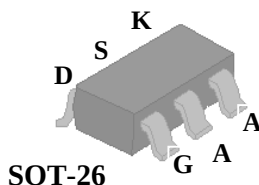




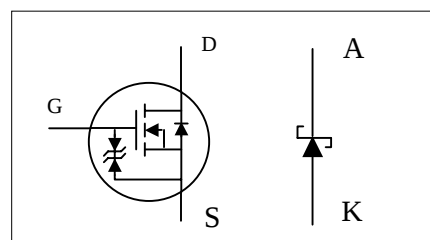
- ▼ Low On-Resistance
- ▼ Fast Switching Characteristic
- ▼ Included Schottky Diode



|              |               |
|--------------|---------------|
| $BV_{DS}$    | 20V           |
| $R_{DS(ON)}$ | 600m $\Omega$ |
| $I_D$        | 1A            |

## Description

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



## Absolute Maximum Ratings

| Symbol                     | Parameter                                      | Rating     | Units            |
|----------------------------|------------------------------------------------|------------|------------------|
| $V_{DS}$                   | Drain-Source Voltage (MOSFET)                  | 20         | V                |
| $V_{KA}$                   | Reverse Voltage (Schottky)                     | 20         | V                |
| $V_{GS}$                   | Gate-Source Voltage (MOSFET)                   | $\pm 6$    | V                |
| $I_D@T_A=25^\circ\text{C}$ | Continuous Drain Current <sup>3</sup> (MOSFET) | 1          | A                |
| $I_D@T_A=70^\circ\text{C}$ | Continuous Drain Current <sup>3</sup> (MOSFET) | 0.8        | A                |
| $I_{DM}$                   | Pulsed Drain Current <sup>1</sup> (MOSFET)     | 8          | A                |
| $I_F$                      | Average Forward Current (Schottky)             | 0.5        | A                |
| $I_{FM}$                   | Pulsed Forward Current <sup>1</sup> (Schottky) | 2          | A                |
| $P_D@T_A=25^\circ\text{C}$ | Total Power Dissipation (MOSFET)               | 0.9        | W                |
|                            | Total Power Dissipation (Schottky)             | 0.9        | W                |
| $T_{STG}$                  | Storage Temperature Range                      | -55 to 125 | $^\circ\text{C}$ |
| $T_J$                      | Operating Junction Temperature Range           | -55 to 125 | $^\circ\text{C}$ |

## Thermal Data

| Symbol      | Parameter                                                   | Value    | Units              |
|-------------|-------------------------------------------------------------|----------|--------------------|
| $R_{thj-a}$ | Thermal Resistance Junction-ambient <sup>3</sup> (MOSFET)   | Max. 110 | $^\circ\text{C/W}$ |
|             | Thermal Resistance Junction-ambient <sup>3</sup> (Schottky) | Max. 110 | $^\circ\text{C/W}$ |

**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               | 20   | -    | -    | V     |
| ΔBV <sub>DSS</sub> /ΔT <sub>j</sub> | Breakdown Voltage Temperature Coefficient           | Reference to 25°C, I <sub>D</sub> =1mA                   | -    | 0.02 | -    | V/°C  |
| R <sub>DS(ON)</sub>                 | Static Drain-Source On-Resistance                   | V <sub>GS</sub> =4.5V, I <sub>D</sub> =1A                | -    | -    | 600  | mΩ    |
|                                     |                                                     | V <sub>GS</sub> =2.5V, I <sub>D</sub> =0.5A              | -    | -    | 850  | mΩ    |
| V <sub>GS(th)</sub>                 | Gate Threshold Voltage                              | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA | 0.5  | -    | 1.2  | V     |
| g <sub>fs</sub>                     | Forward Transconductance                            | V <sub>DS</sub> =5V, I <sub>D</sub> =600mA               | -    | 1    | -    | S     |
| I <sub>DSS</sub>                    | Drain-Source Leakage Current (T <sub>j</sub> =25°C) | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V                | -    | -    | 1    | uA    |
|                                     | Drain-Source Leakage Current (T <sub>j</sub> =70°C) | V <sub>DS</sub> =16V, V <sub>GS</sub> =0V                | -    | -    | 10   | uA    |
| I <sub>GSS</sub>                    | Gate-Source Leakage                                 | V <sub>GS</sub> =±6V                                     | -    | -    | ±10  | uA    |
| Q <sub>g</sub>                      | Total Gate Charge <sup>2</sup>                      | I <sub>D</sub> =600mA                                    | -    | 1.3  | 2    | nC    |
| Q <sub>gs</sub>                     | Gate-Source Charge                                  | V <sub>DS</sub> =16V                                     | -    | 0.3  | -    | nC    |
| Q <sub>gd</sub>                     | Gate-Drain ("Miller") Charge                        | V <sub>GS</sub> =4.5V                                    | -    | 0.5  | -    | nC    |
| t <sub>d(on)</sub>                  | Turn-on Delay Time <sup>2</sup>                     | V <sub>DS</sub> =10V                                     | -    | 21   | -    | ns    |
| t <sub>r</sub>                      | Rise Time                                           | I <sub>D</sub> =600mA                                    | -    | 53   | -    | ns    |
| t <sub>d(off)</sub>                 | Turn-off Delay Time                                 | R <sub>G</sub> =3.3Ω, V <sub>GS</sub> =5V                | -    | 100  | -    | ns    |
| t <sub>f</sub>                      | Fall Time                                           | R <sub>D</sub> =16.7Ω                                    | -    | 125  | -    | ns    |
| C <sub>iss</sub>                    | Input Capacitance                                   | V <sub>GS</sub> =0V                                      | -    | 38   | 60   | pF    |
| C <sub>oss</sub>                    | Output Capacitance                                  | V <sub>DS</sub> =10V                                     | -    | 17   | -    | pF    |
| C <sub>rss</sub>                    | Reverse Transfer Capacitance                        | f=1.0MHz                                                 | -    | 12   | -    | pF    |

**Source-Drain Diode**

| Symbol          | Parameter                       | Test Conditions                            | Min. | Typ. | Max. | Unit |
|-----------------|---------------------------------|--------------------------------------------|------|------|------|------|
| V <sub>SD</sub> | Forward On Voltage <sup>2</sup> | I <sub>S</sub> =750mA, V <sub>GS</sub> =0V | -    | -    | 1.2  | V    |

**Schottky Characteristics@T<sub>j</sub>=25°C**

| Symbol          | Parameter                       | Test Conditions       | Min. | Typ. | Max. | Units |
|-----------------|---------------------------------|-----------------------|------|------|------|-------|
| V <sub>F</sub>  | Forward Voltage Drop            | I <sub>F</sub> =500mA | -    | -    | 0.5  | V     |
| I <sub>rm</sub> | Maximum Reverse Leakage Current | V <sub>r</sub> =20V   | -    | -    | 100  | uA    |
| C <sub>T</sub>  | Junction Capacitance            | V <sub>r</sub> =10V   | -    | 21   | -    | pF    |

**Notes:**

- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse width ≤300us , duty cycle ≤2%.
- 3.Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board, t<sub>≤</sub>5sec ; 180°C/W when mounted on min. copper pad.



## MOSFET

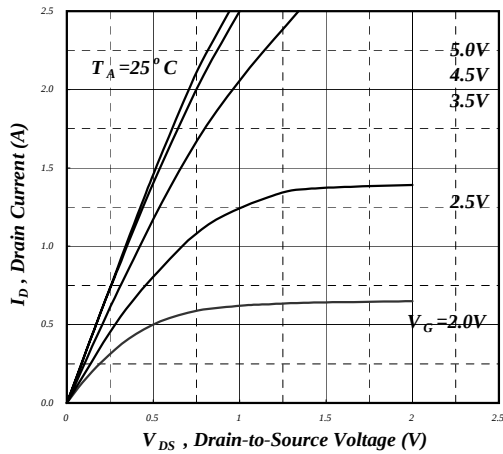


Fig 1. Typical Output Characteristics

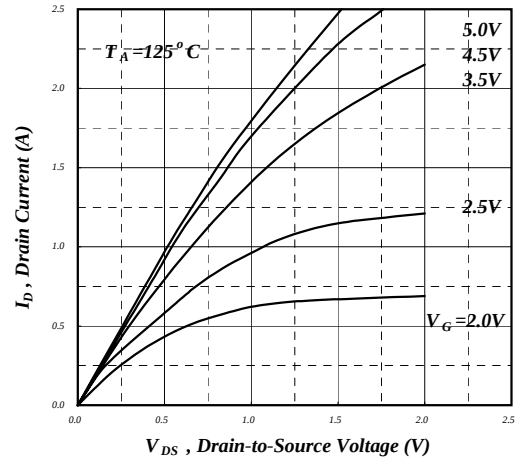


Fig 2. Typical Output Characteristics

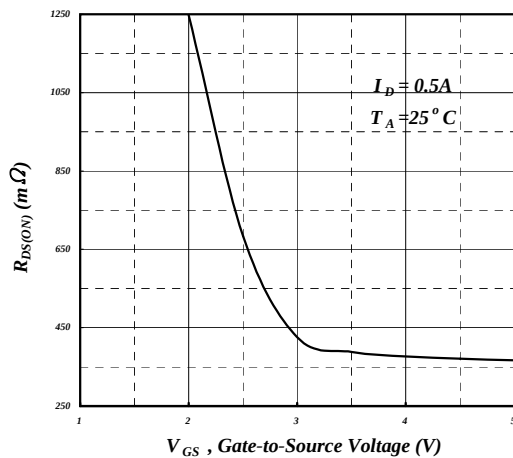
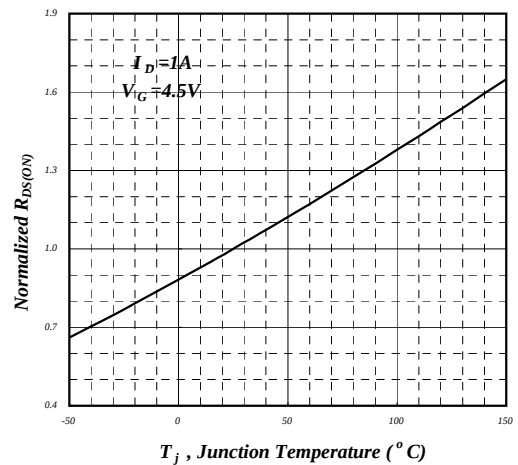
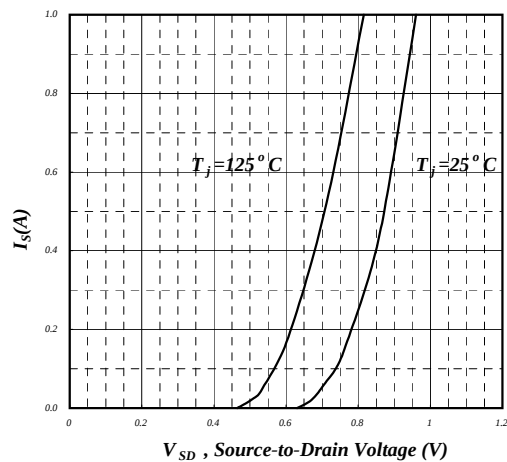
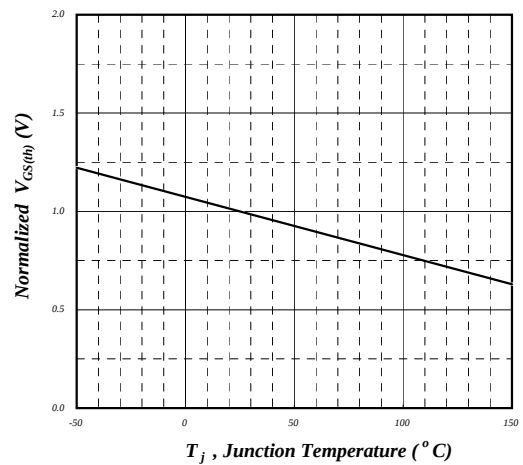


Fig 3. On-Resistance v.s. Gate Voltage

Fig 4. Normalized On-Resistance  
v.s. Junction TemperatureFig 5. Forward Characteristic of  
Reverse DiodeFig 6. Gate Threshold Voltage v.s.  
Junction Temperature

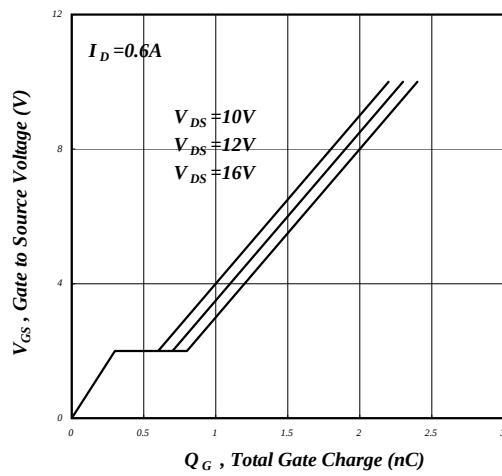


Fig 7. Gate Charge Characteristics

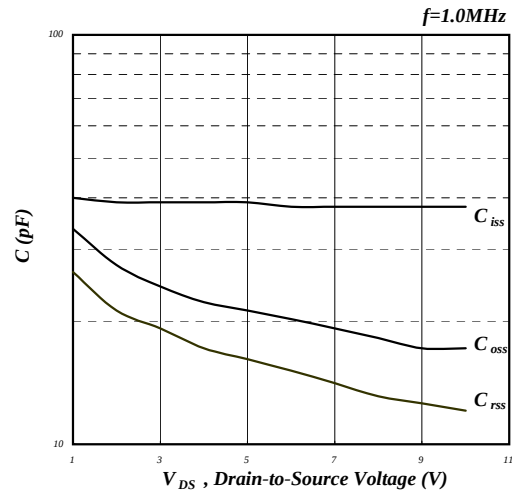


Fig 8. Typical Capacitance Characteristics

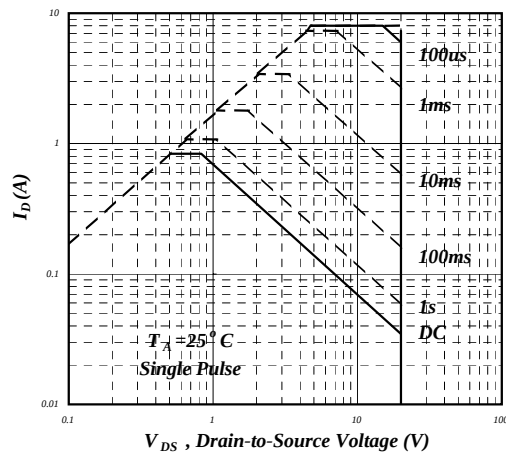


Fig 9. Maximum Safe Operating Area

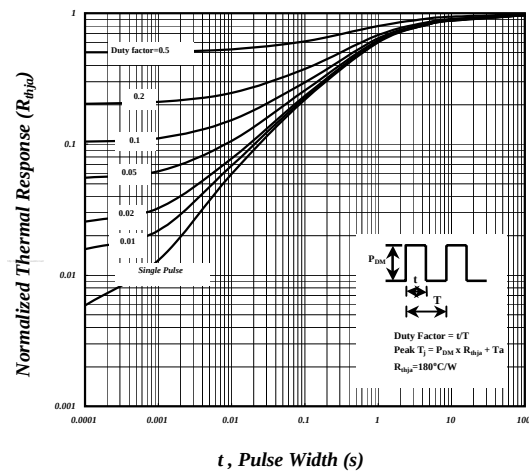


Fig 10. Effective Transient Thermal Impedance

## SCHOTTKY DIODE

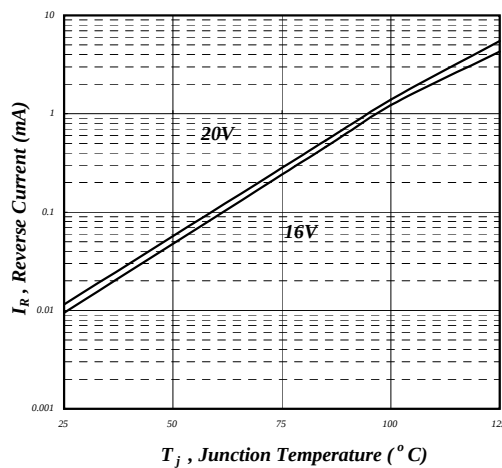


Fig 1. Reverse Leakage Current  
v.s. Junction Temperature

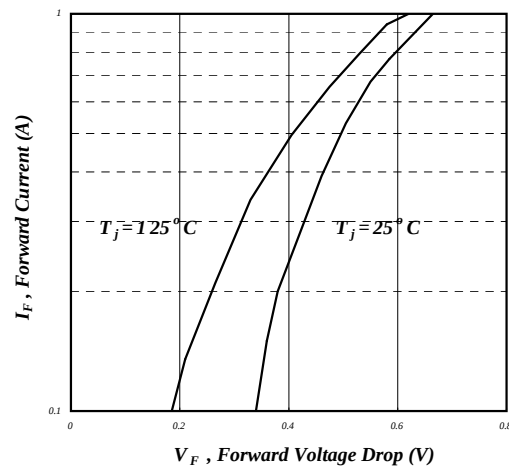


Fig 2. Forward Voltage Drop