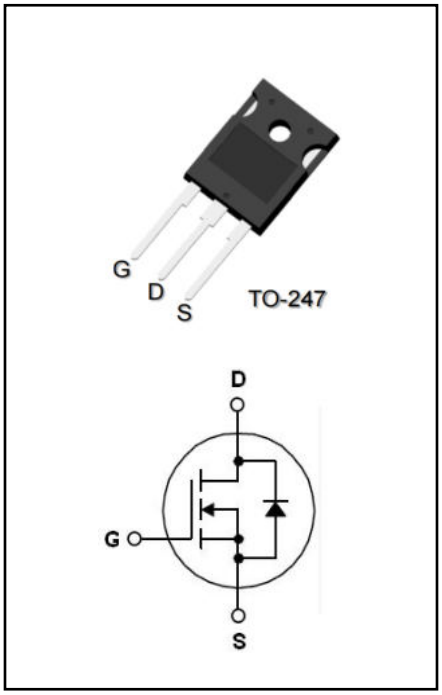
800V 20A N-Channel MOSFET With Fast-Recovery

Description

AKT20N80HCM is utilizing an advanced charge balance mechanism for outstanding low on-resistance and lower gate charge performance.

This advanced technology has been tailored to minimize conduction loss, provide superior switching performance,and withstand extreme dv/dt rate and higher avalanche energy.

AKT20N80HCM is suitable for AC/DC power conversion in switching mode operation for higher efficiency.



Features

- Low on-Resistance: $R_{DS\ (on)}$=0.21Ω(typ.)
- Fast-Recovery body diode
- 100% Avalanche Test
- Extremely Low Reverse Recovery Charge
- Ultra Low Gate Charge

Applications

•DC-DC Converters and AC-DC Power Supply

Absolute Maximum Ratings @T_C=25 ℃ unless otherwise noted

Symbol	Parameter		Ratings	Unit
V_{DSS}	Drain to Source Voltage		800	V
V_{GSS}	Gate to Source Voltage		±30	V
I_D	Drain Current	T_C=25℃	20	A
		T_C=100℃	14	A
I_{DM}	Pulsed Drain Current (Note1)		60	A
P_D	Maximum Power Dissipation	T_C=25℃	230	W
	Derate above 25℃		1.85	W/℃
E_{AS}	Single Pulsed Avalanche Energy (Note 2)		285	mJ
T_J	Operating Junction Temperature Range		-55~+150	℃
T_{STG}	Storage Temperature Range		-55~+150	℃

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{th\ (J-C)}$	Thermal Resistance, Junction to case	0.54	℃/W
$R_{th\ (J-A)}$	Thermal Resistance, Junction to Ambient	62	℃/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=250uA	800	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	2.9	-	4.3	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=10A	-	0.21	0.27	Ω
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=V_{DSS}, V_{GS}=0V	-	-	25	uA
I_{GSS}	Gate to Source Leakage Current	V_{GS}=V_{GSS}, V_{DS}=0V	-	-	±100	nA

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Maximum Drain to Source Diode Forward Current		-	-	20	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS}=0V, I_S=20A	-	0.9	1.2	V
t_{rr}	Reverse Recovery Time	V_{GS}=0V, I_S=20A, di/dt=-100A/us	-	550	-	ns
Q_{rr}	Reverse Recovery Charge		-	15	-	uC

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=20Ω (Note 3)	-	24	-	ns
t_r	Rising Time		-	15	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	71	-	ns
t_f	Falling Time		-	12	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1.0MHz	-	2310	-	pF
C_{oss}	Output Capacitance		-	96	-	pF
C_{rss}	Reverse Transfer Capacitance		-	18	-	pF
Q_g	Total Gate Charge	I_D=20A, V_{DS}=640V V_{GS}=10V (Note 3)	-	90	-	nC
Q_{gs}	Gate to Source Charge		-	14	-	nC
Q_{gd}	Gate to Drain Charge		-	48	-	nC

Note:

1. Repetitive rating: pulse-width limited by maximum junction temperature
2. I_{DS}=11A, V_{DD}=50V, V_G=10V, @T_C=25℃
3. Essentially independent of operating temperature typical characteristics

Typical Performance Characteristics

Fig. 1. Typical on-Region Characteristics

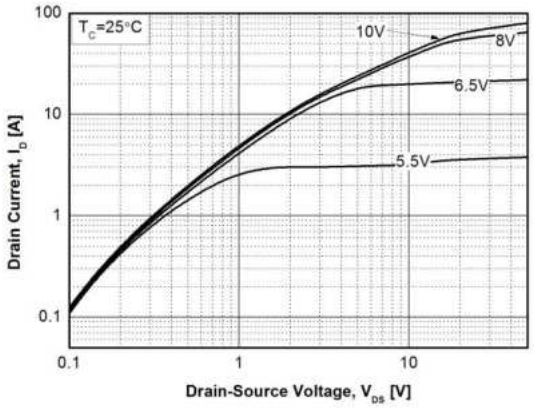


Fig. 2. Typical Transfer Characteristics

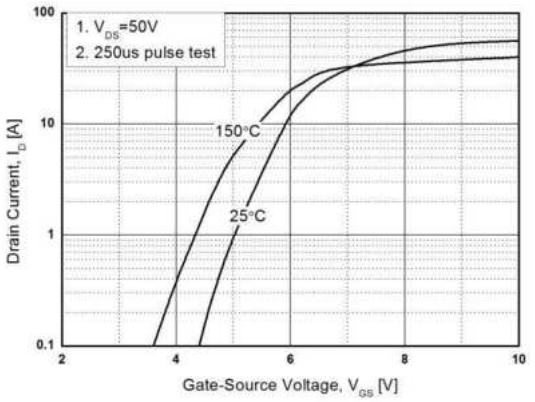


Fig. 3. Static on-Resistance vs. I_D

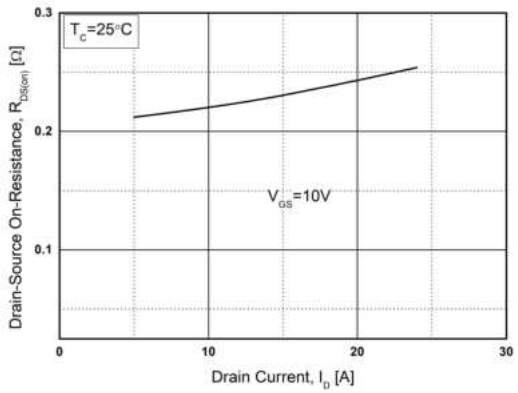


Fig. 4. Body Diode Forward Voltage vs. I_{DR}

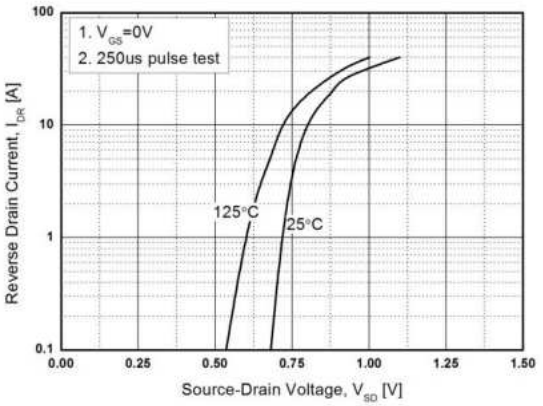


Fig. 5. Capacitance Characteristics

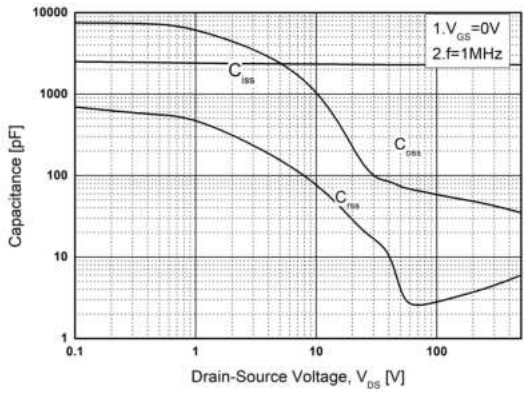
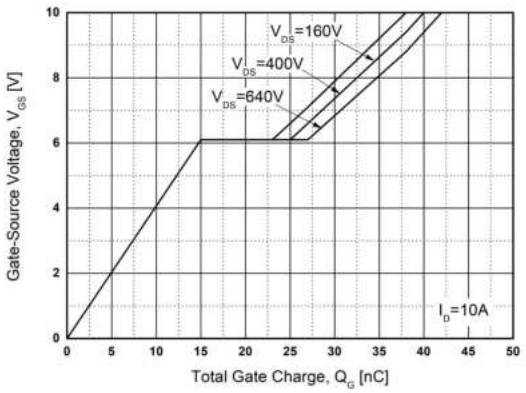


Fig. 6. Gate Charge Characteristics



Typical Performance Characteristics

Fig. 7. Breakdown Voltage vs. Temperature

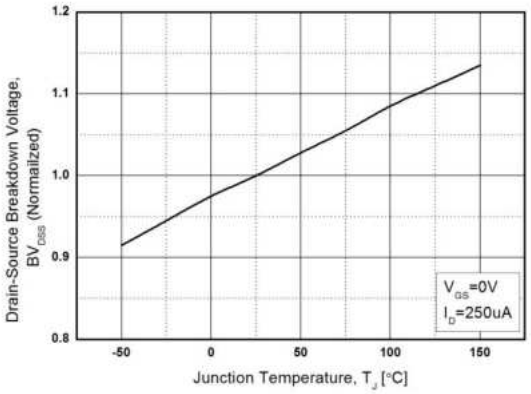


Fig. 8. Static on-Resistance vs. Temperature

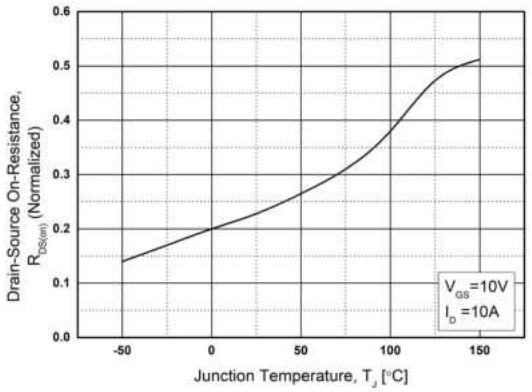


Fig. 9. Maximum Safe Operating Area

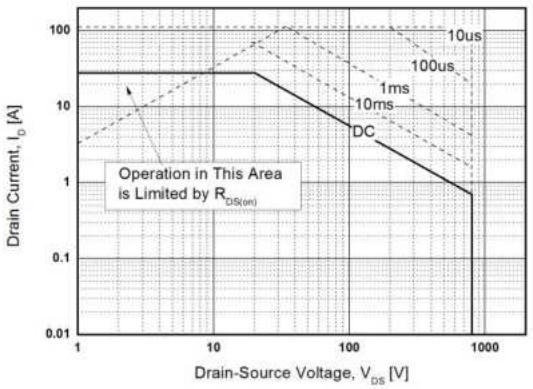


Fig. 10. Maximum Drain Current vs. Temperature

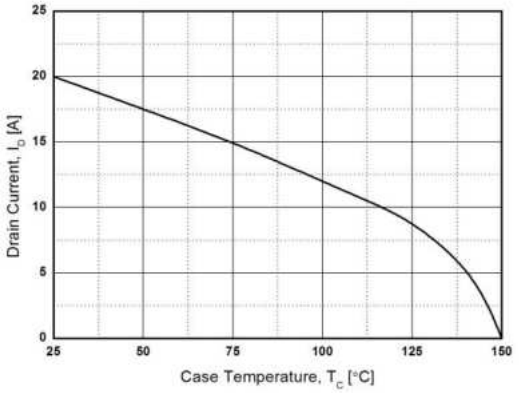
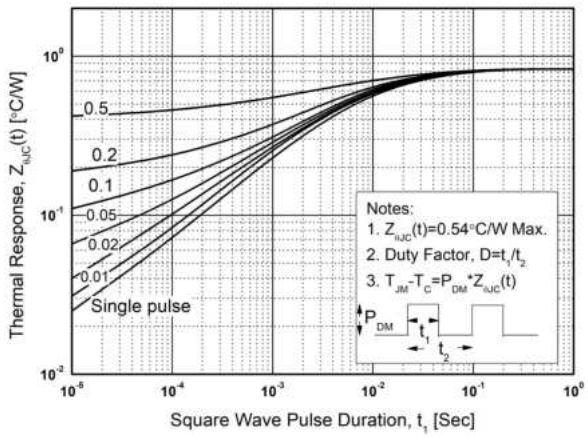


Fig. 11. Transient Thermal Response Curve



Package Dimensions

TO-247

(Dimensions in Millimeters)