DC Solid-State Motor Reverser

DRV-Series Datasheet *<Rev.DR2305F>*

Introduction:

DRV- Series DC solid-state reversers offer a retrofit solution for conventional electromechanical reversers. With a solid-state H-bridge construction, internal structure provides a natural discharge path for back-EMF generated at the motor's turn-OFF. This results in a switch that is maintenance-free, arc-free, and noise-free.

***DRV-* Series** are rated up to 1,500VDC, and 200A continuous. While the "standard model" is designed for directional control only, the "advanced model" further allows pulse width modulation up to 5 kHz, enabling speed control, soft start, and soft-stop programs.

Features and Benefits

- Maintenance-free, Arc-free, Noise-free,
- Robustly Built for High Power Loads
- Cutting-edge PWM Models for Advanced Controls
- Available Ratings Up to 1.5kVDC and 200A
- 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 **ST** = Soft-start Only **SP** = Soft-stop Only **SS** = Soft-start & Soft-stop	Other custom References
		007A =	1-75 VDC			**1 =**	3.3 - 11 VDC			
		01 =	1-100 VDC			**2 =**	12 - 32 VDC			
DRVA	Advanced PWM Model (for polarity reversing and PWM)	**02 =**	1-200 VDC			**3 =**	12 - 24 VDC			
		06 =	600 VDC			**4 =**	4 - 32 VDC			
		1K =	1,000 VDC							
		1K5 =	1,500 VDC							

Contact Us for Other Options

Contact us for any questions or custom requirements:

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	Specifications					
Part No.	**DRV□004-200A**	**DRV□01-200A**	**DRV□02-150A**	**DRV□06-120A**	**DRV□1K-150A**	**DRV□1K5-60A**
Rated Voltage	1 - 40 VDC	1 – 100 VDC	1 – 200 VDC	1 – 600 VDC	1 – 1,000 VDC	1 – 1,500 VDC
Recommended Operating Voltages	(Motors): Up to 24 VDC (Resistive Loads): Up to 30 VDC	(Motors): Up to 36 VDC (Resistive Loads): Up to 80 VDC	(Motors): Up to 60 VDC (Resistive Loads): Up to 150 VDC	(Motors): Up to 180 VDC (Resistive Loads): Up to 480 VDC	(Motors): Up to 230 VDC (Resistive Loads): Up to 750 VDC	(Motors): Up to 360 VDC (Resistive Loads): Up to 1000 VDC
Rated Load Current[1]	200A	200A	150A	120A	150A	60A
Rated Surge Current[2]	400A	300A	200A	120A	150A	60A
Typical ON Resistance or Voltage Drop	12 mΩ	5 mΩ	15 mΩ	<2.9 V	<3.4 V	45 mΩ
Leakage Current	<1mA					
	Standard Model, Input Specifications			**Advanced PWM Model, Input Specifications**		
CTRL Power Supply	None			12-32 VDC, ~100mA		
CTRL Input Voltage	12-32 VDC, ~100mA (customizable) FWD = L1+/L2- | REV = L1-/L2+			3-32 VDC, ~2mA (TTL/CMOS/Logic compatible) FWD = L1+/L2- | REV = L1-/L2+		
Max PWM[3]	20 Hz			Up to 5kHz		
Must Turn-OFF Voltage	<8 VDC			<1.5 VDC		
Interlock Timer	200ms (default)					
Isolation Voltage	2.5kV (AC 1min 50/60hz)					
LED Indicators	Green(forward), Red(reverse)			Amber(power), Green(forward), Red(reverse)		
	Temperature & Physical Specifications					
Operating & Storage	-40 to 80°C [-40 to 176°F]					
Max Junction & Baseplate Temperature	Junction: 125°C [257°F] Baseplate: 100°C [212°F]					
Thermal Impedance[4]	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} = 0.1°C/W, R_{CH}=0.1°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	106x80x50 mm [4.17x3.15x2 in]					
Typical Weight	450 g [1 lb]					

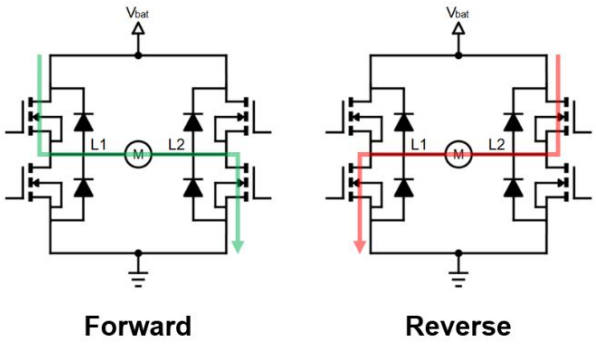
[1] Rated continuous load current assumes baseplate is at a temperature of 100°C..

[2] Rated assumes baseplate is at 25°C. Surge-current withstanding duration depends on cooling provided, up to a maximum of 5s.

[3] Exceeding max PWM may result in duty cycle drift until the unit no longer turning off. For Advanced PWM models, doing so may also generate excessive transient and heating.

[4] R_{JC} =Thermal impedance of junction-baseplate, R_{CH} = thermal impedance of baseplate-heatsink. R_{CH} assumes the presence of a thermal interface material layer of 1W/mK, 0.2mm.

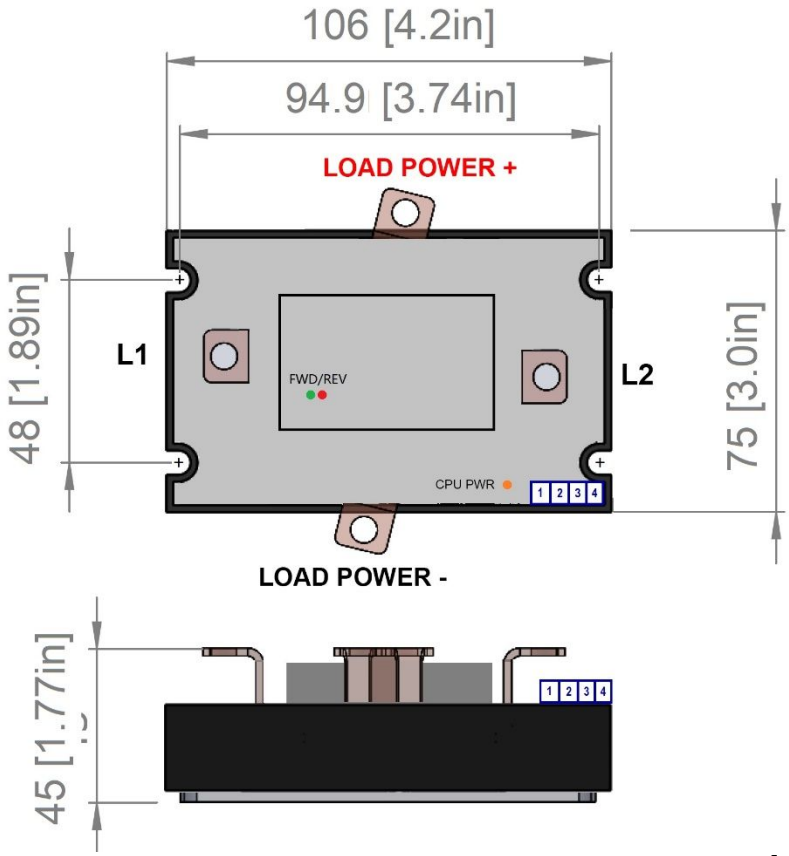
Principle of Operation & Selection Guidlines:



Forward Reverse

- Choose SSR with "*rated voltage*" at least **2x higher** the operating voltage.
- If the DC motor does not require plugging, choose SSR with *"rated current"* **moderately higher than** the motor's **inrush** current.
- If the DC motor requires plugging, choose SSR with *"rated peak current"* **moderately higher than** the motor's **plugging** current.
- When in doubt, a good rule of thumb is to choose a SSR with "*rated current*" **5-8x higher** than the motor's nominal operating current.
- Size a heatsink based on highest current that will sustains over 1 second. Typically, this is the stall current.
- Always consider adding a snubber across load terminals. This will help to suppress transients.

Dimensional Drawings:



Dimensions in mm [in]

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

Advanced PWM 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

Thermal Derating Requirement (Heatsink Rth Upper Limit):

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

DRV□004-200A (*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)	19.9°C/W	30.4°C/W	20.5°C/W	15.5°C/W
100A (Δ0.18V)	4.9°C/W	8.5°C/W	6.7°C/W	5.5°C/W
150A (Δ0.27V)	2.1°C/W	3.9°C/W	3.3°C/W	2.8°C/W
200A (Δ0.36V)	1.1°C/W	2.2°C/W	1.9°C/W	1.7°C/W

DRV□01-200A (*Rated 100VDC, 200A)* Minimum Heatsink Derating at 40°C T-Ambient				
Operating Current (Δ=Voltage Drop)	**Continuous (100% Duty)**	**1kHz (50% Duty)**	**2kHz (50% Duty)**	**3kHz (50% Duty)**
50A (Δ0.1V)	12.91°C/W	15.2°C/W	10.8°C/W	8.3°C/W
100A (Δ0.2V)	1.71°C/W	4.7°C/W	3.7°C/W	3°C/W
150A (Δ0.3V)	0.67°C/W	2.2°C/W	1.8°C/W	1.5°C/W
200A (Δ0.4V)	0.3°C/W	1.2°C/W	1°C/W	0.9°C/W

DRV□02-150A (*Rated 200VDC, 150A)* Minimum Heatsink Derating at 40°C T-Ambient				
Operating Current (Δ=Voltage Drop)	**Continuous (100% Duty)**	**1kHz (50% Duty)**	**2kHz (50% Duty)**	**3kHz (50% Duty)**
50A (Δ0.4V)	1.96°C/W	4°C/W	3.9°C/W	3.8°C/W
75A (Δ0.6V)	0.66°C/W	1.7°C/W	1.7°C/W	1.6°C/W
100A (Δ0.8V)	0.3°C/W	0.9°C/W	0.9°C/W	0.9°C/W
125A (Δ1V)	0.13°C/W	0.5°C/W	0.5°C/W	0.5°C/W

DRV□06-120A (*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

DRV□1K-150A (*Rated 1,000VDC, 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

DRV□1K5-60A (*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