# AT06300K

## 60V N-Channel MOSFET

## Features

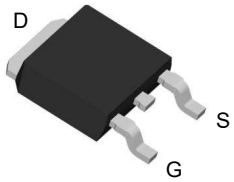
- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Green Device Available

## Product Summary

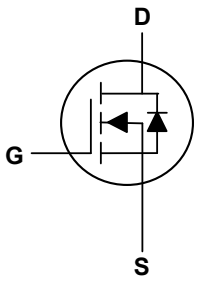
| | | |
|---|---|---|
| $V_{DS}$ | 60 | V |
| $I_D$ | 30 | A |
| $R_{DS(ON)}$ (at $V_{GS}$=10V) | 20 | mΩ |
| $R_{DS(ON)}$ (at $V_{GS}$=4.5V) | 40 | mΩ |

## Applications

- High Frequency Point-of-Load,Synchronous Buck Converter
- Networking DC-DC Power System
- Load Switch




**TO-252 Top View**




## Absolute Maximum Ratings($T_A$=25℃, unless otherwise noted)

| Parameter | Symbol | Rating | Units |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 60 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Continuous Drain Current[1] | $I_D$@$T_C$=25℃ | 30 | A |
| Continuous Drain Current[1] | $I_D$@$T_C$=100℃ | 25 | A |
| Continuous Drain Current[1] | $I_D$@$T_A$=25℃ | 25 | A |
| Continuous Drain Current[1] | $I_D$@$T_A$=70℃ | 20 | A |
| Pulsed Drain Current[2] | $I_{DM}$ | 90 | A |
| Total Power Dissipation[3] | $P_D$@$T_C$=25℃ | 20 | W |
| Total Power Dissipation[3] | $P_D$@$T_A$=25℃ | 2.1 | W |
| Storage Temperature Range | $T_{STG}$ | -55 to 150 | ℃ |
| Operating Junction Temperature Range | $T_J$ | -55 to 150 | ℃ |

## Thermal Characteristics

| Parameter | Symbol | Typ | Max | Unit |
|---|---|---|---|---|
| Thermal Resistance Junction-Ambient[1] | $R_{\theta JA}$ | --- | 62 | ℃/W |
| Thermal Resistance Junction-Case[1] | $R_{\theta JC}$ | --- | 2.1 | ℃/W |

## Electrical Characteristics ($T_J$=25℃, unless otherwise noted)

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V , $I_D$=250uA | 60 | --- | --- | V |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V , $I_D$=30A | --- | 18 | 20 | mΩ |
| | | $V_{GS}$=4.5V , $I_D$=25A | --- | 22 | 40 | mΩ |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | 1 | --- | 3 | V |
| Drain-Source Leakage Current | $I_{DSS}$ | $V_{DS}$=48V, $V_{GS}$=0V | --- | --- | 1 | uA |
| | | $V_{DS}$=48V, $V_{GS}$=0V, $T_J$=85℃ | --- | --- | 5 | uA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| Total Gate Charge | $Q_g$ | $V_{DS}$=30V , $V_{GS}$=10V , $I_D$=12A | --- | 9 | --- | nC |
| Gate-Source Charge | $Q_{gs}$ | | --- | 1.6 | --- | |
| Gate-Drain Charge | $Q_{gd}$ | | --- | 1.8 | --- | |
| Turn-On Delay Time | $T_{d(on)}$ | $V_{DS}$=30V , $V_{GS}$=10V , $R_G$=3Ω, $I_D$=5A | --- | 6 | --- | ns |
| Rise Time | $T_r$ | | --- | 4.6 | --- | |
| Turn-Off Delay Time | $T_{d(off)}$ | | --- | 22 | --- | |
| Fall Time | $T_f$ | | --- | 4 | --- | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=30V , $V_{GS}$=0V , f=1MHz | --- | 540 | --- | pF |
| Output Capacitance | $C_{oss}$ | | --- | 74 | --- | |
| Reverse Transfer Capacitance | $C_{rss}$ | | --- | 34 | --- | |

## Drain-Source Diode Characteristics

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Diode Forward Voltage[2] | $V_{SD}$ | $V_{GS}$=0V, $I_S$=1A | --- | 0.7 | 1.3 | V |

**Note:**

1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3.The power dissipation is limited by 150℃ junction temperature

## Typical Characteristics

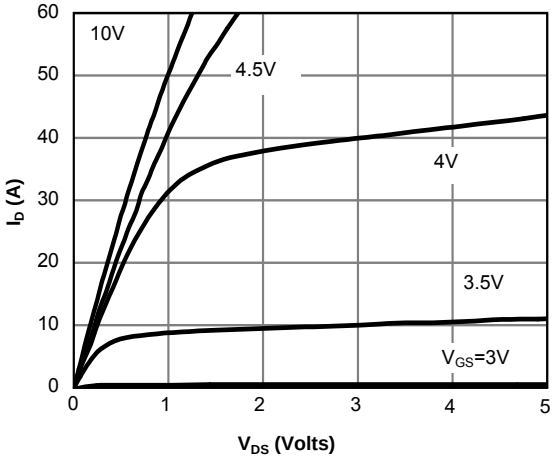



Fig 1: On-Region Characteristics

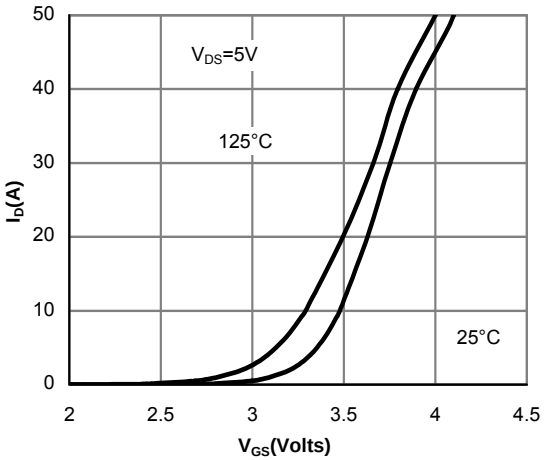



Figure 2: Transfer Characteristics

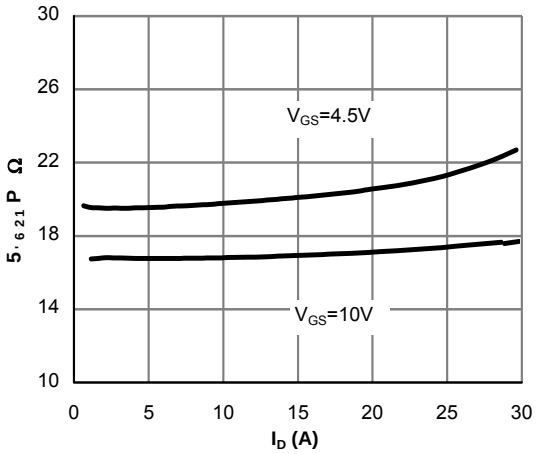



Figure 3: On-Resistance vs. Drain Current and Gate Voltage

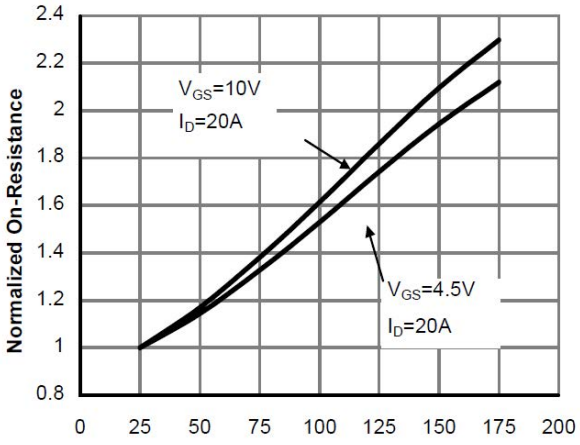



Figure 4: On-Resistance vs. Junction Temperature

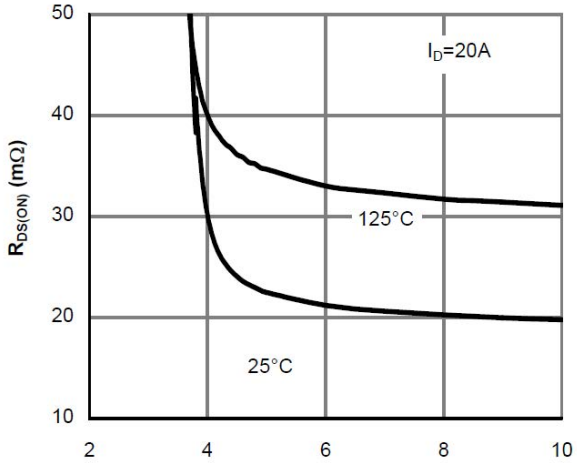



Figure 5: On-Resistance vs. Gate-Source Voltage

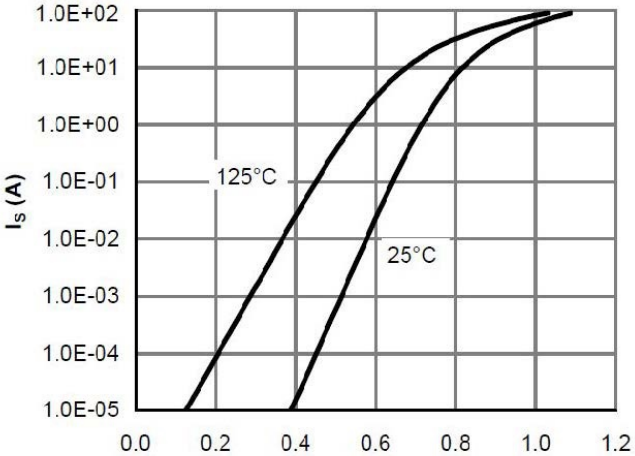



Figure 6: Body-Diode Characteristics

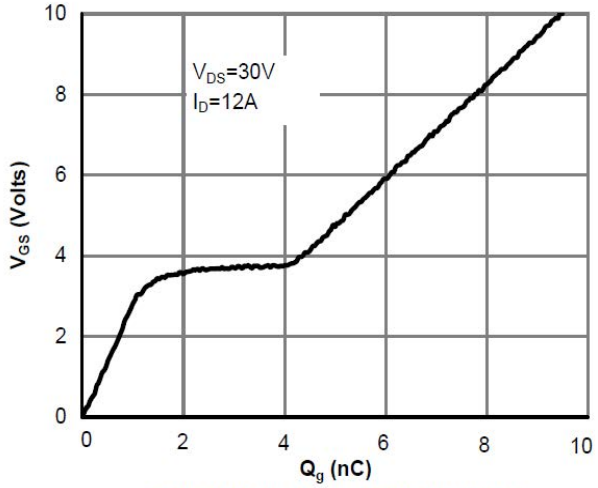



Figure 7: Gate-Charge Characteristics

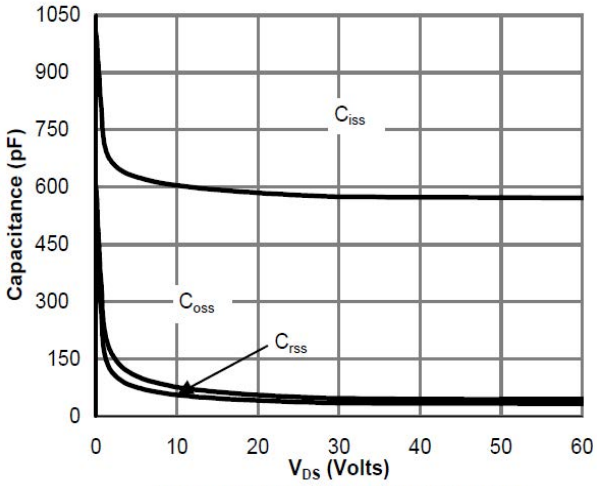



Figure 8: Capacitance Characteristics

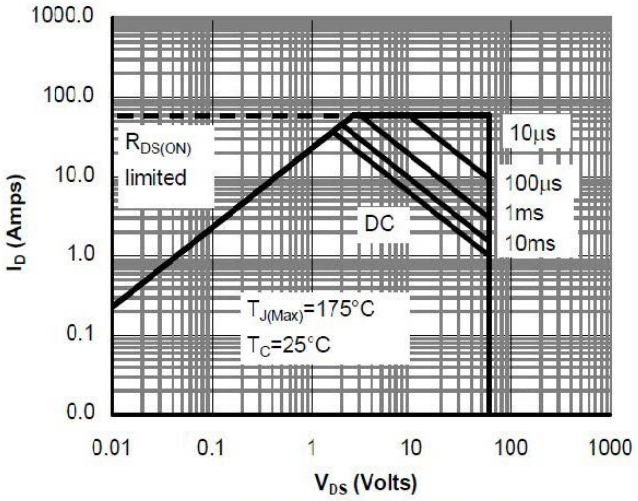



Figure 9: Maximum Forward Biased Safe Operating Area

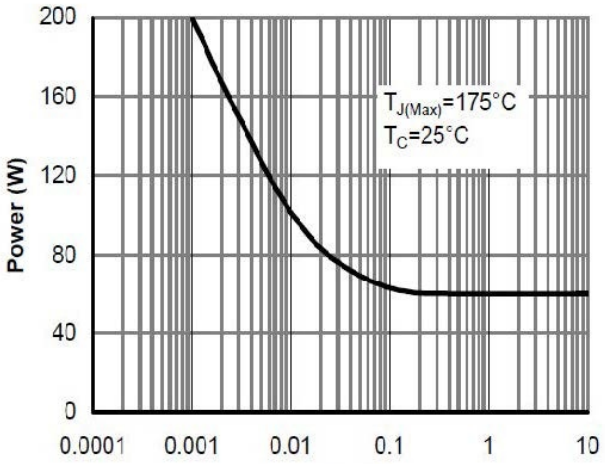



Figure 10: Single Pulse Power Rating Junction-to-Case

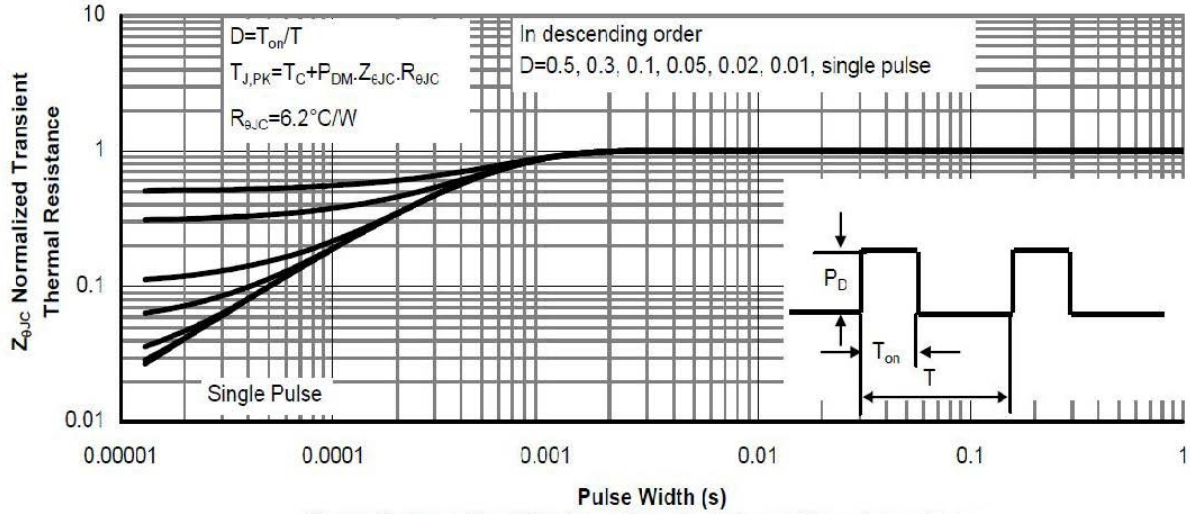
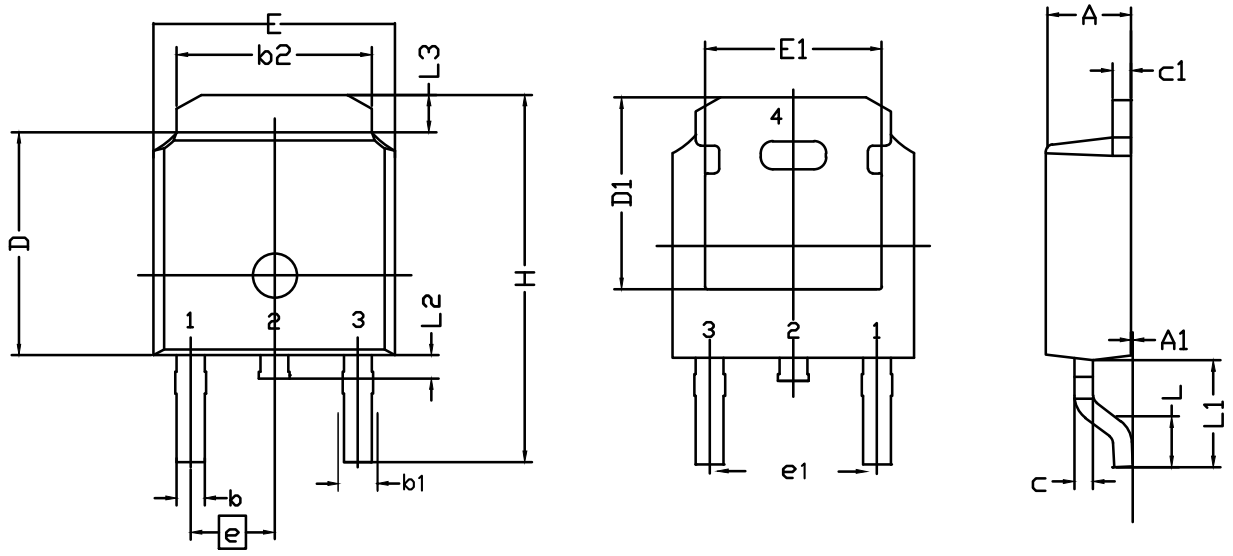



Figure 11: Normalized Maximum Transient Thermal Impedance

## TO-252 Package Outline Dimensions




| Symbol | Dimensions (unit:mm) | | | Symbol | Dimensions (unit:mm) | | |
|---|---|---|---|---|---|---|---|
| | Min | Typ | Max | | Min | Typ | Max |
| A | 2.20 | 2.30 | 2.38 | E | 6.40 | 6.60 | 6.731 |
| $A_1$ | 0.00 | 0.10 | 0.20 | $E_1$ | 4.40 | -- | -- |
| b | 0.64 | 0.76 | 0.89 | e | 2.286 BSC | | |
| $b_1$ | 0.77 | 0.85 | 1.14 | $e_1$ | 4.572 BSC | | |
| $b_2$ | 5.00 | 5.33 | 5.46 | H | 9.40 | 10.00 | 10.40 |
| c | 0.458 | 0.508 | 0.610 | L | 1.40 | 1.52 | 1.77 |
| $C_1$ | 0.458 | 0.508 | 0.620 | $L_1$ | -- | 2.743 | -- |
| D | 5.98 | 6.10 | 6.223 | $L_2$ | 0.60 | 0.80 | 1.01 |
| $D_1$ | 5.20 | 5.25 | 5.38 | $L_3$ | 0.90 | 1.06 | 1.25 |