

1 Characteristics

Table 1. Absolute maximum ratings (T_j = 25 °C unless otherwise stated)

Symbol	Paran	Parameter						
I	DMC on state compant (full size compan)	IPAK, DPAK,TO-220AB, D2PAK	T _c = 110 °C					
I _T (RMS)	RMS on-state current (full sine wave)	TO-220AB Ins.	T _c = 100 °C	8	A			
	Non repetitive surge peak on-state current (full	f = 50 Hz	t = 20 ms	80	Α			
ITSM	cycle, T _j initial = 25 °C)	f = 60 Hz	t _p = 16.7 ms	84				
I ² t	I ² t value for fusing	36	A ² s					
dl/dt	Critical rate of rise of on-state current $I_G = 2 x$ I_{GT} , tr $\leq 100 \text{ ns}$	f = 120 Hz	T _j = 125 °C	50	A/µs			
I _{GM}	Peak gate current	t _p = 20 μs	T _j = 125 °C	4	Α			
P _{G(AV)}	Average gate power dissipation	T _j = 125 °C	1	W				
T _{stg}	Storage junction temperature range		-40 to +150	°C				
Tj	Operating junction temperature range		-40 to +125	°C				

Table 2. Electrical characteristics (T_j = 25 °C, unless otherwise specified) Snubberless and logic level (3 quadrants)

Symbol	Parameter	Quadrant	Quadrant		T8			BTA08/BTB08			Unit
Syllibol	Farameter	Quadrant		10	35	50	TW	sw	CW	BW	Ullit
I _{GT} ⁽¹⁾	V _D = 12 V, R _L = 30 Ω	1 - 11 - 111	Max.	10	35	50	5	10	35	50	mA
V _{GT}	ν _D = 12 ν, 1\(\(\frac{1}{2}\)	1 - 11 - 111	Max.	1.2						V	
V_{GD}	$V_D = V_{DRM}, R_L = 3.3 \text{ k}\Omega, T_j = 125 \text{ °C}$	1 - 11 - 111	Min.				0.2				V
I _H (2)	I _T = 100 mA	1 - 11 - 111	Max.	15	35	75	10	15	35	50	mA
IL	I _G = 1.2 x I _{GT}	I - III	Max.	25	50	70	10	25	50	70	mA
'L	IG = 1.2 × IG	П	Max.	30	60	110	15	30	60	80	ША
dV/dt (2)	$V_D = 67\% V_{DRM}$, gate open, $T_j = 125 °C$		Max.	40	400	1000	20	40	400	1000	V/µs
	(dV/dt)c = 0.1 V/µs, T _j = 125 °C		Min.	5.4			3.5	5.4			
(dl/dt)c (2)	$(dV/dt)c = 10 V/\mu s, T_j = 125 °C$		Min.	2.8			1.5	2.98			A/ms
	Without snubber, T _j = 125 °C		Min.		4.5	7			4.5	7	

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

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^{2.} For both polarities of A2 referenced to A1



Table 3. Standard (4 quadrants)

Symbol	Parameter	Quadrant		BTA08	ВТВ08	Unit	
Symbol	Faranietei	Quaurant		С	В	Ullit	
I _{GT} ⁽¹⁾		1 - 11 - 111	Max.	25	50	mA	
IGT V	$V_D = 12 \text{ V}, R_L = 33 \Omega$	IV	IVIAX.	50	100	IIIA	
V _{GT}		All	Max.	1.3		V	
V_{GD}	$V_D = V_{DRM}$, $R_L = 33 \text{ k}\Omega$, $T_j = 125 \text{ °C}$	All	Min.	0.2		V	
I _H ⁽²⁾	I _T = 500 mA	1 - 11 - 111	Max.	25	50	mA	
L	I _G = 1.2 I _{GT}	I - III - IV	Max.	40	50	mA	
IL.	IG - 1.2 IGT	II	IVIAX.	80	100	IIIA	
dV/dt (2)	V _D = 67 % V _{DRM} gate open, T _j = 125 °C		Min.	200	400	V/µs	
(dV/dt)c (2)	(dl/dt)c = 3.5 A/ms, T _j = 125 °C		Min.	5	10	V/µs	

- 1. Minimum I_{GT} is guaranteed at 5 % of I_{GT} max.
- 2. For both polarities of A2 referenced to A1

Table 4. Static electrical characteristics

Symbol	Test condition	Value	Unit		
V _{TM} ⁽¹⁾	I_{TM} = 11 A, t_p = 380 µs	T _j = 25 °C	Max.	1.55	V
V _{TO} ⁽¹⁾	threshold on-state voltage	T _j = 125 °C	Max.	0.85	V
R _D ⁽¹⁾	Dynamic resistance	T _j = 125 °C	Max.	50	mΩ
loon loon	$V_{DRM} = V_{RRM}$	T _j = 25 °C	Max.	5	μA
I _{DRM} I _{RRM}	VDRM - VRRM	T _j = 125 °C	Max.	1	mA

^{1.} For both polarities of A2 referenced to A1

Table 5. Thermal resistance

Symbol		Parameter					
D.,	Max. junction to case thermal resistance (AC)		IPAK / D2PAK / DPAK / TO-220AB	1.6	°C/W		
R _{th(j-c)}			TO-220AB Insulated	2.5	C/VV		
		S = 2 cm ^{2 (1)}	D²PAK	45			
D	Junction to ambient (typ.)	S = 1 cm ²⁽¹⁾	DPAK	70	°C/W		
R _{th(j-a)}	Junction to ambient (typ.)		TO-220AB / TO-220AB Insulated	60	C/VV		
			IPAK	100			

1. S = Copper surface under tab.

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1.1 Characteristics (curves)

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

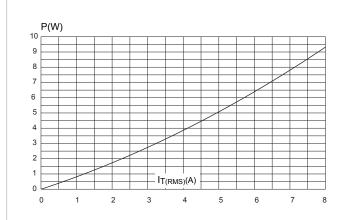


Figure 2. RMS on-state current versus temperature (full cycle)

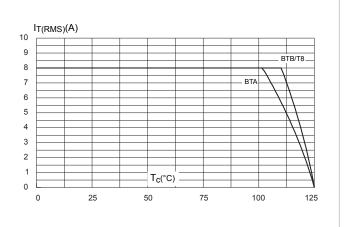


Figure 3. RMS on-state current versus ambient temperature (full cycle)

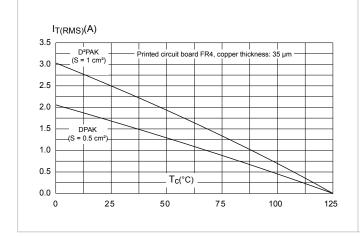
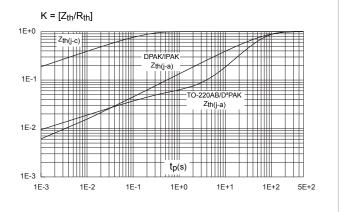


Figure 4. Relative variation of thermal impedance versus pulse duration



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Figure 5. On-state characteristics (maximum values)

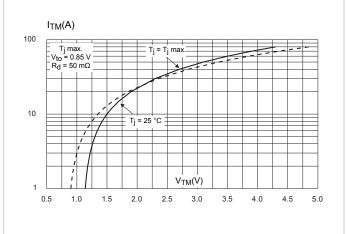


Figure 6. Surge peak on-state current versus number of cycles

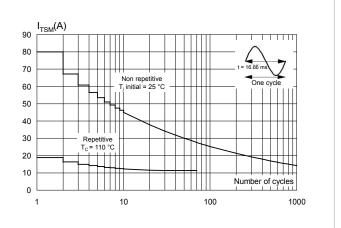


Figure 7. Non repetitive surge peak on-state current for a sinusoidal pulse ($t_p < 10 \text{ ms}$)

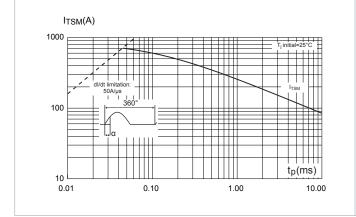


Figure 8. Relative variation of gate trigger current

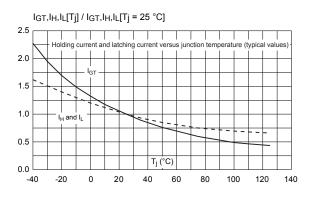


Figure 9. Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values)

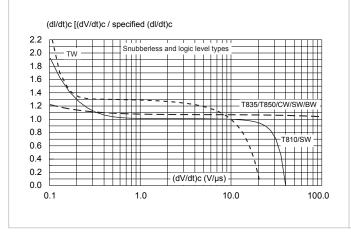
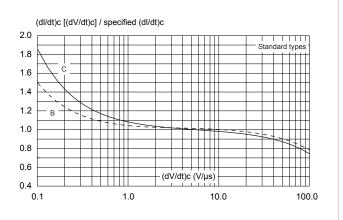


Figure 10. Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values)



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

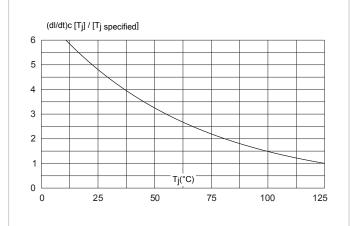
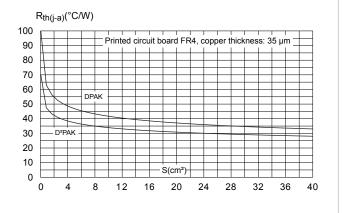


Figure 12. DPAK and D2PAK thermal resistance junction to ambient versus copper surface under tab





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. ECOPACK® is an ST trademark.

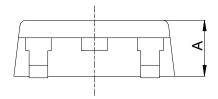
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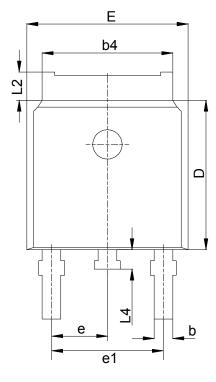


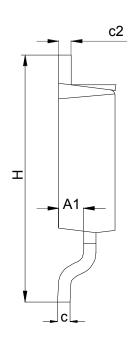
2.1 DPAK package information

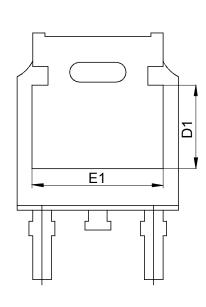
- Epoxy meets UL94, V0
- Lead-free package
- Recommended torque: 0.4 to 0.6 N·m

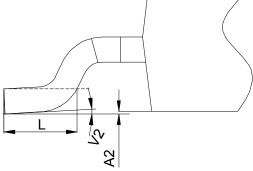
Figure 13. DPAK package outline











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0.0402

+8°



Dimensions Millimeters Ref. Inches⁽¹⁾ Min. Max. Min. Тур. Max. Тур. 2.18 Α 2.40 0.0858 0.0945 Α1 0.90 1.10 0.0354 0.0433 0.03 0.0012 0.0091 A2 0.23 0.64 0.90 0.0252 0.354 b b4 4.95 5.46 0.1949 0.2150 С 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 5.10 0.2008 D1 Ε 6.35 6.73 0.2500 0.2650 E1 4.32 0.1701 2.29 0.0900 4.57 0.1800 e1 Н 9.35 10.40 0.3681 0.4094 0.0701 L 1.00 1.78 0.0394 L2 1.27 0.0500

Table 6. DPAK package mechanical data

0.60

0°

L4

V2

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

1.02

+8°

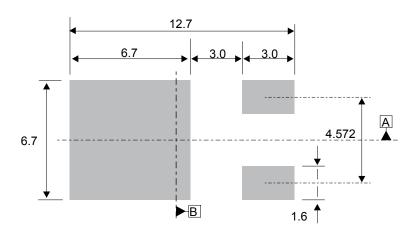


Figure 14. DPAK recommended footprint (dimensions are in mm)

0.0236

0°

The device must be positioned within \$\oplus 0.05 \ AB\$

Downloaded from Arrow.com.

^{1.} Dimensions in inches are given for reference only



2.2 IPAK package information

 $\begin{bmatrix} E \\ b4 \\ \end{bmatrix}$ $\begin{bmatrix} D \\ \end{bmatrix}$

Figure 15. IPAK package outline

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

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Table 7. IPAK package mechanical data

				Dimensions		
Ref.		Millimeters			Inches ⁽¹⁾	
	Min.	Тур.	Max.	Min.	Тур.	Max.
Α	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
B5		0.30			0.0118	
С	0.45		0.60	0.0177		0.0236
c2	0.46		0.60	0.0181		0.0236
D	6.00		6.20	0.2362		0.2441
E	6.40		6.65	0.2520		0.2618
е		2.28			0.0898	
e1	4.40		4.60	0.1732		0.1811
Н		16.10			0.6339	
L	9.00		9.60	0.3545		0.3780
L1	0.80		1.20	0.0315		0.0472
L2		0.80	1.25		0.0315	0.0492
V1		10°			10°	

^{1.} Inch dimensions are for reference only.

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2.3 TO-220AB insulated package information

C В b2 Resin gate 0.5 mm max. protusion⁽¹⁾ ↓ L F Α 14 13 c2 **a**1 12 a2 Μ c1 Resin gate 0.5 mm b1 max. protusion⁽¹⁾

Figure 16. TO-220AB insulated package outline

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

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Table 8. TO-220AB insulated package mechanical data

			Di	mensions		
Ref.		Millimeters			Inches	
	Min.	Тур.	Max.	Min.	Тур.	Max.
Α	15.20		15.90	0.5984		0.6260
a1		3.75			0.1476	
a2	13.00		14.00	0.5118		0.5512
В	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
С	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
е	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
12	1.14		1.70	0.0449		0.0669
13	1.14		1.70	0.0449		0.0669
14	15.80	16.40	16.80	0.6220	0.6457	0.6614
М		2.6			0.1024	

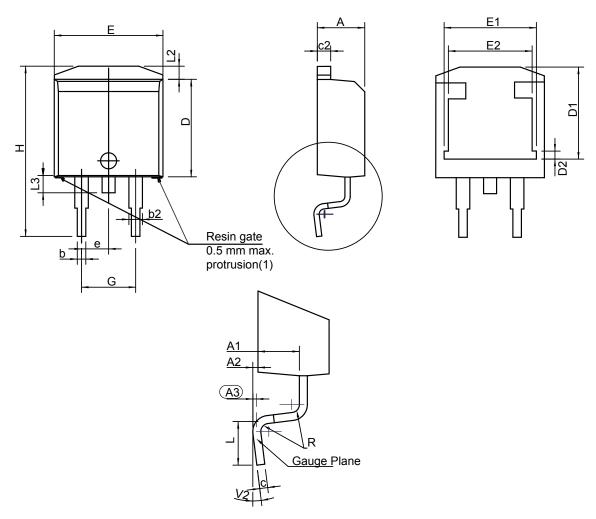
^{1.} Inch dimensions are for reference only.

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2.4 D²PAK package information

Figure 17. D²PAK package outline



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

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Table 9. D²PAK package mechanical data

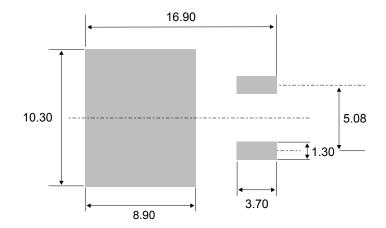
				Dimensions		
Ref.	f. Millime				Inches	
	Min.	Тур.	Max.	Min.	Тур.	Max.
Α	4.30		4.60	0.1693		0.1811
A1	2.49		2.69	0.0980		0.1059
A2	0.03		0.23	0.0012		0.0091
A3		0.25			0.0098	
b	0.70		0.93	0.0276		0.0366
b2	1.25		1.7	0.0492		0.0669
С	0.45		0.60	0.0177		0.0236
c2	1.21		1.36	0.0476		0.0535
D	8.95		9.35	0.3524		0.3681
D1	7.50		8.00	0.2953		0.3150
D2	1.30		1.70	0.0512		0.0669
е	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
Н	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

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Figure 18. D²PAK recommended footprint (dimensions are in mm)



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Ordering information

Figure 19. Ordering information scheme (BTA08 and BTB08 series)

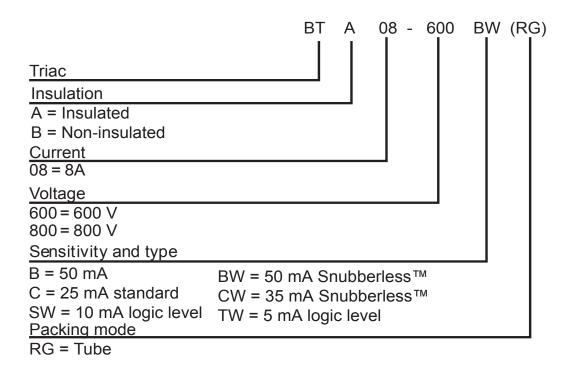
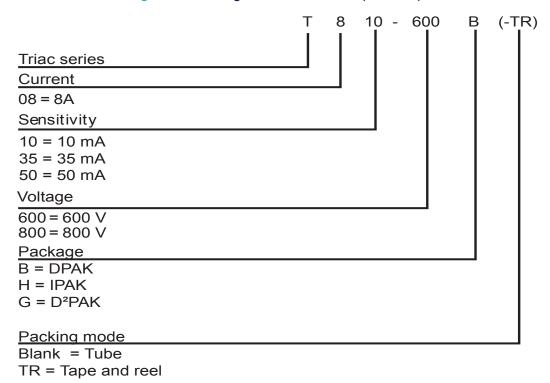


Figure 20. Ordering information scheme (T8 series)



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Table 10. Product selector

5 (1)	Voltage (xxx)		2	_	
Part Number	600	800	- Sensitivity	Туре	Package
T810-xxxB	Х	Х	10 mA	Logic Level	DPAK
T835-xxxH	Х		35 mA	Snubberless™	IPAK
T810-xxxG	Х		10 mA	Logic Level	D ² PAK
T835-xxxG	Х	Х	35 mA	Snubberless™	D ² PAK
T850-xxxG	Х	Х	50 mA	Snubberless™	D ² PAK
BTA08-xxxS	Х		10 mA	Logic Level	TO-220AB Ins.
BTA08-xxxC	Х	Х	35 mA	Standard	TO-220AB Ins.
BTA08-xxxB	Х		50 mA	Standard	TO-220AB Ins.
BTA08-xxxTW	Х		5 mA	Logic Level	TO-220AB Ins.
BTA08-xxxSW	Х		10 mA	Logic Level	TO-220AB Ins.
BTA08-xxxCW	Х		35 mA	Snubberless™	TO-220AB Ins.
BTA08-xxxBW	Х	Х	50 mA	Snubberless™	TO-220AB Ins.
BTB08-xxxS	Х		10 mA	Logic Level	TO-220AB
BTB08-xxxC	Х		35 mA	Standard	TO-220AB
BTB08-xxxB	Х		50 mA	Standard	TO-220AB
BTB08-xxxTW	Х	Х	5 mA	Logic Level	TO-220AB
BTB08-xxxSW	Х		10 mA	Logic Level	TO-220AB
BTB08-xxxCW	Х	Х	35 mA	Snubberless™	TO-220AB
BTB08-xxxBW	Х		50 mA	Snubberless™	TO-220AB



Table 11. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode	
T810-600B	T8 1060					
T835-600B	T8 3560	_		75	Tube	
T835-800B	T8 3580	-				
T810-600B-TR	T8 1060	DPAK	0.30			
T810-800B-TR	T8 1080			2500	Tono 9 Dool 401	
T835-600B-TR	T8 3560			2500	Tape&Reel 13"	
T835-800B-TR	T8 3580					
T835-600H	T8 3560	IPAK	0.40	75	Tube	
T835-600G	T835-600G					
T835-8G	T835-8G			50	Tubo	
T850-6G	T850-6G			50	Tube	
T850-8G	T850-8G					
T810-600G-TR	T810-600G	D ² PAK	1.50			
T835-600G-TR	T835-600G			1000		
T835-8G-TR	T835-8G				Tape&Reel 13"	
T850-6G-TR	T850-6G					
T850-8G-TR	T850-8G					
BTA08-600SRG	BTA08-600S					
BTA08-600BRG	BTA08-600B					
BTA08-600CRG	BTA08-600C					
BTA08-800CRG	BTA08-800C					
BTA08-600BWRG	BTA08-600BW	TO-220AB Ins.				
BTA08-600CWRG	BTA08-600CW	_				
BTA08-600SWRG	BTA08-600SW	-				
BTA08-600TWRG	BTA08-600TW					
BTA08-800BWRG	BTA08-800BW		2.20	50	Tuba	
BTB08-600BRG	BTB08-600B		2.30	50	Tube	
BTB08-600CRG	BTB08-600C					
BTB08-600SRG	BTB08-600S					
BTB08-600BWRG	BTB08-600BW					
BTB08-600CWRG	BTB08-600CW	TO-220AB				
BTB08-600SWRG	BTB08-600SW					
BTB08-600TWRG	BTB08-600TW					
BTB08-800CWRG	BTB08-800CW					
BTB08-800TWRG	BTB08-800TW					



Table 12. Document revision history

Date	Revision	Changes
Apr-2002	5A	Last update.
13-Feb-2006	6	TO-220AB delivery mode changed from bulk to tube. ECOPACK statement added.
10-Mar-2010	7	Updated ECOPACK statement and Figure 26
02-Jun-2014	8	Updated DPAK and IPAK package information and reformatted to current standard.
07-Nov-2016	9	Updated Table 1 and reformatted to current standard.
06-Jan-2017	10	Updated Figure 20: "Ordering information scheme (T8 series)", Table 10: "Product selector" and Table 11: "Ordering information".
09-Feb-2017	11	Added T850 package information.
24-Apr-2017	12	Updated Figure 6 Minor text changes to improve readability.
14-Mar-2018	13	Updated Table 2. Electrical characteristics ($T_j = 25$ °C, unless otherwise specified) Snubberless and logic level (3 quadrants), cover image, Figure 9. Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values) and Figure 20. Ordering information scheme (T8 series).
14-May-2018	14	Updated product status links.
09-Aug-2018	15	Updated Table 3. Standard (4 quadrants).

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