NTP5863N

N-Channel Power MOSFET
60 V, 97 A, 7.8 mΩ

Features

- Low $R_{DS(on)}$
- High Current Capability
- 100% Avalanche Tested
- These Devices are Pb−Free, Halogen Free and are RoHS Compliant

MAXIMUM RATINGS (T_J = 25°C Unless otherwise specified)

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	60	V
Gate−to−Source Voltage − Continuous			V_{GS}	±20	V
Gate−to−Source Voltage − Nonrepetitive (T_P < 10 μs)			V_{GS}	30	V
Continuous Drain Current	Steady State	T_C = 25°C	I_D	97	A
		T_C = 100°C		68	
Power Dissipation	Steady State	T_C = 25°C	P_D	150	W
Pulsed Drain Current	t_p = 10 μs		I_{DM}	383	A
Operating and Storage Temperature Range			T_J, T_{stg}	−55 to +175	°C
Source Current (Body Diode)			I_S	97	A
Single Pulse Drain−to−Source Avalanche Energy (L = 0.1 mH, $I_{L(pk)}$ = 56 A)			E_{AS}	157	mJ
Peak Diode Recovery (dV/dt)			dV/dt	4.1	V/ns
Lead Temperature for Soldering Purposes (1/8″ from Case for 10 Seconds)			T_L	260	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction−to−Case (Drain) Steady State	$R_{\theta JC}$	1.0	°C/W
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	36	

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

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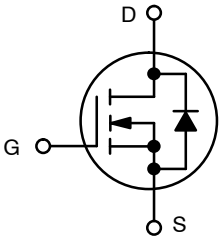
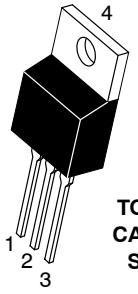
$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
60 V	7.8 mΩ @ 10 V	97 A

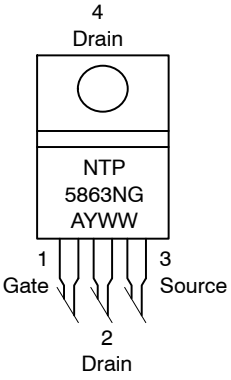


N−CHANNEL MOSFET



TO−220AB
CASE 221A
STYLE 5

MARKING DIAGRAMS & PIN ASSIGNMENTS



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

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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

Characteristics	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{DS} = 0 V, I_D = 250 μA		60			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = 250 μA, ref to 25°C			47		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 60 V	T_J = 25°C			1.0	μA
			T_J = 125°C			50	
Gate−Body 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
Negative Threshold Temperature Coefficient	$V_{GS(th)}/T_J$				9.1		mV/°C
Drain−to−Source On−Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 20 A			6.5	7.8	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 15 V, I_D = 30 A			12		S
CHARGES, CAPACITANCES & GATE RESISTANCE							
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz			3200		pF
Output Capacitance	C_{oss}				350		
Transfer Capacitance	C_{rss}				230		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 48 V, I_D = 48 A			55		nC
Threshold Gate Charge	$Q_{G(TH)}$				3.4		
Gate−to−Source Charge	Q_{GS}				14.5		
Gate−to−Drain Charge	Q_{GD}				19		
Gate Resistance	R_G				0.4		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 = 48 A, R_G = 2.5 Ω			10		ns
Rise Time	t_r				34		
Turn−Off Delay Time	$t_{d(off)}$				25		
Fall Time	t_f				9.0		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 48 A	T_J = 25°C		0.96	1.5	V_{dc}
			T_J = 150°C		0.85		
Reverse Recovery Time	t_{rr}	V_{GS} = 0 V_{dc}, I_S = 48 A_{dc}, dI_S/dt = 100 A/μs			32		ns
Charge Time	t_a				20		
Discharge Time	t_b				12		
Reverse Recovery Stored Charge	Q_{RR}				28		nC

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
3. Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CHARACTERISTICS

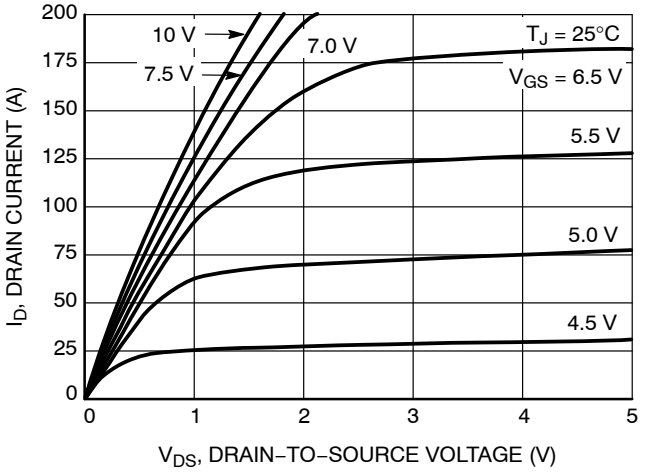


Figure 1. On−Region Characteristics

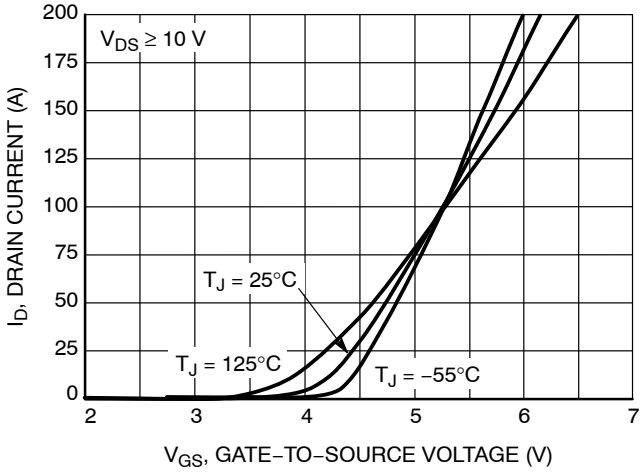


Figure 2. Transfer Characteristics

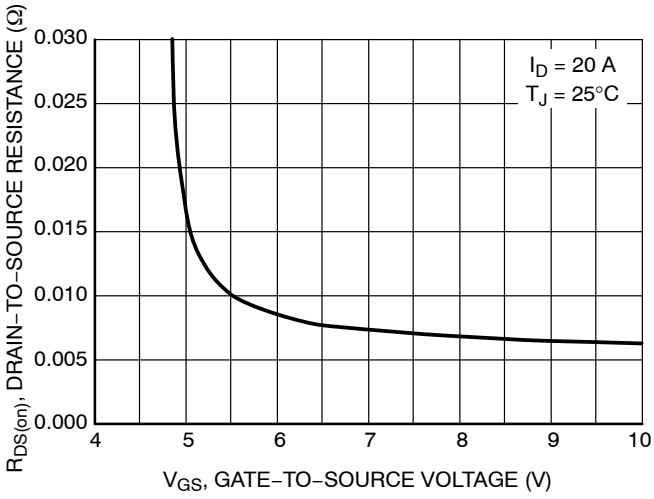


Figure 3. On−Resistance vs. Gate Voltage

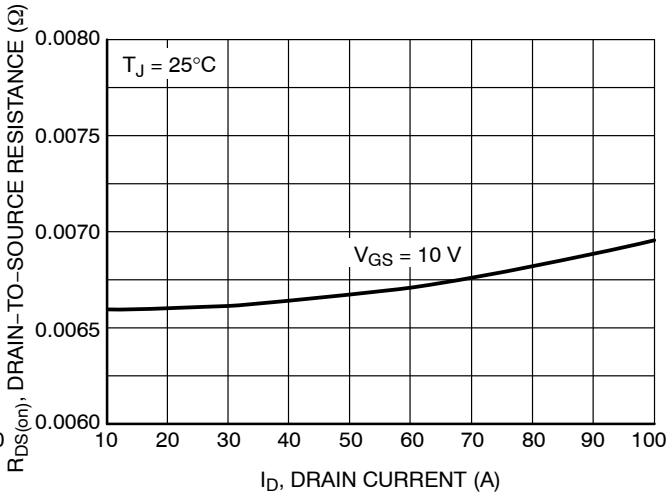


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

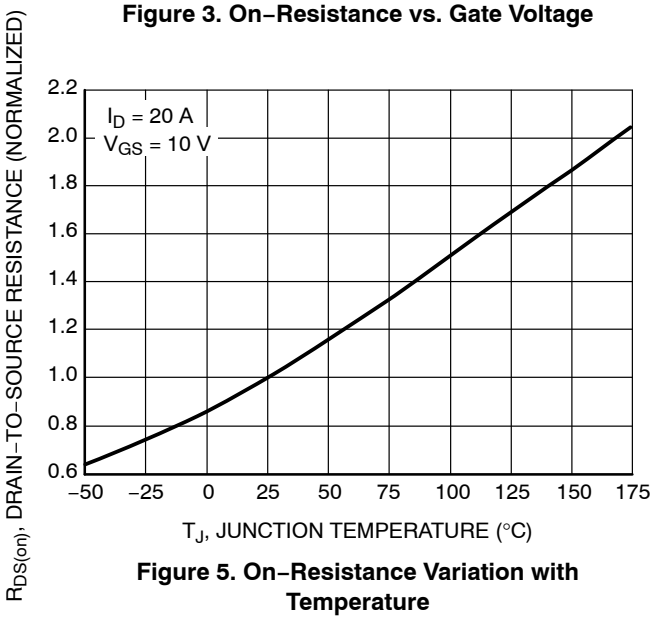


Figure 5. On−Resistance Variation with Temperature

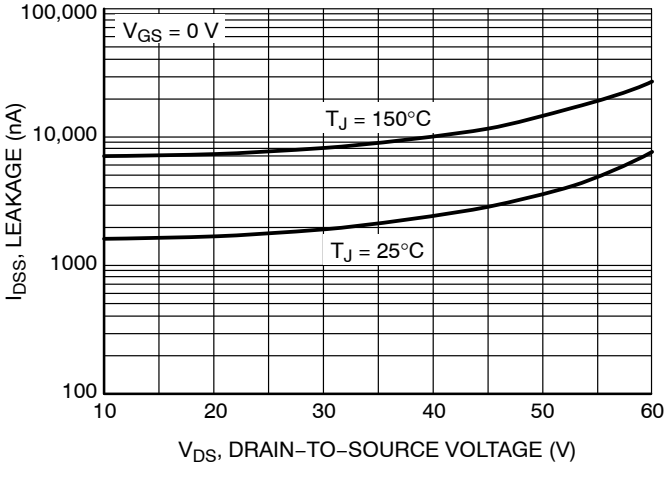


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL PERFORMANCE CHARACTERISTICS

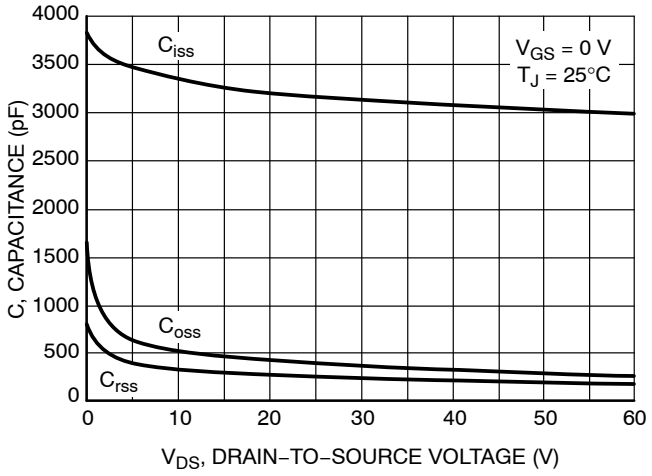


Figure 7. Capacitance Variation

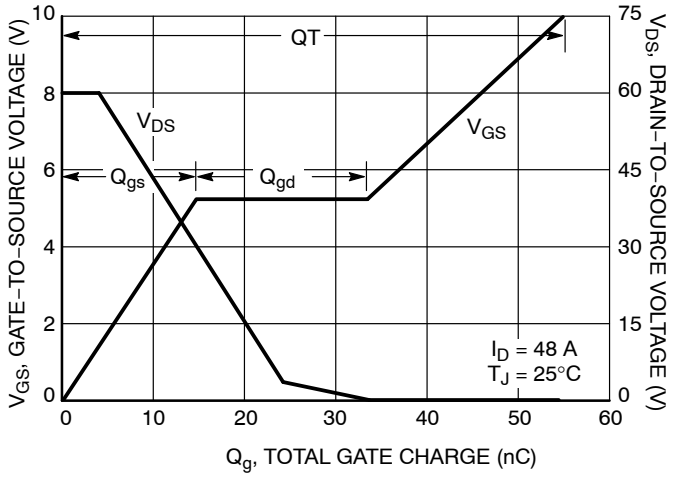


Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

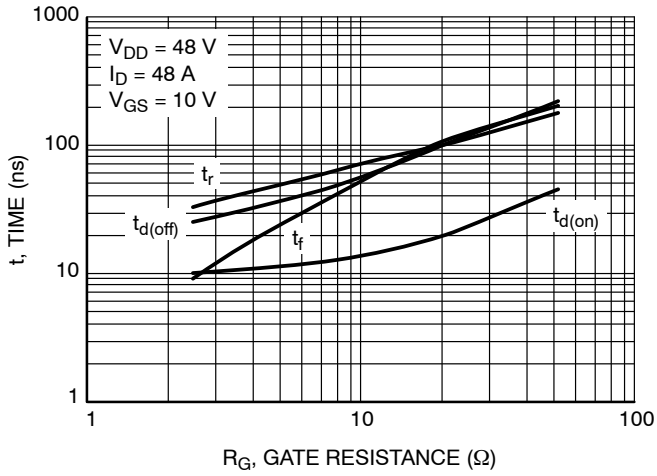


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

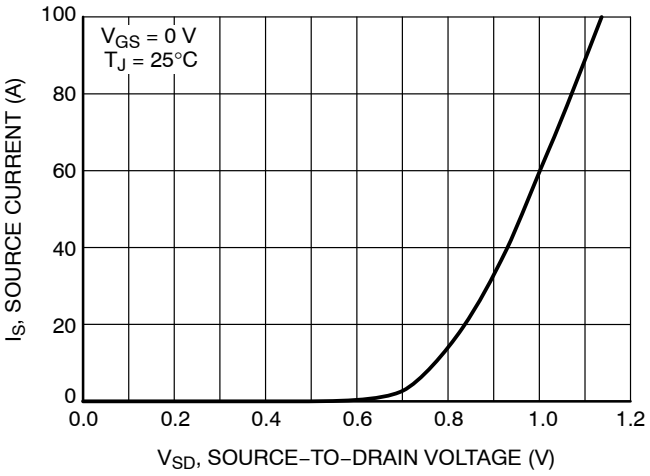


Figure 10. Diode Forward Voltage vs. Current

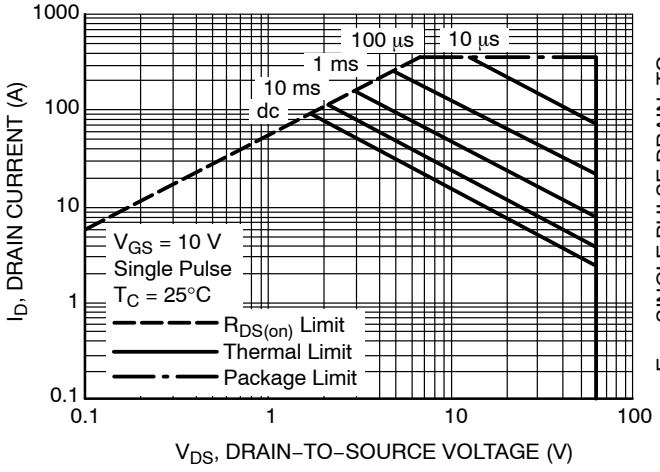


Figure 11. Maximum Rated Forward Biased Safe Operating Area

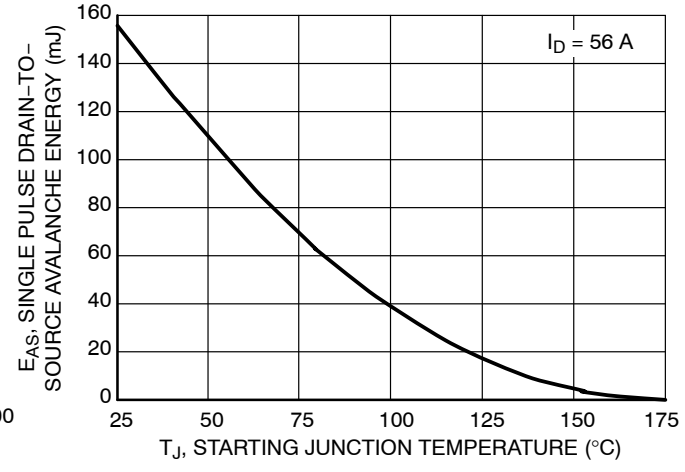


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

TYPICAL PERFORMANCE CHARACTERISTICS

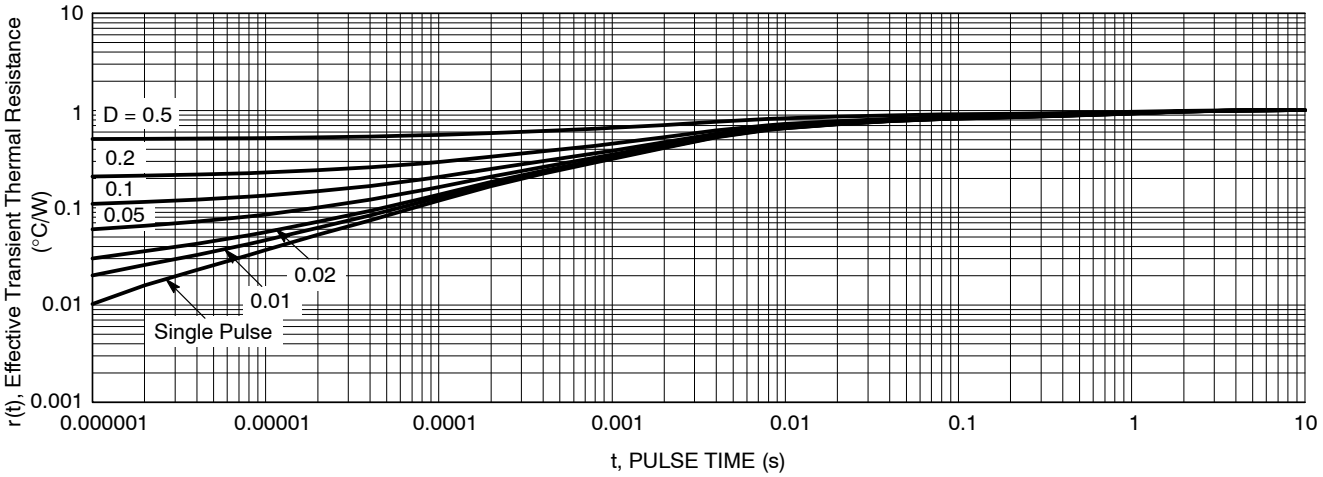


Figure 13. Thermal Response

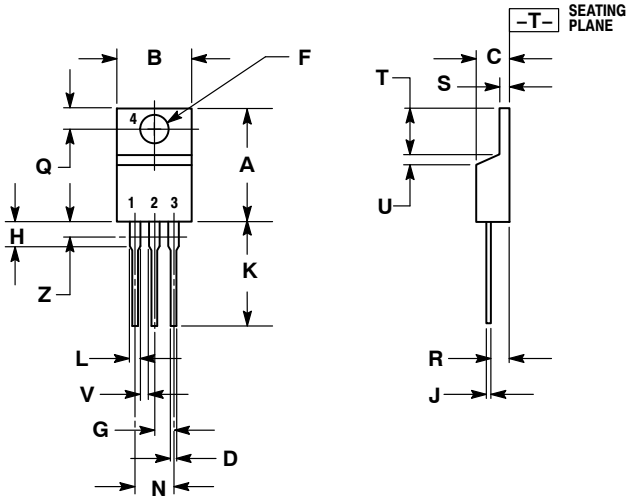
ORDERING INFORMATION

Device	Package	Shipping†
NTP5863NG	TO−220AB (Pb−Free)	50 Units / Rail

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

PACKAGE DIMENSIONS

TO−220
CASE 221A−09
ISSUE AF



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	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.014	0.025	0.36	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	0.045	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 5:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
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