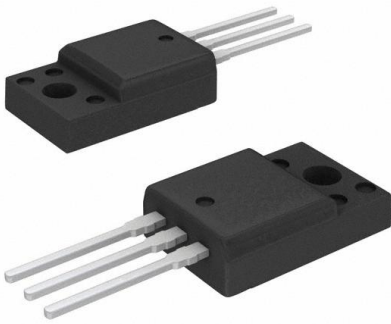


FQPF2N60 Datasheet

www.digi-electronics.com



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

DiGi Electronics Part Number	FQPF2N60-DG
Manufacturer	onsemi
Manufacturer Product Number	FQPF2N60
Description	MOSFET N-CH 600V 1.6A TO220F
Detailed Description	N-Channel 600 V 1.6A (Tc) 28W (Tc) Through Hole T O-220F-3



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

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Purchase and inquiry

Manufacturer Product Number:

FQPF2N60

Series:

QFET®

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

600 V

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

10V

Vgs(th) (Max) @ Id:

5V @ 250µA

Vgs (Max):

±30V

FET Feature:

-

Operating Temperature:

-55°C ~ 150°C (Tj)

Supplier Device Package:

TO-220F-3

Base Product Number:

FQPF2

Manufacturer:

onsemi

Product Status:

Obsolete

Technology:

MOSFET (Metal Oxide)

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

1.6A (Tc)

Rds On (Max) @ Id, Vgs:

4.70hm @ 800mA, 10V

Gate Charge (Qg) (Max) @ Vgs:

11 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

350 pF @ 25 V

Power Dissipation (Max):

28W (Tc)

Mounting Type:

Through Hole

Package / Case:

TO-220-3 Full Pack

Environmental & Export classification

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095



April 2000

QFET™

FQPF2N60

600V N-Channel MOSFET

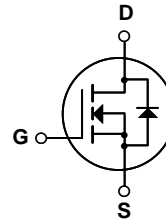
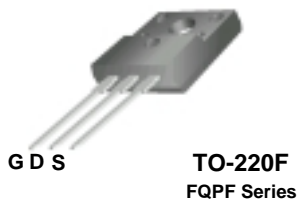
General Description

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 minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switch mode power supply.

Features

- 1.6A, 600V, $R_{DS(on)} = 4.7\Omega$ @ $V_{GS} = 10$ V
- Low gate charge (typical 9.0 nC)
- Low Crss (typical 5.0 pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	FQPF2N60	Units
V_{DSS}	Drain-Source Voltage	600	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) - Continuous ($T_C = 100^\circ\text{C}$)	1.6	A
		1.0	A
I_{DM}	Drain Current - Pulsed (Note 1)	6.4	A
V_{GSS}	Gate-Source Voltage	± 30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	140	mJ
I_{AR}	Avalanche Current (Note 1)	1.6	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	2.8	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5	V/ns
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$) - Derate above 25°C	28	W
		0.22	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	4.46	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	62.5	$^\circ\text{C}/\text{W}$

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
--------	-----------	-----------------	-----	-----	-----	-------

Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	600	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C	--	0.4	--	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$	--	--	10	μA
		$V_{DS} = 480\text{ V}, T_C = 125^\circ\text{C}$	--	--	100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	3.0	--	5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 0.8\text{ A}$	--	3.7	4.7	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 50\text{ V}, I_D = 0.8\text{ A}$ (Note 4)	--	2.0	--	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	270	350	pF
C_{oss}	Output Capacitance		--	40	50	pF
C_{rss}	Reverse Transfer Capacitance		--	5	7	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 300\text{ V}, I_D = 2.4\text{ A},$ $R_G = 25\ \Omega$	--	10	30	ns	
t_r	Turn-On Rise Time		--	25	60	ns	
$t_{d(off)}$	Turn-Off Delay Time		(Note 4, 5)	--	20	50	ns
t_f	Turn-Off Fall Time		--	25	60	ns	
Q_g	Total Gate Charge		$V_{DS} = 480\text{ V}, I_D = 2.4\text{ A},$ $V_{GS} = 10\text{ V}$	--	9.0	11	nC
Q_{gs}	Gate-Source Charge	(Note 4, 5)	--	1.6	--	nC	
Q_{gd}	Gate-Drain Charge		--	4.3	--	nC	

Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current	--	--	1.6	A	
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	6.4	A	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 1.6\text{ A}$	--	--	1.4	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 2.4\text{ A},$ $dI_F / dt = 100\text{ A}/\mu\text{s}$	--	180	--	ns
Q_{rr}	Reverse Recovery Charge	(Note 4)	--	0.72	--	μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L = 100\text{ mH}, I_{AS} = 1.6\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 2.4\text{ A}, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width $\leq 300\ \mu\text{s}$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature

Typical Characteristics

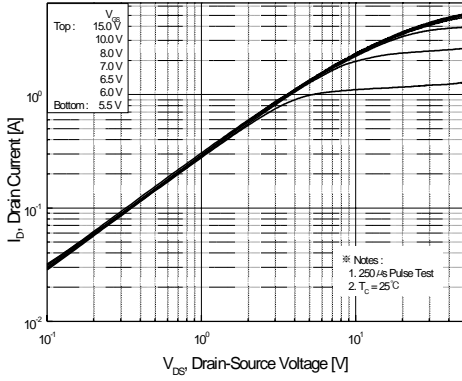


Figure 1. On-Region Characteristics

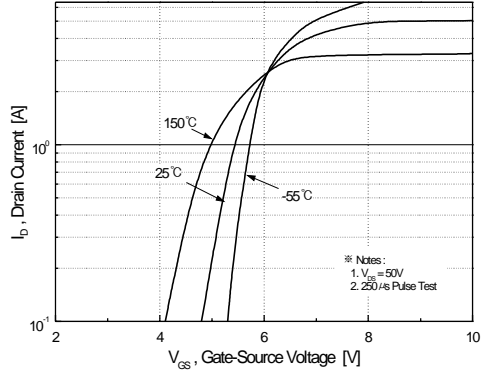


Figure 2. Transfer Characteristics

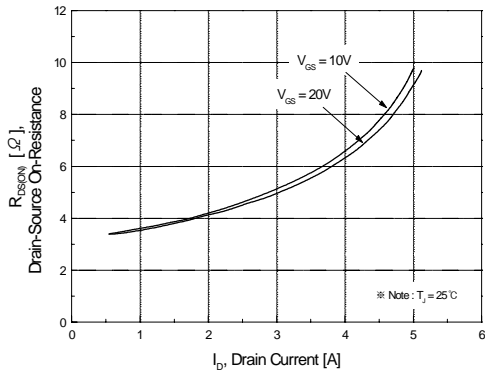


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

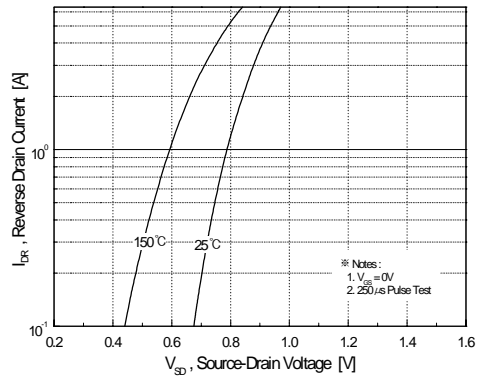


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

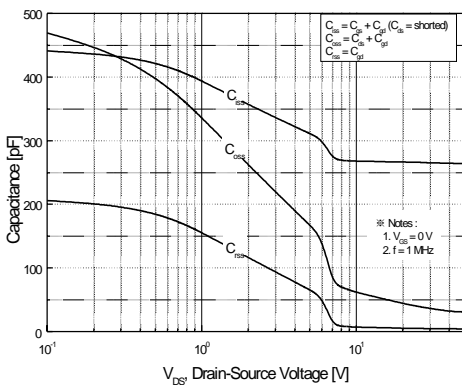


Figure 5. Capacitance Characteristics

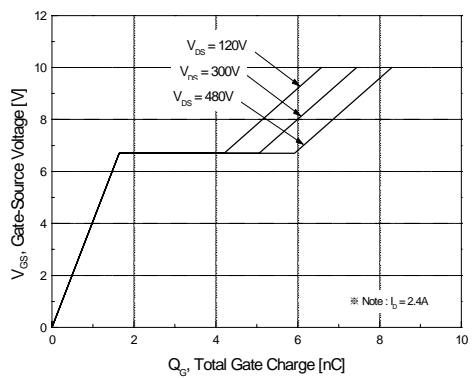


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

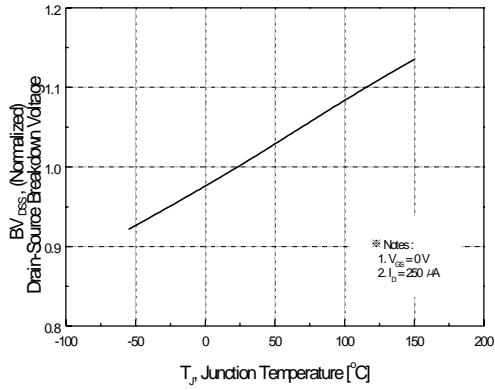


Figure 7. Breakdown Voltage Variation vs. Temperature

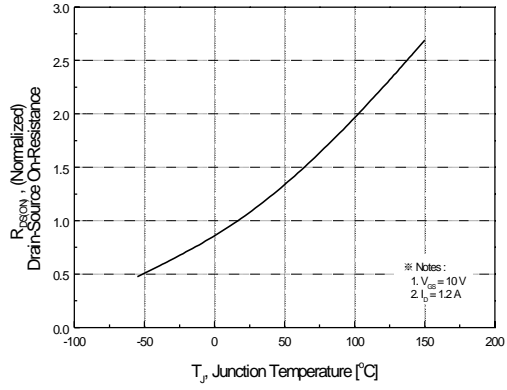


Figure 8. On-Resistance Variation vs. Temperature

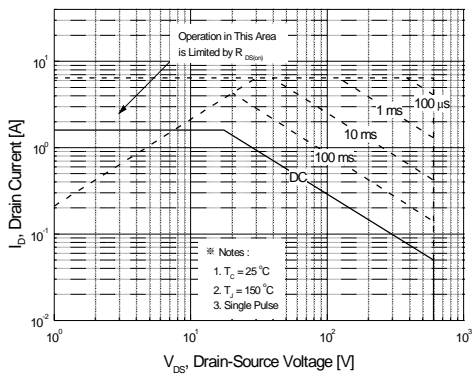


Figure 9. Maximum Safe Operating Area

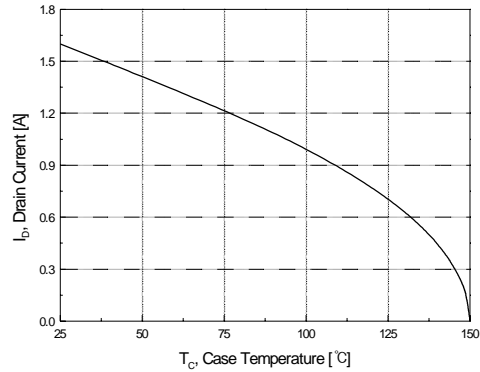


Figure 10. Maximum Drain Current vs. Case Temperature

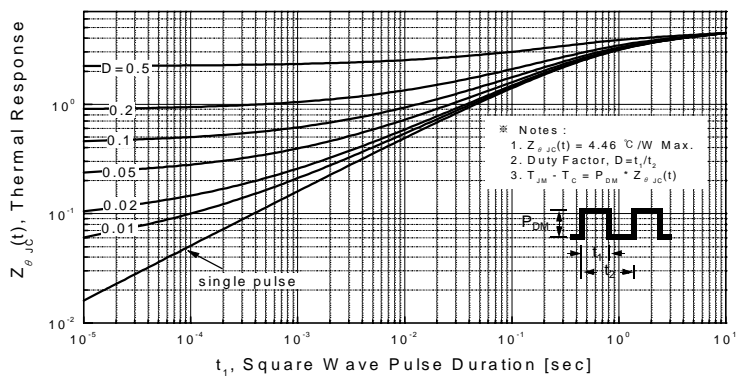
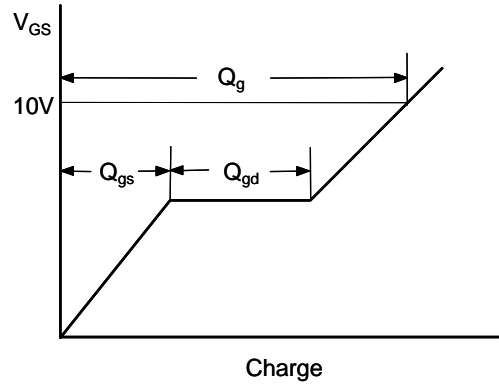
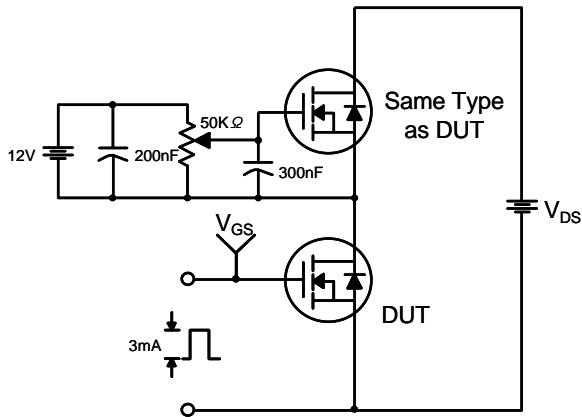


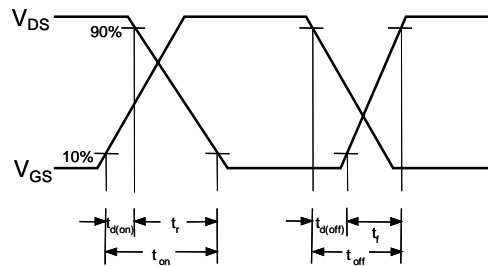
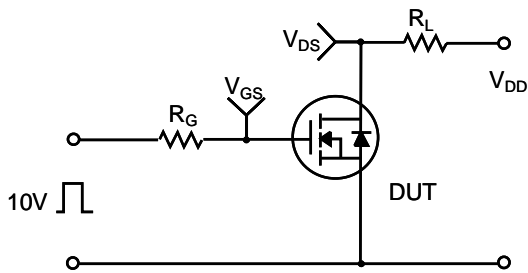
Figure 11. Transient Thermal Response Curve

FQPF2N60

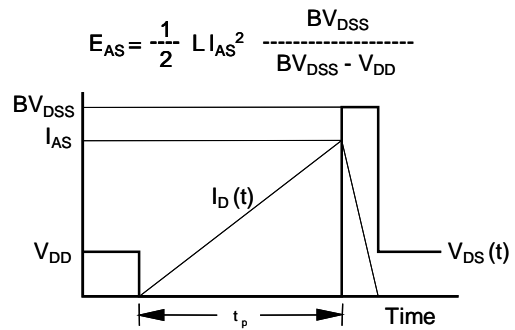
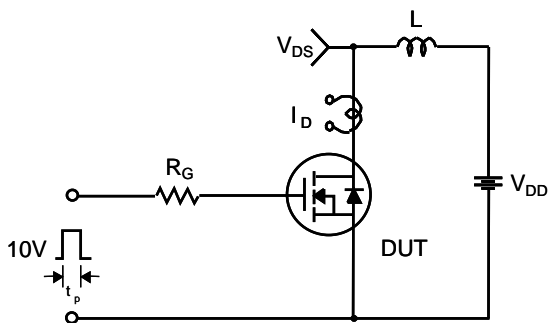
Gate Charge Test Circuit & Waveform



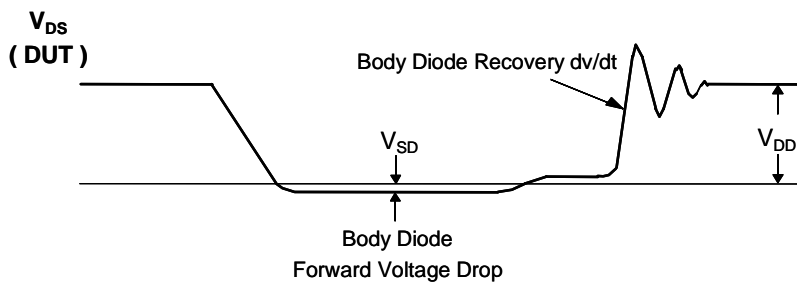
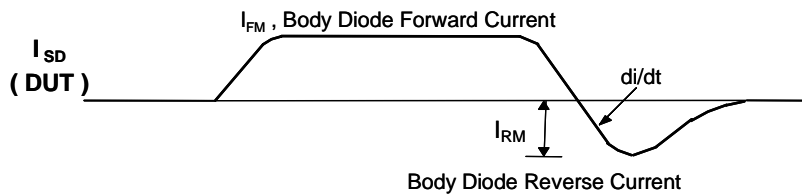
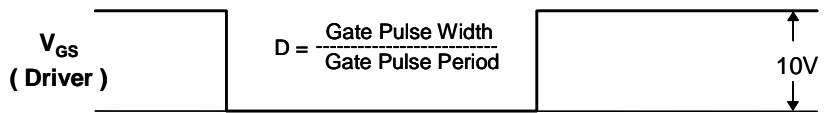
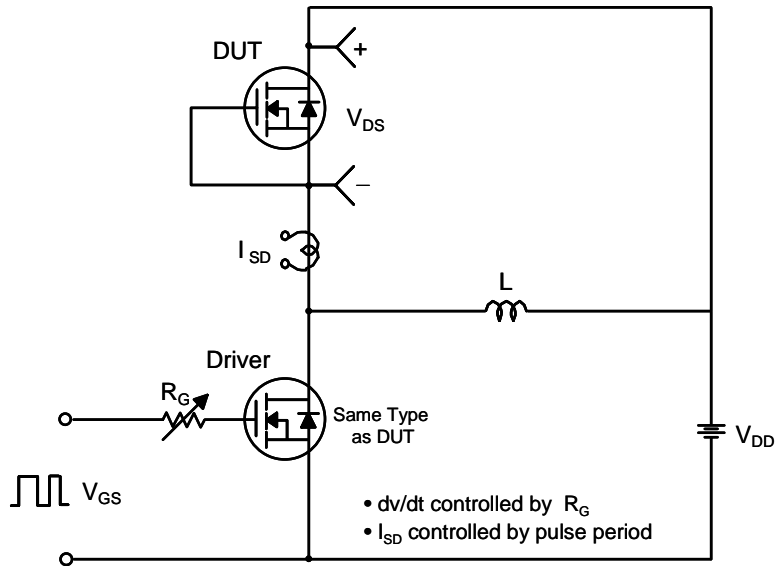
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



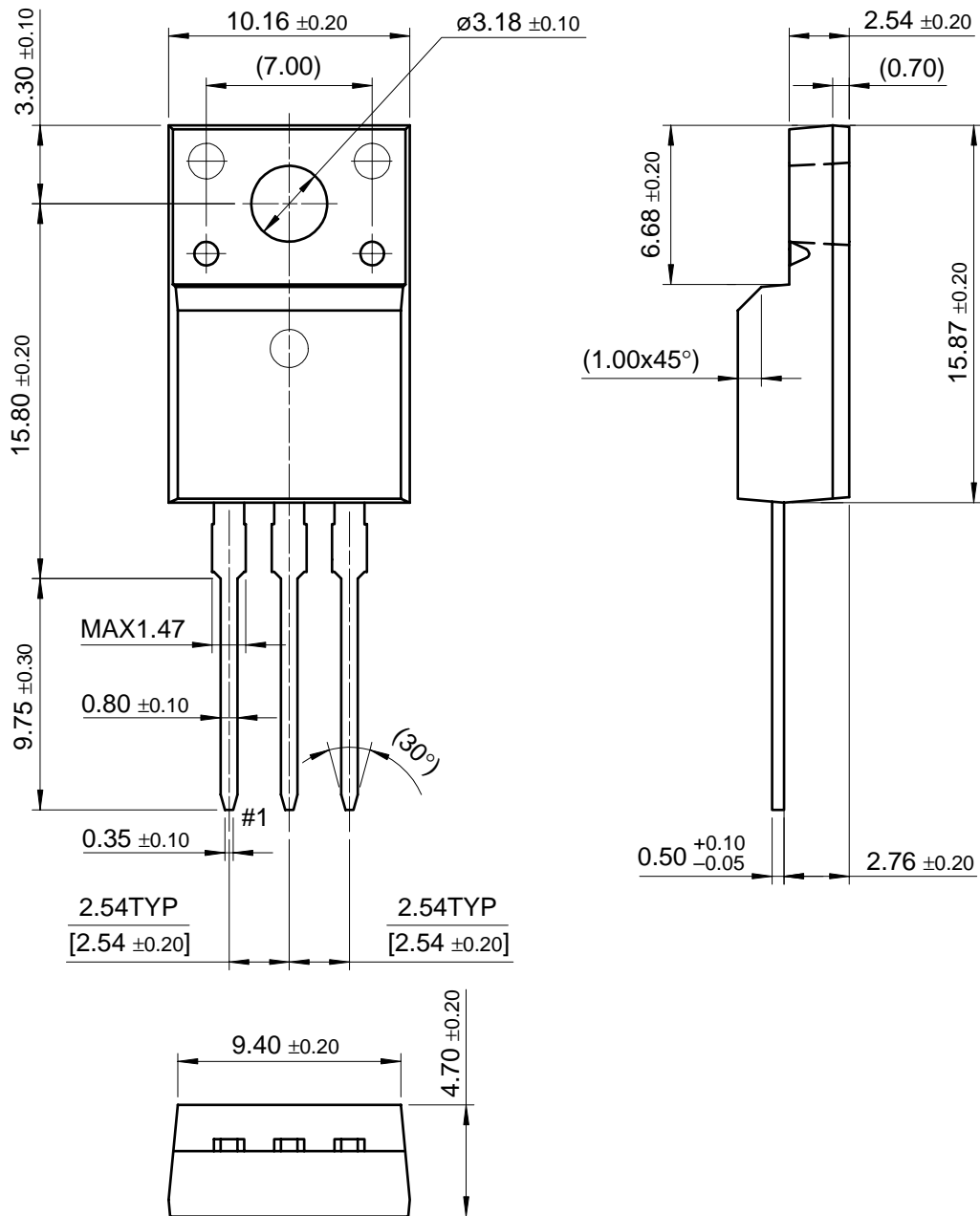
Peak Diode Recovery dv/dt Test Circuit & Waveforms



FQPF2N60

Package Dimensions

TO-220F



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