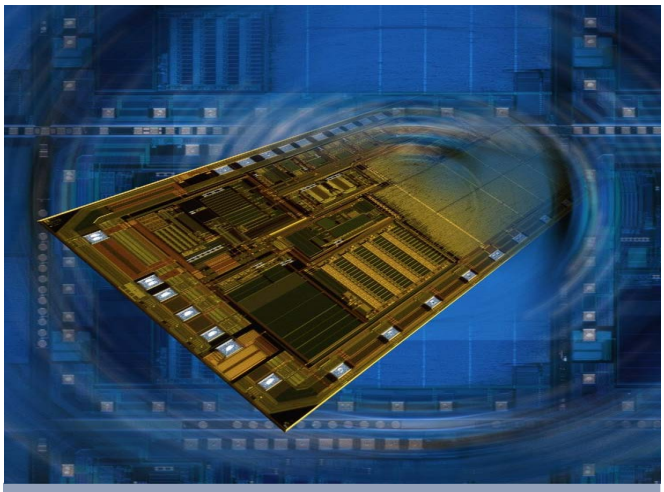
Automotive Electronics

Product Information
6A H-Bridge - CJ220

BOSCH
Invented for life



H-Bridge with integrated free-wheel diodes

Customer benefits:

- Excellent system know-how
- Smart concepts for system safety
- Secured supply
- Long- term availability of manufacturing processes and products
- QS9000 and ISO/TS16949 certified

Features

- Operating supply voltage 5V to 28V
- Typical RDSon = 150 mW for each output transistor (at 25°C)
- Continous DC load current 5A
- Output current limitation at typ. 6.5 A
- Short circuit shut down for output currents over 8A
- Logic- inputs TTL/CMOS-compatible
- Operating-frequency up to 30 kHz
- Over temperature protection
- Short circuit protection
- Undervoltage disable function
- Diagnostic output
- Enable and disable input
- Package: Power-SO20

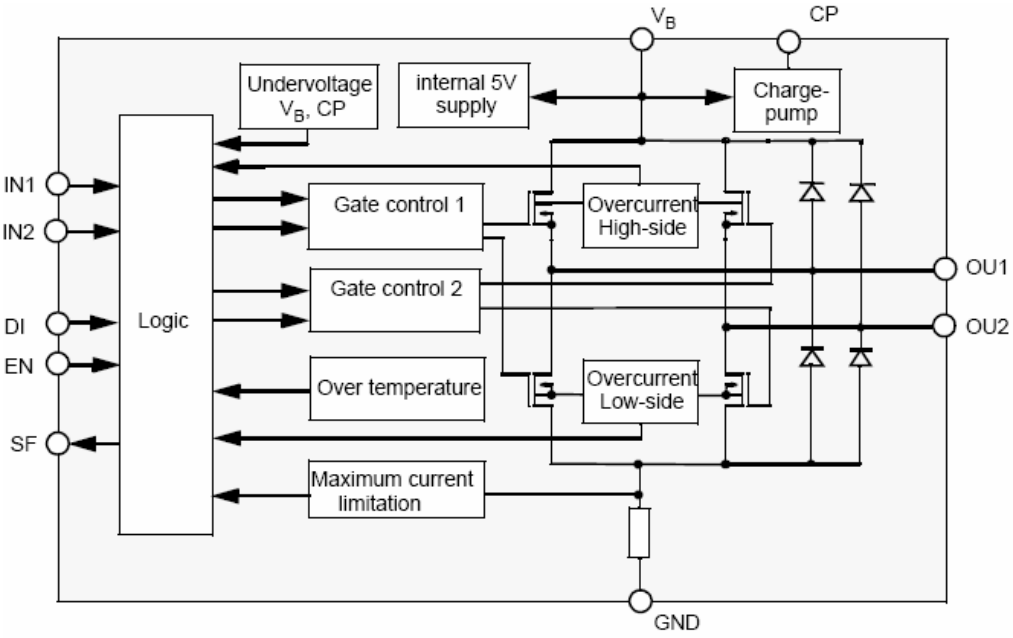
General description

The CJ220 is an intelligent full H-Bridge, designed for the Control of DC and stepper motors in safety critical applications and under extreme environmental conditions.

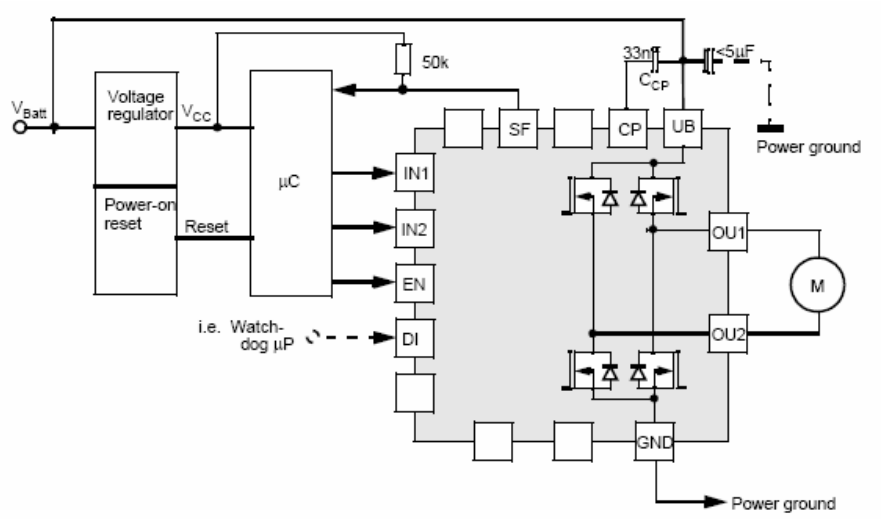
Functional description

The outputs are protected against short circuit to VB, GND and over the load. Whenever at least the supply voltages (VB) is below its specific threshold, the power stages are switched in tristate and the status flag is switched low.
If the supply voltage is over the specific threshold again, the power stage switches independently into normal operation, according to the input pins, and the status flag is reset.
In case of over-temperature or over-current is detected the power stages are switched in tristate independent of the input signals and the status-flag is switched low.
If the level changes from high to low on DI or low to high on EN, the output stage switches on again, if the temperature is below the specified limit. The status-flag is reset to high-level.
The maximum current which can flow under normal operating conditions is limited to Imax = 6,5A ±20%. When the maximum current value is reached, the output stages are switched tristate for a fixed time. According to the time-constant the current decreases exponentially until the next switch-on occurs.

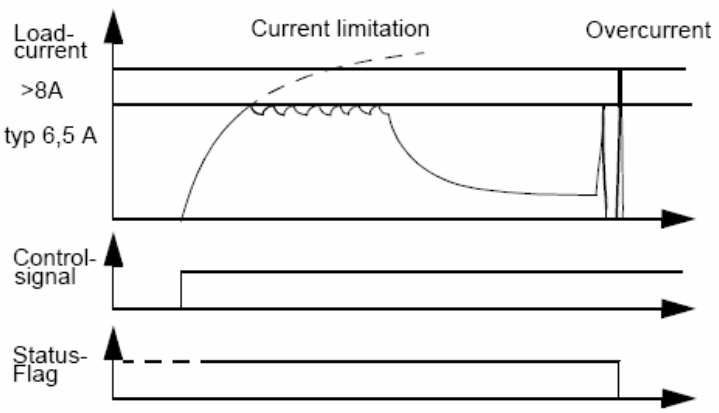
Block diagram



Application example



Timing diagram



Truth table

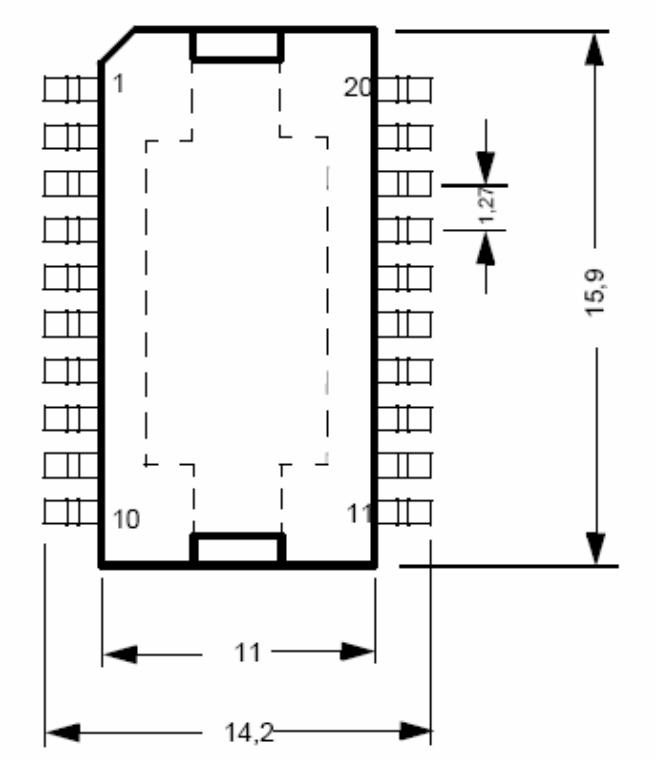
Pos.	DI	EN	IN1	IN2	OU1	OU2	SF
1. Forward	L	H	H	L	H	L	H
2. Reverse	L	H	L	H	L	H	H
3. Free-wheeling low	L	H	L	L	L	L	H
4. Free-wheeling high	L	H	H	H	H	H	H
5. Disable	H	X	X	X	Z	Z	L
6. Enable	X	L	X	X	Z	Z	L
7. IN1 disconnected	L	H	Z	X	H	X	H
8. IN2 disconnected	L	H	X	Z	X	H	H
9. DI disconnected	Z	X	X	X	Z	Z	L
10. EN disconnected	X	Z	X	X	Z	Z	L
11. Current limit. active	L	H	X	X	Z	Z	H
12. Undervoltage 1.)	X	X	X	X	Z	Z	L
13. Overtemperature 2.)	X	X	X	X	Z	Z	L
14. Overcurrent 2.)	X	X	X	X	Z	Z	L

1.) In case of undervoltage tristate and status-flag are reset automatically.

2.) Whenever overcurrent or overtemperature is detected, the fault is stored (i.e. status-flag remains low). The tristate conditions and the status-flag are reset via DI or EN.

L = Low
H = High
X = High or Low
Z = High impedance (all output stage transistors are switched off in static state).

PIN configuration



Pin description

Pin	Name	Function
1	GND	Ground
2	SF	Status-flag
3	IN1	Input 1
4	V_B	Supply voltage
5	V_B	Supply voltage
6	OU1	Output 1
7	OU1	Output 1
8	nc	
9	nc	
10	GND	Ground
11	GND	Ground
12	nc	
13	EN	Enable
14	OU2	Output 2
15	OU2	Output 2
16	V_B	Supply voltage
17	CP	Charge pump
18	DI	Disable
19	IN2	Input 2
20	GND	Ground

Electrical characteristics

Parameter	Condition	Symbol	Min	Typ	Max	Unit
Power supply						
Operating range	static	V_B	5		28	V
Logic inputs	IN1, IN2, DI, EN					
Input „high“		U	3.4			V
Input „low“		U			1.4	V
Input hysteresis		U	0,7	1		V
Input current IN1,IN2, DI	V_{IN}= 0 V	I	-200	-125		µA
Input current EN	V_{EN}= 5V	I_{EN}			100	µA
Power outputs						
Switch on resistance	R_{OU-VB}, R_{OU-BL}					
	5V<V_B<6V C_{CP}= 33nF				400	mΩ
	V_B>6V C_{CP}= 33nF				300	mΩ
Current limitation	Peak value controlled inductive load L = 0,8 ... 5 mH ressistive load R = 0,8 ... 1,8					
Switch-off current		$\|I_{OU}\|_{max}$	5.5	6.6	7.8	A
Short circuit detection current		$\|I_{OUK}\|$	8			A
Output Statusflag	Open drain-output					
Output„high“ (SF not set)	V_{SF} = 5V	I_{SF}			10	µA
Output „low“ (SF set)	V_{SF}< 1 V	I_{SF}	300			µA
Timing						
PWM frequency	C_{CP}= 33 nF	f			1	kHz
Switching frequency during current limitation	V_B= 6 .... 7V C_{CP}=33nF	f			5	kHz
	V_B= 7 ... 8V	f			10	kHz
	V_B= 8 ... 12V	f			20	kHz
	V_B> 12V	f			30	kHz
V_B-Undervoltage switch-off		$V_{VB,GND}$	4.4		5.0	V
Overtemperature switch-off		T_j	175		190	°C

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