

OptiMOS™3 Power-Transistors

Features

- Dual N-channel, logic level
- Fast switching MOSFETs for SMPS
- Optimized technology for DC/DC converters
- Qualified according to JEDEC¹⁾ for target applications
- 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

Type	Package	Marking
BSC072N03LD G	PG-TDSON-8	072N03LD

Maximum ratings, at $T_j=25\text{ °C}$, unless otherwise specified

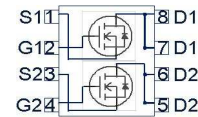
Parameter	Symbol	Conditions	Value		Unit
			≤10 secs	steady state	
Continuous drain current	I_D	$V_{GS}=10\text{ V}, T_C=25\text{ °C}$	20		A
		$V_{GS}=10\text{ V}, T_C=100\text{ °C}$	20		
		$V_{GS}=4.5\text{ V}, T_C=25\text{ °C}$	20		
		$V_{GS}=4.5\text{ V}, T_C=100\text{ °C}$	20		
		$V_{GS}=10\text{ V}, T_A=25\text{ °C}^{3)}$	17.9	11.5	
Pulsed drain current ²⁾	$I_{D,pulse}$	$T_C=25\text{ °C}$	80		
Avalanche energy, single pulse	E_{AS}	$I_D=20\text{ A}, R_{GS}=25\text{ }\Omega$	90		mJ
Gate source voltage	V_{GS}		±20		V
Power dissipation	P_{tot}	$T_C=25\text{ °C}$	57		W
		$T_A=25\text{ °C}^{3)}$	3.6	1.5	
Operating and storage temperature	T_j, T_{stg}		-55 ... 150		°C
IEC climatic category; DIN IEC 68-1			55/150/56		

¹⁾ J-STD20 and JESD22

Product Summary

V_{DS}	30	V
$R_{DS(on),max}$	7.2	mΩ
I_D	20	A

PG-TDSON-8



Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Thermal characteristics

Thermal resistance, junction - case	R_{thJC}	bottom	-	-	2.2	K/W
		top			20	
Thermal resistance, junction - ambient, 6 cm ² cooling area ³⁾	R_{thJA}	$t \leq 10$ s	-	-	35	
		steady state	-	-	85	

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	30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250$ μ A	1	-	2.2	
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 30$ V, $V_{GS} = 0$ V, $T_j = 25$ °C	-	0.1	1	μ A
		$V_{DS} = 30$ 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	-	7.5	9.4	m Ω
		$V_{GS} = 10$ V, $I_D = 20$ A	-	6.0	7.2	
Gate resistance	R_G		-	1.5	2.3	Ω
Transconductance	g_{fs}	$ V_{DS} > 2 I_D R_{DS(on)max}$, $I_D = 20$ A	28	57	-	S

²⁾ See figure 3

³⁾ Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 μ m thick) copper area for drain connection. PCB is vertical in still air. One transistor active.

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic characteristics

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=15\text{ V},$ $f=1\text{ MHz}$	-	2600	3500	pF
Output capacitance	C_{oss}		-	920	1200	
Reverse transfer capacitance	C_{rss}		-	49	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=15\text{ V}, V_{GS}=10\text{ V},$ $I_D=20\text{ A}, R_G=1.6\ \Omega$	-	6.0	-	ns
Rise time	t_r		-	4.0	-	
Turn-off delay time	$t_{d(off)}$		-	25	-	
Fall time	t_f		-	4.0	-	

Gate Charge Characteristics⁴⁾

Gate to source charge	Q_{gs}	$V_{DD}=15\text{ V}, I_D=20\text{ A},$ $V_{GS}=0\text{ to }4.5\text{ V}$	-	7.2	-	nC
Gate charge at threshold	$Q_{g(th)}$		-	3.8	-	
Gate to drain charge	Q_{gd}		-	3.4	-	
Switching charge	Q_{sw}		-	6.8	-	
Gate charge total	Q_g		-	15	20	
Gate plateau voltage	$V_{plateau}$		-	3.0	-	V
Gate charge total	Q_g	$V_{DD}=15\text{ V}, I_D=20\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	31	41	nC
Gate charge total, sync. FET	$Q_{g(sync)}$	$V_{DS}=0.1\text{ V},$ $V_{GS}=0\text{ to }4.5\text{ V}$	-	13	-	
Output charge	Q_{oss}	$V_{DD}=15\text{ V}, V_{GS}=0\text{ V}$	-	24	-	

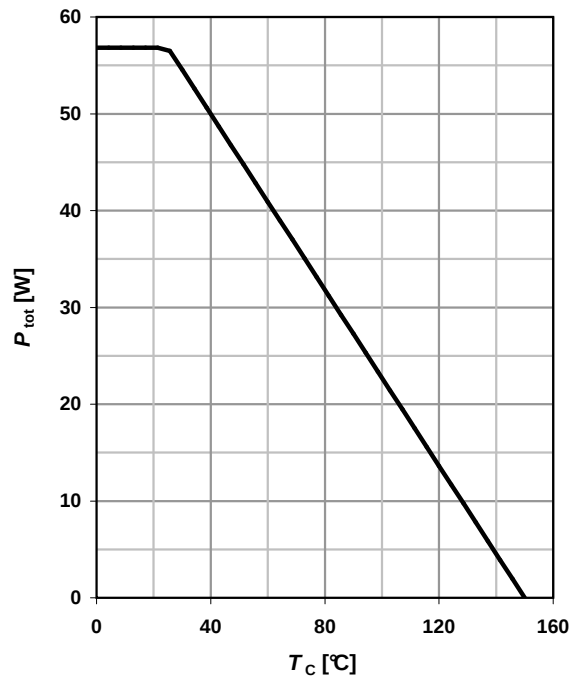
Reverse Diode

Diode continuous forward current	I_S	$T_C=25\text{ °C}$	-	-	20	A
Diode pulse current	$I_{S,pulse}$		-	-	80	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=20\text{ A},$ $T_j=25\text{ °C}$	-	0.87	1.1	V
Reverse recovery charge	Q_{rr}	$V_R=15\text{ V}, I_F=I_S,$ $di_F/dt=400\text{ A}/\mu\text{s}$	-	-	10	nC

⁴⁾ See figure 16 for gate charge parameter definition

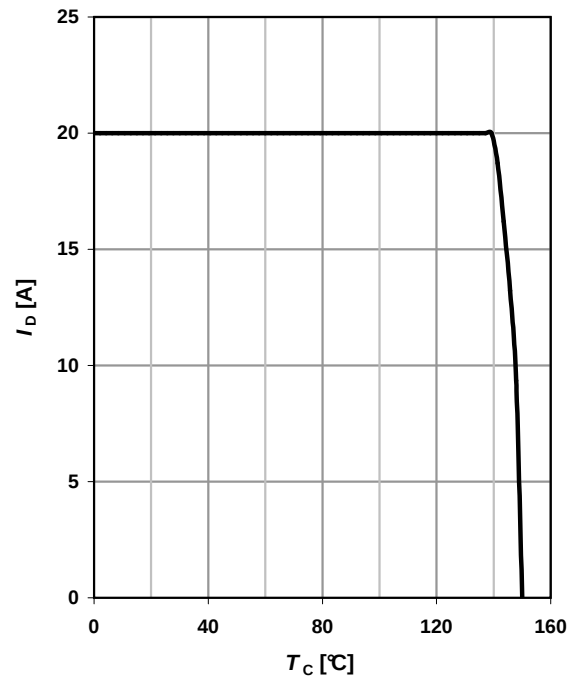
1 Power dissipation

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



2 Drain current

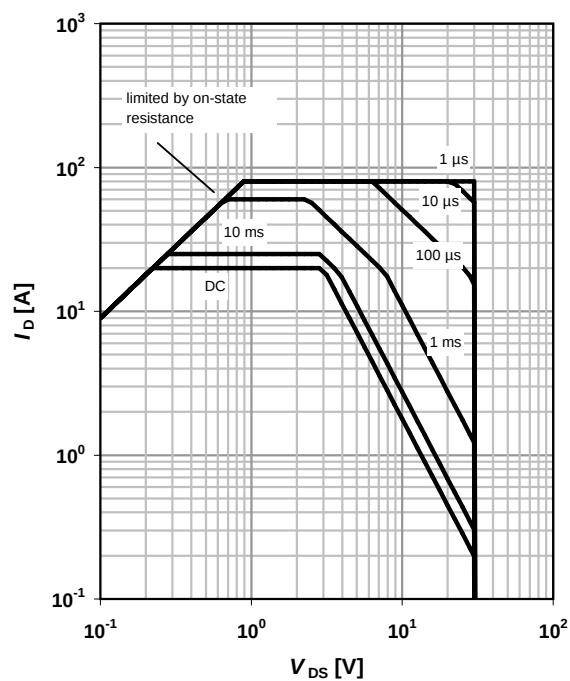
$$I_D = f(T_C); V_{GS} \geq 10 \text{ V}$$



3 Safe operating area

$$I_D = f(V_{DS}); T_C = 25 \text{ °C}; D = 0$$

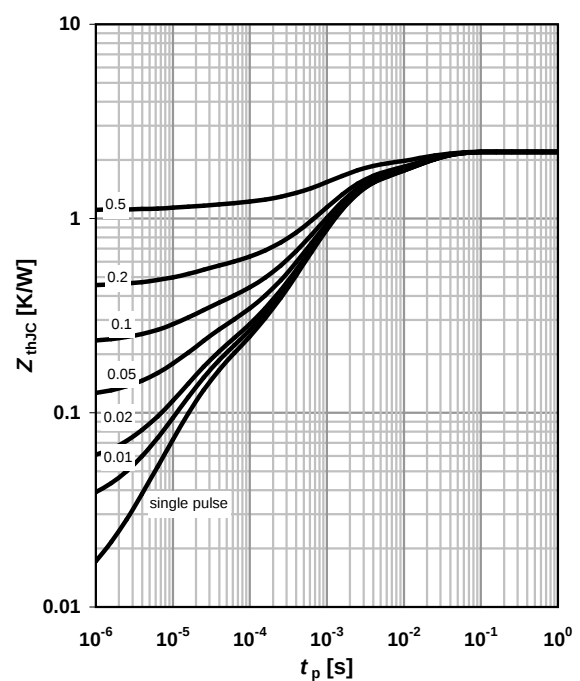
parameter: t_p



4 Max. transient thermal impedance

$$Z_{\text{thJC}} = f(t_p)$$

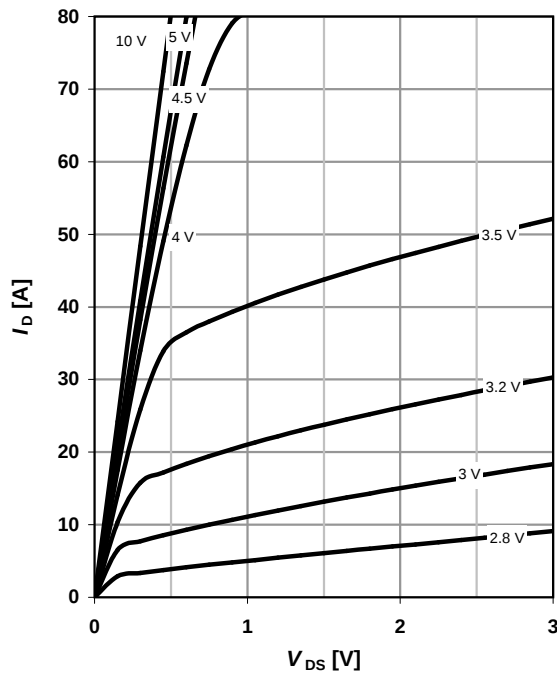
parameter: $D = t_p/T$



5 Typ. output characteristics

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

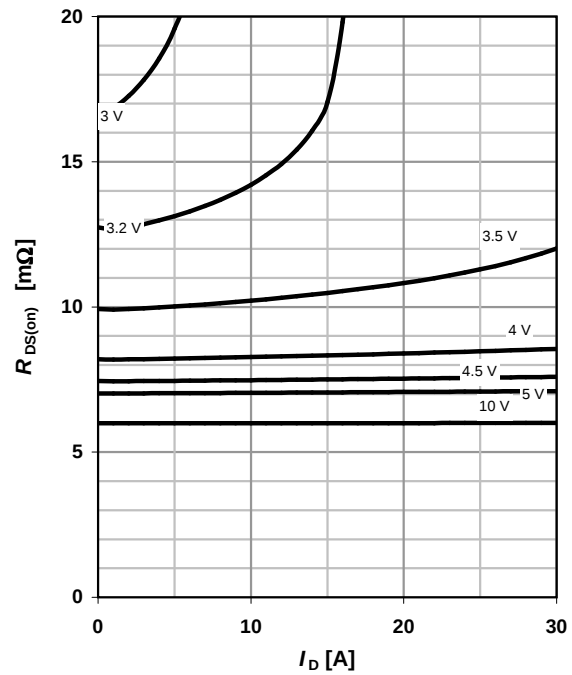
parameter: V_{GS}



6 Typ. drain-source on resistance

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

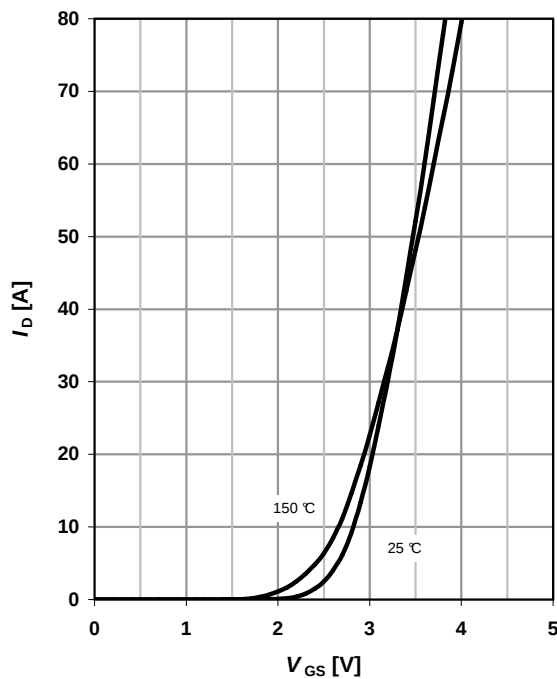
parameter: V_{GS}



7 Typ. transfer characteristics

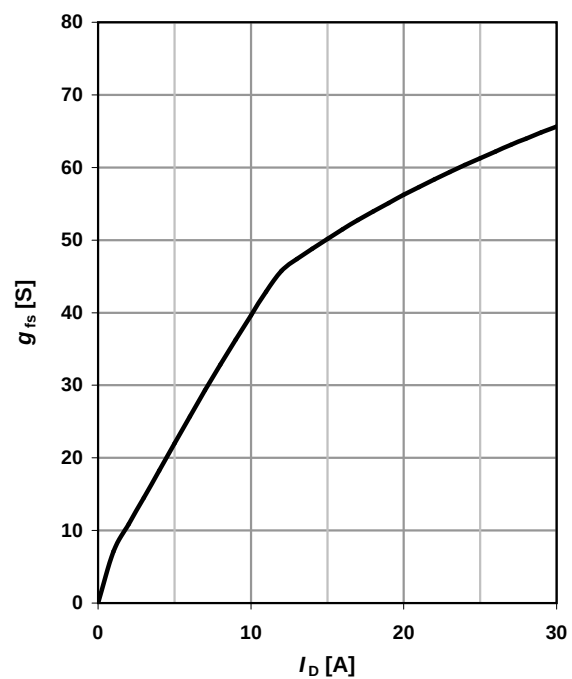
$$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$$

parameter: T_j



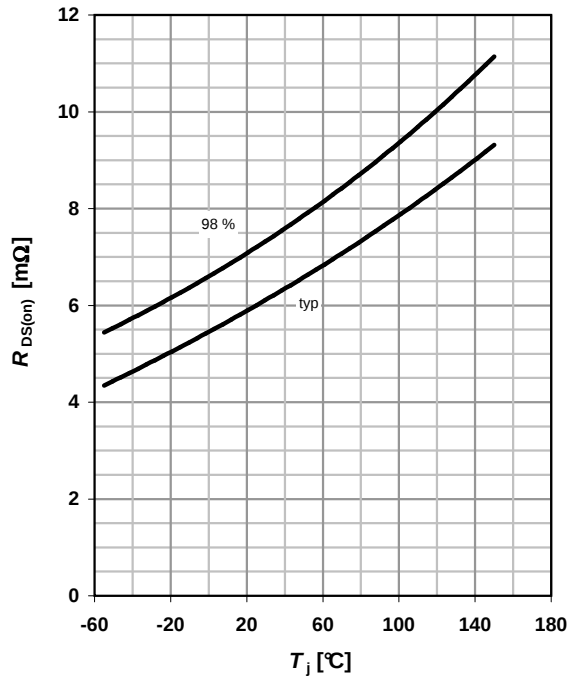
8 Typ. forward transconductance

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



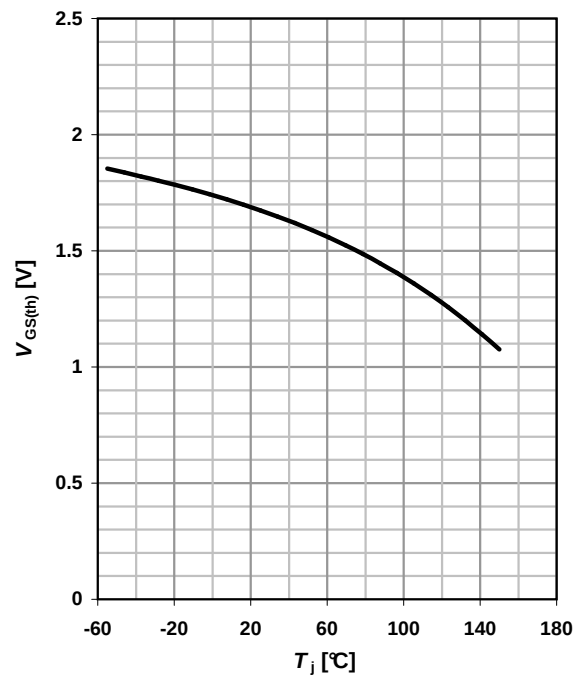
9 Drain-source on-state resistance

$$R_{DS(on)} = f(T_j); I_D = 20 \text{ A}; V_{GS} = 10 \text{ V}$$



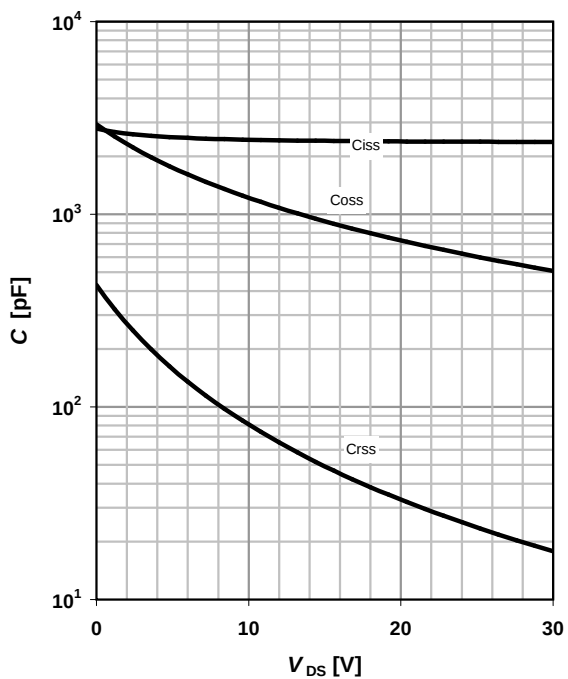
10 Typ. gate threshold voltage

$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = 250 \mu\text{A}$$



11 Typ. capacitances

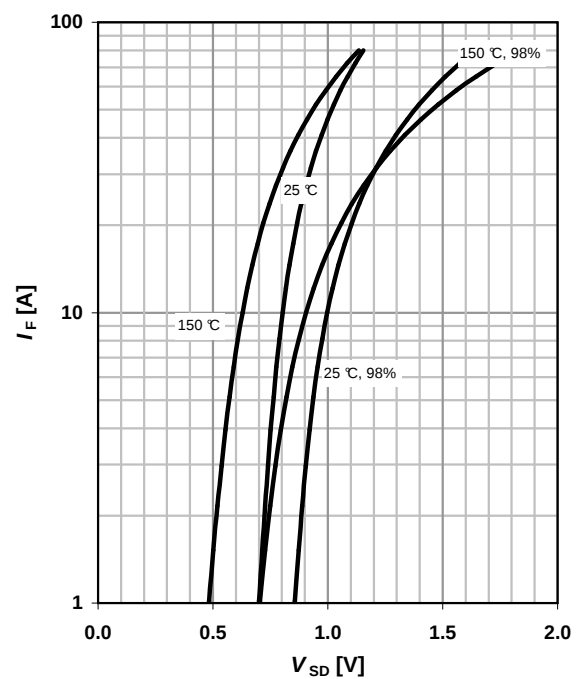
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



12 Forward characteristics of reverse diode

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

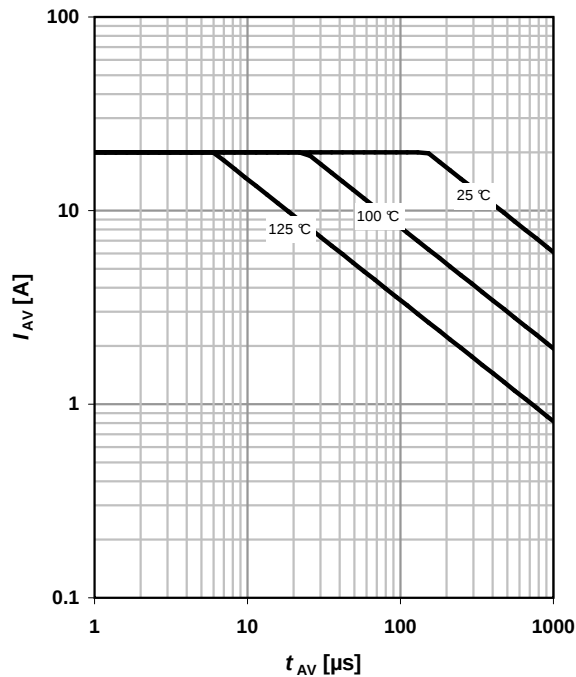
parameter: T_j



13 Avalanche characteristics

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

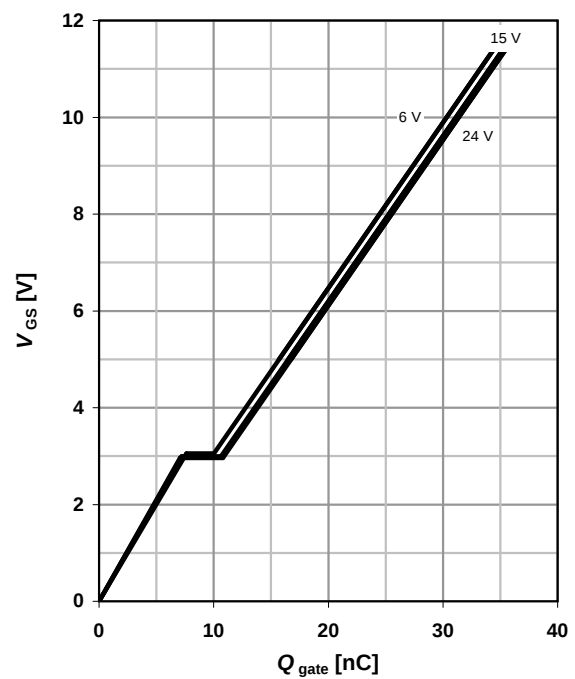
parameter: $T_{j(\text{start})}$



14 Typ. gate charge

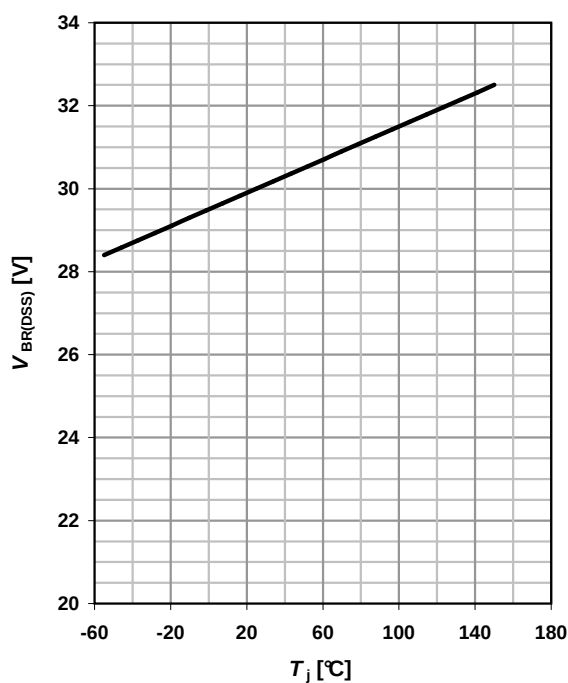
$$V_{GS}=f(Q_{\text{gate}}); I_D=20\ \text{A pulsed}$$

parameter: V_{DD}

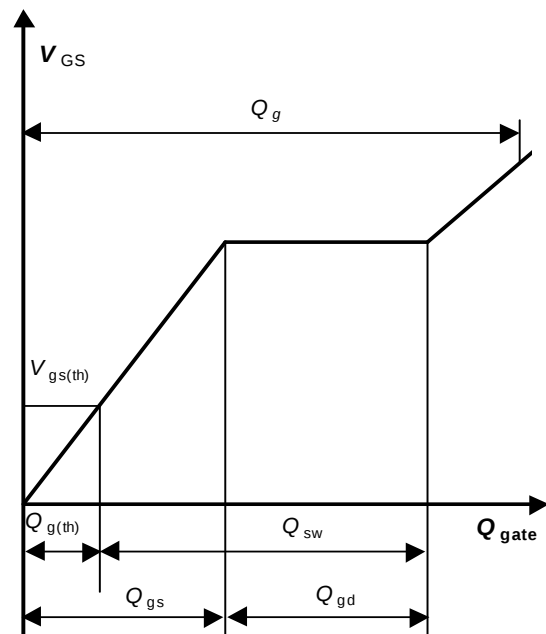


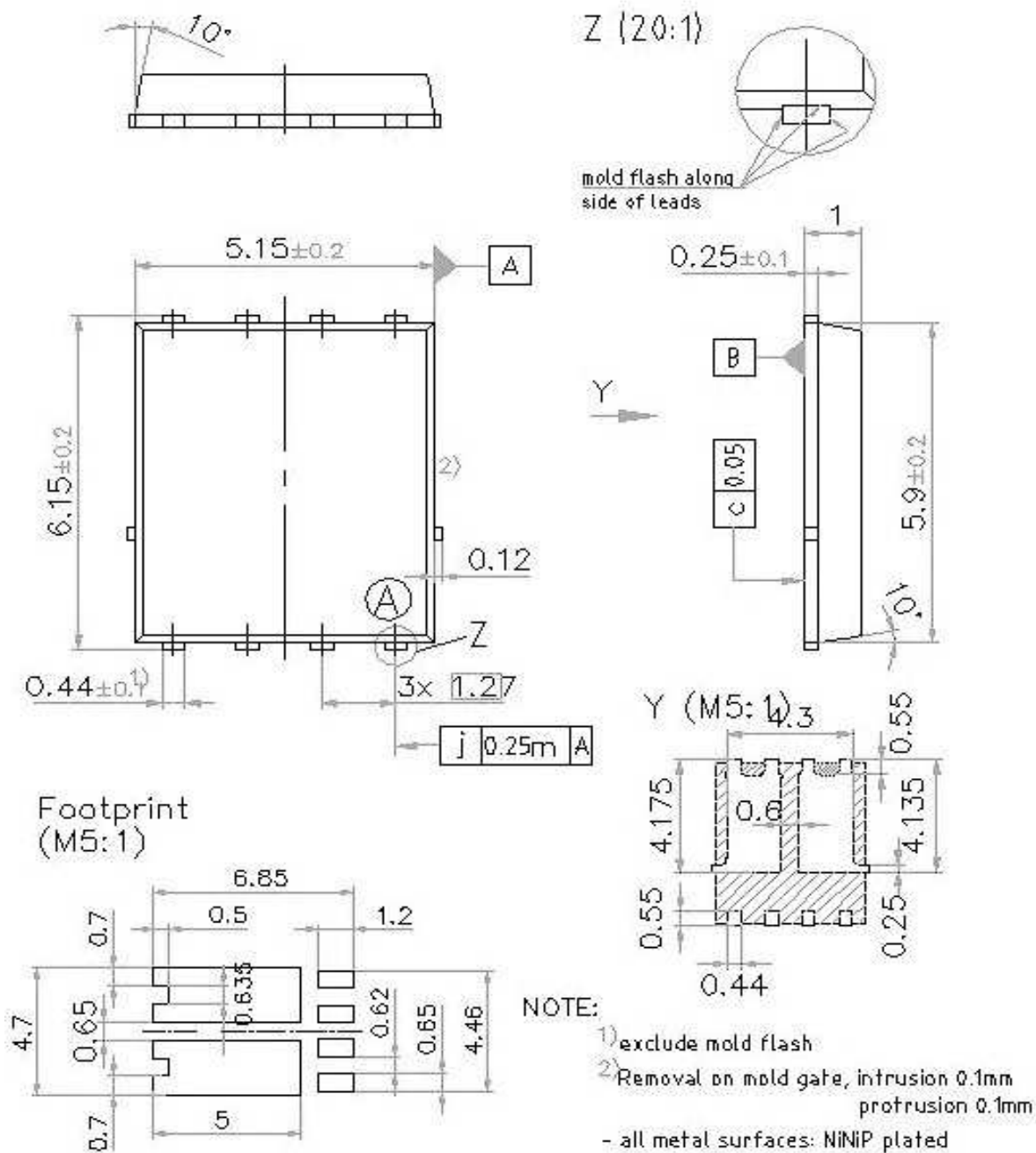
15 Drain-source breakdown voltage

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



16 Gate charge waveforms





PG-TDSON-8



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