



# BUK7Y18-75B

N-channel TrenchMOS standard level FET

1 March 2013

Product data sheet

## 1. General description

Standard level N-channel enhancement mode Field-Effect Transistor (FET) in a plastic package using Nexperia High-Performance Automotive (HPA) TrenchMOS technology. This product has been designed and qualified to the appropriate AEC standard for use in automotive critical applications.

## 2. Features and benefits

- Q101 compliant
- 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
- DC-to-DC converters
- Engine management
- General purpose power switching
- Motors, lamps and solenoids
- Transmission control

## 4. Quick reference data

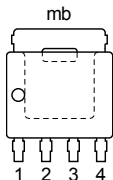
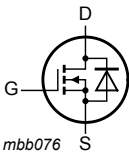
Table 1. Quick reference data

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	$V_{GS} = 10\text{ V}; T_{mb} = 25\text{ °C};$ <a href="#">Fig. 1</a> ; <a href="#">Fig. 4</a>	-	-	49	A
$P_{tot}$	total power dissipation	$T_{mb} = 25\text{ °C};$ <a href="#">Fig. 2</a>	-	-	105	W
<b>Static characteristics</b>						
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 20\text{ A}; T_j = 25\text{ °C};$ <a href="#">Fig. 12</a> ; <a href="#">Fig. 13</a>	-	13.8	18	mΩ
<b>Dynamic characteristics</b>						
$Q_{GD}$	gate-drain charge	$I_D = 20\text{ A}; V_{DS} = 60\text{ V}; V_{GS} = 10\text{ V};$ <a href="#">Fig. 14</a>	-	14.24	-	nC

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Avalanche ruggedness</b>						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 49\text{ A}$ ; $V_{sup} \leq 75\text{ V}$ ; $R_{GS} = 50\ \Omega$ ; $V_{GS} = 10\text{ V}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; unclamped	-	-	118	mJ

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S	source	 <p><b>LFPAK56; Power-SO8 (SOT669)</b></p>	 <p><i>mbb076</i></p>
2	S	source		
3	S	source		
4	G	gate		
mb	D	mounting base; connected to drain		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BUK7Y18-75B	LFPAK56; Power-SO8	Plastic single-ended surface-mounted package (LFPAK56; Power-SO8); 4 leads	SOT669

## 7. Marking

Table 4. Marking codes

Type number	Marking code
BUK7Y18-75B	71875B

## 8. Limiting values

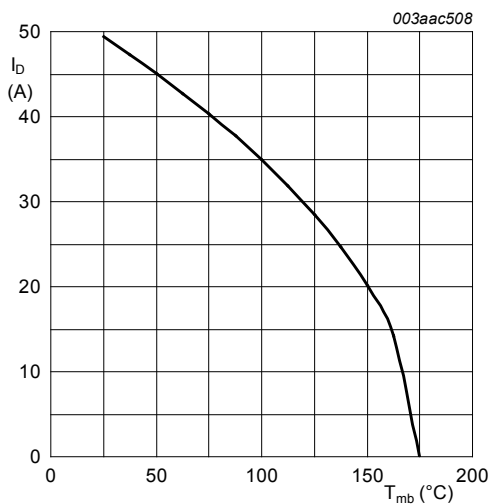
Table 5. Limiting values

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

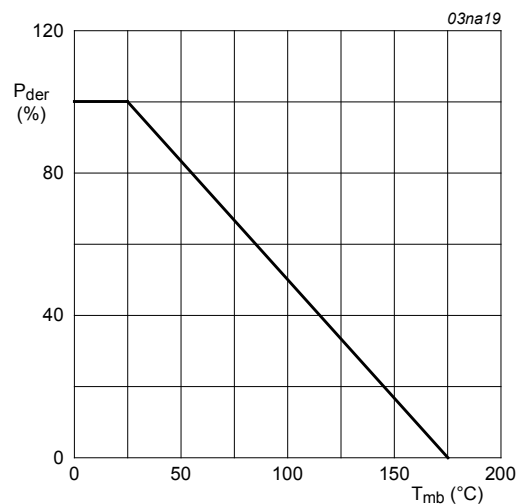
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DS}$	drain-source voltage	$T_j \geq 25\text{ }^\circ\text{C}$ ; $T_j \leq 175\text{ }^\circ\text{C}$	-	75	V
$V_{DGR}$	drain-gate voltage	$R_{GS} = 20\text{ k}\Omega$	-	75	V
$V_{GS}$	gate-source voltage		-20	20	V
$I_D$	drain current	$T_{mb} = 25\text{ }^\circ\text{C}$ ; $V_{GS} = 10\text{ V}$ ; Fig. 1; Fig. 4	-	49	A

Symbol	Parameter	Conditions	Min	Max	Unit
		$T_{mb} = 100\text{ °C}; V_{GS} = 10\text{ V}; \text{Fig. 1}$	-	34.9	A
$I_{DM}$	peak drain current	$T_{mb} = 25\text{ °C}; \text{pulsed}; t_p \leq 10\text{ }\mu\text{s}; \text{Fig. 4}$	-	198	A
$P_{tot}$	total power dissipation	$T_{mb} = 25\text{ °C}; \text{Fig. 2}$	-	105	W
$T_{stg}$	storage temperature		-55	175	°C
$T_j$	junction temperature		-55	175	°C
<b>Source-drain diode</b>					
$I_S$	source current	$T_{mb} = 25\text{ °C}$	-	49	A
$I_{SM}$	peak source current	pulsed; $t_p \leq 10\text{ }\mu\text{s}; T_{mb} = 25\text{ °C}$	-	198	A
<b>Avalanche ruggedness</b>					
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 49\text{ A}; V_{sup} \leq 75\text{ V}; R_{GS} = 50\text{ }\Omega;$ $V_{GS} = 10\text{ V}; T_{j(\text{init})} = 25\text{ °C}; \text{unclamped}$	-	118	mJ
$E_{DS(AL)R}$	repetitive drain-source avalanche energy	<a href="#">Fig. 3</a>	<a href="#">[1][2][3]</a>	-	J

- [1] Single-pulse avalanche rating limited by maximum junction temperature of 175 °C.
- [2] Repetitive avalanche rating limited by an average junction temperature of 170 °C.
- [3] Refer to application note AN10273 for further information.

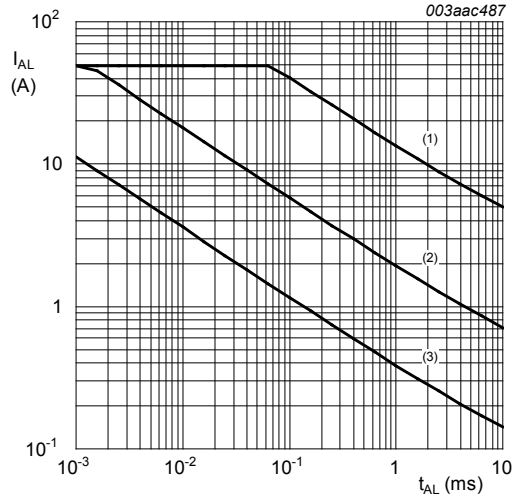


**Fig. 1. Continuous drain current as a function of mounting base temperature**



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

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



- (1) Single pulse;  $T_j = 25^\circ\text{C}$ .
- (2) Single pulse;  $T_j = 150^\circ\text{C}$ .
- (3) Repetitive.

Fig. 3. Single-pulse and repetitive avalanche rating; avalanche current as a function of avalanche time

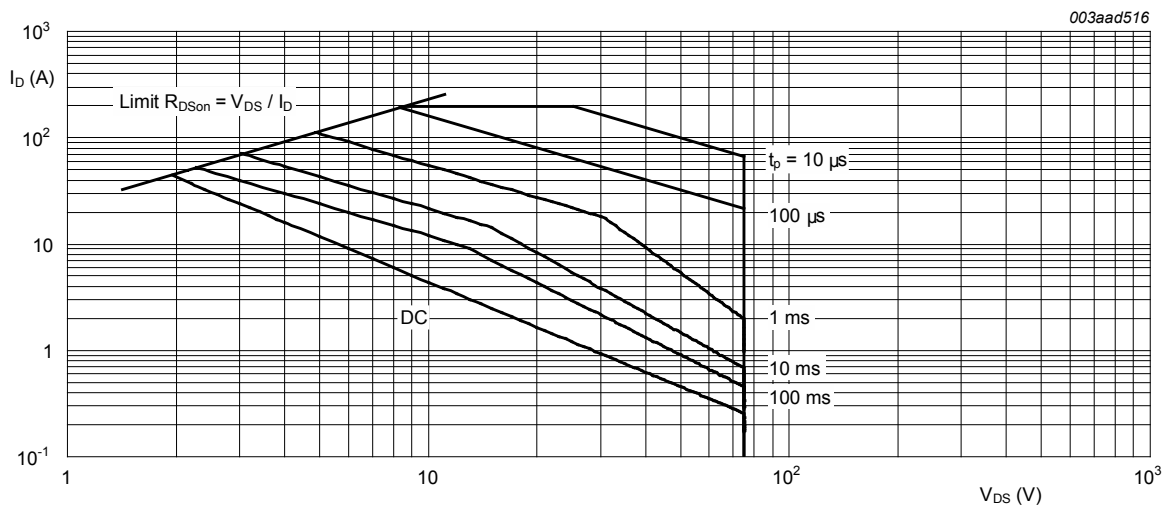


Fig. 4. Safe operating area; continuous and peak drain currents as a function of drain-source voltage.

$T_{mb} = 25^\circ\text{C}; I_{DM}$  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. 5	-	-	1.42	K/W

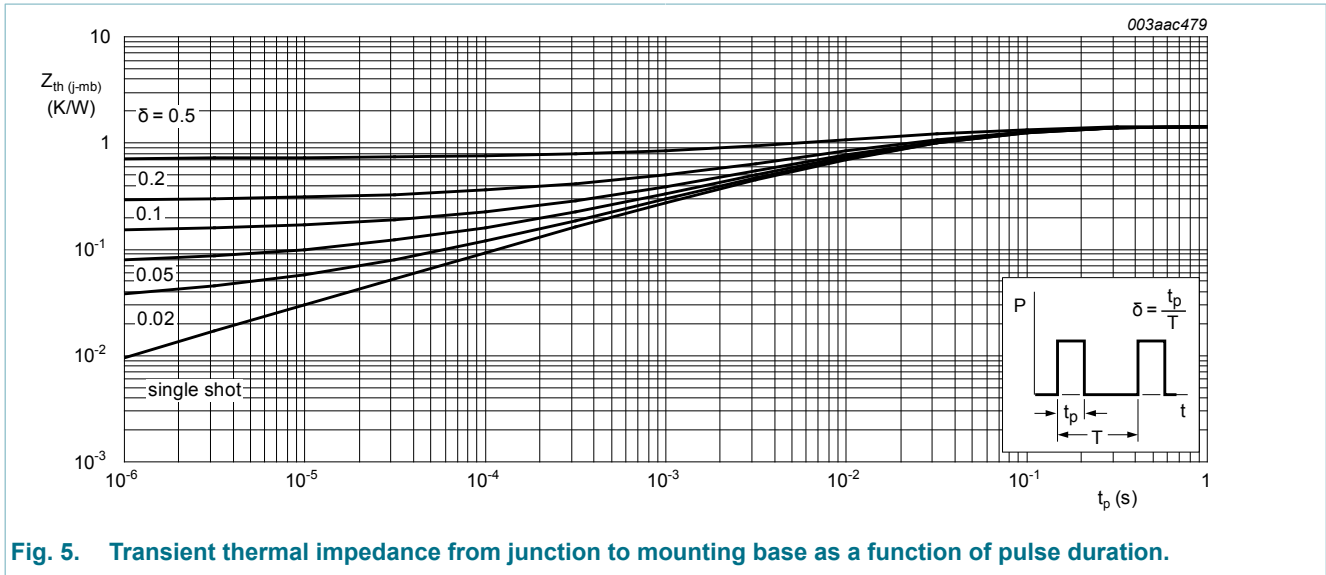


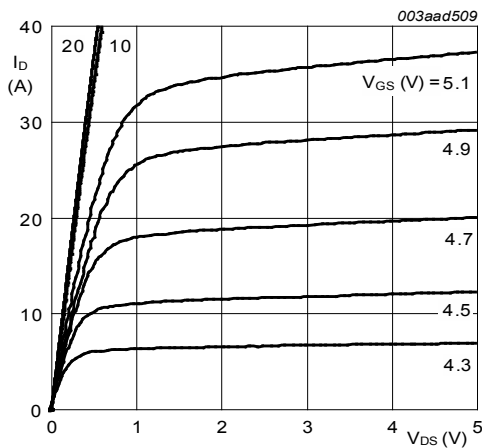
Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration.

## 10. Characteristics

Table 7. Characteristics

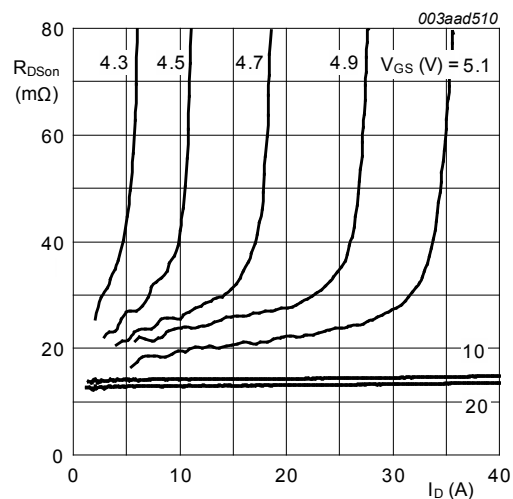
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu A; V_{GS} = 0 V; T_J = 25 \text{ }^\circ C$	75	-	-	V
		$I_D = 250 \mu A; V_{GS} = 0 V; T_J = -55 \text{ }^\circ C$	68	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_J = 25 \text{ }^\circ C;$ <a href="#">Fig. 10</a> ; <a href="#">Fig. 11</a>	2	3	4	V
		$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_J = -55 \text{ }^\circ C;$ <a href="#">Fig. 10</a>	-	-	4.4	V
		$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_J = 175 \text{ }^\circ C;$ <a href="#">Fig. 10</a>	1	-	-	V
$I_{DSS}$	drain leakage current	$V_{DS} = 75 \text{ V}; V_{GS} = 0 \text{ V}; T_J = 25 \text{ }^\circ C$	-	0.02	1	$\mu A$
		$V_{DS} = 75 \text{ V}; V_{GS} = 0 \text{ V}; T_J = 175 \text{ }^\circ C$	-	-	500	$\mu A$
$I_{GSS}$	gate leakage current	$V_{GS} = 20 \text{ V}; V_{DS} = 0 \text{ V}; T_J = 25 \text{ }^\circ C$	-	2	100	nA
		$V_{GS} = -20 \text{ V}; V_{DS} = 0 \text{ V}; T_J = 25 \text{ }^\circ C$	-	2	100	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10 \text{ V}; I_D = 20 \text{ A}; T_J = 175 \text{ }^\circ C;$ <a href="#">Fig. 12</a> ; <a href="#">Fig. 13</a>	-	-	43.2	m $\Omega$
		$V_{GS} = 10 \text{ V}; I_D = 20 \text{ A}; T_J = 25 \text{ }^\circ C;$ <a href="#">Fig. 12</a> ; <a href="#">Fig. 13</a>	-	13.8	18	m $\Omega$
<b>Dynamic characteristics</b>						
$Q_{G(tot)}$	total gate charge	$I_D = 20 \text{ A}; V_{DS} = 60 \text{ V}; V_{GS} = 10 \text{ V};$ <a href="#">Fig. 14</a>	-	35	-	nC
$Q_{GS}$	gate-source charge		-	8.28	-	nC
$Q_{GD}$	gate-drain charge		-	14.24	-	nC

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$C_{iss}$	input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 25\text{ V}; f = 1\text{ MHz};$	-	1630	2173	pF
$C_{oss}$	output capacitance	$T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig. 15</a>	-	274	329	pF
$C_{rss}$	reverse transfer capacitance		-	115	158	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 30\text{ V}; R_L = 1.5\text{ }\Omega; V_{GS} = 10\text{ V};$	-	18.5	-	ns
$t_r$	rise time	$R_{G(ext)} = 10\text{ }\Omega$	-	22.5	-	ns
$t_{d(off)}$	turn-off delay time		-	44.5	-	ns
$t_f$	fall time		-	19.8	-	ns
<b>Source-drain diode</b>						
$V_{SD}$	source-drain voltage	$I_S = 25\text{ A}; V_{GS} = 25\text{ V}; T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig. 16</a>	-	0.85	1.2	V
$t_{rr}$	reverse recovery time	$I_S = 20\text{ A}; di_S/dt = -100\text{ A}/\mu\text{s}; V_{GS} = 0\text{ V};$	-	55.4	-	ns
$Q_r$	recovered charge	$V_{DS} = 30\text{ V}$	-	143	-	nC



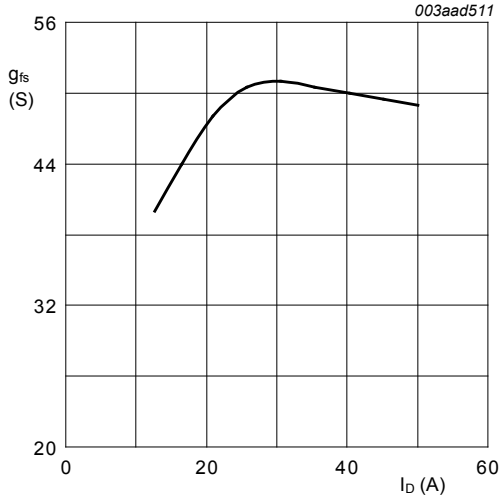
**Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values.**

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



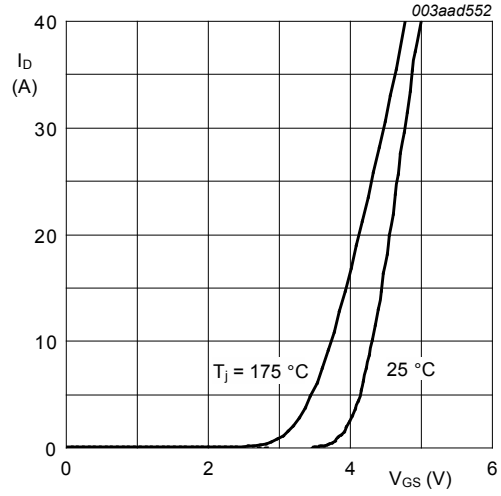
**Fig. 7. Drain-source on-state resistance as a function of drain current; typical values.**

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



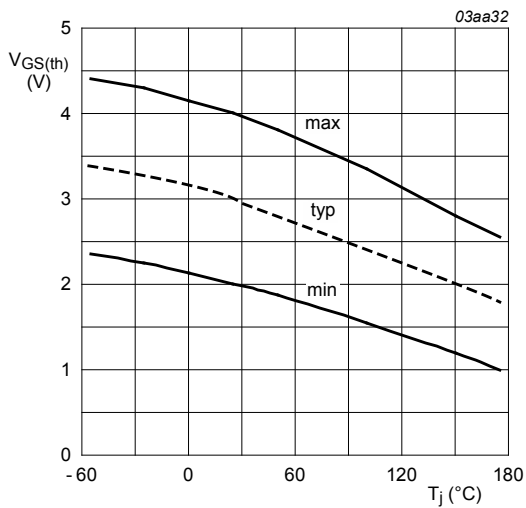
**Fig. 8. Forward transconductance as a function of drain current; typical values.**

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



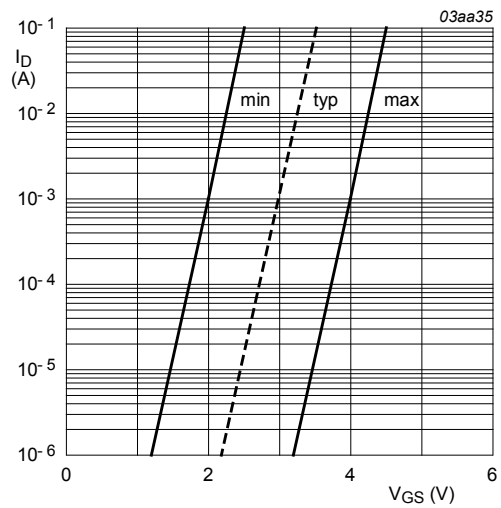
**Fig. 9. Transfer characteristics: drain current as a function of gate-source voltage; typical values.**

$V_{DS} = 25\text{V}$



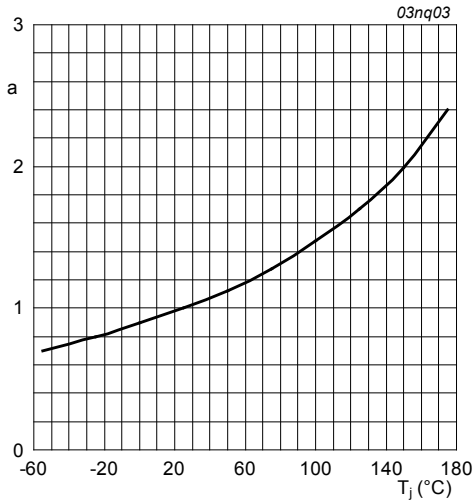
**Fig. 10. Gate-source threshold voltage as a function of junction temperature**

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



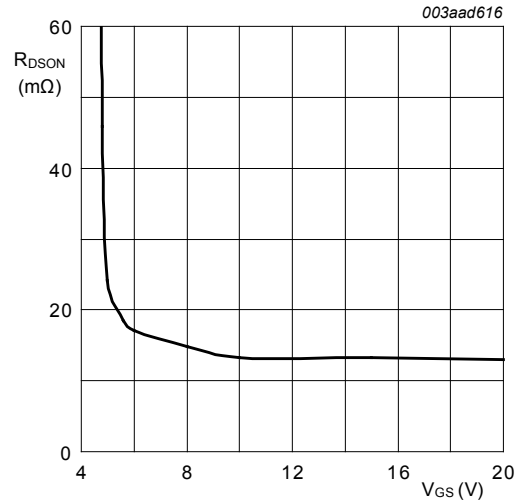
**Fig. 11. Sub-threshold drain current as a function of gate-source voltage**

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



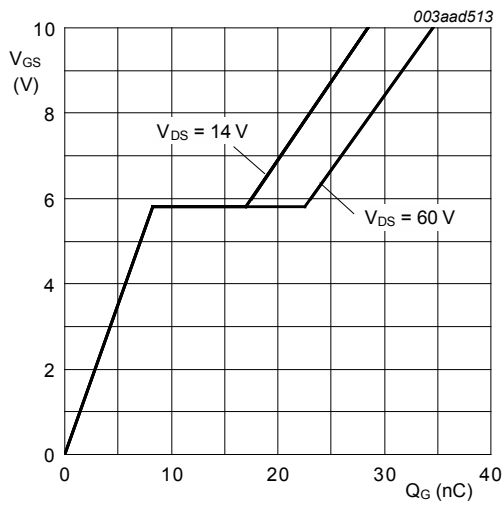
**Fig. 12. Normalized drain-source on-state resistance factor as a function of junction temperature**

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



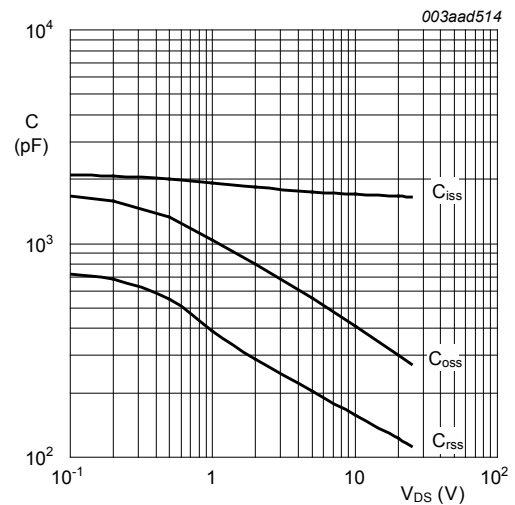
**Fig. 13. Drain-source on-state resistance as a function of gate-source voltage; typical values.**

$$T_j = 25^\circ C; I_D = 20A$$



**Fig. 14. Gate-source voltage as a function of gate charge; typical values.**

$$T_j = 25^\circ C; I_D = 20A$$



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

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

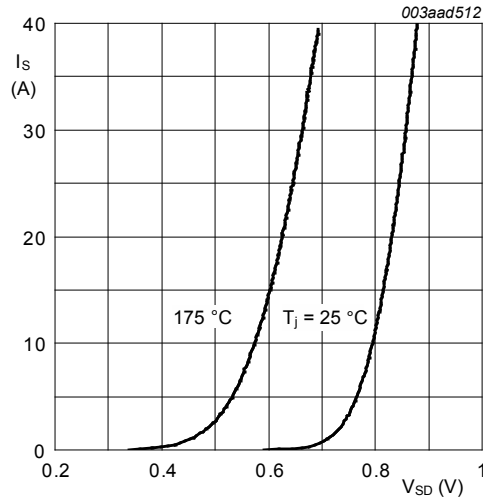


Fig. 16. Source (diode forward) current as a function of source-drain (diode forward) voltage; typical values.

$$V_{GS} = 0V$$

### 11. Package outline

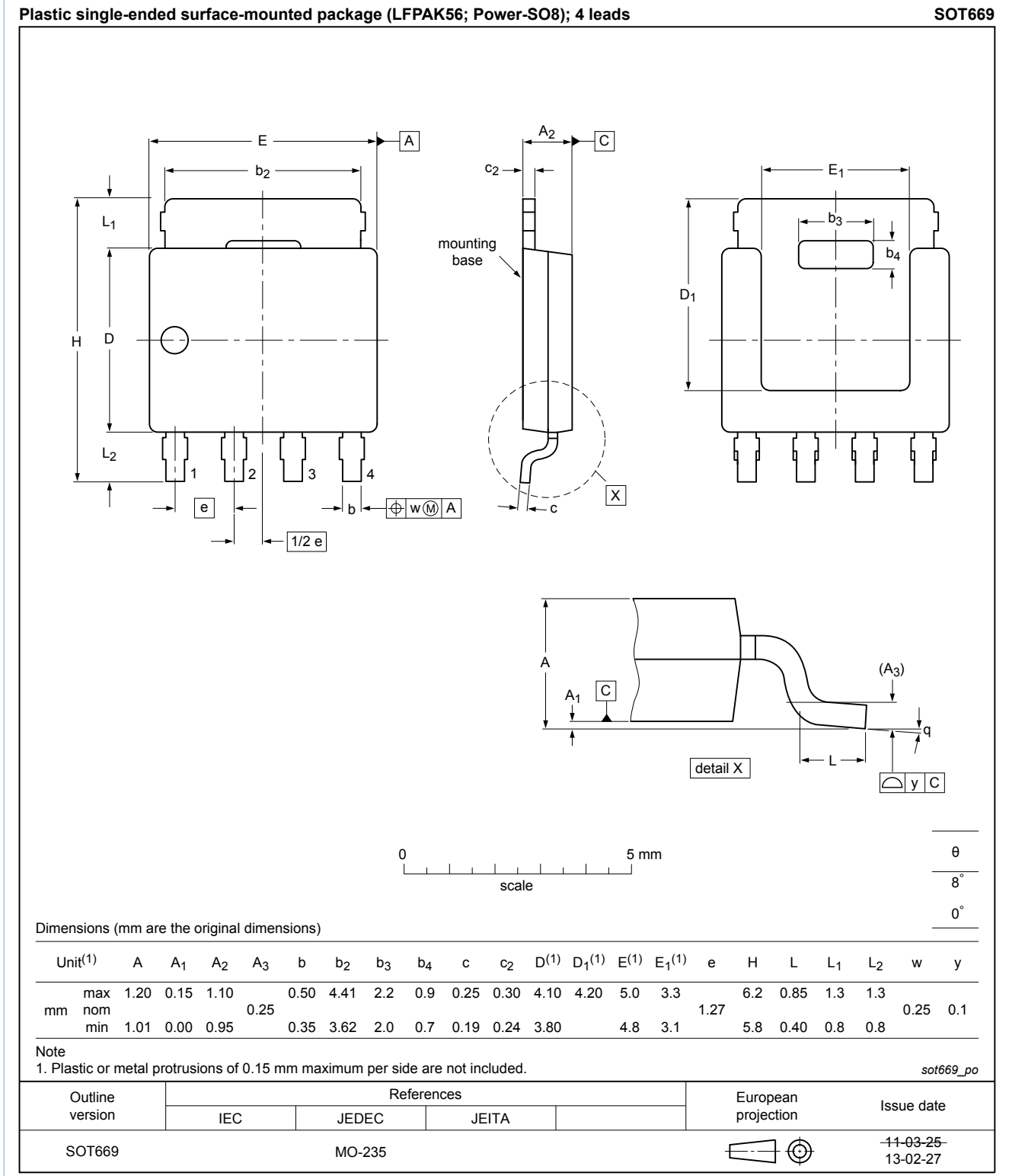


Fig. 17. Package outline LPAK56; Power-SO8 (SOT669)

## 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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- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 01 March 2013