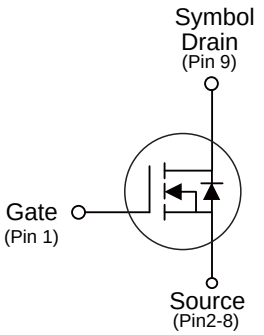
## ■ PRODUCT CHARACTERISTICS

| | |
|---|---|
| $V_{DSS}$ | 120V |
| $R_{DS(ON)}$Typ(@$V_{GS}$=10V) | 1.9mΩ |
| Qg@typ | 154nC |
| $I_D$ | 300A |







TOLL

## ■ APPLICATIONS

* Battery Management
* Motor Control and Drive
* Switching Applications

## ■ FEATURE

* Low Gate Charge
* Low Reverse Transfer Capacitance
* 100% Avalanche Tested

## ■ ORDER INFORMATION

| Order Codes | | Package | Packing |
|---|---|---|---|
| Halogen-Free | Halogen | | |
| MOT5124T | N/A | TOLL | 2000 pieces/Reel |

## ■ ABSOLUTE MAXIMUM RATINGS($T_A$=25°C,unless otherwise specified)

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | 120 | V |
| Gate-Source Voltage | $V_{GSS}$ | ±20 | V |
| Drain Current Continuous(@$V_{GS}$=10V,$T_A$=25°C) | $I_D$ | 300 | A |
| Drain Current Continuous(@$V_{GS}$=10V,$T_A$=100°C) | $I_D$ | 190 | A |
| Drain Current Pulsed | $I_{DM}$ | 1200 | A |
| Avalanche Energy * | $E_{AS}$ | 1849 | mJ |
| Power Dissipation | $P_D$ | 403 | W |
| Junction Temperature | $T_J$ | +150 | °C |
| Storage Temperature | $T_{STG}$ | -55~ +150 | °C |

## ■ THERMAL CHARACTERISTICS

| Parameter | Symbol | Typ | Unit |
|---|---|---|---|
| Junction to Case | $R_{thJC}$ | 0.31 | °C/W |

Note: * EAS condition: $T_J$=25°C,$V_{DD}$=30V,$V_G$=10V,L=0.5mH,$R_g$=25Ω

■ ELECTRICAL CHARACTERISTICS ($T_C$=25°C, unless otherwise noted)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Off characteristics | | | | | | |
| Drain to Source Breakdown Voltage | $V_{DSS}$ | $V_{GS}$=0V,$I_D$=250μA | 120 | - | - | V |
| Drain to Source Leakage Current | $I_{DSS}$ | $V_{DS}$=120V,$V_{GS}$=0V | - | - | 1 | μA |
| Gate to Source Forward Leakage | $I_{GSS(F)}$ | $V_{DS}$=0V, $V_{GS}$=+20V | - | - | 100 | nA |
| Gate to Source Reverse Leakage | $I_{GSS(R)}$ | $V_{DS}$=0V, $V_{GS}$=-20V | - | - | -100 | nA |
| On characteristics | | | | | | |
| Drain to Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V,$I_D$=20A | - | 1.9 | 2.4 | mΩ |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 2 | 3.5 | 4 | V |
| Dynamic characteristics | | | | | | |
| Gate Resistance | $R_g$ | $V_{GS}$=0V,$V_{DS}$=0V ,f=1.0MHz | - | 1.8 | - | Ω |
| Forward Transconductance | $g_{fs}$ | $V_{DS}$=10V,$I_D$=5A | - | 25 | - | S |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=50V,$V_{GS}$=0V f=1.0MHz | - | 8400 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 1600 | - | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 51 | - | pF |
| Resistive Switching Characteristics | | | | | | |
| Turn-on Delay Time | $t_{d(ON)}$ | $I_D$=20A, $V_{DS}$=60V $R_G$=3Ω ,$V_{GS}$=10V | - | 29 | - | ns |
| Rise Time | $t_r$ | | - | 43 | - | ns |
| Turn-off Delay Time | $t_{d(OFF)}$ | | - | 104 | - | ns |
| Fall Time | $t_f$ | | - | 49 | - | ns |
| Total Gate Charge | $Q_g$ | $I_D$=20A, $V_{DS}$=60V $V_{GS}$=10V | - | 154 | - | nC |
| Gate to Source Charge | $Q_{gs}$ | | - | 50 | - | nC |
| Gate to Drain("Miller") Charge | $Q_{gd}$ | | - | 30 | - | nC |
| Source-Drain Diode Characteristics | | | | | | |
| Continuous Source Current(Body Diode) | $I_S$ | | - | - | 300 | A |
| Maximum Pulsed Current(Body Diode) | $I_{SM}$ | | - | - | 1200 | A |
| Diode Forward Voltage | $V_{SD}$ | $I_{SD}$=1A, $V_{GS}$=0V | - | 0.7 | 1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_{SD}$ =20A, $T_J$=25°C dI/dt=100A/μs | - | 117 | - | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | - | 476 | - | nC |

## ■ TYPICAL CHARACTERISTICS

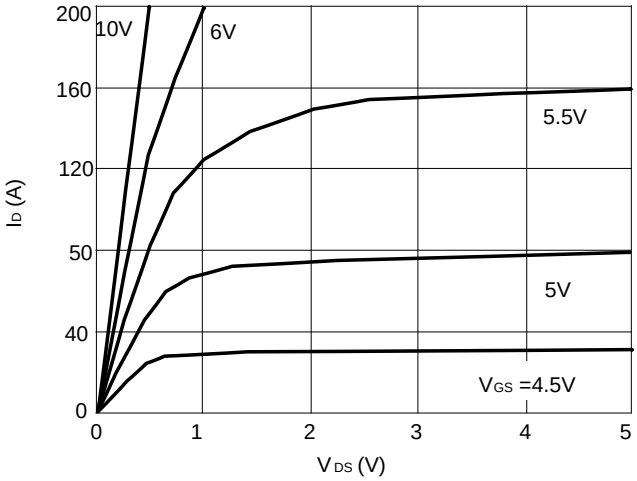



Figure 1: Output Characteristics

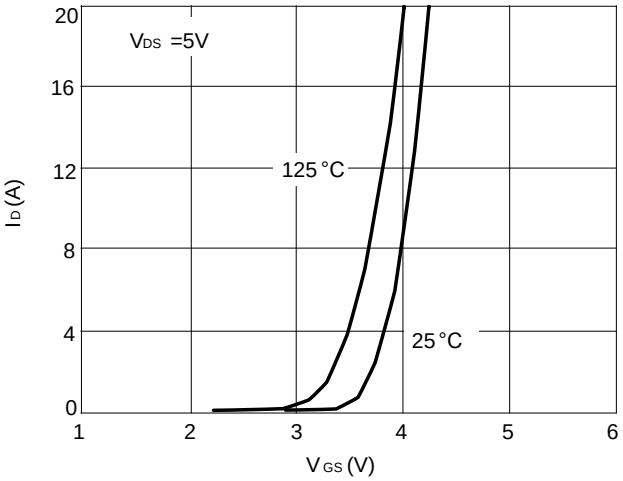



Figure 2: Typical Transfer Characteristics

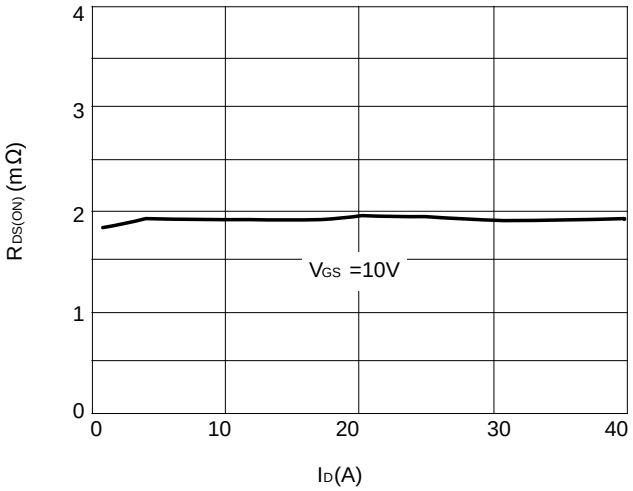



Figure 3: On-Resistance vs. Drain Current

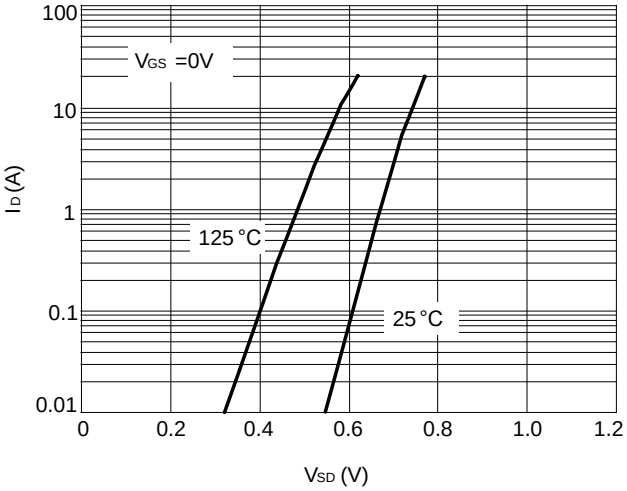



Figure 4: Body Diode Characteristics

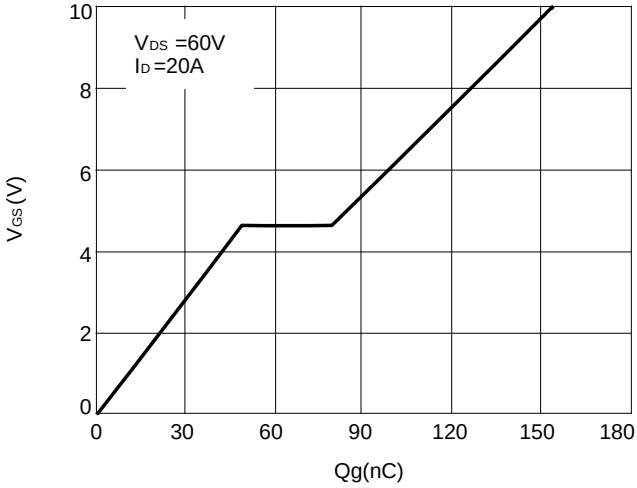



Figure 5: Gate Charge Characteristics

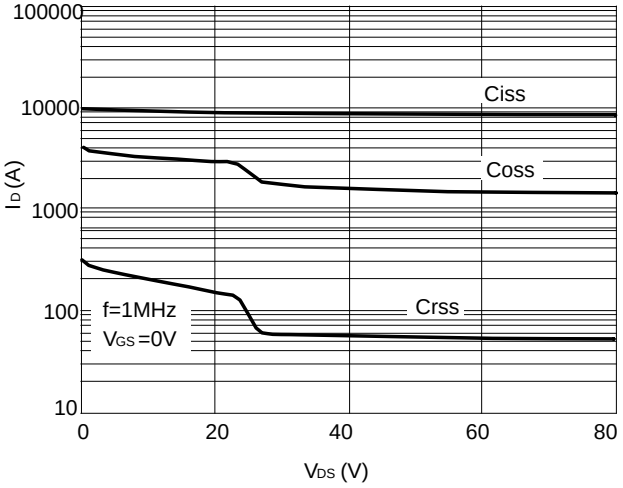



Figure 6: Capacitance Characteristics

## ■ TYPICAL CHARACTERISTICS(Cont.)

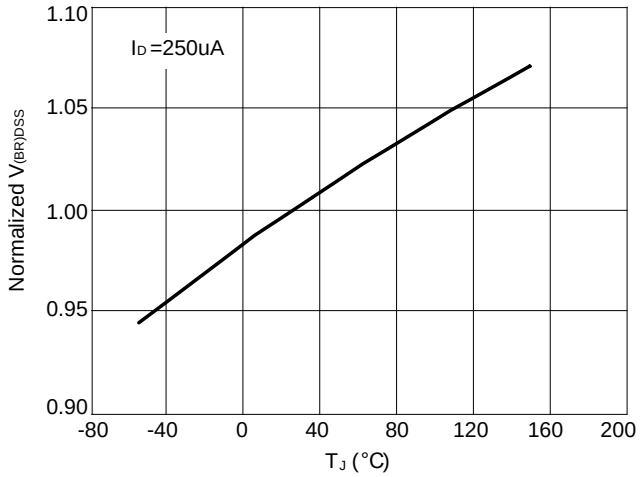



Figure 7: Normalized Breakdown Voltage vs Junction

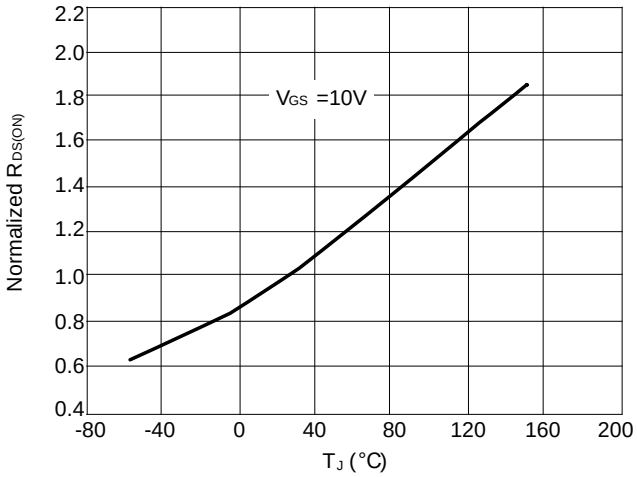



Figure 8: Normalized on Resistance vs. Junction Temperature

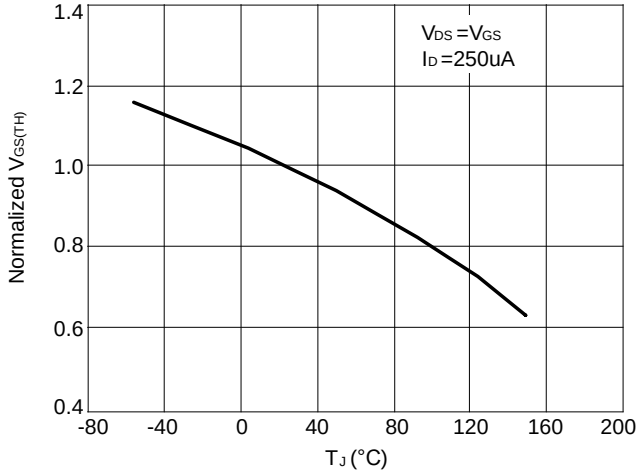



Figure 9: Normalized Threshold Voltage vs. Junction Temperature

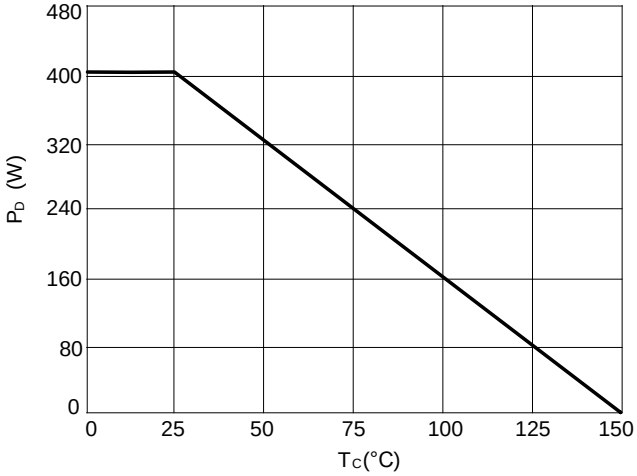



Figure 10: Power De-rating

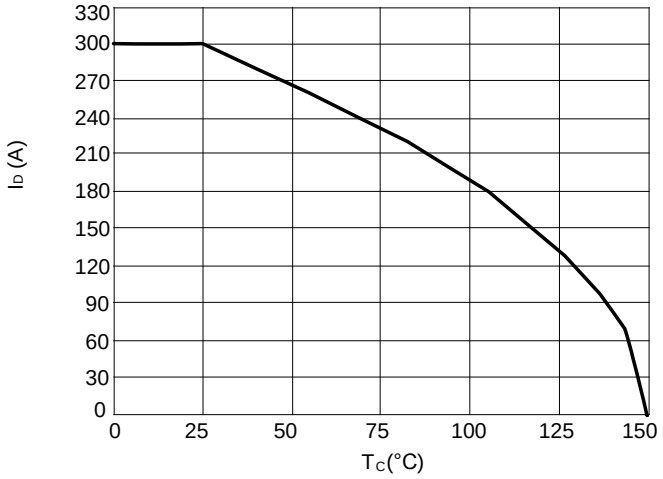



Figure 11: Current De-rating

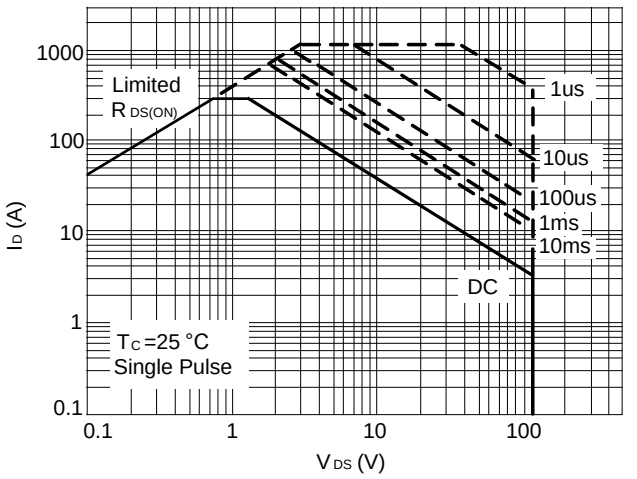
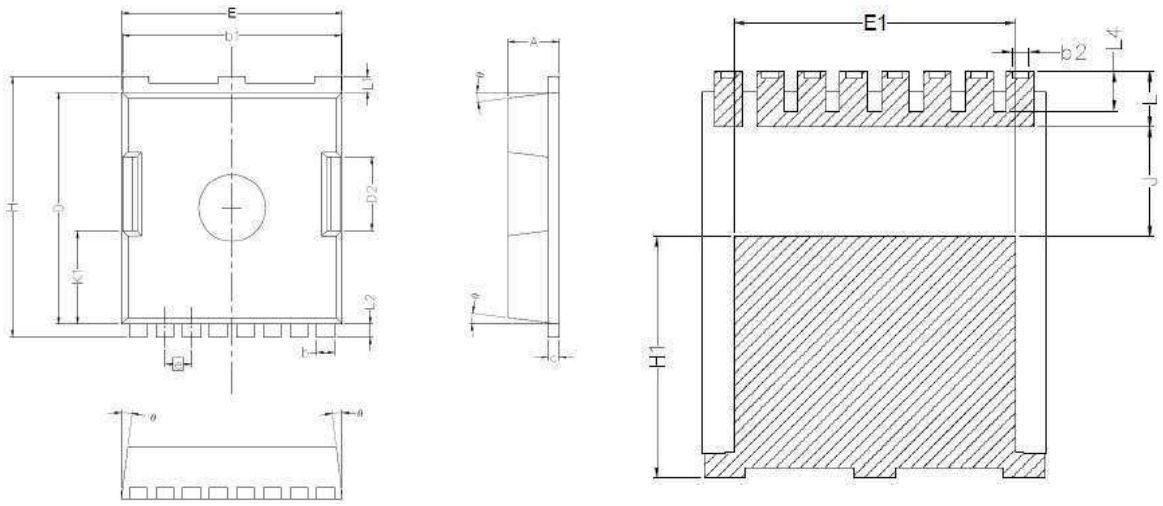



Figure 12: Maximum Safe Operating Area

■ TOLL PACKAGE OUTLINE DIMENSIONS




| Symbol | Dimesions In Millimeters | |
|---|---|---|
| | Min. | Max. |
| A | 2.20 | 2.40 |
| b | 0.70 | 0.90 |
| b1 | 9.70 | 9.90 |
| b2 | 0.42 | 0.50 |
| c | 0.40 | 0.60 |
| D | 10.28 | 10.58 |
| D2 | 3.10 | 3.50 |
| E | 9.70 | 10.10 |
| E1 | 7.90 | 8.30 |
| e | 1.20BSC | |
| H | 11.48 | 11.88 |
| H1 | 6.75 | 7.15 |
| N | 8 | |
| J | 3.00 | 3.30 |
| K1 | 3.98 | 4.38 |
| L | 1.40 | 1.80 |
| L1 | 0.60 | 0.80 |
| L2 | 0.50 | 0.70 |
| L4 | 1.00 | 1.30 |
| $\theta$ | 4° | 10° |