OptiMOS™ Power-MOSFET

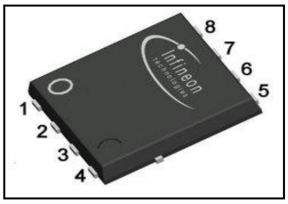
Product Summary

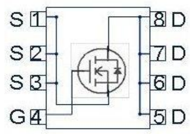
V_{DS}	25	V
$R_{DS(on),max}$	5.0	mΩ
I_D	58	A
Q_{GD}	1.3	nC
Q_G(0V..10V)	10.4	nC

Features

- Optimized for high performance Buck converter
- Very low on-resistance $R_{DS(on)}$ @ V_{GS}=4.5 V
- 100% avalanche tested
- Superior thermal resistance
- N-channel
- Qualified according to JEDEC[1)] for target applications
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21

PG-TDSON-8





Type	Package	Marking
BSC050NE2LS	PG-TDSON-8	050NE2LS

Maximum ratings, at T_j=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	V_{GS}=10 V, T_C=25 °C	58	A
		V_{GS}=10 V, T_C=100 °C	37	
		V_{GS}=4.5 V, T_C=25 °C	49	
		V_{GS}=4.5 V, T_C=100 °C	31	
		V_{GS}=10 V, T_A=25 °C, R_{thJA}=50 K/W[2)]	39	
Pulsed drain current[3)]	$I_{D,pulse}$	T_C=25 °C	232	
Avalanche current, single pulse[4)]	I_{AS}	T_C=25 °C	35	
Avalanche energy, single pulse	E_{AS}	I_D=35 A, R_{GS}=25 Ω	12	mJ
Gate source voltage	V_{GS}		±20	V

[1)] J-STD20 and JESD22

Maximum ratings, at T_j=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Power dissipation	P_{tot}	T_C=25 °C	28	W
		T_A=25 °C, R_{thJA}=50 K/W[2)]	2.5	
Operating and storage temperature	T_j, T_{stg}		-55 ... 150	°C
IEC climatic category; DIN IEC 68-1			55/150/56	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics						
Thermal resistance, junction - case	R_{thJC}		-	-	4.5	K/W
		top	-	-	20	
Device on PCB	R_{thJA}	6 cm^2 cooling area[2)]	-	-	50	

Electrical characteristics, at T_j=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	min.	typ.	max.	Unit
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0 V, I_D=1 mA	25	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250 µA	1.2	-	2	
Zero gate voltage drain current	I_{DSS}	V_{DS}=25 V, V_{GS}=0 V, T_j=25 °C	-	0.1	1	µA
		V_{DS}=25 V, V_{GS}=0 V, T_j=125 °C	-	10	100	
Gate-source leakage current	I_{GSS}	V_{GS}=20 V, V_{DS}=0 V	-	10	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=4.5 V, I_D=30 A	-	5.7	7.1	mΩ
		V_{GS}=10 V, I_D=30 A	-	4.2	5.0	
Gate resistance	R_G		0.3	0.65	1.3	Ω
Transconductance	g_{fs}	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=30 A	38	75	-	S

[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 figure 3 for more detailed information

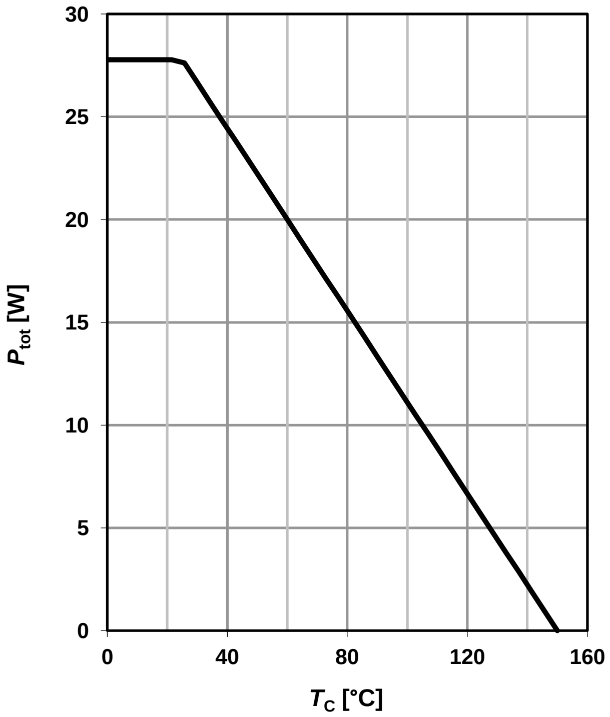
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics						
Input capacitance	C_{iss}	V_{GS}=0 V, V_{DS}=12 V, f=1 MHz	-	760	1011	pF
Output capacitance	C_{oss}		-	320	426	
Reverse transfer capacitance	C_{rss}		-	35	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=12 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$=1.6 Ω	-	2.5	-	ns
Rise time	t_r		-	2.2	-	
Turn-off delay time	$t_{d(off)}$		-	11.4	-	
Fall time	t_f		-	2.0	-	
Gate Charge Characteristics[5)]						
Gate to source charge	Q_{gs}	V_{DD}=12 V, I_D=30 A, V_{GS}=0 to 4.5 V	-	2.2	3	nC
Gate charge at threshold	$Q_{g(th)}$		-	1.2	-	
Gate to drain charge	Q_{gd}		-	1.3	2.0	
Switching charge	Q_{sw}		-	2.2	-	
Gate charge total	Q_g		-	5.0	7	
Gate plateau voltage	$V_{plateau}$		-	2.8	-	V
Gate charge total	Q_g	V_{DD}=12 V, I_D=30 A, V_{GS}=0 to 10 V	-	10.4	14	nC
Gate charge total, sync. FET	$Q_{g(sync)}$	V_{DS}=0.1 V, V_{GS}=0 to 4.5 V	-	4.3	-	
Output charge	Q_{oss}	V_{DD}=12 V, V_{GS}=0 V	-	6.4	8.5	
Reverse Diode						
Diode continuous forward current	I_S	T_C=25 °C	-	-	28	A
Diode pulse current	$I_{S,pulse}$		-	-	112	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=30 A, T_j=25 °C	-	0.89	1	V
Reverse recovery charge	Q_{rr}	V_R=15 V, I_F=I_S, di_F/dt=400 A/µs	-	5	-	nC

4) See figure 13 for more detailed information

5) See figure 16 for gate charge parameter definition

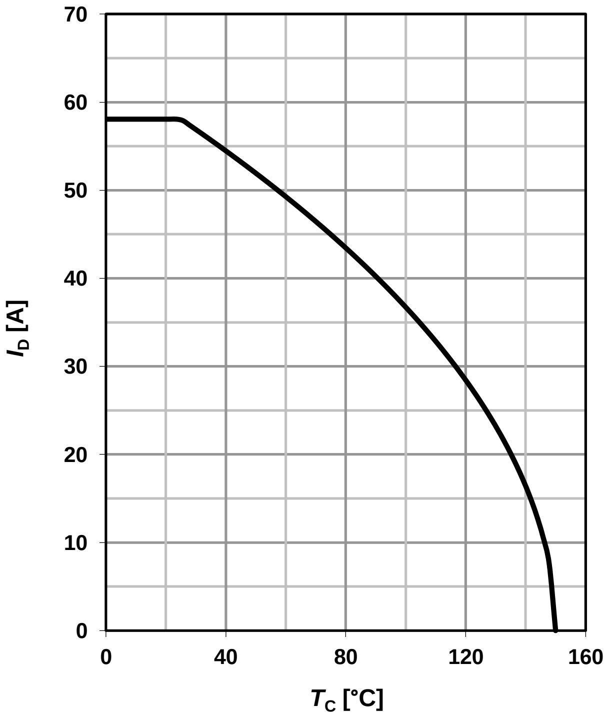
1 Power dissipation

P_{tot}=f(T_C)



2 Drain current

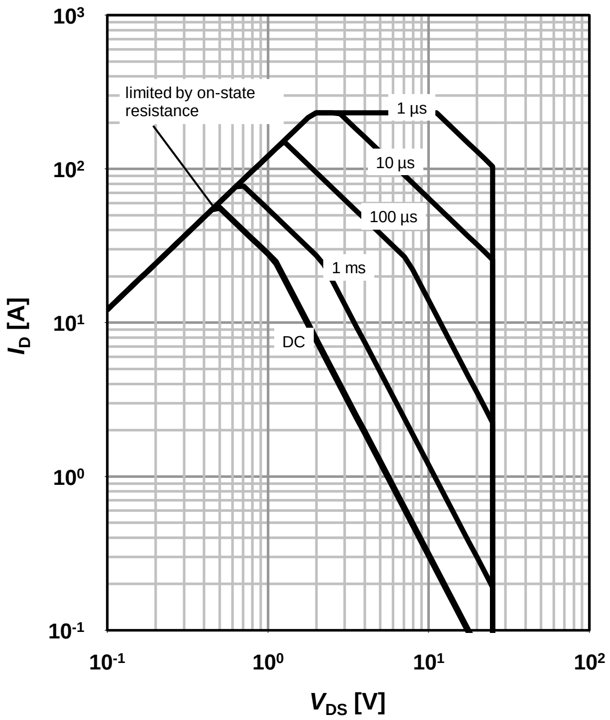
I_D=f(T_C); V_{GS}≥10 V



3 Safe operating area

I_D=f(V_{DS}); T_C=25 °C; D=0

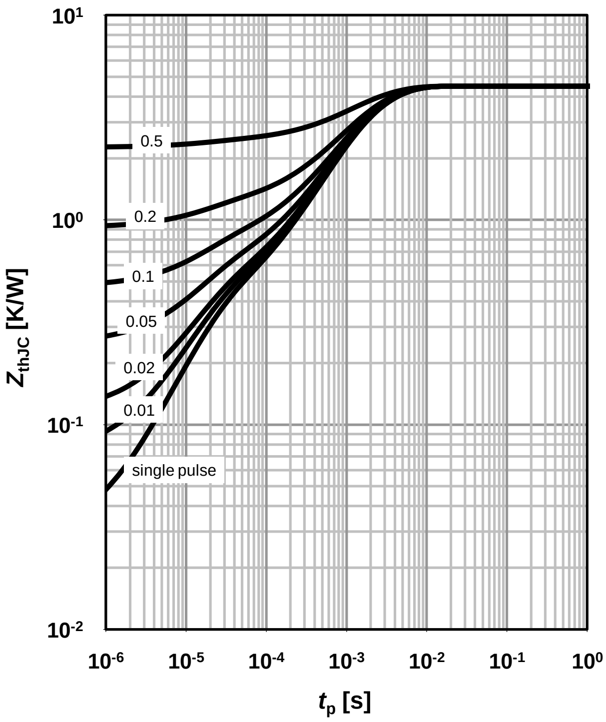
parameter: t_p



4 Max. transient thermal impedance

Z_{thJC}=f(t_p)

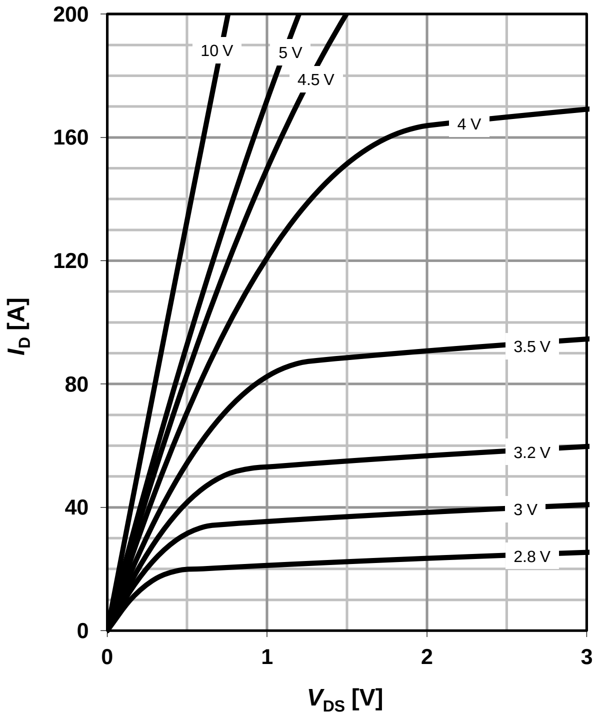
parameter: D=t_p/T



5 Typ. output characteristics

I_D=f(V_{DS}); T_j=25 °C

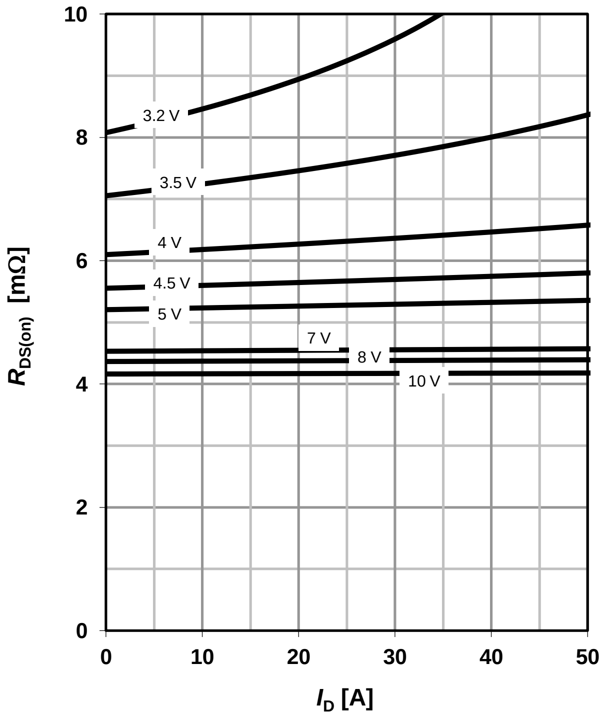
parameter: V_{GS}



6 Typ. drain-source on resistance

$R_{DS(on)}$=f(I_D); T_j=25 °C

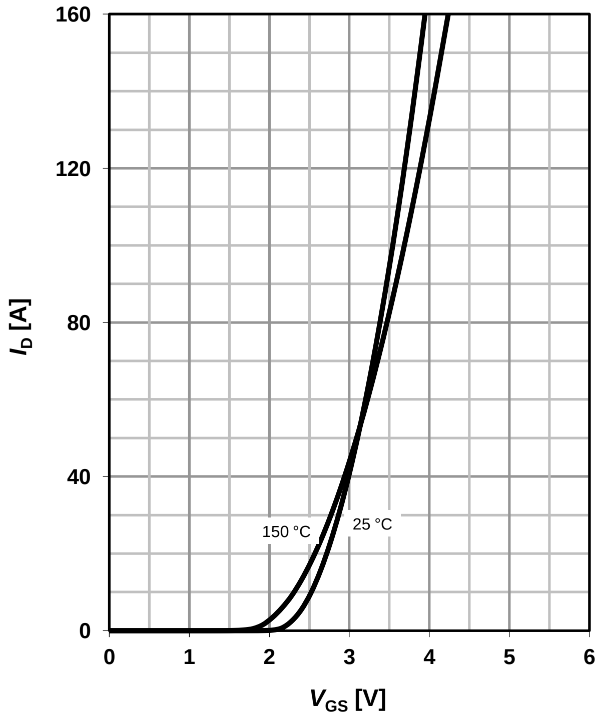
parameter: V_{GS}



7 Typ. transfer characteristics

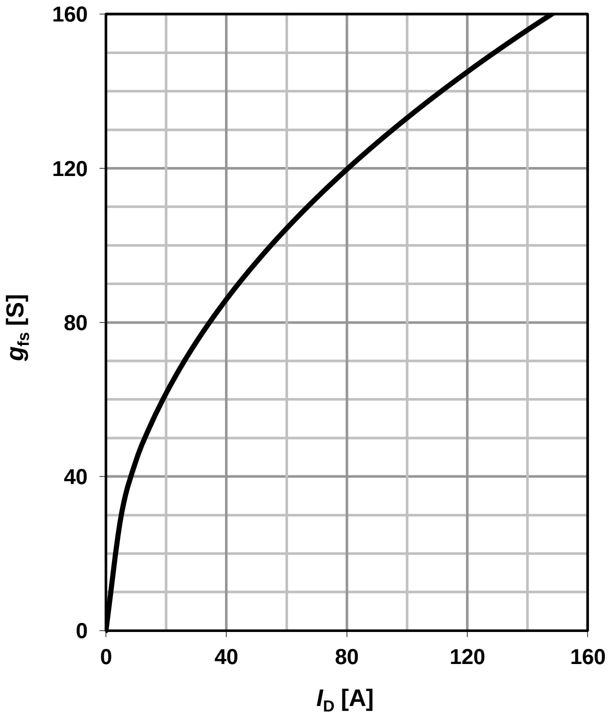
I_D=f(V_{GS}); $|V_{DS}|$>2$|I_D|R_{DS(on)max}$

parameter: T_j



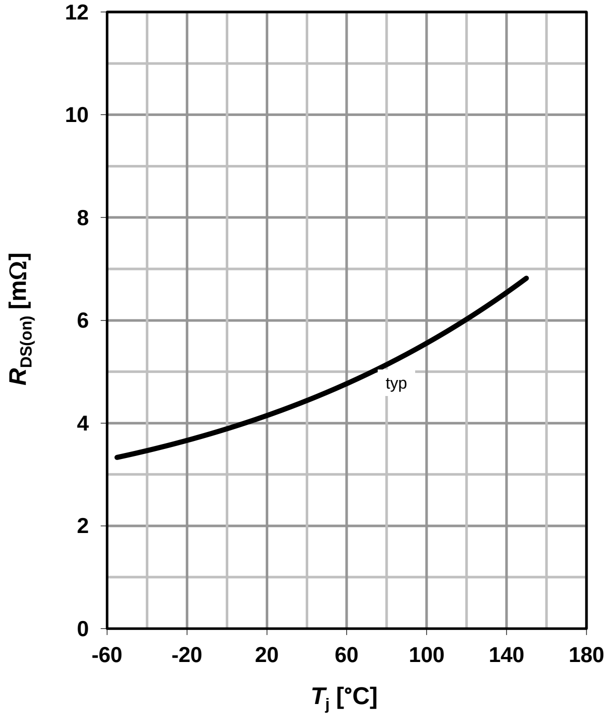
8 Typ. forward transconductance

g_{fs}=f(I_D); T_j=25 °C



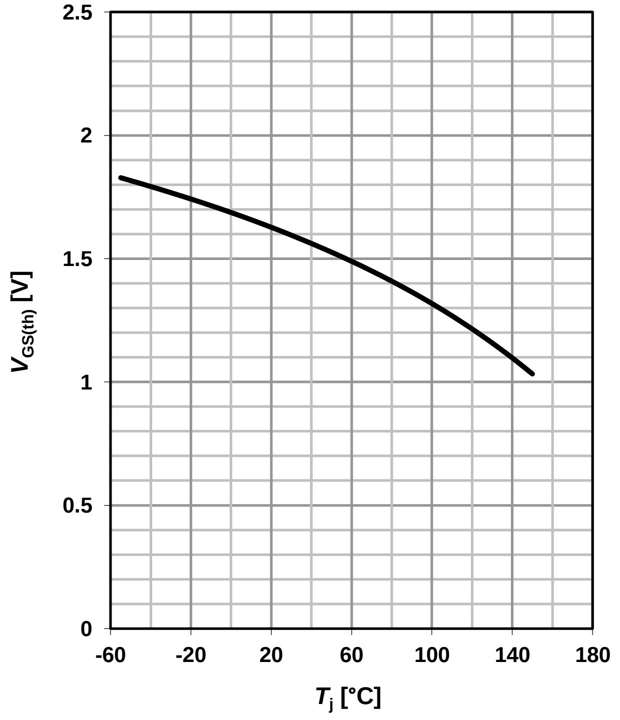
9 Drain-source on-state resistance

$R_{DS(on)}=f(T_j)$; $I_D=30$ A; $V_{GS}=10$ V



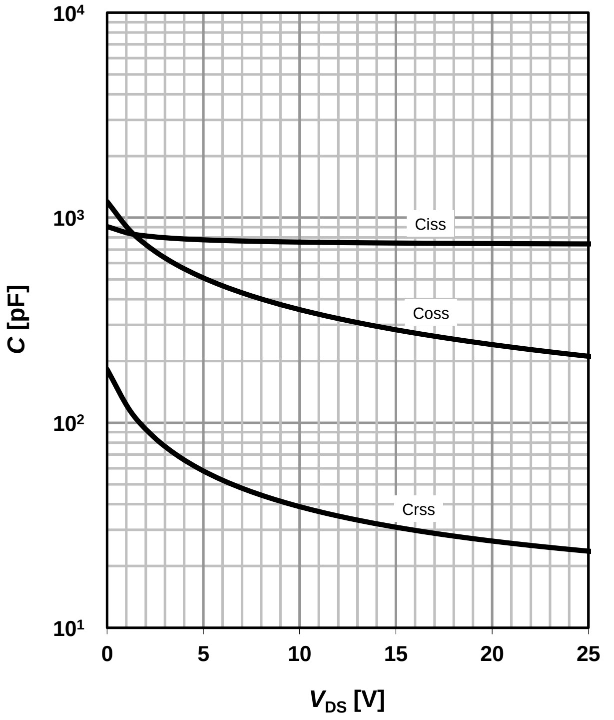
10 Typ. gate threshold voltage

$V_{GS(th)}=f(T_j)$; $V_{GS}=V_{DS}$; $I_D=250$ µA



11 Typ. capacitances

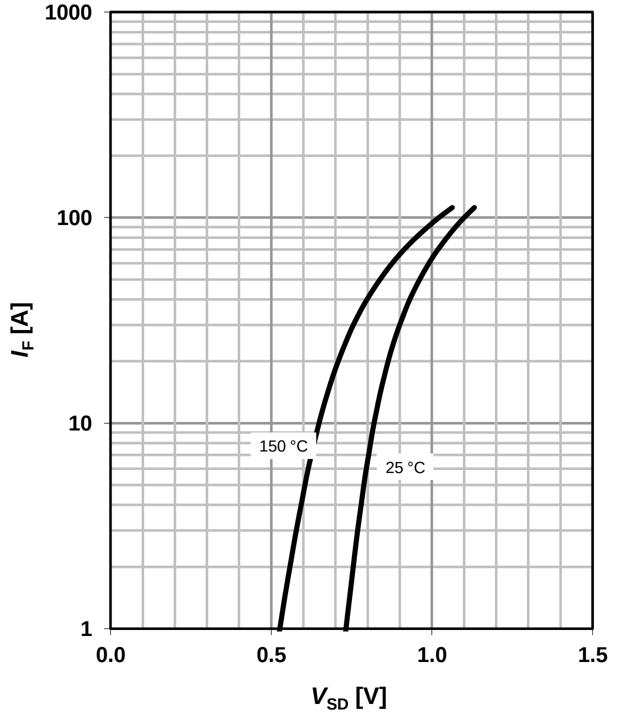
$C=f(V_{DS})$; $V_{GS}=0$ V; $f=1$ MHz



12 Forward characteristics of reverse diode

$I_F=f(V_{SD})$

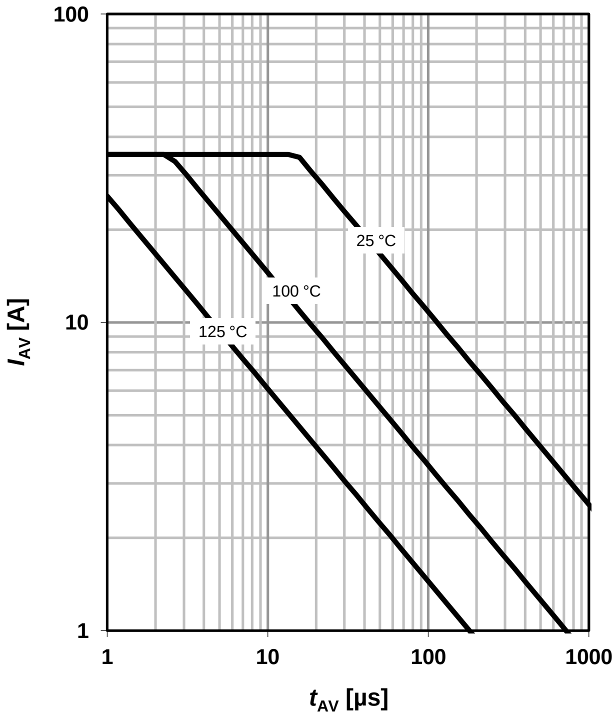
parameter: T_j



13 Avalanche characteristics

I_{AS}=f(t_{AV}); R_{GS}=25 Ω

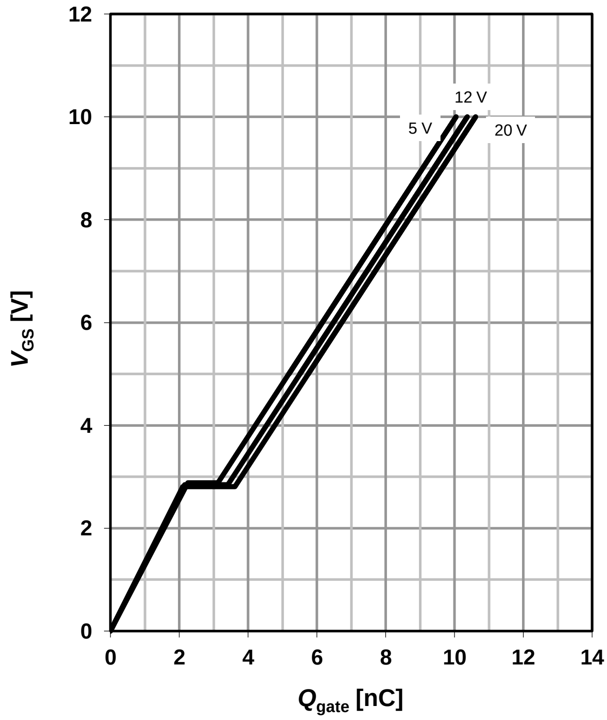
parameter: $T_{j(start)}$



14 Typ. gate charge

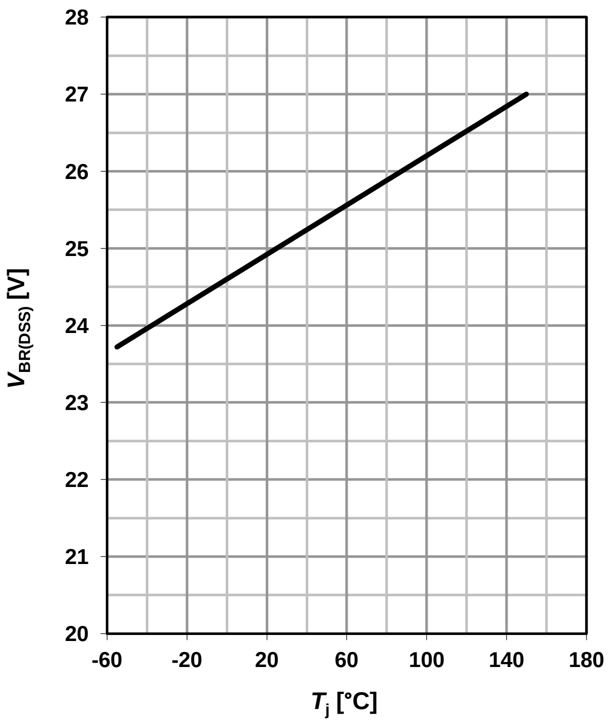
V_{GS}=f(Q_{gate}); I_D=30 A pulsed

parameter: V_{DD}

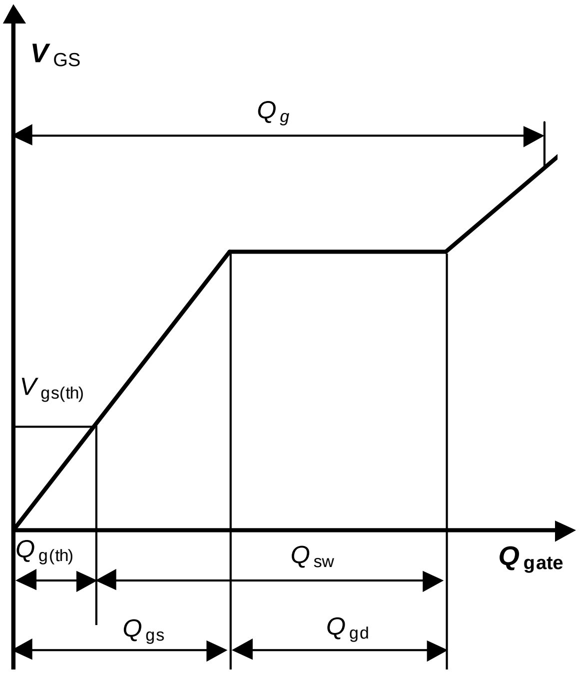


15 Drain-source breakdown voltage

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

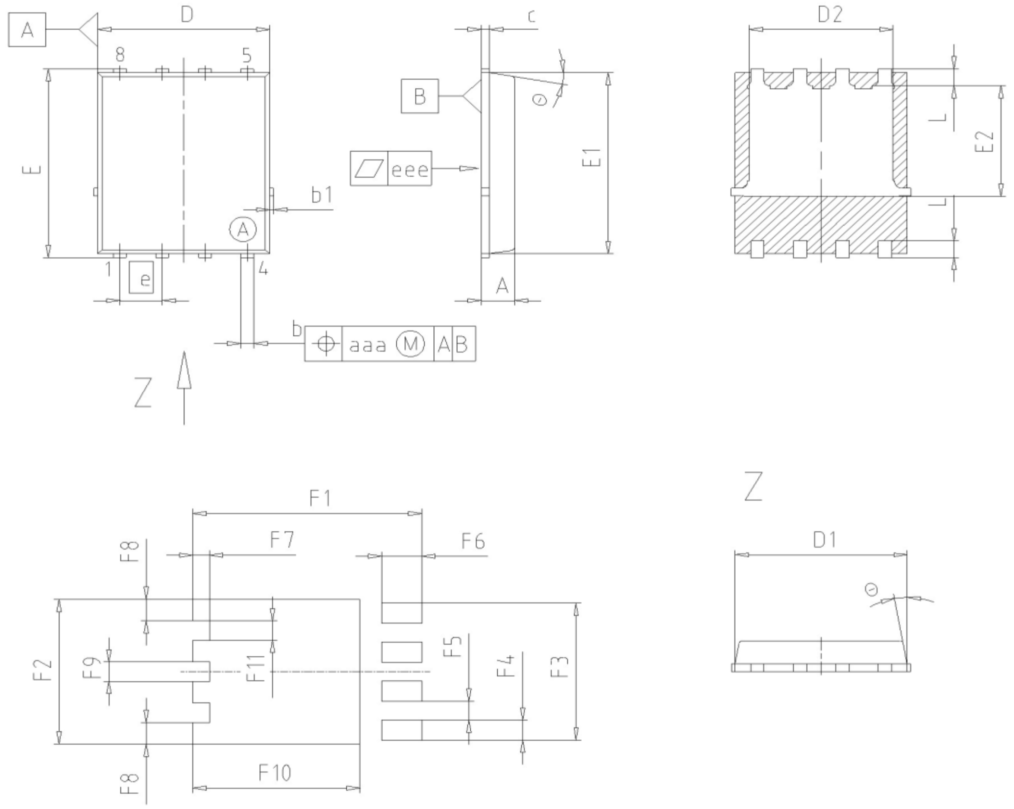


16 Gate charge waveforms



Package Outline **PG-TDSON-8**

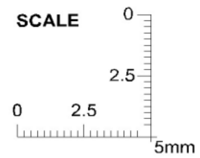
PG-TDSON-8: Outline



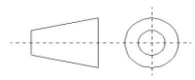
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.10	0.035	0.043
b	0.34	0.54	0.013	0.021
b1	0.02	0.22	0.001	0.008
c	0.15	0.35	0.006	0.014
D=D1	4.95	5.35	0.195	0.211
D2	4.20	4.40	0.165	0.173
E	5.95	6.35	0.234	0.250
E1	5.70	6.10	0.224	0.240
E2	3.40	3.80	0.134	0.150
e	1.27		0.050	
N	8		8	
L	0.45	0.65	0.018	0.026
□	8.5°	11.5°	8.5°	11.5°
aaa	0.25		0.010	
eee	0.05		0.002	
F1	6.75	6.95	0.266	0.274
F2	4.60	4.80	0.181	0.189
F3	4.36	4.56	0.172	0.180
F4	0.55	0.75	0.022	0.030
F5	0.52	0.72	0.020	0.028
F6	1.10	1.30	0.043	0.051
F7	0.40	0.60	0.016	0.024
F8	0.60	0.80	0.024	0.031
F9	0.53	0.73	0.021	0.029
F10	4.90	5.10	0.193	0.201
F11	0.53	0.73	0.021	0.029

DOCUMENT NO.
Z8B00003332

SCALE



EUROPEAN PROJECTION

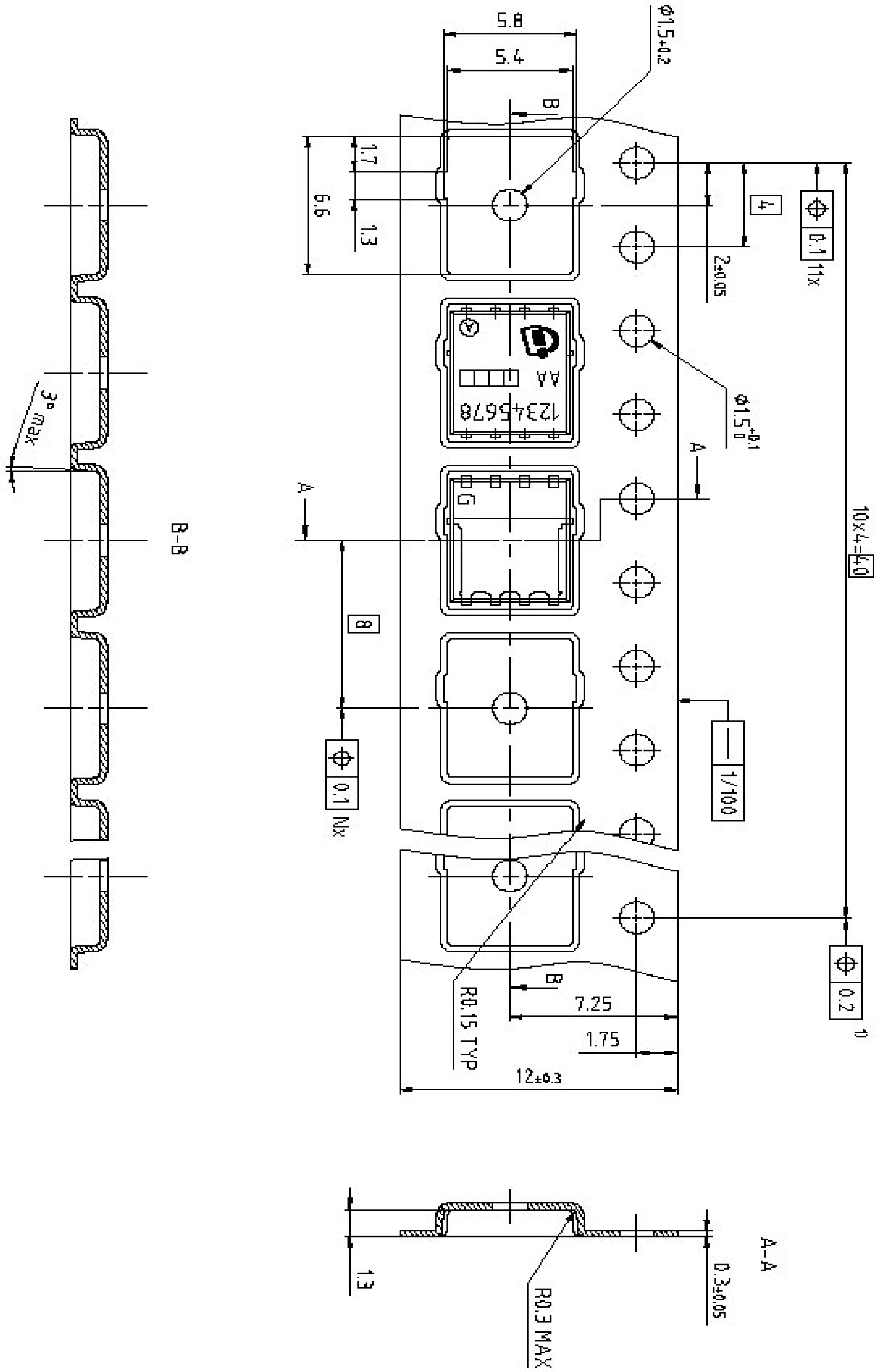


ISSUE DATE
08-03-2007

REVISION
03

Package Outline

PG-TDSON-8: Tape



Dimensions in mm

Published by
Infineon Technologies AG
81726 Munich, Germany

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