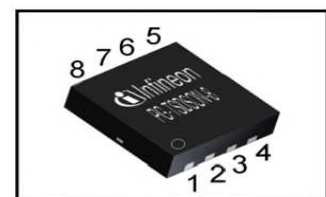
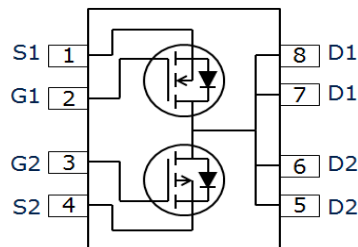


OptiMOS™ 2 + OptiMOS™ P 2 Small Signal Transistor
Features

- 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
$R_{DS(on),max}$	$V_{GS}=\pm 4.5\text{ V}$	150	55	mΩ
	$V_{GS}=\pm 2.5\text{ V}$	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 $T_A=25\text{ °C}$, unless otherwise specified ¹⁾

Parameter	Symbol	Conditions	Value		Unit
			P	N	
Continuous drain current	I_D	$T_A=25\text{ °C}$	-3.2	5.1	A
		$T_A=100\text{ °C}$	-2.2	3.6	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ °C}$	-13	20	
Avalanche energy, single pulse	E_{AS}	P: $I_D=-3.2\text{ A}$, N: $I_D=5.1\text{ A}$, $R_{GS}=25\text{ }\Omega$	11	11	mJ
Gate source voltage	V_{GS}		± 12		V
Power dissipation	P_{tot} ²⁾	$T_A=25\text{ °C}$	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	R_{thJC}		-	-	8	K/W
	N						
Device on PCB		R_{thJA}	6 cm ² cooling area ²⁾	-	-	60	K/W

Electrical characteristics, at $T_j=25\text{ °C}$, unless otherwise specified
Static characteristics

Drain-source breakdown voltage	P	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=-250\text{ }\mu\text{A}$	-	-	-20	V
	N		$V_{GS}=0\text{ V}, I_D=250\text{ }\mu\text{A}$	20	-	-	
Gate threshold voltage	P	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-110\text{ }\mu\text{A}$	-1.4	-1.0	-0.7	
	N		$V_{DS}=V_{GS}, I_D=110\text{ }\mu\text{A}$	0.8	1.1	1.4	
Zero gate voltage drain current	P	I_{DSS}	$V_{DS}=-20\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$	-	-	-0.1	μA
	N		$V_{DS}=20\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$	-	-	0.1	
	P		$V_{DS}=-20\text{ V}, V_{GS}=0\text{ V}, T_j=175\text{ °C}$	-	-	-50	
	N		$V_{DS}=20\text{ V}, V_{GS}=0\text{ V}, T_j=175\text{ °C}$	-	-	50	
Gate-source leakage current	P	I_{GSS}	$V_{GS}=\pm 12\text{ V}, V_{DS}=0\text{ V}$	-	-	± 100	nA
	N						
Drain-source on-state resistance	P	$R_{DS(on)}$	$V_{GS}=-2.5\text{ V}, I_D=2.1\text{ A}$	-	164	310	m Ω
	N		$V_{GS}=2.5\text{ V}, I_D=1.9\text{ A}$	-	63	95	
	P		$V_{GS}=-4.5\text{ V}, I_D=-3.2\text{ A}$	-	97	150	
	N		$V_{GS}=4.5\text{ V}, I_D=5.1\text{ A}$	-	41	55	
Transconductance	P	g_{fs}	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=-2.2\text{ A}$	3.4	6.9	-	S
	N		$ V_{DS} >2 I_D R_{DS(on)max}, I_D=3.6\text{ 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}	$V_{GS}=0\text{ V}$, P: $V_{DS}=-10\text{ V}$, N: $V_{DS}=10\text{ V}$, $f=1\text{ MHz}$	-	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: $V_{DD}=-10\text{ V}$, $V_{GS}=-4.5\text{ V}$, $R_G=6\ \Omega$, $I_D=-3.2\text{ A}$ N: $V_{DD}=10\text{ V}$, $V_{GS}=4.5\text{ V}$, $R_G=6\ \Omega$, $I_D=5.1\text{ A}$	-	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}	$V_{DD}=-10\text{ V}$, $I_D=-3.2\text{ A}$, $V_{GS}=0\text{ to }-4.5\text{ V}$	-	-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}		$V_{DD}=10\text{ V}$, $I_D=5.1\text{ A}$, $V_{GS}=0\text{ to }4.5\text{ V}$	-	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		

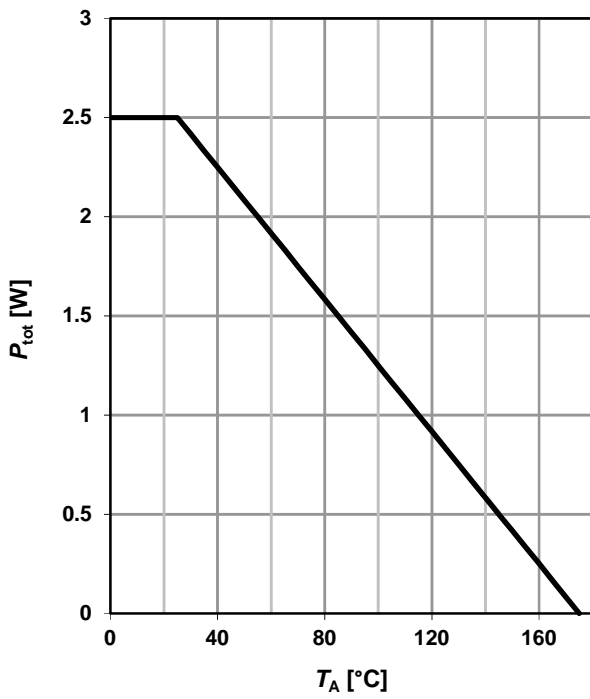
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Reverse Diode

Diode continuous forward current	P	I_S	$T_C=25\text{ °C}$	-	-	-2.1	A		
	N					2.3			
Diode pulse current	P	$I_{S,pulse}$		-	-	-13			
	N					20			
Diode forward voltage	P	V_{SD}		$V_{GS}=0\text{ V}, I_F=3.2\text{ A},$ $T_j=25\text{ °C}$	-	-0.98		-1.2	V
	N			$V_{GS}=0\text{ V}, I_F=5.1\text{ A},$ $T_j=25\text{ °C}$	-	0.9		1.2	
Reverse recovery time	P	t_{rr}	$V_R=\pm 10\text{ V}, I_F=I_S,$ $di_F/dt=100\text{ A}/\mu\text{s}$		12.2		ns		
	N			-	10.9	-			
Reverse recovery charge	P	Q_{rr}			4.6			nC	
	N			-	3.4	-			

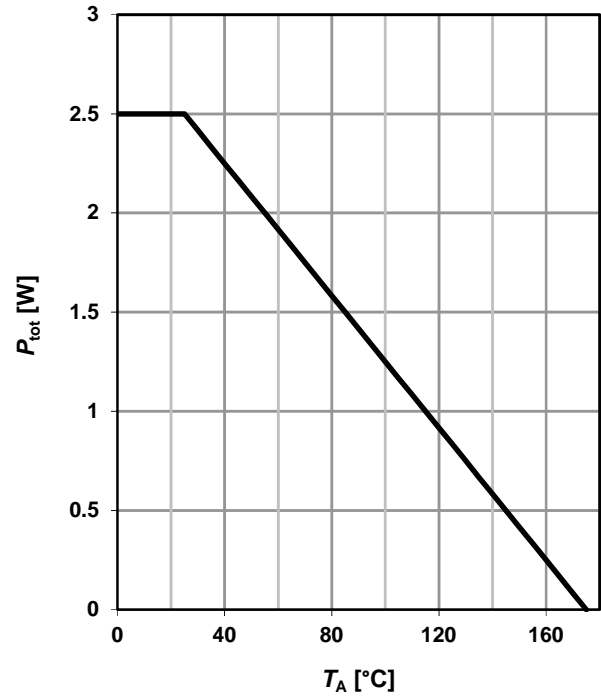
1 Power dissipation (P)

$P_{tot}=f(T_A)$



2 Power dissipation (N)

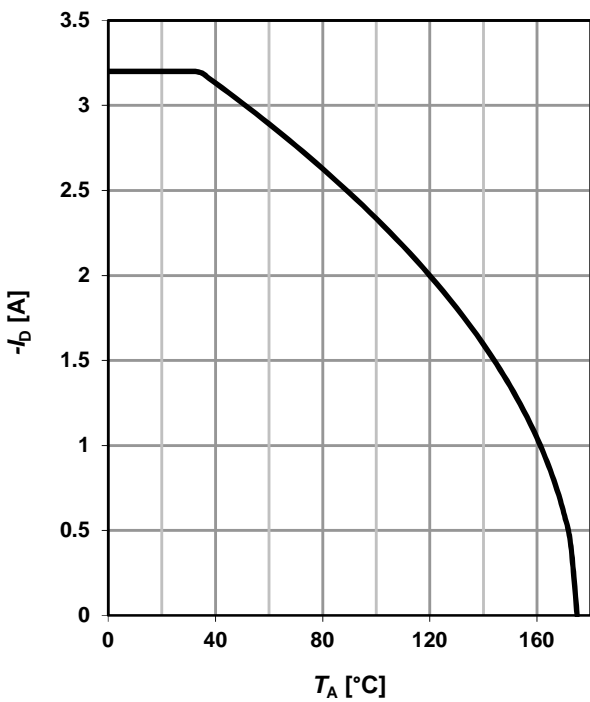
$P_{tot}=f(T_A)$



3 Drain current (P)

$I_D=f(T_A)$

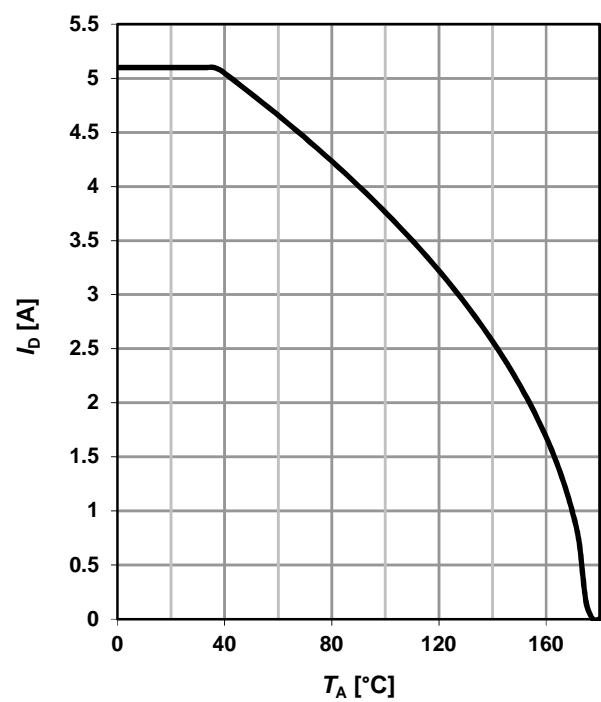
parameter: $V_{GS} \leq -4.5$ V



4 Drain current (N)

$I_D=f(T_A)$

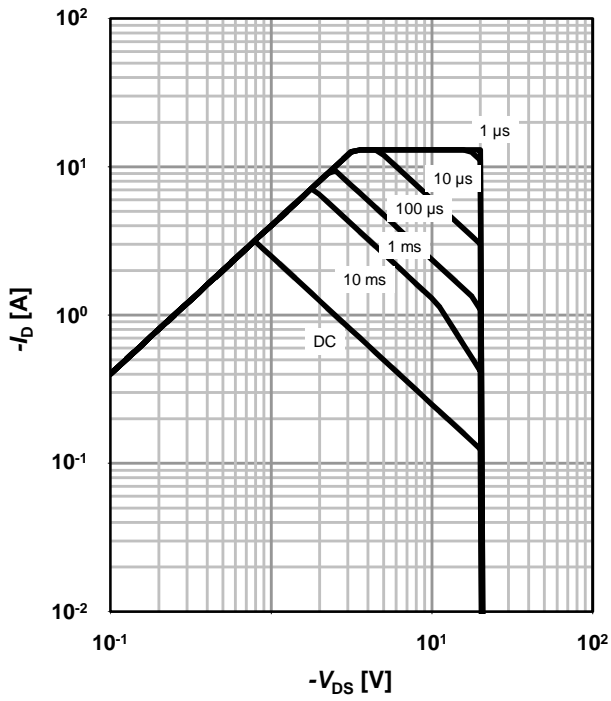
parameter: $V_{GS} \geq 4.5$ V



6 Safe operating area (P)

$I_D=f(V_{DS}); T_A=25\text{ }^\circ\text{C}; D=0$

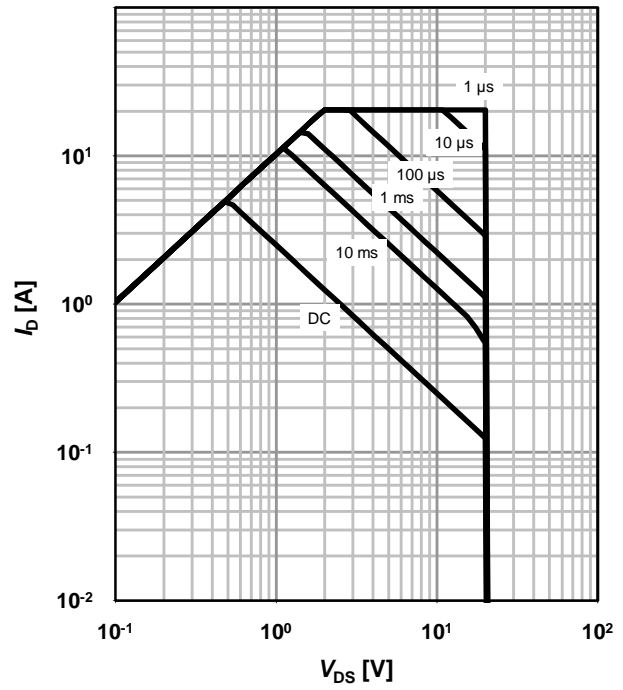
parameter: t_p



6 Safe operating area (N)

$I_D=f(V_{DS}); T_A=25\text{ }^\circ\text{C}; D=0$

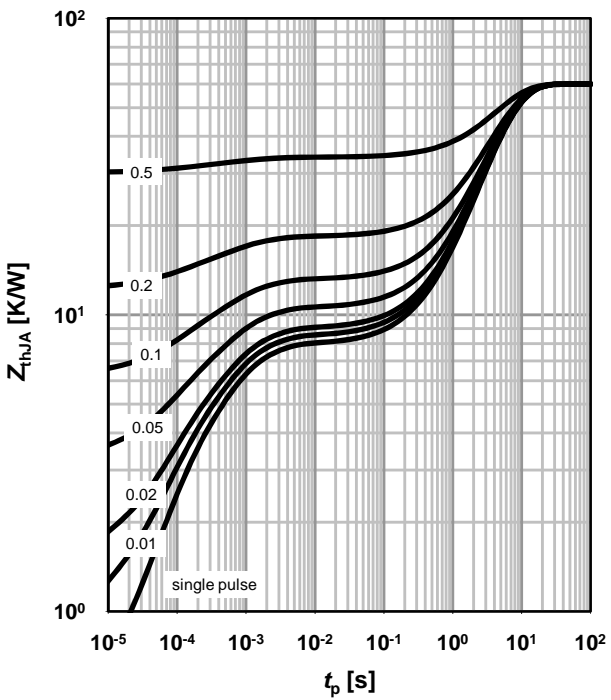
parameter: t_p



7 Max. transient thermal impedance (P)

$Z_{thJA}=f(t_p)$

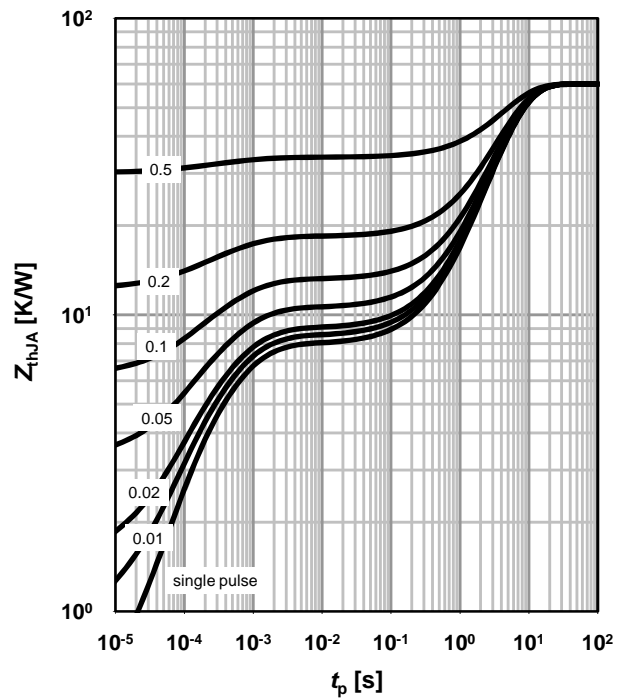
parameter: $D=t_p/T$



8 Max. transient thermal impedance (N)

$Z_{thJA}=f(t_p)$

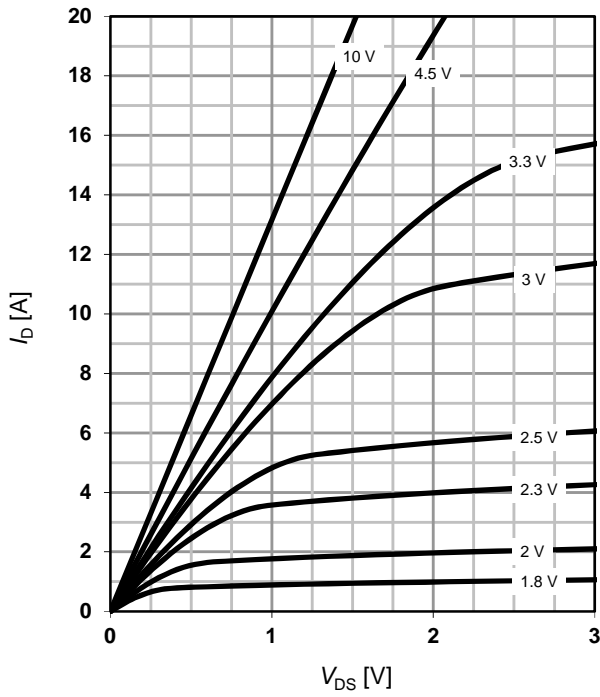
parameter: $D=t_p/T$



10 Typ. Output characteristics (P)

$I_D=f(V_{DS}); T_j=25\text{ }^\circ\text{C}$

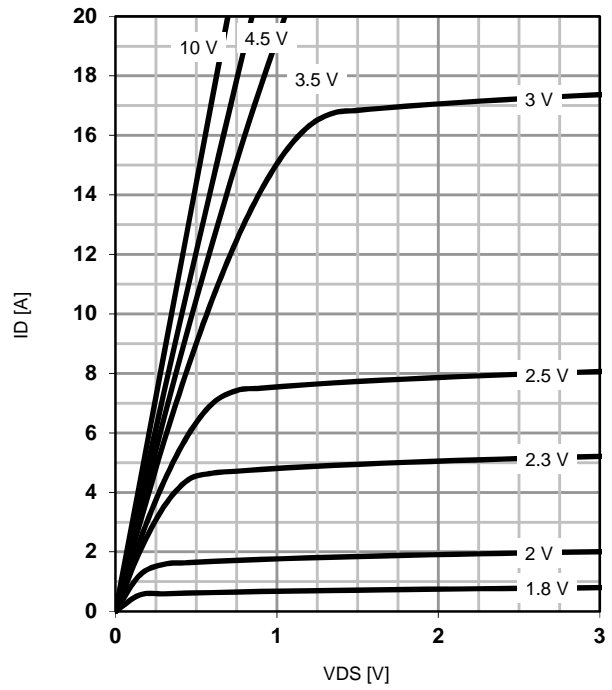
parameter: V_{GS}



10 Typ. output characteristics (N)

$I_D=f(V_{DS}); T_j=25\text{ }^\circ\text{C}$

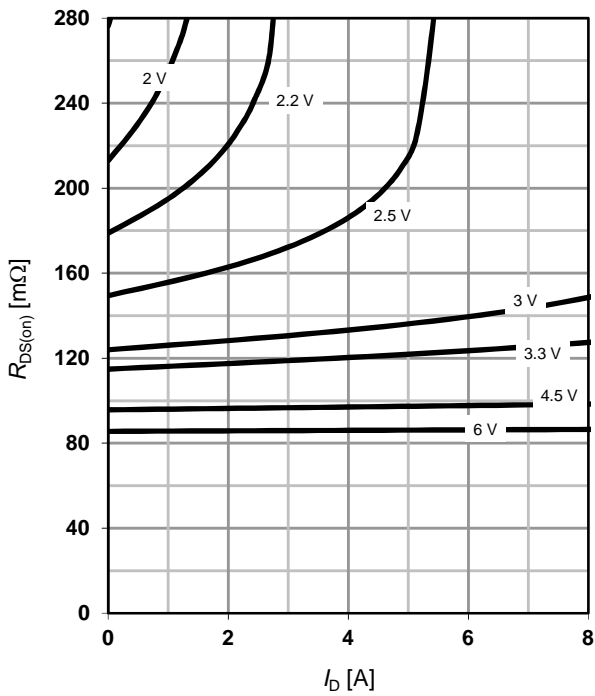
parameter: V_{GS}



11 Typ. drain-source on resistance (P)

$R_{DS(on)}=f(I_D); T_j=25\text{ }^\circ\text{C}$

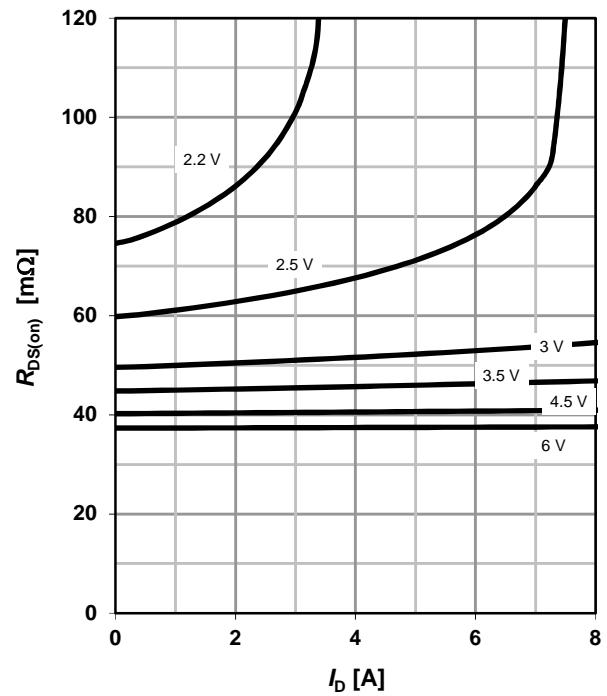
parameter: V_{GS}



12 Typ. drain-source on resistance (N)

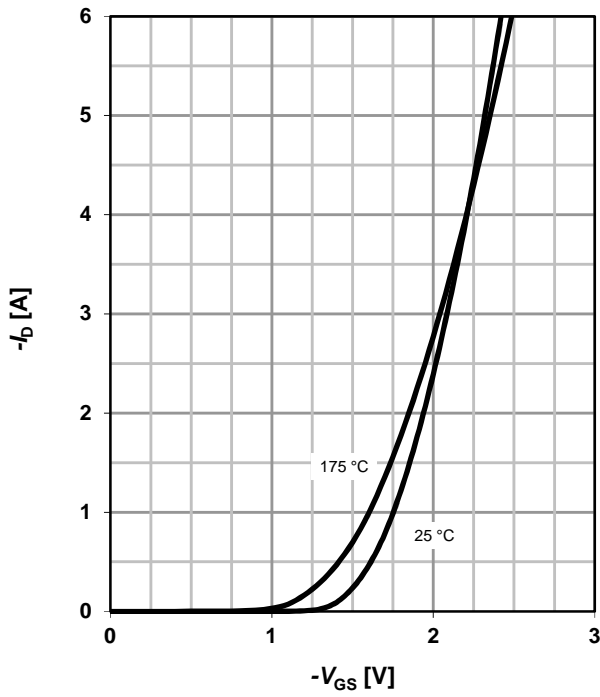
$R_{DS(on)}=f(I_D); T_j=25\text{ }^\circ\text{C}$

parameter: V_{GS}

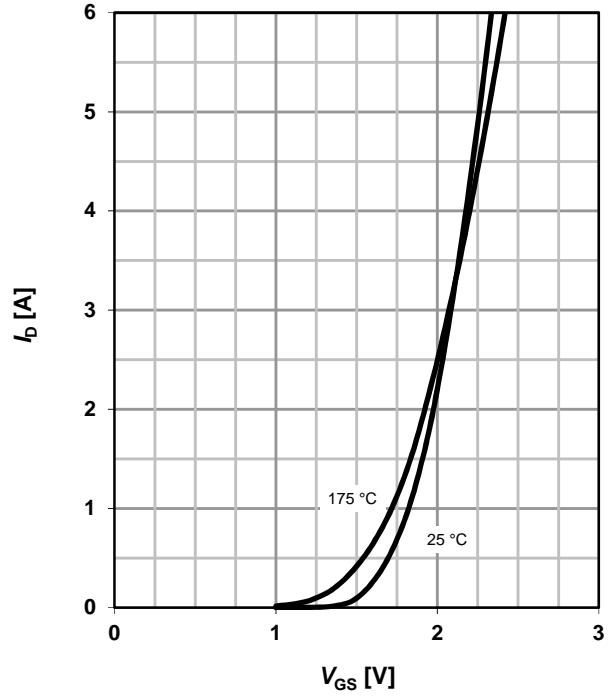


14 Typ. Transfer characteristics (P)

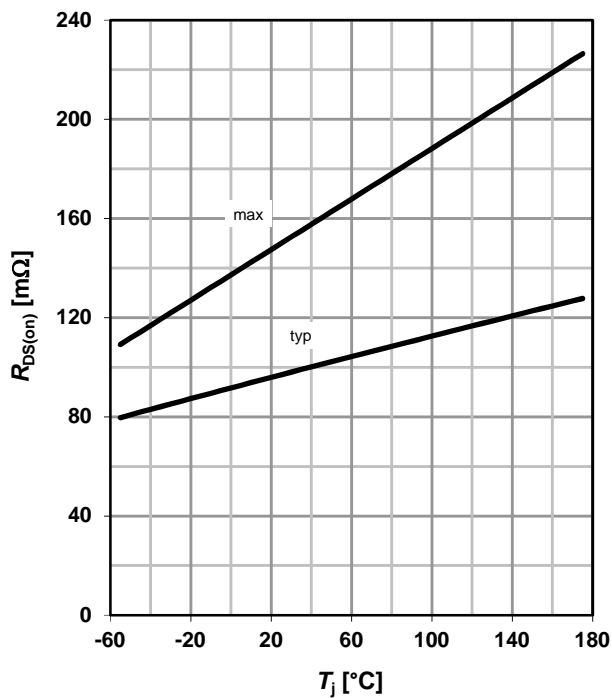
$$I_D = f(V_{GS}); |V_{DS}| > 2 |I_D| R_{DS(on)max}$$

 parameter: T_j

14 Typ. transfer characteristics (N)

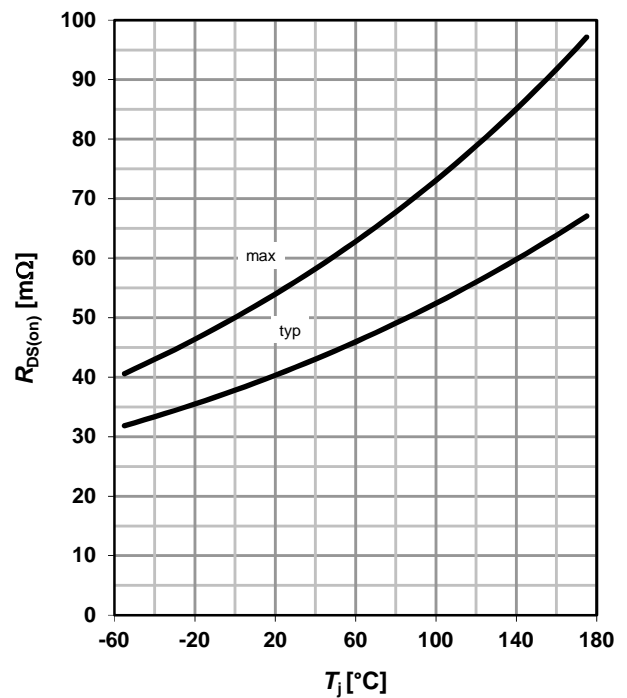
$$I_D = f(V_{GS}); |V_{DS}| > 2 |I_D| R_{DS(on)max}$$

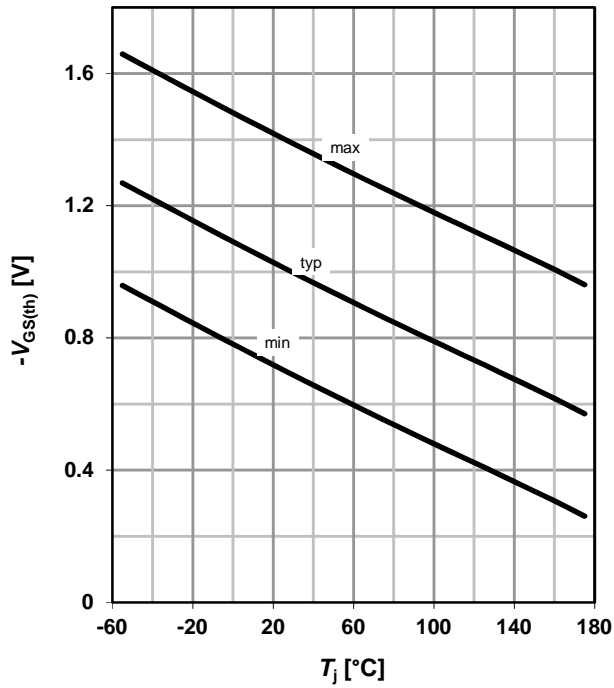
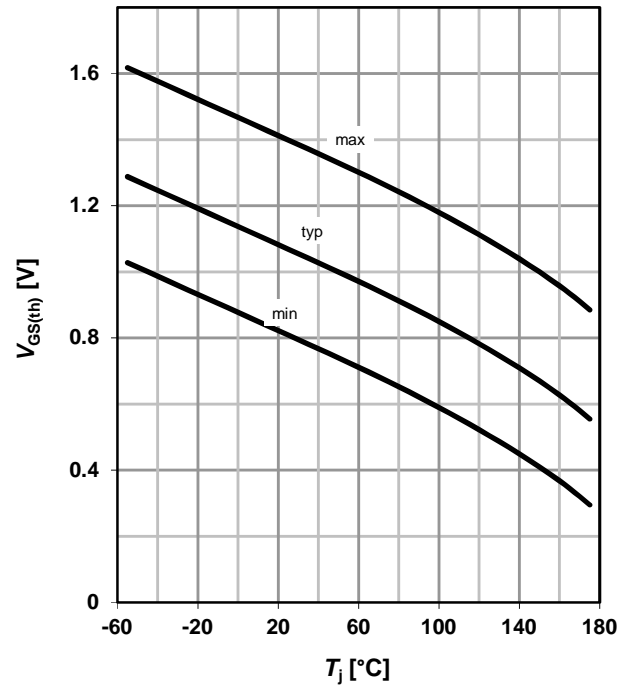
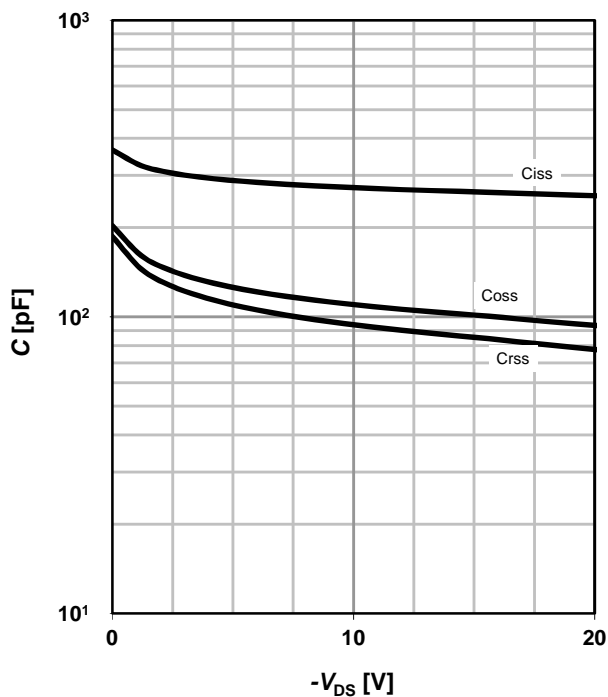
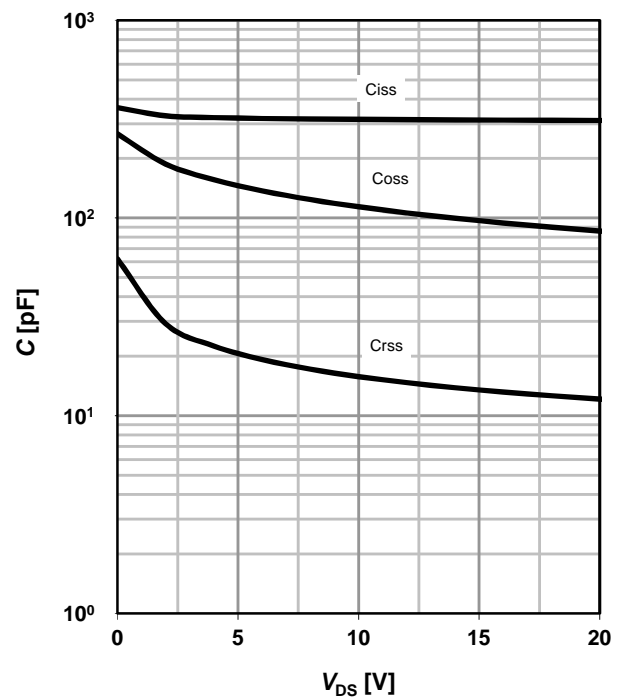
 parameter: T_j

15 Drain-source on-state resistance (P)

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


16 Drain-source on-state resistance (N)

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

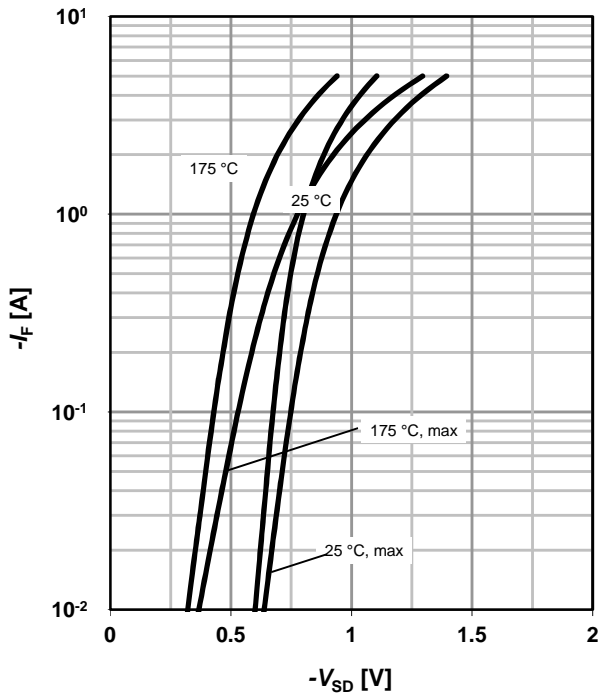


18 Typ. gate threshold voltage (P)
 $V_{GS(th)}=f(T_j); V_{GS}=V_{DS}; I_D=-110 \mu A$

18 Typ. gate threshold voltage (N)
 $V_{GS(th)}=f(T_j); V_{GS}=V_{DS}; I_D=110 \mu A$

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)

$I_F=f(V_{SD})$

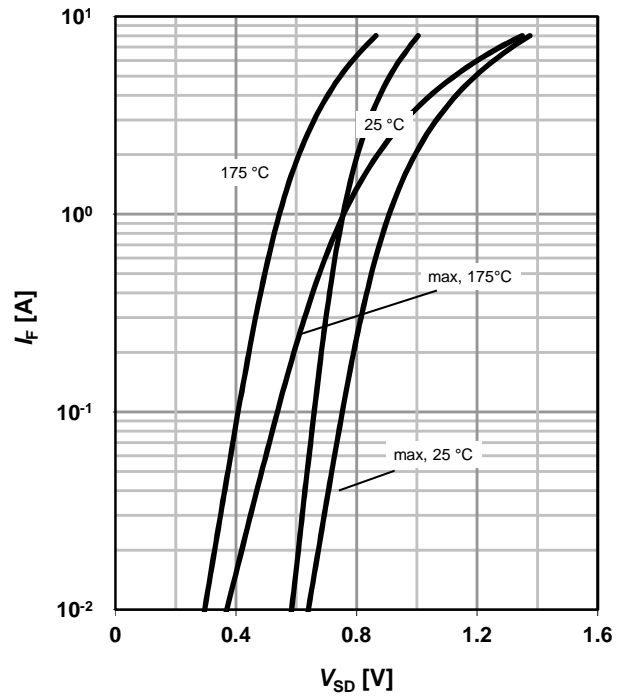
parameter: T_j



22 Forward characteristics of reverse diode (N)

$I_F=f(V_{SD})$

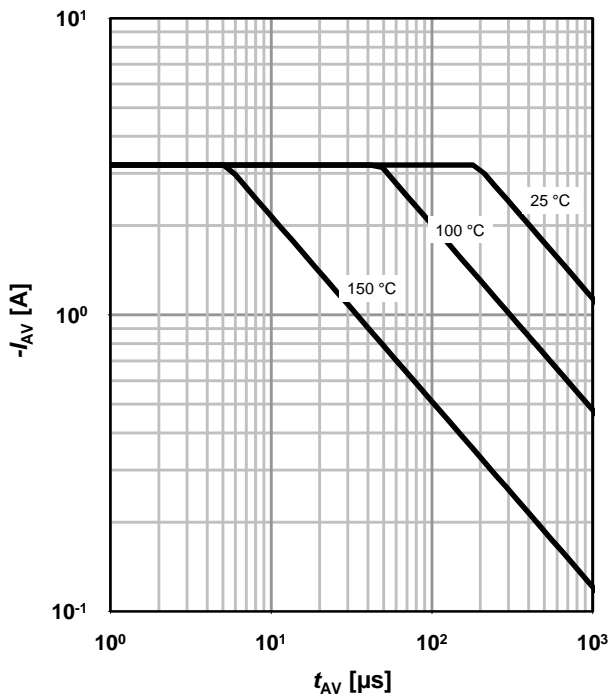
parameter: T_j



23 Avalanche characteristics (P)

$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$

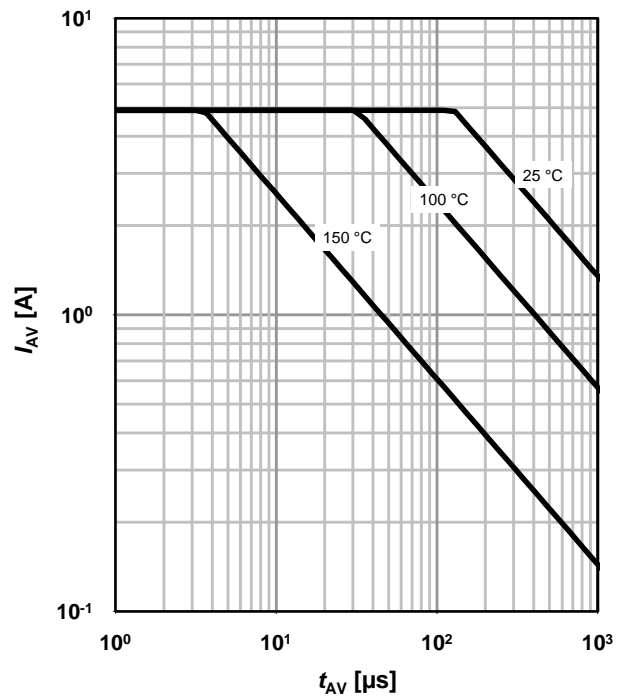
parameter: $T_{j(start)}$



24 Avalanche characteristics (N)

$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$

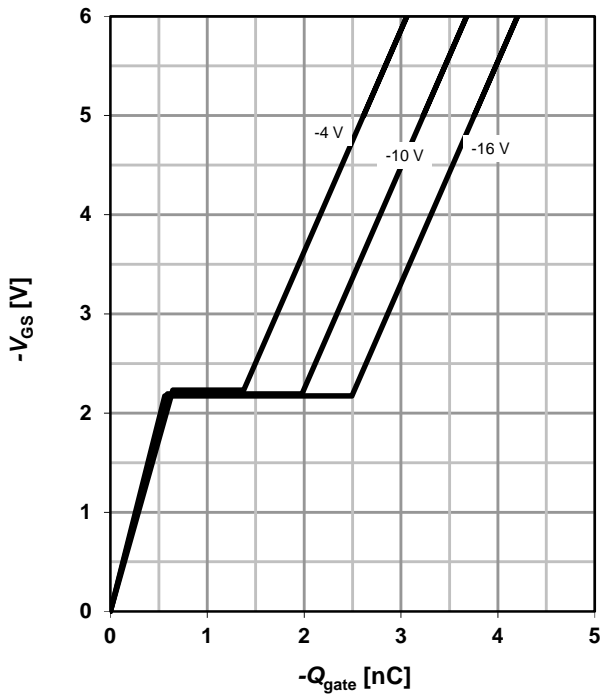
parameter: $T_{j(start)}$



26 Typ. gate charge (P)

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

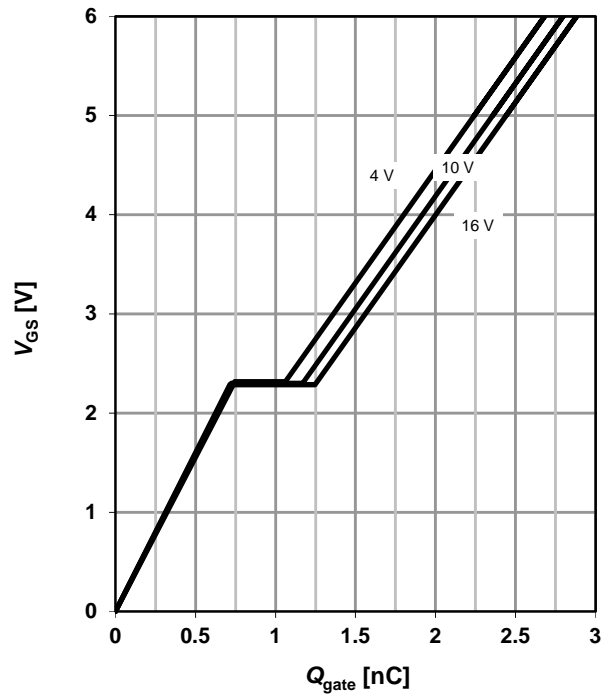
parameter: V_{DD}



26 Typ. gate charge (N)

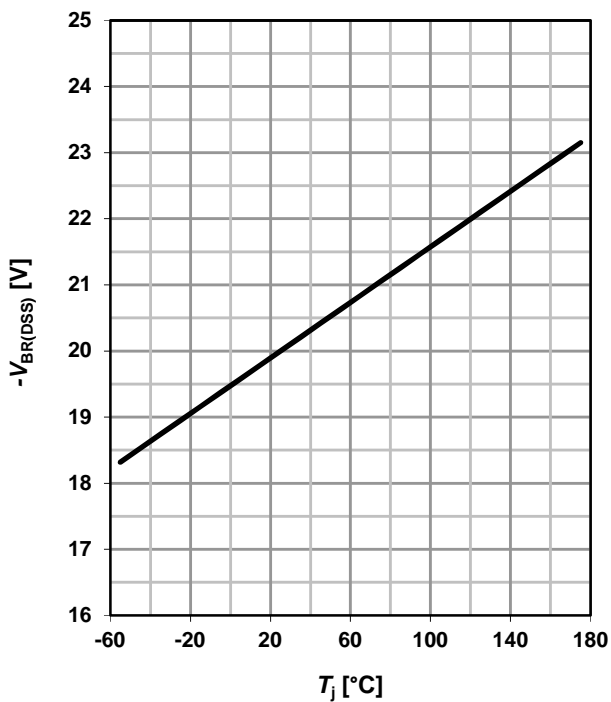
$V_{GS}=f(Q_{gate}); I_D=5.1A$ pulsed

parameter: V_{DD}



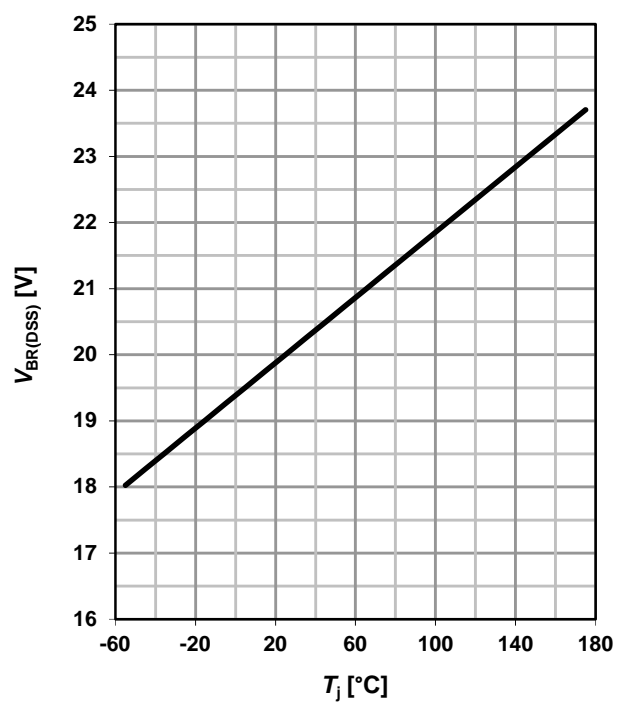
27 Drain-source breakdown voltage (P)

$V_{BR(DSS)}=f(T_j); I_D=-250 \mu A$



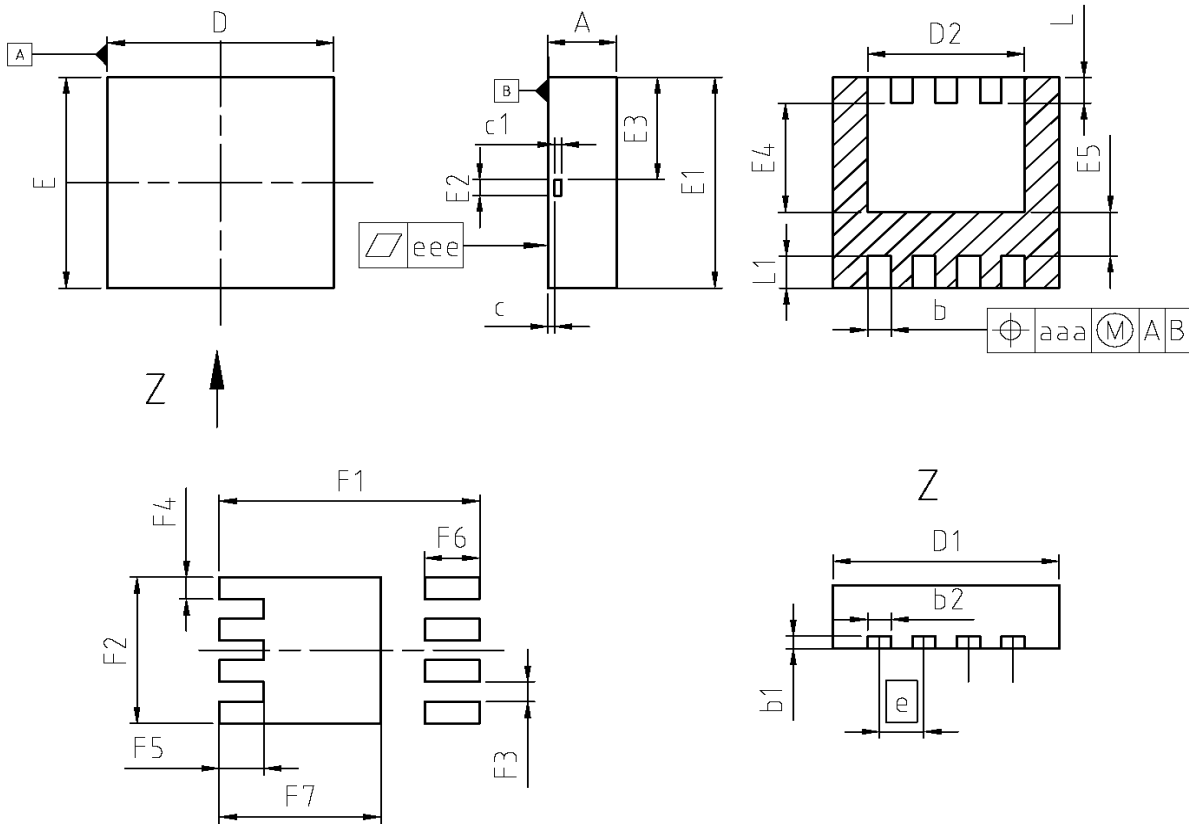
28 Drain-source breakdown voltage (N)

$V_{BR(DSS)}=f(T_j); I_D=250 \mu A$



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

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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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