onsemi

MOSFET – Single, P-Channel, POWERTRENCH[®], Logic Level

FDN358P

General Description

This P-Channel Logic Level MOSFET is produced using **onsemi** 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

- -1.5 A, -30 V
 - $R_{DS(ON)} = 125 \text{ m}\Omega @ V_{GS} = -10 \text{ V}$
 - $R_{DS(ON)} = 200 \text{ m}\Omega @ V_{GS} = -4.5 \text{ V}$
- Low Gate Charge (4 nC Typical)
- High Performance Trench Technology for Extremely Low RDS(ON)
- High Power Version of Industry Standard SOT-23 Package. Identical Pin-Out to SOT-23 with 30% Higher Power Handling Capability
- This Device is Pb–Free and Halide Free

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, unless otherwise noted)

Symbol	Para	Value	Unit	
V _{DSS}	Drain-Source Voltage	-30	V	
V _{GSS}	Gate-Source Voltage	±20	V	
I _D	Drain Current	Continuous (Note 1a)	-1.5	А
		Pulsed	-5	
PD	Power Dissipation	(Note 1a)	0.5	W
	for Single Operation	(Note 1b)	0.46	
T _J , T _{STG}	Operating and Storag Temperature Range	–55 to 150	°C	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS ($T_A = 25^{\circ}C$, unless otherwise noted)

Symbol	Parameter	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	250	°C/W
$R_{ extsf{ heta}JC}$	Thermal Resistance, Junction-to-Case (Note 1)	75	

V _{DSS}	R _{DS(ON)} MAX	I _D MAX
–30 V	125 m Ω @ –10 V	–1.5 A
	200 mΩ @ −4.5 V	



SOT-23/SUPERSOT [™] -23, 3 LEAD, 1.4x2.9 CASE 527AG

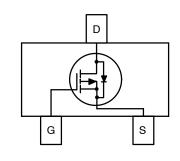
MARKING DIAGRAM



- 358 = Specific Device Code
- M = Month Code = Pb-Free Package

(Note: Microdot may be in either location)

PIN ASSIGNMENT



ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Symbol Parameter		Test Conditions	Min	Тур	Max	Unit				
OFF CHARACTERISTICS										
BV _{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = -250 μ A	-30	-	-	V				
$\frac{\Delta BV_{DSS}}{\Delta T_{J}}$ Breakdown Voltage Temperature Coefficient		$I_D = -250 \ \mu A$, Referenced to $25^{\circ}C$	-	-22	-	mV/°C				
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -24 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	-1	μA				
		V_{DS} = -24 V, V_{GS} = 0 V, T_J = 55 $^\circ C$	-	-	-10					
I _{GSSF}	Gate-Body Leakage, Forward	$V_{GS} = 20 \text{ V}, \text{ V}_{DS} = 0 \text{ V}$	-	-	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	$V_{DS} = V_{GS}, I_D = -250 \ \mu A$	-1	-1.9	-3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250 \ \mu$ A, Referenced to 25° C	-	4	-	mV/°C
R _{DS(on)}	Static Drain-Source On-Resistance	$V_{GS} = -10 \text{ V}, \text{ I}_{D} = -1.5 \text{ A}$	-	105	125	mΩ
		V_{GS} = -10 V, I_D = -1.5 A, T_J = 125°C	-	148	210	
		$V_{GS} = -4.5 \text{ V}, I_D = -1.2 \text{ A}$	-	161	200	
I _{D(on)}	On-State Drain Current	V_{GS} = -4.5 V, V_{DS} = -5 V	-5	-	-	А
9 _{FS}	Forward Transconductance	$V_{DS} = -5 V, I_{D} = -1.5 A$	-	3.5	-	S

DYNAMIC CHARACTERISTICS

C _{iss}	Input Capacitance	V_{DS} = -15 V, V_{GS} = 0 V, f = 1.0 MHz	-	182	-	pF
C _{oss}	Output Capacitance		-	56	-	pF
C _{rss}	Reverse Transfer Capacitance		_	26	_	pF

SWITCHING CHARACTERISTICS (Note 2)

t _{d(on)}	Turn-On Delay Time	$V_{DD} = -15 \text{ V}, \text{ I}_{D} = -0.5 \text{ A},$	-	5	10	ns
t _r	Turn-On Rise Time	V_{GS} = -10 V, R_{GEN} = 6 Ω	-	13	23	ns
t _{d(off)}	Turn-Off Delay Time		-	12	21	ns
t _f	Turn-Off Fall Time		-	2	4	ns
Qg	Total Gate Charge	V_{DS} = -15 V, I_{D} = -1.5 A, V_{GS} = -10 V	-	4	5.6	nC
Q _{gs}	Gate-Source Charge]	-	0.8	_	nC
Q _{gd}	Gate-Drain Charge		-	0.8	-	nC

DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS

IS	Maximum Continuous Drain-Source Diode Forward Current			-	-0.42	А
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_{S} = -0.42 \text{ A} \text{ (Note 2)}$	-	-0.76	-1.2	V

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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.



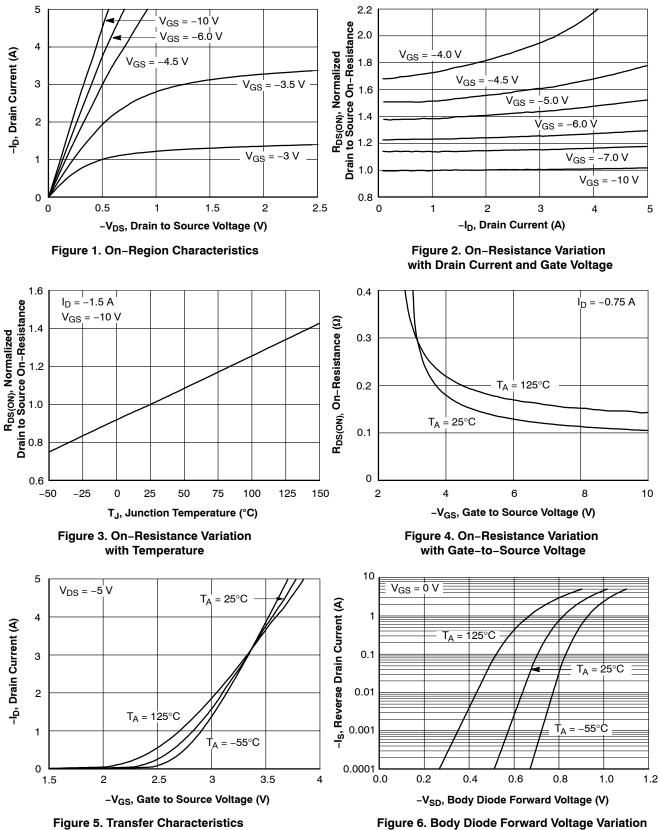
 a) 250°C/W when mounted on a 0.02 in² pad of 2 oz copper

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

Scale 1:1 on letter size paper

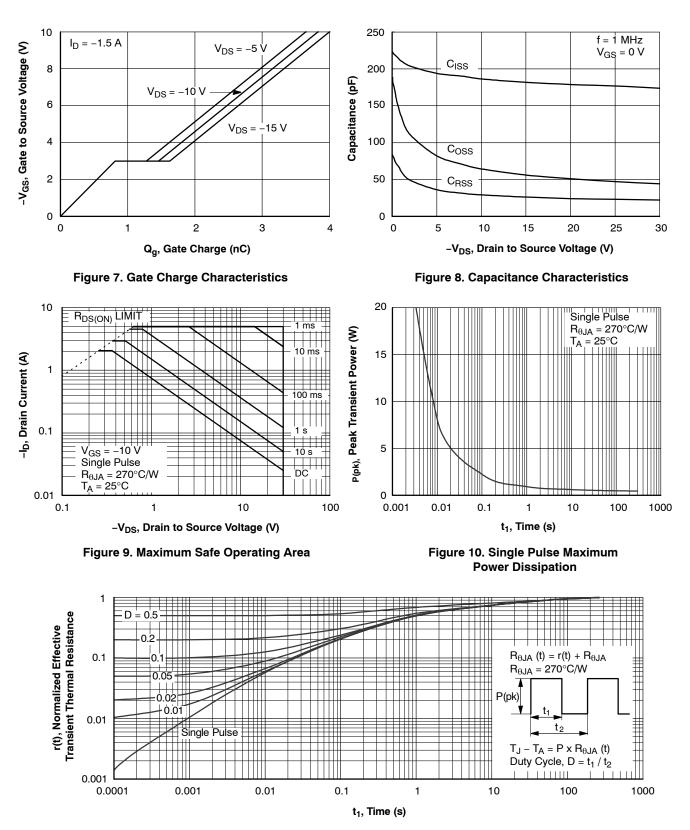
2. Pulse Test: Pulse Width \leq 300 $\mu s,$ Duty Cycle \leq 2.0%.

TYPICAL CHARACTERISTICS



with Source Current and Temperature

TYPICAL CHARACTERISTICS (continued)





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

PACKAGE MARKING AND ORDERING INFORMATION

Device	Device Marking	Package	Reel Size	Tape Width	Shipping [†]
FDN358P	358	SOT-23/SUPERSOT-23, 3 LEAD, 1.4x2.9 (Pb-Free, Halide Free)	7″	8 mm	3000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, <u>BRD8011/D</u>.

POWERTRENCH is a registered trademark of Semiconductor Components Industries, LLC dba "onsemi" or its affiliates and/or subsidiaries in the United States and/or other countries.

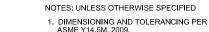
SUPERSOT is trademark of Semiconductor Components Industries, LLC dba "onsemi" or its affiliates and/or subsidiaries in the United States and/or other countries.



SOT-23/SUPERSOT [™] -23, 3 LEAD, 1.4x2.9 CASE 527AG

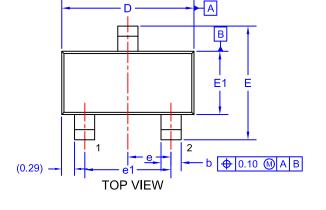
ISSUE A

DATE 09 DEC 2019



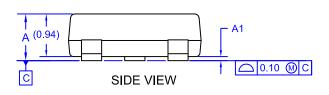
SEE DETAIL A

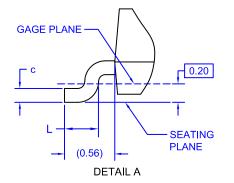
 DIMENSIONING AND TOLERANCING PE ASME Y14.5M, 2009.
ALL DIMENSIONS ARE IN MILLIMETERS 3

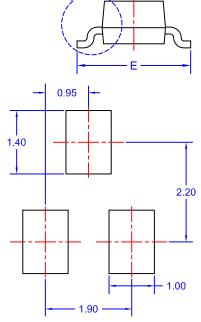


D

3.	ALL DIMENSIONS ARE IN MILLIMETERS. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.							
[DIM	MIN.	NOM.	MAX.				
Γ	A 0.85		0.95	1.12				
ſ	A1	0.00	0.05	0.10				
	b	0.370	0.435	0.508				
	c 0.085		0.150	0.180				
ſ	D	2.80	2.92	3.04				
ſ	Е	2.31	2.51	2.71				
ſ	E1	1.20	1.40	1.52				
	е	0.95 BSC						
	e1	1.90 BSC						
ſ	L	0.33	0.33 0.38 0.43					







LAND PATTERN RECOMMENDATION* *FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

GENERIC **MARKING DIAGRAM***

	RAM* XXX = Specific D M = Month Co • = Pb-Free R (Note: Microdot may be in	de Package	*This information is generic. Plea device data sheet for actual par Pb-Free indicator, "G" or microd or may not be present. Some pro not follow the Generic Marking.	rt marking. ot "■", may
DOCUMENT NUMBER:	98AON34319E	Electronic versions are uncontrolled except when accessed directly from the Document Rep Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.		
DESCRIPTION:	SOT-23/SUPERSOT-23, 3	LEAD, 1.4X2.9		PAGE 1 OF 1

onsemi and ONSEMi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes, LLC doa onsemi on its subsidiaries in the Onited States and/of other countries. Onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the subsidiaries in subsidiaries in the Onited States and/of other countries. Onsemi makes have a new products and/of other countries. The one 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. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, ONSEMI, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "onsemi" or its affiliates and/or subsidiaries in the United States and/or other countries. onsemi owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of onsemi's product/patent coverage may be accessed at <u>www.onsemi.com/site/pdf/Patent_Marking.pdf</u>. onsemi reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and onsemi makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does onsemi 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 indental damages. Buyer is responsible for its products and applications using onsemi products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by onsemi. "Typical" parameters which may be provided in onsemi 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. onsemi does not convey any license under any of its intellectual property rights nor the rights of others. onsemi 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. Buyer shall indemnify and hold onsemi and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs,

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation onsemi Website: www.onsemi.com

ONLINE SUPPORT: <u>www.onsemi.com/support</u> For additional information, please contact your local Sales Representative at <u>www.onsemi.com/support/sales</u>