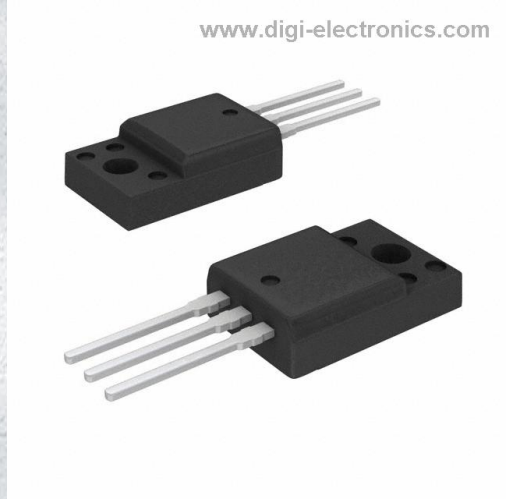
FQPF10N60CT Datasheet



DiGi Electronics Part Number	FQPF10N60CT-DG
Manufacturer	onsemi
Manufacturer Product Number	FQPF10N60CT
Description	MOSFET N-CH 600V 9.5A TO220F
Detailed Description	N-Channel 600 V 9.5A (Tc) 50W (Tc) Through Hole TO-220F-3

https://www.DiGi-Electronics.com

Tel: +00 852-30501935

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Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
FQPF10N60CT	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:
600 V	9.5A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
10V	730mOhm @ 4.75A, 10V
Vgs(th) (Max) @ Id:	Gate Charge (Qg) (Max) @ Vgs:
4V @ 250µA	57 nC @ 10 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±30V	2040 pF @ 25 V
FET Feature:	Power Dissipation (Max):
-	50W (Tc)
Operating Temperature:	Mounting Type:
-55°C ~ 150°C (TJ)	Through Hole
Supplier Device Package:	Package / Case:
TO-220F-3	TO-220-3 Full Pack
Base Product Number:	
FQPF1	

Environmental & Export classification

Moisture Sensitivity Level (MSL):	REACH Status:
1 (Unlimited)	REACH Unaffected
ECCN:	HTSUS:
EAR99	8541.29.0095

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FAIRCHILD SEMICONDUCTOR®

November 2013

FQP10N60C / FQPF10N60C

N-Channel QFET® MOSFET

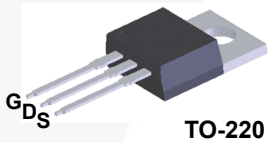
600 V, 9.5 A, 730 mΩ

Description

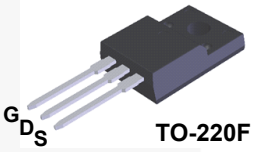
These N-Channel enhancement mode power field effect transistors are produced using Fairchild's proprietary, planar stripe, DMOS technology. This advanced technology has been especially tailored to mini-mize on-state resistance, provide superior switching perfor-mance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high effi-ciency switched mode power supplies, active power factor correction, electronic lamp ballasts based on half bridge topology.

Features

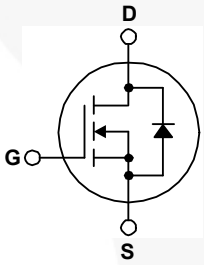
- 9.5 A, 600 V, $R_{DS(on)}$ = 730 mΩ (Max.) @ V_{GS} = 10 V, I_D = 4.75 A
- Low Gate Charge (Typ. 44 nC)
- Low Crss (Typ. 18 pF)
- 100% Avalanche Tested



TO-220



TO-220F



Absolute Maximum Ratings T_C = 25°C unless otherwise noted.

Symbol	Parameter		FQP10N60C	FQPF10N60C	Unit
V_{DSS}	Drain-Source Voltage		600		V
I_D	Drain Current - Continuous (T_C = 25°C)		9.5	9.5 *	A
	Drain Current - Continuous (T_C = 100°C)		5.7	5.7 *	A
I_{DM}	Drain Current - Pulsed	(Note 1)	38	38 *	A
V_{GSS}	Gate-Source Voltage		± 30		V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	700		mJ
I_{AR}	Avalanche Current	(Note 1)	9.5		A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	15.6		mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	4.5		V/ns
P_D	Power Dissipation (T_C = 25°C)		156	50	W
	- Derate above 25°C		1.25	0.4	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 seconds		300		°C

* Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	FQP10N60C	FQPF10N60C	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	0.8	2.5	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink, Typ.	0.5	--	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	62.5	62.5	°C/W

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FQP10N60C	FQP10N60C	TO-220	Tube	N/A	N/A	50 units
FQPF10N60C	FQPF10N60C	TO-220F	Tube	N/A	N/A	50 units
FQPF10N60CT	FQPF10N60CT	TO-220F	Tube	N/A	N/A	50 units
FQPF10N60C_F105	FQPF10N60C	TO-220F	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	600	--	--	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	--	0.7	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600 V, V_{GS} = 0 V	--	--	1	μA
		V_{DS} = 480 V, T_C = 125°C	--	--	10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 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 = 4.75 A	--	0.6	0.73	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40 V, I_D = 4.75 A	--	8.0	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	1570	2040	pF
C_{oss}	Output Capacitance		--	166	215	pF
C_{rss}	Reverse Transfer Capacitance		--	18	24	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 300 V, I_D = 9.5A, R_G = 25 Ω	--	23	55	ns
t_r	Turn-On Rise Time		--	69	150	ns
$t_{d(off)}$	Turn-Off Delay Time		--	144	300	ns
t_f	Turn-Off Fall Time	(Note 4)	--	77	165	ns
Q_g	Total Gate Charge	V_{DS} = 480 V, I_D = 9.5A, V_{GS} = 10 V	--	44	57	nC
Q_{gs}	Gate-Source Charge		--	6.7	--	nC
Q_{gd}	Gate-Drain Charge	(Note 4)	--	18.5	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	9.5	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	38	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 9.5 A	--	--	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 9.5 A, dI_F / dt = 100 A/μs	--	420	--	ns
Q_{rr}	Reverse Recovery Charge		--	4.2	--	μC

NOTES:

1. Repetitive rating: pulse-width limited by maximum junction temperature.
2. L = 14.2 mH, I_{AS} = 9.5 A, V_{DD} = 50 V, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 9.5 A, di/dt ≤ 200 A/μs, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C.
4. Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

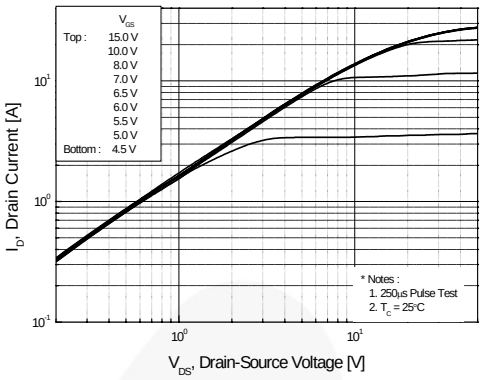


Figure 2. Transfer Characteristics

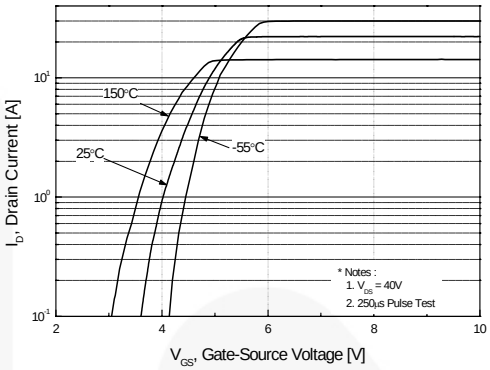


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

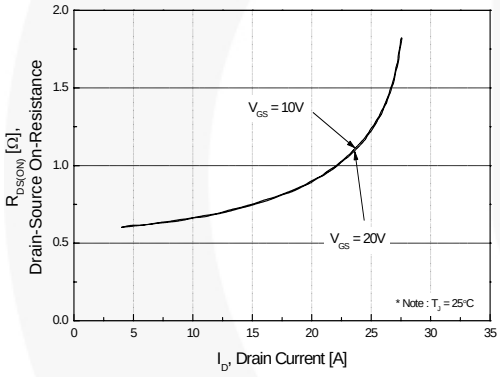


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperatue

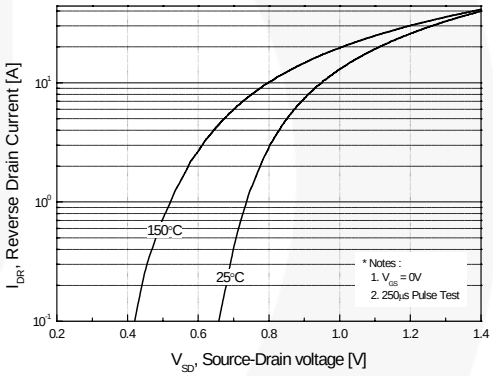


Figure 5. Capacitance Characteristics

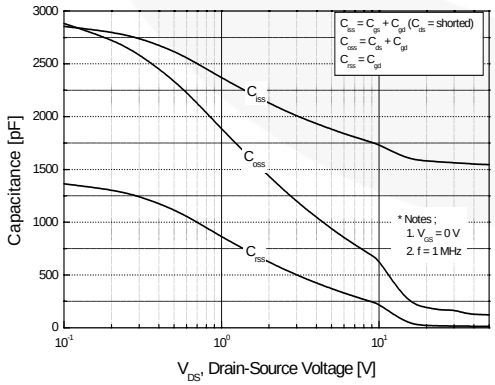
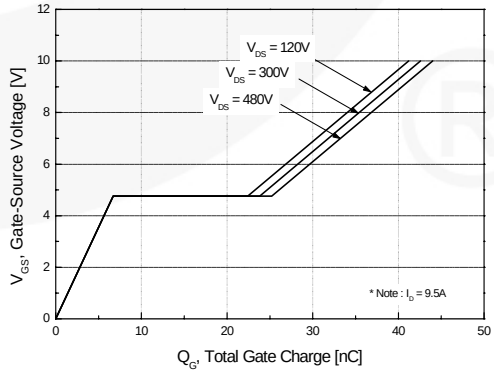


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

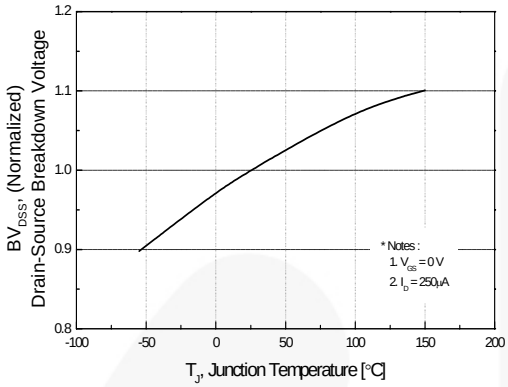


Figure 8. On-Resistance Variation vs. Temperature

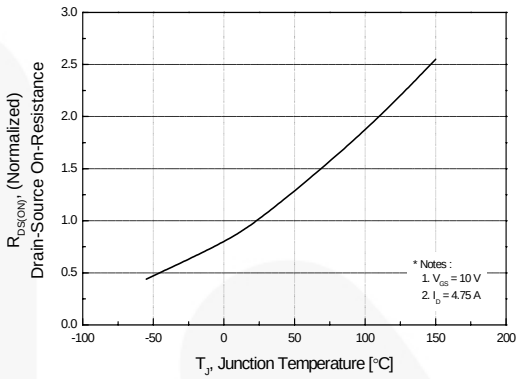


Figure 9-1. Maximum Safe Operating Area for FQP10N60C

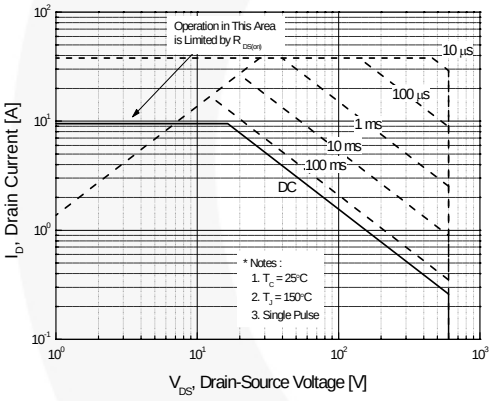


Figure 9-2. Maximum Safe Operating Area for FQPF10N60C

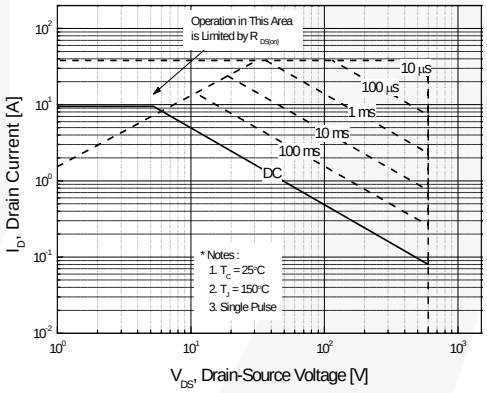
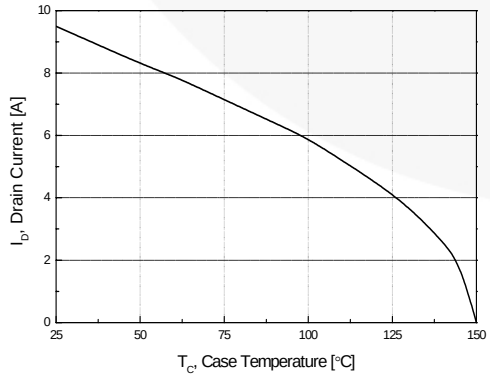


Figure 10. Maximum Drain Current vs. Case Temperature



Typical Performance Characteristics (Continued)

Figure 11-1. Transient Thermal Response Curve for FQP10N60C

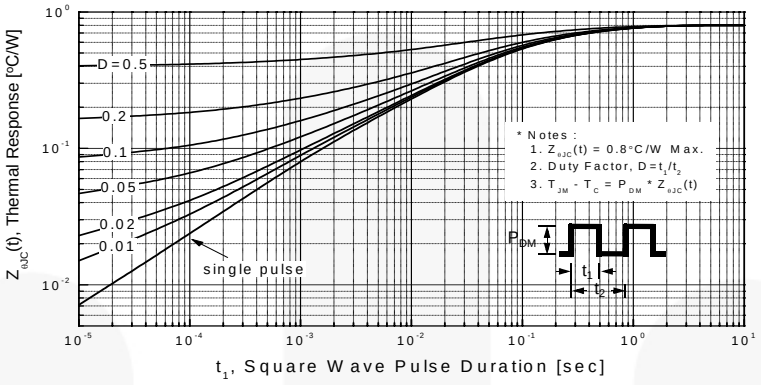
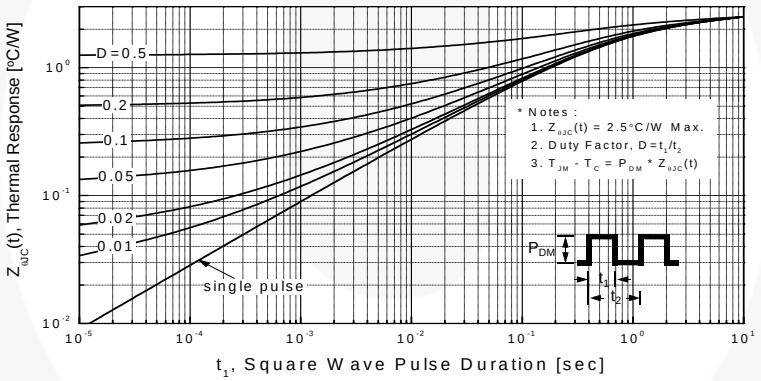


Figure 11-2. Transient Thermal Response Curve for FQPF10N60C



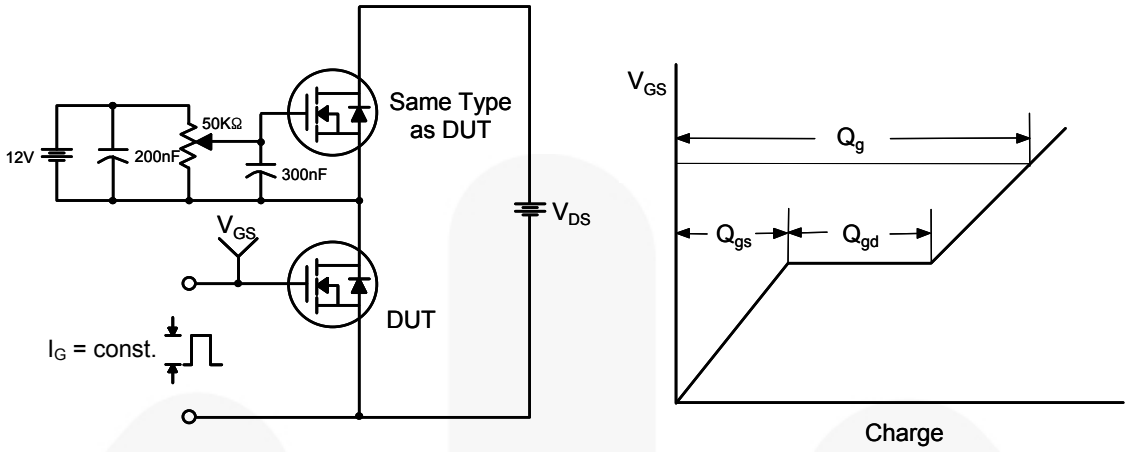


Figure 12. Gate Charge Test Circuit & Waveform

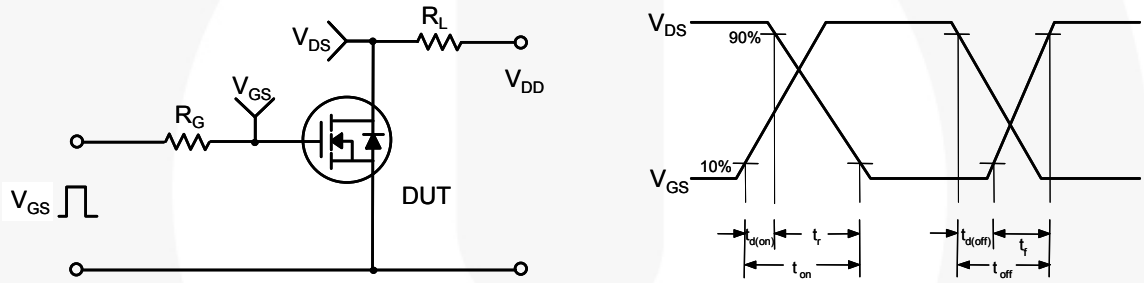


Figure 13. Resistive Switching Test Circuit & Waveforms

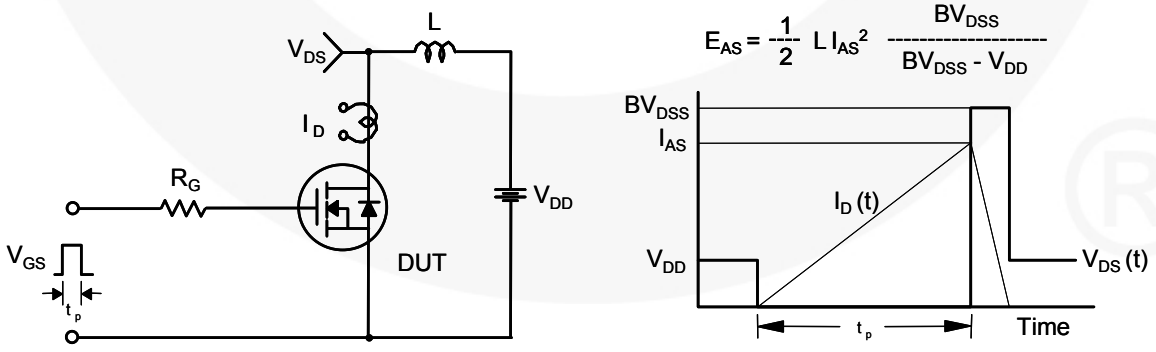


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

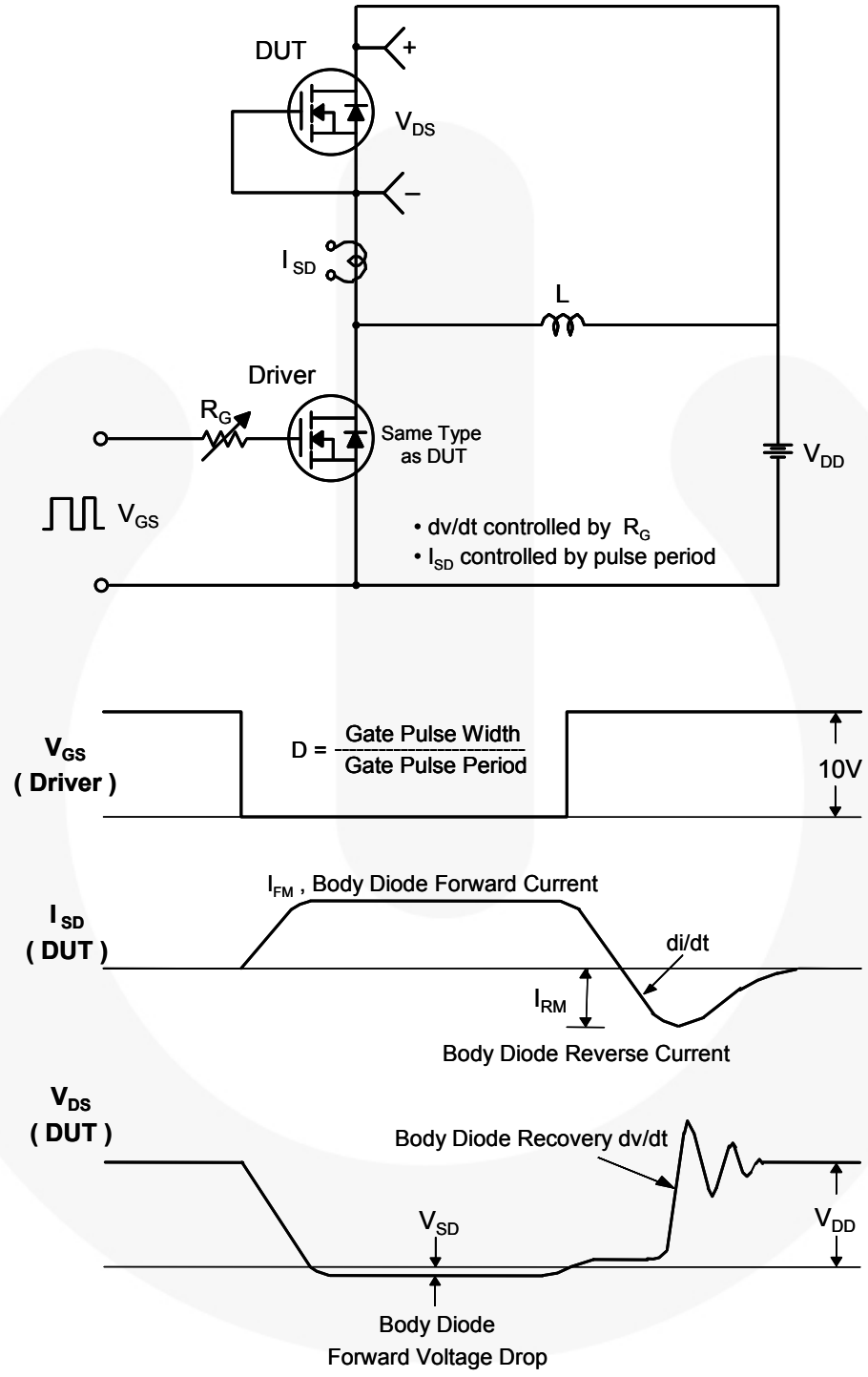


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

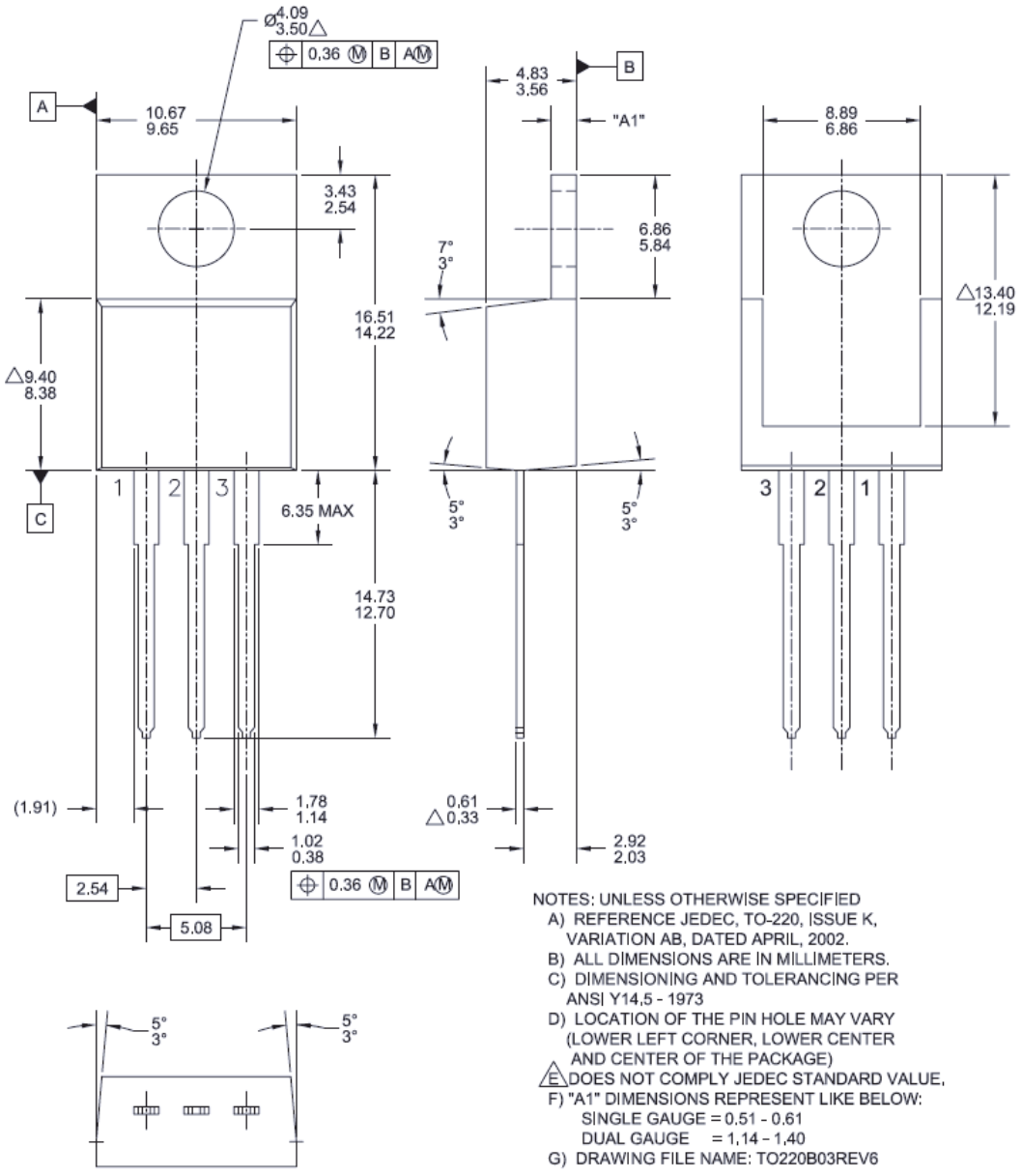


Figure 16. TO-220, Molded, 3-Lead, Jedec Variation AB

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Mechanical Dimensions

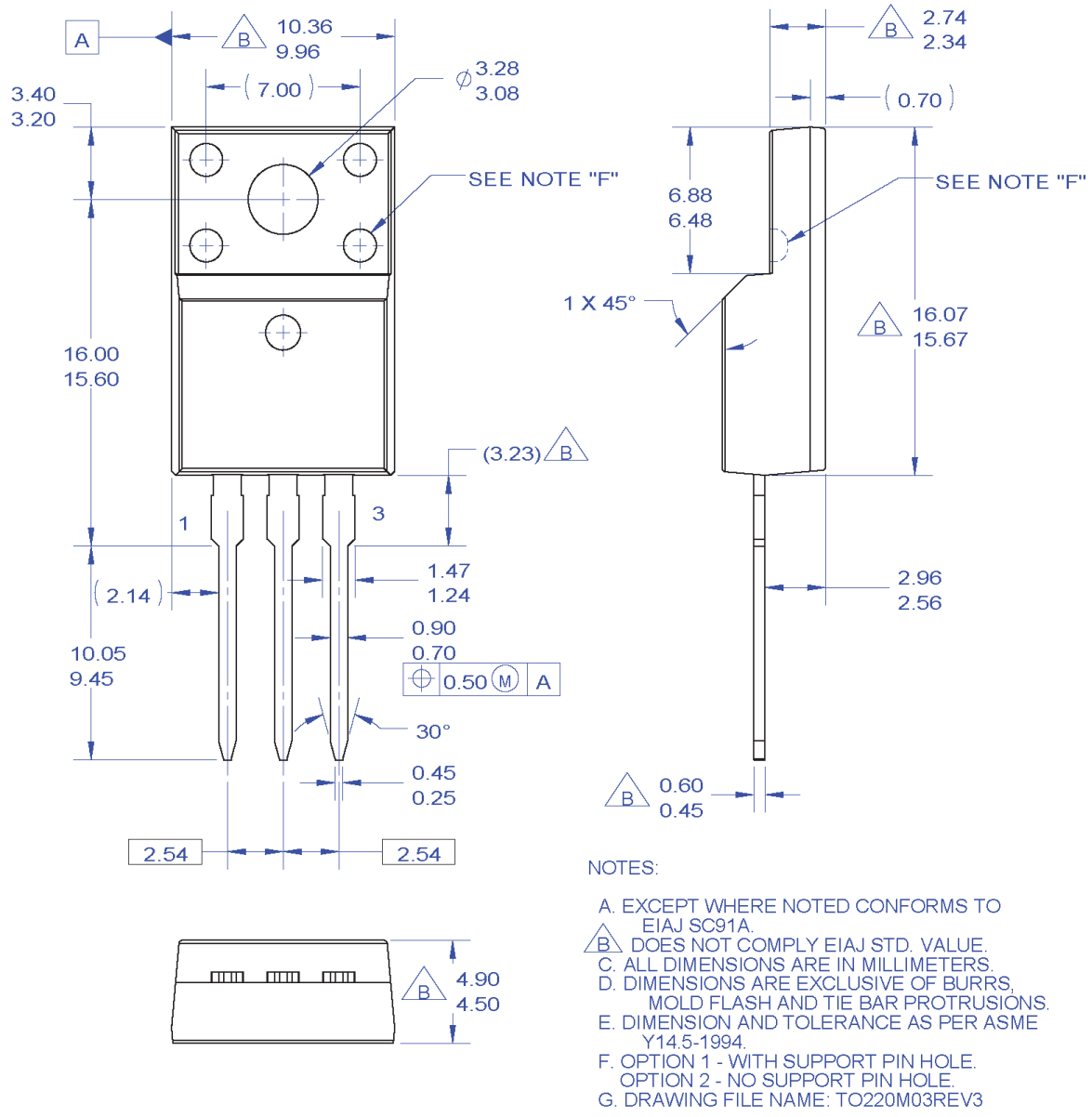

Figure 17. TO220, Molded, 3-Lead, Full Pack, EIAJ SC91, Straight Lead

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Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I66

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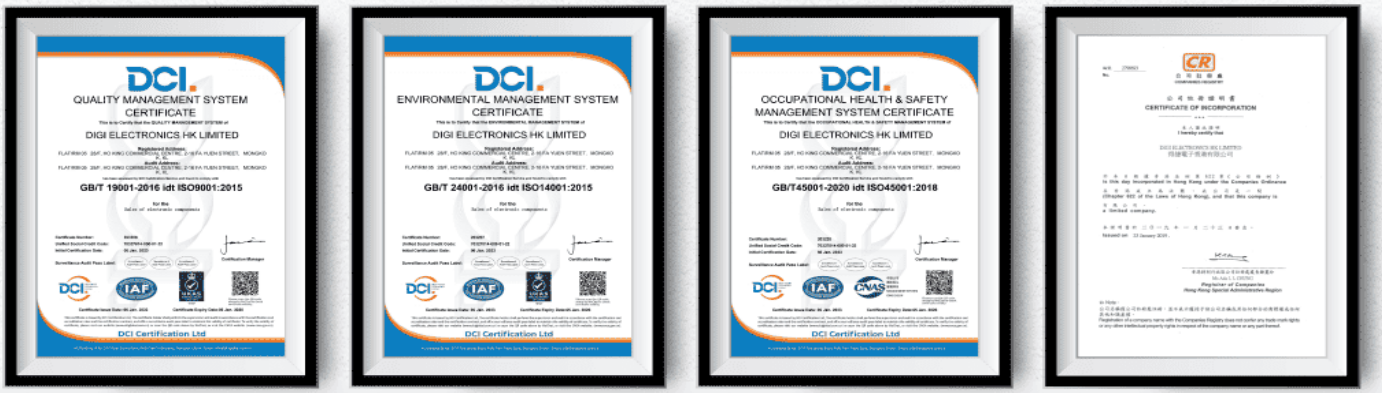

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