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# FDG6318P

## Dual P-Channel, Digital FET

### General Description

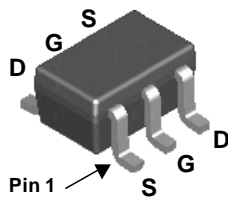
These dual P-Channel logic level enhancement mode MOSFET are produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize on-state resistance. This device has been designed especially for low voltage applications as a replacement for bipolar digital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

### Applications

- Battery management

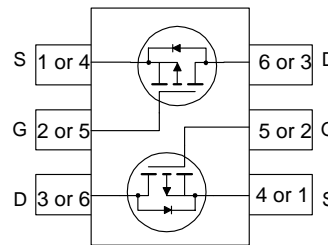
### Features

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



**SC70-6**

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



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

Symbol	Parameter	Ratings	Units
$V_{DSS}$	Drain-Source Voltage	-20	V
$V_{GSS}$	Gate-Source Voltage	$\pm 12$	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	$^\circ\text{C}$

### Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1)	415	$^\circ\text{C/W}$
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### Package Marking and Ordering Information

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

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$BV_{DSS}$	Drain–Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = -250\ \mu\text{A}$	-20			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$		-10		mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
$I_{GSS}$	Gate–Body Leakage	$V_{GS} = \pm 12\text{ V}, V_{DS} = 0\text{ V}$			$\pm 100$	nA

**On Characteristics** (Note 2)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-0.65	-1.2	-1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$		2		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = -4.5\text{ V}, I_D = -0.5\text{ A}$ $V_{GS} = -2.5\text{ V}, I_D = -0.4\text{ A}$ $V_{GS} = -4.5\text{ V}, I_D = -0.5\text{ A}, T_J = 125^\circ\text{C}$		580 980 780	780 1200	m $\Omega$
$I_{D(on)}$	On–State Drain Current	$V_{GS} = -4.5\text{ V}, V_{DS} = -5\text{ V}$	-1.8			A
$g_{FS}$	Forward Transconductance	$V_{DS} = -5\text{ V}, I_D = -0.5\text{ A}$		1.1		S

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		83		pF
$C_{oss}$	Output Capacitance			20		pF
$C_{riss}$	Reverse Transfer Capacitance			11		pF
$R_G$	Gate Resistance	$V_{GS} = 15\text{ mV}, f = 1.0\text{ MHz}$		12.1		$\Omega$

**Switching Characteristics** (Note 2)

$t_{d(on)}$	Turn–On Delay Time	$V_{DD} = -10\text{ V}, I_D = 1\text{ A},$ $V_{GS} = -4.5\text{ V}, R_{GEN} = 6\ \Omega$		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	$V_{DS} = -10\text{ V}, I_D = -0.6\text{ A},$ $V_{GS} = -4.5\text{ V}$		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	$V_{GS} = 0\text{ V}, I_S = -0.25\text{ A}$ (Note 2)		-0.83	-1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = -0.5\text{ A},$ $dI_F/dt = 100\text{ A}/\mu\text{s}$		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.  $R_{\theta JA} = 415^\circ\text{C}/\text{W}$  when mounted on a minimum pad.

2. Pulse Test: Pulse Width < 300 $\mu\text{s}$ , Duty Cycle < 2.0%

Typical Characteristics

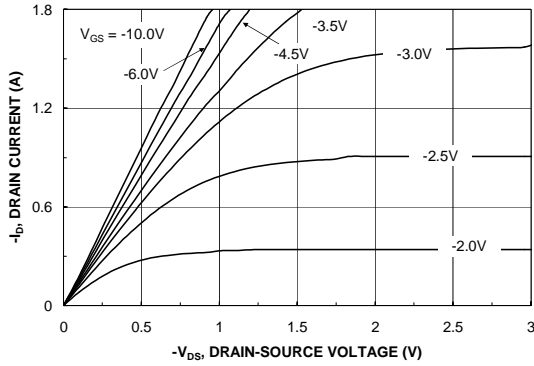


Figure 1. On-Region Characteristics.

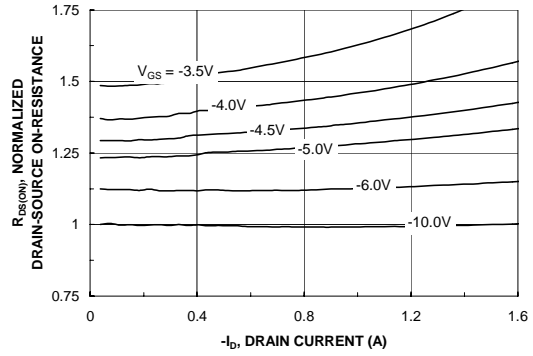


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

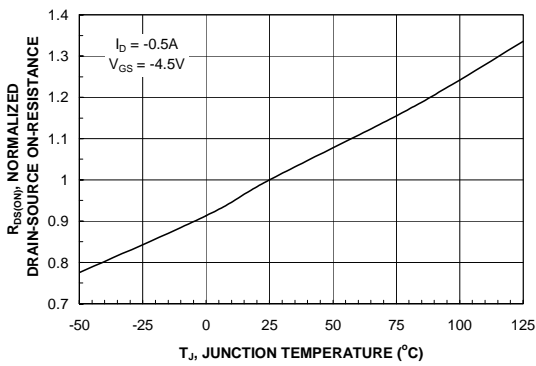


Figure 3. On-Resistance Variation with Temperature.

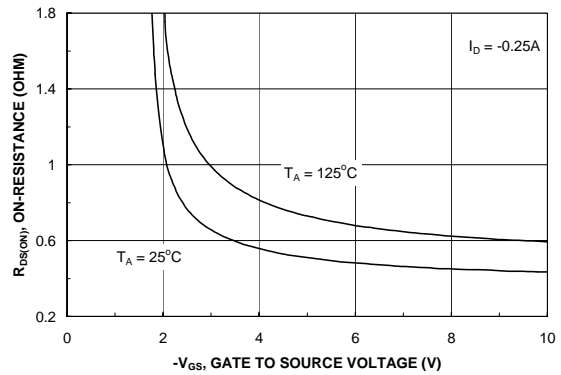


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

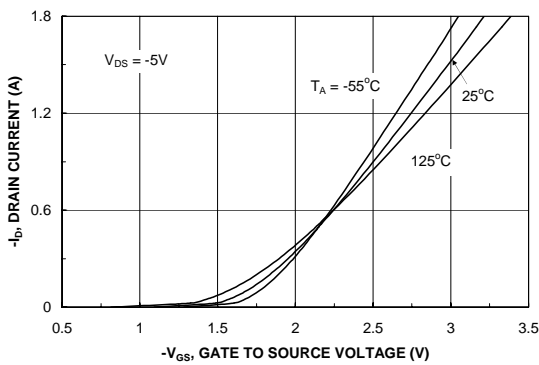


Figure 5. Transfer Characteristics.

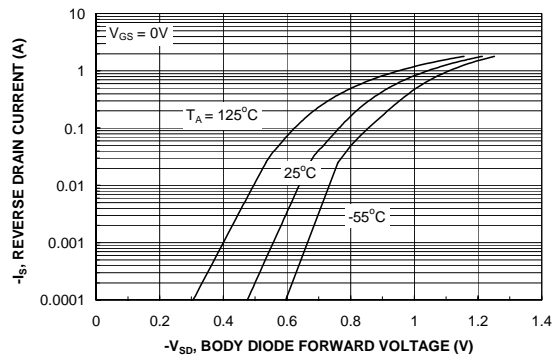


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

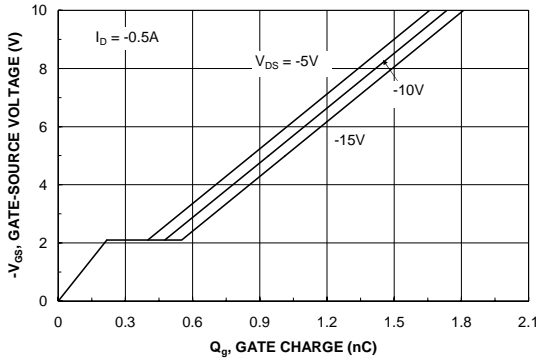


Figure 7. Gate Charge Characteristics.

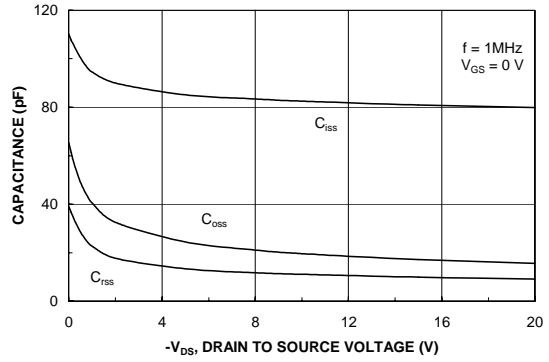


Figure 8. Capacitance Characteristics.

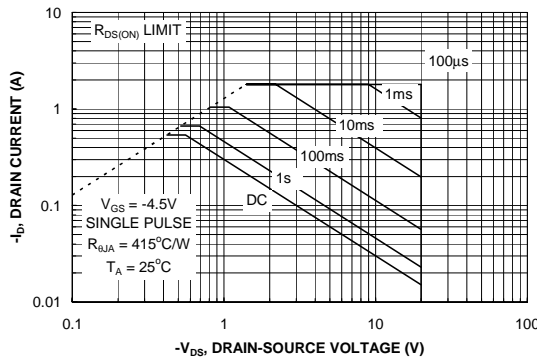


Figure 9. Maximum Safe Operating Area.

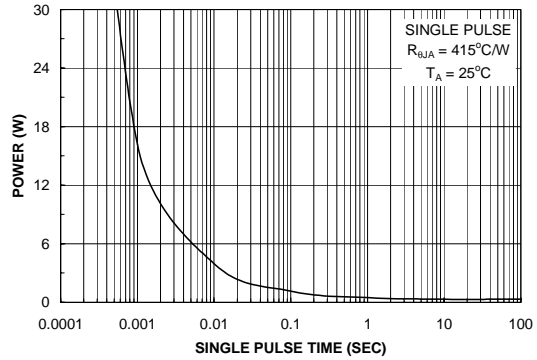


Figure 10. Single Pulse Maximum Power Dissipation.

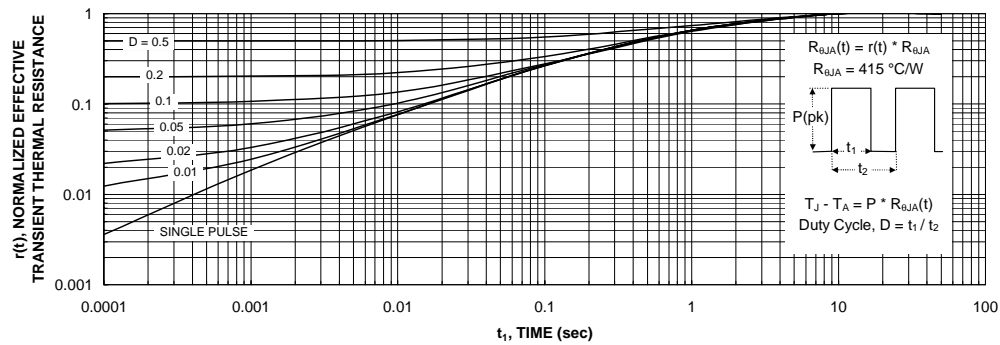


Figure 11. Transient Thermal Response Curve.

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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