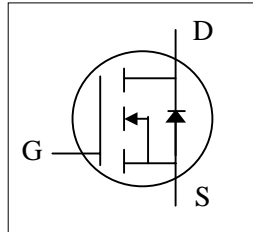


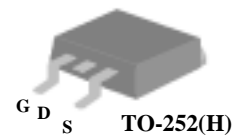
- ▼ Simple Drive Requirement
- ▼ Low Gate Charge
- ▼ Fast Switching



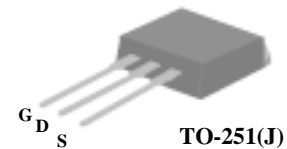
|              |              |
|--------------|--------------|
| $BV_{DSS}$   | 30V          |
| $R_{DS(ON)}$ | 12m $\Omega$ |
| $I_D$        | 45A          |

## 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-252 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 (AP60T03AJ) are available for low-profile applications.



## Absolute Maximum Ratings

| Symbol                    | Parameter                                | Rating     | Units         |
|---------------------------|--|------------|---------------|
| $V_{DS}$                  | Drain-Source Voltage                     | 30         | V             |
| $V_{GS}$                  | Gate-Source Voltage                      | $\pm 20$   | V             |
| $I_D @ T_C = 25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V$ | 45         | A             |
| $I_D @ T_C = 100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 32         | A             |
| $I_{DM}$                  | Pulsed Drain Current <sup>1</sup>        | 120        | A             |
| $P_D @ T_C = 25^\circ C$  | Total Power Dissipation                  | 44         | W             |
|                           | Linear Derating Factor                   | 0.352      | W/ $^\circ C$ |
| $T_{STG}$                 | Storage Temperature Range                | -55 to 175 | $^\circ C$    |
| $T_J$                     | Operating Junction Temperature Range     | -55 to 175 | $^\circ C$    |

## Thermal Data

| Symbol | Parameter                           | Value    | Units        |
|--------|-------------------------------------|----------|--------------|
| Rthj-c | Thermal Resistance Junction-case    | Max. 3.4 | $^\circ C/W$ |
| Rthj-a | Thermal Resistance Junction-ambient | Max. 110 | $^\circ C/W$ |



# AP60T03AH/J

## Electrical Characteristics @T<sub>j</sub>=25°C(unless otherwise specified)

| Symbol                              | Parameter  | Test Conditions  | Min. | Typ. | Max. | Units |
|-------------------------------------|--|--|------|------|------|-------|
| BV <sub>DSS</sub>                   | Drain-Source Breakdown Voltage                       | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA               | 30   | -    | -    | V     |
| ΔBV <sub>DSS</sub> /ΔT <sub>j</sub> | Breakdown Voltage Temperature Coefficient            | Reference to 25°C, I <sub>D</sub> =1mA                   | -    | 0.03 | -    | V/°C  |
| R <sub>DS(ON)</sub>                 | Static Drain-Source On-Resistance <sup>2</sup>       | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                | -    | -    | 12   | mΩ    |
|                                     |  | V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A               | -    | -    | 25   | mΩ    |
| V <sub>GS(th)</sub>                 | Gate Threshold Voltage                               | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA | 1    | -    | 3    | V     |
| g <sub>fs</sub>                     | Forward Transconductance <sup>2</sup>                | V <sub>DS</sub> =10V, I <sub>D</sub> =10A                | -    | 25   | -    | S     |
| I <sub>DSS</sub>                    | Drain-Source Leakage Current (T <sub>j</sub> =25°C)  | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V                | -    | -    | 1    | uA    |
|                                     | Drain-Source Leakage Current (T <sub>j</sub> =175°C) | V <sub>DS</sub> =24V, V <sub>GS</sub> =0V                | -    | -    | 250  | uA    |
| I <sub>GSS</sub>                    | Gate-Source Leakage                                  | V <sub>GS</sub> = ±20V                                   | -    | -    | ±100 | nA    |
| Q <sub>g</sub>                      | Total Gate Charge <sup>2</sup>                       | I <sub>D</sub> =20A                                      | -    | 11.6 | -    | nC    |
| Q <sub>gs</sub>                     | Gate-Source Charge                                   | V <sub>DS</sub> =24V                                     | -    | 3.9  | -    | nC    |
| Q <sub>gd</sub>                     | Gate-Drain ("Miller") Charge                         | V <sub>GS</sub> =4.5V                                    | -    | 7    | -    | nC    |
| t <sub>d(on)</sub>                  | Turn-on Delay Time <sup>2</sup>                      | V <sub>DS</sub> =15V                                     | -    | 8.8  | -    | ns    |
| t <sub>r</sub>                      | Rise Time  | I <sub>D</sub> =20A                                      | -    | 57.5 | -    | ns    |
| t <sub>d(off)</sub>                 | Turn-off Delay Time                                  | R <sub>G</sub> =3.3Ω, V <sub>GS</sub> =10V               | -    | 18.5 | -    | ns    |
| t <sub>f</sub>                      | Fall Time  | R <sub>D</sub> =0.75Ω                                    | -    | 6.4  | -    | ns    |
| C <sub>iss</sub>                    | Input Capacitance                                    | V <sub>GS</sub> =0V                                      | -    | 1135 | -    | pF    |
| C <sub>oss</sub>                    | Output Capacitance                                   | V <sub>DS</sub> =25V                                     | -    | 200  | -    | pF    |
| C <sub>rss</sub>                    | Reverse Transfer Capacitance                         | f=1.0MHz   | -    | 135  | -    | pF    |

## Source-Drain Diode

| Symbol          | Parameter                          | Test Conditions                           | Min. | Typ. | Max. | Units |
|-----------------|------------------------------------|---|------|------|------|-------|
| V <sub>SD</sub> | Forward On Voltage <sup>2</sup>    | I <sub>S</sub> =45A, V <sub>GS</sub> =0V  | -    | -    | 1.3  | V     |
| t <sub>rr</sub> | Reverse Recovery Time <sup>2</sup> | I <sub>S</sub> =20A, V <sub>GS</sub> =0V, | -    | 23.3 | -    | ns    |
| Q <sub>rr</sub> | Reverse Recovery Charge            | di/dt=100A/μs                             | -    | 16   | -    | nC    |

### Notes:

- 1.Pulse width limited by safe operating area.
- 2.Pulse width ≤300us , duty cycle ≤2%.

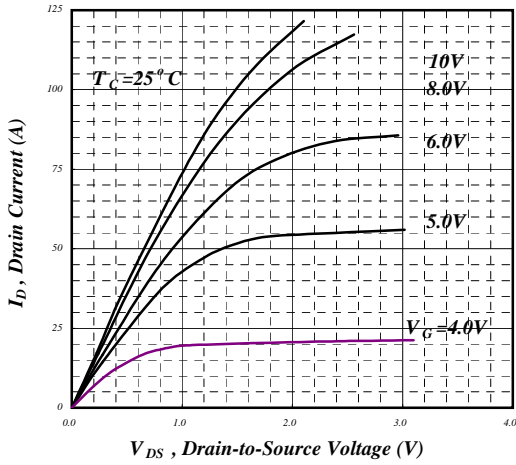


Fig 1. Typical Output Characteristics

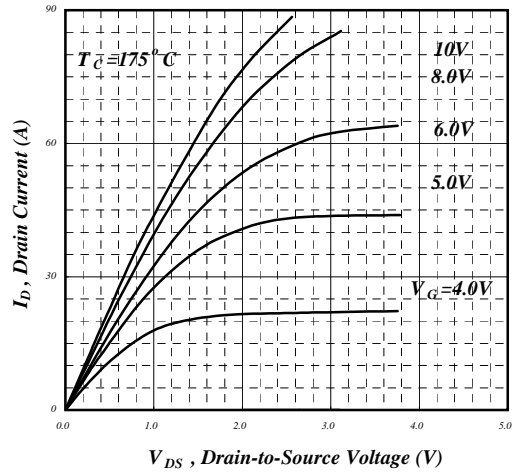


Fig 2. Typical Output Characteristics

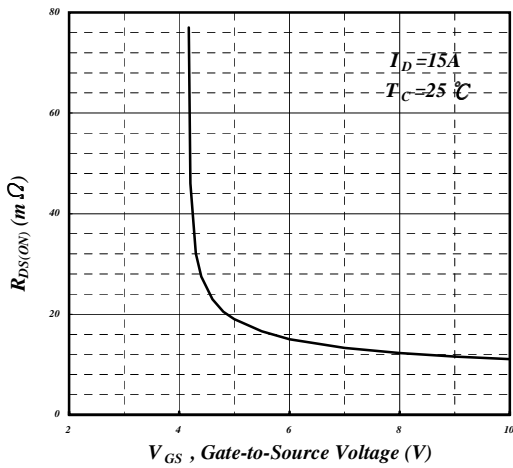


Fig 3. On-Resistance v.s. Gate Voltage

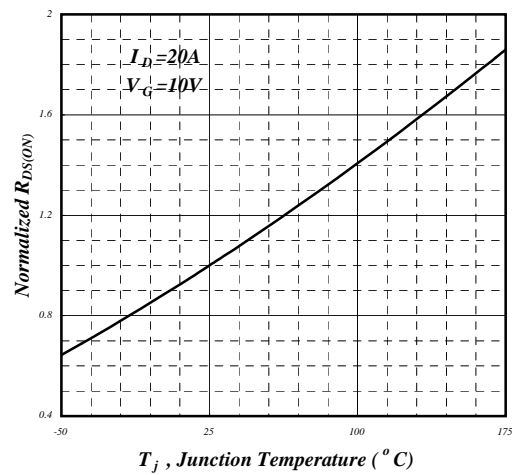


Fig 4. Normalized On-Resistance v.s. Junction Temperature

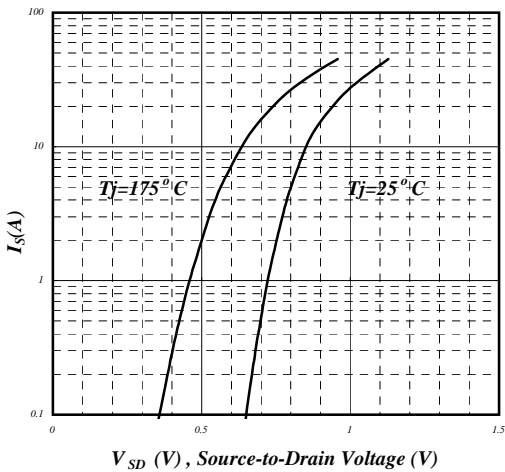


Fig 5. Forward Characteristic of Reverse Diode

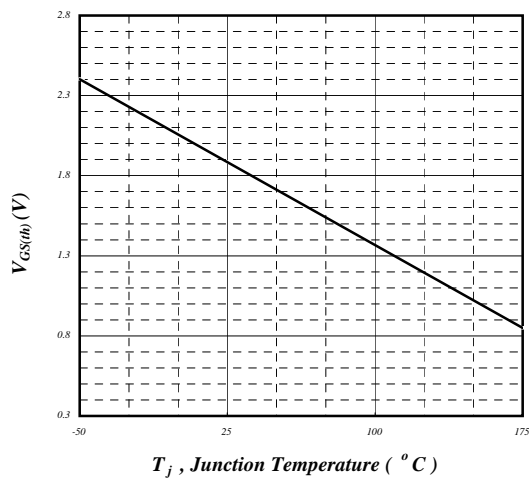
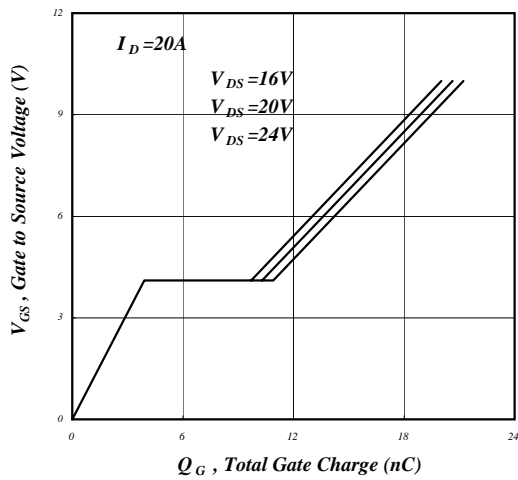
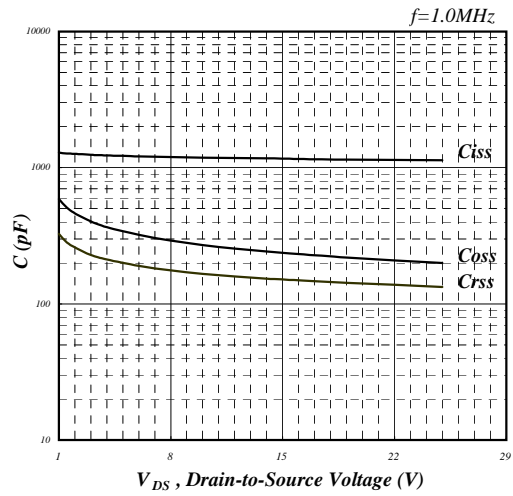


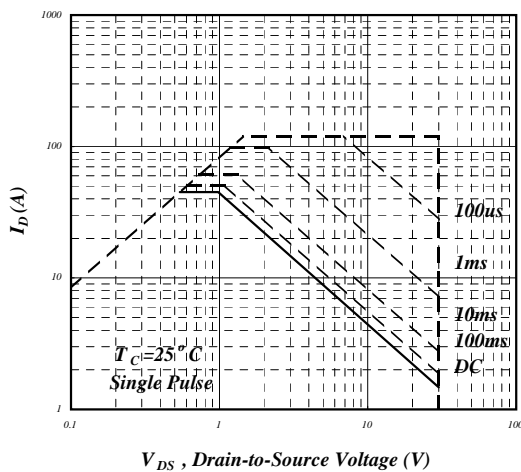
Fig 6. Gate Threshold Voltage v.s. Junction Temperature



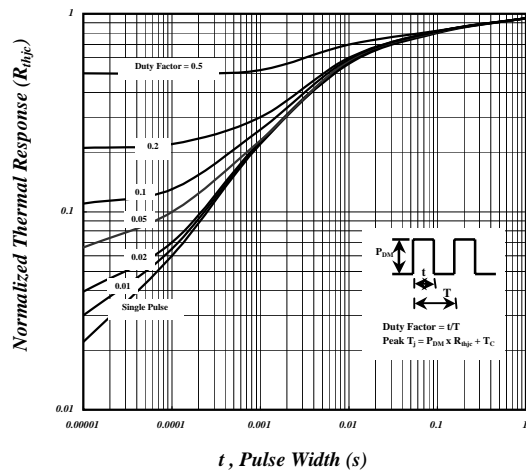
**Fig 7. Gate Charge Characteristics**



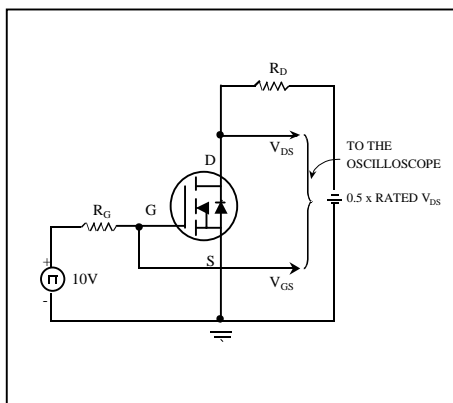
**Fig 8. Typical Capacitance Characteristics**



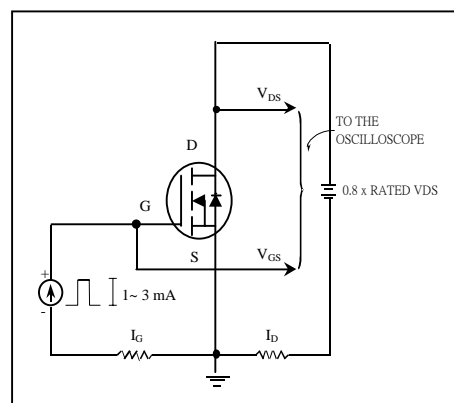
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**



**Fig 11. Switching Time Circuit**



**Fig 12. Gate Charge Circuit**