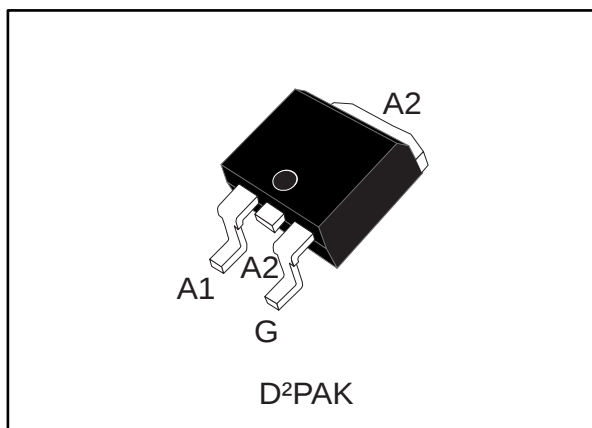


12 A Snubberless™ Triac

Datasheet -production data



Description

Available in SMD, the T1235T-8G Triac can be used for the on/off or phase angle control function in general purpose AC switching where high commutation capability is required. This device can be used without a snubber RC circuit when the limits defined are respected.

D²PAK package is UL94-V0 flammability resin compliance.

Package environmentally friendly Ecopack®2 graded (RoHS and Halogen Free compliance).

Snubberless™ is a trademark of STMicroelectronics.

Features

- High static dV/dt
- High dynamic turn-off commutation (dI/dt)_c
- 150 °C maximum T_j
- Three quadrants
- Surge capability V_{DSM}, V_{RSM} = 900 V

Benefits

- High immunity to turn-on thanks to high static dV/dt
- Better turn-off in high temperature environments thanks to (dI/dt)_c
- Increase of thermal margin due to extended working T_j up to 150 °C
- Good thermal resistance due to non-insulated tab

Applications

- General purpose AC line load switching
- Motor control circuits
- Home appliances
- Heating
- Lighting
- Inrush current limiting circuits
- Overvoltage crowbar protection

Figure 1: Functional diagram

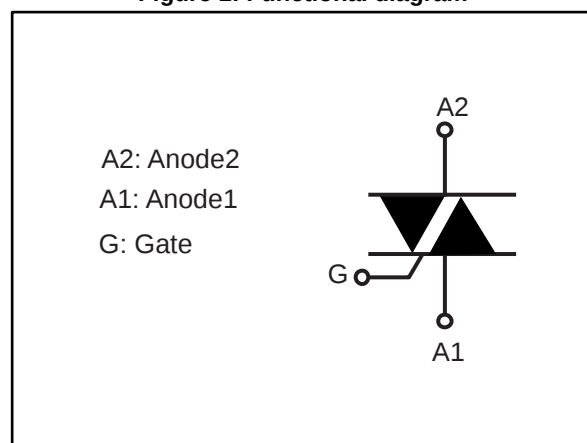


Table 1: Device summary

Symbol	Value	Unit
I _{T(RMS)}	12	A
V _{DRM} /V _{RSM}	800	V
V _{DSM} /V _{RSM}	900	V
I _{GT}	35	mA

1 Characteristics

Table 2: Absolute maximum ratings (limiting values)

Symbol	Parameter		Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)		$T_c = 124\text{ }^{\circ}\text{C}$	12 A
I_{TSM}	Non repetitive surge peak on-state current, T_j initial = $25\text{ }^{\circ}\text{C}$	$t_p = 16.7\text{ ms}$	95	A
		$t_p = 20\text{ ms}$	90	
I^2t	I^2t value for fusing		T_j initial = $25\text{ }^{\circ}\text{C}$	54 A^2s
di/dt	Critical rate of rise of on-state current, $I_G = 2 \times I_{GT}$, $t_r \leq 100\text{ ns}$		$f = 100\text{ Hz}$	100 $\text{A}/\mu\text{s}$
V_{DRM}/V_{RRM}	Repetitive peak off-state voltage		$T_j = 150\text{ }^{\circ}\text{C}$	600 V
			$T_j = 125\text{ }^{\circ}\text{C}$	800 V
V_{DSM}/V_{RSM}	Non Repetitive peak off-state voltage		$t_p = 10\text{ ms}$	900 V
I_{GM}	Peak gate current	$t_p = 20\text{ }\mu\text{s}$	$T_j = 150\text{ }^{\circ}\text{C}$	4 A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 150\text{ }^{\circ}\text{C}$	1 W
T_{stg}	Storage junction temperature range			-40 to +150 $^{\circ}\text{C}$
T_j	Operating junction temperature range			-40 to +150 $^{\circ}\text{C}$

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

Symbol	Test conditions	Quadrants; T_j		Value	Unit
I_{GT}	$V_D = 12\text{ V}$, $R_L = 33\text{ }\Omega$	I - II - III	Min.	1.75	mA
	$V_D = 12\text{ V}$, $R_L = 33\text{ }\Omega$	I - II - III	Max.	35	mA
V_{GT}	$V_D = 12\text{ V}$, $R_L = 33\text{ }\Omega$	I - II - III	Max.	1.3	V
V_{GD}	$V_D = V_{DRM}$, $R_L = 3.3\text{ k}\Omega$, $T_j = 150\text{ }^{\circ}\text{C}$	I - II - III	Min.	0.2	V
I_L	$I_G = 1.2 \times I_{GT}$	I - III	Max.	60	mA
	$I_G = 1.2 \times I_{GT}$	II	Max.	80	mA
$I_H^{(1)}$	$I_T = 500\text{ mA}$, gate open		Max.	40	mA
$dV/dt^{(1)}$	$V_D = 536\text{ V}$, gate open	$T_j = 125\text{ }^{\circ}\text{C}$	Min.	2000	$\text{V}/\mu\text{s}$
	$V_D = 402\text{ V}$, gate open	$T_j = 150\text{ }^{\circ}\text{C}$	Min.	1000	$\text{V}/\mu\text{s}$
$(di/dt)_c^{(1)}$	Without snubber, $(dV/dt)_c > 20\text{ V}/\mu\text{s}$		$T_j = 125\text{ }^{\circ}\text{C}$	Min.	12 A/ms
			$T_j = 150\text{ }^{\circ}\text{C}$	Min.	6 A/ms

Notes:

⁽¹⁾For both polarities of A2 referenced to A1.

Table 4: Static characteristics

Symbol	Test conditions	T _j		Value	Unit
V _{TM} ⁽¹⁾	I _T = 17 A, t _p = 380 μs	25 °C	Max.	1.6	V
V _{TO} ⁽¹⁾	Threshold on-state voltage	150 °C	Max.	0.85	V
R _D ⁽¹⁾	Dynamic resistance	150 °C	Max.	50	mΩ
I _{DRM} /I _{RRM}	V _{DRM} = V _{RRM} = 800 V	25 °C	Max.	5	μA
		125 °C		1	mA
	V _{DRM} = V _{RRM} = 600 V	150 °C	Max.	3.1	mA

Notes:

⁽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)	D ² PAK	Max.	1.6	°C/W

1.1 Characteristics (curves)

Figure 2: Maximum power dissipation versus on-state RMS current

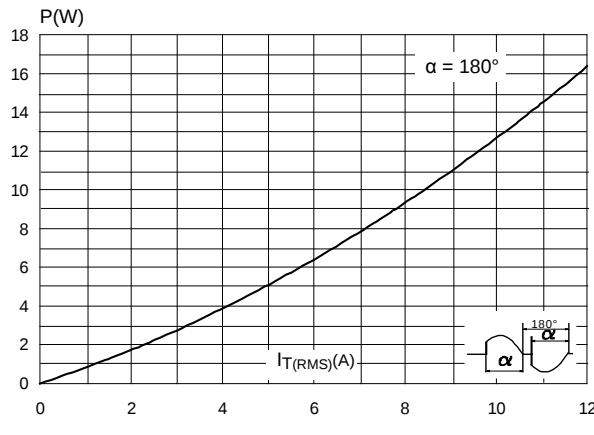


Figure 3: On-state RMS current versus case temperature

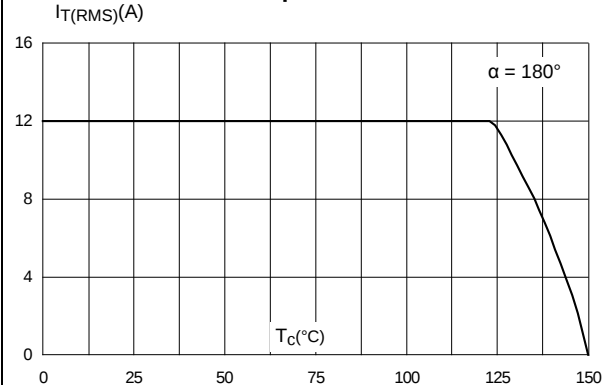


Figure 4: On-state RMS current versus ambient temperature (free air convection)

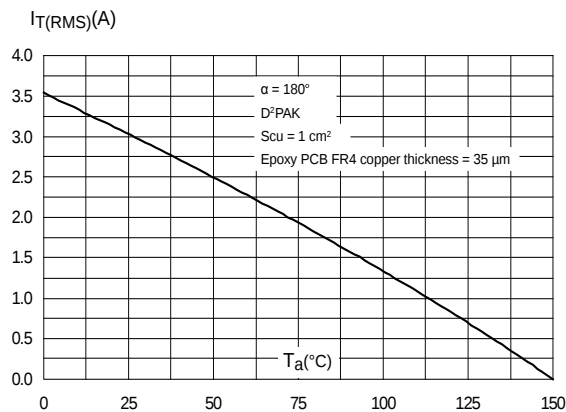


Figure 5: Relative variation of thermal impedance versus pulse duration

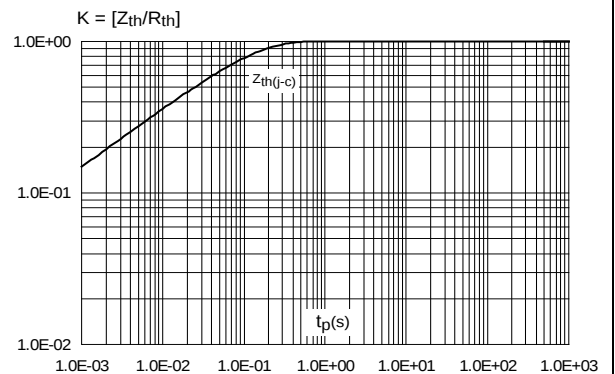


Figure 6: Relative variation of gate trigger voltage and current versus junction temperature (typical values)

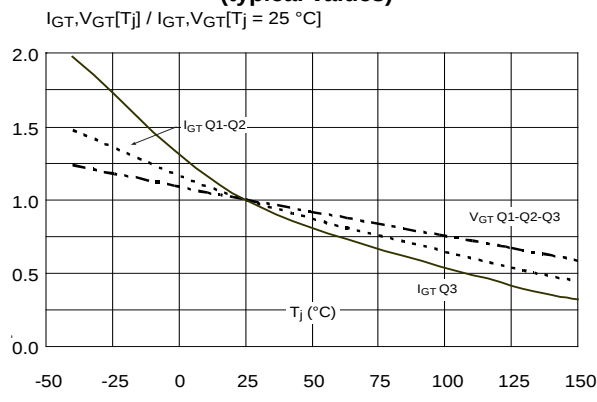


Figure 7: Relative variation of holding current and latching current versus junction temperature (typical values)

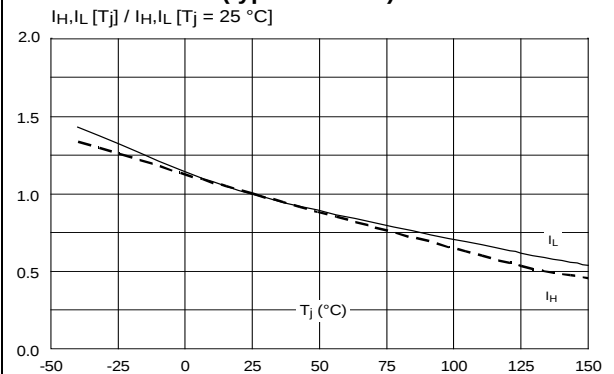


Figure 8: Surge peak on-state current versus number of cycles

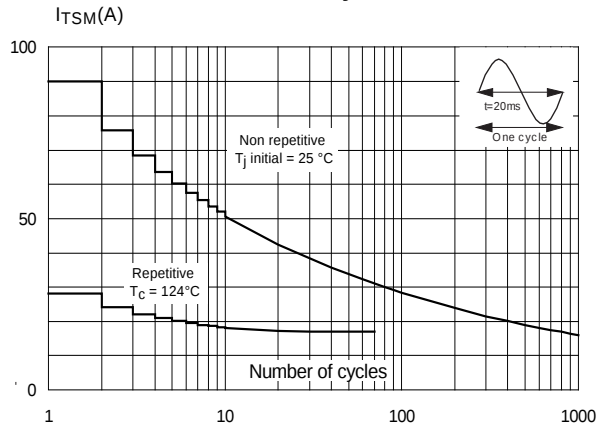


Figure 9: Non repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 10$ ms

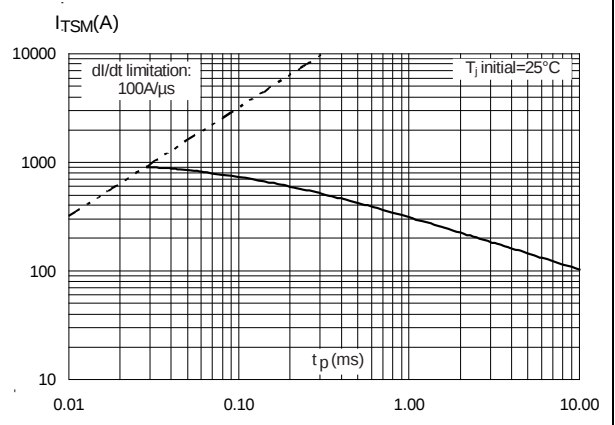


Figure 10: On-state characteristics (maximum values)

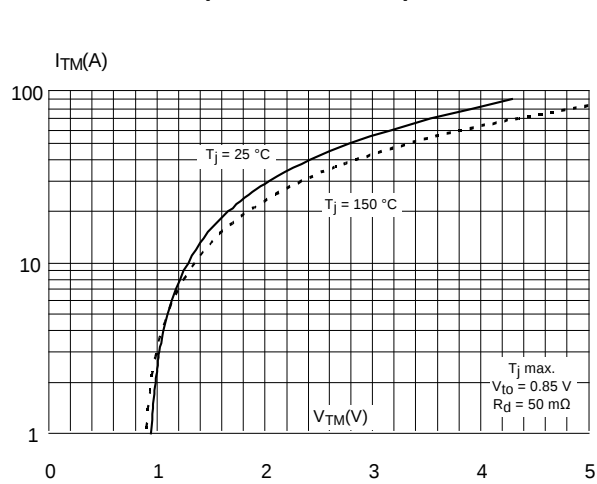


Figure 11: Relative variation of critical rate of decrease of main current versus junction temperature

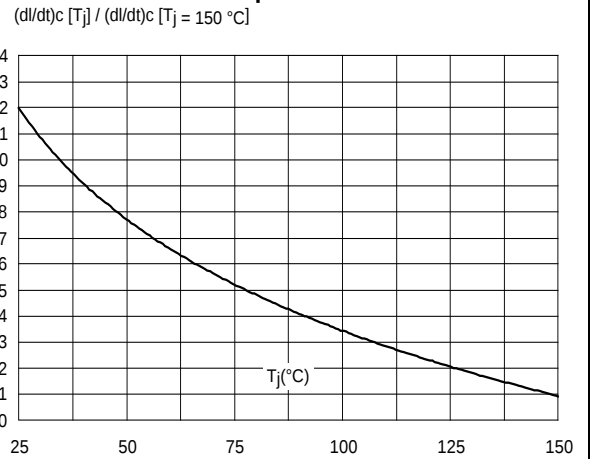


Figure 12: Relative variation of static dV/dt immunity versus junction temperature

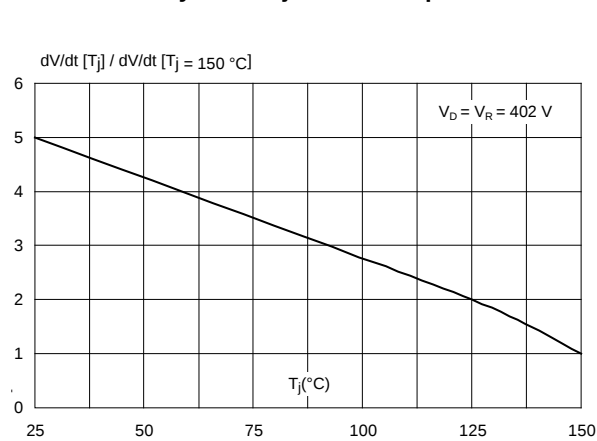
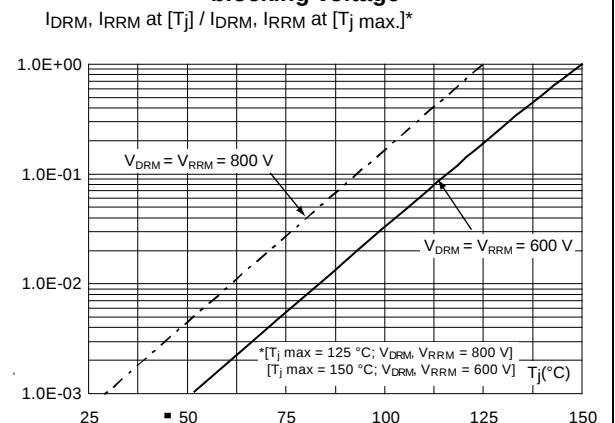


Figure 13: Relative variation of leakage current versus junction temperature for different values of blocking voltage



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. ECOPACK® is an ST trademark.

- ECOPACK®2 compliant
- Lead-free package leads finishing
- Molding compound resin is halogen-free and meets UL standard level V0

2.1 D²PAK package information

Figure 14: D²PAK package outline

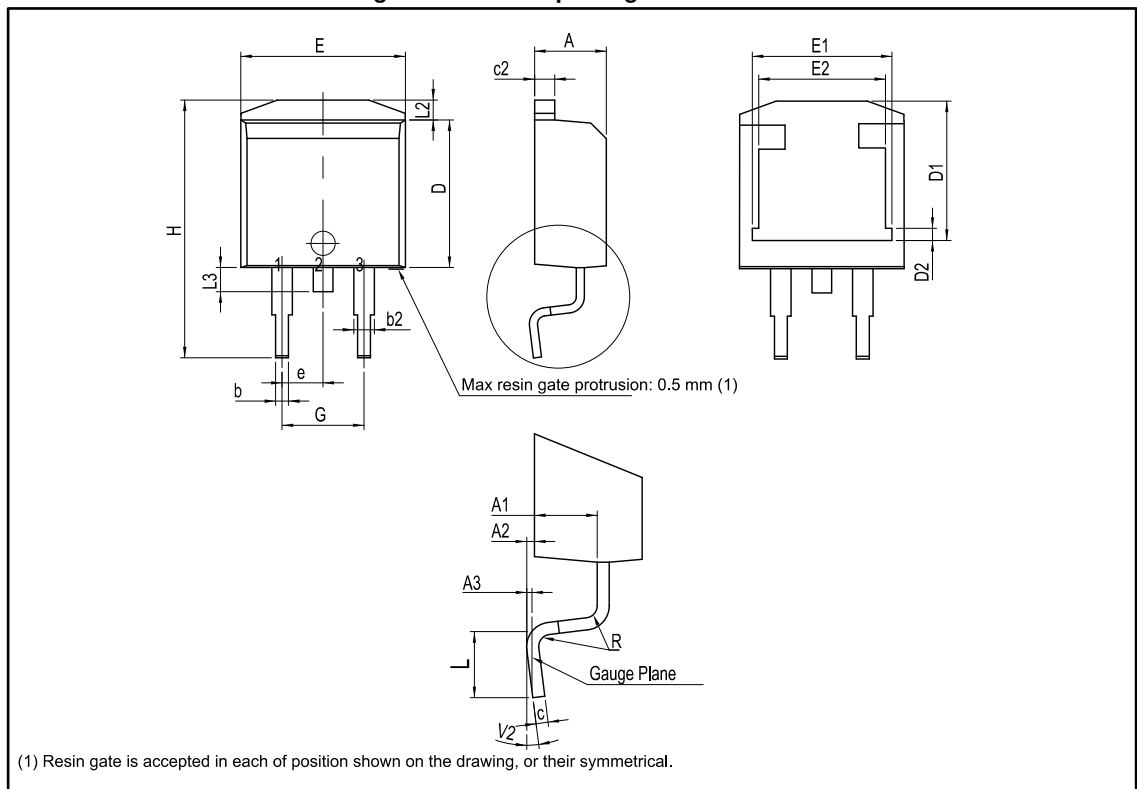
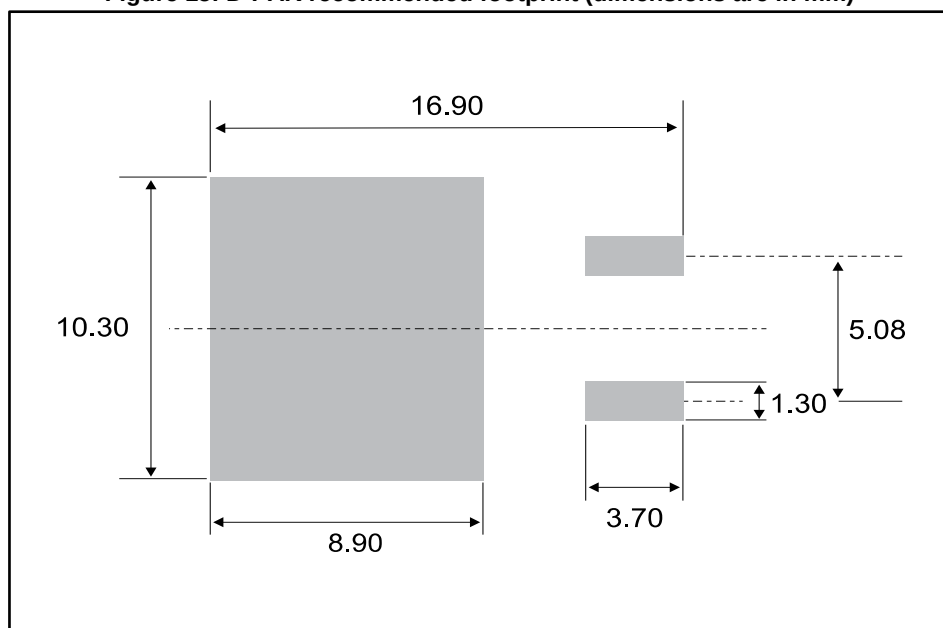
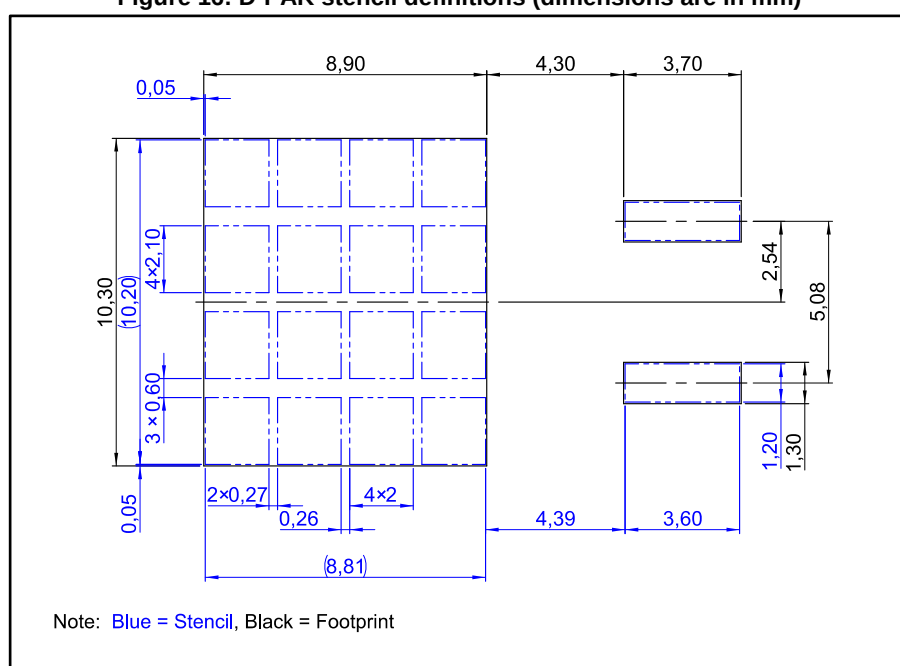


Table 6: D²PAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches ⁽¹⁾		
	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°

Notes:⁽¹⁾Dimensions in inches are given for reference only

Figure 15: D²PAK recommended footprint (dimensions are in mm)Figure 16: D²PAK stencil definitions (dimensions are in mm)

3 Ordering information

Figure 17: Ordering information scheme

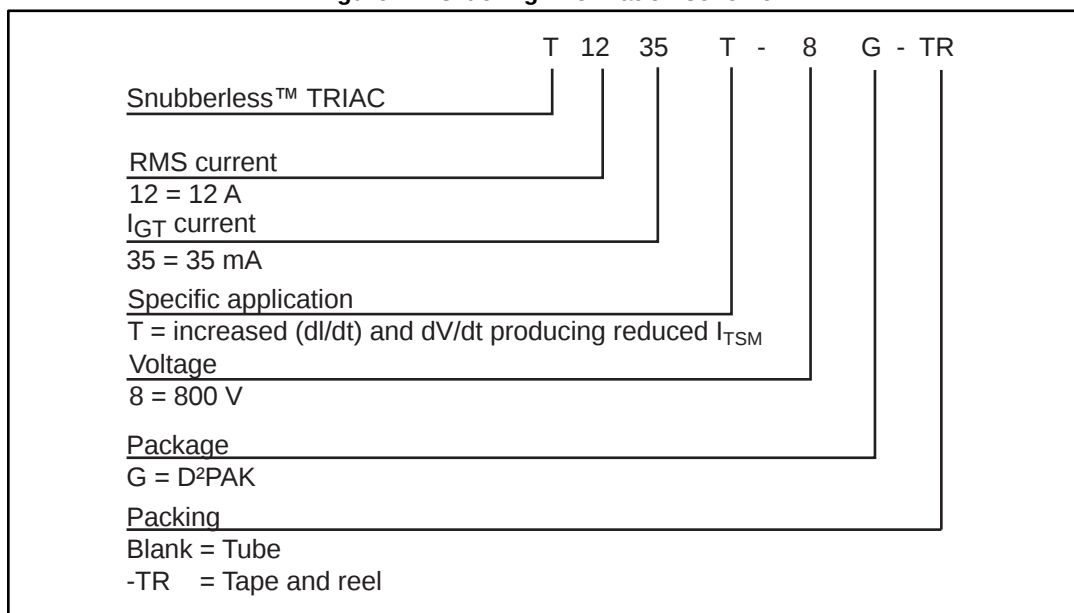


Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
T1235T-8G-TR	T1235T-8G	D ² PAK	1.38 g	1000	Tape and reel
T1235T-8G				50	Tube

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
19-Dec-2017	1	Initial release.

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