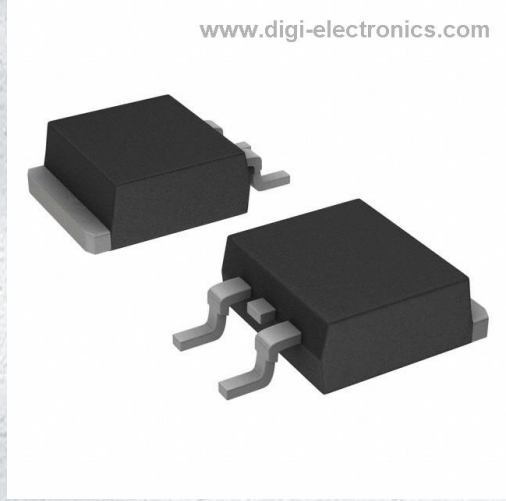
# FDB390N15A Datasheet




| | |
|---|---|
| DiGi Electronics Part Number | FDB390N15A-DG |
| Manufacturer | onsemi |
| Manufacturer Product Number | FDB390N15A |
| Description | MOSFET N-CH 150V 27A D2PAK |
| Detailed Description | N-Channel 150 V 27A (Tc) 75W (Tc) Surface Mount TO-263 (D2PAK) |

https://www.DiGi-Electronics.com

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

## Purchase and inquiry

| Manufacturer Product Number: | Manufacturer: |
| --- | --- |
| FDB390N15A | onsemi |
| Series: | Product Status: |
| PowerTrench® | Active |
| FET Type: | Technology: |
| N-Channel | MOSFET (Metal Oxide) |
| Drain to Source Voltage (Vdss): | Current - Continuous Drain (Id) @ 25°C: |
| 150 V | 27A (Tc) |
| Drive Voltage (Max Rds On, Min Rds On): | Rds On (Max) @ Id, Vgs: |
| 10V | 39mOhm @ 27A, 10V |
| Vgs(th) (Max) @ Id: | Gate Charge (Qg) (Max) @ Vgs: |
| 4V @ 250µA | 18.6 nC @ 10 V |
| Vgs (Max): | Input Capacitance (Ciss) (Max) @ Vds: |
| ±20V | 1285 pF @ 75 V |
| FET Feature: | Power Dissipation (Max): |
| - | 75W (Tc) |
| Operating Temperature: | Mounting Type: |
| -55°C ~ 175°C (TJ) | Surface Mount |
| Supplier Device Package: | Package / Case: |
| TO-263 (D2PAK) | TO-263-3, D2PAK (2 Leads + Tab), TO-263AB |
| Base Product Number: | |
| FDB390 | |

## Environmental & Export classification

| RoHS Status: | Moisture Sensitivity Level (MSL): |
| --- | --- |
| ROHS3 Compliant | 1 (Unlimited) |
| REACH Status: | ECCN: |
| REACH Unaffected | EAR99 |
| HTSUS: | |
| 8541.29.0095 | |

FAIRCHILD™

**Is Now Part of**

ON Semiconductor®

**To learn more about ON Semiconductor, please visit our website at**
**www.onsemi.com**

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

April 2015

# FDB390N15A

## N-Channel PowerTrench® MOSFET

**150 V, 27 A, 39 mΩ**

### Features

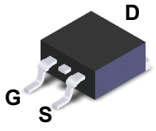
- $R_{DS(on)}$ = 33.5 mΩ (Typ.) @ $V_{GS}$ = 10 V, $I_D$ = 27 A
- Fast Switching Speed
- Low Gate Charge, $Q_G$ = 14.3 nC (Typ.)
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- High Power and Current Handling Capability
- RoHS Compliant

### Description

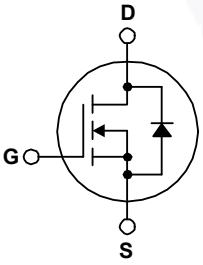
This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench® process that has been tailored to minimize the on-state resistance while maintaining superior switching performance.

### Applications

- Consumer Appliances
- LED TV
- Synchronous Rectification
- Uninterruptible Power Supply
- Micro Solar Inverter




$D^2$-PAK




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

| Symbol | Parameter | | FDB390N15A | Unit |
|---|---|---|---|---|
| $V_{DSS}$ | Drain to Source Voltage | | 150 | V |
| $V_{GSS}$ | Gate to Source Voltage | - DC | ±20 | V |
| | | - AC (f > 1 Hz) | ±30 | |
| $I_D$ | Drain Current | - Continuous ($T_C$ = 25°C,Silicon Limited) | 27 | A |
| | | - Continuous ($T_C$ = 100°C,Silicon Limited) | 19 | |
| $I_{DM}$ | Drain Current | - Pulsed (Note 1) | 108 | A |
| $E_{AS}$ | Single Pulsed Avalanche Energy | (Note 2) | 78 | mJ |
| dv/dt | Peak Diode Recovery dv/dt | (Note 3) | 6.0 | V/ns |
| $P_D$ | Power Dissipation | ($T_C$ = 25°C) | 75 | W |
| | | - Derate Above 25°C | 0.5 | W/°C |
| $T_J$, $T_{STG}$ | Operating and Storage Temperature Range | | -55 to +175 | °C |
| $T_L$ | Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds. | | 300 | °C |

## Thermal Characteristics

| Symbol | Parameter | FDB390N15A | Unit |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max. | 2.0 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Minimum Pad of 2-oz Copper), Max. | 62.5 | |
| | Thermal Resistance, Junction to Ambient (1 $in^2$ Pad of 2-oz Copper), Max. | 40 | |

## Package Marking and Ordering Information

| Part Number | Top Mark | Package | Packing Method | Reel Size | Tape Width | Quantity |
|---|---|---|---|---|---|---|
| FDB390N15A | FDB390N15A | $D^2$-PAK | Tape and Reel | 330 mm | 24 mm | 800 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 | 150 | - | - | V |
| $\Delta BV_{DSS}$ / $\Delta T_J$ | Breakdown Voltage Temperature Coefficient | $I_D$ = 250 μA, Referenced to 25°C | - | 0.1 | - | V/°C |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 120 V, $V_{GS}$ = 0 V | - | - | 1 | μA |
| | | $V_{DS}$ = 120 V, $T_C$ = 150°C | - | - | 500 | |
| $I_{GSS}$ | Gate to Body Leakage Current | $V_{GS}$ = ±20 V, $V_{DS}$ = 0 V | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$ = $V_{DS}$, $I_D$ = 250 μA | 2.0 | - | 4.0 | V |
| $R_{DS(on)}$ | Static Drain to Source On Resistance | $V_{GS}$ = 10 V, $I_D$ = 27 A | - | 33.5 | 39.0 | mΩ |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = 10 V, $I_D$ = 27 A | - | 33 | - | S |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 75 V, $V_{GS}$ = 0 V, f = 1 MHz | - | 965 | 1285 | pF |
| $C_{oss}$ | Output Capacitance | | - | 96 | 130 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 5.8 | - | pF |
| $C_{oss(er)}$ | Energy Related Output Capacitance | $V_{DS}$ = 75 V, $I_D$ = 27 A | | 169 | - | pF |
| $Q_{g(tot)}$ | Total Gate Charge at 10V | $V_{DS}$ = 75 V, $I_D$ = 27 A, $V_{GS}$ = 10 V | - | 14.3 | 18.6 | nC |
| $Q_{gs}$ | Gate to Source Gate Charge | | | 5.0 | - | nC |
| $Q_{gs2}$ | Gate Charge Threshold to Plateau | | - | 2.0 | - | nC |
| $Q_{gd}$ | Gate to Drain “Miller” Charge | (Note 4) | - | 3.5 | - | nC |
| ESR | Equivalent Series Resistance (G-S) | f = 1 MHz | - | 1.4 | - | Ω |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$ = 75 V, $I_D$ = 27 A, $V_{GS}$ = 10 V, $R_G$ = 4.7 Ω | - | 14 | 38 | ns |
| $t_r$ | Turn-On Rise Time | | - | 10 | 30 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | - | 20 | 50 | ns |
| $t_f$ | Turn-Off Fall Time | (Note 4) | - | 5 | 20 | ns |
| **Drain-Source Diode Characteristics** | | | | | | |
| $I_S$ | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 27 | A |
| $I_{SM}$ | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 108 | A |
| $V_{SD}$ | Drain to Source Diode Forward Voltage | $V_{GS}$ = 0 V, $I_{SD}$ = 27 A | - | - | 1.25 | V |
| $t_{rr}$ | Reverse Recovery Time | $V_{GS}$ = 0 V, $I_{SD}$ = 27 A, $V_{DD}$ = 75 V, $dI_F/dt$ = 100 A/μs | - | 63 | - | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | - | 131 | - | nC |

**Notes:**

1. Repetitive rating: pulse-width limited by maximum junction temperature.
2. Starting $T_J$ = 25°C, L = 3 mH, $I_{SD}$ = 7.2 A.
3. $I_{SD} \le 27$ A, di/dt ≤ 200 A/μs, $V_{DD} \le BV_{DSS}$, starting $T_J$ = 25°C.
4. Essentially independent of operating temperature typical characteristics.

## Typical Performance Characteristics

**Figure 1. On-Region Characteristics**

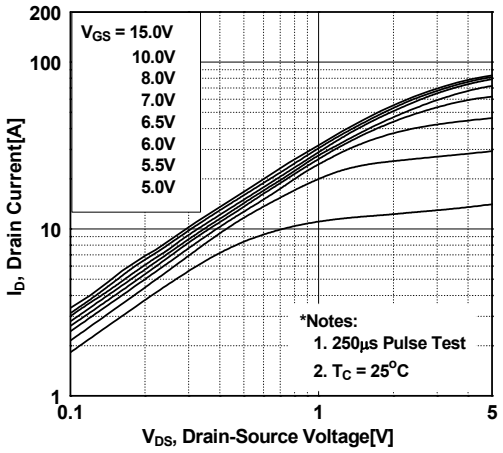



**Figure 2. Transfer Characteristics**

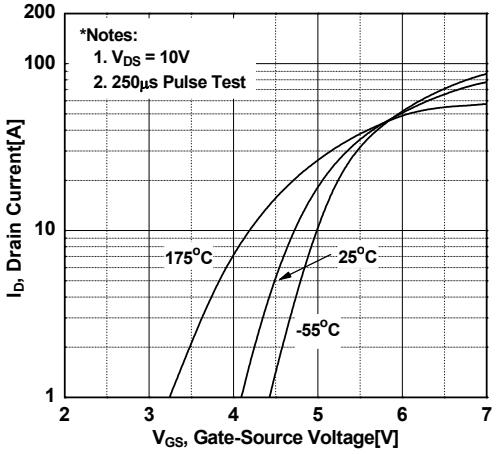



**Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage**

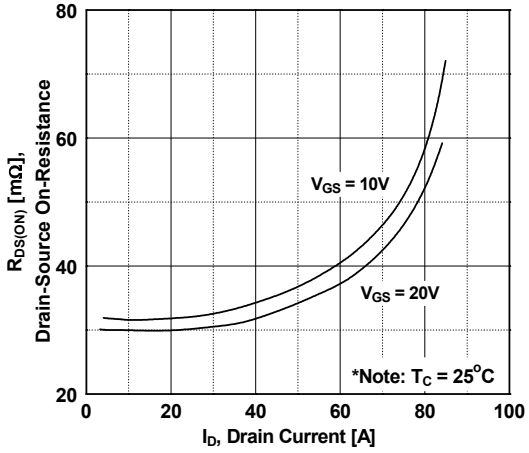



**Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature**

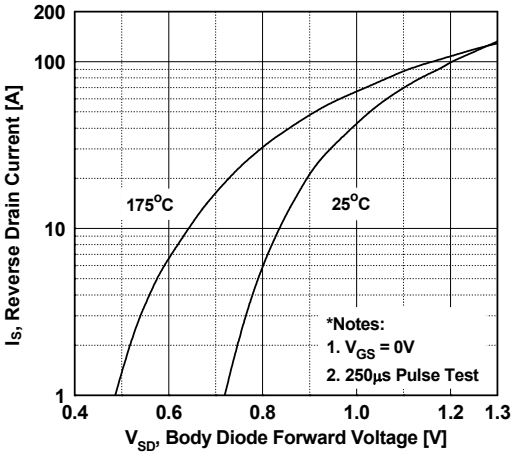



**Figure 5. Capacitance Characteristics**

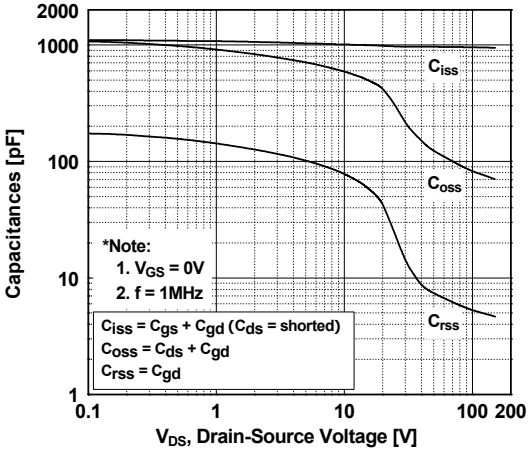
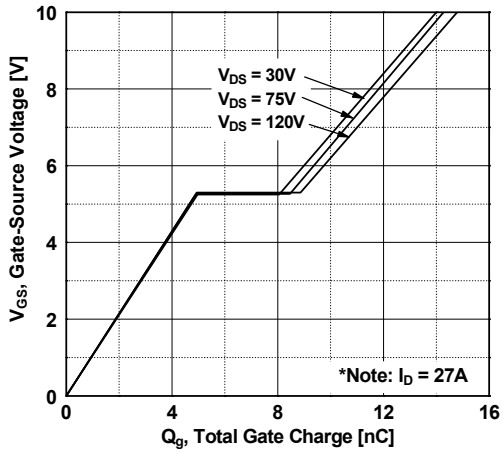



**Figure 6. Gate Charge Characteristics**



## Typical Performance Characteristics (Continued)

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

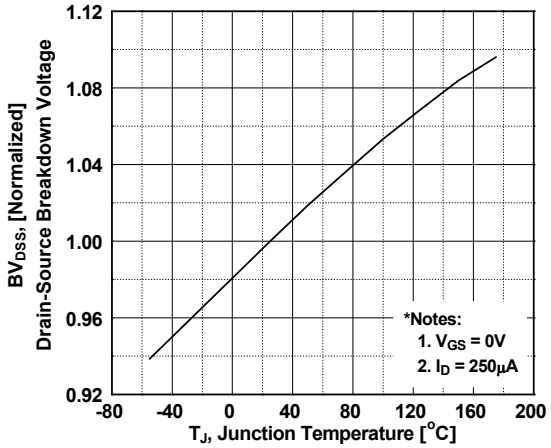



**Figure 8. On-Resistance Variation vs. Temperature**

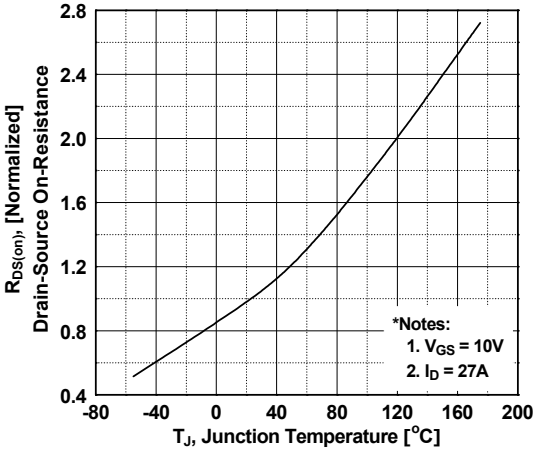



**Figure 9. Maximum Safe Operating Area**

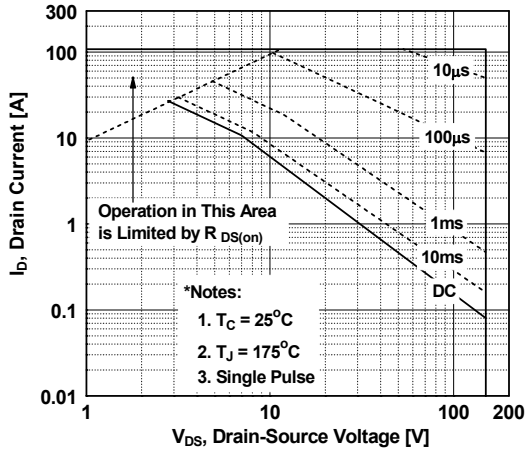



**Figure 10. Maximum Drain Current vs. Case Temperature**

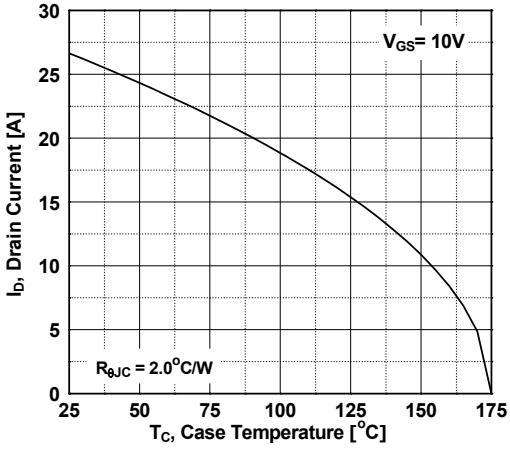



**Figure 11. Eoss vs. Drain to Source Voltage**

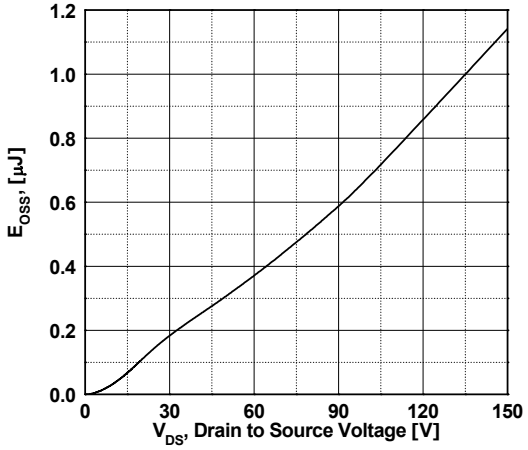
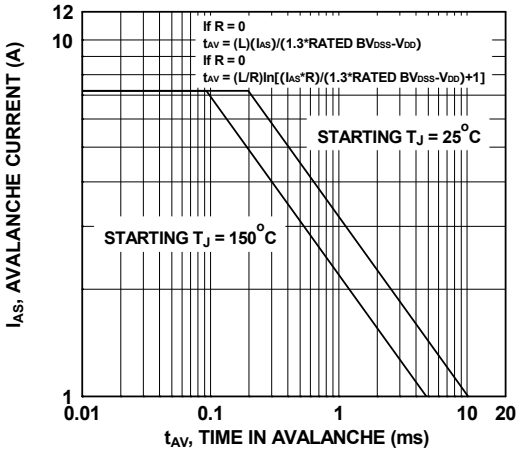
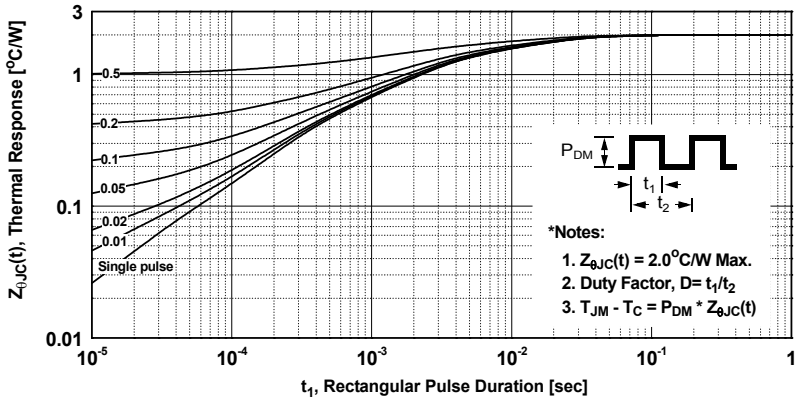



**Figure 12. Unclamped Inductive Switching Capability**



## Typical Performance Characteristics (Continued)

**Figure 13. Transient Thermal Response Curve**



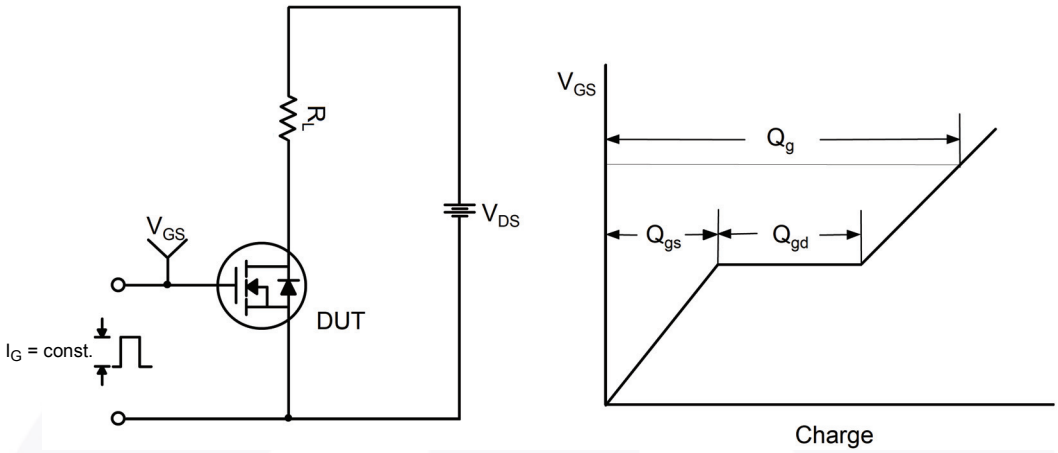



**Figure 14. Gate Charge Test Circuit & Waveform**

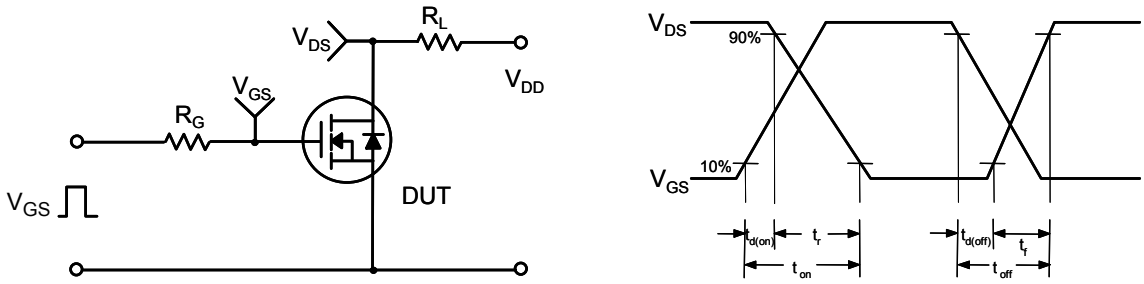



**Figure 15. Resistive Switching Test Circuit & Waveforms**

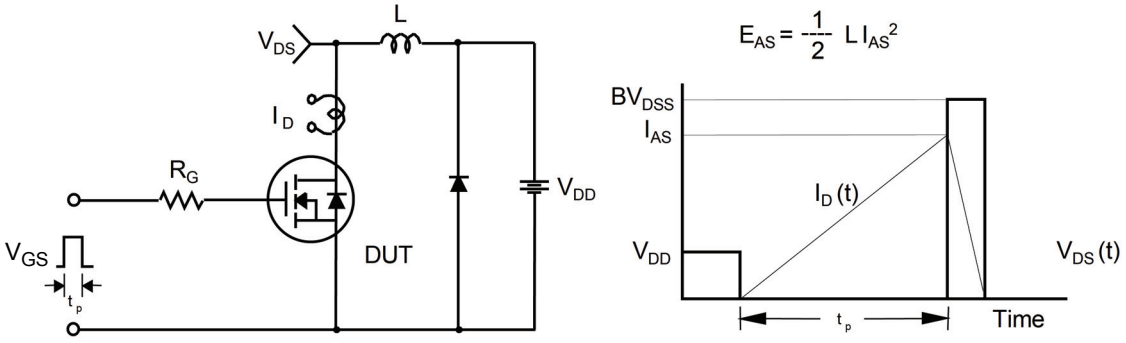



**Figure 16. Unclamped Inductive Switching Test Circuit & Waveforms**

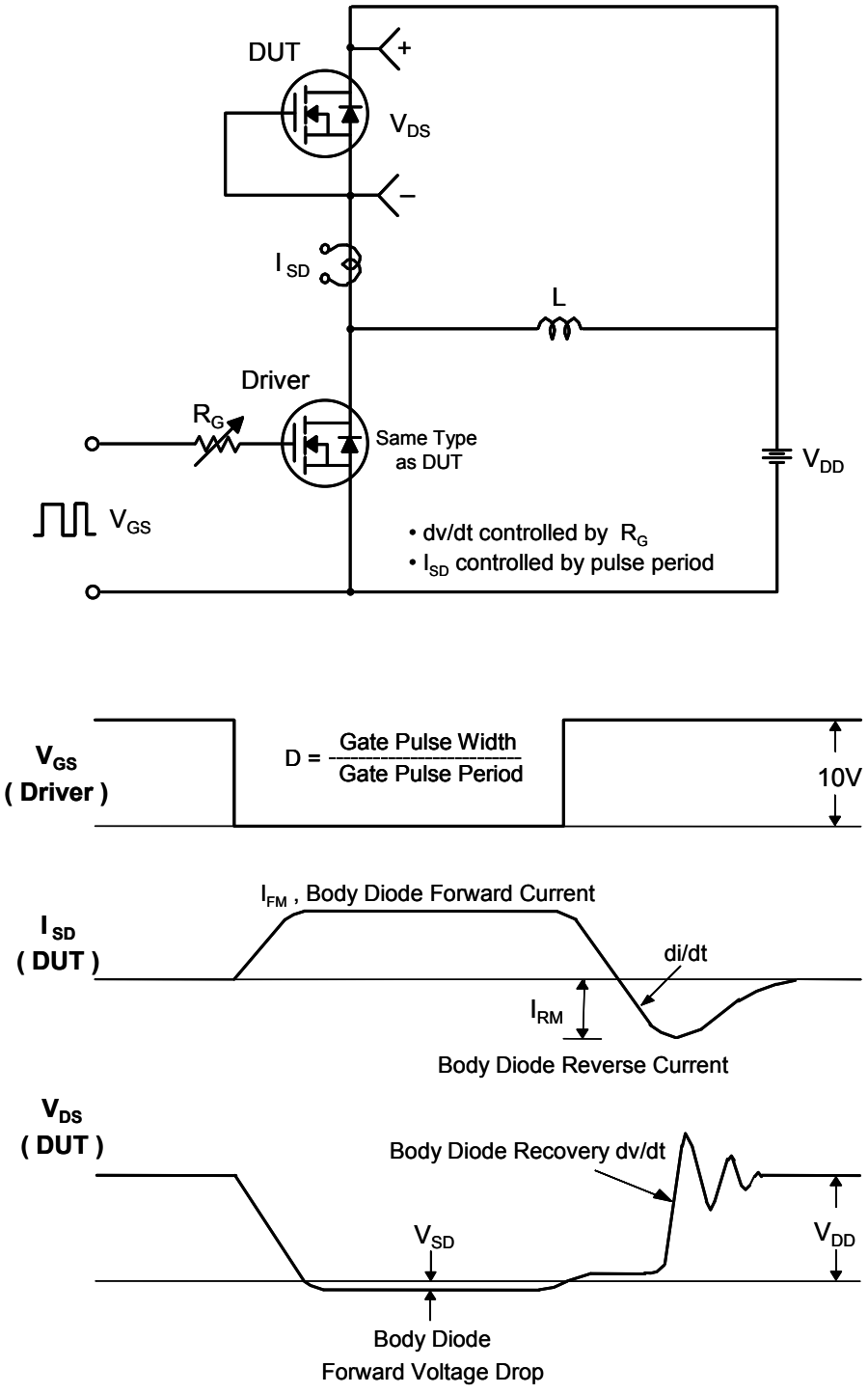
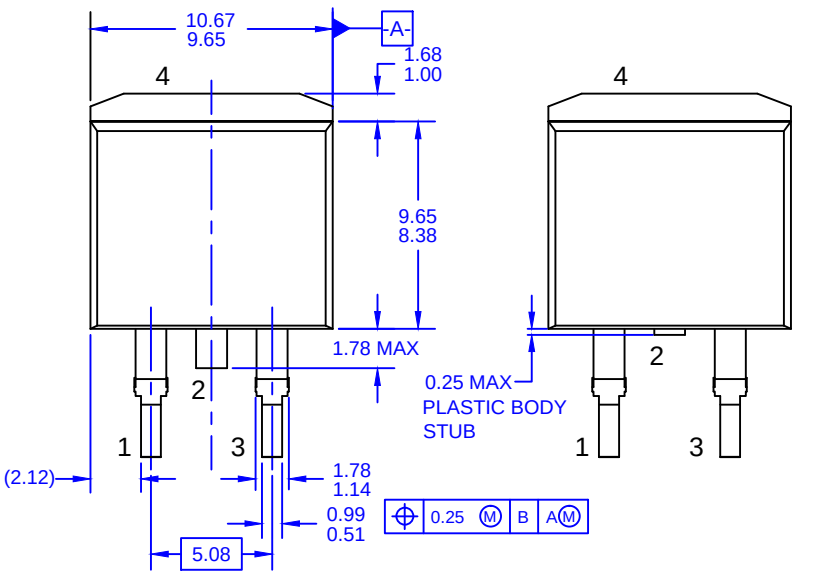
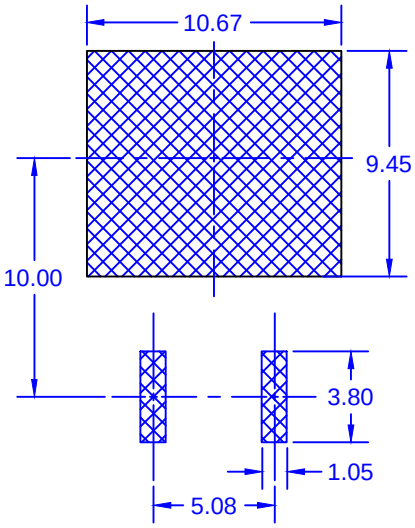


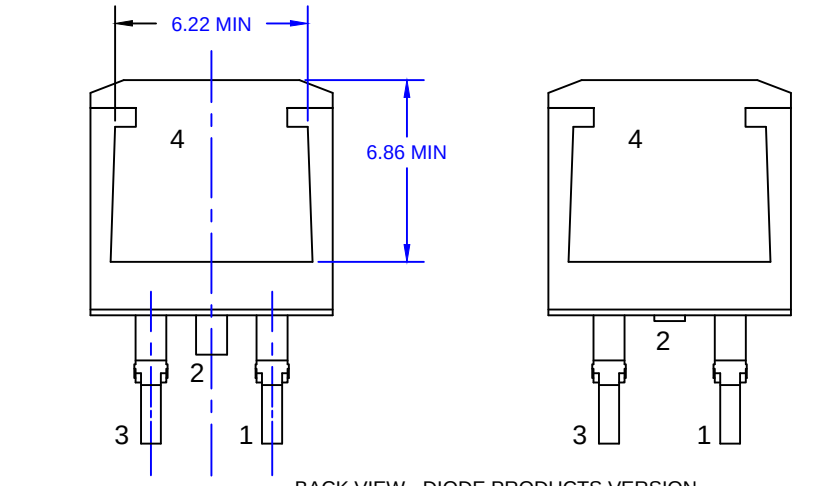

**Figure 17. Peak Diode Recovery dv/dt Test Circuit & Waveforms**



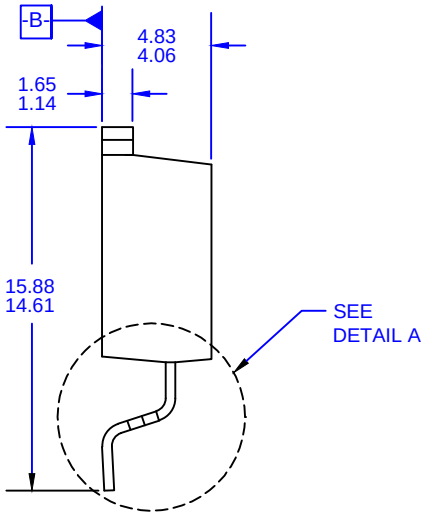

FRONT VIEW - DIODE PRODUCTS VERSION
ALTERNATIVE SUPPLIER DETAIL




LAND PATTERN RECOMMENDATION
UNLESS NOTED, ALL DIMS TYPICAL

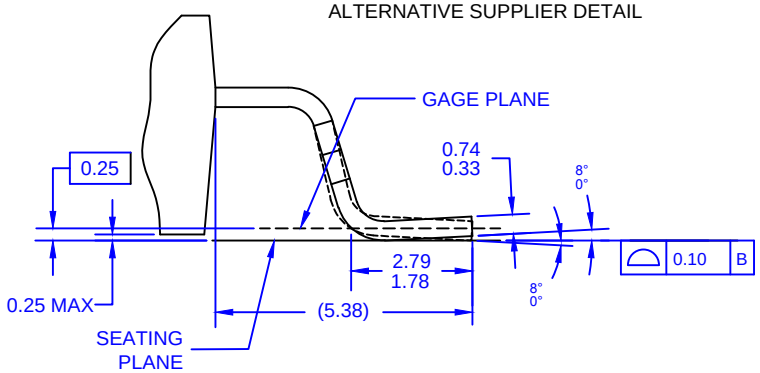



BACK VIEW - DIODE PRODUCTS VERSION
ALTERNATIVE SUPPLIER DETAIL




NOTES: UNLESS OTHERWISE SPECIFIED

A) ALL DIMENSIONS ARE IN MILLIMETERS.
B) REFERENCE JEDEC, TO-263, VARIATION AB.
C) DIMENSIONING AND TOLERANCING PER DIMENSIONING AND TOLERANCING PER ASME Y14.5 - 2009.
D) LOCATION OF THE PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE).
E) LANDPATTERN RECOMMENDATION PER IPC TO254P1524X482-3N
F) FILENAME: TO263A02REV8




DETAIL A, ROTATED 90°
SCALE: 2X

FAIRCHILD.

## PUBLICATION ORDERING INFORMATION

**LITERATURE FULFILLMENT**:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
**Phone**: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
**Fax**: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
**Email**: orderlit@onsemi.com

**N. American Technical Support**: 800−282−9855 Toll Free USA/Canada
**Europe, Middle East and Africa Technical Support:**
Phone: 421 33 790 2910
**Japan Customer Focus Center**
Phone: 81−3−5817−1050

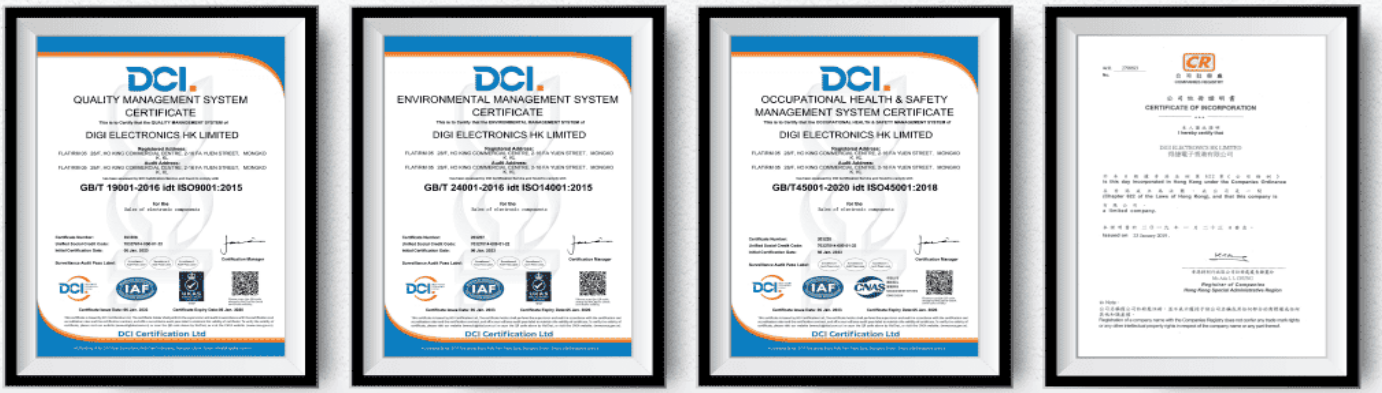
**ON Semiconductor Website**: **www.onsemi.com**

**Order Literature**: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

# OUR CERTIFICATE

DiGi provide top-quality products and perfect service for customer worldwide through standardization, technological innovation and continuous improvement.  DiGi through third-party certification, we striciy control the quality of products and services. Welcome your RFQ to Email: Info@DiGi-Electronics.com





Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.