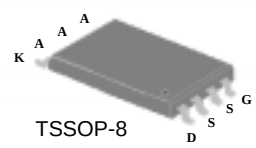
## P-CHANNEL POWER MOSFET WITH SCHOTTKY DIODE

Low on-resistance

Fast switching characteristics

Surface-mount package




TSSOP-8

**P-channel MOSFET**

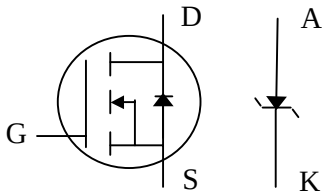
| | |
|---|---|
| $BV_{DSS}$ | -20V |
| $R_{DS(ON)}$ @ 4.5V | 50mΩ |
| $I_D$ | -3.5A |

**Schottky Diode**

| | |
|---|---|
| $V_{KA}$ | 20V |
| $V_f$ @ 0.5V | 1A |
| $I_F$ | 1.5A |

## Description

Power MOSFETs from Silicon Standard 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 and Schottky) | -20 | V |
| $V_{KA}$ | Reverse Voltage (Schottky) | 20 | V |
| $V_{GS}$ | Gate-Source Voltage (MOSFET) | ± 12 | V |
| $I_D$ @ $T_A$=25°C | Continuous Drain Current[3] (MOSFET) | - 3.5 | A |
| $I_D$ @ $T_A$=70°C | Continuous Drain Current[3] (MOSFET) | - 2.8 | A |
| $I_{DM}$ | Pulsed Drain Current[1,2] (MOSFET) | - 30 | A |
| $I_F$ | Average Forward Current (Schottky) | 1 | A |
| $I_{FM}$ | Pulsed Forward Current (Schottky) | 25 | A |
| $P_D$ @ $T_A$=25°C | Total Power Dissipation (MOSFET) | 1 | W |
| | Linear Derating Factor (MOSFET) | | W/°C |
| | Total Power Dissipation (Schottky) | 1 | W |
| | Linear Derating Factor (Schottky) | | W/°C |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | °C |
| $T_J$ | Operating Junction Temperature Range | -55 to 125 | °C |

## Thermal Data

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| Rthj-a | Thermal Resistance Junction-ambient (MOSFET) Max. | 125 | °C/W |
| | Thermal Resistance Junction-ambient (Schottky) Max. | 125 | °C/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 | -20 | - | - | V |
| $\Delta BV_{DSS}/\Delta T_j$ | Breakdown Voltage Temperature Coefficient | Reference to 25°C, $I_D$=-1mA | - | 0.03 | - | V/°C |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=-4.5V, $I_D$=-3.5A | - | - | 50 | mΩ |
| | | $V_{GS}$=-2.5V, $I_D$=-2.7A | - | - | 85 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=-250uA | -0.5 | - | - | V |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$=-10V, $I_D$=-3.5A | - | 10 | - | S |
| $I_{DSS}$ | Drain-Source Leakage Current ($T_j$=25°C) | $V_{DS}$=-20V, $V_{GS}$=0V | - | - | 1 | uA |
| | Drain-Source Leakage Current ($T_j$=70°C) | $V_{DS}$=-16V ,$V_{GS}$=0V | - | - | 25 | uA |
| $I_{GSS}$ | Gate-Source Leakage | $V_{GS}$= ± 12V | - | - | ±100 | nA |
| $Q_g$ | Total Gate Charge[2] | $I_D$= -3.5A | - | 15.6 | - | nC |
| $Q_{gs}$ | Gate-Source Charge | $V_{DS}$= -10V | - | 2.1 | - | nC |
| $Q_{gd}$ | Gate-Drain ("Miller") Charge | $V_{GS}$= -4.5V | - | 5.2 | - | nC |
| $t_{d(on)}$ | Turn-on Delay Time[2] | $V_{DS}$= -10V | - | 8.2 | - | ns |
| $t_r$ | Rise Time | $I_D$= -1A | - | 9.4 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | $R_G$= 3.3Ω ,$V_{GS}$= -4.5V | - | 66.4 | - | ns |
| $t_f$ | Fall Time | $R_D$= 10Ω | - | 48 | - | ns |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V | - | 660 | - | pF |
| $C_{oss}$ | Output Capacitance | $V_{DS}$=-20V | - | 285 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | f=1.0MHz | - | 130 | - | pF |

## Source-Drain Diode

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current ( Body Diode ) | $V_D$=$V_G$=0V , $V_S$=-1.2V | - | - | -0.83 | A |
| $V_{SD}$ | Forward On Voltage[2] | $I_S$=-0.83A, $V_{GS}$=0V | - | - | -1.2 | V |

## Schottky Characteristics @ Tj=25°C

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $V_F$ | Forward Voltage Drop | $I_F$=1A | - | - | 0.5 | V |
| $I_{rm}$ | Maximum Reverse Leakage Current | Vr=20V | - | - | 100 | uA |

**Notes:**

1.Pulse width limited by Max. junction temperature.

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

3.Surface mounted on 1 $in^2$ copper pad of FR4 board ; 208°C/W when mounted on Min. copper pad.

## MOSFET

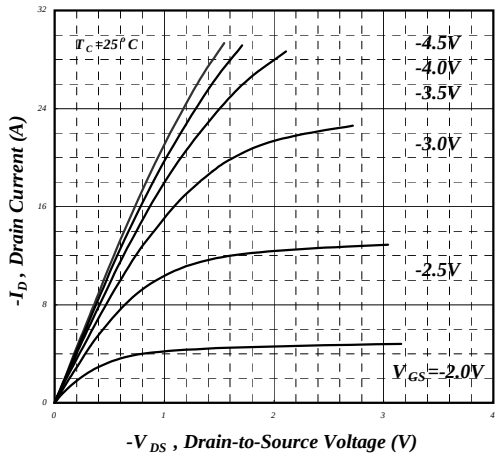



Fig 1. Typical Output Characteristics

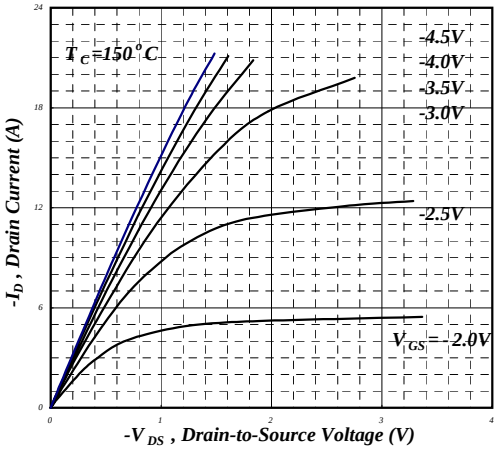



Fig 2. Typical Output Characteristics

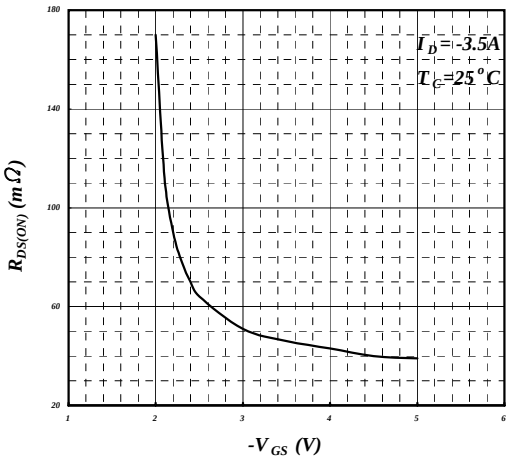



Fig 3. On-Resistance vs. Gate Voltage

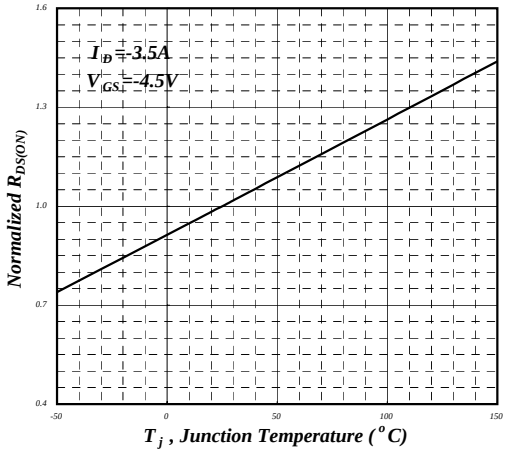



Fig 4. Normalized On-Resistance vs. Junction Temperature

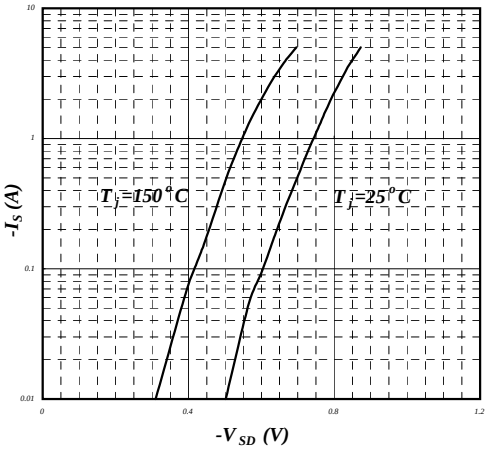



Fig 5. Forward Characteristic of Reverse Diode

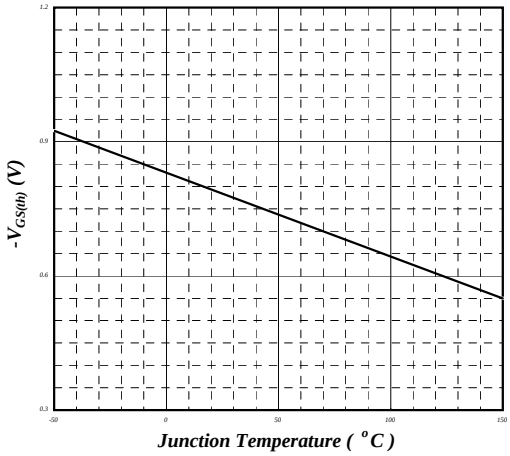



Fig 6. Gate Threshold Voltage vs. Junction Temperature

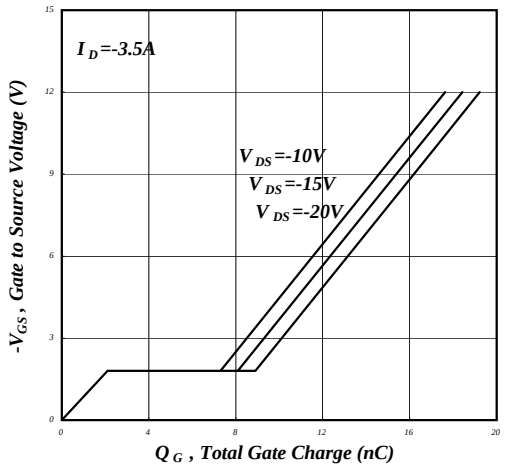



Fig 7. Gate Charge Characteristics

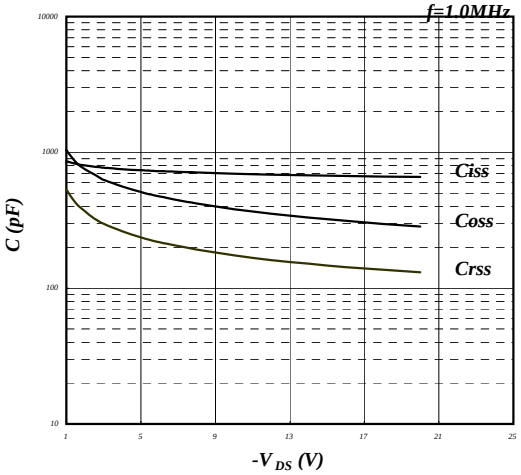



Fig 8. Typical Capacitance Characteristics

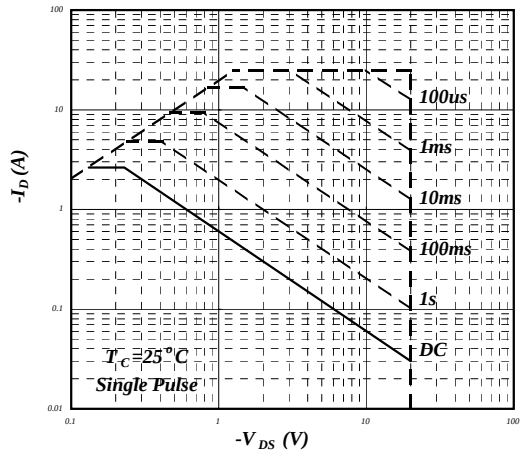



Fig 9. Maximum Safe Operating Area

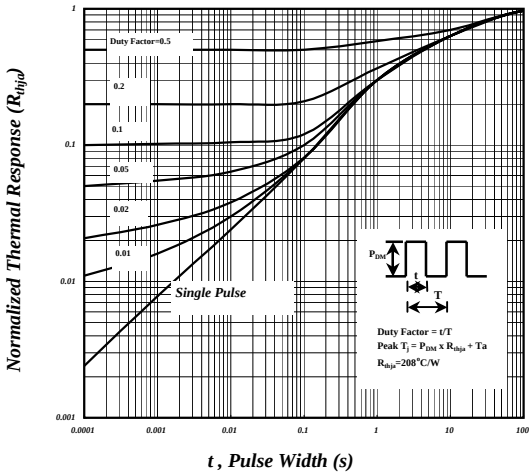



Fig 10. Effective Transient Thermal Impedance

## SCHOTTKY DIODE

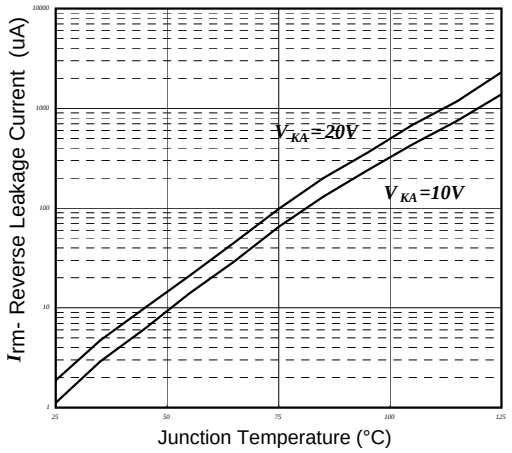



Fig 1. Reverse Leakage Current vs. Junction Temperature

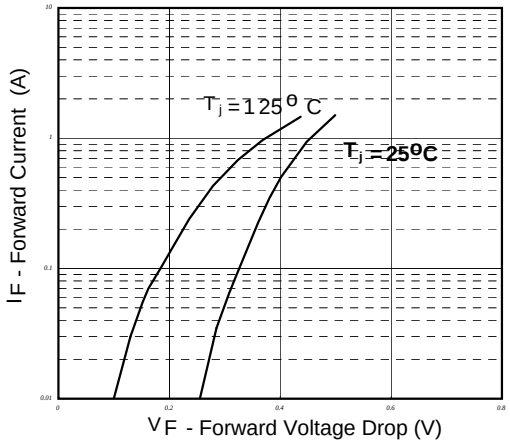



Fig 2. Forward Voltage Drop