

## N-Channel Enhancement Mode Power MOSFET

### Description

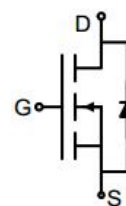
The GT007N04TL uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge. It can be used in a wide variety of applications.

### General Features

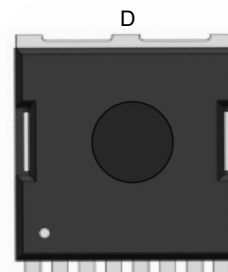
- $V_{DS}$  40V
- $I_D$  (at  $V_{GS} = 10V$ ) 285A
- $R_{DS(ON)}$  (at  $V_{GS} = 10V$ ) < 1.5m $\Omega$
- $R_{DS(ON)}$  (at  $V_{GS} = 4.5V$ ) < 2.0m $\Omega$
- 100% Avalanche Tested
- RoHS Compliant

### Application

- Power switch
- DC/DC converters



Schematic diagram



G<sub>1</sub> S<sub>2</sub> S<sub>3</sub> S<sub>4</sub> S<sub>5</sub> S<sub>6</sub> S<sub>7</sub> S<sub>8</sub>

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### Ordering Information

| Device     | Package | Marking  | Packaging    |
|------------|---------|----------|--------------|
| GT007N04TL | TOLL-8L | GT007N04 | 2000pcs/Reel |

### Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ , unless otherwise noted

| Parameter                                        | Symbol         | Value      | Unit             |
|--------------------------------------------------|----------------|------------|------------------|
| Drain-Source Voltage                             | $V_{DS}$       | 40         | V                |
| Continuous Drain Current                         | $I_D$          | 285        | A                |
| Pulsed Drain Current (note1)                     | $I_{DM}$       | 1140       | A                |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 20$   | V                |
| Power Dissipation                                | $P_D$          | 156        | W                |
| Single pulse avalanche energy (note2)            | $E_{AS}$       | 361        | mJ               |
| Operating Junction and Storage Temperature Range | $T_J, T_{stg}$ | -55 To 150 | $^\circ\text{C}$ |

### Thermal Resistance

| Parameter                               | Symbol     | Value | Unit               |
|-----------------------------------------|------------|-------|--------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{thJA}$ | 40    | $^\circ\text{C/W}$ |
| Maximum Junction-to-Case                | $R_{thJC}$ | 0.8   | $^\circ\text{C/W}$ |

| Specifications T <sub>J</sub> = 25°C, unless otherwise noted |                      |                                                                          |       |      |      |      |
|--------------------------------------------------------------|----------------------|--------------------------------------------------------------------------|-------|------|------|------|
| Parameter                                                    | Symbol               | Test Conditions                                                          | Value |      |      | Unit |
|                                                              |                      |                                                                          | Min.  | Typ. | Max. |      |
| Static Parameters                                            |                      |                                                                          |       |      |      |      |
| Drain-Source Breakdown Voltage                               | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                             | 40    | --   | --   | V    |
| Zero Gate Voltage Drain Current                              | I <sub>DSS</sub>     | V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V                              | --    | --   | 1    | μA   |
| Gate-Source Leakage                                          | I <sub>GSS</sub>     | V <sub>GS</sub> = ±20V                                                   | --    | --   | ±100 | nA   |
| Gate-Source Threshold Voltage                                | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA               | 1     | 1.5  | 2.5  | V    |
| Drain-Source On-Resistance                                   | R <sub>DS(on)</sub>  | V <sub>GS</sub> = 10V, I <sub>D</sub> = 30A                              | --    | 1.2  | 1.5  | mΩ   |
|                                                              |                      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 30A                             | --    | 1.6  | 2.0  |      |
| Forward Transconductance                                     | g <sub>FS</sub>      | V <sub>GS</sub> = 5V, I <sub>D</sub> = 30A                               | --    | 86   | --   | S    |
| Dynamic Parameters                                           |                      |                                                                          |       |      |      |      |
| Input Capacitance                                            | C <sub>iss</sub>     | V <sub>GS</sub> = 0V,<br>V <sub>DS</sub> = 20V,<br>f = 1.0MHz            | --    | 7363 | --   | pF   |
| Output Capacitance                                           | C <sub>oss</sub>     |                                                                          | --    | 1842 | --   |      |
| Reverse Transfer Capacitance                                 | C <sub>rss</sub>     |                                                                          | --    | 1511 | --   |      |
| Total Gate Charge                                            | Q <sub>g</sub>       | V <sub>DD</sub> = 20V,<br>I <sub>D</sub> = 30A,<br>V <sub>GS</sub> = 10V | --    | 163  | --   | nC   |
| Gate-Source Charge                                           | Q <sub>gs</sub>      |                                                                          | --    | 22   | --   |      |
| Gate-Drain Charge                                            | Q <sub>gd</sub>      |                                                                          | --    | 33   | --   |      |
| Turn-on Delay Time                                           | t <sub>d(on)</sub>   | V <sub>DD</sub> = 20V,<br>I <sub>D</sub> = 30A,<br>R <sub>G</sub> = 3Ω   | --    | 13   | --   | ns   |
| Turn-on Rise Time                                            | t <sub>r</sub>       |                                                                          | --    | 18   | --   |      |
| Turn-off Delay Time                                          | t <sub>d(off)</sub>  |                                                                          | --    | 135  | --   |      |
| Turn-off Fall Time                                           | t <sub>f</sub>       |                                                                          | --    | 52   | --   |      |
| Drain-Source Body Diode Characteristics                      |                      |                                                                          |       |      |      |      |
| Continuous Body Diode Current                                | I <sub>S</sub>       | T <sub>C</sub> = 25°C                                                    | --    | --   | 285  | A    |
| Body Diode Voltage                                           | V <sub>SD</sub>      | T <sub>J</sub> = 25°C, I <sub>SD</sub> = 30A, V <sub>GS</sub> = 0V       | --    | --   | 1.2  | V    |
| Reverse Recovery Charge                                      | Q <sub>rr</sub>      | I <sub>F</sub> = 30A, V <sub>GS</sub> = 0V<br>di/dt=500A/us              | --    | 78   | --   | nC   |
| Reverse Recovery Time                                        | T <sub>rr</sub>      |                                                                          | --    | 26   | --   | ns   |

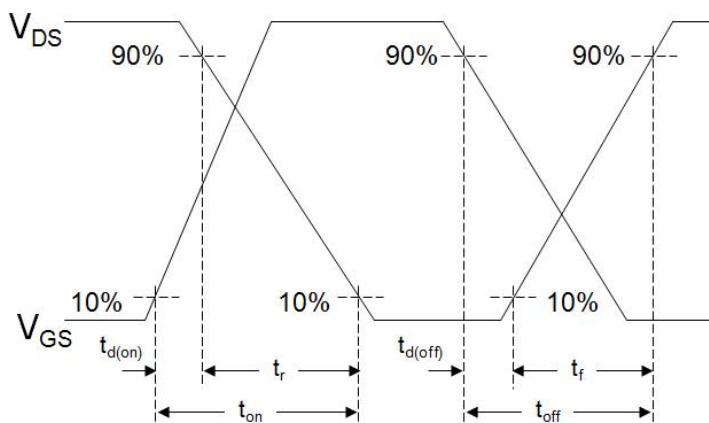
## Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition :  $T_J = 25^{\circ}\text{C}, V_{DD} = 40V, V_{GS} = 10V, L = 0.5mH, R_G = 25\Omega$
3. Identical low side and high side switch with identical  $R_G$

### Gate Charge Test Circuit



### Switch Time Test Circuit

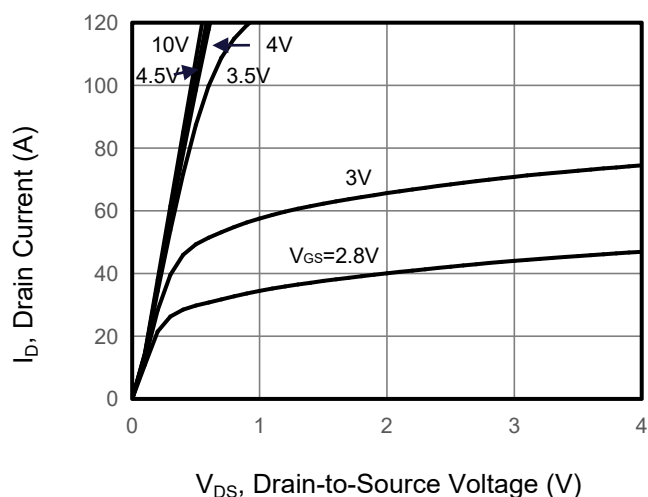


### EAS Test Circuit

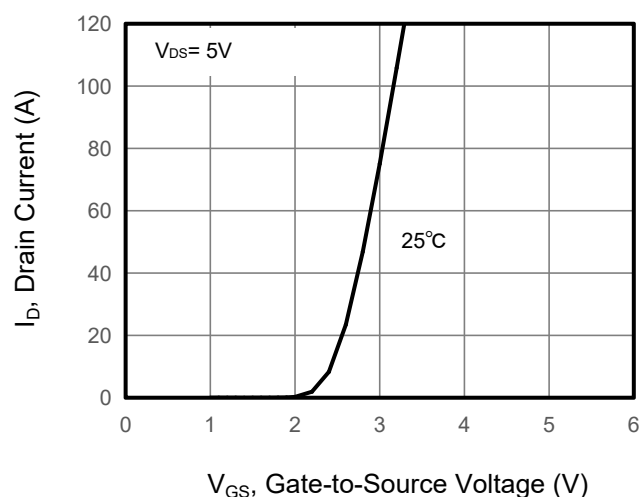


**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

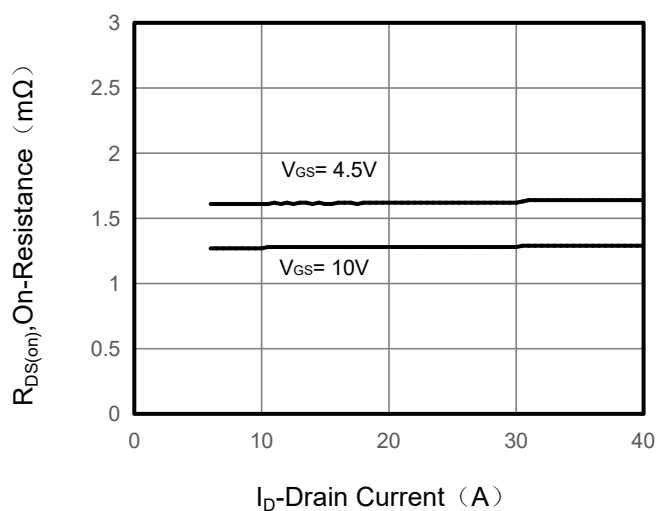
**Figure 1. Output Characteristics**



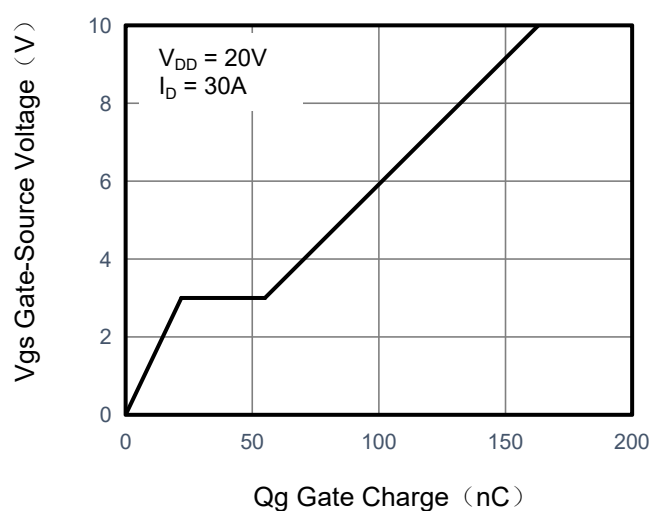
**Figure 2. Transfer Characteristics**



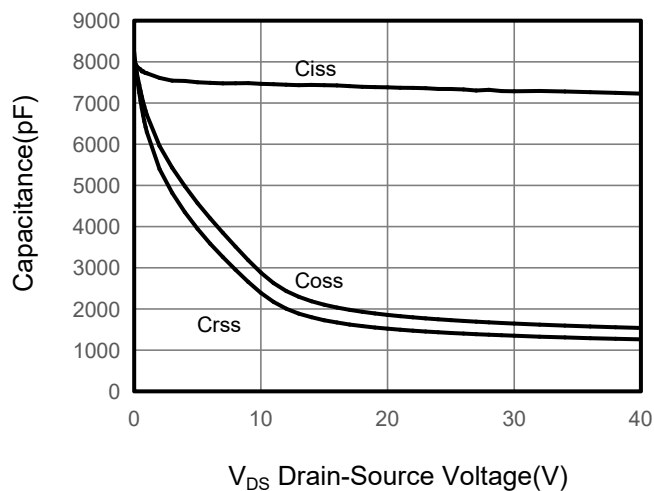
**Figure 3. Drain Source On Resistance**



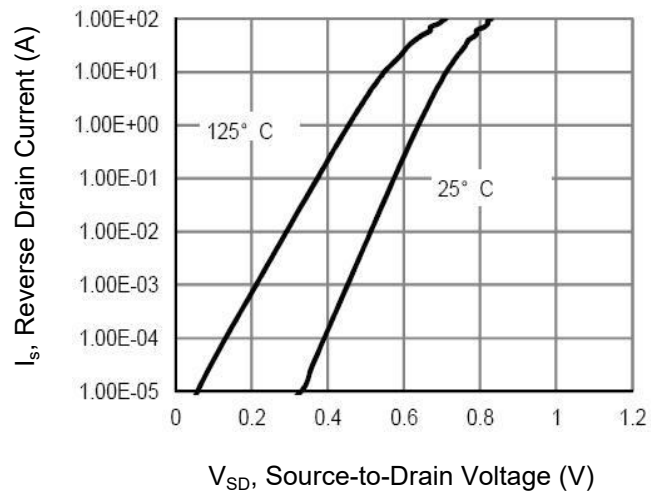
**Figure 4. Gate Charge**



**Figure 5. Capacitance**

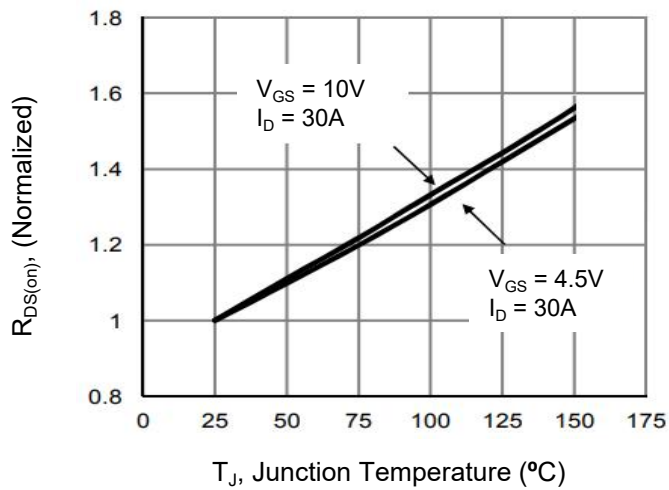


**Figure 6. Source-Drain Diode Forward**

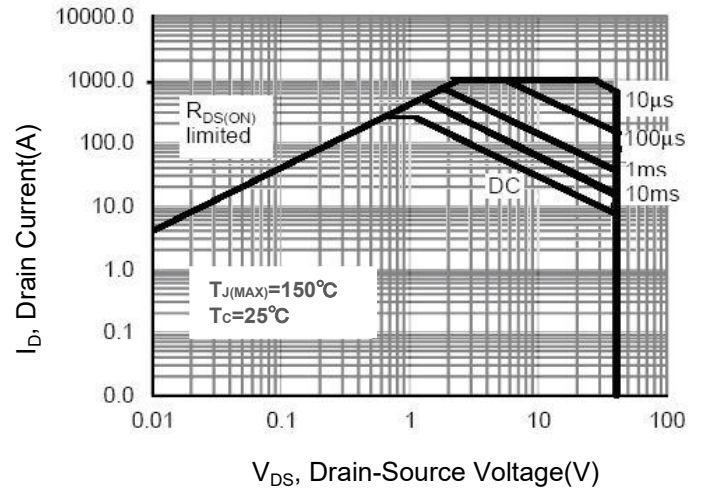


**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

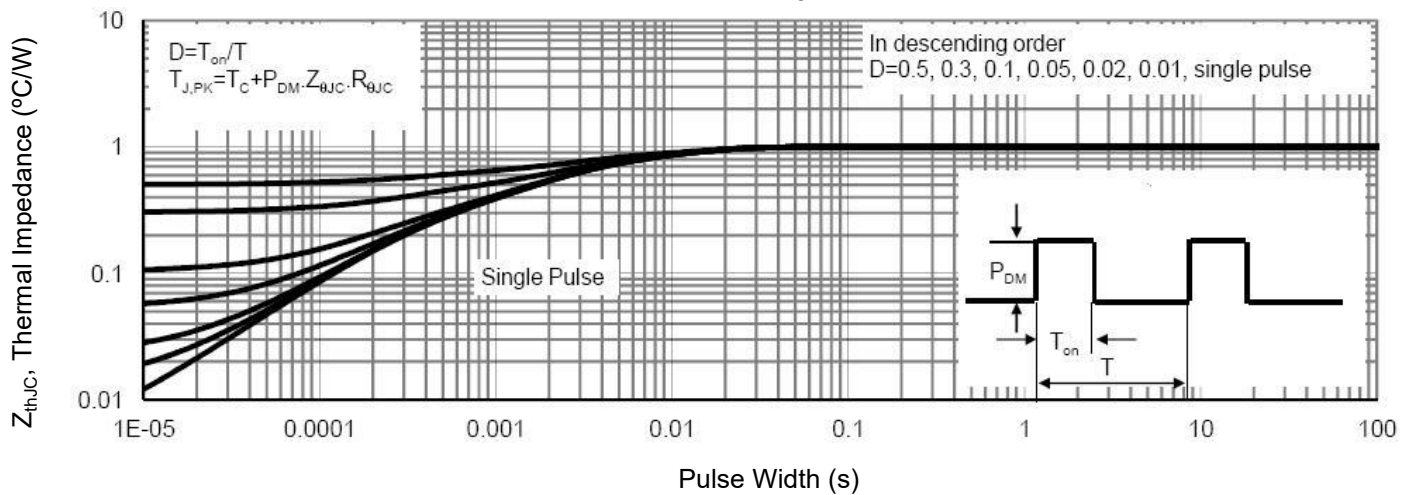
**Figure 7. Drain-Source On-Resistance**



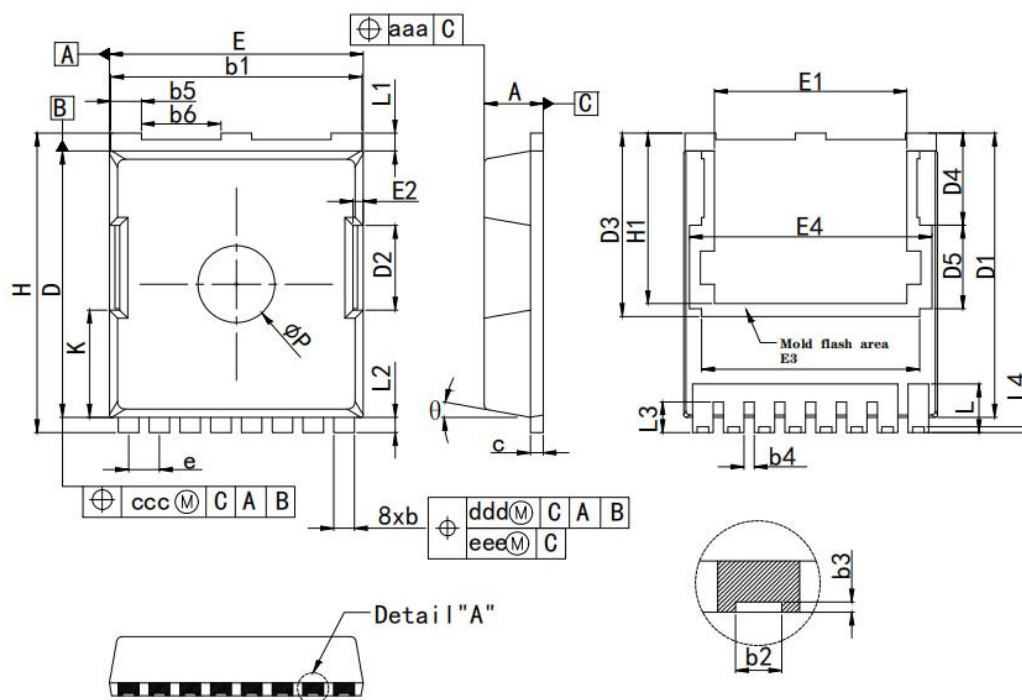
**Figure 8. Safe Operation Area**



**Figure 9. Normalized Maximum Transient Thermal Impedance**



## TOLL Package Information



| SYMBOL   | COMMON     |         |       |
|----------|------------|---------|-------|
|          | MILLIMETER |         |       |
|          | MIN        | NOMINAL | MAX   |
| A        | 2.20       | 2.30    | 2.40  |
| b        | 0.70       | 0.80    | 0.90  |
| b1       | 9.70       | 9.80    | 9.90  |
| b2       | 0.36       | 0.45    | 0.55  |
| b3       | 0.05       | 0.100   | /     |
| b4       | 0.30       | 0.40    | 0.50  |
| b5       | 1.10       | 1.20    | 1.30  |
| b6       | 3.00       | 3.10    | 3.20  |
| c        | 0.40       | 0.50    | 0.60  |
| D        | 10.28      | 10.38   | 10.55 |
| D1       | 10.98      | 11.08   | 11.18 |
| D2       | 3.20       | 3.30    | 3.40  |
| D3       |            | 7.15    |       |
| D4       |            | 3.59    |       |
| D5       |            | 3.26    |       |
| e        | 1.10       | 1.20    | 1.30  |
| E        | 9.80       | 9.90    | 10.00 |
| E1       | 7.40       | 7.50    | 7.60  |
| E2       | 0.30       | 0.40    | 0.50  |
| E3       |            | 8.50    |       |
| E4       |            | 9.46    |       |
| H        | 11.50      | 11.68   | 11.85 |
| H1       | 0.55       | 0.65    | 0.75  |
| K        | 4.08       | 4.18    | 4.28  |
| L        | 1.60       | 1.90    | 2.10  |
| L1       | 0.50       | 0.70    | 0.90  |
| L2       | 0.50       | 0.60    | 0.70  |
| L3       | 1.00       | 1.20    | 1.30  |
| L4       | 0.13       | 0.23    | 0.33  |
| P        | 2.85       | 3.00    | 3.15  |
| $\theta$ |            | 10" REF |       |
| aaa      |            | 0.20    |       |
| ccc      |            | 0.20    |       |
| ddd      |            | 0.25    |       |
| eee      |            | 0.20    |       |