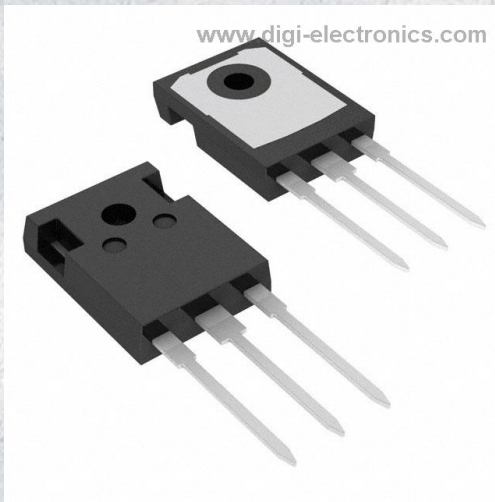


FCH043N60 Datasheet



<https://www.DiGi-Electronics.com>

DiGi Electronics Part Number	FCH043N60-DG
Manufacturer	onsemi
Manufacturer Product Number	FCH043N60
Description	MOSFET N-CH 600V 75A TO247-3
Detailed Description	N-Channel 600 V 75A (Tc) 592W (Tc) Through Hole TO-247-3



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.

Purchase and inquiry

Manufacturer Product Number:

FCH043N60

Series:

SuperFET® II

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

600 V

Drive Voltage (Max Rds On, Min Rds On):

10V

Vgs(th) (Max) @ Id:

3.5V @ 250µA

Vgs (Max):

±20V

FET Feature:

-

Operating Temperature:

-55°C ~ 150°C (Tj)

Supplier Device Package:

TO-247-3

Base Product Number:

FCH043

Manufacturer:

onsemi

Product Status:

Obsolete

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

75A (Tc)

Rds On (Max) @ Id, Vgs:

43mOhm @ 38A, 10V

Gate Charge (Qg) (Max) @ Vgs:

215 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

12225 pF @ 400 V

Power Dissipation (Max):

592W (Tc)

Mounting Type:

Through Hole

Package / Case:

TO-247-3

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

Not Applicable

ECCN:

EAR99

MOSFET – N-Channel, SUPERFET[®] II

600 V, 75 A, 43 mΩ

FCH043N60

Description

SUPERFET II 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 and higher avalanche energy. Consequently, SUPERFET II MOSFET is suitable for various AC/DC power conversion for system miniaturization and higher efficiency.

Features

- Typ. $R_{DS(on)}$ = 37 mΩ
- 600 V @ $T_J = 150^{\circ}\text{C}$
- Ultra Low Gate Charge (Typ. $Q_g = 163$ nC)
- Low Effective Output Capacitance (Typ. $C_{oss(eff.)} = 730$ pF)
- 100% Avalanche Tested
- These Devices are Pb-Free and are RoHS Compliant

Applications

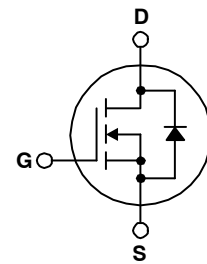
- Telecom / Server Power Supplies
- Industrial Power Supplies



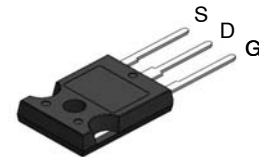
ON Semiconductor[®]

www.onsemi.com

V_{DS}	$R_{DS(on)}$ MAX	I_D MAX
600 V	43 mΩ @ 10 V	75 A

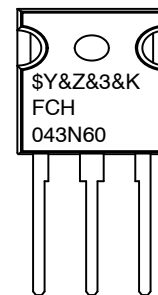


N-CHANNEL MOSFET



TO-247-3LD
CASE 340CK

MARKING DIAGRAM



\$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
FCH043N60	= Specific Device Code

ORDERING INFORMATION

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

FCH043N60**ABSOLUTE MAXIMUM RATINGS** ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	FCH043N60	Unit
V_{DSS}	Drain to Source Voltage	600	V
V_{GSS}	Gate to Source Voltage	- DC	± 20
		- AC ($f > 1$ Hz)	± 30
I_D	Drain Current:	- Continuous ($T_C = 25^\circ\text{C}$)	75
		- Continuous ($T_C = 100^\circ\text{C}$)	47.5
I_{DM}	Drain Current:	- Pulsed (Note 1)	225
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	2025	mJ
I_{AR}	Avalanche Current (Note 1)	15	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	5.92	mJ
dv/dt	MOSFET dv/dt	100	V/ns
	Peak Diode Recovery dv/dt (Note 3)	20	
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	592
		- Derate Above 25°C	4.74
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to + 150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 seconds	300	$^\circ\text{C}$

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. $I_{AS} = 15$ A, $R_G = 25$ Ω , Starting $T_J = 25$ $^\circ\text{C}$.
3. $I_{SD} \leq 38$ A, $di/dt \leq 200$ A/ μs , $V_{DD} \leq 380$ V, Starting $T_J = 25$ $^\circ\text{C}$.

PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Marking	Package	Packing Method	Reel Size	Tape Width	Quantity
FCH043N60	FCH043N60	TO-247	Tube	N/A	N/A	30 Units

THERMAL CHARACTERISTICS

Symbol	Parameter	FCH043N60	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.21	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	40	

FCH043N60**ELECTRICAL CHARACTERISTICS** ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
BV _{DSS}	Drain to Source Breakdown Voltage	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$	600	–	–	V
		$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}, T_J = 150^\circ\text{C}$	650	–	–	
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 10\text{ mA}$, Referenced to 25°C	–	0.67	–	V/ $^\circ\text{C}$
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$	–	–	1	μA
		$V_{DS} = 480\text{ V}, V_{GS} = 0\text{ V}, T_C = 125^\circ\text{C}$	–	4.5	–	
I _{GSS}	Gate to Body Leakage Current	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	–	–	± 100	nA

ON CHARACTERISTICS

V _{GS(th)}	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	2.5	–	3.5	V
R _{DS(on)}	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 38\text{ A}$	–	37	43	m Ω
g _{FS}	Forward Transconductance	$V_{DS} = 20\text{ V}, I_D = 38\text{ A}$	–	73	–	S

DYNAMIC CHARACTERISTICS

C _{iss}	Input Capacitance	$V_{DS} = 400\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	–	9194	12225	pF
C _{oss}	Output Capacitance		–	353	470	pF
C _{rss}	Reverse Transfer Capacitance		–	11	16	pF
C _{oss(eff.)}	Effective Output Capacitance	$V_{DS} = 0\text{ V to } 480\text{ V}, V_{GS} = 0\text{ V}$	–	730	–	pF
Q _{g(tot)}	Total Gate Charge at 10 V	$V_{DS} = 380\text{ V}, I_D = 38\text{ A}, V_{GS} = 10\text{ V}$ (Note 4)	–	163	215	nC
Q _{gs}	Gate to Source Gate Charge		–	35	–	nC
Q _{gd}	Gate to Drain “Miller” Charge		–	39	–	nC
ESR	Equivalent Series Resistance	$f = 1\text{ MHz}$	–	1.1	–	Ω

SWITCHING CHARACTERISTICS

t _{d(on)}	Turn-On Delay Time	$V_{DD} = 380\text{ V}, I_D = 38\text{ A},$ $V_{GS} = 10\text{ V}, R_g = 4.7\ \Omega$ (Note 4)	–	46	102	ns
t _r	Turn-On Rise Time		–	36	82	ns
t _{d(off)}	Turn-Off Delay Time		–	162	334	ns
t _f	Turn-Off Fall Time		–	6	–	ns

DRAIN-SOURCE DIODE CHARACTERISTICS

I _S	Maximum Continuous Source to Drain Diode Forward Current	–	–	75	A	
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current	–	–	225	A	
V _{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_{SD} = 38\text{ A}$	–	–	1.2	V
t _{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_{SD} = 38\text{ A},$ $di_F/dt = 100\text{ A}/\mu\text{s}$	–	605	–	ns
Q _{rr}	Reverse Recovery Charge		–	16	–	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.

FCH043N60

TYPICAL CHARACTERISTICS

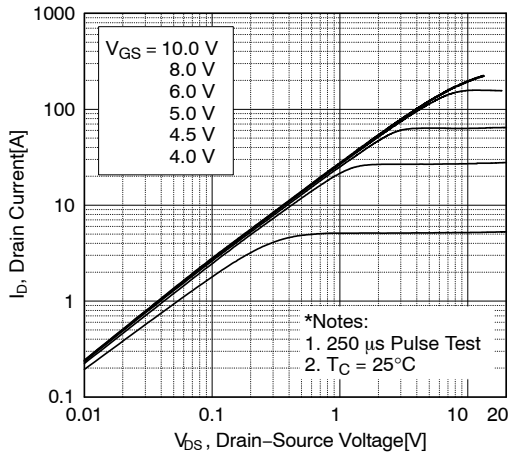


Figure 1. On-Region Characteristics

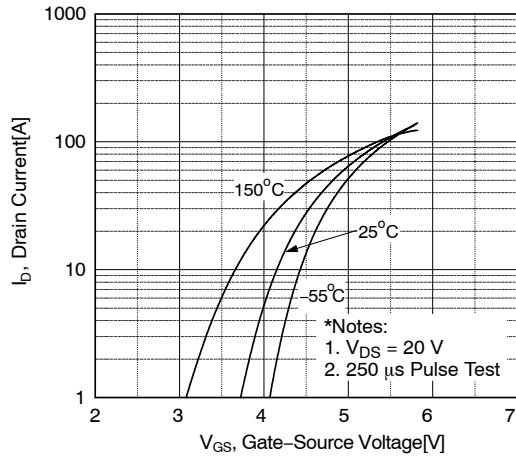


Figure 2. Transfer Characteristics

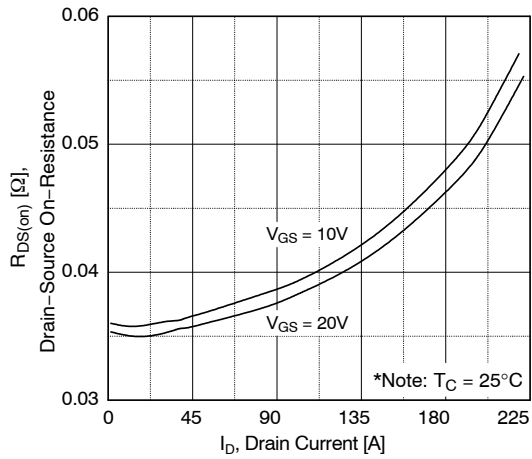


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

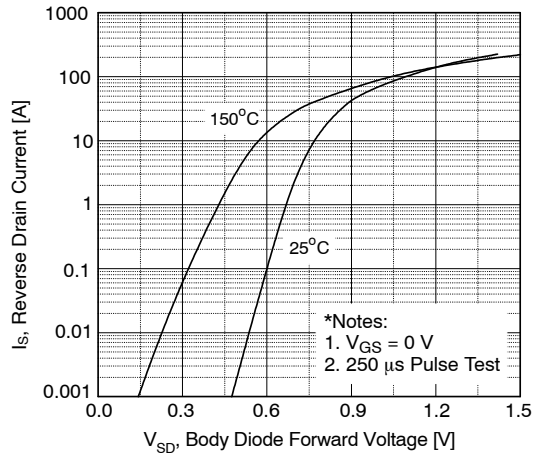


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

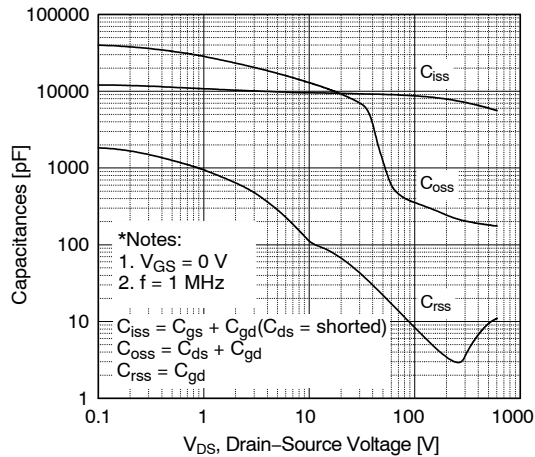


Figure 5. Capacitance Characteristics

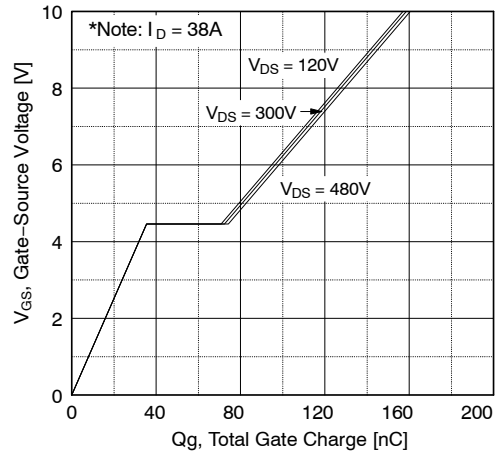


Figure 6. Gate Charge Characteristics

FCH043N60

TYPICAL CHARACTERISTICS

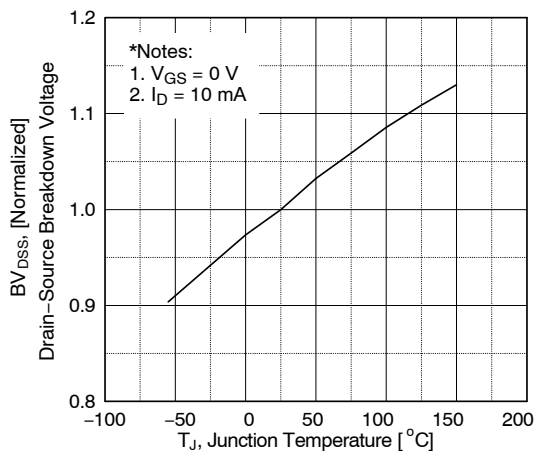


Figure 7. Breakdown Voltage Variation vs. Temperature

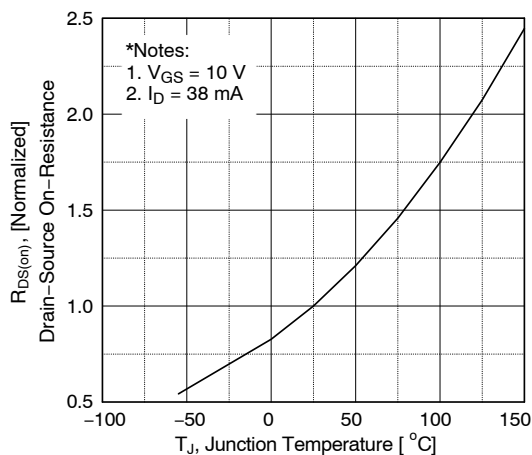


Figure 8. On-Resistance Variation vs. Temperature

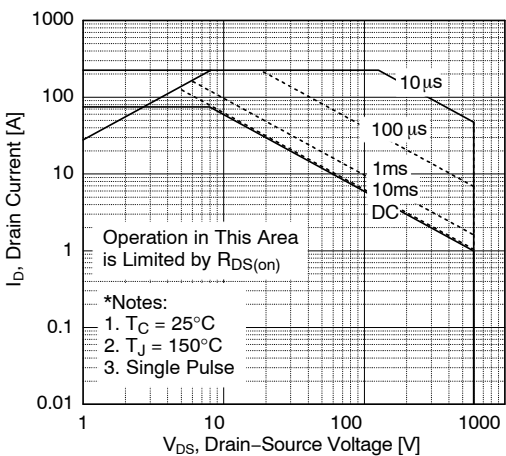


Figure 9. Maximum Safe Operating Area

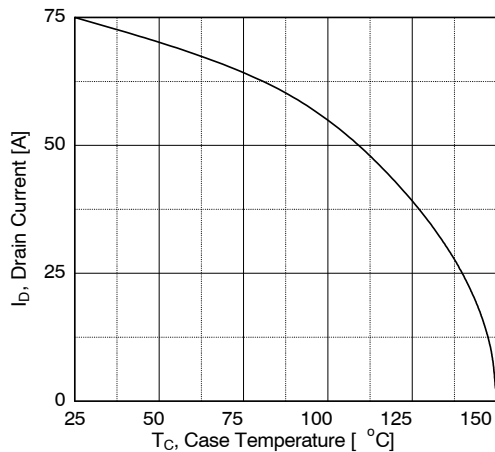


Figure 10. Maximum Drain Current vs. Case Temperature

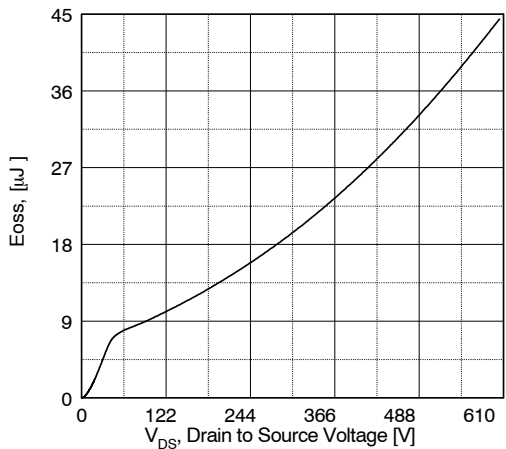


Figure 11. Eoss vs. Drain to Source Voltage Switching Capability

FCH043N60

TYPICAL CHARACTERISTICS

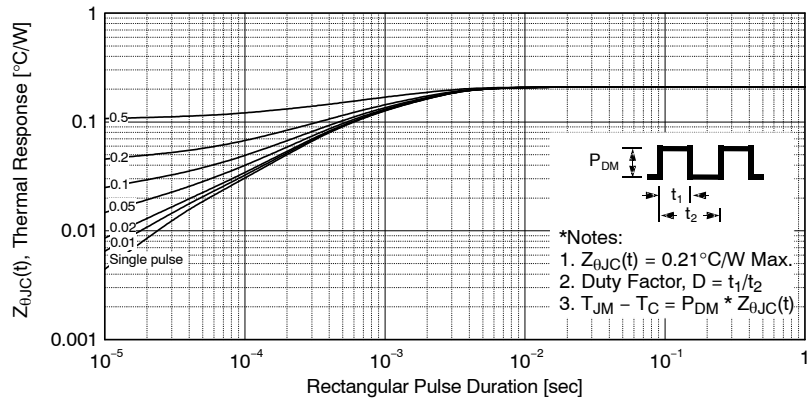


Figure 12. Transient Thermal Response Curve

FCH043N60

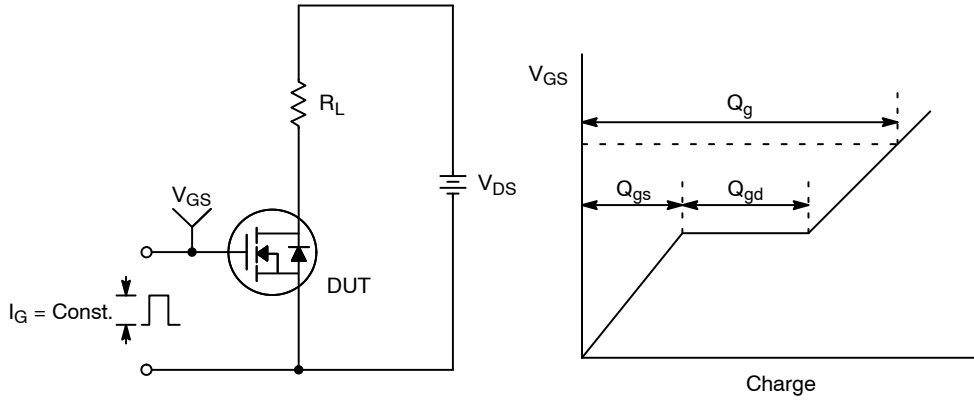


Figure 13. Gate Charge Test Circuit & Waveform

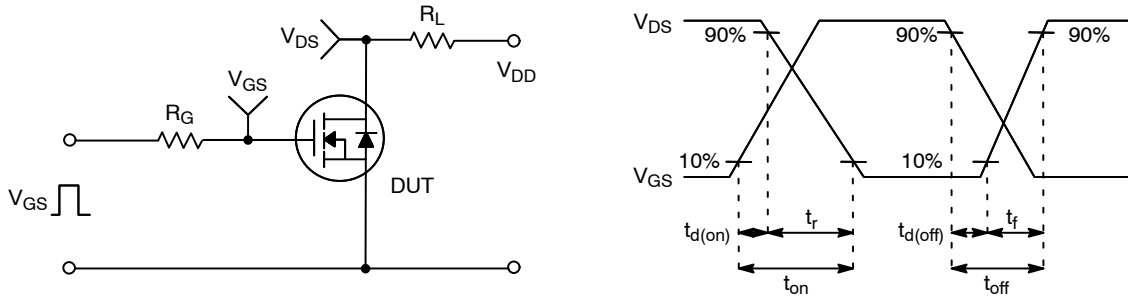


Figure 14. Resistive Switching Test Circuit & Waveforms

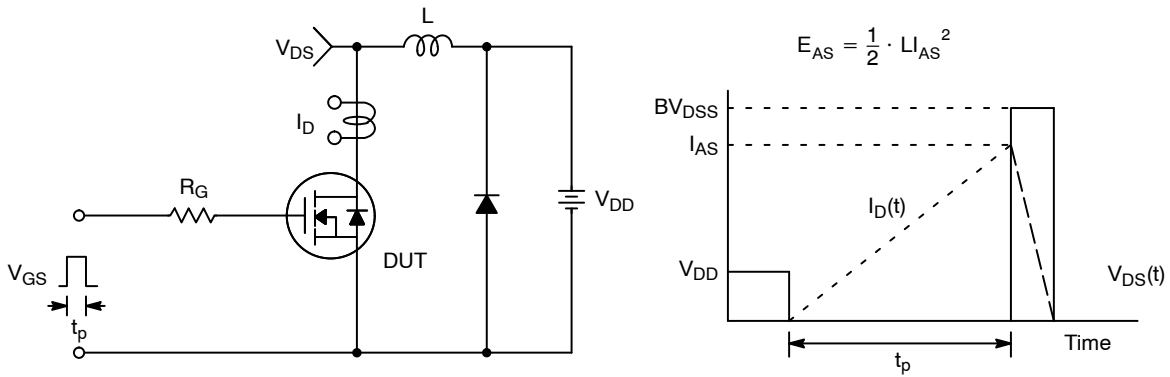


Figure 15. Unclamped Inductive Switching Test Circuit & Waveforms

FCH043N60

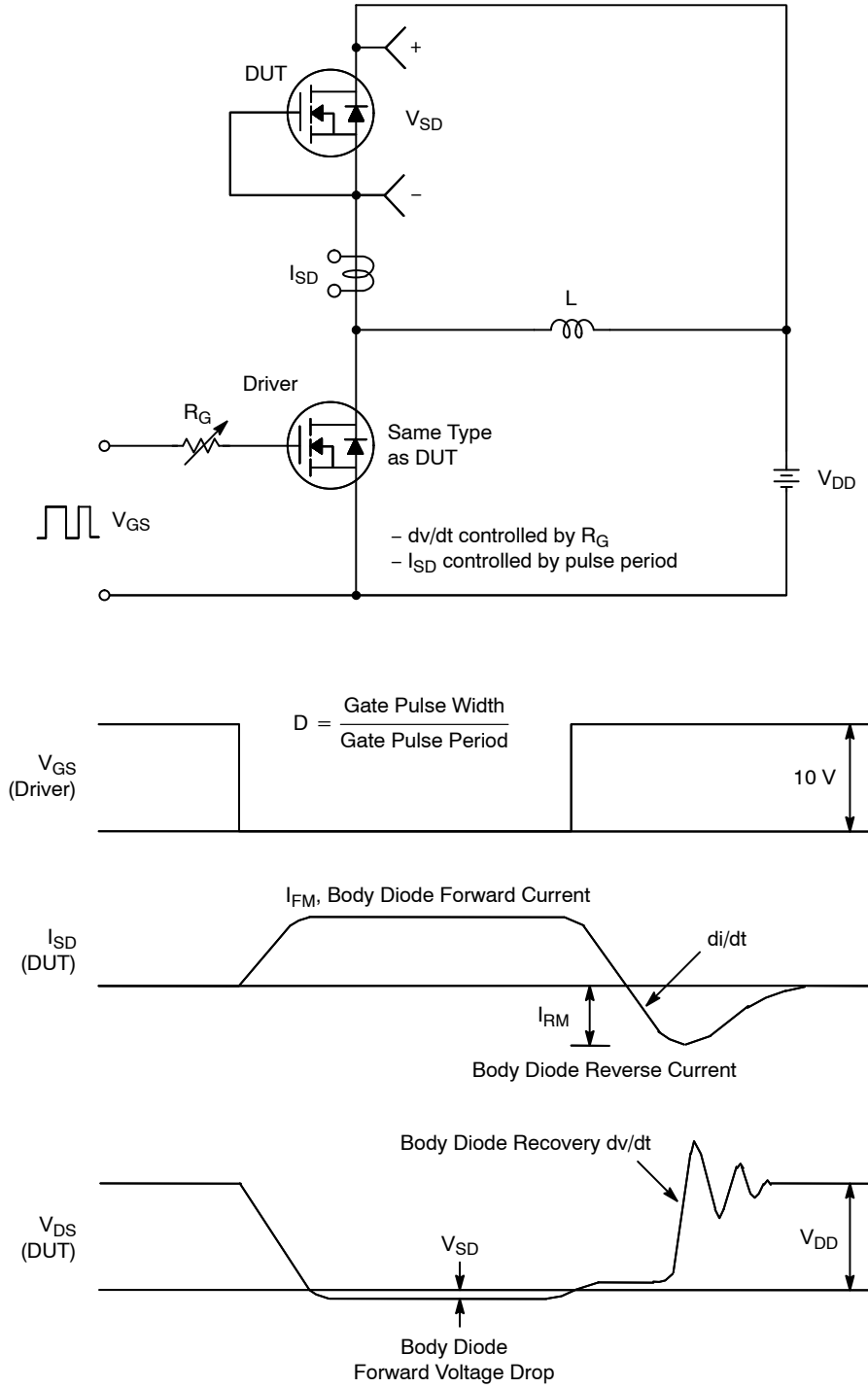
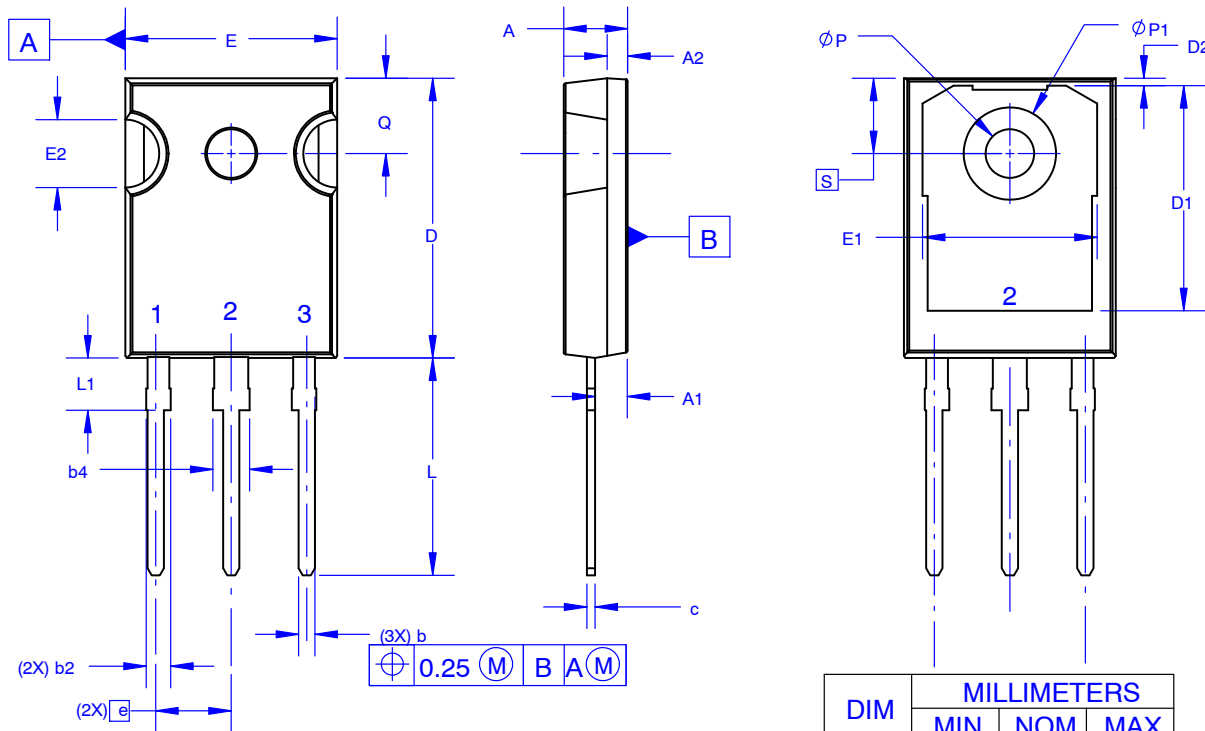


Figure 16. Peak Diode Recovery dv/dt Test Circuit & Waveforms

SUPERFET is a registered trademark of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries.

TO-247-3LD SHORT LEAD
CASE 340CK
ISSUE A

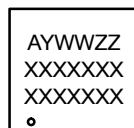
DATE 31 JAN 2019



NOTES: UNLESS OTHERWISE SPECIFIED.

- A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DRAWING CONFORMS TO ASME Y14.5 - 2009.
- D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
- E. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.

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.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.20	2.40	2.60
A2	1.40	1.50	1.60
b	1.17	1.26	1.35
b2	1.53	1.65	1.77
b4	2.42	2.54	2.66
c	0.51	0.61	0.71
D	20.32	20.57	20.82
D1	13.08	~	~
D2	0.51	0.93	1.35
E	15.37	15.62	15.87
E1	12.81	~	~
E2	4.96	5.08	5.20
e	~	5.56	~
L	15.75	16.00	16.25
L1	3.69	3.81	3.93
phi P	3.51	3.58	3.65
phi P1	6.60	6.80	7.00
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

DOCUMENT NUMBER:	98AON13851G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TO-247-3LD SHORT LEAD	PAGE 1 OF 1

onsemi and Onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales

OUR CERTIFICATE

DiGi provide top-quality products and perfect service for customer worldwide through standardization, technological innovation and continuous improvement. DiGi through third-party certification, we stricly control the quality of products and services. Welcome your RFQ to

Email: Info@DiGi-Electronics.com



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.