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Thyristors logic level

BT169 series

GENERAL DESCRIPTION

Passivated, sensitive gate thyristors in a plastic envelope, intended for use in general purpose switching and phase control applications. These devices are intended to be interfaced directly to microcontrollers, logic integrated circuits and other low power gate trigger circuits.

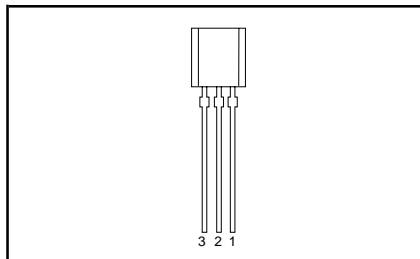
QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX	MAX	MAX	MAX	UNIT
		
BT169						
V_{DRM} , V_{RRM}	Repetitive peak off-state voltages	B 200	D 400	E 500	G 600	V
$I_{T(AV)}$	Average on-state current	0.5	0.5	0.5	0.5	A
$I_{T(RMS)}$	RMS on-state current	0.8	0.8	0.8	0.8	A
I_{TSM}	Non-repetitive peak on-state current	8	8	8	8	A

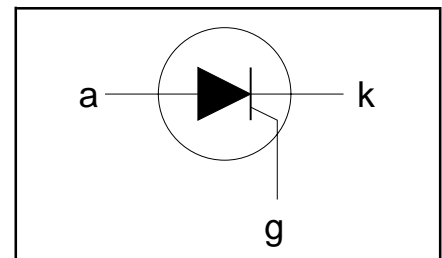
PINNING - TO92 variant

PIN	DESCRIPTION
1	anode
2	gate
3	cathode

PIN CONFIGURATION



SYMBOL



LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.				UNIT
				B	D	E	G	
V_{DRM} , V_{RRM}	Repetitive peak off-state voltages		-	200 ¹	400 ¹	500 ¹	600 ¹	V
$I_{T(AV)}$	Average on-state current	half sine wave; $T_{lead} \leq 83^\circ\text{C}$	-	0.5				A
$I_{T(RMS)}$	RMS on-state current	all conduction angles	-	0.8				A
I_{TSM}	Non-repetitive peak on-state current	$t = 10\text{ ms}$	-	8				A
		$t = 8.3\text{ ms}$	-	9				A
I^2t dl_T/dt	I^2t for fusing Repetitive rate of rise of on-state current after triggering	half sine wave; $T_j = 25^\circ\text{C}$ prior to surge	-	0.32				A^2s
		$t = 10\text{ ms}$ $I_{TM} = 2\text{ A}$; $I_G = 10\text{ mA}$; $dl_G/dt = 100\text{ mA}/\mu\text{s}$	-	50				$\text{A}/\mu\text{s}$
I_{GM}	Peak gate current		-	1				A
V_{GM}	Peak gate voltage		-	5				V
V_{RGM}	Peak reverse gate voltage		-	5				V
P_{GM}	Peak gate power		-	2				W
$P_{G(AV)}$	Average gate power	over any 20 ms period	-	0.1				W
T_{stg}	Storage temperature		-40	150				$^\circ\text{C}$
T_j	Operating junction temperature		-	125				$^\circ\text{C}$

¹ Although not recommended, off-state voltages up to 800V may be applied without damage, but the thyristor may switch to the on-state. The rate of rise of current should not exceed 15 A/ μs .

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THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-lead}$	Thermal resistance junction to lead		-	-	60	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	pcb mounted; lead length = 4mm	-	150	-	K/W

STATIC CHARACTERISTICS $T_j = 25\text{ °C}$ unless otherwise stated

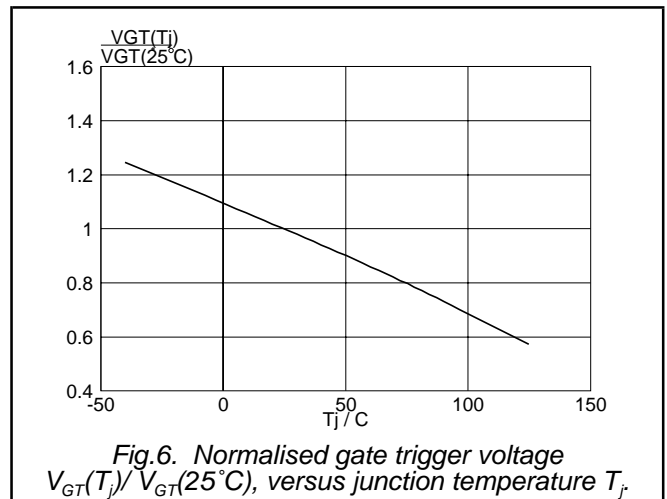
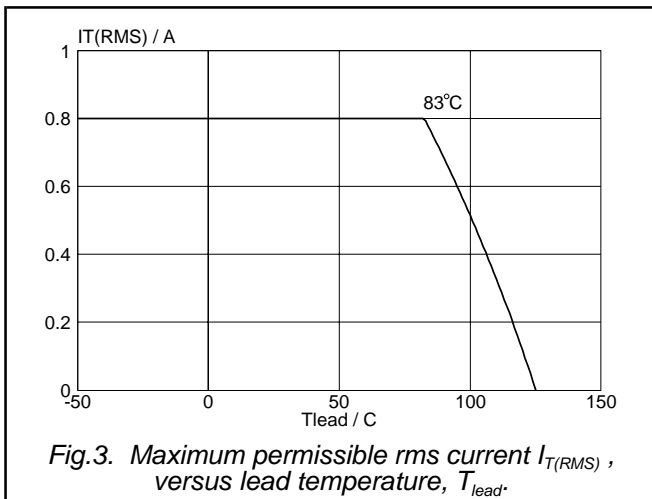
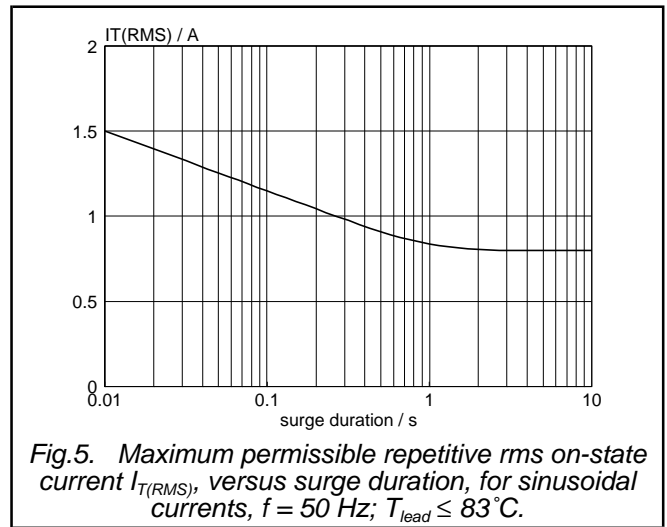
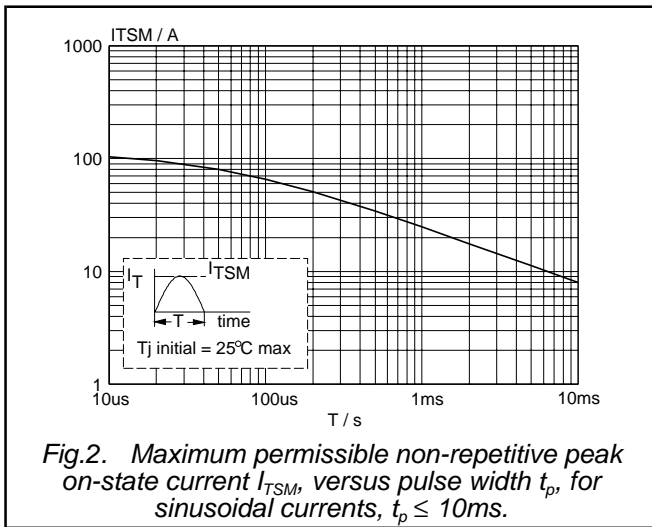
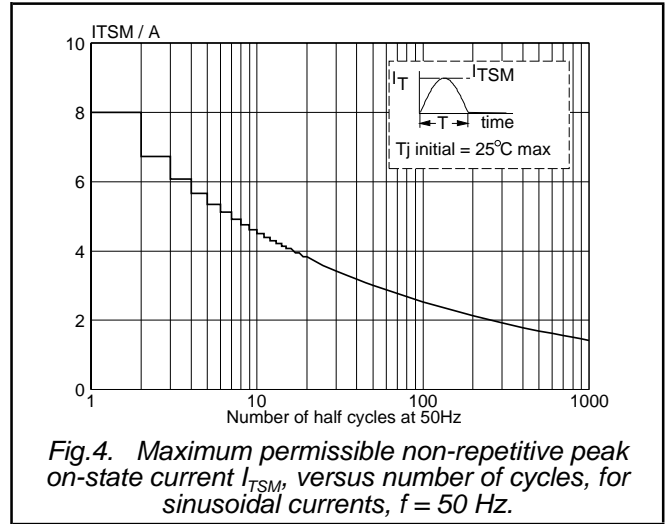
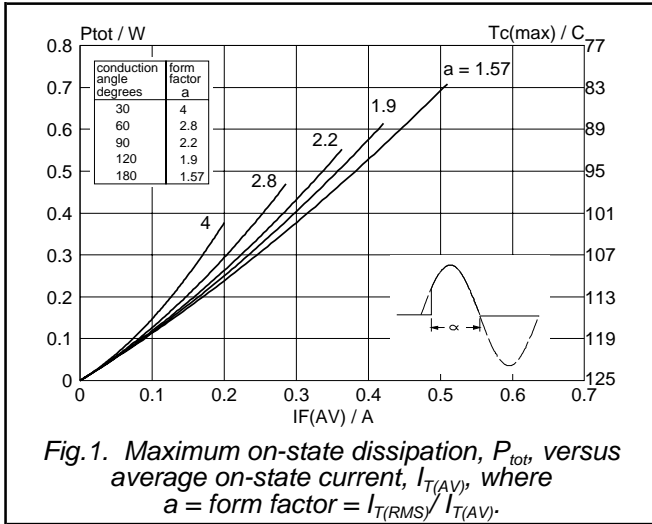
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{GT}	Gate trigger current	$V_D = 12\text{ V}$; $I_T = 10\text{ mA}$; gate open circuit	-	50	200	μA
I_L	Latching current	$V_D = 12\text{ V}$; $I_{GT} = 0.5\text{ mA}$; $R_{GK} = 1\text{ k}\Omega$	-	2	6	mA
I_H	Holding current	$V_D = 12\text{ V}$; $I_{GT} = 0.5\text{ mA}$; $R_{GK} = 1\text{ k}\Omega$	-	2	5	mA
V_T	On-state voltage	$I_T = 1\text{ A}$	-	1.2	1.35	V
V_{GT}	Gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 10\text{ mA}$; gate open circuit	-	0.5	0.8	V
		$V_D = V_{DRM(max)}$; $I_T = 10\text{ mA}$; $T_j = 125\text{ °C}$; gate open circuit	0.2	0.3	-	V
I_D, I_R	Off-state leakage current	$V_D = V_{DRM(max)}$; $V_R = V_{RRM(max)}$; $T_j = 125\text{ °C}$; $R_{GK} = 1\text{ k}\Omega$	-	0.05	0.1	mA

DYNAMIC CHARACTERISTICS $T_j = 25\text{ °C}$ unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
dV_D/dt	Critical rate of rise of off-state voltage	$V_{DM} = 67\% V_{DRM(max)}$; $T_j = 125\text{ °C}$; exponential waveform; $R_{GK} = 1\text{ k}\Omega$	500	800	-	V/ μs
t_{gt}	Gate controlled turn-on time	$I_{TM} = 2\text{ A}$; $V_D = V_{DRM(max)}$; $I_G = 10\text{ mA}$; $dI_G/dt = 0.1\text{ A}/\mu\text{s}$	-	2	-	μs
t_q	Circuit commutated turn-off time	$V_D = 67\% V_{DRM(max)}$; $T_j = 125\text{ °C}$; $I_{TM} = 1.6\text{ A}$; $V_R = 35\text{ V}$; $dI_{TM}/dt = 30\text{ A}/\mu\text{s}$; $dV_D/dt = 2\text{ V}/\mu\text{s}$; $R_{GK} = 1\text{ k}\Omega$	-	100	-	μs

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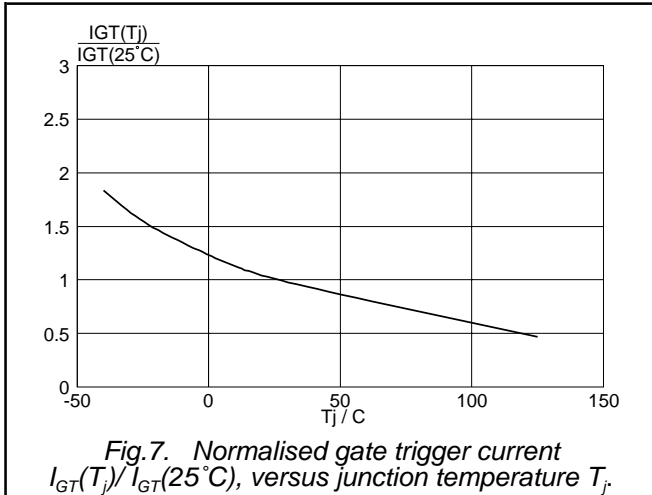


Fig. 7. Normalised gate trigger current $I_{GT}(T_j)/I_{GT}(25^\circ\text{C})$, versus junction temperature T_j .

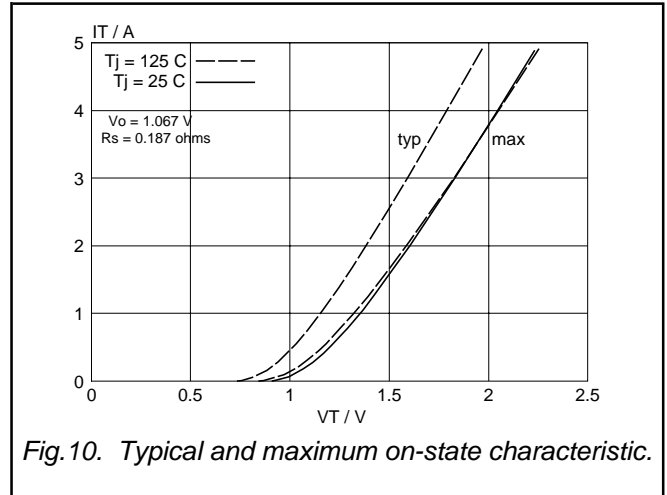


Fig. 10. Typical and maximum on-state characteristic.

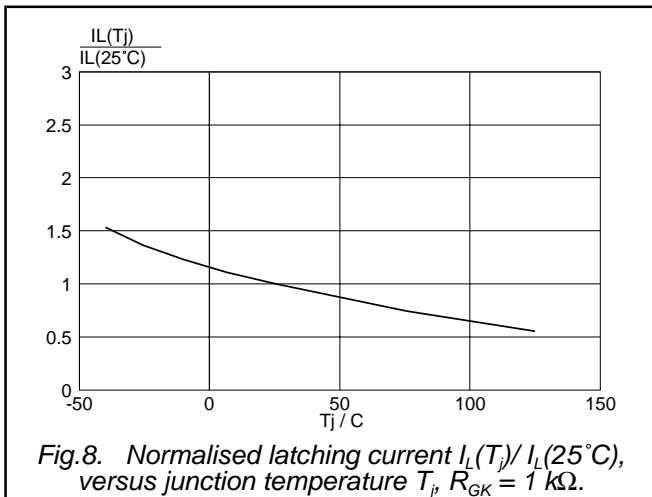


Fig. 8. Normalised latching current $I_L(T_j)/I_L(25^\circ\text{C})$, versus junction temperature T_j , $R_{GK} = 1 \text{ k}\Omega$.

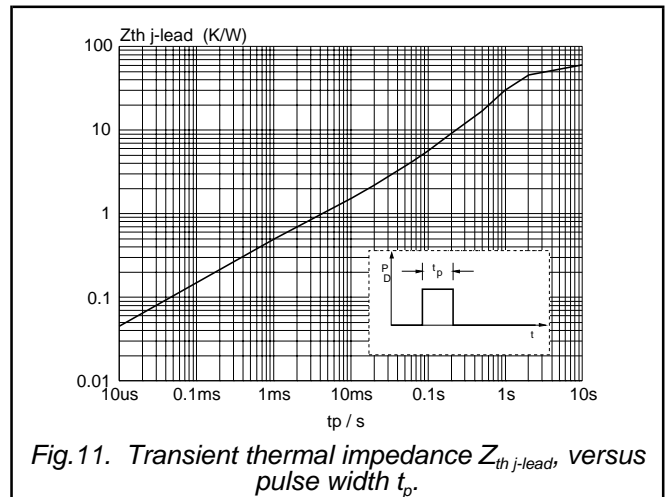


Fig. 11. Transient thermal impedance $Z_{th \text{ j-lead}}$ versus pulse width t_p .

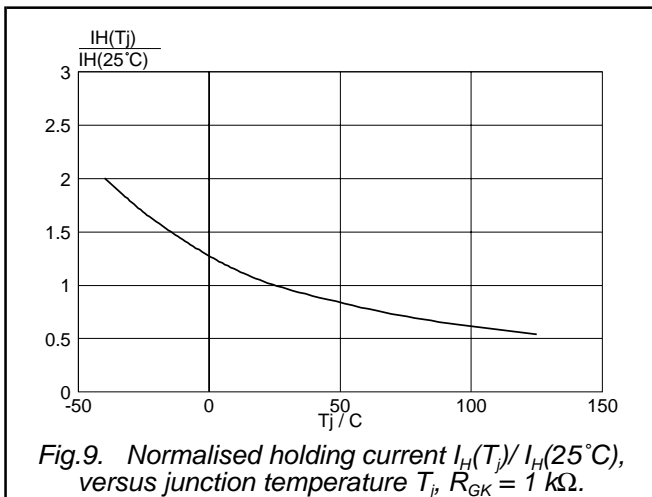


Fig. 9. Normalised holding current $I_H(T_j)/I_H(25^\circ\text{C})$, versus junction temperature T_j , $R_{GK} = 1 \text{ k}\Omega$.

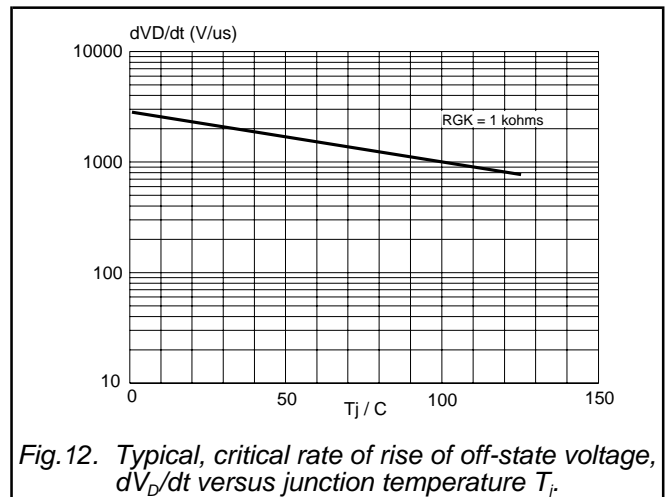
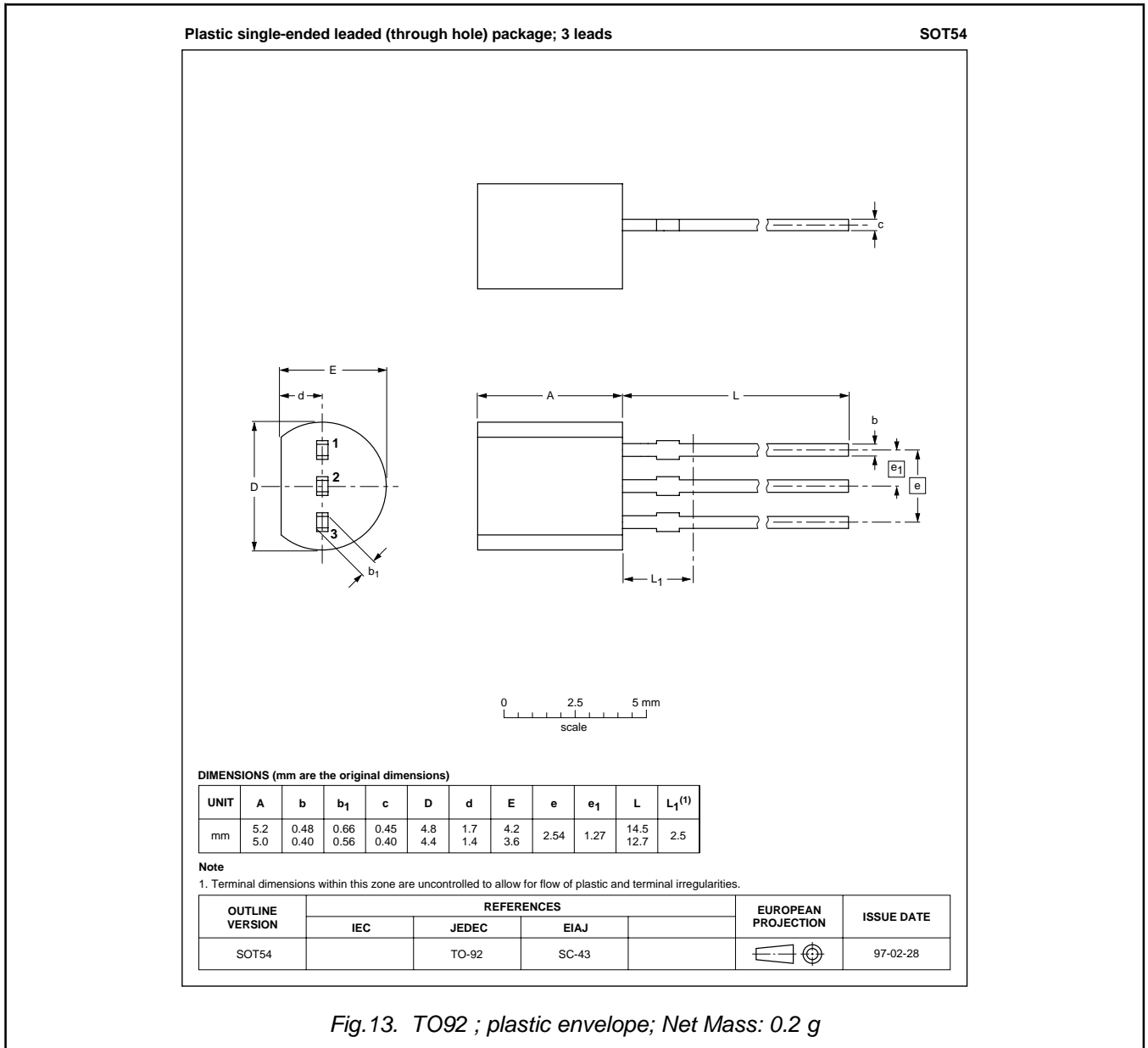


Fig. 12. Typical, critical rate of rise of off-state voltage, dV_D/dt versus junction temperature T_j .

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MECHANICAL DATA



Notes

1. Epoxy meets UL94 V0 at 1/8".

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DEFINITIONS

DATA SHEET STATUS		
DATA SHEET STATUS²	PRODUCT STATUS³	DEFINITIONS
Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice
Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product
Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Changes will be communicated according to the Customer Product/Process Change Notification (CPCN) procedure SNW-SQ-650A
Limiting values		
Limiting values are given in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability.		
Application information		
Where application information is given, it is advisory and does not form part of the specification.		
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