

## 500V 23A N-Channel Enhancement Mode Power MOSFET

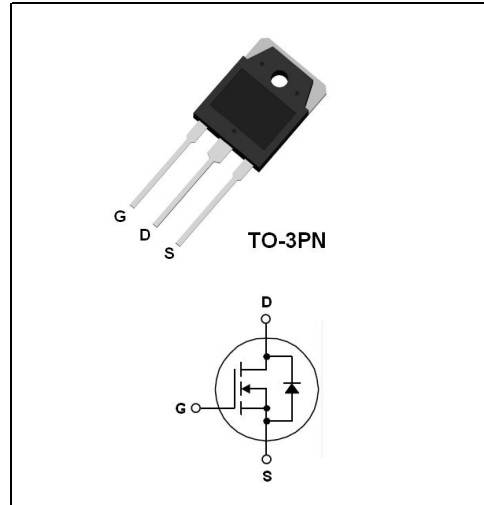
### Description

The AKQA23N50B2 is an N-Channel enhancement mode power MOSFET which using proprietary planar stripe and DMOS technology.

This MOSFET has low static on-resistance and high avalanche energy strength. This device provide excellent switching performance for UPS,DC-DC converters and AC-DC power supply.

### Features

- Low on-Resistance:  $R_{DS(on)}=0.21\Omega(\text{typ.})$
- Special Process Technology for high ESD Capability
- 100% Avalanche Test
- Good Stability and Uniformity with High  $E_{AS}$



### Applications

- UPS 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		500	V
$V_{GSS}$	Gate to Source Voltage		$\pm 30$	V
$I_D$	Drain Current	$T_C=25^\circ\text{C}$	23	A
		$T_C=100^\circ\text{C}$	14.5	A
$I_{DM}$	Pulsed Drain Current	(Note1)	92	A
$P_D$	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	280	W
	Derate above $25^\circ\text{C}$		2.25	W/ $^\circ\text{C}$
$E_{AS}$	Single Pulsed Avalanche Energy	(Note 2)	980	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	0.45	$^\circ\text{C}/\text{W}$
$R_{th(J-A)}$	Thermal Resistance, Junction to Ambient	50	$^\circ\text{C}/\text{W}$

**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	$V_{GS}=0V, I_D=250\mu A$	500	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=11.5A$	-	0.21	-	$\Omega$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=500V, V_{GS}=0V$	-	-	10	$\mu A$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	$\pm 100$	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		-	-	23	A
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS}=0V, I_S=23A$	-	0.92	-	V
$t_{rr}$	Reverse Recovery Time	$V_{GS}=0V, I_S=23A,$	-	0.57	-	us
$Q_{rr}$	Reverse Recovery Charge	$di/dt=-100A/us$	-	7.85	-	$\mu C$

**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	$I_D=23A,$ $V_{DD}=250V,$ $R_G=25\Omega$ (Note 3)	-	42	-	ns
$t_r$	Rising Time		-	79	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	125	-	ns
$t_f$	Falling Time		-	70	-	ns
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=25V,$ $f=1.0MHz$	-	3040	-	pF
$C_{oss}$	Output Capacitance		-	350	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	10	-	pF
$Q_g$	Total Gate Charge	$I_D=23A,$ $V_{DS}=400V$ $V_{GS}=10V$ (Note 3)	-	43	-	nC
$Q_{gs}$	Gate to Source Charge		-	13	-	nC
$Q_{gd}$	Gate to Drain Charge		-	14.5	-	nC

**Note:**

1. Repetitive rating: pulse-width limited by maximum junction temperature
2.  $L=5mH, V_{DD}=100V, V_G=10V, @T_c=25^\circ C$
3. Essentially independent of operating temperature typical characteristics

**Typical Performance Characteristics**

Fig. 1. Typical on-Region Characteristics

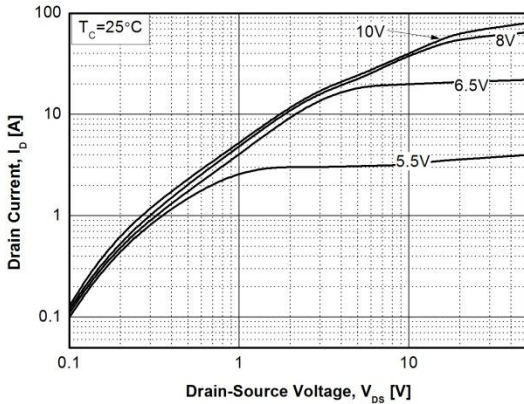


Fig. 2. Typical Transfer Characteristics

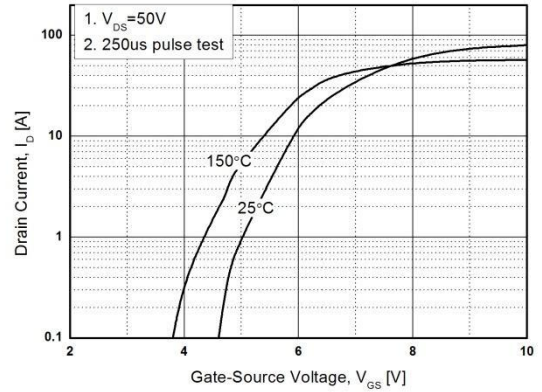


Fig. 3. Static on-Resistance vs.  $I_D$

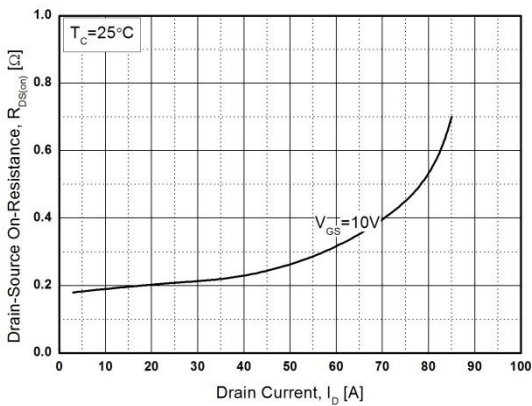


Fig. 4. Body Diode Forward Voltage vs.  $I_{DR}$

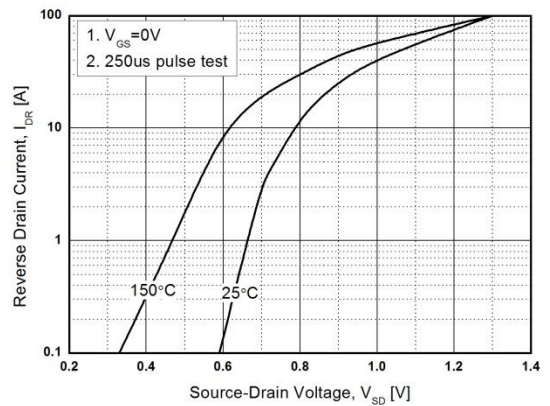


Fig. 5. Capacitance Characteristics

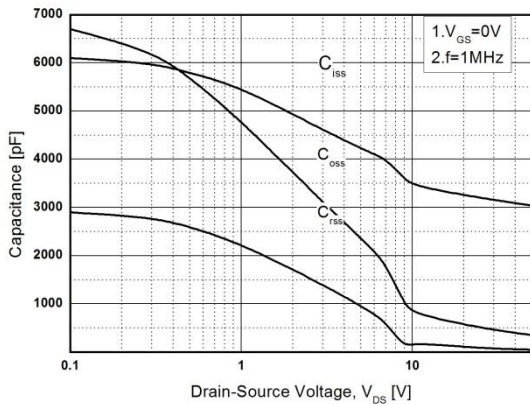
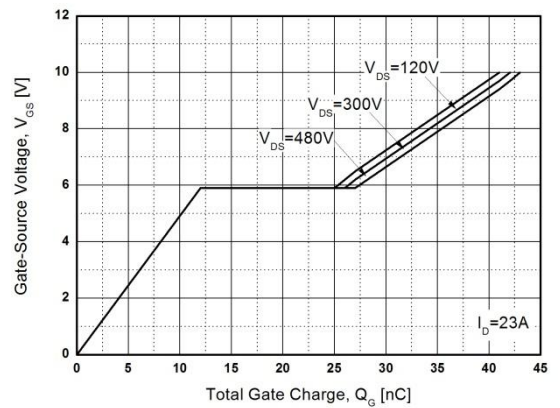


Fig. 6. Gate Charge Characteristics



**Typical Performance Characteristics**

Fig. 7. Breakdown Voltage vs. Temperature

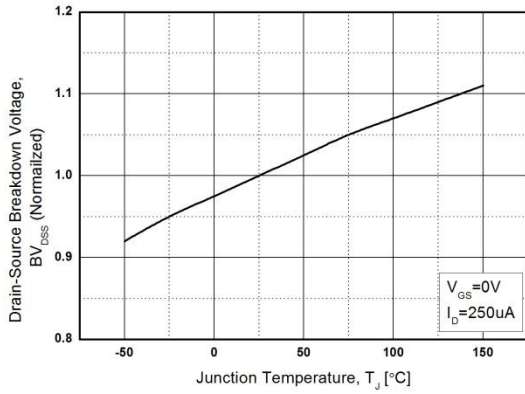


Fig. 8. Static on-Resistance vs. Temperature

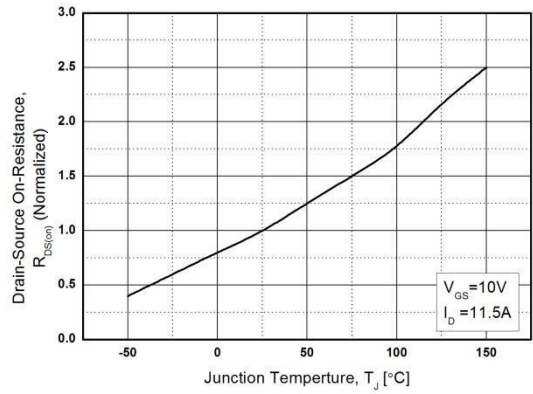


Fig. 9. Maximum Safe Operating Area

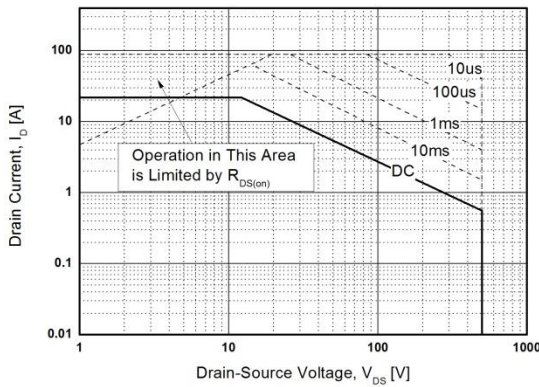


Fig. 10. Maximum Drain Current vs. Temperature

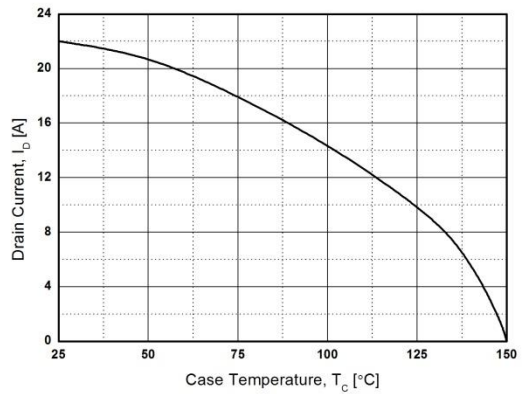
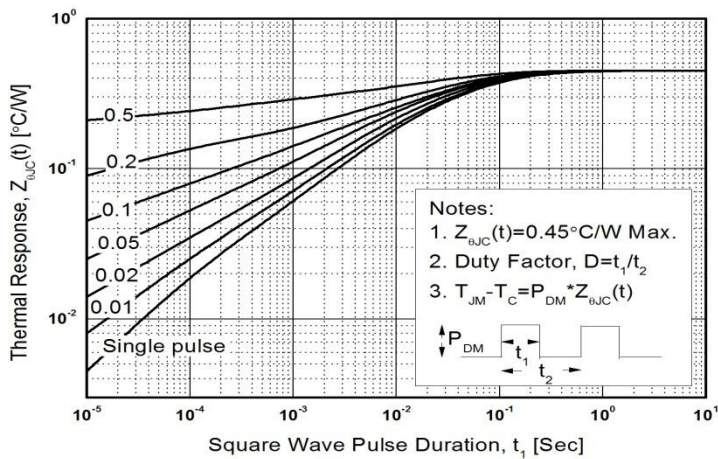


Fig. 11. Transient Thermal Response Curve



Package Dimensions

TO-3PN

(Dimensions in Millimeters)

