

# MOSFET - Power, Single N-Channel, TDFNW8

## 100 V, 4.2 mΩ, 178 A

### NTMTSC4D2N10G

#### Features

- Wide SOA for Linear Mode Operation
- Low  $R_{DS(on)}$  to Minimize Conduction Losses
- High Peak UIS Current Capability for Ruggedness
- Small Footprint (8x8 mm) & Top Metal Cooling
- These Devices are Pb-Free, Halogen-Free / BFR-Free and are RoHS Compliant

#### Typical Applications

- 48 V Hot Swap System, Load Switch, Soft-Start, E-Fuse

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

Parameter	Symbol	Value	Unit	
Drain-to-Source Voltage	$V_{DSS}$	100	V	
Gate-to-Source Voltage	$V_{GS}$	$\pm 20$	V	
Continuous Drain Current $R_{\theta JC}$ (Note 2)	Steady State	$T_C = 25^\circ\text{C}$	$I_D$ 178	A
		$T_C = 100^\circ\text{C}$	125	
Power Dissipation $R_{\theta JC}$ (Note 2)	Steady State	$T_C = 25^\circ\text{C}$	$P_D$ 267	W
		$T_C = 100^\circ\text{C}$	133	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)	Steady State	$T_A = 25^\circ\text{C}$	$I_D$ 21	A
		$T_A = 100^\circ\text{C}$	15	
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)	Steady State	$T_A = 25^\circ\text{C}$	$P_D$ 3.9	W
		$T_A = 100^\circ\text{C}$	1.9	
Pulsed Drain Current	$T_A = 25^\circ\text{C}, t_p = 10 \mu\text{s}$	$I_{DM}$ 2558	A	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +175	$^\circ\text{C}$	
Source Current (Body Diode)	$I_S$	222	A	
Single Pulse Drain-to-Source Avalanche Energy ( $I_{L(pk)} = 100 \text{ A}, L = 0.1 \text{ mH}$ )	$E_{AS}$	506	mJ	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	$T_L$	260	$^\circ\text{C}$	

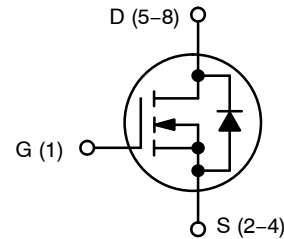
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

#### THERMAL RESISTANCE MAXIMUM RATINGS

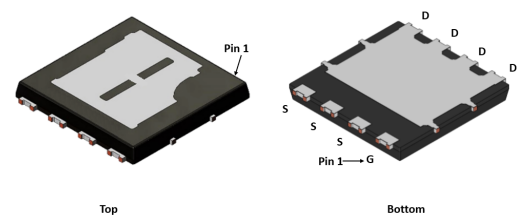
Parameter	Symbol	Value	Unit
Junction-to-Case - Steady State (Note 2)	$R_{\theta JC}$	0.56	$^\circ\text{C}/\text{W}$
Junction-to-Top Source - Steady State (Note 2)	$R_{\theta JC}$	0.86	
Junction-to-Ambient - Steady State (Note 2)	$R_{\theta JA}$	38	

1. Surface-mounted on FR4 board using a 1 in<sup>2</sup>, 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.

$V_{(BR)DSS}$	$R_{DS(ON) MAX}$	$I_D MAX$
100 V	4.2 mΩ @ 10 V	178 A

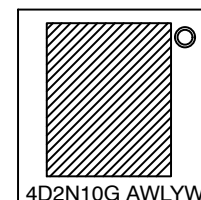


N-CHANNEL MOSFET



TDFNW8  
DUAL COOL  
CASE 507AS

#### MARKING DIAGRAM



4D2N10G = 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.

# NTMTSC4D2N10G

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	100			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> /T <sub>J</sub>	I <sub>D</sub> = 250 μA, ref to 25°C		84.1		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 80 V	T <sub>J</sub> = 25°C		1.0	μA
			T <sub>J</sub> = 150°C		100	
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			±100	nA

### ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 450 μA	2.0		4.0	V
Negative Threshold Temperature Coefficient	V <sub>GS(TH)</sub> /T <sub>J</sub>	I <sub>D</sub> = 450 μA, ref to 25°C		-9.24		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 88 A		2.9	4.2	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 88 A		61		S
Gate Resistance	R <sub>G</sub>	T <sub>A</sub> = 25°C		0.9		Ω

### CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> = 0 V, f = 1 MHz, V <sub>DS</sub> = 50 V		10450		pF
Output Capacitance	C <sub>OSS</sub>			1050		
Reverse Transfer Capacitance	C <sub>RSS</sub>			158		
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 50 V; I <sub>D</sub> = 88 A		159		nC
Threshold Gate Charge	Q <sub>G(TH)</sub>			27.7		
Gate-to-Source Charge	Q <sub>GS</sub>			61		
Gate-to-Drain Charge	Q <sub>GD</sub>			38		

### SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	t <sub>d(ON)</sub>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 50 V, I <sub>D</sub> = 88 A, R <sub>G</sub> = 4.7 Ω		40		ns
Rise Time	t <sub>r</sub>			36		
Turn-Off Delay Time	t <sub>d(OFF)</sub>			76		
Fall Time	t <sub>f</sub>			26		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 88 A	T <sub>J</sub> = 25°C		0.82	1.2	V
			T <sub>J</sub> = 125°C		0.70		
Reverse Recovery Time	t <sub>RR</sub>	V <sub>GS</sub> = 0 V, dI <sub>S</sub> /dt = 300 A/μs, I <sub>S</sub> = 44 A		46.7		ns	
Reverse Recovery Charge	Q <sub>RR</sub>			224		nC	
Reverse Recovery Time	t <sub>RR</sub>	V <sub>GS</sub> = 0 V, dI <sub>S</sub> /dt = 1000 A/μs, I <sub>S</sub> = 44 A		46.1		ns	
Reverse Recovery Charge	Q <sub>RR</sub>			595		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. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.

4. Switching characteristics are independent of operating junction temperatures.

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## TYPICAL CHARACTERISTICS

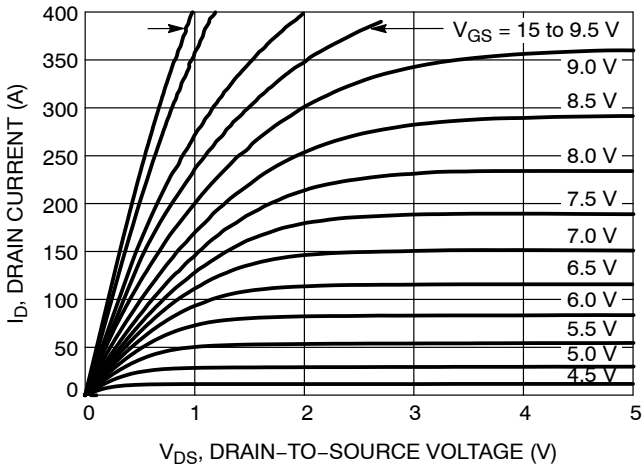


Figure 1. On-Region Characteristics

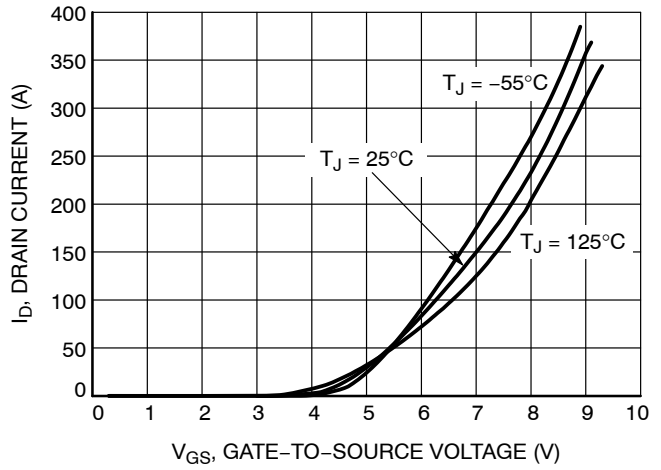


Figure 2. Transfer Characteristics

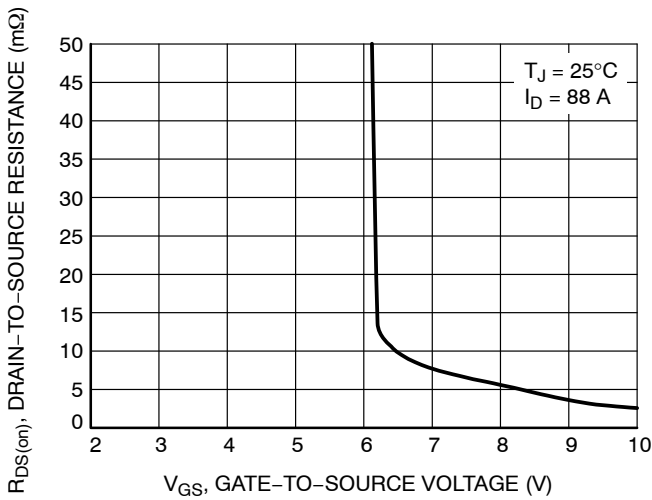


Figure 3. On-Resistance vs. Gate-to-Source Voltage

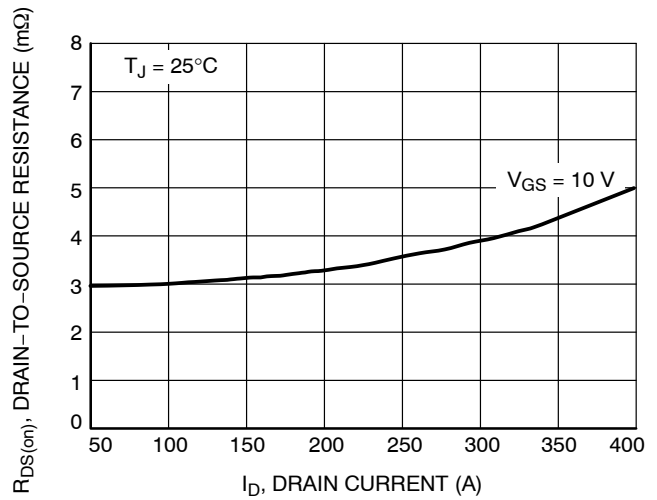


Figure 4. On-Resistance vs. Drain Current

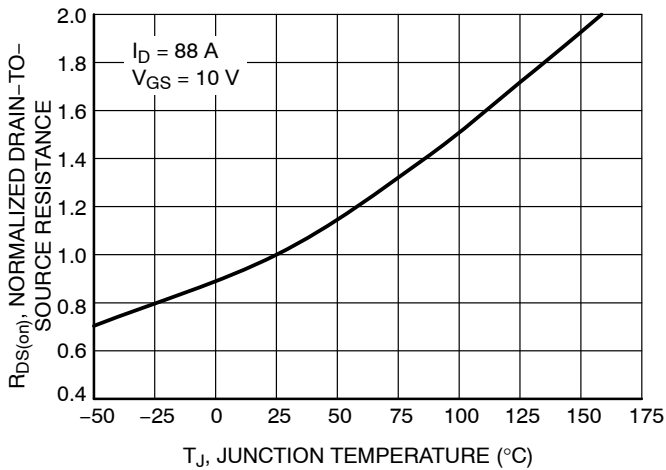


Figure 5. On-Resistance Variation with Temperature

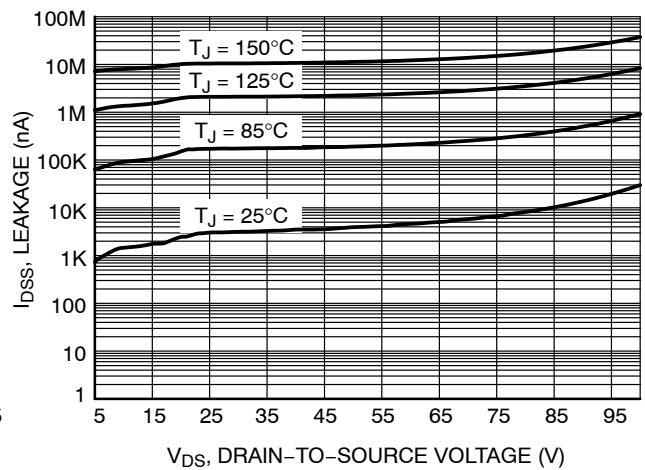


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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## TYPICAL CHARACTERISTICS

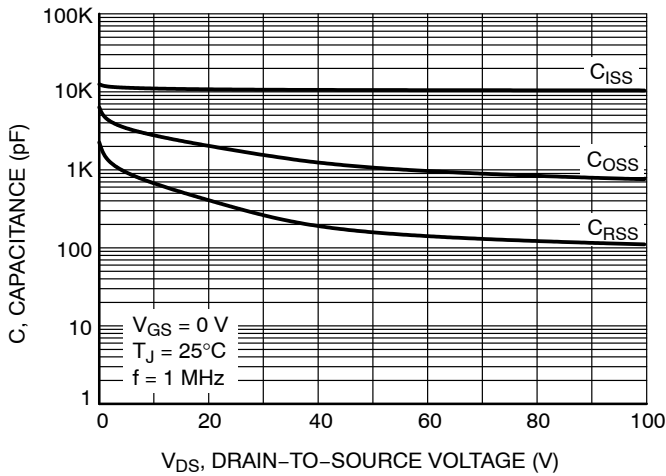


Figure 7. Capacitance Variation

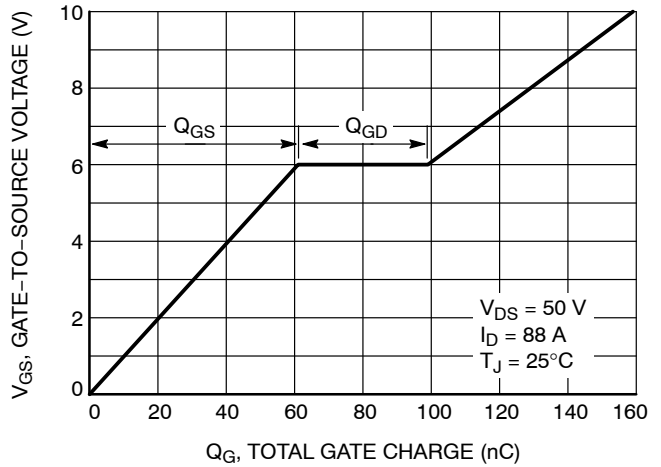


Figure 8. Gate-to-Source Voltage vs. Total Charge

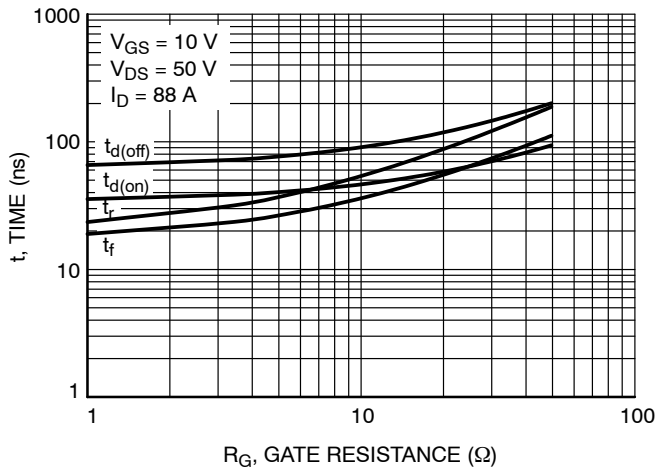


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

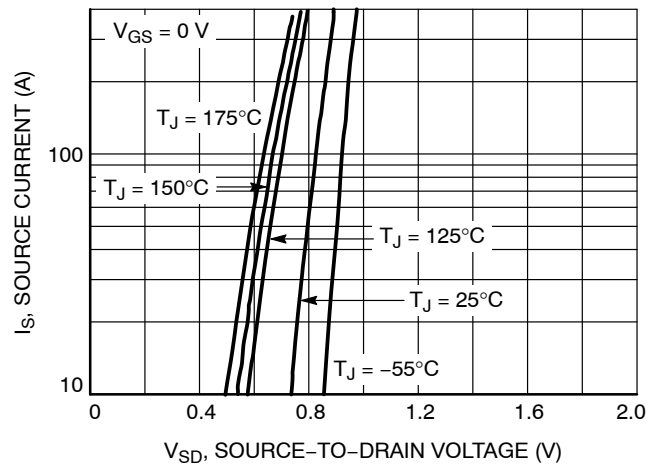


Figure 10. Diode Forward Voltage vs. Current

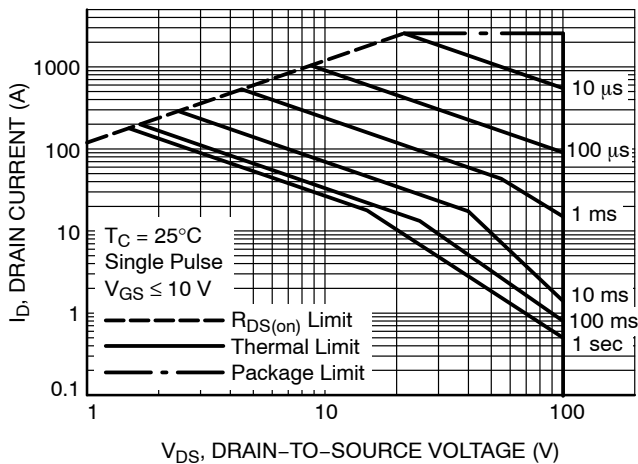


Figure 11. Maximum Rated Forward Biased Safe Operating Area

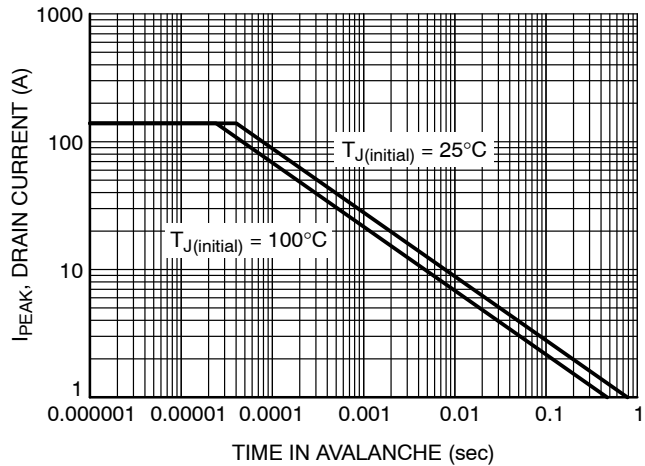


Figure 12. Maximum Drain Current vs. Time in Avalanche

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## TYPICAL CHARACTERISTICS

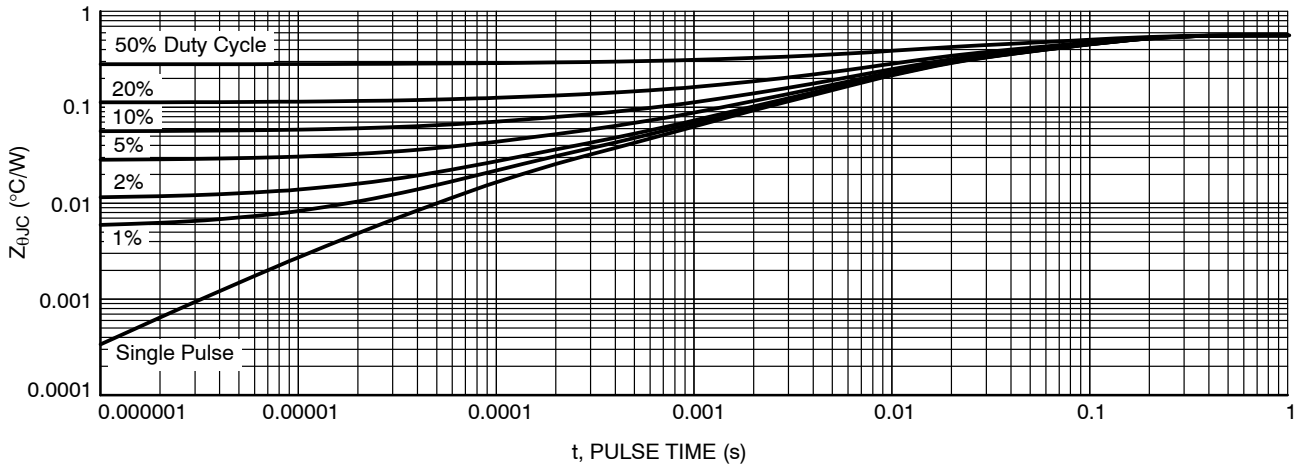


Figure 13. Junction-to-Ambient Transient Thermal Response

### DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping <sup>†</sup>
NTMTSC4D2N10G	4D2N10G	TDFNW8 (Pb-Free)	3000 / Tape & Reel

<sup>†</sup>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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