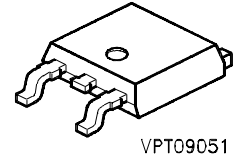
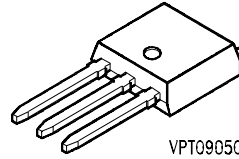


## SIPMOS® Power Transistor

- N-Channel
- Enhancement mode
- Avalanche rated
- dv/dt rated
- 175°C operating temperature



Pin 1	Pin 2	Pin 3
G	D	S

Type	V <sub>DS</sub>	I <sub>D</sub>	R <sub>DS(on)</sub>	@ V <sub>GS</sub>	Package	Ordering Code
SPD30N03	30 V	30 A	0.015 Ω	V <sub>GS</sub> = 10 V	P-TO252	Q67040-S4144-A2
SPU30N03					P-TO251-3-1	Q67040-S4146-A2

### Maximum Ratings, at T<sub>j</sub> = 25 °C, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous drain current T <sub>C</sub> = 25 °C, <sup>1)</sup> T <sub>C</sub> = 100 °C	I <sub>D</sub>	30 30	A
Pulsed drain current T <sub>C</sub> = 25 °C	I <sub>D puls</sub>	120	
Avalanche energy, single pulse I <sub>D</sub> = 30 A, V <sub>DD</sub> = 25 V, R <sub>GS</sub> = 25 Ω	E <sub>AS</sub>	250	mJ
Avalanche current, periodic limited by T <sub>jmax</sub>	I <sub>AR</sub>	30	A
Avalanche energy, periodic limited by T <sub>j(max)</sub>	E <sub>AR</sub>	12	mJ
Reverse diode dv/dt I <sub>S</sub> = 30 A, V <sub>DS</sub> = 24 V, di/dt = 200 A/μs, T <sub>jmax</sub> = 175 °C	dv/dt	6	kV/μs
Gate source voltage	V <sub>GS</sub>	±20	V
Power dissipation T <sub>C</sub> = 25 °C	P <sub>tot</sub>	120	W
Operating temperature	T <sub>j</sub>	-55 ... +175	°C
Storage temperature	T <sub>stg</sub>	-55 ... +175	
IEC climatic category; DIN IEC 68-1		55/175/56	

<sup>1</sup>current limited by bond wire

## Electrical Characteristics

Parameter at $T_j = 25\text{ °C}$ , unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	

## Thermal Characteristics

Thermal resistance, junction - case	$R_{thJC}$	-		1.25	K/W
Thermal resistance, junction - ambient	$R_{thJA}$	-	100	-	
SMD version, device on PCB: @ min. footprint @ 6 cm <sup>2</sup> cooling area <sup>1)</sup>	$R_{thJA}$	-	50 tbd	-	

## Static Characteristics

Drain- source breakdown voltage $V_{GS} = 0\text{ V}$ , $I_D = 0.25\text{ mA}$	$V_{(BR)DSS}$	30	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D = 80\text{ }\mu\text{A}$ , $T_j = 25\text{ °C}$	$V_{GS(th)}$	2.1	3	4	
Zero gate voltage drain current $V_{DS} = 30\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 25\text{ °C}$ $V_{DS} = 30\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 150\text{ °C}$	$I_{DSS}$	-	0.1	1	$\mu\text{A}$
Gate-source leakage current $V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$	$I_{GSS}$	-	10	100	
Drain-Source on-state resistance $V_{GS} = 10\text{ V}$ , $I_D = 30\text{ A}$	$R_{DS(on)}$	-	0.0085	0.015	$\Omega$

<sup>1</sup> Device on 50mm\*50mm\*1.5mm epoxy PCB FR4 with 6 cm<sup>2</sup> (one layer, 70 $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

## Electrical Characteristics

Parameter at $T_j = 25\text{ °C}$ , unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
<b>Dynamic Characteristics</b>					
Transconductance $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = 30\text{ A}$	$g_{fs}$	18	34	-	S
Input capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{iss}$	-	1400	1750	pF
Output capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{oss}$	-	645	810	
Reverse transfer capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{rss}$	-	260	325	
Turn-on delay time $V_{DD} = 15\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 30\text{ A}$ , $R_G = 6.8\ \Omega$	$t_{d(on)}$	-	20	30	ns
Rise time $V_{DD} = 15\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 30\text{ A}$ , $R_G = 6.8\ \Omega$	$t_r$	-	35	52	
Turn-off delay time $V_{DD} = 15\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 30\text{ A}$ , $R_G = 6.8\ \Omega$	$t_{d(off)}$	-	50	75	
Fall time $V_{DD} = 15\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 30\text{ A}$	$t_f$	-	45	65	

## Electrical Characteristics

Parameter at $T_j = 25\text{ °C}$ , unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	

## Dynamic Characteristics

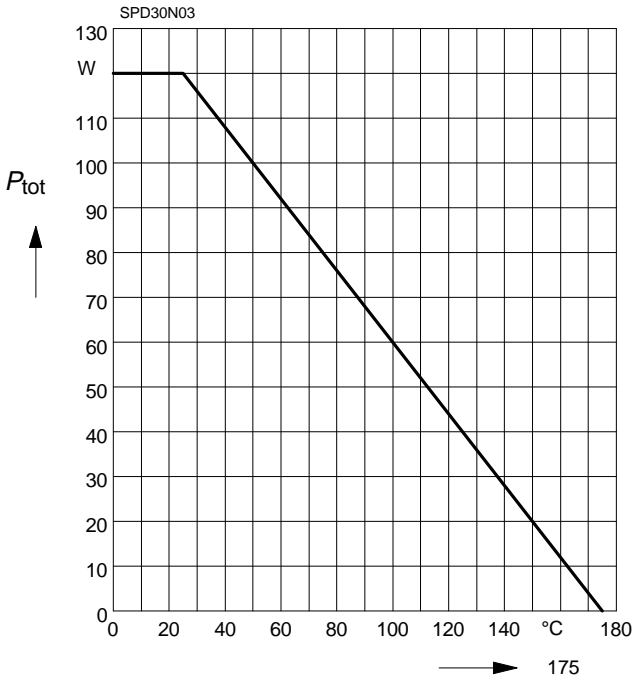
Gate charge at threshold $V_{DD} = 24\text{ V}$ , $I_D = 30\text{ A}$ , $V_{GS} = 0\text{ to }1\text{ V}$	$Q_{G(th)}$	-	1	1.5	nC
Gate charge at $V_{GS}=7\text{V}$ $V_{DD} = 24\text{ V}$ , $I_D = 30\text{ A}$ , $V_{GS} = 0\text{ to }7\text{ V}$	$Q_{g(7)}$	-	30	45	nC
Gate charge total $V_{DD} = 24\text{ V}$ , $I_D = 30\text{ A}$ , $V_{GS} = 0\text{ to }10\text{ V}$	$Q_g$	-	39	60	
Gate plateau voltage $V_{DD} = 24\text{ V}$ , $I_D = 30\text{ A}$	$V_{(plateau)}$	-	4.8	-	V

## Reverse Diode

Inverse diode continuous forward current $T_C = 25\text{ °C}$	$I_S$	-	-	30	A
Inverse diode direct current,pulsed $T_C = 25\text{ °C}$	$I_{SM}$	-	-	120	
Inverse diode forward voltage $V_{GS} = 0\text{ V}$ , $I_F = 60\text{ A}$	$V_{SD}$	-	1	1.6	V
Reverse recovery time $V_R = 15\text{ V}$ , $I_F=I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$	$t_{rr}$	-	40	60	ns
Reverse recovery charge $V_R = 15\text{ V}$ , $I_F=I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$	$Q_{rr}$	-	0.035	0.052	$\mu\text{C}$

### Power Dissipation

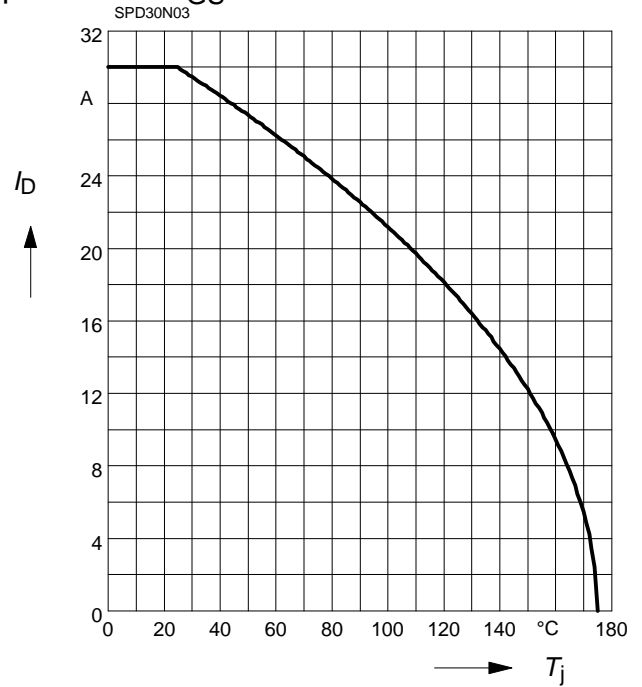
$$P_{\text{tot}} = f(T_C)$$



### Drain current

$$I_D = f(T_C)$$

parameter:  $V_{GS} \geq 10 \text{ V}$



### Transient thermal impedance

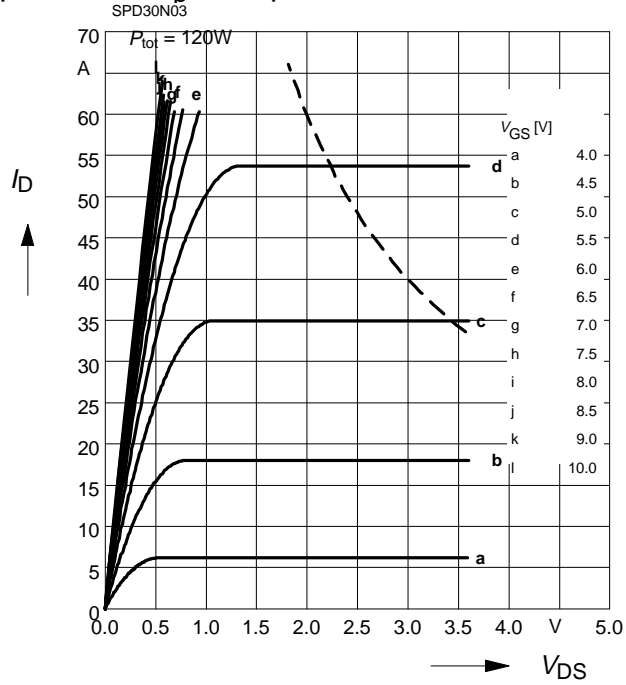
$$Z_{\text{thJC}} = f(t_p)$$

parameter:  $D = t_p/T$

### Typ. output characteristics

$$I_D = f(V_{DS})$$

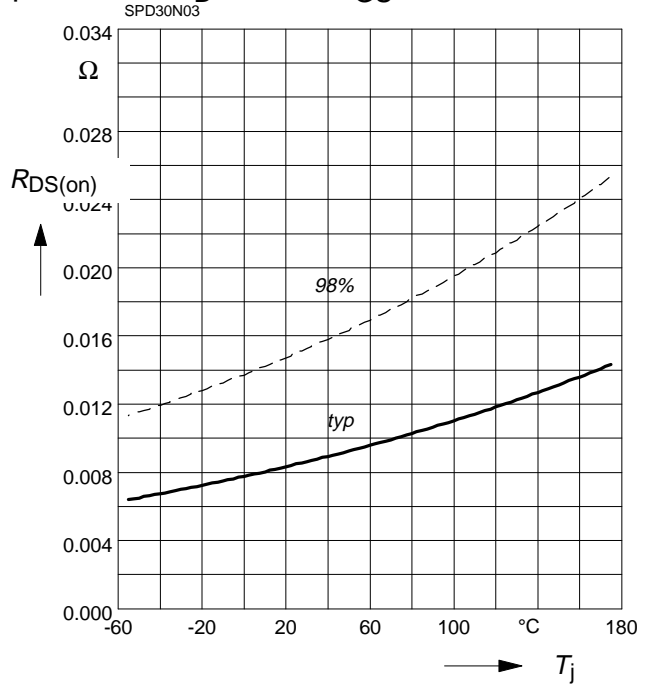
parameter:  $t_D = 80 \mu s$



### Drain-source on-resistance

$$R_{DS(on)} = f(T_j)$$

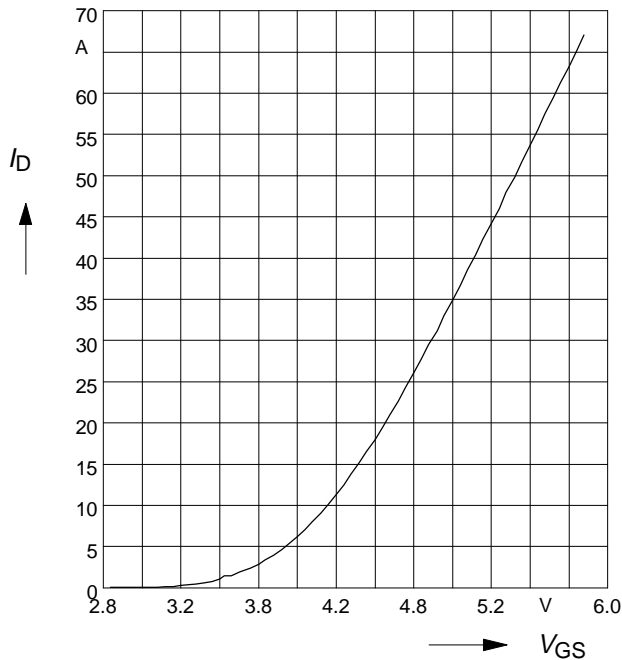
parameter:  $I_D = 30 A, V_{GS} = 10 V$



**Typ. transfer characteristics  $I_D = f(V_{GS})$**

parameter:  $t_p = 80 \mu s$

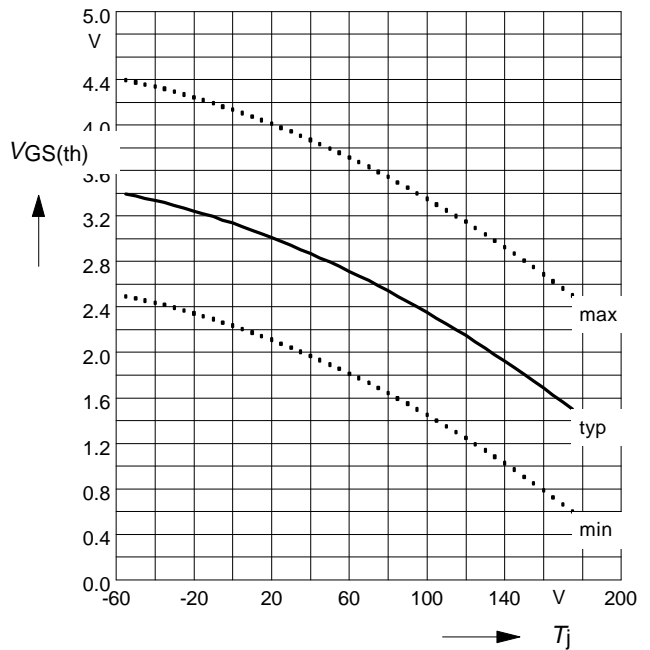
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



**Gate threshold voltage  $V_{GS(th)} = f(T_j)$**

$V_{GS(th)} = f(T_j)$

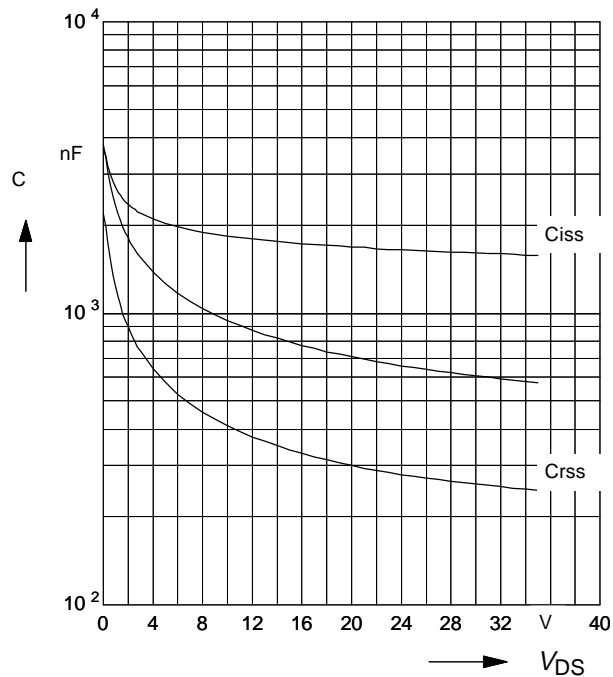
parameter:  $V_{GS} = V_{DS}, I_D = 80 \mu A$



**Typ. capacitances  $C = f(V_{DS})$**

$C = f(V_{DS})$

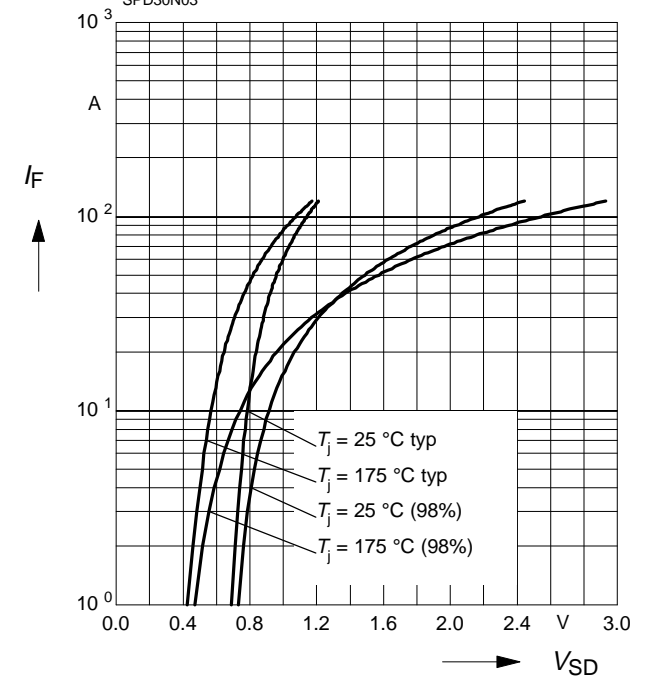
Parameter:  $V_{GS} = 0 V, f = 1 MHz$



**Forward characteristics of reverse diode  $I_F = f(V_{SD})$**

$I_F = f(V_{SD})$

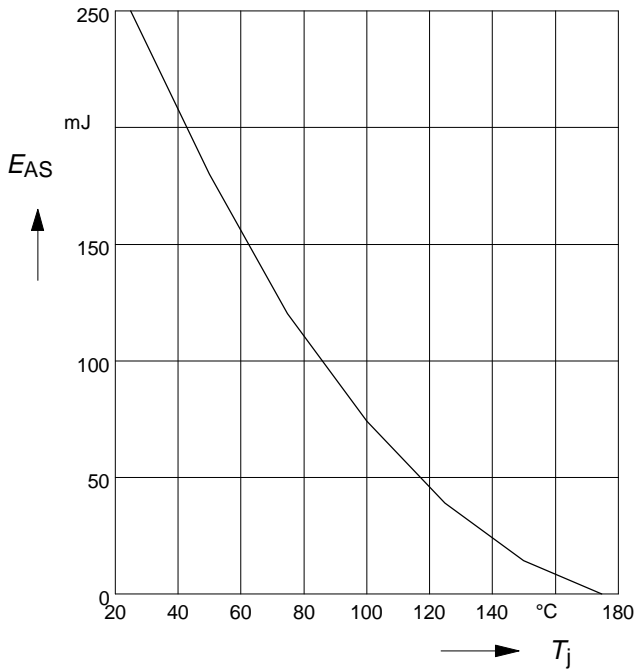
parameter:  $T_j, t_p = 80 \mu s$



**Avalanche Energy  $E_{AS} = f(T_j)$**

parameter:  $I_D = 30\text{ A}$ ,  $V_{DD} = 25\text{ V}$

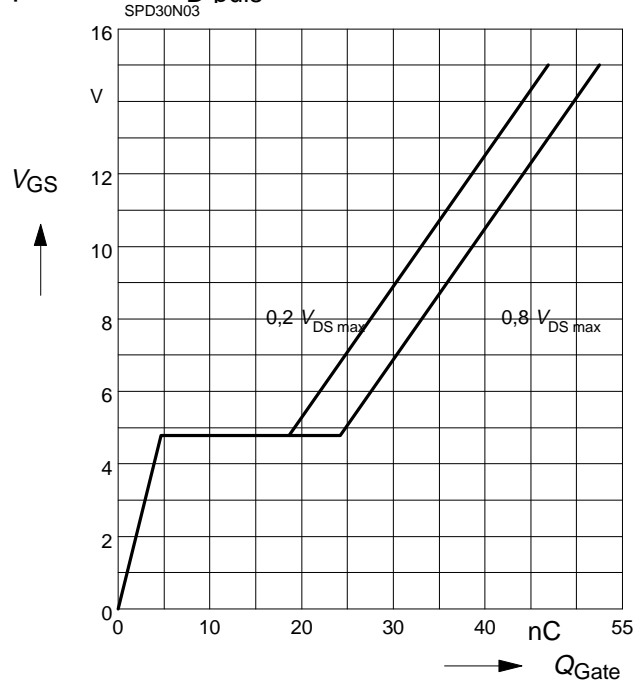
$R_{GS} = 25\ \Omega$



**Typ. gate charge  $V_{GS} = f(Q_{Gate})$**

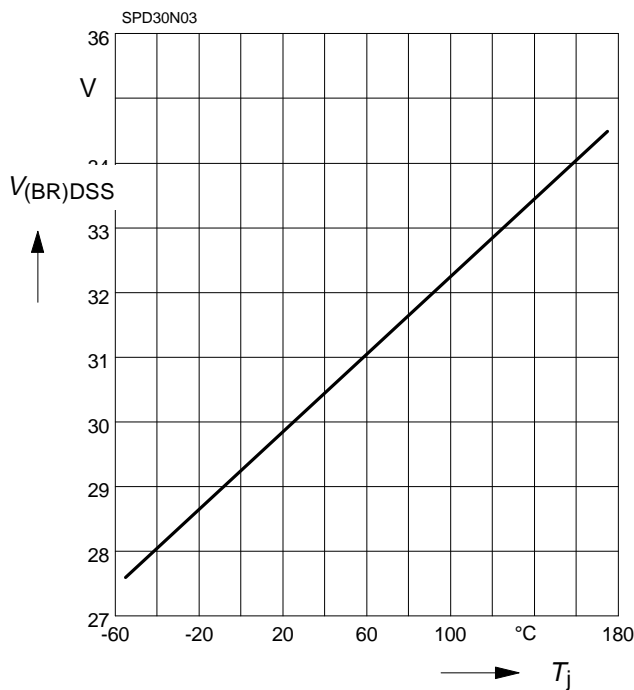
parameter:  $I_{D\text{ puls}} = 30\text{ A}$

parameter:  $I_{D\text{ puls}} = 30\text{ A}$



**Drain-source breakdown voltage  $V_{(BR)DSS} = f(T_j)$**

$V_{(BR)DSS} = f(T_j)$





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