NTP7N40

Preferred Devices

Product Preview

Power MOSFET 7 Amps, 400 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°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain–Source Voltage	V_{DSS}	400	Vdc
Drain–Gate Voltage (R_{GS} = 1.0 MΩ)	V_{DGR}	400	Vdc
Gate–Source Voltage – Continuous – Non–Repetitive ($t_p \leq 10$ ms)	 V_{GS} V_{GS}	 ±20 ±40	Vdc
Drain – Continuous @ T_A 25°C – Continuous @ T_A 100°C – Single Pulse ($t_p \leq 10$ µs)	I_D I_D I_{DM}	7 6.3 24.5	Adc Apk
Total Power Dissipation @ T_A 25°C Derate above 25°C Total Power Dissipation @ T_A 25°C (Note NO TAG)	P_D	96 0.77 1.75	Watts W/°C Watts
Operating and Storage Temperature Range	T_J, T_{stg}	–55 to +150	°C
Single Drain–to–Source Avalanche Energy – Starting T_J = 25°C (V_{DD} = 100 V, V_{GS} = 10 Vdc, I_L(pk) = 7 A, L = 10 mH, V_{DS} = 400 Vdc, R_G = 25 Ω)	E_{AS}	180	mJ
Thermal Resistance – Junction–to–Case – Junction–to–Ambient	 $R_{\theta JC}$ $R_{\theta JA}$	 1.3 62.5	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 10 seconds	T_L	260	°C

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

This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.

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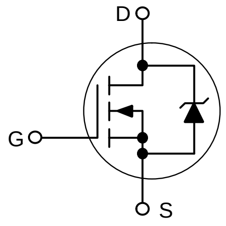
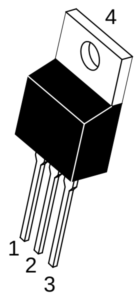
7 AMPERES
400 VOLTS
$R_{DS(on)}$ = 1100 mΩ

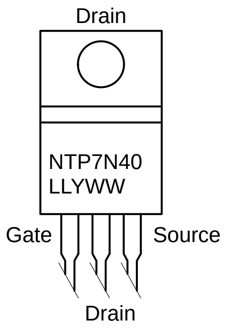
N–Channel



MARKING DIAGRAMS AND PIN ASSIGNMENTS



TO–220AB
CASE 221A
STYLE 5



NTP7N40 = Device Code
LL = Location Code
Y = Year
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping
NTP7N40	TO–220AB	50 Units/Rail

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

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

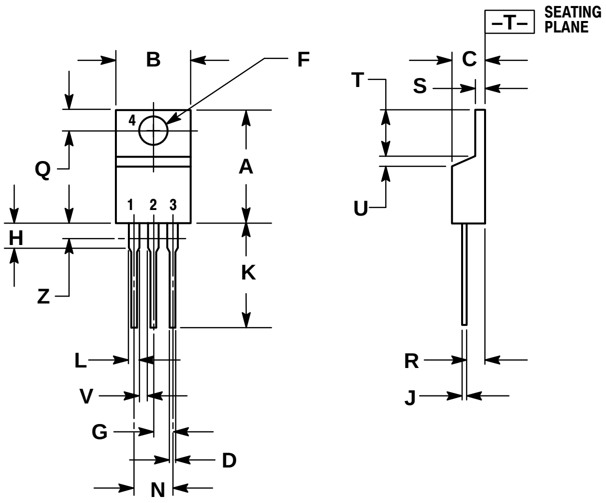
Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain–to–Source Breakdown Voltage (Note 2.)		$V_{(BR)DSS}$				Vdc
(V_{GS} = 0 Vdc, I_D = 250 μAdc)			400	–	–	
Temperature Coefficient (Positive)			–	500	–	mV/°C
Zero Gate Voltage Drain Current		I_{DSS}				μAdc
(V_{DS} = 400 Vdc, V_{GS} = 0 Vdc)			–	–	10	
(V_{DS} = 400 Vdc, V_{GS} = 0 Vdc, T_J =125°C)			–	–	100	
Gate–Body Leakage Current (V_{GS} = ±20 Vdc, V_{DS} = 0 Vdc)		I_{GSS}	–	–	±100	nAdc
ON CHARACTERISTICS (Note 2.)						
Gate Threshold Voltage		$V_{GS(th)}$				Vdc
(V_{DS} = V_{GS}, I_D = 250 μAdc)			2.0	2.7	4.0	
Temperature Coefficient (Negative)			–	6.0	–	mV/°C
Static Drain–to–Source On–Resistance (V_{GS} = 10 Vdc, I_D = 3.5 Adc)		$R_{DS(on)}$	–	900	1100	mOhm
Static Drain–to–Source On–Resistance		$V_{DS(on)}$				V
(V_{GS} = 10 Vdc, I_D = 7 Adc)			–	–	9.2	
(V_{GS} = 10 Vdc, I_D = 3.5 Adc, T_J = 125°C)			–	–	8.3	
Forward Transconductance (V_{DS} = 15 Vdc, I_D = 3.5 Adc)		g_{FS}	2.0	4.4	–	mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = 25 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{iss}	–	515	720	pF
Output Capacitance		C_{oss}	–	185	260	
Transfer Capacitance		C_{rss}	–	15	30	
SWITCHING CHARACTERISTICS (Note 3.)						
Turn–On Delay Time	(V_{DD} = 200 Vdc, I_D = 7 Adc, V_{GS} = 10 Vdc, R_G = 9.1 Ω)	$t_{d(on)}$	–	7.0	10	ns
Rise Time		t_r	–	11	20	
Turn–Off Delay Time		$t_{d(off)}$	–	19	40	
Fall Time		t_f	–	10	20	
Gate Charge	(V_{DS} = 320 Vdc, I_D = 7 Adc, V_{GS} = 10 Vdc)	Q_T	–	9.5	19	nC
		Q_1	–	2.0	–	
		Q_2	–	3.0	–	
SOURCE–DRAIN DIODE CHARACTERISTICS						
Forward On–Voltage (Note 2.)	(I_S = 7 Adc, V_{GS} = 0 Vdc)	V_{SD}	–	0.9	1.0	Vdc
	(I_S = 6 Adc, V_{GS} = 0 Vdc, T_J = 125°C)		–	0.8	–	
Reverse Recovery Time	(I_S = 7 Adc, V_{GS} = 0 Vdc, dI_S/dt = 100 A/μs)	t_{rr}	–	270	–	ns
		t_a	–	110	–	
		t_b	–	160	–	
Reverse Recovery Stored Charge		Q_{RR}	–	1.6	–	μC

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

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.

	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	0.045	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

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