

## 1. General description

WSJ2M60R065DB is a high voltage N-channel MOSFET in TO263 package, which utilizes the advanced super-junction technology to provide superior FOM  $R_{DS(on)} * Q_g$  among silicon based MOSFETs. It is particularly suitable for applications require extreme high efficiency and power density.



## 2. Features and benefits

- Superior FOM  $R_{DS(on)} * Q_g$
- Extremely low switching loss
- Integrated ultrafast body diode
- 100% avalanche tested

## 3. Applications

- Telecom and server power supplies
- LED lighting
- Adapter
- Solar
- UPS

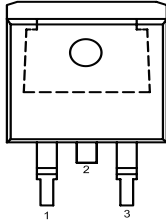
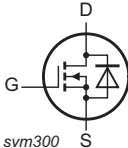
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V <sub>DS</sub>	drain-source voltage			600			V
V <sub>GS</sub>	gate-source voltage	static		±20			V
V <sub>GS</sub>	gate-source voltage	dynamic AC (f > 1 HZ)		±30			V
I <sub>D</sub>	continuous drain current	T <sub>C</sub> = 25 °C		42			A
P <sub>tot</sub>	power dissipation	T <sub>C</sub> = 25 °C		250			W
T <sub>j</sub>	junction temperature			-55 to 150			°C
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
R <sub>DS(on)</sub>	drain-source on-state resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 21 A		-	56	65	mΩ
Dynamic characteristics							
Q <sub>G(tot)</sub>	total gate charge	I <sub>D</sub> = 21 A; V <sub>DS</sub> = 400 V; V <sub>GS</sub> = 10 V		-	82	-	nC
E <sub>OSS</sub>	coss stored energy	V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 0 to 400 V		-	9.4	-	μJ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate		
2	D	drain		
3	S	source		
mb	D	mounting base; connected to drain		

6. Ordering information

Table 3. Ordering information

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
WSJ2M60R065DB	TO263	WSJ2M60R065DBJ	Reel	800	TO263N	28-Sep-2016

7. Marking

Table 4. Marking codes

Type number	Marking codes
WSJ2M60R065DB	WSJ2M 60R065DB

8. Limiting values

Table 5. Limiting values  
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Notes	Values	Unit
$V_{DS}$	drain-source voltage			600	V
$V_{GS}$	gate-source voltage	static		$\pm 20$	V
$V_{GS}$	gate-source voltage	dynamic AC ( $f > 1\text{ Hz}$ )		$\pm 30$	V
$I_D$	continuous drain current	$T_C = 25\text{ }^\circ\text{C}$		42	A
		$T_C = 100\text{ }^\circ\text{C}$		25	A
$I_{DM}$	pulsed drain current	$T_C = 25\text{ }^\circ\text{C}$		168	A
$P_{tot}$	power dissipation	$T_C = 25\text{ }^\circ\text{C}$		250	W
$E_{AS}$	single pulse drain-to-source avalanche	$I_{AS} = 8.4\text{ A}$ ; $R_{GS} = 25\text{ }\Omega$ ; $V_{DD} = 50\text{ V}$ ; $T_j = 25\text{ }^\circ\text{C}$		352	mJ
$E_{AR}$	repetitive avalanche energy	$I_{AS} = 8.4\text{ A}$ ; $R_{GS} = 25\text{ }\Omega$ ; $V_{DD} = 50\text{ V}$ ; $T_j = 25\text{ }^\circ\text{C}$		1.98	mJ
$I_{AS}$	avalanche current, single pulse			8.4	A
dv/dt	MOSFET dv/dt ruggedness			120	V/ns
dv/dt	reverse diode dv/dt			60	V/ns
dI <sub>F</sub> /dt	maximum diode commutation speed			1000	A/ $\mu$ s
$T_{stg}$	storage temperature			-55 to 150	$^\circ\text{C}$
$T_j$	junction temperature			-55 to 150	$^\circ\text{C}$

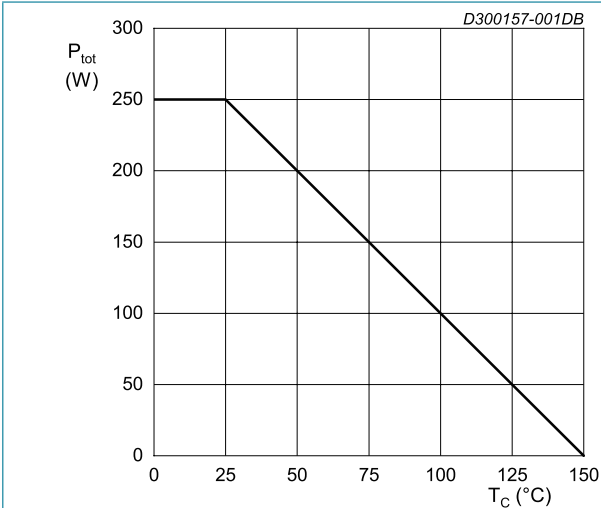


Fig. 1. Normalized total power dissipation as a function of case temperature

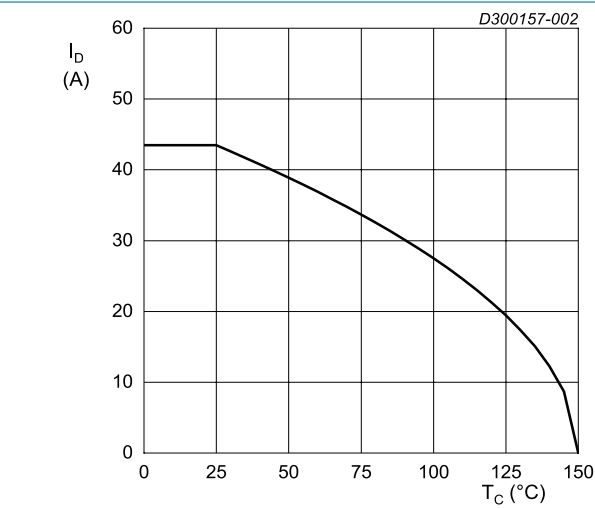


Fig. 2. Continuous Drain Current as a function of case temperature

9. Thermal & Mechanical characteristics

Table 6. Thermal & Mechanical characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-c)}$	thermal resistance from junction to case			-	0.36	0.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	60	-	K/W

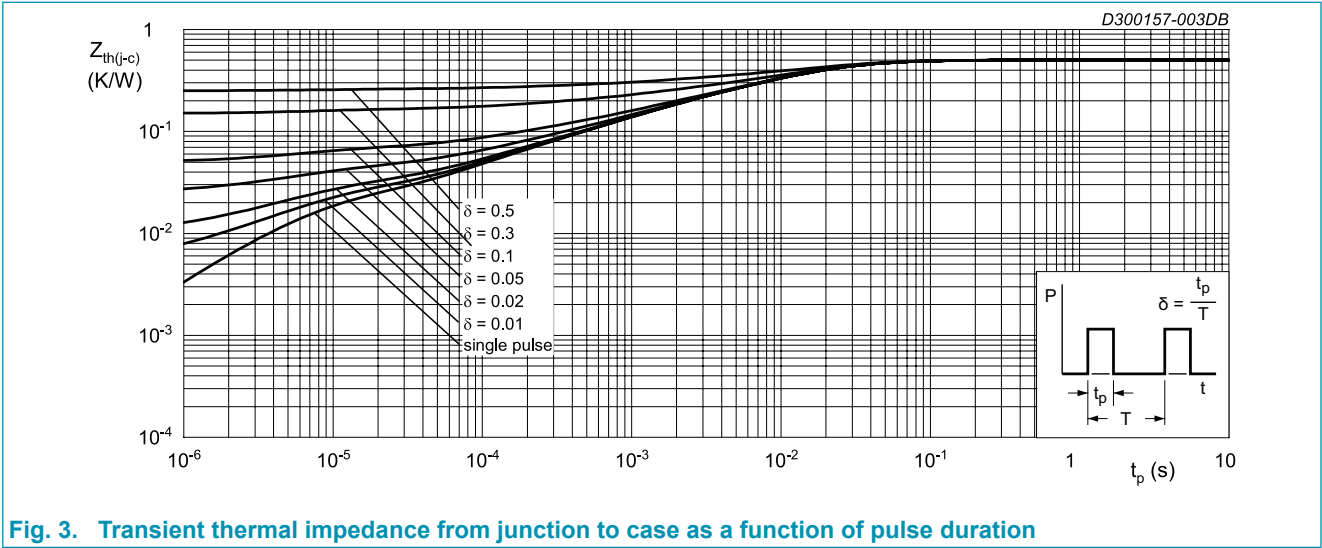


Fig. 3. Transient thermal impedance from junction to case as a function of pulse duration

## 10. Characteristics

**Table 7. Characteristics**
 $T_j = 25\text{ }^{\circ}\text{C}$  unless otherwise noted

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V <sub>(BR)DSS</sub>	drain-source breakdown voltage	I <sub>D</sub> = 1 mA; V <sub>GS</sub> = 0 V		600	-	-	V
V <sub>GS(th)</sub>	gate-source threshold voltage	I <sub>D</sub> = 250 μA; V <sub>DS</sub> = V <sub>GS</sub>		3.0	-	5.0	V
I <sub>DSS</sub>	drain leakage current	V <sub>DS</sub> = 600 V; V <sub>GS</sub> = 0 V		-	-	10	μA
		V <sub>DS</sub> = 600 V; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 125 °C		-	200	-	μA
I <sub>GSS</sub>	gate leakage current	V <sub>GS</sub> = ±20 V; V <sub>DS</sub> = 0 V		-	-	±100	nA
R <sub>DS(on)</sub>	drain-source on-state resistance	V <sub>GS</sub> = 10 V; I <sub>D</sub> = 21 A		-	56	65	mΩ
R <sub>G</sub>	gate resistance	f = 1 MHz		-	1.3	-	Ω
Dynamic characteristics							
Q <sub>G(tot)</sub>	total gate charge	I <sub>D</sub> = 21 A; V <sub>DS</sub> = 400 V; V <sub>GS</sub> = 10 V		-	82	-	nC
Q <sub>GS</sub>	gate-source charge			-	28	-	nC
Q <sub>GD</sub>	gate-drain charge			-	34	-	nC
C <sub>iss</sub>	input capacitance	V <sub>DS</sub> = 400 V; V <sub>GS</sub> = 0 V; f = 1 MHz		-	3368	-	pF
C <sub>oss</sub>	output capacitance			-	61	-	pF
C <sub>rss</sub>	reverse transfer capacitance			-	2.0	-	pF
C <sub>o(er)</sub>	effective output capacitance, energy related	V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 0 to 400 V		-	117	-	pF
C <sub>o(tr)</sub>	effective output capacitance, time related			-	1021	-	pF
t <sub>d(on)</sub>	turn-on delay time	V <sub>DS</sub> = 400 V; V <sub>GS</sub> = 10 V; R <sub>G</sub> = 5 Ω; I <sub>D</sub> = 21 A		-	62	-	ns
t <sub>r</sub>	rise time			-	12	-	ns
t <sub>d(off)</sub>	turn-off delay time			-	73	-	ns
t <sub>f</sub>	fall time			-	3.5	-	ns
Source-drain diode							
V <sub>SD</sub>	source-drain voltage	V <sub>GS</sub> = 0 V; I <sub>S</sub> = 21 A		-	1.0	1.2	V
I <sub>S</sub>	body-diode continuous current	T <sub>C</sub> = 25 °C		-	-	42	A
t <sub>rr</sub>	reverse recovery time	V <sub>R</sub> = 400 V; I <sub>F</sub> = 21 A; dI <sub>F</sub> /dt = 100 A/μs		-	123	-	ns
Q <sub>rr</sub>	reverse recovered charge			-	0.7	-	μC
I <sub>rrm</sub>	reverse recovery current			-	11	-	A

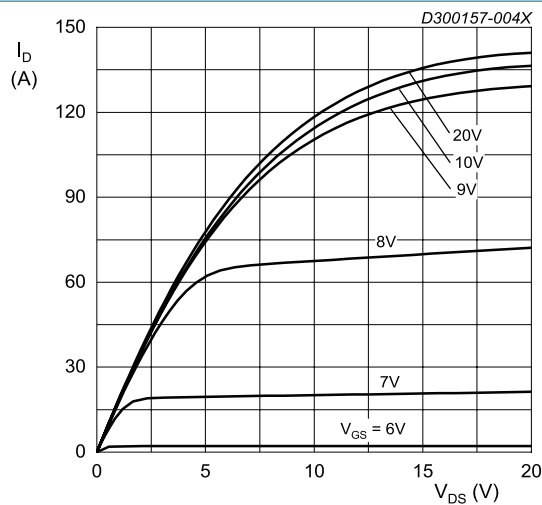
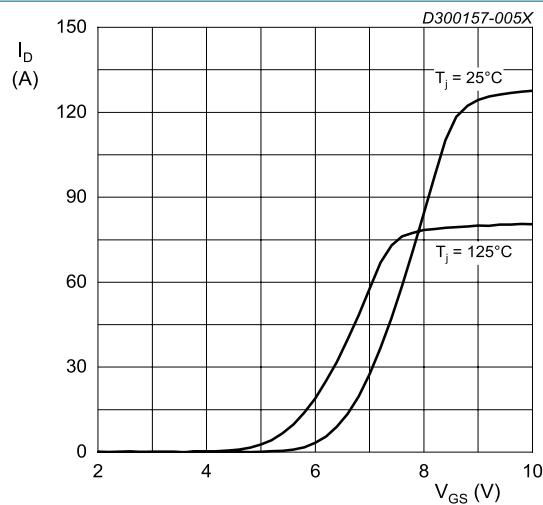
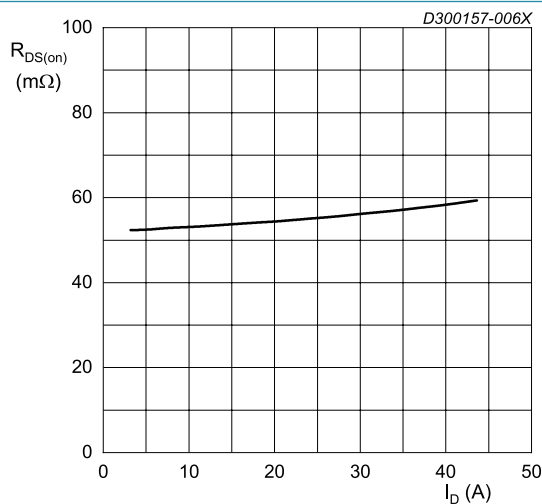


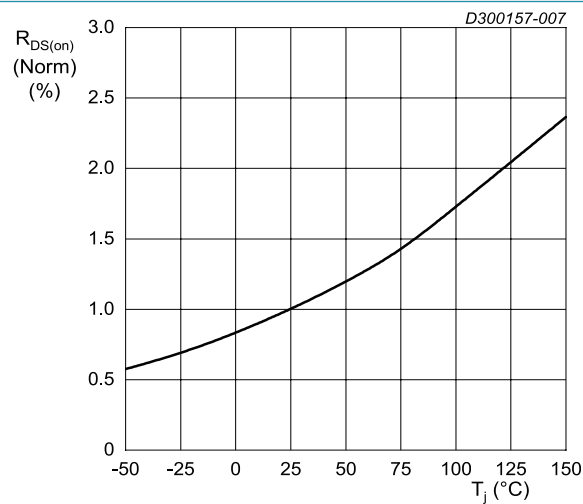
Fig. 4. Drain current as a function of drain-source voltage; typical values



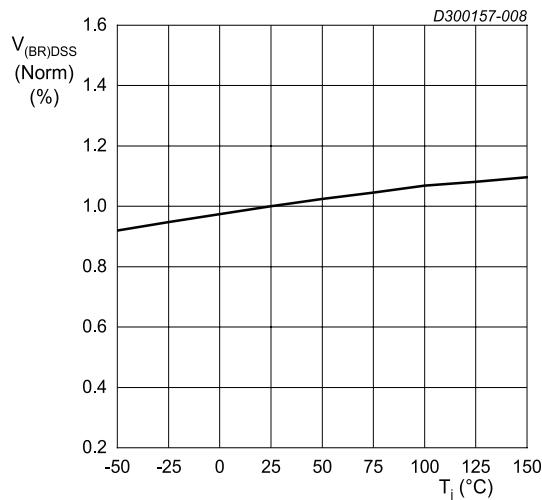
$V_{DS} = 20\text{ V}$   
Fig. 5. Drain current as a function of gate-source voltage; typical values



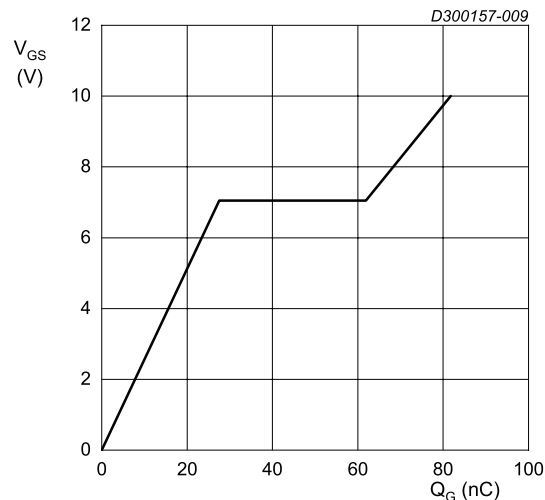
$V_{GS} = 10\text{ V}$   
Fig. 6. Drain-source on-state resistance as a function of drain current; typical values



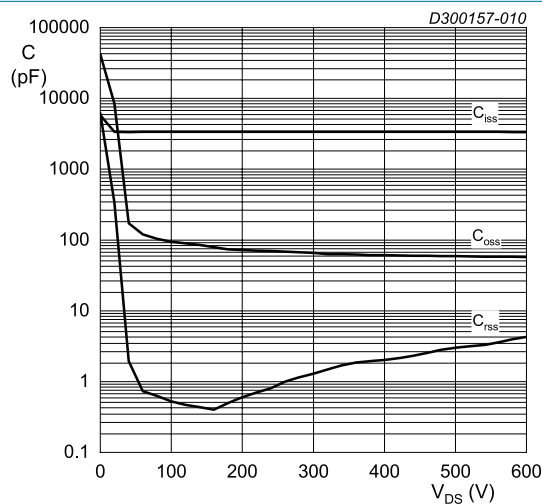
$V_{GS} = 10\text{ V}$ ;  $I_D = 21\text{ A}$   
Fig. 7. Normalized drain-source on-state resistance as a function of junction temperature



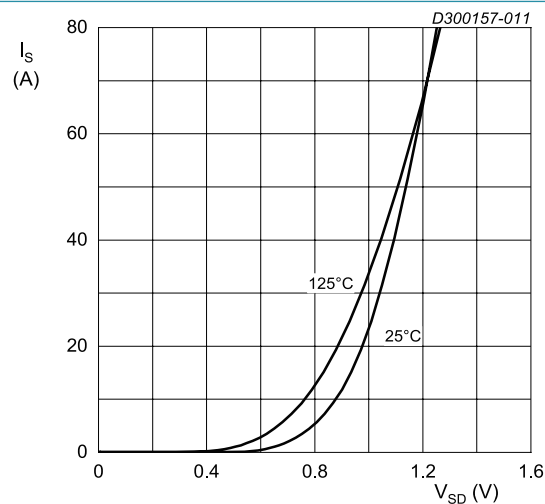
$I_D = 5 \text{ mA}$   
**Fig. 8. Normalized drain-source breakdown voltage as a function of junction temperature**



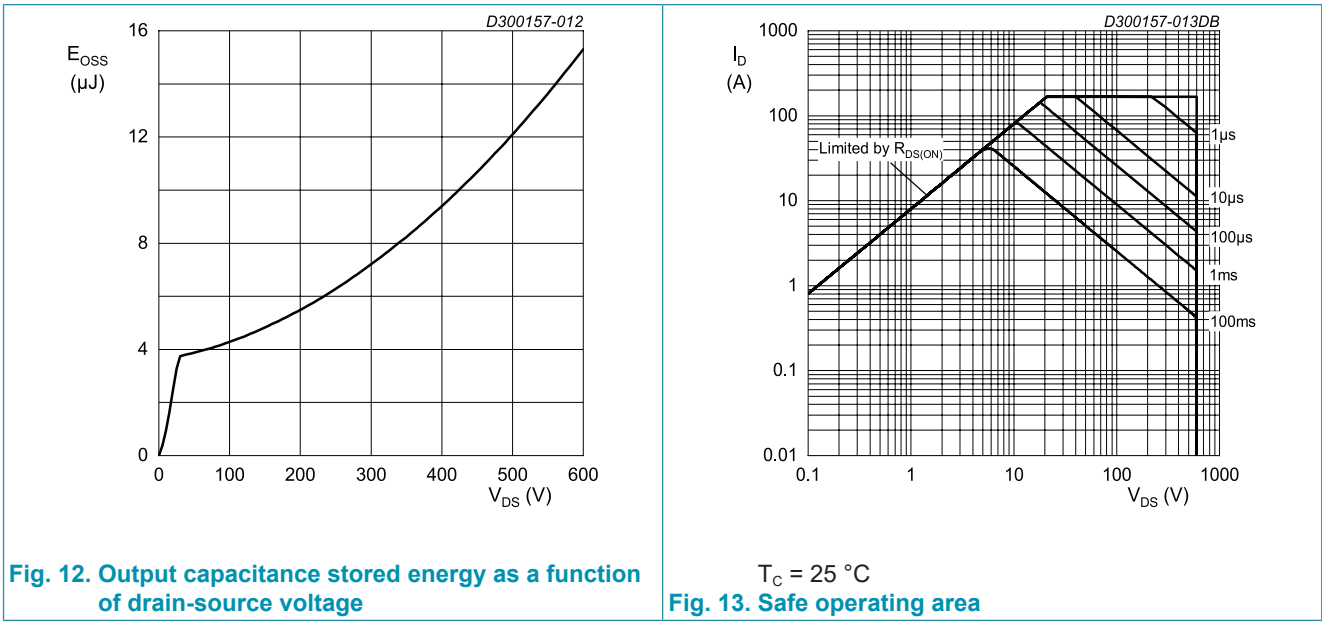
$I_D = 21 \text{ A}; V_{DS} = 400 \text{ V}$   
**Fig. 9. Gate-source voltage as a function of gate charge; typical values**



$V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$   
**Fig. 10. Capacitances as a function of drain-source voltage; typical values**

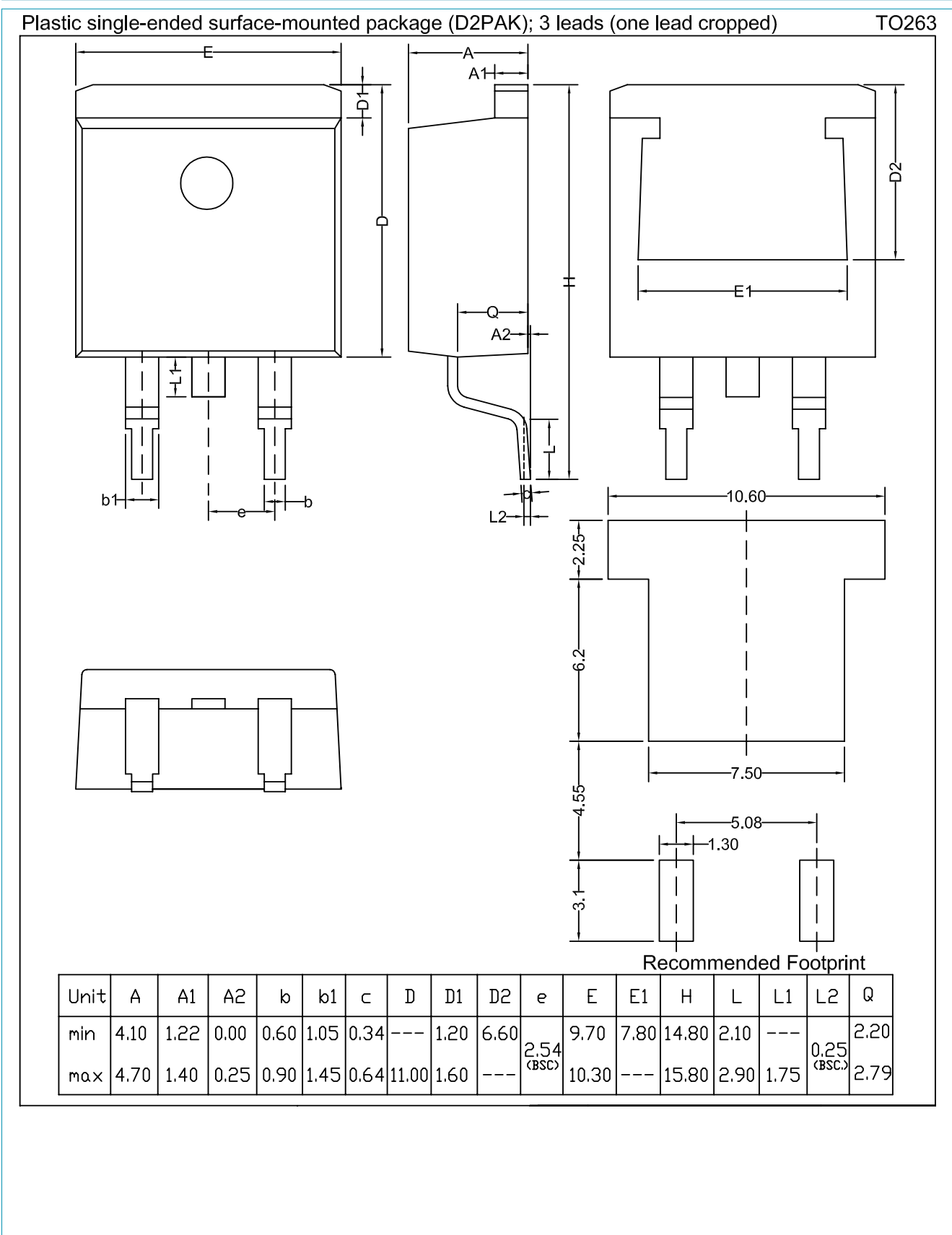


$V_{GS} = 0 \text{ V}$   
**Fig. 11. Source current as a function of source-drain voltage; typical values**





11. Package outline



## 12. 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.
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- [2] The term 'short data sheet' is explained in section "Definitions".
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13. Contents

1. General description..... 1

2. Features and benefits ..... 1

3. Applications ..... 1

4. Quick reference data..... 1

5. Pinning information..... 2

6. Ordering information..... 2

7. Marking..... 2

8. Limiting values ..... 3

9. Thermal & Mechanical characteristics ..... 4

10. Characteristics..... 5

11. Package outline ..... 9

12. Legal information ..... 10

13. Contents ..... 12

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