



BUK9214-30A

N-channel TrenchMOS logic level FET

Rev. 3 — 14 June 2012

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

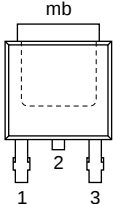
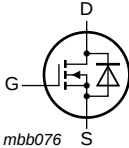
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{DS}	drain-source voltage	T _j ≥ 25 °C; T _j ≤ 175 °C	-	-	30	V
I _D	drain current	V _{GS} = 5 V; T _{mb} = 25 °C; see Figure 1 ; see Figure 3	-	-	63	A
P _{tot}	total power dissipation	T _{mb} = 25 °C; see Figure 2	-	-	107	W
Static characteristics						
R _{DSon}	drain-source on-state resistance	V _{GS} = 4.5 V; I _D = 25 A; T _j = 25 °C	-	-	15.5	mΩ
		V _{GS} = 10 V; I _D = 25 A; T _j = 25 °C	-	9	12	mΩ
		V _{GS} = 5 V; I _D = 25 A; T _j = 25 °C; see Figure 11 ; see Figure 12	-	11	14	mΩ
Dynamic characteristics						
Q _{GD}	gate-drain charge	V _{GS} = 5 V; I _D = 25 A; V _{DS} = 24 V; T _j = 25 °C; see Figure 13	-	12.2	-	nC
Avalanche ruggedness						
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	I _D = 63 A; V _{sup} ≤ 30 V; R _{GS} = 50 Ω; V _{GS} = 5 V; T _{j(init)} = 25 °C; unclamped	-	-	230	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		

SOT428 (DPAK)

3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BUK9214-30A	DPAK	plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	SOT428

4. Marking

Table 4. Marking codes

Type number	Marking code
BUK9214-30A	BUK9214-30A

5. Limiting values

Table 5. 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 ≥ 25 °C; T _j ≤ 175 °C	-	30	V
V _{DGR}	drain-gate voltage	R _{GS} = 20 kΩ	-	30	V
V _{GS}	gate-source voltage		-15	15	V
I _D	drain current	T _{mb} = 25 °C; V _{GS} = 5 V; see Figure 1 ; see Figure 3	-	63	A
		T _{mb} = 100 °C; V _{GS} = 5 V; see Figure 1	-	45	A
I _{DM}	peak drain current	T _{mb} = 25 °C; pulsed; t _p ≤ 10 μs; see Figure 3	-	253	A
P _{tot}	total power dissipation	T _{mb} = 25 °C; see Figure 2	-	107	W
T _{stg}	storage temperature		-55	175	°C
T _j	junction temperature		-55	175	°C
Source-drain diode					
I _S	source current	T _{mb} = 25 °C	-	63	A
I _{SM}	peak source current	pulsed; t _p ≤ 10 μs; T _{mb} = 25 °C	-	253	A
Avalanche ruggedness					
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	I _D = 63 A; V _{sup} ≤ 30 V; R _{GS} = 50 Ω; V _{GS} = 5 V; T _{j(init)} = 25 °C; unclamped	-	230	mJ

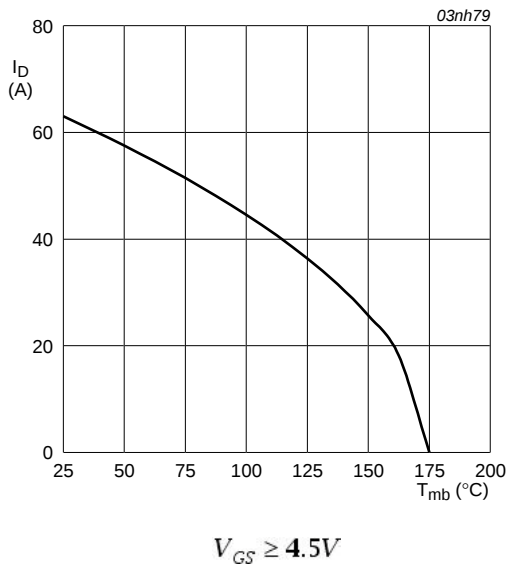


Fig 1. Continuous drain current as a function of mounting base temperature

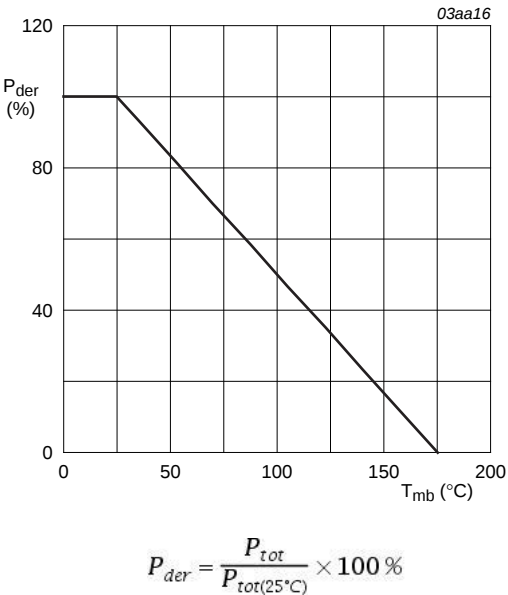


Fig 2. Normalized total power dissipation as a function of mounting base temperature

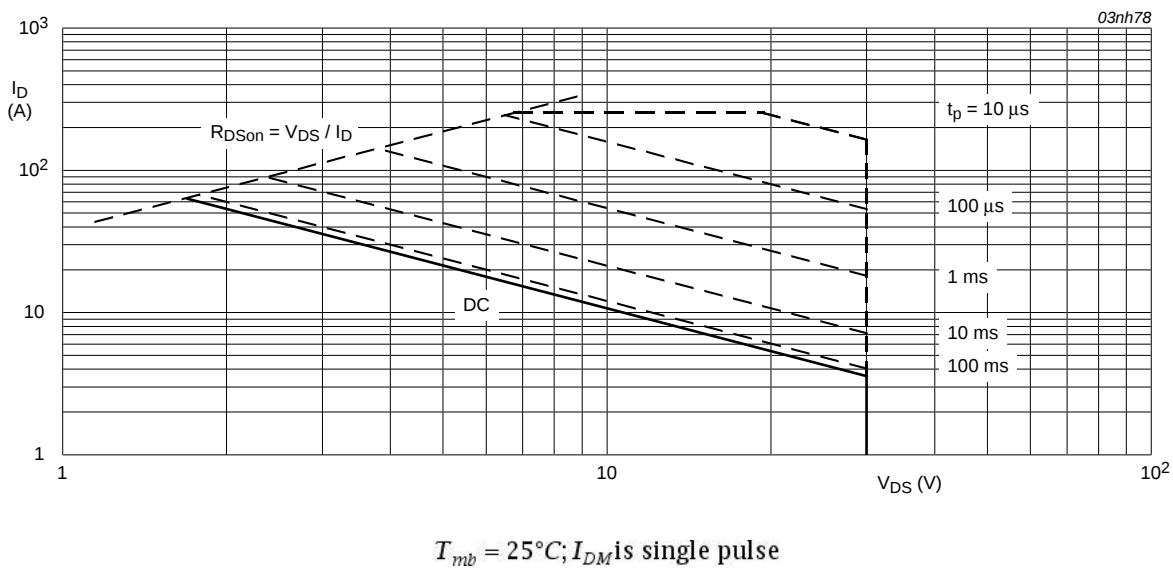


Fig 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see Figure 4	-	-	1.4	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient		-	71.4	-	K/W

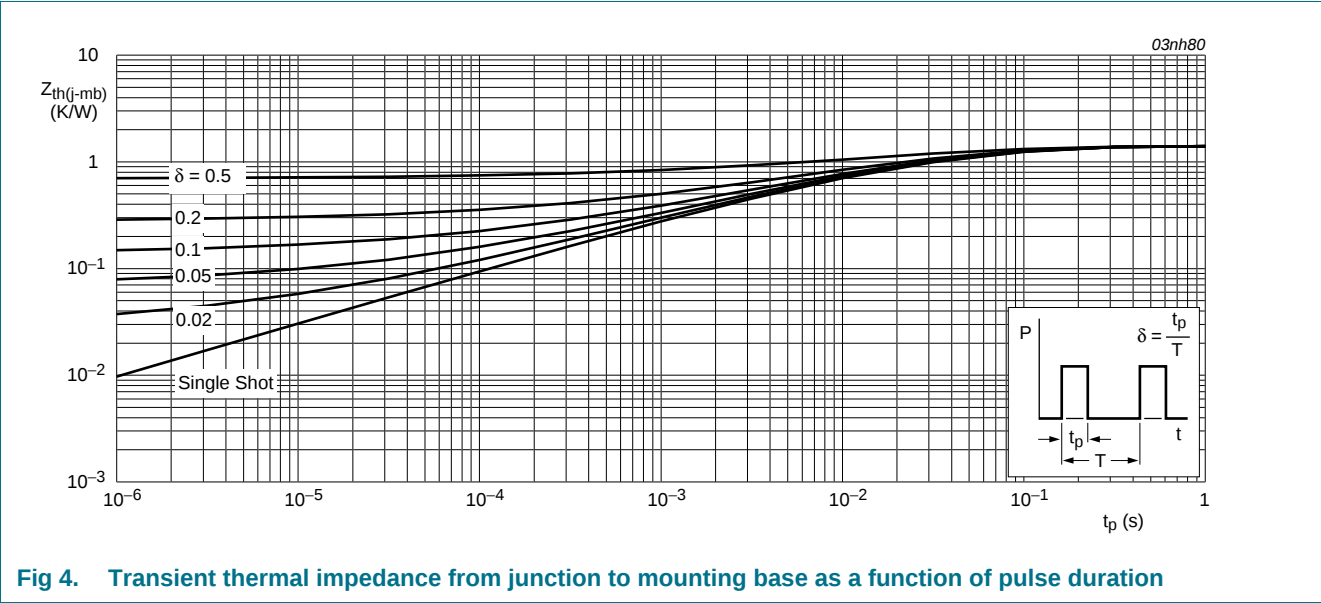


Fig 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V _{(BR)DSS}	drain-source breakdown voltage	I _D = 0.25 mA; V _{GS} = 0 V; T _J = 25 °C	30	-	-	V
		I _D = 0.25 mA; V _{GS} = 0 V; T _J = -55 °C	27	-	-	V
V _{GS(th)}	gate-source threshold voltage	I _D = 1 mA; V _{DS} = V _{GS} ; T _J = 25 °C; see Figure 10	1	1.5	2	V
		I _D = 1 mA; V _{DS} = V _{GS} ; T _J = -55 °C; see Figure 10	-	-	2.3	V
		I _D = 1 mA; V _{DS} = V _{GS} ; T _J = 175 °C; see Figure 10	0.5	-	-	V
I _{DSS}	drain leakage current	V _{DS} = 30 V; V _{GS} = 0 V; T _J = 175 °C	-	-	500	μA
		V _{DS} = 30 V; V _{GS} = 0 V; T _J = 25 °C	-	0.05	10	μA
I _{GSS}	gate leakage current	V _{GS} = 10 V; V _{DS} = 0 V; T _J = 25 °C	-	2	100	nA
		V _{GS} = -10 V; V _{DS} = 0 V; T _J = 25 °C	-	2	100	nA
R _{DSon}	drain-source on-state resistance	V _{GS} = 4.5 V; I _D = 25 A; T _J = 25 °C	-	-	15.5	mΩ
		V _{GS} = 10 V; I _D = 25 A; T _J = 25 °C	-	9	12	mΩ
		V _{GS} = 5 V; I _D = 25 A; T _J = 175 °C; see Figure 11 ; see Figure 12	-	-	26.6	mΩ
		V _{GS} = 5 V; I _D = 25 A; T _J = 25 °C; see Figure 11 ; see Figure 12	-	11	14	mΩ
Dynamic characteristics						
Q _{G(tot)}	total gate charge	I _D = 25 A; V _{DS} = 24 V; V _{GS} = 5 V; T _J = 25 °C; see Figure 13	-	31	-	nC
Q _{GS}	gate-source charge		-	5.3	-	nC
Q _{GD}	gate-drain charge		-	12.2	-	nC
C _{iss}	input capacitance		V _{GS} = 0 V; V _{DS} = 25 V; f = 1 MHz; T _J = 25 °C; see Figure 14	-	1730	2317
C _{oss}	output capacitance	-		400	481	pF
C _{rss}	reverse transfer capacitance	-		260	365	pF
t _{d(on)}	turn-on delay time	V _{DS} = 30 V; R _L = 1.2 Ω; V _{GS} = 5 V; R _{G(ext)} = 10 Ω; T _J = 25 °C	-	10	-	ns
t _r	rise time		-	85	-	ns
t _{d(off)}	turn-off delay time		-	94	-	ns
t _f	fall time		-	108	-	ns
L _D	internal drain inductance	from drain to centre of die ; T _J = 25 °C	-	2.5	-	nH
L _S	internal source inductance	from source lead to source bond pad ; T _J = 25 °C	-	7.5	-	nH
Source-drain diode						
V _{SD}	source-drain voltage	I _S = 20 A; V _{GS} = 0 V; T _J = 25 °C; see Figure 15	-	0.85	1.2	V
t _{rr}	reverse recovery time	I _S = 20 A; dI _S /dt = -100 A/μs; V _{GS} = -10 V; V _{DS} = 30 V; T _J = 25 °C	-	83	-	ns
Q _r	recovered charge		-	119	-	nC

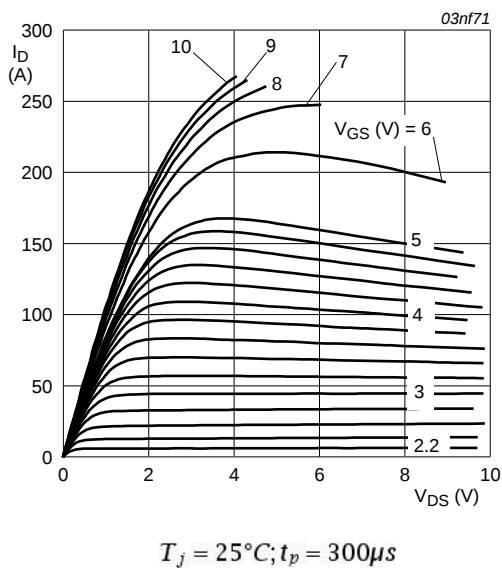


Fig 5. Output characteristics: drain current as a function of drain-source voltage; typical values

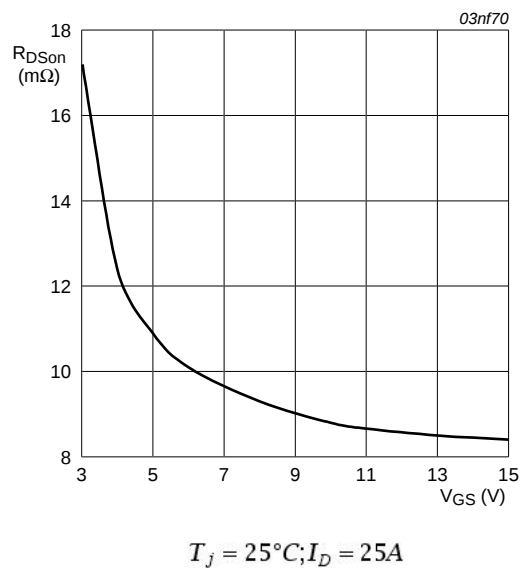


Fig 6. Drain-source on-state resistance as a function of gate-source voltage; typical values

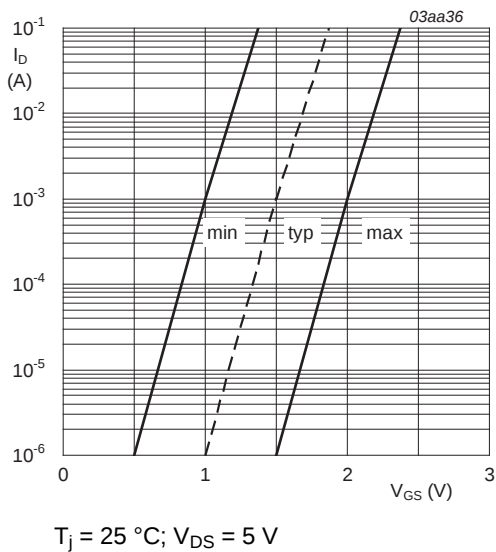


Fig 7. Sub-threshold drain current as a function of gate-source voltage

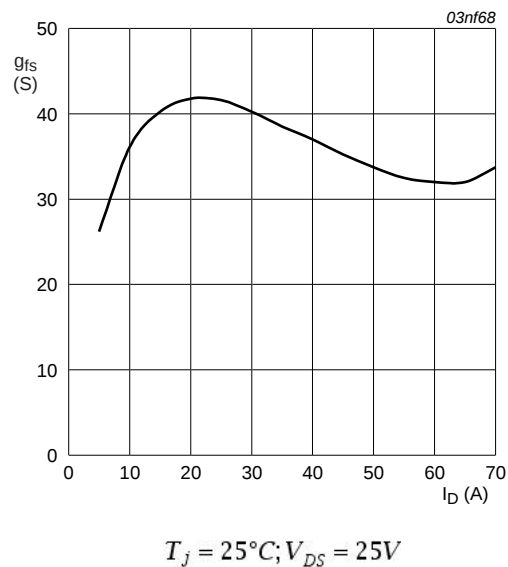


Fig 8. Forward transconductance as a function of drain current; typical values

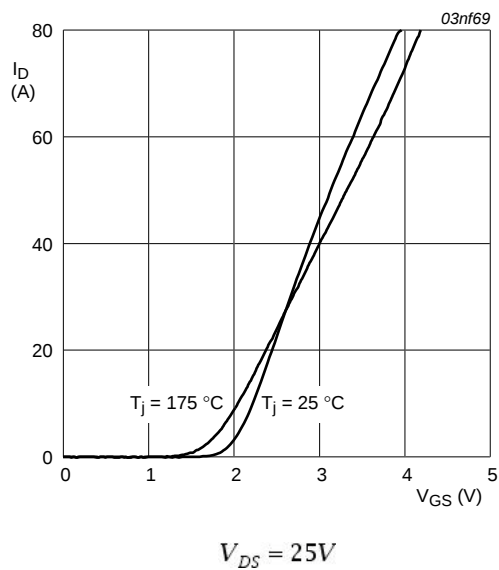


Fig 9. Transfer characteristics: drain current as a function of gate-source voltage; typical values

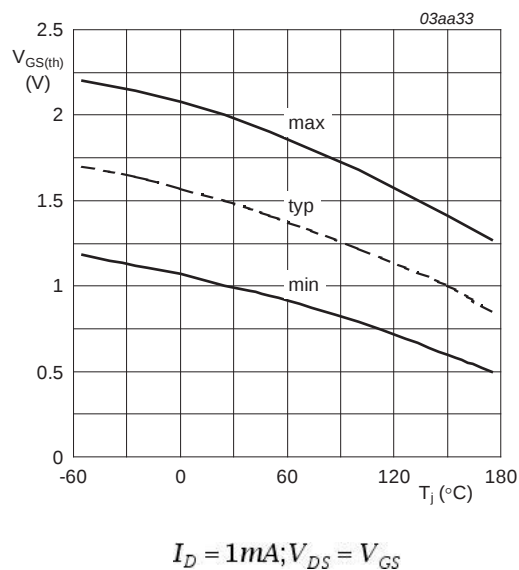


Fig 10. Gate-source threshold voltage as a function of junction temperature

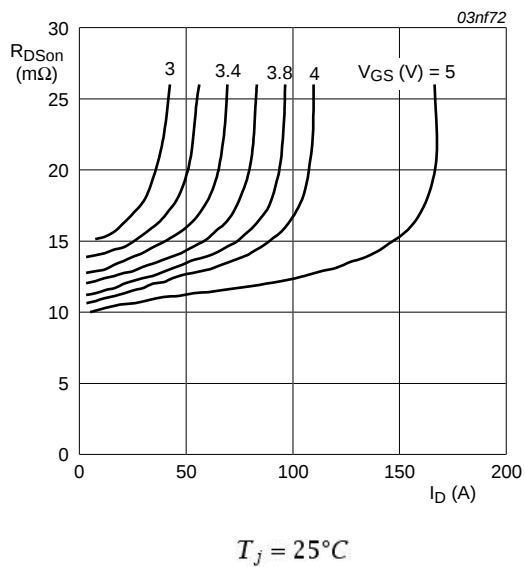


Fig 11. Drain-source on-state resistance as a function of drain current; typical values

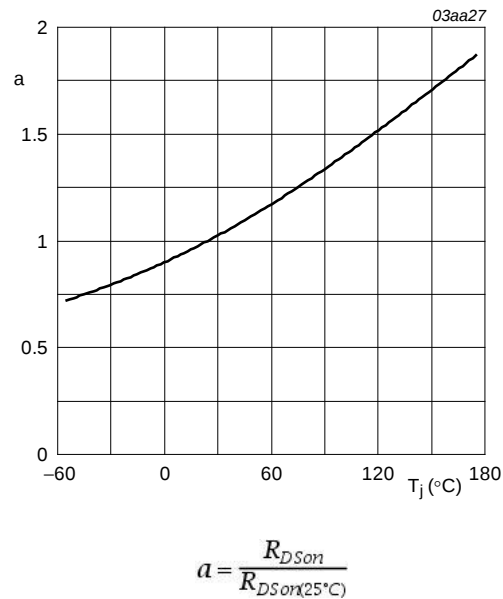


Fig 12. Normalized drain-source on-state resistance factor as a function of junction temperature

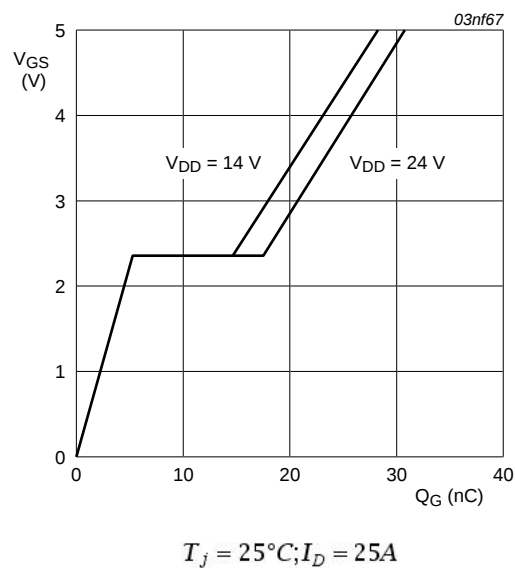


Fig 13. Gate-source voltage as a function of turn-on gate charge; typical values

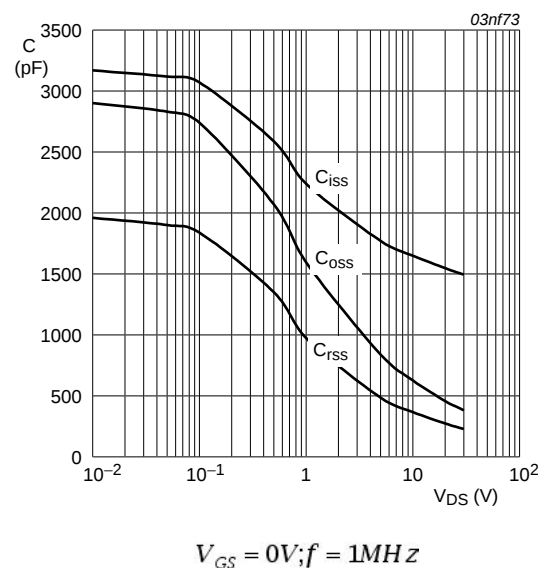


Fig 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

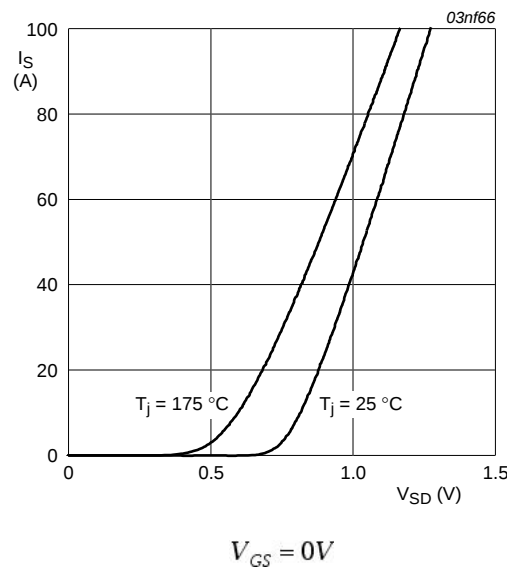


Fig 15. Reverse diode current as a function of reverse diode voltage; typical values

8. Package outline

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

SOT428

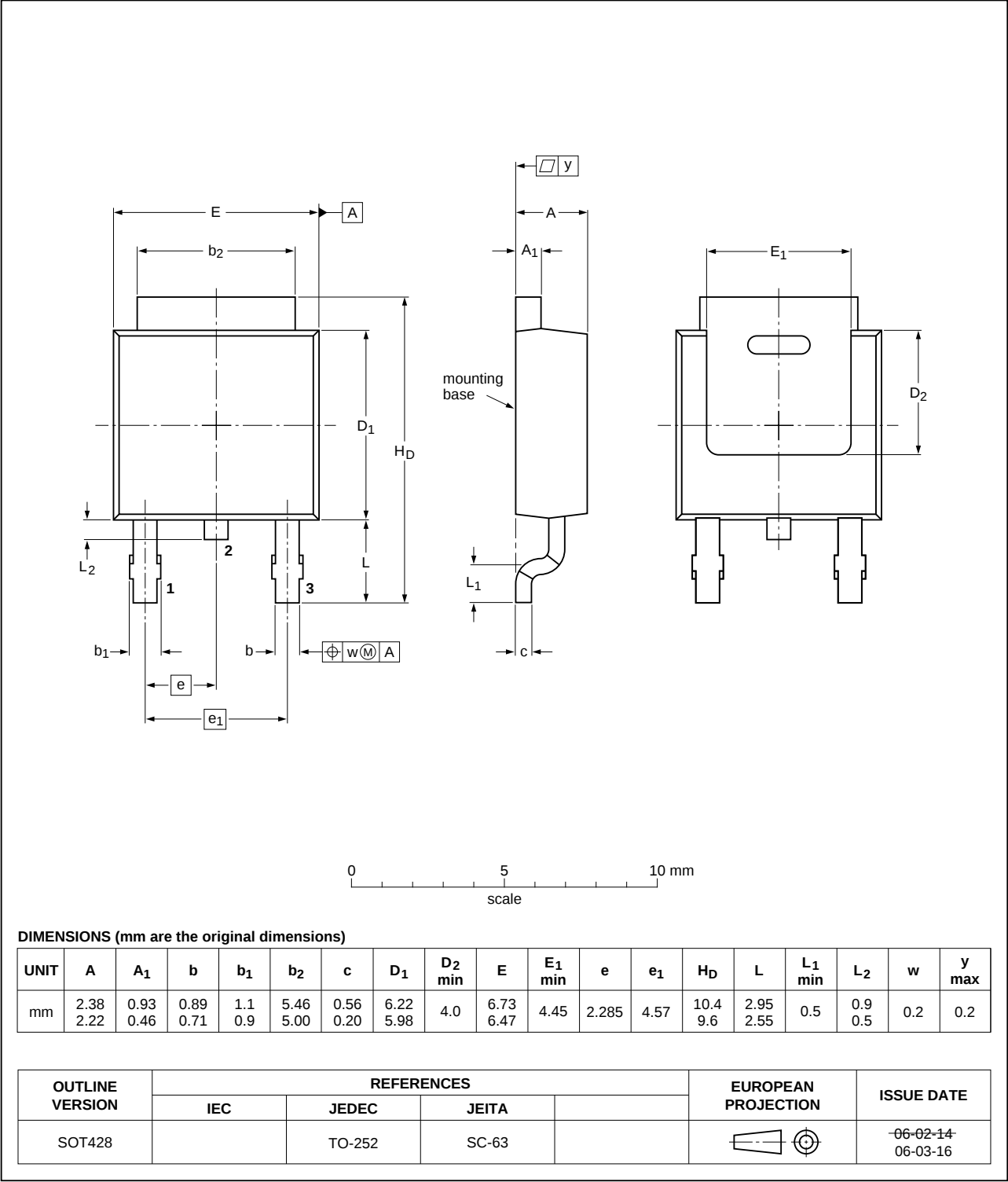


Fig 16. Package outline SOT428 (DPAK)

9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BUK9214-30A v.3	20120614	Product data sheet	-	BUK9214-30A v.2
Modifications:	Various changes to content.			
BUK9214-30A v.2	20100615	Product data sheet	-	BUK9214-30A v.1

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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