

## Description

Sensitive Triacs are intended in general purpose applications where high surge current capability is required. These Triacs feature a gate current capability sensitivities of 5 mA or 10 mA depending on the quadrant.

**Table 1. Device summary**

Symbol	Value	Unit
$I_{T(rms)}$	4	A
$V_{DRM}, V_{RRM}$	600	V
$V_{DSM}, V_{RSM}$	700	V
$I_{GT}$	5 / 10 <sup>(1)</sup>	mA

1. Quadrant I,II,III = 5 mA, quadrant IV = 10 mA.

## Features

- MCU direct gate drive
- 4 quadrants Triac
- ECOPACK<sup>®</sup>2 compliant component

## Applications

- Motor control circuits
- Small home appliances
- Fan speed controller
- Pump and valve drive
- Mahjong machines
- Lighting dimmers

# 1 Characteristics

**Table 2. Absolute maximum ratings ( $T_j = 25\text{ °C}$  unless otherwise stated)**

Symbol	Parameter			Value	Unit
$I_{T(rms)}$	On-state rms current (full sine wave)	I <sub>PAK</sub> , DPAK	$T_c = 110\text{ °C}$	4	A
$I_{TSM}$	Non repetitive surge peak on-state current (full cycle, $T_j$ initial = $25\text{ °C}$ )		$t_p = 20\text{ ms}$	35	A
			$t_p = 16.7\text{ ms}$	38	
$I^2t$	$I^2t$ value for fusing		$t_p = 10\text{ ms}$	6	A <sup>2</sup> s
dI/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$		$F = 100\text{ Hz}$	50	A/ $\mu$ s
$I_{GM}$	Peak gate current	$t_p = 20\text{ }\mu$ s	$T_j = 125\text{ °C}$	4	A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 125\text{ °C}$	0.5	W
$T_{stg}$ $T_j$	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	°C
$V_{DSM}$ , $V_{RSM}$	Non repetitive surge peak off-state voltage		$t_p = 10\text{ ms}$	700	V

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

Symbol	Test conditions	Quadrant		Value	Unit
				T405Q	
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$ , $R_L = 30\text{ }\Omega$	I - II - III IV	Max.	5 10	mA
$V_{GT}$	$V_D = 12\text{ V}$ , $R_L = 30\text{ }\Omega$	All	Max.	1.3	V
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$ , $T_j = 125\text{ °C}$	All	Min.	0.2	V
$I_H^{(2)}$	$I_T = 100\text{ mA}$		Max.	10	mA
$I_L$	$I_G = 1.2 I_{GT}$	I - III - IV	Max.	10	mA
		II	Max.	15	
$dV/dt^{(2)}$	$V_D = 67\% V_{DRM}$ , gate open	$T_j = 125\text{ °C}$	Min.	10	V/ $\mu$ s
$(dI/dt)_C^{(2)}$	$(dV/dt)_C = 2\text{ V}/\mu$ s	$T_j = 125\text{ °C}$	Min.	1.8	A/ms

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

2. For both polarities of A2 referenced to A1

Table 4. Static characteristics

Symbol	Test conditions			Value	Unit
$V_{TM}^{(1)}$	$I_{TM} = 5 \text{ A}$ , $t_p = 380 \text{ } \mu\text{s}$	$T_j = 25 \text{ } ^\circ\text{C}$	Max.	1.5	V
$V_{t0}^{(1)}$	Threshold voltage	$T_j = 125 \text{ } ^\circ\text{C}$	Max.	0.85	V
$R_d^{(1)}$	Dynamic resistance	$T_j = 125 \text{ } ^\circ\text{C}$	Max.	100	m $\Omega$
$I_{DRM}$ $I_{RRM}$	$V_{DRM} = V_{RRM}$	$T_j = 25 \text{ } ^\circ\text{C}$	Max.	5	$\mu\text{A}$
		$T_j = 125 \text{ } ^\circ\text{C}$		1	mA

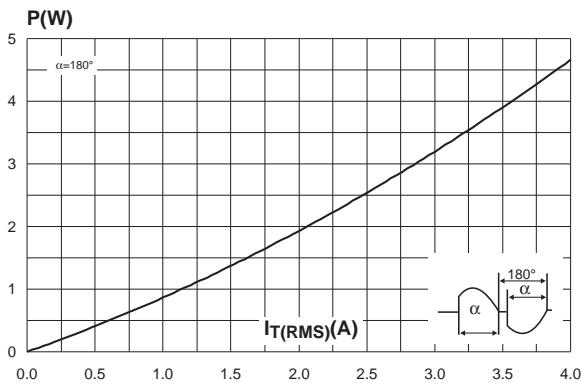
1. For both polarities of A2 referenced to A1

Table 5. Thermal resistance

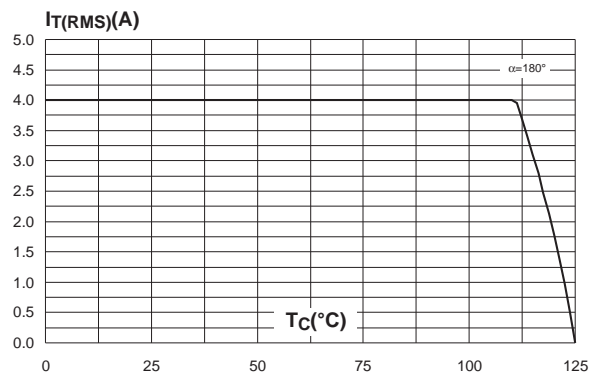
Symbol	Parameter		Value	Unit	
$R_{th(j-c)}$	Junction to case (AC)		3	$^\circ\text{C/W}$	
$R_{th(j-a)}$	Junction to ambient	$S^{(1)} = 0.5 \text{ cm}^2$	DPAK	70	$^\circ\text{C/W}$
			IPAK	100	$^\circ\text{C/W}$

1. S = Copper surface under tab.

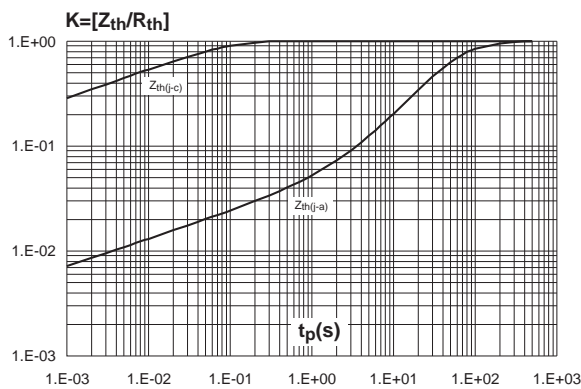
**Figure 1. Maximum power dissipation versus RMS on-state current**



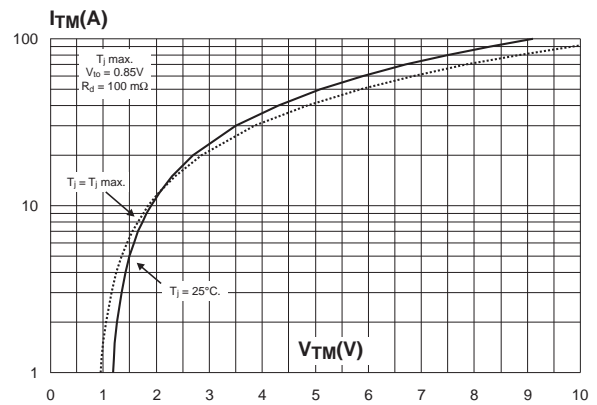
**Figure 2. RMS on-state current versus case temperature**



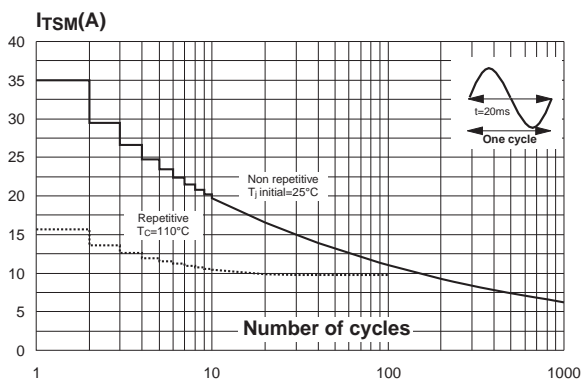
**Figure 3. Relative variation of thermal impedance versus pulse duration**



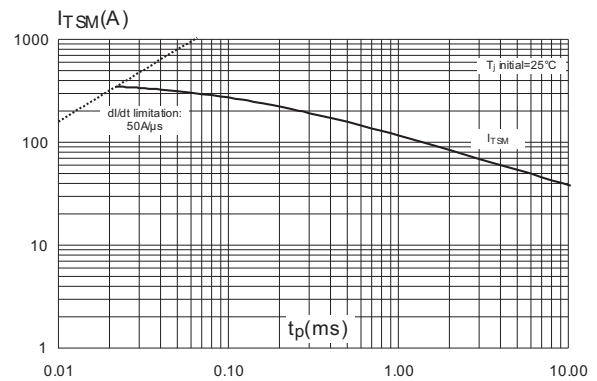
**Figure 4. On-state characteristics (maximum values)**



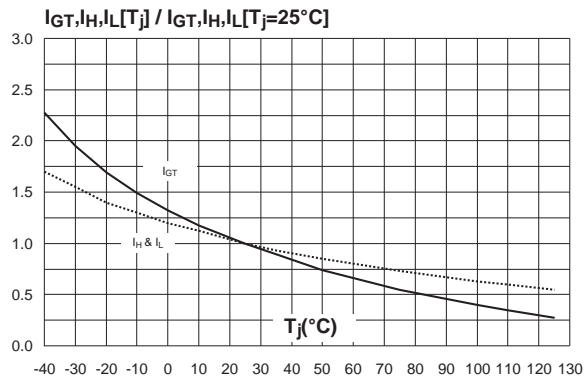
**Figure 5. Surge peak on-state current versus number of cycles**



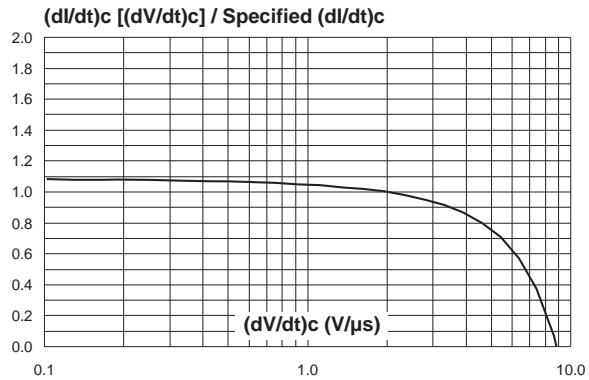
**Figure 6. Non-repetitive surge peak on-state current for a sinusoidal pulse with width tp < 10 ms**



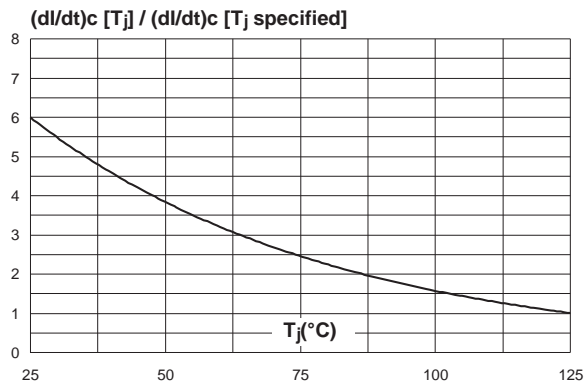
**Figure 7. Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values)**



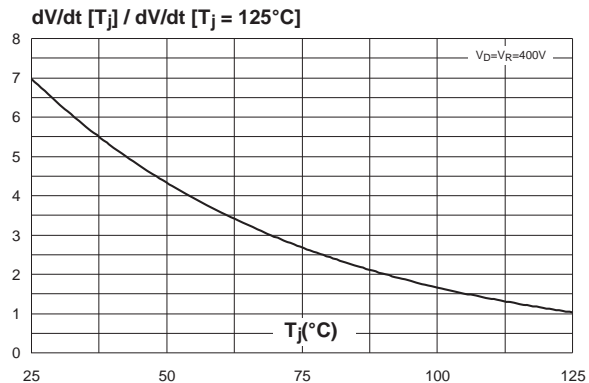
**Figure 8. Relative variation of critical rate of decrease of main current versus  $(dV/dt)_c$  (typical values)**



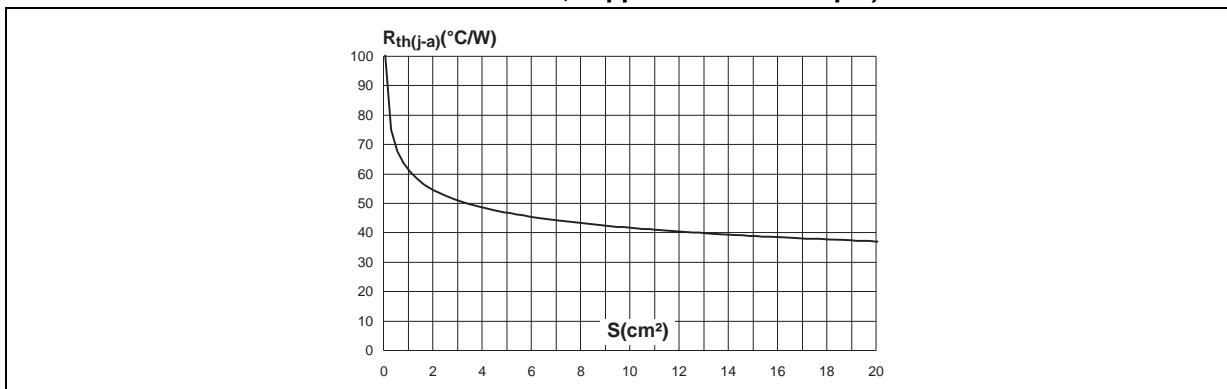
**Figure 9. Relative variation of critical rate of decrease of main current versus junction temperature**



**Figure 10. Relative variation of static  $dV/dt$  immunity versus junction temperature**



**Figure 11. DPAK thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35  $\mu\text{m}$ )**



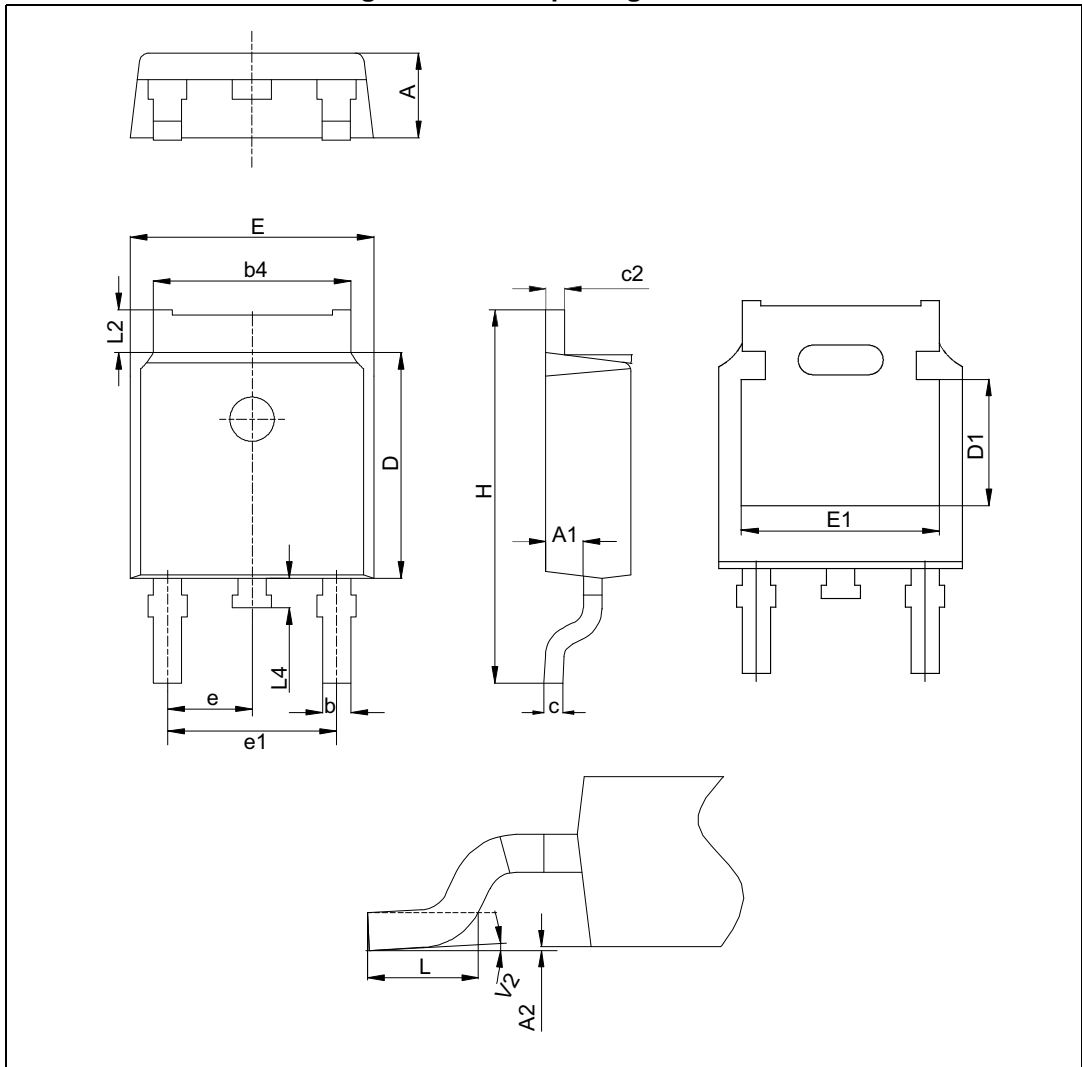
## 2 Package information

- Epoxy meets UL94, V0
- Lead-free package
- Recommended torque: 0.4 to 0.6 N·m

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### 2.1 DPAK package information

Figure 12. DPAK package outline



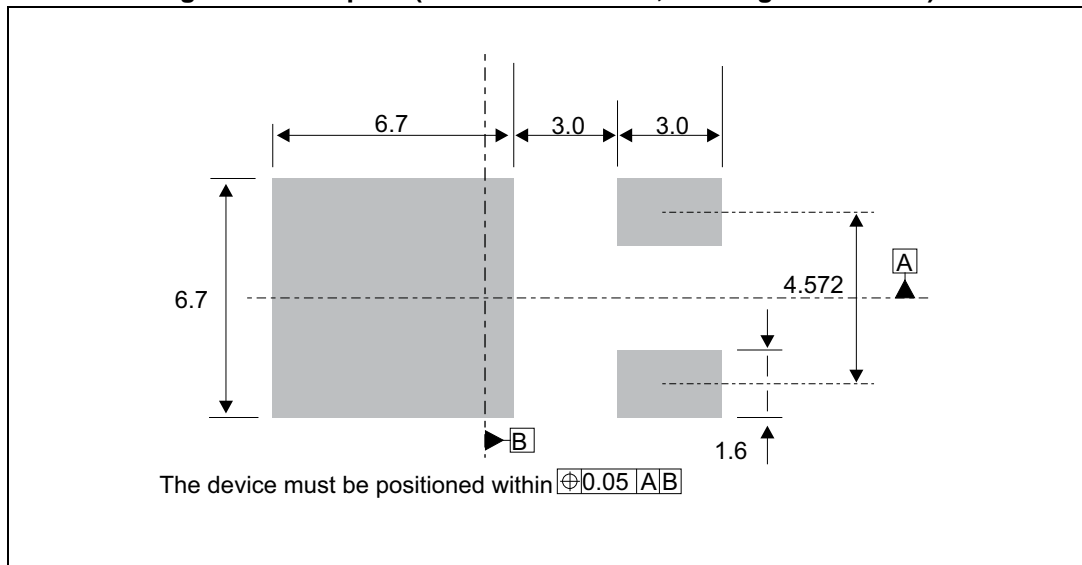
Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6. DPAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.18		2.40	0.0858		0.0945
A1	0.90		1.10	0.0354		0.0433
A2	0.03		0.23	0.0012		0.0091
b	0.64		0.90	0.0252		0.0354
b4	4.95		5.46	0.1949		0.2150
c	0.46		0.61	0.0181		0.0240
c2	0.46		0.60	0.0181		0.0236
D	5.97		6.22	0.2350		0.2449
D1	4.95		5.60	0.1949		0.2204
E	6.35		6.73	0.2500		0.2650
E1	4.32		5.50	0.1701		0.2165
e		2.286			0.0900	
e1	4.40		4.70	0.1732		0.1850
H	9.35		10.40	0.3681		0.4094
L	1.00		1.78	0.0394		0.0701
L2		1.27			0.0500	
L4	0.60		1.02	0.0236		0.0402
V2	-8°		8°	-8°		8°

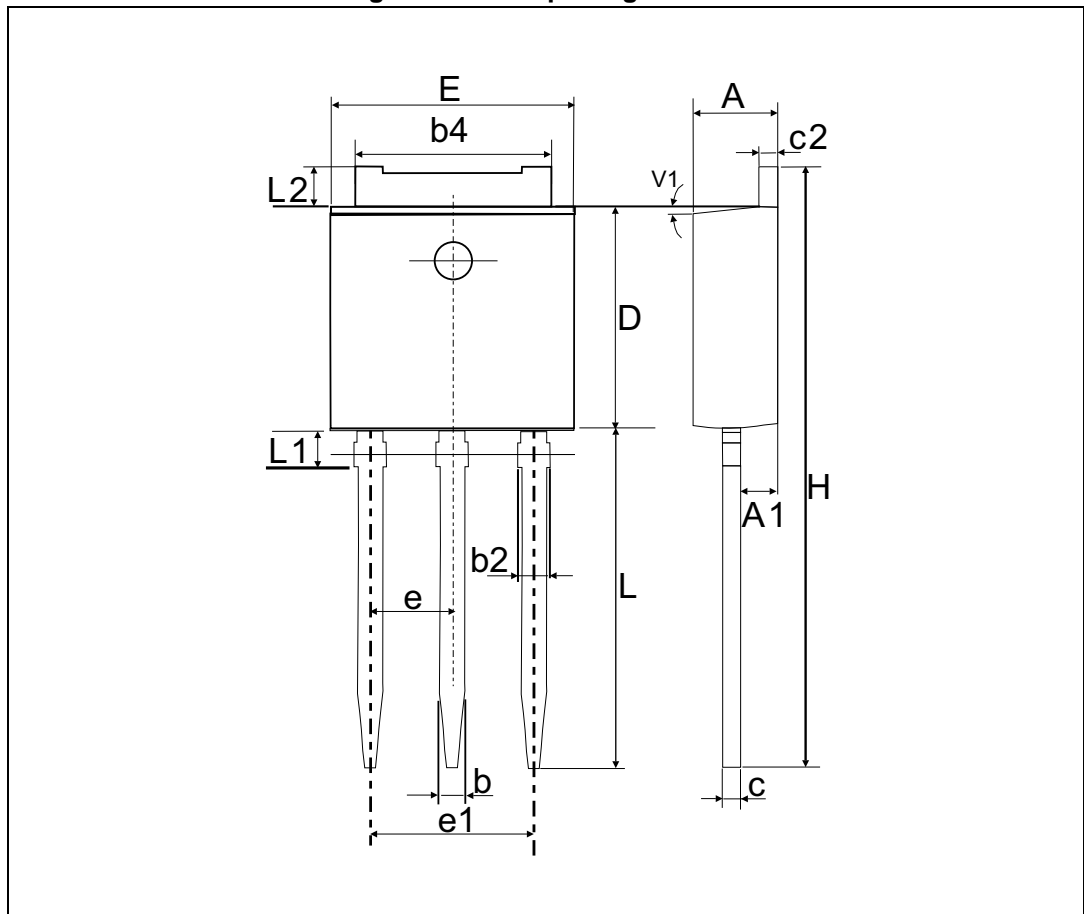
1. Inch dimensions are only for reference

Figure 13. Footprint (dimensions in mm, drawing not in scale)



## 2.2 IPAK package information

Figure 14. IPAK package outline



*Note:* This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.



Table 7. IPAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20		2.40	0.0866		0.0945
A1	0.90		1.10	0.0354		0.0433
b	0.64		0.90	0.0252		0.0354
b2			0.95			0.0374
b4	5.20		5.43	0.2047		0.2138
c	0.45		0.60	0.0177		0.0236
c2	0.46		0.60	0.0181		0.0236
D	6		6.20	0.2362		0.2441
E	6.40		6.65	0.2520		0.2618
e		2.28			0.0898	
e1	4.40		4.60	0.1732		0.1811
H		16.10			0.6339	
L	9		9.60	0.3543		0.3780
L1	0.8		1.20	0.0315		0.0472
L2		0.80	1.25		0.0315	0.0492
V1		10°			10°	

1. Inch dimensions are only for reference

### 3 Ordering information

Figure 15. Order information scheme

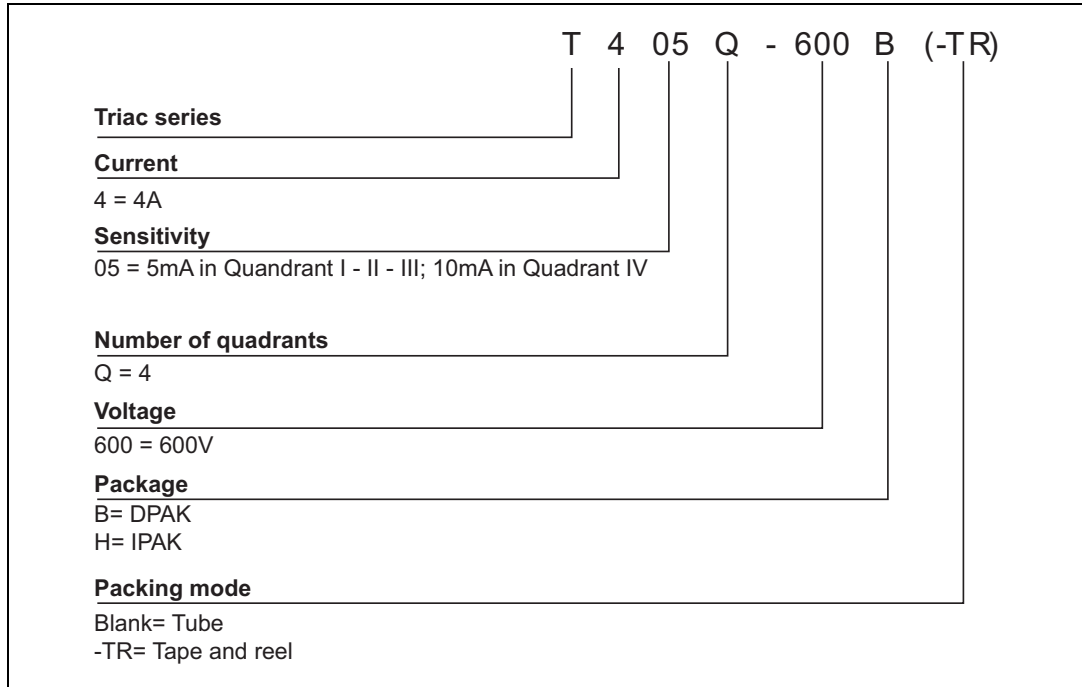


Table 8. Product selector

Part Number	Voltage	Sensitivity	Type	Package
T405Q-600B-TR	600 V	5 / 10 mA	Sensitive	DPAK
T405Q-600H	600 V	5 / 10 mA	Sensitive	IPAK

Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
T405Q-600B-TR	T405Q 600	DPAK	0.3 g	2500	Tape and reel
T405Q-600H	T405Q 600	IPAK	0.4 g	75	Tube

## 4 Revision history

**Table 10. Document revision history**

<b>Date</b>	<b>Revision</b>	<b>Changes</b>
July-2002	1	First issue.
29-May-2014	2	Updated DPAK and IPAK package information and reformatted to current standard.
25-Sep-2015	3	Updated Features in cover page. Updated Table 3 and Section 2: Package information.
11-Feb-2016	4	Updated DPAK package information and reformatted to current standard. Added $V_{DSM}$ parameter.

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