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Si24SB4-30V-20A-AP1, Smart H-Bridge, with Integrated Aluminum Plate Heat-Sink, 5kHz or 20kHz PWM Soft-Start and Soft-Stop, Active Low Control Inputs, Y-Chip

The **Si24SB4-30V-20A-AP1** is a 30V 20A, microprocessor based, high-power, Smart H-Bridge with a small (4.0"x3.3"x0.062") Aluminum Plate Heat Sink and with user selectable Soft-Start and Soft-Stop features. This controller uses a single (9V to 30V at 0 to 20A) DC power supply to control the speed of a DC motor (or load-current) in forward or reverse direction. An onboard microprocessor generates a 5kHz or 20kHz **PWM** carrier signal, controls the load-power (or motor speed), controls the load-current rate (or motor acceleration and deceleration). The **PWM** carrier frequency is user selectable by the jumper **J2**, 20kHz when **J2** is open and 5kHz when short. This high frequency PWM rate insures a quiet motor environment. The user can choose between slow or fast (Soft Select) motor



acceleration/deceleration modes by short-circuiting or open-circuiting the pins labeled **J1**. The slow mode, with rise-time/fall-time of 1.25Sec, is selected by short-circuit (**J1** jumper installed); while the fast buildup mode, with rise-time/fall-time of 0.05s, is selected by leaving these pins open (no Jumper installed). As the name "Smart" implies the required motor speed (or PWM pulse-duration) is variable from 0 to 100% in 0.83% steps using the analog voltage ($V_{P1,G}$ on **CN6**), while the motor direction (or Load-Current Direction) is selected using two active low digital (0 to +5V) control signals ($V_{F,N}$ and $V_{R,N}$) or switches. All inputs are optically isolated or zener-diode protected. A bicolor LED is used to monitor the motor (or load) voltage (Red = Forward, Green = Reverse). A small (4.0"x3.3"x0.065") integrated Aluminum Plate Hear-Sink is used to operate at 20A current levels. Higher current-levels (25A or 750W) can be achieved with more efficient heat-sinks. Please click on this link and read the [Board Mounting Instructions and Heat Sink Selection Guide](#). This board operates in a wide voltage-range (9V to 50V) at max. continuous load current of 20A. Typical applications are: Bi-directional DC Motor-Speed Controller, Peltier Effect TE Coolers, Heat Pumps, DPDT Solid State Relay, etc. This board can be configured and programmed to perform efficiently in many customized applications.

Motor Control-Action Truth Table, (Pins on Connector CN4)

$(V_{F,N})$ Voltage at Pin F relative to pin N	$(V_{R,N})$ Voltage at Pin R relative to pin N	Operation Mode of Motor or Load
$V_{F,N} = 5V$ or pin Open	$V_{R,N} = 5V$ or pin Open	Stop Rotatio (Motor Open)
$V_{F,N} = 0V$ @ 2mA Sink	$V_{R,N} = 5V$ or pin Open	Forward Rotation with V_{PWM} Control
$V_{F,N} = 5V$ or pin Open	$V_{R,N} = 0V$ @ 2mA Sink	Reverse Rotation with V_{PWM} Control
$V_{F,N} = 0V$ @ 2mA Sink	$V_{R,N} = 0V$ @ 2mA Sink	Stop Rotation (Motor Open)

The motor action or load-current direction is controlled by active low control inputs, (0 to +5V) applied to Pin **F** (Forward) and/or pin **R** (Reverse) relative to Pin **N** (Neutral) on the Connector **CN4**. These pins are optically isolated from the H-Bridge, providing good noise immunity for these inputs. The control actions and the required voltage levels are defined by the Truth-Table listed above. All control lines (analog and digital) are sampled approximately at 80Hz rate in the fast mode (**J1** jumper open), and at 8Hz rate in the slow mode (**J1** jumper short).

