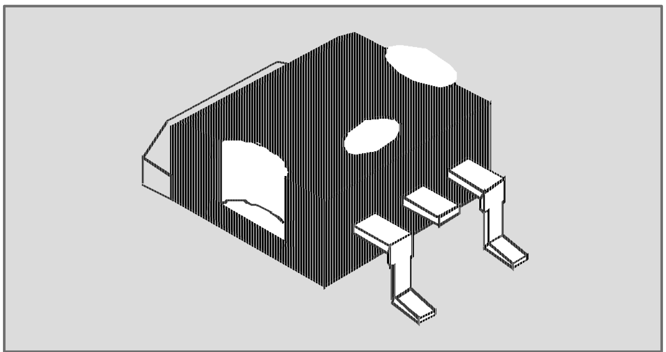
Automotive Electronics

Product Information
Ignition Power Switch – BIP372



Current limiting bipolar igniter driver with overheating protection

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
- Thermal shut down, sparkles
- Input protected against V_{BAT}
- 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: D^2PAK

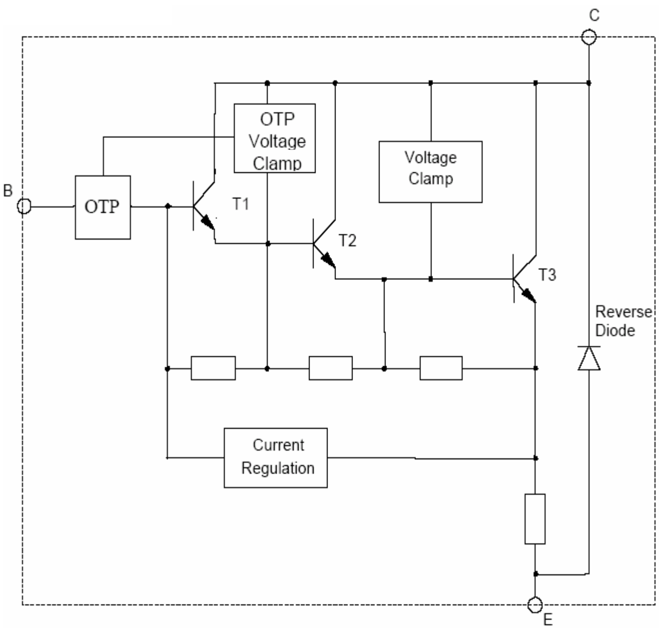
The bipolar triple stage darlington BIP372 especially developed to drive an ignition coil in automotive ignition circuits can be controlled by standard CMOS logic. The rugged bipolar process assures safe operation in automotive specific environment even under harsh conditions. The excellent quality of the concept - chip design and plastic packaging - has been proven in the field a million times. Due to the ESD performance, typical for HV- bipolar devices special precautions during manufacture or operation are unnecessary.

The BIP372 has an active voltage clamp between collector and emitter. It is temperature compensated with an accuracy of about ±25 V in the entire temperature range. In order to protect the ECU, the wire harness, the coil and the ignition driver the collector current is limited to type. 11 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.

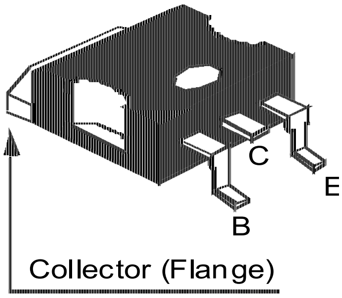
In order to prevent overheating and thermal damage of the device in case of excessive long dwell times the power stage is switched off internally by the integrated “Over temperature Protection” circuit (OTP) when reaching critical junction temperature. Suppressing spark ignition the primary voltage is clamped on low level when thermal shut down occurs.

The BIP372 with all the built-in protection circuits is suitable for high performance and high operation temperature automotive applications.

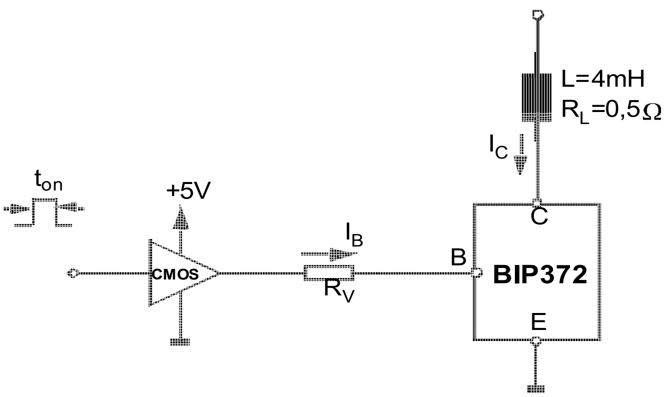
Block diagram



PIN configuration



Application example



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 wave tp= 40us, f= 100Hz)	I_C	15	A
Reverse diode forward current t=300s, T_{case} = 25°C	I_{EC}	10	A
Input voltage Tcase < 40°C, t < 60s, no function	V_{BE}	13.5	V
Input current, no function	I_B	-100 ...200	mA
Input signal rise time	dV_{BE}/dt	0.2	V/ns
Inductive load switching avalanche energy (L= 4 mH, I_C= 15A	E_{off}	450	mJ
Operating and storage junction temperature range	T_j	-40... 150	°C
Battery voltage	V_{bat}	6...16	V

Electrical characteristics

Unless otherwise specified: V_{Bat} = 6V...16V, I_B= 5mA...12mA, $T_{Junction}$ = -40°C....+150°C

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{Cl}	Collector emitter clamping voltage	at I_C= 6A....7.3A, L= 4mH, V_{BE_off} < 0.7V, measured 25µs after V_{CE}= 200V	350	375	400	V
V_{ClPeak}	Collector emitter clamping voltage peak	at I_C= 6A....7.3A, L= 4mH, V_{BE_off} < 0.7V			450	V
I_{con}	Collector current limitation	V_{CE}= 6V...10V;	8.5	11	14.5	A
		V_{CE}= 6V...10V; T_j < 125°C	9.0		14.5	
		V_{CE}= 4V	8.0		14.5	
I_{coff}	Leak current	V_{BE}= 0V, V_{CE}= 250V			15	mA
I_{coffa}	Leak current by active Input	V_{BE} ≤ 0.5V; V_{CE} ≤ 20V			15	mA
		I_B= 10uA; V_{CE} ≤2 0V			15	
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= 7 A, T_j= 25°C		1.7		V
		I_C= 7 A	1.4		2.0	
		I_C= 7.6 A			2.3	
		I_C= 8 A; T_j <= 125°C			2.3	
I_B	Input current		5.0	7.0	12.0	mA
V_{BE_Cl}		Base Emitter Voltage in the clamping/off-state			0.5	V
V_{BE_SAT}	Base emitter saturation voltage	I_C= 7A, I_B = 5mA	2.55		3.75	V
		I_C= 7A, I_B = 12mA	3.35		4.35	
t_{OFF}	Switching time	I_C= 7A, Trigger: V_{CE}=200V, t_0 at ½ IB			40	us
T_{OTP}	Thermal shut down	Active heating: T_{OTP}= $T_{Junction}$	180	195	210	°C
I_{coff_OTP}	Leak current after OTP	V_{BV}= 5V, R_V= 82Ω, V_{bat}= 14V, L= 4mH, 1ms after V_{CE} < 15V			25	mA
V_{BE_OTP}	V_{BE} after OTP	V_{BV}= 5V, R_V= 82Ω	4.55		4.85	V
V_{Cl_OTP}	OTP collector emitter clamping voltage	Thermal shut down	25		44	V
I_{Bmin_OTP}	Input current OTP	Minimal input current for the function OTP	2		5	mA
$R_{thj\text{-}case}$	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