

## 描述 / Descriptions

SOP-8 塑封封装互补增强模式 MOS 场效应管。

Complementary Enhancement MOSFET in a SOP-8 Plastic Package.

## 特征 / Features

|                                          |                                           |
|------------------------------------------|-------------------------------------------|
| N-channel                                | P-channel                                 |
| $V_{DS}(V)=30V$                          | $V_{DS}(V)=-30V$                          |
| $I_D=6.9A$                               | $I_D=-6A$                                 |
| $R_{DS(ON)}<32m\Omega$ ( $V_{GS}=10V$ )  | $R_{DS(ON)}<65m\Omega$ ( $V_{GS}=-10V$ )  |
| $R_{DS(ON)}<36m\Omega$ ( $V_{GS}=4.5V$ ) | $R_{DS(ON)}<75m\Omega$ ( $V_{GS}=-4.5V$ ) |

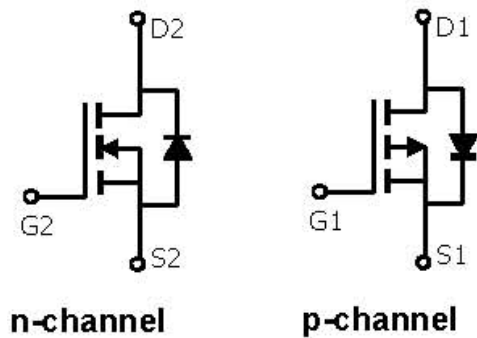
无卤产品。Halogen-free Product.

## 用途 / Applications

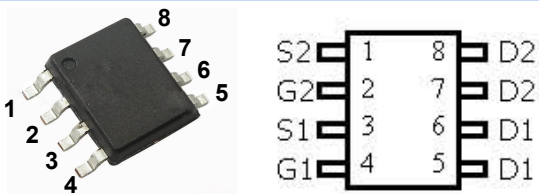
用于高功率 DC/DC 转换和功率开关。适用于作负载开关或脉宽调制应用。

These devices are well suited for high efficiency switching DC/DC converters and switch mode power supplies. And suitable for use as a load switch or in PWM applications.

## 内部等效电路 / Equivalent Circuit



## 引脚排列 / Pinning



## 放大及印章代码 / h<sub>FE</sub> Classifications & Marking

见印章说明。See Marking Instructions.

## 极限参数 / Absolute Maximum Ratings(Ta=25°C)

| 参数<br>Parameter                          | 符号<br>Symbol                       | 数值<br>Rating |           | 单位<br>Unit         |
|------------------------------------------|------------------------------------|--------------|-----------|--------------------|
|                                          |                                    | N-channel    | P-channel |                    |
| Drain-Source Voltage                     | $V_{DS}$                           | $\pm 30$     |           | V                  |
| Gate-Source Voltage                      | $V_{GS}$                           | $\pm 12$     |           | V                  |
| Continuous Drain Current <sup>A</sup>    | $I_D (T_A=25^\circ\text{C})$       | 6.9          | -6.0      | A                  |
|                                          | $I_D (T_A=70^\circ\text{C})$       | 5.8          | -5.0      | A                  |
| Pulsed Drain Current <sup>B</sup>        | $I_{DM}$                           | $\pm 30$     |           | A                  |
| Power Dissipation                        | $P_D (T_A=25^\circ\text{C})$       | 2            |           | W                  |
|                                          | $P_D (T_A=70^\circ\text{C})$       | 1.44         |           | W                  |
| Maximum Junction-to-Ambient <sup>A</sup> | $R_{\theta JA}(t \leq 10\text{s})$ | 62.5         |           | $^\circ\text{C/W}$ |
|                                          | $R_{\theta JA}$                    | 110          |           | $^\circ\text{C/W}$ |
| Maximum Junction-to-Lead <sup>C</sup>    | $R_{\theta JL}$                    | 60           | 4         | $^\circ\text{C/W}$ |
| Junction and Storage Temperature Range   | $T_J, T_{STG}$                     | -55 to +150  |           | $^\circ\text{C}$   |

## Notes:

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$ . The value in any a given application depends on the user's specific board design. The current rating is based on the  $t \leq 10\text{s}$  thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C: The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to lead  $R_{\theta JL}$  and lead to ambient.

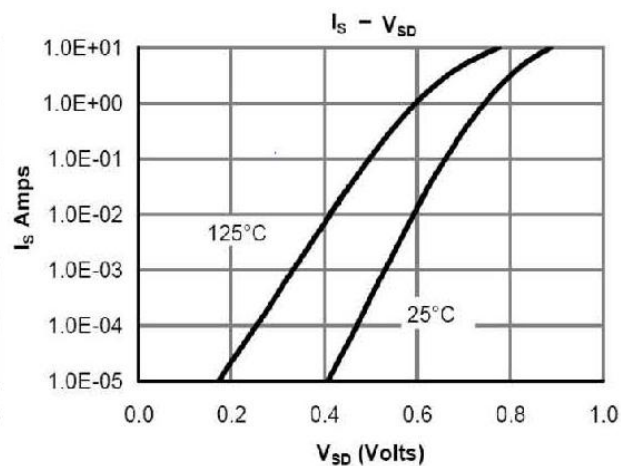
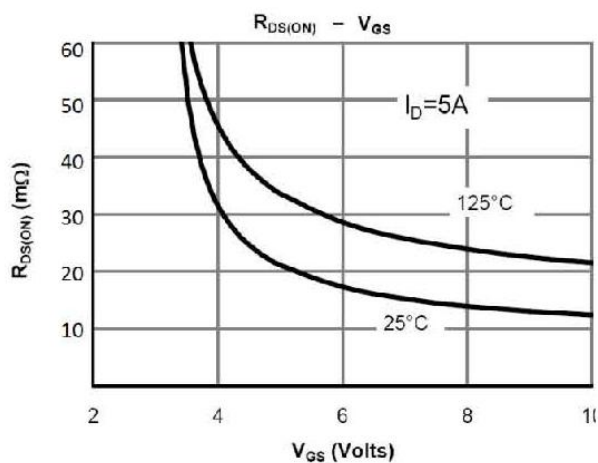
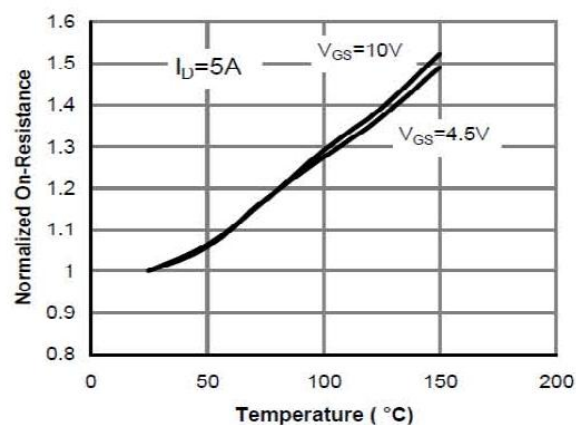
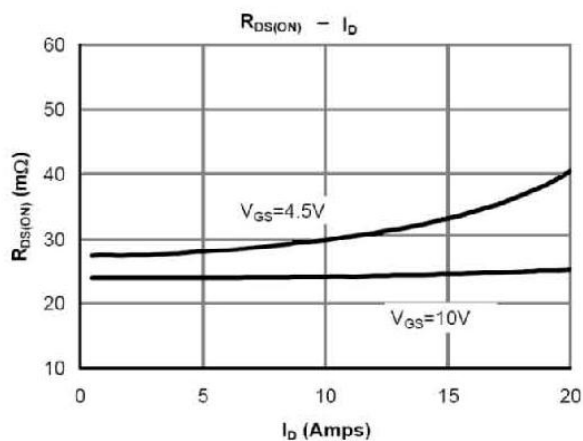
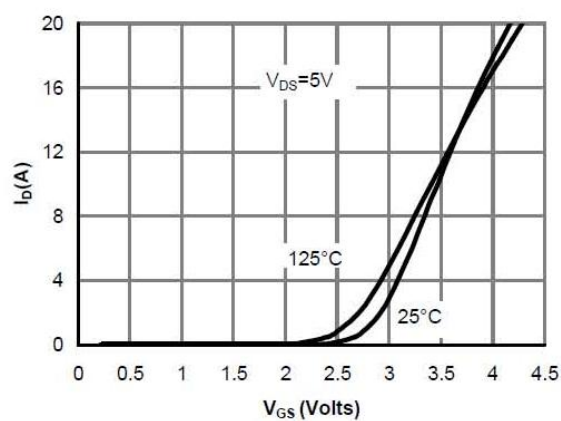
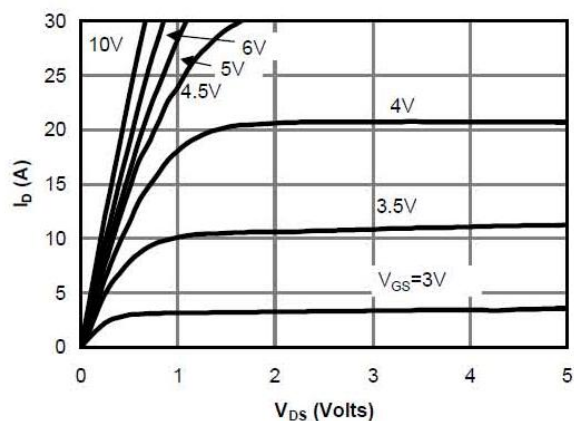
D: The static characteristics in Figures 1 to 6, 12, 14 are obtained using 80  $\mu\text{s}$  pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$ . The SOA curve provides a single pulse rating.

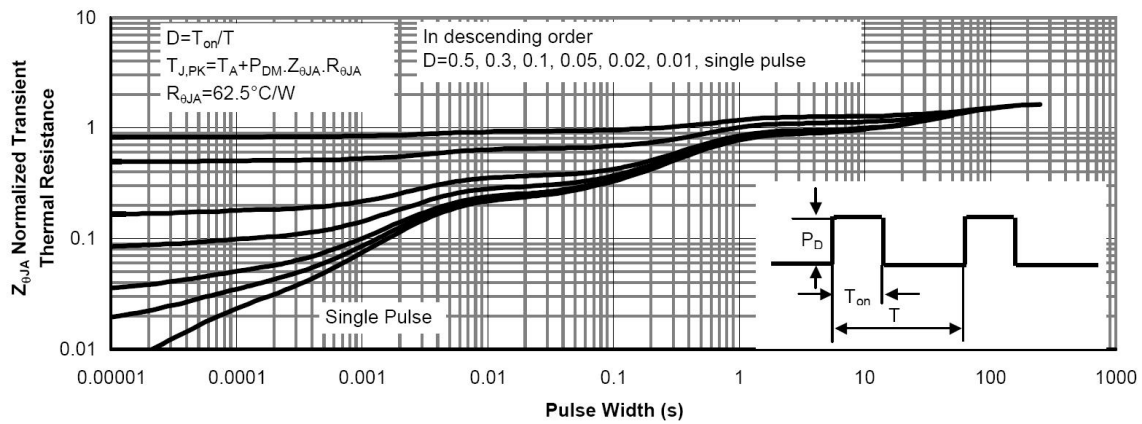
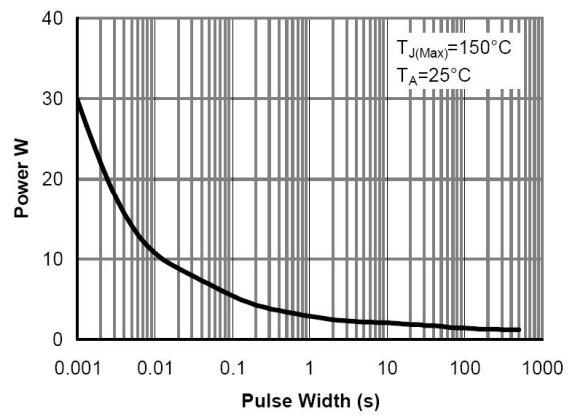
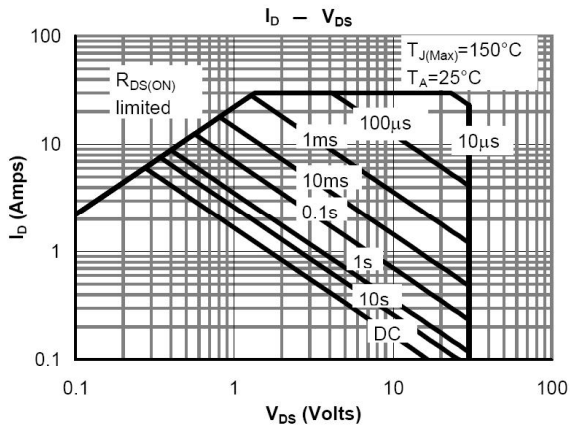
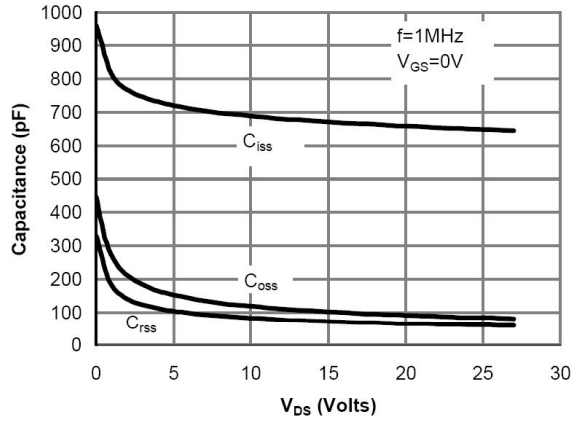
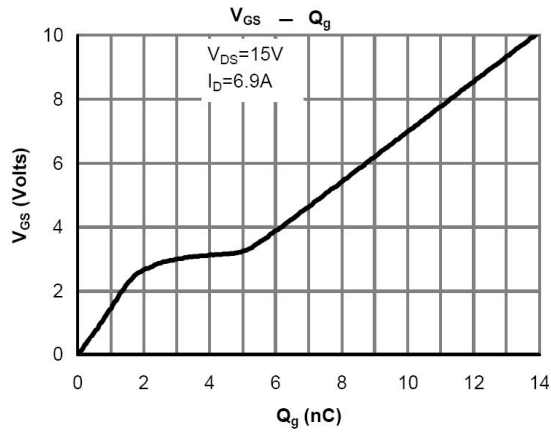
## N-沟道电性能参数/N-CHANNEL Electrical Characteristics(Ta=25℃)

| 参数<br>Parameter                    | 符号<br>Symbol | 测试条件<br>Test Conditions                                        | 最小值<br>Min | 典型值<br>Typ | 最大值<br>Max | 单位<br>Unit |
|------------------------------------|--------------|----------------------------------------------------------------|------------|------------|------------|------------|
| Drain-Source Breakdown Voltage     | $BV_{DSS}$   | $V_{GS}=0V$ $I_D=250\mu A$                                     | 30         |            |            | V          |
| Zero Gate Voltage Drain Current    | $I_{DSS}$    | $V_{DS}=24V$ $V_{GS}=0V$                                       |            |            | 1.0        | $\mu A$    |
|                                    |              | $V_{DS}=24V$ $V_{GS}=0V$<br>$T_J=55^\circ C$                   |            |            | 5.0        | $\mu A$    |
| Gate-Body leakage current          | $I_{GSS}$    | $V_{GS}=\pm 12V$ $V_{DS}=0V$                                   |            |            | 100        | nA         |
| Gate Threshold Voltage             | $V_{GS(th)}$ | $V_{DS}=V_{GS}$ $I_D=250\mu A$                                 | 0.65       |            | 1.3        | V          |
| On state drain current             | $I_{D(on)}$  | $V_{DS}=4.5V$ $V_{GS}=5.0V$                                    | 6.9        |            |            | A          |
| Static Drain-Source On-Resistance  | $R_{DS(on)}$ | $V_{GS}=10V$ $I_D=6.9A$                                        |            | 24         | 32         | m $\Omega$ |
|                                    |              | $V_{GS}=10V$ $I_D=6.9A$<br>$T_J=125^\circ C$                   |            | 32.3       | 38         | m $\Omega$ |
|                                    |              | $V_{GS}=4.5V$ $I_D=5.0A$                                       |            | 27         | 36         | m $\Omega$ |
| Forward Transconductance           | $g_{FS}$     | $V_{DS}=5.0V$ $I_D=5.0A$                                       |            | 9          |            | S          |
| Diode Forward Voltage              | $V_{SD}$     | $V_{GS}=0V$ $I_S=1.0A$                                         |            | 0.76       | 1.0        | V          |
| Input Capacitance                  | $C_{iss}$    | $V_{DS}=15V$ $V_{GS}=0V$<br>$f=1.0MHz$                         |            | 680        |            | pF         |
| Output Capacitance                 | $C_{oss}$    |                                                                |            | 102        |            | pF         |
| Reverse Transfer Capacitance       | $C_{rss}$    |                                                                |            | 77         |            | pF         |
| Gate resistance                    | $R_g$        | $V_{DS}=0V$ $V_{GS}=0V$<br>$f=1.0MHz$                          |            | 3.0        |            | $\Omega$   |
| Total Gate Charge(10V)             | $Q_g$        | $V_{GS}=10V$ $V_{DS}=15V$<br>$I_D=6.9A$                        |            | 13.84      |            | nC         |
| Total Gate Charge(4.5V)            |              |                                                                |            | 6.74       |            | nC         |
| Gate-Source Charge                 | $Q_{gs}$     |                                                                |            | 1.82       |            | nC         |
| Gate-Drain Charge                  | $Q_{gd}$     |                                                                |            | 3.2        |            | nC         |
| Turn-On Delay Time                 | $t_{d(on)}$  | $V_{DS}=15V$ $V_{GS}=10V$<br>$R_L=2.1\Omega$ $R_{GEN}=3\Omega$ |            | 4.6        |            | ns         |
| Turn-On Rise Time                  | $t_r$        |                                                                |            | 4.1        |            | ns         |
| Turn-Off Delay Time                | $t_{d(off)}$ |                                                                |            | 20.6       |            | ns         |
| Turn-Off Fall Time                 | $t_f$        |                                                                |            | 5.2        |            | ns         |
| Body Diode Reverse Recovery Time   | $t_{rr}$     | $I_F=6.9A$<br>$dI/dt=100A/\mu s$                               |            | 16.5       |            | ns         |
| Body Diode Reverse Recovery Charge | $Q_{rr}$     | $I_F=6.9A$<br>$dI/dt=100A/\mu s$                               |            | 7.8        |            | nC         |

**N-沟道电参数曲线图 / N-CHANNEL Electrical Characteristic Curve**



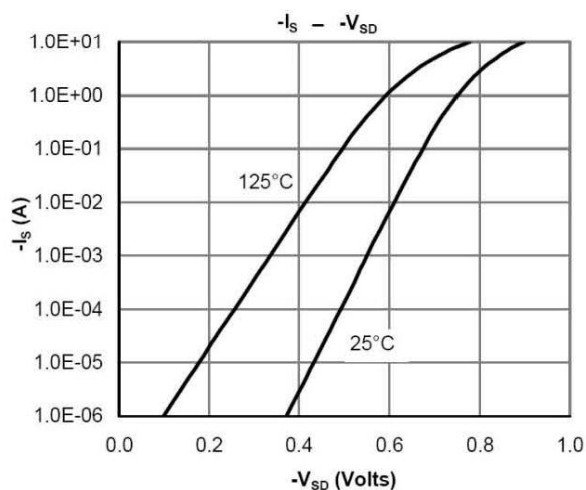
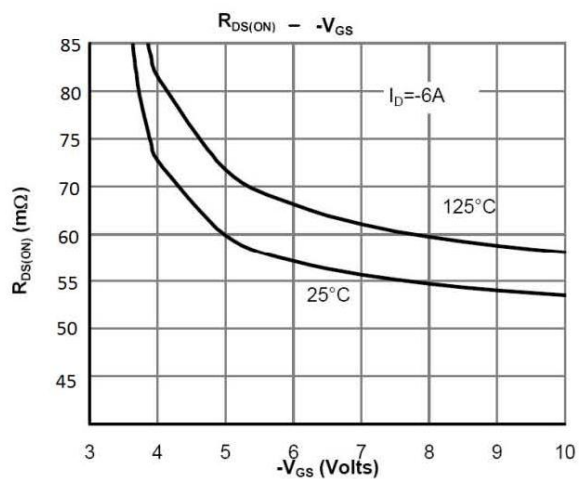
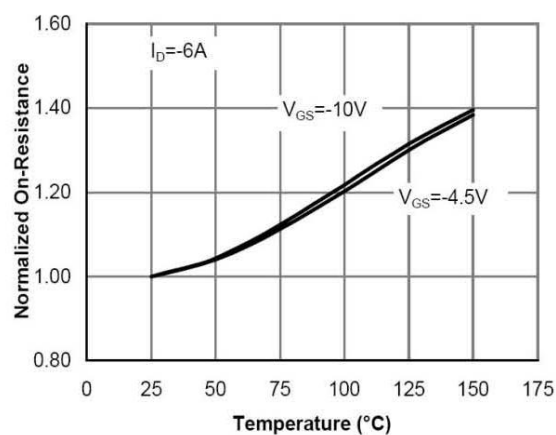
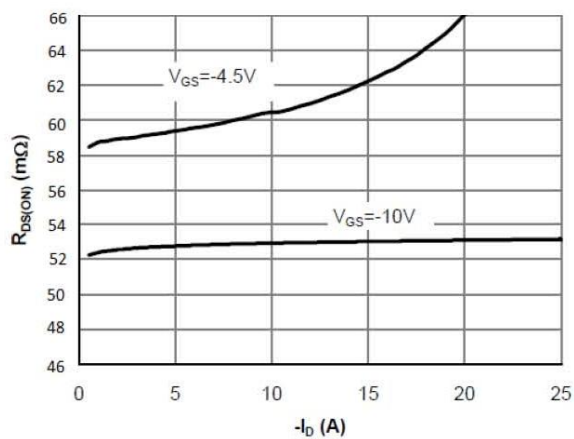
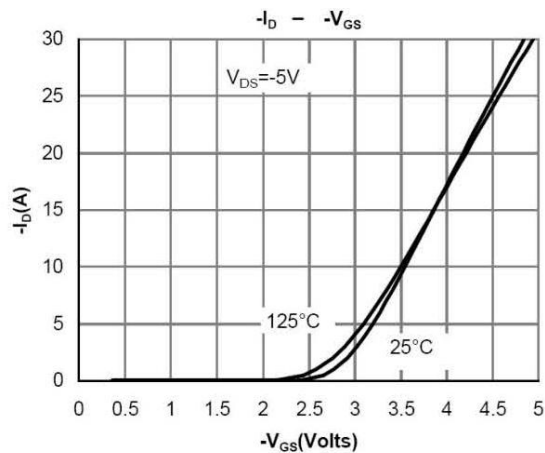
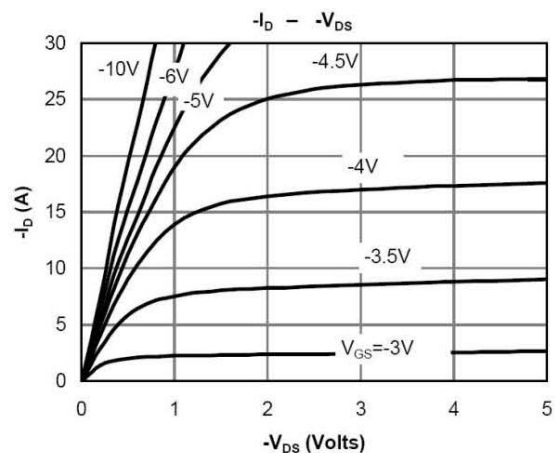
**N-沟道电参数曲线图 / N-CHANNEL Electrical Characteristic Curve**



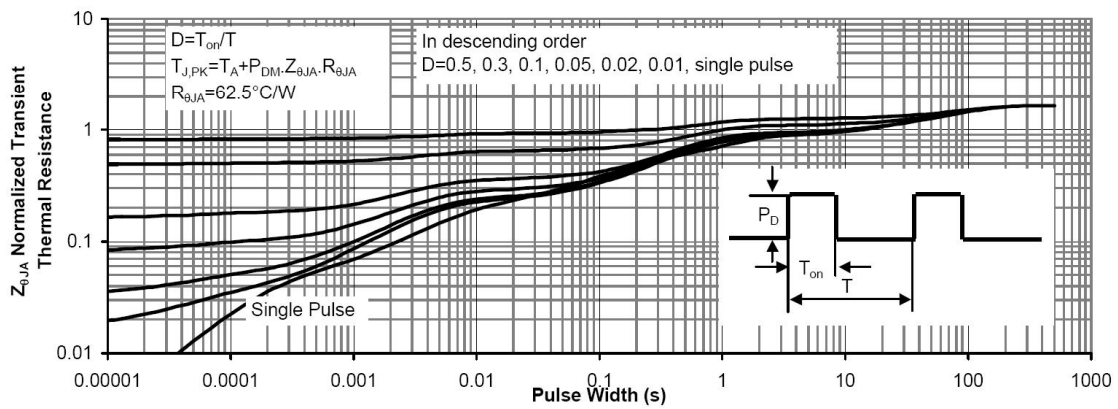
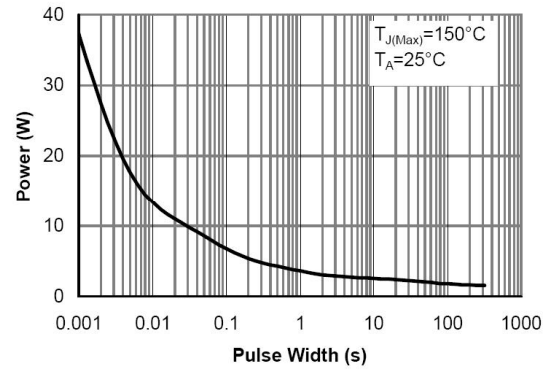
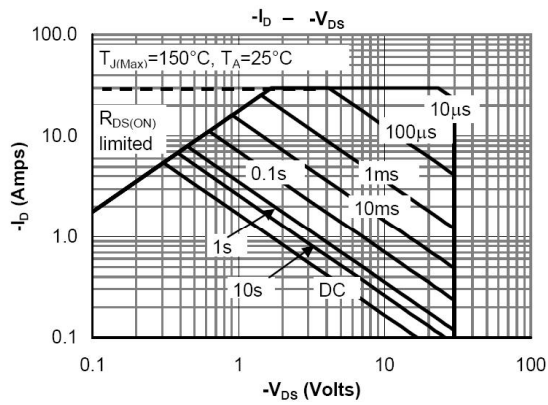
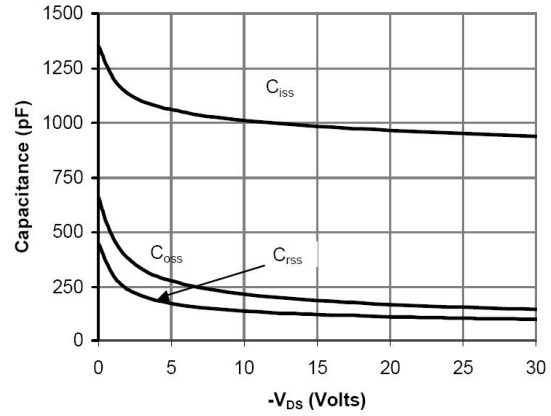
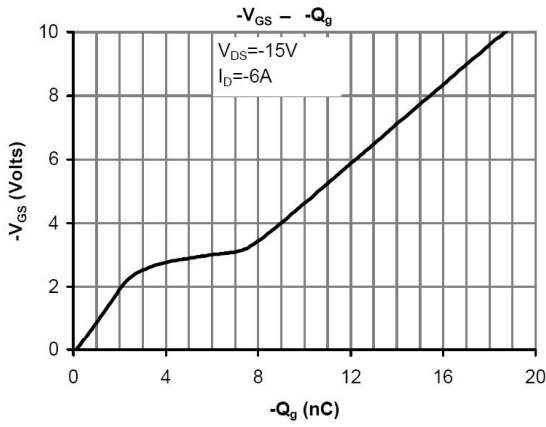
## P-沟道电性能参数/P-CHANNEL Electrical Characteristics(Ta=25°C)

| 参数<br>Parameter                    | 符号<br>Symbol | 测试条件<br>Test Conditions                                          | 最小值<br>Min | 典型值<br>Typ | 最大值<br>Max | 单位<br>Unit |
|------------------------------------|--------------|------------------------------------------------------------------|------------|------------|------------|------------|
| Drain-Source Breakdown Voltage     | $BV_{DSS}$   | $V_{GS}=0V$ $I_D=-250\mu A$                                      | -30        |            |            | V          |
| Zero Gate Voltage Drain Current    | $I_{DSS}$    | $V_{DS}=-24V$ $V_{GS}=0V$                                        |            |            | -1.0       | $\mu A$    |
|                                    |              | $V_{DS}=-24V$ $V_{GS}=0V$<br>$T_J=55^\circ C$                    |            |            | -5.0       | $\mu A$    |
| Gate-Body leakage current          | $I_{GSS}$    | $V_{GS}=\pm 12V$ $V_{DS}=0V$                                     |            |            | $\pm 100$  | nA         |
| Gate Threshold Voltage             | $V_{GS(th)}$ | $V_{DS}=V_{GS}$ $I_D=-250\mu A$                                  | -0.5       | -0.7       | -1.3       | V          |
| On state drain current             | $I_{D(on)}$  | $V_{DS}=-4.5V$ $V_{GS}=-5.0V$                                    | 6          |            |            | A          |
| Static Drain-Source On-Resistance  | $R_{DS(on)}$ | $V_{GS}=-10V$ $I_D=-6.0A$                                        |            | 52         | 65         | m $\Omega$ |
|                                    |              | $V_{GS}=-10V$ $I_D=-6.0A$<br>$T_J=125^\circ C$                   |            | 57         | 86         | m $\Omega$ |
|                                    |              | $V_{GS}=-4.5V$ $I_D=-5.0A$                                       |            | 59         | 75         | m $\Omega$ |
| Forward Transconductance           | $g_{FS}$     | $V_{DS}=-5.0V$ $I_D=-5.0A$                                       |            | 12         |            | S          |
| Diode Forward Voltage              | $V_{SD}$     | $V_{GS}=0V$ $I_S=-1.0A$                                          |            | -0.76      | -1.0       | V          |
| Input Capacitance                  | $C_{iss}$    | $V_{DS}=-15V$ $V_{GS}=0V$<br>$f=1.0MHz$                          |            | 920        |            | pF         |
| Output Capacitance                 | $C_{oss}$    |                                                                  |            | 190        |            | pF         |
| Reverse Transfer Capacitance       | $C_{rss}$    |                                                                  |            | 122        |            | pF         |
| Gate resistance                    | $R_g$        | $V_{DS}=0V$ $V_{GS}=0V$<br>$f=1.0MHz$                            |            | 3.6        |            | $\Omega$   |
| Total Gate Charge(10V)             | $Q_g$        | $V_{GS}=-10V$ $V_{DS}=-15V$<br>$I_D=-6.0A$                       |            | 18.5       |            | nC         |
| Total Gate Charge(4.5V)            |              |                                                                  |            | 9.6        |            | nC         |
| Gate-Source Charge                 | $Q_{gs}$     |                                                                  |            | 2.7        |            | nC         |
| Gate-Drain Charge                  | $Q_{gd}$     |                                                                  |            | 4.5        |            | nC         |
| Turn-On Delay Time                 | $t_{d(on)}$  | $V_{DS}=-15V$ $V_{GS}=-10V$<br>$R_L=2.7\Omega$ $R_{GEN}=3\Omega$ |            | 7.7        |            | ns         |
| Turn-On Rise Time                  | $t_r$        |                                                                  |            | 5.7        |            | ns         |
| Turn-Off Delay Time                | $t_{d(off)}$ |                                                                  |            | 20.2       |            | ns         |
| Turn-Off Fall Time                 | $t_f$        |                                                                  |            | 9.5        |            | ns         |
| Body Diode Reverse Recovery Time   | $t_{rr}$     | $I_F=-6.0A$<br>$dI/dt=100A/\mu s$                                |            | 20         |            | ns         |
| Body Diode Reverse Recovery Charge | $Q_{rr}$     | $I_F=-6.0A$<br>$dI/dt=100A/\mu s$                                |            | 8.8        |            | nC         |

**P-沟道电参数曲线图 / P-CHANNEL Electrical Characteristic Curve**



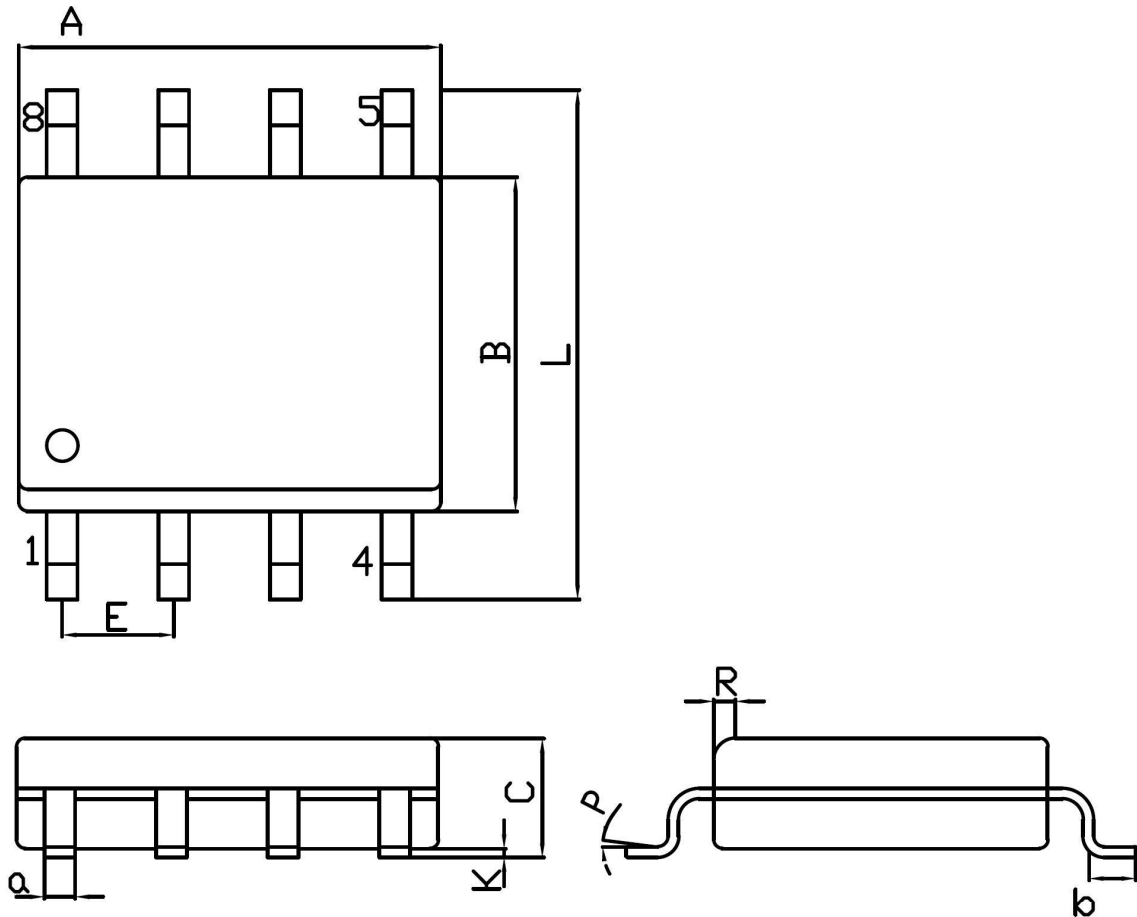
**P-沟道电参数曲线图 / P-CHANNEL Electrical Characteristic Curve**



外形尺寸图 / Package Dimensions

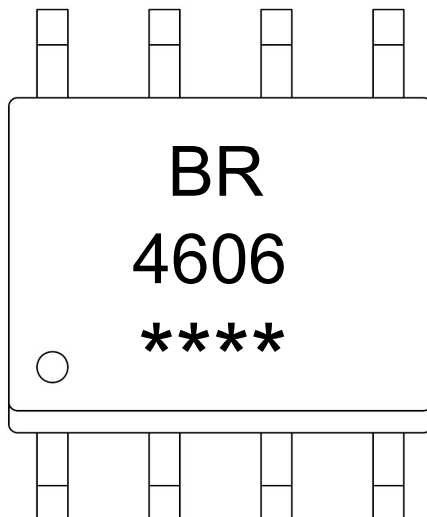
SOP-8

Unit:mm



| Symbol | Dimensions In Millimeters |      | Symbol | Dimensions In Millimeters |      |
|--------|---------------------------|------|--------|---------------------------|------|
|        | Min                       | Max  |        | Min                       | Max  |
| A      | 4.70                      | 5.10 | C      | 1.35                      | 1.75 |
| B      | 3.70                      | 4.10 | a      | 0.35                      | 0.49 |
| L      | 5.80                      | 6.20 | R      | 0.30                      | 0.60 |
| E      | 1.27BSC                   |      | P      | 0°                        | 7°   |
| K      | 0.12                      | 0.22 | b      | 0.40                      | 1.25 |

**印章说明 / Marking Instructions**



说明：

BR： 为公司代码

4606： 为型号代码

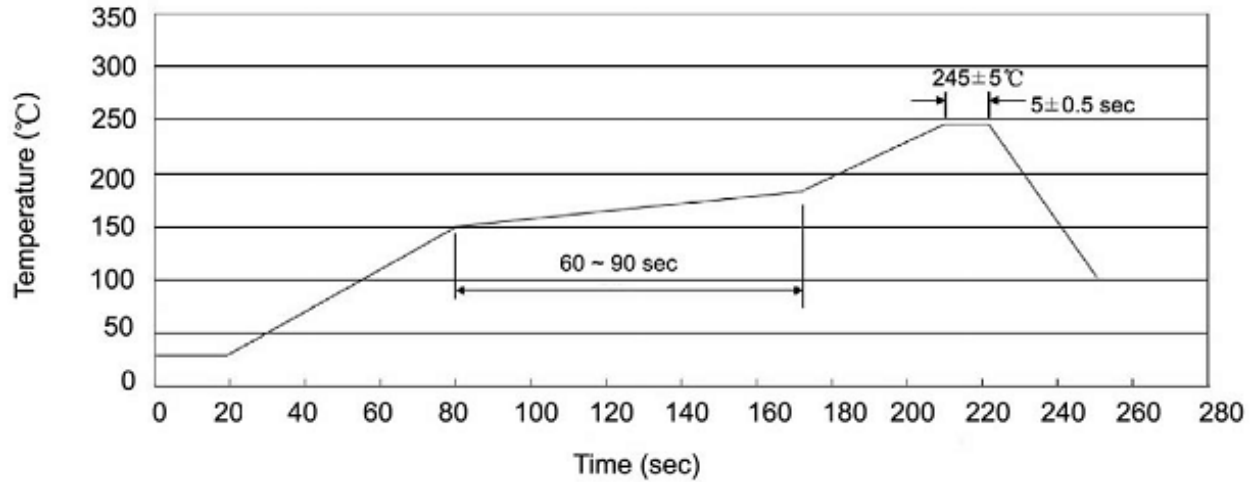
\*\*\*\*： 为生产批号代码，随生产批号变化。

Note:

BR: Company Code.

4606: Product Type.

\*\*\*\*: Lot No. Code, code change with Lot No.

**回流焊温度曲线图(无铅) / Temperature Profile for IR Reflow Soldering(Pb-Free)**


说明：

- 1、预热温度 150 ~ 180°C，时间 60 ~ 90sec；
- 2、峰值温度 245±5°C，时间持续为 5±0.5sec；
- 3、焊接制程冷却速度为 2 ~ 10°C/sec.

Note:

- 1.Preheating:150~180°C, Time:60~90sec.
- 2.Peak Temp.:245±5°C, Duration:5±0.5sec.
3. Cooling Speed: 2~10°C/sec.

**耐焊接热试验条件 / Resistance to Soldering Heat Test Conditions**

温度：260±5°C

时间：10±1 sec.

Temp.:260±5°C

Time:10±1 sec

**包装规格 / Packaging SPEC.**

卷盘包装 / REEL

| Package Type<br>封装形式 | Units 包装数量         |                         |                        |                              |                        | Dimension 包装尺寸 (unit: mm <sup>3</sup> ) |             |             |
|----------------------|--------------------|-------------------------|------------------------|------------------------------|------------------------|-----------------------------------------|-------------|-------------|
|                      | Units/Reel<br>只/卷盘 | Reels/Inner Box<br>卷盘/盒 | Units/Inner Box<br>只/盒 | Inner Boxes/Outer Box<br>盒/箱 | Units/Outer Box<br>只/箱 | Reel                                    | Inner Box 盒 | Outer Box 箱 |
| SOP/ESOP-8           | 4,000              | 2                       | 8,000                  | 6                            | 48,000                 | 13" ×12                                 | 360×360×50  | 380×335×366 |

**使用说明 / Notices**