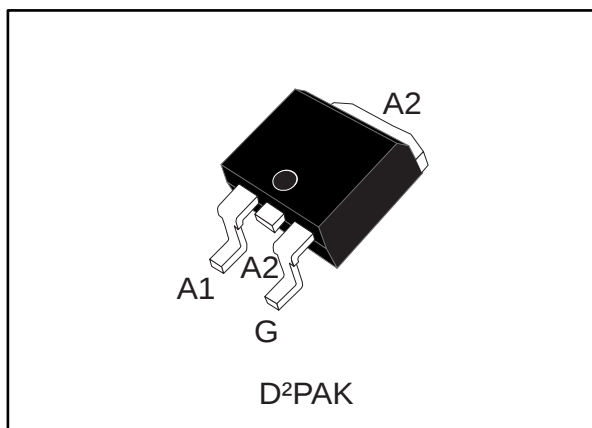


12 A Snubberless™ Triac

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

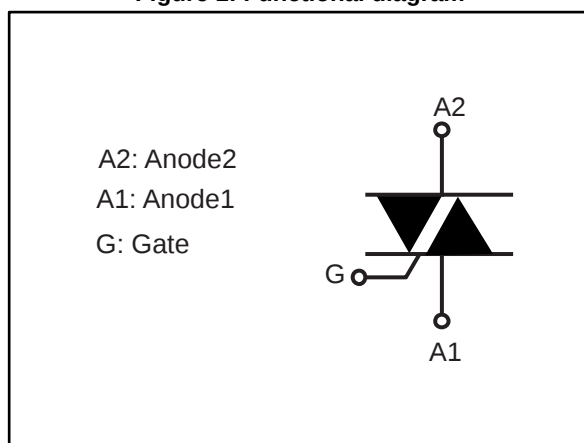


Table 1: Device summary

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 °C	12	A
I _{TSM}	Non repetitive surge peak on-state current, T _j initial = 25 °C		t _p = 16.7 ms	95	A
			t _p = 20 ms	90	
I ² t	I ² t value for fusing		T _j initial = 25 °C	54	A ² s
di/dt	Critical rate of rise of on-state current, I _G = 2 x I _{GT} , tr ≤ 100 ns		f = 100 Hz	100	A/μs
V _{DRM} /V _{RRM}	Repetitive peak off-state voltage		T _j = 150 °C	600	V
			T _j = 125 °C	800	V
V _{DSM} /V _{RSM}	Non Repetitive peak off-state voltage		t _p = 10 ms	900	V
I _{GM}	Peak gate current	t _p = 20 μs	T _j = 150 °C	4	A
P _{G(AV)}	Average gate power dissipation		T _j = 150 °C	1	W
T _{stg}	Storage junction temperature range			-40 to +150	°C
T _j	Operating junction temperature range			-40 to +150	°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 V, R _L = 33 Ω	I - II - III	Min.	1.75	mA
	V _D = 12 V, R _L = 33 Ω	I - II - III	Max.	35	mA
V _{GT}	V _D = 12 V, R _L = 33 Ω	I - II - III	Max.	1.3	V
V _{GD}	V _D = V _{DRM} , R _L = 3.3 kΩ, T _j = 150 °C	I - II - III	Min.	0.2	V
I _L	I _G = 1.2 x I _{GT}	I - III	Max.	60	mA
	I _G = 1.2 x I _{GT}	II	Max.	80	mA
I _H ⁽¹⁾	I _T = 500 mA, gate open		Max.	40	mA
dV/dt ⁽¹⁾	V _D = 536 V, gate open	T _j = 125 °C	Min.	2000	V/μs
	V _D = 402 V, gate open	T _j = 150 °C	Min.	1000	V/μs
(dI/dt) _c ⁽¹⁾	Without snubber, (dV/dt) _c > 20 V/μs	T _j = 125 °C	Min.	12	A/ms
		T _j = 150 °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
$V_{TM}^{(1)}$	$I_T = 17\text{ A}$, $t_p = 380\text{ }\mu\text{s}$	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	m Ω
I_{DRM}/I_{RRM}	$V_{DRM} = V_{RRM} = 800\text{ V}$	25 °C	Max.	5	μA
		125 °C		1	mA
	$V_{DRM} = V_{RRM} = 600\text{ V}$	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

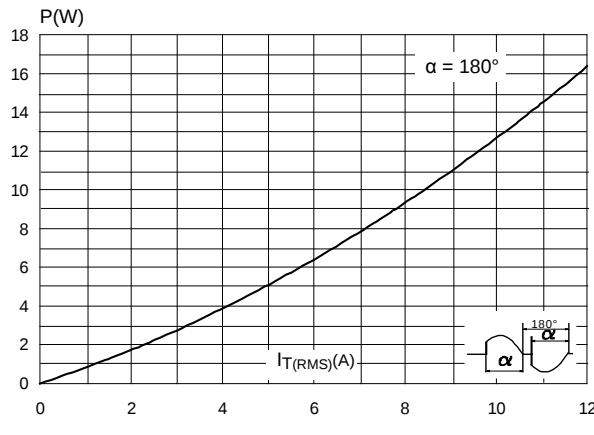


Figure 3: On-state RMS current versus case temperature

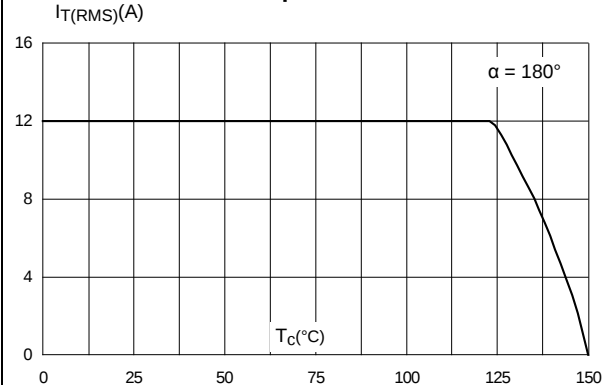


Figure 4: On-state RMS current versus ambient temperature (free air convection)

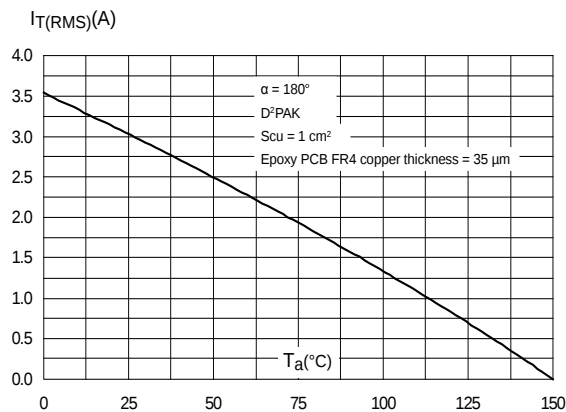


Figure 5: Relative variation of thermal impedance versus pulse duration

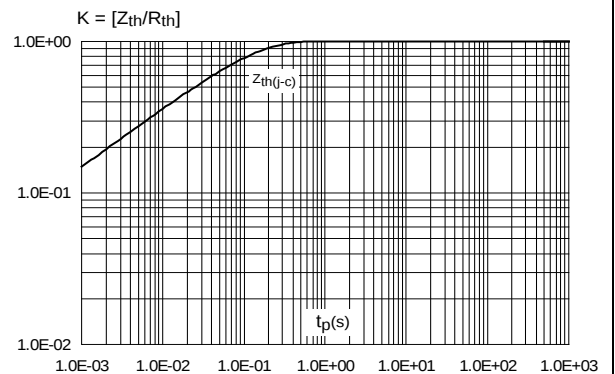


Figure 6: Relative variation of gate trigger voltage and current versus junction temperature (typical values)

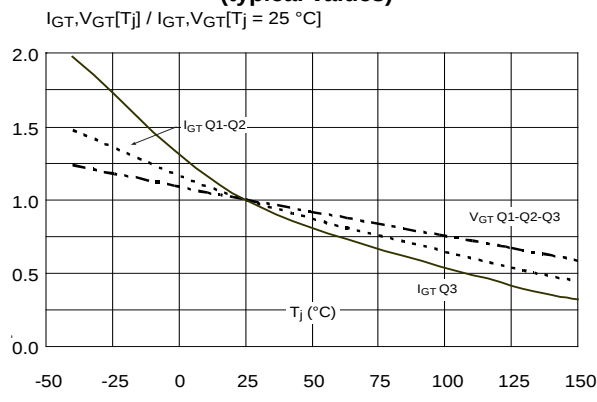


Figure 7: Relative variation of holding current and latching current versus junction temperature (typical values)

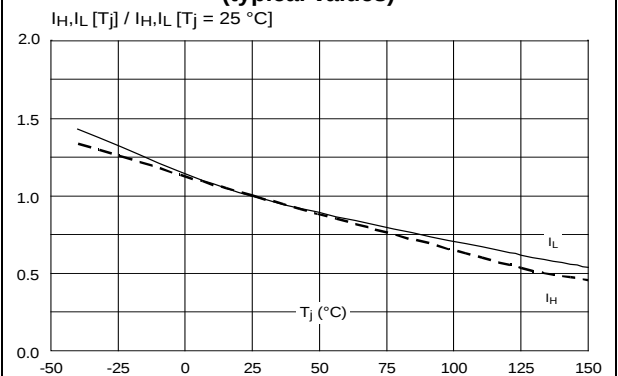


Figure 8: Surge peak on-state current versus number of cycles

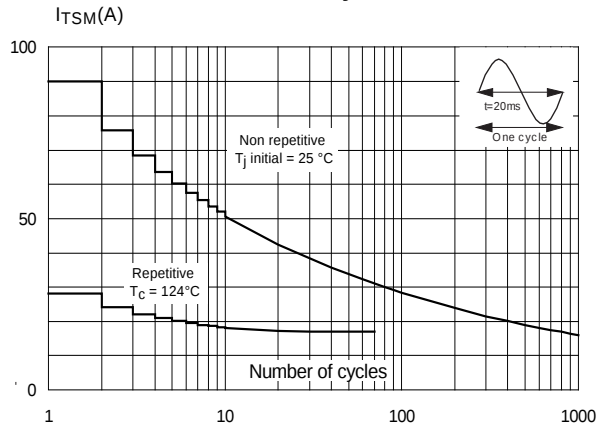


Figure 9: Non repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 10$ ms

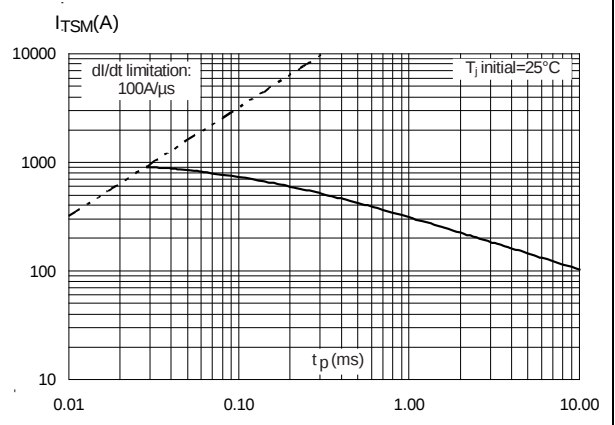


Figure 10: On-state characteristics (maximum values)

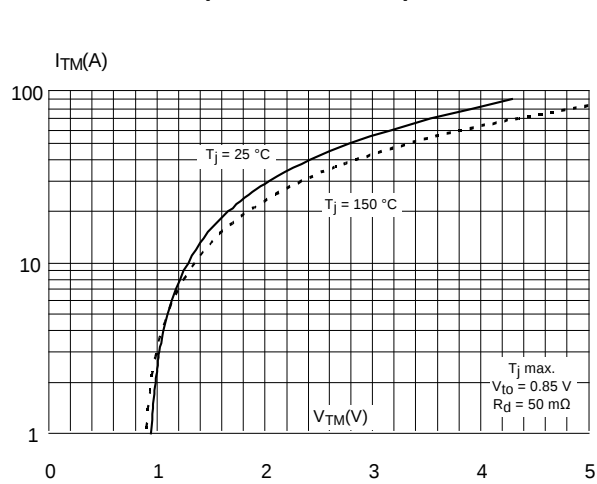


Figure 11: Relative variation of critical rate of decrease of main current versus junction temperature

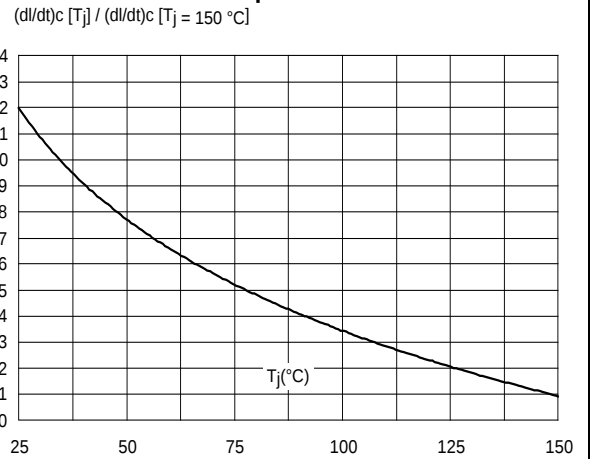


Figure 12: Relative variation of static dV/dt immunity versus junction temperature

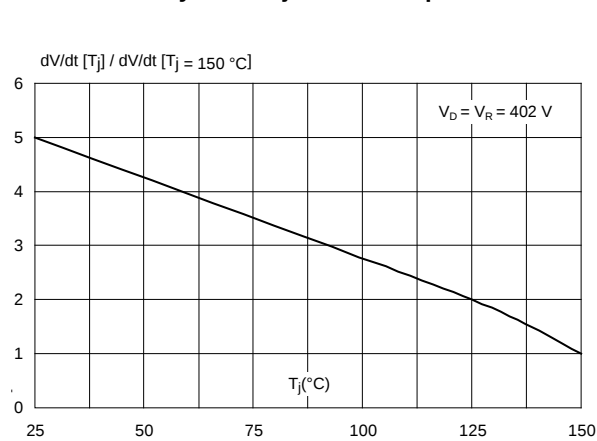
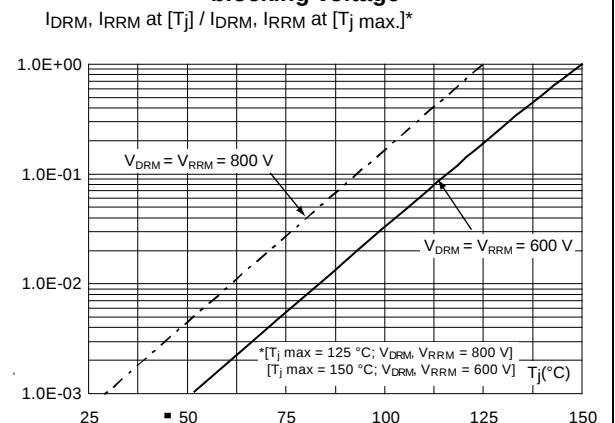


Figure 13: Relative variation of leakage current versus junction temperature for different values of blocking voltage



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

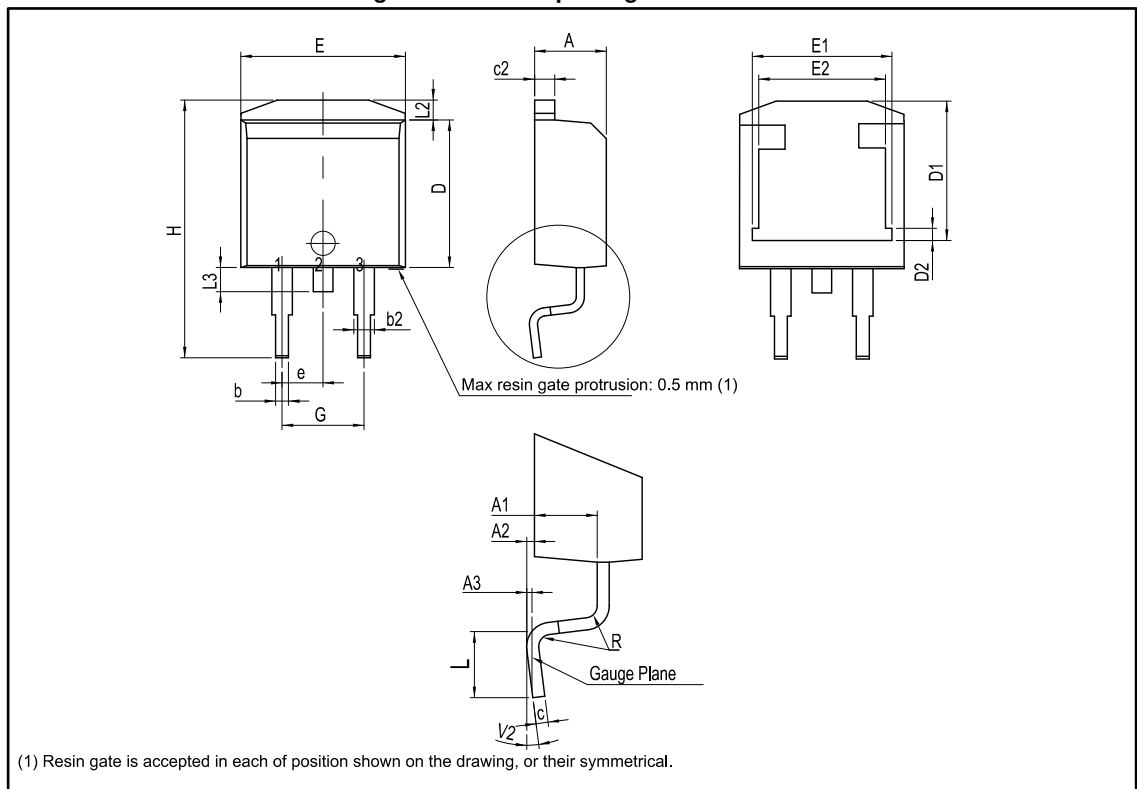
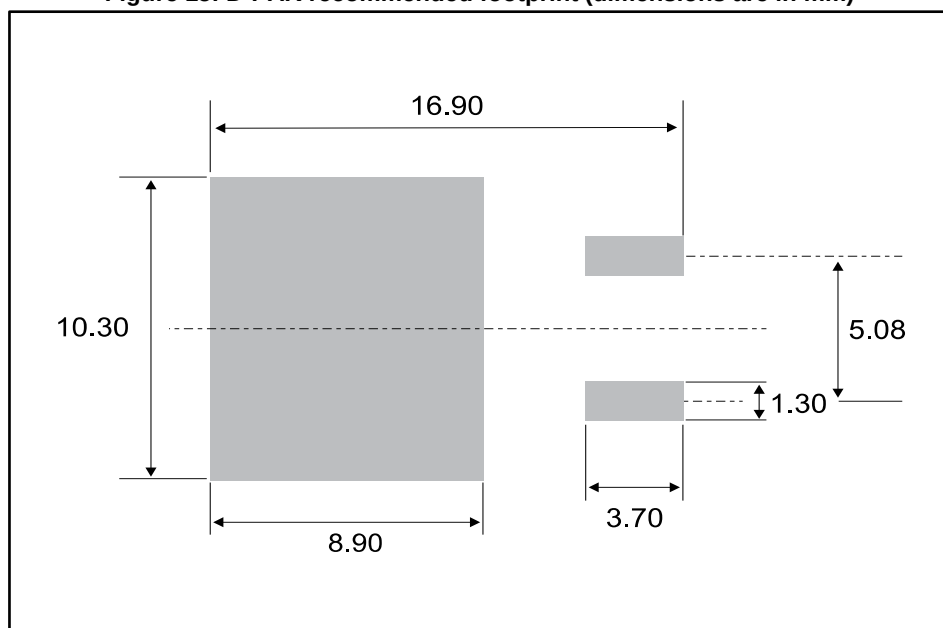
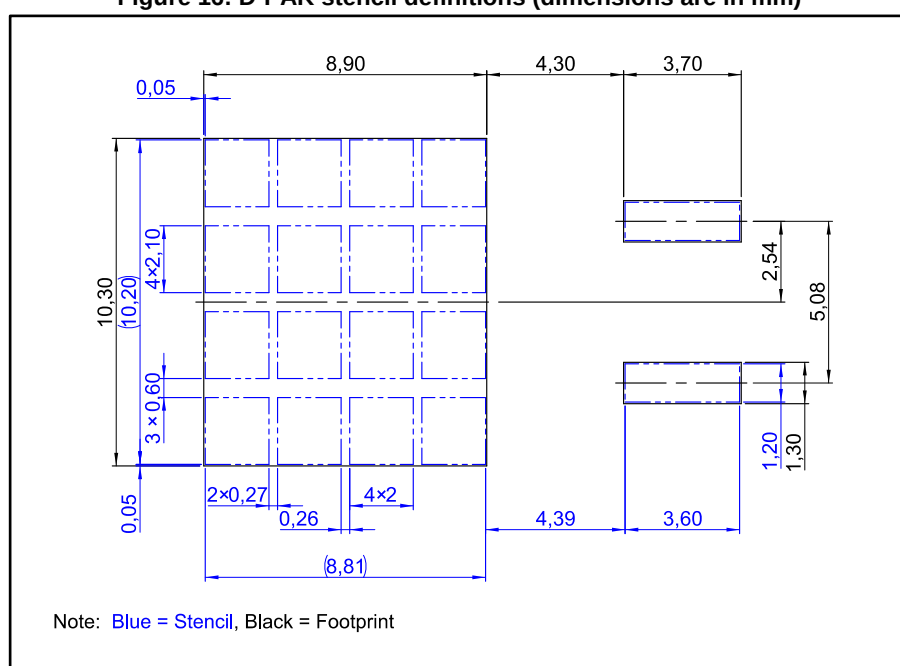


Table 6: D²PAK package mechanical data

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

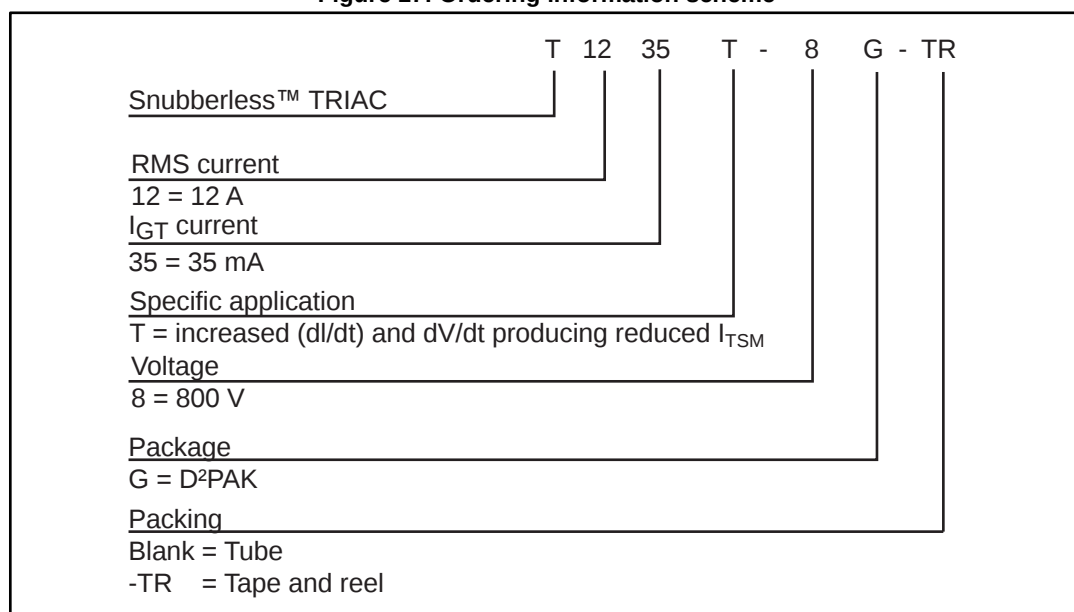


Table 7: Ordering information

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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