# FCPF260N65FL1-F154

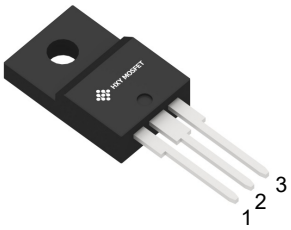
SiC Power MOSFET N-Channel Enhancement Mode

## Features

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low $R_{DS(on)}$
- Easy to drive and parallel
- Effectively lower down Tj and Rth,High anti-EMI ability
- RoHS Compliant

## Benefits

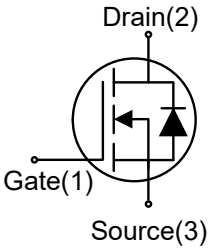
- Increased Power Density
- Faster Operating Freequency
- Reduction of Heat Sink Requirements
- Higher Efficiency
- Reduced EMI




TO-220F

## Applications

- Power Factor Correction Modules
- Switch Mode Power Supplies
- Power Inverters
- High Voltage DC/DC Converters




| Ordering Part Number | Package | Brand |
|---|---|---|
| FCPF260N65FL1-F154 | TO-220F | HXY MOSFET |

## Maximum Ratings (Tc = 25 ˚C unless otherwise specified)

| Symbol | Parameter | Value | Unit | Test Conditions |
|---|---|---|---|---|
| $V_{DSmax}$ | Drain - Source Voltage | 650 | V | |
| $V_{GSmax}$ | Gate - Source Voltage (dynamic) | -5/+26 | V | |
| $V_{GSop}$ | Gate - Source Voltage (static) | 0/+15 | V | |
| $I_D$ | Continuous Drain Current | 20 | A | $T_C$ = 25˚C |
| | | 16.5 | | $T_C$ = 100˚C |
| $I_{D(pulse)}$ | Pulsed Drain Current | 30 | A | Pulse width $t_P$ limited by $T_{jmax}$ |
| $P_D$ | Power Dissipation | 52 | W | $T_C$ = 25˚C |
| | | 25 | | $T_C$ = 100˚C |
| $T_J$ , $T_{stg}$ | Operating Junction and Storage Temperature | -55 to +175 | ˚C | |

## Electrical Characteristics ($T_C$ = 25˚C unless other wise specified)

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | 650 | | 850 | V | $V_{GS}$ = 0 V, $I_D$ = 1 mA | |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | | 2 | 100 | μA | $V_{GS}$ = 0 V, $V_{DS}$ = 750 V | |
| $I_{GSS+}$ | Gate-Source Leakage Current | | | 200 | nA | $V_{DS}$ = 0 V, $V_{GS}$ = +22 V | |
| $I_{GSS-}$ | Gate-Source Leakage Current | | | 200 | nA | $V_{DS}$ = 0 V, $V_{GS}$ = -10 V | |
| $V_{GS(th)}$ | Gate Threshold Voltage | 2.2 | 3.5 | 4.2 | V | $V_{GS}$ = $V_{DS}$, $I_{DS}$ = 1 mA, $T_J$ = 25˚C | Fig. 14 |
| | | | 2.6 | | | $V_{GS}$ = $V_{DS}$, $I_{DS}$ = 1 mA, $T_J$ = 175˚C | |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | | 160 | 180 | mΩ | $V_{GS}$ = 15 V, $I_D$ = 6 A, $T_J$ = 25˚C | Fig. 15 |
| | | | 195 | | | $V_{GS}$ = 15 V, $I_D$ = 6 A, $T_J$ = 175˚C | |
| $C_{iss}$ | Input Capacitance | | 208 | | pF | $V_{DS}$ = 400 V, f = 1 MHz, $V_{GS}$ = 0 V | Fig. 8 |
| $C_{oss}$ | Output Capacitance | | 18 | | | | |
| $C_{rss}$ | Reverse Transfer Capacitance | | 1.8 | | | | |
| $Q_g$ | Total Gate Charge | | 10.6 | | nC | $V_{DD}$ = 400 V, $V_{GS}$ = -5/18 V, $I_D$ = 5 A | Fig. 7 |
| $Q_{gs}$ | Gate-Source Charge | | 5.1 | | | | |
| $Q_{gd}$ | Gate-Drain Charge | | 2.2 | | | | |
| $R_{G(int)}$ | Gate Input Resistance | | 1.2 | | Ω | f = 1 MHz, $I_D$ = 0 A | |
| $E_{on}$ | Turn-On Switching Energy | | 25 | | μJ | $V_{DD}$ = 400 V, $I_D$ = 5 A, $R_G$ = 10 Ω, $V_{GS}$ = -5/18 V | Fig. 12 |
| $E_{off}$ | Turn-Off Switching Energy | | 10 | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | | 5 | | ns | $V_{DD}$ = 400 V, $I_D$ = 5 A, $R_G$ = 10 Ω, $V_{GS}$ = -5/18 V | |
| $t_r$ | Rise Time | | 17 | | | | |
| $t_{d(off)}$ | Turn-Off Delay Time | | 8 | | | | |
| $t_f$ | Fall Time | | 10 | | | | |

## Reverse SiC Diode Characteristics

| Symbol | Parameter | Typ. | Max. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|---|
| $V_{SD}$ | Diode Forward Voltage | 4.0 | | V | $V_{GS}$ = -4V, $I_{SD}$ = 5A, $T_J$ = 25°C | Fig. 16 |
| | | 3.6 | | | $V_{GS}$ = -4 V, $I_{SD}$ = 5 A, $T_J$ = 175°C | Fig. 17 |
| *$I_{SD}$ | Continuous Diode Forward Current | | 18 | A | $T_C$ = 25˚C | |
| | | | 10 | | $T_C$ = 175˚C | |
| $t_{rr}$ | Reverse Recovery Time | 50 | | ns | $I_{SD}$ = 5 A, di/dt = 1000 A/µs, $V_{DD}$ = 400 V, $V_{GS}$ = -5 V | |
| $Q_{rr}$ | Reverse Recovery Charge | 38 | | nC | | |
| $I_{RRM}$ | Peak Reverse Recovery Current | 2.4 | | A | | |

* **Depends on bonding wire**

## Thermal Characteristics

| Symbol | Parameter | Typ. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|
| $R_{thJC}$ | Thermal Resistance from Junction to Case | 2.88 | ˚C/W | | Fig. 2 |
| $R_{thJA}$ | Thermal Resistance From Junction to Ambient | 40 | | | |

## Typical Performance

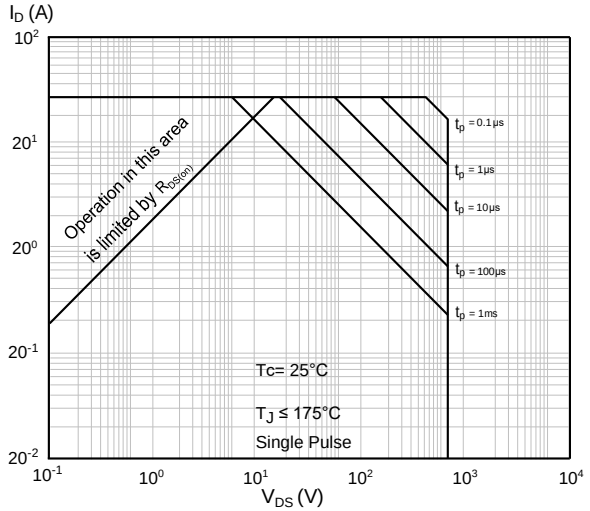



Figure 1. Safe Operating Area

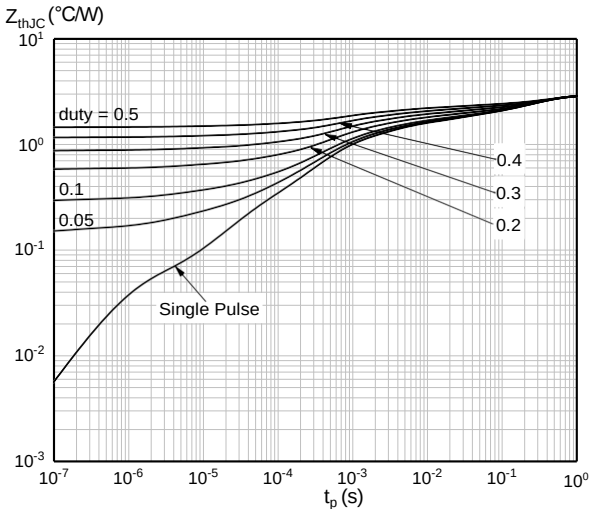



Figure 2. Maximum Transient Thermal Impedance

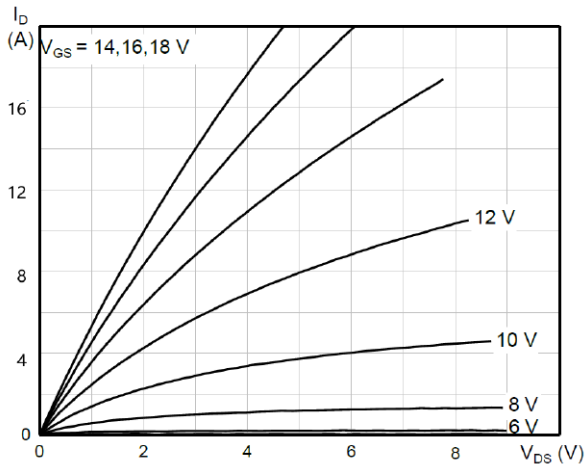



Figure 3. Typical Output Characteristics, $T_J$ = 25°C

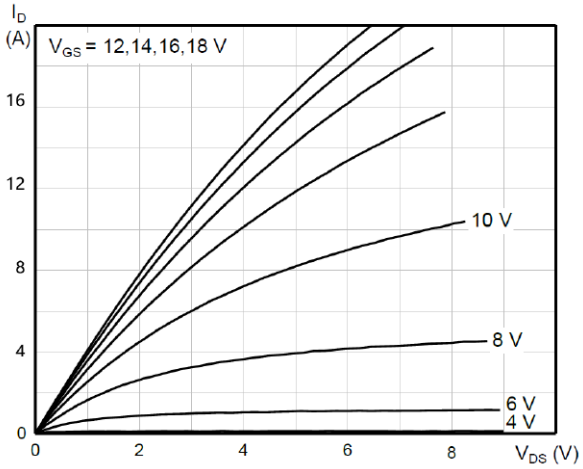



Figure 4. Typical Output Characteristics, $T_J$ =175°C

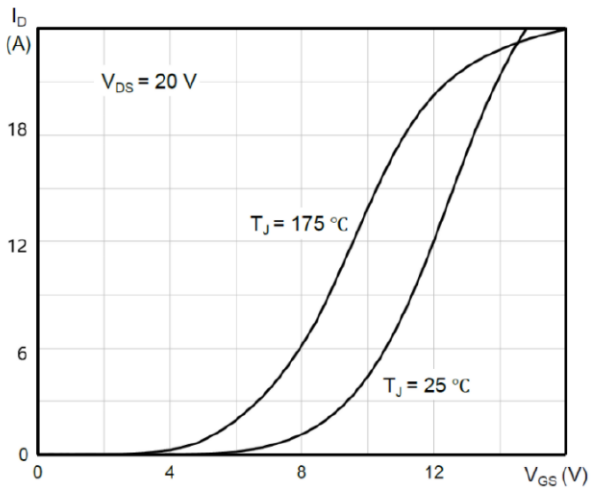



Figure 5. Typical Transfer Characteristics

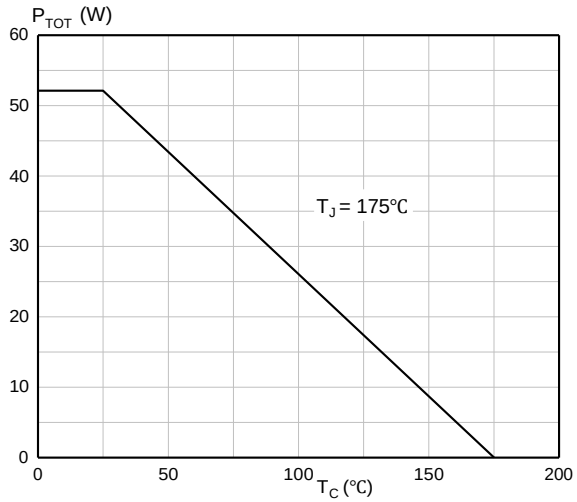



Figure 6. Total Power Dissipation

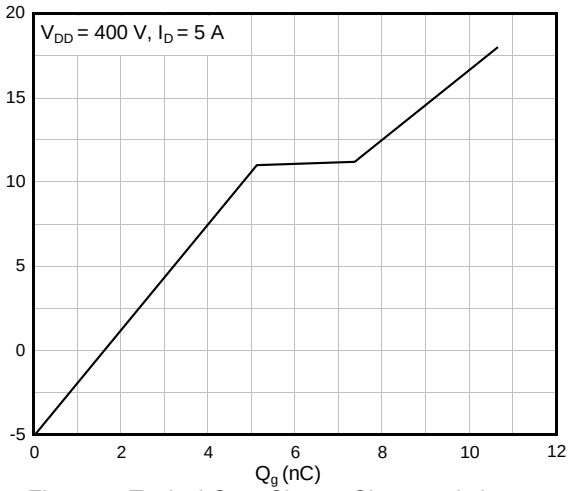



Figure 7. Typical Gate Charge Characteristics

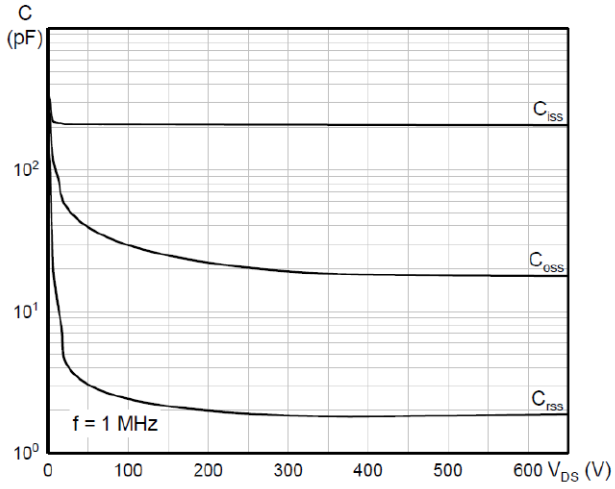



Figure 8. Typical Capacitance Characteristics

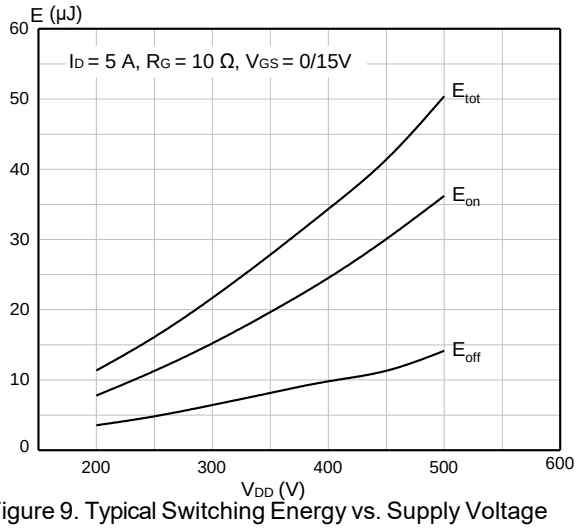



Figure 9. Typical Switching Energy vs. Supply Voltage

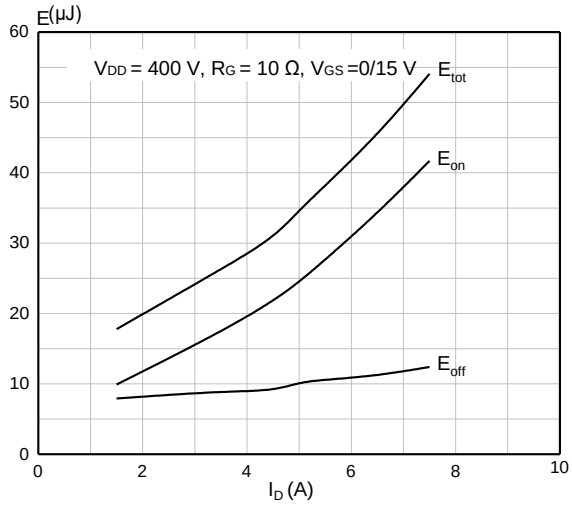



Figure 10. Typical Switching Energy vs. Drain Current

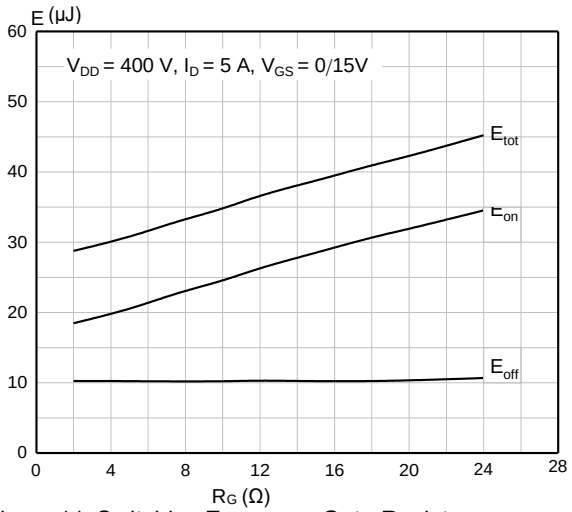



Figure 11. Switching Energy vs. Gate Resistance

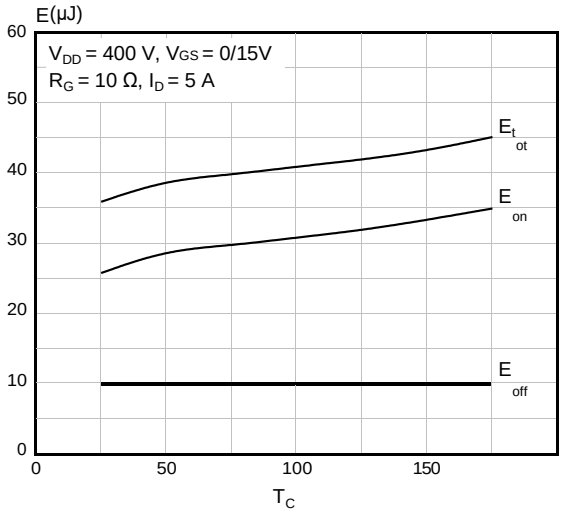



Figure 12. Typical Switching Energy vs. Temperature

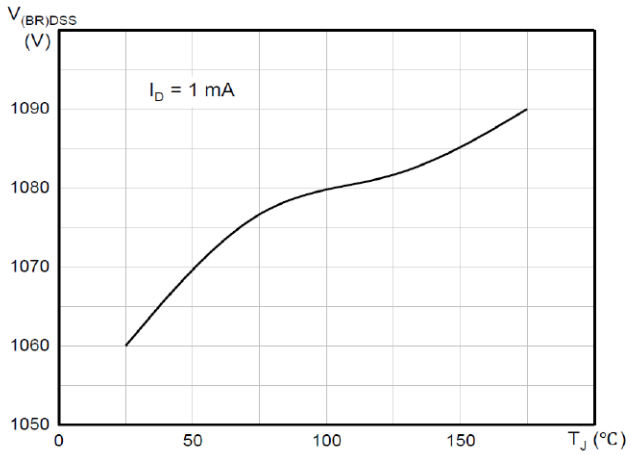



Figure 13. Breakdown Voltage vs. Temperature

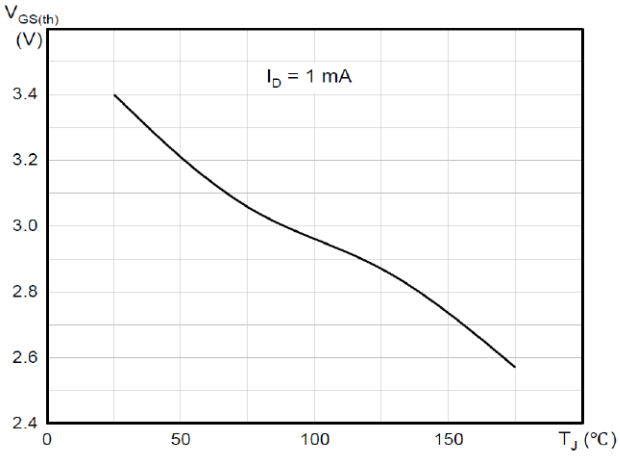



Figure 14. Gate Threshold vs. Temperature

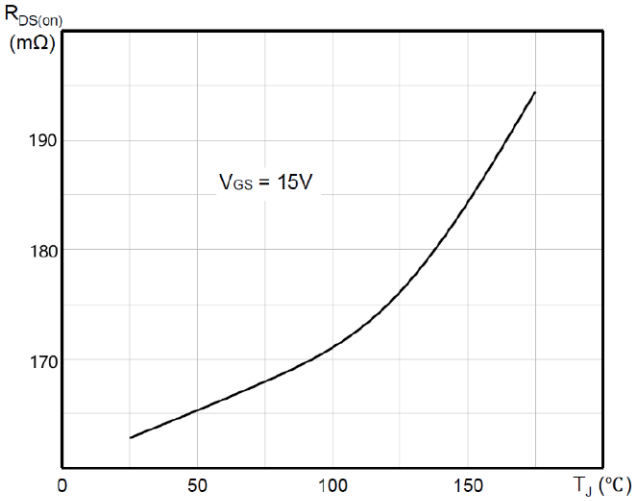



Figure 15. On-Resistance vs. Temperature

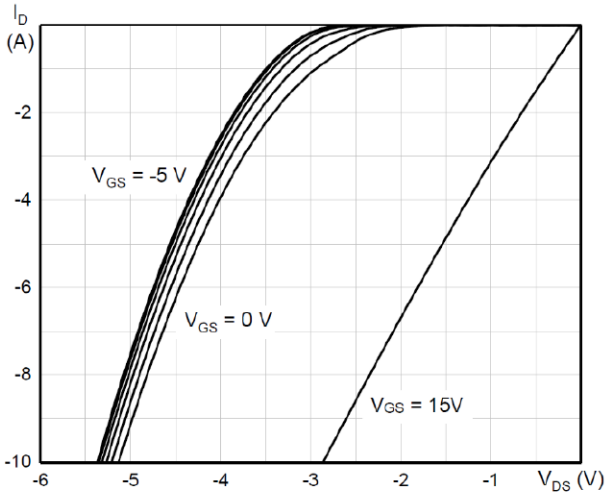
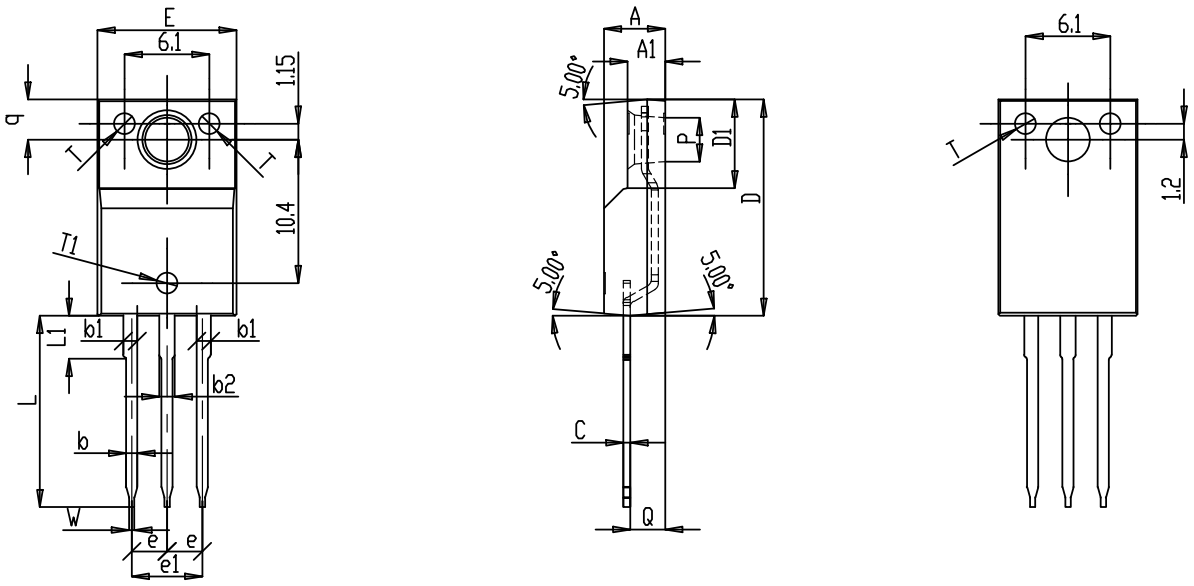



Figure 16.Body Diode Characteristics,$T_J$=25°C

## Package Dimensions

Package TO-220F




| SYMBOL | MILLIMETERS | | | NOTES | SYMBOL | MILLIMETERS | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| | Normal | MIN. | MAX. | | | Normal | MIN. | MAX. | |
| A | 4.4 | 4.2 | 4.6 | | e1 | 5.08 | 5 | 5.12 | |
| A1 | 2.7 | 2.5 | 2.9 | | L | 13.90 | 13.5 | 14.4 | |
| b | 0.8 | 0.7 | 0.9 | | L1 | 3.12 | 2.8 | 3.3 | |
| b1 | 1.07 | 0.9 | 1.3 | | P | 3.14 | 3.00 | 3.20 | |
| b2 | 1.17 | 1 | 1.4 | | Q | 2.44 | 2.3 | 2.6 | |
| C | 0.5 | 0.4 | 0.6 | | q | 2.87 | 2.6 | 3 | |
| D | 15.63 | 15.4 | 15.8 | | W | 0.37 | 0.3 | 0.5 | |
| D1 | 6.22 | 6 | 6.4 | | T | 1.52 | 1.3 | 1.7 | |
| E | 10.06 | 9.7 | 10.3 | | T1 | 1.20 | 1.1 | 1.3 | |
| e | 2.54 | 2.5 | 2.58 | | | | | | |

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## HXY MOSFET:

AZ4007-01H HRCLAMP3371ZCTFT HSEN3611D3 HSTS521050B331 AQ15C-01FTG AZ4836-01L HACPDQC5V0-HF PESDSC2FD5VU TPSMB28A-VR HESD36VD3B PJEC5V0M1FN2 TPSMB100CA-VR BV05C-H HAZ4007-01H HSEN2411D3 PESDLC2FD3V3BH PESDNC2XD5VBF PJSD24CW_R1 HLY323BC1524L HPTVSUC3D5VB PESDNC2XD5VBL ESD5L5.0C-HXY HESDSLC3V3D3B HSD15C.TCT ESD5LM5.0C-HXY HCEZ36V,L3F LM393DR-HXY RLSD32A121V 60N06 HSG3D15B3.3MA