BUK9832-55A

N-channel TrenchMOS logic level FET

Rev. 02 — 1 June 2010 **Product data sheet**

1. Product profile

1.1 General description

Logic level N-channel enhancement mode Field-Effect Transistor (FET) in a plastic package using TrenchMOS technology. This product has been designed and qualified to the appropriate AEC standard for use in automotive critical applications.

1.2 Features and benefits

- Low conduction losses due to low on-state resistance
- Q101 compliant
- Suitable for logic level gate drive sources

1.3 Applications

- 12 V and 24 V loads
- Automotive and general purpose power switching
- Motors, lamps and solenoids

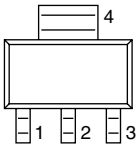
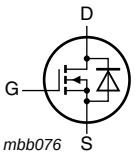
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25$ °C; $T_j \leq 150$ °C	-	-	55	V
I_D	drain current	$V_{GS} = 5$ V; $T_{sp} = 25$ °C; see Figure 1; see Figure 3	-	-	12	A
P_{tot}	total power dissipation	$T_{sp} = 25$ °C; see Figure 2	-	-	8	W
Static characteristics						
R_{DSon}	drain-source on-state resistance	$V_{GS} = 4.5$ V; $I_D = 8$ A; $T_j = 25$ °C	-	-	36	mΩ
		$V_{GS} = 10$ V; $I_D = 8$ A; $T_j = 25$ °C	-	25	29	m Ω
		$V_{GS} = 5$ V; $I_D = 8$ A; $T_j = 25$ °C; see Figure 12; see Figure 13	-	27	32	mΩ
Avalanche ruggedness						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 10$ A; $V_{sup} \leq 55$ V; $R_{GS} = 50$ Ω; $V_{GS} = 5$ V; $T_{j(init)} = 25$ °C; unclamped	-	-	100	mJ

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 SOT223 (SC-73)	
2	D	drain		
3	S	source		
4	D	drain		

3. Ordering information

Table 3. Ordering information

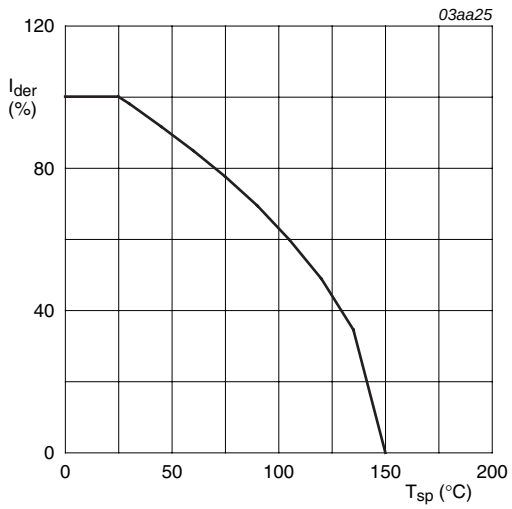
Type number	Package		
	Name	Description	Version
BUK9832-55A	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

4. Limiting values

Table 4. Limiting values

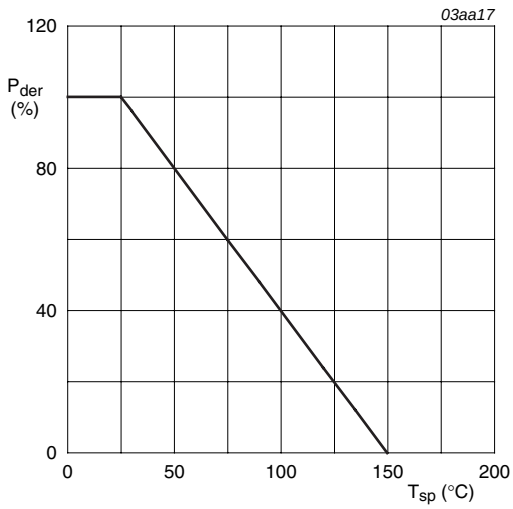
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25$ ℃; $T_j \leq 150$ °C	-	-	55	V
V_{DGR}	drain-gate voltage	R_{GS} = 20 kΩ	-	-	55	V
V_{GS}	gate-source voltage		-10	-	10	V
I_D	drain current	T_{sp} = 25 ℃; V_{GS} = 5 V; see Figure 1; see Figure 3	-	-	12	A
		T_{sp} = 100 ℃; V_{GS} = 5 V; see Figure 1	-	-	7	A
I_{DM}	peak drain current	T_{sp} = 25 ℃; $t_p \leq 10$ µs; pulsed; see Figure 3	-	-	47	A
P_{tot}	total power dissipation	T_{sp} = 25 ℃; see Figure 2	-	-	8	W
T_{stg}	storage temperature		-55	-	150	℃
T_j	junction temperature		-55	-	150	℃
V_{GSM}	peak gate-source voltage	pulsed; $t_p \leq 50$ µs	-15	-	15	V
Source-drain diode						
I_S	source current	T_{sp} = 25 °C	-	-	12	A
I_{SM}	peak source current	$t_p \leq 10$ µs; pulsed; T_{sp} = 25 °C	-	-	47	A
Avalanche ruggedness						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	I_D = 10 A; $V_{sup} \leq 55$ V; R_{GS} = 50 Ω; V_{GS} = 5 V; $T_{j(init)}$ = 25 ℃; unclamped	-	-	100	mJ



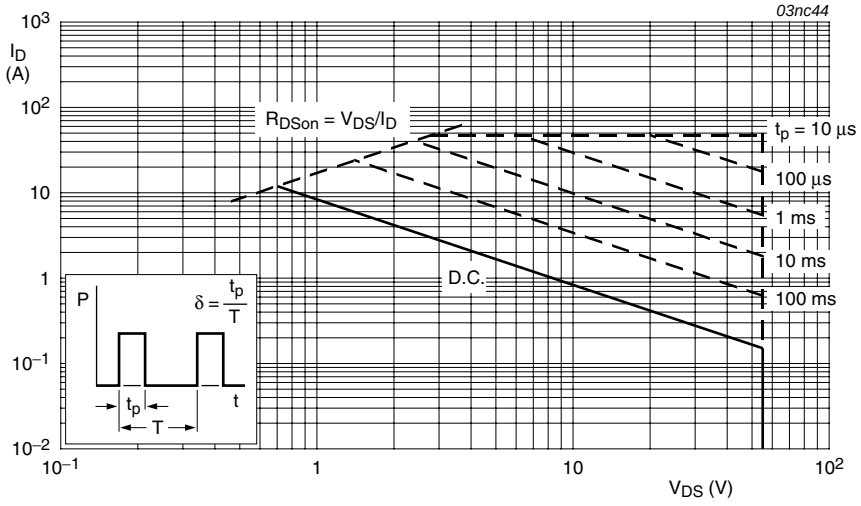
$$I_{der} = \frac{I_D}{I_{D(25°C)}} \times 100\,\%$$

Fig 1. Normalized continuous drain current as a function of solder point temperature



$$P_{der} = \frac{P_{tot}}{P_{tot(25°C)}} \times 100\,\%$$

Fig 2. Normalized total power dissipation as a function of solder point temperature



$T_{amb} = 25°C; I_{DM}$ is single pulse

Fig 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	see Figure 4	-	70	-	K/W

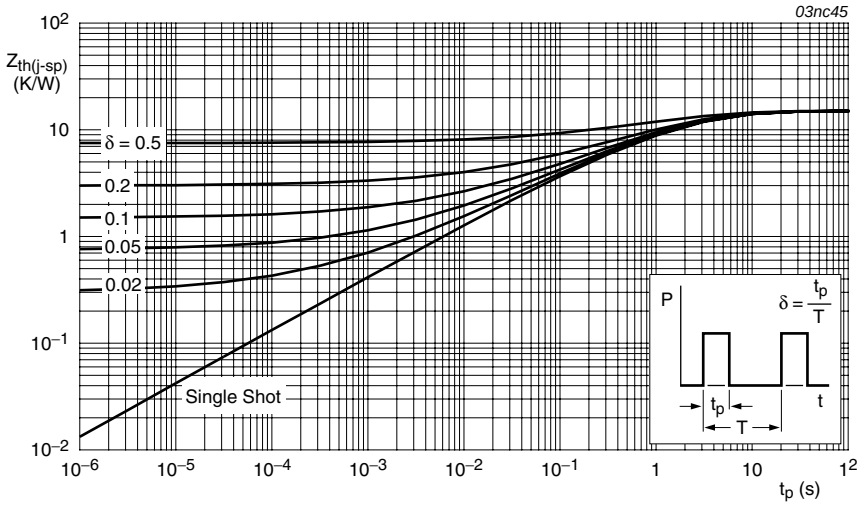
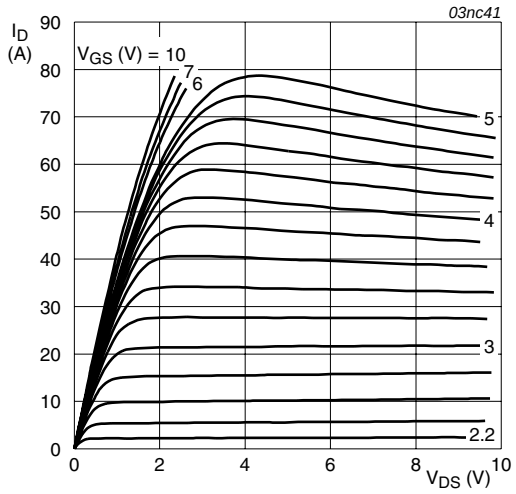


Fig 4. Transient thermal impedance from junction to solder point as a function of pulse duration

6. Characteristics

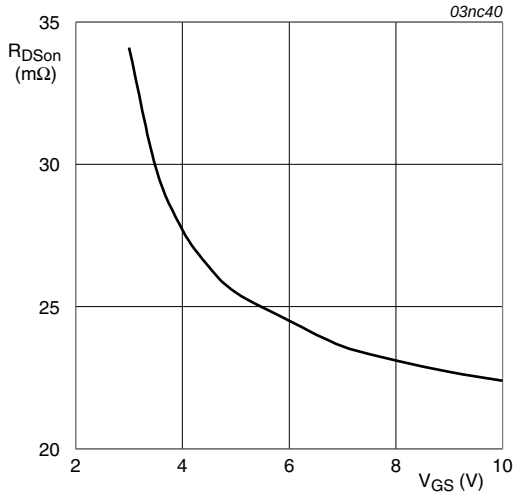
Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 0.25 mA; V_{GS} = 0 V; T_j = -55 ℃	50	-	-	V
		I_D = 0.25 mA; V_{GS} = 0 V; T_j = 25 °C	55	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	I_D = 1 mA; V_{DS} = V_{GS}; T_j = 25 ℃; see Figure 11	1	1.5	2	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = -55 ℃; see Figure 11	-	-	2.3	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = 150 ℃; see Figure 11	0.6	-	-	V
I_{DSS}	drain leakage current	V_{DS} = 55 V; V_{GS} = 0 V; T_j = 150 ℃	-	-	500	µA
		V_{DS} = 55 V; V_{GS} = 0 V; T_j = 25 ℃	-	0.05	10	µA
I_{GSS}	gate leakage current	V_{DS} = 0 V; V_{GS} = 10 V; T_j = 25 ℃	-	2	100	nA
		V_{DS} = 0 V; V_{GS} = -10 V; T_j = 25 ℃	-	2	100	nA
R_{DSon}	drain-source on-state resistance	V_{GS} = 4.5 V; I_D = 8 A; T_j = 25 °C	-	-	36	mΩ
		V_{GS} = 5 V; I_D = 8 A; T_j = 150 ℃; see Figure 12; see Figure 13	-	-	59	mΩ
		V_{GS} = 10 V; I_D = 8 A; T_j = 25 ℃	-	25	29	m Ω
		V_{GS} = 5 V; I_D = 8 A; T_j = 25 ℃; see Figure 12; see Figure 13	-	27	32	mΩ
Dynamic characteristics						
C_{iss}	input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz; T_j = 25 ℃; see Figure 14	-	1195	1594	pF
C_{oss}	output capacitance		-	212	254	pF
C_{rss}	reverse transfer capacitance		-	144	198	pF
$t_{d(on)}$	turn-on delay time	V_{DS} = 30 V; R_L = 1.2 Ω; V_{GS} = 5 V; $R_{G(ext)}$ = 10 Ω; T_j = 25 ℃	-	14	-	ns
t_r	rise time		-	125	-	ns
$t_{d(off)}$	turn-off delay time		-	64	-	ns
t_f	fall time		-	68	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	I_S = 18 A; V_{GS} = 0 V; T_j = 25 ℃; see Figure 15	-	0.85	1.2	V
t_{rr}	reverse recovery time	I_S = 20 A; dI_S/dt = -100 A/µs; V_{GS} = -10 V; V_{DS} = 30 V; T_j = 25 ℃	-	51	-	ns
Q_r	recovered charge		-	80	-	nC



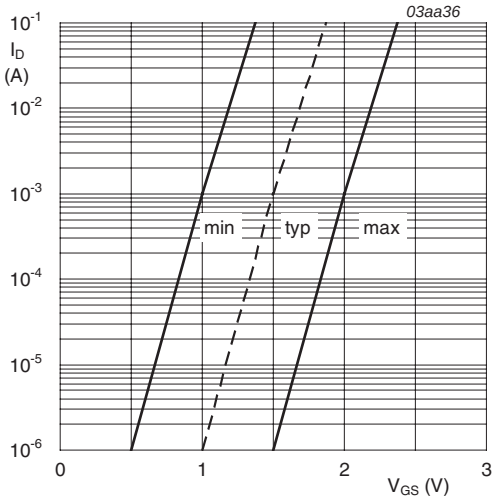
$T_j = 25°C$

Fig 5. Output characteristics: drain current as a function of drain-source voltage; typical values



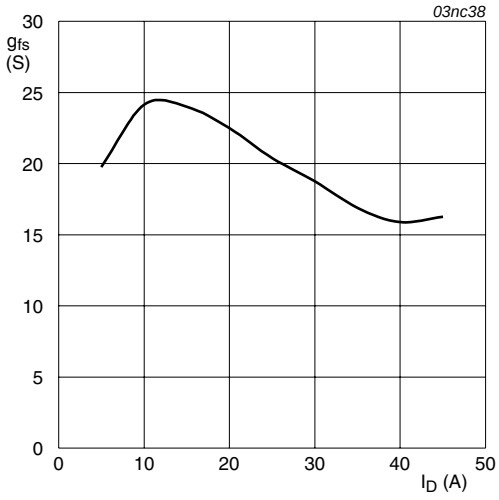
$T_j = 25°C; I_D = 15A$

Fig 6. Drain-source on-state resistance as a function of gate-source voltage; typical values



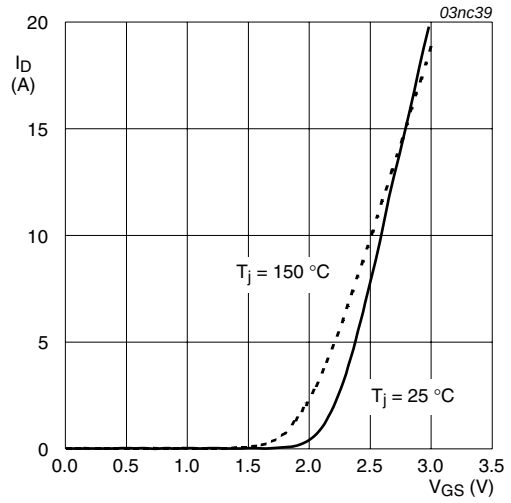
$T_j = 25°C; V_{DS} = V_{GS}$

Fig 7. Sub-threshold drain current as a function of gate-source voltage



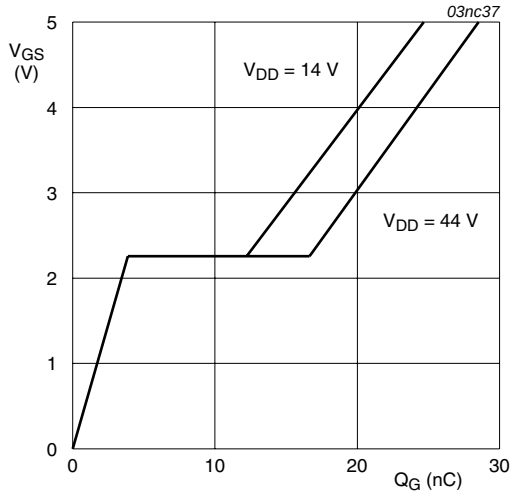
$T_j = 25°C; V_{DS} = 25V$

Fig 8. Forward transconductance as a function of drain current; typical values



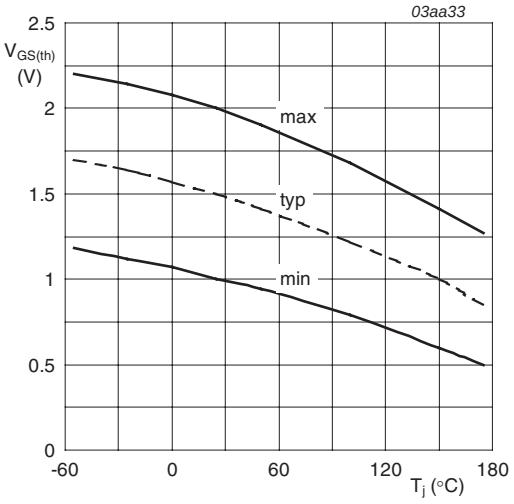
$V_{DS} = 25V$

Fig 9. Transfer characteristics: drain current as a function of gate-source voltage; typical values



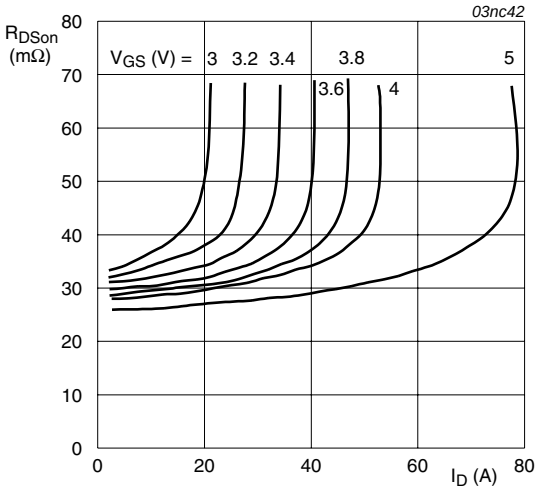
$T_j = 25°C; I_D = 15A$

Fig 10. Gate-source voltage as a function of turn-on gate charge; typical values



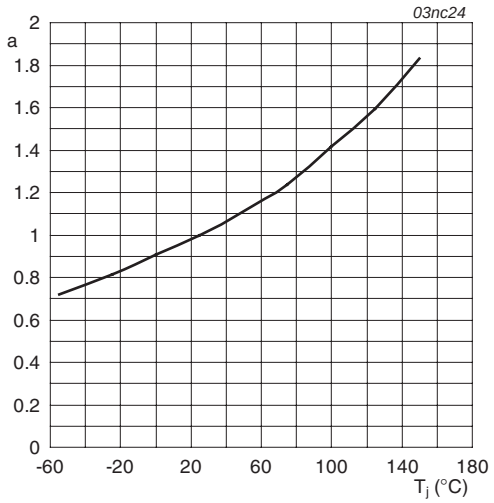
$I_D = 1mA; V_{DS} = V_{GS}$

Fig 11. Gate-source threshold voltage as a function of junction temperature



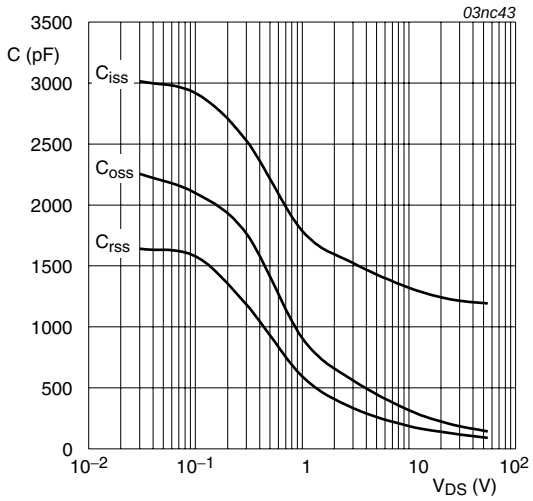
$T_j = 25°C$

Fig 12. Drain-source on-state resistance as a function of drain current; typical values



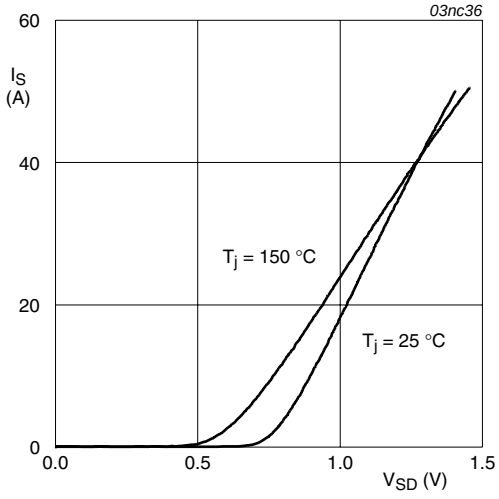
$$a = \frac{R_{DSon}}{R_{DSon(25°C)}}$$

Fig 13. Normalized drain source on-state resistance factor as a function of junction temperature



$$V_{GS} = 0\ V; f = 1\ MHz$$

Fig 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

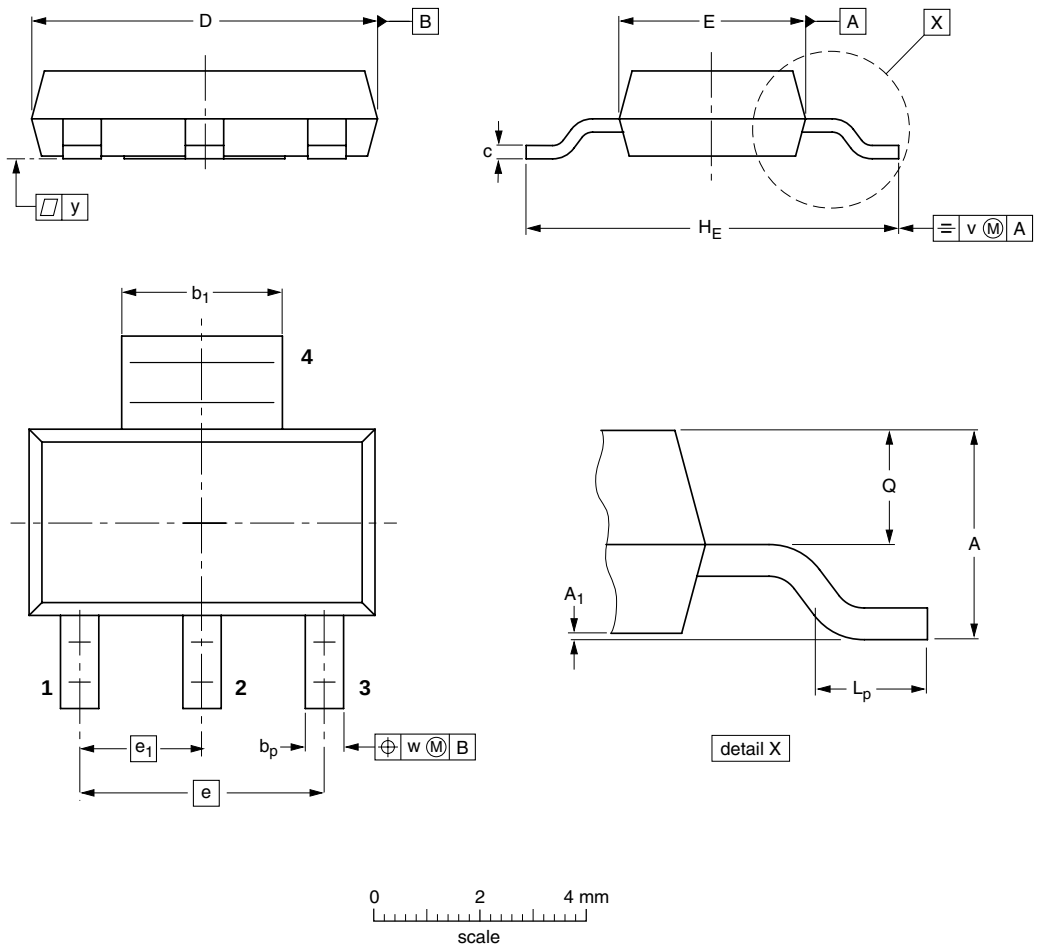


$$V_{GS} = 0V$$

Fig 15. Reverse diode current as a function of reverse diode voltage; typical value

7. Package outline

Plastic surface-mounted package with increased heatsink; 4 leads **SOT223**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.8 1.5	0.10 0.01	0.80 0.60	3.1 2.9	0.32 0.22	6.7 6.3	3.7 3.3	4.6	2.3	7.3 6.7	1.1 0.7	0.95 0.85	0.2	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT223			SC-73			~~04-11-10~~ 06-03-16

Fig 16. Package outline SOT223 (SC-73)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BUK9832-55A v.2	20100601	Product data sheet	-	BUK9832-55A-01
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate.			
BUK9832-55A-01 (9397 750 07734)	20010131	Product specification	-	-

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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