MOSFET - Power 60 V, 63 A, 12.4 m Ω

Features

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

MAXIMUM RATINGS ($T_J = 25^{\circ}C$ 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	Steady	T _C = 25°C	I _D	63	Α	
Current – R _{θJC} (Note 1)	State	T _C = 100°C		45		
Power Dissipation -	Steady	T _C = 25°C	P_{D}	107	W	
R _{θJC} (Note 1)	State	T _C = 100°C		54		
Pulsed Drain Current	t _p :	= 10 μs	I _{DM}	252	Α	
Operating Junction and Storage Temperature			T _J , T _{STG}	–55 to 175	°C	
Source Current (Body Diode) Pulsed			IS	63	Α	
Single Pulse Drain-to Source Avalanche		Source Avalanche		80	mJ	
Energy – (L = 0.1 mH)			IAS	40	Α	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			TL	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).

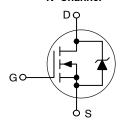


ON Semiconductor®

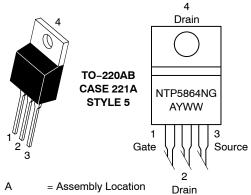
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V _{(BR)DSS}	R _{DS(ON)} MAX	I _D MAX (Note 1)
60 V	12.4 mΩ @ 10 V	63 A

N-Channel



MARKING DIAGRAM & PIN ASSIGNMENT



= Year

Υ WW = Work Week G = Pb-Free Package

ORDERING INFORMATION

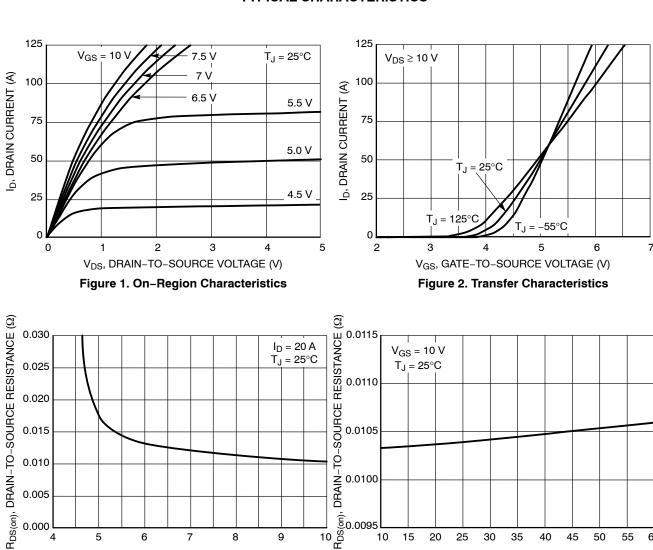
Device	Package	Shipping
NTP5864NG	TO-220 (Pb-Free)	50 Units / Rail

ELECTRICAL CHARACTERISTICS ($T_J = 25^{\circ}C$ unless otherwise stated)

Parameter	Symbol	Test Con	Test Condition		Тур	Max	Unit
OFF CHARACTERISTICS	,		<u>.</u>				
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$		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	μΑ
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _O	_{SS} = ±20 V			±100	nA
ON CHARACTERISTICS (Note 2)	•		•		•	•	•
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _E) = 250 μΑ	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	9FS	V _{DS} = 15 V, I _D = 20 A			10		S
CHARGES AND CAPACITANCES			<u>.</u>				
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}	103			124		
Total Gate Charge	Q _{G(TOT)}				31		nC
Threshold Gate Charge	Q _{G(TH)}	V _{GS} = 10 V, V	$V_{GS} = 10 \text{ V}, V_{DS} = 48 \text{ V},$ $I_{D} = 20 \text{ A}$		2.0		7
Gate-to-Source Charge	Q _{GS}	I _D = 20	ĎĂ		7.3		7 !
Gate-to-Drain Charge	Q_{GD}				10		
Gate Resistance	R_{g}				0.5		Ω
SWITCHING CHARACTERISTICS, Vo	is = 10 V (Note	3)					
Turn-On Delay Time	t _{d(ON)}				10		ns
Rise Time	t _r	V _{GS} = 10 V, V	_{DD} = 48 V,		6.4		7
Turn-Off Delay Time	t _{d(OFF)}	$I_D = 20 \text{ A}, R_G = 2.5 \Omega$			18		
Fall Time	t _f				4.6		
DRAIN-SOURCE DIODE CHARACTE	RISTICS		<u>.</u>				
Forward Diode Voltage V _{SD}	V_{SD}	$V_{GS} = 0 V$	T _J = 25°C		0.94	1.2	V
	I _S = 40 A	T _J = 125°C		0.84			
Reverse Recovery Time	t _{RR}	$V_{GS} = 0 \text{ V, } dl_{SD}/dt = 100 \text{ A/}\mu\text{s,}$ $l_{S} = 20 \text{ A}$			24		ns
Charge Time	t _a				16		
Discharge Time	t _b				7.9		
Reverse Recovery Charge	Q _{RR}				20		nC

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

TYPICAL CHARACTERISTICS



V_{GS}, GATE-TO-SOURCE VOLTAGE (V) Figure 3. On-Resistance vs. Gate Voltage

7

0.005

0.000

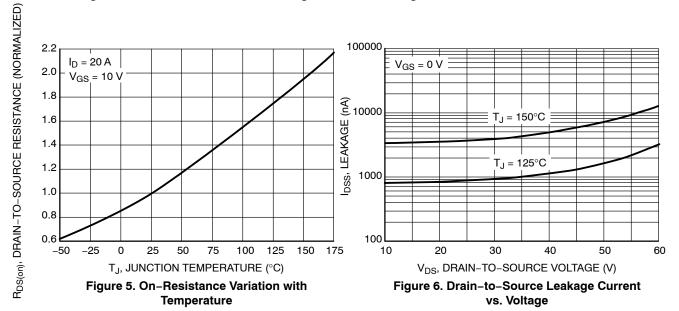
I_D, DRAIN CURRENT (A) Figure 4. On-Resistance vs. Drain Current

35

40

50

60



10 E 0.0095

15

10

20

TYPICAL CHARACTERISTICS

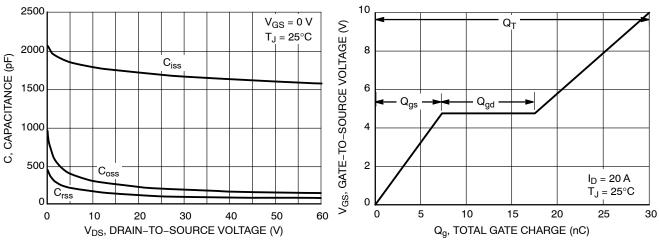


Figure 7. Capacitance Variation

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

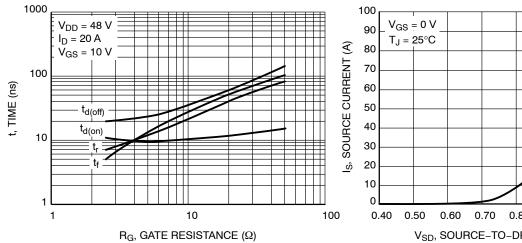


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

0.70 0.80 0.90 1.00 1.10 1.20 V_{SD}, SOURCE-TO-DRAIN VOLTAGE (V) Figure 10. Diode Forward Voltage vs. Current

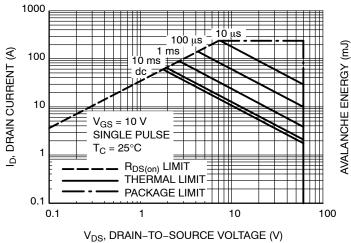


Figure 11. Maximum Rated Forward Biased Safe Operating Area

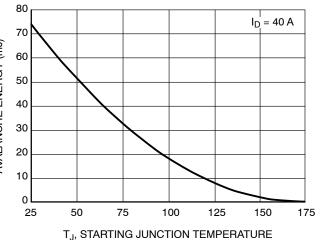


Figure 12. Maximum Avalanche Energy versus **Starting Junction Temperature**

TYPICAL CHARACTERISTICS

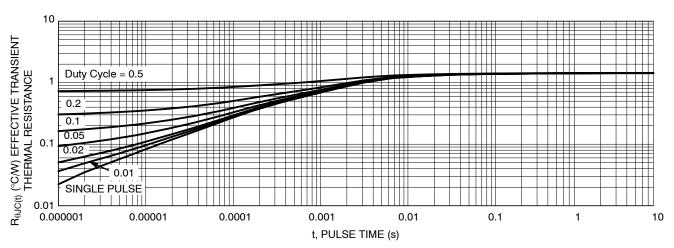


Figure 13. Thermal Response

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