FAIRCHILD SEMICONDUCTOR®

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FDM606P

P-Channel 1.8V Logic Level Power Trench® MOSFET

General Description

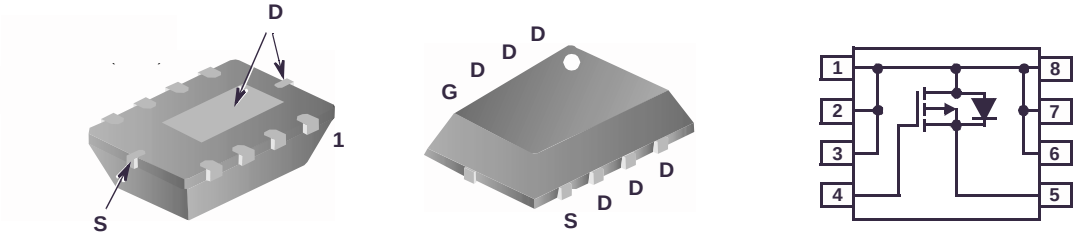
This P-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain low gate charge for superior switching performance. These devices are well suited for portable electronics applications.

Features

- Fast switching
- $r_{DS(ON)}$ = 0.026Ω (Typ), V_{GS} = -4.5V
- $r_{DS(ON)}$ = 0.033Ω (Typ), V_{GS} = -2.5V
- $r_{DS(ON)}$ = 0.052Ω (Typ), V_{GS} = -1.8V

Applications

- Load switch
- Battery charge
- Battery disconnect circuits



MicroFET 3x2-8

MOSFET Maximum Ratings T_A=25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain to Source Voltage	-20	V
V_{GS}	Gate to Source Voltage	±8	V
I_D	Drain Current Continuous (T_C = 25°C, V_{GS} = - 4.5V)	-6.8	A
	Continuous (T_C = 100°C, V_{GS} = - 2.5V)	-3.8	A
	Continuous (T_C = 100°C, V_{GS} = -1.8V)	-3.0	A
	Pulsed	Figure 4	
P_D	Power dissipation Derate above 25°C	1.92 15.4	W mW/°C
T_J, T_{STG}	Operating and Storage Temperature	-55 to 150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case (Note1)	6.0	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (Note 2)	65	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
.06P	FDM606P	MicroFET3x2	178 mm	8 mm	3000

Electrical Characteristics T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
Off Characteristics							
B_{VDSS}	Drain to Source Breakdown Voltage	I_D = -250µA, V_{GS} = 0V		-20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -16V, V_{GS} = 0V		-	-	-1	µA
			T_A=100°C	-	-	-5	
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±8V		-	-	±100	nA
On Characteristics							
$V_{GS(TH)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = -250µA		-0.4	-0.9	-1.5	V
$r_{DS(ON)}$	Drain to Source On Resistance	I_D = -6.8A, V_{GS} = -4.5V		-	0.026	0.030	Ω
		I_D = -3.8A, V_{GS} = -2.5V		-	0.033	0.038	
		I_D = -3.0A, V_{GS} = -1.8V		-	0.052	0.070	
Dynamic Characteristics							
C_{ISS}	Input Capacitance	V_{DS} = -10V, V_{GS} = 0V, f = 1MHz		-	2200	-	pF
C_{OSS}	Output Capacitance			-	350	-	pF
C_{RSS}	Reverse Transfer Capacitance			-	160	-	pF
$Q_{g(TOT)}$	Total Gate Charge at -4.5V	V_{GS} = 0V to -4.5V	V_{DD} = -10V, I_D = -3.0A, I_g = 1.0mA	-	20	30	nC
$Q_{g(-2.5)}$	Total Gate Charge at -2.5V	V_{GS} = 0V to -2.5V		-	12	18	nC
Q_{gs}	Gate to Source Gate Charge			-	3.0	-	nC
Q_{gd}	Gate to Drain “Miller” Charge			-	3.8	-	nC
Switching Characteristics (V_{GS} = -4.5V)							
t_{ON}	Turn-On Time	V_{DD} = -10V, I_D = -3.0A, V_{GS} = -4.5V, R_{GS} = 6.8Ω		-	-	81	ns
$t_{d(ON)}$	Turn-On Delay Time			-	9	-	ns
t_r	Rise Time			-	46	-	ns
$t_{d(OFF)}$	Turn-Off Delay Time			-	134	-	ns
t_f	Fall Time			-	71	-	ns
t_{OFF}	Turn-Off Time			-	-	308	ns
Drain-Source Diode Characteristics							
V_{SD}	Source to Drain Diode Voltage	I_{SD} = -6.8A		-	-0.9	-1.2	V
t_{rr}	Reverse Recovery Time	I_{SD} = -3.0A, dI_{SD}/dt = 100A/µs		-	-	28	ns
Q_{RR}	Reverse Recovered Charge	I_{SD} = -3.0A, dI_{SD}/dt = 100A/µs		-	-	20	nC

Notes:

1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the center drain pad. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by user’s board design.

2. $R_{\theta JA}$ is 65 °C/W (steady state) when mounted on a 1 inch^2 copper pad on FR-4.

Typical Characteristic T_A = 25°C unless otherwise noted

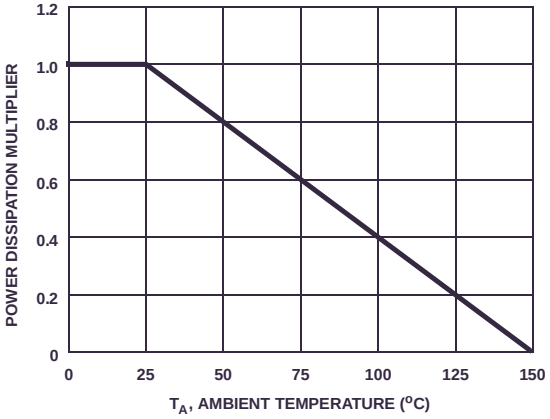


Figure 1. Normalized Power Dissipation vs Ambient Temperature

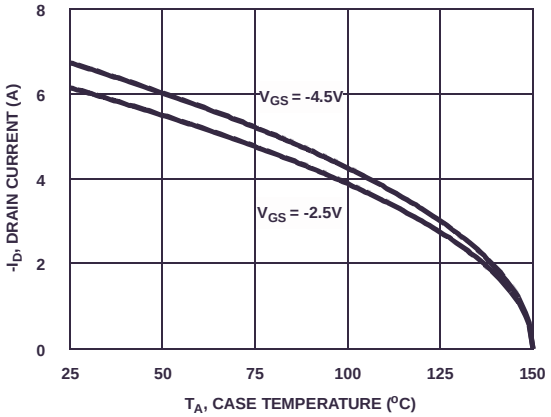


Figure 2. Maximum Continuous Drain Current vs Case Temperature

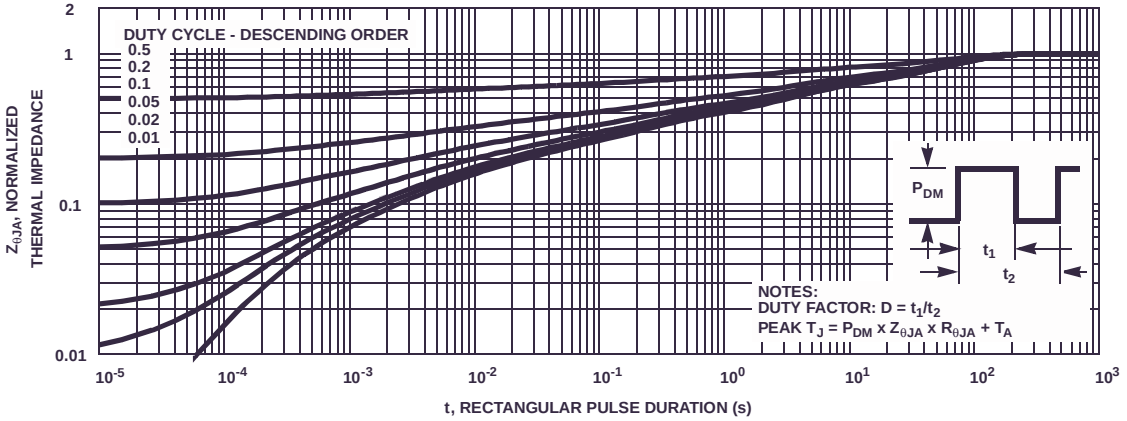


Figure 3. Normalized Maximum Transient Thermal Impedance

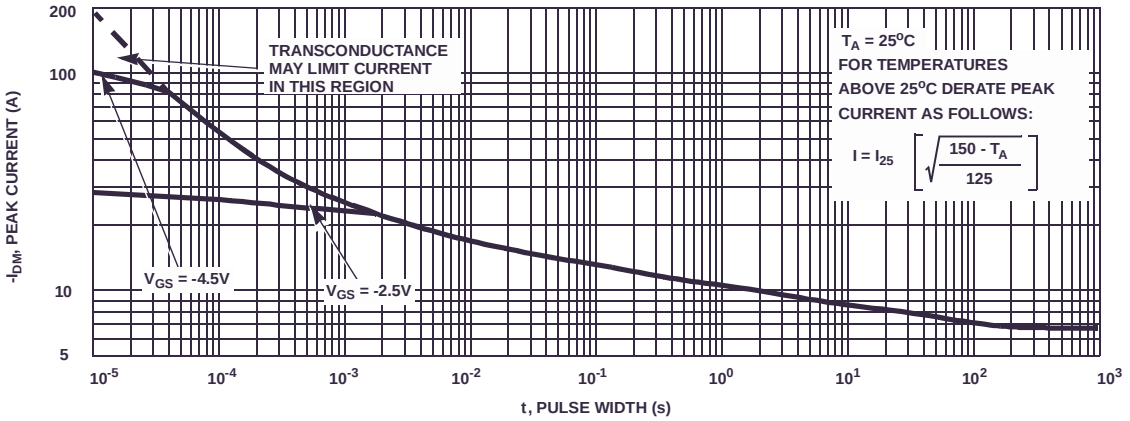


Figure 4. Peak Current Capability

Typical Characteristic (Continued) T_A = 25°C unless otherwise noted

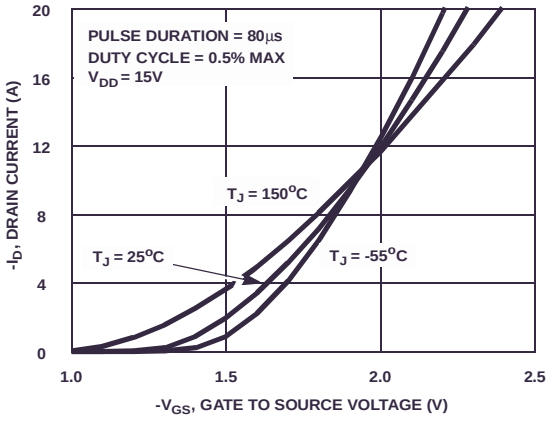


Figure 5. Transfer Characteristics

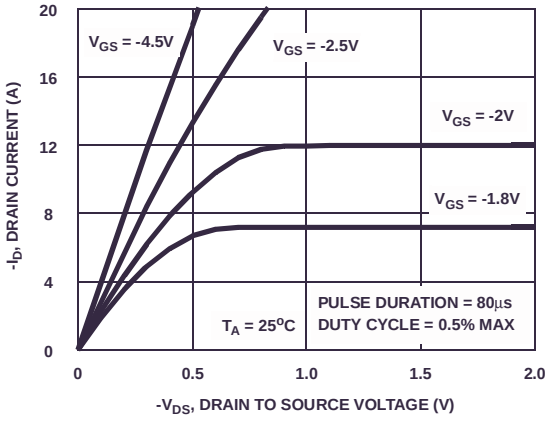


Figure 6. Saturation Characteristics

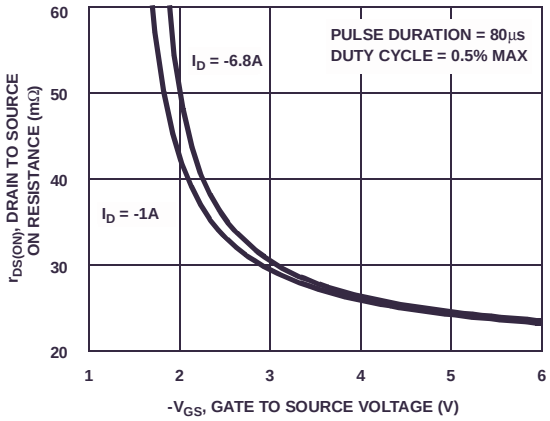


Figure 7. Drain to Source On Resistance vs Gate Voltage and Drain Current

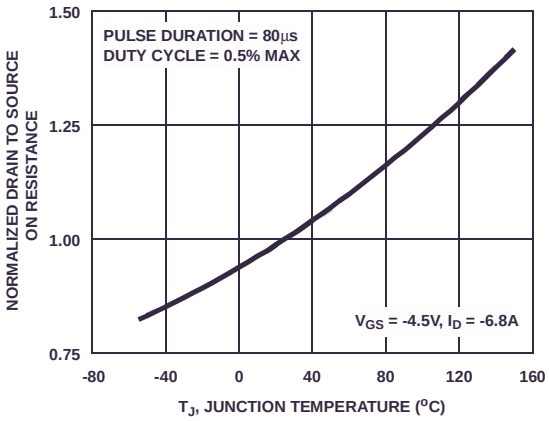


Figure 8. Normalized Drain to Source On Resistance vs Junction Temperature

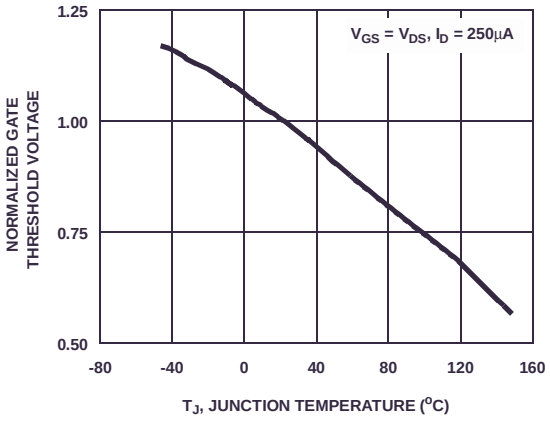


Figure 9. Normalized Gate Threshold Voltage vs Junction Temperature

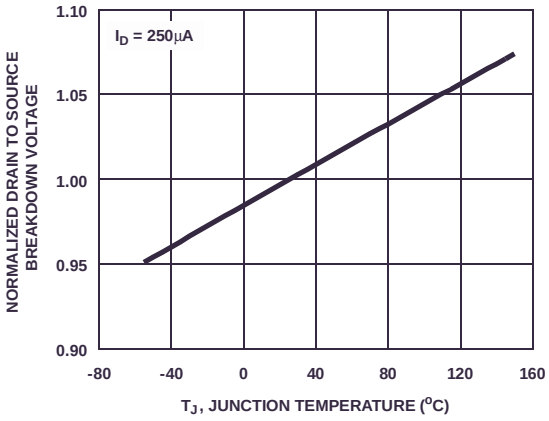


Figure 10. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

Typical Characteristic (Continued) T_A = 25°C unless otherwise noted

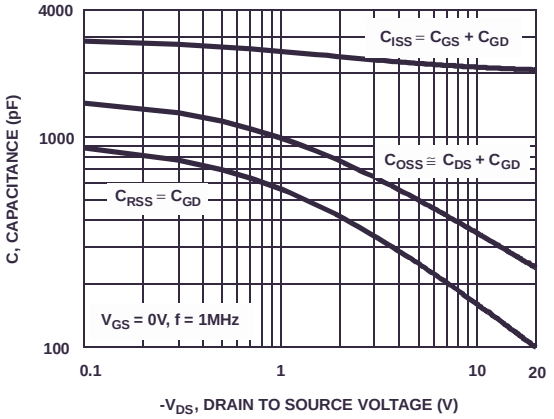


Figure 11. Capacitance vs Drain to Source Voltage

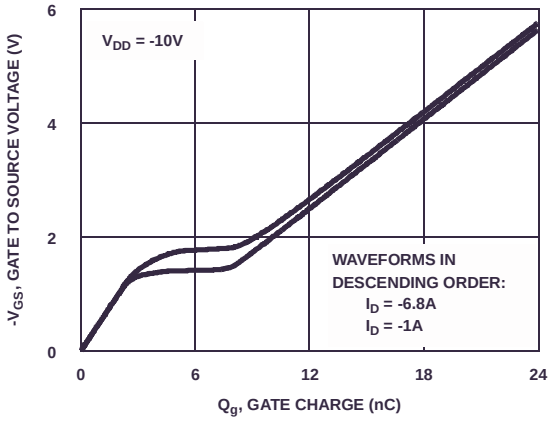


Figure 12. Gate Charge Waveforms for Constant Gate Currents

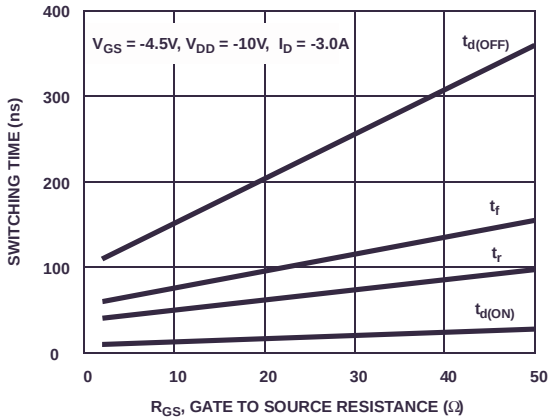


Figure 13. Switching Time vs Gate Resistance

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