

BUK96180-100A

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	-	-	11	Α
P _{tot}	total power dissipation		-	-	54	W
Static cha	aracteristics					
R _{DSon}	drain-source on-state	$V_{GS} = 10 \text{ V}; I_D = 5 \text{ A}; T_j = 25 ^{\circ}\text{C}$	-	152	173	mΩ
	resistance	$V_{GS} = 5 \text{ V}; I_D = 5 \text{ A}; T_j = 25 \text{ °C}$	-	165	180	mΩ
Avalanch	e ruggedness					
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	$I_D = 5.5$ A; $V_{sup} \le 25$ V; $R_{GS} = 50$ Ω ; $V_{GS} = 5$ V; $T_{j(init)} = 25$ °C; unclamped	-	-	1.5	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

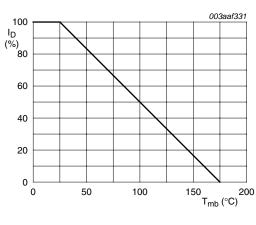
Type number	Package		
	Name	Description	Version
BUK96180-100A	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

4. Limiting values

Table 4. Limiting values

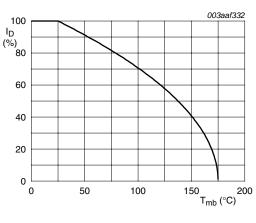
In accordance with the Absolute Maximum Rating System (IEC 60134).

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		-15	15	V
I_D	drain current	T _{mb} = 25 °C	-	11	Α
		T _{mb} = 100 °C	-	7.7	Α
I _{DM}	peak drain current	T _{mb} = 25 °C; pulsed	-	44	Α
P _{tot}	total power dissipation	T _{mb} = 25 °C	-	54	W
T _{stg}	storage temperature		-55	175	°C
Tj	junction temperature		-55	175	°C
Source-drain	n diode				
Is	source current	T _{mb} = 25 °C	-	11	Α
I _{SM}	peak source current	pulsed; T _{mb} = 25 °C	-	44	Α
Avalanche r	uggedness				
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	I_D = 5.5 A; V_{sup} ≤ 25 V; R_{GS} = 50 Ω; V_{GS} = 5 V; $T_{j(init)}$ = 25 °C; unclamped	-	1.5	mJ



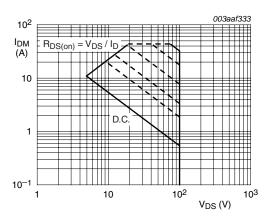
$$P_{der} = \frac{P_{tot}}{P_{tot(25^{\circ}C)}} \times 100 \,\%$$

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



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

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



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

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

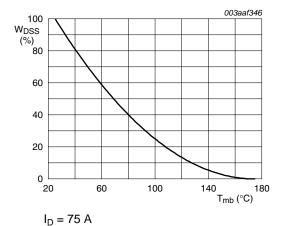
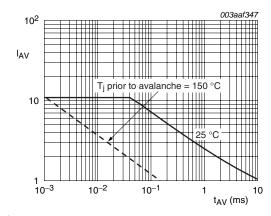


Fig 4. Normalised drain-source non-repetitive avalanche energy as a function of mounting-base temperature



unclamped inductive load

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

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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		-	-	2.8	K/W
R _{th(j-a)}	thermal resistance from junction to ambient	minimum footprint ; FR4 board	-	50	-	K/W

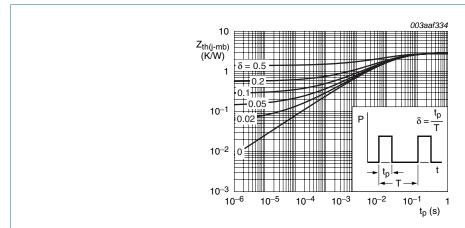


Fig 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

6. Characteristics

Table 6. Characteristics

Table 6.	Characteristics					
Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Static cha	aracteristics					
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	$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = -55 \text{ °C}$	-	-	2.3	V
	voltage	$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = 25 \text{ °C}$	1	1.5 2	2	V
		$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = 175 \text{ °C}$	0.5	-	-	V
I _{DSS}	drain leakage current	$V_{DS} = 100 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 175 \text{ °C}$	-	-	500	μΑ
		$V_{DS} = 100 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ °C}$	-	0.05	10	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 V; V _{DS} = 0 V; T _j = 25 °C	-	2	100	nA
R _{DSon}	drain-source on-state	V _{GS} = 5 V; I _D = 5 A; T _j = 175 °C	-	-	450	mΩ
	resistance	V _{GS} = 4.5 V; I _D = 5 A; T _j = 25 °C	-	170	200	mΩ
		V _{GS} = 10 V; I _D = 5 A; T _j = 25 °C	-	152	173	mΩ
		V _{GS} = 5 V; I _D = 5 A; T _i = 25 °C	-	165	180	mΩ
Dynamic	characteristics					
C _{iss}	input capacitance	$V_{GS} = 0 \text{ V}; V_{DS} = 25 \text{ V}; f = 1 \text{ MHz};$ $T_j = 25 \text{ °C}$	-	464	619	pF
C _{oss}	output capacitance		-	60	72	pF
C _{rss}	reverse transfer capacitance		-	37	50	pF
t _{d(on)}	turn-on delay time	$V_{DS} = 30 \text{ V}; R_L = 1.2 \Omega; V_{GS} = 5 \text{ V};$	-	9	20	ns
t _r	rise time	$R_{G(ext)} = 10 \Omega$; $T_j = 25 °C$	-	112	157	ns
t _{d(off)}	turn-off delay time		-	18	27	ns
t _f	fall time		-	25	38	ns
L _D	internal drain inductance	measured from drain lead 6 mm from package to centre of die	-	4.5	-	nΗ
		measured from upper edge of drain tab to centre of die	-	2.5	-	nΗ
L _S	internal source inductance	measured from source lead to source bond pad	-	7.5	-	nΗ
Source-d	rain diode					
V_{SD}	source-drain voltage	$I_S = 5 \text{ A}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ °C}$	-	0.85	1.2	V
		I _S = 11 A; V _{GS} = 0 V; T _j = 25 °C	-	1.1	-	V
t _{rr}	reverse recovery time	$I_S = 11 \text{ A}; dI_S/dt = -100 \text{ A/}\mu\text{s};$	-	49	-	ns
Q _r	recovered charge	$V_{GS} = -10 \text{ V}; V_{DS} = 30 \text{ V}; T_j = 25 \text{ °C}$	-	0.13	-	μC

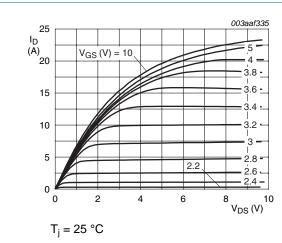


Fig 7. Output characteristics: drain current as a function of drain-source voltage; typical values

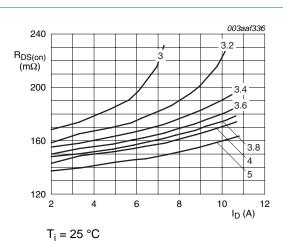


Fig 8. Drain-source on-state resistance as a function of drain current; typical values

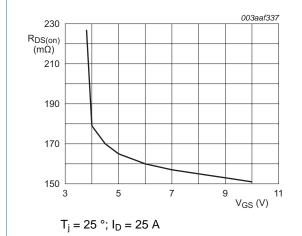


Fig 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

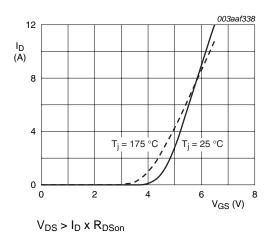
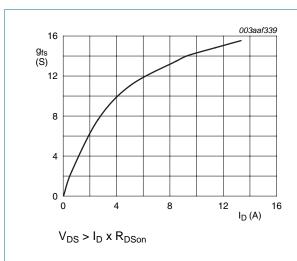
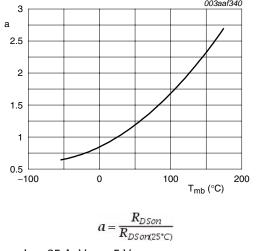


Fig 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values





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

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



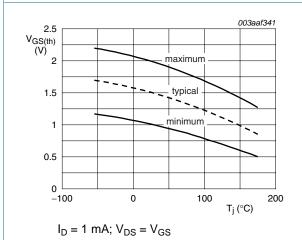
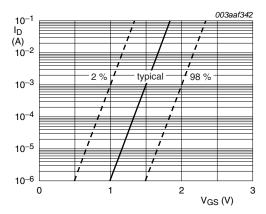


Fig 13. Gate-source threshold voltage as a function of junction temperature



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

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

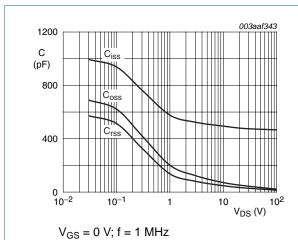
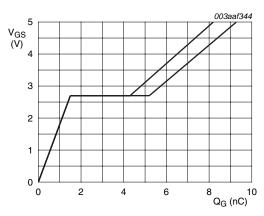
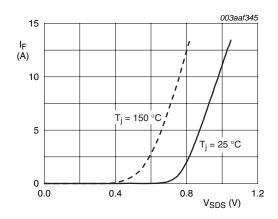


Fig 15. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values



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

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



 $V_{GS} = 0 V$

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

7. Package outline

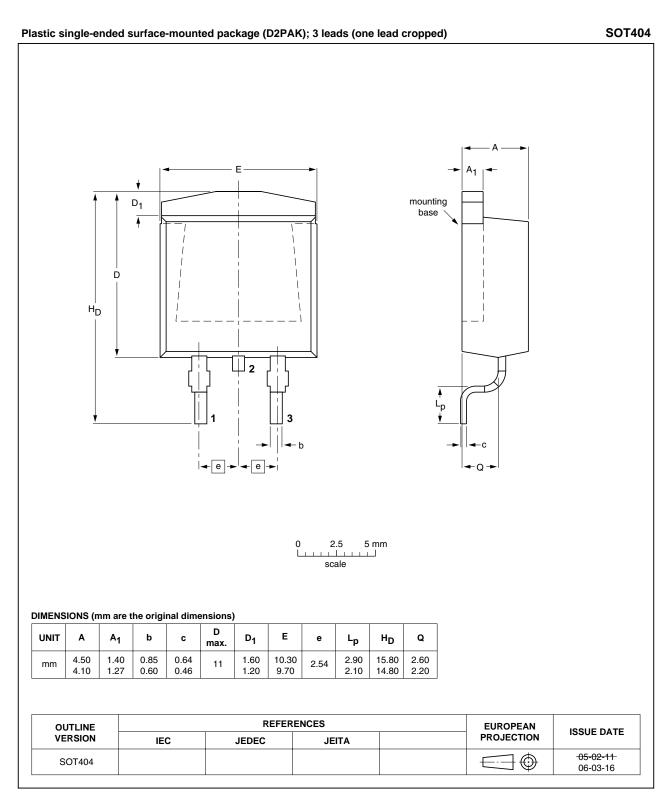


Fig 18. Package outline SOT404 (D2PAK)

Revision history

Table 7. **Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes	
BUK96180-100A v.2	20110426	Product data sheet	-	BUK95180_96180-100A 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 BUK96180-100A separa	ated from data sheet	BUK95180_96180-100A v.1.	
BUK95180_96180-100A v.1	20000501	Product specification	-	-	

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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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