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December 2013

FQP8N80C / FQPF8N80C / FQPF8N80CYDTU

N-Channel QFET® MOSFET

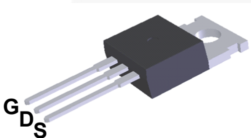
800 V, 8.0 A, 1.55 Ω

Description

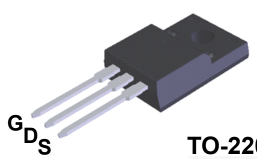
This N-Channel enhancement mode power MOSFET is produced using Fairchild Semiconductor's proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, active power factor correction (PFC), and electronic lamp ballasts.

Features

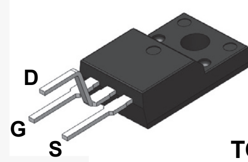
- 8.0 A, 800 V, $R_{DS(on)}$ = 1.55 Ω (Max.) @ V_{GS} = 10 V, I_D = 4.0 A
- Low Gate Charge (Typ. 35 nC)
- Low Crss (Typ. 13 pF)
- 100% Avalanche Tested



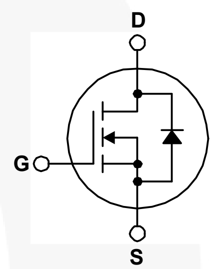
TO-220



TO-220F



TO-220F
Y-formed



Absolute Maximum Ratings

T_C = 25°C unless otherwise noted.

Symbol	Parameter		FQP8N80C	FQPF8N80C	Unit
V_{DSS}	Drain-Source Voltage		800		V
I_D	Drain Current - Continuous (T_C = 25°C)		8	8 *	A
	- Continuous (T_C = 100°C)		5.1	5.1 *	A
I_{DM}	Drain Current - Pulsed	(Note 1)	32	32 *	A
V_{GSS}	Gate-Source Voltage		± 30		V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	850		mJ
I_{AR}	Avalanche Current	(Note 1)	8		A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	17.8		mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	4.5		V/ns
P_D	Power Dissipation (T_C = 25°C)		178	59	W
	- Derate above 25°C		1.43	0.48	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	FQP8N80C	FQPF8N80C	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	0.89	2.66	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink Typ, Max.	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
FQP8N80C	FQP8N80C	TO-220	Tube	N/A	N/A	50 units
FQPF8N80C	FQPF8N80C	TO-220F	Tube	N/A	N/A	50 units
FQPF8N80CYDTU	FQPF8N80C	TO-220F (Y-formed)	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	800	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	I_D = 250 µA, Referenced to 25°C	--	0.5	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 800 V, V_{GS} = 0 V	--	--	10	µA
		V_{DS} = 640 V, T_C = 125°C	--	--	100	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	3.0	--	5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 4 A	--	1.29	1.55	Ω
g_{FS}	Forward Transconductance	V_{DS} = 50 V, I_D = 4 A (Note 4)	--	5.6	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	1580	2050	pF
C_{oss}	Output Capacitance		--	135	175	pF
C_{rss}	Reverse Transfer Capacitance		--	13	17	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 400 V, I_D = 8 A, R_G = 25 Ω (Note 4, 5)	--	40	90	ns
t_r	Turn-On Rise Time		--	110	230	ns
$t_{d(off)}$	Turn-Off Delay Time		--	65	140	ns
t_f	Turn-Off Fall Time		--	70	150	ns
Q_g	Total Gate Charge	V_{DS} = 640 V, I_D = 8 A, V_{GS} = 10 V (Note 4, 5)	--	35	45	nC
Q_{gs}	Gate-Source Charge		--	10	--	nC
Q_{gd}	Gate-Drain Charge		--	14	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	8	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	32	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 8 A	--	--	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 8 A, dI_F / dt = 100 A/µs (Note 4)	--	690	--	ns
Q_{rr}	Reverse Recovery Charge		--	8.2	--	µC

Notes:
1. Repetitive rating : pulse-width limited by maximum junction temperature.
2. L = 25 mH, I_{AS} = 8 A, V_{DD} = 50 V, R_G = 25 Ω, starting T_J = 25°C.
3. $I_{SD} \le$ 8 A, di/dt $\le$ 200 A/µs, $V_{DD} \le BV_{DSS}$, starting T_J = 25°C.
4. Pulse test : pulse-width $\le$ 300 µs, duty cycle $\le$ 2%.
5. Essentially independent of operating temperature.

Typical Characteristics

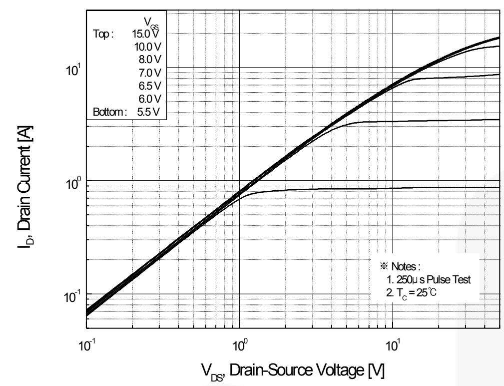


Figure 1. On-Region Characteristics

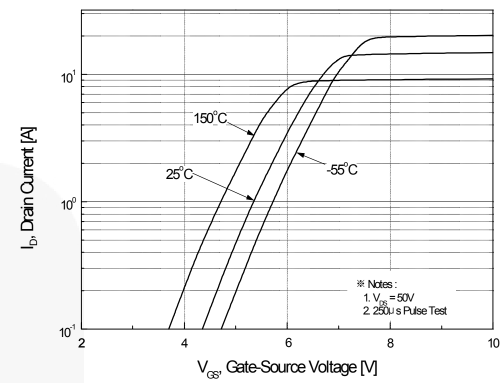


Figure 2. Transfer Characteristics

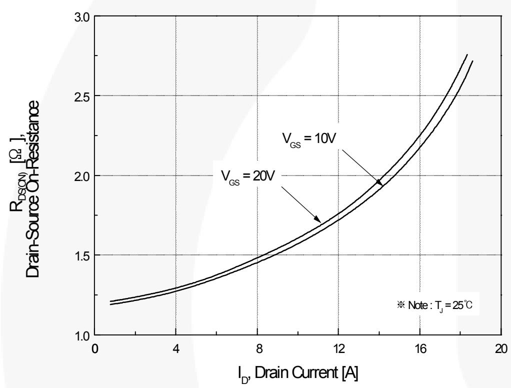


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

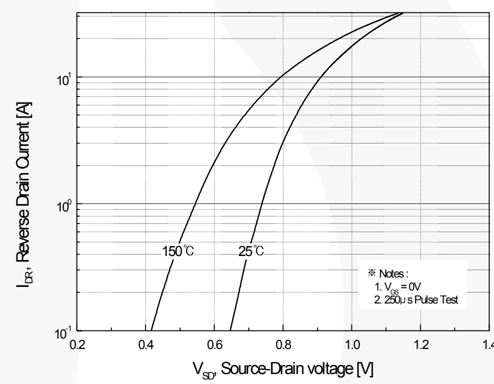


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

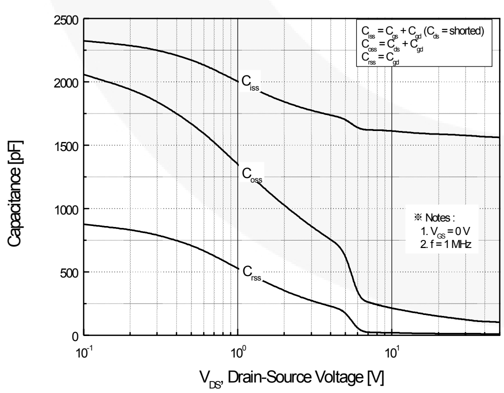


Figure 5. Capacitance Characteristics

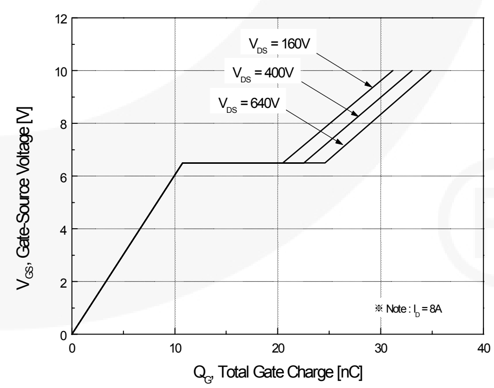


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

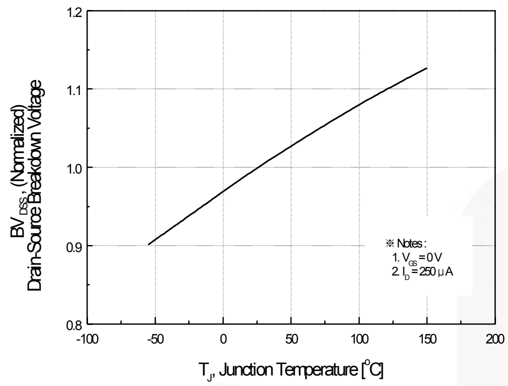


Figure 7. Breakdown Voltage Variation vs Temperature

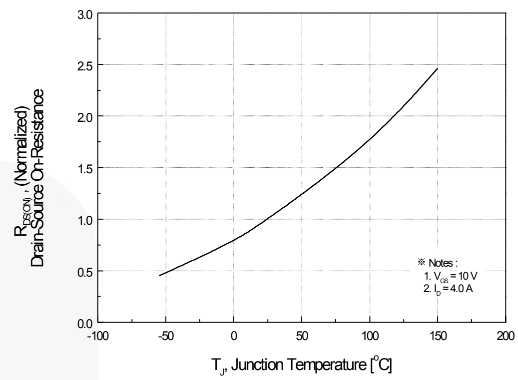


Figure 8. On-Resistance Variation vs Temperature

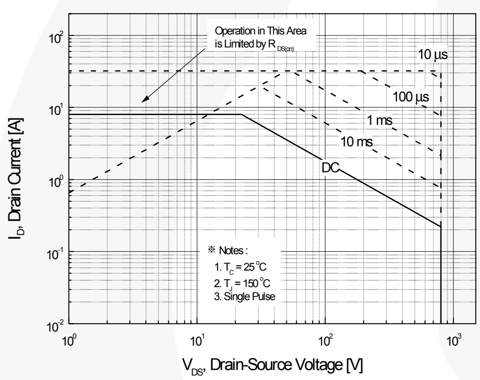


Figure 9-1. Maximum Safe Operating Area for FQP8N80C

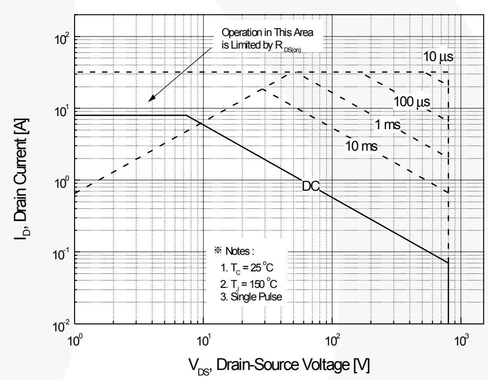


Figure 9-2. Maximum Safe Operating Area for FQPF8N80C

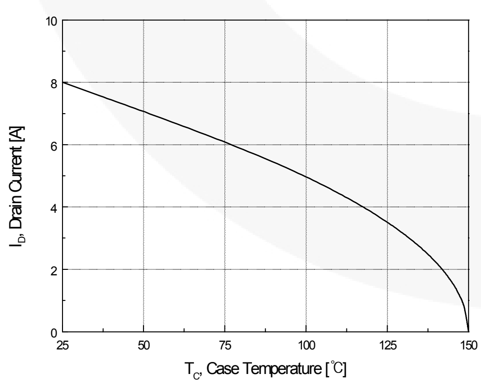


Figure 10. Maximum Drain Current vs Case Temperature

Typical Characteristics (Continued)

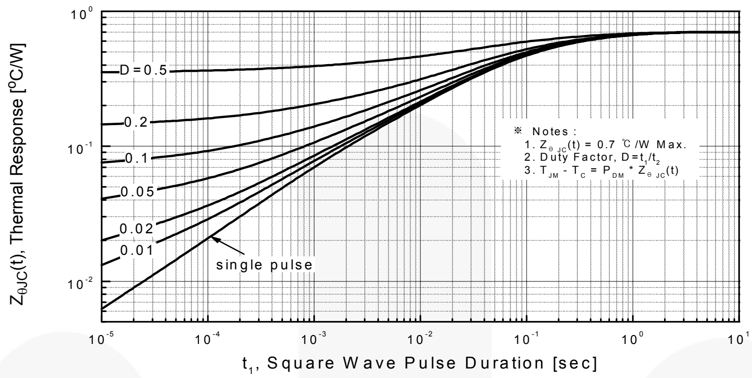


Figure 11-1. Transient Thermal Response Curve for FQP8N80C

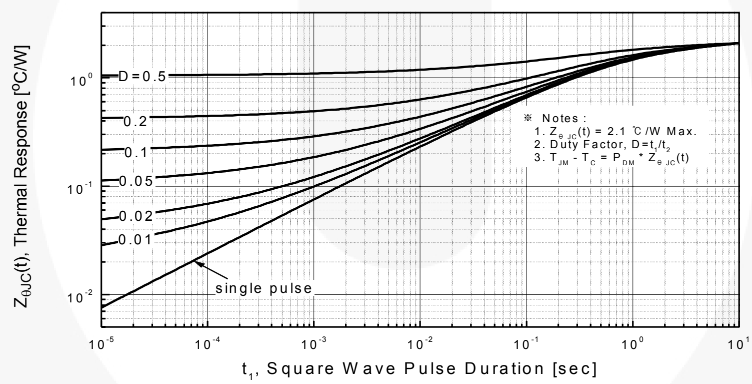


Figure 11-2. Transient Thermal Response Curve for FQPF8N80C

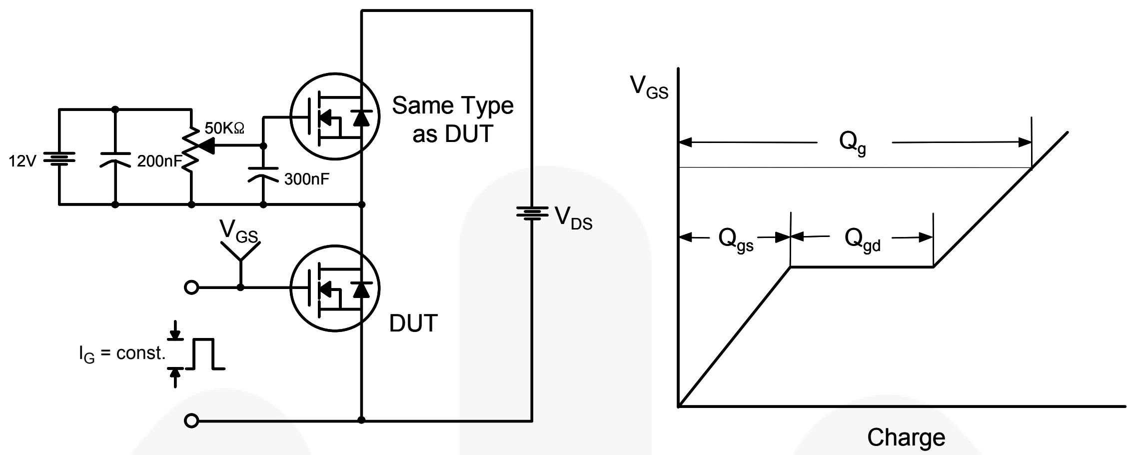


Figure 12. Gate Charge Test Circuit & Waveform

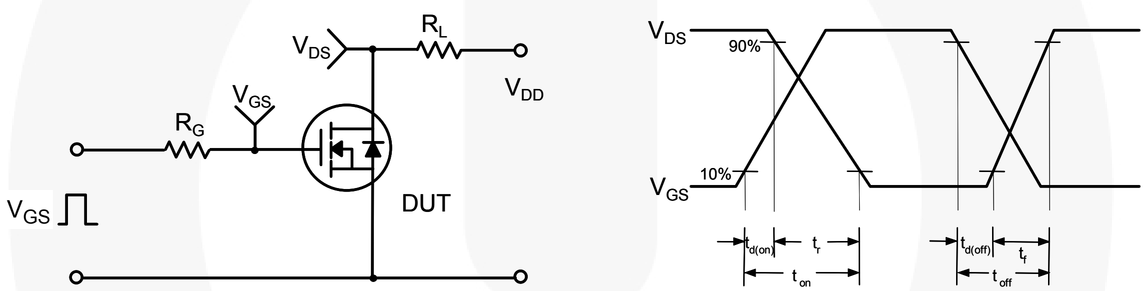


Figure 13. Resistive Switching Test Circuit & Waveforms

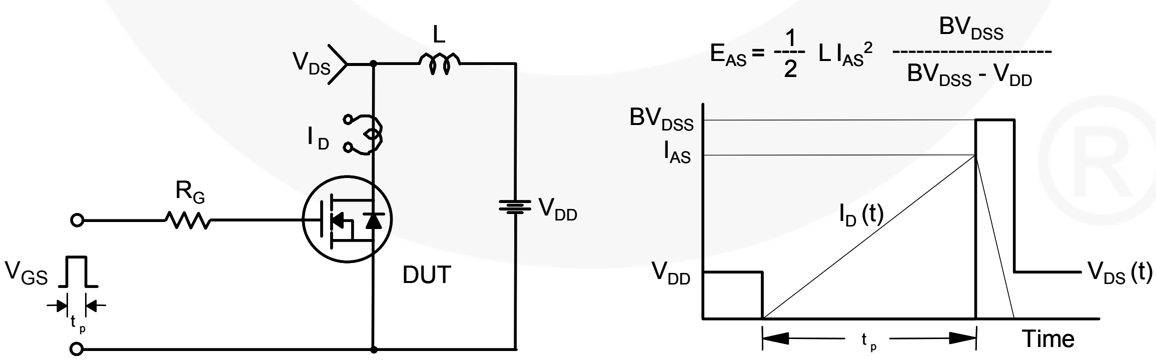


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

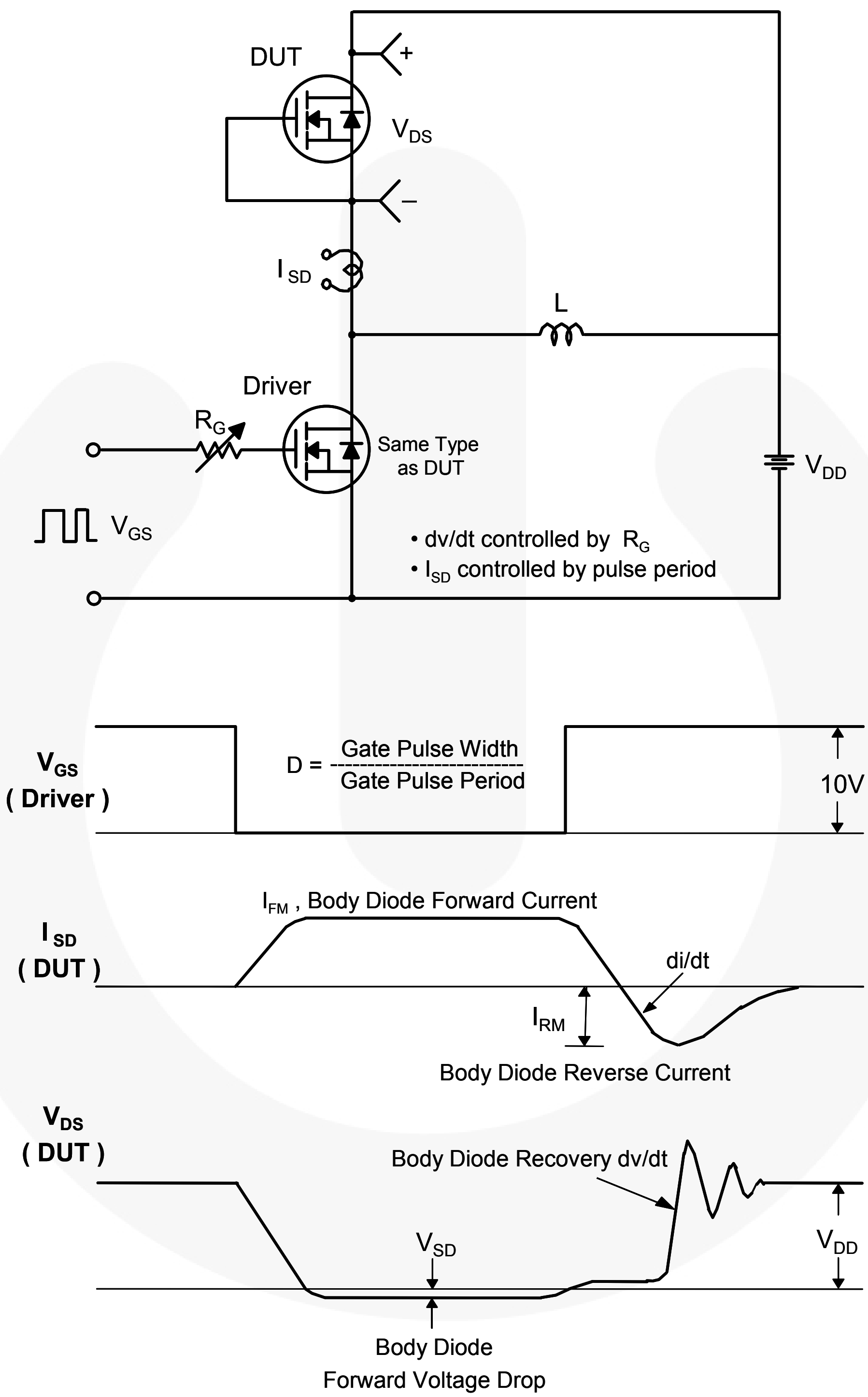


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

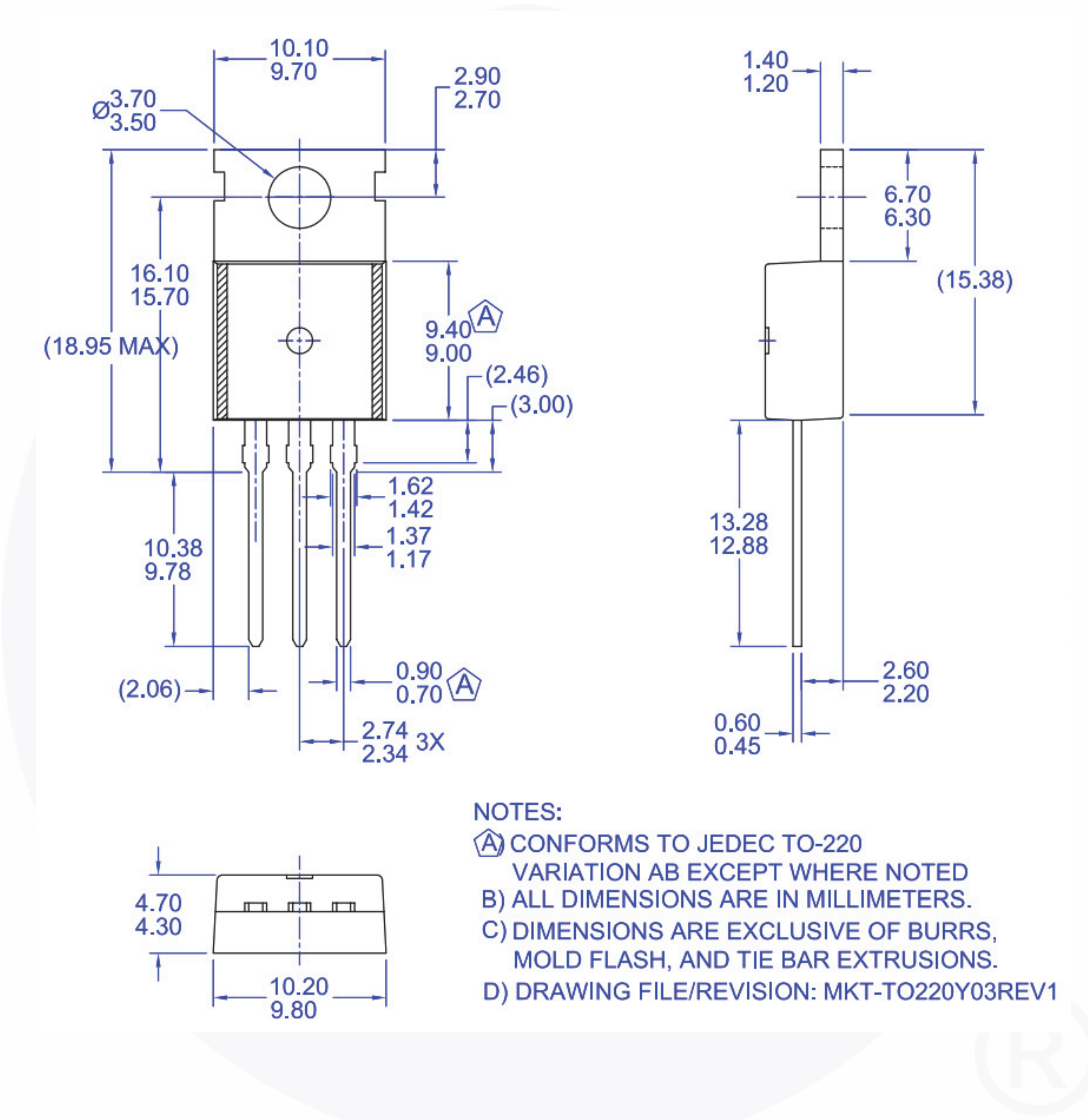


Figure 16. TO220, Molded, 3-Lead, Jedec Variation AB

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Mechanical Dimensions

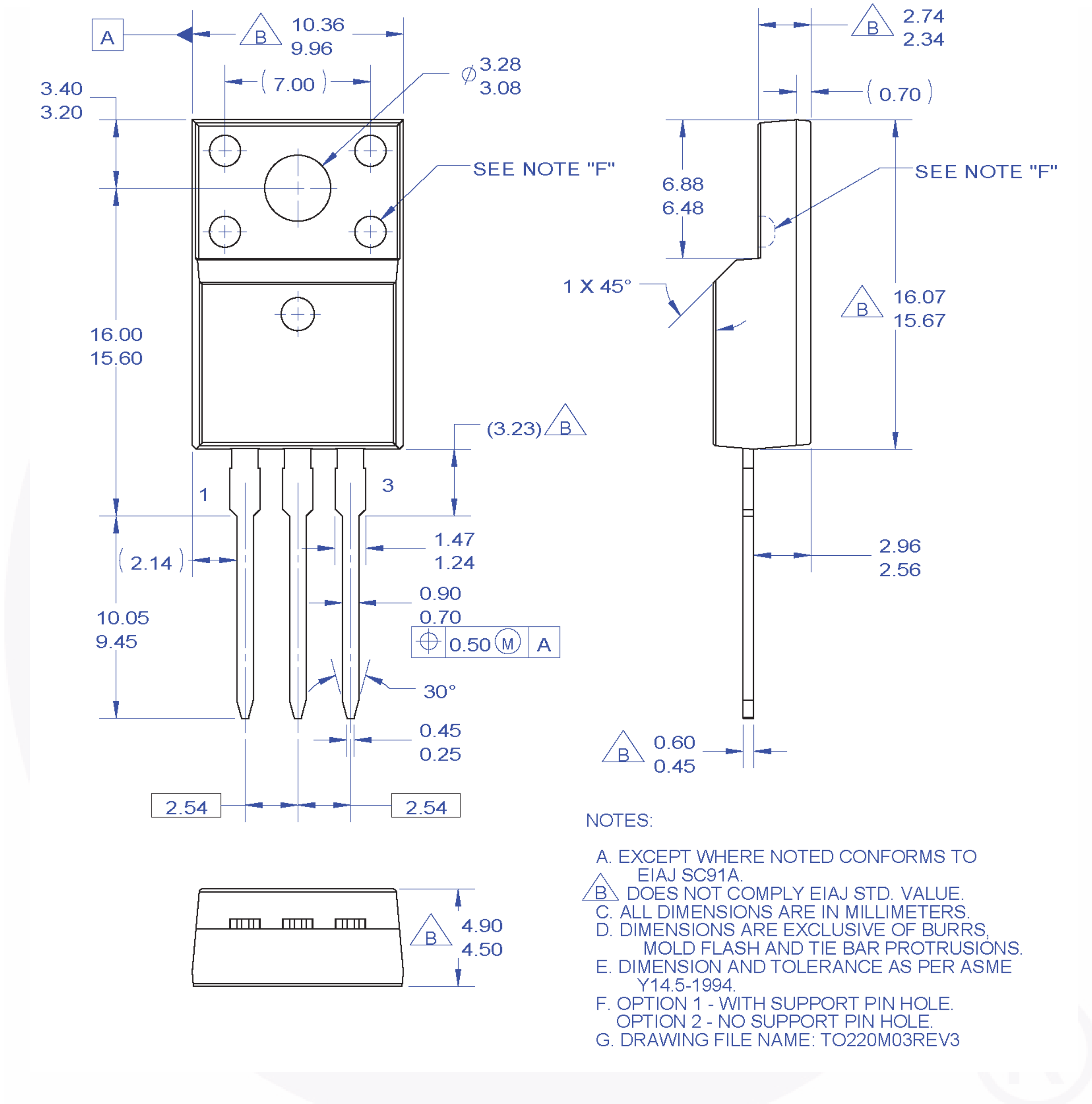

Figure 17. TO220, Molded, 3-Lead, Full Pack, EIAJ SC91, Straight Lead

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Mechanical Dimensions

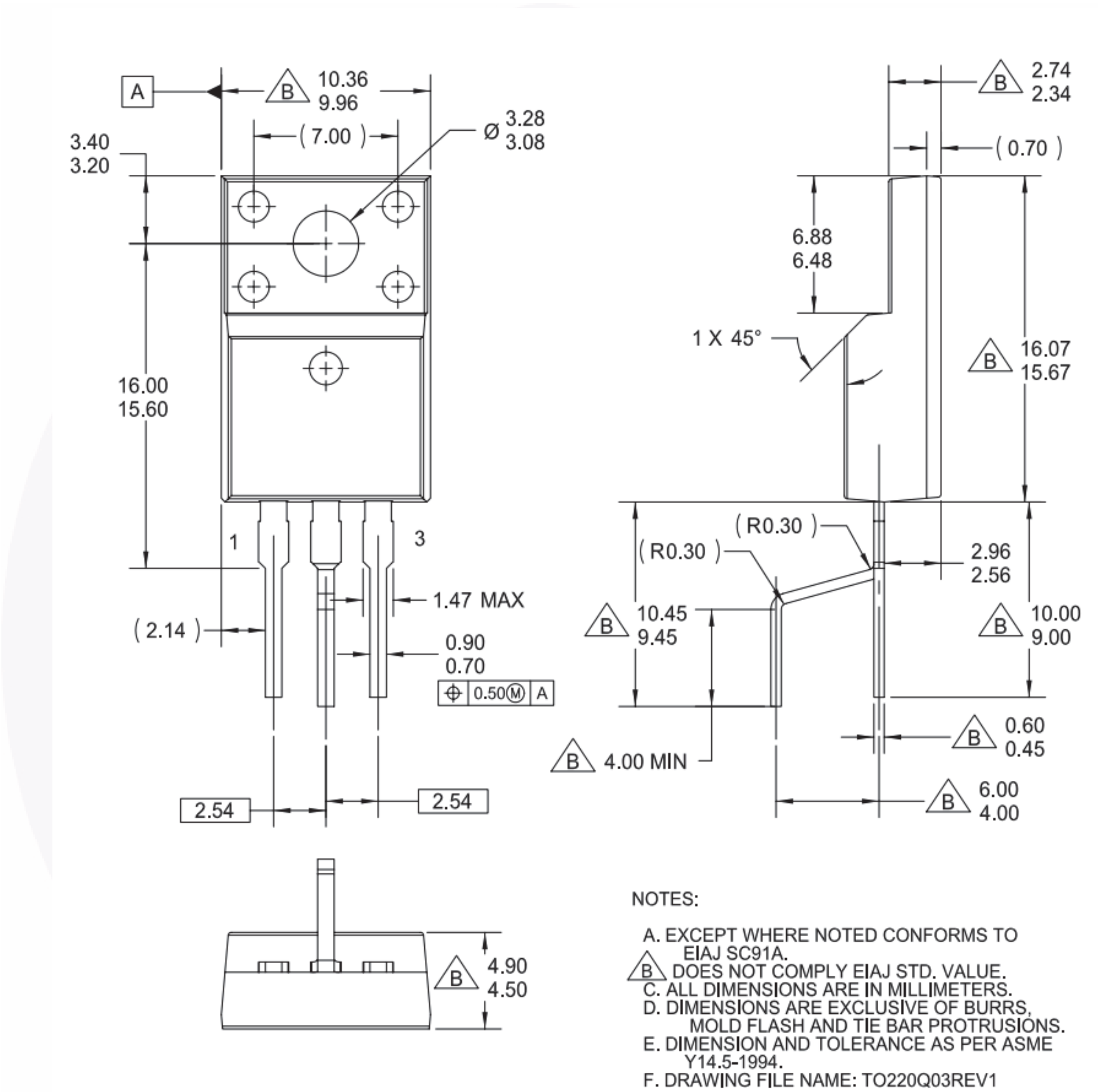

Figure 18. TO220, Molded, 3-Lead, Full Pack, EIAJ SC91, Y-Formed

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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.

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