HIGH DIODE

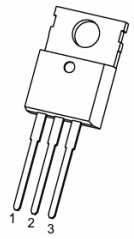
# T105N15NTB

## 150V N-Channel MOSFET

### Product Summary

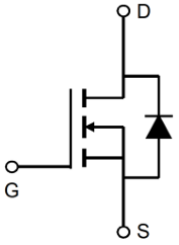
| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
|---|---|---|
| 150V | 10.5mΩ@10V | 83A |

TO220-3L




1. GATE
2. DRAIN
3. SOURCE

**Schematic diagram**




### Feature

- Split Gate Trench Technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- Low Gate Resistance
- 100% UIS Tested

### Application

- Power Switching Application
- Hard Switched and High Frequency Circuits
- DC/DC Converter

### Package Marking and Ordering Information

| Part Number | Package | Marking | Packing | Reel Size | Tape Width | Qty |
|---|---|---|---|---|---|---|
| T105N15NTB | TO-220-3L | T105N15N | Tube | NA | NA | 50pcs |

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

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 150 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current[1] | $T_C$ = 25°C | $I_D$ | 83 | A |
| | $T_C$ = 100°C | $I_D$ | 52 | A |
| Pulsed Drain Current[2] | | $I_{DM}$ | 332 | A |
| Single Pulsed Avalanche Current[3] | | $I_{AS}$ | 35 | A |
| Single Pulsed Avalanche Energy[3] | | $E_{AS}$ | 306 | mJ |
| Power Dissipation[5] | $T_C$ = 25°C | $P_D$ | 174 | W |
| Thermal Resistance from Junction to Ambient[6] | | $R_{\theta JA}$ | 58 | °C/W |
| Thermal Resistance from Junction to Case | | $R_{\theta JC}$ | 0.72 | °C/W |
| Junction Temperature | | $T_J$ | 150 | °C |
| Storage Temperature | | $T_{STG}$ | -55~ +150 | °C |

**MOSFET ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C unless otherwise noted)**

| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 150 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 150V, $V_{GS}$ = 0V | | | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$ = ±20V, $V_{DS}$ = 0V | | | ±150 | nA |
| **On Characteristics[4]** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 2 | 3.1 | 4 | V |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 20A | | 10.5 | 14.0 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 75V, $V_{GS}$ = 0V, f = 1MHz | | 2240 | | pF |
| Output Capacitance | $C_{oss}$ | | | 256 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 3.2 | | |
| Gate Resistance | $R_g$ | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1MHz | | 2.8 | | Ω |
| **Switching Characteristics** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 70V, $V_{GS}$ = 10V, $I_D$ = 20A | | 31 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 7.3 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 7.2 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = 75V, $V_{GS}$ = 10V, $I_D$ = 35A, $R_G$ = 3Ω | | 13 | | ns |
| Turn-On Rise Time | $t_r$ | | | 4 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 16 | | |
| Turn-Off Fall Time | $t_f$ | | | 3 | | |
| **Source-Drain Diode Characteristics** | | | | | | |
| Diode Forward Voltage[4] | $V_{SD}$ | $V_{GS}$ = 0V, $I_S$ = 20A | | | 1.2 | V |
| Diode Continuous Forward Current[1] | $I_S$ | $T_C$ = 25°C | | | 83 | A |
| Diode Pulse Forward Current[2] | $I_{SM}$ | | | | 332 | A |
| Diode Reverse Recovery Time | $t_{rr}$ | $I_F$ = 60A, dI/dt = 100A/μs | | 85 | | ns |
| Diode Reverse Recovery Charge | $Q_{rr}$ | | | 450 | | nC |

Notes:

1.The maximum current rating is limited by package. And device mounted on a large heatsink.

2.Pulse Test: Pulse Width ≤ 10μs, duty cycle ≤ 1%.

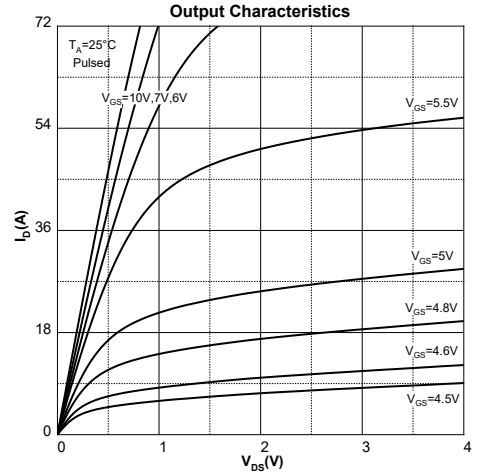
3.$E_{AS}$ condition: $V_{DD}$ = 50V, $V_{GS}$ = 10V, L = 0.5mH, $R_G$ = 25Ω Starting $T_J$ = 25°C.

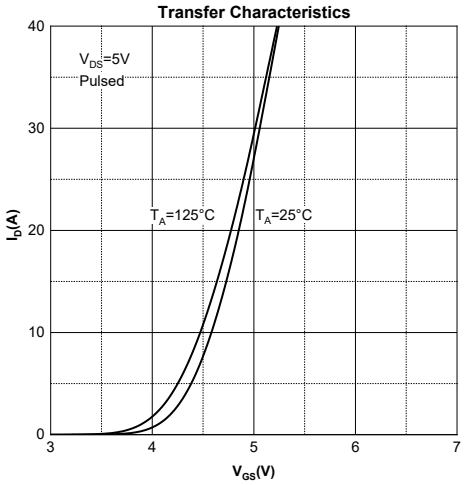
4.Pulse Test: Pulse Width ≤ 300μs, duty cycle ≤ 2%.

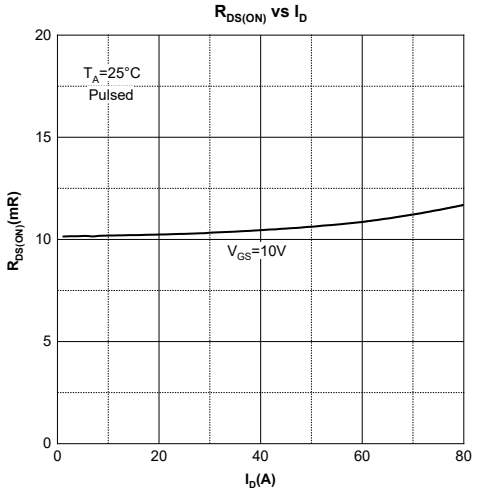
5.The power dissipation $P_D$ is limited by $T_{J(MAX)}$ = 150°C. And device mounted on a large heatsink.

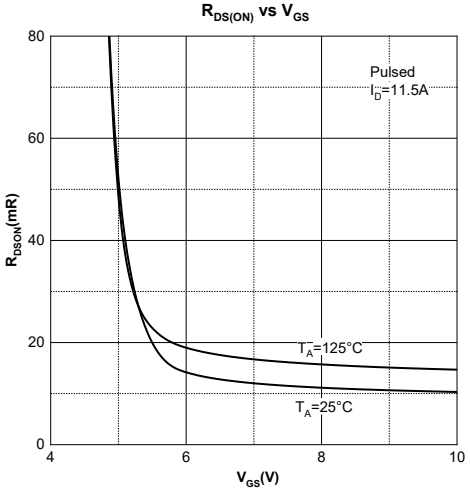
6.Device mounted on 1in$^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_A$ =25°C.

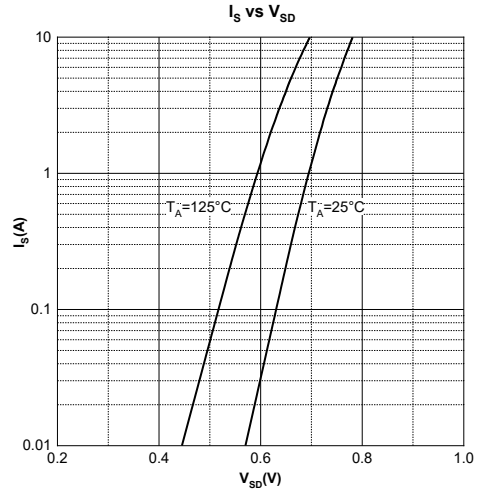
## Typical Characteristics

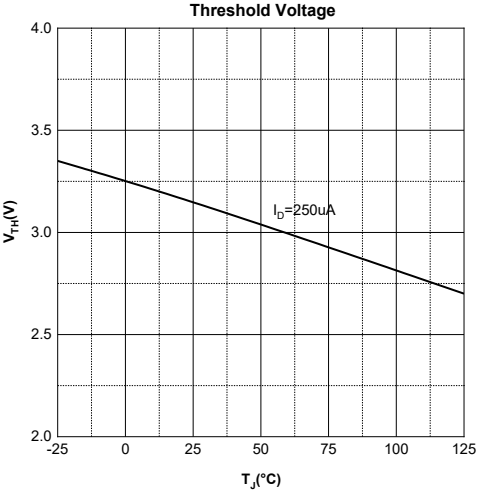


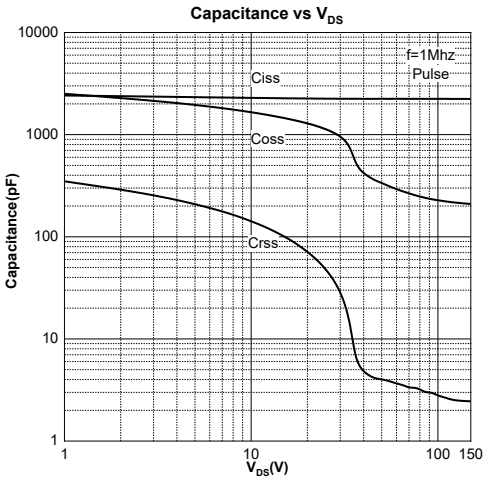



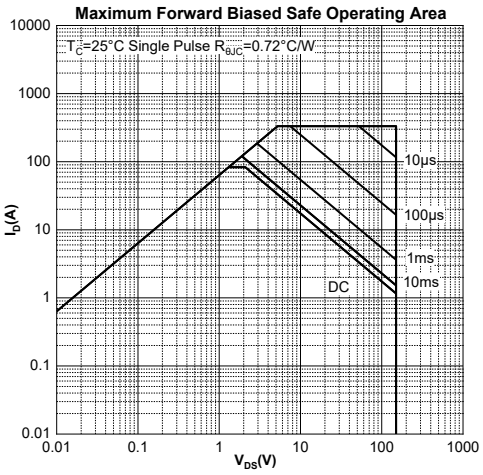



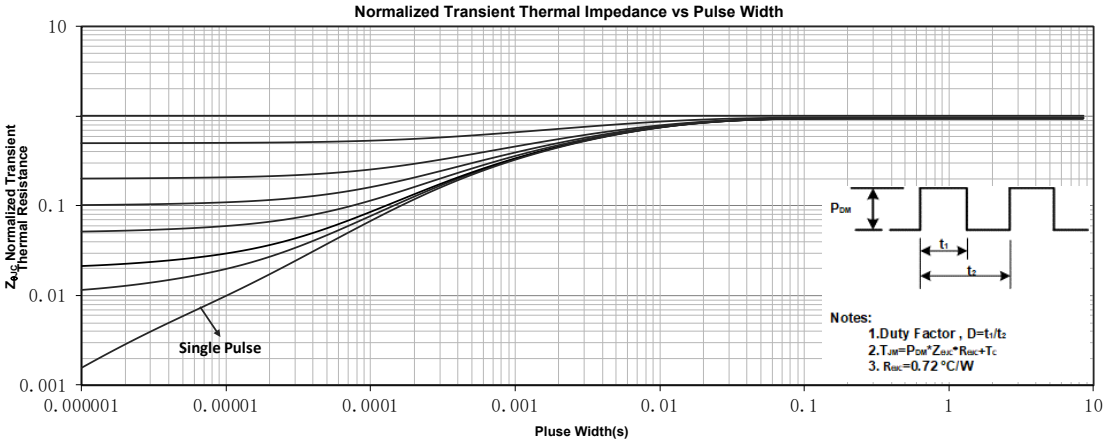



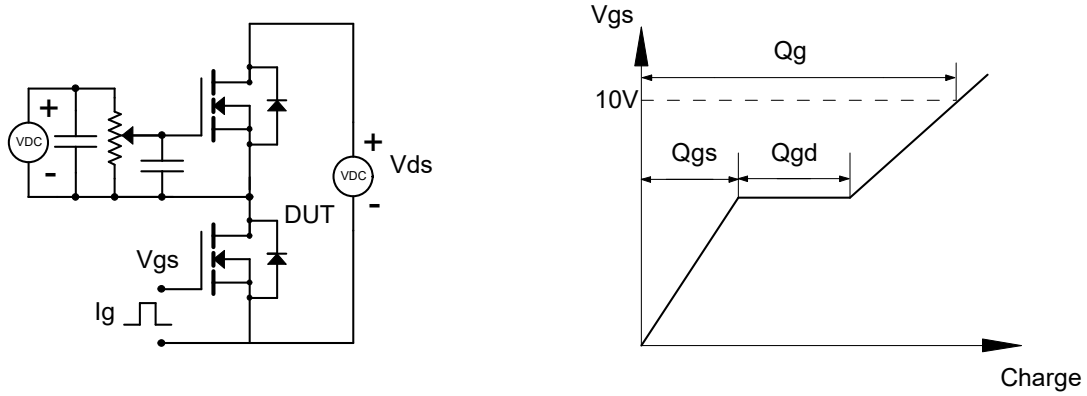

Capacitance vs $V_{DS}$
f=1Mhz
Pulse
Ciss
Coss
Crss
Capacitance(pF)
$V_{DS}$(V)
10000
1000
100
10
1
1
10
100
150


Maximum Forward Biased Safe Operating Area
$T_C$=25°C Single Pulse $R_{\theta JC}$=0.72°C/W
10µs
100µs
1ms
10ms
DC
$I_D$(A)
$V_{DS}$(V)
10000
1000
100
10
1
0.1
0.01
0.01
0.1
1
10
100
1000

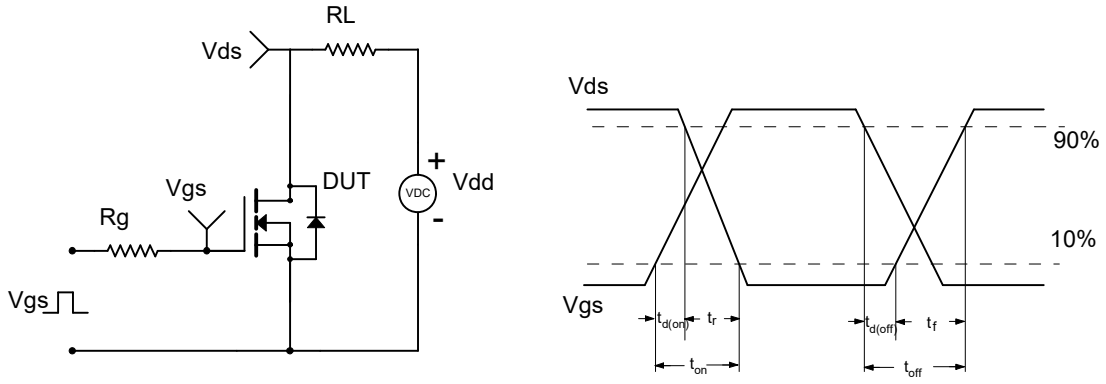

Normalized Transient Thermal Impedance vs Pulse Width
$Z_{\theta JC}$ Normalized Transient Thermal Resistance
Single Pulse
$P_{DM}$
$t_1$
$t_2$
Notes:
1.Duty Factor , D=$t_1/t_2$
2.$T_{JM}=P_{DM}*Z_{\theta JC}*R_{\theta JC}+T_C$
3. $R_{\theta JC}$=0.72 °C/W
Pluse Width(s)
10
0.1
0.01
0.001
0.000001
0.00001
0.0001
0.001
0.01
0.1
1
10

## Test Circuit

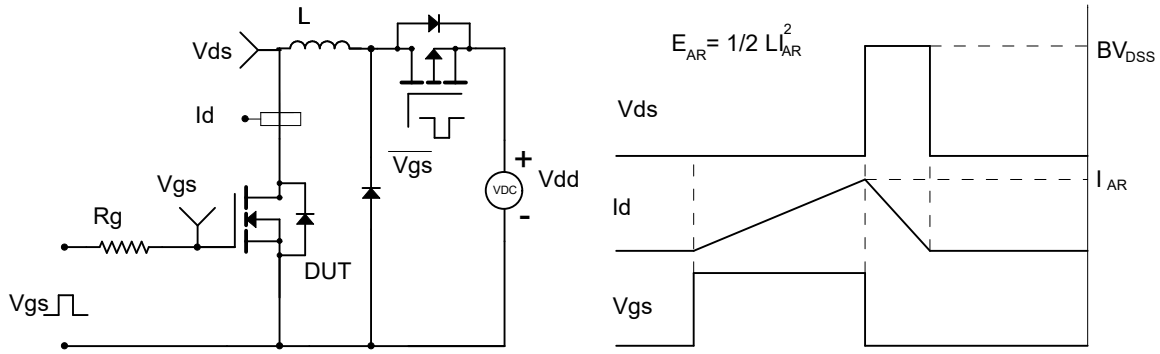
Gate Charge Test Circuit & Waveform



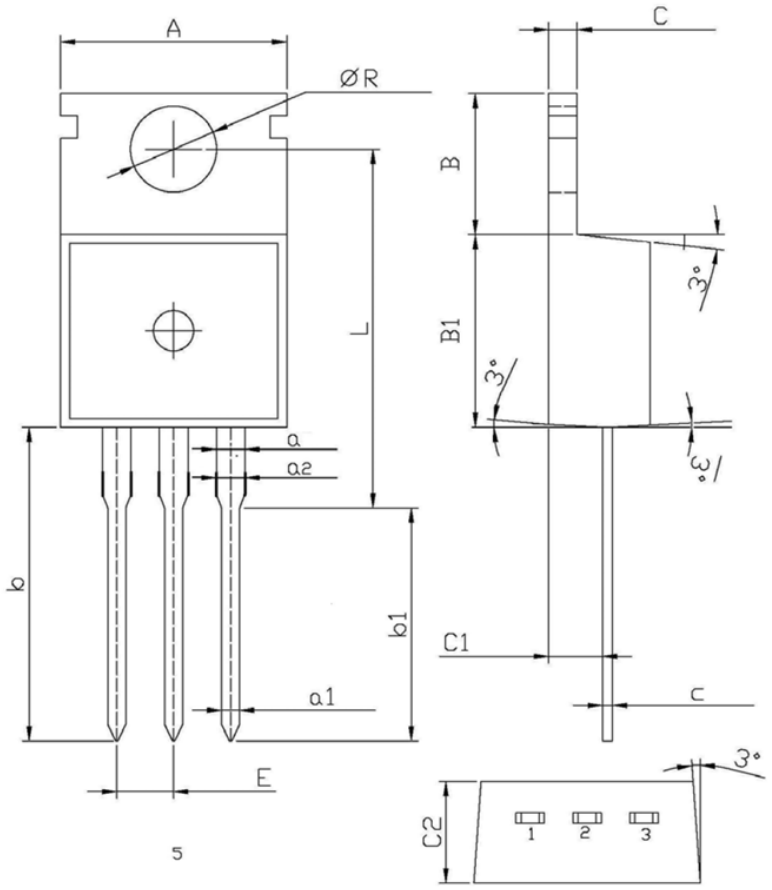

Resistive Switching Test Circuit & Waveform




Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



**TO-220-3L Package Information**




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 9.800 | 10.200 | 0.386 | 0.402 |
| R | 3.560 | 3.640 | 0.140 | 0.143 |
| L | 15.700 | 16.100 | 0.618 | 0.634 |
| b | 12.600 | 13.600 | 0.496 | 0.535 |
| b1 | 9.600 | 10.600 | 0.378 | 0.417 |
| a | 1.220 | 1.320 | 0.048 | 0.052 |
| E | 2.340 | 2.740 | 0.092 | 0.108 |
| a2 | 1.250 | 1.620 | 0.049 | 0.064 |
| C | 1.200 | 1.400 | 0.047 | 0.055 |
| B | 5.900 | 6.700 | 0.232 | 0.264 |
| B1 | 9.000 | 9.400 | 0.354 | 0.370 |
| C1 | 2.200 | 2.600 | 0.087 | 0.102 |
| a1 | 0.700 | 0.900 | 0.028 | 0.035 |
| c | 0.400 | 0.600 | 0.016 | 0.024 |
| C2 | 4.300 | 4.700 | 0.169 | 0.185 |