

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 $R_{\theta JC}$	I_D	$T_C = 25^\circ\text{C}$	9.0
		$T_C = 100^\circ\text{C}$	6.0
Power Dissipation – $R_{\theta JC}$	P_D	65	W
Pulsed Drain Current	I_{DM}	35	A
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	$^\circ\text{C}/\text{W}$

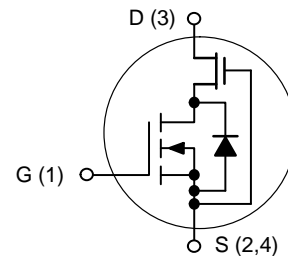


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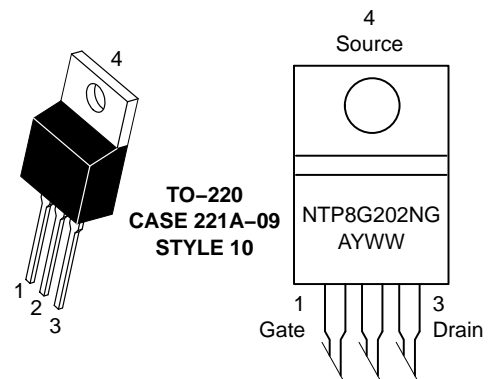
www.onsemi.com

$V_{(BR)DSS}$	$R_{DS(ON)}$ 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

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ELECTRICAL CHARACTERISTICS (T_J = 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 _{(BR)DSS}	V _{GS} = 0 V, I _D = 1 mA	600			V
Drain-to-Source Leakage Current	I _{DSS}	V _{DS} = 600 V, V _{GS} = 0 V	T _J = 25°C	2.5	90	μA
			T _J = 150°C		8.0	
Gate-to-Source Leakage Current	I _{GSS}	V _{GS} = ±18 V			±100	nA

ON CHARACTERISTICS (Note 1)

Gate Threshold Voltage	V _{GS(TH)}	V _{DS} = V _{GS} , I _D = 500 μA	1.6	2.1	2.6	V
Static Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 8 V, I _D = 5.5 A		290	350	mΩ

DYNAMIC CHARACTERISTICS

Input Capacitance	C _{iss}	V _{DS} = 400 V, V _{GS} = 0 V, f = 1 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 V, V _{DS} = 0 to 480 V		36		
Effective output capacitance, time related (Note 4)	C _{o(tr)}	I _D = constant, V _{GS} = 0 V, V _{DS} = 0 to 480 V		57		
Total Gate Charge	Q _g	V _{DS} = 100 V, I _D = 5.5 A, V _{GS} = 4.5 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 V, I _D = 5.5 A, V _{GS} = 10 V, R _G = 2 Ω		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 A, V _{GS} = 0 V	T _J = 25°C		2.1		V
Reverse Recovery Time	t _{rr}	V _{GS} = 0 V, V _{DD} = 480 V, I _S = 5.5 A, d _i /d _t = 1500 A/μs			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 ≤ 300 μs, Duty Cycle ≤ 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

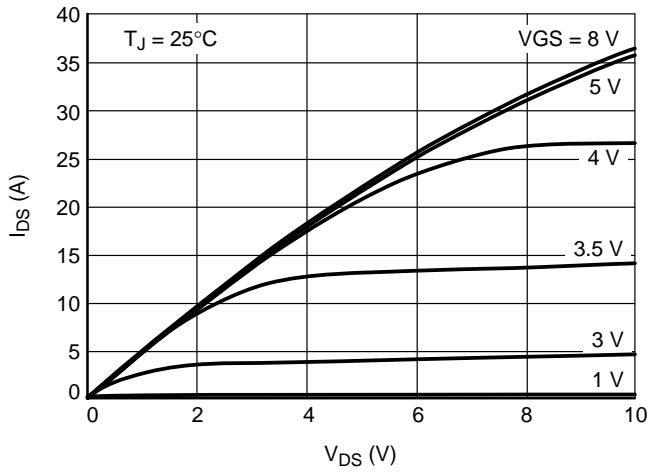


Figure 1. Typical Output Characteristics

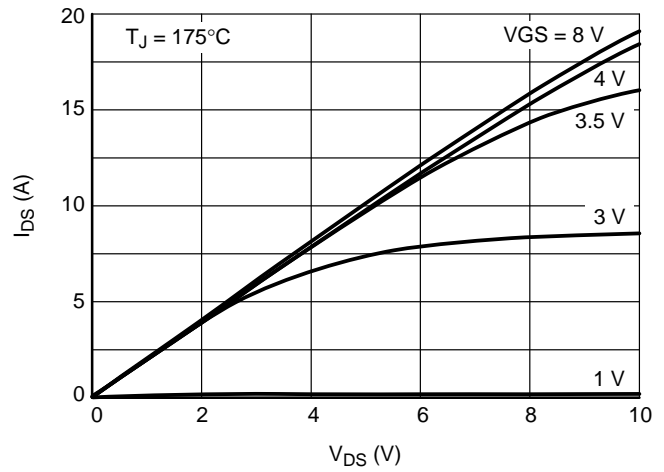


Figure 2. Typical Output Characteristics

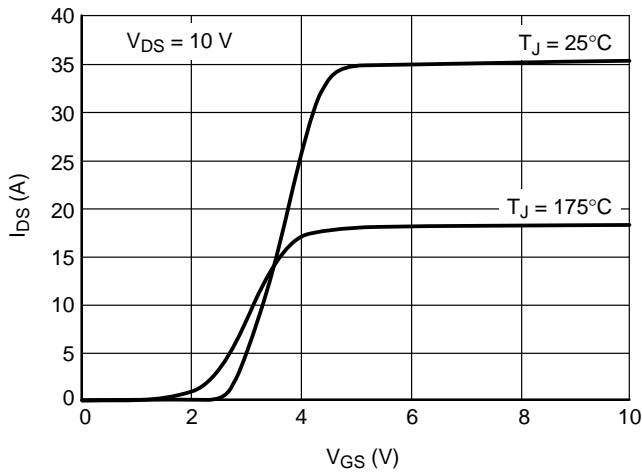


Figure 3. Typical Transfer Characteristics

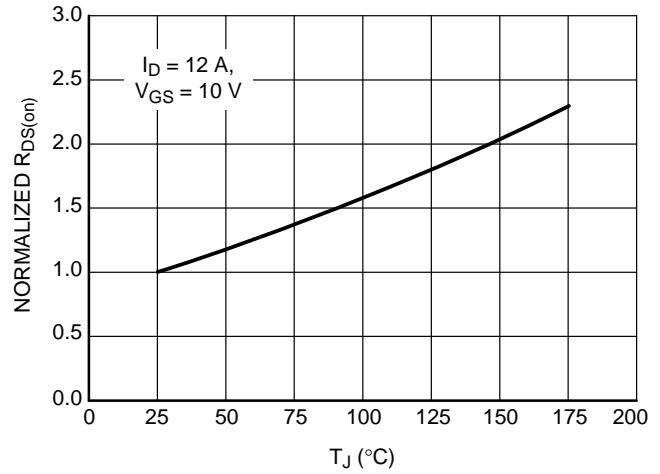


Figure 4. Normalized On-Resistance

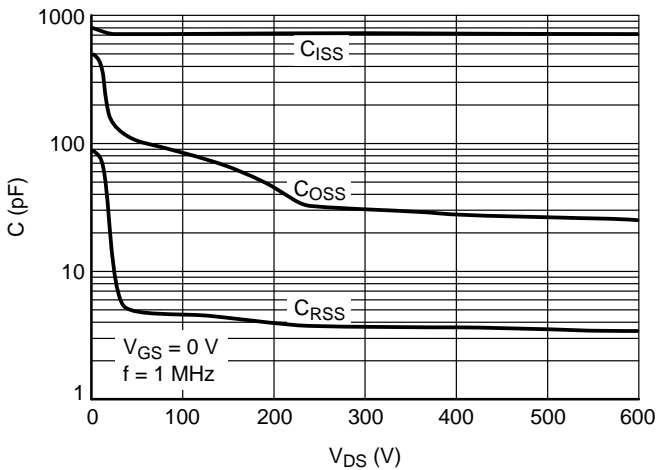


Figure 5. Typical Capacitance

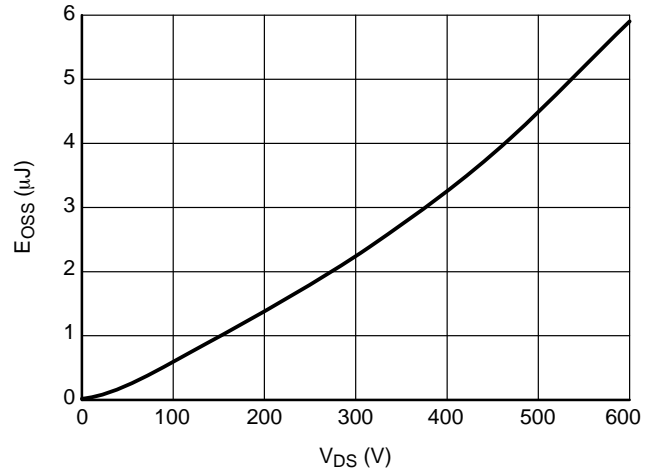


Figure 6. Typical Coss Stored Energy

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TYPICAL CHARACTERISTICS

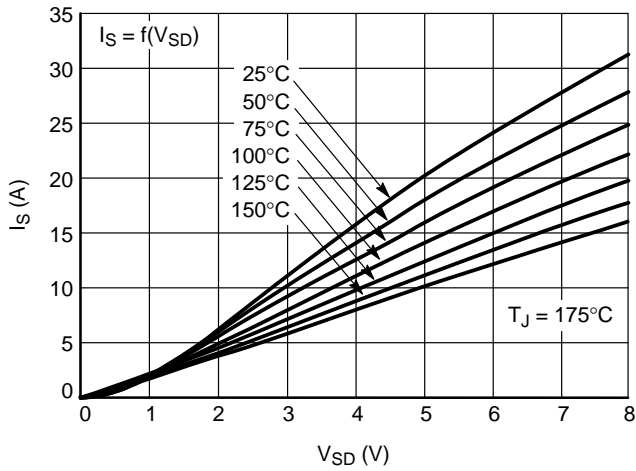


Figure 7. Forward Characteristics of Rev. Diode

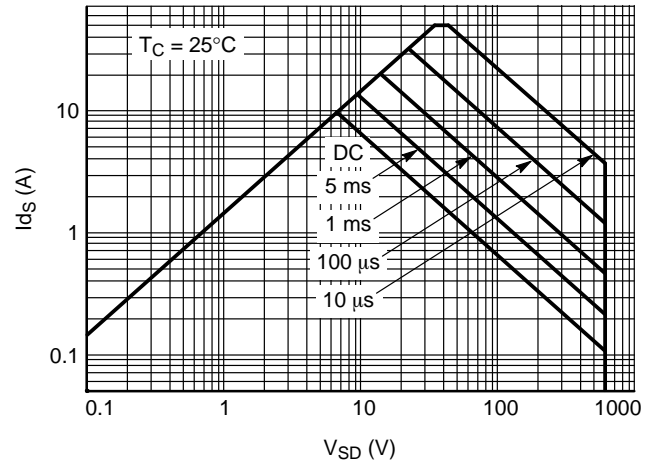


Figure 8. Safe Operating Area

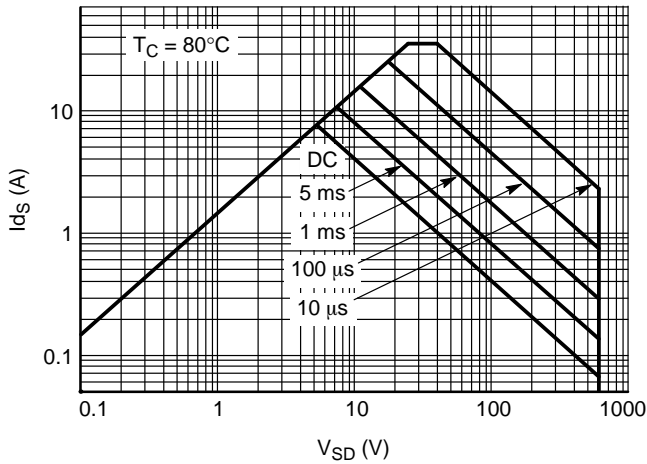


Figure 9. Safe Operating Area

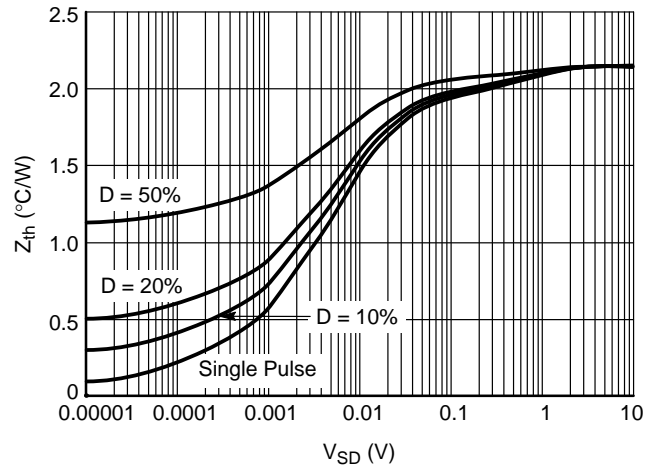


Figure 10. Transient Thermal Resistance

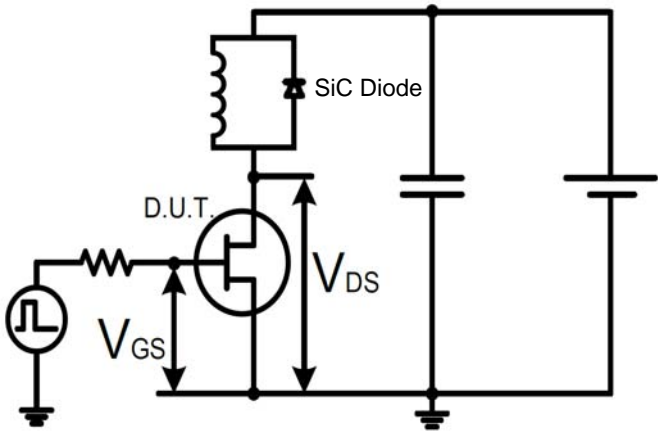


Figure 11. Switching Time Test Circuit

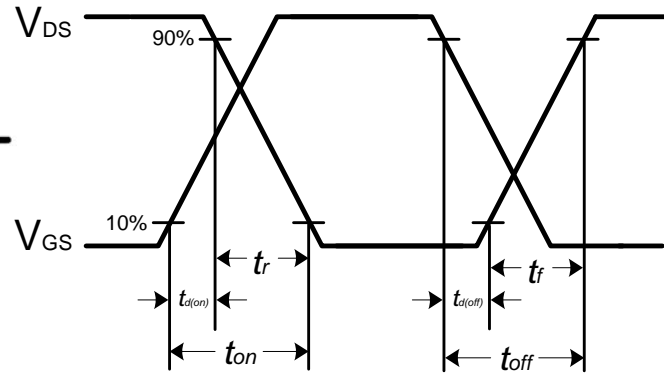


Figure 12. Switching Time Waveform

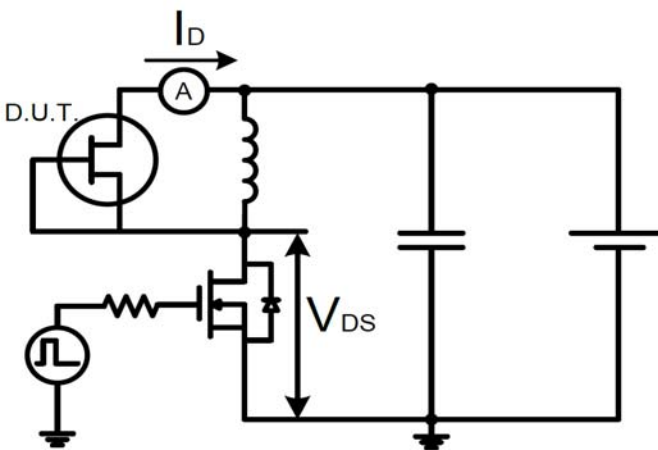


Figure 13. Test Circuit for Reverse Diode Characteristics

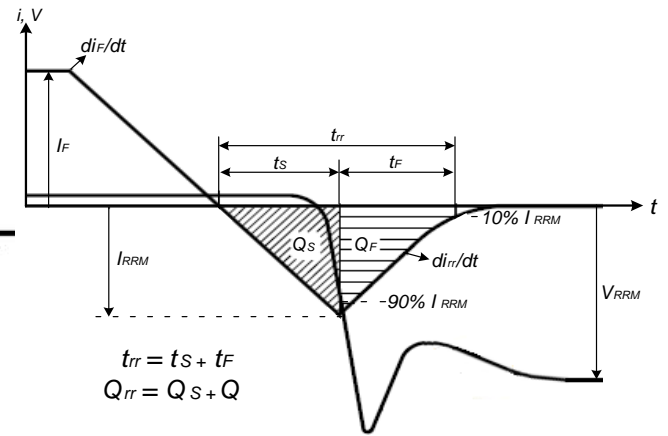
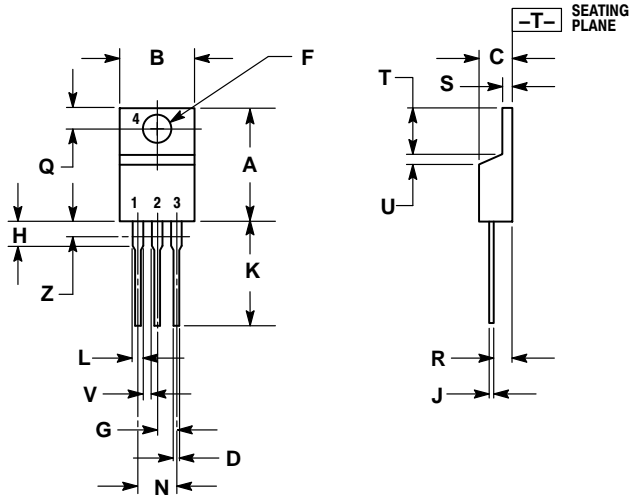


Figure 14. Diode Recovery Waveform

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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
- SOURCE
- DRAIN
- SOURCE

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