SGS-THOMSON MICROELECTRONICS

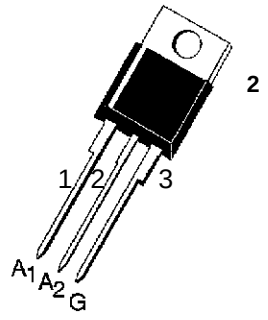
RBO40-40

REVERSED BATTERY AND OVERVOLTAGE PROTECTION CIRCUIT (RBO)

PRELIMINARY DATA

FEATURES

- DISSIPATION THROUGH PIN 2 : TAB CONNECTED TO GROUND
- MONOLITHIC SILICON CHIP
- NEGATIVE OVERVOLTAGE PROTECTION BY CLAMPING (COMPONENT T1)
- BREAKDOWN VOLTAGE : 24 V min
- CLAMPING VOLTAGE : ± 40 V max
- AVERAGE FORWARD CURRENT (COMPONENT D1) : 40 A



TO 220 AB
(Plastic)

DESCRIPTION

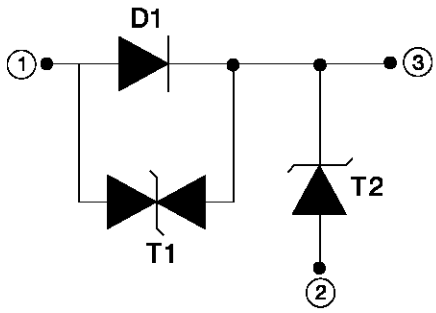
Developed especially for automotive reversed battery operation and overvoltage (load dump) protection, this monolithic component chip offers multiple functions in the same package (see page 4) :

D1 : reversed battery protection

T1 : clamping function to negative overvoltage effect

T2 : Transil function to Load Dump effect

FUNCTIONAL DIAGRAM



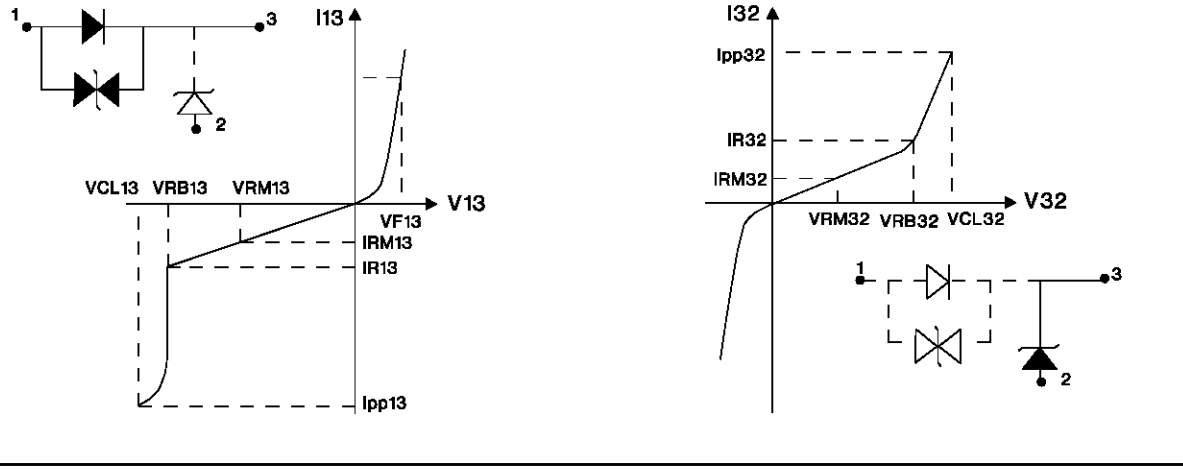
ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FSM}	Non repetitive surge peak forward current between Pins 1 and 3 @ T= 10 µs	Tj = 25°C	400	A
$I_{F(AV)}$	Average forward current between Pins 1 and 3	Tc = 80°C	40	A
V_{PP}	Peak load dump voltage (see note 1 and 2)	Tc = 85°C	80	V
P_{PP}	Peak pulse power between Pins 1 and 3 @ T= 1 ms	Tc = 85°C	1500	W
P	Total power dissipation	Tc = 80°C	70	W
Tstg Tj	Storage and junction temperature range		- 40 to + 150	°C
T_L	Maximum lead temperature for soldering during 10 s at 4.5 mm from case		230	°C

Notes 1 : for a surge greater than the maximum value, the source will present a short circuit.
Notes 2 : see schaffner circuit page 3

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
Rth (j-c)	Junction to case	1	°C/W

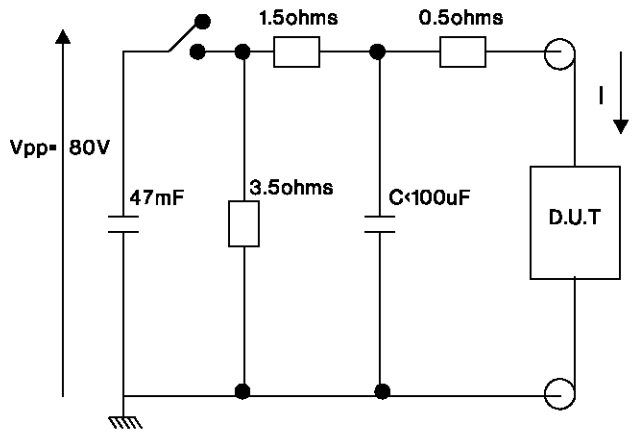


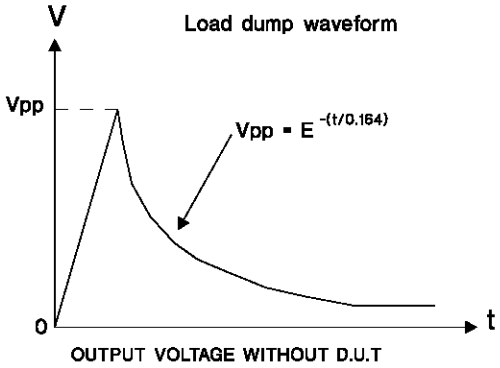
ELECTRICAL CHARACTERISTICS

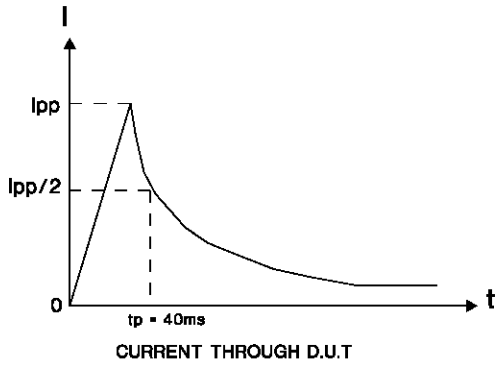
Symbol	Test Conditions			Value	Unit
$V_{F\ 13}$	Maximum forward voltage @ I_F = 40 A	Tj=25°C	MAX	1.7	V
		Tj=85°C			
$V_{F\ 13}$	Maximum forward voltage @ IF = 20 A	Tj=25°C	MAX	1.35	V
		Tj=85°C			
$V_{F\ 13}$	Maximum forward voltage @ IF = 1A	Tj=85°C	MAX	0.9	V
$V_{BR\ 31}$	Breakdown voltage @ I_R = 1 mA	Tj=25°C	MIN	24	V
			MAX	32	
$I_{RM\ 31}$	Leakage current @ V_{RM} = 20 V	Tc=25°C	MAX	50	µA
		Tc=85°C		300	
$V_{CL\ 31}$	Clamping voltage @ I_{PP} = 37.5 A @ T= 1 ms	Tc=25°C	MAX	40	V
$V_{BR\ 32}$	Breakdown voltage @ I_R = 1 mA	Tj=25°C	MIN	24	V
			MAX	32	
$I_{RM\ 32}$	Leakage current @ V_{RM} = 20 V	Tc=25°C	MAX	10	µA
		Tc=85°C		100	
$V_{CL\ 32}$	Clamping voltage @ IPP = 20 A	Tc=25°C	MAX	40	V
α t	Temperature coefficient	Tc=25°C	MAX	10^{-4}	/°C
C 13	Capacitance at 0 V	Tc=25°C	TYP	3000	pF
C 32	Capacitance at 0 V	Tc=25°C	TYP	7000	pF

Note : 13 and 32
Ex : V_F 13 . between Pin 1 and Pin 3
V_{BR} 32 . between Pin 3 and Pin 2

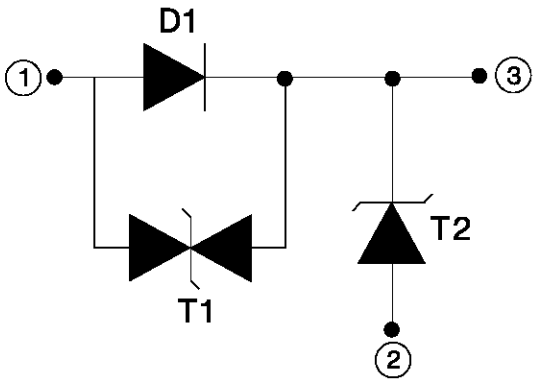
SCHAFFNER CIRCUIT







PRODUCT DESCRIPTION



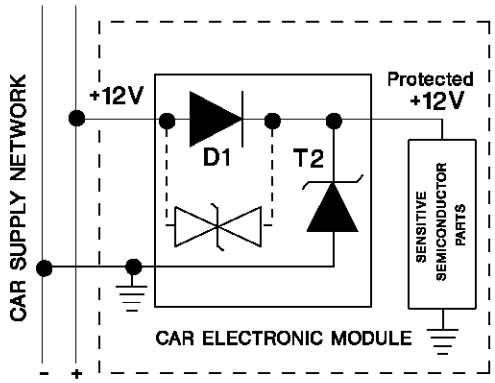
The RBO has 3 integrated functions on the same chip.

D1 : “Rectifier function” in order to protect against reversed battery operation.

T2 : “Transil function” in order to protect against Load dump generated by the alternator.

T1 : Protection for motor driver application (See below).

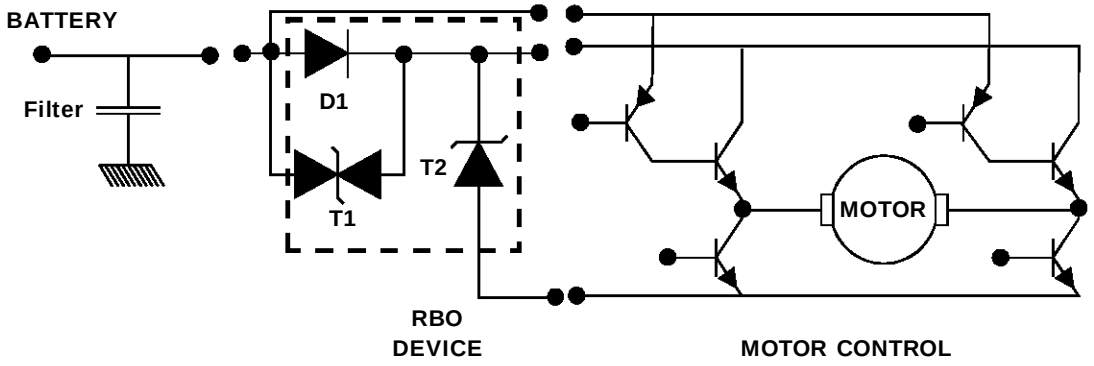
BASIC APPLICATION



*The monolithic multi function protection (RBO) has been developed to protect sensitive semiconductors in the car electronic module against both overvoltage and battery reverse.

*In addition, this RBO circuit prevents overvoltages generated by the module affecting the car supply network.

MOTOR DRIVER APPLICATION



In this application, one half of the motor drive circuit is supplied through the “RBO” and is thus protected as per its basic function application.
The second part is connected directly to the “car supply network” and is protected as follows :
- For positive surges : T2 (clamping phase) and D1 forward-biased.
- For negative surges : T1 (clamping phase) and T2 forward-biased.

ORDERING INFORMATION

RBO 40 - 40 T

Reversed Battery & Overvolage protection

$I_{F(AV)}$ = 40 A

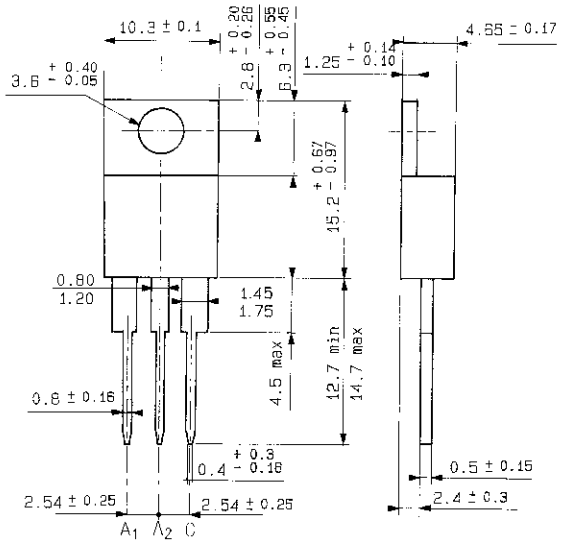
V_{CL} = 40V

Packages :
T = TO 220 AB
M = SOP 10 (Power SO) *

* To be announced later on

PACKAGE MECHANICAL DATA (in millimeters)

TO 220 AB Plastic



Cooling method : C
Marking : type number
Weight : 2 g
Polarity : N A
Stud torque : N A