

## N-Channel MOSFET

Primary characteristics			
Symbol	Parameter	Value	Unit
$I_D$	Continuous drain current (@ $T_a=25^\circ\text{C}$ )	340	mA
$V_{DS}$	Drain source voltage	50	V
$R_{DS(on)}$ @ $V_{GS}=4.5\text{V}$	Static drain-source on-resistance	3.0	$\Omega$

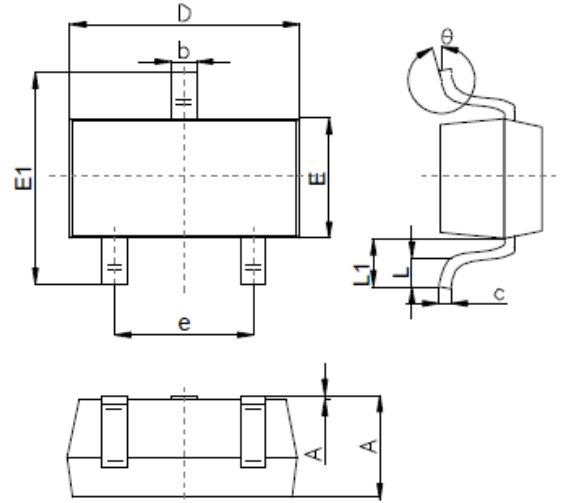
### Features

- **SOT-23** case for easy automatic insertion
- Pb-free and **RoHS** compliant
- Low input Capacitance
- Fast Switching Speed
- Low Input / Output Leakage
- Voltage controlled small signal switch

### Application

- Battery operated systems
- Solid-state relays
- Direct logic-level interface: TTL/CMOS

### Case dimensions



#### SOT-23 (TO-236AB)

Unit	A	A <sub>1max</sub>	b	c	D	E	E1	e	L	L <sub>1</sub>	$\theta$
mm	0.9 - 1.4	0.1	0.30 - 0.50	0.08 - 0.20	2.9 ±0.2	1.2 - 1.6	2.25 - 2.80	1.9 ±0.1	0.10 - 0.50	0.40 - 0.55	0° - 10°

### Absolute maximum ratings ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Value	Unit
Drain-source voltage	$V_{DS}$	50	V
Gate-source voltage	$V_{GS}$	±20	V
Continuous drain current	$I_D$	340	mA
Pulsed drain current <sup>1</sup>	$I_{DM}$	1.5	A
Power Dissipation <sup>2</sup>	$P_D$	350	mW
Operating junction temperature range	$T_J, T_{STG}$	-55 ~ 150	°C
Thermal resistance junction-ambient <sup>2</sup>	$R_{\theta JA}$	357	°C/W

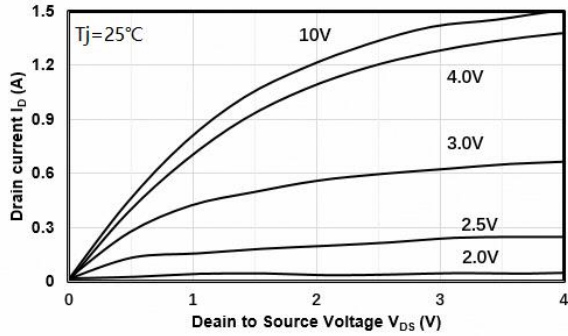
Electrical characteristics (T <sub>A</sub> = 25°C)						
Characteristic	Test condition	Symbol	Value			Unit
			Min.	Typ.	Max.	
Drain-source breakdown voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	V <sub>DSS</sub>	50	-	-	V
Zero gate voltage drain current	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V	I <sub>DSS</sub>	-	-	1.0	μA
Gate-body leakage current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	I <sub>GSS</sub>	-	-	±100	nA
Gate threshold voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	V <sub>GS(th)</sub>	0.8	1.2	1.6	V
Static drain-source on-state resistance <sup>3</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =300mA	R <sub>DS(ON)</sub>	-	1.1	2.5	Ω
	V <sub>GS</sub> =4.5V, I <sub>D</sub> =200mA		-	2.2	3.0	
On state drain current	V <sub>GS</sub> =10V, V <sub>DS</sub> =5.0V	I <sub>D(ON)</sub>	680	-	-	mA
Dynamic electrical characteristics						
Characteristic	Test condition	Symbol	Value			Unit
			Min.	Typ.	Max.	
Input capacitance	V <sub>DS</sub> =25V V <sub>GS</sub> =0V f=1.0MHz	C <sub>iss</sub>	-	28.5	-	pF
Output capacitance		C <sub>oss</sub>	-	2.7	-	
Reverse transfer capacitance		C <sub>rss</sub>	-	1.78	-	
Total gate charge	V <sub>DS</sub> =25V V <sub>GS</sub> =10V I <sub>D</sub> =300mA	Q <sub>g</sub>	-	1.7	2.5	nC
Gate source charge		Q <sub>gs</sub>	-	0.4	-	
Gate drain charge		Q <sub>gd</sub>	-	0.24	-	
Switching characteristics						
Characteristic	Test condition	Symbol	Value			Unit
			Min.	Typ.	Max.	
Turn on delay time	V <sub>DS</sub> =25V V <sub>GS</sub> =10V I <sub>D</sub> =300mA R <sub>G</sub> =6.0Ω	t <sub>d(ON)</sub>	-	2.6	-	ns
Turn on rise time		t <sub>r</sub>	-	18.8	-	
Turn off delay time		t <sub>d(OFF)</sub>	-	9.7	-	
Turn off fall time		t <sub>f</sub>	-	47	-	
Source drain diode characteristics						
Characteristic	Test condition	Symbol	Value			Unit
			Min.	Typ.	Max.	
Maximum body-diode continuous current	T <sub>A</sub> =25°C	I <sub>SD</sub>	-	-	340	mA
Diode forward voltage	I <sub>S</sub> =300mA, V <sub>GS</sub> =0V	V <sub>SD</sub>	-	-	1.2	V

**Notes:**

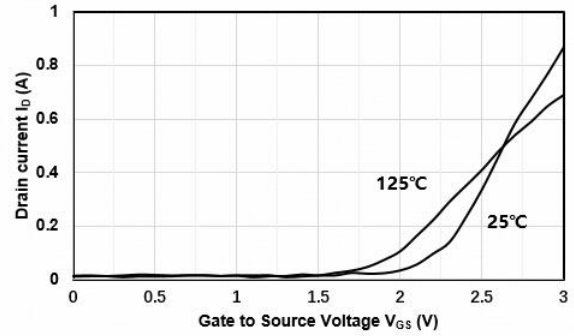
1. Pulse width limited by maximum allowable junction temperature.
2. The value of PD&RθJA is measured with the device mounted on 1 in2 FR-4 board with 2oz.Copper, double sided, in a still air environment with Ta=25°C.
3. Pulse test; Pulse width≤300us, duty cycle ≤ 2%

Typical characteristics

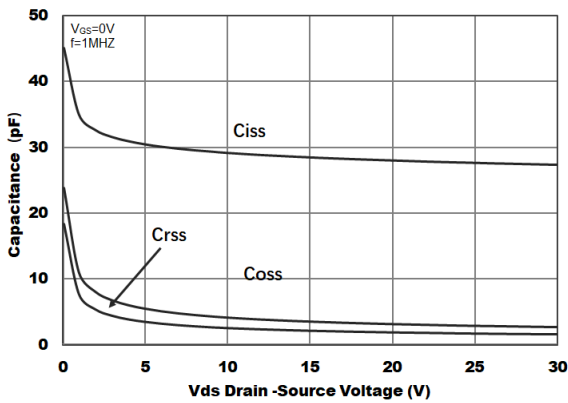
Output Characteristics



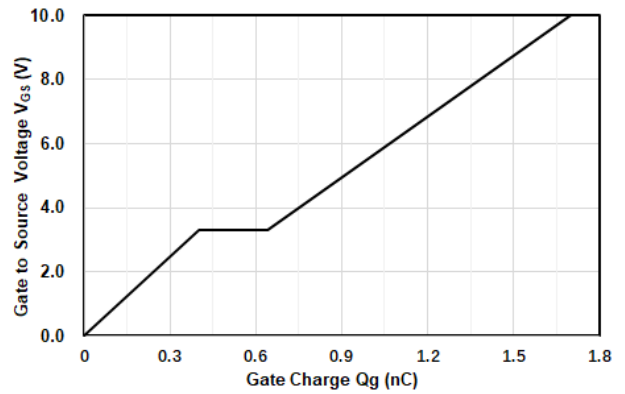
Transfer Characteristics



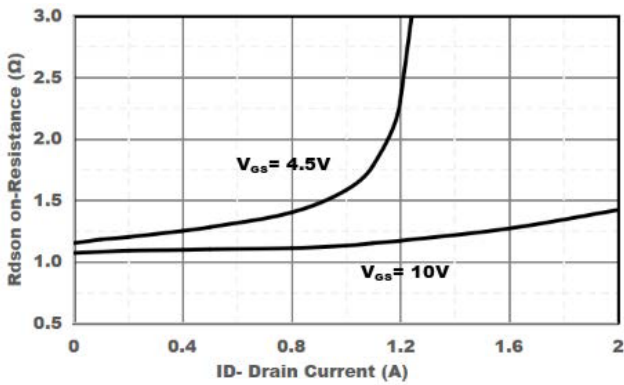
Capacitance Characteristics



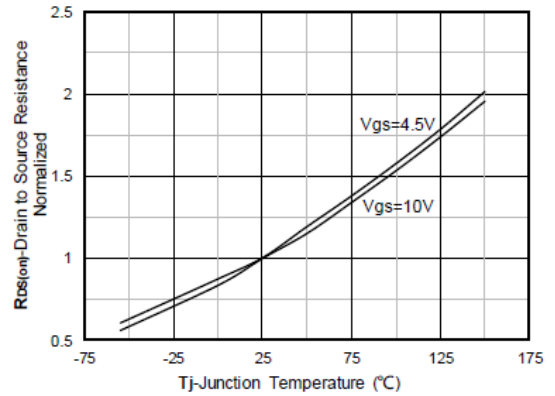
Gate Charge



Drain-Source on Resistance

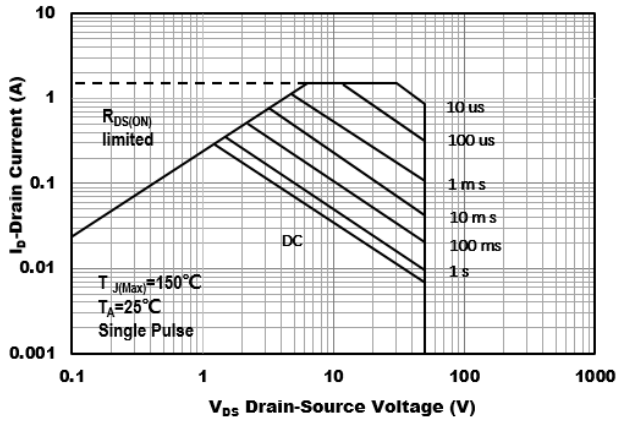


Drain-Source on Resistance

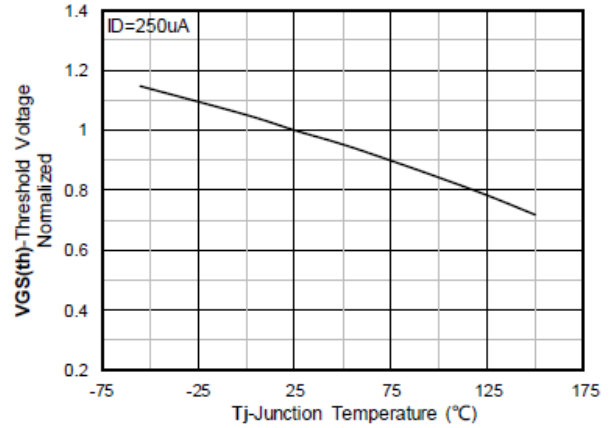


Typical characteristics

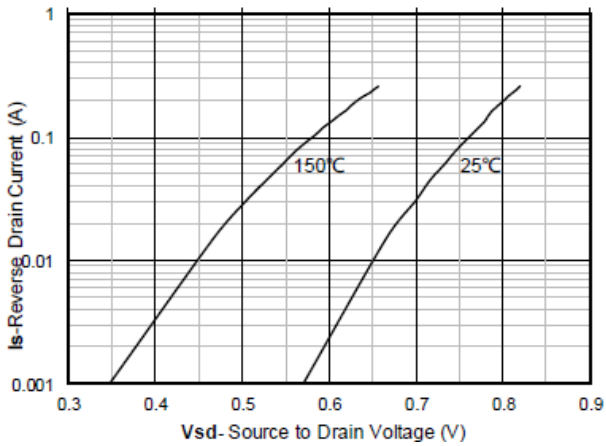
Safe Operation Area



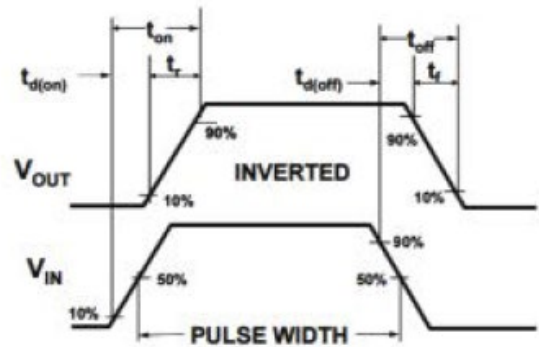
Normalized Threshold voltage

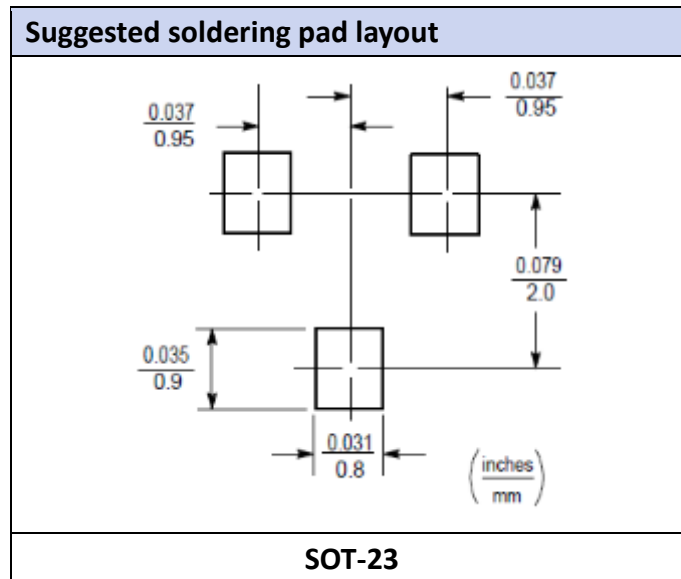


Forward characteristics of reverse diode



Switching wave





Ordering information			
Part Number	Package	Shipping Quantity	Dimensions
BSS138	SOT-23	3000 pcs / 7" reel	---

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