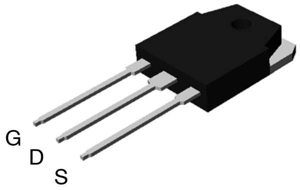
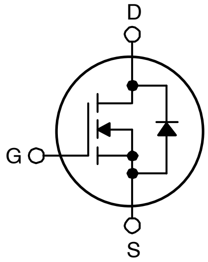
MOSFET – N-Channel, POWERTRENCH®

75 V, 235 A, 3.2 mΩ

FDA032N08



TO−3P−3LD / EIAJ SC−65, ISOLATED
CASE 340BZ



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

- $R_{DS(on)}$ = 2.5 mΩ (Typ.) @ V_{GS} = 10 V, I_D = 75 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

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

Symbol	Parameter	Value	Unit
V_{DSS}	Drain to Source Voltage	75	V
V_{GSS}	Gate to Source Voltage	±20	V
I_D	Drain Current Continuous (T_C = 25°C, Silicon Limited) Continuous (T_C = 100°C, Silicon Limited) Continuous (T_C = 25°C, Package Limited)	 235 165 120	A
I_{DM}	Drain Current − Pulsed (Note 1)	940	A
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	1995	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.5	V/ns
P_D	Power Dissipation (T_C = 25°C) − Derate above 25°C	 375 2.5	 W 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.

MARKING DIAGRAM

FDA
032N08
AYWWZZ

FDA032N08 = Specific Device Code
A = Assembly Location
YWW = Date Code (Year and Week)
ZZ = Assembly Lot

ORDERING INFORMATION

Device	Package	Shipping
FDA032N08	TO−3P−3L (Pb−Free)	450 Units / Tube

THERMAL CHARACTERISTICS

Symbol	Parameter	FDA032N08	Unit
$R_{\theta JC}$	Thermal Resistance, Junction−to−Case, Max	0.4	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction−to−Ambient, Max	40	°C/W

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTIC						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V, T_C = 25°C	75	–	–	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	–	0.05	–	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 75 V, V_{GS} = 0 V	–	–	1	μA
		V_{DS} = 75 V, T_C = 150°C	–	–	10	
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	3.5	4.5	V
$R_{DS(on)}$	Static Drain to Source On−Resistance	V_{GS} = 10 V, I_D = 75 A	–	2.5	3.2	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 20 V, I_D = 75 A	–	180	–	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz	–	11400	15160	pF
C_{oss}	Output Capacitance		–	1360	1810	pF
C_{rss}	Reverse Transfer Capacitance		–	595	800	pF
$Q_{g(TOT)}$	Total Gate Charge at 10 V	V_{DS} = 60 V, I_D = 75 A, V_{GS} = 10 V (Note 4)	–	169	220	nC
Q_{gs}	Gate to Source Gate Charge		–	60	–	nC
Q_{gd}	Gate to Drain “Miller” Charge		–	47	–	nC
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = 37.5 V, I_D = 75 A, R_G = 25 Ω, V_{GS} = 10 V (Note 4)	–	230	470	ns
t_r	Turn−On Rise Time		–	191	392	ns
$t_{d(off)}$	Turn−Off Delay Time		–	335	680	ns
t_f	Turn−Off Fall Time		–	121	252	ns
DRAIN−SOURCE DIODE CHARACTERISTICS						
I_S	Maximum Continuous Drain to Source Diode Forward Current		–	–	235	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		–	–	940	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0 V, I_{SD} = 75 A	–	–	1.3	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_{SD} = 75 A, dI_F/dt = 100 A/μs	–	53	–	ns
Q_{rr}	Reverse Recovery Charge		–	77	–	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.

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. L = 0.71 mH, I_{AS} = 75 A, V_{DD} = 50 V, R_G = 25 Ω, Starting T_J = 25°C.
3. $I_{SD} \le 75$ A, di/dt ≤ 200 A/μs, $V_{DD} \le BV_{DSS}$, Starting T_J = 25°C.
4. Essentially independent of operating temperature typical characteristics.

TYPICAL PERFORMANCE CHARACTERISTICS

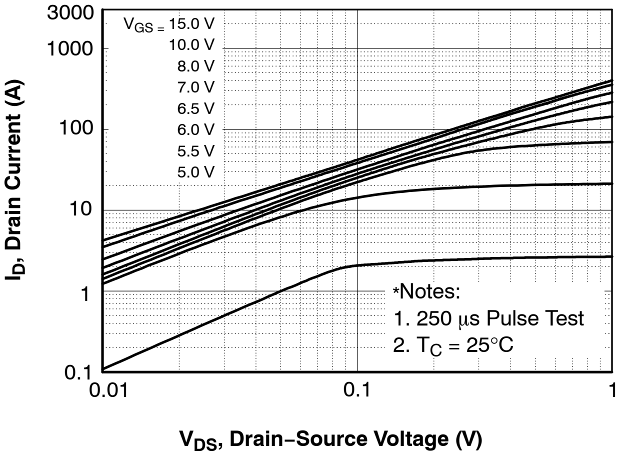


Figure 1. On−Region Characteristics

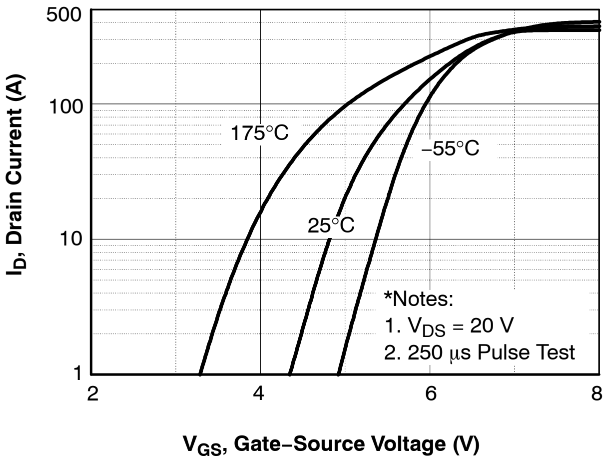


Figure 2. Transfer Characteristics

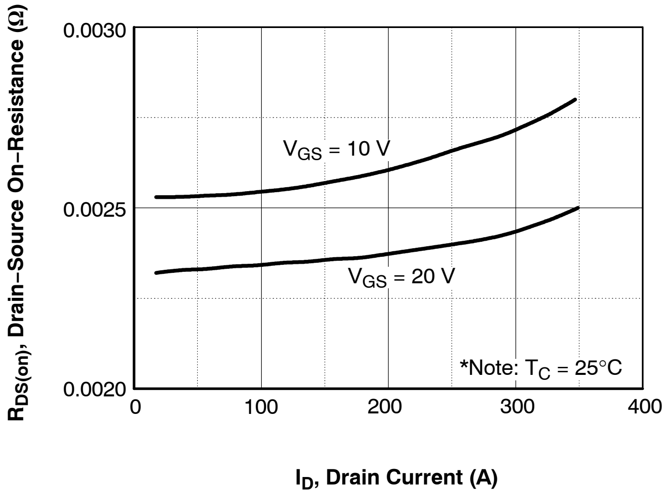


Figure 3. On−Resistance Variation vs. Drain Current and Gate Voltage

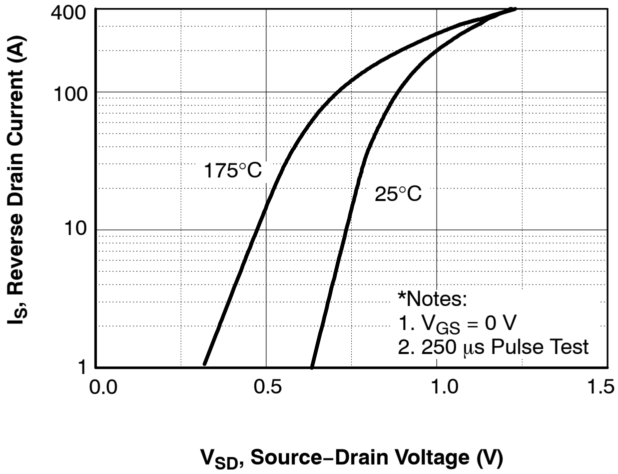


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

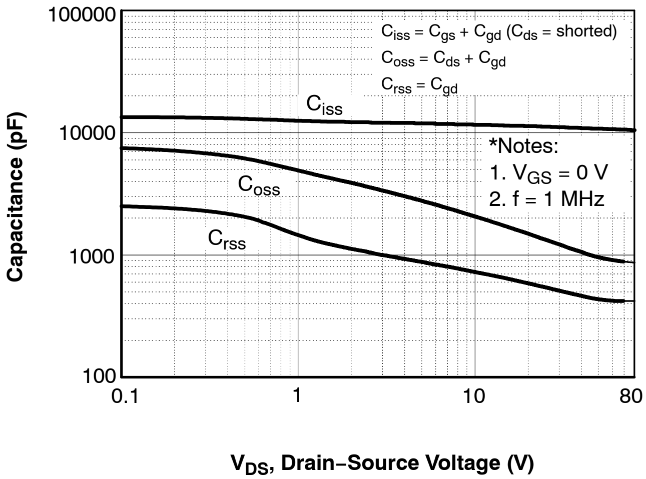


Figure 5. Capacitance Characteristics

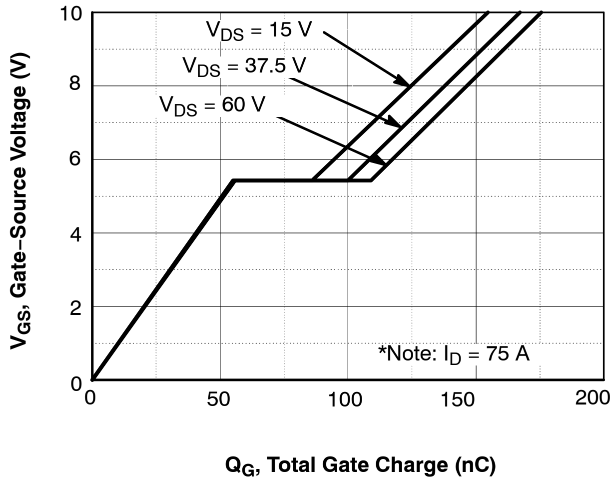


Figure 6. Gate Charge Characteristics

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

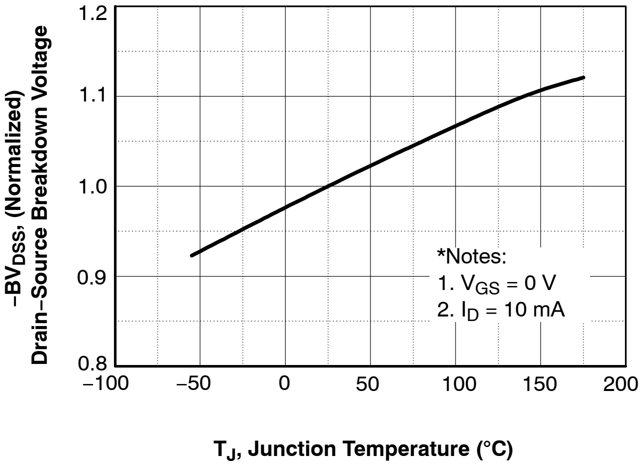


Figure 7. Breakdown Voltage Variation vs. Temperature

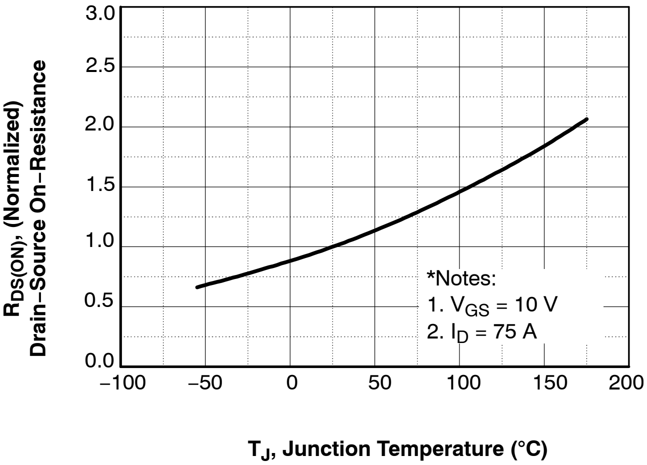


Figure 8. On−Resistance Variation vs. Temperature

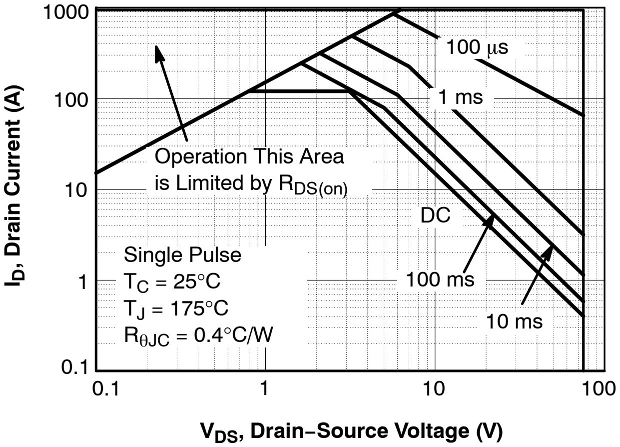


Figure 9. Maximum Safe Operating Area

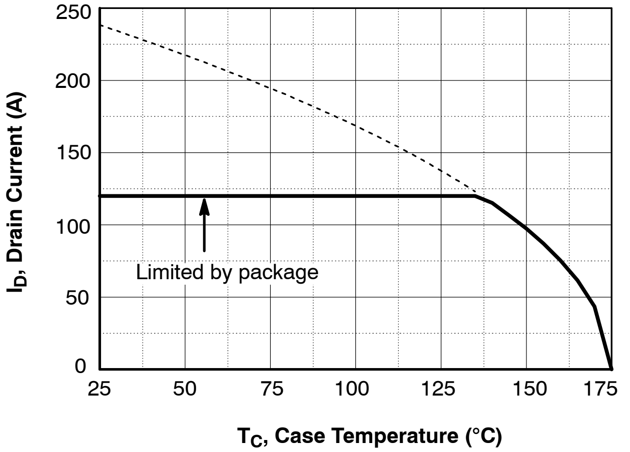


Figure 10. Maximum Drain Current vs. Case Temperature

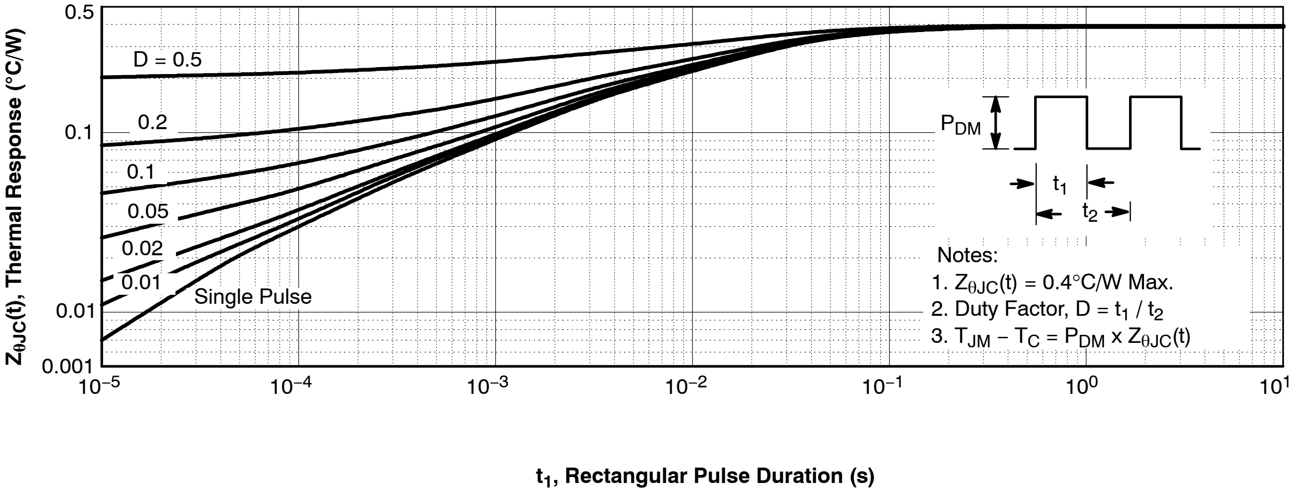


Figure 11. Transient Thermal Response Curve

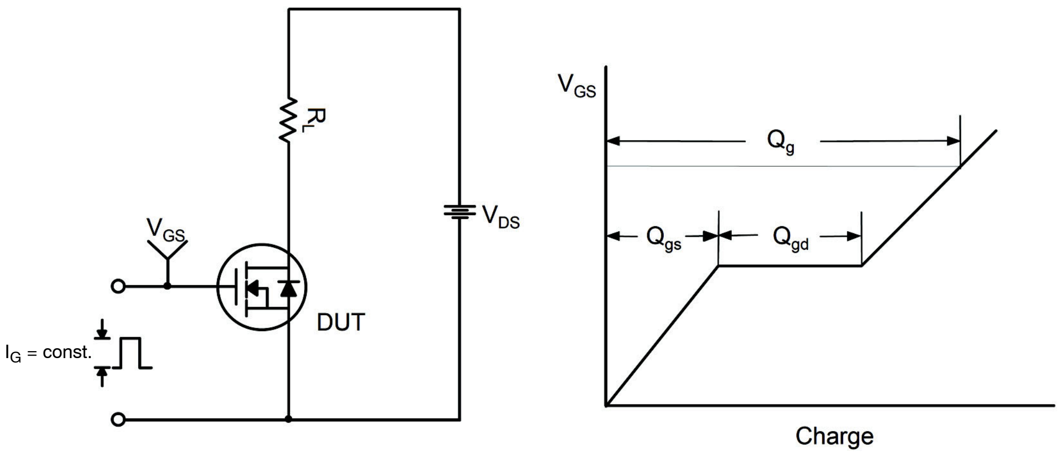


Figure 12. Gate Charge Test Circuit & Waveform

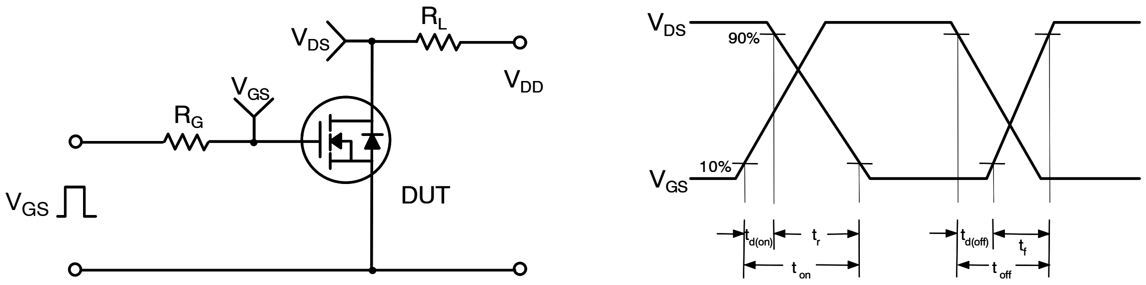


Figure 13. Resistive Switching Test Circuit & Waveforms

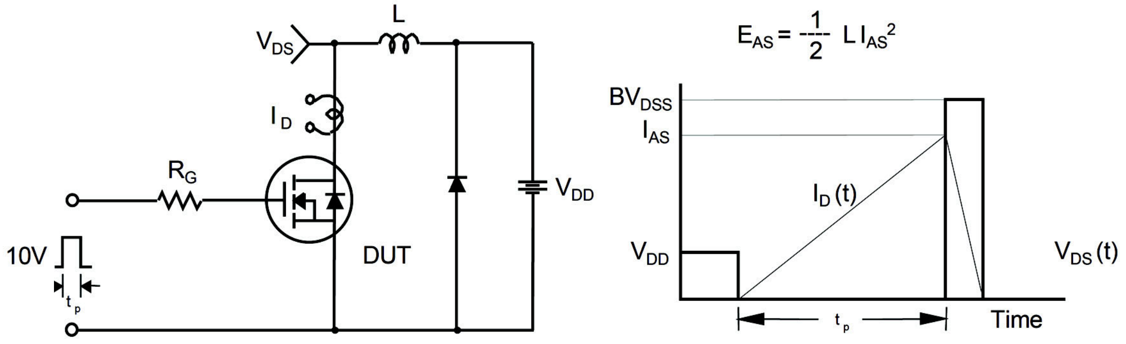


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

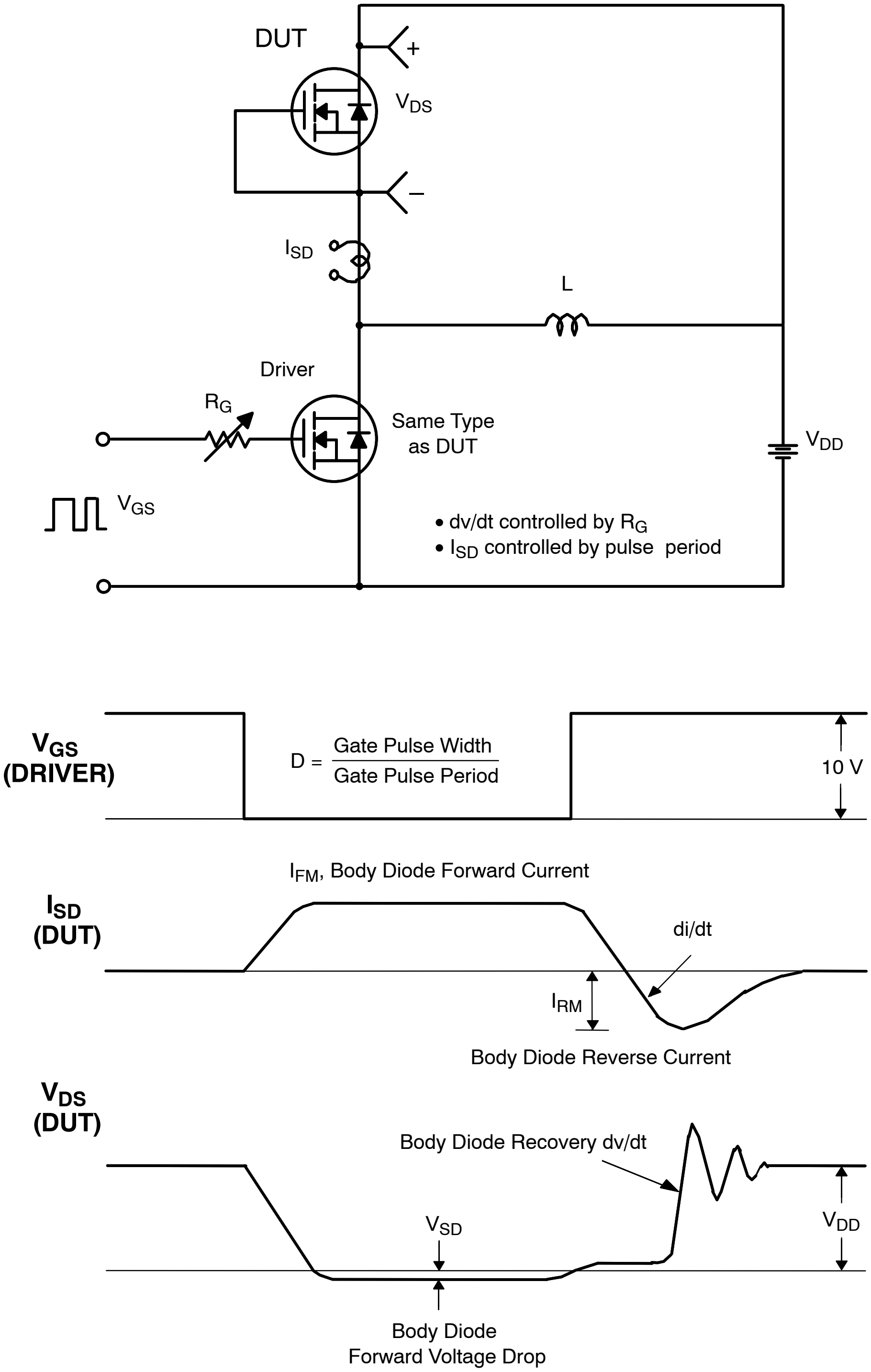
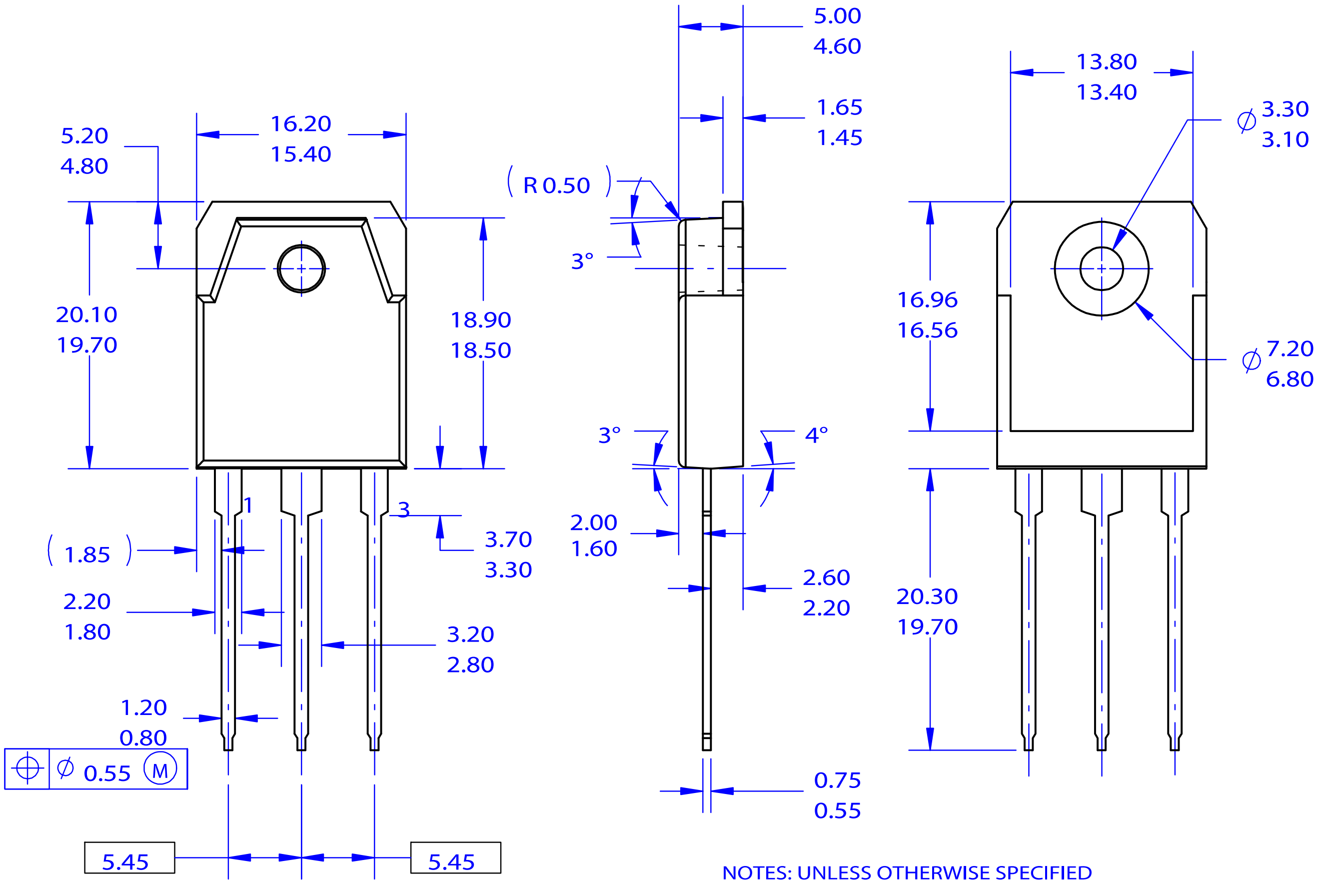


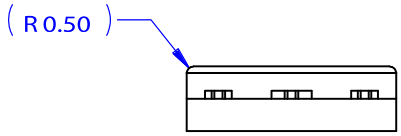
Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

TO−3P−3LD / EIAJ SC−65, ISOLATED
CASE 340BZ
ISSUE O

DATE 31 OCT 2016





NOTES: UNLESS OTHERWISE SPECIFIED

A) THIS PACKAGE CONFORMS TO EIAJ SC-65 PACKAGING STANDARD.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSION AND TOLERANCING PER ASME14.5-2009.
D) DIMENSIONS ARE EXCLUSSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSSIONS.

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DESCRIPTION:	**TO−3P−3LD / EIAJ SC−65, ISOLATED**	**PAGE 1 OF 1**

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