



FGA180N30D

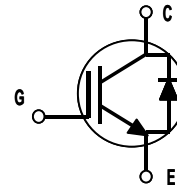
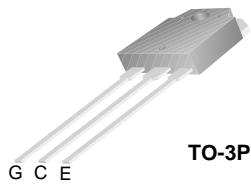
300V PDP IGBT

Features

- High Current Capability
- Low saturation voltage: $V_{CE(sat)}$, Typ = 1.1 V @ $I_C = 40A$
- High Input Impedance

Description

Employing Unified IGBT Technology, FGA180N30D provides low conduction and switching loss. FGA180N30D offers the optimum solution for PDP applications where low conduction loss is essential.



Absolute Maximum Rating TC = 25oC unless otherwise noted

| Symbol | Description | FGA180N30D | Units | |
|-----------|---|-----------------------|------------|---|
| V_{CES} | Collector-Emitter Voltage | 300 | V | |
| V_{GES} | Gate-Emitter Voltage | ± 30 | V | |
| I_C | Collector Current | @ $T_C = 25^\circ C$ | 180 | A |
| I_{CM} | Pulsed Collector Current (Note 1) | @ $T_C = 25^\circ C$ | 450 | A |
| I_F | Diode Continuous Forward Current | @ $T_C = 100^\circ C$ | 10 | A |
| I_{FM} | Diode Maximum Forward Current | | 40 | A |
| P_D | Maximum Power Dissipation | @ $T_C = 25^\circ C$ | 480 | W |
| | Maximum Power Dissipation | @ $T_C = 100^\circ C$ | 192 | W |
| T_J | Operating Junction Temperature | -55 to +150 | $^\circ C$ | |
| T_{stg} | Storage Temperature Range | 300 | $^\circ C$ | |
| T_L | Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds | 300 | $^\circ C$ | |

Notes:

(1) Repetitive test , pulse width = 100usec , Duty = 0.2

* I_{c_pulse} limited by max T_j

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Units |
|-----------------|--|------|------|--------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case for IGBT | -- | 0.26 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case for Diode | -- | 1.56 | $^\circ C/W$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | -- | 40 | $^\circ C/W$ |

Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|----------------|------------|---------|-----------|------------|----------|
| FGA180N30D | FGA180N30D | TO-3P | -- | -- | 30 |

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 = 250μA | 300 | -- | -- | V |
| ΔBV _{CES} /ΔT _J | Temperature Coefficient of Breakdown Voltage | V _{GE} = 0V, I _C = 250μA | -- | 0.6 | -- | V/°C |
| I _{CES} | Collector Cut-Off Current | V _{CE} = V _{CES} , V _{GE} = 0V | -- | -- | 100 | μA |
| I _{GES} | G-E Leakage Current | V _{GE} = V _{GES} , V _{CE} = 0V | -- | -- | ± 250 | nA |
| On Characteristics | | | | | | |
| V _{GE(th)} | G-E Threshold Voltage | I _C = 250μA, V _{CE} = V _{GE} | 2.5 | 4.0 | 5.0 | V |
| V _{CE(sat)} | Collector to Emitter Saturation Voltage | I _C = 40A, V _{GE} = 15V | -- | 1.1 | 1.4 | V |
| | | I _C = 180A, V _{GE} = 15V, T _C = 25°C | -- | 1.9 | -- | V |
| | | I _C = 180A, V _{GE} = 15V, T _C = 125°C | -- | 2.0 | -- | V |
| Dynamic Characteristics | | | | | | |
| C _{ies} | Input Capacitance | V _{CE} = 30V, V _{GE} = 0V, f = 1MHz | -- | 3420 | -- | pF |
| C _{oes} | Output Capacitance | | -- | 520 | -- | pF |
| C _{res} | Reverse Transfer Capacitance | | -- | 150 | -- | pF |
| Switching Characteristics | | | | | | |
| t _{d(on)} | Turn-On Delay Time | V _{CC} = 200V, I _C = 40A, R _G = 5Ω, V _{GE} = 15V, Resistive Load, T _C = 25°C | -- | 30 | -- | ns |
| t _r | Rise Time | | -- | 210 | -- | ns |
| t _{d(off)} | Turn-Off Delay Time | | -- | 100 | -- | ns |
| t _f | Fall Time | | -- | 140 | 300 | ns |
| E _{on} | Turn-On Switching Loss | | -- | 0.26 | -- | mJ |
| E _{off} | Turn-Off Switching Loss | | -- | 0.75 | -- | mJ |
| E _{ts} | Total Switching Loss | | -- | 1.01 | -- | mJ |
| t _{d(on)} | Turn-On Delay Time | V _{CC} = 200V, I _C = 40A, R _G = 5Ω, V _{GE} = 15V, Resistive Load, T _C = 125°C | -- | 30 | -- | ns |
| t _r | Rise Time | | -- | 230 | -- | ns |
| t _{d(off)} | Turn-Off Delay Time | | -- | 110 | -- | ns |
| t _f | Fall Time | | -- | 220 | -- | ns |
| E _{on} | Turn-On Switching Loss | | -- | 0.27 | -- | mJ |
| E _{off} | Turn-Off Switching Loss | | -- | 1.0 | -- | mJ |
| E _{ts} | Total Switching Loss | | -- | 1.27 | -- | mJ |
| Q _g | Total Gate Charge | V _{CE} = 200V, I _C = 40A, V _{GE} = 15V | -- | 185 | 277 | nC |
| Q _{ge} | Gate-Emitter Charge | | -- | 24 | 36 | nC |
| Q _{gc} | Gate-Collector Charge | | -- | 88 | 132 | nC |

Electrical Characteristics of DIODE $T_C = 25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units | |
|----------|-------------------------------------|---|---------------------------|------|------|-------|----|
| V_{FM} | Diode Forward Voltage | $I_F = 10\text{A}$ | $T_C = 25^\circ\text{C}$ | -- | 1.1 | 1.4 | V |
| | | | $T_C = 125^\circ\text{C}$ | -- | 0.9 | -- | |
| t_{rr} | Diode Reverse Recovery Time | $I_F = 10\text{A}$ $di/dt = 200\text{A}/\mu\text{s}$ | $T_C = 25^\circ\text{C}$ | -- | 21 | -- | ns |
| | | | $T_C = 125^\circ\text{C}$ | -- | 35 | -- | |
| I_{rr} | Diode Peak Reverse Recovery Current | | $T_C = 25^\circ\text{C}$ | -- | 2.8 | -- | A |
| | | | $T_C = 125^\circ\text{C}$ | -- | 5.6 | -- | |
| Q_{rr} | Diode Reverse Recovery Charge | | $T_C = 25^\circ\text{C}$ | -- | 29.4 | -- | nC |
| | | | $T_C = 125^\circ\text{C}$ | -- | 98 | -- | |

Typical Performance Characteristics Typical Saturation Voltage Characteristics

Figure 1. Typical Output Characteristics

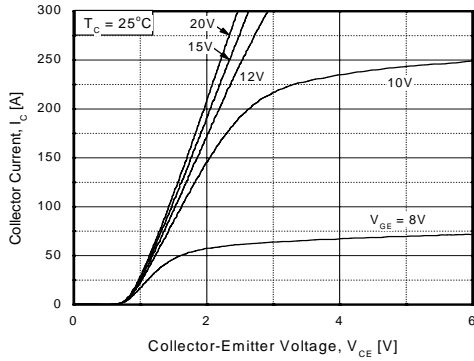


Figure 2. Typical Output Characteristics

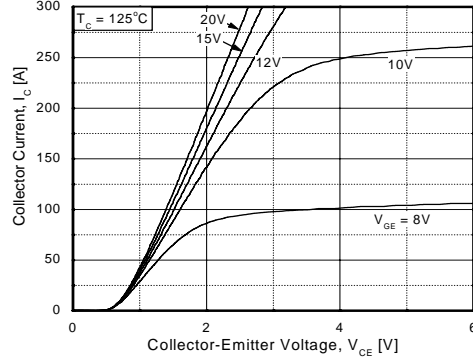


Figure 3. Saturation Voltage

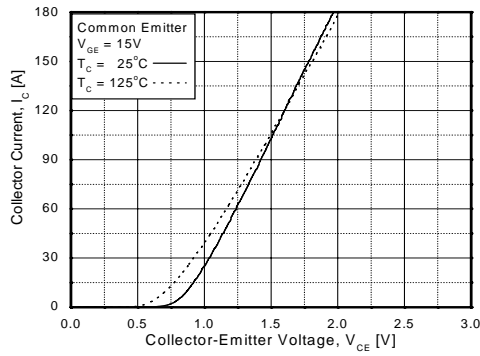


Figure 4. Transfer Characteristics

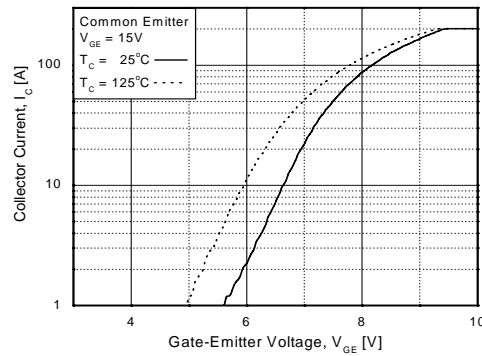


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

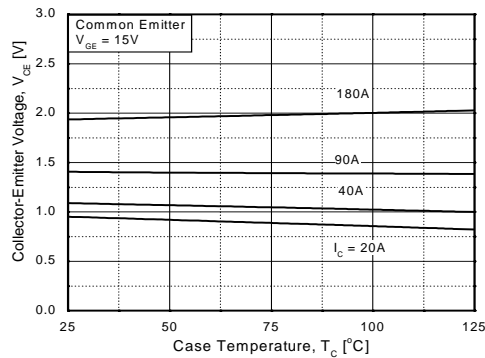
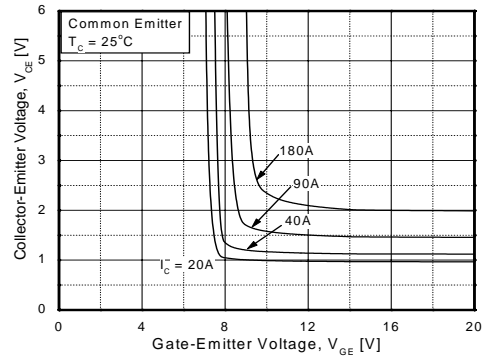


Figure 6. Saturation Voltage vs. V_{GE}



Typical Performance Characteristics (Continued)

Figure 7. Saturation Voltage vs. V_{GE}

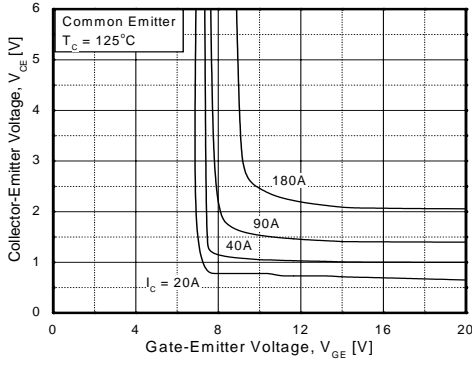


Figure 8. Capacitance Characteristics

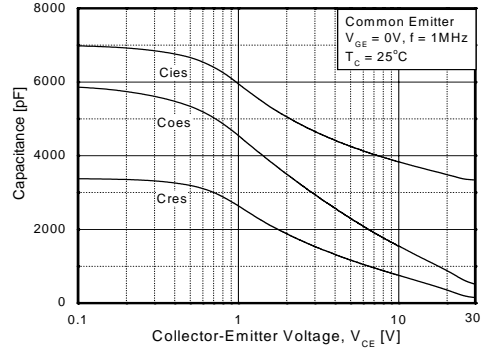


Figure 9. Gate Charge Characteristics

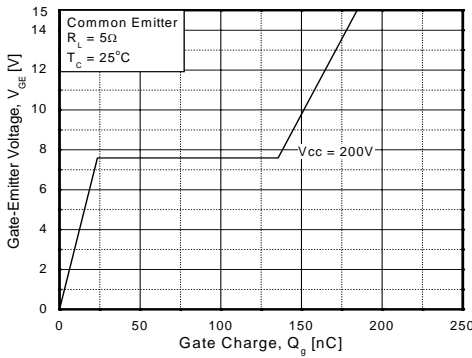


Figure 10. SOA Characteristics

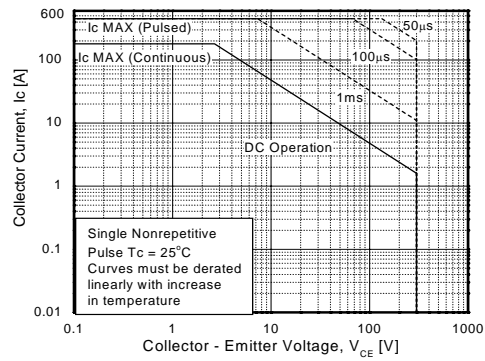


Figure 11. Turn-On Characteristics vs. Gate Resistance

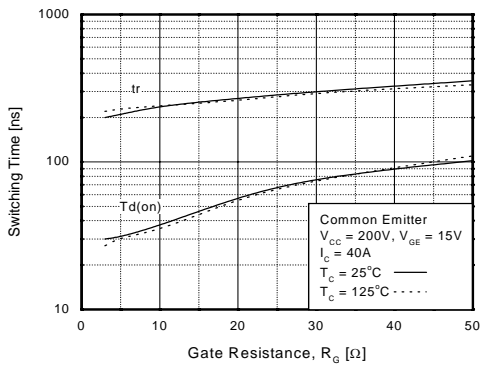
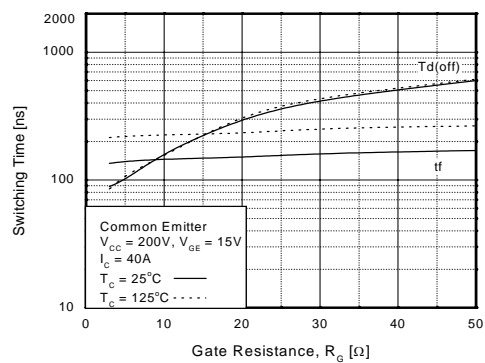


Figure 12. Turn Off Characteristics vs. Gate Resistance



Typical Performance Characteristics (Continued)

Figure 13. Turn-On Characteristics vs. Collector Current

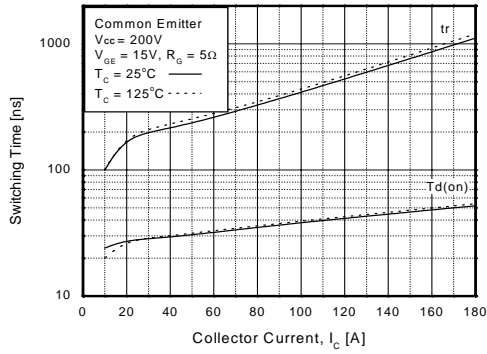


Figure 14. Turn-Off Characteristics vs. Collector Current

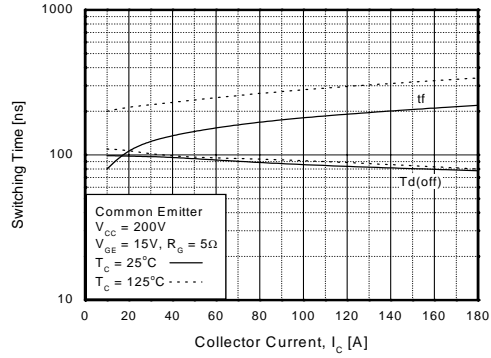


Figure 15. Switching Loss vs Gate Resistance

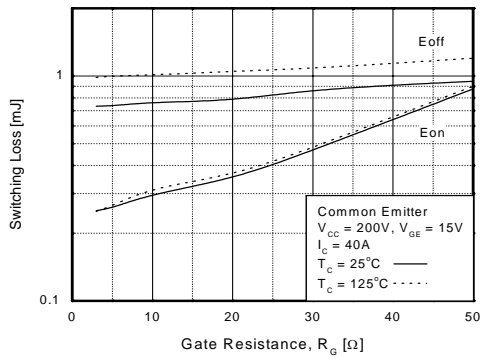


Figure 16. Switching Loss vs Collector Current

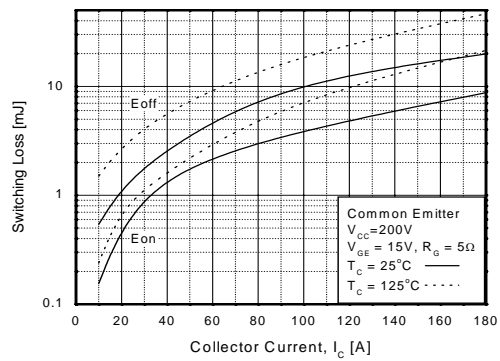
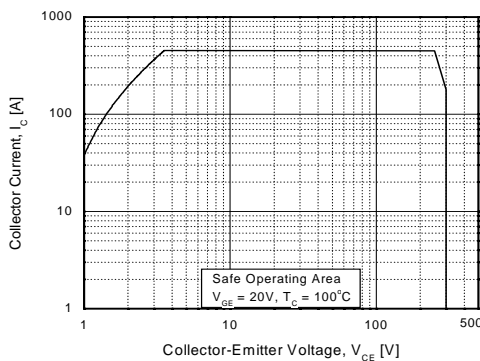


Figure 17. Turn Off SOA Characteristics



Typical Performance Characteristics (Continued)

Figure 18. Transient Thermal Impedance of IGBT

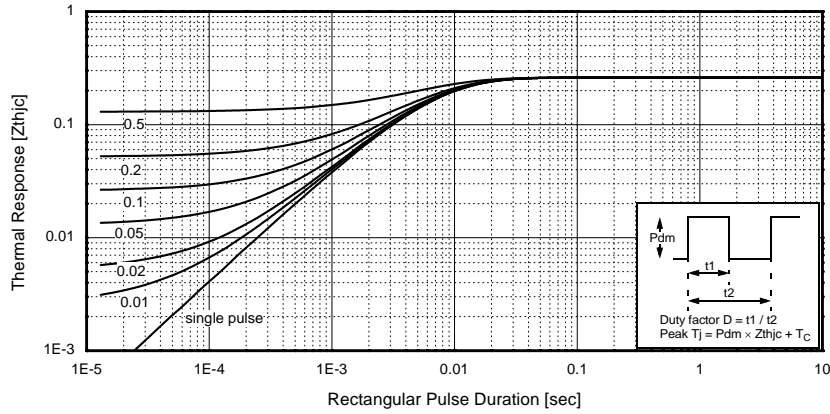


Figure 19. Forward Characteristics

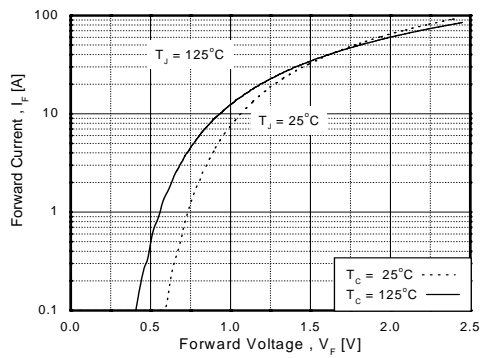


Figure 20. Typical Reverse Recovery Current

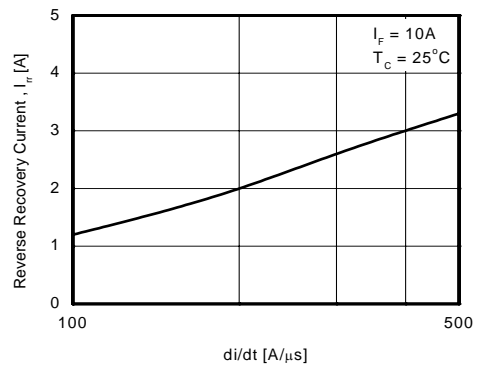
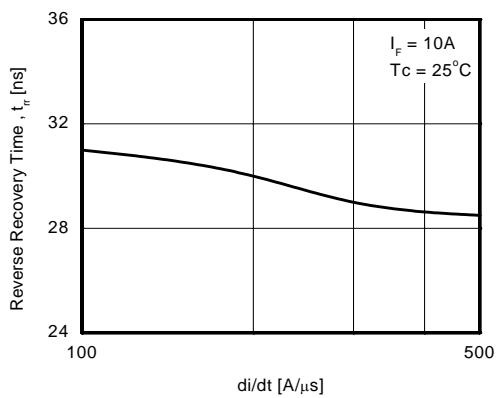
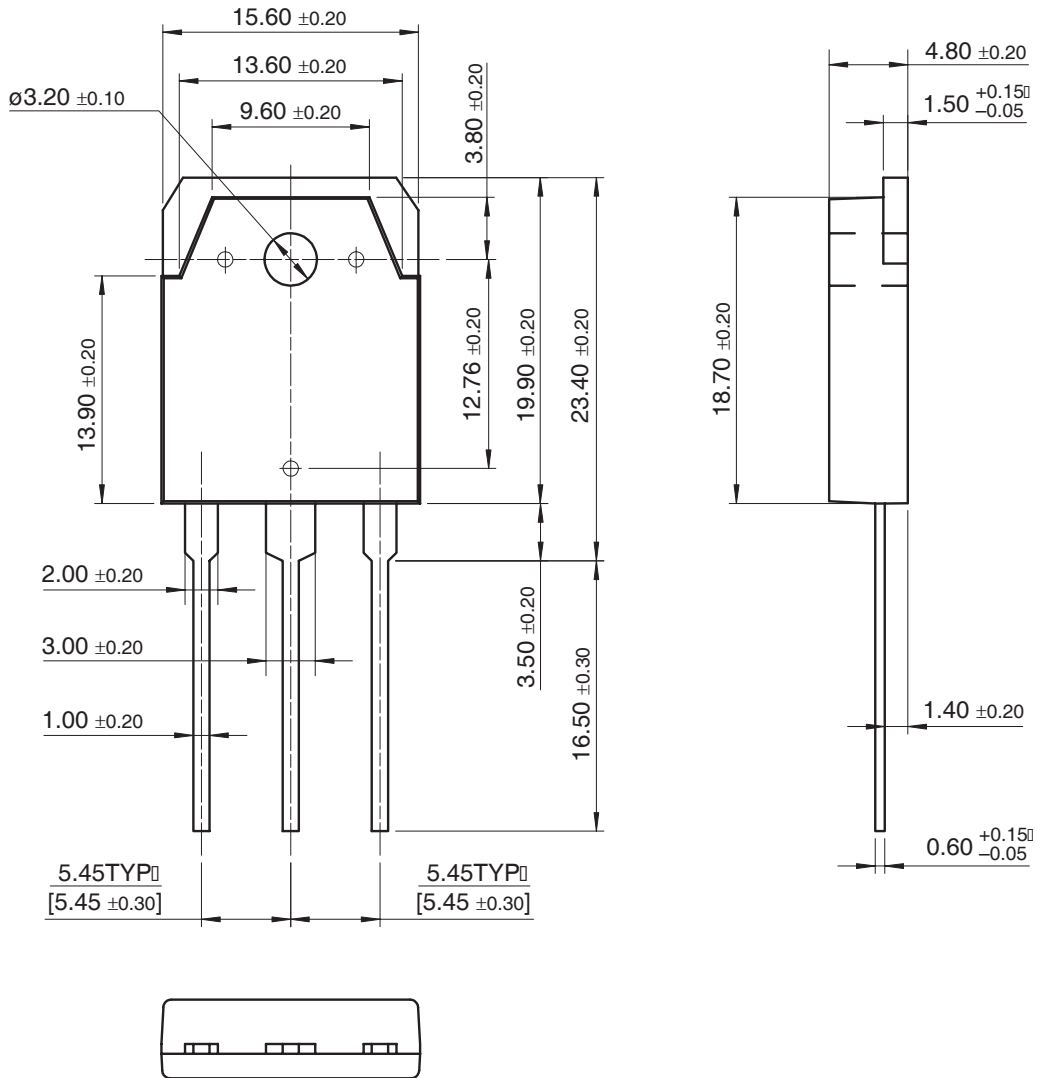


Figure 21. Typical Reverse Recovery Time



TO-3P Capacitance Characteristics Turn-On Characteristics vs. Gate



Dimensions in Millimeters

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