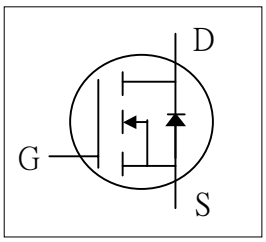
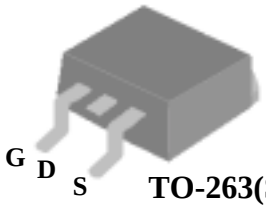
**Advanced Power Electronics Corp.**

*N-CHANNEL ENHANCEMENT MODE POWER MOSFET*

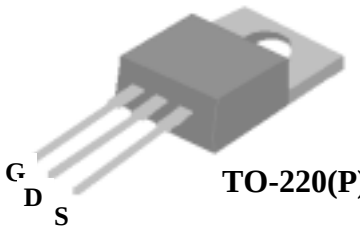
- ▼ **Dynamic dv/dt Rating**
- ▼ **Repetitive Avalanche Rated**
- ▼ **Fast Switching**
- ▼ **Simple Drive Requirement**




| | |
|---|---|
| $BV_{DSS}$ | 30V |
| $R_{DS(ON)}$ | 52mΩ |
| $I_D$ | 20A |




**TO-263(S)**




**TO-220(P)**

## Description

The Advanced Power MOSFETs from APEC provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-263 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters. The through-hole version (AP20N03P) is available for low-profile applications.

## Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 30 | V |
| $V_{GS}$ | Gate-Source Voltage | ± 20 | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current, $V_{GS}$ @ 10V | 20 | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current, $V_{GS}$ @ 10V | 13 | A |
| $I_{DM}$ | Pulsed Drain Current[1] | 60 | A |
| $P_D$@$T_C$=25℃ | Total Power Dissipation | 31 | W |
| | Linear Derating Factor | 0.25 | W/℃ |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Data

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| Rthj-case | Thermal Resistance Junction-case | Max. | 4.0 | ℃/W |
| Rthj-amb | Thermal Resistance Junction-ambient | Max. | 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 | 30 | - | - | V |
| $\Delta BV_{DSS}/\Delta T_j$ | Breakdown Voltage Temperature Coefficient | Reference to 25℃, $I_D$=1mA | - | 0.037 | - | V/℃ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V, $I_D$=10A | - | - | 52 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=8A | - | - | 85 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250uA | 1 | - | 3 | V |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$=10V, $I_D$=10A | - | 3 | - | S |
| $I_{DSS}$ | Drain-Source Leakage Current ($T_j$=25°C) | $V_{DS}$=30V, $V_{GS}$=0V | - | - | 1 | uA |
| | Drain-Source Leakage Current ($T_j$=150°C) | $V_{DS}$=24V, $V_{GS}$=0V | - | - | 100 | uA |
| $I_{GSS}$ | Gate-Source Leakage | $V_{GS}$= ± 20V | - | - | ±100 | nA |
| $Q_g$ | Total Gate Charge[2] | $I_D$=10A | - | 6.1 | - | nC |
| $Q_{gs}$ | Gate-Source Charge | $V_{DS}$=24V | - | 1.4 | - | nC |
| $Q_{gd}$ | Gate-Drain ("Miller") Charge | $V_{GS}$=5V | - | 4 | - | nC |
| $t_{d(on)}$ | Turn-on Delay Time[2] | $V_{DS}$=15V | - | 4.9 | - | ns |
| $t_r$ | Rise Time | $I_D$=20A | - | 29 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | $R_G$=3.3Ω,$V_{GS}$=10V | - | 14.3 | - | ns |
| $t_f$ | Fall Time | $R_D$=0.75Ω | - | 3.6 | - | ns |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V | - | 290 | - | pF |
| $C_{oss}$ | Output Capacitance | $V_{DS}$=25V | - | 160 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | f=1.0MHz | - | 45 | - | pF |

## Source-Drain Diode

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current ( Body Diode ) | $V_D$=$V_G$=0V , $V_S$=1.3V | - | - | 20 | A |
| $I_{SM}$ | Pulsed Source Current ( Body Diode )[1] | | - | - | 60 | A |
| $V_{SD}$ | Forward On Voltage[2] | $T_j$=25℃, $I_S$=20A, $V_{GS}$=0V | - | - | 1.3 | V |

**Notes:**

1.Pulse width limited by safe operating area.

2.Pulse width ≤300us , duty cycle ≤2%.

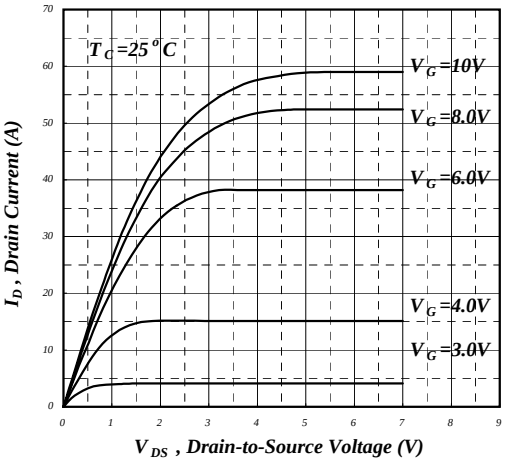



**Fig 1. Typical Output Characteristics**

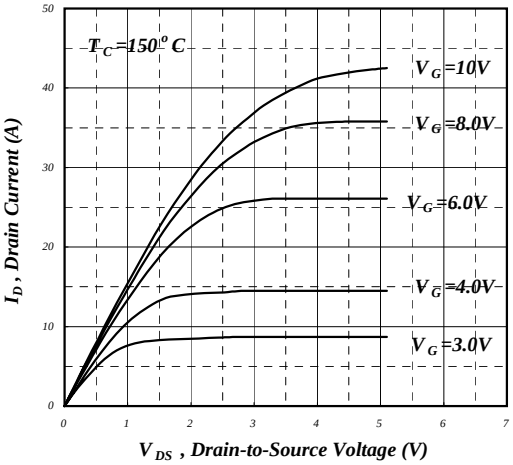



**Fig 2. Typical Output Characteristics**

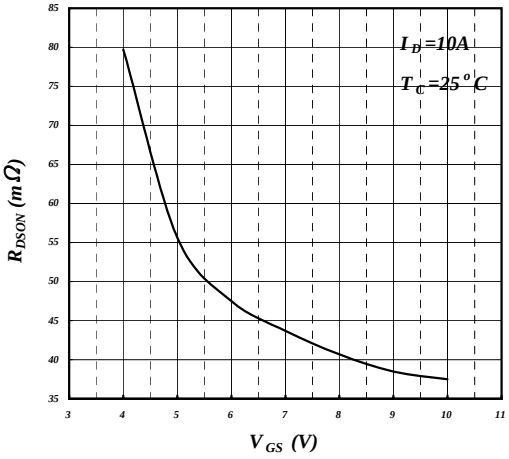
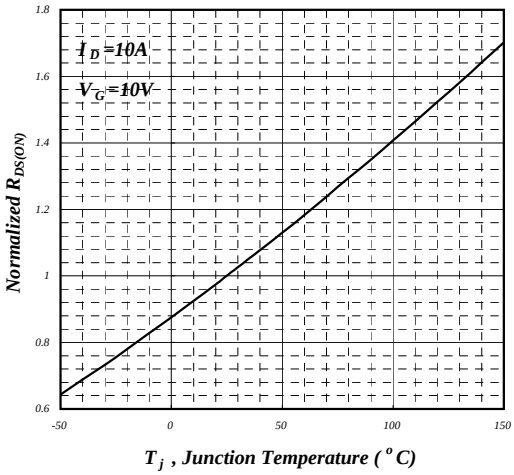



**Fig 3. On-Resistance v.s. Gate Voltage**




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

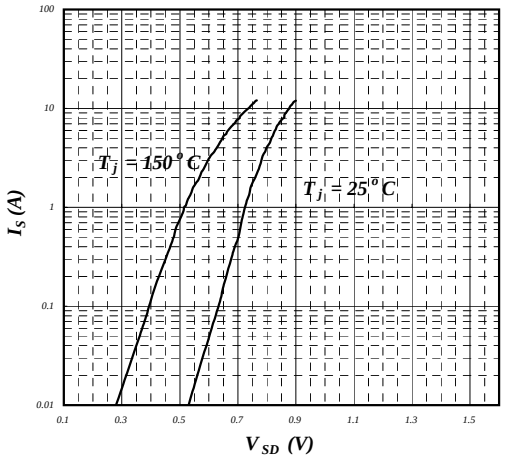



**Fig 5. Forward Characteristic of Reverse Diode**

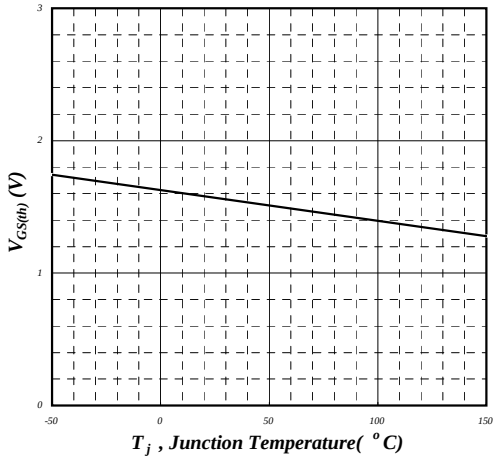



**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**

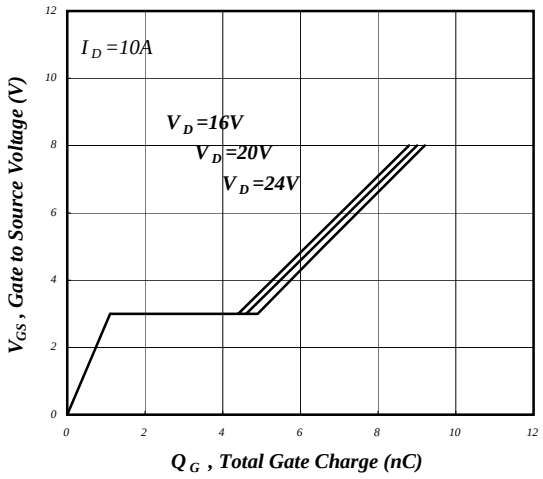



Fig 7. Gate Charge Characteristics

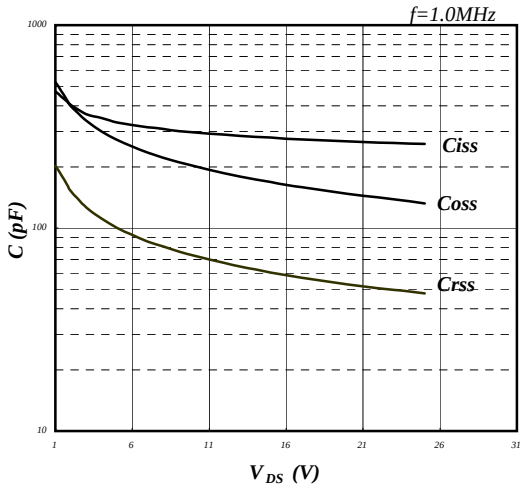



Fig 8. Typical Capacitance Characteristics

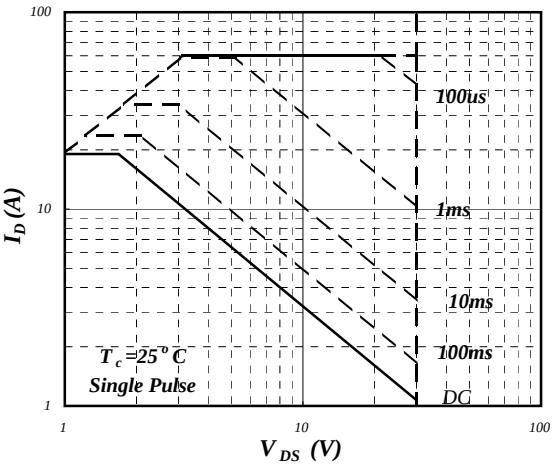



Fig 9. Maximum Safe Operating Area

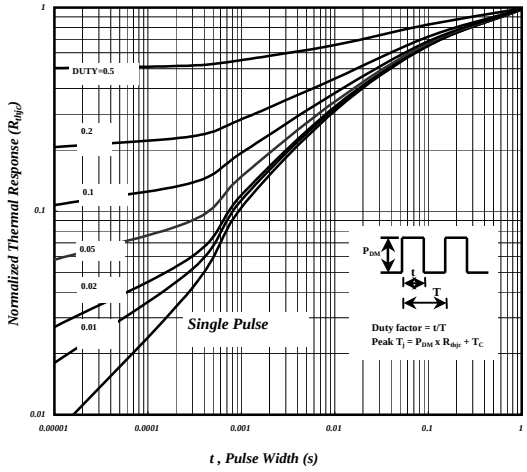



Fig 10. Effective Transient Thermal Impedance

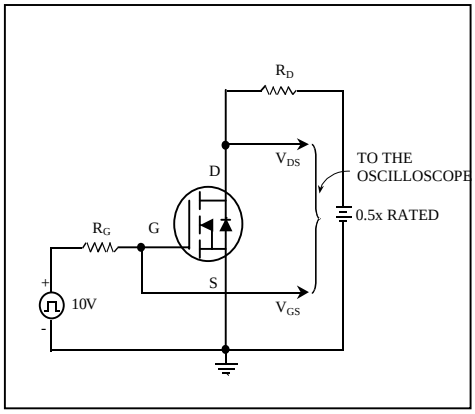



Fig 11. Switching Time Circuit

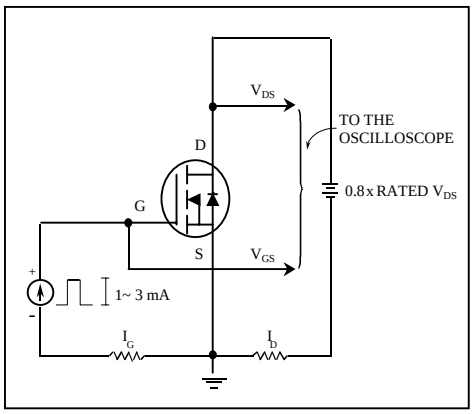



Fig 12. Gate Charge Circuit