

BUK9628-100A

N-channel TrenchMOS logic level FET Rev. 02 — 26 April 2011

Product data sheet

Product profile 1.

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	Тур	Max	Unit
V_{DS}	drain-source voltage	T _j ≥ 25 °C; T _j ≤ 175 °C	-	-	100	V
I_D	drain current	T _{mb} = 25 °C	-	-	49	Α
P _{tot}	total power dissipation		-	-	166	W
Static cha	aracteristics					
R _{DSon}	drain-source on-state resistance	$V_{GS} = 5 \text{ V}; I_D = 25 \text{ A}; T_j = 25 ^{\circ}\text{C}$	-	18.5	28	mΩ
		$V_{GS} = 10 \text{ V}; I_D = 25 \text{ A}; T_j = 25 \text{ °C}$	-	17	27	mΩ
Avalanch	e ruggedness					
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	$\begin{split} I_D &= 30 \text{ A; } V_{sup} \leq 25 \text{ V;} \\ R_{GS} &= 50 \Omega; V_{GS} = 5 \text{ V;} \\ T_{j(\text{init})} &= 25 ^{\circ}\text{C; } \text{unclamped} \end{split}$	-	-	45	mJ



2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol	
1	G	gate			
2	D	drain	mb	D	
3	S	source			
mb	D mounting base; connected to drain		mbb076 S		
			SOT404 (D2PAK)		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
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 ≥ 25 °C; T _j ≤ 175 °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 °C	-	49	Α
		T _{mb} = 100 °C	-	34	Α
I _{DM}	peak drain current	T _{mb} = 25 °C; pulsed	-	195	Α
P _{tot}	total power dissipation	T _{mb} = 25 °C	-	166	W
T _{stg}	storage temperature		-55	175	°C
Tj	junction temperature		-55	175	°C
V_{GSM}	peak gate-source voltage	pulsed; t _p ≤ 50 μs	-15	15	V
Source-dra	ain diode				
Is	source current	T _{mb} = 25 °C	-	49	Α
I _{SM}	peak source current	pulsed; T _{mb} = 25 °C	-	195	Α
Avalanche	ruggedness				
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	I_D = 30 A; V_{sup} ≤ 25 V; R_{GS} = 50 Ω; V_{GS} = 5 V; $T_{j(init)}$ = 25 °C; unclamped	-	45	mJ

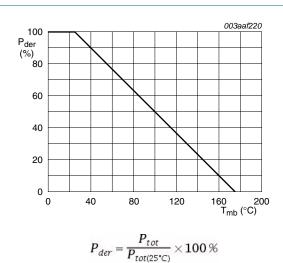


Fig 1. Normalized total power dissipation as a function of mounting base temperature

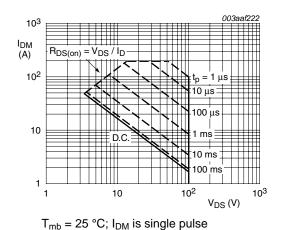
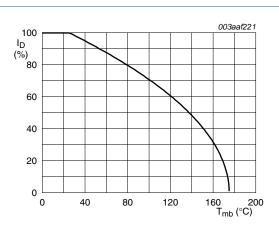


Fig 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage



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

V_{GS} ≥ 5 V

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

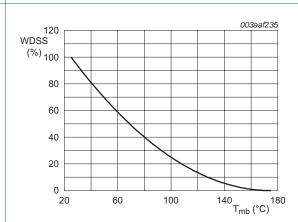
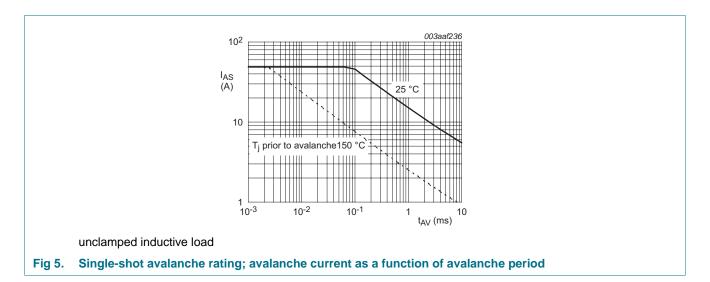


Fig 4. Normalised drain-source non-repetitive avalanche energy as a function of mounting-base temperature

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5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Тур	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

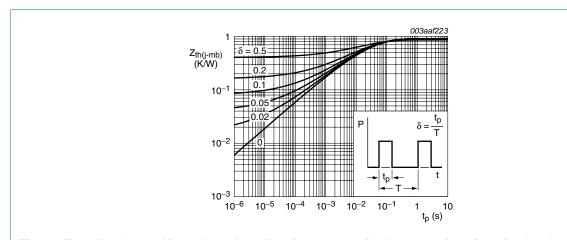


Fig 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

6. Characteristics

Table 6. Characteristics

Table 6.	Characteristics					
Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Static cha	racteristics					
V _{(BR)DSS}	drain-source breakdown	$I_D = 0.25 \text{ mA}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ °C}$	100	-	-	V
	voltage	$I_D = 0.25 \text{ mA}; V_{GS} = 0 \text{ V}; T_j = -55 \text{ °C}$	89	-	-	V
V _{GS(th)}	gate-source threshold voltage	$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = 25 \text{ °C}$	1	1.5	2	V
		$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = 175 \text{ °C}$	0.5	-	-	V
		$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = -55 \text{ °C}$	-	-	2.3	V
I _{DSS} drain leakage	drain leakage current	$V_{DS} = 100 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ °C}$	-	0.05	10	μΑ
		$V_{DS} = 100 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 175 \text{ °C}$	-	-	500	μΑ
I _{GSS}	gate leakage current	$V_{GS} = 10 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ °C}$	-	2	100	nΑ
		$V_{GS} = -10 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ °C}$	-	2	100	nΑ
R _{DSon} drain-source on-state		$V_{GS} = 5 \text{ V}; I_D = 25 \text{ A}; T_j = 25 \text{ °C}$	-	18.5	28	mΩ
	resistance	$V_{GS} = 5 \text{ V}; I_D = 25 \text{ A}; T_j = 175 ^{\circ}\text{C}$	-	-	70	mΩ
		$V_{GS} = 10 \text{ V}; I_D = 25 \text{ A}; T_j = 25 ^{\circ}\text{C}$	-	17	27	mΩ
	$V_{GS} = 4.5 \text{ V}; I_D = 25 \text{ A}; T_j = 25 \text{ °C}$	-	18.8	31	mΩ	
Dynamic (characteristics					
C _{iss}	input capacitance	$V_{GS} = 0 \text{ V}; V_{DS} = 25 \text{ V}; f = 1 \text{ MHz};$ $T_j = 25 \text{ °C}$	-	3220	4293	pF
C _{oss}	output capacitance		-	315	378	pF
C _{rss}	reverse transfer capacitance		-	187	256	pF
t _{d(on)}	turn-on delay time	$V_{DS} = 30 \text{ V}; R_L = 1.2 \Omega; V_{GS} = 5 \text{ V};$	-	11	16	ns
t _r	rise time	$R_{G(ext)} = 10 \Omega; T_j = 25 °C$	-	58	87	ns
$t_{d(off)}$	turn-off delay time		-	250	350	ns
t _f	fall time		-	106	148	ns
L _D	internal drain inductance	measured from drain lead 6 mm from package to centre of die ; $T_j = 25 ^{\circ}\text{C}$	-	4.5	-	nΗ
		measured from upper edge of drain tab to centre of die ; $T_j = 25$ °C	-	2.5	-	nΗ
L _S	internal source inductance	measured from source lead to source bond pad ; $T_j = 25$ °C	-	7.5	-	nΗ
Source-dr	rain diode					
V_{SD}	source-drain voltage	$I_S = 25 \text{ A}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ °C}$	-	0.85	1.2	V
		$I_S = 49 \text{ A}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ °C}$	-	1.1	-	V
t _{rr}	reverse recovery time	$I_S = 49 \text{ A}$; $dI_S/dt = -100 \text{ A/}\mu\text{s}$;	-	63	-	ns
Q _r	recovered charge	$V_{GS} = -10 \text{ V}; V_{DS} = 30 \text{ V}; T_i = 25 \text{ °C}$		0.22		μC

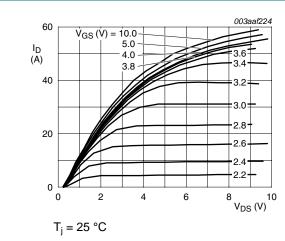


Fig 7. Output characteristics: drain current as a function of drain-source voltage; typical values

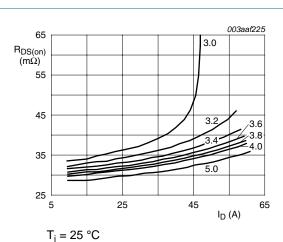


Fig 8. Drain-source on-state resistance as a function of drain current; typical values

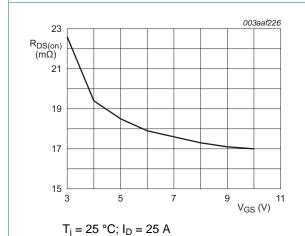


Fig 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

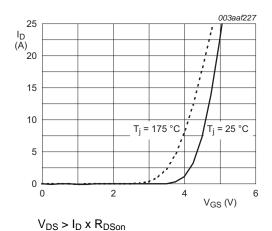


Fig 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

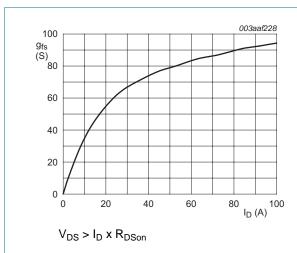


Fig 11. Forward transconductance as a function of drain current; typical values

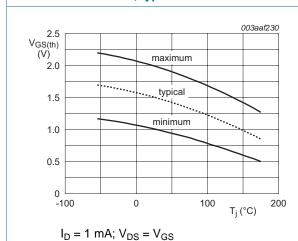
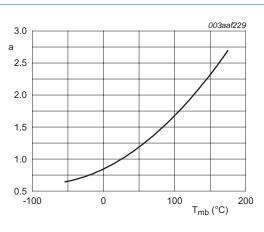


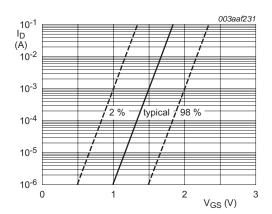
Fig 13. Gate-source threshold voltage as a function of junction temperature



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

 $I_D = 25 \text{ A}; V_{GS} = 5 \text{ V}$

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



 $T_j = 25 \, ^{\circ}C; \, V_{DS} = V_{GS}$

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

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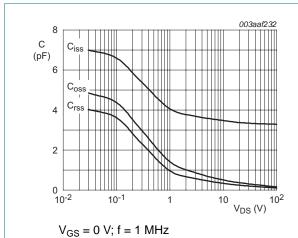
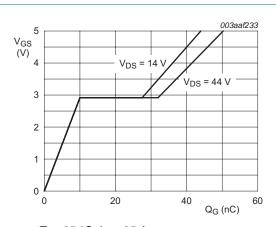
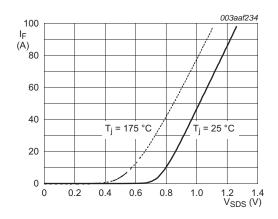


Fig 15. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical



 $T_j = 25 \, ^{\circ}C; I_D = 25 \, A$

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



 $V_{GS} = 0 V$

values

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

7. Package outline

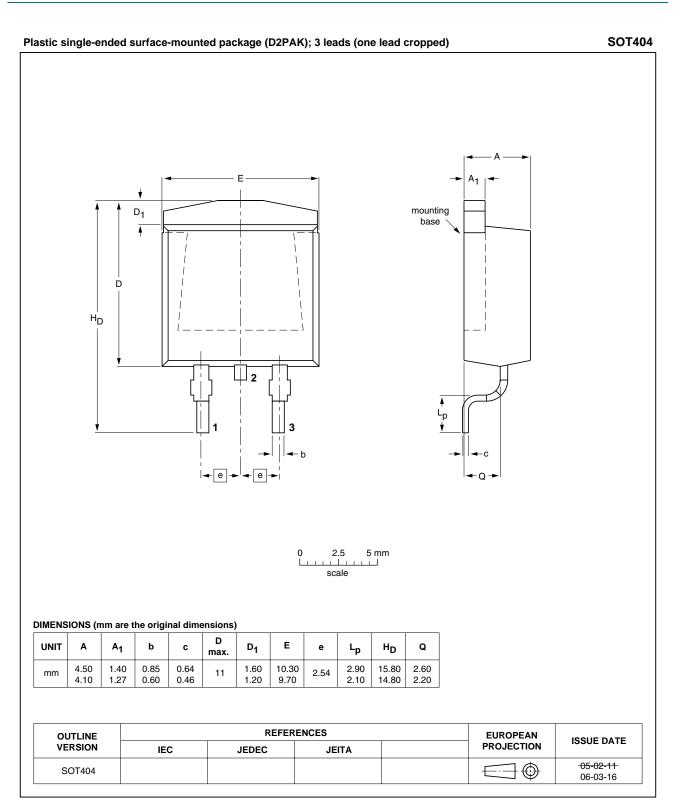


Fig 18. Package outline SOT404 (D2PAK)

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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:		 The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. 			
	 Legal texts h 	ave been adapted to the	new company name	where appropriate.	
	 Type numbe 	r BUK9628-100A separat	ed from data sheet I	BUK9528_9628-100A v.1.	
BUK9528_9628-100A v.1	20000301	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.
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