BUK7277-55A

N-channel TrenchMOS standard level FET

12 June 2014 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 and 24 V loads
- Automotive and 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		-	-	55	V
I_D	drain current	V_{GS} = 10 V; T_{mb} = 25 °C; Fig. 2; Fig. 3		-	-	18	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; Fig. 1		-	-	51	W
Static characteristics							
R_{DSon}	drain-source on-state resistance	V_{GS} = 10 V; I_D = 10 A; T_j = 175 °C; Fig. 12; Fig. 13		-	-	154	mΩ
		V_{GS} = 10 V; I_D = 10 A; T_j = 25 °C; Fig. 12; Fig. 13		-	65	77	mΩ
Avalanche ruggedness							
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	I_D = 6 A; $V_{sup} \leq 55$ V; R_{GS} = 50 Ω; V_{GS} = 10 V; $T_{j(init)}$ = 25 °C; unclamped		-	-	36	mJ

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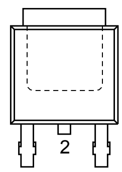
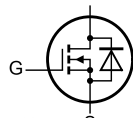
5. Pinning information

Table 2. Pinning information

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

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BUK7277-55A	DPAK	plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	SOT428

7. Marking

Table 4. Marking codes

Type number	Marking code
BUK7277-55A	BUK7277-55A

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	$T_j \geq 25$ °C; $T_j \leq 175$ °C		-	55	V
V_{DGR}	drain-gate voltage	$R_{GS} = 20$ kΩ		-	55	V
V_{GS}	gate-source voltage			-20	20	V
P_{tot}	total power dissipation	$T_{mb} = 25$ °C; Fig. 1		-	51	W
I_D	drain current	$T_{mb} = 100$ °C; $V_{GS} = 10$ V; Fig. 2		-	13	A
		$T_{mb} = 25$ °C; $V_{GS} = 10$ V; Fig. 2; Fig. 3		-	18	A
I_{DM}	peak drain current	$T_{mb} = 25$ °C; pulsed; $t_p \leq 10$ µs; Fig. 3	[1]	-	73	A
T_{stg}	storage temperature			-55	175	°C
T_j	junction temperature			-55	175	°C

Symbol	Parameter	Conditions		Min	Max	Unit
Source-drain diode						
I_S	source current	T_{mb} = 25 °C		-	18	A
I_{SM}	peak source current	pulsed; t_p ≤ 10 µs; T_{mb} = 25 °C		-	73	A
Avalanche ruggedness						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	I_D = 6 A; V_{sup} ≤ 55 V; R_{GS} = 50 Ω; V_{GS} = 10 V; $T_{j(init)}$ = 25 °C; unclamped		-	36	mJ

[1] Peak drain current is limited by chip, not package.

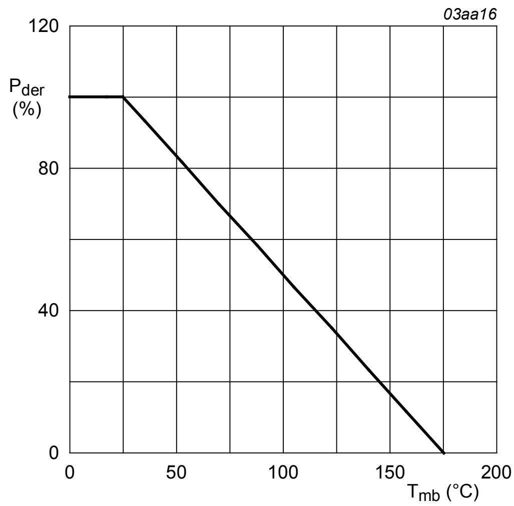


Fig. 1. Normalized total power dissipation as a function of mounting base temperature

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

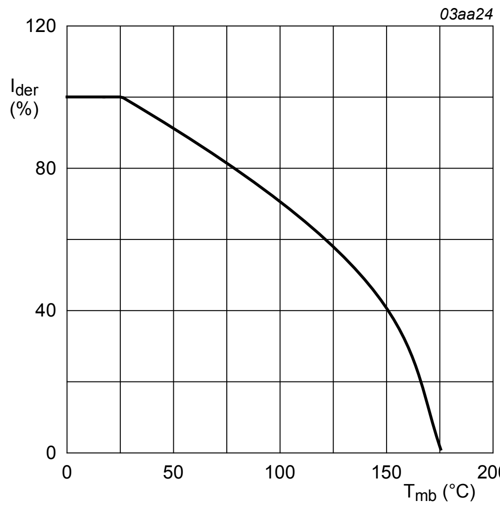


Fig. 2. Normalized continuous drain current as a function of mounting base temperature

$$I_{der} = \frac{I_D}{I_{D(25^{\circ}C)}} \times 100\,\%$$

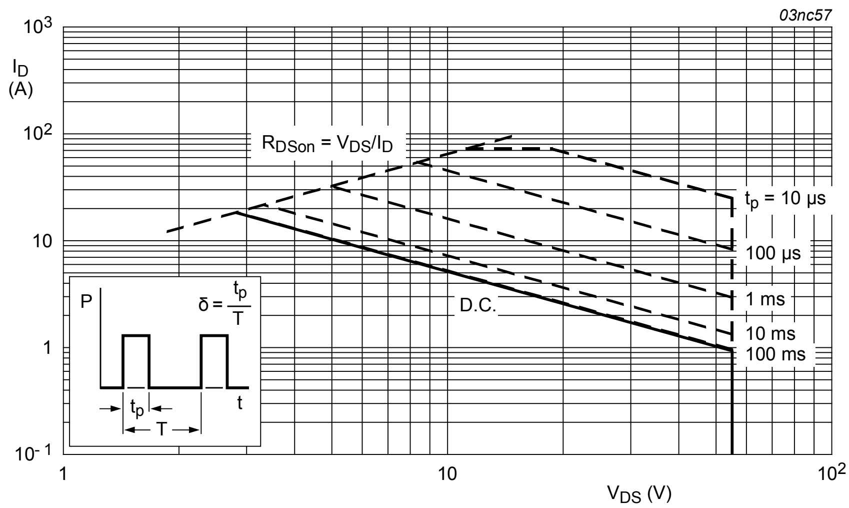


Fig. 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

$T_{mb} = 25°C$; 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		-	-	2.9	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	minimum footprint; FR4 board		-	71.4	-	K/W

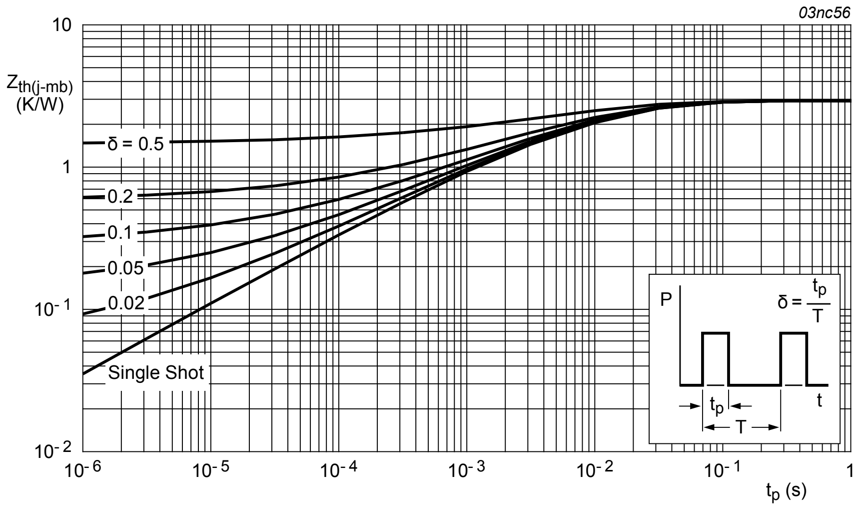


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

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		55	-	-	V
		I_D = 0.25 mA; V_{GS} = 0 V; T_j = -55 °C		50	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	I_D = 1 mA; V_{DS} = V_{GS}; T_j = 25 °C; Fig. 11		2	3	4	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = -55 °C; Fig. 11		-	-	4.4	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = 175 °C; Fig. 11		1	-	-	V
I_{DSS}	drain leakage current	V_{DS} = 55 V; V_{GS} = 0 V; T_j = 25 °C		-	0.05	10	µA
		V_{DS} = 55 V; V_{GS} = 0 V; T_j = 175 °C		-	-	500	µA

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
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 = 10 A; T_j = 175 °C; Fig. 12; Fig. 13		-	-	154	mΩ
		V_{GS} = 10 V; I_D = 10 A; T_j = 25 °C; Fig. 12; Fig. 13		-	65	77	mΩ
Dynamic characteristics							
C_{iss}	input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz; T_j = 25 °C; Fig. 14		-	316	422	pF
C_{oss}	output capacitance			-	92	110	pF
C_{rss}	reverse transfer capacitance			-	64	87	pF
$t_{d(on)}$	turn-on delay time	V_{DS} = 30 V; R_L = 1.2 Ω; V_{GS} = 10 V; $R_{G(ext)}$ = 10 Ω; T_j = 25 °C		-	10	-	ns
t_r	rise time			-	50	-	ns
$t_{d(off)}$	turn-off delay time			-	70	-	ns
t_f	fall time			-	40	-	ns
L_D	internal drain inductance	measured from drain lead from package to centre of die; T_j = 25 °C		-	2.5	-	nH
L_S	internal source inductance	measured from source lead from package to source bond pad; T_j = 25 °C		-	7.5	-	nH
Source-drain diode							
V_{SD}	source-drain voltage	I_S = 10 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		-	32	-	ns
Q_r	recovered charge			-	120	-	nC

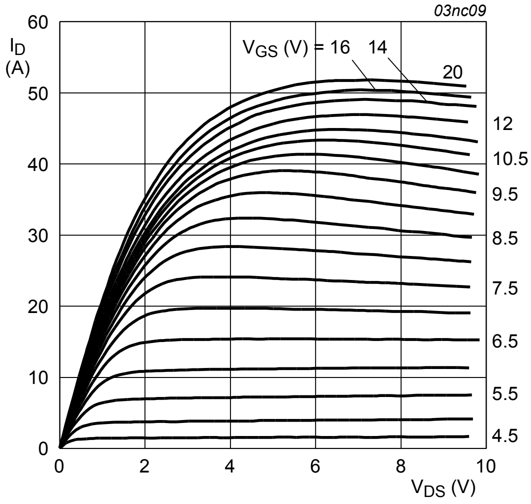


Fig. 5. Output characteristics; drain current as a function of drain-source voltage; typical values

$T_j = 25°C$

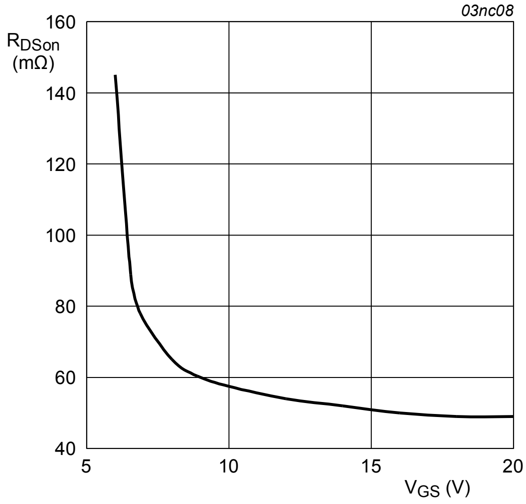


Fig. 6. Drain-source on-state risistance as a function of gate-source voltage; typical values

$T_j = 25°C; I_D = 10A$

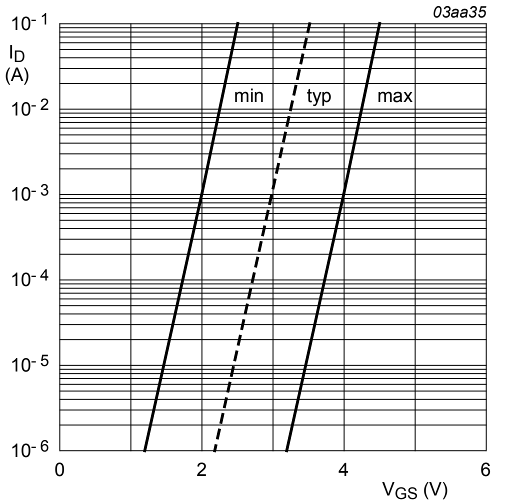


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

$T_j = 25°C; V_{DS} = 5V$

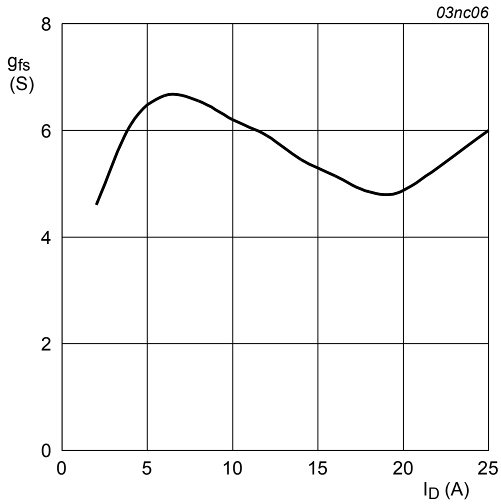


Fig. 8. Forward transconductance as a function of drain current; typical values

$T_j = 25°C; V_{DS} = 25V$

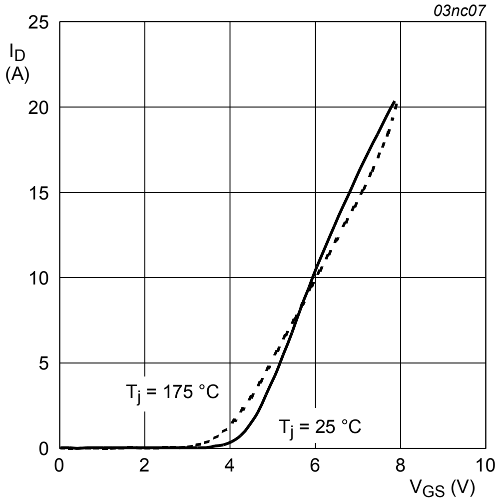


Fig. 9. Transfer characteristics: drain current as a function of gate-source voltage; typical values

$V_{DS} = 25V$

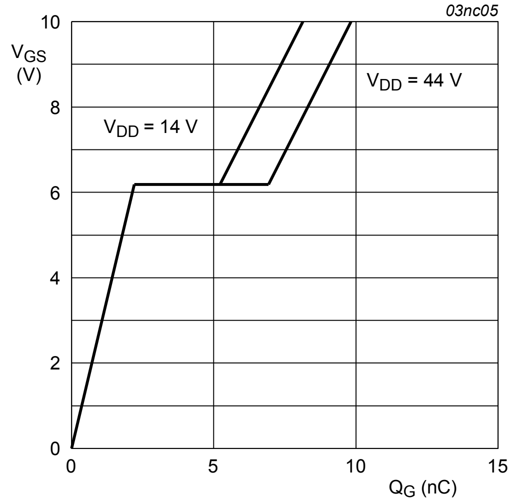


Fig. 10. Gate-source voltage as a function of gate charge; typical values

$T_j = 25°C; I_D = 10A$

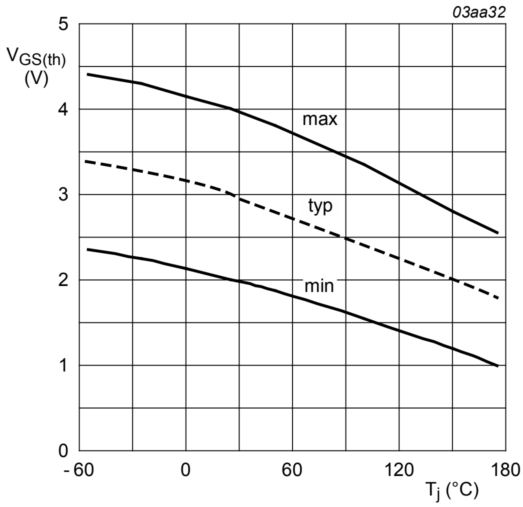


Fig. 11. Gate-source threshold voltage as a function of junction temperature

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

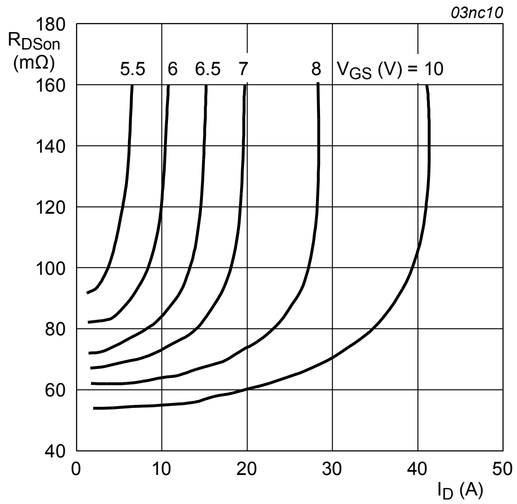


Fig. 12. Drain-source on-state resistance as a function of drain current; typical values

$T_j = 25°C$

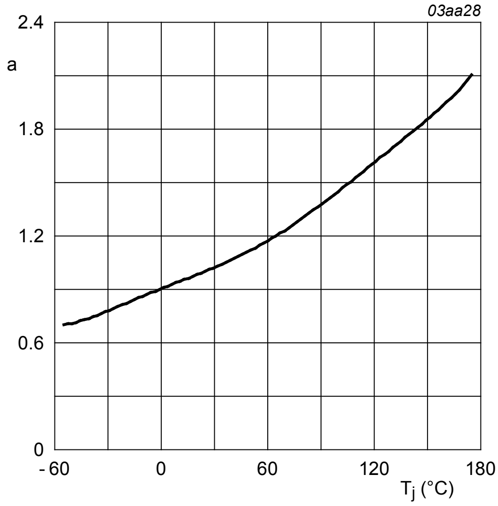


Fig. 13. Normalized drain-source on-state resistance factor as a function of junction temperature

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

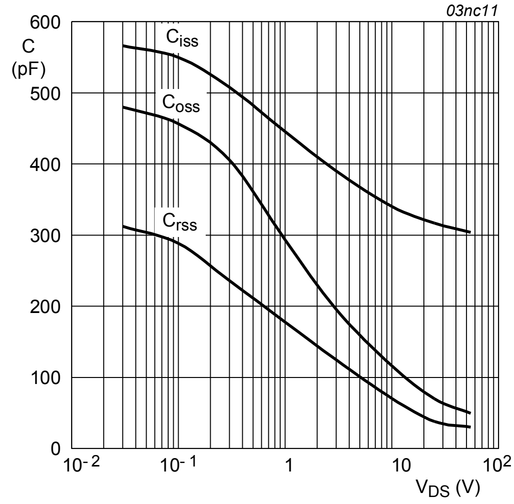


Fig. 14. Input, output and reverse capicitances as a function of drain-source voltage; typical values

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

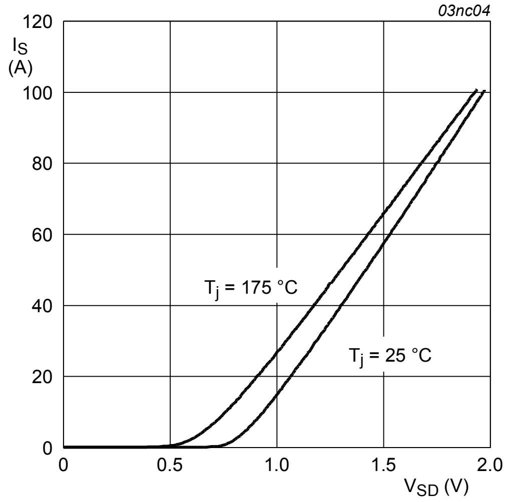
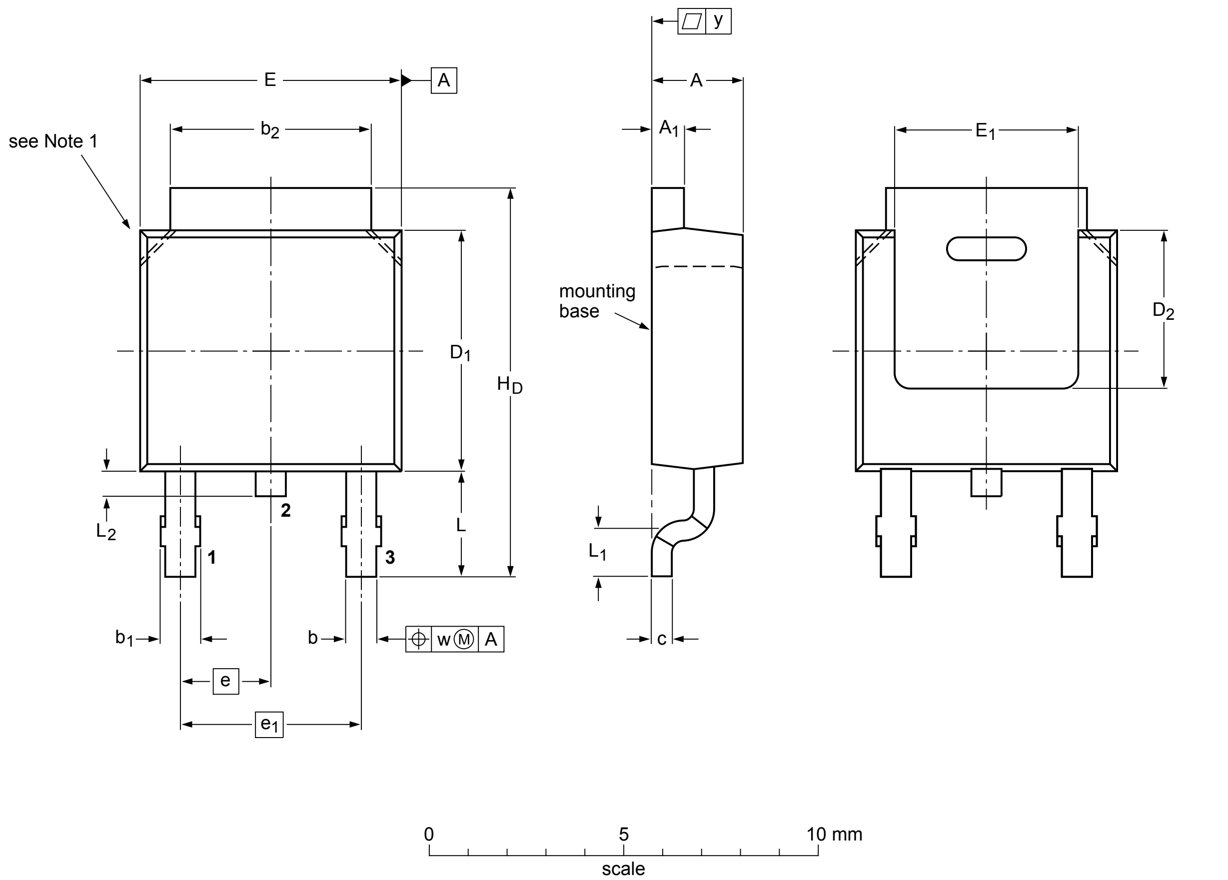


Fig. 15. Reverse diode current as a function of reverse dioode voltage; typical values

$$V_{GS} = 0V$$

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	E	E_1	e	e_1	H_D	L	L_1	L_2	w	y
mm	max	2.38	0.93	0.89	1.1	5.46	0.56	6.22		6.73				10.4	2.95		0.9		0.2
	nom											2.285	4.57					0.2	
	min	2.22	0.46	0.71	0.9	5.00	0.20	5.98	4.0	6.47	4.45			9.6	2.55	0.5	0.5		

Note
1. Plastic body may have 45° chamfer.

sot428_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT428		TO-252	SC-63			~~06-03-16~~ 14-06-10

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.

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13. Contents

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