500V 50A N-Channel Enhancement Mode Power MOSFET
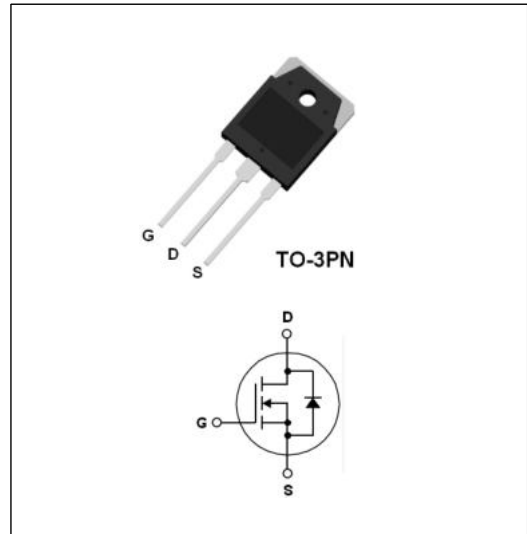
Description

The AKT50N50N is an N-Channel enhancement mode power MOSFET, it 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: $R_{DS (on)}$=0.097Ω(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 ℃ unless otherwise noted

Symbol	Parameter		Ratings	Unit
V_{DSS}	Drain to Source Voltage		500	V
V_{GSS}	Gate to Source Voltage		±30	V
I_D	Drain Current	T_C=25℃	50	A
		T_C=100℃	32	A
I_{DM}	Pulsed Drain Current	(Note1)	200	A
P_D	Maximum Power Dissipation	T_C=25℃	560	W
	Derate above 25℃		4.54	W/℃
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	5700	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	0.22	℃/W
$R_{th (J-A)}$	Thermal Resistance, Junction to Ambient	40	℃/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	500	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	3.0	4.1	5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=25A	-	0.097	-	Ω
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=V_{DSS}, V_{GS}=0V	-	-	1	uA
I_{GSS}	Gate to Source Leakage Current	V_{GS}=V_{GSS}, V_{DS}=0V	-	-	$\pm$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		-	-	50	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS}=0V, I_S=50A	-	0.9	1.1	V
t_{rr}	Reverse Recovery Time	V_{GS}=0V, I_S=50A, di/dt=-100A/us	-	-	0.4	us
Q_{rr}	Reverse Recovery Charge		-	12	-	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=50A, V_{DD}=250V, R_G=25Ω (Note 3)	-	110	-	ns
t_r	Rising Time		-	350	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	210	-	ns
t_f	Falling Time		-	230	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1.0MHz	-	5300	-	pF
C_{oss}	Output Capacitance		-	850	-	pF
C_{rss}	Reverse Transfer Capacitance		-	70	-	pF
Q_g	Total Gate Charge	I_D=50A, V_{DS}=400V, V_{GS}=10V (Note 3)	-	115	-	nC
Q_{gs}	Gate to Source Charge		-	35	-	nC
Q_{gd}	Gate to Drain Charge		-	50	-	nC

Note:

1. Repetitive rating: pulse-width limited by maximum junction temperature

2. L=20mH, V_{DD}=150V, V_G=10V, @T_C=25℃

3. Essentially independent of operating temperature typical characteristics

Typical Performance Characteristics
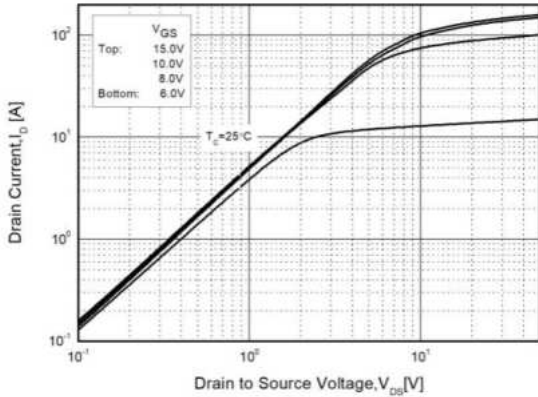
Fig. 1. Typical on-Resistance Characteristics
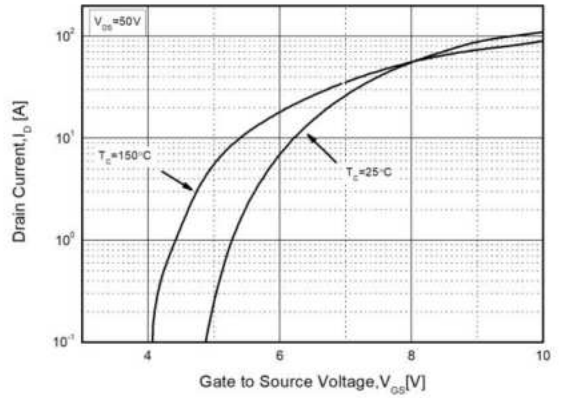
Fig. 2. Typical Transfer Characteristics
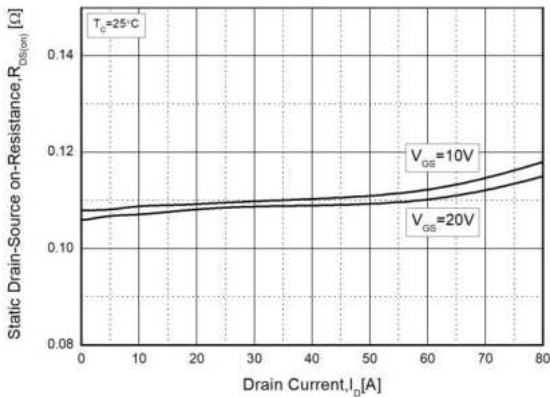
Fig. 3. Static on-Resistance vs. I_D

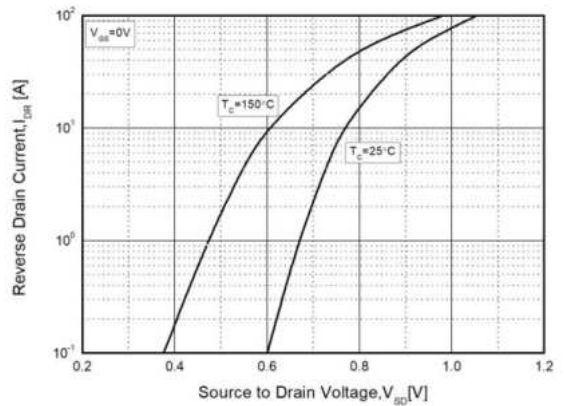Fig. 4. Body Diode Forward Voltage vs. I_{DR}
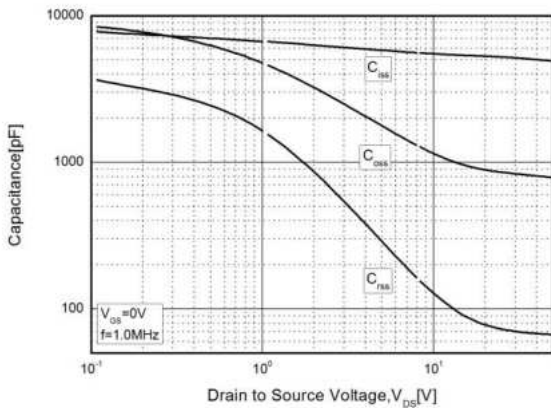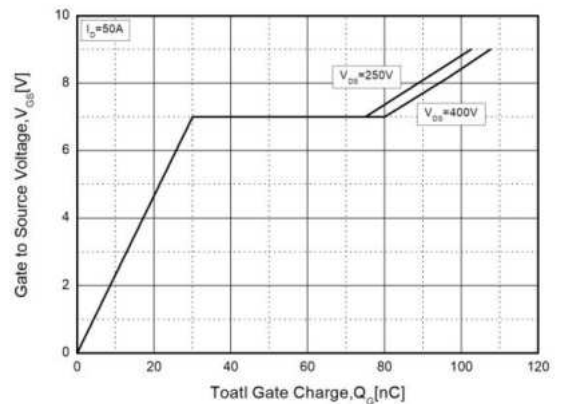
Fig. 5. Capacitance Characteristics

Fig. 6. Gate Charge Characteristics

Typical Performance Characteristics
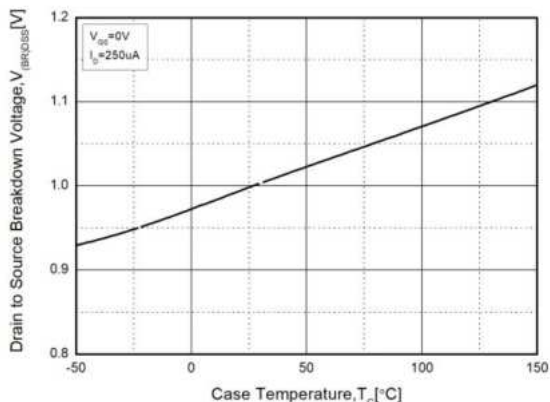
Fig. 7. Breakdown Voltage vs. Temperature

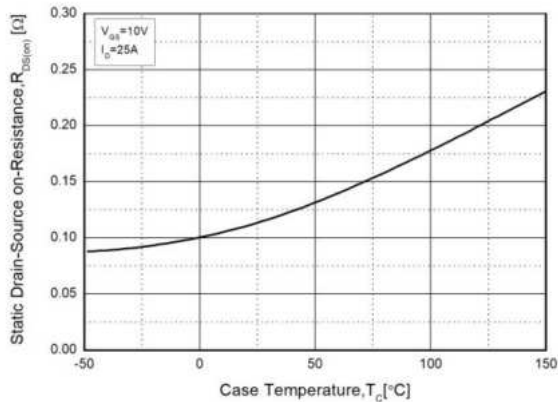Fig. 8. Static on-Resistance vs. Temperature
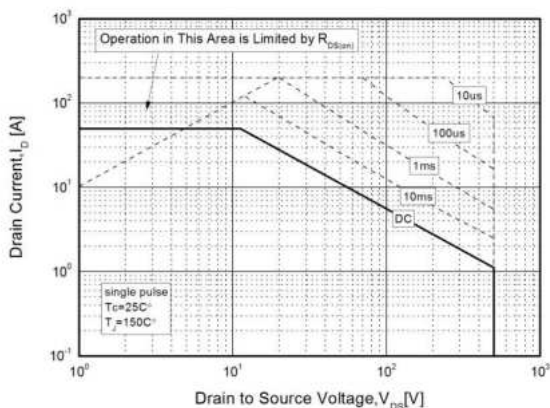
Fig. 9. Maximum Safe Operating Area

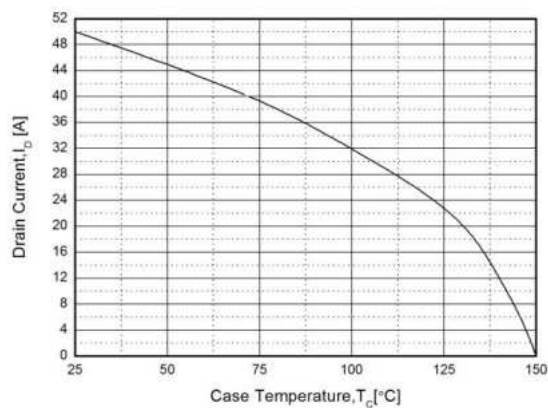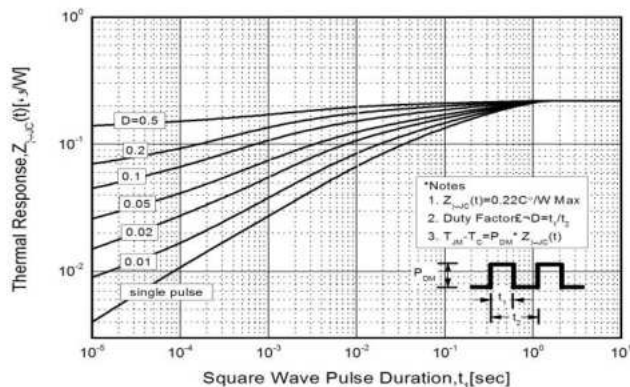Fig. 10. Maximum Drain Current vs. Temperature

Fig. 11. Transient Thermal Response Curve

Package Dimensions

TO-3PN

(Dimensions in Millimeters)