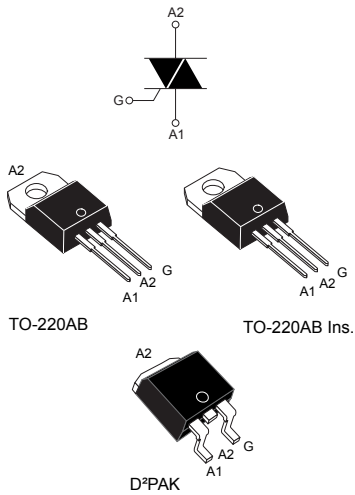


## 25 A, 1200 V Snubberless Triacs



### Features

- On-state RMS current: 25 A
- Blocking voltage: 1200 V
- High static community and dynamic commutation
- $I_{GT} = 50$  mA
- High endurance reliability
- Compact high voltage device

### Applications

- Motor control circuits
- Heating control circuits

### Description

The T2550-12x is a 25 A 1200 V Snubberless Triac available in three packages: D<sup>2</sup>PAK, TO-220AB and TO-220AB insulated.

Its 1200 V blocking voltage enables use in 3-phase industrial application. Its noise immunity and dynamic commutation makes it suitable for either inductive, capacitive or resistive load control.

#### Product status link

[T2550-12G, T2550-12T, T2550-12I](#)

#### Product summary

$I_{T(RMS)}$	25 A
$V_{DRM}/V_{RRM}$	1200 V
$I_{GT}$	50 mA

# 1 Characteristics

**Table 1. Absolute maximum ratings (limiting values,  $T_j = 25\text{ °C}$ , unless otherwise stated)**

Symbol	Parameters		Value	Unit	
$I_{T(RMS)}$	RMS on-state current (full sine wave)	D <sup>2</sup> PAK, TO-220AB	$T_c = 100\text{ °C}$	25	A
		TO-220AB Ins.	$T_c = 71\text{ °C}$		
$I_{TSM}$	Non repetitive surge peak on-state current (full cycle, $T_j$ initial = $25\text{ °C}$ )	$t_p = 20\text{ ms}$		240	A
		$t_p = 16.7\text{ ms}$		252	
$I^2t$	$I^2t$ value for fusing	$t_p = 10\text{ ms}$		380	A <sup>2</sup> s
$di/dt$	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$	$f = 60\text{ Hz}$	$T_j = 125\text{ °C}$	100	A/ $\mu$ s
$V_{DRM}/V_{RRM}$	Repetitive peak off-state voltage			1200	V
$V_{DSM}/V_{RSM}$	Non repetitive surge peak off-state voltage	$t_p = 10\text{ ms}$		1300	V
$I_{GM}$	Peak gate current	$t_p = 20\text{ }\mu$ s		4	A
$V_{GM}$	Peak positive gate voltage	$t_p = 20\text{ }\mu$ s		16	V
$P_{G(AV)}$	Average gate power dissipation			1	W
$T_{stg}$	Storage junction temperature range			-40 to +150	°C
$T_j$	Operating junction temperature range			-40 to +125	°C
$V_{ins.}$	Insulation RMS voltage, 1 minute	TO-220AB Ins.		2500	V

**Table 2. Electrical characteristics ( $T_j = 25\text{ °C}$ , unless otherwise specified) - Snubberless™ (3 quadrants)**

Symbol	Parameters	Quadrant		Value	Unit
$I_{GT}$	$V_D = 12\text{ V}$ , $R_L = 33\text{ }\Omega$	I - II - III	Min.	2.5	mA
			Max.	50	
$V_{GT}$		I - II - III	Max.	1.3	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
$I_H^{(1)}$	$I_T = 500\text{ mA}$ , gate open		Max.	60	mA
$I_L$	$I_G = 1.2 I_{GT}$	I - II - III	Max.	80	mA
$dV/dt^{(1)}$	$V_D = 67\% V_{DRM}$ gate open, $T_j = 125\text{ °C}$		Min.	2500	V/ $\mu$ s
$(di/dt)_c^{(1)}$	Without snubber, $T_j = 125\text{ °C}$		Min.	20	A/ms
$t_{gt}$	$I_{TM} = 13\text{ A}$ , $V_D = 400\text{ V}$ , $I_G = 100\text{ mA}$ , $di_G/dt = 100\text{ mA}/\mu$ s, $R_L = 30\text{ }\Omega$	I - II - III	Typ.	2	$\mu$ s

1. For both polarities of A2 referenced to A1

**Table 3. Static electrical characteristics**

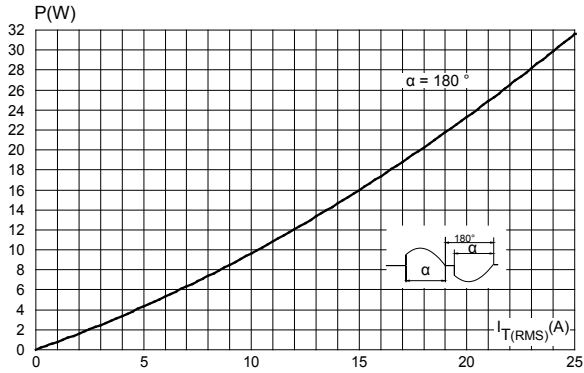
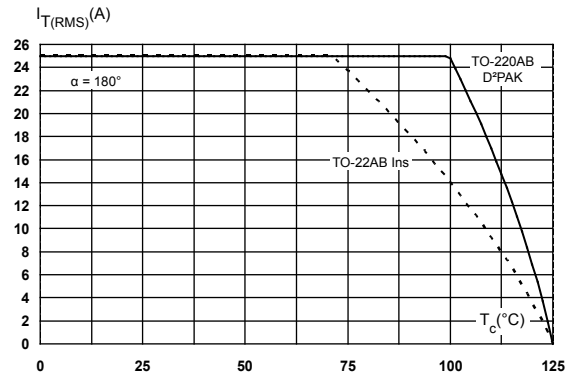
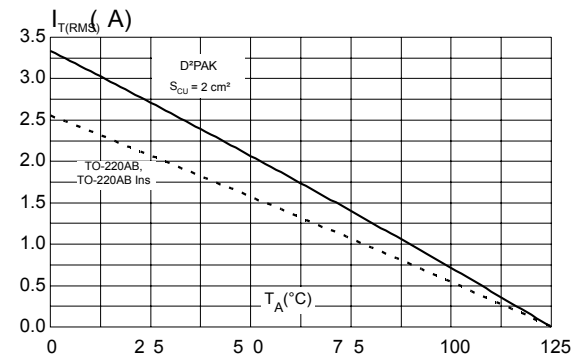
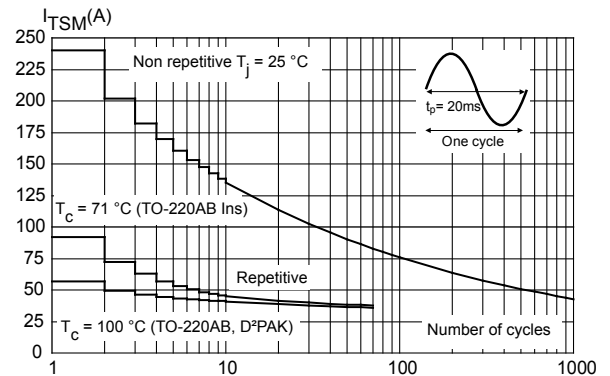
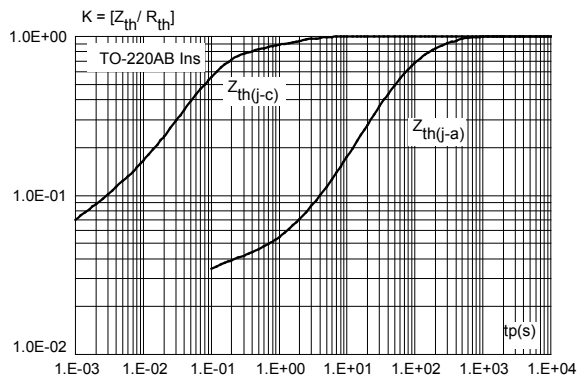
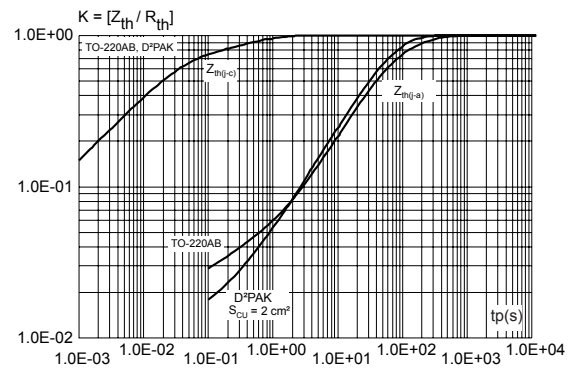
Symbol	Test conditions	T <sub>j</sub>		Value	Unit
V <sub>TM</sub> <sup>(1)</sup>	I <sub>TM</sub> = 35 A, t <sub>p</sub> = 380 μs	25 °C	Max.	1.55	V
V <sub>TO</sub> <sup>(1)</sup>	threshold on-state voltage	125 °C	Max.	0.85	V
R <sub>D</sub> <sup>(1)</sup>	Dynamic resistance	125 °C	Max.	20	mΩ
I <sub>DRM</sub> I <sub>RRM</sub>	V <sub>D</sub> = V <sub>R</sub> = 1200 V	25 °C	Max.	10	μA
		125 °C		6	mA

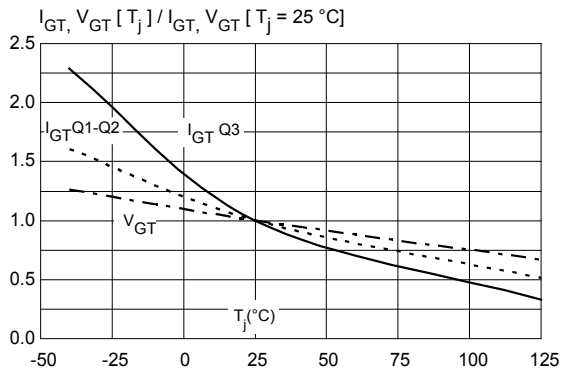
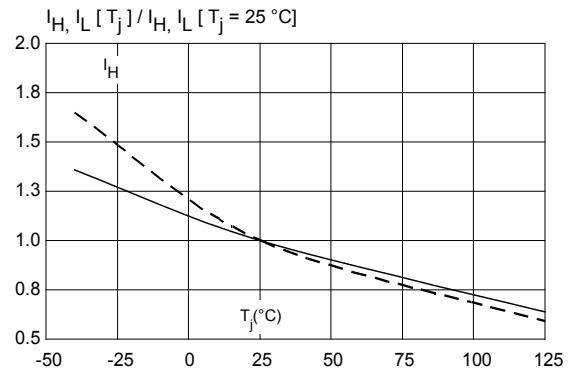
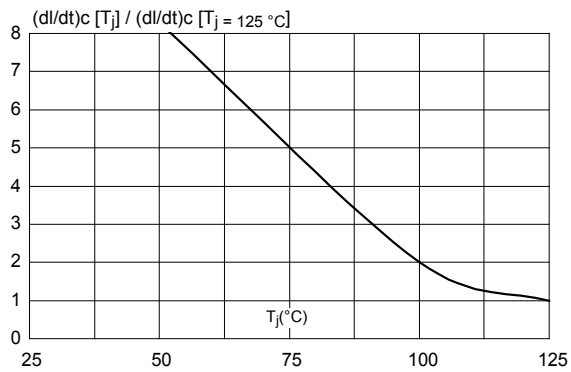
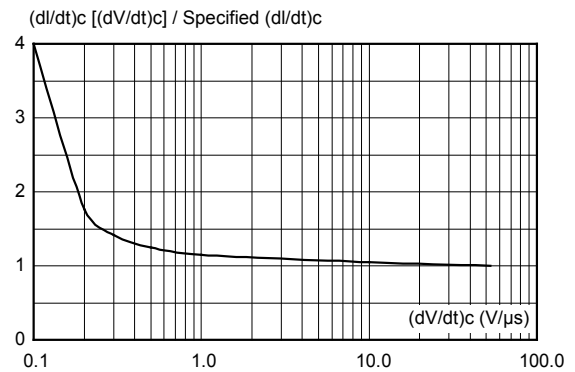
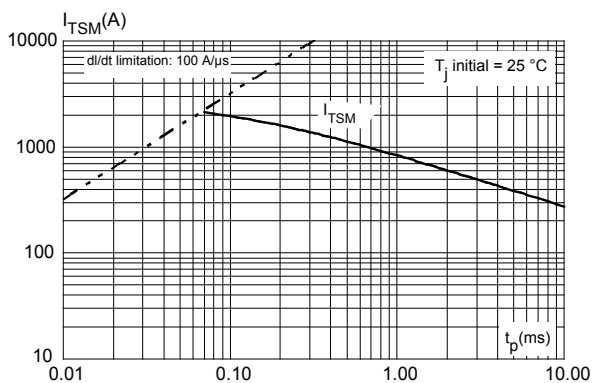
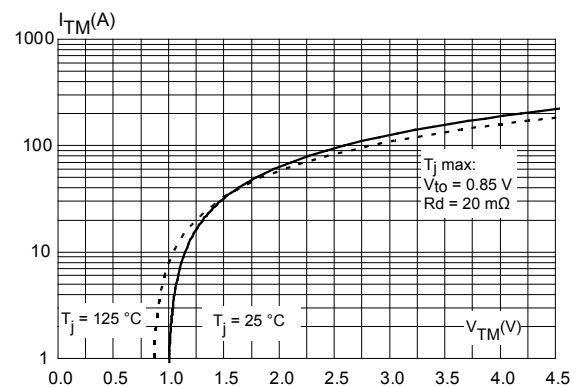
1. For both polarities of A2 referenced to A1

**Table 4. Thermal resistance**

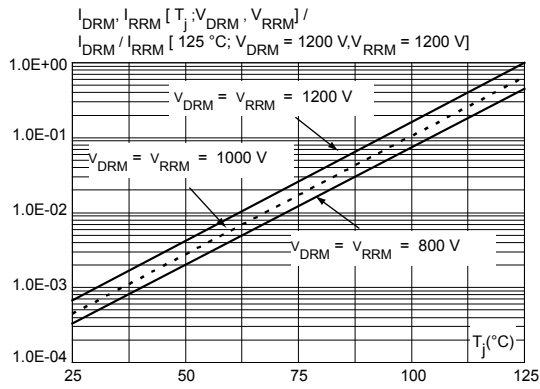
Symbol	Parameters			Value	Unit
R <sub>th(j-c)</sub>	Junction to case (AC)	TO-220AB / D <sup>2</sup> PAK	Max.	0.8	°C/W
		TO-220AB insulated		1.7	
R <sub>th(j-a)</sub>	Junction to ambient (S = 2 cm <sup>2</sup> ) <sup>(1)</sup>	D <sup>2</sup> PAK	Typ.	45	
	Junction to ambient	TO-220AB / TO-220AB ins		60	

1. Copper surface under tab.

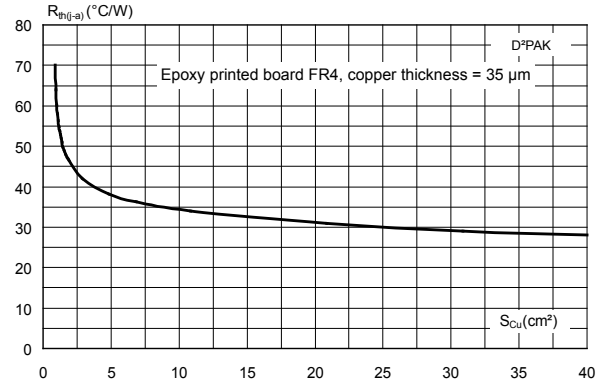
**1.1 Characteristics (curves)**
**Figure 1. Maximum power dissipation versus on-state RMS current (full cycle)**

**Figure 2. RMS on-state current versus case temperature (full cycle)**

**Figure 3. On-state RMS current versus ambient temperature (free air convection)**

**Figure 4. Surge peak on-state current versus number of cycles**

**Figure 5. Relative variation of thermal impedance versus pulse duration (T2550-12I)**

**Figure 6. Relative variation of thermal impedance versus pulse duration**


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

**Figure 8. Relative variation of holding current and latching current versus junction temperature (typical values)**

**Figure 9. Relative variation of critical rate of decrease of main current versus junction temperature (typical values)**

**Figure 10. Relative variation of critical rate of decrease of main current versus reapplied dV/dt**

**Figure 11. Non repetitive surge peak on-state current versus sinusoidal pulse width (t\_p < 10 ms)**

**Figure 12. On-state characteristics (maximum values)**


**Figure 13. Relative variation of leakage current versus junction temperature for different values of blocking voltage (typical values)**



**Figure 14. D<sup>2</sup>PAK thermal resistance junction to ambient versus copper surface under tab**



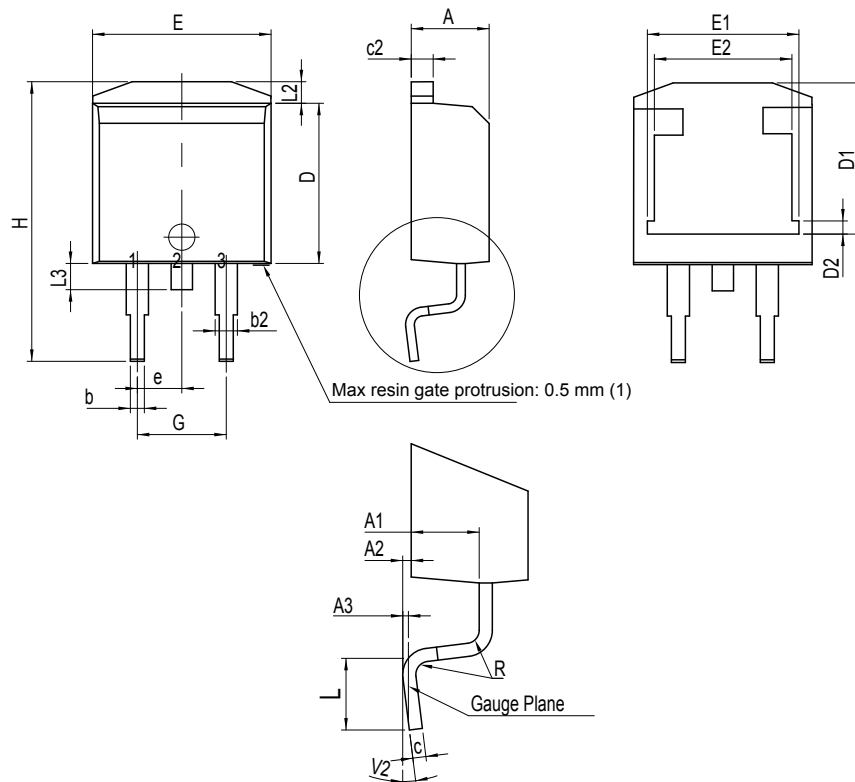
## 2 Package information

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). ECOPACK is an ST trademark.

### 2.1 D<sup>2</sup>PAK package information

- Epoxy meets UL 94,V0
- Lead-free package

Figure 15. D<sup>2</sup>PAK package outline



(1) Resin gate is accepted in each of position shown on the drawing, or their symmetrical.

**Table 5. D<sup>2</sup>PAK package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.60	0.1693		0.1811
A1	2.49		2.69	0.0980		0.1059
A2	0.03		0.23	0.0012		0.0091
A3		0.25			0.0098	
b	0.70		0.93	0.0276		0.0366
b2	1.25		1.7	0.0492		0.0669
c	0.45		0.60	0.0177		0.0236
c2	1.21		1.36	0.0476		0.0535
D	8.95		9.35	0.3524		0.3681
D1	7.50		8.00	0.2953		0.3150
D2	1.30		1.70	0.0512		0.0669
e	2.54			0.1		
E	10.00		10.28	0.3937		0.4047
E1	8.30		8.70	0.3268		0.3425
E2	6.85		7.25	0.2697		0.2854
G	4.88		5.28	0.1921		0.2079
H	15		15.85	0.5906		0.6240
L	1.78		2.28	0.0701		0.0898
L2	1.27		1.40	0.0500		0.0551
L3	1.40		1.75	0.0551		0.0689
R		0.40			0.0157	
V2	0°		8°	0°		8°

1. Dimensions in inches are given for reference only



Figure 16. D<sup>2</sup>PAK recommended footprint (dimensions are in mm)

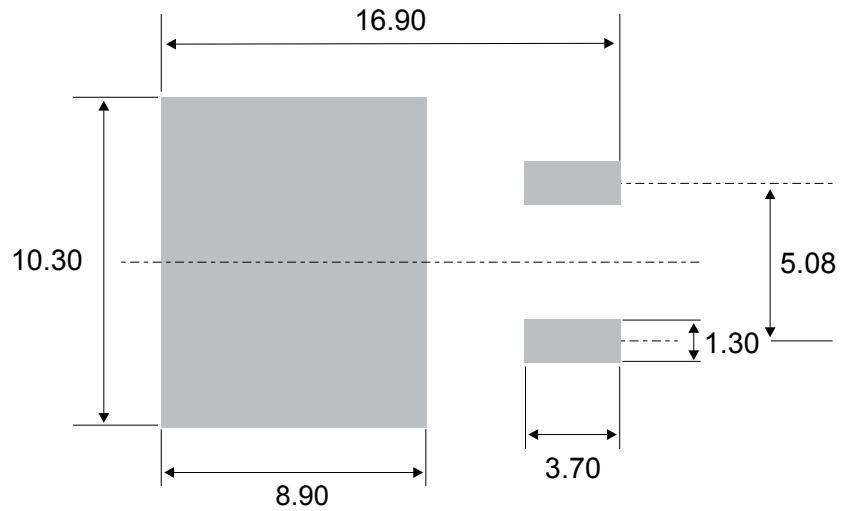
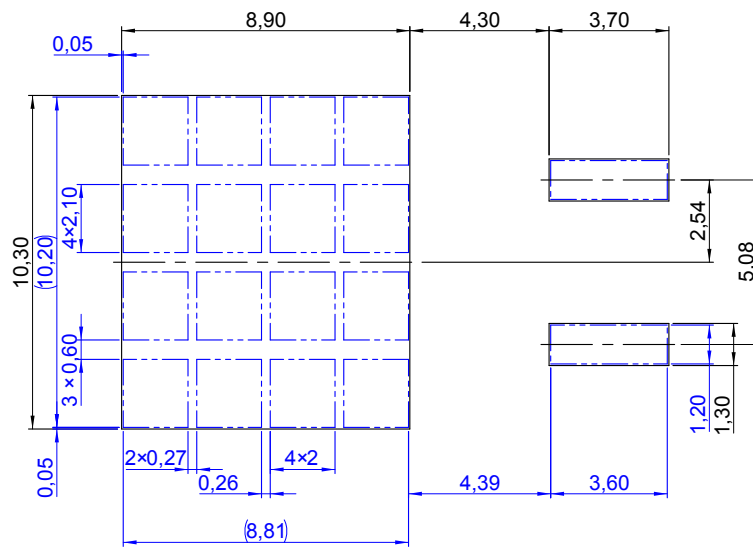


Figure 17. D<sup>2</sup>PAK footprint and stencil dimensions' definitions (dimensions in mm)

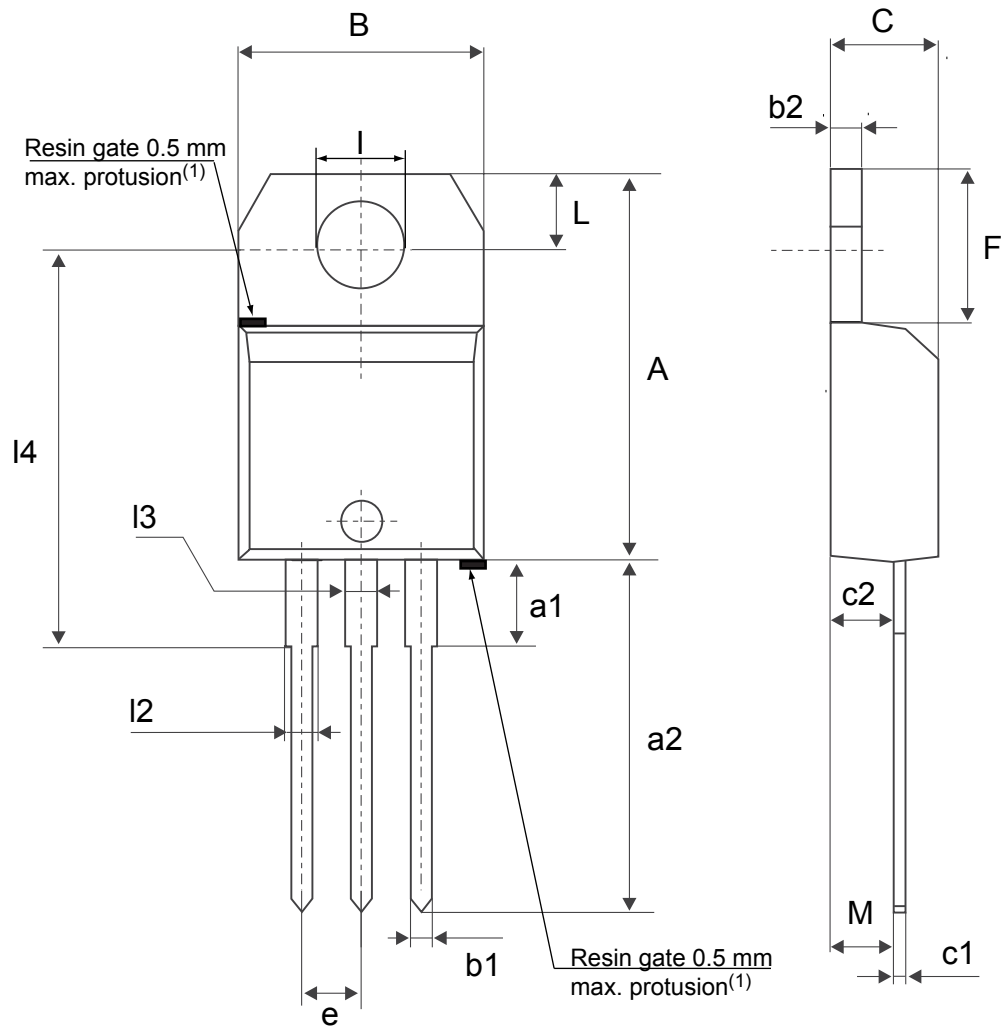


Note: Blue = Stencil, Black = Footprint

## 2.2 TO-220AB non ins. and insulated package information

- Molding compound resin is halogen-free and meets flammability standard UL94 level 0
- Lead-free package leads finishing
- Recommended torque: 0.4 to 0.6 N.m

Figure 18. TO-220AB non ins. and insulated package outline



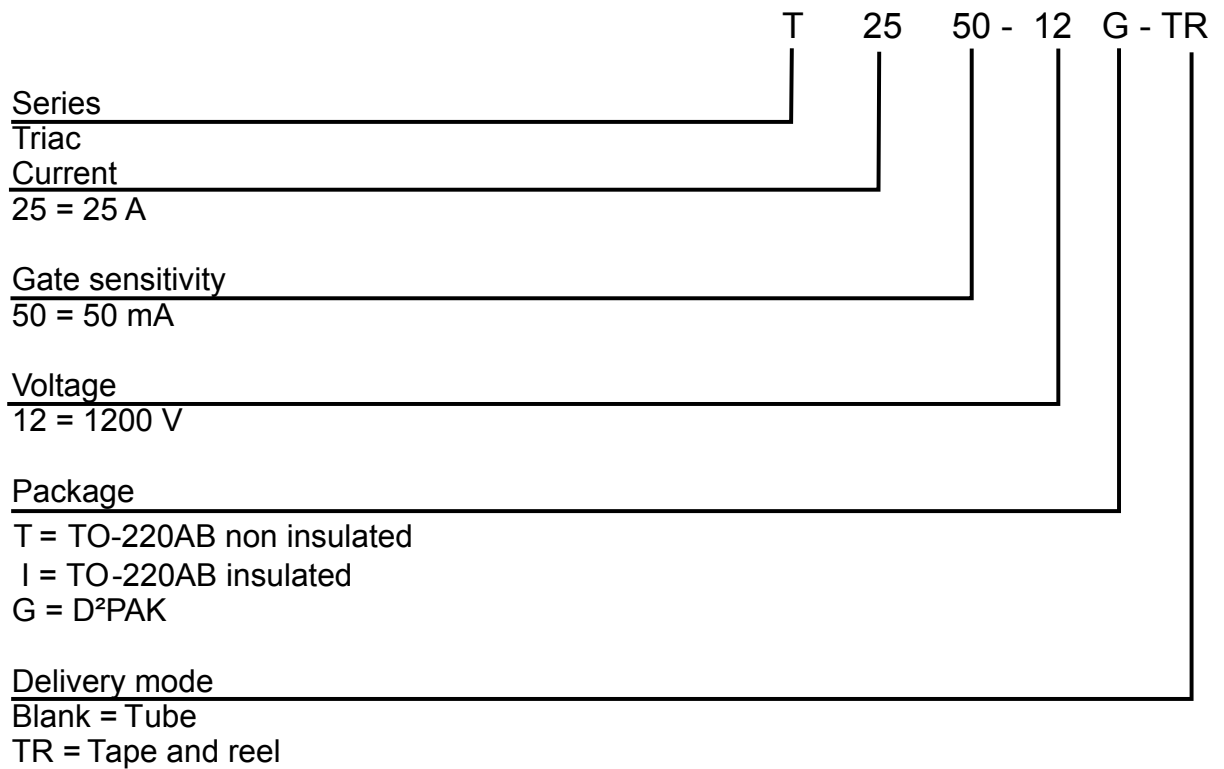
(1) Resin gate position accepted in one of the two positions or in the symmetrical opposites.

**Table 6. TO-220AB non ins. and insulated package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches <sup>1</sup>		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.5984		0.6260
a1		3.75			0.1476	
a2	13.00		14.00	0.5118		0.5512
B	10.00		10.40	0.3937		0.4094
b1	0.61		0.88	0.0240		0.0346
b2	1.23		1.32	0.0484		0.0520
C	4.40		4.60	0.1732		0.1811
c1	0.49		0.70	0.0193		0.0276
c2	2.40		2.72	0.0945		0.1071
e	2.40		2.70	0.0945		0.1063
F	6.20		6.60	0.2441		0.2598
I	3.73		3.88	0.1469		0.1528
L	2.65		2.95	0.1043		0.1161
I2	1.14		1.70	0.0449		0.0669
I3	1.14		1.70	0.0449		0.0669
I4	15.80	16.40	16.80	0.6220	0.6457	0.6614
M		2.6			0.1024	

1. Inch dimensions are for reference only.

### 3 Ordering information

**Figure 19. Ordering information scheme**

**Table 7. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
T2550-12G	T2550-12G	D <sup>2</sup> PAK	1.50 g	50	Tube
T2550-12G-TR				1000	Tape and reel 13"
T2550-12T	T2550-12T	TO-220AB	2.3 g	50	Tube
T2550-12I	T2550-12I	TO-220AB Ins.	2.3 g	50	Tube

## Revision history

**Table 8. Document revision history**

Date	Revision	Changes
9-Jan-2014	1	Initial release.
30-Jan-2014	2	Updated table 4.
10-Dec-2015	3	Inserted TO-220AB insulated package information and reformatted to current standard.
17-May-2019	4	Updated <a href="#">Table 1</a> , <a href="#">Table 4</a> and <a href="#">Figure 15</a> . Added <a href="#">Figure 18</a> . Minor text changed.

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