

# 900V 25A N-Channel Enhancement Mode Power MOSFET

## Description

The AKT25N90L is an N-Channel enhancement mode power MOSFET which using proprietary planar stripe and DMOS technology.

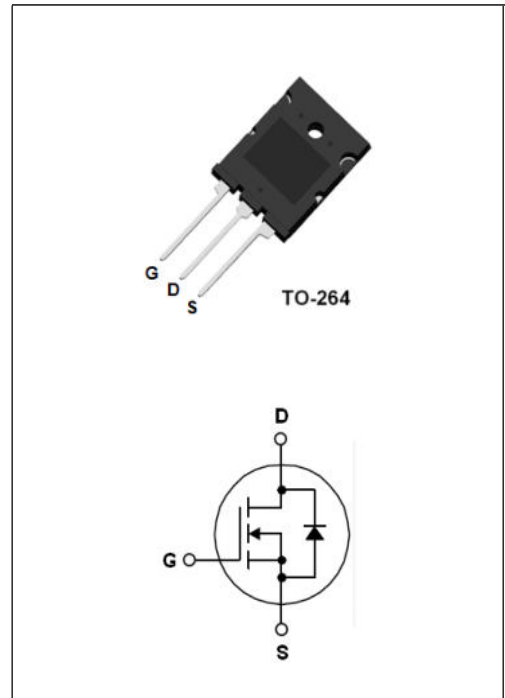
This MOSFET has low static on-resistance and high avalanche energy strength. This device provide excellent performance for high voltage power supplies or pulse circuits.

## Features

- Typical on-Resistance:  $R_{DS(on)}=0.34\Omega$
- High Blocking Voltage
- 100% Avalanche Test
- Good Stability and Uniformity with High  $E_{AS}$

## Applications

- High Voltage Power Supplies
- Capacitor Discharge Applications
- Pulse Circuits



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

| Symbol    | Parameter                            |                           | Ratings  | Unit                  |
|-----------|--------------------------------------|---------------------------|----------|-----------------------|
| $V_{DSS}$ | Drain to Source Voltage              |                           | 900      | V                     |
| $V_{GSS}$ | Gate to Source Voltage               |                           | $\pm 30$ | V                     |
| $I_D$     | Drain Current                        | $T_C=25^{\circ}\text{C}$  | 25       | A                     |
|           |                                      | $T_C=100^{\circ}\text{C}$ | 16       | A                     |
| $I_{DM}$  | Pulsed Drain Current                 | (Note1)                   | 100      | A                     |
| $P_D$     | Maximum Power Dissipation            | $T_C=25^{\circ}\text{C}$  | 500      | W                     |
|           | Derate above $25^{\circ}\text{C}$    |                           | 4        | W/ $^{\circ}\text{C}$ |
| $E_{AS}$  | Single Pulsed Avalanche Energy       | (Note 2)                  | 1800     | mJ                    |
| $T_J$     | Operating Junction Temperature Range |                           | -50~+150 | $^{\circ}\text{C}$    |
| $T_{STG}$ | Storage Temperature Range            |                           | -50~+150 | $^{\circ}\text{C}$    |

## Thermal Characteristics

| Symbol        | Parameter                               | Ratings | Unit                        |
|---------------|-----------------------------------------|---------|-----------------------------|
| $R_{th(J-C)}$ | Thermal Resistance, Junction to case    | 0.25    | $^{\circ}\text{C}/\text{W}$ |
| $R_{th(J-A)}$ | Thermal Resistance, Junction to Ambient | 40      | $^{\circ}\text{C}/\text{W}$ |

## 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> =250μA               | -    | 950  | -    | V    |
| V <sub>GS(th)</sub> | Gate Threshold Voltage            | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA | 3.2  | 3.9  | 4.6  | V    |
| R <sub>DS(on)</sub> | Static Drain-Source On-Resistance | V <sub>GS</sub> =10V, I <sub>D</sub> =12.5A              | -    | 0.34 | -    | Ω    |
| I <sub>DSS</sub>    | Zero Gate Voltage Drain Current   | V <sub>DS</sub> =V <sub>DSS</sub> , V <sub>GS</sub> =0V  | -    | -    | 1    | μA   |
| 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 |                                                             | -    | -    | 25   | A    |
| V <sub>SD</sub> | Drain-Source Diode Forward Voltage            | V <sub>GS</sub> =0V, I <sub>S</sub> =25A                    | -    | 0.89 | 1.1  | V    |
| t <sub>rr</sub> | Reverse Recovery Time                         | V <sub>GS</sub> =0V, I <sub>S</sub> =25A,<br>di/dt=-100A/μs | -    | -    | 400  | ns   |
| Q <sub>rr</sub> | Reverse Recovery Charge                       |                                                             | -    | -    | 7    | μC   |

## 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> =25A ,<br>V <sub>DD</sub> =450V,<br>R <sub>G</sub> =10Ω (Note 3) | -    | 25   | -    | ns   |
| t <sub>r</sub>      | Rising Time                  |                                                                                 | -    | 15   | -    | ns   |
| t <sub>d(off)</sub> | Turn-off Delay Time          |                                                                                 | -    | 50   | -    | ns   |
| t <sub>f</sub>      | Falling Time                 |                                                                                 | -    | 15   | -    | ns   |
| C <sub>iss</sub>    | Input Capacitance            | V <sub>GS</sub> =0V, V <sub>DS</sub> =25V,<br>f=1.0MHz                          | -    | 7600 | -    | pF   |
| C <sub>oss</sub>    | Output Capacitance           |                                                                                 | -    | 1250 | -    | pF   |
| C <sub>rss</sub>    | Reverse Transfer Capacitance |                                                                                 | -    | 570  | -    | pF   |
| Q <sub>g</sub>      | Total Gate Charge            | I <sub>D</sub> =25A,<br>V <sub>DD</sub> =720V<br>V <sub>GS</sub> =10V (Note 3)  | -    | 52   | -    | nC   |
| Q <sub>gs</sub>     | Gate to Source Charge        |                                                                                 | -    | 12   | -    | nC   |
| Q <sub>gd</sub>     | Gate to Drain Charge         |                                                                                 | -    | 21   | -    | nC   |

### Note:

1. Repetitive rating: pulse-width limited by maximum junction temperature
2. V<sub>DD</sub>=100V, L=10mH, V<sub>G</sub>=10V, I<sub>D</sub>=20A
3. Essentially independent of operating temperature typical characteristics

## Typical Performance Characteristics

Fig. 1. Typical on-Resistance Characteristics

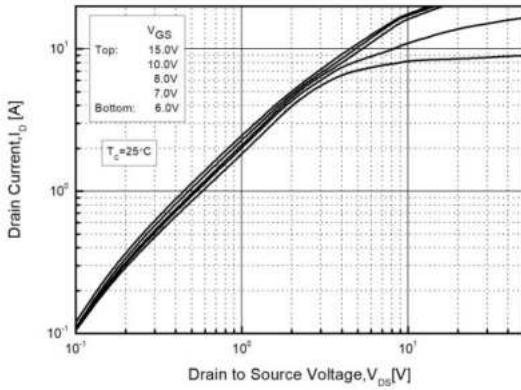


Fig. 2. Typical Transfer Characteristics

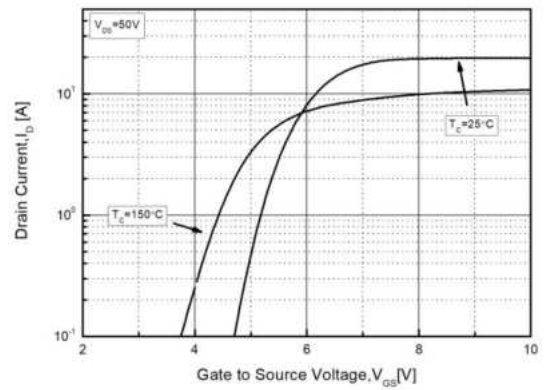


Fig. 3. Static on-Resistance vs.  $I_D$

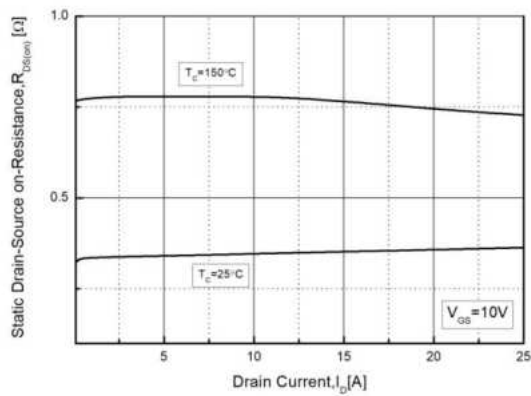


Fig. 4. Body Diode Forward Voltage vs.  $I_{DR}$

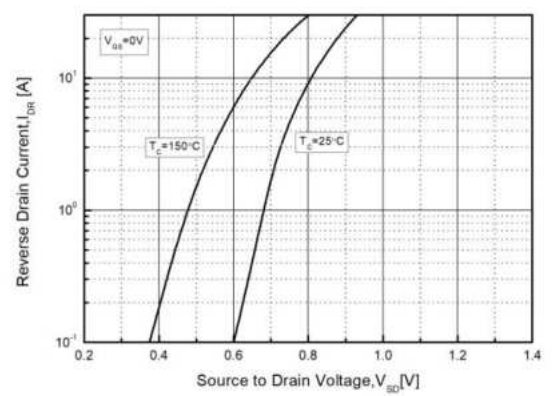


Fig. 5. Capacitance Characteristics

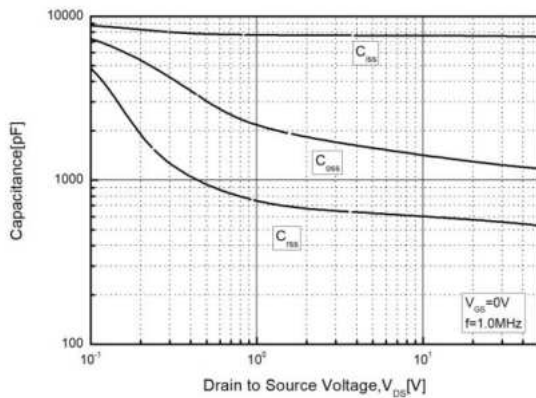
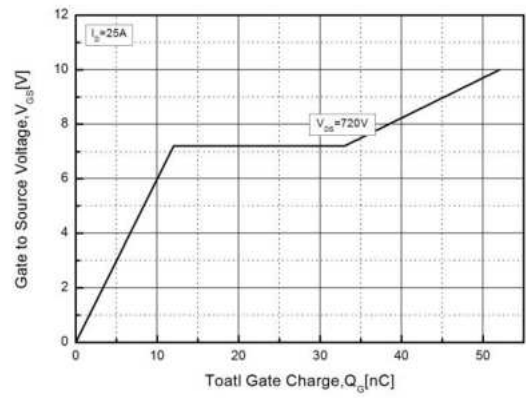


Fig. 6. Gate Charge Characteristics



## Typical Performance Characteristics

Fig. 7. Breakdown Voltage vs. Temperature

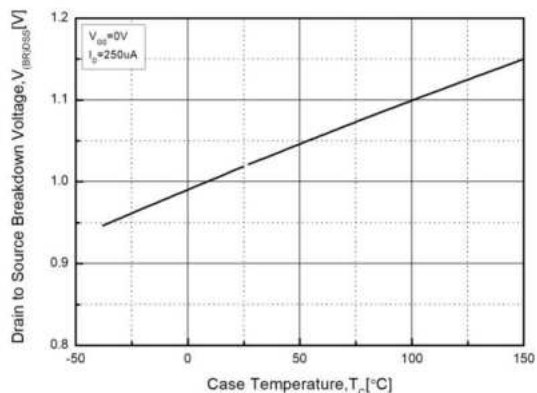


Fig. 8. Static on-Resistance vs. Temperature

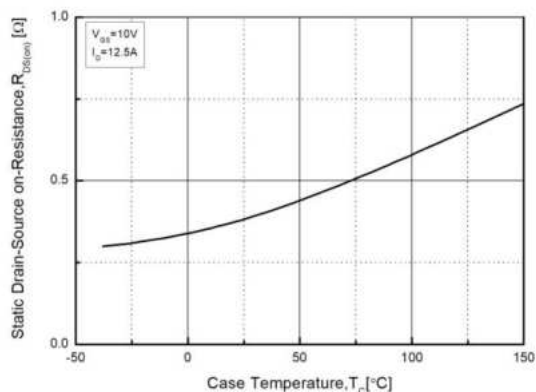


Fig. 9. Safe Operating Area

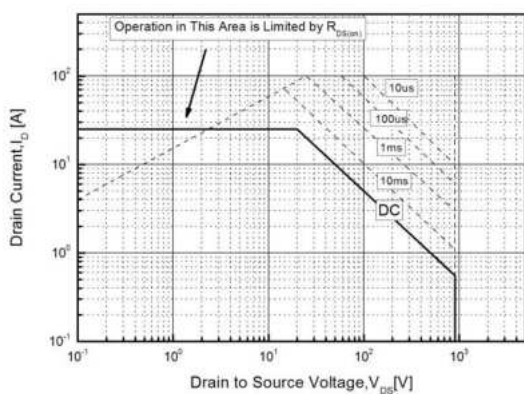


Fig. 10. Maximum Drain Current vs. Temperature

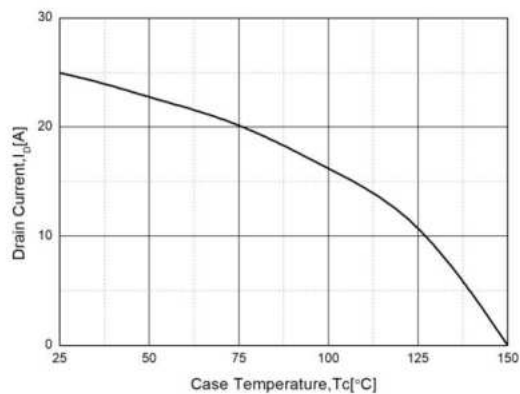
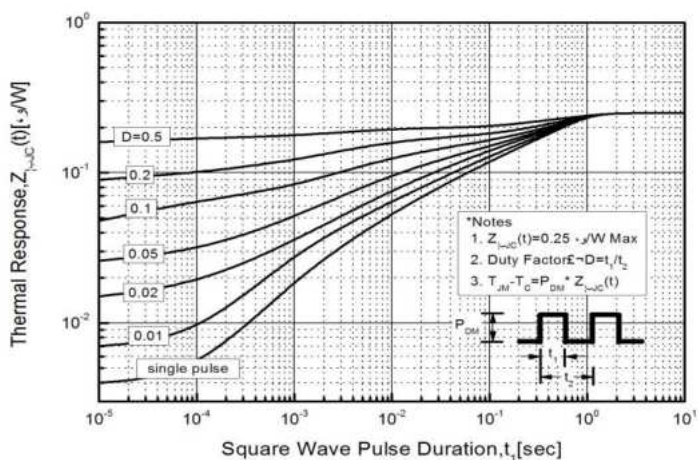


Fig. 11. Transient Thermal Response Curve



## Package Dimensions

### TO-264

(Dimensions in Millimeters)

