Fuzzy-logic, noise-free f-SPDT Solid-State

Drivers for applications where EMI

(electromagnetic interference) is prohibited

The fT7Lxxx (D or A) xx/x/x series

Electronic Design & Research Inc.

Under management

Vs Holding LLC

www.vsholding.com

Contents:

Electronic Design & Research Inc. manufactures vast varieties of Solid State Relays, Breakers, Video Switches, ½ Bridge Drivers, H-Bridge Drivers, Push-Pull Drivers, etc. Here is one more family of drivers, the way they work, applications and a data sheets for some of them

The EDR's family of the "T" relays

NOTES: We are bringing, in an average four new devices to the market per month. Above is just an example of switches/drivers that we keep in our stock in small quantities and ready to ship them at once. For your unique application that required a different voltage, current or speed, Ordering Instruction (please see page #21) could be rather useful. Do not hesitate to send us an email to: info@vsholding.com for any additional information, delivery schedule and prices.

Thank you,

Vladimir A. Shvartsman, Ph.D.
President & CEO
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The f-SPDT Solid-State Drivers (SSD) with a fuzzy-logic control input

A unique feature of an f-SPDT driver is a fuzzy-logic control and power source for the internal logic and drivers. The control input designed for the maximum application flexibility and simplicity in interfacing. It is a high impedance input and any 5V CMOS logic can be used to control it. The best result can be obtained with tri-state output logic, like bus-driver IC chips or CPUs. The control input has three defined levels, as that can be seen on the figure, below: 0-1.7V, 1.9-3.2V, and 3.4-5V. That voltage variation allows targeting control any one of terminals or turn "OFF" the driver (terminals) all together. If the control signal remains within the shutdown window (1.9-3.2V), the outputs (pins 1, 2 and 3) are disabled (NO/NO). When the control signal moves on either side of the "shutdown window", it is below 1.7V, or above 3.4V, the pair of terminals 1-2 and 2-3 will change a state from N.O. to N.C. respectively. Otherwise, the control signal's rising and falling thresholds outline in the Electrical Specifications determine when the lower and upper gates are enabled.

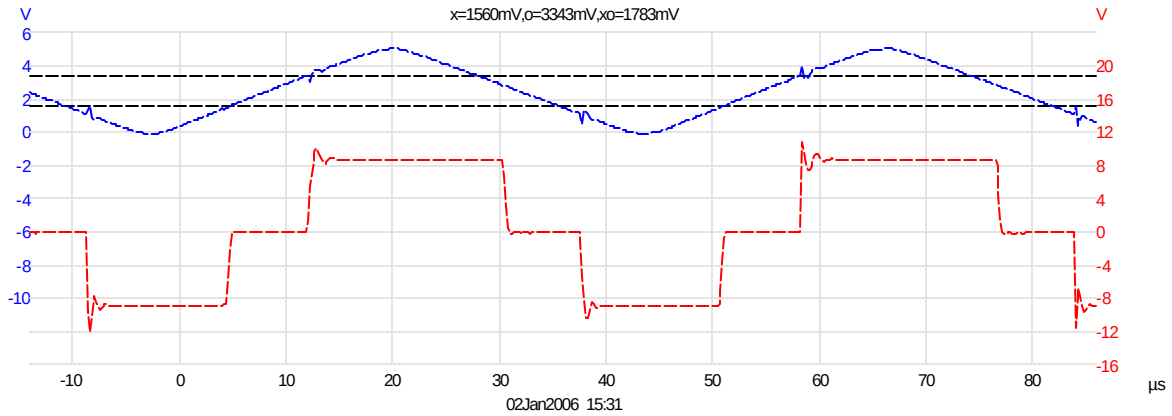

Figure shows a control signal (top) and a voltage on a load (below). When a control signal (a tooth-wave was selected for a better illustration) rises above 3.34V it turns on one pier of output terminals and when it falls below 1.56V other pair of terminals conducts.

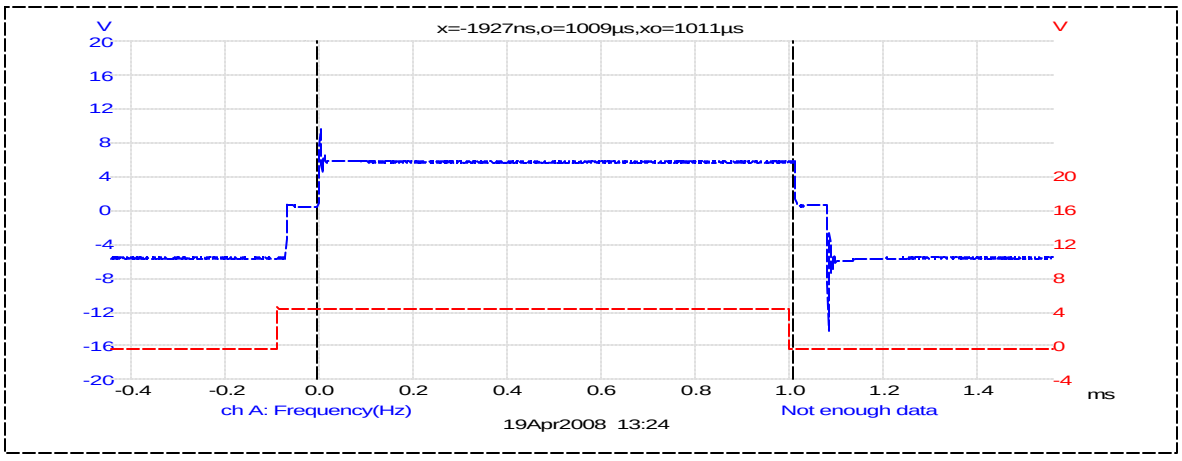

Figure shows break-before-make properties of an f-SPDT driver. Its "dead" time is about 68mS. Duration of the "dead" was selected based on a power property of the f-SPDT and set during its production. The "dead" time can be set of any length.

Call us if you do not see on our website a product that will meet your requirements. If we do not have, we will make for you and a few weeks.

Electronic Design & Research Inc. ** 7331 Intermodal Dr. ** Louisville ** KY 40258
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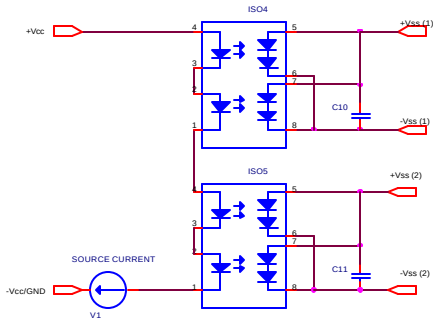
A noise-free power source and f-SPDT driver

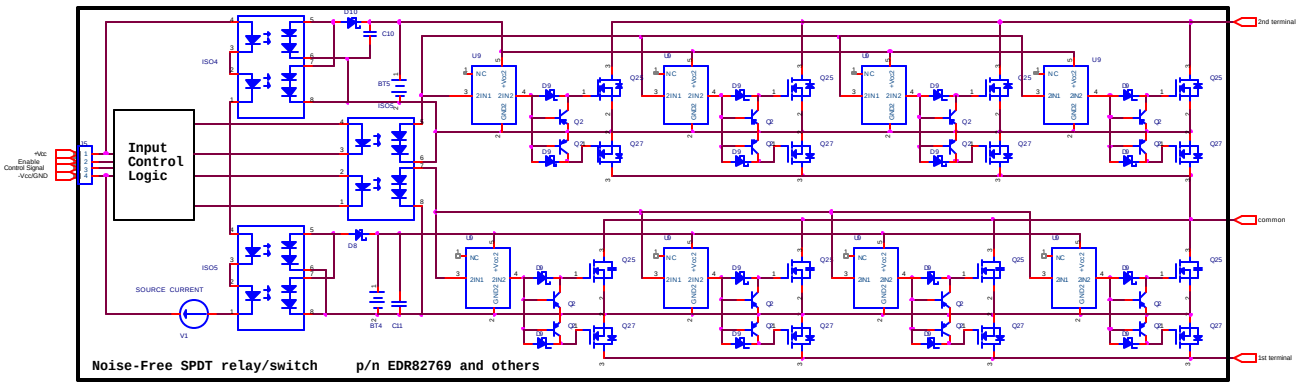
There are few commonly used means to drive an output powerful semiconductor (MOSFET) in an isolated Solid-State Relay/Switch. A photo-voltaic driver would be a prim choice for a low-power, low-voltage, and low speed SSRs. The situation is drastically different when a high-power MOSFET, which has a large input capacitance has to be turn-on in a few microseconds or faster and quite often (at a high frequency). The situation is not better when a high-voltage MOSFET must be used. The HV MOSFET has requited about 10V to be applied on its gate for achieving the best possible, low-on resistance. Unfortunately, the photo-voltaic driver can not provide a required power or voltage for such designs.

In the order to overcome above obstacles a designer uses a DC/DC, DC/AC, or AC/AC converters for generating enough power for the internal logic and MOSFETs drivers. We, at EDR Inc. has developed and manufactured a thousand of Solid-State Relays, Switches, Breakers and Drivers exploiting that means for delivering power and control signals. It is relatively inexpensive and trouble free solution unless a strict requirements for an electromagnetic interference (EMI). Hardly an issue an excessive EMI noise generated by a transformer based converters made in an industrial applications but such a device became unusable for fine signal measurements in scientific and bio-medical applications.

Below is a block-diagram of a new, noise-free power. A proper number of photovoltaic cells will provide enough power to driver a high-power, high-voltage, and high-speed Solid-State Device.



The figure above shows an isolated power generation for the f-SPDT driver.



The figure above shows a simplified block-diagram of the f-SPDT driver to control an eight AC or DC power (current).

Newly designed f-SPDT accomodate a number improvements comparing with the previous desing. Mostly it is visible in the way a parralel transistors were connected and drived. A parasitic osscilating effects destrucively and almoust anevoidebley if a several transistors were connected in parallel for increasing a curretn throught. EDR solved that problme by using a dedicated driver for each pare of transistors and installing ferrit bids.

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Technology for people's ideas

Isolated, a break-before-make switches

The EDR82769 (T7L200A40L500A5) belongs to the "T" family of a fussy-logic controlled relays, noise-free devices that are offering needed flexibility that required in sensitive scientific and industrial applications.

Features: It is assemble with terminals rated for various current and voltage. Rating between terminals 1&2 is +/-500VDC & 5A rms and between terminals 2&3 is +/- 200VDC & 40A. Fuzzy-logic control allows power for an internal logic generated by photovoltaic cells thus Insures a virtual EMI noise-free operation. Please specify power supply and control voltage

Input Specifications:

Input Control Voltage (pin 4)		see the next page
Nominal Current		0.3 mA
Power Supply +Vcc		40mA at 12VDC

Output Specifications for terminals 2 and 3:

Operating Voltage Range		+/-200VDC (140VAC)
Continuous Current	(Icr)	40 A rms
Maximum Continues Current	(Id)	500A
Maximum Pulse Current (0.1mS)	Idm	1000 A
Maximum on-state resistance		0.050 Ohm

Output Specifications for terminals 2 and 1:

Operating Voltage Range		+/-500 VDC(350VAC)
Continues Current	(Icr)	5 A rms
Maximum Continues Current	(Id)	54A
Maximum Pulse Current	(Idm)	180A
Maximum ON-state resistance		0.1 Ohm

Timings

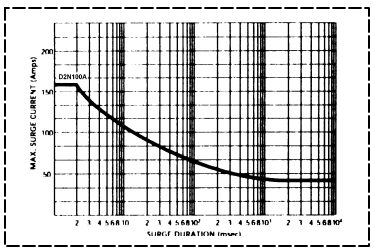
Please see the following page for timings

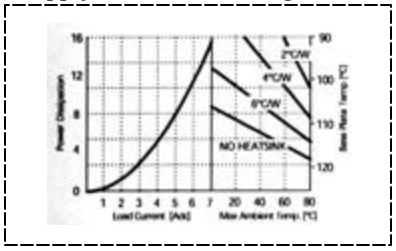
Maximum switching frequency	80 Hz

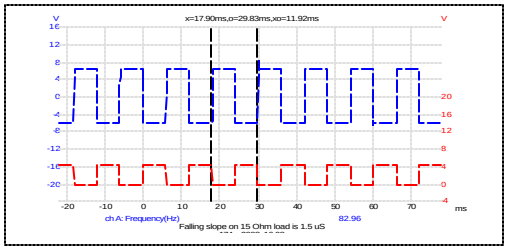
All specifications were giving without any heatsink at room temperature

General Specifications:

Ambient operating temperature range	-35^0 C to 75^0 C
Ambient storage temperature range	-55^0 C to 125^0 C
Dielectric Strength input-to-output	3,000VAC







Load

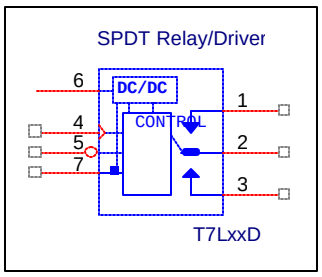
Control

A sample of driving a load at 82 Hz

Mechanical Specifications:

Weight (lb)		2.2
Encapsulation	Epoxies Etc.	50-2366RFR / 50-2366CFR

PIN 1: NO1
PIN 2: COM
PIN 3: NO2
PIN 4: Control Signal (CS) (5VDC)
PIN 5: Enable (EN)
PIN 6: + 12 VDC
PIN 7 GND



All Dimensions are in inches (millimeters).

Dimensions for SIP7 package	1.15"H x 1.75"L x 0.8"W
Terminals/solder for SIP7 package	control - 0.20", power – 0.6"

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 AC applied voltage and unidirectional for DC applied voltage, should be used to clamp excessive spikes.

Input Electrical Characteristics (Ta = 25^{0}C) for T7L200A40L500A5/5/12, p/n EDR82769/2/3

Characteristic	Test Condition	Min	Typ.	Max.	Unit
Control Voltage, low level threshold			1.7		V
Control Voltage, high level threshold			3.3		V
Enable (EN) threshold (pin 5)			1.0	2.0	V
Input Current			0.300		mA

Input Electrical Characteristics (Ta = 25^{0}C)

Power Supply (pins 6), Vcc (200 mA maximum)	11	12	13	V
Maximum Vcc current at DC – 1.0 Hz		40		mA
Maximum Vcc Current at 80 KHz		50		mA

Switching time test – Load – 8.3 Ohm & 2.2 A

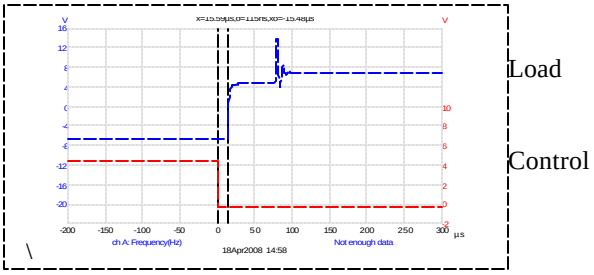


Figure 1 Turn-on delay is 15.3 µS

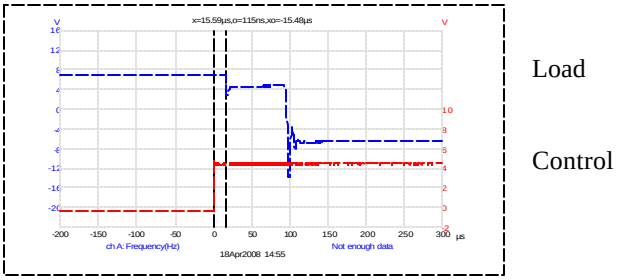


Figure 2 Turn-off delay is 15.3 µS

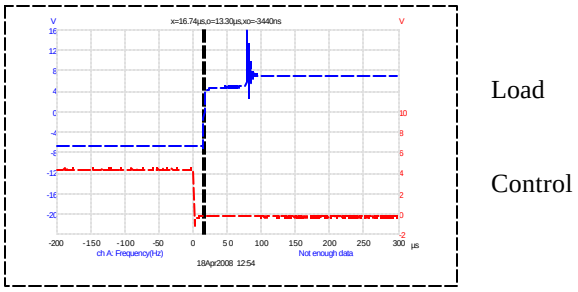


Figure 3 Rising Time is 3640 nS

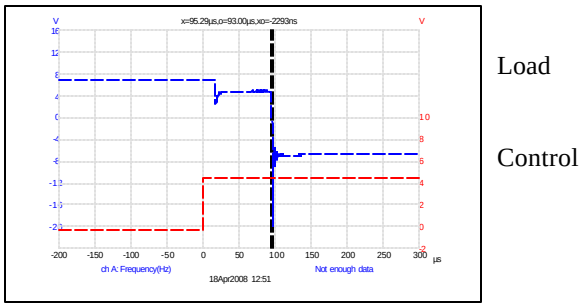


Figure 4 Fall Time is 2293 nS

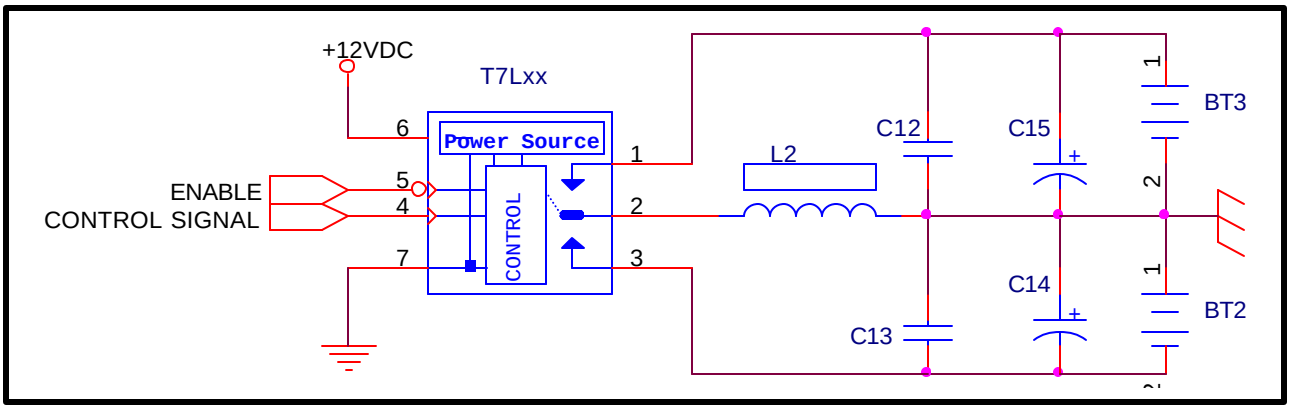


Fig. 5 Switching Time Test Circuit

The enable is connected to +5VDC via a 10K resistor and can be left floating.

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