



# BUK9245-55A

N-channel TrenchMOS logic level FET

Rev. 02 — 31 May 2010

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

- Low conduction losses due to low on-state resistance
- Q101 compliant
- Suitable for logic level gate drive sources
- Suitable for thermally demanding environments due to 175 °C rating

### 1.3 Applications

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

### 1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage	$T_j \geq 25^\circ\text{C}; T_j \leq 175^\circ\text{C}$	-	-	55	V
$I_D$	drain current	$V_{GS} = 5\text{ V}; T_{mb} = 25^\circ\text{C}$ ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 3</a>	-	-	28	A
$P_{tot}$	total power dissipation	$T_{mb} = 25^\circ\text{C}$ ; see <a href="#">Figure 2</a>	-	-	70	W
Static characteristics						
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 5\text{ A}; T_j = 25^\circ\text{C}$	-	27	40	$\text{m}\Omega$
		$V_{GS} = 4.5\text{ V}; I_D = 5\text{ A}; T_j = 25^\circ\text{C}$	-	-	50	$\text{m}\Omega$
		$V_{GS} = 5\text{ V}; I_D = 5\text{ A}; T_j = 25^\circ\text{C}$ ; see <a href="#">Figure 11</a> ; see <a href="#">Figure 12</a>	-	31	45	$\text{m}\Omega$

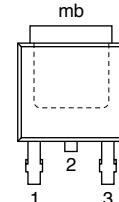
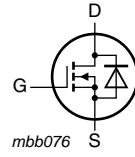
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Table 1. Quick reference data ...continued

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Avalanche ruggedness</b>						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 28 \text{ A}$ ; $V_{sup} \leq 55 \text{ V}$ ; $R_{GS} = 50 \Omega$ ; $V_{GS} = 5 \text{ V}$ ; $T_{j(init)} = 25 \text{ }^\circ\text{C}$ ; unclamped	-	-	62	$\text{mJ}$
<b>Dynamic characteristics</b>						
$Q_{GD}$	gate-drain charge	$V_{GS} = 5 \text{ V}$ ; $I_D = 5 \text{ A}$ ; $V_{DS} = 44 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 13</a>	-	6.3	-	$\text{nC}$

## 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		
SOT428 (DPAK)				

## 3. Ordering information

Table 3. Ordering information

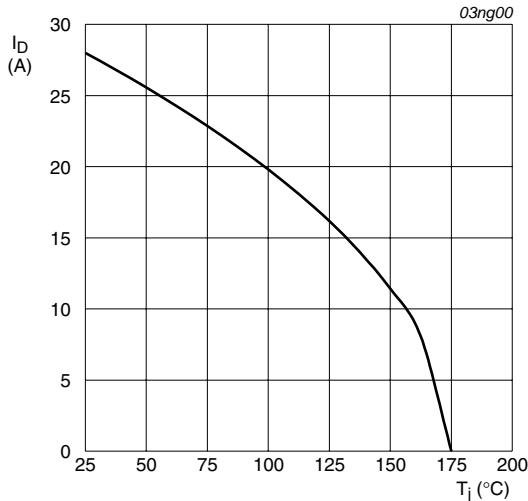
Type number	Package		
	Name	Description	Version
BUK9245-55A	DPAK	plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	SOT428

## 4. Limiting values

**Table 4. Limiting values**

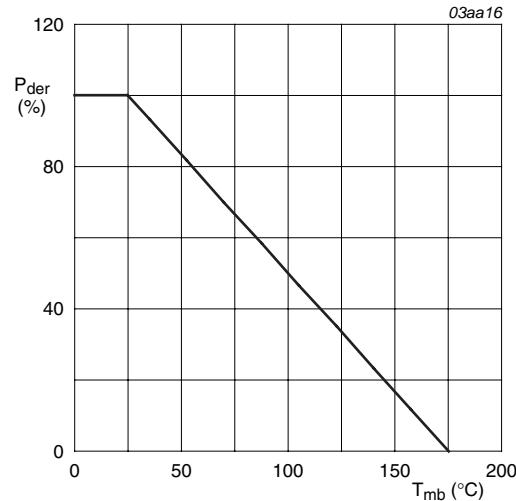
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage	$T_j \geq 25^\circ\text{C}; T_j \leq 175^\circ\text{C}$	-	-	55	V
$V_{DGR}$	drain-gate voltage	$R_{GS} = 20 \text{ k}\Omega$	-	-	55	V
$V_{GS}$	gate-source voltage		-15	-	15	V
$I_D$	drain current	$T_{mb} = 25^\circ\text{C}; V_{GS} = 5 \text{ V}$ ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 3</a>	-	-	28	A
		$T_{mb} = 100^\circ\text{C}; V_{GS} = 5 \text{ V}$ ; see <a href="#">Figure 1</a>	-	-	20	A
$I_{DM}$	peak drain current	$T_{mb} = 25^\circ\text{C}; t_p \leq 10 \mu\text{s}$ ; pulsed; see <a href="#">Figure 3</a>	-	-	112	A
$P_{tot}$	total power dissipation	$T_{mb} = 25^\circ\text{C}$ ; see <a href="#">Figure 2</a>	-	-	70	W
$T_{stg}$	storage temperature		-55	-	175	°C
$T_j$	junction temperature		-55	-	175	°C
<b>Source-drain diode</b>						
$I_S$	source current	$T_{mb} = 25^\circ\text{C}$	-	-	28	A
$I_{SM}$	peak source current	$t_p \leq 10 \mu\text{s}$ ; pulsed; $T_{mb} = 25^\circ\text{C}$	-	-	112	A
<b>Avalanche ruggedness</b>						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 28 \text{ A}; V_{sup} \leq 55 \text{ V}; R_{GS} = 50 \Omega; V_{GS} = 5 \text{ V}; T_{j(init)} = 25^\circ\text{C}$ ; unclamped	-	-	62	mJ



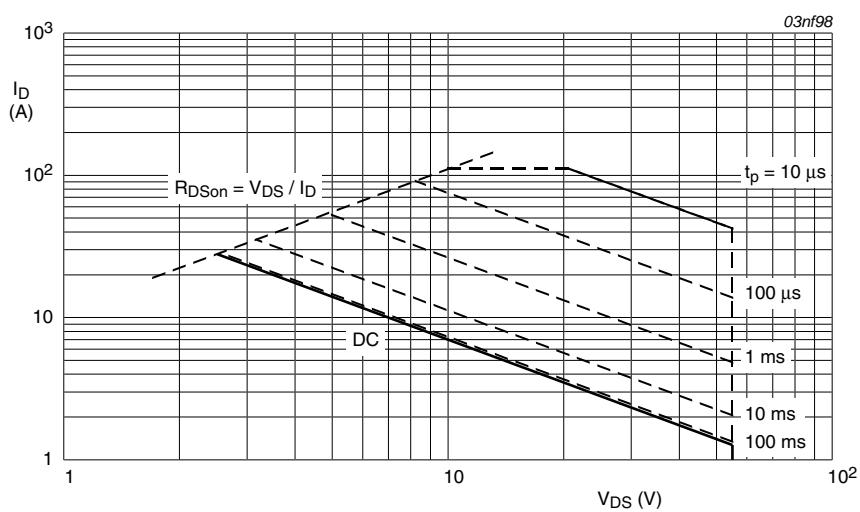
$$V_{GS} \geq 4.5V I_{der} = \frac{I_D}{I_{D(25^\circ\text{C})}} \times 100\%$$

**Fig 1. 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**



$T_{mb} = 25^\circ C$ ;  $I_{DM}$  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
$R_{th(j\text{-}mb)}$	thermal resistance from junction to mounting base	see <a href="#">Figure 4</a>	-	-	2.1	K/W
$R_{th(j\text{-}a)}$	thermal resistance from junction to ambient		-	71.4	-	K/W

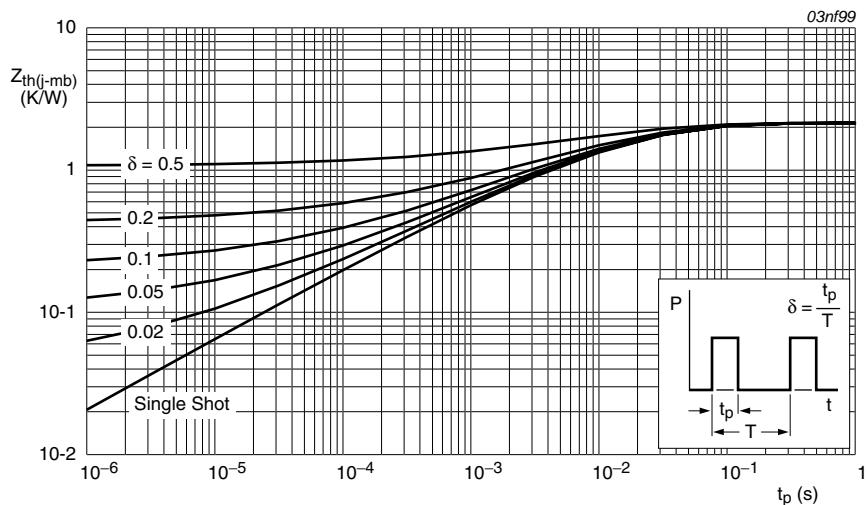
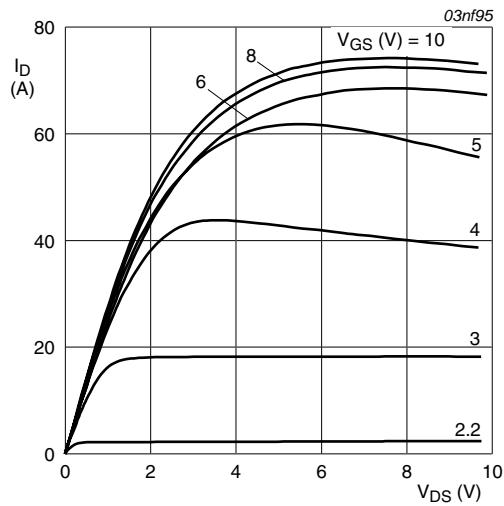


Fig 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

## 6. Characteristics

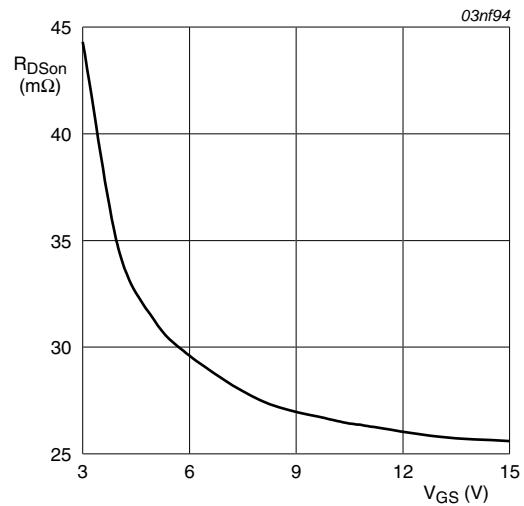
**Table 6. Characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 0.25 \text{ mA}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ $I_D = 0.25 \text{ mA}; V_{GS} = 0 \text{ V}; T_j = -55 \text{ }^\circ\text{C}$	55	-	-	V
$V_{GS(\text{th})}$	gate-source threshold voltage	$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = 175 \text{ }^\circ\text{C};$ see <a href="#">Figure 10</a> $I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = 25 \text{ }^\circ\text{C};$ see <a href="#">Figure 10</a> $I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = -55 \text{ }^\circ\text{C};$ see <a href="#">Figure 10</a>	0.5	-	-	V
$I_{DSS}$	drain leakage current	$V_{DS} = 55 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 175 \text{ }^\circ\text{C}$ $V_{DS} = 55 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	500	$\mu\text{A}$
$I_{GSS}$	gate leakage current	$V_{DS} = 0 \text{ V}; V_{GS} = 10 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ $V_{DS} = 0 \text{ V}; V_{GS} = -10 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	2	100	nA
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 10 \text{ V}; I_D = 5 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$ $V_{GS} = 5 \text{ V}; I_D = 5 \text{ A}; T_j = 175 \text{ }^\circ\text{C};$ see <a href="#">Figure 11</a> ; see <a href="#">Figure 12</a> $V_{GS} = 4.5 \text{ V}; I_D = 5 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$ $V_{GS} = 5 \text{ V}; I_D = 5 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$ see <a href="#">Figure 11</a> ; see <a href="#">Figure 12</a>	-	27	40	$\text{m}\Omega$
<b>Dynamic characteristics</b>						
$Q_{G(\text{tot})}$	total gate charge	$I_D = 5 \text{ A}; V_{DS} = 44 \text{ V}; V_{GS} = 5 \text{ V};$	-	14	-	nC
$Q_{GS}$	gate-source charge	$T_j = 25 \text{ }^\circ\text{C};$ see <a href="#">Figure 13</a>	-	1.6	-	nC
$Q_{GD}$	gate-drain charge		-	6.3	-	nC
$C_{iss}$	input capacitance	$V_{GS} = 0 \text{ V}; V_{DS} = 25 \text{ V}; f = 1 \text{ MHz};$	-	750	1006	pF
$C_{oss}$	output capacitance	$T_j = 25 \text{ }^\circ\text{C};$ see <a href="#">Figure 14</a>	-	140	166	pF
$C_{rss}$	reverse transfer capacitance		-	97	132	pF
$t_{d(\text{on})}$	turn-on delay time	$V_{DS} = 30 \text{ V}; R_L = 1.2 \text{ } \Omega; V_{GS} = 5 \text{ V};$	-	10	-	ns
$t_r$	rise time	$R_{G(\text{ext})} = 10 \text{ } \Omega; T_j = 25 \text{ }^\circ\text{C}$	-	132	-	ns
$t_{d(\text{off})}$	turn-off delay time		-	38	-	ns
$t_f$	fall time		-	112	-	ns
$L_D$	internal drain inductance	measured from drain to centre of die	-	2.5	-	nH
$L_S$	internal source inductance	measured from source lead to source bond pad	-	7.5	-	nH
<b>Source-drain diode</b>						
$V_{SD}$	source-drain voltage	$I_S = 8 \text{ A}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C};$ see <a href="#">Figure 15</a>	-	0.85	1.2	V
$t_{rr}$	reverse recovery time	$I_S = 20 \text{ A}; dI_S/dt = -100 \text{ A}/\mu\text{s};$ $V_{GS} = -10 \text{ V}; V_{DS} = 30 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	50	-	ns
$Q_r$	recovered charge		-	53	-	nC



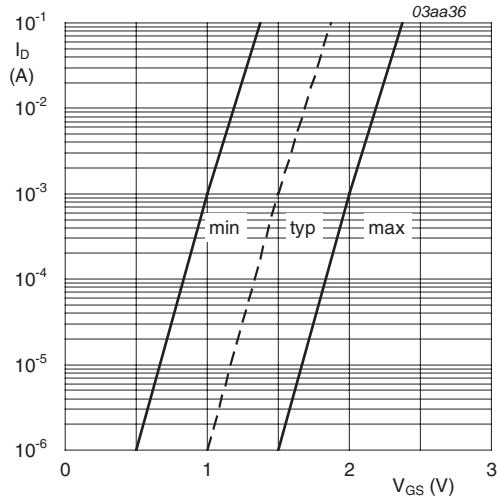
$T_j = 25^\circ C$

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



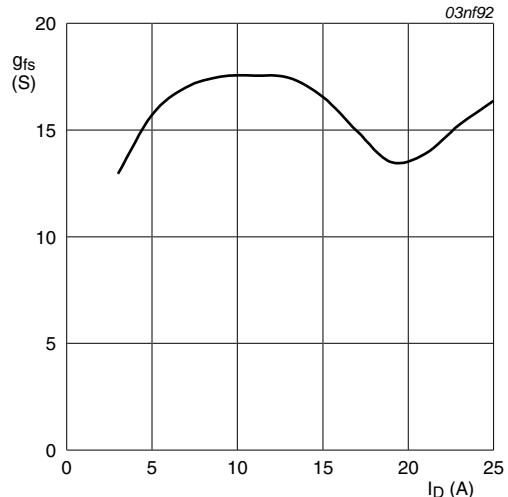
$T_j = 25^\circ C; I_D = 5A$

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



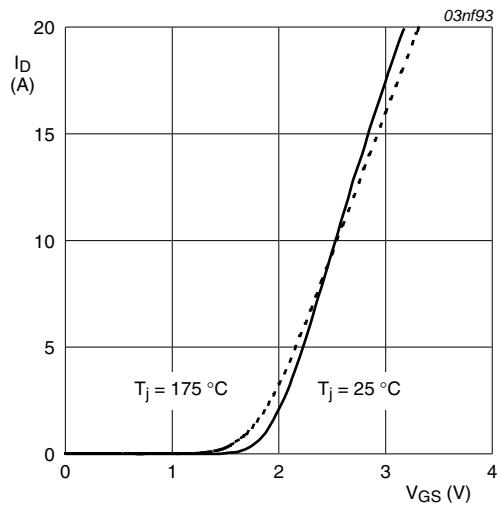
$T_j = 25^\circ C; V_{DS} = V_{GS}$

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



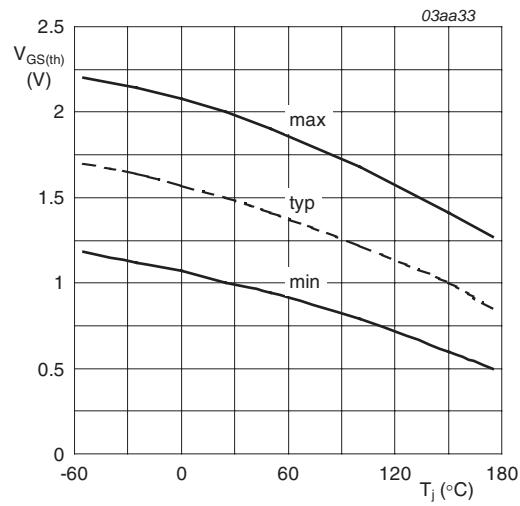
$T_j = 25^\circ C; V_{DS} = 25V$

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



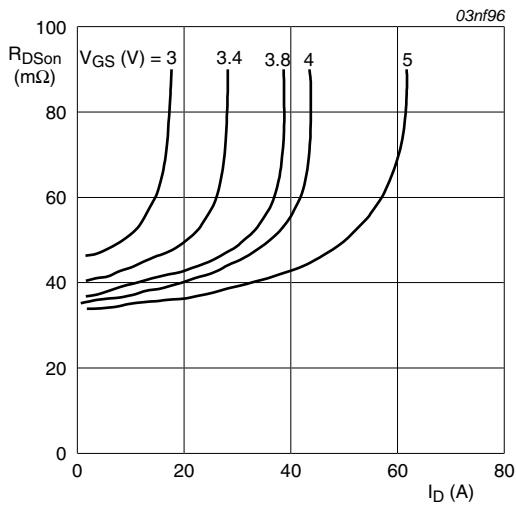
$V_{DS} = 25V$

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



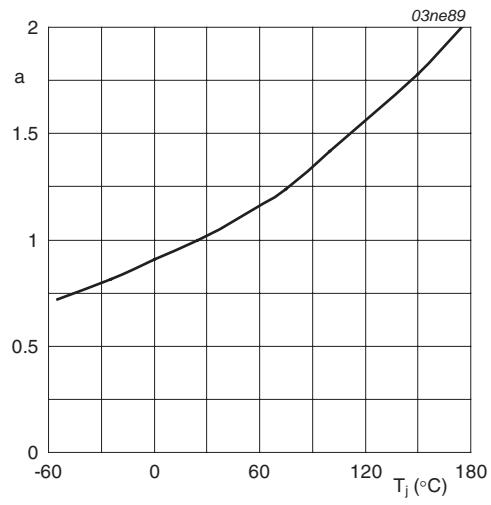
$I_D = 1mA; V_{DS} = V_{GS}$

**Fig 10. Gate-source threshold voltage as a function of junction temperature**



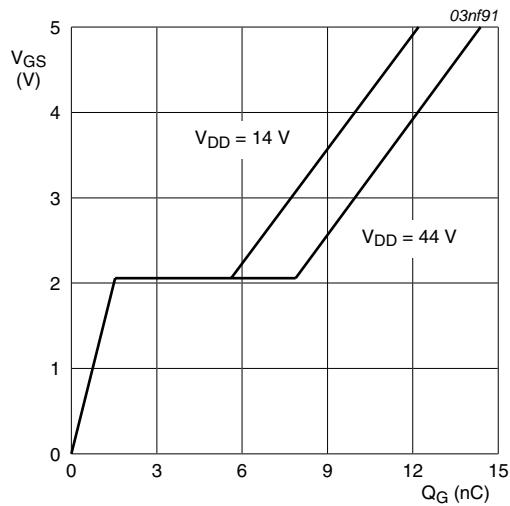
$T_j = 25^{\circ}C$

**Fig 11. Drain-source on-state resistance as a function of drain current; typical values**



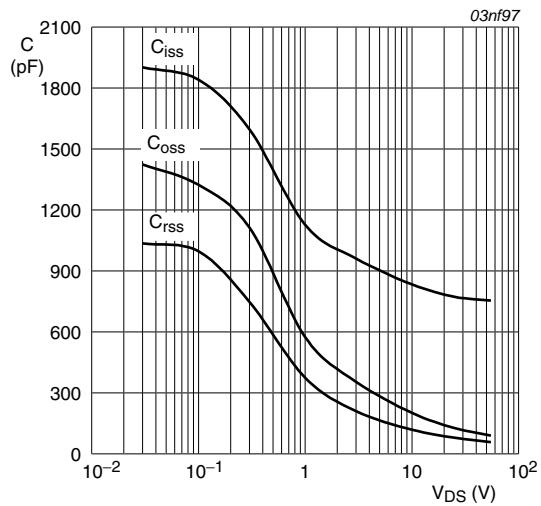
$$a = \frac{R_{DSon}}{R_{DSon}(25^{\circ}C)}$$

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



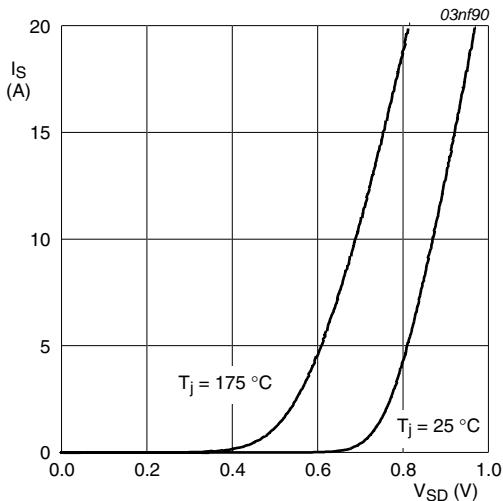
$T_j = 25^\circ C; I_D = 5A$

**Fig 13. Gate-source voltage as a function of turn-on gate charge; typical values**



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

**Fig 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values**



$V_{GS} = 0V$

**Fig 15. Reverse diode current as a function of reverse diode voltage; typical values**

## 7. Package outline

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

SOT428

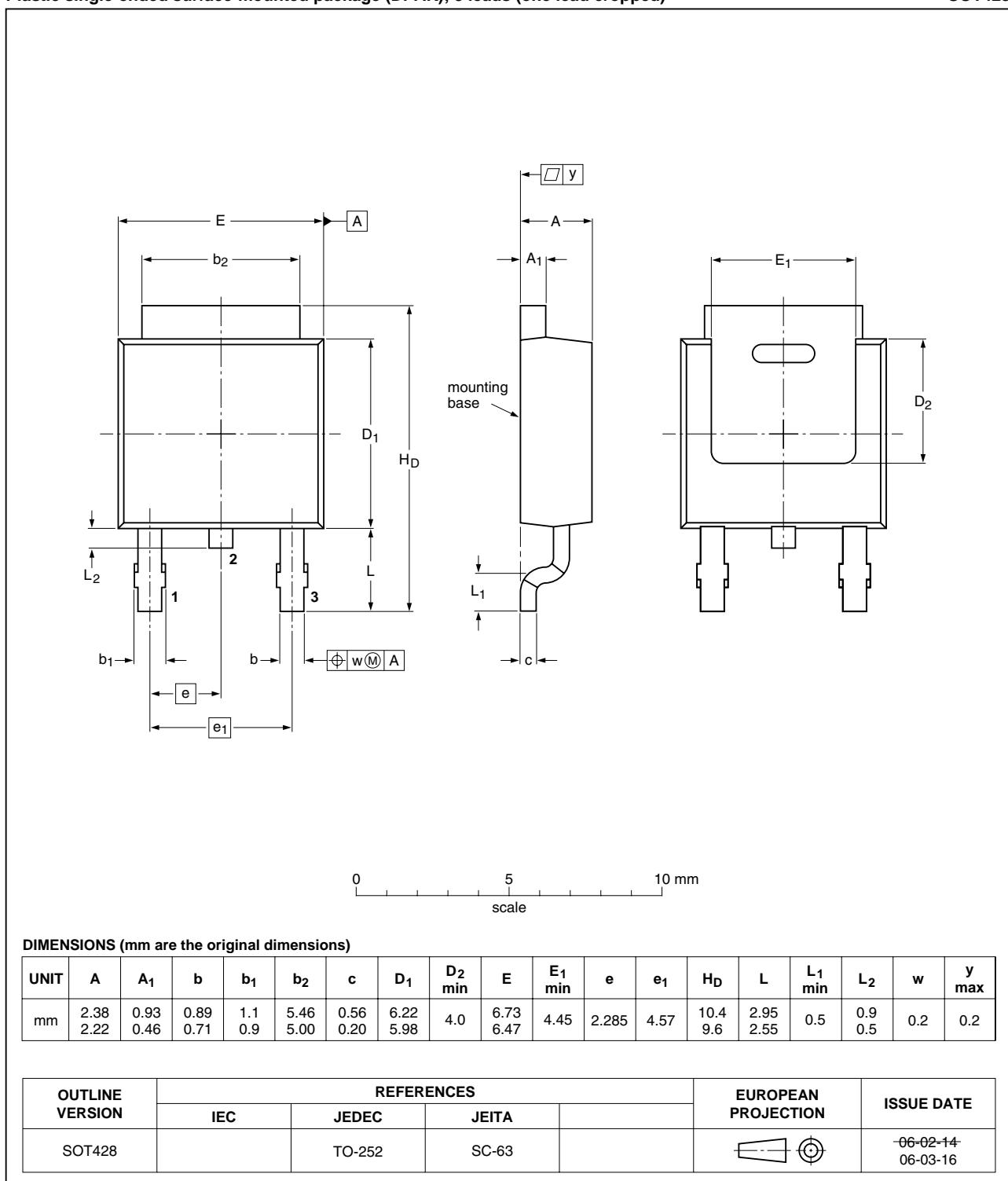


Fig 16. Package outline SOT428 (DPAK)

## 8. Revision history

**Table 7. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BUK9245-55A v.2	20100531	Product data sheet	-	BUK9245_55A_1
Modifications:		• Various changes to content.		
BUK9245_55A_1	20011011	Product data	-	-

## 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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# OCEAN CHIPS

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## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

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



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