



THE DATASHEET OF RBO40-40G





RBO40-40G/T

Application Specific Discretes
A.S.D.™

REVERSED BATTERY AND OVERVOLTAGE PROTECTION

FEATURES

- PROTECTION AGAINST “LOAD DUMP” PULSE
- 40A DIODE TO GUARD AGAINST BATTERY REVERSAL
- MONOLITHIC STRUCTURE FOR GREATER RELIABILITY
- BREAKDOWN VOLTAGE : 24 V min.
- CLAMPING VOLTAGE : ± 40 V max.
- COMPLIANT WITH ISO / DTR 7637

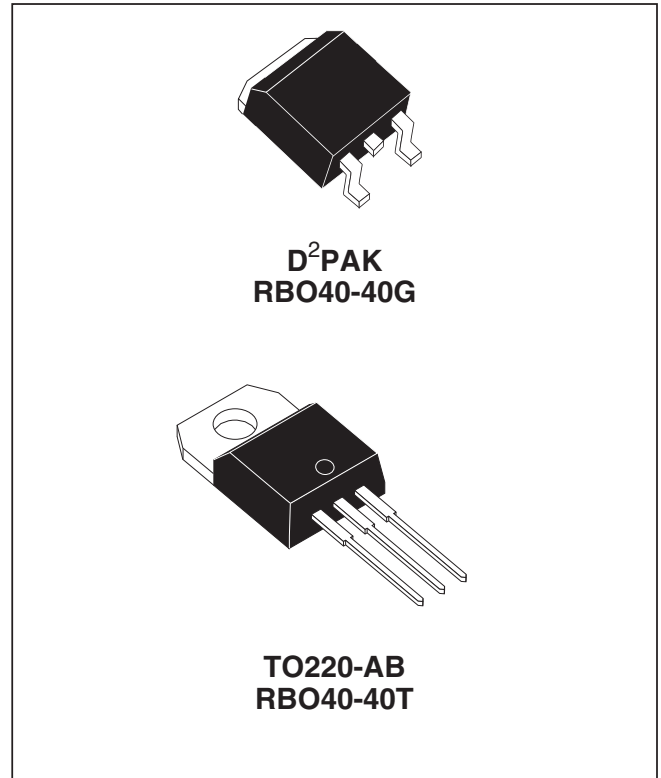
DESCRIPTION

Designed to protect against battery reversal and load dump overvoltages in automotive applications, this monolithic component offers multiple functions in the same package :

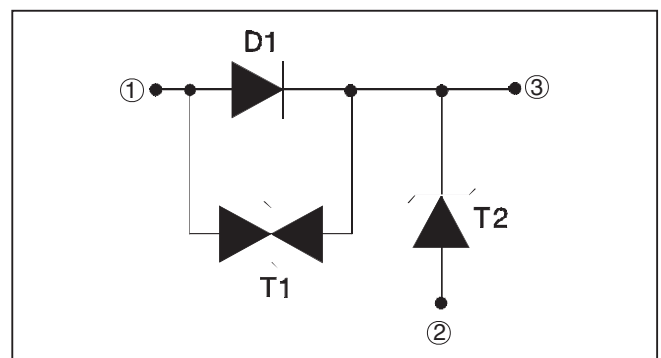
D1 : reversed battery protection

T1 : clamping against negative overvoltages

T2 : Transil function against “load dump” effect.



FUNCTIONAL DIAGRAM



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ABSOLUTE MAXIMUM RATINGS

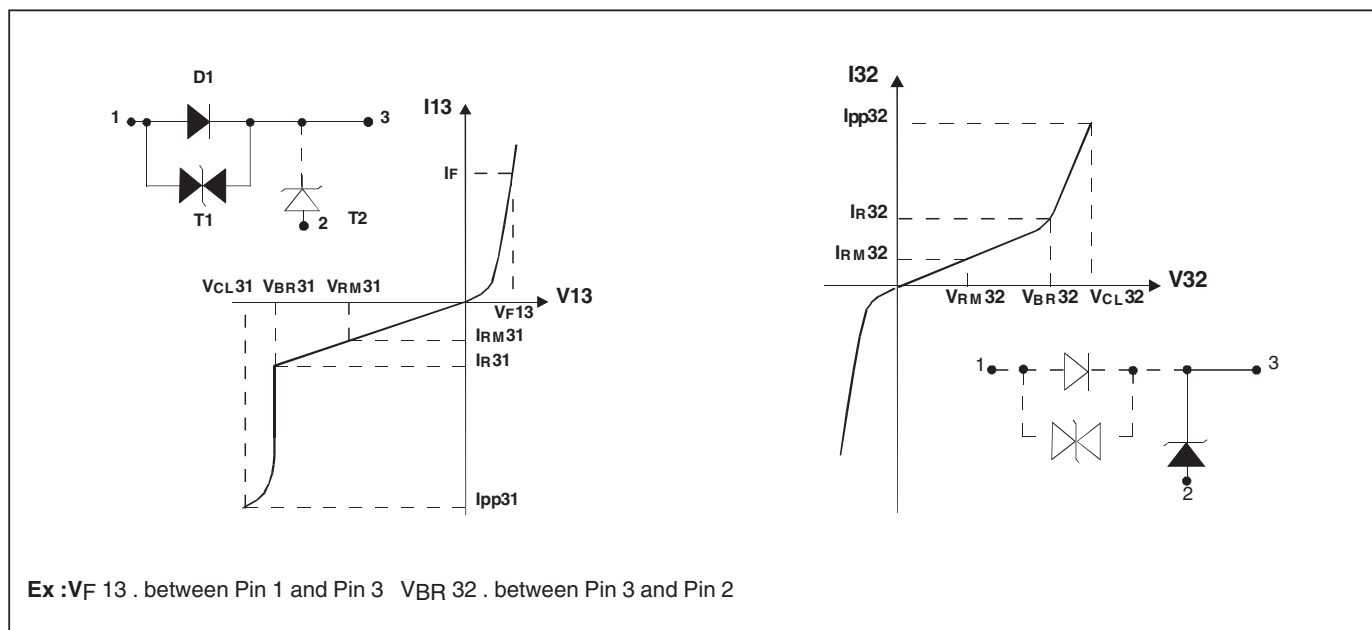
Symbol	Parameter		Value	Unit
I_{FSM}	Non repetitive surge peak forward current (Diode D1)	$t_p = 10 \text{ ms}$	120	A
I_F	DC forward current (Diode D1)	$T_c = 75^\circ\text{C}$	40	A
V_{PP}	Peak load dump voltage (see note 1 and 2) 5 pulses (1 minute between each pulse)		80	V
P_{PP}	Peak pulse power between Input and Output (Transil T1)	$10/1000 \mu\text{s}$ $T_j \text{ initial} = 25^\circ\text{C}$	1500	W
T_{stg}/T_j	Storage and operating junction temperature range		- 40 to + 150	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering during 10 s at 4.5mm from case for TO220-AB		260	$^\circ\text{C}$

Note 1 : for a surge greater than the maximum value, the device will fail in short-circuit.

Note 2 : see Load Dump curves.

THERMAL RESISTANCE

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	RBO40-40G RBO40-40T	1.0 1.0	$^\circ\text{C}/\text{W}$
$R_{th(j-a)}$	Junction to ambient	RBO40-40T	60	$^\circ\text{C}/\text{W}$



Symbol	Parameter
V_{RM31}/V_{RM32}	Stand-off voltage Transil T1 / Transil T2.
V_{BR31}/V_{BR32}	Breakdown voltage Transil T1 / Transil T2.
I_{R31}/I_{R32}	Leakage current Transil T1 / Transil T2.
V_{CL31}/V_{CL32}	Clamping voltage Transil T1 / Transil T2.
V_{F13}	Forward voltage drop Diode D1.
I_{PP}	Peak pulse current.
αT	Temperature coefficient of V_{BR} .
C_{31}/C_{32}	Capacitance Transil T1 / Transil T2.
C_{13}	Capacitance of Diode D1

ELECTRICAL CHARACTERISTICS : DIODE D1 (- 40°C < T_{amb} < + 85°C)

Symbol	Test Conditions	Value			Unit
		Min.	Typ.	Max.	
V_{F13}	$I_F = 40\text{ A}$			1.9	V
V_{F13}	$I_F = 20\text{ A}$			1.45	V
V_{F13}	$I_F = 1\text{ A}$			1	V
V_{F13}	$I_F = 100\text{ mA}$			0.95	V
C_{13}	$F = 1\text{ MHz}$ $V_R = 0\text{ V}$		3000		pF

ELECTRICAL CHARACTERISTICS : TRANSIL T1 (- 40°C < T_{amb} < + 85°C)

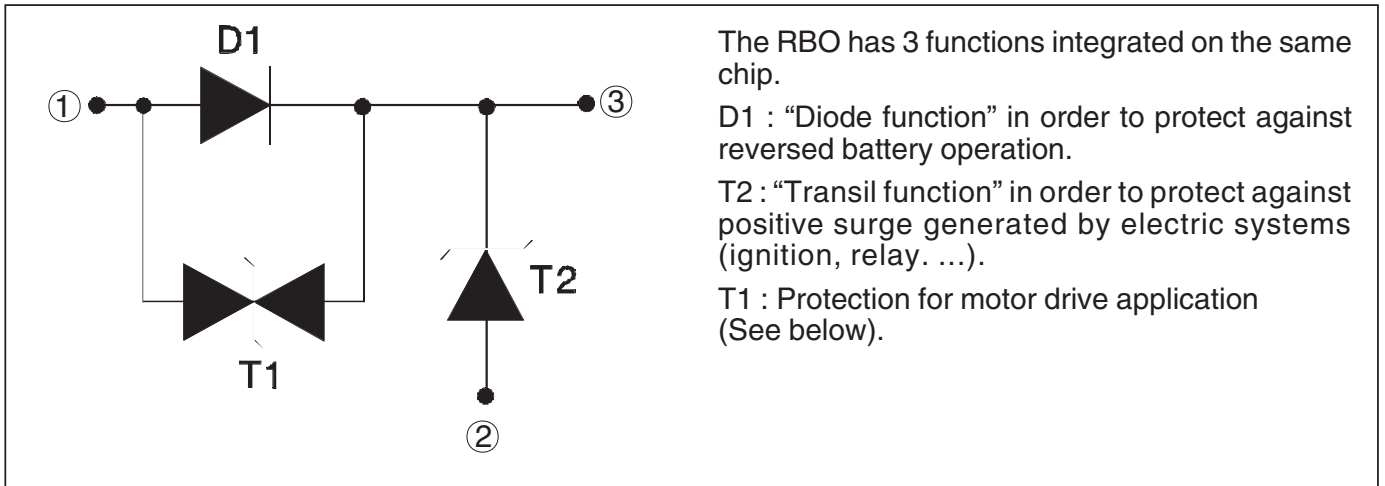
Symbol	Test Conditions	Value			Unit
		Min.	Typ.	Max.	
V_{BR31}	$I_R = 1\text{ mA}$	22		35	V
V_{BR31}	$I_R = 1\text{ mA}$, $T_{amb} = 25^\circ\text{C}$	24		32	V
I_{RM31}	$V_{RM} = 20\text{ V}$			100	μA
I_{RM31}	$V_{RM} = 20\text{ V}$, $T_{amb} = 25^\circ\text{C}$			10	μA
V_{CL31}	$I_{PP} = 37.5\text{ A}$, $T_j\text{ initial} = 25^\circ\text{C}$		10/1000 μs	40	V
αT	Temperature coefficient of V_{BR}			9	$10^{-4}/^\circ\text{C}$
C_{31}	$F = 1\text{ MHz}$ $V_R = 0\text{ V}$		3000		pF

ELECTRICAL CHARACTERISTICS : TRANSIL T2 (- 40°C < T_{amb} < + 85°C)

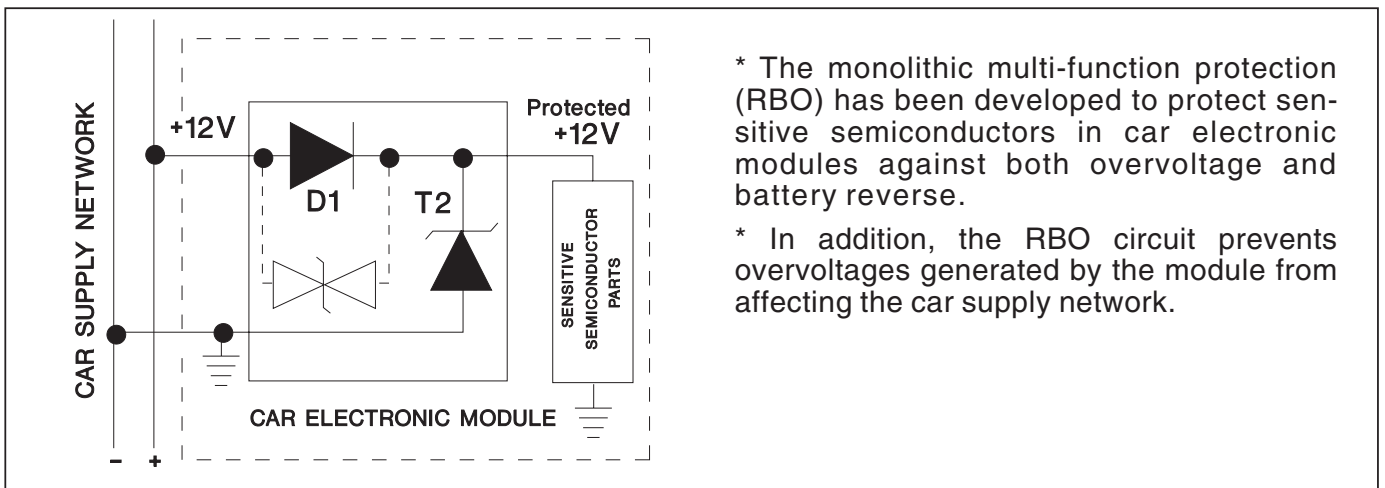
Symbol	Test Conditions	Value			Unit
		Min.	Typ.	Max.	
V_{BR32}	$I_R = 1\text{ mA}$	22		35	V
V_{BR32}	$I_R = 1\text{ mA}$, $T_{amb} = 25^\circ\text{C}$	24		32	V
I_{RM32}	$V_{RM} = 20\text{ V}$			100	μA
I_{RM32}	$V_{RM} = 20\text{ V}$, $T_{amb} = 25^\circ\text{C}$			10	μA
V_{CL32}	$I_{PP} = 20\text{ A}$ (note 1)			40	V
αT	Temperature coefficient of V_{BR}			9	$10^{-4}/^\circ\text{C}$
C_{32}	$F = 1\text{ MHz}$ $V_R = 0\text{ V}$		8000		pF

Note 1 : One pulse, see pulse definition in load dump test generator circuit.

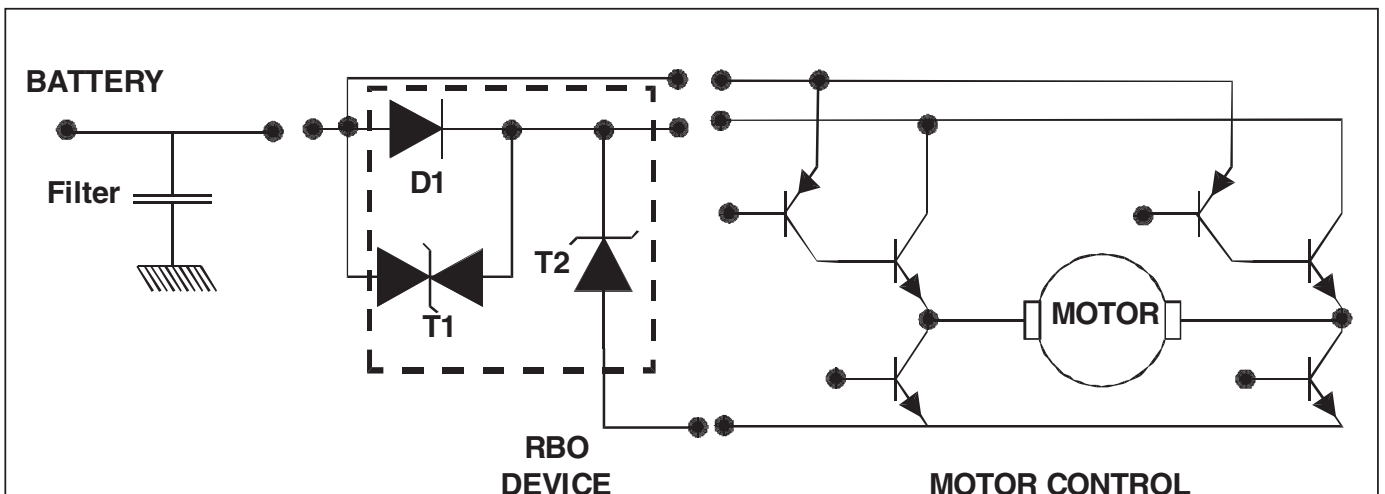
PRODUCT DESCRIPTION



BASIC APPLICATION



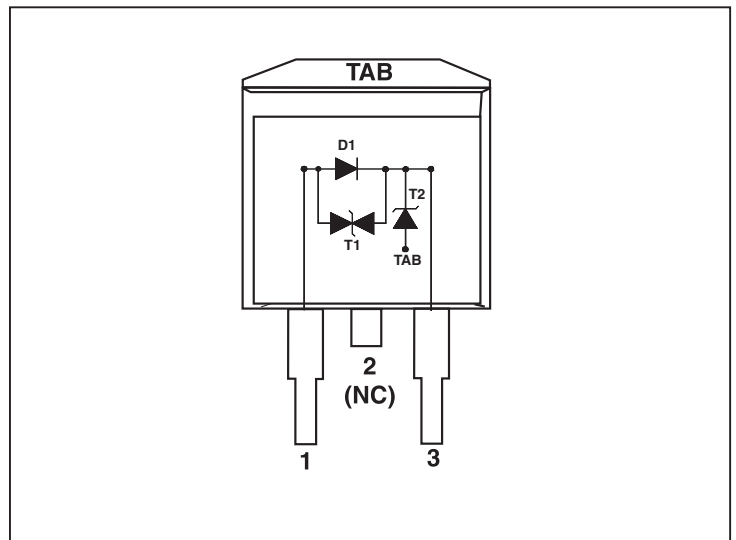
MOTOR DRIVER APPLICATION



PINOUT configuration in D²PAK :

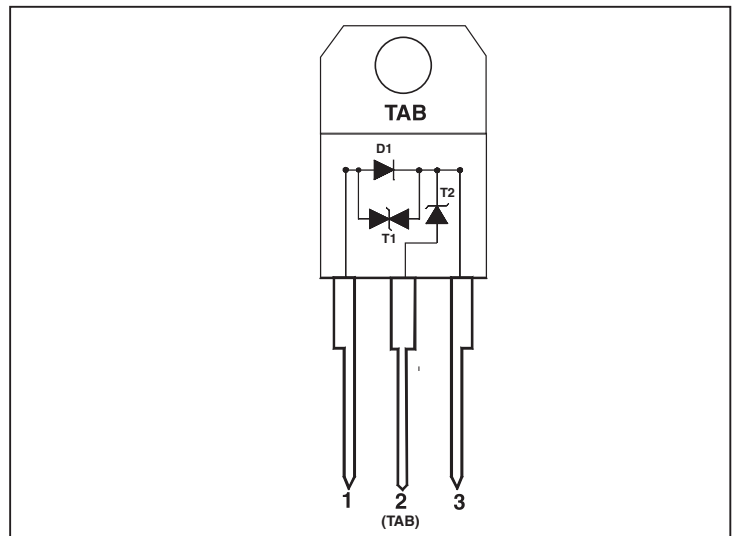
- Input (1): Pin 1
- Output (3): Pin 3
- Gnd (2): Connected to base Tab

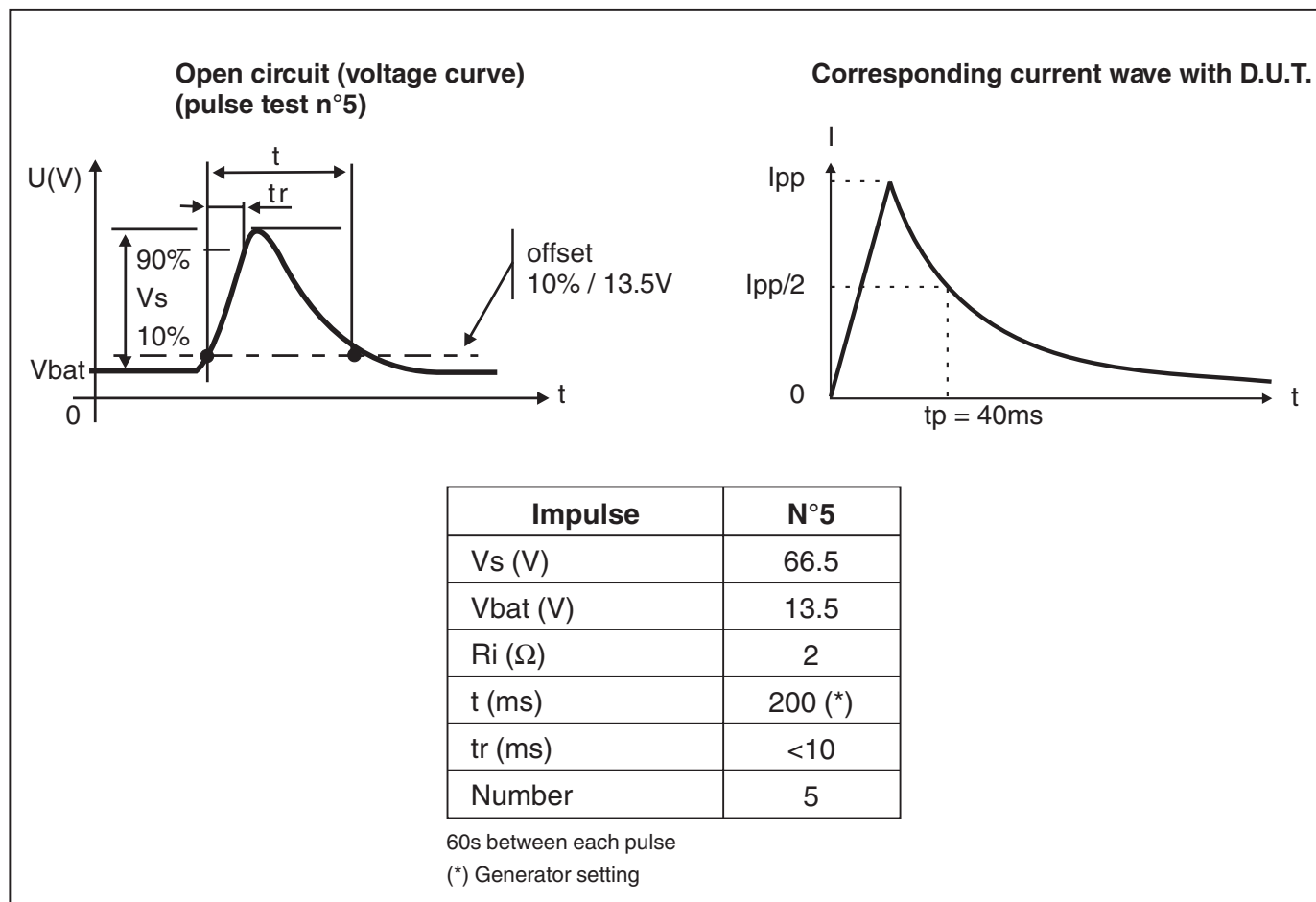
Marking : Logo, date code, RBO40-40G

**PINOUT configuration in TO220AB :**

- Input (1): Pin 1
- Output (3): Pin 3
- GND (2): Connected to base Tab

Marking : Logo, date code, RBO40-40T

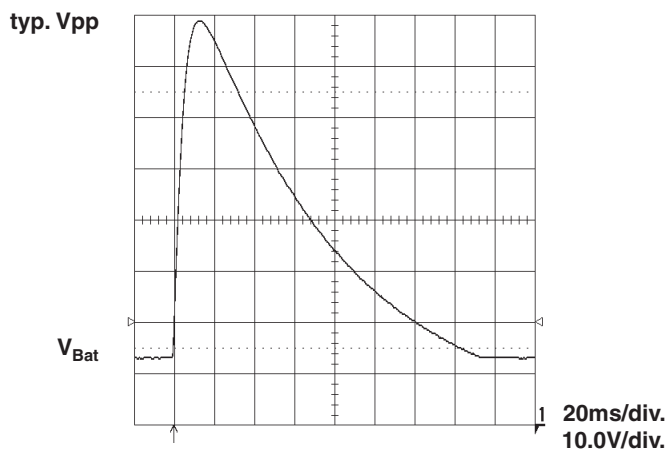




CALIBRATION METHOD FOR SCHAFFNER NSG 506 C

- 1) With open circuit (generator is in open circuit):
 - calibrate Vs
- 2) With short circuit (generator is in short circuit):
 - calibrate Ri (Ri = 2Ω)
- 3) With D.U.T.
 - calibrate tp (tp = 40ms @ Ipp/2)

Typical Voltage curve (open circuit)



Typical Voltage and Current curve with D.U.T.

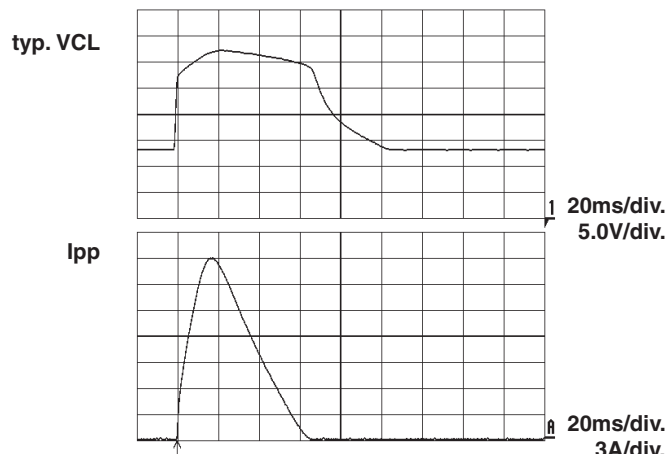


Fig. 1 : Peak pulse power versus exponential pulse duration (T_j initial = 85°C).

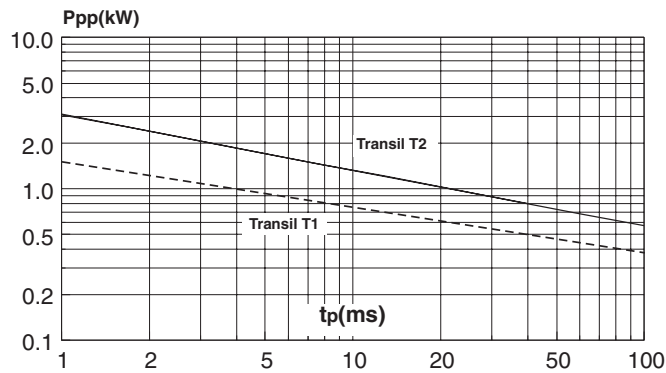


Fig. 2-1 : Clamping voltage versus peak pulse current (T_j initial = 85°C).

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

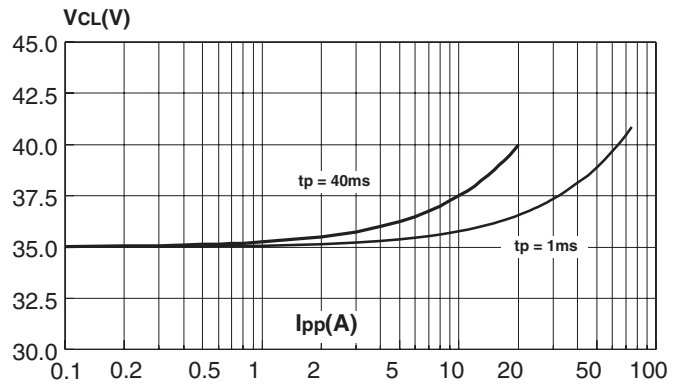


Fig. 2-2 : Clamping voltage versus peak pulse current (T_j initial = 85°C).

Exponential waveform $t_p = 1$ ms and $t_p = 20 \mu s$ (TRANSIL T1).

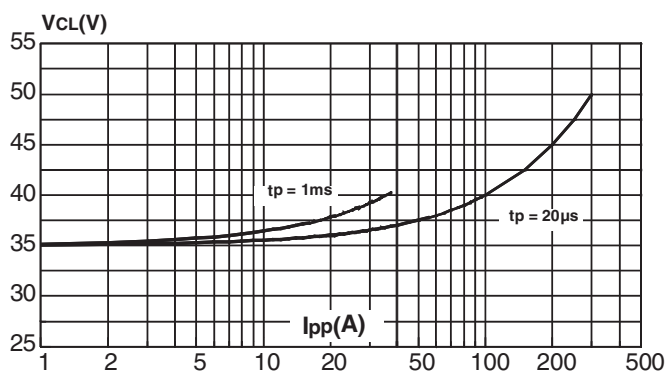


Fig. 3 : Relative variation of peak pulse power versus junction temperature.

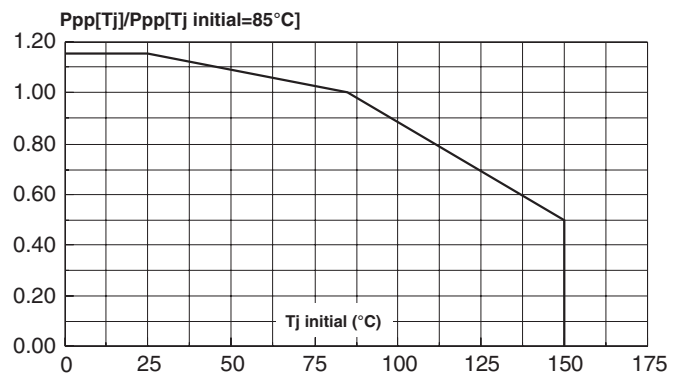


Fig. 4 : Relative variation of thermal impedance junction to case versus pulse duration.

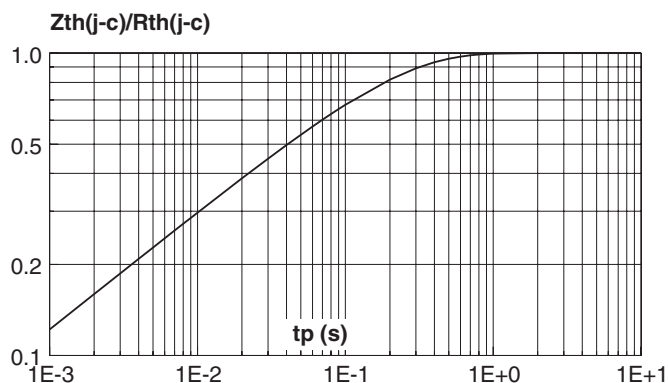


Fig. 5-1 : Peak forward voltage drop versus peak forward current (typical values) - (TRANSIL T2).

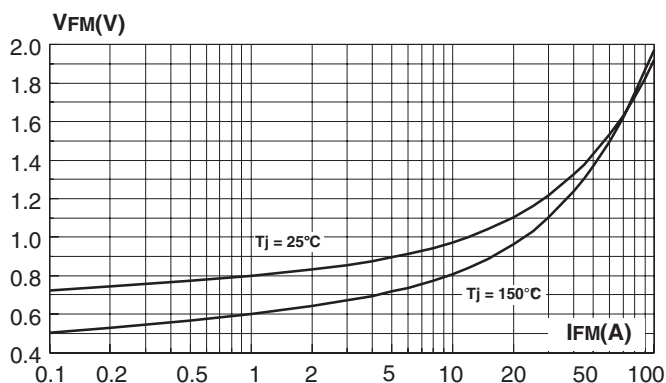


Fig. 5-2 : Peak forward voltage drop versus peak forward current (typical values) - (DIODE D1).

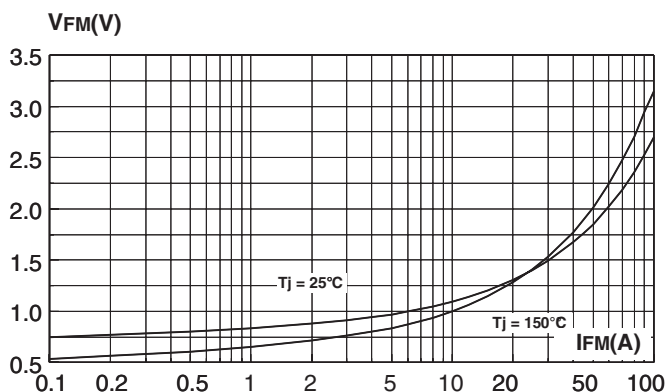
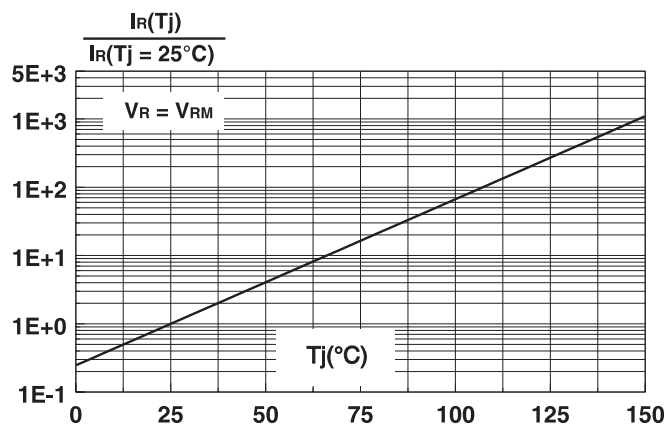
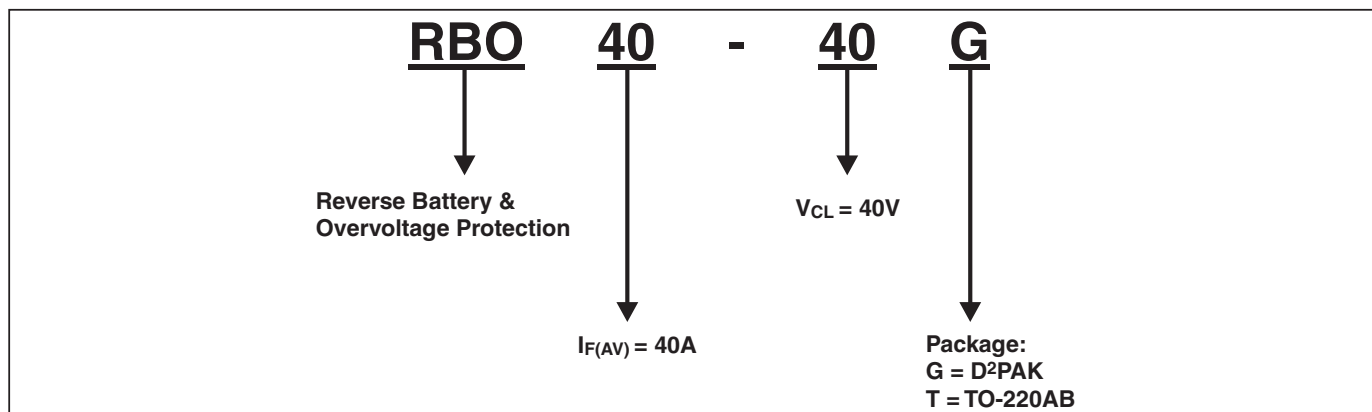


Fig. 6 : Relative variation of leakage current versus junction temperature.

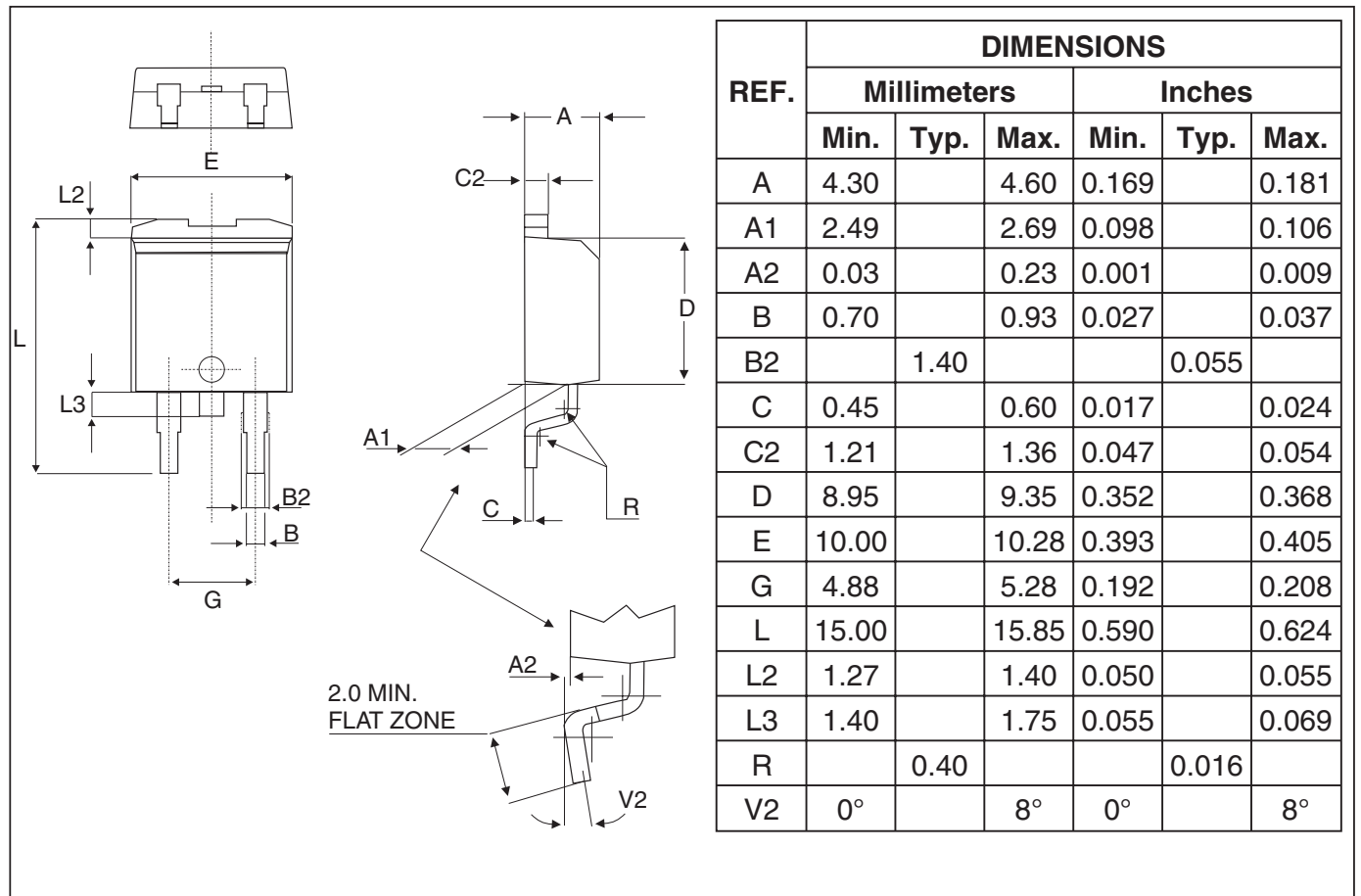


ORDERING INFORMATION



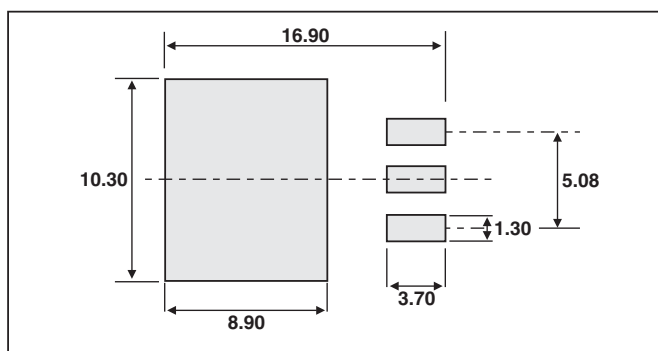
PACKAGE MECHANICAL DATA

D²PAK Plastic



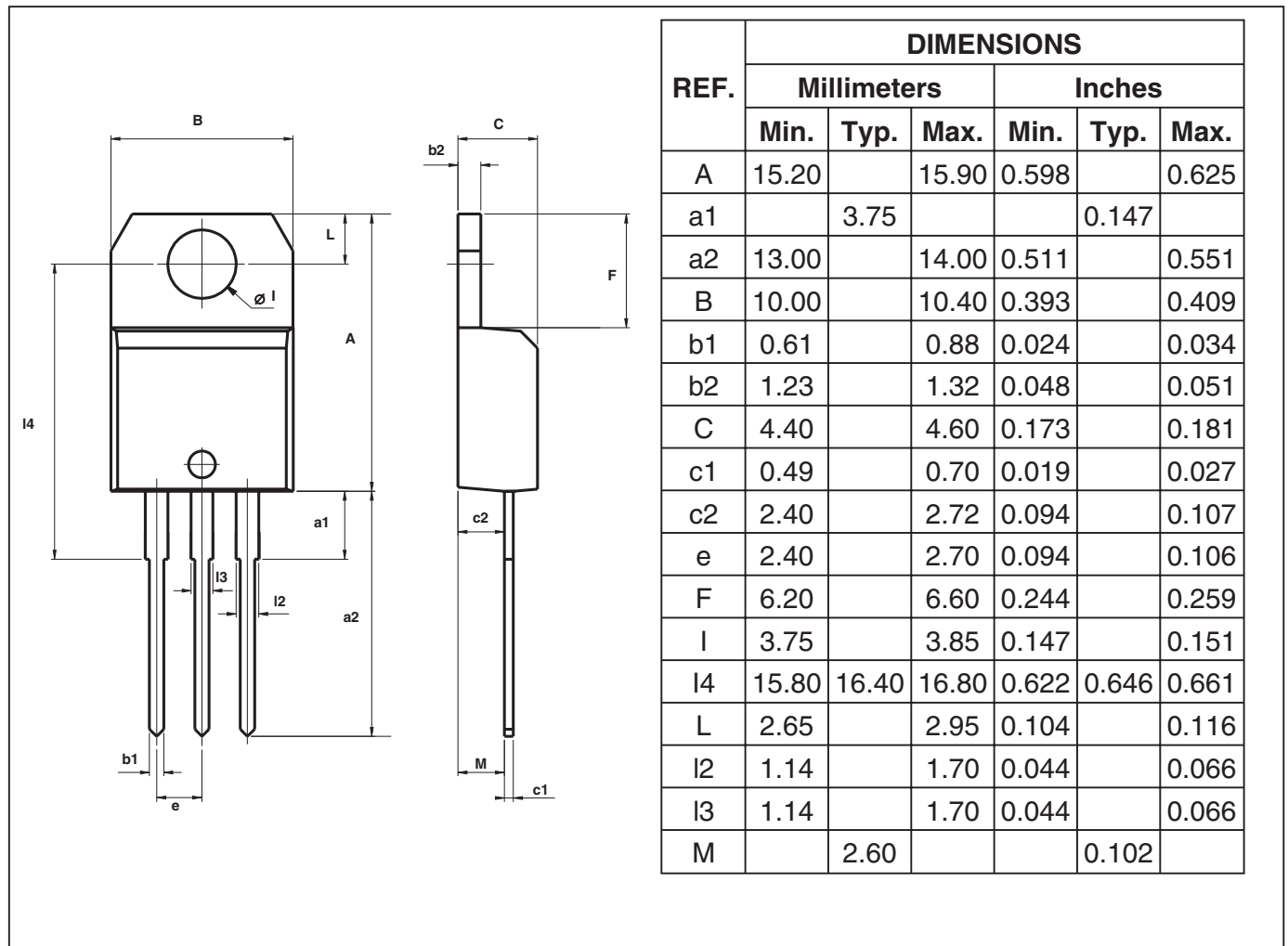
FOOT-PRINT (in millimeters)

D²PAK



PACKAGE MECHANICAL DATA

TO-220AB Plastic



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