

# ON Semiconductor

## Is Now



To learn more about onsemi™, please visit our website at  
[www.onsemi.com](http://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](http://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.

# MOSFET – Power, Single N-Channel, TDFNW8 DUAL COOL® 150 V, 4.45 mΩ, 165 A

## NVMTSC4D3N15MC

### Features

- Small Footprint (8x8 mm) for Compact Design
- Low  $R_{DS(on)}$  to Minimize Conduction Losses
- Low  $Q_G$  and Capacitance to Minimize Driver Losses
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter			Value	Unit
V <sub>DSS</sub>	Drain-to-Source Voltage			150	V
V <sub>GS</sub>	Gate-to-Source Voltage			±20	V
I <sub>D</sub>	Continuous Drain Current R <sub>θJC</sub> (Note 2)	Steady State	T <sub>C</sub> = 25°C	165	A
P <sub>D</sub>	Power Dissipation R <sub>θJC</sub> (Note 2)			292	W
I <sub>D</sub>	Continuous Drain Current R <sub>θJC</sub> (Note 2)	Steady State	T <sub>C</sub> = 100°C	117	A
P <sub>D</sub>	Power Dissipation R <sub>θJC</sub> (Note 2)			146	W
I <sub>D</sub>	Continuous Drain Current R <sub>θJA</sub> (Notes 1, 2)	Steady State	T <sub>A</sub> = 25°C	23	A
P <sub>D</sub>	Power Dissipation R <sub>θJA</sub> (Notes 1, 2)			5	W
I <sub>D</sub>	Continuous Drain Current R <sub>θJA</sub> (Notes 1, 2)	Steady State	T <sub>A</sub> = 100°C	16	A
P <sub>D</sub>	Power Dissipation R <sub>θJA</sub> (Notes 1, 2)			3	W
I <sub>DM</sub>	Pulsed Drain Current	T <sub>A</sub> = 25°C, t <sub>p</sub> = 10 μs		900	A
T <sub>J</sub> , T <sub>stg</sub>	Operating Junction and Storage Temperature Range			-55 to +175	°C
I <sub>S</sub>	Source Current (Body Diode)			243	A
E <sub>AS</sub>	Single Pulse Drain-to-Source Avalanche Energy (I <sub>L</sub> = 14.1 A <sub>pk</sub> )			3390	mJ
T <sub>L</sub>	Lead Temperature Soldering Reflow for Soldering Purposes (1/8" from case for 10 s)			260	°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.

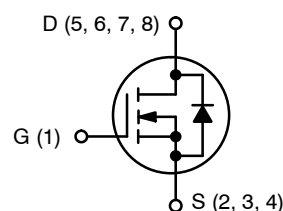
1. Surface-mounted on FR4 board using 1 in<sup>2</sup> pad size, 1 oz Cu pad.
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted



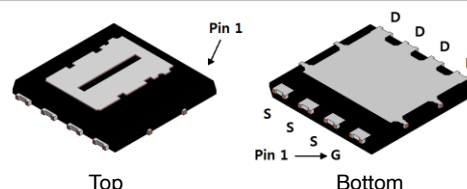
ON Semiconductor®

[www.onsemi.com](http://www.onsemi.com)

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
150 V	4.45 mΩ @ 10 V	165 A

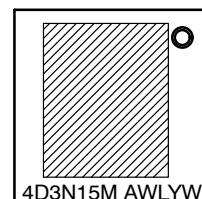


N-CHANNEL MOSFET



TDFNW8  
CASE 507AS

### MARKING DIAGRAM



4D3N15M = Specific Device Code  
A = Assembly Location  
WL = Wafer Lot Code  
Y = Year Code  
W = Work Week Code

### ORDERING INFORMATION

Device	Package	Shipping†
NVMTSC4D3N15MC	TDFNW8 (Pb-Free)	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, BRD8011/D.

# NVMTSC4D3N15MC

## THERMAL RESISTANCE RATINGS

Symbol	Parameter	Max	Unit
$R_{\theta JC}$	Junction-to-Case – Steady State (Note 2)	0.5	°C/W
$R_{\theta JC}$	Junction-to-Case Top (Note 2)	0.8	
$R_{\theta JA}$	Junction-to-Ambient – Steady State (Note 2)	28	

## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
--------	-----------	----------------	-----	-----	-----	------

### OFF CHARACTERISTICS

V <sub>(BR)DSS</sub>	Drain – to – Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA		150	–	–	V
V <sub>(BR)DSS</sub> / T <sub>J</sub>	Drain – to – Source Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, ref to 25°C		–	49.84	–	mV/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 120 V	T <sub>J</sub> = 25°C	–	–	1	μA
			T <sub>J</sub> = 125°C	–	–	10	μA
I <sub>GSS</sub>	Gate – to – Source Leakage Current	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V		–	–	±100	nA

### ON CHARACTERISTICS (Note 3)

$V_{GS(TH)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 521\text{ }\mu\text{A}$	2.5	3.6	4.5	V
$V_{GS(TH)} / T_J$	Negative Threshold Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , ref to $25^\circ\text{C}$	–	–9.93	–	mV/°C
$R_{DS(on)}$	Drain – to – Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 95\text{ A}$	–	3.4	4.45	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 5\text{ V}, I_D = 95\text{ A}$	–	177	–	S
$R_G$	Gate-Resistance	$T_A = 25^\circ\text{C}$	–	1.1	–	$\Omega$

### CHARGES & CAPACITANCES

$C_{ISS}$	Input Capacitance	$V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 75\text{ V}$	–	6514	–	pF
$C_{OSS}$	Output Capacitance		–	1750	–	
$C_{RSS}$	Reverse Transfer Capacitance		–	12.5	–	
$Q_{G(TOT)}$	Total Gate Charge	$V_{GS} = 10\text{ V}, V_{DS} = 75\text{ V}, I_D = 95\text{ A}$	–	79	–	nC
$Q_{G(TH)}$	Threshold Gate Charge		–	21	–	
$Q_{GS}$	Gate-to-Source Charge		–	36	–	
$Q_{GD}$	Gate-to-Drain Charge		–	11	–	
$V_{GP}$	Plateau Voltage		–	5.8	–	

### SWITCHING CHARACTERISTICS, $V_{GS} = 10\text{ V}$ (Note 3)

$t_{d(ON)}$	Turn – On Delay Time	$V_{GS} = 10\text{ V}, V_{DS} = 75\text{ V}, I_D = 95\text{ A}, R_G = 6\text{ }\Omega$	–	38	–	ns
$t_r$	Rise Time		–	11	–	
$t_{d(OFF)}$	Turn – Off Delay Time		–	48	–	
$t_f$	Fall Time		–	8	–	

### DRAIN-SOURCE DIODE CHARACTERISTICS

V <sub>SD</sub>	Forward Diode Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 95 A	T <sub>J</sub> = 25°C	–	0.86	1.2	V
			T <sub>J</sub> = 125°C	–	0.80	–	
t <sub>RR</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0 V, dI <sub>S</sub> /dt = 100 A/μs, I <sub>S</sub> = 95 A		–	85	–	ns
t <sub>a</sub>	Charge Time			–	58	–	
t <sub>b</sub>	Discharge Time			–	38	–	
Q <sub>RR</sub>	Reverse Recovery Charge			–	194	–	nC

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.

3. Switching characteristics are independent of operating junction temperatures

TYPICAL CHARACTERISTICS

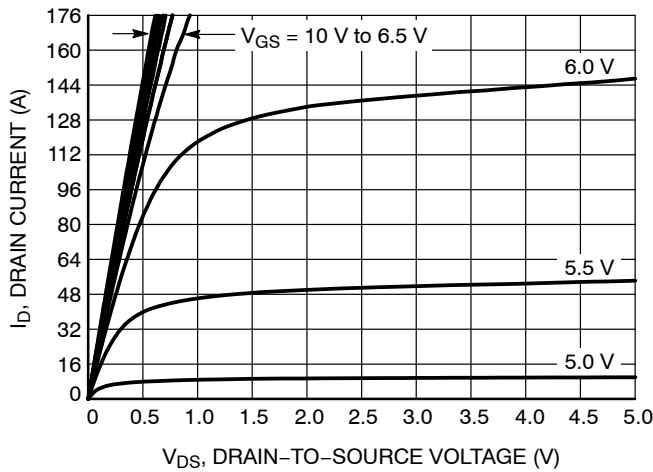


Figure 1. On-Region Characteristics

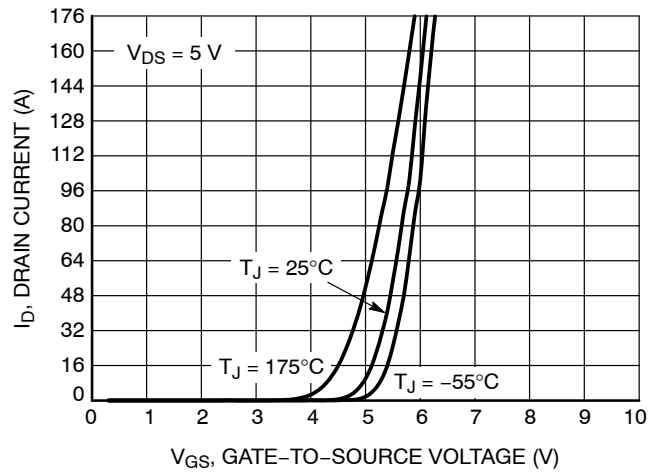


Figure 2. Transfer Characteristics

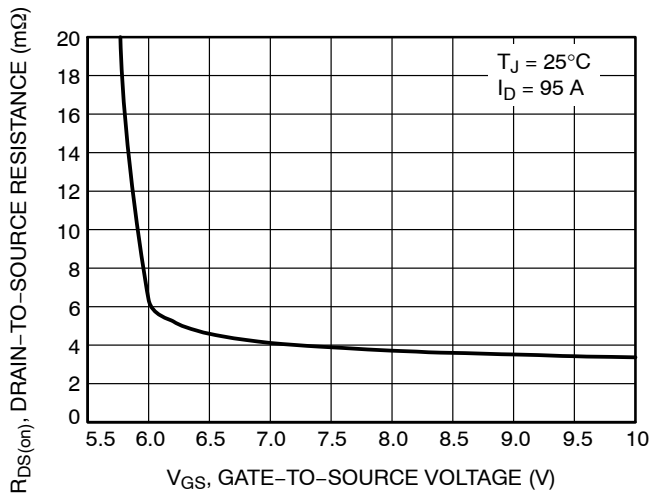


Figure 3. On-Resistance vs. Gate-to-Source Voltage

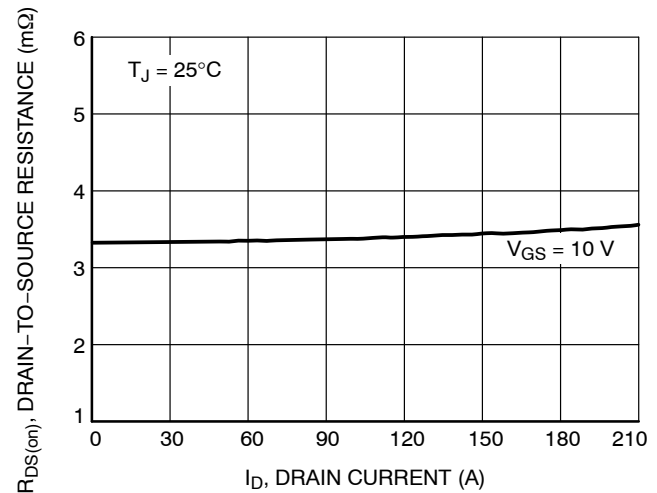


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

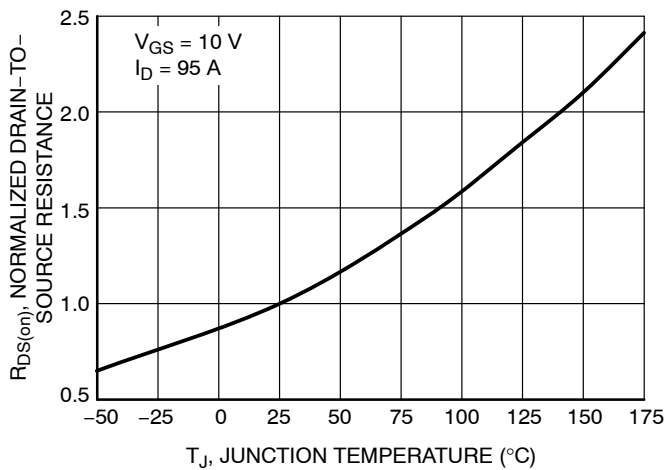


Figure 5. On-Resistance Variation with Temperature

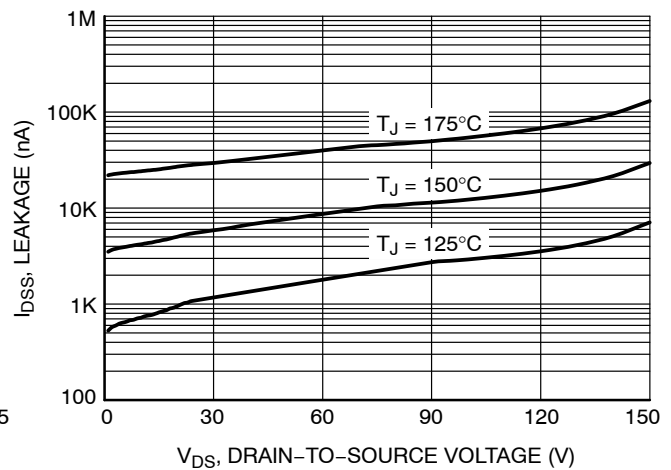


Figure 6. Drain-to-Source Leakage Current vs. Voltage

# NVMTSC4D3N15MC

## TYPICAL CHARACTERISTICS

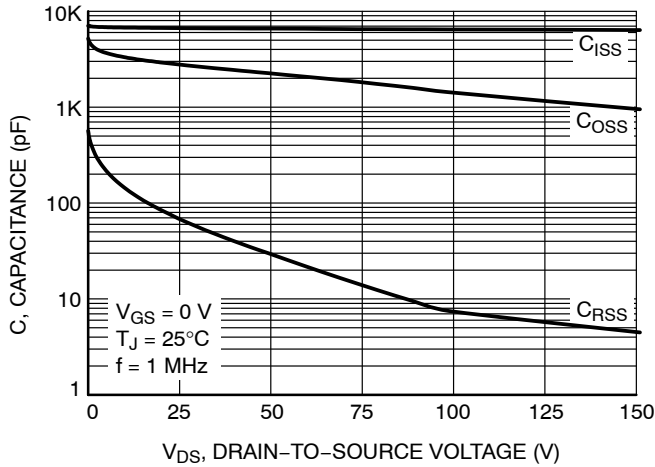


Figure 7. Capacitance Variation

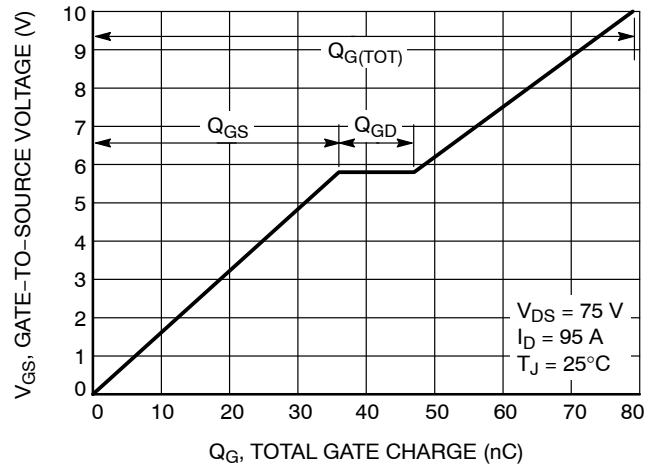


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

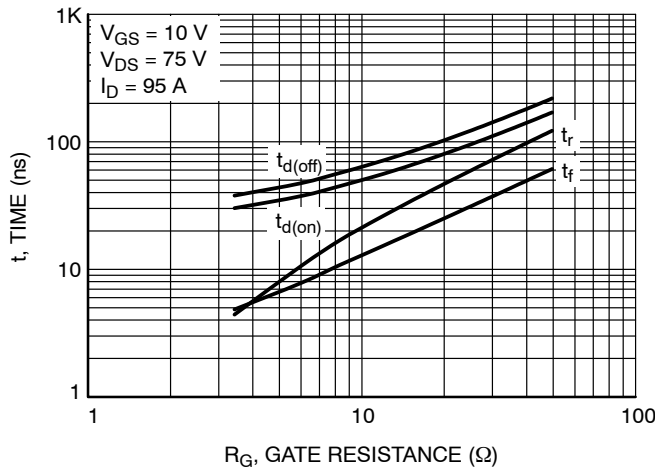


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

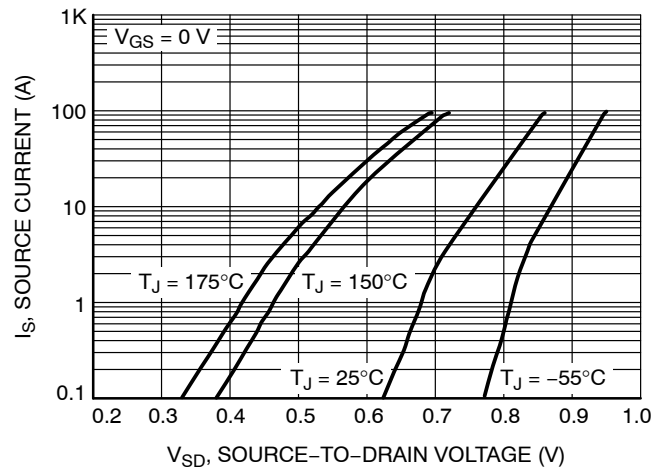


Figure 10. Diode Forward Voltage vs. Current

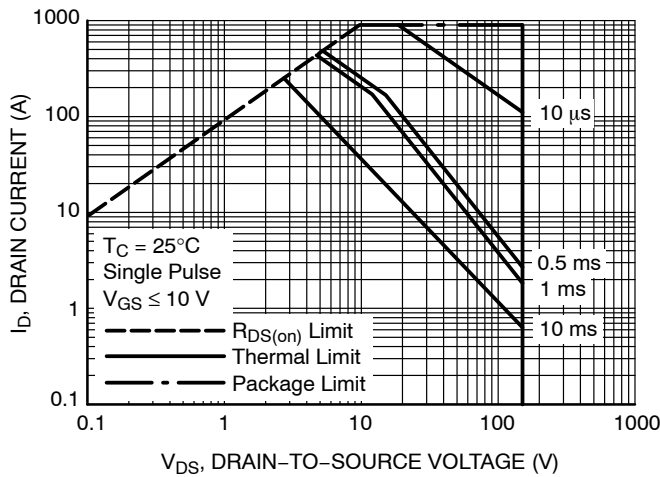


Figure 11. Safe Operating Area

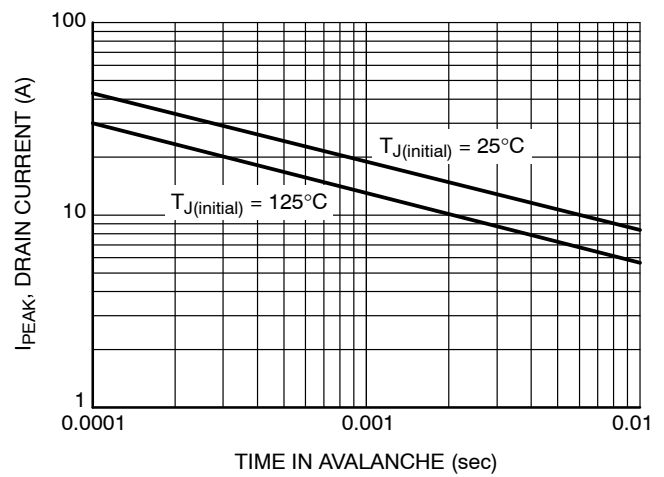


Figure 12.  $I_{PEAK}$  vs. Time in Avalanche

# NVMTSC4D3N15MC

## TYPICAL CHARACTERISTICS

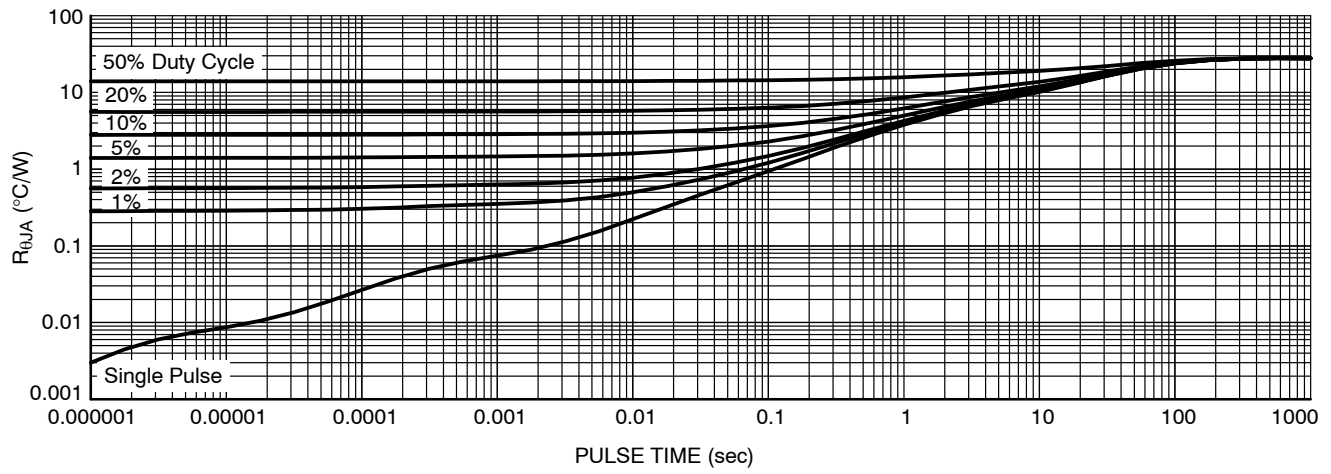
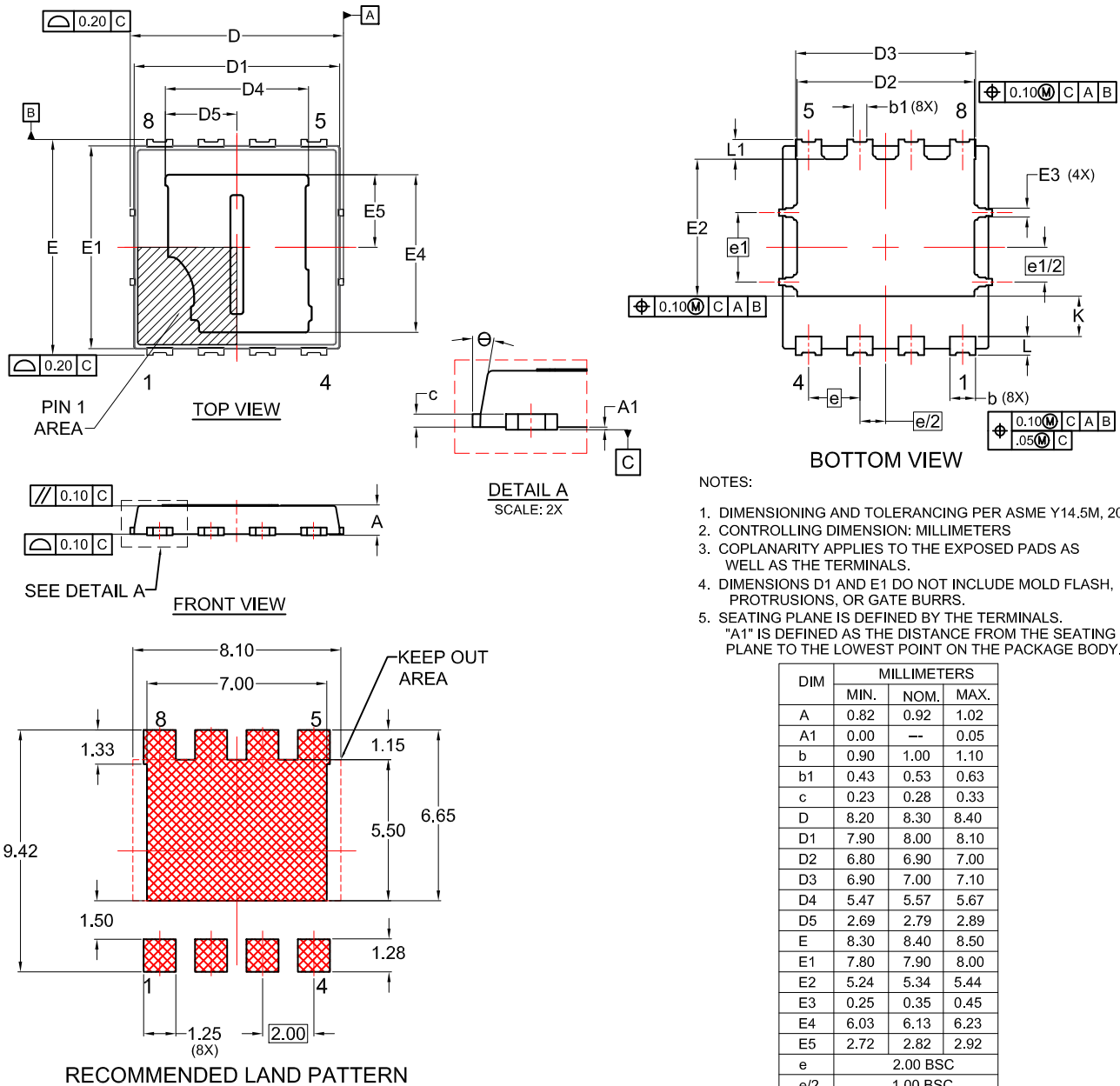


Figure 13. Thermal Characteristics


# NVMTSC4D3N15MC

## PACKAGE DIMENSIONS

**TDFNW8 8.3x8.4, 2P**  
CASE 507AS  
ISSUE A



DUAL COOL is registered trademark of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries.

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](http://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:

Email Requests to: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

ON Semiconductor Website: [www.onsemi.com](http://www.onsemi.com)

### TECHNICAL SUPPORT

North American Technical Support:

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative