



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

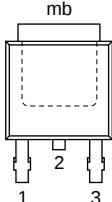
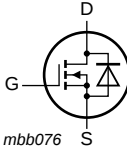
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25\text{ °C}$; $T_j \leq 175\text{ °C}$	-	-	30	V
I_D	drain current	$V_{GS} = 10\text{ V}$; $T_{mb} = 25\text{ °C}$; see Figure 1 ; see Figure 3	[1]	-	55	A
P_{tot}	total power dissipation	$T_{mb} = 25\text{ °C}$; see Figure 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	 SOT428 (DPAK)	
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	
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.

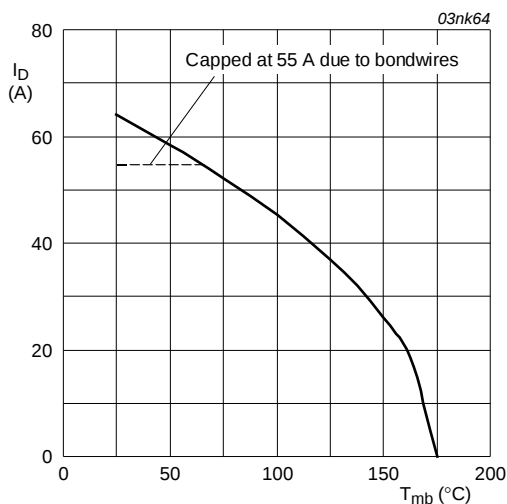
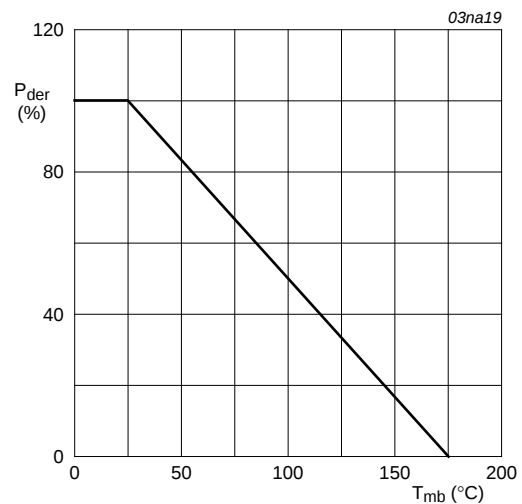


Fig 1. Continuous drain current as a function of mounting base temperature.



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

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

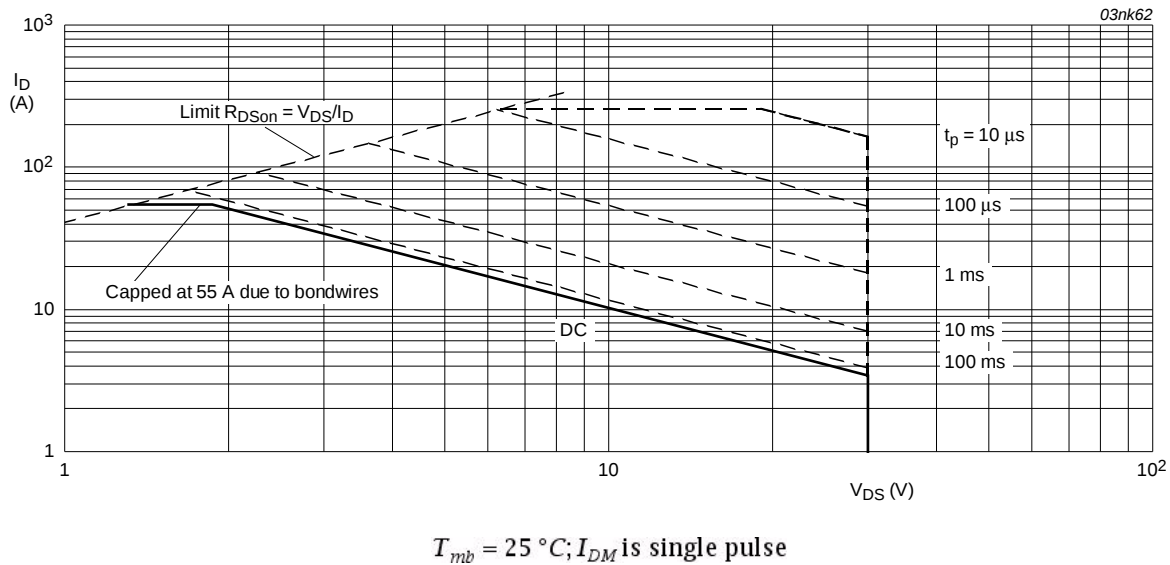


Fig 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage.

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	$I_D = 0.25\text{ mA}; V_{GS} = 0\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	30	-	-	V
		$I_D = 0.25\text{ mA}; V_{GS} = 0\text{ V}; T_j = -55\text{ }^{\circ}\text{C}$	27	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1\text{ mA}; V_{DS} = V_{GS}; T_j = 25\text{ }^{\circ}\text{C}$	1	1.8	3	V
V_{GSth}	gate-source threshold voltage	$I_D = 1\text{ mA}; V_{DS} = V_{GS}; T_j = -55\text{ }^{\circ}\text{C}$	-	-	3.5	V
		$I_D = 1\text{ mA}; V_{DS} = V_{GS}; T_j = 175\text{ }^{\circ}\text{C}$	0.5	-	-	V
I_{DSS}	drain leakage current	$V_{DS} = 30\text{ V}; V_{GS} = 0\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	0.05	10	μA
I_{GSS}	gate leakage current	$V_{GS} = 20\text{ V}; V_{DS} = 0\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	2	100	nA
		$V_{GS} = -20\text{ V}; V_{DS} = 0\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	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
		$V_{GS} = 10\text{ V}; I_D = 10\text{ A}; T_j = 175\text{ }^{\circ}\text{C}$	-	-	25	m Ω
		$V_{GS} = 10\text{ V}; I_D = 10\text{ A}; T_j = 25\text{ }^{\circ}\text{C};$ 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

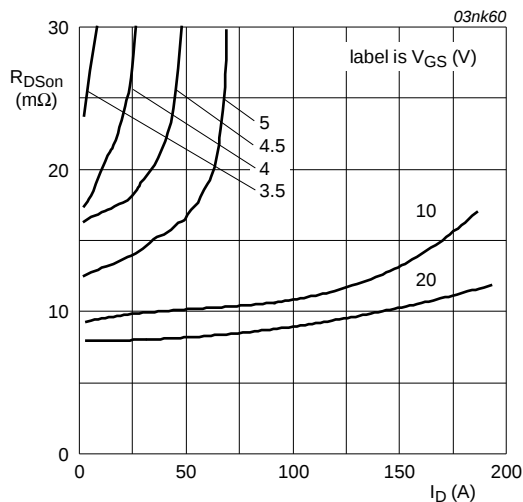
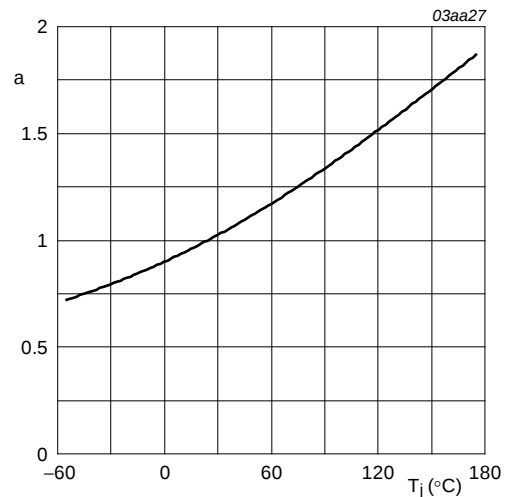


Fig 4. Drain-source on-state resistance as a function of drain current; typical values.



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

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

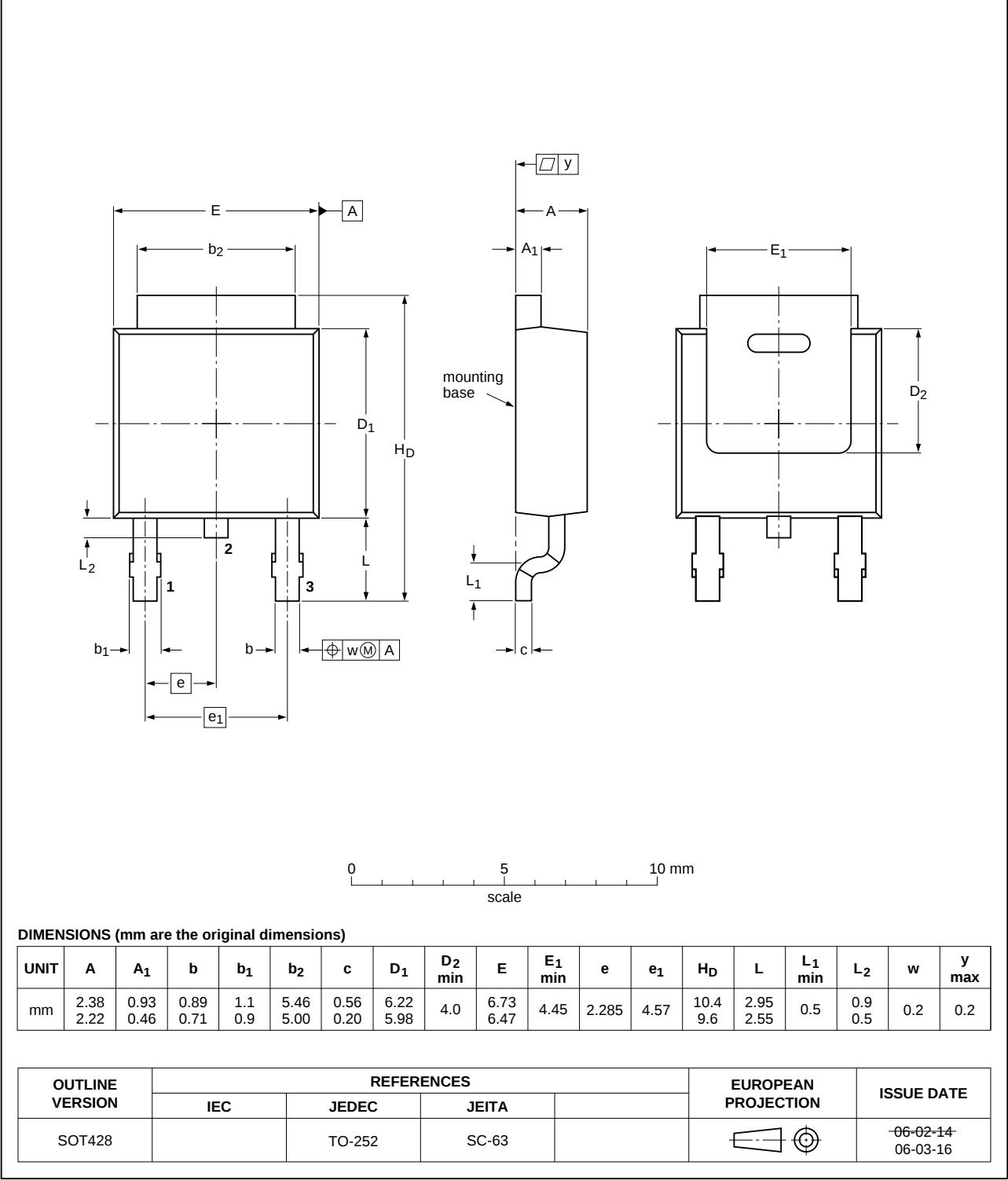


Fig 6. Package outline SOT428 (DPAK)

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:	• 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	-	-

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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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