

OptiMOS™ 2 + OptiMOS™ P 2 Small Signal Transistor

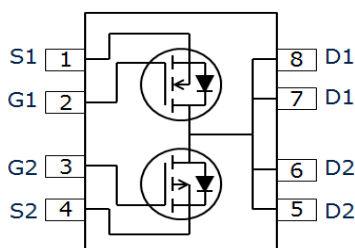
Features

- 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

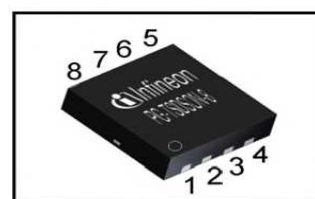


Product Summary

		P	N	
V_{DS}		-20	20	V
$R_{DS(on),max}$	$V_{GS}=\pm 4.5\text{ V}$	150	55	$m\Omega$
	$V_{GS}=\pm 2.5\text{ V}$	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		

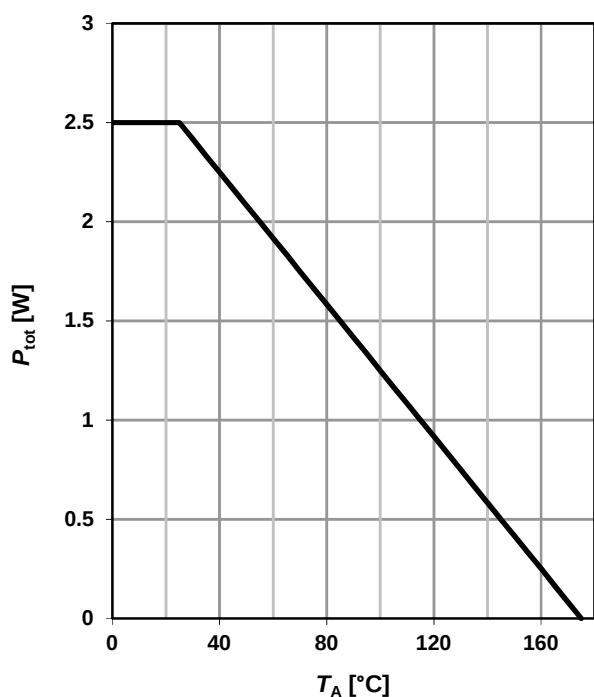
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

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	-	

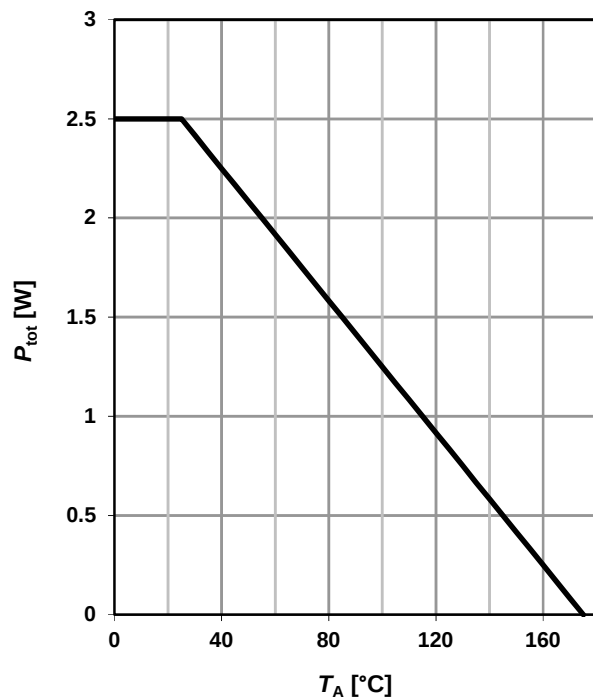
1 Power dissipation (P)

$$P_{\text{tot}} = f(T_A)$$



2 Power dissipation (N)

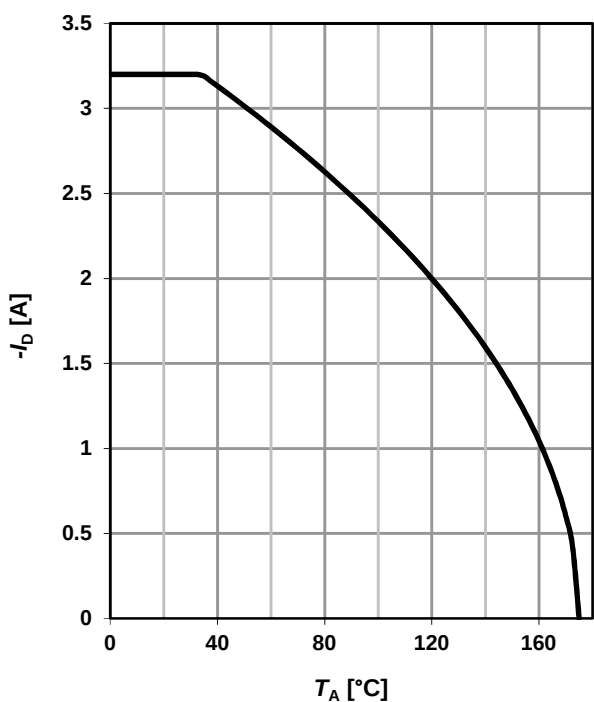
$$P_{\text{tot}} = f(T_A)$$



3 Drain current (P)

$$I_D = f(T_A)$$

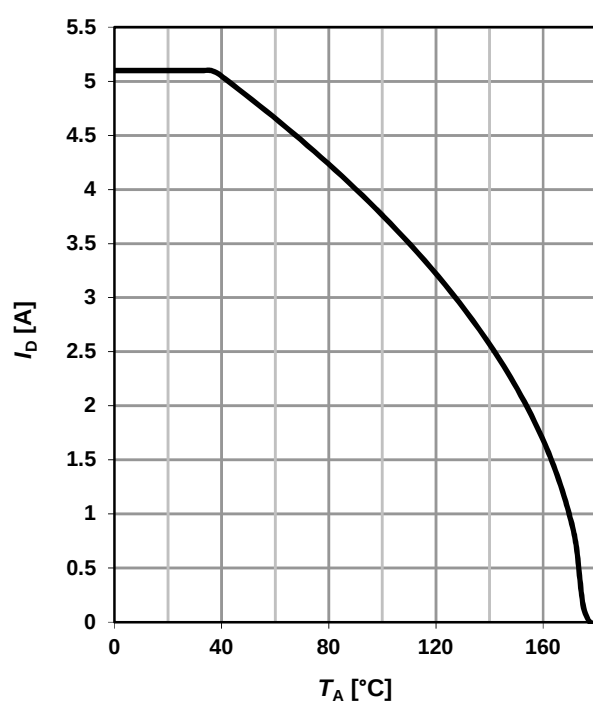
parameter: $V_{GS} \leq -4.5$ V



4 Drain current (N)

$$I_D = f(T_A)$$

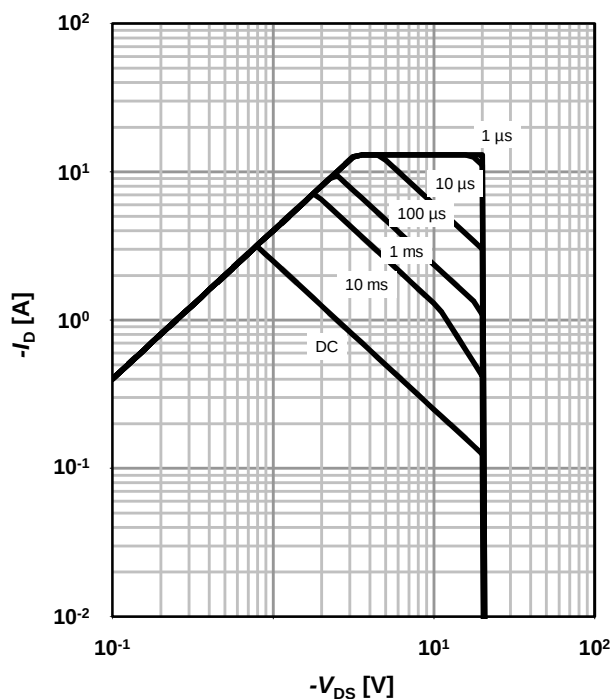
parameter: $V_{GS} \geq 4.5$ V



6 Safe operating area (P)

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

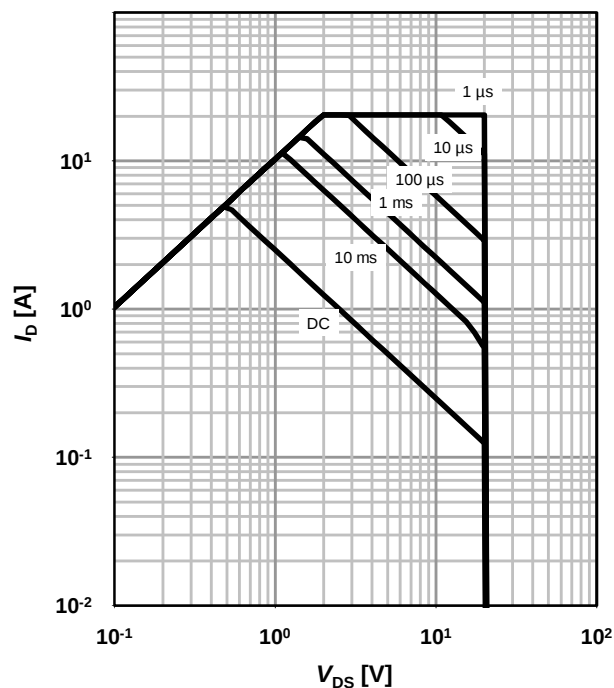
parameter: t_p



6 Safe operating area (N)

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

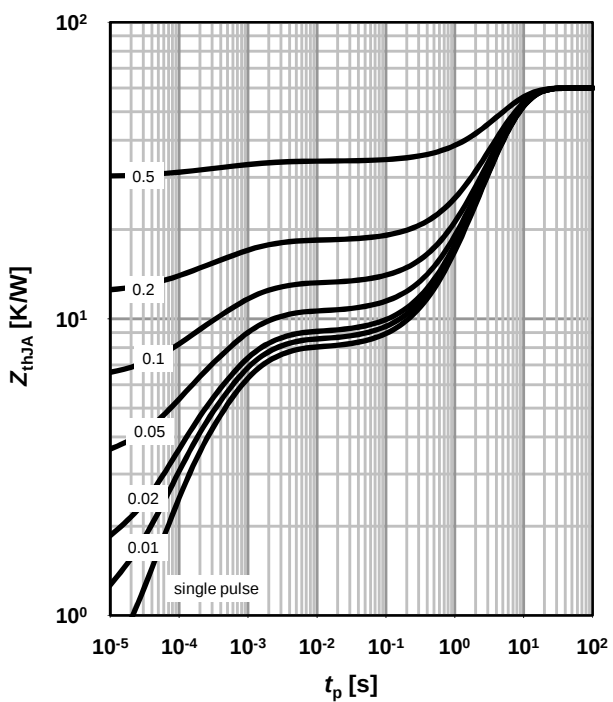
parameter: t_p



7 Max. transient thermal impedance (P)

$$Z_{thJA} = f(t_p)$$

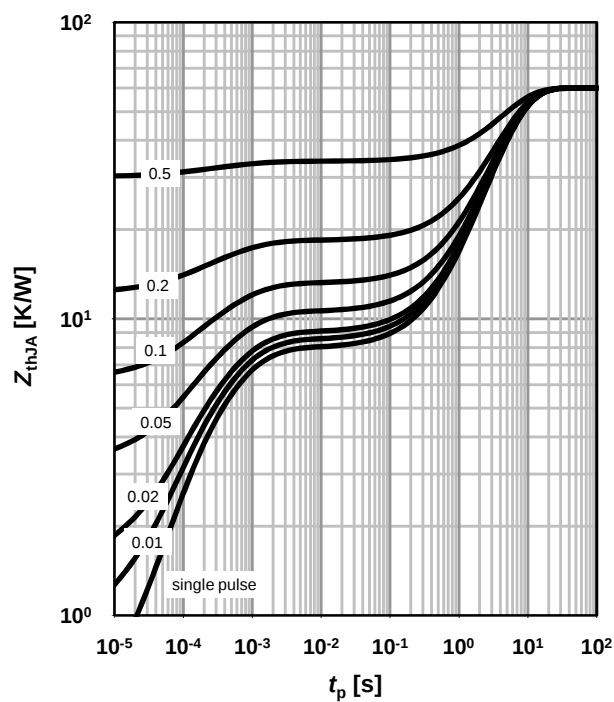
parameter: $D = t_p/T$



8 Max. transient thermal impedance (N)

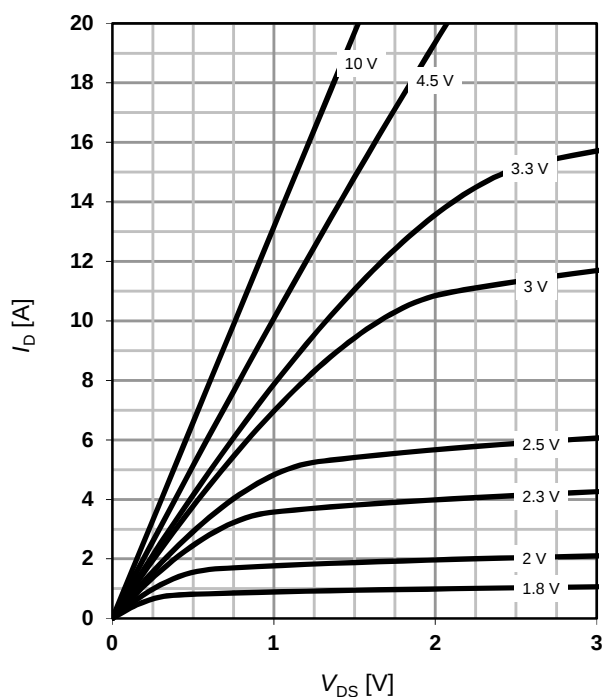
$$Z_{thJA} = f(t_p)$$

parameter: $D = t_p/T$



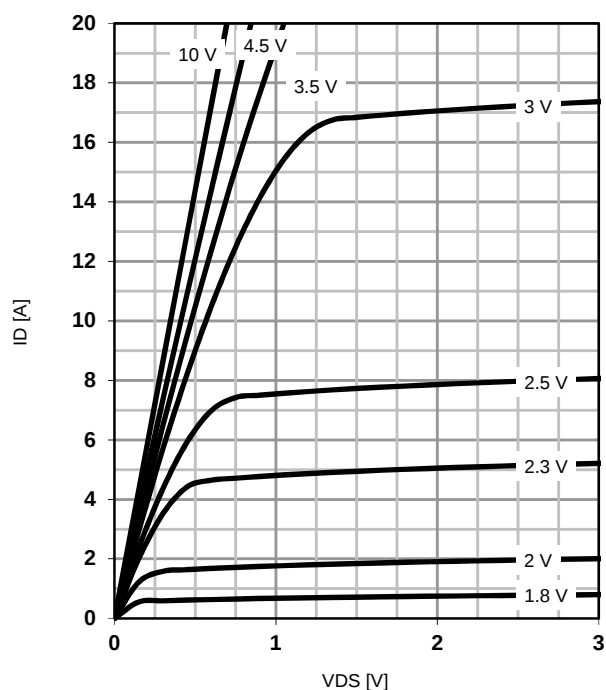
10 Typ. Output characteristics (P)

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

parameter: V_{GS}


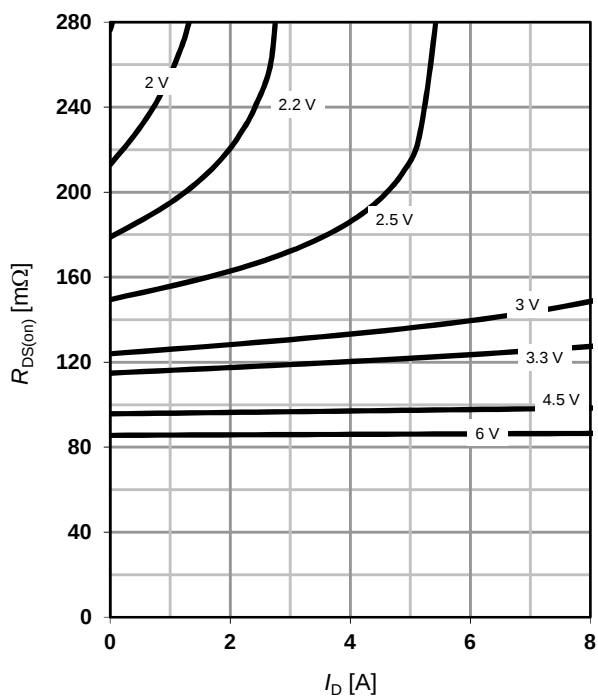
10 Typ. output characteristics (N)

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

parameter: V_{GS}


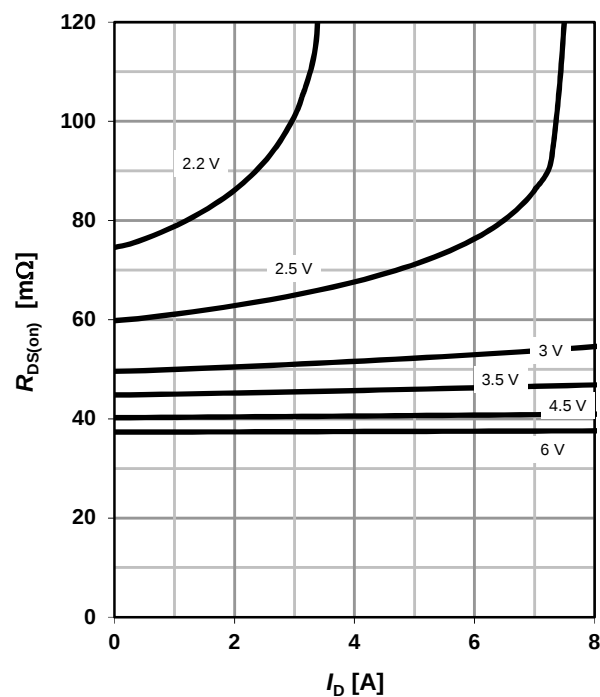
11 Typ. drain-source on resistance (P)

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

parameter: V_{GS}


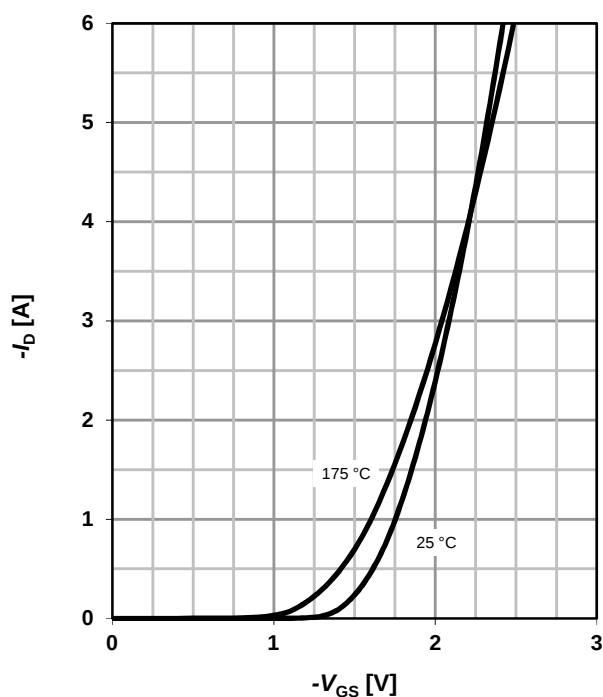
12 Typ. drain-source on resistance (N)

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

parameter: V_{GS}


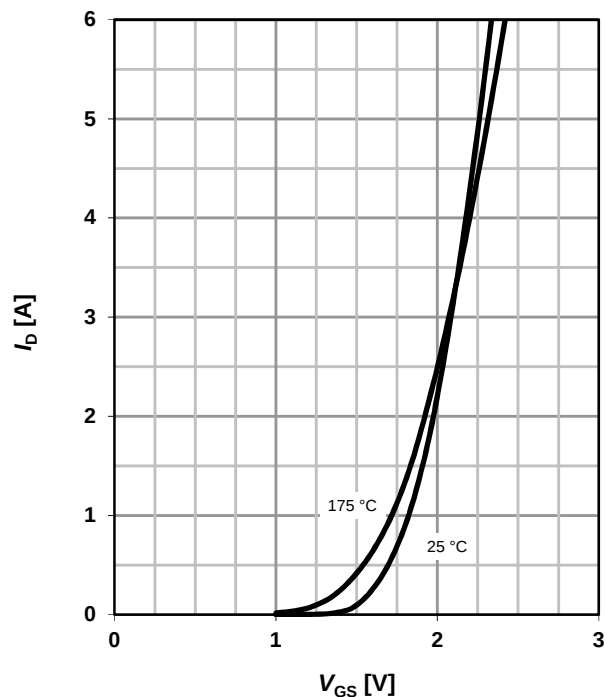
14 Typ. Transfer characteristics (P)

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

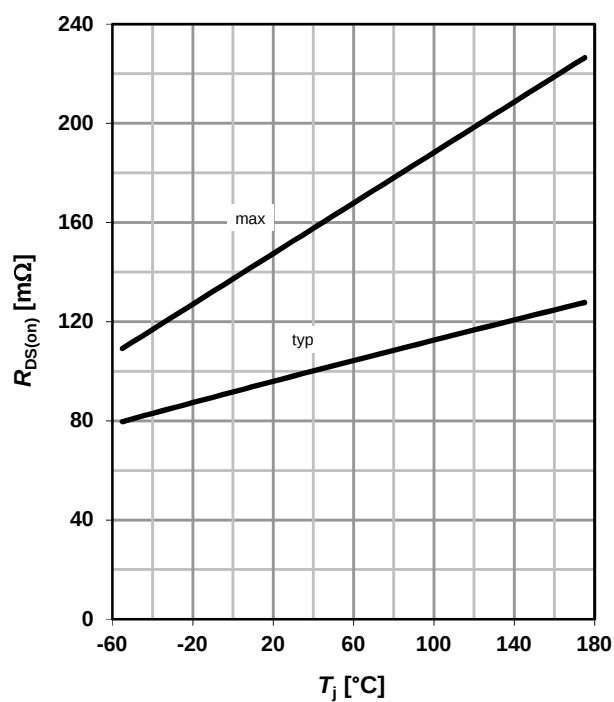
parameter: T_j


14 Typ. transfer characteristics (N)

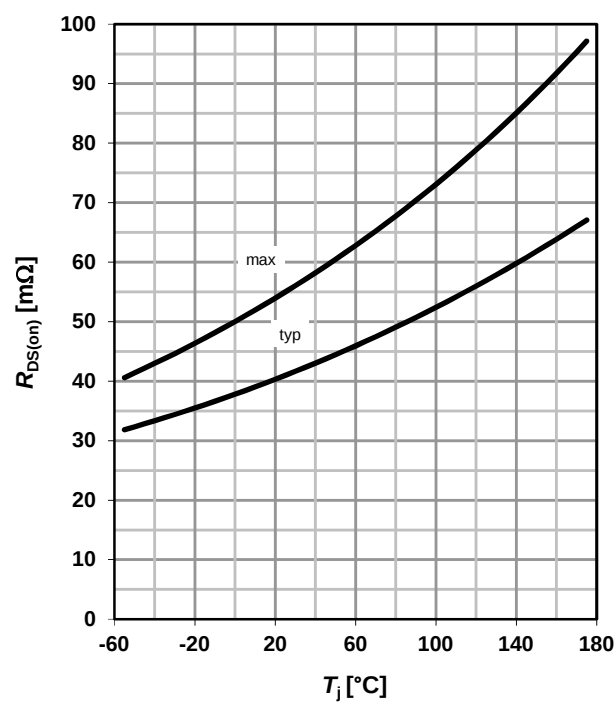
 $I_D = f(V_{GS}); |V_{DS}| > 2 |I_D| R_{DS(on)max}$

parameter: T_j


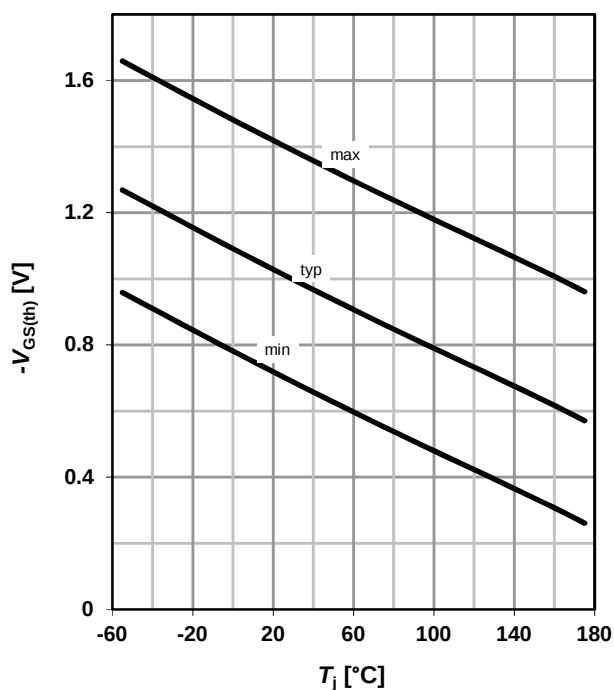
15 Drain-source on-state resistance (P)

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


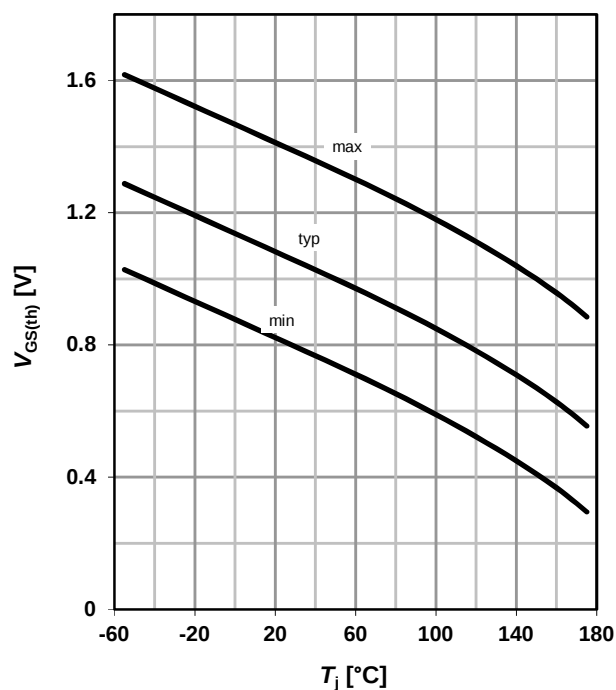
16 Drain-source on-state resistance (N)

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


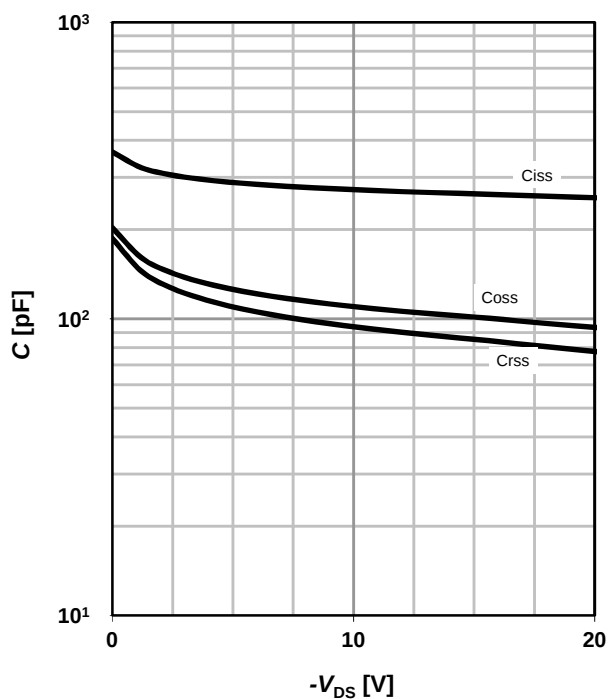
18 Typ. gate threshold voltage (P)

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


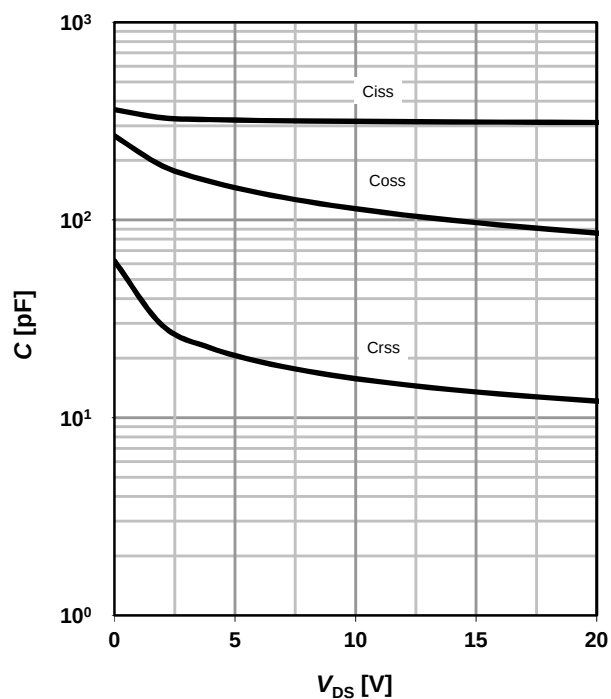
18 Typ. gate threshold voltage (N)

 $V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = 110 \mu A$


19 Typ. capacitances (P)

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


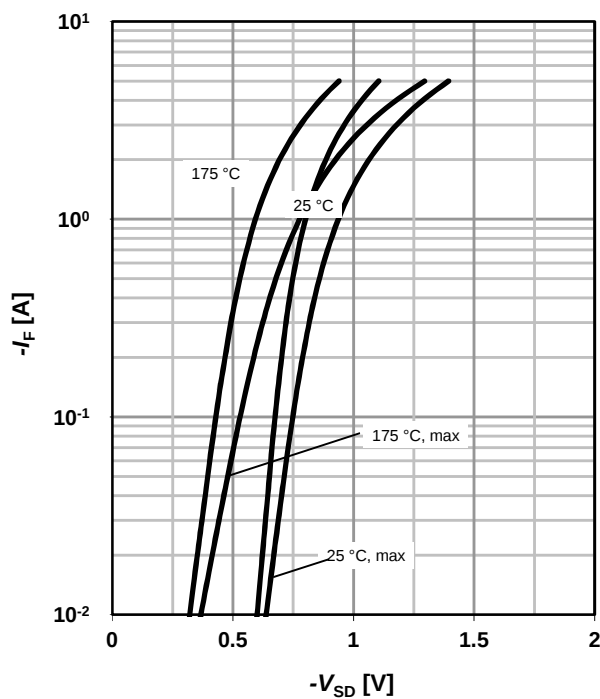
20 Typ. capacitances (N)

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


22 Forward characteristics of reverse diode (P)

$$I_F = f(V_{SD})$$

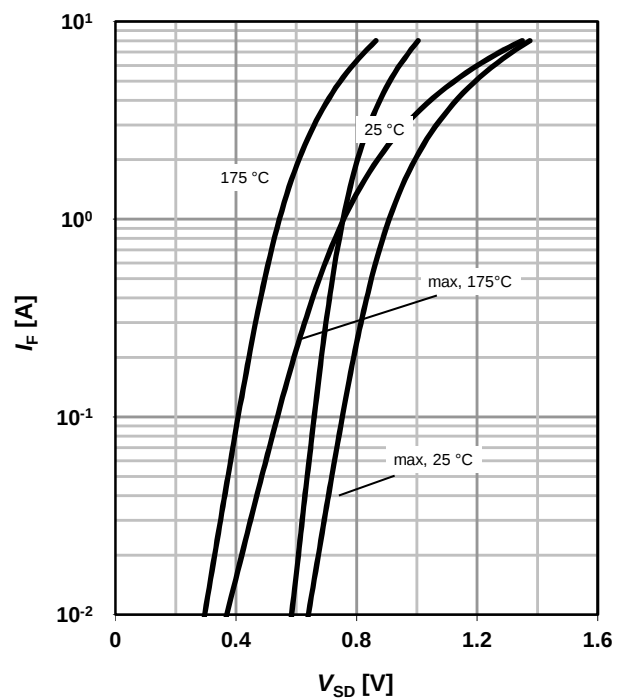
parameter: T_j



22 Forward characteristics of reverse diode (N)

$$I_F = f(V_{SD})$$

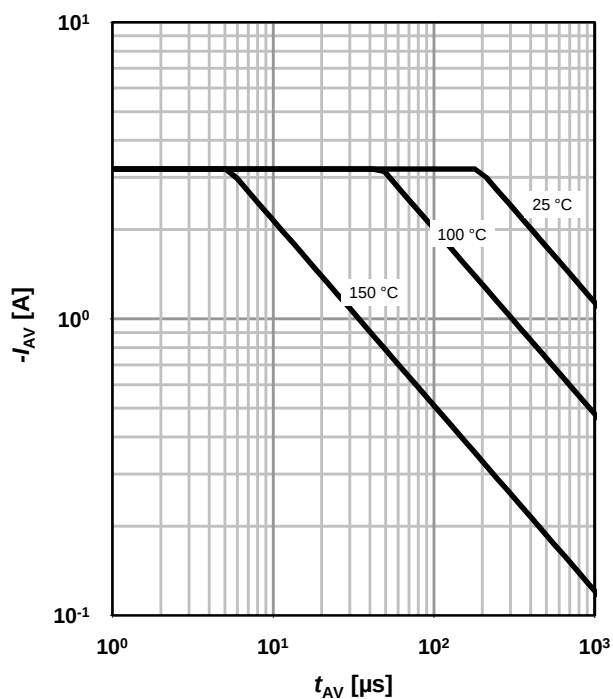
parameter: T_j



23 Avalanche characteristics (P)

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

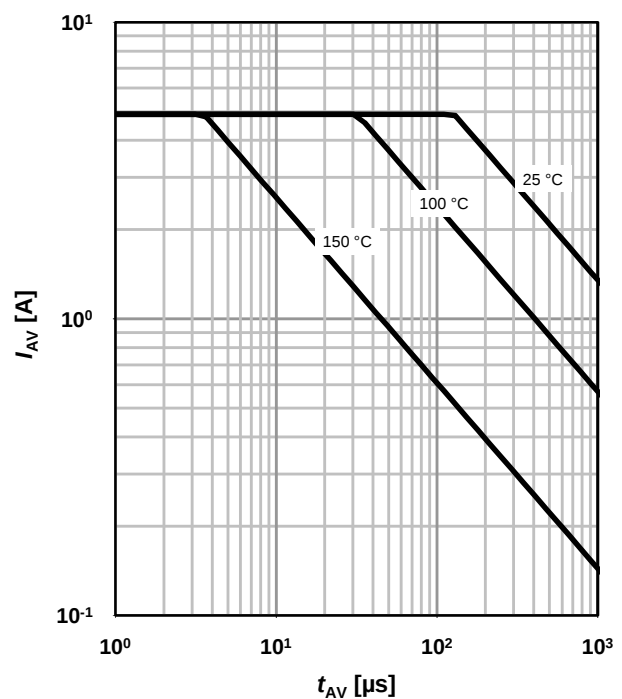
parameter: $T_{j(start)}$



24 Avalanche characteristics (N)

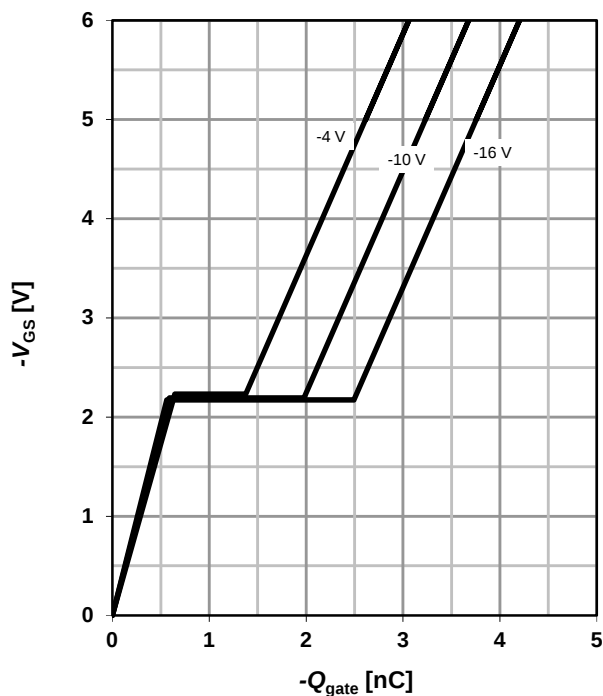
$$I_{AS} = f(t_{AV}); R_{GS} = 25 \Omega$$

parameter: $T_{j(start)}$



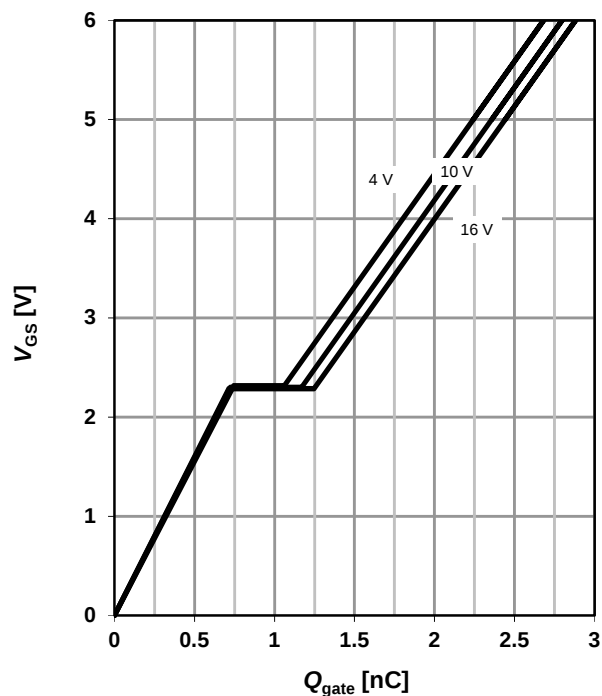
26 Typ. gate charge (P)

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

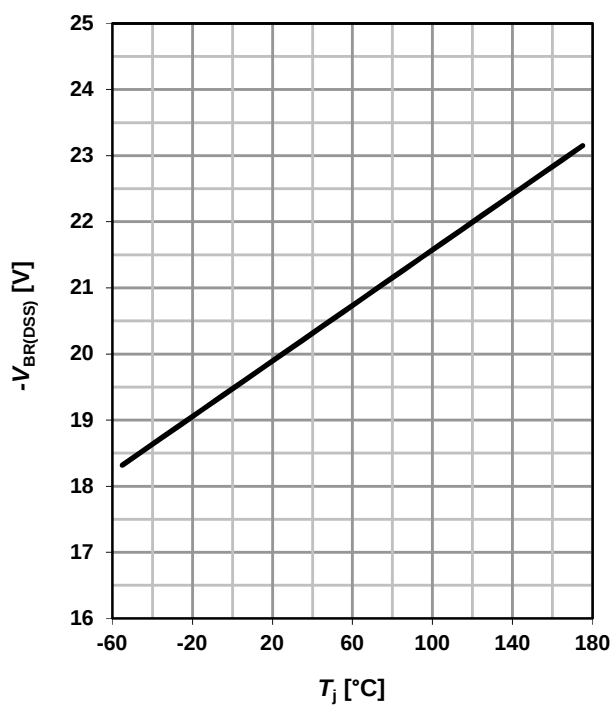
parameter: V_{DD}


26 Typ. gate charge (N)

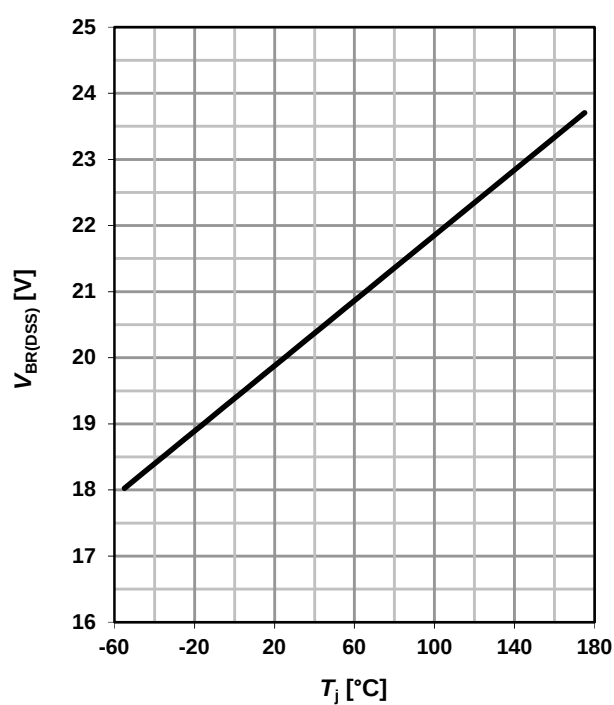
 $V_{GS}=f(Q_{gate}); I_D=5.1A$ pulsed

parameter: V_{DD}


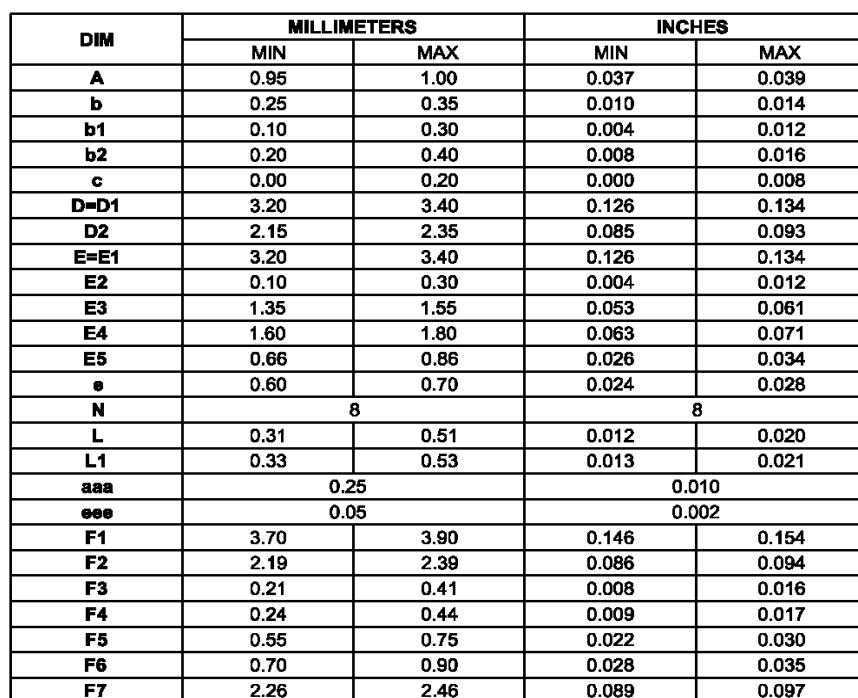
27 Drain-source breakdown voltage (P)

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


28 Drain-source breakdown voltage (N)

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


PG-TSDSON-8



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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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