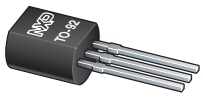


Z0103MA0

4Q Triac

Rev. 2 — 18 March 2011 **Product data sheet**

1. Product profile

1.1 General description

Planar passivated very sensitive gate four quadrant triac in a SOT54 (TO-92) plastic package intended for use in applications requiring enhanced noise immunity and direct interfacing to logic ICs and low power gate drivers.

1.2 Features and benefits

- Direct interfacing to logic level ICs
- Enhanced current surge capability
- Enhanced noise immunity
- High blocking voltage capability
- Planar passivated for voltage ruggedness and reliability
- Triggering in all four quadrants
- Very sensitive gate in four quadrants

1.3 Applications

- General purpose low power motor control
- Home appliances
- Industrial process control
- Low power AC Fan controllers

1.4 Quick reference data

Table 1. Quick reference data

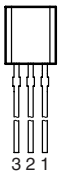
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	600	V
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)}$ = 25 °C; t_p = 20 ms; see Figure 4; see Figure 5	-	-	12.5	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{lead} \leq$ 45 °C; see Figure 3; see Figure 1; see Figure 2	-	-	1	A

Table 1. Quick reference data *...continued*

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; see Figure 7	0.2	-	3	mA
		V_D = 12 V; I_T = 0.1 A; T2+ G-; T_j = 25 °C; see Figure 7	0.2	-	3	mA
		V_D = 12 V; I_T = 0.1 A; T2- G-; T_j = 25 °C; see Figure 7	0.2	-	3	mA
		V_D = 12 V; I_T = 0.1 A; T2- G+; T_j = 25 °C; see Figure 7	0.2	-	5	mA

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T2	main terminal 2		 *sym051*
2	G	gate		
3	T1	main terminal 1		

SOT54 (TO-92)

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
Z0103MA0	TO-92	plastic single-ended leaded (through hole) package; 3 leads	SOT54

4. 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; $T_{lead} \leq 45$ °C; see Figure 3; see Figure 1; see Figure 2	-	1	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25$ °C; $t_p = 20$ ms; see Figure 4; see Figure 5	-	12.5	A
		full sine wave; $T_{j(init)} = 25$ °C; $t_p = 16.7$ ms	-	13.8	A
I^2t	I^2t for fusing	$t_p = 10$ ms; sine-wave pulse	-	0.78	A^2s
dI_T/dt	rate of rise of on-state current	$I_T = 1$ A; $I_G = 20$ mA; $dI_G/dt = 100$ mA/µs; T2+ G+	-	50	A/µs
		$I_T = 1$ A; $I_G = 20$ mA; $dI_G/dt = 100$ mA/µs; T2+ G-	-	50	A/µs
		$I_T = 1$ A; $I_G = 20$ mA; $dI_G/dt = 100$ mA/µs; T2- G-	-	50	A/µs
		$I_T = 1$ A; $I_G = 20$ mA; $dI_G/dt = 100$ mA/µs; T2- G+	-	20	A/µs
I_{GM}	peak gate current		-	1	A
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	°C
T_j	junction temperature		-	125	°C

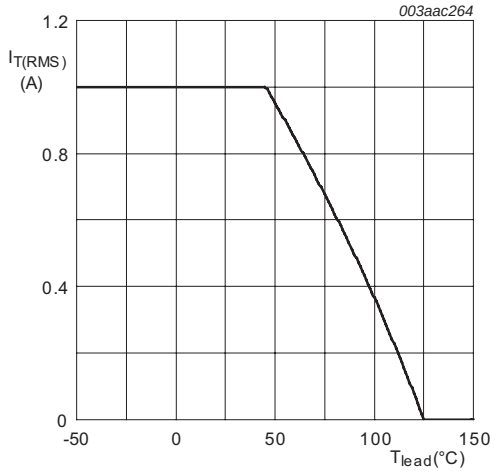
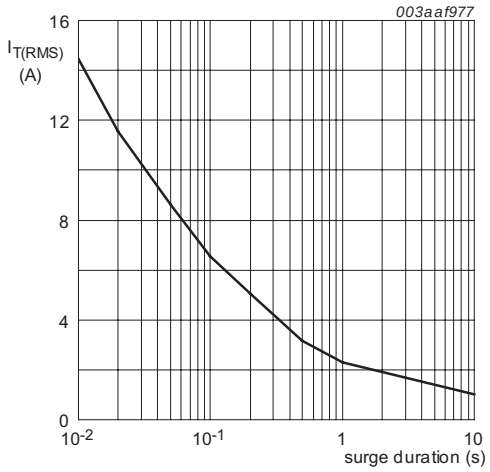
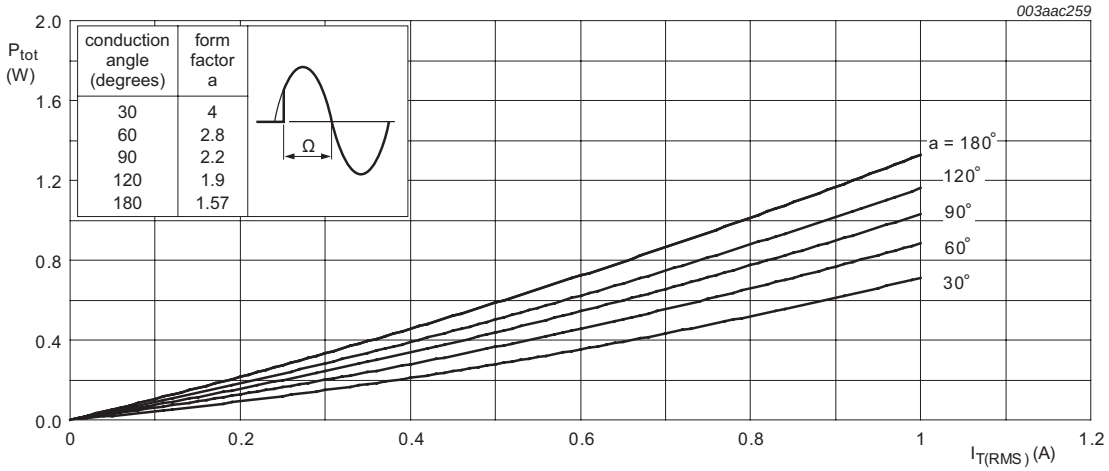


Fig 1. RMS on-state current as a function of lead temperature; maximum values



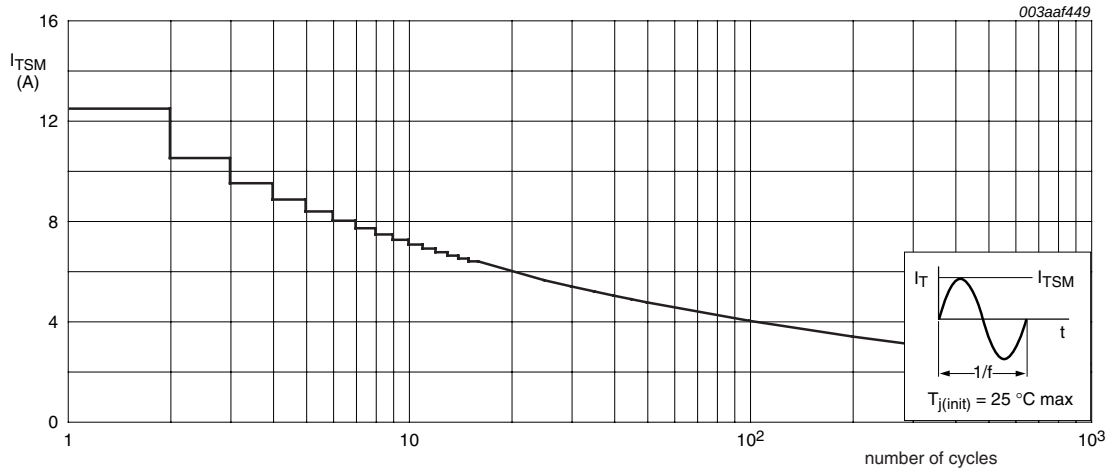
$f = 50Hz; T_{lead} = 45°C$

Fig 2. RMS on-state current as a function of surge duration; maximum values



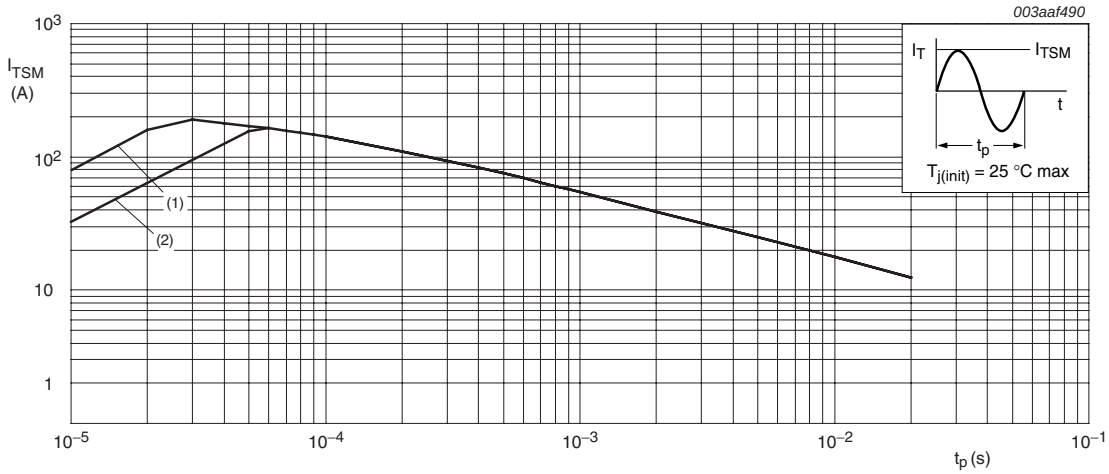
α = conduction angle

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



f = 50 Hz

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



$t_p \leq 20\,ms$;
(1) dI_T/dt limit;
(2) T2 − G + quadrant limit

Fig 5. Non-repetitive peak on-state current as a function of pulse width; maximum values

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j\text{-}lead)}$	thermal resistance from junction to lead	full cycle; see Figure 6	-	-	60	K/W
$R_{th(j\text{-}a)}$	thermal resistance from junction to ambient	full cycle; printed circuit board mounted; lead length 4 mm	-	150	-	K/W

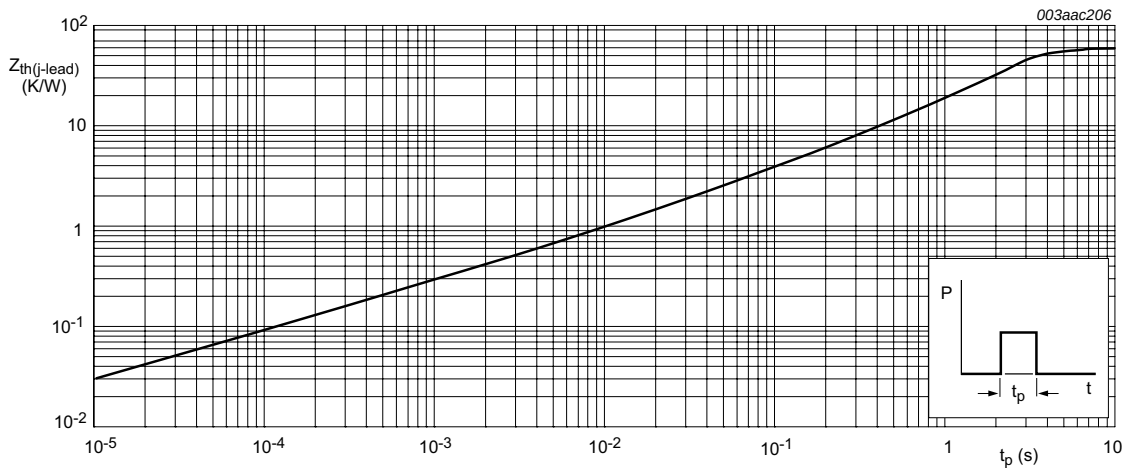
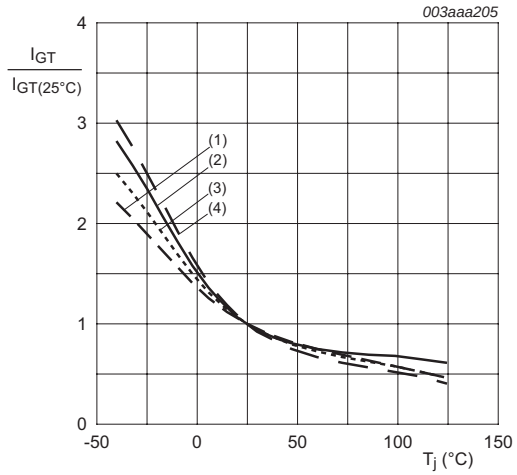


Fig 6. Transient thermal impedance from junction to lead as a function of pulse width

6. Characteristics

Table 6. 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; see Figure 7	0.2	-	3	mA
		V_D = 12 V; I_T = 0.1 A; T2+ G-; T_j = 25 °C; see Figure 7	0.2	-	3	mA
		V_D = 12 V; I_T = 0.1 A; T2- G-; T_j = 25 °C; see Figure 7	0.2	-	3	mA
		V_D = 12 V; I_T = 0.1 A; T2- G+; T_j = 25 °C; see Figure 7	0.2	-	5	mA
I_L	latching current	V_D = 12 V; I_G = 0.1 A; T2+ G+; T_j = 25 °C; see Figure 8	-	-	7	mA
		V_D = 12 V; I_G = 0.1 A; T2+ G-; T_j = 25 °C; see Figure 8	-	-	20	mA
		V_D = 12 V; I_G = 0.1 A; T2- G-; T_j = 25 °C; see Figure 8	-	-	7	mA
		V_D = 12 V; I_G = 0.1 A; T2- G+; T_j = 25 °C; see Figure 8	-	-	7	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; see Figure 9	-	-	7	mA
V_T	on-state voltage	I_T = 1.4 A; T_j = 25 °C; see Figure 10	-	1.3	1.6	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; see Figure 11	-	-	1.3	V
		V_D = 600 V; I_T = 0.1 A; T_j = 125 °C; see Figure 11	0.2	-	-	V
I_D	off-state current	V_D = 600 V; T_j = 125 °C	-	-	0.5	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 402 V; T_j = 110 °C; gate open circuit; exponential waveform; see Figure 12	80	-	-	V/µs
dV_{com}/dt	rate of change of commutating voltage	V_D = 400 V; T_j = 110 °C; dI_{com}/dt = 0.44 A/ms; I_T = 1 A; gate open circuit	0.5	-	-	V/µs



(1) T2- G+

(2) T2- G-

(3) T2+ G-

(4) T2+ G+

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

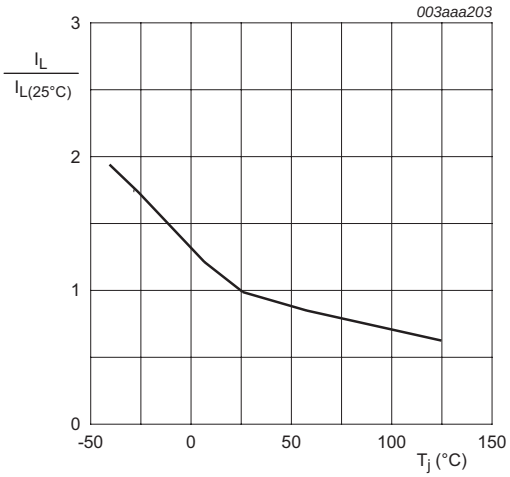


Fig 8. Normalized latching current as a function of junction temperature

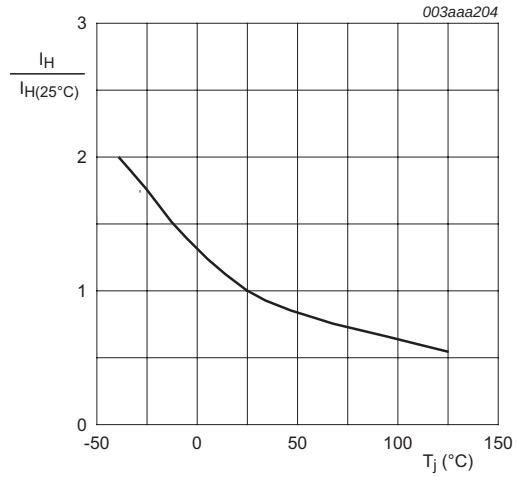
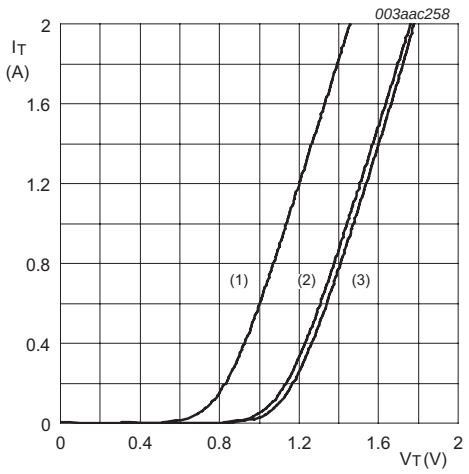


Fig 9. Normalized holding current as a function of junction temperature



V_o = 1.13 V

R_s = 0.31 Ω

(1) T_j = 125 °C; typical values

(2) T_j = 125 °C; maximum values

(3) T_j = 25 °C; maximum values

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

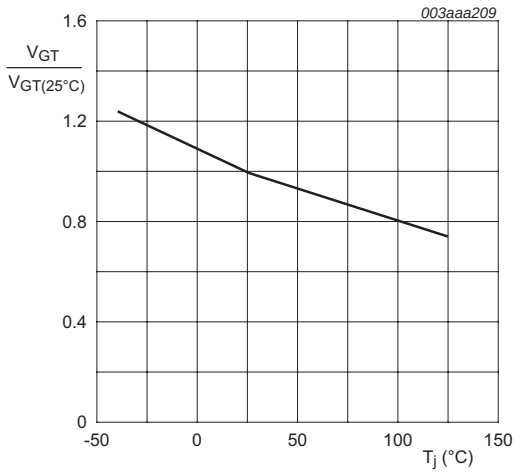
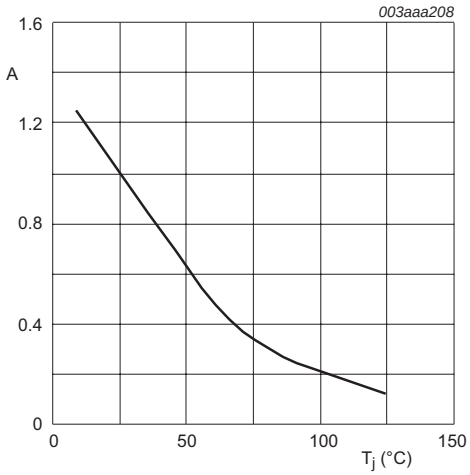


Fig 11. Normalized gate trigger voltage as a function of junction temperature

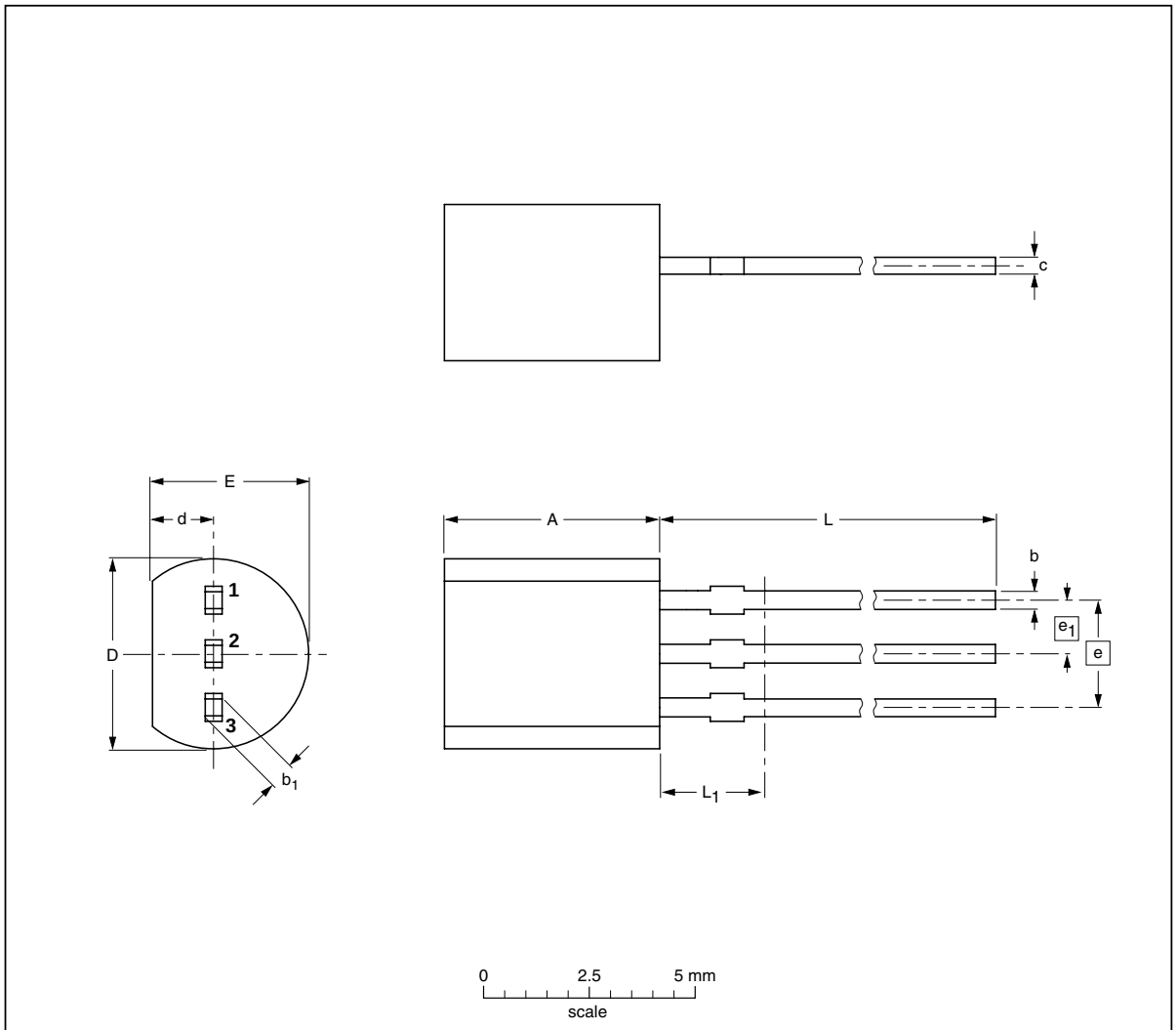


$$A = \frac{dV_D / dt}{dV_{D(25°C)} / dt}$$

Fig 12. Normalized critical rate of rise of off-state voltage as a function of junction temperature;typical values

7. Package outline

Plastic single-ended leaded (through hole) package; 3 leads **SOT54**



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b_1	c	D	d	E	e	e_1	L	L_1(1) max.
mm	5.2 5.0	0.48 0.40	0.66 0.55	0.45 0.38	4.8 4.4	1.7 1.4	4.2 3.6	2.54	1.27	14.5 12.7	2.5

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT54		TO-92	SC-43A			~~04-06-28~~ 04-11-16

Fig 13. Package outline SOT54 (TO-92)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
Z0103MA0 v.2	20110318	Product data sheet	-	Z0103MA0 v.1
Modifications:	• Various changes to content.			
Z0103MA0 v.1	20110103	Product data sheet	-	-

9. Legal information

9.1 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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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11. Contents

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