FAIRCHILD SEMICONDUCTOR®

January 2003

FDG6318P

Dual P-Channel, Digital FET

General Description

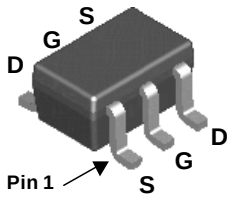
These dual P-Channel logic level enhancement mode MOSFET are produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize on-state resistance. This device has been designed especially for low voltage applications as a replacement for bipolar digital transistors and small signal MOSFETS.

Applications

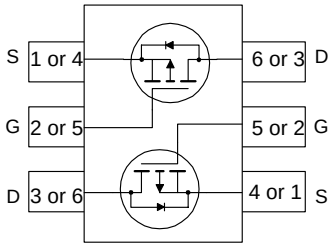
- Battery management

Features

- –0.5 A, –20 V. $R_{DS(ON)}$ = 780 mΩ @ V_{GS} = –4.5 V
  $R_{DS(ON)}$ = 1200 mΩ @ V_{GS} = –2.5 V
- Very low level gate drive requirements allowing direct operation in 3V circuits ($V_{GS(th)}$ < 1.5V).
- Compact industry standard SC70-6 surface mount package



SC70-6



The pinouts are symmetrical; pin 1 and pin 4 are interchangeable.

Absolute Maximum Ratings

T_A=25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-Source Voltage	–20	V
V_{GSS}	Gate-Source Voltage	±12	V
I_D	Drain Current – Continuous (Note 1)	–0.5	A
	– Pulsed	–1.8	
P_D	Power Dissipation for Single Operation (Note 1)	0.3	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	–55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1)	415	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
.38	FDG6318P	7''	8mm	3000 units

Electrical Characteristics

T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain–Source Breakdown Voltage	V_{GS} = 0 V, I_D = –250 µA	–20			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = –250 µA, Referenced to 25°C		–10		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = –16 V, V_{GS} = 0 V			–1	µA
I_{GSS}	Gate–Body Leakage	V_{GS} = ±12 V, V_{DS} = 0 V			±100	nA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = –250 µA	–0.65	–1.2	–1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = –250 µA, Referenced to 25°C		2		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	V_{GS} = –4.5 V, I_D = –0.5 A V_{GS} = –2.5 V, I_D = –0.4 A V_{GS} = –4.5 V, I_D = –0.5 A, T_J=125°C		580 980 780	780 1200	mΩ
$I_{D(on)}$	On–State Drain Current	V_{GS} = –4.5 V, V_{DS} = –5 V	–1.8			A
g_{FS}	Forward Transconductance	V_{DS} = –5 V, I_D = –0.5 A		1.1		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = –10 V, V_{GS} = 0 V, f = 1.0 MHz		83		pF
C_{oss}	Output Capacitance			20		pF
C_{rss}	Reverse Transfer Capacitance			11		pF
R_G	Gate Resistance	V_{GS} = 15 mV, f = 1.0 MHz		12.1		Ω
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = –10 V, I_D = 1 A, V_{GS} = –4.5 V, R_{GEN} = 6 Ω		6	12	ns
t_r	Turn–On Rise Time			12	22	ns
$t_{d(off)}$	Turn–Off Delay Time			6	13	ns
t_f	Turn–Off Fall Time			1	3	ns
Q_g	Total Gate Charge	V_{DS} = –10 V, I_D = –0.6 A, V_{GS} = –4.5 V		0.86	1.2	nC
Q_{gs}	Gate–Source Charge			0.22		nC
Q_{gd}	Gate–Drain Charge			0.25		nC
Drain–Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain–Source Diode Forward Current				–0.25	A
V_{SD}	Drain–Source Diode Forward Voltage	V_{GS} = 0 V, I_S = –0.25 A (Note 2)		–0.83	–1.2	V
t_{rr}	Reverse Recovery Time	I_F = –0.5 A, d_{iF}/d_t = 100 A/µs		12.6		ns
Q_{rr}	Reverse Recovery Charge			2.52		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 drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design. $R_{\theta JA}$ = 415°C/W when mounted on a minimum pad .

2. Pulse Test: Pulse Width < 300µs, Duty Cycle < 2.0%

Typical Characteristics

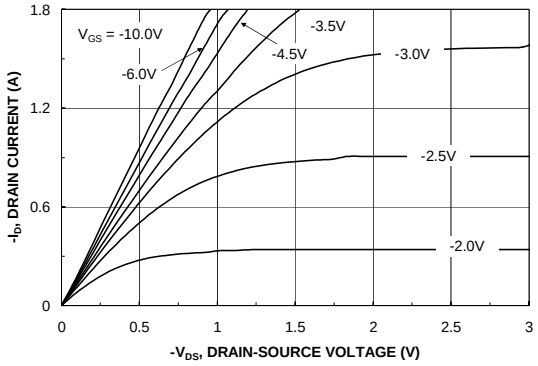


Figure 1. On-Region Characteristics.

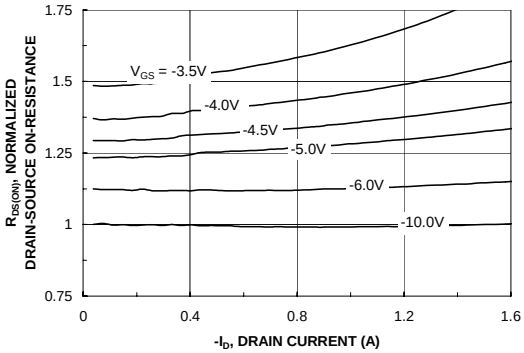


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

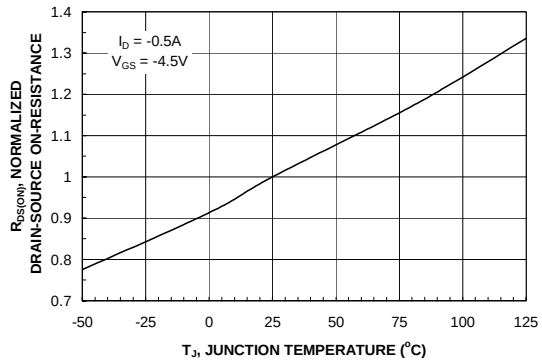


Figure 3. On-Resistance Variation with Temperature.

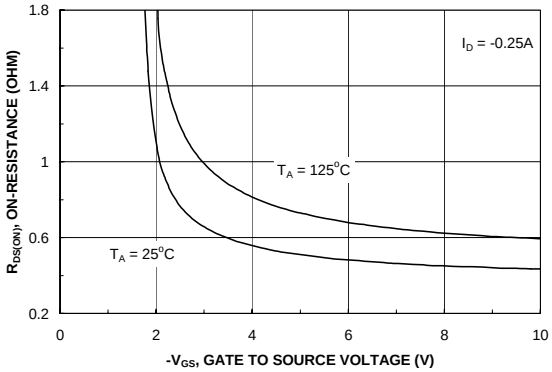


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

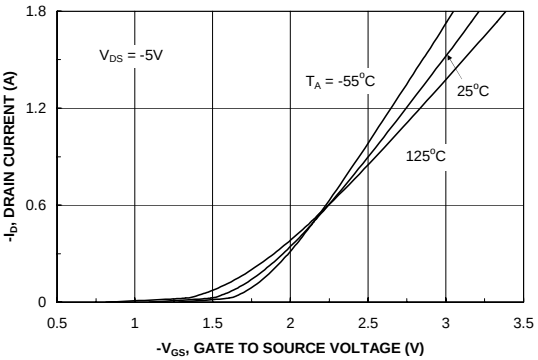


Figure 5. Transfer Characteristics.

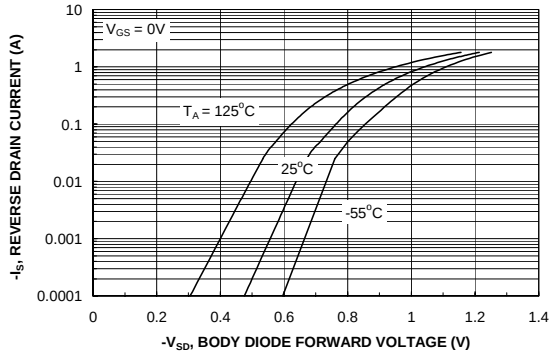


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

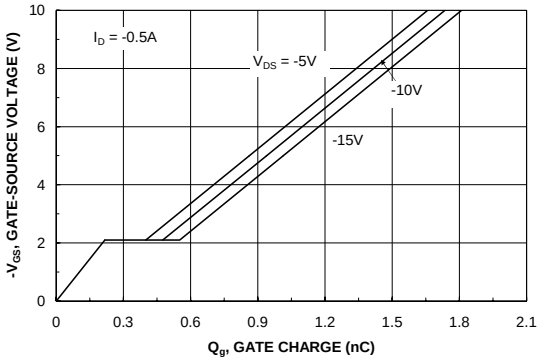


Figure 7. Gate Charge Characteristics.

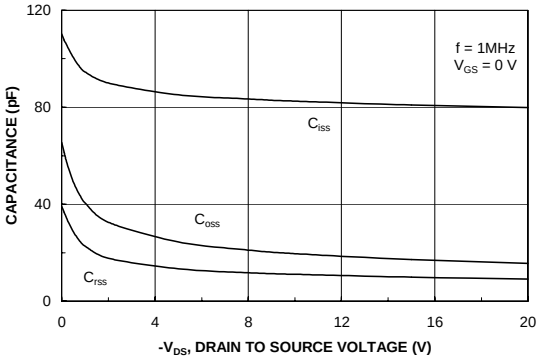


Figure 8. Capacitance Characteristics.

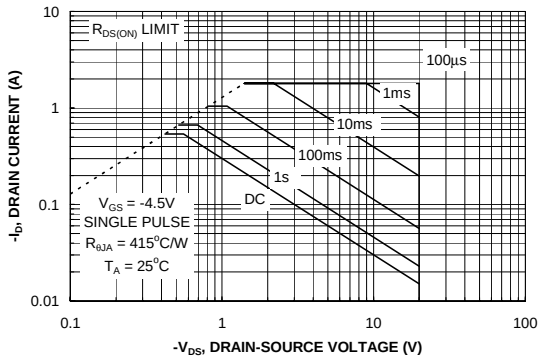


Figure 9. Maximum Safe Operating Area.

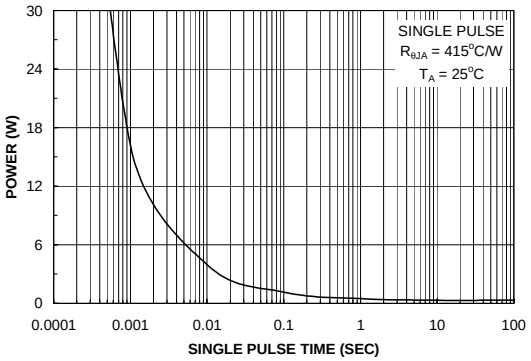


Figure 10. Single Pulse Maximum Power Dissipation.

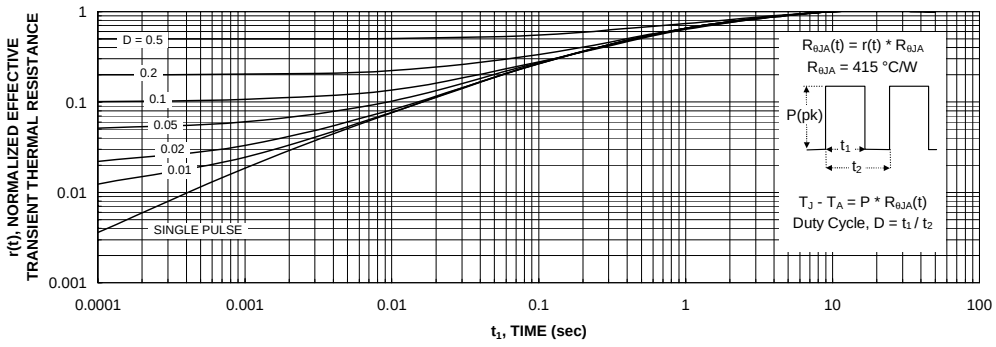


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1.
Transient thermal response will change depending on the circuit board design.

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