



# BUK7614-55A

## N-channel TrenchMOS standard level FET

Rev. 2 — 26 April 2011

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

- 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

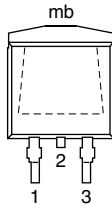
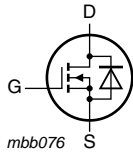
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage	$T_j \geq 25\text{ °C}$ ; $T_j \leq 175\text{ °C}$	-	-	55	V
$I_D$	drain current	$T_{mb} = 25\text{ °C}$	-	-	73	A
$P_{tot}$	total power dissipation		-	-	166	W
<b>Static characteristics</b>						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}$ ; $I_D = 25\text{ A}$ ; $T_j = 25\text{ °C}$	-	12	14	mΩ
<b>Specify Name</b>						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 50\text{ A}$ ; $V_{sup} \leq 25\text{ V}$ ; $R_{GS} = 50\text{ Ω}$ ; $V_{GS} = 5\text{ V}$ ; $T_{j(init)} = 25\text{ °C}$ ; unclamped	-	-	125	mJ



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		
SOT404 (D2PAK)				

3. Ordering information

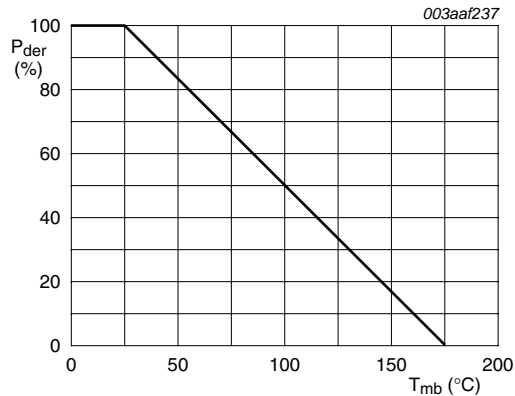
Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BUK7614-55A	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

4. Limiting values

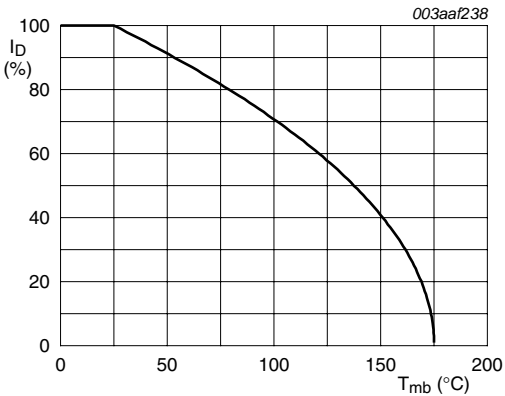
Table 4. Limiting values  
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>DS</sub>	drain-source voltage	T <sub>j</sub> ≥ 25 °C; T <sub>j</sub> ≤ 175 °C	-	55	V
V <sub>DGR</sub>	drain-gate voltage	R <sub>GS</sub> = 20 kΩ	-	55	V
V <sub>GS</sub>	gate-source voltage		-20	20	V
I <sub>D</sub>	drain current	T <sub>mb</sub> = 25 °C	-	73	A
		T <sub>mb</sub> = 100 °C	-	52	A
I <sub>DM</sub>	peak drain current	T <sub>mb</sub> = 25 °C; pulsed	-	266	A
P <sub>tot</sub>	total power dissipation	T <sub>mb</sub> = 25 °C	-	166	W
T <sub>stg</sub>	storage temperature		-55	175	°C
T <sub>j</sub>	junction temperature		-55	175	°C
Source-drain diode					
I <sub>S</sub>	source current	T <sub>mb</sub> = 25 °C	-	73	A
I <sub>SM</sub>	peak source current	pulsed; T <sub>mb</sub> = 25 °C	-	266	A
Specify Name					
E <sub>DS(AL)S</sub>	non-repetitive drain-source avalanche energy	I <sub>D</sub> = 50 A; V <sub>sup</sub> ≤ 25 V; R <sub>GS</sub> = 50 Ω; V <sub>GS</sub> = 5 V; T <sub>j(init)</sub> = 25 °C; unclamped	-	125	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



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

V<sub>GS</sub> ≥ 5 V

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

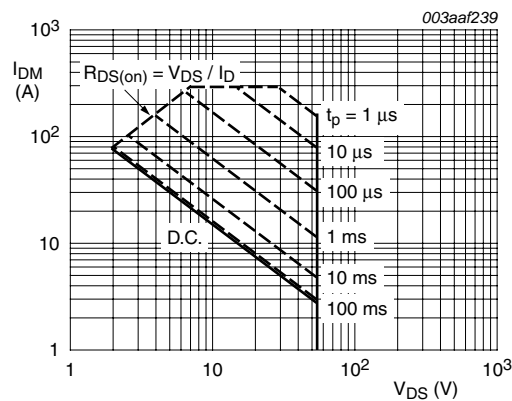


Fig 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

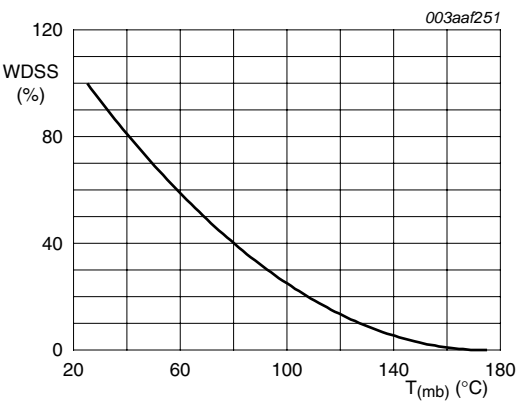


Fig 4. Normalised drain-source non-repetitive avalanche energy as a function of mounting-base temperature

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		-	-	0.9	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	minimum footprint; FR4 board	-	50	-	K/W

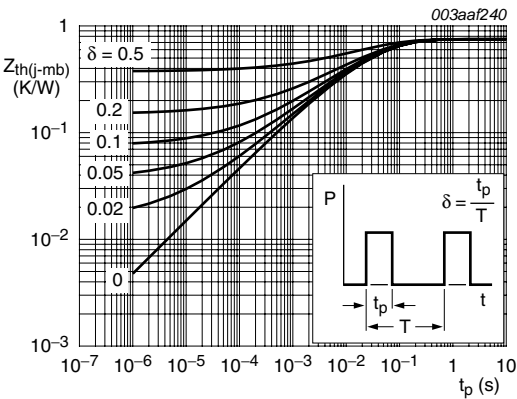


Fig 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

## 6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V <sub>(BR)DSS</sub>	drain-source breakdown voltage	I <sub>D</sub> = 0.25 mA; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C	55	-	-	V
		I <sub>D</sub> = 0.25 mA; V <sub>GS</sub> = 0 V; T <sub>j</sub> = -55 °C	50	-	-	V
V <sub>GS(th)</sub>	gate-source threshold voltage	I <sub>D</sub> = 1 mA; V <sub>DS</sub> = V <sub>GS</sub> ; T <sub>j</sub> = 25 °C	2	3	4	V
		I <sub>D</sub> = 1 mA; V <sub>DS</sub> = V <sub>GS</sub> ; T <sub>j</sub> = 175 °C	1	-	-	V
		I <sub>D</sub> = 1 mA; V <sub>DS</sub> = V <sub>GS</sub> ; T <sub>j</sub> = -55 °C	-	-	4.4	V
I <sub>DSS</sub>	drain leakage current	V <sub>DS</sub> = 55 V; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C	-	0.05	10	μA
		V <sub>DS</sub> = 55 V; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 175 °C	-	-	500	μA
I <sub>GSS</sub>	gate leakage current	V <sub>GS</sub> = 20 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C	-	2	100	nA
		V <sub>GS</sub> = -20 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C	-	2	100	nA
R <sub>DSon</sub>	drain-source on-state resistance	V <sub>GS</sub> = 10 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 175 °C	-	-	28	mΩ
		V <sub>GS</sub> = 10 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 25 °C	-	12	14	mΩ
Dynamic characteristics						
C <sub>iss</sub>	input capacitance	V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 25 V; f = 1 MHz; T <sub>j</sub> = 25 °C	-	1848	2464	pF
C <sub>oss</sub>	output capacitance		-	421	506	pF
C <sub>rss</sub>	reverse transfer capacitance		-	231	317	pF
t <sub>d(on)</sub>	turn-on delay time	V <sub>DS</sub> = 30 V; R <sub>L</sub> = 1.2 Ω; V <sub>GS</sub> = 5 V; R <sub>G(ext)</sub> = 10 Ω; T <sub>j</sub> = 25 °C	-	17	26	ns
t <sub>r</sub>	rise time		-	79	119	ns
t <sub>d(off)</sub>	turn-off delay time		-	57	80	ns
t <sub>f</sub>	fall time		-	51	71	ns
L <sub>D</sub>	internal drain inductance	measured from drain lead 6 mm from package to centre of die; T <sub>j</sub> = 25 °C	-	4.5	-	nH
		measured from upper edge of drain mounting base to centre of die; T <sub>j</sub> = 25 °C	-	2.5	-	nH
L <sub>S</sub>	internal source inductance	measured from source lead to source bond pad; T <sub>j</sub> = 25 °C	-	7.5	-	nH
Source-drain diode						
V <sub>SD</sub>	source-drain voltage	I <sub>S</sub> = 25 A; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C	-	0.85	1.2	V
		I <sub>S</sub> = 73 A; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C	-	1.1	-	V
t <sub>rr</sub>	reverse recovery time	I <sub>S</sub> = 73 A; dI <sub>S</sub> /dt = -100 A/μs; V <sub>GS</sub> = -10 V; V <sub>DS</sub> = 30 V; T <sub>j</sub> = 25 °C	-	54	-	ns
Q <sub>r</sub>	recovered charge	V <sub>GS</sub> = -10 V; V <sub>DS</sub> = 30 V; T <sub>j</sub> = 25 °C	-	0.12	-	μC

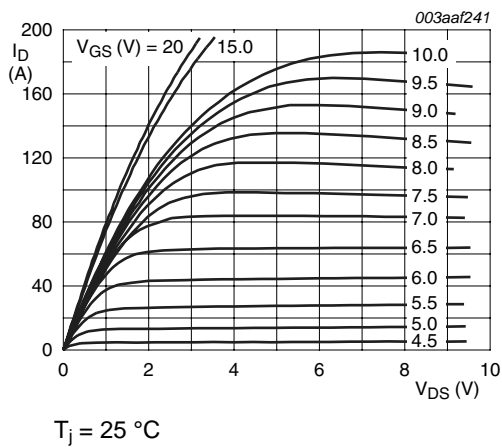


Fig 6. Output characteristics: drain current as a function of drain-source voltage; typical values

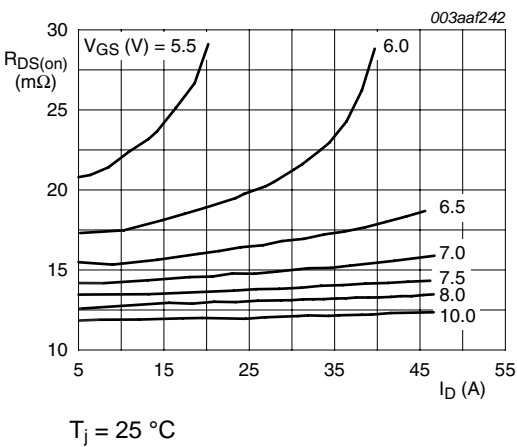


Fig 7. Drain-source on-state resistance as a function of drain current; typical values

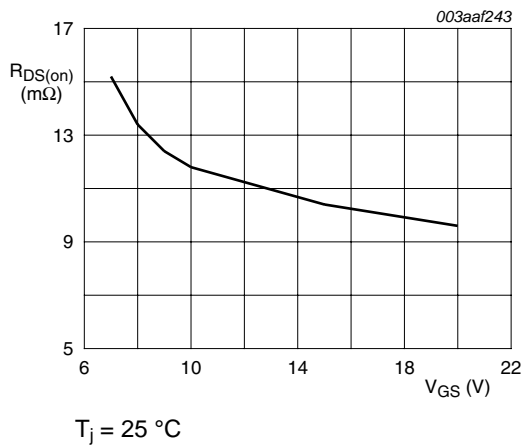


Fig 8. Drain-source on-state resistance as a function of gate-source voltage; typical values

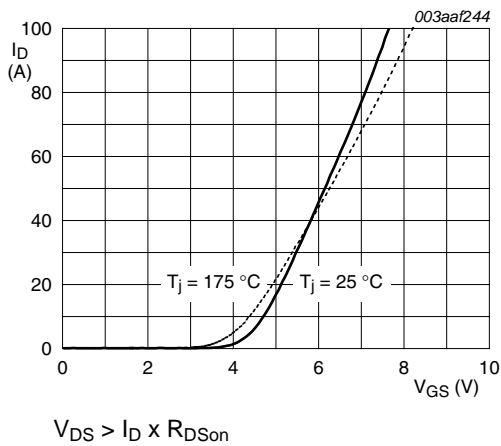


Fig 9. Transfer characteristics: drain current as a function of gate-source voltage; typical values

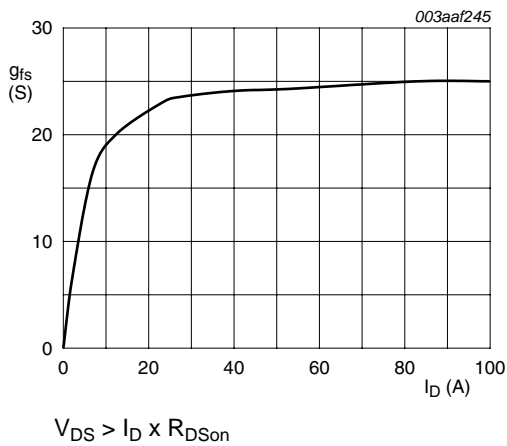


Fig 10. Forward transconductance as a function of drain current; typical values

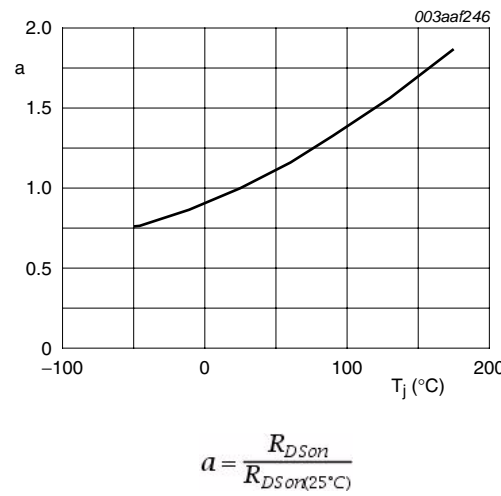


Fig 11. Normalized drain-source on-state resistance factor as a function of junction temperature

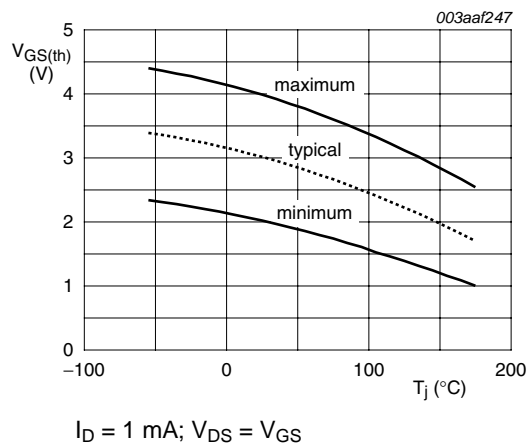


Fig 12. Gate-source threshold voltage as a function of junction temperature

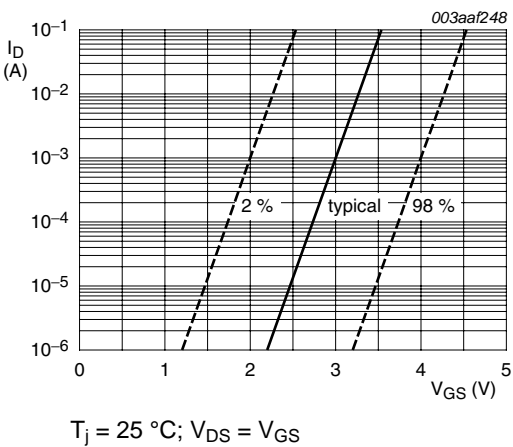


Fig 13. Sub-threshold drain current as a function of gate-source voltage

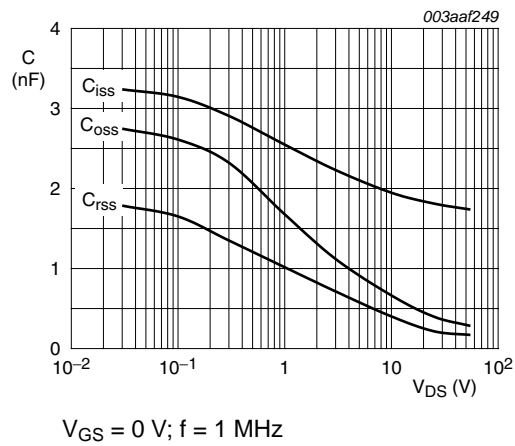


Fig 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

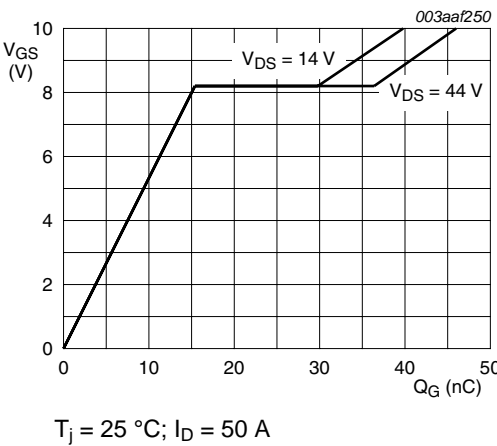


Fig 15. Gate-source voltage as a function of gate charge; typical values

7. Package outline

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)

SOT404

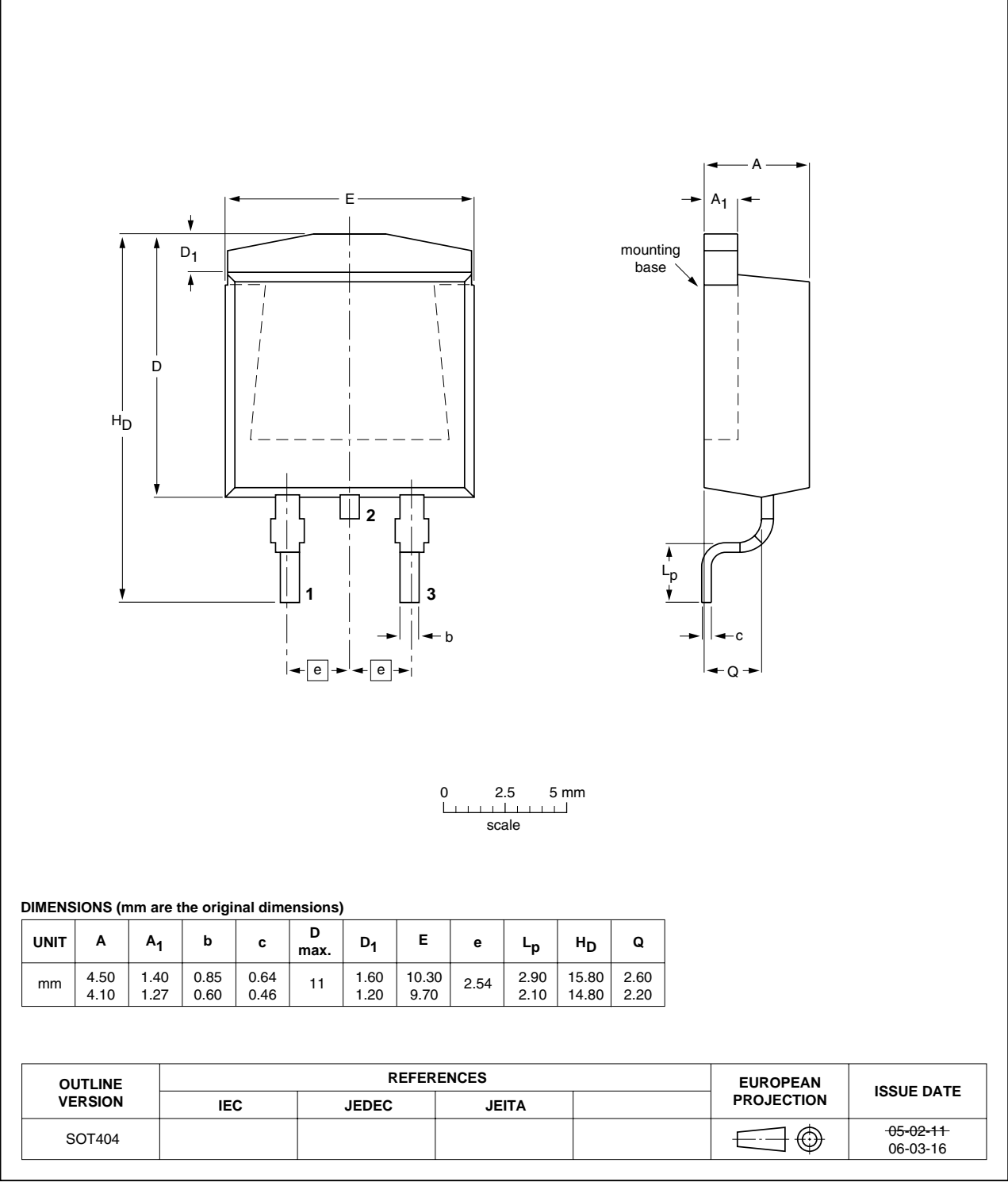


Fig 16. Package outline SOT404 (D2PAK)

## 8. Revision history

**Table 7.** Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BUK7614-55A v.2	20110426	Product data sheet	-	BUK7514_7614-55A_1
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 BUK7614-55A separated from data sheet BUK7514_7614-55A_1.</li></ul>			
BUK7514_7614-55A_1	20000701	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.

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[2] The term 'short data sheet' is explained in section "Definitions".

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