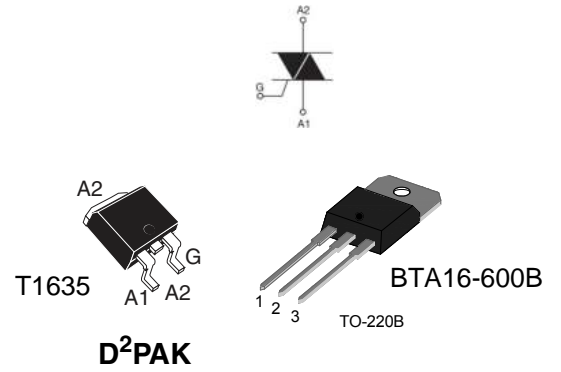


## Main features

Symbol	Value	Unit
$I_{T(RMS)}$	16	A
$V_{DRM}/V_{RRM}$	800	V
$I_{GT (Q1)}$	35	mA



# 1 Characteristics

**Table 1. Absolute maximum ratings**

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)	D <sup>2</sup> PAK	$T_c = 130^\circ\text{C}$	16	A
$I_{TSM}$	Non repetitive surge peak on-state current (full cycle sine wave, $T_j$ initial = $25^\circ\text{C}$ )	F = 60 Hz	t = 16.7 ms	170	A
		F = 50 Hz	t = 20 ms	160	
I2t	I2t Value for fusing	tp = 10 ms		100	A <sup>2</sup> S
di/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , tr ≤ 100 ns	F = 120 Hz	$T_j = 150^\circ\text{C}$	50	A/μs
$V_{DSM}/V_{RSM}$	Non repetitive surge peak off state voltage		$T_j = 25^\circ\text{C}$	800	V
$I_{GM}$	Peak gate current	t <sub>p</sub> = 20 μs	$T_j = 150^\circ\text{C}$	4	A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 150^\circ\text{C}$	1	W
$T_{stg}$ $T_j$	Storage junction temperature range Operating junction temperature range			-40 to +150 -40 to +150	°C

**Table 2. Electrical characteristics ( $T_j = 25^\circ\text{C}$ , unless otherwise specified)**

Symbol	Test conditions	Quadrant		Value	Unit
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$ , $R_L = 33\ \Omega$	II - III	MAX	35	mA
$V_{GT}$		II - III	MAX	1.3	V
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\ \text{k}\Omega$	II - III	MIN	0.15	V
$I_H^{(2)}$	$I_T = 100\ \text{mA}$		MAX	35	mA
$I_L$	$I_G = 1.2 \times I_{GT}$	I - III	MAX	50	mA
		II		80	
dV/dt <sup>(2)</sup>	$V_D = 67\% V_{DRM}$ , gate open, $T_j = 150^\circ\text{C}$		MIN	300	V/μs
(di/dt) <sub>c</sub> <sup>(2)</sup>	Without snubber, $T_j = 150^\circ\text{C}$		MIN	7.1	A/ms

1. minimum  $I_{GT}$  is guaranteed at 5% of  $I_{GT}$  max
2. for both polarities of A2 referenced to A1

**Table 3. Static electrical characteristics**

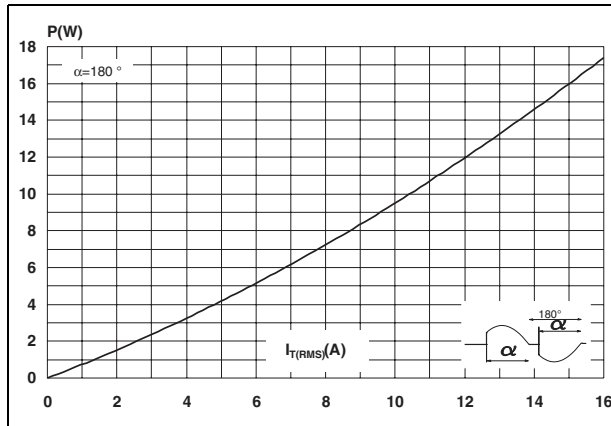
Symbol	Test conditions			Value	Unit
$V_{TM}^{(1)}$	$I_{TM} = 22.5\text{ A}$ , $t_p = 380\ \mu\text{s}$	$T_j = 25^\circ\text{ C}$	MAX	1.5	V
$V_{TO}^{(1)}$		$T_j = 150^\circ\text{ C}$	MAX	0.80	V
$R_D^{(1)}$		$T_j = 150^\circ\text{ C}$	MAX	23	m $\Omega$
$I_{DRM}$ $I_{RRM}$	$V_{DRM} = V_{RRM}$	$T_j = 25^\circ\text{ C}$	MAX	5	$\mu\text{A}$
		$T_j = 150^\circ\text{ C}$		6.4	mA
	$V_D/V_R = 400\text{ V}$ (at peak mains voltage)	$T_j = 150^\circ\text{ C}$		4.2	

1. for both polarities of A2 referenced to A1

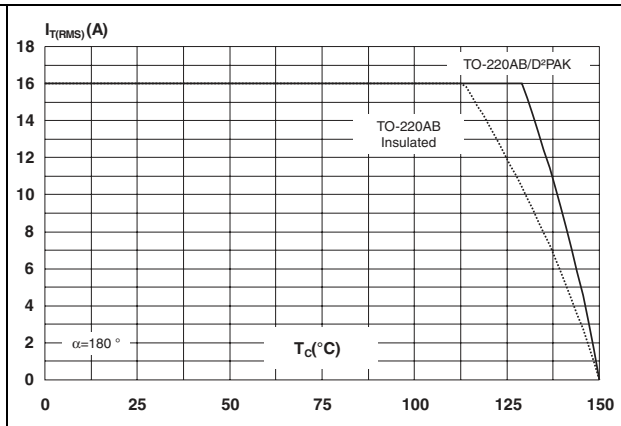
**Table 4. Thermal resistance**

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (AC)	D <sup>2</sup> PAK	1.2	$^\circ\text{C/W}$
$R_{th(j-a)}$	Junction to ambient		45	

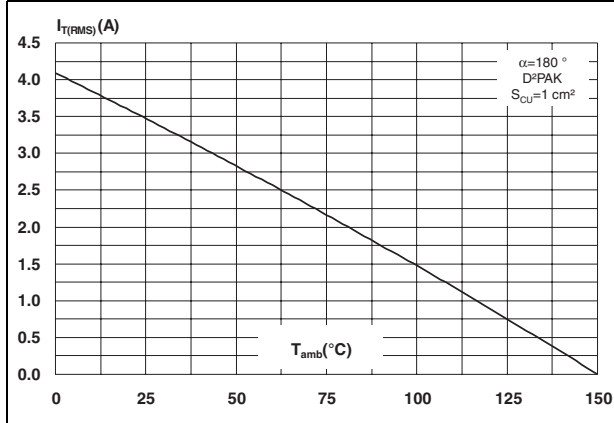
**Figure 1. Maximum power dissipation vs RMS on-state current (full cycle)**



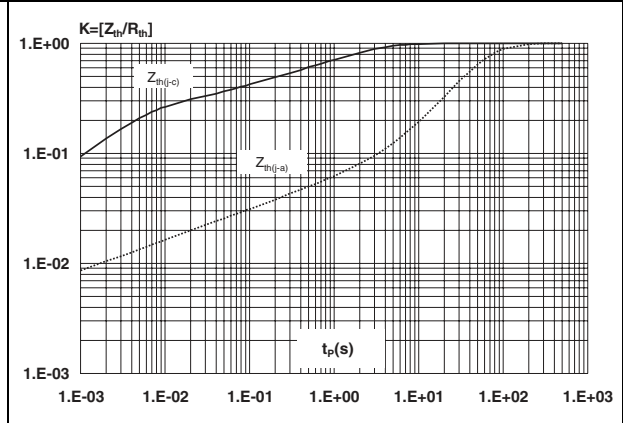
**Figure 2. RMS on-state current vs case temperature (full cycle)**



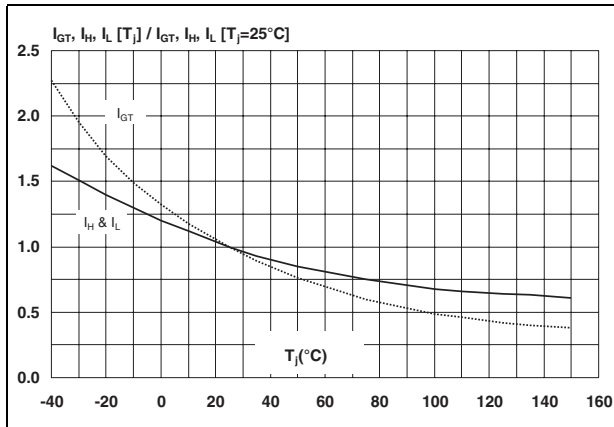
**Figure 3. RMS on-state current vs ambient temperature, PCB FR4,  $e_{CU} = 35 \mu m$**



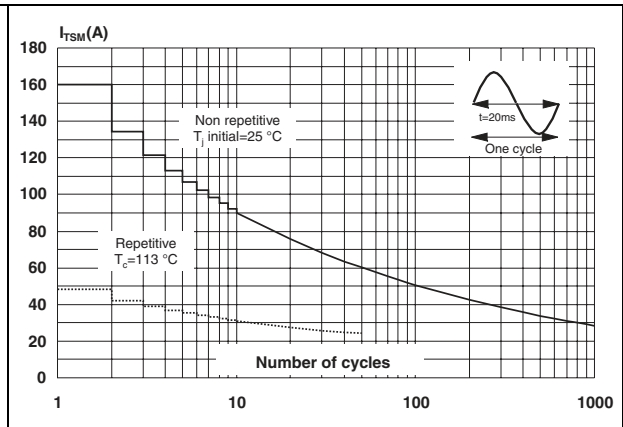
**Figure 4. Relative variation of thermal impedance vs pulse duration**



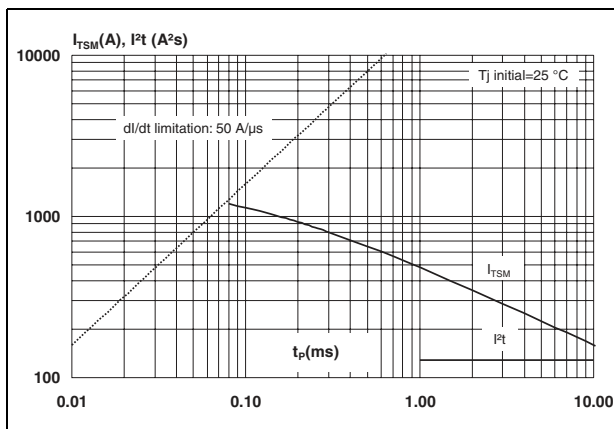
**Figure 5. Relative variation of gate trigger current, holding current and latching current vs junction temperature (typical values)**



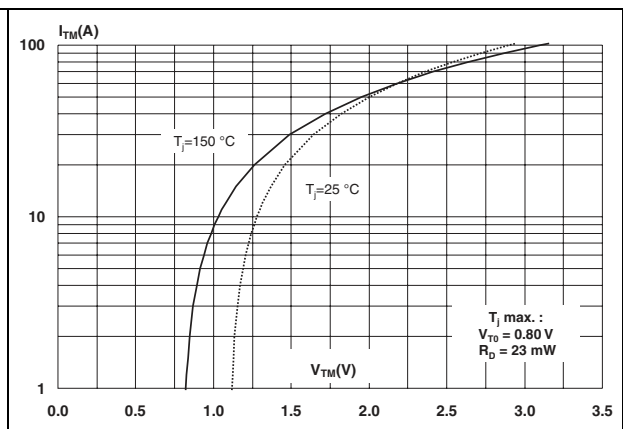
**Figure 6. Surge peak on-state current vs number of cycles**



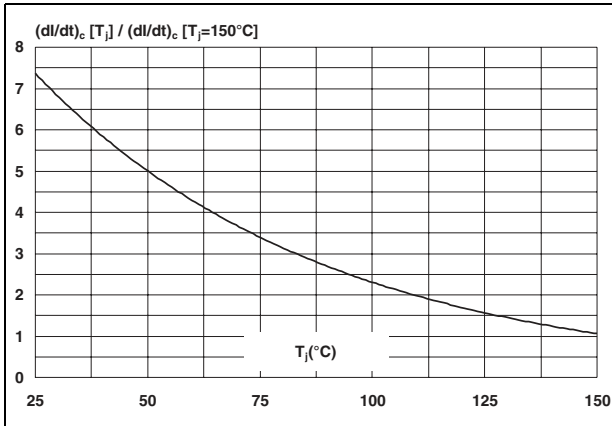
**Figure 7. Non repetitive surge peak on-state current (sinusoidal pulse width  $t_p < 10 ms$ ) and corresponding value of  $I^2t$**



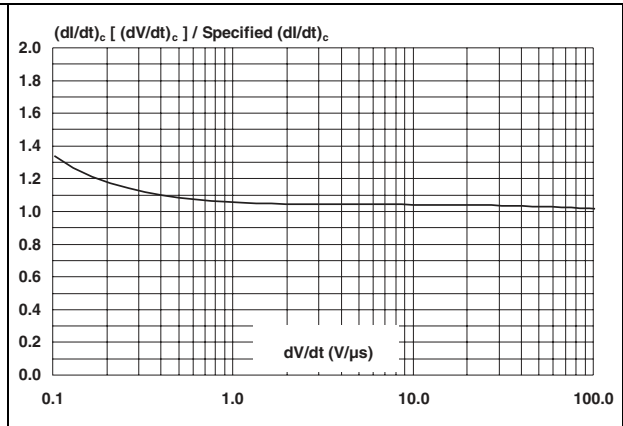
**Figure 8. On-state characteristics (maximum values)**



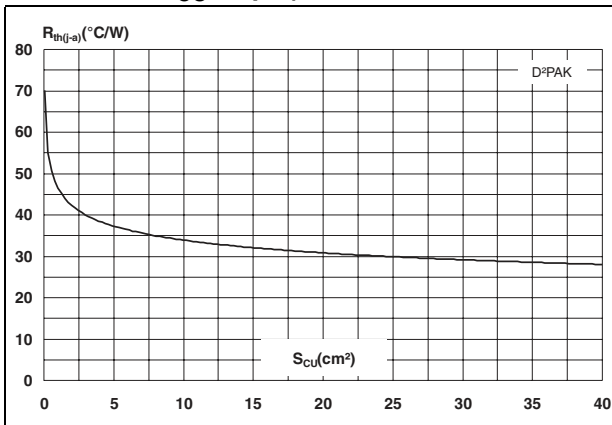
**Figure 9. Relative variation of critical rate of decrease of main current  $(di/dt)_c$  versus junction temperature**



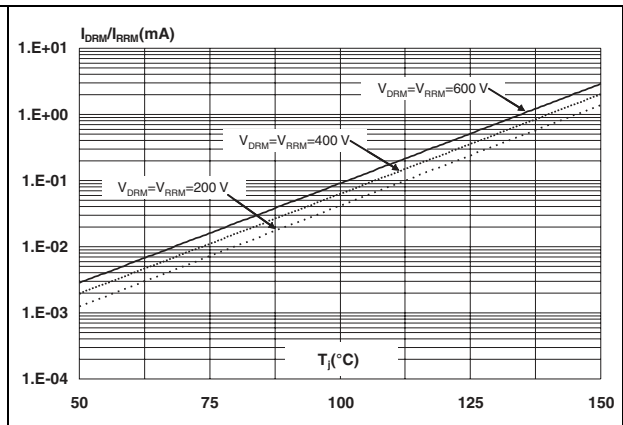
**Figure 10. Relative variation of critical rate of decrease of main current  $(di/dt)_c$  versus reapplied  $dV/dt$  (typical values)**



**Figure 11. Variation of thermal resistance, junction to ambient versus copper surface under tab (PCB FR4,  $e_{Cu}$  35  $\mu m$ )**



**Figure 12. Leakage current versus junction temperature for different values of blocking voltage (typical values)**



**Figure 13. Acceptable repetitive peak off-state voltage versus case-ambient thermal resistance**

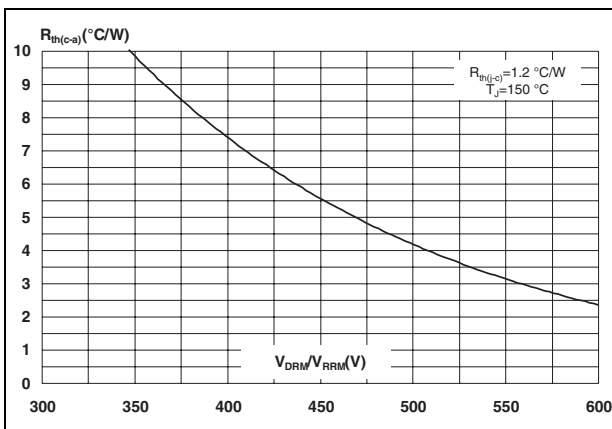
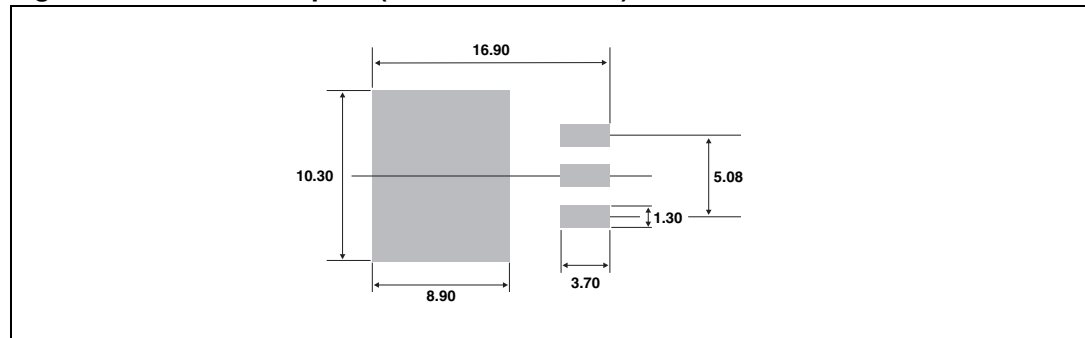


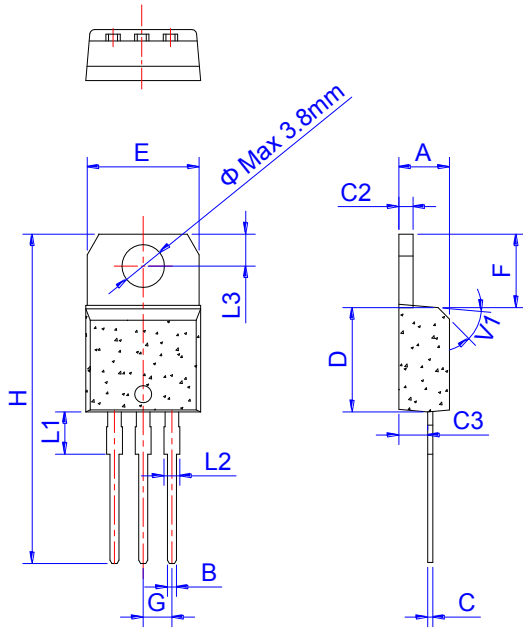
Table 5. D<sup>2</sup>PAK Mechanical data

REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	0.208
L	15.00	15.85	0.590	0.624
L2	1.27	1.40	0.050	0.055
L3	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

Figure 14. D<sup>2</sup>PAK Footprint (dimensions in mm)



**PACKAGE MECHANICAL DATA**



TO-220B

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
B	0.61		0.88	0.024		0.035
C	0.46		0.70	0.018		0.028
C2	1.21		1.32	0.048		0.052
C3	2.40		2.72	0.094		0.107
D	8.60		9.70	0.339		0.382
E	9.80		10.4	0.386		0.409
F	6.55		6.95	0.258		0.274
G		2.54			0.1	
H	28.0		29.8	1.102		1.173
L1		3.75			0.148	
L2	1.14		1.70	0.045		0.067
L3	2.65		2.95	0.104		0.116
V1		45°			45°	