



ON Semiconductor®

FDN360P

Single P-Channel, PowerTrench® MOSFET

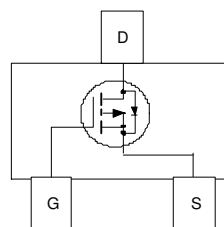
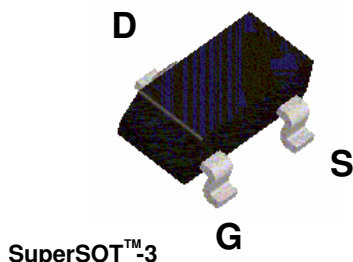
General Description

This P-Channel Logic Level MOSFET is produced using ON 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. $R_{DS(ON)} = 80\text{ m}\Omega @ V_{GS} = -10\text{ V}$
 $R_{DS(ON)} = 125\text{ m}\Omega @ V_{GS} = -4.5\text{ V}$
- 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.
- These Devices are Pb-Free and are RoHS Compliant



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) – 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	°C

Thermal Characteristics

R _{θJA}	Thermal Resistance, Junction-to-Ambient (Note 1a)	250	°C/W
R _{θJC}	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

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	$V_{GS} = 0\text{ V}, I_D = -250\ \mu\text{A}$	-30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$, Referenced to 25°C		-22		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -24\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -24\text{ V}, V_{GS} = 0\text{ V}, T_J = 55^\circ\text{C}$			-10	
I_{GSSF}	Gate–Body Leakage, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
I_{GSSR}	Gate–Body Leakage, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$			-100	nA

On Characteristics (Note 2)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-1	-1.9	-3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$, Referenced to 25°C		4		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = -10\text{ V}, I_D = -2\text{ A}$		63	80	m Ω
		$V_{GS} = -10\text{ V}, I_D = -2\text{ A}, T_J = 125^\circ\text{C}$		90	136	
		$V_{GS} = -4.5\text{ V}, I_D = -1.5\text{ A}$		100	125	
$I_{D(on)}$	On–State Drain Current	$V_{GS} = -10\text{ V}, V_{DS} = -5\text{ V}$	-10			A
g_{FS}	Forward Transconductance	$V_{DS} = -5\text{ V}, I_D = -2\text{ A}$		5		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = -15\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		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	$V_{DD} = -15\text{ V}, I_D = -1\text{ A},$ $V_{GS} = -10\text{ V}, R_{GEN} = 6\ \Omega$		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	$V_{DS} = -15\text{ V}, I_D = -3.6\text{ A},$ $V_{GS} = -10\text{ V}$		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	$V_{GS} = 0\text{ V}, I_S = -0.42\text{ A}$ (Note 2)		-0.8	-1.2	V

Notes:

- $R_{\theta JA}$ 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. copper.



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

Scale 1 : 1 on letter size paper

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

Typical Characteristics

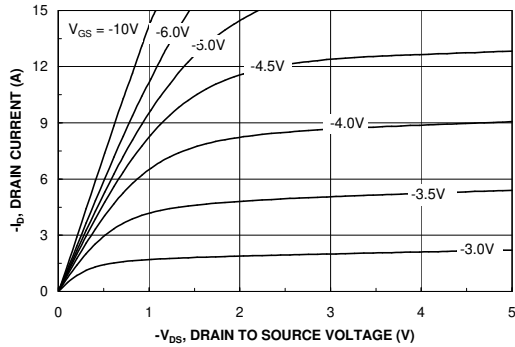


Figure 1. On-Region Characteristics.

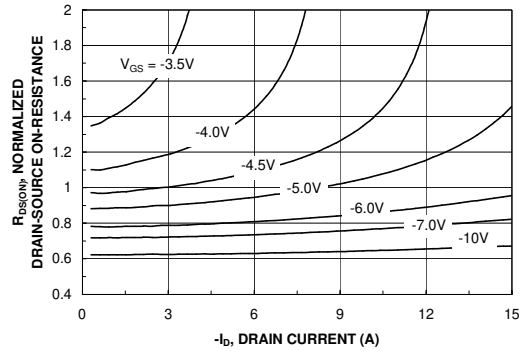


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

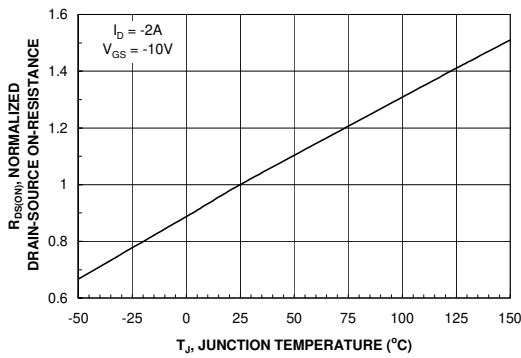


Figure 3. On-Resistance Variation with Temperature.

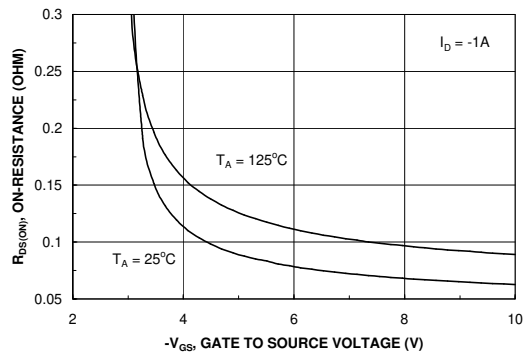


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

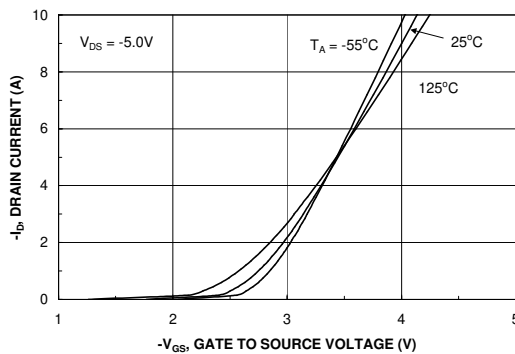


Figure 5. Transfer Characteristics.

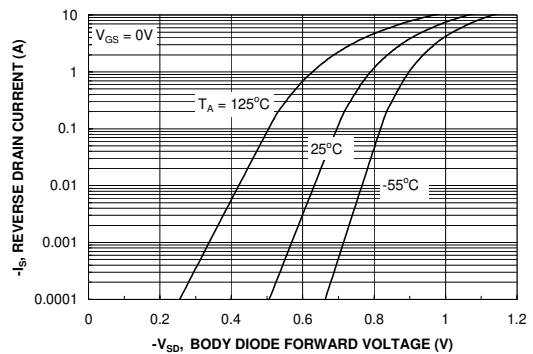


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

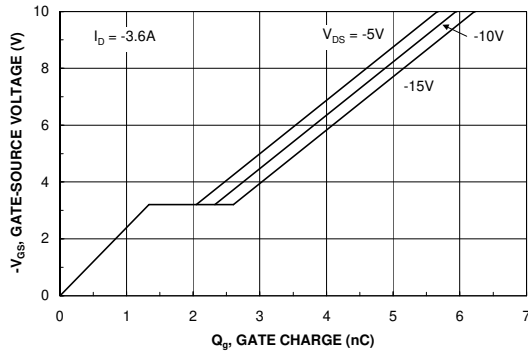


Figure 7. Gate Charge Characteristics.

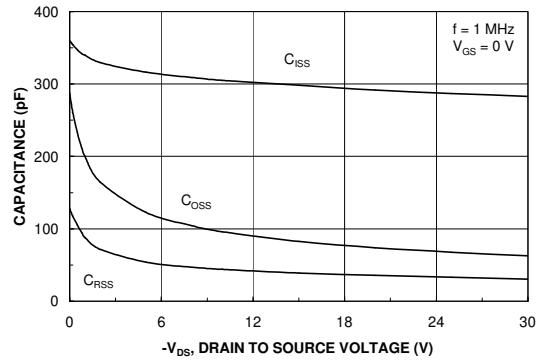


Figure 8. Capacitance Characteristics.

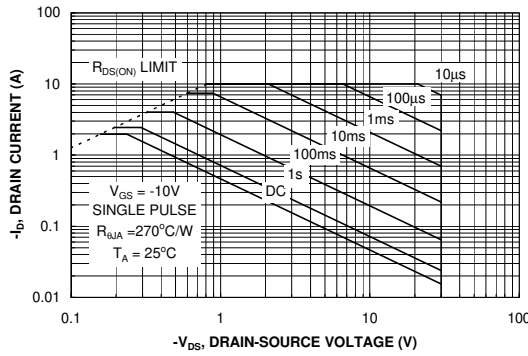


Figure 9. Maximum Safe Operating Area.

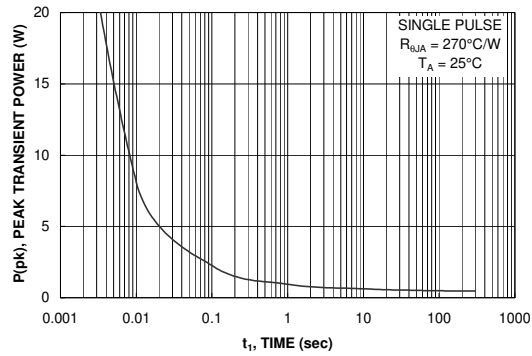


Figure 10. Single Pulse Maximum Power Dissipation.

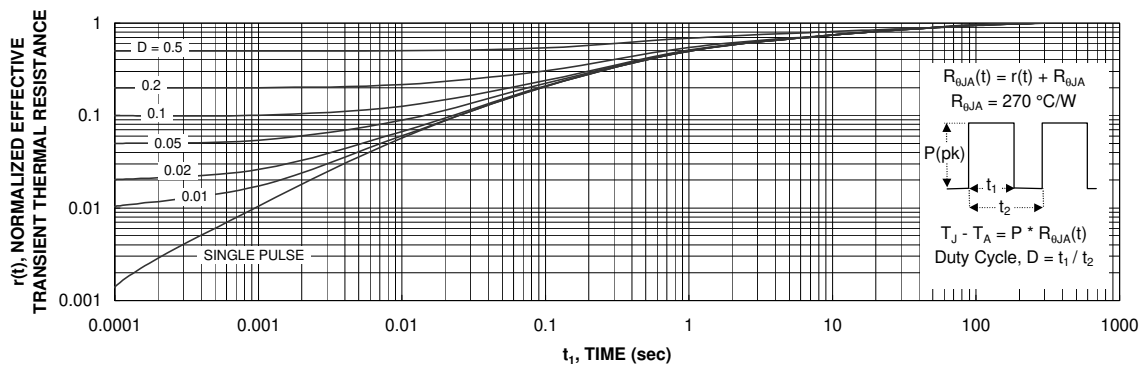


Figure 11. Transient Thermal Response Curve.

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

MECHANICAL CASE OUTLINE

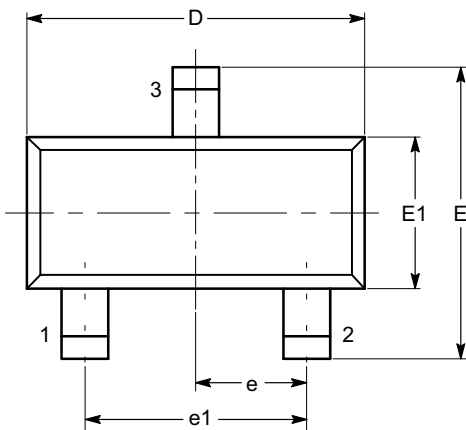
PACKAGE DIMENSIONS

ON Semiconductor®



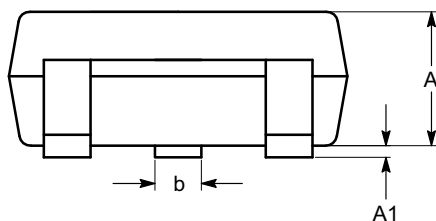
SOT-23, 3 Lead
CASE 527AG-01
ISSUE O

DATE 19 DEC 2008

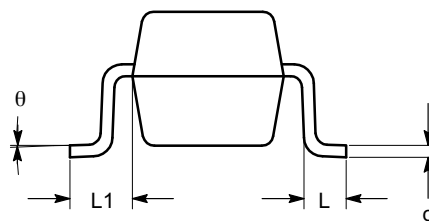


TOP VIEW

SYMBOL	MIN	NOM	MAX
A	0.89		1.12
A1	0.013		0.10
b	0.37		0.50
c	0.085		0.18
D	2.80		3.04
E	2.10		2.64
E1	1.20		1.40
e	0.95 BSC		
e1	1.90 BSC		
L	0.40 REF		
L1	0.54 REF		
θ	0°		8°



SIDE VIEW



END VIEW

Notes:


- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC TO-236.

DOCUMENT NUMBER:	98AON34319E	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
STATUS:	ON SEMICONDUCTOR STANDARD	
REFERENCE:		
DESCRIPTION:	SOT-23, 3 LEAD	PAGE 1 OF 2



ISSUE	REVISION	DATE
O	RELEASED FOR PRODUCTION FROM POD #SOT233-007-01 TO ON SEMICONDUCTOR. REQ. BY B. BERGMAN.	19 DEC 2008

ON Semiconductor and ON are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local
Sales Representative