



BUK6213-30A

N-channel TrenchMOS intermediate level FET

Rev. 03 — 2 February 2011

Product data sheet

1. Product profile

1.1 General description

Intermediate 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
- Suitable for logic or 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 data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25\text{ °C}$; $T_j \leq 175\text{ °C}$	-	-	30	V
I_D	drain current	$V_{GS} = 10\text{ V}$; $T_{mb} = 25\text{ °C}$; see Figure 1 ; see Figure 3	[1]	-	55	A
P_{tot}	total power dissipation	$T_{mb} = 25\text{ °C}$; see Figure 2	-	-	102	W
Static characteristics						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}$; $I_D = 10\text{ A}$; $T_j = 25\text{ °C}$; see Figure 4 ; see Figure 5	-	10	13	mΩ
Avalanche ruggedness						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 55\text{ A}$; $V_{sup} \leq 30\text{ V}$; $R_{GS} = 50\text{ Ω}$; $V_{GS} = 10\text{ V}$; $T_{j(init)} = 25\text{ °C}$; unclamped	-	-	267	mJ
Dynamic characteristics						
Q_{GD}	gate-drain charge	$V_{GS} = 5\text{ V}$; $I_D = 25\text{ A}$; $V_{DS} = 24\text{ V}$	-	14	-	nC

[1] Continuous current is limited by bondwires.



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		Version
	Name	Description	
BUK6213-30A	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	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25\text{ }^{\circ}\text{C}$; $T_j \leq 175\text{ }^{\circ}\text{C}$	-	30	V
V_{DGR}	drain-gate voltage	$R_{GS} = 20\text{ k}\Omega$	-	30	V
V_{GS}	gate-source voltage		-20	20	V
I_D	drain current	$T_{mb} = 100\text{ }^{\circ}\text{C}$; $V_{GS} = 10\text{ V}$; see Figure 1 [1]	-	45	A
		$T_{mb} = 25\text{ }^{\circ}\text{C}$; $V_{GS} = 10\text{ V}$; see Figure 1 ; [2]	-	55	A
		see Figure 3 [1]	-	64	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	-	257	A
P_{tot}	total power dissipation	$T_{mb} = 25\text{ }^{\circ}\text{C}$; see Figure 2	-	102	W
T_{stg}	storage temperature		-55	175	$^{\circ}\text{C}$
T_j	junction temperature		-55	175	$^{\circ}\text{C}$

Source-drain diode

I _S	source current	T _{mb} = 25 °C	[1]	-	64	A
			[2]	-	55	A
I _{SM}	peak source current	pulsed; t _p ≤ 10 μs; T _{mb} = 25 °C		-	257	A

Avalanche ruggedness

$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 55\text{ A}$; $V_{sup} \leq 30\text{ V}$; $R_{GS} = 50\text{ }\Omega$; $V_{GS} = 10\text{ V}$; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$; unclamped	-	267	mJ
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[1] Current is limited by power dissipation chip rating.

[2] Continuous current is limited by bondwires.

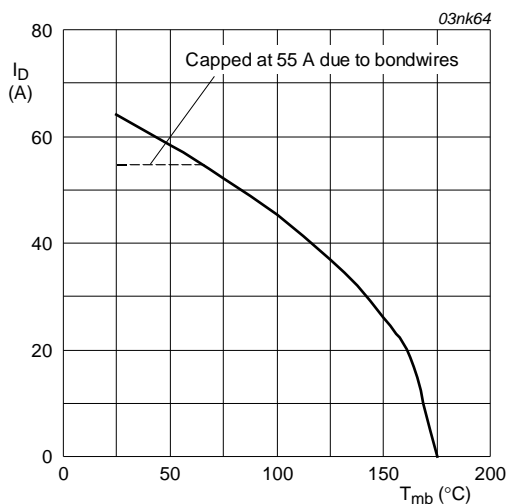
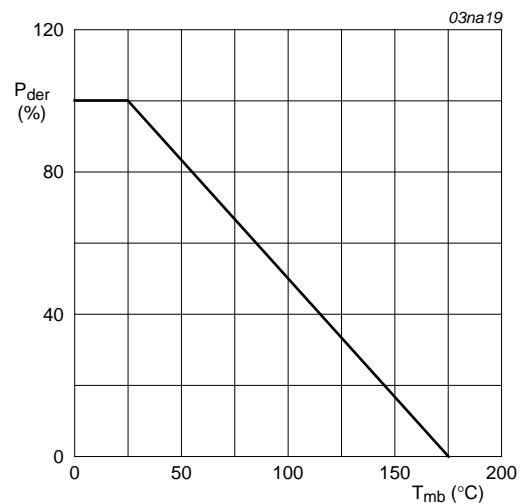


Fig 1. Continuous drain current as a function of mounting base temperature.



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

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

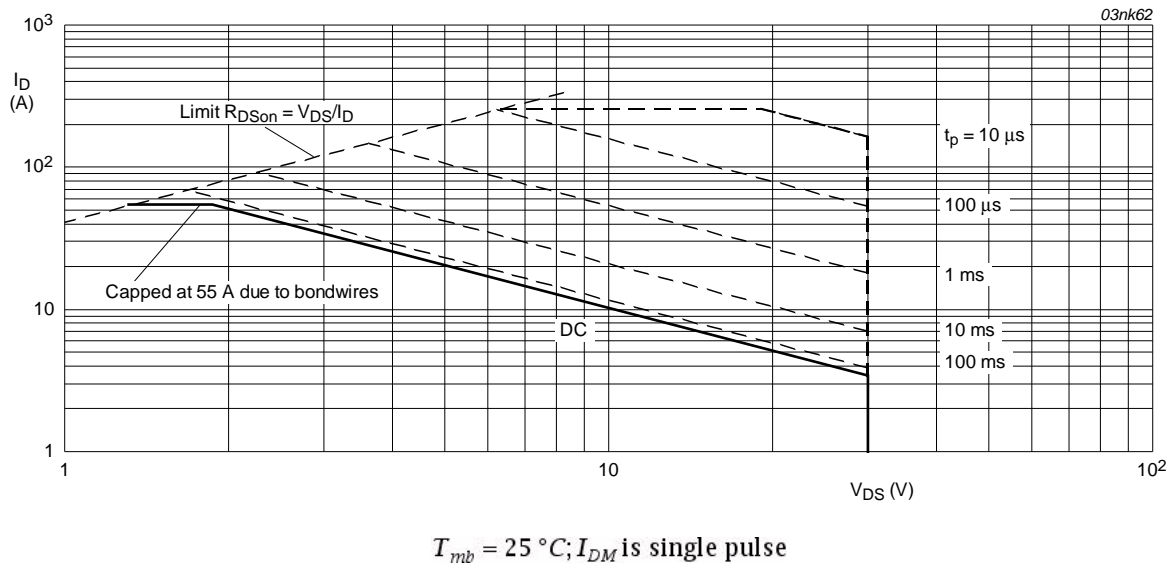


Fig 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage.

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		-	-	1.4	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient		-	71.4	-	K/W

6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 0.25 \text{ mA}$; $V_{GS} = 0 \text{ V}$; $T_j = 25^\circ C$	30	-	-	V
		$I_D = 0.25 \text{ mA}$; $V_{GS} = 0 \text{ V}$; $T_j = -55^\circ C$	27	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1 \text{ mA}$; $V_{DS} = V_{GS}$; $T_j = 25^\circ C$	1	1.8	3	V
V_{GSth}	gate-source threshold voltage	$I_D = 1 \text{ mA}$; $V_{DS} = V_{GS}$; $T_j = -55^\circ C$	-	-	3.5	V
		$I_D = 1 \text{ mA}$; $V_{DS} = V_{GS}$; $T_j = 175^\circ C$	0.5	-	-	V
I_{DSS}	drain leakage current	$V_{DS} = 30 \text{ V}$; $V_{GS} = 0 \text{ V}$; $T_j = 25^\circ C$	-	0.05	10	μA
I_{GSS}	gate leakage current	$V_{GS} = 20 \text{ V}$; $V_{DS} = 0 \text{ V}$; $T_j = 25^\circ C$	-	2	100	nA
		$V_{GS} = -20 \text{ V}$; $V_{DS} = 0 \text{ V}$; $T_j = 25^\circ C$	-	2	100	nA
R_{DSon}	drain-source on-state resistance	$V_{GS} = 4.5 \text{ V}$; $I_D = 10 \text{ A}$	-	15	20	m Ω
		$V_{GS} = 10 \text{ V}$; $I_D = 10 \text{ A}$; $T_j = 175^\circ C$	-	-	25	m Ω
		$V_{GS} = 10 \text{ V}$; $I_D = 10 \text{ A}$; $T_j = 25^\circ C$; see Figure 4; see Figure 5	-	10	13	m Ω

Table 6. Characteristics ...continued

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{DSS}	drain leakage current	$V_{DS} = 30\text{ V}$; $V_{GS} = 0\text{ V}$; $T_j = 175\text{ }^{\circ}\text{C}$; see Figure 4; see Figure 5	-	-	500	μA
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$I_D = 25\text{ A}$; $V_{DS} = 24\text{ V}$; $V_{GS} = 10\text{ V}$	-	44	-	nC
		$I_D = 25\text{ A}$; $V_{DS} = 24\text{ V}$; $V_{GS} = 5\text{ V}$	-	26	-	nC
Q_{GS}	gate-source charge		-	7	-	nC
Q_{GD}	gate-drain charge		-	14	-	nC
C_{iss}	input capacitance	$V_{GS} = 0\text{ V}$; $V_{DS} = 25\text{ V}$; $f = 1\text{ MHz}$; $T_j = 25\text{ }^{\circ}\text{C}$	-	1490	1986	pF
C_{oss}	output capacitance		-	505	606	pF
C_{rss}	reverse transfer capacitance		-	325	445	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 25\text{ V}$; $R_L = 1.2\text{ }\Omega$; $V_{GS} = 10\text{ V}$; $R_{G(ext)} = 10\text{ }\Omega$	-	12	-	ns
t_r	rise time		-	95	-	ns
$t_{d(off)}$	turn-off delay time		-	75	-	ns
t_f	fall time		-	105	-	ns
L_D	internal drain inductance	measured from drain to center of die	-	2.5	-	nH
L_S	internal source inductance	measured from source lead to source bond pad	-	7.5	-	nH
Source-drain diode						
V_{SD}	source-drain voltage	$I_S = 15\text{ A}$; $V_{GS} = 0\text{ V}$; $T_j = 25\text{ }^{\circ}\text{C}$	-	0.85	1.2	V
t_{rr}	reverse recovery time	$I_S = 20\text{ A}$; $dI_S/dt = -100\text{ A}/\mu\text{s}$; $V_{GS} = -10\text{ V}$; $V_{DS} = 25\text{ V}$	-	49	-	ns
Q_r	recovered charge		-	27	-	nC

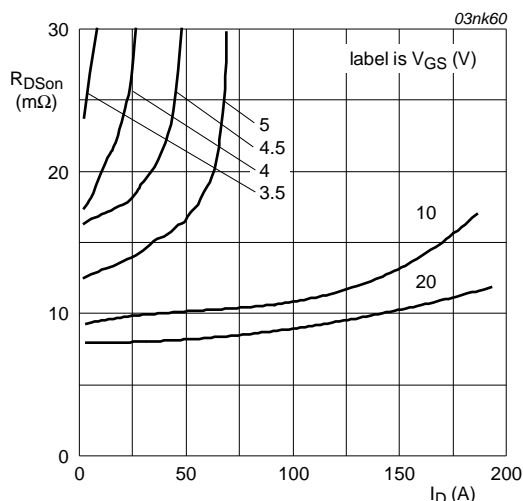
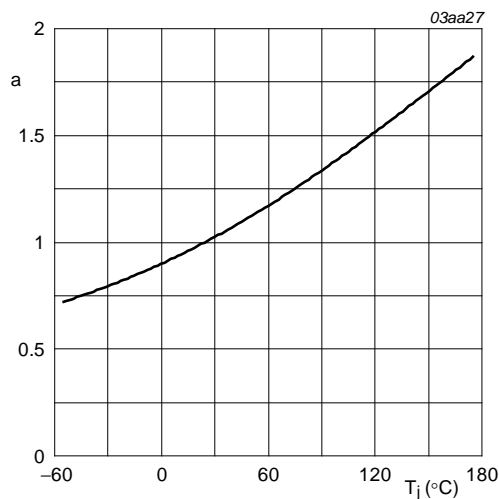


Fig 4. Drain-source on-state resistance as a function of drain current; typical values.



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

Fig 5. Normalized drain-source on-state resistance factor as a function of junction temperature

7. Package outline

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

SOT428

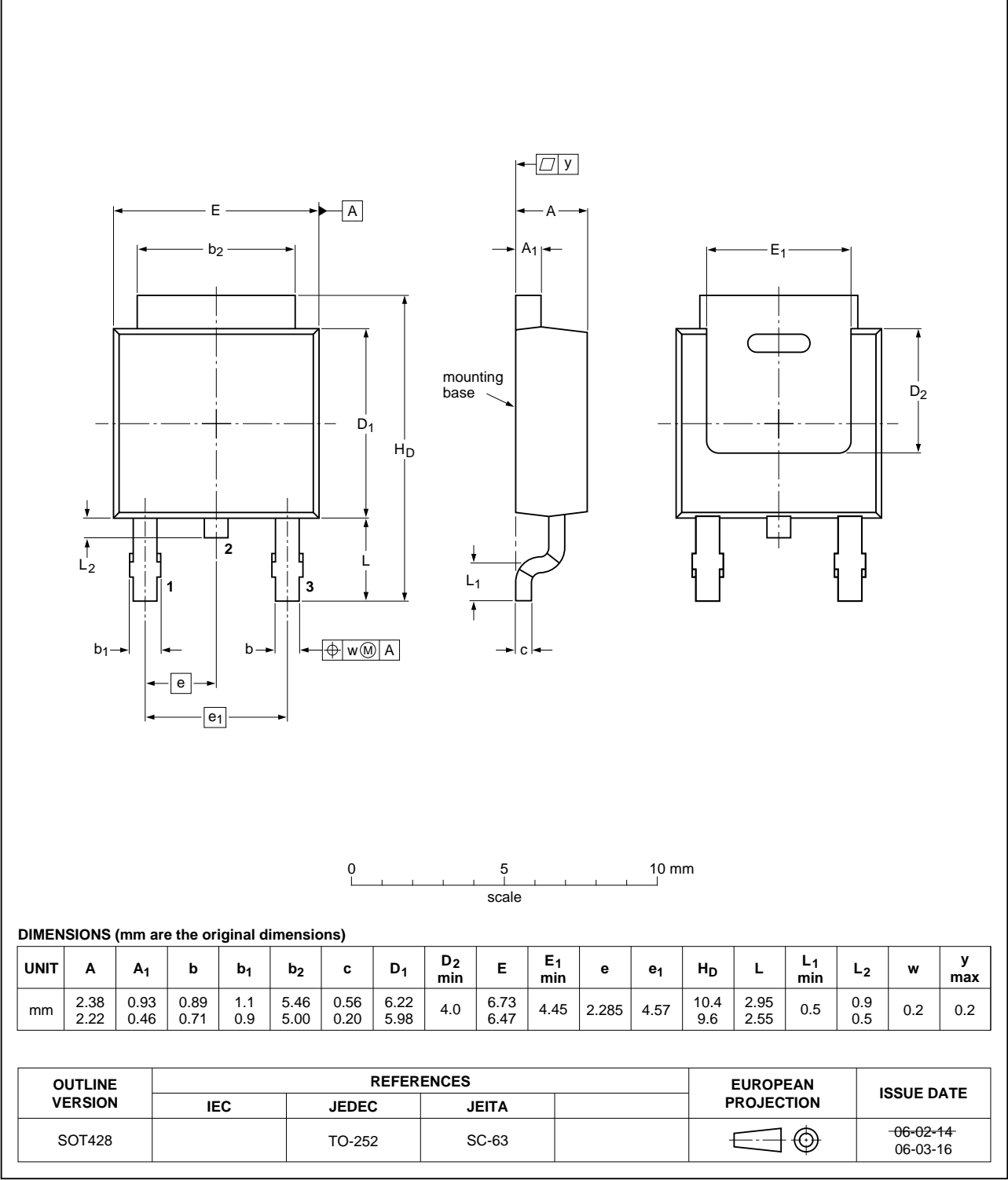


Fig 6. Package outline SOT428 (DPAK)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BUK6213-30A v.3	20110202	Product data sheet	-	BUK6213-30A v.2
Modifications:	<ul style="list-style-type: none">• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.• Legal texts have been adapted to the new company name where appropriate.• Various changes to content.			
BUK6213-30A v.2 (9397 750 12028)	20030922	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".

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