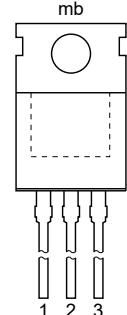
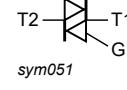


Symbol	Parameter	Conditions		Min	Typ	Max	Unit
		$V_D = 12 \text{ V}$; $I_T = 0.1 \text{ A}$; T_2+G- ; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 7		2	-	50	mA
		$V_D = 12 \text{ V}$; $I_T = 0.1 \text{ A}$; T_2-G- ; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 7		2	-	50	mA
I_H	holding current	$V_D = 12 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 9		-	-	60	mA
V_T	on-state voltage	$I_T = 20 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 10		-	1.2	1.5	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 402 \text{ V}$; $T_j = 125 \text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		1000	-	-	V/ μ s
		$V_{DM} = 402 \text{ V}$; $T_j = 150 \text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		600	-	-	V/ μ s
dI_{com}/dt	rate of change of commutating current	$V_D = 400 \text{ V}$; $T_j = 125 \text{ }^\circ\text{C}$; $I_{T(RMS)} = 16 \text{ A}$; $dV_{com}/dt = 20 \text{ V}/\mu\text{s}$; (without snubber condition); gate open circuit		15	-	-	A/ms
		$V_D = 400 \text{ V}$; $T_j = 150 \text{ }^\circ\text{C}$; $I_{T(RMS)} = 16 \text{ A}$; $dV_{com}/dt = 20 \text{ V}/\mu\text{s}$; (without snubber condition); gate open circuit		6	-	-	A/ms

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1		
2	T2	main terminal 2		
3	G	gate		
mb	n.c.	mounting base; isolated	 TO-220AB (SOT78D)	

6. Ordering information

Table 3. Ordering information

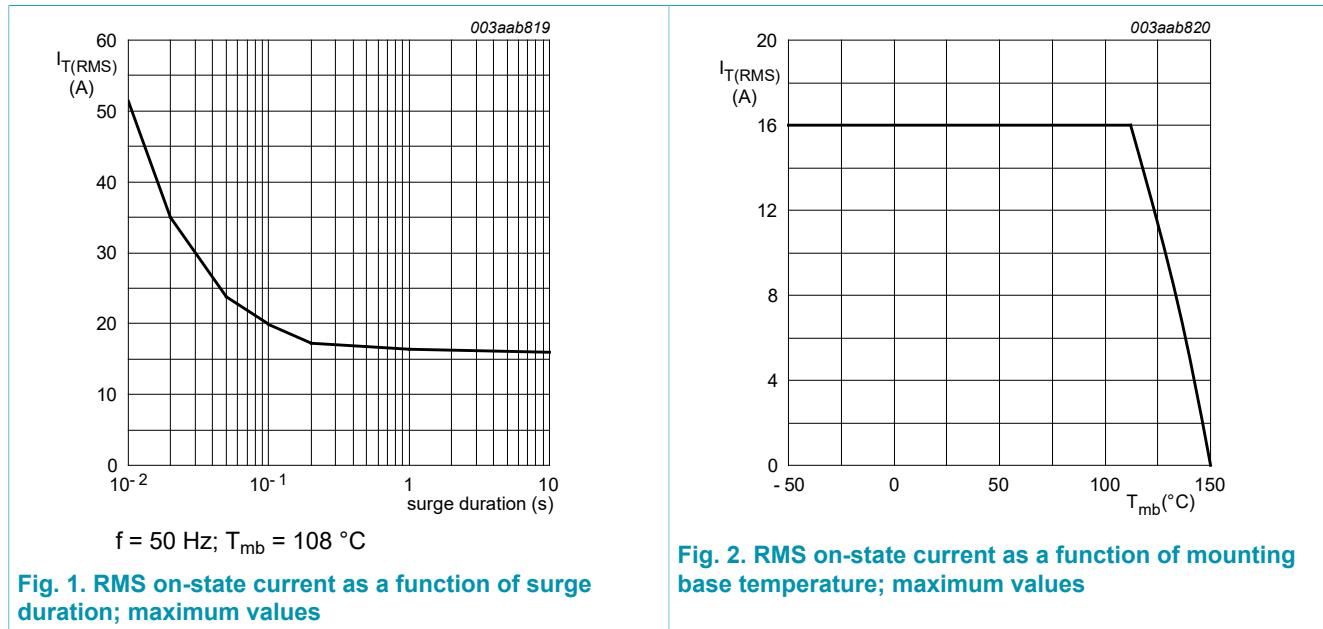
Type number	Package		
	Name	Description	Version
BTA416Y-600B	TO-220AB	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220	SOT78D

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage			-	600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 108^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3		-	16	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(\text{init})} = 25^\circ\text{C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5		-	160	A
		full sine wave; $T_{j(\text{init})} = 25^\circ\text{C}$; $t_p = 16.7\text{ ms}$		-	176	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN		-	128	A^2s
dI_T/dt	rate of rise of on-state current	$I_G = 0.2\text{ A}$		-	100	$\text{A}/\mu\text{s}$
I_{GM}	peak gate current			-	2	A
P_{GM}	peak gate power			-	5	W
$P_{G(AV)}$	average gate power	over any 20 ms period		-	0.5	W
T_{stg}	storage temperature			-40	150	$^\circ\text{C}$
T_j	junction temperature			-	150	$^\circ\text{C}$



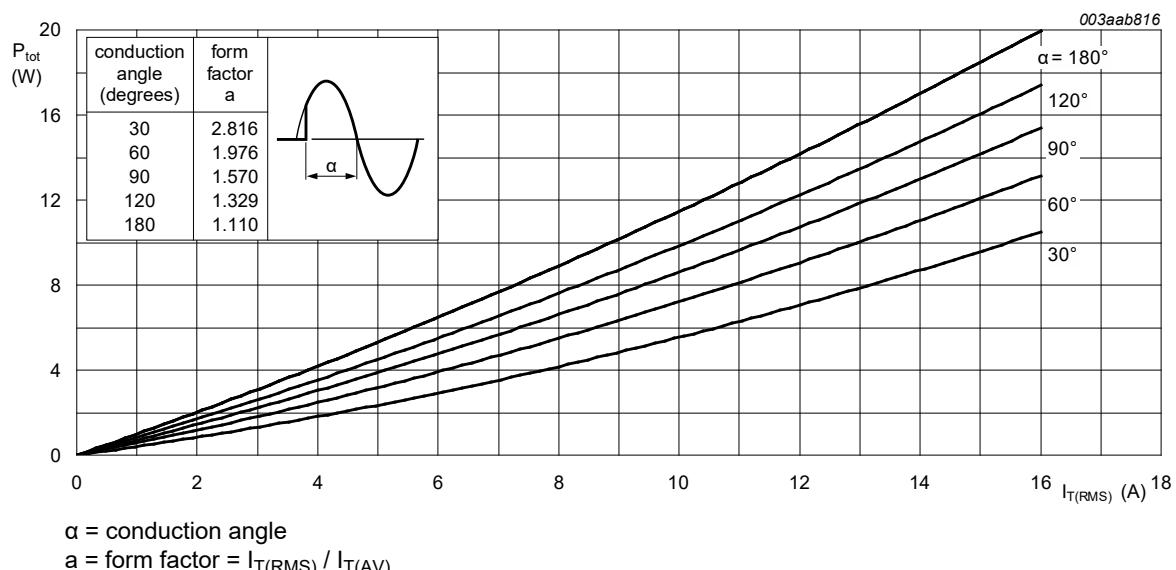


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

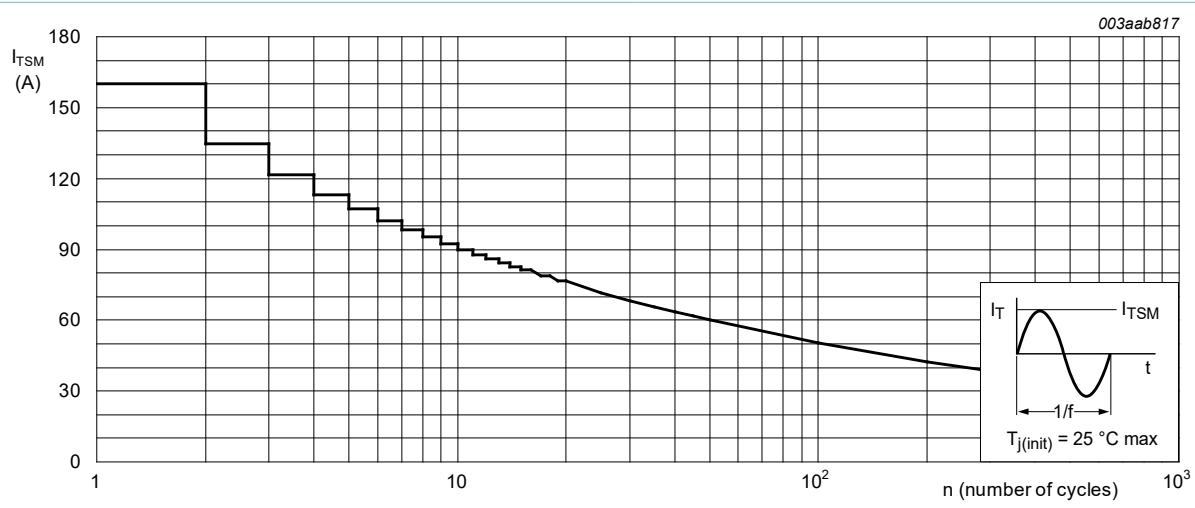
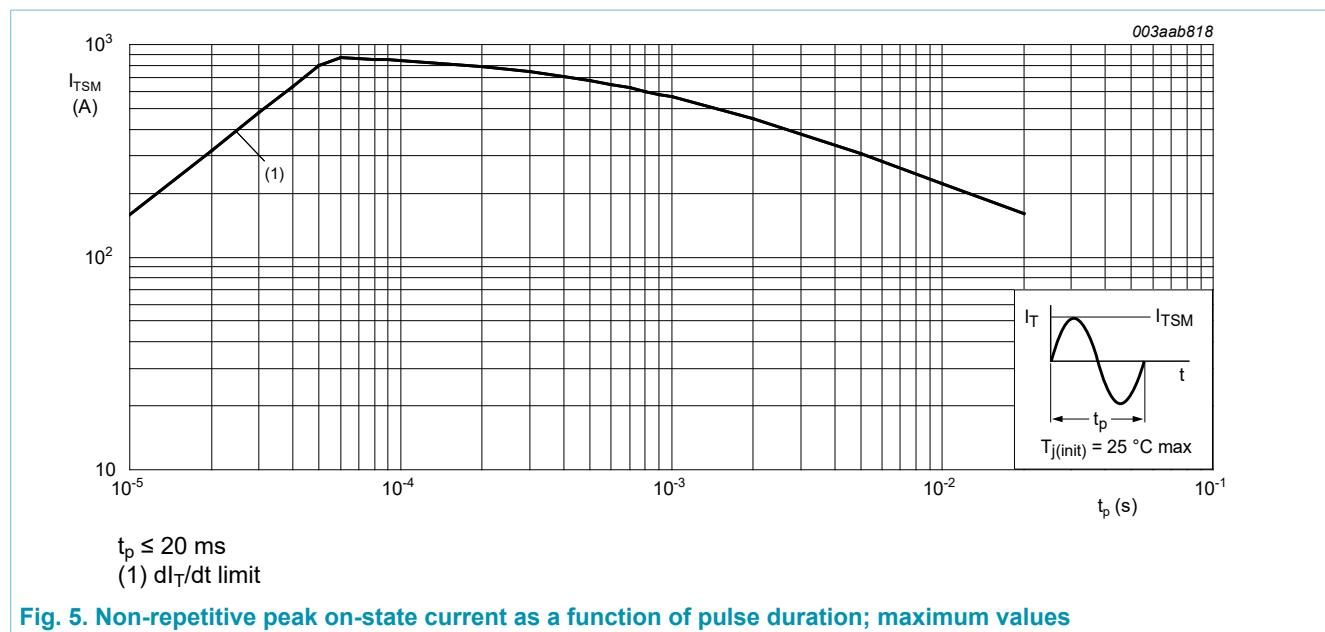


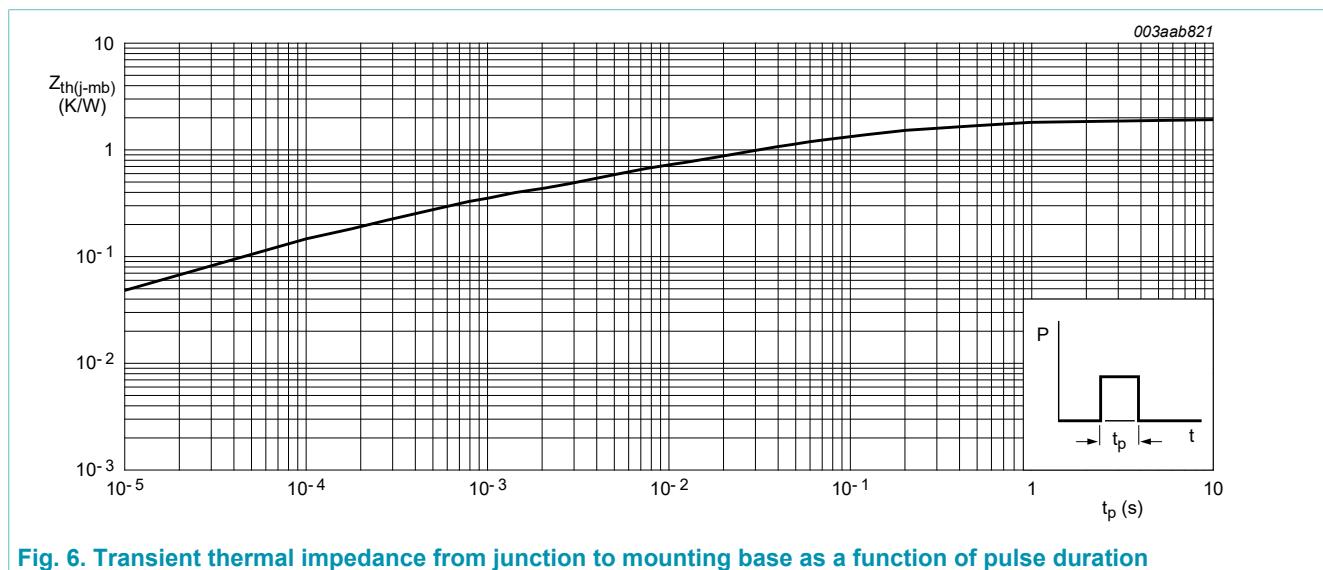
Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; Fig. 6	-	-	1.9	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W



9. Isolation characteristics

Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	from all terminals to external heatsink; sinusoidal waveform; clean and dust free; $50 \text{ Hz} \leq f \leq 60 \text{ Hz}$; $\text{RH} \leq 65\%$; $T_{mb} = 25^\circ\text{C}$	-	-	2500	V
C_{isol}	isolation capacitance	from main terminal 2 to external heatsink; $f = 1 \text{ MHz}$; $T_{mb} = 25^\circ\text{C}$	-	10	-	pF

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I _{GT}	gate trigger current	V _D = 12 V; I _T = 0.1 A; T2+ G+; T _j = 25 °C; Fig. 7	2	-	50	mA
		V _D = 12 V; I _T = 0.1 A; T2+ G-; T _j = 25 °C; Fig. 7	2	-	50	mA
		V _D = 12 V; I _T = 0.1 A; T2- G-; T _j = 25 °C; Fig. 7	2	-	50	mA
I _L	latching current	V _D = 12 V; I _G = 0.1 A; T2+ G+; T _j = 25 °C; Fig. 8	-	-	60	mA
		V _D = 12 V; I _G = 0.1 A; T2+ G-; T _j = 25 °C; Fig. 8	-	-	90	mA
		V _D = 12 V; I _G = 0.1 A; T2- G-; T _j = 25 °C; Fig. 8	-	-	60	mA
I _H	holding current	V _D = 12 V; T _j = 25 °C; Fig. 9	-	-	60	mA
V _T	on-state voltage	I _T = 20 A; T _j = 25 °C; Fig. 10	-	1.2	1.5	V
V _{GT}	gate trigger voltage	V _D = 12 V; I _T = 0.1 A; T _j = 25 °C; Fig. 11	-	0.7	1	V
		V _D = 400 V; I _T = 0.1 A; T _j = 150 °C	0.25	0.4	-	V
I _D	off-state current	V _D = 600 V; T _j = 125 °C	-	0.1	0.5	mA
		V _D = 600 V; T _j = 150 °C	-	0.4	2	mA
Dynamic characteristics						
dV _D /dt	rate of rise of off-state voltage	V _{DM} = 402 V; T _j = 125 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit	1000	-	-	V/μs
		V _{DM} = 402 V; T _j = 150 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit	600	-	-	V/μs
dI _{com} /dt	rate of change of commutating current	V _D = 400 V; T _j = 125 °C; I _{T(RMS)} = 16 A; dV _{com} /dt = 20 V/μs; (without snubber condition); gate open circuit	15	-	-	A/ms
		V _D = 400 V; T _j = 150 °C; I _{T(RMS)} = 16 A; dV _{com} /dt = 20 V/μs; (without snubber condition); gate open circuit	6	-	-	A/ms

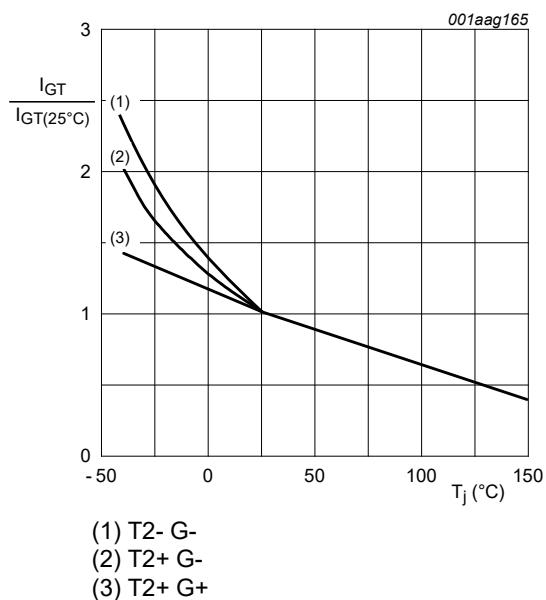


Fig. 7. Normalized gate trigger current as a function of junction temperature

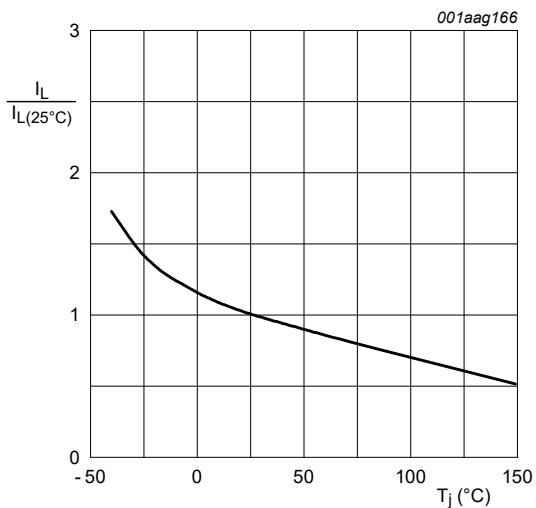


Fig. 8. Normalized latching current as a function of junction temperature

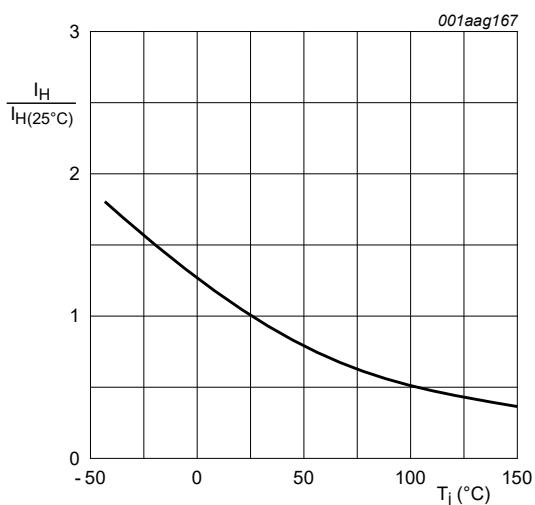


Fig. 9. Normalized holding current as a function of junction temperature

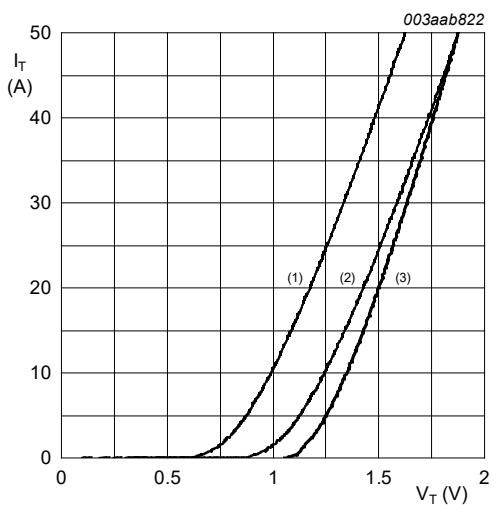


Fig. 10. On-state current as a function of on-state voltage

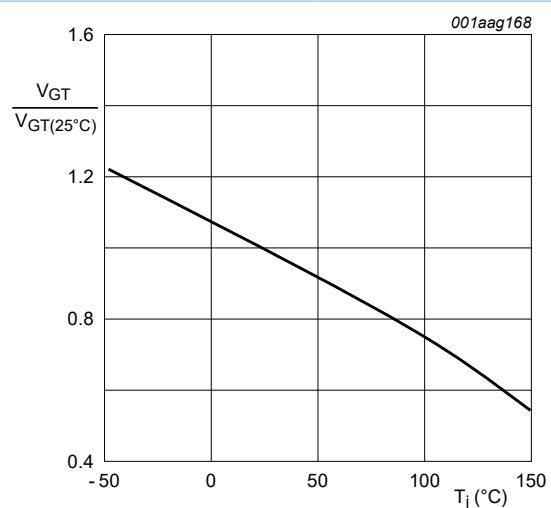
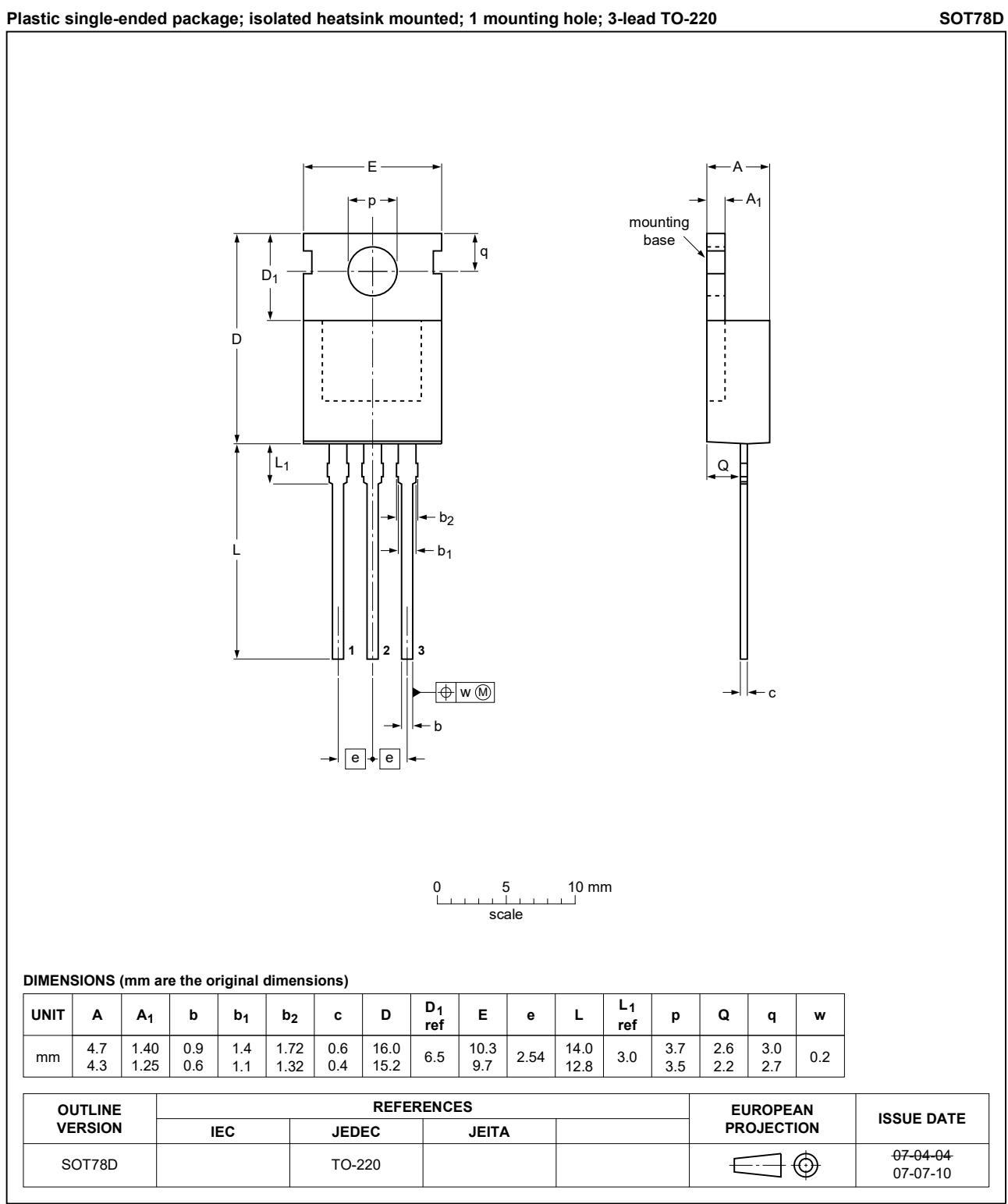


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

11. Package outline



12. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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- [2] The term 'short data sheet' is explained in section "Definitions".
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