MOSFET

Metal Oxide Semiconductor Field Effect Transistor

OptiMOS™

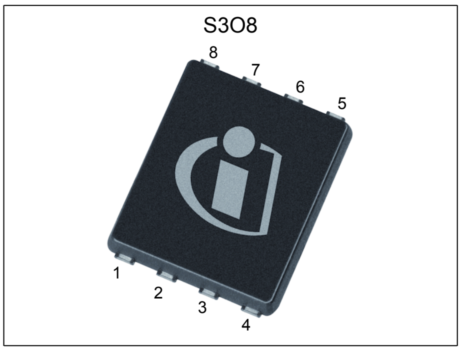
OptiMOS™3 Power-Transistor, 100 V
BSZ440N10NS3 G

Data Sheet

Rev. 2.1
Final

Power Management & Multimarket

1 Description



Features

- Very low gate charge for high frequency applications
- Optimized for dc-dc conversion
- N-channel, normal level
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Very low on-resistance $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC[1)] for target application
- Halogen-free according to IEC61249-2-21

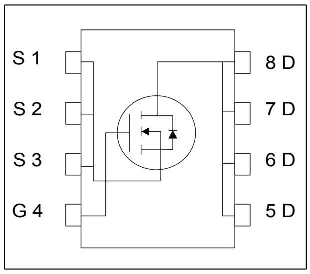


Table 1 Key Performance Parameters

Parameter	Value	Unit
V_{DS}	100	V
$R_{DS(on),max}$	44	mΩ
I_D	18	A

Type / Ordering Code	Package	Marking	Related Links
BSZ440N10NS3 G	PG-TSDSON-8	440N10N	-

1) J-STD20 and JESD22

Table of Contents

2 Maximum ratings

at T_j = 25 °C, unless otherwise specified

Table 2 Maximum ratings

at 25 °C

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current	I_D	- - -	- - -	18 11 5.3	A	T_C=25 °C T_C=100 °C T_A=25 °C, R_{thJA}=50 K/W[1)]
Pulsed drain current[2)]	$I_{D,pulse}$	-	-	72	A	T_C=25 °C
Avalanche energy, single pulse	E_{AS}	-	-	17	mJ	I_D=12 A, R_{GS}=25 Ω
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	29	W	T_C=25 °C
Operating and storage temperature	T_j, T_{stg}	-55	-	150	°C	IEC climatic category; DIN IEC 68-1: 55/150/56

3 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	4.3	K/W	-
Thermal resistance, junction - ambient, 6 cm^2 cooling area[1)]	R_{thJA}	-	-	50	K/W	-

1) 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.
2) see figure 3

4 Electrical characteristics

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	100	-	-	V	V_{GS}=0 V, I_D=1 mA
Gate threshold voltage	$V_{GS(th)}$	2	2.7	3.5	V	V_{DS}=V_{GS}, I_D=12 µA
Zero gate voltage drain current	I_{DSS}	- -	0.01 10	1 100	µA	V_{DS}=100 V, V_{GS}=0 V, T_j=25 °C V_{DS}=100 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	$R_{DS(on)}$	- -	38 48	44 86	mΩ	V_{GS}=10 V, I_D=12 A V_{GS}=6 V, I_D=6 A
Gate resistance	R_G	-	1.5	-	Ω	-
Transconductance	g_{fs}	8	15	-	S	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=12 A

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance[1]	C_{iss}	-	480	640	pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Output capacitance[1]	C_{oss}	-	87	120	pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Reverse transfer capacitance	C_{rss}	-	6	-	pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Turn-on delay time	$t_{d(on)}$	-	4.3	-	ns	V_{DD}=50 V, V_{GS}=10 V, I_D=6 A, R_G=1.6 Ω
Rise time	t_r	-	1.8	-	ns	V_{DD}=50 V, V_{GS}=10 V, I_D=6 A, R_G=1.6 Ω
Turn-off delay time	$t_{d(off)}$	-	9.1	-	ns	V_{DD}=50 V, V_{GS}=10 V, I_D=6 A, R_G=1.6 Ω
Fall time	t_f	-	2.0	-	ns	V_{DD}=50 V, V_{GS}=10 V, I_D=6 A, R_G=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}	-	2.2	-	nC	V_{DD}=50 V, I_D=6 A, V_{GS}=0 to 10 V
Gate to drain charge	Q_{gd}	-	1.3	-	nC	V_{DD}=50 V, I_D=6 A, V_{GS}=0 to 10 V
Switching charge	Q_{sw}	-	2.0	-	nC	V_{DD}=50 V, I_D=6 A, V_{GS}=0 to 10 V
Gate charge total[1]	Q_g	-	6.8	9.1	nC	V_{DD}=50 V, I_D=6 A, V_{GS}=0 to 10 V
Gate plateau voltage	$V_{plateau}$	-	4.5	-	V	V_{DD}=50 V, I_D=6 A, V_{GS}=0 to 10 V
Output charge[1]	Q_{oss}	-	9.0	12	nC	V_{DD}=50 V, V_{GS}=0 V

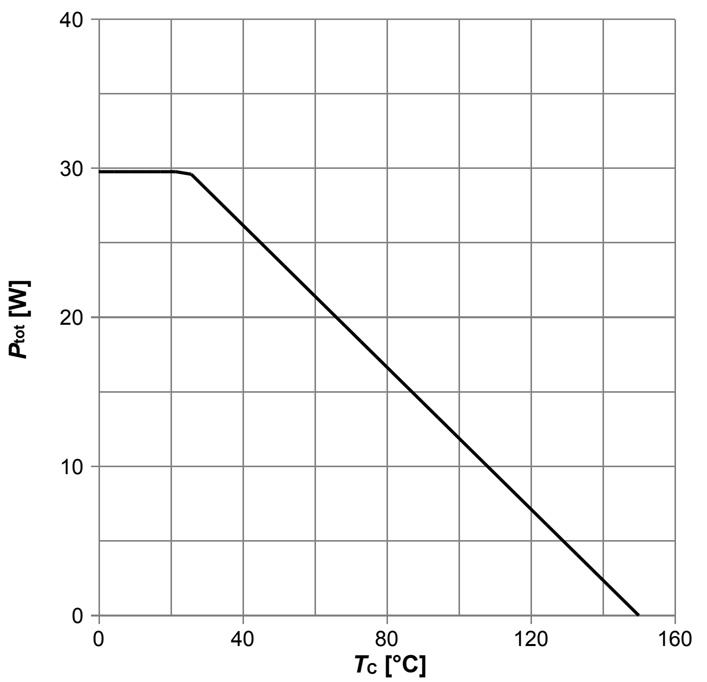
[1] Defined by design. Not subject to production test.
[2] See "Gate charge waveforms" for parameter definition

Table 7 Reverse diode

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continous forward current	I_S	-	-	18	A	T_C=25 °C
Diode pulse current	$I_{S,pulse}$	-	-	72	A	T_C=25 °C
Diode forward voltage	V_{SD}	-	1	1.2	V	V_{GS}=0 V, I_F=18 A, T_j=25 °C
Reverse recovery time	t_{rr}	-	44	-	ns	V_R=50 V, I_F=6 A, di_F/dt=100 A/µs
Reverse recovery charge	Q_{rr}	-	61	-	nC	V_R=50 V, I_F=6 A, di_F/dt=100 A/µs

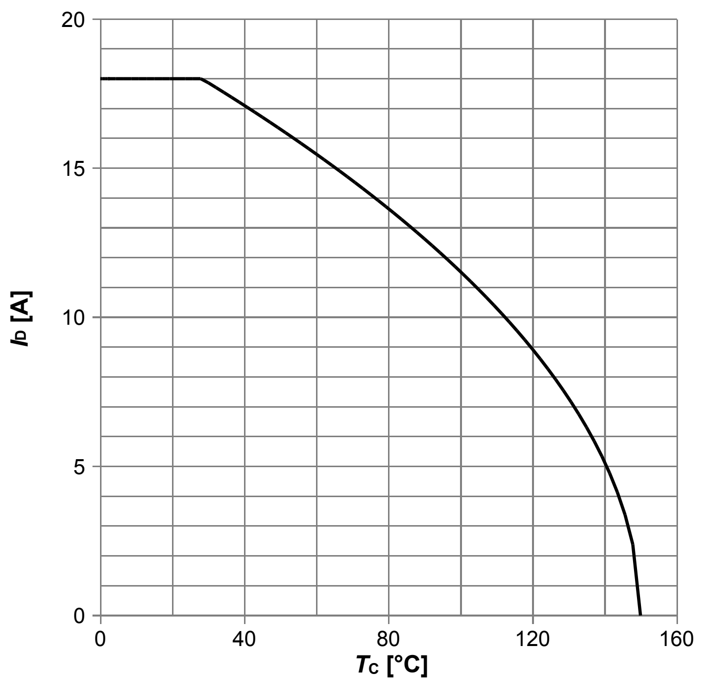
5 Electrical characteristics diagrams

Diagram 1: Power dissipation



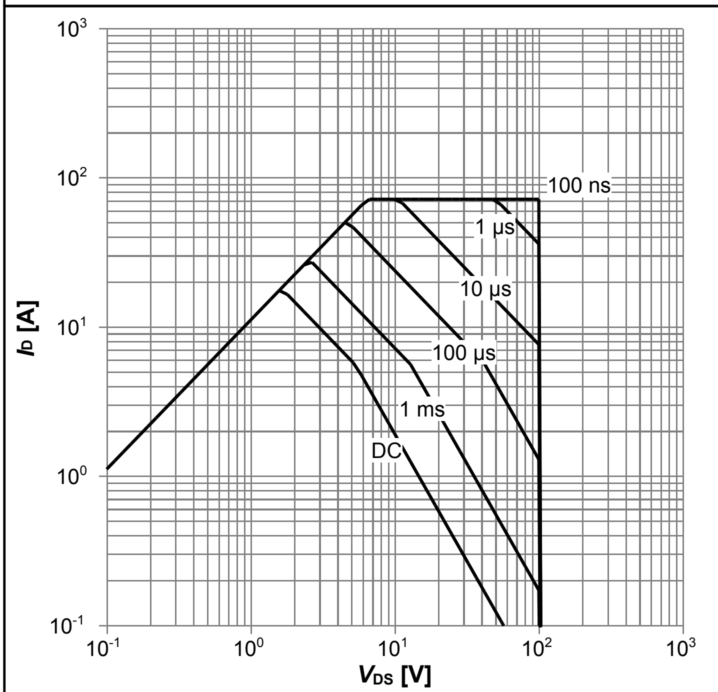
P_{tot}=f(T_C)

Diagram 2: Drain current



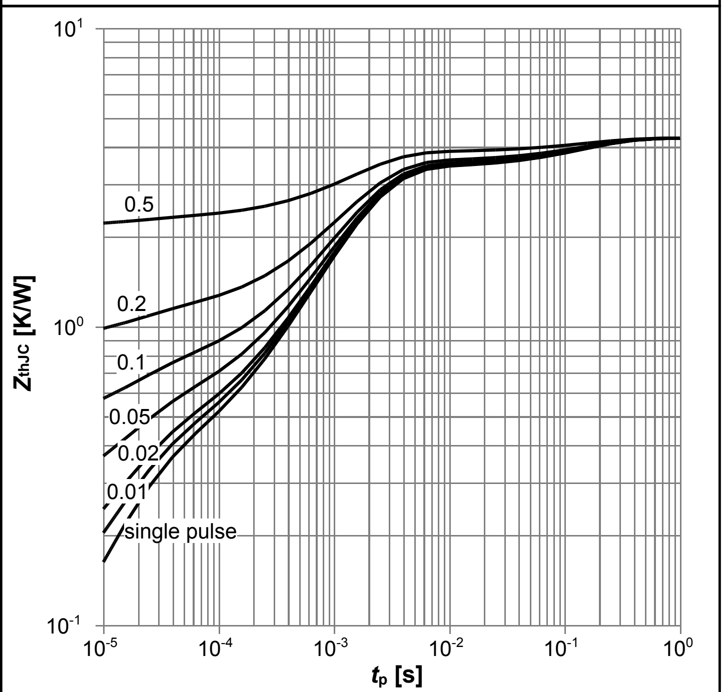
I_D=f(T_C); V_{GS}≥10 V

Diagram 3: Safe operating area



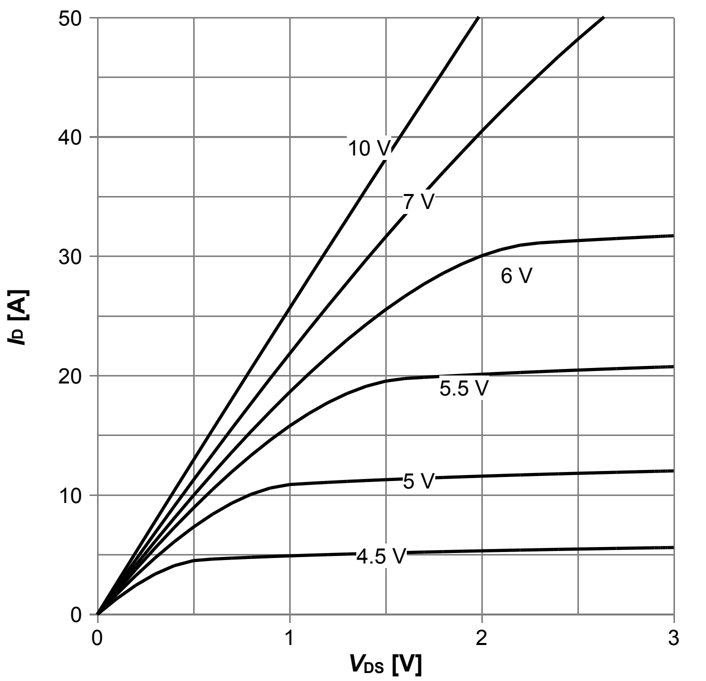
I_D=f(V_{DS}); T_C=25 °C; D=0; parameter: t_p

Diagram 4: Max. transient thermal impedance



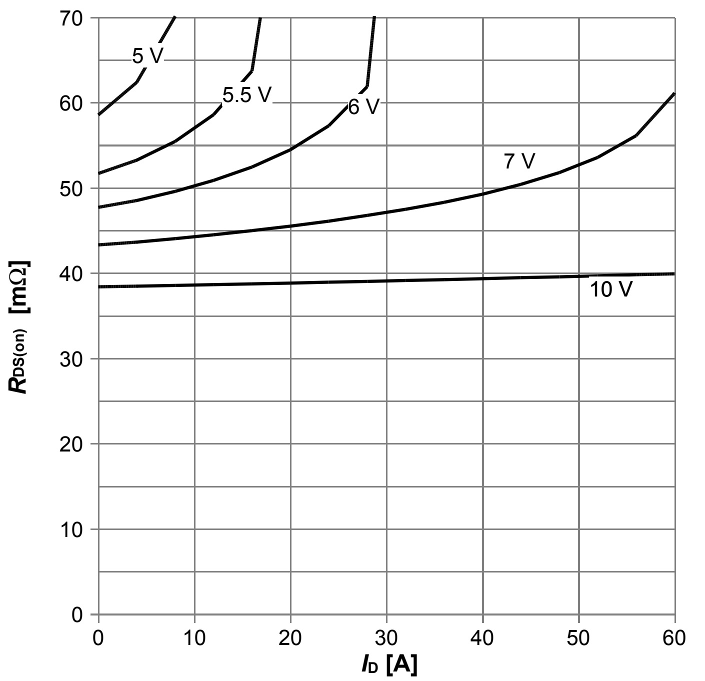
Z_{thJC}=f(t_p); parameter: D=t_p/T

Diagram 5: Typ. output characteristics



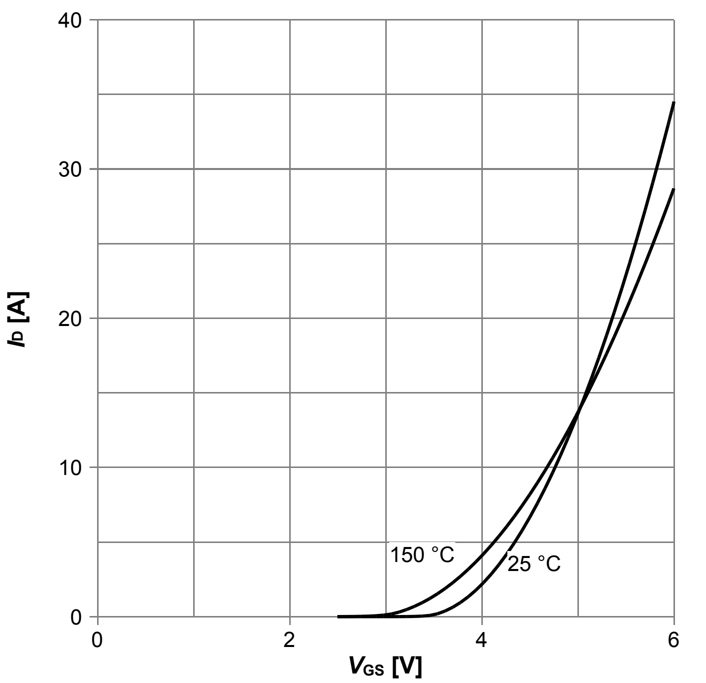
I_D=f(V_{DS}); T_j=25 °C; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



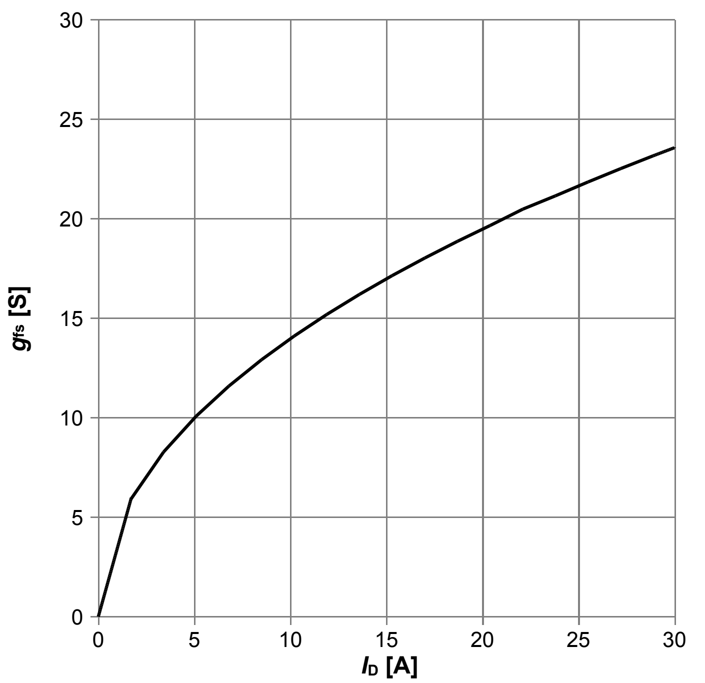
$R_{DS(on)}$=f(I_D); T_j=25 °C; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



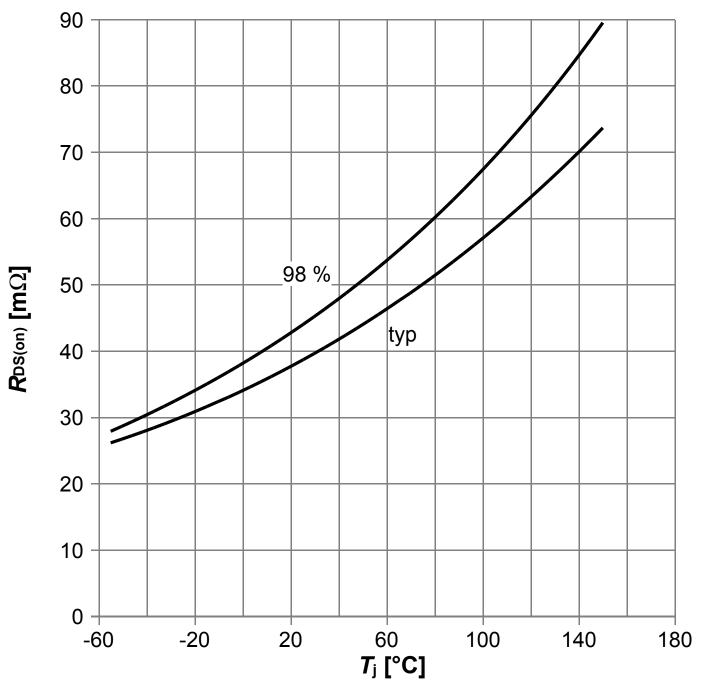
I_D=f(V_{GS}); |V_{DS}|>2|I_D|$R_{DS(on)max}$; parameter: T_j

Diagram 8: Typ. forward transconductance



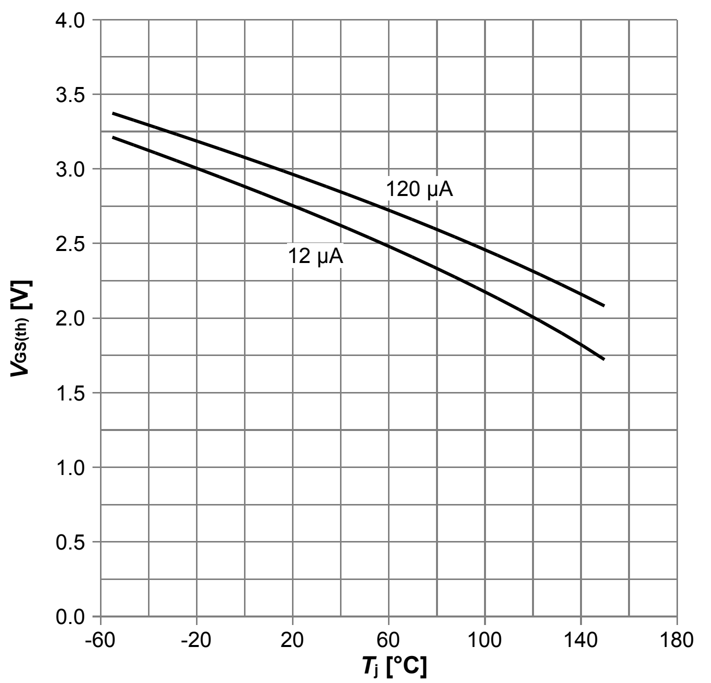
g_{fs}=f(I_D); T_j=25 °C

Diagram 9: Drain-source on-state resistance



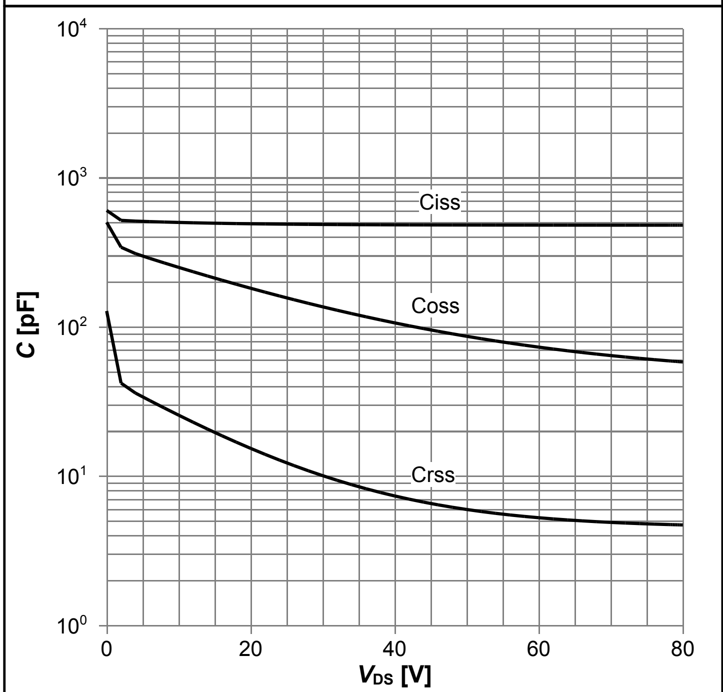
$R_{DS(on)}$=f(T_j); I_D=12 A; V_{GS}=10 V

Diagram 10: Typ. gate threshold voltage



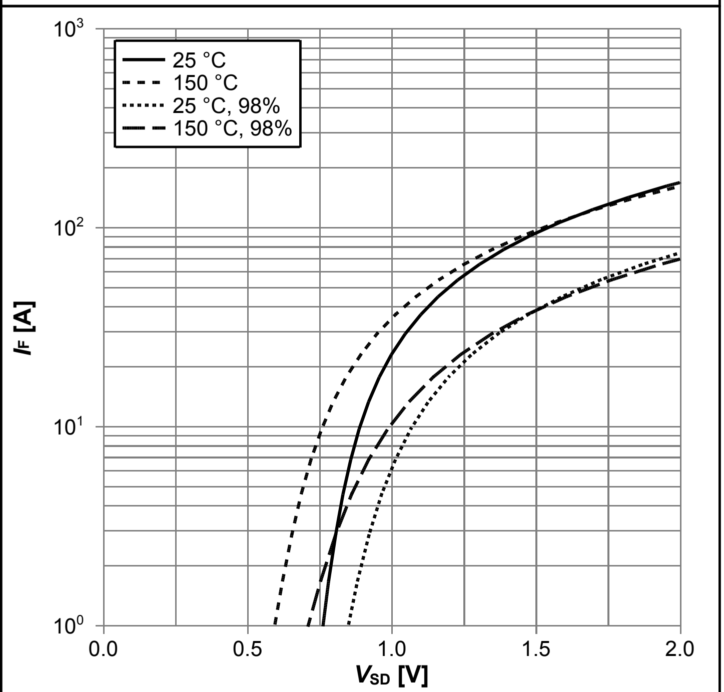
$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; parameter: I_D

Diagram 11: Typ. capacitances



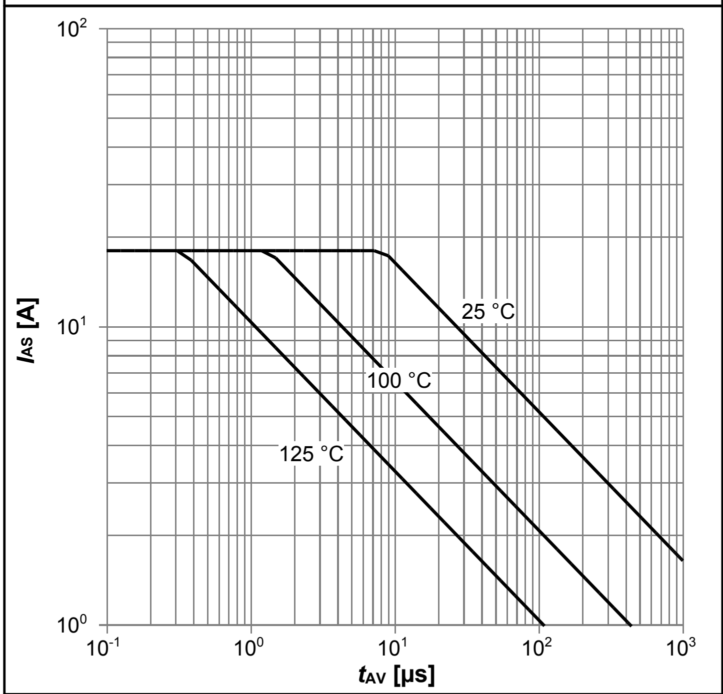
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz

Diagram 12: Forward characteristics of reverse diode



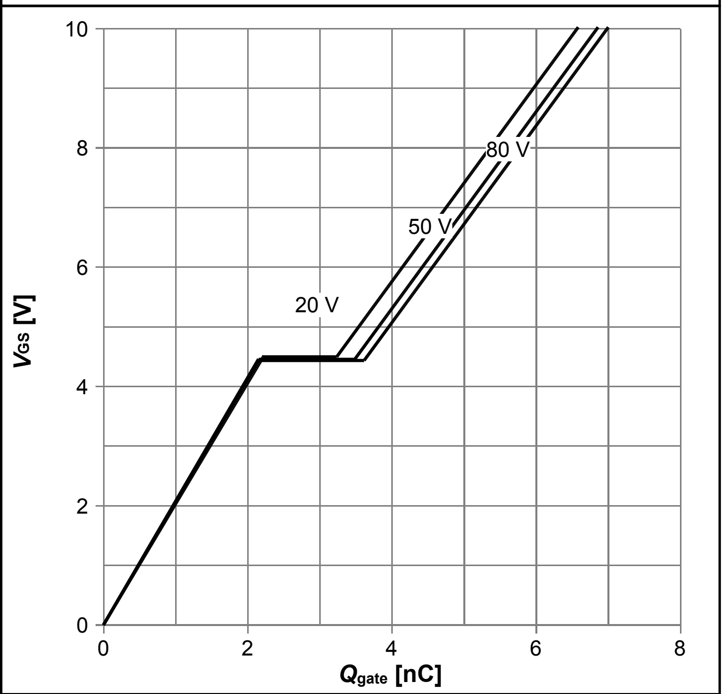
I_F=f(V_{SD}); parameter: T_j

Diagram 13: Avalanche characteristics



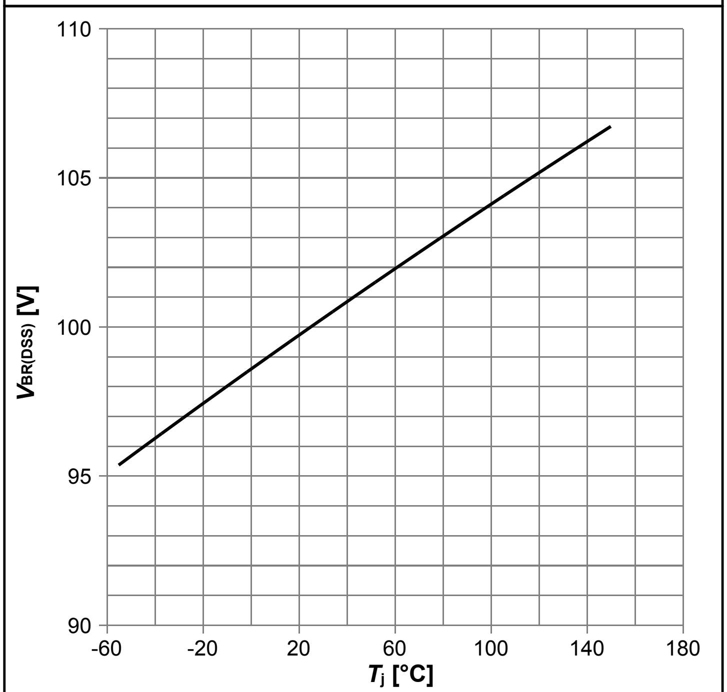
I_{AS}=f(t_{AV}); R_{GS}=25 Ω; parameter: $T_{j(start)}$

Diagram 14: Typ. gate charge



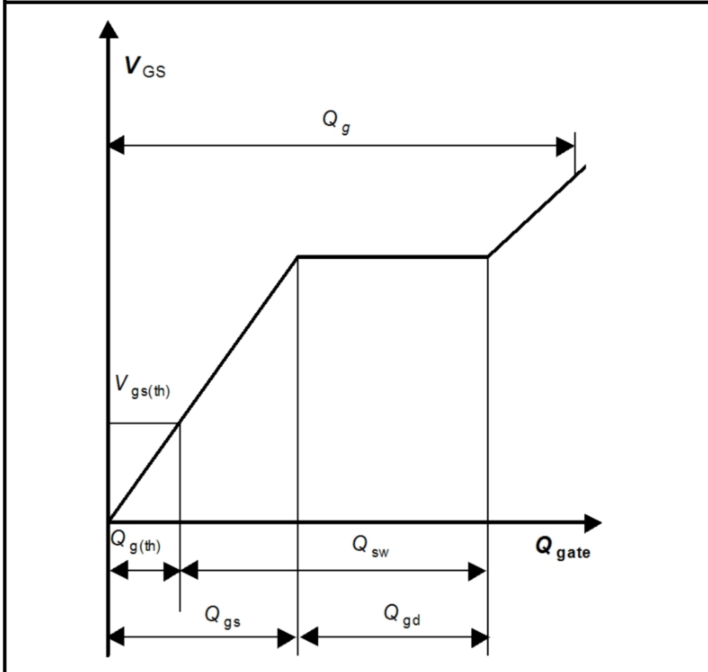
V_{GS}=f(Q_{gate}); I_D=6 A pulsed; parameter: V_{DD}

Diagram 15: Drain-source breakdown voltage

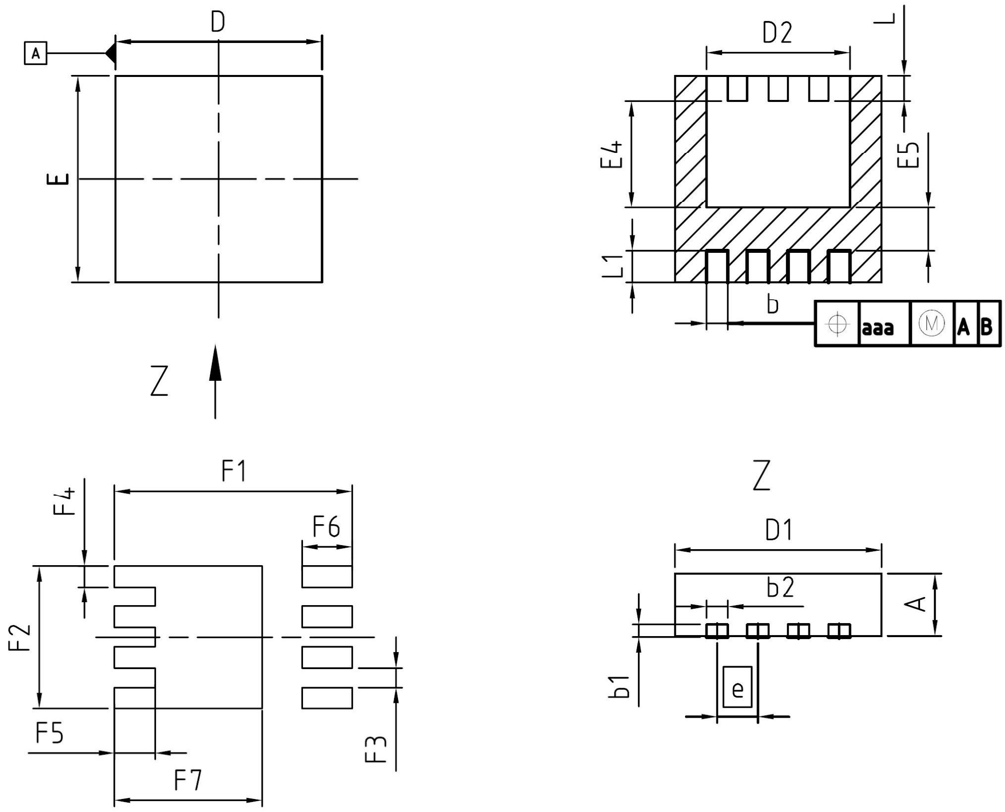


$V_{BR(DSS)}$=f(T_j); I_D=1 mA

Gate charge waveforms



6 Package Outlines



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.10	0.035	0.043
b	0.24	0.44	0.009	0.017
b1	0.10	0.30	0.004	0.012
b2	0.20	0.44	0.008	0.017
D=D1	3.20	3.40	0.126	0.134
D2	2.15	2.45	0.085	0.096
E	3.20	3.40	0.126	0.134
E4	1.60	1.81	0.063	0.071
E5	0.59	0.86	0.023	0.034
e	0.65		0.026	
N	8		8	
L	0.30	0.56	0.012	0.022
L1	0.33	0.60	0.013	0.024
aaa	0.25		0.010	
F1	3.80		0.150	
F2	2.29		0.090	
F3	0.31		0.012	
F4	0.34		0.013	
F5	0.65		0.026	
F6	0.80		0.031	
F7	2.36		0.093	

DOCUMENT NO.
Z8B00131645

SCALE 0 2.5 5mm

EUROPEAN PROJECTION

ISSUE DATE
17-09-2008

REVISION
02

Figure 1 Outline PG-TSDSON-8, dimensions in mm/inches

Revision History

BSZ440N10NS3 G

Revision: 2015-02-06, Rev. 2.1

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.1	2015-02-06	Insert pin numbered package drawing and trr and Qrr values

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Published by
Infineon Technologies AG
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