



THE DATASHEET OF BSS139IXTSA1



MOSFET

Small-Signal Transistor

Features

- N-channel
- Depletion mode
- dv/dt rated
- Halogen free according to IEC61249-2-21
- Pb-free lead-plating; RoHS compliant

Product validation

Fully qualified according to JEDEC for Industrial Applications

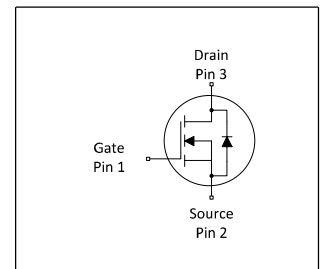
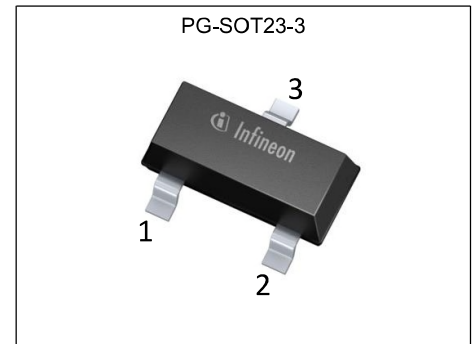


Table 1 Key Performance Parameters

Parameter	Value	Unit
V_{DS}	250	V
$R_{DS(on),max}$	30	Ω
$I_{DSS,min}$	0.03	A
ESD Sensitivity, JESD22-A114 (HBM)	Class 0 (<250V)	



RoHS

Type / Ordering Code	Package	Marking	Related Links
BSS139I	PG-SOT23	Tls	-

Table of Contents

Description	1
Maximum ratings	3
Thermal characteristics	3
Electrical characteristics	3
Electrical characteristics diagrams	5
Package Outlines	9
Revision History	10
Trademarks	10
Disclaimer	10

1 Maximum ratings

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

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current	I_D	-	-	0.10 0.08	A	$T_A=25\text{ °C}$ $T_A=70\text{ °C}$
Pulsed drain current	$I_{D,pulse}$	-	-	0.4	A	$T_A=25\text{ °C}$
Reverse diode dv/dt	dv/dt	-	-	6	kV/ μ s	$I_D=0.1\text{ A}$, $V_{DS}=200\text{ V}$, $di/dt=200\text{ A}/\mu\text{s}$, $T_{j,max}=150\text{ °C}$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	0.36	W	$T_A=25\text{ °C}$
Operating and storage temperature	T_j, T_{stg}	-55	-	150	$^{\circ}\text{C}$	IEC climatic category; DIN IEC 68-1: 55/150/56

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - ambient, minimal footprint	R_{thJA}	-	-	350	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	$V_{(BR)DSS}$	250	-	-	V	$V_{GS}=-3\text{ V}$, $I_D=250\text{ }\mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	-2.1	-1.4	-1	V	$V_{DS}=3\text{ V}$, $I_D=56\text{ }\mu\text{A}$
Drain-source cutoff current	$I_{D(off)}$	-	-	0.1 10	μA	$V_{DS}=250\text{ V}$, $V_{GS}=-3\text{ V}$, $T_j=25\text{ °C}$ $V_{DS}=250\text{ V}$, $V_{GS}=-3\text{ V}$, $T_j=125\text{ °C}$
Gate-source leakage current	I_{GSS}	-	-	10	nA	$V_{GS}=20\text{ V}$, $V_{DS}=0\text{ V}$
On-state drain current	I_{DSS}	30	-	-	mA	$V_{GS}=0\text{ V}$, $V_{DS}=10\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	12.5 7.8	30 14	Ω	$V_{GS}=0\text{ V}$, $I_D=15\text{ mA}$ $V_{GS}=10\text{ V}$, $I_D=0.1\text{ A}$
Transconductance	g_{fs}	0.060	0.13	-	S	$ V_{DS} >2 I_D /R_{DS(on)max}$, $I_D=0.08\text{ A}$

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	60	-	pF	$V_{GS}=-3\text{ V}$, $V_{DS}=25\text{ V}$, $f=1\text{ MHz}$
Output capacitance	C_{oss}	-	6.7	-	pF	$V_{GS}=-3\text{ V}$, $V_{DS}=25\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance	C_{rss}	-	2.6	-	pF	$V_{GS}=-3\text{ V}$, $V_{DS}=25\text{ V}$, $f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	5.8	-	ns	$V_{DD}=125\text{ V}$, $V_{GS}=-3\text{ to }5\text{ V}$, $I_D=0.04\text{ A}$, $R_G=6\ \Omega$
Rise time	t_r	-	5.4	-	ns	$V_{DD}=125\text{ V}$, $V_{GS}=-3\text{ to }5\text{ V}$, $I_D=0.04\text{ A}$, $R_G=6\ \Omega$
Turn-off delay time	$t_{d(off)}$	-	29	-	ns	$V_{DD}=125\text{ V}$, $V_{GS}=-3\text{ to }5\text{ V}$, $I_D=0.04\text{ A}$, $R_G=6\ \Omega$
Fall time	t_f	-	182	-	ns	$V_{DD}=125\text{ V}$, $V_{GS}=-3\text{ to }5\text{ V}$, $I_D=0.04\text{ A}$, $R_G=6\ \Omega$

Table 6 Gate charge characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	0.14	-	nC	$V_{DD}=200\text{ V}$, $I_D=0.04\text{ A}$, $V_{GS}=-3\text{ to }5\text{ V}$
Gate to drain charge	Q_{gd}	-	1.3	-	nC	$V_{DD}=200\text{ V}$, $I_D=0.04\text{ A}$, $V_{GS}=-3\text{ to }5\text{ V}$
Gate charge total	Q_g	-	2.3	-	nC	$V_{DD}=200\text{ V}$, $I_D=0.04\text{ A}$, $V_{GS}=-3\text{ to }5\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	-0.28	-	V	$V_{DD}=200\text{ V}$, $I_D=0.04\text{ A}$, $V_{GS}=-3\text{ to }5\text{ V}$

Table 7 Reverse diode

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	0.10	A	$T_A=25\text{ }^\circ\text{C}$
Diode pulse current	$I_{S,pulse}$	-	-	0.4	A	$T_A=25\text{ }^\circ\text{C}$
Diode forward voltage	V_{SD}	-	0.81	1.2	V	$V_{GS}=-3\text{ V}$, $I_F=0.1\text{ A}$, $T_j=25\text{ }^\circ\text{C}$
Reverse recovery time	t_{rr}	-	8.6	12.9	ns	$V_R=50\text{ V}$, $I_F=0.04\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}	-	2.1	3.1	nC	$V_R=50\text{ V}$, $I_F=0.04\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$

4 Electrical characteristics diagrams

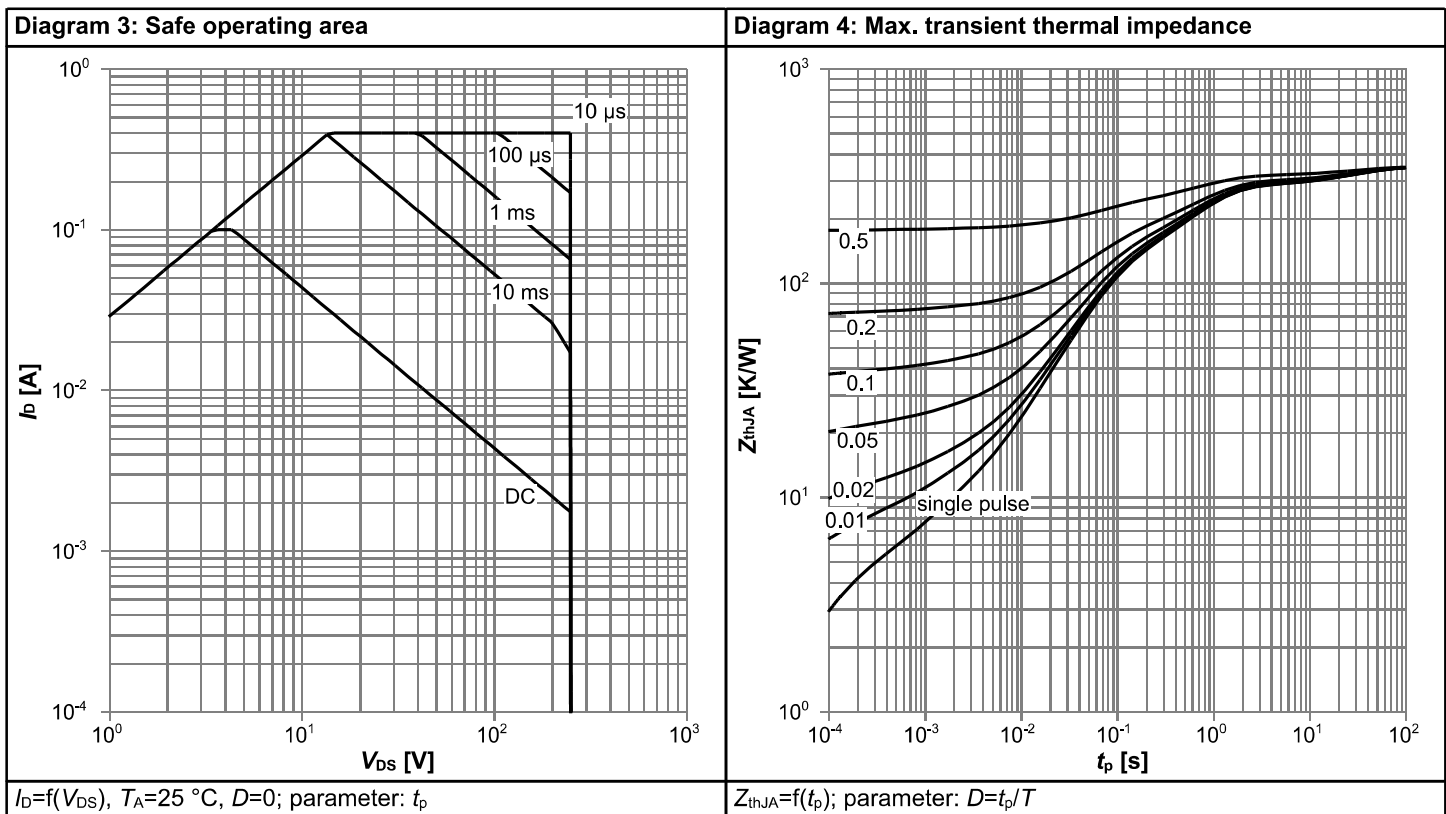
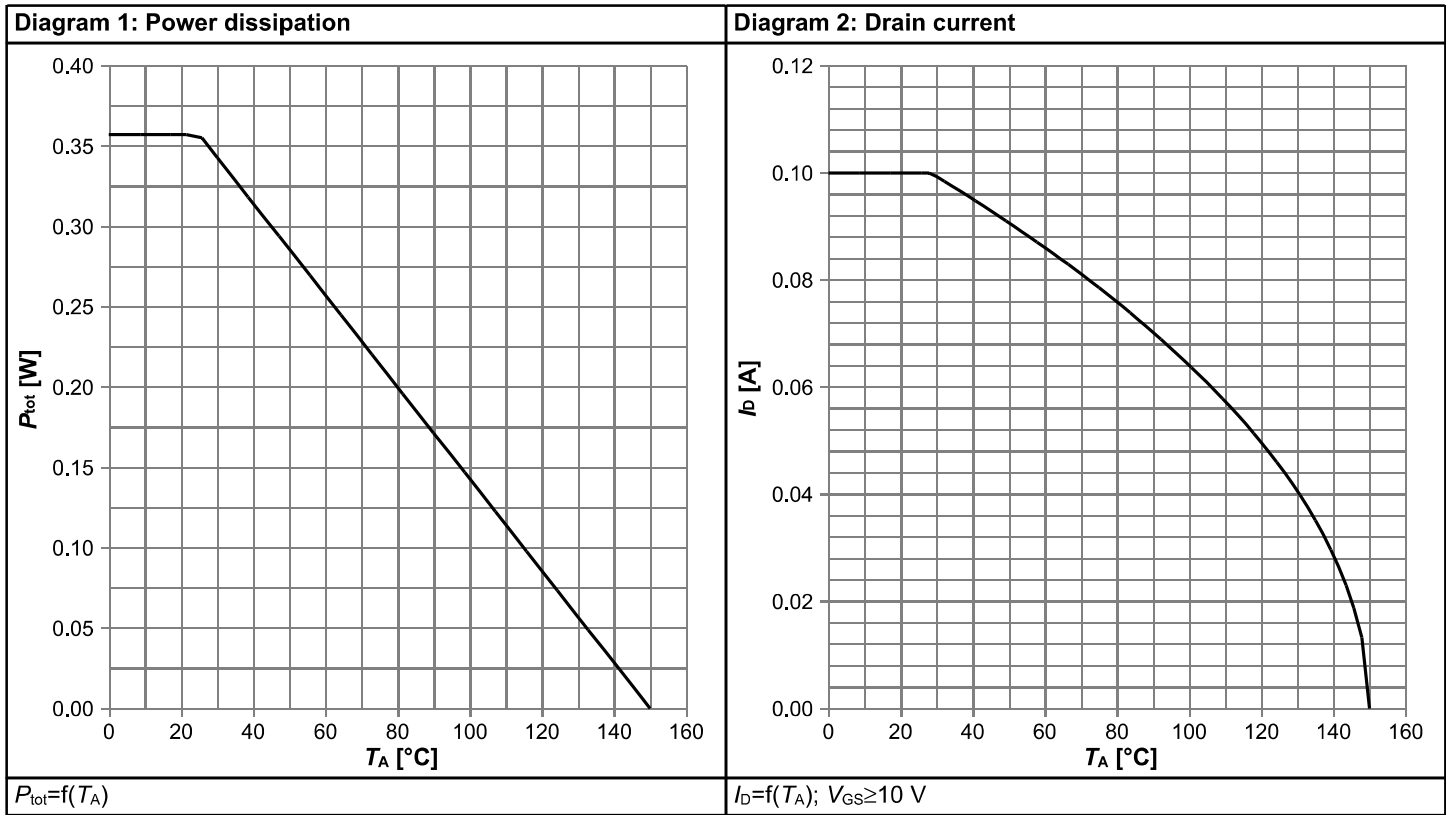
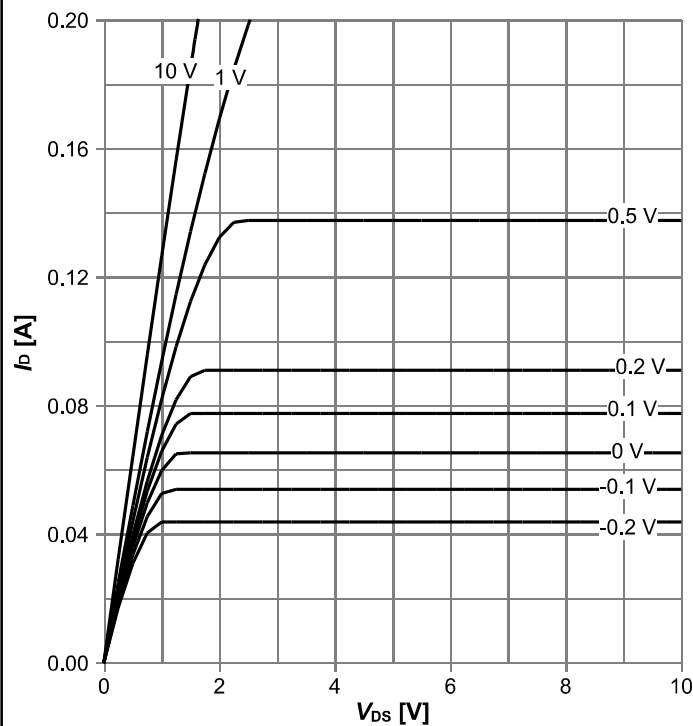
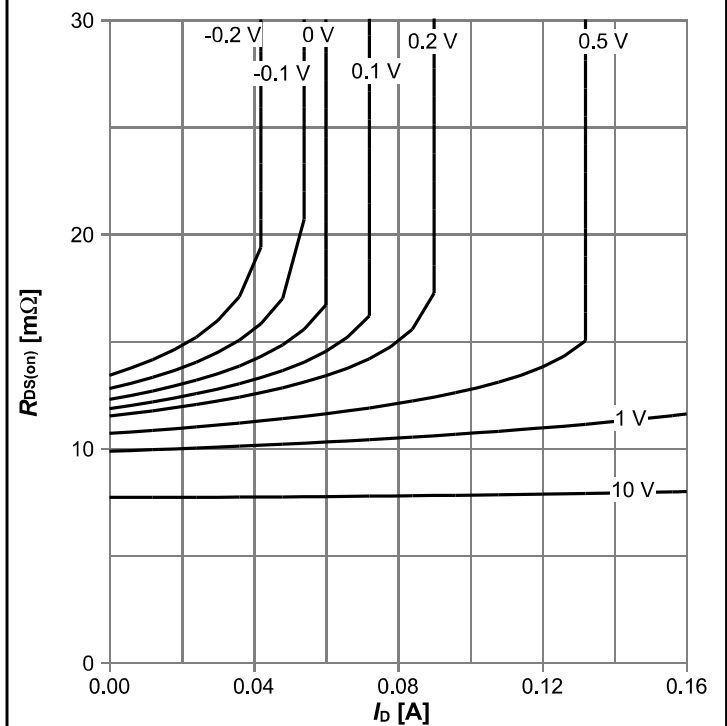


Diagram 5: Typ. output characteristics



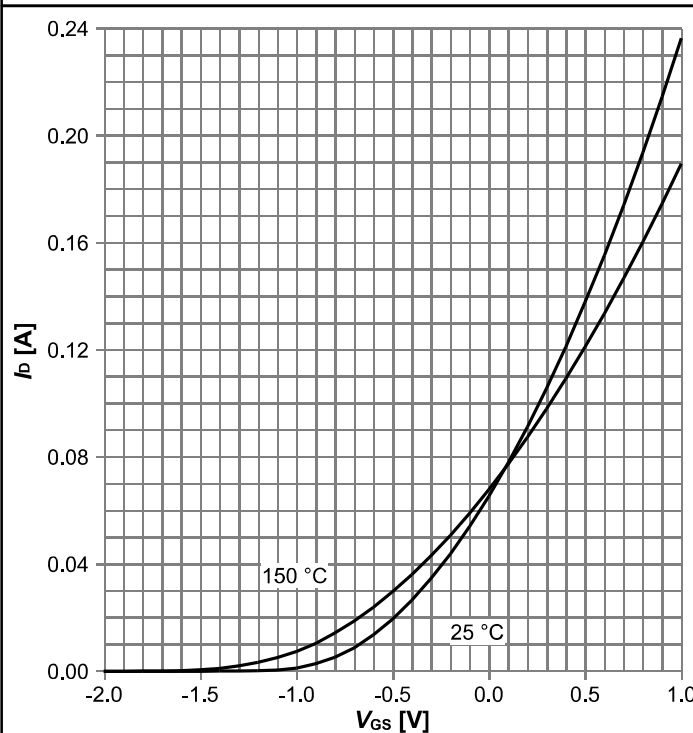
$I_D = f(V_{DS}), T_J = 25\text{ °C};$ parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



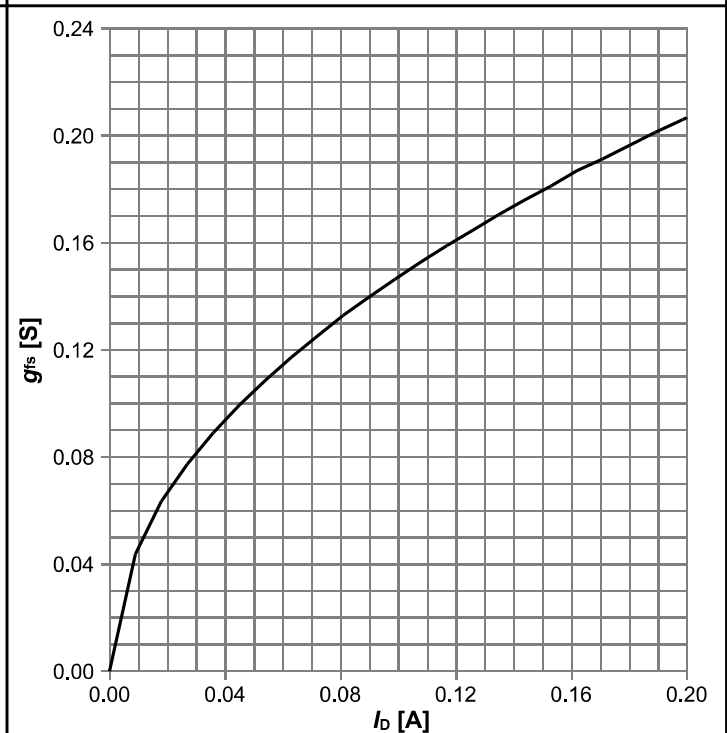
$R_{DS(on)} = f(I_D), T_J = 25\text{ °C};$ parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



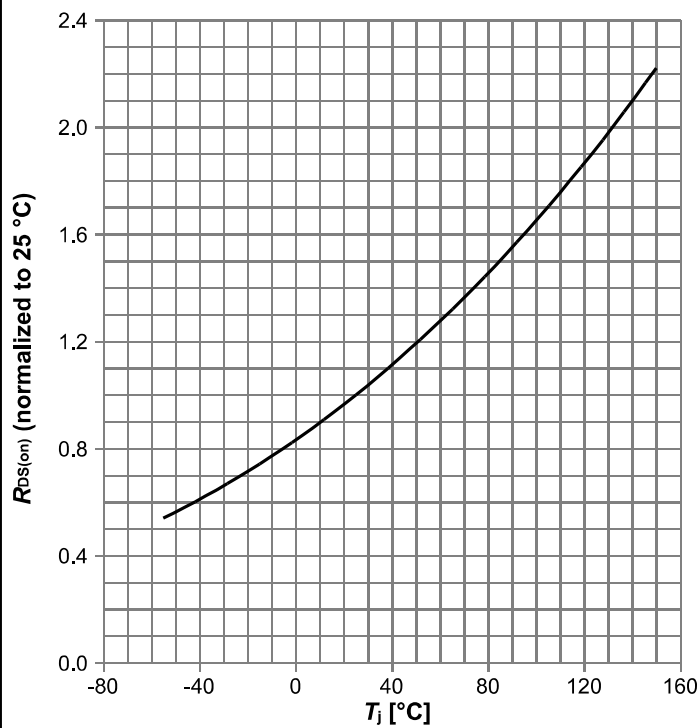
$I_D = f(V_{GS}), |V_{DS}| > 2|I_D|R_{DS(on)max};$ parameter: T_J

Diagram 8: Typ. transconductance



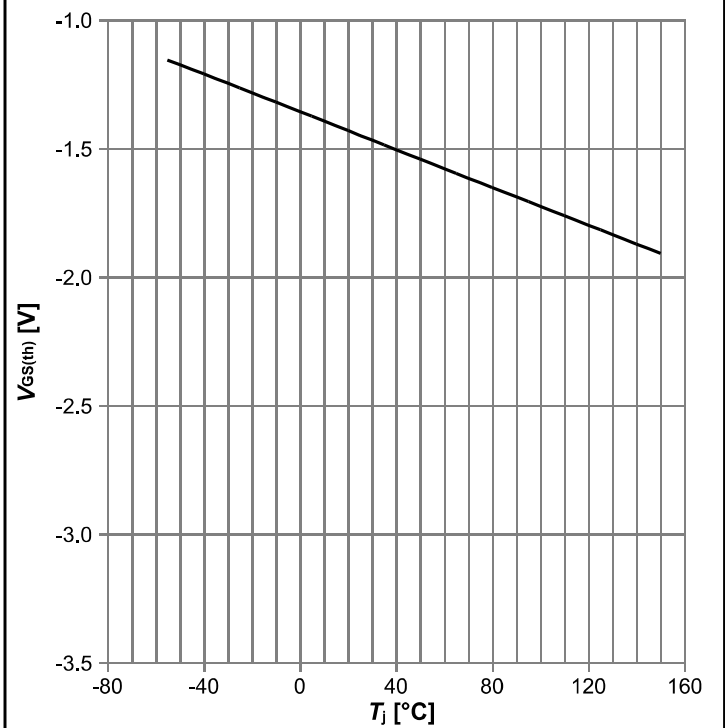
$g_{fs} = f(I_D), V_{DS} = 10\text{ V}, T_J = 25\text{ °C}$

Diagram 9: Normalized drain-source on resistance



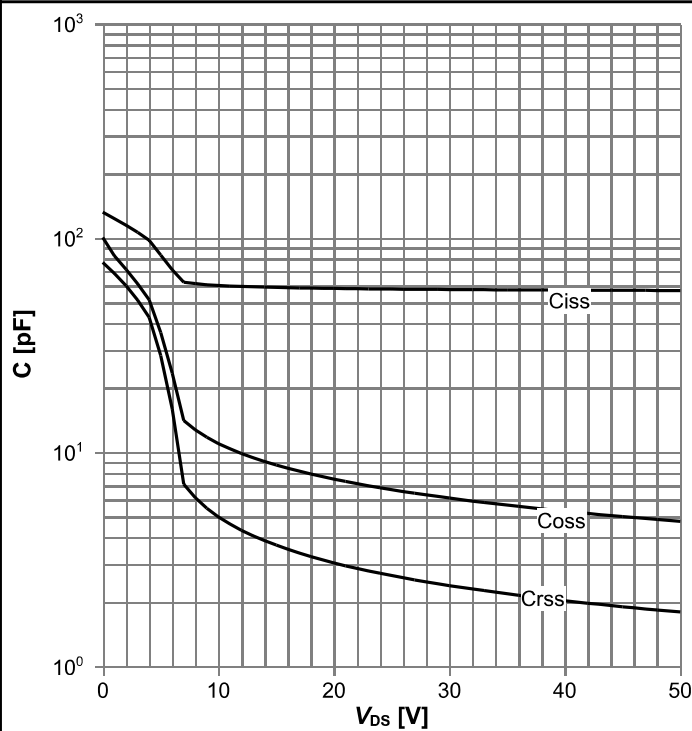
$R_{DS(on)}=f(T_j)$, $I_D=0.1$ A, $V_{GS}=10$ V

Diagram 10: Typ. gate threshold voltage



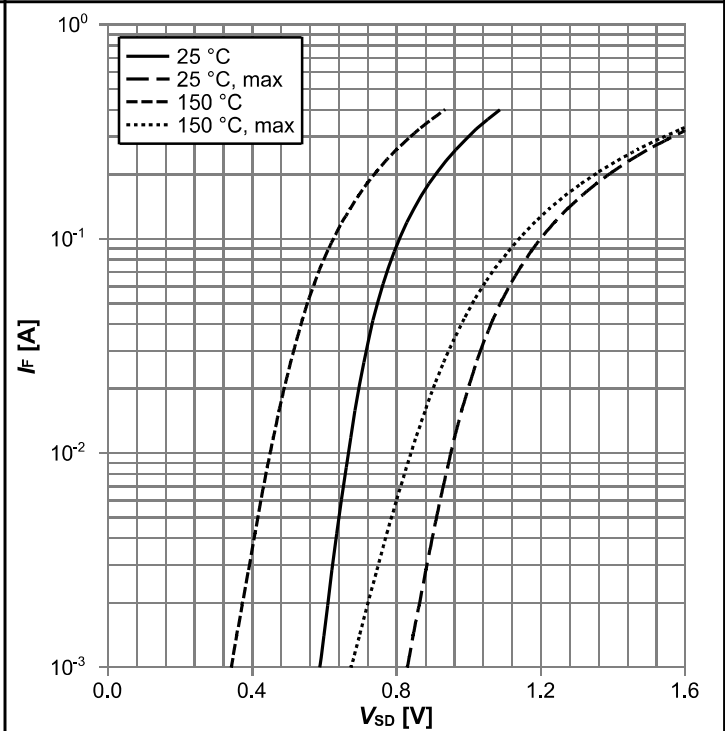
$V_{GS(th)}=f(T_j)$, $V_{DS}=3$ V, $I_D=56$ μ A

Diagram 11: Typ. capacitances



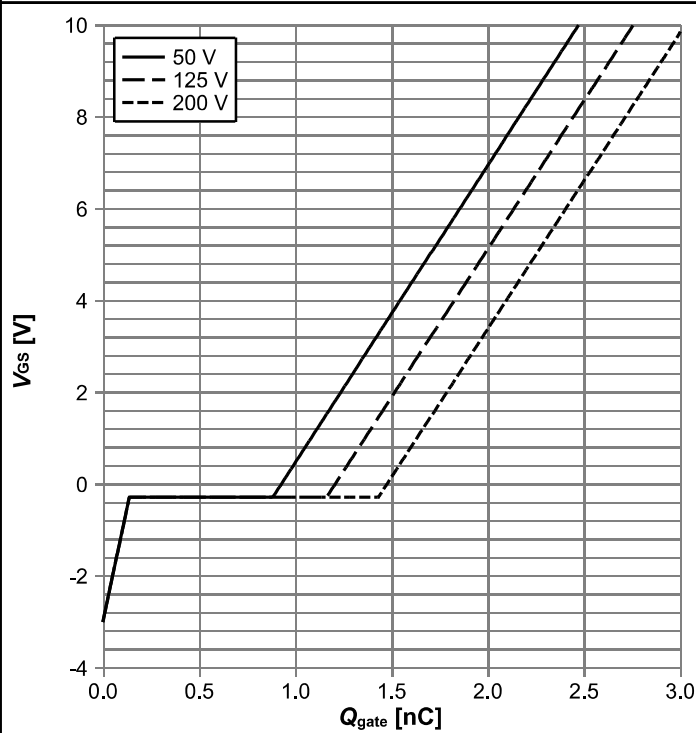
$C=f(V_{DS})$, $V_{GS}=-3$ V, $f=1$ MHz

Diagram 12: Forward characteristics of reverse diode



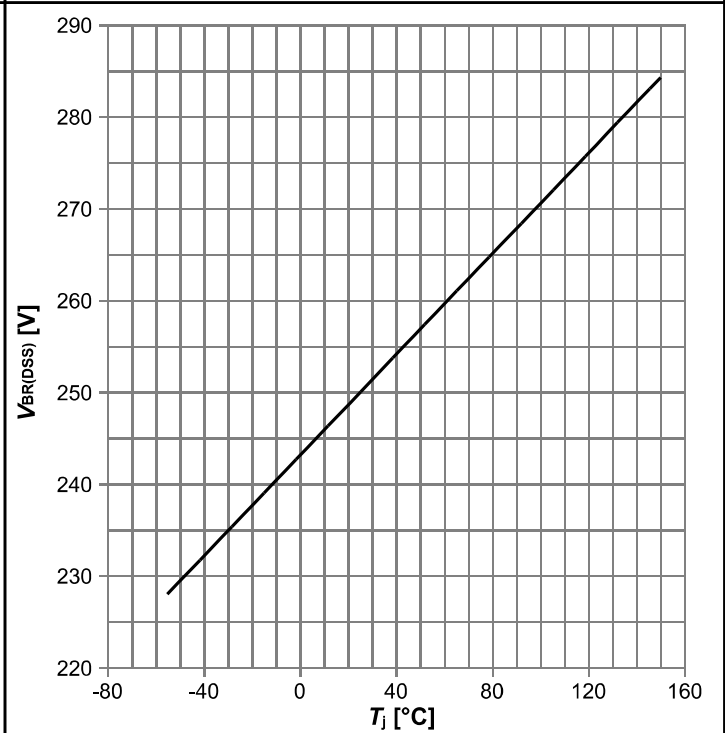
$I_F=f(V_{SD})$, $V_{GS}=-3$ V; parameter: T_j

Diagram 13: Typ. gate charge



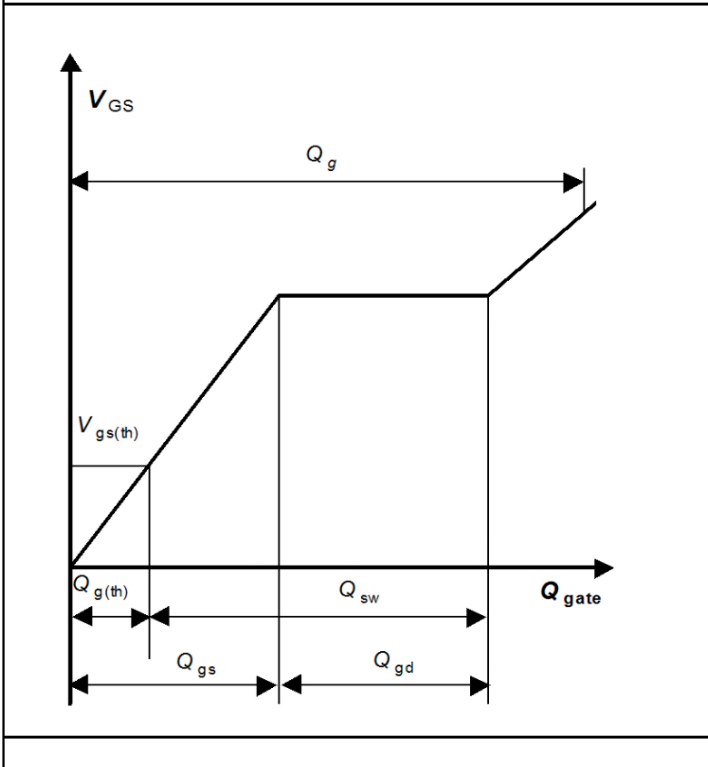
$V_{GS}=f(Q_{gate}), I_D=0.1 \text{ A pulsed}, T_j=25 \text{ }^\circ\text{C}$

Diagram 14: Drain-source breakdown voltage

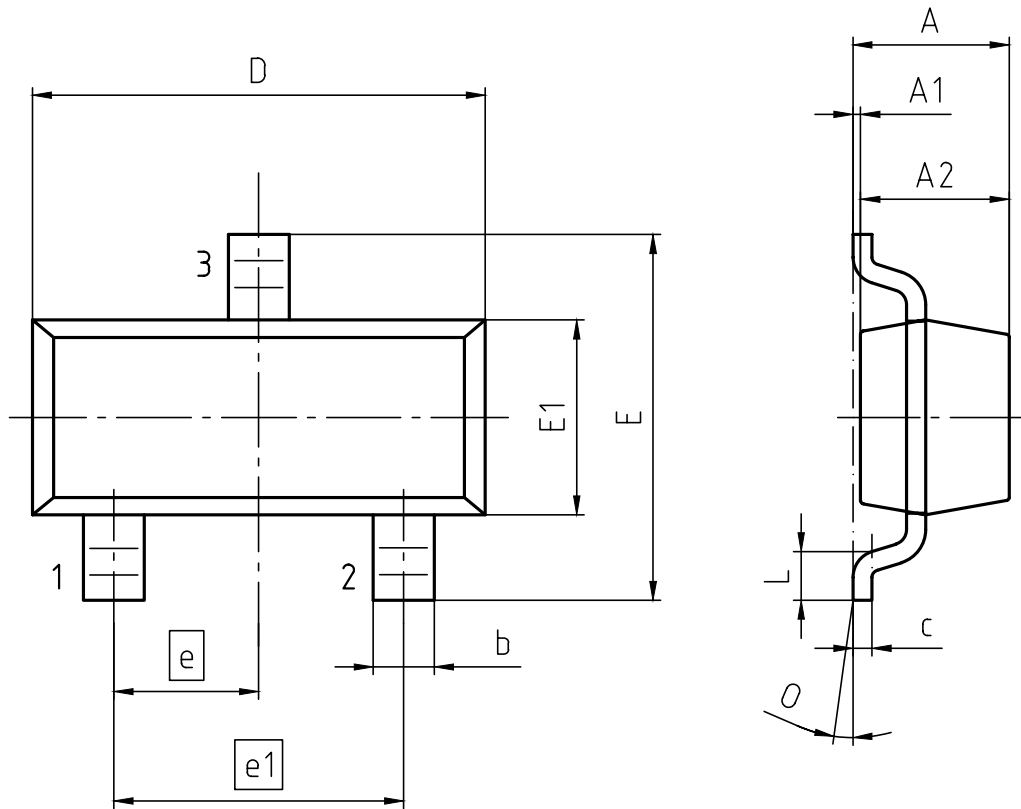


$V_{BR(DSS)}=f(T_j); I_D=250 \text{ } \mu\text{A}, V_{GS}=-3 \text{ V}$

Diagram Gate charge waveforms



5 Package Outlines



PACKAGE - GROUP NUMBER: PG-SOT23-3-U01		
REVISION: 01		DATE: 09.12.2020
DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A	0.89	1.12
A1	0.01	0.10
A2	0.88	1.02
b	0.30	0.50
c	0.08	0.20
D	2.80	3.04
E	2.10	2.64
E1	1.20	1.40
e	0.95	
e1	1.90	
L	0.15	0.60
O	0°	8°

Figure 1 Outline PG-SOT23, dimensions in mm

Revision History

BSS139I

Revision: 2021-03-17, Rev. 2.1

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.0	2021-01-25	Release of final version
2.1	2021-03-17	Update technology naming

Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

We Listen to Your Comments

Any information within this document that you feel is wrong, unclear or missing at all? Your feedback will help us to continuously improve the quality of this document. Please send your proposal (including a reference to this document) to:

erratum@infineon.com

Published by

Infineon Technologies AG

81726 München, Germany

© 2020 Infineon Technologies AG

All Rights Reserved.

Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

Information

For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office (www.infineon.com).

Warnings

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.

The Infineon Technologies component described in this Data Sheet may be used in life-support devices or systems and/or automotive, aviation and aerospace applications or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support, automotive, aviation and aerospace device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- ⊖ [View BSS139IXTSA1 on WIN SOURCE](#)
- ⊖ [Infineon Technologies Information](#)

Optimize Your Supply Chain with WIN SOURCE Solutions

- ✓ Global Sourcing Solution
- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management