

# NTMTSC1D5N08MC

## MOSFET - Power, Single N-Channel, DFNW8, DUAL COOL<sup>®</sup> 80 V, 1.56 mΩ, 287 A

### 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
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Typical Applications

- Power Tools, Battery Operated Vacuums
- UAV/Drones, Material Handling
- BMS/Storage, Home Automation

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

Parameter		Symbol	Value	Unit	
Drain-to-Source Voltage		$V_{DSS}$	80	V	
Gate-to-Source Voltage		$V_{GS}$	$\pm 20$	V	
Continuous Drain Current $R_{\theta JC}$ (Note 2)	Steady State	$T_C = 25^\circ\text{C}$	$I_D$	287	A
			$P_D$	250	W
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)	Steady State	$T_A = 25^\circ\text{C}$	$I_D$	33	A
			$P_D$	3.3	W
Pulsed Drain Current	$T_C = 25^\circ\text{C}, t_p = 10 \mu\text{s}$	$I_{DM}$	3500	A	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$	
Single Pulse Drain-to-Source Avalanche Energy ( $I_{L(pk)} = 31 \text{ A}, L = 3 \text{ mH}$ )		$E_{AS}$	1441	mJ	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		$T_L$	260	$^\circ\text{C}$	

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 RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case - Steady State (Note 2)	$R_{\theta JC}$	0.5	$^\circ\text{C}/\text{W}$
Junction-to-Ambient - Steady State (Note 2)	$R_{\theta JA}$	38	$^\circ\text{C}/\text{W}$

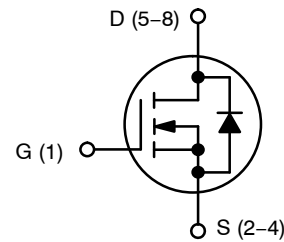
1. Surface-mounted on FR4 board using a 1 in<sup>2</sup> pad size, 1 oz. Cu pad.
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.



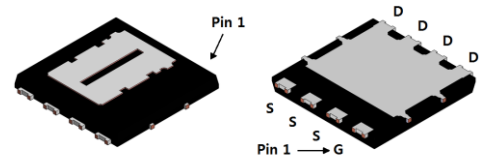
ON Semiconductor<sup>®</sup>

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

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
80 V	1.56 mΩ @ 10 V	287 A
	4.0 mΩ @ 6 V	

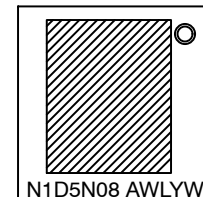


N-CHANNEL MOSFET



DFNW8  
DUAL COOL  
CASE 507AS

### MARKING DIAGRAM



N1D5N08 = Specific Device Code  
 A = Assembly Location  
 WL = 2-digit Wafer Lot Code  
 Y = Year Code  
 W = Work Week Code

### ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

# NTMTSC1D5N08MC

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	80			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = 250\ \mu\text{A}$ , ref to $25^\circ\text{C}$		82		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}, V_{DS} = 80\text{ V}$	$T_J = 25^\circ\text{C}$		1	$\mu\text{A}$
			$T_J = 125^\circ\text{C}$		250	
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA

## ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 650\ \mu\text{A}$	2.0	3.0	4.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	$I_D = 650\ \mu\text{A}$ , ref to $25^\circ\text{C}$		-8.3		mV/ $^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 80\text{ A}$		1.10	1.56	m $\Omega$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 6\text{ V}, I_D = 58\text{ A}$		1.75	4.0	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS} = 5\text{ V}, I_D = 80\text{ A}$		219		S
Gate Resistance	$R_G$	$T_A = 25^\circ\text{C}$		0.9		$\Omega$

## CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 40\text{ V}$		7420	10,400	pF
Output Capacitance	$C_{OSS}$			2555	3600	
Reverse Transfer Capacitance	$C_{RSS}$			101	175	
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 10\text{ V}, V_{DS} = 40\text{ V}; I_D = 80\text{ A}$		101	140	nC
Threshold Gate Charge	$Q_{G(TH)}$			20	28	
Gate-to-Source Charge	$Q_{GS}$			32		
Gate-to-Drain Charge	$Q_{GD}$			21		
Output Charge	$Q_{OSS}$			141		
Sync Charge	$Q_{sync}$			82		
Plateau Voltage	$V_{plateau}$			5		

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

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 10\text{ V}, V_{DS} = 40\text{ V}, I_D = 80\text{ A}, R_G = 6\ \Omega$		30		ns
Rise Time	$t_r$			24		
Turn-Off Delay Time	$t_{d(OFF)}$			69		
Fall Time	$t_f$			31		

## DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 2\text{ A}$		0.7	1.2	V
		$V_{GS} = 0\text{ V}, I_S = 80\text{ A}$		0.8	1.3	
Reverse Recovery Time	$t_{RR}$	$I_F = 40\text{ A}, di/dt = 300\text{ A}/\mu\text{s}$		39	62	ns
Reverse Recovery Charge	$Q_{RR}$			89	142	nC
Reverse Recovery Time	$t_{RR}$	$I_F = 40\text{ A}, di/dt = 1000\text{ A}/\mu\text{s}$		31	50	ns
Reverse Recovery Charge	$Q_{RR}$			209	335	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

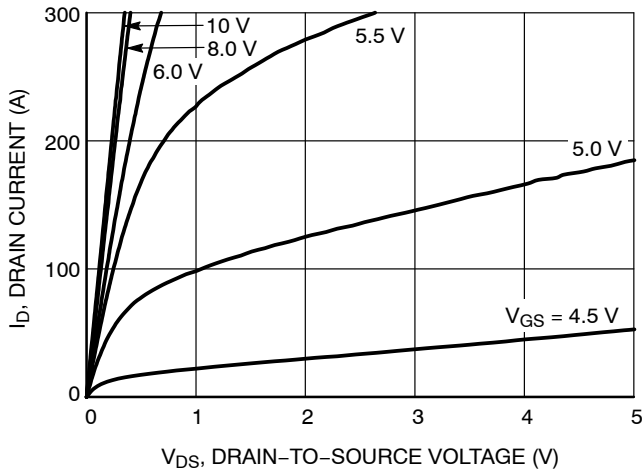


Figure 1. On-Region Characteristics

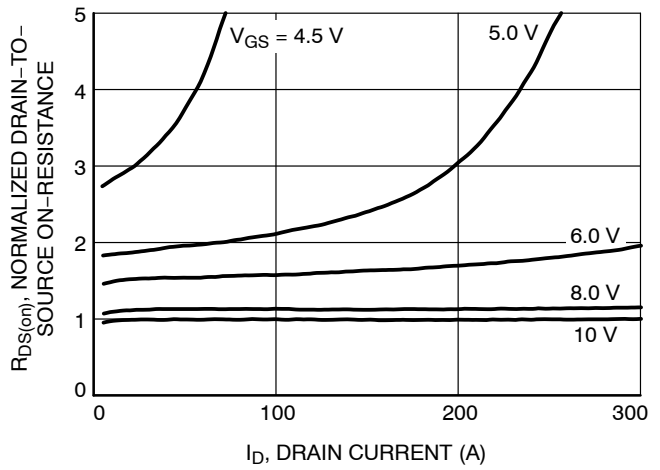


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

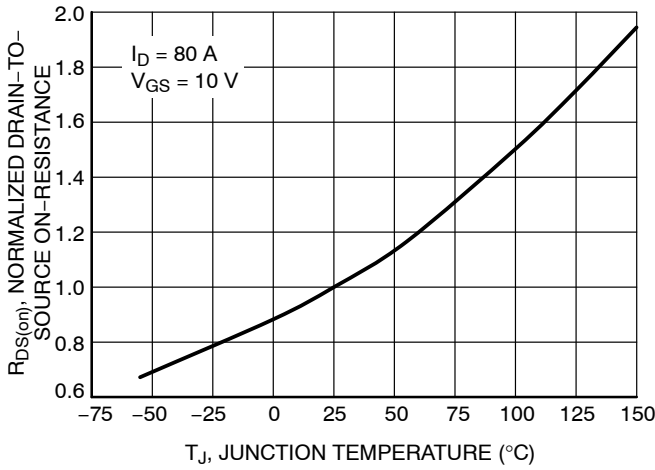


Figure 3. Normalized On Resistance vs. Junction Temperature

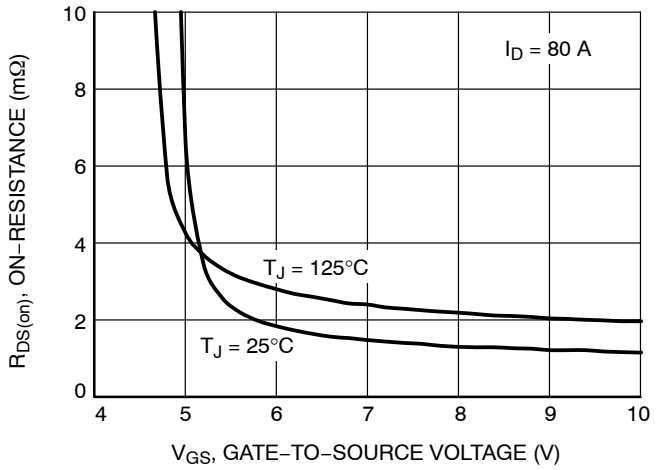


Figure 4. On-Resistance vs. Gate-to-Source Voltage

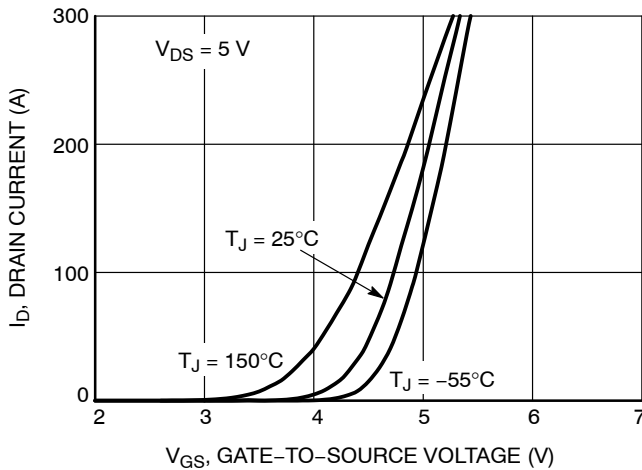


Figure 5. Transfer Characteristics

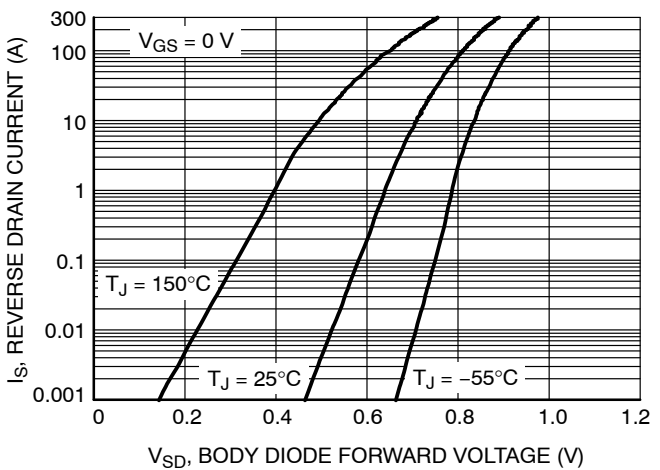


Figure 6. Source-to-Drain Diode Forward Voltage vs. Source Current

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## TYPICAL CHARACTERISTICS

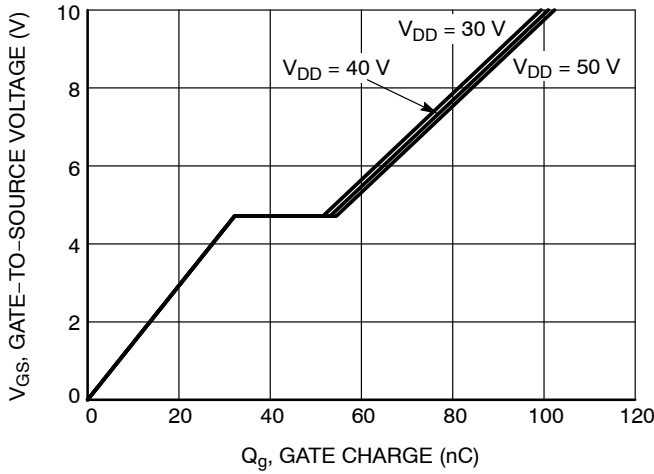


Figure 7. Gate Charge Characteristics

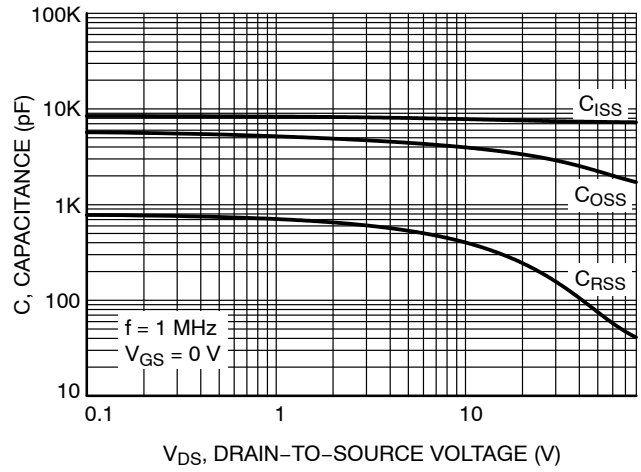


Figure 8. Capacitance vs. Drain-to-Source Voltage

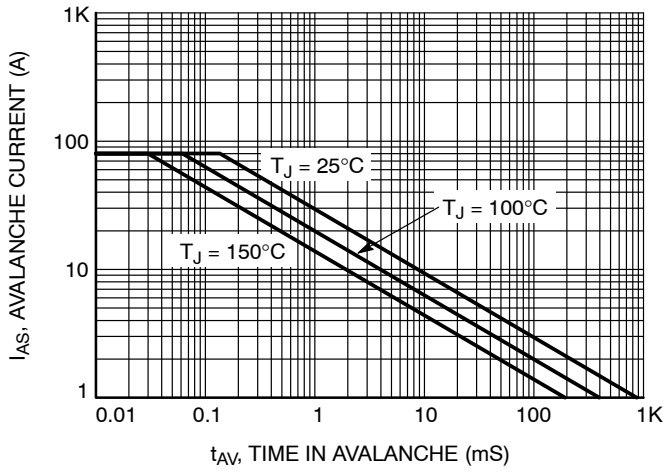


Figure 9. Unclamped Inductive Switching Capability

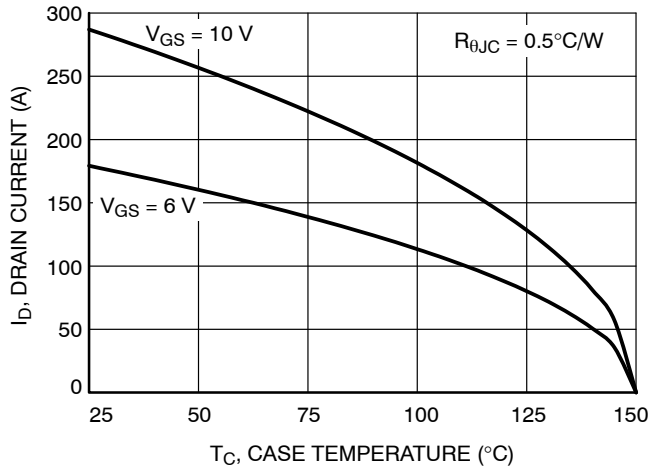


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

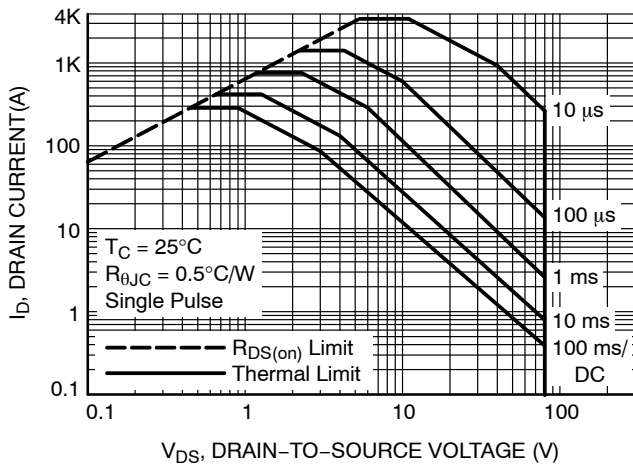


Figure 11. Forward Biased Safe Operating Area

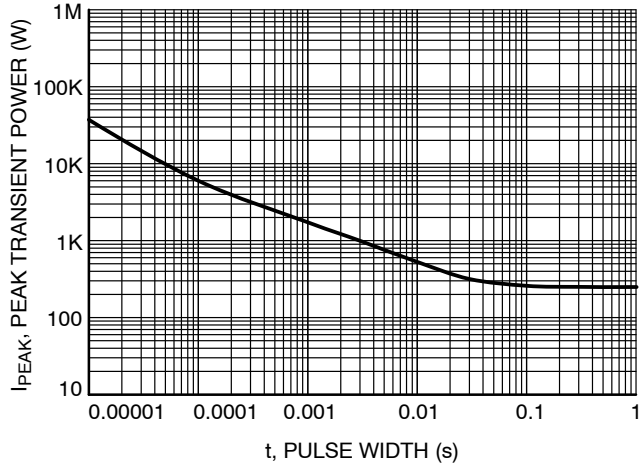


Figure 12. Single Pulse Maximum Power Dissipation

# NTMTSC1D5N08MC

## TYPICAL CHARACTERISTICS

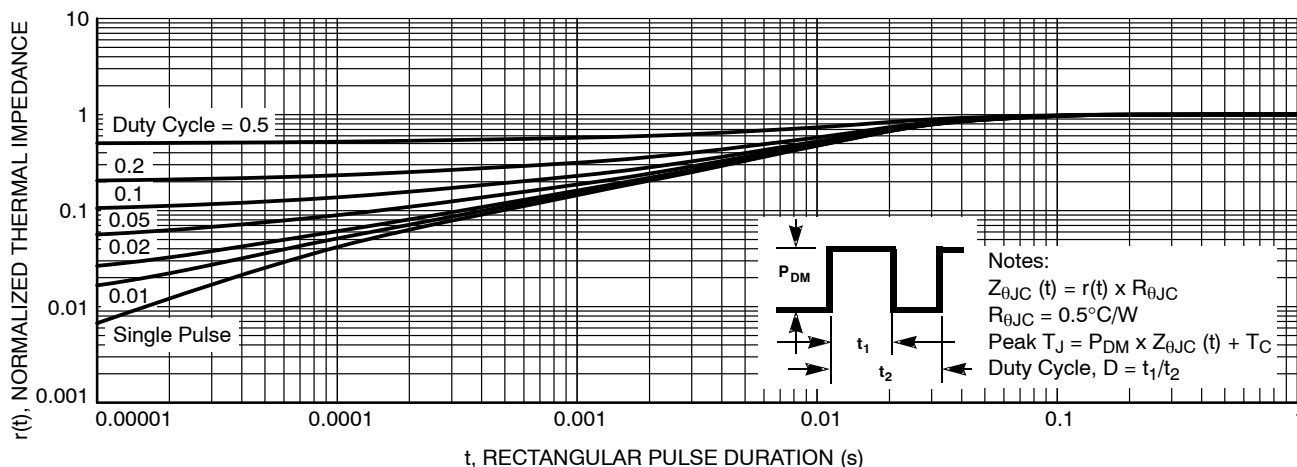


Figure 13. Transient Thermal Impedance

### DEVICE ORDERING INFORMATION

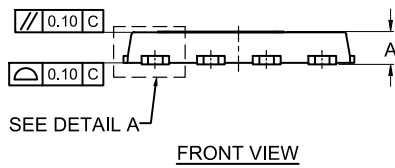
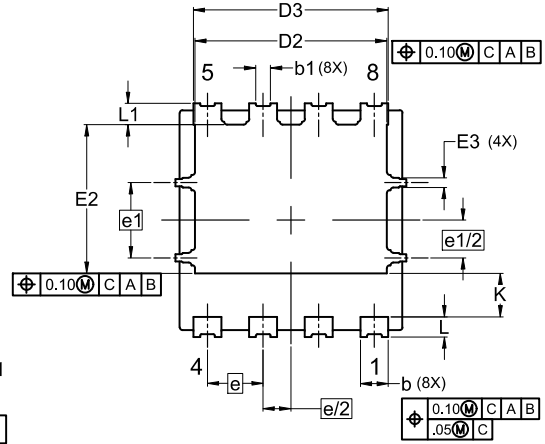
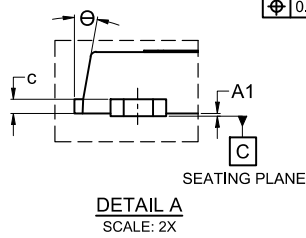
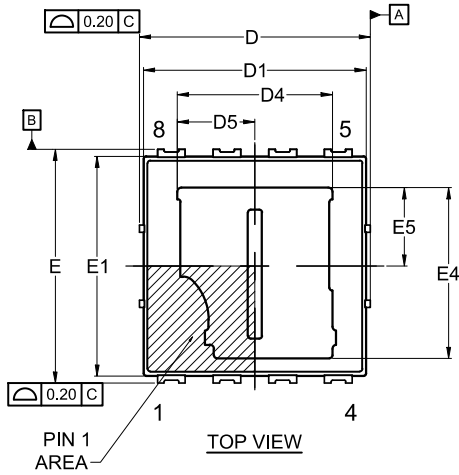
Device	Marking	Package	Shipping†
NTMTSC1D5N08MC	N1D5N08	DFNW8 DUAL COOL (Pb-Free)	3000 / Tape & Reel

†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.

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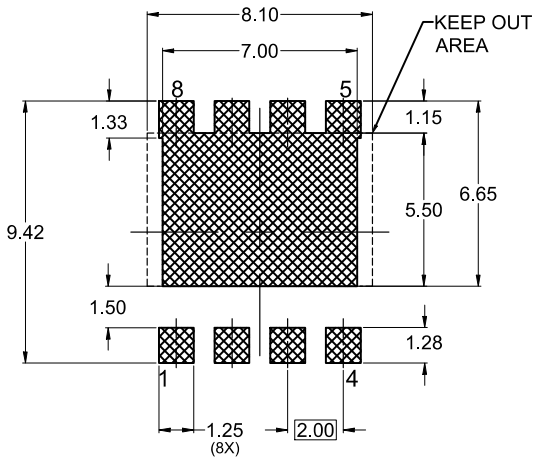
## PACKAGE DIMENSIONS

DFNW8 8.3x8.4, 2P  
CASE 507AS  
ISSUE O



### NOTES:


1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
5. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.



DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.85	0.95	1.05
A1	0.00	—	0.05
b	0.90	1.00	1.10
b1	0.43	0.53	0.63
c	0.23	0.28	0.33
D	8.20	8.30	8.40
D1	7.90	8.00	8.10
D2	6.80	6.90	7.00
D3	6.90	7.00	7.10
D4	5.47	5.57	5.67
D5	2.69	2.79	2.89
E	8.30	8.40	8.50
E1	7.80	7.90	8.00
E2	5.24	5.34	5.44
E3	0.25	0.35	0.45
E4	6.03	6.13	6.23
E5	2.72	2.82	2.92
e	2.00 BSC		
e/2	1.00 BSC		
e1	2.70 BSC		
e1/2	1.35 BSC		
K	1.50	1.57	1.70
L	0.64	0.74	0.84
L1	0.67	0.77	0.87
Θ	0°	—	12°

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