



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 NXP 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

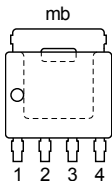
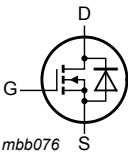
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25\text{ °C}$; $T_j \leq 175\text{ °C}$	-	-	75	V
I_D	drain current	$V_{GS} = 10\text{ V}$; $T_{mb} = 25\text{ °C}$; Fig. 1 ; Fig. 4	-	-	49	A
P_{tot}	total power dissipation	$T_{mb} = 25\text{ °C}$; Fig. 2	-	-	105	W
Static characteristics						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}$; $I_D = 20\text{ A}$; $T_j = 25\text{ °C}$; Fig. 12 ; Fig. 13	-	13.8	18	mΩ
Dynamic characteristics						
Q_{GD}	gate-drain charge	$I_D = 20\text{ A}$; $V_{DS} = 60\text{ V}$; $V_{GS} = 10\text{ V}$; Fig. 14	-	14.24	-	nC



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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S	source	 LFPAK56; Power-SO8 (SOT669)	 mbb076
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	$T_j \geq 25\text{ °C}$; $T_j \leq 175\text{ °C}$	-	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. 4	-	49	A

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

[1] Single-pulse avalanche rating limited by maximum junction temperature of 175 $^{\circ}\text{C}$.

[2] Repetitive avalanche rating limited by an average junction temperature of 170 $^{\circ}\text{C}$.

[3] Refer to application note AN10273 for further information.

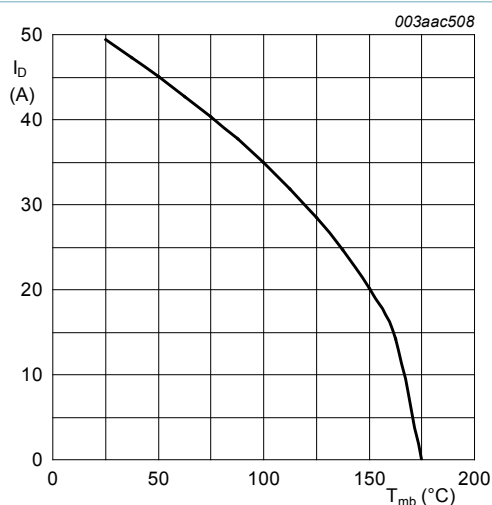


Fig. 1. Continuous drain current as a function of mounting base temperature

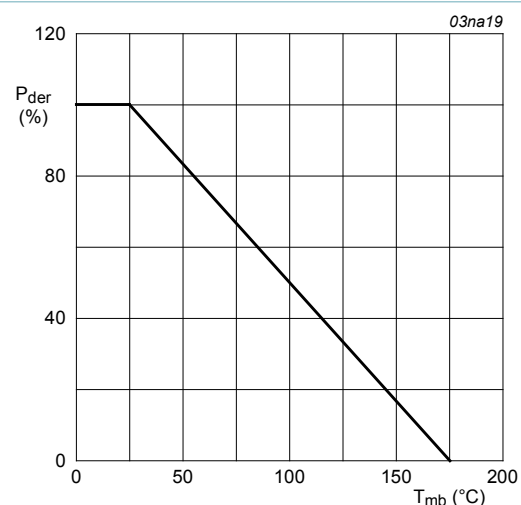


Fig. 2. Normalized total power dissipation as a function of mounting base temperature

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

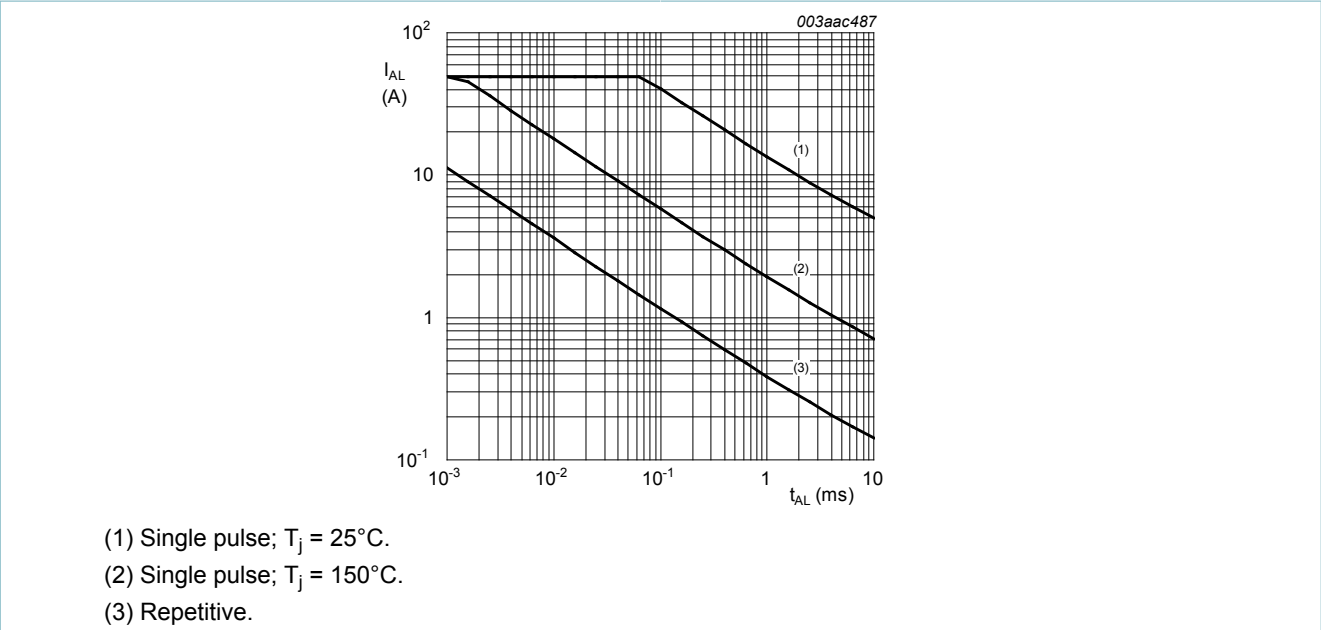


Fig. 3. Single-pulse and repetitive avalanche rating; avalanche current as a function of avalanche time

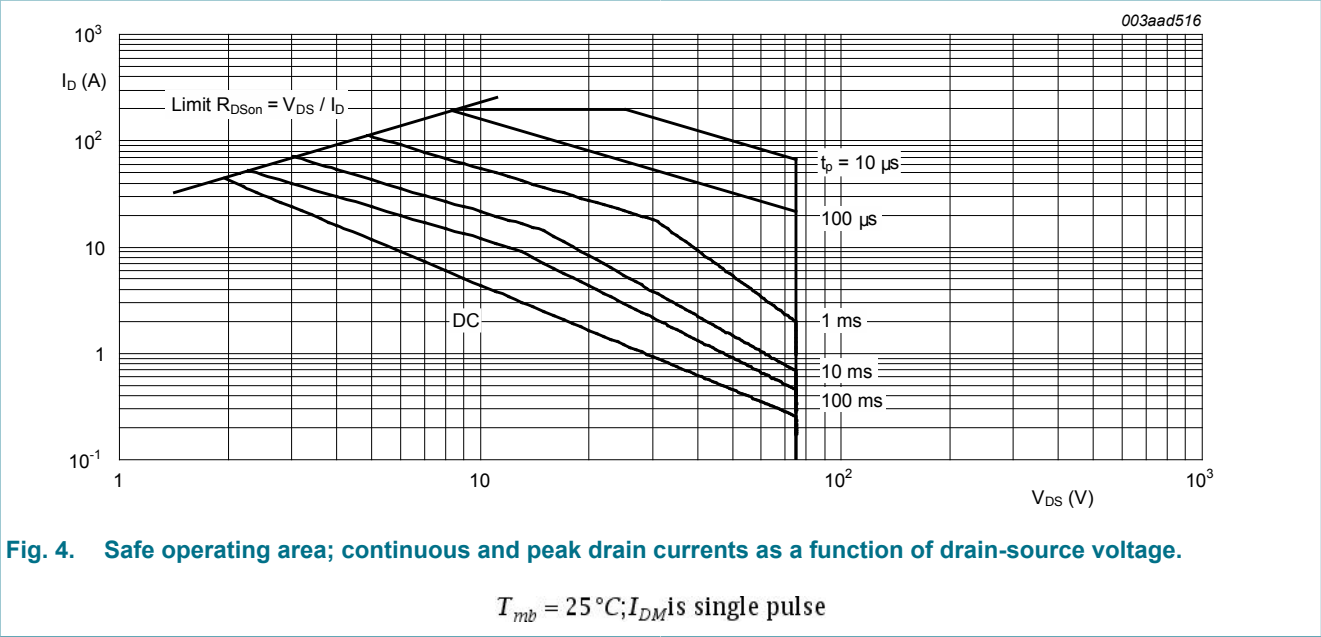


Fig. 4. Safe operating area; continuous and peak drain currents as a function of drain-source voltage.

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

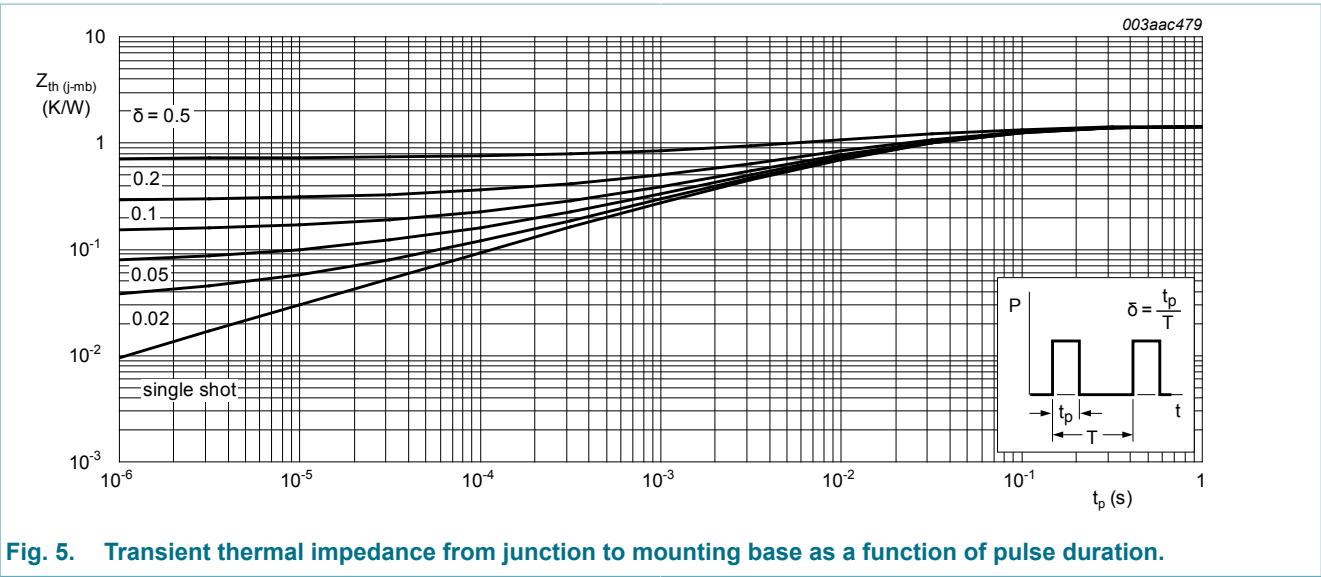


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration.

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V _{(BR)DSS}	drain-source breakdown voltage	I _D = 250 μA; V _{GS} = 0 V; T _J = 25 °C		75	-	-	V
		I _D = 250 μA; V _{GS} = 0 V; T _J = -55 °C		68	-	-	V
V _{GS(th)}	gate-source threshold voltage	I _D = 1 mA; V _{DS} = V _{GS} ; T _J = 25 °C; Fig. 10 ; Fig. 11		2	3	4	V
		I _D = 1 mA; V _{DS} = V _{GS} ; T _J = -55 °C; Fig. 10		-	-	4.4	V
		I _D = 1 mA; V _{DS} = V _{GS} ; T _J = 175 °C; Fig. 10		1	-	-	V
I _{DSS}	drain leakage current	V _{DS} = 75 V; V _{GS} = 0 V; T _J = 25 °C		-	0.02	1	μA
		V _{DS} = 75 V; V _{GS} = 0 V; T _J = 175 °C		-	-	500	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 = 20 A; T _J = 175 °C; Fig. 12 ; Fig. 13		-	-	43.2	mΩ
		V _{GS} = 10 V; I _D = 20 A; T _J = 25 °C; Fig. 12 ; Fig. 13		-	13.8	18	mΩ
Dynamic characteristics							
Q _{G(tot)}	total gate charge	I _D = 20 A; V _{DS} = 60 V; V _{GS} = 10 V; Fig. 14		-	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 V; V _{DS} = 25 V; f = 1 MHz; T _j = 25 °C; Fig. 15		-	1630	2173	pF
C _{oss}	output capacitance			-	274	329	pF
C _{rss}	reverse transfer capacitance			-	115	158	pF
t _{d(on)}	turn-on delay time	V _{DS} = 30 V; R _L = 1.5 Ω; V _{GS} = 10 V; R _{G(ext)} = 10 Ω		-	18.5	-	ns
t _r	rise time			-	22.5	-	ns
t _{d(off)}	turn-off delay time			-	44.5	-	ns
t _f	fall time			-	19.8	-	ns
Source-drain diode							
V _{SD}	source-drain voltage	I _S = 25 A; V _{GS} = 25 V; T _j = 25 °C; Fig. 16		-	0.85	1.2	V
t _{rr}	reverse recovery time	I _S = 20 A; dI _S /dt = -100 A/μs; V _{GS} = 0 V; V _{DS} = 30 V		-	55.4	-	ns
Q _r	recovered charge			-	143	-	nC

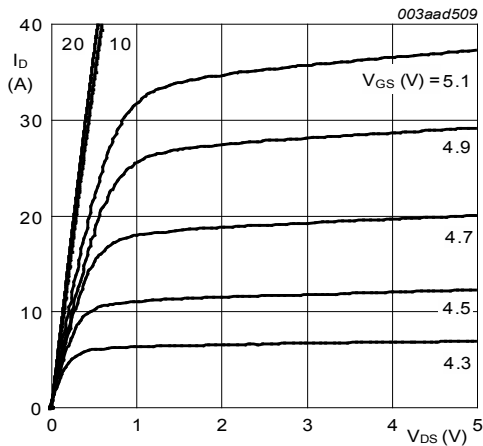


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values.

T_j = 25 °C

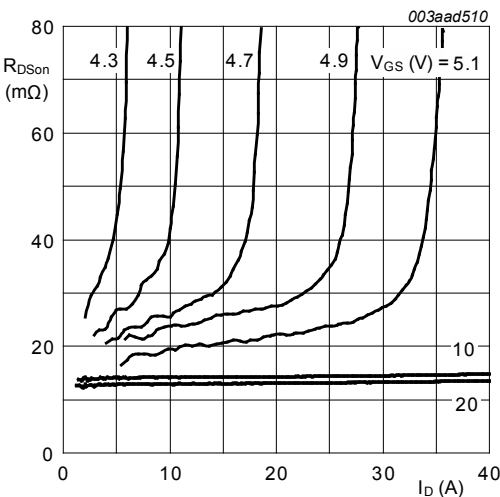


Fig. 7. Drain-source on-state resistance as a function of drain current; typical values.

T_j = 25 °C

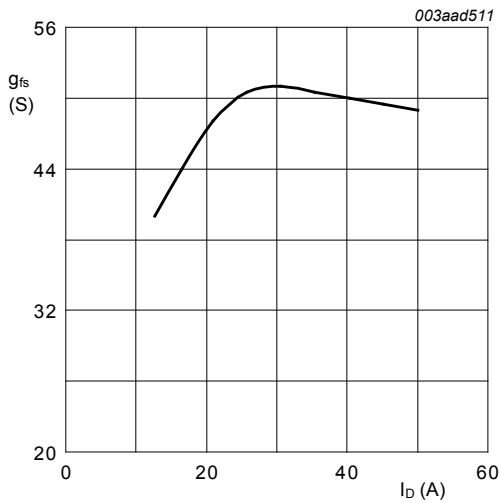


Fig. 8. Forward transconductance as a function of drain current; typical values.

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

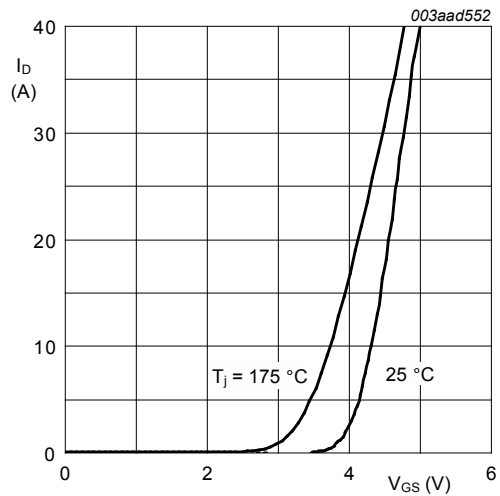


Fig. 9. Transfer characteristics: drain current as a function of gate-source voltage; typical values.

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

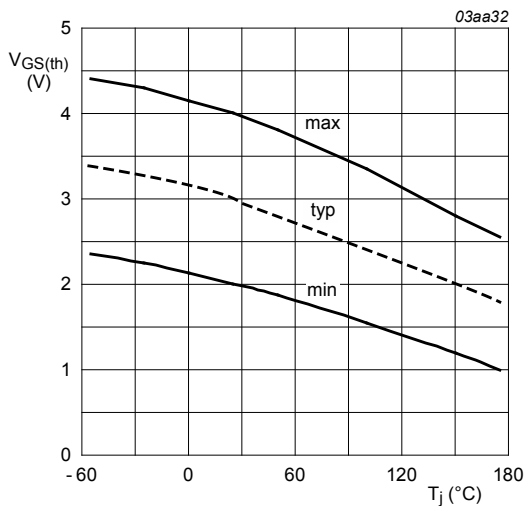


Fig. 10. Gate-source threshold voltage as a function of junction temperature

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

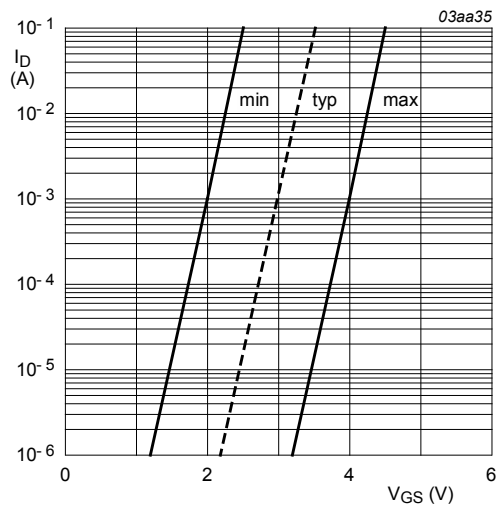


Fig. 11. Sub-threshold drain current as a function of gate-source voltage

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

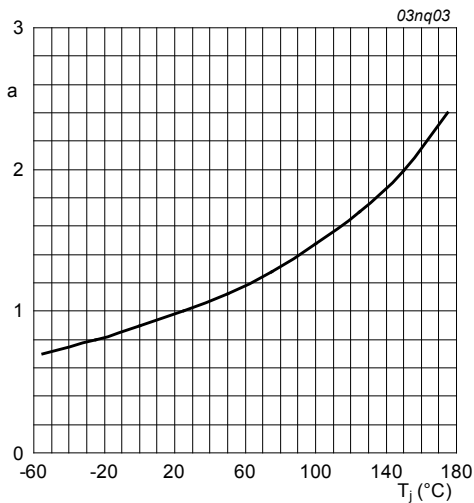


Fig. 12. Normalized drain-source on-state resistance factor as a function of junction temperature

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

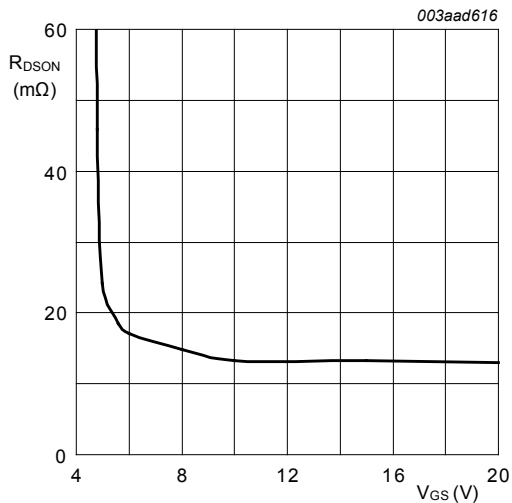


Fig. 13. Drain-source on-state resistance as a function of gate-source voltage; typical values.

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

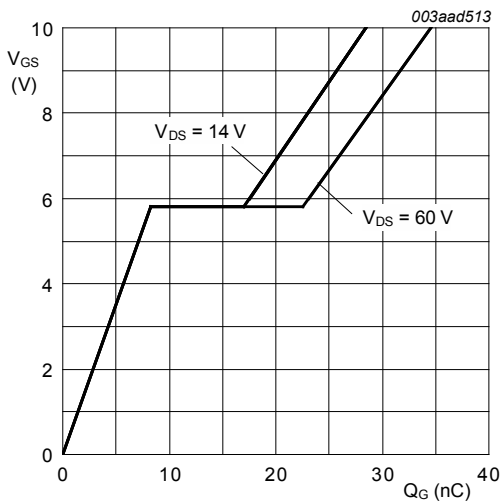


Fig. 14. Gate-source voltage as a function of gate charge; typical values.

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

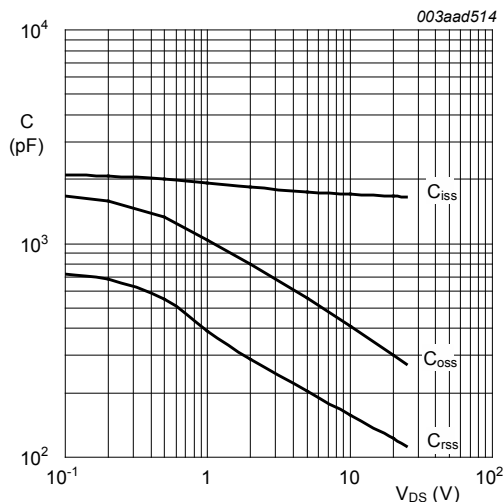


Fig. 15. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values.

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

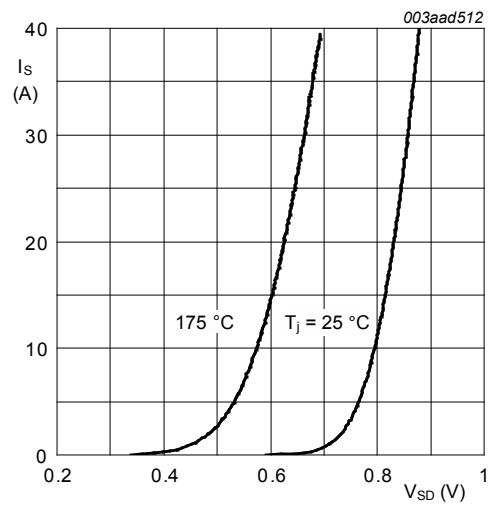


Fig. 16. Source (diode forward) current as a function of source-drain (diode forward) voltage; typical values.

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

11. Package outline

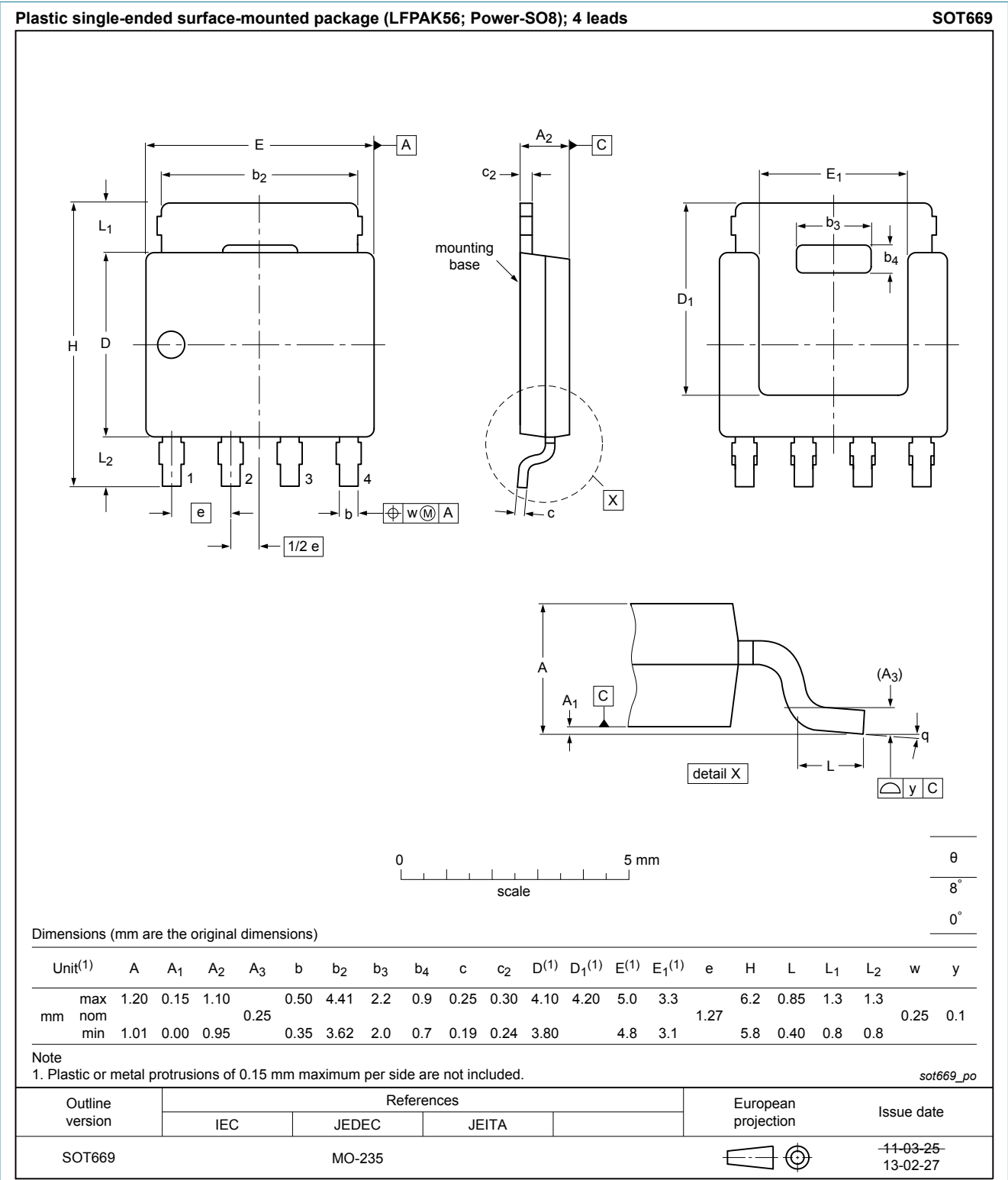


Fig. 17. Package outline LPAK56; Power-SO8 (SOT669)

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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.
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