Product data sheet

1. General description

P-channel enhancement mode MOSFET in an LFPAK56 (Power SO8) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

This product has been designed and qualified to AEC-Q101 standard for use in high-performance automotive applications such as reverse battery protection.

2. Features and benefits

- · High thermal power dissipation capability
- Suitable for thermally demanding environments due to 175 °C rating
- Trench MOSFET technology
- AEC-Q101 qualified

3. Applications

- · Reverse battery protection
- Power management
- · High-side loadswitch
- Motor drive

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
V _{DS}	drain-source voltage	T _j = 25 °C		-	-	-60	V
V_{GS}	gate-source voltage		[1]	-20	-	20	V
I _D	drain current	V _{GS} = -10 V; T _{mb} = 25 °C		-	-	-23	Α
P _{tot}	total power dissipation	T _{mb} = 25 °C		-	-	66	W
Static characte	Static characteristics						
R _{DSon}	drain-source on-state resistance	$V_{GS} = -10 \text{ V}; I_D = -4.8 \text{ A}; T_j = 25 \text{ °C}$		-	45	57	mΩ

[1] V_{GS} = -20 V/+5 V according AEC-Q101 at T_j = 175 °C; V_{GS} = -20 V/+20 V according AEC-Q101 at T_j = 150 °C



5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S	source	mb	D
2	S	source	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
3	S	source		G P
4	G	gate		s
mb	D	mounting base; connected to drain	1 2 3 4 LFPAK56; Power- SO8 (SOT669)	017aaa094

6. Ordering information

Table 3. Ordering information

Type number	Package					
	Name	Description	Version			
BUK6Y57-60P	LFPAK56; Power-SO8	plastic, single-ended surface-mounted package; 4 terminals	SOT669			

7. Marking

Table 4. Marking codes

Type number	Marking code
BUK6Y57-60P	6Y5760P

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 = 25 °C		-	-60	٧
V_{GS}	gate-source voltage		[1]	-20	20	V
I _D	drain current	V _{GS} = -10 V; T _{mb} = 25 °C		-	-23	Α
		V _{GS} = -10 V; T _{mb} = 100 °C		-	-16	Α
I _{DM}	peak drain current	single pulse; $t_p \le 10 \mu s$; $T_{mb} = 25 °C$		-	-91	Α
P _{tot}	total power dissipation	T _{mb} = 25 °C		-	66	W
Tj	junction temperature			-55	175	°C
T _{amb}	ambient temperature			-55	175	°C
T _{stg}	storage temperature			-65	175	°C
Source-drain di	ode					
Is	source current	T _{mb} = 25 °C		-	-23	Α
I _{SM}	peak source current	single pulse; $t_p \le 10 \mu s$; $T_{mb} = 25 °C$		-	-91	Α
ESD maximum	rating					
V _{ESD}	electrostatic discharge voltage	НВМ	[2]	-	1000	V
Avalanche rugg	edness					
E _{DS(AL)S}	non-repetitive drain- source avalanche energy	$V_{sup} \le -60 \text{ V}; V_{GS} = -10 \text{ V}; T_{j(init)} = 25 ^{\circ}\text{C};$ $I_D = -4.8 \text{ A}; DUT \text{ in avalanche}$ (unclamped)		-	3.9	mJ

^[1] $V_{GS} = -20 \text{ V/+5 V}$ according AEC-Q101 at $T_j = 175 \text{ °C}$; $V_{GS} = -20 \text{ V/+20 V}$ according AEC-Q101 at $T_j = 150 \text{ °C}$

^[2] Measured between all pins.

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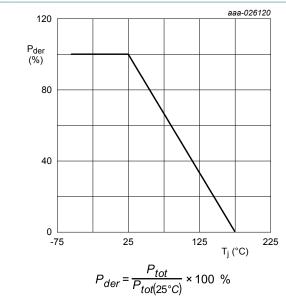


Fig. 1. Normalized total power dissipation as a function of junction temperature

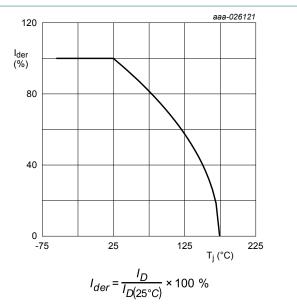


Fig. 2. Normalized continuous drain current as a function of junction temperature

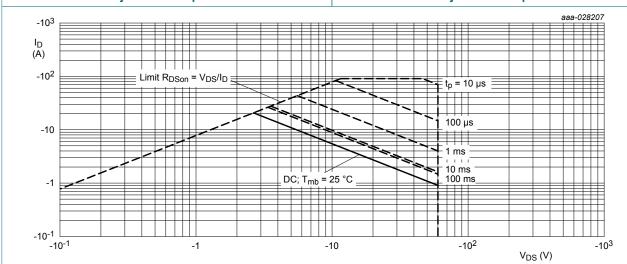


Fig. 3. Safe operating area; junction to mounting base; continuous and peak drain currents as a function of drain-source voltage

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9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
R _{th(j-mb)}	thermal resistance from junction to mounting base		-	1.8	2.3	K/W

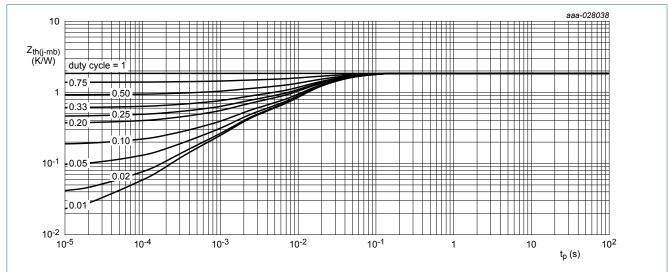


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration; typical values

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10. Characteristics

Table 7. Characteristics

 T_i = 25 °C unless otherwise specified

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Static chara	acteristics					'
V _{(BR)DSS}	drain-source breakdown voltage	I _D = -250 μA; V _{GS} = 0 V	-60	-	-	V
V_{GSth}	gate-source threshold voltage	I_D = -250 μ A; V_{DS} = V_{GS} ; T_j = 25 °C	-1.5	-2	-3	V
I _{DSS}	drain leakage current	V _{DS} = -60 V; V _{GS} = 0 V; T _j = 25 °C	-	-	-1	μΑ
		V _{DS} = -60 V; V _{GS} = 0 V; T _j = 175 °C	-	-	-100	μA
I _{GSS}	gate leakage current	V _{GS} = 20 V; V _{DS} = 0 V; T _j = 25 °C	-	-	100	nA
		V _{GS} = -20 V; V _{DS} = 0 V; T _j = 25 °C	-	-	-100	nA
R _{DSon}	drain-source on-state	V_{GS} = -10 V; I_D = -4.8 A; T_j = 25 °C	-	45	57	mΩ
	resistance	V _{GS} = -10 V; I _D = -4.8 A; T _j = 175 °C	-	100	127	mΩ
		V _{GS} = -4.5 V; I _D = -3.9 A	-	58	87	mΩ
g _{fs}	forward transconductance	V_{DS} = -10 V; I_D = -2 A; T_j = 25 °C	-	65	-	S
R _G	gate resistance	f = 1 MHz	-	7	-	Ω
Dynamic ch	naracteristics					
Q _{G(tot)}	total gate charge	V_{DS} = -30 V; I_{D} = -5.3 A; V_{GS} = -10 V	-	21	24	nC
Q _{GS}	gate-source charge		-	3.7	-	nC
Q _{GD}	gate-drain charge		-	4.6	-	nC
C _{iss}	input capacitance	V _{DS} = -30 V; f = 1 MHz; V _{GS} = 0 V	-	1200	-	pF
C _{oss}	output capacitance		-	105	-	pF
C _{rss}	reverse transfer capacitance		-	56	-	pF
t _{d(on)}	turn-on delay time	$V_{DS} = -30 \text{ V}; I_D = -4.8 \text{ A}; V_{GS} = -10 \text{ V};$	-	6	-	ns
t _r	rise time	$R_{G(ext)} = 6 \Omega$	-	12	-	ns
t _{d(off)}	turn-off delay time		-	39	-	ns
t _f	fall time		-	16	-	ns
Source-dra	in diode		'	•	•	
V _{SD}	source-drain voltage	I _S = -22.7 A; V _{GS} = 0 V; T _j = 25 °C	-	-0.7	-1.2	V
t _{rr}	reverse recovery time	$I_S = -4.8 \text{ A}; \text{ d}I_S/\text{d}t = 100 \text{ A/}\mu\text{s};$	-	30	-	ns
Q _r	recovered charge	$V_{GS} = 0 \text{ V}; V_{DS} = -30 \text{ V}; T_j = 25 ^{\circ}\text{C}$	-	36	-	nC

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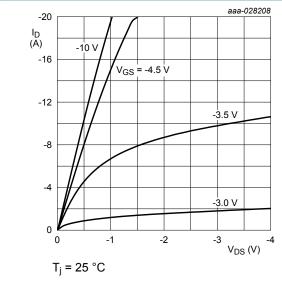


Fig. 5. Output characteristics: drain current as a function of drain-source voltage; typical values

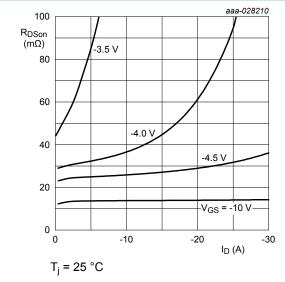


Fig. 7. Drain-source on-state resistance as a function of drain current; typical values

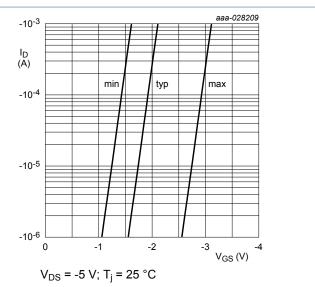


Fig. 6. Sub-threshold drain current as a function of gate-source voltage

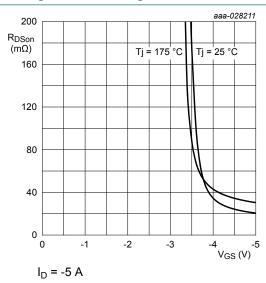


Fig. 8. Drain-source on-state resistance as a function of gate-source voltage; typical values

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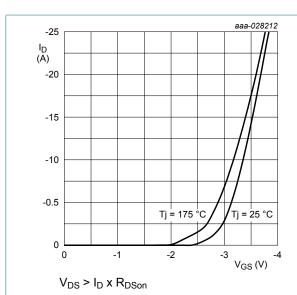


Fig. 9. Transfer characteristics: drain current as a function of gate-source voltage; typical values

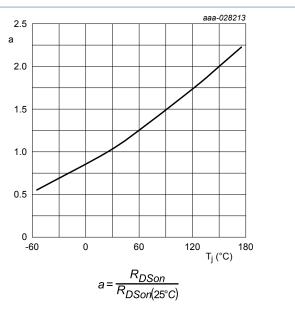


Fig. 10. Normalized drain-source on-state resistance as a function of junction temperature; typical values

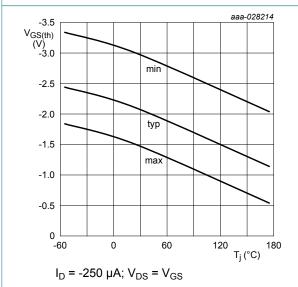
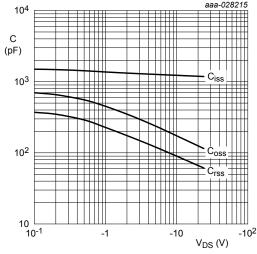


Fig. 11. Gate-source threshold voltage as a function of junction temperature



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

Fig. 12. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

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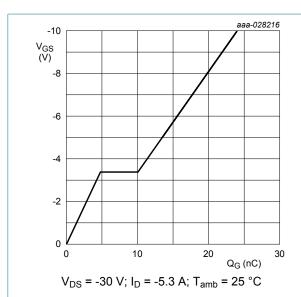


Fig. 13. Gate-source voltage as a function of gate charge; typical values

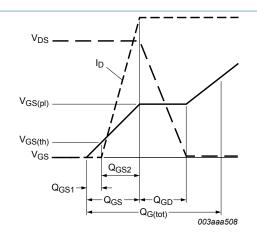


Fig. 14. Gate charge waveform definitions

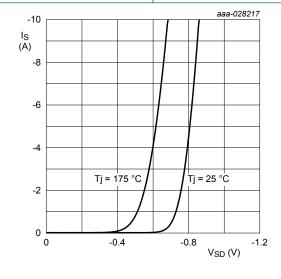
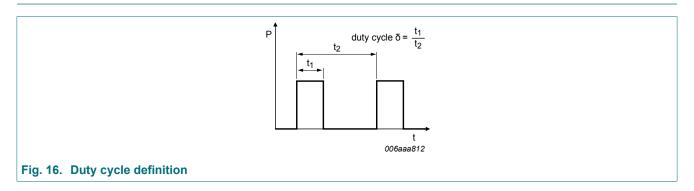


Fig. 15. Source current as a function of source-drain voltage; typical values

 $V_{GS} = 0 V$

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11. Test information

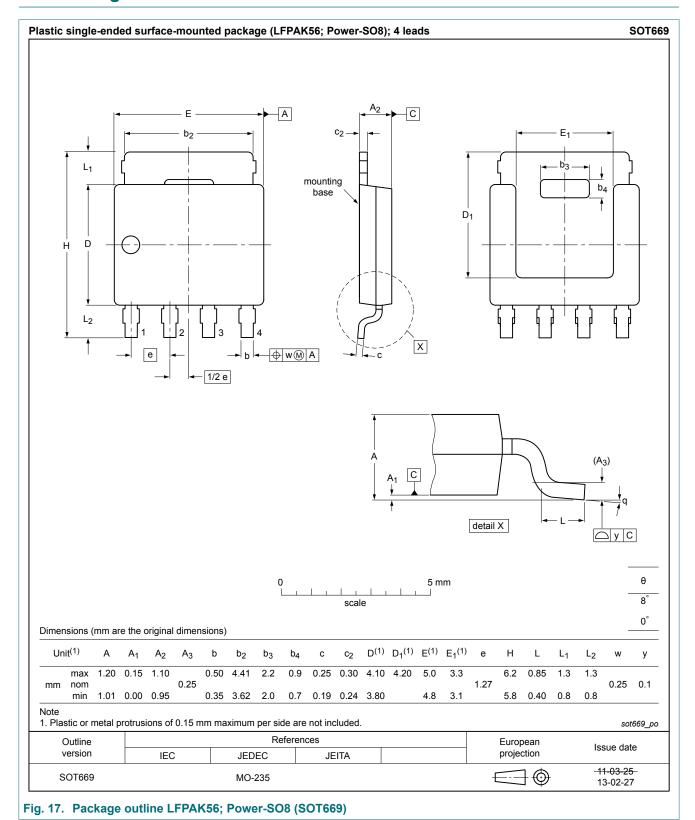


Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

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12. Package outline



13. Revision history

Table 8. Revision history

Table of Novicion motory							
Data sheet ID	Release date	Data sheet status	Change notice	Supersedes			
BUK6Y57-60P v.3	20180705	Product data sheet	-	BUK6Y57-60P v.2			
Modifications:	Characteristics: Fig. 5 updated.						
BUK6Y57-60P v.2	20180606	Product data sheet	-	BUK6Y57-60P v.1			
BUK6Y57-60P v.1	20180309	Product data sheet	-	-			

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14. Legal information

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.

- Please consult the most recently issued document before initiating or completing a design.
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BUK6Y57-60P

60 V, P-channel Trench MOSFET

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Офис по работе с юридическими лицами:

105318, г. Москва, ул. Щербаковская д. 3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru moschip.ru_6 moschip.ru_4 moschip.ru_9