BUK7608-40B

N-channel TrenchMOS standard level FET

Rev. 04 — 24 September 2008 **Product data sheet**

1. Product profile

1.1 General description

Standard 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 standard level gate drive sources
- Suitable for thermally demanding environments due to 175 °C rating

1.3 Applications

- 12 V loads
- Automotive systems
- General purpose power switching
- Motors, lamps and solenoids

1.4 Quick reference data

Table 1. Quick reference

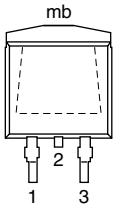
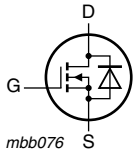
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25$ °C; $T_j \leq 175$ °C		-	-	40	V
I_D	drain current	V_{GS} = 10 V; T_{mb} = 25 °C; see Figure 1; see Figure 3;	[1]	-	-	75	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; see Figure 2		-	-	157	W
Avalanche ruggedness							
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	I_D = 75 A; $V_{sup} \leq 40$ V; R_{GS} = 50 Ω; V_{GS} = 10 V; $T_{j(init)}$ = 25 °C; unclamped		-	-	241	mJ
Dynamic characteristics							
Q_{GD}	gate-drain charge	V_{GS} = 10 V; I_D = 25 A; V_{DS} = 32 V; T_j = 25 °C; see Figure 14		-	12	-	nC
Static characteristics							
R_{DSon}	drain-source on-state resistance	V_{GS} = 10 V; I_D = 25 A; T_j = 25 °C; see Figure 12; see Figure 11		-	6.6	8	mΩ

[1] Continuous current is limited by package.

nexperia

2. Pinning information

Table 2. Pinning information

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

[1] It is not possible to make a connection to pin 2.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BUK7608-40B	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	$T_j \geq 25$ °C; $T_j \leq 175$ °C		-	40	V
V_{DGR}	drain-gate voltage	$R_{GS} = 20$ kΩ		-	40	V
V_{GS}	gate-source voltage			-20	20	V
I_D	drain current	$T_{mb} = 25$ °C; $V_{GS} = 10$ V; see Figure 1; see Figure 3;	[1]	-	101	A
		$T_{mb} = 100$ °C; $V_{GS} = 10$ V; see Figure 1;	[1]	-	71	A
		$T_{mb} = 25$ °C; $V_{GS} = 10$ V; see Figure 1; see Figure 3;	[2]	-	75	A
I_{DM}	peak drain current	$T_{mb} = 25$ °C; $t_p \leq 10$ µs; pulsed; see Figure 3		-	407	A
P_{tot}	total power dissipation	$T_{mb} = 25$ °C; see Figure 2		-	157	W
T_{stg}	storage temperature			-55	175	°C
T_j	junction temperature			-55	175	°C
Source-drain diode						
I_S	source current	$T_{mb} = 25$ °C;	[1]	-	101	A
		$T_{mb} = 25$ °C;	[2]	-	75	A
I_{SM}	peak source current	$t_p \leq 10$ µs; pulsed; $T_{mb} = 25$ °C		-	407	A

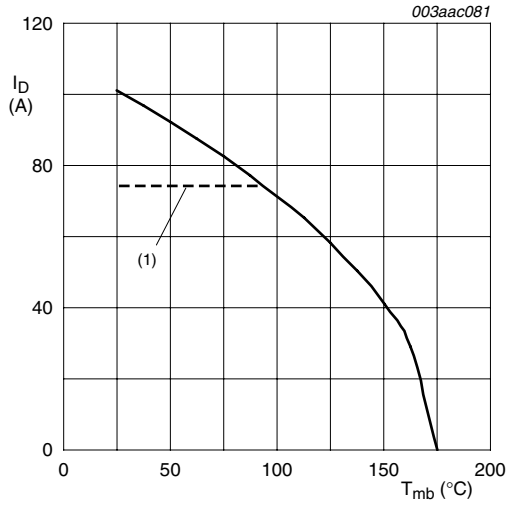
Table 4. Limiting values *...continued*

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

Symbol	Parameter	Conditions	Min	Max	Unit
Avalanche ruggedness					
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	I_D = 75 A; $V_{sup} \leq$ 40 V; R_{GS} = 50 Ω; V_{GS} = 10 V; $T_{j(init)}$ = 25 °C; unclamped	-	241	mJ

[1] Current is limited by power dissipation chip rating.

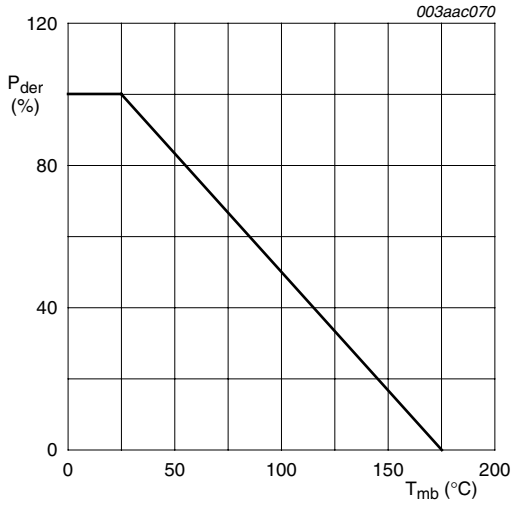
[2] Continuous current is limited by package.



$V_{GS} \geq 10\,V$

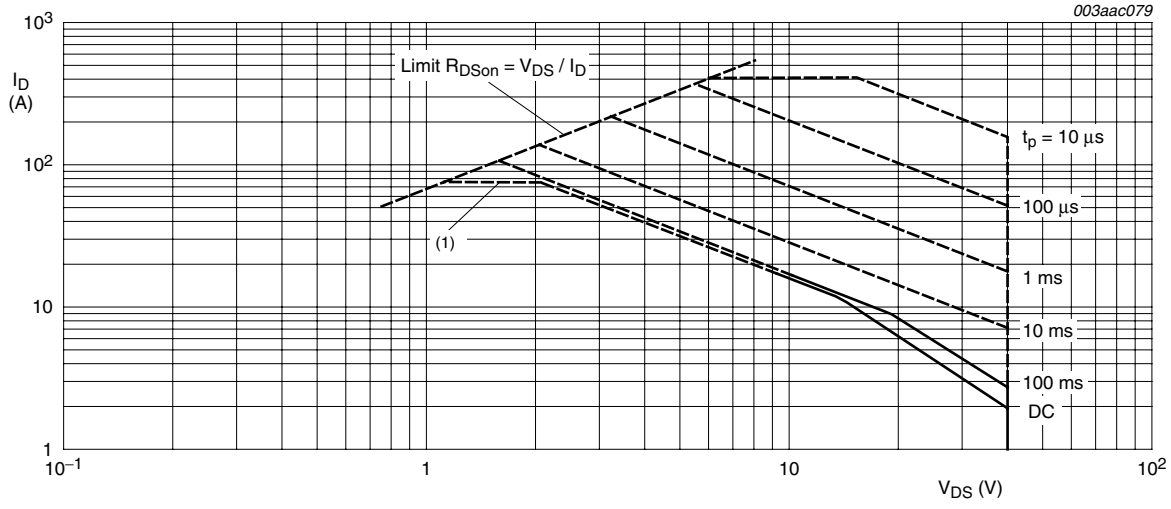
(1) Capped at 75 A due to package.

Fig 1. Continuous drain current as a function of mounting base 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



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

(1) Capped at 75 A due to package.

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

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	mounted on a printed-circuit board; minimum footprint	-	50	-	K/W
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see Figure 4	-	-	0.95	K/W

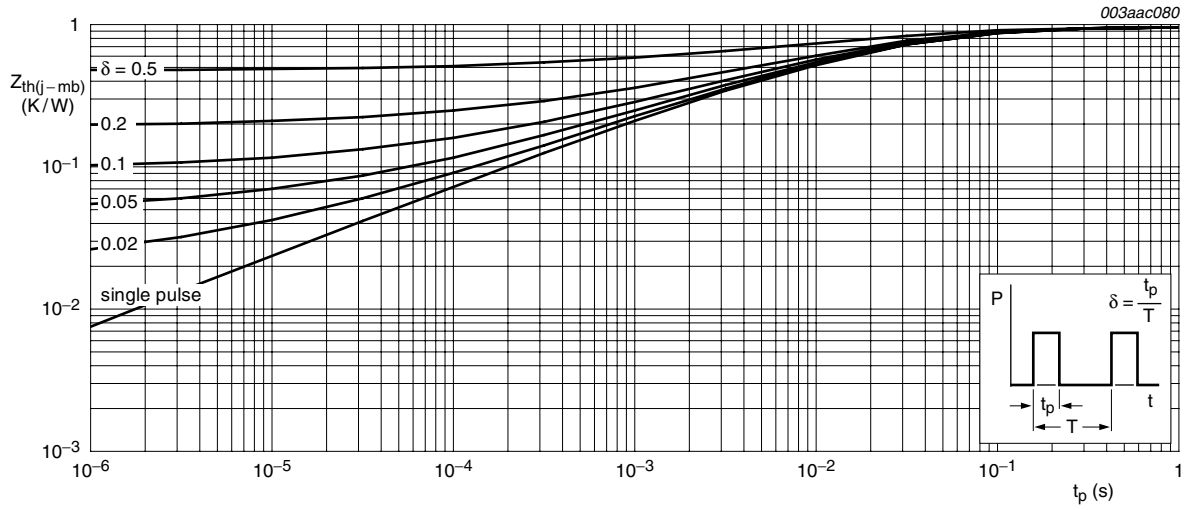
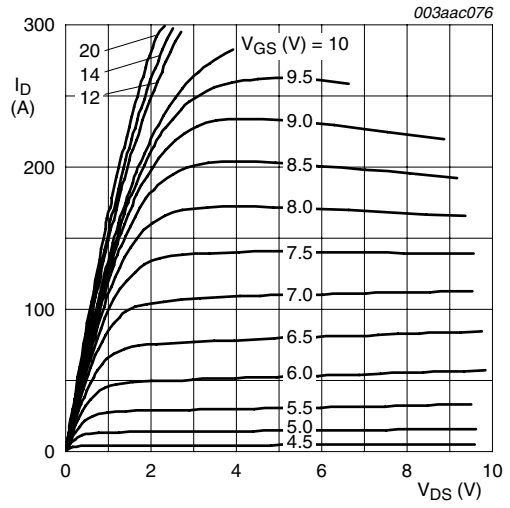


Fig 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

6. Characteristics

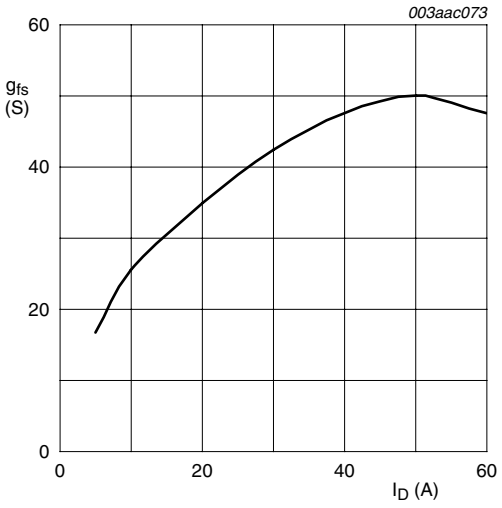
Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 0.25 mA; V_{GS} = 0 V; T_j = 25 °C	40	-	-	V
		I_D = 0.25 mA; V_{GS} = 0 V; T_j = -55 °C	36	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	I_D = 1 mA; V_{DS} = V_{GS}; T_j = 25 °C; see Figure 9; see Figure 10	2	3	4	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = -55 °C; see Figure 9; see Figure 10	-	-	4.4	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = 175 °C; see Figure 9; see Figure 10	1	-	-	V
I_{DSS}	drain leakage current	V_{DS} = 40 V; V_{GS} = 0 V; T_j = 25 °C	-	0.02	1	µA
		V_{DS} = 40 V; V_{GS} = 0 V; T_j = 175 °C	-	-	500	µA
I_{GSS}	gate leakage current	V_{DS} = 0 V; V_{GS} = 20 V; T_j = 25 °C	-	2	100	nA
		V_{DS} = 0 V; V_{GS} = -20 V; T_j = 25 °C	-	2	100	nA
R_{DSon}	drain-source on-state resistance	V_{GS} = 10 V; I_D = 25 A; T_j = 175 °C; see Figure 11; see Figure 12	-	-	15.2	mΩ
		V_{GS} = 10 V; I_D = 25 A; T_j = 25 °C; see Figure 12; see Figure 11	-	6.6	8	mΩ
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	I_D = 25 A; V_{DS} = 32 V; V_{GS} = 10 V; T_j = 25 °C; see Figure 14	-	36	-	nC
Q_{GS}	gate-source charge		-	9	-	nC
Q_{GD}	gate-drain charge		-	12	-	nC
C_{iss}	input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz; T_j = 25 °C; see Figure 15	-	2017	2689	pF
C_{oss}	output capacitance		-	486	583	pF
C_{rss}	reverse transfer capacitance		-	213	291	pF
$t_{d(on)}$	turn-on delay time	V_{DS} = 30 V; R_L = 1.2 Ω; V_{GS} = 10 V; $R_{G(ext)}$ = 10 Ω; T_j = 25 °C	-	20	-	ns
t_r	rise time		-	51	-	ns
$t_{d(off)}$	turn-off delay time		-	20	-	ns
t_f	fall time		-	33	-	ns
L_D	internal drain inductance	from drain lead 6 mm from package to center of die; T_j = 25 °C	-	4.5	-	nH
		from upper edge of drain mounting base to centre of die; T_j = 25 °C	-	2.5	-	nH
L_S	internal source inductance	from source lead 6 mm from package to source bond pad; T_j = 25 °C	-	7.5	-	nH
Source-drain diode						
V_{SD}	source-drain voltage	I_S = 25 A; V_{GS} = 0 V; T_j = 25 °C; see Figure 13	-	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} = 20 V; T_j = 25 °C	-	53	-	ns
Q_r	recovered charge		-	44	-	nC



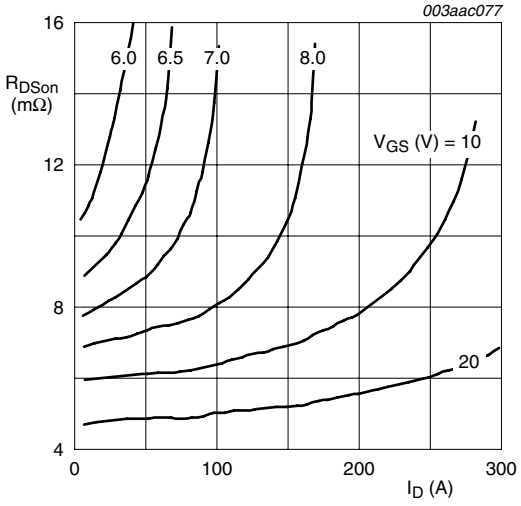
$T_j = 25°C; t_p = 300\mu s$

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



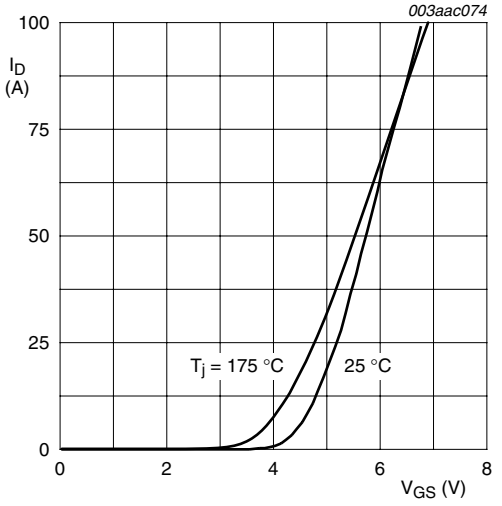
$T_j = 25\,°C; V_{DS} = 25V$

Fig 6. Forward transconductance as a function of drain current; typical values



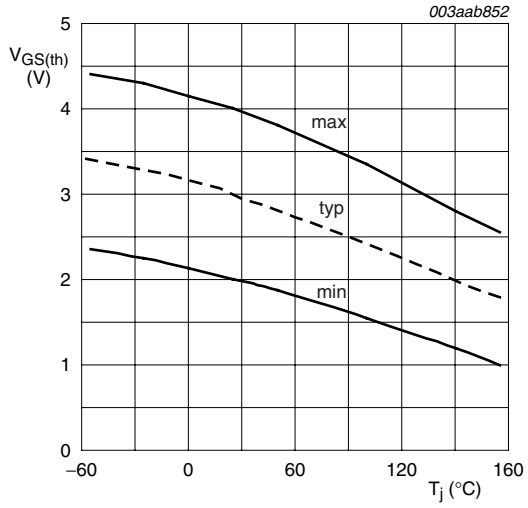
$T_j = 25\,°C$

Fig 7. Drain-source on-state resistance as a function of drain current; typical values



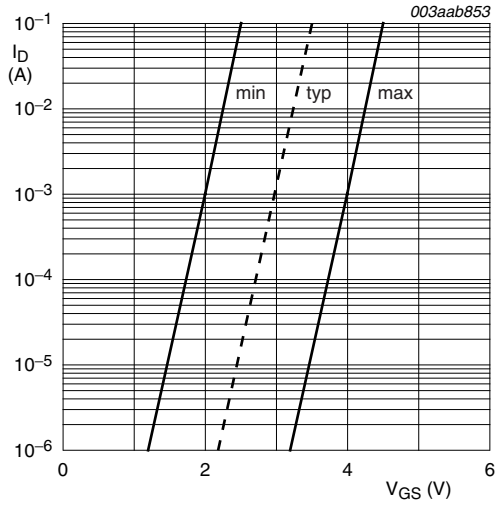
$V_{DS} = 25V$

Fig 8. Transfer characteristics: drain current as a function of gate-source voltage; typical values



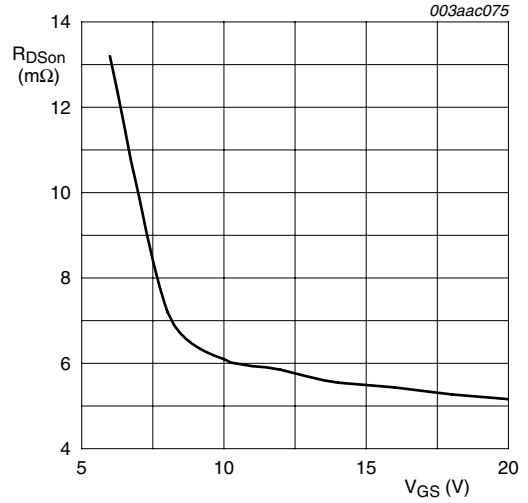
$I_D = 1\,mA; V_{DS} = V_{GS}$

Fig 9. Gate-source threshold voltage as a function of junction temperature



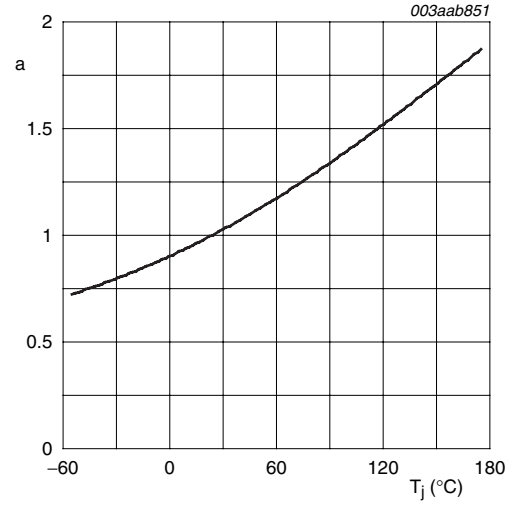
$T_j = 25\,°C; V_{DS} = V_{GS}$

Fig 10. Sub-threshold drain current as a function of gate-source voltage



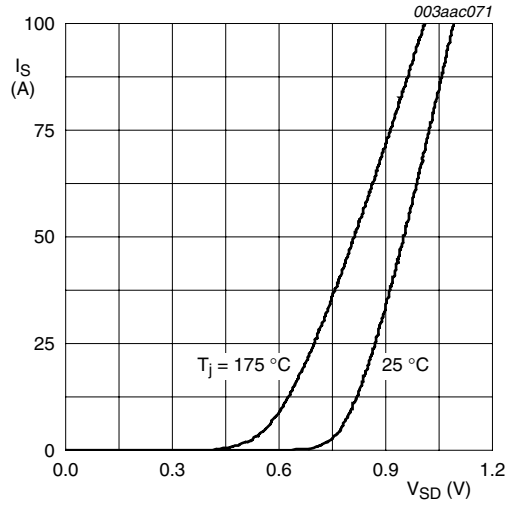
$T_j = 25\,°C; I_D = 25\,A$

Fig 11. Drain-source on-state resistance as a function of gate-source voltage; typical values



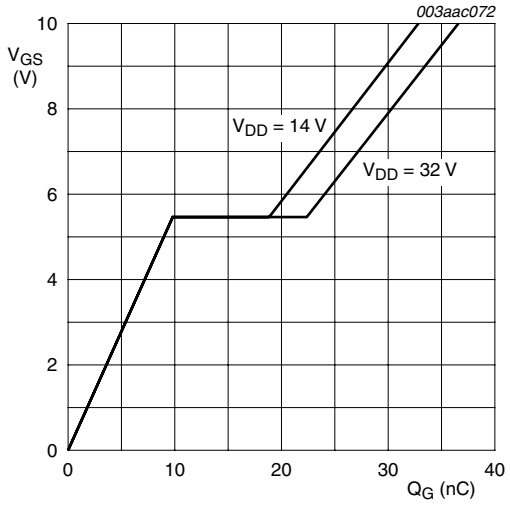
$$a = \frac{R_{DSon}}{R_{DSon(25\,°C)}}$$

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



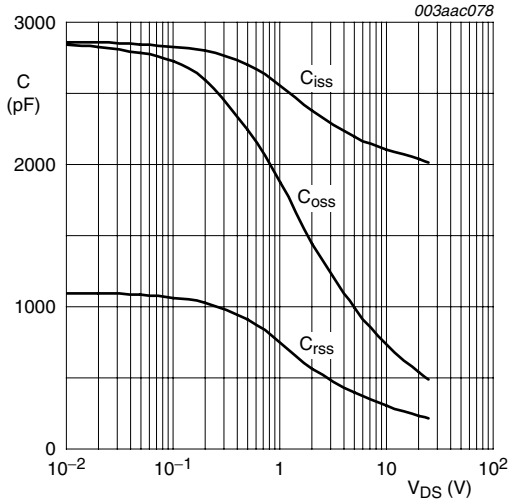
$V_{GS} = 0V$

Fig 13. Reverse diode current as a function of reverse diode voltage; typical values



$T_j = 25\,°C; I_D = 25A$

Fig 14. Gate-source voltage as a function of turn-on gate charge; typical values

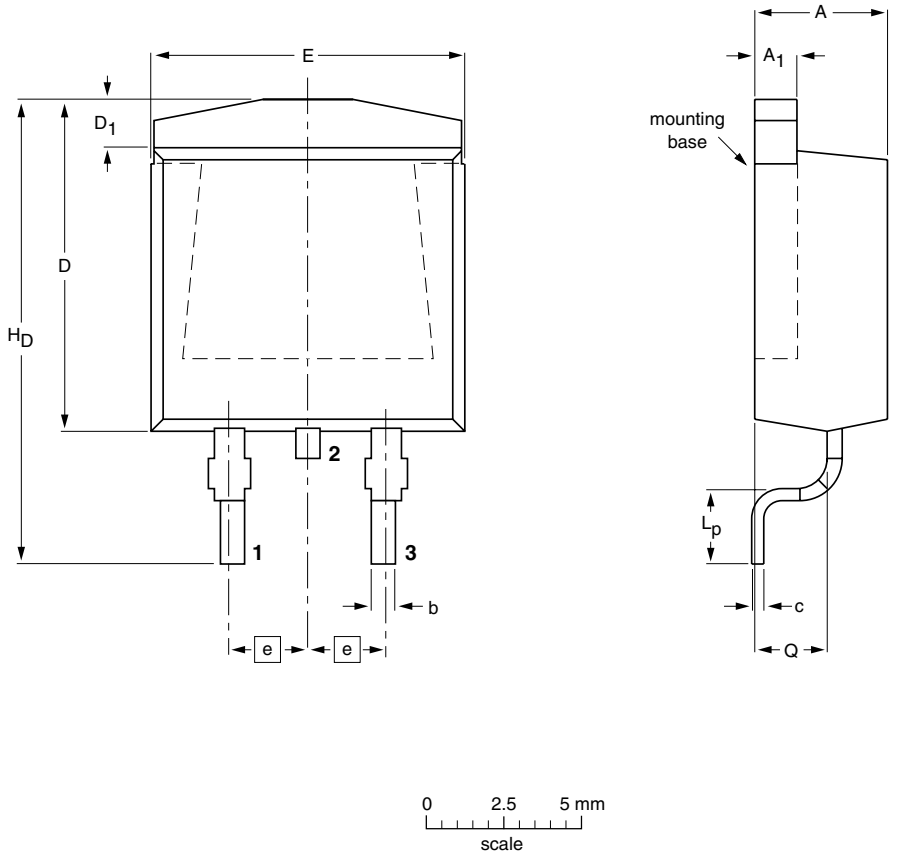


$V_{GS} = 0V; f = 1MHz$

Fig 15. Input, output and reverse transfer capacitances as a function of drain-source 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_1	b	c	D max.	D_1	E	e	L_p	H_D	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 16. Package outline SOT404 (D2PAK)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BUK7608-40B_4	20080924	Product data sheet	-	BUK75_7608-40B_3
Modifications:	• Type number BUK7608-40B separated from data sheet BUK75_7608-40B_3			
BUK75_7608-40B_3	20071128	Product data sheet	-	BUK75_7608-40B_2
BUK75_7608-40B_2	20071116	Product data sheet	-	BUK75_7608_40B-01
BUK75_7608_40B-01	20030319	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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nexperia.com.

9.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. Nexperia does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local Nexperia sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

9.3 Disclaimers

General — Information in this document is believed to be accurate and reliable. However, Nexperia does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Right to make changes — Nexperia reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — Nexperia products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of a Nexperia product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Nexperia accepts no liability for inclusion and/or use of Nexperia products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. Nexperia makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Quick reference data — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

Terms and conditions of sale — Nexperia products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nexperia.com/profile/terms, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by Nexperia. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

9.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

10. Contact information

For more information, please visit: http://www.nexperia.com

For sales office addresses, please send an email to: salesaddresses@nexperia.com

11. Contents

For more information, please visit: http://www.nexperia.com
For sales office addresses, please send an email to: salesaddresses@nexperia.com
Date of release: 24 September 2008

Стандарт Электрон Связь

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

Наши контакты:

Телефон: +7 812 627 14 35

Электронная почта: sales@st-electron.ru

Адрес: 198099, Санкт-Петербург, Промышленная ул, дом № 19, литера Н, помещение 100-Н Офис 331