

MOSFET - Power, Single N-Channel

80 V, 1.25 mΩ, 348 A

NVMTSC1D3N08M7

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
- New Power 88 Dual Cool Package
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant
- Wettable Flank Plated Option For Enhanced Optical Inspection

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}	± 20	V
Continuous Drain Current $R_{\theta JCB}$ (Notes 1, 3)	Steady State	$T_C = 25^\circ\text{C}$	I_D 348 A
		$T_C = 100^\circ\text{C}$	246
Power Dissipation $R_{\theta JCB}$ (Note 1)	Steady State	$T_C = 25^\circ\text{C}$	P_D 287 W
		$T_C = 100^\circ\text{C}$	144
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2, 3)	Steady State	$T_A = 25^\circ\text{C}$	I_D 46 A
		$T_A = 100^\circ\text{C}$	33
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)	Steady State	$T_A = 25^\circ\text{C}$	P_D 5.1 W
		$T_A = 100^\circ\text{C}$	2.6
Pulsed Drain Current	$T_A = 25^\circ\text{C}, t_p = 10 \mu\text{s}$	I_{DM} 900	A
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175	$^\circ\text{C}$
Source Current (Body Diode)	I_S	239	A
Single Pulse Drain-to-Source Avalanche Energy ($I_{L(pk)} = 28.2 \text{ A}$)	E_{AS}	2228	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T_L	260	$^\circ\text{C}$

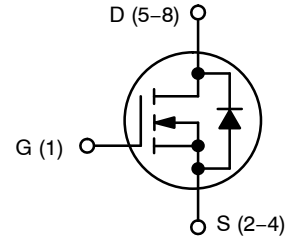
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case Bottom - Steady State	$R_{\theta JCB}$	0.5	$^\circ\text{C}/\text{W}$
Junction-to-Case Top - Steady State	$R_{\theta JCT}$	0.81	$^\circ\text{C}/\text{W}$
Junction-to-Ambient - Steady State (Note 2)	$R_{\theta JA}$	29	$^\circ\text{C}/\text{W}$

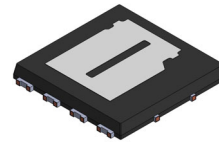
1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface-mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

$V_{(BR)DSS}$	$R_{DS(ON) MAX}$	$I_D MAX$
80 V	1.25 mΩ @ 10 V	348 A

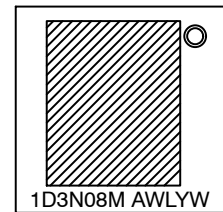


N-CHANNEL MOSFET

MARKING DIAGRAM



TDFNW8
CASE 507AR



1D3N08M = Specific Device Code
A = Assembly Location
WL = 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.

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

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	$V_{(BR)DSS}/T_J$			31.4		mV/°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	μA
			$T_J = 125^\circ\text{C}$		250	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = 20\text{ V}$			100	nA

ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	2.0		4.0	V
Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			-10		mV/°C
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 80\text{ A}$		0.97	1.25	m Ω
Forward Transconductance	g_{FS}	$V_{DS} = 15\text{ V}, I_D = 80\text{ A}$		253		S

CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 40\text{ V}$		14530		pF
Output Capacitance	C_{OSS}			2047		
Reverse Transfer Capacitance	C_{RSS}			106		
Total Gate Charge	$Q_G(TOT)$	$V_{GS} = 10\text{ V}, V_{DS} = 40\text{ V}; I_D = 80\text{ A}$		196		nC
Threshold Gate Charge	$Q_G(TH)$	$V_{GS} = 10\text{ V}, V_{DS} = 40\text{ V}; I_D = 80\text{ A}$		37.3		
Gate-to-Source Charge	Q_{GS}			68.3		
Gate-to-Drain Charge	Q_{GD}			36.4		
Plateau Voltage	V_{GP}			4.82		V

SWITCHING CHARACTERISTICS (Note 5)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 10\text{ V}, V_{DS} = 40\text{ V}, I_D = 80\text{ A}, R_G = 2.5\ \Omega$		39.9		ns
Rise Time	t_r			29.0		
Turn-Off Delay Time	$t_{d(OFF)}$			80.9		
Fall Time	t_f			32.8		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 80\text{ A}$	$T_J = 25^\circ\text{C}$		0.80	1.2	V
			$T_J = 125^\circ\text{C}$		0.68		
Reverse Recovery Time	t_{RR}	$V_{GS} = 0\text{ V}, dI_S/dt = 100\text{ A}/\mu\text{s}, I_S = 80\text{ A}$		80.3		ns	
Charge Time	t_a			50			
Discharge Time	t_b			30			
Reverse Recovery Charge	Q_{RR}			152			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.

4. Pulse Test: pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.

5. Switching characteristics are independent of operating junction temperatures.

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TYPICAL CHARACTERISTICS

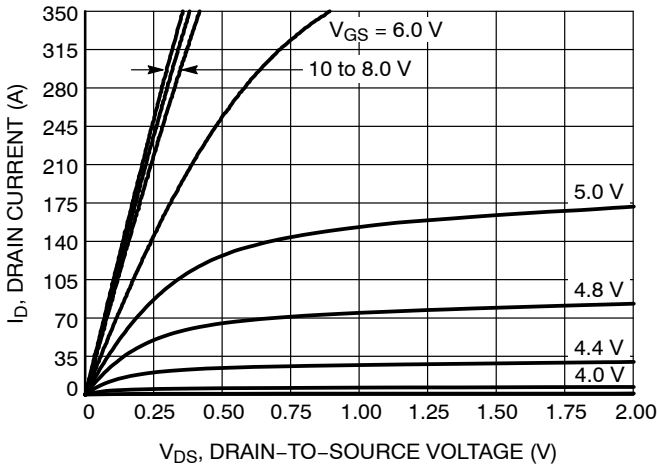


Figure 1. On-Region Characteristics

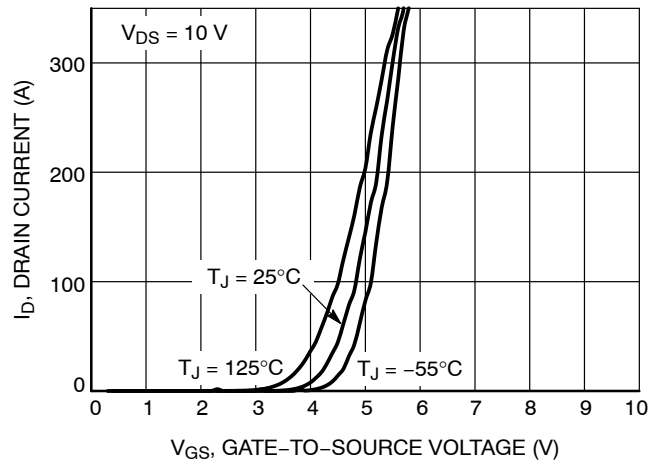


Figure 2. Transfer Characteristics

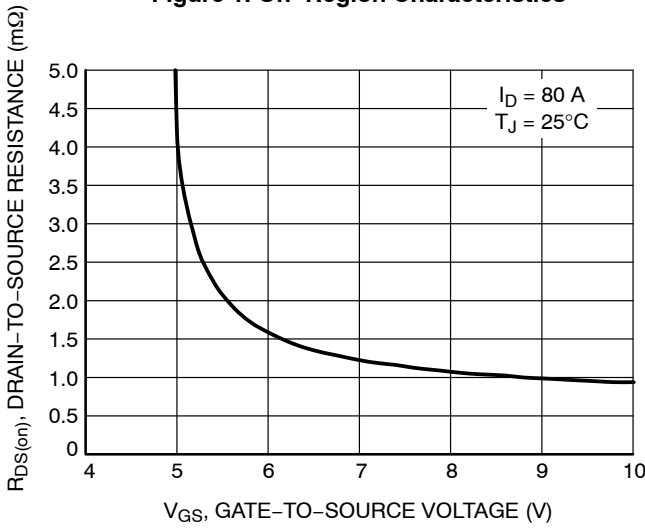


Figure 3. On-Resistance vs. Gate-to-Source Voltage

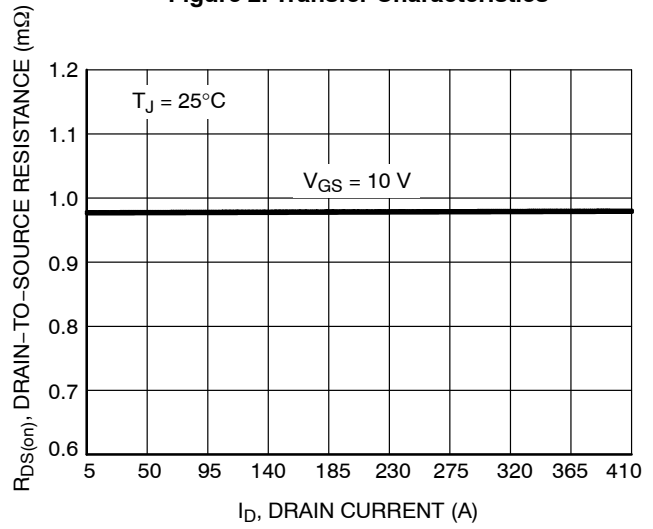


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

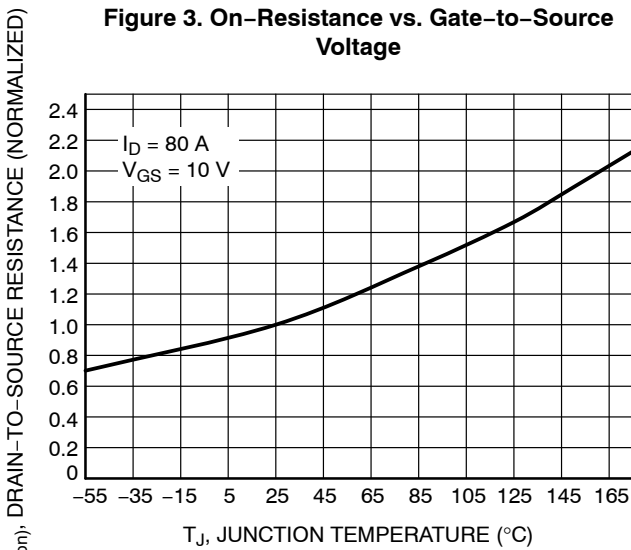


Figure 5. On-Resistance Variation with Temperature

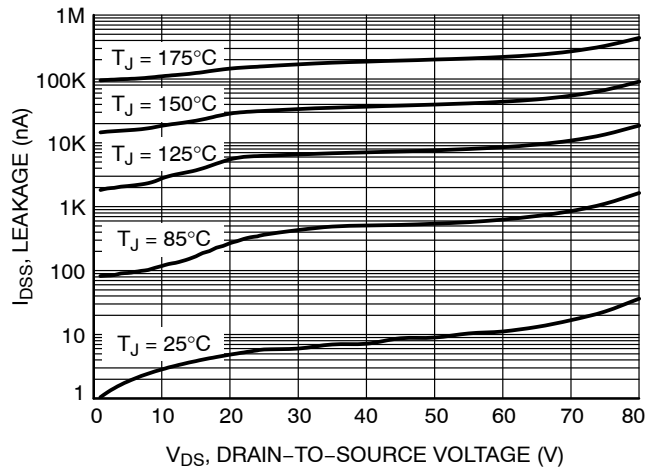


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL CHARACTERISTICS

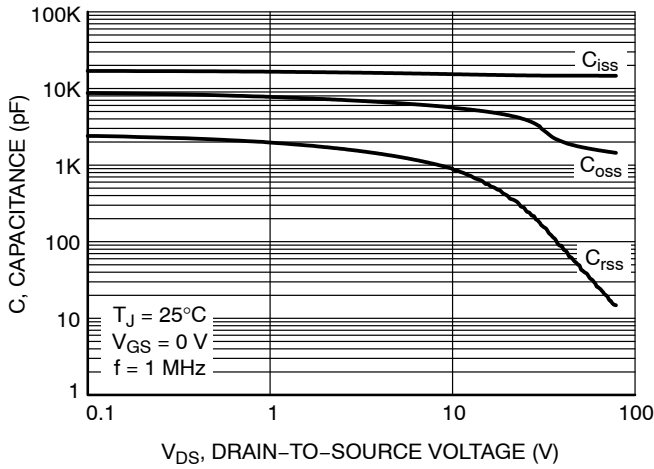


Figure 7. Capacitance Variation

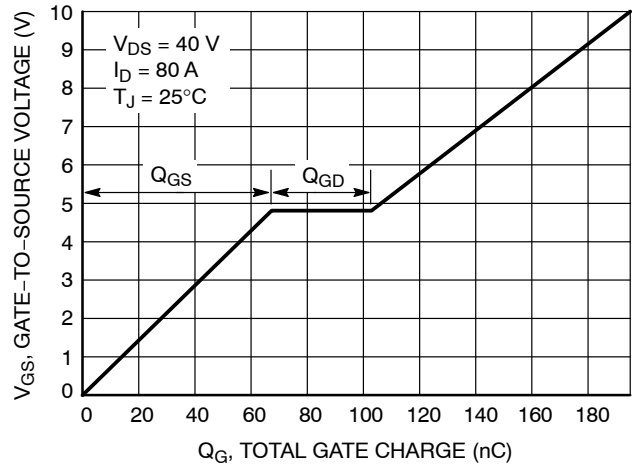


Figure 8. Gate-to-Source vs. Total Charge

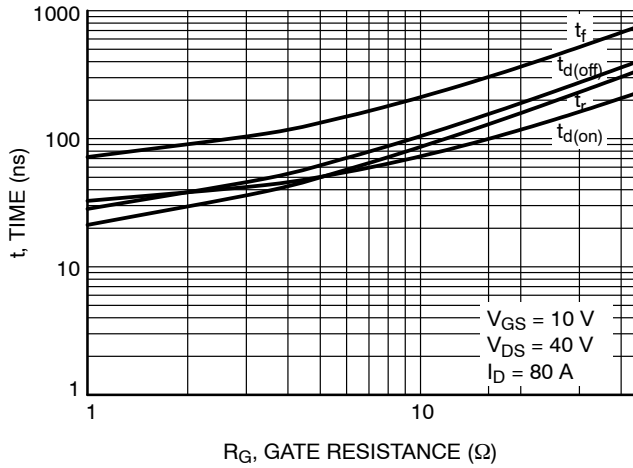


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

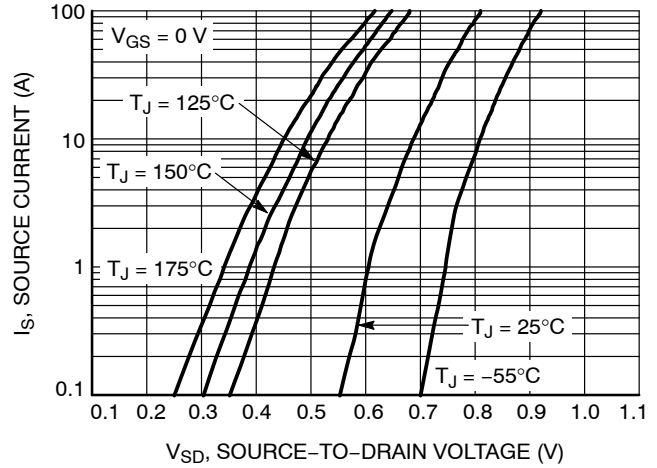


Figure 10. Diode Forward Voltage vs. Current

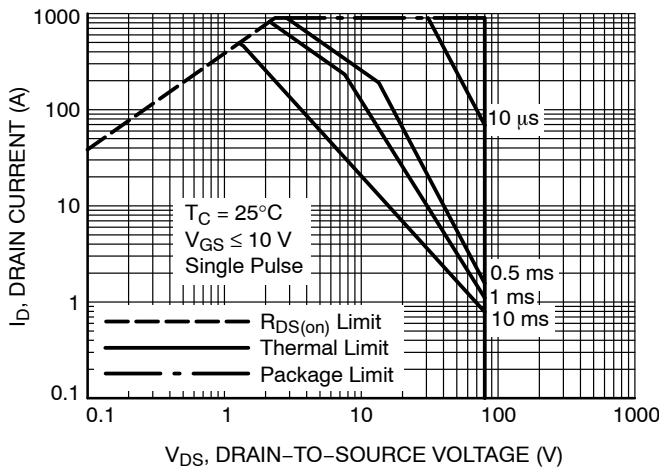


Figure 11. Maximum Rated Forward Biased Safe Operating Area

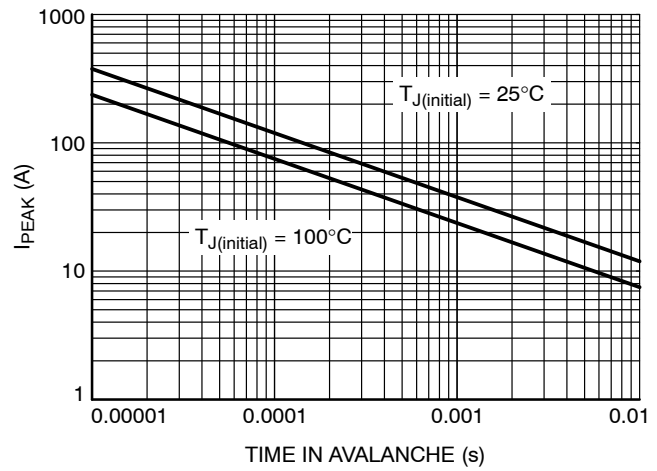


Figure 12. Maximum Drain Current vs. Time in Avalanche

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TYPICAL CHARACTERISTICS

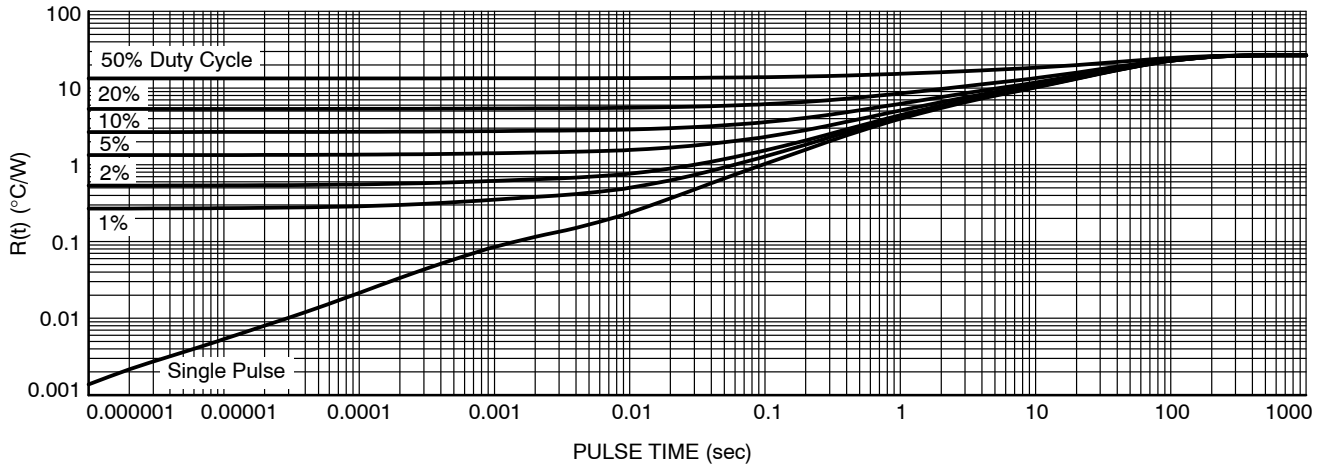
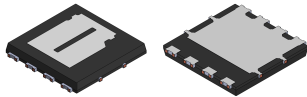


Figure 13. Thermal Response

DEVICE ORDERING INFORMATION

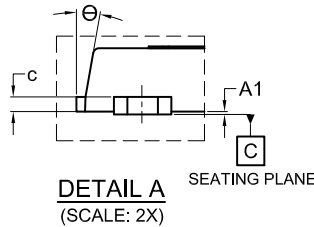
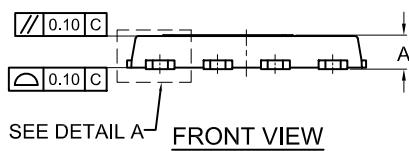
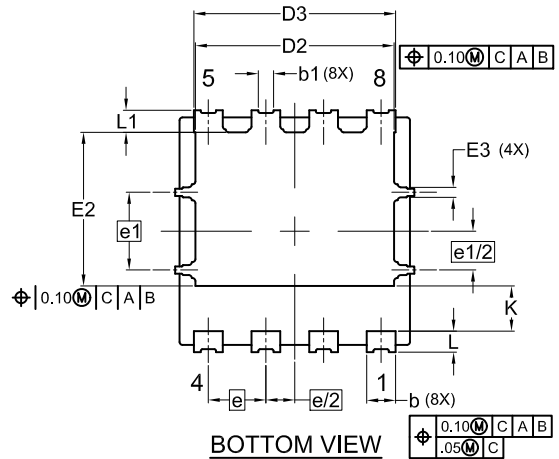
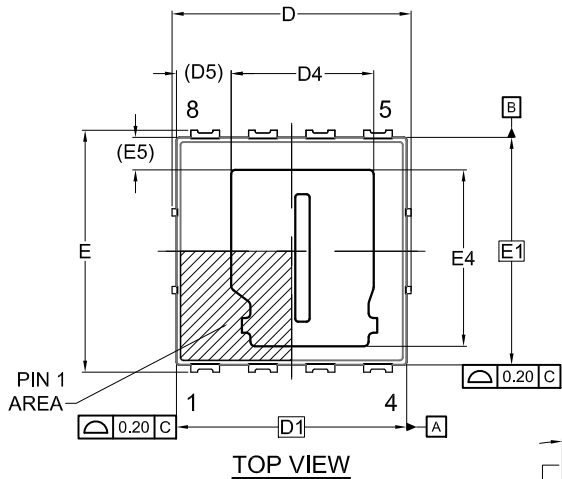
Device	Marking	Package	Shipping [†]
NVMTSC1D3N08M7TXG	1D3N08M	TDFNW8 (Pb-Free)	3000 / Tape & Reel

[†]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.



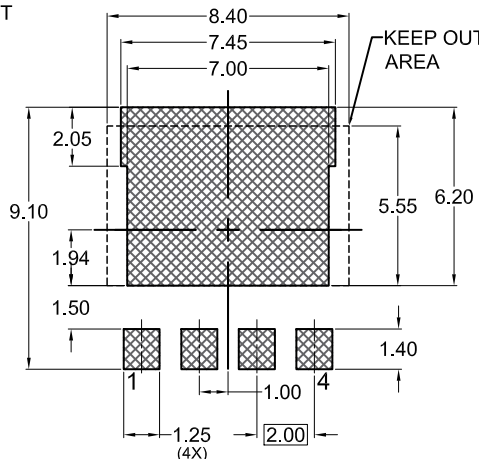
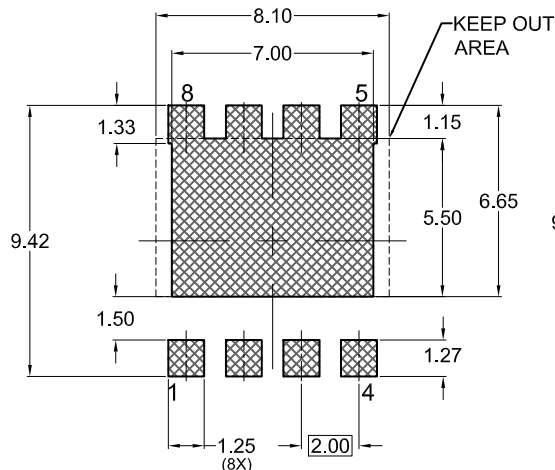
TDFNW8 8.30x8.40x0.92, 2.00P
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ISSUE C

DATE 29 MAY 2024



NOTES:

- DIMENSIONING & TOLERANCING PER ASME Y14.5M, 2009.
- CONTROLLING DIMENSION: MILLIMETERS
- COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
- DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
- 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.



RECOMMENDED LAND PATTERN

UNIVERSAL LAND PATTERN*

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.82	0.92	1.02
A1	0.00	—	0.05
b	0.90	1.00	1.10
b1	0.35	0.45	0.55
c	0.23	0.28	0.33
D	8.20	8.30	8.40
D1	8.00 BSC		
D2	6.80	6.90	7.00
D3	6.90	7.00	7.10
D4	4.90	5.05	5.20
D5	1.85 REF		
E	8.30	8.40	8.50
E1	7.90 BSC		
E2	5.24	5.34	5.44
E3	0.25	0.35	0.45
E4	6.08	6.23	6.38
E5	1.13 REF		
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°

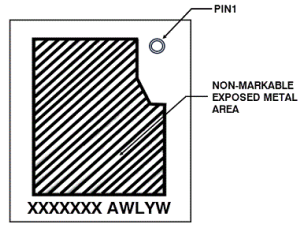
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CASE 507AR
ISSUE C

DATE 29 MAY 2024

**GENERIC
MARKING DIAGRAM***



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

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

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