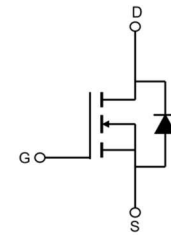


Feature

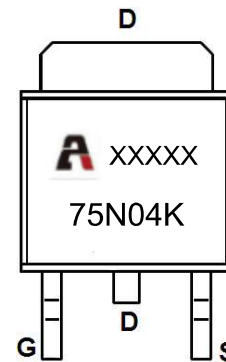
- 40V,60A
 $R_{DS(ON)} < 8.0m\ \Omega @ V_{GS}=10V$ TYP 5.8 m Ω
 $R_{DS(ON)} < 12m\ \Omega @ V_{GS}=4.5V$ TYP 9.0 m Ω
- Advanced Trench Technology
- Lead free product is acquired
- Excellent $R_{DS(ON)}$ and Low Gate Charge



Schematic Diagram

Application

- PWM applications
- Load Switch
- Power management



Marking and pin assignment

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity (PCS) |
|----------------|----------|----------------|-----------|------------|----------------|
| 75N04K | AP75N04K | TO-252 | 13 inch | - | 2500 |

ABSOLUTE MAXIMUM RATINGS ($T_a=25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|-----------------|-----------|---------------------------|
| Drain-Source Voltage | V_{DS} | 40 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current ($T_c = 25^\circ\text{C}$) | I_D | 60 | A |
| Continuous Drain Current ($T_c = 100^\circ\text{C}$) | I_D | 39 | A |
| Pulsed Drain Current ⁽¹⁾ | I_{DM} | 240 | A |
| Single Pulsed Avalanche Energy ⁽²⁾ | E_{AS} | 60 | mJ |
| Power Dissipation | P_D | 53 | W |
| Thermal Resistance from Junction to Case ⁽⁴⁾ | $R_{\theta JC}$ | 2.8 | $^\circ\text{C}/\text{W}$ |
| Junction Temperature | T_J | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{STG} | -55~ +150 | $^\circ\text{C}$ |

MOSFET ELECTRICAL CHARACTERISTICS($T_a=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|-----------------|---|-----|------|-----------|------------|
| Static Characteristics | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$ | 40 | - | - | V |
| Zero gate voltage drain current | I_{DSS} | $V_{DS} = 40V, V_{GS} = 0V$ | - | - | 1 | μA |
| Gate-body leakage current | I_{GSS} | $V_{GS} = \pm 20V, V_{DS} = 0V$ | - | - | ± 100 | nA |
| Gate threshold voltage ⁽³⁾ | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 1 | 1.5 | 2.5 | V |
| Drain-source on-resistance ⁽³⁾ | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 30A$ | - | 5.8 | 8.0 | m Ω |
| | | $V_{GS} = 4.5V, I_D = 20A$ | - | 9.0 | 12 | |
| Dynamic characteristics | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = 20V, V_{GS} = 0V, f = 1MHz$ | - | 2400 | - | pF |
| Output Capacitance | C_{oss} | | - | 190 | - | |
| Reverse Transfer Capacitance | C_{rss} | | - | 160 | - | |
| Switching characteristics | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = 30V, I_D = 25A, R_L = 1\Omega$ $V_{GS} = 10V, R_G = 3\Omega$ | - | 12 | - | ns |
| Turn-on rise time | t_r | | - | 70 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 50 | - | |
| Turn-off fall time | t_f | | - | 100 | - | |
| Total Gate Charge | Qg | $V_{DS} = 20V, I_D = 25A,$ $V_{GS} = 10V$ | - | 45 | - | nC |
| Gate-Source Charge | Qgs | | - | 8 | - | |
| Gate-Drain Charge | Qgd | | - | 10 | - | |
| Source-Drain Diode characteristics | | | | | | |
| Diode Forward voltage ⁽³⁾ | V_{DS} | $V_{GS} = 0V, I_S = 1A$ | - | - | 1.2 | V |
| Diode Forward current ⁽⁴⁾ | I_S | | - | - | 60 | A |
| Body Diode Reverse Recovery Time | t _{rr} | $T_J = 25^{\circ}$, $I_F = 30A, di/dt = 100A/\mu s$ | | 15 | | ns |
| Body Diode Reverse Recovery Charge | Q _{rr} | $T_J = 25^{\circ}$, $I_F = 30A, di/dt = 100A/\mu s$ | | 9 | | nc |

Notes:

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: $T_J = 25^{\circ}\text{C}, V_{DD} = 20V, R_G = 25\Omega, L = 0.5\text{mH}$
3. Pulse Test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
4. Surface Mounted on FR4 Board, $t \leq 10\text{ sec}$

Test Circuit

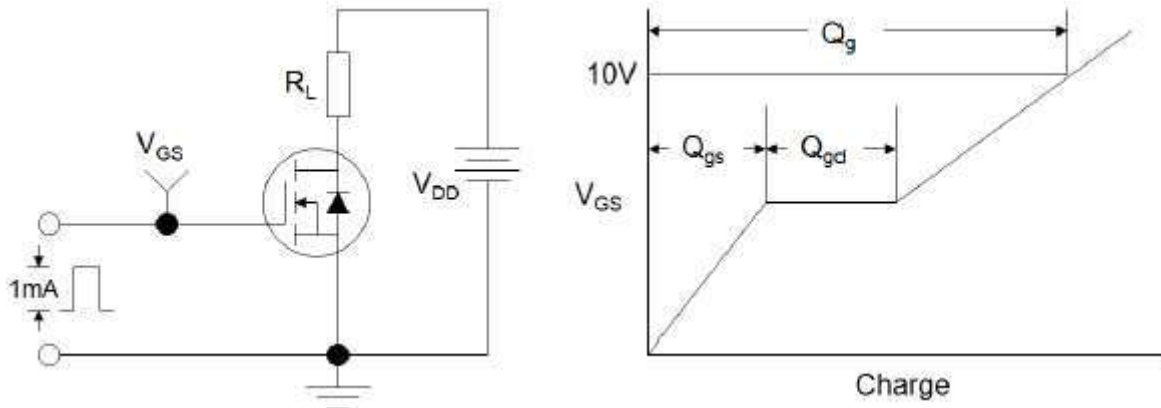


Figure1:Gate Charge Test Circuit & Waveform

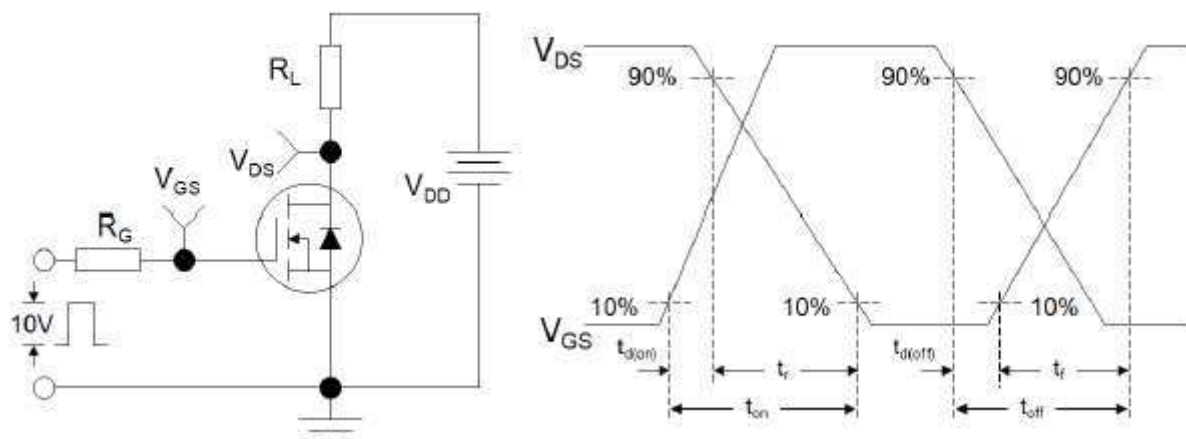


Figure 2: Resistive Switching Test Circuit & Waveforms

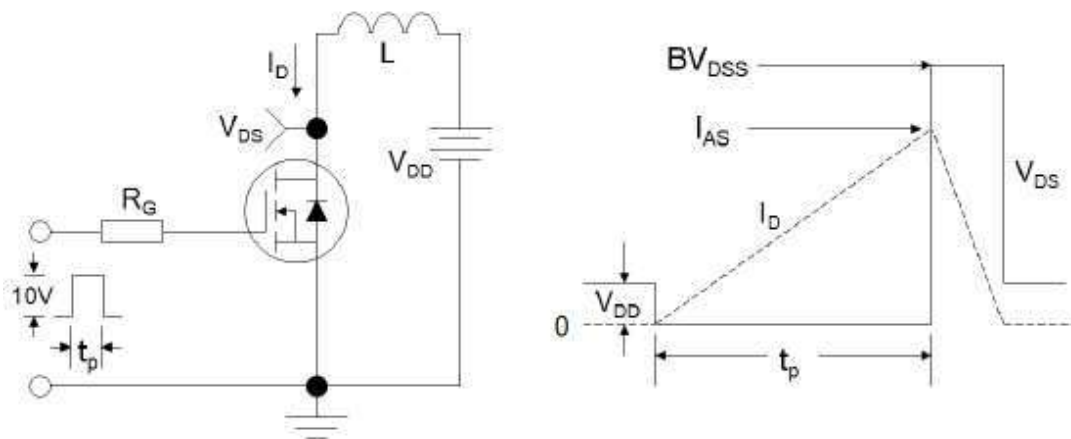


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Typical Performance Characteristics

Figure 1: Output Characteristics

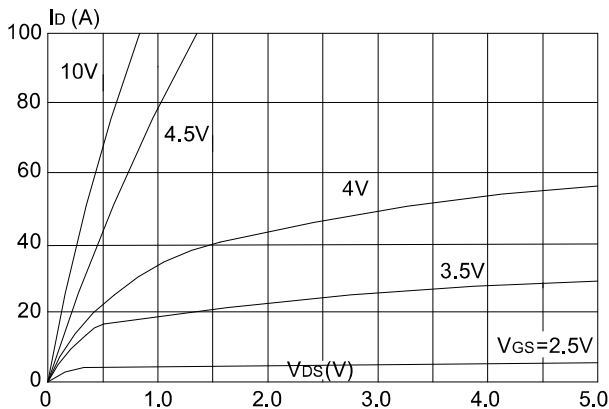


Figure 2: Typical Transfer Characteristics

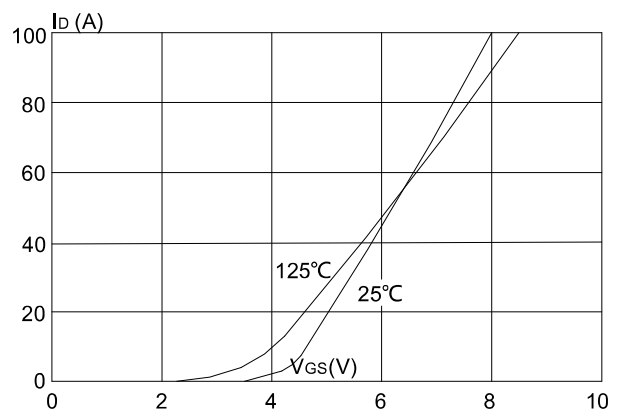


Figure 3: On-resistance vs. Drain Current

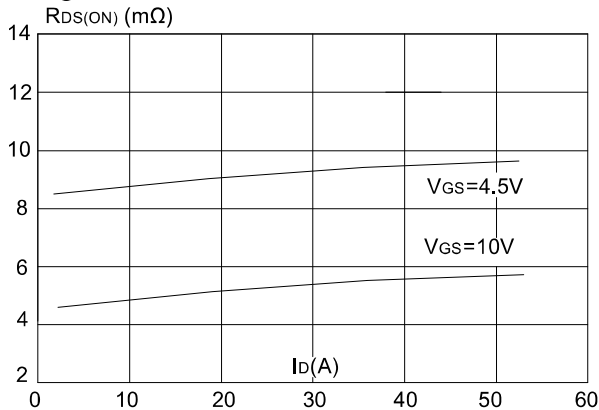


Figure 4: Body Diode Characteristics

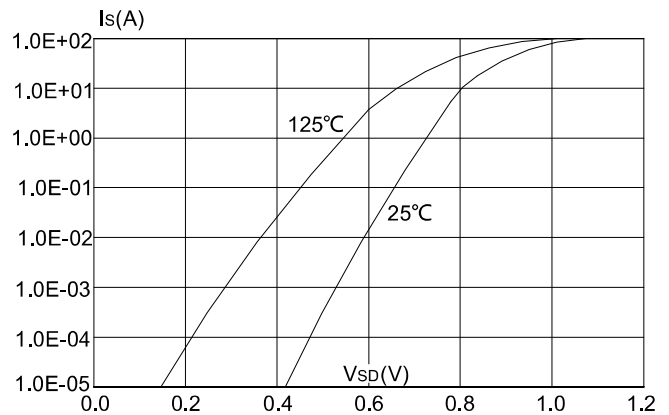


Figure 5: Gate Charge Characteristics

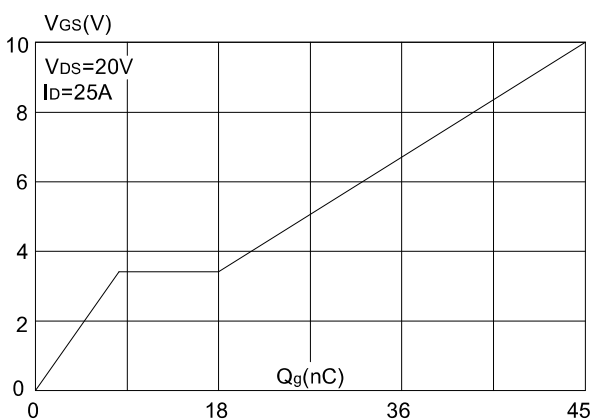


Figure 6: Capacitance Characteristics

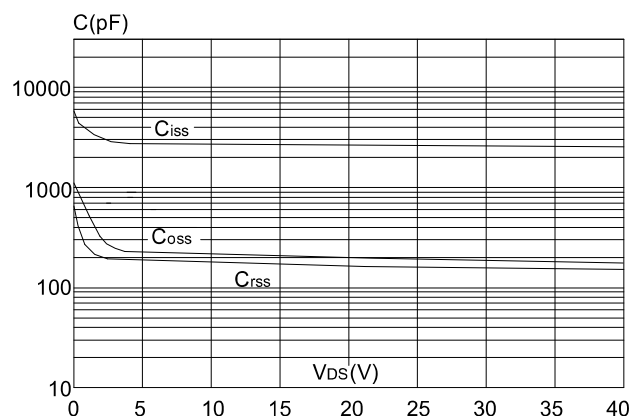


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

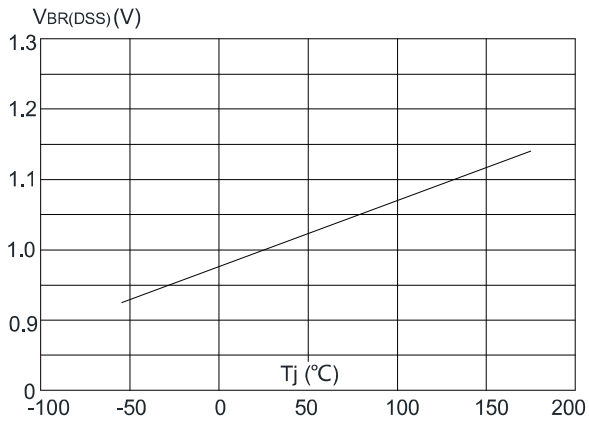


Figure 8: Normalized on Resistance vs. Junction Temperature

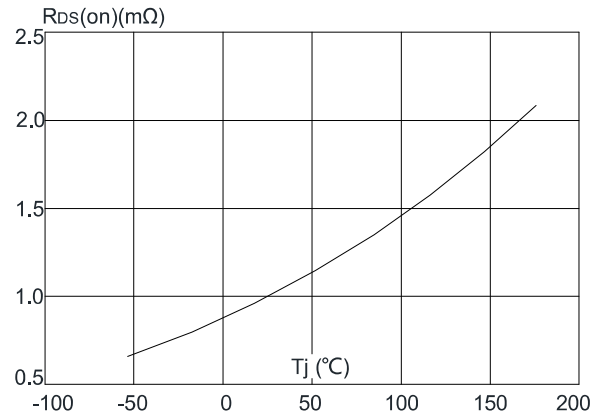


Figure 9: Maximum Safe Operating Area

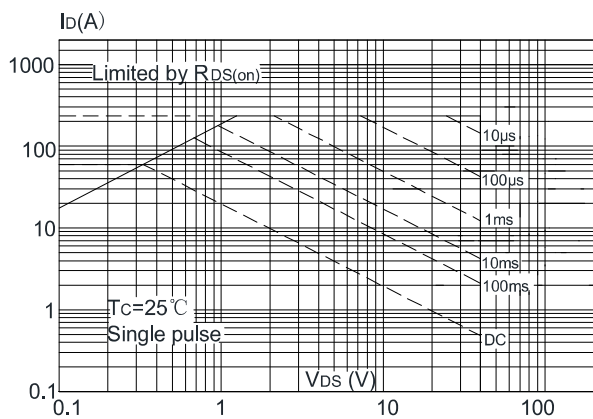


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

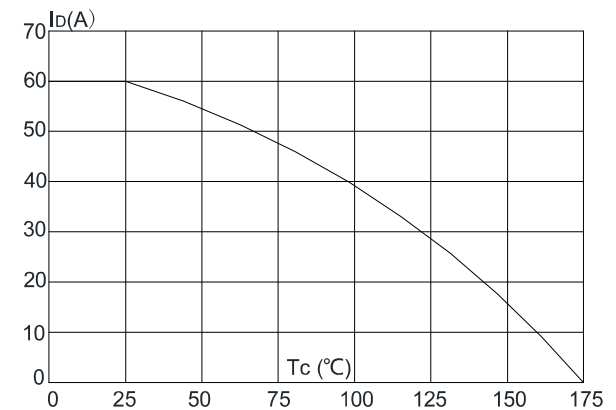
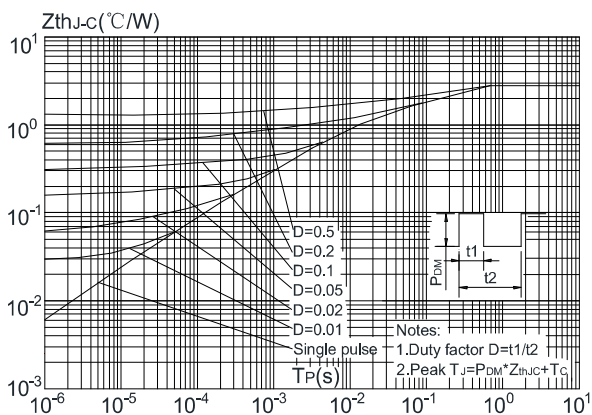
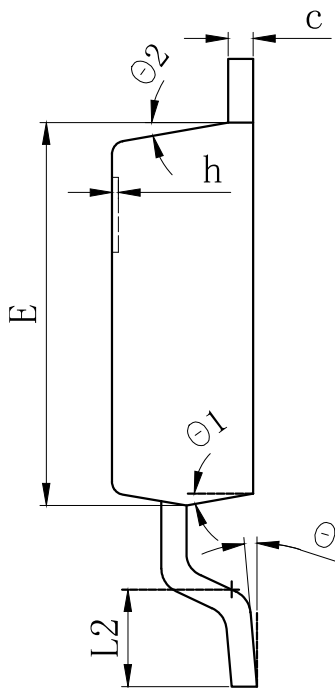
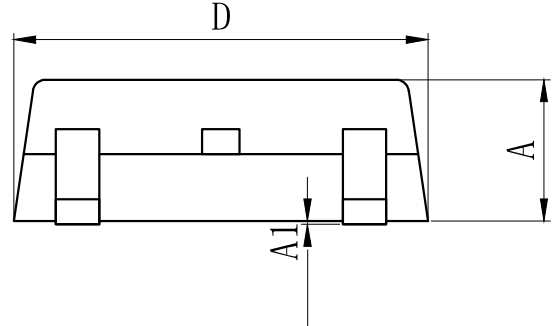
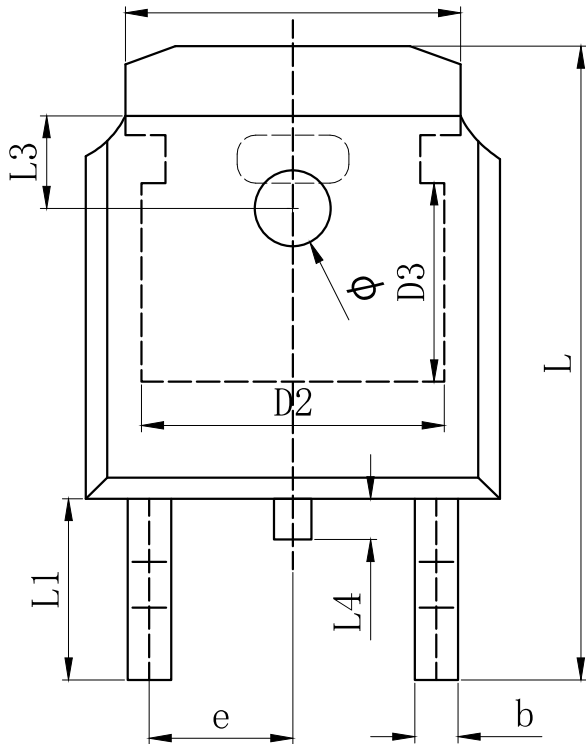


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



TO-252 Package Information



| SYMBOL | MILLIMETER | | |
|---------|------------|--------|--------|
| | MIN | Typ. | MAX |
| A | 2.200 | 2.300 | 2.400 |
| A1 | 0.000 | | 0.127 |
| b | 0.640 | 0.690 | 0.740 |
| c(电镀后) | 0.460 | 0.520 | 0.580 |
| D | 6.500 | 6.600 | 6.700 |
| D1 | 5.334 REF | | |
| D2 | 4.826 REF | | |
| D3 | 3.166 REF | | |
| E | 6.000 | 6.100 | 6.200 |
| e | 2.286 TYP | | |
| h | 0.000 | 0.100 | 0.200 |
| L | 9.900 | 10.100 | 10.300 |
| L1 | 2.888 REF | | |
| L2 | 1.400 | 1.550 | 1.700 |
| L3 | 1.600 REF | | |
| L4 | 0.600 | 0.800 | 1.000 |
| phi | 1.100 | 1.200 | 1.300 |
| theta | 0° | | 8° |
| theta 1 | 9° TYP | | |
| theta 2 | 9° TYP | | |