

1200V N-Channel SiC Power MOSFET

Description

The AKM4CM016N120P-E is a high blocking voltage N-Channel SiC power MOSFET. This device provide excellent performance for high voltage power supplies or pulse circuits.

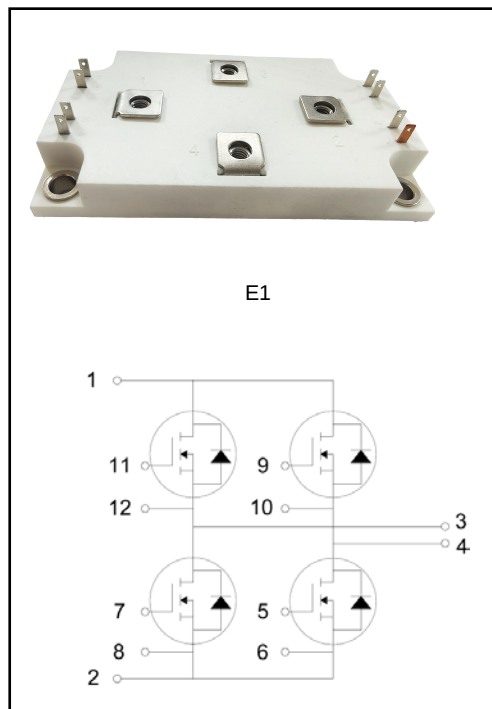
These SiC MOS Module series are ideally suited for Solar and UPS Inverters, High Voltage DC/DC Converters, Motor Drivers, Switch Mode Power Supplies where switching losses are significant portion of the total losses.

Features

- Typical on-Resistance: $R_{DS(on)}=16m\Omega$ @ $V_G=18V$
- High Blocking Voltage
- High Speed Switching with Low Capacitance
- Good Stability and Uniformity with High E_{AS}

Applications

- Solar and UPS 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		-8/+22	V
V_{GSop}	Recommended operation Values of Gate-Source Voltage		-4/+15	V
I_D	Drain Current	$V_{GS}=18V, T_C=25^\circ C$	120	A
		$V_{GS}=18V, T_C=100^\circ C$	90	A
I_{DM}	Pulsed Drain Current (Note 1)		200	A
P_D	Maximum Power Dissipation	$T_C=25^\circ C$	600	W
E_{AS}	Single Pulsed Avalanche Energy (Note 2)		1562	mJ
T_J	Operating Junction Temperature Range		-55~+175	$^\circ C$
T_{STG}	Storage Temperature Range		-55~+175	$^\circ C$

Static 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 =10mA	2.2	2.7	4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =18V, I _D =60A	-	16	25	mΩ
		V _{GS} =18V, I _D =60A T _C =175 °C	-	27	-	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =V _{DSS} , V _{GS} =0V	-	-	100	uA
I _{GSS+}	Gate to Source Leakage Current	V _{GS} =15V, V _{DS} =0V	-	-	± 500	nA
I _{GSS-}	Gate to Source Leakage Current	V _{GS} =-4V, V _{DS} =0V	-	-	± 500	nA
g _{fs}	Transconductance	V _{DS} =20V, I _D =60A	-	21.7	-	S
R _{g,int}	Internal Gate Resistance	V _{AC} =25mV, f=1MHz	-	16.6	-	Ω

Switching Characteristics @T_C=25 °C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =1000V, f=1MHz	-	6505	-	pF
C _{oss}	Output Capacitance		-	291	-	pF
C _{rss}	Reverse Transfer Capacitance		-	26	-	pF
E _{oss}	Coss Stored Energy		-	160	-	uJ
Q _g	Total Gate Charge	I _D =60A, V _{DD} =800V V _{GS} =-4V/15V (Note 3)	-	200	-	nC
Q _{gs}	Gate to Source Charge		-	68	-	nC
Q _{gd}	Gate to Drain Charge		-	92	-	nC
t _{d(on)}	Turn-on Delay Time	I _D =60A , V _{DD} =800V, R _L =2.5Ω V _{GS} = -4/15V, (Note 3)	-	125	-	ns
t _r	Turn-on Rise Time		-	51	-	ns
t _{d(off)}	Turn-off Delay Time		-	106	-	ns
t _f	Turn-off Fall Time		-	30	-	ns

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

Drain-Source Diode Characteristics @T_C=25 °C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} =0V, I _S =30A, V _{GS} =-4V	-	3.3	-	V
t _{rr}	Reverse Recovery Time	V _{GS} =-4V, I _S =60A, di/dt=-1000A/us	-	33	-	ns
Q _{rr}	Reverse Recovery Charge		-	306	-	nC

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
R _{th} (J-C), MOSFET	Thermal Resistance, Junction to case, MOSFET	0.25	°C/W
R _{th} (C-S)	Thermal Resistance, Case to Sink	0.05	°C/W

Typical Performance Characteristics

Fig. 1. Typical Output Characteristics @ 25°C

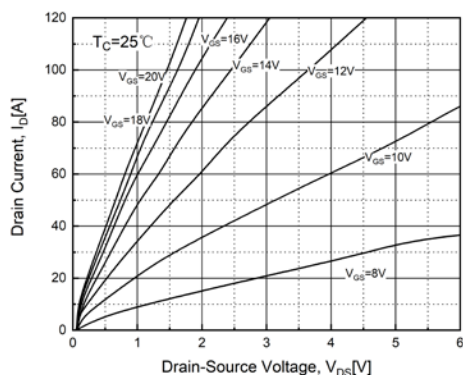


Fig. 2. Typical Output Characteristics @ 175°C

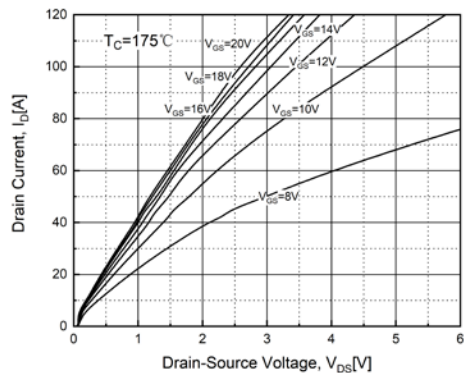


Fig. 3. Normalized On-Resistance vs. Junction Temperature

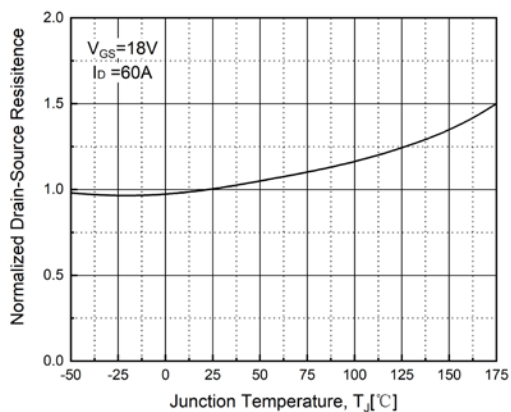


Fig. 4. On-Resistance vs. Drain Current for Various Temperatures

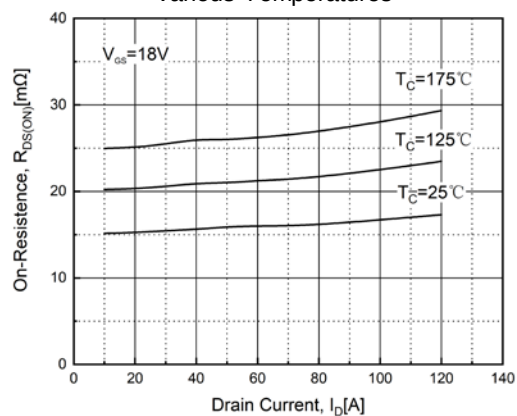


Fig. 5. On-Resistance vs. Drain Current for Various Gate Voltage

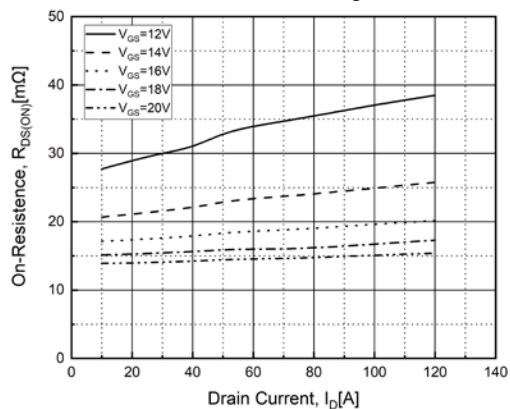
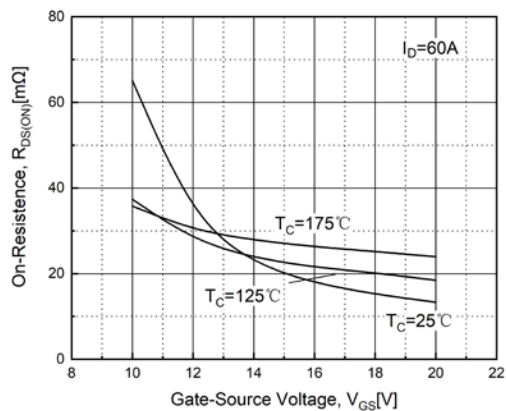


Fig. 6. On-Resistance vs. Gate Voltage for Various Temperatures



Typical Performance Characteristics

Fig. 7. Transfer Characteristics

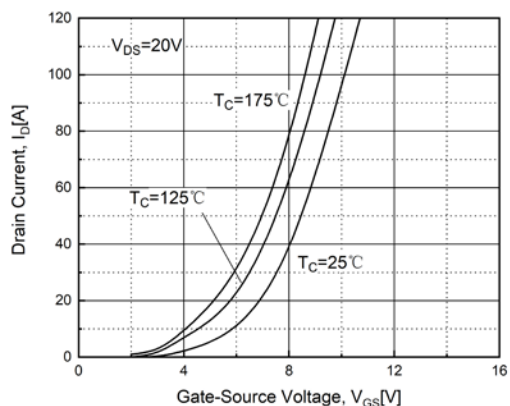


Fig. 8. Diode Forward Characteristics

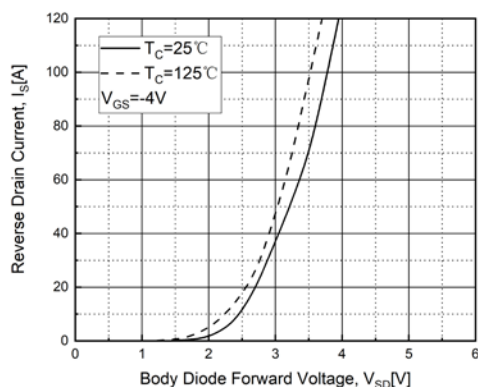


Fig. 9. Gate Charge Characteristics

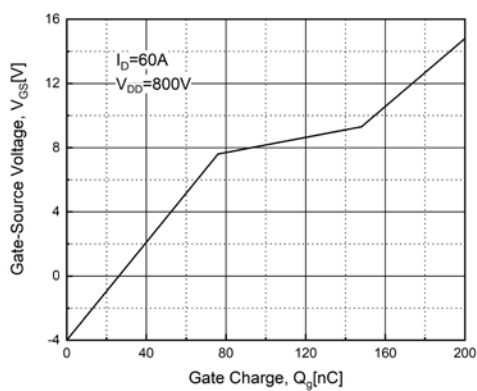


Fig. 10. Capacitance vs. Drain-to-Source Voltage

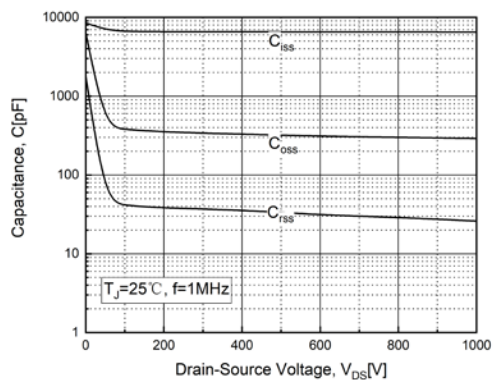


Fig. 11. Transient Thermal Impedance

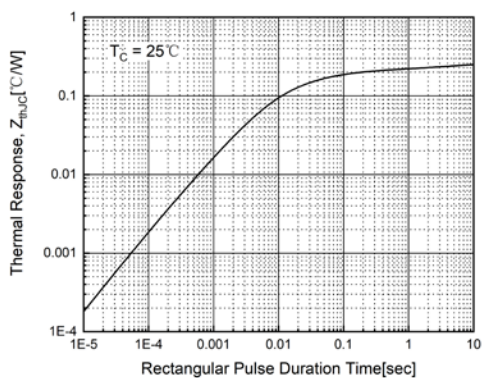
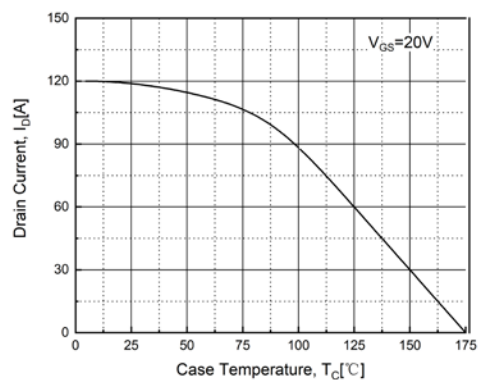


Fig. 12. Maximum Drain Current vs. Temperature



E1

