



BUK763R8-80E

N-channel TrenchMOS standard level FET

28 July 2016

Product data sheet

1. General description

Standard level N-channel MOSFET in a SOT404 package using TrenchMOS technology. This product has been designed and qualified to AEC Q101 standard for use in high performance automotive applications.

2. Features and benefits

- AEC Q101 compliant
- Repetitive avalanche rated
- Suitable for thermally demanding environments due to 175 °C rating
- True standard level gate with $V_{GS(th)}$ rating of greater than 1 V at 175 °C

3. Applications

- 12V, 24V and 48V Automotive systems
- Electric and electro-hydraulic power steering
- Motors, lamps and solenoid control
- Start-Stop micro-hybrid applications
- Transmission control
- Ultra high performance power switching

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25\text{ °C}$; $T_j \leq 175\text{ °C}$	-	-	80	V
I_D	drain current	$V_{GS} = 10\text{ V}$; $T_{mb} = 25\text{ °C}$; Fig. 2	[1]	-	120	A
P_{tot}	total power dissipation	$T_{mb} = 25\text{ °C}$; Fig. 1	-	-	349	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	-	3.1	3.8	m Ω
Dynamic characteristics						
Q_{GD}	gate-drain charge	$V_{GS} = 10\text{ V}$; $I_D = 25\text{ A}$; $V_{DS} = 64\text{ V}$; Fig. 13 ; Fig. 14	-	51	-	nC

[1] Continuous current is limited by package.

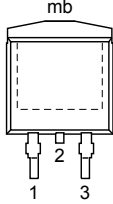
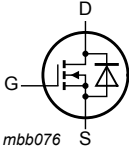


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5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 <p>D2PAK (SOT404)</p>	 <p><i>mbb076</i></p>
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
BUK763R8-80E	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

7. Marking

Table 4. Marking codes

Type number	Marking code
BUK763R8-80E	BUK763R8-80E

8. Limiting values

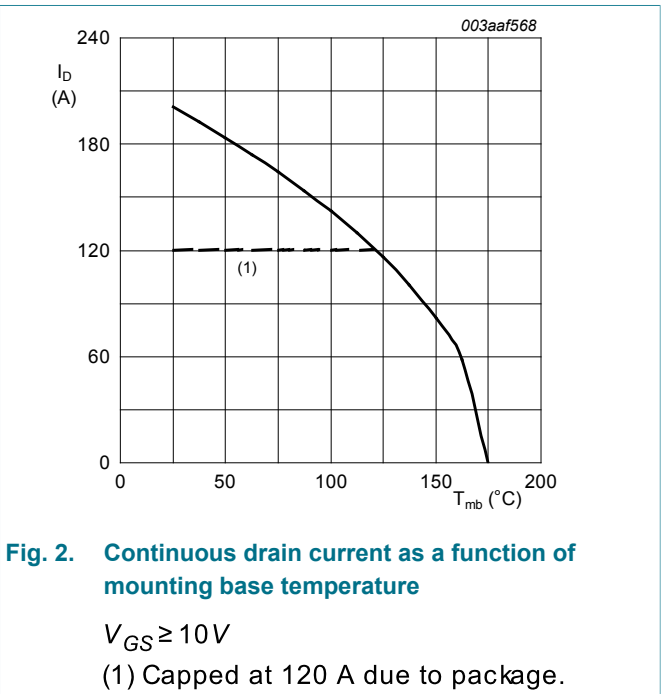
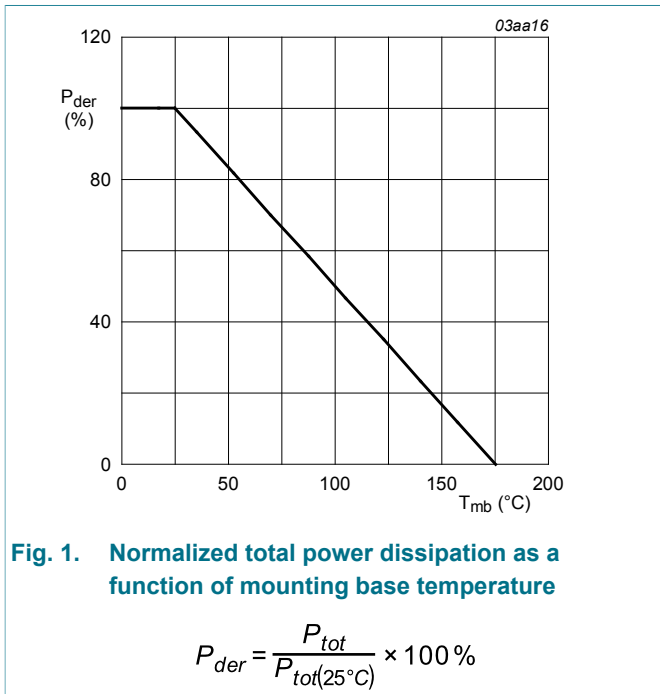
Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25\text{ °C}$; $T_j \leq 175\text{ °C}$		-	80	V
V_{DGR}	drain-gate voltage	$R_{GS} = 20\text{ k}\Omega$		-	80	V
V_{GS}	gate-source voltage	$T_j \leq 175\text{ °C}$; DC		-20	20	V
P_{tot}	total power dissipation	$T_{mb} = 25\text{ °C}$; Fig. 1		-	349	W
I_D	drain current	$T_{mb} = 25\text{ °C}$; $V_{GS} = 10\text{ V}$; Fig. 2	[1]	-	120	A
		$T_{mb} = 100\text{ °C}$; $V_{GS} = 10\text{ V}$; Fig. 2	[1]	-	120	A
I_{DM}	peak drain current	$T_{mb} = 25\text{ °C}$; pulsed; $t_p \leq 10\text{ }\mu\text{s}$; Fig. 3		-	778	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	$T_{mb} = 25\text{ }^\circ\text{C}$	[1]	-	120	A
I_{SM}	peak source current	pulsed; $t_p \leq 10\text{ }\mu\text{s}$; $T_{mb} = 25\text{ }^\circ\text{C}$		-	778	A
Avalanche ruggedness						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 120\text{ A}$; $V_{sup} \leq 80\text{ V}$; $R_{GS} = 50\text{ }\Omega$; $V_{GS} = 10\text{ V}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; unclamped; Fig. 4	[2][3]	-	488	mJ

- [1] Continuous current is limited by package.
- [2] Single-pulse avalanche rating limited by maximum junction temperature of 175 °C.
- [3] Refer to application note AN10273 for further information.



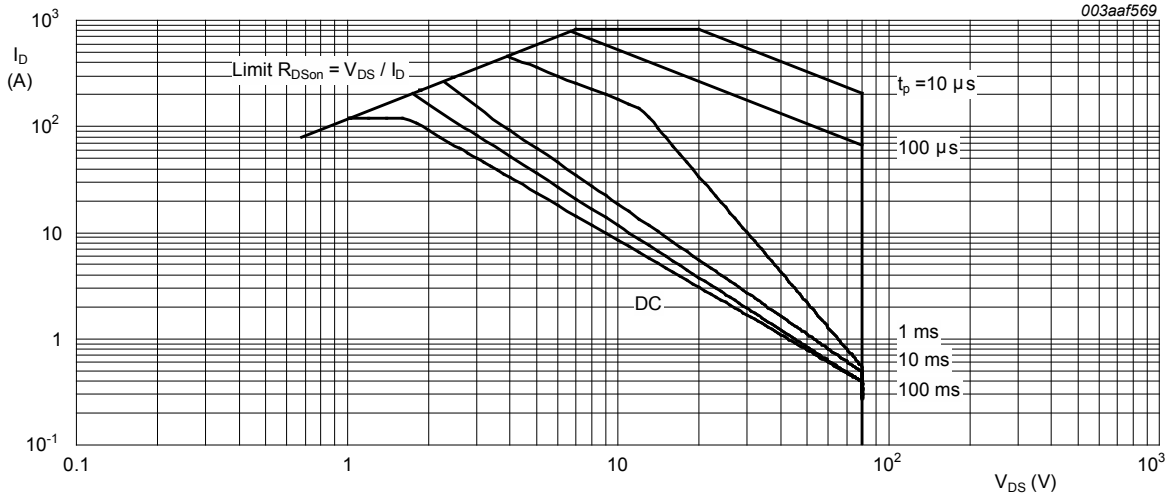


Fig. 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

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

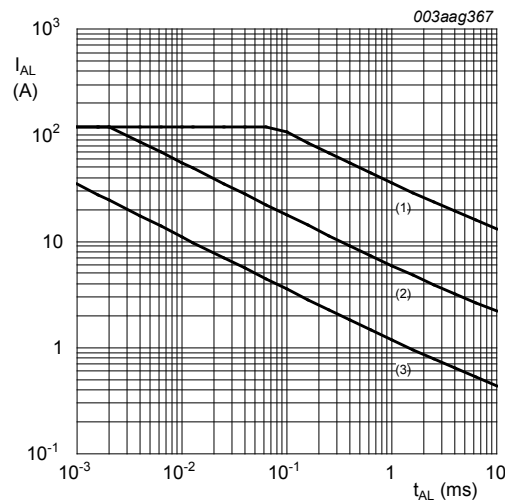


Fig. 4. Avalanche rating; avalanche current as a function of avalanche time.

(1) $T_j(init) = 25^\circ C$; (2) $T_j(init) = 150^\circ C$; (3) Repetitive Avalanche

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. 5	-	-	0.43	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	minimum footprint ; mounted on a printed-circuit board	-	50	-	K/W

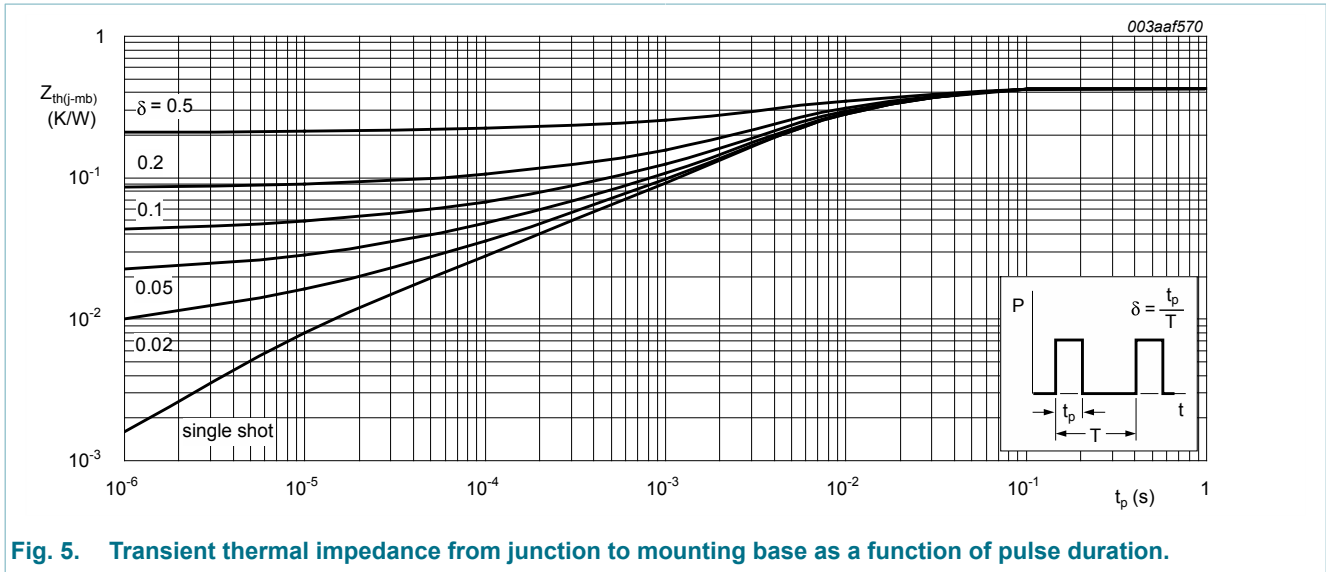


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration.

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu A; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$	80	-	-	V
		$I_D = 250 mA; V_{GS} = 0 V; T_j = -55 \text{ }^\circ C$	72	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1 mA; V_{DS} = V_{GS}; T_j = 25 \text{ }^\circ C;$ Fig. 9; Fig. 10	2.4	3	4	V
		$I_D = 1 mA; V_{DS} = V_{GS}; T_j = 175 \text{ }^\circ C;$ Fig. 9	1	-	-	V
		$I_D = 1 mA; V_{DS} = V_{GS}; T_j = -55 \text{ }^\circ C;$ Fig. 9	-	-	4.5	V
I_{DSS}	drain leakage current	$V_{DS} = 80 V; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$	-	0.15	1	μA
		$V_{DS} = 80 V; V_{GS} = 0 V; T_j = 175 \text{ }^\circ C$	-	-	500	μA
I_{GSS}	gate leakage current	$V_{GS} = 20 V; V_{DS} = 0 V; T_j = 25 \text{ }^\circ C$	-	2	100	nA
		$V_{GS} = -20 V; V_{DS} = 0 V; T_j = 25 \text{ }^\circ C$	-	2	100	nA
R_{DSon}	drain-source on-state resistance	$V_{GS} = 10 V; I_D = 25 A; T_j = 25 \text{ }^\circ C;$ Fig. 11	-	3.1	3.8	m Ω
		$V_{GS} = 10 V; I_D = 25 A; T_j = 175 \text{ }^\circ C;$ Fig. 12; Fig. 11	-	-	9.2	m Ω
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$I_D = 25 A; V_{DS} = 64 V; V_{GS} = 10 V;$ Fig. 13; Fig. 14	-	169	-	nC
Q_{GS}	gate-source charge		-	37	-	nC
Q_{GD}	gate-drain charge		-	51	-	nC

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
C_{iss}	input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 25\text{ V}; f = 1\text{ MHz};$	-	9020	12030	pF
C_{oss}	output capacitance	$T_j = 25\text{ }^\circ\text{C};$ Fig. 15	-	840	1010	pF
C_{rss}	reverse transfer capacitance		-	470	645	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 60\text{ V}; R_L = 2.4\text{ }\Omega; V_{GS} = 10\text{ V};$	-	38	-	ns
t_r	rise time	$R_{G(ext)} = 5\text{ }\Omega$	-	48	-	ns
$t_{d(off)}$	turn-off delay time		-	129	-	ns
t_f	fall time		-	65	-	ns
L_D	internal drain inductance	from upper edge of mounting base to centre of die	-	2.5	-	nH
L_S	internal source inductance	measured from source lead to source bond pad; $T_j = 25\text{ }^\circ\text{C}$	-	7.5	-	nH
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. 16	-	0.77	1.2	V
t_{rr}	reverse recovery time	$I_S = 20\text{ A}; dI_S/dt = -100\text{ A}/\mu\text{s}; V_{GS} = 0\text{ V};$	-	58	-	ns
Q_r	recovered charge	$V_{DS} = 25\text{ V}$	-	121	-	nC

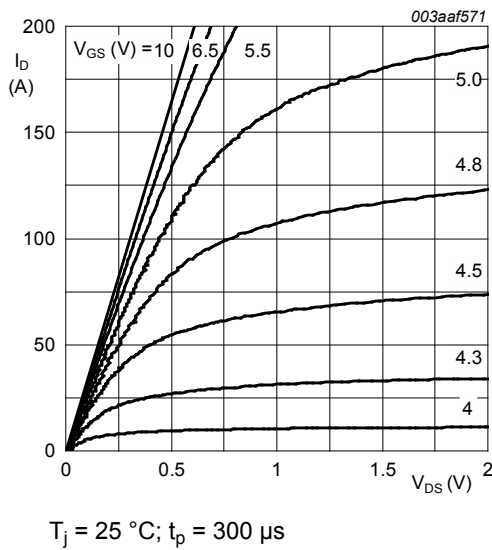


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

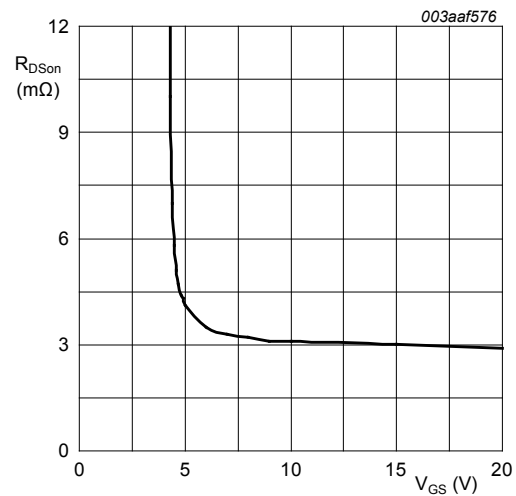


Fig. 7. Drain-source on-state resistance as a function of gate-source voltage; typical values

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

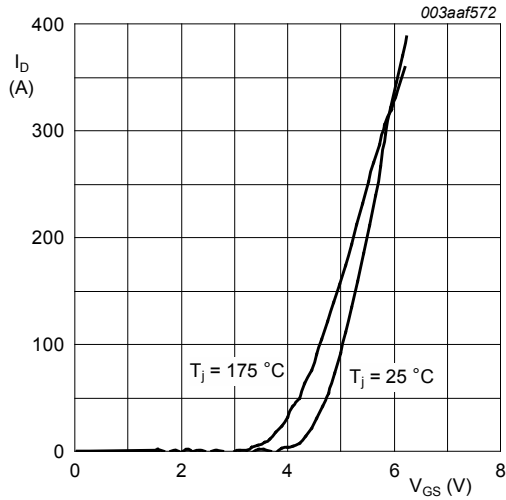


Fig. 8. Transfer characteristics: drain current as a function of gate-source voltage; typical values

$V_{DS} = 12\text{V}$

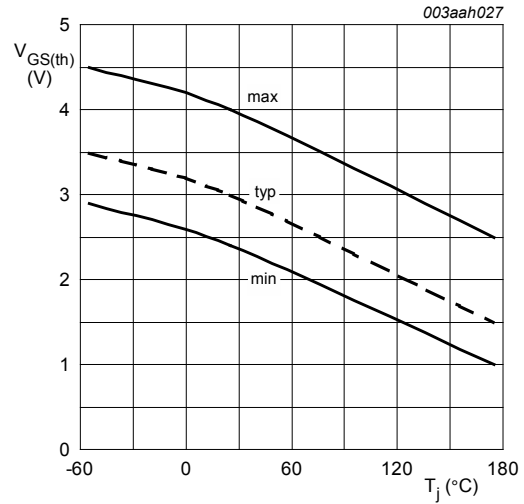


Fig. 9. Gate-source threshold voltage as a function of junction temperature

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

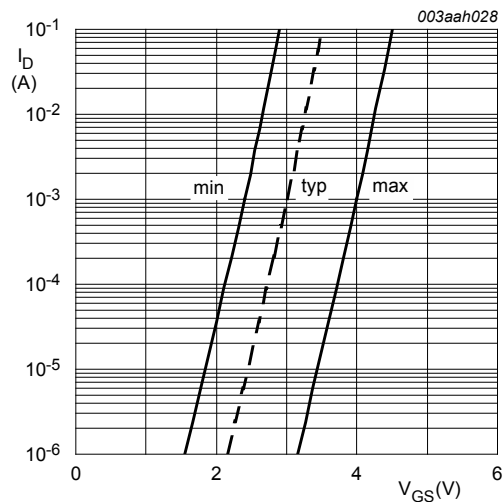


Fig. 10. Sub-threshold drain current as a function of gate-source voltage

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

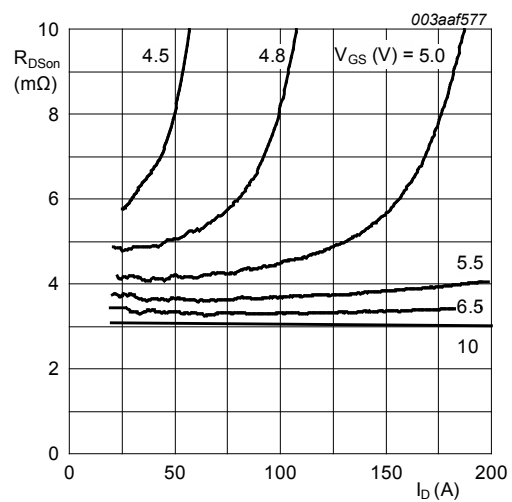


Fig. 11. Drain-source on-state resistance as a function of drain current; typical values

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

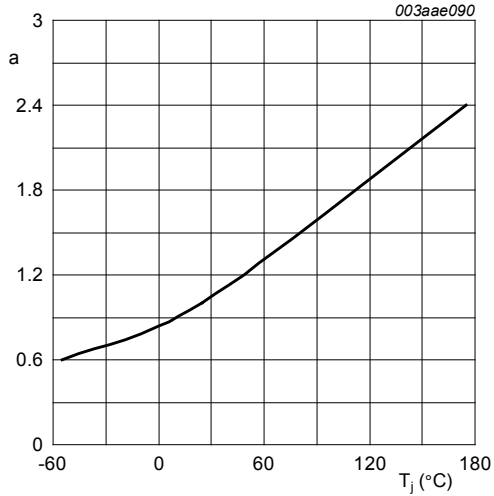
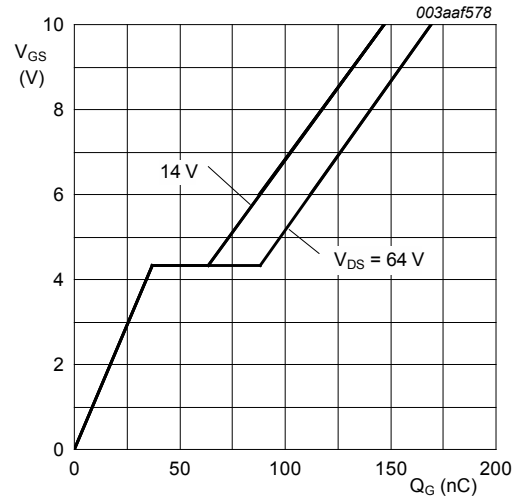


Fig. 12. Normalized drain-source on-state resistance factor as a function of junction temperature

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



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

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

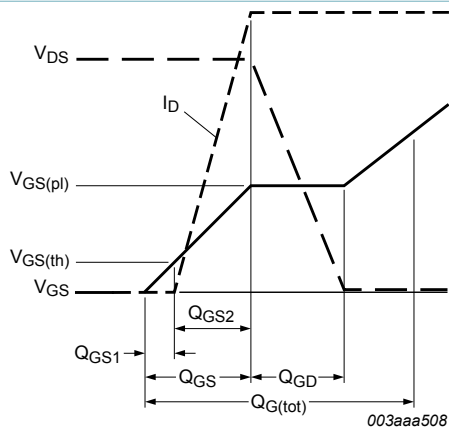
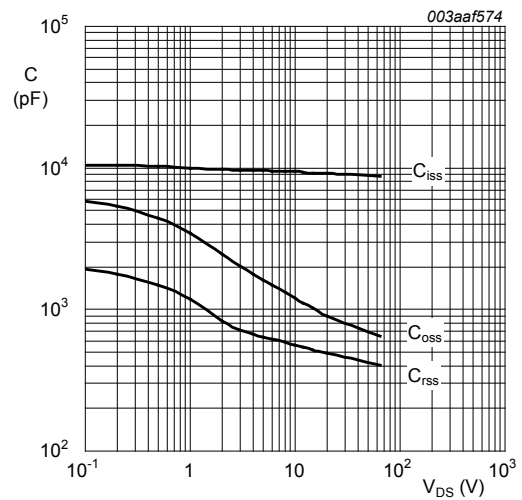
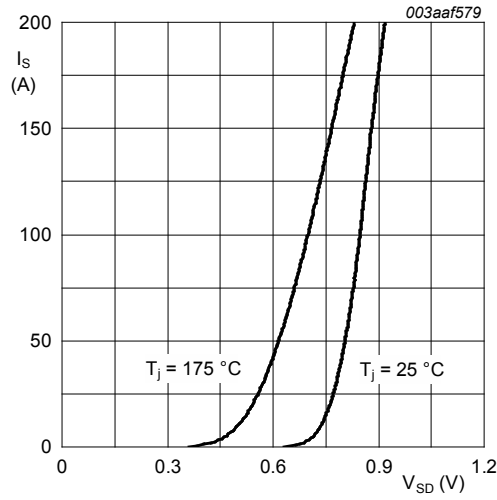


Fig. 14. Gate charge waveform definitions



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

Fig. 15. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

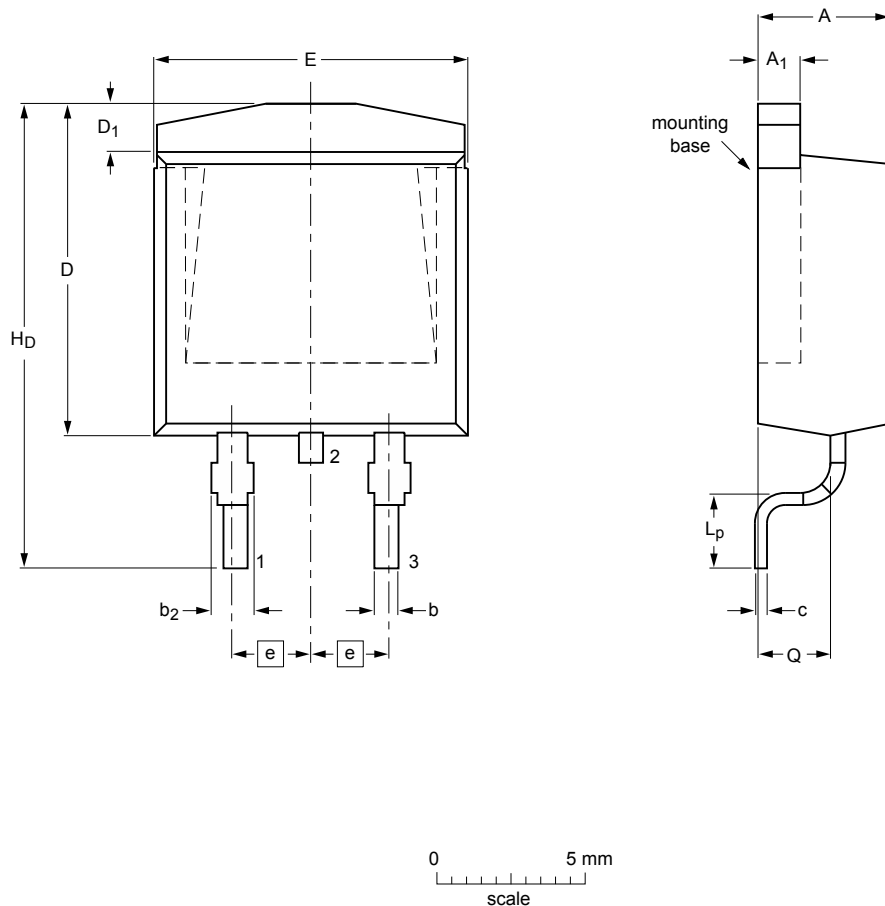


V_{GS} = 0 V

Fig. 16. Source (diode forward) current as a function of source-drain (diode forward) voltage; typical values

11. Package outline

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped) SOT404



Dimensions (mm are the original dimensions)

Unit	A	A ₁	b	b ₂	c	D	D ₁	E	e	H _D	L _p	Q
max	4.5	1.40	0.85	1.45	0.64	11	1.6	10.3		15.8	2.9	2.6
nom									2.54			
min	4.1	1.27	0.60	1.05	0.46		1.2	9.7		14.8	2.1	2.2

sot404_po

Outline version	References			European projection	Issue date
	IEC	JEDEC	JEITA		
SOT404					-06-03-16- 13-02-25

Fig. 17. Package outline D2PAK (SOT404)

12. Legal information

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Document status [1][2]	Product status [3]	Definition
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