

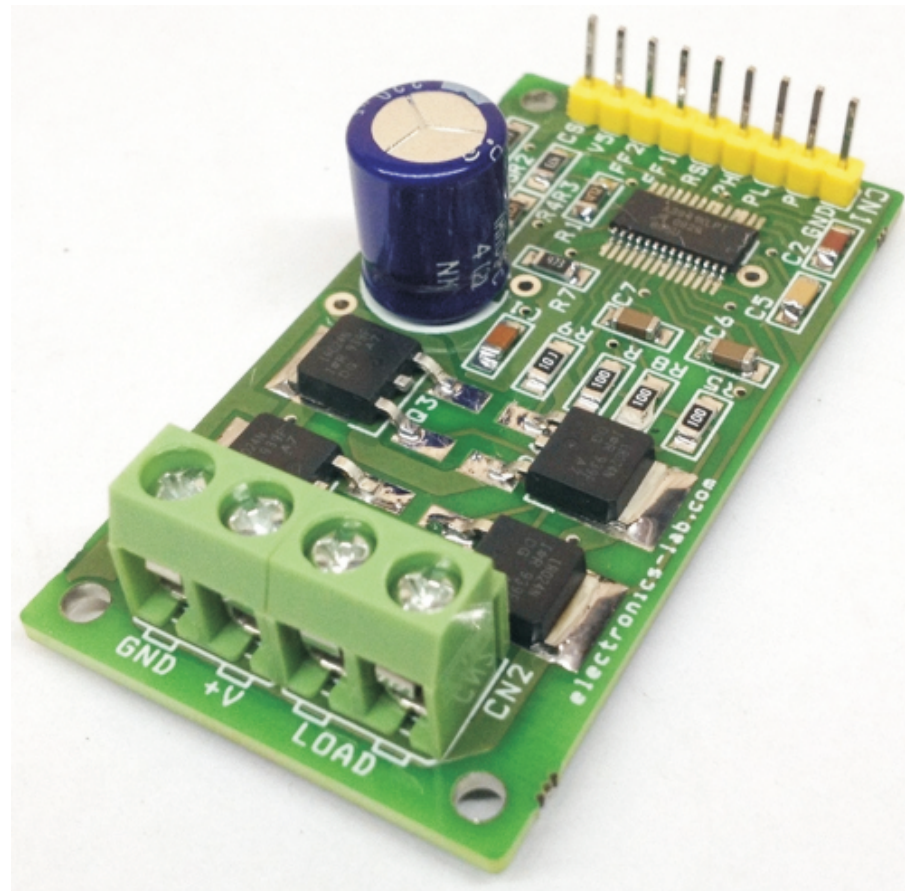
50V/10A Bidirectional DC Motor Driver Using A3941

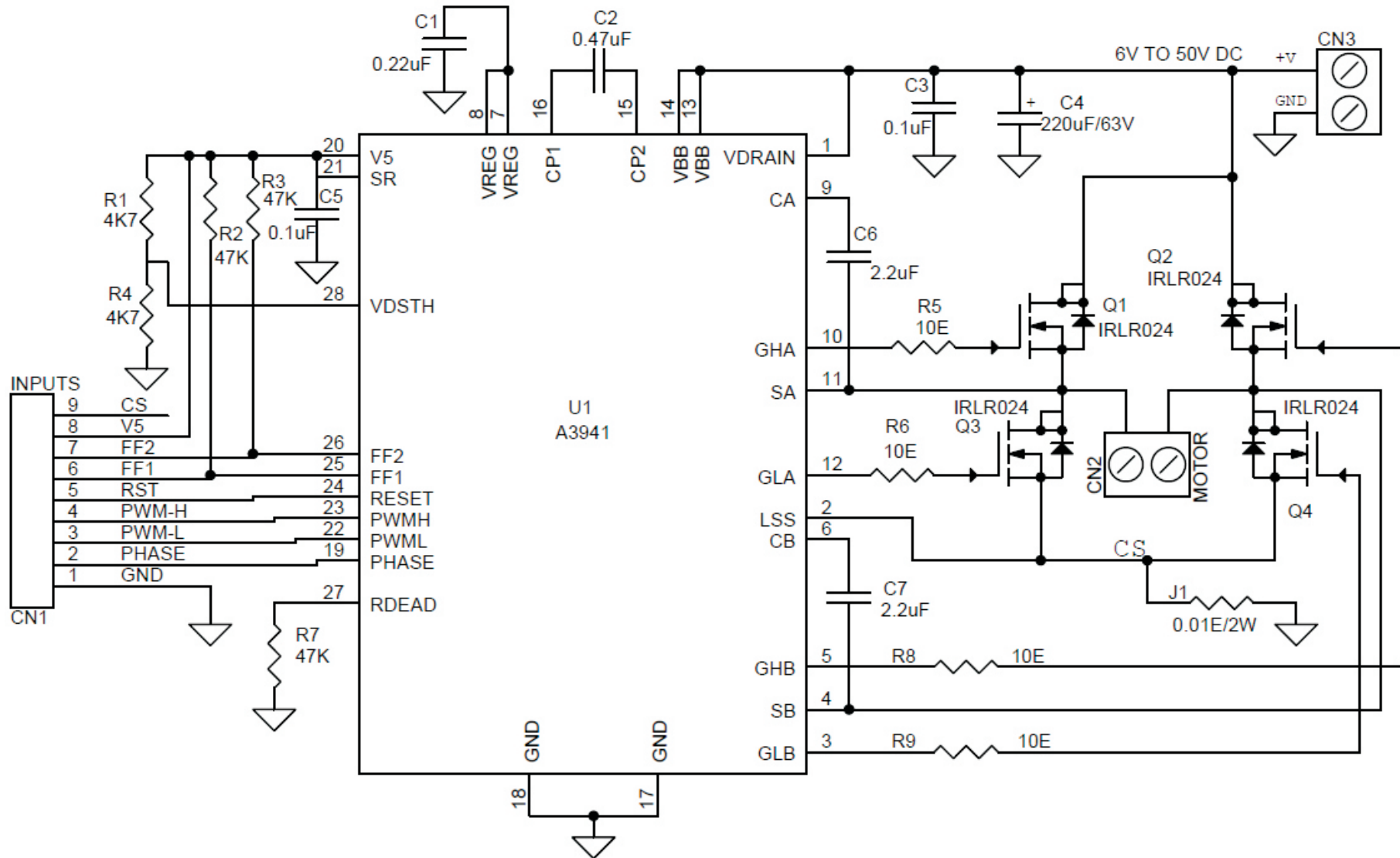
The tiny board designed to drive bidirectional DC brushed motor of large current, DC supply up to 50V DC. A3941 gate driver IC and 4X N Channel Mosfet IRLR024 used as H-Bridge. The project can handle load continues 10Amp. Screw terminals provided to connect load and load supply, 9 Pin header connector provided for easy interface with micro-controller. On board shunt resistor provides current feedback.

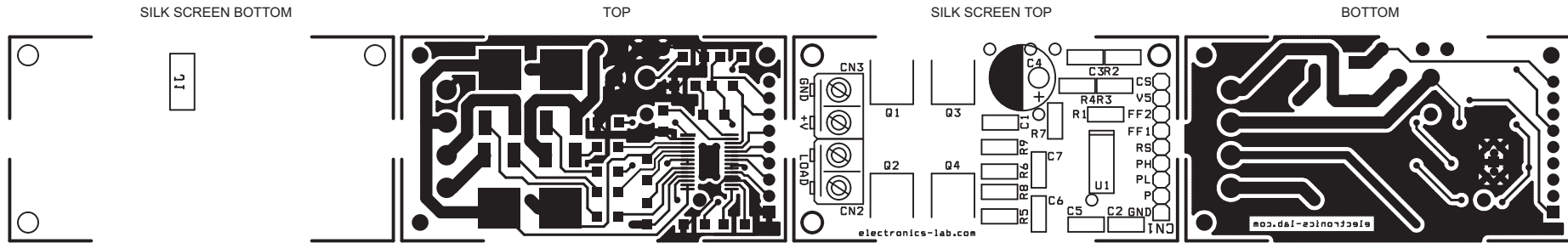
The A3941 is a full-bridge controller for use with external N-channel power MOSFETs and is specifically designed for automotive applications with high-power inductive loads, such as brush DC motors. A unique charge pump regulator provides full (>10 V) gate drive for battery voltages down to 7 V and allows the A3941 to operate with a reduced gate drive, down to 5.5 V. A bootstrap capacitor is used to provide the above-battery supply voltage required for N-channel MOSFETs. An internal charge pump for the high-side drive allows DC (100% duty cycle) operation. The full bridge can be driven in fast or slow decay modes using diode or synchronous rectification. In the slow decay mode, current recirculation can be through the high-side or the low side FETs. The power FETs are protected from shoot-through by resistor R7 adjustable dead time. Integrated diagnostics provide indication of under voltage, over temperature, and power bridge faults, and can be configured to protect the power MOSFETs under most short circuit conditions.

Features

- High current gate drive for N-channel MOSFET full bridge
- High-side or low-side PWM switching
- Charge pump for low supply voltage operation
- Top-off charge pump for 100% PWM
- Cross-conduction protection with adjustable dead time
- 5.5 to 50 V supply voltage range
- Integrated 5 V regulator
- Diagnostics output
- Low current sleep mode







MOTOR CONTROL TRUTH TABLE			
PWM L	PWM H	PHASE	OPERATIONS
H	H	H	MOTOR CW
H	H	L	MOTOR CCW
H	L	X	BRAKE
L	H	X	BRAKE
PULL RESET PIN HIGH WITH 22K RESISTOR FOR NORMAL OPERATIONS			

FAULTS DEFINITIONS		
FF1	FF2	OUTPUT
LOW	LOW	NO FAULT
LOW	HIGH	SHORT CIRCUIT
HIGH	LOW	OVR TEMP.
HIGH	HIGH	UNDR VOLT

BOM			
SR	QNTY.	REF.	DESC.
1	1	CN1	9 PIN HEADER CONNECTOR
2	1	CN2	2 PIN SCREW TERMINAL
3	1	CN3	2 PIN SCREW TERMINAL
4	1	C1	0.22uF SMD 1206
5	1	C2	0.47uF SMD 1206
6	2	C3,C5	0.1uF SMD 1206
7	1	C4	220uF/63V
8	2	C6,C7	2.2uF SMD 1206
9	1	J1	0.01E/2W SMD 2512
10	4	Q1,Q2,Q3,Q4	IRLR024 SMD DPAK
11	2	R1,R4	4K7 SMD 1206
12	3	R2,R3,R7	47K SMD 1206
13	4	R5,R6,R8,R9	10E SMD 1206
14	1	U1	A3941 SMD

The A3941 is a full-bridge MOSFET driver (pre-driver) requiring a single unregulated supply of 7 to 50 V. It includes an integrated 5 V logic supply regulator. The four high current gate drives are capable of driving a wide range of N-channel power MOSFETs, and are configured as two high-side drives and two low-side drives. The A3941 provides all the necessary circuits to ensure that the gate-source voltage of both high-side and low-side external FETs are above 10 V, at supply voltages down to 7 V. For extreme battery voltage drop conditions, correct functional operation is guaranteed at supply voltages down to 5.5 V, but with a reduced gate drive voltage. The A3941 can be driven with a single PWM input from a Microcontroller and can be configured for fast or slow decay. Fast decay can provide four-quadrant motor control, while slow decay is suitable for two-quadrant motor control or simple inductive loads. In slow decay, current recirculation can be through the high-side or the low-side MOSFETs. In either case, bridge efficiency can be enhanced by synchronous rectification. Cross conduction (shoot through) in the external bridge is avoided by an adjustable dead time. A low power sleep mode allows the A3941, the power bridge, and the load to remain connected to a vehicle battery supply without the need for an additional supply switch. The A3941 includes a number of protection features against under voltage, over temperature, and Power Bridge faults. Fault states enable responses by the device or by the external controller, depending on the fault condition and logic settings. Two fault flag outputs, FF1 and FF2, are provided to signal detected faults to an external controller.

