

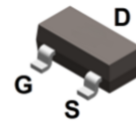


### Features

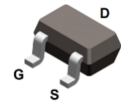
- Low on-resistance
- High-speed switching
- HBM: JESD22-A114-B: 2
- RoHS compliant with Halogen-free

### Mechanical Data

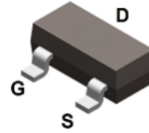
- Case: SOT-23, SOT-323, SOT-23-3L
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte Tin-Plated Leads, Solderability-per MIL-STD-202, Method 208



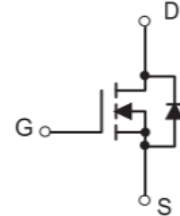
**BSS123**  
**SOT-23**



**BSS123W**  
**SOT-323**



**BSS123-3L**  
**SOT-23-3L**



### Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
BSS123	SOT-23	3000 pcs / Tape & Reel	B123
BSS123W	SOT-323	3000 pcs / Tape & Reel	B123
BSS123-3L	SOT-23-3L	3000 pcs / Tape & Reel	B123

### Maximum Ratings (@ T<sub>A</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V <sub>DSS</sub>	100	V
Gate-to-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current (T <sub>A</sub> = 25°C) *1	I <sub>D</sub>	170	mA
Continuous Drain Current (T <sub>A</sub> = 70°C) *1		135	mA
Pulsed Drain Current (t <sub>p</sub> = 10μs, T <sub>A</sub> = 25°C)	I <sub>DM</sub>	680	mA
Single Pulse Avalanche Energy *3	E <sub>AS</sub>	0.1	mJ
Power Dissipation (T <sub>A</sub> = 25°C, SOT-23, SOT-23-3L) *1	P <sub>D</sub>	0.35	W
Power Dissipation (T <sub>A</sub> = 25°C, SOT-323) *1		0.2	W
Operating Junction Temperature Range	T <sub>J</sub>	-55 ~ +150	°C
Storage Temperature Range	T <sub>STG</sub>	-55 ~ +150	°C

### Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case (SOT-23, SOT-23-3L)	R <sub>θJC</sub>	-	190	200	°C/W
Thermal Resistance Junction-to-Case (SOT-323)		-	-	300	°C/W
Thermal Resistance Junction-to-Air (SOT-23, SOT-23-3L) *1	R <sub>θJA</sub>	-	330	357	°C/W
Thermal Resistance Junction-to-Air (SOT-323) *1		-	-	625	°C/W



### Electrical Characteristics (@ T<sub>A</sub> = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
V <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	100	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V	-	-	1	μA
		V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V	-	-	10	nA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	-	-	±1	μA
<b>On Characteristics</b>						
R <sub>DS(ON)</sub>	Drain-Source On-resistance <sup>*2</sup>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 0.17A	-	3.5	6	Ω
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 0.17A	-	4.3	10	
V <sub>GS(TH)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	1	1.9	2.8	V
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> = 0V, f = 1MHz	-	41	-	Ω
<b>Dynamic Characteristics</b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>GS</sub> = 0V V <sub>DS</sub> = 20V f = 1.0MHz	-	37	-	pF
C <sub>OSS</sub>	Output Capacitance		-	5	-	
C <sub>RSS</sub>	Reverse Transfer Capacitance		-	2	-	
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time <sup>*4</sup>	V <sub>DD</sub> = 30V V <sub>GS</sub> = 10V I <sub>D</sub> = 0.28A R <sub>G</sub> = 50Ω	-	8	-	ns
t <sub>r</sub>	Turn-on Rise Time <sup>*4</sup>		-	8	-	
t <sub>d(off)</sub>	Turn-Off Delay Time <sup>*4</sup>		-	13	-	
t <sub>f</sub>	Turn-Off Fall Time <sup>*4</sup>		-	16	-	
Q <sub>G</sub>	Total Gate-Charge(V <sub>GS</sub> = 10V)	V <sub>DD</sub> = 80V V <sub>GS</sub> = 4.5V I <sub>D</sub> = 0.2A	-	4	-	nC
	Total Gate-Charge(V <sub>GS</sub> = 4.5V)		-	2	-	
Q <sub>GS</sub>	Gate to Source Charge		-	1.2	-	
Q <sub>GD</sub>	Gate to Drain (Miller) Charge		-	0.45	-	
<b>Source-Drain Diode Characteristics</b>						
V <sub>SD</sub>	Diode Forward Voltage <sup>*2</sup>	I <sub>S</sub> = 0.3A, V <sub>GS</sub> = 0V	-	0.88	1.3	V

Notes:

1. The data tested by surface mounted on a minimum recommended FR-4 board
2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
3. The E<sub>AS</sub> data shows Max. rating. The test condition is V<sub>DD</sub> = 50V, V<sub>GS</sub> = 10V, L = 0.1mH
4. Guaranteed by design, not subject to production



### Ratings and Characteristic Curves (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

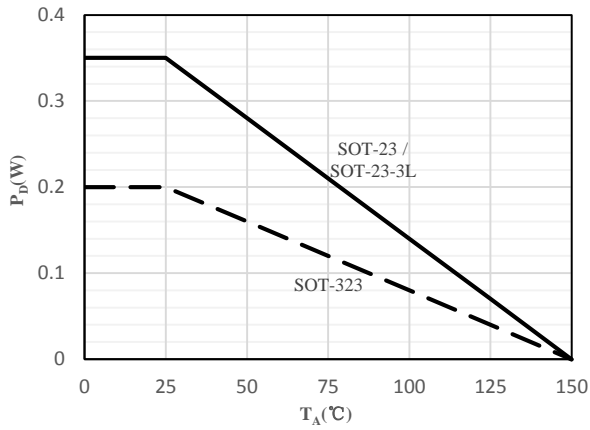


Fig 1 Power Dissipation

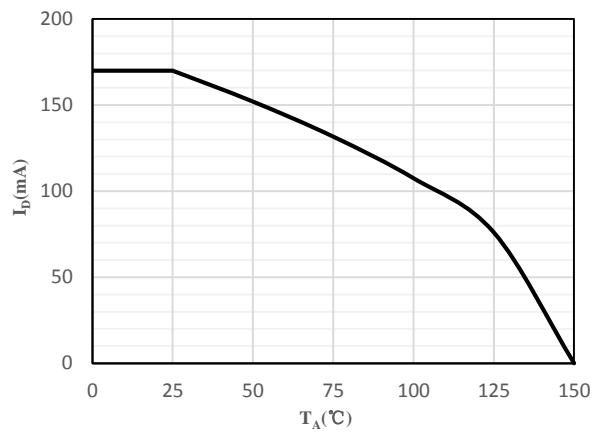


Fig 2 Drain Current

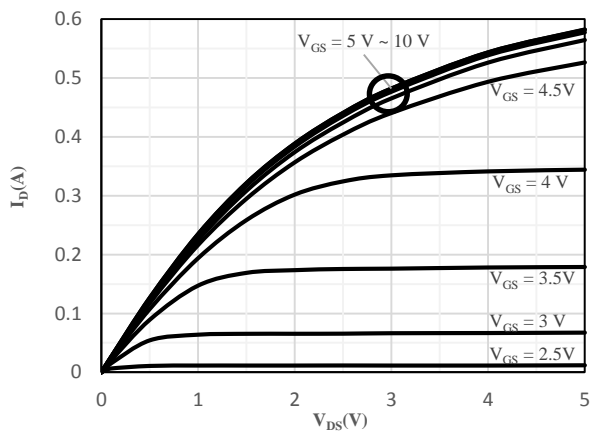


Fig 3 Typical Output Characteristics

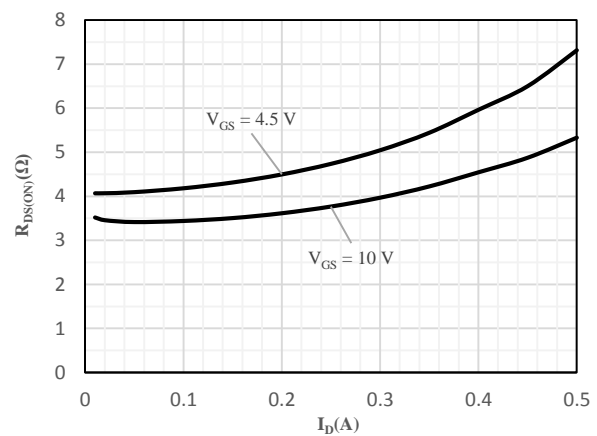


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

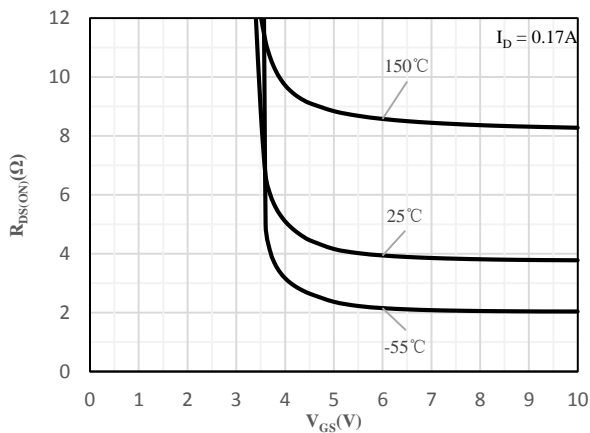


Fig 5 On-Resistance vs. Gate-Source Voltage

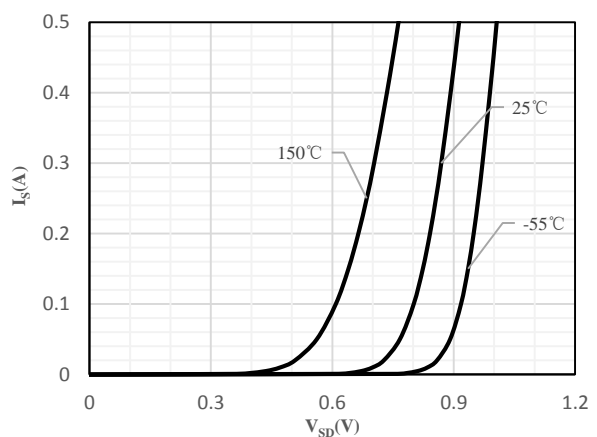
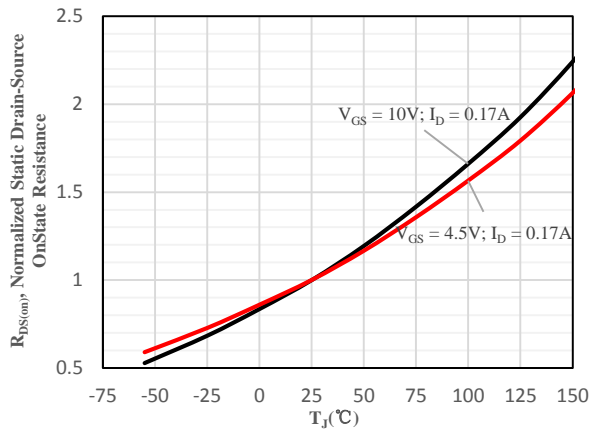
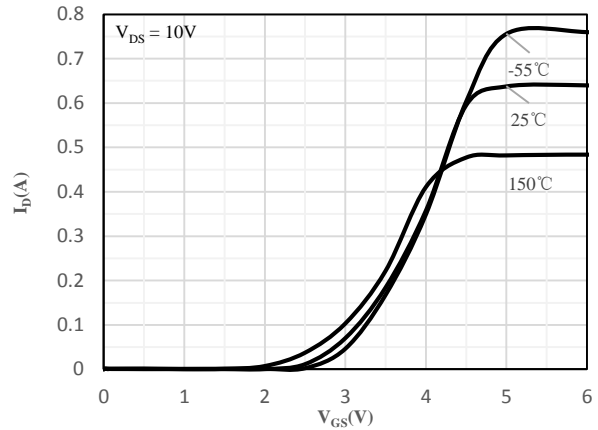


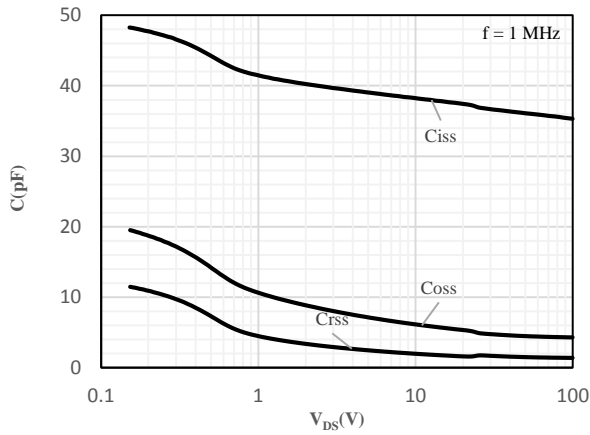
Fig 6 Body-Diode Characteristics



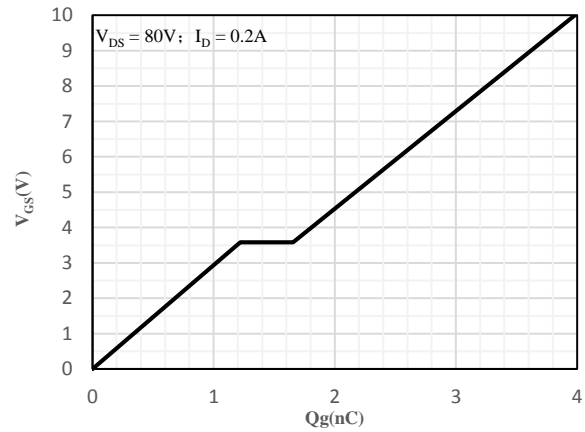
**Fig 7 Normalized On-Resistance vs. Junction Temperature**



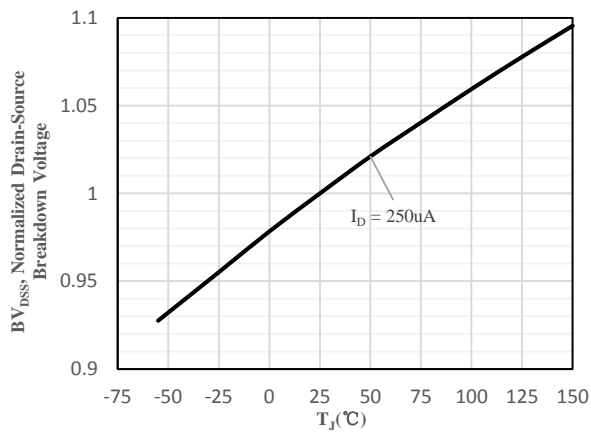
**Fig 8 Transfer Characteristics**



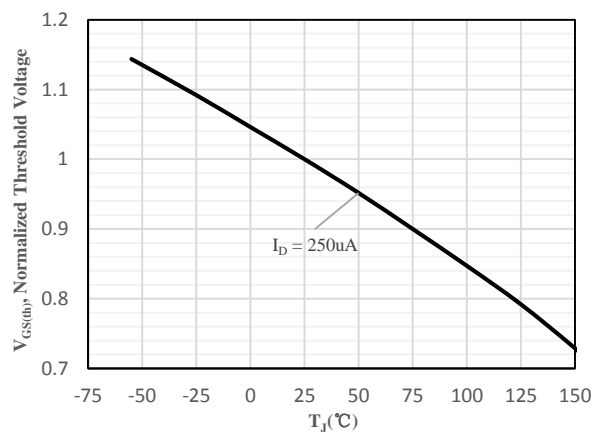
**Fig 9 Capacitance Characteristics**



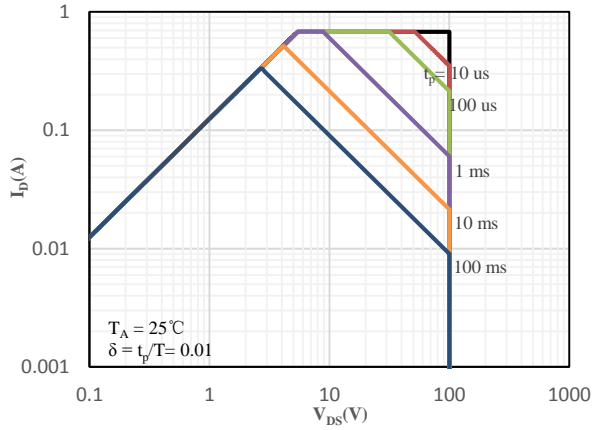
**Fig 10 Gate-Charge Characteristics**



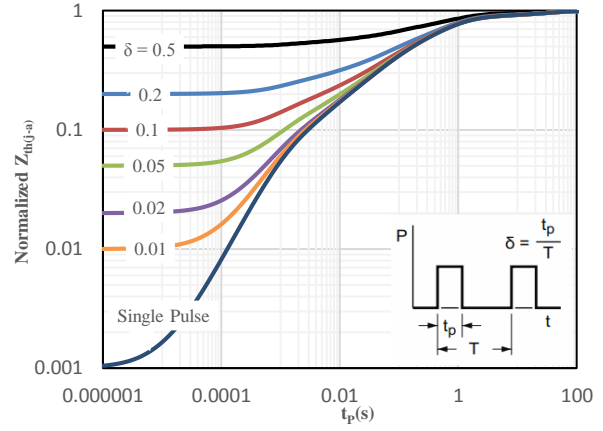
**Fig 11 Normalized Breakdown Voltage vs. Junction Temperature**



**Fig 12 Normalized  $V_{GS(th)}$  vs. Junction Temperature**



**Fig 13 Safe Operating Area**

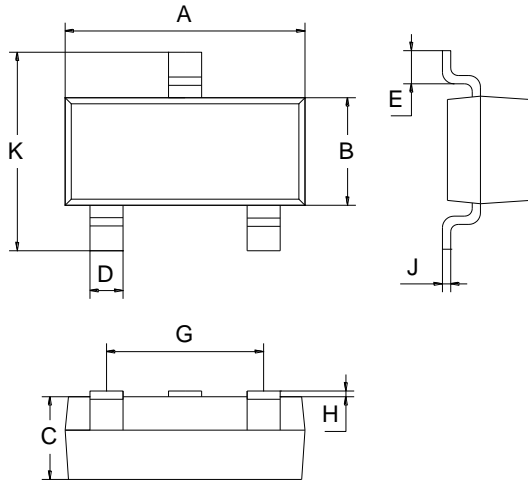


**Fig 14 Normalized Maximum transient thermal impedance**



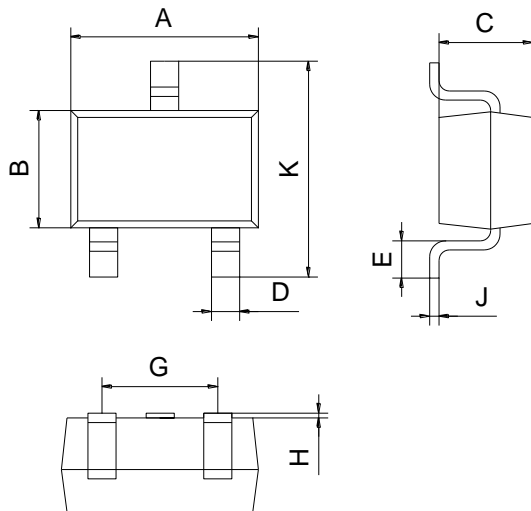
### Package Outline Dimensions (Unit: mm)

#### SOT-23



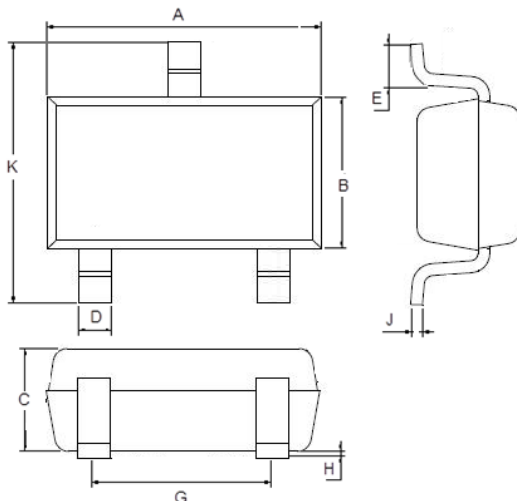
SOT-23		
Dimension	Min.	Max.
A	2.70	3.10
B	1.10	1.50
C	0.90	1.10
D	0.30	0.50
E	0.35	0.48
G	1.80	2.00
H	0.02	0.10
J	0.05	0.15
K	2.20	2.60

#### SOT-323



SOT-323		
Dimension	Min.	Max.
A	2.00	2.20
B	1.15	1.35
C	0.90	1.10
D	0.15	0.35
E	0.25	0.40
G	1.20	1.40
H	0.02	0.10
J	0.05	0.15
K	2.20	2.40

#### SOT-23-3L

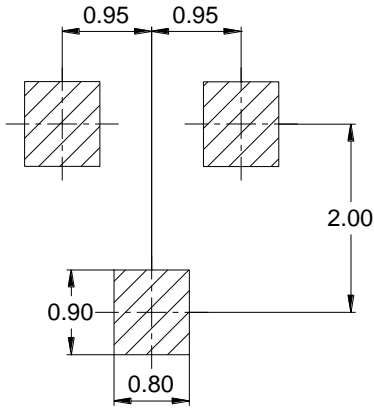


SOT-23-3L		
Dimension	Min.	Max.
A	2.80	3.00
B	1.50	1.70
C	1.00	1.20
D	0.35	0.45
E	0.35	0.55
G	1.80	2.00
H	0.02	0.10
J	0.10	0.20
K	2.60	3.00

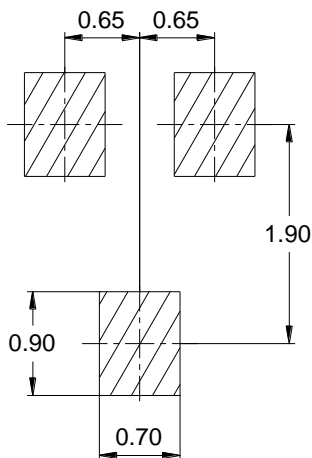


### Mounting Pad Layout (Unit: mm)

#### SOT-23



#### SOT-323



#### SOT-23-3L

