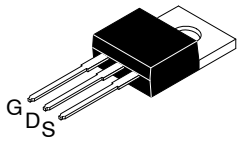
MOSFET – N-Channel, POWERTRENCH®

200 V, 62 A, 27 mΩ

FDP2614

V_{DS}	$R_{DS(on)}$ MAX	I_D MAX
200 V	27 mΩ @ 10 V	62 A



TO−220−3LD
CASE 340AT

General 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.

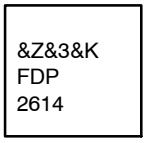
Features

- $R_{DS(on)}$ = 22.9 mΩ (Typ.) @ V_{GS} = 10 V, I_D = 31 A
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- High Power and Current Handing Capability
- This Device is Pb−Free, Halide Free and is RoHS Compliant

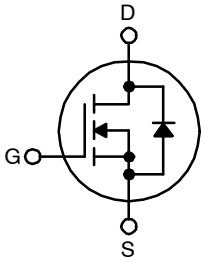
Applications

- Consumer Appliances
- Synchronous Rectification
- Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies

MARKING DIAGRAM



&Z = Assembly Plant Code
&3 = 3−Digit Date Code
&K = 2−Digits Lot Run Traceability Code
FDP2614 = Specific Device Code



N−Channel

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

Symbol	Parameter		Value	Unit
V_{DS}	Drain to Source Voltage		200	V
V_{GS}	Gate to Source Voltage		+30	V
I_D	Drain Current	Continuous (T_C = 25°C)	62	A
		Continuous (T_C = 100°C)	39.3	
I_{DM}	Drain Current	Pulsed (Note 1)	see Figure 9	A
E_{AS}	Single Pulse Avalanche Energy (Note 2)		145	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		4.5	V/ns
P_D	Power Dissipation (T_C = 25°C)		260	W
	Derate above 25°C		2.1	W/°C
T_J, T_{STG}	Operating and Storage Temperature		−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.

ORDERING INFORMATION

Device	Package	Shipping
FDP2614	TO−220−3LD	800 Units / Tube

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance Junction to Case, Max.	0.48	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient, Max.	62.5	°C/W

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

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
B_{VDSS}	Drain–Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA, T_J = 25°C	200	–	–	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	–	0.2	–	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 200 V, V_{GS} = 0 V	–	–	10	μA
		V_{DS} = 200 V, V_{GS} = 0 V, T_J = 125°C	–	–	500	
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	4.0	5.0	V
$R_{DS(on)}$	Static Drain–Source On–Resistance	V_{GS} = 10 V, I_D = 31 A	–	22.9	27	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 31 A	–	72	–	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	–	5435	7230	pF
C_{oss}	Output Capacitance		–	505	675	pF
C_{rss}	Reverse Transfer Capacitance		–	110	165	pF
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = 100 V, I_D = 62 A, V_{GS} = 10 V, R_{GEN} = 25 Ω (Note 4)	–	77	165	ns
t_r	Turn–On Rise Time		–	284	560	ns
$t_{d(off)}$	Turn–Off Delay Time		–	103	220	ns
t_f	Turn–Off Fall Time		–	162	335	ns
Q_g	Total Gate Charge	V_{DS} = 100 V, I_D = 62 A, V_{GS} = 10 V (Note 4)	–	76	99	nC
Q_{gs}	Gate–Source Charge		–	35	–	nC
Q_{gd}	Gate–Drain Charge		–	18	–	nC
DRAIN–SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
I_S	Maximum Continuous Drain–Source Diode Forward Current		–	–	62	A
I_{SM}	Maximum Pulsed Drain–Source Diode Forward Current		–	–	186	A
V_{SD}	Drain–Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 62 A	–	–	1.2	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 62 A, dI_F/dt = 100 A/μs	–	145	–	ns
Q_{rr}	Reverse Recovery Charge		–	0.81	–	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.

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 1 mH, I_{AS} = 17 A, V_{DD} = 50 V, R_G = 25 Ω, Starting T_J = 25°C
3. I_{SD} ≤ 62 A, di/dt ≤ 100 A/ms, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Essentially Independent of Operating Temperature Typical Characteristics.

TYPICAL PERFORMANCE CHARACTERISTICS

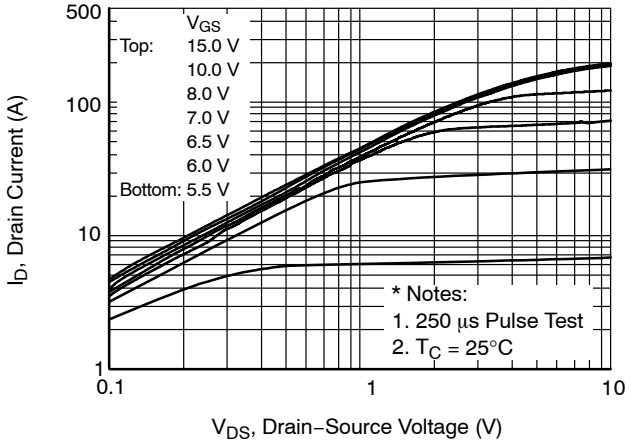


Figure 1. On−Region Characteristics

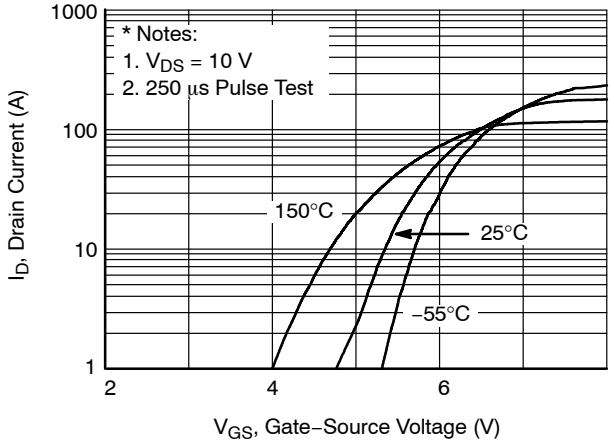


Figure 2. Transfer Characteristics

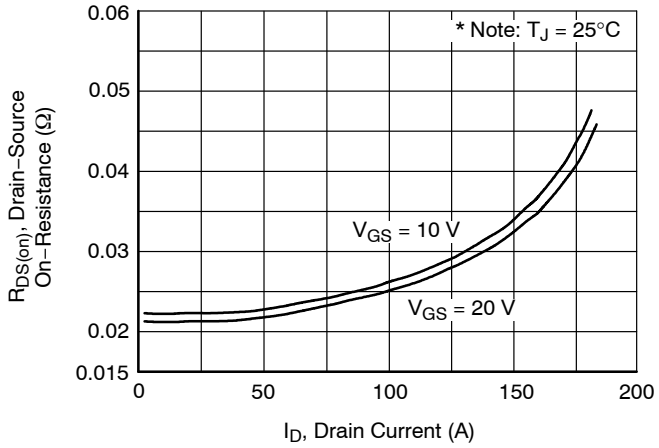


Figure 3. On−Resistance Variation vs. Drain Current and Gate Voltage

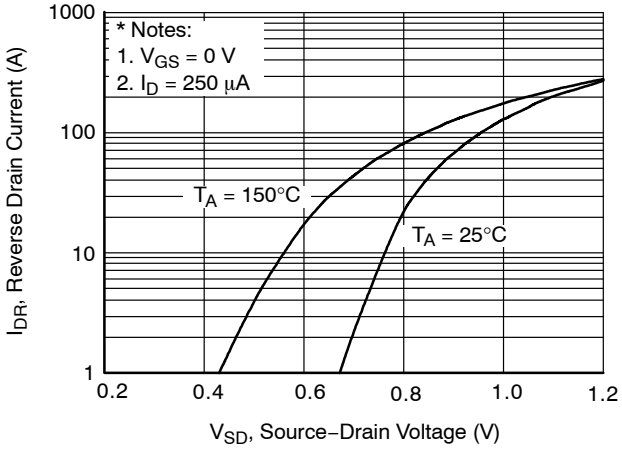


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

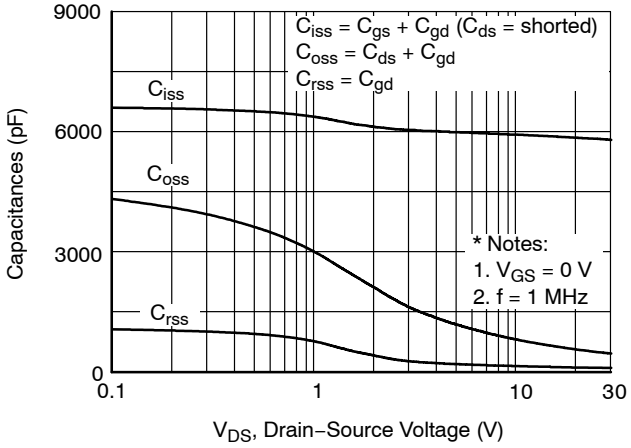


Figure 5. Capacitance Characteristics

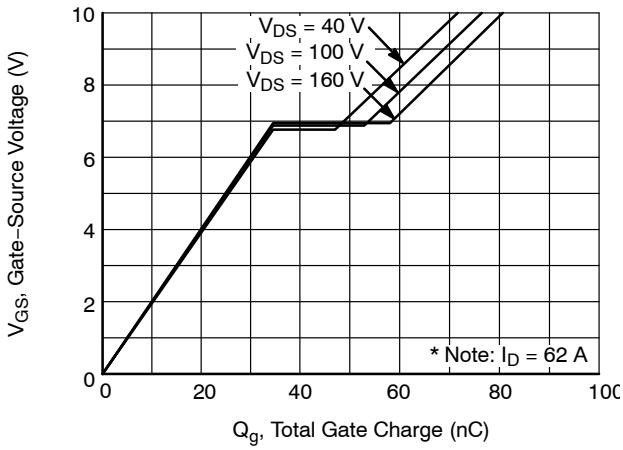


Figure 6. Gate Charge Characteristics

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

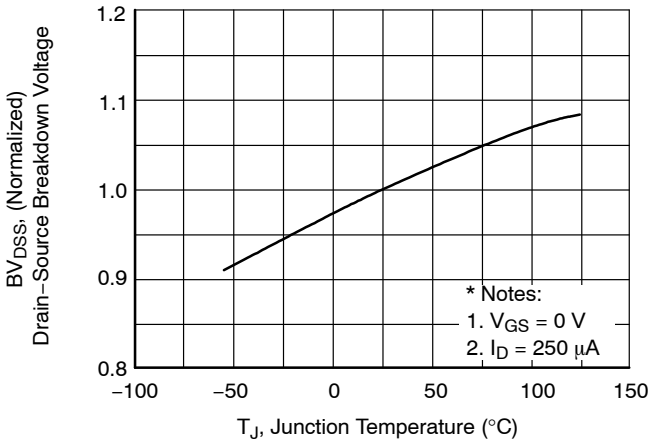


Figure 7. Breakdown Voltage Variation vs. Temperature

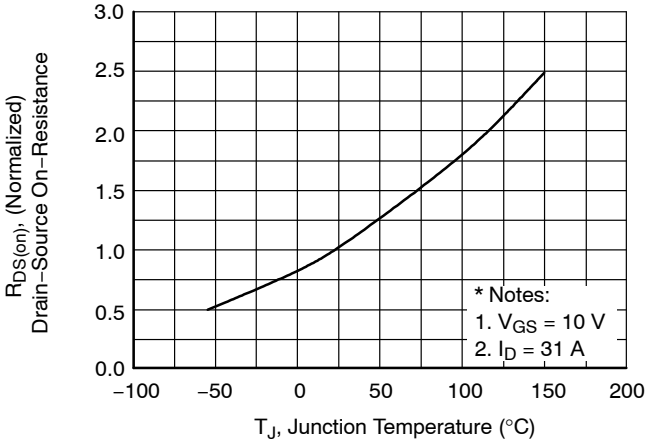


Figure 8. On−Resistance Variation vs. Temperature

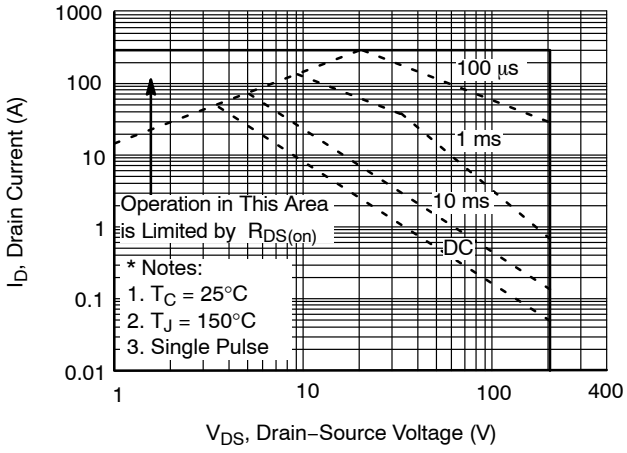


Figure 9. Maximum Safe Operating Area

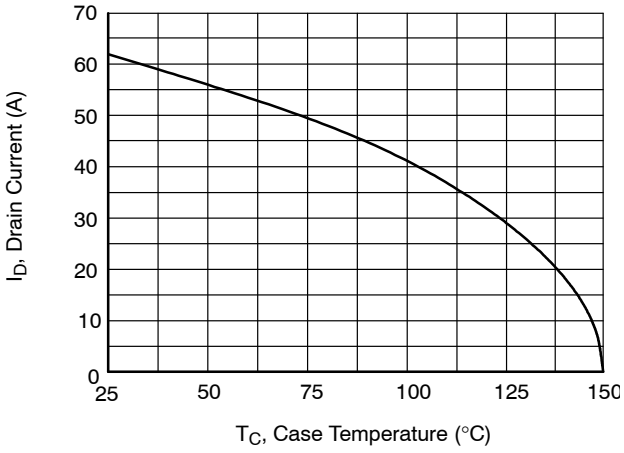


Figure 10. Maximum Drain Current vs. Case Temperature

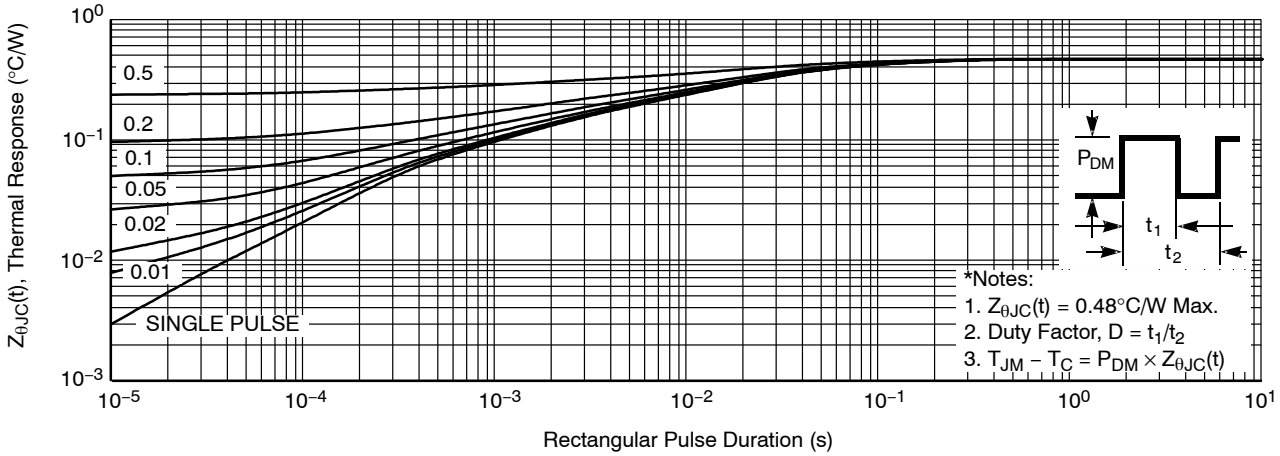


Figure 11. Transient Thermal Response Curve

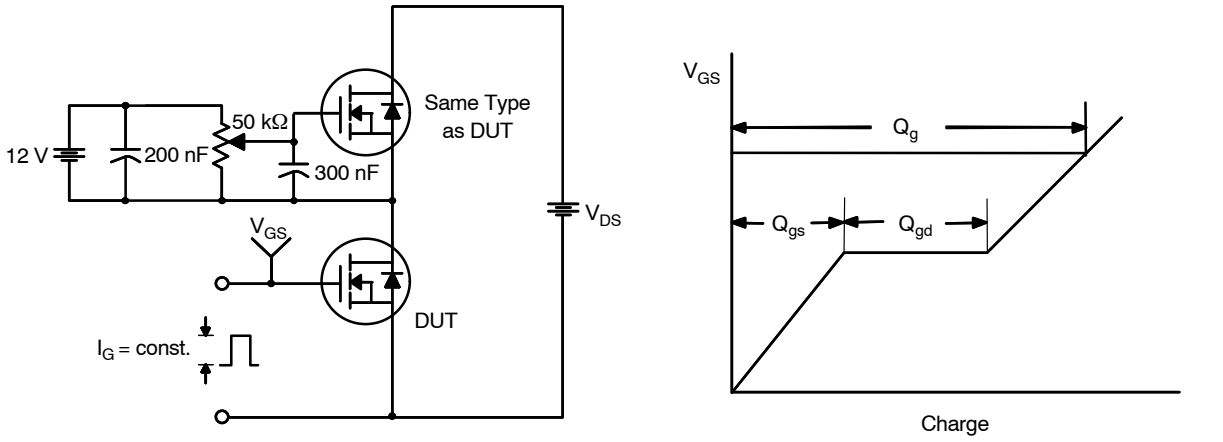


Figure 12. Gate Charge Test Circuit & Waveform

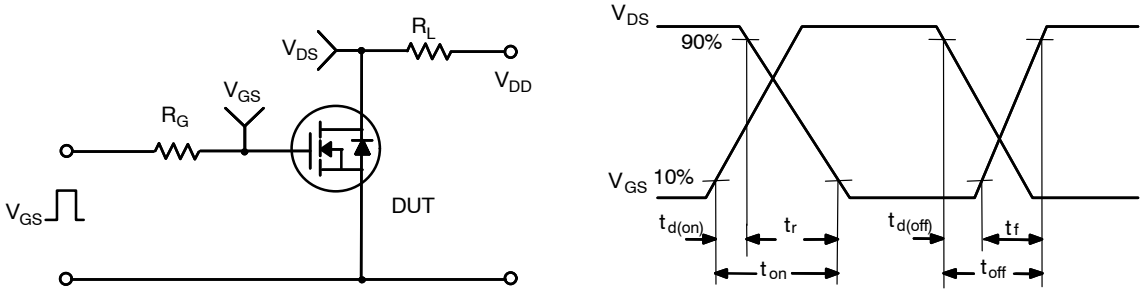


Figure 13. Resistive Switching Test Circuit & Waveforms

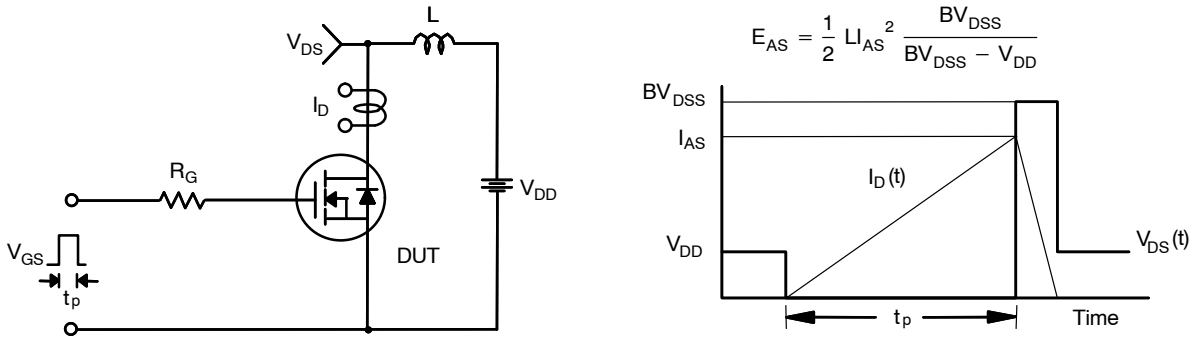


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

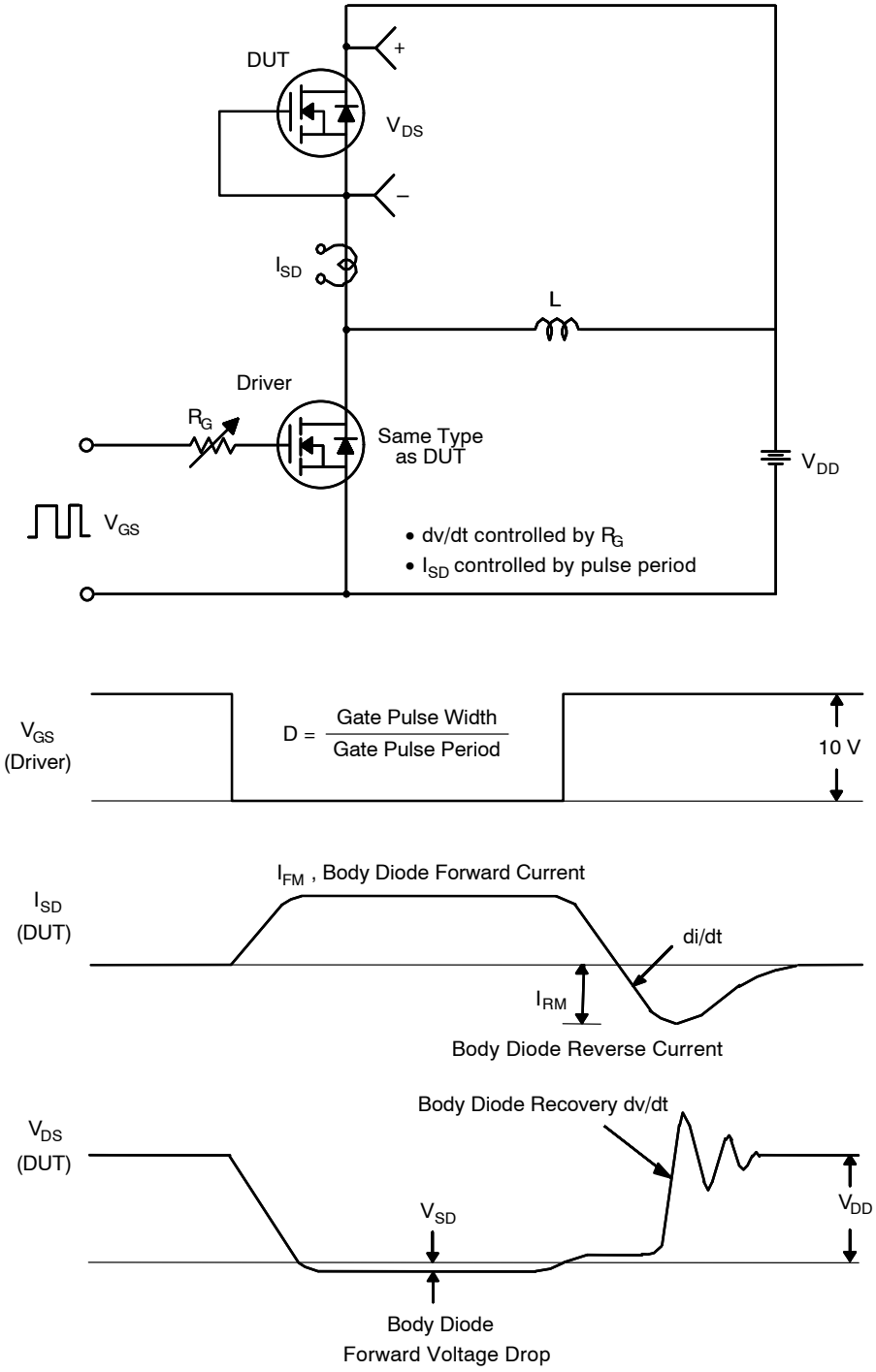
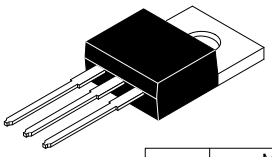


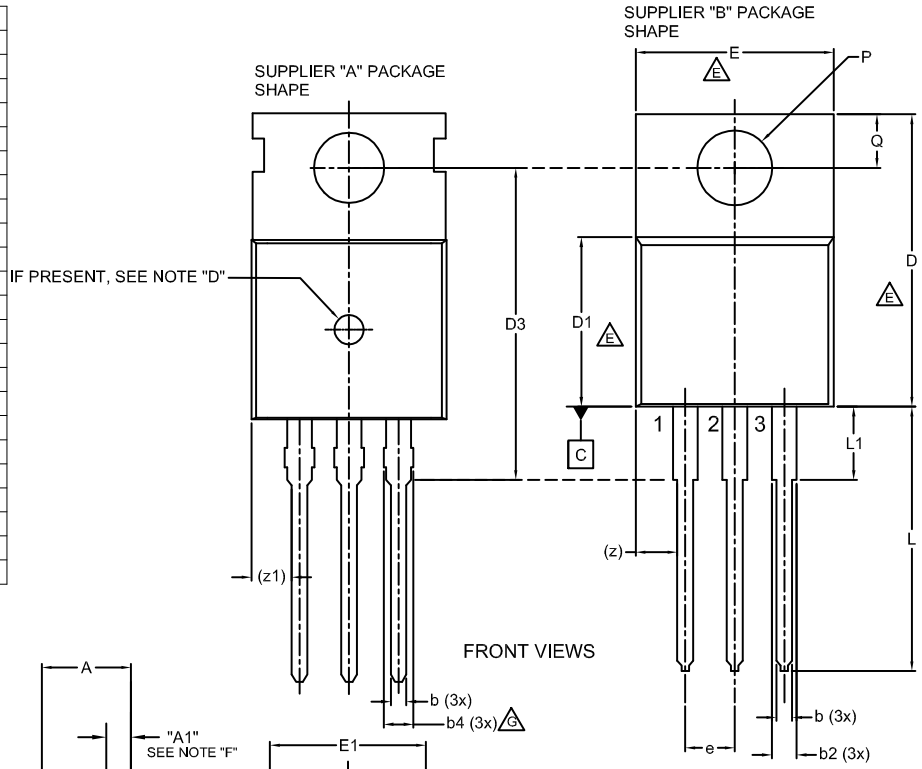
Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

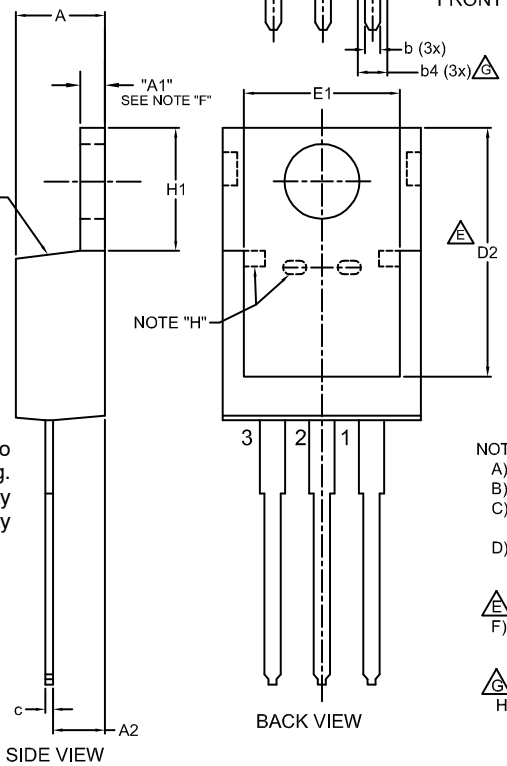


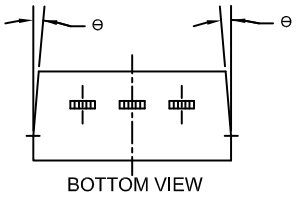
TO−220−3LD
CASE 340AT
ISSUE B

DATE 08 AUG 2022

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	4.00	--	4.70
A1	SEE NOTE "F"		
A2	2.10	--	2.85
b	0.55	--	1.00
b2	1.10	--	1.62
b4	1.42	--	1.62
c	0.36	--	0.60
D	13.90	--	16.30
D1	8.13	--	9.40
D2	11.50	--	14.30
D3	15.42	--	16.51
E	9.65	--	10.67
E1	7.59	--	8.65
e	2.40	--	2.67
H1	6.06	--	6.69
L	12.70	--	14.04
L1	2.70	--	4.10
P	3.50	--	4.00
Q	2.50	--	3.40
z	2.13 REF		
z1	2.06 REF		
Θ	3°	–	5°







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.

NOTES:
A) REFERENCE JEDEC, TO-220, VARIATION AB
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS COMMON TO ALL PACKAGE SUPPLIERS EXCEPT WHERE NOTED [ ].
D) LOCATION OF MOLDED FEATURE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE)
E) DOES NOT COMPLY JEDEC STANDARD VALUE.
F) "A1" DIMENSIONS AS BELOW:
SINGLE GAUGE = 0.51 - 0.61
DUAL GAUGE = 1.10 - 1.45
G) PRESENCE IS SUPPLIER DEPENDENT
H) SUPPLIER DEPENDENT MOLD LOCKING HOLES IN HEATSINK.

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DESCRIPTION:	**TO−220−3LD**	**PAGE 1 OF 1**

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