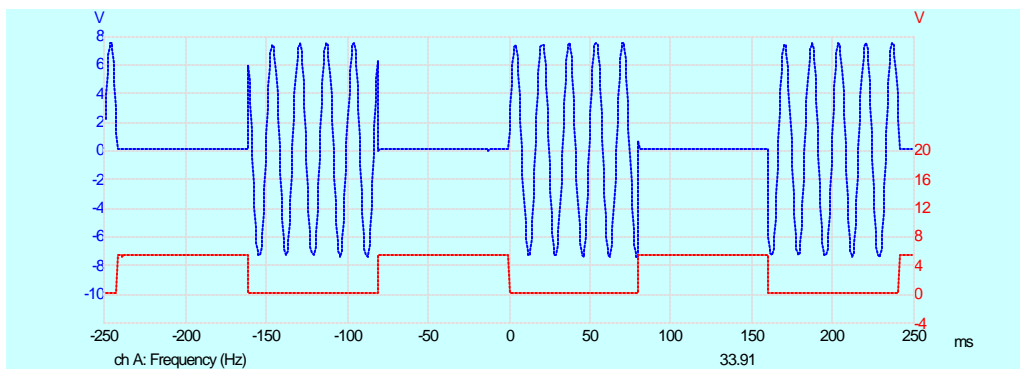
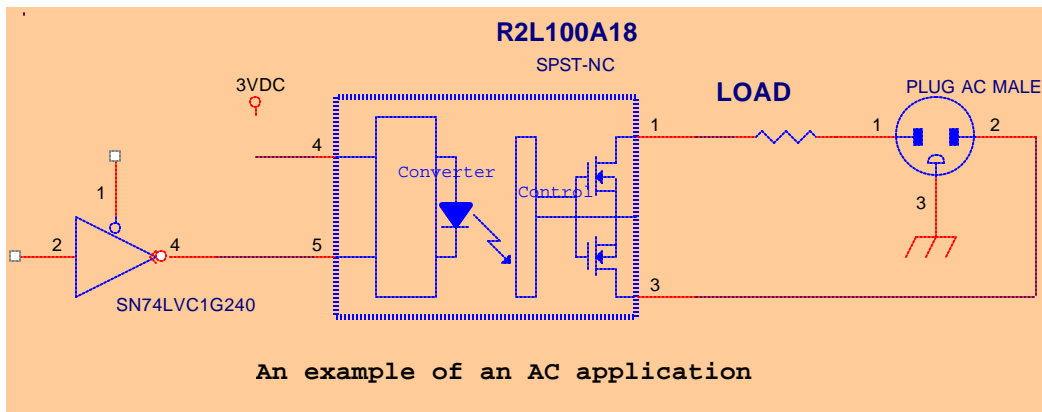


SPST-NC (1 Form B) relay, p/n EDR82648 is controlling AC power



The relay manufactured for AC-power control made without pins #2 for allowing more free space on a PC board.

G – ground, P – Power Supply, S – control signal



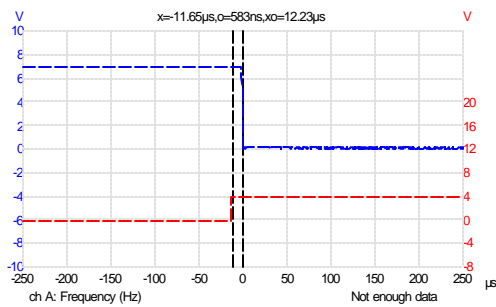
Cycling an AC-power with a random turn on/off

Input Electrical Characteristics (Ta = 25°C) for R3L100A18/3, p/n EDR82648/1

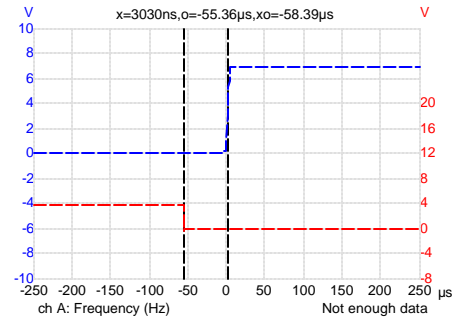
	Minimum	Nominal	Maximum	
Control Signal, Pins 4-5	2.9	3.2	5	V
Control Current, Pins 4-5	0.9	3.0	11.55	mA
Turn on		2.7		V
Turn off	2.5			V

An external resistor, connected in series can be use for a different control voltage (current must not exceeded 30mA)

Switching time test – Load – 5 Ohm & 3.6A, a single 50 μS pulse width



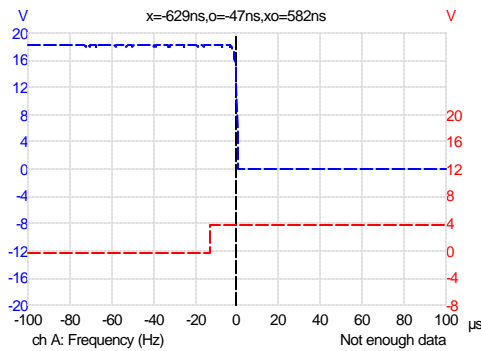
Load
Control



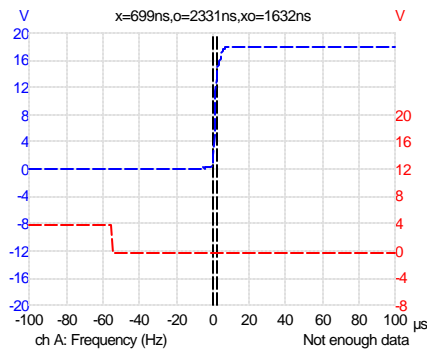
Load
Control

Turn-on delay is 12.23μS

Turn-off delay is 58.39μS



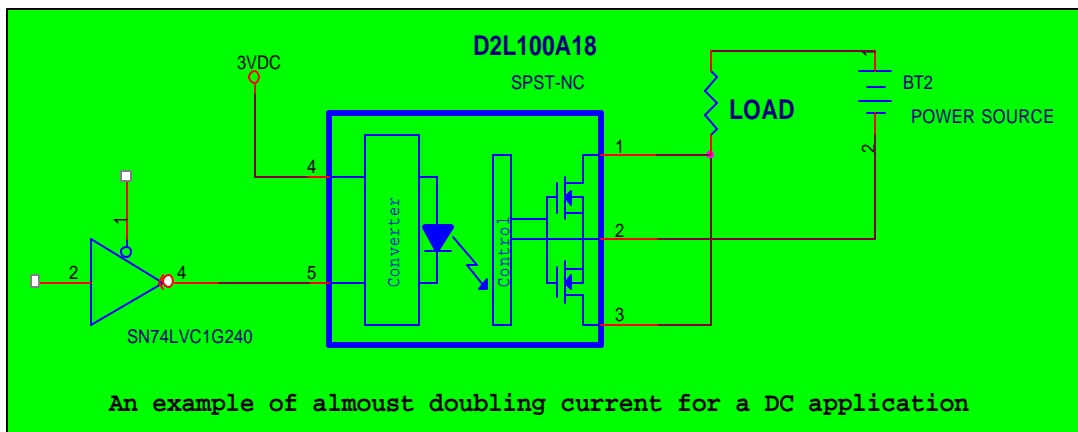
Load
Control



Load
Control

Rising Time is 0.582μS

Fall Time is 1.632μS



Switching Time Test Circuit

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

OUTPUT SPECIFICATIONS

(We rated our SSR's for the maximum current without a heat sink)

Model Number	Package	Operating Voltage	Id (A) cont.	p/n	notes
R1L30D6/xx	SIP4, mini	0 – 30 VDC	6 A rms	EDR82486/x	
R2L45D10/xx	SIP4	0 – 45VDC	10A rms	EDR82734/x	
R1L55D2/xx	SIP4, mini	0 – 55 VDC	2.3 A rms	EDR82487/x	
R3L55D05/xx	SIP4	0 – 55 VDC	0.5A	EDR82774/x	
R1L60A1/xx	SIP4	+/-60VDC (42VAC)	1.0 A rms	EDR82792/xL	low power
R1L60A3/xx	SIP4	+/-60VDC (42VAC)	3.0 A	EDR82644/x	
R3L75D15/xx	SIP4	0 -- 75 VDC	15 A rms	EDR82642/x	
R2L75D15/xx	SIP4	0 – 75 VDC	15 Arms	EDR82737/xL	low power
R3L75D10xx	SIP4/SIP5	+/- 75VDC (50VAC)	10 A rms	EDR82646/xL	low power
R1L100D06/xx	SIP4, mini	0 – 100 VDC	0.65 A rms	EDR82488/x	
R2L100A18/xx	SIP4/SIP5	+/-100VDC (72VAC)	18A rms	EDR82648/xL	low power
R2L100D35/xx	SIP4/SIP5	0--100VDC	35A rms	EDR82428/xL	low power
R2L100A30/xx	SIP4/SIP5	+/-100VDC (72VAC)	30A rms	EDR82429/xL	low power
R1L150A02/xx	SIP4 mini	+/- 150 VDC (100VAC)	0.2 A rms	EDR82479/x	
R3L200D6xx	SIP4	0 – 200VDC	6A rms	EDR82730/x	
R3L200A5xx	SIP4/SIP5	+/- 200Vdc (140VAC)	5A rms	EDR82731/x	
R4L200D11xx	SIP4	0 – 200VDC	11A rms	EDR82732/x	
R4L200A10xx	SIP4/SIP5	+/-200VDC (140VAC)	10A rms	EDR82733/x	
R1L250D04/xx	SIP4 mini	0 -- 250VDC	0.4 A rms	EDR82480/x	
R1L350A008/xx	SIP4	+/-350 VDC (230VAC)	0.08 A rms	EDR82656/x	
R1L400D03/xx	SIP4	0 – 400VDC	0.3 A rms	EDR82427/x	
R1L400A02/xx	SIP4	+/-400VDC (280AVC)	0.2 A rms	EDR82426/x	

We make Solid State Relays with varieties of rated voltages and currents. Please inquire.

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 EDR82486. 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.

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 400 and above for any type (input and output specifications) Solid State Relay/Switch and Solid State Breaker.

A part description will be marked according to the description below but p/n EDRxxxxx will stay the same for already items in circulation (already sold).

In the same package we make DPST-NO and SPST-NO relays. Both types made with n AC and DC input

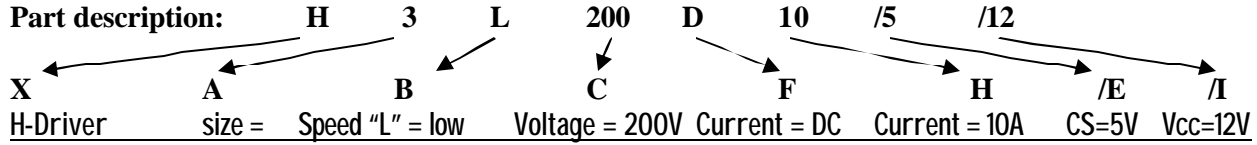
Transient Protection: All loads are inductive, even ones that are not so obvious or labeled. An inductive load produces a harmful transient voltage, which is much higher than the applied voltage, when it is turned on and off. A SSR built with a MOSFET output acts as an ideal switch and can produce a 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.

Electronic Design & Research Inc. ** 7331 Intermodal Dr. ** Louisville ** KY 40258

Tel: 502-933-8660; Fax: 502-933-3422; Sales: 800-336-1337; e-mail: vsholding@vsholding.com

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 un ify 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 or Switch with output terminals: SPST-NO (normally open)
- R Solid-State Relay or Switch with output terminals: WITH ONE OR MORE normally closed terminal
- 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 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

We can manufacture a device for any required current.

“T” 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