OptiMOS™3 M-Series Power-MOSFET

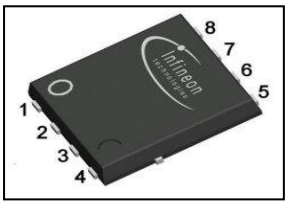
Features

- Optimized for 5V driver application (Notebook, VGA, POL)
- Low FOM_{SW} for High Frequency SMPS
- 100% Avalanche tested
- N-channel
- Very low on-resistance $R_{DS(on)}$ @ V_{GS}=4.5 V
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Qualified according to JEDEC[1] for target applications
- Superior thermal resistance
- Pb-free plating; RoHS compliant
- Halogen-free according to IEC61249-2-21

Product Summary

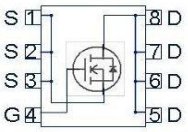
V_{DS}		30	V
$R_{DS(on),max}$	V_{GS}=10 V	12	mΩ
	V_{GS}=4.5 V	14	
I_D		39	A

PG-TDSON-8



RoHS

Halogen-Free



Type	Package	Marking
BSC120N03MS G	PG-TDSON-8	120N03MS

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	39	A
		V_{GS}=10 V, T_C=100 °C	24	
		V_{GS}=4.5 V, T_C=25 °C	36	
		V_{GS}=4.5 V, T_C=100 °C	23	
		V_{GS}=4.5 V, T_A=25 °C, R_{thJA}=50 K/W[2]	11	
Pulsed drain current[3]	$I_{D,pulse}$	T_C=25 °C	156	
Avalanche current, single pulse[4]	I_{AS}	T_C=25 °C	35	
Avalanche energy, single pulse	E_{AS}	I_D=25 A, R_{GS}=25 Ω	10	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}	bottom	-	-	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						
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0 V, I_D=1 mA	30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250 µA	1	-	2	
Zero gate voltage drain current	I_{DSS}	V_{DS}=30 V, V_{GS}=0 V, T_j=25 °C	-	0.1	1	µA
		V_{DS}=30 V, V_{GS}=0 V, T_j=125 °C	-	10	100	
Gate-source leakage current	I_{GSS}	V_{GS}=16 V, V_{DS}=0 V	-	10	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=4.5 V, I_D=20 A	-	12.5	14	mΩ
		V_{GS}=10 V, I_D=30 A	-	10.0	12.0	
Gate resistance	R_G		0.4	0.9	1.6	Ω
Transconductance	g_{fs}	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=30 A	25	50	-	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.

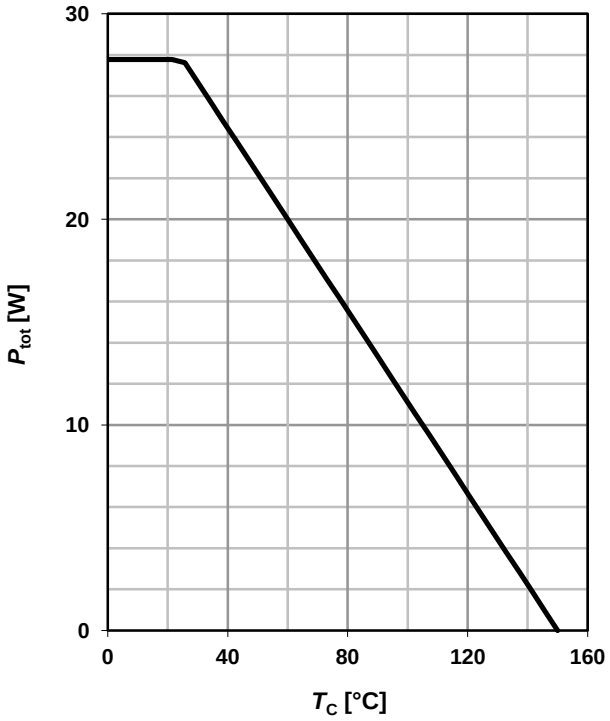
[3)] See figure 3 for more detailed information

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics						
Input capacitance	C_{iss}	V_{GS}=0 V, V_{DS}=15 V, f=1 MHz	-	1100	1500	pF
Output capacitance	C_{oss}		-	390	520	
Reverse transfer capacitance	C_{rss}		-	24	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=15 V, V_{GS}=4.5 V, I_D=30 A, $R_{G,ext}$=1.6 Ω	-	7.9	-	ns
Rise time	t_r		-	4.4	-	
Turn-off delay time	$t_{d(off)}$		-	7.0	-	
Fall time	t_f		-	5.0	-	
Gate Charge Characteristics[5)]						
Gate to source charge	Q_{gs}	V_{DD}=15 V, I_D=30 A, V_{GS}=0 to 4.5 V	-	3.8	5.1	nC
Gate charge at threshold	$Q_{g(th)}$		-	1.8	2.4	
Gate to drain charge	Q_{gd}		-	1.7	2.9	
Switching charge	Q_{sw}		-	3.7	5.5	
Gate charge total	Q_g		-	7.2	10	
Gate plateau voltage	$V_{plateau}$		-	3.3	-	V
Gate charge total	Q_g	V_{DD}=15 V, I_D=30 A, V_{GS}=0 to 10 V	-	15	20	nC
Gate charge total, sync. FET	$Q_{g(sync)}$	V_{DS}=0.1 V, V_{GS}=0 to 4.5 V	-	6.2	8.3	
Output charge	Q_{oss}	V_{DD}=15 V, V_{GS}=0 V	-	10	14	
Reverse Diode						
Diode continuous forward current	I_S	T_C=25 °C	-	-	25	A
Diode pulse current	$I_{S,pulse}$		-	-	156	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=30 A, T_j=25 °C	-	0.92	1.1	V
Reverse recovery charge	Q_{rr}	V_R=15 V, I_F=I_S, di_F/dt=400 A/µs	-	-	10	nC

[4)] See figure 13 for more detailed information
[5)] See figure 16 for gate charge parameter definition

1 Power dissipation

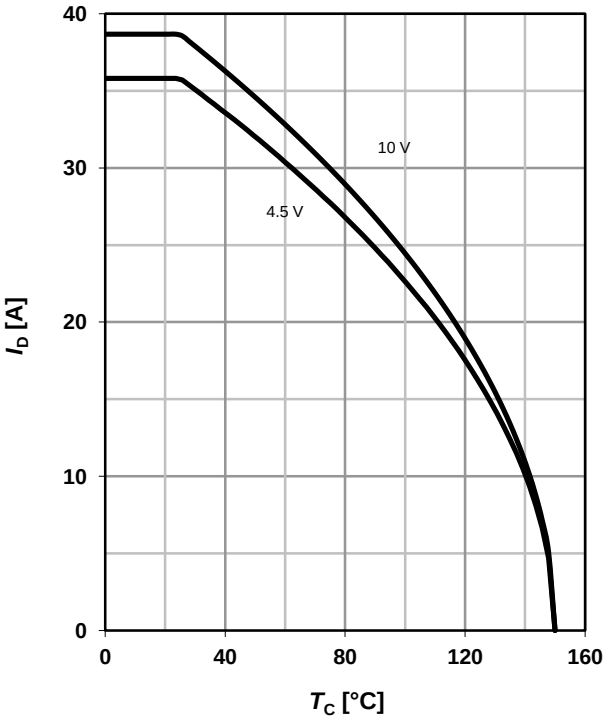
$P_{tot}=f(T_C)$



2 Drain current

$I_D=f(T_C)$

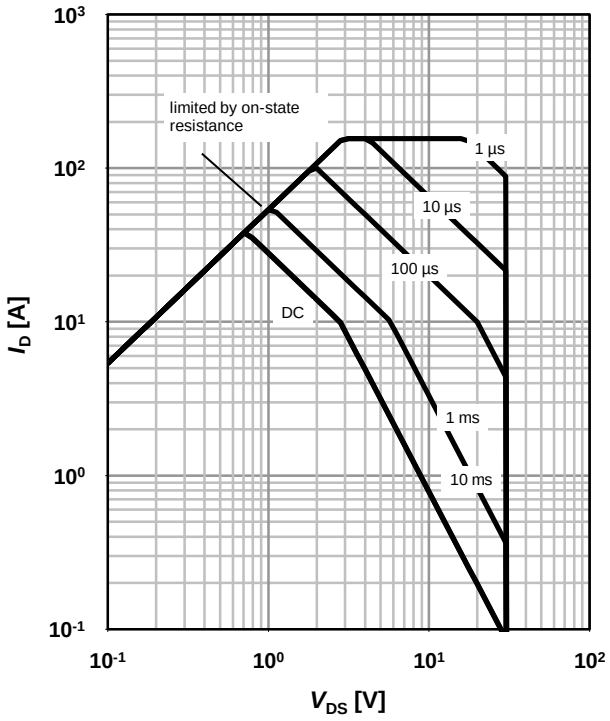
parameter: V_{GS}



3 Safe operating area

$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$

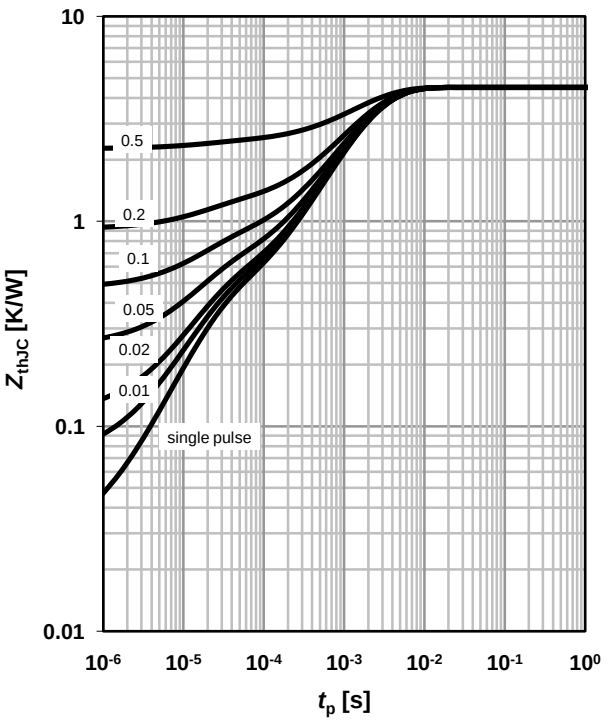
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC}=f(t_p)$

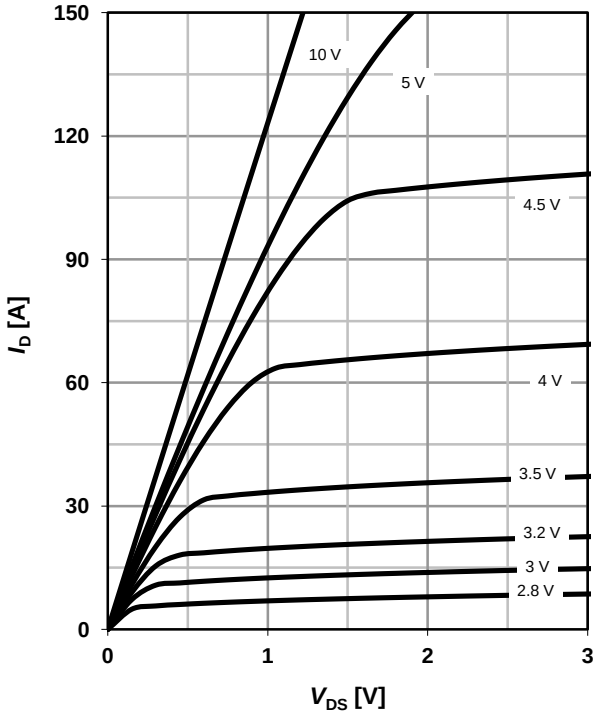
parameter: $D=t_p/T$



5 Typ. output characteristics

$I_D=f(V_{DS})$; $T_j=25$ °C

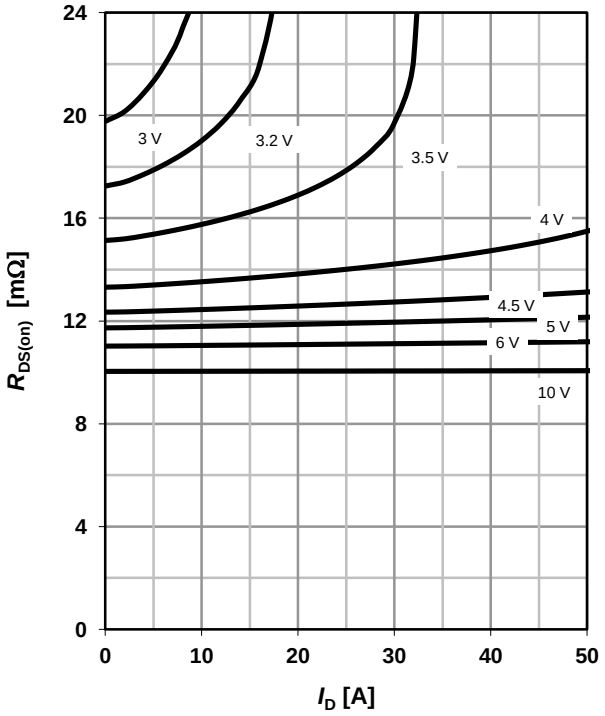
parameter: V_{GS}



6 Typ. drain-source on resistance

$R_{DS(on)}=f(I_D)$; $T_j=25$ °C

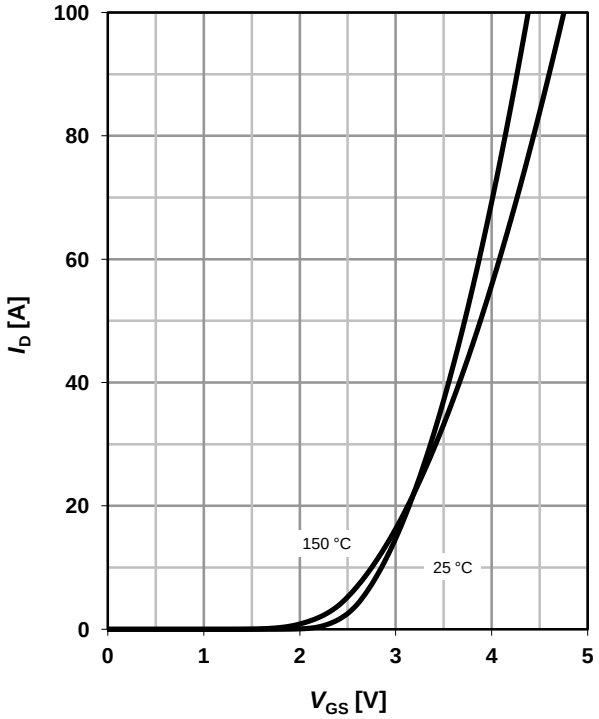
parameter: V_{GS}



7 Typ. transfer characteristics

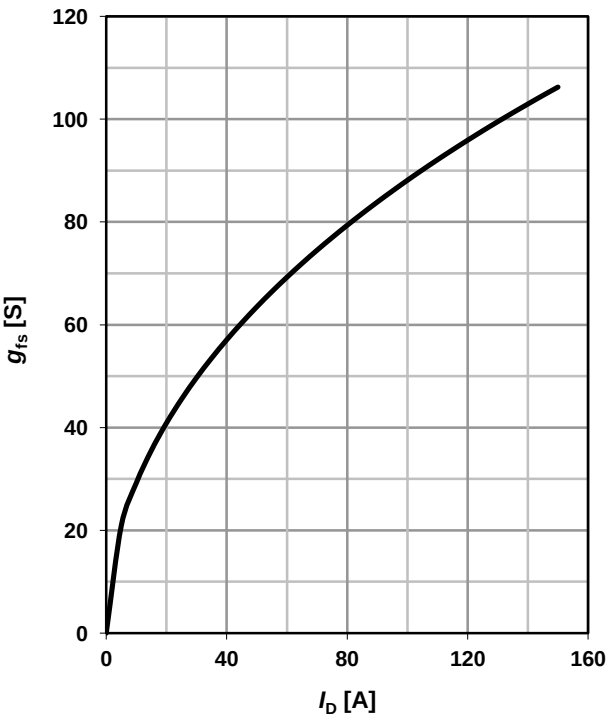
$I_D=f(V_{GS})$; $|V_{DS}|>2|I_D|R_{DS(on)max}$

parameter: T_j



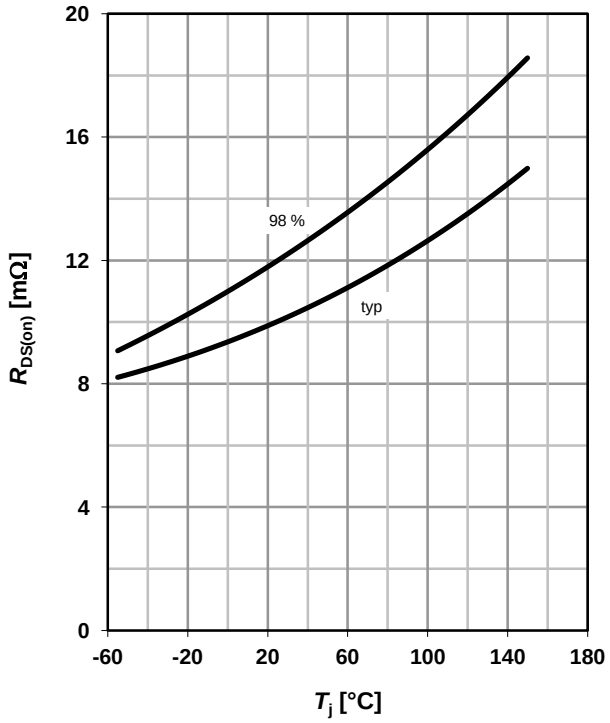
8 Typ. forward transconductance

$g_{fs}=f(I_D)$; $T_j=25$ °C



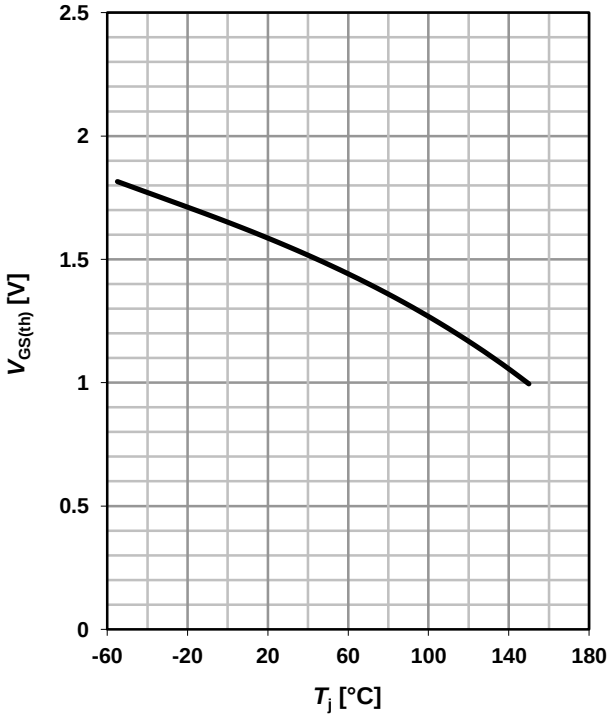
9 Drain-source on-state resistance

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



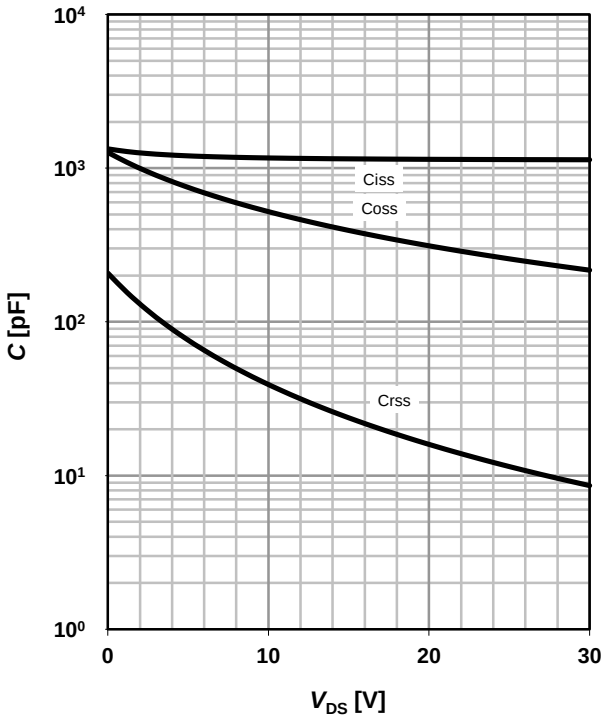
10 Typ. gate threshold voltage

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



11 Typ. capacitances

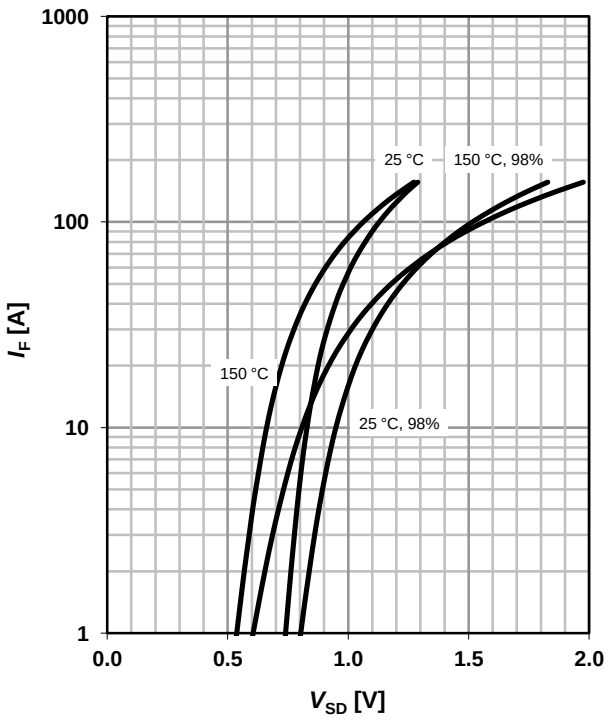
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz



12 Forward characteristics of reverse diode

I_F=f(V_{SD})

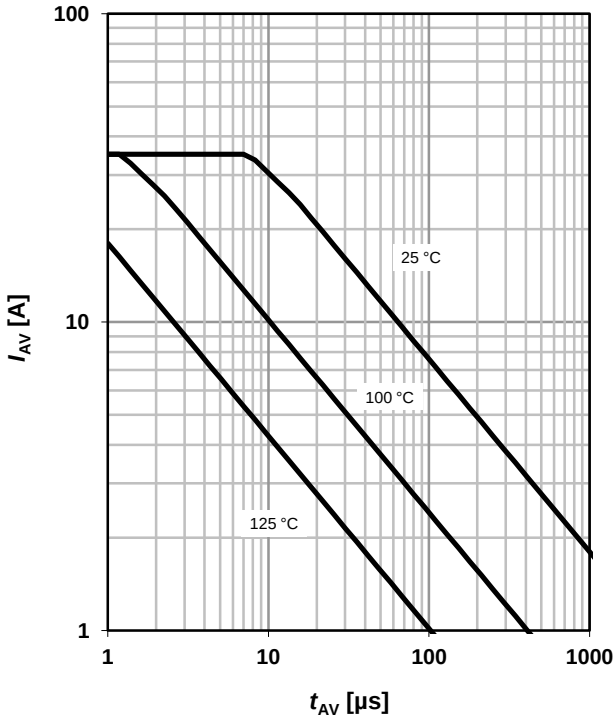
parameter: T_j



13 Avalanche characteristics

I_{AS}=f(t_{AV}); R_{GS}=25 Ω

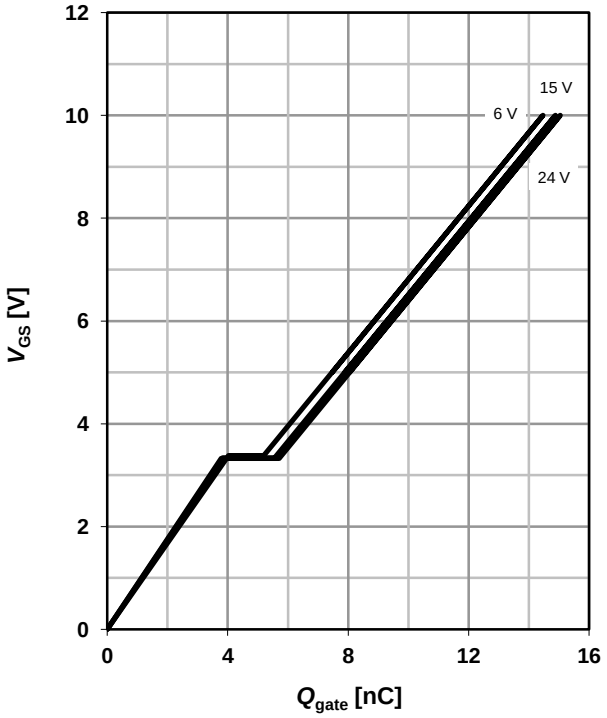
parameter: $T_{j(start)}$



14 Typ. gate charge

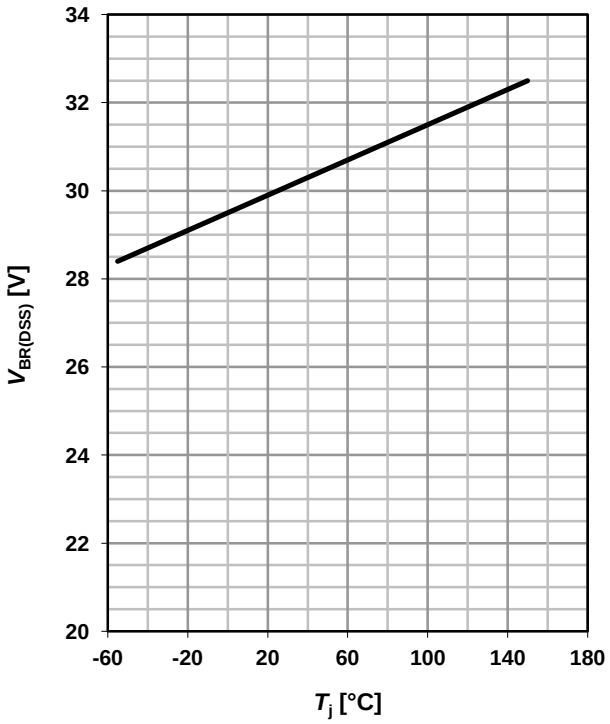
V_{GS}=f(Q_{gate}); I_D=30 A pulsed

parameter: V_{DD}

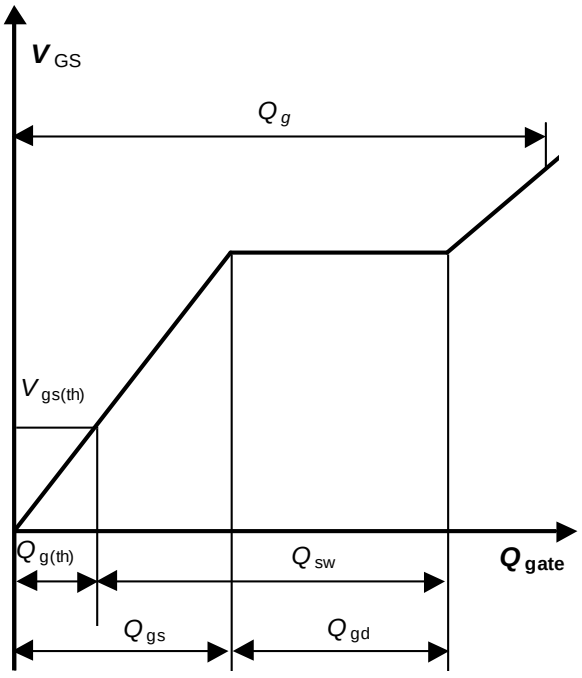


15 Drain-source breakdown voltage

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

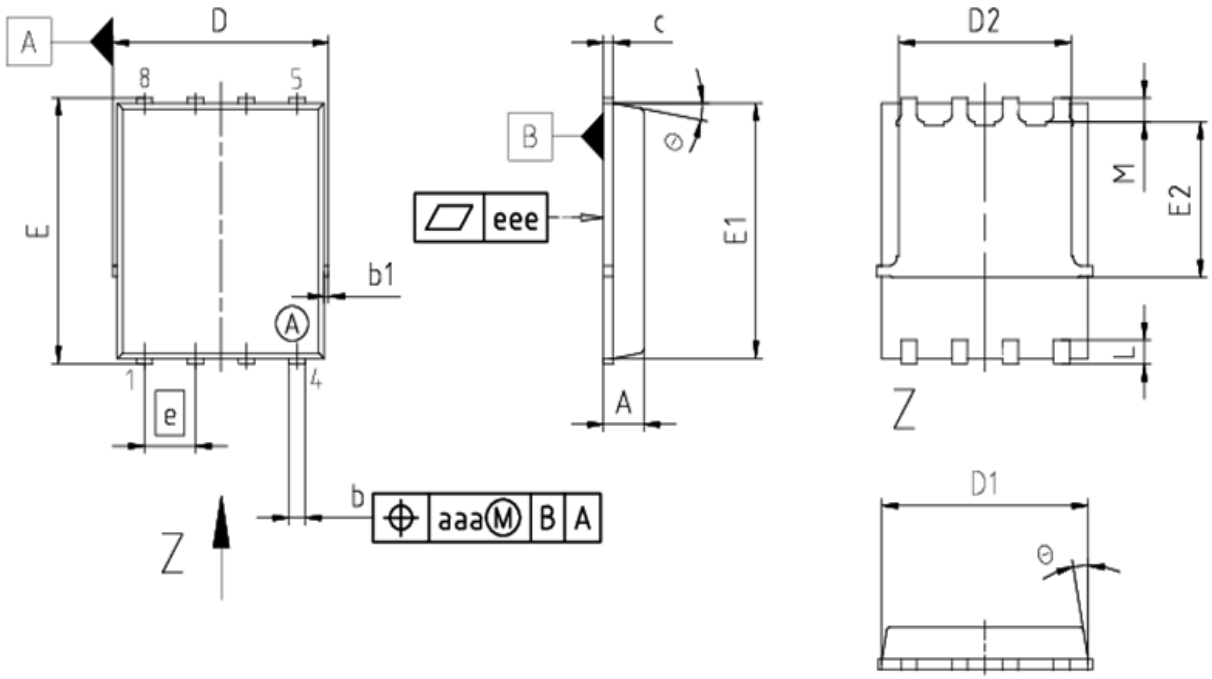


16 Gate charge waveforms



Package Outline **PG-TDSON-8**

PG-TDSON-8: Outline

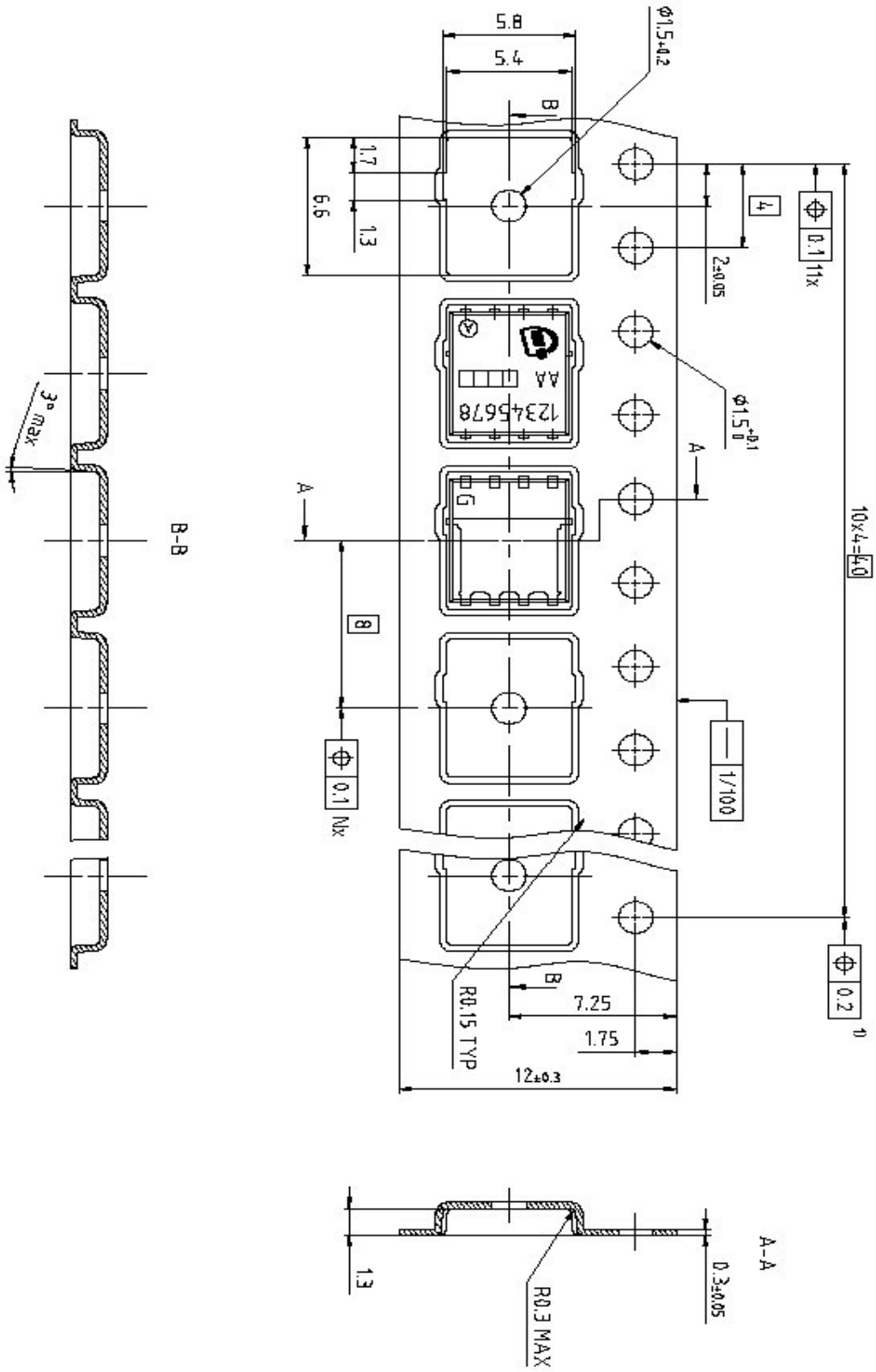


DIM	MILLIMETERS	
	MIN	MAX
A	0.90	1.10
b	0.31	0.54
b1	0.02	0.22
c	0.15	0.35
D	5.15	5.49
D1	4.95	5.35
D2	3.70	4.40
E	5.95	6.35
E1	5.70	6.10
E2	3.40	3.80
e	1.27	
N	8	
L	0.45	0.71
M	0.45	0.75
Θ	8.5°	12°
aaa	0.25	
eee	0.08	

DOCUMENT NO.	Z8B00003332
SCALE	0 2 0 2 4mm
EUROPEAN PROJECTION	
ISSUE DATE	10-04-2013
REVISION	04

Package Outline

PG-TDSON-8: Tape



Dimensions in mm

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