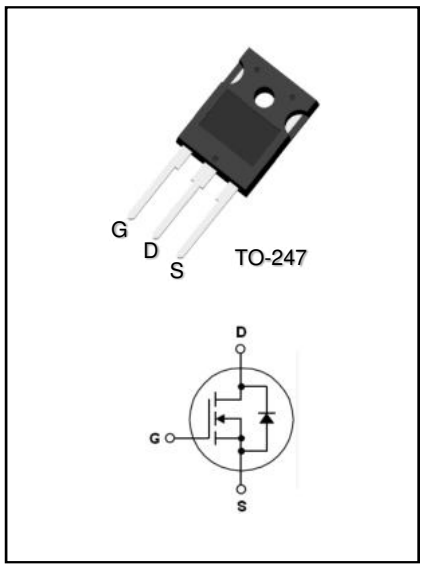
650V 20A N-Channel MOSFET With Fast-Recovery

Description

AKT20N65HCM is utilizing an advanced charge balance mechanism for outstanding low onresistance 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 energyAKQH20N65CM is suitable for ACDC power conversion inswitching mode operation for higher efficiency.



Features

- Low on-Resistance: $R_{DS\ (on)}$=163mΩ(typ.)
- Fast-Recovery body diode
- 100% Avalanche Test
- Extremely Low Reverse Recovery 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		650	V
V_{GSS}	Gate to Source Voltage		±30	V
I_D	Drain Current	T_C=25℃	20	A
		T_C=100℃	12	A
I_{DM}	Pulsed Drain Current	(Note1)	60	A
P_D	Maximum Power Dissipation	T_C=25℃	150	W
	Derate above 25℃		1.2	W/℃
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	122	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	0.83	℃/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	650	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	2.5	2.9	4.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=10A	-	163	-	mΩ
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=V_{DSS}, V_{GS}=0V	-	-	2	uA
I_{GSS}	Gate to Source Leakage Current	V_{GS}=V_{GSS}, V_{DS}=0V	-	-	±200	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	-	0.89	-	V
t_{rr}	Reverse Recovery Time	V_{GS}=0V, I_S=20A, di/dt=-100A/us	-	305	-	ns
Q_{rr}	Reverse Recovery Charge		-	2.2	-	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}=325V, R_G=20Ω (Note 3)	-	27	-	ns
t_r	Rising Time		-	36	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	88	-	ns
t_f	Falling Time		-	6	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=100V, f=1.0MHz	-	1760	-	pF
C_{oss}	Output Capacitance		-	78	-	pF
C_{rss}	Reverse Transfer Capacitance		-	1.8	-	pF
Q_g	Total Gate Charge	I_D=10A, V_{DS}=520V V_{GS}=10V (Note 3)	-	42	-	nC
Q_{gs}	Gate to Source Charge		-	15	-	nC
Q_{gd}	Gate to Drain Charge		-	12	-	nC

Note:

1. Repetitive rating: pulse-width limited by maximum junction temperature
2. L=5mH, 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

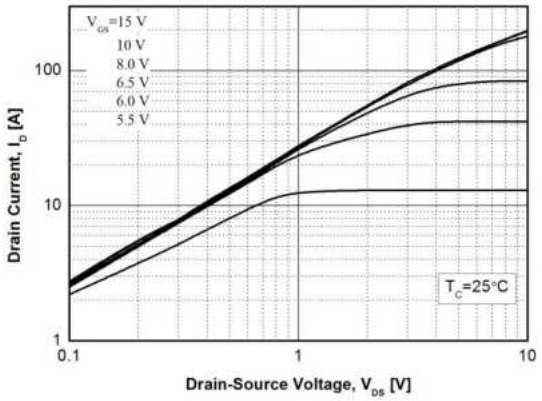


Fig. 2. Typical Transfer Characteristics

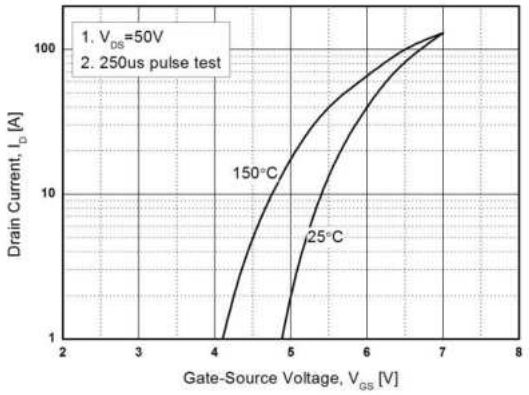


Fig. 3. Static on-Resistance vs. I_D

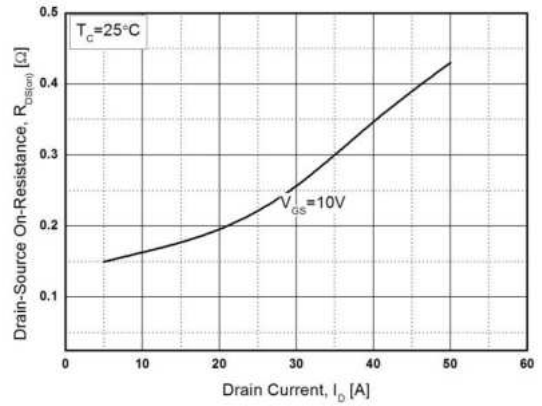


Fig. 4. Body Diode Forward Voltage vs. I_{DR}

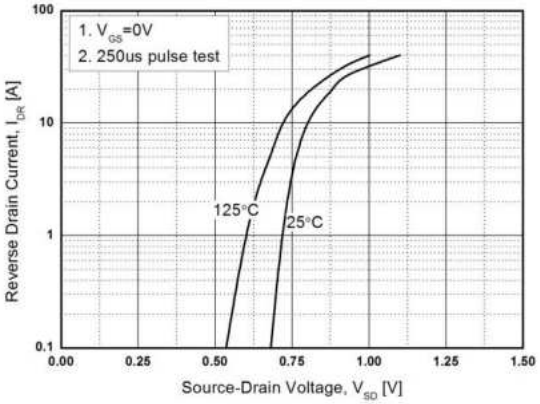


Fig. 5. Capacitance Characteristics

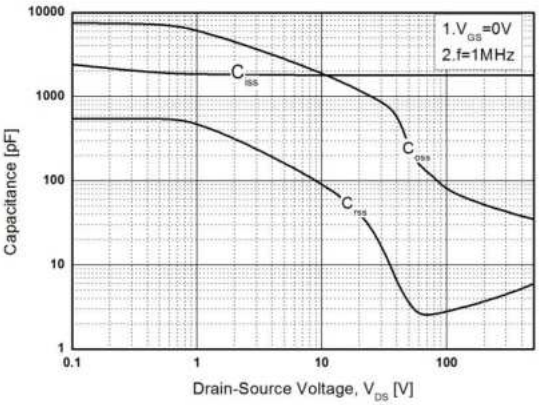
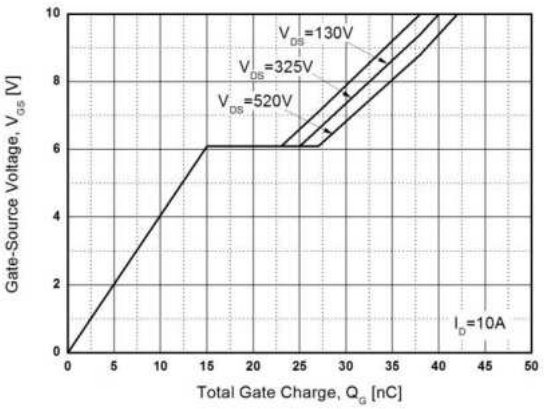


Fig. 6. Gate Charge Characteristics



Typical Performance Characteristics

Fig. 7. Breakdown Voltage vs. Temperature

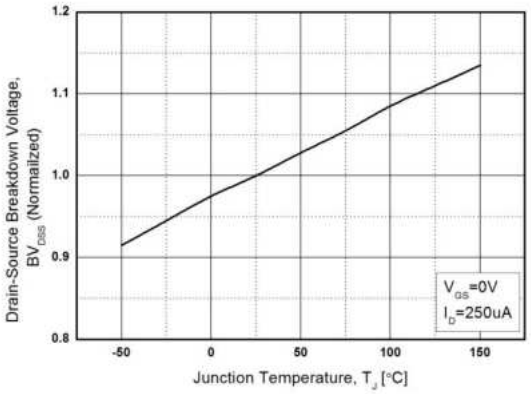


Fig. 8. Static on-Resistance vs. Temperature

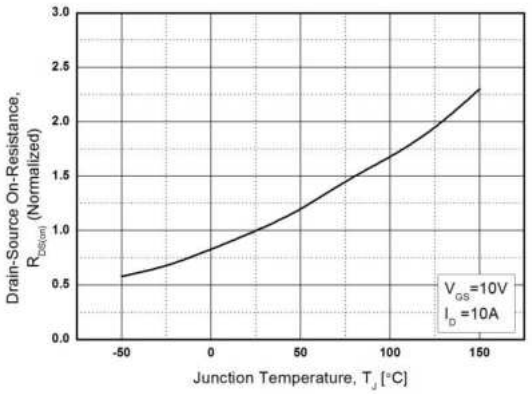


Fig. 9. Maximum Safe Operating Area

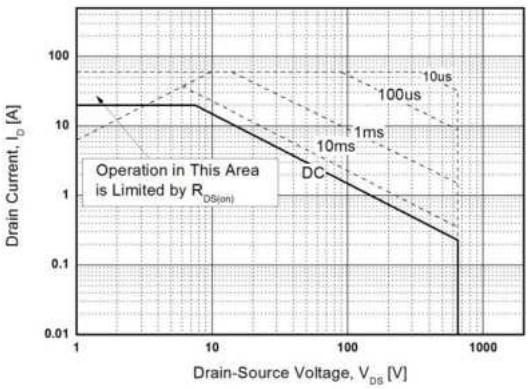


Fig. 10. Maximum Drain Current vs. Temperature

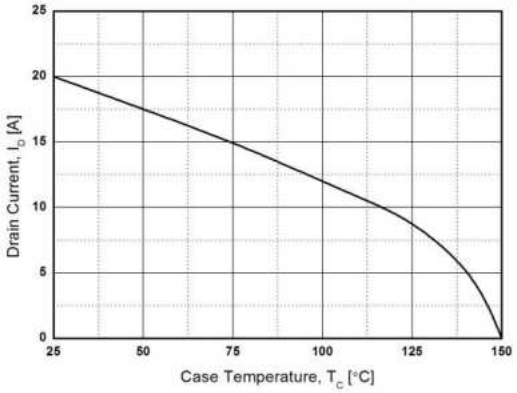
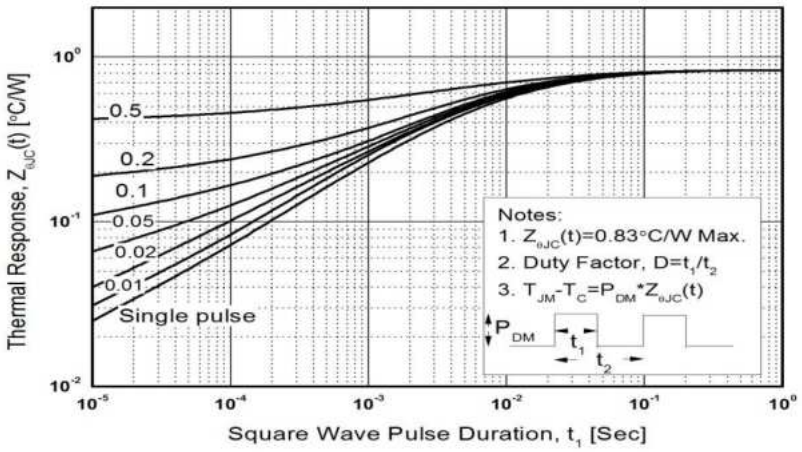


Fig. 11. Transient Thermal Response Curve



Package Dimensions

TO-247

(Dimensions in Millimeters)