

ON Semiconductor

Is Now



To learn more about onsemi™, please visit our website at
www.onsemi.com

onsemi and 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 product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. 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 incidental 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 in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use onsemi products for any such unintended or unauthorized application, Buyer shall indemnify and hold onsemi 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 onsemi was negligent regarding the design or manufacture of the part. onsemi is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner. Other names and brands may be claimed as the property of others.



ON Semiconductor®

FDMA8878

Single N-Channel Power Trench® MOSFET 30 V, 9.0 A, 16 mΩ

Features

- Max $r_{DS(on)}$ = 16 mΩ at $V_{GS} = 10$ V, $I_D = 9.0$ A
- Max $r_{DS(on)}$ = 19 mΩ at $V_{GS} = 4.5$ V, $I_D = 8.5$ A
- High performance trench technology for extremely low $r_{DS(on)}$
- Fast switching speed
- RoHS Compliant

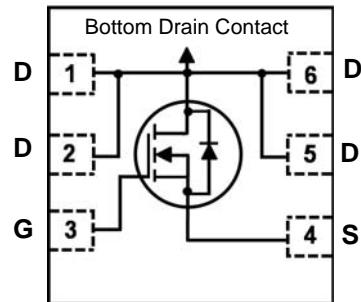
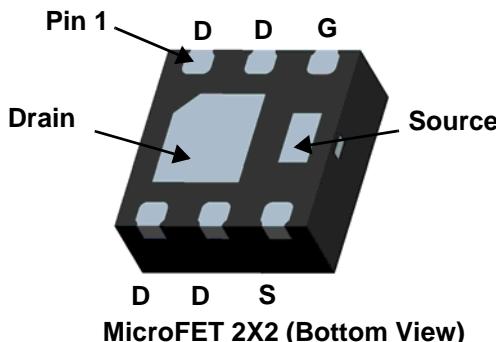


General Description

This N-Channel MOSFET is produced using ON Semiconductor's advanced Power Trench® process that has been optimized for $r_{DS(on)}$, switching performance.

Application

- DC/DC Buck Converters
- Load Switch in NB
- Notebook Battery Power Management



MOSFET Maximum Ratings $T_A = 25$ °C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	30	V
V_{GS}	Gate to Source Voltage	(Note 3)	±20
I_D	Drain Current -Continuous (Package Limited) $T_C = 25$ °C	10	A
	-Continuous $T_A = 25$ °C (Note 1a)	9.0	
	-Pulsed	40	
P_D	Power Dissipation $T_A = 25$ °C (Note 1a)	2.4	W
	Power Dissipation $T_A = 25$ °C (Note 1b)	0.9	
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)	52	°C/W
$R_{θJA}$	Thermal Resistance, Junction to Ambient (Note 1b)	145	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
878	FDMA8878	MicroFET 2x2	7 "	8 mm	3000 units

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{ V}$	30			V
ΔBV_{DSS} ΔT_J	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, referenced to 25°C		26		$\text{mV/}^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24 \text{ V}, V_{GS} = 0 \text{ V}$		1		μA
I_{GSS}	Gate to Source Leakage Current, Forward	$V_{GS} = 20 \text{ V}, V_{DS} = 0 \text{ V}$		100		nA

On Characteristics

$V_{GS(\text{th})}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$	1.2	1.8	3.0	V
$\Delta V_{GS(\text{th})}$ ΔT_J	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, referenced to 25°C		-5		$\text{mV/}^\circ\text{C}$
$r_{DS(\text{on})}$	Static Drain to Source On Resistance	$V_{GS} = 10 \text{ V}, I_D = 9.0 \text{ A}$		13	16	$\text{m}\Omega$
		$V_{GS} = 4.5 \text{ V}, I_D = 8.5 \text{ A}$		16	19	
		$V_{GS} = 10 \text{ V}, I_D = 9.0 \text{ A}, T_J = 125^\circ\text{C}$		17	21	
g_{FS}	Forward Transconductance	$V_{DD} = 5 \text{ V}, I_D = 9.0 \text{ A}$		41		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		539	720	pF
C_{oss}	Output Capacitance			172	230	pF
C_{rss}	Reverse Transfer Capacitance			24	35	pF
R_g	Gate Resistance			1.3		Ω

Switching Characteristics

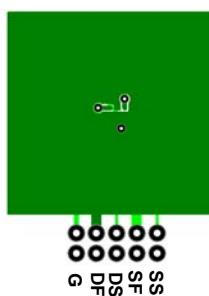
$t_{d(\text{on})}$	Turn-On Delay Time	$V_{DD} = 15 \text{ V}, I_D = 9.0 \text{ A}, V_{GS} = 10 \text{ V}, R_{\text{GEN}} = 6 \Omega$		6	12	ns
t_r	Rise Time			2	10	ns
$t_{d(\text{off})}$	Turn-Off Delay Time			14	25	ns
t_f	Fall Time			2	10	ns
$Q_{g(\text{TOT})}$	Total Gate Charge	$V_{GS} = 0 \text{ V} \text{ to } 10 \text{ V}$		8.5	12	nC
	Total Gate Charge	$V_{GS} = 0 \text{ V} \text{ to } 4.5 \text{ V}$	$V_{DD} = 15 \text{ V}$	4.1	5.8	nC
Q_{gs}	Total Gate Charge	$I_D = 9.0 \text{ A}$		1.6		nC
Q_{gd}	Gate to Drain "Miller" Charge			1.2		nC

Drain-Source Diode Characteristics

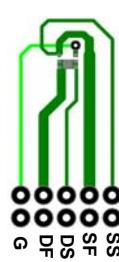
V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_S = 2.0 \text{ A}$	(Note 2)	0.75	1.2	V
		$V_{GS} = 0 \text{ V}, I_S = 9.0 \text{ A}$	(Note 2)			
t_{rr}	Reverse Recovery Time	$I_F = 9.0 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}$		16	28	ns

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. 52 °C/W when mounted on a 1 in² pad of 2 oz copper.



b. 145 °C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0 %.

3. As an N-ch device, the negative V_{GS} rating is for low duty cycle pulse occurrence only. No continuous rating is implied.

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

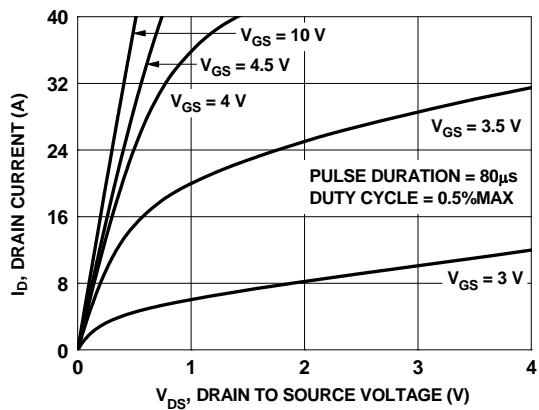


Figure 1. On Region Characteristics

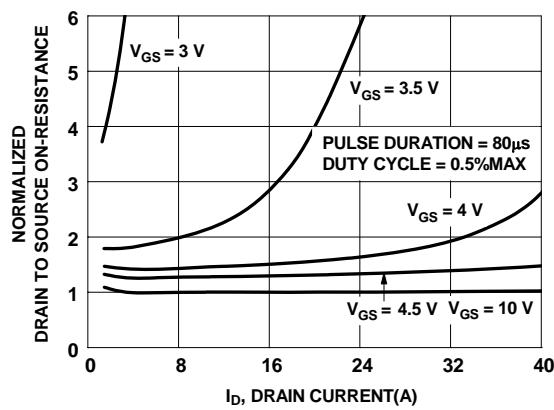


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

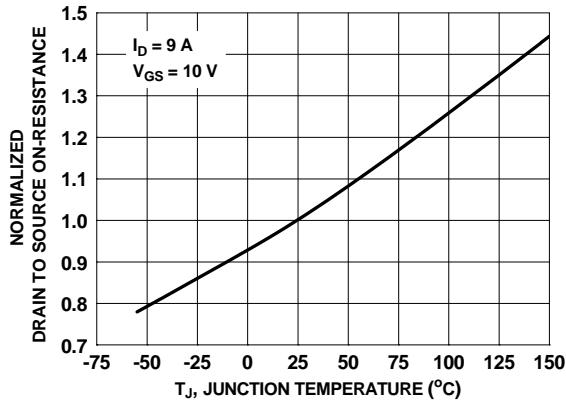


Figure 3. Normalized On Resistance vs Junction Temperature

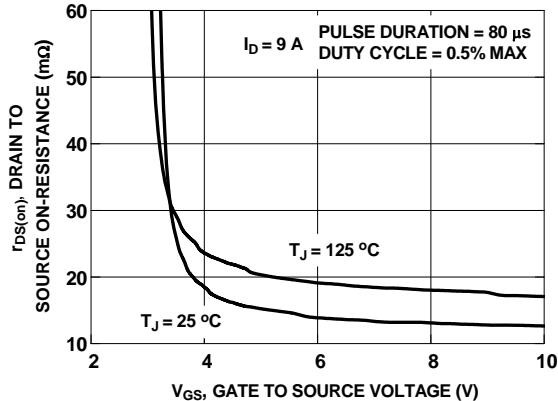


Figure 4. On-Resistance vs Gate to Source Voltage

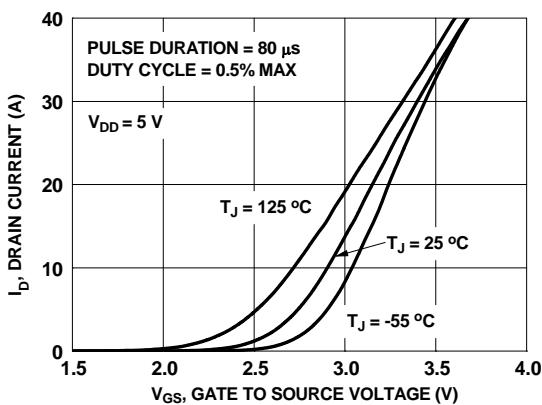


Figure 5. Transfer Characteristics

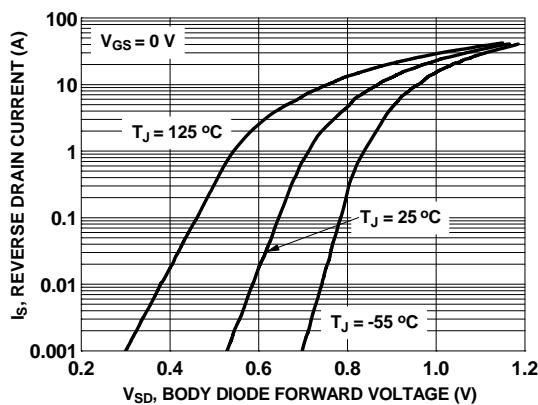


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

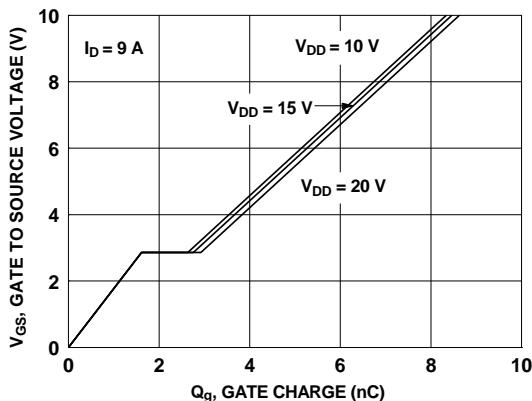


Figure 7. Gate Charge Characteristics

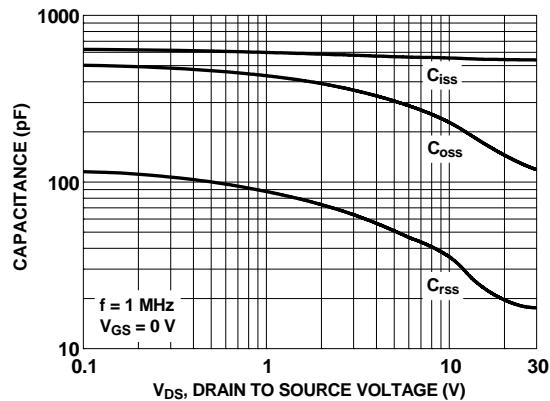


Figure 8. Capacitance vs Drain to Source Voltage

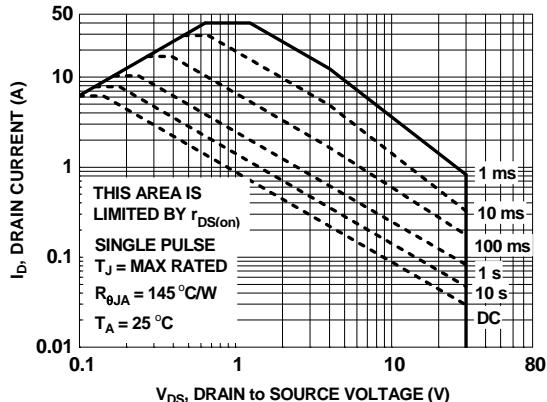


Figure 9. Forward Bias Safe Operating Area

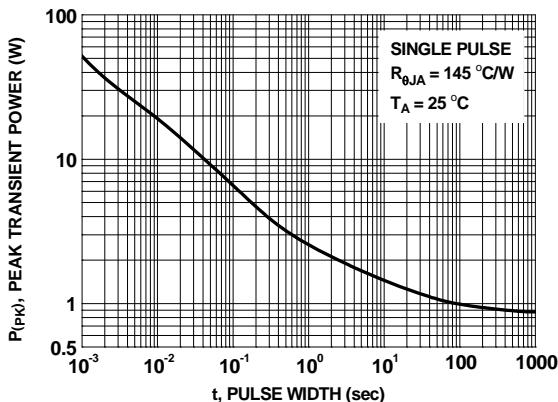


Figure 10. Single Pulse Maximum Power Dissipation

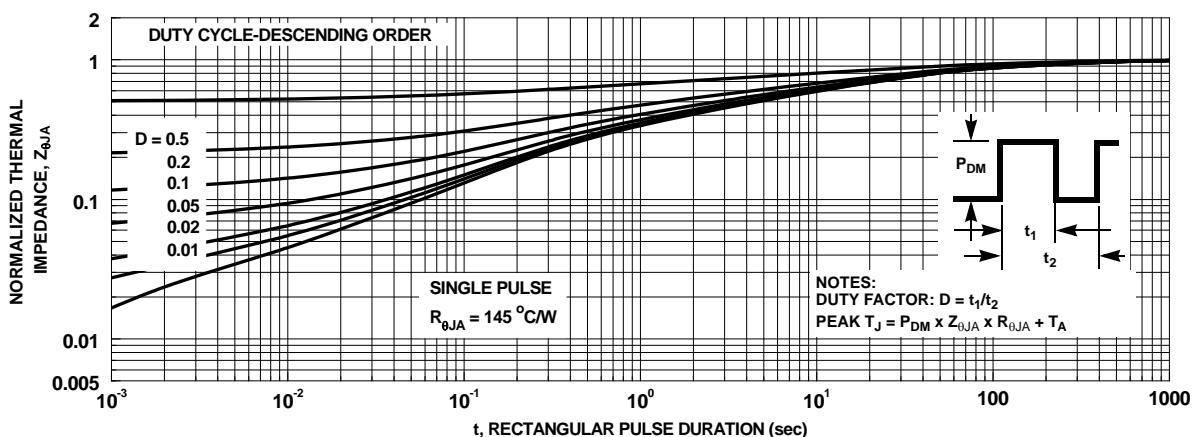


Figure 11. Junction-to-Ambient Transient Thermal Response Curve

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
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com

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

For additional information, please contact your local
Sales Representative