



# BUK9628-100A

N-channel TrenchMOS logic level FET

Rev. 02 — 26 April 2011

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

- AEC Q101 compliant
- Low conduction losses due to low on-state resistance

### 1.3 Applications

- Automotive and general purpose power switching

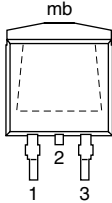
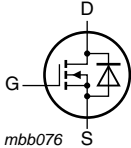
### 1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>DS</sub>	drain-source voltage	T <sub>j</sub> ≥ 25 °C; T <sub>j</sub> ≤ 175 °C	-	-	100	V
I <sub>D</sub>	drain current	T <sub>mb</sub> = 25 °C	-	-	49	A
P <sub>tot</sub>	total power dissipation		-	-	166	W
Static characteristics						
R <sub>DSon</sub>	drain-source on-state resistance	V <sub>GS</sub> = 5 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 25 °C	-	18.5	28	mΩ
		V <sub>GS</sub> = 10 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 25 °C	-	17	27	mΩ
Avalanche ruggedness						
E <sub>DS(AL)S</sub>	non-repetitive drain-source avalanche energy	I <sub>D</sub> = 30 A; V <sub>sup</sub> ≤ 25 V; R <sub>GS</sub> = 50 Ω; V <sub>GS</sub> = 5 V; T <sub>j(init)</sub> = 25 °C; unclamped	-	-	45	mJ

## 2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate		
2	D	drain		
3	S	source		
mb	D	mounting base; connected to drain		
			SOT404 (D2PAK)	

## 3. Ordering information

Table 3. Ordering information

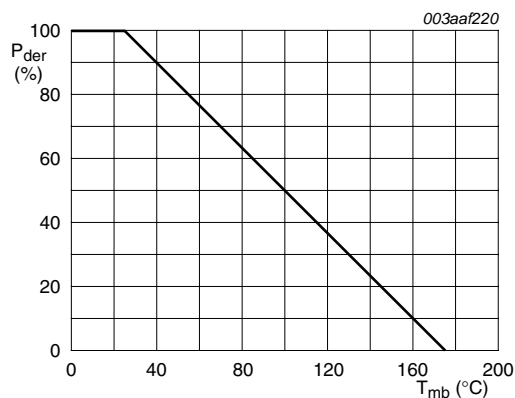
Type number	Package		Version
	Name	Description	
BUK9628-100A	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

## 4. Limiting values

Table 4. Limiting values

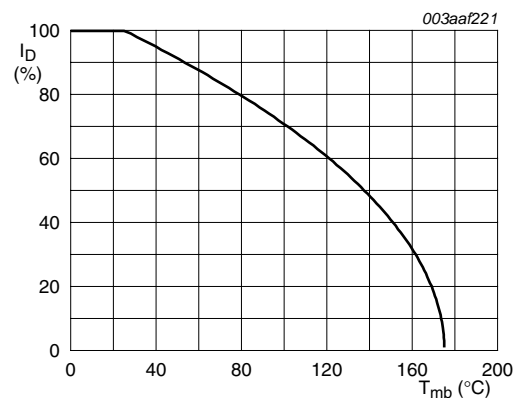
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DS}$	drain-source voltage	$T_j \geq 25\text{ °C}$ ; $T_j \leq 175\text{ °C}$	-	100	V
$V_{DGR}$	drain-gate voltage	$R_{GS} = 20\text{ k}\Omega$	-	100	V
$V_{GS}$	gate-source voltage		-10	10	V
$I_D$	drain current	$T_{mb} = 25\text{ °C}$	-	49	A
		$T_{mb} = 100\text{ °C}$	-	34	A
$I_{DM}$	peak drain current	$T_{mb} = 25\text{ °C}$ ; pulsed	-	195	A
$P_{tot}$	total power dissipation	$T_{mb} = 25\text{ °C}$	-	166	W
$T_{stg}$	storage temperature		-55	175	°C
$T_j$	junction temperature		-55	175	°C
$V_{GSM}$	peak gate-source voltage	pulsed; $t_p \leq 50\text{ }\mu\text{s}$	-15	15	V
<b>Source-drain diode</b>					
$I_S$	source current	$T_{mb} = 25\text{ °C}$	-	49	A
$I_{SM}$	peak source current	pulsed; $T_{mb} = 25\text{ °C}$	-	195	A
<b>Avalanche ruggedness</b>					
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 30\text{ A}$ ; $V_{sup} \leq 25\text{ V}$ ; $R_{GS} = 50\text{ }\Omega$ ; $V_{GS} = 5\text{ V}$ ; $T_{j(init)} = 25\text{ °C}$ ; unclamped	-	45	mJ



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

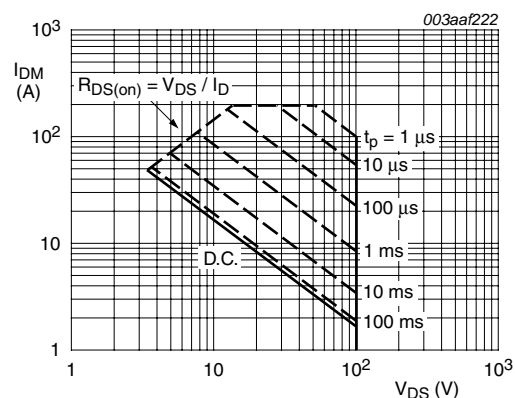
Fig 1. Normalized total power dissipation as a function of mounting base temperature



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

$V_{GS} \geq 5\text{ V}$

Fig 2. Normalized continuous drain current as a function of mounting base temperature



$T_{mb} = 25\text{ }^{\circ}\text{C}$ ;  $I_{DM}$  is single pulse

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

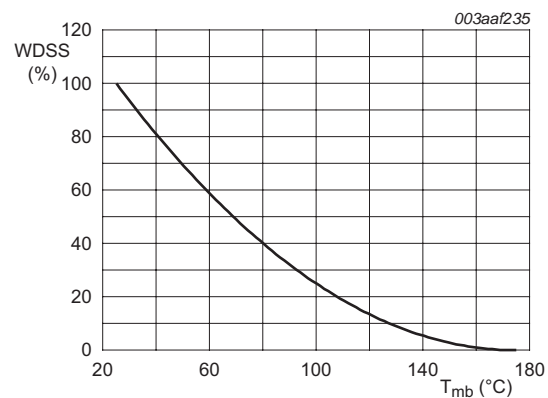
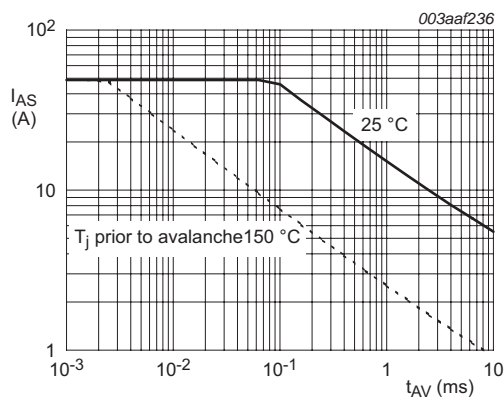


Fig 4. Normalised drain-source non-repetitive avalanche energy as a function of mounting-base temperature



unclamped inductive load

Fig 5. Single-shot avalanche rating; avalanche current as a function of avalanche period

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base		-	-	0.9	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	minimum footprint ; FR4 board	-	50	-	K/W

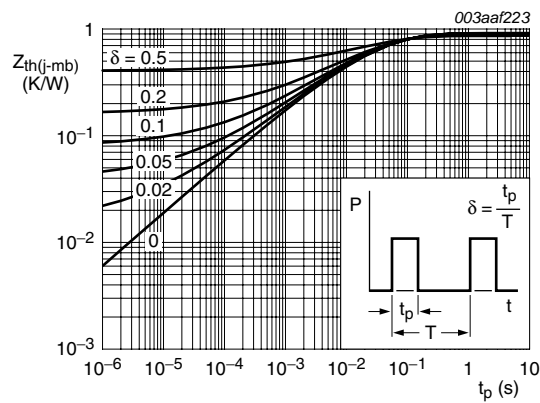


Fig 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

## 6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V <sub>(BR)DSS</sub>	drain-source breakdown voltage	I <sub>D</sub> = 0.25 mA; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C	100	-	-	V
		I <sub>D</sub> = 0.25 mA; V <sub>GS</sub> = 0 V; T <sub>j</sub> = -55 °C	89	-	-	V
V <sub>GS(th)</sub>	gate-source threshold voltage	I <sub>D</sub> = 1 mA; V <sub>DS</sub> = V <sub>GS</sub> ; T <sub>j</sub> = 25 °C	1	1.5	2	V
		I <sub>D</sub> = 1 mA; V <sub>DS</sub> = V <sub>GS</sub> ; T <sub>j</sub> = 175 °C	0.5	-	-	V
		I <sub>D</sub> = 1 mA; V <sub>DS</sub> = V <sub>GS</sub> ; T <sub>j</sub> = -55 °C	-	-	2.3	V
I <sub>DSS</sub>	drain leakage current	V <sub>DS</sub> = 100 V; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C	-	0.05	10	µA
		V <sub>DS</sub> = 100 V; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 175 °C	-	-	500	µA
I <sub>GSS</sub>	gate leakage current	V <sub>GS</sub> = 10 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C	-	2	100	nA
		V <sub>GS</sub> = -10 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C	-	2	100	nA
R <sub>DSon</sub>	drain-source on-state resistance	V <sub>GS</sub> = 5 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 25 °C	-	18.5	28	mΩ
		V <sub>GS</sub> = 5 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 175 °C	-	-	70	mΩ
		V <sub>GS</sub> = 10 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 25 °C	-	17	27	mΩ
		V <sub>GS</sub> = 4.5 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 25 °C	-	18.8	31	mΩ
Dynamic characteristics						
C <sub>iss</sub>	input capacitance	V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 25 V; f = 1 MHz; T <sub>j</sub> = 25 °C	-	3220	4293	pF
C <sub>oss</sub>	output capacitance		-	315	378	pF
C <sub>rss</sub>	reverse transfer capacitance		-	187	256	pF
t <sub>d(on)</sub>	turn-on delay time	V <sub>DS</sub> = 30 V; R <sub>L</sub> = 1.2 Ω; V <sub>GS</sub> = 5 V; R <sub>G(ext)</sub> = 10 Ω; T <sub>j</sub> = 25 °C	-	11	16	ns
t <sub>r</sub>	rise time		-	58	87	ns
t <sub>d(off)</sub>	turn-off delay time		-	250	350	ns
t <sub>f</sub>	fall time		-	106	148	ns
L <sub>D</sub>	internal drain inductance	measured from drain lead 6 mm from package to centre of die ; T <sub>j</sub> = 25 °C	-	4.5	-	nH
		measured from upper edge of drain tab to centre of die ; T <sub>j</sub> = 25 °C	-	2.5	-	nH
L <sub>S</sub>	internal source inductance	measured from source lead to source bond pad ; T <sub>j</sub> = 25 °C	-	7.5	-	nH
Source-drain diode						
V <sub>SD</sub>	source-drain voltage	I <sub>S</sub> = 25 A; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C	-	0.85	1.2	V
		I <sub>S</sub> = 49 A; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C	-	1.1	-	V
t <sub>rr</sub>	reverse recovery time	I <sub>S</sub> = 49 A; dI <sub>S</sub> /dt = -100 A/µs; V <sub>GS</sub> = -10 V; V <sub>DS</sub> = 30 V; T <sub>j</sub> = 25 °C	-	63	-	ns
Q <sub>r</sub>	recovered charge		-	0.22	-	µC

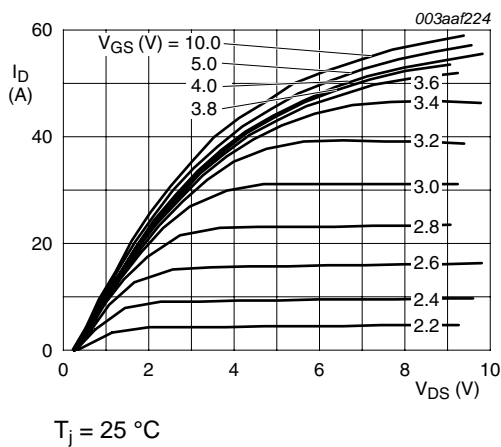


Fig 7. Output characteristics: drain current as a function of drain-source voltage; typical values

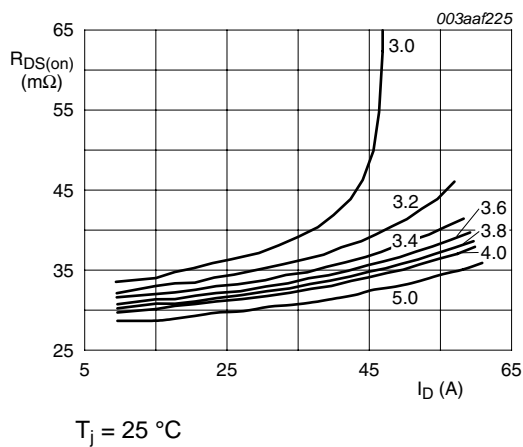


Fig 8. Drain-source on-state resistance as a function of drain current; typical values

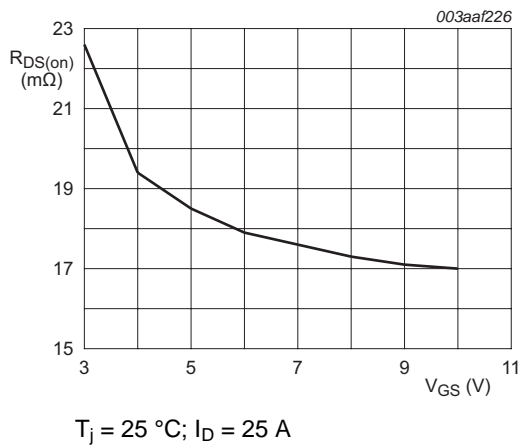


Fig 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

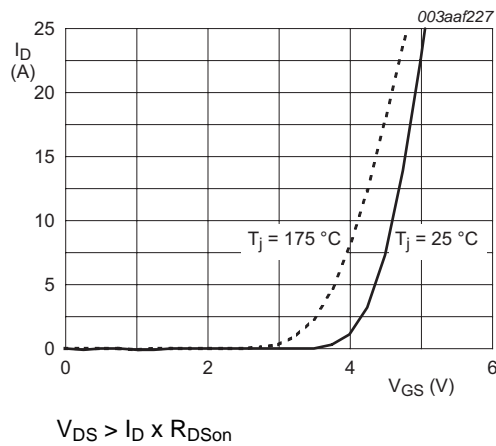


Fig 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

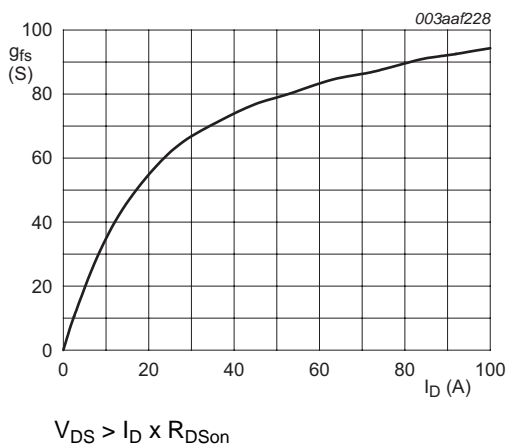


Fig 11. Forward transconductance as a function of drain current; typical values

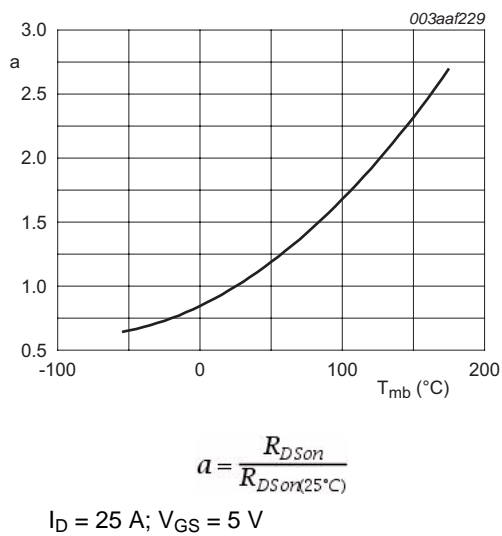


Fig 12. Normalized drain-source on-state resistance factor as a function of junction temperature

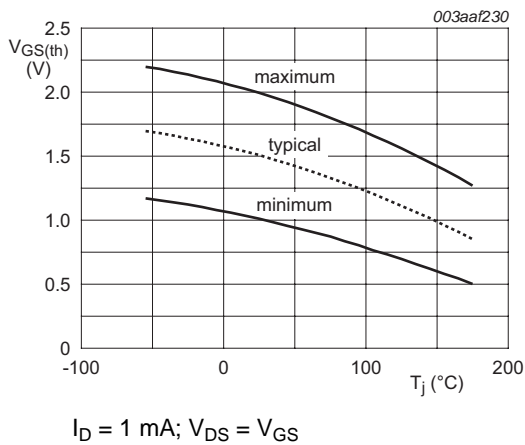


Fig 13. Gate-source threshold voltage as a function of junction temperature

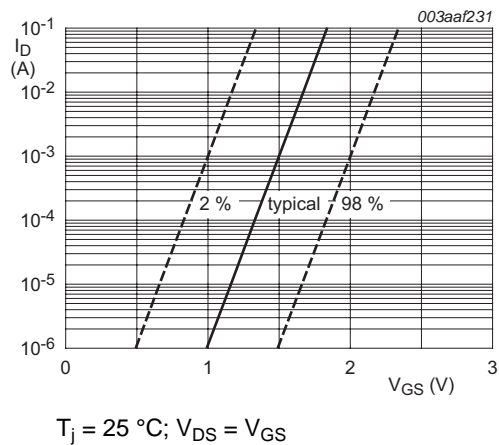


Fig 14. Sub-threshold drain current as a function of gate-source voltage

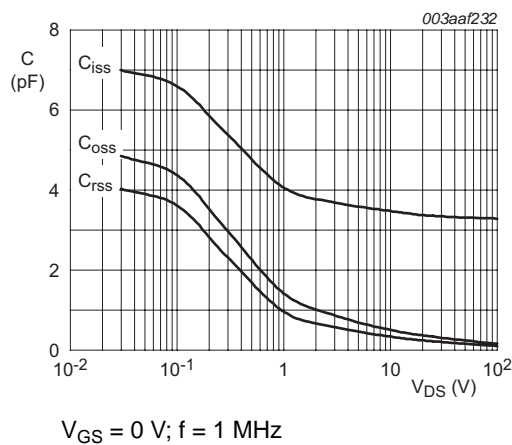


Fig 15. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

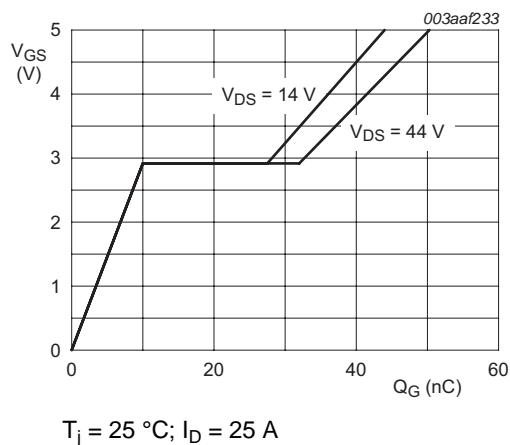


Fig 16. Gate-source voltage as a function of gate charge; typical values

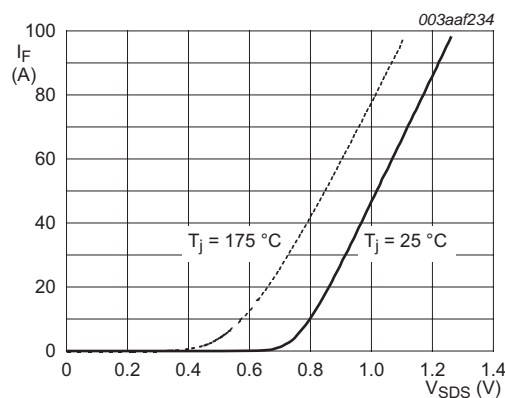


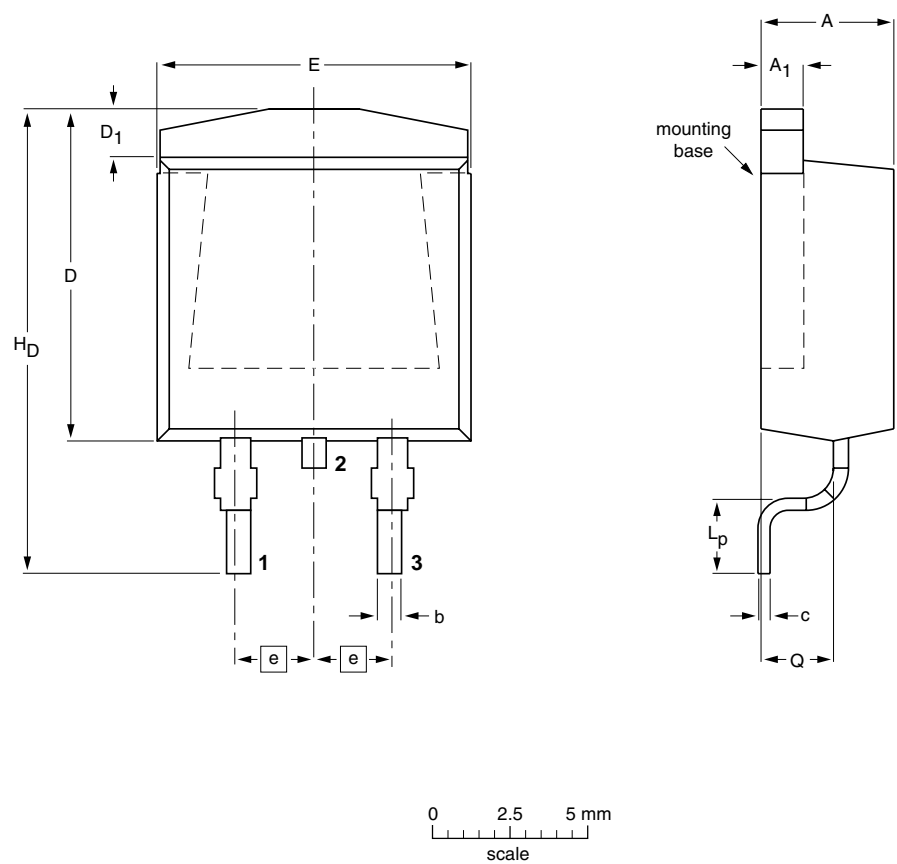
Fig 17. Source (diode forward) current as a function of source-drain (diode forward) voltage; typical values



7. Package outline

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)

SOT404



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub>	b	c	D <sub>max.</sub>	D <sub>1</sub>	E	e	L <sub>p</sub>	H <sub>D</sub>	Q
mm	4.50 4.10	1.40 1.27	0.85 0.60	0.64 0.46	11	1.60 1.20	10.30 9.70	2.54	2.90 2.10	15.80 14.80	2.60 2.20

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT404						05-02-11 06-03-16

Fig 18. Package outline SOT404 (D2PAK)

## 8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BUK9628-100A v.2	20110426	Product data sheet	-	BUK9528_9628-100A v.1
Modifications:	<ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li><li>• Type number BUK9628-100A separated from data sheet BUK9528_9628-100A v.1.</li></ul>			
BUK9528_9628-100A v.1	20000301	Product specification	-	-

## 9. Legal information

### 9.1 Data sheet status

Document status <sup>[1] [2]</sup>	Product status <sup>[3]</sup>	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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«FORSTAR» (основан в 1998 г.)

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(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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