

BC018SG12SWSD

N-Channel Silicon Carbide Power MOSFET

1200 V, 110 A , 18mΩ

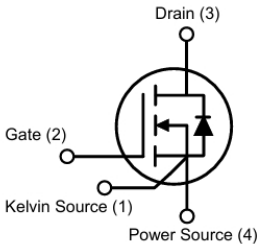
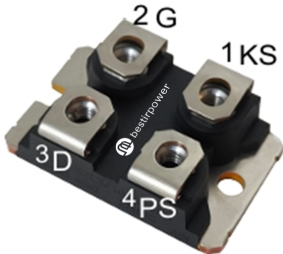
Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Halogen Free, RoHS Compliant

$BV_{DSS,Tc=25^{\circ}C}$	$I_{D,Tc=25^{\circ}C}$	$R_{DS(on),typ.Tc=25^{\circ}C}$	$Q_{g,typ}$
1200 V	110 A	18 mΩ	204 nC

Benefits

- System efficiency improvement
- Higher frequency applicability
- Increased power density
- Reduced cooling effort



Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Motor Drives
- Pulsed Power applications



Absolute Maximum Ratings (T_C = 25°C unless otherwise noted)

Symbol	Parameter		Value	Unit
V _{DSS}	Drain to Source Voltage		1200	V
V _{GSmax}	Gate to Source Voltage		-8 / +22	V
V _{GSop}	Recommended Operation Value		-5 / +18	V
I _D	Drain Current	Continuous (V _{GS} =18V, T _C = 25°C)	110	A
		Continuous (V _{GS} =18V, T _C = 100°C)	85	
I _{DM}	Drain Current	Pulsed (Note1)	400	A
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to 175	°C

※Note 1 : Limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	Value	Unit
R _{θC}	Thermal Resistance, Junction to Case	0.27	°C/W
R _{θA}	Thermal Resistance, Junction to Ambient	35	

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BC018SG12SWSD	BC018SG12SWSD	SOT-227	Tube	10 units

Electrical Characteristics ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 100\text{ }\mu\text{A}$	1200			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 1200\text{ V}, V_{GS} = 0\text{ V}$		10	100	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS} = 18\text{ V}, V_{DS} = 0\text{ V}$		20	200	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_{DS} = 20\text{ mA}, T_C = 25^\circ\text{C}$	2.0	3.0	4.0	V
		$V_{GS} = V_{DS}, I_{DS} = 20\text{ mA}, T_C = 175^\circ\text{C}$		2.3		
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 18\text{ V}, I_D = 60\text{ A}, T_C = 25^\circ\text{C}$		18	25	mΩ
		$V_{GS} = 18\text{ V}, I_D = 60\text{ A}, T_C = 175^\circ\text{C}$		30		
g_{fs}	Transconductance	$V_{DS} = 20\text{ V}, I_D = 60\text{ A}, T_J = 25^\circ\text{C}$		50		S
		$V_{DS} = 20\text{ V}, I_D = 60\text{ A}, T_J = 175^\circ\text{C}$		48		

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 1000\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}, V_{AC} = 25\text{ mV}$		5880		pF
C_{oss}	Output Capacitance			192		
C_{rss}	Reverse Capacitance			10		
$Q_{g(tot)}$	Total Gate Charge	$V_{DD} = 800\text{ V}, V_{GS} = -5/18\text{ V}, I_D = 60\text{ A}$		204		nC
Q_{gs}	Gate to Source Charge			65		
Q_{gd}	Gate to Drain "Miller" Charge			80		
R_G	Internal Gate Resistance	$f = 1\text{ MHz}, V_{AC} = 25\text{ mV}$		1.0		Ω

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 800\text{ V}, V_{GS} = -5/18\text{ V},$ $I_D = 60\text{ A}, R_{G(ext)} = 10\text{ }\Omega$		50		ns
t_r	Turn-On Rise Time			80		
$t_{d(off)}$	Turn-Off Delay Time			100		
t_f	Turn-Off Fall Time			60		
E_{on}	Turn-on Switching Energy	$V_{DS} = 800\text{ V}, V_{GS} = -5/18\text{ V},$ $I_D = 60\text{ A}, R_{G(ext)} = 10\text{ }\Omega$		1650		μJ
E_{off}	Turn-off Switching Energy			400		

Source-Drain Diode Characteristics

I_S	Maximum Continuous Diode Forward Current			110	A
V_{SD}	Diode Forward Voltage	$V_{GS} = -5\text{ V}, I_{SD} = 60\text{ A}, T_J = 25^\circ\text{C}$		4.2	V
		$V_{GS} = -5\text{ V}, I_{SD} = 60\text{ A}, T_J = 175^\circ\text{C}$		3.6	
t_{rr}	Reverse Recovery Time	$V_R = 800\text{ V}, V_{GS} = -5\text{ V}, I_{SD} = 60\text{ A},$ $di_f/dt = 1200\text{ A}/\mu\text{s}$		200	ns
Q_{rr}	Reverse Recovery Charge			1250	nC
I_{rrm}	Peak Reverse Recovery Current			25	A

Typical Performance Characteristics

Figure 1. Output Characteristics $T_J = 25^\circ\text{C}$

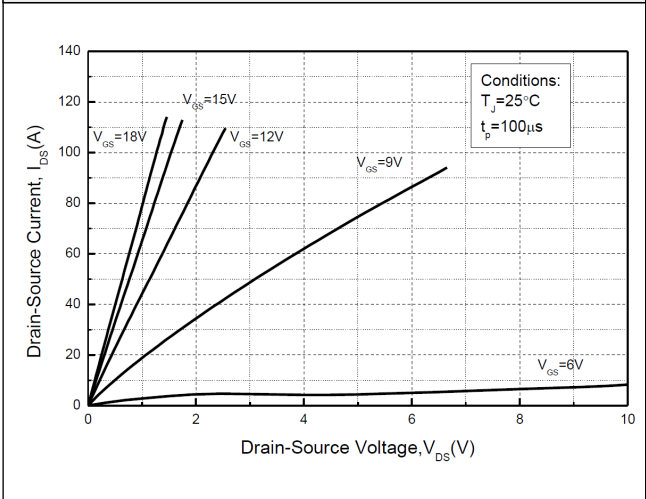


Figure 2. Output Characteristics $T_J = 175^\circ\text{C}$

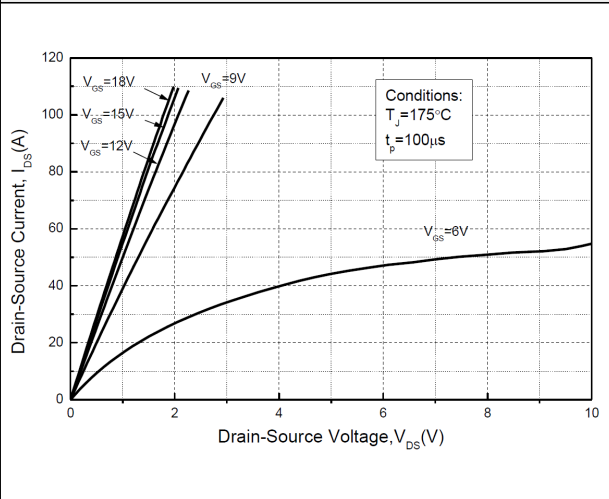


Figure 3. Capacitances vs. Drain-Source Voltage

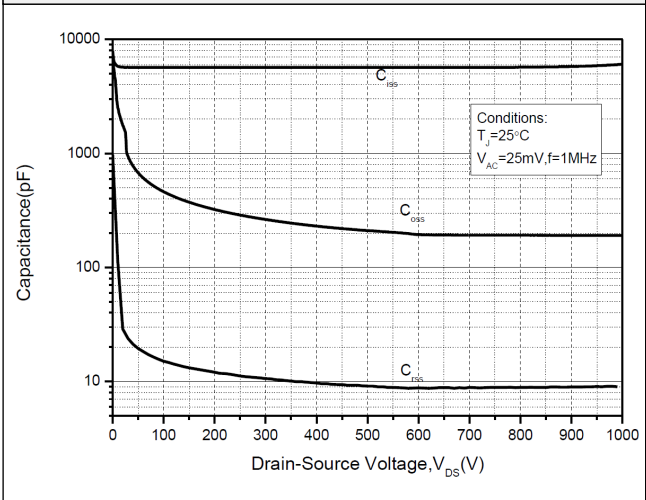


Figure 4. On-Resistance For Various Gate Voltage

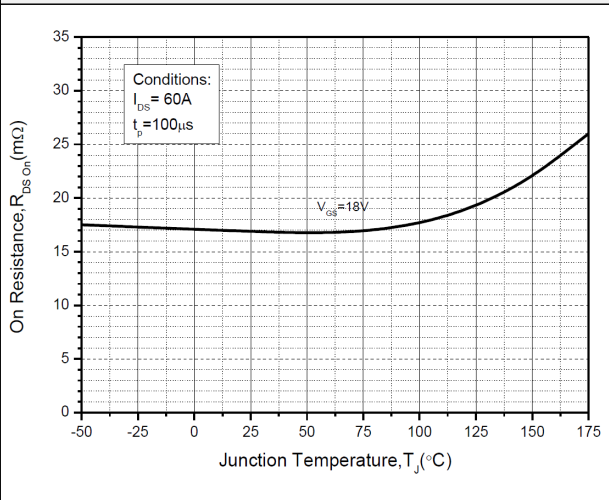


Figure 5. Threshold Voltage vs. Temperature

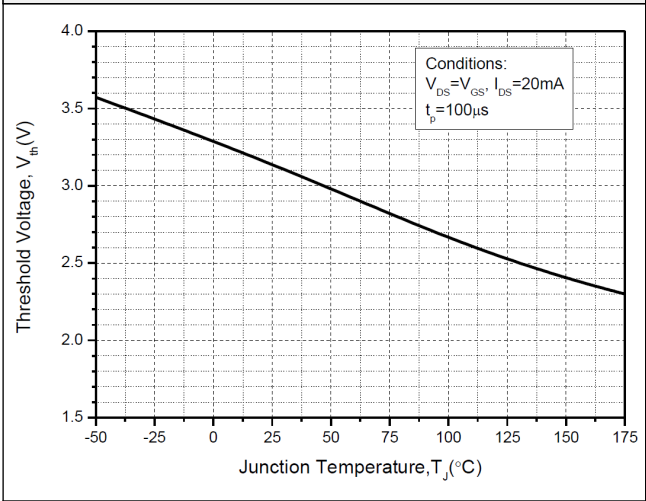
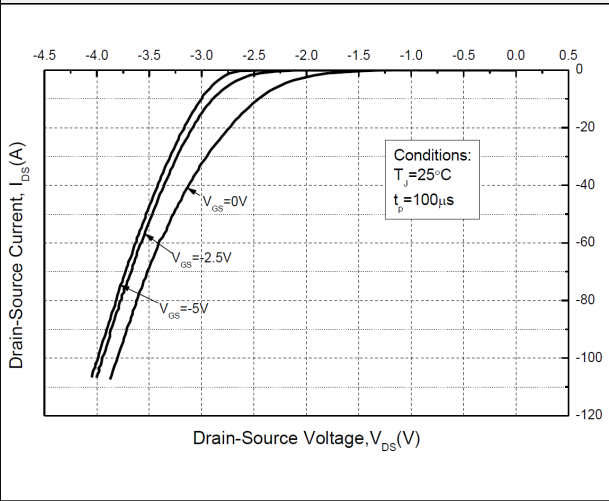


Figure 6. Body Diode Characteristics $T_J = 25^\circ\text{C}$



Typical Performance Characteristics

Figure 7. .Body Diode Characteristics $T_J = 175\text{ }^{\circ}\text{C}$

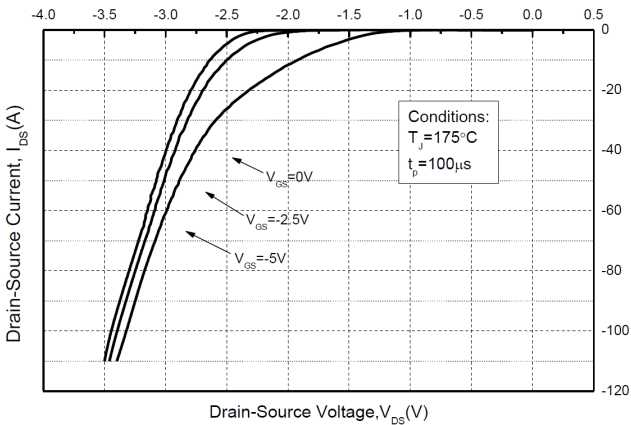


Figure 8. Gate Charge Characteristics

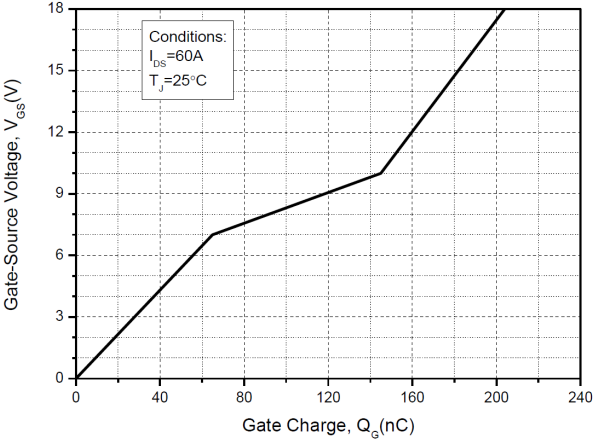
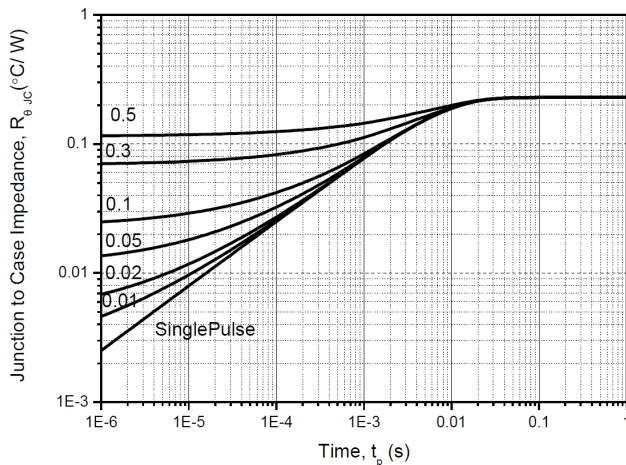
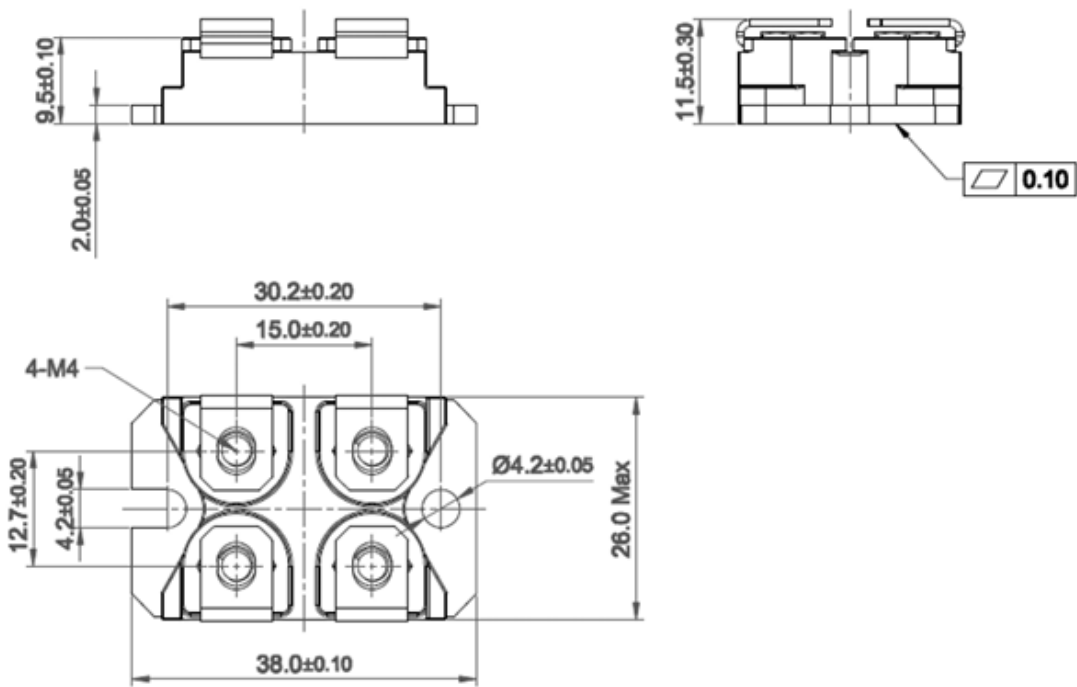


Figure 9. Transient Thermal Impedence



Package Outlines
SOT-227

Package Drawing and Dimensions (UNIT: mm)



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