# N-Channel Enhancement Mode MOSFET

## BL014N04T-TL

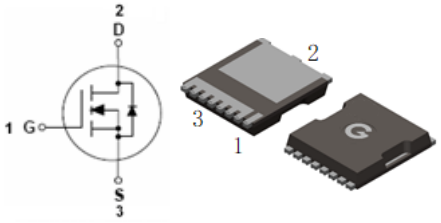
## Features

- Ultra-low on-resistance and gate-charge
- Advanced shielded-gate technology

HF

## Mechanical Data

- Case: TOLL
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208




TOLL

## Ordering Information

| Part Number | Package | Shipping Quantity | Marking Code |
|---|---|---|---|
| BL014N04T-TL | TOLL | 2000 pcs / Tape & Reel | 014N04T |

## Maximum Ratings (@ $T_A$ = 25°C unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-to-Source Voltage | $V_{DSS}$ | 40 | V |
| Gate-to-Source Voltage | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current (Package Limited) | $I_D$ | 130 | A |
| Continuous Drain Current ($T_C$ = 25°C, Silicon Limited) *1 | | 328 | A |
| Continuous Drain Current ($T_C$ = 100°C, Silicon Limited) *1 | | 207 | A |
| Pulsed Drain Current *4 | $I_{DM}$ | 240 | A |
| Single Pulse Avalanche Energy *5 | $E_{AS}$ | 69 | mJ |
| Avalanche Current *6 | $I_{AS}$ | 39 | A |

## Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation ($T_C$ = 25°C) | $P_D$ | 250 | W |
| Thermal Resistance Junction-to-Case | $R_{\theta JC}$ | 0.5 | °C/W |
| Thermal Resistance Junction-to-Air *3 | $R_{\theta JA}$ | 45 | °C/W |
| Operating Junction Temperature Range | $T_J$ | -55 ~ +150 | °C |
| Storage Temperature Range | $T_{STG}$ | -55 ~ +150 | °C |

## Electrical Characteristics (@ $T_J$ = 25°C unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| $V_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$ = 0V, $I_D$ = 250μA | 40 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 40V, $V_{GS}$ = 0V | - | - | 1 | μA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$ = ±20V, $V_{DS}$ = 0V | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| $R_{DS(ON)}$ | Static Drain-Source On-resistance | $V_{GS}$ = 10V,$I_D$ = 20A | - | 1.1 | 1.4 | mΩ |
| | | $V_{GS}$ = 4.5V,$I_D$ = 20A | - | 1.4 | 1.8 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 1 | 1.5 | 2 | V |
| $R_G$ | Gate Resistance | $V_{GS}$ = 0V, f = 1MHz | - | 1.5 | - | Ω |
| **Dynamic Characteristics** | | | | | | |
| $C_{ISS}$ | Input Capacitance | $V_{GS}$ = 0V<br>$V_{DS}$ = 20V<br>f = 150KHz | - | 6461 | - | pF |
| $C_{OSS}$ | Output Capacitance | | - | 3257 | - | |
| $C_{RSS}$ | Reverse Transfer Capacitance | | - | 196 | - | |
| **Switching Characteristics** | | | | | | |
| $t_{d(ON)}$ | Turn-on Delay Time | $V_{DD}$ = 20V<br>$V_{GS}$ = 4.5V<br>$R_G$ = 3Ω<br>$I_D$ = 20A | - | 24 | - | ns |
| $t_r$ | Turn-on Rise Time | | - | 84 | - | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | - | 62 | - | |
| $t_f$ | Turn-Off Fall Time | | - | 20 | - | |
| $Q_G$ | Total Gate-Charge | $V_{DD}$ = 20V<br>$V_{GS}$ = 4.5V<br>$I_D$ = 20A | - | 55 | - | nC |
| $Q_{GS}$ | Gate to Source Charge | | - | 15 | - | |
| $Q_{GD}$ | Gate to Drain (Miller) Charge | | - | 19 | - | |
| **Source-Drain Diode Characteristics** | | | | | | |
| $V_{SD}$ | Diode Forward Voltage | $I_S$ = 50A, $V_{GS}$ = 0V | - | 0.8 | - | V |
| trr | Reverse Recovery Time | $I_S$ = 20A, $V_{GS}$ = 0V<br>di/dt = 100A/μs | - | 171 | - | ns |
| Qrr | Reverse Recovery Charge | | - | 381 | - | nC |

Notes:

1. Rated according to $R_{\theta JC}$
2. Rated according to $R_{\Theta ja}$
3. Surface−mounted on 1 inch² FR4 board, 2 oz Cu
4. Limited by maximum $T_J$
5. Starting $T_J$ = 25°C, $V_{DD}$ = 30V, $V_{GS}$ = 10V, L = 0.1mH
6. Pulse width limited by maximum $T_J$

## Ratings and Characteristics Curves (@ $T_A$ = 25°C unless otherwise specified)

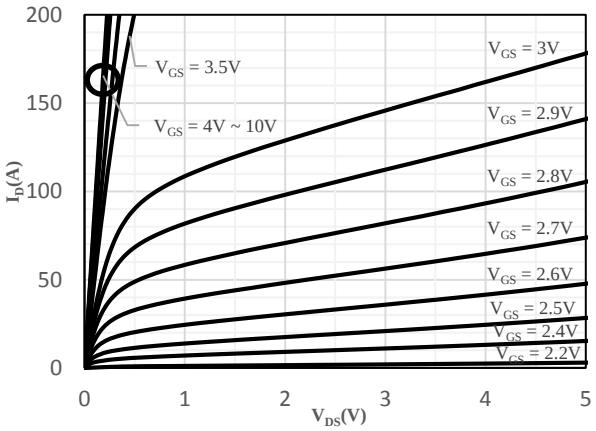



Fig 1 Typical Output Characteristics

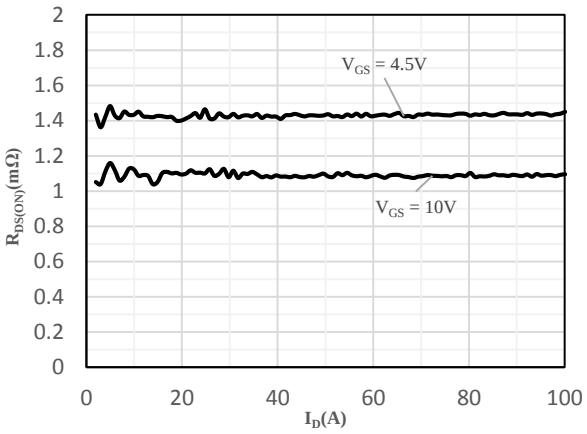



Fig 2 On-Resistance vs. Drain Current and Gate Voltage

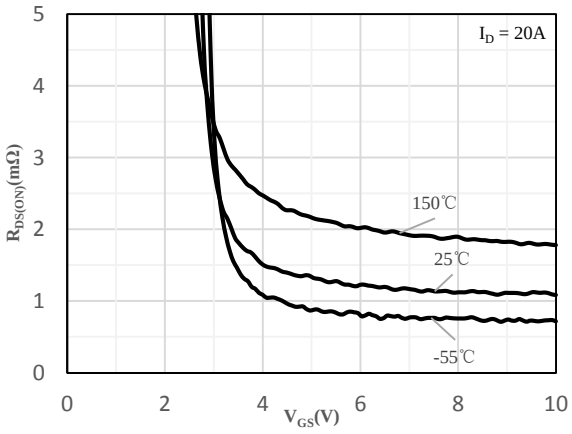



Fig 3 On-Resistance vs. Gate-Source Voltage

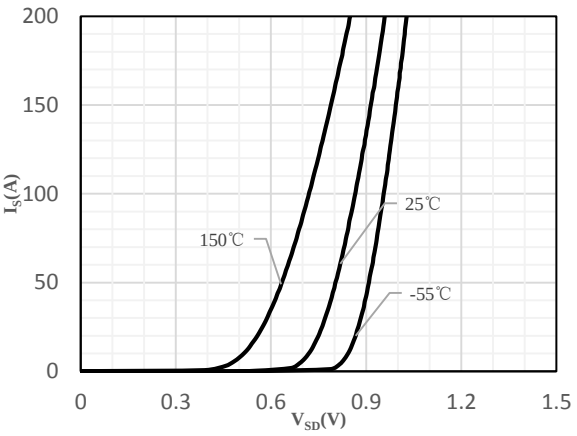



Fig 4 Body-Diode Characteristics

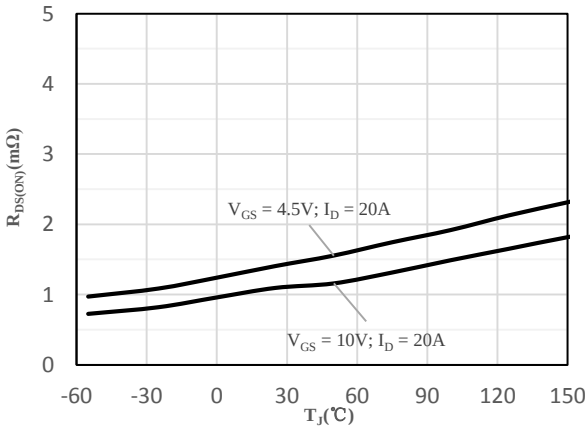



Fig 5 On-Resistance vs. Junction Temperature

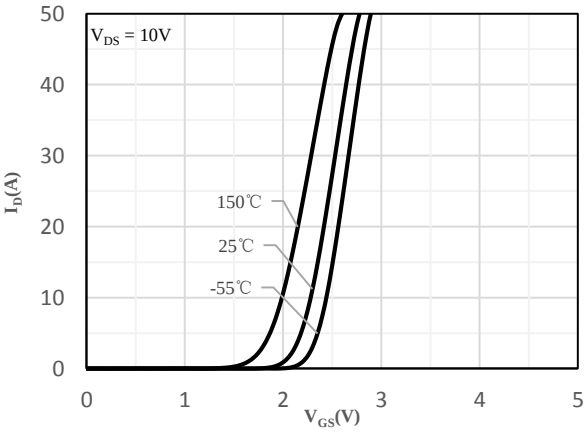



Fig 6 Transfer Characteristics

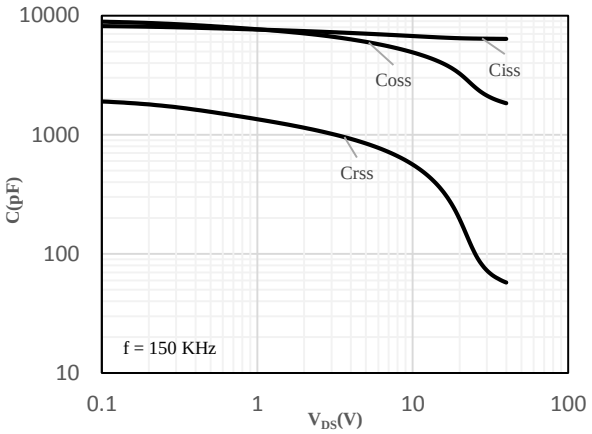



Fig 7 Capacitance Characteristics

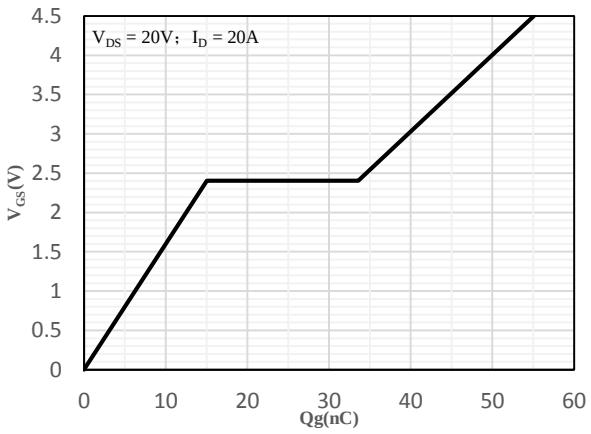



Fig 8 Gate-Charge Characteristics

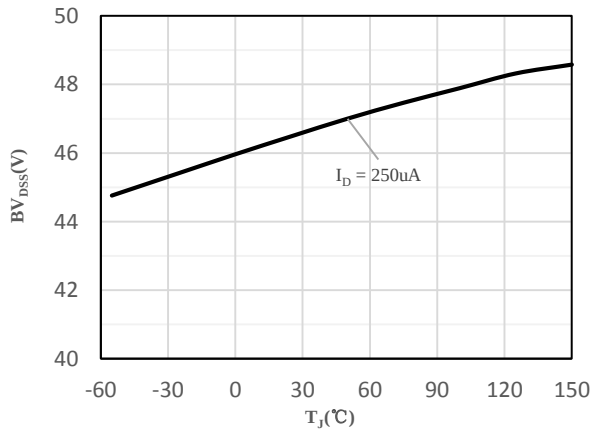



Fig 9 Breakdown Voltage vs. Junction Temperature

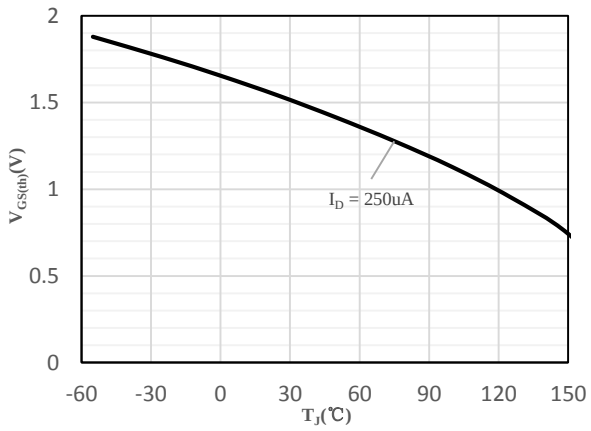
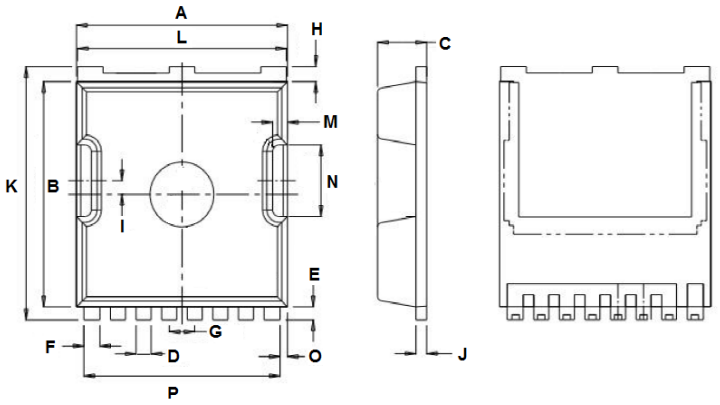



Fig 10 $V_{GS(th)}$ vs. Junction Temperature

## Package Outline Dimensions (Unit: mm)




| TOLL | | |
|---|---|---|
| **Dimension** | **Min.** | **Max.** |
| A | 9.850 | 9.950 |
| B | 10.350 | 10.450 |
| C | 2.250 | 2.350 |
| D | 0.600 | 0.800 |
| E | 0.500 | 0.700 |
| F | 0.650 | 0.850 |
| G | 1.100 | 1.300 |
| H | 0.600 | 0.800 |
| I | 0.580 | 0.680 |
| J | 0.492 | 0.508 |
| K | 11.600 | 11.800 |
| L | 9.750 | 9.850 |
| M | 0.550 | 0.650 |
| N | 3.250 | 3.350 |
| O | 0.250 | 0.450 |
| P | 9.175 | 9.225 |

## IMPORTANT NOTICE