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FDN360P

Single P-Channel, PowerTrench® MOSFET

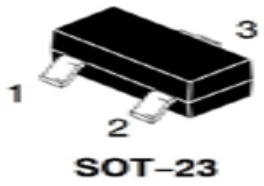
General Description

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 low voltage and battery powered applications where low in-line power loss and fast switching are required.

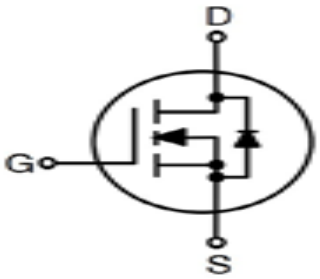
Features

- –2 A, –30 V. $R_{DS(ON)}$ = 80 mΩ @ V_{GS} = –10 V
  $R_{DS(ON)}$ = 125 mΩ @ V_{GS} = –4.5 V
- Low gate charge (6.2 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.



SOT–23

1 – Gate
2 – Source
3 – Drain



Absolute Maximum Ratings

T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-Source Voltage		–30	V
V_{GSS}	Gate-Source Voltage		±20	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
360	FDN360P	7''	8mm	3000 units

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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	–30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = –250 μA, Referenced to 25°C		–22		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = –24V, V_{GS} = 0 V			–1	μA
		V_{DS} = –24V, V_{GS} = 0 V, T_J=55°C			–10	
I_{GSSF}	Gate–Body Leakage, Forward	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
I_{GSSR}	Gate–Body Leakage, Reverse	V_{GS} = –20 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	–1	–1.9	–3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = –250 μA, Referenced to 25°C		4		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	V_{GS} = –10 V, I_D = –2 A		63	80	mΩ
		V_{GS} = –10 V, I_D = –2 A, T_J=125°C		90	136	
		V_{GS}= –4.5 V, I_D = –1.5A		100	125	
$I_{D(on)}$	On–State Drain Current	V_{GS} = –10 V, V_{DS} = –5 V	–10			A
g_{FS}	Forward Transconductance	V_{DS} = –5 V, I_D = –2 A		5		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = –15 V, V_{GS} = 0 V, f = 1.0 MHz		298		pF
C_{oss}	Output Capacitance			83		pF
C_{rss}	Reverse Transfer Capacitance			39		pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = –15 V, I_D = –1 A, V_{GS} = –10 V, R_{GEN} = 6 Ω		6	12	ns
t_r	Turn–On Rise Time			13	23	ns
$t_{d(off)}$	Turn–Off Delay Time			11	20	ns
t_f	Turn–Off Fall Time			6	12	ns
Q_g	Total Gate Charge	V_{DS} = –15V, I_D = –3.6 A, V_{GS} = –10 V		6.2	9	nC
Q_{gs}	Gate–Source Charge			1		nC
Q_{gd}	Gate–Drain Charge			1.2		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)		–0.8	–1.2	V

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Typical Characteristics

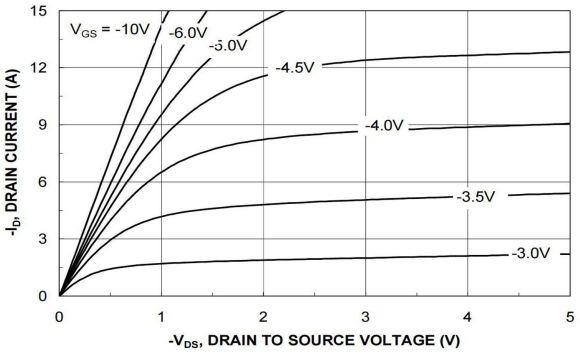


Figure 1. On-Region Characteristics.

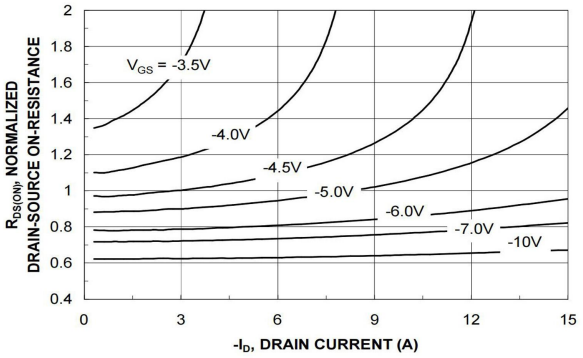


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

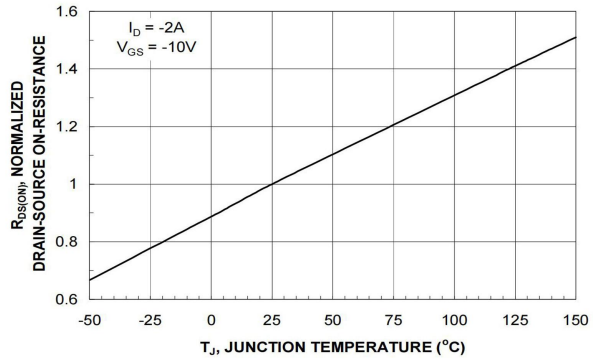


Figure 3. On-Resistance Variation with Temperature.

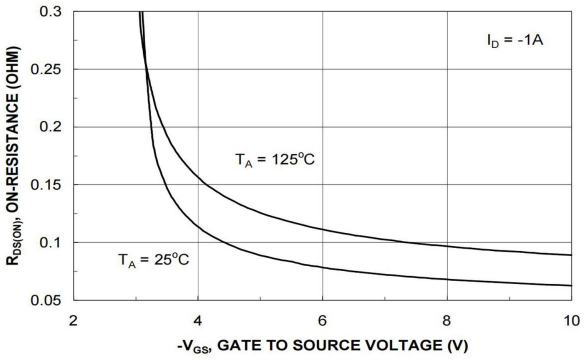


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

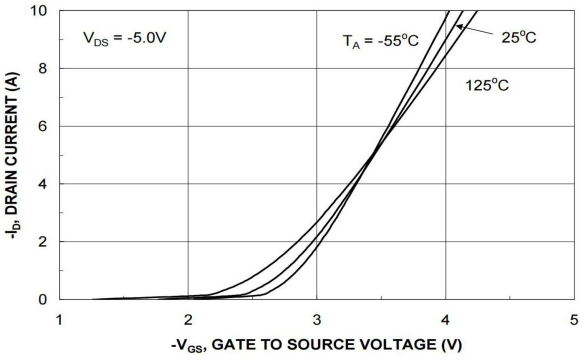


Figure 5. Transfer Characteristics.

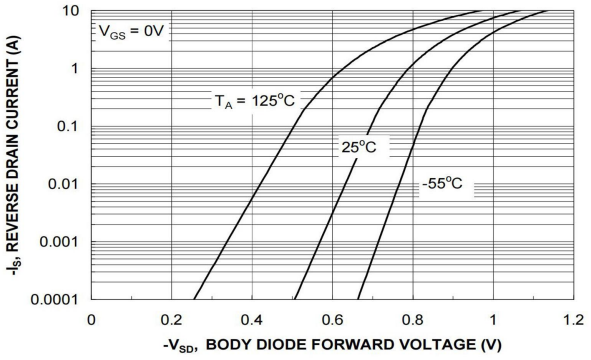


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

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Typical Characteristics

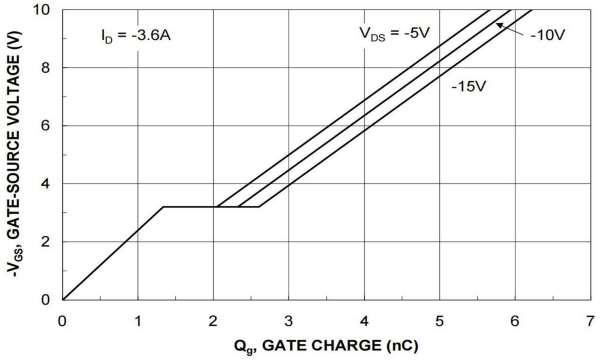


Figure 7. Gate Charge Characteristics.

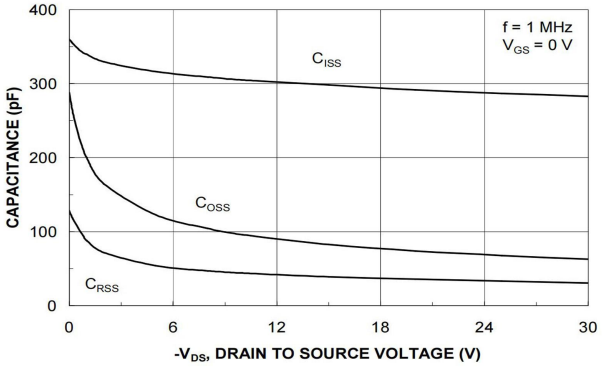


Figure 8. Capacitance Characteristics.

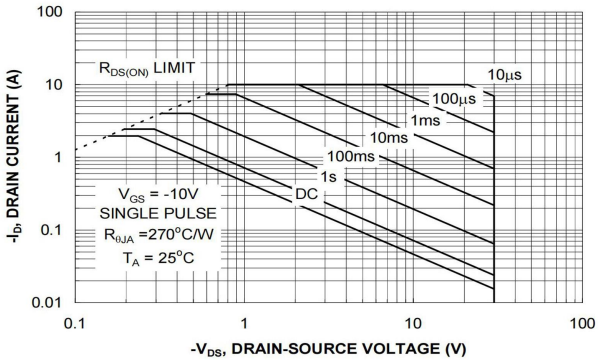


Figure 9. Maximum Safe Operating Area.

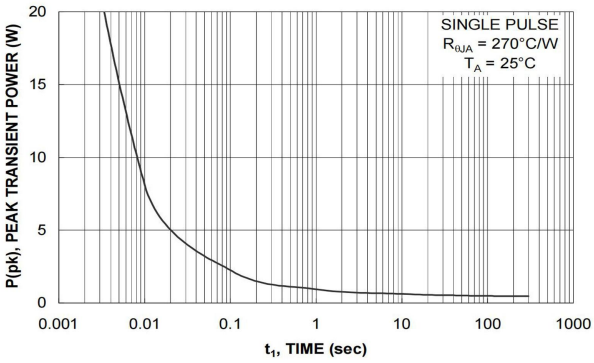


Figure 10. Single Pulse Maximum Power Dissipation.

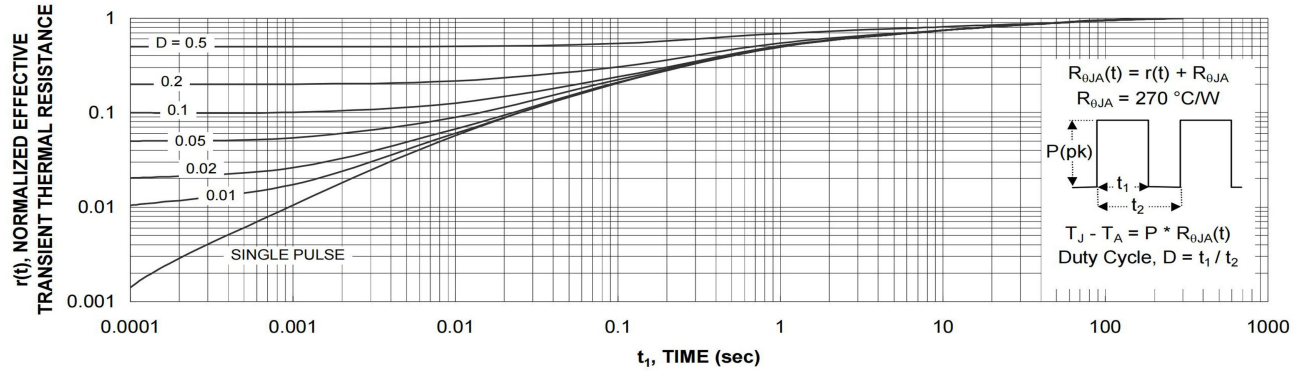


Figure 11. Transient Thermal Response Curve.

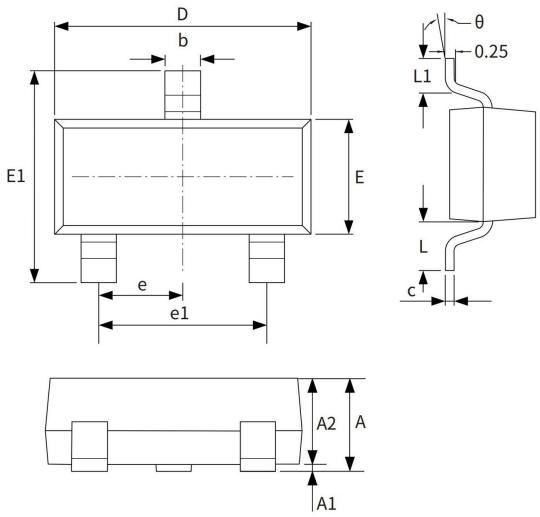
Thermal characterization performed using the conditions described in Note 1b.
Transient thermal response will change depending on the circuit board design.

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Ordering Information

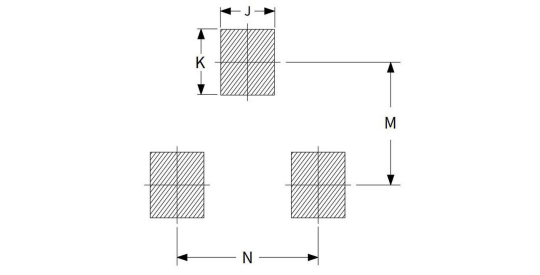
PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
SOT-23	R1	0.008	3000	30000	240000	7''

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