

## Features

- On-state current ( $I_{T(RMS)}$ ): 40 A
- Max. blocking voltage ( $V_{DRM}/V_{RRM}$ ): 1200 V
- Gate current ( $I_{GT}$ ): 200 mA
- Commutation at 10 V/ $\mu$ s: up to 142 A/ms
- Noise immunity: 500 V/ $\mu$ s
- Insulated package:
  - 2,500 V rms (UL recognized: E81734)

## Description

The TPDVxx40 series use a high performance alternistor technology. Featuring very high commutation levels and high surge current capability, this family is well adapted to power control on inductive load (motor, transformer...).

**Table 1. Device summary**

Parameter	Blocking voltage $V_{DRM}/V_{RRM}$	On-state current $I_{T(RMS)}$	Gate current $I_{GT}$
TPDV640RG	600 V	40 A	200 mA
TPDV840RG	800 V		
TPDV1240RG	1200 V		

# 1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter		Value	Unit
$I_{T(RMS)}$	On-state rms current (180° conduction angle)	$T_c = 75^\circ\text{C}$	40	A
$I_{TSM}$	Non repetitive surge peak on-state current	$t_p = 2.5 \text{ ms}$	590	A
		$t_p = 8.3 \text{ ms}$	370	
		$t_p = 10 \text{ ms}$	350	
$I^2t$	$I^2t$ value for fusing	$t_p = 10 \text{ ms}$	$T_j = 25^\circ\text{C}$	610
$dI/dt$	Critical rate of rise of on-state current $I_G = 500 \text{ mA}; dI_G/dt = 1 \text{ A}/\mu\text{s}$	Repetitive $F = 50 \text{ Hz}$		20
		Non repetitive		100
$V_{DRM}$ $V_{RRM}$	Repetitive peak off-state voltage	TPDV640	$T_j = 125^\circ\text{C}$	600
		TPDV840		800
		TPDV1240		1200
$T_{stg}$ $T_j$	Storage junction temperature range Operating junction temperature range		-40 to +150 -40 to +125	°C
$T_L$	Maximum lead temperature for soldering during 10 s at 2 mm from case		260	°C
$V_{INS(RMS)}^{(1)}$	Insulation rms voltage		2500	V

1. A1, A2, gate terminals to case for 1 minute

Table 3. Electrical Characteristics ( $T_j = 25^\circ\text{C}$ , unless otherwise specified)

Symbol	Test condition	Quadrant		Value	Unit
$I_{GT}$	$V_D = 12 \text{ V DC}, R_L = 33 \Omega$	I - II - III	Max.	200	mA
$V_{GT}$			Max.	1.5	V
$V_{GD}$	$V_D = V_{DRM} R_L = 3.3 \text{ k}\Omega$	$T_j = 125^\circ\text{C}$	Min.	0.2	V
$t_{gt}$	$V_D = V_{DRM} I_G = 500 \text{ mA} dI_G/dt = 3 \text{ A}/\mu\text{s}$	I - II - III	Typ.	2.5	μs
$I_H^{(1)}$	$I_T = 500 \text{ mA}$ Gate open		Typ.	50	mA
$I_L$	$I_G = 1.2 \times I_{GT}$	I - III	Typ.	100	mA
		II		200	
$dV/dt$	Linear slope up to : $V_D = 67\% V_{DRM}$ Gate open	$T_j = 125^\circ\text{C}$	Min.	500	V/μs
$V_{TM}^{(1)}$	$I_{TM} = 56 \text{ A}$ $t_p = 380 \mu\text{s}$		Max.	1.8	V
$I_{DRM}$ $I_{RRM}$	$V_{DRM} = V_{RRM}$	$T_j = 25^\circ\text{C}$	Max.	20	μA
		$T_j = 125^\circ\text{C}$		8	mA
$(dI/dt)_c^{(1)}$	$(dV/dt)_c = 200 \text{ V}/\mu\text{s}$ $(dV/dt)_c = 10 \text{ V}/\mu\text{s}$	$T_j = 125^\circ\text{C}$	Min.	35	A/ms
				142	

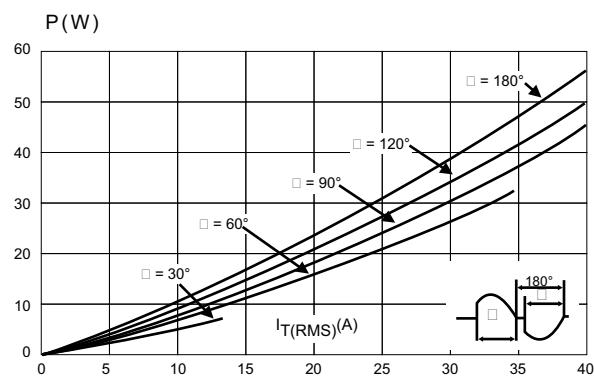
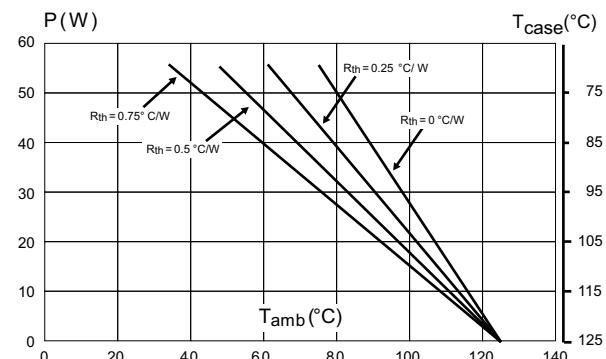
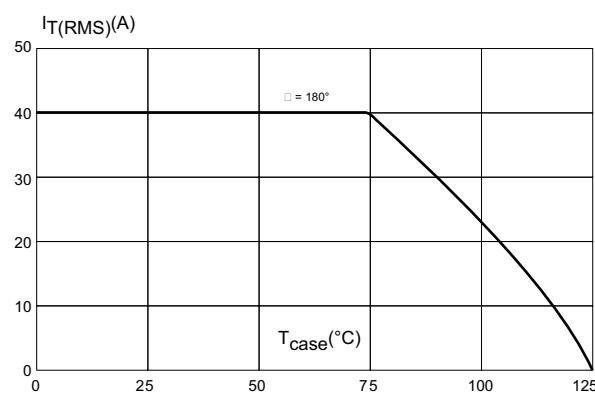
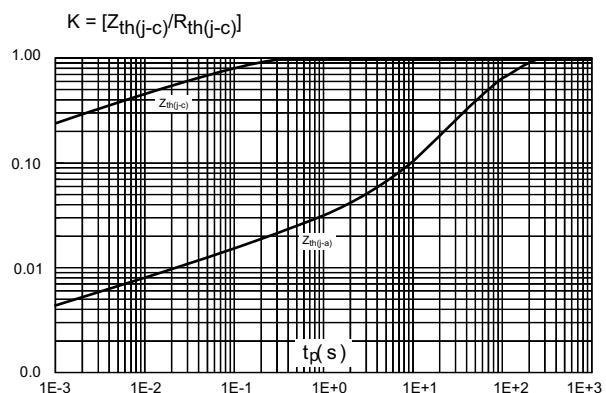
1. For either polarity of electrode A<sub>2</sub> voltage with reference to electrode A<sub>1</sub>.

**Table 4. Gate characteristics (maximum values)**

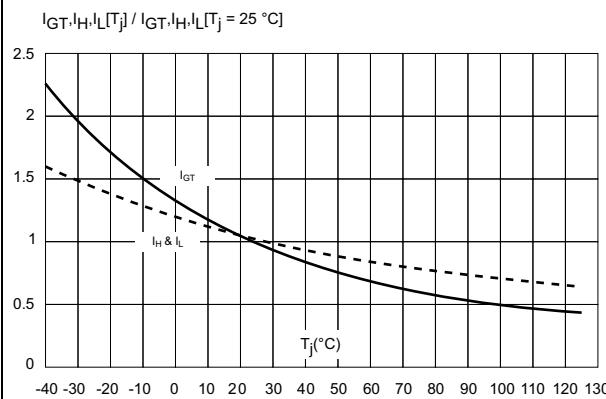
Symbol	Parameter	Value	Unit	
P <sub>G(AV)</sub>	Average gate power dissipation	1	W	
P <sub>GM</sub>	Peak gate power dissipation	t <sub>p</sub> = 20 µs	40	W
I <sub>GM</sub>	Peak gate current	t <sub>p</sub> = 20 µs	8	A
V <sub>GM</sub>	Peak positive gate voltage	t <sub>p</sub> = 20 µs	16	V

**Table 5. Thermal resistance**

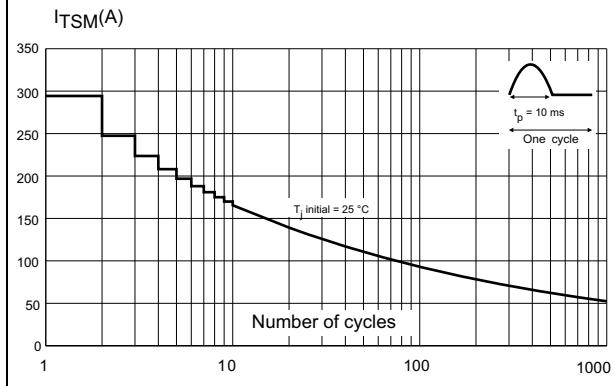
Symbol	Parameter	Value	Unit
R <sub>th(j-a)</sub>	Junction to ambient	50	°C/W
R <sub>th(j-c) DC</sub>	Junction to case for DC	1.2	°C/W
R <sub>th(j-c) AC</sub>	Junction to case for 360 °conduction angle (F = 50 Hz)	0.9	°C/W

**Figure 1. Max. rms power dissipation versus on-state rms current (F = 50 Hz) (curves limited by (dI/dt)c)****Figure 2. Max. rms power dissipation and max. allowable temperatures (T<sub>amb</sub> and T<sub>case</sub>) for various R<sub>th</sub>****Figure 3. On-state rms current versus case temperature****Figure 4. Relative variation of thermal impedance versus pulse duration**

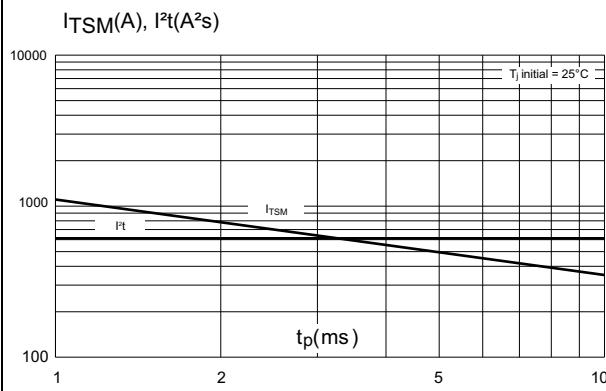
**Figure 5. Relative variation of gate trigger current and holding current versus junction temperature**



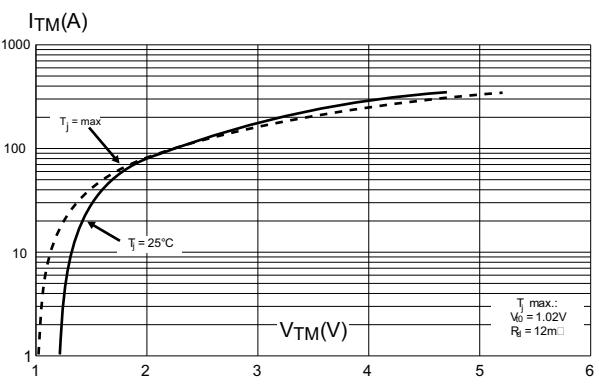
**Figure 6. Non repetitive surge peak on-state current versus number of cycles**



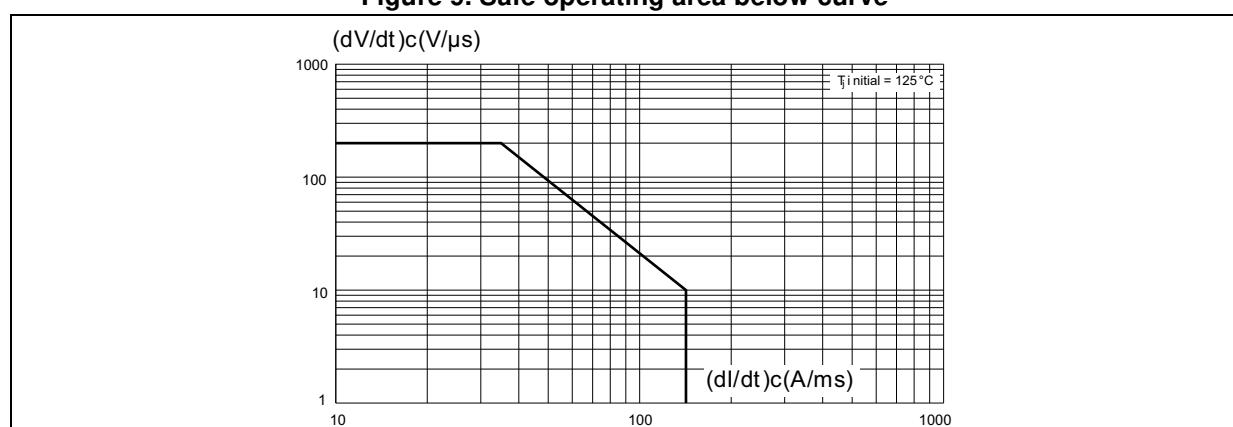
**Figure 7. Non-repetitive surge peak on-state current for a sinusoidal pulse and corresponding values of  $I^2t$**



**Figure 8. On-state characteristics (maximum values)**



**Figure 9. Safe operating area below curve**



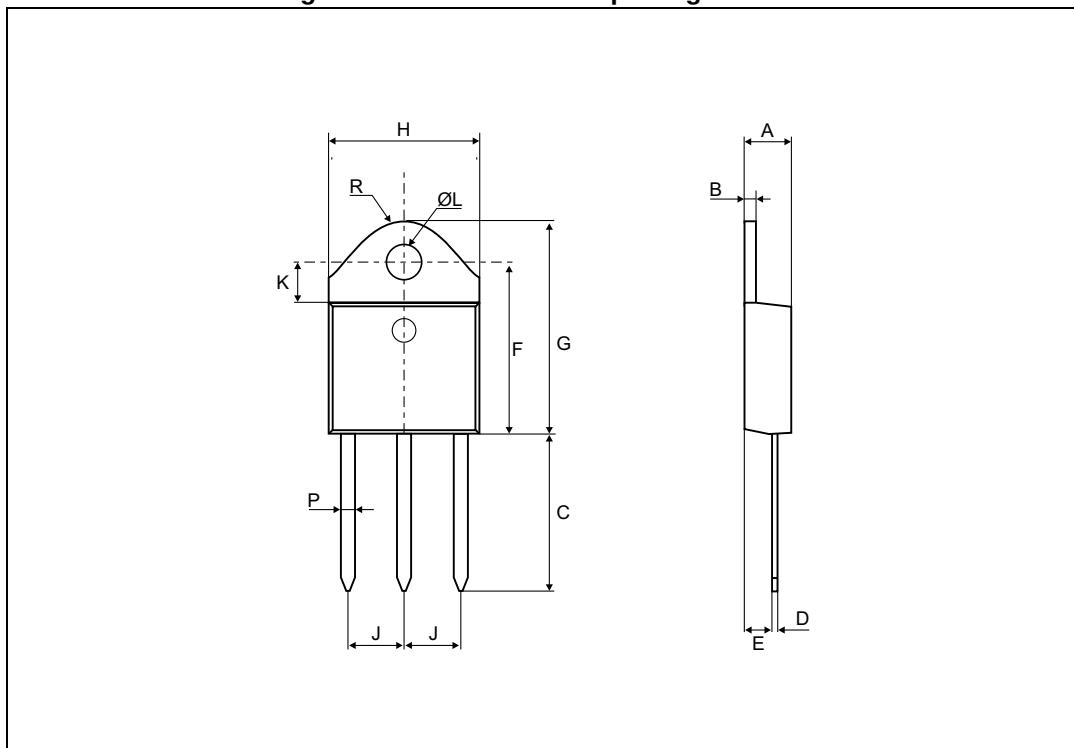
## 2 Package information

- Epoxy meets UL94, V0
- Cooling method:C (by conduction)
- Recommended torque value:0.9 to 1.2 N·m

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com).  
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### 2.1 TOP3 insulated package information

Figure 10. TOP3 insulated package outline



**Table 6. TOP3 insulated package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	Typ.	Min.	Max.	Typ.	Min.	Max.
A		4.4	4.6		0.173	0.181
B		1.45	1.55		0.057	0.061
C		14.35	15.60		0.565	0.614
D		0.5	0.7		0.020	0.028
E		2.7	2.9		0.106	0.114
F		15.8	16.5		0.622	0.650
G		20.4	21.1		0.815	0.831
H		15.1	15.5		0.594	0.610
J		5.4	5.65		0.213	0.222
K		3.4	3.65		0.134	0.144
ØL		4.08	4.17		0.161	0.164
P		1.20	1.40		0.047	0.055
R	4.60			0.181		

1. Values in inches are converted from mm and rounded to 4 decimal digits.

### 3 Ordering information

**Table 7. Ordering information**

Order code	Marking	Package	Weight	Base qty.	delivery mode
TPDV640RG	TPDV640	TOP3 insulated	4.5 g	30	Tube
TPDV840RG	TPDV840				
TPDV1240RG	TPDV1240				

### 4 Revision history

**Table 8. Document revision history**

Date	Revision	Changes
30-Mar-2011	1	Initial release.
10-Jun-2015	2	Updated <a href="#">Table 3</a> . Updated <a href="#">Figure 9</a> . Format updated to current standard.

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