



BUK7K15-80E

Dual N-channel 80 V, 15 mΩ standard level MOSFET

11 May 2018

Product data sheet

1. General description

Dual Standard level N-channel MOSFET in an LFPAK56D (Dual Power-SO8) 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

- Dual MOSFET
- 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

- 12 V, 24 V and 48 V automotive systems
- Motors, lamps and solenoid control
- Transmission control
- Ultra high performance power switching

4. Quick reference data

Table 1. Quick reference data

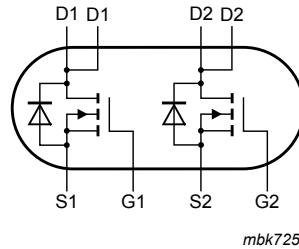
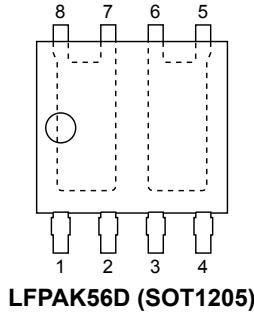
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Limiting values FET1 and FET2							
V_{DS}	drain-source voltage	$25^{\circ}\text{C} \leq T_j \leq 175^{\circ}\text{C}$		-	-	80	V
I_D	drain current	$V_{GS} = 10 \text{ V}; T_{mb} = 25^{\circ}\text{C}$; Fig. 2		-	-	23	A
P_{tot}	total power dissipation	$T_{mb} = 25^{\circ}\text{C}$; Fig. 1		-	-	68	W
Static characteristics FET1 and FET2							
R_{DSon}	drain-source on-state resistance	$V_{GS} = 10 \text{ V}; I_D = 10 \text{ A}; T_j = 25^{\circ}\text{C}$; Fig. 11		-	11.2	15	$\text{m}\Omega$
Dynamic characteristics FET1 and FET2							
Q_{GD}	gate-drain charge	$I_D = 10 \text{ A}; V_{DS} = 64 \text{ V}; V_{GS} = 10 \text{ V}; T_j = 25^{\circ}\text{C}$; Fig. 13 ; Fig. 14		-	11.3	-	nC
Source-drain diode FET1 and FET2							
Q_r	recovered charge	$I_S = 10 \text{ A}; dI_S/dt = -100 \text{ A}/\mu\text{s}; V_{GS} = 0 \text{ V}; V_{DS} = 25 \text{ V}; T_j = 25^{\circ}\text{C}$		-	37.7	-	nC

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5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S1	source1		
2	G1	gate1		
3	S2	source2		
4	G2	gate2		
5	D2	drain2		
6	D2	drain2		
7	D1	drain1		
8	D1	drain1		



6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BUK7K15-80E	LFPAK56D	plastic, single ended surface mounted package (LFPAK56D); 8 leads	SOT1205

7. Marking

Table 4. Marking codes

Type number	Marking code
BUK7K15-80E	71580E

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
Limiting values FET1 and FET2						
V _{DS}	drain-source voltage	25 °C ≤ T _j ≤ 175 °C		-	80	V
V _{DGR}	drain-gate voltage	R _{GS} = 20 kΩ		-	80	V
V _{GS}	gate-source voltage	DC; T _j ≤ 175 °C		20	-20	V
P _{tot}	total power dissipation	T _{mb} = 25 °C; Fig. 1		-	68	W
I _D	drain current	V _{GS} = 10 V; T _{mb} = 25 °C; Fig. 2		-	23	A
		V _{GS} = 10 V; T _{mb} = 100 °C; Fig. 2		-	16	A
I _{DM}	peak drain current	pulsed; t _p ≤ 10 µs; T _{mb} = 25 °C; Fig. 3		-	92	A
T _{stg}	storage temperature			-55	175	°C
T _j	junction temperature			-55	175	°C
Source-drain diode FET1 and FET2						
I _S	source current	T _{mb} = 25 °C		-	23	A
I _{SM}	peak source current	pulsed; t _p ≤ 10 µs; T _{mb} = 25 °C		-	92	A
Avalanche ruggedness FET1 and FET2						
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	I _D = 23 A; V _{sup} ≤ 80 V; R _{GS} = 50 Ω; V _{GS} = 10 V; T _{j(init)} = 25 °C; unclamped; Fig. 4	[1] [2]	-	133	mJ

[1] Single-pulse avalanche rating limited by maximum junction temperature of 175 °C.

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

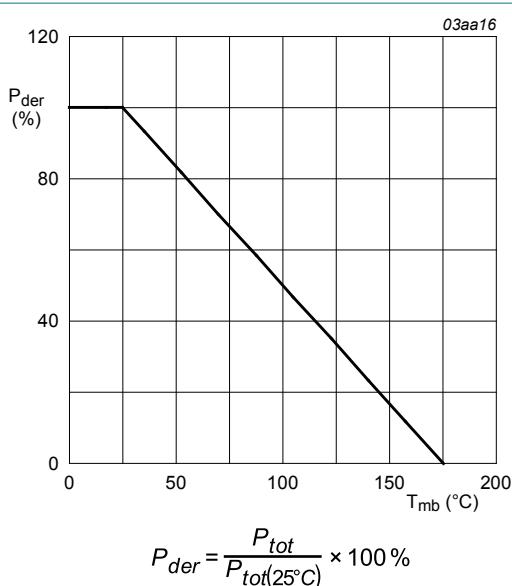


Fig. 1. Normalized total power dissipation as a function of mounting base temperature

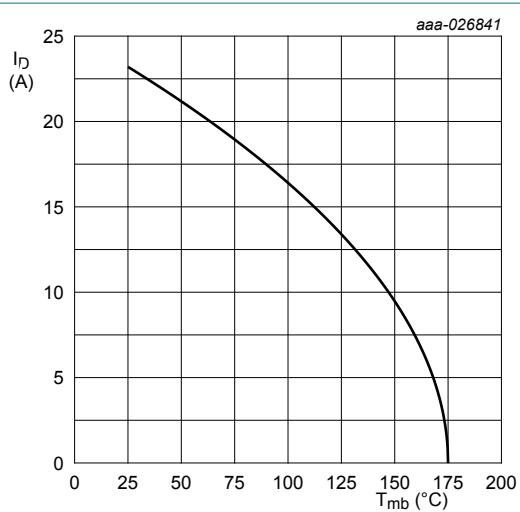
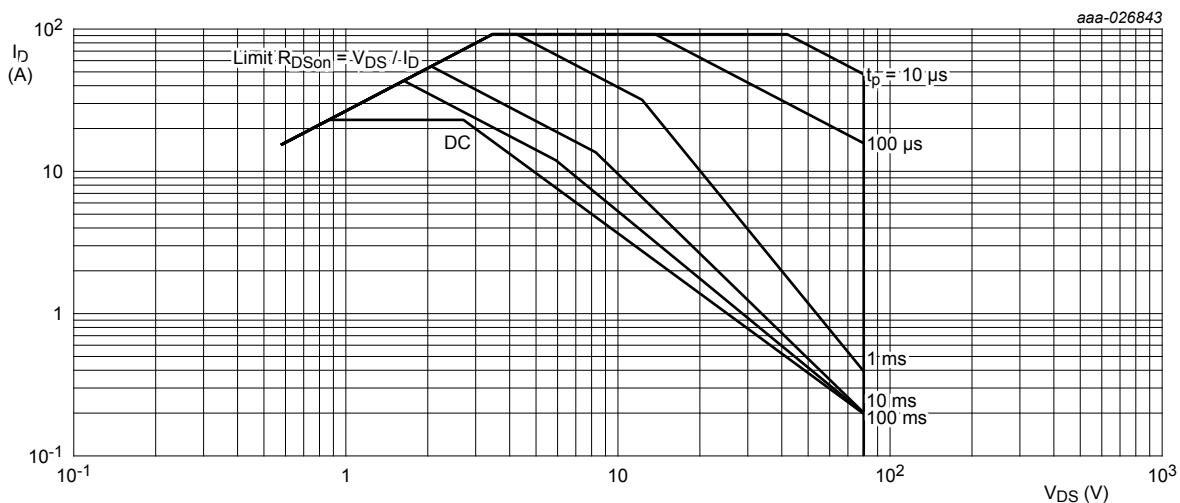
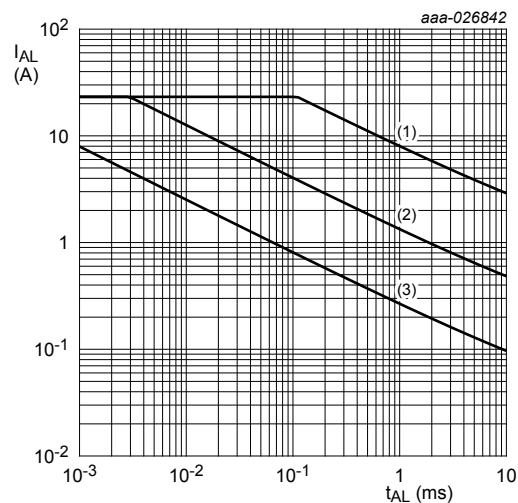


Fig. 2. Continuous drain current as a function of mounting base temperature, FET1 and FET2



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

Fig. 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage, FET1 and FET2



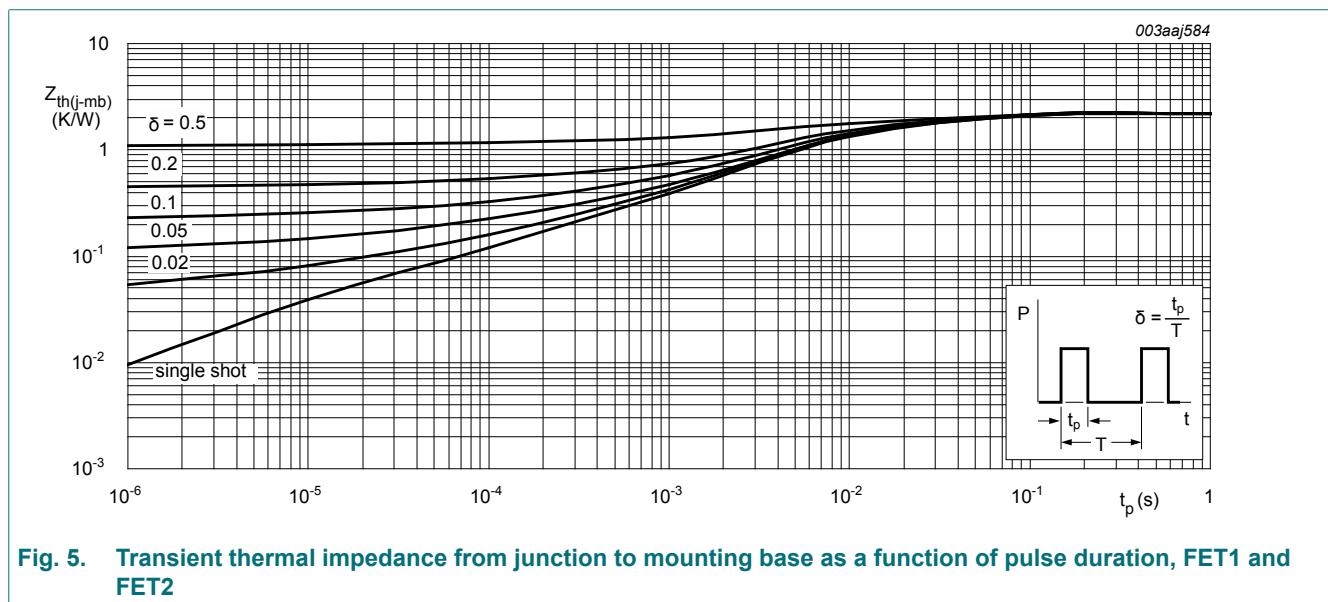
(1) $T_j \text{ (init)} = 25^\circ\text{C}$; (2) $T_j \text{ (init)} = 150^\circ\text{C}$; (3) Repetitive Avalanche

Fig. 4. Avalanche rating; avalanche current as a function of avalanche time, FET1 and FET2

9. Thermal characteristics

Table 6. Thermal characteristics

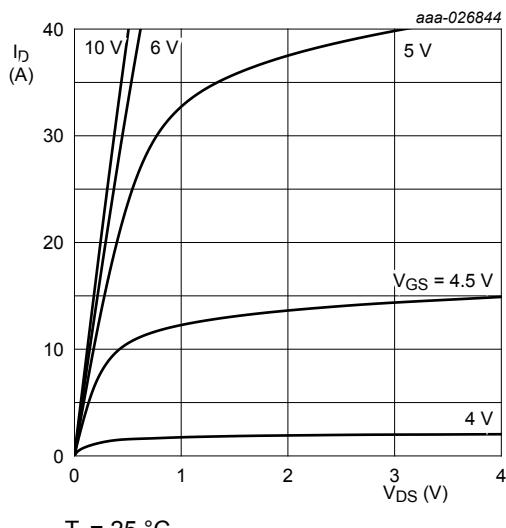
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 5		-	-	2.21	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	Minimum footprint; mounted on a printed circuit board		-	95	-	K/W



10. Characteristics

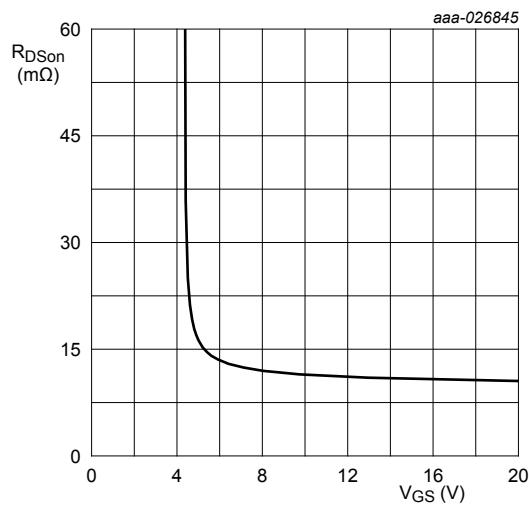
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics FET1 and FET2							
V _{(BR)DSS}	drain-source breakdown voltage	I _D = 250 µA; V _{GS} = 0 V; T _j = 25 °C		80	-	-	V
		I _D = 250 µA; V _{GS} = 0 V; T _j = -55 °C		72	-	-	V
V _{GS(th)}	gate-source threshold voltage	I _D = 1 mA; V _{DS} =V _{GS} ; T _j = 25 °C; Fig. 9 ; Fig. 10		2.4	3	4	V
		I _D = 1 mA; V _{DS} =V _{GS} ; T _j = -55 °C; Fig. 10		-	-	4.5	V
		I _D = 1 mA; V _{DS} =V _{GS} ; T _j = 175 °C; Fig. 10		1	-	-	V
I _{DSS}	drain leakage current	V _{DS} = 80 V; V _{GS} = 0 V; T _j = 25 °C		-	0.03	1	µA
		V _{DS} = 80 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 = 10 A; T _j = 25 °C; Fig. 11		-	11.2	15	mΩ
		V _{GS} = 10 V; I _D = 10 A; T _j = 175 °C; Fig. 12		-	-	38	mΩ
Dynamic characteristics FET1 and FET2							
Q _{G(tot)}	total gate charge	I _D = 10 A; V _{DS} = 64 V; V _{GS} = 10 V; T _j = 25 °C; Fig. 13 ; Fig. 14		-	35.1	-	nC
Q _{GS}	gate-source charge			-	7.4	-	nC
Q _{GD}	gate-drain charge			-	11.3	-	nC
C _{iss}	input capacitance	V _{DS} = 25 V; V _{GS} = 0 V; f = 1 MHz; T _j = 25 °C; Fig. 15		-	1847	2457	pF
C _{oss}	output capacitance			-	194	233	pF
C _{rss}	reverse transfer capacitance			-	115	158	pF
t _{d(on)}	turn-on delay time	V _{DS} = 60 V; R _L = 5 Ω; V _{GS} = 10 V; R _{G(ext)} = 5 Ω; T _j = 25 °C		-	8.8	-	ns
t _r	rise time			-	12.6	-	ns
t _{d(off)}	turn-off delay time			-	25.1	-	ns
t _f	fall time			-	15.1	-	ns
Source-drain diode FET1 and FET2							
V _{SD}	source-drain voltage	I _S = 10 A; V _{GS} = 0 V; T _j = 25 °C; Fig. 16		-	0.8	1.2	V
t _{rr}	reverse recovery time	I _S = 10 A; dI _S /dt = -100 A/µs; V _{GS} = 0 V; V _{DS} = 25 V; T _j = 25 °C		-	30.5	-	ns
Q _r	recovered charge			-	37.7	-	nC



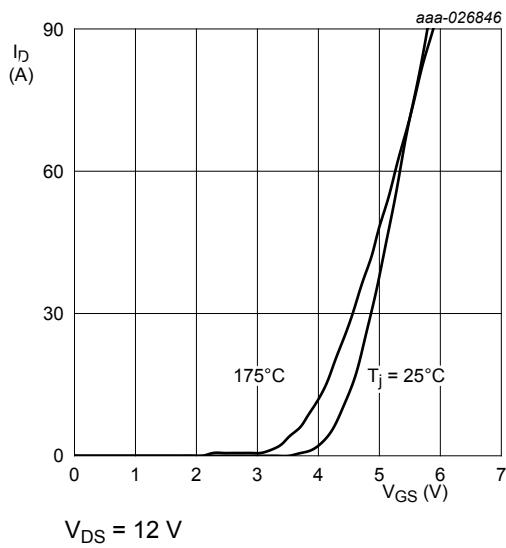
$T_j = 25^\circ\text{C}$

Fig. 6. Output characteristics; drain current as a function of drain-source voltage; typical values, FET1 and FET2



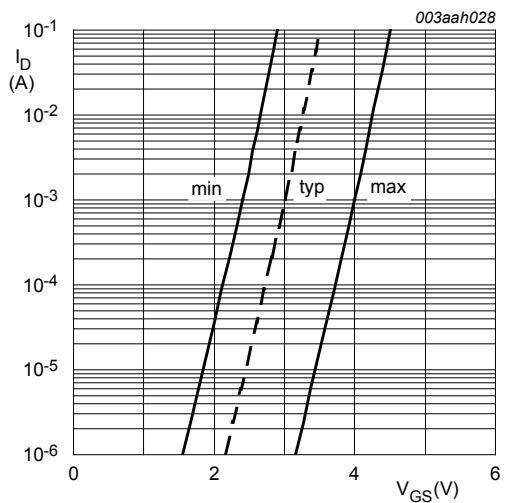
$T_j = 25^\circ\text{C}; I_D = 10$ A

Fig. 7. Drain-source on-state resistance as a function of gate-source voltage; typical values, FET1 and FET2



$V_{DS} = 12$ V

Fig. 8. Transfer characteristics; drain current as a function of gate-source voltage; typical values, FET1 and FET2



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

Fig. 9. Sub-threshold drain current as a function of gate-source voltage, FET1 and FET2

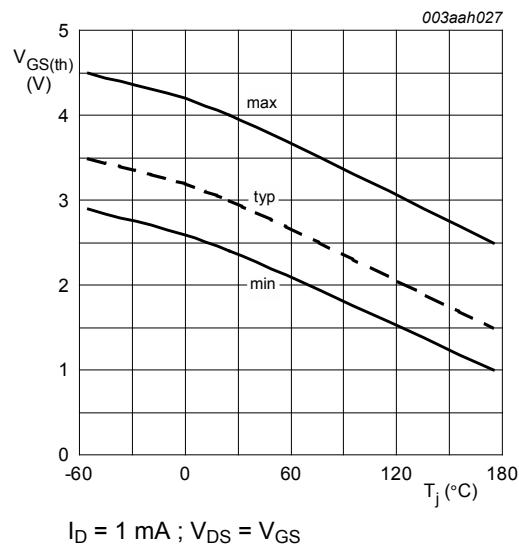


Fig. 10. Gate-source threshold voltage as a function of junction temperature, FET1 and FET2

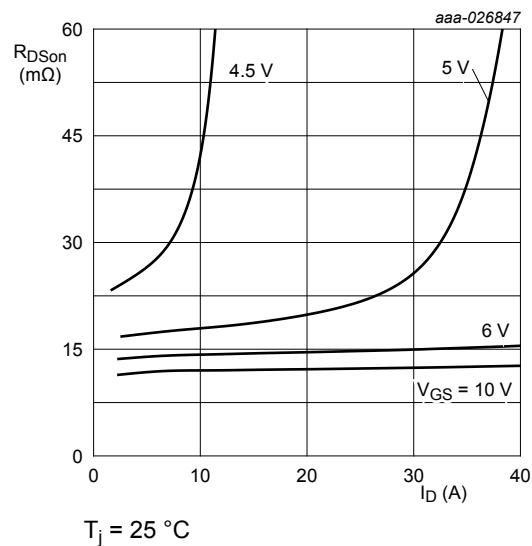


Fig. 11. Drain-source on-state resistance as a function of drain current; typical values, FET1 and FET2

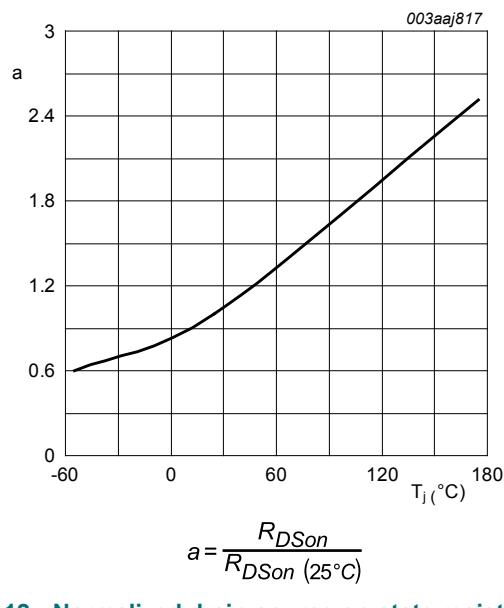


Fig. 12. Normalized drain-source on-state resistance factor as a function of junction temperature, FET1 and FET2

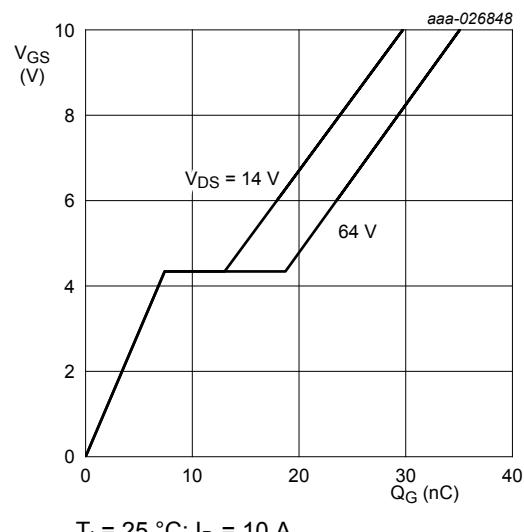


Fig. 13. Gate-source voltage as a function of gate charge; typical values, FET1 and FET2

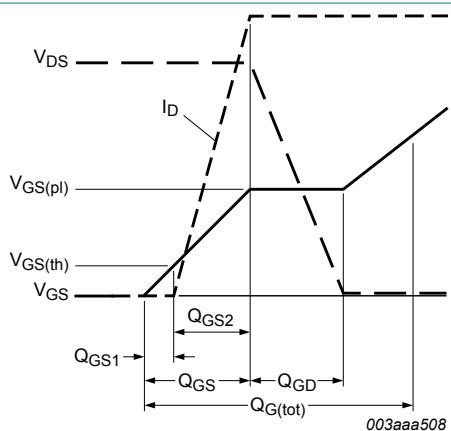


Fig. 14. Gate charge waveform definitions

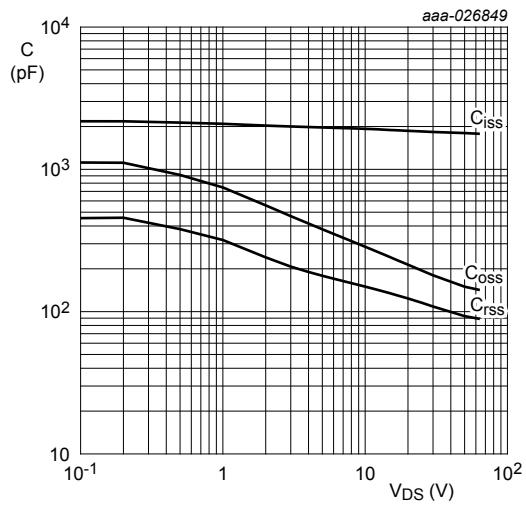
 $V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$

Fig. 15. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values, FET1 and FET2

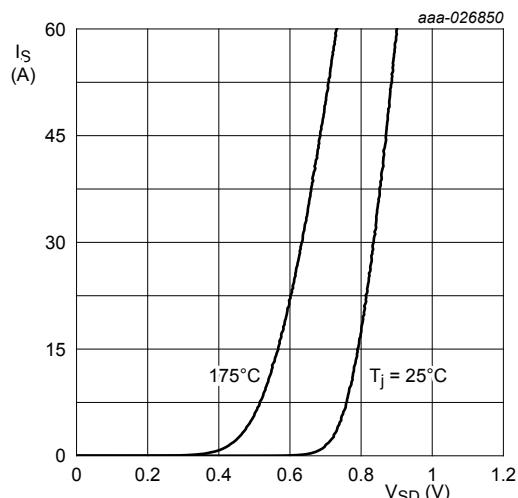
 $V_{GS} = 0 \text{ V}$

Fig. 16. Source-drain (diode forward) current as a function of source-drain (diode forward) voltage; typical values, FET1 and FET2

11. Package outline

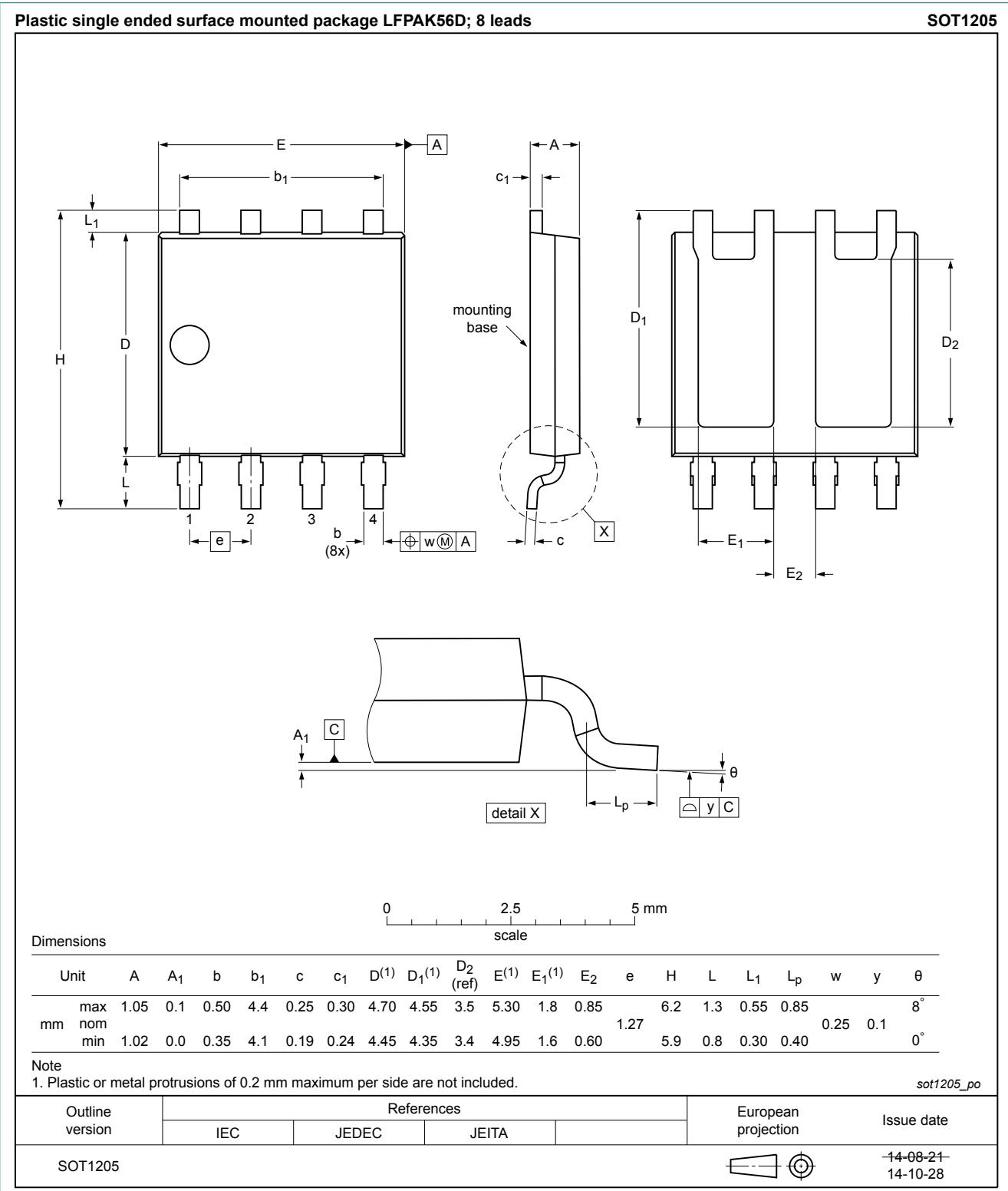


Fig. 17. Package outline LFPAK56D (SOT1205)

12. Legal information

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Document status [1][2]	Product status [3]	Definition
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Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
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Date of release: 11 May 2018



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