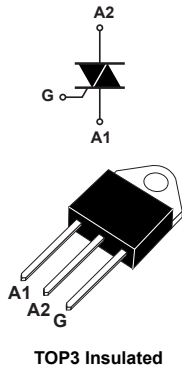


## 40 A standard Triacs in TOP3 package



### 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:
  - 2500 V rms (UL recognized: E81734)

### Application

- Heating system
- Motor starter
- Induction motor speed control

### Description

The TPDVxx40 series use high performance alternistor technology.

Featuring very high commutation levels and high surge current capability, this family is well adapted to power control for inductive loads (motor, transformer...) especially on three-phase power grid. Targeted three-phase applications include heating systems, motor starters, and induction motor speed control (especially for fans).

#### Product status link

[TPDV640RG](#)

[TPDV840RG](#)

[TPDV1240RG](#)

#### Product summary

$I_{T(RMS)}$	40 A
$V_{DRM}/V_{RRM}$	TPDV640RG: 600 V
	TPDV840RG: 800 V
	TPDV1240RG: 1200 V
$I_{GT}$	200 mA

# 1 Characteristics

**Table 1. Absolute maximum ratings (limiting values)**

Symbol	Parameters			Value	Unit
I <sub>T(RMS)</sub>	RMS on-state current (180° conduction angle)		T <sub>c</sub> = 75 °C	40	A
I <sub>TSM</sub>	Non repetitive surge peak on-state current	t <sub>p</sub> = 2.5 ms	T <sub>j</sub> = 25 °C	590	A
		t <sub>p</sub> = 8.3 ms		370	
		t <sub>p</sub> = 10 ms		350	
I <sup>2</sup> t	I <sup>2</sup> t value for fusing	t <sub>p</sub> = 10 ms	T <sub>j</sub> = 25 °C	610	A <sup>2</sup> s
di/dt	Critical rate of rise of on-state current I <sub>G</sub> = 500 mA, di <sub>G</sub> /dt = 1 A/μs	Repetitive, f = 50 Hz		20	A/μs
		Non repetitive		100	
V <sub>DRM</sub> , V <sub>RRM</sub>	Repetitive surge peak off-state voltage	TPDV640	T <sub>j</sub> = 125 °C	600	V
		TPDV840		800	
		TPDV1240		1200	
I <sub>GM</sub>	Peak gate current	t <sub>p</sub> = 20 μs		8	A
P <sub>GM</sub>	Peak gate power dissipation			40	W
V <sub>GM</sub>	Peak positive gate voltage			16	V
P <sub>G(AV)</sub>	Average gate power dissipation			1	W
T <sub>stg</sub>	Storage junction temperature range			-40 to +150	°C
T <sub>j</sub>	Operating junction temperature range			-40 to +125	°C
T <sub>L</sub>	Maximum lead temperature for soldering during 10 s at 2 mm from case			260	°C
V <sub>INS</sub> <sup>(1)</sup>	Insulation RMS voltage, 1 minute			2500	V

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

**Table 2. Electrical characteristics ( $T_j = 25\text{ °C}$ , unless otherwise specified)**

Symbol	Parameters	Quadrant		Value	Unit
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$ , $R_L = 33\ \Omega$	I - II - III	Max.	200	mA
$V_{GT}$		I - II - III	Max.	1.5	V
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$ , $T_j = 125\text{ }^\circ\text{C}$	I - II - III	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	$\mu\text{s}$
$I_H^{(2)}$	$I_T = 500\text{ mA}$		Typ.	50	mA
$I_L$	$I_G = 1.2\ I_{GT}$	I - III	Typ.	100	mA
		II	Typ.	200	
$dV/dt^{(2)}$	$V_D = 67\ \% V_{DRM}$ gate open, $T_j = 125\text{ }^\circ\text{C}$		Min.	500	V/ $\mu\text{s}$
$(di/dt)_c^{(2)}$	$(dV/dt)_c = 200\text{ V}/\mu\text{s}$ , $T_j = 125\text{ }^\circ\text{C}$		Min.	35	A/ms
	$(dV/dt)_c = 10\text{ V}/\mu\text{s}$ , $T_j = 125\text{ }^\circ\text{C}$			142	

1. Minimum  $I_{GT}$  is guaranteed at 5 % of  $I_{GT}$  max.

2. For both polarities of A2 referenced to A1

**Table 3. Static electrical characteristics**

Symbol	Test conditions			Value	Unit
$V_{TM}^{(1)}$	$I_{TM} = 56\text{ A}$ , $t_p = 380\text{ }\mu\text{s}$	$T_j = 25\text{ }^\circ\text{C}$	Max.	1.8	V
$V_{TO}^{(1)}$	threshold on-state voltage	$T_j = 125\text{ }^\circ\text{C}$	Max.	1.02	V
$R_D^{(1)}$	Dynamic resistance	$T_j = 125\text{ }^\circ\text{C}$	Max.	12	m $\Omega$
$I_{DRM}/I_{RRM}$	$V_{DRM} = V_{RRM}$	$T_j = 25\text{ }^\circ\text{C}$	Max.	20	$\mu\text{A}$
		$T_j = 125\text{ }^\circ\text{C}$		8	mA

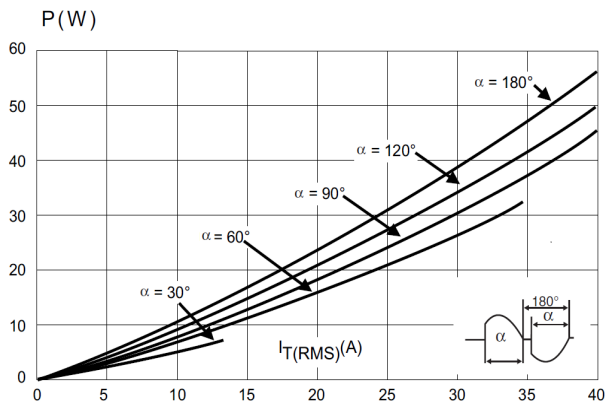
1. For both polarities of A2 referenced to A1

**Table 4. Thermal resistance**

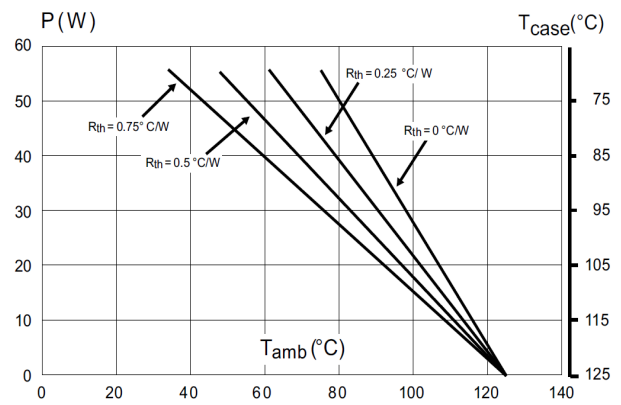
Symbol	Parameters	Value	Unit
$R_{th(j-c)}$	Junction to case (DC)	Max.	1.2
	Junction to case (AC) for 360 ° conduction angle ( $f = 50\text{ Hz}$ )	Max.	0.9
$R_{th(j-a)}$	Junction to ambient	Typ.	50

## 1.1 Characteristics (curves)

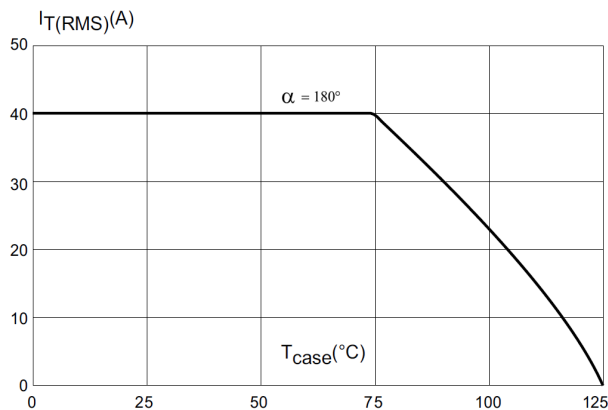
**Figure 1.** Max. rms power dissipation versus on-state rms current ( $f = 50\text{Hz}$ , curves limited by  $(di/dt)_c$ )



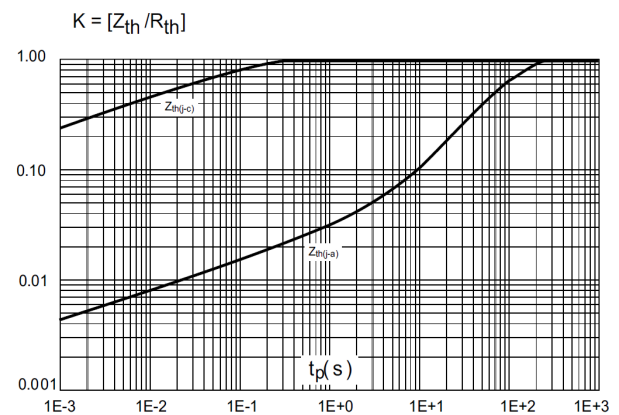
**Figure 2.** Max. rms power dissipation and max. allowable temperatures ( $T_{amb}$  and  $T_{case}$ ) for various  $R_{th}$



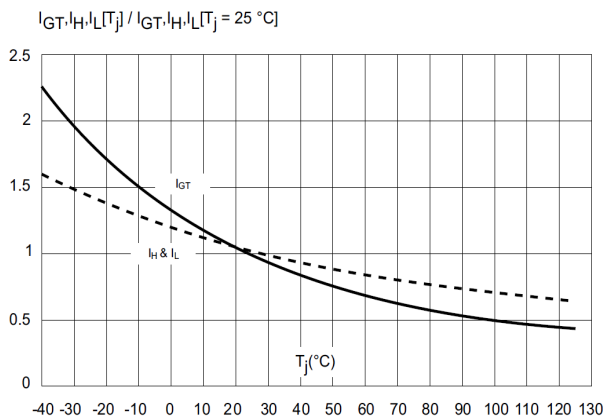
**Figure 3.** On-state rms current versus case temperature



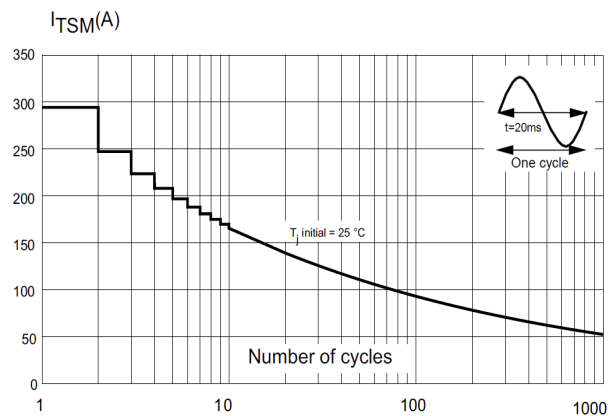
**Figure 4.** Relative variation of thermal impedance versus pulse duration



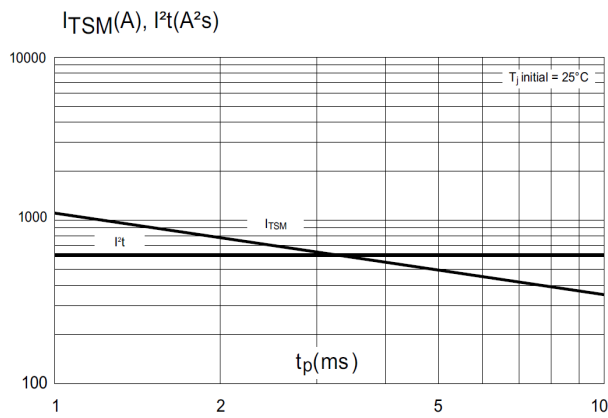
**Figure 5.** Relative variation of gate trigger current, holding current, and latching current versus junction temperature



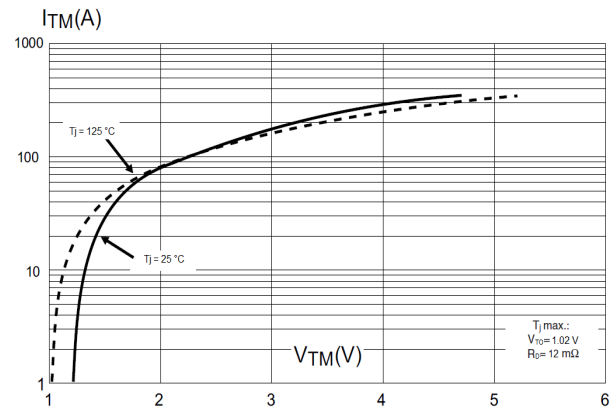
**Figure 6.** Non-repetitive surge peak on-state current versus number of cycles



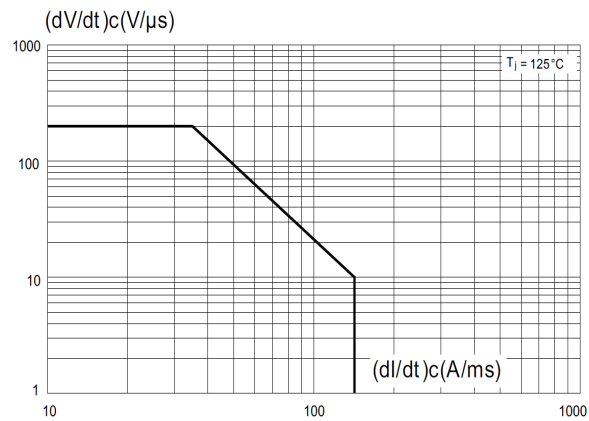
**Figure 7. Non-repetitive surge peak on-state current for a sinusoidal pulse and corresponding values of  $I^2t$**



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



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



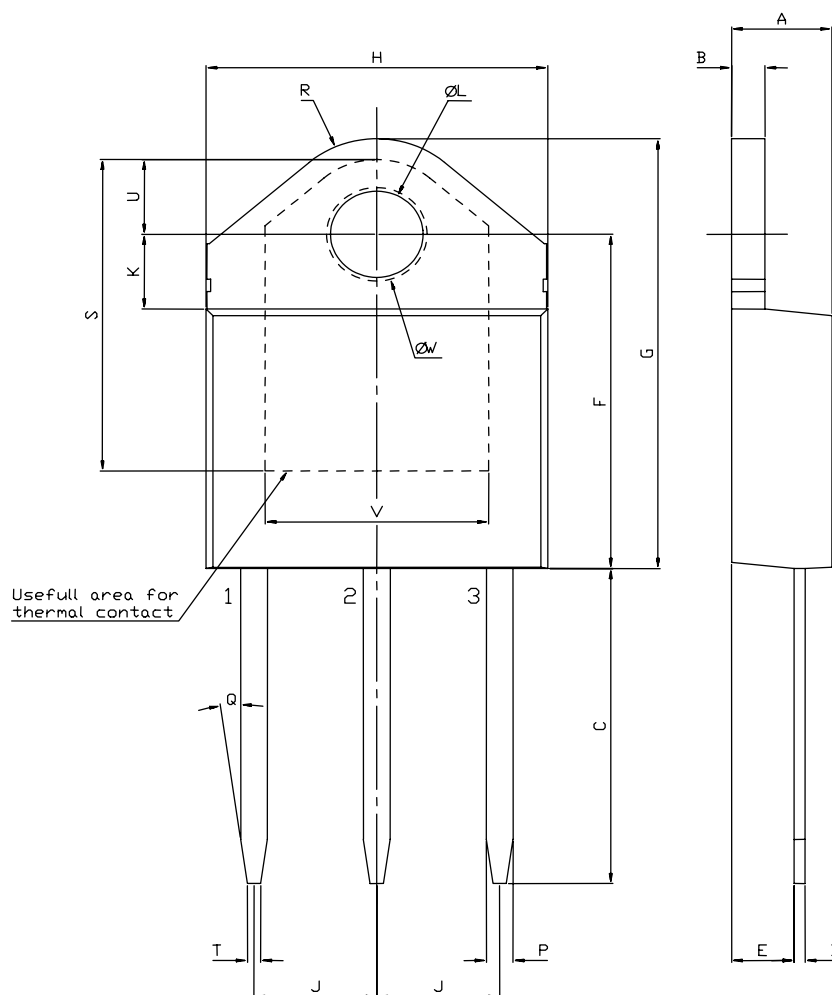
## 2 Package information

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). ECOPACK is an ST trademark.

### 2.1 Package information

- **ECOPACK** (lead-free plating and halogen free package compliance)
- Lead-free package leads finishing
- Halogen-free molding compound resin meets UL94 standard level V0
- Recommended torque: 1.05 N·m (max. torque: 1.2 N·m)

Figure 10. Package outline



0039771\_14

**Table 5. Mechanical data**

Ref.	Dimensions					
	mm			Inches <sup>(1)</sup>		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.1732		0.1811
B	1.45		1.55	0.0571		0.0610
C	14.35		15.60	0.5650		0.6142
D	0.50		0.70	0.0197		0.0276
E	2.70		2.90	0.1063		0.1142
F	15.80		16.50	0.6220		0.6496
G	20.40		21.10	0.8031		0.8307
H	15.10		15.50	0.5945		0.6102
J	5.40		5.65	0.2126		0.2224
K	3.40		3.65	0.1339		0.1437
L	4.08		4.17	0.1606		0.1642
P	1.10		1.30	0.0430		0.0510
R		4.60			0.1811	

1. Inches given for reference only

### 3 Ordering information

Table 6. Ordering information

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

## Revision history

**Table 7. Document revision history**

Date	Revision	Changes
30-Mar-2011	1	Initial release.
10-Jun-2015	2	Updated <i>Table 3</i> . Updated <i>Figure 9</i> . Format updated to current standard.
06-Oct-2023	3	Updated <i>Section 2.1 Package information</i> .
02-Jul-2025	4	Updated <a href="#">Table 2</a> , <a href="#">Figure 3</a> , and <a href="#">Figure 6</a> .

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