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FDH210N08

N-Channel UniFET™ MOSFET

75 V, 210 A, 5.5 mΩ

Features

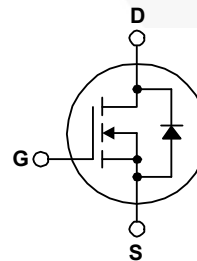
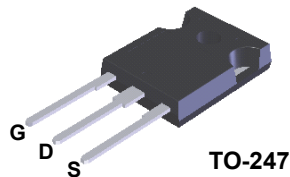
- $R_{DS(on)} = 4.65 \text{ m}\Omega$ (Typ.) @ $V_{GS} = 10 \text{ V}$, $I_D = 125 \text{ A}$
- Low Gate Charge (Typ. 232 nC)
- Low C_{rss} (Typ. 262 pF)
- 100% Avalanche Tested
- Improved dv/dt Capability

Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies

Description

UniFET™ MOSFET is Fairchild Semiconductor's high voltage MOSFET family based on planar stripe and DMOS technology. This MOSFET is tailored to reduce on-state resistance, and to provide better switching performance and higher avalanche energy strength. This device family is suitable for switching power converter applications such as power factor correction (PFC), flat panel display (FPD) TV power, ATX and electronic lamp ballasts.



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	FDH210N08	Unit
V_{DSS}	Drain-Source Voltage	75	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$)	210	A
		132	A
I_{DM}	Drain Current - Pulsed (Note 1)	840	A
V_{GSS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	9375	mJ
I_{AR}	Avalanche Current (Note 1)	210	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	46.2	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5	V/ns
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	462	W
	- Derate Above 25°C	3.7	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds	300	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	FDH210N08	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	0.27	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	40	$^\circ\text{C}/\text{W}$

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FDH210N08	FDH210N08	TO-247	Tube	N/A	N/A	30 units

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	75	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C	--	0.1	--	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 75\text{ V}, V_{GS} = 0\text{ V}$	--	--	20	μA
		$V_{DS} = 60\text{ V}, T_J = 150^\circ\text{C}$	--	--	250	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$	--	--	200	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$	--	--	-200	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 125\text{ A}$	--	4.65	5.5	m Ω
g_{FS}	Forward Transconductance	$V_{DS} = 25\text{ V}, I_D = 125\text{ A}$	--	200	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	8743	11340	pF
C_{oss}	Output Capacitance		--	2134	2778	pF
C_{rss}	Reverse Transfer Capacitance		--	262	393	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 37.5\text{ V}, I_D = 69\text{ A},$ $R_G = 25\ \Omega$	--	100	210	ns
t_r	Turn-On Rise Time		--	410	830	ns
$t_{d(off)}$	Turn-Off Delay Time		--	630	1270	ns
t_f	Turn-Off Fall Time		(Note 4)	--	290	590
Q_g	Total Gate Charge	$V_{DS} = 60\text{ V}, I_D = 125\text{ A},$ $V_{GS} = 10\text{ V}$	--	232	301	nC
Q_{gs}	Gate-Source Charge		--	58	--	nC
Q_{gd}	Gate-Drain Charge		(Note 4)	--	77	--
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	210	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	840	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 125\text{ A}$	--	--	1.4	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 125\text{ A},$ $di_F / dt = 100\text{ A}/\mu\text{s}$	--	123	--	ns
Q_{rr}	Reverse Recovery Charge		--	420	--	nC

Notes:

1. Repetitive rating: pulse-width limited by maximum junction temperature.
2. $L = 0.4\text{ mH}, I_{AS} = 125\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\ \Omega$, starting $T_J = 25^\circ\text{C}$.
3. $I_{SD} \leq 125\text{ A}, di/dt \leq 260\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, starting $T_J = 25^\circ\text{C}$.
4. Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

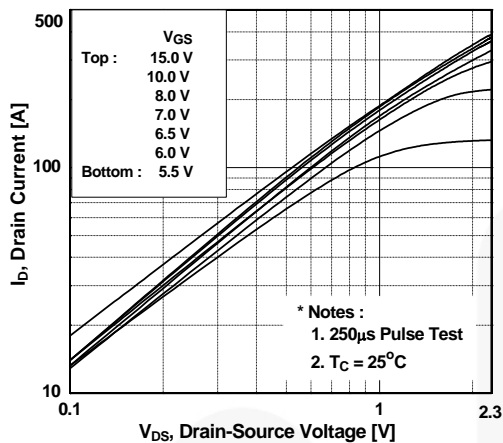


Figure 1. On-Region Characteristics

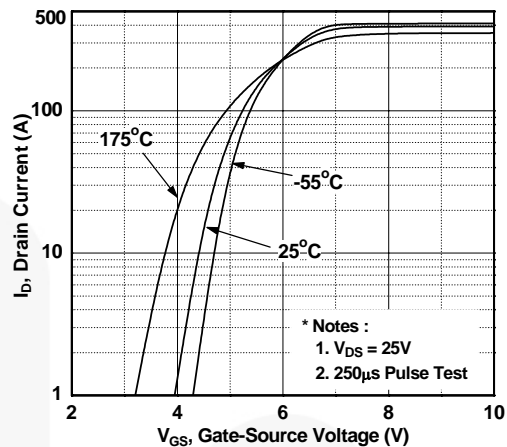


Figure 2. Transfer Characteristics

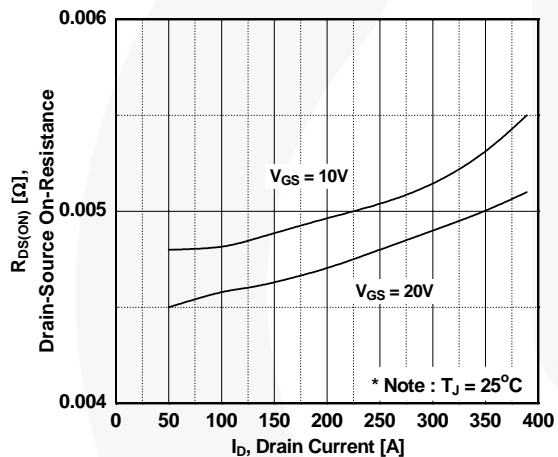


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

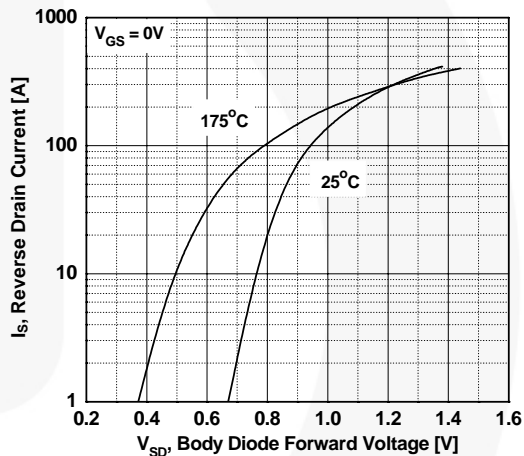


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

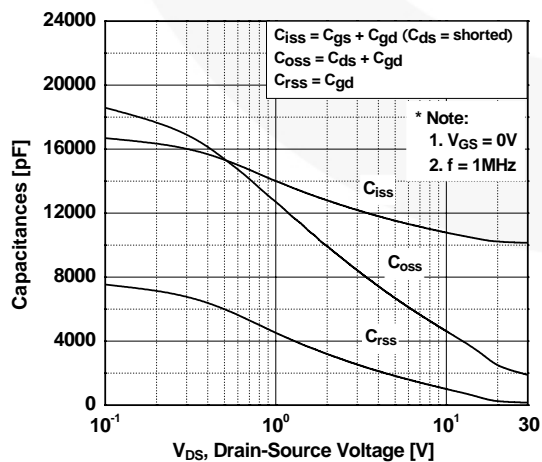


Figure 5. Capacitance Characteristics

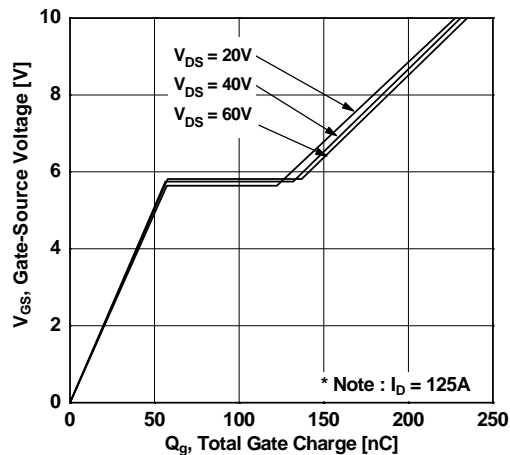


Figure 6. Gate Charge Characteristics

Typical Performance Characteristics (Continued)

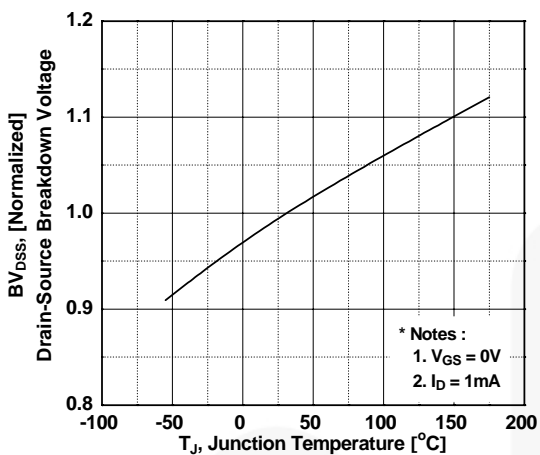


Figure 7. Breakdown Voltage Variation vs. Temperature

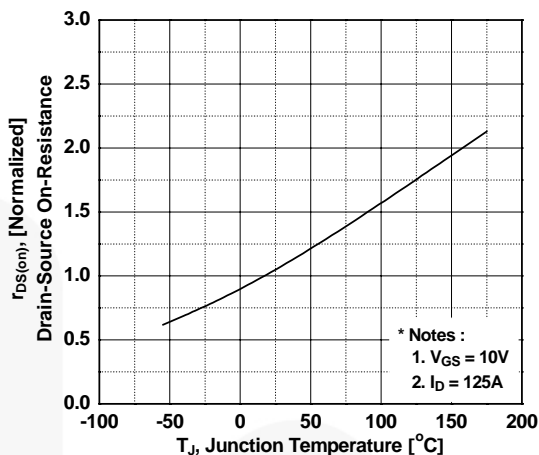


Figure 8. On-Resistance Variation vs. Temperature

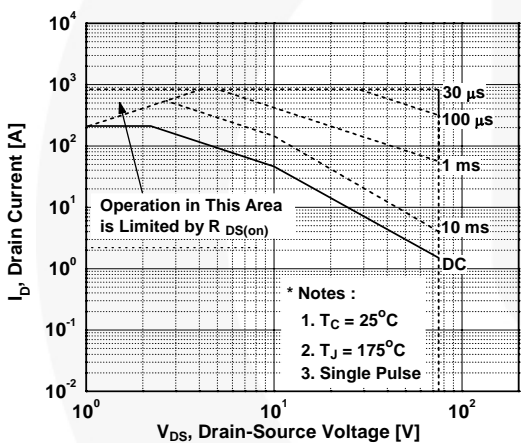


Figure 9. Maximum Safe Operating Area

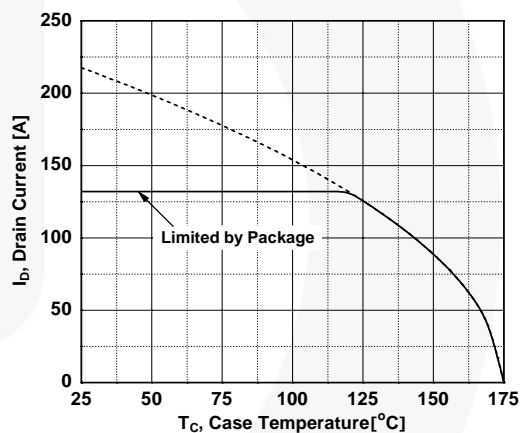


Figure 10. Maximum Drain Current vs. Case Temperature

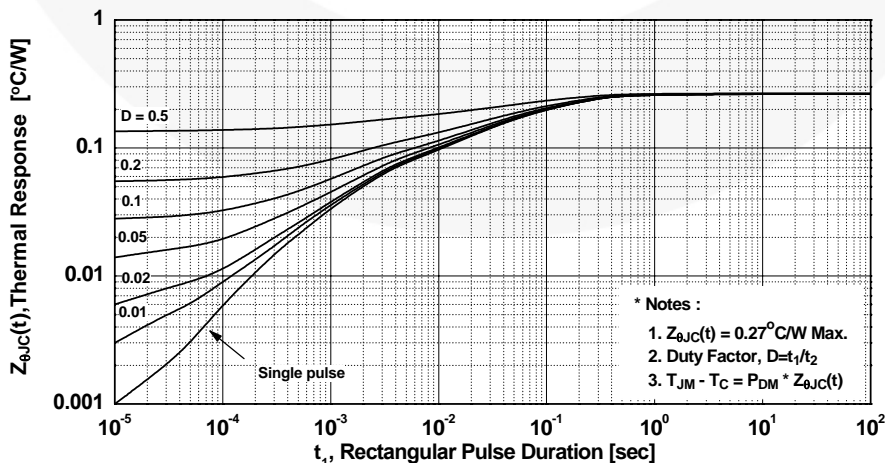


Figure 11. Transient Thermal Response Curve

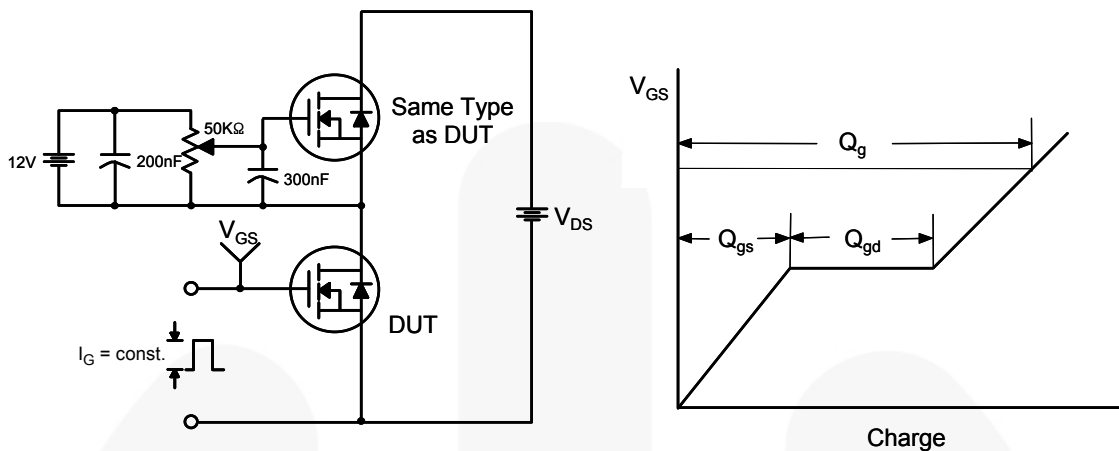


Figure 12. Gate Charge Test Circuit & Waveform

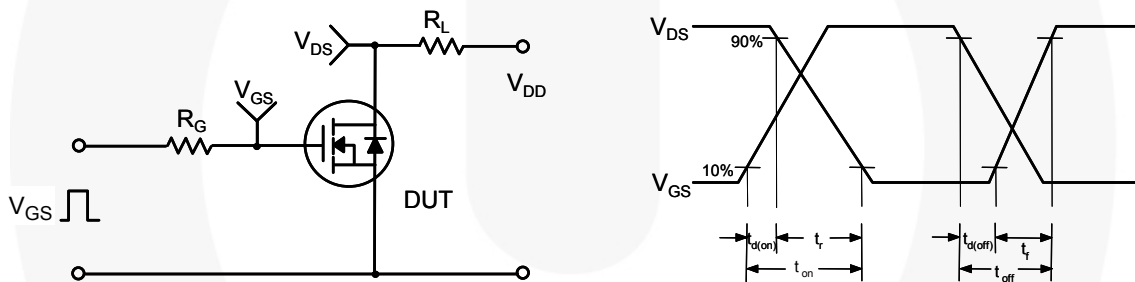


Figure 13. Resistive Switching Test Circuit & Waveforms

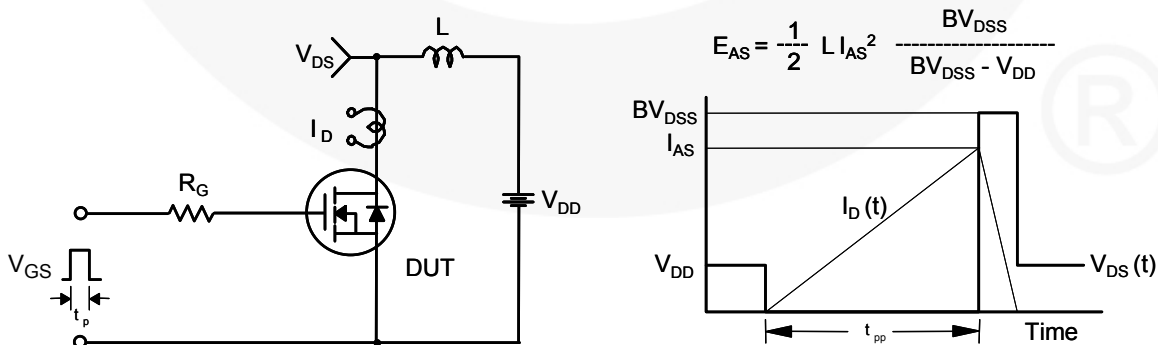


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

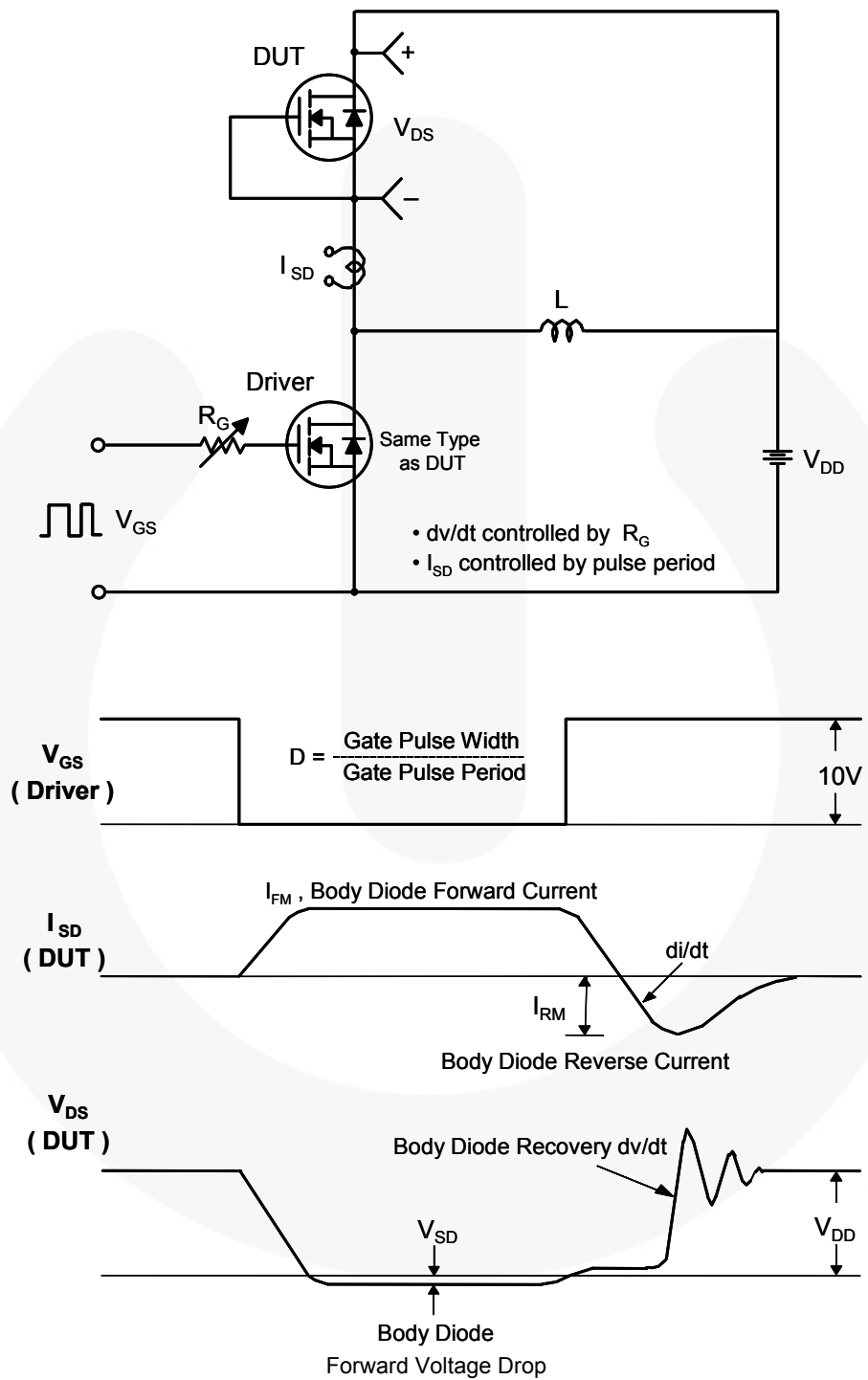
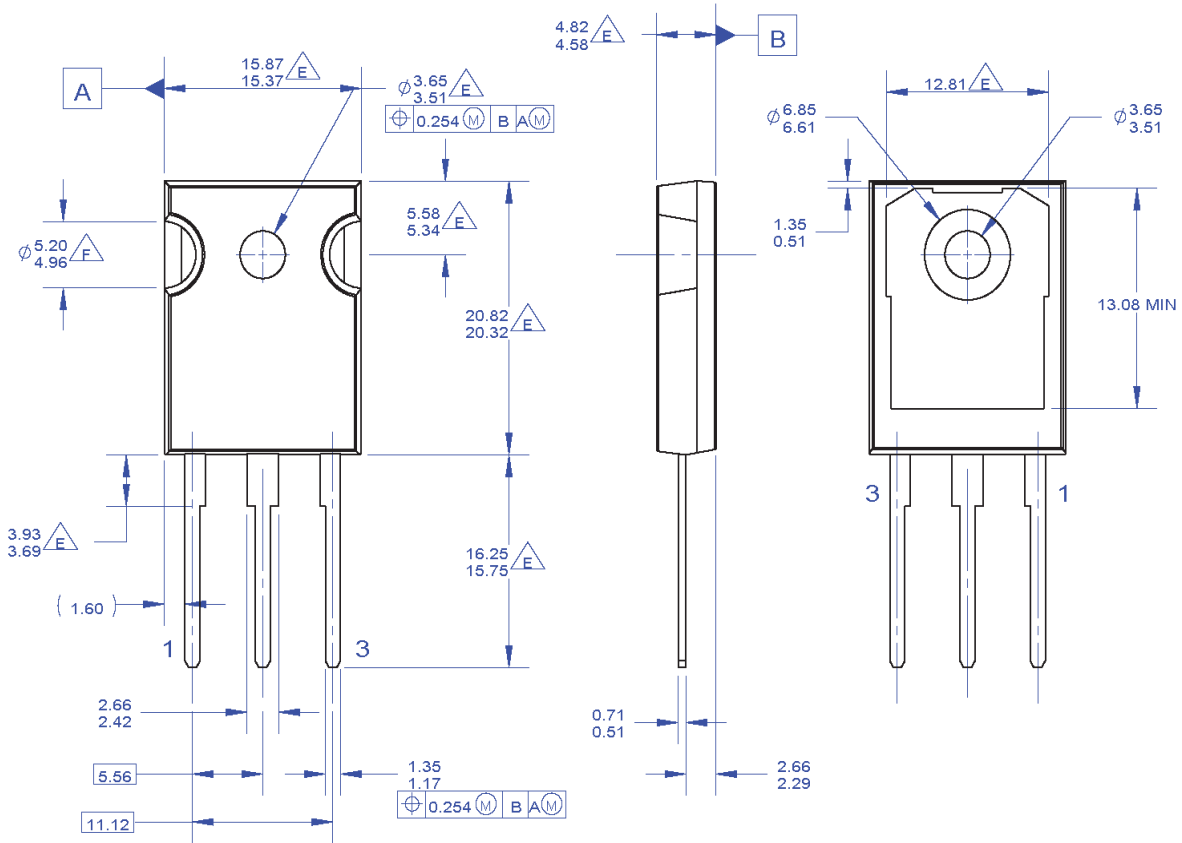


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED.

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G. DRAWING FILENAME: MKT-TO247A03_REV03

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

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