Solid-State DC Motor Reverser

Datasheet <Rev.22DRD>

Introduction:

DRV- Series DC Reversing Solid State Relay may be used in place of traditional mechanical reversers and motor controllers. With a solid-state H-bridge construction, the internal diode bridge provides a natural discharge path for back-EMF generated at the motor's turn-OFF. This results in a switch that is arc-free, wear-free, and noise-free.

DRV- Series currently support ratings up to 1,500VDC, 200A continuous, and 400A inrush current. While the "standard model" is designed for directional control only, the "advanced model" supports directional control and pulse width modulation up to 5 kHz, enabling speed control, soft start, and soft-stop programs.

Features and Benefits

- High Power DC Reversing
- Patent Pending, Rugged Construction
- Solid State H-bridge, Built-in Flyback Suppression
- Maximum Semiconductor Performances
- Made in Canada; Semiconductor Parts from the USA

Part# Reference:

Model		Output Voltage			Output Current	Control Input			Other Features	
DRV		*004*		-	*200A*	*2*		-	*N/A*	-
DRVS	Standard Model (for DC polarity reversing only)	**004 =**	1-40 VDC		Rated Continuous Current (A)	**N/A**	3 - 32 VDC (CMOS/TTL)		**N/A** = none **S1** = 1s Soft Start only **SS2** = 2s Soft Start & Soft Stop **T2** = External Thermal protection	Other custom References
		007A =	1-75 VDC			**1 =**	3.3 - 11 VDC			
		01 =	1-100 VDC			**2 =**	12 - 32 VDC			
DRVA	Advanced Model (for DC polarity reversing and PWM up to 5kHz)	**02 =**	1-200 VDC			**3 =**	12 - 24 VDC			
		06 =	600 VDC			**4 =**	4 - 32 VDC			
		12 =	1,200 VDC			**5 =**	10 - 32 VDC			
		15 =	1,500 VDC			**6 =**	36 - 75 VDC			

Contact Us for Other Options

Contact us for any questions or custom requirements:

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	(High Power Models) Output Specifications					
Part No.	DRVx004-200A	DRVx007A-200A	DRVx01A-150A	DRVx06-120A	DRVx12-150A	DRVx15-60A
Rated Voltage	1 - 40 VDC	1 – 75 VDC	1 – 150 VDC	1 – 600 VDC	1 – 1,200 VDC	1 – 1,500 VDC
Recommended Operating Voltage:	Up to 24 VDC (motors) Up to 30 VDC (resistive loads)	Up to 48 VDC (motors) Up to 60 VDC (resistive loads)	Up to 90 VDC (motors) Up to 120 VDC (resistive loads)	Up to 230 VDC (motors) Up to 480 VDC (resistive loads)	Up to 360 VDC (motors) Up to 800 VDC (resistive loads)	Up to 690 VDC (motors) Up to 1200 VDC (resistive loads)
Rated Load Current[1]	200A	200A	150A	120A	150A	60A
Rated Peak Current[1] above	400A/200ms	400A/200ms	250A/200ms	120A	150A	60A
Typical ON-State Resistance or Voltage Drop	1.9 mΩ	2 mΩ	4.4 mΩ	<2.9 V	<3 V	45 mΩ
Leakage Current	<1.5mA	<1 mA	<2 mA	<2 mA	<2 mA	<2 mA
Max PWM[2]	**Standard Model:** 5 Hz **|** **Advanced Model:** Up to 5 kHz					
	Input Specifications					
Power Supply	**Standard Model:** None **|** **Advanced Model:** 12-32 VDC, ≥100mA					
Control Input Voltage	**Standard Model:** 12-32 VDC, ≥100mA (customizable) **|** **Advanced Mode:** 3-32 VDC, ≥2mA					
Must Turn-OFF Voltage	**Standard Model:** <5 VDC **|** **Advanced Model:** <1.5 DC					
Must Turn-ON Voltage	**Standard Model:** ≥8 VDC **|** **Advanced Model:** ≥3 VDC					
Interlock Timer	100ms (default)					
Isolation Voltage	2.5kV (AC 1min 50/60hz)					
LED Indicators	**Standard Model:** Green(forward), Red(reverse) **Advanced Model:** Amber(power), Green(forward), Red(reverse)					
	Temperature & Physical Specifications					
Operating & Storage	-40 to 80°C or -40 to 176°F					
Max Junction Temp.	165°C	150°C	165°C	165°C	165°C	165°C
Thermal Impedance[3]	R_{JC} = 0.1°C/W, R_{CH}=0.05°C/W	R_{JC} = 0.1°C/W, R_{CH}=0.08°C/W	R_{JC} = 0.15°C/W, R_{CH}=0.08°C/W	R_{JC} = 0.29°C/W, R_{CH}=0.08°C/W	R_{JC} = 0.12°C/W, R_{CH}=0.08°C/W	R_{JC} = 0.3°C/W, R_{CH}=0.1°C/W
Input Termination	14-28 AWG (max 0.4 Nm)					
Output Termination	Threaded M5					
Dimensions LxWxH	106 x 74 x 45 mm					
Typical Weight	450 g					
M.T.B.F	3 million hours					

[1] *This rating is limited by the contactor's terminals*

[2] *Exceeding recommended max PWM rating may result in deviations to output duty cycle and contactor staying ON*

[3] *R_{ch} assumes thermal interface material of 1W/mK, 0.07mm, is applied between the base plate and the heatsink surface*

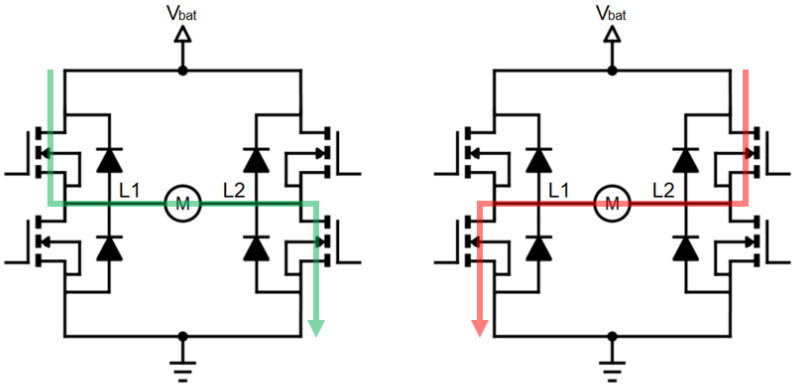
	(Low Power Models) Output Specifications					
Part No.	DRVS01-50A4	DRVS01-60A4	DRVS02-50A	DRVS02-60A	-	-
Rated Voltage	1 - 100 VDC	1 – 100 VDC	1 – 200 VDC	1 – 200 VDC	-	-
Recommended Operating Voltage:	Up to 48 VDC (motors) Up to 80 VDC (resistive loads)	48 VDC (motors) 80 VDC (resistive loads)	Up to 90 VDC (motors) Up to 120 VDC (resistive loads)	Up to 90 VDC (motors) Up to 120 VDC (resistive loads)	-	-
Rated Load Current[4]	50A	60A	50A	60A	-	-
Rated Peak Current[1] above	100A/200ms	200A/150ms	100A/200ms	200A/150ms	-	-
Typical ON-State Resistance or Voltage Drop	10 mΩ	5 mΩ	0.4V (typical), 0.7V (max)	0.6V (typical) 0.9V (max)	-	-
Leakage Current	<1 mA				-	-
Max PWM[5]	5Hz				-	-
	Input Specifications					
Control Input Voltage	4-32 VDC, ~20mA				-	-
Must Turn-OFF Voltage	<2 VDC				-	-
Must Turn-ON Voltage	>3 VDC				-	-
Interlock Timer	100ms (default)				-	-
Isolation Voltage	2.5kV (AC 1min 50/60hz)				-	-
LED Indicators	**Standard Model:** Green(forward), Red(reverse)				-	-
	Temperature & Physical Specifications					
Operating & Storage	-40 to 60°C or -40 to 176°F				-	-
Max Junction Temp.	100°C	110°C	110°C	110°C	-	-
Thermal Impedance[6]	R_{JC} = 0.3°C/W, R_{CH}=0.7°C/W	R_{JC} = 0.3°C/W, R_{CH}=0.5°C/W	R_{JC} = 0.3°C/W, R_{CH}=0.5°C/W	R_{JC} = 0.3°C/W, R_{CH}=0.5°C/W	-	-
Input Termination	14-22 AWG (max 0.4 Nm)				-	-
Output Termination	M4	M5	M5	M5	-	-
Dimensions LxWxH	56 x 45 x 30 mm	105 x 73 x 41 mm	105 x 73 x 41 mm	105 x 73 x 41 mm	-	-
Typical Weight	180 g	400 g	350 g	400 g	-	-

[4] *This rating is limited by the contactor's terminals*

[5] *Exceeding recommended max PWM rating may result in deviations to output duty cycle and contactor staying ON*

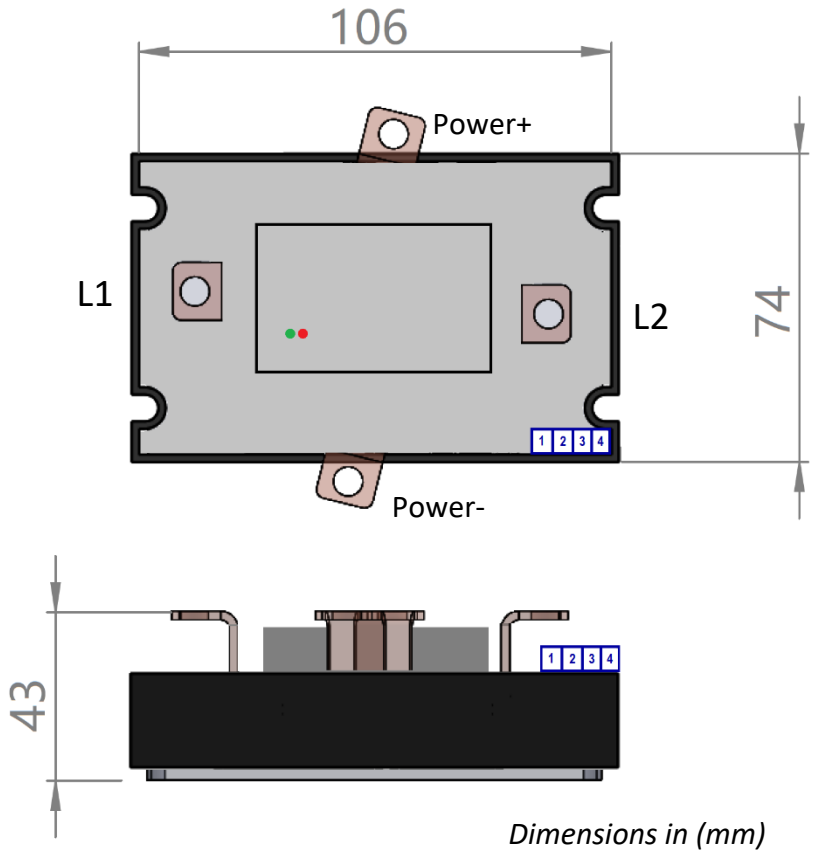
[6] *R_{ch} assumes thermal interface material of 1W/mK, 0.07mm, is applied between the base plate and the heatsink surface*

Principle of Operation:



Forward **Reverse**

Dimensional Drawings:



Dimensions in (mm)

Standard Model	
Input Terminal	**Connection(s)**
1	N/A
2	FWD Signal (+)
3	0V/COM or FWD (-), REV (-)
4	REV Signal (-)

Advanced Model	
Input Terminal	**Connection(s)**
1	0V COM, or Power (-), FWD (-), REV (-)
2	Power (+), +12-32 VDC, ≥100mA
3	FWD Signal, +3-32 VDC
4	REV Signal, +3-32 VDC

Minimum Thermal Derating Requirement:

When unsure about operating duty cycle, use continuous current as the basis of cooling needs.

DRVX004-200A (*Rated 40VDC, 200A*) Minimum Heatsink Derating at 40°C T-Ambient				
Operating Current (Δ=Voltage Drop)	**Continuous (100% Duty)**	**1kHz (50% Duty)**	**3kHz (50% Duty)**	**5kHz (50% Duty)**
50A (Δ0.09V)	27.6°C/W	42.8°C/W	29.4°C/W	22.3°C/W
100A (Δ0.18V)	6.8°C/W	12°C/W	9.5°C/W	7.9°C/W
150A (Δ0.27V)	2.9°C/W	5.5°C/W	4.6°C/W	4°C/W
200A (Δ0.36V)	1.6°C/W	3.1°C/W	2.7°C/W	2.4°C/W

DRVX007A-200A (*Rated 75VDC, 200A*) Minimum Heatsink Derating at 40°C T-Ambient				
Operating Current (Δ=Voltage Drop)	**Continuous (100% Duty)**	**1kHz (50% Duty)**	**3kHz (50% Duty)**	**5kHz (50% Duty)**
50A (Δ0.2V)	12.3°C/W	21°C/W	16°C/W	13°C/W
100A (Δ0.4V)	2.9°C/W	5.5°C/W	4.7°C/W	4.1°C/W
150A (Δ0.6V)	1.2°C/W	2.4°C/W	2.2°C/W	1.9°C/W
200A (Δ0.8V)	0.6°C/W	1.3°C/W	1.2°C/W	1.1°C/W

DRVX01A-150A (*Rated 150VDC, 150A*) Minimum Heatsink Derating at 40°C T-Ambient				
Operating Current (Δ=Voltage Drop)	**Continuous (100% Duty)**	**1kHz (50% Duty)**	**3kHz (50% Duty)**	**5kHz (50% Duty)**
50A (Δ0.39V)	6.2°C/W	11.6°C/W	9.9°C/W	8.6°C/W
100A (Δ0.78V)	1.4°C/W	2.9°C/W	2.6°C/W	2.4°C/W
150A (Δ1.17V)	0.5°C/W	1.2°C/W	1.1°C/W	1.1°C/W

DRVX06-120A (*Rated 600VDC, 120A*) Minimum Heatsink Derating at 40°C T-Ambient	
Operating Current (Δ=Voltage Drop)	**Continuous (100% Duty)**
50A (Δ2.4V)	0.5°C/W
100A (Δ3.0V)	0.1°C/W

DRVX12-150A (*Rated 1,200VDC, 150A*) Minimum Heatsink Derating at 40°C T-Ambient	
Operating Current (Δ=Voltage Drop)	**Continuous (100% Duty)**
50A (Δ2.6V)	0.5°C/W
100A (Δ3.4V)	0.1°C/W

DRVX15-60A (*Rated 1,500VDC, 60A*) Minimum Heatsink Derating at 40°C T-Ambient	
Operating Current (Δ=Voltage Drop)	**Continuous (100% Duty)**
25A (Δ2.5V)	1.5°C/W
50A (Δ3.0V)	0.2°C/W