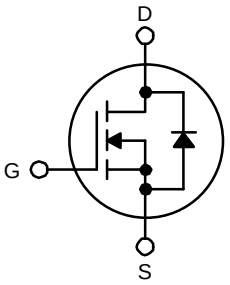
MOSFET – N-Channel, POWERTRENCH®

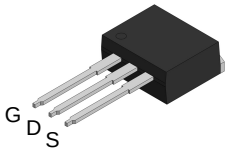
100 V, 57 A, 16 mΩ

FDI150N10

V_{DSS}	$R_{DS(on)}$ MAX	I_D MAX
100 V	16 mΩ @ 10 V	57 A



P−Channel MOSFET



I2PAK
CASE 418AV

Description

This N−Channel MOSFET is produced using **onsemi**'s advanced POWERTRENCH process that has been tailored to minimize the on−state resistance while maintaining superior switching performance.

Features

- $R_{DS(on)}$ = 12 mΩ (Typ.) @ V_{GS} = 10 V, I_D = 49 A
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- High Power and Current Handling Capability
- RoHS Compliant

Applications

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

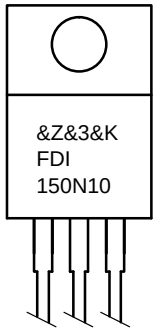
MOSFET MAXIMUM RATINGS (T_C = 25°C, unless otherwise noted)

Symbol	Parameter		FDI150N10	Unit
V_{DSS}	Drain to Source Voltage		100	V
V_{GSS}	Gate to Source Voltage		±20	V
I_D	Drain Current	− Continuous (T_C = 25°C)	57	A
		− Continuous (T_C = 100°C)	40	A
I_{DM}	Drain Current	− Pulsed (Note 1)	228	A
E_{AS}	Single Pulsed Avalanche Energy (Note 2)		132	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		7.5	V/ns
P_D	Power Dissipation	(T_C = 25°C)	110	W
		− Derate Above 25°C	0.88	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		−55 to +150	°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 = 0.11 mH, I_{AS} = 49 A, V_{DD} = 50 V, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 49 A, di/dt ≤ 200 A/μs, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C.

MARKING DIAGRAM



&Z	= Assembly Plant Code
&3	= 3−Digit Plant Code
&K	= 2−Digits Lot Run Traceability Code
FDI150N10	= Specific Device Code

ORDERING INFORMATION

Device	Package	Shipping
FDI150N10	I2PAK	800 Units / Tube

THERMAL CHARACTERISTICS

Symbol	Parameter	FDI150N10	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	1.13	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	

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	I_D = 250 μA, V_{GS} = 0 V, T_C = 25°C	100	–	–	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	–	0.1	–	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 100 V, V_{GS} = 0 V	–	–	1	μA
		V_{DS} = 100 V, V_{GS} = 0 V, T_C = 150°C	–	–	500	
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V	–	–	±100	nA
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	2.5	–	4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 49 A	–	12	16	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 20 V, I_D = 49 A	–	156	–	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz	–	3580	4760	pF
C_{oss}	Output Capacitance		–	340	450	pF
C_{rss}	Reverse Transfer Capacitance		–	140	210	pF
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = 50 V, I_D = 49 A, V_{GS} = 10 V, R_G = 25 Ω (Note 4)	–	47	104	ns
t_r	Turn−On Rise Time		–	164	338	ns
$t_{d(off)}$	Turn−Off Delay Time		–	86	182	ns
t_f	Turn−Off Fall Time		–	83	176	ns
$Q_{g(tot)}$	Total Gate Charge at 10 V	V_{DS} = 80 V, I_D = 49 A, V_{GS} = 10 V (Note 4)	–	53	69	nC
Q_{gs}	Gate to Source Gate Charge		–	19	–	nC
Q_{gd}	Gate to Drain “Miller” Charge		–	15	–	nC
DRAIN−SOURCE DIODE CHARACTERISTICS						
I_S	Maximum Continuous Drain to Source Diode Forward Current		–	–	57	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		–	–	228	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0 V, I_{SD} = 49 A	–	–	1.3	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_{SD} = 49 A, dI_F/dt = 100 A/μs	–	41	–	ns
Q_{rr}	Reverse Recovery Charge		–	70	–	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

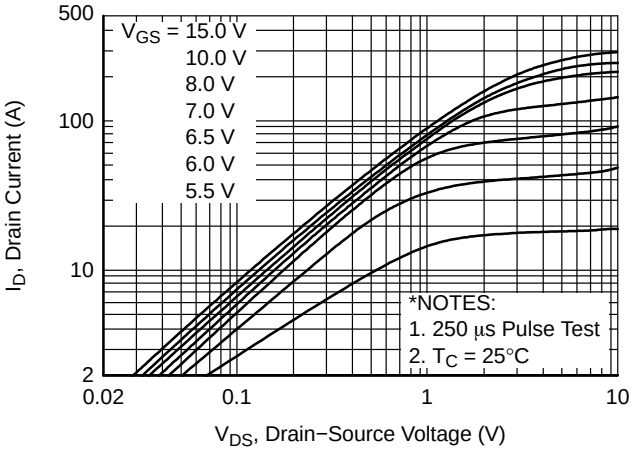


Figure 1. On−Region Characteristics

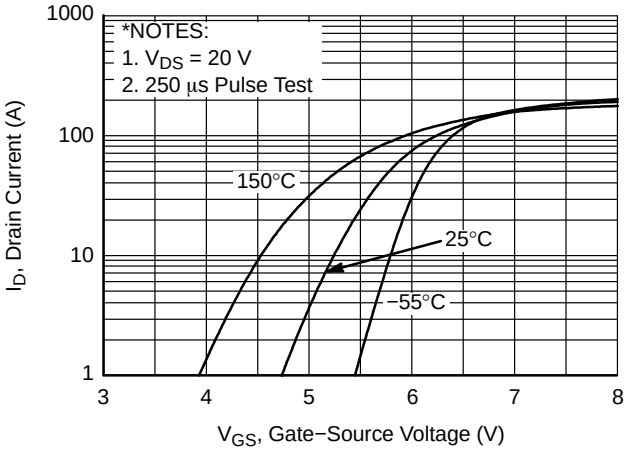


Figure 2. Transfer Characteristics

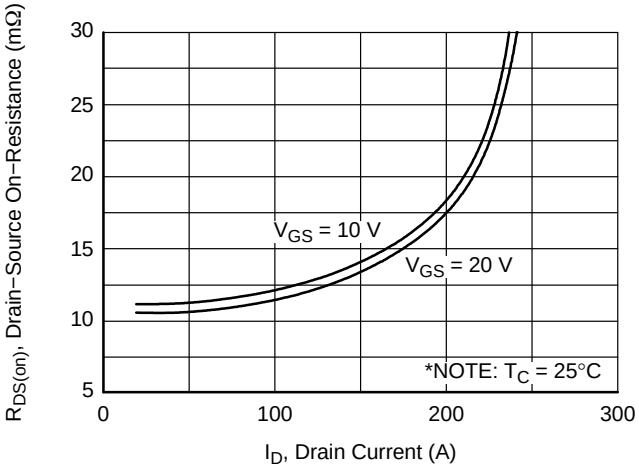


Figure 3. On−Resistance Variation vs. Drain Current and Gate Voltage

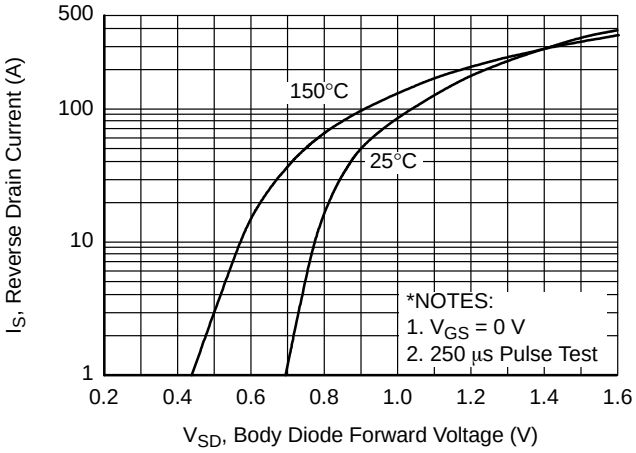


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

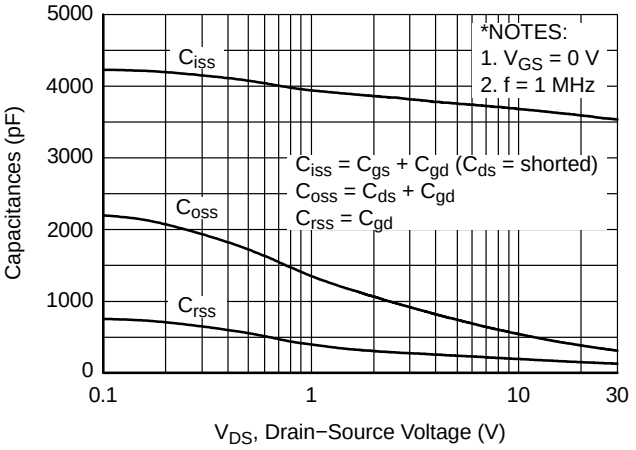


Figure 5. Capacitance Characteristics

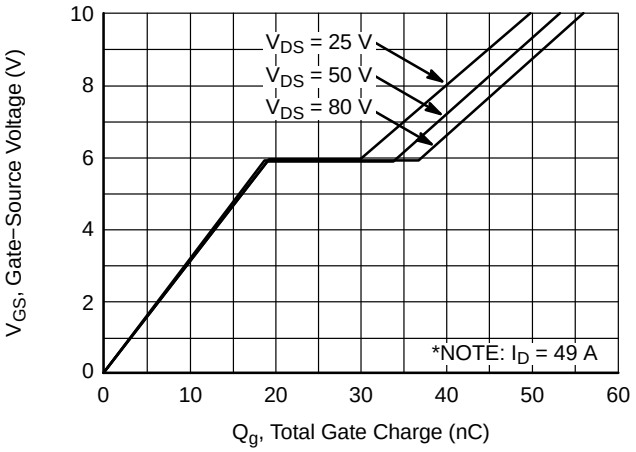


Figure 6. Gate Charge Characteristics

TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

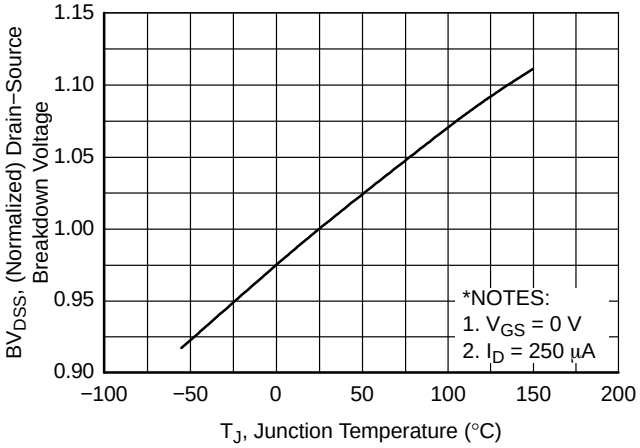


Figure 7. Breakdown Voltage Variation vs. Temperature

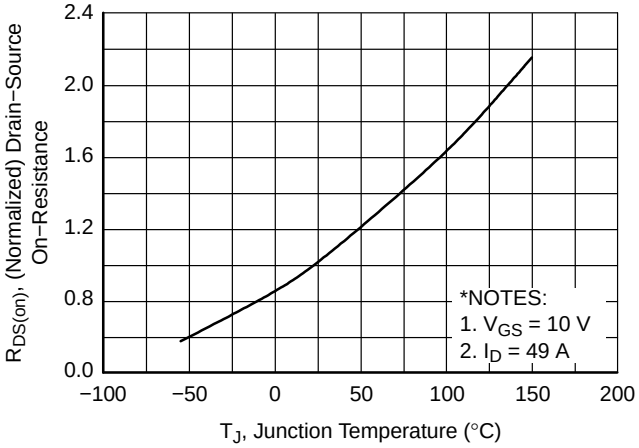


Figure 8. On−Resistance Variation vs. Temperature

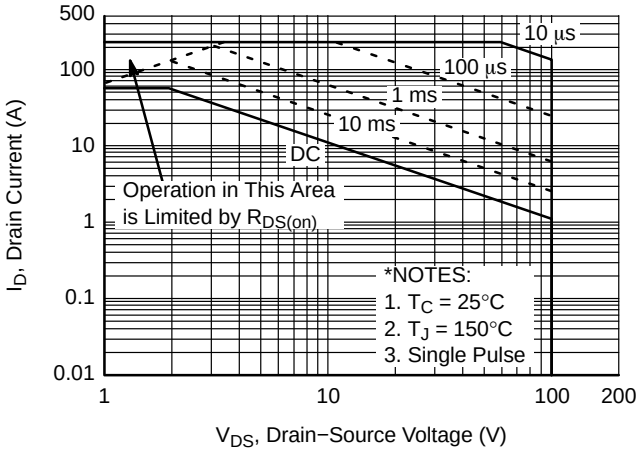


Figure 9. Maximum Safe Operating Area

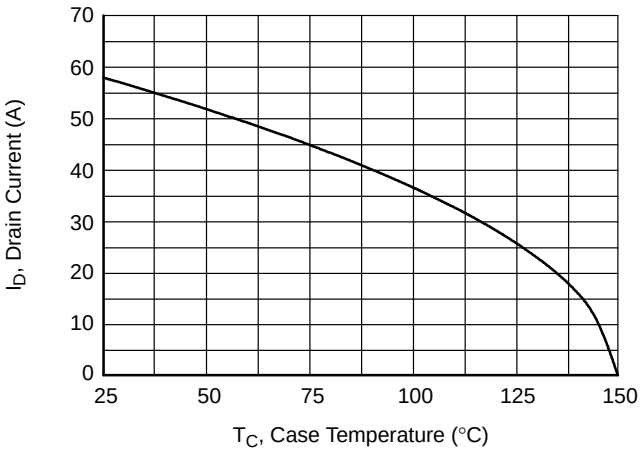


Figure 10. Maximum Drain Current vs. Case Temperature

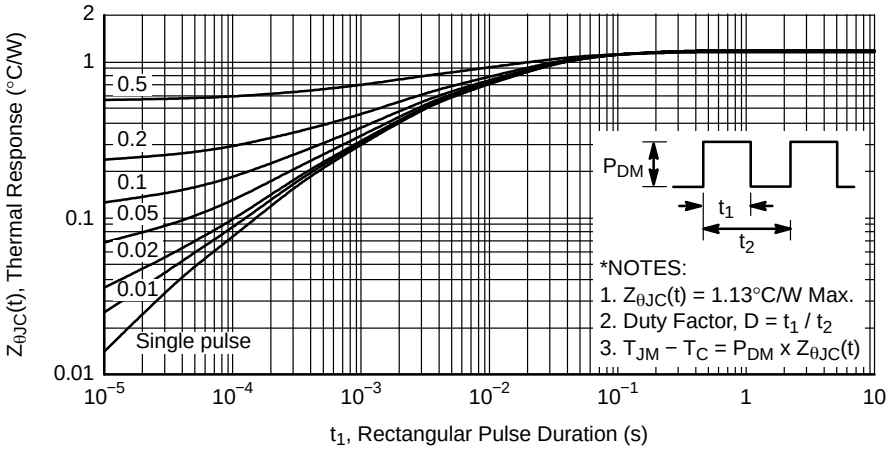


Figure 11. Transient Thermal Response Curve

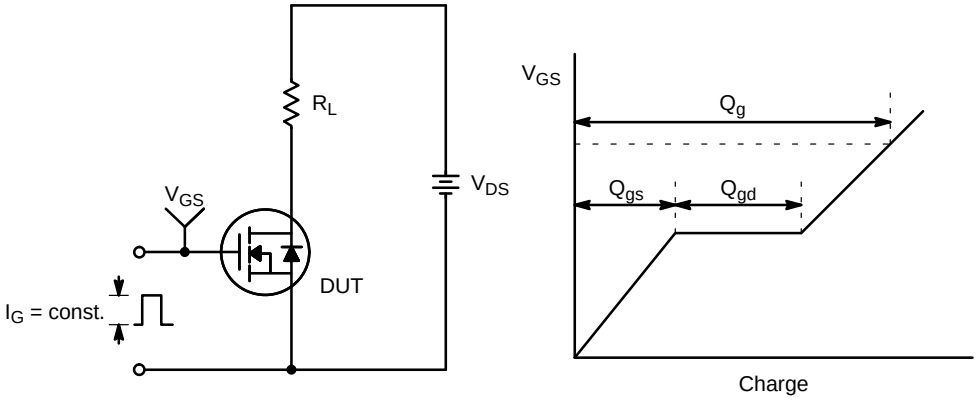


Figure 12. Gate Charge Test Circuit & Waveform

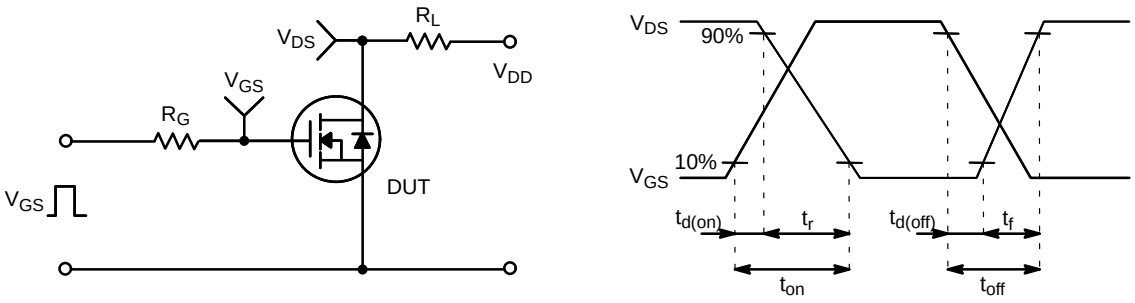


Figure 13. Resistive Switching Test Circuit & Waveforms

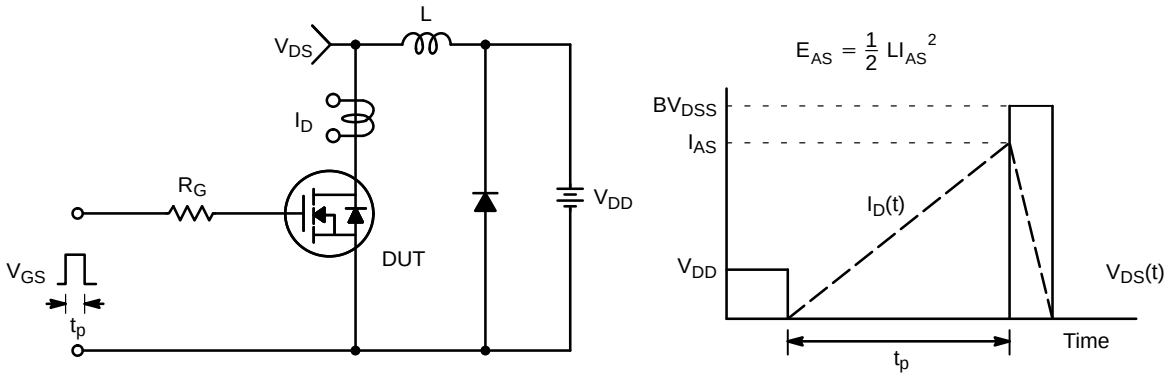


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

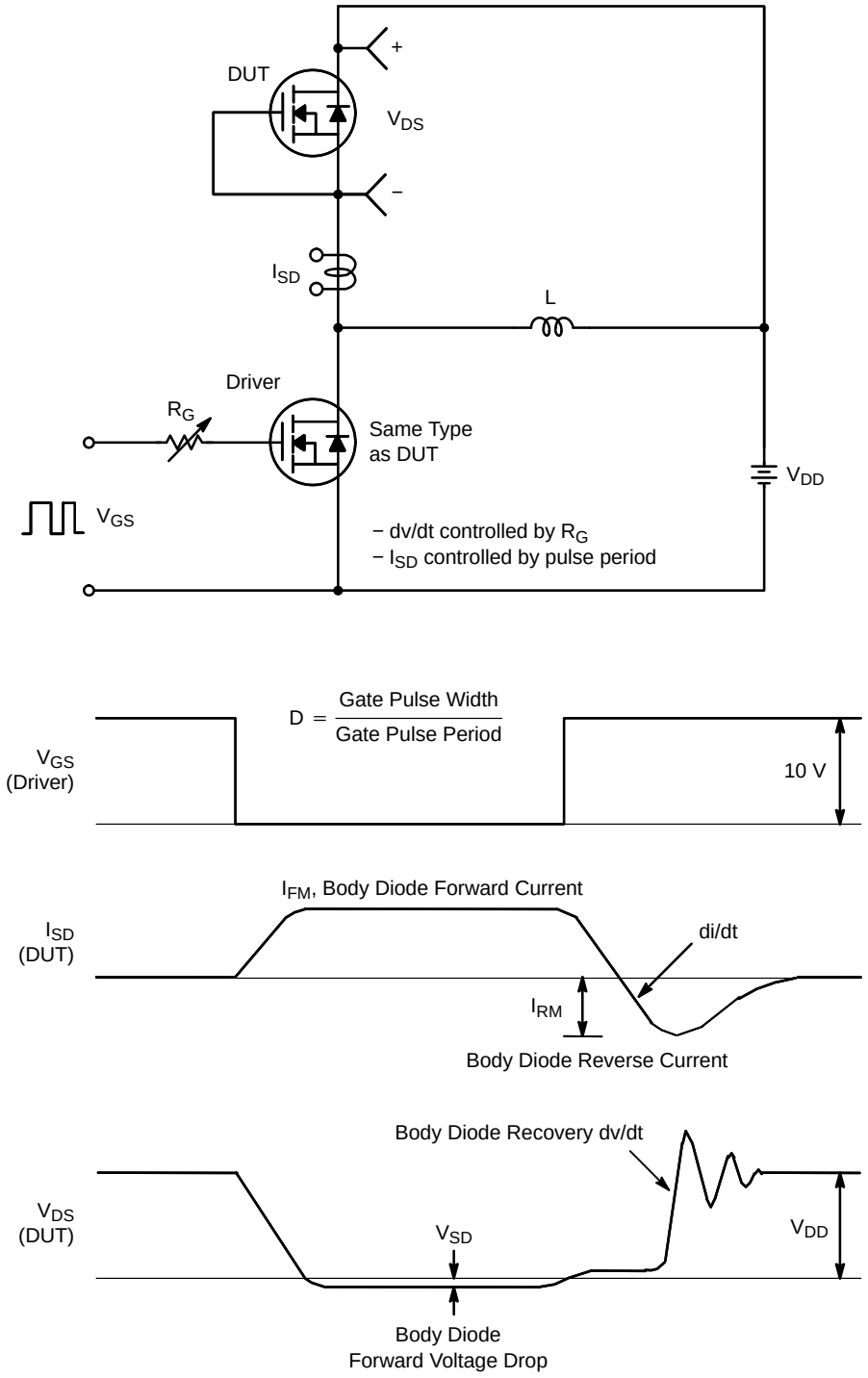
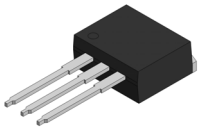
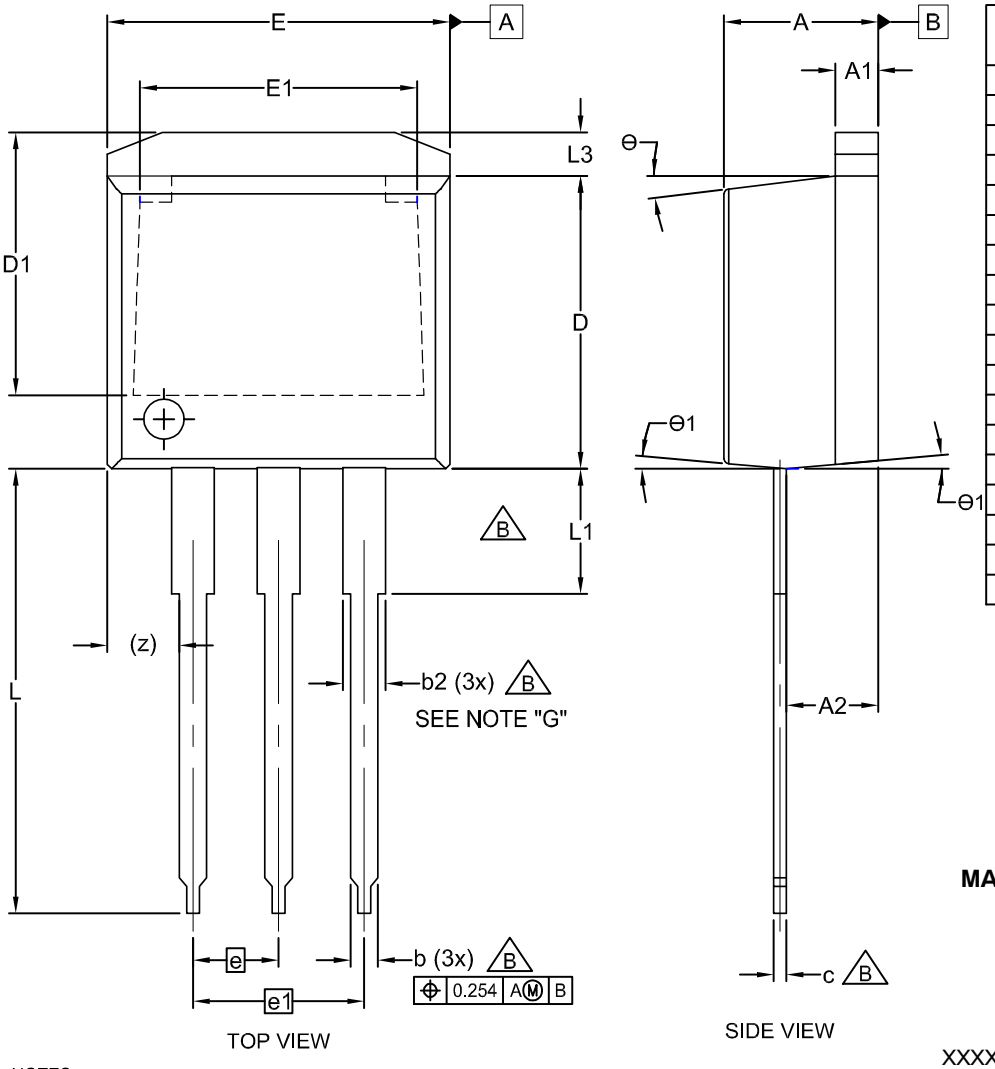


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



I2PAK (TO−262 3 LD)
CASE 418AV
ISSUE A

DATE 30 AUG 2022

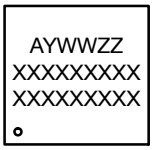


DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.06	4.45	4.83
A1	1.14	1.27	1.40
A2	2.03	2.41	2.79
b	0.64	0.77	0.90
b2	1.14	1.46	1.78
c	0.33	0.49	0.64
D	8.64	9.15	9.65
D1	6.86	7.37	7.88
E	9.65	9.97	10.29
E1	6.22	7.28	8.33
e	2.54 BSC		
e1	5.08 BSC		
L	12.70	13.72	14.73
L1	2.80	3.38	3.96
L3	1.00	1.20	1.40
z	2.13 REF		
Θ	0°	--	7°
Θ1	0°	--	5°

NOTES:

A. EXCEPT WHERE NOTED CONFORMS TO TO262 JEDEC VARIATION AA.
B. DOES NOT COMPLY JEDEC STD. VALUE.
C. ALL DIMENSIONS ARE IN MILLIMETERS.
D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
E. DIMENSION AND TOLERANCE AS PER ANSI Y14.5-1994.
F. LOCATION OF PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF PACKAGE)
G. MAXIMUM WIDTH FOR F102 DEVICE = 1.35 MAX.

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.

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