# 30V N-ch Power MOSFET

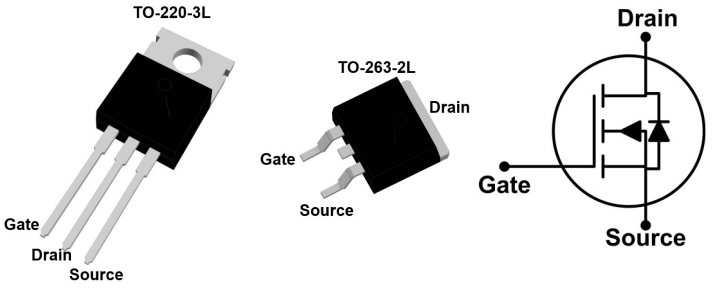
| $BV_{DSS}$ | $R_{DS(ON),max.}$ | $I_D$[2] |
|---|---|---|
| 30V | 3.0mΩ | 166A |

## General Features

- Proprietary New Trench Technology
- $R_{DS(ON),typ.}$=2.4mΩ@$V_{GS}$=10V
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

## Applications

- High efficiency DC/DC Converters
- Synchronous Rectification
- UPS Inverter




## Ordering Information

| Part Number | Package | Marking |
|---|---|---|
| FTP30N3P0L | TO-220-3L | 30N3P0L |
| FTB30N3P0L | TO-263-2L | 30N3P0L |

## Absolute Maximum Ratings

$T_C$=25℃ unless otherwise specified

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DSS}$ | Drain-to-Source Voltage[1] | 30 | V |
| $V_{GSS}$ | Gate-to-Source Voltage | ±20 | |
| $I_D$ | Continuous Drain Current[2] | 166 | A |
| | Continuous Drain Current[3] | 130 | |
| | Continuous Drain Current at $T_C$=100℃[2] | 117 | |
| $I_{DM}$ | Pulsed Drain Current at $V_{GS}$=10V[2,4] | 663 | |
| $E_{AS}$ | Single Pulse Avalanche Energy ($V_{DD}$=15V, $V_{GS}$=10V, $R_G$=25Ω, L=1mH) | 297 | mJ |
| $P_D$ | Power Dissipation | 153 | W |
| | Derating Factor above 25℃ | 1.0 | W/℃ |
| $T_L$ | Soldering Temperature Distance of 1.6mm from case for 10 seconds | 300 | ℃ |
| $T_J$ & $T_{STG}$ | Operating and Storage Temperature Range | -55 to 175 | |

*Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.*

## Thermal Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | | | 0.98 | ℃/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | | | 63 | |

# Electrical Characteristics

## OFF Characteristics

$T_J$=25℃ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-to-Source Breakdown Voltage | 30 | | | V | $V_{GS}$=0V, $I_D$=250uA |
| $I_{DSS}$ | Drain-to-Source Leakage Current | | | 1 | uA | $V_{DS}$=24V, $V_{GS}$=0V |
| $I_{GSS}$ | Gate-to-Source Leakage Current | | | ±100 | nA | $V_{GS}$=±20V, $V_{DS}$=0V |

## ON Characteristics

$T_J$=25℃ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | Static Drain-to-Source On-Resistance | -- | 2.4 | 3.0 | mΩ | $V_{GS}$=10V, $I_D$=80A[5] |
| | | | 3.2 | 4.3 | mΩ | $V_{GS}$=4.5V, $I_D$=80A[5] |
| $V_{GS(TH)}$ | Gate Threshold Voltage | 1.0 | -- | 3.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$=250uA |

## Dynamic Characteristics

Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| $C_{iss}$ | Input Capacitance | | 2.6 | | nF | $V_{GS}$=0V, $V_{DS}$=25V, f=1.0MHz |
| $C_{rss}$ | Reverse Transfer Capacitance | | 0.28 | | | |
| $C_{oss}$ | Output Capacitance | | 0.55 | | | |
| $R_g$ | Gate Series Resistance | | 3.1 | | Ω | f=1.0MHz |
| $Q_g$ | Total Gate Charge | | 27 | | nC | $V_{DD}$=15V, $I_D$=80A, $V_{GS}$=4.5V |
| | | | 53 | | | $V_{DD}$=15V, $I_D$=80A, $V_{GS}$=10V |
| $Q_{gs}$ | Gate-to-Source Charge | | 8.4 | | | |
| $Q_{gd}$ | Gate-to-Drain (Miller) Charge | | 11 | | | |

## Resistive Switching Characteristics

Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| $t_{d(on)}$ | Turn-on Delay Time | | 16 | | ns | $V_{DD}$=15V $I_D$=80A $V_{GS}$=4.5V $R_G$=2.5Ω |
| $t_{rise}$ | Rise Time | | 4.4 | | | |
| $t_{d(off)}$ | Turn-off Delay Time | | 56 | | | |
| $t_{fall}$ | Fall Time | | 11 | | | |

## Source-Drain Body Diode Characteristics

$T_J$=25℃ unless otherwise specified

| Symbol | Parameter | Min | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| $I_{SD}$ | Continuous Source Current[2] | | | 166 | A | Maximum Ratings |
| $V_{SD}$ | Diode Forward Voltage | | 0.9 | 1.2 | V | $I_S$=80A, $V_{GS}$=0V |
| $t_{rr}$ | Reverse Recovery Time | | 37 | | ns | $V_{GS}$=0V $I_F$=20A,di/dt=100A/μs |
| $Q_{rr}$ | Reverse Recovery Charge | | 3.1 | | nC | |

Note:

[1] $T_J$=25℃ to 175℃
[2] Silicon limited current only
[3] Package limited current
[4] Repetitive rating, pulse width limited by maximum junction temperature.
[5] Pulse width≤380μs; duty cycle≤2%.

## Typical Characteristics

**Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case**

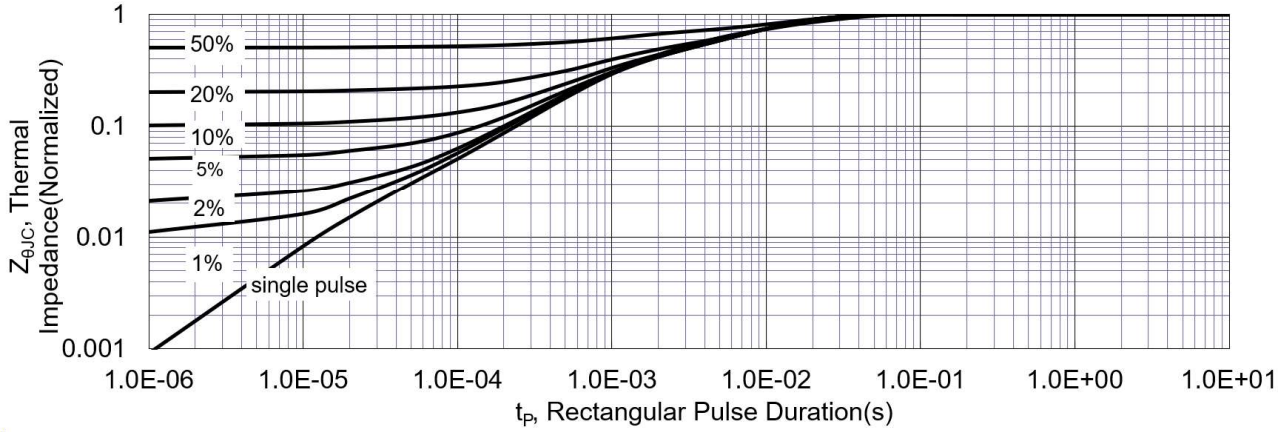



**Figure 2. Maximum Power Dissipation vs. Case Temperature**

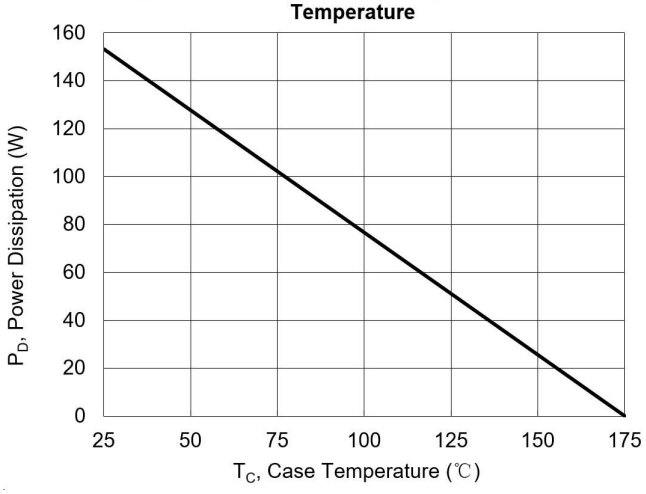



**Figure 3. Maximum Continuous Drain Current vs Case Temperature**

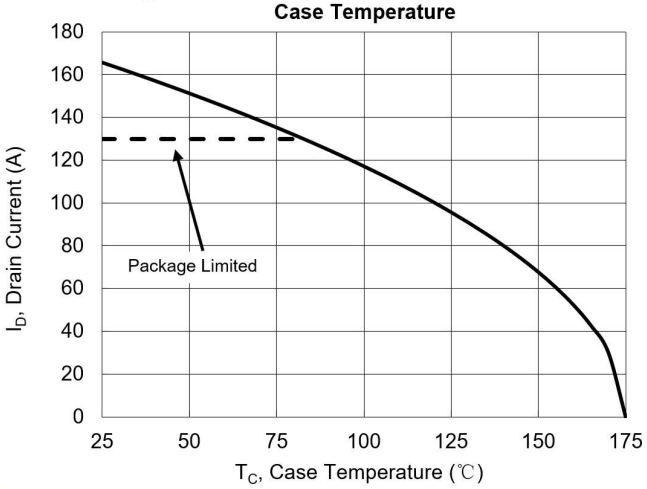



**Figure 4. Typical Output Characteristics**

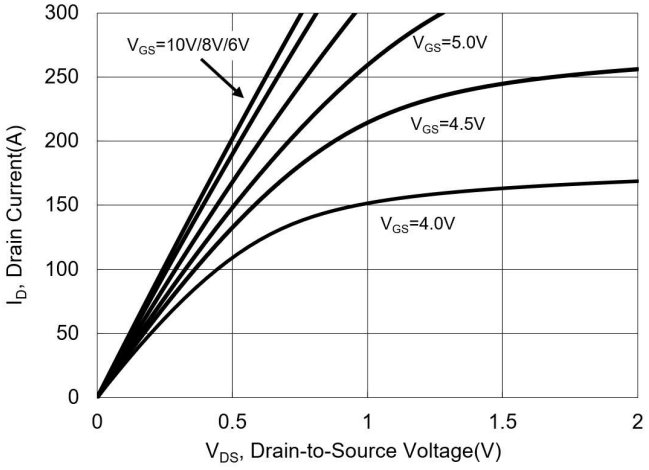



**Figure 5. Typical Drain-to-Source ON Resistance vs. Gate Voltage**

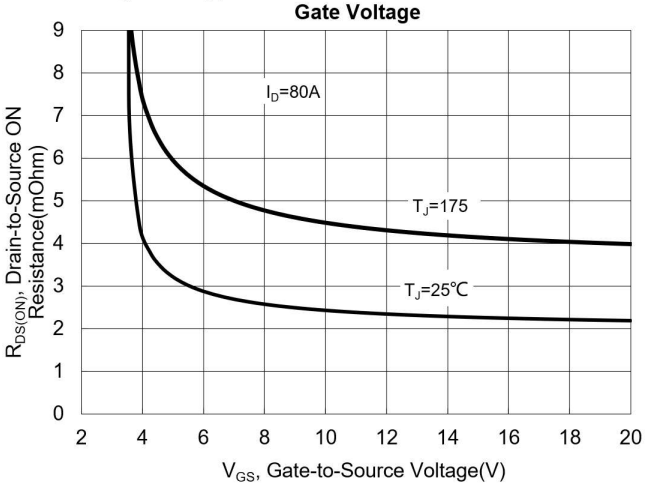


**Figure 6. Maximum Peak Current Capability**

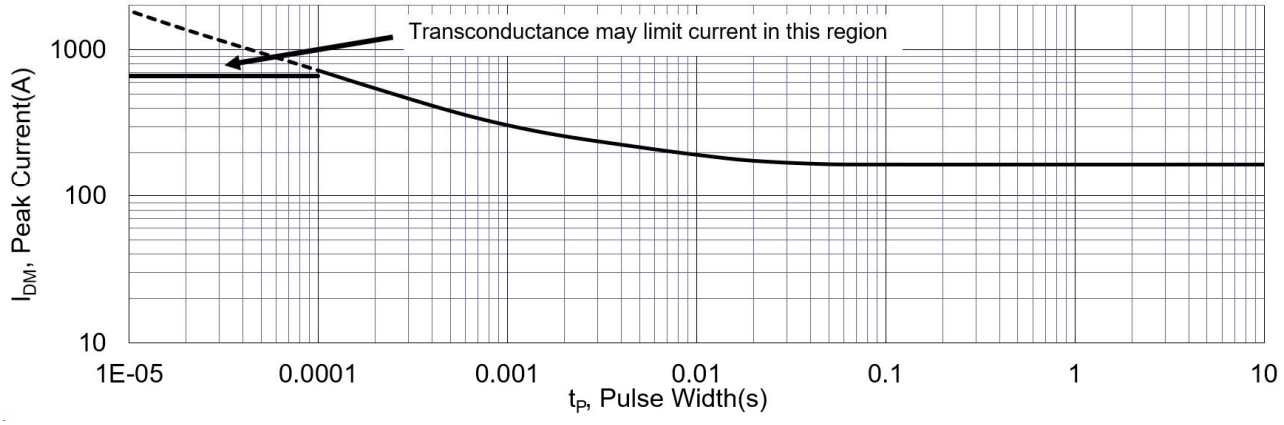



**Figure 7. Typical Transfer Characteristics**

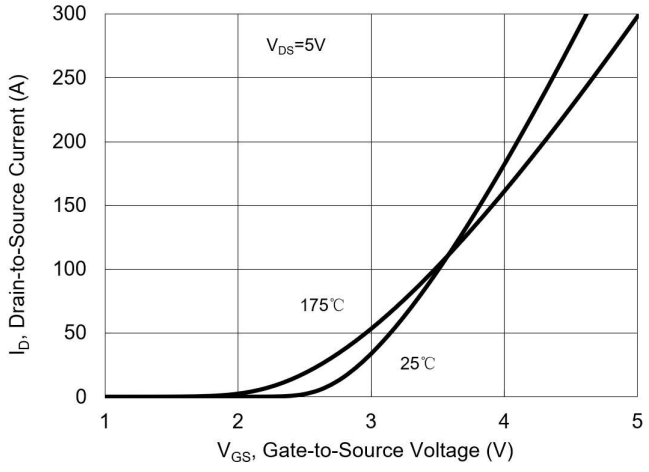



**Figure 8. Unclamped Inductive Switching Capability**

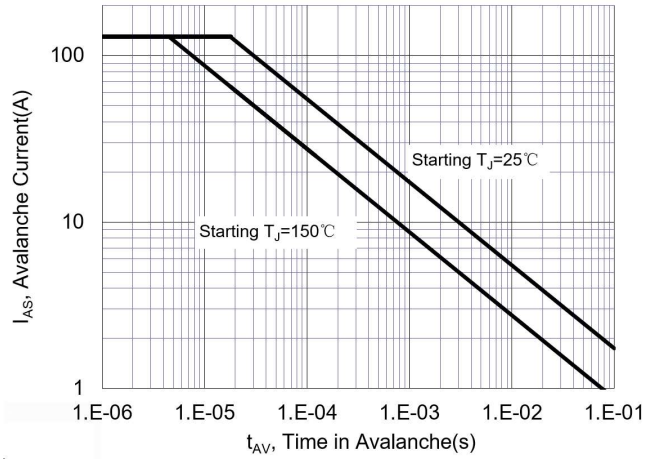



**Figure 9. Typical Drain-to-Source ON Resistance**

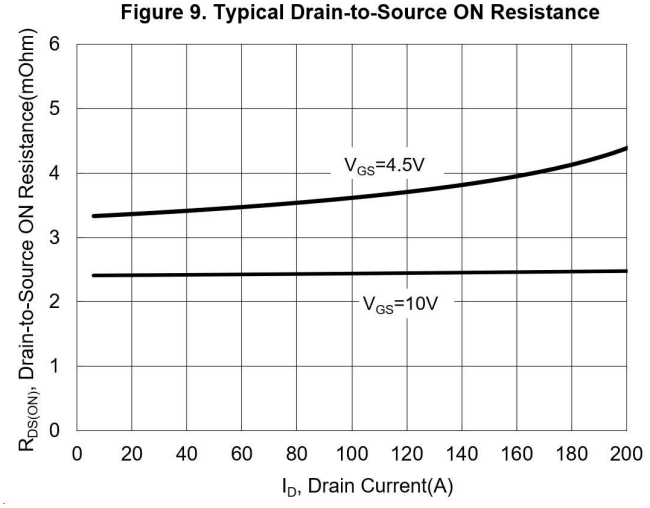



**Figure 10. Typical Drain-to-Source On Resistance vs. Junction Temperature**

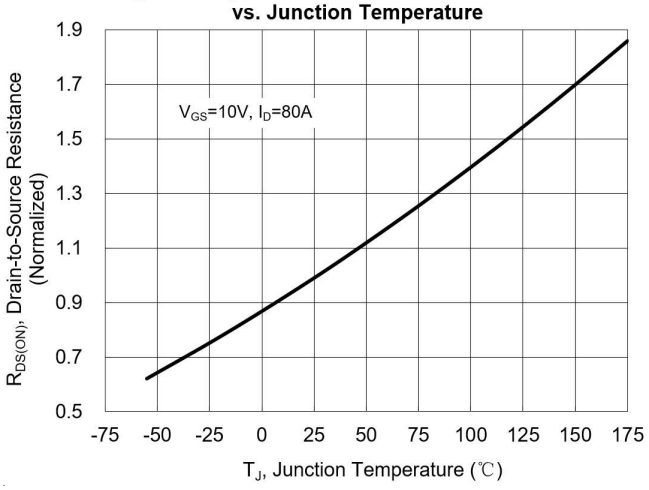


**Figure 11.Typical Breakdown Voltage vs. Junction Temperature**

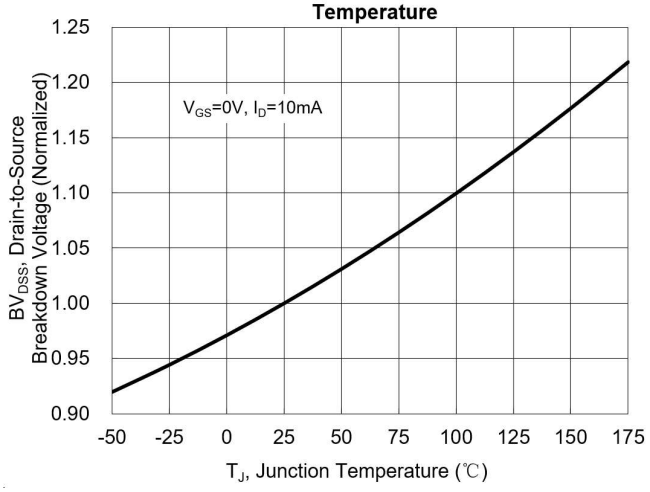



**Figure 12.Typical Threshold Voltage vs. Junction Temperature**

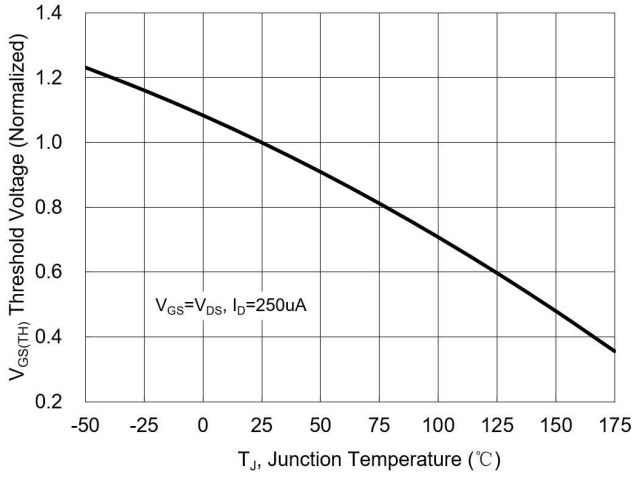



**Figure 13. Maximum Forward Safe Operation Area**

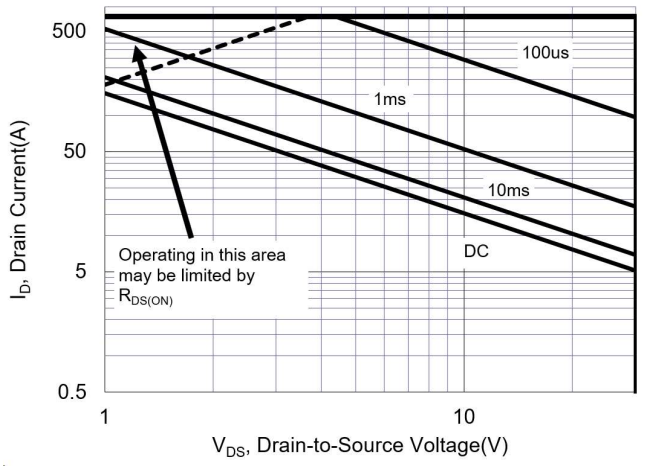



**Figure 14. Typical Capacitance vs. Drain-to-Source Voltage**

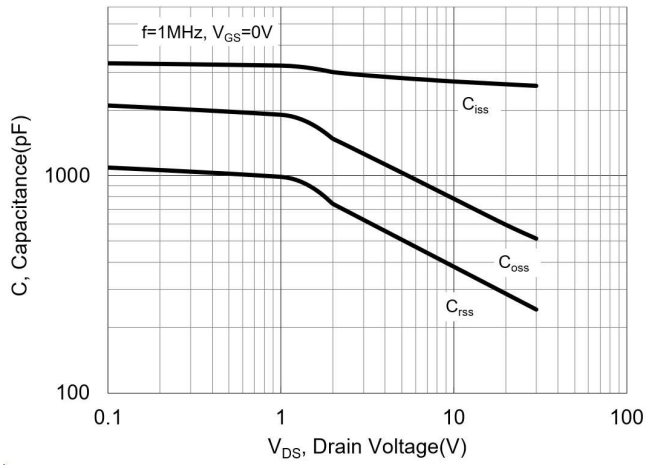



**Figure 15. Typical Gate Charge vs. Gate-to-Source Voltage**

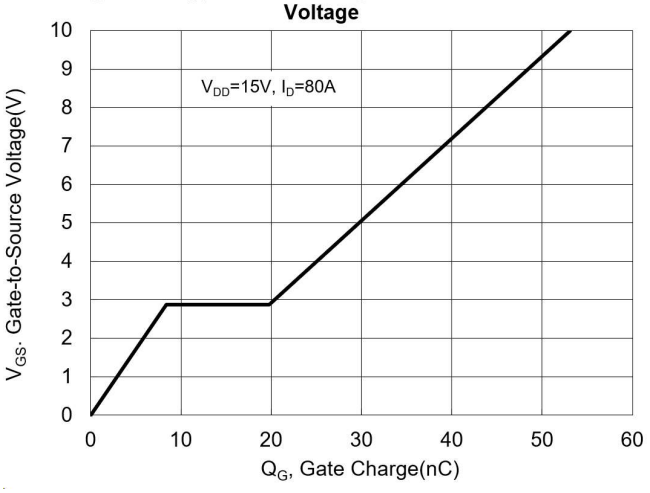
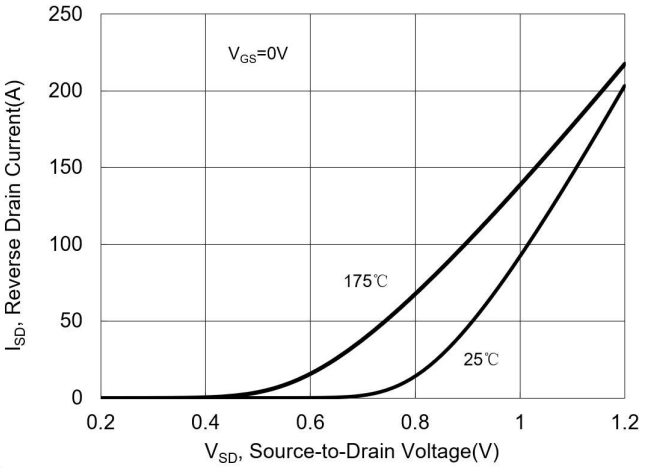
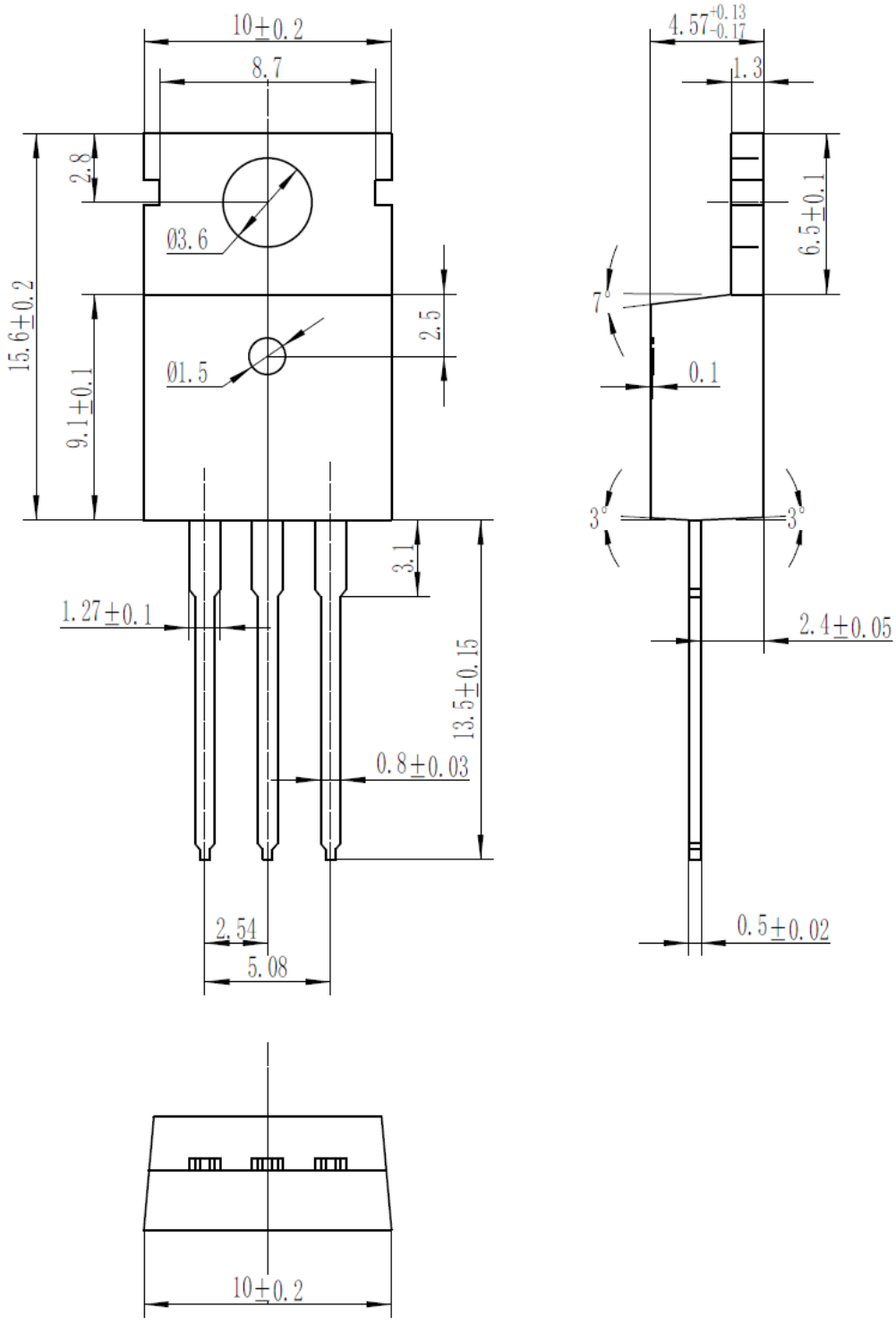



**Figure 16. Typical Body Diode Transfer Characteristics**

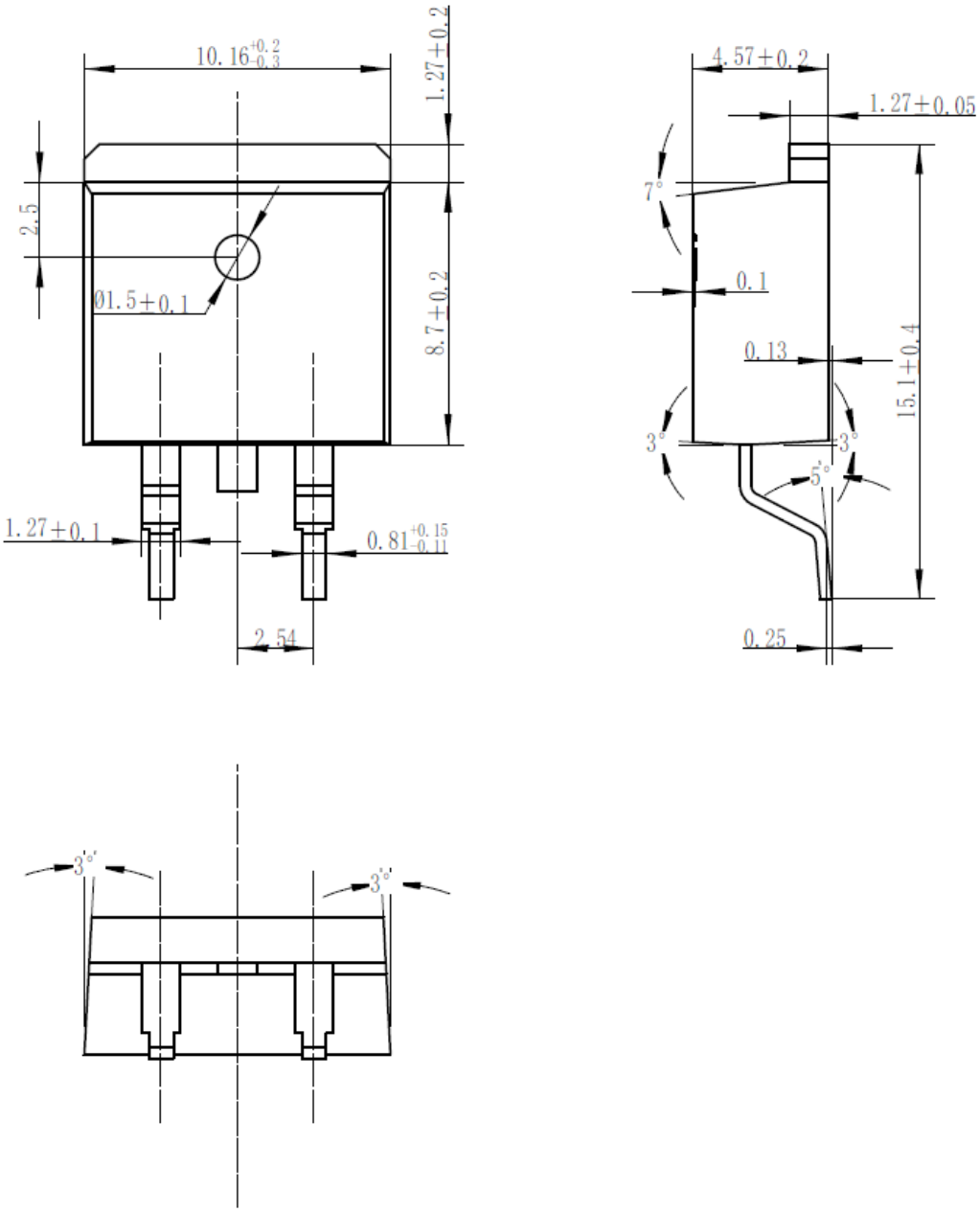


## Package Dimensions

**TO-220-3L**



**TO-263-2L**


10.16+0.2 -0.3
1.27+0.2
2.5
Ø1.5+0.1
8.7+0.2
1.27+0.1
0.81+0.15 -0.11
2.54
4.57+0.2
1.27+0.05
7°
0.1
0.13
15.1+0.4
3°
3°
5°
0.25
3°
3°

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