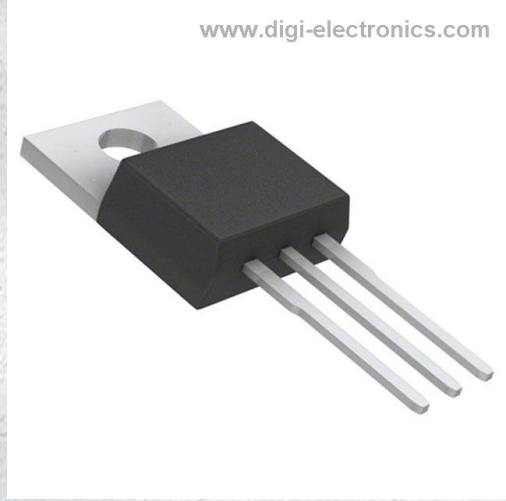
FQP50N06L Datasheet



DiGi Electronics Part Number	FQP50N06L-DG
Manufacturer	onsemi
Manufacturer Product Number	FQP50N06L
Description	MOSFET N-CH 60V 52.4A TO220-3
Detailed Description	N-Channel 60 V 52.4A (Tc) 121W (Tc) Through Hole TO-220-3

https://www.DiGi-Electronics.com

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
FQP50N06L	onsemi
Series:	Product Status:
QFET®	Obsolete
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
60 V	52.4A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
5V, 10V	21mOhm @ 26.2A, 10V
Vgs(th) (Max) @ Id:	Gate Charge (Qg) (Max) @ Vgs:
2.5V @ 250µA	32 nC @ 5 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±20V	1630 pF @ 25 V
FET Feature:	Power Dissipation (Max):
-	121W (Tc)
Operating Temperature:	Mounting Type:
-55°C ~ 175°C (TJ)	Through Hole
Supplier Device Package:	Package / Case:
TO-220-3	TO-220-3
Base Product Number:	
FQP50	

Environmental & Export classification

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

ON Semiconductor

Is Now

To learn more about onsemi™, please visit our website at
www.onsemi.com

ON Semiconductor®

FQP50N06L

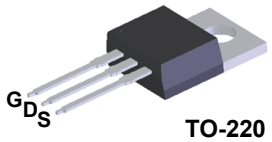
N-Channel QFET® MOSFET
60 V, 52.4 A, 21 mΩ

Description

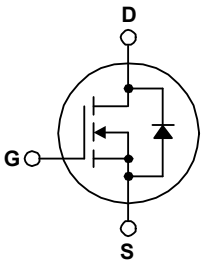
This N-Channel enhancement mode power MOSFET is produced using ON Semiconductor's proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength.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

Features

- 52.4 A, 60 V, $R_{DS(on)}$ = 21 mΩ (Max.) @ V_{GS} = 10 V, I_D = 26.2 A
- Low Gate Charge (Typ. 24.5 nC)
- Low Crss (Typ. 90 pF)
- 100% Avalanche Tested
- 175°C Maximum Junction Temperature Rating



TO-220



Absolute Maximum Ratings

T_C = 25°C unless otherwise noted.

Symbol	Parameter		FQP50N06L	Unit
V_{DSS}	Drain-Source Voltage		60	V
I_D	Drain Current - Continuous (T_C = 25°C)		52.4	A
	- Continuous (T_C = 100°C)		37.1	A
I_{DM}	Drain Current - Pulsed	(Note 1)	210	A
V_{GSS}	Gate-Source Voltage		± 20	V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	990	mJ
I_{AR}	Avalanche Current	(Note 1)	52.4	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	12.1	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	7.0	V/ns
P_D	Power Dissipation (T_C = 25°C)		121	W
	- Derate above 25°C		0.81	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

Thermal Characteristics

Symbol	Parameter	FQP50N06L	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	1.24	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	62.5	°C/W

October-2017,Rev.3

Publication Order Number:
FQP50N06L/D

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FQP50N06L	FQP50N06L	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-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	60	--	--	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	--	0.06	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60 V, V_{GS} = 0 V	--	--	1	μA
		V_{DS} = 48 V, T_C = 150°C	--	--	10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 20 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -20 V, V_{DS} = 0 V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	1.0	--	2.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 26.2 A	--	0.017	0.021	Ω
		V_{GS} = 5 V, I_D = 26.2 A	--	0.020	0.025	
g_{FS}	Forward Transconductance	V_{DS} = 25 V, I_D = 26.2 A	--	40	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	1250	1630	pF
C_{oss}	Output Capacitance		--	445	580	pF
C_{rss}	Reverse Transfer Capacitance		--	90	120	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 30 V, I_D = 26.2 A, R_G = 25 Ω (Note 4)	--	20	50	ns
t_r	Turn-On Rise Time		--	380	770	ns
$t_{d(off)}$	Turn-Off Delay Time		--	80	170	ns
t_f	Turn-Off Fall Time		--	145	300	ns
Q_g	Total Gate Charge	V_{DS} = 48 V, I_D = 52.4 A, V_{GS} = 5 V (Note 4)	--	24.5	32	nC
Q_{gs}	Gate-Source Charge		--	6	--	nC
Q_{gd}	Gate-Drain Charge		--	14.5	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	52.4	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	210	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 52.4 A	--	--	1.5	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 52.4 A, dI_F / dt = 100 A/μs	--	65	--	ns
Q_{rr}	Reverse Recovery Charge		--	125	--	nC

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature.
2. L = 300 μH, I_{AS} = 52.4 A, V_{DD} = 25 V, R_G = 25 Ω, starting T_J = 25°C.
3. $I_{SD} \leq$ 52.4 A, di/dt ≤ 300 A/μs, $V_{DD} \leq BV_{DSS}$, starting T_J = 25°C.
4. Essentially independent of operating temperature.

Typical Characteristics

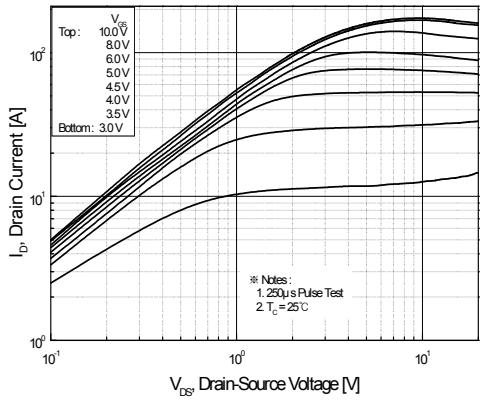


Figure 1. On-Region Characteristics

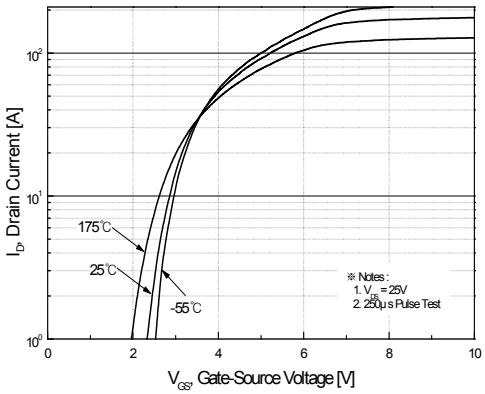


Figure 2. Transfer Characteristics

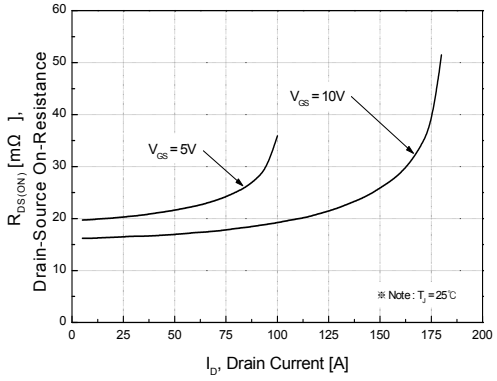


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

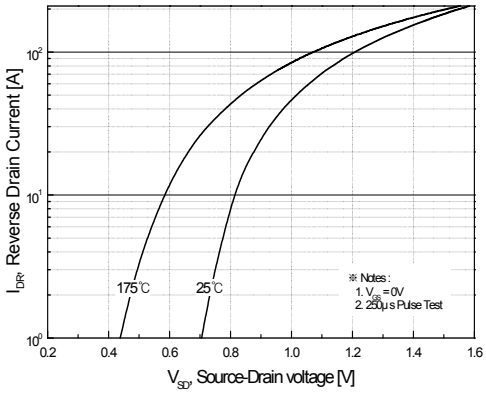


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

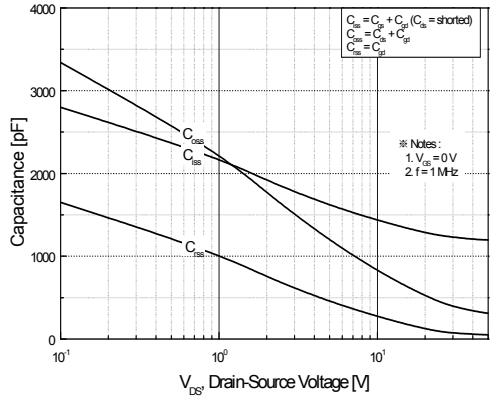


Figure 5. Capacitance Characteristics

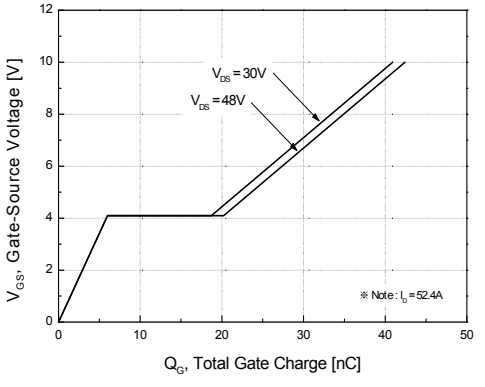


Figure 6. Gate Charge Characteristics

Typical Characteristics (continued)

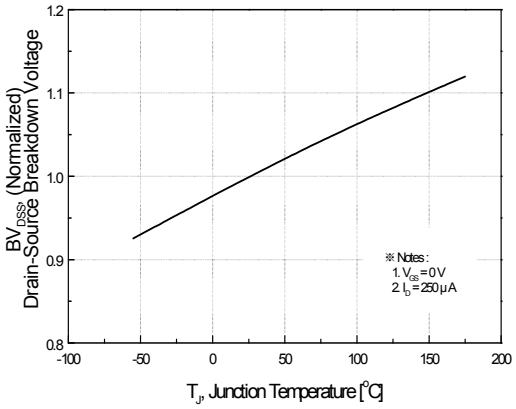


Figure 7. Breakdown Voltage Variation vs. Temperature

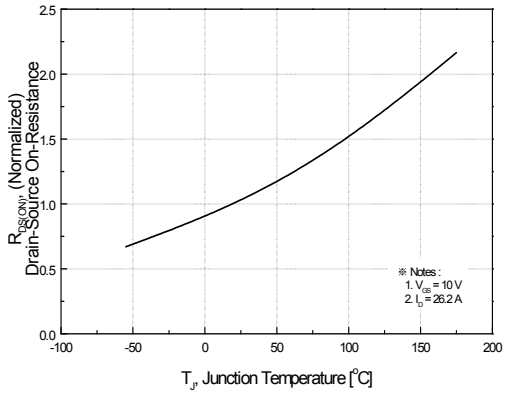


Figure 8. On-Resistance Variation vs. Temperature

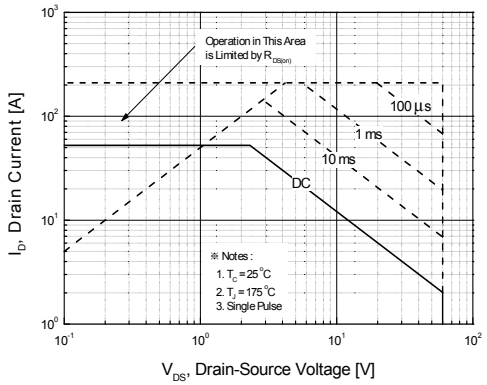


Figure 9. Maximum Safe Operating Area

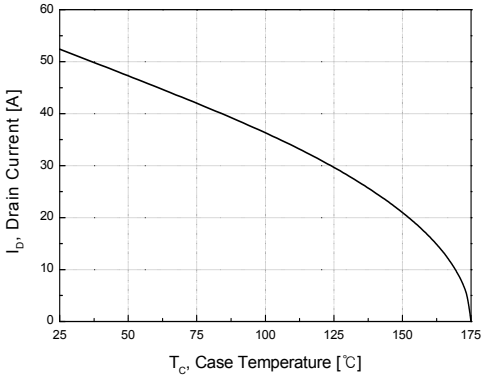


Figure 10. Maximum Drain Current vs. Case Temperature

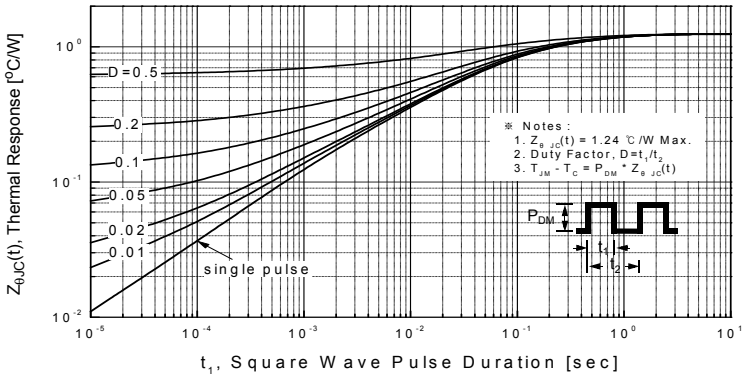


Figure 11. Transient Thermal Response Curve

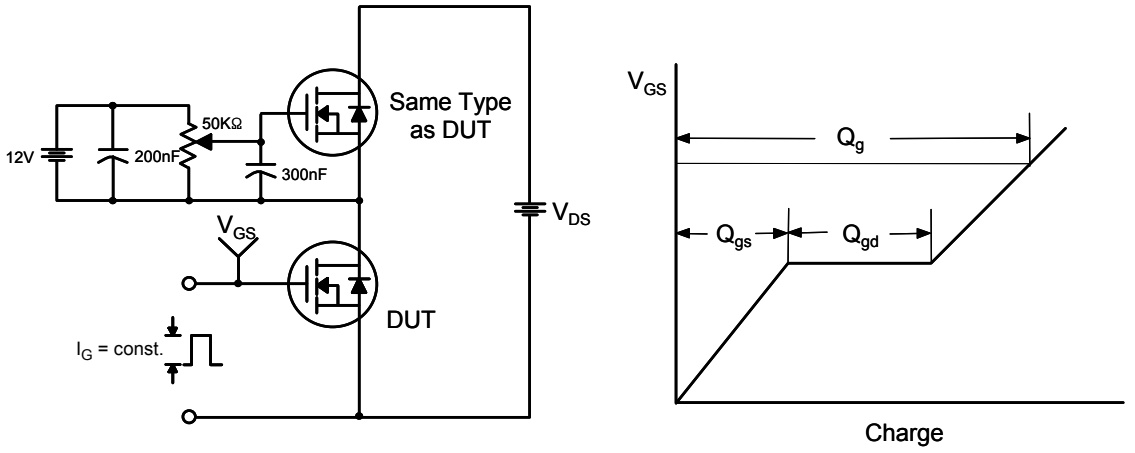


Figure 12. Gate Charge Test Circuit & Waveform

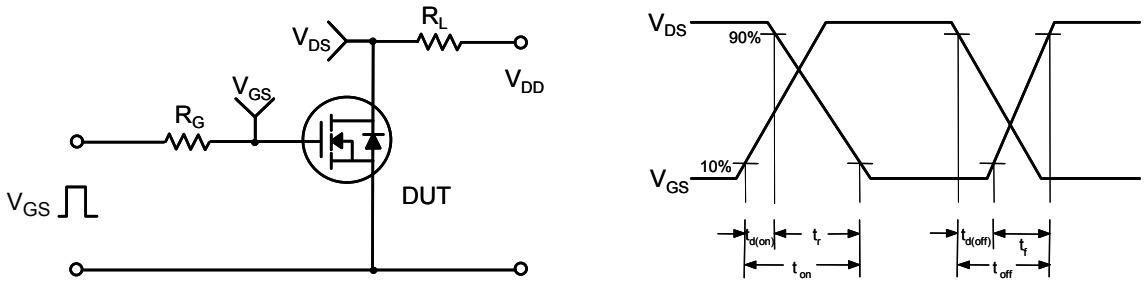


Figure 13. Resistive Switching Test Circuit & Waveforms

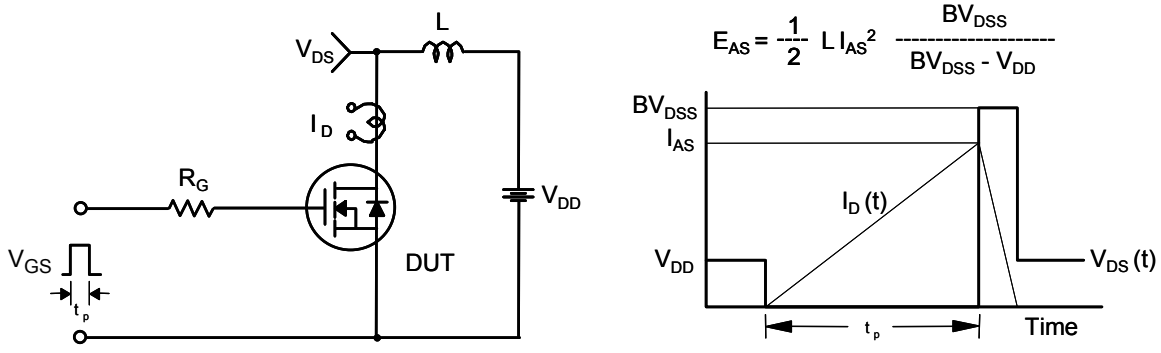


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

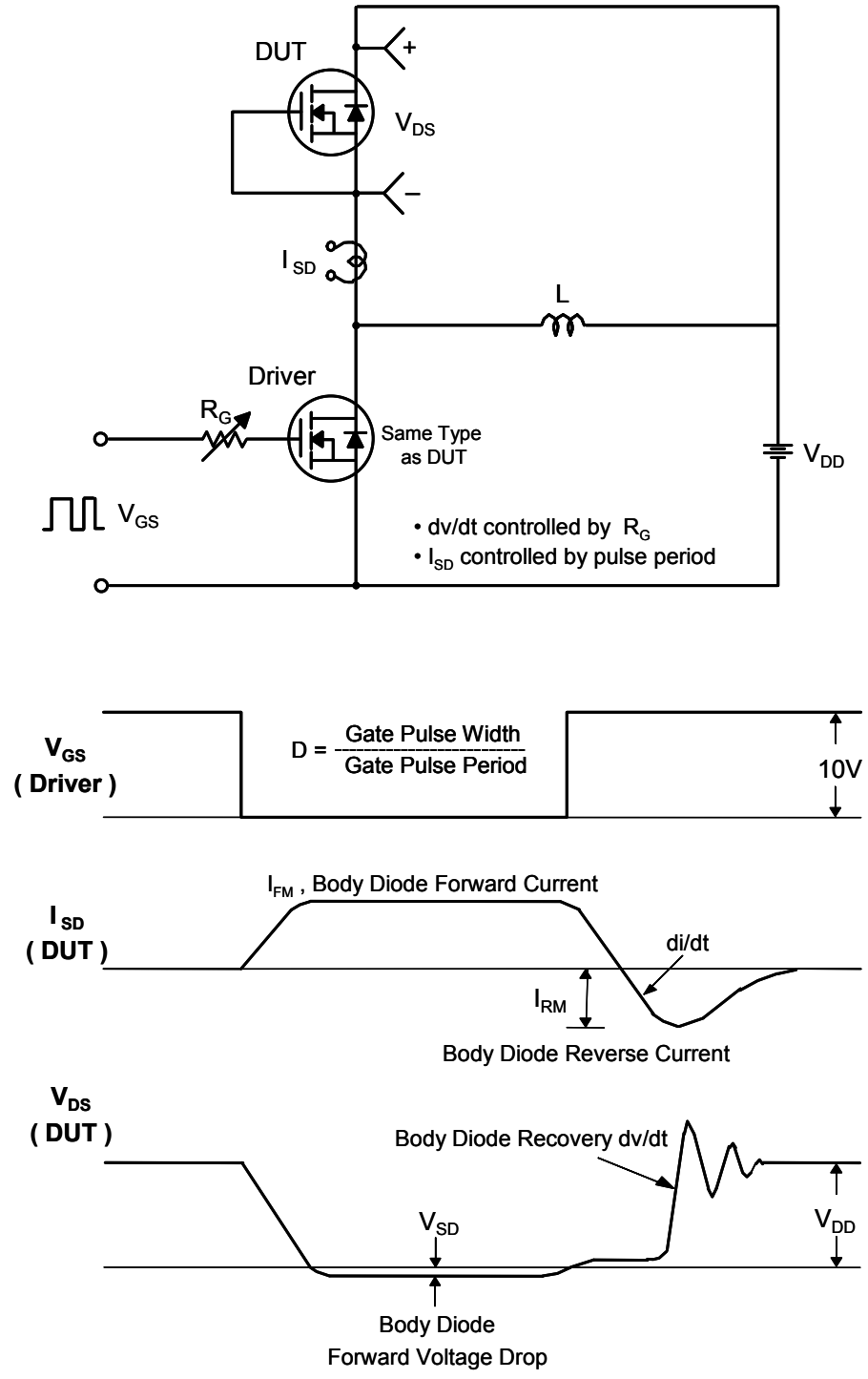


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

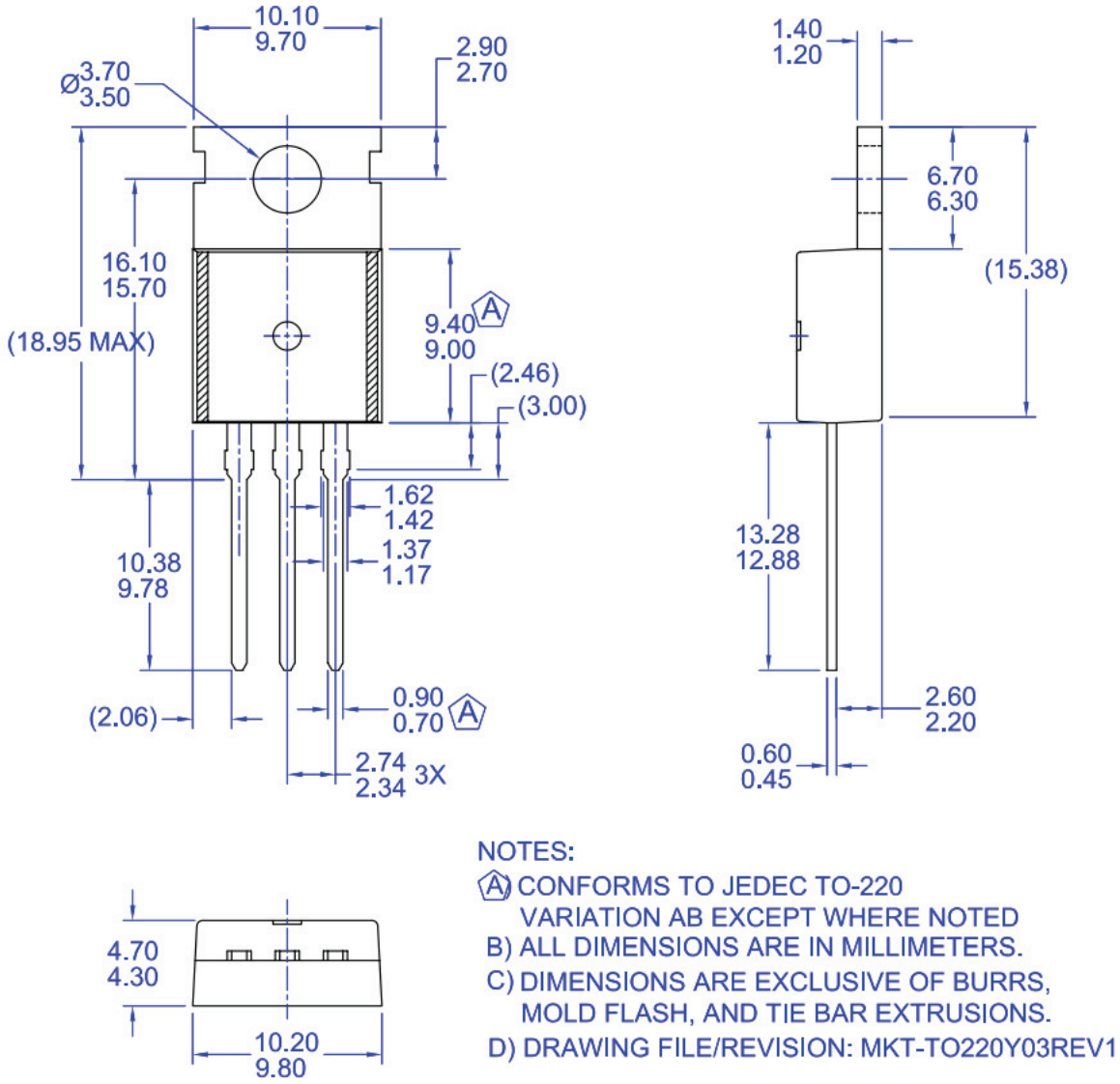


Figure 16. TO220, Molded, 3-Lead, Jedec Variation AB

Package drawings are provided as a service to customers considering ON Semiconductor components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a ON Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of ON Semiconductor's worldwide terms and conditions, specif-ically the warranty therein, which covers ON Semiconductor products.

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
Japan Customer Focus Center
Phone: 81−3−5817−1050

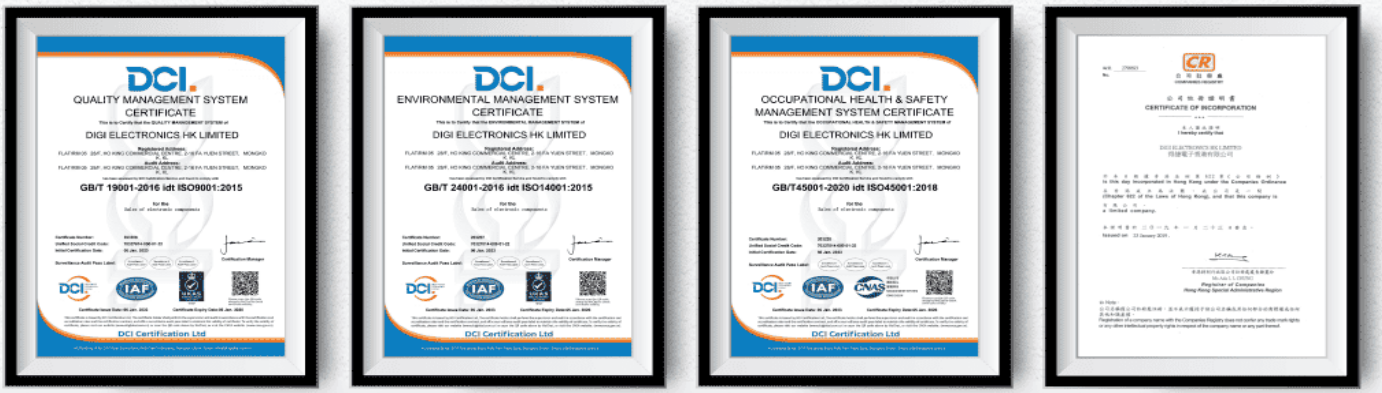
ON Semiconductor Website: **www.onsemi.com**

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

For additional information, please contact your local Sales Representative

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 striciy 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.