



# THE DATASHEET OF TPDV1225RG



## 25 A high voltage Triacs

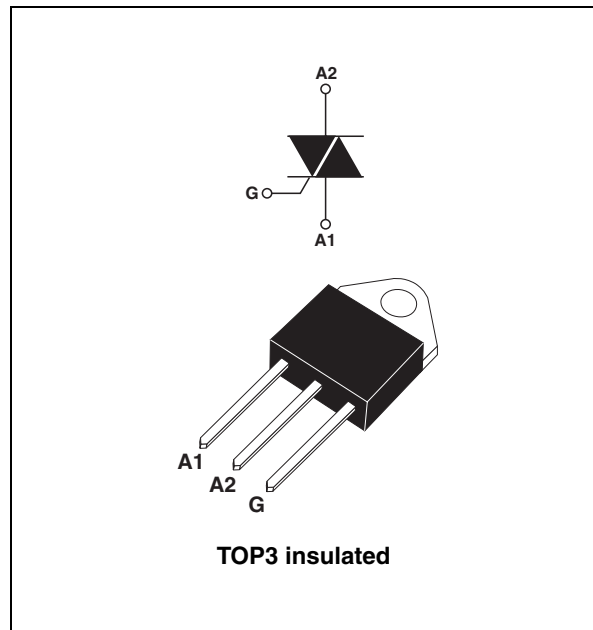
### Features

- On-state current ( $I_{T(RMS)}$ ): 25 A
- Max. blocking voltage ( $V_{DRM}/V_{RRM}$ ): 1200 V
- Gate current ( $I_{GT}$ ): 150 mA
- Commutation @ 10 V/ $\mu$ s: up to 88 A/ms
- Noise immunity: 2 kV/ $\mu$ s
- Insulated package:
  - 2,500 V rms (UL recognized: E81734).

### Description

The TPDVxx25 series use high performance alternistor technology.

Featuring very high commutation levels and high surge current capability, these devices are well adapted to power control for inductive and resistive 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).



**Table 1. Device summary**

Parameter	TPDV825RG	TPDV1025RG	TPDV1225RG
Blocking voltage $V_{DRM}/V_{RRM}$	800 V	1000 V	1200 V
On-state current $I_{T(RMS)}$	25 A		
Gate current $I_{GT}$	150 mA		

# 1 Characteristics

**Table 2. Absolute maximum ratings (limiting values)**

Symbol	Parameter		Value	Unit	
$I_{T(RMS)}$	On-state rms current (180° conduction angle)		$T_c = 85\text{ °C}$	25	A
$I_{TSM}$	Non repetitive surge peak on-state current	$t_p = 2.5\text{ ms}$	$T_j = 25\text{ °C}$	390	A
		$t_p = 8.3\text{ ms}$		250	
		$t_p = 10\text{ ms}$		230	
$I^2t$	$I^2t$ value for fusing	$t_p = 10\text{ ms}$	$T_j = 25\text{ °C}$	265	A <sup>2</sup> s
$di/dt$	Critical rate of rise of on-state current $I_G = 500\text{ mA}$ , $dI_G/dt = 1\text{ A}/\mu\text{s}$	F = 50 Hz		100	A/ $\mu\text{s}$
$V_{DRM}$ $V_{RRM}$	Repetitive peak off-state voltage	TPDV825	$T_j = 125\text{ °C}$	800	V
		TPDV1025		1000	
		TPDV1225		1200	
$T_{stg}$ $T_j$	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	°C
$V_{INS(RMS)}^{(1)}$	Insulation rms voltage			2500	V

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

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

Symbol	Test conditions		Quadrant		Value	Unit
$I_{GT}$	$V_D = 12\text{ V DC}$ , $R_L = 33\ \Omega$		I - II - III	MAX.	150	mA
$V_{GT}$				MAX.	1.5	V
$V_{GD}$	$V_D = V_{DRM}$ $R_L = 3.3\text{ k}\Omega$	$T_j = 125\text{ °C}$	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	$\mu\text{s}$
$I_H^{(1)}$	$I_T = 500\text{ mA}$ 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	$T_j = 125\text{ °C}$		MIN.	2000	V/ $\mu\text{s}$
$V_{TM}^{(1)}$	$I_{TM} = 35\text{ A}$ $t_p = 380\ \mu\text{s}$			MAX.	1.8	V
$V_{to}^{(1)}$	Threshold voltage			MAX.	1.1	V
$R_d^{(1)}$	Dynamic resistance			MAX.	19	m $\Omega$
$I_{DRM}$ $I_{RRM}$	$V_{DRM} = V_{RRM}$	$T_j = 25\text{ °C}$		MAX.	20	$\mu\text{A}$
		$T_j = 125\text{ °C}$			8	mA
$(di/dt)_c^{(1)}$	$(dV/dt)_c = 200\text{ V}/\mu\text{s}$		$T_j = 125\text{ °C}$	MIN.	20	A/ms
	$(dV/dt)_c = 10\text{ V}/\mu\text{s}$				88	

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

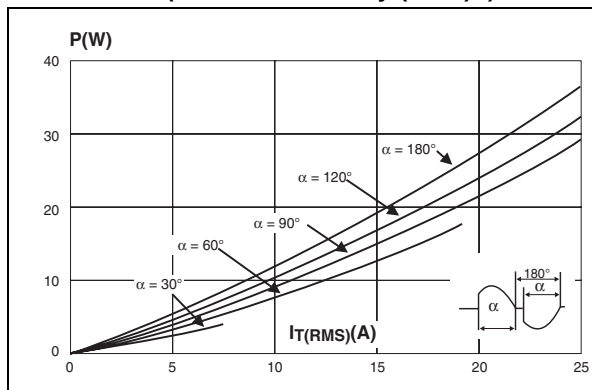
**Table 4. Gate characteristics (maximum values)**

Symbol	Parameter	Value	Unit
$P_{G(AV)}$	Average gate power dissipation	1	W
$P_{GM}$	Peak gate power dissipation	$t_p = 20 \mu s$ 40	W
$I_{GM}$	Peak gate current	$t_p = 20 \mu s$ 8	A
$V_{GM}$	Peak positive gate voltage	$t_p = 20 \mu s$ 16	V

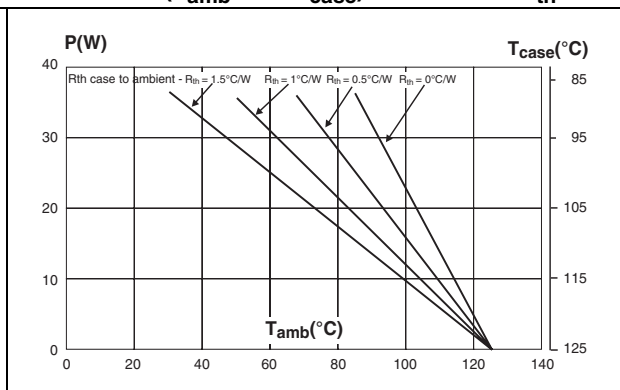
**Table 5. Thermal resistance**

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction to ambient	50	$^{\circ}C/W$
$R_{th(j-c) DC}$	Junction to case for DC	1.5	$^{\circ}C/W$
$R_{th(j-c) AC}$	Junction to case for 360 $^{\circ}$ Conduction angle ( $F = 50 Hz$ )	1.1	$^{\circ}C/W$

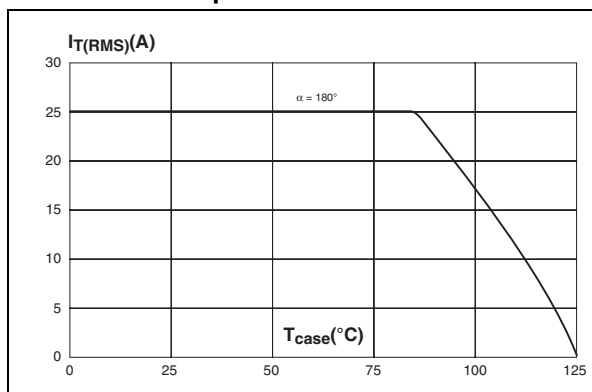
**Figure 1. Max. rms power dissipation versus on-state rms current ( $F = 50Hz$ ). (curves limited by  $(di/dt)_c$ )**



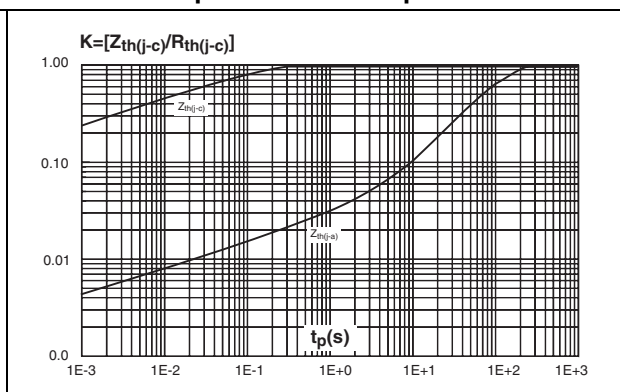
**Figure 2. Max. rms power dissipation and max. allowable temperatures ( $T_{amb}$  and  $T_{case}$ ) for various  $R_{th}$**



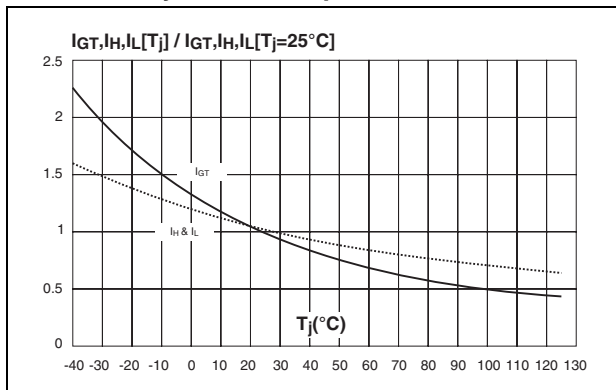
**Figure 3. On-state rms current versus case temperature**



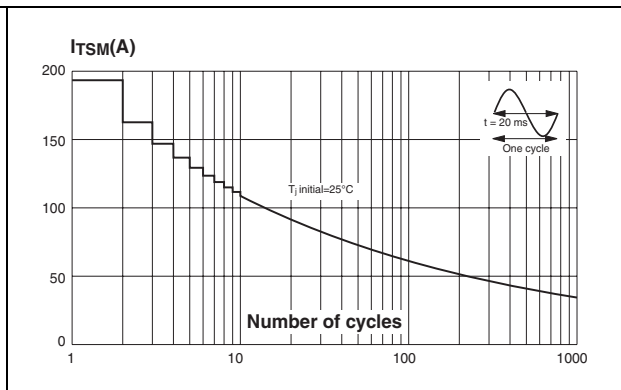
**Figure 4. Relative variation of thermal impedance versus pulse duration**



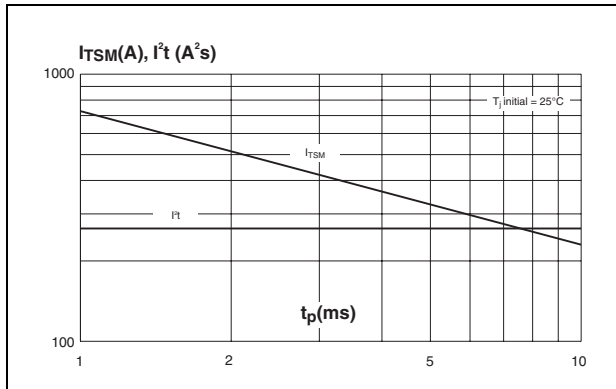
**Figure 5. Relative variation of gate trigger current and holding current versus junction temperature**



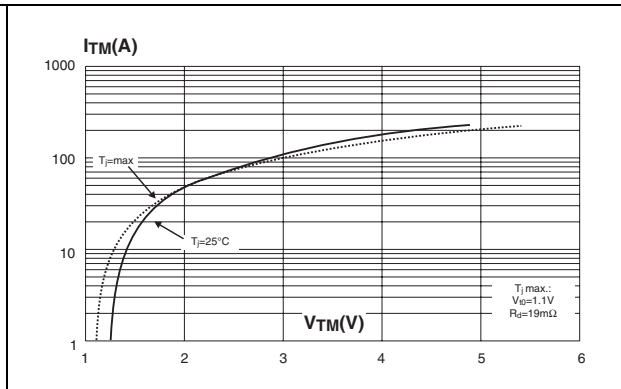
**Figure 6. Non repetitive surge peak on-state current versus number of cycles**



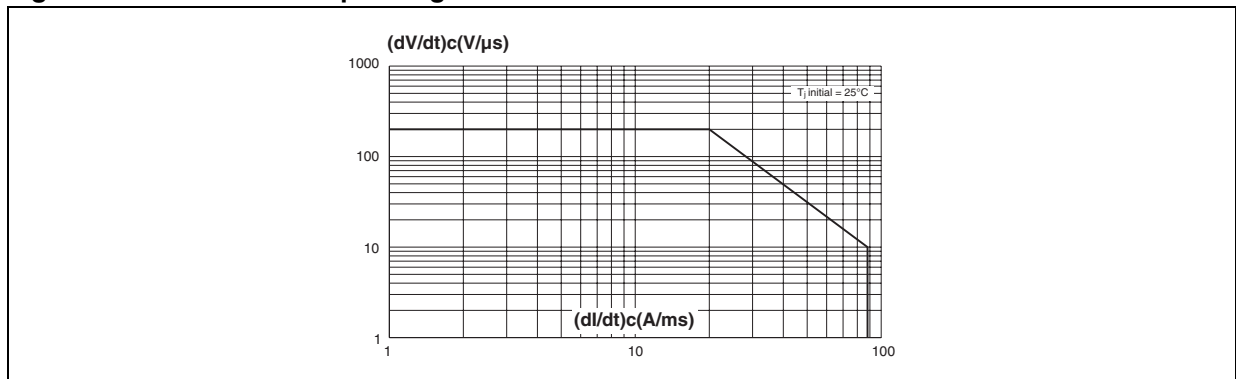
**Figure 7. Non-repetitive surge peak on-state current for a sinusoidal pulse and corresponding values of I<sup>2</sup>t**



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



**Figure 9. Safe turn-off operating area**



## 2 Package information

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

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**Table 6. TOP3 insulated dimensions**

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	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 typ.		0.181 typ.	

### 3 Ordering information

**Table 7. Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
TPDV825RG	TPDV825	TOP3 insulated	4.5 g	30	Tube
TPDV1025RG	TPDV1025				
TPDV1225RG	TPDV1225				

### 4 Revision history

**Table 8. Document revision history**

Date	Revision	Changes
30-Mar-2011	1	First issue.
13-Jan-2012	2	Updated $dl/dt$ in <a href="#">Table 2</a> and added $V_{to}$ and $R_d$ to <a href="#">Table 3</a> .

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