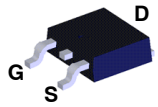
# MOSFET – N-Channel QFET

## 1000 V, 8 A, 1.45 Ω

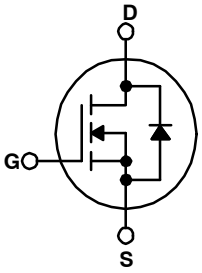
# FQD30N06




TO−252−3
CASE 369AS

### Description

This N−Channel Enhancement Mode Power MOSFET is produced using **onsemi**'s proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on−state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, audio amplifier, DC motor control, and variable switching power applications.




### Features

- 22.7 A, 60 V $R_{DS(on)}$ = 45 mΩ (Max.) @ $V_{GS}$ = 10 V, $I_D$ = 11.4 A
- Low Gate Charge (Typ. 19 nC)
- Low Crss (Typ. 40 pF)
- 100% Avalanche Tested
- This Device is Pb−Free  Halide, Free and RoHS Compliant

### MARKING DIAGRAM




| | |
|---|---|
| &Z | = Assembly Plant Code |
| &3 | = Numeric Date Code |
| &K | = 2−Digit Lot Code |
| FQD30N06 | = Specific Device Code |

### MOSFET MAXIMUM RATINGS ($T_C$ = 25°C unless otherwise noted.)

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DSS}$ | Drain to Source Voltage | 60 | V |
| $I_D$ | Drain Current<br>− Continuous ($T_C$ = 25°C)<br>− Continuous ($T_C$ = 100°C) | <br>22.7<br>14.3 | A |
| $I_{DM}$ | Drain Current − Pulsed (Note 1) | 90.8 | A |
| $V_{GSS}$ | Gate−Source Voltage | ±25 | V |
| $E_{AS}$ | Single Pulse Avalanche Energy (Note 2) | 280 | mJ |
| $I_{AR}$ | Avalanche Current (Note 1) | 22.7 | A |
| $E_{AR}$ | Repetitive Avalanche Energy (Note 1) | 4.4 | mJ |
| dv/dt | Peak Diode Recovery dv/dt (Note 3) | 7.0 | V/ns |
| $P_D$ | Power Dissipation ($T_A$ = 25°C) * | 2.5 | W |
| | Power Dissipation<br>− ($T_C$ = 25°C)<br>− Derate Above 25°C | <br>44<br>0.35 | <br>W<br>W/°C |
| $T_J$,$T_{STG}$ | Operating and Storage Temperature Range | −55 to +150 | °C |
| $T_L$ | Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds | 300 | °C |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| FQD30N06 | TO−252−3<br>(Pb−Free) | 2500 /<br>Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

© Semiconductor Components Industries, LLC, 2016

## THERMAL CHARACTERISTICS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max. | 2.85 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Minimum Pad of 2−oz Copper), Max. | 110 | |
| | Thermal Resistance, Junction to Ambient (*1 $in^2$ Pad of 2−oz Copper), Max. | 50 | |

## ELECTRICAL CHARACTERISTICS ($T_C$ = 25°C unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain to Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = 250 μA | 60 | – | – | V |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D$ = 250 μA, Referenced to 25°C | – | 0.06 | – | V/°C |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 60 V, $V_{GS}$ = 0 V | – | – | 1 | μA |
| | Zero Gate Voltage Drain Current | $V_{DS}$ = 48 V, $T_C$ = 125°C | – | – | 10 | μA |
| $I_{GSSF}$ | Gate to Body Leakage Current, Forward | $V_{GS}$ = 25 V, $V_{DS}$ = 0 V | – | – | 100 | nA |
| $I_{GSSR}$ | Gate to Body Leakage Current, Reverse | $V_{GS}$ = −25 V, $V_{DS}$ = 0 V | – | – | −100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 μA | 2.0 | – | 4.0 | V |
| $R_{DS(on)}$ | Static Drain−Source On−Resistance | $V_{GS}$ = 10 V, $I_D$ = 11.4 A | – | 0.036 | 0.045 | Ω |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = 25 V, $I_D$ = 11.4 A | – | 15 | – | S |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 25 V, $V_{GS}$ = 0 V, f = 1.0 MHz | – | 725 | 945 | pF |
| $C_{oss}$ | Output Capacitance | | – | 270 | 350 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | – | 40 | 52 | pF |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn−On Delay Time | $V_{DD}$ = 30 V, $I_D$ = 15 A, $R_G$ = 25 Ω (Note 4) | – | 10 | 30 | ns |
| $t_r$ | Turn−On Rise Time | | – | 85 | 180 | ns |
| $t_{d(off)}$ | Turn−Off Delay Time | | – | 35 | 80 | ns |
| $t_f$ | Turn−Off Fall Time | | – | 40 | 90 | ns |
| Qg | Total Gate Charge | $V_{DS}$ = 48 V, $I_D$ = 30 A, $V_{GS}$ = 10 V (Note 4) | – | 19 | 25 | nC |
| Qgs | Gate−Source Charge | | – | 5.4 | – | nC |
| Qgd | Gate−Drain Charge | | – | 8.5 | – | nC |
| **Drain−Source Diode Characteristics and Maximum Ratings** | | | | | | |
| $I_S$ | Maximum Continuous Drain−Source Diode Forward Current | | – | – | 22.7 | A |
| $I_{SM}$ | Maximum Pulsed Drain−Source Diode Forward Current | | – | – | 90.8 | A |
| $V_{SD}$ | Drain−Source Diode Forward Voltage | $V_{GS}$ = 0 V, $I_S$ = 22.7 A | – | – | 1.5 | V |
| $t_{rr}$ | Reverse Recovery Time | $V_{GS}$ = 0 V, $I_S$ = 30 A, $dI_F/dt$ = 100 A/μs | – | 45 | – | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | – | 65 | – | nC |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

NOTES:

1. Repetitive Rating: Pulse−width limited by maximum junction temperature.
2. L = 630 μH, $I_{AS}$ = 227 A, $V_{DD}$ = 25 V, $R_G$ = 25 Ω starting $T_J$ = 25°C.
3. $I_{SD}$ ≤ 30 A, di/dt ≤ 300 A/μs, $V_{DD}$ ≤ $BV_{DSS}$, starting $T_J$ = 25°C.
4. Essentially independent of operating temperature.

## TYPICAL CHARACTERISTICS

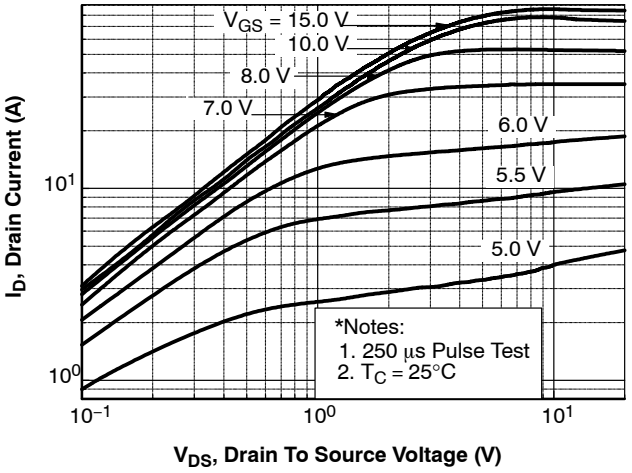



Figure 1. On−Region Characteristics

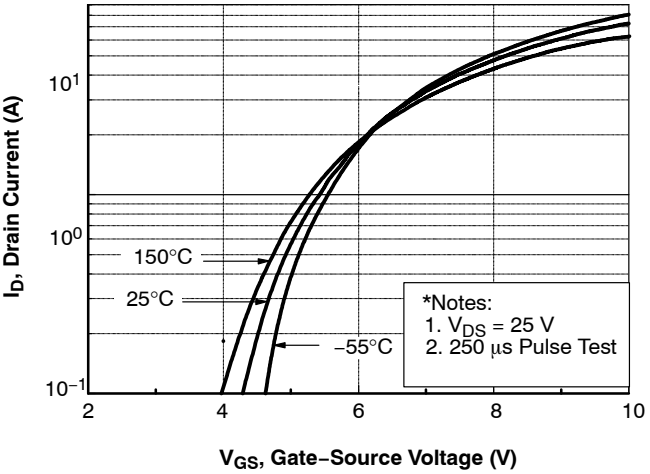



Figure 2. Transfer Characteristics

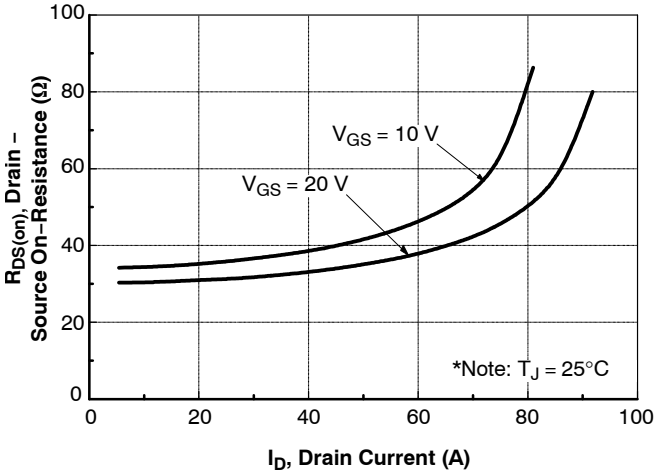



Figure 3. On−Resistance Variation vs Drain Current and Gate Voltage

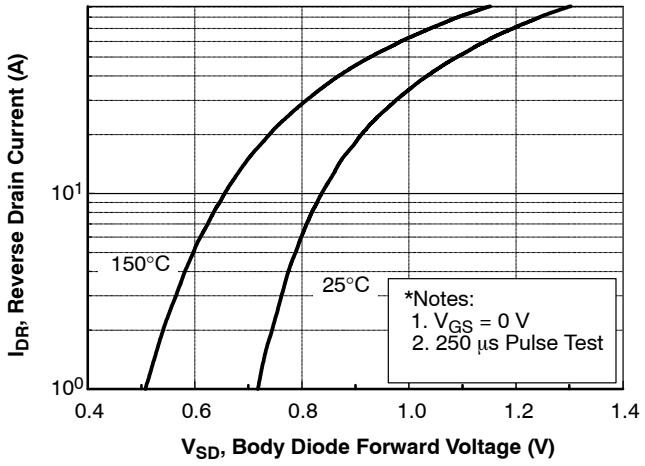



Figure 4. Body Diode Forward Voltage Variation vs Source Current and Temperature

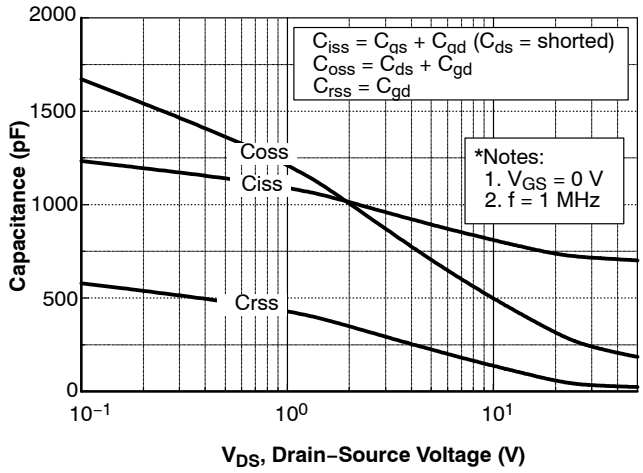



Figure 5. Capacitance Characteristics

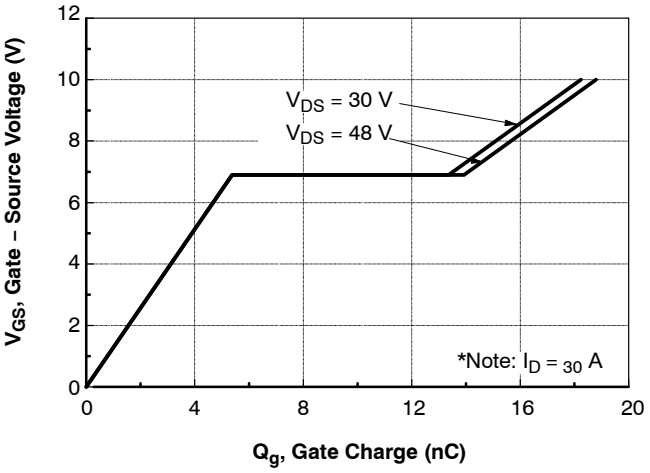



Figure 6. Gate Charge Characteristics

## TYPICAL CHARACTERISTICS (CONTINUED)

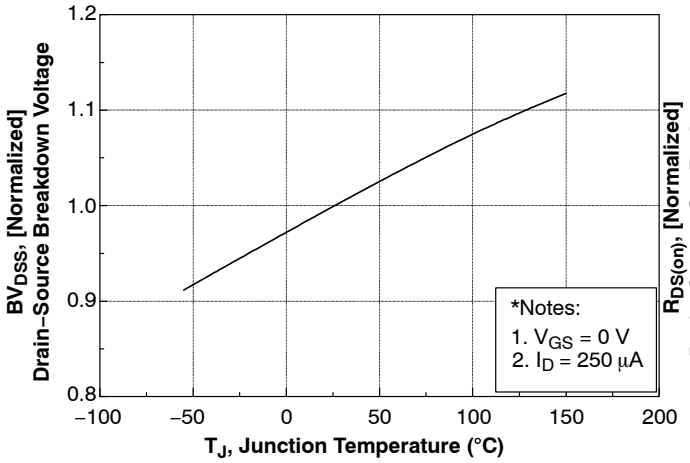



**Figure 7. Breakdown Voltage Variation vs Temperature**

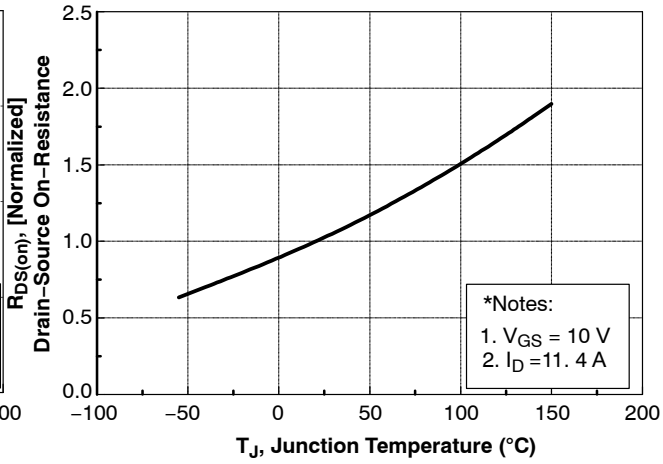



**Figure 8. On−Resistance Variation vs Temperature**

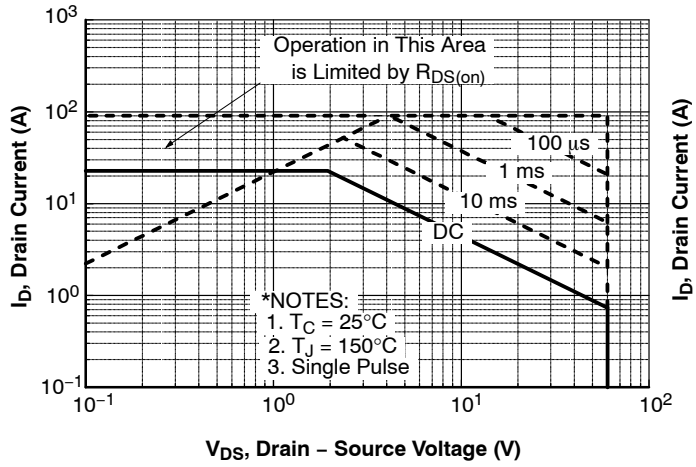



**Figure 9. Maximum Safe Operating Area**

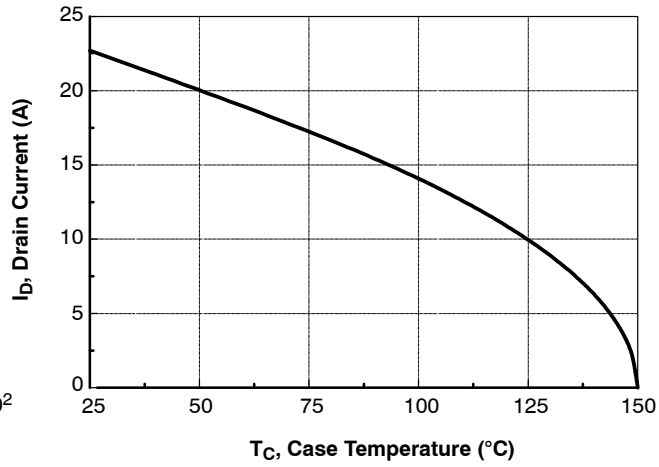



**Figure 10. Maximum Drain Current vs. Case Temperature**

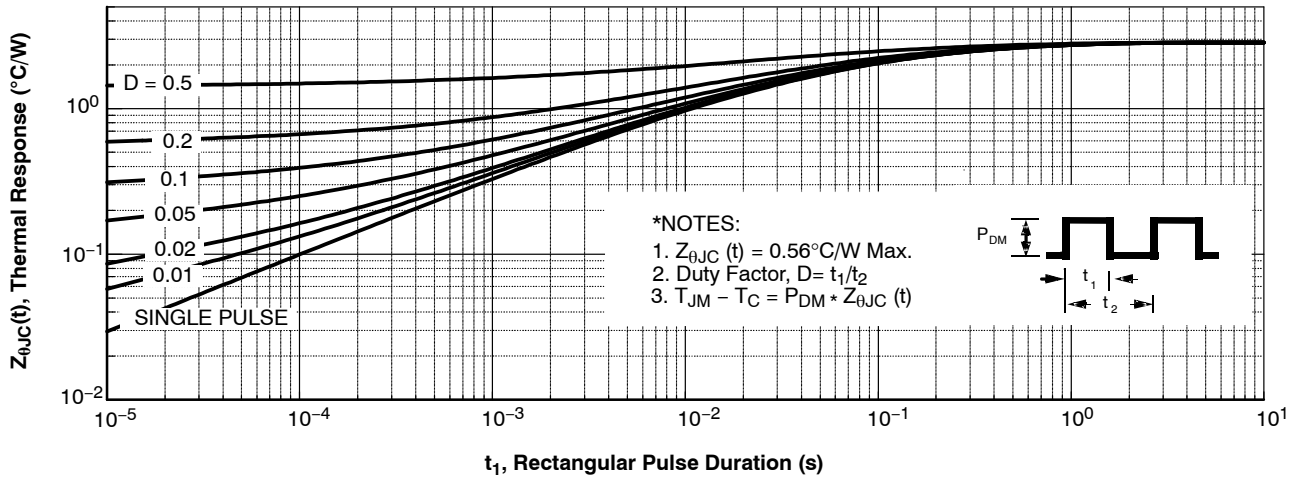



**Figure 11. Transient Thermal Response Curve**

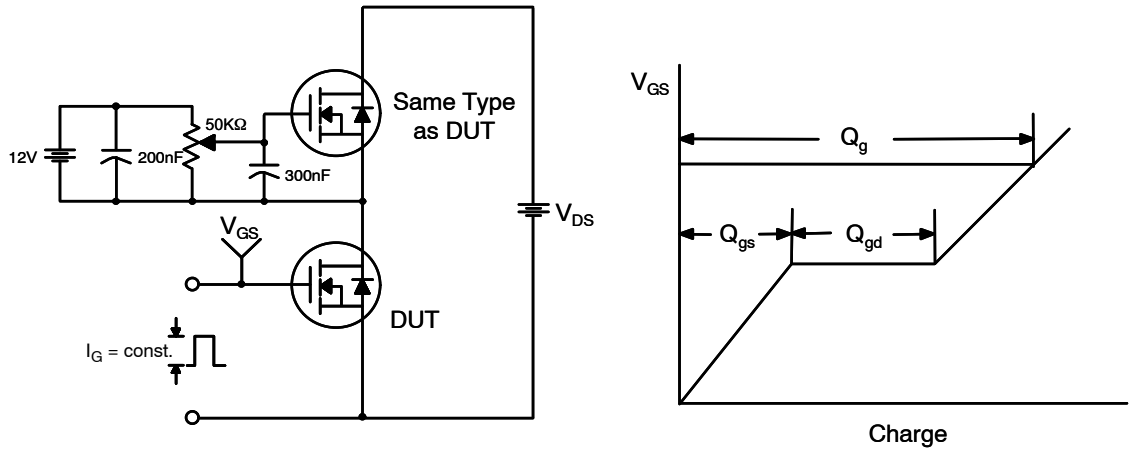



**Figure 12. Gate Charge Test Circuit & Waveform**

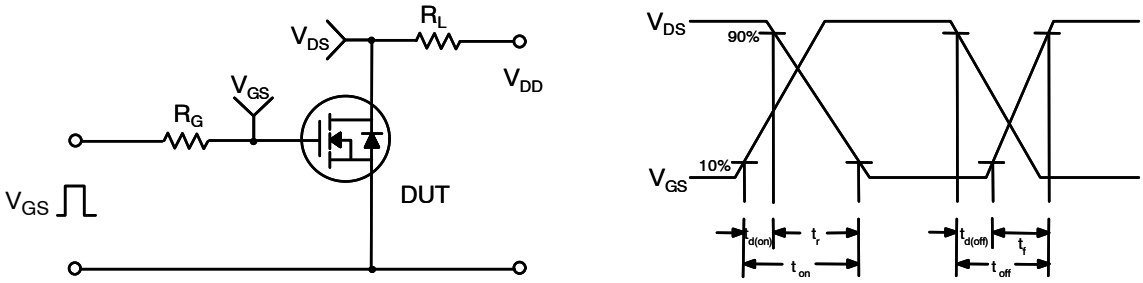



**Figure 13. Resistive Switching Test Circuit & Waveforms**

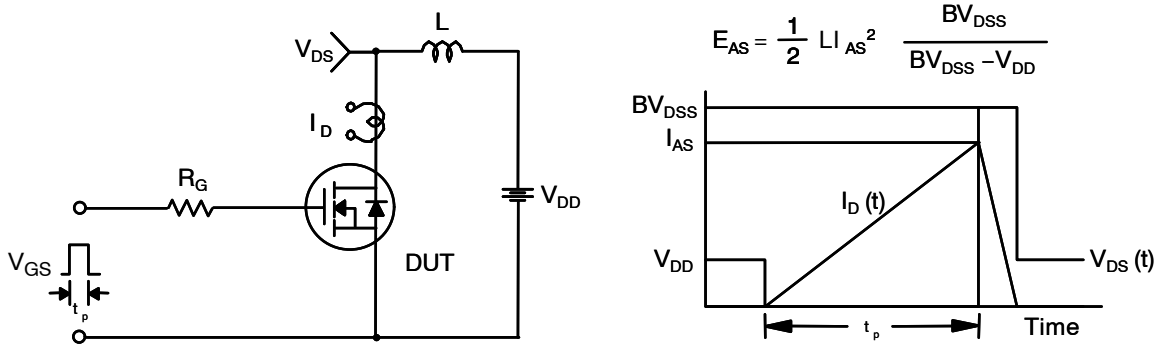



**Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms**

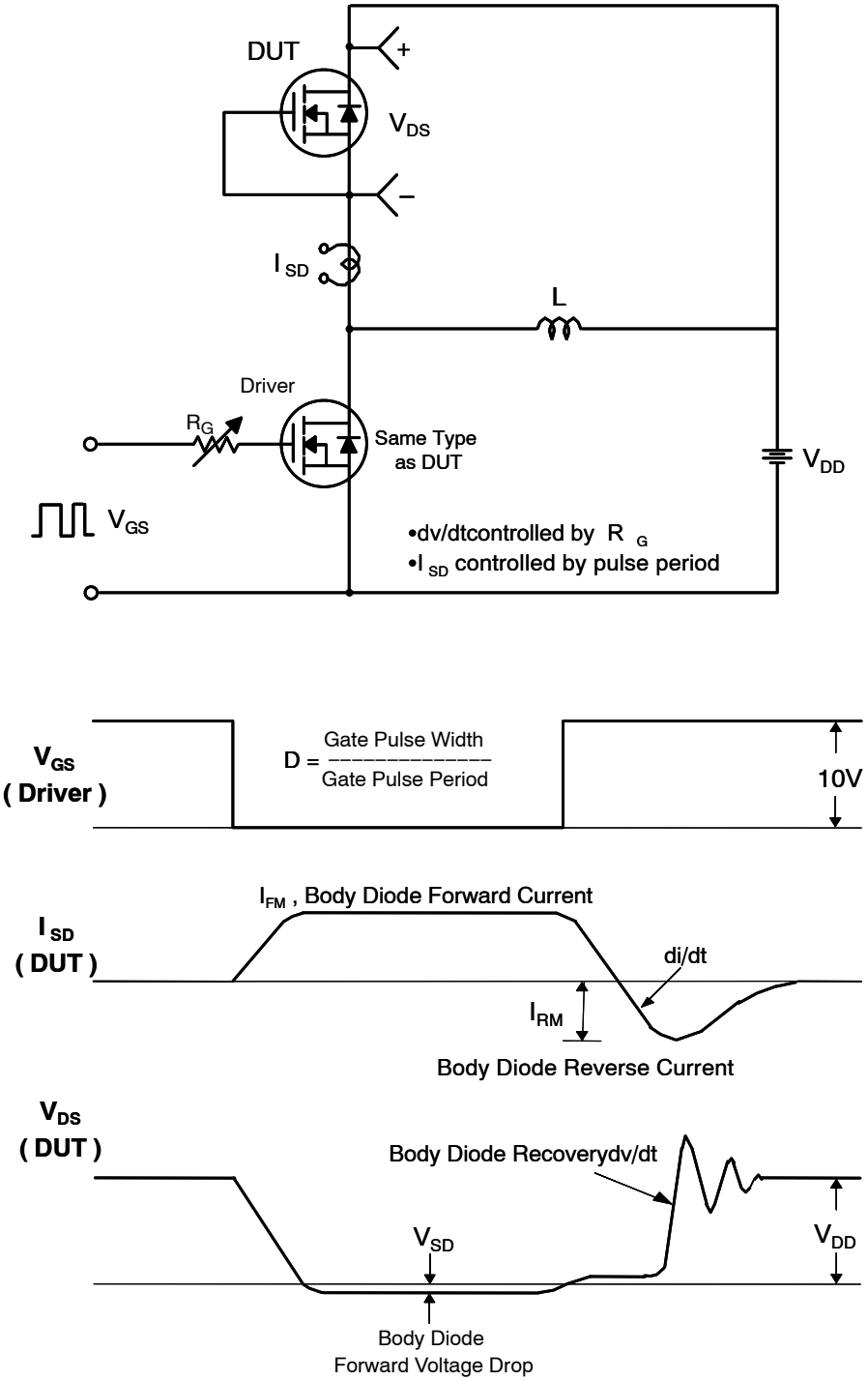
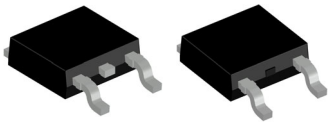
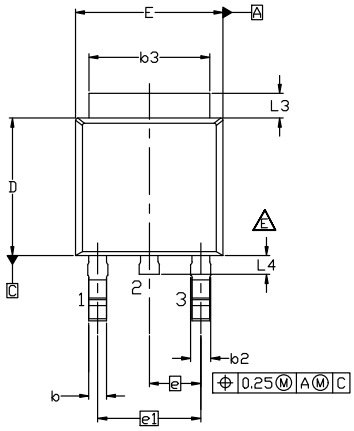



**Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms**

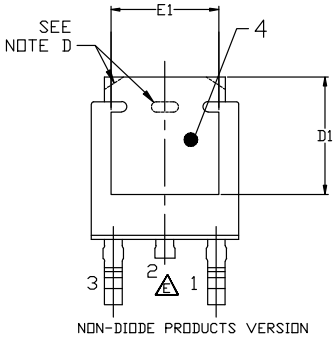


**DPAK3 6.10x6.54x2.29, 4.57P**
CASE 369AS
ISSUE B

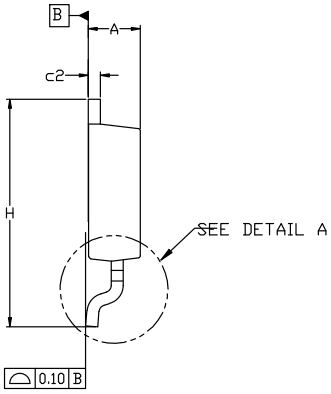
DATE 20 DEC 2023



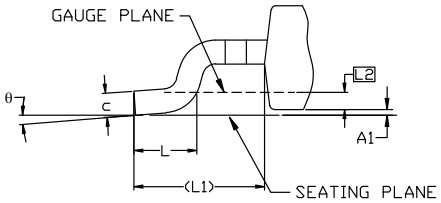

NON-DIODE PRODUCTS VERSION




NON-DIODE PRODUCTS VERSION

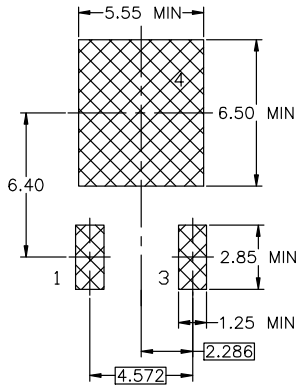



NOTES: UNLESS OTHERWISE SPECIFIED
A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE F, VARIATION AA.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2018.
D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED CORNERS OR EDGE PROTRUSION.
E) FOR DIODE PRODUCTS, L4 IS 0.25 MM MAX PLASTIC BODY STUB WITHOUT CENTER LEAD.
F) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TO228P991X239-3N.




DETAIL A
(ROTATED -90°)
SCALE: 12X

| DIM | MILLIMETERS | | |
|---|---|---|---|
| | MIN. | NOM. | MAX. |
| A | 2.18 | 2.29 | 2.39 |
| A1 | 0.00 | – | 0.127 |
| b | 0.64 | 0.77 | 0.89 |
| b2 | 0.76 | 0.95 | 1.14 |
| b3 | 5.21 | 5.34 | 5.46 |
| c | 0.45 | 0.53 | 0.61 |
| c2 | 0.45 | 0.52 | 0.58 |
| D | 5.97 | 6.10 | 6.22 |
| D1 | 5.21 | --- | --- |
| E | 6.35 | 6.54 | 6.73 |
| E1 | 4.32 | --- | --- |
| e | 2.286 BSC | | |
| e1 | 4.572 BSC | | |
| H | 9.40 | 9.91 | 10.41 |
| L | 1.40 | 1.59 | 1.78 |
| L1 | 2.90 REF | | |
| L2 | 0.51 BSC | | |
| L3 | 0.89 | 1.08 | 1.27 |
| L4 | --- | --- | 1.02 |
| θ | 0° | --- | 10° |




LAND PATTERN RECOMMENDATION

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

**GENERIC MARKING DIAGRAM***




*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code

| | | |
|---|---|---|
| **DOCUMENT NUMBER:** | **98AON13810G** | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red. |
| **DESCRIPTION:** | **DPAK3 6.10x6.54x2.29, 4.57P** | **PAGE 1 OF 1** |

**onsemi** and onsemi are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.

**onsemi**, , and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as−is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

**TECHNICAL PUBLICATIONS**:
**Technical Library:** www.onsemi.com/design/resources/technical−documentation
**onsemi Website:** www.onsemi.com

**ONLINE SUPPORT**: www.onsemi.com/support
**For additional information, please contact your local Sales Representative at** www.onsemi.com/support/sales

ENTEGRECİ

Bu belge www.entegreci.com üzerinden sunulmaktadır.

# 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.