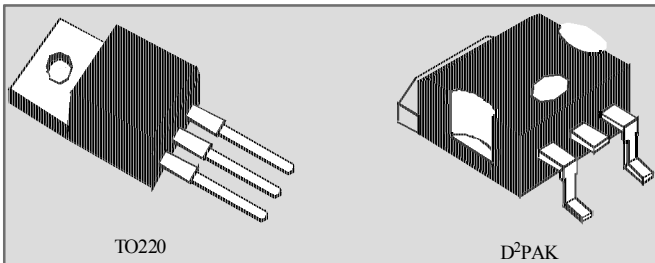


Product Information Ignition Power Switch - BIP172



BOSCH

Invented for life



Current limiting bipolar igniter with low saturation voltage

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

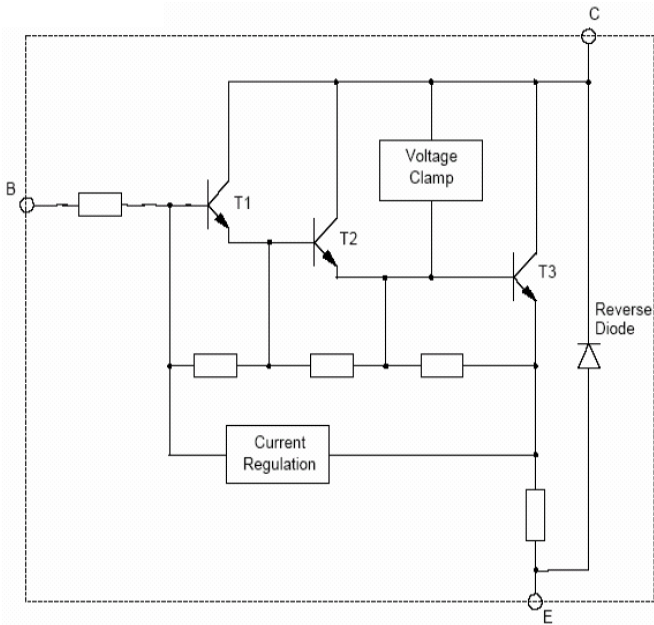
- ▶ Triple stage darlington designed for automotive ignition application
- ▶ Driven by standard CMOS logic with very low power consumption in the driving circuit
- ▶ Input protected against VBAT
- ▶ Internal CE voltage clamp, temperature compensated
- ▶ Collector current limiting circuit
- ▶ Low saturation voltage (<2 V at 7 A in the entire temperature range)
- ▶ Integrated capacitors for oscillation free operation
- ▶ Package: TO220 and D2PAK

Description

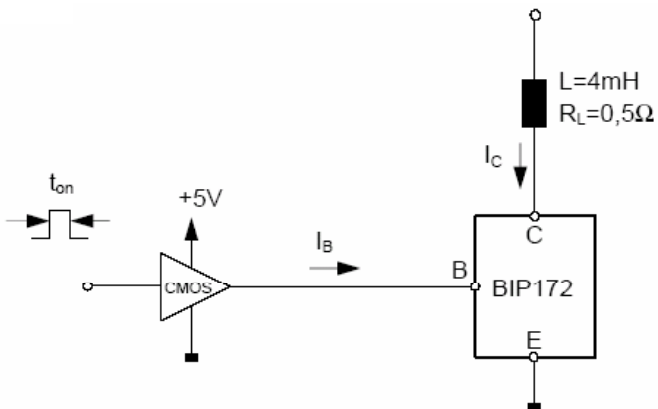
The bipolar triple stage darlington BIP172 especially developed to drive an ignition coil in automotive ignition circuits can be driven by standard CMOS logic. The rugged bipolar process assures safe operation in automotive specific environment even under harsh conditions. The excellent quality of the concept - chip design and plastic packaging - has been proven in the field over 10 million times. Due to the ESD performance, typical for HV-bipolar devices special precautions during manufacture or operation are unnecessary.

The BIP172 has an active voltage clamp between collector and emitter. It is temperature compensated with an accuracy of about ± 30 V in the entire temperature range. In order to protect the ECU, the wire harness, the coil and the igniter the collector current is limited to typ. 10 A at long dwell times. Using a virtual sense concept a low saturation voltage of less than 2 V at 7 A in the entire temperature range has been obtained.

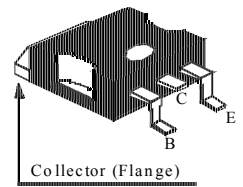
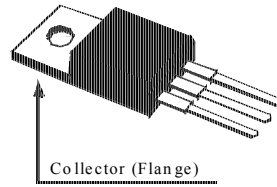
Block diagram



Application example



PIN configuration



Maximum ratings

Parameter	Symb.	Value	Unit
Collector emitter breakdown voltage	V_{CE}	250	V
Collector base breakdown voltage	V_{CB}	250	V
Collector current (sine half cycle $t_p = 40\mu s$, $f = 100\text{Hz}$)	I_c	15	A
Reverse diode forward current $t = 300s$, $T_{case} = 25^\circ\text{C}$	I_{EC}	10	A
Input voltage ($T_{case} < 40^\circ\text{C}$, $t < 60s$)	V_{BE}	10	V
Input current (without function guarantee)	I_B	-100 ...100	mA
Inductive load switching avalanche energy ($L = 6\text{mH}$, $I_c = 11\text{A}$)	E_{off}	430	mJ
Operating and storage junction Temperature range	T_j	-40... 150	$^\circ\text{C}$
Battery voltage	V_{bat}	6...16	V

Electrical characteristics

Unless otherwise specified: $V_{Bat} = 6V...16V$, $I_B = 3mA...12mA$, $T_{junction} = -40^{\circ}C...+150^{\circ}C$

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{Cl}	Collector emitter clamping voltage	at $I_C = 6A...7.3A$, $L = 10mH$, measured $25\mu s$ after $V_{CE} = 200V$	330	360	390	V
I_{Con}	Collector current limitation	$V_{CE} = 6V...10V$; $I_B = 4...12mA$, $T_j > 125^{\circ}C$	8.5	10.0	12.2	A
		$V_{CE} = 6V...10V$; $I_B = 3...12mA$, $T_j \leq 125^{\circ}C$	9.0			
		$V_{CE} = 4V$; $I_B = 3...12mA$, $T_j \leq 125^{\circ}C$	8.0			
		$V_{CE} = 4V$; $I_B = 4...12mA$, $T_j > 125^{\circ}C$	8.0			
I_{Coff}	Leak current	$V_{BE} = 0$; $V_{CE} = 250V$			15	mA
I_{Coffa}	Leak current by active Input	$V_{BE} \leq 0.5V$; $V_{CE} \leq 20V$			25	mA
		$I_B = 10\mu A$; $V_{CE} \leq 20V$			25	
V_{CE_REV}	Reverse polarity collector emitter voltage	$I_C = -5A$	-1.3	-1.0		V
V_{BE_REV}	Reverse polarity base emitter voltage	$I_C = -5A$	-1.2			V
V_{CE_SAT}	Collector emitter saturation voltage	$I_C = 7A$; $T_j \leq 125^{\circ}C$	1.4		2.0	V
		$I_C = 7A$; $I_B = 4...12mA$; $T_j > 125^{\circ}C$	1.4		2.0	
		$I_C = 8A$; $T_j > 25^{\circ}C$			2.3	
V_{BE_SAT}	Base emitter voltage	$I_C = 7A$	1.8		3.1	V
		$I_C = 6A$	1.75		3.05	
I_B	Input current		3.0	6.0	12.0	mA
V_{BE_Cl}		Base emitter voltage in the clamping/off-state			0.5	V
t_{OFF}	Switching time	$I_C = 7A$, Trigger: $V_{CE} = 200V$, t_0 at $\frac{1}{2} I_B$	10		50	μs
$R_{thj-case}$	Thermal resistance				1.3	K/W

Contact

Robert Bosch GmbH
Sales Semiconductors
Postbox 13 42
72703 Reutlingen
Germany
Tel.: +49 7121 35-2979
Fax: +49 7121 35-2170

Robert Bosch Corporation
Component Sales
38000 Hills Tech Drive
Farmington Hills, MI 48331
USA
Tel.: +1 248 876-7441
Fax: +1 248 848-2818

Robert Bosch K.K.
Component Sales
9-1, Ushikubo 3-chome
Tsuzuki-ku, Yokohama 224
Japan
Tel.: +81 45 9 12-83 01
Fax: +81 45 9 12-95 73

E-Mail: bosch.semiconductors@de.bosch.com

Internet: www.bosch-semiconductors.de

© 03/2006 All rights reserved by Robert Bosch GmbH including the right to file industrial property rights
Robert Bosch GmbH retains the sole powers of distribution, such as reproduction, copying and distribution.

For any use of products outside the released application, specified environments or installation conditions no warranty shall apply and Bosch shall not be liable for such products or any damage caused by such products.