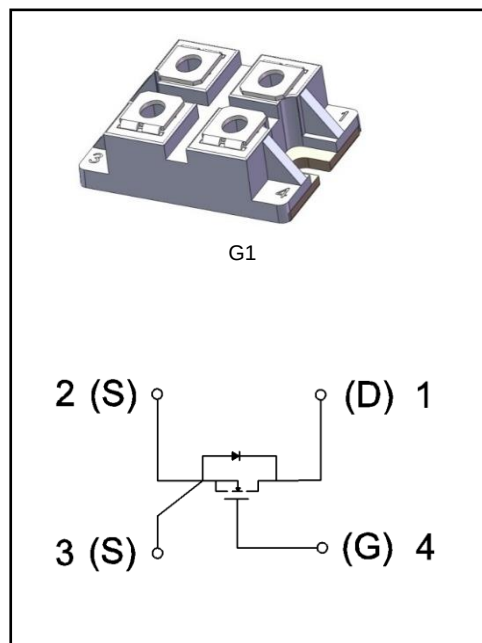


1200V 20mΩ N-Channel SiC Power MOSFET & SiC SBD

Description

The AKM1CM020N120EC is a high blocking voltage N-Channel SiC power MOSFET. This device provides excellent performance for high voltage power supplies or pulse circuits.

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



Features

- Typical on-Resistance: $R_{DS(on)}=20m\Omega$ @ $V_G=18V$
- High Blocking Voltage
- 100% Avalanche Test
- Good Stability and Uniformity with High E_{AS}

Applications

- Solar Inverters
- High Voltage DC/DC Converters
- Motor Drivers
- Switch Mode Power Supplies
- Battery Chargers

Absolute Maximum Ratings @ $T_C=25^\circ C$ unless otherwise noted

Symbol	Parameter		Ratings	Unit
V_{DSS}	Drain to Source Voltage		1200	V
V_{GSS}	Gate to Source Voltage		-10/+25	V
V_{GSop}	Recommended operation Values of Gate -Source Voltage		-5/+20	V
I_D	Drain Current	$V_{GS}=18V, T_C=25^\circ C$	100	A
		$V_{GS}=18V, T_C=100^\circ C$	75	A
I_{DM}	Pulsed Drain Current	(Note 1)	250	A
P_D	Maximum Power Dissipation	$T_C=25^\circ C$	600	W
E_{AS}	Single Pulsed Avalanche Energy (Note 2)		1450	mJ
T_J	Operating Junction Temperature Range		-55~+175	$^\circ C$
T_{STG}	Storage Temperature Range		-55~+175	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{th(J-C)}$	Thermal Resistance, Junction to case	0.25	$^\circ C/W$
$R_{th(J-A)}$	Thermal Resistance, Junction to Ambient	40	$^\circ C/W$

Electrical Characteristics @T_C=25 °C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain to Source Breakdown 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 =60A	-	20	28	mΩ
		V _{GS} =18V, I _D =60A T _C =175 °C	-	30	-	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =V _{DSS} , V _{GS} =0V	-	3	100	uA
I _{GSS}	Gate to Source Leakage Current	V _{GS} =-8V/22V, V _{DS} =0V	-	10	±250	nA
g _{fs}	Transconductance	V _{GS} =20V, I _D =60A	-	33	-	S
		V _{GS} =20V, I _D =60A T _C =175 °C	-	28	-	

Switching Characteristics @T_C=25 °C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
t _{d(on)}	Turn-on Delay Time	I _D =32A , V _{DD} =800V, R _L =40Ω V _{GS} = -5/20V, (Note 3)	-	20	-	ns
t _r	Turn-on Rise Time		-	18	-	ns
t _{d(off)}	Turn-off Delay Time		-	45	-	ns
t _f	Turn-off Fall Time		-	12	-	ns
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =1000V, f=1.0MHz	-	4470	-	pF
C _{oss}	Output Capacitance		-	180	-	pF
C _{rss}	Reverse Transfer Capacitance		-	19	-	pF
Q _g	Total Gate Charge	I _D =32A, V _{DD} =800V V _{GS} =-5V/20V (Note 3)	-	217	-	nC
Q _{gs}	Gate to Source Charge		-	53	-	nC
Q _{gd}	Gate to Drain Charge		-	42	-	nC

D-S Diode Characteristics and Maximum Rating @T_C=25 °C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V _{SD}	Drain-Source Diode Forward Voltage	I _S =60A	-	1.45	1.8	V
I _R	Reverse Current	V _R =1200V	-	15	100	uA
C	Total Capacitance	V _R =0V, f=1MHz	-	1980	-	pF
Q _c	Reverse Recovery Charge	V _R =800V, I _F =60A di/dt=200A/us	-	114	-	nC

Note:

1. Repetitive rating: pulse-width 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°C

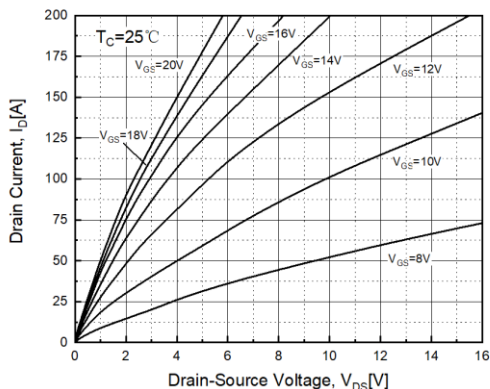


Fig. 2. Typical Output Characteristics @175°C

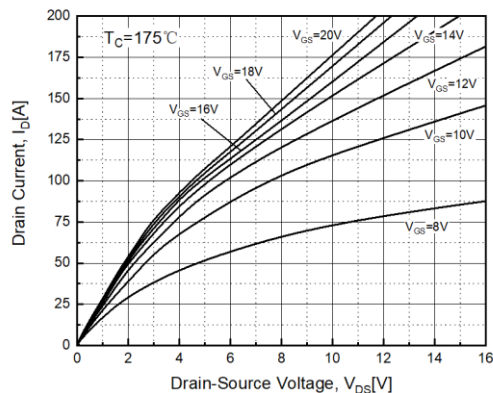


Fig. 3. On-Resistance vs. Drain Current and Gate Voltage

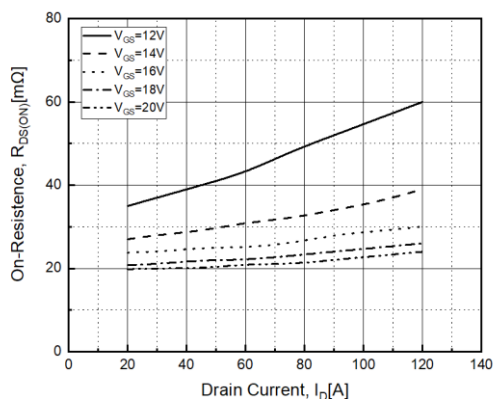


Fig. 4. On-Resistance vs. Gate-to-source Voltage

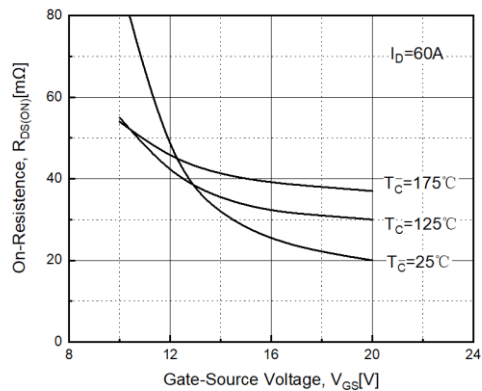


Fig. 5. On-Resistance vs. Drain Current for Various Temperatures

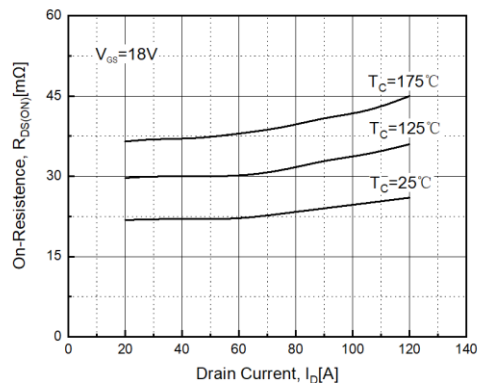
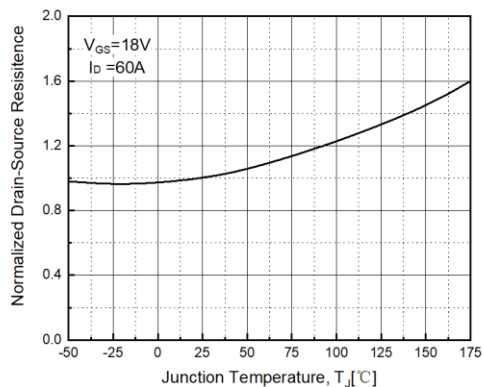


Fig. 6. Normalized On-Resistance vs. Temperature



Typical Performance Characteristics

Fig. 7. Transfer Characteristics

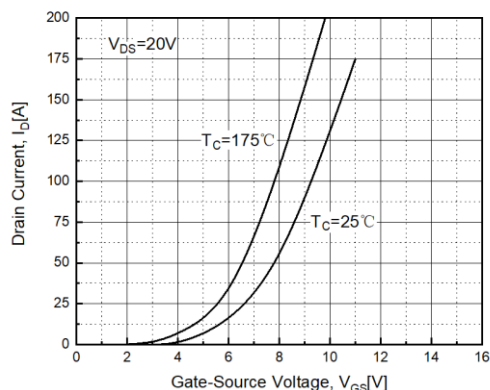


Fig. 8. Diode Forward Characteristics

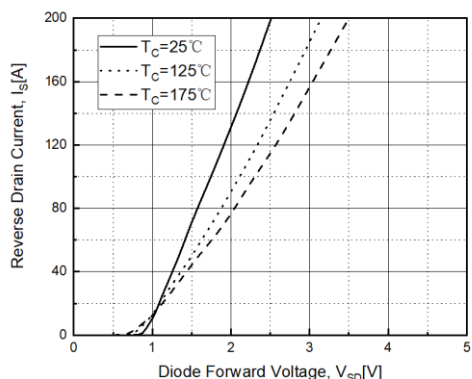


Fig. 9. Gate Charge Characteristics

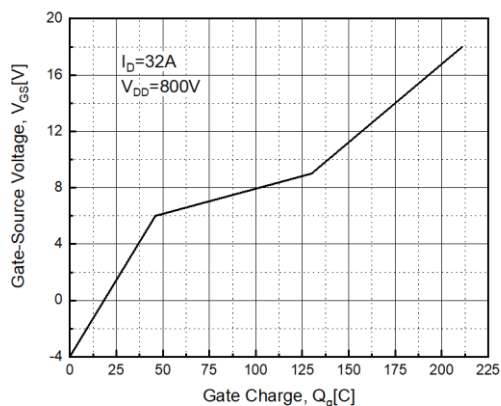


Fig. 10. Capacitance vs. Drain-to-Source Voltage

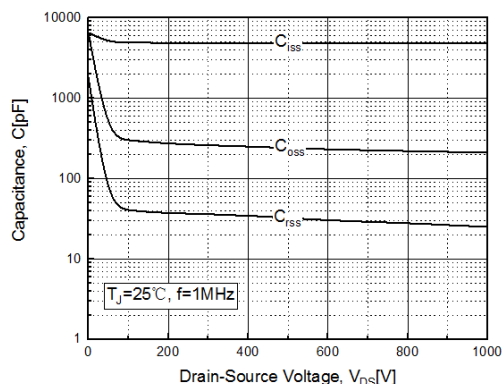


Fig. 11. Maximum Drain Current vs. Temperature

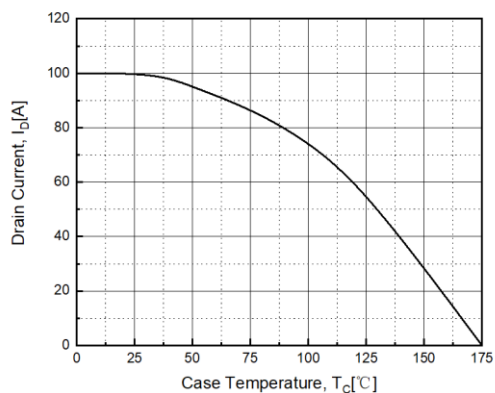
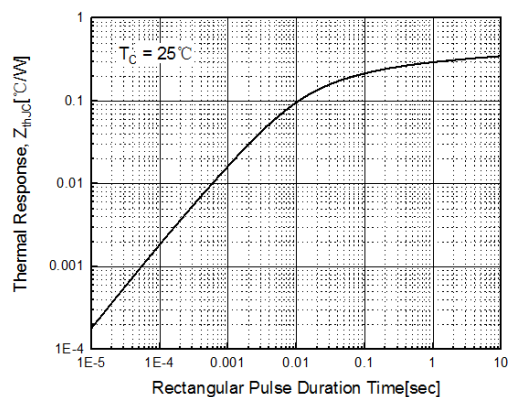
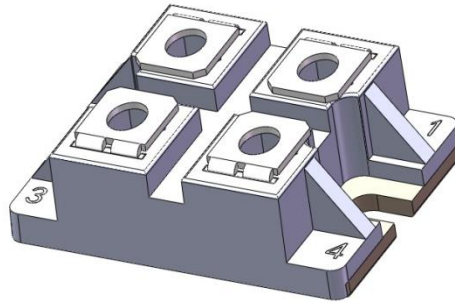


Fig. 12. Transient Thermal Impedance



Package Dimensions

G1



(Dimensions in Millimeters)

