

NTP6N60

Preferred Device

Product Preview

TMOS 7 E-FET™

Power Field Effect Transistor N-Channel Enhancement-Mode Silicon Gate

This advanced TMOS E-FET is designed to withstand high energy in the avalanche and commutation modes. The new energy efficient design also offers a drain-to-source diode with a fast recovery time. Designed for low voltage, high speed switching applications in power supplies, converters and PWM motor controls. These devices are particularly well-suited for bridge circuits where diode speed and commutating safe operating areas are critical and offer additional safety margin against unexpected voltage transients.

New Features of TMOS 7

- Ultra Low On-Resistance Provides Higher Efficiency
- Reduced Gate Charge

Features Common to TMOS 7 and TMOS E-FETS

- Avalanche Energy Specified
- Diode Characterized for Use in Bridge Circuits
- I_{DSS} and $V_{DS(on)}$ Specified at Elevated Temperature

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 — Continuous — Non-Repetitive ($t_p \leq 10\text{ ms}$) | V_{GS} V_{GSM} | ± 20 ± 40 | Vdc |
| Drain — Continuous — Continuous @ 100°C — Single Pulse ($t_p \leq 10\text{ }\mu\text{s}$) | I_D I_D I_{DM} | 6.0 4.8 21 | Adc |
| Total Power Dissipation Derate above 25°C | P_D | 142 1.14 | Watts W/ $^\circ\text{C}$ |
| Operating and Storage Temperature Range | T_J, T_{stg} | -55 to 150 | $^\circ\text{C}$ |
| Single Drain-to-Source Avalanche Energy — Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = 100\text{ V}$, $V_{GS} = 10\text{ Vdc}$, $I_L = 6\text{ A}$, $L = 25\text{ mH}$, $R_G = 25\text{ }\Omega$) | E_{AS} | 450 | mJ |
| Thermal Resistance — Junction-to-Case — Junction-to-Ambient | $R_{\theta JC}$ $R_{\theta JA}$ | 0.88 62.5 | $^\circ\text{C/W}$ |
| Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds | T_L | 260 | $^\circ\text{C}$ |

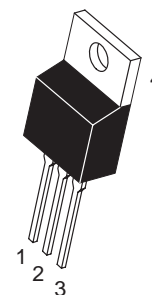
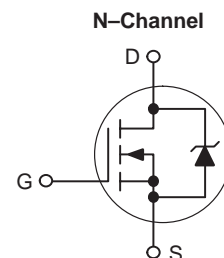
This document contains information on a new product. Specifications and information herein are subject to change without notice.



ON Semiconductor

<http://onsemi.com>

TMOS POWER FET
6 AMPERES
600 VOLTS
 $R_{DS(on)} = 1.2\text{ }\Omega$



TO-220AB
CASE 221A
STYLE 5

PIN ASSIGNMENT

| | |
|---|--------|
| 1 | Gate |
| 2 | Drain |
| 3 | Source |
| 4 | Drain |

ORDERING INFORMATION

| Device | Package | Shipping |
|---------|---------|---------------|
| NTP6N60 | TO220AB | 50 Units/Rail |

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

NTP6N60

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | |
|---|--|----------|----------|------------|--------------|
| Drain-to-Source Breakdown Voltage (V _{GS} = 0 Vdc, I _D = 0.25 mAdc) Temperature Coefficient (Positive) | V _{(BR)DSS} | 600 — | — 715 | — — | Vdc mV/°C |
| Zero Gate Voltage Collector 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) | I _{GSS(f)} I _{GSS(r)} | — — | — — | 100 100 | nAdc |

ON CHARACTERISTICS (1)

| | | | | | |
|--|---------------------|----------|------------|------------|--------------|
| Gate Threshold Voltage I _D = 0.25 mA, V _{DS} = V _{GS} Temperature Coefficient (Negative) | V _{GS(th)} | 2.0 — | 2.6 6.6 | 4.0 — | Vdc mV/°C |
| Static Drain-to-Source On-Resistance (V _{GS} = 10 Vdc, I _D = 3 Adc) | R _{DS(on)} | — | 0.85 | 1.2 | Ohm |
| Drain-to-Source On-Voltage (V _{GS} = 10 Vdc, I _D = 6 Adc) (V _{GS} = 10 Vdc, I _D = 3 Adc, T _J = 125°C) | V _{DS(on)} | — — | — — | 7.9 6.9 | Vdc |
| Forward Transconductance (V _{DS} = 15 Vdc, I _D = 3 Adc) | g _{FS} | 2.0 | 7.0 | — | mhos |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|----------------------|---|------------------|---|------|------|----|
| Input Capacitance | (V _{DS} = 25 Vdc, V _{GS} = 0 Vdc, f = 1.0 MHz) | C _{iss} | — | 1190 | 1670 | pF |
| Output Capacitance | | C _{oss} | — | 350 | 490 | |
| Transfer Capacitance | | C _{rss} | — | 20 | 40 | |

SWITCHING CHARACTERISTICS (2)

| | | | | | | |
|---------------------|---|---------------------|---|-----|----|----|
| Turn-On Delay Time | (V _{DD} = 300 Vdc, I _D = 6 Adc, V _{GS} = 10 Vdc, R _G = 9.1 Ω) | t _{d(on)} | — | 11 | 20 | ns |
| Rise Time | | t _r | — | 10 | 20 | |
| Turn-Off Delay Time | | t _{d(off)} | — | 34 | 70 | |
| Fall Time | | t _f | — | 19 | 40 | |
| Gate Charge | (V _{DS} = 400 Vdc, I _D = 6 Adc, V _{GS} = 10 Vdc) | Q _T | — | 24 | 30 | nC |
| | | Q ₁ | — | 6.0 | — | |
| | | Q ₂ | — | 8.0 | — | |
| | | Q ₃ | — | 12 | — | |

SOURCE-DRAIN DIODE CHARACTERISTICS

| | | | | | | |
|-----------------------------------|--|-----------------|--------|--------------|----------|-----|
| Forward On-Voltage ⁽¹⁾ | (I _S = 6 Adc, V _{GS} = 0 Vdc) (I _S = 6 Adc, V _{GS} = 0 Vdc, T _J = 125°C) | V _{SD} | — — | 0.85 0.73 | 1.0 — | Vdc |
| Reverse Recovery Time | (I _S = 6 Adc, V _{GS} = 0 Vdc, di _S /dt = 100 A/μs) | t _{rr} | — | 440 | — | ns |
| | | t _a | — | 130 | — | |
| | | t _b | — | 310 | — | |
| Reverse Recovery Stored Charge | | Q _{RR} | — | 2.8 | — | μC |

INTERNAL PACKAGE INDUCTANCE

| | | | | | |
|--|----------------|--------|------------|--------|----|
| Internal Drain Inductance (Measured from contact screw on tab to center of die) (Measured from the drain lead 0.25" from package to center of die) | L _D | — — | 3.5 4.5 | — — | nH |
| Internal Source Inductance (Measured from the source lead 0.25" from package to source bond pad) | L _S | — | 7.5 | — | |

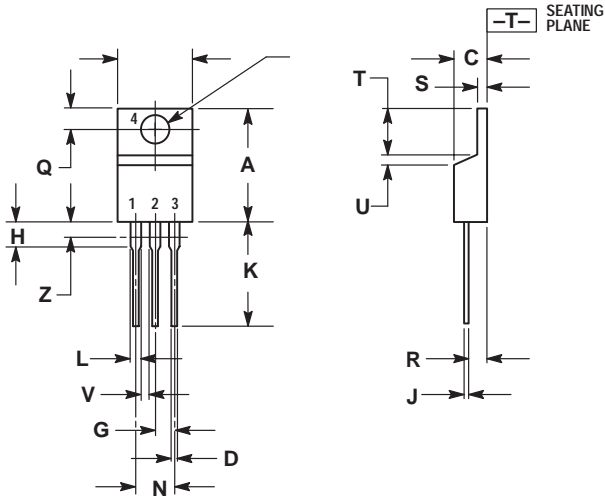
(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

(2) Switching characteristics are independent of operating junction temperature.

NTP6N60

PACKAGE DIMENSIONS

TO-220AB
CASE 221A-09
ISSUE Z




- 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
2. DRAIN
3. SOURCE
4. DRAIN

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