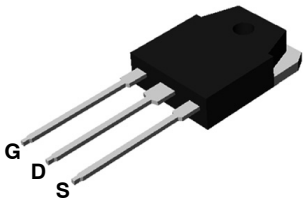
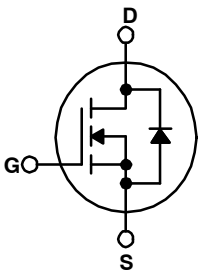
MOSFET – N-Channel, QFET

600 V, 23.5 A, 240 mΩ

FQA24N60



TO−3P−3L
CASE 340BZ



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, active power factor correction (PFC), and electronic lamp ballasts.

Features

- 23.5 A, 600 V, $R_{DS(on)}$ = 240 mΩ (Max.) @ V_{GS} = 10 V, I_D = 11.8 A
- Low Gate Charge (Typ. 110 nC)
- Low C_{rss} (Typ. 56 pF)
- 100% Avalanche Tested
- This Device is Pb−Free

ABSOLUTE MAXIMUM RATINGS

(T_C = 25°C unless otherwise noted.)

Symbol	Parameter	Value	Unit
V_{DSS}	Drain to Source Voltage	600	V
I_D	Drain Current – Continuous (T_C = 25°C) – Continuous (T_C = 100°C)	 23.5 14.9	A
I_{DM}	Drain Current – Pulsed (Note 1)	94	A
V_{GSS}	Gate to Source Voltage	±30	V
E_{AS}	Single Pulse Avalanche Energy (Note 2)	1300	mJ
I_{AR}	Avalanche Current (Note 1)	23.5	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	31	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5	V/ns
P_D	Power Dissipation – (T_C = 25°C) – Derate Above 25°C	 310 2.5	 W 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.

MARKING DIAGRAM



FQA24N60	= Specific Device Code
A	= Assembly Location
YWW	= Date Code (Year & Week)
ZZ	= Assembly Lot

ORDERING INFORMATION

Device	Package	Shipping†
FQA24N60	TO−3P−3L (Pb−Free)	450 Units / Tube

© Semiconductor Components Industries, LLC, 2006

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction−to−Case, Max	0.4	°C/W
$R_{\theta CS}$	Thermal Resistance, Case−to−Sink, Typ.	0.24	
$R_{\theta JA}$	Thermal Resistance, Junction−to−Ambient, Max.	40	

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain−Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	600	–	–	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	–	0.6	–	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600 V, V_{GS} = 0 V	–	–	10	μA
		V_{DS} = 480 V, T_C = 125°C	–	–	100	μA
I_{GSSF}	Gate−Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	–	–	100	nA
I_{GSSR}	Gate−Body Leakage Current, Reverse	V_{GS} = −30 V, V_{DS} = 0 V	–	–	−100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	3.0	–	5.0	V
$R_{DS(on)}$	Static Drain−Source On−Resistance	V_{GS} = 10 V, I_D = 11.8 A	–	0.18	0.24	Ω
g_{FS}	Forward Transconductance	V_{DS} = 50 V, I_D = 11.8 A	–	22.5	–	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	–	4200	5500	pF
C_{oss}	Output Capacitance		–	550	720	pF
C_{rss}	Reverse Transfer Capacitance		–	56	75	pF
Switching Characteristics						
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = 300 V, I_D = 23.5 A, R_G = 25 Ω (Note 4)	–	90	190	ns
t_r	Turn−On Rise Time		–	270	550	ns
$t_{d(off)}$	Turn−Off Delay Time		–	200	410	ns
t_f	Turn−Off Fall Time		–	170	350	ns
Q_g	Total Gate Charge	V_{DS} = 480 V, I_D = 23.5 A, V_{GS} = 10 V (Note 4)	–	110	145	nC
Q_{gs}	Gate−Source Charge		–	25	–	nC
Q_{gd}	Gate−Drain Charge		–	53	–	nC
Drain−Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain−Source Diode Forward Current		–	–	23.5	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		–	–	94	A
V_{SD}	Drain−Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 23.5 A	–	–	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 23.5 A, dI_F/dt = 100 A/μs	–	470	–	ns
Q_{rr}	Reverse Recovery Charge		–	6.2	–	μC

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 = 4.3 mH, I_{AS} = 23.5 A, V_{DD} = 50 V, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 23.5 A, di/dt ≤ 200 A/μs, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C.
4. Essentially independent of operating temperature.

Share Feedback
Your Opinion Matters

TYPICAL CHARACTERISTICS

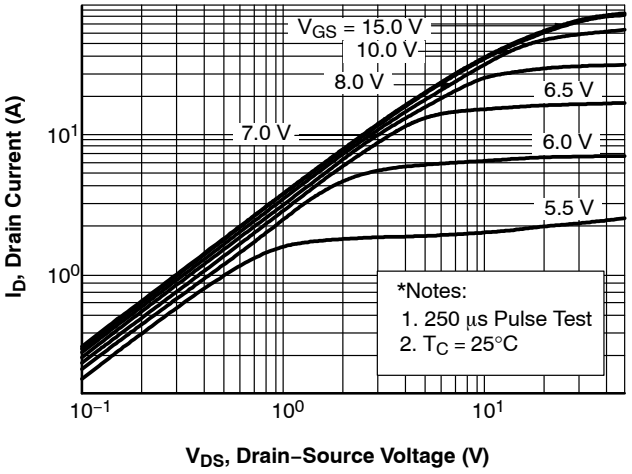


Figure 1. On−Region Characteristics

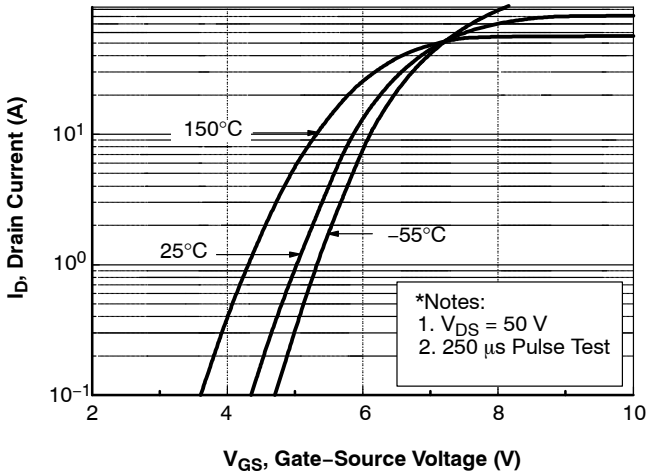


Figure 2. Transfer Characteristics

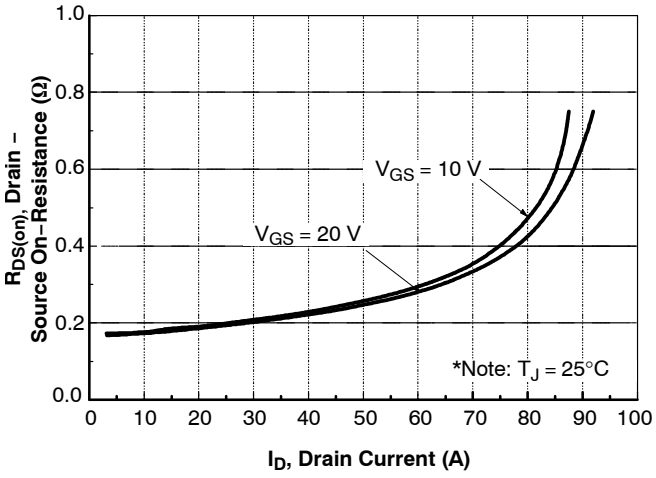


Figure 3. On−Resistance Variation vs Drain Current and Gate Voltage

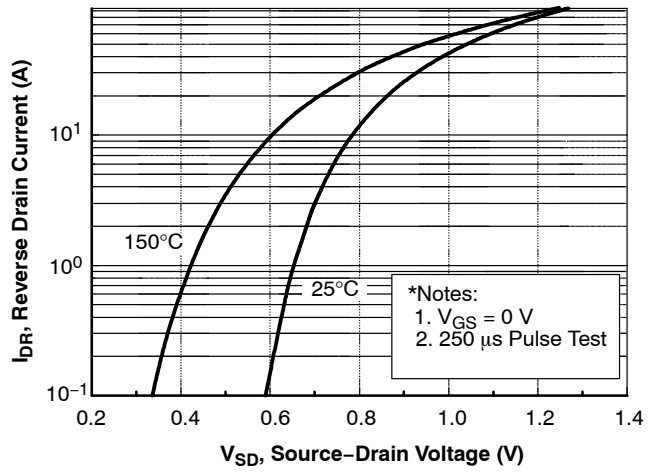


Figure 4. Body Diode Forward Voltage Variation vs Source Current and Temperature

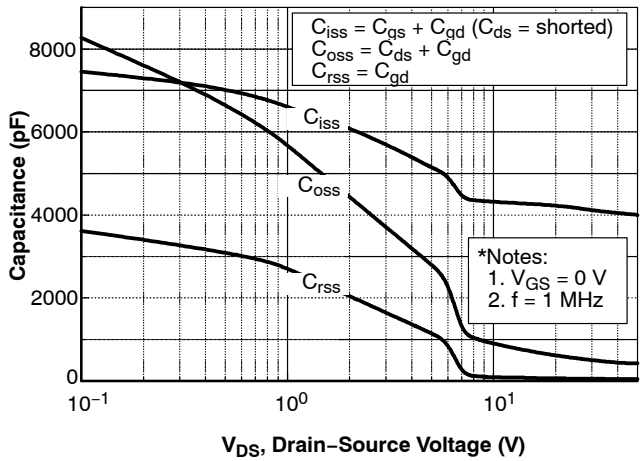


Figure 5. Capacitance Characteristics

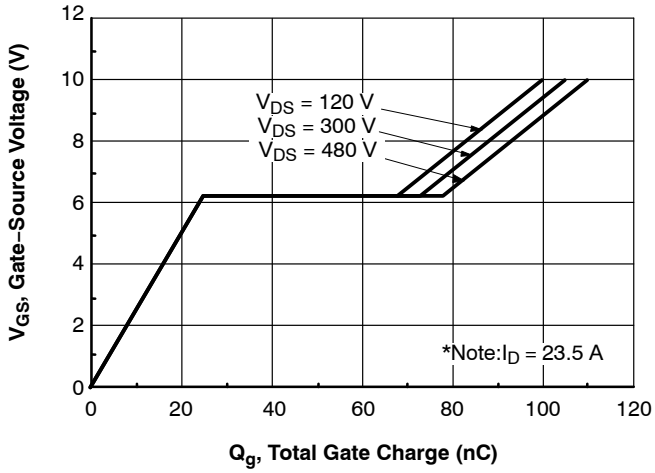


Figure 6. Gate Charge Characteristics

Share Feedback
Your Opinion Matters

TYPICAL CHARACTERISTICS (CONTINUED)

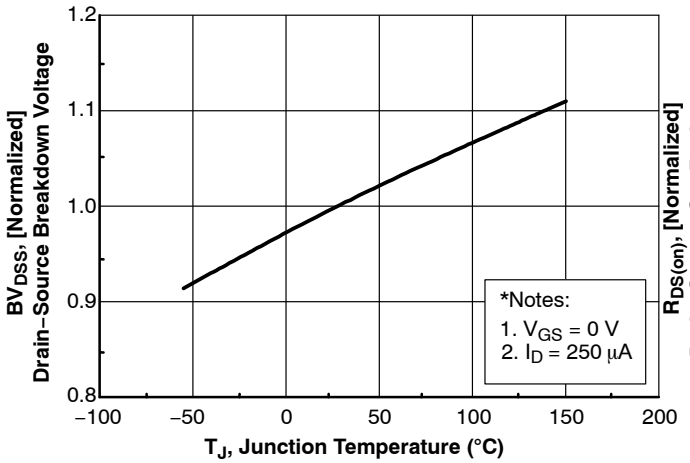


Figure 7. Breakdown Voltage Variation vs Temperature

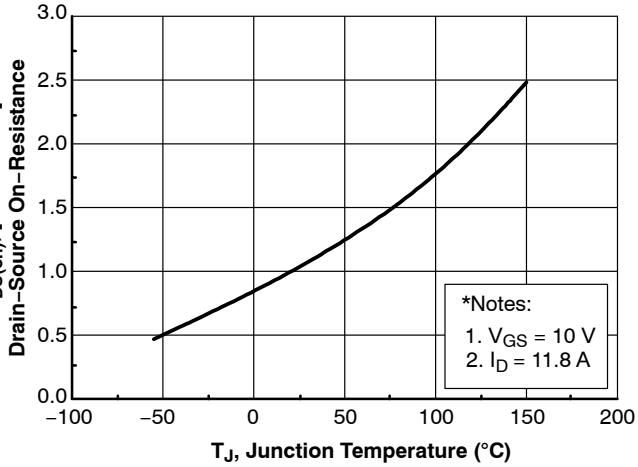


Figure 8. On−Resistance Variation vs Temperature

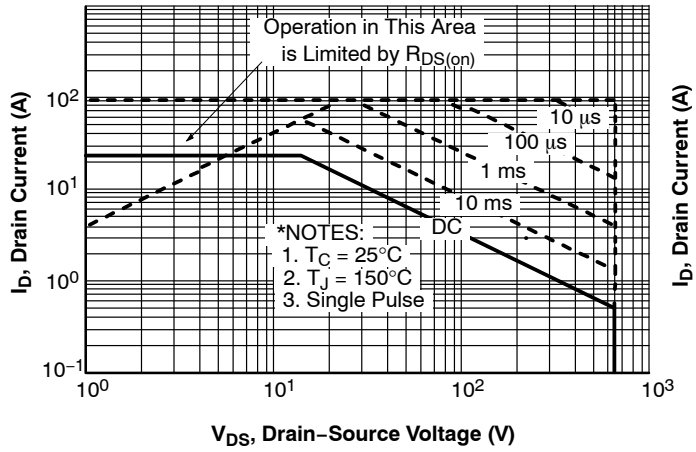


Figure 9. Maximum Safe Operating Area

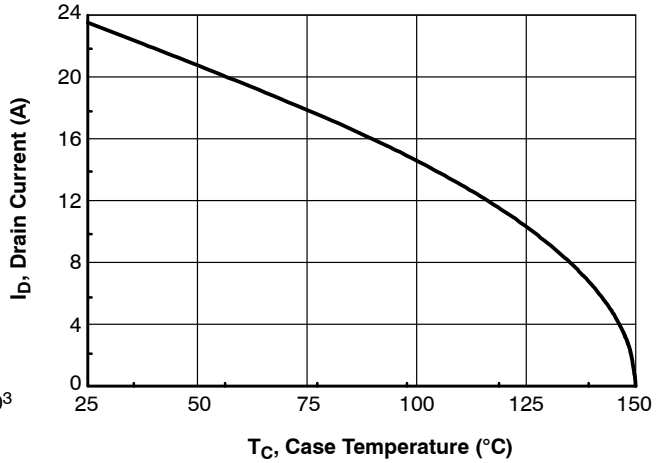


Figure 10. Maximum Drain Current vs. Case Temperature

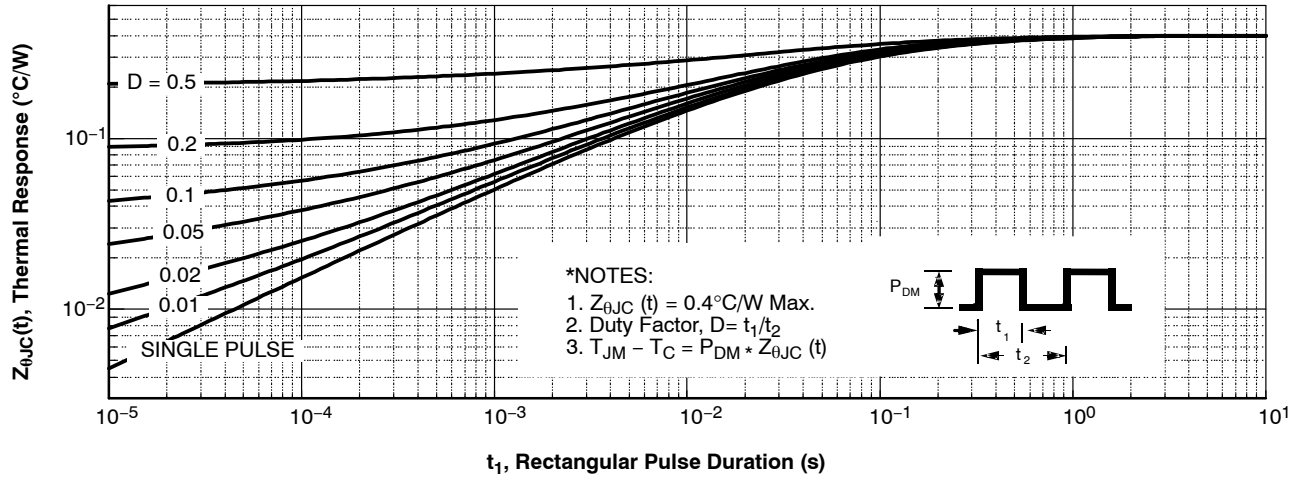


Figure 11. Transient Thermal Response Curve

Share Feedback
Your Opinion Matters

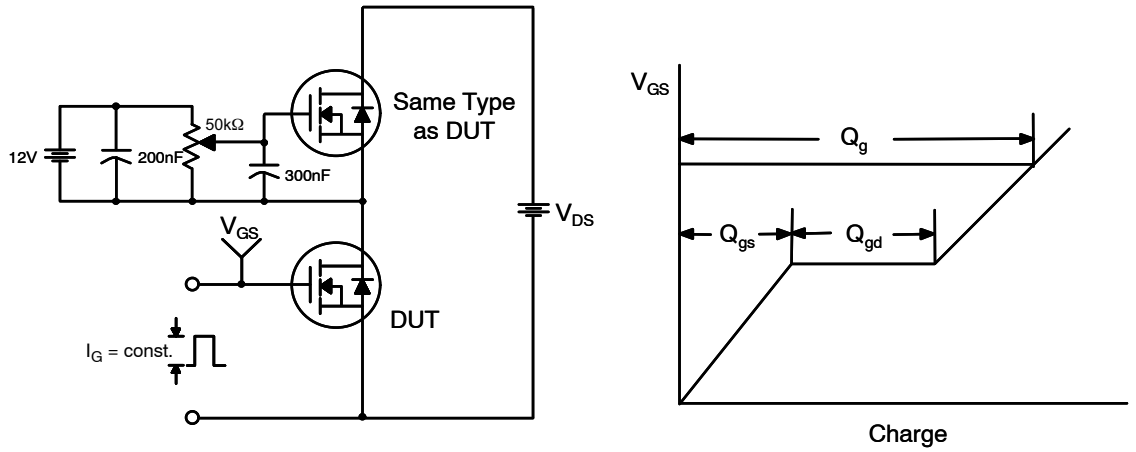


Figure 12. Gate Charge Test Circuit & Waveform

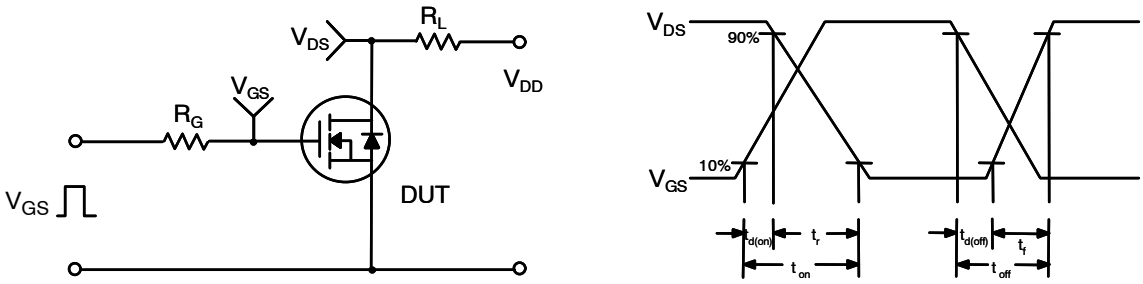


Figure 13. Resistive Switching Test Circuit & Waveforms

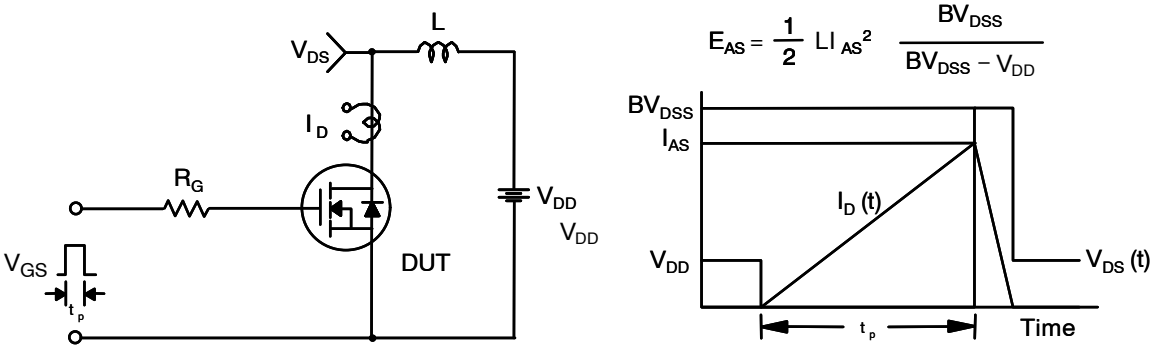


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

Share Feedback
Your Opinion Matters

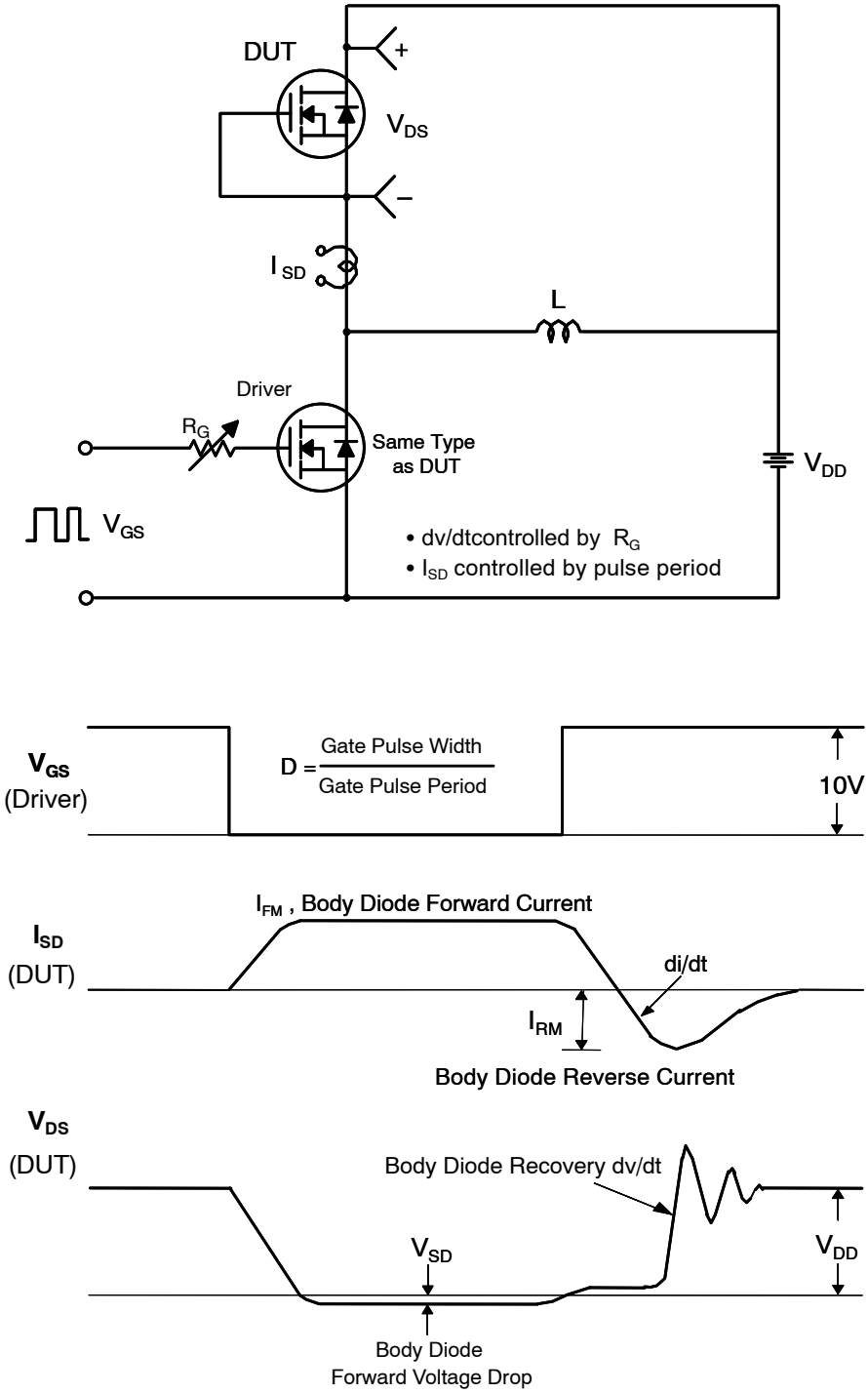
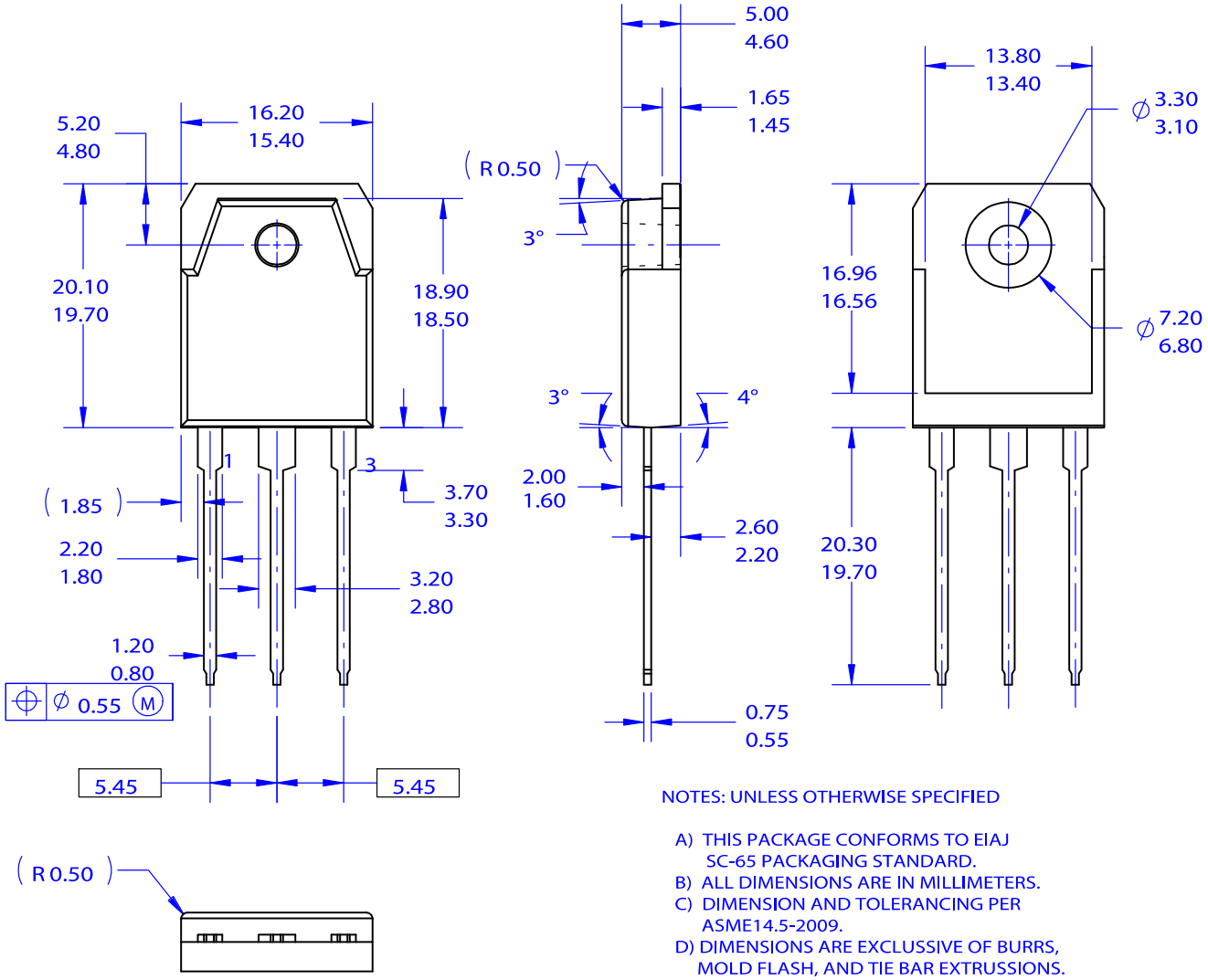


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Share Feedback
Your Opinion Matters

TO−3P−3LD / EIAJ SC−65, ISOLATED
CASE 340BZ
ISSUE O

DATE 31 OCT 2016



NOTES: UNLESS OTHERWISE SPECIFIED

A) THIS PACKAGE CONFORMS TO EIAJ SC-65 PACKAGING STANDARD.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSION AND TOLERANCING PER ASME14.5-2009.
D) DIMENSIONS ARE EXCLUSSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSSIONS.

DOCUMENT NUMBER:	**98AON13862G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.	
DESCRIPTION:	**TO−3P−3LD / EIAJ SC−65, ISOLATED**		**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.