

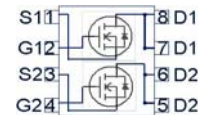
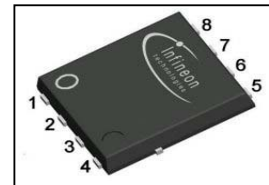
**OptiMOS™ 3 Power-Transistors**
**Features**

- Dual N-channel, logic level
- Fast switching MOSFETs for SMPS
- Optimized technology for DC/DC converters
- Qualified according to JEDEC<sup>1)</sup> 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

**Product Summary**

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

PG-TDSON-8



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 <sup>2)</sup>	$I_{D,pulse}$	$T_C=25\text{ °C}$	80		
Avalanche energy, single pulse	$E_{AS}$	$I_D=20\text{ A}, R_{GS}=25\text{ Ω}$	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		

<sup>1)</sup> J-STD20 and JESD22

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 <sup>2</sup> cooling area <sup>3)</sup>	$R_{thJA}$	t≤10 s	-	-	35	
		steady state	-	-	85	

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

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$	30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\text{ }\mu\text{A}$	1	-	2.2	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=30\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$	-	0.1	1	$\mu\text{A}$
		$V_{DS}=30\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ °C}$	-	10	100	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	-	10	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=4.5\text{ V}, I_D=20\text{ A}$	-	7.5	9.4	m $\Omega$
		$V_{GS}=10\text{ V}, I_D=20\text{ A}$	-	6.0	7.2	
Gate resistance	$R_G$		-	1.5	2.3	$\Omega$
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=20\text{ A}$	28	57	-	S

<sup>2)</sup> See figure 3

<sup>3)</sup> Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  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 Characteristics<sup>4)</sup>**

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	-	
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	-	

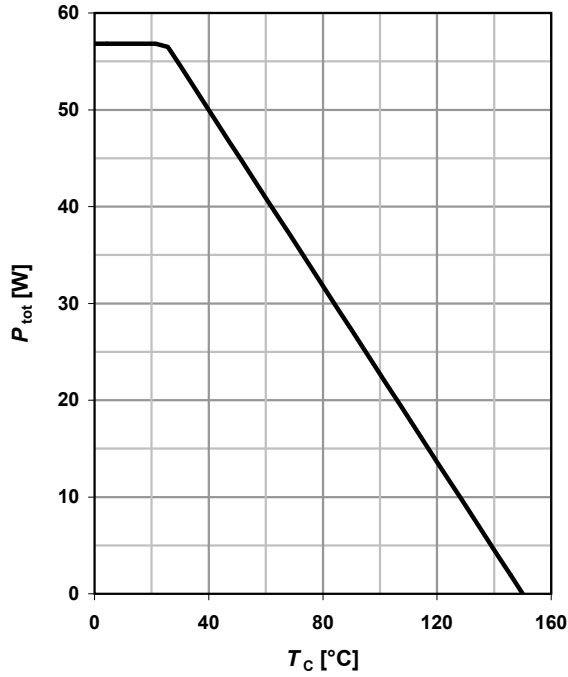
**Reverse Diode**

Diode continuous forward current	$I_S$	$T_C=25\text{ }^\circ\text{C}$	-	-	20	A
Diode pulse current	$I_{S,pulse}$		-	-	80	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=20\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	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

<sup>4)</sup> See figure 16 for gate charge parameter definition

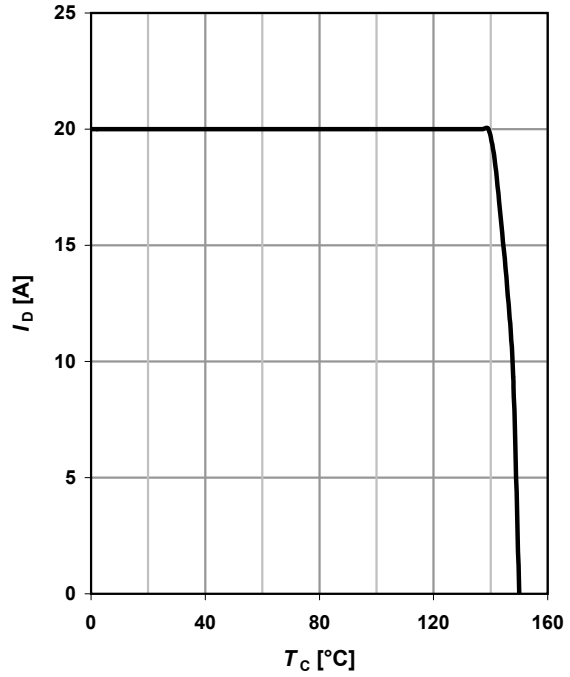
**1 Power dissipation**

$P_{tot}=f(T_C)$



**2 Drain current**

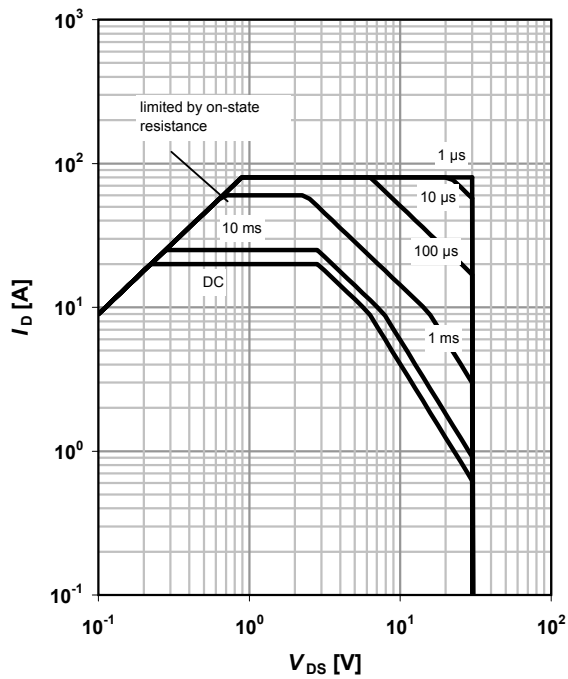
$I_D=f(T_C); V_{GS} \geq 10\text{ V}$



**3 Safe operating area**

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

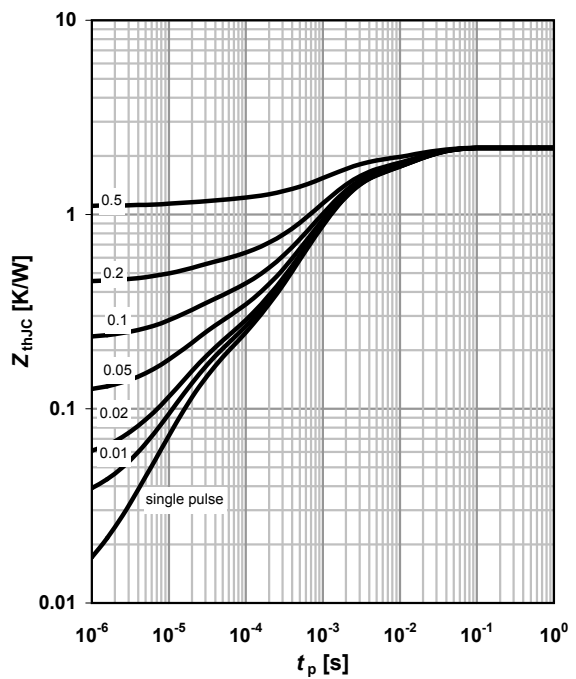
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJC}=f(t_p)$

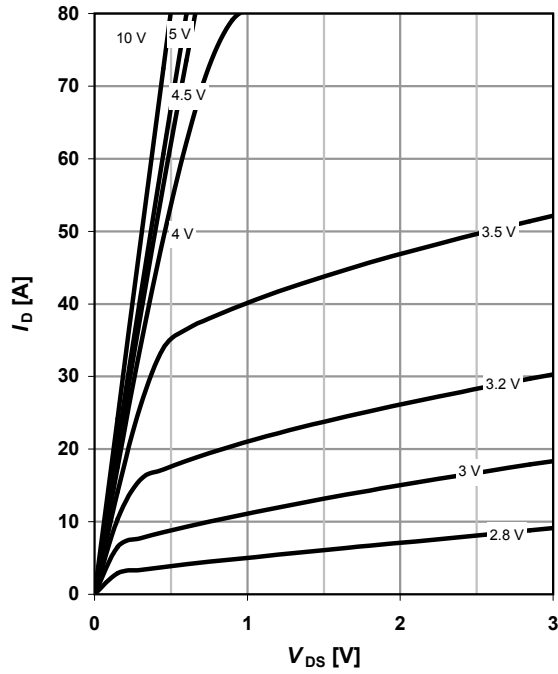
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

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

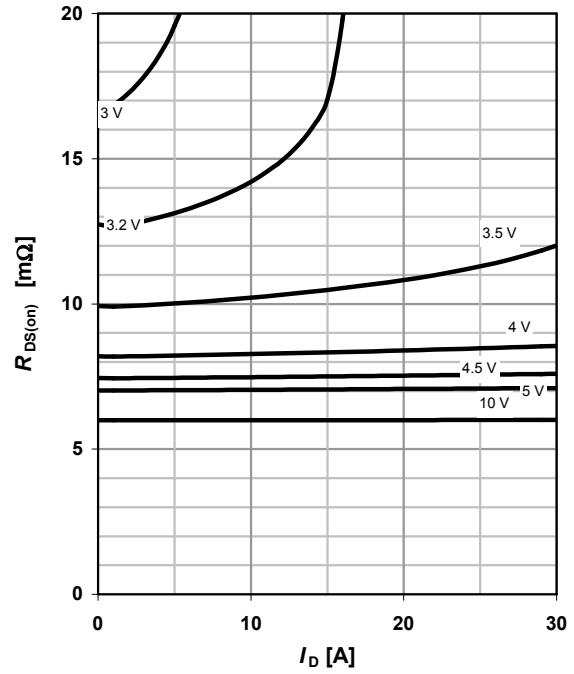
parameter:  $V_{GS}$



**6 Typ. drain-source on resistance**

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

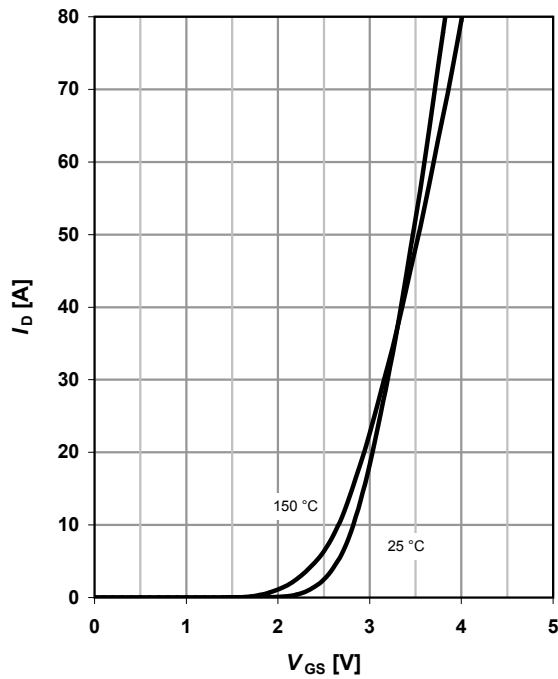
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

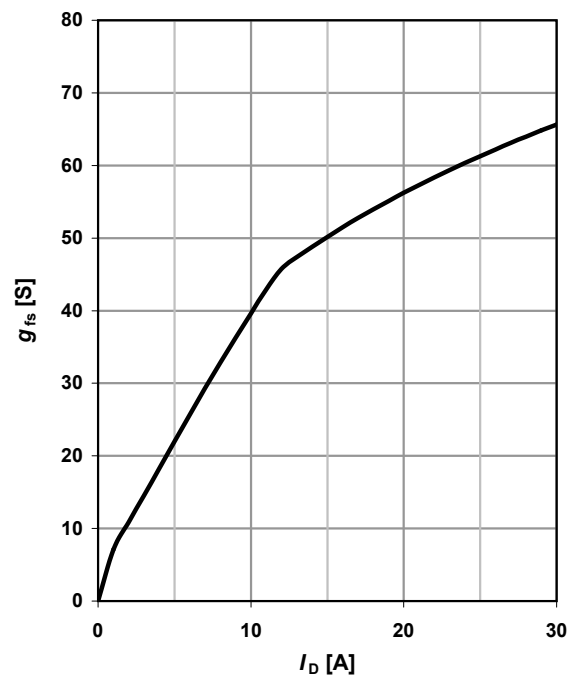
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter:  $T_j$



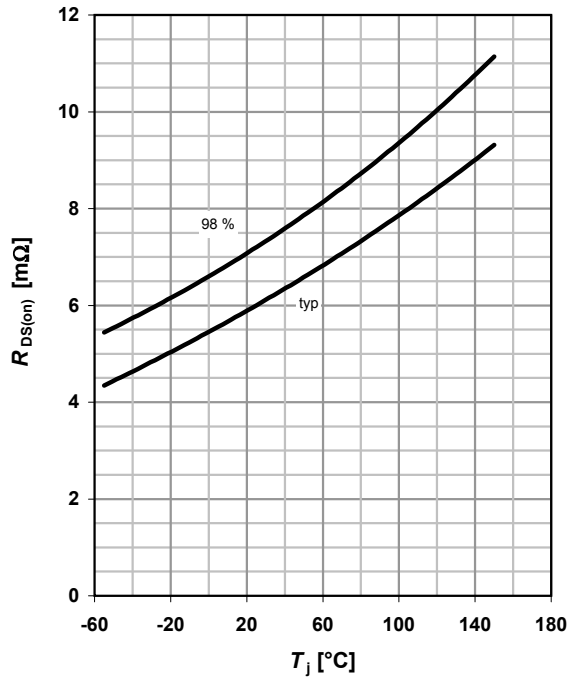
**8 Typ. forward transconductance**

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



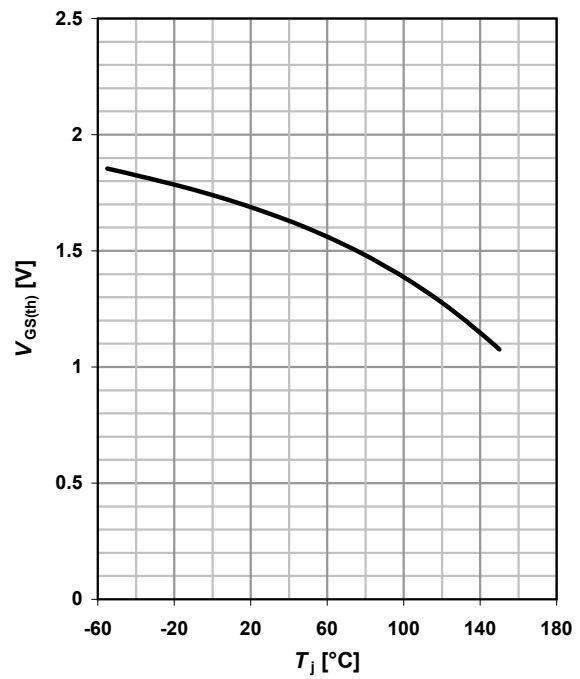
**9 Drain-source on-state resistance**

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



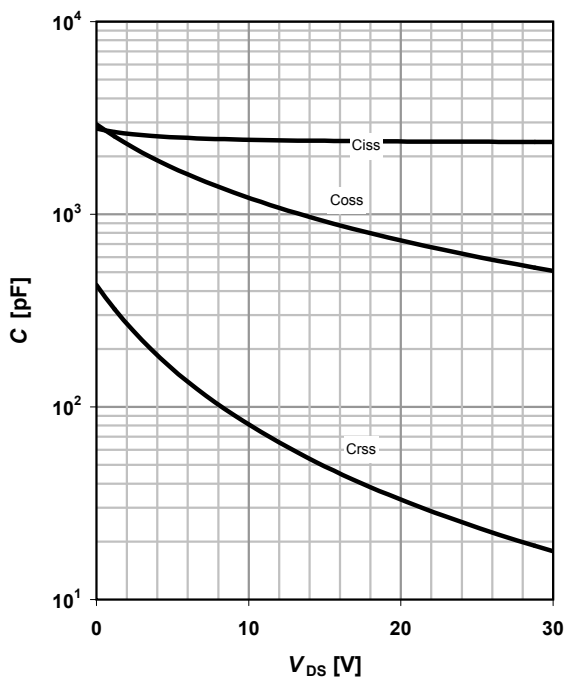
**10 Typ. gate threshold voltage**

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



**11 Typ. capacitances**

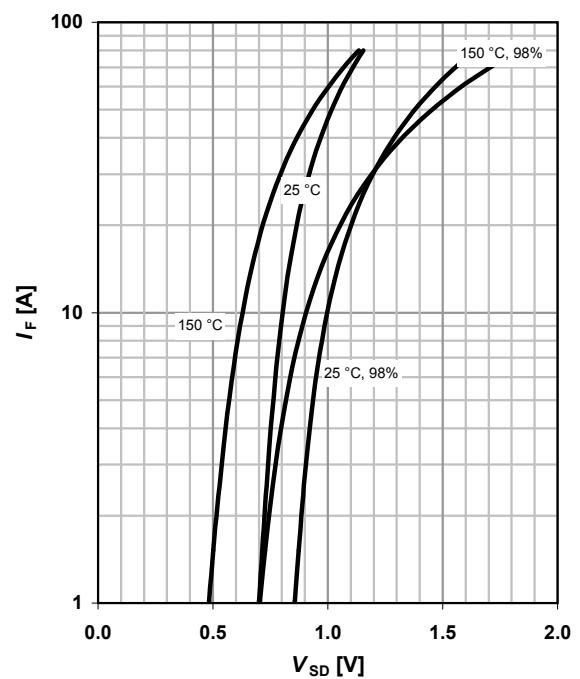
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



**12 Forward characteristics of reverse diode**

$I_F = f(V_{SD})$

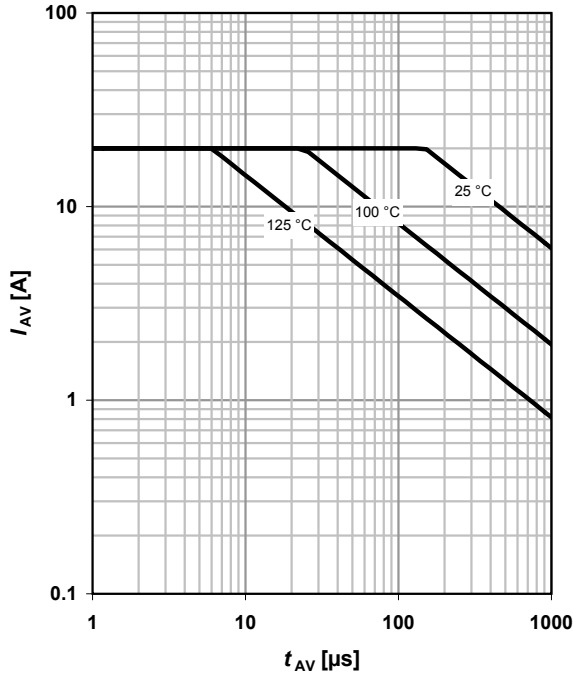
parameter:  $T_j$



**13 Avalanche characteristics**

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

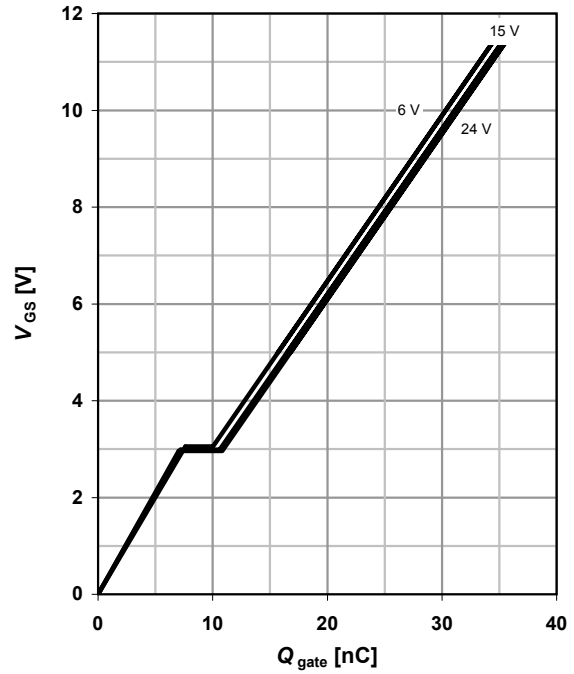
parameter:  $T_{j(start)}$



**14 Typ. gate charge**

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

parameter:  $V_{DD}$



**15 Drain-source breakdown voltage**

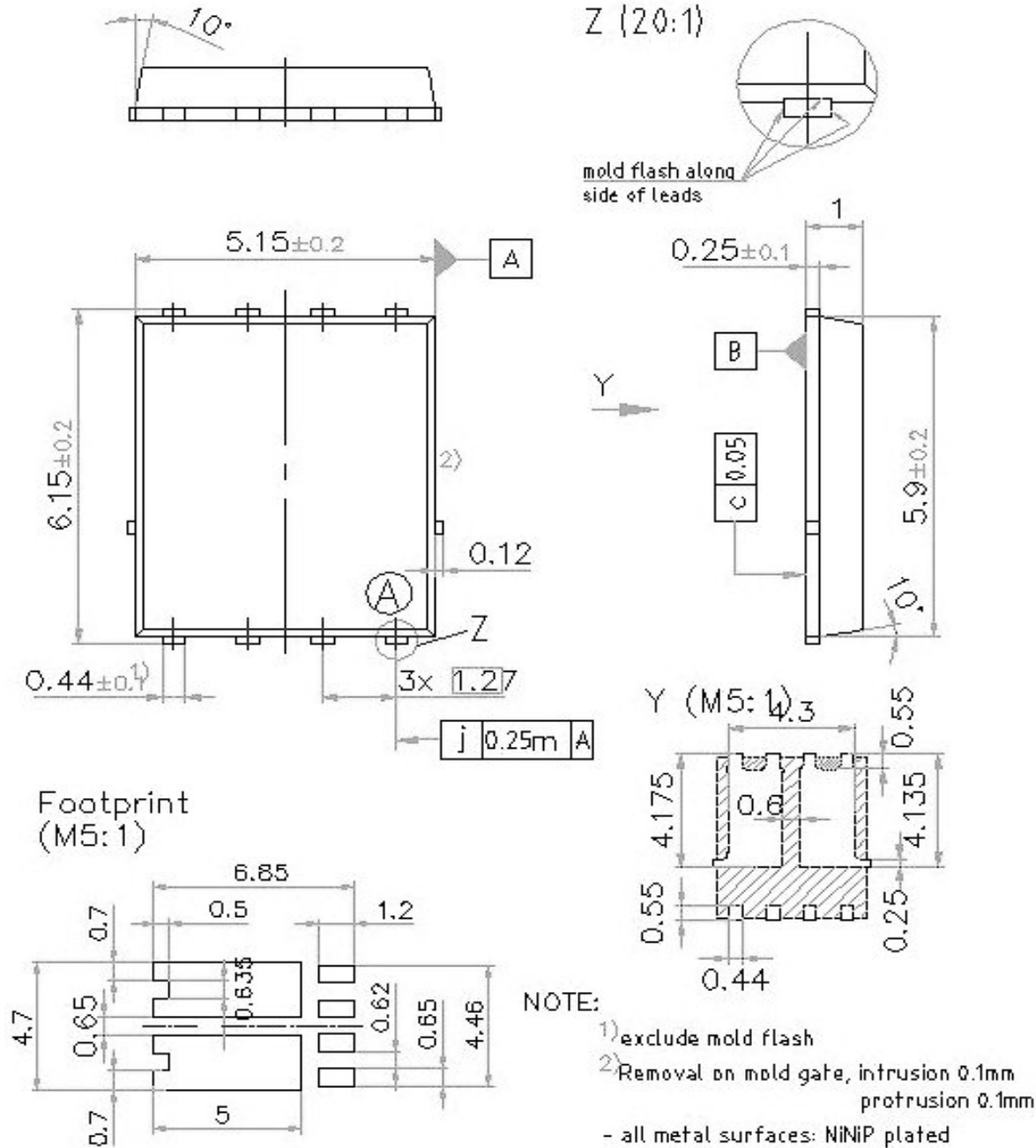
$V_{BR(DSS)}=f(T_j); I_D=1 \text{ mA}$



**16 Gate charge waveforms**



Package Outline and Footprint PG-TDSON-8 dual







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