

## 900V 4A N-Channel Enhancement Mode Power MOSFET

### Description

The AKT4N90FCL is an N-Channel on-resistance and high avalanche energy enhancement mode power MOSFET which using proprietary planar stripe and DMOS technology.

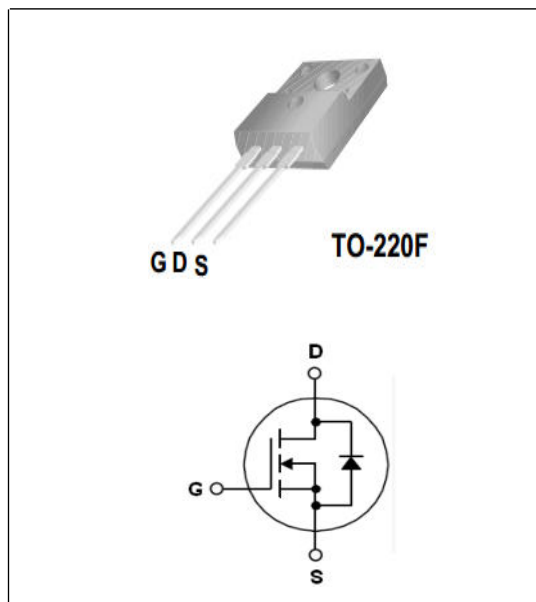
This MOSFET has low static strength. This device provide excellent switching performance for switched mode power supplies, active power factor correction and electronic lamp ballasts.

### Features

- Low on-Resistance:  $R_{DS(on)}=2.85\Omega(\text{typ.})$
- Special Process Technology for high ESD Capability
- 100% Avalanche Test
- Good Stability and Uniformity with High  $E_{AS}$

### Applications

- Switched Mode Power Supplies
- Active Power Factor Correction, Electronic Ballasts



### Absolute Maximum Ratings @ $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rated	Unit
$V_{DSS}$	Drain to Source Voltage	900	V
$V_{GSS}$	Gate to Source Voltage	$\pm 30$	V
$I_D$	Drain Current	$T_C=25^\circ\text{C}$	4
		$T_C=100^\circ\text{C}$	2.3
$I_{DM}$	Pulsed Drain Current (Note1)	16	A
$P_D$	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	115
	Derate above $25^\circ\text{C}$		0.85
$E_{AS}$	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	Rated	Unit
$R_{th(J-C)}$	Thermal Resistance, Junction to case	1.1	$^\circ\text{C}/\text{W}$
$R_{th(J-A)}$	Thermal Resistance, Junction to Ambient	62.5	$^\circ\text{C}/\text{W}$

**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	900	-	-	V
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	3.0	-	5.0	V
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =2A	-	2.85	3.0	Ω
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	-	-	±100	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		-	-	4.0	A
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =4A	-	-	0.9	V
T <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> =0V, I <sub>S</sub> =4A,	-	405	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=-100A/us	-	3.6	-	nC

**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> =4A, V <sub>DD</sub> =450V, R <sub>G</sub> =25Ω (Note 3)	-	37	-	ns
t <sub>r</sub>	Rise Time		-	46	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	48	-	ns
t <sub>f</sub>	Fall Time		-	44	-	ns
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz	-	813	-	pF
C <sub>oss</sub>	Output Capacitance		-	69	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	5.3	-	pF
Q <sub>g</sub>	Total Gate Charge	I <sub>D</sub> =4A, V <sub>DD</sub> =720V V <sub>GS</sub> =10V (Note 3)	-	18	-	nC
Q <sub>gs</sub>	Gate to Source Charge		-	4.6	-	nC
Q <sub>gd</sub>	Gate to Drain Charge		-	8.0	-	nC

**Note:**

1. Repetitive rating: pulse-width limited by maximum junction temperature
2. V<sub>DD</sub>=100V, L=20mH, R<sub>G</sub>=25Ω, V<sub>G</sub>=10V, stating T<sub>J</sub>=25°C
3. Essentially independent of operating temperature typical characteristics

**Typical Performance Characteristics**

Fig. 1. Typical on-Region Characteristics

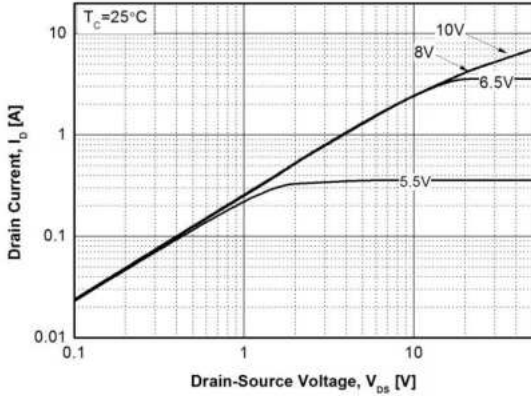


Fig. 2. Typical Transfer Characteristics

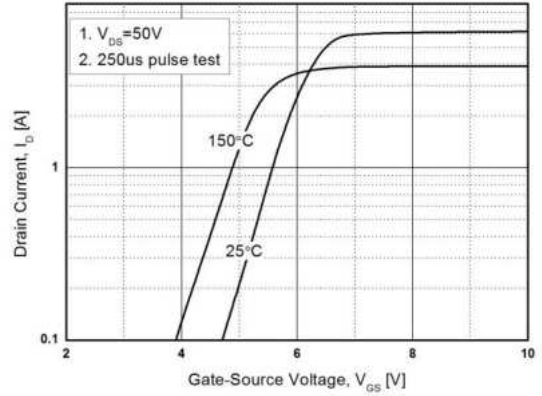


Fig. 3. Static on-Resistance vs.  $I_D$

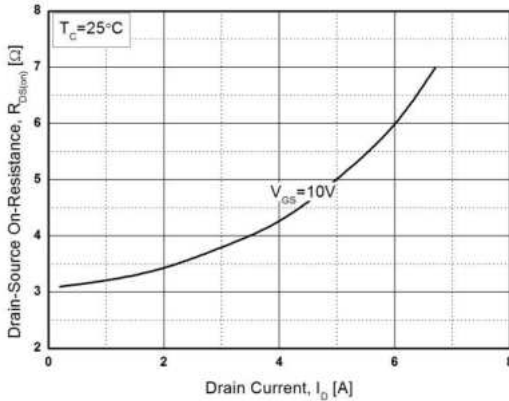


Fig. 4. Body Diode Forward Voltage vs.  $I_{DR}$

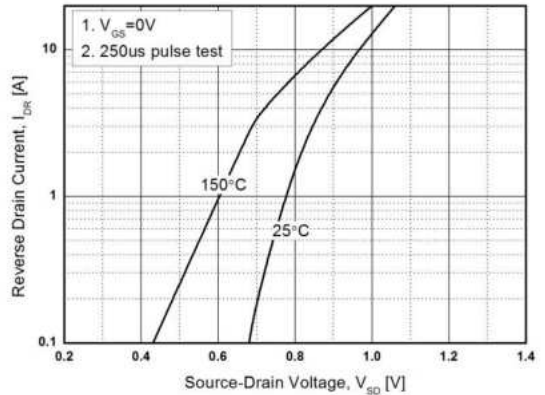


Fig. 5. Capacitance Characteristics

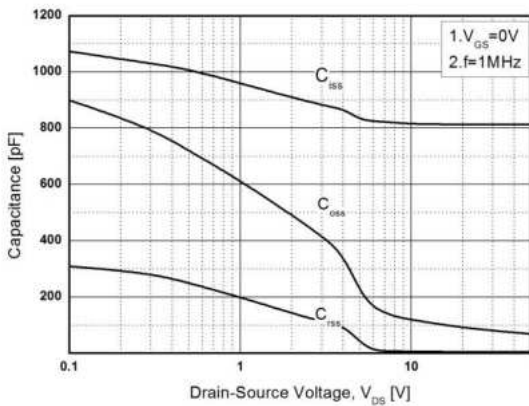
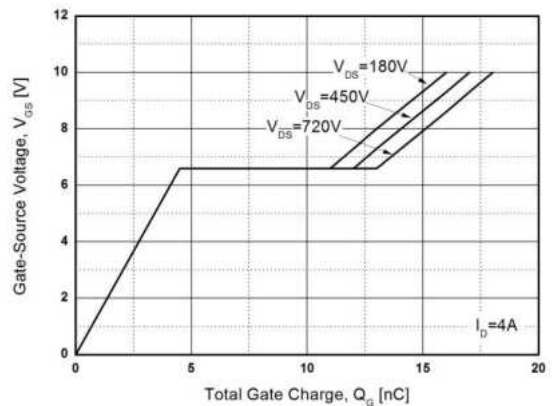


Fig. 6. Gate Charge Characteristics



**Typical Performance Characteristics**

Fig. 7. Breakdown Voltage vs. Temperature

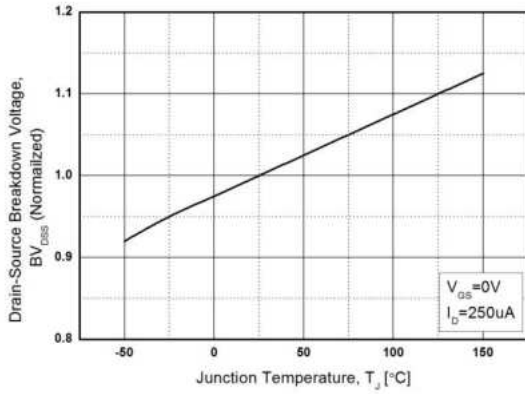


Fig. 8. Static on-Resistance vs. Temperature

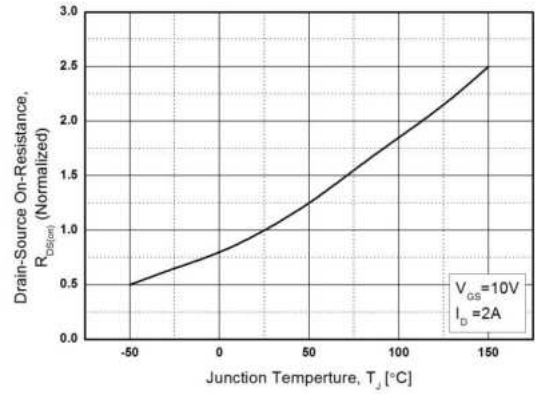


Fig. 9. Maximum Safe Operating Area

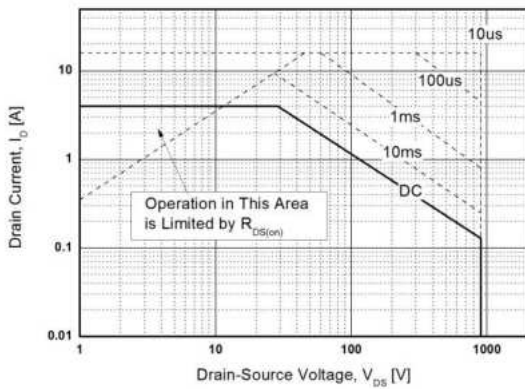


Fig. 10. Maximum Drain Current vs. Temperature

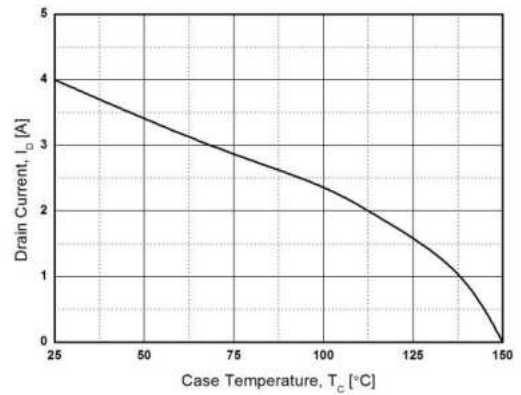
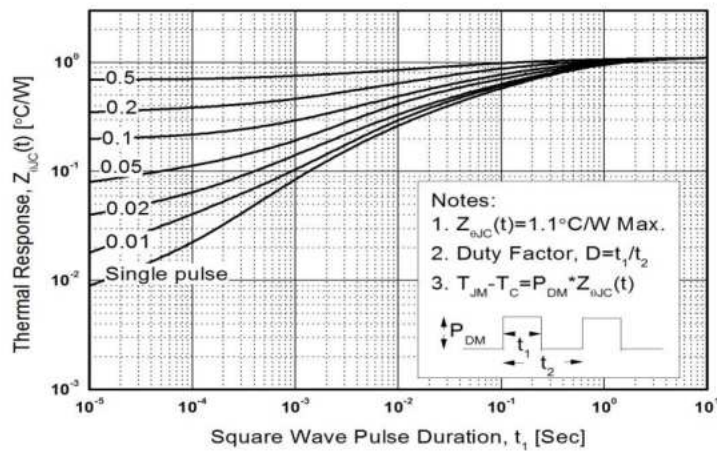


Fig. 11. Transient Thermal Response Curve



**Package Dimensions**

**TO-220F**

(Dimensions in Millimeters)

