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FAIRCHILD

SEMICONDUCTOR TM

FDN340P

Single P-Channel, Logic Level, PowerTrench® MOSFET

General Description

This P-Channel Logic Level MOSFET is produced using Fairchild Semiconductor advanced Power Trench 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: load switching and power management, battery charging circuits, and DC/DC conversion.

100% RoHS COMPLIANT

Features

- $-2A$, 20 V $\quad R_{DS(ON)} = 70$ mΩ @ $V_{GS} = -4.5$ V
  $R_{DS(ON)} = 110$ mΩ @ $V_{GS} = -2.5$ V

- Low gate charge (7.2 nC typical).

- High performance trench technology for extremely low $R_{DS(ON)}$.

- High power version of industry Standard SOT-23 package. Identical pin-out to SOT-23 with 30% higher power handling capability.

D

340

S

G

SuperSOT -3 ™

D

G   S
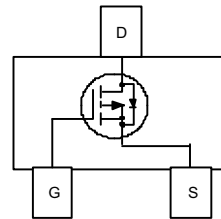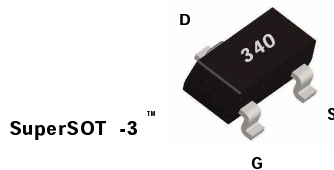
Absolute Maximum Ratings T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-Source Voltage		-20	V
V_{GSS}	Gate-Source Voltage		± 8	V
I_D	Drain Current – Continuous	(Note 1a)	-2	A
	– Pulsed		-10	
P_D	Power Dissipation for Single Operation	(Note 1a)	0.5	W
		(Note 1b)	0.46	
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 1a)	250	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	75	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
340	FDN340P	7''	8mm	3000 units

FDN340P

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		–12		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = –16 V, V_{GS} = 0 V			–1	µA
		V_{DS} = –16 V, V_{GS} = 0 V, T_J=55°C			–10	
I_{GSSF}	Gate–Body Leakage, Forward	V_{GS} = 8 V, V_{DS} = 0 V			100	nA
I_{GSSR}	Gate–Body Leakage, Reverse	V_{GS} = –8 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	–0.4	–0.8	–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		60	70	mΩ
		V_{GS} = –4.5 V, I_D = –2 A, T_J=125°C		77	120	
		V_{GS}= –2.5 V, I_D = –1.7A,		82	110	
$I_{D(on)}$	On–State Drain Current	V_{GS} = –4.5 V, V_{DS} = –5 V	–5			A
g_{FS}	Forward Transconductance	V_{DS} = –4.5 V, I_D = –2 A		9		S
Dynamic Characteristics						
600	Input Capacitance	V_{DS} = –10 V, V_{GS} = 0 V,		779		pF
175	Output Capacitance	f = 1.0 MHz		121		pF
80	Reverse Transfer Capacitance			56		pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = –10 V, I_D = –1 A,		10	20	ns
t_r	Turn–On Rise Time	V_{GS} = –4.5 V, R_{GEN} = 6 Ω		9	10	ns
$t_{d(off)}$	Turn–Off Delay Time			27	43	ns
t_f	Turn–Off Fall Time			11	20	ns
Q_g	Total Gate Charge	V_{DS} = –10V, I_D = –3.5 A,		7.2	10	nC
Q_{gs}	Gate–Source Charge	V_{GS} = –4.5 V		1.7		nC
Q_{gd}	Gate–Drain Charge			1.5		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 0.02in² pad of 2 oz copper

b. 270°C/W when mounted on a .001 in² pad of 2 oz copper

Scale 1 : 1 on letter size paper

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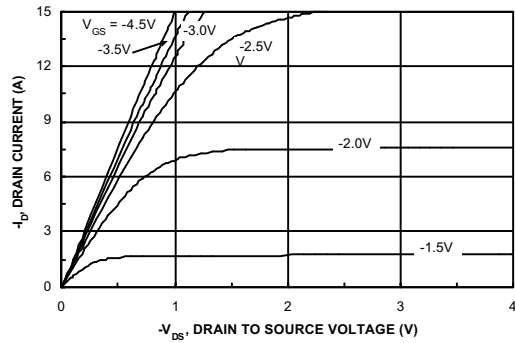
Typical Characteristics

Figure 1. On-Region Characteristics.
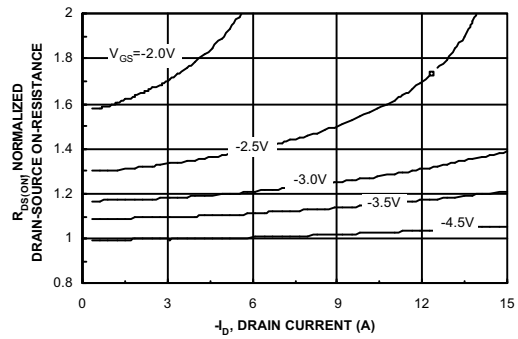

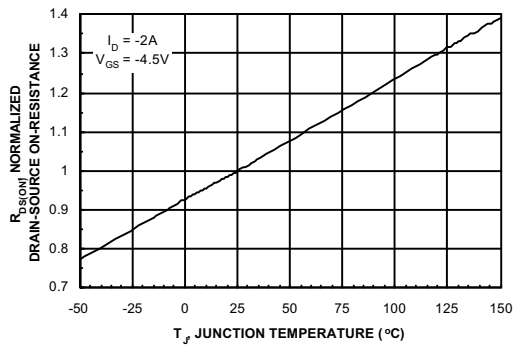**Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.**

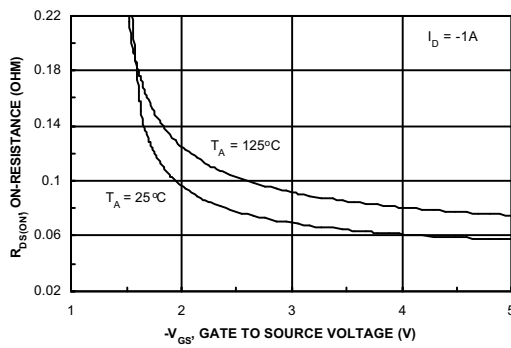**Figure 3. On-Resistance Variation with Temperature.**

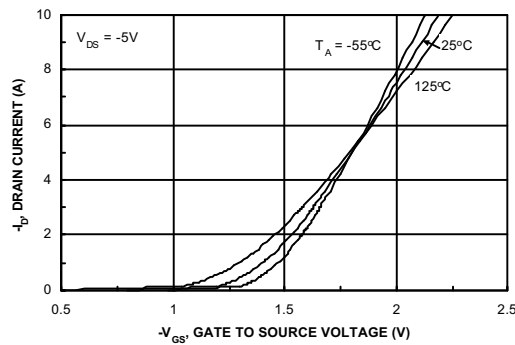**Figure 4. On-Resistance Variation with Gate-to-Source Voltage.**
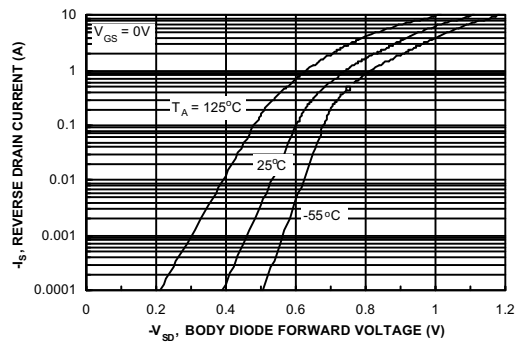

Figure 5. Transfer Characteristics.

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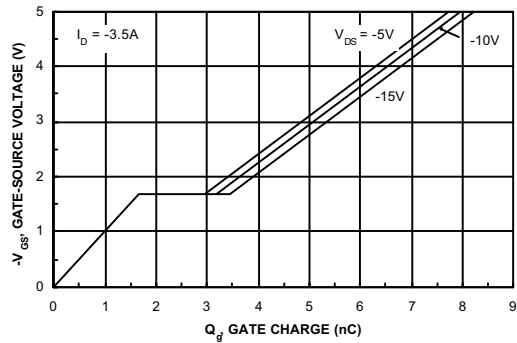
Typical Characteristics

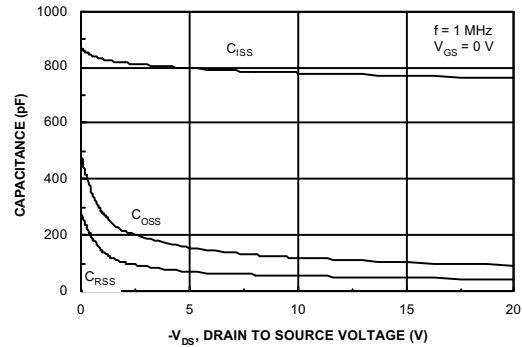

Figure 7. Gate Charge Characteristics.
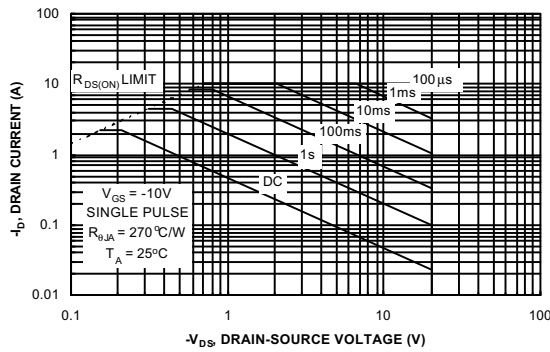

Figure 8. Capacitance Characteristics.

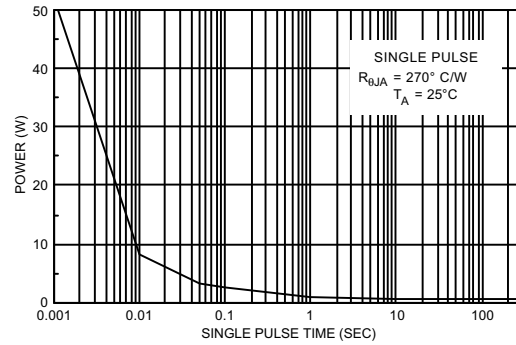**Figure 9. Maximum Safe Operating Area.**

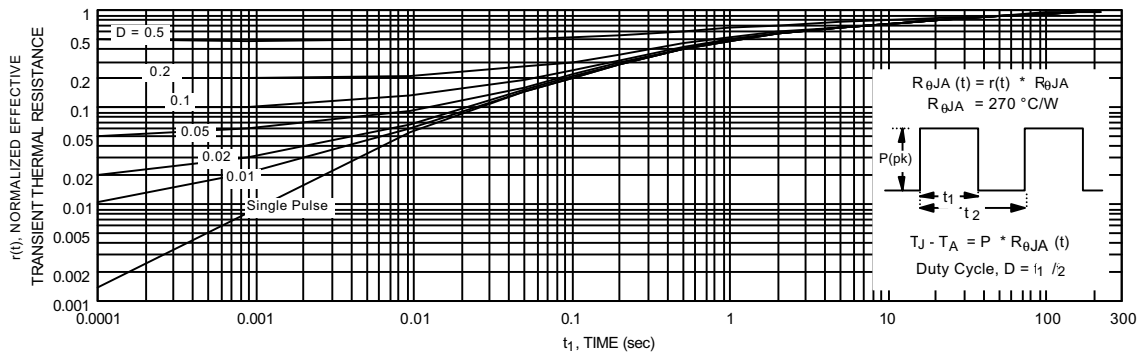**Figure 10. Single Pulse Maximum Power Dissipation.**

Figure 11. Transient Thermal Response Curve.

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

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