OptiMOS™ Power-MOSFET

Features

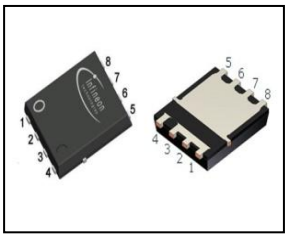
- Optimized for synchronous rectification
- Integrated monolithic Schottky-like diode
- Very low on-resistance $R_{DS(on)}$
- 100% avalanche tested
- N-channel, logic level
- Qualified according to JEDEC[1] for target applications
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21
- Higher solder joint reliability due to enlarged source interconnection

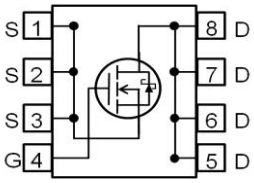
Product Summary

V_{DS}	40	V
$R_{DS(on),max}$	1.45	mΩ
I_D	100	A
Q_{OSS}	53	nC
Q_G(0V..10V)	55	nC

PG-TDSON-8 FL

(enlarged source interconnection)





Type	Package	Marking
BSC014N04LSI	PG-TDSON-8 FL	014N04LI

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	100	A
		V_{GS}=10 V, T_C=100 °C	100	
		V_{GS}=4.5 V, T_C=25 °C	100	
		V_{GS}=4.5 V, T_C=100 °C	100	
		V_{GS}=10 V, T_A=25 °C, R_{thJA}=50 K/W[2]	31	
Pulsed drain current[3]	$I_{D,pulse}$	T_C=25 °C	400	
Avalanche current, single pulse[4]	I_{AS}	T_C=25 °C	50	
Avalanche energy, single pulse	E_{AS}	I_D=50 A, R_{GS}=25 Ω	90	mJ
Gate source voltage	V_{GS}		±20	V

[1] J-STD20 and JESD22

[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

[4] See figure 13 for more detailed information

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

Parameter	Symbol	Conditions	Value	Unit
Power dissipation	P_{tot}	T_C=25 °C	96	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	-	-	1.3	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

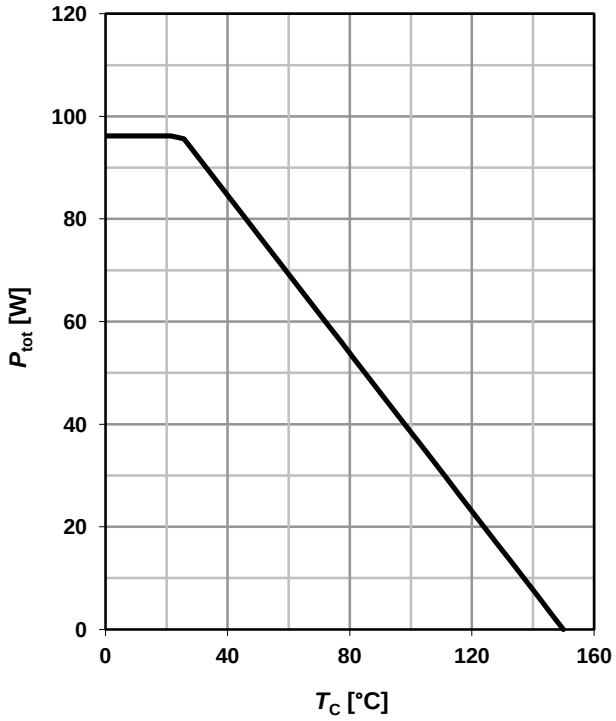
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0 V, I_D=10 mA	40	-	-	V
Breakdown voltage temperature coefficient	$dV_{(BR)DSS}/dT_j$	I_D=10 mA, referenced to 25 °C	-	30	-	mV/K
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250 µA	1.2	-	2	
Zero gate voltage drain current	I_{DSS}	V_{DS}=32 V, V_{GS}=0 V, T_j=25 °C	-	-	0.5	mA
		V_{DS}=32 V, V_{GS}=0 V, T_j=125 °C	-	2	-	
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=50 A	-	1.5	2	mΩ
		V_{GS}=10 V, I_D=50 A	-	1.2	1.45	
Gate resistance	R_G		-	0.9	-	Ω
Transconductance	g_{fs}	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=50 A	110	220	-	S

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics						
Input capacitance	C_{iss}	V_{GS}=0 V, V_{DS}=20 V, f=1 MHz	-	4000	-	pF
Output capacitance	C_{oss}		-	1200	-	
Reverse transfer capacitance	C_{rss}		-	90	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=20 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$,ext=1.6 Ω	-	16	-	ns
Rise time	t_r		-	50	-	
Turn-off delay time	$t_{d(off)}$		-	55	-	
Fall time	t_f		-	11	-	
Gate Charge Characteristics[5)]						
Gate to source charge	Q_{gs}	V_{DD}=20 V, I_D=50 A, V_{GS}=0 to 10 V	-	9.9	-	nC
Gate charge at threshold	$Q_{g(th)}$		-	6.3	-	
Gate to drain charge	Q_{gd}		-	8.9	-	
Switching charge	Q_{sw}		-	12	-	
Gate charge total	Q_g		-	55	-	
Gate plateau voltage	$V_{plateau}$		-	2.5	-	V
Gate charge total	Q_g	V_{DD}=20 V, I_D=50 A, V_{GS}=0 to 4.5 V	-	29	-	nC
Gate charge total, sync. FET	$Q_{g(sync)}$	V_{DS}=0.1 V, V_{GS}=0 to 10 V	-	49	-	
Output charge	Q_{oss}	V_{DD}=20 V, V_{GS}=0 V	-	53	-	
Reverse Diode						
Diode continuous forward current	I_S	T_C=25 °C	-	-	96	A
Diode pulse current	$I_{S,pulse}$		-	-	400	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=12 A, T_j=25 °C	-	0.56	0.7	V
Reverse recovery charge	Q_{rr}	V_R=20 V, I_F=12 A, di_F/dt=400 A/µs	-	20	-	nC

[5)] See figure 16 for gate charge parameter definition

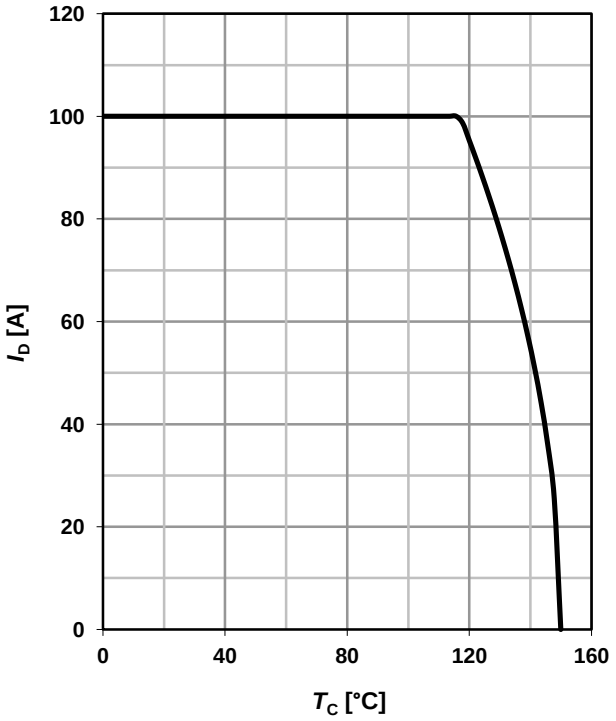
1 Power dissipation

$P_{tot}=f(T_C)$



2 Drain current

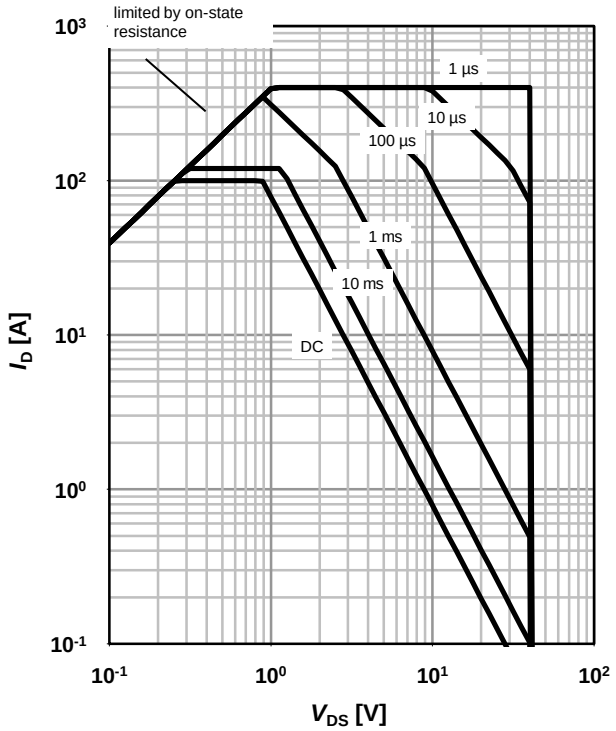
$I_D=f(T_C)$; $V_{GS}\geq 10$ V



3 Safe operating area

$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$

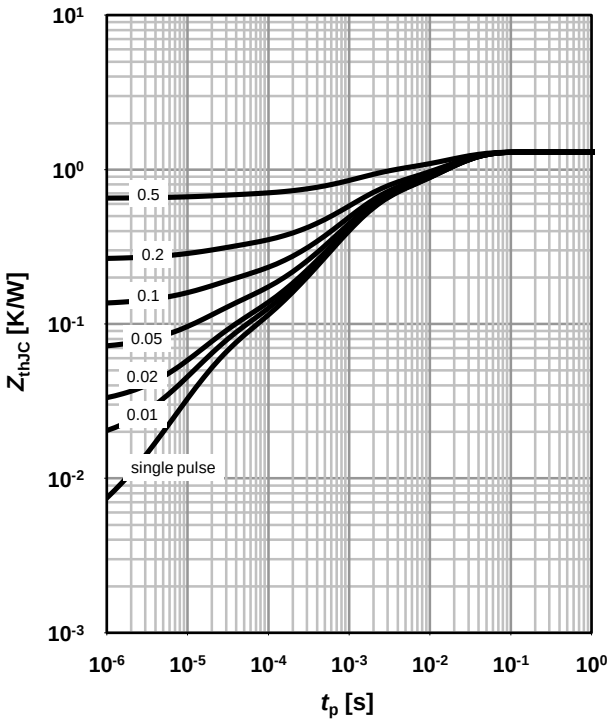
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC}=f(t_p)$

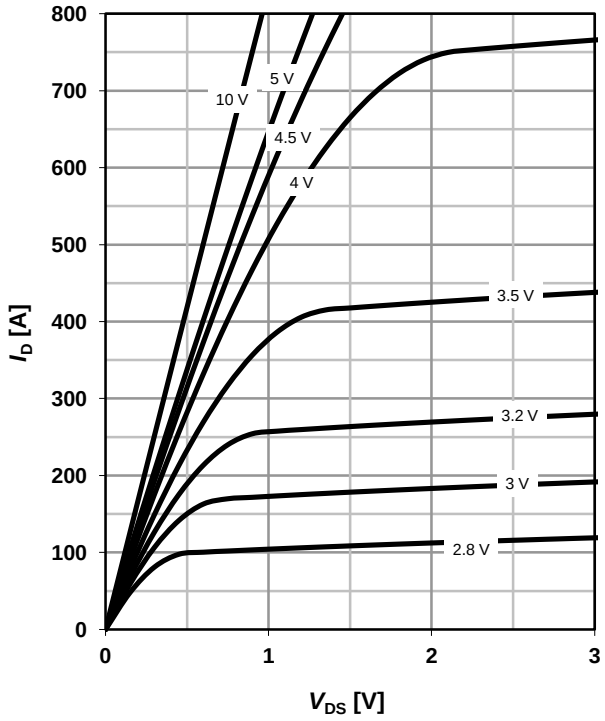
parameter: $D=t_p/T$



5 Typ. output characteristics

$I_D=f(V_{DS})$; T_j=25 °C

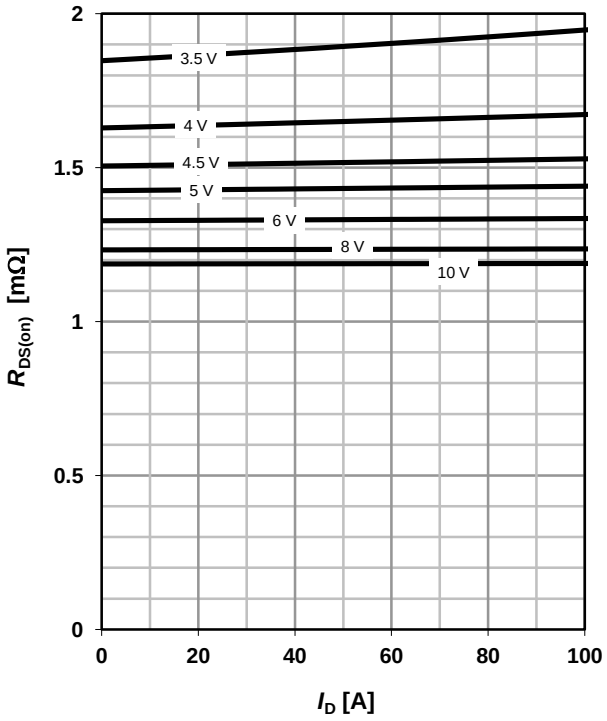
parameter: V_{GS}



6 Typ. drain-source on resistance

$R_{DS(on)}=f(I_D)$; T_j=25 °C

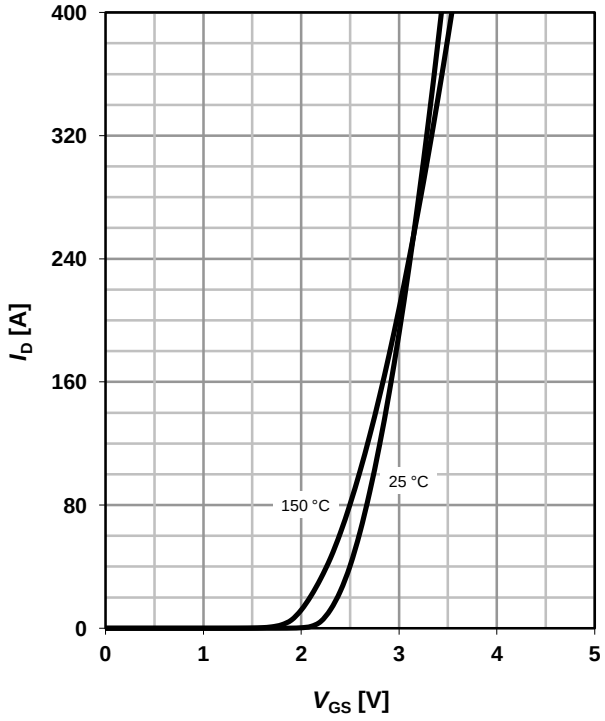
parameter: V_{GS}



7 Typ. transfer characteristics

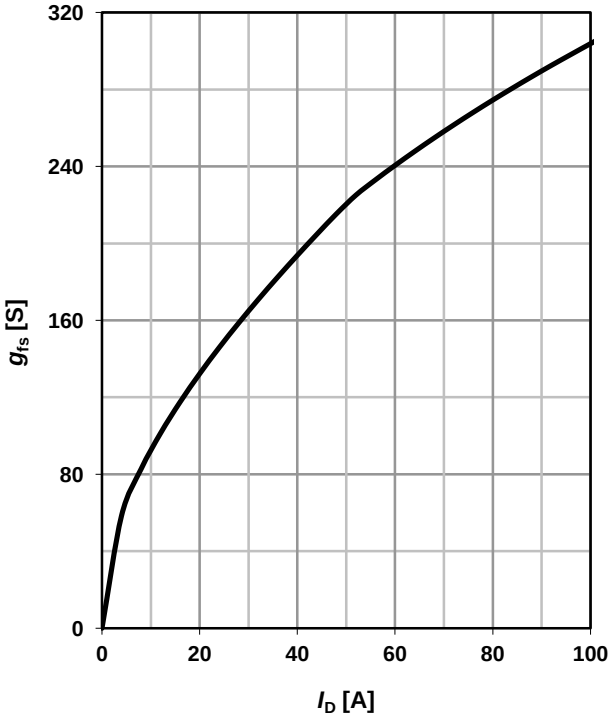
$I_D=f(V_{GS})$; $|V_{DS}|>2|I_D|R_{DS(on)max}$

parameter: T_j



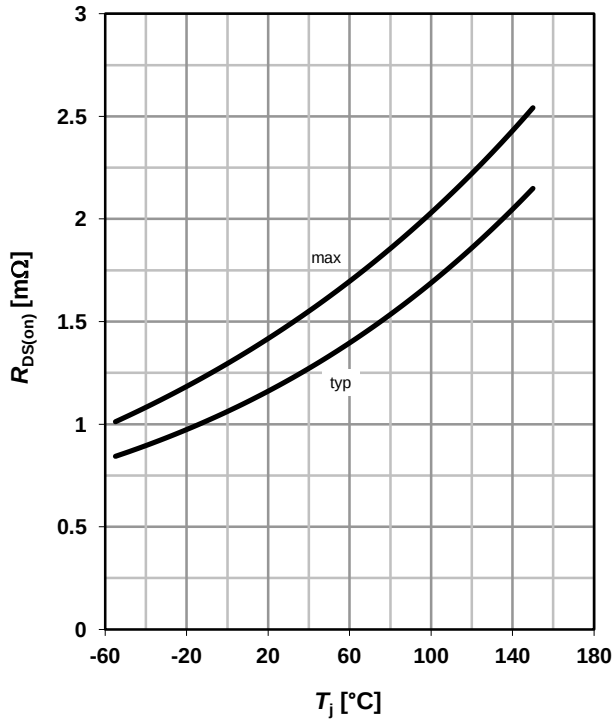
8 Typ. forward transconductance

$g_{fs}=f(I_D)$; T_j=25 °C



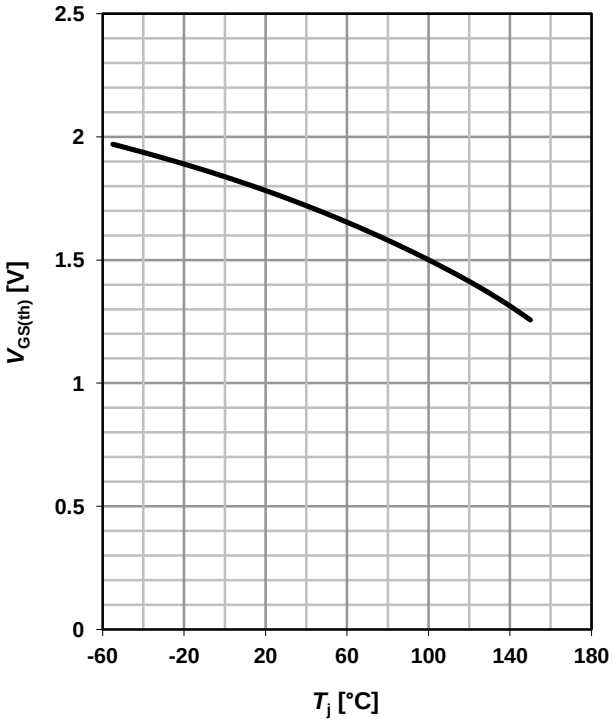
9 Drain-source on-state resistance

$R_{DS(on)}$=f(T_j); I_D=50 A; V_{GS}=10 V



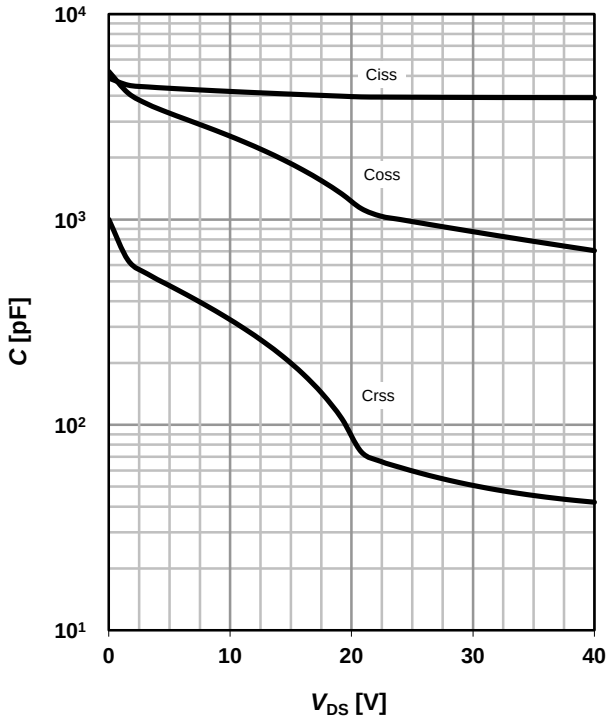
10 Typ. gate threshold voltage

$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; I_{DS}=10mA



11 Typ. capacitances

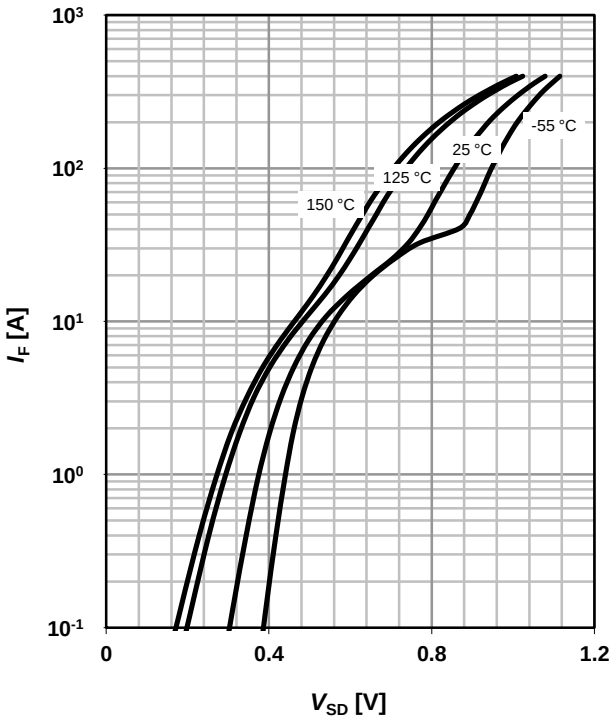
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz



12 Forward characteristics of reverse diode

I_F=f(V_{SD})

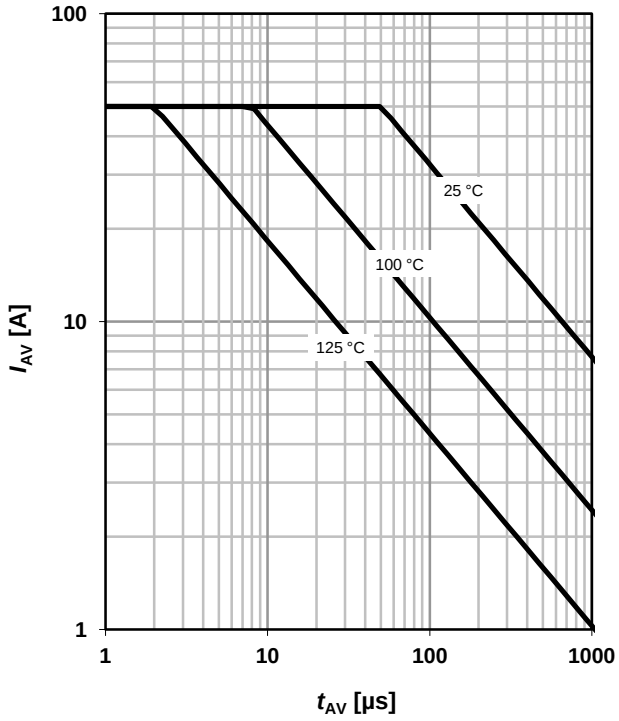
parameter: T_j



13 Avalanche characteristics

I_{AS}=f(t_{AV}); R_{GS}=25 Ω

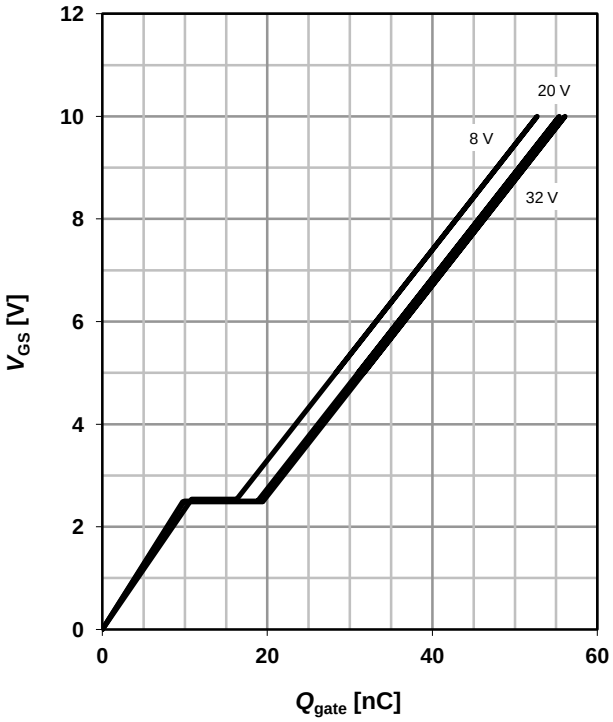
parameter: $T_{j(start)}$



14 Typ. gate charge

V_{GS}=f(Q_{gate}); I_D=50 A pulsed

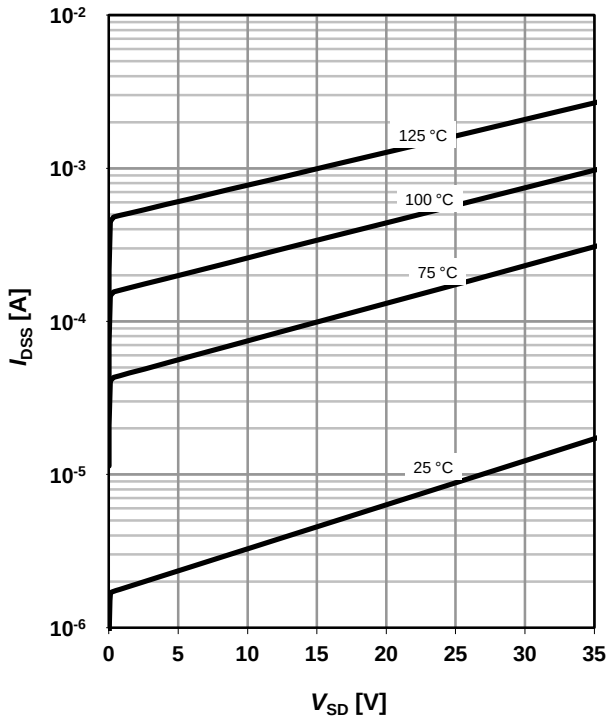
parameter: V_{DD}



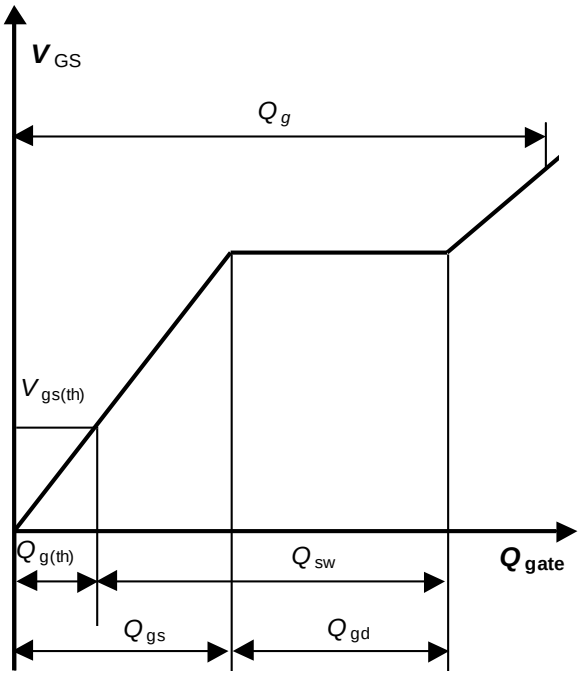
15 Typ. drain-source leakage current

I_{DSS}=f(V_{DS}); V_{GS}=0 V

parameter: T_j

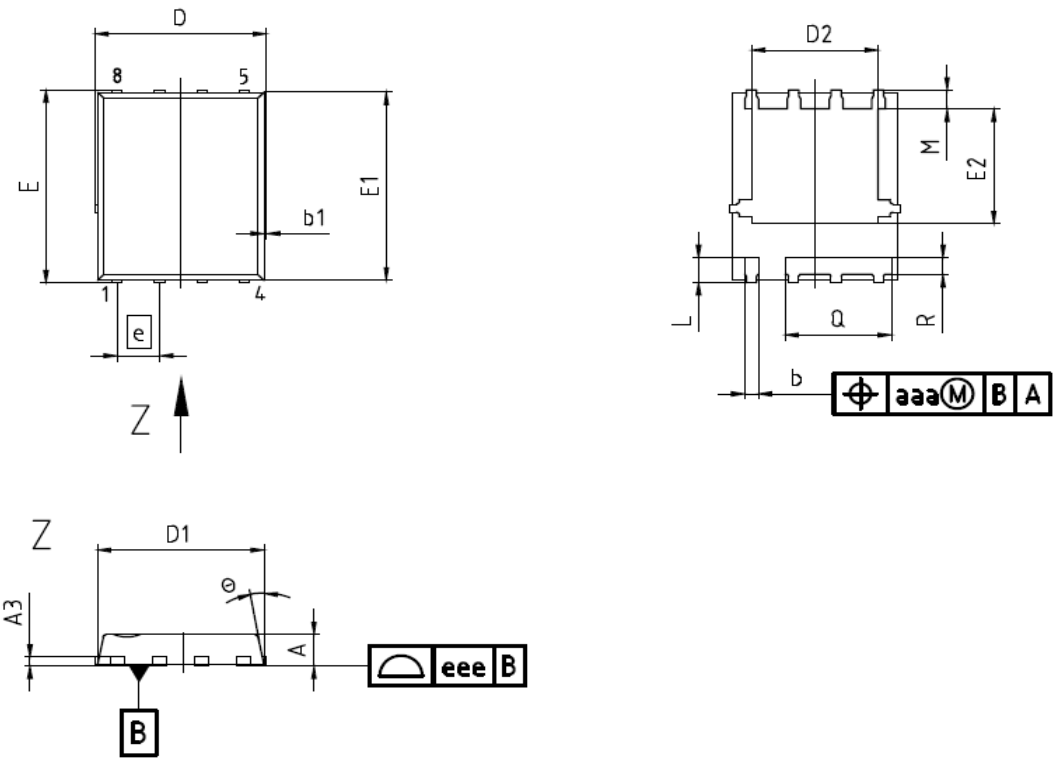


16 Gate charge waveforms



Package Outline **PG-TDSON-8 FL**

PG-TDSON-8 FL: Outline



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.10	0.035	0.043
A3	0.25 (REF)		0.011 (REF)	
b	0.34	0.54	0.013	0.021
b1	0.02	0.22	0.001	0.009
D	5.15 (BSC)		0.203 (BSC)	
D1	5.00 (BSC)		0.197 (BSC)	
D2	3.70	4.40	0.146	0.173
E	6.15 (BSC)		0.242 (BSC)	
E1	6.00 (BSC)		0.236 (BSC)	
E2	3.40	3.80	0.134	0.150
e	1.27 (BSC)		0.050 (BSC)	
N	8		8	
L	0.74	0.84	0.029	0.033
M	0.45	0.66	0.018	0.026
Θ	8.5°	12°	8.5°	12°
Q	3.15	3.25	0.124	0.128
R	0.48	0.58	0.019	0.023
aaa	0.25		0.010	
eee	0.08		0.003	

DOCUMENT NO.
Z8B00162237

SCALE
0 2.5 5mm

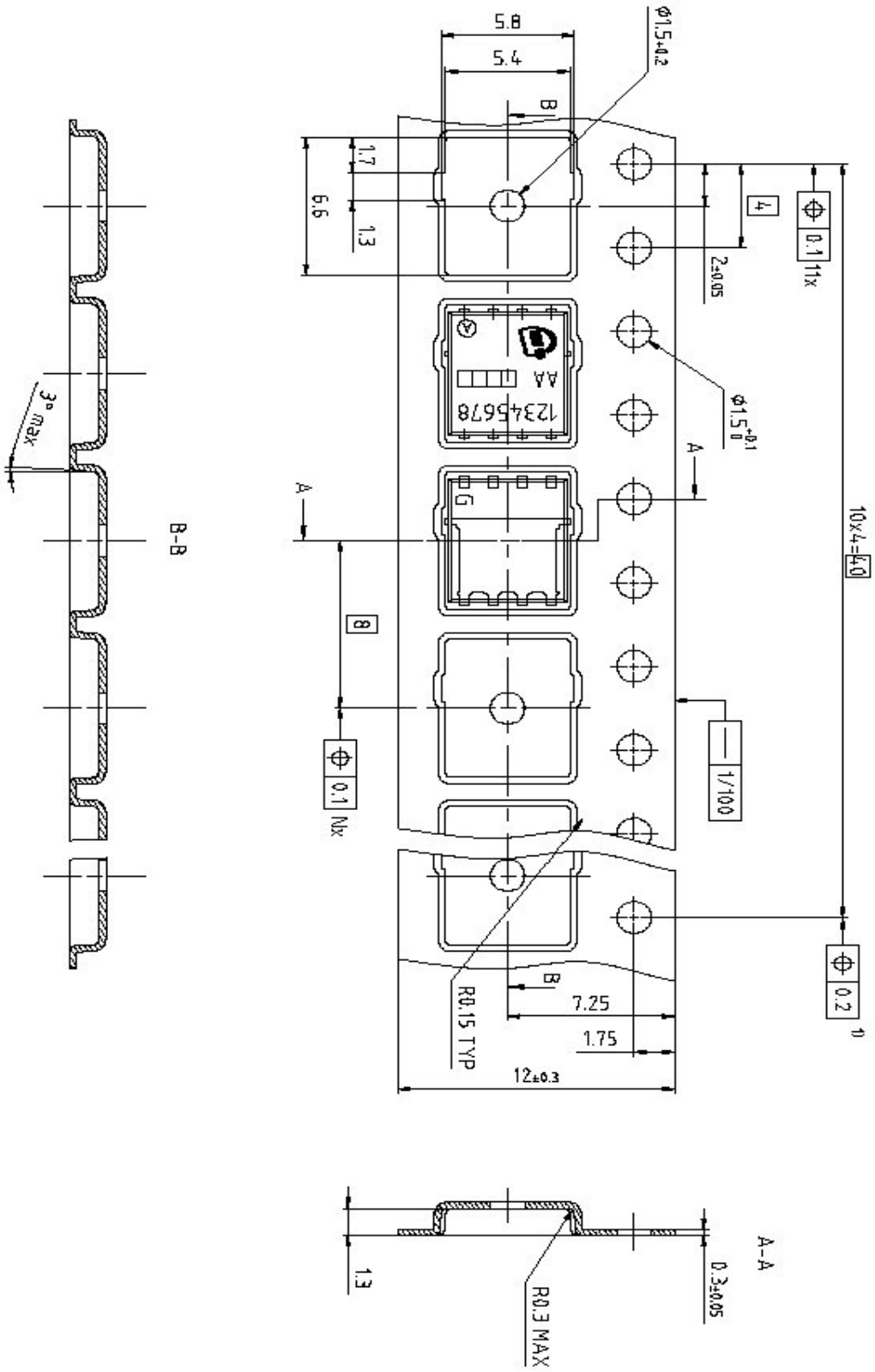
EUROPEAN PROJECTION

ISSUE DATE
02-08-2011

REVISION
01

Package Outline

PG-TDSON-8 FL: Tape



Dimensions in mm

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