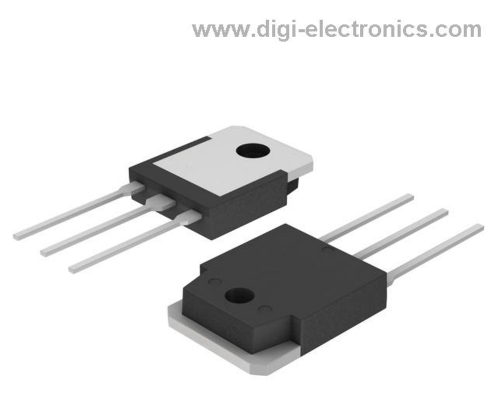
FQA140N10 Datasheet



https://www.DiGi-Electronics.com

DiGi Electronics Part Number	FQA140N10-DG
Manufacturer	onsemi
Manufacturer Product Number	FQA140N10
Description	MOSFET N-CH 100V 140A TO3PN
Detailed Description	N-Channel 100 V 140A (Tc) 375W (Tc) Through Hole TO-3PN

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
FQA140N10	onsemi
Series:	Product Status:
QFET®	Active
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
100 V	140A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
10V	10mOhm @ 70A, 10V
Vgs(th) (Max) @ Id:	Gate Charge (Qg) (Max) @ Vgs:
4V @ 250μA	285 nC @ 10 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±25V	7900 pF @ 25 V
FET Feature:	Power Dissipation (Max):
-	375W (Tc)
Operating Temperature:	Mounting Type:
-55°C ~ 175°C (TJ)	Through Hole
Supplier Device Package:	Package / Case:
TO-3PN	TO-3P-3, SC-65-3
Base Product Number:	
FQA140	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	Not Applicable
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.29.0095	

DATA SHEET
www.onsemi.com

MOSFET – N-Channel QFET

100 V, 140 A, 10 mΩ

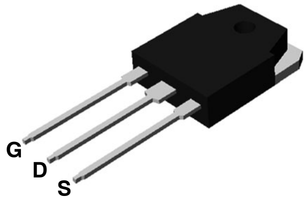
FQA140N10

Description

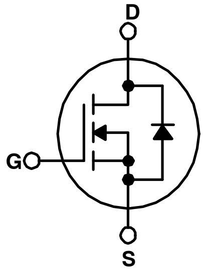
This N−Channel Enhancement Mode Power MOSFET is produced using **onsemi**'s proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on−state resistance, and to provide superior switching performance and high avalanche energy strength. These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

Features

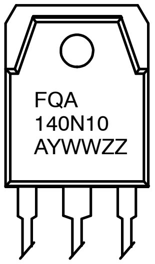
- 140 A, 100 V, $R_{DS(on)}$ = 10 mΩ (Max.) @ V_{GS} = 10 V, I_D = 70 A
- Low Gate Charge (Typ. 220 nC)
- Low Crss (Typ. 470 pF)
- 100% Avalanche Tested
- 175°C Maximum Junction Temperature Rating



TO−3P−3LD
CASE 340BZ



MARKING DIAGRAM



FQA140N10 = Specific Device Code
A = Assembly Location
YWW = Date Code (Year and Week)
ZZ = Assembly Lot Code

ORDERING INFORMATION

Device	Package	Shipping
FQA140N10	TO−3P−3LD (Pb−Free)	450 Units / Tube

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

Symbol	Parameter	Value	Unit
V_{DSS}	Drain−Source Voltage	100	V
I_D	Drain Current		A
	− Continuous (T_C = 25°C)	140	
	− Continuous (T_C = 100°C)	99	
I_{DM}	Drain Current − Pulsed (Note 1)	560	A
V_{GSS}	Gate−Source Voltage	±25	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	1500	mJ
I_{AR}	Avalanche Current (Note 1)	140	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	37.5	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	6.5	V/ns
P_D	Power Dissipation		
	− (T_C = 25°C)	375	W
	− Derate Above 25°C	2.5	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.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	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 Characteristics						
BV_{DSS}	Drain−Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	100	–	–	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	–	0.08	–	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80 V, V_{GS} = 0 V	–	–	1	μA
		V_{DS} = 64 V, T_C = 150°C	–	–	10	μA
I_{GSSF}	Gate−Body Leakage Current, Forward	V_{GS} = 25 V, V_{DS} = 0 V	–	–	100	nA
I_{GSSR}	Gate−Body Leakage Current, Reverse	V_{GS} = −25 V, V_{DS} = 0 V	–	–	−100	nA
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−Source On−Resistance	V_{GS} = 10 V, I_D = 70 A	–	0.008	0.01	Ω
g_{FS}	Forward Transconductance	V_{DS} = 30 V, I_D = 70 A	–	80	–	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	–	6100	7900	pF
C_{oss}	Output Capacitance		–	2000	2600	pF
C_{rss}	Reverse Transfer Capacitance		–	420	550	pF
Switching Characteristics						
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = 40 V, I_D = 140 A, R_G = 25 Ω (Note 4)	–	75	160	ns
t_r	Turn−On Rise Time		–	940	1890	ns
$t_{d(off)}$	Turn−Off Delay Time		–	350	710	ns
t_f	Turn−Off Fall Time		–	360	730	ns
Qg	Total Gate Charge	V_{DS} = 64 V, I_D = 140 A, V_{GS} = 10 V (Note 4)	–	220	285	nC
Qgs	Gate−Source Charge		–	39	–	nC
Qgd	Gate−Drain Charge		–	114	–	nC
Drain−Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain−Source Diode Forward Current (Note 5)		–	–	140	A
I_{SM}	Maximum Pulsed Drain−Source Diode Forward Current		–	–	560	A
V_{SD}	Drain−Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 140 A	–	–	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 140 A, dI_F/dt = 100 A/μs	–	140	–	ns
Q_{rr}	Reverse Recovery Charge		–	730	–	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.

NOTES:
1. Repetitive rating: pulse−width limited by maximum junction temperature.
2. L = 0.115 mH, I_{AS} = 140 A, V_{DD} = 25 V, R_G = 25 Ω, starting T_J = 25°C.
3. $I_{SD} \leq$ 140 A, di/dt $\leq$ 300 A/μs, $V_{DD} \leq BV_{DSS}$, starting T_J = 25°C.
4. Essentially independent of operating temperature.
5. Continuous drain current calculated by maximum junction temperature: limited by package.

TYPICAL CHARACTERISTICS

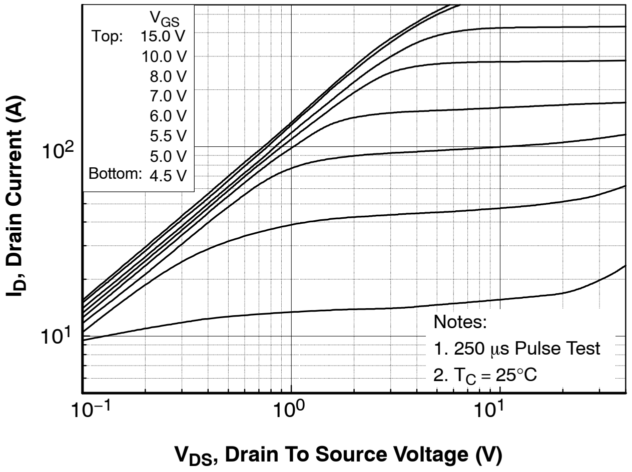


Figure 1. On−Region Characteristics

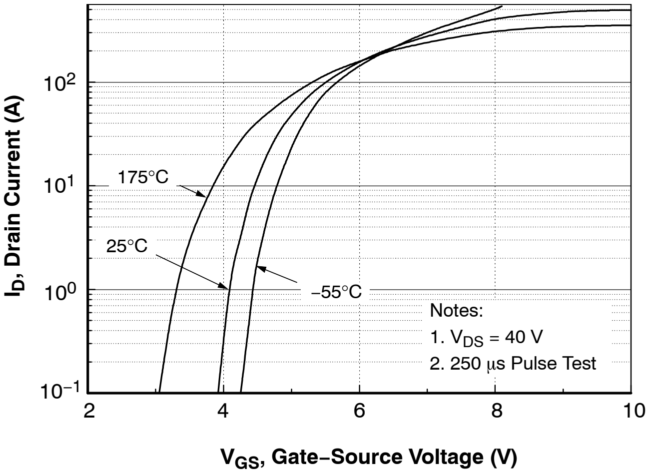


Figure 2. Transfer Characteristics

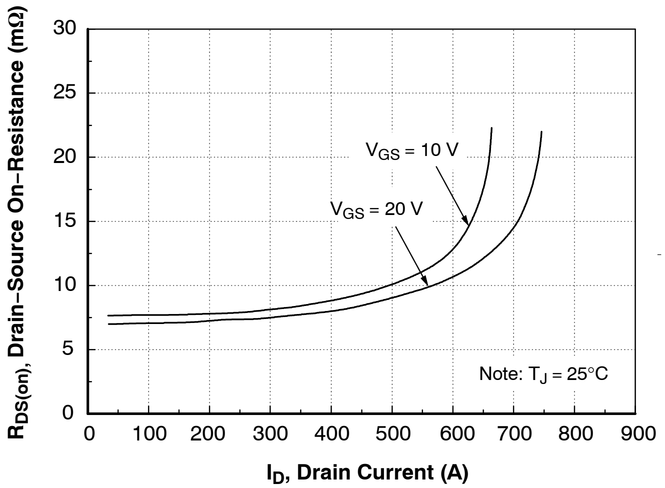


Figure 3. On−Resistance Variation vs Drain Current and Gate Voltage

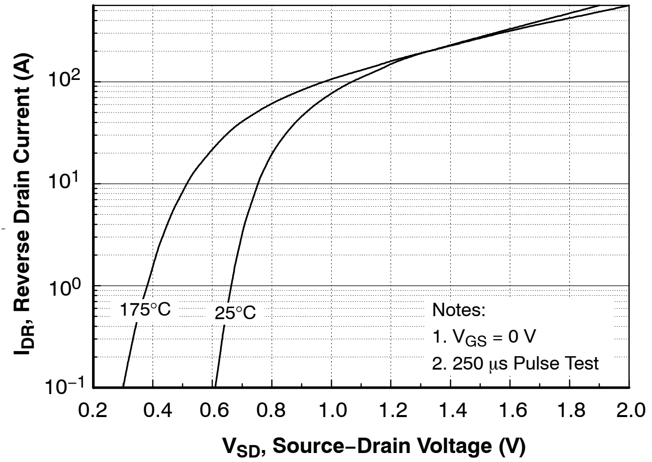


Figure 4. Body Diode Forward Voltage Variation vs Source Current and Temperature

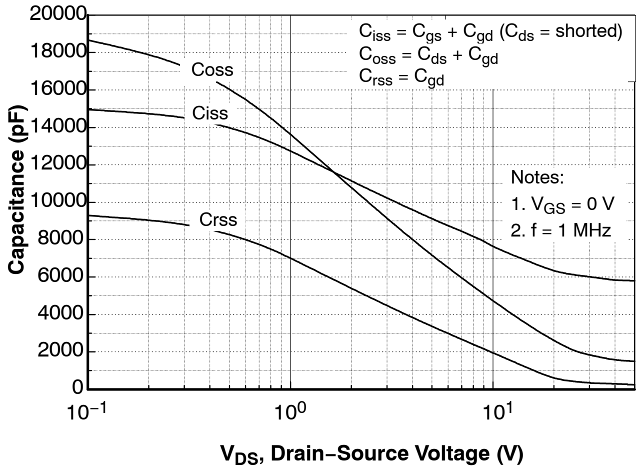


Figure 5. Capacitance Characteristics

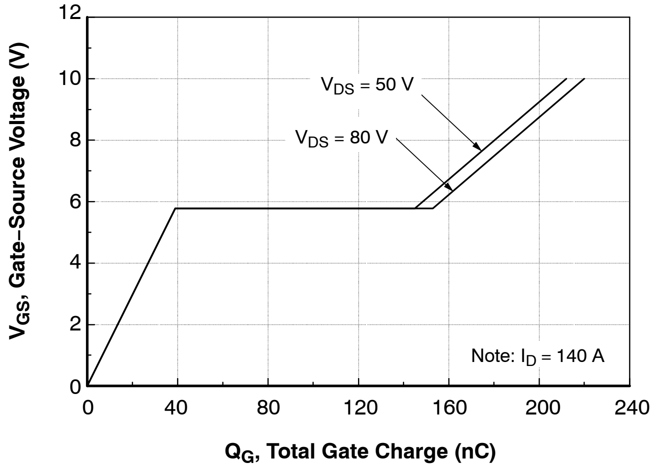


Figure 6. Gate Charge Characteristics

TYPICAL CHARACTERISTICS (continued)

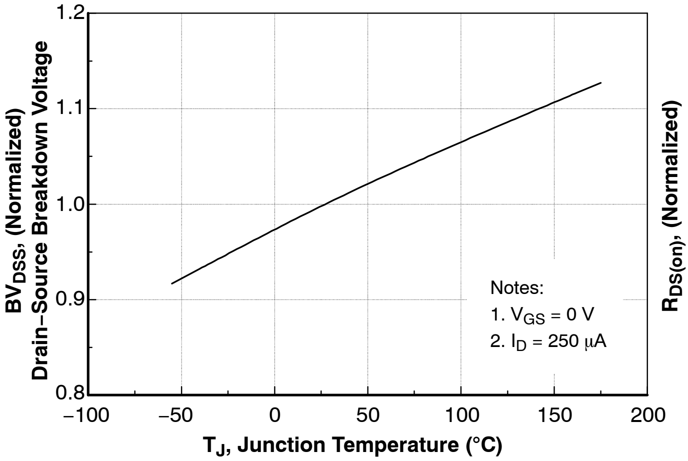


Figure 7. Breakdown Voltage Variation vs Temperature

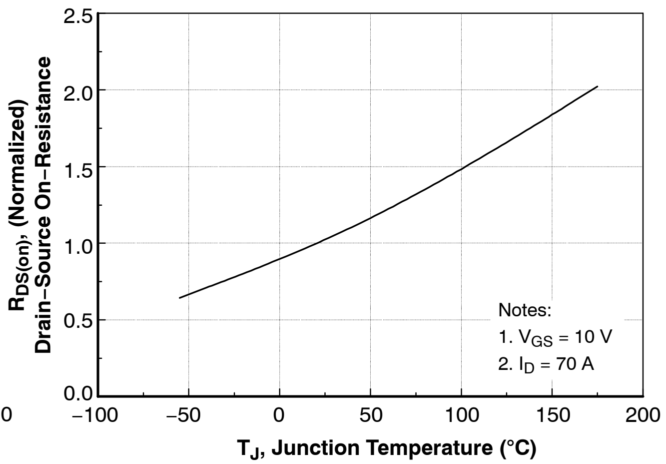


Figure 8. On−Resistance Variation vs Temperature

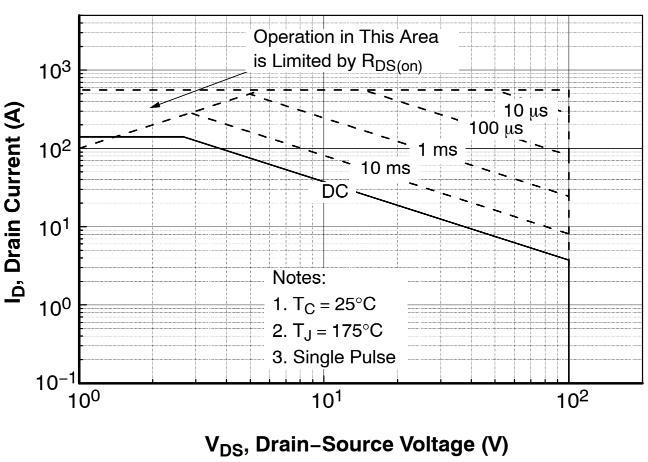


Figure 9. Maximum Safe Operating Area

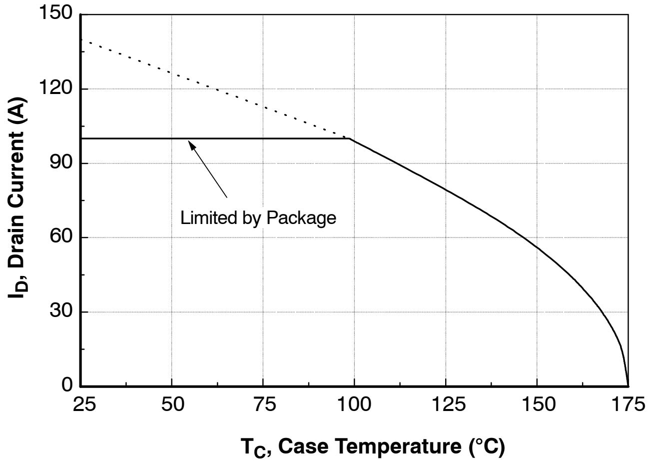


Figure 10. Maximum Drain Current vs. Case Temperature

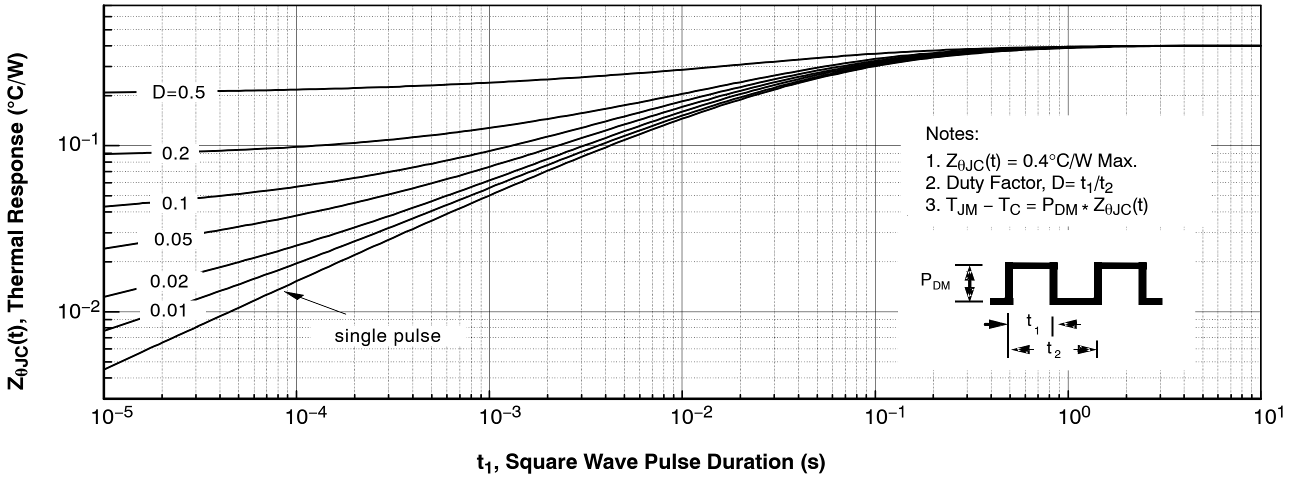


Figure 11. Transient Thermal Response Curve

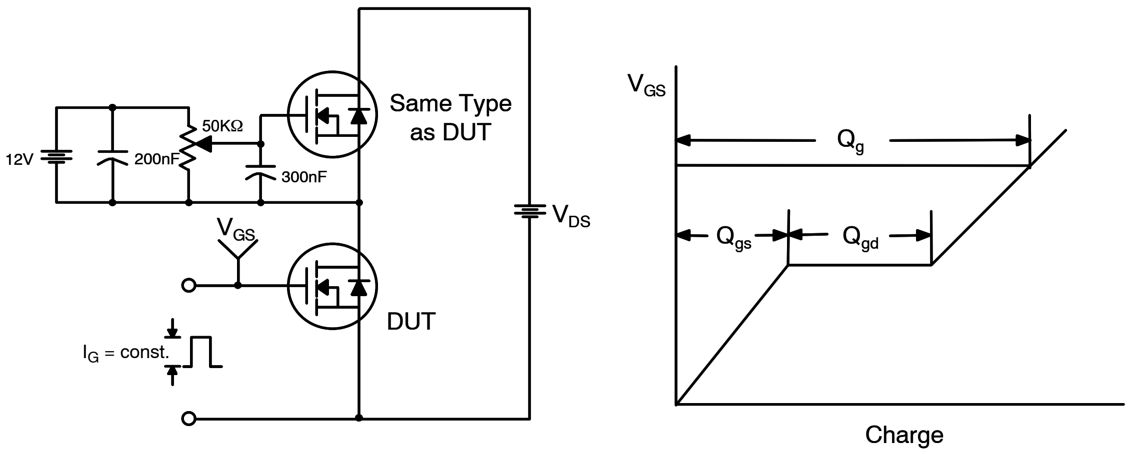


Figure 12. Gate Charge Test Circuit & Waveform

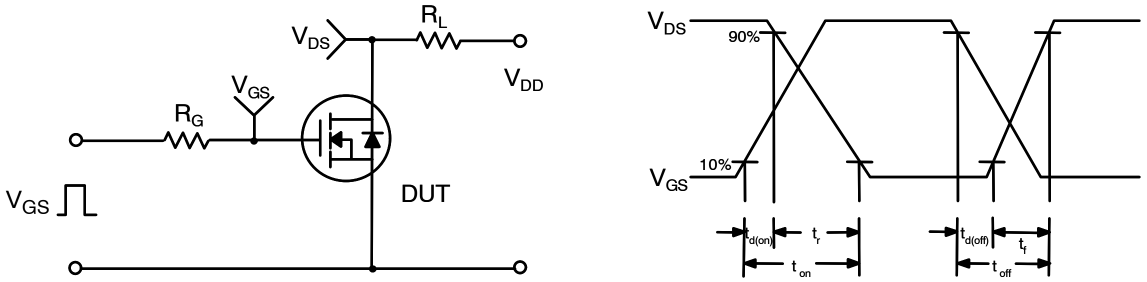


Figure 13. Resistive Switching Test Circuit & Waveforms

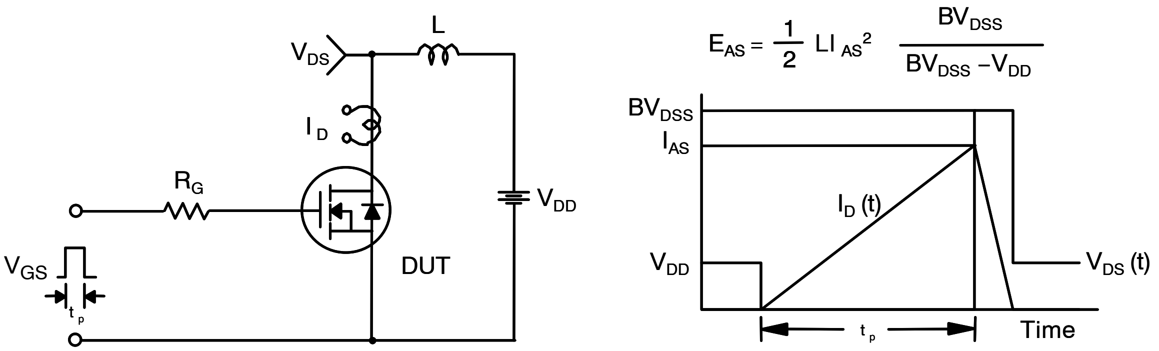


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

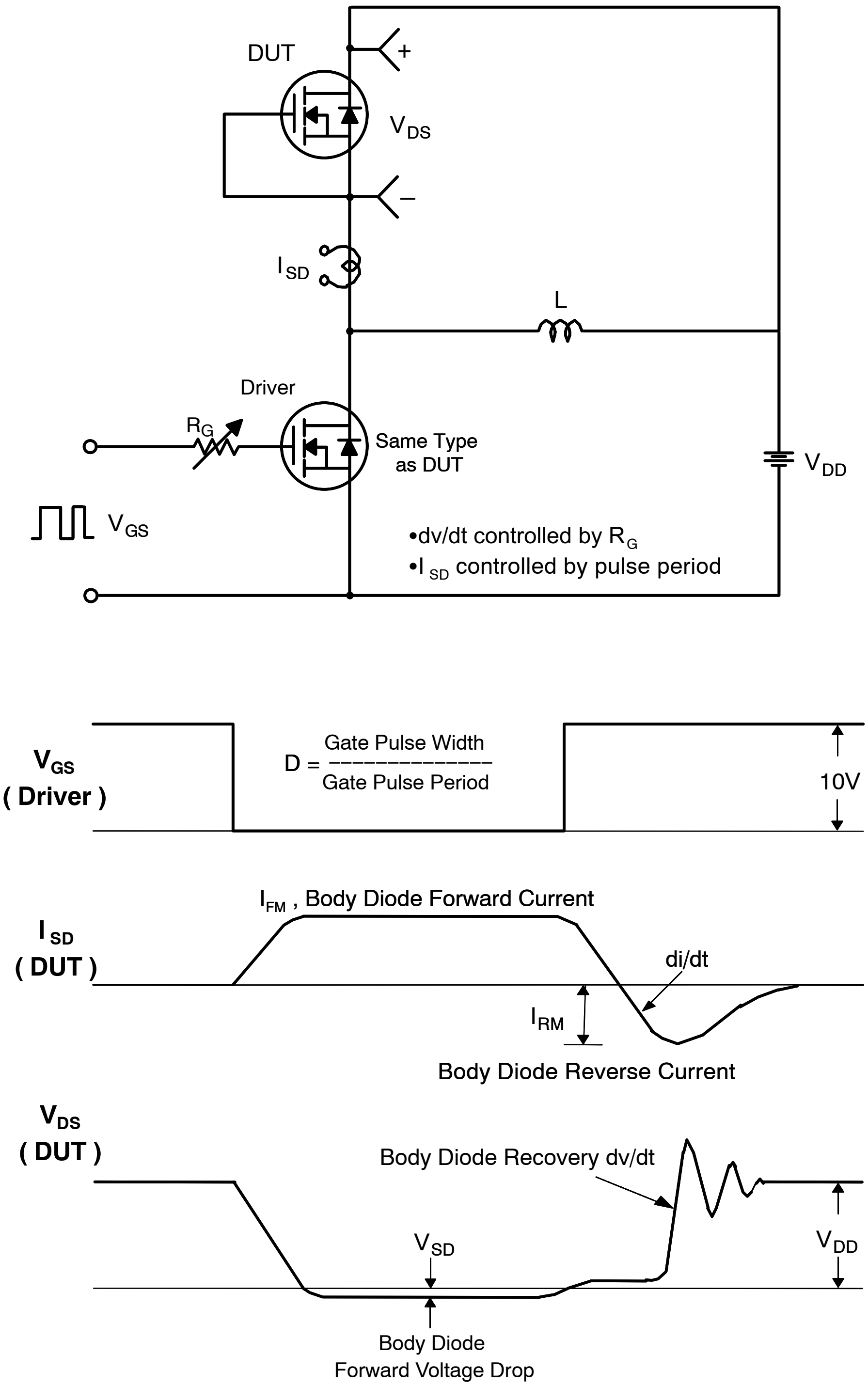
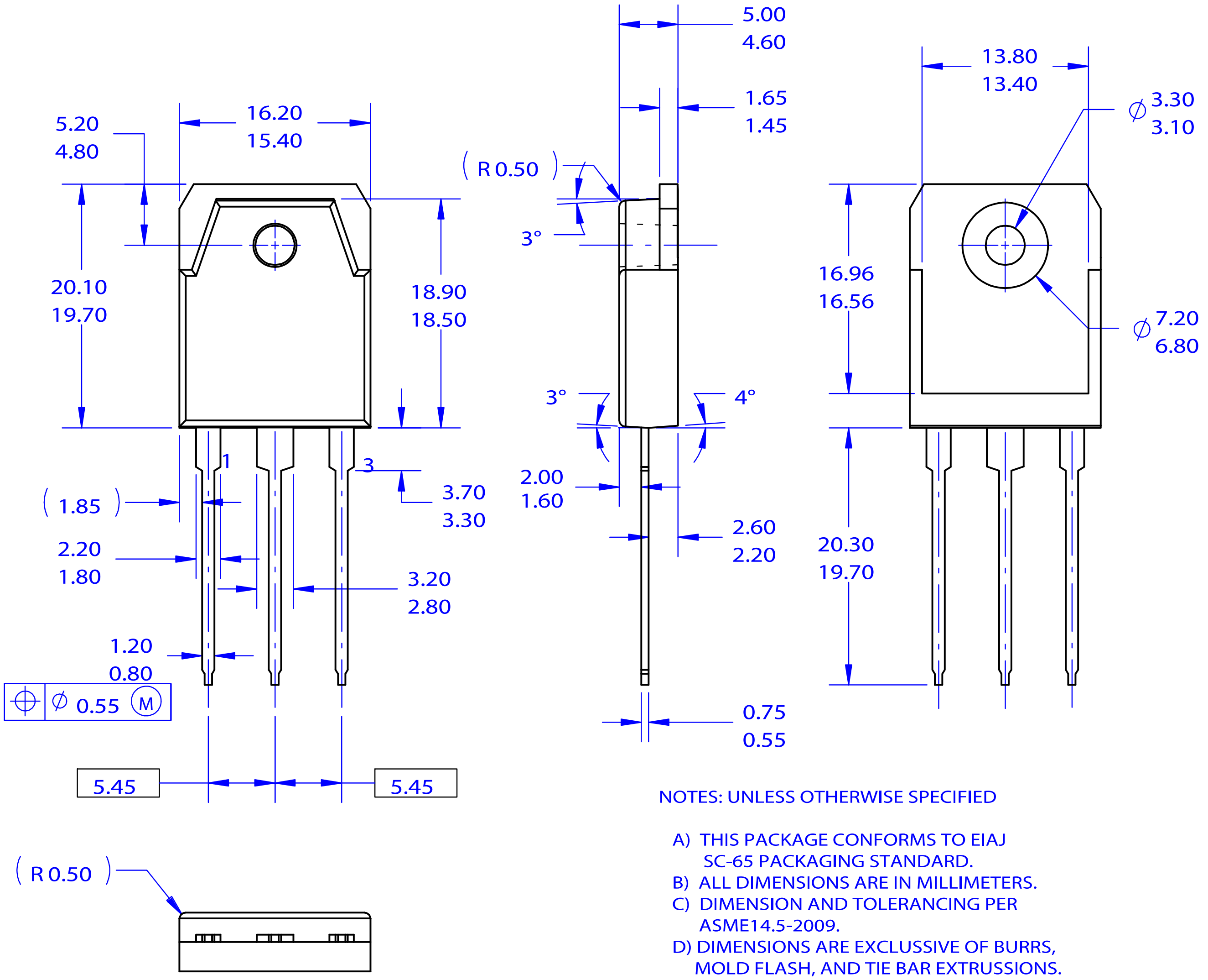


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

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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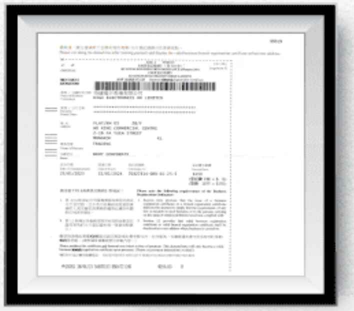

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