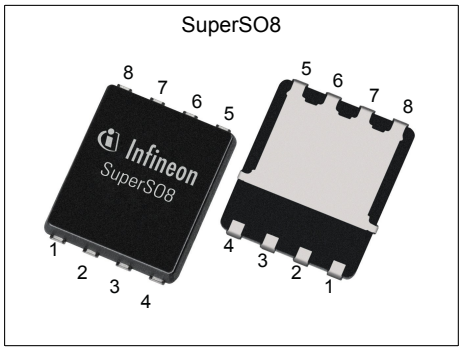
MOSFET

OptiMOS™3 Power-Transistor, 250 V



Features

- N-channel, normal level
- 175 °C rated
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Very low on-resistance $R_{DS(on)}$
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC[1] for target application
- Halogen-free according to IEC61249-2-21
- Ideal for high-frequency switching and synchronous rectification

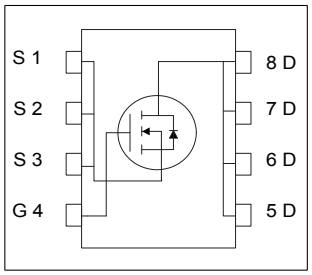


Table 1 Key Performance Parameters

Parameter	Value	Unit
V_{DS}	250	V
$R_{DS(on),max}$	67	mΩ
I_D	24	A

Type / Ordering Code	Package	Marking	Related Links
BSC670N25NSFD	PG-TDSON-8	670N25NF	-

[1] J-STD20 and JESD22

Table of Contents

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	I_D	- -	- -	24 19	A	T_C=25 °C T_C=100 °C
Pulsed drain current[1]	$I_{D,pulse}$	-	-	96	A	T_C=25 °C
Avalanche energy, single pulse	E_{AS}	-	-	69	mJ	I_D=16 A, R_{GS}=25 Ω
Reverse diode dv/dt	dv/dt	-	-	60	kV/µs	I_D=46 A, V_{DS}=125 V, di/dt=1500 A/µs, $T_{j,max}$=175 °C
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	150	W	T_C=25 °C
Operating and storage temperature	T_j, T_{stg}	-55	-	175	°C	-

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	0.6	1	K/W	-
Thermal resistance, junction - ambient, minimal footprint	R_{thJA}	-	-	75	K/W	-
Thermal resistance, junction - ambient, 6 cm^2 cooling area[2]	R_{thJA}	-	-	50	K/W	-

3 Electrical characteristics

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	250	-	-	V	V_{GS}=0 V, I_D=1 mA
Gate threshold voltage	$V_{GS(th)}$	2	3	4	V	V_{DS}=V_{GS}, I_D=90 µA
Zero gate voltage drain current	I_{DSS}	- -	0.1 10	1 100	µA	V_{DS}=200 V, V_{GS}=0 V, T_j=25 °C V_{DS}=200 V, V_{GS}=0 V, T_j=125 °C
Gate-source leakage current	I_{GSS}	-	1	100	nA	V_{GS}=20 V, V_{DS}=0 V
Drain-source on-state resistance	$R_{DS(on)}$	-	59	67	mΩ	V_{GS}=10 V, I_D=24 A
Gate resistance	R_G	-	3.3	5	Ω	-
Transconductance	g_{fs}	24	47	-	S	|V_{DS}|>2|I_D|$R_{DS(on)max}$, I_D=24 A

[1] See Diagram 3
[2] Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm^2 (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	1810	2410	pF	V_{GS}=0 V, V_{DS}=125 V, f=1 MHz
Output capacitance[1)]	C_{oss}	-	103	137	pF	V_{GS}=0 V, V_{DS}=125 V, f=1 MHz
Reverse transfer capacitance[1)]	C_{rss}	-	5.4	-	pF	V_{GS}=0 V, V_{DS}=125 V, f=1 MHz
Turn-on delay time	$t_{d(on)}$	-	8.0	-	ns	V_{DD}=125 V, V_{GS}=10 V, I_D=12 A, $R_{G,ext}$=1.6 Ω
Rise time	t_r	-	3.6	-	ns	V_{DD}=125 V, V_{GS}=10 V, I_D=12 A, $R_{G,ext}$=1.6 Ω
Turn-off delay time	$t_{d(off)}$	-	19	-	ns	V_{DD}=125 V, V_{GS}=10 V, I_D=12 A, $R_{G,ext}$=1.6 Ω
Fall time	t_f	-	4.0	-	ns	V_{DD}=125 V, V_{GS}=10 V, I_D=12 A, $R_{G,ext}$=1.6 Ω

Table 6 Gate charge characteristics[2)]

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	8.2	-	nC	V_{DD}=125 V, I_D=24 A, V_{GS}=0 to 10 V
Gate to drain charge	Q_{gd}	-	2.9	-	nC	V_{DD}=125 V, I_D=24 A, V_{GS}=0 to 10 V
Switching charge	Q_{sw}	-	5.6	-	nC	V_{DD}=125 V, I_D=24 A, V_{GS}=0 to 10 V
Gate charge total[1)]	Q_g	-	22	30	nC	V_{DD}=125 V, I_D=24 A, V_{GS}=0 to 10 V
Gate plateau voltage	$V_{plateau}$	-	4.5	-	V	V_{DD}=125 V, I_D=24 A, V_{GS}=0 to 10 V
Output charge	Q_{oss}	-	48	-	nC	V_{DD}=125 V, V_{GS}=0 V

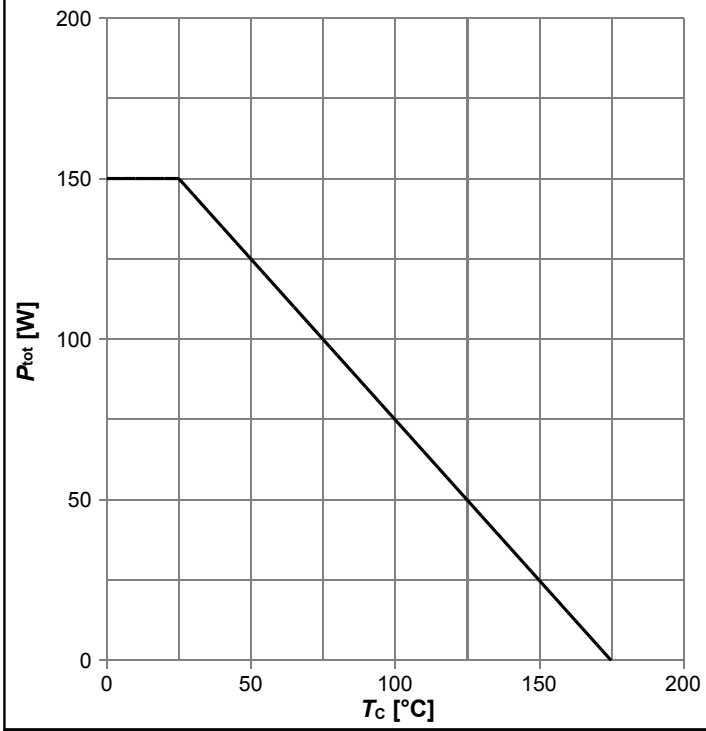
Table 7 Reverse diode

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continous forward current	I_S	-	-	24	A	T_C=25 °C
Diode pulse current[3)]	$I_{S,pulse}$	-	-	96	A	T_C=25 °C
Diode hard commutation current[4)]	$I_{S,hard}$	-	-	46	A	T_C=25 °C, di_F/dt=1500 A/µs
Diode forward voltage	V_{SD}	-	0.9	1.2	V	V_{GS}=0 V, I_F=24 A, T_j=25 °C
Reverse recovery time[1)]	t_{rr}	-	69	138	ns	V_R=125 V, I_F=16.1A, di_F/dt=100 A/µs
Reverse recovery charge[1)]	Q_{rr}	-	153	306	nC	V_R=125 V, I_F=16.1A, di_F/dt=100 A/µs

[1)] Defined by design. Not subject to production test.
[2)] See ″Gate charge waveforms″ for parameter definition
[3)] Diode pulse current is defined by thermal and/or package limits
[4)] Maximum allowed hard-commutated current through diode at di/dt=1500 A/µs

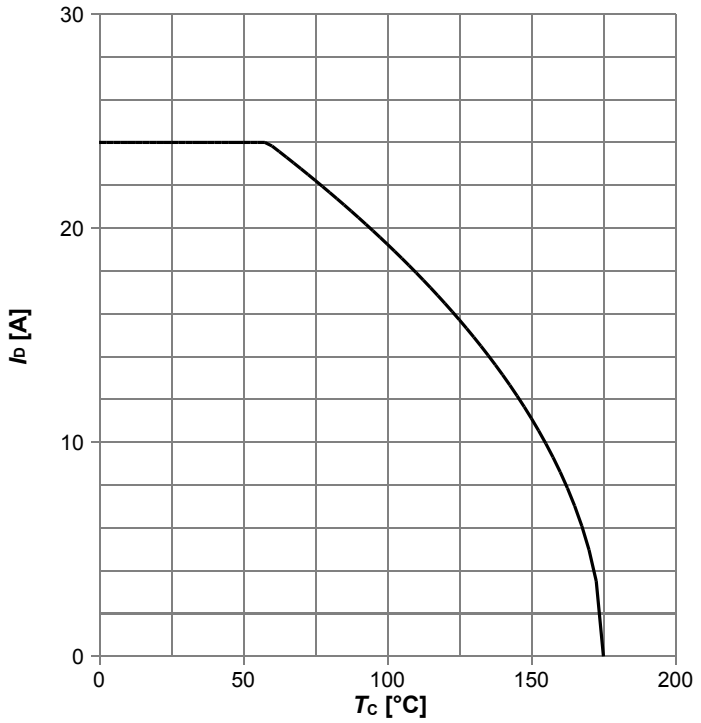
4 Electrical characteristics diagrams

Diagram 1: Power dissipation



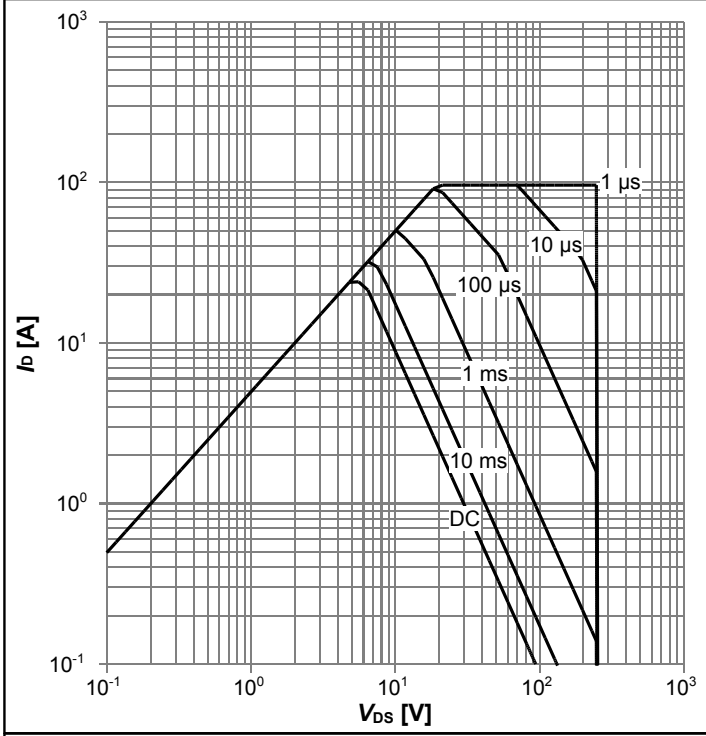
$P_{tot}=f(T_C)$

Diagram 2: Drain current



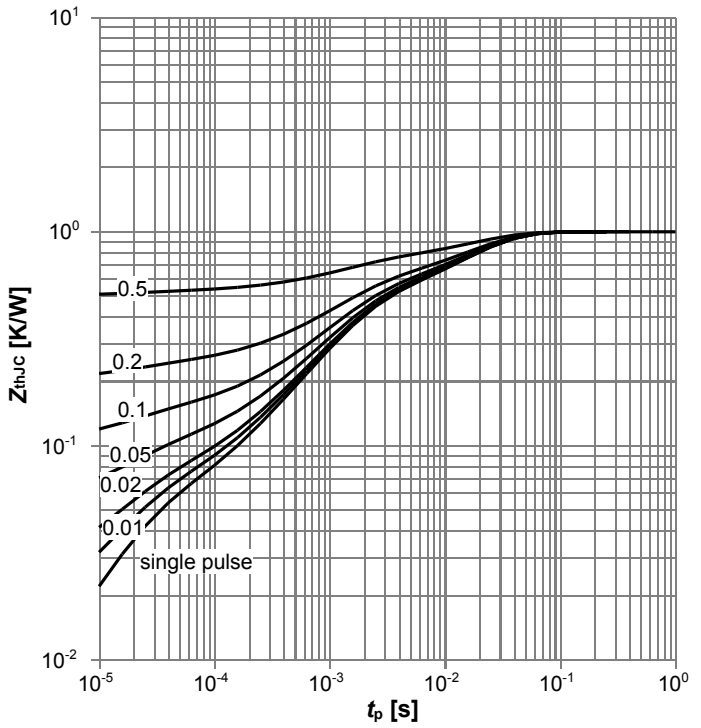
$I_D=f(T_C)$; V_{GS}>=10 V

Diagram 3: Safe operating area



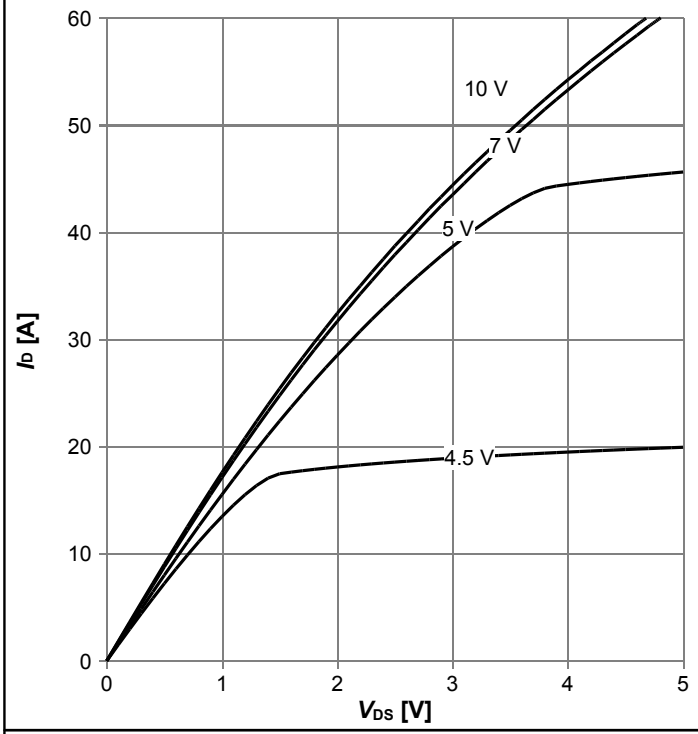
$I_D=f(V_{DS})$; T_C=25 °C; D=0; parameter: t_p

Diagram 4: Max. transient thermal impedance



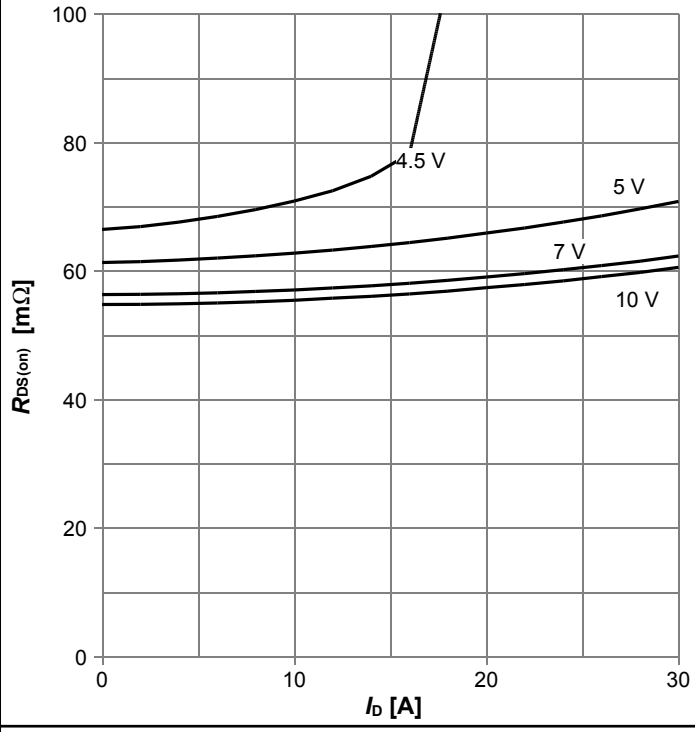
$Z_{thJC}=f(t_p)$; parameter: $D=t_p/T$

Diagram 5: Typ. output characteristics



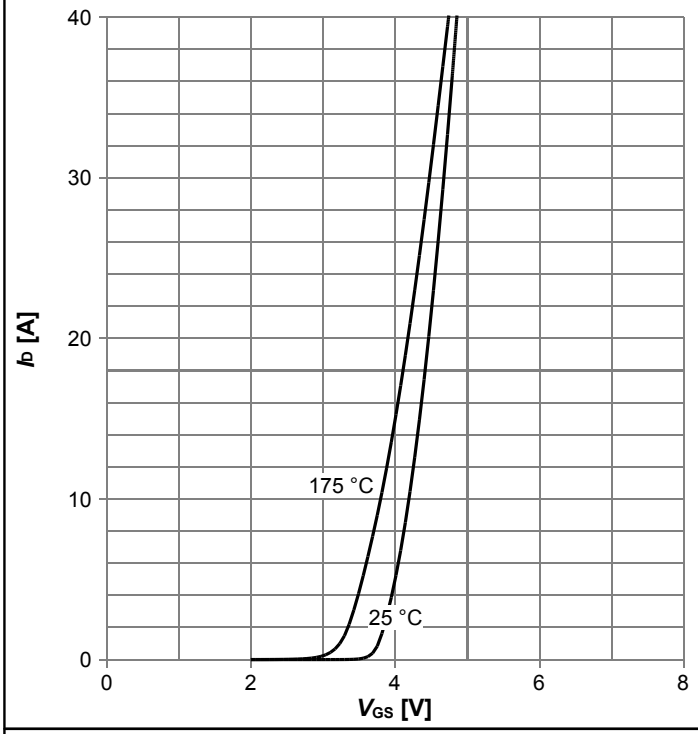
I_D=f(V_{DS}); T_j=25 °C; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



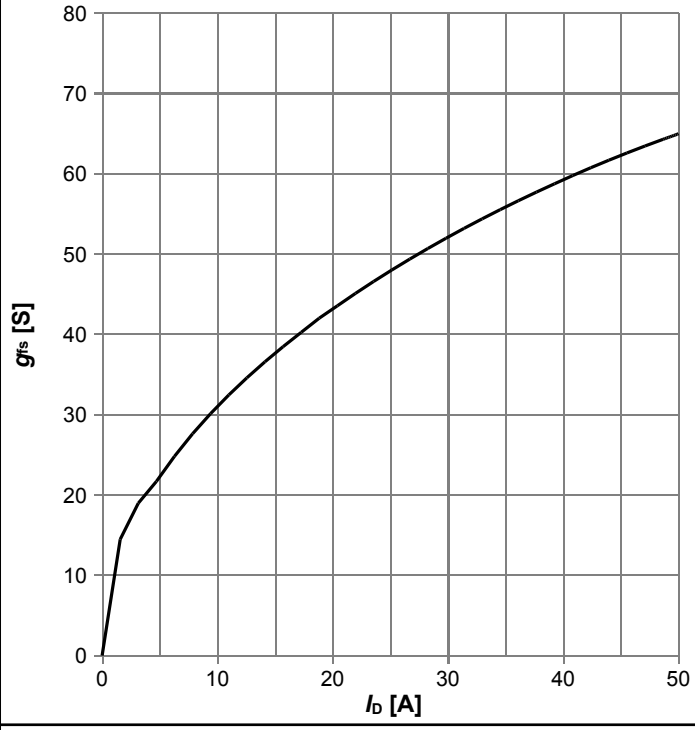
$R_{DS(on)}$=f(I_D); T_j=25 °C; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



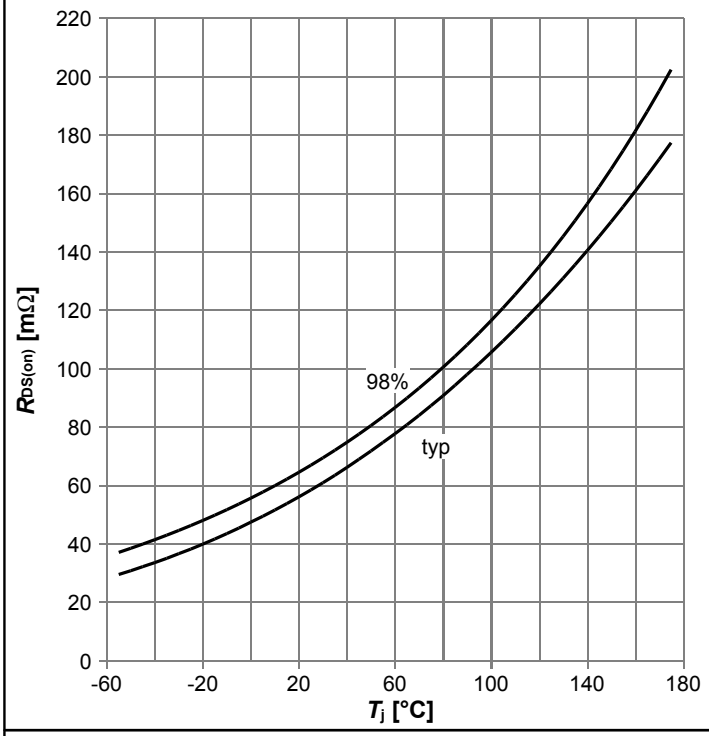
I_D=f(V_{GS}); |V_{DS}|>2|I_D|$R_{DS(on)max}$; parameter: T_j

Diagram 8: Typ. forward transconductance



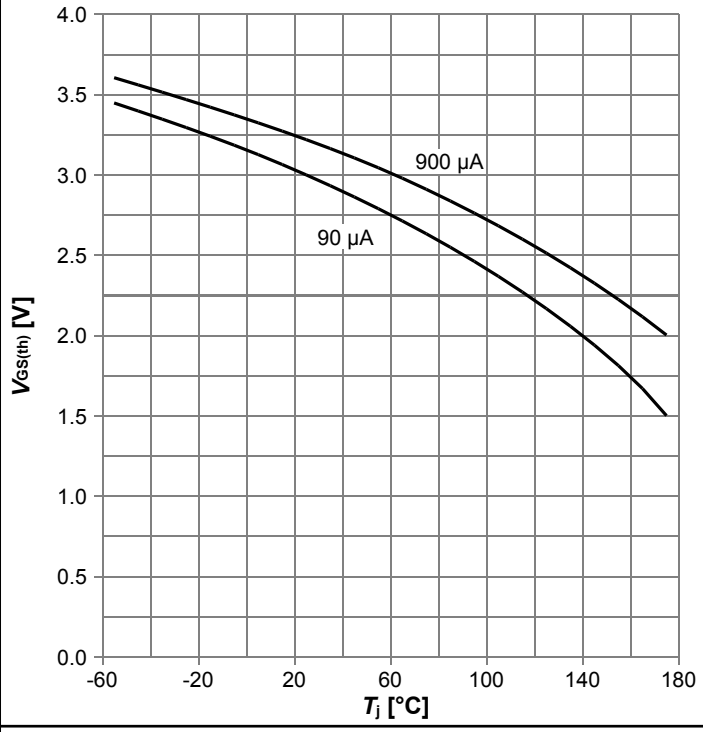
g_{fs}=f(I_D); T_j=25 °C

Diagram 9: Drain-source on-state resistance



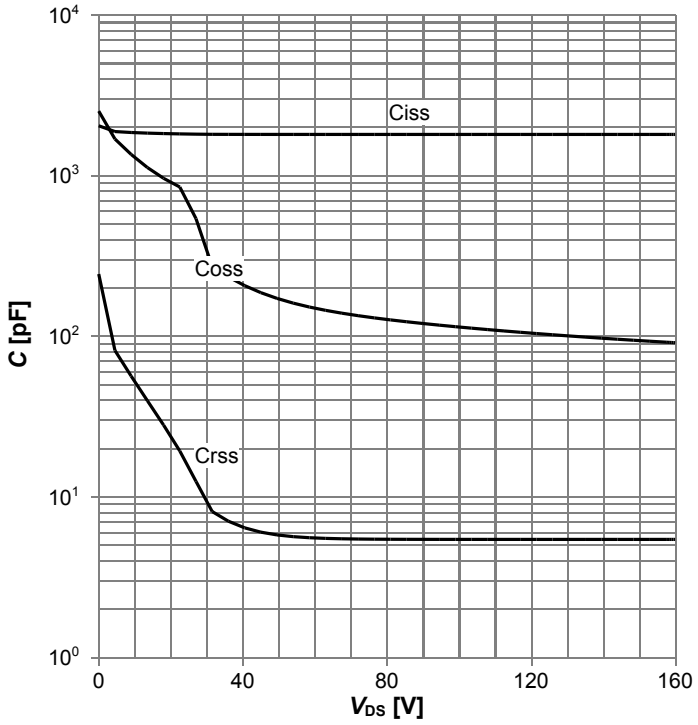
$R_{DS(on)}$=f(T_j); I_D=24 A; V_{GS}=10 V

Diagram 10: Typ. gate threshold voltage



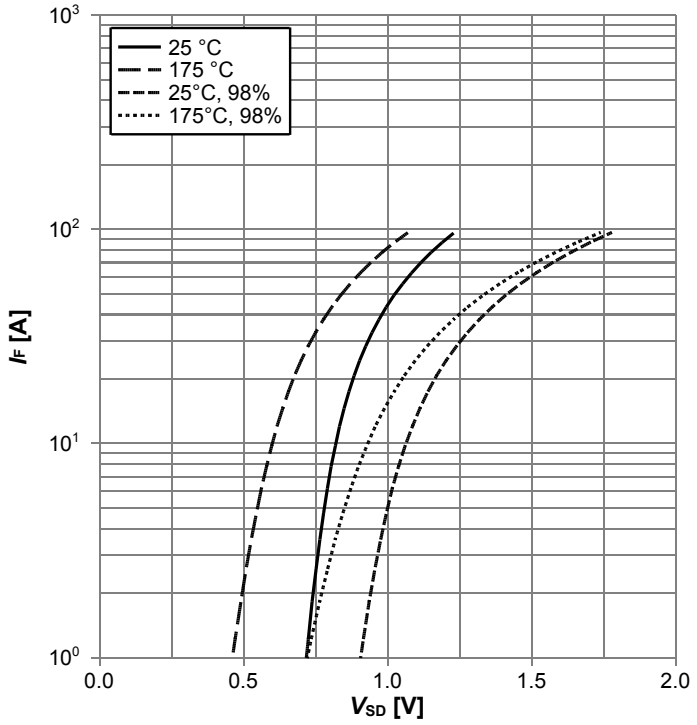
$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; parameter: I_D

Diagram 11: Typ. capacitances



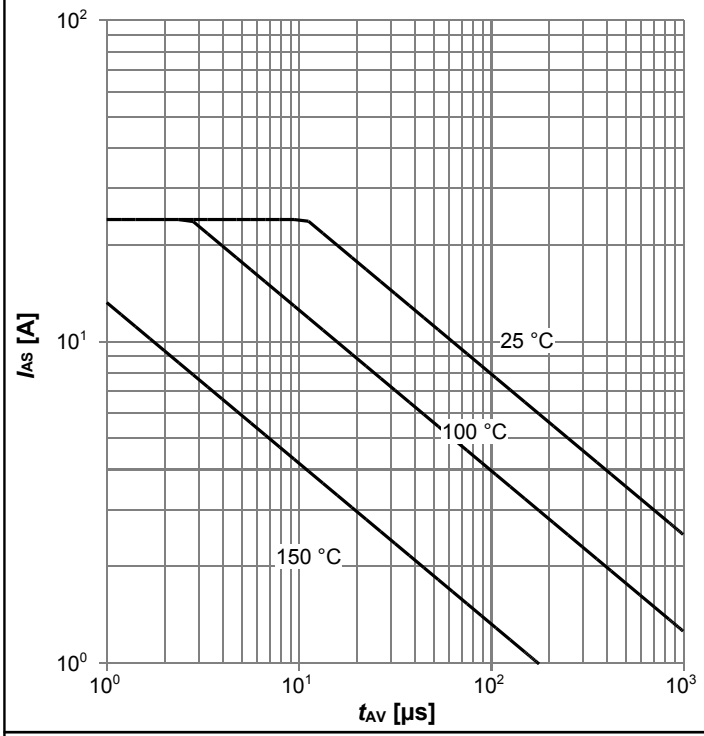
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz

Diagram 12: Forward characteristics of reverse diode



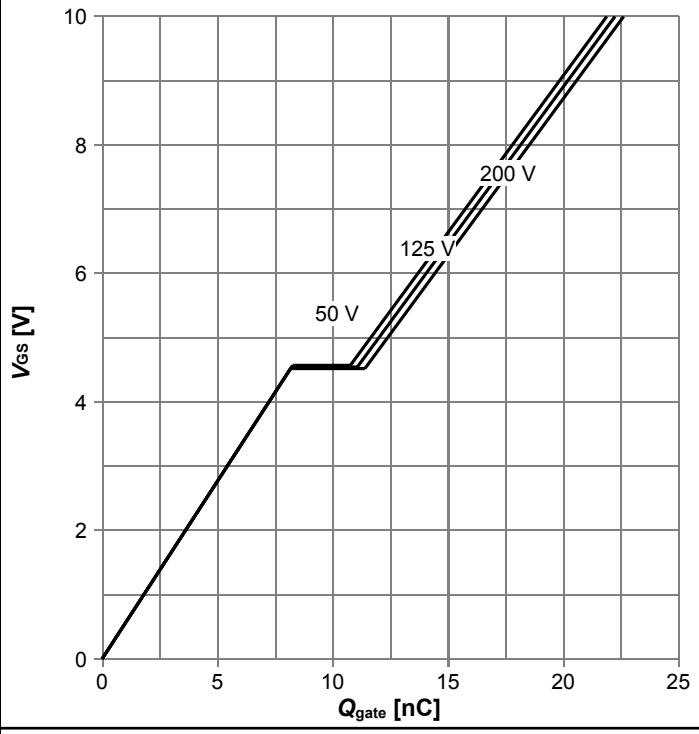
I_F=f(V_{SD}); parameter: T_j

Diagram 13: Avalanche characteristics



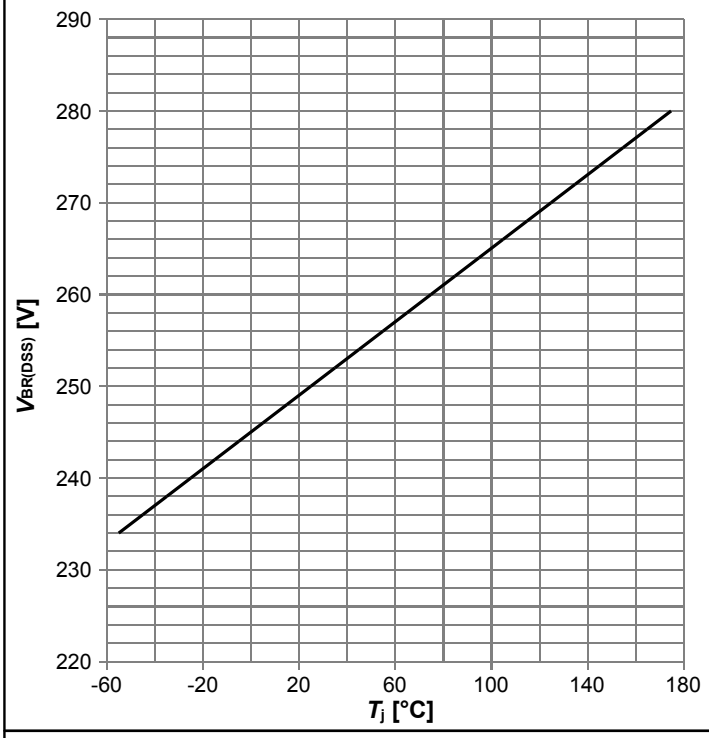
$I_{AS}=f(t_{AV})$; $R_{GS}=25\ \Omega$; parameter: $T_{j(start)}$

Diagram 14: Typ. gate charge



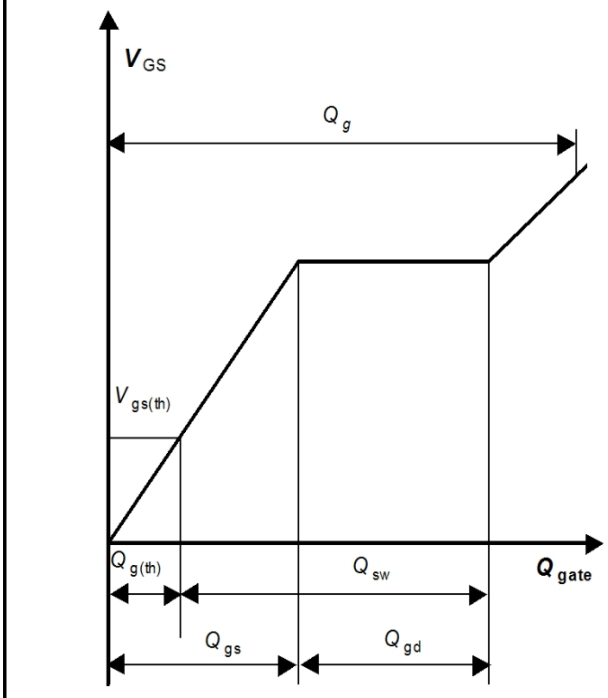
$V_{GS}=f(Q_{gate})$; $I_D=24$ A pulsed; parameter: V_{DD}

Diagram 15: Drain-source breakdown voltage

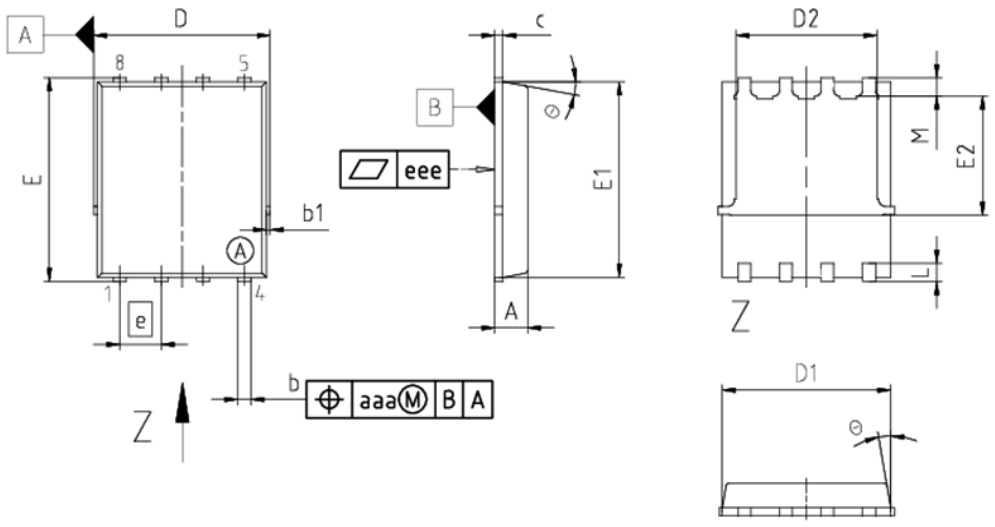


$V_{BR(DSS)}=f(T_j)$; $I_D=1$ mA

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	

DOCUMENT NO.
Z8B00003332

SCALE
0 2 0 2 4mm

EUROPEAN PROJECTION

ISSUE DATE
10-04-2013

REVISION
04

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

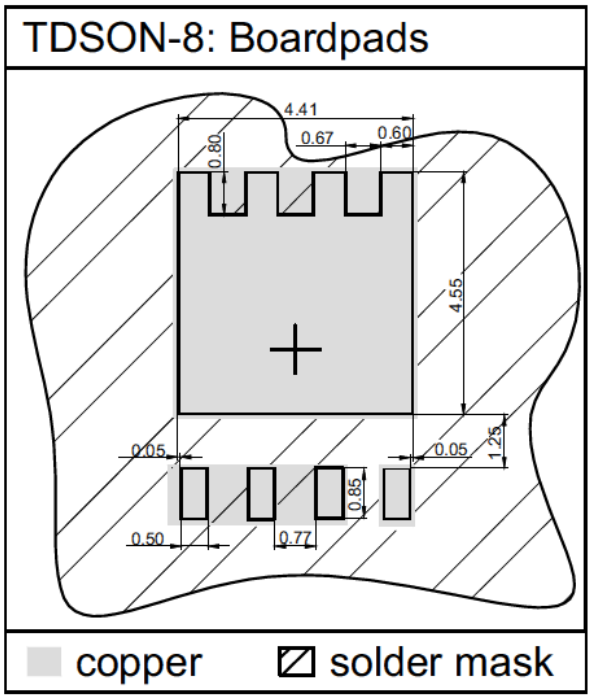


Figure 2 Outline Footprint (TDSON-8)

Revision History

BSC670N25NSFD

Revision: 2016-12-05, Rev. 2.1

Previous Revision

Revision	Date	Subjects (major changes since last revision)
1.2	2016-05-13	Rev. 1.2 (preliminary datasheet)
2.0	2016-10-25	Release of final version
2.1	2016-12-05	Update Eas

We Listen to Your Comments
Any information within this document that you feel is wrong, unclear or missing at all? Your feedback will help us to continuously improve the quality of this document. Please send your proposal (including a reference to this document) to:
erratum@infineon.com

Published by
Infineon Technologies AG
81726 München, Germany

Legal Disclaimer
The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics (“Beschaffenheitsgarantie”) .

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.
In addition, any information given in this document is subject to customer’s compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer’s products and any use of the product of Infineon Technologies in customer’s applications.
The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer’s technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

Information
For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office (**www.infineon.com**).

Warnings
Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.
The Infineon Technologies component described in this Data Sheet may be used in life-support devices or systems and/or automotive, aviation and aerospace applications or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support, automotive, aviation and aerospace device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.