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*IGBT*

# SGH20N60RUFD

## Short Circuit Rated IGBT

### General Description

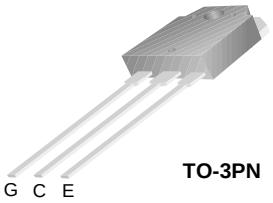
Fairchild's RUFD series of Insulated Gate Bipolar Transistors (IGBTs) provide low conduction and switching losses as well as short circuit ruggedness. The RUFD series is designed for applications such as motor control, uninterrupted power supplies (UPS) and general inverters where short circuit ruggedness is a required feature.

### Features

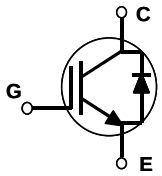
- Short circuit rated 10us @ $T_C$ = 100°C, $V_{GE}$ = 15V
- High speed switching
- Low saturation voltage : $V_{CE(sat)}$ = 2.2 V @ $I_C$ = 20A
- High input impedance
- CO-PAK, IGBT with FRD : $t_{rr}$ = 50ns (typ.)

### Applications

AC & DC motor controls, general purpose inverters, robotics, and servo controls.




TO-3PN




## Absolute Maximum Ratings

$T_C$ = 25°C unless otherwise noted

| Symbol | Description | | SGH20N60RUFD | Units |
|---|---|---|---|---|
| $V_{CES}$ | Collector-Emitter Voltage | | 600 | V |
| $V_{GES}$ | Gate-Emitter Voltage | | ± 20 | V |
| $I_C$ | Collector Current | @ $T_C$ = 25°C | 32 | A |
| | Collector Current | @ $T_C$ = 100°C | 20 | A |
| $I_{CM\ (1)}$ | Pulsed Collector Current | | 60 | A |
| $I_F$ | Diode Continuous Forward Current | @ $T_C$ = 100°C | 25 | A |
| $I_{FM}$ | Diode Maximum Forward Current | | 220 | A |
| $T_{SC}$ | Short Circuit Withstand Time | @ $T_C$ = 100°C | 10 | us |
| $P_D$ | Maximum Power Dissipation | @ $T_C$ = 25°C | 195 | W |
| | Maximum Power Dissipation | @ $T_C$ = 100°C | 75 | W |
| $T_J$ | Operating Junction Temperature | | -55 to +150 | °C |
| $T_{stg}$ | Storage Temperature Range | | -55 to +150 | °C |
| $T_L$ | Maximum Lead Temp. for Soldering Purposes, 1/8" from Case for 5 Seconds | | 300 | °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 | -- | 0.64 | °C/W |
| $R_{\theta JC}$(DIODE) | Thermal Resistance, Junction-to-Case | -- | 0.83 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | -- | 40 | °C/W |

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## 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, $I_C$ = 250uA | 600 | -- | -- | V |
| $\Delta B_{VCES}/\Delta T_J$ | Temperature Coefficient of Breakdown Voltage | $V_{GE}$ = 0V, $I_C$ = 1mA | -- | 0.6 | -- | V/°C |
| $I_{CES}$ | Collector Cut-Off Current | $V_{CE}$ = $V_{CES}$, $V_{GE}$ = 0V | -- | -- | 250 | uA |
| $I_{GES}$ | G-E Leakage Current | $V_{GE}$ = $V_{GES}$, $V_{CE}$ = 0V | -- | -- | ± 100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GE(th)}$ | G-E Threshold Voltage | $I_C$ = 20mA, $V_{CE}$ = $V_{GE}$ | 5.0 | 6.0 | 8.5 | V |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage | $I_C$ = 20A, $V_{GE}$ = 15V | -- | 2.2 | 2.8 | V |
| | | $I_C$ = 32A, $V_{GE}$ = 15V | -- | 2.5 | -- | V |
| **Dynamic Characteristics** | | | | | | |
| $C_{ies}$ | Input Capacitance | $V_{CE}$ = 30V, $V_{GE}$ = 0V, f = 1MHz | -- | 1323 | -- | pF |
| $C_{oes}$ | Output Capacitance | | -- | 254 | -- | pF |
| $C_{res}$ | Reverse Transfer Capacitance | | -- | 47 | -- | pF |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{CC}$ = 300 V, $I_C$ = 20A, $R_G$ = 10Ω, $V_{GE}$ = 15V, Inductive Load, $T_C$ = 25°C | -- | 30 | -- | ns |
| $t_r$ | Rise Time | | -- | 49 | -- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 48 | 70 | ns |
| $t_f$ | Fall Time | | -- | 152 | 200 | ns |
| $E_{on}$ | Turn-On Switching Loss | | -- | 524 | -- | uJ |
| $E_{off}$ | Turn-Off Switching Loss | | -- | 473 | -- | uJ |
| $E_{ts}$ | Total Switching Loss | | -- | 997 | 1400 | uJ |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{CC}$ = 300 V, $I_C$ = 20A, $R_G$ = 10Ω, $V_{GE}$ = 15V, Inductive Load, $T_C$ = 125°C | -- | 30 | -- | ns |
| $t_r$ | Rise Time | | -- | 51 | -- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 52 | 75 | ns |
| $t_f$ | Fall Time | | -- | 311 | 400 | ns |
| $E_{on}$ | Turn-On Switching Loss | | -- | 568 | -- | uJ |
| $E_{off}$ | Turn-Off Switching Loss | | -- | 1031 | -- | uJ |
| $E_{ts}$ | Total Switching Loss | | -- | 1599 | 2240 | uJ |
| $T_{sc}$ | Short Circuit Withstand Time | $V_{CC}$ = 300 V, $V_{GE}$ = 15V @ $T_C$ = 100°C | 10 | -- | -- | us |
| $Q_g$ | Total Gate Charge | $V_{CE}$ = 300 V, $I_C$ = 20A, $V_{GE}$ = 15V | -- | 55 | 80 | nC |
| $Q_{ge}$ | Gate-Emitter Charge | | -- | 10 | 15 | nC |
| $Q_{gc}$ | Gate-Collector Charge | | -- | 25 | 40 | nC |
| $L_e$ | Internal Emitter Inductance | Measured 5mm from PKG | -- | 14 | -- | nH |

## Electrical Characteristics of DIODE $T_C$ = 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|---|
| $V_{FM}$ | Diode Forward Voltage | $I_F$ = 25A | $T_C$ = 25°C | -- | 1.4 | 1.7 | V |
| | | | $T_C$ = 100°C | -- | 1.3 | -- | |
| $t_{rr}$ | Diode Reverse Recovery Time | $I_F$= 25A, di/dt = 200 A/us | $T_C$ = 25°C | -- | 50 | 95 | ns |
| | | | $T_C$ = 100°C | -- | 105 | -- | |
| $I_{rr}$ | Diode Peak Reverse Recovery Current | | $T_C$ = 25°C | -- | 4.5 | 10 | A |
| | | | $T_C$ = 100°C | -- | 8.5 | -- | |
| $Q_{rr}$ | Diode Reverse Recovery Charge | | $T_C$ = 25°C | -- | 112 | 375 | nC |
| | | | $T_C$ = 100°C | -- | 420 | -- | |

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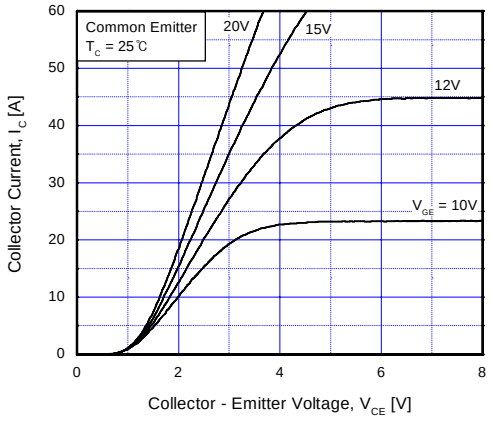



**Fig 1. Typical Output Characteristics**

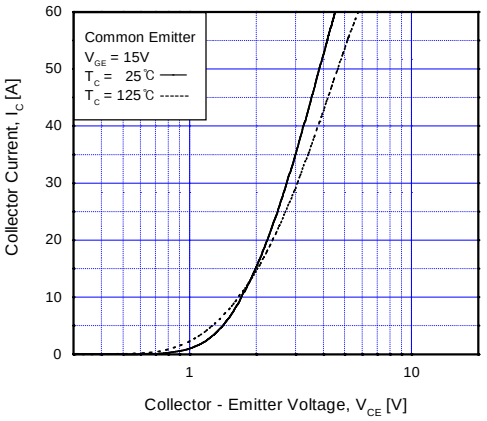



**Fig 2. Typical Saturation Voltage Characteristics**

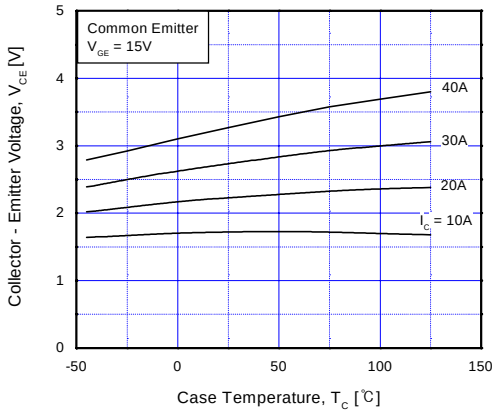



**Fig 3. Saturation Voltage vs. Case Temperature at Variant Current Level**

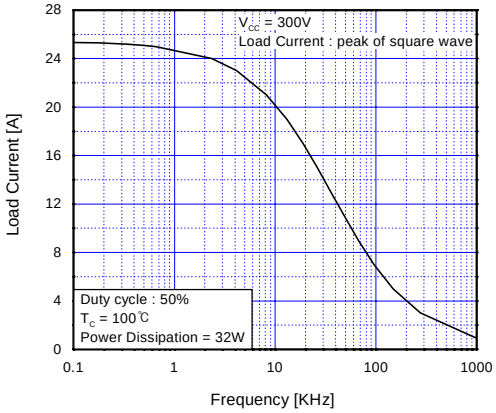



**Fig 4. Load Current vs. Frequency**

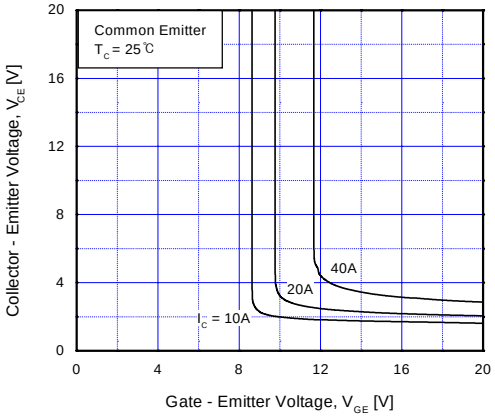



**Fig 5. Saturation Voltage vs. $V_{GE}$**

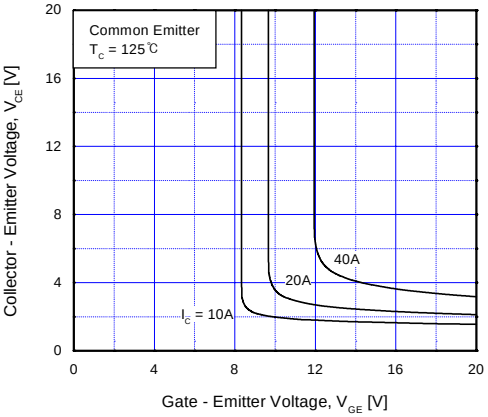



**Fig 6. Saturation Voltage vs. $V_{GE}$**

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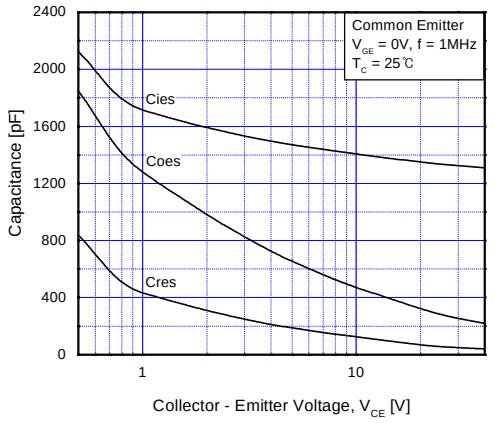



**Fig 7. Capacitance Characteristics**

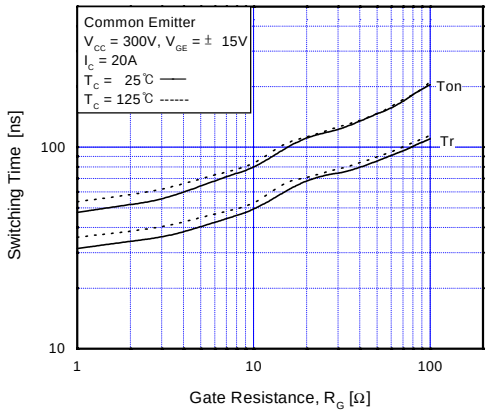



**Fig 8. Turn-On Characteristics vs. Gate Resistance**

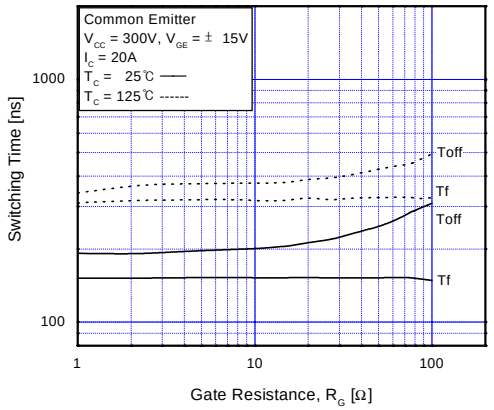



**Fig 9. Turn-Off Characteristics vs. Gate Resistance**

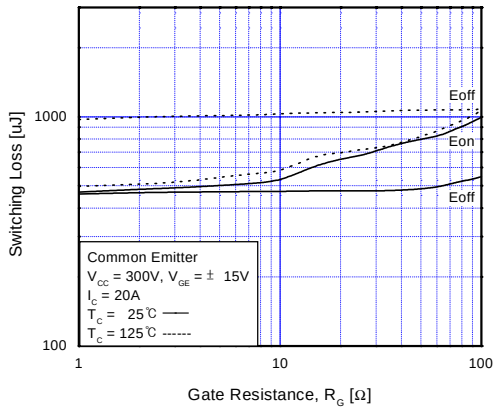



**Fig 10. Switching Loss vs. Gate Resistance**

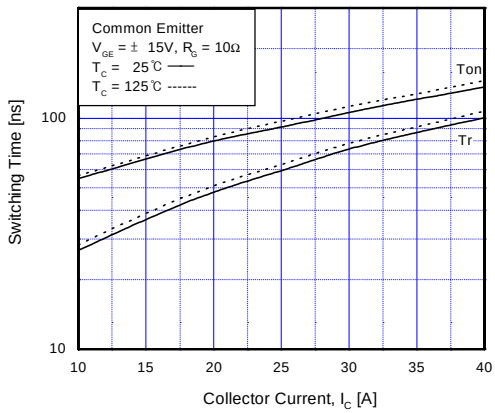



**Fig 11. Turn-On Characteristics vs. Collector Current**

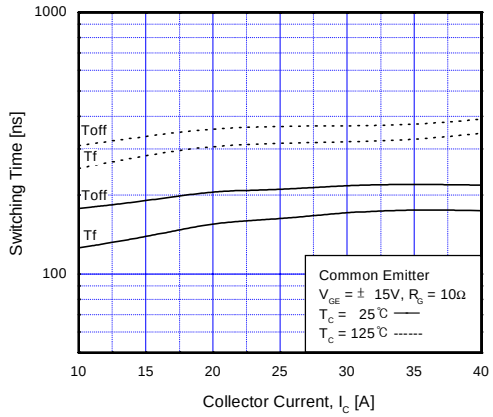



**Fig 12. Turn-Off Characteristics vs. Collector Current**

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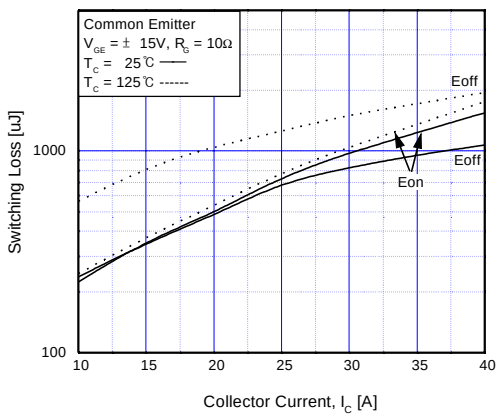



**Fig 13. Switching Loss vs. Collector Current**

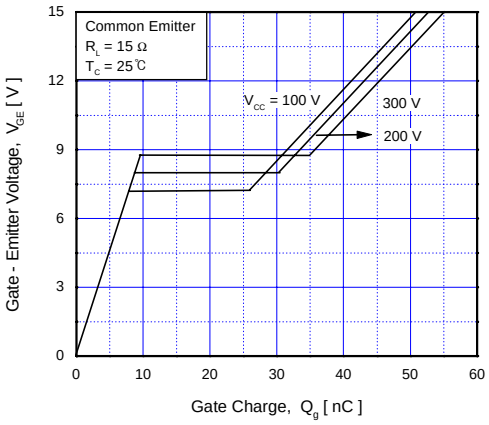



**Fig 14. Gate Charge Characteristics**

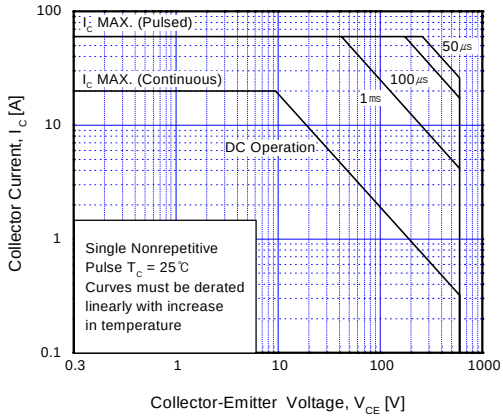



**Fig 15. SOA Characteristics**

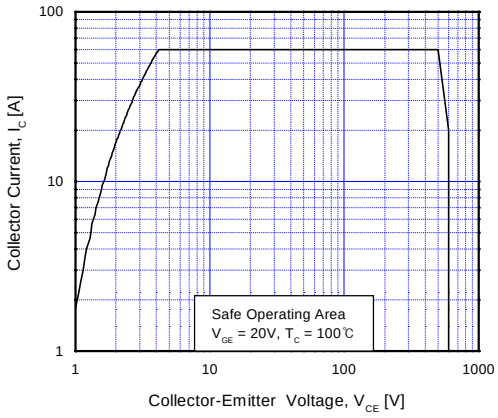



**Fig 16. Turn-Off SOA Characteristics**

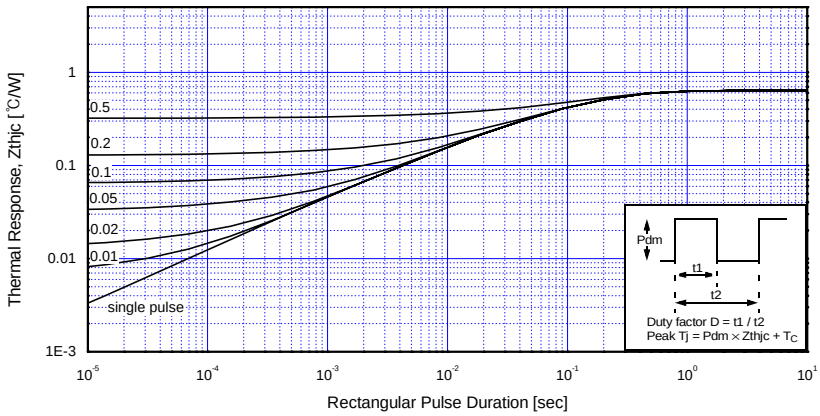



**Fig 17. Transient Thermal Impedance of IGBT**

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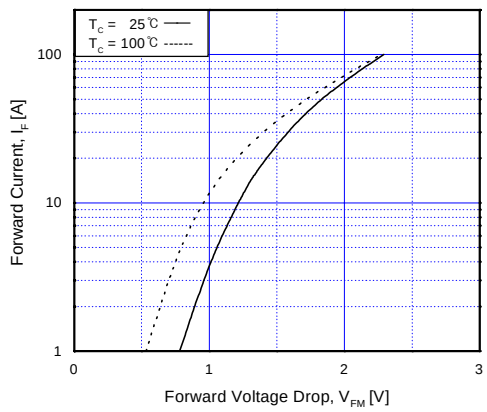



**Fig 18. Forward Characteristics**

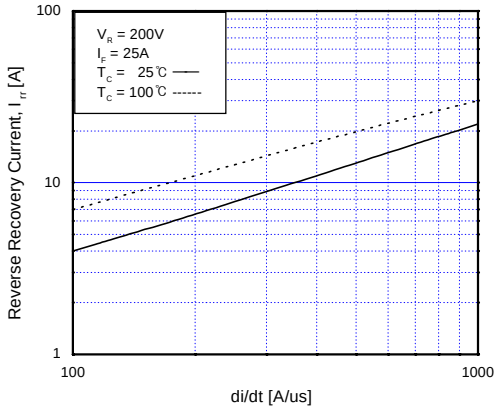



**Fig 19. Reverse Recovery Current**

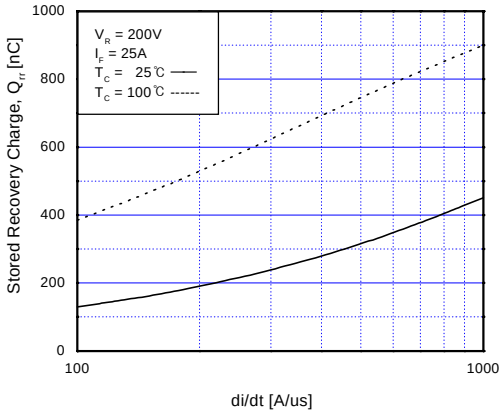



**Fig 20. Stored Charge**

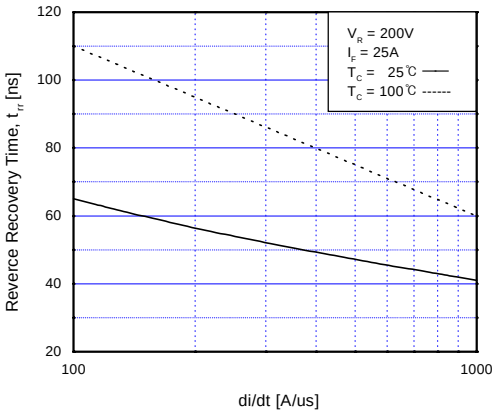
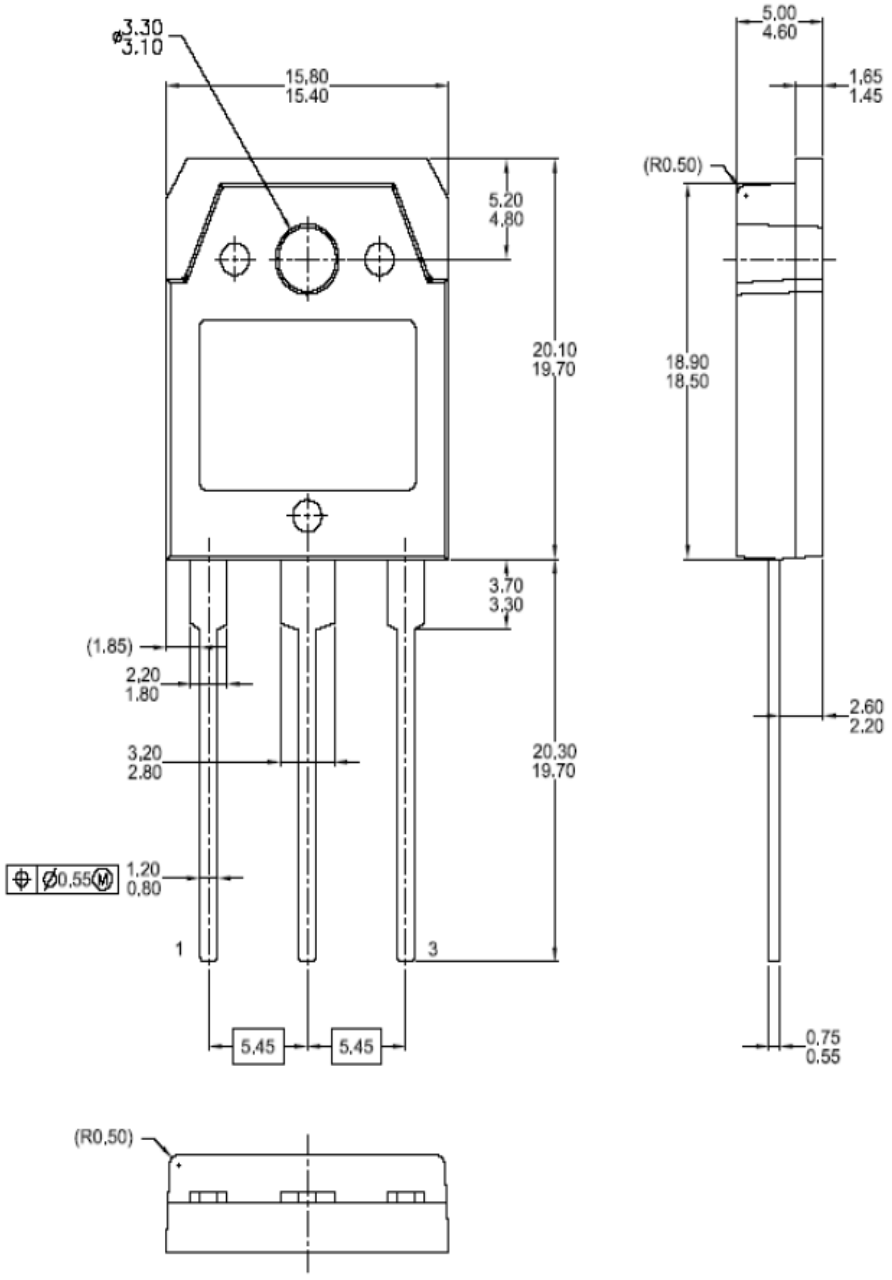



**Fig 21. Reverse Recovery Time**

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## Mechanical Dimensions

### TO-3PN




Dimensions in Millimeters

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# Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

### Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

**www.entegreci.com**

### Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

**Kategorilere göz atın**

### Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

**Üreticileri görün**

### Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

**Teklif isteyin**

**www.entegreci.com** | **destek@entegreci.com** | **0850 305 90 34**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.