NTP4804N

Power MOSFET
30 V, 133 A, Single N−Channel, TO−220

Features

- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Optimized Gate Charge to Minimize Switching Losses
- These are Pb−Free Devices*

Applications

- AC−DC Converters
- DC−DC Converters
- Low Side Switching

MAXIMUM RATINGS (T_J = 25°C unless otherwise stated)

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	30	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current $R_{\theta JA}$ (Note 1)	Steady State	T_A = 25°C	I_D	21	A
		T_A = 85°C		13	
Power Dissipation $R_{\theta JA}$ (Note 1)		T_A = 25°C	P_D	3.0	W
Continuous Drain Current $R_{\theta JC}$		T_C = 25°C	I_D	133	A
		T_C = 85°C		85	
Power Dissipation RθJC		T_C = 25°C	P_D	120	W
Pulsed Drain Current	T_A = 25°C, t_p = 10 μs		I_{DM}	350	A
Current Limited by Package	T_A = 25°C		$I_{DmaxPkg}$	45	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to +175	°C
Source Current (Body Diode)			I_S	78	A
Drain to Source DV/DT			dV/dt	6	V/ns
Single Pulse Drain−to−Source Avalanche Energy T_J = 25°C, V_{DD} = 24 V, V_{GS} = 10 V, $I_{L(pk)}$ = 56 A, L = 0.3 mH, R_G = 25 Ω			EAS	474	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	°C

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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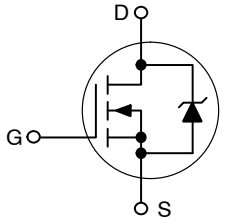
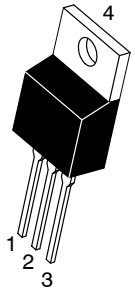
$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
30 V	4.0 mΩ @ 10 V	133 A
	5.5 mΩ @ 4.5 V	

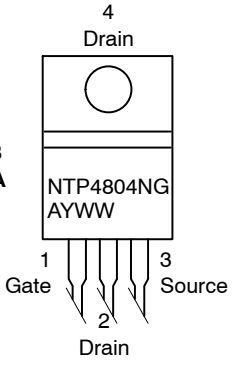
N−Channel



MARKING DIAGRAM & PIN ASSIGNMENT



TO−220AB
CASE 221A
STYLE 5



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

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 3 of this data sheet.

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction−to−Case (Drain)	$R_{\theta JC}$	1.25	°C/W
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	50	

1. Surface mounted on FR4 board using 1 in sq pad size, 1 oz Cu.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA		30			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				21		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 24 V	T_J = 25°C			1.0	μA
			T_J = 150°C			100	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V				±100	nA
ON CHARACTERISTICS (Note 2)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		1.5		2.5	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				6.9		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 30 A		3.3	4.0	mΩ
		V_{GS} = 4.5 V	I_D = 30 A		4.4	5.5	
			I_D = 15 A		4.4	5.5	
Forward Transconductance	g_{FS}	V_{DS} = 15 V, I_D = 15 A			22		TBD
CHARGES, CAPACITANCES AND GATE RESISTANCE							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 12 V			4160		pF
Output Capacitance	C_{OSS}				938		
Reverse Transfer Capacitance	C_{RSS}				455		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 15 V; I_D = 30 A			28	40	nC
Threshold Gate Charge	$Q_{G(TH)}$				3.4		
Gate−to−Source Charge	Q_{GS}				11.3		
Gate−to−Drain Charge	Q_{GD}				11.1		
Gate Resistance	R_G				0.49		Ω
SWITCHING CHARACTERISTICS (Note 3)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 4.5 V, V_{DS} = 15 V, I_D = 15 A, R_G = 3.0 Ω			18		ns
Rise Time	t_r				20		
Turn−Off Delay Time	$t_{d(OFF)}$				24		
Fall Time	t_f				8.0		
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DS} = 15 V, I_D = 15 A, R_G = 3.0 Ω			13		ns
Rise Time	t_r				19.6		
Turn−Off Delay Time	$t_{d(OFF)}$				35.7		
Fall Time	tf				7.7		

2. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
3. Switching characteristics are independent of operating junction temperatures.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 10 A	T_J = 25 °C		0.77	1.2	V
			T_J = 150°C		0.57		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, d_{IS}/d_t = 100 A/μs, I_S = 30 A			34.4		ns
Charge Time	T_a				18.9		
Discharge Time	T_b				15.5		
Reverse Recovery Charge	Q_{RR}				29.5		nC

2. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
3. Switching characteristics are independent of operating junction temperatures.

ORDERING INFORMATION

Order Number	Package	Shipping
NTP4804NG	TO−220 (Pb−Free)	50 Units / Rail

TYPICAL CHARACTERISTICS

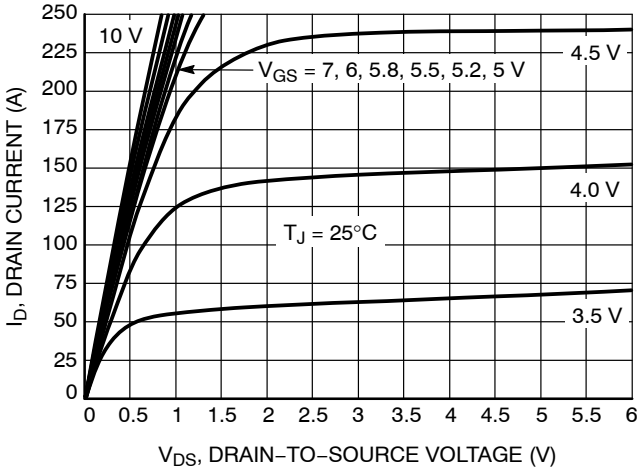


Figure 1. On−Region Characteristics

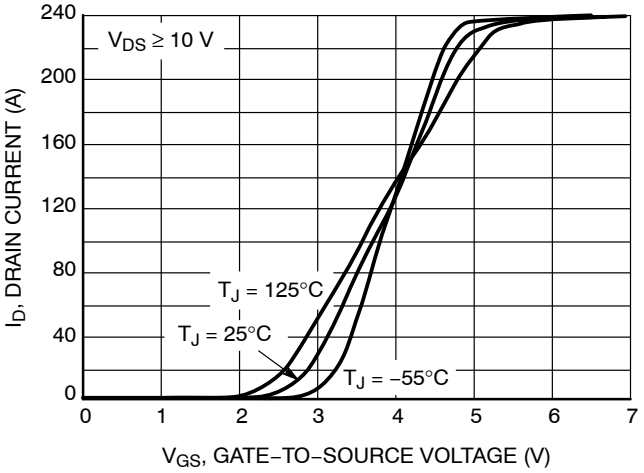


Figure 2. Transfer Characteristics

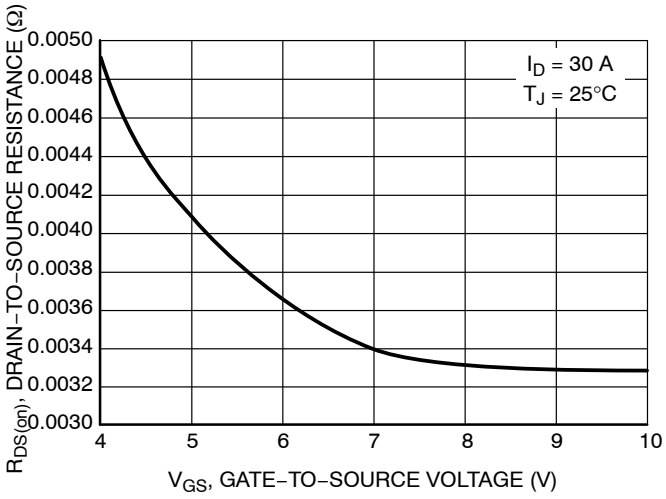


Figure 3. On−Resistance vs. Drain Current

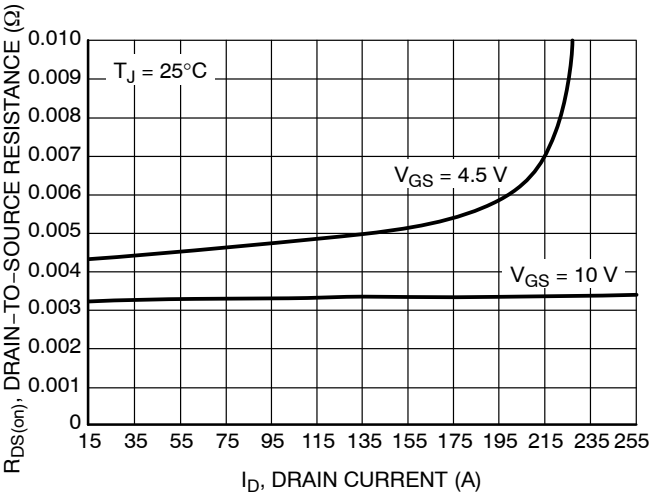


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

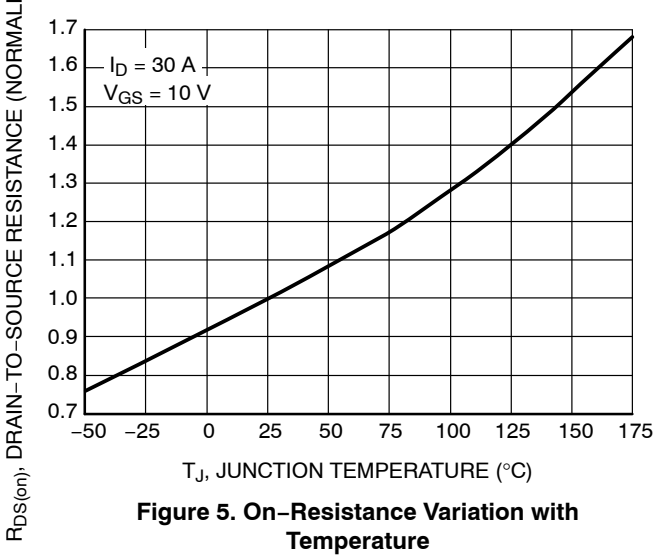


Figure 5. On−Resistance Variation with Temperature

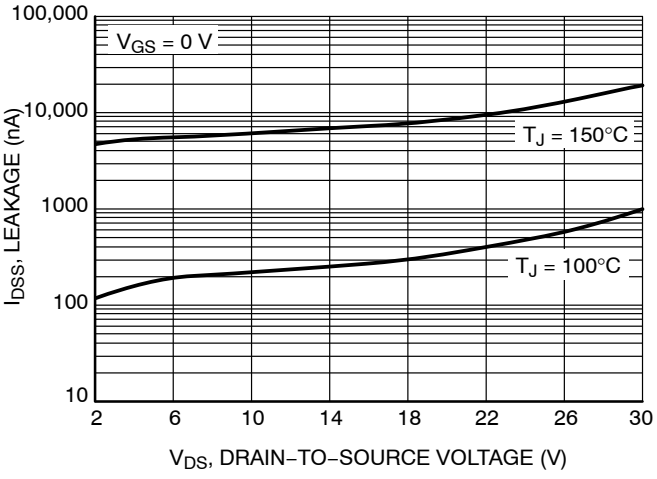


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

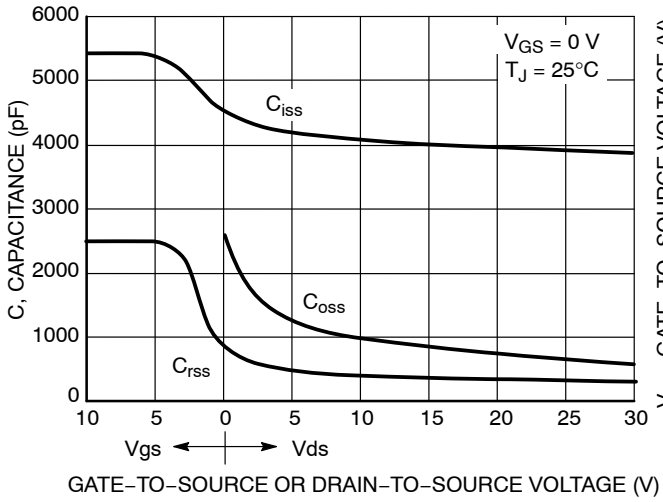


Figure 7. Capacitance Variation

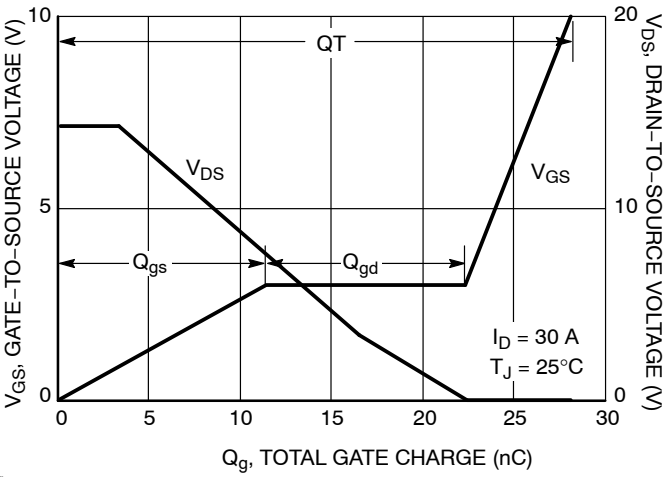


Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

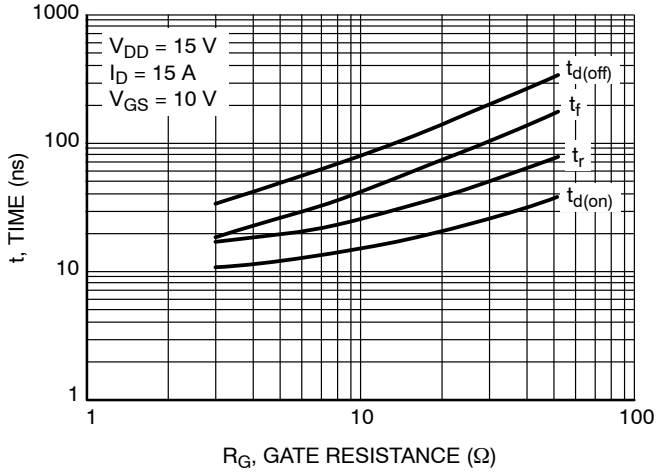


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

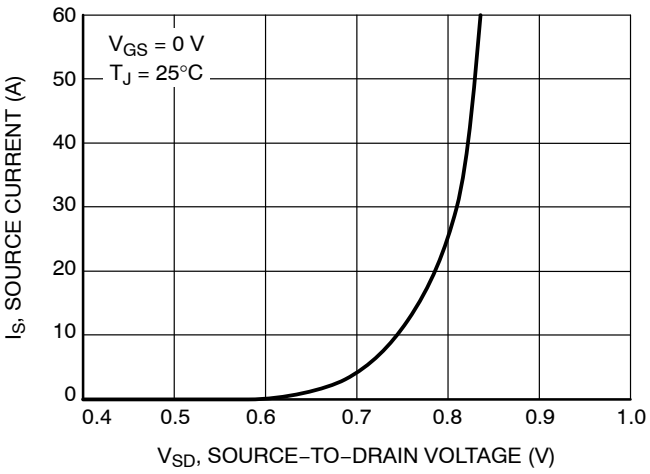
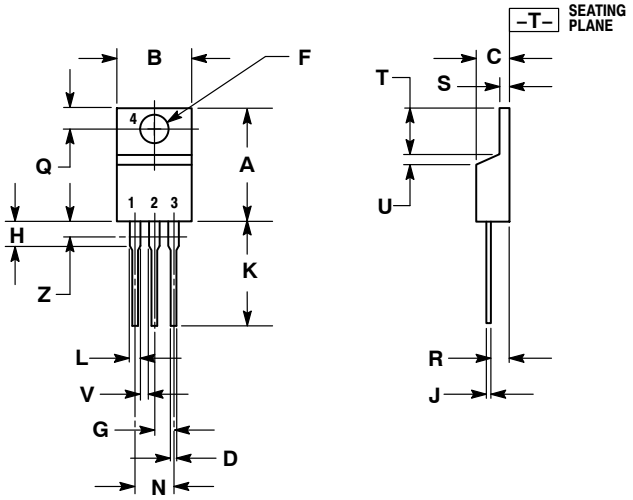


Figure 10. Diode Forward Voltage vs. Current

PACKAGE DIMENSIONS

TO−220, SINGLE GAUGE
CASE 221AB−01
ISSUE O



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.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	0.64
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	0.020	0.055	0.508	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 5:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

PUBLICATION ORDERING INFORMATION

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