

# FQH8N100C

## N-Channel QFET® MOSFET

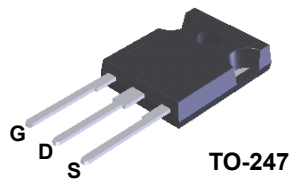
1000 V, 8.0 A, 1.45 Ω

### Description

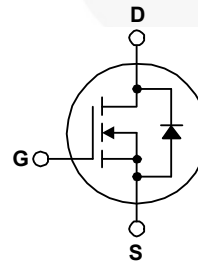
This N-Channel enhancement mode power MOSFET is produced using Fairchild Semiconductor's proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, active power factor correction (PFC), and electronic lamp ballasts.

### Features

- 8 A, 1000 V,  $R_{DS(on)} = 1.45 \Omega$  (Max.) @  $V_{GS} = 10 \text{ V}$
- Low Gate Charge (Typ. 53 nC)
- Low Crss (Typ. 16 pF)
- Fast Switching
- 100% Avalanche Tested
- Improved dv/dt Capability
- RoHS Compliant



TO-247



### Absolute Maximum Ratings T<sub>C</sub> = 25°C unless otherwise noted.

Symbol	Parameter	FQH8N100C	Unit
	Drain-Source Voltage	1000	V
I <sub>D</sub>	Drain Current - Continuous (T <sub>C</sub> = 25°C) - Continuous (T <sub>C</sub> = 100°C)	8.0	A
		5.0	A
I <sub>DM</sub>	Drain Current - Pulsed (Note 1)	32	A
V <sub>GSS</sub>	Gate-Source Voltage	± 30	V
E <sub>AS</sub>	Single Pulsed Avalanche Energy (Note 2)	850	mJ
I <sub>AR</sub>	Avalanche Current (Note 1)	8.0	A
E <sub>AR</sub>	Repetitive Avalanche Energy (Note 1)	22	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.0	V/ns
P <sub>D</sub>	Power Dissipation (T <sub>C</sub> = 25°C)	225	W
	- Derate above 25°C	1.79	W/°C
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range	-55 to +150	°C
T <sub>L</sub>	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds.	300	°C

### Thermal Characteristics

Symbol	Parameter	FQH8N100C	Unit
R <sub>θJC</sub>	Thermal Resistance, Junction to Case, Max.	0.56	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient, Max.	40	

## Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FQH8N100C	FQH8N100C	TO-247	Tube	N/A	N/A	30 units

## Electrical Characteristics T<sub>C</sub> = 25°C unless otherwise noted.

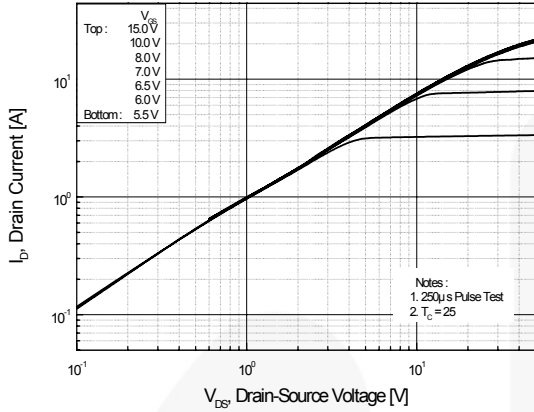
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
<b>Off Characteristics</b>							
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	1000	--	--	V	
ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25°C	--	1.4	--	V/°C	
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 1000 V, V <sub>GS</sub> = 0 V	--	--	10	μA	
		V <sub>DS</sub> = 800 V, T <sub>C</sub> = 125°C	--	--	100	μA	
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	V <sub>GS</sub> = 30 V, V <sub>DS</sub> = 0 V	--	--	100	nA	
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	V <sub>GS</sub> = -30 V, V <sub>DS</sub> = 0 V	--	--	-100	nA	
<b>On Characteristics</b>							
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	3.0	--	5.0	V	
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 4.0A	--	1.2	1.45	Ω	
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 50 V, I <sub>D</sub> = 4.0 A	--	8.0	--	S	
<b>Dynamic Characteristics</b>							
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz	--	2475	3220	pF	
C <sub>oss</sub>	Output Capacitance		--	195	255	pF	
C <sub>rss</sub>	Reverse Transfer Capacitance		--	16	21	pF	
<b>Switching Characteristics</b>							
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = 500 V, I <sub>D</sub> = 8.0A, R <sub>G</sub> = 25 Ω	--	50	110	ns	
t <sub>r</sub>	Turn-On Rise Time		--	95	200	ns	
t <sub>d(off)</sub>	Turn-Off Delay Time		(Note 4)	--	122	254	ns
t <sub>f</sub>	Turn-Off Fall Time		(Note 4)	--	80	170	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 800 V, I <sub>D</sub> = 8.0A, V <sub>GS</sub> = 10 V	--	53	70	nC	
Q <sub>gs</sub>	Gate-Source Charge		(Note 4)	--	13	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		(Note 4)	--	23	--	nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>							
I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current		--	--	8.0	A	
I <sub>SM</sub>	Maximum Pulsed Drain-Source Diode Forward Current		--	--	32.0	A	
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 8.0 A	--	--	1.4	V	
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 8.0 A, dI <sub>F</sub> / dt = 100 A/μs	--	620	--	ns	
Q <sub>rr</sub>	Reverse Recovery Charge		--	5.2	--	μC	

### Notes:

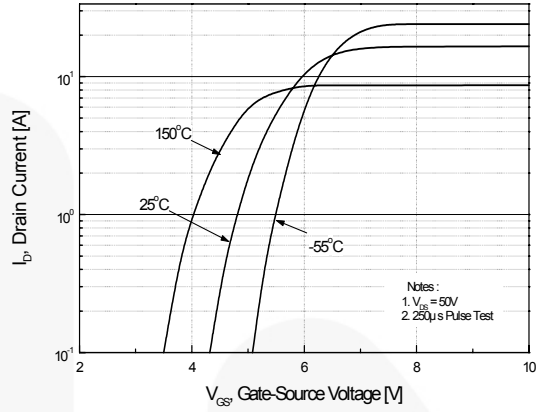
1. Repetitive rating : pulse-width limited by maximum junction temperature.
2. L = 25 mH, I<sub>AS</sub> = 8.0 A, V<sub>DD</sub> = 50 V, R<sub>G</sub> = 25 Ω, starting T<sub>J</sub> = 25°C.
3. I<sub>SD</sub> ≤ 8.0 A, di/dt ≤ 200 A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub> = 25°C.
4. Essentially independent of operating temperature.

## Typical Performance Characteristics

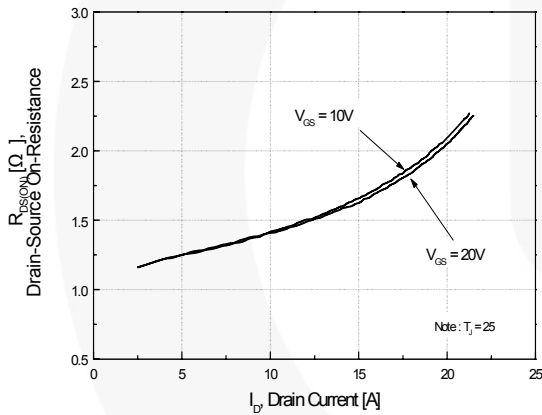
**Figure 1. On-Region Characteristics**



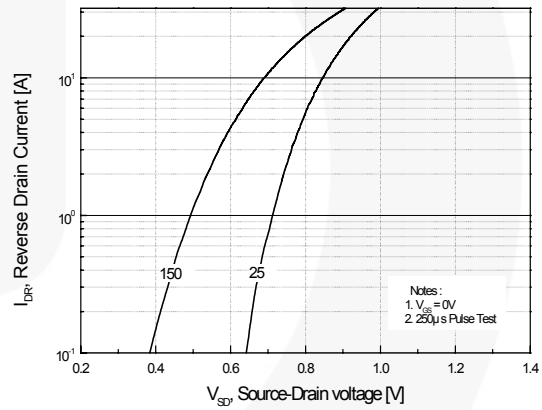
**Figure 2. Transfer Characteristics**



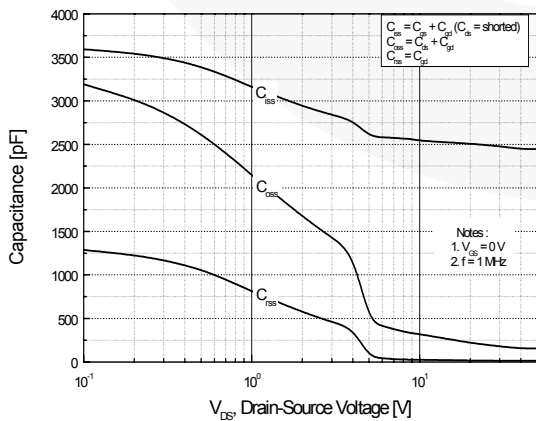
**Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage**



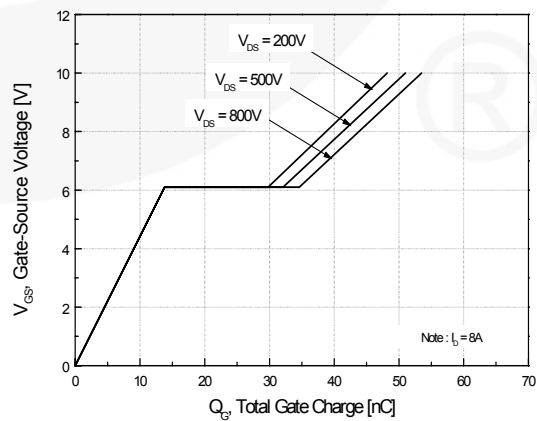
**Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature**



**Figure 5. Capacitance Characteristics**

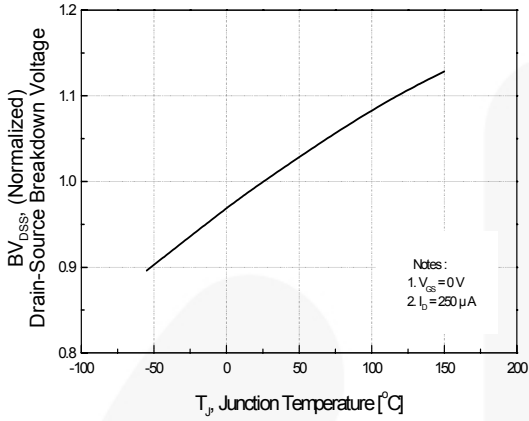


**Figure 6. Gate Charge Characteristics**

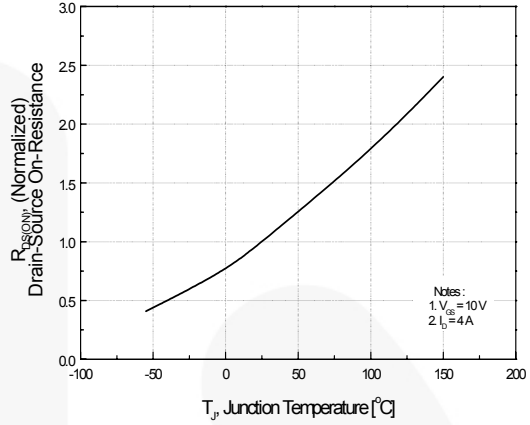


**Typical Performance Characteristics** (Continued)

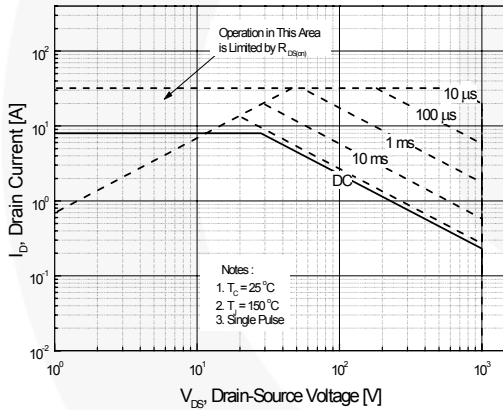
**Figure 7. Breakdown Voltage Variation vs. Temperature**



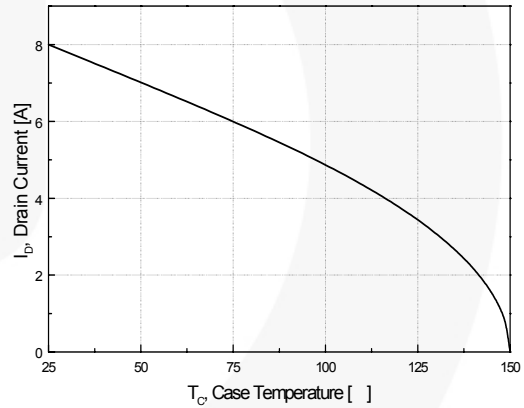
**Figure 8. On-Resistance Variation vs. Temperature**



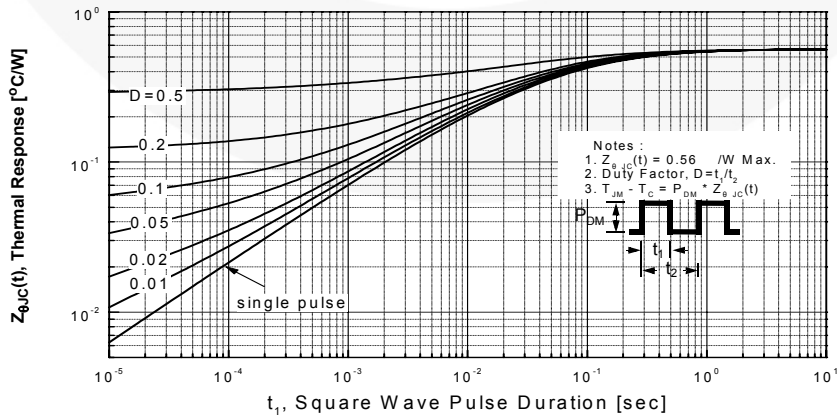
**Figure 9. Maximum Safe Operating Area**



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



**Figure 11. Transient Thermal Response Curve**



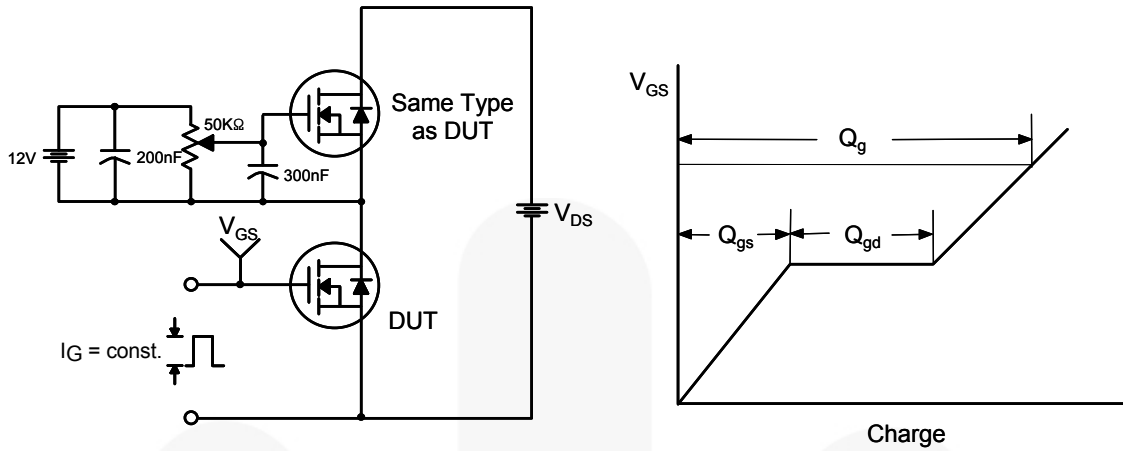


Figure 12. Gate Charge Test Circuit & Waveform

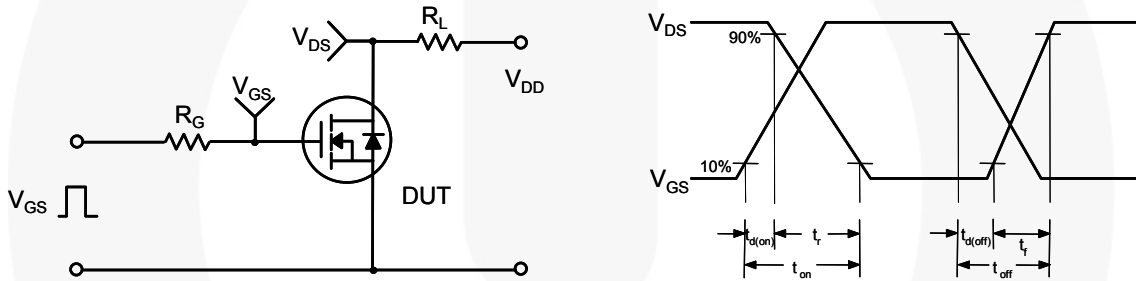


Figure 13. Resistive Switching Test Circuit & Waveforms

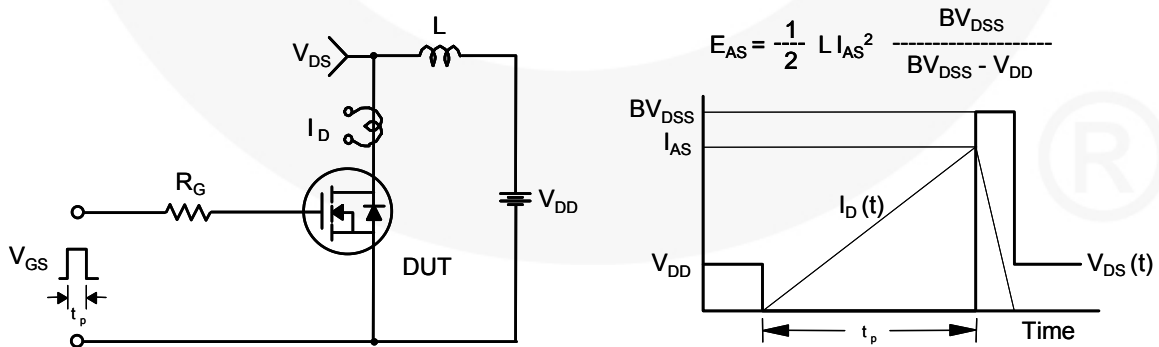


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

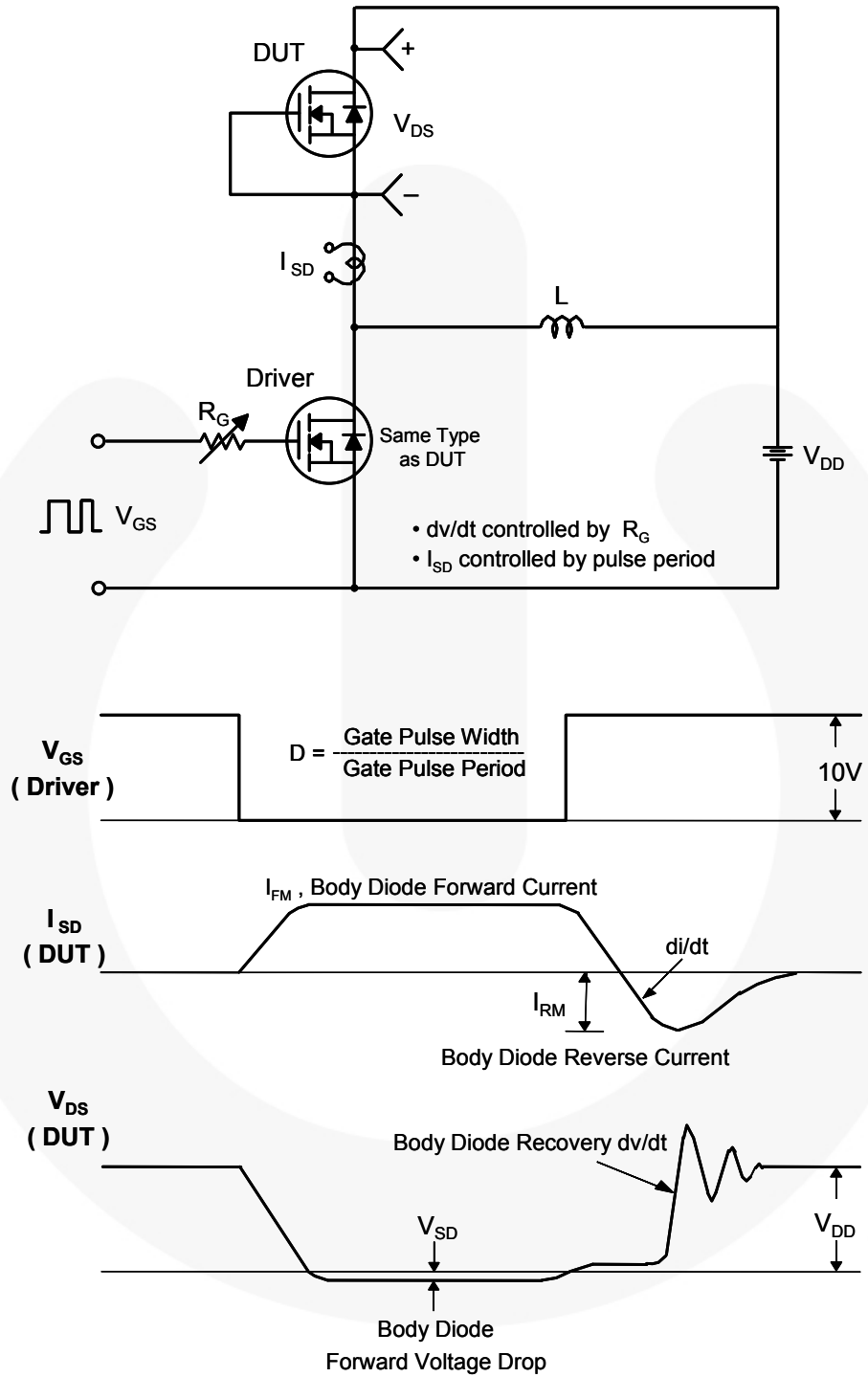
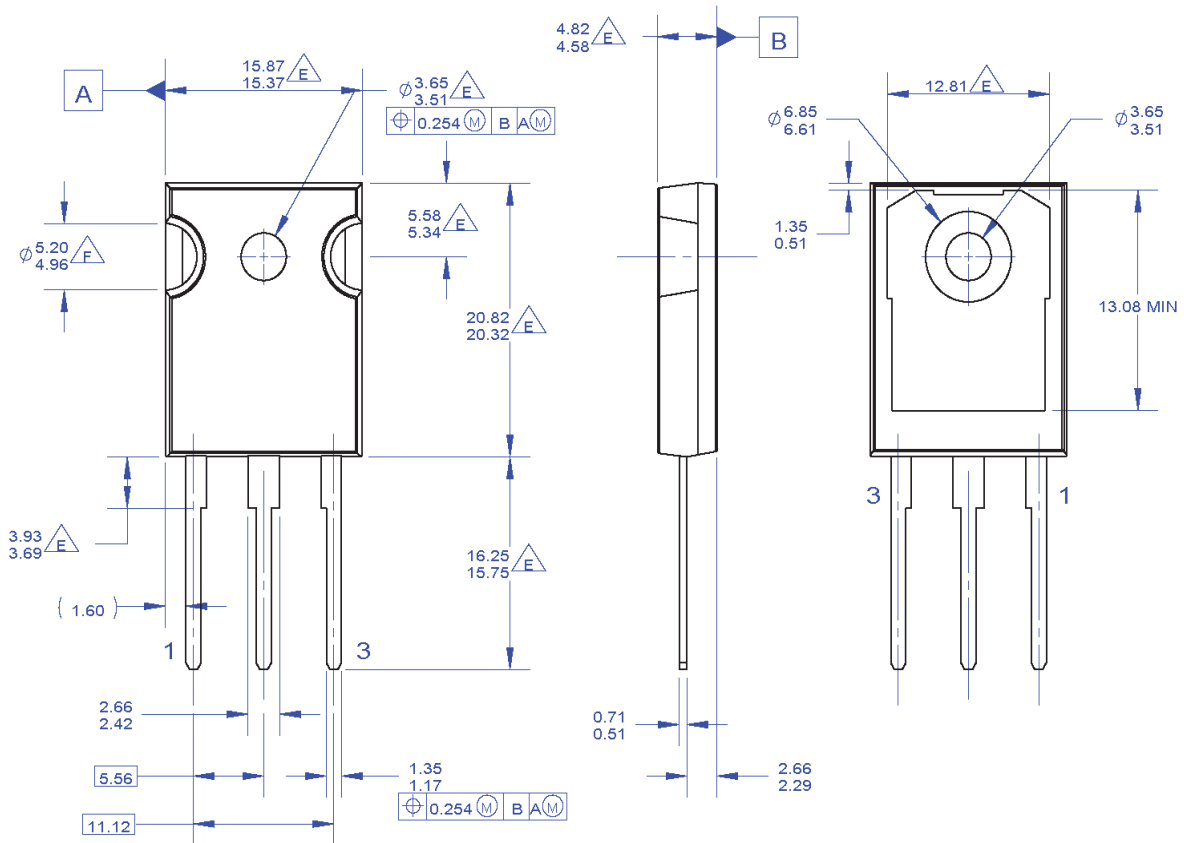


Figure 15. Peak Diode Recovery  $dv/dt$  Test Circuit & Waveforms

## Mechanical Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED.

- A. PACKAGE REFERENCE: JEDEC TO-247, ISSUE E, VARIATION AB, DATED JUNE, 2004.
- B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- C. ALL DIMENSIONS ARE IN MILLIMETERS.
- D. DRAWING CONFORMS TO ASME Y14.5 - 1994

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NOTCH MAY BE SQUARE

G. DRAWING FILENAME: MKT-TO247A03\_REV03

**Figure 16. TO-247, Molded, 3-Lead, Jedec Variation AB**

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| AX-CAP®*                 | FRFET®  | <b>SYSTEM GENERAL</b> ®* |
| BitSiC™                  | Global Power Resource <sup>SM</sup>             | TinyBoost®               |
| Build it Now™            | GreenBridge™                                    | TinyBuck®                |
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| CorePOWER™               | Green FPS™ e-Series™                            | TinyLogic®               |
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| FACT®                    | mWSaver®  | VCX™                     |
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| FastvCore™               | OPTOLOGIC®                                      | VoltagePlus™             |
| FETBench™                | OPTOPLANAR®                                     | XS™                      |
| FPS™                     |   |                          |
|                          | PowerTrench®                                    |                          |
|                          | PowerXS™  |                          |
|                          | Programmable Active Droop™                      |                          |
|                          | QFET®   |                          |
|                          | QS™   |                          |
|                          | Quiet Series™                                   |                          |
|                          | RapidConfigure™                                 |                          |
|                          | Saving our world, 1mW/W/kW at a time™           |                          |
|                          | SignalWise™                                     |                          |
|                          | SmartMax™                                       |                          |
|                          | SMART START™                                    |                          |
|                          | Solutions for Your Success™                     |                          |
|                          | SPM®  |                          |
|                          | STEALTH™  |                          |
|                          | SuperFET®                                       |                          |
|                          | SuperSOT™-3                                     |                          |
|                          | SuperSOT™-6                                     |                          |
|                          | SuperSOT™-8                                     |                          |
|                          | SupreMOS®                                       |                          |
|                          | SyncFET™  |                          |

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