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August 1999

FDN342P

P-Channel 2.5V Specified PowerTrench™ MOSFET

General Description

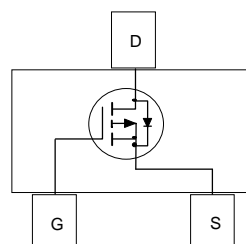
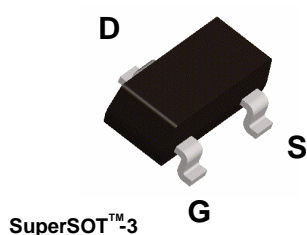
This P-Channel 2.5V specified MOSFET is produced in a rugged gate version of Fairchild Semiconductor's advanced PowerTrench process. It has been optimized for power management applications for a wide range of gate drive voltages (2.5V - 12V).

Applications

- Load switch
- Battery protection
- Power management

Features

- -2 A, -20 V. $R_{DS(ON)} = 0.08 \Omega @ V_{GS} = -4.5 V$
 $R_{DS(ON)} = 0.13 \Omega @ V_{GS} = -2.5 V$.
- Rugged gate rating ($\pm 12V$).
- High performance trench technology for extremely low $R_{DS(ON)}$.
- Enhanced power SuperSOT™-3 (SOT-23).



Absolute Maximum Ratings $T_A = 25^\circ C$ 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 1a) - Pulsed	-2	A
		-10	
P_D	Power Dissipation for Single Operation (Note 1a) (Note 1b)	0.5	W
		0.46	
T_J, T_{stg}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	250	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 1)	75	$^\circ C/W$

Package Outlines and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
FDN342P	FDN342P	7"	8mm	3000 units

Electrical Characteristics

$T_A = 25^\circ\text{C}$ 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		-16		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -16 V, V _{GS} = 0 V			-1	μA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 12 V, V _{DS} = 0 V			100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	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	-0.6	-1.05	-1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I _D = -250 μA,Referenced to 25°C		3		mV/°C
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = -4.5 V, I _D = -2 A V _{GS} = -4.5 V, I _D = -2 A,T _J =125°C V _{GS} = -2.5 V, I _D = -1.5 A		0.062 0.086 0.099	0.08 0.14 0.13	Ω
I _{D(on)}	On-State Drain Current	V _{GS} = -4.5 V, V _{DS} = -5 V	-5			A
g _{FS}	Forward Transconductance	V _{DS} = -5 V, I _D = -5 A		7		S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -10 V, V _{GS} = 0 V f = 1.0 MHz		635		pF
C _{oss}	Output Capacitance			175		pF
C _{rss}	Reverse Transfer Capacitance			75		pF
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		20	35	ns
t _r	Turn-On Rise Time			8	16	ns
t _{d(off)}	Turn-Off Delay Time			9	18	ns
t _f	Turn-Off Fall Time			19	32	ns
Q _g	Total Gate Charge	V _{DS} = -10 V, I _D = -2 A V _{GS} = -4.5 V,		6.3	9	nC
Q _{gs}	Gate-Source Charge			1.5		nC
Q _{gd}	Gate-Drain Charge			1.7		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current				-0.42	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = -0.42 A (Note 2)		-0.7	-1.2	V

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 $R_{\theta CA}$ is determined by the user's board design.



a) 250°C/W when mounted on a 0.02 in^2 pad of 2 oz. Cu.



b) 270°C/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

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

Typical Characteristics

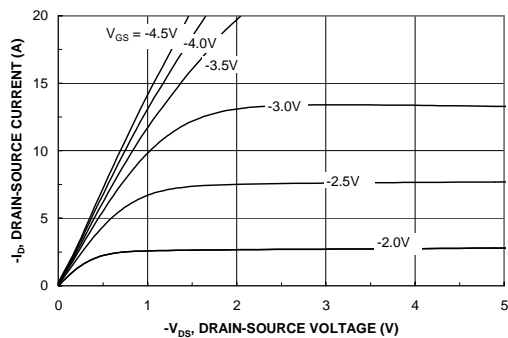


Figure 1. On-Region Characteristics.

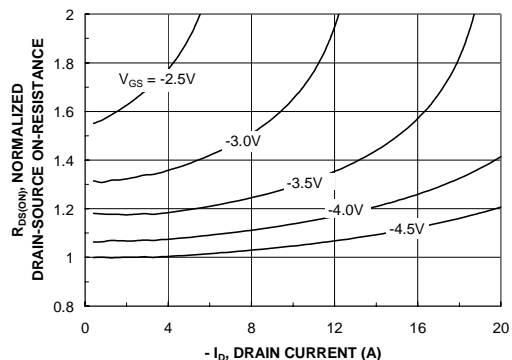


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

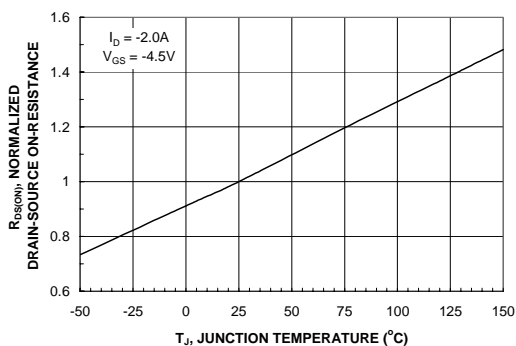


Figure 3. On-Resistance Variation with Temperature.

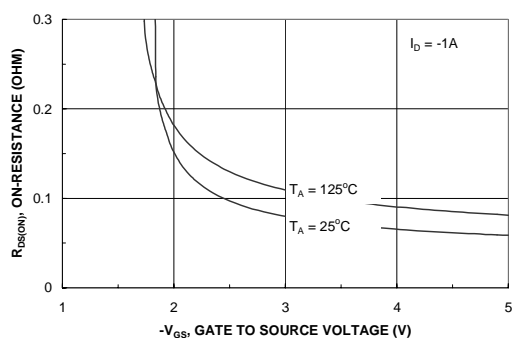


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

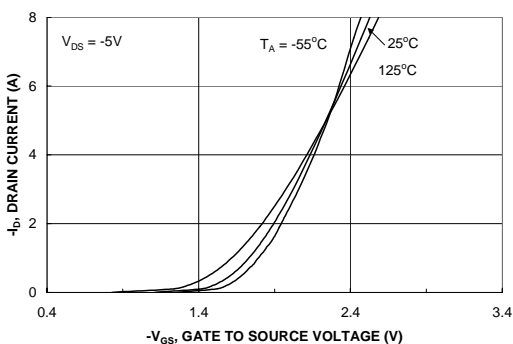


Figure 5. Transfer Characteristics.

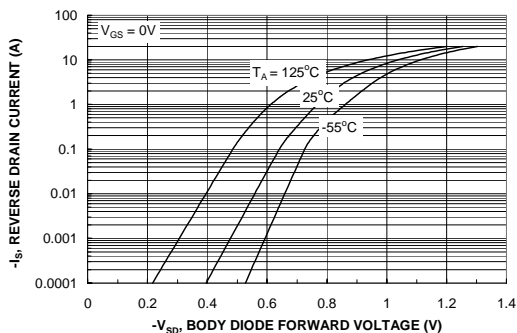


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics (continued)

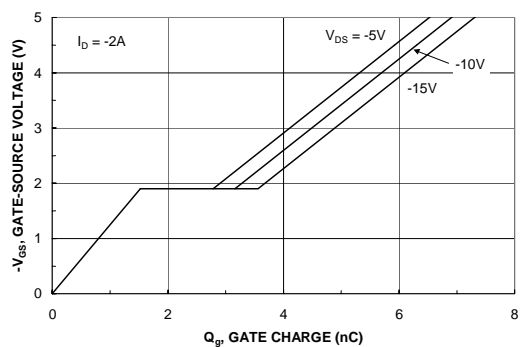


Figure 7. Gate Charge Characteristics.

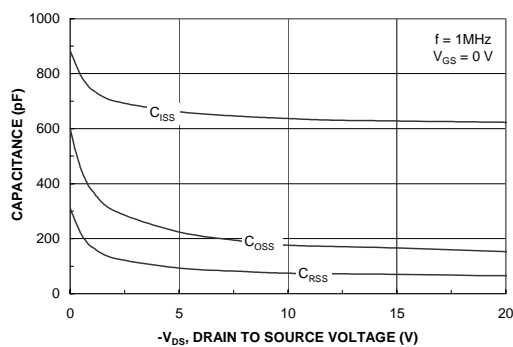


Figure 8. Capacitance Characteristics.

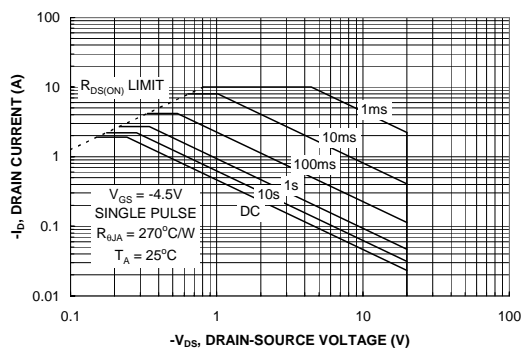


Figure 9. Maximum Safe Operating Area.

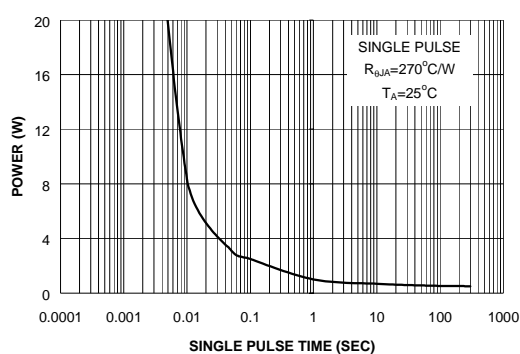


Figure 10. Single Pulse Maximum Power Dissipation.

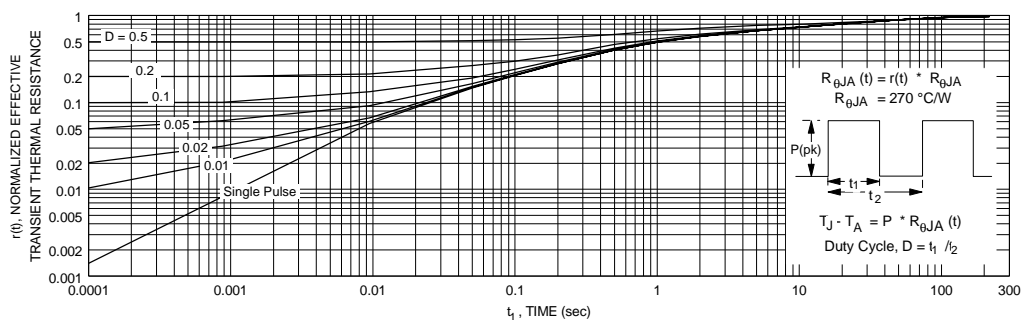


Figure 11. Transient Thermal Response Curve.

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

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FACT Quiet Series™	Quiet Series™	
FAST®	SuperSOT™-3	
FASTr™	SuperSOT™-6	
GTO™	SuperSOT™-8	
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