

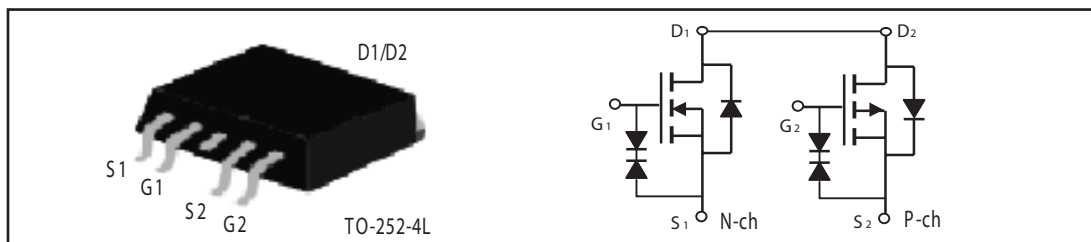


STU407DH

Dual Enhancement Mode Field Effect Transistor (N and P Channel)

| PRODUCT SUMMARY (N-Channel) | | |
|-----------------------------|----------------|--------------------------------|
| V _{DSS} | I _D | R _{DS(ON)} (mΩ) Max |
| 40V | 16A | 29 @ V _{GS} = 10V |
| | | 39 @ V _{GS} = 4.5V |

| PRODUCT SUMMARY (P-Channel) | | |
|-----------------------------|----------------|--------------------------------|
| V _{DSS} | I _D | R _{DS(ON)} (mΩ) Max |
| -40V | -12A | 47 @ V _{GS} = -10V |
| | | 64 @ V _{GS} = -4.5V |



ABSOLUTE MAXIMUM RATINGS (T_A=25°C unless otherwise noted)

| Parameter | | Symbol | N-Channel | P-Channel | Unit |
|--|-----------------------|-----------------------------------|------------|-----------|------|
| Drain-Source Voltage | | V _{DS} | 40 | -40 | V |
| Gate-Source Voltage | | V _{GS} | ±20 | ±20 | V |
| Drain Current-Continuous @ T _c | 25°C | I _D | 16 | -12 | A |
| | 70°C | | 13.8 | -10 | A |
| -Pulsed ^a | | I _{DM} | 50 | -50 | A |
| Drain-Source Diode Forward Current | | I _S | 8 | -6 | A |
| Maximum Power Dissipation | T _c = 25°C | P _D | 11 | | W |
| | T _c = 70°C | | 7.7 | | |
| Operating Junction and Storage Temperature Range | | T _J , T _{STG} | -55 to 175 | | °C |

THERMAL CHARACTERISTICS

| | | | |
|---|------------------|------|------|
| Thermal Resistance, Junction-to-Case | R _{θJC} | 13.6 | °C/W |
| Thermal Resistance, Junction-to-Ambient | R _{θJA} | 120 | °C/W |

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N-Channel ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ ^c | Max | Unit |
|--|--------------|--|-----|------------------|----------|---------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 40 | | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=32V, V_{GS}=0V$ | | | 1 | μA |
| Gate-Body Leakage | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | | | ± 10 | μA |
| ON CHARACTERISTICS^a | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1 | 1.8 | 3 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=8A$ | | 21 | 29 | m ohm |
| | | $V_{GS}=4.5V, I_D=6A$ | | 29 | 39 | m ohm |
| On-State Drain Current | $I_{D(ON)}$ | $V_{DS}=5V, V_{GS}=4.5V$ | 20 | | | A |
| Forward Transconductance | g_{FS} | $V_{DS}=10V, I_D=8A$ | | 15 | | S |
| DYNAMIC CHARACTERISTICS^b | | | | | | |
| Input Capacitance | C_{ISS} | $V_{DS}=20V, V_{GS}=0V$ $f=1.0MHz$ | | 735 | | μF |
| Output Capacitance | C_{OSS} | | | 120 | | μF |
| Reverse Transfer Capacitance | C_{RSS} | | | 70 | | μF |
| Gate resistance | R_g | $V_{GS}=0V, V_{DS}=0V, f=1.0MHz$ | | 0.36 | | ohm |
| SWITCHING CHARACTERISTICS^b | | | | | | |
| Turn-On Delay Time | $t_{D(ON)}$ | $V_{DD}=20V$ $I_D=3A$ $V_{GS}=10V$ $R_{GEN}=3\text{ ohm}$ | | 13 | | ns |
| Rise Time | t_r | | | 15 | | ns |
| Turn-Off Delay Time | $t_{D(OFF)}$ | | | 26 | | ns |
| Fall Time | t_f | | | 10 | | ns |
| Total Gate Charge | Q_g | $V_{DS}=20V, I_D=8A, V_{GS}=10V$ | | 15 | | nC |
| | | $V_{DS}=20V, I_D=8A, V_{GS}=4.5V$ | | 7.2 | | nC |
| Gate-Source Charge | Q_{gs} | $V_{DS}=20V, I_D=8A$ | | 2.0 | | nC |
| Gate-Drain Charge | Q_{gd} | $V_{GS}=10V$ | | 3.8 | | nC |

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P-Channel ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ ^c | Max | Unit |
|--|--------------|---|-----|------------------|----------|---------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=-250\mu A$ | -40 | | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=-32V, V_{GS}=0V$ | | | -1 | μA |
| Gate-Body Leakage | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | | | ± 10 | μA |
| ON CHARACTERISTICS^a | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -1 | -1.6 | -3 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=-10V, I_D=-6A$ | | 39 | 47 | m ohm |
| | | $V_{GS}=-4.5V, I_D=-4A$ | | 49 | 64 | m ohm |
| On-State Drain Current | $I_{D(ON)}$ | $V_{DS}=-5V, V_{GS}=-10V$ | -20 | | | A |
| Forward Transconductance | g_{FS} | $V_{DS}=-10V, I_D=-6A$ | | 9 | | S |
| DYNAMIC CHARACTERISTICS^b | | | | | | |
| Input Capacitance | C_{ISS} | $V_{DS}=-20V, V_{GS}=0V$ $f=1.0MHz$ | | 920 | | pF |
| Output Capacitance | C_{OSS} | | | 135 | | pF |
| Reverse Transfer Capacitance | C_{RSS} | | | 75 | | pF |
| Gate resistance | R_g | $V_{GS}=0V, V_{DS}=0V, f=1.0MHz$ | | 3.5 | | ohm |
| SWITCHING CHARACTERISTICS^b | | | | | | |
| Turn-On Delay Time | $t_{D(ON)}$ | $V_{DD}=-20V$ $I_D=-3A$ $V_{GS}=-10V$ $R_{GEN}=3\text{ ohm}$ | | 12 | | ns |
| Rise Time | t_r | | | 13 | | ns |
| Turn-Off Delay Time | $t_{D(OFF)}$ | | | 60 | | ns |
| Fall Time | t_f | | | 25 | | ns |
| Total Gate Charge | Q_g | $V_{DS}=-20V, I_D=-6A, V_{GS}=-10V$ | | 15 | | nC |
| | | $V_{DS}=-20V, I_D=-6A, V_{GS}=-4.5V$ | | 7.2 | | nC |
| Gate-Source Charge | Q_{gs} | $V_{DS}=-20V, I_D=-6A$ | | 2 | | nC |
| Gate-Drain Charge | Q_{gd} | $V_{GS}=-10V$ | | 4.0 | | nC |

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

| Parameter | Symbol | Condition | Min | Typ ^c | Max | Unit |
|---|----------|---|--------------|------------------|-------------|------|
| DRAIN-SOURCE DIODE CHARACTERISTICS^b | | | | | | |
| Diode Forward Voltage | V_{SD} | $V_{GS} = 0V, I_S = 8A$ $V_{GS} = 0V, I_S = -6A$ | N-Ch P-Ch | 0.94 -0.87 | 1.2 -1.2 | V |

Notes

- a. Pulse Test: Pulse Width $\leq 300 \mu s$, Duty Cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.

N-Channel

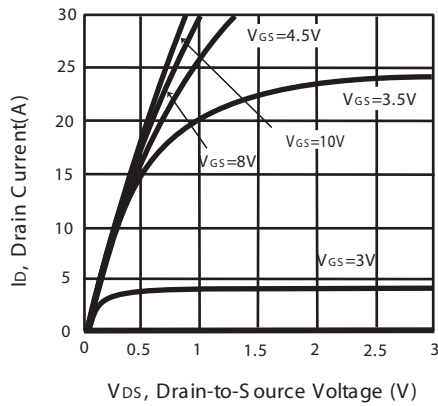


Figure 1. Output Characteristics

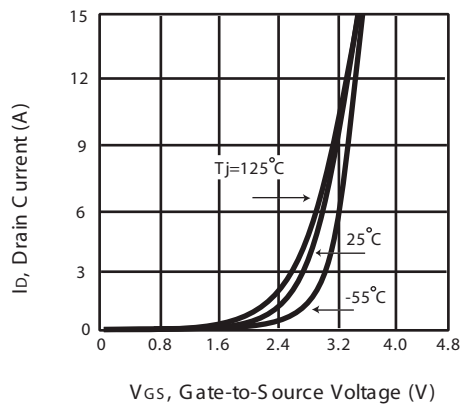


Figure 2. Transfer Characteristics

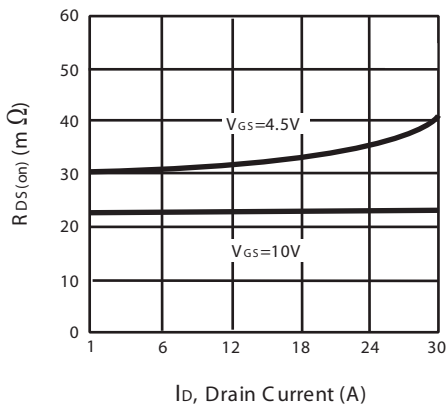


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

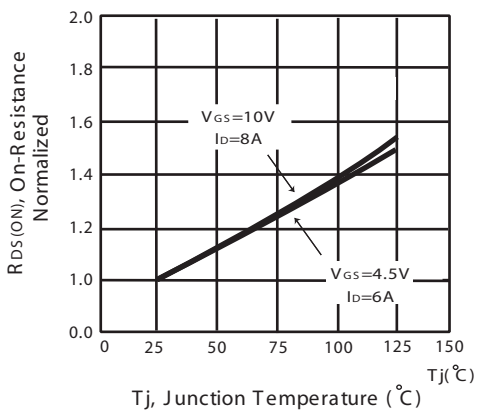


Figure 4. On-Resistance Variation with Drain Current and Temperature

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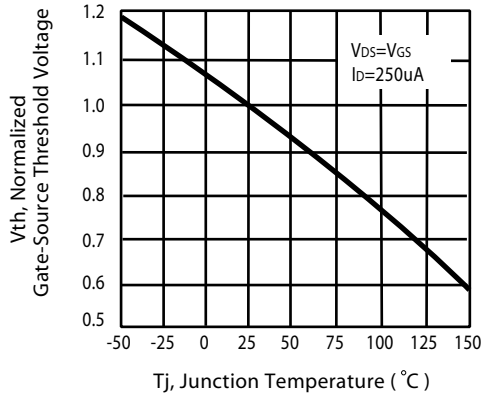


Figure 5. Gate Threshold Variation with Temperature

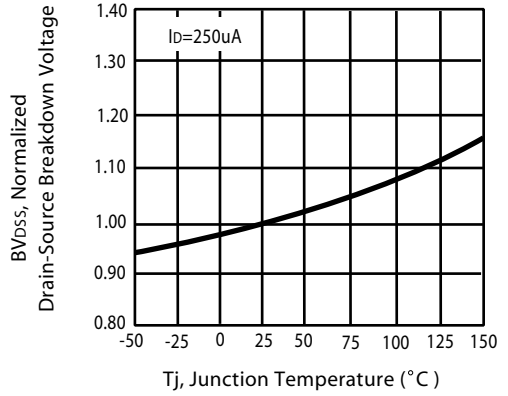


Figure 6. Breakdown Voltage Variation with Temperature

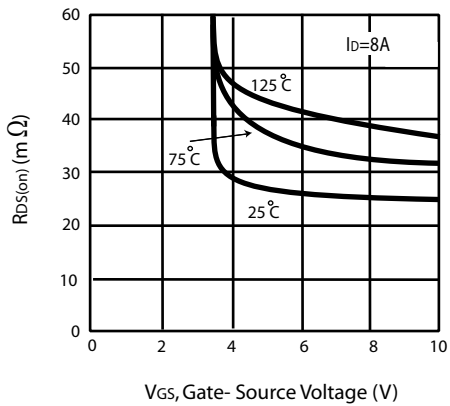


Figure 7. On-Resistance vs. Gate-Source Voltage

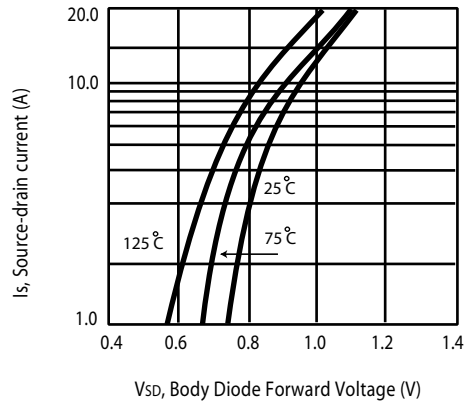


Figure 8. Body Diode Forward Voltage Variation with Source Current

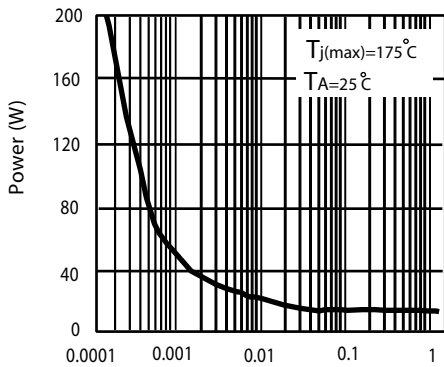
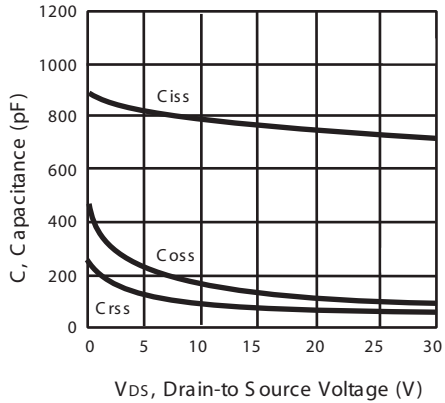


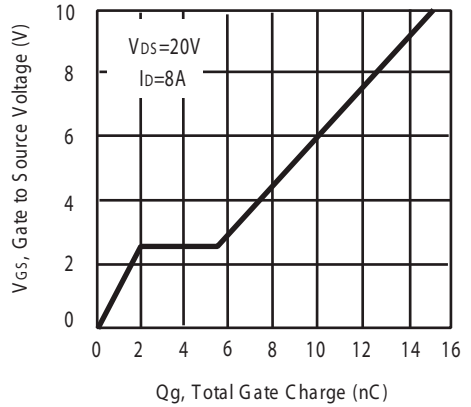
Figure 9. Single Pulse Power Rating Junction-to-Case

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V_{DS} , Drain-to Source Voltage (V)

Figure 10. Capacitance



Q_g , Total Gate Charge (nC)

Figure 11. Gate Charge

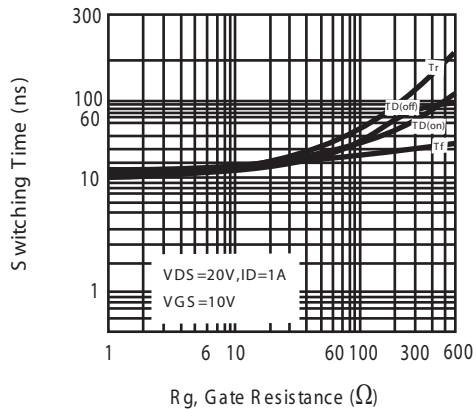


Figure 12. switching characteristics

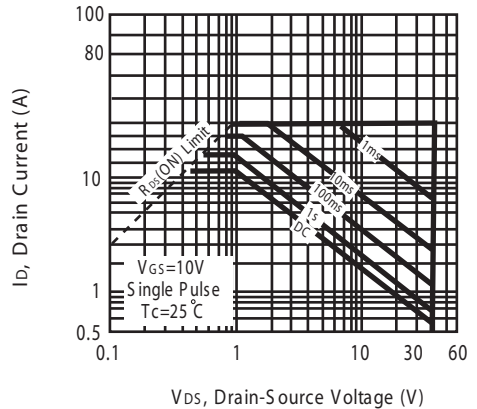


Figure 13. Maximum Safe Operating Area

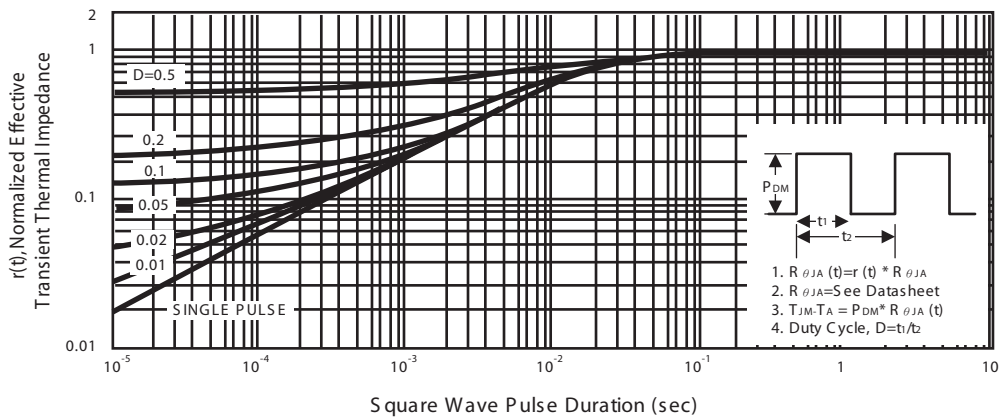


Figure 14. Normalized Thermal Transient Impedance Curve

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P-Channel

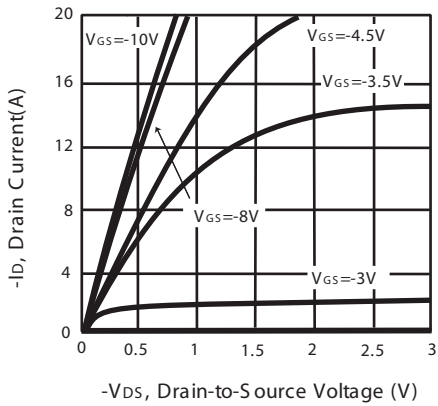


Figure 1. Output Characteristics

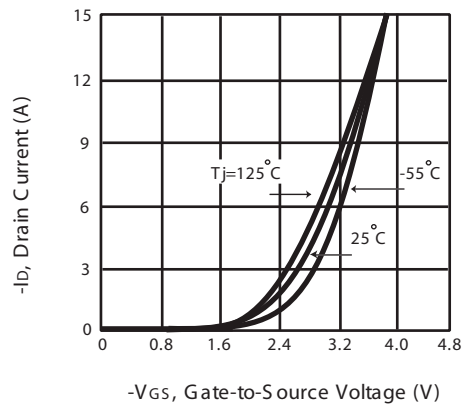


Figure 2. Transfer Characteristics

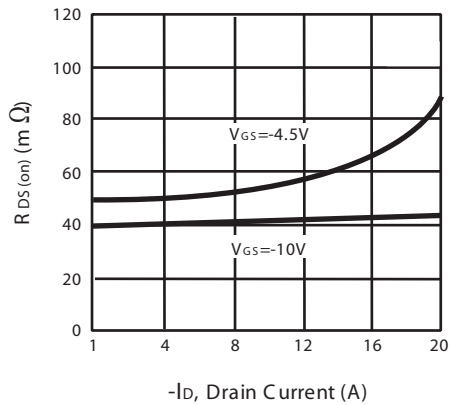


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

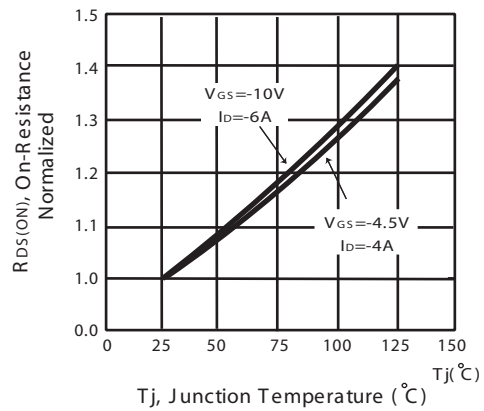


Figure 4. On-Resistance Variation with Drain Current and Temperature

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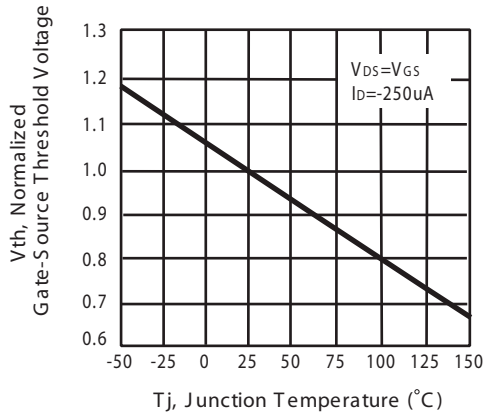


Figure 5. Gate Threshold Variation with Temperature

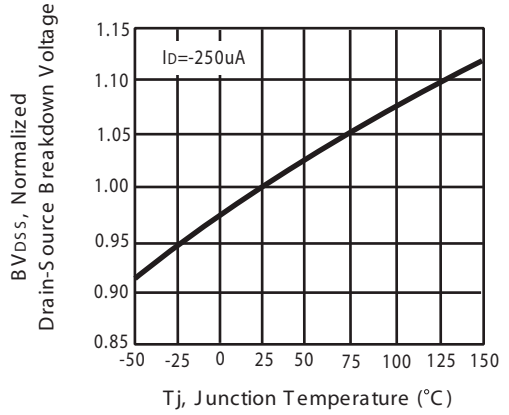


Figure 6. Breakdown Voltage Variation with Temperature

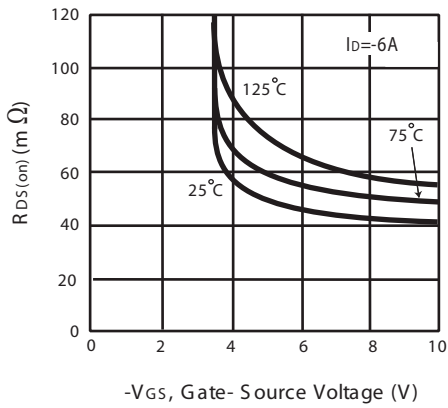


Figure 7. On-Resistance vs. Gate-Source Voltage

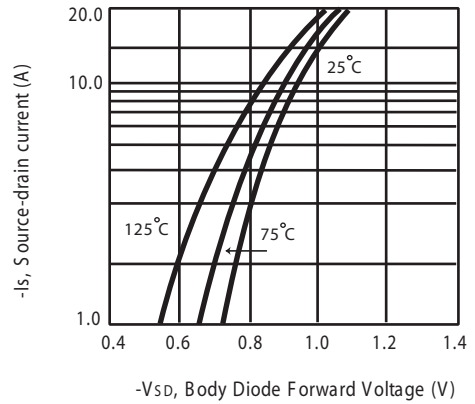


Figure 8. Body Diode Forward Voltage Variation with Source Current

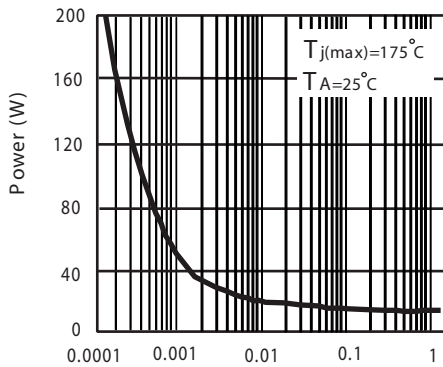


Figure 9. Single Pulse Power Rating Junction-to-Case

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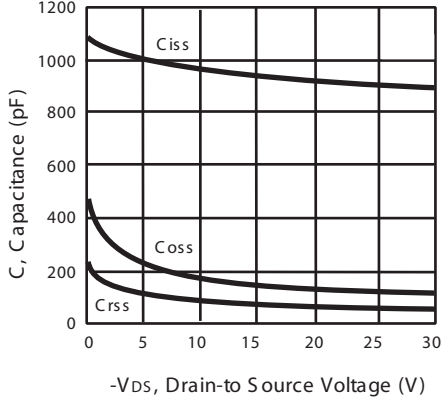


Figure 10. Capacitance

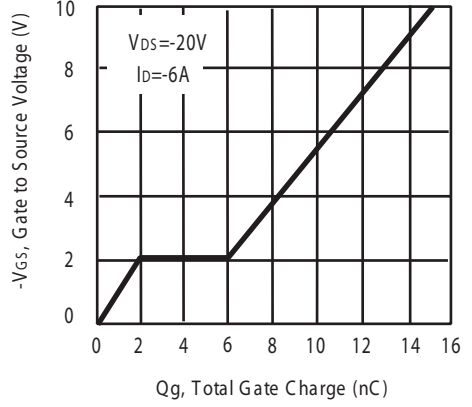


Figure 11. Gate Charge

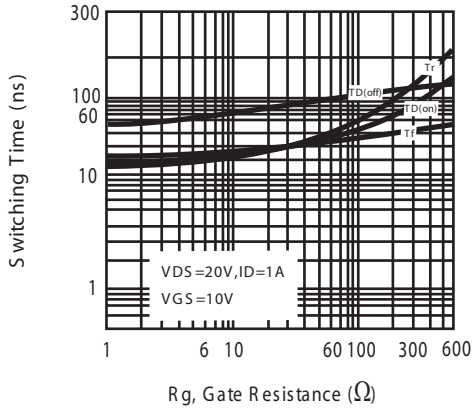


Figure 12. switching characteristics

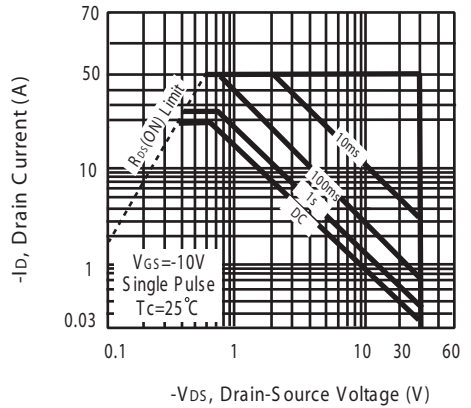


Figure 13. Maximum Safe Operating Area

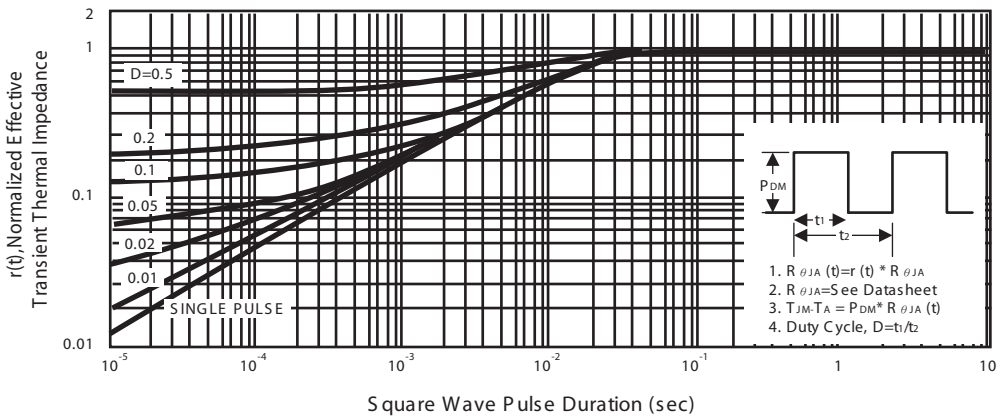
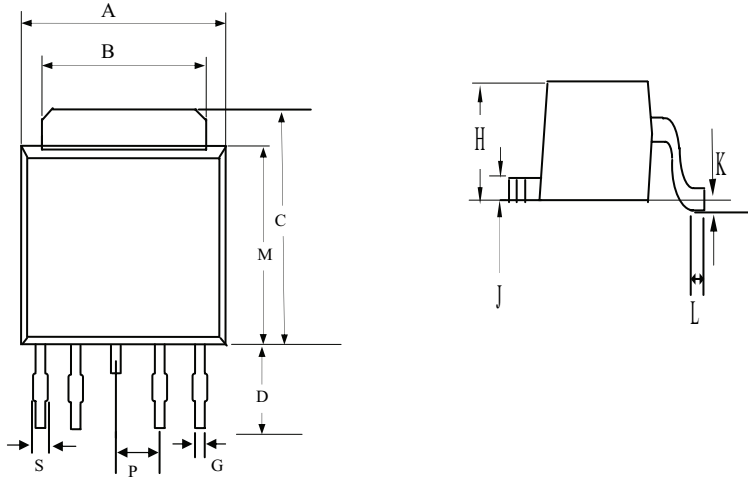


Figure 14. Normalized Thermal Transient Impedance Curve

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PACKAGE OUTLINE DIMENSIONS

TO-252-4L

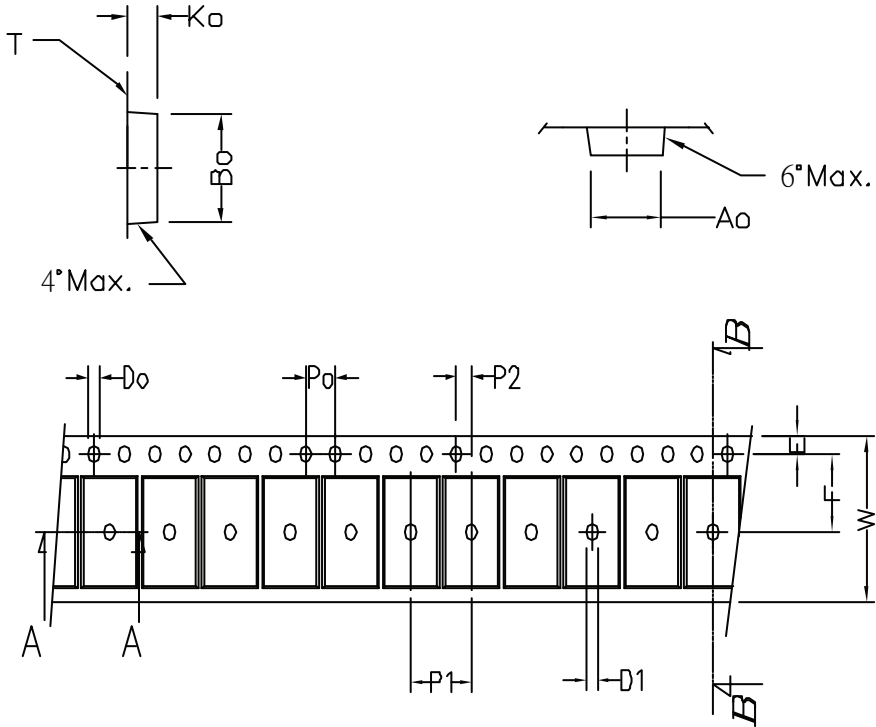


| REF . | Millimeters | |
|-------|-------------|-------|
| | MIN | MAX |
| A | 6.40 | 6.80 |
| B | 5.2 | 5.50 |
| C | 6.80 | 10.20 |
| D | 2.20 | 3.00 |
| P | 1.27 REF. | |
| S | 0.50 | 0.80 |
| G | 0.40 | 0.60 |
| H | 2.20 | 2.40 |
| J | 0.45 | 0.60 |
| K | 0 | 0.15 |
| L | 0.90 | 1.50 |
| M | 5.40 | 5.80 |

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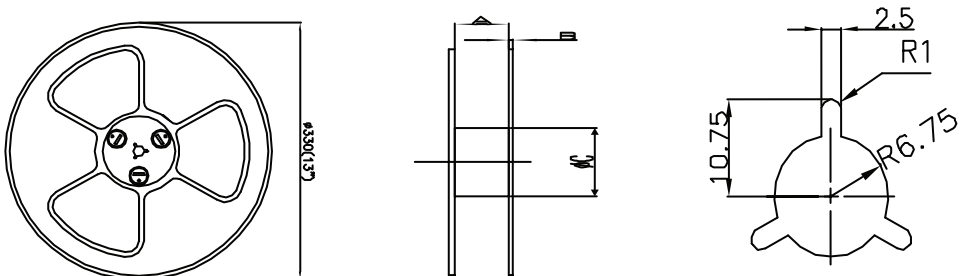
TO-252-4L Tape and Reel Data

TO-252-4L Carrier Tape



| | | | | | | | |
|--------|----------|-----------|-----------|----------|--------------------------------------|----------|------------|
| symbol | Ao | Bo | Ko | Po | P1 | P2 | T |
| Spec | 6.96±0.1 | 10.49±0.1 | 2.79±0.1 | 4.0±0.1 | 8.0±0.10 | 2.0±0.05 | 0.33±0.013 |
| symbol | E | F | Do | D1 | W | 10Po | |
| Spec | 1.75±0.1 | 7.5±0.05 | 1.55±0.05 | 1.5±0.25 | 16.0 ^{+0.3} _{-0.1} | 40.0±0.2 | |

TO-252-4L Reel



UNIT:mm

| | | | | | | | |
|-----------------------|-----|------|------|------|------|------|------|
| Width of carrier tape | 8 | 12 | 16 | 24 | 32 | 44 | 56 |
| A±0.1 | 9.4 | 13.4 | 17.4 | 25.4 | 33.4 | 45.4 | 57.4 |
| B | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| ∅C | 100 | 100 | 100 | 100 | 100 | 100 | 100 |