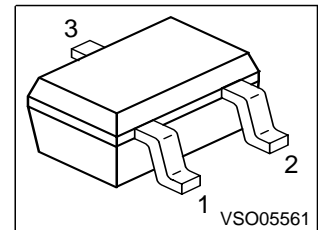


**SIPMOS<sup>®</sup> Small-Signal-Transistor**
**Features**

- 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  $T_j = 25\text{ °C}$ , unless otherwise specified**

Parameter	Symbol	Value	Unit
Continuous drain current $T_A = 25\text{ °C}$	$I_D$	-0.15	A
Pulsed drain current $T_A = 25\text{ °C}$	$I_{D\text{ puls}}$	-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 $T_{jmax}$	$E_{AR}$	0.03	
Reverse diode dv/dt $I_S = -0.15\text{ A}$ , $V_{DS} = -48\text{ V}$ , $di/dt = 200\text{ A}/\mu\text{s}$ , $T_{jmax} = 150\text{ °C}$	dv/dt	6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$	$\pm 20$	V
Power dissipation $T_A = 25\text{ °C}$	$P_{tot}$	0.3	W
Operating and storage temperature	$T_j, T_{stg}$	-55...+150	$^{\circ}\text{C}$
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  $T_j = 25\text{ °C}$ , unless otherwise specified**

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

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Dynamic Characteristics**

Transconductance	$g_{fs}$	$V_{DS} \leq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = 0.15\text{A}$	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	$t_{d(on)}$	$V_{DD} = -30\text{V}$ , $V_{GS} = -4.5\text{V}$ , $I_D = -0.12\text{A}$ , $R_G = 25\Omega$	-	6.7	10	ns
Rise time	$t_r$		-	16.2	24.3	
Turn-off delay time	$t_{d(off)}$		-	8.6	12.9	
Fall time	$t_f$		-	20.5	30.8	

**Gate Charge Characteristics**

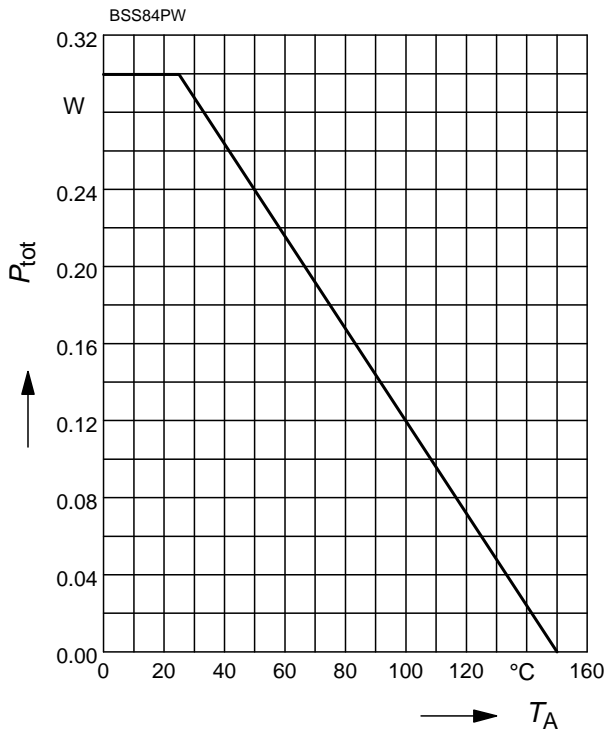
Gate to source charge	$Q_{gs}$	$V_{DD} = -48\text{V}$ , $I_D = -0.15\text{A}$	-	0.25	0.38	nC
Gate to drain charge	$Q_{gd}$		-	0.3	0.45	
Gate charge total	$Q_g$	$V_{DD} = -48\text{V}$ , $I_D = -0.15\text{A}$ , $V_{GS} = 0$ to $-10\text{V}$	-	1	1.5	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} = -48\text{V}$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

**Reverse Diode**

Inverse diode continuous forward current	$I_S$	$T_A = 25\text{ }^\circ\text{C}$	-	-	-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**

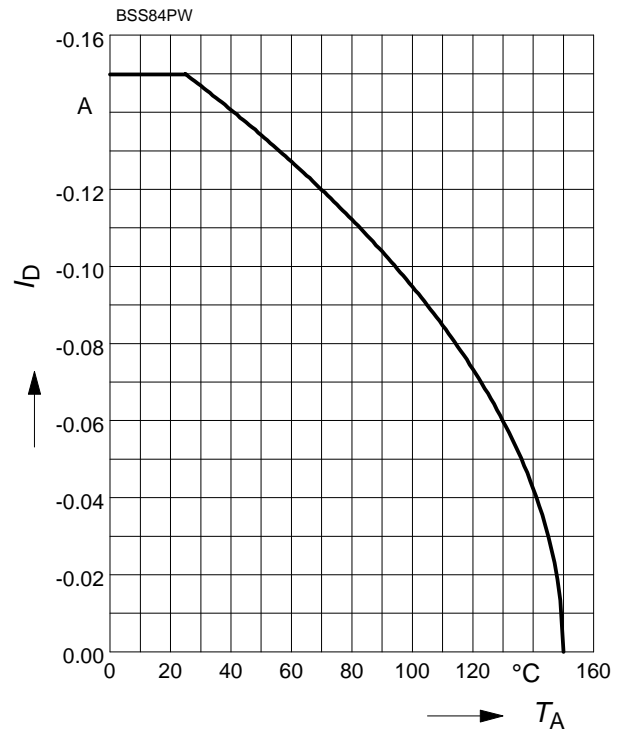
$$P_{tot} = f(T_A)$$



**Drain current**

$$I_D = f(T_A)$$

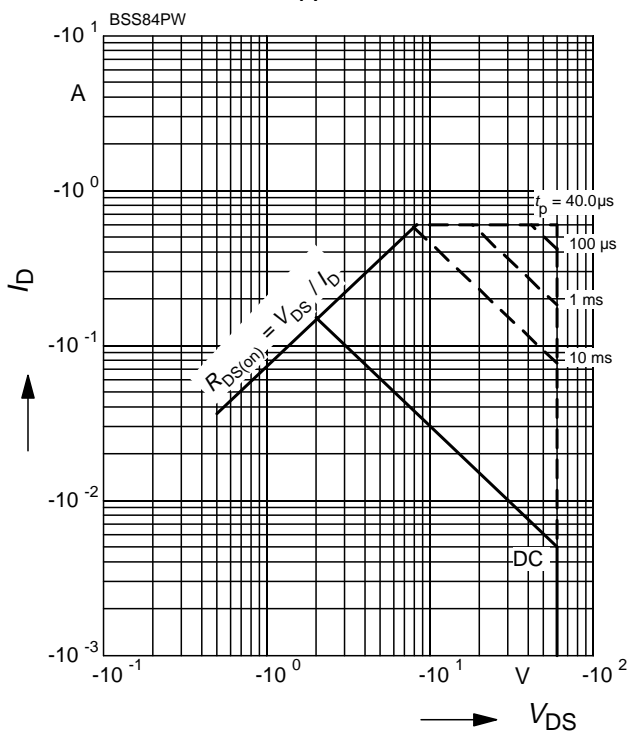
parameter:  $V_{GS} \geq 10 \text{ V}$



**Safe operating area**

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

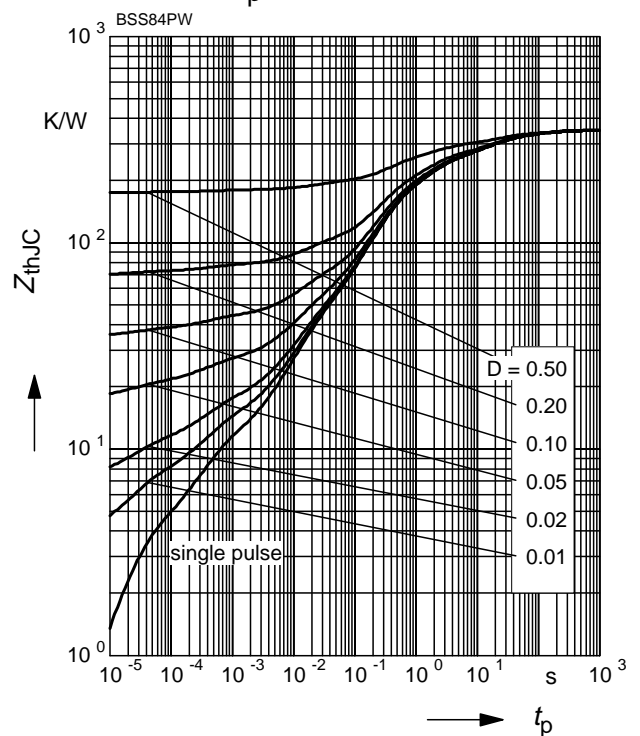
parameter:  $D = 0, T_A = 25 \text{ °C}$



**Transient thermal impedance**

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

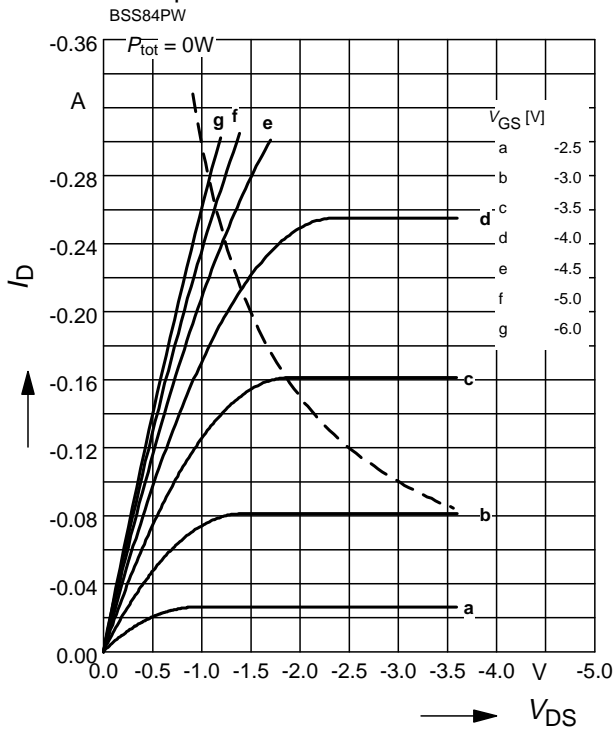
parameter:  $D = t_p/T$



**Typ. output characteristic**

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

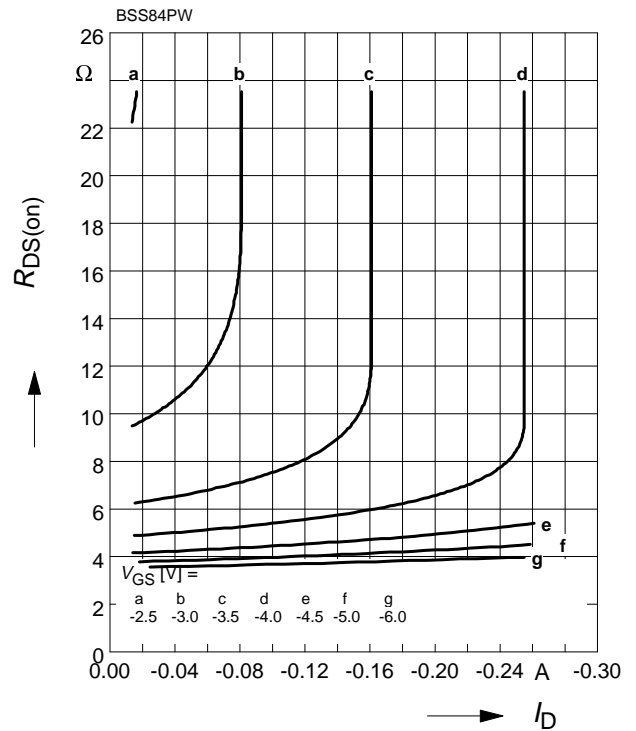
parameter:  $t_p = 80 \mu\text{s}$



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

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

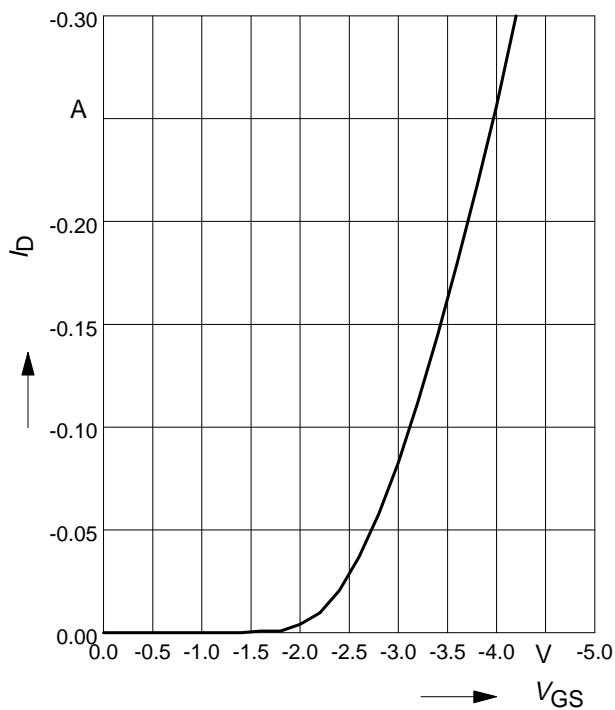
parameter:  $V_{GS}$



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

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

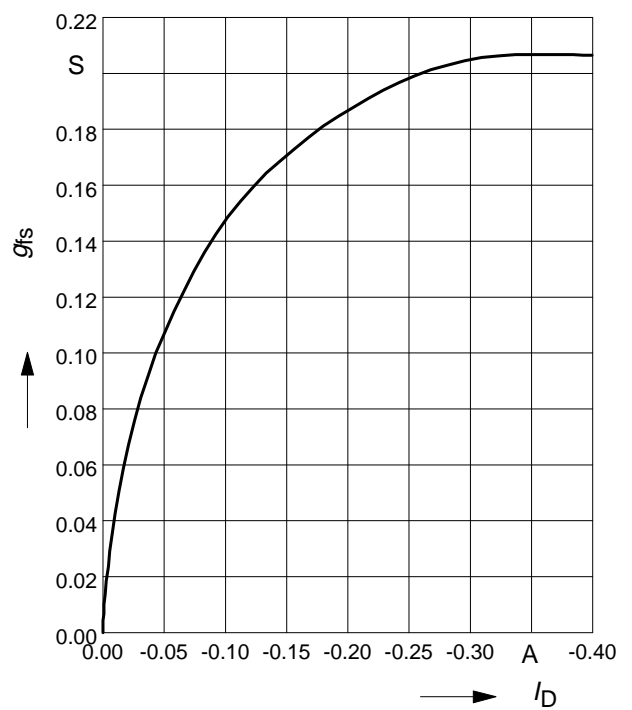
parameter:  $t_p = 80 \mu\text{s}$



**Typ. forward transconductance**

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

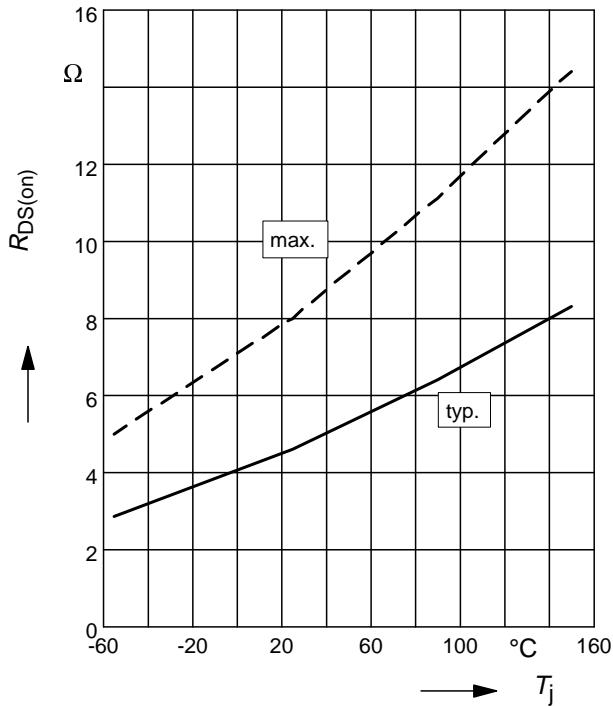
parameter:  $g_{fs}$



**Drain-source on-resistance**

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

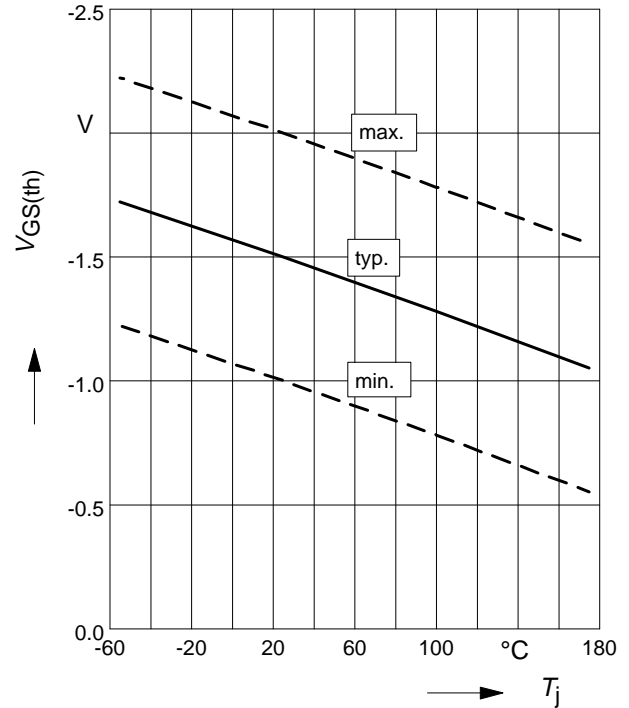
parameter:  $I_D = -0.17A$ ,  $V_{GS} = -10V$



**Gate threshold voltage**

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

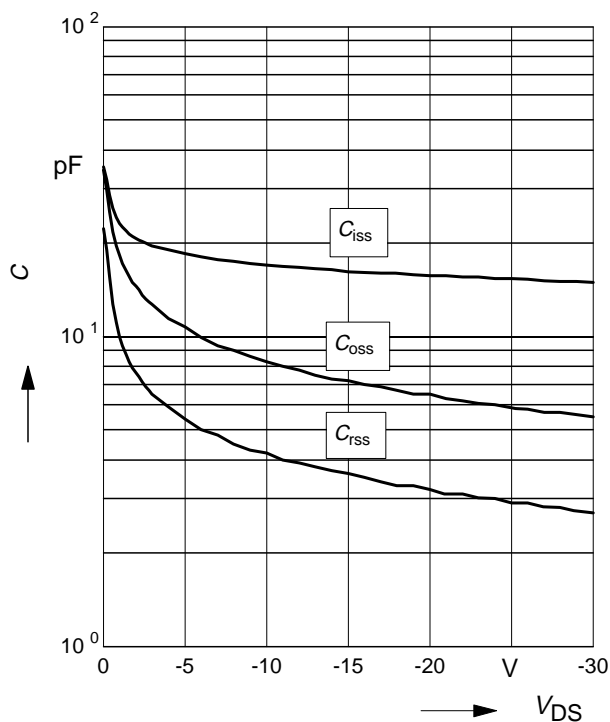
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = -20 \mu A$



**Typ. capacitances**

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

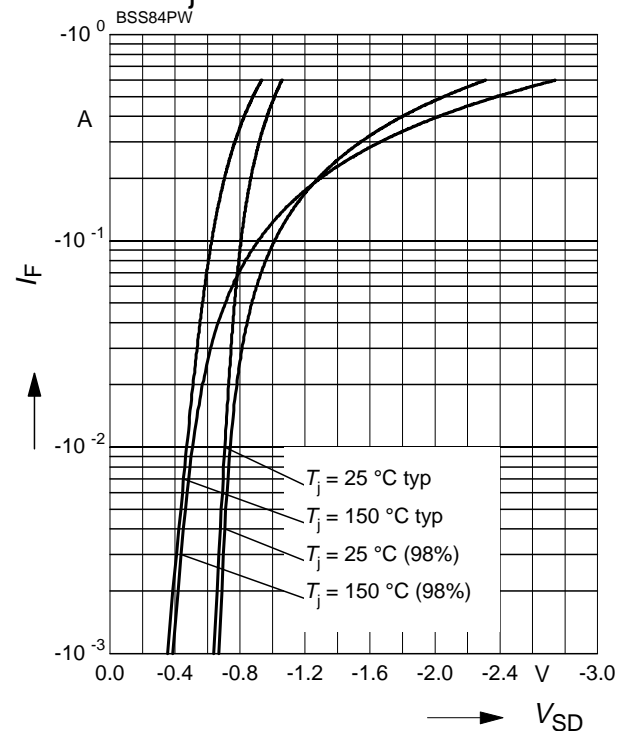
Parameter:  $V_{GS} = 0V$ ,  $f = 1MHz$



**Forward characteristics of reverse diode**

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

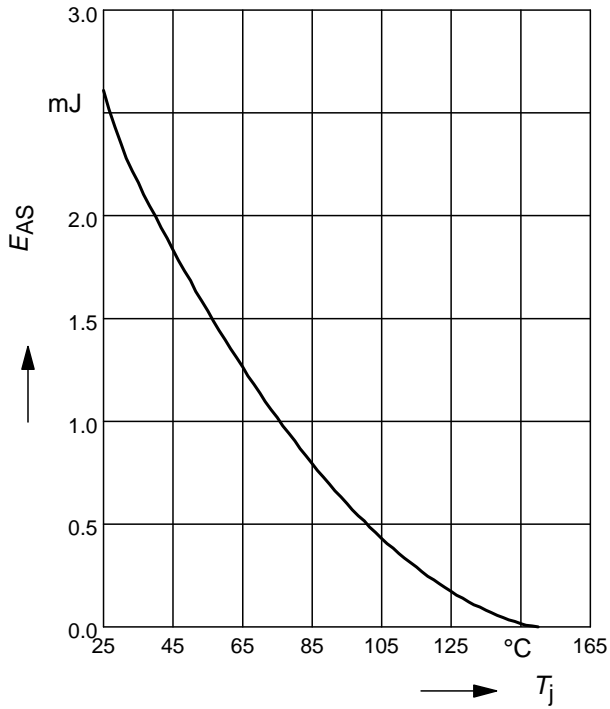
parameter:  $T_j$ ,  $t_p = 80 \mu s$



**Avalanche energy**

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

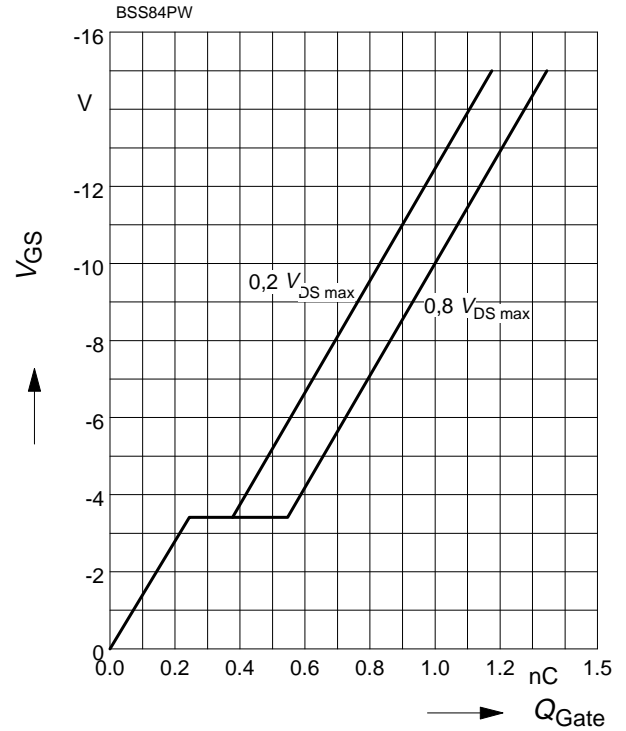
par.:  $I_D = -0.15 \text{ A}$  ,  $V_{DD} = -25 \text{ V}$  ,  $R_{GS} = 25 \ \Omega$



**Typ. gate charge**

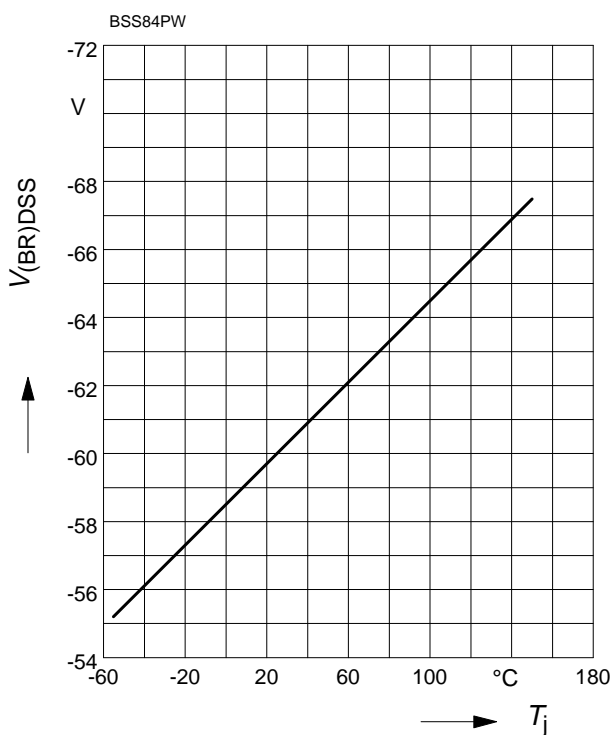
$$V_{GS} = f(Q_{Gate})$$

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

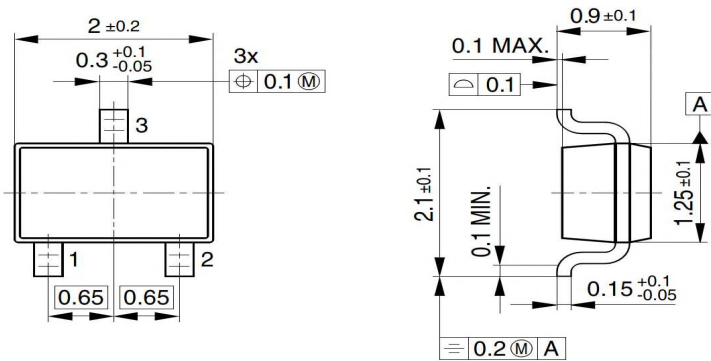


**Drain-source breakdown voltage**

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



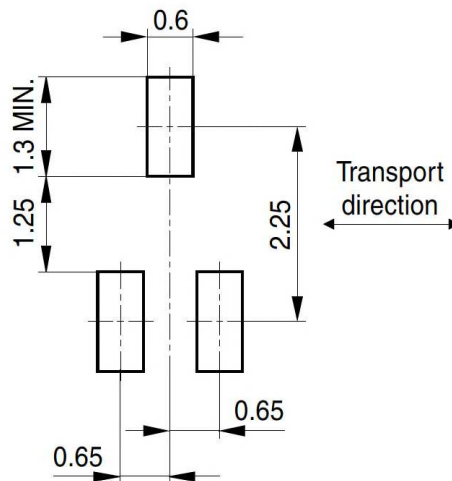
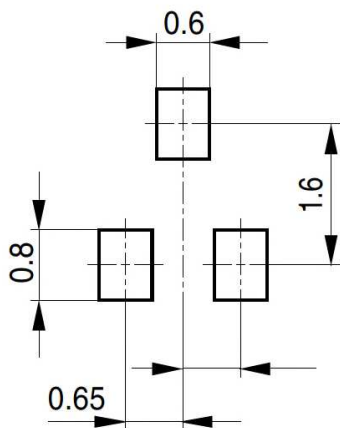
Package Outline SOT-323



Footprint

Soldering type: Reflow soldering

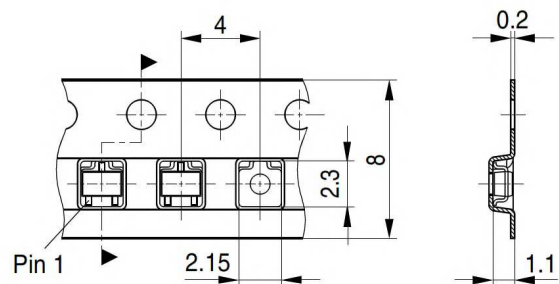
Soldering type: Wave soldering



Tape and Reel

Reel  $\varnothing 180 \text{ mm}$ : 3.000 Pieces/Reel  
 Reels/Box: 1 x 3.000 = 3.000  
 Reels/Box: 10 x 3.000 = 30.000

Reel  $\varnothing 330 \text{ mm}$ : 10.000 Pieces/Reel  
 Reels/Box: 1 x 10.000 = 10.000





# -60V SIPMOS Small Signal Transistor

## BSS84PW

### Revision History

BSS84PW

**Revision: 2016-06-27, Rev. 2.0**

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.0	2016-06-27	Release of final version

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