

MOSFET - Power, Single N-Channel, DFNW8 80 V, 1.56 mΩ, 287 A

NTMTS1D5N08MC

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}	±20	V
Continuous Drain Current R _{θJC} (Note 2)	Steady State	T _C = 25°C	I _D	287	A
Power Dissipation R _{θJC} (Note 2)			P _D	250	W
Continuous Drain Current R _{θJA} (Notes 1, 2)	Steady State	T _A = 25°C	I _D	33	A
Power Dissipation R _{θJA} (Notes 1, 2)			P _D	3.3	W
Pulsed Drain Current	T _C = 25°C, t _p = 10 μs		I _{DM}	3500	A
Operating Junction and Storage Temperature Range			T _J , T _{stg}	-55 to +150	°C
Single Pulse Drain-to-Source Avalanche Energy (I _{L(pk)} = 31 A, L = 3 mH)			E _{AS}	1441	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T _L	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.

THERMAL RESISTANCE MAXIMUM RATINGS

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

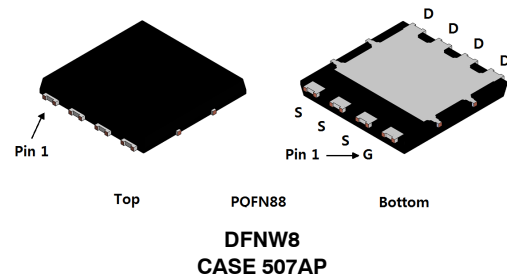
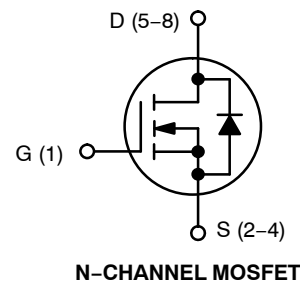
1. Surface-mounted on FR4 board using a 1 in² pad size, 1 oz. Cu pad.
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.



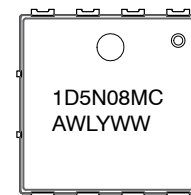
ON Semiconductor®

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



MARKING DIAGRAM



1D5N08MC = Device Code
A = Assembly Location
WL = 2-digit Wafer Lot Code
Y = Year Code
WW = Work Week Code

ORDERING INFORMATION

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

NTMTS1D5N08MC

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	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	80			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = 250\text{ }\mu\text{A}$, ref to 25°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	μA
			$T_J = 125^\circ\text{C}$		250	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 650\text{ }\mu\text{A}$	2.0	3.0	4.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	$I_D = 650\text{ }\mu\text{A}$, ref to 25°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 Ω
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 6\text{ V}, I_D = 58\text{ A}$		1.75	4.0	m Ω
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		Ω

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		V

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

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 10\text{ V}, V_{DS} = 40\text{ V}, I_D = 80\text{ A}, R_G = 6\text{ }\Omega$		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	
Reverse Recovery Time	t_{RR}	$I_F = 40\text{ A}, di/dt = 1000\text{ A}/\mu\text{s}$		31	50	nC
Reverse Recovery Charge	Q_{RR}			209	335	

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

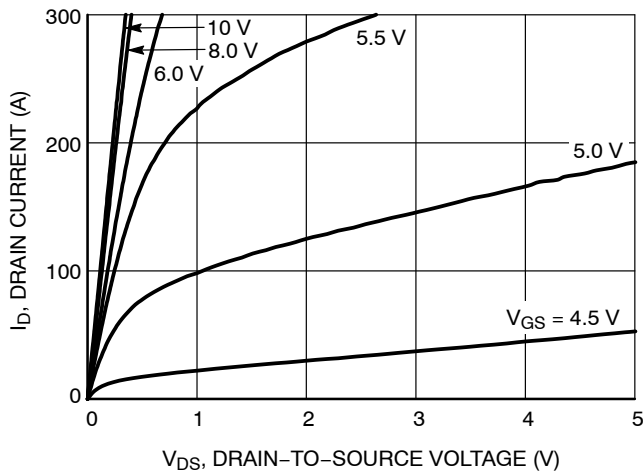


Figure 1. On-Region Characteristics

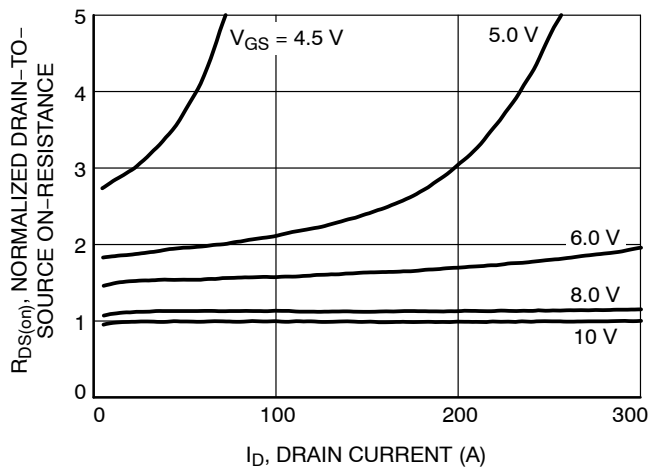


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

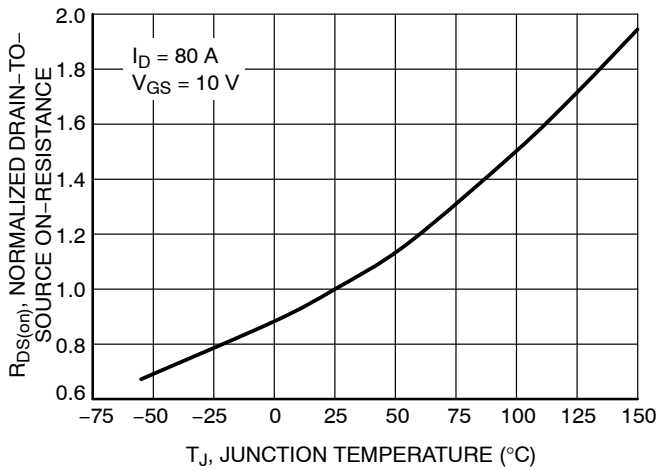


Figure 3. Normalized On Resistance vs. Junction Temperature

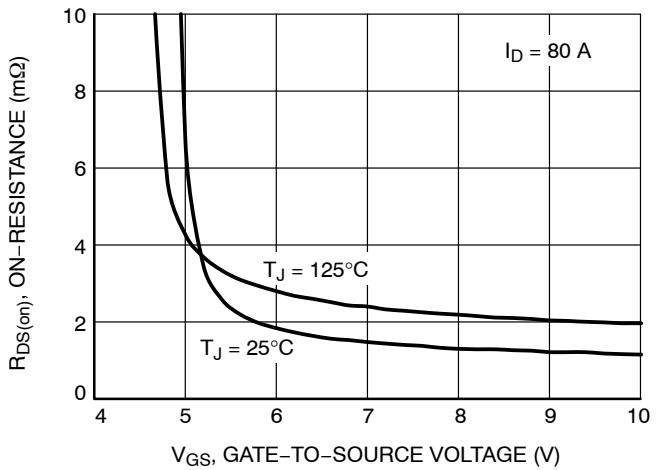


Figure 4. On-Resistance vs. Gate-to-Source Voltage

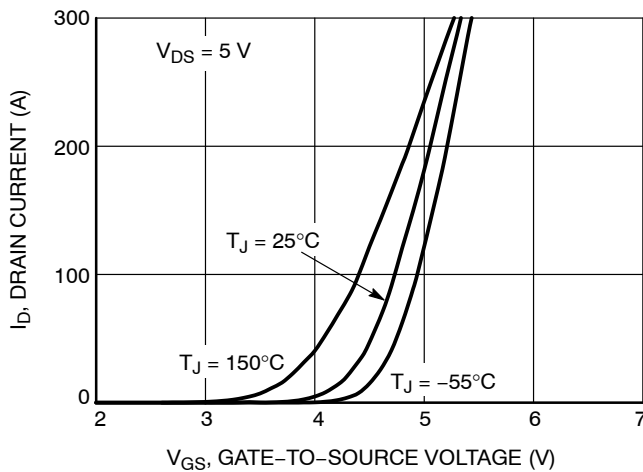


Figure 5. Transfer Characteristics

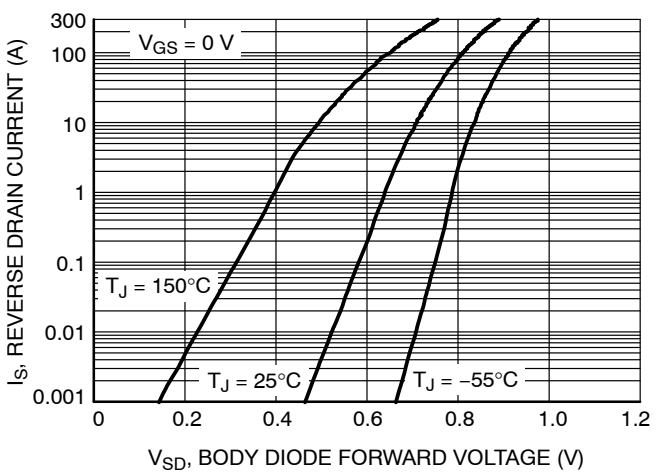


Figure 6. Source-to-Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS

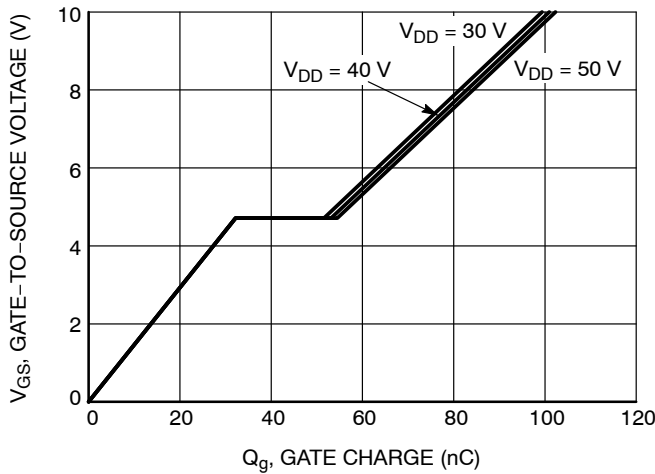


Figure 7. Gate Charge Characteristics

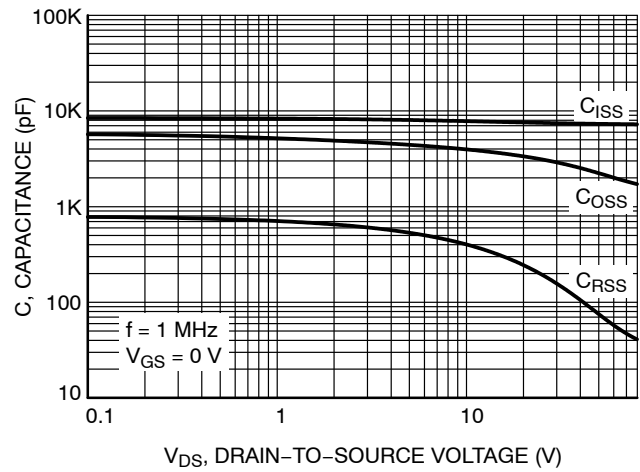


Figure 8. Capacitance vs. Drain-to-Source Voltage

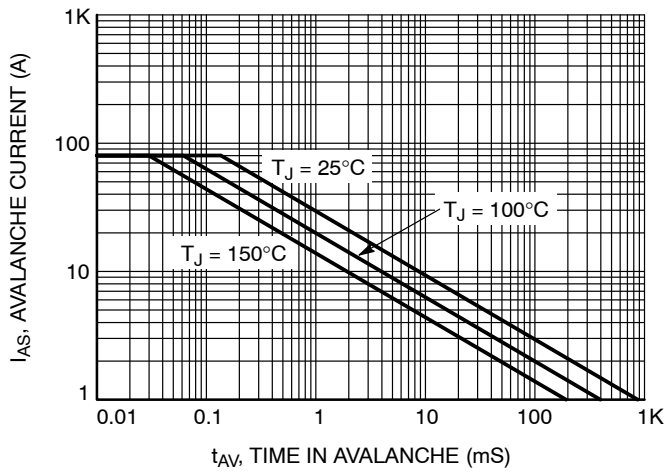


Figure 9. Unclamped Inductive Switching Capability

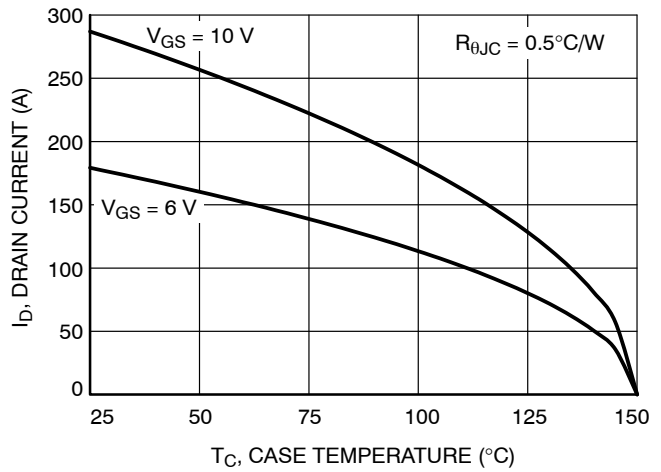


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

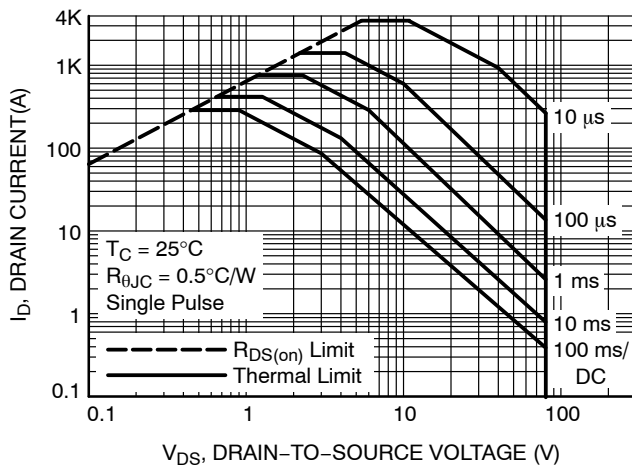


Figure 11. Forward Biased Safe Operating Area

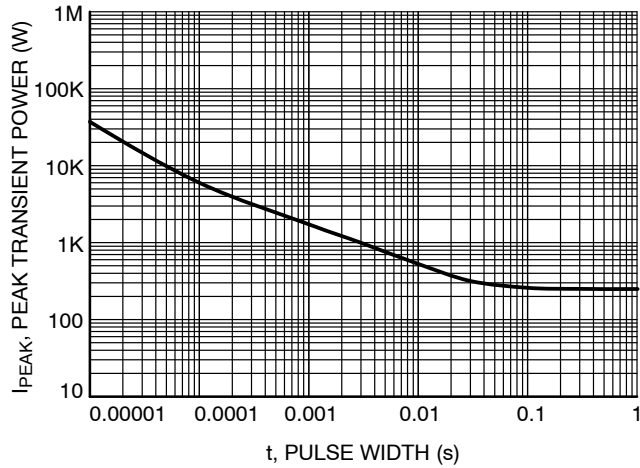


Figure 12. Single Pulse Maximum Power Dissipation

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TYPICAL CHARACTERISTICS

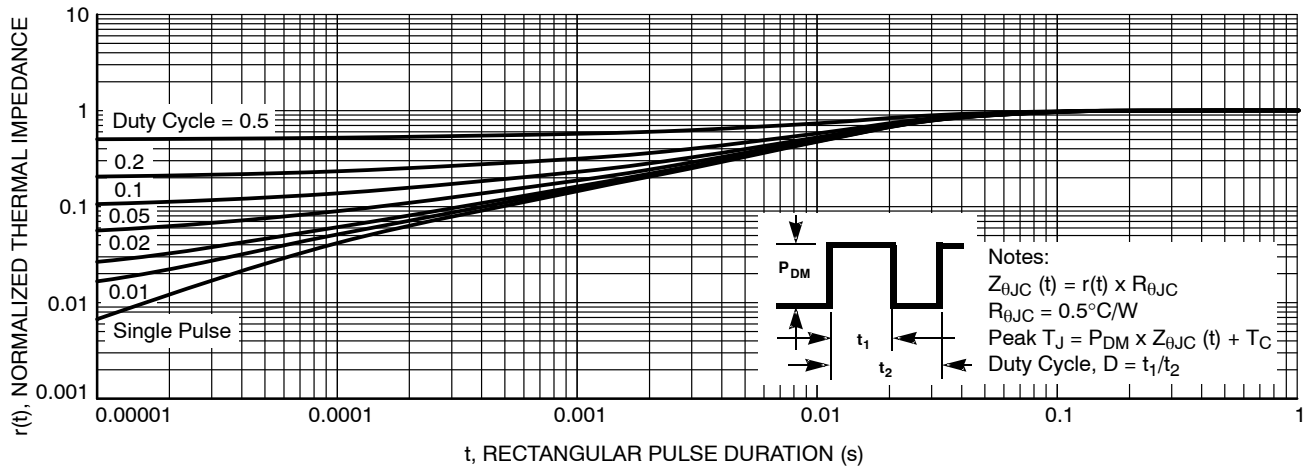


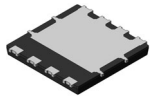
Figure 13. Transient Thermal Impedance

DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping†
NTMTS1D5N08MC	NTMTS 1D5N08MC	DFNW8 (Pb-Free)	3000 / Tape & Reel

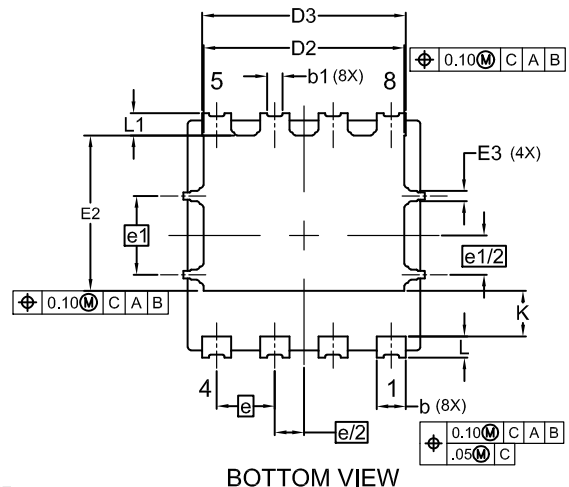
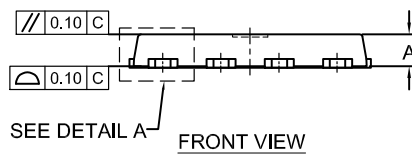
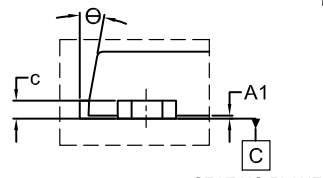
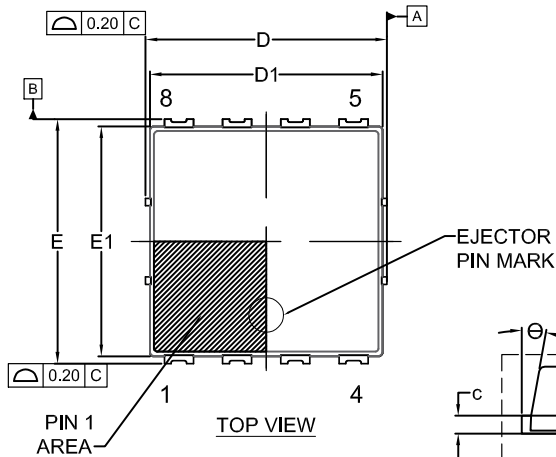
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



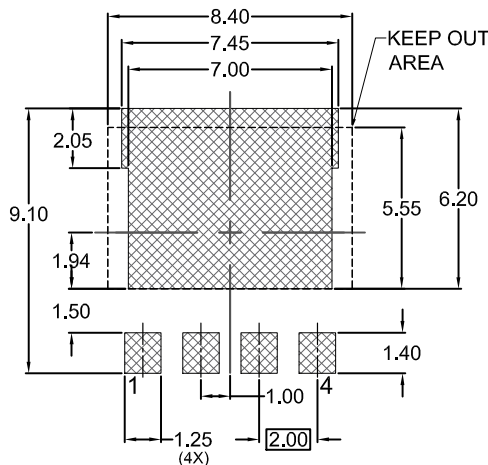
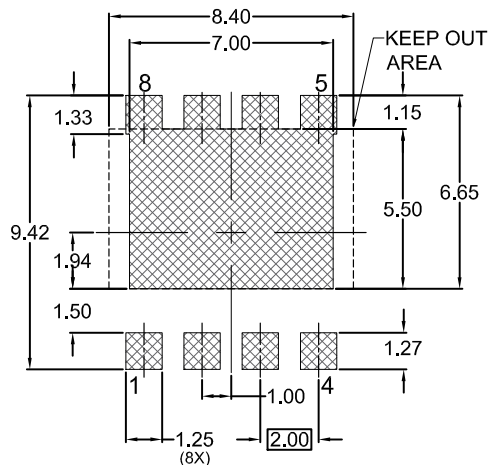
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CASE 507AP
ISSUE E

DATE 08 MAY 2024



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.



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

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	1.00	1.10	1.20
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	7.90	8.00	8.10
D2	6.80	6.90	7.00
D3	6.90	7.00	7.10
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
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°

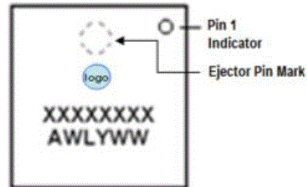
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CASE 507AP
ISSUE E

DATE 08 MAY 2024

**GENERIC
MARKING DIAGRAM***



XXXX = Specific Device Code
A = Assembly Location
WL = Wafer Lot Code
Y = Year Code
WW = 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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