

# NTP8G206N

## Power GaN Cascode Transistor 600 V, 150 mΩ

### Features

- Fast Switching
- Extremely Low  $Q_{rr}$
- Transphorm Inside
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

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

Parameter	Symbol	NDD	Unit
Drain-to-Source Voltage	$V_{DSS}$	600	V
Gate-to-Source Voltage	$V_{GS}$	$\pm 18$	V
Continuous Drain Current $R_{\theta JC}$	Steady State	$T_C = 25^\circ\text{C}$	17
		$T_C = 100^\circ\text{C}$	12
Power Dissipation – $R_{\theta JC}$	Steady State	$T_C = 25^\circ\text{C}$	96
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	$I_{DM}$	60
Operating Junction and Storage Temperature	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$
Lead Temperature for Soldering Leads	$T_L$	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

Parameter	Symbol	Value	Unit
Junction-to-Case (Drain)	$R_{\theta JC}$	1.55	$^\circ\text{C}/\text{W}$
Junction-to-Ambient Steady State	$R_{\theta JA}$	62	$^\circ\text{C}/\text{W}$

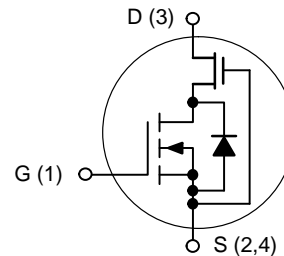


**ON Semiconductor®**

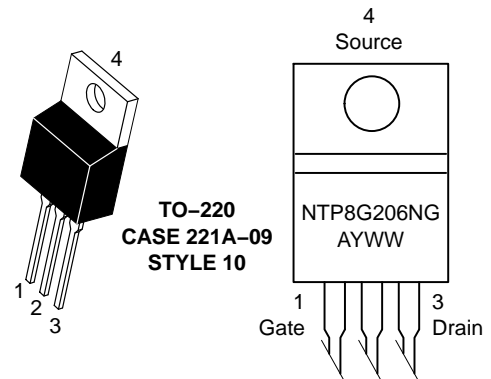
[www.onsemi.com](http://www.onsemi.com)

$V_{(BR)DSS}$	$R_{DS(ON)}$ TYP
600 V	150 mΩ @ 10 V

### N-Channel MOSFET



### MARKING DIAGRAM & PIN ASSIGNMENT



- A = Assembly Location
- Y = Year
- WW = Work Week
- G = Pb-Free Package

### ORDERING INFORMATION

Device	Package	Shipping
NTP8G206NG	TO-220 (Pb-Free)	50 Units / Rail

# NTP8G206N

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

Characteristic	Symbol	Test Conditions	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> = 1 mA	600			V
Drain-to-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = 600 V, V <sub>GS</sub> = 0 V	T <sub>J</sub> = 25°C	2.5	90	μA
			T <sub>J</sub> = 150°C	8.0		
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±18 V			±100	nA

### ON CHARACTERISTICS (Note 1)

Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 500 μA	1.6	2.1	2.6	V
Static Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 8 V, I <sub>D</sub> = 11 A, T <sub>J</sub> = 25°C		150	180	mΩ
		V <sub>GS</sub> = 8 V, I <sub>D</sub> = 11 A, T <sub>J</sub> = 175°C		340		

### DYNAMIC CHARACTERISTICS

Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 480 V, V <sub>GS</sub> = 0 V, f = 1 MHz		760		pF
Output Capacitance	C <sub>oss</sub>			44		
Reverse Transfer Capacitance	C <sub>rss</sub>			5.0		
Effective output capacitance, energy related (Note 3)	C <sub>o(er)</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 0 to 480 V		64		
Effective output capacitance, time related (Note 4)	C <sub>o(tr)</sub>	I <sub>D</sub> = constant, V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 0 to 480 V		105		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 100 V, I <sub>D</sub> = 11 A, V <sub>GS</sub> = 4.5 V		6.2	9.3	nC
Gate-to-Source Charge	Q <sub>gs</sub>			2.1		
Gate-to-Drain Charge	Q <sub>gd</sub>			2.2		

### SWITCHING CHARACTERISTICS (Note 2)

Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 480 V, I <sub>D</sub> = 11 A, V <sub>GS</sub> = 10 V, R <sub>G</sub> = 2 Ω		6.2		ns
Rise Time	t <sub>r</sub>			4.5		
Turn-off Delay Time	t <sub>d(off)</sub>			9.7		
Fall Time	t <sub>f</sub>			4.0		

### SOURCE-DRAIN DIODE CHARACTERISTICS

Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = 11 A, V <sub>GS</sub> = 0 V	T <sub>J</sub> = 25°C		2.2		V
Reverse Recovery Time	t <sub>rr</sub>	V <sub>GS</sub> = 0 V, V <sub>DD</sub> = 400 V, I <sub>S</sub> = 11 A, d <sub>i</sub> /d <sub>t</sub> = 2000 A/μs			17		ns
Reverse Recovery Charge	Q <sub>rr</sub>					53	

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.

1. Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
2. Switching characteristics are independent of operating junction temperatures.
3. C<sub>o(er)</sub> is a fixed capacitance that gives the same stored energy as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0 to 80% V<sub>(BR)DSS</sub>
4. C<sub>o(tr)</sub> is a fixed capacitance that gives the same charging time as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0 to 80% V<sub>(BR)DSS</sub>

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## TYPICAL CHARACTERISTICS

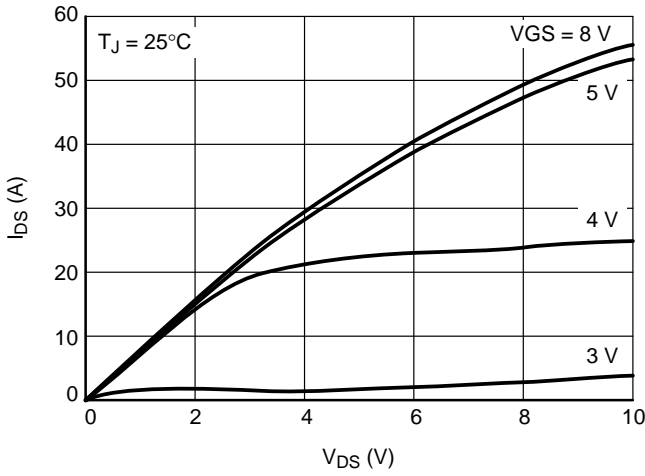


Figure 1. Typical Output Characteristics

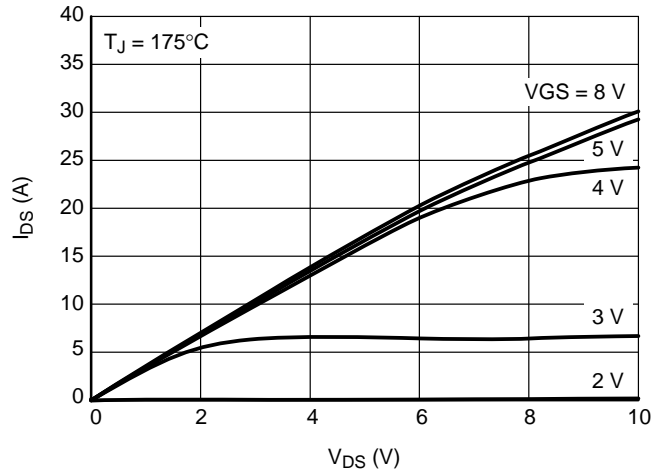


Figure 2. Typical Output Characteristics

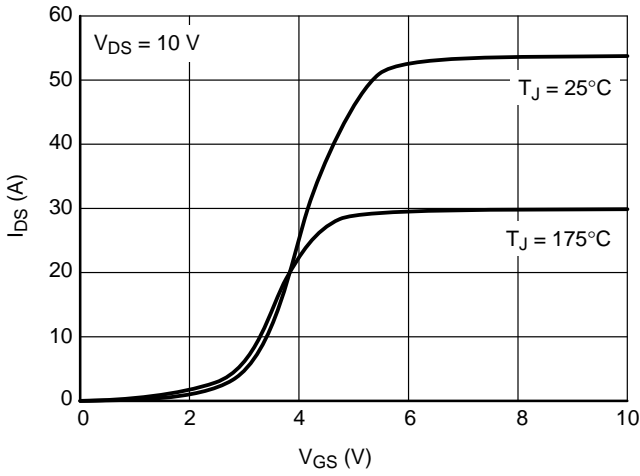


Figure 3. Typical Transfer Characteristics

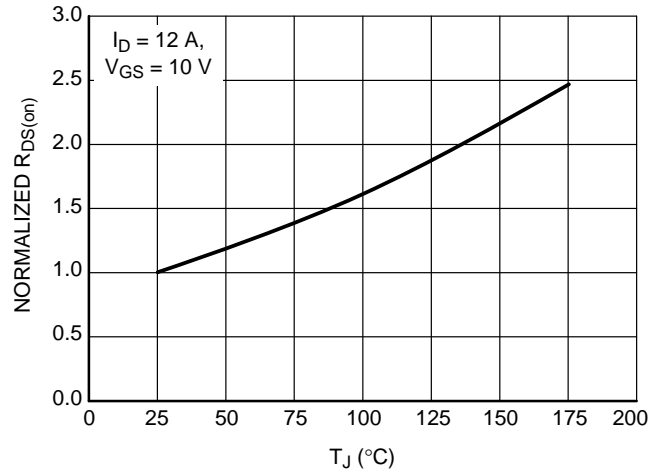


Figure 4. Normalized On-Resistance

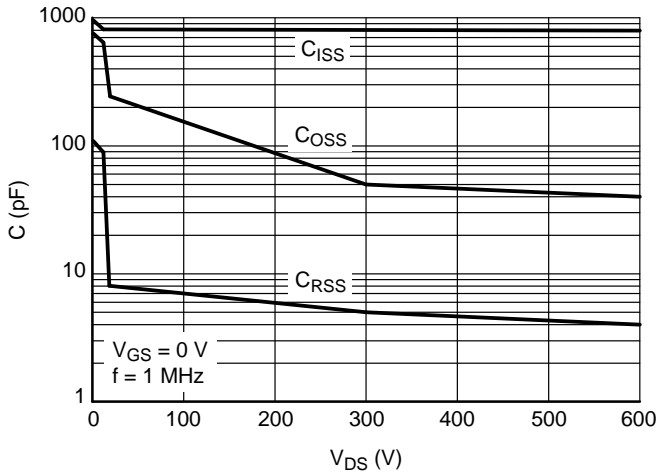


Figure 5. Typical Capacitance

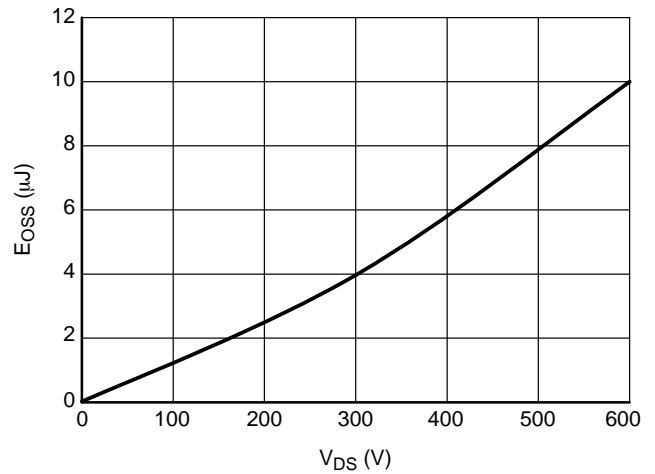
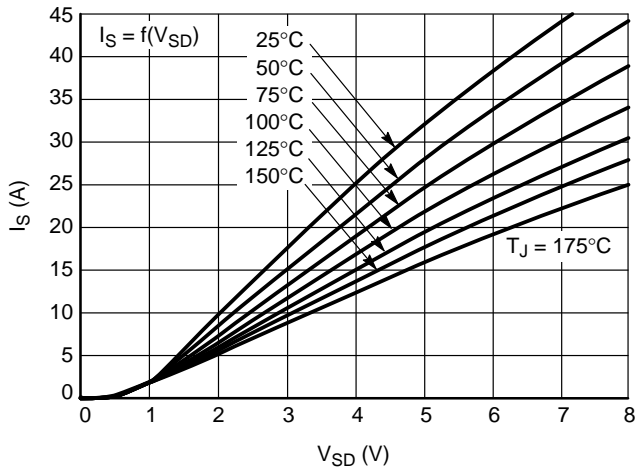


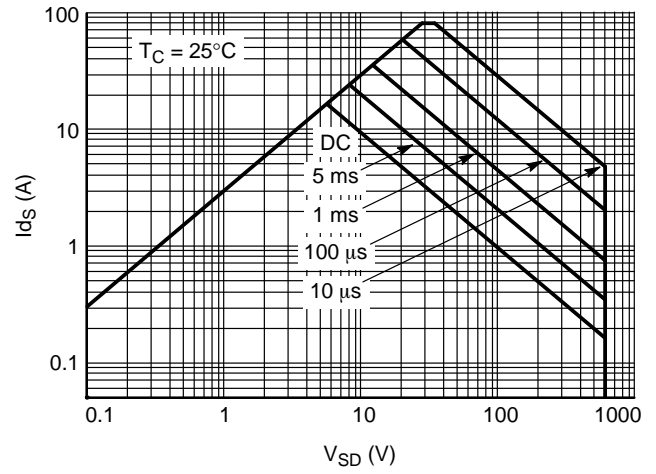
Figure 6. Typical Coss Stored Energy

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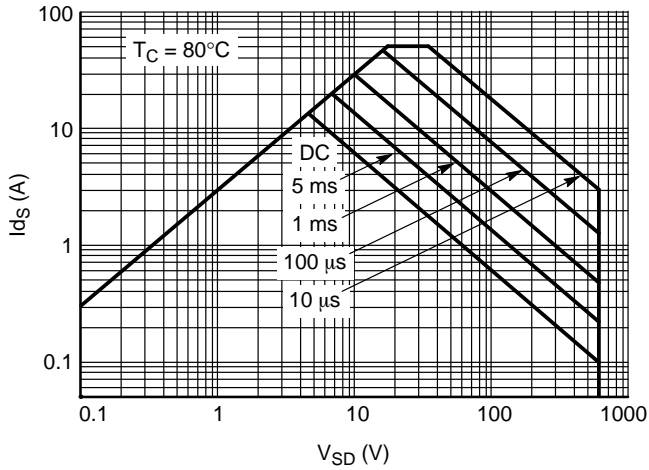
## TYPICAL CHARACTERISTICS



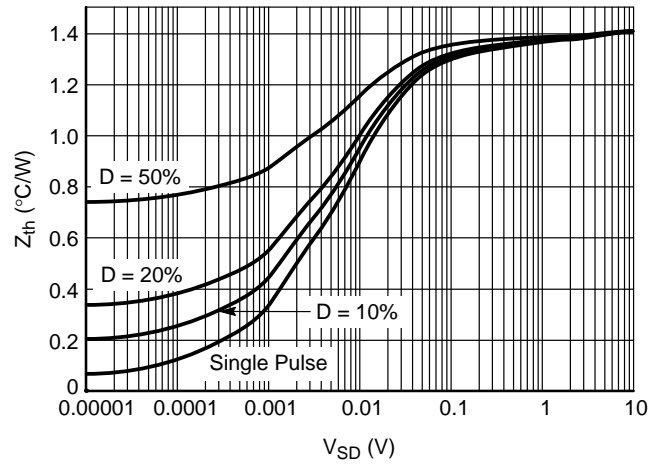
**Figure 7. Forward Characteristics of Rev. Diode**



**Figure 8. Safe Operating Area**



**Figure 9. Safe Operating Area**



**Figure 10. Transient Thermal Resistance**

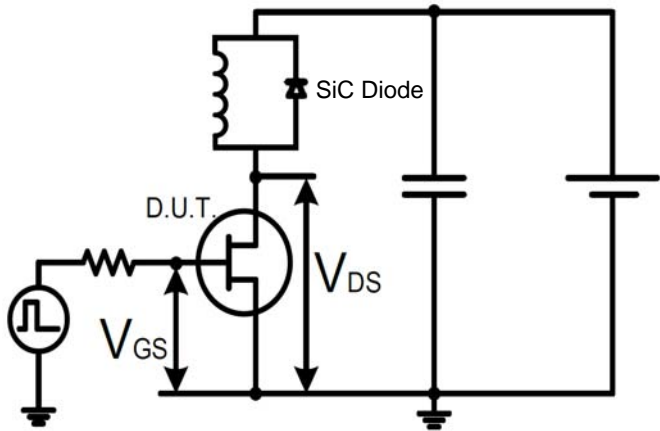


Figure 11. Switching Time Test Circuit

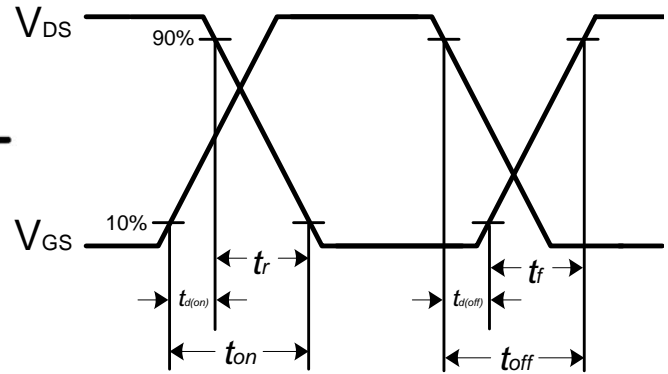


Figure 12. Switching Time Waveform

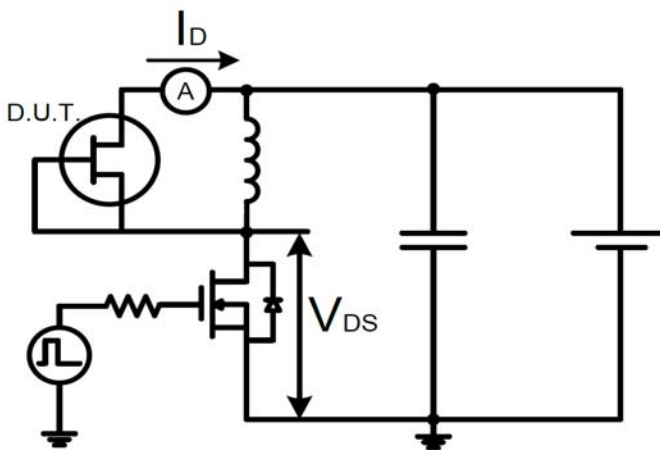


Figure 13. Test Circuit for Reverse Diode Characteristics

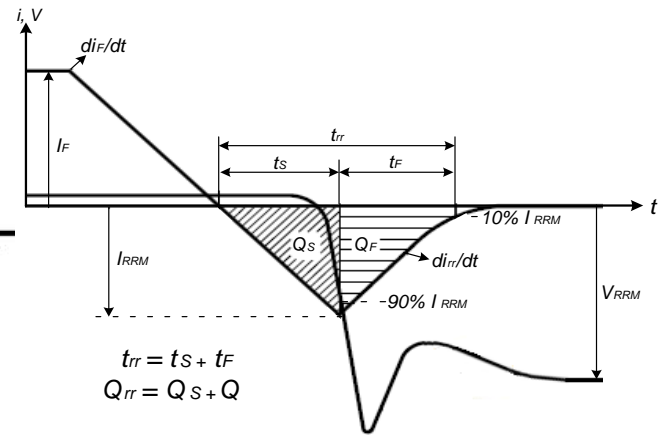
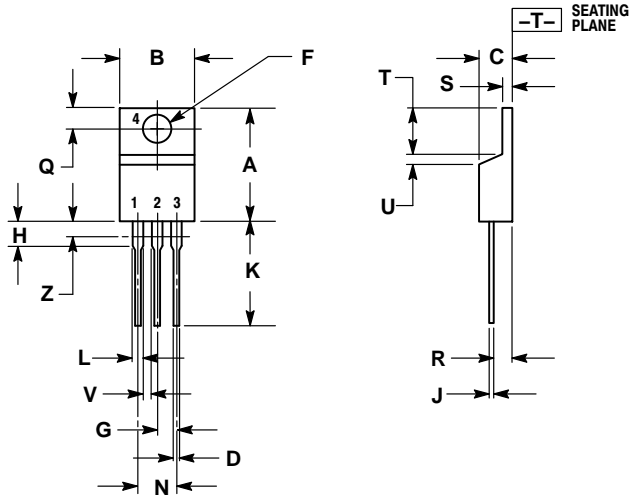


Figure 14. Diode Recovery Waveform

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## PACKAGE DIMENSIONS

TO-220  
CASE 221A-09  
ISSUE AH




**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.415	9.66	10.53
C	0.160	0.190	4.07	4.83
D	0.025	0.038	0.64	0.96
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.024	0.36	0.61
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

**STYLE 10:**

- PIN 1. GATE
- SOURCE
- DRAIN
- SOURCE

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