SGS-THOMSON MICROELECTRONICS

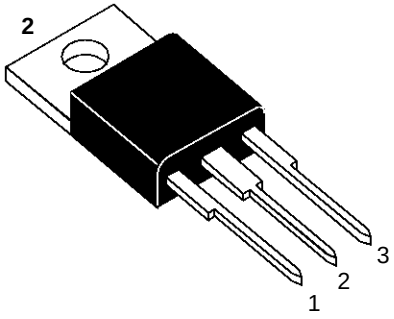
RBO08-40T

Application Specific Discretes
A.S.D.™

REVERSED BATTERY AND OVERVOLTAGE PROTECTION

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) : 8 A



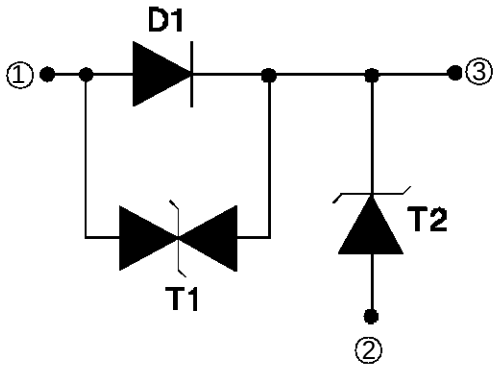
TO 220 AB
(Plastic)

DESCRIPTION

Developed especially for automotive reversed battery operation and overvoltage protection, this monolithic component chip offers multiple functions in the same package (see page 3) :

D1 : reversed battery protection
T1 : clamping function to negative overvoltage effect
T2 : Transil function to positive overvoltage effect

FUNCTIONAL DIAGRAM



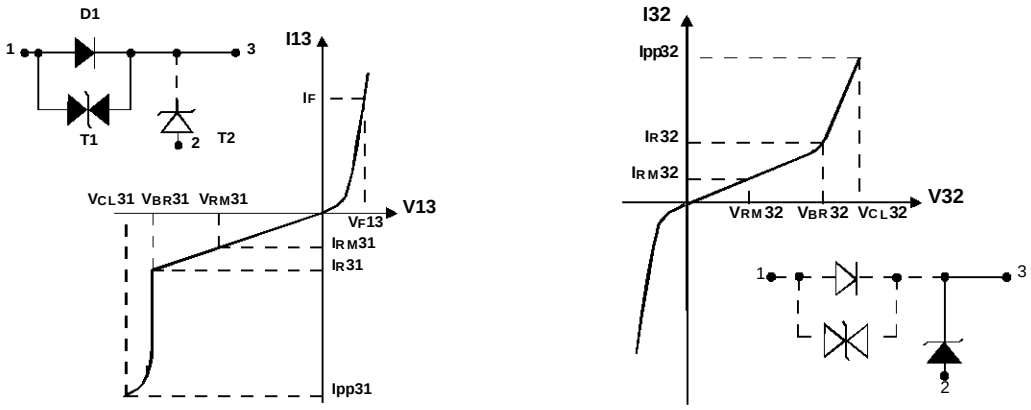
ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
I_{FSM}	Non repetitive surge peak forward current between Pins 1 and 3 @ t_p = 10 µs	Tj = 25°C	80	A
$I_{F(AV)}$	Average forward current between Pins 1 and 3	Tc = 85°C	8	A
P_P	Peak pulse between Pins 1 and 3 @ t_p= 1 ms (see note 1)	Tc = 85°C	600	W
P_{PP}	Peak pulse power between Pins 3 and 2 @ t_p= 1 ms	Tc = 85°C	1500	W
P	Total power dissipation	Tc = 85°C	25	W
T_{stg} Tj	Storage temperature range Maximum operating junction temperature		- 40 to + 150 + 150	°C
T_L	Maximum lead temperature for soldering during 10 s at 4.5 mm from case		260	°C

Note 1 : for a surge greater than the maximum value, the source will present a short circuit.

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
Rth (j-c)	Junction to case	2.4	°C/W



ELECTRICAL CHARACTERISTICS

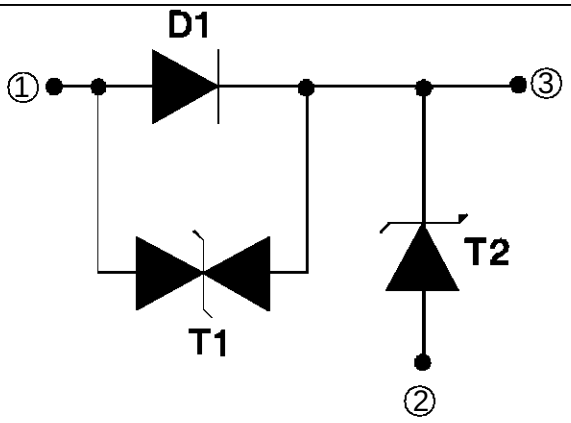
Symbol	Test Conditions			Value	Unit
$V_{F\ 13}$	Maximum forward voltage @ I_F = 8 A	Tj=25°C	MAX	1.7	V
		Tj=85°C			
$V_{F\ 13}$	Maximum forward voltage @ IF = 4 A	Tj=25°C	MAX	1.35	V
		Tj=85°C			
$V_{F\ 13}$	Maximum forward voltage @ IF = 1 A	Tj=85°C	MAX	0.9	V
$V_{BR\ 31}$	Breakdown voltage @ IR = 1 mA	Tj=25°C	MIN	24	V
			MAX	32	
$I_{RM\ 31}$	Leakage current @ V_{RM} = 20 V	Tc=25°C	MAX	10	µA
		Tc=85°C		100	
$V_{CL\ 31}$	Clamping voltage @ I_{PP} = 15 A @ t_p = 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		50	
$V_{CL\ 32}$	Clamping voltage @ I_{PP} = 37.5 A @ t_p = 1 ms	Tc=25°C	MAX	40	V
α t	Temperature coefficient		MAX	8.5	$10^{-4/}$°C
C 13	Capacitance at 0 V	Tc=25°C	TYP	1000	pF
C 32	Capacitance at 0 V	Tc=25°C	TYP	2000	pF

Note : 13 and 32

Ex : V_F 13 . between Pin 1 and Pin 3

V_{BR} 32 . between Pin 3 and Pin 2

PRODUCT DESCRIPTION



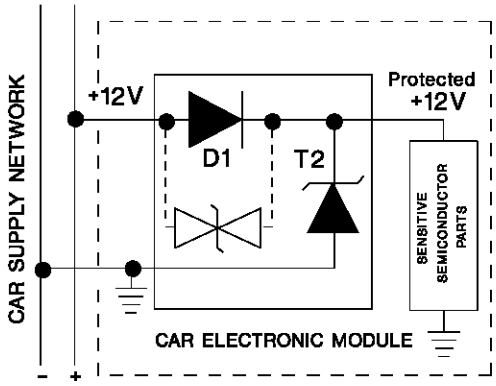
The RBO has 3 integrated functions on the same chip.

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

T2 : "Transil function" in order to protect against positive surge generated by electric systems (ignition, relay. ...).

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

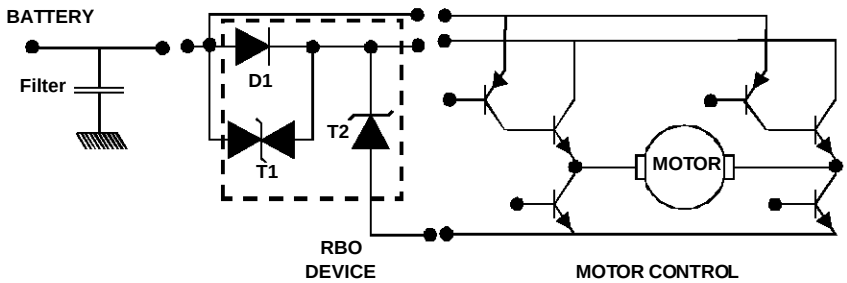
BASIC APPLICATION



* 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, the 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 in forward-biased.
- For negative surges : T1 (clamping phase) and T2 in forward-biased.

Fig. 1 : Peak pulse power versus exponential pulse duration (Tj initial = 85°C).

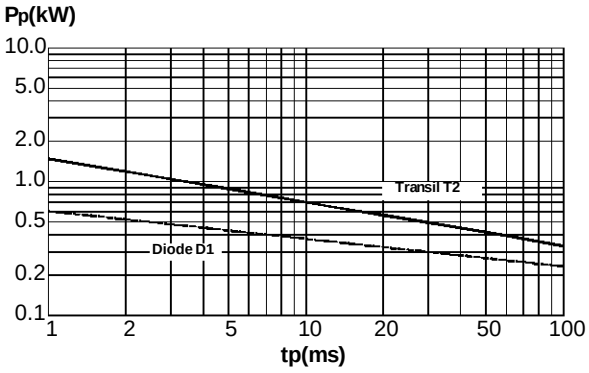


Fig. 2-1 : Clamping voltage versus peak pulse current (Tj initial = 85°C).

Exponential waveform tp = 40 ms and tp = 1 ms (TRANSIL T2).

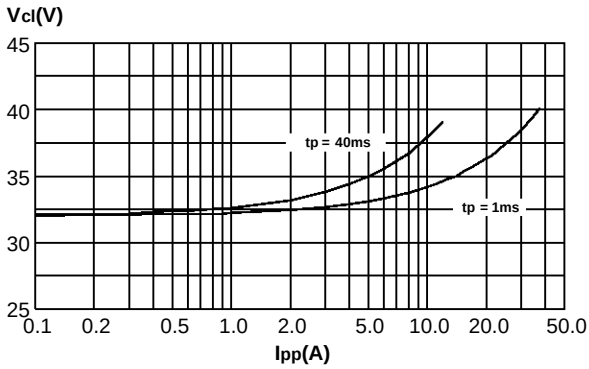


Fig. 2-2 : Clamping voltage versus peak pulse current (Tj initial = 85°C).

Exponential waveform tp = 1 ms and tp = 20 µs (TRANSIL T1).

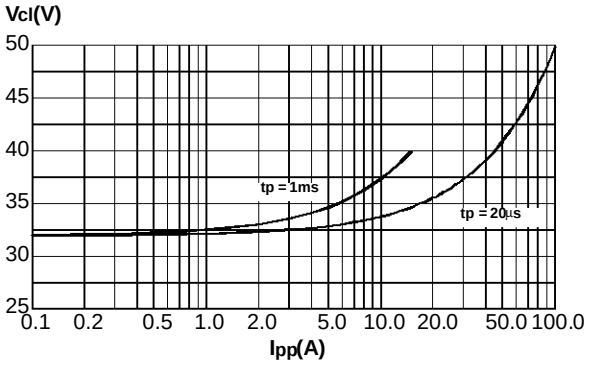


Fig. 3 : Relative variation of peak pulse power versus junction temperature.

(Exponential waveform 1ms)

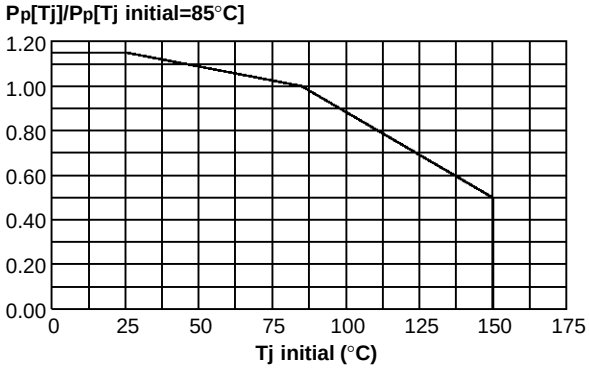


Fig. 4 : Relative variation of thermal impedance junction to case versus pulse duration.

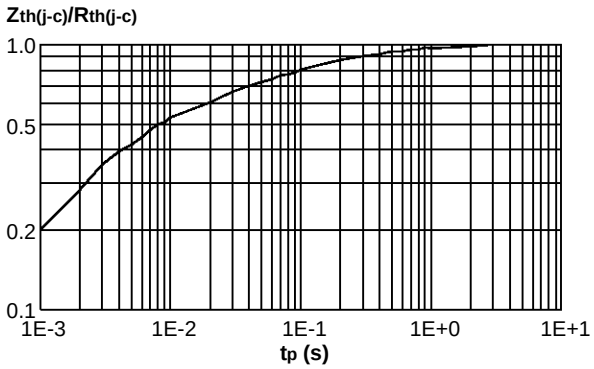


Fig. 5-1 : Peak forward voltage drop versus peak forward current (typical values) - (DIODE D1).

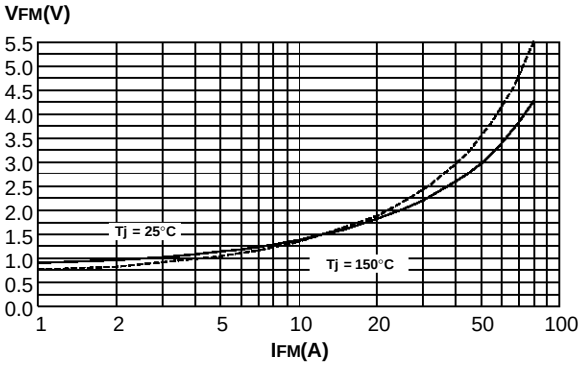
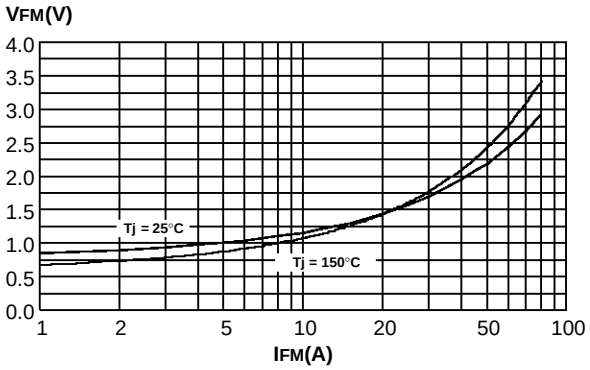
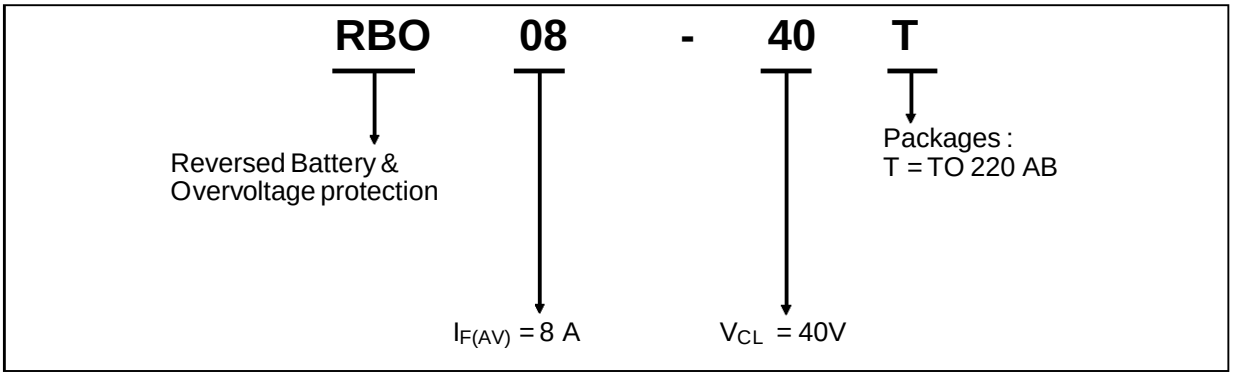


Fig. 5-2 : Peak forward voltage drop versus peak forward current (typical values) - (TRANSIL T2).

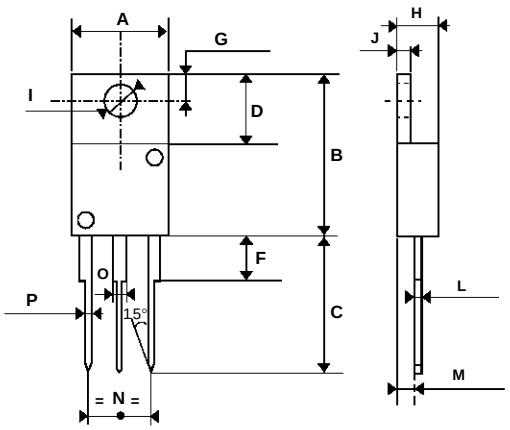


ORDERING INFORMATION



PACKAGE MECHANICAL DATA

TO 220 AB Plastic



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	10.20	10.50	0.401	0.413
B	14.23	15.87	0.560	0.625
C	12.70	14.70	0.500	0.579
D	5.85	6.85	0.230	0.270
F		4.50		0.178
G	2.54	3.00	0.100	0.119
H	4.48	4.82	0.176	0.190
I	3.55	4.00	0.140	0.158
J	1.15	1.39	0.045	0.055
L	0.35	0.65	0.013	0.026
M	2.10	2.70	0.082	0.107
N	4.58	5.58	0.18	0.22
O	0.80	1.20	0.031	0.048
P	0.64	0.96	0.025	0.038

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