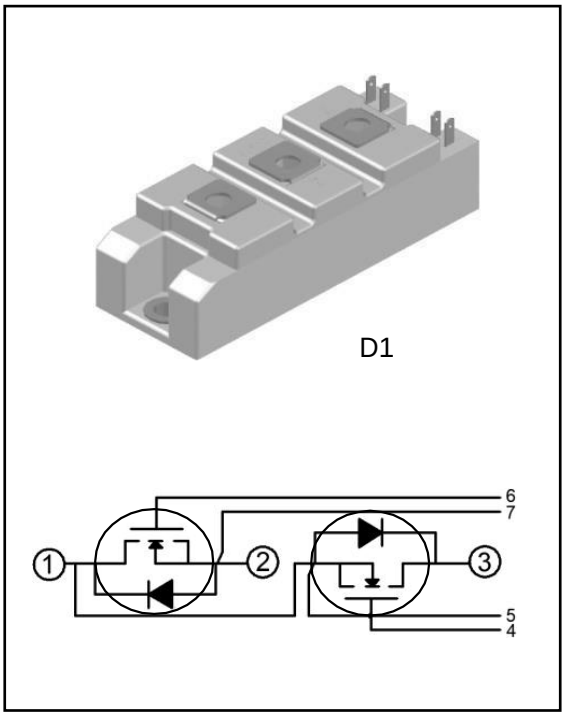
1200V N-Channel SiC Power MOSFET

Description

The AKM2CM011N120-B is a high blocking voltage N-Channel SiC pow er MOSFET. This device provide excellent performance for high voltage pow er supplies or pulse circuits.

These SiC MOS Module series are ideally suited for DC-DC converters, Induction Heating, Solar and Wind Inverters w here sw itching losses are significant portion of the total losses.



Features

- Typical on-Resistance: $R_{DS\,(on)}$=11mΩ @V_G=18V
- High Blocking Voltage
- 100% Avalanche Test
- Good Stability and Uniformity w ith High E_{AS}

Applications

- Solar Inverters
- High Voltage DC/DC Converters
- Motor Drivers
- Sw itch Mode Pow er Supplies
- Battery Chargers

Absolute Maximum Ratings @T_C=25 ℃ unless otherw ise noted

Sym bol	Param eter		Ratings	Unit
V_{DSS}	Drain to Source Voltage		1200	V
V_{GSS}	Gate to Source Voltage		-10/+22	V
V_{GSop}	Recommended operation Values of Gate −Source Voltage		-5/+18	V
I_D	Drain Current	V_{GS}=18V，T_C=25℃	180	A
		V_{GS}=18V，T_C=100℃	135	A
I_{DM}	Pulsed Drain Current (Note 1)		450	A
P_D	Maximum Pow er Dissipation	T_C=25℃	625	W
E_{AS}	Single Pulsed Avalanche Energy (Note 2)		1700	mJ
T_J	Operating Junction Temperature Range		-55~+175	℃
T_{STG}	Storage Temperature Range		-55~+175	℃

Thermal Characteristics

Sym bol	Param eter	Ratings	Unit
$R_{th\,(J-C)}$	Thermal Resistance, Junction to case	0.2	℃/W
$R_{th\,(C-S)}$	Thermal Resistance, Case to Sink	0.05	℃/W

Electrical Characteristics @T_C=25 ℃ unless otherw ise noted

Symbol	Param eter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain to Source Breakdow n Voltage	V_{GS}=0V, I_D=250uA	1200	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=20mA	2.0	2.6	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS}=18V, I_D=120A	-	11	13	mΩ
		V_{GS}=18V, I_D=120A T_C=175 ℃	-	19	-	
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=V_{DSS}, V_{GS}=0V	-	5	100	uA
I_{GSS}	Gate to Source Leakage Current	V_{GS}=-10V/22V, V_{DS}=0V	-	20	±250	nA
g_{fs}	Transconductance	V_{GS}=20V, I_D=120A	-	26	-	S
		V_{GS}=20V, I_D=120A T_C=175 ℃	-	21	-	

Switching Characteristics @T_C=25 ℃ unless otherw ise noted

Symbol	Param eter	Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	I_D=64A , V_{DD}=800V, R_L=40Ω V_{GS} = −5/18V, (Note 3)	-	30	-	ns
t_r	Turn-on Rise Time		-	27	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	67	-	ns
t_f	Turn-off Fall Time		-	20	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=1000V, f=1.0MHz	-	8940	-	pF
C_{oss}	Output Capacitance		-	360	-	pF
C_{rss}	Reverse Transfer Capacitance		-	38	-	pF
Q_g	Total Gate Charge	I_D=64A, V_{DD}=800V V_{GS}=-5V/18V (Note 3)	-	534	-	nC
Q_{gs}	Gate to Source Charge		-	106	-	nC
Q_{gd}	Gate to Drain Charge		-	44	-	nC

D-S Diode Characteristics and Maximum Rating @T_C=25 ℃ unless otherw ise noted

Symbol	Param eter	Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Drain-Source Diode Forw ard Voltage	I_S=120A	-	5.0	5.2	V
I_R	Reverse Current	V_R=1200V	-	15	100	uA
C	Total Capacitance	V_R=0V, *f*=1MHz	-	3960	-	pF
Q_c	Reverse Recovery Charge	V_R=800V, I_F=120A di/dt=200A/us	-	228	-	nC

Note:

1. Repetitive rating: pulse-w idth limited by maximum junction temperature
2. V_{DD}=100V, L=5mH, V_{clamp}=1200V, V_G=15V, I_D=25.0A
3. Essentially independent of operating temperature typical characteristics

Typical Performance Characteristics

Fig. 1. Typical Output Characteristics @25℃

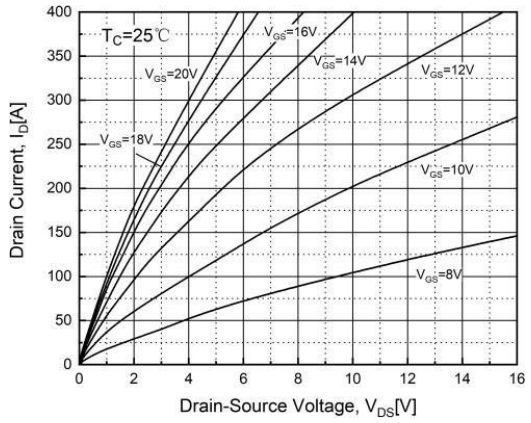


Fig. 2. Typical Output Characteristics @175℃

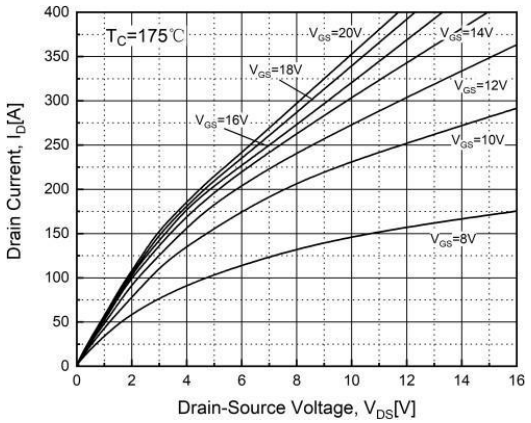


Fig. 3. On-Resistance vs. Drain Current and Gate Voltage

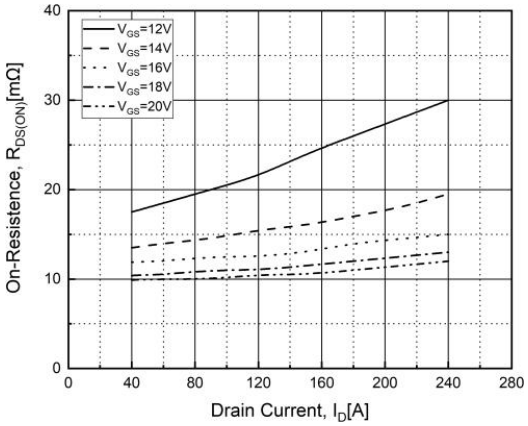


Fig. 4. On-Resistance vs. Gate-to-source Voltage

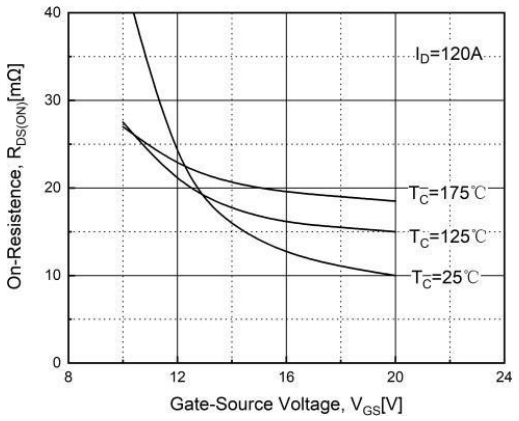


Fig. 5. On-Resistance vs. Drain Current for Various Temperatures

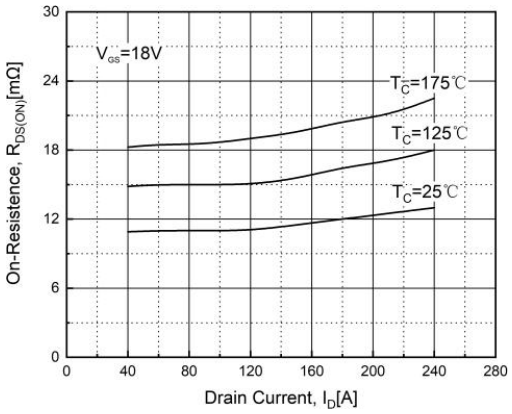
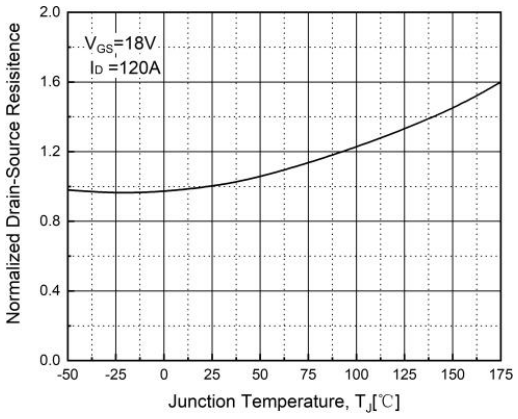


Fig. 6. Normalized On-Resistance vs. Temperature



Typical Performance Characteristics

Fig. 7. Transfer Characteristics

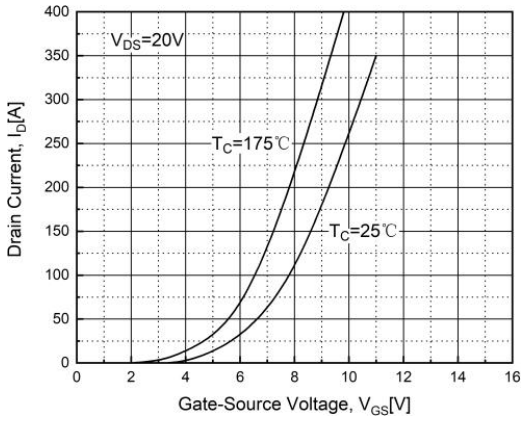


Fig. 8. Diode Forward Characteristics

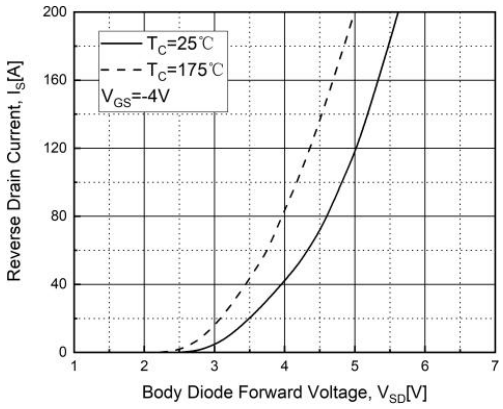


Fig. 9. Gate Charge Characteristics

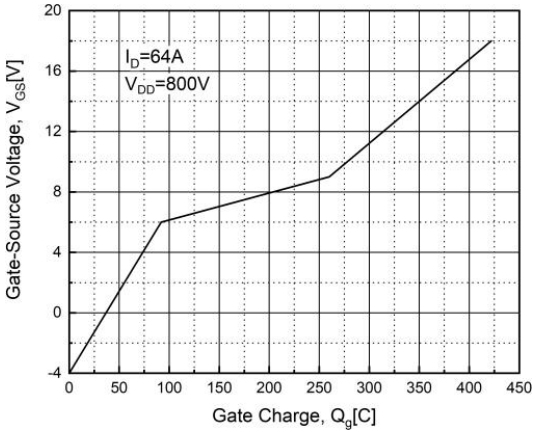


Fig. 10. Capacitancevs. Drain-to-Source Voltage

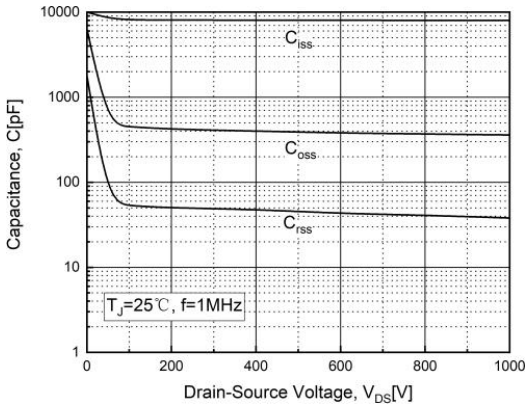


Fig. 11. Maximum Drain Current vs. Temperature

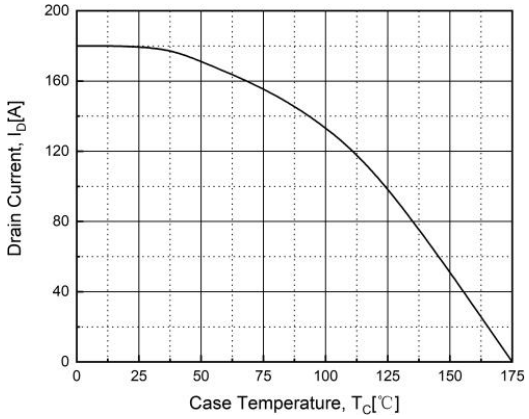
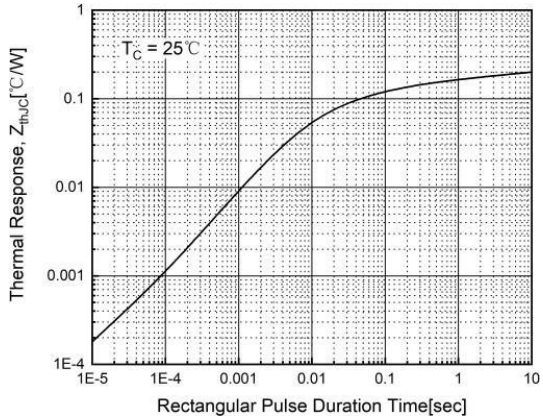
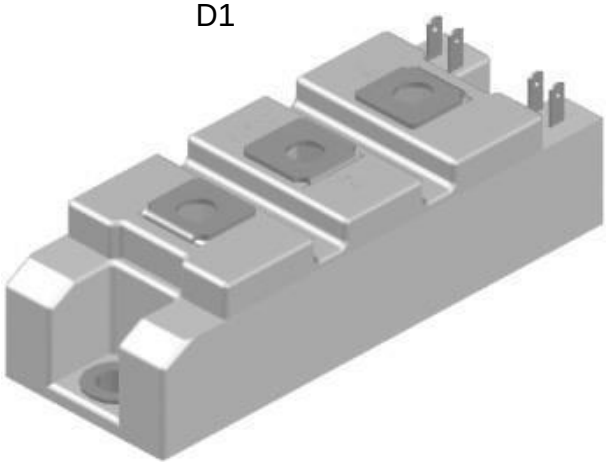


Fig. 12. Transient Thermal Impedance



Package Dimensions

D1



(Dimensions in Millimeters)