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FDN336P

Single P-Channel 2.5V Specified PowerTrench™ MOSFET

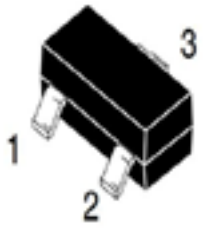
General Description

This P-Channel 2.5V specified MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench 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.

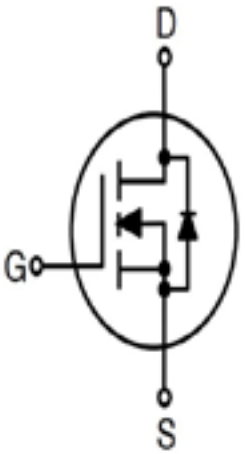
Features

- -1.3 A, -20 V. $R_{DS(ON)}$ = 0.20 Ω @ V_{GS} = -4.5 V
  $R_{DS(ON)}$ = 0.27 Ω @ V_{GS}= -2.5 V.
- Low gate charge (3.6 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.



SOT-23

1 - Gate
2 - Source
3 - Drain



Absolute Maximum Ratings T_A = 25°C unless other wise noted

Symbol	Parameter		FDN336P	Units
V_{DSS}	Drain-Source Voltage		-20	V
V_{GSS}	Gate-Source Voltage		±8	V
I_D	Drain Current	- Continuous	-1.3	A
		- Pulsed	-10	
P_D	Maximum Power Dissipation	(Note 1a)	0.5	W
		(Note 1b)	0.46	
T_J,T_{STG}	Operating and Storage 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

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Electrical Characteristics (T_A = 25 °C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = -250 µA	-20			V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. 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
		T_J = 55°C			-10	µA
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	-0.9	-1.5	V
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Temp. 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 = -1.3 A		0.122	0.2	Ω
		T_J =125°C		0.18	0.32	
		V_{GS} = -2.5 V, I_D = -1.1 A		0.19	0.27	
$I_{D(ON)}$	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		4		S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = -10 V, V_{GS} = 0 V, f = 1.0 MHz		330		pF
C_{oss}	Output Capacitance			80		pF
C_{rss}	Reverse Transfer Capacitance			35		pF
SWITCHING CHARACTERISTICS (Note 2)						
$t_{D(on)}$	Turn - On Delay Time	V_{DD} = -5 V, I_D = -0.5 A, V_{GS} = -4.5 V, R_{GEN} = 6 Ω		7	15	ns
t_r	Turn - On Rise Time			12	22	ns
$t_{D(off)}$	Turn - Off Delay Time			16	26	ns
t_f	Turn - Off Fall Time			5	12	ns
Q_g	Total Gate Charge	V_{DS} = -10 V, I_D = - 2 A, V_{GS} = -4.5 V		3.6	5	nC
Q_{gs}	Gate-Source Charge			0.8		nC
Q_{gd}	Gate-Drain Charge			0.7		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)		-0.7	-1.2	V

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Typical Electrical Characteristics

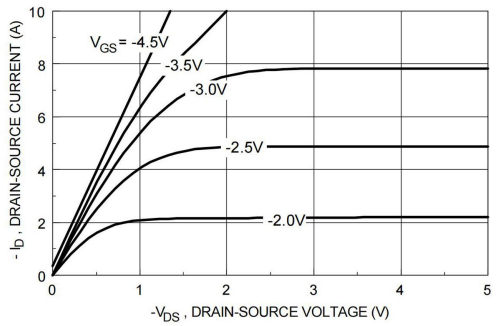


Figure 1. On-Region Characteristics.

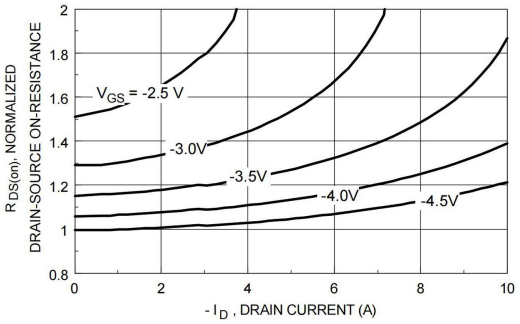


Figure 2. On-Resistance Variation with Drain Current and Gate

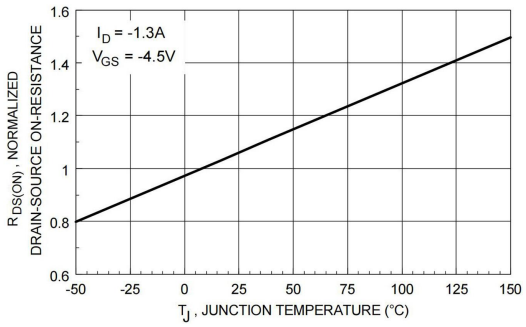


Figure 3. On-Resistance Variation with Temperature.

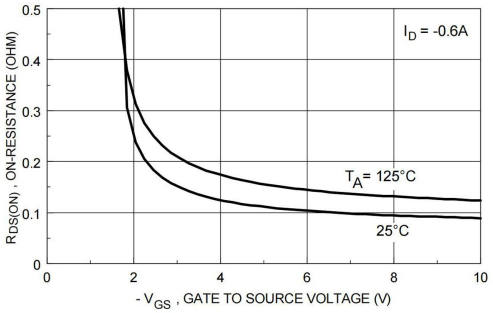


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

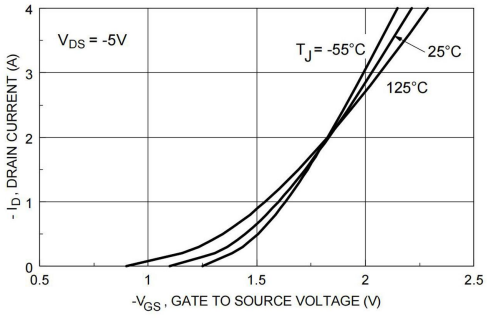


Figure 5. Transfer Characteristics.

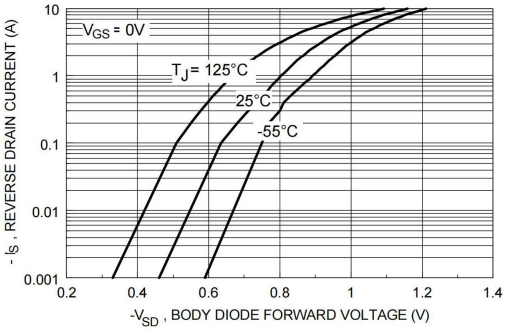


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

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Typical Electrical Characteristics (continued)

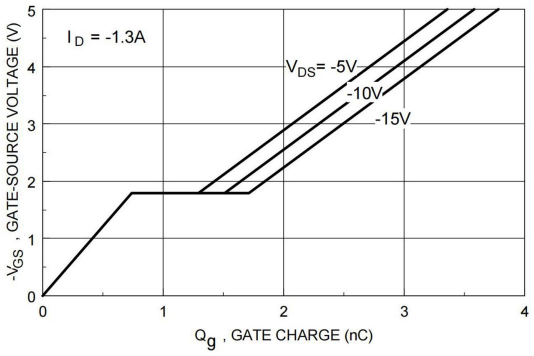


Figure 7. Gate Charge Characteristics.

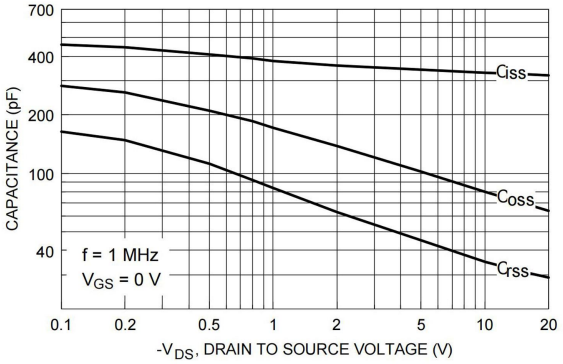


Figure 8. Capacitance Characteristics.

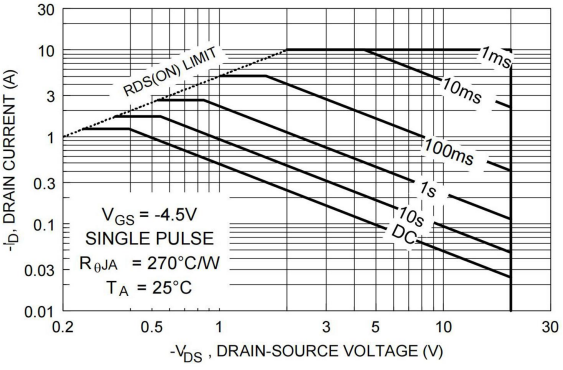


Figure 9. Maximum Safe Operating Area.

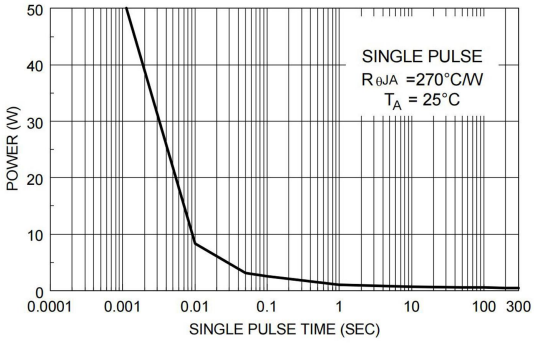


Figure 10. Single Pulse Maximum Power Dissipation.

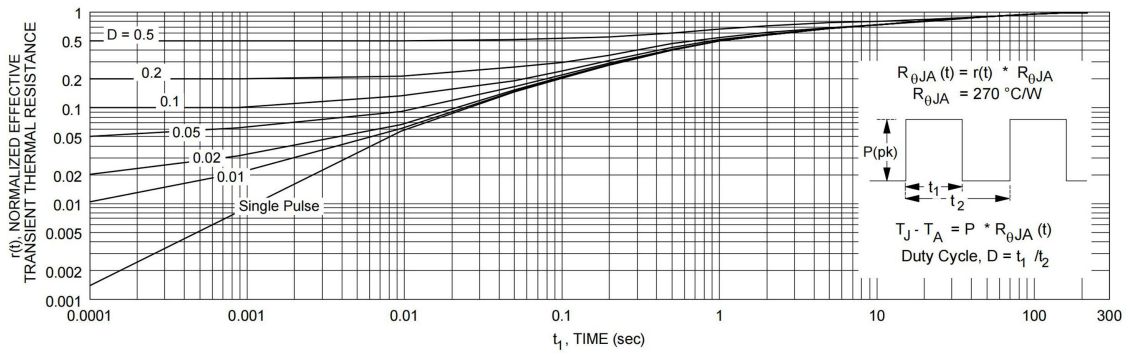


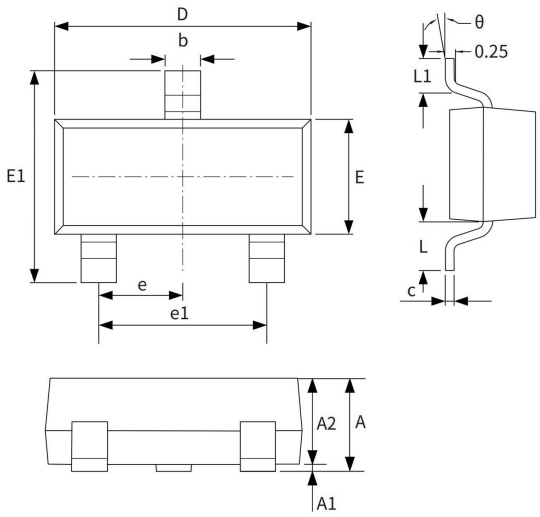
Figure 11. Transient Thermal Response Curve.

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Ordering Information

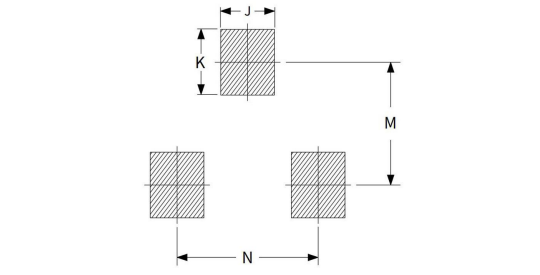
PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
SOT-23	R1	0.008	3000	30000	240000	7''

Package Outline Dimensions (SOT-23)



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.90	1.15	0.035	0.045
A1	-	0.10	-	0.004
A2	0.90	1.05	0.035	0.041
b	0.30	0.50	0.012	0.020
c	0.10	0.20	0.004	0.008
D	2.80	3.00	0.110	0.118
E	1.20	1.40	0.047	0.055
E1	2.25	2.55	0.089	0.100
e	0.950TYP		0.037TYP	
e1	1.80	2.00	0.071	0.079
L	0.550REF		0.022REF	
L1	0.30	0.50	0.012	0.020
θ	-	8°	-	8°

Suggested Pad Layout



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
J	0.75	0.85	0.030	0.033
K	0.85	0.95	0.033	0.037
M	1.95	2.05	0.077	0.081
N	1.85	1.95	0.073	0.077