

MOSFET

OptiMOS™ 3 Power-MOSFET, 30 V

Features

Features

- Fast switching MOSFET for SMPS
- Optimized technology for DC/DC converters
- Qualified according to JEDEC¹⁾ for target applications
- N-channel; Logic level
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Very low on-resistance $R_{DS(on)}$
- Superior thermal resistance
- Avalanche rated
- Pb-free plating; RoHS compliant
- Halogen-free according to IEC61249-2-21

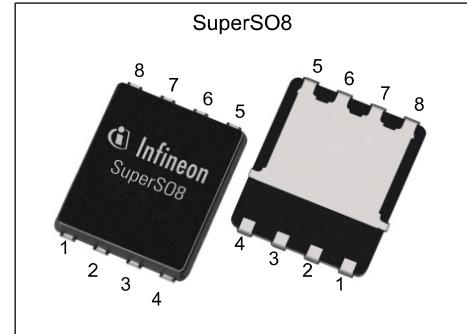
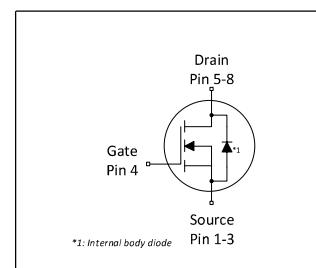


Table 1 Key Performance Parameters

Parameter	Value	Unit
V_{DS}	30	V
$R_{DS(on),max}$	3.4	$\text{m}\Omega$
I_D	109	A



Type / Ordering Code	Package	Marking	Related Links
BSC034N03LS G	PG-TDSON-8	034N03LS	-

¹⁾ J-STD20 and JESD22

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1 Maximum ratings

at $T_A=25$ °C, unless otherwise specified

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current ¹⁾	I_D	-	-	109	A	$V_{GS}=10$ V, $T_C=25$ °C
		-	-	69		$V_{GS}=10$ V, $T_C=100$ °C
		-	-	89		$V_{GS}=4.5$ V, $T_C=25$ °C
		-	-	56		$V_{GS}=4.5$ V, $T_C=100$ °C
		-	-	22		$V_{GS}=10$ V, $T_A=25$ °C, $R_{thJA}=50$ K/W ²⁾
Pulsed drain current ³⁾	$I_{D,pulse}$	-	-	436	A	$T_C=25$ °C
Avalanche current, single pulse ⁴⁾	I_{AS}	-	-	50	A	$T_C=25$ °C
Avalanche energy, single pulse	E_{AS}	-	-	55	mJ	$I_D=50$ A, $R_{GS}=25$ Ω
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	63	W	$T_C=25$ °C
		-	-	2.5		$T_A=25$ °C, $R_{thJA}=50$ K/W ²⁾
Operating and storage temperature	T_j, T_{stg}	-55	-	150	°C	IEC climatic category; DIN IEC 68-1: 55/150/56

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case, bottom	R_{thJC}	-	-	2.0	K/W	-
Thermal resistance, junction - case, top	R_{thJC}	-	-	20	K/W	-
Device on PCB, 6 cm ² cooling area ²⁾	R_{thJA}	-	-	50	K/W	-

¹⁾ Rating refers to the product only with datasheet specified absolute maximum values, maintaining case temperature as specified. For other case temperatures please refer to Diagram 2. De-rating will be required based on the actual environmental conditions.

²⁾ Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.

³⁾ See Diagram 3 for more detailed information

⁴⁾ See Diagram 13 for more detailed information

3 Electrical characteristics

at $T_j=25^\circ\text{C}$, unless otherwise specified

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(\text{BR})\text{DSS}}$	30	-	-	V	$V_{\text{GS}}=0\text{ V}$, $I_D=1\text{ mA}$
Gate threshold voltage	$V_{\text{GS}(\text{th})}$	1.0	-	2.2	V	$V_{\text{DS}}=V_{\text{GS}}$, $I_D=250\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	0.1 10	1.0 100	μA	$V_{\text{DS}}=30\text{ V}$, $V_{\text{GS}}=0\text{ V}$, $T_j=25^\circ\text{C}$ $V_{\text{DS}}=30\text{ V}$, $V_{\text{GS}}=0\text{ V}$, $T_j=125^\circ\text{C}$
Gate-source leakage current	I_{GSS}	-	10	100	nA	$V_{\text{GS}}=20\text{ V}$, $V_{\text{DS}}=0\text{ V}$
Drain-source on-state resistance	$R_{\text{DS}(\text{on})}$	-	4.1 2.8	5.1 3.4	$\text{m}\Omega$	$V_{\text{GS}}=4.5\text{ V}$, $I_D=30\text{ A}$ $V_{\text{GS}}=10\text{ V}$, $I_D=30\text{ A}$
Gate resistance	R_G	0.7	1.5	1.8	Ω	-
Transconductance	g_{fs}	45	90	-	S	$ V_{\text{DS}} >2 I_D R_{\text{DS}(\text{on})\text{max}}$, $I_D=30\text{ A}$

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance ¹⁾	C_{iss}	-	3200	4300	pF	$V_{\text{GS}}=0\text{ V}$, $V_{\text{DS}}=15\text{ V}$, $f=1\text{ MHz}$
Output capacitance ¹⁾	C_{oss}	-	1000	1300	pF	$V_{\text{GS}}=0\text{ V}$, $V_{\text{DS}}=15\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance	C_{rss}	-	62	-	pF	$V_{\text{GS}}=0\text{ V}$, $V_{\text{DS}}=15\text{ V}$, $f=1\text{ MHz}$
Turn-on delay time	$t_{\text{d}(\text{on})}$	-	6.9	-	ns	$V_{\text{DD}}=15\text{ V}$, $V_{\text{GS}}=10\text{ V}$, $I_D=30\text{ A}$, $R_{\text{G,ext}}=1.6\text{ }\Omega$
Rise time	t_r	-	4.8	-	ns	$V_{\text{DD}}=15\text{ V}$, $V_{\text{GS}}=10\text{ V}$, $I_D=30\text{ A}$, $R_{\text{G,ext}}=1.6\text{ }\Omega$
Turn-off delay time	$t_{\text{d}(\text{off})}$	-	28	-	ns	$V_{\text{DD}}=15\text{ V}$, $V_{\text{GS}}=10\text{ V}$, $I_D=30\text{ A}$, $R_{\text{G,ext}}=1.6\text{ }\Omega$
Fall time	t_f	-	4.6	-	ns	$V_{\text{DD}}=15\text{ V}$, $V_{\text{GS}}=10\text{ V}$, $I_D=30\text{ A}$, $R_{\text{G,ext}}=1.6\text{ }\Omega$

Table 6 Gate charge characteristics²⁾

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	9.0	12.0	nC	$V_{\text{DD}}=15\text{ V}$, $I_D=30\text{ A}$, $V_{\text{GS}}=0$ to 4.5 V
Gate charge at threshold	$Q_{\text{g}(\text{th})}$	-	4.8	6.4	nC	$V_{\text{DD}}=15\text{ V}$, $I_D=30\text{ A}$, $V_{\text{GS}}=0$ to 4.5 V
Gate to drain charge	Q_{gd}	-	4.3	7.2	nC	$V_{\text{DD}}=15\text{ V}$, $I_D=30\text{ A}$, $V_{\text{GS}}=0$ to 4.5 V
Switching charge	Q_{sw}	-	8.5	12.8	nC	$V_{\text{DD}}=15\text{ V}$, $I_D=30\text{ A}$, $V_{\text{GS}}=0$ to 4.5 V
Gate charge total	Q_g	-	18.8	25	nC	$V_{\text{DD}}=15\text{ V}$, $I_D=30\text{ A}$, $V_{\text{GS}}=0$ to 4.5 V
Gate plateau voltage	V_{plateau}	-	3.0	-	V	$V_{\text{DD}}=15\text{ V}$, $I_D=30\text{ A}$, $V_{\text{GS}}=0$ to 4.5 V
Gate charge total	Q_g	-	39	52	nC	$V_{\text{DD}}=15\text{ V}$, $I_D=30\text{ A}$, $V_{\text{GS}}=0$ to 10 V
Gate charge total, sync. FET	$Q_{\text{g}(\text{sync})}$	-	16.3	22	nC	$V_{\text{DS}}=0.1\text{ V}$, $V_{\text{GS}}=0$ to 4.5 V
Output charge	Q_{oss}	-	27	36	nC	$V_{\text{DD}}=15\text{ V}$, $V_{\text{GS}}=0\text{ V}$

¹⁾ Defined by design. Not subject to production test

²⁾ See figure 16 for gate charge parameter definition. Defined by design, not subject to production test

Table 7 Reverse diode

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	57	A	$T_C=25\text{ }^\circ\text{C}$
Diode pulse current	$I_{S,pulse}$	-	-	436	A	$T_C=25\text{ }^\circ\text{C}$
Diode forward voltage	V_{SD}	-	0.83	1.1	V	$V_{GS}=0\text{ V}$, $I_F=30\text{ A}$, $T_j=25\text{ }^\circ\text{C}$
Reverse recovery charge ¹⁾	Q_{rr}	-	-	10	nC	$V_R=15\text{ V}$, $I_F=I_S$, $di_F/dt=400\text{ A}/\mu\text{s}$

¹⁾ Defined by design. Not subject to production test

4 Electrical characteristics diagrams

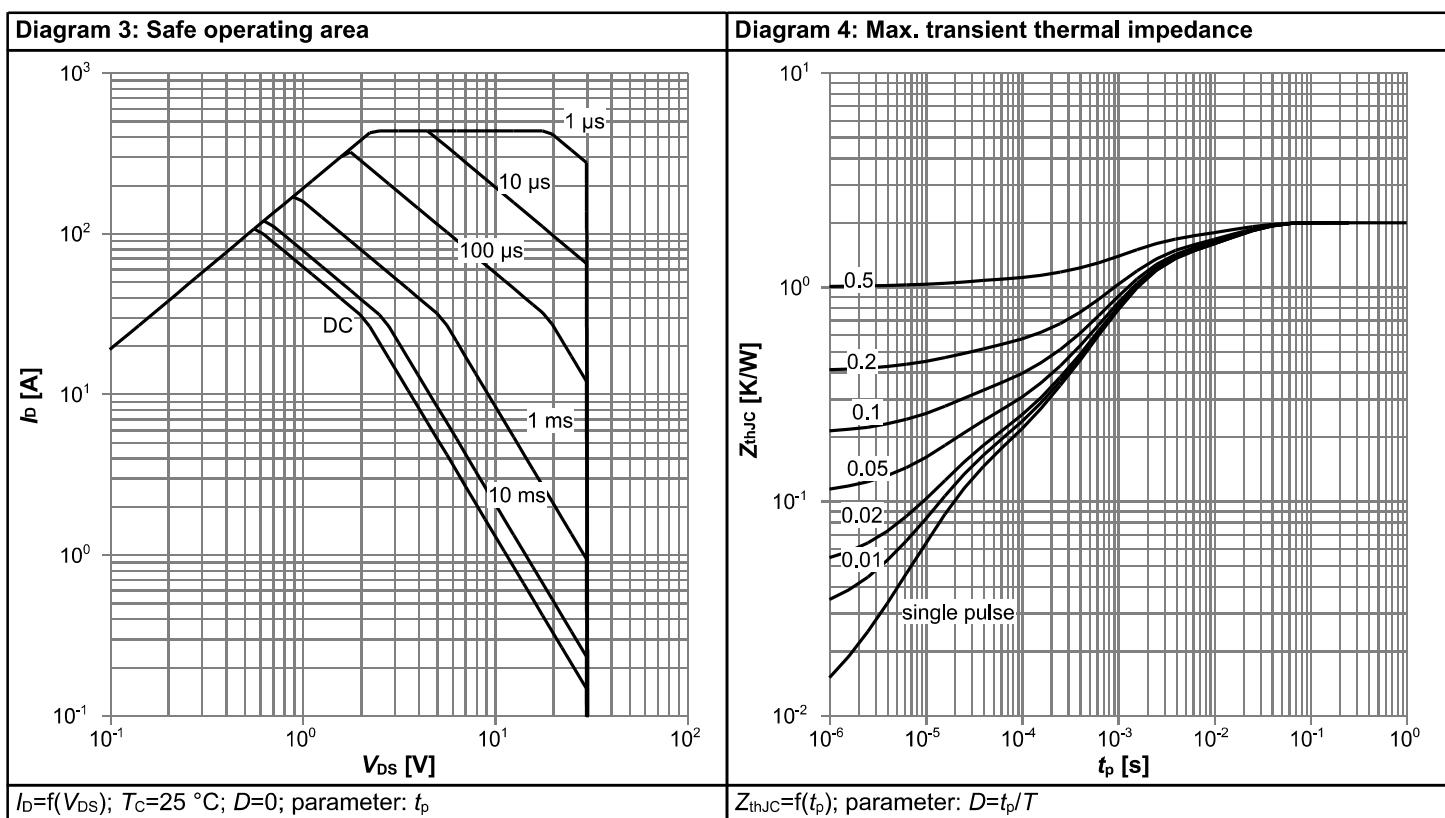
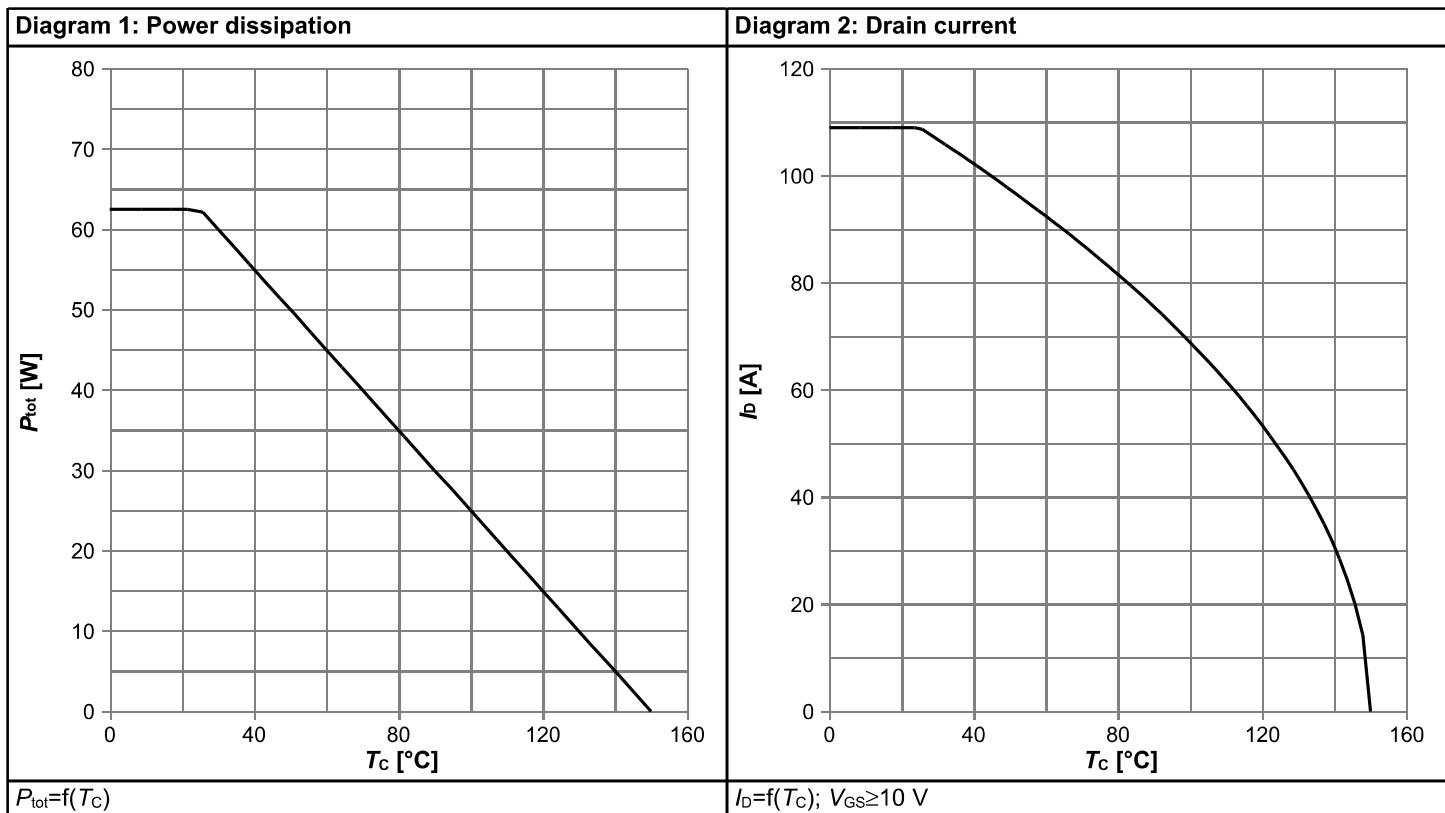
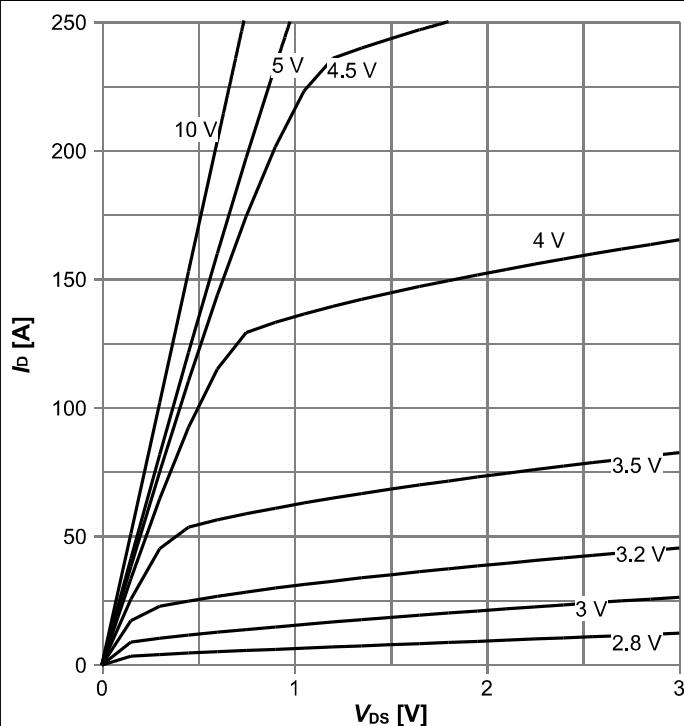
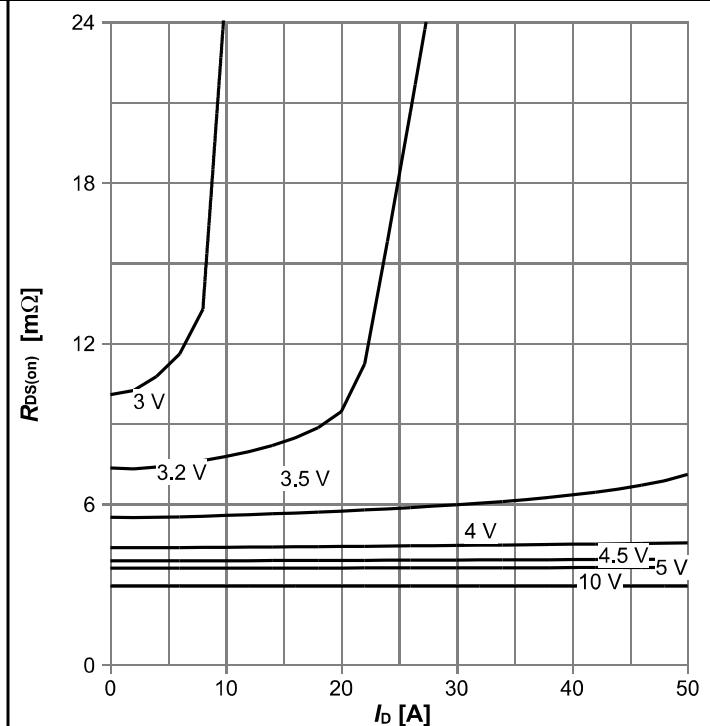


Diagram 5: Typ. output characteristics



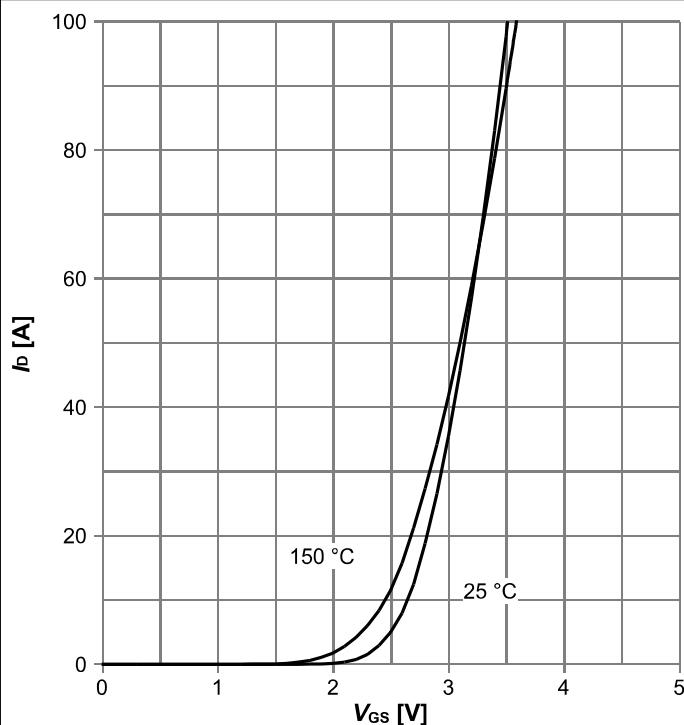
$I_D=f(V_{DS})$; $T_j=25\text{ }^\circ\text{C}$; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



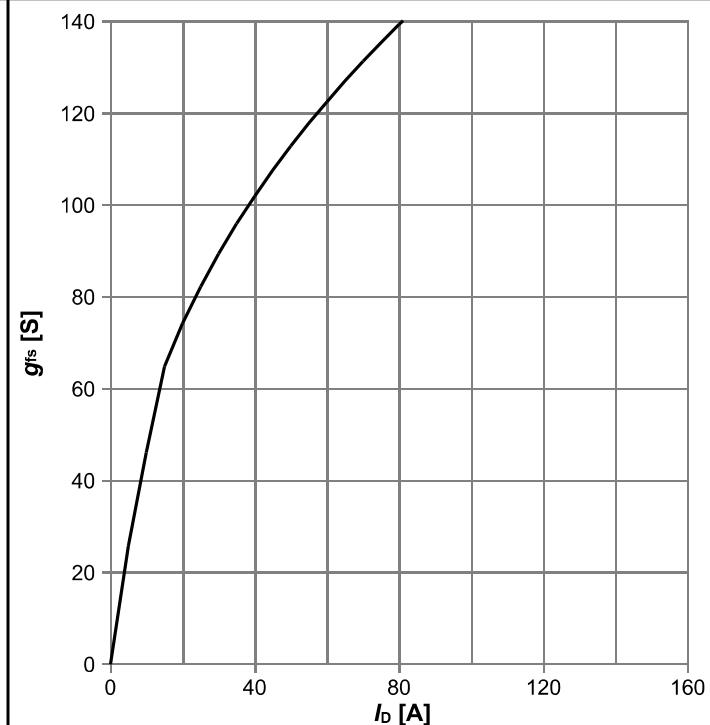
$R_{DS(on)}=f(I_D)$; $T_j=25\text{ }^\circ\text{C}$; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



$I_D=f(V_{GS})$; $|V_{DS}|>2|I_D|R_{DS(on)max}$; parameter: T_j

Diagram 8: Typ. forward transconductance



$g_{fs}=f(I_D)$; $T_j=25\text{ }^\circ\text{C}$

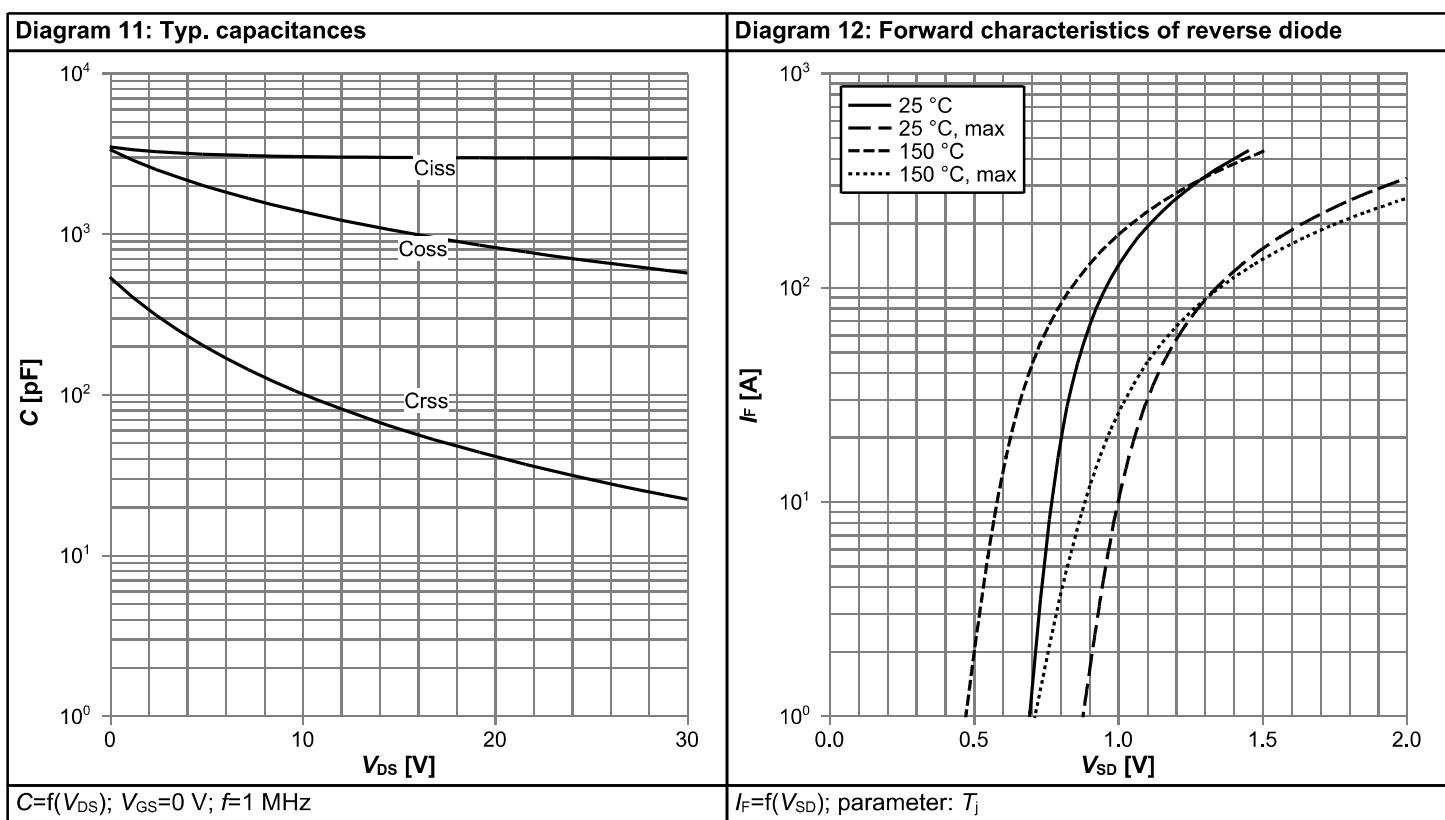
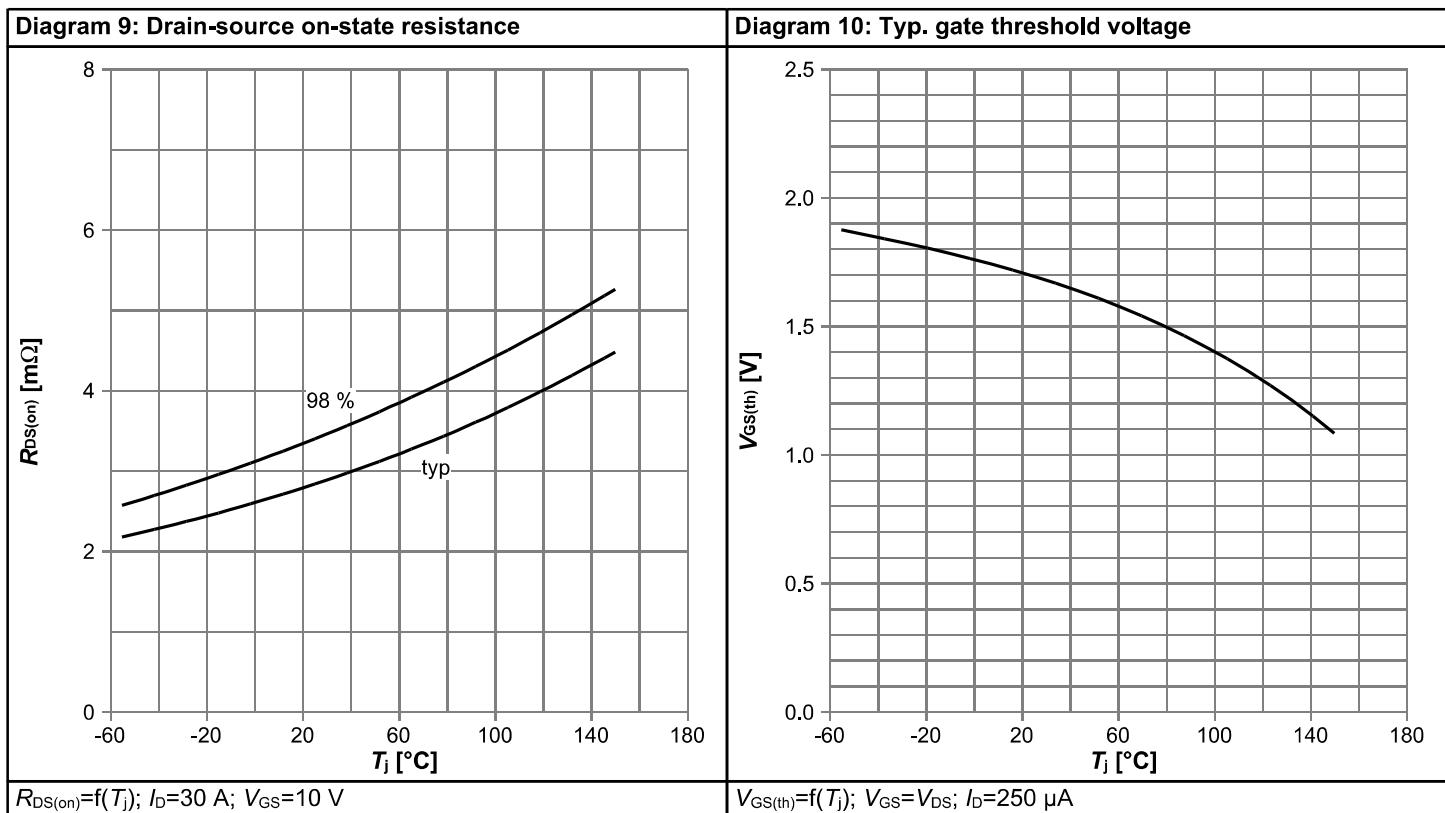
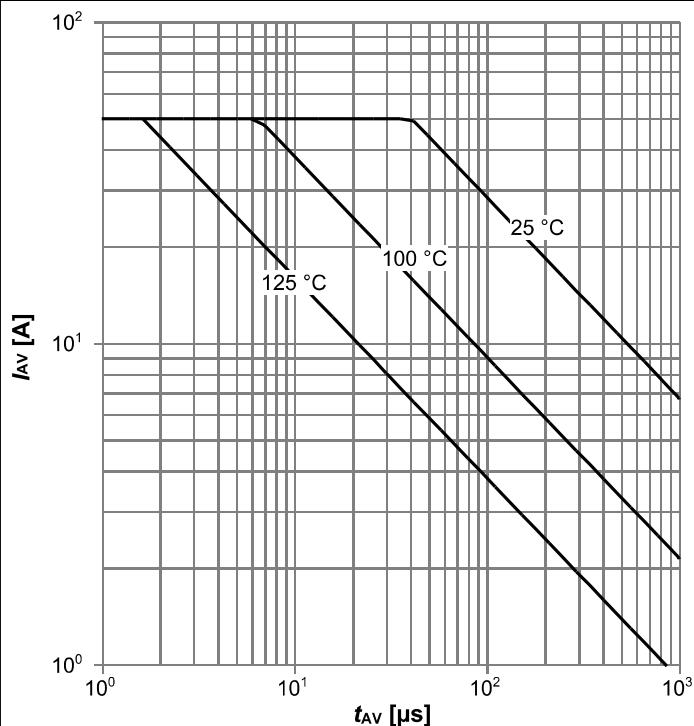
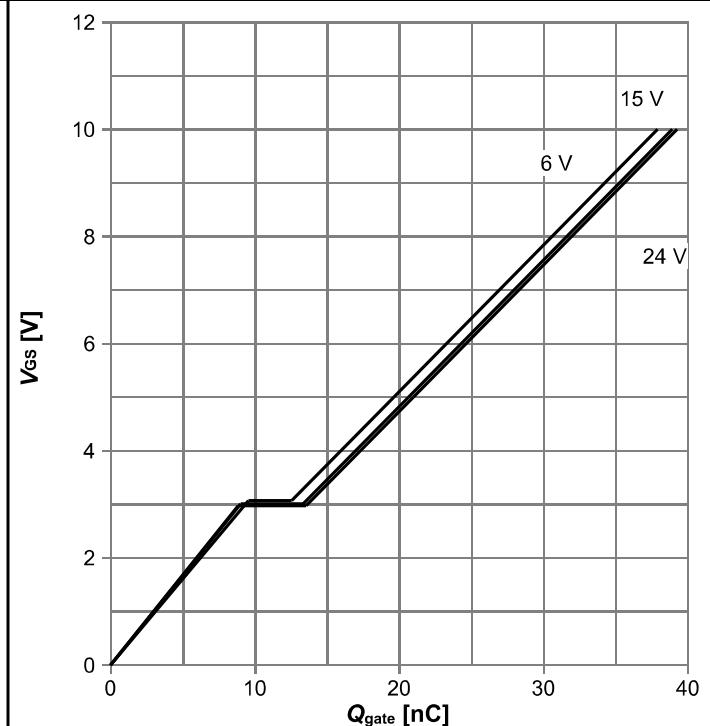


Diagram 13: Avalanche characteristics



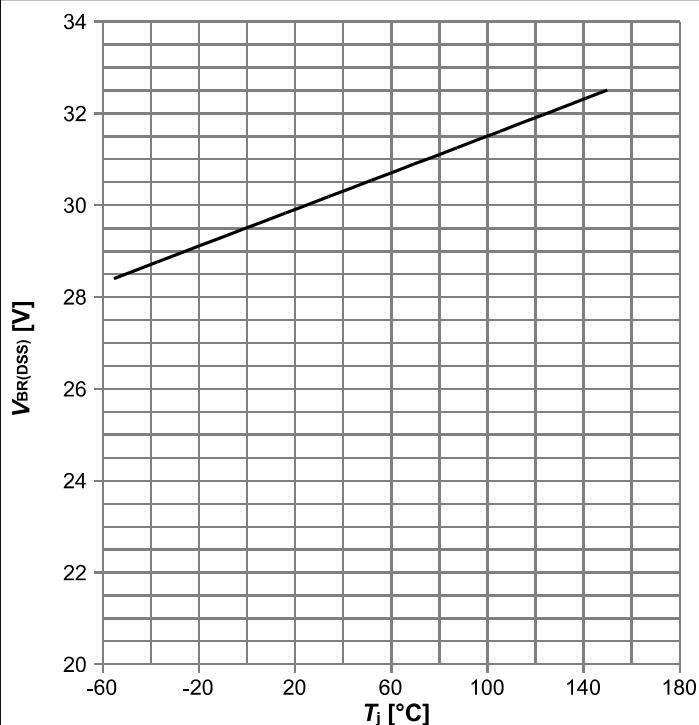
$I_{AV}=f(t_{AV})$; $R_{GS}=25 \Omega$; parameter: $T_{j(start)}$

Diagram 14: Typ. gate charge



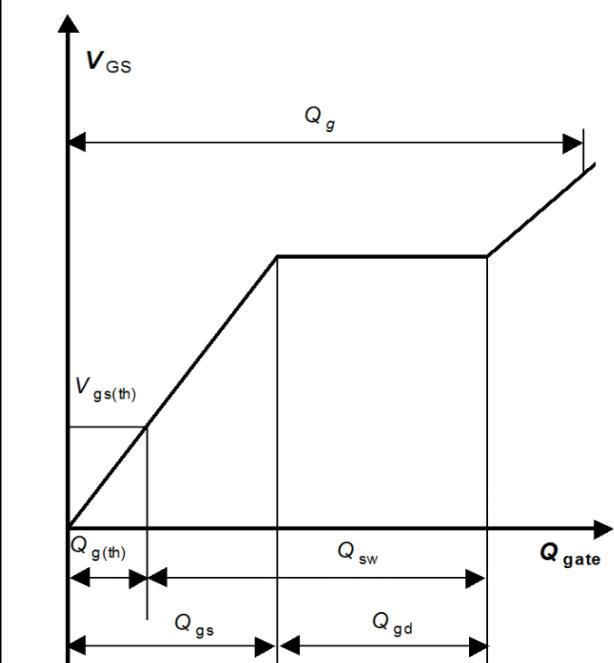
$V_{GS}=f(Q_{gate})$; $I_D=30 \text{ A pulsed}$; parameter: V_{DD}

Diagram 15: Drain-source breakdown voltage

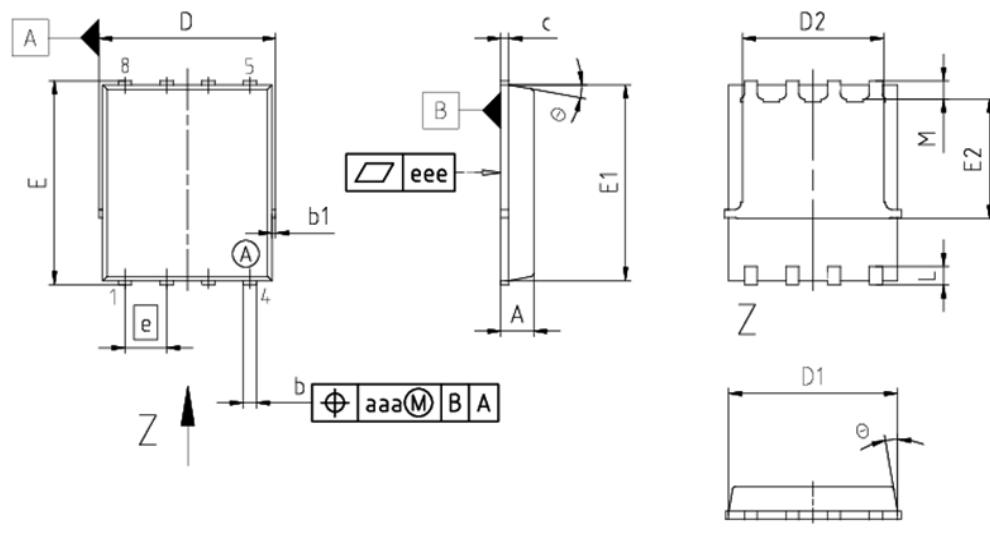


$V_{BR(DSS)}=f(T_j)$; $I_D=1 \text{ mA}$

Diagram Gate charge waveforms



5 Package Outlines



DIM	MILLIMETERS	
	MIN	MAX
A	0.90	1.10
b	0.31	0.54
b1	0.02	0.22
c	0.15	0.35
D	5.15	5.49
D1	4.95	5.35
D2	3.70	4.40
E	5.95	6.35
E1	5.70	6.10
E2	3.40	3.80
e	1.27	
N	8	
L	0.45	0.71
M	0.45	0.75
θ	8.5°	12°
aaa	0.25	
eee	0.08	

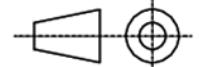
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ISSUE DATE	10-04-2013
REVISION	04

Figure 1 Outline PG-TDSON-8, dimensions in mm

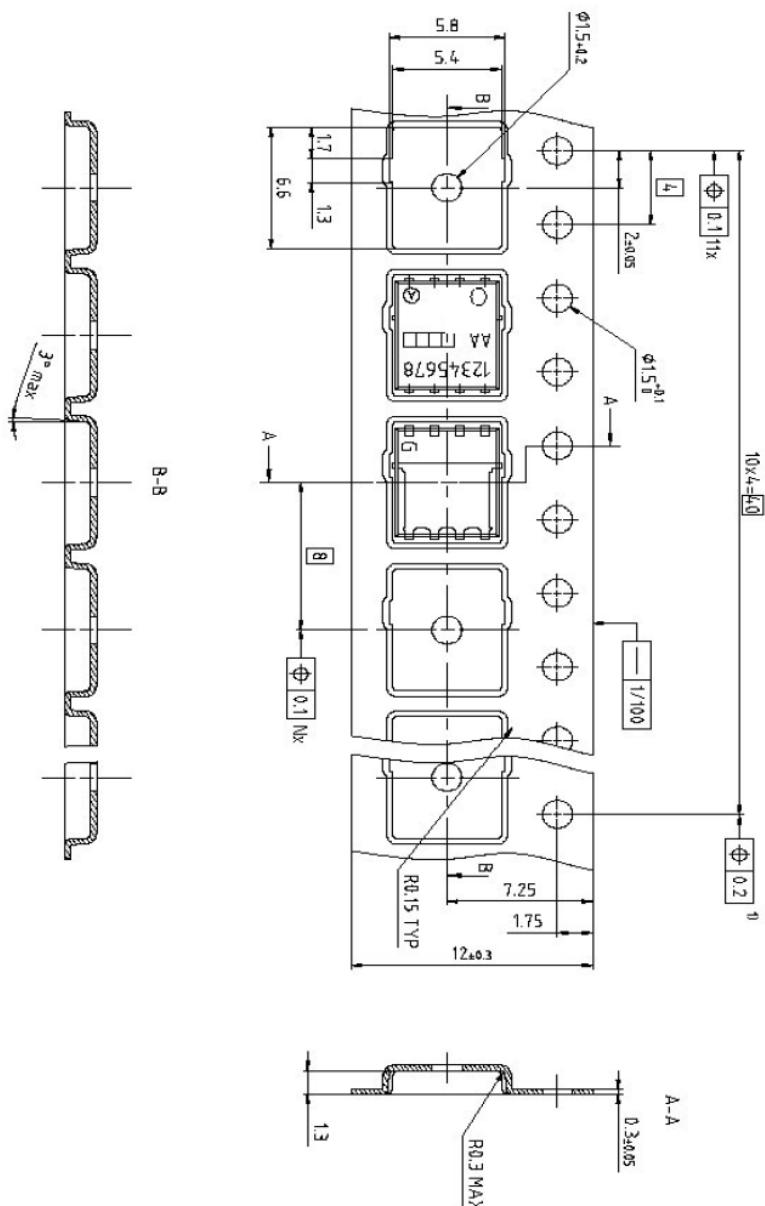


Figure 2 Outline Tape (PG-TDSON-8), dimensions in mm

Revision History

BSC034N03LS G

Revision: 2021-06-09, Rev. 2.0

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.0	2021-06-09	Update current rating, footnotes, Ptot and addition Vsd max

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Infineon Technologies AG

81726 München, Germany

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