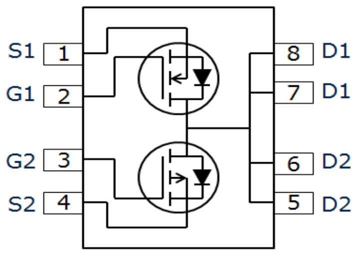
OptiMOS™ 2 + OptiMOS™P 2 Small Signal Transistor

Features

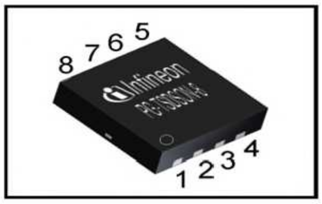
- Complementary P + N channel
- Enhancement mode
- Super Logic level (2.5V rated)
- Common drain
- Avalanche rated
- 175 °C operating temperature
- Qualified according to AEC Q101
- 100% lead-free; RoHS compliant
- Halogen-free according to IEC61246-21

Product Summary

		P	N	
V_{DS}		-20	20	V
$R_{DS(on),max}$	V_{GS}=±4.5 V	150	55	mΩ
	V_{GS}=±2.5 V	310	95	
I_D		-3.2	5.1	A



PG-TSDSON-8



Type	Package	Marking	Lead Free	Halogen Free	Packing
BSZ15DC02KD H	PG-TSDSON-8	15DC02K	Yes	Yes	Non dry

Maximum ratings, at T_A=25 °C, unless otherwise specified [1)]

Parameter	**Symbol**	**Conditions**	**Value**		**Unit**
			P	**N**	
Continuous drain current	I_D	T_A=25 °C	-3.2	5.1	A
		T_A=100 °C	-2.2	3.6	
Pulsed drain current	$I_{D,pulse}$	T_A=25 °C	-13	20	
Avalanche energy, single pulse	E_{AS}	P: I_D=-3.2 A, N: I_D=5.1 A, R_{GS}=25 Ω	11	11	mJ
Gate source voltage	V_{GS}		±12		V
Power dissipation	P_{tot} [2)]	T_A=25 °C	2.5		W
Operating and storage temperature	T_j, T_{stg}		-55 ... 175		°C
ESD class		JESD22-A114-HBM	0 (<250V)		
Soldering temperature	T_{solder}		260		°C
IEC climatic category; DIN IEC 68-1			55/175/56		

[1)] Remark: only one of both transistors active

Parameter		Symbol	Conditions	Values			Unit
				min.	typ.	max.	
Thermal characteristics							
Thermal resistance, junction - case	P N	R_{thJC}		-	-	8	K/W
Device on PCB		R_{thJA}	6 cm^2 cooling area[2)]	-	-	60	K/W

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

Parameter		Symbol	Conditions	min.	typ.	max.	Unit
Static characteristics							
Drain-source breakdown voltage	P	$V_{(BR)DSS}$	V_{GS}=0 V, I_D=-250 µA	-	-	-20	V
	N		V_{GS}=0 V, I_D=250 µA	20	-	-	
Gate threshold voltage	P	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-110 µA	-1.4	-1.0	-0.7	
	N		V_{DS}=V_{GS}, I_D=110 µA	0.8	1.1	1.4	
Zero gate voltage drain current	P	I_{DSS}	V_{DS}=-20 V, V_{GS}=0 V, T_j=25 °C	-	-	-0.1	µA
	N		V_{DS}=20 V, V_{GS}=0 V, T_j=25 °C	-	-	0.1	
	P		V_{DS}=-20 V, V_{GS}=0 V, T_j=175 °C	-	-	-50	
	N		V_{DS}=20 V, V_{GS}=0 V, T_j=175 °C	-	-	50	
Gate-source leakage current	P N	I_{GSS}	V_{GS}=±12 V, V_{DS}=0 V	-	-	±100	nA
Drain-source on-state resistance	P	$R_{DS(on)}$	V_{GS}=-2.5 V, I_D=2.1 A	-	164	310	mΩ
	N		V_{GS}=2.5 V, I_D=1.9 A	-	63	95	
	P		V_{GS}=-4.5 V, I_D=-3.2 A	-	97	150	
	N		V_{GS}=4.5 V, I_D=5.1 A	-	41	55	
Transconductance	P	g_{fs}	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=-2.2 A	3.4	6.9	-	S
	N		$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=3.6 A	5.5	11	-	

[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.

Parameter		Symbol	Conditions	Values			Unit
				min.	typ.	max.	
Dynamic characteristics							
Input capacitance	P	C_{iss}	V_{GS}=0 V, P: V_{DS}=-10 V, N: V_{DS}= 10 V, f=1 MHz	-	270	360	pF
	N			-	315	419	
Output capacitance	P	C_{oss}		-	110	150	
	N			-	114	152	
Reverse transfer capacitance	P	C_{rss}		-	94	140	
	N			-	16	24	
Turn-on delay time	P	$t_{d(on)}$	P: V_{DD}=-10 V, V_{GS}=-4.5 V, R_G=6 Ω, I_D=-3.2 A N: V_{DD}=10 V, V_{GS}=4.5 V, R_G=6 Ω, I_D=5.1 A	-	7.4	-	ns
	N			-	4.9	-	
Rise time	P	t_r		-	3.7	-	
	N			-	2.0	-	
Turn-off delay time	P	$t_{d(off)}$		-	11.3	-	
	N			-	12.2	-	
Fall time	P	t_f		-	4.7	-	
	N			-	1.4	-	
Gate Charge Characteristics							
Gate to source charge	P	Q_{gs}	V_{DD}=-10 V, I_D=-3.2 A, V_{GS}=0 to -4.5 V	-	-0.59	-0.8	nC
Gate to drain charge		Q_{gd}		-	-1.4	-1.8	
Switching charge		Q_g		-	-3.0	-4.5	
Gate plateau voltage		$V_{plateau}$		-	-2.2	-	
Gate to source charge	N	Q_{gs}	V_{DD}=10 V, I_D=5.1 A, V_{GS}=0 to 4.5 V	-	0.7	1.0	
Gate to drain charge		Q_{gd}		-	0.4	-	
Switching charge		Q_g			2.1	2.8	
Gate plateau voltage		$V_{plateau}$			2.3		

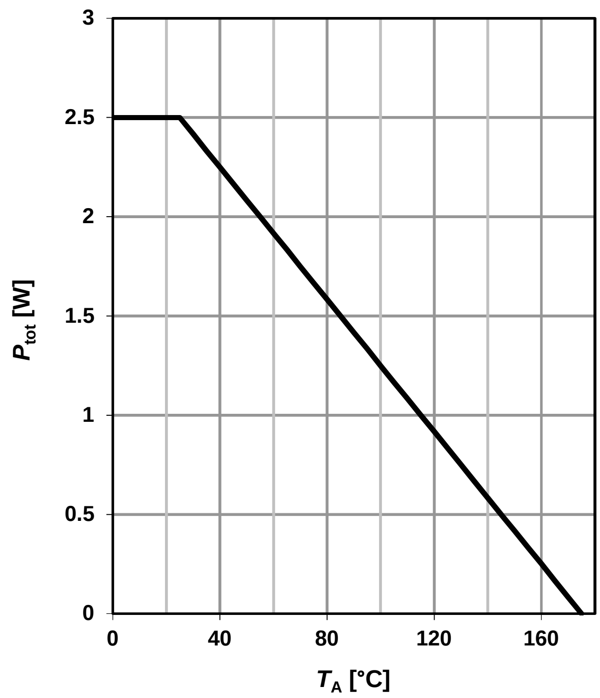
Parameter		Symbol	Conditions	Values			Unit
				min.	typ.	max.	

Reverse Diode

Parameter		Symbol	Conditions	min.	typ.	max.	Unit
Diode continuous forward current	P	I_S	T_C=25 °C	-	-	-2.1	A
	N					2.3	
Diode pulse current	P	$I_{S,pulse}$		-	-	-13	
	N					20	
Diode forward voltage	P	V_{SD}	V_{GS}=0 V, I_F=3.2 A, T_j=25 °C	-	-0.98	-1.2	V
	N		V_{GS}=0 V, I_F=5.1 A, T_j=25 °C	-	0.9	1.2	
Reverse recovery time	P	t_{rr}	V_R=±10 V, I_F=I_S, di_F/dt=100 A/µs		12.2		ns
	N			-	10.9	-	
Reverse recovery charge	P	Q_{rr}			4.6		nC
	N			-	3.4	-	

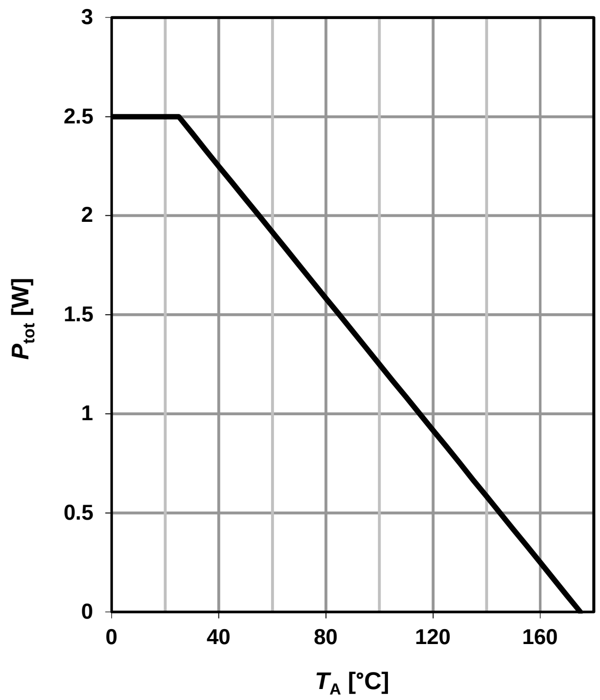
1 Power dissipation (P)

P_{tot}=f(T_A)



2 Power dissipation (N)

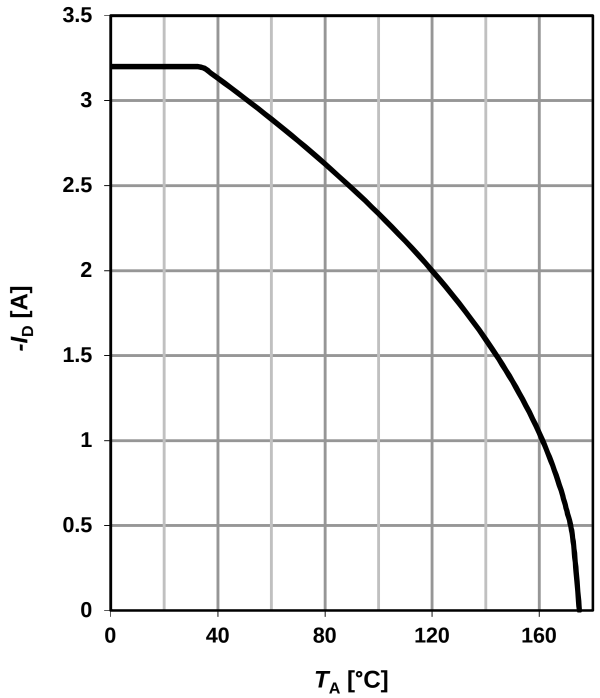
P_{tot}=f(T_A)



3 Drain current (P)

I_D=f(T_A)

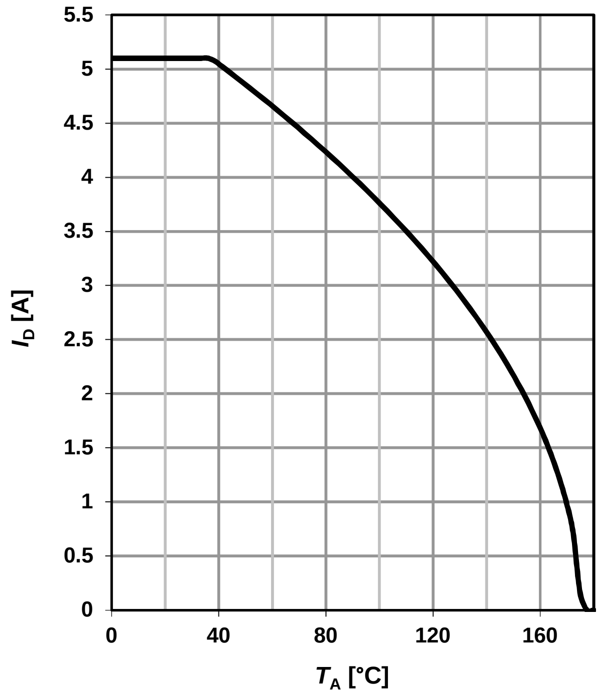
parameter: V_{GS}≤-4.5 V



4 Drain current (N)

I_D=f(T_A)

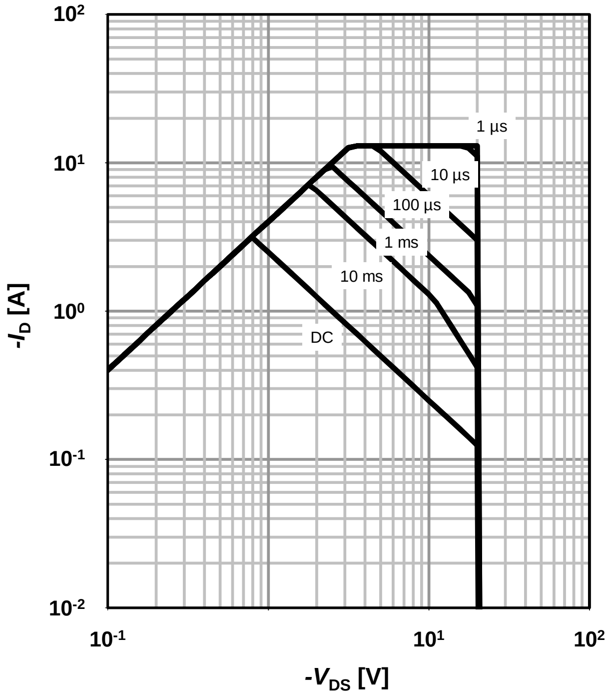
parameter: V_{GS}≥4.5 V



6 Safe operating area (P)

I_D=f(V_{DS}); T_A=25 °C; D=0

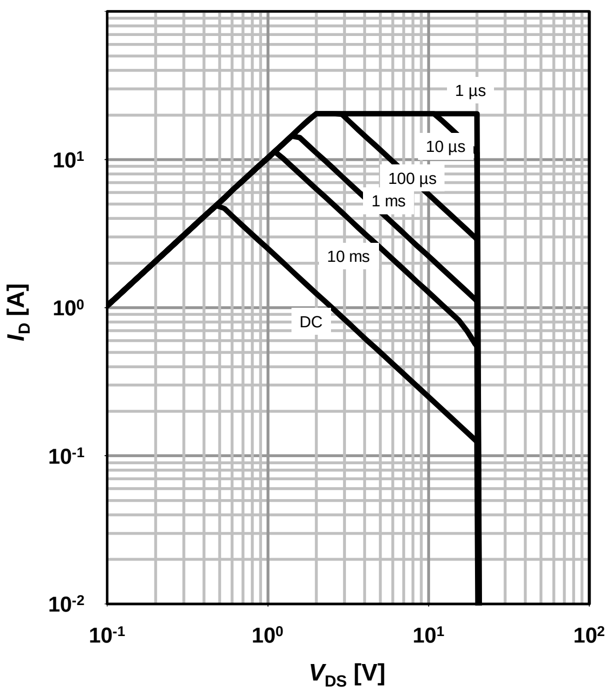
parameter: t_p



6 Safe operating area (N)

I_D=f(V_{DS}); T_A=25 °C; D=0

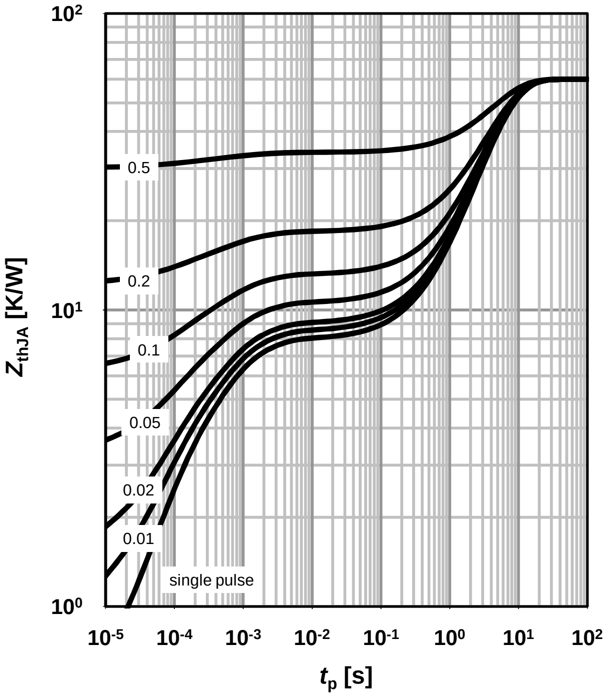
parameter: t_p



7 Max. transient thermal impedance (P)

Z_{thJA}=f(t_p)

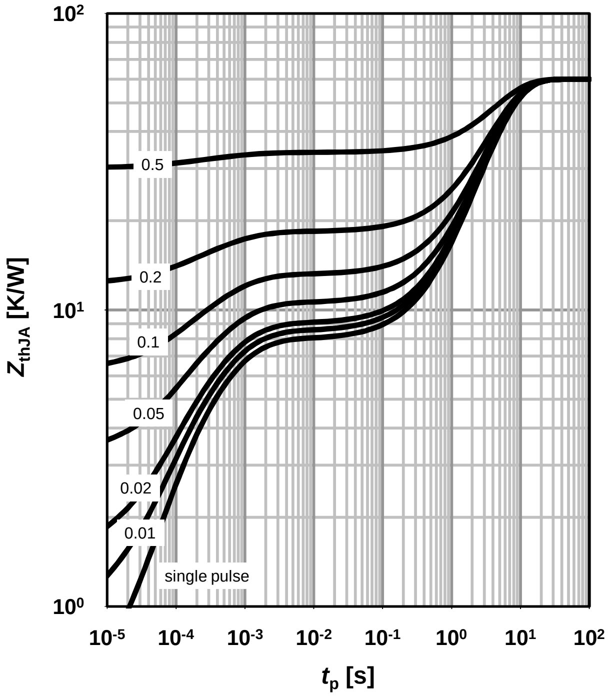
parameter: D=t_p/T



8 Max. transient thermal impedance (N)

Z_{thJA}=f(t_p)

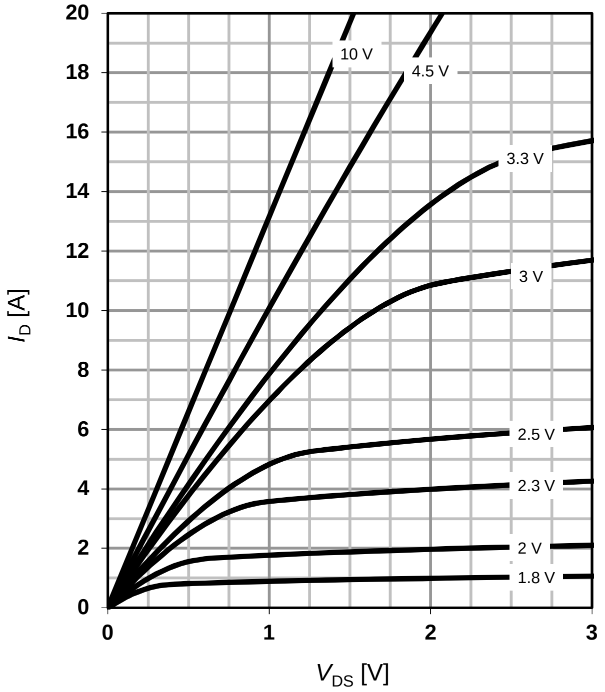
parameter: D=t_p/T



10 Typ. Output characteristics (P)

I_D=f(V_{DS}); T_j=25 °C

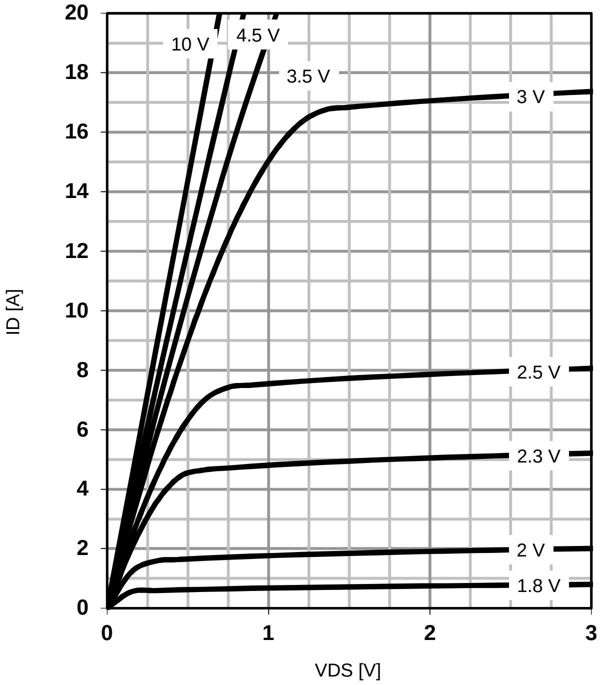
parameter: V_{GS}



10 Typ. output characteristics (N)

I_D=f(V_{DS}); T_j=25 °C

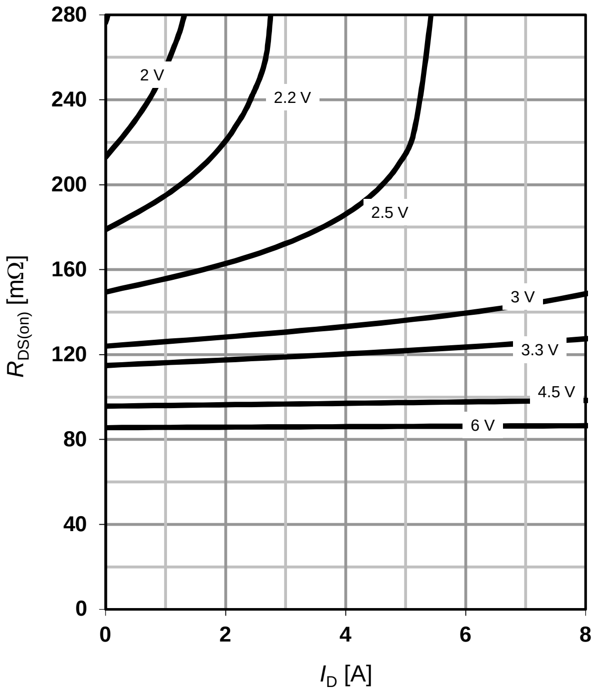
parameter: V_{GS}



11 Typ. drain-source on resistance (P)

$R_{DS(on)}$=f(I_D); T_j=25 °C

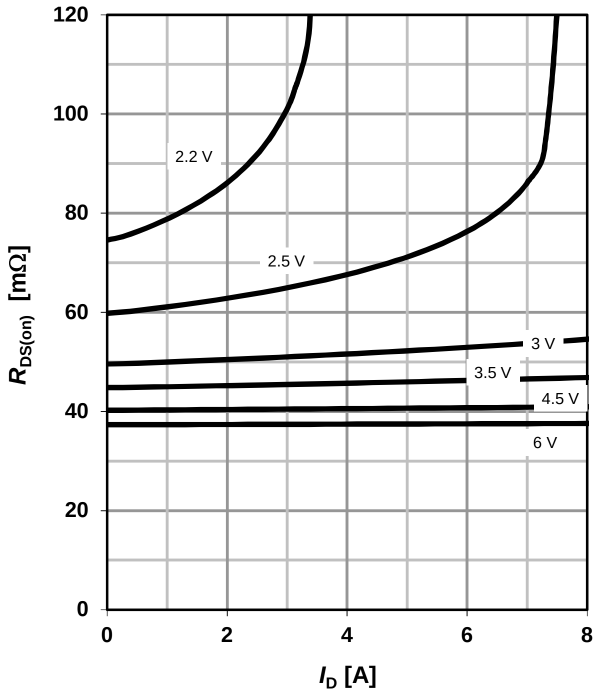
parameter: V_{GS}



12 Typ. drain-source on resistance (N)

$R_{DS(on)}$=f(I_D); T_j=25 °C

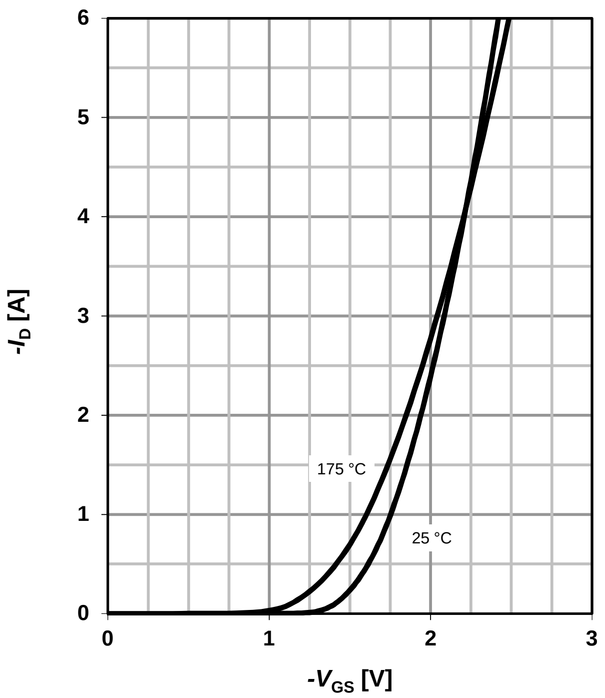
parameter: V_{GS}



14 Typ. Transfer characteristics (P)

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

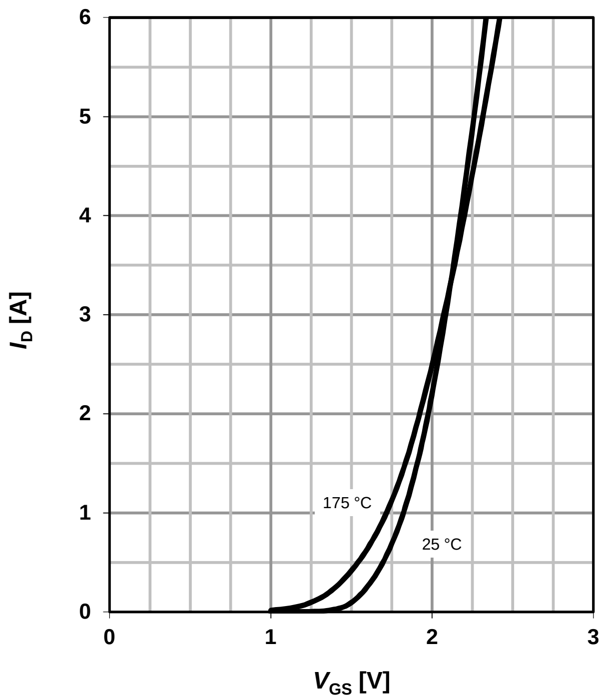
parameter: T_j



14 Typ. transfer characteristics (N)

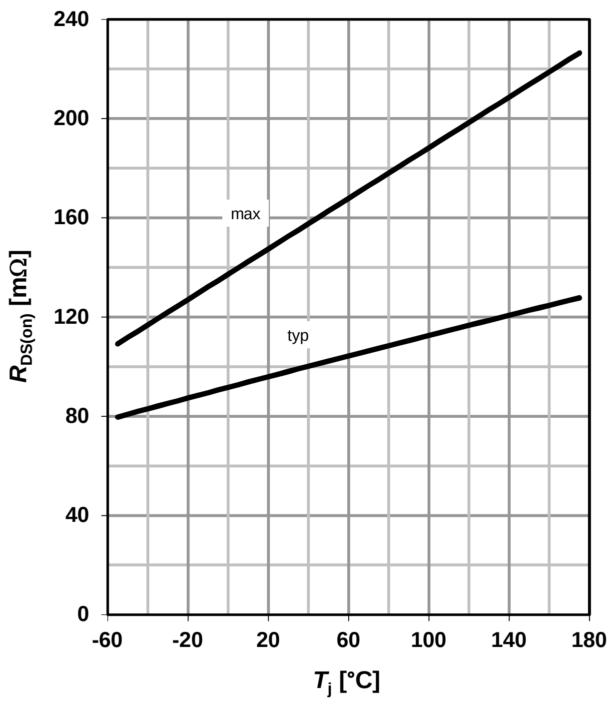
$I_D=f(V_{GS})$; $|V_{DS}|>2\ |I_D|\ R_{DS(on)max}$

parameter: T_j



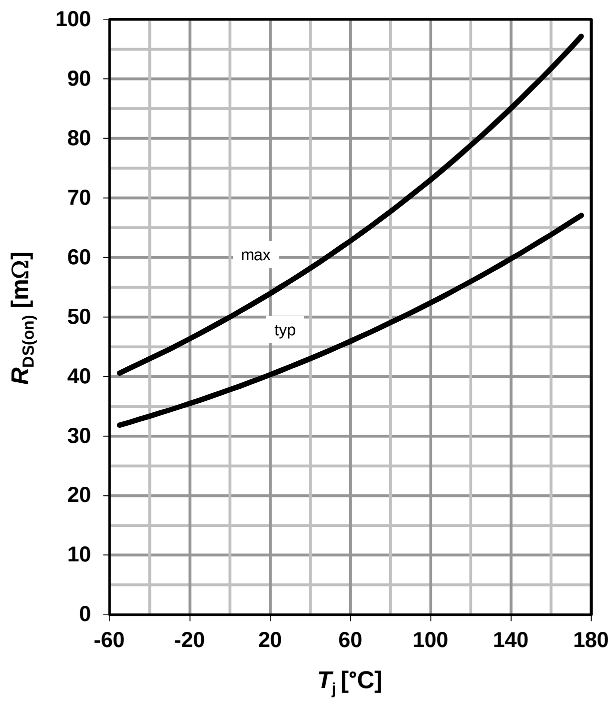
15 Drain-source on-state resistance (P)

$R_{DS(on)}=f(T_j)$; I_D=-3.2 A; V_{GS}=-4.5 V



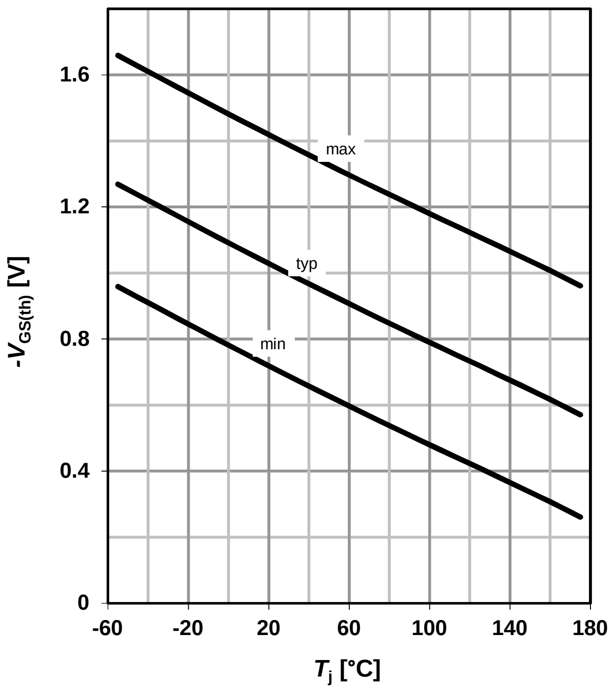
16 Drain-source on-state resistance (N)

$R_{DS(on)}=f(T_j)$; I_D=5.1A; V_{GS}=4.5 V



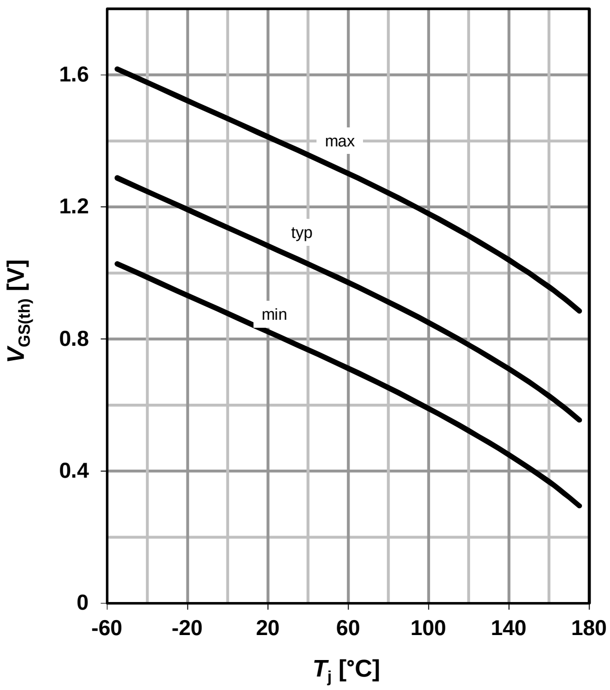
18 Typ. gate threshold voltage (P)

$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; I_D=-110 µA



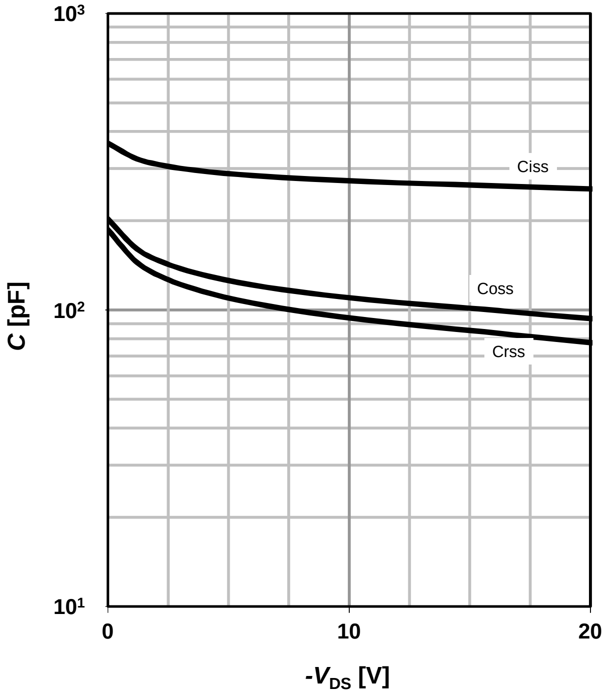
18 Typ. gate threshold voltage (N)

$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; I_D=110 µA



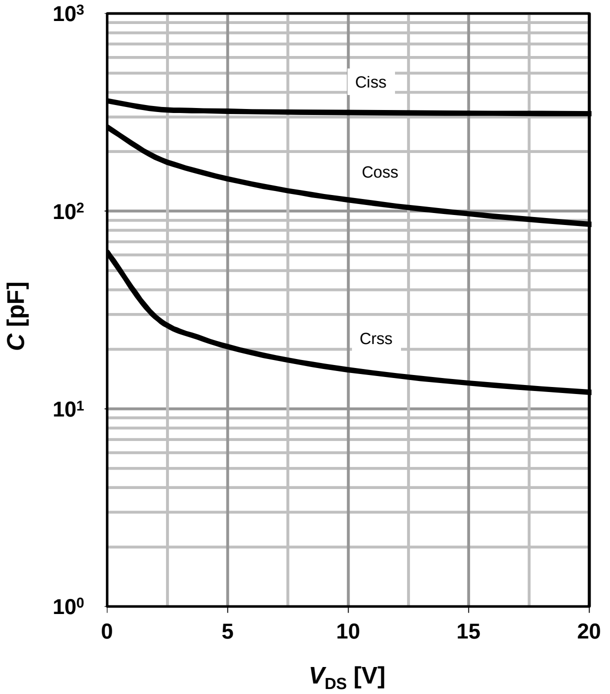
19 Typ. capacitances (P)

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



20 Typ. capacitances (N)

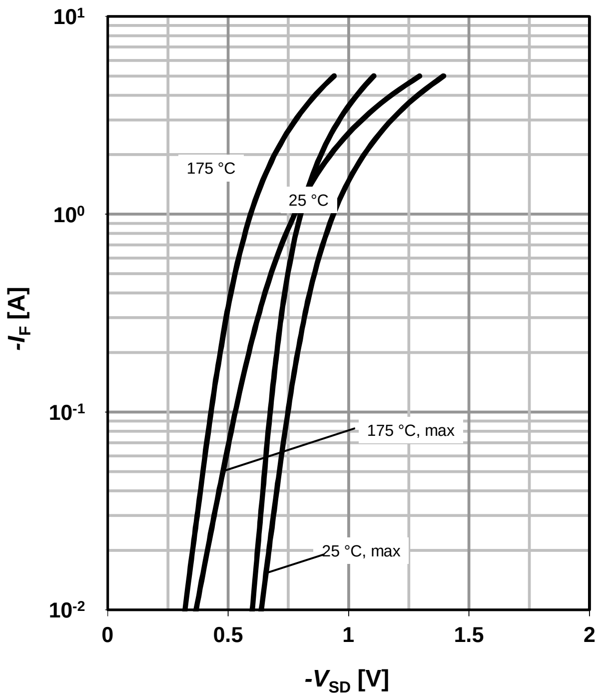
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz



22 Forward characteristics of reverse diode (P)

I_F=f(V_{SD})

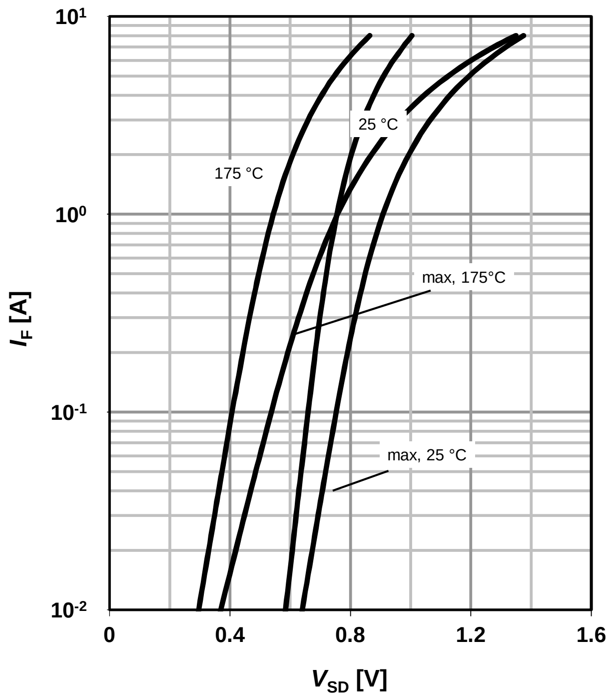
parameter: T_j



22 Forward characteristics of reverse diode (N)

I_F=f(V_{SD})

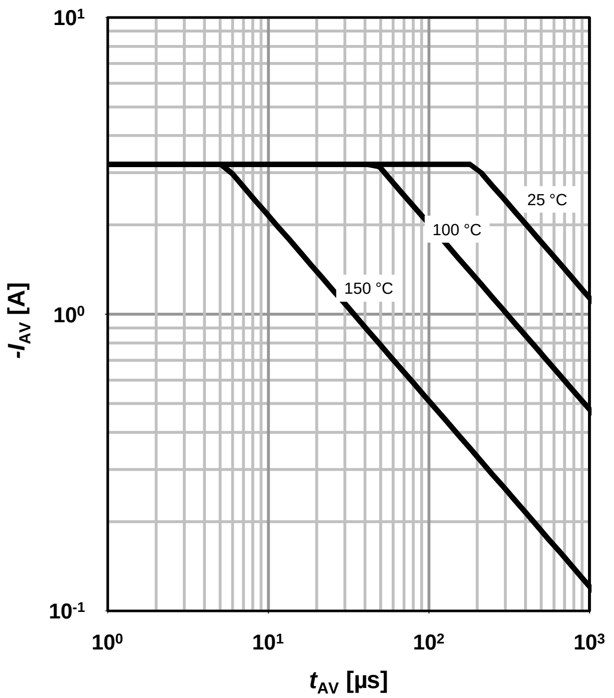
parameter: T_j



23 Avalanche characteristics (P)

I_{AS}=f(t_{AV}); R_{GS}=25 Ω

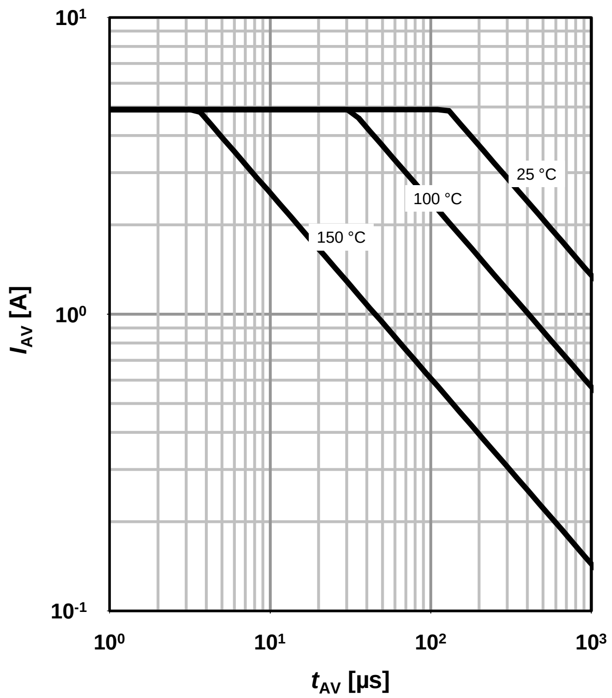
parameter: $T_{j(start)}$



24 Avalanche characteristics (N)

I_{AS}=f(t_{AV}); R_{GS}=25 Ω

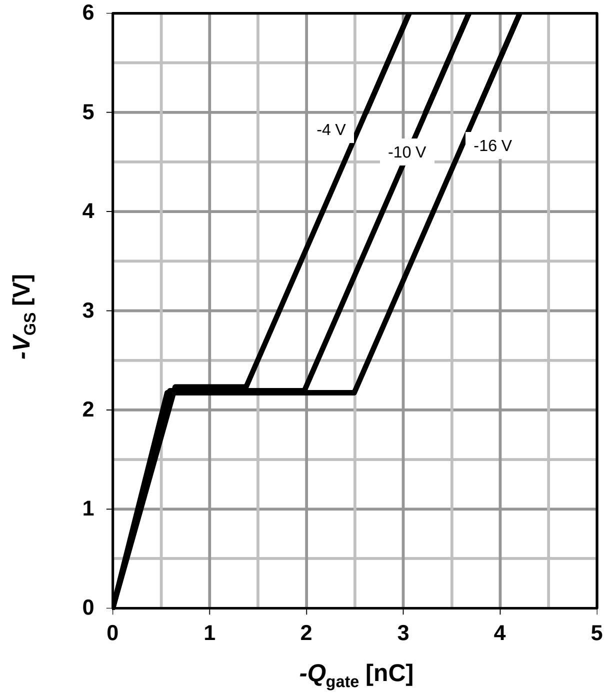
parameter: $T_{j(start)}$



26 Typ. gate charge (P)

V_{GS}=f(Q_{gate}); I_D=-3.2A pulsed

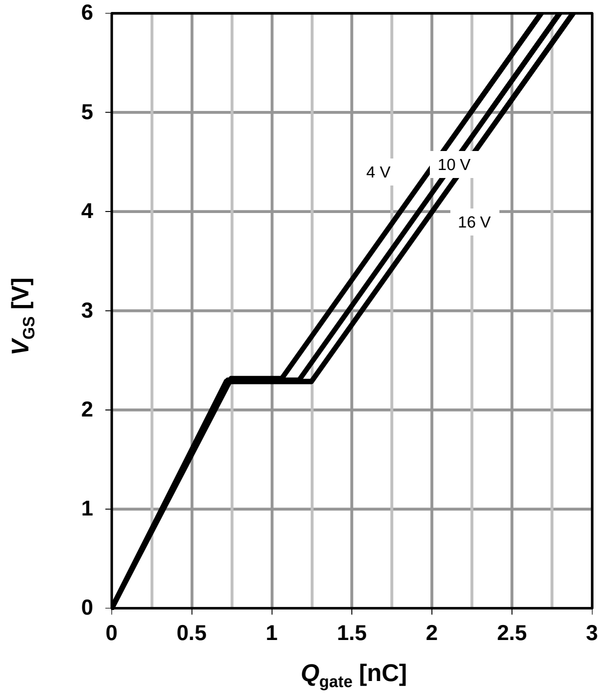
parameter: V_{DD}



26 Typ. gate charge (N)

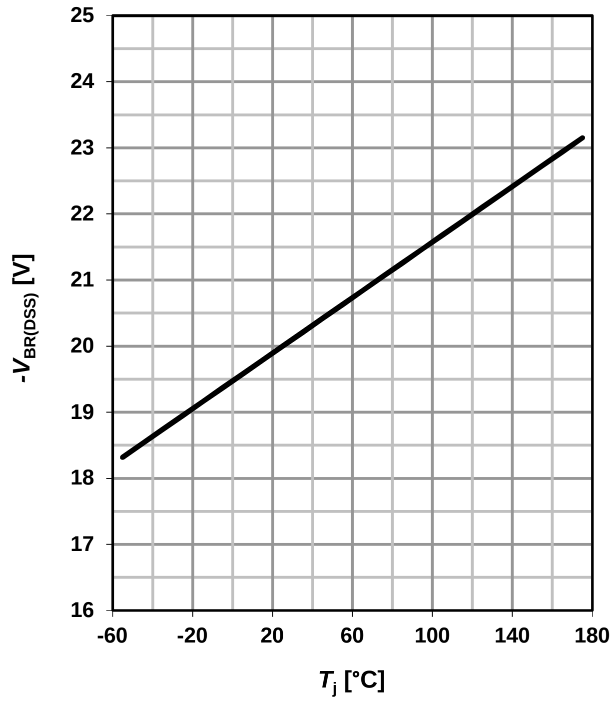
V_{GS}=f(Q_{gate}); I_D=5.1A pulsed

parameter: V_{DD}



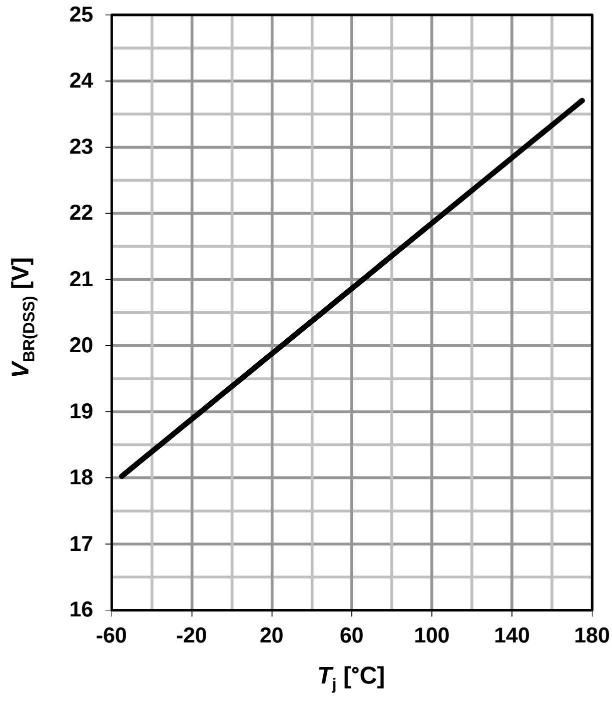
27 Drain-source breakdown voltage (P)

$V_{BR(DSS)}$=f(T_j); I_D=-250 µA

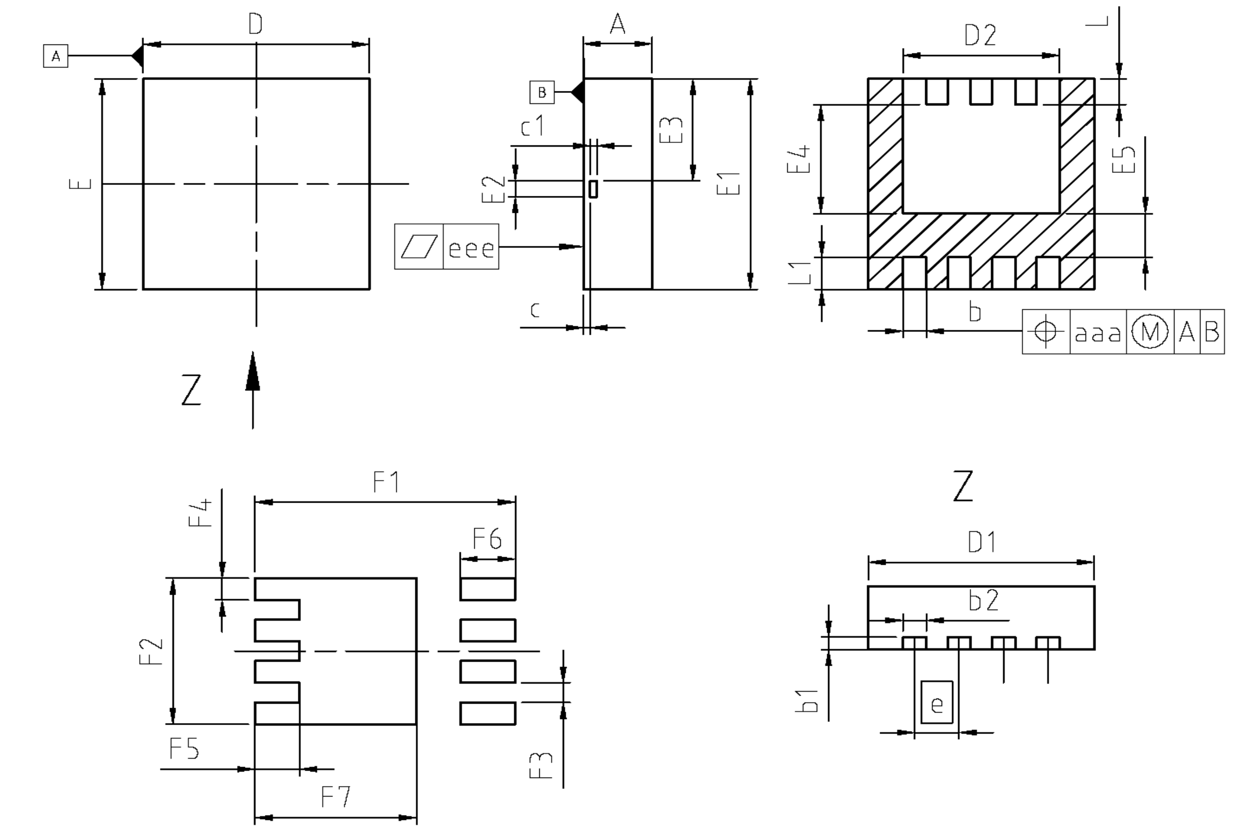


28 Drain-source breakdown voltage (N)

$V_{BR(DSS)}$=f(T_j); I_D=250 µA



Package Outline **PG-TSDSON-8**

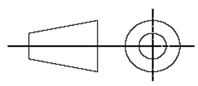


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.95	1.00	0.037	0.039
b	0.25	0.35	0.010	0.014
b1	0.10	0.30	0.004	0.012
b2	0.20	0.40	0.008	0.016
c	0.00	0.20	0.000	0.008
D=D1	3.20	3.40	0.126	0.134
D2	2.15	2.35	0.085	0.093
E=E1	3.20	3.40	0.126	0.134
E2	0.10	0.30	0.004	0.012
E3	1.35	1.55	0.053	0.061
E4	1.60	1.80	0.063	0.071
E5	0.66	0.86	0.026	0.034
e	0.60	0.70	0.024	0.028
N	8		8	
L	0.31	0.51	0.012	0.020
L1	0.33	0.53	0.013	0.021
aaa	0.25		0.010	
eee	0.05		0.002	
F1	3.70	3.90	0.146	0.154
F2	2.19	2.39	0.086	0.094
F3	0.21	0.41	0.008	0.016
F4	0.24	0.44	0.009	0.017
F5	0.55	0.75	0.022	0.030
F6	0.70	0.90	0.028	0.035
F7	2.26	2.46	0.089	0.097

DOCUMENT NO.
Z8B00131645

SCALE 0 2.5 5mm

EUROPEAN PROJECTION



ISSUE DATE
09-03-2007

REVISION
01

Revision History

BSZ15DC02KD H

Revision: 2019-01-30, Rev. 2.3

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.3	2019-01-30	Update Marking

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