

# BUK7675-100A,118 Datasheet



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DiGi Electronics Part Number	BUK7675-100A,118-DG
Manufacturer	<a href="#">Nexperia USA Inc.</a>
Manufacturer Product Number	BUK7675-100A,118
Description	MOSFET N-CH 100V 23A D2PAK
Detailed Description	N-Channel 100 V 23A (Tc) 99W (Tc) Surface Mount D 2PAK



Tel: +00 852-30501935

RFQ Email: [Info@DiGi-Electronics.com](mailto:Info@DiGi-Electronics.com)

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## Purchase and inquiry

Manufacturer Product Number:

BUK7675-100A,118

Series:

TrenchMOS™

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

100 V

Drive Voltage (Max Rds On, Min Rds On):

10V

Vgs(th) (Max) @ Id:

4V @ 1mA

Input Capacitance (Ciss) (Max) @ Vds:

1210 pF @ 25 V

Power Dissipation (Max):

99W (Tc)

Grade:

Automotive

Mounting Type:

Surface Mount

Package / Case:

TO-263-3, D2PAK (2 Leads + Tab), TO-263AB

Manufacturer:

Nexperia USA Inc.

Product Status:

Obsolete

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

23A (Tc)

Rds On (Max) @ Id, Vgs:

75mOhm @ 13A, 10V

Vgs (Max):

±20V

FET Feature:

-

Operating Temperature:

-55°C ~ 175°C (TJ)

Qualification:

AEC-Q101

Supplier Device Package:

D2PAK

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99



# BUK7675-100A

## N-channel TrenchMOS standard level FET

Rev. 02 — 31 July 2009

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, 24 V and 42 V loads
- Automotive and general purpose power switching
- Motors, lamps and solenoids

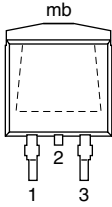
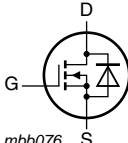
### 1.4 Quick reference data

Table 1. Quick reference

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage	$T_j \geq 25\text{ °C}$ ; $T_j \leq 175\text{ °C}$	-	-	100	V
$I_D$	drain current	$V_{GS} = 10\text{ V}$ ; $T_{mb} = 25\text{ °C}$ ; see <a href="#">Figure 1</a> and <a href="#">3</a>	-	-	23	A
$P_{tot}$	total power dissipation	$T_{mb} = 25\text{ °C}$ ; see <a href="#">Figure 2</a>	-	-	99	W
<b>Avalanche ruggedness</b>						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 14\text{ A}$ ; $V_{sup} \leq 100\text{ V}$ ; $R_{GS} = 50\ \Omega$ ; $V_{GS} = 10\text{ V}$ ; $T_{j(init)} = 25\text{ °C}$ ; unclamped	-	-	100	mJ
<b>Static characteristics</b>						
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}$ ; $I_D = 13\text{ A}$ ; $T_j = 175\text{ °C}$ ; see <a href="#">Figure 12</a> and <a href="#">13</a>	-	-	187	m $\Omega$
		$V_{GS} = 10\text{ V}$ ; $I_D = 13\text{ A}$ ; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 12</a> and <a href="#">13</a>	-	64	75	m $\Omega$

## 2. Pinning information

**Table 2. Pinning information**

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

## 3. Ordering information

**Table 3. Ordering information**

Type number	Package		Version
	Name	Description	
BUK7675-100A	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).

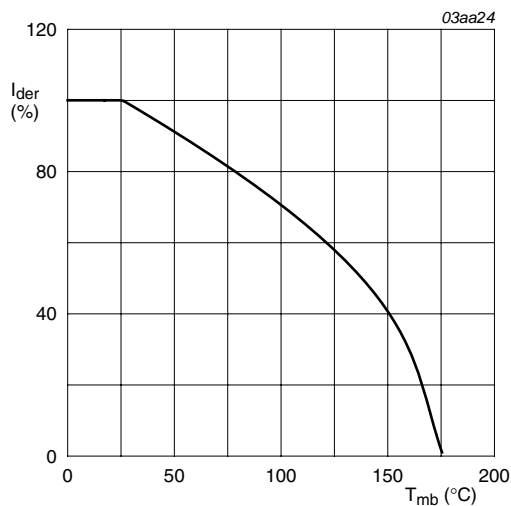
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DS}$	drain-source voltage	$T_j \geq 25\text{ °C}$ ; $T_j \leq 175\text{ °C}$	-	100	V
$V_{DGR}$	drain-gate voltage	$R_{GS} = 20\text{ k}\Omega$	-	100	V
$V_{GS}$	gate-source voltage		-20	20	V
$I_D$	drain current	$T_{mb} = 25\text{ °C}$ ; $V_{GS} = 10\text{ V}$ ; see <a href="#">Figure 1</a> and <a href="#">3</a>	-	23	A
		$T_{mb} = 100\text{ °C}$ ; $V_{GS} = 10\text{ V}$ ; see <a href="#">Figure 1</a>	-	16.2	A
$I_{DM}$	peak drain current	$T_{mb} = 25\text{ °C}$ ; $t_p \leq 10\text{ }\mu\text{s}$ ; pulsed; see <a href="#">Figure 3</a>	-	92	A
$P_{tot}$	total power dissipation	$T_{mb} = 25\text{ °C}$ ; see <a href="#">Figure 2</a>	-	99	W
$T_{stg}$	storage temperature		-55	175	°C
$T_j$	junction temperature		-55	175	°C

### Avalanche ruggedness

$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 14\text{ A}$ ; $V_{sup} \leq 100\text{ V}$ ; $R_{GS} = 50\text{ }\Omega$ ; $V_{GS} = 10\text{ V}$ ; $T_{j(init)} = 25\text{ °C}$ ; unclamped	-	100	mJ
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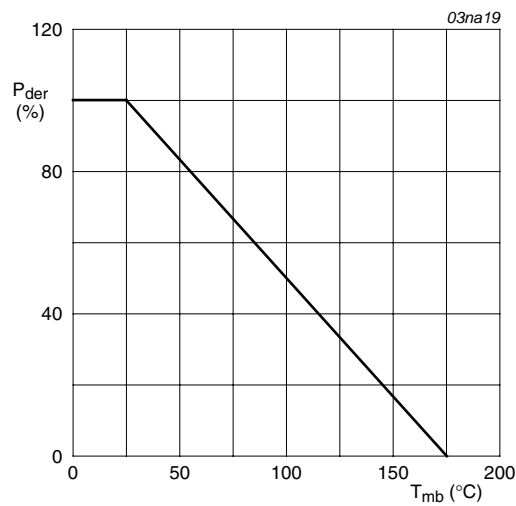
### Source-drain diode

$I_S$	source current	$T_{mb} = 25\text{ °C}$	-	23	A
$I_{SM}$	peak source current	$t_p \leq 10\text{ }\mu\text{s}$ ; pulsed; $T_{mb} = 25\text{ °C}$	-	92	A



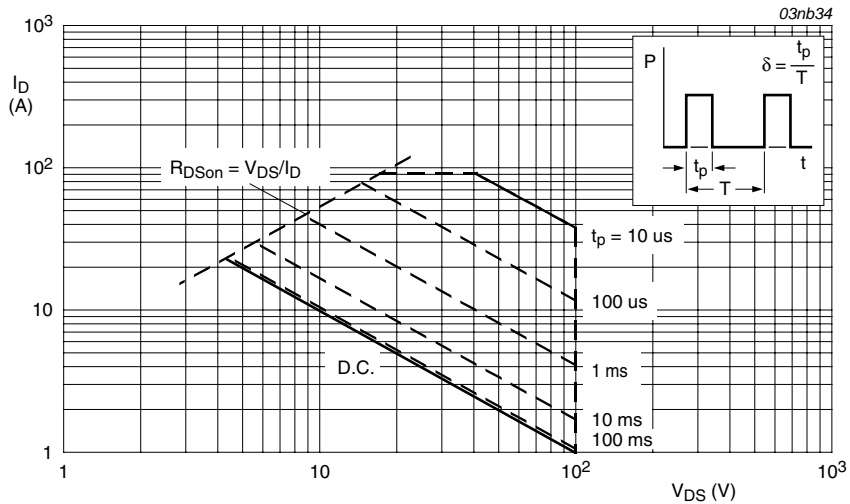
$$I_{der} = \frac{I_D}{I_{D(25^\circ\text{C})}} \times 100\%$$

**Fig 1. Normalized continuous drain current as a function of mounting base temperature**



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

**Fig 2. Normalized total power dissipation as a function of mounting base temperature**



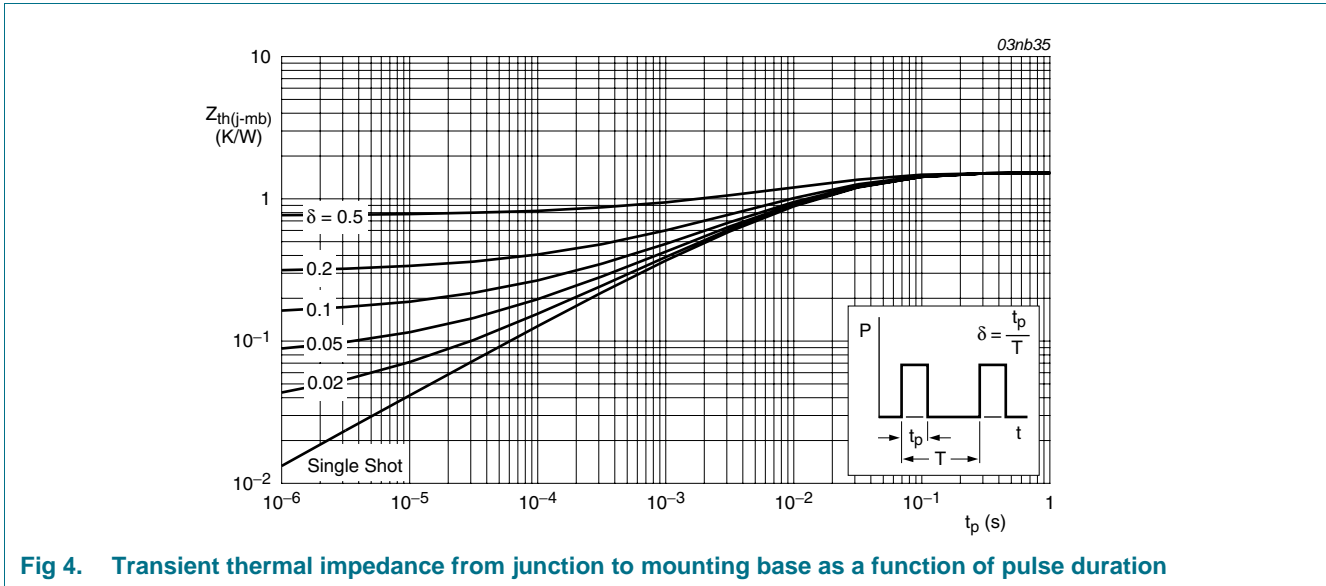
$T_{mb} = 25^\circ\text{C}; I_{DM}$  is single pulse

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

## 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	see <a href="#">Figure 4</a>	-	-	1.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient		-	50	-	K/W



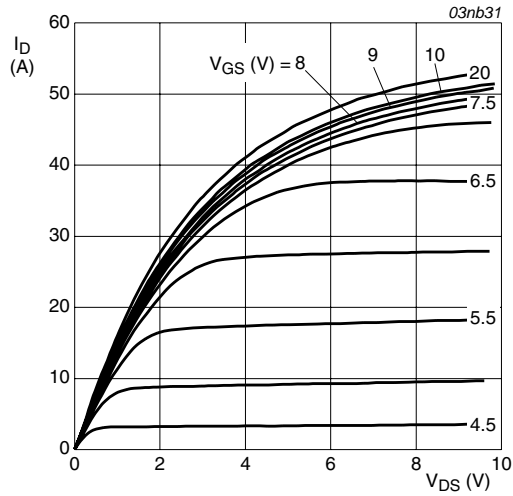
**Fig 4. Transient thermal impedance from junction to mounting base as a function of pulse duration**

## 6. Characteristics

**Table 6. Characteristics**

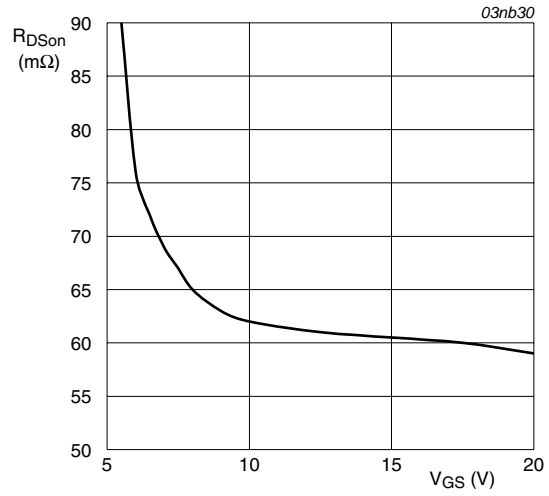
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 0.25\text{ A}; V_{GS} = 0\text{ V}; T_j = 25\text{ °C}$	100	-	-	V
		$I_D = 0.25\text{ A}; V_{GS} = 0\text{ V}; T_j = -55\text{ °C}$	89	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1\text{ mA}; V_{DS} = V_{GS}; T_j = 175\text{ °C};$ see <a href="#">Figure 11</a>	1	-	-	V
		$I_D = 1\text{ mA}; V_{DS} = V_{GS}; T_j = -55\text{ °C};$ see <a href="#">Figure 11</a>	-	-	4.4	V
		$I_D = 1\text{ mA}; V_{DS} = V_{GS}; T_j = 25\text{ °C};$ see <a href="#">Figure 11</a>	2	3	4	V
$I_{DSS}$	drain leakage current	$V_{DS} = 100\text{ V}; V_{GS} = 0\text{ V}; T_j = 175\text{ °C}$	-	-	500	$\mu\text{A}$
		$V_{DS} = 100\text{ V}; V_{GS} = 0\text{ V}; T_j = 25\text{ °C}$	-	0.05	10	$\mu\text{A}$
$I_{GSS}$	gate leakage current	$V_{DS} = 0\text{ V}; V_{GS} = 20\text{ V}; T_j = 25\text{ °C}$	-	2	100	nA
		$V_{DS} = 0\text{ V}; V_{GS} = -20\text{ V}; T_j = 25\text{ °C}$	-	2	100	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 13\text{ A}; T_j = 175\text{ °C};$ see <a href="#">Figure 12</a> and <a href="#">13</a>	-	-	187	m $\Omega$
		$V_{GS} = 10\text{ V}; I_D = 13\text{ A}; T_j = 25\text{ °C};$ see <a href="#">Figure 12</a> and <a href="#">13</a>	-	64	75	m $\Omega$
<b>Dynamic characteristics</b>						
$C_{iss}$	input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 25\text{ V}; f = 1\text{ MHz};$ $T_j = 25\text{ °C};$ see <a href="#">Figure 15</a>	-	907	1210	pF
$C_{oss}$	output capacitance		-	127	150	pF
$C_{rss}$	reverse transfer capacitance		-	78	110	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 30\text{ V}; R_L = 2.2\text{ }\Omega; V_{GS} = 10\text{ V};$ $R_{G(ext)} = 5.6\text{ }\Omega; T_j = 25\text{ °C}$	-	8	-	ns
$t_r$	rise time		-	39	-	ns
$t_{d(off)}$	turn-off delay time		-	26	-	ns
$t_f$	fall time		-	24	-	ns
$L_D$	internal drain inductance	from drain lead 6 mm from package to centre of die; $T_j = 25\text{ °C}$	-	4.5	-	nH
		from upper edge of drain mounting base to centre of die; $T_j = 25\text{ °C}$	-	2.5	-	nH
$L_S$	internal source inductance	from source lead to source bond pad; $T_j = 25\text{ °C}$	-	7.5	-	nH
<b>Source-drain diode</b>						
$V_{SD}$	source-drain voltage	$I_S = 25\text{ A}; V_{GS} = 0\text{ V}; T_j = 25\text{ °C};$ see <a href="#">Figure 14</a>	-	0.85	1.2	V
$t_{rr}$	reverse recovery time	$I_S = 13\text{ A}; dI_S/dt = -100\text{ A}/\mu\text{s}; V_{GS} = -10\text{ V};$ $V_{DS} = 30\text{ V}; T_j = 25\text{ °C}$	-	64	-	ns
$Q_r$	recovered charge		-	120	-	nC





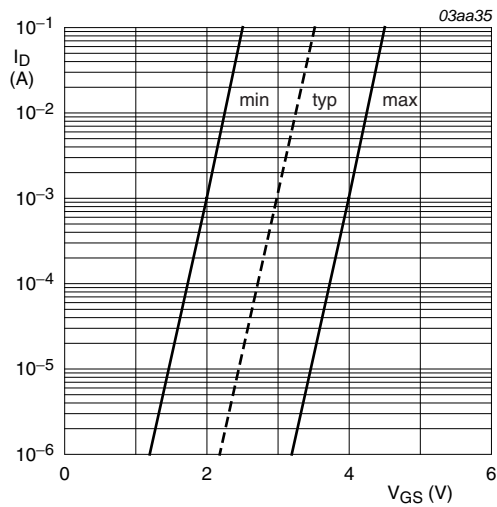
$T_j = 25^\circ\text{C}; t_p = 300\mu\text{s}$

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



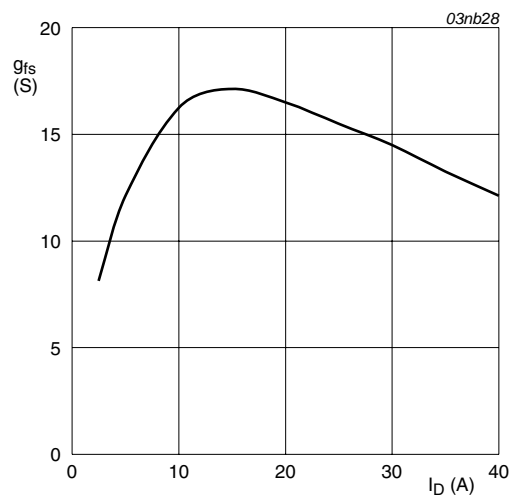
$T_j = 25^\circ\text{C}; I_D = 10\text{A}$

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



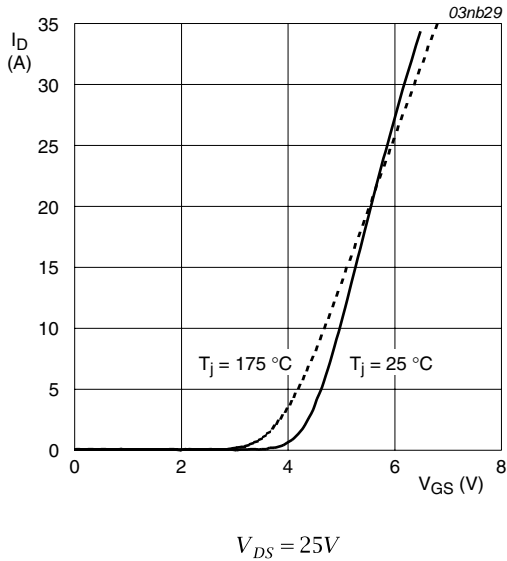
$T_j = 25^\circ\text{C}; V_{DS} = 5\text{V}$

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

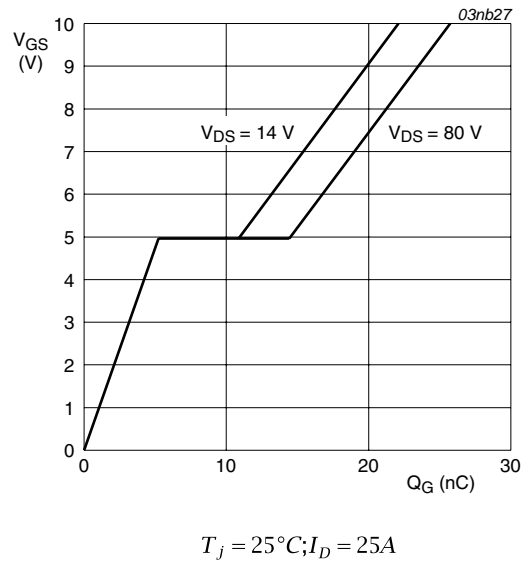


$T_j = 25^\circ\text{C}; V_{DS} = 25\text{V}$

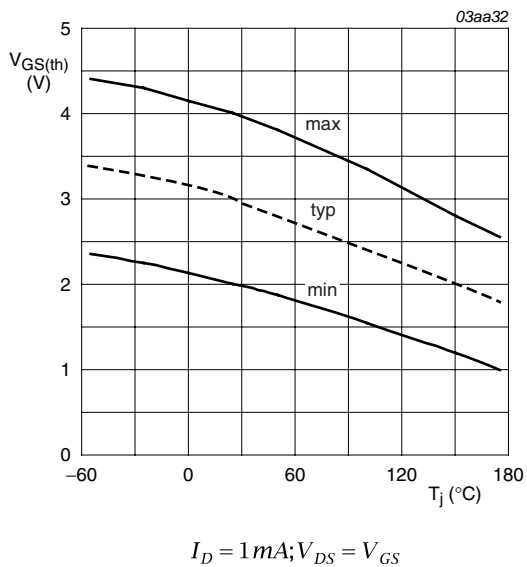
**Fig 8. Forward transconductance as a function of drain current; typical values**



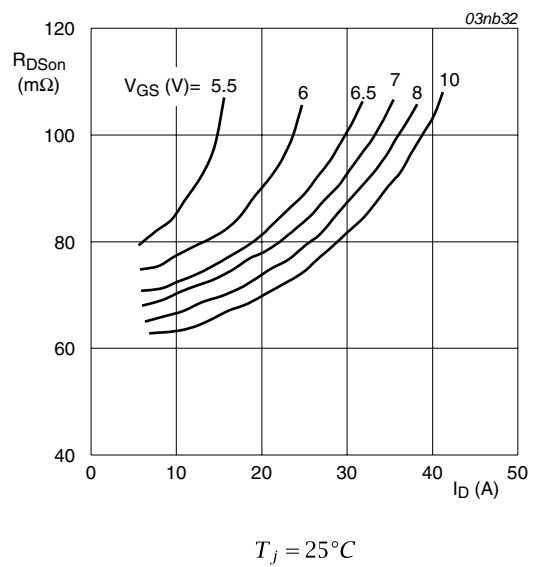
**Fig 9. Transfer characteristics: drain current as a function of gate-source voltage; typical values**



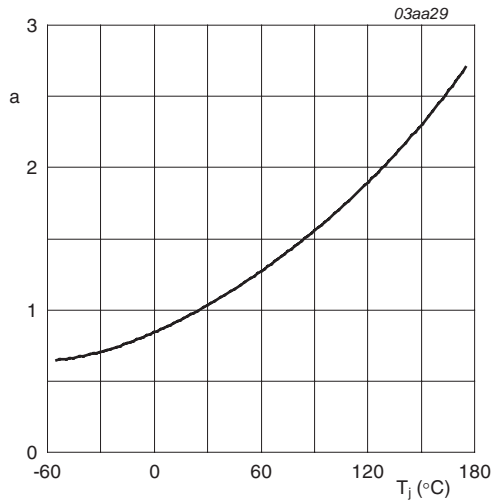
**Fig 10. Gate-source voltage as a function of turn-on gate charge; typical values**



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

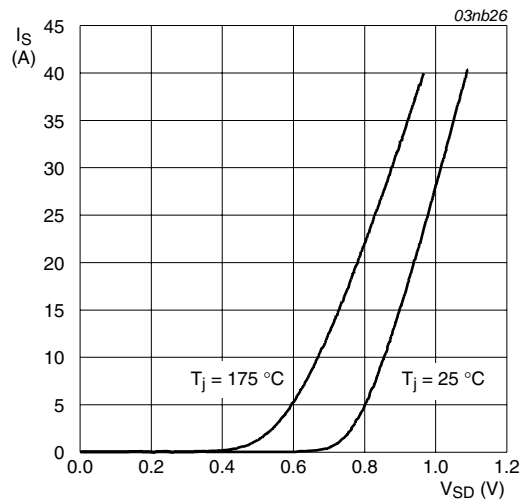


**Fig 12. Drain-source on-state resistance as a function of drain current; typical values**



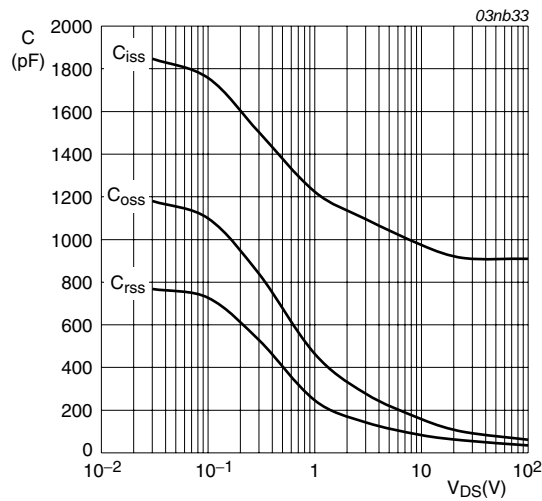
$$a = \frac{R_{DSon}}{R_{DSon(25^{\circ}\text{C})}}$$

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



$$V_{GS} = 0V$$

**Fig 14. Reverse diode current as a function of reverse diode voltage; typical values**



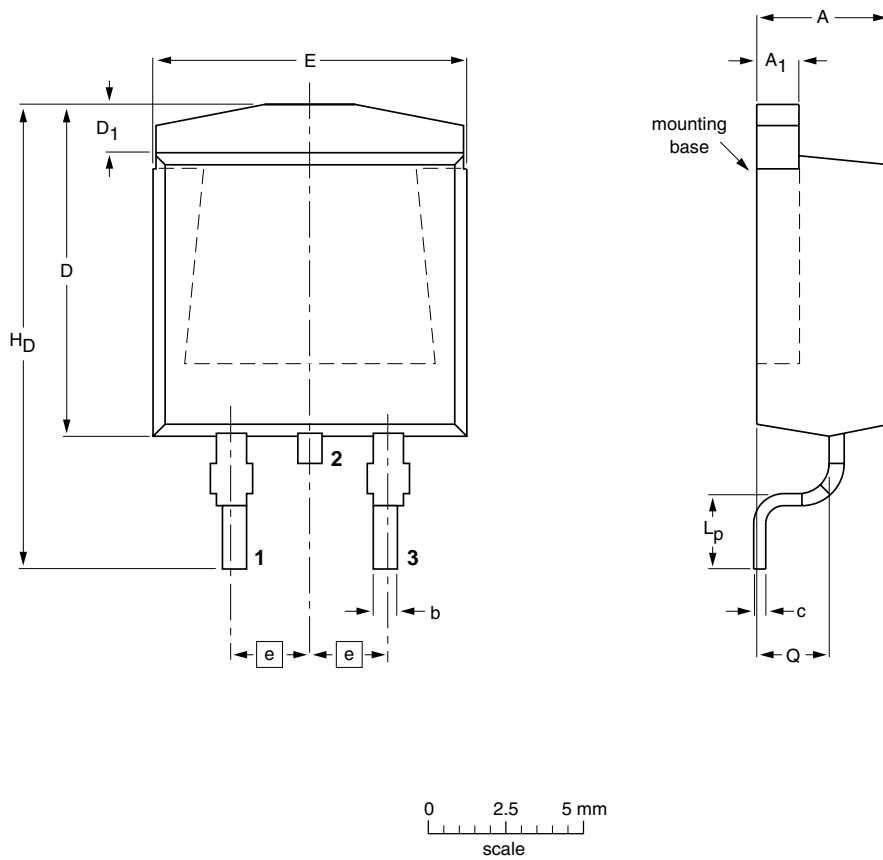
$$V_{GS} = 0V; f = 1MHz$$

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

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
BUK7675-100A_2	20090731	Product data sheet	-	BUK7575_7675-100A-01
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 BUK7675-100A separated from data sheet BUK7575_7675-100A-01.</li> </ul>		
BUK7575_7675-100A-01 (9397 750 07623)	20001024	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".

[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>.

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