

NTP5N60

Preferred Devices

Product Preview

Power MOSFET 5 Amps, 600 Volts N-Channel TO-220

Designed for high voltage, high speed switching applications in power supplies, converters, power motor controls and bridge circuits.

Features

- Higher Current Rating
- Lower $R_{DS(on)}$
- Lower Capacitances
- Lower Total Gate Charge
- Tighter V_{SD} Specifications
- Avalanche Energy Specified

Typical Applications

- Switch Mode Power Supplies
- PWM Motor Controls
- Converters
- Bridge Circuits

MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	600	Vdc
Drain-Gate Voltage ($R_{GS} = 1.0\text{ M}\Omega$)	V_{DGR}	600	Vdc
Gate-Source Voltage	V_{GS}	± 20	Vdc
– Continuous	V_{GS}	± 40	
– Non-Repetitive ($t_p \leq 10\text{ ms}$)			
Drain-Continuous @ $T_A 25^\circ\text{C}$	I_D	5	Adc
– Continuous @ $T_A 100^\circ\text{C}$	I_D	3.8	
– Single Pulse ($t_p \leq 10\ \mu\text{s}$)	I_{DM}	17.5	Apk
Total Power Dissipation @ $T_A 25^\circ\text{C}$	P_D	96	Watts
Derate above 25°C		0.77	W/ $^\circ\text{C}$
Total Power Dissipation @ $T_A 25^\circ\text{C}$ (Note 1.)		1.75	Watts
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$
Single Drain-to-Source Avalanche Energy – Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = 100\text{ V}$, $V_{GS} = 10\text{ Vdc}$, $I_L(pk) = 5\text{ A}$, $L = 10\text{ mH}$, $V_{DS} = 600\text{ Vdc}$, $R_G = 25\ \Omega$)	E_{AS}	80	mJ
Thermal Resistance			$^\circ\text{C/W}$
– Junction-to-Case	$R_{\theta JC}$	1.3	
– Junction-to-Ambient	$R_{\theta JA}$	62.5	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	$^\circ\text{C}$

1. Repetitive rating; pulse width limited by maximum junction temperature.

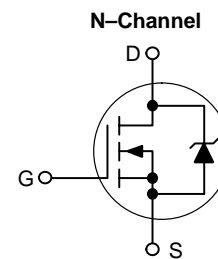
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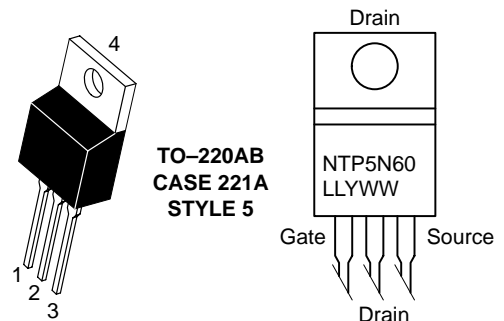
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**5 AMPERES
600 VOLTS
 $R_{DS(on)} = 2400\text{ m}\Omega$**



MARKING DIAGRAMS AND PIN ASSIGNMENTS



NTP5N60 = Device Code
LL = Location Code
Y = Year
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping
NTP5N60	TO-220AB	50 Units/Rail

Preferred devices are recommended choices for future use and best overall value.

NTP5N60

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain-to-Source Breakdown Voltage (Note 2.) (V _{GS} = 0 Vdc, I _D = 250 μAdc) Temperature Coefficient (Positive)	V _{(BR)DSS}	600 –	– 700	– –	Vdc mV/°C
Zero Gate Voltage Drain Current (V _{DS} = 600 Vdc, V _{GS} = 0 Vdc) (V _{DS} = 600 Vdc, V _{GS} = 0 Vdc, T _J = 125°C)	I _{DSS}	– –	– –	10 100	μAdc
Gate-Body Leakage Current (V _{GS} = ±20 Vdc, V _{DS} = 0 Vdc)	I _{GSS}	–	–	±100	nAdc

ON CHARACTERISTICS (Note 2.)

Gate Threshold Voltage (V _{DS} = V _{GS} , I _D = 250 μAdc) Temperature Coefficient (Negative)	V _{GS(th)}	2.0 –	2.7 6.0	4.0 –	Vdc mV/°C
Static Drain-to-Source On-Resistance (V _{GS} = 10 Vdc, I _D = 2.5 Adc)	R _{DS(on)}	–	2100	2400	mOhm
Static Drain-to-Source On-Resistance (V _{GS} = 10 Vdc, I _D = 5 Adc) (V _{GS} = 10 Vdc, I _D = 2.5 Adc, T _J = 125°C)	V _{DS(on)}	– –	– –	14.4 13.1	V
Forward Transconductance (V _{DS} = 15 Vdc, I _D = 2.5 Adc)	g _{FS}	0.7	3.8	–	mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	(V _{DS} = 25 Vdc, V _{GS} = 0 Vdc, f = 1.0 MHz)	C _{iss}	–	540	780	pF
Output Capacitance		C _{oss}	–	125	180	
Transfer Capacitance		C _{rss}	–	8.0	20	

SWITCHING CHARACTERISTICS (Note 3.)

Turn-On Delay Time	(V _{DD} = 300 Vdc, I _D = 5 Adc, V _{GS} = 10 Vdc, R _G = 9.1 Ω)	t _{d(on)}	–	12	20	ns
Rise Time		t _r	–	7.0	10	
Turn-Off Delay Time		t _{d(off)}	–	19	40	
Fall Time		t _f	–	10	20	
Gate Charge	(V _{DS} = 400 Vdc, I _D = 5 Adc, V _{GS} = 10 Vdc)	Q _T	–	5.0	10	nC
		Q ₁	–	2.7	–	
		Q ₂	–	2.0	–	

SOURCE-DRAIN DIODE CHARACTERISTICS

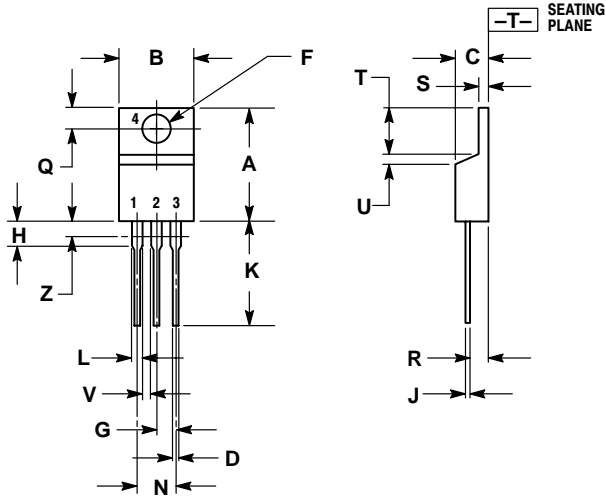
Forward On-Voltage (Note 2.)	(I _S = 5 Adc, V _{GS} = 0 Vdc) (I _S = 5 Adc, V _{GS} = 0 Vdc, T _J = 125°C)	V _{SD}	– –	0.86 0.75	1.0 –	Vdc
Reverse Recovery Time	(I _S = 5 Adc, V _{GS} = 0 Vdc, di _S /dt = 100 A/μs)	t _{rr}	–	655	–	ns
		t _a	–	103	–	
		t _b	–	552	–	
Reverse Recovery Stored Charge		Q _R	–	1.9	–	μC

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

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PACKAGE DIMENSIONS

TO-220 THREE-LEAD
TO-220AB
CASE 221A-09
ISSUE AA



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	0.405	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	0.045	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
- DRAIN
- SOURCE
- DRAIN

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