

# FQT5P10

## 100V P-Channel MOSFET

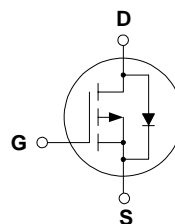
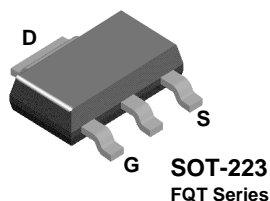
### General Description

These P-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 low voltage applications such as audio amplifier, high efficiency switching DC/DC converters, and DC motor control.

### Features

- -1.0A, -100V,  $R_{DS(on)} = 1.05\Omega @ V_{GS} = -10V$
- Low gate charge ( typical 6.3 nC)
- Low Crss ( typical 18 pF)
- Fast switching
- Improved dv/dt capability



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

Symbol	Parameter	FQT5P10	Units
$V_{DSS}$	Drain-Source Voltage	-100	V
$I_D$	Drain Current - Continuous ( $T_C = 25^\circ\text{C}$ ) - Continuous ( $T_C = 70^\circ\text{C}$ )	-1.0	A
		-0.8	A
$I_{DM}$	Drain Current - Pulsed (Note 1)	-4.0	A
$V_{GSS}$	Gate-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulsed Avalanche Energy (Note 2)	55	mJ
$I_{AR}$	Avalanche Current (Note 1)	-1.0	A
$E_{AR}$	Repetitive Avalanche Energy (Note 1)	0.2	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	-6.0	V/ns
$P_D$	Power Dissipation ( $T_C = 25^\circ\text{C}$ ) - Derate above $25^\circ\text{C}$	2.0	W
		0.016	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
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient *	--	62.5	$^\circ\text{C}/\text{W}$

\* When mounted on the minimum pad size recommended (PCB Mount)

**Electrical Characteristics**T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250 μA	-100	--	--	V
ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = -250 μA, Referenced to 25°C	--	-0.1	--	V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = -100 V, V <sub>GS</sub> = 0 V	--	--	-1	μA
		V <sub>DS</sub> = -80 V, T <sub>C</sub> = 125°C	--	--	-10	μA
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	V <sub>GS</sub> = -30 V, V <sub>DS</sub> = 0 V	--	--	-100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	V <sub>GS</sub> = 30 V, V <sub>DS</sub> = 0 V	--	--	100	nA

**On Characteristics**

V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA	-2.0	--	-4.0	V
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -0.5 A	--	0.82	1.05	Ω
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = -40 V, I <sub>D</sub> = -0.5 A (Note 4)	--	1.4	--	S

**Dynamic Characteristics**

C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = -25 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz	--	190	250	pF
C <sub>oss</sub>	Output Capacitance		--	70	90	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	18	25	pF

**Switching Characteristics**

t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = -50 V, I <sub>D</sub> = -4.5 A, R <sub>G</sub> = 25 Ω  (Note 4, 5)	--	9	30	ns
t <sub>r</sub>	Turn-On Rise Time		--	70	150	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	12	35	ns
t <sub>f</sub>	Turn-Off Fall Time		--	30	70	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = -80 V, I <sub>D</sub> = -4.5 A, V <sub>GS</sub> = -10 V  (Note 4, 5)	--	6.3	8.2	nC
Q <sub>gs</sub>	Gate-Source Charge		--	1.7	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	3.0	--	nC

**Drain-Source Diode Characteristics and Maximum Ratings**

I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current	--	--	-1.0	A	
I <sub>SM</sub>	Maximum Pulsed Drain-Source Diode Forward Current	--	--	-4.0	A	
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = -1.0 A	--	--	-4.0	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0 V, I <sub>S</sub> = -4.5 A,	--	85	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge	dI <sub>F</sub> / dt = 100 A/μs (Note 4)	--	0.27	--	μC

**Notes:**

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 83mH, I<sub>AS</sub> = -1.0A, V<sub>DD</sub> = -25V, R<sub>G</sub> = 25 Ω, Starting T<sub>J</sub> = 25°C
3. I<sub>SD</sub> ≤ -4.5A, di/dt ≤ 300A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub> = 25°C
4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

## Typical Characteristics

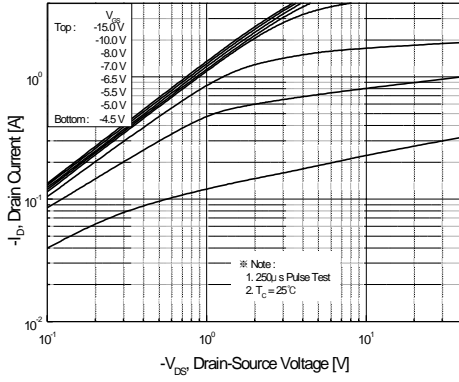


Figure 1. On-Region Characteristics

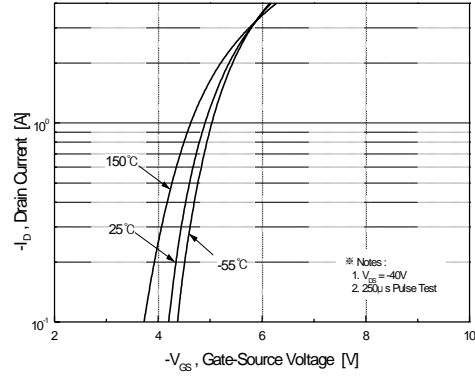


Figure 2. Transfer Characteristics

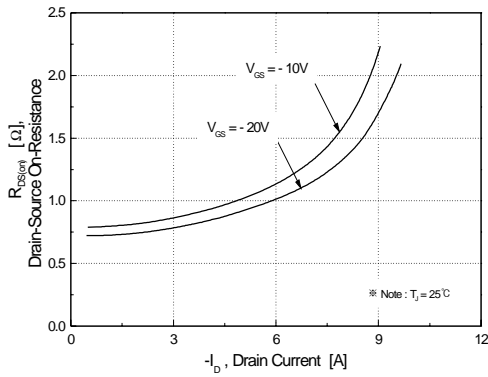


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

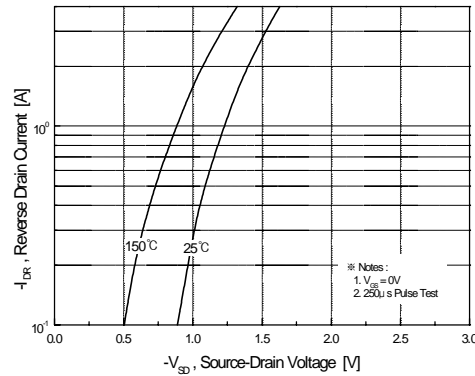


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

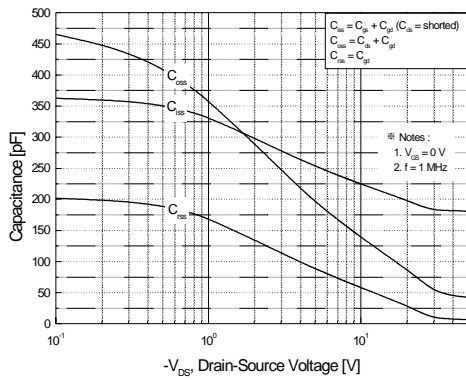


Figure 5. Capacitance Characteristics

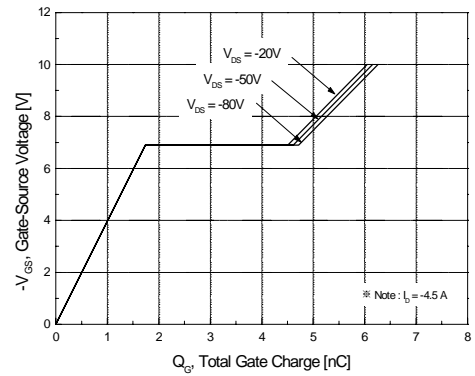
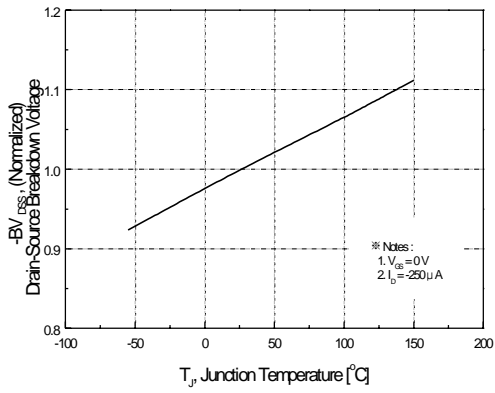
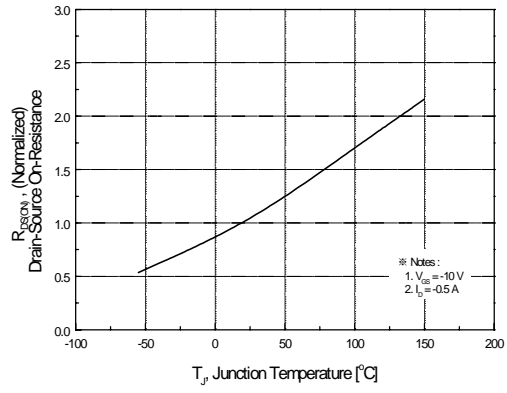


Figure 6. Gate Charge Characteristics

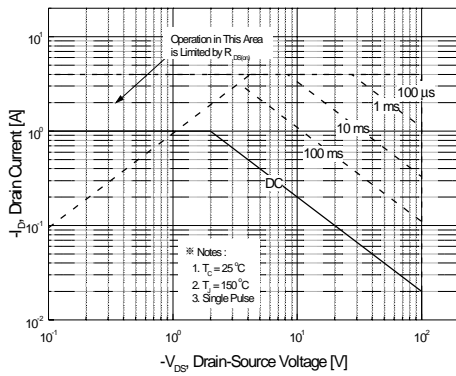
**Typical Characteristics** (Continued)



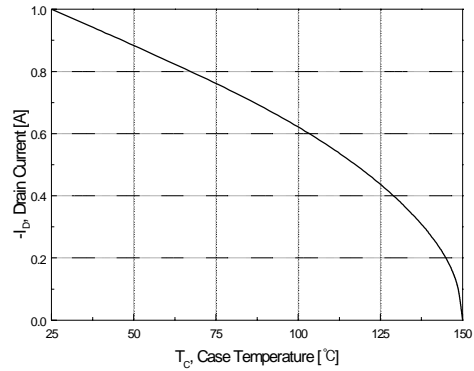
**Figure 7. Breakdown Voltage Variation vs. Temperature**



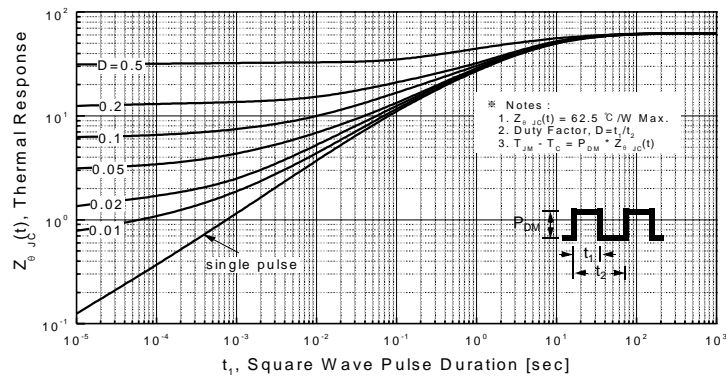
**Figure 8. On-Resistance Variation vs. Temperature**



**Figure 9. Maximum Safe Operating Area**



**Figure 10. Maximum Drain Current vs. Case Temperature**



**Figure 11. Transient Thermal Response Curve**

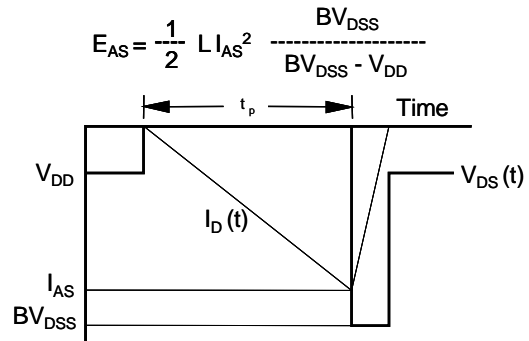
**Gate Charge Test Circuit & Waveform**



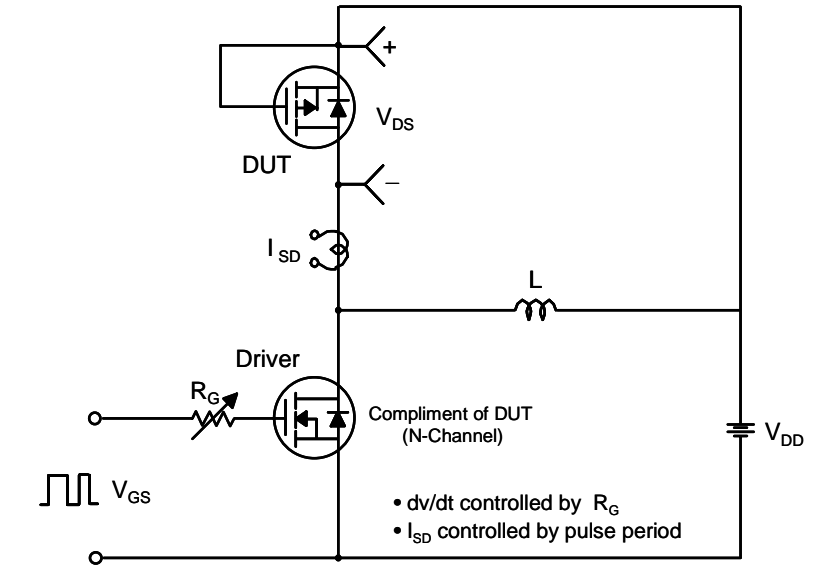
**Resistive Switching Test Circuit & Waveforms**



**Unclamped Inductive Switching Test Circuit & Waveforms**

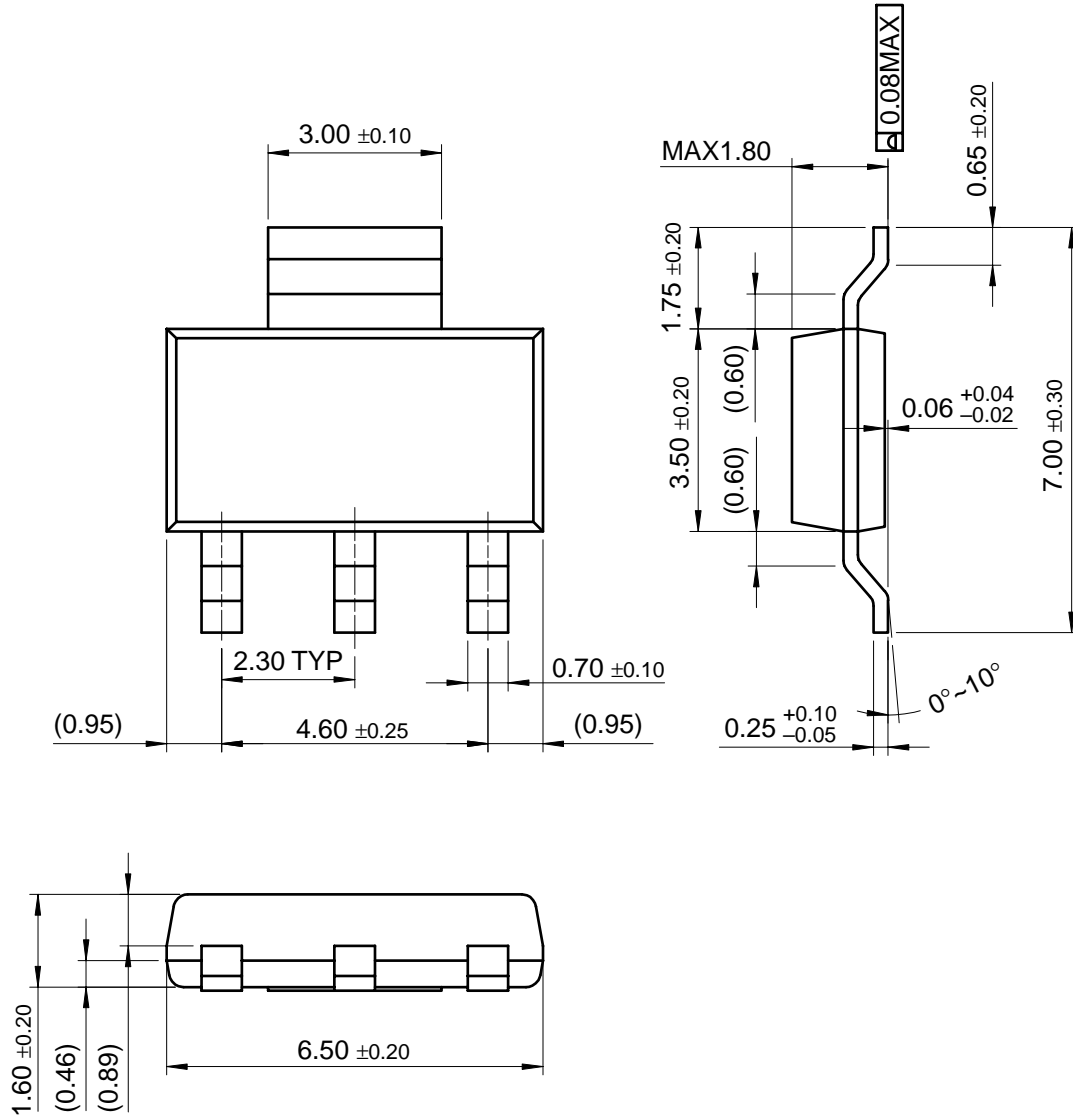


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Dimensions

SOT-223



Dimensions in Millimeters

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