

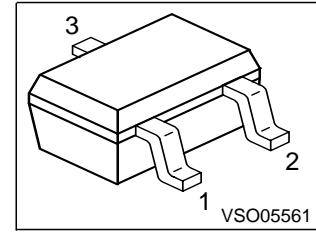
## SIPMOS® Small-Signal-Transistor

### Features

- P-Channel
- Enhancement mode
- Avalanche rated
- Logic Level
- dv/dt rated
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC61249-2-21

### Product Summary

Drain source voltage	$V_{DS}$	-60	V
Drain-source on-state resistance	$R_{DS(on)}$	8	$\Omega$
Continuous drain current	$I_D$	-0.15	A

Type	Package	Tape and Reel	Marking	Pin 1	PIN 2	PIN 3
BSS84PW	PG-SOT-323	H6327:3000pcs/r.	YBs	G	S	D

**Maximum Ratings**, at  $T_j = 25^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous drain current $T_A = 25^\circ\text{C}$	$I_D$	-0.15	A
Pulsed drain current $T_A = 25^\circ\text{C}$	$I_{D \text{ puls}}$	-0.6	
Avalanche energy, single pulse $I_D = -0.15 \text{ A} , V_{DD} = -25 \text{ V}, R_{GS} = 25 \Omega$	$E_{AS}$	2.61	mJ
Avalanche energy, periodic limited by $T_{j\text{max}}$	$E_{AR}$	0.03	
Reverse diode dv/dt $I_S = -0.15 \text{ A}, V_{DS} = -48 \text{ V}, di/dt = 200 \text{ A}/\mu\text{s}, T_{j\text{max}} = 150^\circ\text{C}$	dv/dt	6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$	$\pm 20$	V
Power dissipation $T_A = 25^\circ\text{C}$	$P_{\text{tot}}$	0.3	W
Operating and storage temperature	$T_j, T_{\text{stg}}$	-55...+150	°C
IEC climatic category; DIN IEC 68-1		55/150/56	
ESD Class JESF22-A114-HBM		Class 0	

**Thermal Characteristics**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Characteristics</b>					
Thermal resistance, junction - soldering point (Pin 3)	$R_{thJS}$	-	-	110	K/W
SMD version, device on PCB: @ min. footprint @ 6 cm <sup>2</sup> cooling area <sup>1)</sup>	$R_{thJA}$	-	-	420	
		-	-	350	

**Electrical Characteristics**, at  $T_j = 25^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Static Characteristics</b>					
Drain-source breakdown voltage $V_{GS} = 0 \text{ V}$ , $I_D = -250 \mu\text{A}$	$V_{(BR)DSS}$	-60	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D = -20 \mu\text{A}$	$V_{GS(\text{th})}$	-1	-1.5	-2	
Zero gate voltage drain current $V_{DS} = -60 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $T_j = 25^\circ\text{C}$ $V_{DS} = -60 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $T_j = 125^\circ\text{C}$	$I_{DSS}$	-	-0.1	-1	$\mu\text{A}$
-	-	-	-10	-100	
Gate-source leakage current $V_{GS} = -20 \text{ V}$ , $V_{DS} = 0 \text{ V}$	$I_{GSS}$	-	-10	-100	nA
Drain-source on-state resistance $V_{GS} = -2.7 \text{ V}$ , $I_D = -0.01 \text{ A}$	$R_{DS(\text{on})}$	-	10.5	25	$\Omega$
Drain-source on-state resistance $V_{GS} = -4.5 \text{ V}$ , $I_D = -0.12 \text{ A}$	$R_{DS(\text{on})}$	-	6.9	12	
Drain-source on-state resistance $V_{GS} = -10 \text{ V}$ , $I_D = -0.15 \text{ A}$	$R_{DS(\text{on})}$	-	4.6	8	

<sup>1)</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

**Electrical Characteristics**, at  $T_j = 25^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
<b>Dynamic Characteristics</b>						
Transconductance	$g_{fs}$	$V_{DS} \leq 2^* I_D^* R_{DS(\text{on})\text{max}}, I_D = 0.15\text{A}$	0.08	0.16	-	S
Input capacitance	$C_{iss}$	$V_{GS}=0\text{V}, V_{DS}=-25\text{V}, f=1\text{MHz}$	-	15.3	19.1	pF
Output capacitance	$C_{oss}$		-	5.8	7.3	
Reverse transfer capacitance	$C_{rss}$		-	3	3.8	
Turn-on delay time	$t_{d(\text{on})}$	$V_{DD}=-30\text{V}, V_{GS}=-4.5\text{V}, I_D=-0.12\text{A}, R_G=25\Omega$	-	6.7	10	ns
Rise time	$t_r$		-	16.2	24.3	
Turn-off delay time	$t_{d(\text{off})}$		-	8.6	12.9	
Fall time	$t_f$		-	20.5	30.8	

### Gate Charge Characteristics

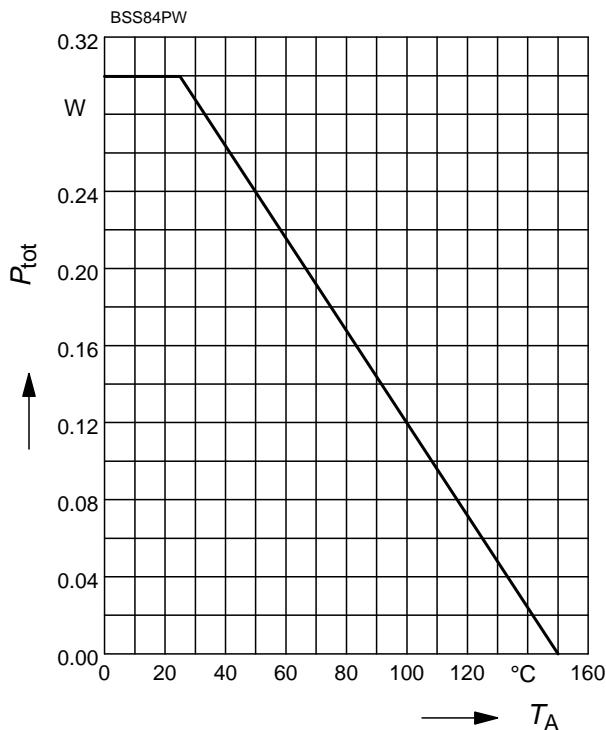
Gate to source charge	$Q_{gs}$	$V_{DD}=-48\text{V}, I_D=-0.15\text{A}$	-	0.25	0.38	nC
Gate to drain charge	$Q_{gd}$		-	0.3	0.45	
Gate charge total	$Q_g$	$V_{DD}=-48\text{V}, I_D=-0.15\text{A}, V_{GS}=0 \text{ to } -10\text{V}$	-	1	1.5	
Gate plateau voltage	$V_{(\text{plateau})}$	$V_{DD}=-48\text{V}, I_D=-0.15\text{A}$	-	-3.4	-	V

### Reverse Diode

Inverse diode continuous forward current	$I_S$	$T_A=25^\circ\text{C}$	-	-	-0.15	A
Inverse diode direct current, pulsed	$I_{SM}$		-	-	-0.6	
Inverse diode forward voltage	$V_{SD}$	$V_{GS}=0\text{V}, I_F=-0.15\text{A}$	-	-0.84	-1.12	V
Reverse recovery time	$t_{rr}$	$V_R=-30\text{V}, I_F=I_S, di_F/dt=100\text{A}/\mu\text{s}$	-	23.6	35.4	ns
Reverse recovery charge	$Q_{rr}$		-	11.6	17.4	

### Power Dissipation

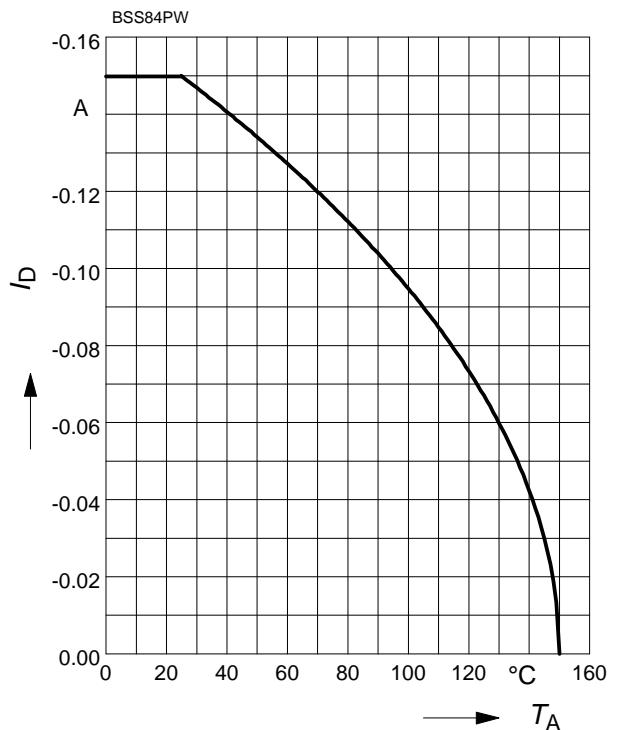
$$P_{\text{tot}} = f(T_A)$$



### Drain current

$$I_D = f(T_A)$$

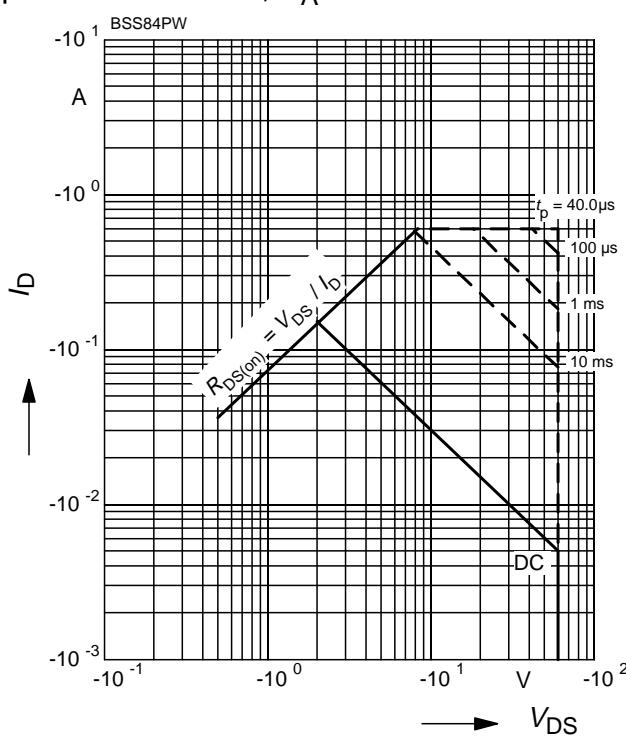
parameter:  $V_{GS} \geq 10$  V



### Safe operating area

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

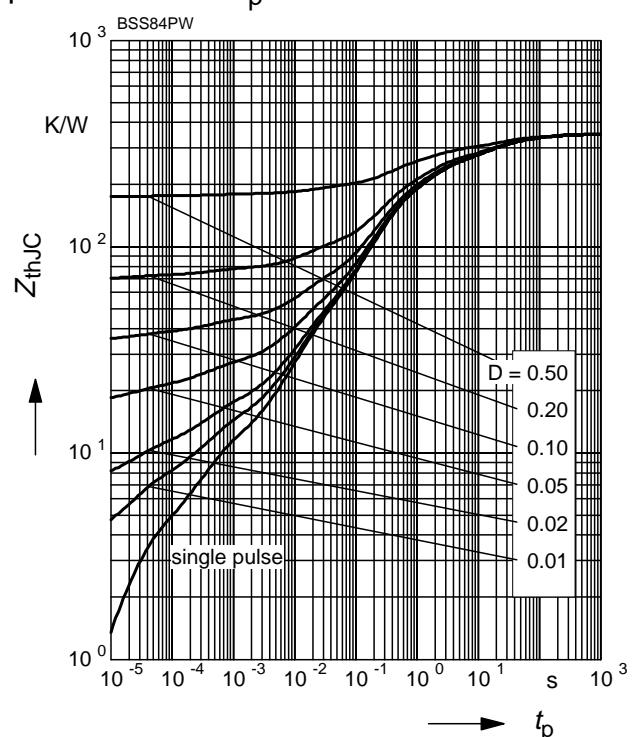
parameter :  $D = 0$  ,  $T_A = 25$  °C



### Transient thermal impedance

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

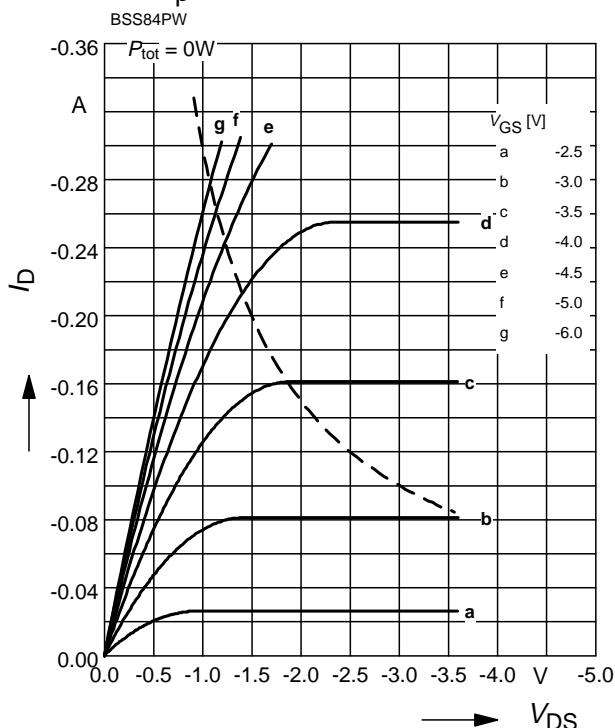
parameter :  $D = t_p/T$



**Typ. output characteristic**

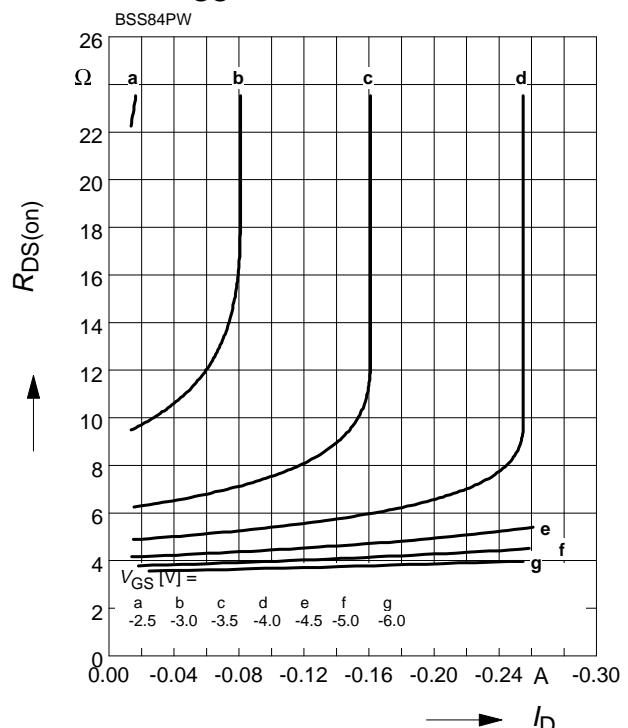
$$I_D = f(V_{DS}); \quad T_j=25^\circ\text{C}$$

parameter:  $t_p = 80 \mu\text{s}$


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

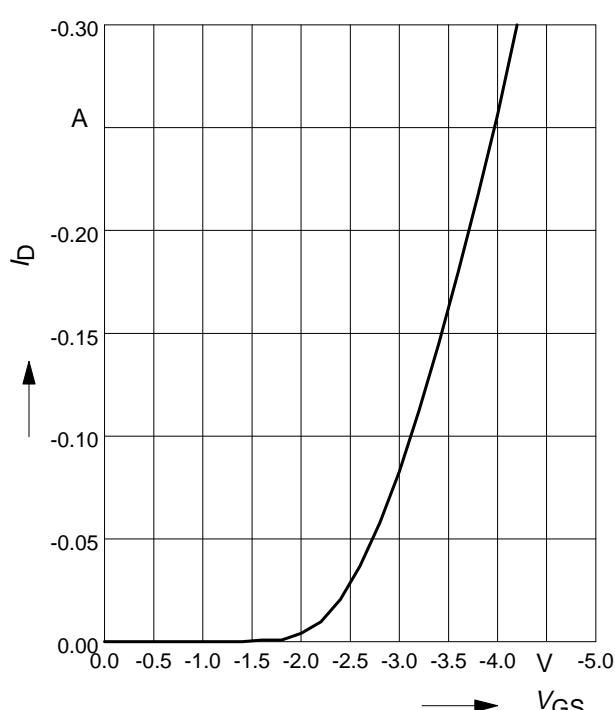
$$R_{DS(on)} = f(I_D)$$

parameter:  $V_{GS}$


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

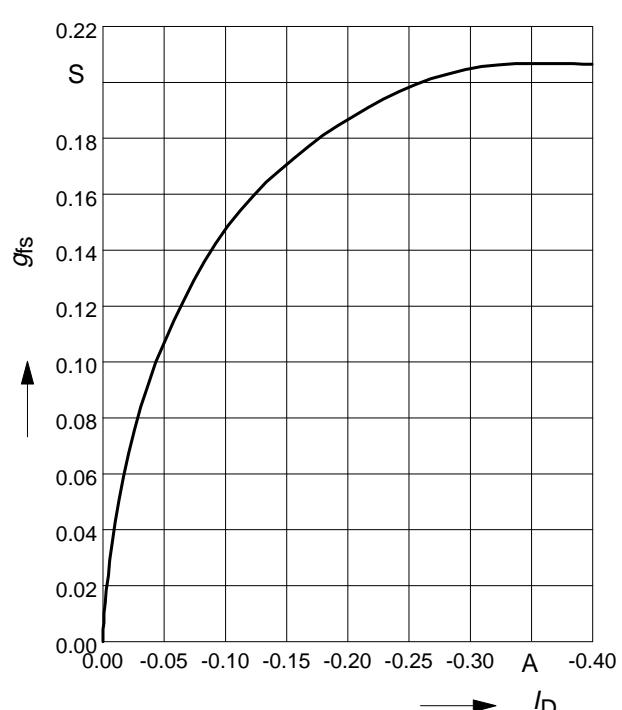
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)\max}$$

parameter:  $t_p = 80 \mu\text{s}$


**Typ. forward transconductance**

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

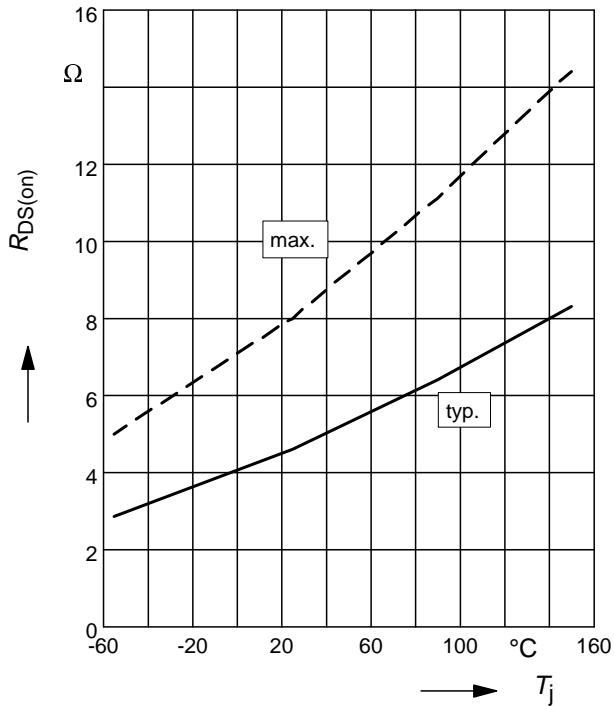
parameter:  $g_{fs}$



### Drain-source on-resistance

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

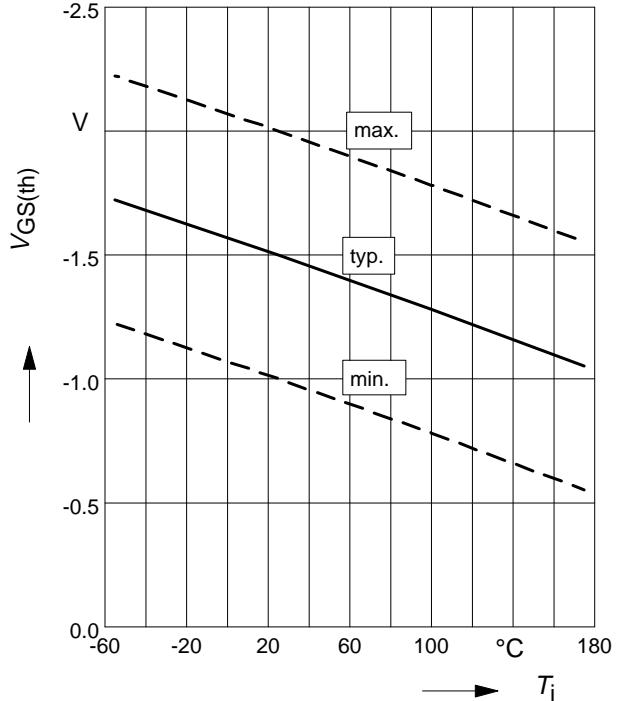
parameter:  $I_D = -0.17A$ ,  $V_{GS} = -10V$



### Gate threshold voltage

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

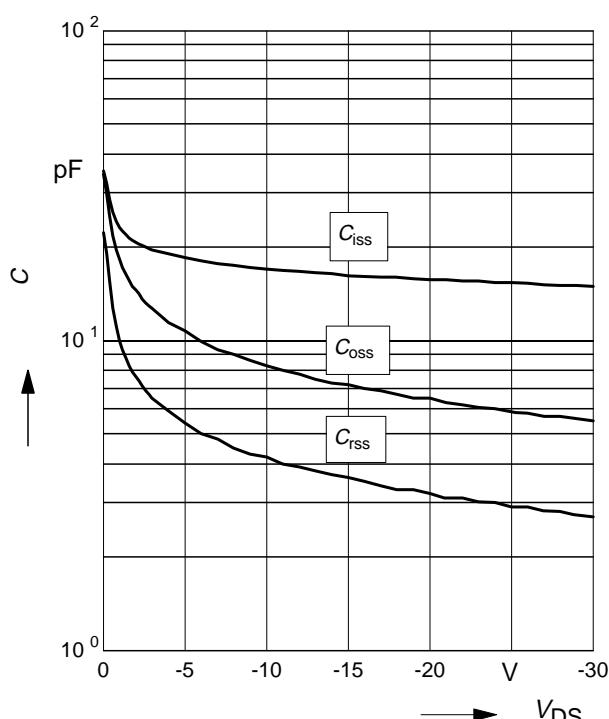
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = -20 \mu A$



### Typ. capacitances

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

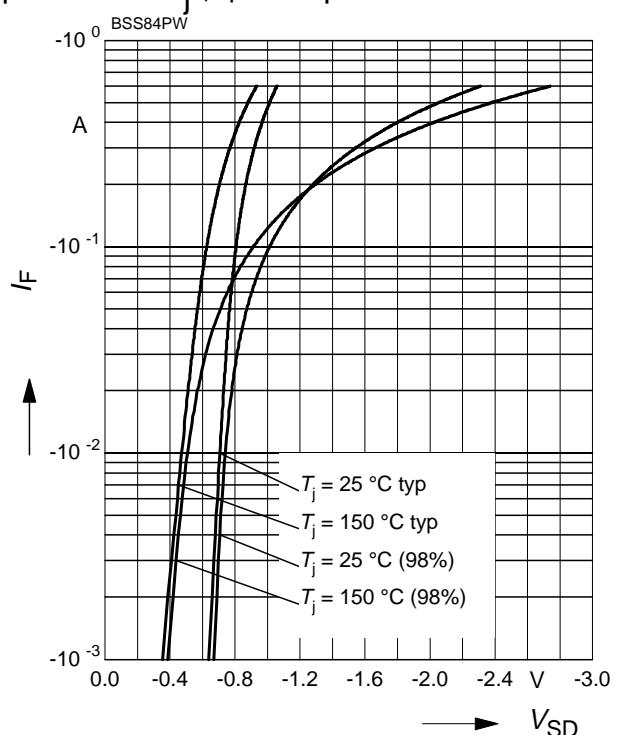
Parameter:  $V_{GS}=0V$ ,  $f=1\text{ MHz}$



### Forward characteristics of reverse diode

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

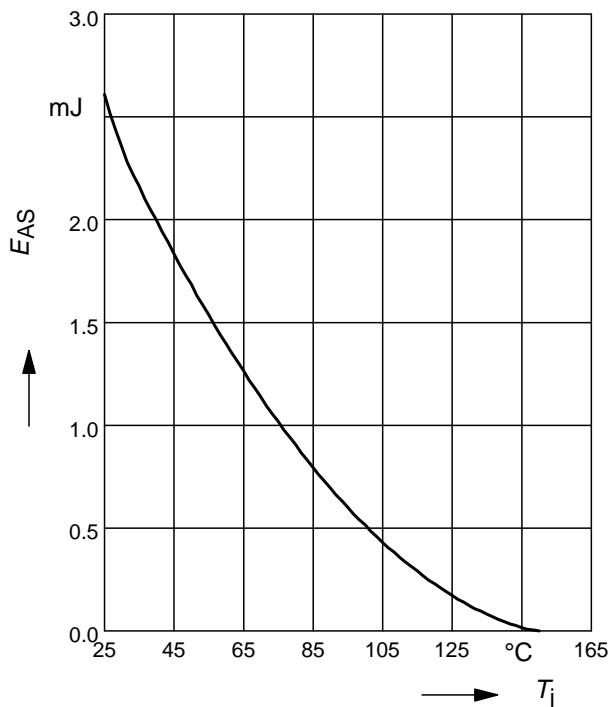
parameter:  $T_j$ ,  $t_p = 80 \mu s$



**Avalanche energy**

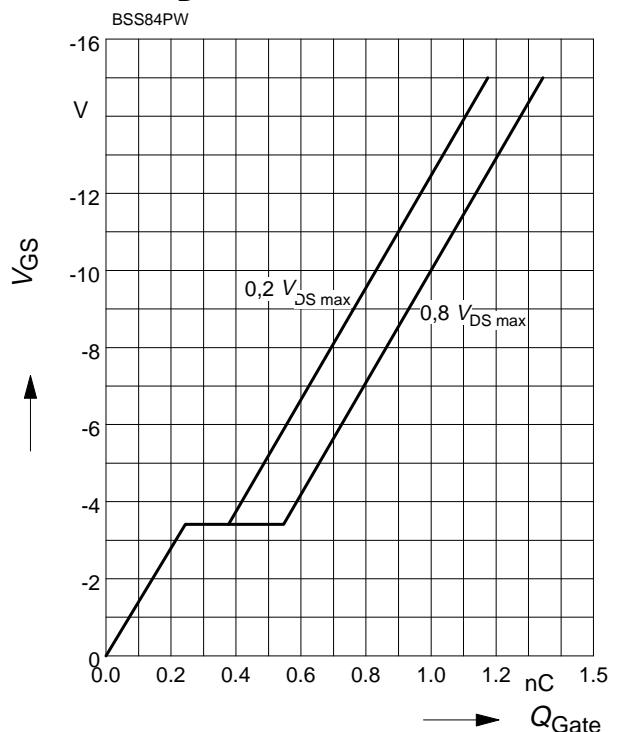
$$E_{AS} = f(T_j)$$

par.:  $I_D = -0.15 \text{ A}$ ,  $V_{DD} = -25 \text{ V}$ ,  $R_{GS} = 25 \Omega$

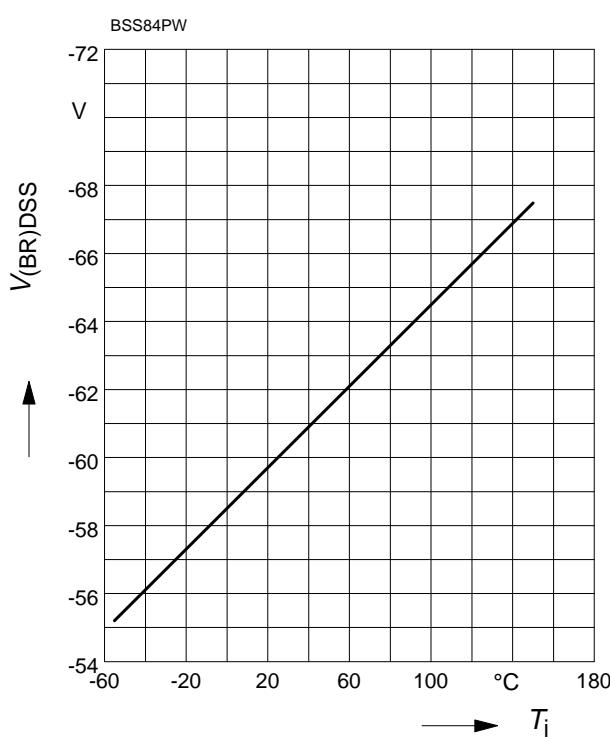

**Typ. gate charge**

$$V_{GS} = f(Q_{Gate})$$

parameter:  $I_D = -0.15 \text{ A}$  pulsed


**Drain-source breakdown voltage**

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



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