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May 2014

# FCA35N60

## N-Channel SuperFET® MOSFET

### 600 V, 35 A, 98 mΩ

## Features

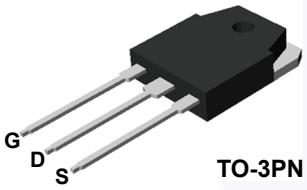
- 650V @ $T_J$ = 150°C
- Typ. $R_{DS(on)}$ = 79 mΩ
- Ultra Low Gate Charge (Typ. $Q_g$ = 139 nC )
- Low Effective Output Capacitance (Typ. $C_{oss(eff.)}$ = 340 pF )
- 100% Avalanche Tested

## Applications

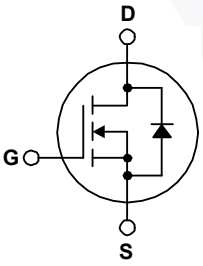
- Solar Inverter
- AC-DC Power Supply

## Description

SuperFET® MOSFET is Fairchild Semiconductor's first generation of high voltage super-junction (SJ) MOSFET family that is utilizing charge balance technology for outstanding low on-resistance and lower gate charge performance. This technology is tailored to minimize conduction loss, provide superior switching performance, dv/dt rate and higher avalanche energy. Consequently, SuperFET MOSFET is very suitable for the switching power applications such as PFC, server/telecom power, FPD TV power, ATX power and industrial power applications.




TO-3PN




## MOSFET Maximum Ratings $T_C$ = 25°C unless otherwise noted.

| Symbol | Parameter | | | FCA35N60 | Unit |
|---|---|---|---|---|---|
| $V_{DSS}$ | Drain to Source Voltage | | | 600 | V |
| $V_{GSS}$ | Gate-Soure voltage | | | ±30 | V |
| $I_D$ | Drain Current | - Continuous ($T_C$ = 25°C) | | 35 | A |
| | | - Continuous ($T_C$ = 100°C) | | 22.2 | |
| $I_{DM}$ | Drain Current | - Pulsed | (Note 1) | 105 | A |
| $E_{AS}$ | Single Pulsed Avalanche Energy | | (Note 2) | 1455 | mJ |
| $I_{AR}$ | Avalanche Current | | (Note 1) | 35 | A |
| $E_{AR}$ | Repetitive Avalanche Energy | | (Note 1) | 31.25 | mJ |
| dv/dt | Peak Diode Recovery dv/dt | | (Note 3) | 20 | V/ns |
| $P_D$ | Power Dissipation | ($T_C$ = 25°C) | | 312.5 | W |
| | | - Derate Above 25°C | | 2.5 | W/°C |
| $T_J$, $T_{STG}$ | Operating and Storage Temperature Range | | | -55 to +150 | °C |
| $T_L$ | Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds | | | 300 | °C |

## Thermal Characteristics

| Symbol | Parameter | FCA35N60 | Unit |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max. | 0.4 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient, Max. | 42 | |

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## Package Marking and Ordering Information

| Part Number | Top Mark | Package | Packing Method | Reel Size | Tape Width | Quantity |
|---|---|---|---|---|---|---|
| FCA35N60 | FCA35N60 | TO-3PN | Tube | N/A | N/A | 30 units |

## Electrical Characteristics $T_C = 25^oC$ unless otherwise noted.

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain to Source Breakdown Voltage | $I_D$ = 250 μA, $V_{GS}$ = 0 V, $T_J$ = 25°C | 600 | - | - | V |
| | | $I_D$ = 250 μA, $V_{GS}$ = 0 V, $T_J$ = 150°C | - | 650 | - | V |
| $\Delta BV_{DSS}$ / $\Delta T_J$ | Breakdown Voltage Temperature Coefficient | $I_D$ = 250 μA, Referenced to 25°C | - | 0.6 | - | V/°C |
| $BV_{DS}$ | Drain-Source Avalanche Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = 16 A | - | 700 | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 600 V, $V_{GS}$ = 0 V | - | - | 1 | μA |
| | | $V_{DS}$ = 480 V, $T_C$ = 125°C | - | - | 10 | |
| $I_{GSS}$ | Gate to Body Leakage Current | $V_{GS}$ = ±30 V, $V_{DS}$ = 0 V | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$ = $V_{DS}$, $I_D$ = 250 μA | 3.0 | - | 5.0 | V |
| $R_{DS(on)}$ | Static Drain to Source On Resistance | $V_{GS}$ = 10 V, $I_D$ = 17.5 A | - | 0.079 | 0.098 | Ω |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = 40 V, $I_D$ = 17.5 A | - | 28.8 | - | S |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 25 V, $V_{GS}$ = 0 V, f = 1 MHz | - | 4990 | 6640 | pF |
| $C_{oss}$ | Output Capacitance | | - | 2380 | 3170 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 140 | - | pF |
| $C_{oss}$ | Output Capacitance | $V_{DS}$ = 480 V, $V_{GS}$ = 0 V, f = 1 MHz | - | 113 | - | pF |
| $C_{oss(eff.)}$ | Effective Output Capacitance | $V_{DS}$ = 0 V to 480 V, $V_{GS}$ = 0 V | - | 340 | - | pF |
| $Q_g$ | Total Gate Charge at 10V | $V_{DS}$ = 480 V, $I_D$ = 35 A, $V_{GS}$ = 10 V (Note 4) | - | 139 | 181 | nC |
| $Q_{gs}$ | Gate to Source Gate Charge | | - | 31 | - | nC |
| $Q_{gd}$ | Gate to Drain “Miller” Charge | | - | 69 | - | nC |
| ESR | Equivalent Series Resistance (G-S) | f = 1 MHz | - | 1.4 | - | Ω |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$ = 300 V, $I_D$ = 35 A, $V_{GS}$ = 10 V, $R_G$ = 4.7 Ω (Note 4) | - | 34 | 78 | ns |
| $t_r$ | Turn-On Rise Time | | - | 120 | 250 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | - | 105 | 220 | ns |
| $t_f$ | Turn-Off Fall Time | | - | 73 | 155 | ns |
| **Drain-Source Diode Characteristics** | | | | | | |
| $I_S$ | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 35 | A |
| $I_{SM}$ | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 105 | A |
| $V_{SD}$ | Drain to Source Diode Forward Voltage | $V_{GS}$ = 0 V, $I_{SD}$ = 35 A | - | - | 1.4 | V |
| $t_{rr}$ | Reverse Recovery Time | $V_{GS}$ = 0 V, $I_{SD}$ = 35 A, $dI_F/dt$ = 100 A/μs | - | 614 | - | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | - | 16.3 | - | μC |

**Notes:**

1: Repetitive rating: pulse-width limited by maximum junction temperature.

2: $I_{AS}$ = 17.5 A, $V_{DD}$ = 50 V, $R_G$ = 25 Ω, starting $T_J$ = 25°C.

3: $I_{SD}$ ≤ 35 A, di/dt ≤ 200 A/μs, $V_{DD}$ ≤ $BV_{DSS}$, starting $T_J$ = 25°C.

4: Essentially independent of operating temperature typical characteristics.

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## Typical Performance Characteristics

**Figure 1. On-Region Characteristics**

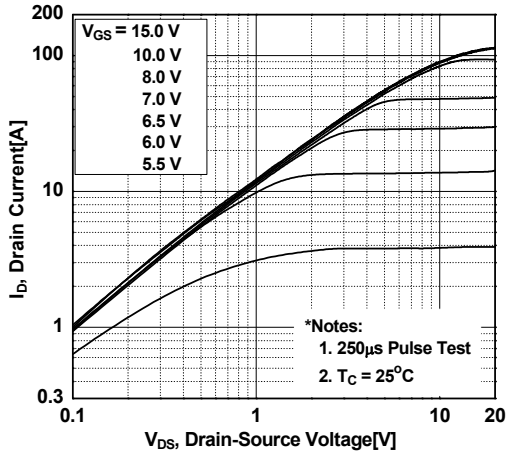



**Figure 2. Transfer Characteristics**

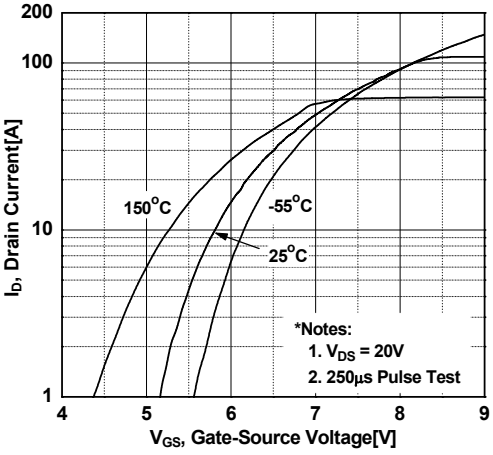



**Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage**

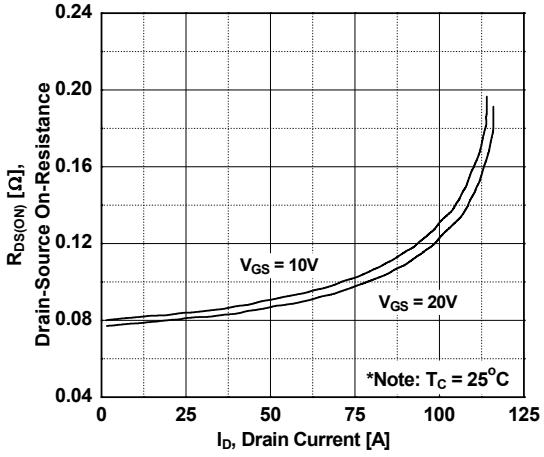



**Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature**

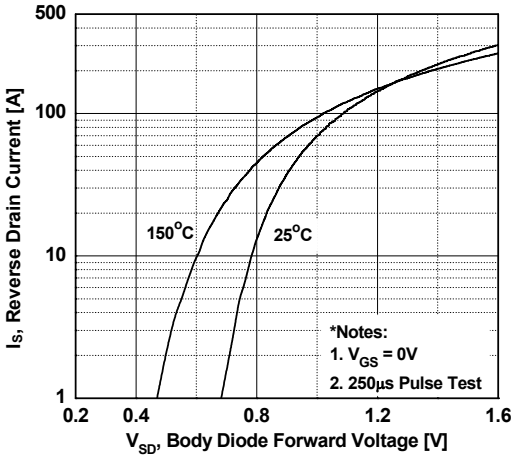



**Figure 5. Capacitance Characteristics**

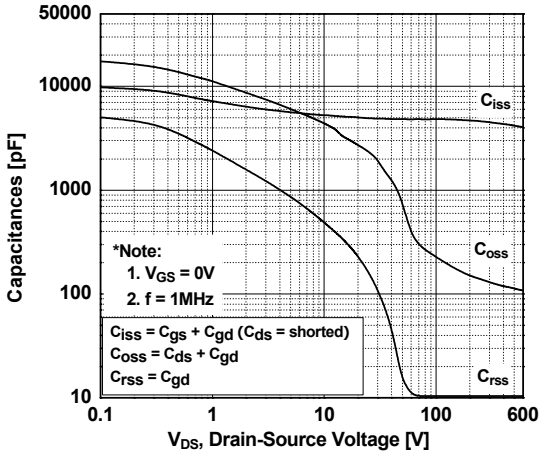
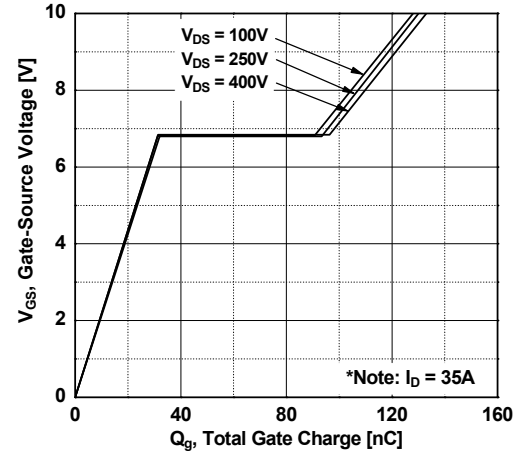



**Figure 6. Gate Charge Characteristics**



## Typical Performance Characteristics (Continued)

**Figure 7. Breakdown Voltage Variation vs. Temperature**

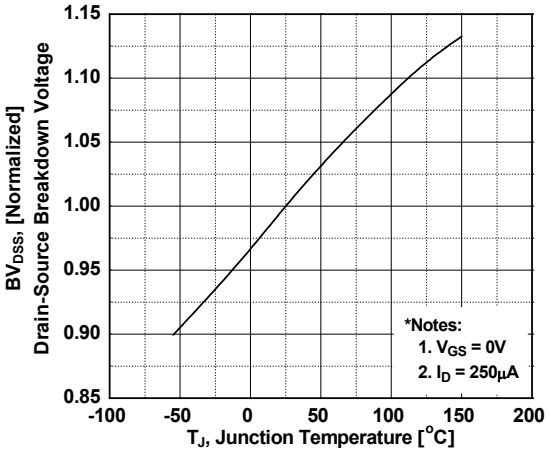



**Figure 8. On-Resistance Variation vs. Temperature**

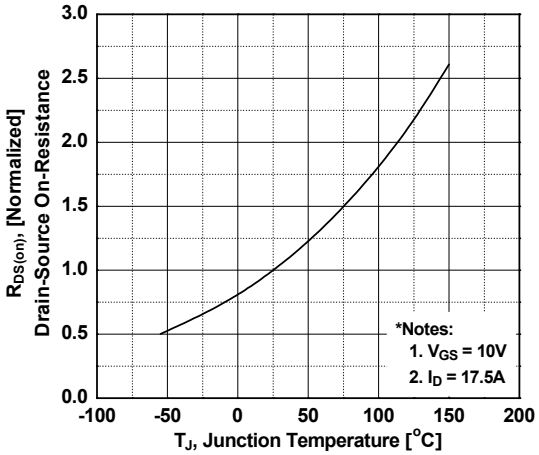



**Figure 9. Maximum Safe Operating Area**

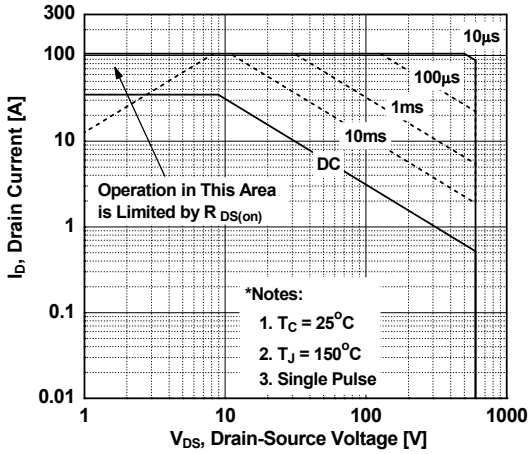



**Figure 10. Maximum Drain Current vs. Case Temperature**

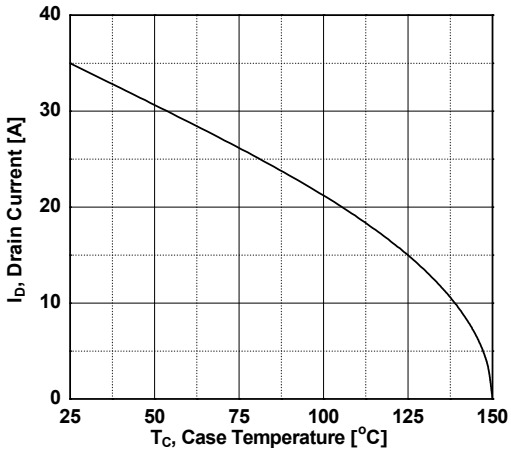
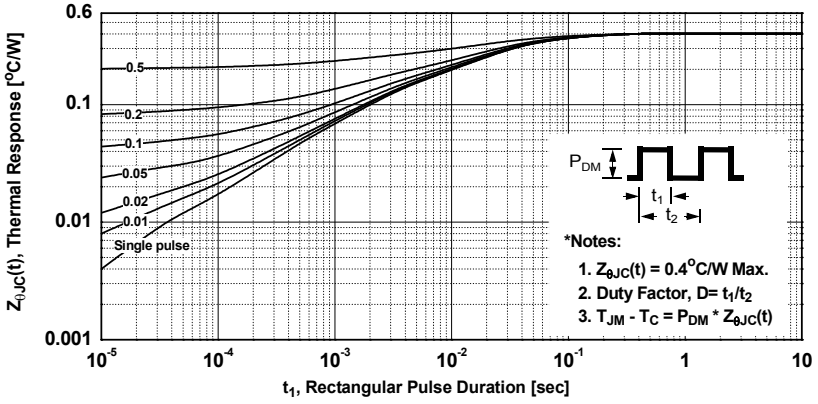



**Figure 11. Transient Thermal Response Curve**



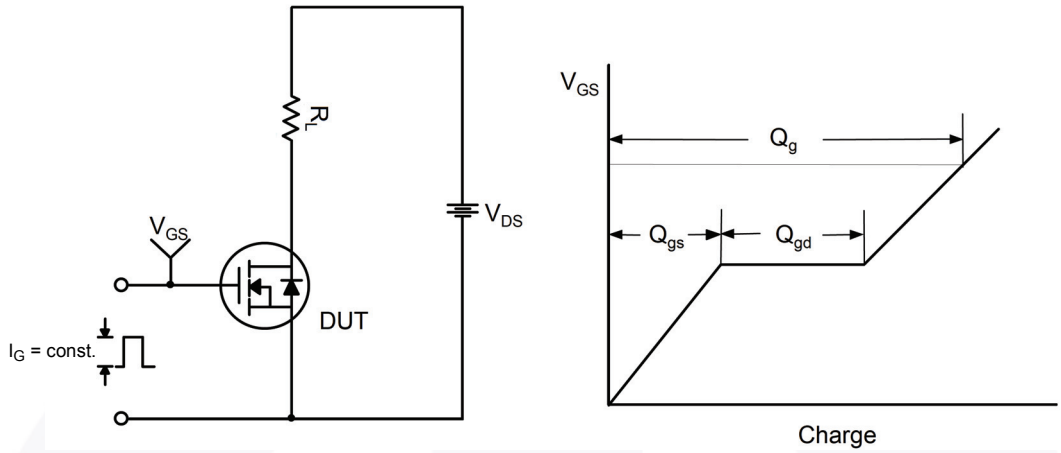



**Figure 12. Gate Charge Test Circuit & Waveform**

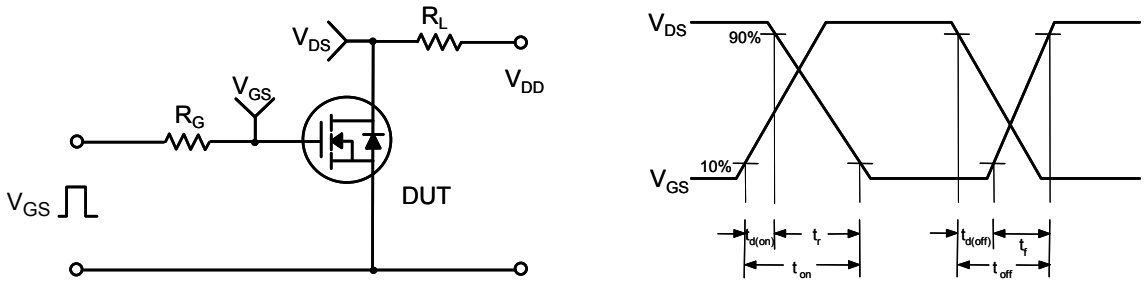



**Figure 13. Resistive Switching Test Circuit & Waveforms**

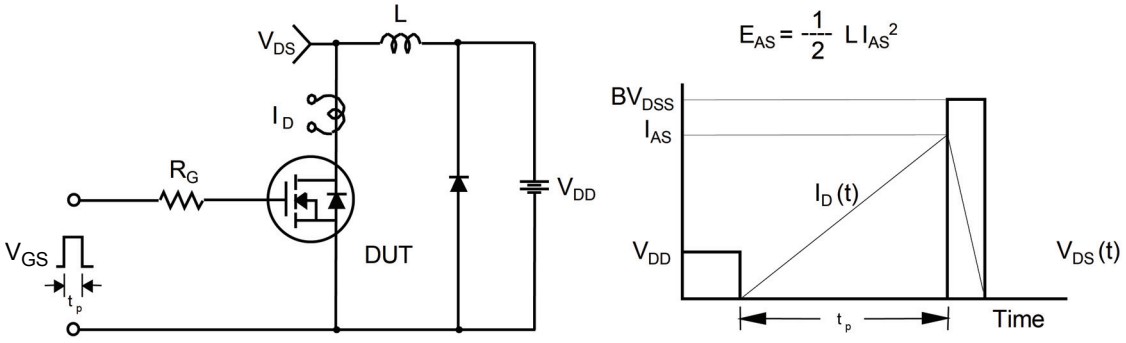



**Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms**

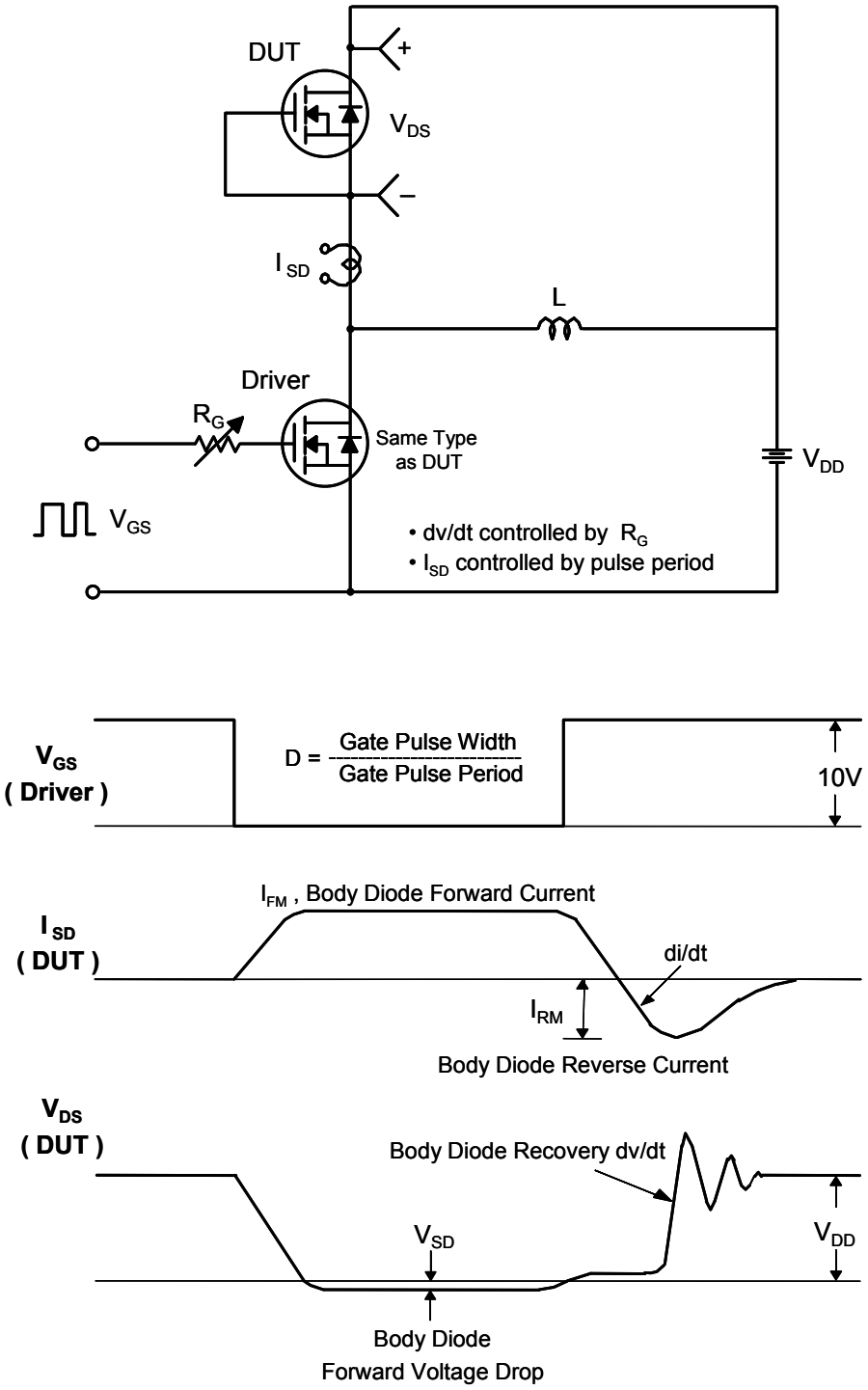



**Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms**

## Mechanical Dimensions

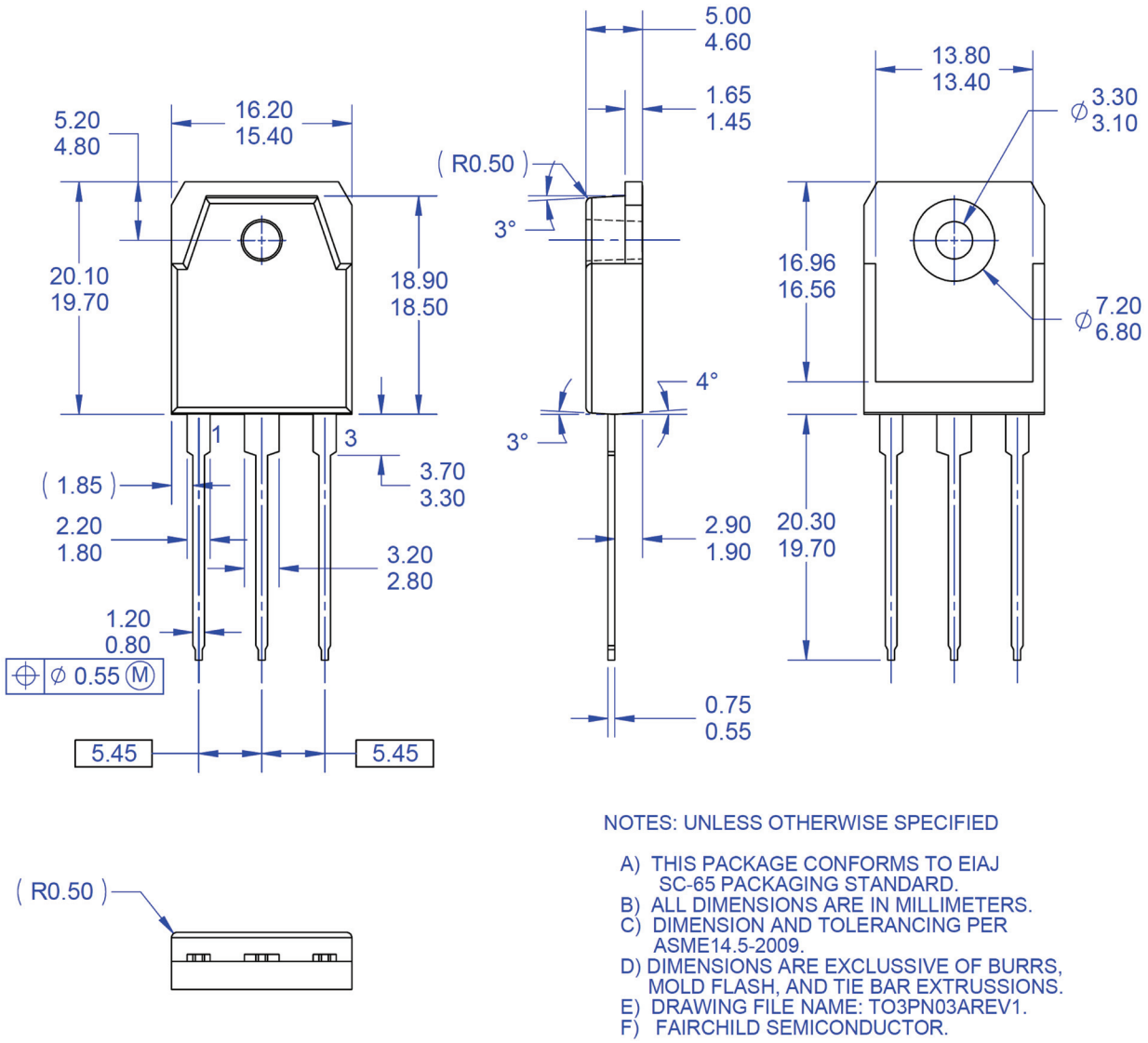



**Figure 16. TO3PN, 3-Lead, Plastic, EIAJ SC-65**

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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**

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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.

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