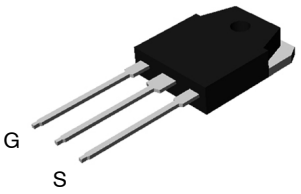
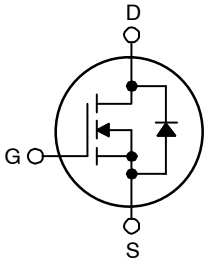
MOSFET – N-Channel, QFET

150 V, 70 A, 28 mΩ

FQA70N15



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



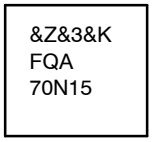
Description

This N−Channel enhancement mode power MOSFET is produced using **onsemi**'s proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on−state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, audio amplifier, DC motor control, and variable switching power applications.

Features

- 70 A, 100 V, $R_{DS(on)}$ = 28 mΩ (Max) @ V_{GS} = 10 V, I_D = 35 A
- Low Gate Charge (Typ. 135 nC)
- Low Crss (Typ. 135 pF)
- 100% Avalanche Tested
- This is a Pb−Free Device

MARKING DIAGRAM



&Z = Assembly Location
&3 = Date Code (Year and Week)
&K = Lot Code
FQA70N15 = Specific Device Code

ABSOLUTE MAXIMUM RATINGS

(T_C = 25°C unless otherwise noted)

Symbol	Parameter	FQA70N15	Unit
V_{DSS}	Drain to Source Voltage	150	V
I_D	Drain Current Continuous (T_C = 25°C) Continuous (T_C = 100°C)	 70 50	 A
I_{DM}	Drain Current − Pulsed (Note 1)	250	A
V_{GSS}	Gate to Source Voltage	±25	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	1000	mJ
I_{AR}	Avalanche Current (Note 1)	70	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	33	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	6.0	V/ns
P_D	Power Dissipation (T_C = 25°C) − Derate above 25°C	 330 2.2	 W W/°C
T_J, T_{STG}	Operating and Storage Temperature Range	−55 to +175	°C
T_L	Maximum Lead Temperature for Soldering Purposes, 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 = 0.34 mH, I_{AS} = 70 A, V_{DD} = 25 V, R_G = 25 Ω, Starting T_J = 25°C.
3. I_{SD} ≤ 70 A, di/dt ≤ 300 A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C.

ORDERING INFORMATION

Device	Package	Shipping†
FQA70N15	TO−3P (Pb−Free)	450 / Tube

THERMAL CHARACTERISTICS

Symbol	Parameter	FQA70N15	Unit
$R_{\theta JC}$	Thermal Resistance, Junction−to−Case, Max	0.45	°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	150	–	–	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	–	0.15	–	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 150 V, V_{GS} = 0 V	–	–	1	μA
		V_{DS} = 120 V, T_C = 150°C	–	–	10	
I_{GSSF}	Gate to Body Leakage Current, Forward	V_{GS} = 25 V, V_{DS} = 0 V	–	–	100	nA
I_{GSSR}	Gate to Body Leakage Current, Reverse	V_{GS} = −25 V, V_{DS} = 0 V	–	–	−100	
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	2.0	–	4.0	V
$R_{DS(on)}$	Static Drain to Source On−Resistance	V_{GS} = 10 V, I_D = 35 A	–	0.023	0.028	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40 V, I_D = 35 A	–	48	–	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	–	4150	5400	pF
C_{oss}	Output Capacitance		–	840	1100	pF
C_{rss}	Reverse Transfer Capacitance		–	135	175	pF
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = 75 V, I_D = 70 A, R_G = 25 Ω (Note 4)	–	60	130	ns
t_r	Turn−On Rise Time		–	420	850	ns
$t_{d(off)}$	Turn−Off Delay Time		–	340	690	ns
t_f	Turn−Off Fall Time		–	290	590	ns
Q_g	Total Gate Charge	V_{DS} = 120 V, I_D = 70 A, V_{GS} = 10 V (Note 4)	–	135	175	nC
Q_{gs}	Gate to Source Charge		–	25	–	nC
Q_{gd}	Gate to Drain Charge		–	65	–	nC
DRAIN−SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
I_S	Maximum Continuous Drain to Source Diode Forward Current		–	–	70	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		–	–	280	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 70 A	–	–	1.5	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 70 A, dI_F/dt = 100 A/μs	–	150	–	ns
Q_{rr}	Reverse Recovery Charge		–	0.67	–	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.

4. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

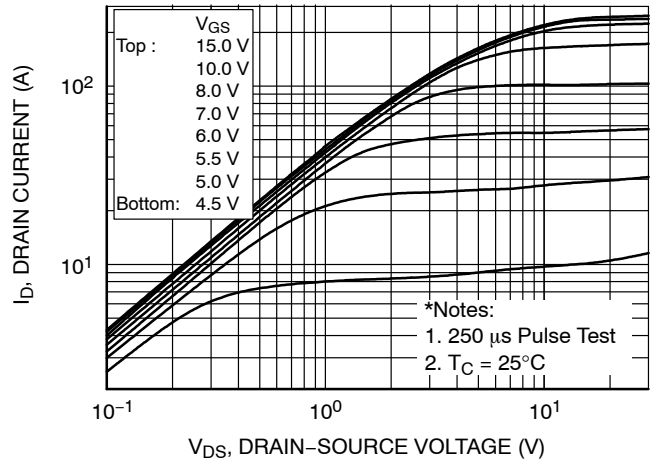


Figure 1. On−Region Characteristics

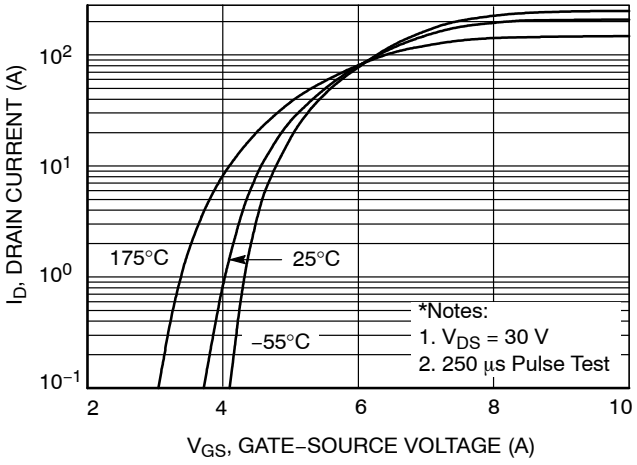


Figure 2. Transfer Characteristics

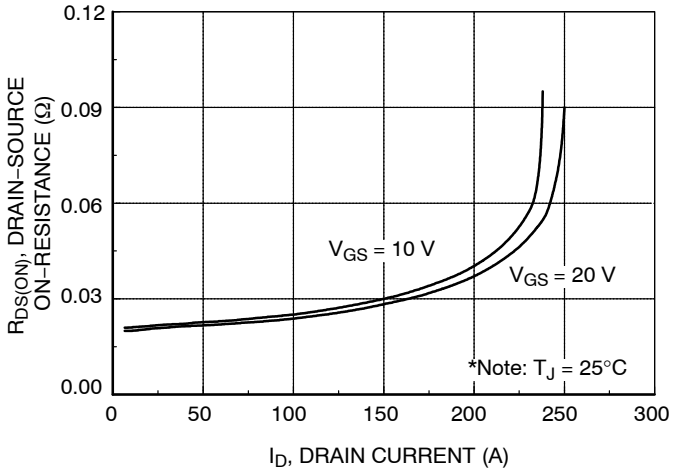


Figure 3. On−Resistance Variation vs. Drain Current and Gate Voltage

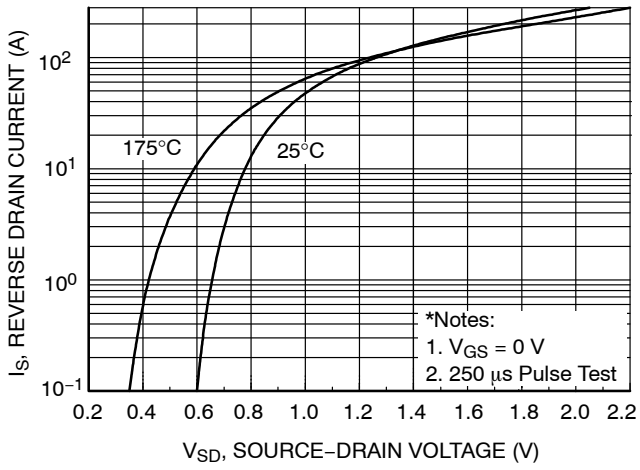


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

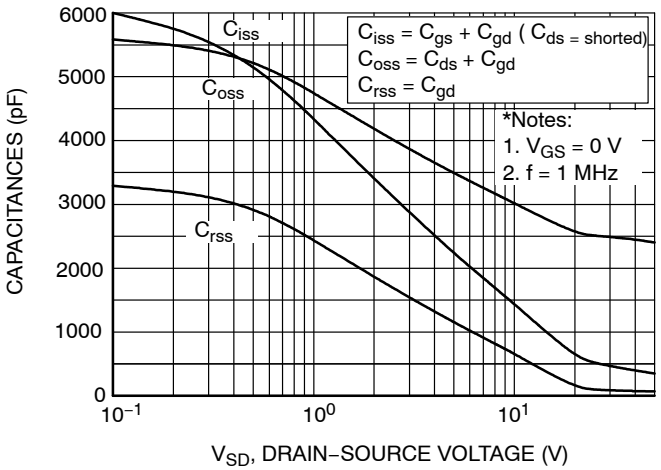


Figure 5. Capacitance Characteristics

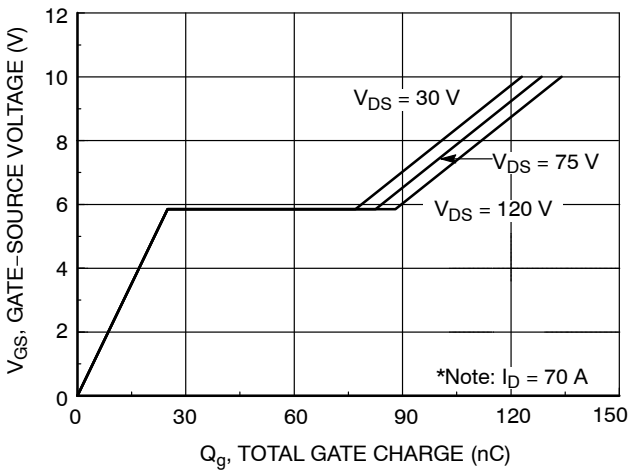


Figure 6. Gate Charge Characteristics

TYPICAL CHARACTERISTICS (CONTINUED)

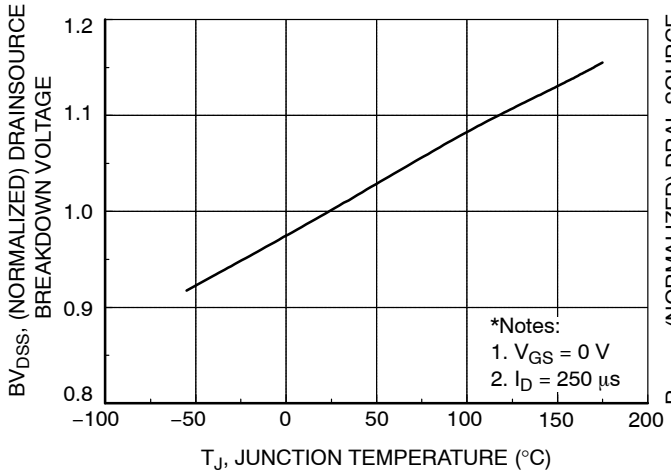


Figure 7. Breakdown Voltage Variation vs. Temperature

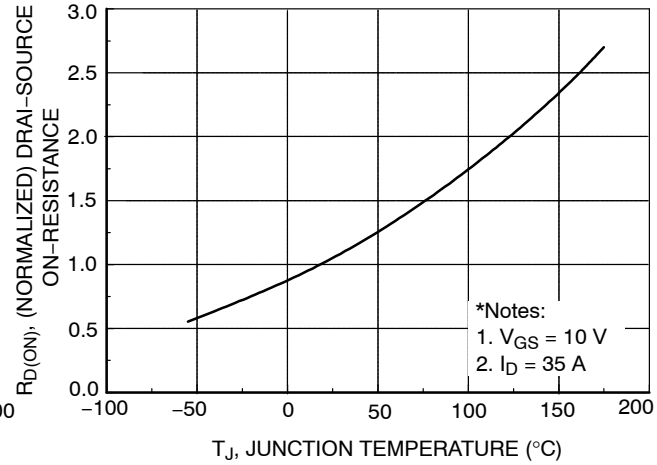


Figure 8. On−Resistance Variation vs. Temperature

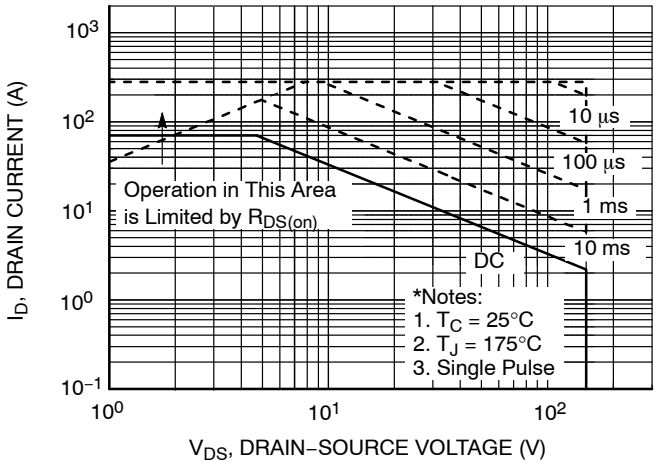


Figure 9. Maximum Safe Operating Area

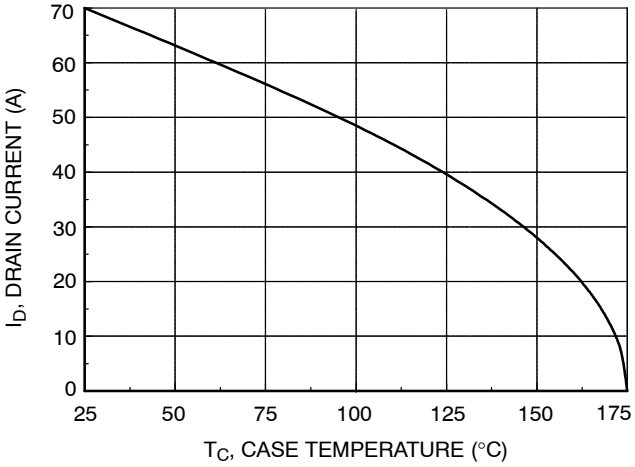


Figure 10. Maximum Drain Current vs. Case Temperature

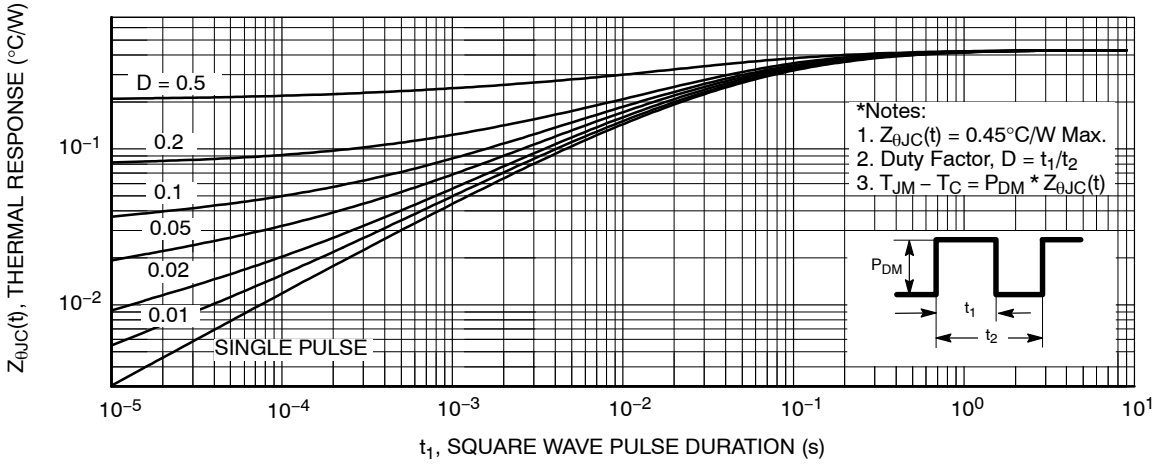


Figure 11. Transient Thermal Response Curve

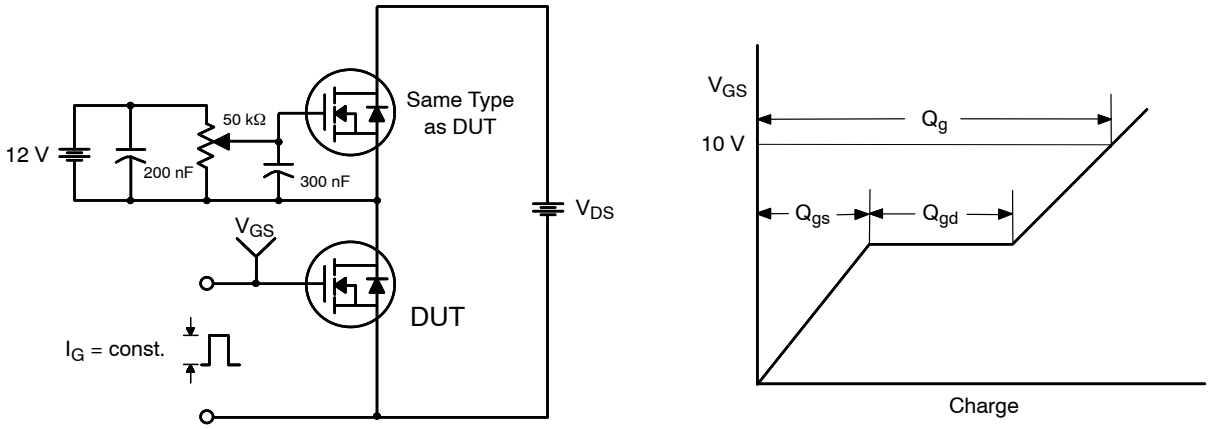


Figure 12. Gate Charge Test Circuit & Waveform

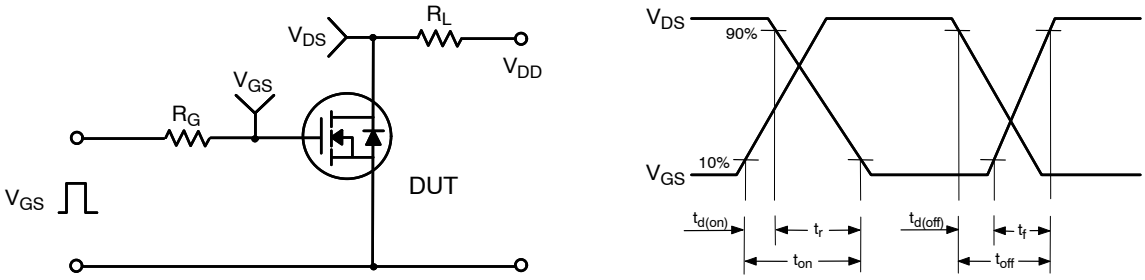


Figure 13. Resistive Switching Test Circuit & Waveforms

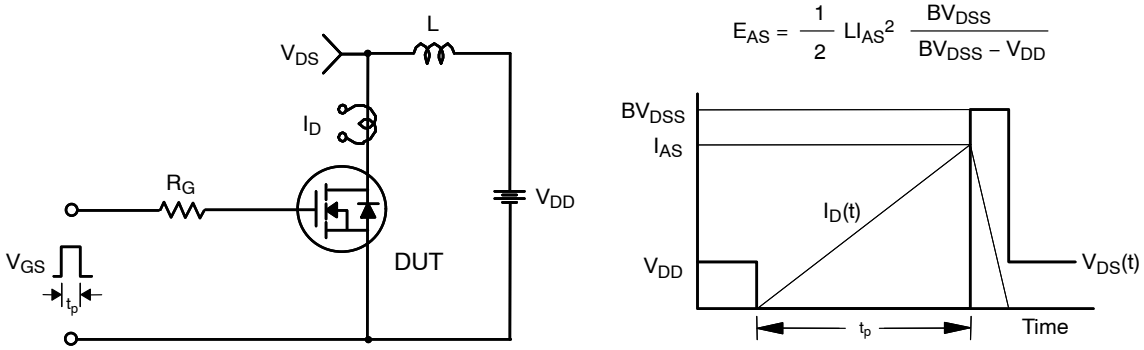


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

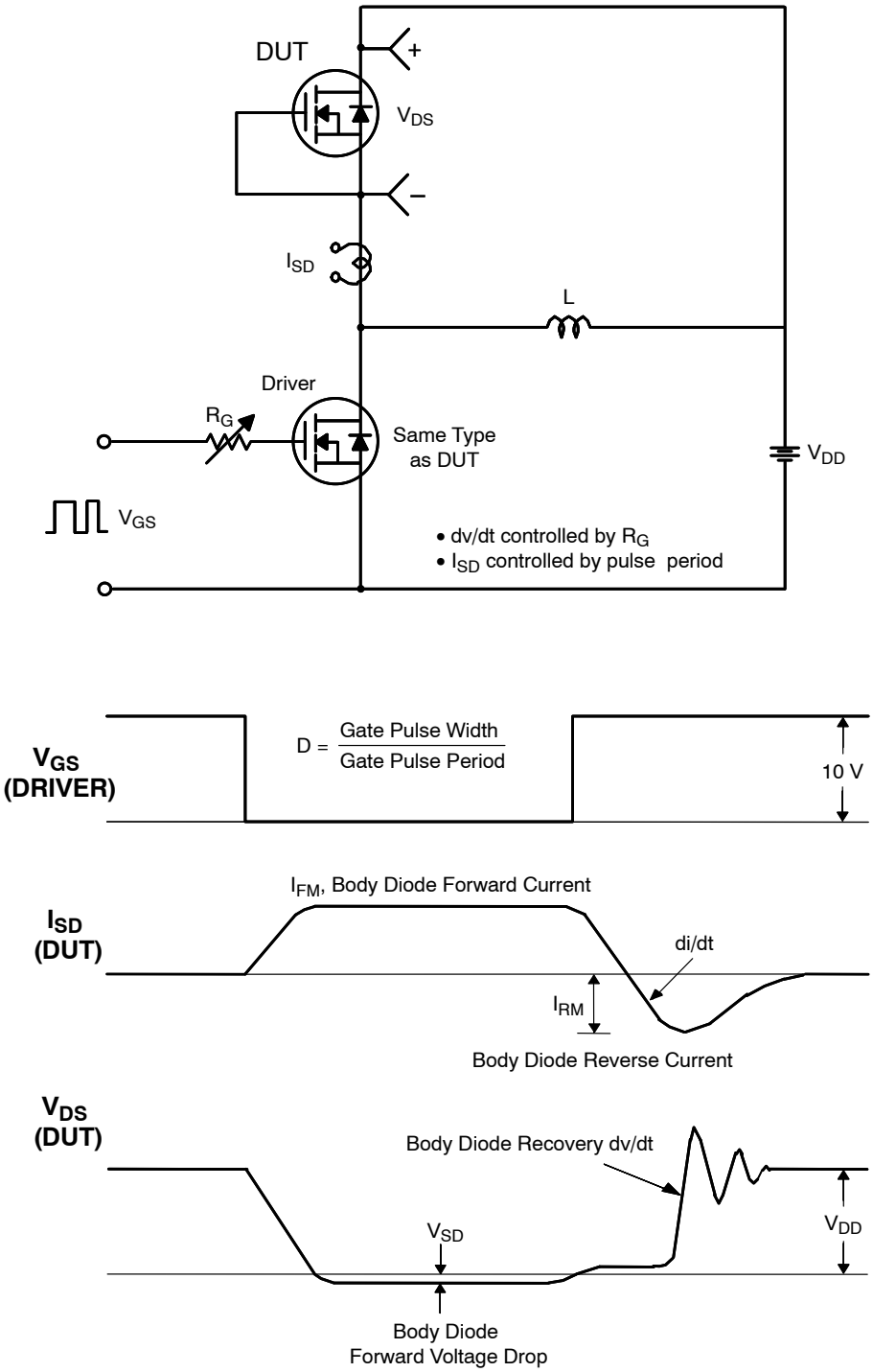
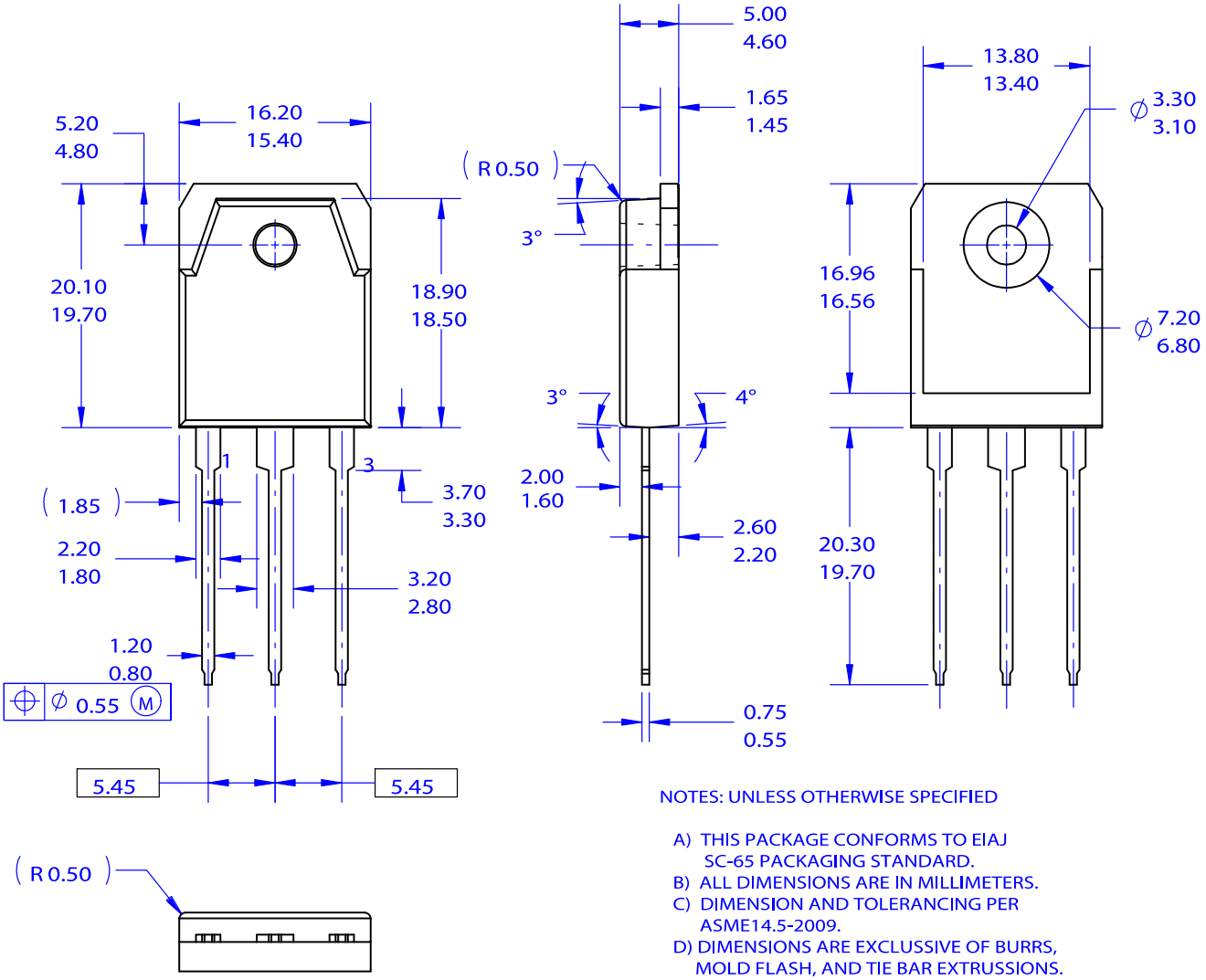


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

TO−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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