

FGH80N60FD2

600V, 80A Field Stop IGBT

Features

- High current capability
- Low saturation voltage: $V_{CE(sat)} = 1.8V @ I_C = 40A$
- High input impedance
- Fast switching
- RoHS compliant

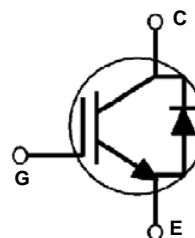
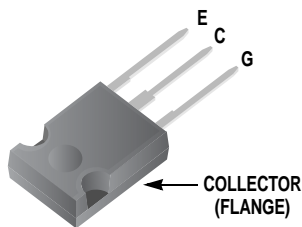
Applications

- Induction Heating Application



General Description

Using Novel Field Stop IGBT Technology, Fairchild's new series of Field Stop IGBTs offer the optimum performance for Induction Heating applications where low conduction and switching losses are essential.



Absolute Maximum Ratings

| Symbol | Description | Ratings | Units |
|-------------|---|-------------|------------|
| V_{CES} | Collector-Emitter Voltage | 600 | V |
| V_{GES} | Gate-Emitter Voltage | ± 20 | V |
| I_C | Collector Current @ $T_C = 25^\circ C$ | 80 | A |
| | Collector Current @ $T_C = 100^\circ C$ | 40 | A |
| $I_{CM(1)}$ | Pulsed Collector Current @ $T_C = 25^\circ C$ | 160 | A |
| P_D | Maximum Power Dissipation @ $T_C = 25^\circ C$ | 290 | W |
| | Maximum Power Dissipation @ $T_C = 100^\circ C$ | 116 | W |
| T_J | Operating Junction Temperature | -55 to +150 | $^\circ C$ |
| T_{stg} | Storage Temperature Range | -55 to +150 | $^\circ C$ |
| T_L | Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds | 300 | $^\circ C$ |

Notes :

(1) Repetitive rating : Pulse width limited by max. junction temperature

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Units |
|------------------------|---|------|------|--------------|
| $R_{\theta JC}(IGBT)$ | Thermal Resistance, Junction-to-Case | -- | 0.43 | $^\circ C/W$ |
| $R_{\theta JC}(Diode)$ | Thermal Resistance, Junction-to-Case | -- | 1.45 | $^\circ C/W$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | -- | 40 | $^\circ C/W$ |

Package Marking and Ordering Information

| Device Marking | Device | Package | Packaging Type | Qty per Tube | Max Qty per Box |
|----------------|---------------|---------|----------------|--------------|-----------------|
| FGH80N60FD2 | FGH80N60FD2TU | TO-247 | Tube | 30ea | - |

Electrical Characteristics of the IGBT T_C = 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|----------------------------------|--|--|------|------|-----------|---------|
| Off Characteristics | | | | | | |
| BV_{CES} | Collector-Emitter Breakdown Voltage | $V_{GE} = 0V, I_C = 250\mu A$ | 600 | -- | -- | V |
| $\Delta BV_{CES} / \Delta T_J$ | Temperature Coefficient of Breakdown Voltage | $V_{GE} = 0V, I_C = 250\mu A$ | -- | 0.6 | -- | V/°C |
| I_{CES} | Collector Cut-Off Current | $V_{CE} = V_{CES}, V_{GE} = 0V$ | -- | -- | 250 | μA |
| I_{GES} | G-E Leakage Current | $V_{GE} = V_{GES}, V_{CE} = 0V$ | -- | -- | ± 400 | nA |
| On Characteristics | | | | | | |
| $V_{GE(th)}$ | G-E Threshold Voltage | $I_C = 250\mu A, V_{CE} = V_{GE}$ | 4.5 | 5.5 | 7.0 | V |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage | $I_C = 40A, V_{GE} = 15V$ | -- | 1.8 | 2.4 | V |
| | | $I_C = 40A, V_{GE} = 15V, T_C = 125^\circ C$ | -- | 2.05 | -- | V |
| Dynamic Characteristics | | | | | | |
| C_{ies} | Input Capacitance | $V_{CE} = 30V, V_{GE} = 0V, f = 1MHz$ | -- | 2110 | -- | pF |
| C_{oes} | Output Capacitance | | -- | 200 | -- | pF |
| C_{res} | Reverse Transfer Capacitance | | -- | 60 | -- | pF |
| Switching Characteristics | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{CC} = 400V, I_C = 40A, R_G = 10\Omega, V_{GE} = 15V, \text{Inductive Load}, T_C = 25^\circ C$ | -- | 21 | -- | ns |
| t_r | Rise Time | | -- | 56 | -- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 126 | -- | ns |
| t_f | Fall Time | | -- | 50 | 100 | ns |
| E_{on} | Turn-On Switching Loss | | -- | 1 | 1.5 | mJ |
| E_{off} | Turn-Off Switching Loss | | -- | 0.52 | 0.78 | mJ |
| E_{ts} | Total Switching Loss | | -- | 1.52 | 2.28 | mJ |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{CC} = 400V, I_C = 40A, R_G = 10\Omega, V_{GE} = 15V, \text{Inductive Load}, T_C = 125^\circ C$ | -- | 20 | -- | ns |
| t_r | Rise Time | | -- | 54 | -- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 131 | -- | ns |
| t_f | Fall Time | | -- | 70 | -- | ns |
| E_{on} | Turn-On Switching Loss | | -- | 1.1 | -- | mJ |
| E_{off} | Turn-Off Switching Loss | | -- | 0.78 | -- | mJ |
| E_{ts} | Total Switching Loss | | -- | 1.88 | -- | mJ |
| Q_g | Total Gate Charge | $V_{CE} = 400V, I_C = 40A, V_{GE} = 15V$ | -- | 120 | -- | nC |
| Q_{ge} | Gate-Emitter Charge | | -- | 14 | -- | nC |
| Q_{gc} | Gate-Collector Charge | | -- | 58 | -- | nC |

Electrical Characteristics of the Diode T_C = 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max | Units |
|-----------------|--------------------------------|---|------------------------|------|------|-----|-------|
| V _{FM} | Diode Forward Voltage | I _F = 15A | T _C = 25°C | - | 1.2 | 1.5 | V |
| | | | T _C = 125°C | - | 1.0 | - | |
| t _{rr} | Diode Reverse Recovery Time | I _{ES} = 15A, dI _{ES} /dt = 200A/μs | T _C = 25°C | - | 61 | - | ns |
| | | | T _C = 125°C | - | 125 | - | |
| I _{rr} | Diode Reverse Recovery Current | | T _C = 25°C | - | 4.8 | - | A |
| | | | T _C = 125°C | - | 8.4 | - | |
| Q _{rr} | Diode Reverse Recovery Charge | | T _C = 25°C | - | 146 | - | nC |
| | | | T _C = 125°C | - | 525 | - | |

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

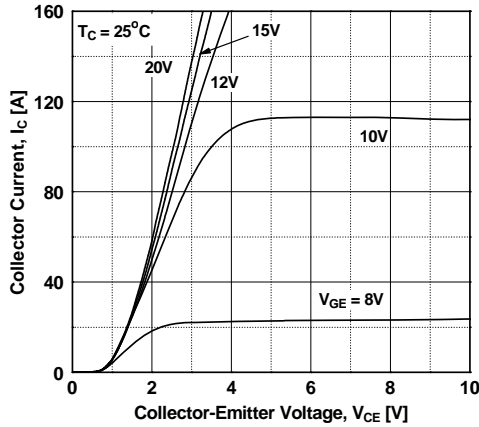


Figure 2. Typical Saturation Voltage Characteristics

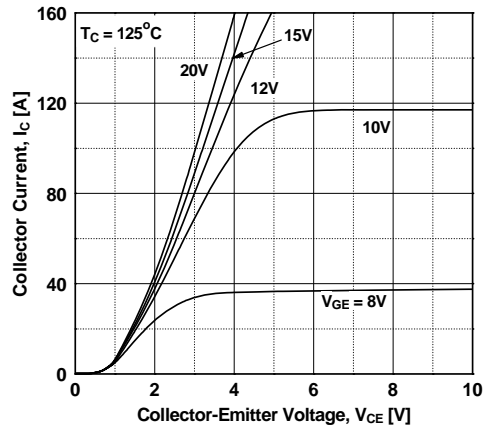


Figure 3. Typical Saturation Voltage Characteristics

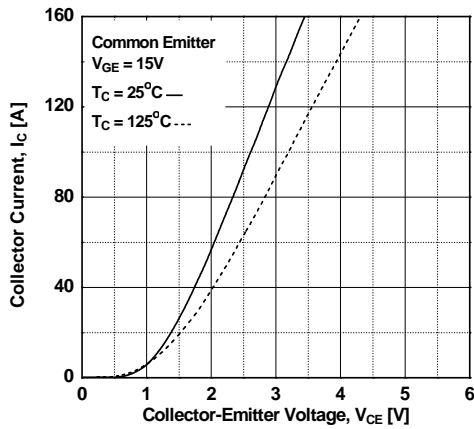


Figure 4. Transfer Characteristics

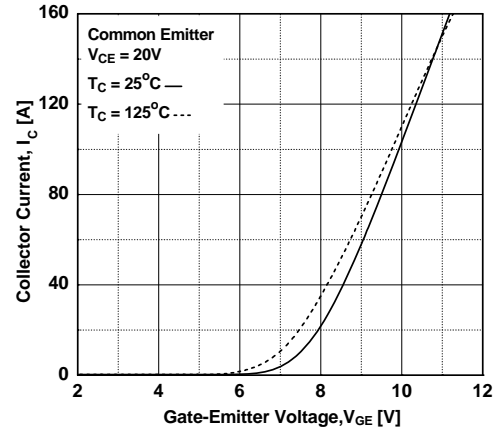


Figure 5. Saturation Voltage vs. Case

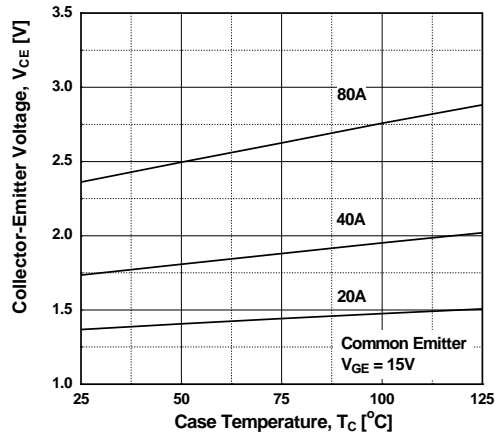
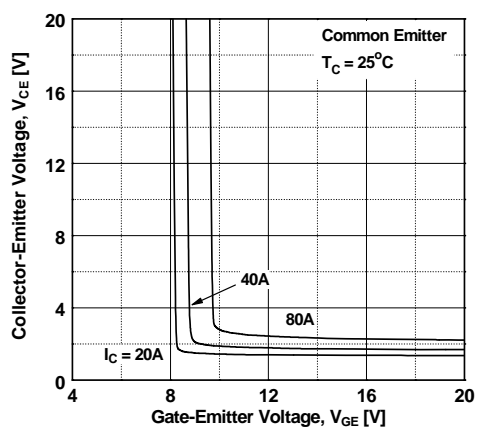


Figure 6. Saturation Voltage vs. V_{ge}



Typical Performance Characteristics (Continued)

Figure 7. Saturation Voltage vs. V_{GE}

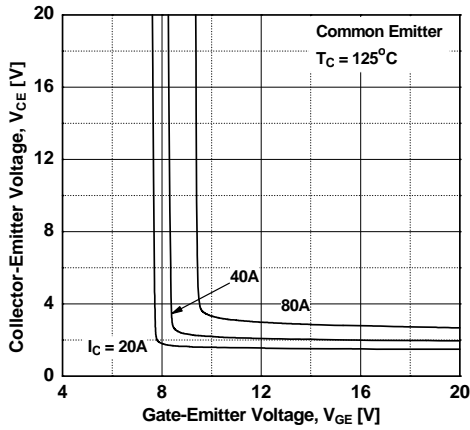


Figure 8. Capacitance Characteristics

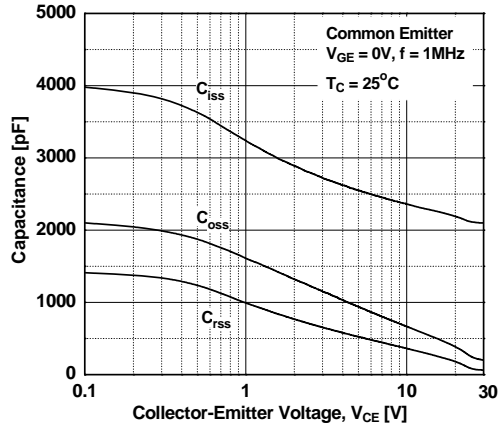


Figure 9. Gate Charge Characteristics

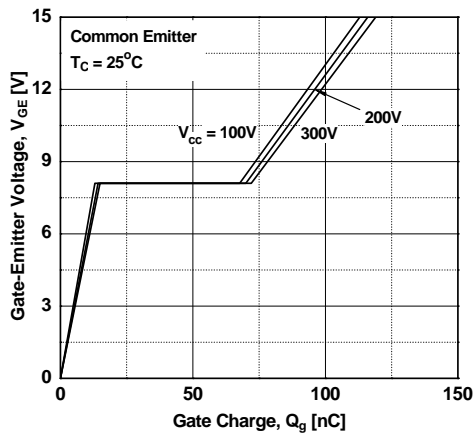


Figure 10. SOA Characteristics

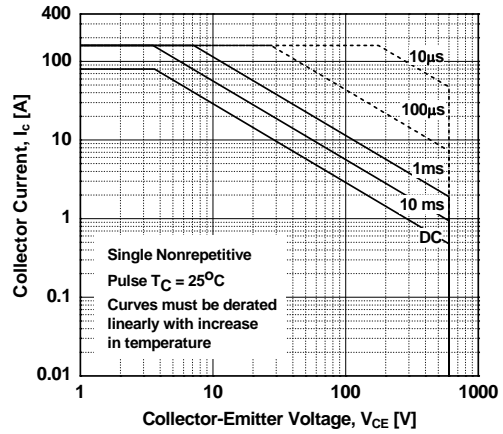


Figure 11. Turn-Off Switching SOA Characteristics

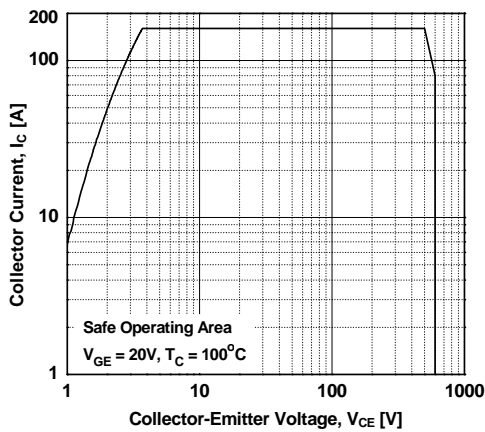
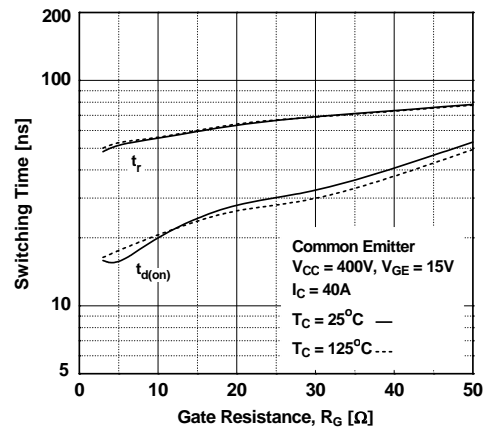


Figure 12. Turn-On Characteristics vs. Gate Resistance



Typical Performance Characteristics (Continued)

Figure 13. Turn-Off Characteristics vs. Gate Resistance

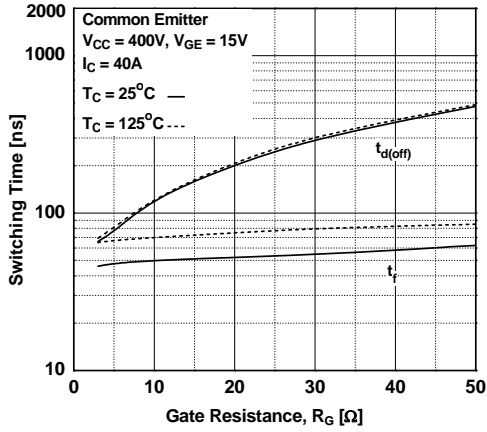


Figure 14. Turn-On Characteristics vs. Collector Current

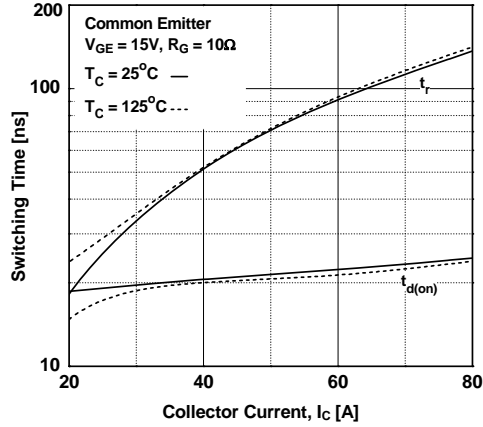


Figure 15. Turn-Off Characteristics vs. Collector Current

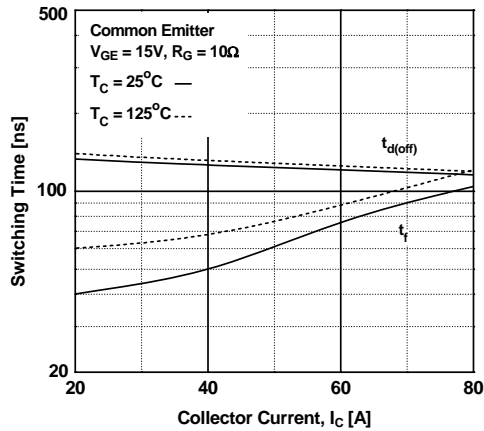


Figure 16. Switching Loss vs Gate Resistance

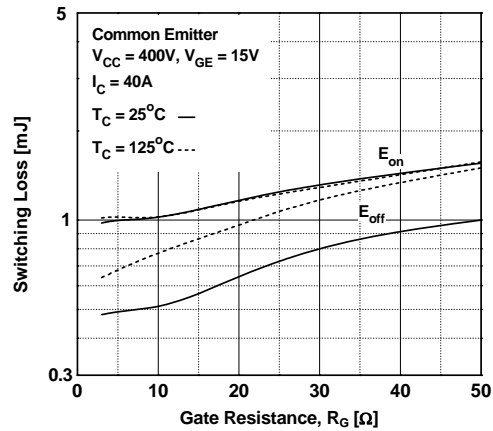
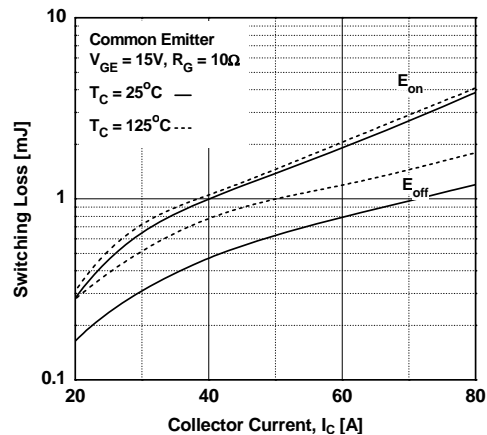


Figure 17. Switching Loss vs Collector Current



Typical Performance Characteristics (Continued)

Figure 18. Transient Thermal Impedance of IGBT

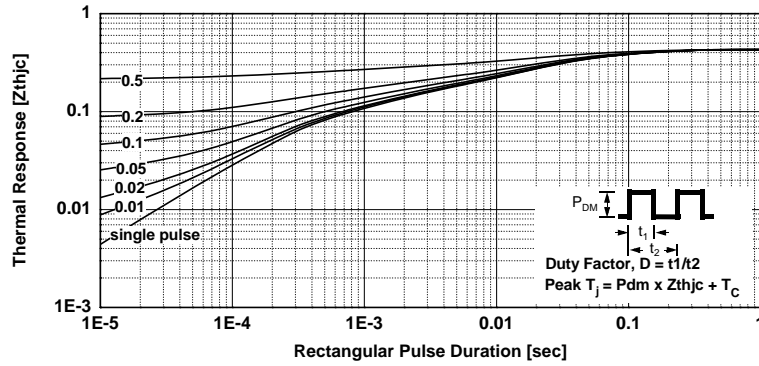


Figure 19. Typical Forward Voltage Drop

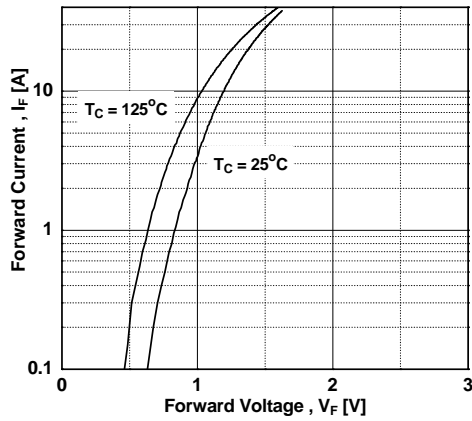


Figure 20. Stored Charge

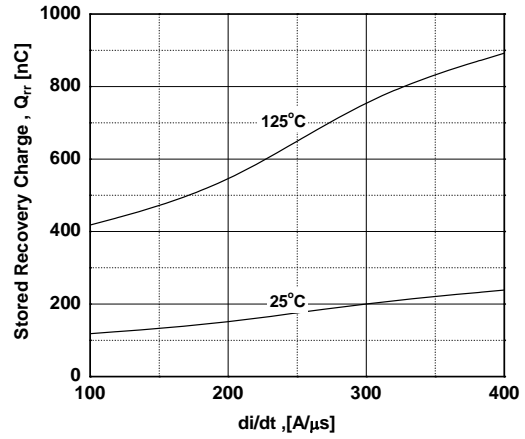


Figure 21. Reverse Recovery Time

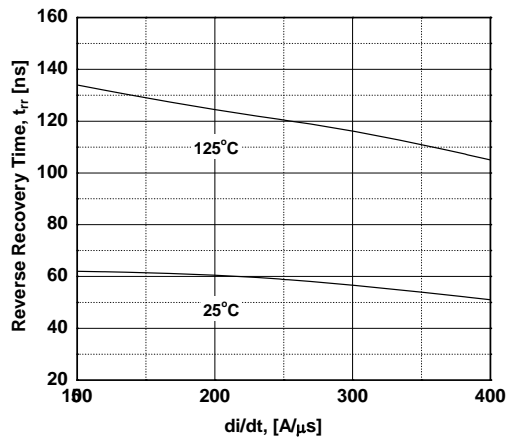
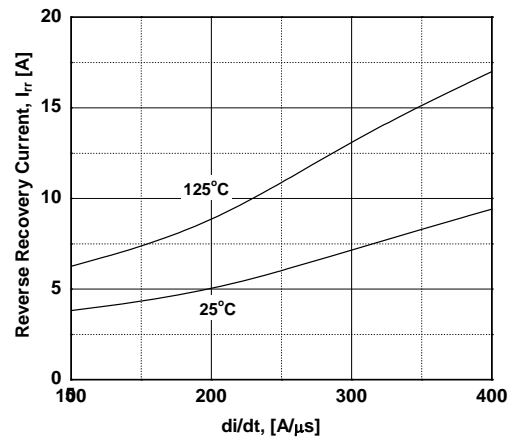
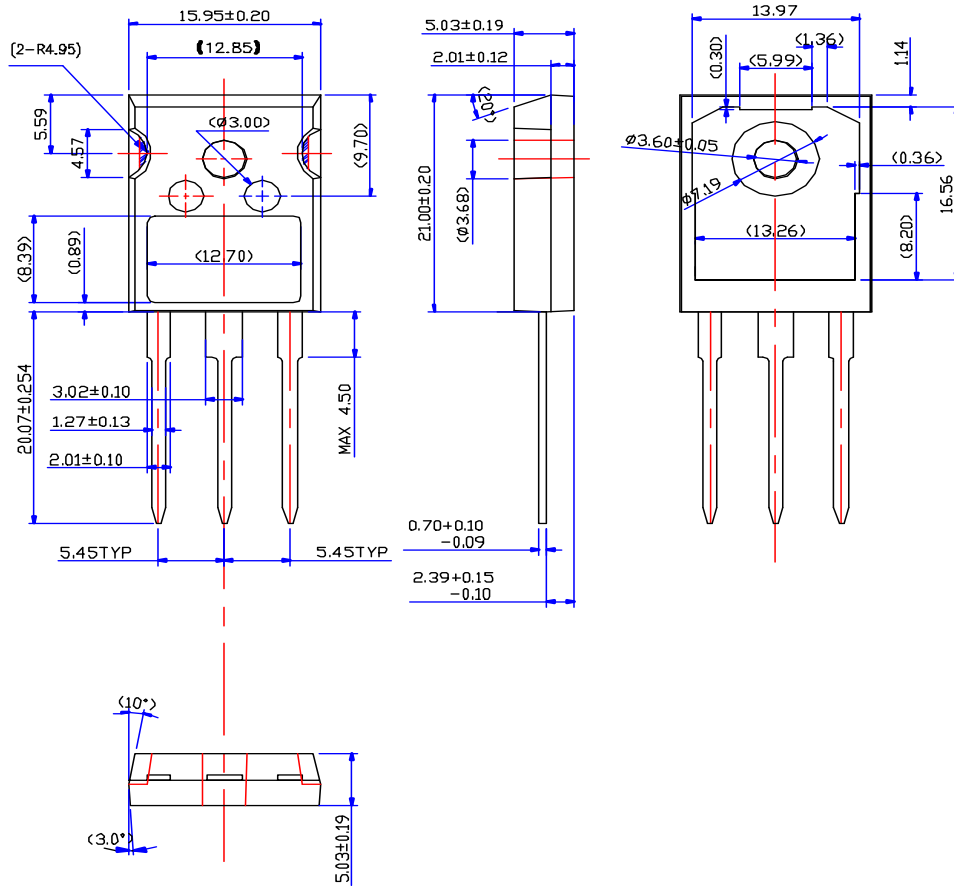


Figure 22. Reverse Recovery Current



Mechanical Dimensions

TO-247AD (FKS PKG CODE 001)





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