BSC093N04LSGATMA1 Datasheet

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DiGi Electronics Part Number	BSC093N04LSGATMA1-DG
Manufacturer	Infineon Technologies
Manufacturer Product Number	BSC093N04LSGATMA1
Description	MOSFET N-CH 40V 13A/49A TDSON
Detailed Description	N-Channel 40 V 13A (Ta), 49A (Tc) 2.5W (Ta), 35W (Tc) Surface Mount PG-TDSON-8-5

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Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
BSC093N04LSGATMA1	Infineon Technologies
Series:	Product Status:
OptiMOS™	Active
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
40 V	13A (Ta), 49A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
4.5V, 10V	9.3mOhm @ 40A, 10V
Vgs(th) (Max) @ Id:	Gate Charge (Qg) (Max) @ Vgs:
2V @ 14µA	24 nC @ 10 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±20V	1900 pF @ 20 V
FET Feature:	Power Dissipation (Max):
-	2.5W (Ta), 35W (Tc)
Operating Temperature:	Mounting Type:
-55°C ~ 150°C (TJ)	Surface Mount
Supplier Device Package:	Package / Case:
PG-TDSON-8-5	8-PowerTDFN
Base Product Number:	
BSC093	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.29.0095	

BSC093N04LS G

OptiMOS™3 Power-Transistor

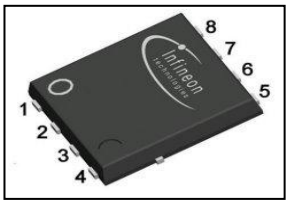
Features

- Fast switching MOSFET for SMPS
- Optimized technology for DC/DC converters
- Qualified according to JEDEC[1] for target applications
- N-channel; Logic level
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Very low on-resistance $R_{DS(on)}$
- Superior thermal resistance
- 100% Avalanche tested
- Pb-free plating; RoHS compliant
- Halogen-free according to IEC61249-2-21

Product Summary

V_{DS}	40	V
$R_{DS(on),max}$	9.3	mΩ
I_D	49	A

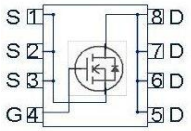
PG-TDSON-8



RoHS

Halogen-Free

Type	Package	Marking
BSC093N04LS G	PG-TDSON-8	093N04LS



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	49	A
		V_{GS}=10 V, T_C=100 °C	31	
		V_{GS}=4.5 V, T_C=25 °C	40	
		V_{GS}=4.5 V, T_C=100 °C	26	
		V_{GS}=10 V, T_A=25 °C, R_{thJA}=50 K/W[2]	13	
Pulsed drain current[3]	$I_{D,pulse}$	T_C=25 °C	196	
Avalanche current, single pulse[4]	I_{AS}	T_C=25 °C	40	
Avalanche energy, single pulse	E_{AS}	I_D=40 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	35	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	-	-	3.6	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	40	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=14 µA	1.2	-	2	
Zero gate voltage drain current	I_{DSS}	V_{DS}=40 V, V_{GS}=0 V, T_j=25 °C	-	0.1	1	µA
		V_{DS}=40 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=20 A	-	11.0	13.7	mΩ
		V_{GS}=10 V, I_D=40 A	-	7.8	9.3	
Gate resistance	R_G		-	1	-	Ω
Transconductance	g_{fs}	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=40 A	34	67	-	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

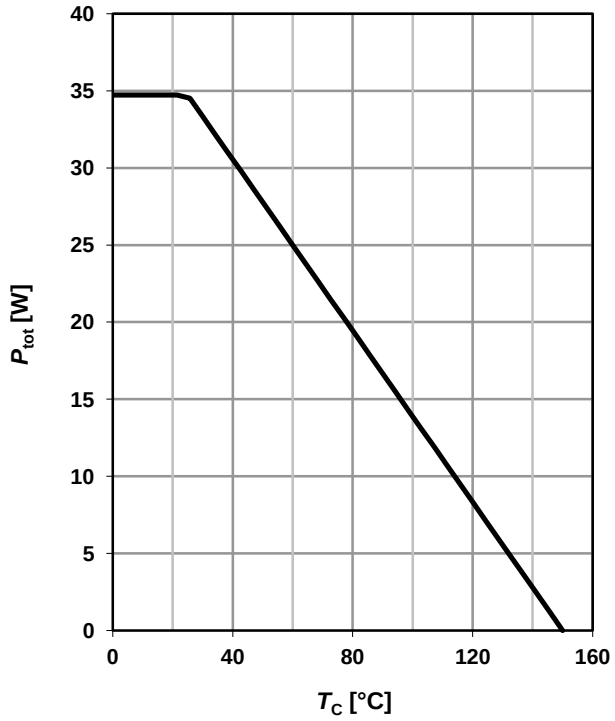
[4)] See figure 13 for more detailed information

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	-	1400	1900	pF
Output capacitance	C_{oss}		-	340	450	
Reverse transfer capacitance	C_{rss}		-	16	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=20 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$=1.6 Ω	-	3.6	-	ns
Rise time	t_r		-	2.4	-	
Turn-off delay time	$t_{d(off)}$		-	16	-	
Fall time	t_f		-	2.8	-	
Gate Charge Characteristics[5)]						
Gate to source charge	Q_{gs}	V_{DD}=20 V, I_D=30 A, V_{GS}=0 to 10 V	-	4.9	-	nC
Gate charge at threshold	$Q_{g(th)}$		-	2.3	-	
Gate to drain charge	Q_{gd}		-	2.0	-	
Switching charge	Q_{sw}		-	4.6	-	
Gate charge total	Q_g		-	18	24	
Gate plateau voltage	$V_{plateau}$		-	3.5	-	V
Gate charge total	Q_g	V_{DD}=20 V, I_D=30 A, V_{GS}=0 to 4.5 V	-	8.6	11.4	nC
Gate charge total, sync. FET	$Q_{g(sync)}$	V_{DS}=0.1 V, V_{GS}=0 to 10 V	-	17	-	
Output charge	Q_{oss}	V_{DD}=20 V, V_{GS}=0 V	-	13	-	
Reverse Diode						
Diode continuous forward current	I_S	T_C=25 °C	-	-	29	A
Diode pulse current	$I_{S,pulse}$		-	-	196	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=40 A, T_j=25 °C	-	0.9	1.2	V
Reverse recovery charge	Q_{rr}	V_R=20 V, I_F=I_S, di_F/dt=400 A/µs	-	15	-	nC

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

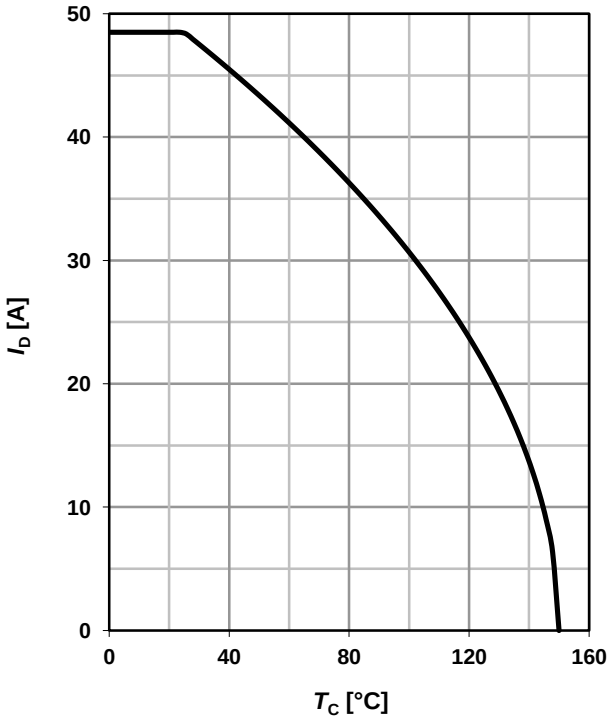
1 Power dissipation

$P_{tot}=f(T_C)$



2 Drain current

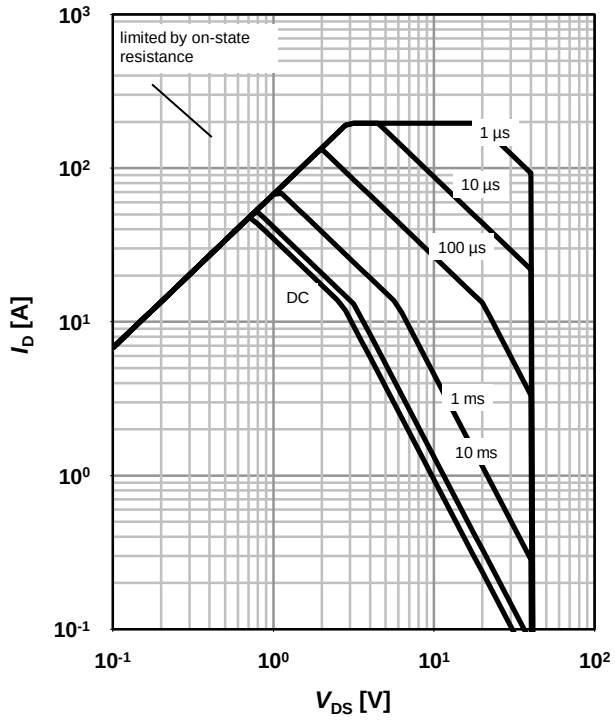
$I_D=f(T_C)$; $V_{GS}\geq 10$ V



3 Safe operating area

$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$

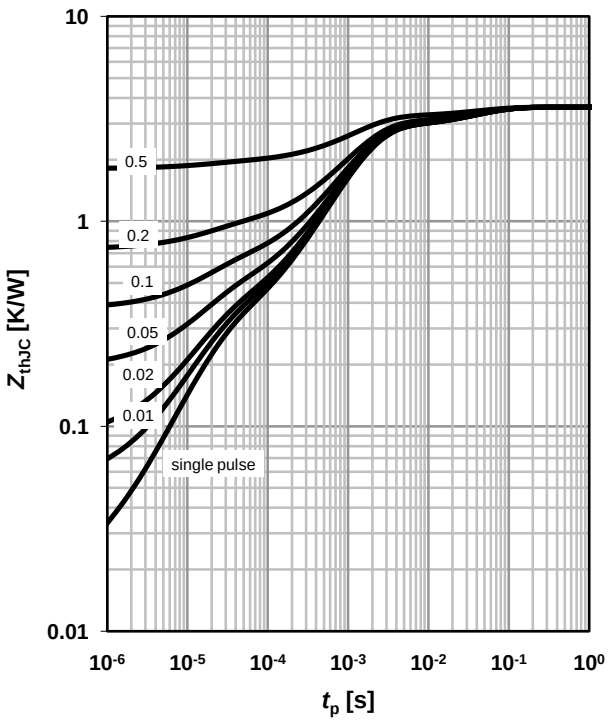
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC}=f(t_p)$

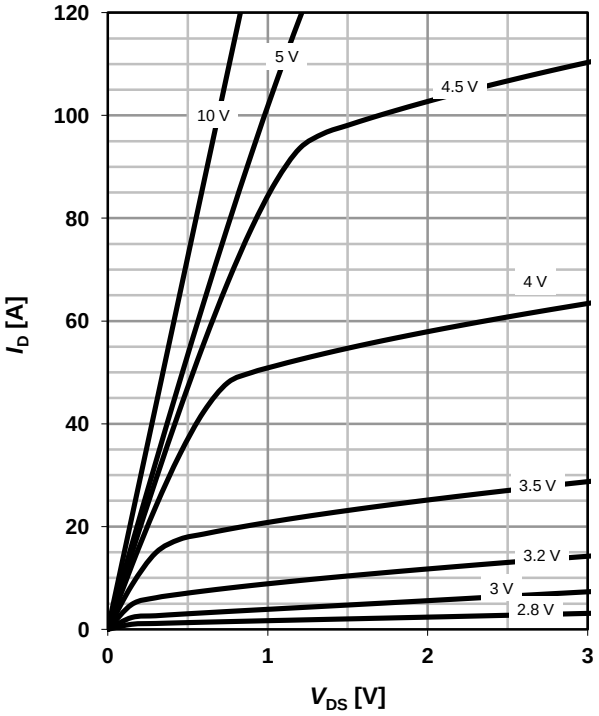
parameter: $D=t_p/T$



5 Typ. output characteristics

I_D=f(V_{DS}); T_j=25 °C

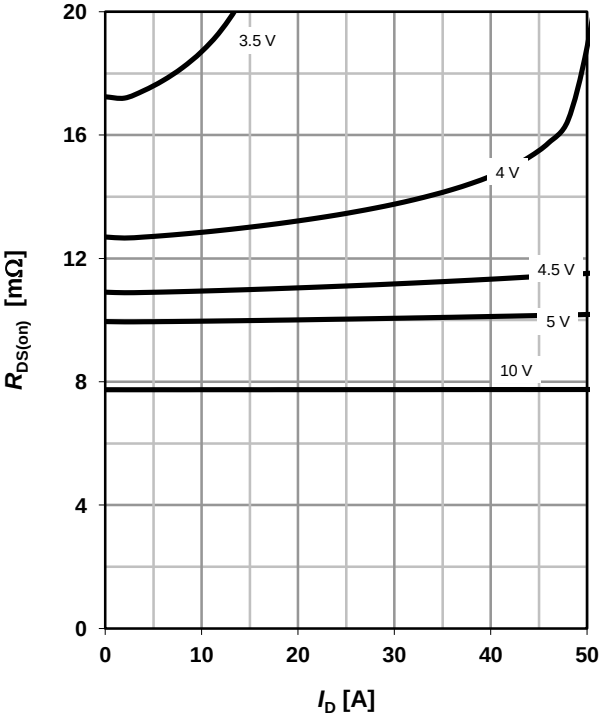
parameter: V_{GS}



6 Typ. drain-source on resistance

$R_{DS(on)}$=f(I_D); T_j=25 °C

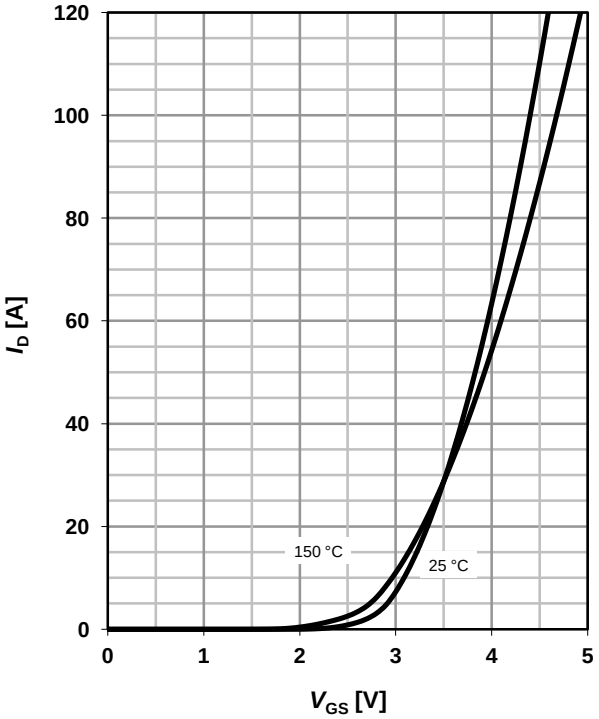
parameter: V_{GS}



7 Typ. transfer characteristics

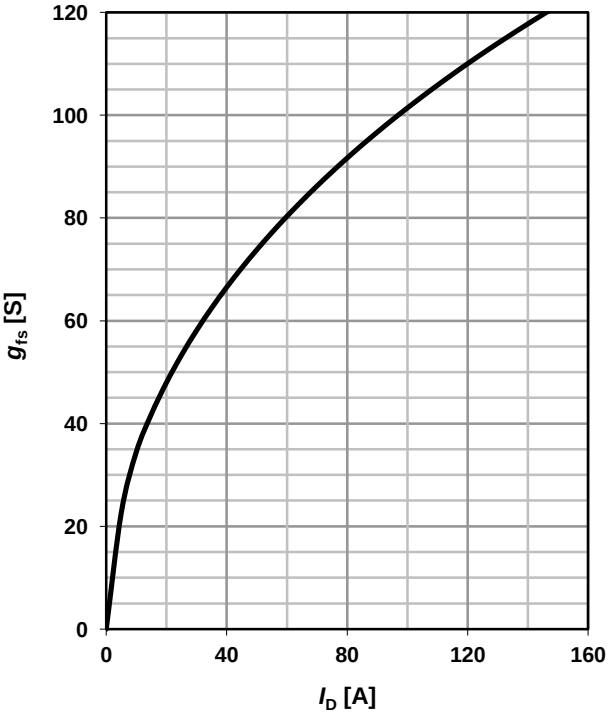
I_D=f(V_{GS}); |V_{DS}|>2|I_D|$R_{DS(on)max}$

parameter: T_j



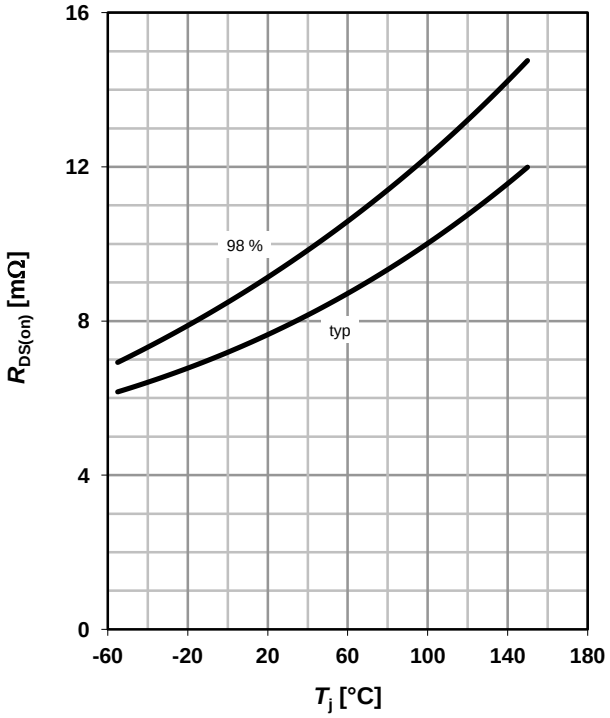
8 Typ. forward transconductance

g_{fs}=f(I_D); T_j=25 °C



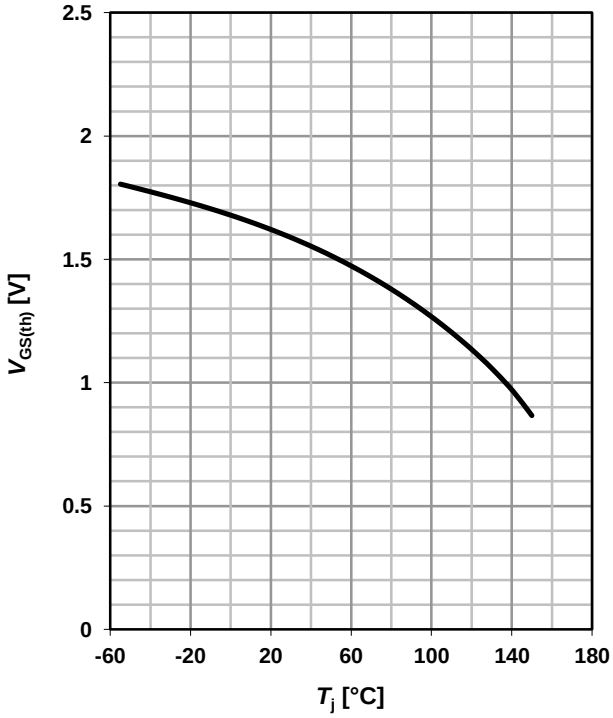
9 Drain-source on-state resistance

$R_{DS(on)}$=f(T_j); I_D=40 A; V_{GS}=10 V



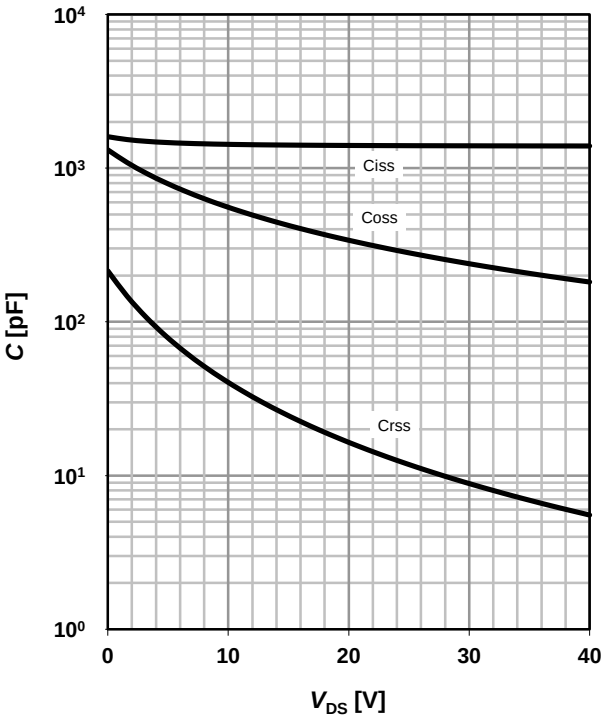
10 Typ. gate threshold voltage

$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; I_D=14 µA



11 Typ. capacitances

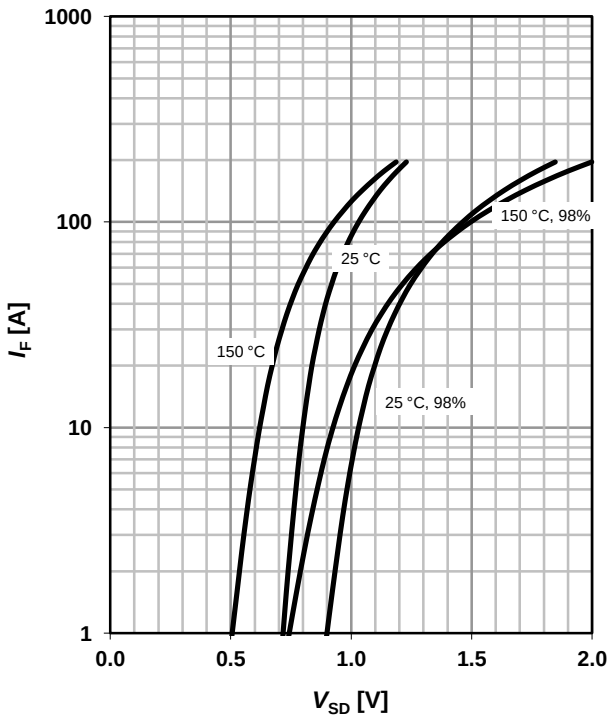
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz



12 Forward characteristics of reverse diode

I_F=f(V_{SD})

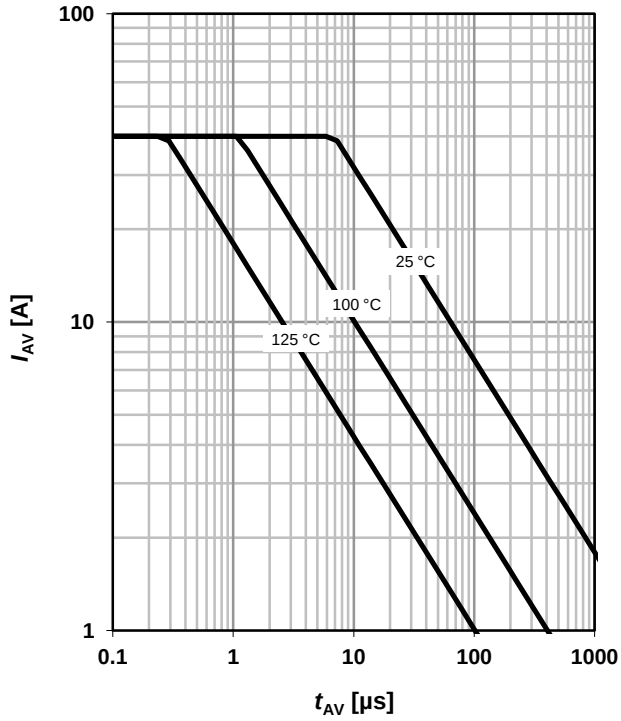
parameter: T_j



13 Avalanche characteristics

I_{AS}=f(t_{AV}); R_{GS}=25 Ω

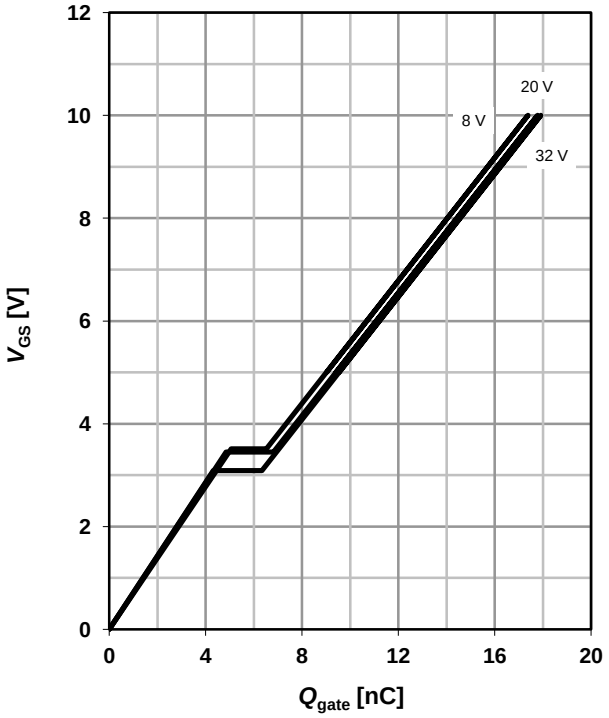
parameter: $T_{j(start)}$



14 Typ. gate charge

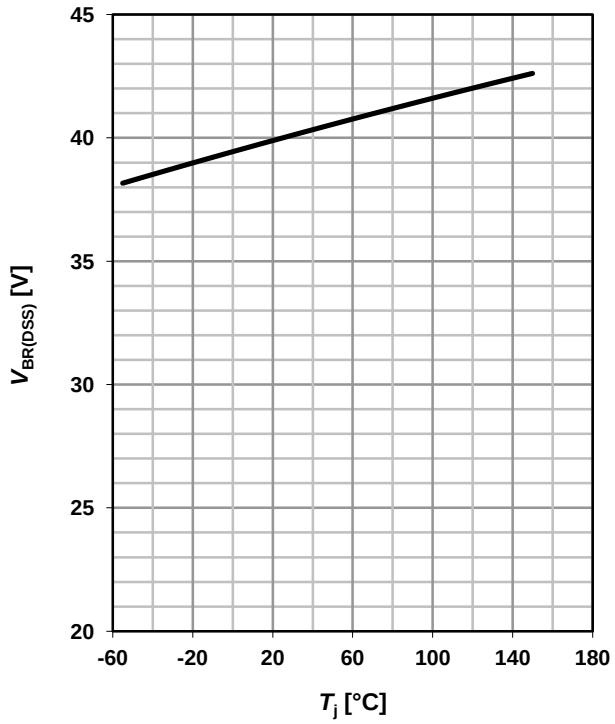
V_{GS}=f(Q_{gate}); I_D=30 A pulsed

parameter: V_{DD}

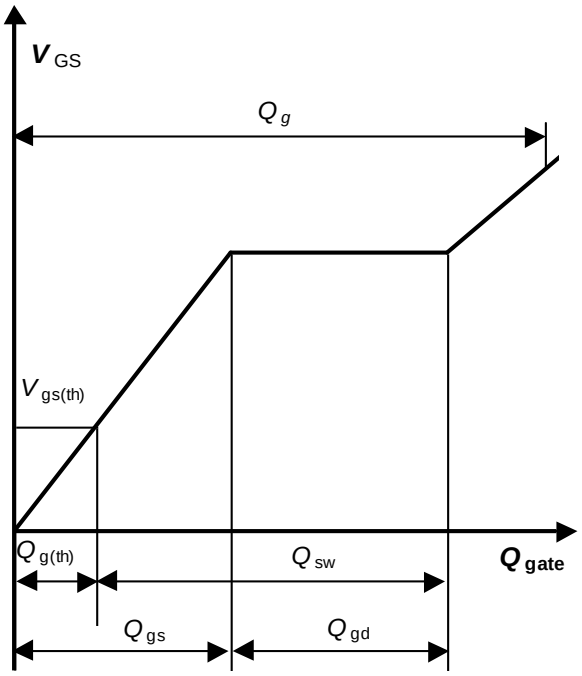


15 Drain-source breakdown voltage

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

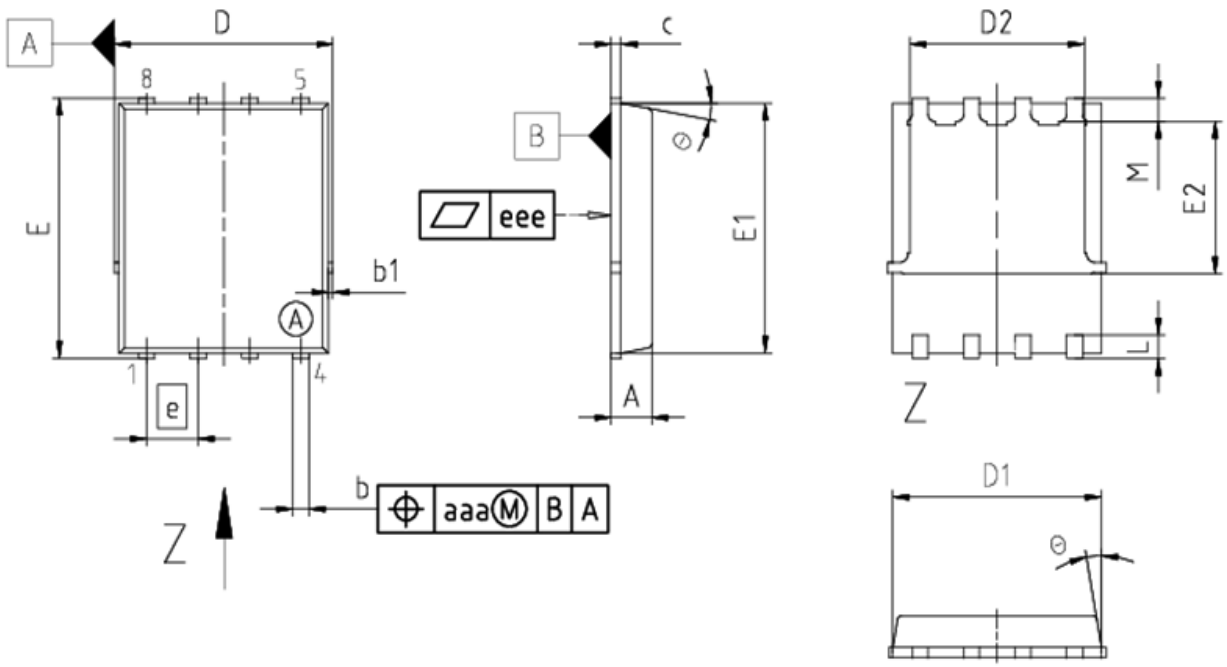


16 Gate charge waveforms



Package Outline **PG-TDSON-8**

PG-TDSON-8: Outline



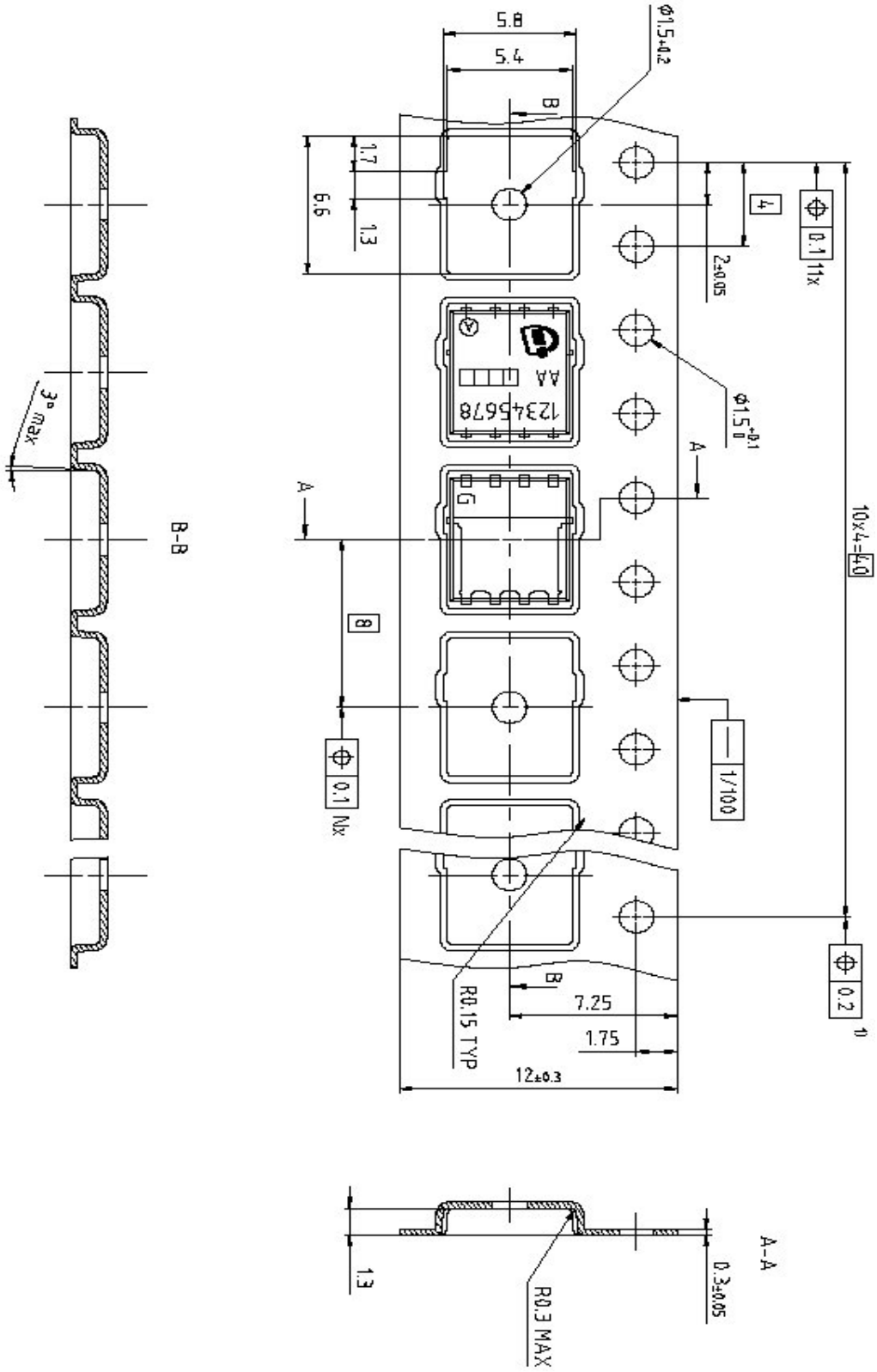
DIM	MILLIMETERS	
	MIN	MAX
A	0.90	1.10
b	0.31	0.54
b1	0.02	0.22
c	0.15	0.35
D	5.15	5.49
D1	4.95	5.35
D2	3.70	4.40
E	5.95	6.35
E1	5.70	6.10
E2	3.40	3.80
e	1.27	
N	8	
L	0.45	0.71
M	0.45	0.75
Θ	8.5°	12°
aaa	0.25	
eee	0.08	

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

Footprint

Package Outline

PG-TDSON-8: Tape



Dimensions in mm

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