

## N-Channel Enhancement Mode Power MOSFET

|   |  |
|---|--|
| <p><b>Description</b></p> <p>The GT105N10T uses advanced trench technology to provide excellent <math>R_{DS(ON)}</math>, low gate charge. It can be used in a wide variety of applications.</p> <p><b>General Features</b></p> <ul style="list-style-type: none"> <li>● <math>V_{DS}</math> 100V</li> <li>● <math>I_D</math> (at <math>V_{GS} = 10V</math>) 55A</li> <li>● <math>R_{DS(ON)}</math> (at <math>V_{GS} = 10V</math>) &lt; 10.5m<math>\Omega</math></li> <li>● <math>R_{DS(ON)}</math> (at <math>V_{GS} = 4.5V</math>) &lt; 15m<math>\Omega</math></li> <li>● 100% Avalanche Tested</li> <li>● RoHS Compliant</li> </ul> <p><b>Application</b></p> <ul style="list-style-type: none"> <li>● Power switch</li> <li>● DC/DC converters</li> </ul> | <p style="text-align: center;">Schematic diagram</p> <p style="text-align: center;">TO-220</p> |
|---|--|

### Ordering Information

| Device    | Package | Marking  | Packaging  |
|-----------|---------|----------|------------|
| GT105N10T | TO-220  | GT105N10 | 50psc/Tube |

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

| Parameter  | Symbol         | Value      | Unit       |
|--|----------------|------------|------------|
| Drain-Source Voltage                             | $V_{DS}$       | 100        | V          |
| Continuous Drain Current                         | $I_D$          | 55         | A          |
| Pulsed Drain Current (note1)                     | $I_{DM}$       | 220        | A          |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 20$   | V          |
| Power Dissipation                                | $P_D$          | 74         | W          |
| Single pulse avalanche energy (note2)            | $E_{AS}$       | 72         | mJ         |
| Operating Junction and Storage Temperature Range | $T_J, T_{stg}$ | -55 To 150 | $^\circ C$ |

### Thermal Resistance

| Parameter                               | Symbol     | Value | Unit         |
|---|------------|-------|--------------|
| Thermal Resistance, Junction-to-Ambient | $R_{thJA}$ | 78    | $^\circ C/W$ |
| Maximum Junction-to-Case                | $R_{thJC}$ | 1.6   | $^\circ C/W$ |

| Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted |               |  |       |      |           |            |
|--|---------------|--|-------|------|-----------|------------|
| Parameter  | Symbol        | Test Conditions  | Value |      |           | Unit       |
|  |               |  | Min.  | Typ. | Max.      |            |
| <b>Static Parameters</b>   |               |  |       |      |           |            |
| Drain-Source Breakdown Voltage                                   | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$                            | 100   | --   | --        | V          |
| Zero Gate Voltage Drain Current                                  | $I_{DSS}$     | $V_{DS} = 100V, V_{GS} = 0V$                             | --    | --   | 1         | $\mu A$    |
| Gate-Source Leakage  | $I_{GSS}$     | $V_{GS} = \pm 20V$                                       | --    | --   | $\pm 100$ | nA         |
| Gate-Source Threshold Voltage                                    | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu A$                        | 1.0   | 1.7  | 2.5       | V          |
| Drain-Source On-Resistance                                       | $R_{DS(on)}$  | $V_{GS} = 10V, I_D = 20A$                                | --    | 8.5  | 10.5      | m $\Omega$ |
|  |               | $V_{GS} = 4.5V, I_D = 20A$                               | --    | 10.5 | 15        |            |
| Forward Transconductance   | $g_{FS}$      | $V_{GS} = 5V, I_D = 20A$                                 | --    | 59   | --        | S          |
| <b>Dynamic Parameters</b>  |               |  |       |      |           |            |
| Input Capacitance  | $C_{iss}$     | $V_{GS} = 0V,$<br>$V_{DS} = 50V,$<br>$f = 1.0\text{MHz}$ | --    | 1625 | --        | pF         |
| Output Capacitance   | $C_{oss}$     |  | --    | 665  | --        |            |
| Reverse Transfer Capacitance                                     | $C_{rss}$     |  | --    | 14   | --        |            |
| Total Gate Charge  | $Q_g$         | $V_{DD} = 50V,$<br>$I_D = 20A,$<br>$V_{GS} = 10V$        | --    | 54   | --        | nC         |
| Gate-Source Charge   | $Q_{gs}$      |  | --    | 10   | --        |            |
| Gate-Drain Charge  | $Q_{gd}$      |  | --    | 14   | --        |            |
| Turn-on Delay Time   | $t_{d(on)}$   | $V_{DD} = 50V,$<br>$I_D = 20A,$<br>$R_G = 1.6\Omega$     | --    | 13   | --        | ns         |
| Turn-on Rise Time  | $t_r$         |  | --    | 10   | --        |            |
| Turn-off Delay Time  | $t_{d(off)}$  |  | --    | 30   | --        |            |
| Turn-off Fall Time   | $t_f$         |  | --    | 8    | --        |            |
| <b>Drain-Source Body Diode Characteristics</b>                   |               |  |       |      |           |            |
| Continuous Body Diode Current                                    | $I_S$         | $T_C = 25^\circ\text{C}$                                 | --    | --   | 55        | A          |
| Body Diode Voltage   | $V_{SD}$      | $T_J = 25^\circ\text{C}, I_{SD} = 20A, V_{GS} = 0V$      | --    | --   | 1.2       | V          |
| Reverse Recovery Charge  | $Q_{rr}$      | $I_F = 20A, V_{GS} = 0V$<br>$di/dt = 100A/\mu s$         | --    | 95   | --        | nC         |
| Reverse Recovery Time  | $T_{rr}$      |  | --    | 45   | --        | ns         |

### Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition :  $T_J = 25^\circ\text{C}, V_{DD} = 50V, V_{GS} = 10V, L = 0.5\text{mH}, R_G = 25\Omega$
3. Identical low side and high side switch with identical  $R_G$

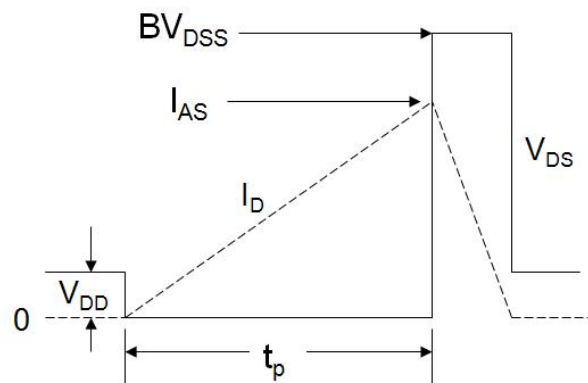
### Gate Charge Test Circuit



### Switch Time Test Circuit

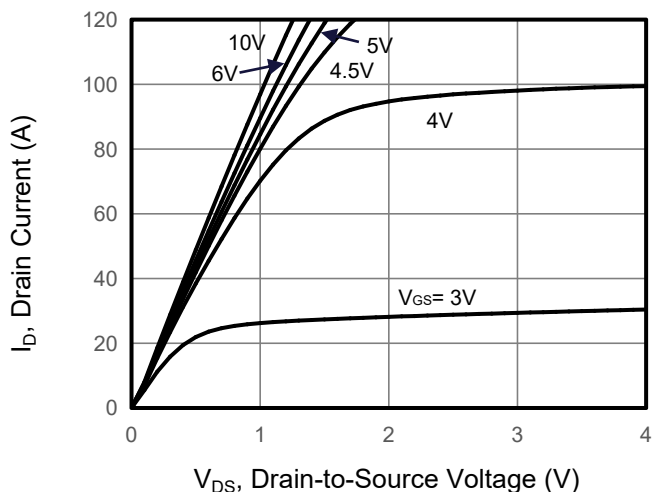


### EAS Test Circuit

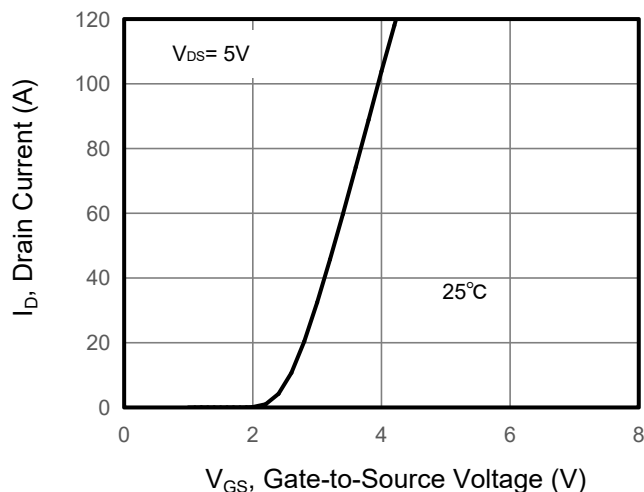


Typical Characteristics  $T_J = 25^\circ\text{C}$ , unless otherwise noted

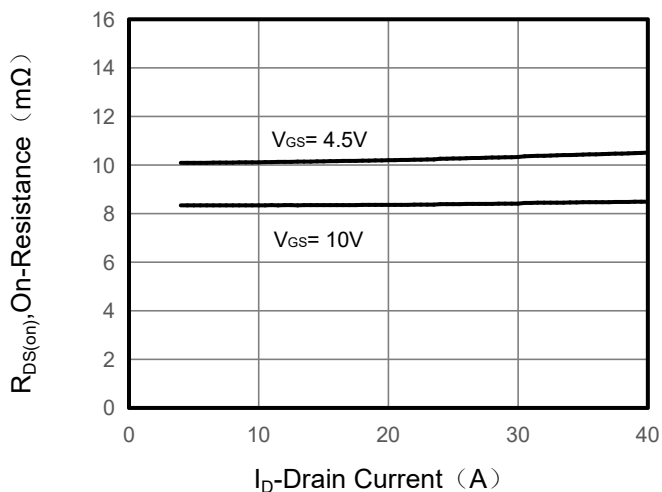
**Figure 1. Output Characteristics**



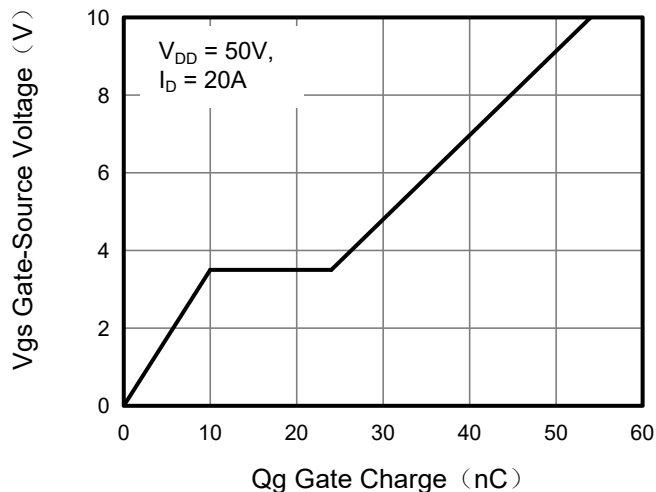
**Figure 2. Transfer Characteristics**



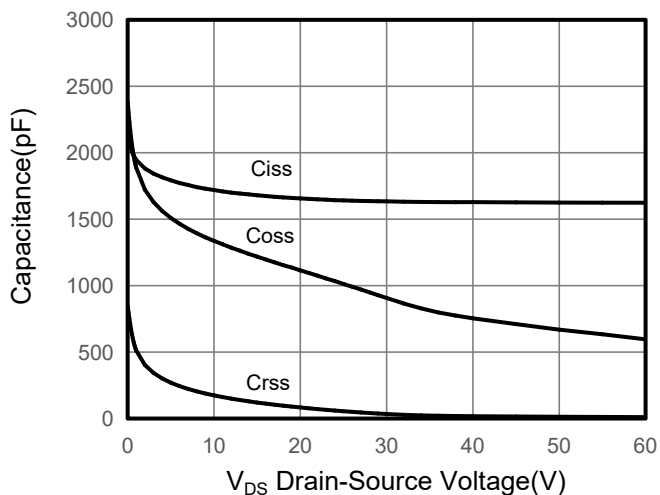
**Figure 3. Drain Source On Resistance**



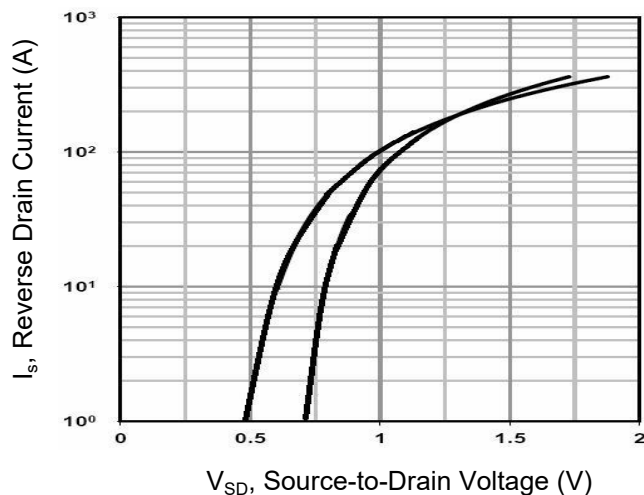
**Figure 4. Gate Charge**



**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

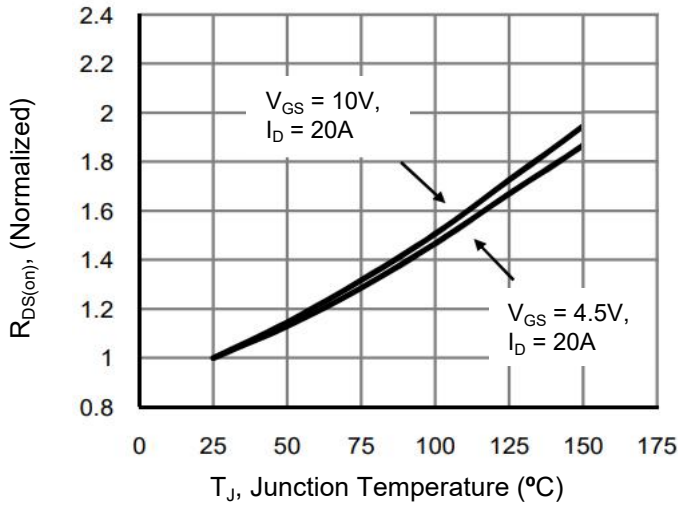


Figure 8. Safe Operation Area

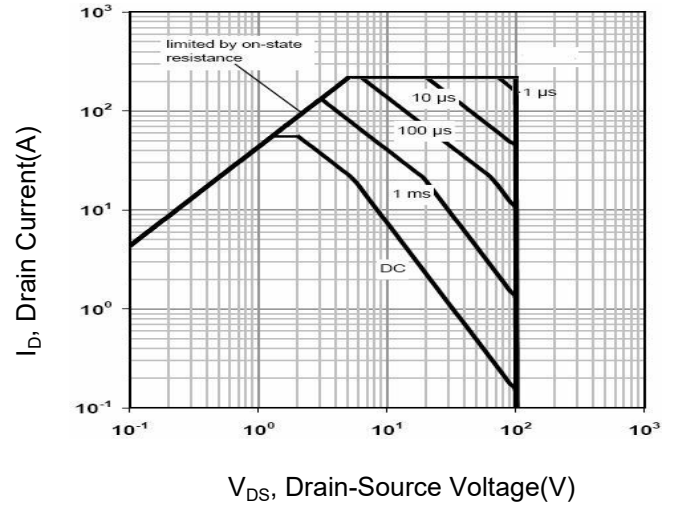
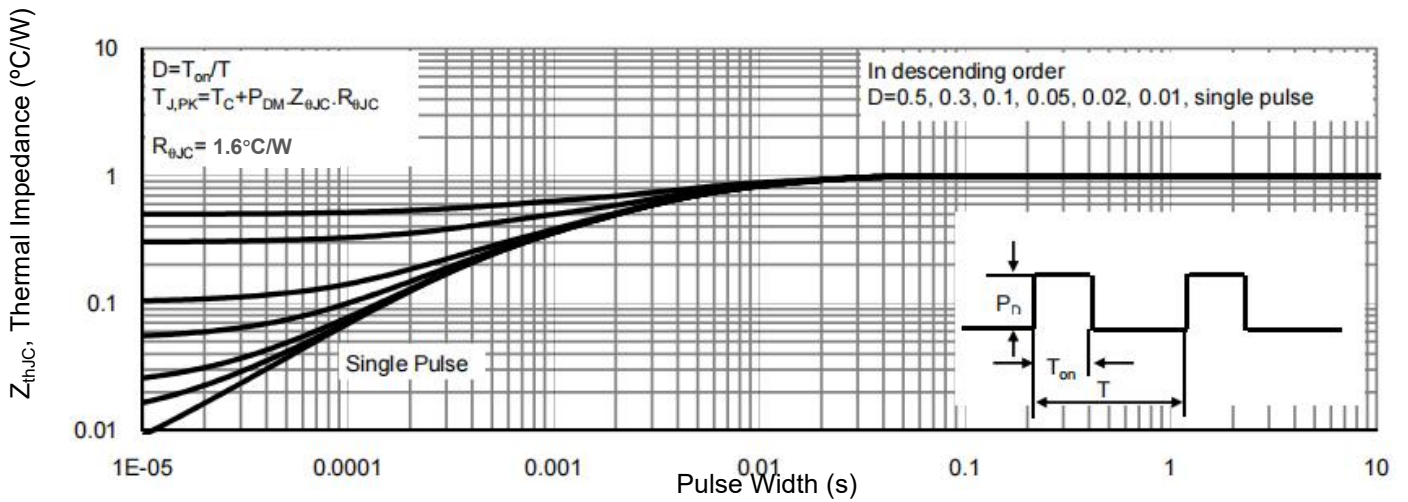
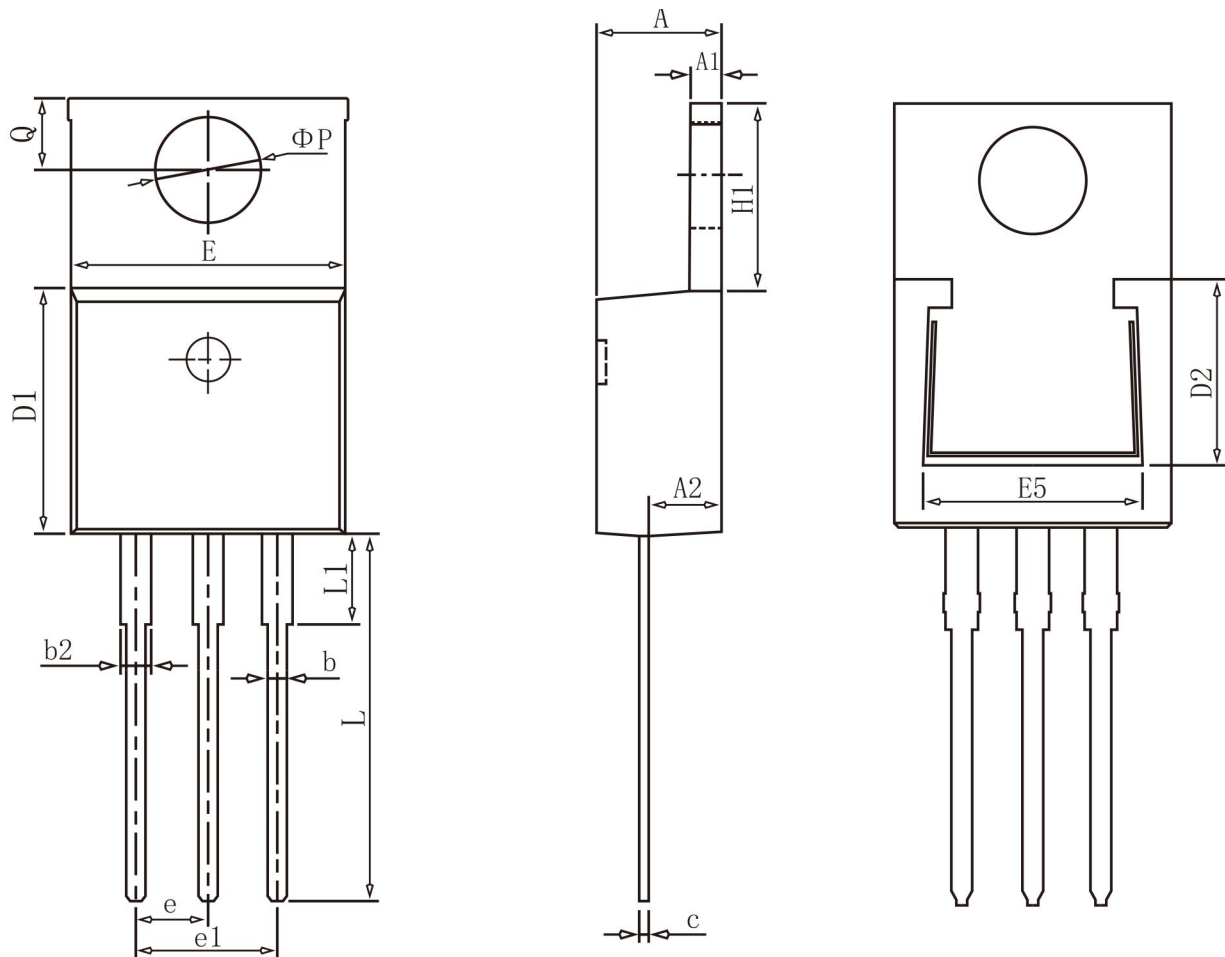


Figure 9. Normalized Maximum Transient Thermal Impedance



## TO-220 Package Information



### COMMON DIMENSIONS

| 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      | 2.54BSC |       |       |
| e1     | 5.08BSC |       |       |
| H1     | 6.10    | 6.30  | 6.50  |
| L      | 13.10   | 13.40 | 13.70 |
| L1     | -       | 3.75  | 4.10  |
| Φ P    | 3.70    | 3.84  | 3.99  |
| Q      | 2.54    | 2.74  | 2.94  |