

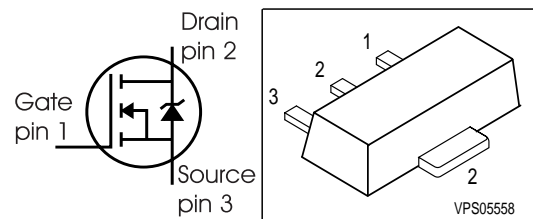
## SIPMOS<sup>®</sup> Small-Signal-Transistor

### Feature

- N-Channel
- Enhancement mode, Logic Level
- dv/dt rated
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC 61249-2-21

### Product Summary

$V_{DS}$	240	V
$R_{DS(on)}$	6	$\Omega$
$I_D$	0.26	A



Type	Package	Pb-free	Tape and Reel Information	Marking
BSS87	P-SOT89-4-2	Yes	H6327: 1000 pcs/reel	KA

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

Parameter	Symbol	Value	Unit
Continuous drain current $T_A=25\text{ }^\circ\text{C}$ $T_A=70\text{ }^\circ\text{C}$	$I_D$	0.26 0.21	A
Pulsed drain current $T_A=25\text{ }^\circ\text{C}$	$I_{D\text{ puls}}$	1.04	
Reverse diode dv/dt $I_S=0.26\text{A}$ , $V_{DS}=192\text{V}$ , $di/dt=200\text{A}/\mu\text{s}$ , $T_{jmax}=150\text{ }^\circ\text{C}$	dv/dt	6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$	$\pm 20$	V
ESD class (JESD22-A114-HBM)		1A (>250V, <500V)	
Power dissipation, related to min. footprint $T_A=25\text{ }^\circ\text{C}$	$P_{tot}$	1	W
Operating and storage temperature	$T_j, T_{stg}$	-55... +150	$^\circ\text{C}$
IEC climatic category; DIN IEC 68-1		55/150/56	

**Thermal Characteristics**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Characteristics</b>					
Thermal resistance, junction - case (Pin 2)	$R_{thJC}$	-	-	10	K/W
SMD version, device on PCB: @ min. footprint @ 6 cm <sup>2</sup> cooling area <sup>1)</sup>	$R_{thJA}$	-	-	125 70	

**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 $V_{GS}=0, I_D=250\mu\text{A}$	$V_{(BR)DSS}$	240	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D=108\mu\text{A}$	$V_{GS(th)}$	0.8	1.2	1.8	
Zero gate voltage drain current $V_{DS}=240\text{V}, V_{GS}=0, T_j=25^\circ\text{C}$ $V_{DS}=240\text{V}, V_{GS}=0, T_j=150^\circ\text{C}$	$I_{DSS}$	-	-	0.1 100	$\mu\text{A}$
Gate-source leakage current $V_{GS}=20\text{V}, V_{DS}=0$	$I_{GSS}$	-	-	10	
Drain-source on-state resistance $V_{GS}=4.5\text{V}, I_D=0.24\text{A}$	$R_{DS(on)}$	-	4.6	7.5	$\Omega$
Drain-source on-state resistance $V_{GS}=10\text{V}, I_D=0.26\text{A}$	$R_{DS(on)}$	-	3.9	6	

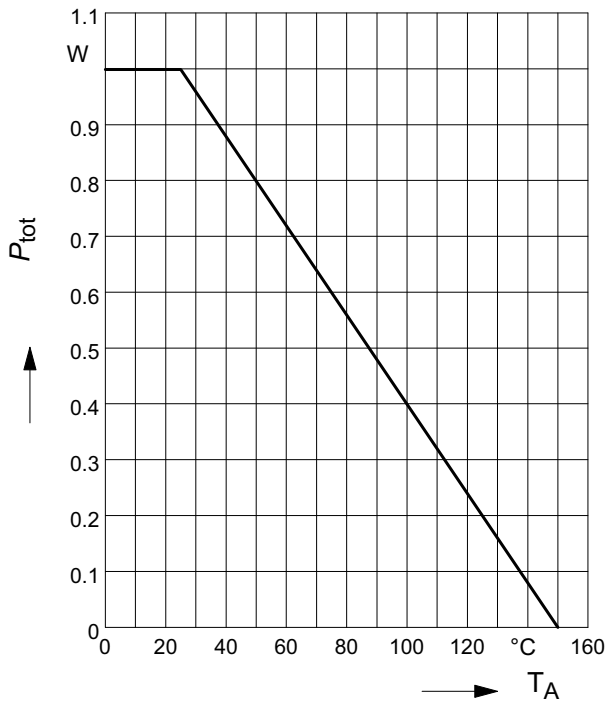
<sup>1)</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

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

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
<b>Dynamic Characteristics</b>						
Transconductance	$g_{fs}$	$V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = 0.21\text{A}$	0.16	0.33	-	S
Input capacitance	$C_{iss}$	$V_{GS} = 0$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$	-	77.5	97	pF
Output capacitance	$C_{oss}$		-	11.2	14	
Reverse transfer capacitance	$C_{rss}$		-	5.8	7.3	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 120\text{V}$ , $V_{GS} = 10\text{V}$ , $I_D = 0.28\text{A}$ , $R_G = 6\Omega$	-	3.7	5.5	ns
Rise time	$t_r$		-	3.5	5.2	
Turn-off delay time	$t_{d(off)}$		-	17.6	26.4	
Fall time	$t_f$		-	27.3	41	
<b>Gate Charge Characteristics</b>						
Gate to source charge	$Q_{gs}$	$V_{DD} = 192\text{V}$ , $I_D = 0.26\text{A}$	-	0.14	0.21	nC
Gate to drain charge	$Q_{gd}$		-	1.7	2.5	
Gate charge total	$Q_g$	$V_{DD} = 192\text{V}$ , $I_D = 0.26\text{A}$ , $V_{GS} = 0$ to $10\text{V}$	-	3.7	5.5	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} = 192\text{V}$ , $I_D = 0.26\text{A}$	-	2.7	-	V
<b>Reverse Diode</b>						
Inverse diode continuous forward current	$I_S$	$T_A = 25\text{ }^\circ\text{C}$	-	-	0.26	A
Inv. diode direct current, pulsed	$I_{SM}$		-	-	1.04	
Inverse diode forward voltage	$V_{SD}$	$V_{GS} = 0$ , $I_F = I_S$	-	0.82	1.2	V
Reverse recovery time	$t_{rr}$	$V_R = 120\text{V}$ , $I_F = I_S$ , $di_F/dt = 100\text{A}/\mu\text{s}$	-	53.6	80.4	ns
Reverse recovery charge	$Q_{rr}$		-	101	152	

### 1 Power dissipation

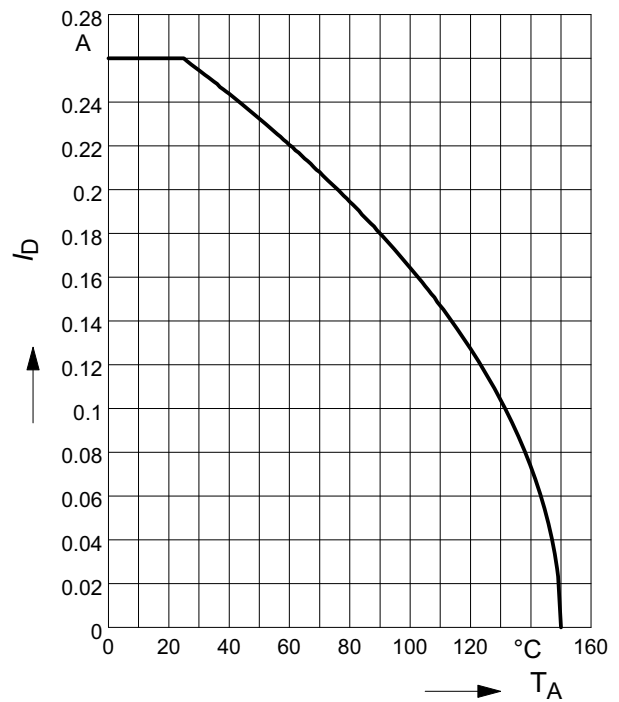
$$P_{tot} = f(T_A)$$



### 2 Drain current

$$I_D = f(T_A)$$

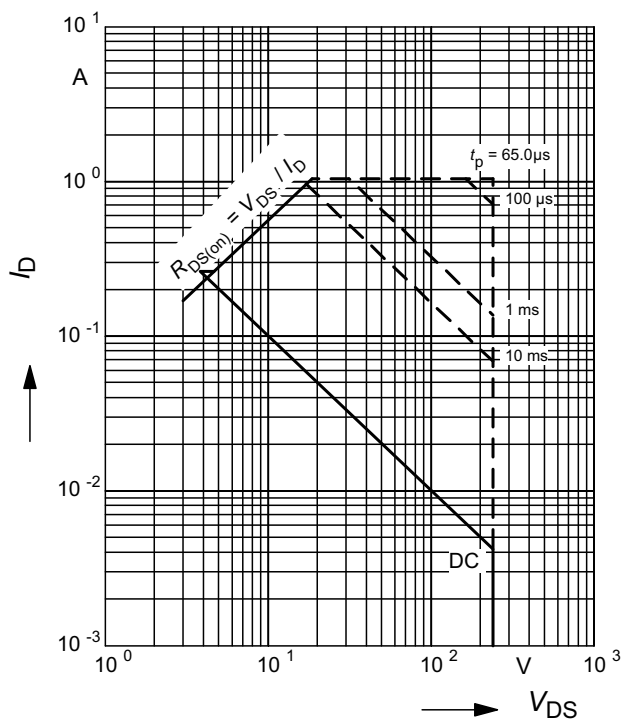
parameter:  $V_{GS} \geq 10\text{ V}$



### 3 Safe operating area

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

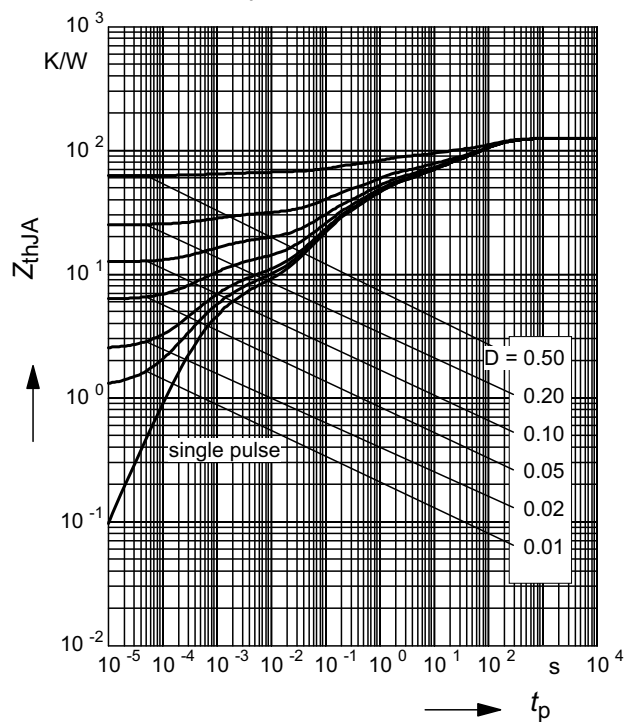
parameter:  $D = 0$ ,  $T_A = 25\text{ °C}$



### 4 Transient thermal impedance

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

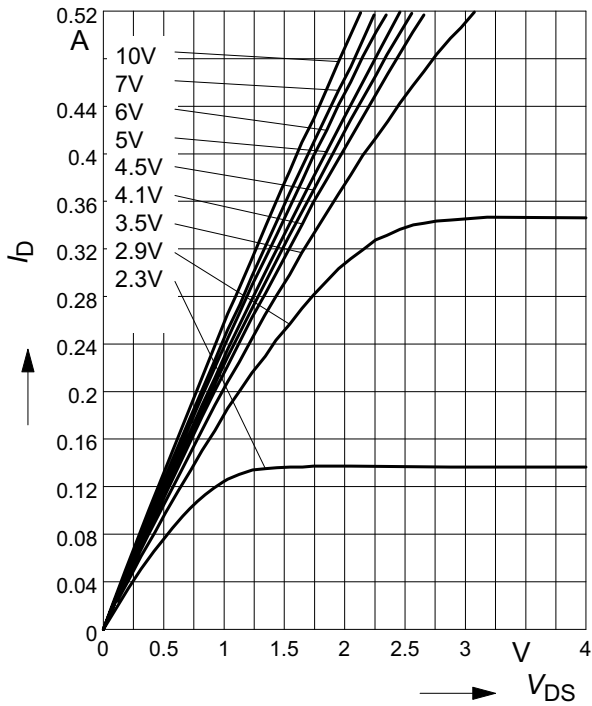
parameter:  $D = t_p/T$



**5 Typ. output characteristic**

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

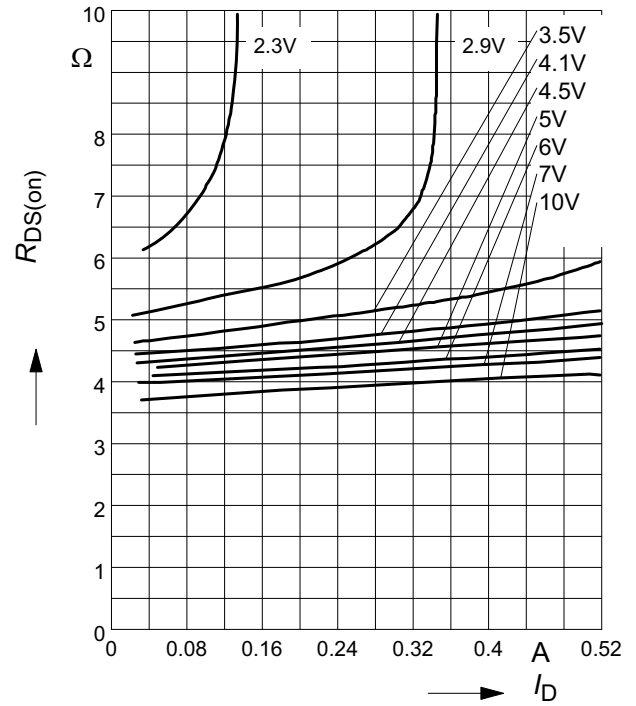
parameter:  $T_j = 25\text{ }^\circ\text{C}$ ,  $V_{GS}$



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

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

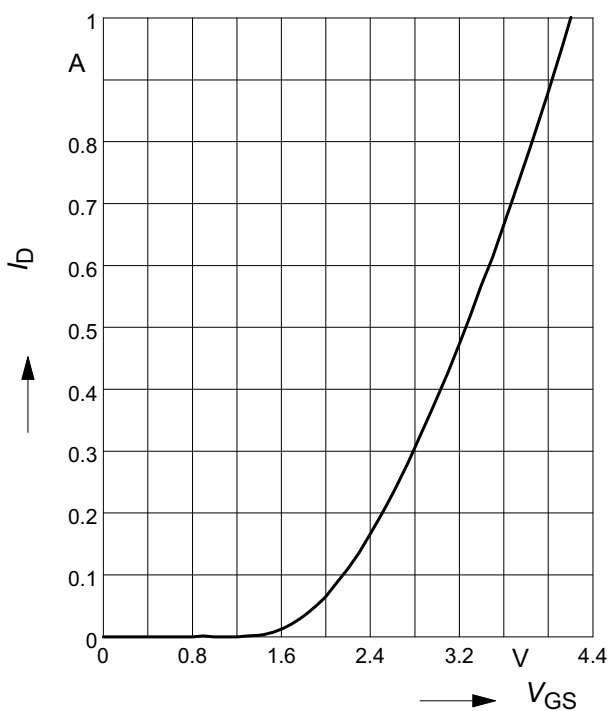
parameter:  $T_j = 25\text{ }^\circ\text{C}$ ,  $V_{GS}$



**7 Typ. transfer characteristics**

$$I_D = f(V_{GS}); V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$

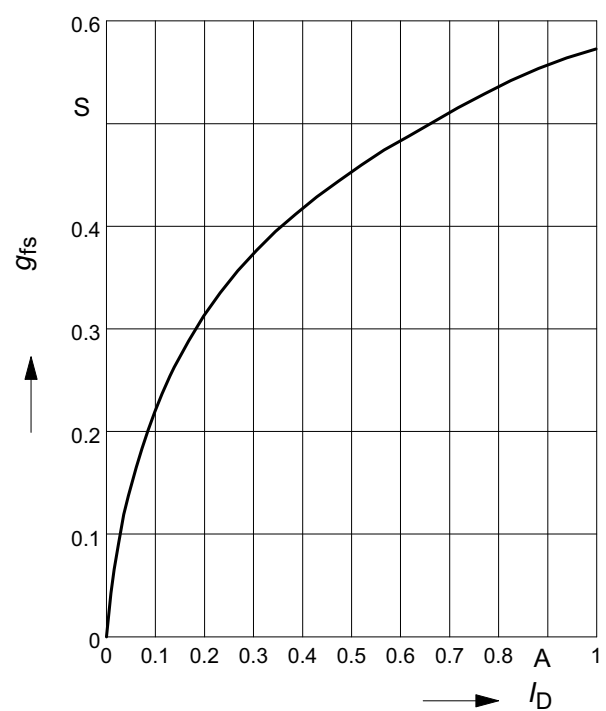
parameter:  $T_j = 25\text{ }^\circ\text{C}$



**8 Typ. forward transconductance**

$$g_{fs} = f(I_D)$$

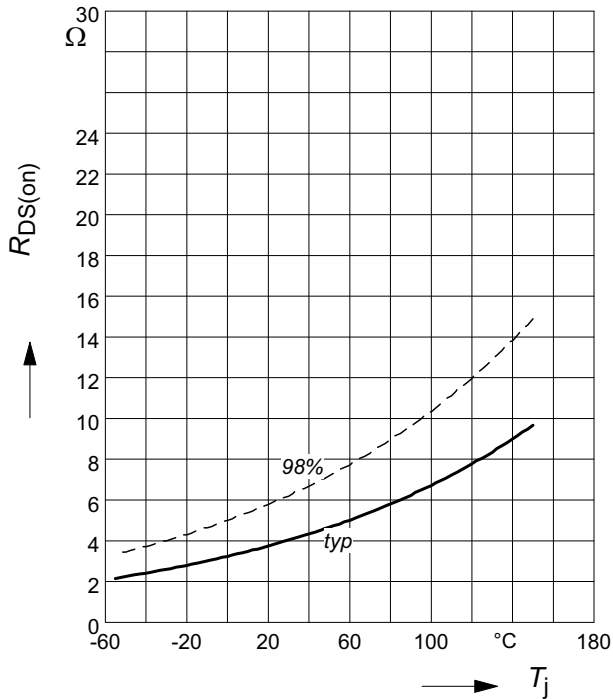
parameter:  $T_j = 25\text{ }^\circ\text{C}$



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

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

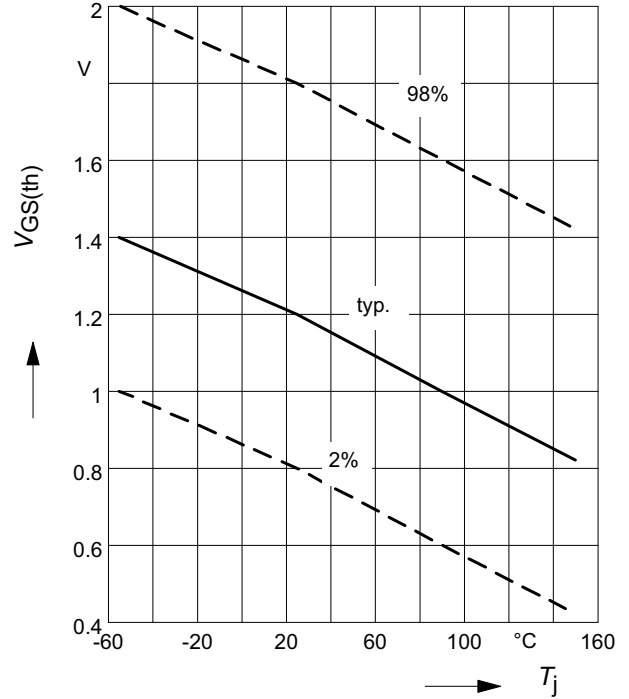
parameter :  $I_D = 0.26 \text{ A}$ ,  $V_{GS} = 10 \text{ V}$



**10 Typ. gate threshold voltage**

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

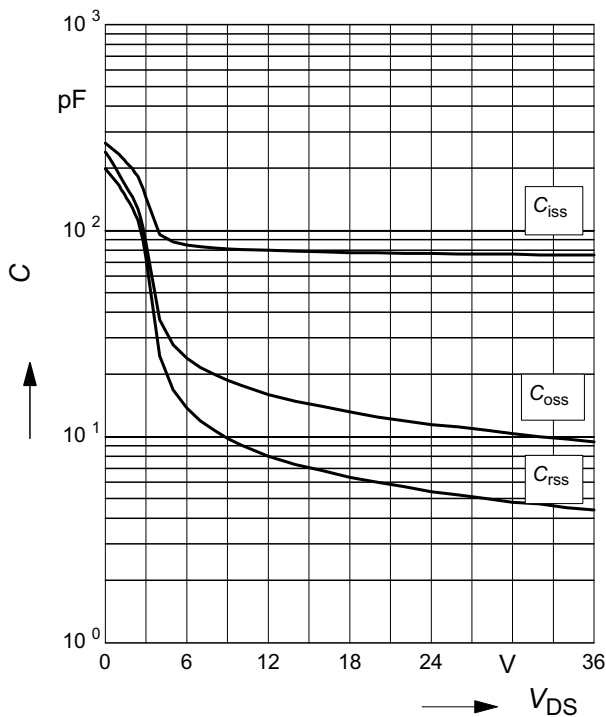
parameter:  $V_{GS} = V_{DS}$ ;  $I_D = 108 \mu\text{A}$



**11 Typ. capacitances**

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

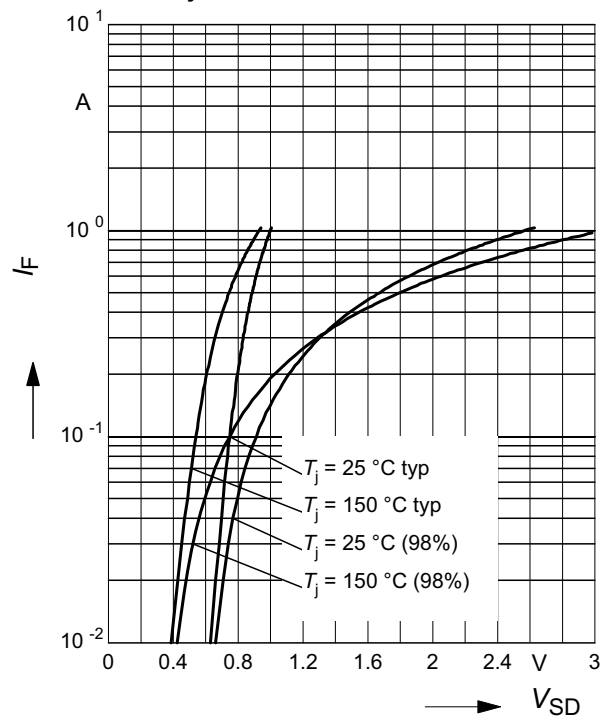
parameter:  $V_{GS}=0$ ,  $f=1 \text{ MHz}$ ,  $T_j = 25 \text{ }^\circ\text{C}$



**12 Forward character. of reverse diode**

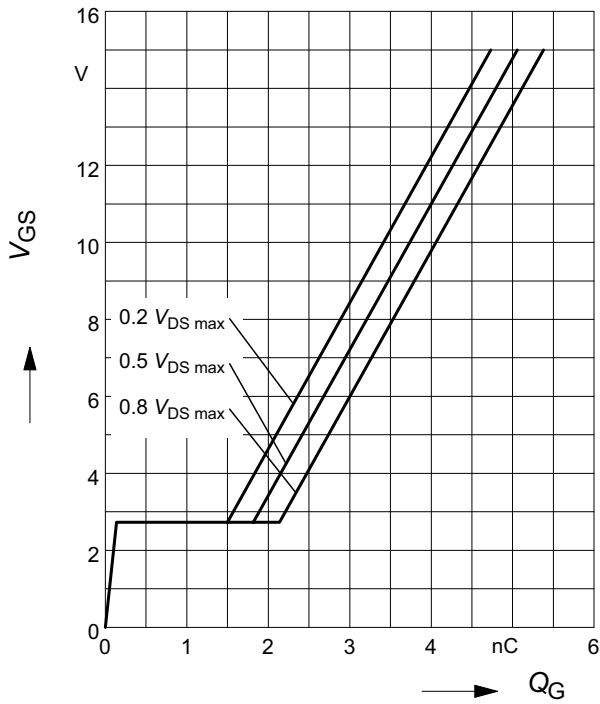
$$I_F = f(V_{SD})$$

parameter:  $T_j$



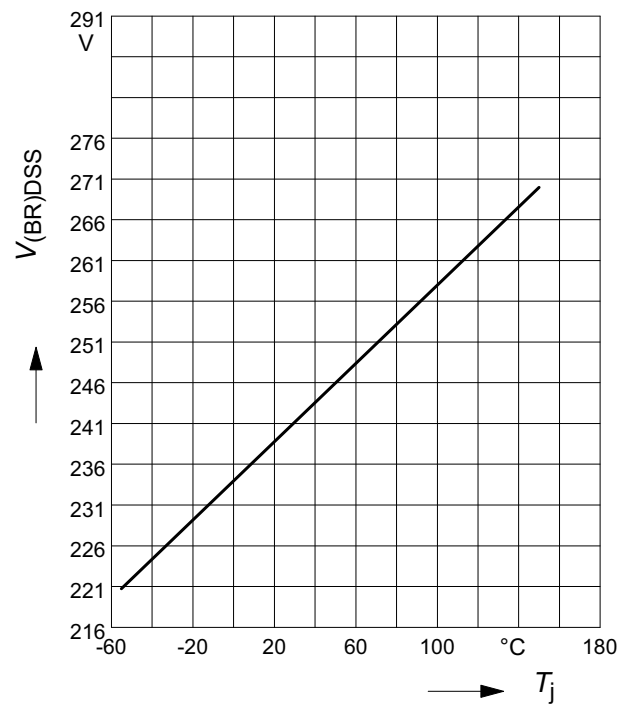
**13 Typ. gate charge**

$V_{GS} = f(Q_G)$ ; parameter:  $V_{DS}$ ,  
 $I_D = 0.26$  A pulsed,  $T_j = 25$  °C

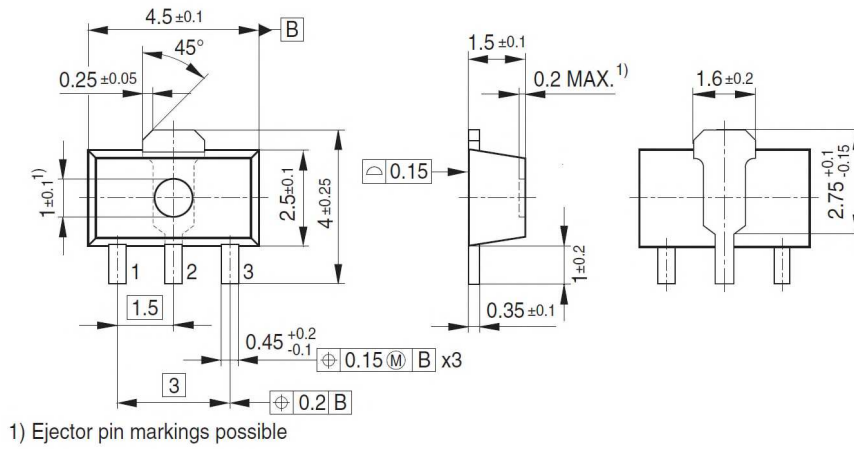


**14 Drain-source breakdown voltage**

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

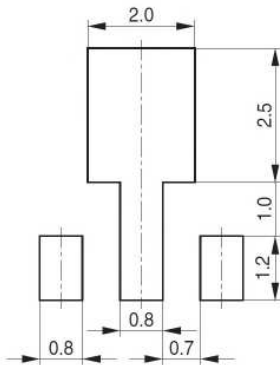


**Package Outline SOT-89**



**Footprint**

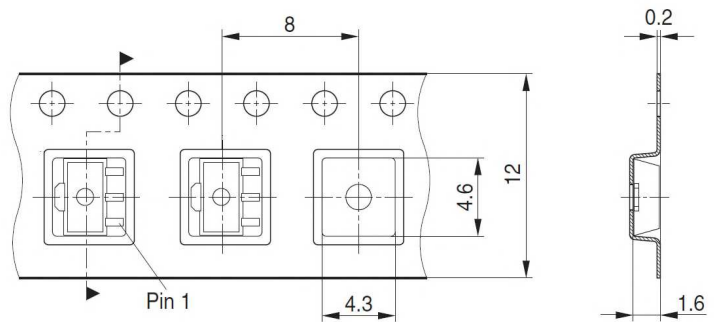
Soldering type: Reflow soldering



**Tape and Reel**

Reel  $\phi 180$  mm: 1.000 Pieces/Reel  
 Reels/Box: 1 x 1.000 = 1.000

Reel  $\phi 330$  mm: 4.000 Pieces/Reel  
 Reels/Box: 1 x 4.000 = 4.000



Dimensions in mm



## Revision History

BSS87

**Revision: 2016-06-09, Rev. 2.0**

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.0	2016-06-09	Release of final version

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