



### Features

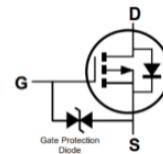
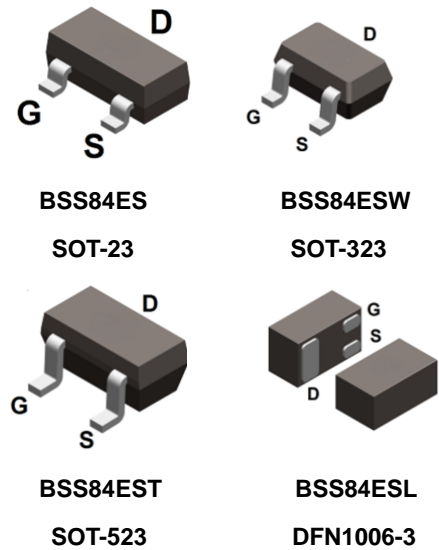
- Low on-resistance
- High-speed switching
- Drive circuits can be simple
- Parallel use is easy
- ESD protected gate up to 2kV HBM
- RoHS compliant with Halogen-free

### Typical Applications

- P-channel enhancement mode effect transistor
- Switching application

### Mechanical Data

- Case: SOT-23, SOT-323, SOT-523, DFN1006-3
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



### Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
BSS84ES	SOT-23	3000 pcs / Tape & Reel	ES
BSS84ESW	SOT-323	3000 pcs / Tape & Reel	ES
BSS84EST	SOT-523	3000 pcs / Tape & Reel	ES
BSS84ESL	DFN1006-3	10000 pcs / Tape & Reel	ES

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

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V <sub>DSS</sub>	-60	V
Gate-to-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current	I <sub>D</sub>	-130	mA
Pulsed Drain Current *4	I <sub>DM</sub>	-520	mA



### Thermal Characteristics

Parameter	Symbol	Value	Unit
Power Dissipation **1	P <sub>D</sub>	0.36	W
		0.20	
		0.15	
		0.15	
Thermal Resistance Junction-to-Air **1	R <sub>θJA</sub>	347	°C/W
		625	
		834	
		834	
Thermal Resistance Junction-to-Lead **1	R <sub>θJL</sub>	208	°C/W
		375	
		500	
		500	
Thermal Resistance Junction-to-Case **1	R <sub>θJC</sub>	175	°C/W
		315	
		421	
		421	
Operating Junction Temperature Range	T <sub>J</sub>	-55 ~ +150	°C
Storage Temperature Range	T <sub>STG</sub>	-55 ~ +150	°C



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

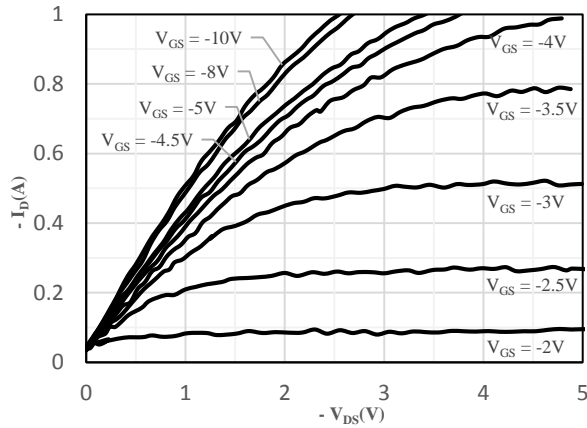
Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
V <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-60	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = -50V, V <sub>GS</sub> = 0V	-	-	-1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	-	-	±10	μA
<b>On Characteristics</b> <sup>*2</sup>						
R <sub>DS(ON)</sub>	Static Drain-Source On-resistance	V <sub>GS</sub> = -5V, I <sub>D</sub> = -0.1A	-	2.4	8	Ω
		V <sub>GS</sub> = -10V, I <sub>D</sub> = -0.13A	-	2.0	6	
V <sub>GS(TH)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1	-1.5	-2	V
<b>Dynamic Characteristics</b> <sup>*3</sup>						
C <sub>ISS</sub>	Input Capacitance	V <sub>GS</sub> = 0V V <sub>DS</sub> = -20V f = 1.0MHz	-	53	-	pF
C <sub>OSS</sub>	Output Capacitance					
C <sub>RSS</sub>	Reverse Transfer Capacitance					
R <sub>G</sub>	Gate Resistance	f = 1.0MHz, V <sub>GS</sub> = 0V	-	721	-	Ω
<b>Switching Characteristics</b>						
t <sub>d(ON)</sub>	Turn-on Delay Time	V <sub>DS</sub> = -15V R <sub>L</sub> = -50Ω I <sub>D</sub> = -2.5A	-	2.5	-	ns
t <sub>r</sub>	Turn-on Rise Time					
t <sub>d(OFF)</sub>	Turn-Off Delay Time					
t <sub>f</sub>	Turn-Off Fall Time					
Q <sub>G</sub>	Total Gate-Charge	V <sub>DS</sub> = -25V V <sub>GS</sub> = -4.5V I <sub>D</sub> = -0.2A	-	2.5	-	nC
Q <sub>GS</sub>	Gate to Source Charge					
Q <sub>GD</sub>	Gate to Drain (Miller) Charge					
<b>Source-Drain Diode Characteristics</b>						
V <sub>SD</sub>	Diode Forward Voltage <sup>*2</sup>	I <sub>S</sub> = -0.26A, V <sub>GS</sub> = 0 V	-	-0.9	-1.4	V
I <sub>S</sub>	Continuous Source Current	T <sub>C</sub> = 25°C	-	-	-0.13	A
I <sub>SM</sub>	Pulsed Source Current	T <sub>C</sub> = 25°C	-	-	-0.52	A

Notes:

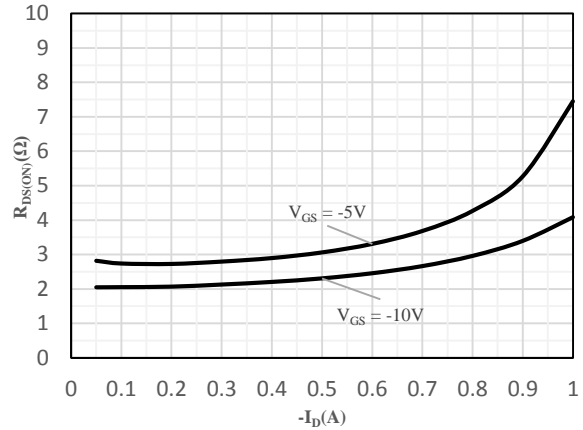
- 1、 Surface mounted on FR4 board, and standard footprint, t ≤ 10 sec
- 2、 Pulse test: pulse width ≤ 300μs, duty cycle ≤ 2%
- 3、 Guaranteed by design, not subject to production
- 4、 Pulse width limited by maximum junction temperature



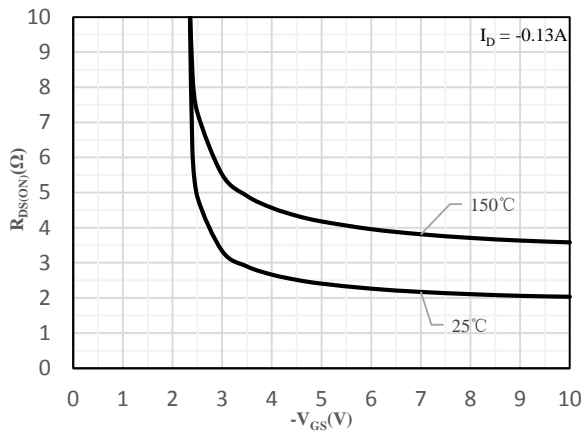
### Ratings and Characteristics Curves (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)



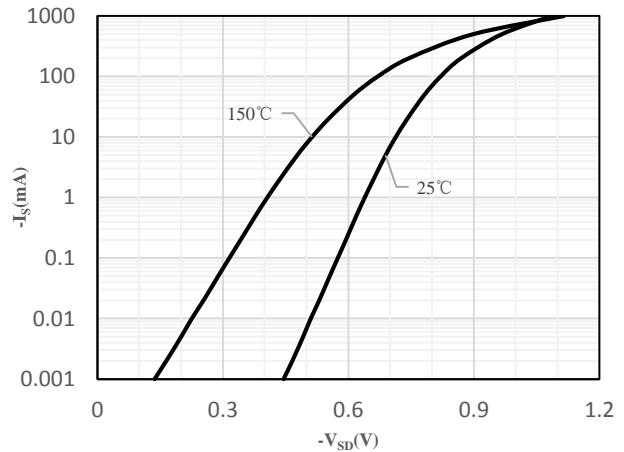
**Fig 1 Output Characteristics**



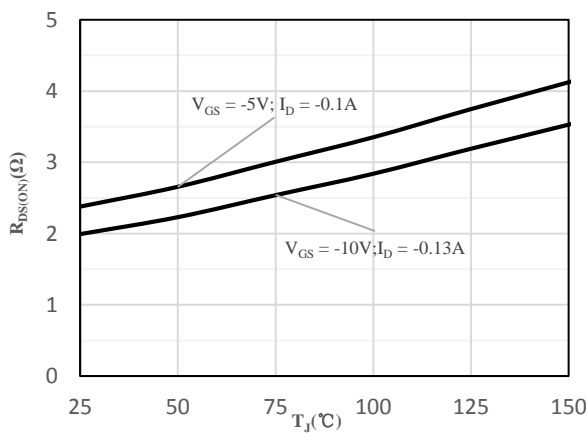
**Fig 2 On-Resistance vs. Drain Current and Gate Voltage**



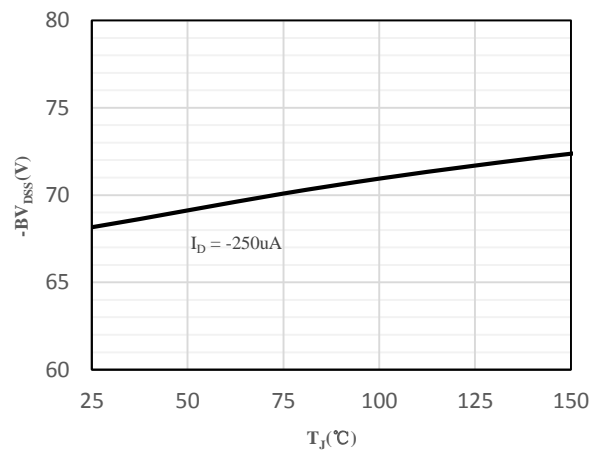
**Fig 3 On-Resistance vs. Gate-Source Voltage**



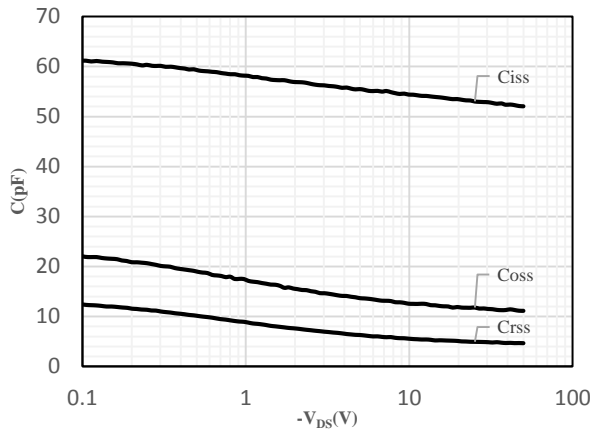
**Fig 4 Body-Diode Characteristics**



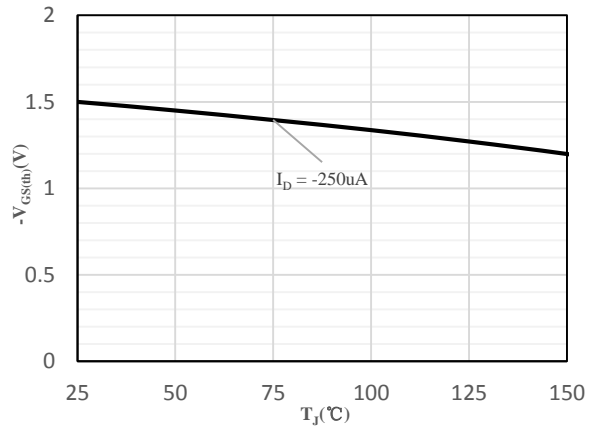
**Fig 5 On-Resistance vs. Junction Temperature**



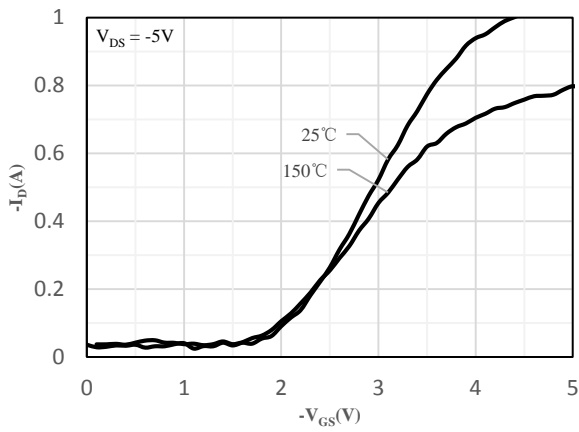
**Fig 6 Drain-Source Voltage vs. Junction Temperature**



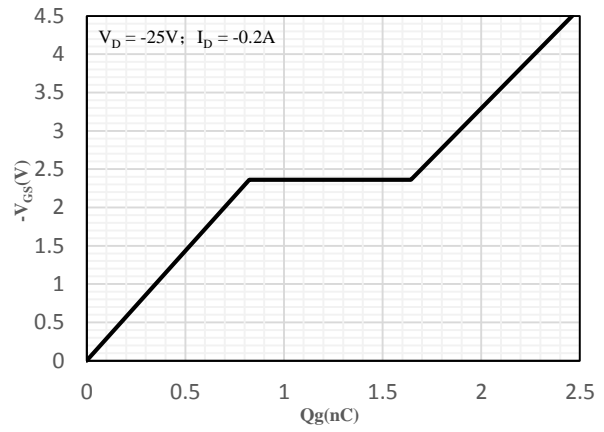
**Fig 7 Capacitance Characteristics**



**Fig 8 Gate Voltage vs. Junction Temperature**



**Fig 9 Transfer Characteristics**

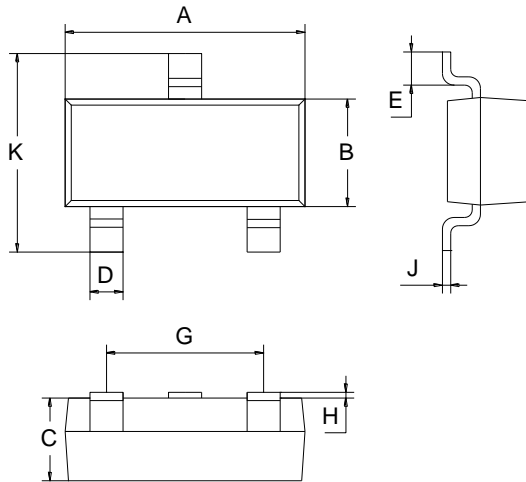


**Fig 10 Gate-Charge Characteristics**



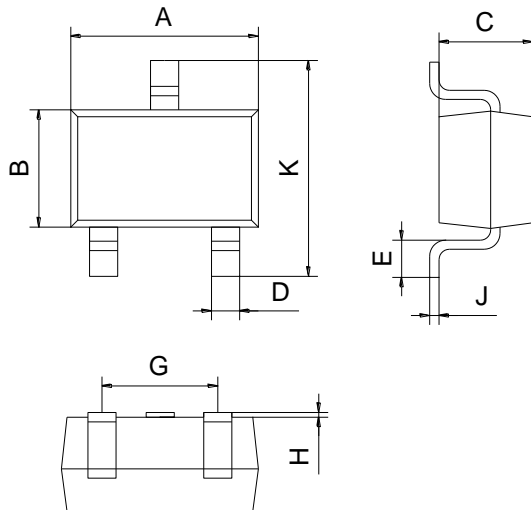
### Package Outline Dimensions (Unit: mm)

#### SOT-23



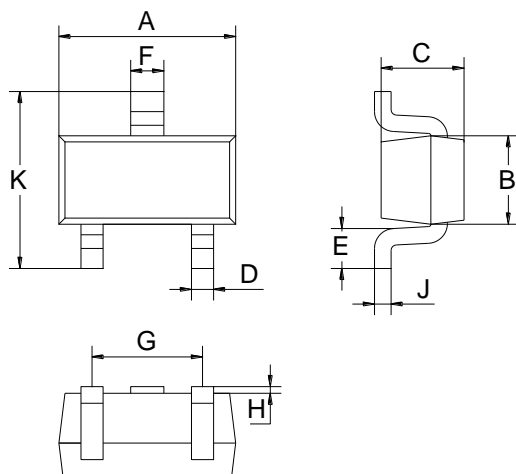
SOT-23		
Dimension	Min.	Max.
A	2.70	3.10
B	1.10	1.50
C	0.90	1.10
D	0.30	0.50
E	0.35	0.48
G	1.80	2.00
H	0.02	0.10
J	0.05	0.15
K	2.20	2.60

#### 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

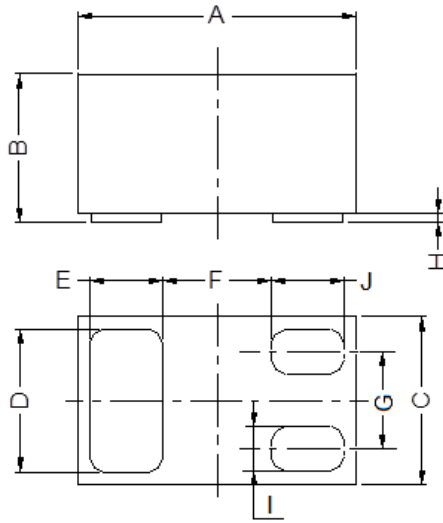
#### SOT-523



SOT-523		
Dimension	Min.	Max.
A	1.50	1.70
B	0.75	0.85
C	0.60	0.80
D	0.15	0.30
E	0.30	0.40
F	0.25	0.40
G	0.90	1.10
H	0.02	0.10
J	0.08	0.18
K	1.45	1.75



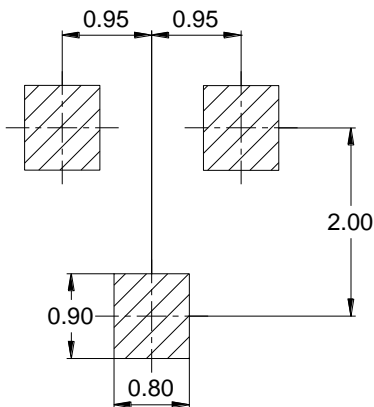
### DFN1006-3



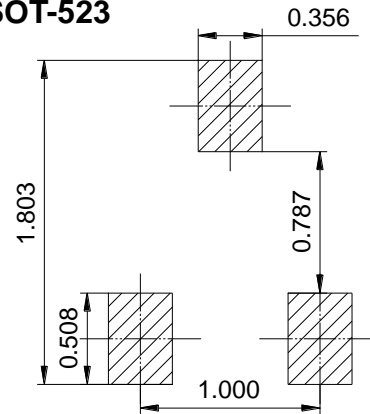
DFN1006-3			
Dimension	Min.	Typ.	Max.
A	0.95	1.00	1.075
B	0.47	0.50	0.53
C	0.55	0.60	0.675
D	0.45	0.50	0.55
E/J	0.20	0.25	0.30
F	-	0.40	-
G	-	0.35	-
H	0	0.03	0.05
I	0.10	0.15	0.20

### Mounting Pad Layout (Unit: mm)

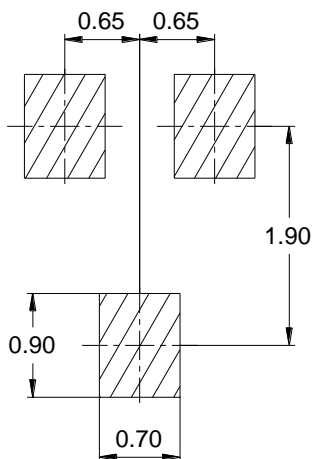
#### SOT-23



#### SOT-523



#### SOT-323



#### DFN1006-3

