BC10/BC20

PRELIMINARY

FEATURES

- 10V TO 500V MOTOR SUPPLY AT 20 A CONTINUOUS AND 40 A PEAK OUTPUT CURRENT, BC20
- 10V TO 100V MOTOR SUPPLY AT 10 A CONTINUOUS AND 20 A PEAK OUTPUT CURRENT, BC10
- OPERATION WITH 10.8V TO 16V VCC, ALLOWING NOMINAL 12V OR 15 V VCC SUPPLIES
- THREE PHASE FULL BRIDGE OPERATION WITH 2 OR 4 QUADRANT PWM
- AUTOMATIC BRAKING WHEN USING 2 QUADRANT PWM
- THERMAL PROTECTION
- TOP AND BOTTOM RAIL SHORT CIRCUIT PROTECTION
- ANTI SHOOT THROUGH DESIGN
- 50 KHZ INTERNALLY SET PWM FREQUENCY, WHICH MAY BE LOWERED WITH EXTERNAL CAPACITOR S
- SELECTABLE 60° OR 120° COMMUTATION SEQUENCES
- COMMUTATION TRANSITIONS OUTPUT FOR DERIVING SPEED CONTROL
- MAY BE USED OPEN LOOP, OR WITHIN A FEEDBACK LOOP
- ANALOG MOTOR CURRENT MONITOR OUTPUT, MAY BE USED FOR TORQUE CONTROL OR FOR TRANSCONDUCTANCE AMPLIfiER DRIVE.
- ANALOG REFERENCE, FEEDBACK, AND TORQUE INPUTS

DESCRIPTION

The BC10 and BC20 Brushless DC Motor Controllers provide the necessary functions to control conventional 3 phase brushless dc motors in an open loop or closed loop system. The BC10 is able to control motors requiring up to 1 kW continuous input power; the BC20 is able to control larger motors requiring up to 10 kW continuous input power.

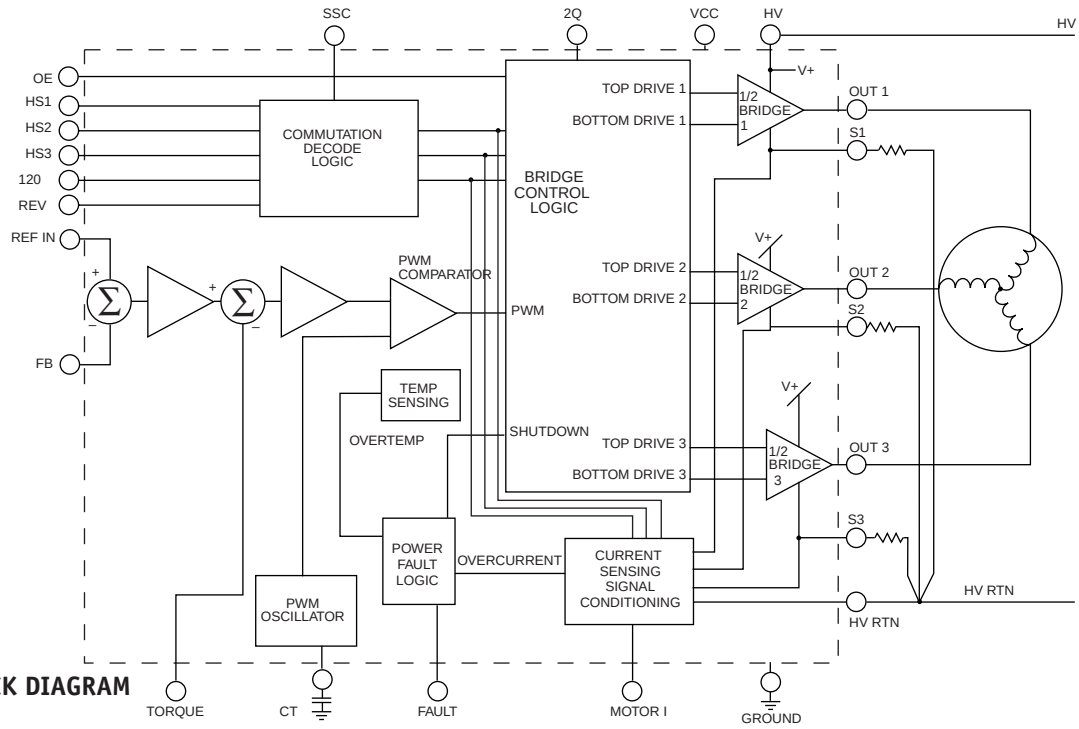
Both controllers drive the motors, generate the PWM, decode the commutation patterns, multiplex the current sense, and provide error amplification. Operation with either 60° or 120° commutation patterns may be selected with a logic input.

Current sense multiplexing is used to make the current monitor output always proportional to the active motor coils current. Therefore the current monitor output may be used in generating transconductance drive for easy servo compensation.

The controller may generate 4-quadrant PWM for applications requiring continuous transition through zero velocity, or 2 quadrant PWM for electrically quieter operation in unidirectional applications. Direction of rotation may be reversed in 2-quadrant mode by using the reverse command input. When in 2-quadrant mode if the motor is stopped or decelerating dynamic braking is automatically applied. In this way deceleration profiles may be followed even when using 2-quadrant PWM.

APPLICATIONS

- 3 PHASE BRUSHLESS MOTOR CONTROL



BLOCK DIAGRAM

ABSOLUTE MAXIMUM RATINGS

	BC10	BC20
MOTOR VOLTAGE, V+	100V	500V
CIRCUIT SUPPLY, Vcc	16V	16V
OUTPUT CURRENT, peak	20A	40A
OUTPUT CURRENT, continuos	10 A	20A
POWER DISSIPATION, internal	TBD	TDB
ANALOG INPUT VOLTAGE	–0.3V to Vcc+0.3V	–0.3V to Vcc +0.3
DIGITAL INPUT VOLTAGE	–0.3V to 5.35V	–.03V tp 5.35V
TEMPERATURE, pin solder, 10s	300°C	300°C
TEMPERATURE, junction[1]	150°C	150°C
TEMPERATURE RANGE, storage	–65 to 150°C	–65 to 150°C
OPERATING TEMPERATURE, case	–25 to 85°C	–25 to 85°C

SPECIFICATIONS

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
ERROR AMP					
OFFSET VOLTAGE				3.3	mV
BIAS CURRENT				4	pA
GAIN, DC[2]		19.8	20	20.2	db
COMMON MODE VOLTAGE RANGE		0		Vcc–2.5	V
UNITY GAIN BANDWIDTH			1.4		MHz
INPUT AMP					
STAGE GAIN[2]		9.5	10	10.5	V/V
INPUT IMPEDANCE[2]			2		Kohm
COMMON MODE VOLTAGE			Vcc/2		
COMMON MODE REJECTI0N		46	80		db
DIFFERENTIAL OFFSET			TBD		
UNITY GAIN BANDWIDTH			1.4		MHz
OUTPUT					
TOTAL R_{on}			TBD		
EFFICIANCY, 10A			HIGH		
SWITCHING FREQUENCY			50		Khz
CURRENT, continuous, BC10		10		10	A
CURRENT, peak, BC10		20		20	A
CURRENT, continuous, BC20		20		20	A
CURRENT, peak, BC20		40		40	A
UNITY GAIN BANDWIDTH			1.4		MHz
POWER SUPPLY					
VOLTAGE, V+ (BC10)		10		100	V
VOLTAGE, V+ (BC20)		10		500	V
VOLTAGE, Vcc		10.8		16	V

NOTES: 1. Long term operation at the maximum junction temperature will result in reduced product life. Derate internal power dissipation to achieve high MTTF.
2. Set internally.

CAUTION The BC10 and BC20 are constructed from static sensitive components. ESD handling procedures must be observed.

PIN FUNCTION

I/O	SIGNAL	DESCRIPTION	PIN
I	HV	Unregulated high current motor supply voltage	tbd
I	HVRTN	Return line for the high motor current	tbd
O	OUT1	Half bridge output for driving motor coil	tbd
O	OUT2	Half bridge output for driving motor coil	tbd
O	OUT3	Half bridge output for driving motor coil	tbd
I/O	S1	Source of the N-rail FET in half bridge 1	tbd
I/O	S2	Source of the N-rail FET in half bridge 2	tbd
I/O	S3	Source of the N-rail FET in half bridge 3	tbd
I	HS1	Commutation sensor input 1	tbd
I	HS2	Commutation sensor input 2	tbd
I	HS3	Commutation sensor input 3	tbd
I	120	Sets commutation logic for 120 0 phasing	tbd
I	REV	Reverses direction when 2 quadrant PWM is used	tbd
I	GROUND	Signal ground	tbd
I	Vcc	Control circuit power	tbd
I	REF IN	Velocity/speed input	tbd
I	FB	Input for analog voltage proportional to velocity or speed	tbd
I	TORQUE	Input for an analog voltage proportional to motor current	tbd
O	MOTOR I	Analog voltage proportional to motor current	tbd
O	SSC	HCMOS level pulse for each sensor state change.	tbd
O	FAULT	HCMOS logic level output, a 0 indicates over temperature or over current condition.	tbd
I	OE	HCMOS 1 enables power FET operation	tbd
I/O	CT	The PWM frequency may be lowered by installing a capacitor between this output and ground.	tbd
I	2Q	A logic 1 on this input enables 2 quadrant PWM	tbd

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