

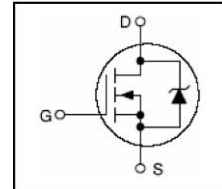
N-Channel Enhancement Mode Field Effect Transistor

Features

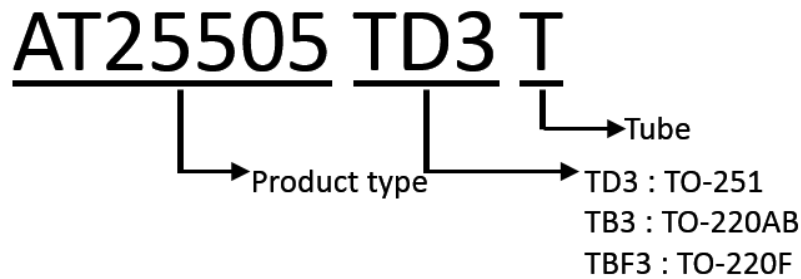
| | | |
|---------------|--------------|-------|
| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | I_D |
| 500V | 1.25Ω | 5A |

Application

- High efficiency switch mode power supplies
- Electronic lamp ballasts based on half bridge
- UPS



Order information:



ABSOLUTE MAXIMUM RATINGS

| PARAMETERS/TEST CONDITIONS | SYMBOL | LIMITS | UNITS |
|---|----------------|------------|-------|
| Drain-Source Voltage | V_{DS} | 500 | V |
| Drain Current –continuous @25°C | I_D | 5 | A |
| Drain Current –continuous @100°C | I_D | 3 | A |
| Pulsed Drain Current ¹ | I_{DM} | 20 | A |
| Gate-Source Voltage | V_{GS} | ±30 | V |
| Single Pulse Avalanche ² | E_{AS} | 135 | mJ |
| Pulsed Avalanche Rating ² | I_{AS} | 5 | A |
| Operating Junction & Storage Temperature | T_j, T_{stg} | -55 to 150 | °C |
| Lead Temperature (¹ / ₁₆ " from case for 10sec.) | T_L | 300 | °C |

Note:

1. Pulse width limited by maximum junction temperature.
2. $V_{DD} = 50V, V_{DS} = 500V, R_G = 25 \Omega, T_J: 25^\circ C$

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ELECTRICAL CHARACTERISTICS

| PARAMETER | SYMBOL | TEST CONDITIONS | LIMITS | | | UNIT |
|---|-----------------|---|--------|------|-----------|--------------|
| | | | MIN | TYP | MAX | |
| STATIC | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$ | 500 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 3.0 | | 4.5 | |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0V, V_{GS} = \pm 30V$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 500V, V_{GS} = 0V$ | | | 1 | μA |
| | | $V_{DS} = 500V, V_{GS} = 0V, T_J = 150^\circ C$ | | | 10 | |
| On-State Drain Current | $R_{DS(ON)}$ | $V_{GS} = 10V, I_D = 2.5A$ | | 1.25 | 1.5 | Ω |
| Forward Transconductance | G_{FS} | $V_{DS} = 40V, I_D = 3A$ | | 5.1 | | S |
| DYNAMIC | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0V, V_{DS} = 25V, f = 1MHz$ | | 782 | | pF |
| Output Capacitance | C_{oss} | | | 56 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 26 | | |
| Total Gate Charge | Q_g | $V_{DD} = 500V, I_D = 5A, V_{GS} = 10V$ | | 16 | | nC |
| Gate-Source Charge | Q_{gs} | | | 6 | | |
| Gate-Drain Charge | Q_{gd} | | | 7.7 | | |
| SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ($T_C = 25^\circ C$) | | | | | | |
| Continuous Current | I_S | | | | 5 | A |
| Forward Voltage | V_{SD} | $I_F = I_S, V_{GS} = 0V$ | | | 1.5 | V |
| Reverse Recovery Time | t_{rr} | $I_S = 5A, di_F/dt = 100A / \mu S$ | | 295 | | nS |
| Reverse Recovery Charge | Q_{rr} | $V_{GS} = 0V$ | | 1.7 | | μC |
| THERMAL DATA | | | | | | |
| Thermal Resistance Junction to Case | $R_{\theta JC}$ | AT25505 (TO-251) | | | 2.4 | $^\circ C/W$ |
| | | AT25505 (TO-220AB) | | | 1.8 | $^\circ C/W$ |
| | | AT25513 (TO-220F) | | | 3.8 | $^\circ C/W$ |
| Thermal Resistance Junction to Ambient | $R_{\theta JA}$ | AT25505 (TO-251) | | | 100 | $^\circ C/W$ |
| | | AT25513 (TO-220AB) | | | 62.5 | $^\circ C/W$ |
| | | AT25513 (TO-220F) | | | 62.5 | $^\circ C/W$ |

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Typical Characteristics

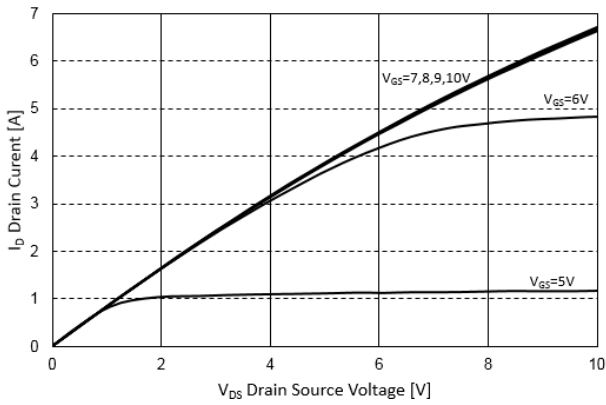


Figure 1. On-Region Characteristics

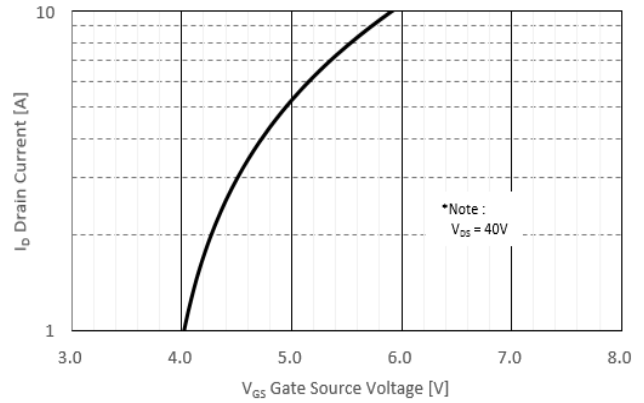


Figure 2. G_{FS} Characteristics

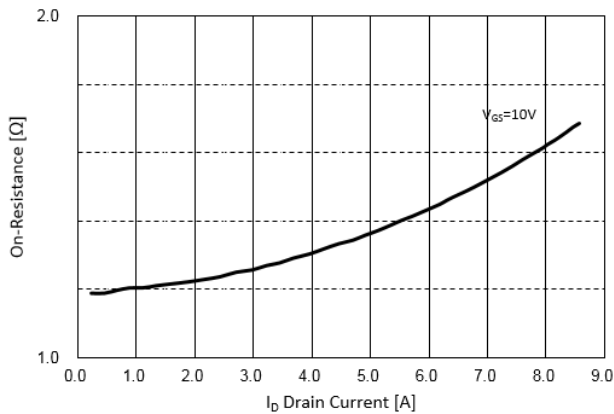


Figure 3. On-Resistance Variation vs Drain Current

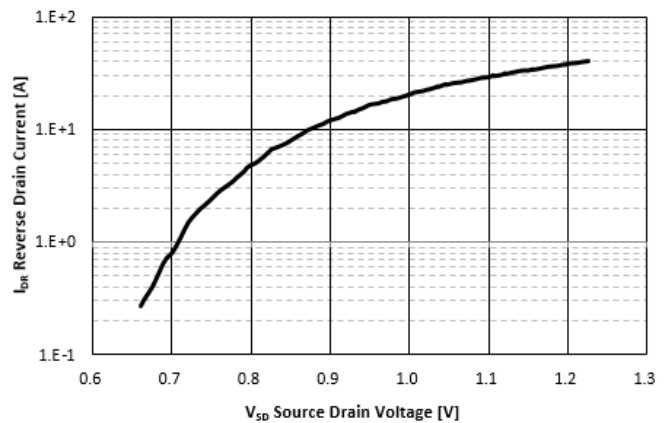


Figure 4. Body diode Forward Voltage

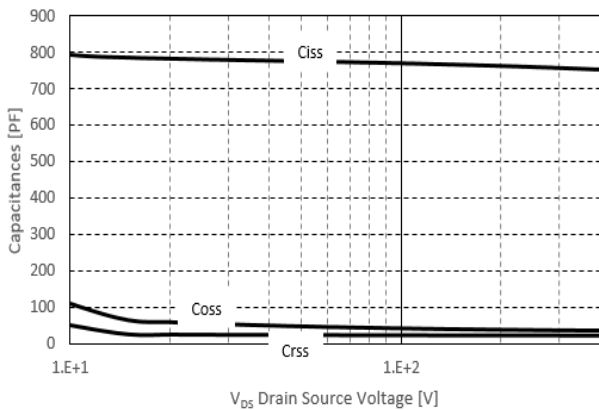


Figure 5. Capacitance Characteristics

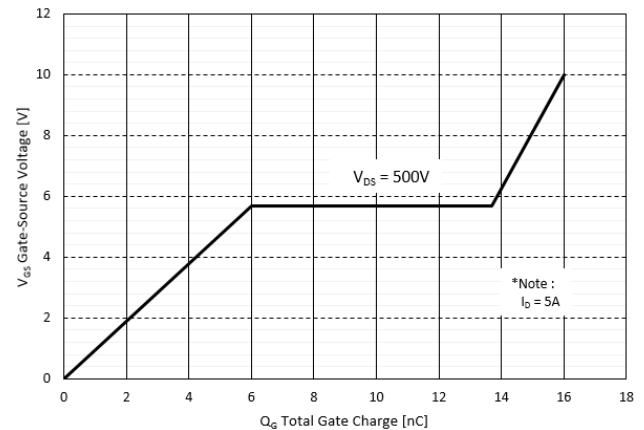
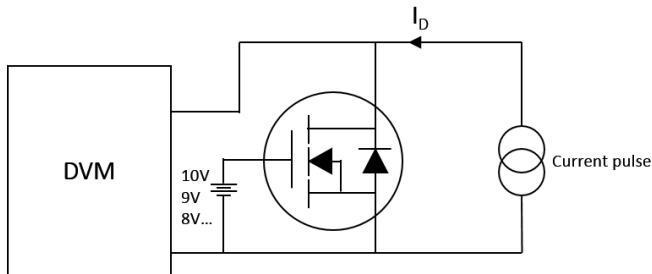


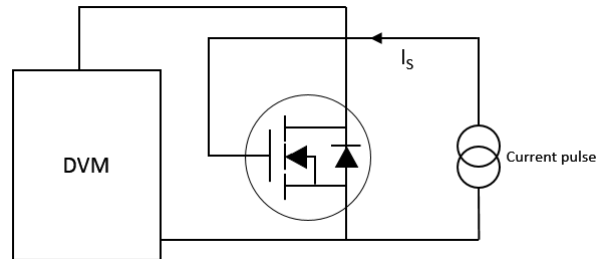
Figure 6. Gate Charge Characteristics

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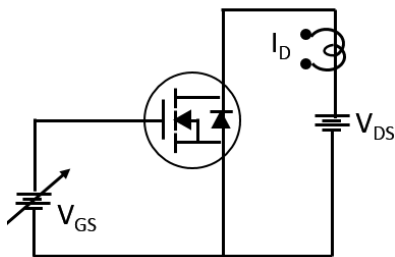
On-Region Characteristics Test Circuit



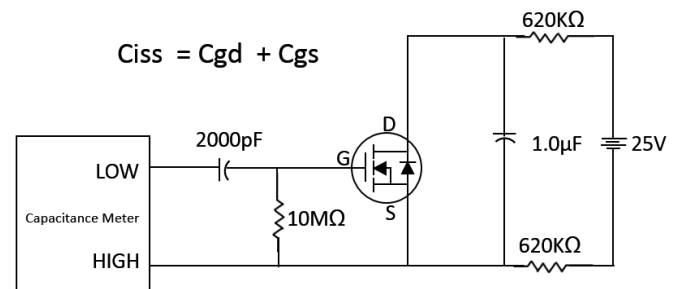
V_{SD} Characteristics Test Circuit



G_{FS} Characteristics Test Circuit

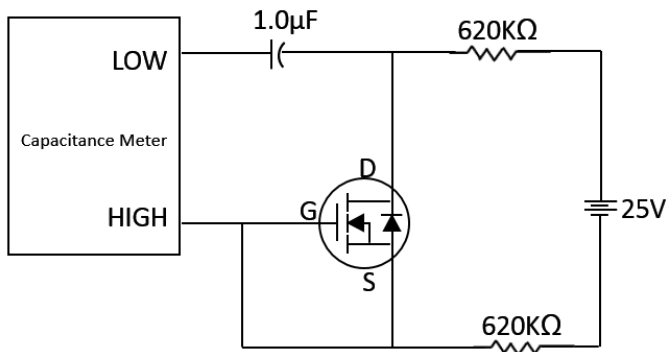


Input Capacitance Characteristics Test Circuit



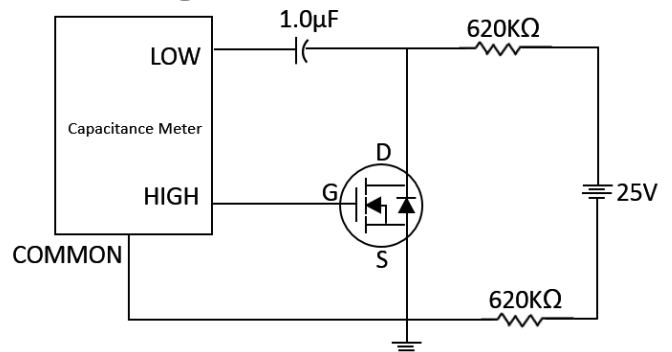
Output Capacitance Characteristics Test Circuit

$$C_{oss} = C_{gd} + C_{ds}$$



Reverse Capacitance Characteristics Test Circuit

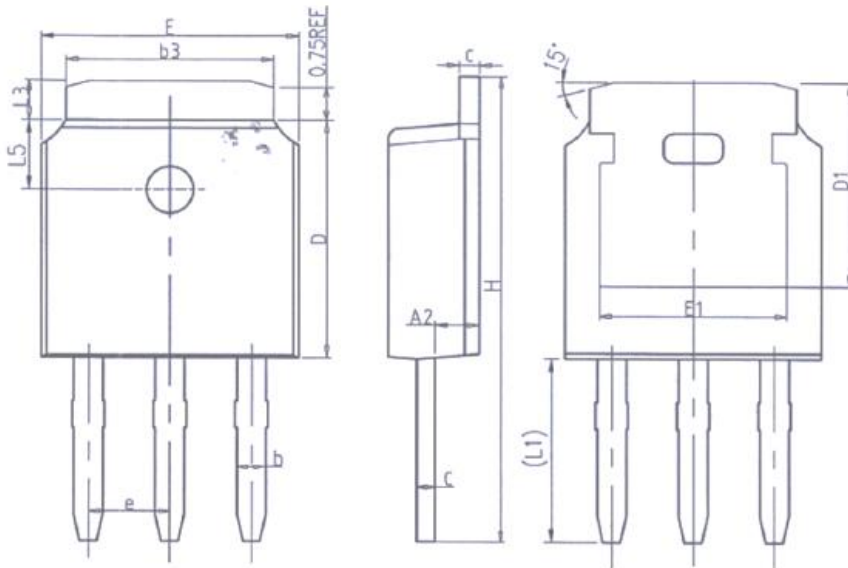
$$C_{rss} = C_{gd}$$



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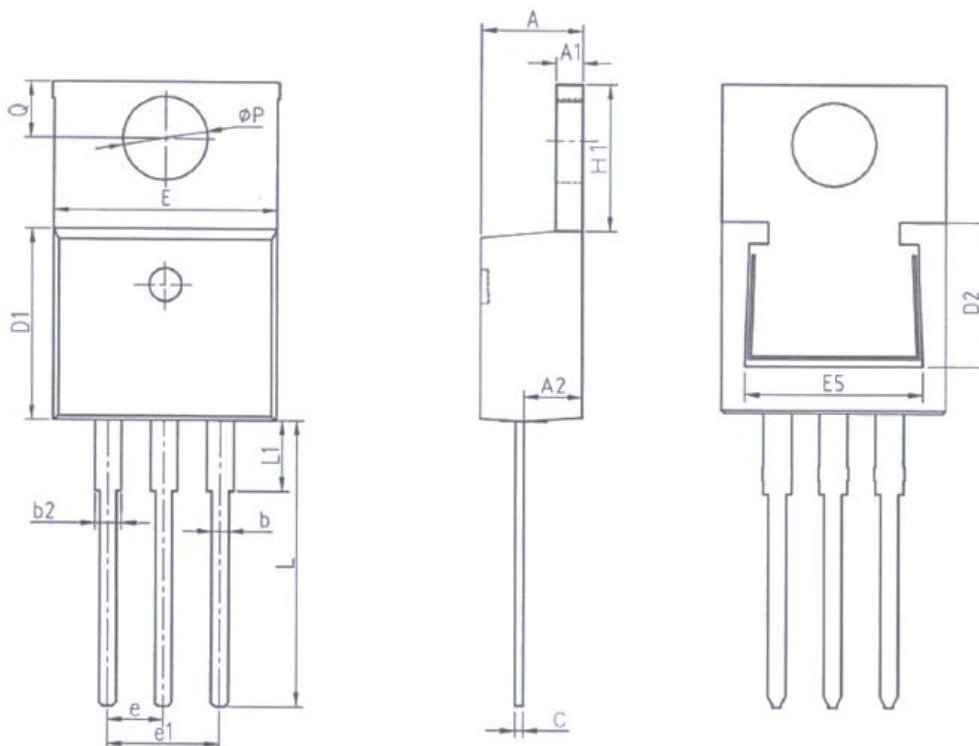
Mechanical Dimensions

TO-251



| SYMBOL | MM | | |
|--------|----------|-------|-------|
| | MIN | NOM | MAX |
| A | 2.20 | 2.30 | 2.40 |
| A2 | 0.97 | 1.07 | 1.17 |
| b | 0.68 | 0.78 | 0.90 |
| b3 | 5.20 | 5.33 | 5.50 |
| c | 0.43 | 0.53 | 0.63 |
| D | 5.98 | 6.10 | 6.22 |
| D1 | 5.30REF | | |
| E | 6.40 | 6.60 | 6.80 |
| E1 | 4.63 | - | - |
| e | 2.286BSC | | |
| H | 10.00 | 11.22 | 11.44 |
| L1 | 3.90 | 4.10 | 4.30 |
| L3 | 0.88 | 1.02 | 1.28 |
| L5 | 1.65 | 1.80 | 1.95 |

TO-220AB

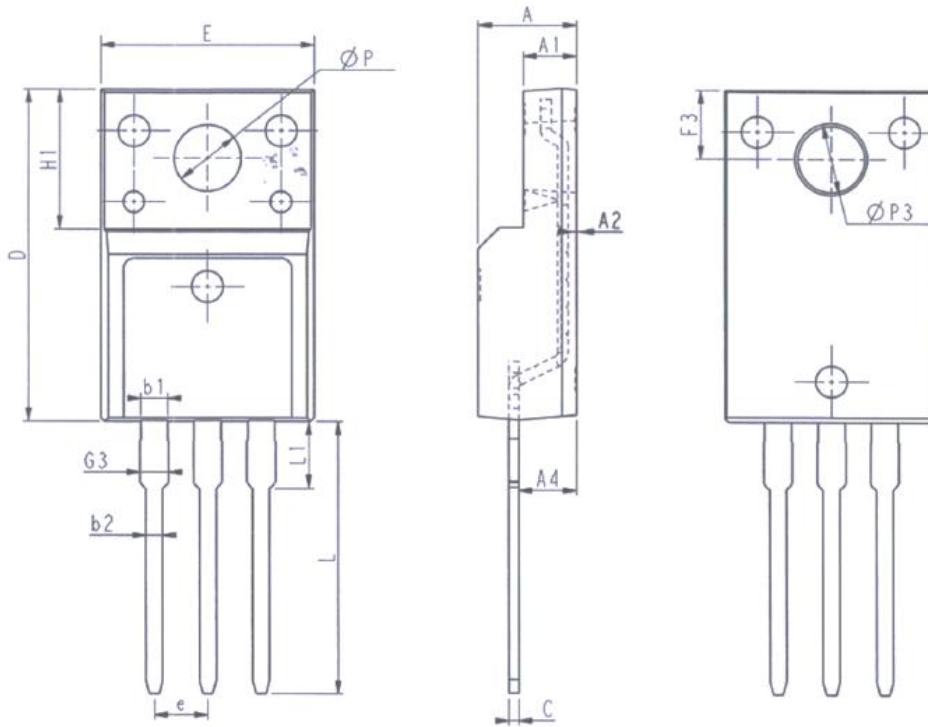


| SYMBOL | MM | | |
|--------|----------|-------|-------|
| | MIN | NOM | MAX |
| A | 4.37 | 4.57 | 4.77 |
| A1 | 1.22 | 1.27 | 1.42 |
| A2 | 2.49 | 2.69 | 2.89 |
| b | 0.75 | 0.81 | 0.96 |
| b2 | 1.22 | 1.27 | 1.47 |
| c | 0.30 | 0.38 | 0.48 |
| D1 | 8.50 | 8.70 | 8.90 |
| D2 | 5.20 | - | - |
| E | 9.86 | 10.16 | 10.36 |
| E5 | 7.06 | - | - |
| e | 2.54 BSC | | |
| e1 | 5.08 BSC | | |
| H1 | 6.10 | 6.30 | 6.50 |
| L | 13.10 | 13.40 | 13.70 |
| L1 | - | 3.75 | 4.10 |
| ΦP | 3.70 | 3.84 | 3.99 |
| Q | 2.54 | 2.74 | 2.94 |

N-Channel Enhancement Mode Field Effect Transistor

Mechanical Dimensions

TO-220F



| SYMBOL | MM | | |
|--------|---------|-------|-------|
| | MIN | NOM | MAX |
| E | 9.96 | 10.16 | 10.36 |
| A | 4.50 | 4.70 | 4.90 |
| A1 | 2.34 | 2.54 | 2.74 |
| A2 | 0.30 | 0.45 | 0.60 |
| A4 | 2.56 | 2.76 | 2.96 |
| c | 0.40 | 0.50 | 0.65 |
| D | 15.57 | 15.87 | 16.17 |
| H1 | 6.70REF | | |
| e | 2.54BSC | | |
| L | 12.68 | 12.98 | 13.28 |
| L1 | 2.93 | 3.03 | 3.13 |
| ØP | 3.03 | 3.18 | 3.38 |
| ØP3 | 3.15 | 3.45 | 3.65 |
| F3 | 3.15 | 3.30 | 3.45 |
| G3 | 1.25 | 1.35 | 1.55 |
| b1 | 1.18 | 1.28 | 1.43 |
| b2 | 0.70 | 0.80 | 0.95 |