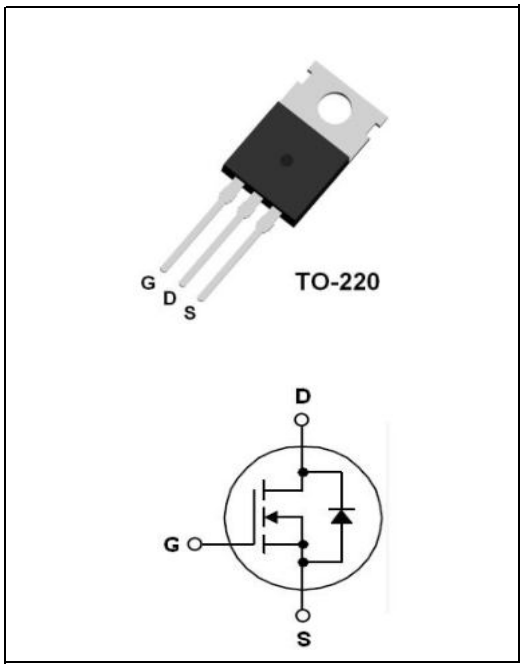
# 60V 210A N-Channel Trench MOSFET

## Description

The AKT210N06TT is an N-Channel enhancement mode power MOSFET and based on advanced trench technology, it has extremely low static on-resistance and high avalanche energy strength. This device provide excellent switching performance for switched mode power supplies.




## Features

- Advanced Trench Technology
- Typical on-Resistance:
  $R_{DS\ (on)}$=2.8mΩ @$V_{GS}$=10V, $I_D$=105A
- Rated Avalanche Energy
- RoHS Compliant

## Applications

- Switched Mode Power Supplies
- Motor Control
- Synchronous Rectification

## Absolute Maximum Ratings @$T_C$=25 ℃ unless otherwise noted

| Symbol | Parameter | | Ratings | Unit |
|---|---|---|---|---|
| $V_{DSS}$ | Drain to Source Voltage | | 60 | V |
| $V_{GSS}$ | Gate to Source Voltage | | ±25 | V |
| $I_D$ | Drain Current | $T_C$=25℃ | 210 | A |
| | | $T_C$=100℃ | 132 | A |
| $I_{DM}$ | Pulsed Drain Current (Note1) | | 840 | A |
| $P_D$ | Maximum Power Dissipation | $T_C$=25℃ | 220 | W |
| | Derate above 25℃ | | 1.67 | W/℃ |
| $E_{AS}$ | Single Pulsed Avalanche Energy (Note 2) | | 1082 | 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 | 0.6 | ℃/W |
| $R_{th\ (J-A)}$ | Thermal Resistance, Junction to Ambient | 45 | ℃/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 | 60 | - | - | V |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250uA | 2 | - | 4 | V |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V, $I_D$=105A | - | 2.8 | 4.2 | mΩ |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=$V_{DSS}$, $V_{GS}$=0V | - | - | 10 | uA |
| $I_{GSS}$ | Gate to Source Leakage Current | $V_{GS}$=$V_{GSS}$, $V_{DS}$=0V | - | - | ±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 | | - | - | 210 | A |
| $V_{SD}$ | Drain-Source Diode Forward Voltage | $V_{GS}$=0V, $I_S$=210A | - | 1.1 | 1.3 | V |
| $t_{rr}$ | Reverse Recovery Time | $V_{GS}$=0V, $I_S$=105A, di/dt=-100A/us | - | 46 | - | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | - | 48 | - | nC |

## Switching Characteristics @$T_C$=25 ℃ unless otherwise noted

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{d(on)}$ | Turn-on Delay Time | $I_D$=105A, $V_{DD}$=30V, $V_{GS}$=10V $R_G$=10Ω (Note 3) | - | 30.5 | - | ns |
| $t_r$ | Rising Time | | - | 29 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 95 | - | ns |
| $t_f$ | Falling Time | | - | 34.5 | - | ns |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$=30V, f=1.0MHz | - | 8500 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 1520 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 81 | - | pF |
| $Q_g$ | Total Gate Charge | $I_D$=105A, $V_{DD}$=30V $V_{GS}$=10V (Note 3) | - | 115 | - | nC |
| $Q_{gs}$ | Gate to Source Charge | | - | 39 | - | nC |
| $Q_{gd}$ | Gate to Drain Charge | | - | 28 | - | nC |

**Note:**

1. Repetitive rating: pulse-width limited by maximum junction temperature
2. $V_{DD}$=50V, L=500uH, $V_G$=10V
3. Essentially independent of operating temperature typical characteristics

## Typical Performance Characteristics

Fig. 1. Typical on-Resistance Characteristics

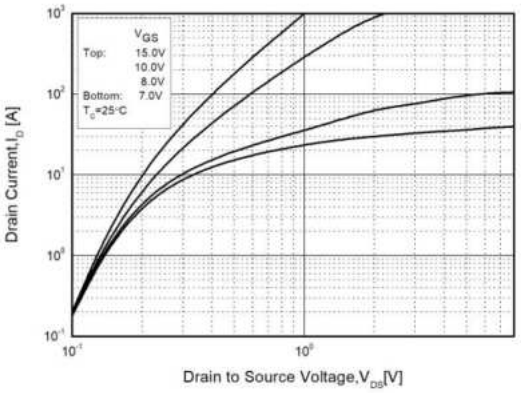



Fig. 2. Typical Transfer Characteristics

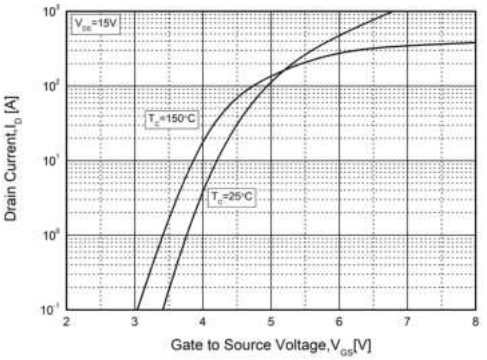



Fig. 3. Static on-Resistance vs. $I_D$

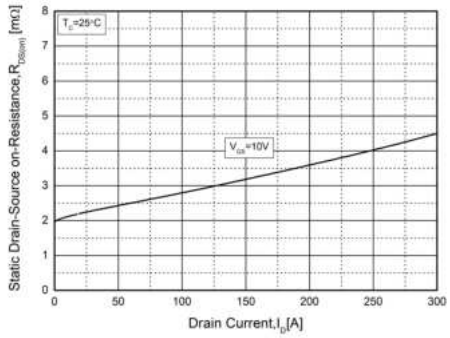



Fig. 4. Body Diode Forward Voltage vs. $I_{DR}$

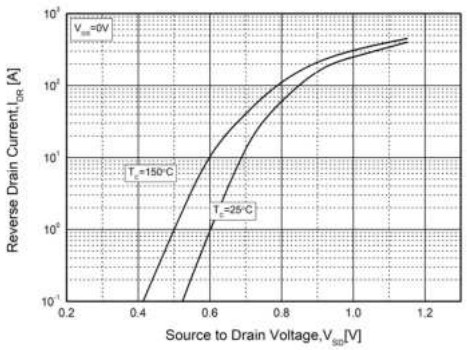



Fig. 5. Capacitance Characteristics

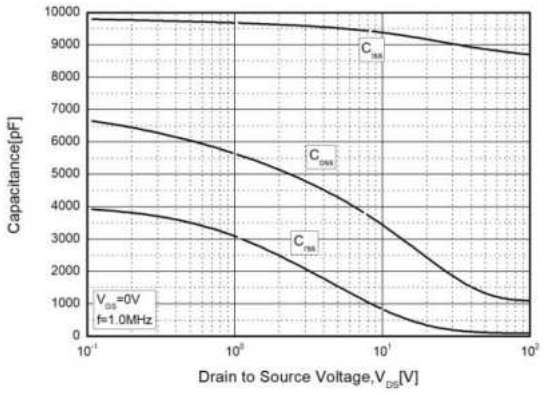
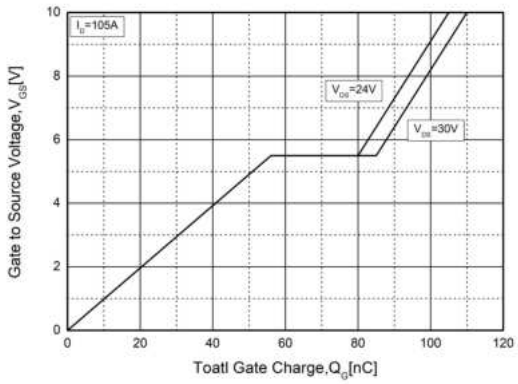



Fig. 6. Gate Charge Characteristics



## Typical Performance Characteristics

Fig. 7. Breakdown Voltage vs. Temperature

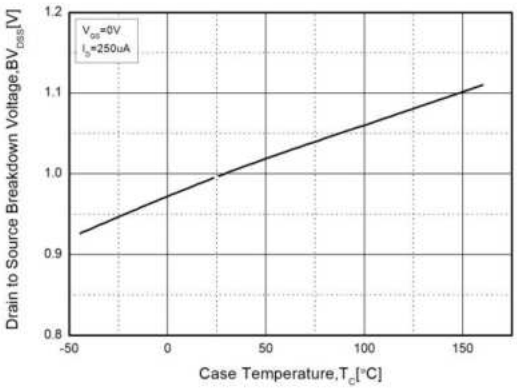



Fig. 8. Static on-Resistance vs. Temperature

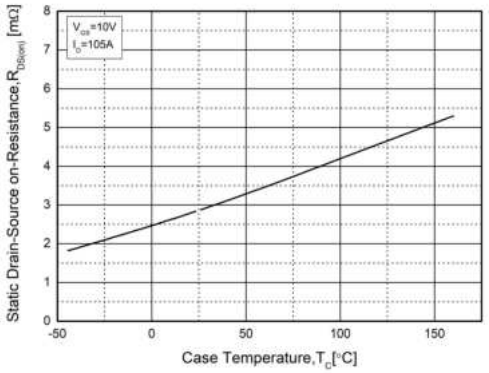



Fig. 9. Maximum Safe Operating Area

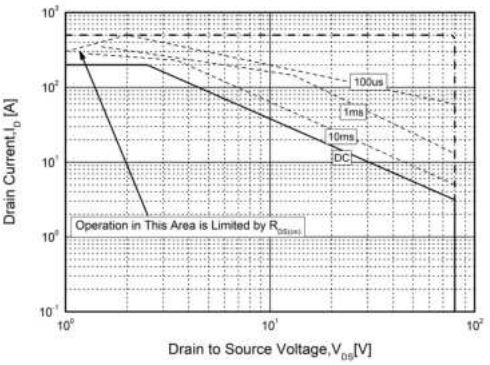



Fig. 10. Maximum Drain Current vs. Temperature

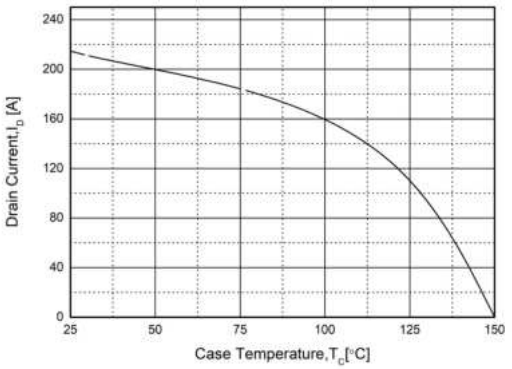
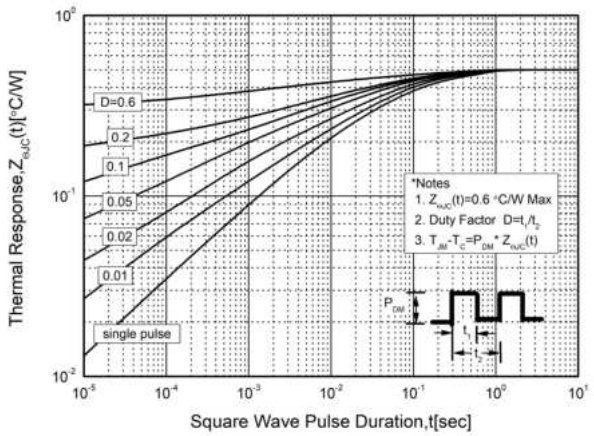



Fig. 11. Transient Thermal Response Curve



## Package Dimensions

**TO-220**

(Dimensions in Millimeters)