

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

Description

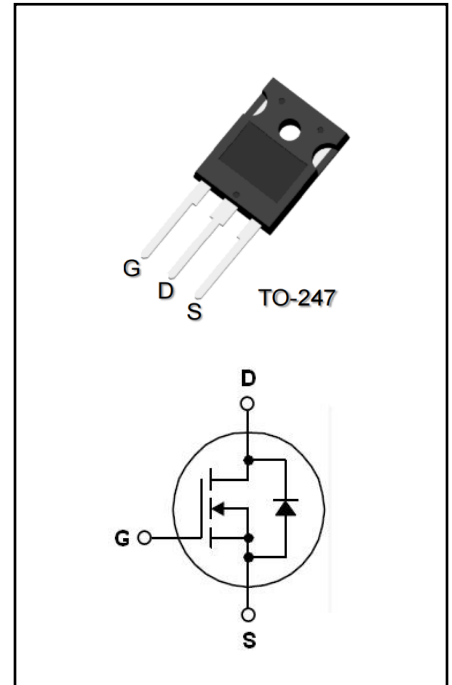
AKQH20N80CM is utilizing an advanced charge balance mechanism for outstanding low on-resistance and lower gate charge performance.

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

AKQH20N80CM is suitable for AC/DC power conversion in switching mode operation for higher efficiency.

Features

- Low on-Resistance: $R_{DS(on)}=0.21\Omega$ (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 @ $T_C=25^\circ\text{C}$ 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	$T_C=25^\circ\text{C}$	20
		$T_C=100^\circ\text{C}$	14
I_{DM}	Pulsed Drain Current (Note1)	60	A
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	230
	Derate above 25°C		1.85
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	285	mJ
T_J	Operating Junction Temperature Range	$-55\sim+150$	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	$-55\sim+150$	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{th(J-C)}$	Thermal Resistance, Junction to case	0.54	$^\circ\text{C}/\text{W}$
$R_{th(J-A)}$	Thermal Resistance, Junction to Ambient	62	$^\circ\text{C}/\text{W}$

Electrical Characteristics @ $T_c=25\text{ }^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	800	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	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	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS}=V_{GSS}, V_{DS}=0V$	-	-	± 100	nA

D-S Diode Characteristics and Maximum Rating @ $T_c=25\text{ }^\circ\text{C}$ 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	$V_{GS}=0V, I_S=20A,$	-	550	-	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=-100A/\mu s$	-	15	-	μC

Switching Characteristics @ $T_c=25\text{ }^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$I_D=20A,$ $V_{DD}=400V,$ $R_G=20\Omega$ (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. $I_{DS}=11A, V_{DD}=50V, V_G=10V, @T_c=25^\circ C$
3. Essentially independent of operating temperature typical characteristics

Typical Performance Characteristics

Fig. 1. Typical on-Region Characteristics

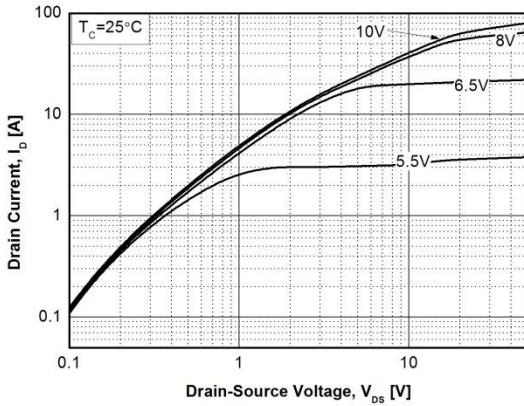


Fig. 2. Typical Transfer Characteristics

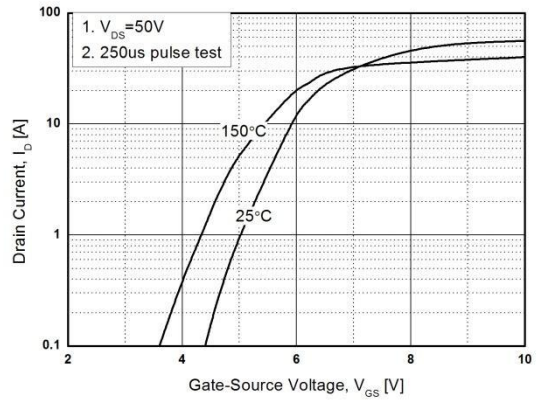


Fig. 3. Static on-Resistance vs. I_D

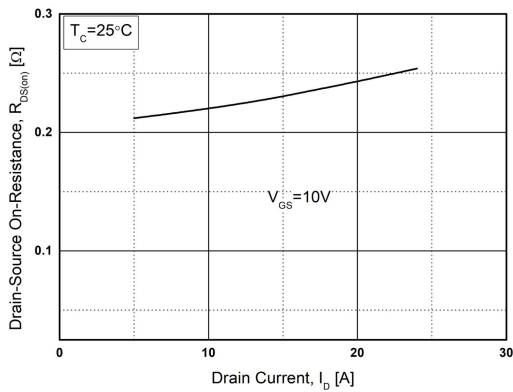


Fig. 4. Body Diode Forward Voltage vs. I_{DR}

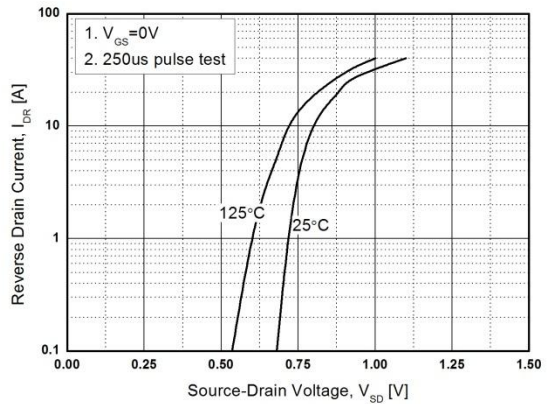


Fig. 5. Capacitance Characteristics

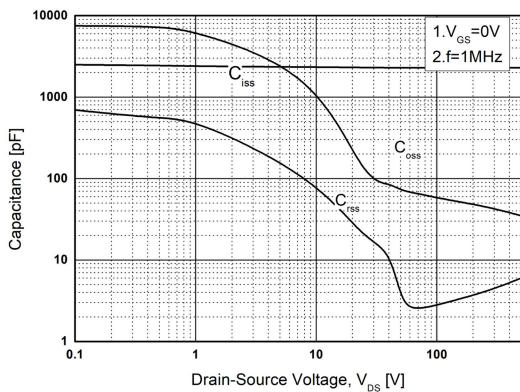
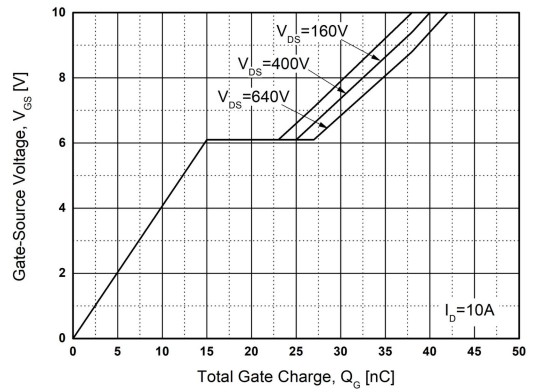


Fig. 6. Gate Charge Characteristics



Typical Performance Characteristics

Fig. 7. Breakdown Voltage vs. Temperature

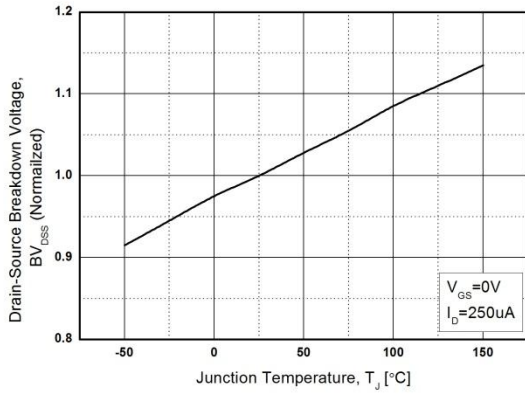


Fig. 8. Static on-Resistance vs. Temperature

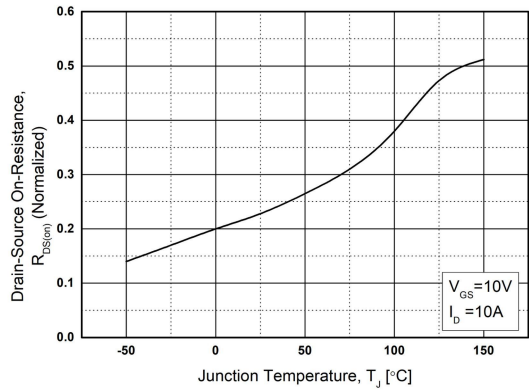


Fig. 9. Maximum Safe Operating Area

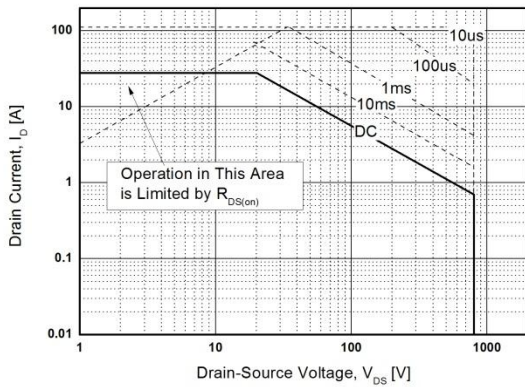


Fig. 10. Maximum Drain Current vs. Temperature

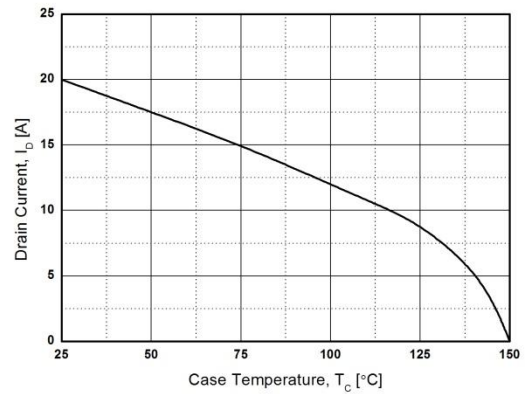
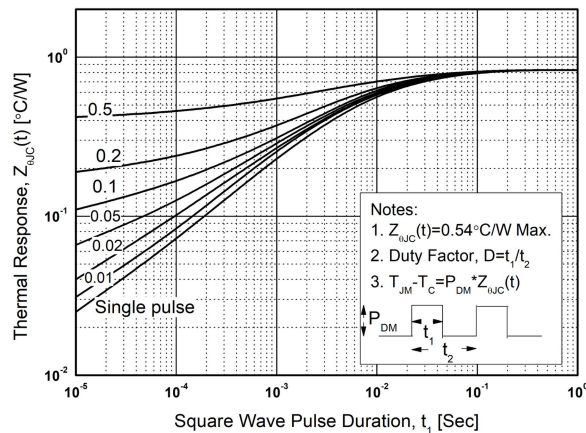


Fig. 11. Transient Thermal Response Curve



Package Dimensions

TO-247

(Dimensions in Millimeters)

