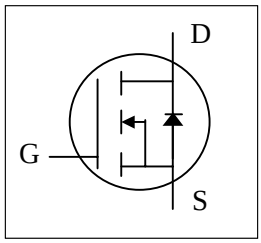
# AP10TN040P

**Halogen-Free Product**

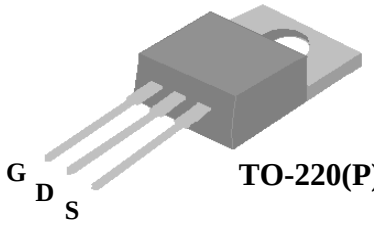
**Advanced Power Electronics Corp.**

*N-CHANNEL ENHANCEMENT MODE POWER MOSFET*

- ▼ **100% $R_g$ & UIS Test**
- ▼ **Simple Drive Requirement**
- ▼ **Fast Switching Characteristic**
- ▼ **RoHS Compliant & Halogen-Free**




| | |
|---|---|
| $BV_{DSS}$ | 100V |
| $R_{DS(ON)}$ | 40mΩ |
| $I_D$ | 31.5A |




**TO-220(P)**

## Description

AP10TN040 series are from Advanced Power innovated design and silicon process technology to achieve the lowest possible on-resistance and fast switching performance. It provides the designer with an extreme efficient device for use in a wide range of power applications.

The TO-220 package is widely preferred for all commercial-industrial through hole applications. The low thermal resistance and low package cost contribute to the worldwide popular package.

## Absolute Maximum Ratings@$T_j$=25°C(unless otherwise specified)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 100 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25℃ | Drain Current, $V_{GS}$ @ 10V | 31.5 | A |
| $I_D$@$T_C$=100℃ | Drain Current, $V_{GS}$ @ 10V | 20 | A |
| $I_{DM}$ | Pulsed Drain Current[1] | 100 | A |
| $P_D$@$T_C$=25℃ | Total Power Dissipation | 89.2 | W |
| $P_D$@$T_A$=25℃ | Total Power Dissipation | 2 | W |
| $E_{AS}$ | Single Pulse Avalanche Energy[3] | 72 | mJ |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Data

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| Rthj-c | Maximum Thermal Resistance, Junction-case | 1.4 | ℃/W |
| Rthj-a | Maximum Thermal Resistance, Junction-ambient | 62 | ℃/W |

## Electrical Characteristics@$T_j$=25°C(unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250uA | 100 | - | - | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=10V, $I_D$=16A | - | - | 40 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250uA | 2 | - | 5 | V |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$=10V, $I_D$=16A | - | 20 | - | S |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=80V, $V_{GS}$=0V | - | - | 25 | uA |
| $I_{GSS}$ | Gate-Source Leakage | $V_{GS}$= ±20V, $V_{DS}$=0V | - | - | ±100 | nA |
| $Q_g$ | Total Gate Charge | $I_D$=16A | - | 38 | 61 | nC |
| $Q_{gs}$ | Gate-Source Charge | $V_{DS}$=80V | - | 14 | - | nC |
| $Q_{gd}$ | Gate-Drain ("Miller") Charge | $V_{GS}$=10V | - | 15 | - | nC |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DS}$=50V | - | 15 | - | ns |
| $t_r$ | Rise Time | $I_D$=16A | - | 45 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | $R_G$=3.3Ω | - | 19 | - | ns |
| $t_f$ | Fall Time | $V_{GS}$=10V | - | 8 | - | ns |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V | - | 2030 | 3250 | pF |
| $C_{oss}$ | Output Capacitance | $V_{DS}$=25V | - | 230 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | f=1.0MHz | - | 115 | - | pF |
| $R_g$ | Gate Resistance | f=1.0MHz | - | 1.1 | 2.2 | Ω |

## Source-Drain Diode

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $V_{SD}$ | Forward On Voltage[2] | $I_S$=16A, $V_{GS}$=0V | - | - | 1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_S$=16A, $V_{GS}$=0V, | - | 80 | - | ns |
| $Q_{rr}$ | Reverse Recovery Charge | dI/dt=100A/μs | - | 250 | - | nC |

### Notes:

1.Pulse width limited by Max. junction temperature.

2.Pulse test

3.Starting $T_j$=25°C , $V_{DD}$=50V , L=1mH , $R_G$=25Ω

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.
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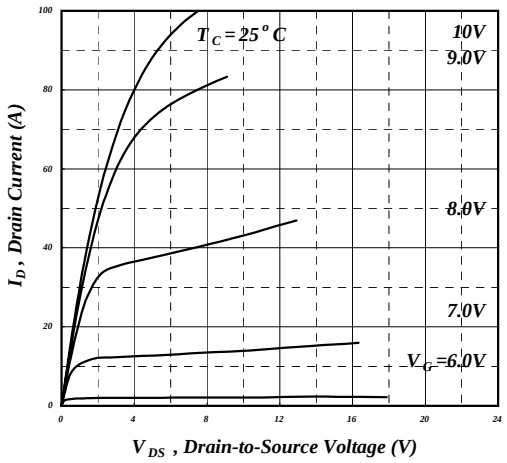



Fig 1. Typical Output Characteristics

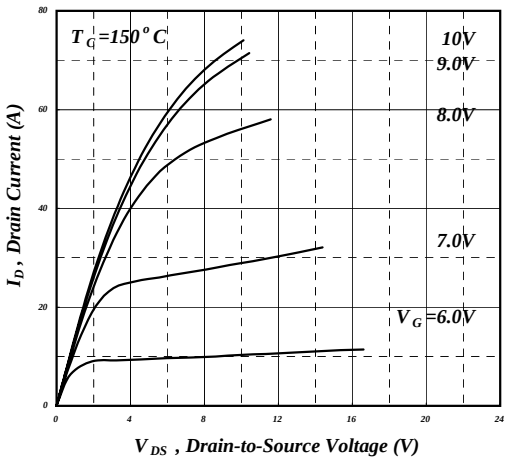



Fig 2. Typical Output Characteristics

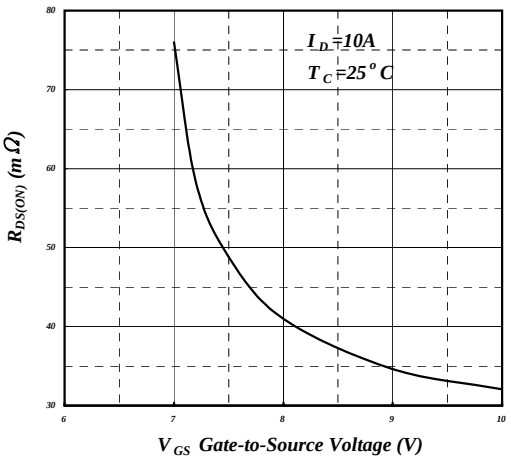



Fig 3. On-Resistance v.s. Gate Voltage

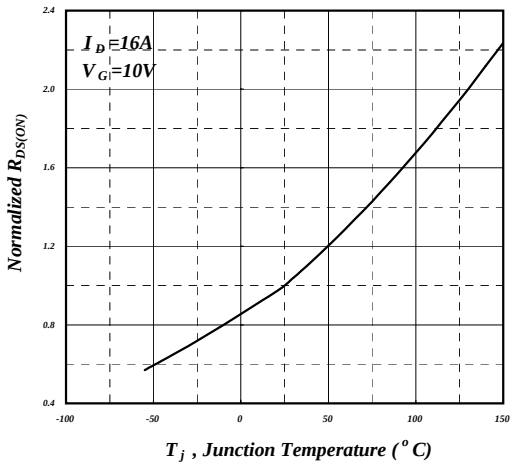



Fig 4. Normalized On-Resistance v.s. Junction Temperature

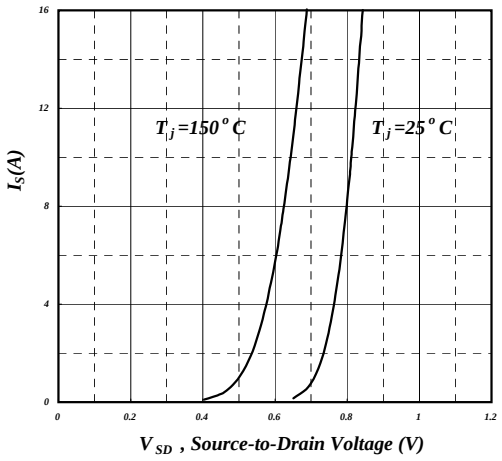



Fig 5. Forward Characteristic of Reverse Diode

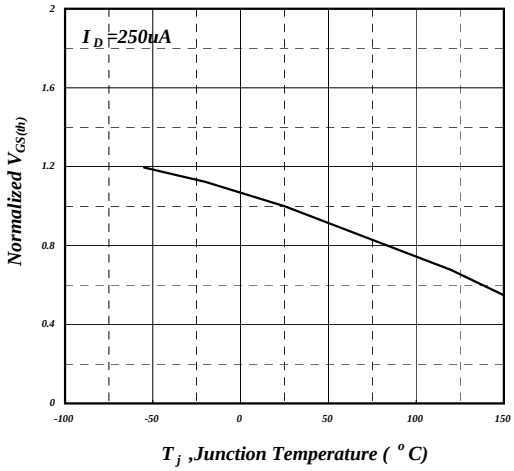



Fig 6. Gate Threshold Voltage v.s. Junction Temperature

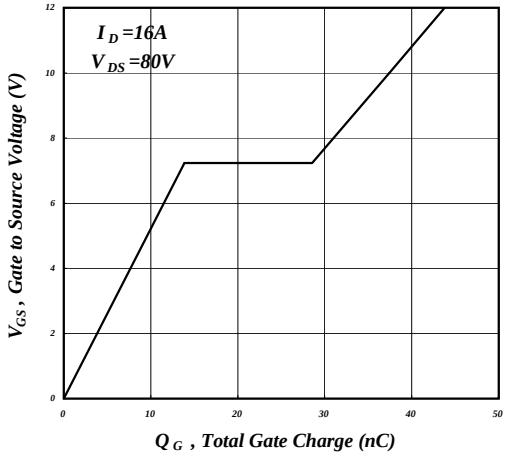



Fig 7. Gate Charge Characteristics

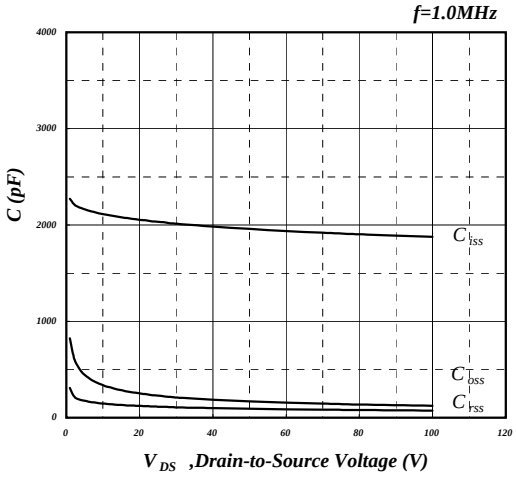



Fig 8. Typical Capacitance Characteristics

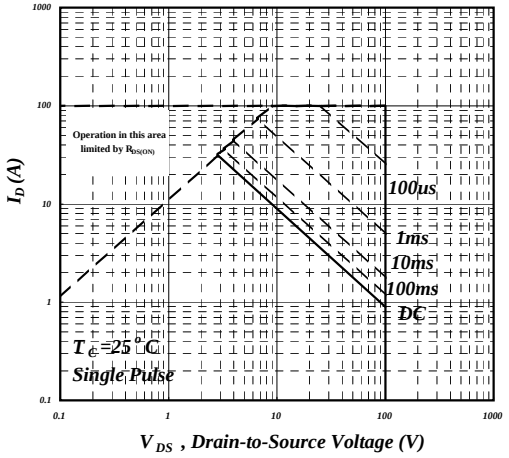



Fig 9. Maximum Safe Operating Area

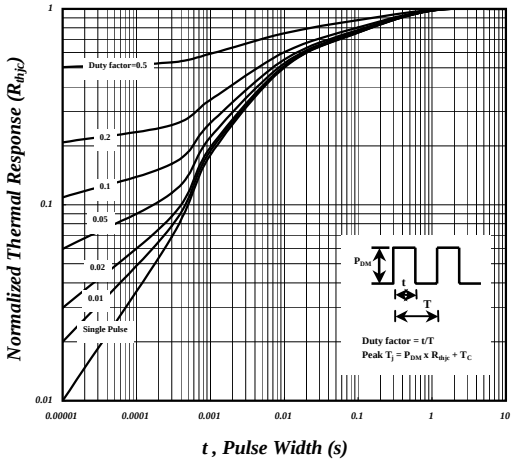



Fig 10. Effective Transient Thermal Impedance

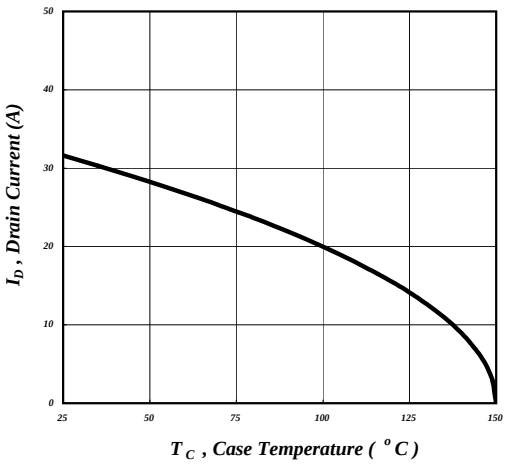



Fig 11. Drain Current v.s. Case Temperature

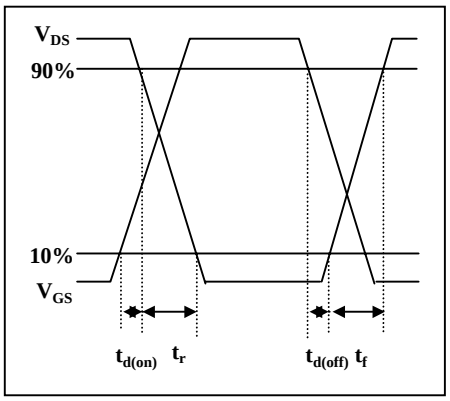



Fig 12. Switching Time Waveform

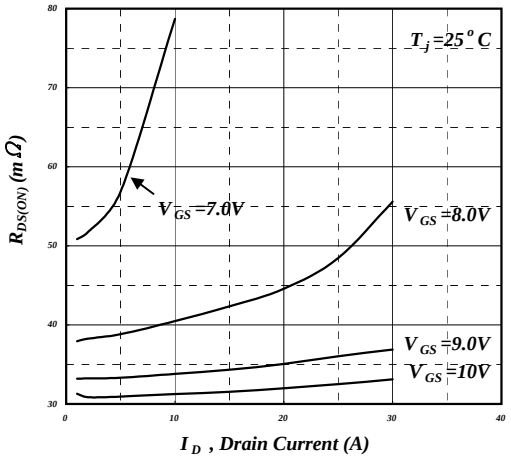



**Fig 13. Typ. Drain-Source on State Resistance**

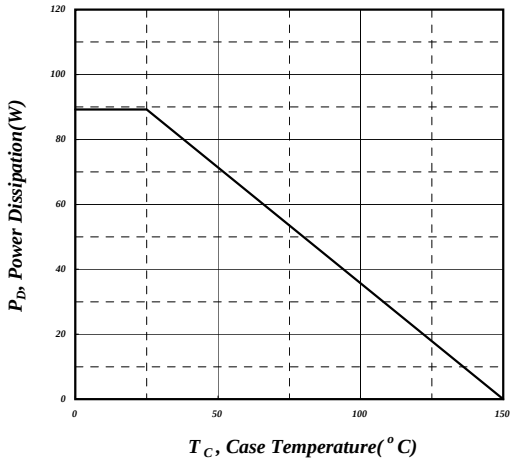



**Fig 14. Total Power Dissipation**

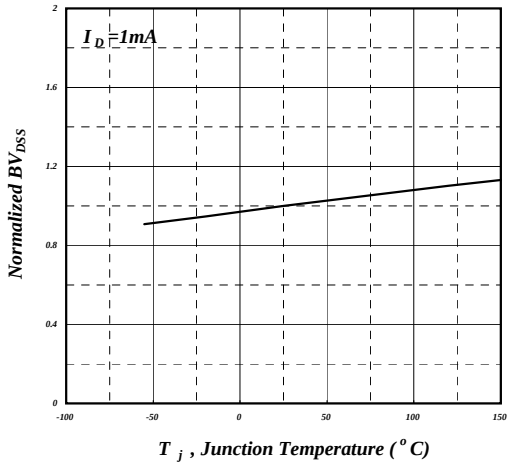
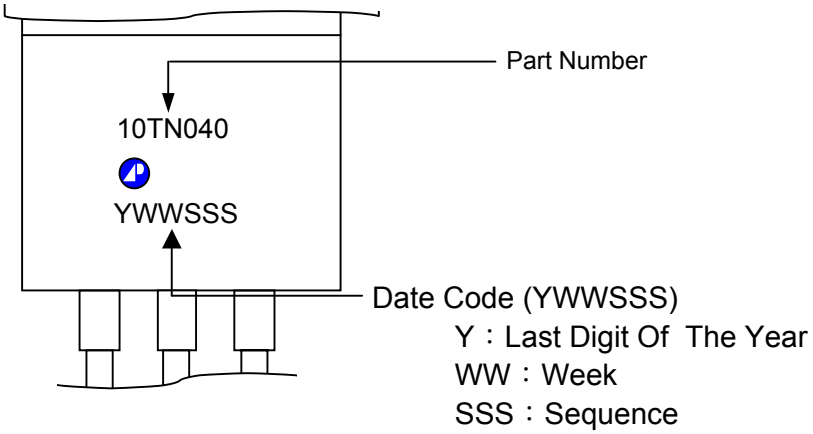



**Fig 15. Normalized $BV_{DSS}$ v.s. Junction**

## MARKING INFORMATION