



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

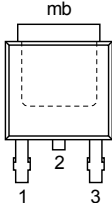
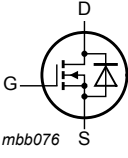
4. Quick reference data

Table 1. Quick reference data

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 DPAK (SOT428)	 mbb076
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	$T_j \geq 25\text{ °C}$; $T_j \leq 175\text{ °C}$	-	75	V
V_{DGR}	drain-gate voltage	$R_{GS} = 20\text{ k}\Omega$	-	75	V
V_{GS}	gate-source voltage		-20	20	V
I_D	drain current	$T_{mb} = 25\text{ °C}$; $V_{GS} = 10\text{ V}$; Fig. 1; Fig. 3	-	69	A
		$T_{mb} = 100\text{ °C}$; $V_{GS} = 10\text{ V}$; Fig. 1	-	49	A
I_{DM}	peak drain current	$T_{mb} = 25\text{ °C}$; pulsed; $t_p \leq 10\text{ }\mu\text{s}$; Fig. 3	-	276	A
P_{tot}	total power dissipation	$T_{mb} = 25\text{ °C}$; 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 ≤ 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} ≤ 75 V; R _{GS} = 50 Ω; V _{GS} = 10 V; T _{j(init)} = 25 °C; unclamped		-	136	mJ

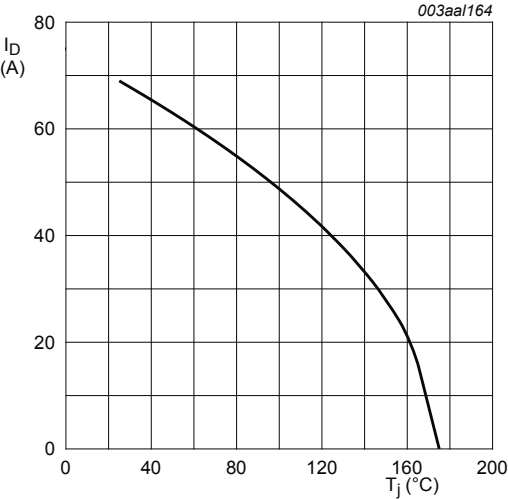


Fig. 1. Continuous drain current as a function of mounting base temperature

$V_{GS} \geq 10V$

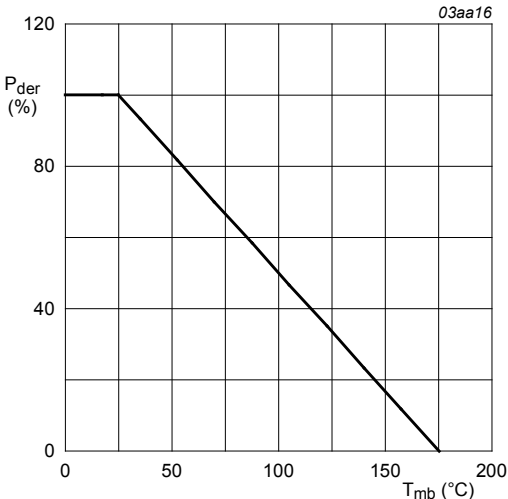


Fig. 2. Normalized total power dissipation as a function of mounting base temperature

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

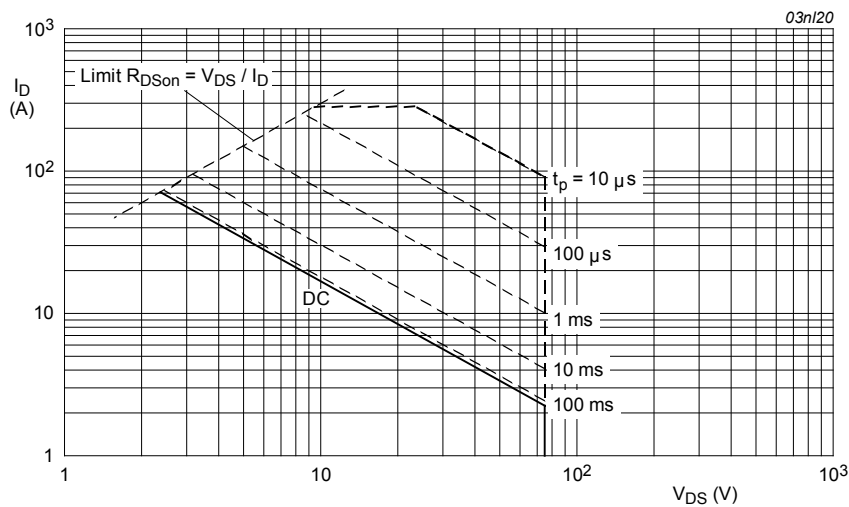


Fig. 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

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

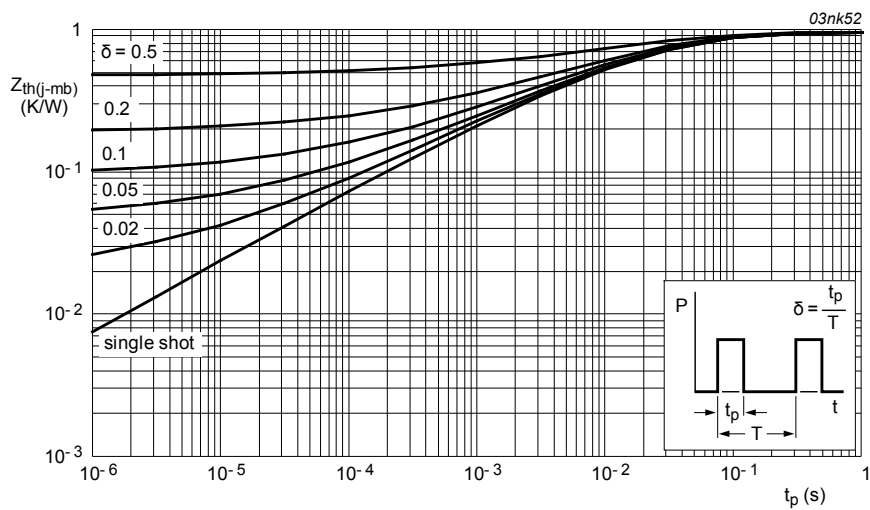


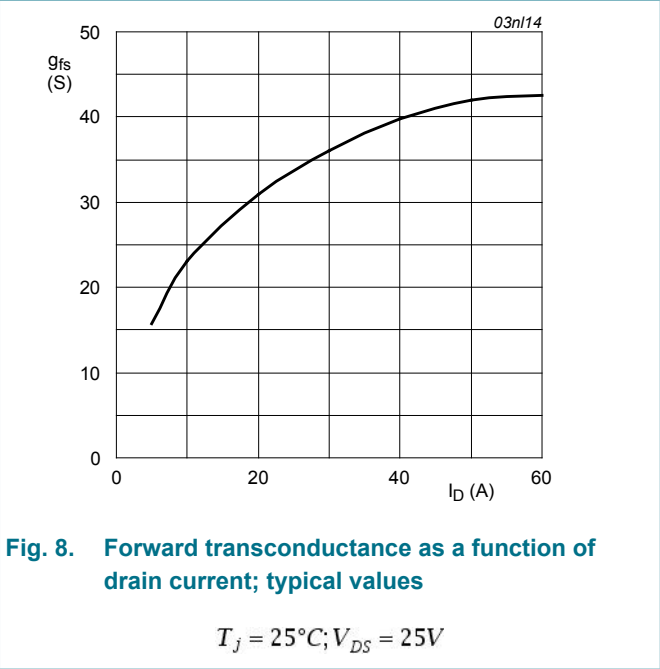
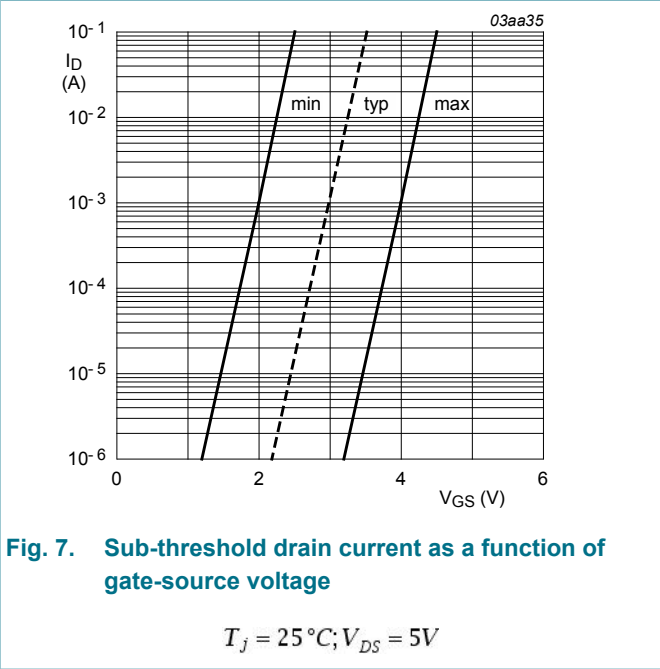
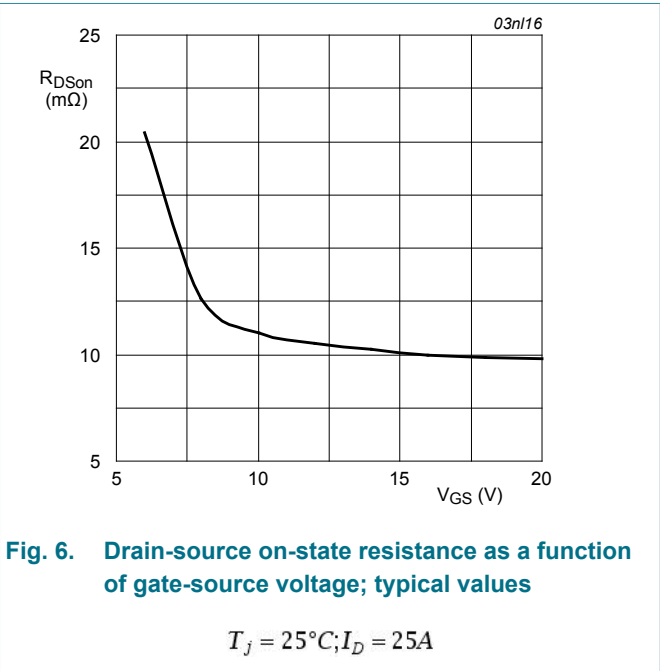
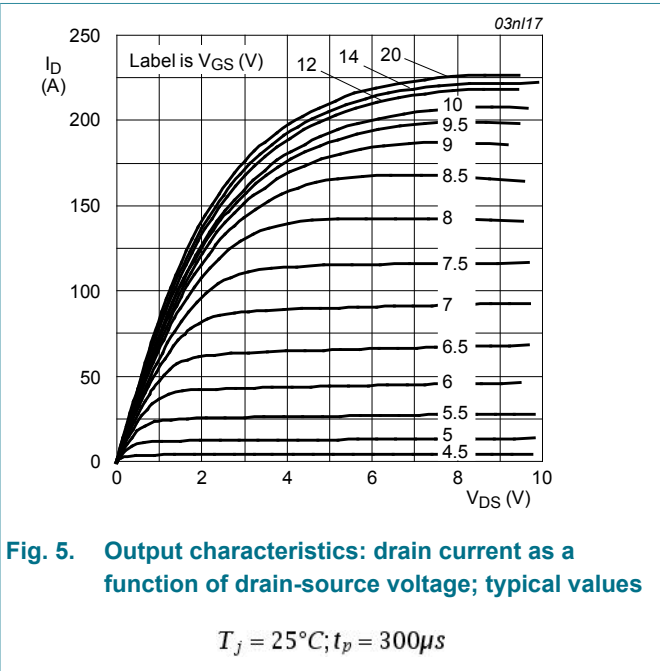
Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

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	$I_S = 25\text{ A}$; $V_{GS} = 0\text{ V}$; $T_J = 25\text{ }^{\circ}\text{C}$; Fig. 15		-	0.85	1.2	V
t_{rr}	reverse recovery time	$I_S = 20\text{ A}$; $dI_S/dt = -100\text{ A}/\mu\text{s}$;		-	74	-	ns
Q_r	recovered charge	$V_{GS} = -10\text{ V}$; $V_{DS} = 30\text{ V}$; $T_J = 25\text{ }^{\circ}\text{C}$		-	94	-	nC



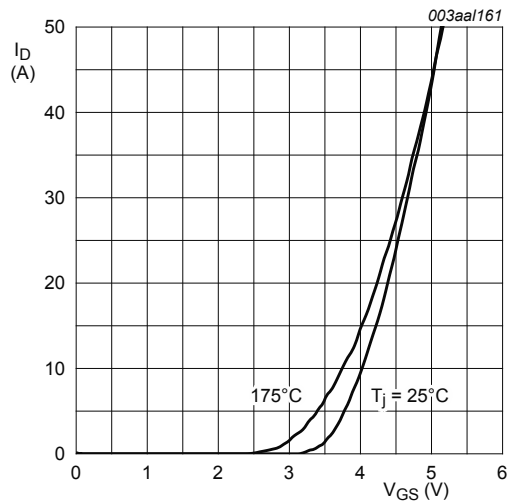


Fig. 9. Transfer characteristics; drain current as a function of gate-source voltage; typical values

$$V_{DS} = 12V$$

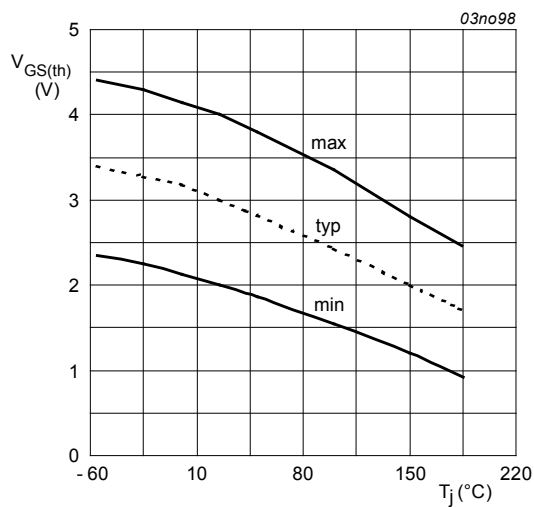


Fig. 10. Gate-source threshold voltage as a function of junction temperature

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

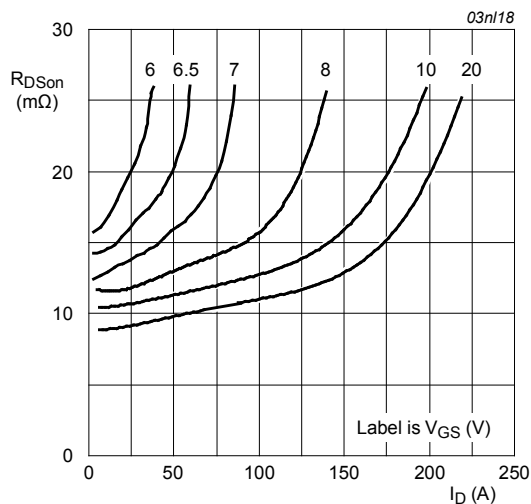


Fig. 11. Drain-source on-state resistance as a function of drain current; typical values

$$T_j = 25^\circ\text{C}; t_p = 300\mu s$$

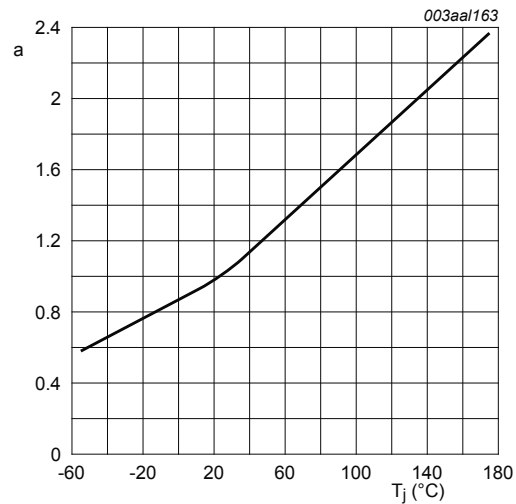


Fig. 12. Normalized drain-source on-state resistance factor as a function of junction temperature

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

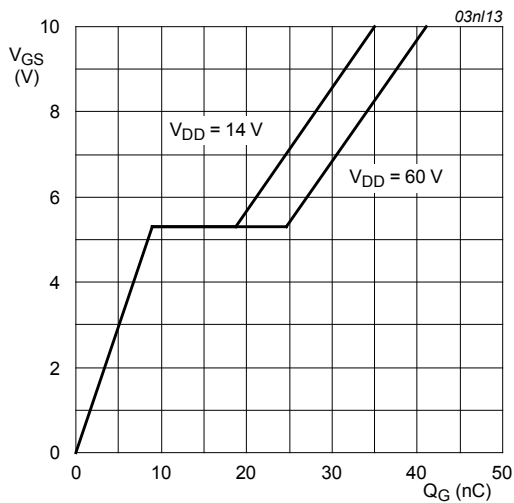


Fig. 13. Gate-source voltage as a function of gate charge; typical values

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

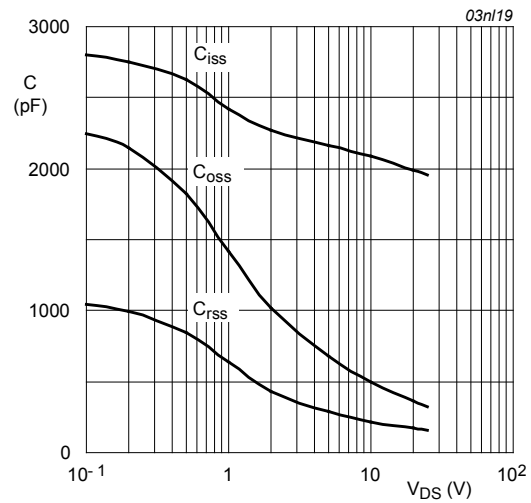


Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

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

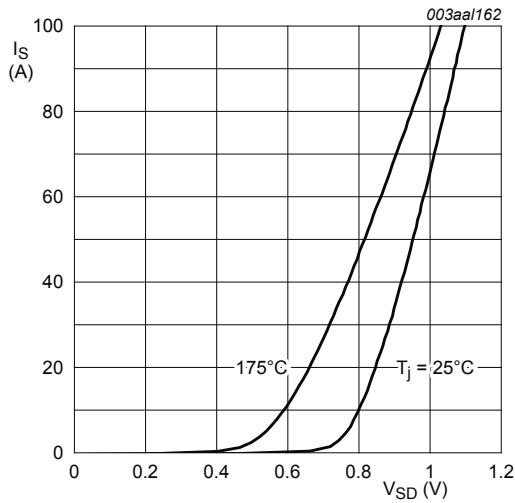


Fig. 15. Source current as a function of source-drain voltage; typical values

$$V_{GS} = 0\text{ V}$$

11. Package outline

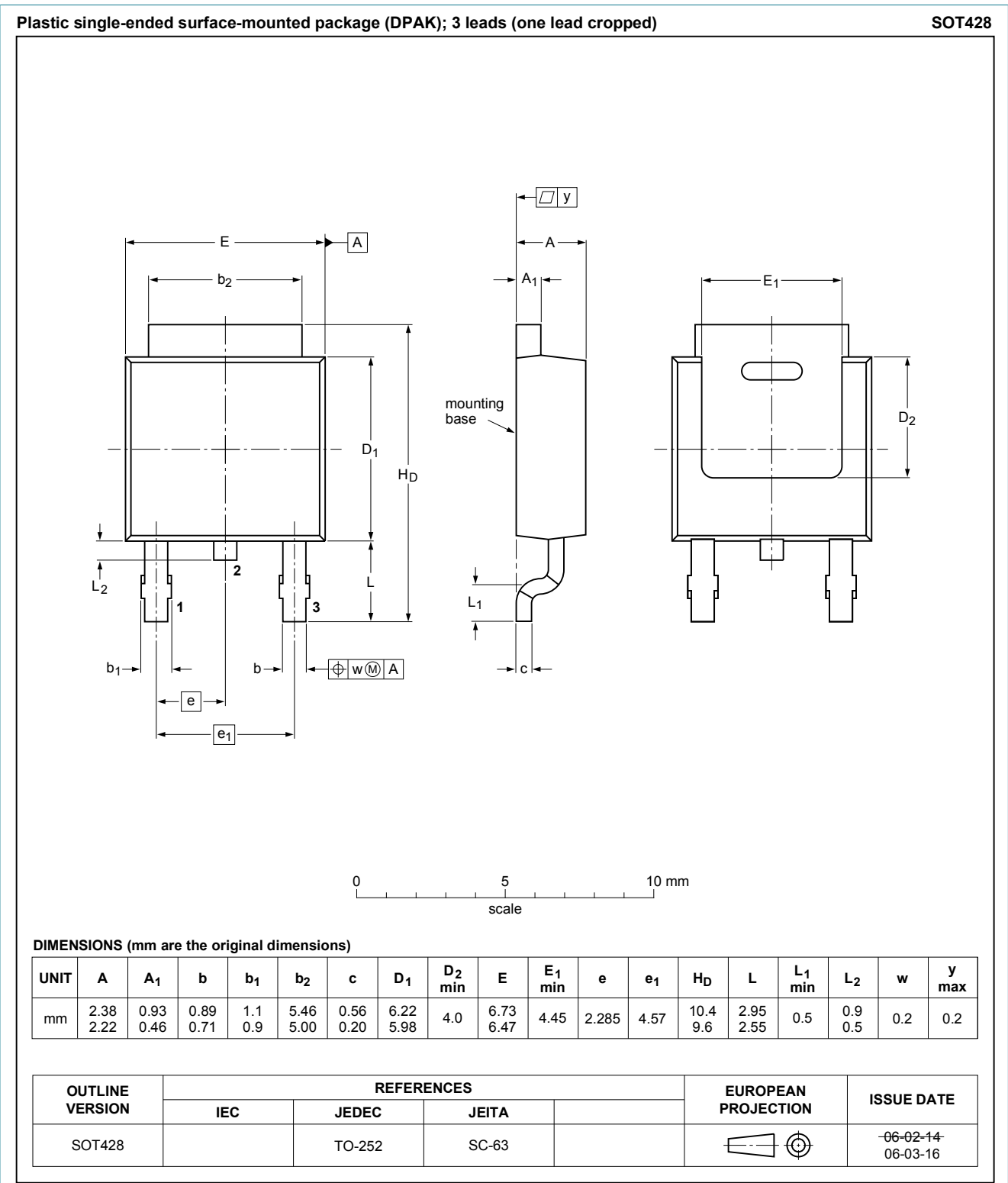


Fig. 16. Package outline DPAK (SOT428)

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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
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