NTP5864N

MOSFET – Power
60 V, 63 A, 12.4 mΩ

Features

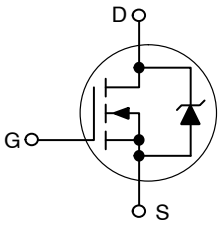
- Low $R_{DS(on)}$
- High Current Capability
- Avalanche Energy Specified
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

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$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX (Note 1)
60 V	12.4 mΩ @ 10 V	63 A

N−Channel



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

Parameter			Symbol	Value	Units
Drain−to−Source Voltage			V_{DSS}	60	V
Gate−to−Source Voltage − Continuous			V_{GS}	±20	V
Gate−to−Source Voltage − Non−Repetitive (t_p = 10 μs)			V_{GS}	±30	V
Continuous Drain Current − $R_{\theta JC}$ (Note 1)	Steady State	T_C = 25°C	I_D	63	A
		T_C = 100°C		45	
Power Dissipation − $R_{\theta JC}$ (Note 1)	Steady State	T_C = 25°C	P_D	107	W
		T_C = 100°C		54	
Pulsed Drain Current	t_p = 10 μs		I_{DM}	252	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 175	°C
Source Current (Body Diode) Pulsed			I_S	63	A
Single Pulse Drain−to Source Avalanche Energy − (L = 0.1 mH)			EAS	80	mJ
			IAS	40	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	°C

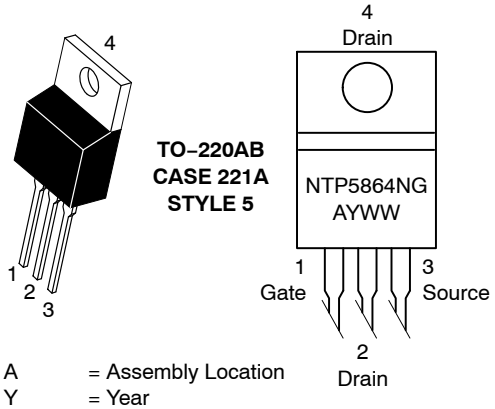
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Units
Junction−to−Case (Drain) − Steady State (Note 1)	$R_{\theta JC}$	1.4	°C/W
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	33	°C/W

1. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces).

MARKING DIAGRAM & PIN ASSIGNMENT



TO−220AB
CASE 221A
STYLE 5

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

ORDERING INFORMATION

Device	Package	Shipping
NTP5864NG	TO−220 (Pb−Free)	50 Units / Rail

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

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		60			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				58		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 60 V	T_J = 25°C			1.0	μA
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		2.0		4.0	V
Gate Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				−10		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 20 A			10.2	12.4	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 15 V, I_D = 20 A			10		S
CHARGES AND CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 25 V			1680		pF
Output Capacitance	C_{OSS}				189		
Reverse Transfer Capacitance	C_{RSS}				124		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 48 V, I_D = 20 A			31		nC
Threshold Gate Charge	$Q_{G(TH)}$				2.0		
Gate−to−Source Charge	Q_{GS}				7.3		
Gate−to−Drain Charge	Q_{GD}				10		
Gate Resistance	R_g				0.5		Ω
SWITCHING CHARACTERISTICS, V_{GS} = 10 V (Note 3)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DD} = 48 V, I_D = 20 A, R_G = 2.5 Ω			10		ns
Rise Time	t_r				6.4		
Turn−Off Delay Time	$t_{d(OFF)}$				18		
Fall Time	t_f				4.6		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 40 A	T_J = 25°C		0.94	1.2	V
			T_J = 125°C		0.84		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_{SD}/dt = 100 A/μs, I_S = 20 A			24		ns
Charge Time	t_a				16		
Discharge Time	t_b				7.9		
Reverse Recovery Charge	Q_{RR}				20		nC

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

TYPICAL CHARACTERISTICS

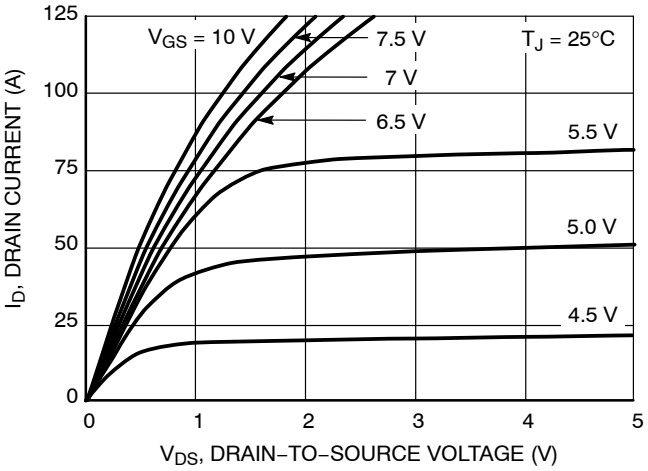


Figure 1. On−Region Characteristics

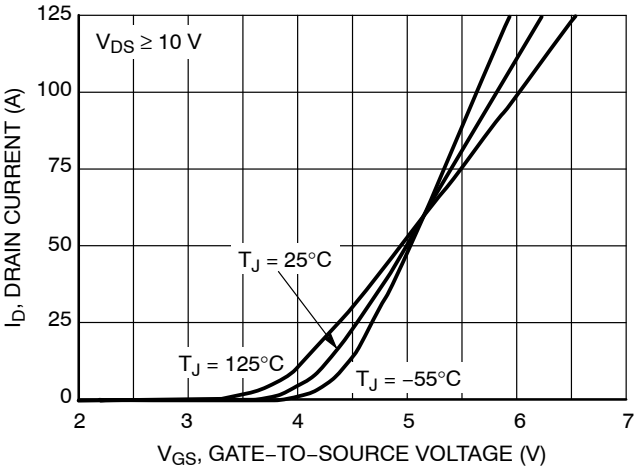


Figure 2. Transfer Characteristics

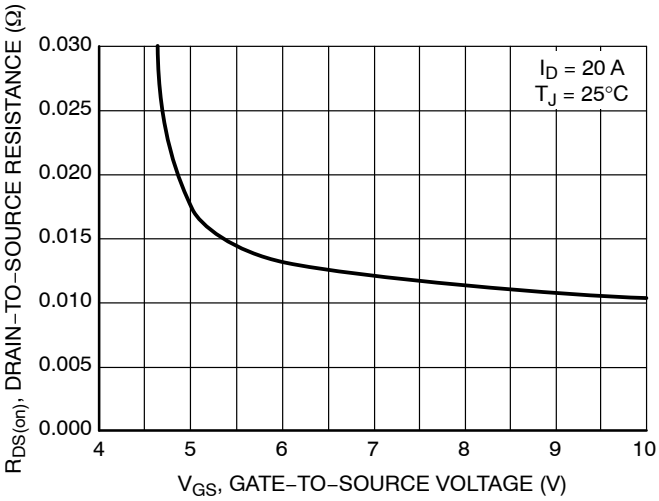


Figure 3. On−Resistance vs. Gate Voltage

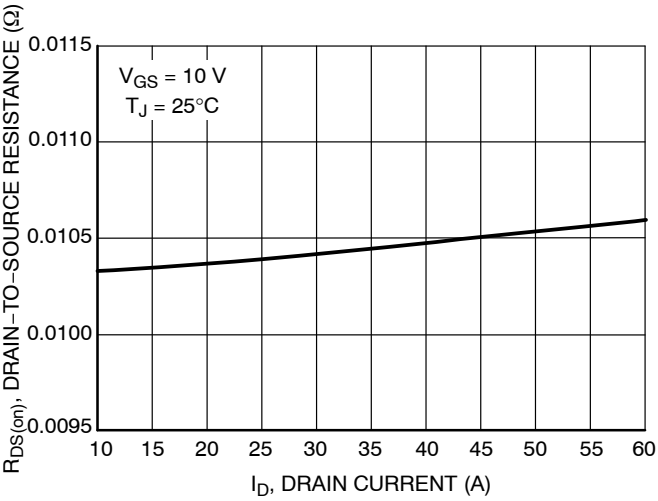


Figure 4. On−Resistance vs. Drain Current

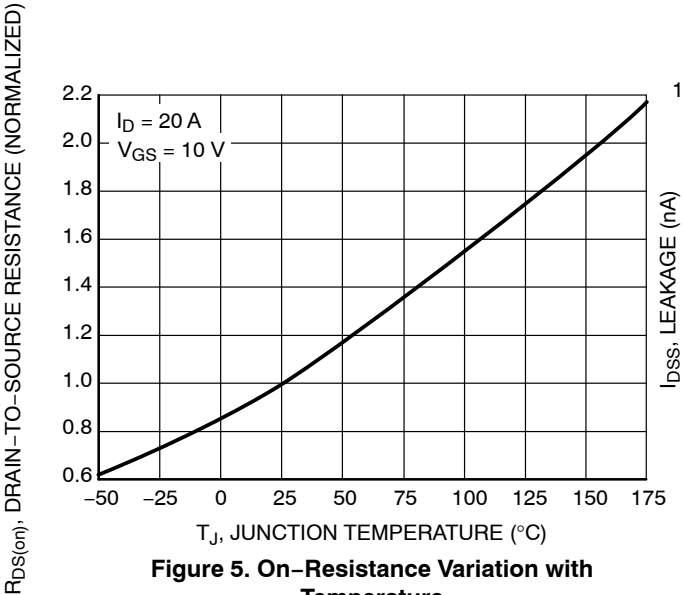


Figure 5. On−Resistance Variation with Temperature

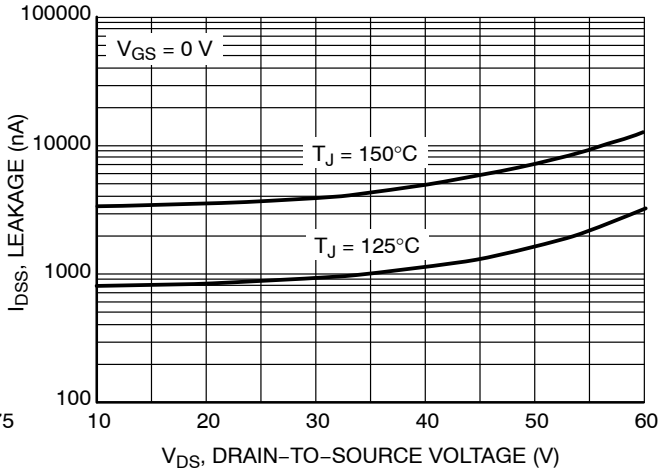


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

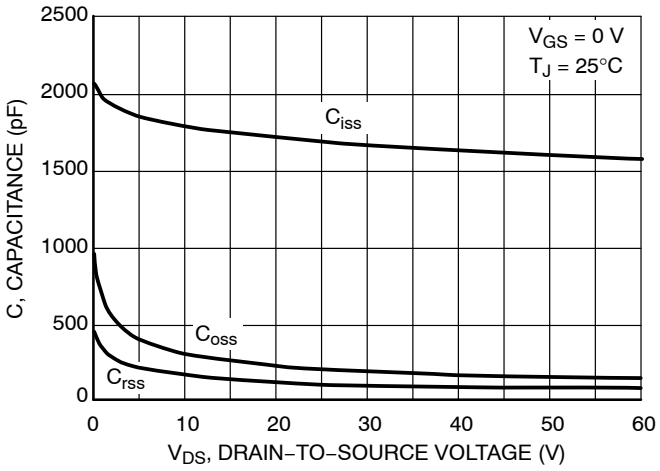


Figure 7. Capacitance Variation

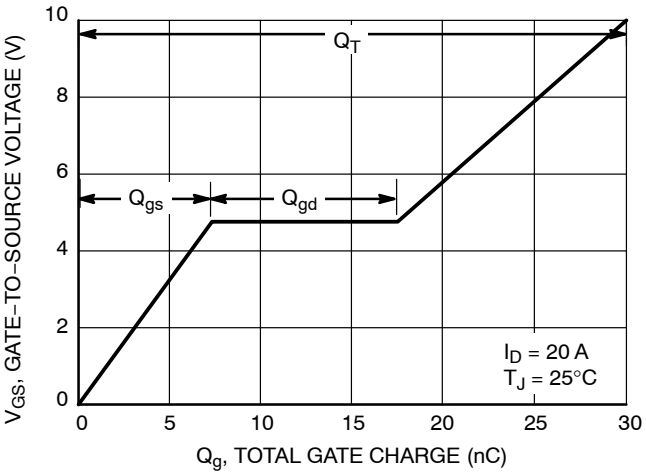


Figure 8. Gate−to−Source vs. Total Charge

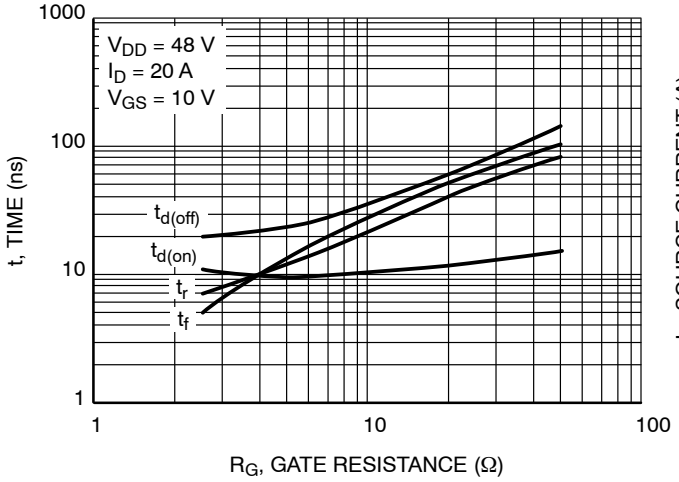


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

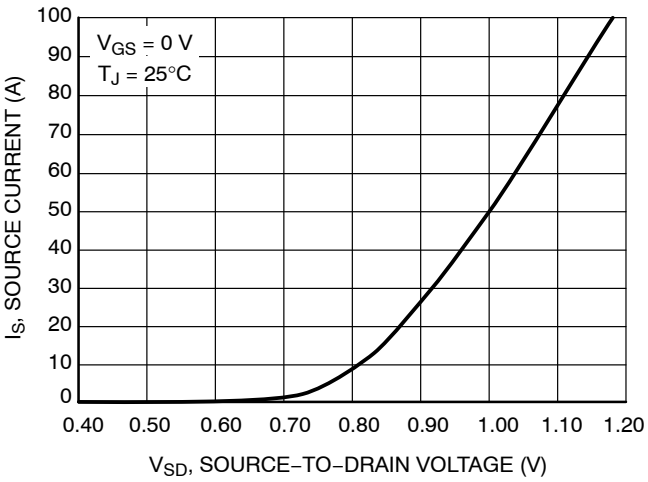


Figure 10. Diode Forward Voltage vs. Current

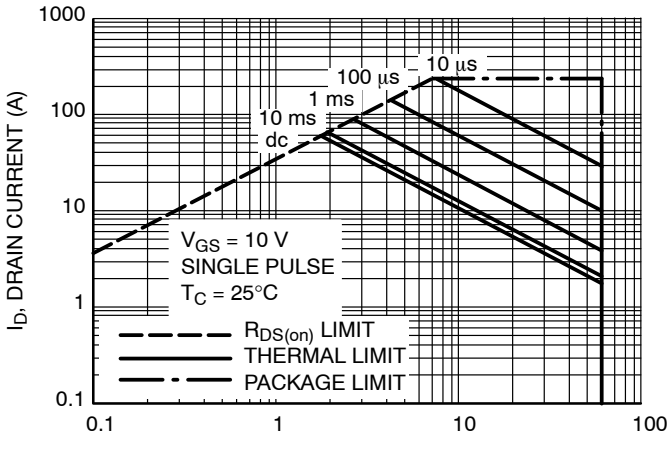


Figure 11. Maximum Rated Forward Biased Safe Operating Area

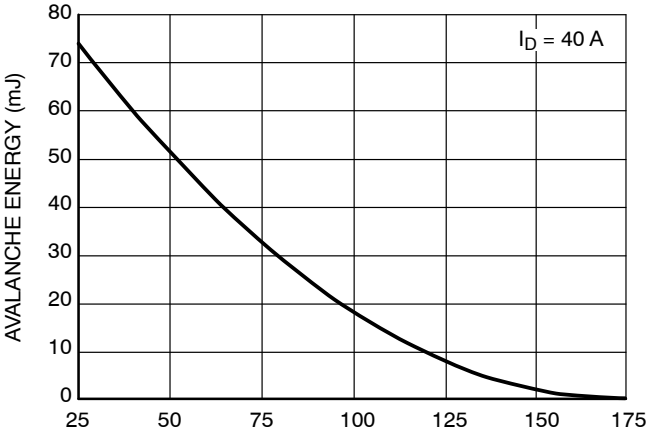


Figure 12. Maximum Avalanche Energy versus Starting Junction Temperature

TYPICAL CHARACTERISTICS

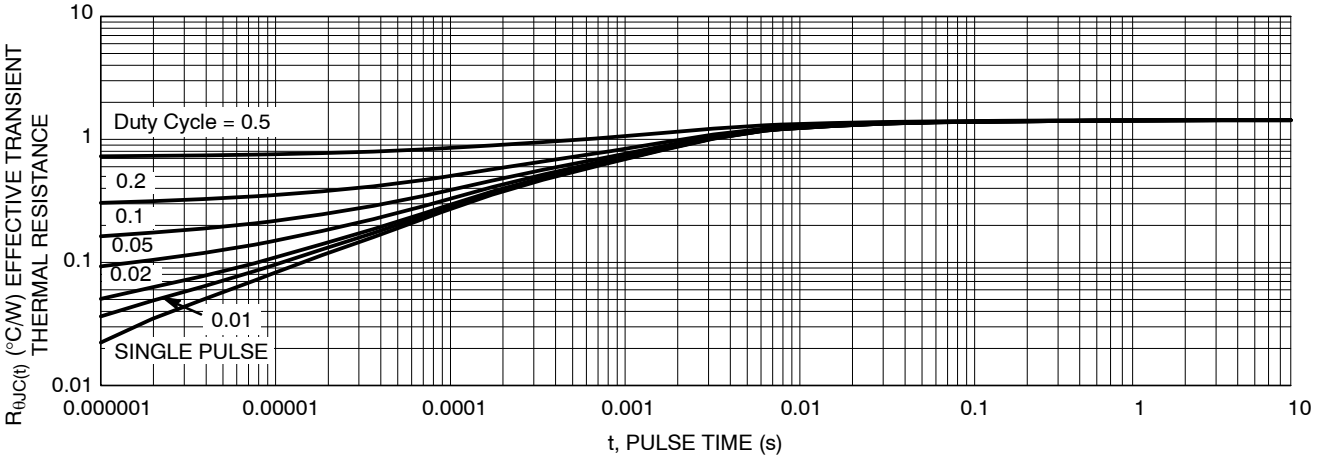


Figure 13. Thermal Response

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