

## 1700V 1Ω N-Channel SiC Power MOSFET

### Description

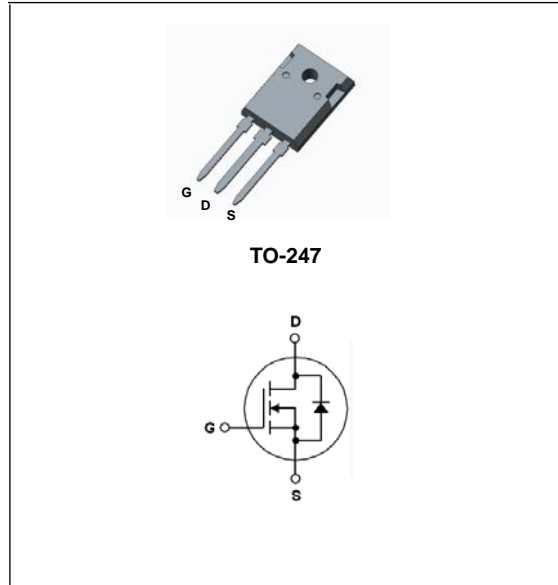
The AKCT1000N170H is a high blocking voltage N-Channel SiC power MOSFET. This device provide excellent performance for high voltage power supplies or pulse circuits.

### Features

- Typical on-Resistance:  $R_{DS(on)}=1\Omega(\text{typ.})$
- 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



### Absolute Maximum Ratings @ $T_C=25\text{ }^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Unit
$V_{DSS}$	Drain to Source Voltage	1700	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	$T_C=25\text{ }^\circ\text{C}$	5.0
		$T_C=100\text{ }^\circ\text{C}$	3.0
$I_{DM}$	Pulsed Drain Current (Note1)	20.0	A
$P_D$	Maximum Power Dissipation	$T_C=25\text{ }^\circ\text{C}$	62
	Derate above 25 $^\circ\text{C}$		0.5
$T_J$	Operating Junction Temperature Range	-55~+150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55~+150	$^\circ\text{C}$

### Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{th(J-C)}$	Thermal Resistance, Junction to case	2.02	$^\circ\text{C}/\text{W}$
$R_{th(J-A)}$	Thermal Resistance, Junction to Ambient	40	$^\circ\text{C}/\text{W}$

## Electrical Characteristics @T<sub>C</sub>=25 °C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain to Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =100uA	1700	-	-	V
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =1mA	2.0	2.6	4.0	V
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =20V, I <sub>D</sub> =2A	-	1	1.3	Ω
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =V <sub>DSS</sub> , V <sub>GS</sub> =0V	-	-	100	uA
I <sub>GSS</sub>	Gate to Source Leakage Current	V <sub>GS</sub> =V <sub>GSS</sub> , V <sub>DS</sub> =0V	-	-	±250	nA

## D-S Diode Characteristics and Maximum Rating @T<sub>C</sub>=25 °C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> =-5V, I <sub>S</sub> =1A	-	4.2	-	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> =0V, I <sub>S</sub> =2A, di/dt=-290A/us	-	25	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	15	-	nC

## Switching Characteristics @T<sub>C</sub>=25 °C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
t <sub>d(on)</sub>	Turn-on Delay Time	I <sub>D</sub> =30A , V <sub>DD</sub> =1200V, R <sub>G</sub> =2.5Ω V <sub>GS</sub> = -5/20V, (Note 3)	-	5	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	9.2	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	13.8	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	22.8	-	ns
E <sub>ON</sub>	Turn-On Switching Energy	V <sub>DS</sub> =1200V, V <sub>GS</sub> =-5V/20V I <sub>D</sub> =2A, R <sub>G(ext)</sub> =2.5Ω, L=1500μH	-	5.1	-	uJ
E <sub>Off</sub>	Turn-Off Switching Energy		-	9.2	-	uJ
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =1000V, f=1.0MHz	-	194	-	pF
C <sub>oss</sub>	Output Capacitance		-	13	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	1.8	-	pF
Q <sub>g</sub>	Total Gate Charge	I <sub>D</sub> =2A, V <sub>DD</sub> =1200V V <sub>GS</sub> =-5V/20V (Note 3)	-	23	-	nC
Q <sub>gs</sub>	Gate to Source Charge		-	5.4	-	nC
Q <sub>gd</sub>	Gate to Drain Charge		-	7.6	-	nC

### Note:

1. Repetitive rating: pulse-width limited by maximum junction temperature
2. V<sub>DD</sub>=100V, L=1mH, V<sub>G</sub>=10V, I<sub>D</sub>=2.0A
3. Essentially independent of operating temperature typical characteristics.

**Typical Performance Characteristics**

Fig. 1. Typical on-Resistance Characteristics

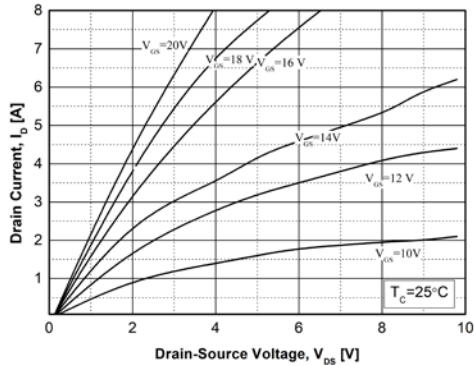


Fig. 2. Typical on-Resistance Characteristics

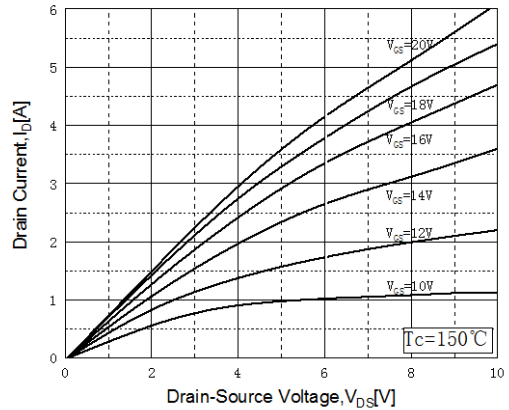


Fig. 3 Normalized On-Resistance vs. Drain Current and Gate Voltage

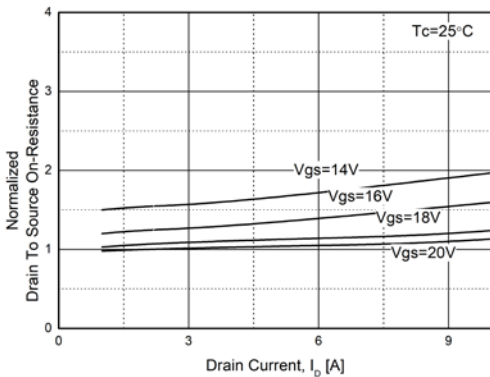


Fig. 4. Normalized On-Resistance vs. Junction Temperature

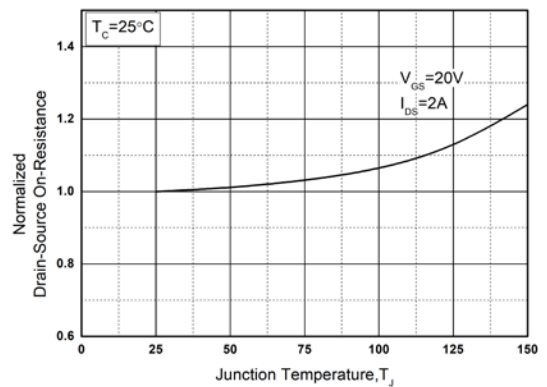


Fig. 5. On-Resistance vs. Drain Current

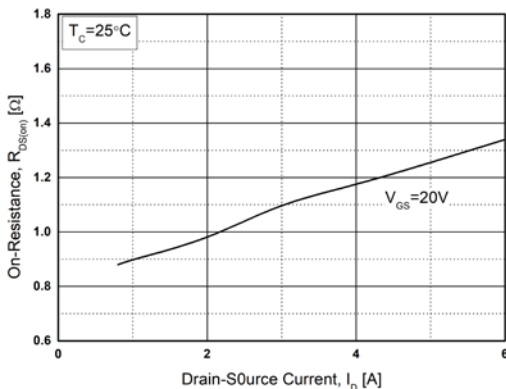
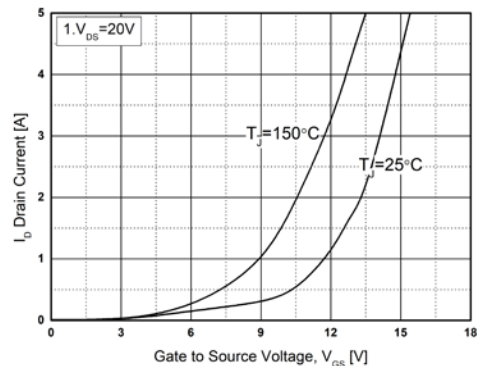


Fig. 6. Transfer Characteristics



**Typical Performance Characteristics**

Fig. 7. Source-to-Drain Diode Forward Voltage vs. Source Current

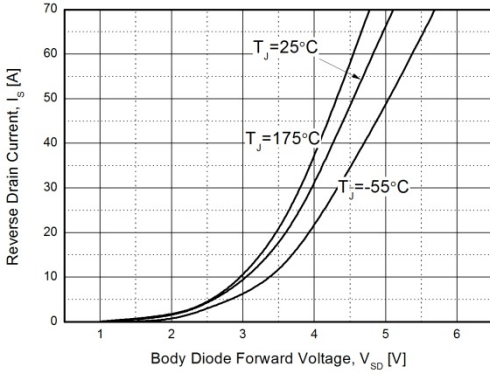


Fig. 8. Gate Charge Characteristics

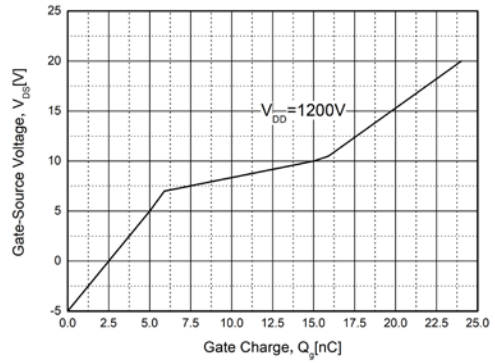


Fig. 9. Characteristics vs. Drain-to-Source Voltage

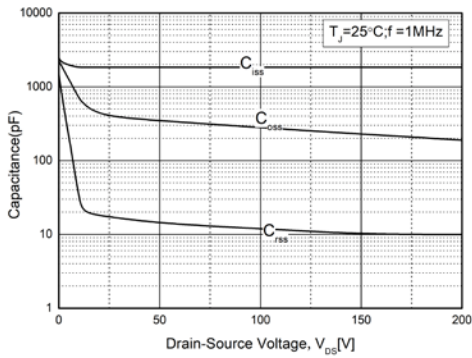
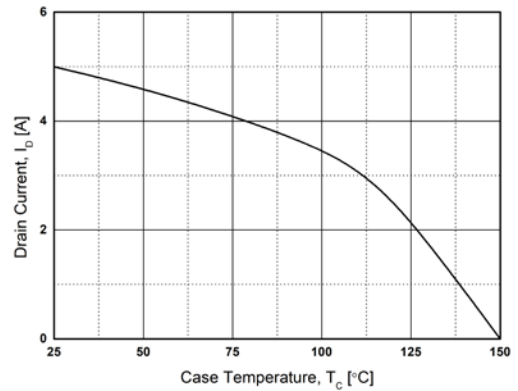


Fig.10. Maximum Drain Current vs. Temperature



**Package Dimensions**

**TO-247**

(Dimensions in Millimeters)

