



**THE DATASHEET OF
NTP8G202NG**



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}	± 18	V
Continuous Drain Current $R_{\theta JC}$	Steady State	$T_C = 25^\circ\text{C}$	9.0
		$T_C = 100^\circ\text{C}$	6.0
Power Dissipation – $R_{\theta JC}$	Steady State	$T_C = 25^\circ\text{C}$	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	$^\circ\text{C}$
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)	$R_{\theta JC}$	2.3	$^\circ\text{C}/\text{W}$
Junction-to-Ambient Steady State	$R_{\theta JA}$	62	$^\circ\text{C}/\text{W}$

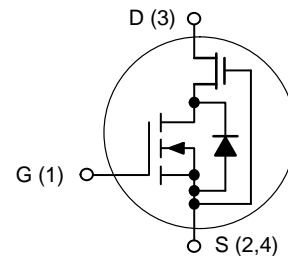


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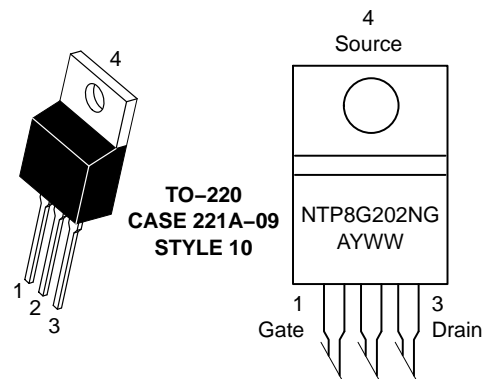
www.onsemi.com

$V_{(BR)DSS}$	$R_{DS(ON)}$ TYP
600 V	290 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
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
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	600			V
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$	$T_J = 25^\circ\text{C}$	2.5	90	μA
			$T_J = 150^\circ\text{C}$	8.0		
Gate-to-Source Leakage Current	I_{GSS}	$V_{GS} = \pm 18\text{ V}$			± 100	nA

ON CHARACTERISTICS (Note 1)

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

DYNAMIC CHARACTERISTICS

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

SWITCHING CHARACTERISTICS (Note 2)

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

SOURCE-DRAIN DIODE CHARACTERISTICS

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

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

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TYPICAL CHARACTERISTICS

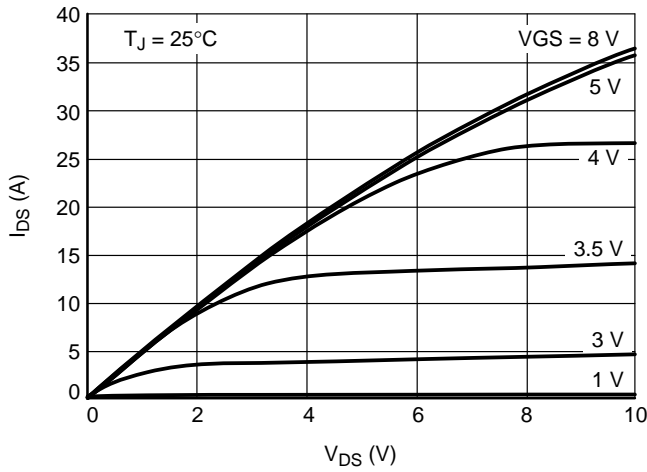


Figure 1. Typical Output Characteristics

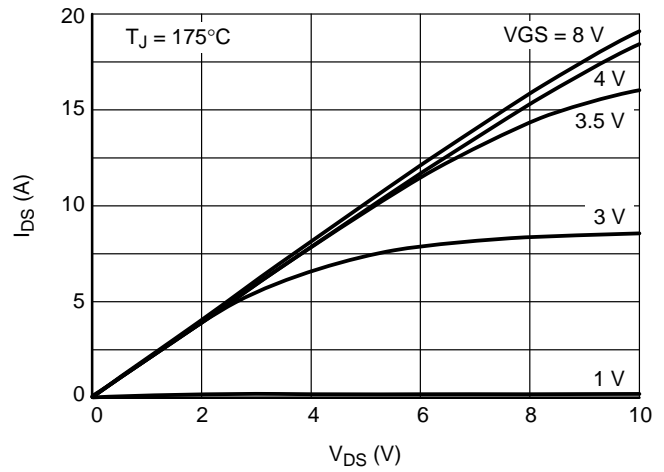


Figure 2. Typical Output Characteristics

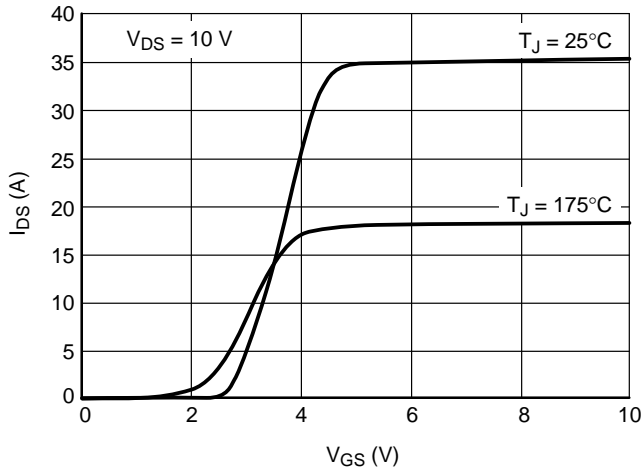


Figure 3. Typical Transfer Characteristics

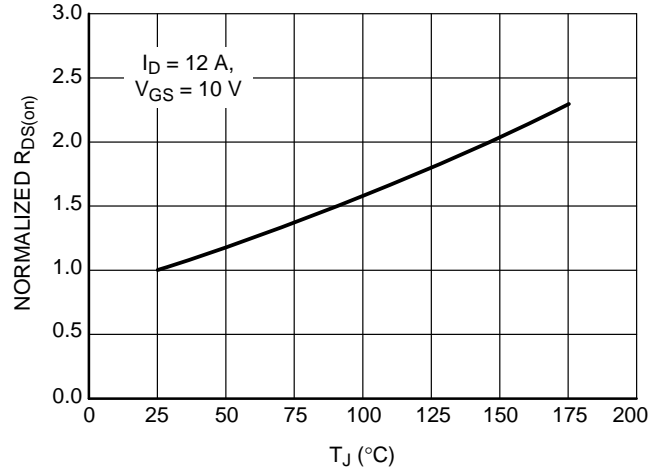


Figure 4. Normalized On-Resistance

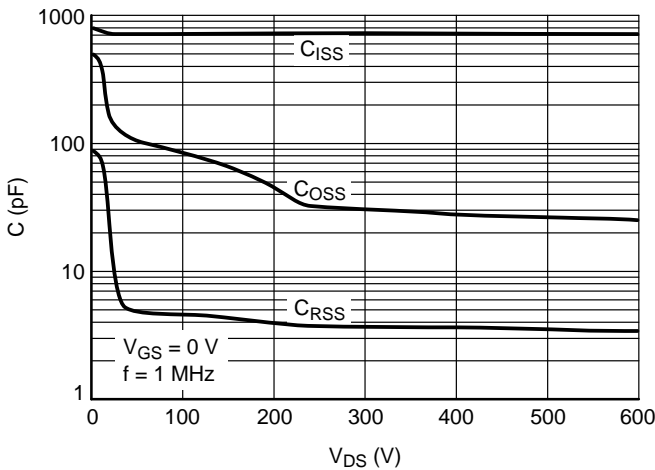


Figure 5. Typical Capacitance

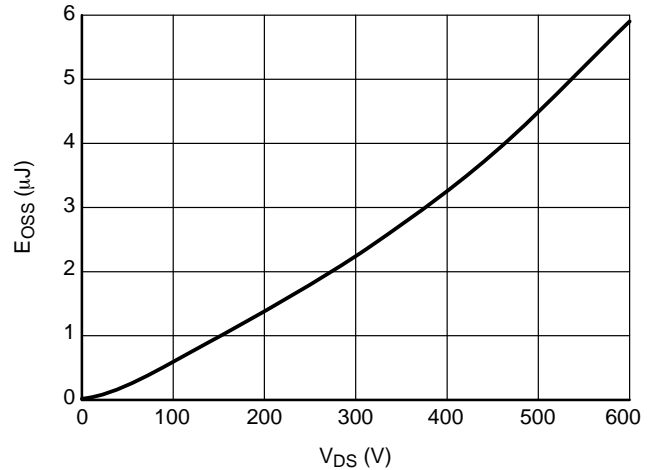


Figure 6. Typical Coss Stored Energy

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TYPICAL CHARACTERISTICS

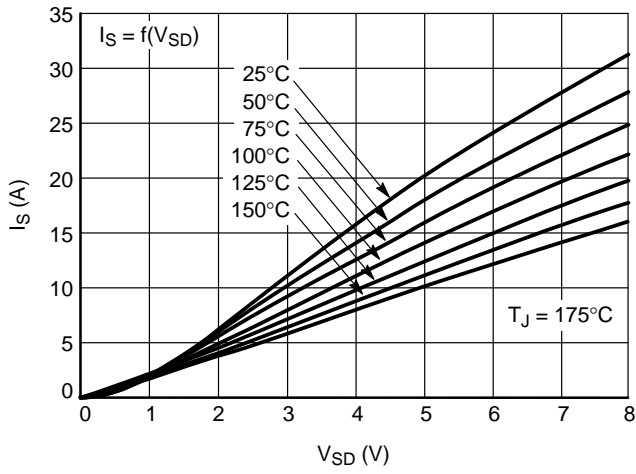


Figure 7. Forward Characteristics of Rev. Diode

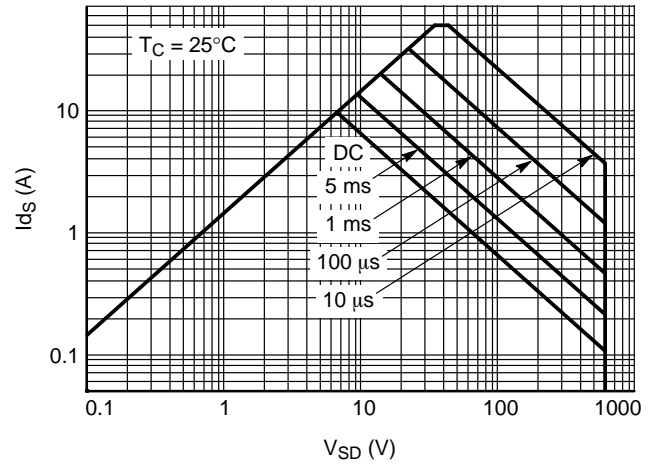


Figure 8. Safe Operating Area

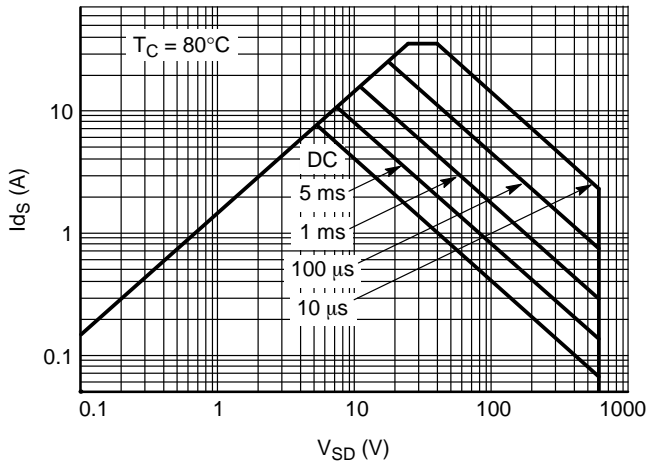


Figure 9. Safe Operating Area

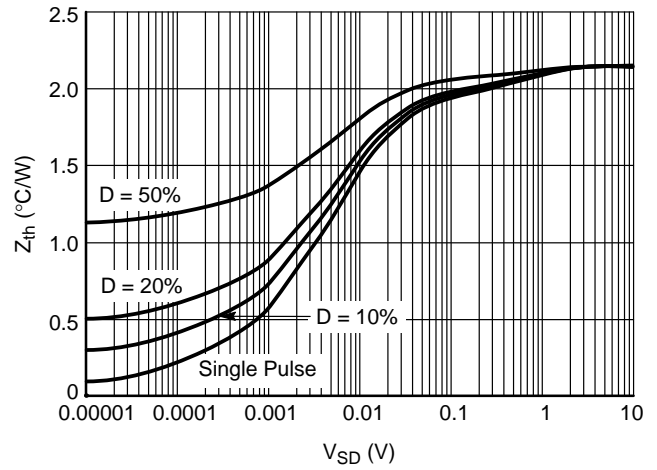


Figure 10. Transient Thermal Resistance

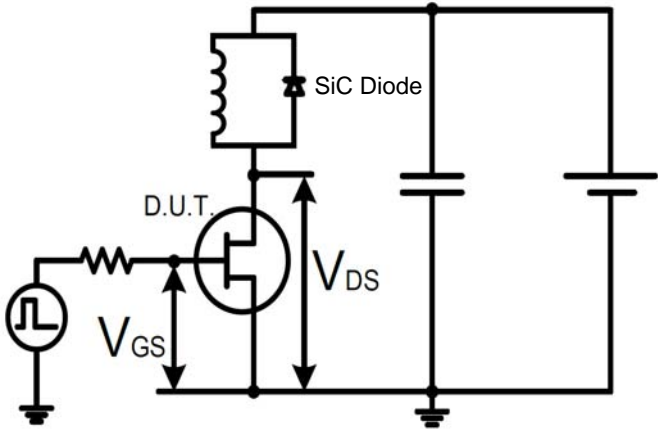


Figure 11. Switching Time Test Circuit

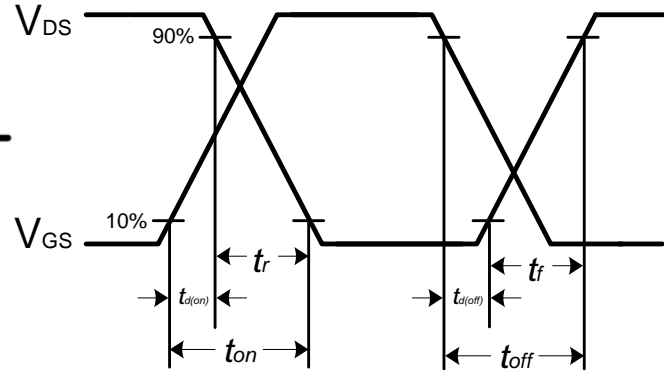


Figure 12. Switching Time Waveform

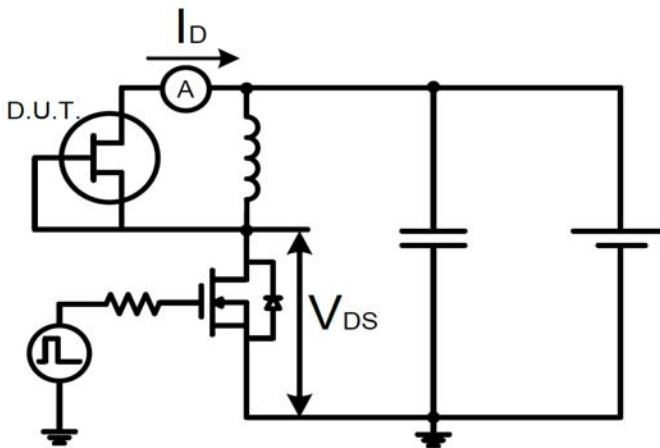


Figure 13. Test Circuit for Reverse Diode Characteristics

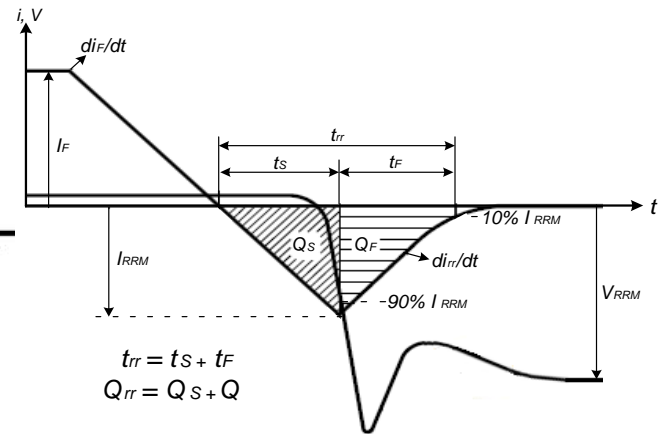
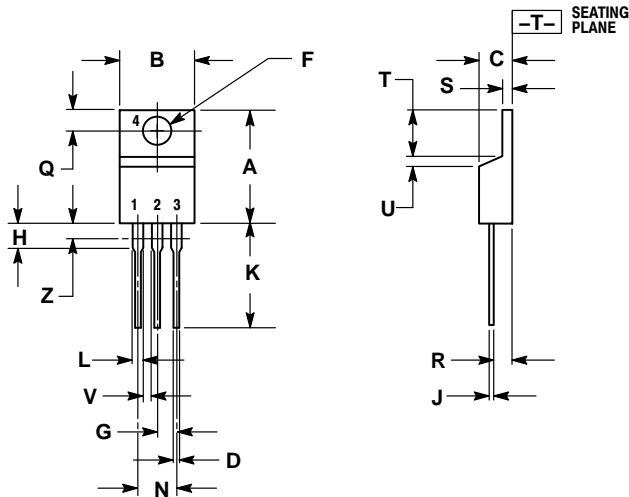


Figure 14. Diode Recovery Waveform

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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
- 2. SOURCE
- 3. DRAIN
- 4. SOURCE

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