

## 650V 35AN-Channel MOSFET With Fast-Recovery

### Description

AKQH35N65CM is utilizing an advanced charge balance mechanism for outstanding low on resistance an 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.

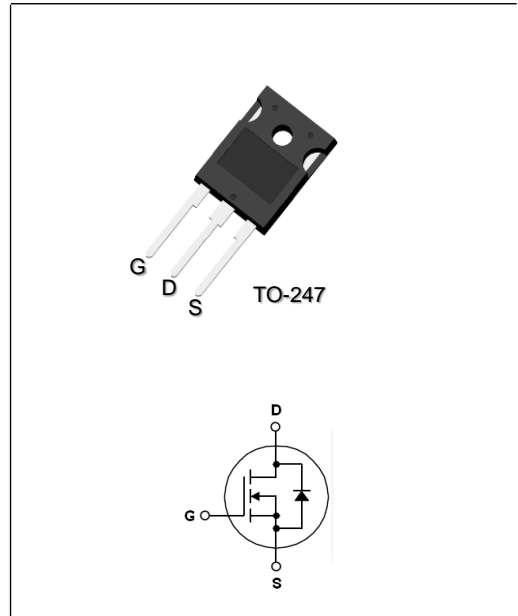
AKQH35N65CM is suitable for AC/DC power conversion in switching mode operation for higher efficiency.

### Features

- Low on-Resistance:  $R_{DS(on)}=83m\Omega$ (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 @ $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Unit	
$V_{DSS}$	Drain to Source Voltage	650	V	
$V_{GSS}$	Gate to Source Voltage	$\pm 30$	V	
$I_D$	Drain Current	$T_C=25^\circ\text{C}$	35	A
		$T_C=100^\circ\text{C}$	24	A
$I_{DM}$	Pulsed Drain Current (Note1)	110	A	
$P_D$	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	125	W
	Derate above $25^\circ\text{C}$		1.0	W/ $^\circ\text{C}$
$E_{AS}$	Single Pulsed Avalanche Energy (Note 2)	200	mJ	
$T_J$	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	1.0	$^\circ\text{C}/\text{W}$
$R_{th(J-A)}$	Thermal Resistance, Junction to Ambient	62	$^\circ\text{C}/\text{W}$

## 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> =250uA	650	-	-	V
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	2.5	3.1	4.5	V
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =17.5A	-	83	-	mΩ
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =V <sub>DSS</sub> , V <sub>GS</sub> =0V	-	-	10	uA
I <sub>GSS</sub>	Gate to Source Leakage Current	V <sub>GS</sub> =V <sub>GSS</sub> , V <sub>DS</sub> =0V	-	-	±200	nA

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Maximum Drain to Source Diode Forward Current		-	-	35	A
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =35A	-	0.93	-	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> =0V, I <sub>S</sub> =35A,	-	221	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=-100A/us	-	3.2	-	uC

## 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> =35A, V <sub>DD</sub> =325V, R <sub>G</sub> =20Ω (Note 3)	-	34	-	ns
t <sub>r</sub>	Rising Time		-	81	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	101	-	ns
t <sub>f</sub>	Falling Time		-	6	-	ns
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =100V, f=1.0MHz	-	3805	-	pF
C <sub>oss</sub>	Output Capacitance		-	135	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	1.3	-	pF
Q <sub>g</sub>	Total Gate Charge	I <sub>D</sub> =17.5A, V <sub>DS</sub> =520V V <sub>GS</sub> =10V (Note 3)	-	115	-	nC
Q <sub>gs</sub>	Gate to Source Charge		-	25	-	nC
Q <sub>gd</sub>	Gate to Drain Charge		-	48	-	nC

### Note:

1. Repetitive rating: pulse-width limited by maximum junction temperature
2. L=5mH, V<sub>DD</sub>=50V, V<sub>G</sub>=10V, @T<sub>C</sub>=25°C
3. Essentially independent of operating temperature typical characteristics

**Typical Performance Characteristics**

Fig. 1. Typical on-Region Characteristics

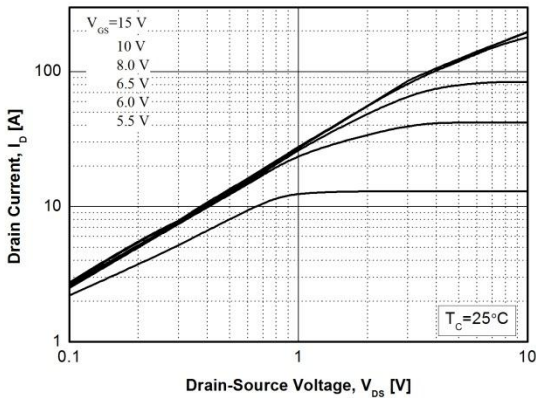


Fig. 2. Typical Transfer Characteristics

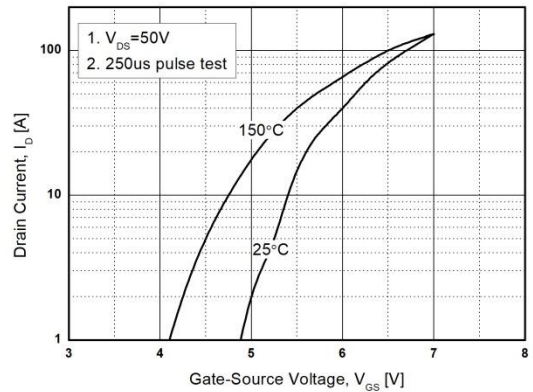


Fig. 3. Static on-Resistance vs.  $I_D$

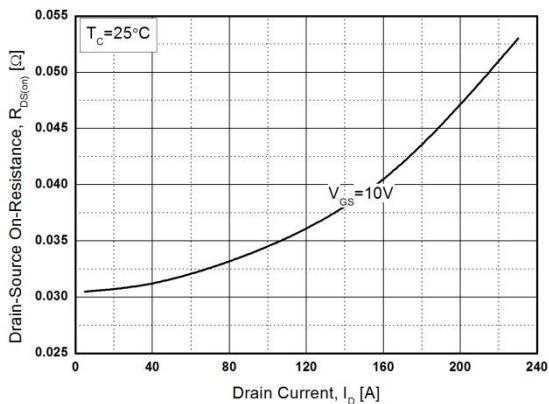


Fig. 4. Body Diode Forward Voltage vs.  $I_{DR}$

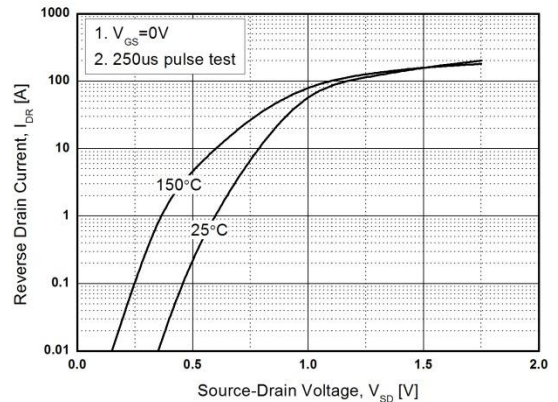


Fig. 5. Capacitance Characteristics

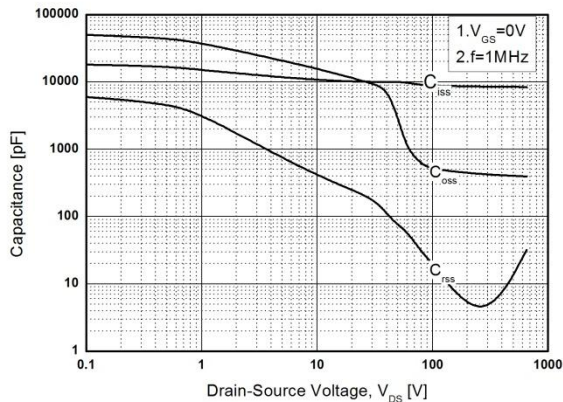
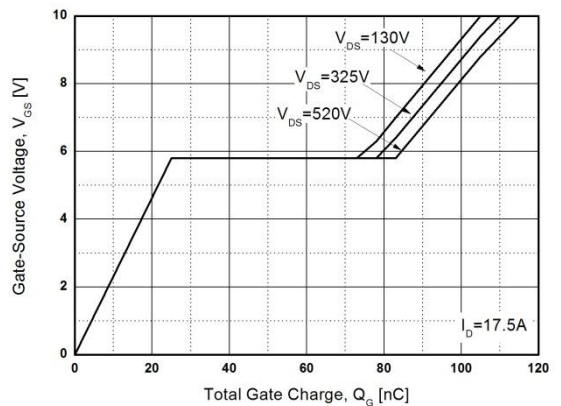


Fig. 6. Gate Charge Characteristics



**Typical Performance Characteristics**

Fig. 7. Breakdown Voltage vs. Temperature

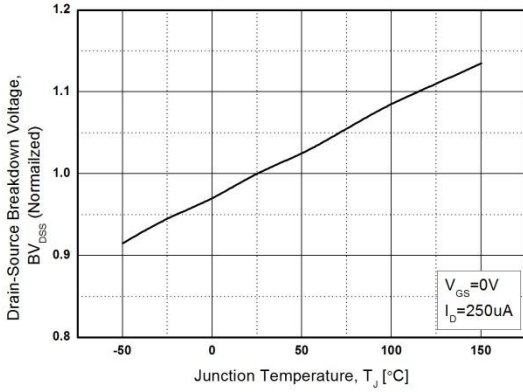


Fig. 8. Static on-Resistance vs. Temperature

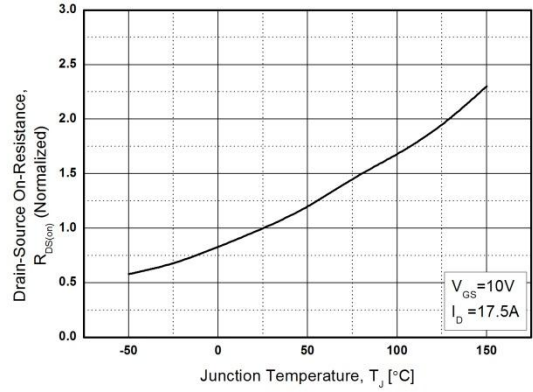


Fig. 9. Maximum Safe Operating Area

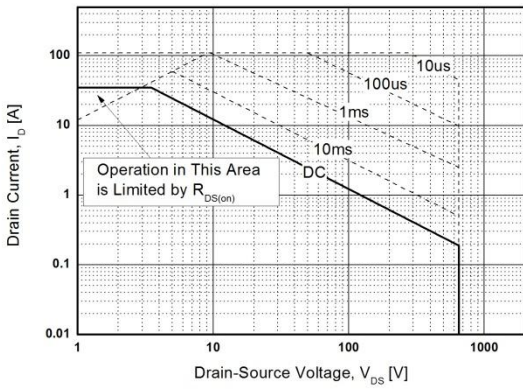


Fig. 10. Maximum Drain Current vs. Temperature

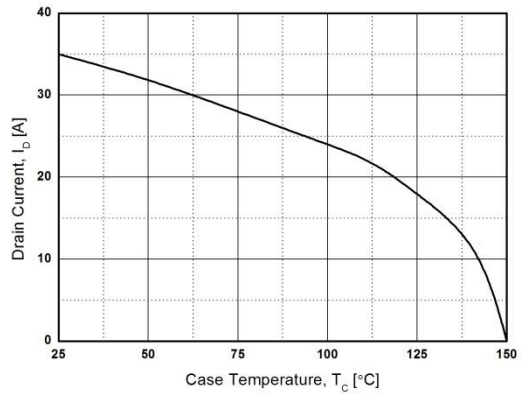
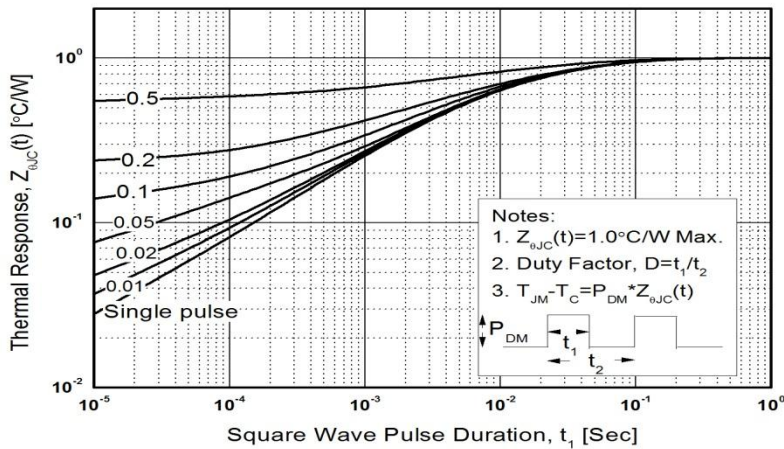


Fig. 11. Transient Thermal Response Curve



**Package Dimensions**

**TO-247**

(Dimensions in Millimeters)

