

February 2007

FDN340P

Single P-Channel, Logic Level, PowerTrench® MOSFET

General Description

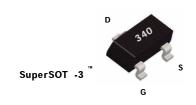
This P-Channel Logic Level MOSFET is produced using Fairchild Semiconductor advanced Power Trench process that has been especially tailored to minimize the on-state resistance and yet maintain low gate charge for superior switching performance.

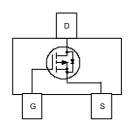
These devices are well suited for portable electronics applications: load switching and power management, battery charging circuits, and DC/DC conversion.



Features

- -2A, 20 V $R_{DS(ON)} = 70 \text{ m}\Omega$ @ $V_{GS} = -4.5 \text{ V}$ $R_{DS(ON)} = 110 \text{ m}\Omega$ @ $V_{GS} = -2.5 \text{ V}$
- Low gate charge (7.2 nC typical).
- High performance trench technology for extremely low $R_{DS(\text{ON})}$.
- High power version of industry Standard SOT-23 package. Identical pin-out to SOT-23 with 30% higher power handling capability.





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	А
	– 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 _{eJC}	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

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Off Char	acteristics					
BV _{DSS}	Drain–Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_D = -250 \mu\text{A}$	-20			V
ΔBV _{DSS} ΔT _J	Breakdown Voltage Temperature Coefficient	I_D = –250 μA,Referenced to 25°C		-12		mV/°C
DSS	Zero Gate Voltage Drain Current	V _{DS} = -16 V, V _{GS} = 0 V			-1	μΑ
		$V_{DS} = -16 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 55^{\circ}\text{C}$			-10	
GSSF	Gate–Body Leakage, Forward	$V_{GS} = 8 \text{ V}, \qquad V_{DS} = 0 \text{ V}$			100	nA
GSSR	Gate–Body Leakage, Reverse	$V_{GS} = -8 \text{ V}, V_{DS} = 0 \text{ V}$			-100	nA
On Char	acteristics (Note 2)					
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = -250 \mu A$	-0.4	-0.8	-1.5	V
$\Delta V_{GS(th)} \over \Delta T_J$	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
	On–Resistance	V _{GS} = -4.5 V, I _D = -2 A,T _J =125°C		77	120	
		$V_{GS} = -2.5 \text{ V}, \qquad I_D = -1.7 \text{A},$		82	110	
D(on)	On–State Drain Current	$V_{GS} = -4.5 \text{ V}, V_{DS} = -5 \text{ V}$	-5			Α
g _{FS}	Forward Transconductance	$V_{DS} = -4.5 \text{ V}, I_{D} = -2 \text{ A}$		9		S
Dvnamio	Characteristics	,		•		
600	Input Capacitance	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V},$		779		pF
175	Output Capacitance	f = 1.0 MHz		121		pF
80	Reverse Transfer Capacitance	1 1		56		pF
Switchin	g Characteristics (Note 2)	'				,
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -10 \text{ V}, I_{D} = -1 \text{ A},$		10	20	ns
t _r	Turn-On Rise Time	$V_{GS} = -4.5 \text{ V}, R_{GEN} = 6 \Omega$		9	10	ns
t _{d(off)}	Turn-Off Delay Time	-		27	43	ns
t _f	Turn–Off Fall Time	-		11	20	ns
$\overline{Q_{g}}$	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_S	ource Diode Characteristics a	and Maximum Ratings				
ls	Maximum Continuous Drain–Source I				-0.42	Α
V _{SD}	Drain–Source Diode Forward Voltage	V _{GS} = 0 V, I _S = -0.42 A (Note 2)		-0.7	-1.2	V

1. R_{BJA} 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_{BJC} is guaranteed by design while R_{BCA} is determined by the user's board design.





a. 250°C/W when mounted on a 0.02in° pad of 2 oz copper b. 270°C/W when mounted on a 0.001 in° pad of 2 oz copper

Scale 1:1 on letter size paper

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

Typical Characteristics

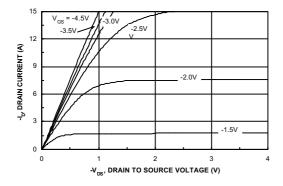


Figure 1. On-Region Characteristics.

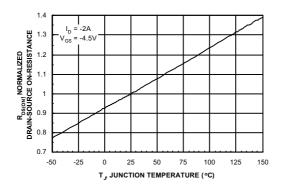


Figure 3. On-Resistance Variation with Temperature.

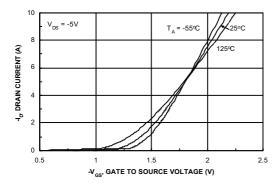


Figure 5. Transfer Characteristics.

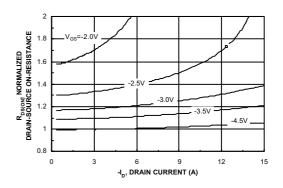


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

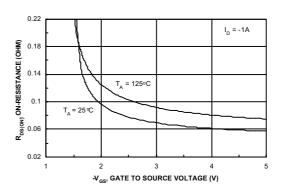


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

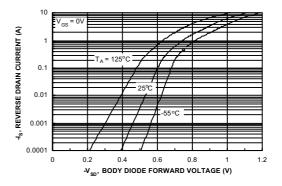
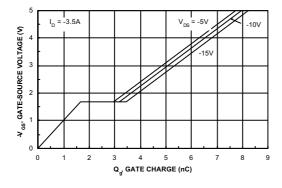


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics



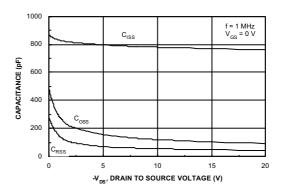
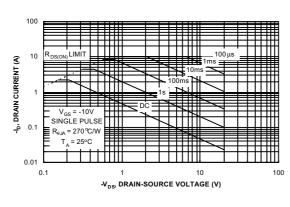


Figure 7. Gate Charge Characteristics.





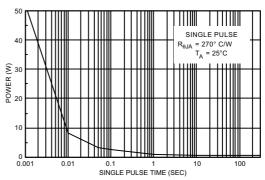


Figure 9. Maximum Safe Operating Area.

Figure 10. Single Pulse Maximum Power Dissipation.

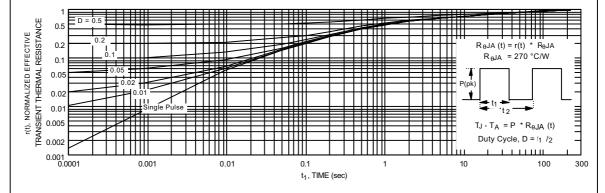


Figure 11. Transient Thermal Response Curve.

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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