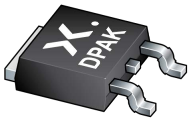

BUK7214-75B

N-channel TrenchMOS standard level FET

18 July 2013 Product data sheet

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.

2. Features and benefits

- AEC Q101 compliant
- Low conduction losses due to low on-state resistance
- Suitable for standard level gate drive sources
- Suitable for thermally demanding environments due to 175 °C rating

3. Applications

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

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25$ °C; $T_j \leq 175$ °C		-	-	75	V
I_D	drain current	V_{GS} = 10 V; T_{mb} = 25 °C; Fig. 1; Fig. 3		-	-	69	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; Fig. 2		-	-	158	W
Static characteristics							
R_{DSon}	drain-source on-state resistance	V_{GS} = 10 V; I_D = 25 A; T_j = 25 °C; Fig. 11; Fig. 12		-	12.6	14	mΩ
Dynamic characteristics							
Q_{GD}	gate-drain charge	V_{GS} = 10 V; I_D = 25 A; V_{DS} = 60 V; T_j = 25 °C; Fig. 13		-	15	-	nC
Avalanche ruggedness							
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	I_D = 69 A; $V_{sup} \leq 75$ V; R_{GS} = 50 Ω; V_{GS} = 10 V; $T_{j(init)}$ = 25 °C; unclamped		-	-	136	mJ

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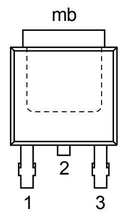
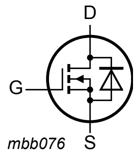
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 DPAK (SOT428)	
2	D	drain[1]		
3	S	source		
mb	D	mounting base; connected to drain		

[1] It is not possible to make a connection to pin 2

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BUK7214-75B	DPAK	plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	SOT428

7. Marking

Table 4. Marking codes

Type number	Marking code
BUK7214-75B	BUK7214-75B

8. 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		-	75	V
V_{DGR}	drain-gate voltage	R_{GS} = 20 kΩ		-	75	V
V_{GS}	gate-source voltage			-20	20	V
I_D	drain current	T_{mb} = 25 °C; V_{GS} = 10 V; Fig. 1; Fig. 3		-	69	A
		T_{mb} = 100 °C; V_{GS} = 10 V; Fig. 1		-	49	A
I_{DM}	peak drain current	T_{mb} = 25 °C; pulsed; t_p ≤ 10 µs; Fig. 3		-	276	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; Fig. 2		-	158	W

Symbol	Parameter	Conditions		Min	Max	Unit
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		-	69	A
I_{SM}	peak source current	pulsed; $t_p \leq 10$ µs; T_{mb} = 25 °C		-	276	A
Avalanche ruggedness						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	I_D = 69 A; $V_{sup} \leq 75$ V; R_{GS} = 50 Ω; V_{GS} = 10 V; $T_{j(init)}$ = 25 °C; unclamped		-	136	mJ

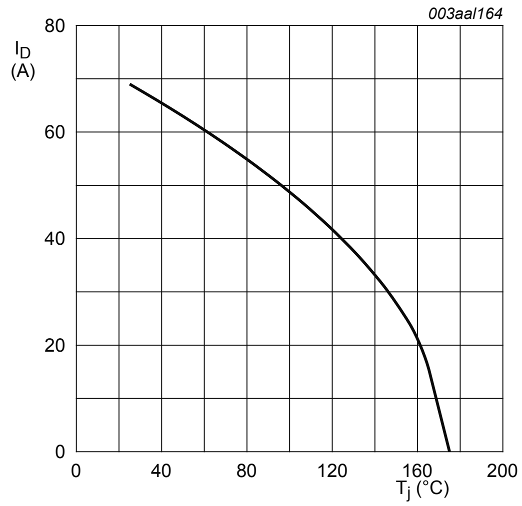


Fig. 1. Continuous drain current as a function of mounting base temperature

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

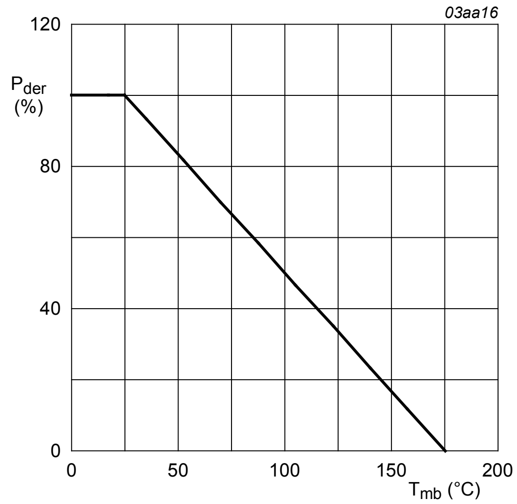


Fig. 2. Normalized total power dissipation as a function of mounting base temperature

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

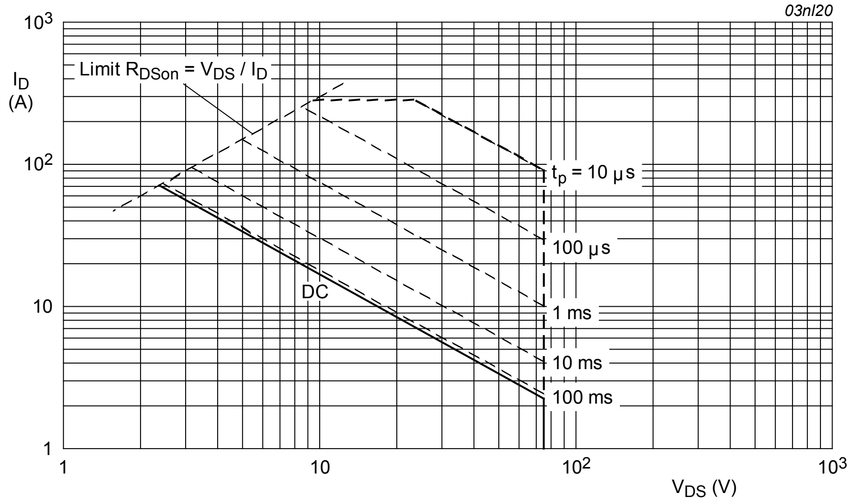


Fig. 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

$T_{mb} = 25°C; I_{DM}$ is single pulse

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 4		-	-	0.95	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient			-	71.4	-	K/W

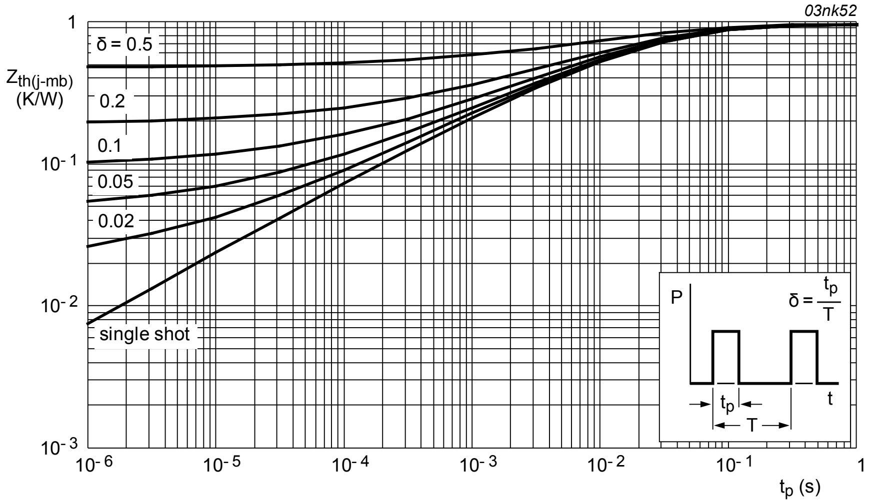


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. 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		75	-	-	V
		I_D = 0.25 mA; V_{GS} = 0 V; T_j = -55 °C		70	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	I_D = 1 mA; V_{DS} = V_{GS}; T_j = 175 °C; Fig. 10		0.9	-	-	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = 25 °C; Fig. 10		2	3	4	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = -55 °C; Fig. 10		-	-	4.4	V
I_{DSS}	drain leakage current	V_{DS} = 75 V; V_{GS} = 0 V; T_j = 175 °C		-	-	500	µA
		V_{DS} = 75 V; V_{GS} = 0 V; T_j = 25 °C		-	0.02	1	µA
I_{GSS}	gate leakage current	V_{GS} = 20 V; V_{DS} = 0 V; T_j = 25 °C		-	2	100	nA
		V_{GS} = -20 V; V_{DS} = 0 V; T_j = 25 °C		-	2	100	nA
R_{DSon}	drain-source on-state resistance	V_{GS} = 10 V; I_D = 25 A; T_j = 175 °C; Fig. 11; Fig. 12		-	-	33	mΩ
		V_{GS} = 10 V; I_D = 25 A; T_j = 25 °C; Fig. 11; Fig. 12		-	12.6	14	mΩ
Dynamic characteristics							
$Q_{G(tot)}$	total gate charge	I_D = 25 A; V_{DS} = 60 V; V_{GS} = 10 V; T_j = 25 °C; Fig. 13		-	41	-	nC
Q_{GS}	gate-source charge			-	9	-	nC
Q_{GD}	gate-drain charge			-	15	-	nC
C_{iss}	input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz; T_j = 25 °C; Fig. 14		-	1959	2612	pF
C_{oss}	output capacitance			-	326	391	pF
C_{rss}	reverse transfer capacitance			-	159	218	pF
$t_{d(on)}$	turn-on delay time	V_{DS} = 25 V; R_L = 1.2 Ω; V_{GS} = 10 V; $R_{G(ext)}$ = 10 Ω; T_j = 25 °C		-	18	-	ns
t_r	rise time			-	114	-	ns
$t_{d(off)}$	turn-off delay time			-	52	-	ns
t_f	fall time			-	45	-	ns
L_D	internal drain inductance	measured from drain to centre of die ; T_j = 25 °C		-	2.5	-	nH
L_S	internal source inductance	measured from source lead to source bond pad ; T_j = 25 °C		-	7.5	-	nH

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Source-drain diode							
V_{SD}	source-drain voltage	I_S = 25 A; V_{GS} = 0 V; T_j = 25 °C; Fig. 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		-	74	-	ns
Q_r	recovered charge			-	94	-	nC

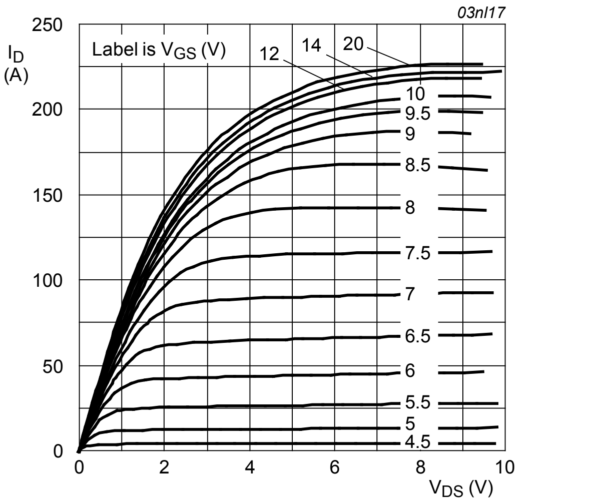


Fig. 5. Output characteristics: drain current as a function of drain-source voltage; typical values

$T_j = 25°C; t_p = 300\mu s$

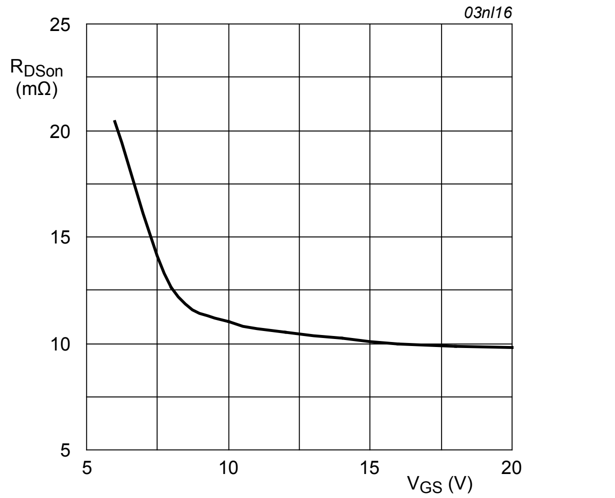


Fig. 6. Drain-source on-state resistance as a function of gate-source voltage; typical values

$T_j = 25°C; I_D = 25A$

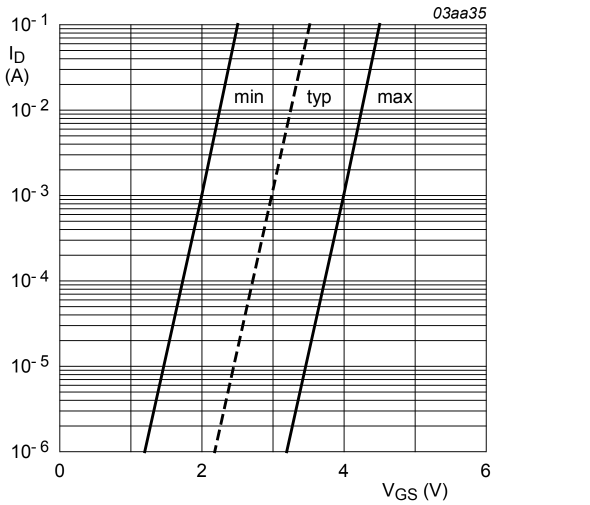


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

$T_j = 25°C; V_{DS} = 5V$

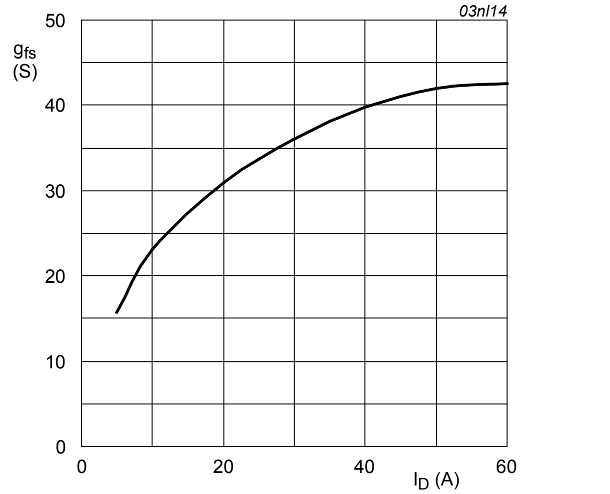


Fig. 8. Forward transconductance as a function of drain current; typical values

$T_j = 25°C; V_{DS} = 25V$

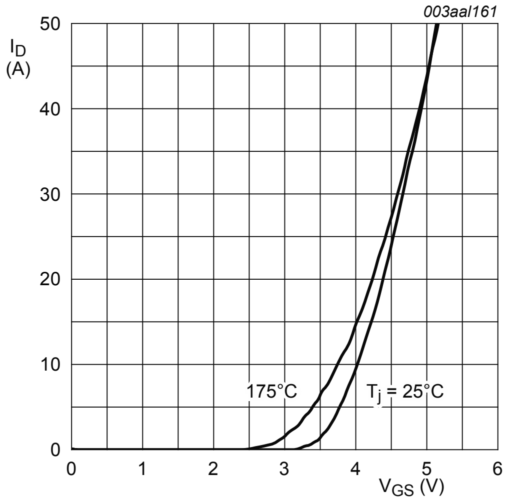


Fig. 9. Transfer characteristics; drain current as a function of gate-source voltage; typical values

$V_{DS} = 12V$

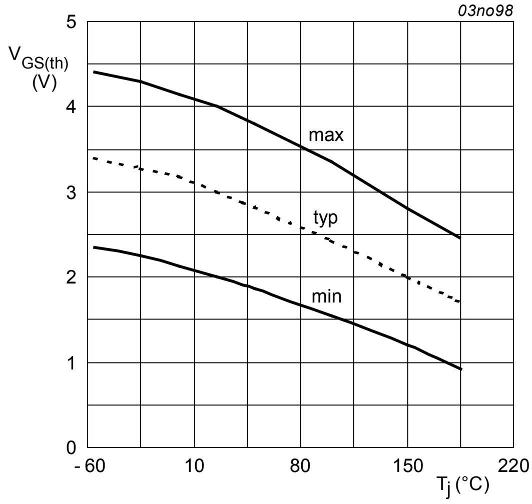


Fig. 10. Gate-source threshold voltage as a function of junction temperature

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

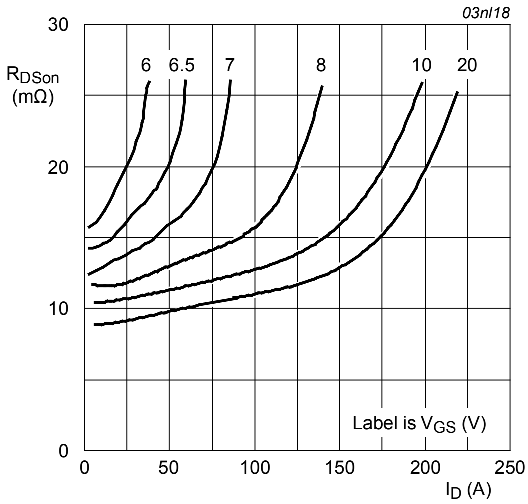


Fig. 11. Drain-source on-state resistance as a function of drain current; typical values

$T_j = 25°C; t_p = 300\mu s$

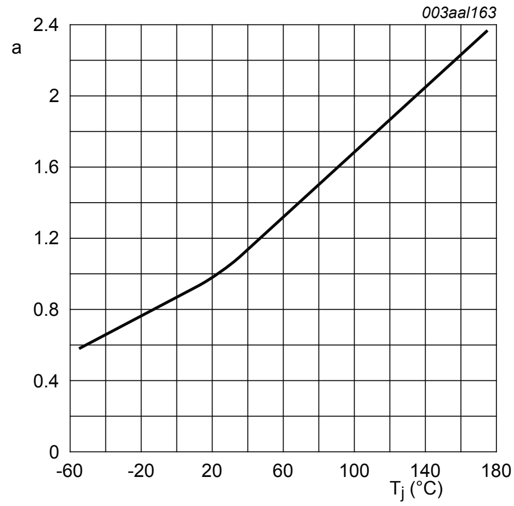


Fig. 12. Normalized drain-source on-state resistance factor as a function of junction temperature

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

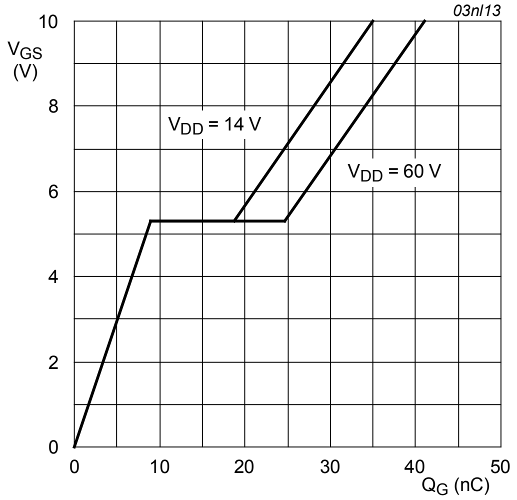


Fig. 13. Gate-source voltage as a function of gate charge; typical values

$$T_j = 25°C; I_D = 25A$$

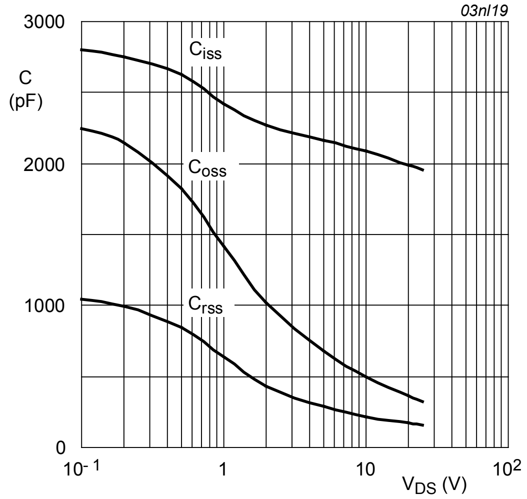


Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

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

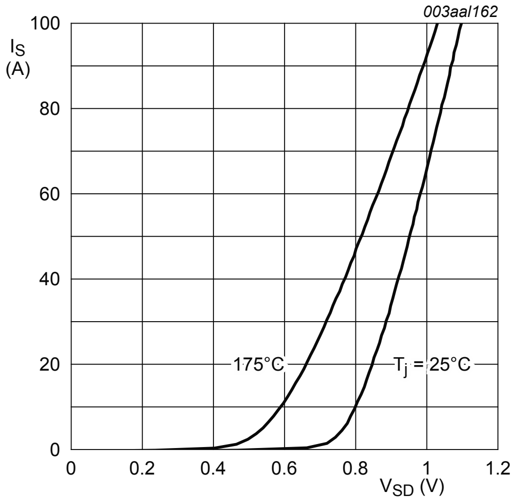
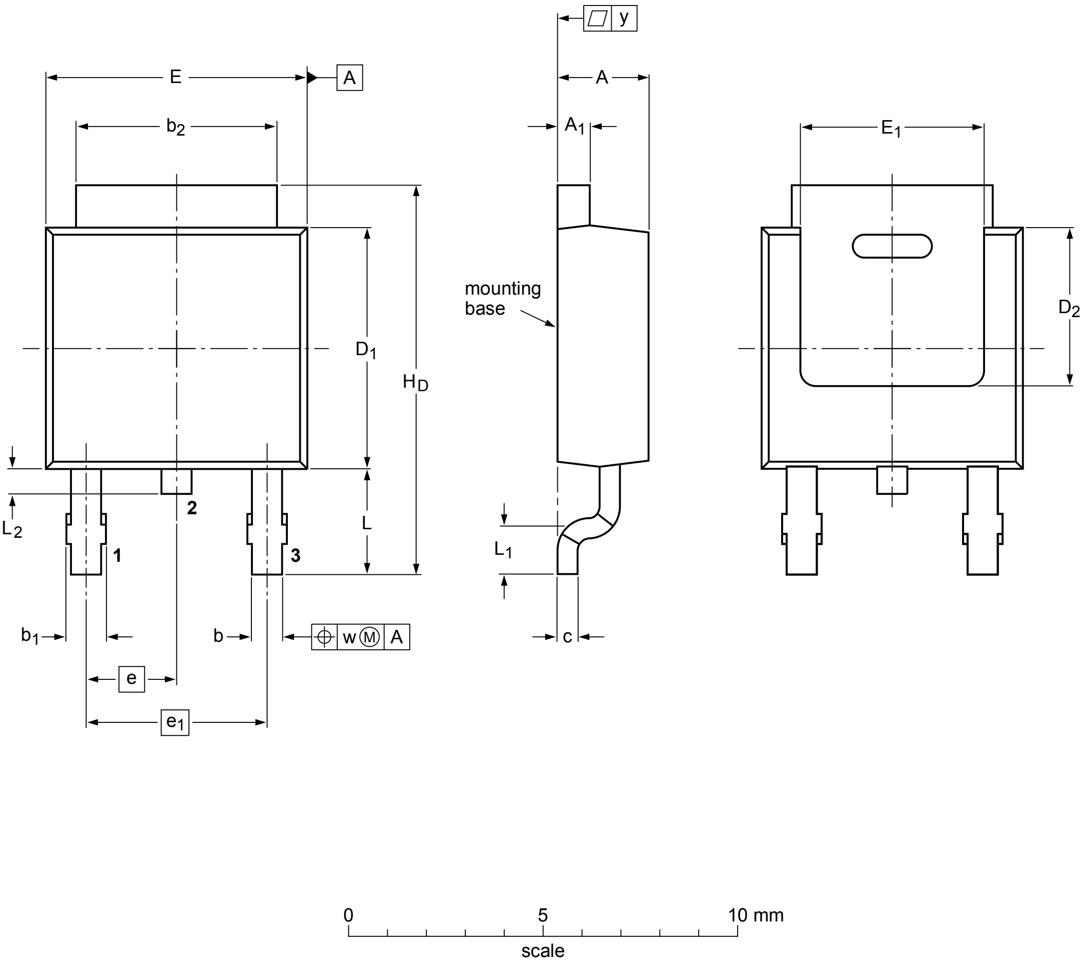


Fig. 15. Source current as a function of source-drain voltage; typical values

$$V_{GS} = 0V$$

11. Package outline

Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped) **SOT428**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1	b_2	c	D_1	D_2 min	E	E_1 min	e	e_1	H_D	L	L_1 min	L_2	w	y max
mm	2.38 2.22	0.93 0.46	0.89 0.71	1.1 0.9	5.46 5.00	0.56 0.20	6.22 5.98	4.0	6.73 6.47	4.45	2.285	4.57	10.4 9.6	2.95 2.55	0.5	0.9 0.5	0.2	0.2

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT428		TO-252	SC-63			~~06-02-14~~ 06-03-16

Fig. 16. Package outline DPAK (SOT428)

12. Legal information

12.1 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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13. Contents

Date of release: 18 July 2013