



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

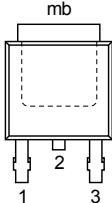
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V _{DS}	drain-source voltage	T _j ≥ 25 °C; T _j ≤ 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} ≤ 55 V; R _{GS} = 50 Ω; V _{GS} = 10 V; T _{j(init)} = 25 °C; unclamped		-	-	36	mJ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 DPAK (SOT428)	 mbb076
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	$T_j \geq 25\text{ °C}$; $T_j \leq 175\text{ °C}$		-	55	V
V_{DGR}	drain-gate voltage	$R_{GS} = 20\text{ k}\Omega$		-	55	V
V_{GS}	gate-source voltage			-20	20	V
P_{tot}	total power dissipation	$T_{mb} = 25\text{ °C}$; Fig. 1		-	51	W
I_D	drain current	$T_{mb} = 100\text{ °C}$; $V_{GS} = 10\text{ V}$; Fig. 2		-	13	A
		$T_{mb} = 25\text{ °C}$; $V_{GS} = 10\text{ V}$; Fig. 2; Fig. 3		-	18	A
I_{DM}	peak drain current	$T_{mb} = 25\text{ °C}$; pulsed; $t_p \leq 10\text{ }\mu\text{s}$; 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	$T_{mb} = 25\text{ }^{\circ}\text{C}$		-	18	A
I_{SM}	peak source current	pulsed; $t_p \leq 10\text{ }\mu\text{s}$; $T_{mb} = 25\text{ }^{\circ}\text{C}$		-	73	A
Avalanche ruggedness						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 6\text{ A}$; $V_{sup} \leq 55\text{ V}$; $R_{GS} = 50\text{ }\Omega$; $V_{GS} = 10\text{ V}$; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; unclamped		-	36	mJ

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

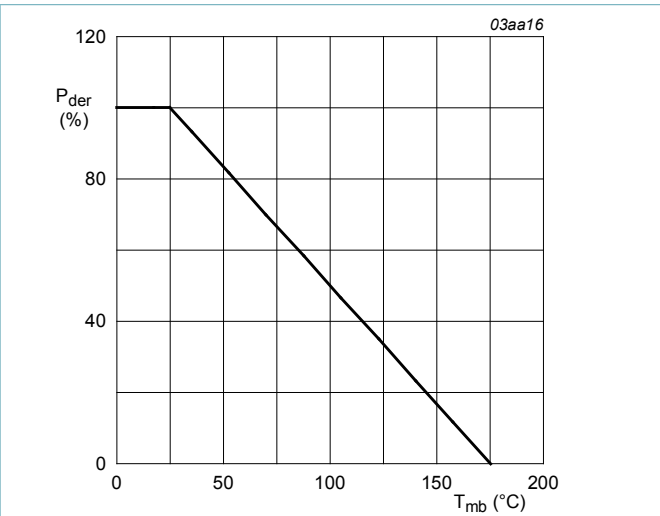


Fig. 1. Normalized total power dissipation as a function of mounting base temperature

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

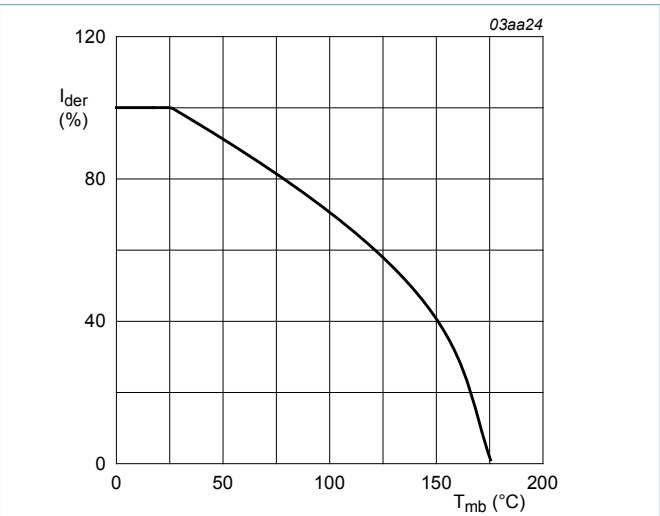


Fig. 2. Normalized continuous drain current as a function of mounting base temperature

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

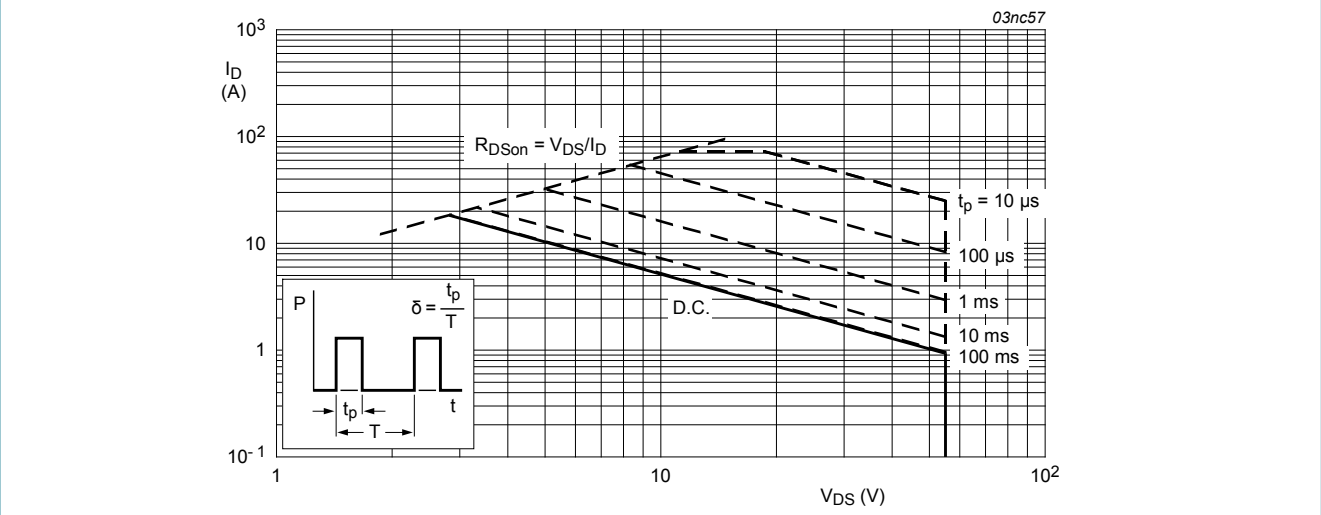


Fig. 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

$$T_{mb} = 25^{\circ}\text{C}; I_{DM} \text{ is single pulse}$$

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

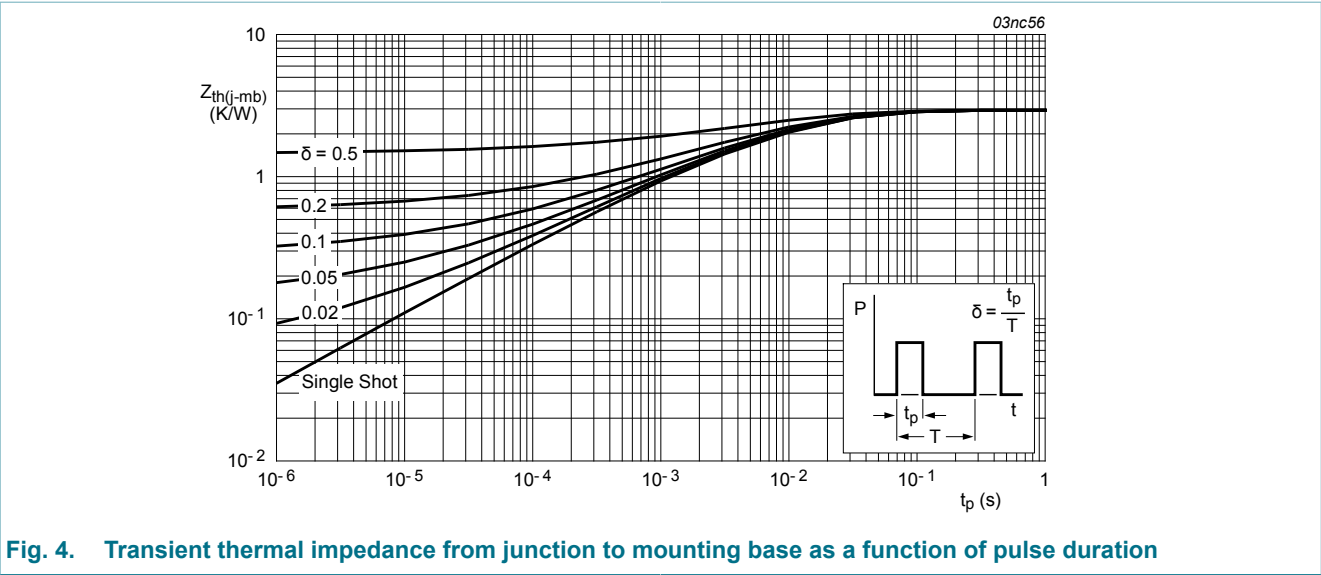


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 0.25\text{ mA}; V_{GS} = 0\text{ V}; T_J = 25\text{ }^{\circ}\text{C}$	55	-	-	V
		$I_D = 0.25\text{ mA}; V_{GS} = 0\text{ V}; T_J = -55\text{ }^{\circ}\text{C}$	50	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1\text{ mA}; V_{DS} = V_{GS}; T_J = 25\text{ }^{\circ}\text{C};$ Fig. 11	2	3	4	V
		$I_D = 1\text{ mA}; V_{DS} = V_{GS}; T_J = -55\text{ }^{\circ}\text{C};$ Fig. 11	-	-	4.4	V
		$I_D = 1\text{ mA}; V_{DS} = V_{GS}; T_J = 175\text{ }^{\circ}\text{C};$ Fig. 11	1	-	-	V
I_{DSS}	drain leakage current	$V_{DS} = 55\text{ V}; V_{GS} = 0\text{ V}; T_J = 25\text{ }^{\circ}\text{C}$	-	0.05	10	μA
		$V_{DS} = 55\text{ V}; V_{GS} = 0\text{ V}; T_J = 175\text{ }^{\circ}\text{C}$	-	-	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	-
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

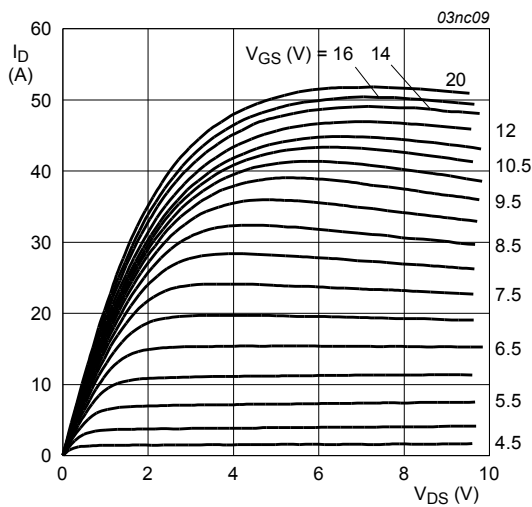


Fig. 5. Output characteristics; drain current as a function of drain-source voltage; typical values

$T_j = 25^\circ\text{C}$

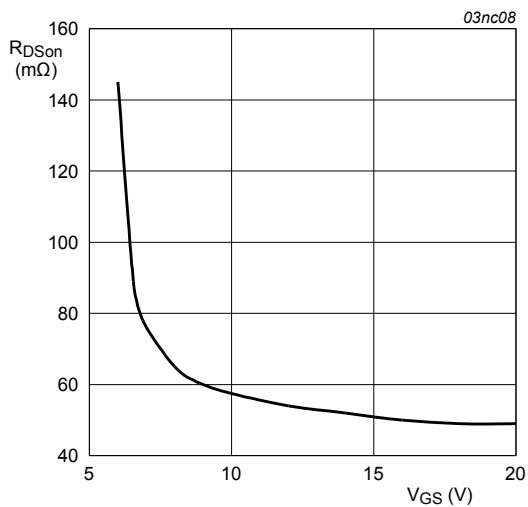


Fig. 6. Drain-source on-state resistance as a function of gate-source voltage; typical values

$T_j = 25^\circ\text{C}; I_D = 10\text{A}$

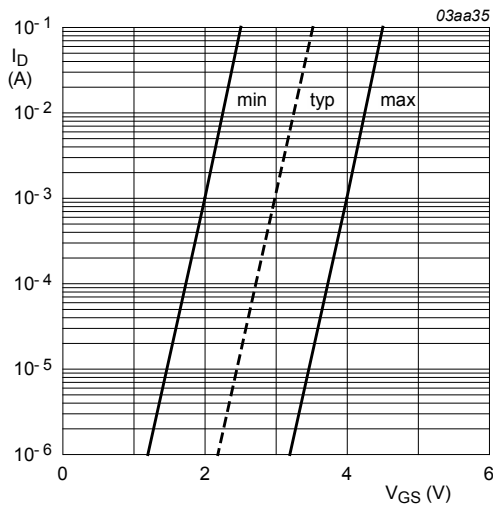


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

$T_j = 25^\circ\text{C}; V_{DS} = 5\text{V}$

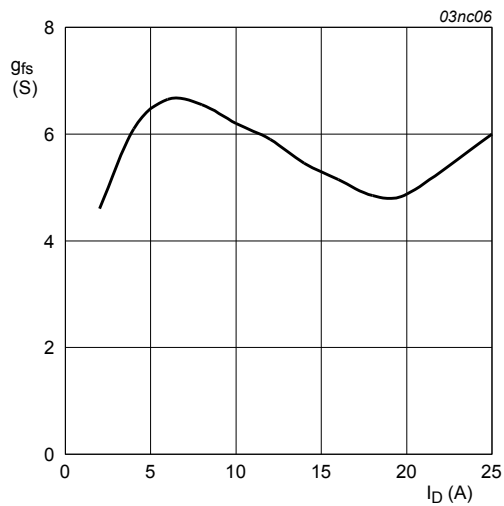


Fig. 8. Forward transconductance as a function of drain current; typical values

$T_j = 25^\circ\text{C}; V_{DS} = 25\text{V}$

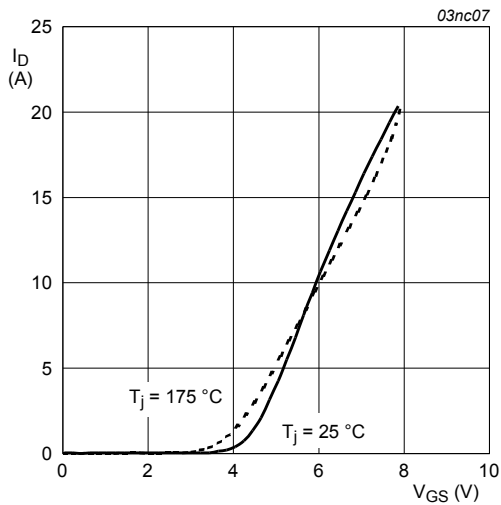


Fig. 9. Transfer characteristics: drain current as a function of gate-source voltage; typical values

$V_{DS} = 25V$

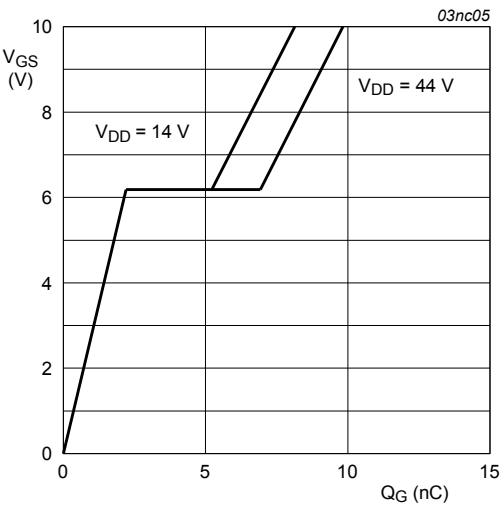


Fig. 10. Gate-source voltage as a function of gate charge; typical values

$T_j = 25^{\circ}C; I_D = 10A$

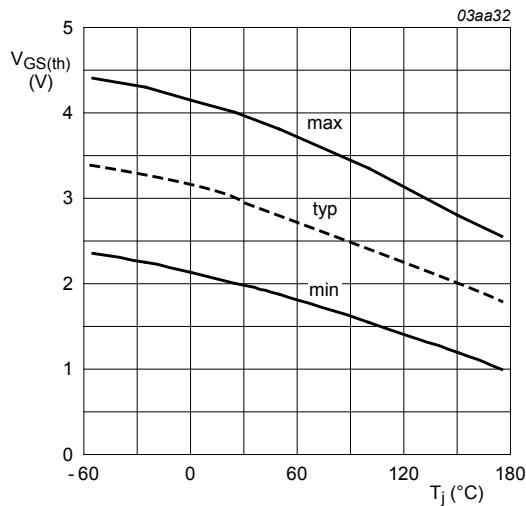


Fig. 11. Gate-source threshold voltage as a function of junction temperature

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

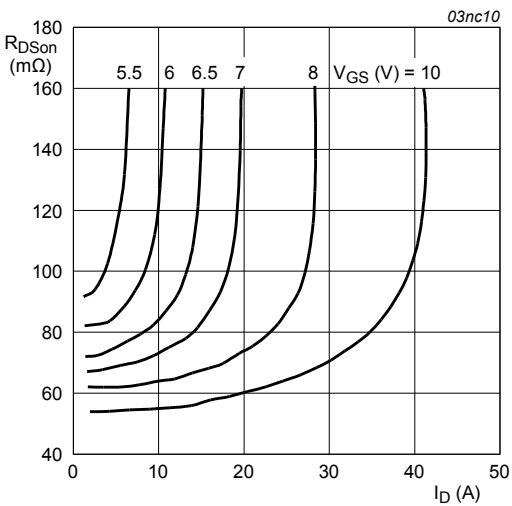


Fig. 12. Drain-source on-state resistance as a function of drain current; typical values

$T_j = 25^{\circ}C$

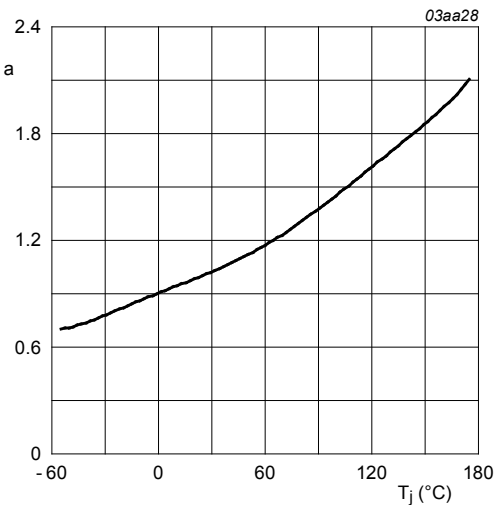


Fig. 13. Normalized drain-source on-state resistance factor as a function of junction temperature

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

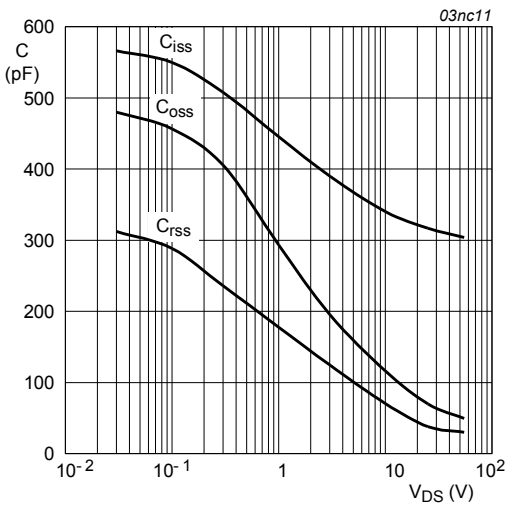


Fig. 14. Input, output and reverse capacitances as a function of drain-source voltage; typical values

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

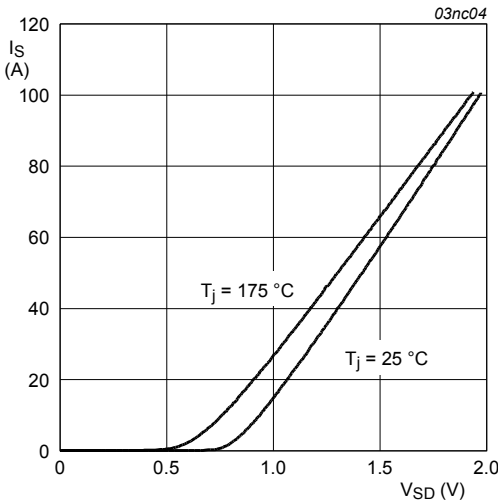


Fig. 15. Reverse diode current as a function of reverse diode voltage; typical values

$$V_{GS} = 0V$$

11. Package outline

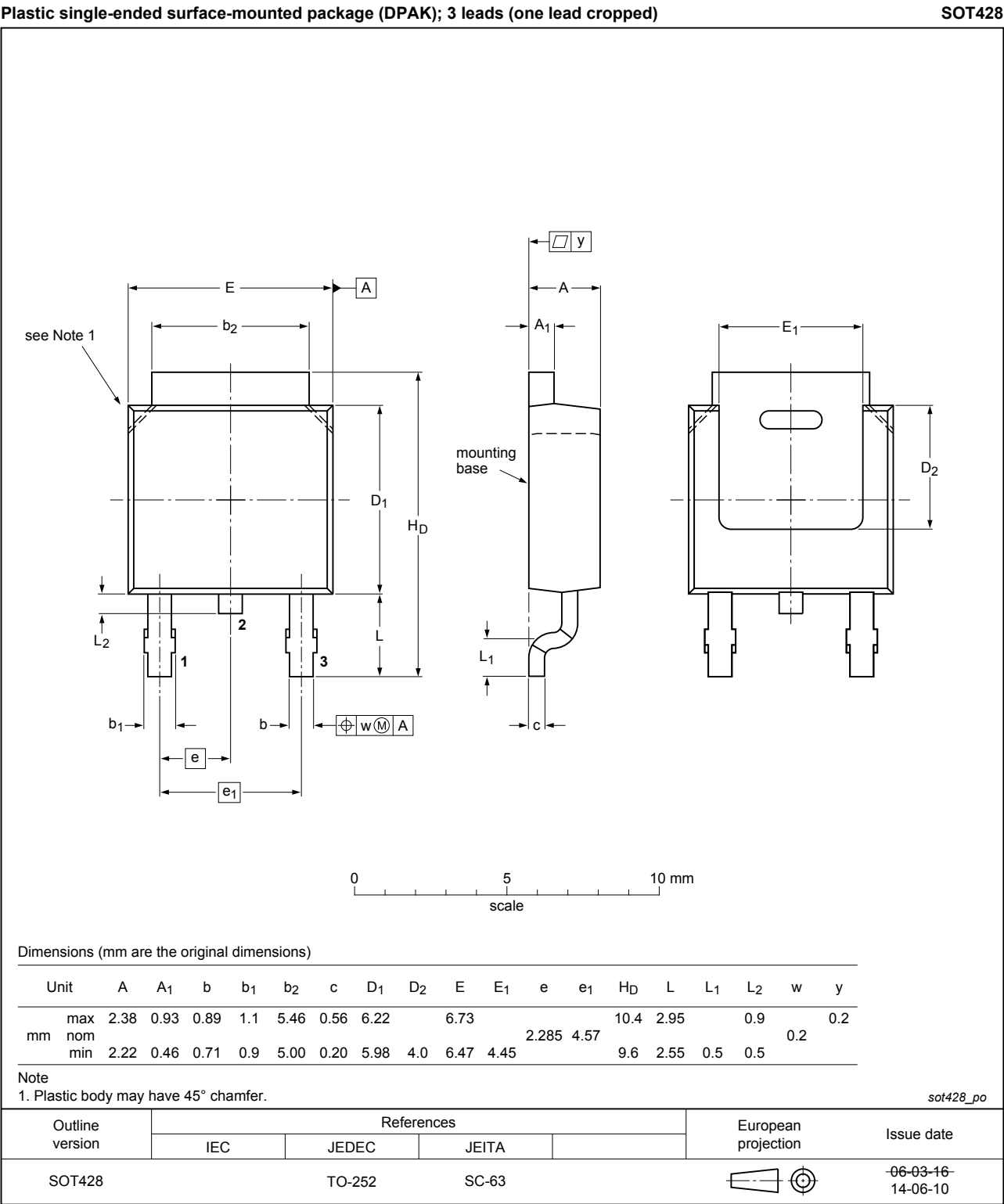


Fig. 16. Package outline DPAK (SOT428)

12. Legal information

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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