

MOSFET – N-Channel, UniFET™ 75 V, 210 A, 5.5 mΩ

FDH210N08

Description

UniFET™ MOSFET is ON 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.

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
- This Device is Pb-Free and is RoHS Compliant

Applications

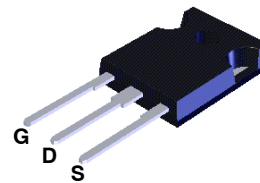
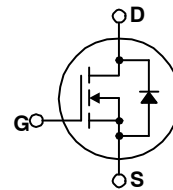
- Synchronous Rectification for ATX / Server / Telecom PSU
- Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies



ON Semiconductor®

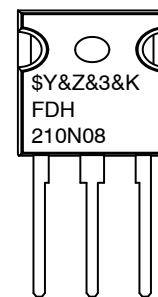
www.onsemi.com

V_{DSS}	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
75 V	5.5 mΩ	210 A



TO-247-3
CASE 340CK

MARKING DIAGRAM



\$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Data Code (Year & Week)
&K	= Lot
FDH210N08	= Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

FDH210N08

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, Unless otherwise noted)

Symbol	Parameter		Value	Unit
V _{DSS}	Drain–Source Voltage		75	V
I _D	Drain Current	Continuous (T _C = 25°C)	210	A
		Continuous (T _C = 100°C)	132	
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°C)	462	W
		Derate Above 25°C	3.7	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

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.

1. Repetitive rating; pulse width limited by maximum junction temperature.
2. L = 0.4 mH, I_{AS} = 125 A, V_{DD} = 50 V, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 125 A, di/dt ≤ 260 A/μs, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C.

THERMAL CHARACTERISTICS

Symbol	Parameter	FDH210N08	Unit
R _{θJC}	Thermal Resistance, Junction to Case, Max.	0.27	°C/W
R _{θJA}	Thermal Resistance, Junction to Ambient, Max.	40	°C/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

FDH210N08

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
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OFF CHARACTERISTICS

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	75			V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C		0.1		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	
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	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	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	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		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	$V_{DD} = 37.5\text{ V}, I_D = 69\text{ A}, R_G = 25\text{ }\Omega$ (Note 4)		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			290	590	ns
Q_g	Total Gate Charge	$V_{DS} = 60\text{ V}, I_D = 125\text{ A}, V_{GS} = 10\text{ V}$ (Note 4)		232	301	nC
Q_{gs}	Gate-Source Charge			58		nC
Q_{gd}	Gate-Drain Charge			77		nC

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 Recovered Charge			420		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.

4. Essentially independent of operating temperature typical characteristics.

TYPICAL PERFORMANCE CHARACTERISTICS

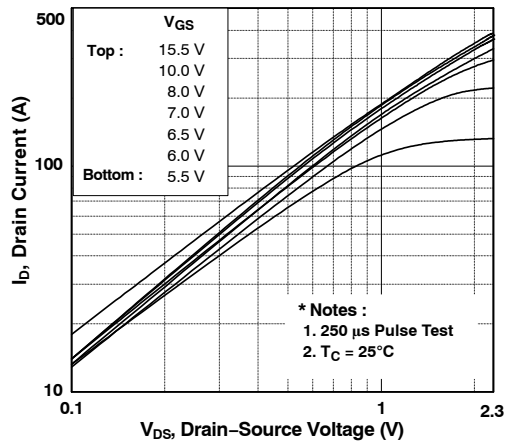


Figure 1. On-Region Characteristics

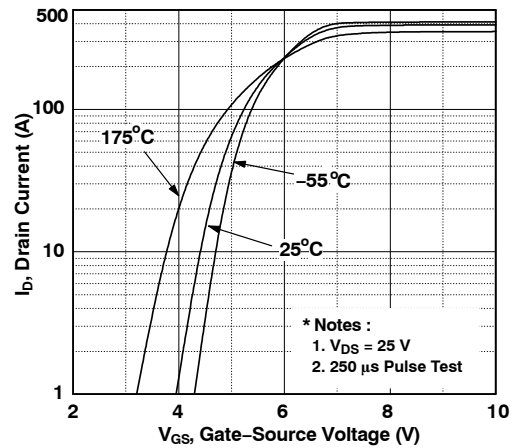


Figure 2. Transfer Characteristics

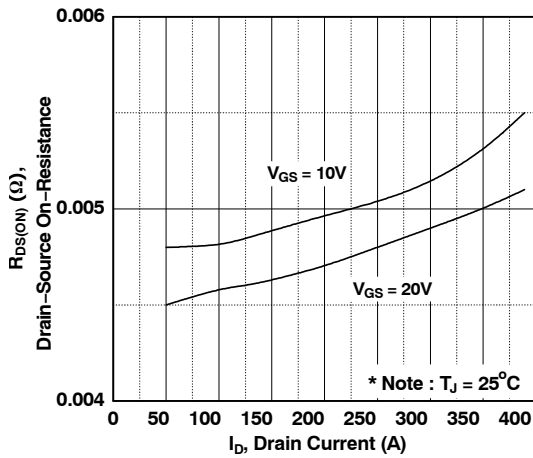


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

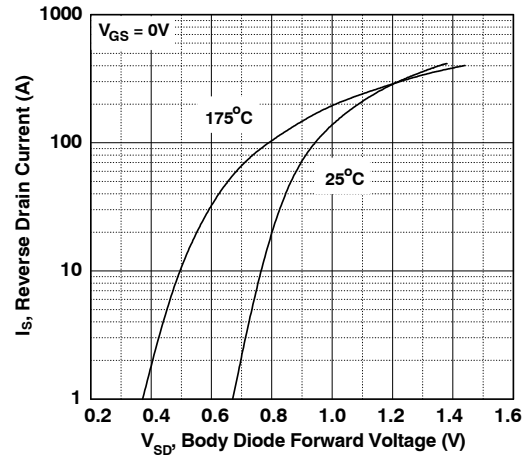


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

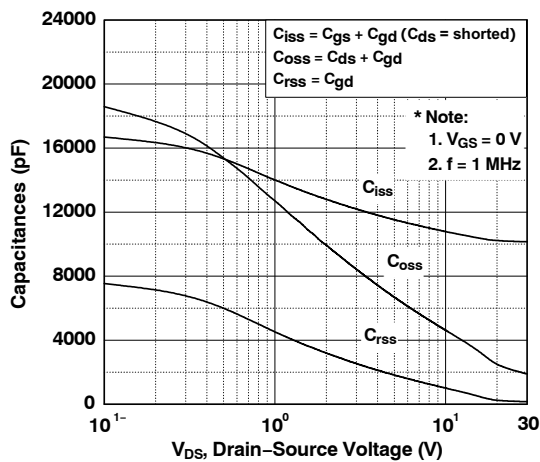


Figure 5. Capacitance Characteristics

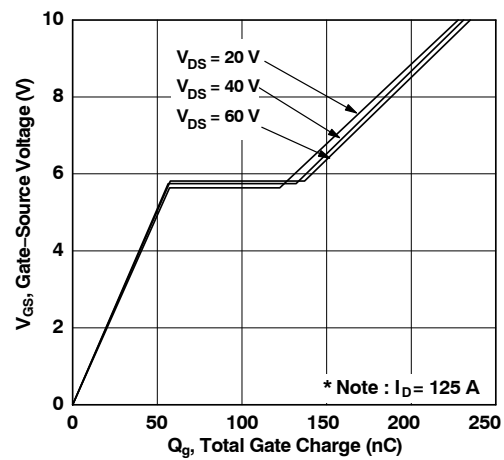


Figure 6. Gate Charge Characteristics

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

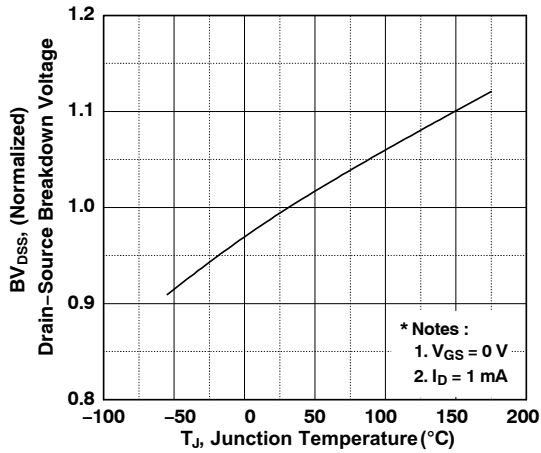


Figure 7. Breakdown Voltage Variation vs. Temperature

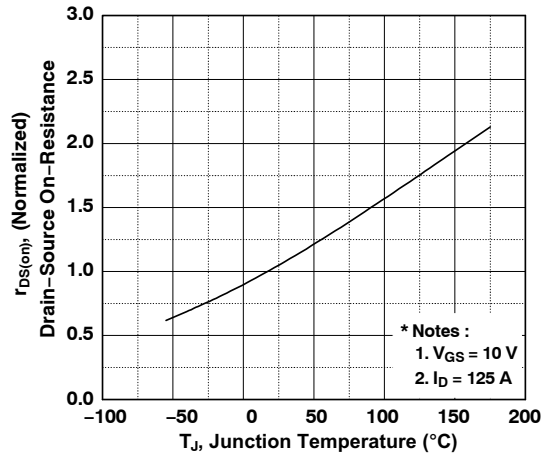


Figure 8. On-Resistance Variation vs. Temperature

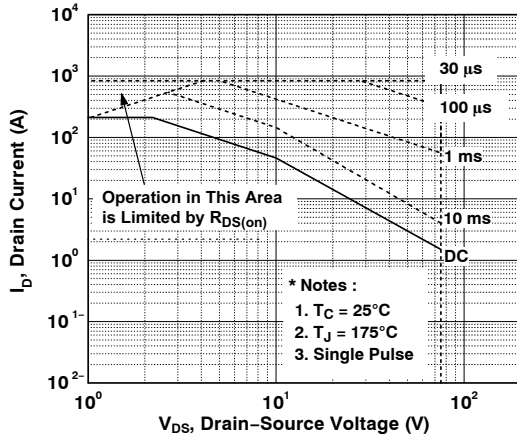


Figure 9. Maximum Safe Operating Area

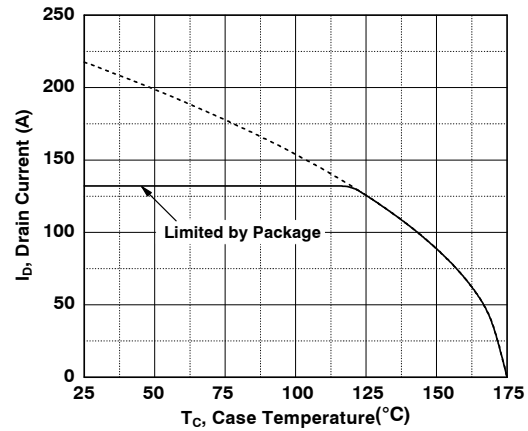


Figure 10. Maximum Drain Current vs. Case Temperature

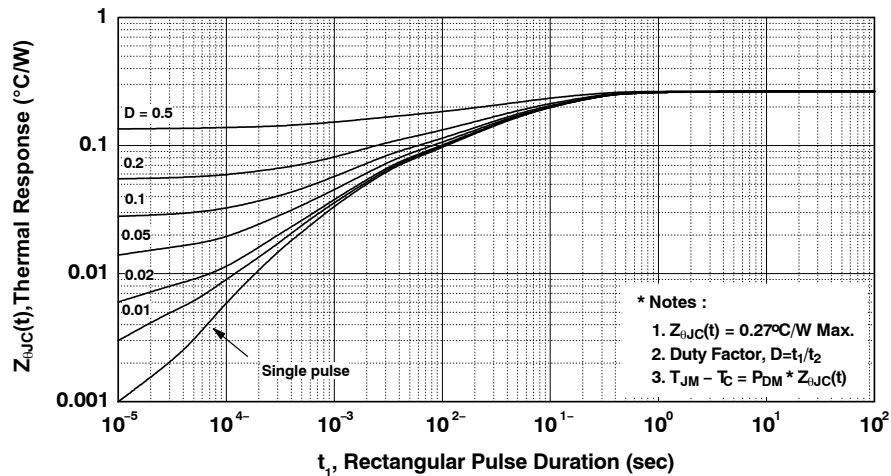


Figure 11. Transient Thermal Response Curve

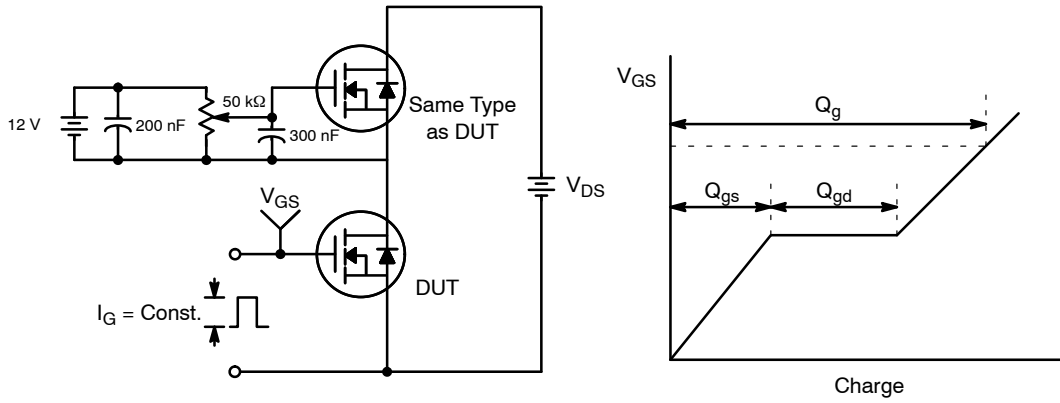


Figure 12. Gate Charge Test Circuit & Waveform

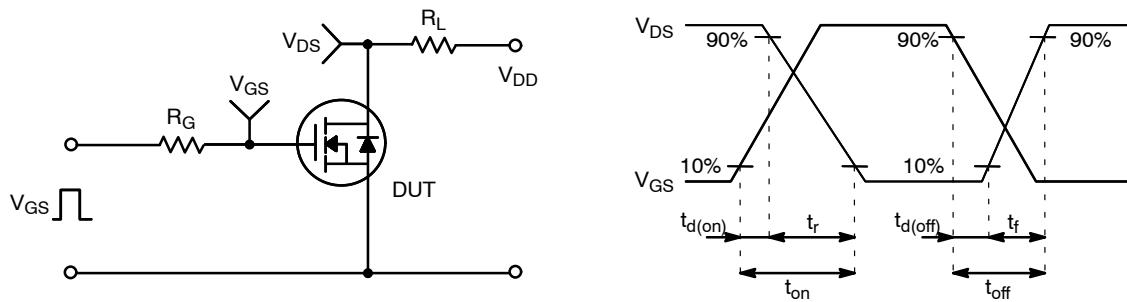


Figure 13. Resistive Switching Test Circuit & Waveforms

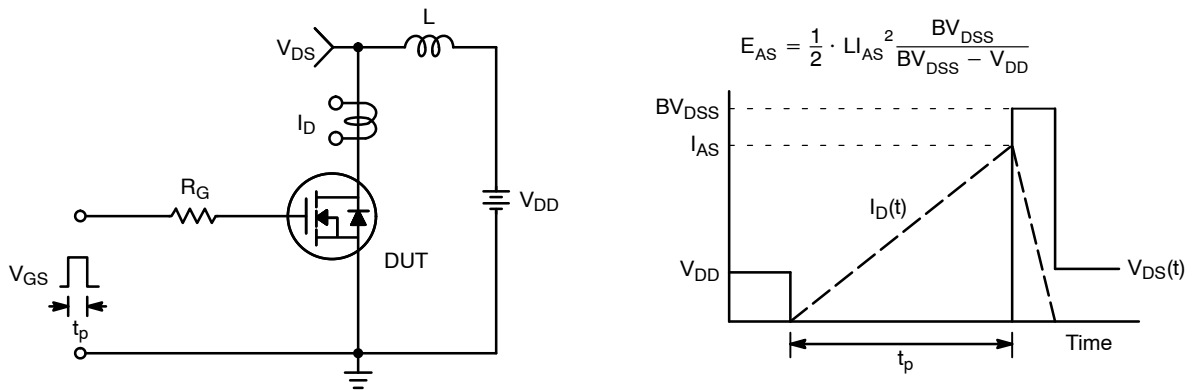


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

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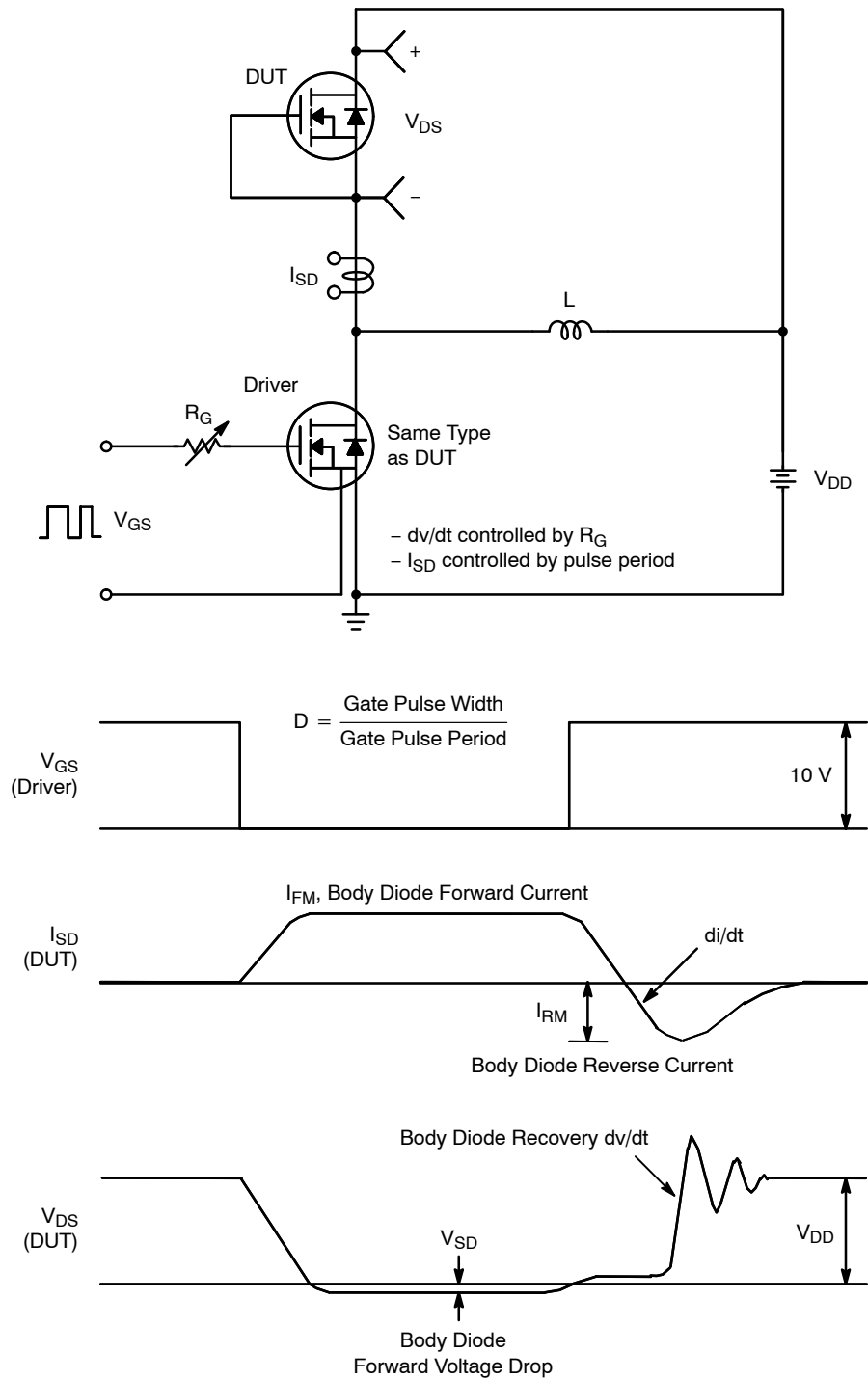
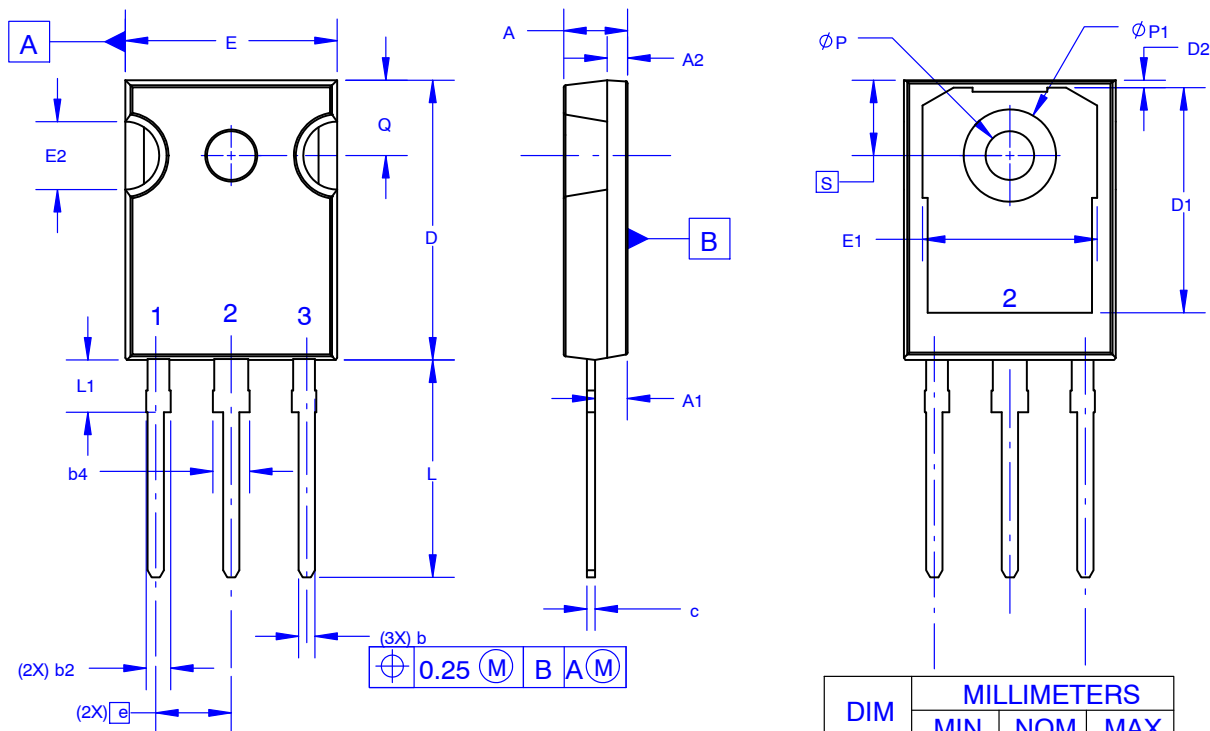


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

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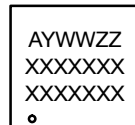
DATE 31 JAN 2019



NOTES: UNLESS OTHERWISE SPECIFIED.

- A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DRAWING CONFORMS TO ASME Y14.5 - 2009.
- D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
- E. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.

GENERIC MARKING DIAGRAM*



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

*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.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.20	2.40	2.60
A2	1.40	1.50	1.60
b	1.17	1.26	1.35
b2	1.53	1.65	1.77
b4	2.42	2.54	2.66
c	0.51	0.61	0.71
D	20.32	20.57	20.82
D1	13.08	~	~
D2	0.51	0.93	1.35
E	15.37	15.62	15.87
E1	12.81	~	~
E2	4.96	5.08	5.20
e	~	5.56	~
L	15.75	16.00	16.25
L1	3.69	3.81	3.93
ϕP	3.51	3.58	3.65
$\phi P1$	6.60	6.80	7.00
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

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