N and P-Channel Enhancement Mode Power MOSFET

# WG4614

## General Features

- **N-Channel**
  - $V_{DS}$ =40V,$I_D$ =8A
  - $R_{DS(ON)}$ < 19mΩ @ $V_{GS}$=10V
  - $R_{DS(ON)}$ < 29mΩ @ $V_{GS}$=4.5V
- **P-Channel**
  - $V_{DS}$ =-40V,$I_D$ = -7A
  - $R_{DS(ON)}$ <35mΩ @ $V_{GS}$=-10V
  - $R_{DS(ON)}$ <45mΩ @ $V_{GS}$=-4.5V

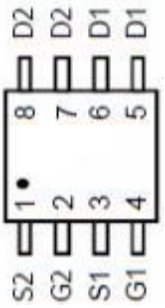
## Application

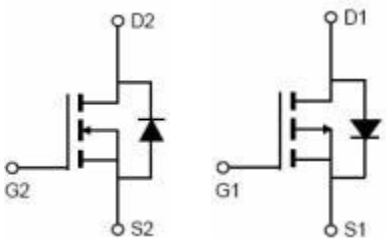
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

SOP-8

RoHS COMPLIANT






**N-channel** **P-channel**

**SOP-8 top view**

## Absolute Maximum Ratings ($T_A$=25℃unless otherwise noted)

| Parameter | | Symbol | N-Channel | P-Channel | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 40 | -40 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | ±20 | V |
| Continuous Drain Current | $T_A$=25℃ | $I_D$ | 8 | -7 | A |
| | $T_A$=70℃ | | 6 | -5.5 | |
| Pulsed Drain Current (Note 1) | | $I_{DM}$ | 40 | -30 | A |
| Maximum Power Dissipation | $T_A$=25℃ | $P_D$ | 2.0 | 2.0 | W |
| Operating Junction and Storage Temperature Range | | $T_J$,$T_{STG}$ | -55 To 150 | -55 To 150 | ℃ |

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## Thermal Characteristic

| | | | | |
|---|---|---|---|---|
| Thermal Resistance,Junction-to-Ambient (Note2) | $R_{\theta JA}$ | N-Ch | 62.5 | ℃/W |
| Thermal Resistance,Junction-to-Ambient (Note2) | $R_{\theta JA}$ | P-Ch | 62.5 | ℃/W |

## N-CH Electrical Characteristics ($T_A$=25℃unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=250μA | 40 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=40V,$V_{GS}$=0V | - | - | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V,$V_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics (Note 3)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 1 | 1.9 | 2.0 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=8A | - | 16 | 19 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=4A | - | 21 | 29 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=5V,$I_D$=8A | 33 | - | - | S |
| **Dynamic Characteristics (Note4)** | | | | | | |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=20V,$V_{GS}$=0V, F=1.0MHz | - | 415 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 112 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 11 | - | PF |
| **Switching Characteristics (Note 4)** | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=20V, $R_L$=2.5Ω $V_{GS}$=10V,$R_{GEN}$=3Ω | - | 4 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 3 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 15 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 2 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=20V,$I_D$=8A, $V_{GS}$=10V | - | 12 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 3.2 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 3.1 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=8A | - | 0.8 | 1.2 | V |

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## P-CH Electrical Characteristics ($T_A$=25℃unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=-250μA | -40 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-40V,$V_{GS}$=0V | - | - | -1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V,$V_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics** (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=-250μA | -1.0 | -1.5 | -2.0 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=-10V, $I_D$=-8A | - | 30 | 35 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-4A | - | 36 | 45 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=-5V,$I_D$=-8A | 20 | - | - | S |
| **Dynamic Characteristics** (Note4) | | | | | | |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=-20V,$V_{GS}$=0V, F=1.0MHz | - | 520 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 100 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 65 | - | PF |
| **Switching Characteristics** (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=-20V, $R_L$=2.3Ω $V_{GS}$=-10V,$R_{GEN}$=6Ω | - | 7.5 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 5.5 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 19 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 7 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=-20V,$I_D$=-8A $V_{GS}$=-10V | - | 13 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 3.8 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 3.1 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=-10A | - | - | -1.2 | V |

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**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

## N- Channel Typical Electrical and Thermal Characteristics (Curves)

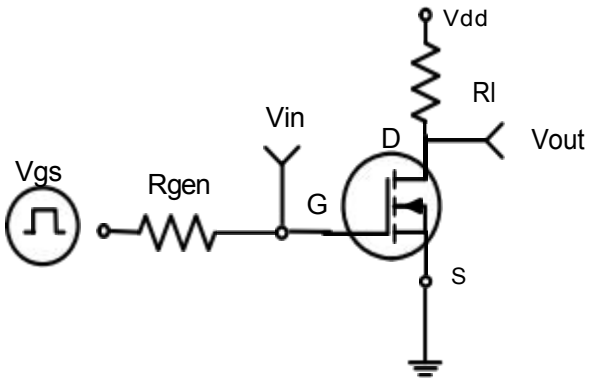


**Figure 1:Switching Test Circuit**

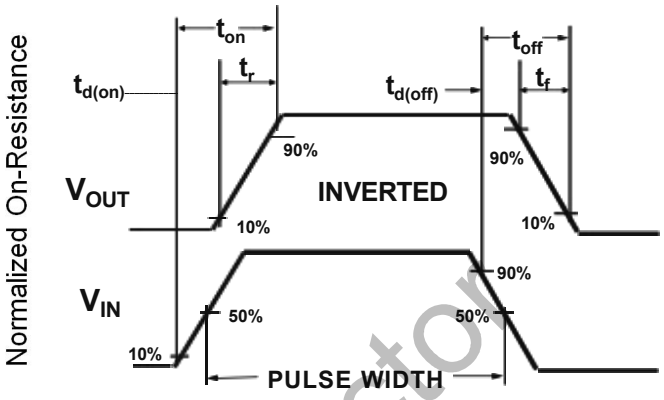


**Figure 2:Switching Waveforms**

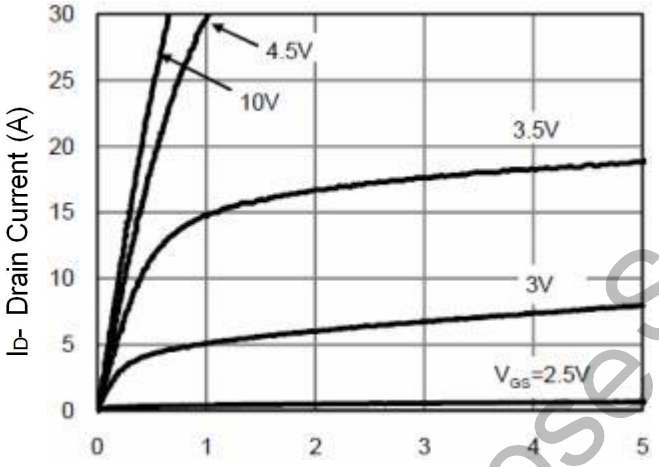


**Figure 3 Output Characteristics**

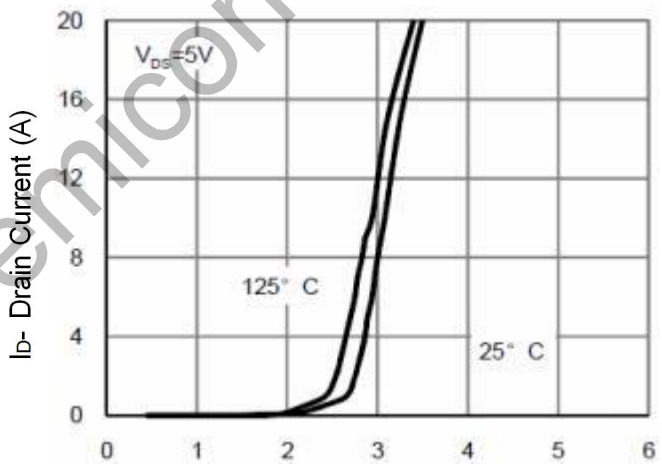


**Figure 4 Transfer Characteristics**

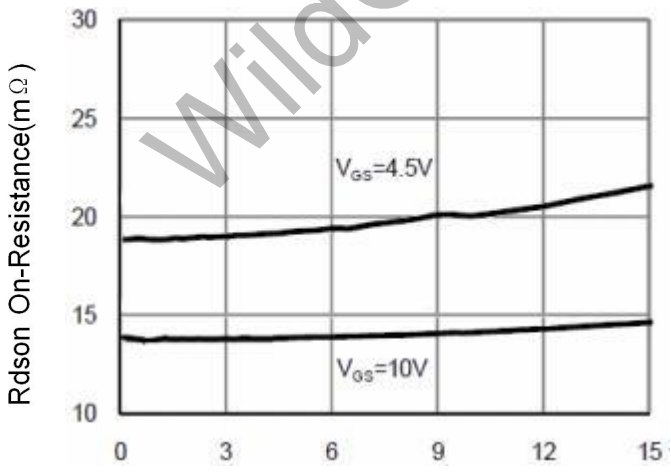


**Figure 5 Drain-Source On-Resistance**

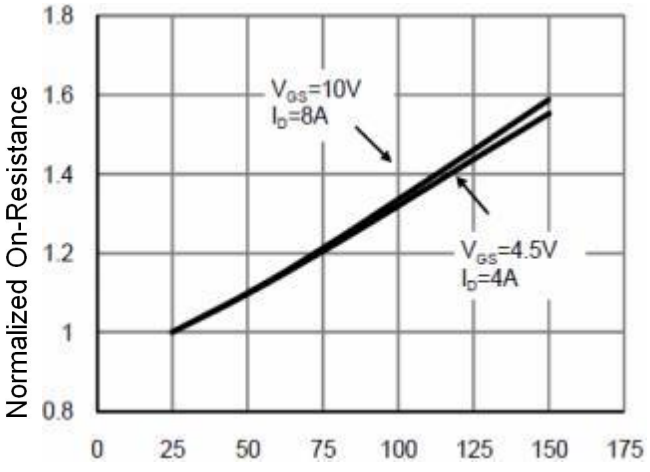


**Figure 6 Drain-Source On-Resistance**

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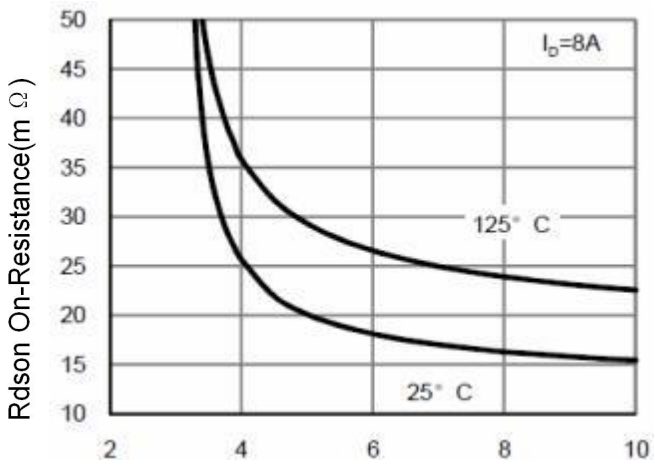
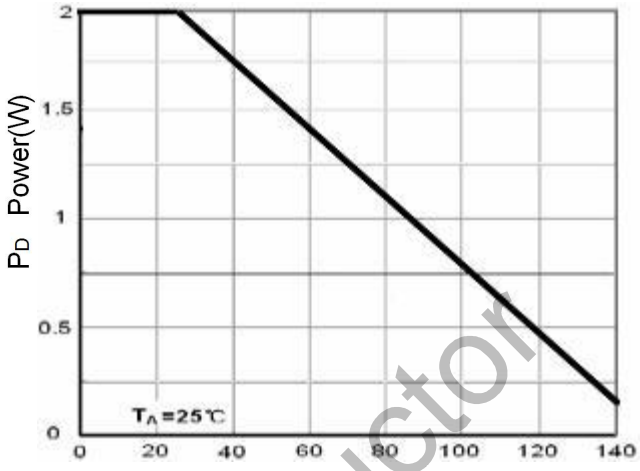


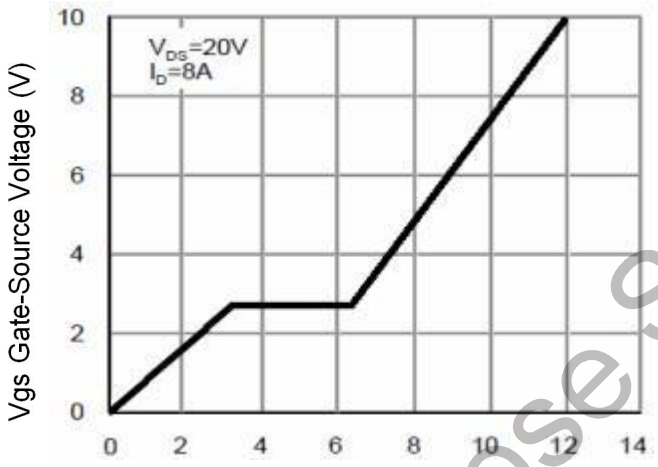

Vgs Gate-Source Voltage (V)

**Figure7 Rdson vs Vgs**



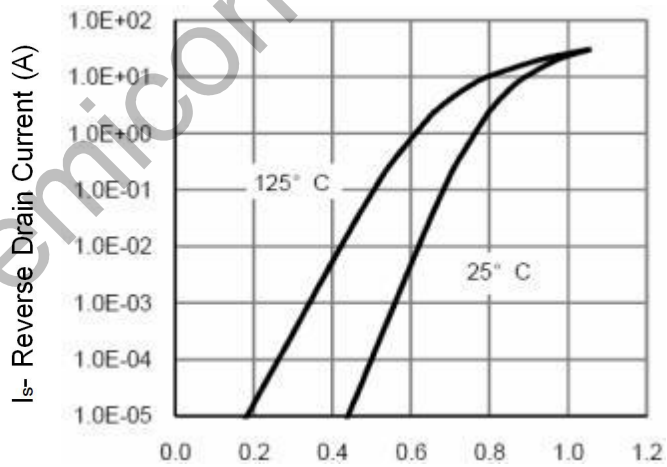

$T_J$-Junction Temperature(℃)

**Figure 8 Power Dissipation**



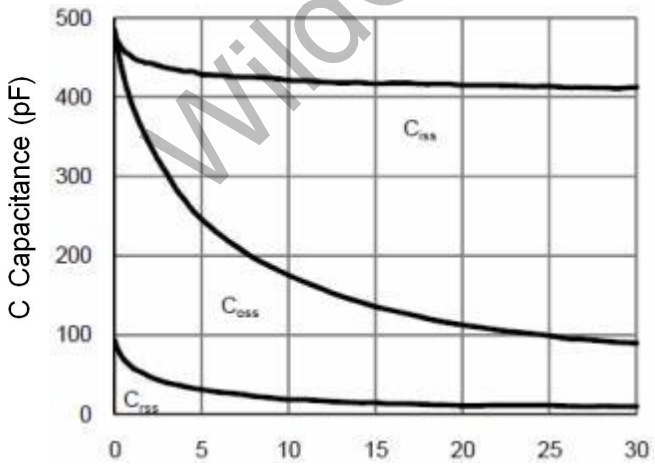

Qg Gate Charge (nC)

**Figure 9 Gate Charge**



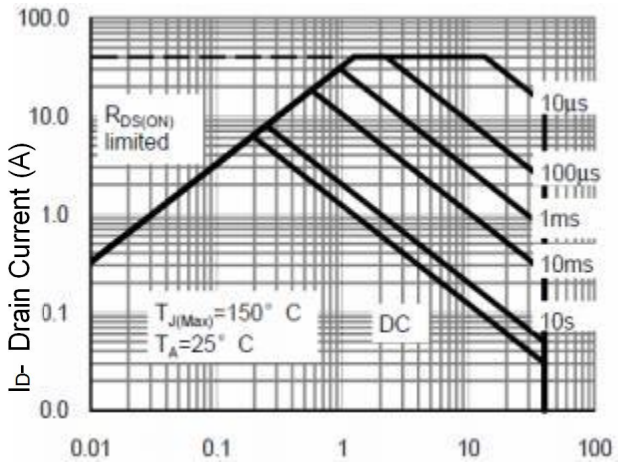

Vds Drain-Source Voltage (V)

**Figure 10 Source- Drain Diode Forward**




Vds Drain-Source Voltage (V)

**Figure 11 Capacitance vs Vds**




Vds Drain-Source Voltage (V)

**Figure 12 Safe Operation Area**

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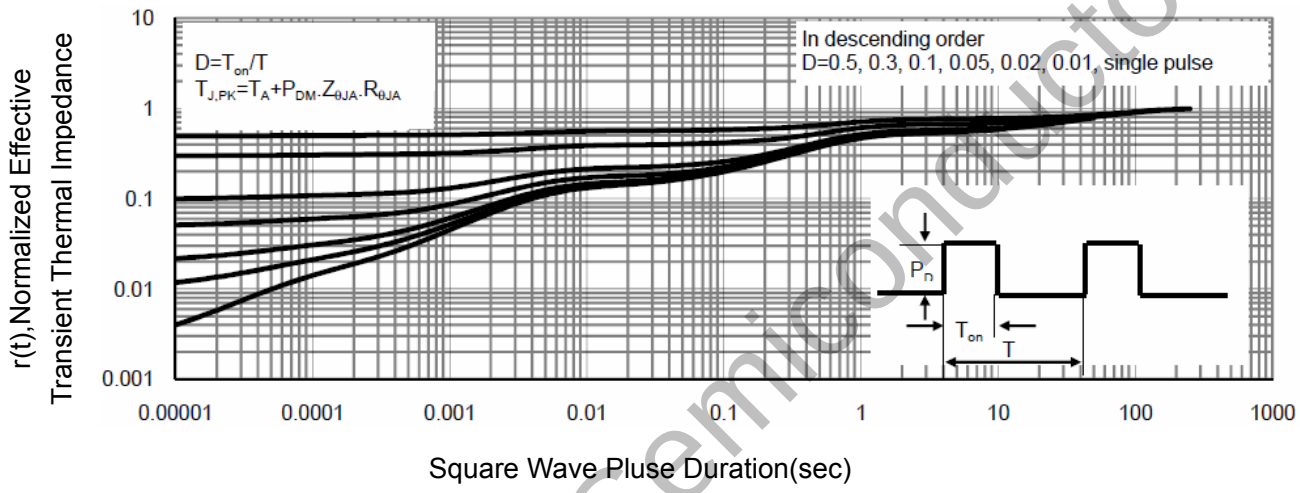


**Figure 13 Normalized Maximum Transient Thermal Impedance**

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## P- Channel Typical Electrical and Thermal Characteristics (Curves)

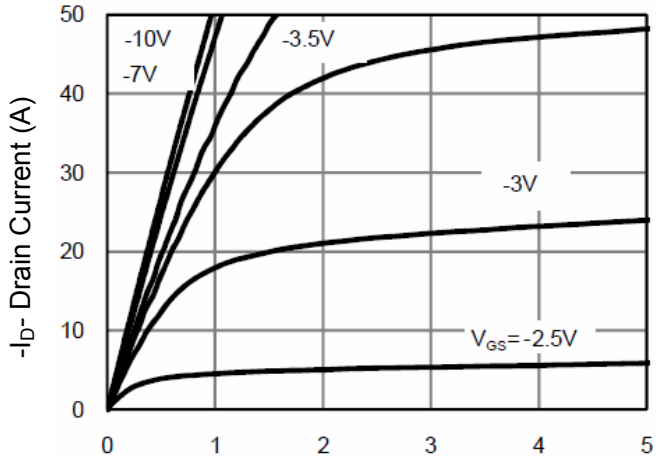


**Figure 1 Output Characteristics**

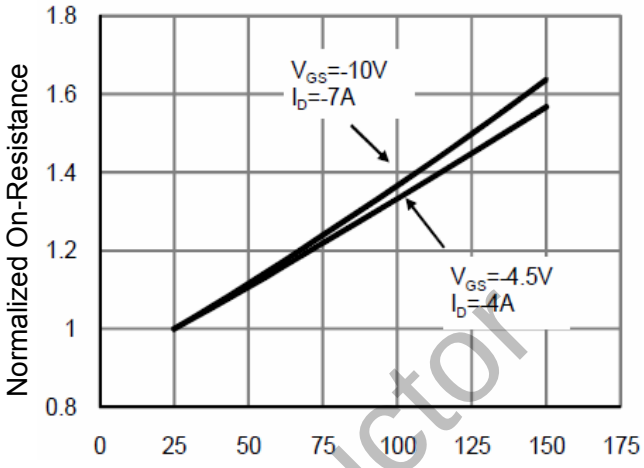


**Figure 4 Rdson-Junction Temperature**

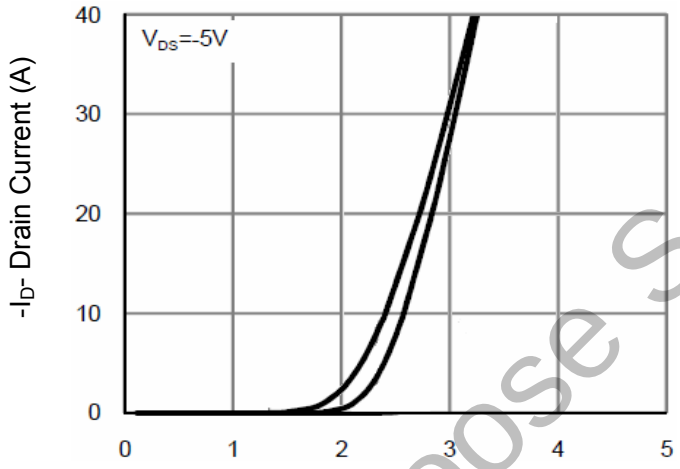


**Figure 2 Transfer Characteristics**

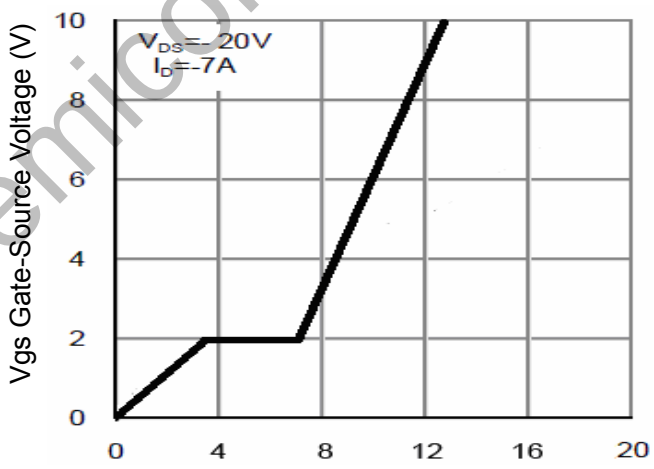


**Figure 5 Gate Charge**

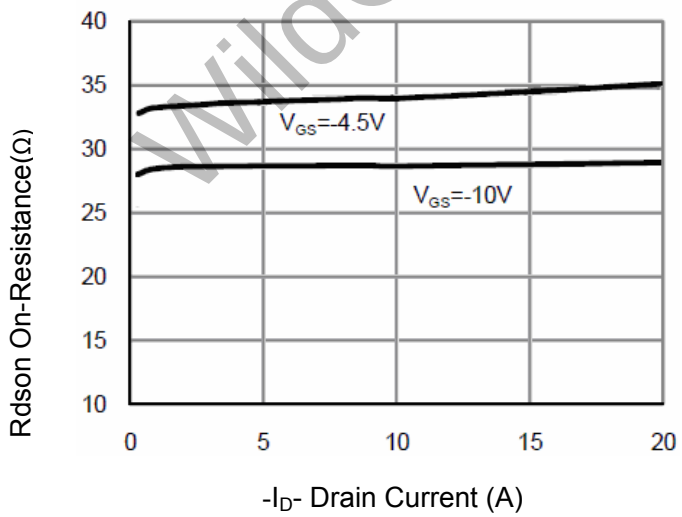


**Figure 3 Rdson- Drain Current**

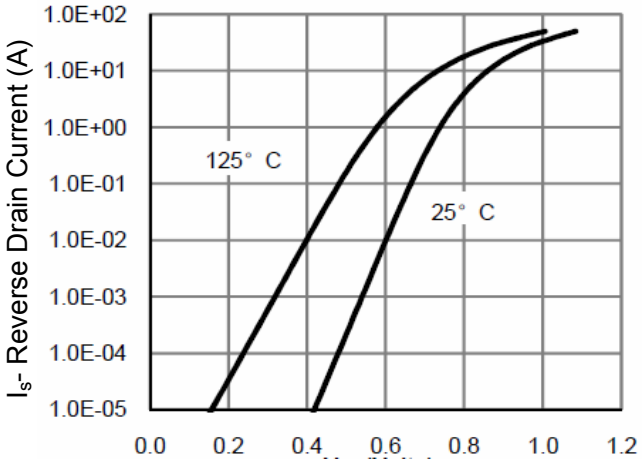


**Figure 6 Source- Drain Diode Forward**

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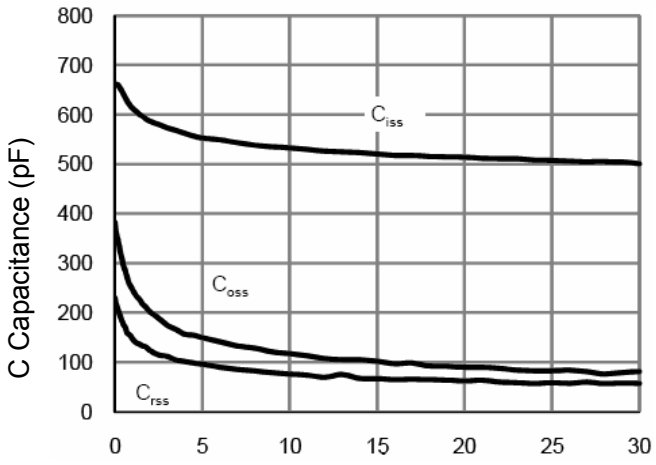


**Figure 7 Capacitance vs Vds**

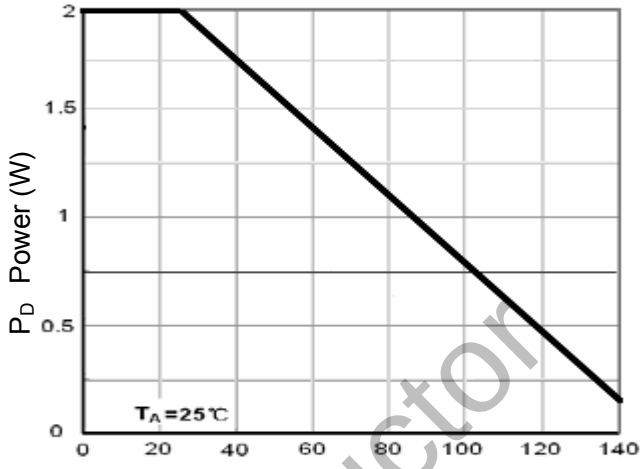


**Figure 9 Power Dissipation**

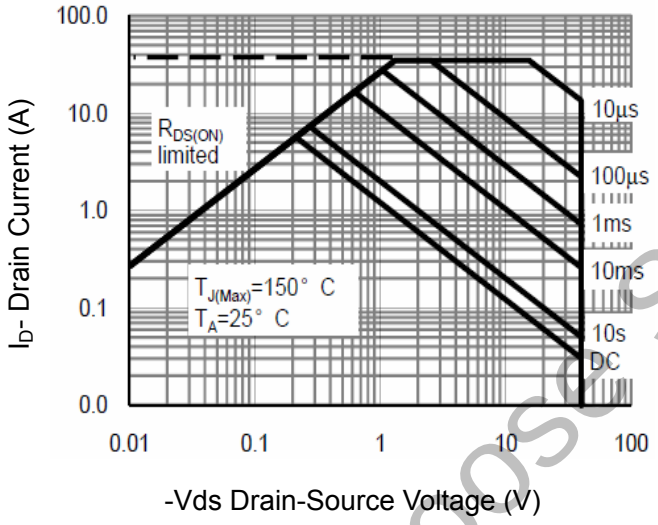


**Figure 8 Safe Operation Area**

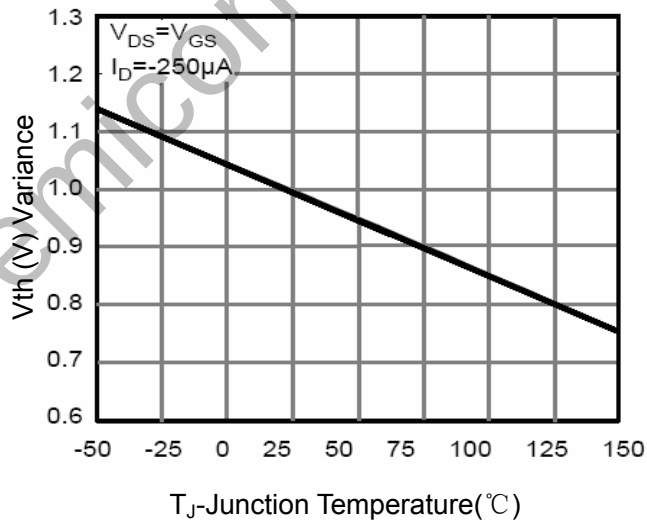


**Figure 10 $V_{GS(th)}$ vs Junction Temperature**

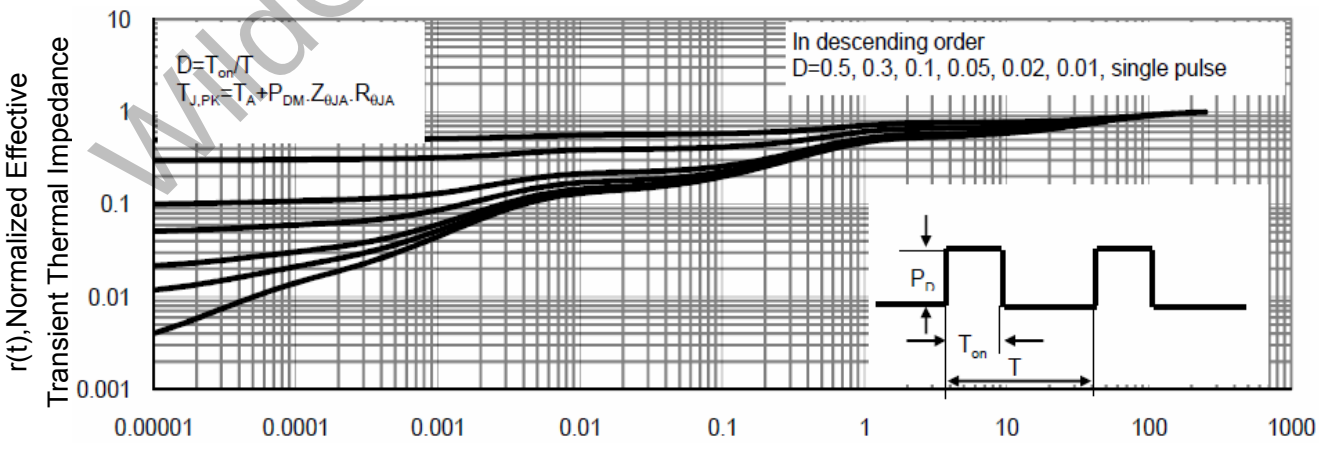


**Figure 11 Normalized Maximum Transient Thermal Impedance**

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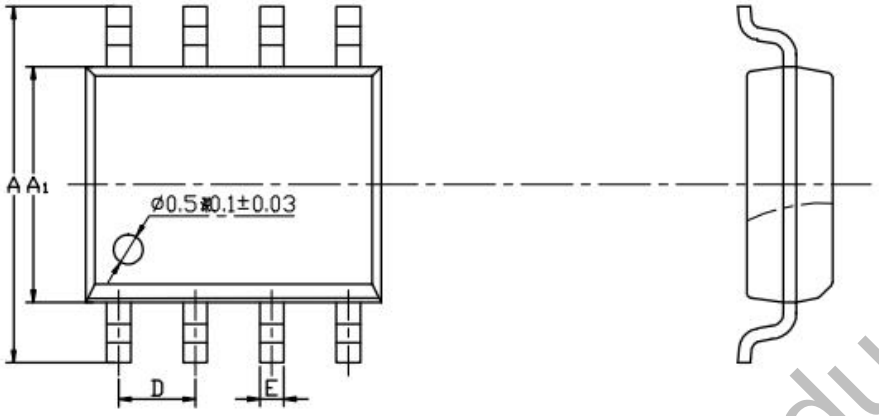
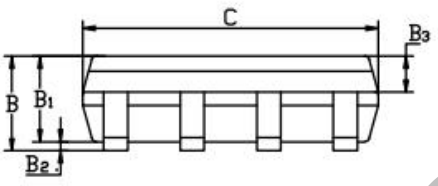
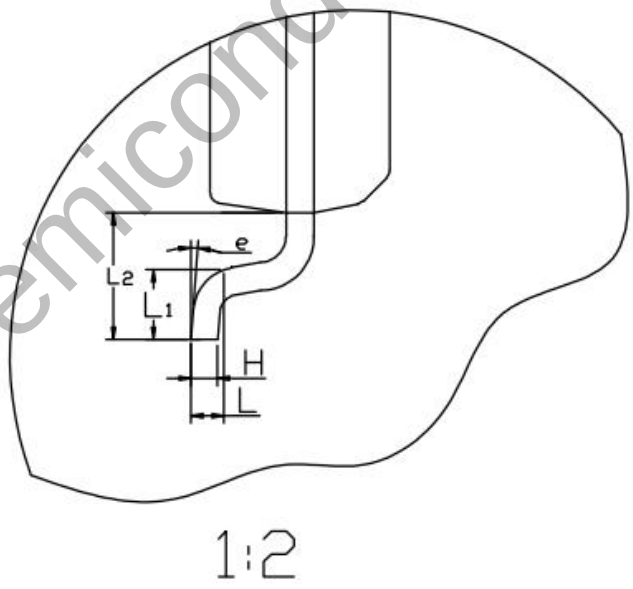
## SOP-8 Package Information




| 尺寸数据： | | | 单位：mm | |
|---|---|---|---|---|
| 标注 | Min | Nom | Max | 备注 |
| A | 5.80 | 6.00 | 6.20 | 跨度 |
| A1 | 3.70 | 3.90 | 4.10 | |
| B | 1.50 | 1.60 | 1.75 | |
| B1 | 1.30 | 1.40 | 1.50 | |
| B2 | 0.05 | 0.125 | 0.2 | 站高 |
| B3 | 0.60 | 0.70 | 0.75 | |
| C | 4.75 | 4.85 | 5.05 | |
| D | 1.27BSC | | | |
| E | 0.39 | 0.44 | 0.49 | |
| H | 0.10 | 0.20 | 0.25 | |
| L | 0.25BSC | | | |
| L1 | 0.40 | 0.6 | 0.8 | |
| L2 | 0.95 | 1.05 | 1.20 | 脚长 |
| e | 0 | 4° | 8° | |

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