

Small-Signal Transistor

Features

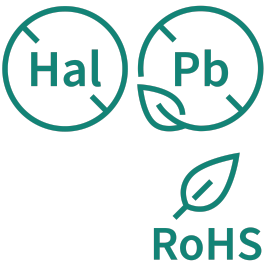
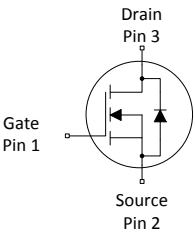
- N-channel
- Depletion mode
- dv/dt rated
- Pb-free lead-plating; RoHS compliant
- Halogen-free according to AEC61249-2-21

Product validation

Qualified for industrial applications according to the relevant tests of JEDEC JESD47, JESD22 and J-STD-020.

Table 1 Key performance parameters

Parameter	Value	Unit
V_{DS}	100	V
$R_{DS(on),max}$	12	Ω
$I_{DSS,min}$	0.09	A
ESD Sensitivity, JESD22-A114 (HBM)	Class 0 (<250V)	



Part number	Package	Marking	Related links
BSS169I	PG-SOT23-3	Fl	-

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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	-	-	0.19	A	$T_A=25\text{ °C}$
				0.15		$T_A=70\text{ °C}$
Pulsed drain current	$I_{D,pulse}$	-	-	0.76	A	$T_A=25\text{ °C}$
Reverse diode dv/dt	dv/dt	-	-	6	kV / μs	$I_D=0.19\text{ A}$, $V_{DS}=20\text{ V}$, $di/dt=200\text{ A}/\mu s$, $T_{j,max}=150\text{ °C}$
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	°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}	-	-	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	$V_{GS}=-10\text{ V}$, $I_D=250\text{ }\mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	-2.9	-2.2	-1.8	V	$V_{DS}=3\text{ V}$, $I_D=50\text{ }\mu\text{A}$
Drain-source cutoff current	$I_{D(off)}$	-	-	0.1	μA	$V_{DS}=100\text{ V}$, $V_{GS}=-10\text{ V}$, $T_j=25\text{ °C}$
				10		$V_{DS}=100\text{ V}$, $V_{GS}=-10\text{ V}$, $T_j=125\text{ °C}$
Gate-source leakage current	I_{GSS}	-	-	10	nA	$V_{GS}=20\text{ V}$, $V_{DS}=0\text{ V}$
On-state drain current	I_{DSS}	90	-	-	mA	$V_{GS}=0\text{ V}$, $V_{DS}=10\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	5.3	12	Ω	$V_{GS}=0\text{ V}$, $I_D=0.05\text{ A}$
			2.9	-		$V_{GS}=10\text{ V}$, $I_D=0.19\text{ A}$
Transconductance	g_{fs}	-	0.20	-	S	$ V_{DS} >2 I_D R_{DS(on)max}$, $I_D=0.15\text{ A}$

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	51	-	pF	$V_{GS}=-10\text{ V}$, $V_{DS}=25\text{ V}$, $f=1\text{ MHz}$
Output capacitance	C_{oss}		9			
Reverse transfer capacitance	C_{rss}		4			
Turn-on delay time	$t_{d(on)}$	-	2.9	-	ns	$V_{DD}=50\text{ V}$, $V_{GS}=-3\text{ to }7\text{ V}$, $I_D=0.12\text{ A}$, $R_G=6\text{ }\Omega$
Rise time	t_r		2.7			
Turn-off delay time	$t_{d(off)}$		11			
Fall time	t_f		27			

Table 6 Gate charge characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	0.12	-	nC	$V_{DD}=80\text{ V}$, $I_D=0.12\text{ A}$, $V_{GS}=-3\text{ to }7\text{ V}$
Gate to drain charge	Q_{gd}		0.9		nC	
Gate charge total	Q_g		2.1		nC	
Gate plateau voltage	$V_{plateau}$		-0.43		V	

Table 7 Reverse diode

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	0.19	A	$T_A=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$			0.76		
Diode forward voltage	V_{SD}	-	0.82	1.2	V	$V_{GS}=-10\text{ V}$, $I_F=0.19\text{ A}$, $T_J=25\text{ °C}$
Reverse recovery time	t_{rr}	-	20.5	25.6	ns	$V_R=50\text{ V}$, $I_F=0.12\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		9.7	12.1	nC	

4 Electrical characteristics diagrams

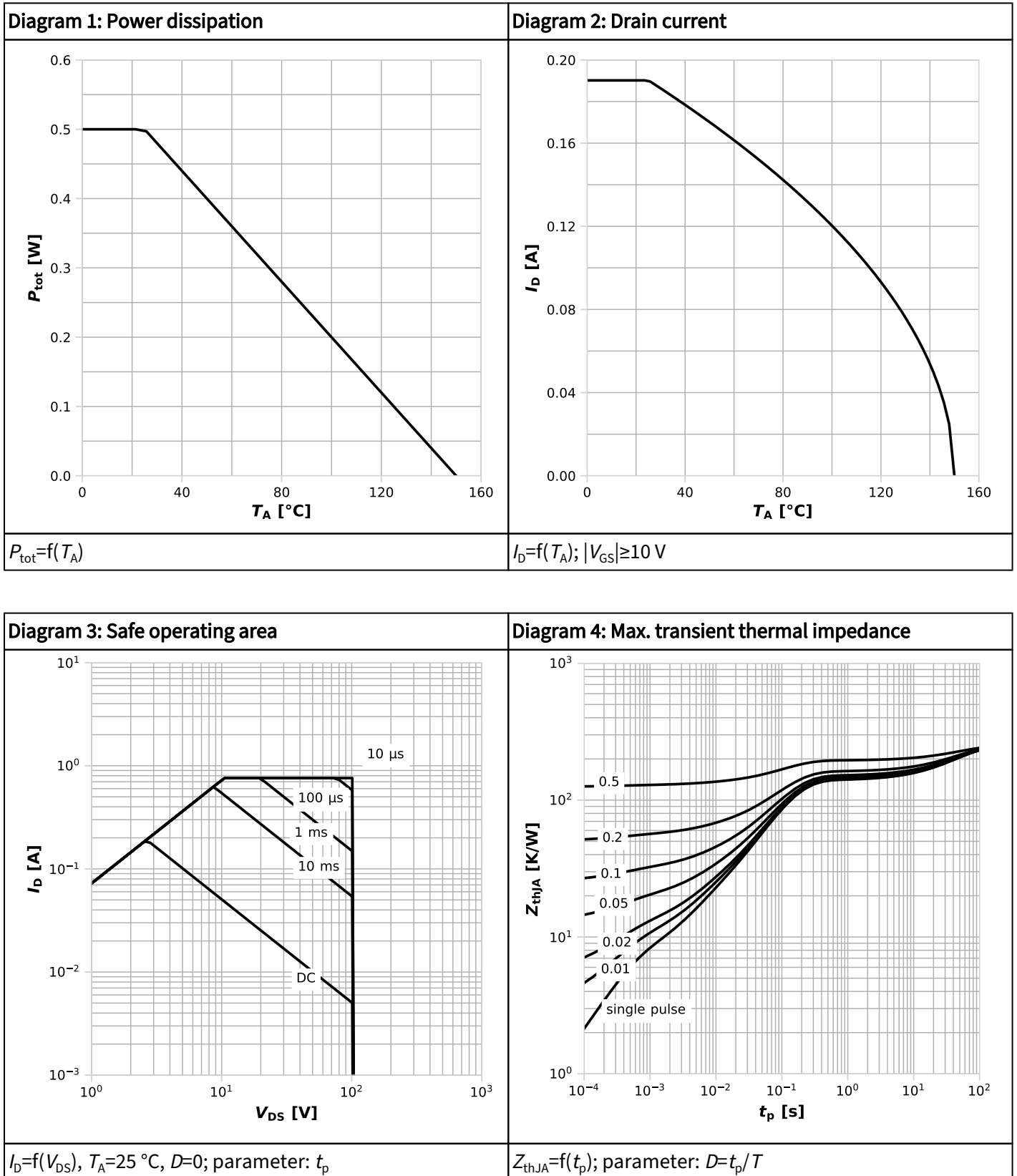
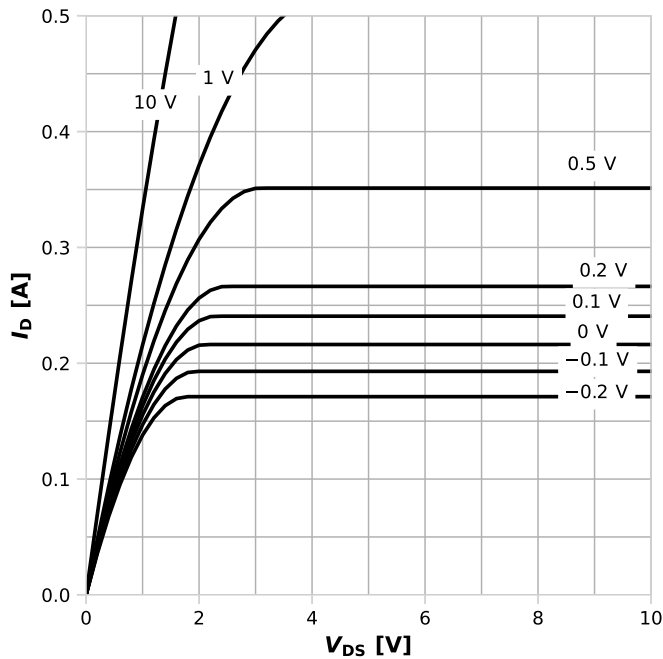
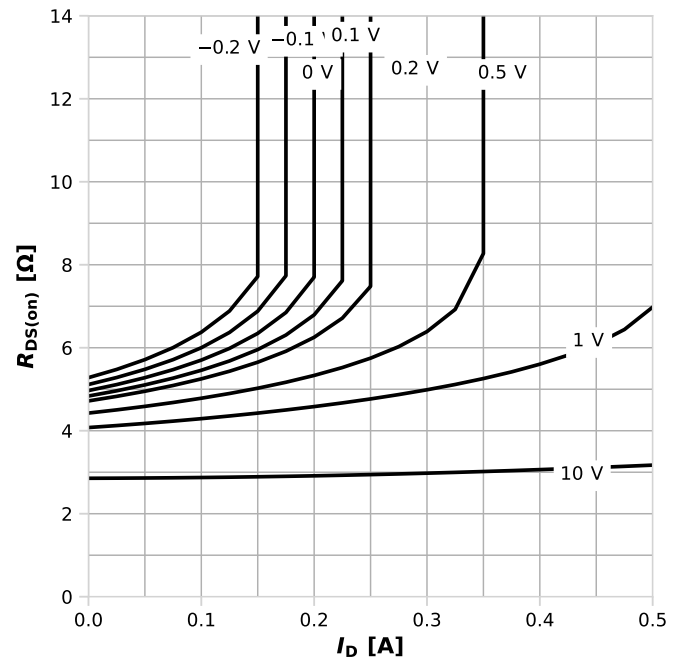


Diagram 5: Typ. output characteristics



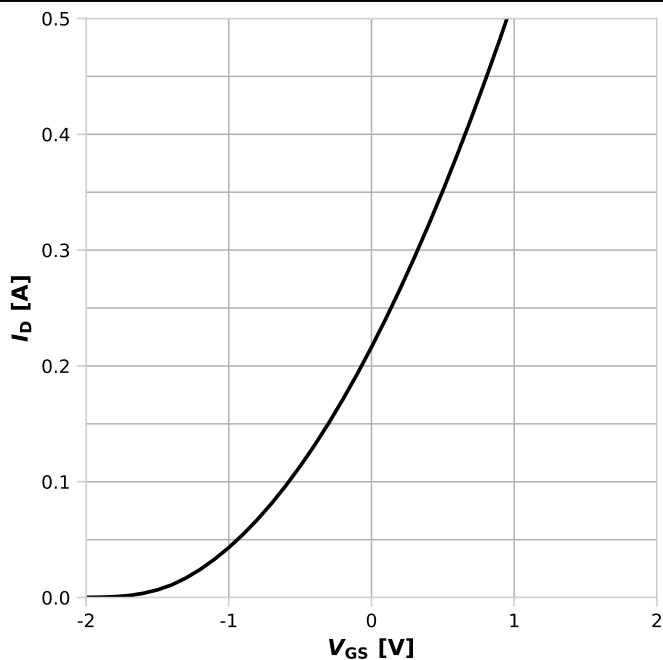
$$I_D = f(V_{DS}), T_j = 25^\circ\text{C}; \text{parameter: } V_{GS}$$

Diagram 6: Typ. drain-source on resistance



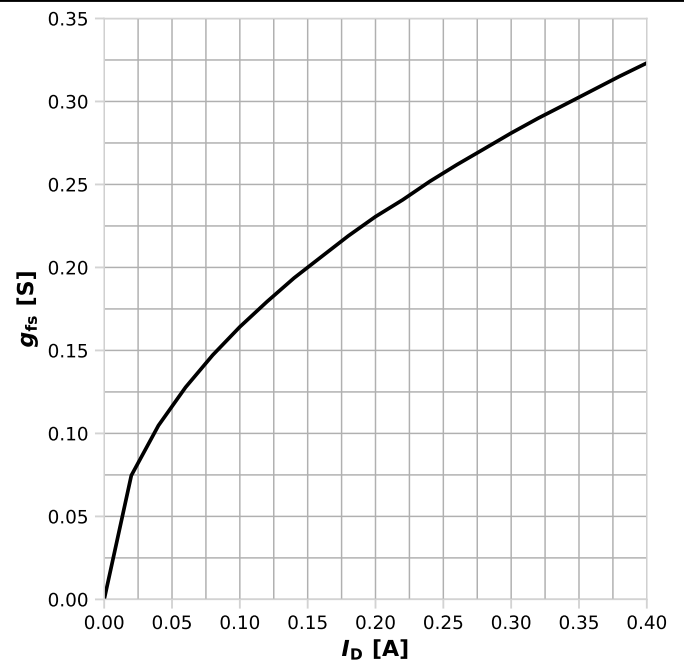
$$R_{DS(on)} = f(I_D), T_j = 25^\circ\text{C}; \text{parameter: } V_{GS}$$

Diagram 7: Typ. transfer characteristics



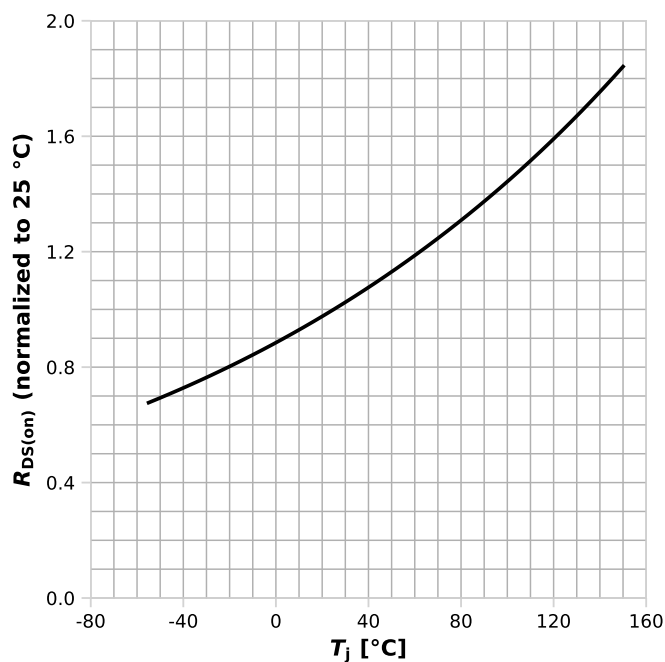
$$I_D = f(V_{GS}), |V_{DS}| > 2|I_D|R_{DS(on)\max}, T_j = 25^\circ\text{C}$$

Diagram 8: Typ. transconductance



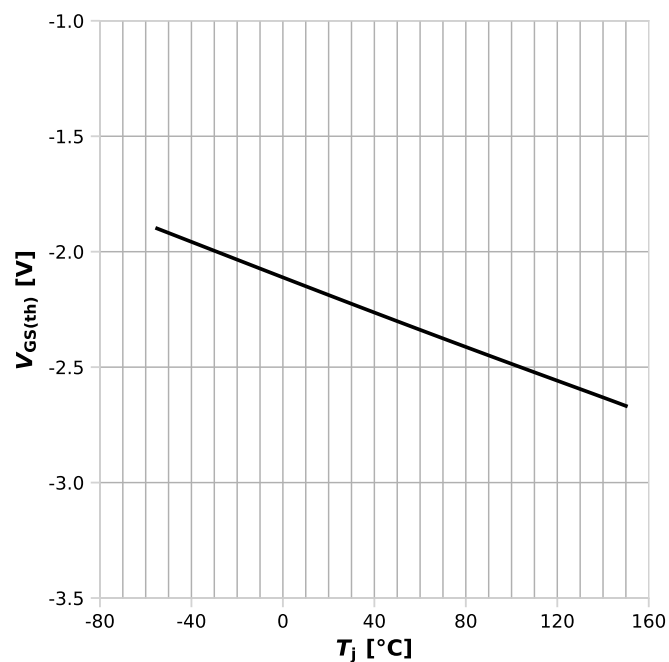
$$g_{fs} = f(I_D), V_{DS} = 5\text{ V}, T_j = 25^\circ\text{C}$$

Diagram 9: Normalized drain-source on resistance



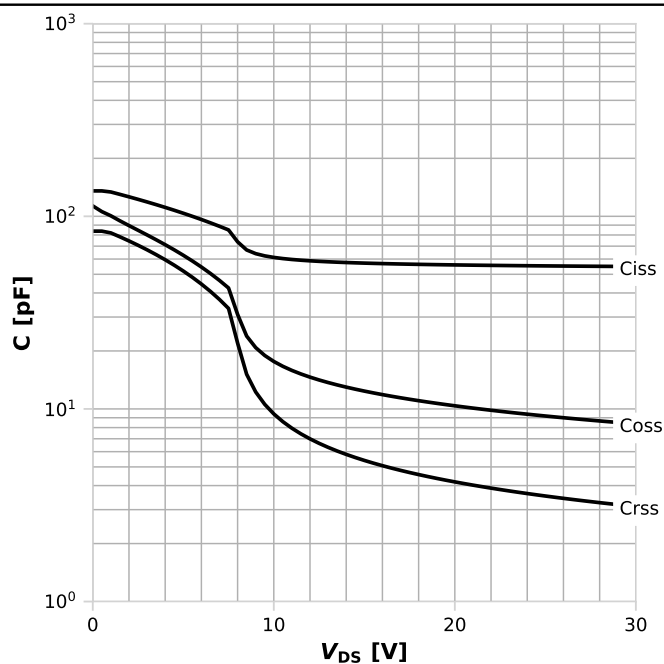
$$R_{DS(on)} = f(T_j), I_D = 0.05 \text{ A}, V_{GS} = 0 \text{ V}$$

Diagram 10: Typ. gate threshold voltage



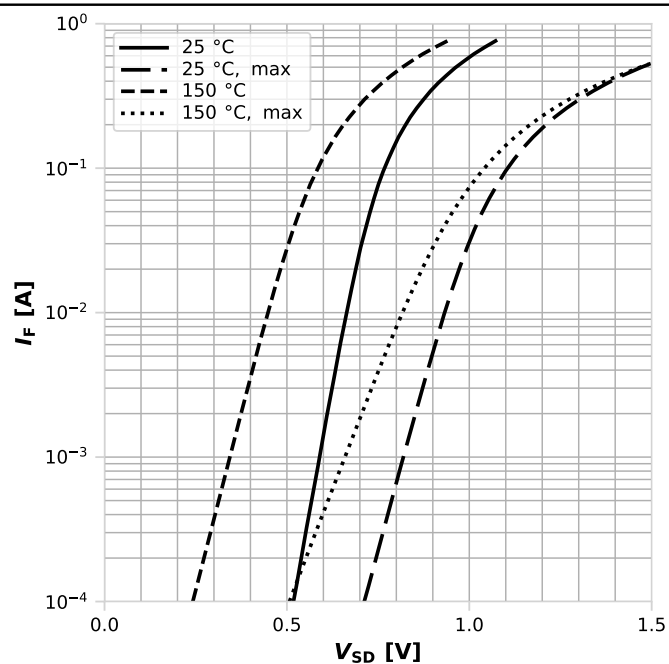
$$V_{GS(th)} = f(T_j), V_{DS} = 3 \text{ V}, I_D = 50 \text{ } \mu\text{A}$$

Diagram 11: Typ. capacitances

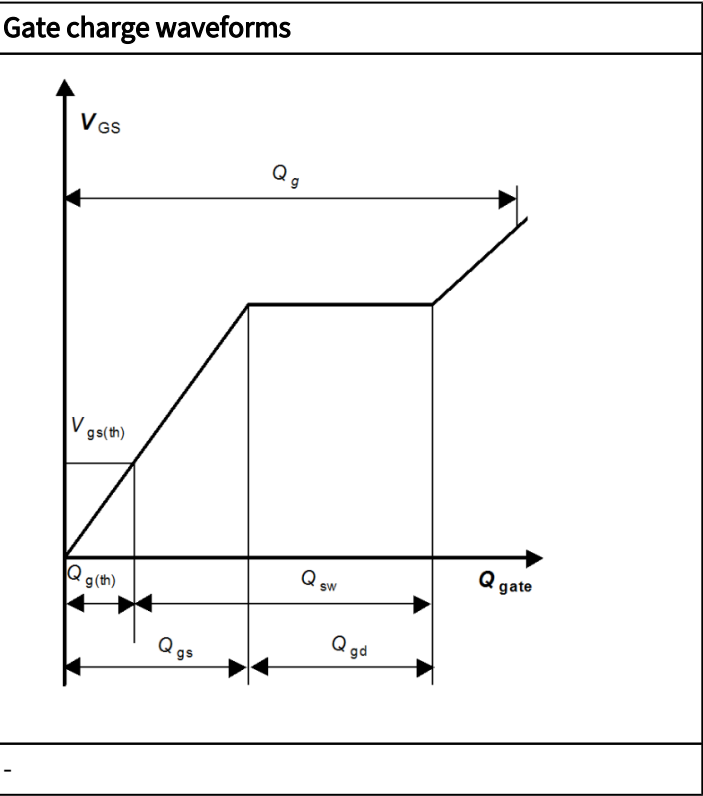
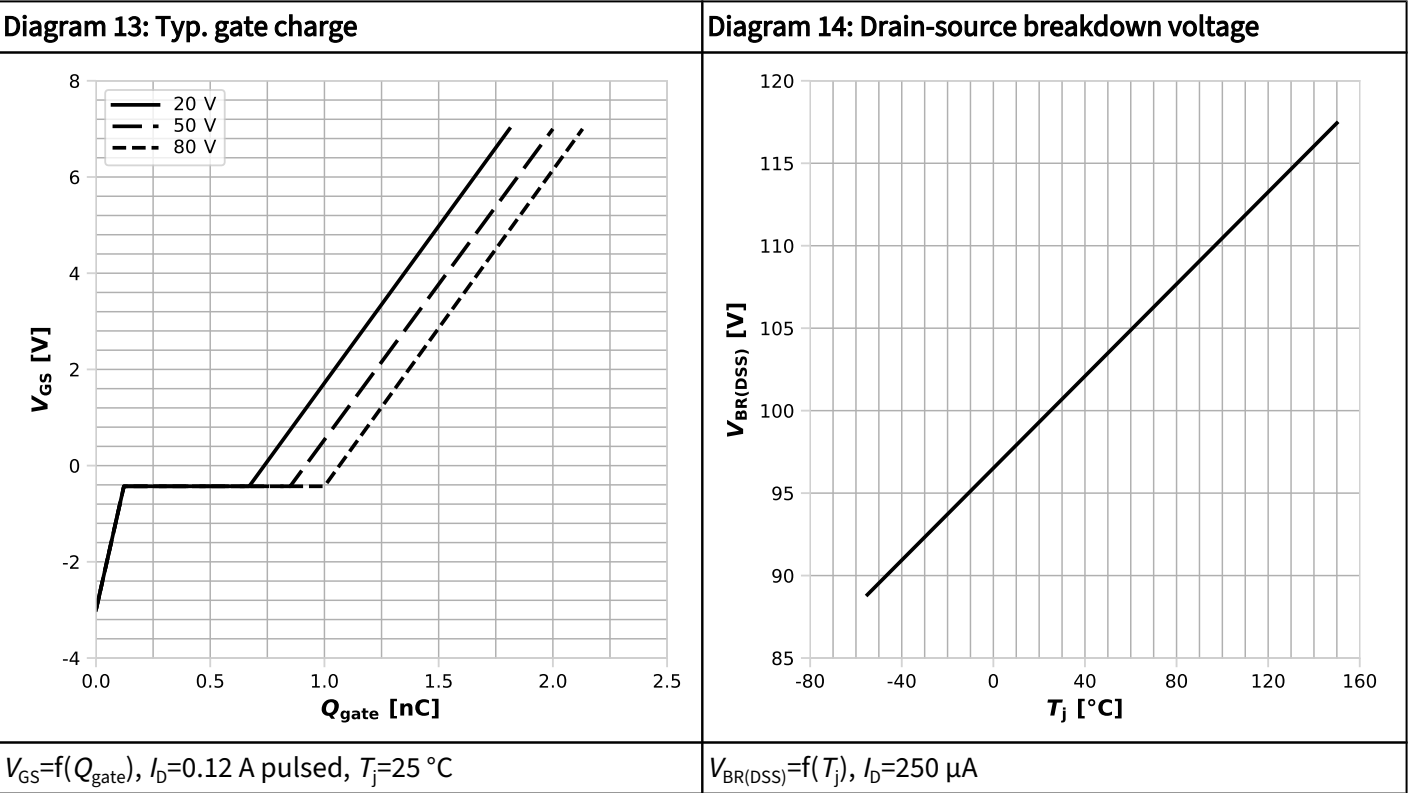


$$C = f(V_{DS}), V_{GS} = -3 \text{ V}, f = 1 \text{ MHz}$$

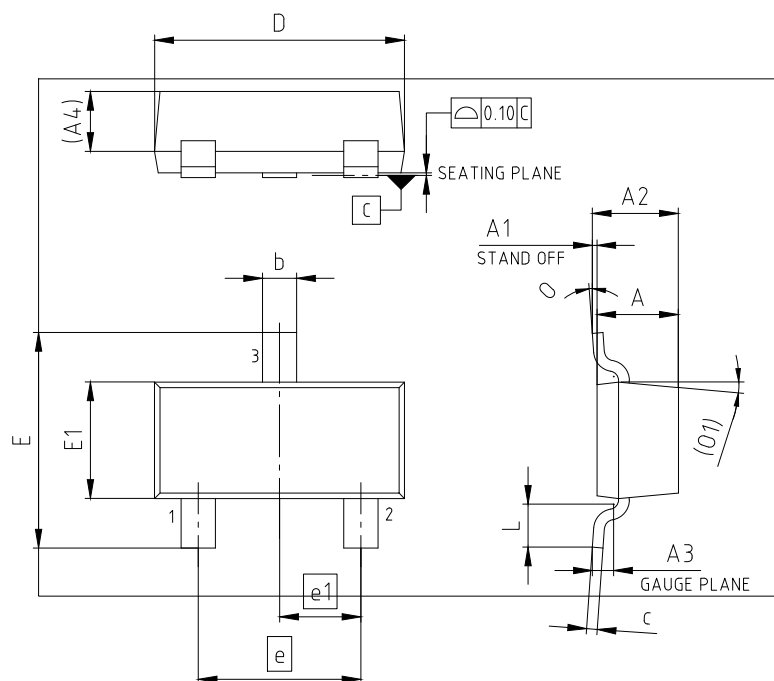
Diagram 12: Forward characteristics of reverse diode



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



5 Package outlines



PACKAGE - GROUP NUMBER: PG-SOT23-3-U03					
DIMENSIONS	MILLIMETERS		DIMENSIONS	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.88	1.02	e	1.90	
A1	0.01	0.10	e1	0.95	
A2	0.89	1.12	L	0.40	0.60
A3	0.15	0.35	N	3	
A4	0.70		O	3°	8°
b	0.32	0.47	O1	6°	8°
c	0.08	0.18			
D	2.80	3.04			
E	2.40	2.64			
E1	1.32	1.40			

NOTE: ALL DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

Figure 1 Outline PG-SOT23-3mm

Revision history

BSS169I

Revision 2025-09-30, Rev. 2.3

Previous revisions

Revision	Date	Subjects (major changes since last revision)
2.0	2021-01-26	Release of final version
2.1	2021-03-17	Update technology naming
2.2	2025-03-13	Update package outline drawing
2.3	2025-09-30	Update marking

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