

MOSFET

SIPMOS® Small-Signal-Transistor

Features

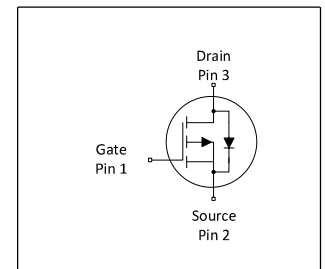
- P-Channel
- Enhancement mode / Logic level
- Avalanche rated
- Pb-free lead plating; RoHS compliant
- Footprint compatible to SOT23
- Halogen free according to IEC61249-2-21

Product validation

Qualified according to AEC Q101

Table 1 Key Performance Parameters

Parameter	Value	Unit
V_{DS}	-100	V
$R_{DS(on),max}$	1.8	Ω
I_D	-0.36	A



Type / Ordering Code	Package	Marking	Related Links
BSR316P	PG-SC59-3	LC	-

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1 Maximum ratings

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

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current	I_D	-	-	-0.36 -0.29	A	$T_A=25\text{ °C}$ $T_A=70\text{ °C}$
Pulsed drain current	$I_{D,pulse}$	-	-	-1.44	A	$T_A=25\text{ °C}$
Avalanche energy, single pulse	E_{AS}	-	-	25	mJ	$I_D=-0.36\text{ A}$, $R_{GS}=25\text{ }\Omega$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	0.5	W	$T_C=25\text{ °C}$
Operating and storage temperature	T_j, T_{stg}	-55	-	150	°C	IEC climatic category; DIN IEC 68-1: 55/150/56
ESD class	-	-	1A (250V to 500V)	-	-	JESD22-A114-HBM
Soldering temperature	-	-	260 °C	-	-	-

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - ambient, minimal footprint, steady state	R_{thJA}	-	-	250	K/W	-

3 Electrical characteristics

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

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	-100	-	-	V	$V_{GS}=0\text{ V}$, $I_D=-250\text{ }\mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	-2	-1.5	-1	V	$V_{DS}=V_{GS}$, $I_D=-170\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	-0.1 -10	-1 -100	μA	$V_{DS}=-100\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ °C}$ $V_{DS}=-100\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=150\text{ °C}$
Gate-source leakage current	I_{GSS}	-	-10	-100	nA	$V_{GS}=-20\text{ V}$, $V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	1.8 1.3	2.2 1.8	Ω	$V_{GS}=-4.5\text{ V}$, $I_D=-0.33\text{ A}$ $V_{GS}=-10\text{ V}$, $I_D=-0.36\text{ A}$
Transconductance	g_{fs}	0.3	0.5	-	S	$ V_{DS} >2 I_D R_{DS(on)max}$, $I_D=-0.29\text{ A}$

Table 5 Dynamic characteristics¹⁾

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	124	165	pF	$V_{GS}=0\text{ V}$, $V_{DS}=-25\text{ V}$, $f=1\text{ MHz}$
Output capacitance	C_{oss}	-	25	33	pF	$V_{GS}=0\text{ V}$, $V_{DS}=-25\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance	C_{rss}	-	13	20	pF	$V_{GS}=0\text{ V}$, $V_{DS}=-25\text{ V}$, $f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	5	8	ns	$V_{DD}=-50\text{ V}$, $V_{GS}=-10\text{ V}$, $I_D=-0.36\text{ A}$, $R_{G,ext}=6\ \Omega$
Rise time	t_r	-	6	9	ns	$V_{DD}=-50\text{ V}$, $V_{GS}=-10\text{ V}$, $I_D=-0.36\text{ A}$, $R_{G,ext}=6\ \Omega$
Turn-off delay time	$t_{d(off)}$	-	71	106	ns	$V_{DD}=-50\text{ V}$, $V_{GS}=-10\text{ V}$, $I_D=-0.36\text{ A}$, $R_{G,ext}=6\ \Omega$
Fall time	t_f	-	26	39	ns	$V_{DD}=-50\text{ V}$, $V_{GS}=-10\text{ V}$, $I_D=-0.36\text{ A}$, $R_{G,ext}=6\ \Omega$

Table 6 Gate charge characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	0.3	0.4	nC	$V_{DD}=-80\text{ V}$, $I_D=-0.36\text{ A}$, $V_{GS}=0\text{ to }-10\text{ V}$
Gate to drain charge	Q_{gd}	-	1.6	2.4	nC	$V_{DD}=-80\text{ V}$, $I_D=-0.36\text{ A}$, $V_{GS}=0\text{ to }-10\text{ V}$
Gate charge total	Q_g	-	5.3	7.0	nC	$V_{DD}=-80\text{ V}$, $I_D=-0.36\text{ A}$, $V_{GS}=0\text{ to }-10\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	-2.7	-	V	$V_{DD}=-80\text{ V}$, $I_D=-0.36\text{ A}$, $V_{GS}=0\text{ to }-10\text{ V}$

Table 7 Reverse diode

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	-0.36	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$	-	-	-1.44	A	$T_C=25\text{ °C}$
Diode forward voltage	V_{SD}	-	-0.8	-1.1	V	$V_{GS}=0\text{ V}$, $I_F=0.36\text{ A}$, $T_J=25\text{ °C}$
Reverse recovery time	t_{rr}	-	40.6	-	ns	$V_R=-50\text{ V}$, $I_F= I_S $, $di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}	-	46.4	-	nC	$V_R=-50\text{ V}$, $I_F= I_S $, $di_F/dt=100\text{ A}/\mu\text{s}$

¹⁾ >Defined by design. Not subjected to production test

4 Electrical characteristics diagrams

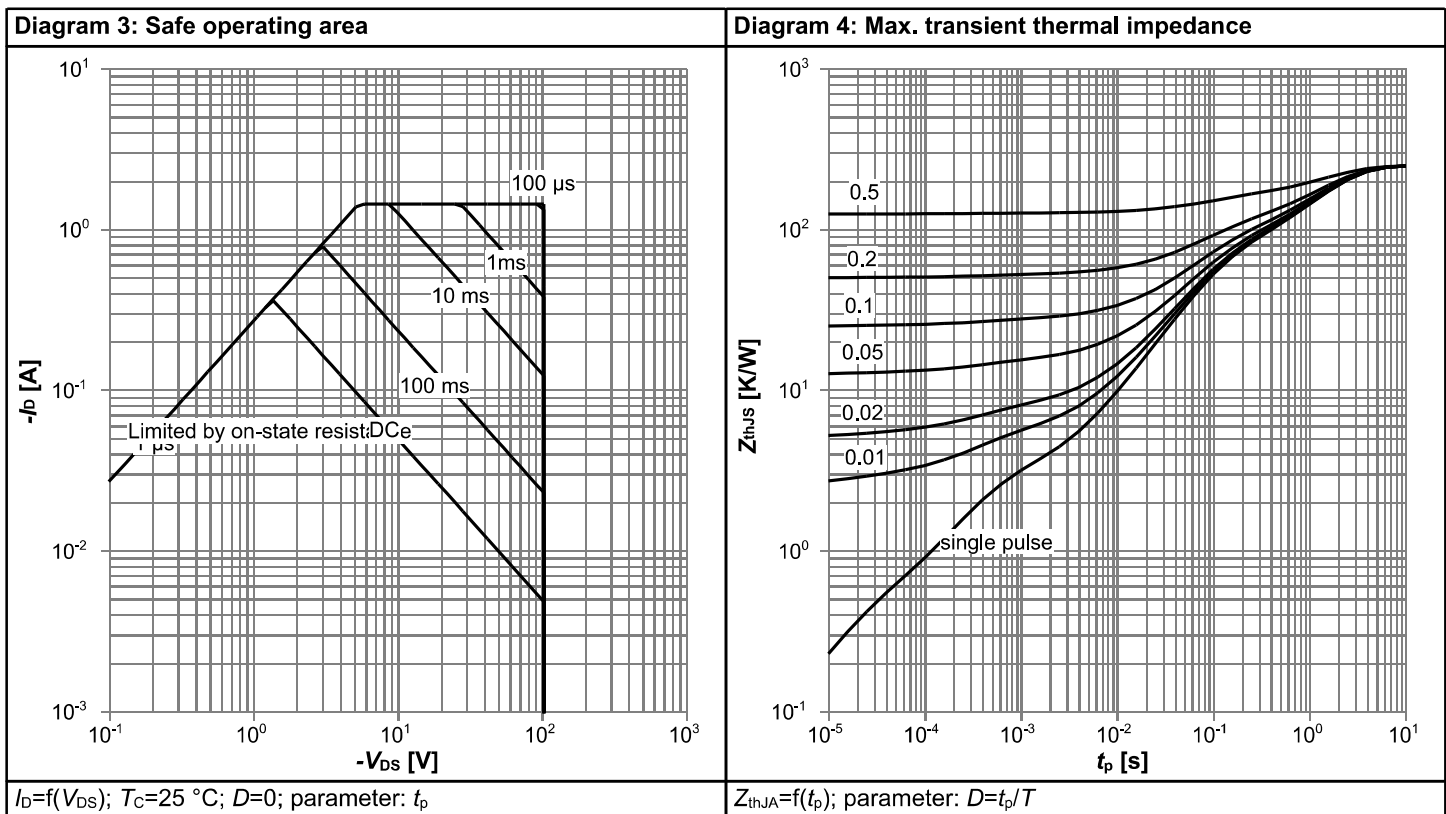
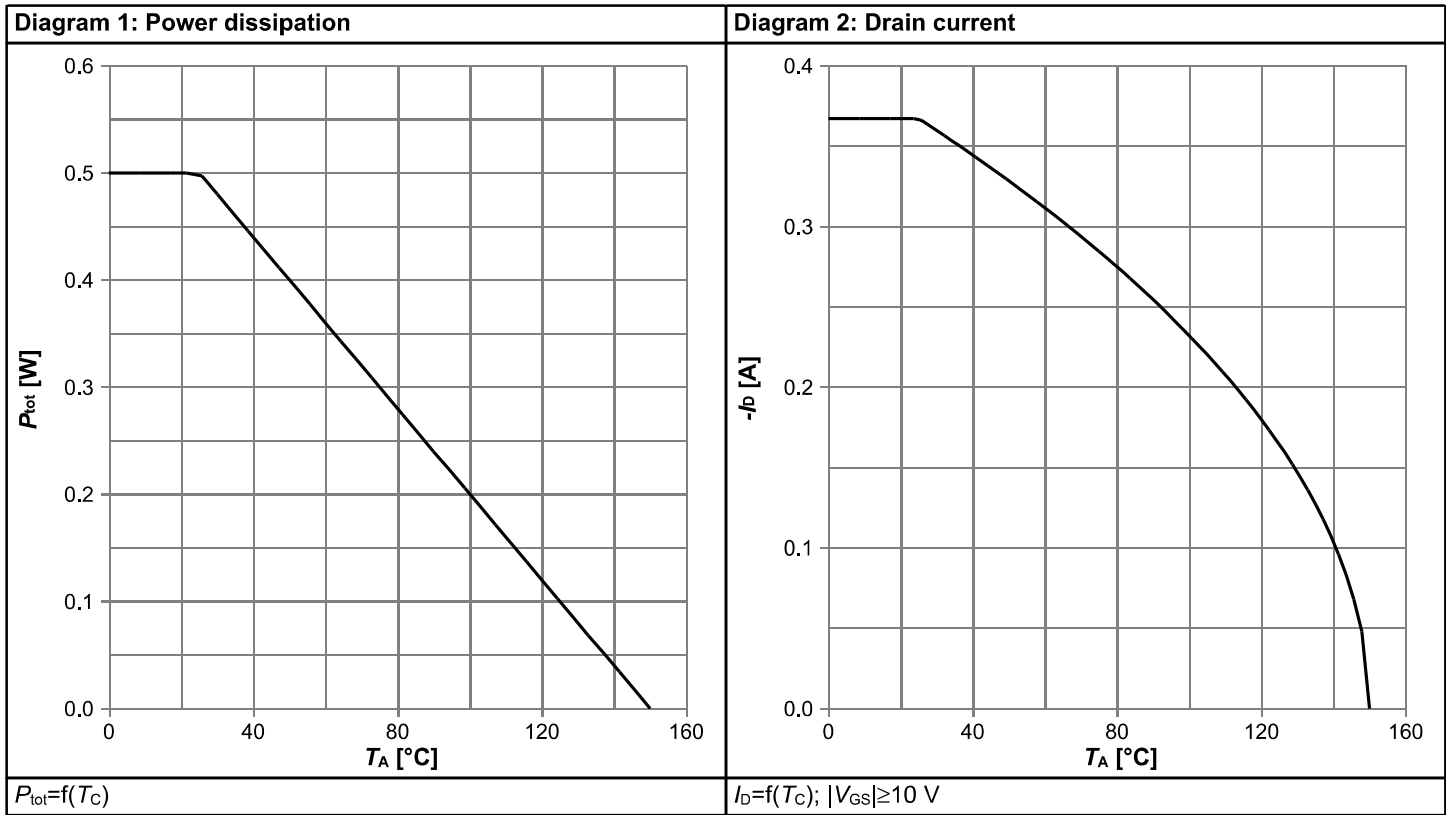
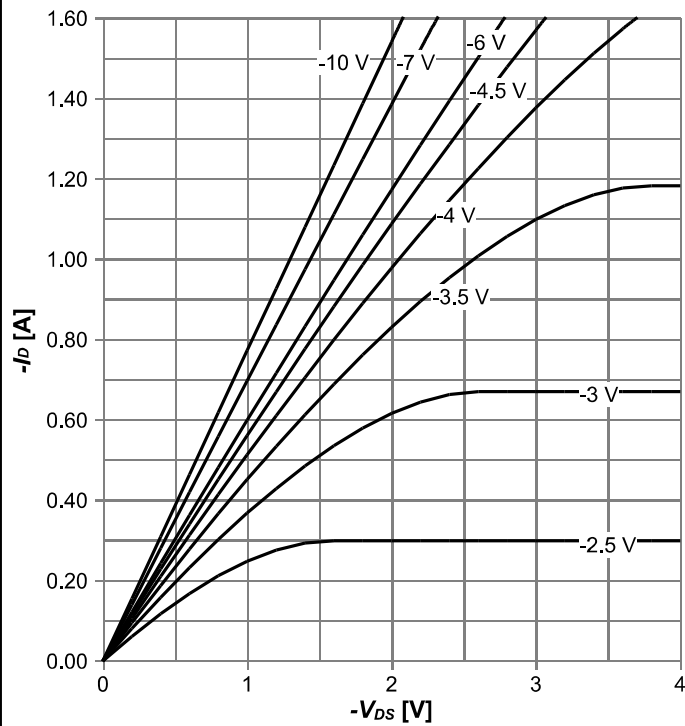
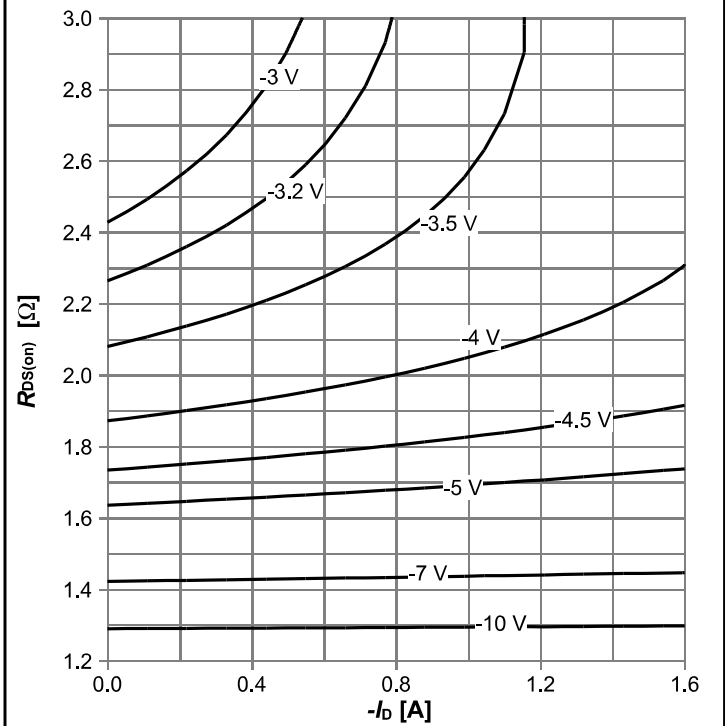


Diagram 5: Typ. output characteristics



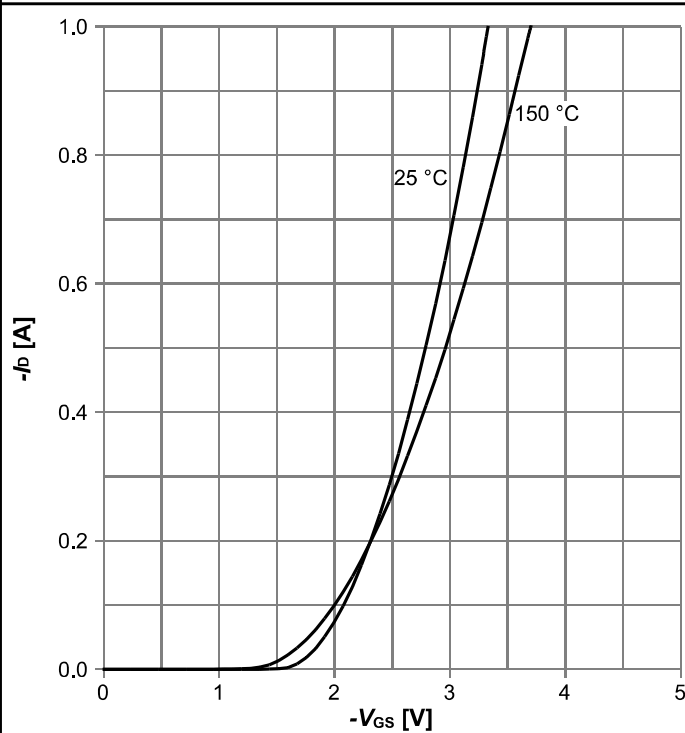
$I_D = f(V_{DS}); T_J = 25\text{ °C};$ parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



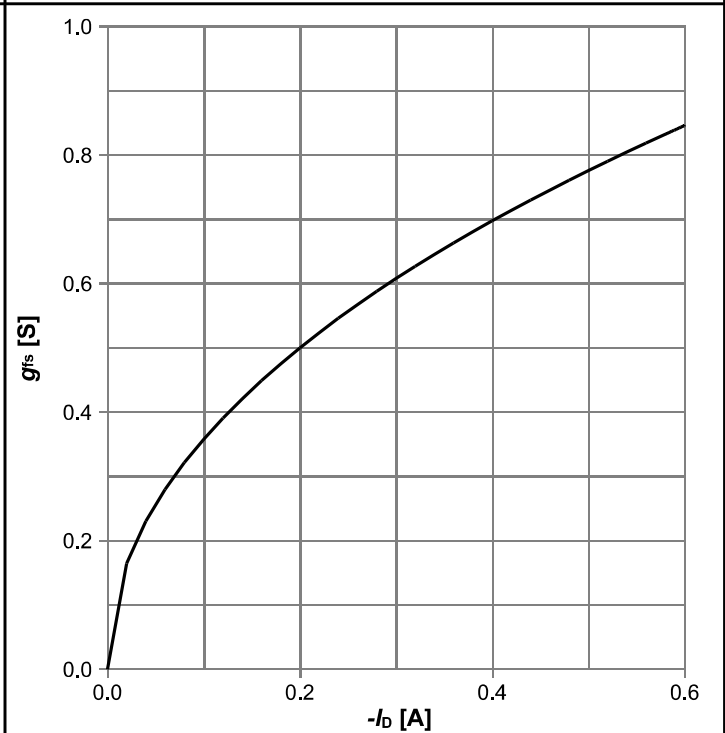
$R_{DS(on)} = f(I_D); T_J = 25\text{ °C};$ parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



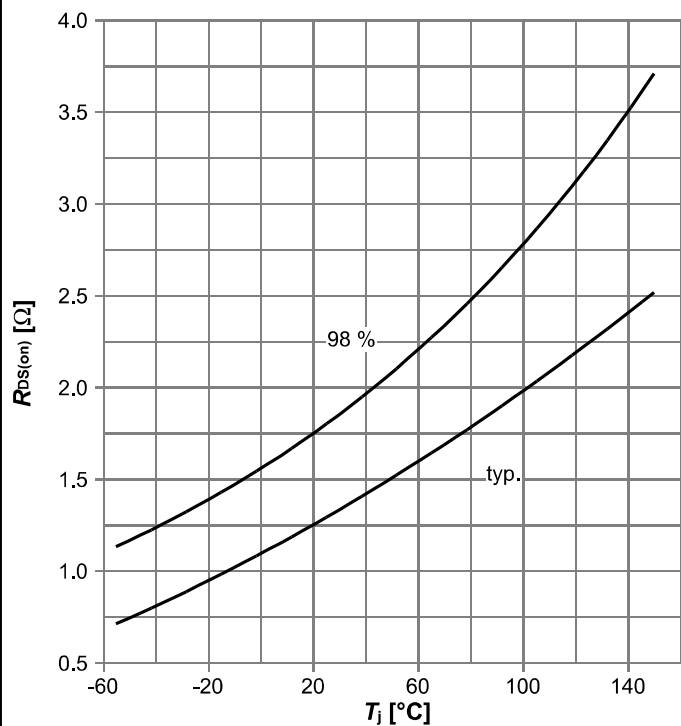
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max};$ parameter: T_J

Diagram 8: Typ. forward transconductance



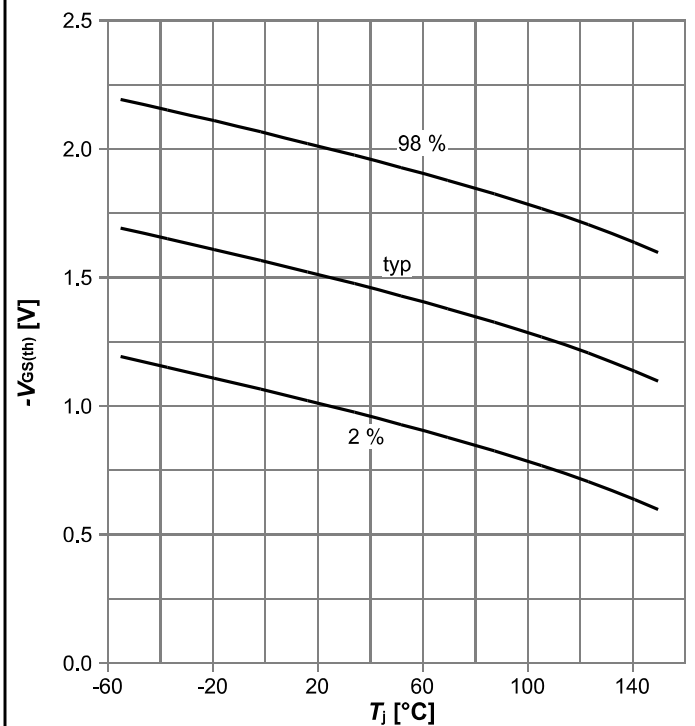
$g_{fs} = f(I_D); T_J = 25\text{ °C}$

Diagram 9: Drain-source on-state resistance



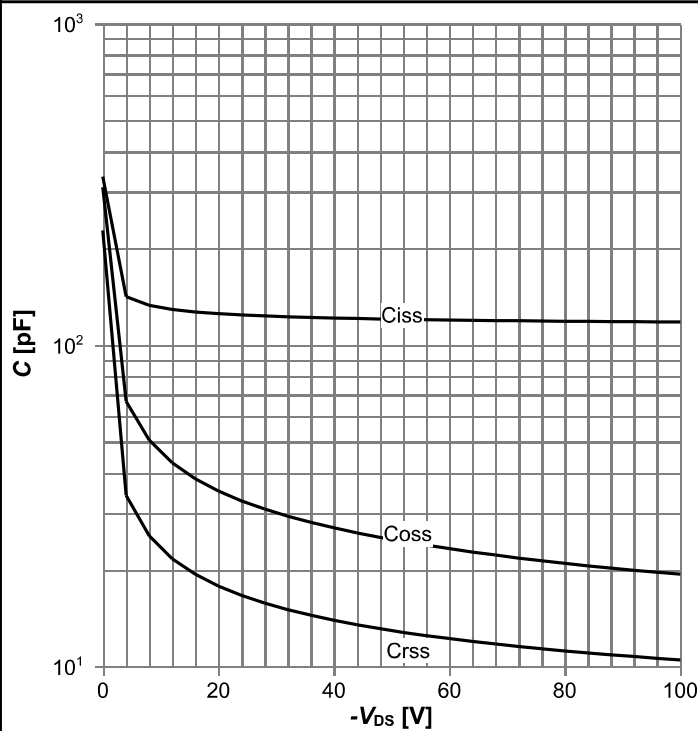
$R_{DS(on)}=f(T_j); I_D=-0.36\text{ A}; V_{GS}=-10\text{ V}$

Diagram 10: Typ. gate threshold voltage



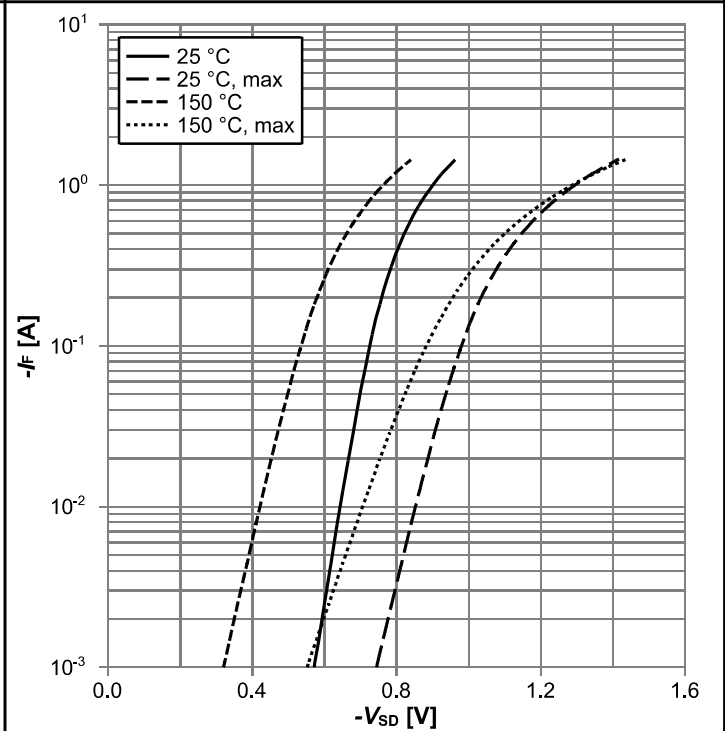
$V_{GS(th)}=f(T_j); V_{GS}=V_{DS}; I_D=-170\text{ }\mu\text{A}$

Diagram 11: Typ. capacitances



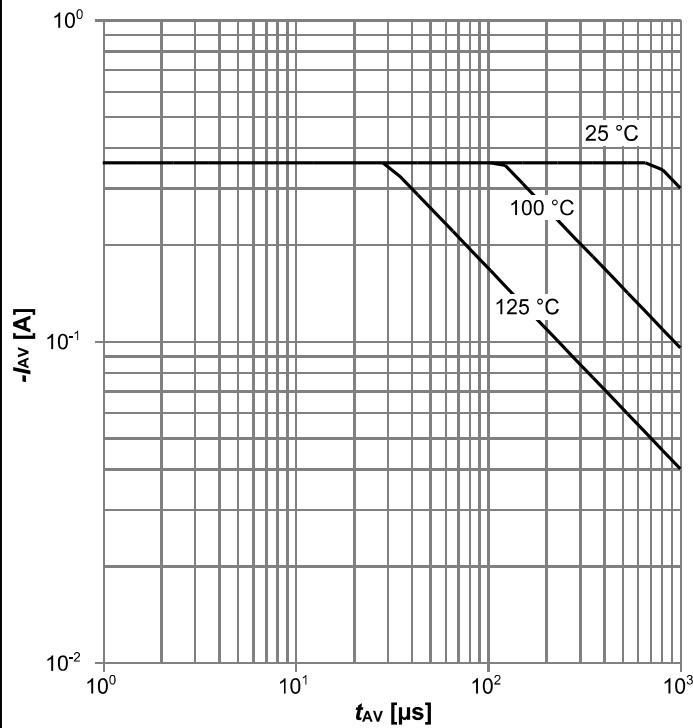
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=1\text{ MHz}$

Diagram 12: Forward characteristics of reverse diode



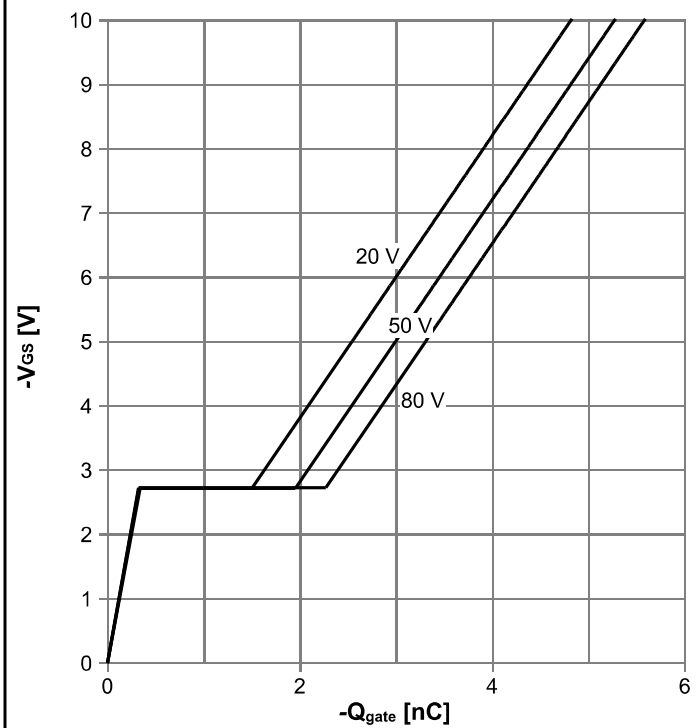
$I_F=f(V_{SD}); \text{parameter: } T_j$

Diagram 13: Avalanche characteristics



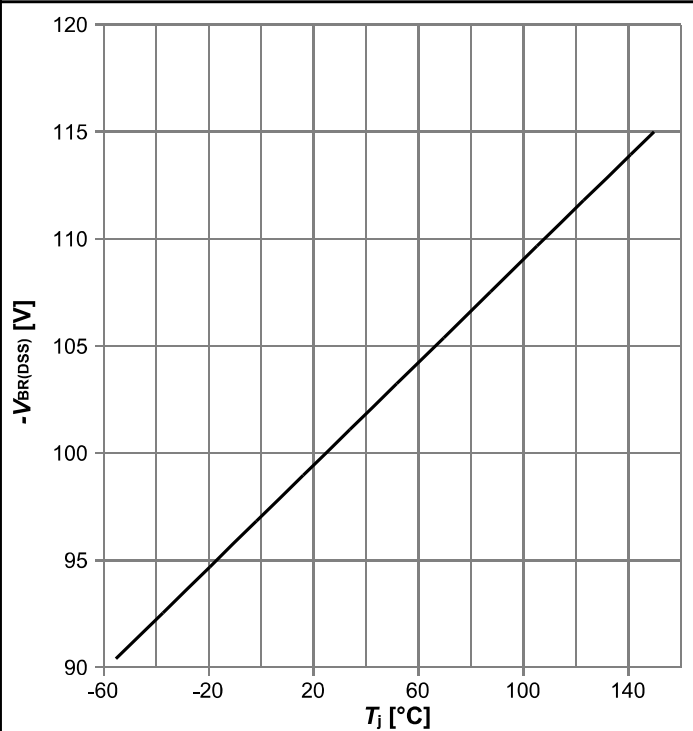
$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$; parameter: $T_{j(start)}$

Diagram 14: Typ. gate charge



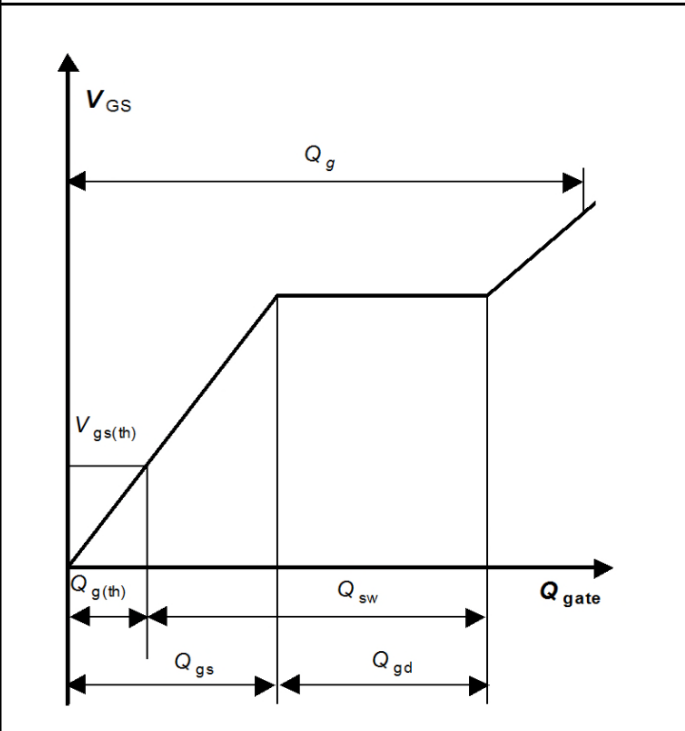
$V_{GS}=f(Q_{gate}); I_D=-0.36$ A pulsed; parameter: V_{DD}

Diagram 15: Drain-source breakdown voltage



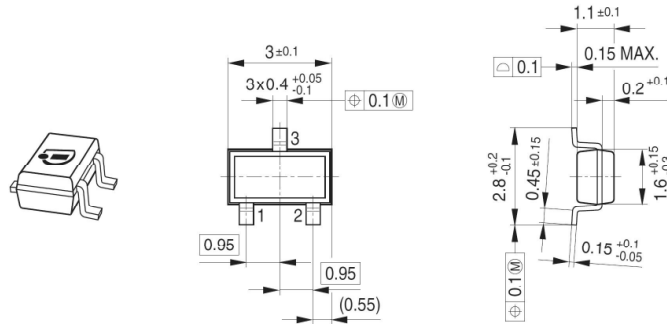
$V_{BR(DSS)}=f(T_j); I_D=-250 \mu$ A

Diagram Gate charge waveforms



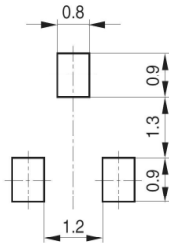
5 Package Outlines

Package Outline

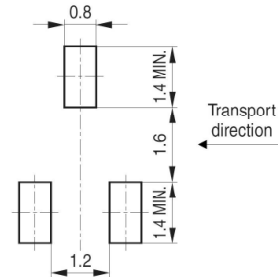


Foot Print

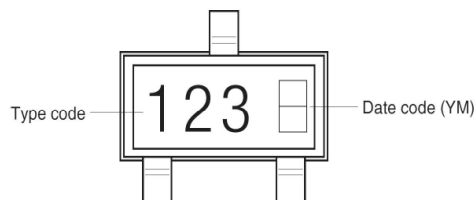
Soldering Type: Reflow Soldering



Soldering Type: Wave Soldering



Marking Layout



Tape and Reel

Reel ϕ 180 mm: 3.000 Pieces/Reel
Reels/Box: 1 x 3.000 = 3.000

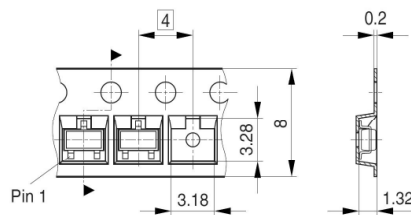


Figure 1 Outline PG-SC59-3, dimensions in mm/inches

Revision History

BSR316P

Revision: 2021-05-27, Rev. 2.1

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.0	2020-11-10	Breakdown voltage max to min
2.1	2021-05-27	Update schematic and legend Diagram 4

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