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# NTP8G202N

## Power GaN Cascode Transistor 600 V, 290 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	$I_D$	9.0	A
			6.0	
Power Dissipation – $R_{\theta JC}$	Steady State	$T_C = 25^\circ\text{C}$	$P_D$	65
Pulsed Drain Current		$t_p = 10 \mu\text{s}$	$I_{DM}$	35
Operating Junction and Storage Temperature		$T_J, T_{STG}$	-55 to +150	°C
Lead Temperature for Soldering Leads		$T_L$	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

Parameter	Symbol	Value	Unit
Junction-to-Case (Drain)	$R_{\theta JC}$	2.3	°C/W
Junction-to-Ambient Steady State	$R_{\theta JA}$	62	°C/W

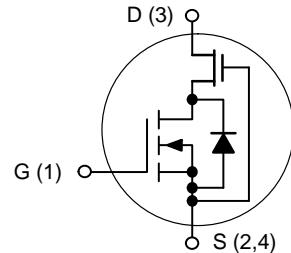
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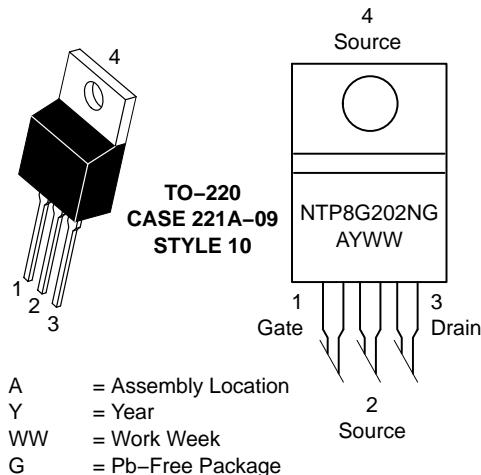
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$V_{(BR)DSS}$	$R_{DS(ON)} \text{ TYP}$
600 V	290 mΩ @ 10 V

### N-Channel MOSFET



### MARKING DIAGRAM & PIN ASSIGNMENT



### ORDERING INFORMATION

Device	Package	Shipping
NTP8G202NG	TO-220 (Pb-Free)	50 Units / Rail

# NTP8G202N

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

Characteristic	Symbol	Test Conditions		Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>							
Drain-to-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0 \text{ V}$ , $I_D = 1 \text{ mA}$		600			V
Drain-to-Source Leakage Current	$I_{\text{DSS}}$	$V_{\text{DS}} = 600 \text{ V}$ , $V_{\text{GS}} = 0 \text{ V}$	$T_J = 25^\circ\text{C}$		2.5	90	$\mu\text{A}$
			$T_J = 150^\circ\text{C}$		8.0		
Gate-to-Source Leakage Current	$I_{\text{GSS}}$	$V_{\text{GS}} = \pm 18 \text{ V}$				$\pm 100$	nA

## ON CHARACTERISTICS (Note 1)

Gate Threshold Voltage	$V_{\text{GS}(\text{TH})}$	$V_{\text{DS}} = V_{\text{GS}}$ , $I_D = 500 \mu\text{A}$	1.6	2.1	2.6	V
Static Drain-to-Source On Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 8 \text{ V}$ , $I_D = 5.5 \text{ A}$		290	350	$\text{m}\Omega$

## DYNAMIC CHARACTERISTICS

Input Capacitance	$C_{\text{iss}}$	$V_{\text{DS}} = 400 \text{ V}$ , $V_{\text{GS}} = 0 \text{ V}$ , $f = 1 \text{ MHz}$		760		pF
Output Capacitance	$C_{\text{oss}}$			26		
Reverse Transfer Capacitance	$C_{\text{rss}}$			3.5		
Effective output capacitance, energy related (Note 3)	$C_{\text{o(er)}}$	$V_{\text{GS}} = 0 \text{ V}$ , $V_{\text{DS}} = 0 \text{ to } 480 \text{ V}$		36		
Effective output capacitance, time related (Note 4)	$C_{\text{o(tr)}}$	$I_D = \text{constant}$ , $V_{\text{GS}} = 0 \text{ V}$ , $V_{\text{DS}} = 0 \text{ to } 480 \text{ V}$		57		
Total Gate Charge	$Q_g$	$V_{\text{DS}} = 100 \text{ V}$ , $I_D = 5.5 \text{ A}$ , $V_{\text{GS}} = 4.5 \text{ V}$		6.2	9.3	nC
Gate-to-Source Charge	$Q_{\text{gs}}$			2.1		
Gate-to-Drain Charge	$Q_{\text{gd}}$			2.2		

## SWITCHING CHARACTERISTICS (Note 2)

Turn-on Delay Time	$t_{\text{d(on)}}$	$V_{\text{DD}} = 480 \text{ V}$ , $I_D = 5.5 \text{ A}$ , $V_{\text{GS}} = 10 \text{ V}$ , $R_G = 2 \Omega$		6.2		ns
Rise Time	$t_r$			4.5		
Turn-off Delay Time	$t_{\text{d(off)}}$			9.7		
Fall Time	$t_f$			5.0		

## SOURCE-DRAIN DIODE CHARACTERISTICS

Diode Forward Voltage	$V_{\text{SD}}$	$I_S = 5.5 \text{ A}$ , $V_{\text{GS}} = 0 \text{ V}$	$T_J = 25^\circ\text{C}$		2.1		V
Reverse Recovery Time	$t_{\text{rr}}$	$V_{\text{GS}} = 0 \text{ V}$ , $V_{\text{DD}} = 480 \text{ V}$			12		ns
Reverse Recovery Charge	$Q_{\text{rr}}$	$I_S = 5.5 \text{ A}$ , $d_I/d_t = 1500 \text{ A}/\mu\text{s}$			29		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.

1. Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
2. Switching characteristics are independent of operating junction temperatures.
3.  $C_{\text{o(er)}}$  is a fixed capacitance that gives the same stored energy as  $C_{\text{oss}}$  while  $V_{\text{DS}}$  is rising from 0 to 80%  $V_{(\text{BR})\text{DSS}}$
4.  $C_{\text{o(tr)}}$  is a fixed capacitance that gives the same charging time as  $C_{\text{oss}}$  while  $V_{\text{DS}}$  is rising from 0 to 80%  $V_{(\text{BR})\text{DSS}}$

## TYPICAL CHARACTERISTICS

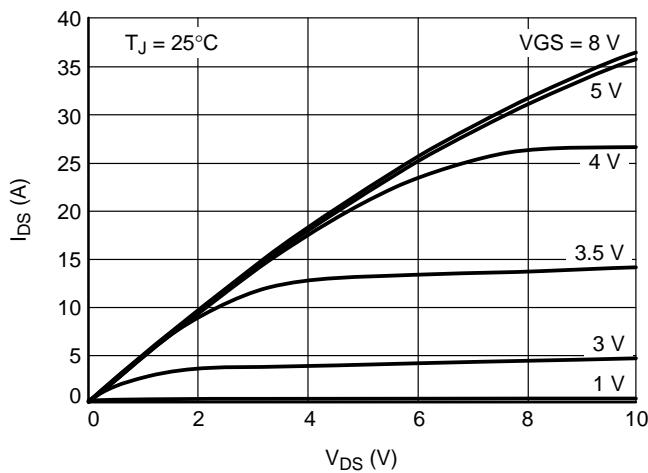


Figure 1. Typical Output Characteristics

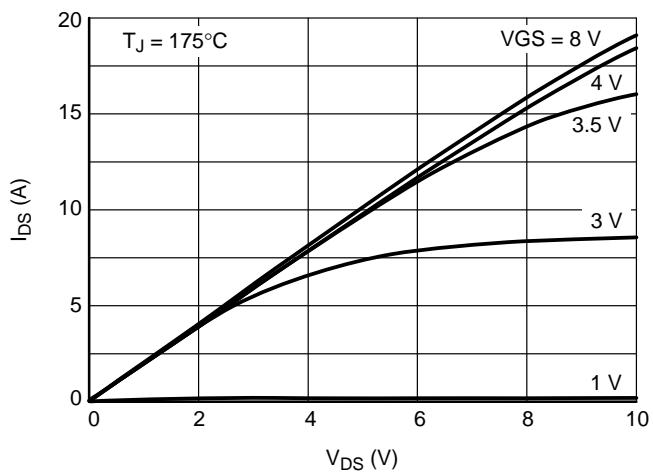


Figure 2. Typical Output Characteristics

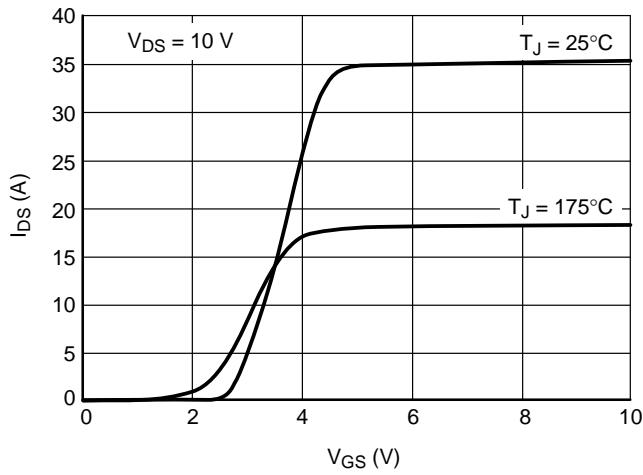


Figure 3. Typical Transfer Characteristics

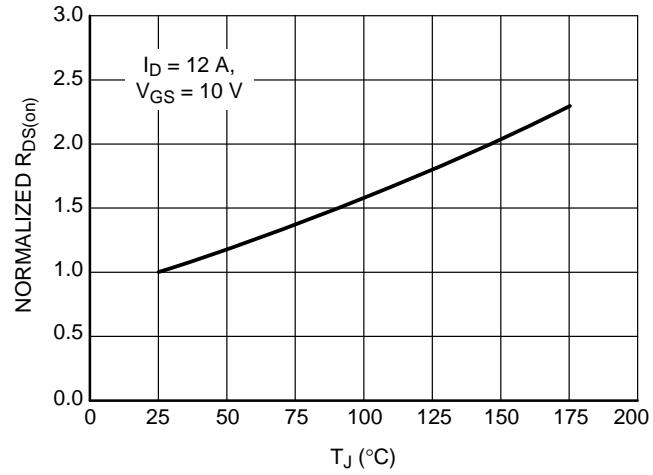


Figure 4. Normalized On-Resistance

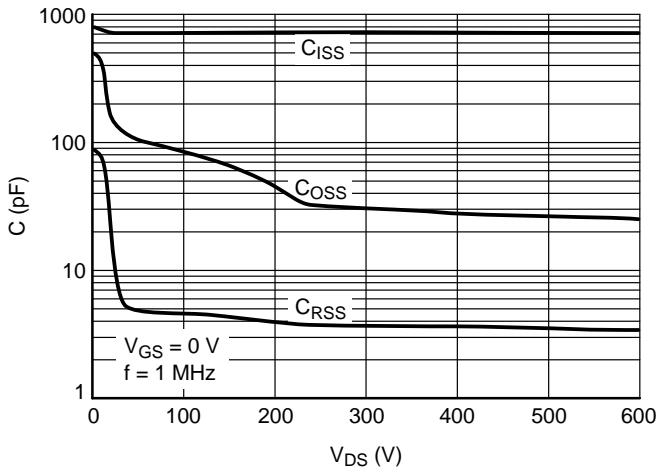
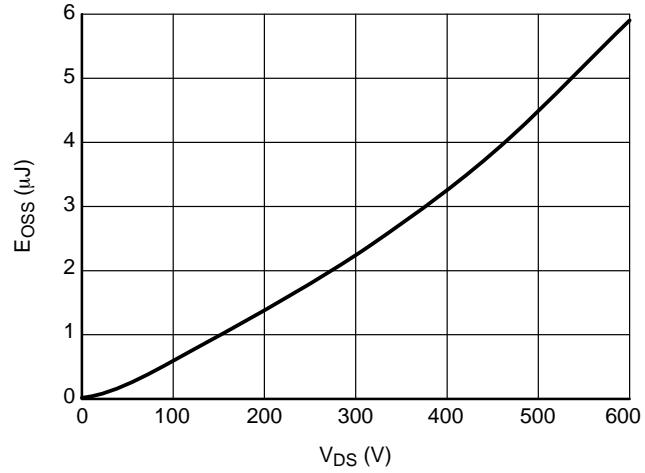


Figure 5. Typical Capacitance

Figure 6. Typical  $C_{oss}$  Stored Energy

## TYPICAL CHARACTERISTICS

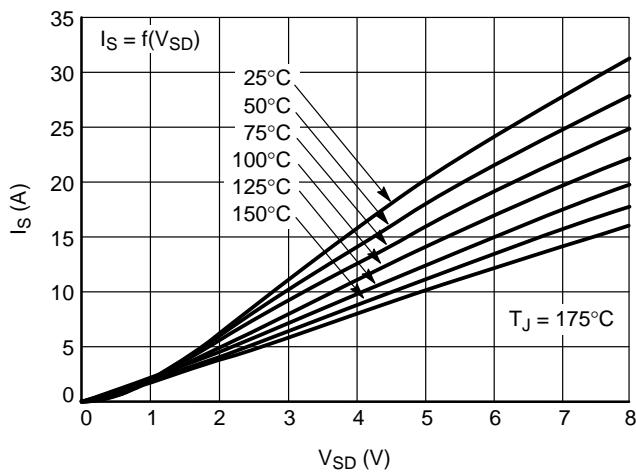


Figure 7. Forward Characteristics of Rev. Diode

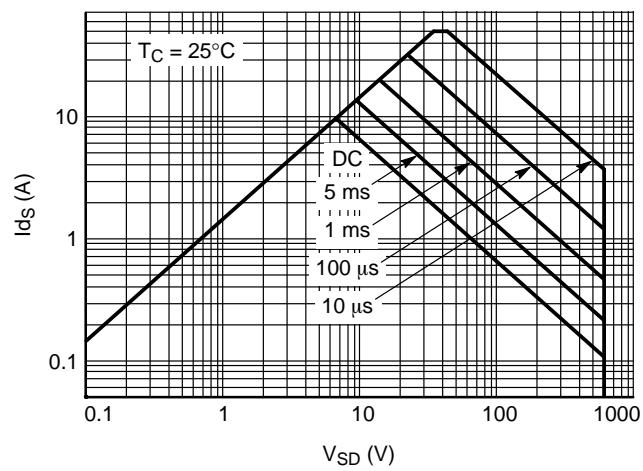


Figure 8. Safe Operating Area

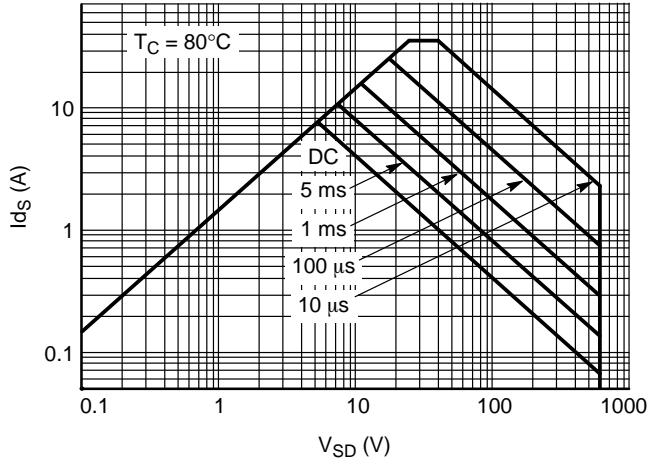


Figure 9. Safe Operating Area

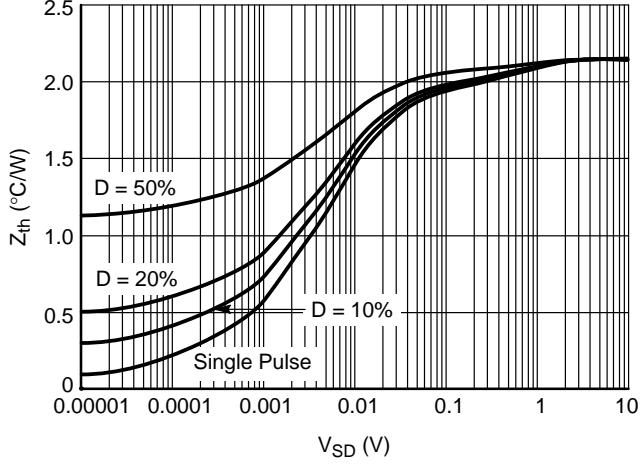


Figure 10. Transient Thermal Resistance

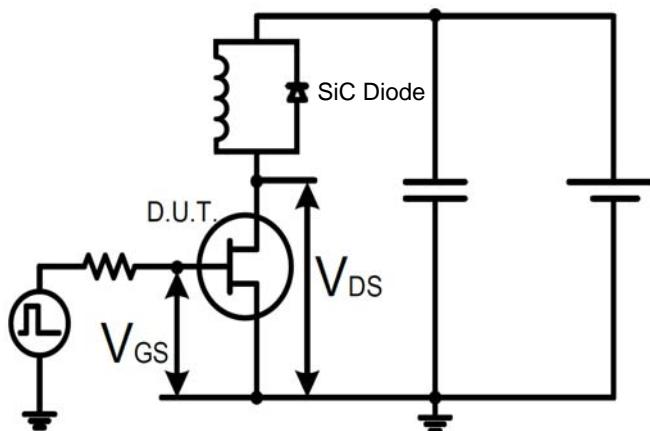


Figure 11. Switching Time Test Circuit

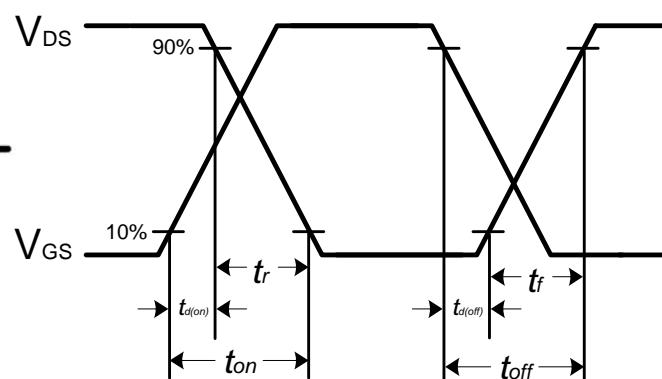


Figure 12. Switching Time Waveform

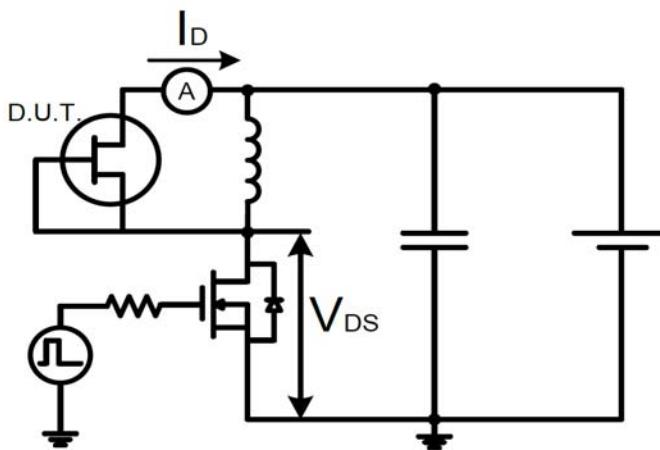


Figure 13. Test Circuit for Reverse Diode Characteristics

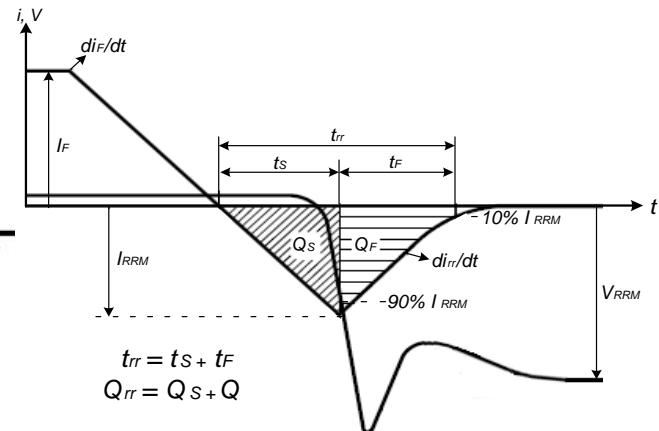
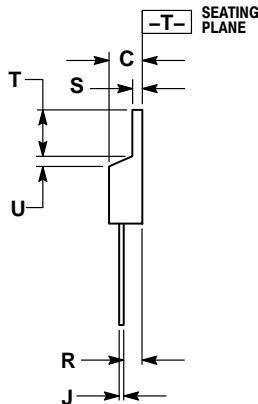
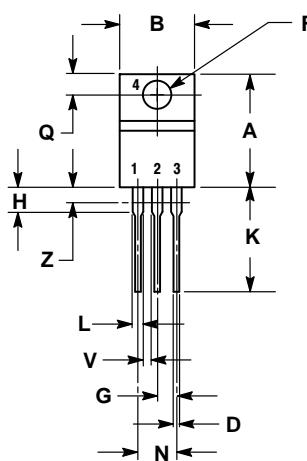


Figure 14. Diode Recovery Waveform

## 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  
 2. SOURCE  
 3. DRAIN  
 4. SOURCE

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