FCP260N65S3

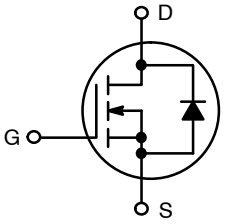
MOSFET – Power, N-Channel, SUPERFET III, Easy Drive

650 V, 12 A, 260 mΩ

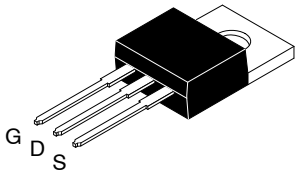
ON Semiconductor®

www.onsemi.com

V_{DSS}	$R_{DS(ON)}$ MAX	I_D MAX
650 V	260 mΩ @ 10 V	12 A



POWER MOSFET



TO−220
CASE 340AT

Description

SUPERFET III MOSFET is ON Semiconductor's brand-new high voltage super-junction (SJ) MOSFET family that is utilizing charge balance technology for outstanding low on-resistance and lower gate charge performance. This advanced technology is tailored to minimize conduction loss, provide superior switching performance, and withstand extreme dv/dt rate. Consequently, SUPERFET III MOSFET Easy drive series helps manage EMI issues and allows for easier design implementation.

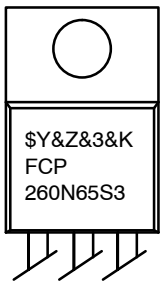
Features

- 700 V @ T_J = 150°C
- Typ. $R_{DS(on)}$ = 222 mΩ
- Ultra Low Gate Charge (Typ. Q_g = 24 nC)
- Low Effective Output Capacitance (Typ. $C_{oss(eff.)}$ = 248 pF)
- 100% Avalanche Tested
- These Devices are Pb−Free and are RoHS Compliant

Applications

- Computing / Display Power Supplies
- Telecom / Server Power Supplies
- Industrial Power Supplies
- Lighting / Charger / Adapter

MARKING DIAGRAM



$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
FCP260N65S3	= Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, Unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{DSS}	Drain to Source Voltage		650	V
V_{GSS}	Gate to Source Voltage	DC	±30	V
		AC (f > 1 Hz)	±30	V
I_D	Drain Current	Continuous (T_C = 25°C)	12	A
		Continuous (T_C = 100°C)	7.6	
I_{DM}	Drain Current	Pulsed (Note 1)	30	A
E_{AS}	Single Pulsed Avalanche Energy (Note 2)		57	mJ
I_{AS}	Avalanche Current (Note 1)		2.3	A
E_{AR}	Repetitive Avalanche Energy (Note 1)		0.9	mJ
dv/dt	MOSFET dv/dt		100	V/ns
	Peak Diode Recovery dv/dt (Note 3)		20	
P_D	Power Dissipation	(T_C = 25°C)	90	W
		Derate Above 25°C	0.72	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 s		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. I_{AS} = 2.3 A, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 6 A, di/dt ≤ 200 A/μs, V_{DD} ≤ 400 V, starting T_J = 25°C.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	1.39	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	

PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Marking	Package	Packing Method	Reel Size	Tape Width	Quantity
FCP260N65S3	FCP260N65S3	TO−220	Tube	N/A	N/A	50 Units

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	V_{GS} = 0 V, I_D = 1 mA, T_J = 25°C	650			V
		V_{GS} = 0 V, I_D = 1 mA, T_J = 150°C	700			V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	I_D = 1 mA, Referenced to 25°C		0.66		V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 650 V, V_{GS} = 0 V			1	μA
		V_{DS} = 520 V, T_C = 125°C		0.77		
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±30 V, V_{DS} = 0 V			±100	nA
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 0.29 mA	2.5		4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 6 A		222	260	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 20 V, I_D = 6 A		7.4		S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 400 V, V_{GS} = 0 V, f = 1 MHz		1010		pF
C_{oss}	Output Capacitance			25		pF
$C_{oss(eff.)}$	Effective Output Capacitance	V_{DS} = 0 V to 400 V, V_{GS} = 0 V		248		pF
$C_{oss(er.)}$	Energy Related Output Capacitance	V_{DS} = 0 V to 400 V, V_{GS} = 0 V		33		pF
$Q_{g(tot)}$	Total Gate Charge at 10 V	V_{DS} = 400 V, I_D = 6 A, V_{GS} = 10 V (Note 4)		24		nC
Q_{gs}	Gate to Source Gate Charge			6.1		nC
Q_{gd}	Gate to Drain “Miller” Charge			9.7		nC
ESR	Equivalent Series Resistance	f = 1 MHz		8.7		Ω
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 400 V, I_D = 6 A, V_{GS} = 10 V, R_g = 4.7 Ω (Note 4)		18		ns
t_r	Turn-On Rise Time			18		ns
$t_{d(off)}$	Turn-Off Delay Time			49		ns
t_f	Turn-Off Fall Time			12		ns
SOURCE-DRAIN DIODE CHARACTERISTICS						
I_S	Maximum Continuous Source to Drain Diode Forward Current				12	A
I_{SM}	Maximum Pulsed Source to Drain Diode Forward Current				30	A
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_{SD} = 6 A			1.2	V
t_{rr}	Reverse Recovery Time	V_{DD} = 400 V, I_{SD} = 6 A, dI_F/dt = 100 A/μs		251		ns
Q_{rr}	Reverse Recovery Charge			3.4		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.

TYPICAL PERFORMANCE CHARACTERISTICS

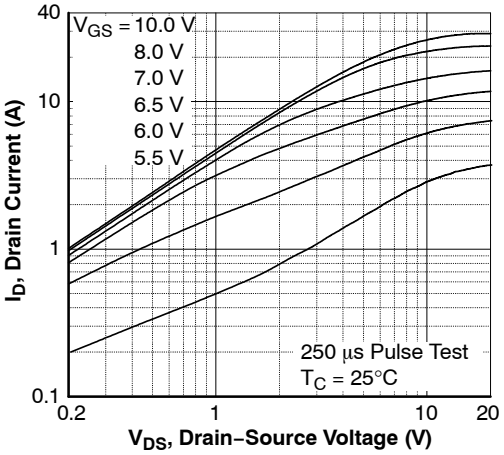


Figure 1. On−Region Characteristics

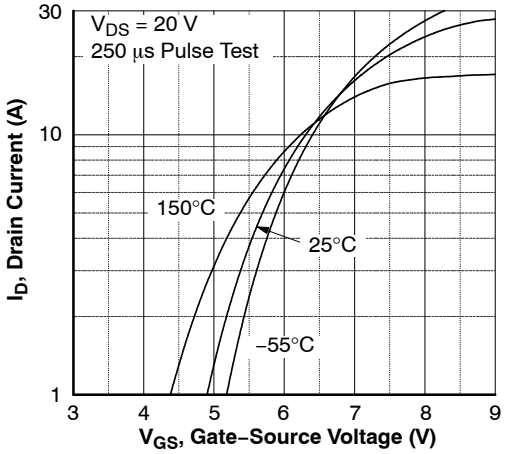


Figure 2. Transfer Characteristics

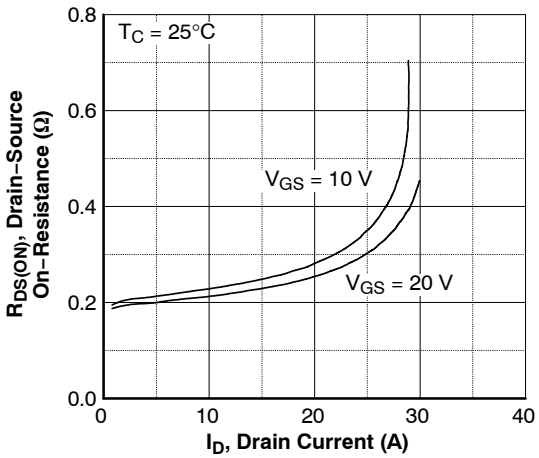


Figure 3. On−Resistance Variation vs. Drain Current and Gate Voltage

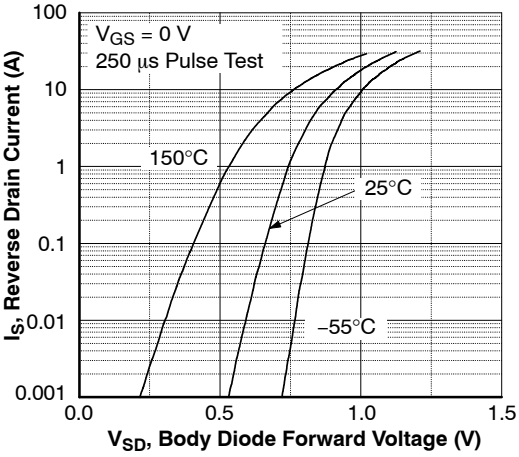


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

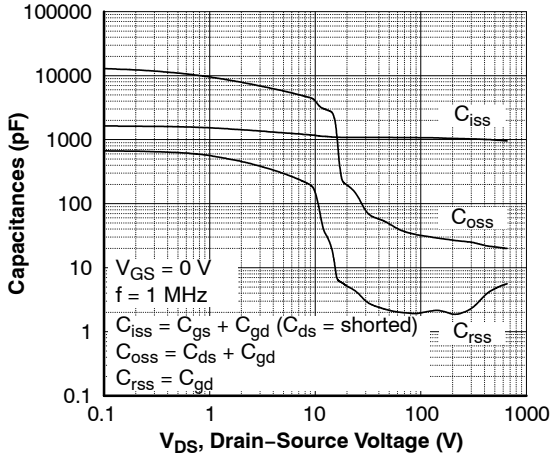


Figure 5. Capacitance Characteristics

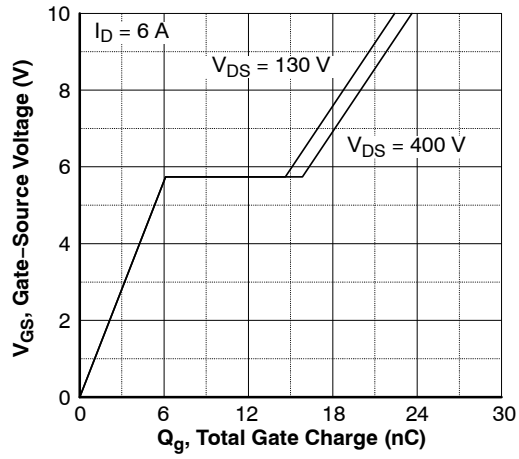


Figure 6. Gate Charge Characteristics

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

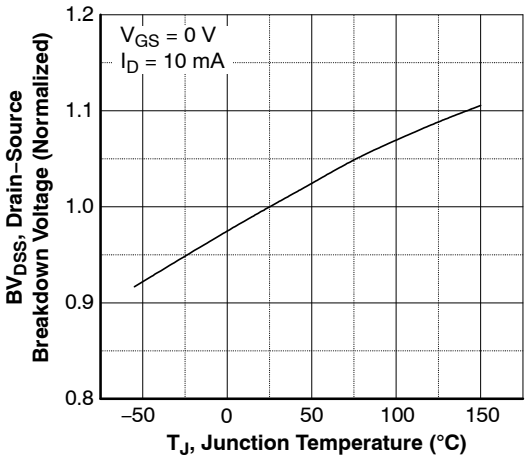


Figure 7. Breakdown Voltage Variation vs. Temperature

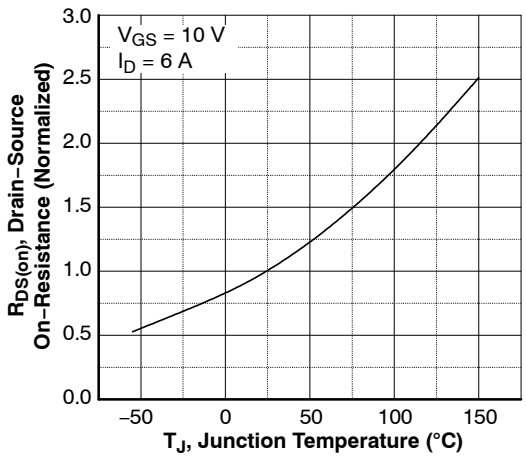


Figure 8. On−Resistance Variation vs. Temperature

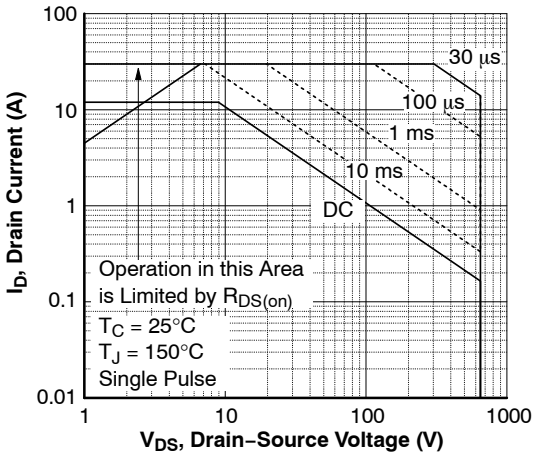


Figure 9. Maximum Safe Operating Area

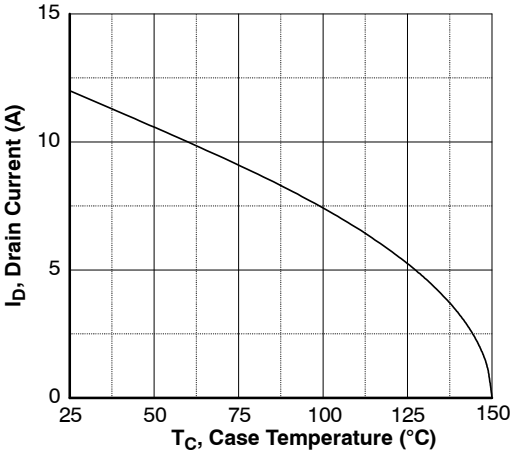


Figure 10. Maximum Drain Current vs. Case Temperature

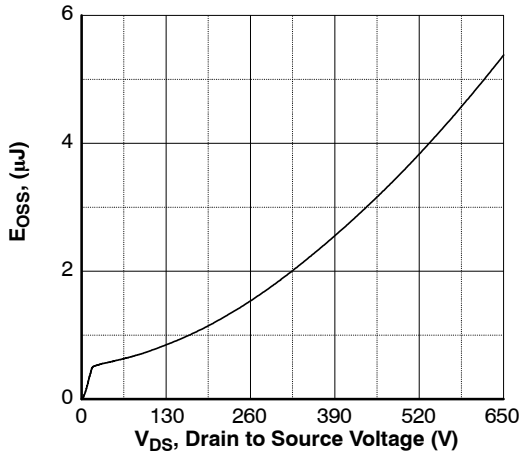


Figure 11. E_{OSS} vs. Drain to Source Voltage

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

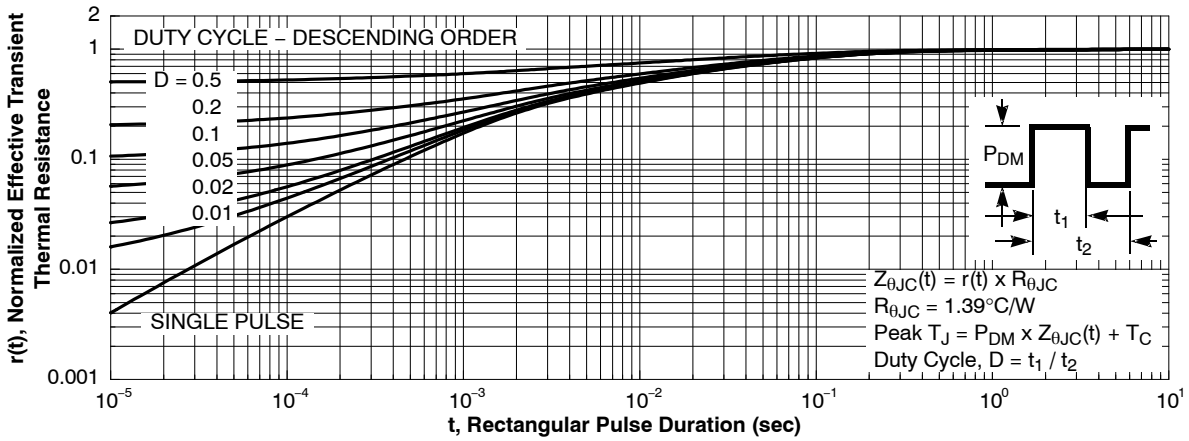


Figure 12. Transient Thermal Response Curve

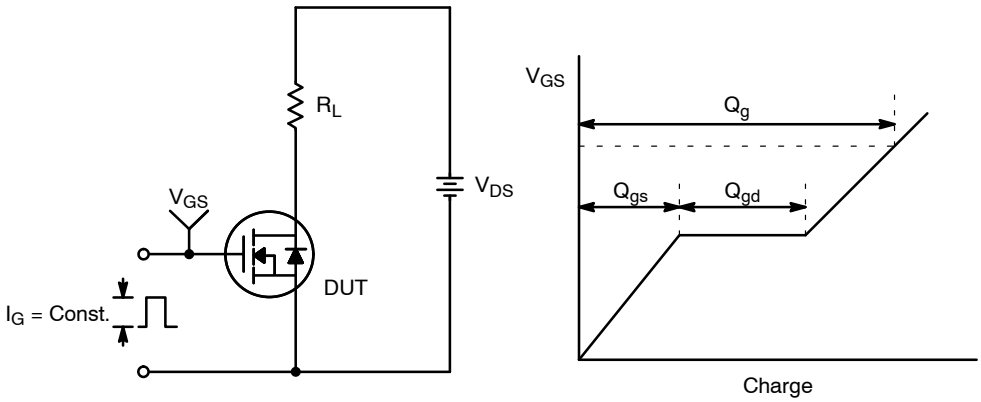


Figure 13. Gate Charge Test Circuit & Waveform

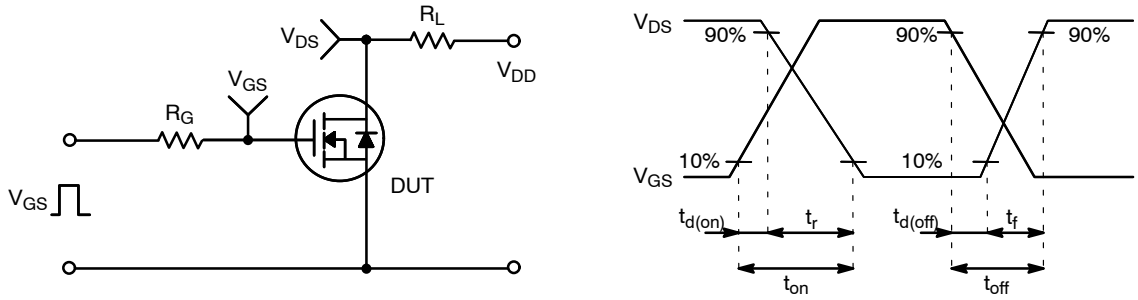


Figure 14. Resistive Switching Test Circuit & Waveforms

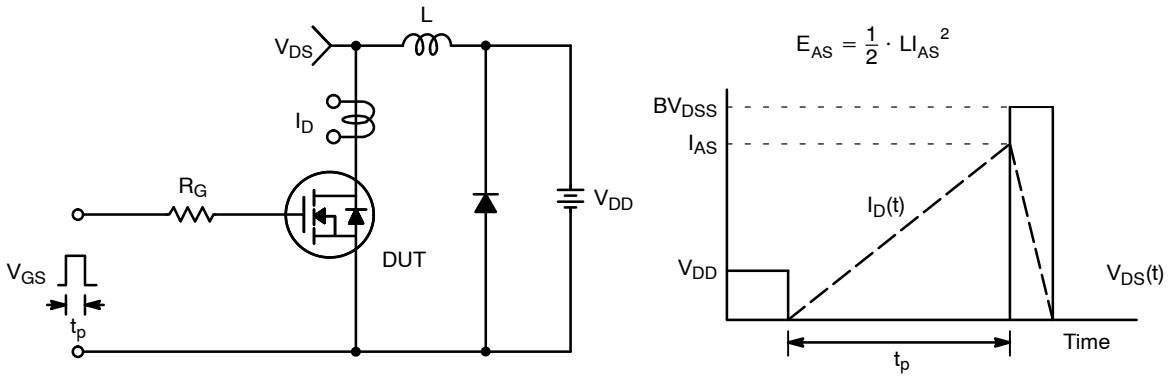


Figure 15. Unclamped Inductive Switching Test Circuit & Waveforms

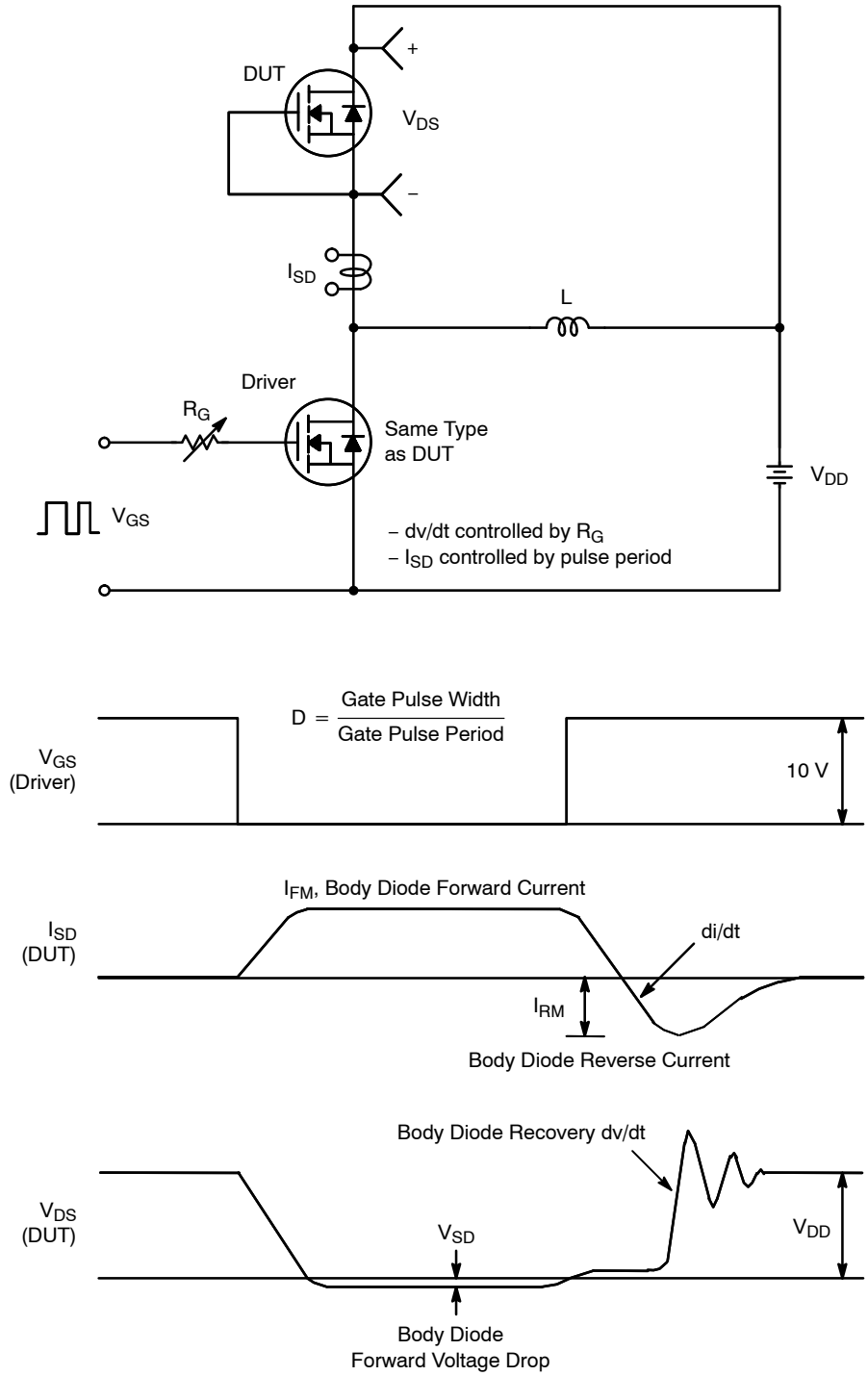
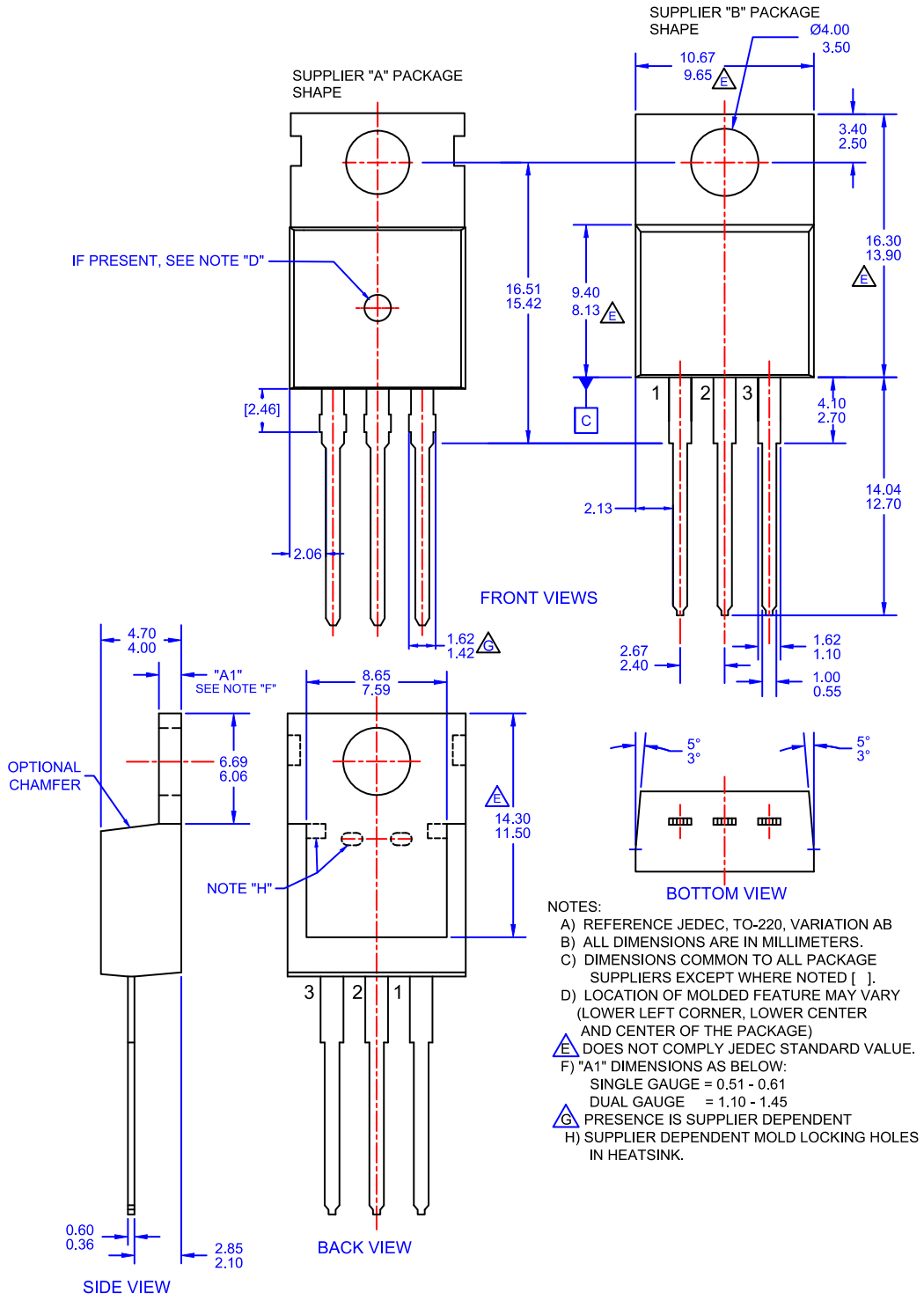


Figure 16. Peak Diode Recovery dv/dt Test Circuit & Waveforms

TO−220−3LD
CASE 340AT
ISSUE A

DATE 03 OCT 2017



DOCUMENT NUMBER:	**98AON13818G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.	
STATUS:	**ON SEMICONDUCTOR STANDARD**		
NEW STANDARD:			
DESCRIPTION:	**TO−220−3LD**		**PAGE 1 OF 2**

ISSUE	REVISION	DATE
O	RELEASED FOR PRODUCTION FROM FAIRCHILD TO220B03 TO ON SEMICONDUCTOR. REQ. BY B. NG.	30 SEP 2016
A	CHANGED NOTE I LABEL TO NOTE H IN BACK VIEW. REQ. BY H. ALLEN.	03 OCT 2017

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

◊