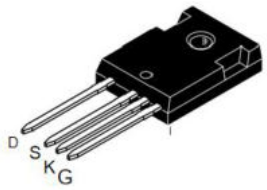
650V 65mΩ N-Channel SiC Power MOSFET

Description

The AKCT65N65H4L is a high blocking voltage N-Channel SiC power MOSFET. This device provide excellent performance for SMPS,UPS, Solar PV inverters , EV charging infrastructure, Energy storage and battery formation.



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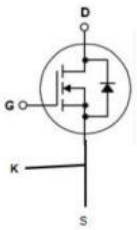


Features

- Typical on-Resistance: $R_{DS\ (on)}$=65mΩ(typ.)
- High Blocking Voltage
- 100% Avalanche Test
- Good Stability and Uniformity with High E_{AS}

Applications

- SMPS
- UPS
- Solar PV inverters
- EV charging infrastructure
- Energy storage and battery formation

Absolute Maximum Ratings @T_C=25 ℃ unless otherwise noted

Symbol	Parameter		Ratings	Unit
V_{DSS}	Drain to Source Voltage		650	V
V_{GSS}	Gate to Source Voltage		-8/+22	V
V_{GSop}	Recommended operation Values of Gate −Source Voltage		-4/+18	V
I_D	Drain Current	T_C=25℃	29	A
		T_C=100℃	18	A
I_{DM}	Pulsed Drain Current	(Note1)	99	A
P_D	Maximum Power Dissipation	T_C=25℃	428	W
	Derate above 25℃		2.86	W/℃
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	102	mJ
T_J	Operating Junction Temperature Range		-55~+175	℃
T_{STG}	Storage Temperature Range		-55~+175	℃

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{th\ (J-C)}$	Thermal Resistance, Junction to case	0.35	℃/W
$R_{th\ (J-A)}$	Thermal Resistance, Junction to Ambient	40	℃/W

Electrical Characteristics @T_C=25 ℃ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain to Source Breakdown Voltage	V_{GS}=0V, I_D=100uA	650	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=5mA	1.8	3.0	4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS}=18V, I_D=20A	-	65	80	mΩ
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}=V_{GSS}, V_{DS}=0V	-	-	±500	nA

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS}=0V, I_S=6.6A	-	4.4	-	V
t_{rr}	Reverse Recovery Time	V_{GS}=0V, I_S=14.5A, V_{DD}=400V	-	30	-	ns
Q_{rr}	Reverse Recovery Charge		-	50	-	nC

Switching Characteristics @T_C=25 ℃ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	I_D=20A , V_{DD}=400V, R_G=2.0Ω V_{GS} = −5/20V, (Note 3)	-	16.0	-	ns
t_r	Turn-on Rise Time		-	9.0	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	20.2	-	ns
t_f	Turn-off Fall Time		-	6.1	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=400V, f=1.0MHz	-	830	-	pF
C_{oss}	Output Capacitance		-	82	-	pF
C_{rss}	Reverse Transfer Capacitance		-	14	-	pF
Q_g	Total Gate Charge	I_D=14.5A, V_{DD}=400V V_{GS}=-4V/18V (Note 3)	-	50	-	nC
Q_{gs}	Gate to Source Charge		-	13	-	nC
Q_{gd}	Gate to Drain Charge		-	12	-	nC

Note:

1. Repetitive rating: pulse-width limited by maximum junction temperature
2. V_{DD}=50V, L=10mH, V_{clamp}=650V, V_G=10V, I_D=4.5A
3. Essentially independent of operating temperature typical characteristics

Typical Performance Characteristics

Fig. 1. Typical on-Resistance Characteristics

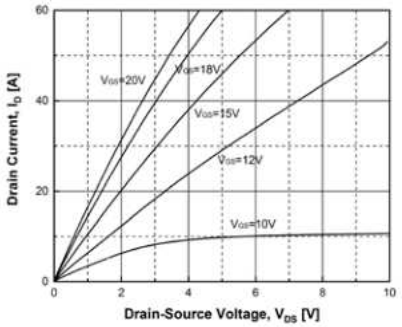


Fig. 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

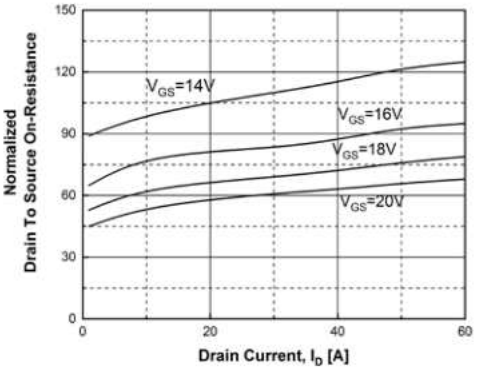


Fig. 3. Normalized On-Resistance vs. Junction Temperature

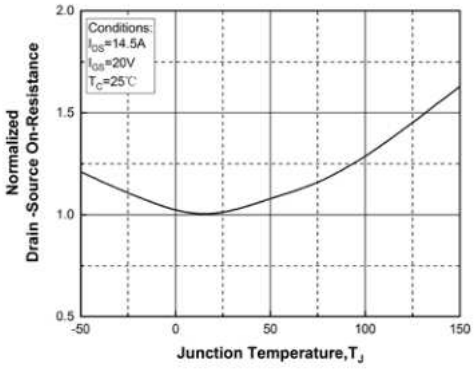


Fig. 4. On-Resistance vs. Gate-to-source Voltage

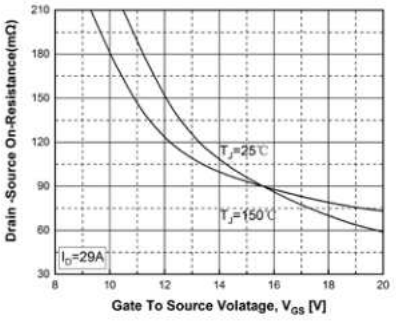


Fig. 5. Transfer Characteristics

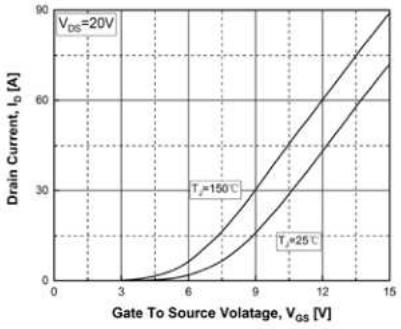
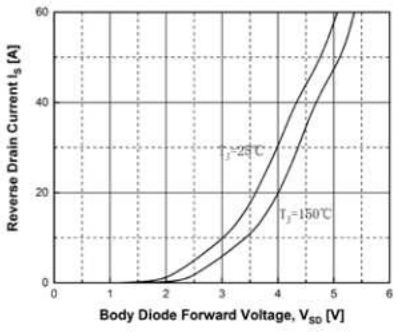


Fig. 6. Source-to-Drain Diode Forward Voltage vs. Source Current



Typical Performance Characteristics

Fig. 7. Gate Charge Characteristics

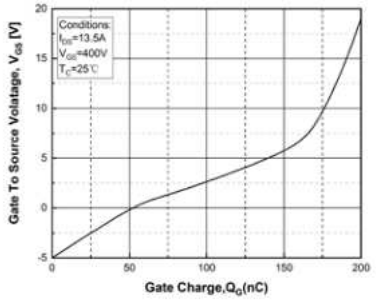


Fig. 8. Characteristics vs. Drain-to-Source Voltage

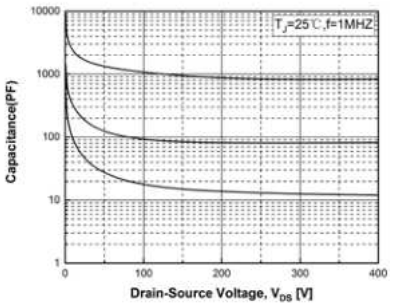
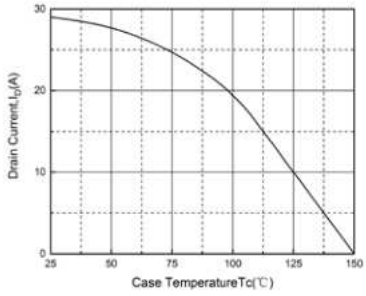


Fig. 9. Maximum Drain Current vs. Temperature



Package Dimensions

TO-247-4L

(Dimensions in Millimeters)