

MOSFET – Power, Single, N-Channel

60 V, 0.81 mΩ, 398.2 A

NTMTS001N06CL

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
- Power 88 Package, Industry Standard
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V _{DSS}	60	V
Gate-to-Source Voltage		V _{GS}	±20	V
Continuous Drain Current R _{θJC} (Notes 1, 3)	Steady State	T _C = 25°C	I _D	398.2
		T _C = 100°C		281.6
Power Dissipation R _{θJC} (Note 1)	Steady State	T _C = 25°C	P _D	244
		T _C = 100°C		122
Continuous Drain Current R _{θJA} (Notes 1, 2, 3)	Steady State	T _A = 25°C	I _D	56.9
		T _A = 100°C		40.2
Power Dissipation R _{θJA} (Notes 1, 2)	Steady State	T _A = 25°C	P _D	5.0
		T _A = 100°C		2.5
Pulsed Drain Current	T _A = 25°C, t _p = 10 µs	I _{DM}	900	A
Operating Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +175	°C
Source Current (Body Diode)		I _S	203.4	A
Single Pulse Drain-to-Source Avalanche Energy (I _{L(pk)} = 30 A)		E _{AS}	887	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T _L	260	°C

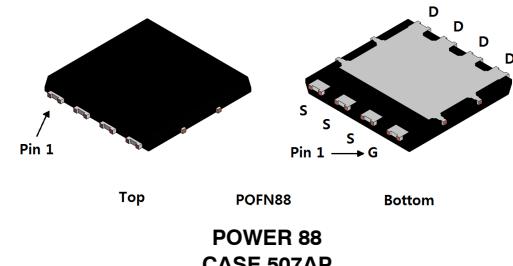
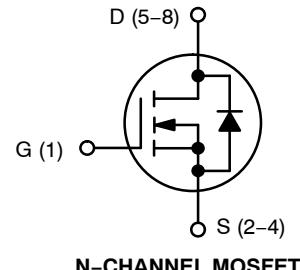
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE MAXIMUM RATINGS

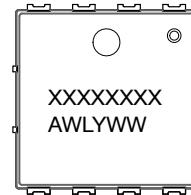
Parameter	Symbol	Value	Unit
Junction-to-Case – Steady State	R _{θJC}	0.614	°C/W
Junction-to-Ambient – Steady State (Note 2)	R _{θJA}	30.1	

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}
60 V	0.81 mΩ @ 10 V	398.2 A
	1.05 mΩ @ 4.5 V	



MARKING DIAGRAM



XXX = Device Code
(8 A–N characters max)
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.

NTMTS001N06CL

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	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0 \text{ V}, I_D = 250 \mu\text{A}$		60	—	—	V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(\text{BR})\text{DSS}}/T_J$	$I_D = 250 \mu\text{A}$, ref to 25°C		—	25	—	$\text{mV}/^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{GS}} = 0 \text{ V}$, $V_{\text{DS}} = 60 \text{ V}$	$T_J = 25^\circ\text{C}$	—	—	10	μA
			$T_J = 125^\circ\text{C}$	—	—	250	
Gate-to-Source Leakage Current	I_{GSS}	$V_{\text{DS}} = 0 \text{ V}, V_{\text{GS}} = 20 \text{ V}$		—	—	100	nA

ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage	$V_{\text{GS}(\text{TH})}$	$V_{\text{GS}} = V_{\text{DS}}, I_D = 250 \mu\text{A}$		1.2	—	2.2	V
Threshold Temperature Coefficient	$V_{\text{GS}(\text{TH})}/T_J$	$I_D = 250 \mu\text{A}$, ref to 25°C		—	—5.53	—	$\text{mV}/^\circ\text{C}$
Drain-to-Source On Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 10 \text{ V}$	$I_D = 50 \text{ A}$	—	0.73	0.81	$\text{m}\Omega$
Drain-to-Source On Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 4.5 \text{ V}$	$I_D = 50 \text{ A}$	—	0.94	1.05	$\text{m}\Omega$
Forward Transconductance	g_{FS}	$V_{\text{DS}} = 15 \text{ V}, I_D = 50 \text{ A}$		—	275	—	S

CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	C_{ISS}	$V_{\text{GS}} = 0 \text{ V}, f = 1 \text{ MHz}, V_{\text{DS}} = 25 \text{ V}$	—	12300	—	pF
Output Capacitance	C_{OSS}		—	6225	—	
Reverse Transfer Capacitance	C_{RSS}		—	130	—	
Total Gate Charge	$Q_{\text{G}(\text{TOT})}$	$V_{\text{GS}} = 10 \text{ V}, V_{\text{DS}} = 30 \text{ V}; I_D = 50 \text{ A}$	—	165	—	nC
Total Gate Charge	$Q_{\text{G}(\text{TOT})}$	$V_{\text{GS}} = 4.5 \text{ V}, V_{\text{DS}} = 30 \text{ V}; I_D = 50 \text{ A}$	—	74.3	—	nC
			—	15.6	—	
			—	28.7	—	
			—	14.7	—	
			—	2.59	—	V

SWITCHING CHARACTERISTICS (Note 5)

Turn-On Delay Time	$t_{\text{d}(\text{ON})}$	$V_{\text{GS}} = 4.5 \text{ V}, V_{\text{DS}} = 30 \text{ V}, I_D = 50 \text{ A}, R_G = 2.5 \Omega$	—	47.2	—	ns
Rise Time	t_r		—	25.2	—	
Turn-Off Delay Time	$t_{\text{d}(\text{OFF})}$		—	70.7	—	
Fall Time	t_f		—	23.3	—	

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{\text{GS}} = 0 \text{ V}, I_S = 50 \text{ A}$	$T_J = 25^\circ\text{C}$	—	0.77	1.2	V
			$T_J = 125^\circ\text{C}$	—	0.63	—	
Reverse Recovery Time	t_{RR}	$V_{\text{GS}} = 0 \text{ V}, dI_S/dt = 100 \text{ A}/\mu\text{s}, I_S = 50 \text{ A}$	—	98.9	—	ns	
Charge Time	t_a		—	66.8	—		
Discharge Time	t_b		—	32.1	—		
Reverse Recovery Charge	Q_{RR}		—	229	—	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.

TYPICAL CHARACTERISTICS

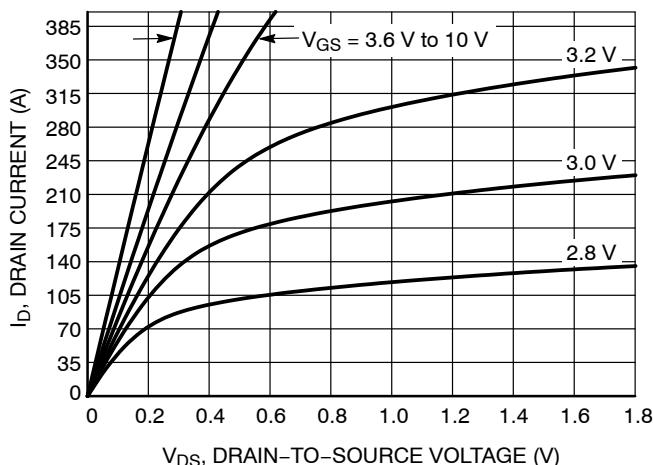


Figure 1. On-Region Characteristics

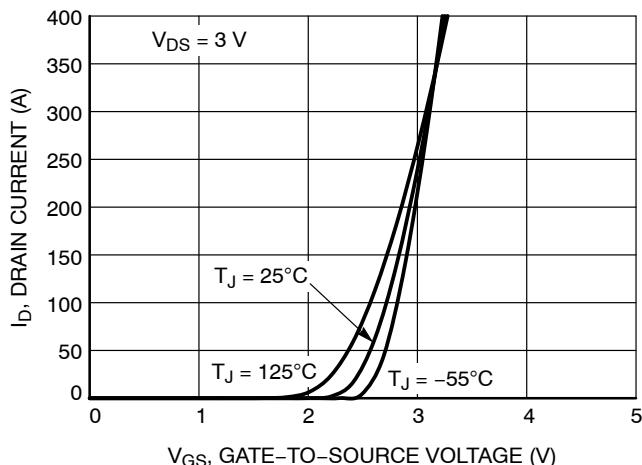


Figure 2. Transfer Characteristics

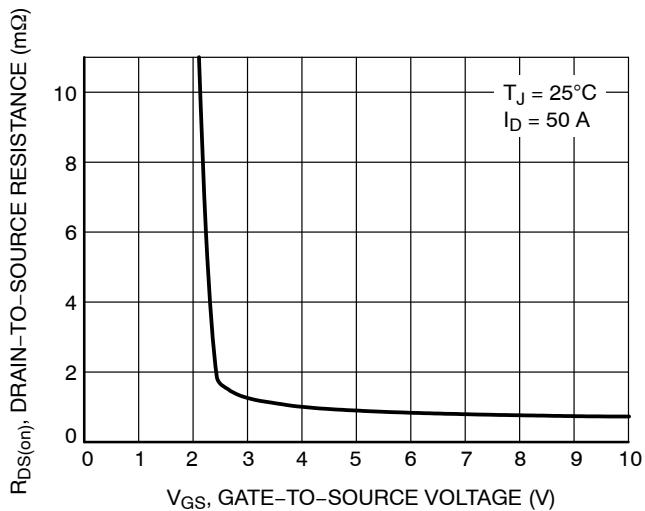


Figure 3. On-Resistance vs. Gate-to-Source Voltage

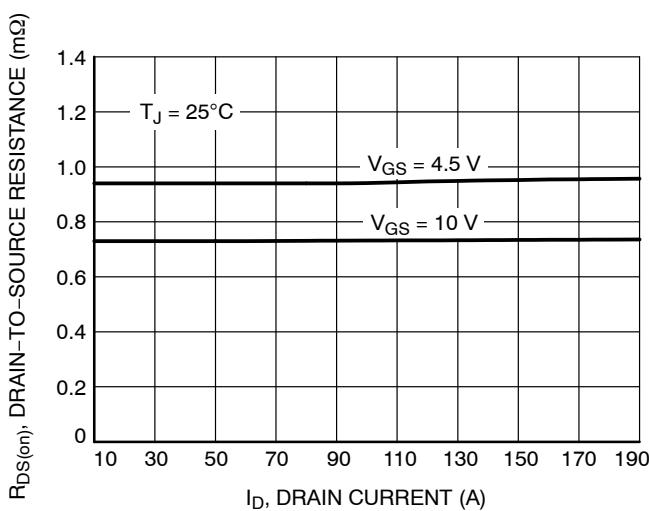


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

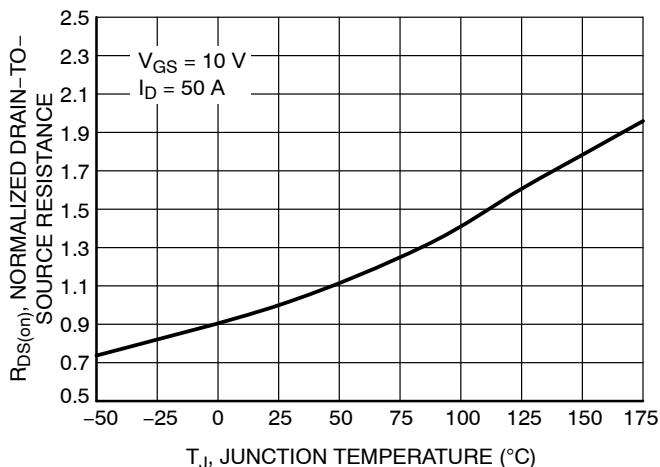


Figure 5. On-Resistance Variation with Temperature

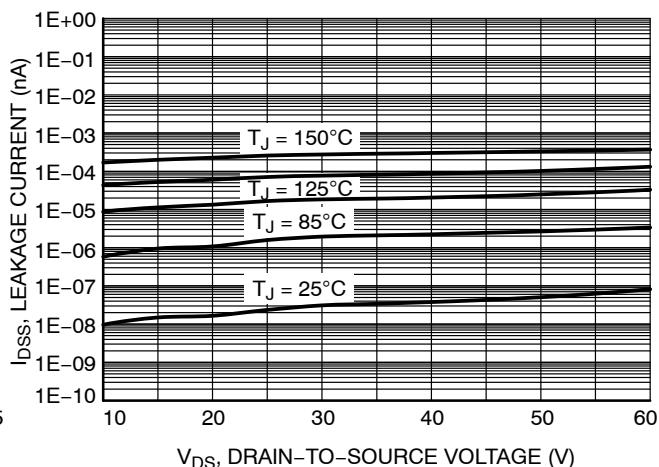


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

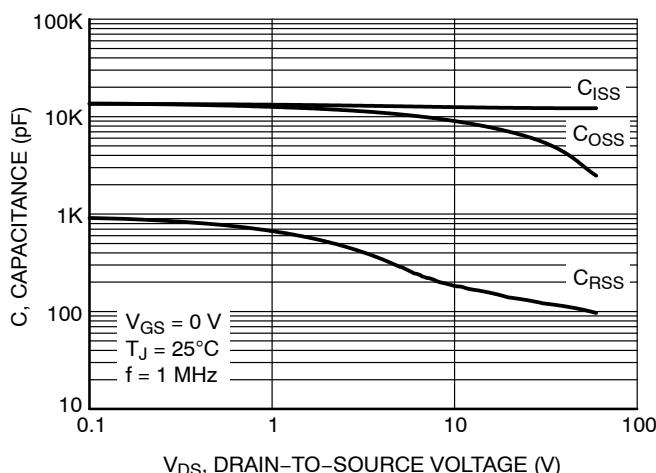


Figure 7. Capacitance Variation

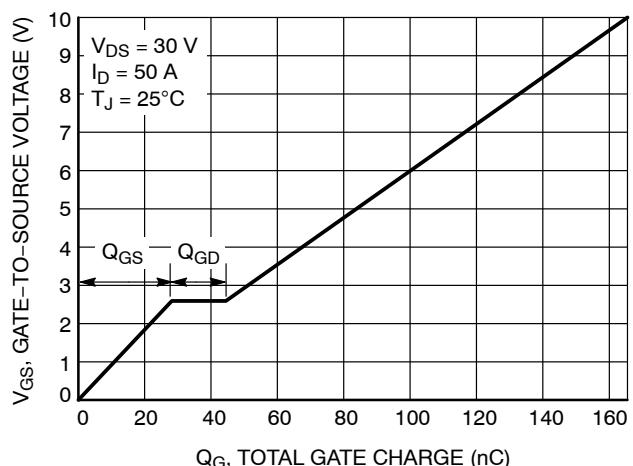


Figure 8. Gate-to-Source Voltage vs. Total Charge

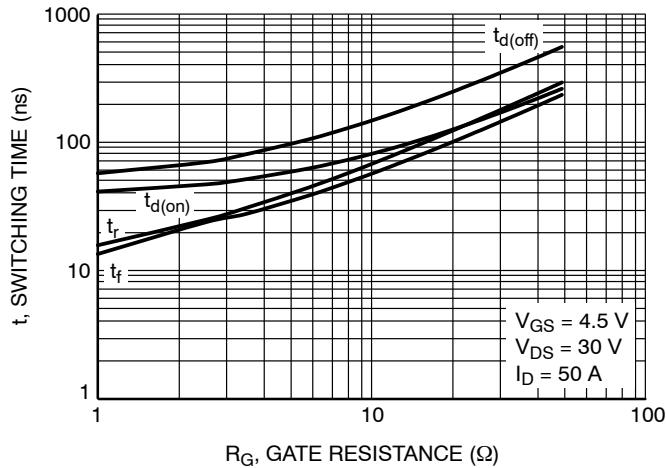


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

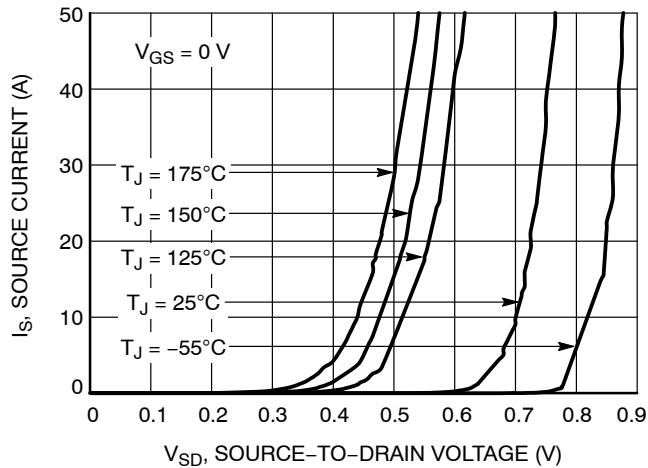


Figure 10. Diode Forward Voltage vs. Current

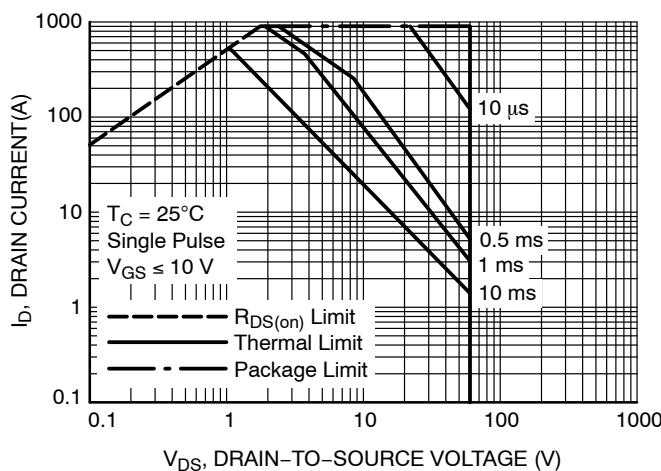
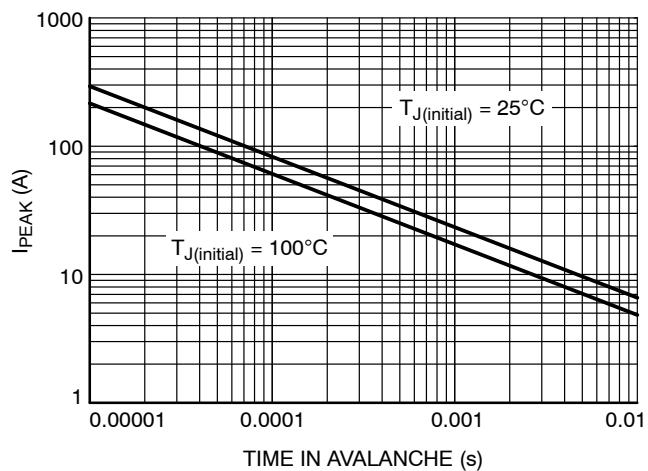


Figure 11. Maximum Rated Forward Biased Safe Operating Area

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

TYPICAL CHARACTERISTICS

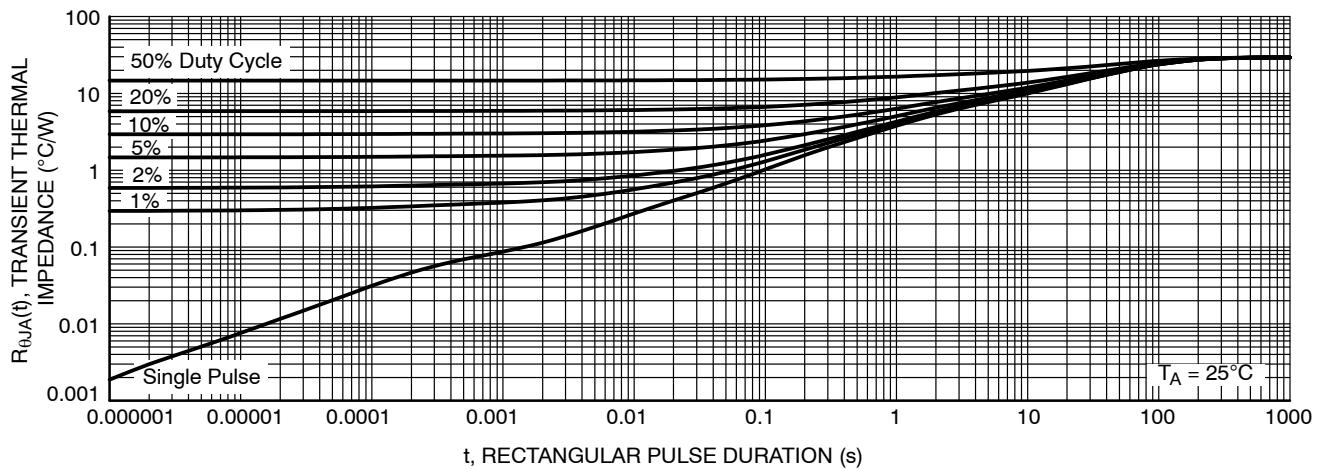


Figure 13. Thermal Response

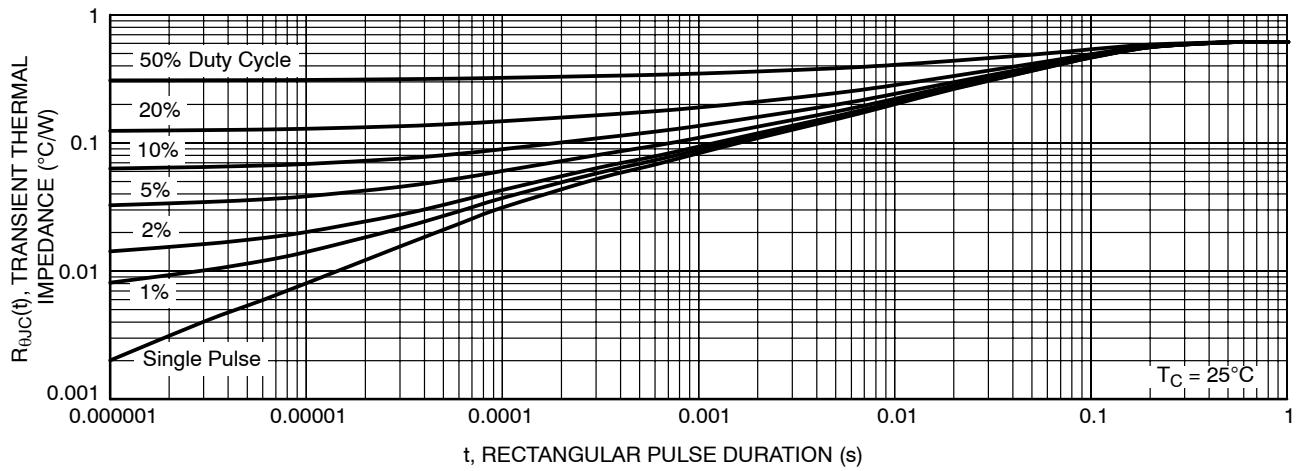
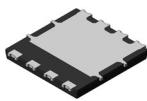


Figure 14. Thermal Response

DEVICE ORDERING INFORMATION

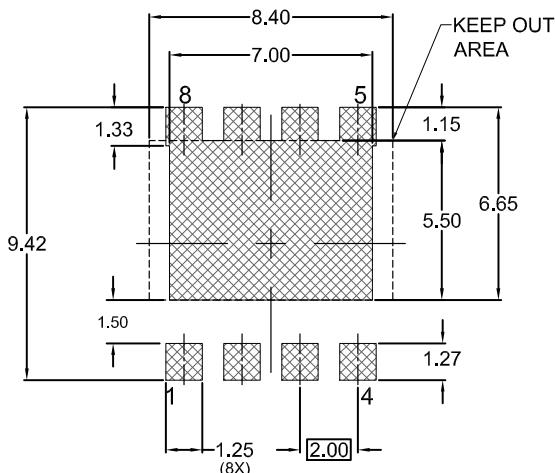
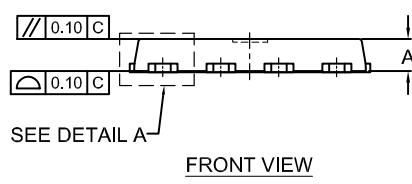
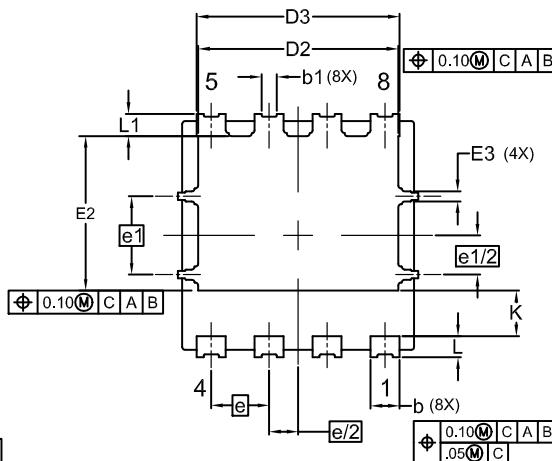
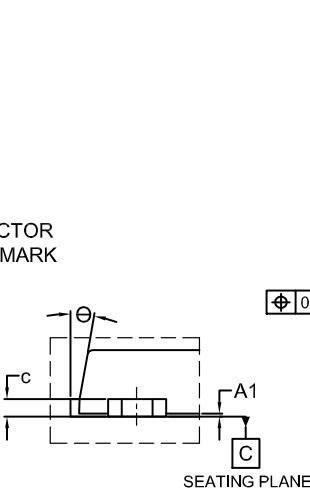
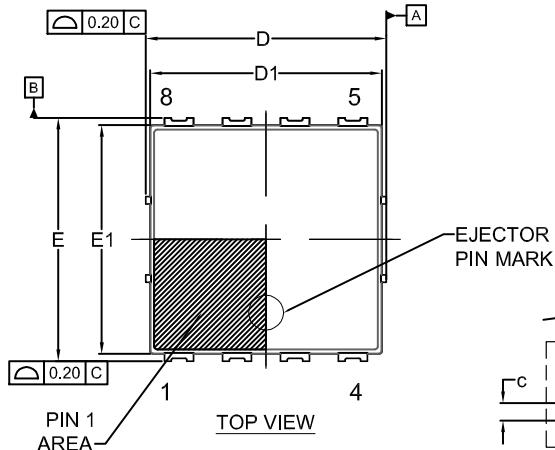
Device	Marking	Package	Shipping [†]
NTMTS001N06CLTXG	001N06CL	POWER 88 (Pb-Free)	3,000 / Tape & Reel

[†]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.

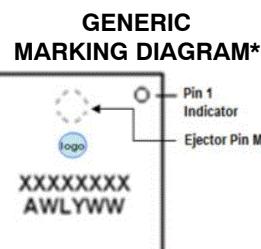


TDFNW8 8.3x8.4, 2.0P, SINGLE COOL
CASE 507AP
ISSUE D

DATE 29 MAR 2021



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



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.

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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