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FDC365P

P-Channel PowerTrench® MOSFET -35V, -4.3A, 55mΩ

Features

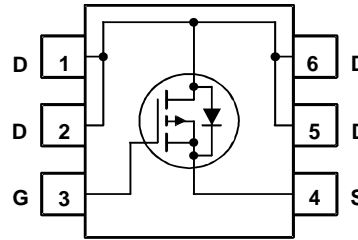
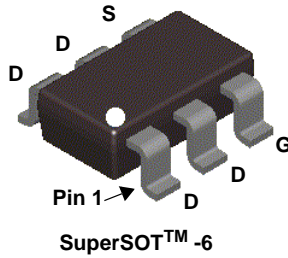
- Max $r_{DS(on)}$ = 55mΩ at $V_{GS} = -10V$, $I_D = -4.2A$
- Max $r_{DS(on)}$ = 80mΩ at $V_{GS} = -4.5V$, $I_D = -3.2A$
- RoHS Compliant

General Description

This P-Channel MOSFET has been produced using Fairchild Semiconductor's proprietary PowerTrench® technology to deliver low $r_{DS(on)}$ and optimized $Bvdss$ capability to offer superior performance benefit in the applications.

Applications

- Inverter
- Power Supplies



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

Symbol	Parameter	Rated	Units
V_{DS}	Drain to Source Voltage	-35	V
V_{GS}	Gate to Source Voltage	± 20	V
I_D	-Continuous (Note 1a)	-4.3	A
	-Pulsed	-20	
P_D	Power Dissipation (Note 1a)	1.6	W
	Power Dissipation (Note 1b)	0.8	
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 1a)	78	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1b)	156	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
.365P	FDC365P	SSOT6	7"	8mm	3000 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = -250\mu\text{A}, V_{GS} = 0\text{V}$	-35			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250\mu\text{A}$, referenced to 25°C		-26		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -28\text{V}, V_{GS} = 0\text{V}$			-1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$			± 100	nA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = -250\mu\text{A}$	-1	-1.8	-3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = -250\mu\text{A}$, referenced to 25°C		5.0		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = -10\text{V}, I_D = -4.2\text{A}$		45	55	m Ω
		$V_{GS} = -4.5\text{V}, I_D = -3.2\text{A}$		70	80	
		$V_{GS} = -10\text{V}, I_D = -4.2\text{A}, T_J = 125^\circ\text{C}$		69	90	
g_{FS}	Forward Transconductance	$V_{DS} = -10\text{V}, I_D = -4.2\text{A}$		8.7		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = -20\text{V}, V_{GS} = 0\text{V},$ $f = 1\text{MHz}$		530	705	pF
C_{oss}	Output Capacitance			105	135	pF
C_{riss}	Reverse Transfer Capacitance			55	80	pF
R_g	Gate Resistance		$f = 1\text{MHz}$		6.1	

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -20\text{V}, I_D = -4.2\text{A},$ $V_{GS} = -10\text{V}, R_{GEN} = 6\Omega$		7	13	ns	
t_r	Rise Time			3	10	ns	
$t_{d(off)}$	Turn-Off Delay Time			15	28	ns	
t_f	Fall Time			3	10	ns	
Q_g	Total Gate Charge		$V_{GS} = 0\text{V to } -10\text{V}$		11	15	nC
Q_g	Total Gate Charge	$V_{GS} = 0\text{V to } -5\text{V}$	$V_{DD} = -20\text{V},$ $I_D = -4.2\text{A}$		6	9	nC
Q_{gs}	Gate to Source Charge				1.7		nC
Q_{gd}	Gate to Drain "Miller" Charge				2.2		nC

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = -1.3\text{A}$ (Note 2)		-0.8	-1.2	V
t_{rr}	Reverse Recovery Time	$I_F = -4.2\text{A}, di/dt = 100\text{A}/\mu\text{s}$		16	29	ns
Q_{rr}	Reverse Recovery Charge			7	14	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.



a. 78°C/W when mounted on a 1 in^2 pad of 2 oz copper on FR-4 board.



b. 156°C/W when mounted on a minimum pad of 2 oz copper.

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

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

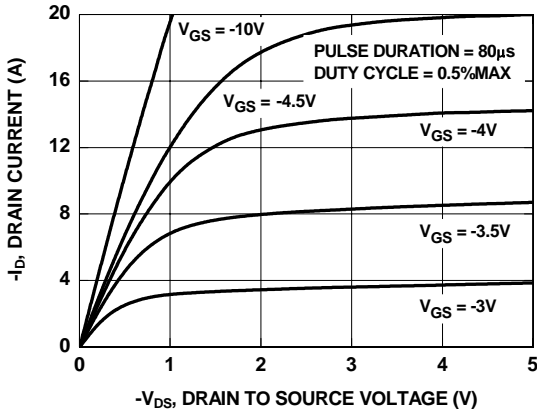


Figure 1. On-Region Characteristics

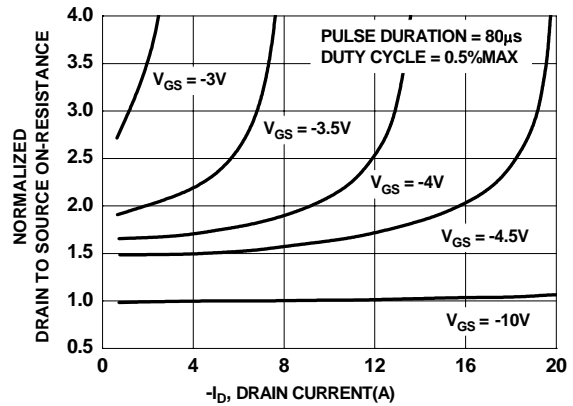


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

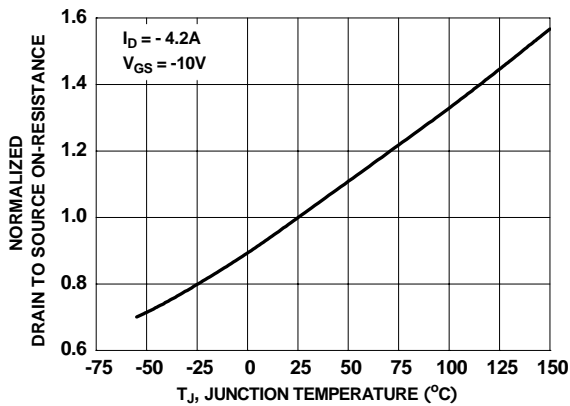


Figure 3. Normalized On-Resistance vs Junction Temperature

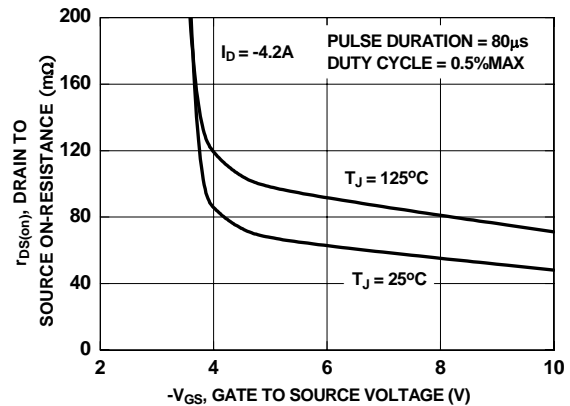


Figure 4. On-Resistance vs Gate to Source Voltage

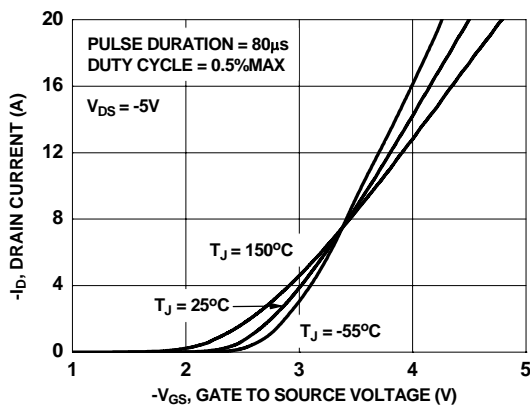


Figure 5. Transfer Characteristics

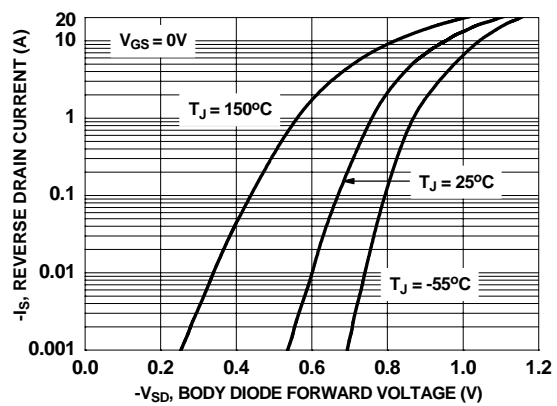


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

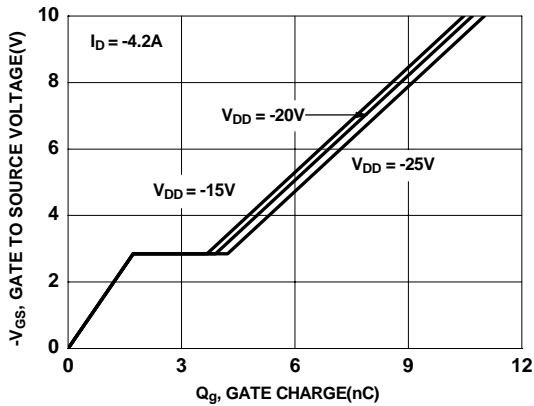


Figure 7. Gate Charge Characteristics

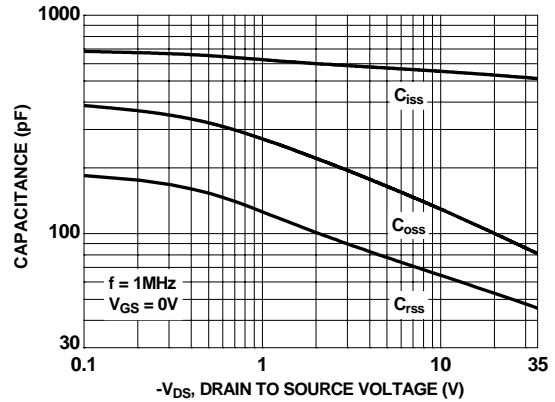


Figure 8. Capacitance vs Drain to Source Voltage

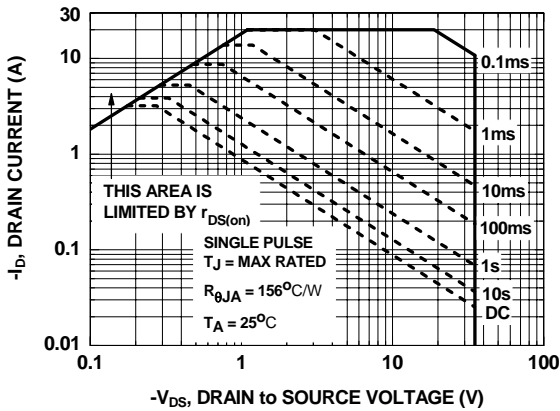


Figure 9. Forward Bias Safe Operating Area

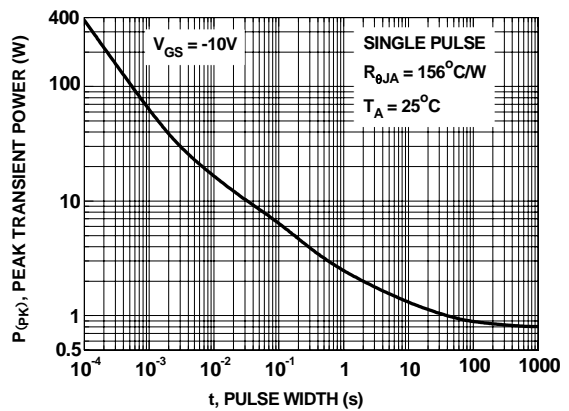


Figure 10. Single Pulse Maximum Power Dissipation

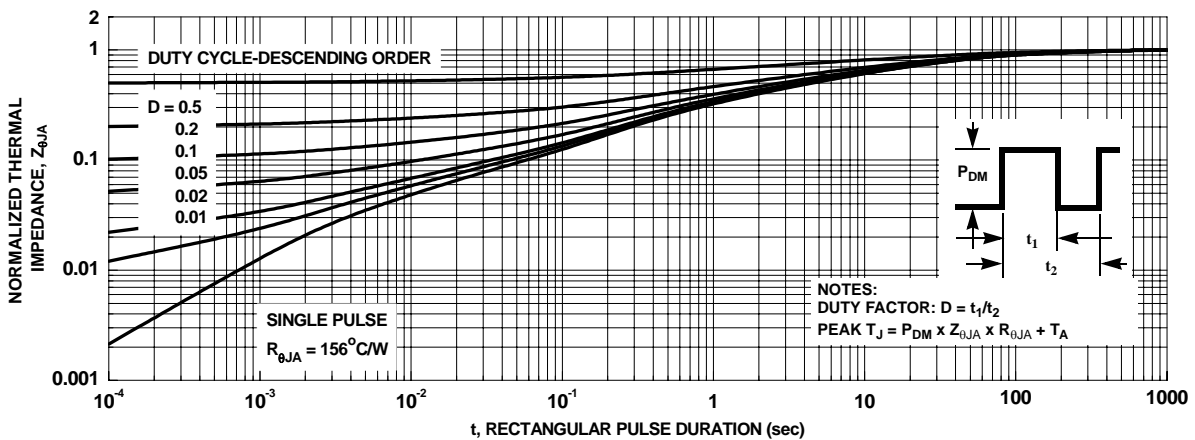
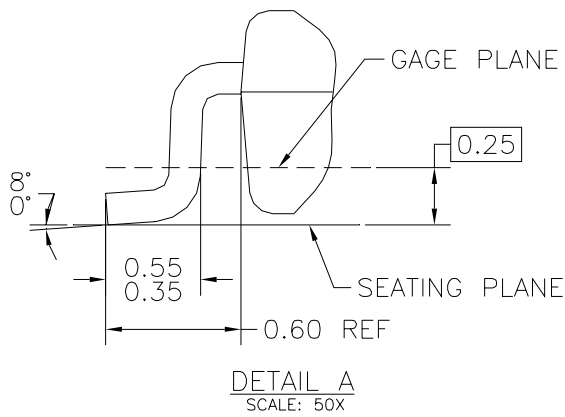
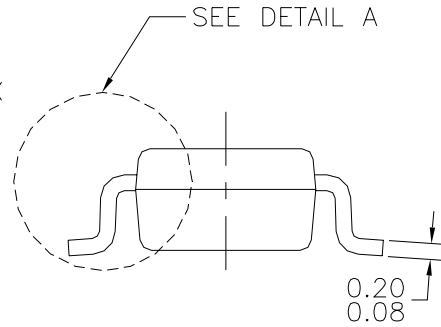
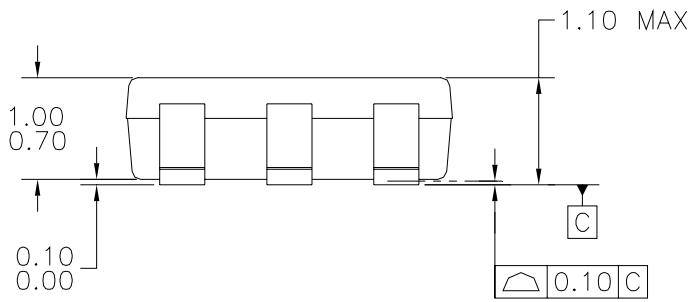
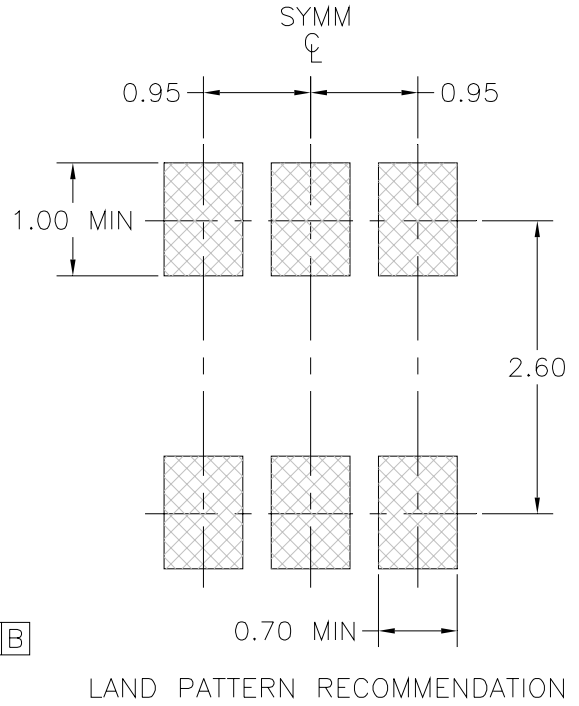
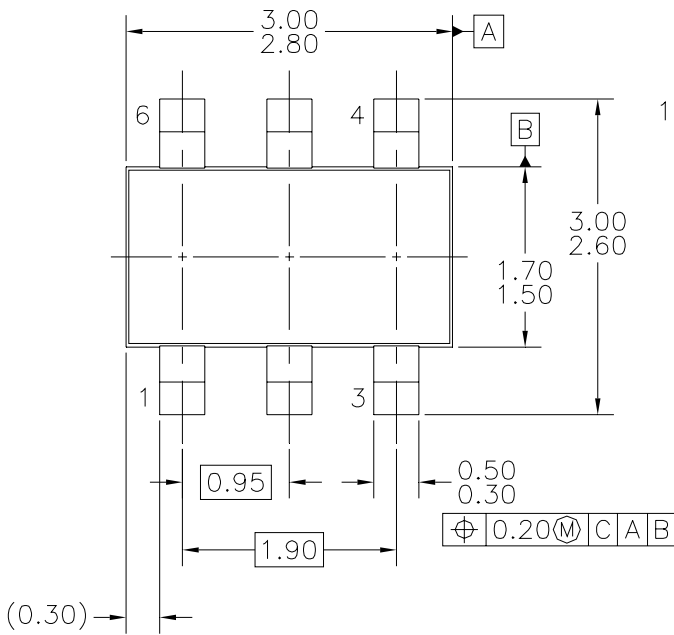


Figure 11. Transient Thermal Response Curve

Dimensional Outline and Pad Layout



NOTES: UNLESS OTHERWISE SPECIFIED

- A) THIS PACKAGE CONFORMS TO JEDEC MO-193. VAR. AA, ISSUE C, DATED JANUARY 2000.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.

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