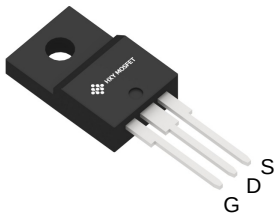
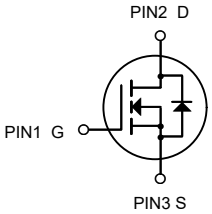
## Description

The AOTF16N50 can be used in various power swithching circuit for system miniaturization and higher efficiency.The package form is TO-220/ TO-220F, which accords with the RoHS standard.




**TO-220F**




N-Channel MOSFET

## General Features

$V_{DS}$ = 500V,$I_D$ =20A

$R_{DS(ON)}$ < 0.3Ω@ $V_{GS}$=10V

## Application

● Power switch circuit of adaptor and charger.

## Ordering Information

| Product ID | Pack | Brand | Units Tube |
|---|---|---|---|
| AOTF16N50 | TO-220F | HXY MOSFET | 50 |

## Absolute Maximum Ratings@T =25°C(unless otherwise specified)

| Symbol | Parameter | Limit | Unit |
|---|---|---|---|
| $V_{DSS}$ | Drain-to-Source Voltage[1] | 500 | V |
| $V_{GSS}$ | Gate-to-Source Voltage | ±30 | |
| $I_D$ | Continuous Drain Current | 20 | A |
| $I_{D\ @\ Tc=100°C}$ | Continuous Drain Current @ Tc=100°C | Figure 3 | |
| $I_{DM}$ | Pulsed Drain Current at $V_{GS}$=10V[2] | Figure 6 | |
| $E_{AS}$ | Single Pulse Avalanche Energy | 1500 | mJ |
| dv/dt | Peak Diode Recovery dv/dt[3] | 5.0 | V/ns |
| $P_D$ | Power Dissipation | 165 | W |
| $T_L$<br>$T_{PAK}$ | Maximum Temperature for Soldering Leads at 0.063in (1.6mm) from Case for 10 seconds, Package Body for 10 seconds | 300<br>260 | °C |
| $T_J$& $T_{STG}$ | Operating and Storage Temperature Range | -55 to 150 | |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | 2.27 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 100 | |

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

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

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-to-Source Breakdown Voltage | 500 | -- | -- | V | $V_{GS}$=0V, $I_D$=250uA |
| $I_{DSS}$ | Drain-to-Source Leakage Current | -- | -- | 1 | uA | $V_{DS}$=500V, $V_{GS}$=0V |
| | | -- | -- | 100 | | $V_{DS}$=400V, $V_{GS}$=0V, $T_J$ =125℃ |
| $I_{GSS}$ | Gate-to-Source Leakage Current | -- | -- | +100 | nA | $V_{GS}$=+30V, $V_{DS}$=0V |
| | | -- | -- | -100 | | $V_{GS}$=-30V, $V_{DS}$=0V |
| $R_{DS(ON)}$ | Static Drain-to-Source On-Resistance[4] | -- | 0.26 | 0.3 | Ω | $V_{GS}$=10V, $I_D$=10A |
| $V_{GS(TH)}$ | Gate Threshold Voltage | 2.0 | -- | 4.0 | V | $V_{DS}$=$V_{GS}$, $I_D$=250uA |
| gfs | Forward Transconductance[4] | -- | 17 | -- | S | VDS=15V,ID=10A |
| $C_{iss}$ | Input Capacitance | -- | 2864 | -- | pF | $V_{GS}$=0V, $V_{DS}$=25V, f=1.0$MH_Z$ |
| $C_{rss}$ | Reverse Transfer Capacitance | -- | 25 | -- | | |
| $C_{oss}$ | Output Capacitance | -- | 286 | -- | | |
| $Q_g$ | Total Gate Charge | -- | 63 | -- | nC | $V_{DD}$=250V, $I_D$=20A, $V_{GS}$=0 to 10V |
| $Q_{gs}$ | Gate-to-Source Charge | -- | 14 | -- | | |
| $Q_{gd}$ | Gate-to-Drain (Miller) Charge | -- | 24 | -- | | |
| $t_{d(ON)}$ | Turn-on Delay Time | -- | 33 | -- | nS | $V_{DD}$=250V, $I_D$=20A, $V_{GS}$= 10V $R_G$=25 Ω |
| $t_{rise}$ | Rise Time | -- | 75 | -- | | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | -- | 181 | -- | | |
| $t_{fall}$ | Fall Time | -- | 83 | -- | | |
| $I_{SD}$ | Continuous Source Current[4] | -- | -- | 20 | A | Integral PN-diode in MOSFET |
| $I_{SM}$ | Pulsed Source Current[4] | -- | -- | 80 | | |
| $V_{SD}$ | Diode Forward Voltage | -- | -- | 1.5 | V | $I_S$=20A, $V_{GS}$=0V |
| trr | Reverse recovery time | -- | 392 | -- | V | $V_{GS}$=0V ,$I_F$=20A, $di_F/dt$=100A/μs |
| Qrr | Reverse recovery charge | -- | 3.3 | -- | uC | |

**Note:**

[1] $T_J$=+25°C to +150°C
[2] Repetitive rating; pulse width limited by maximum junction temperature.
[3] $I_{SD}$= 20A di/dt < 100 A/μs, $V_{DD}$ < $BV_{DSS}$, $T_J$=+150°C.
[4] Pulse width≤380μs; duty cycle≤2%.

## Typical Characteristics

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

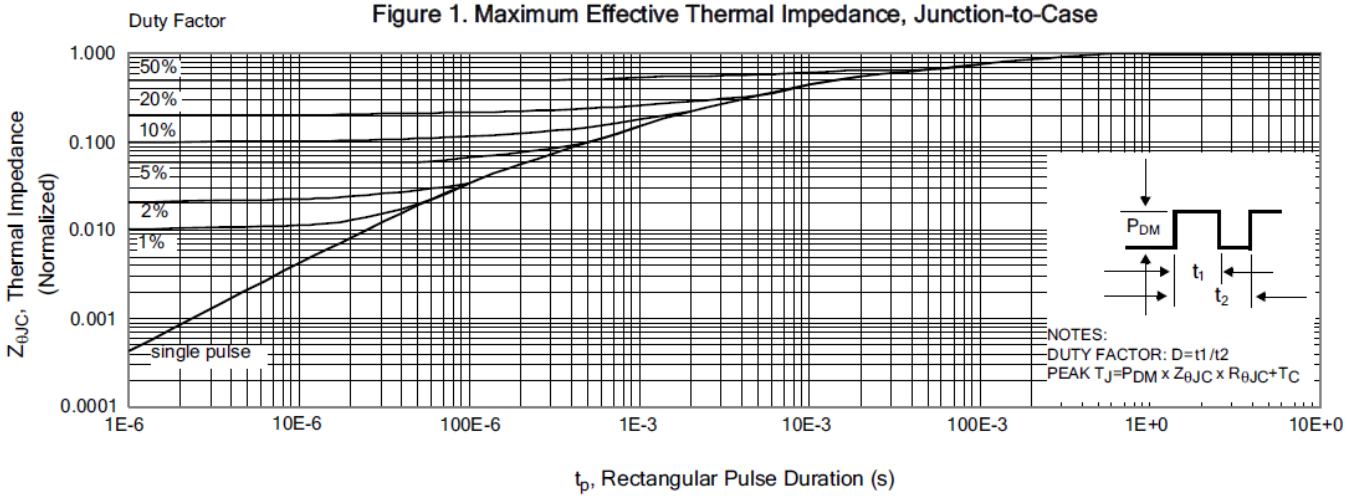



Figure 2. Maximum Power Dissipation vs Case Temperature

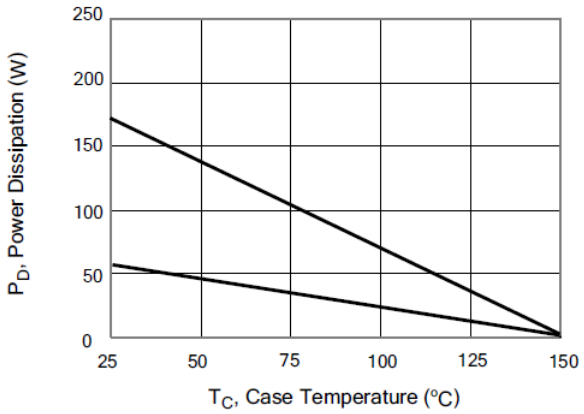



Figure 3. Maximum Continuous Drain Current vs Case Temperature

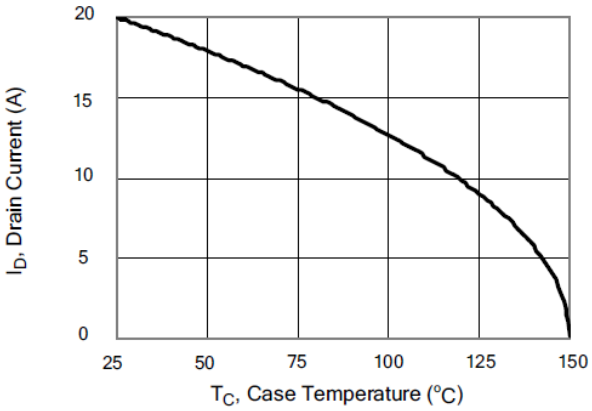



Figure 4. Typical Output Characteristics

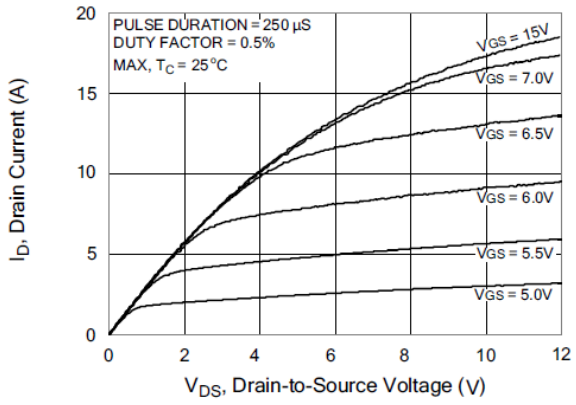



Figure 5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current

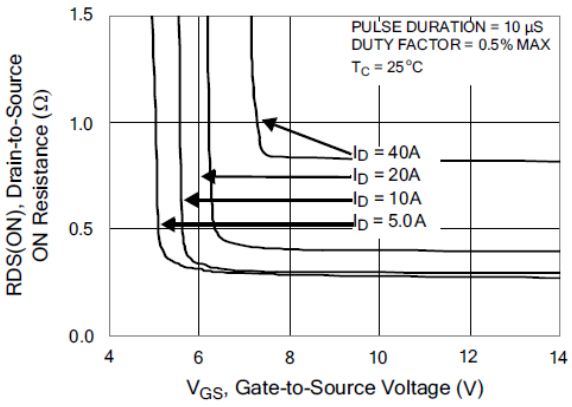


Figure 6. Maximum Peak Current Capability

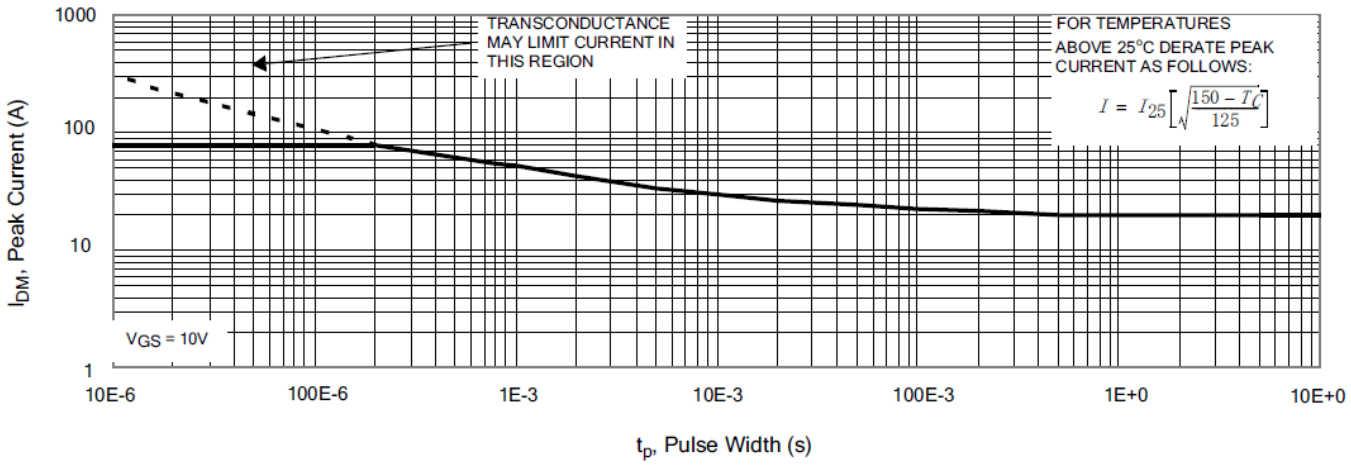



Figure 7. Typical Transfer Characteristics

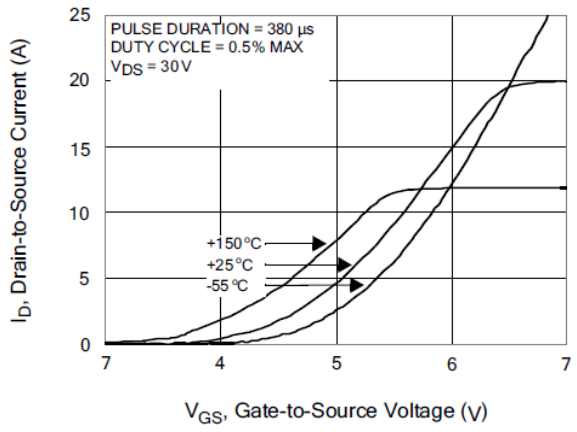



Figure 8. Unclamped Inductive Switching Capability

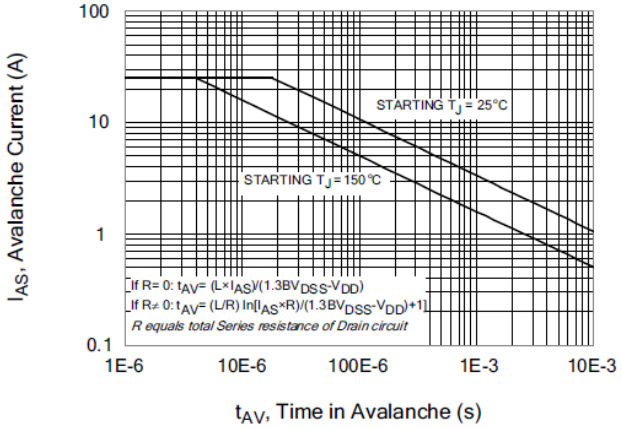



Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

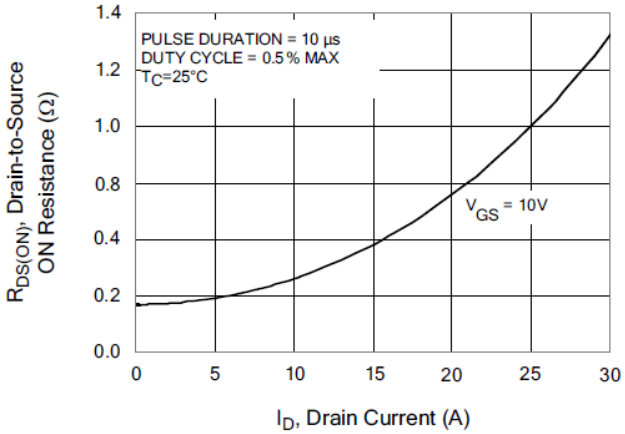



Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature

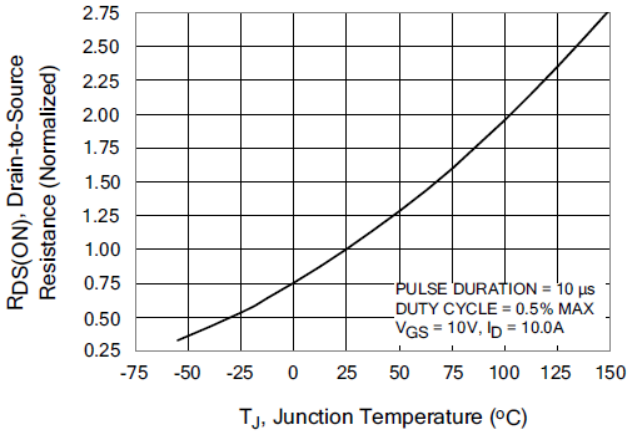


Figure 11. Typical Breakdown Voltage vs Junction Temperature

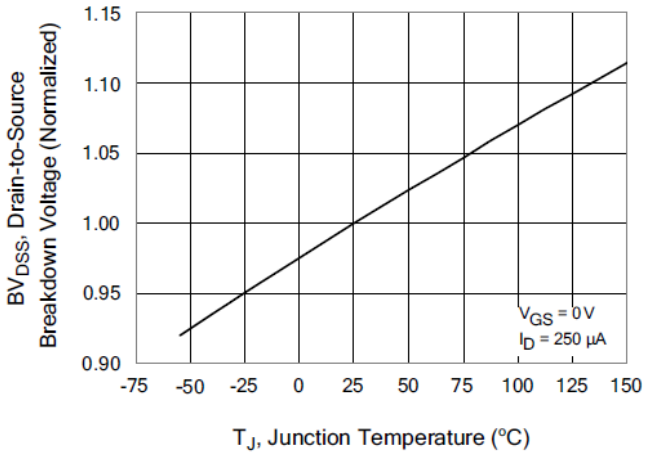



Figure 12. Typical Threshold Voltage vs Junction Temperature

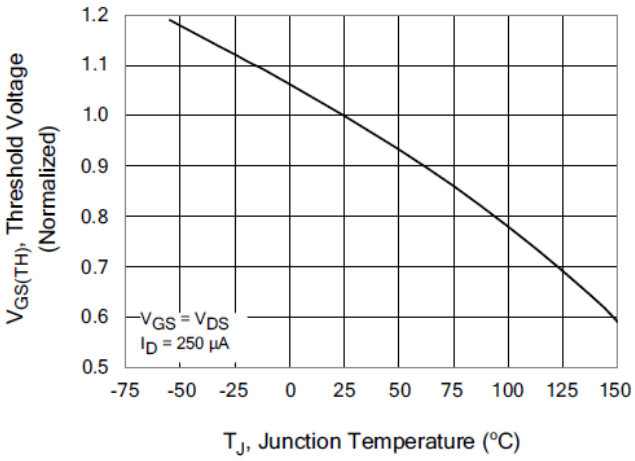



Figure 13. Maximum Forward Bias Safe Operating Area

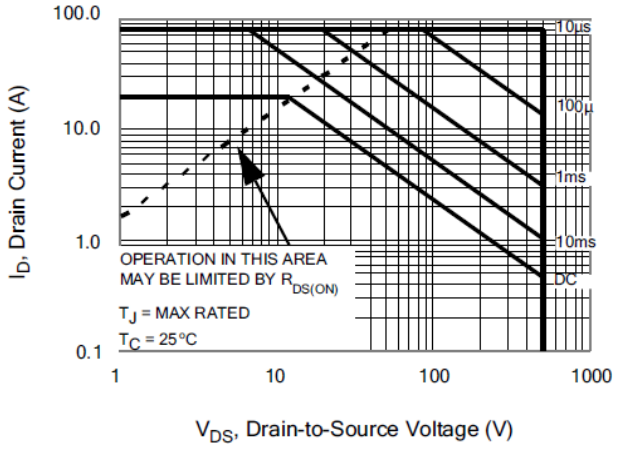



Figure 14. Typical Capacitance vs Drain-to-Source Voltage

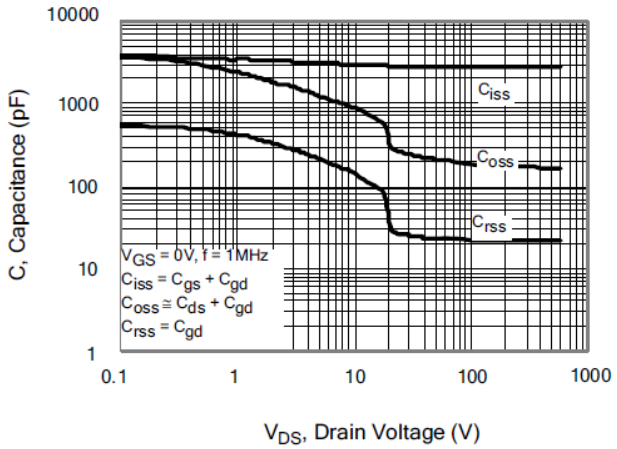



Figure 15. Typical Gate Charge vs Gate-to-Source Voltage

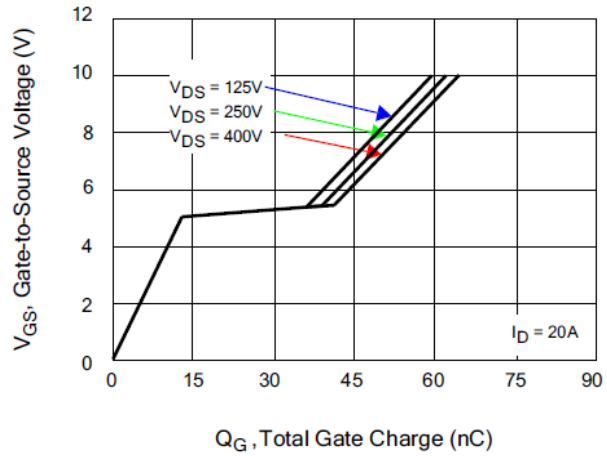
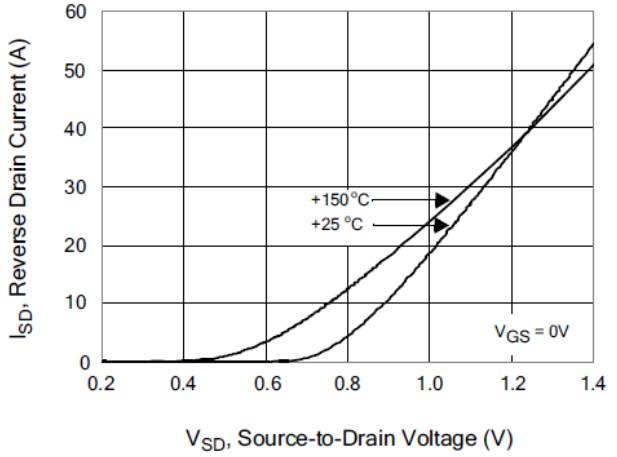
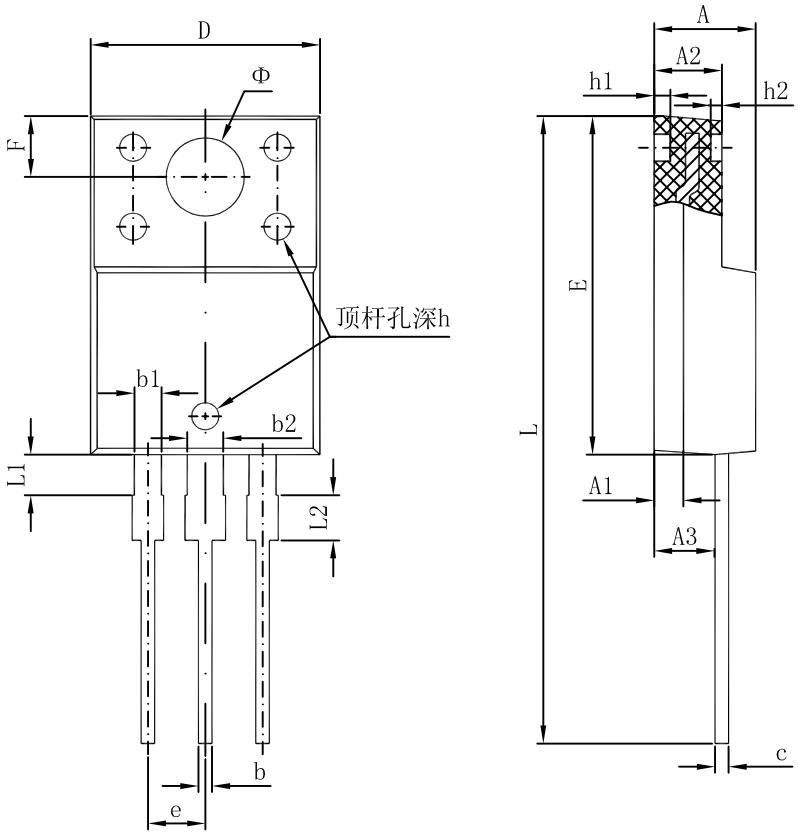



Figure 16. Typical Body Diode Transfer Characteristics



## Package Dimension TO-220F




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 4.300 | 4.700 | 0.169 | 0.185 |
| A1 | 1.300 REF. | | 0.051 REF. | |
| A2 | 2.800 | 3.200 | 0.110 | 0.126 |
| A3 | 2.500 | 2.900 | 0.098 | 0.114 |
| b | 0.500 | 0.750 | 0.020 | 0.030 |
| b1 | 1.100 | 1.350 | 0.043 | 0.053 |
| b2 | 1.500 | 1.750 | 0.059 | 0.069 |
| c | 0.500 | 0.750 | 0.020 | 0.030 |
| D | 9.960 | 10.360 | 0.392 | 0.408 |
| E | 14.800 | 15.200 | 0.583 | 0.598 |
| e | 2.540 TYP. | | 0.100 TYP. | |
| F | 2.700 REF. | | 0.106 REF. | |
| Φ | 3.500 REF. | | 0.138 REF. | |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| h1 | 0.800 REF. | | 0.031 REF. | |
| h2 | 0.500 REF. | | 0.020 REF. | |
| L | 28.000 | 28.400 | 1.102 | 1.118 |
| L1 | 1.700 | 1.900 | 0.067 | 0.075 |
| L2 | 1.900 | 2.100 | 0.075 | 0.083 |

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