

BUK7619-100B

N-channel TrenchMOS standard level FET

Rev. 01 — 10 October 2007

Product data sheet

1. Product profile

1.1 General description

N-channel enhancement mode power Field-Effect Transistor (FET) in a plastic package using NXP High Performance Automotive (HPA) TrenchMOS technology.

1.2 Features

- TrenchMOS technology
- 175 °C rated
- Q101 compliant
- Standard level compatible

1.3 Applications

- Automotive systems
- Motors, lamps and solenoids
- General purpose power switching
- 12 V, 24 V and 42 V loads.

1.4 Quick reference data

- $E_{DS(AL)S} \leq 222$ mJ
- $I_D \leq 64$ A
- $R_{DSon} = 17$ m Ω (typ)
- $P_{tot} \leq 200$ W

2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Symbol
1	gate (G)	<p style="text-align: center;">SOT404 (D2PAK)</p>	<p style="text-align: center;">mbb076</p>
2	drain (D)		
3	source (S)		
mb	mounting base; connected to drain (D)		

3. Ordering information

Table 2. Ordering information

Type number	Package		Version
	Name	Description	
BUK7619-100B	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3-leads (one lead cropped)	SOT404

4. Limiting values

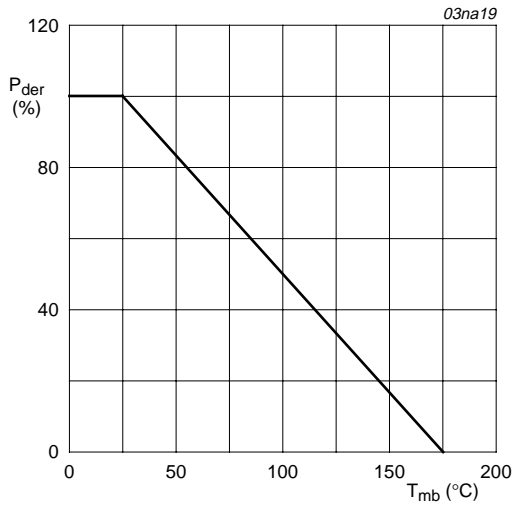
Table 3. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	drain-source voltage		-	100	V
V_{DGR}	drain-gate voltage (DC)	$R_{GS} = 20 \text{ k}\Omega$	-	100	V
V_{GS}	gate-source voltage		-	± 20	V
I_D	drain current	$T_{sp} = 25 \text{ }^\circ\text{C}$; $V_{GS} = 10 \text{ V}$; see Figure 2 and 3	-	64	A
		$T_{sp} = 100 \text{ }^\circ\text{C}$; $V_{GS} = 10 \text{ V}$; see Figure 2	-	45	A
I_{DM}	peak drain current	$T_{mb} = 25 \text{ }^\circ\text{C}$; pulsed; $t_p \leq 10 \text{ }\mu\text{s}$; see Figure 3	-	256	A
P_{tot}	total power dissipation	$T_{mb} = 25 \text{ }^\circ\text{C}$; see Figure 1	-	200	W
T_{stg}	storage temperature		-55	+175	$^\circ\text{C}$
T_j	junction temperature		-55	+175	$^\circ\text{C}$
Source-drain diode					
I_{DR}	reverse drain current	$T_{mb} = 25 \text{ }^\circ\text{C}$	-	64	A
I_{DRM}	peak reverse drain current	$T_{mb} = 25 \text{ }^\circ\text{C}$; pulsed; $t_p \leq 10 \text{ }\mu\text{s}$	-	256	A
Avalanche ruggedness					
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	unclamped inductive load; $I_D = 64 \text{ A}$; $V_{DS} \leq 100 \text{ V}$; $R_{GS} = 50 \text{ }\Omega$; $V_{GS} = 10 \text{ V}$; starting at $T_j = 25 \text{ }^\circ\text{C}$	-	222	mJ
$E_{DS(AL)R}$	repetitive drain-source avalanche energy		[1]	-	mJ

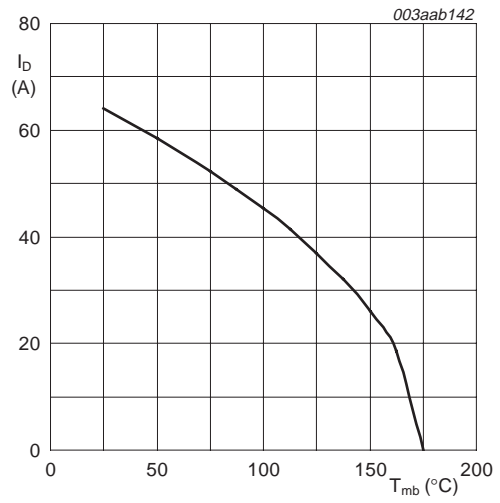
[1] Conditions:

- Maximum value not quoted. Repetitive rating defined in [Figure 16](#).
- Single-pulse avalanche rating limited by $T_{j(max)}$ of $175 \text{ }^\circ\text{C}$.
- Repetitive avalanche rating limited by an average junction temperature of $170 \text{ }^\circ\text{C}$.
- Refer to application note *AN10273* for further information.



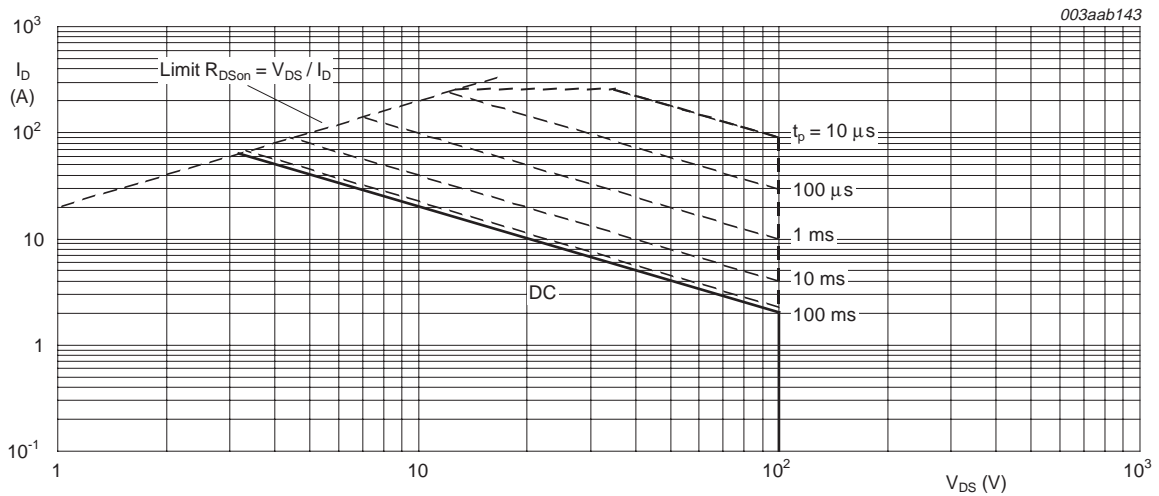
$$P_{der} = \frac{P_{tot}}{P_{tot(25^{\circ}C)}} \times 100\%$$

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



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

Fig 2. Continuous drain current 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 4. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base		-	-	0.74	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	mounted on a printed-circuit board; minimum footprint	-	50	-	K/W

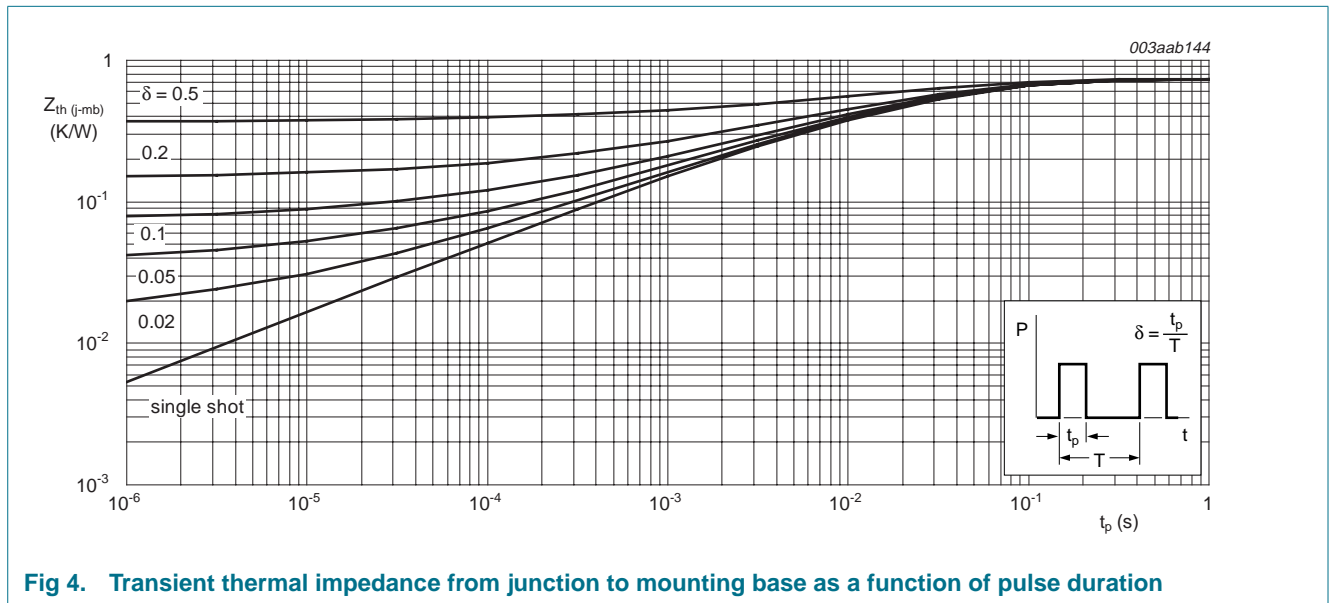
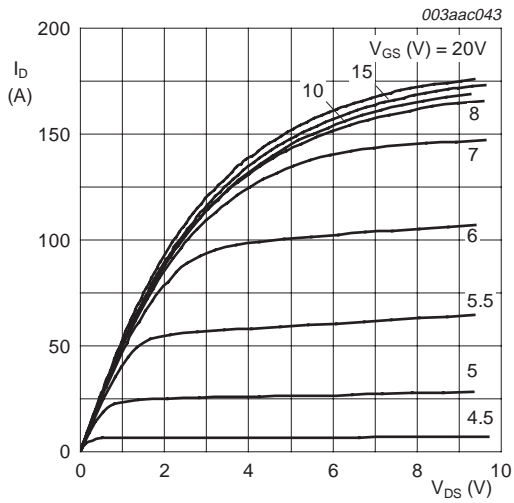


Fig 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

6. Characteristics

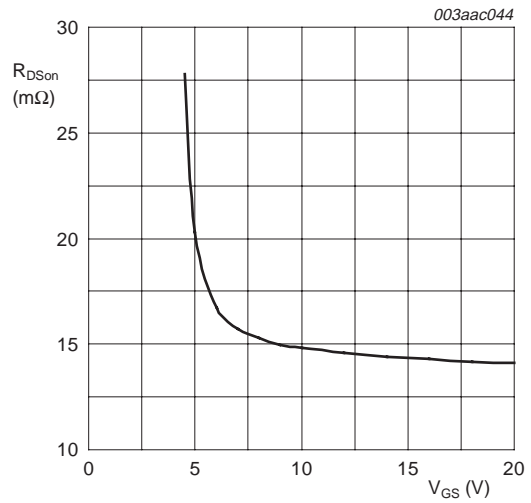
Table 5. Characteristics
T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V _{(BR)DSS}	drain-source breakdown voltage	I _D = 250 μA; V _{GS} = 0 V				
		T _j = 25 °C	100	-	-	V
		T _j = -55 °C	89	-	-	V
V _{GS(th)}	gate-source threshold voltage	I _D = 1 mA; V _{DS} = V _{GS} ; see Figure 9 and 10				
		T _j = 25 °C	2	3	4	V
		T _j = 175 °C	1	-	-	V
		T _j = -55 °C	-	-	4.4	V
I _{DSS}	drain leakage current	V _{DS} = 100 V; V _{GS} = 0 V				
		T _j = 25 °C	-	0.02	1	μA
		T _j = 175 °C	-	-	500	μA
I _{GSS}	gate leakage current	V _{GS} = ±20 V; V _{DS} = 0 V	-	2	100	nA
R _{DS(on)}	drain-source on-state resistance	V _{GS} = 10 V; I _D = 25 A; see Figure 7 and 8				
		T _j = 25 °C	-	17	19	mΩ
		T _j = 175 °C	-	-	49	mΩ
Dynamic characteristics						
Q _{G(tot)}	total gate charge	I _D = 25 A; V _{DD} = 80 V; V _{GS} = 10 V; see Figure 14	-	53	-	nC
Q _{GS}	gate-source charge		-	11	-	nC
Q _{GD}	gate-drain charge		-	27	-	nC
C _{iss}	input capacitance	V _{GS} = 0 V; V _{DS} = 25 V; f = 1 MHz; see Figure 12	-	2555	3400	pF
C _{oss}	output capacitance		-	340	480	pF
C _{rss}	reverse transfer capacitance		-	84	115	pF
t _{d(on)}	turn-on delay time	V _{DS} = 30 V; R _L = 1.2 Ω;	-	19	-	ns
t _r	rise time	V _{GS} = 10 V; R _G = 10 Ω	-	45	-	ns
t _{d(off)}	turn-off delay time		-	85	-	ns
t _f	fall time		-	34	-	ns
Source-drain diode						
V _{SD}	source-drain voltage	I _S = 25 A; V _{GS} = 0 V; see Figure 15	-	0.85	1.2	V
t _{rr}	reverse recovery time	I _S = 20 A; di _S /dt = -100 A/μs;	-	116	-	ns
Q _r	recovered charge	V _{GS} = 0 V; V _R = 30 V	-	130	-	nC



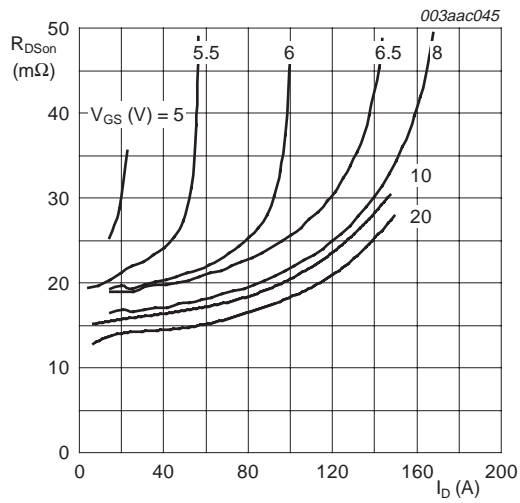
$T_j = 25\text{ °C}$

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



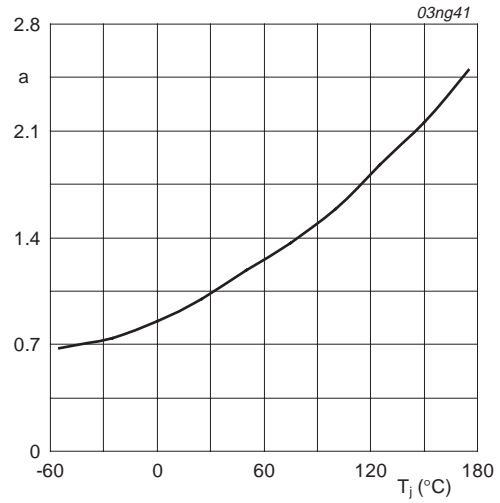
$T_j = 25\text{ °C}; I_D = 10\text{ A}$

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



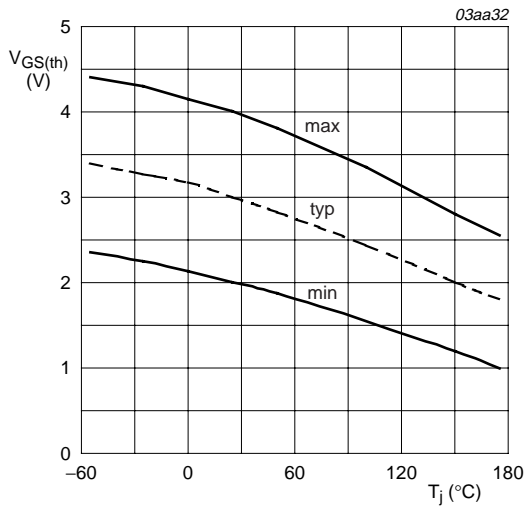
$T_j = 25\text{ °C}$

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



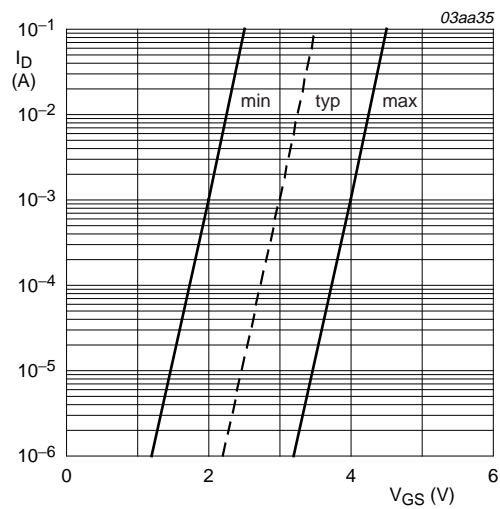
$$a = \frac{R_{DSon}}{R_{DSon(25\text{°C})}}$$

Fig 8. Normalized drain-source on-state resistance factor as a function of junction temperature



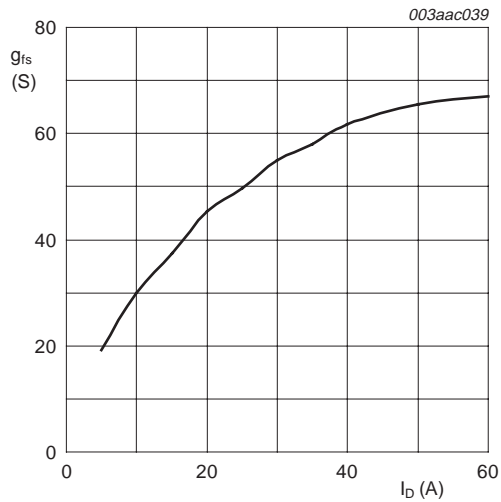
$I_D = 1 \text{ mA}; V_{DS} = V_{GS}$

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



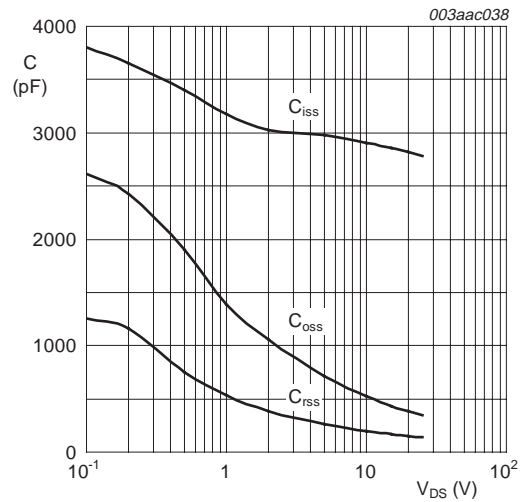
$T_j = 25 \text{ }^{\circ}C; V_{DS} = V_{GS}$

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



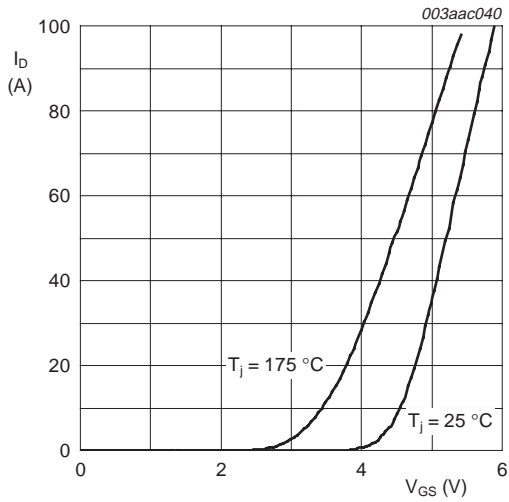
$T_j = 25 \text{ }^{\circ}C; V_{DS} = 25 \text{ V}$

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



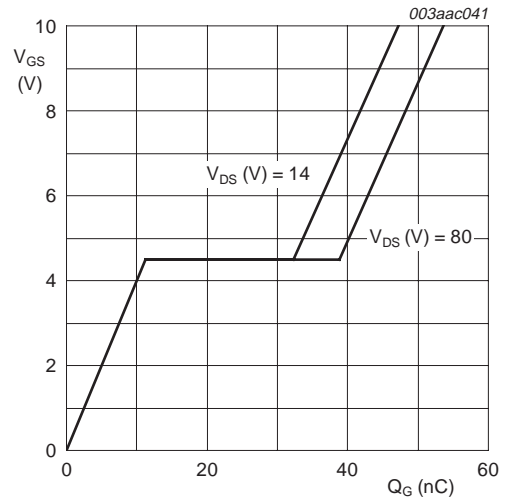
$V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$

Fig 12. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values



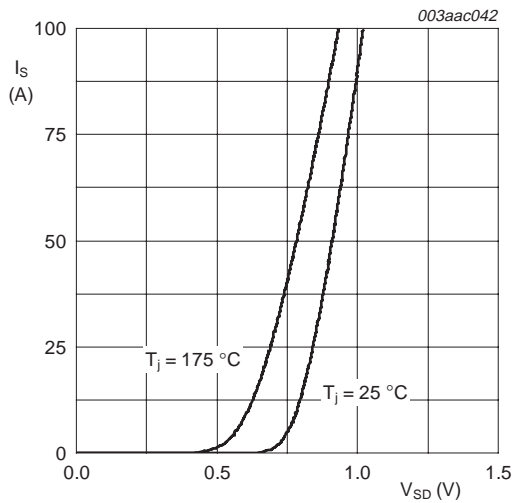
$V_{DS} = 25\text{ V}$

Fig 13. Transfer characteristics: drain current as a function of gate-source voltage; typical values



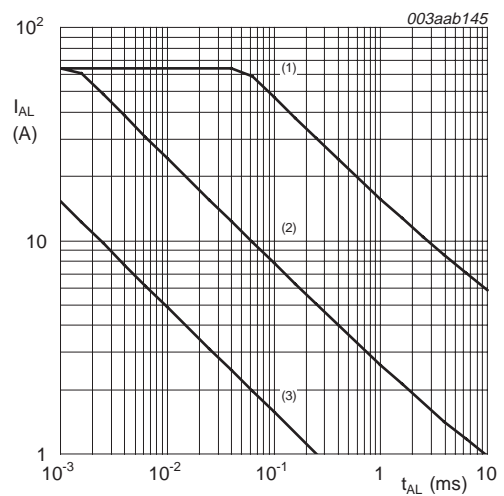
$T_j = 25\text{ °C}; I_D = 25\text{ A}$

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



$V_{GS} = 0\text{ V}$

Fig 15. Source (diode forward) current as a function of source-drain (diode forward) voltage; typical values



See [Table note 1](#) of [Table 3](#) Limiting values.

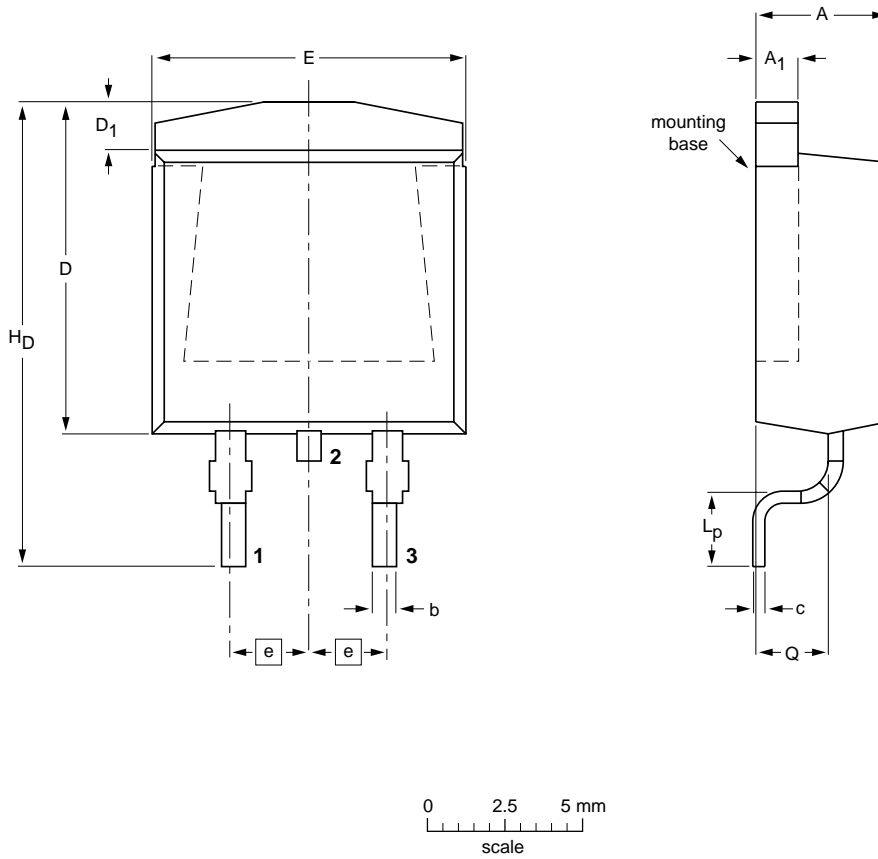
- (1) Single-pulse; $T_j = 25\text{ °C}$.
- (2) Single-pulse; $T_j = 125\text{ °C}$.
- (3) Repetitive.

Fig 16. Single-pulse and repetitive avalanche rating; avalanche current as a function of avalanche time

7. Package outline

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

SOT404



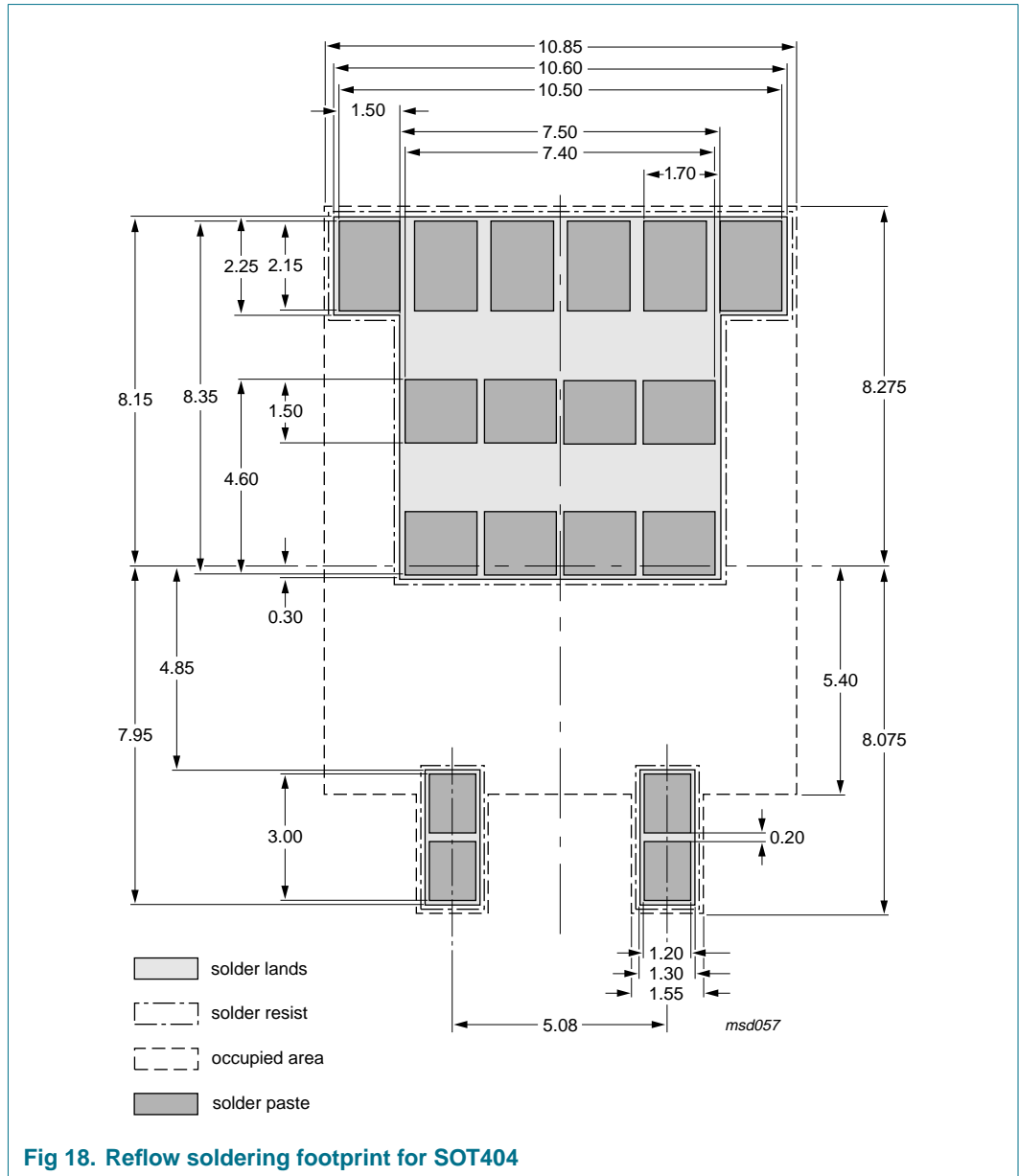
DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁	b	c	D max.	D ₁	E	e	L _p	H _D	Q
mm	4.50	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		2.10	14.80	2.20

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT404						05-02-11 06-03-16

Fig 17. Package outline SOT404 (D2PAK)

8. Soldering



9. Revision history

Table 6. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BUK7619-100B_1	20071010	Product data sheet	-	-

10. Legal information

10.1 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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