

**描述 / Descriptions**

SOT-23 塑封封装 N 沟道场效应管。

N- CHANNEL MOSFET in a SOT-23 Plastic Package.

**特征 / Features**

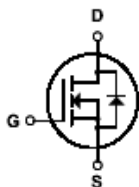
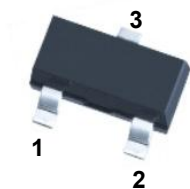
芯片采用超高密度圆胞设计技术,  $R_{DS(ON)}$  导通电阻小, SOT-23 封装。

Super high dense cell design for low  $R_{DS(ON)}$ , SOT-23 package.

**用途 / Applications**

电池管理, 高速开关, 低功率 DC-DC 转换。

Battery management, High speed switch, low power DC to DC converter.

**内部等效电路 / Equivalent Circuit****引脚排列 / Pinning**

PIN1 : G

PIN 2 : S

PIN 3 : D

**印章代码 / Marking**

|         |      |
|---------|------|
| Marking | H304 |
|---------|------|

**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 |
|--------------------------------------------|--------------|-----------------|--------------|------------|
| Drain-Source Voltage                       |              | $V_{DSS}$       | 30           | V          |
| Gate-Source Voltage                        |              | $V_{GSS}$       | $\pm 20$     | V          |
| Drain Current – Continuous                 |              | $I_D$           | 3.5          | A          |
| Pulsed Drain Current                       |              | $I_{DM}$        | 15           | A          |
| Continuous Source Current                  |              | $I_S$           | 1.5          | A          |
| Power Dissipation                          |              | $P_D$           | 1.4          | W          |
| Storage Temperature Range                  |              | $T_{stg}$       | -55~150      | °C         |
| Maximum Junction-to-Ambient <sup>A</sup>   | $t \leq 10s$ | $R_{\theta JA}$ | 92           | °C/W       |
| Maximum Junction-to-Ambient <sup>A D</sup> | Steady-State |                 | 126          | °C/W       |
| Maximum Junction-to-Lead                   | Steady-State | $R_{\theta JL}$ | 82           | °C/W       |

A. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$ . The value in any given application depends on the user's specific board design.

B. The power dissipation  $P_D$  is based on  $T_J(\text{MAX}) = 150^\circ\text{C}$ , using  $\leq 10s$  junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature  $T_J(\text{MAX}) = 150^\circ\text{C}$ . Ratings are based on low frequency and duty cycles to keep initial  $T_J = 25^\circ\text{C}$ .

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

E. The static characteristics in Figures 1 to 6 are obtained using  $< 300\mu s$  pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in2 FR-4 board with

2oz. Copper, assuming a maximum junction temperature of  $T_J(\text{MAX}) = 150^\circ\text{C}$ . The SOA curve provides a single pulse rating.


**电性能参数 / 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     | $V_{(BR)DSS}$ | $V_{GS}=0$ $I_D=250\mu A$                                      | 30         |            |            | V          |
| Zero Gate Voltage Drain Current    | $I_{DSS}$     | $V_{GS}=0$ $V_{DS}=30V$                                        |            |            | 1.0        | $\mu A$    |
| Gate-Body Leakage.                 | $I_{GSS}$     | $V_{GS}=\pm 20V$ $V_{DS}=0V$                                   |            |            | $\pm 100$  | nA         |
| Static Drain-Source On-Resistance  | $R_{DS(on)1}$ | $V_{GS}=10V$ $I_D=2A$                                          |            | 38.5       | 90         | m $\Omega$ |
|                                    | $R_{DS(on)2}$ | $V_{GS}=4.5V$ $I_D=1.5A$                                       |            | 55         | 150        | m $\Omega$ |
| Forward Transconductance           | $g_{FS}$      | $V_{DS}=10V$ $I_D=1A$                                          |            | 1.5        |            | S          |
| Drain-Source Diode Forward Voltage | $V_{SD}$      | $V_{GS}=0V$ $I_D=1A$                                           |            | 0.79       | 1.2        | V          |
| Gate Threshold Voltage             | $V_{GS(th)}$  | $V_{DS}=V_{GS}$ $I_D=50\mu A$                                  | 1.0        | 1.5        | 2.5        | V          |
| Gate resistance                    | $R_g$         | $V_{DS}=0V$ $V_{GS}=0V$<br>$f=1.0MHz$                          |            | 1.46       |            | $\Omega$   |
| Input Capacitance                  | $C_{iss}$     | $V_{DS}=25V$ $V_{GS}=0V$<br>$f=1.0MHz$                         |            | 208        |            | pF         |
| Output Capacitance                 | $C_{oss}$     |                                                                |            | 26         |            |            |
| Reverse Transfer Capacitance       | $C_{rss}$     |                                                                |            | 21         |            |            |
| Total Gate Charge(10V)             | $Q_g$         | $V_{DS}=15V$ $I_D=3.6A$<br>$V_{GS}=10V$                        |            | 4          |            | nC         |
| Total Gate Charge(4.5V)            |               |                                                                |            | 2          |            |            |
| Gate-Source Charge                 | $Q_{gs}$      |                                                                |            | 0.55       |            |            |
| Gate-Drain Charge                  | $Q_{gd}$      |                                                                |            | 1          |            |            |
| Turn-On Delay Time                 | $t_{d(on)}$   | $V_{GS}=10V$ $V_{DS}=15V$<br>$R_{GEN}=3\Omega$ $R_L=2.2\Omega$ |            | 4.5        |            | ns         |
| Turn-On Rise Time                  | $t_r$         |                                                                |            | 1.5        |            |            |
| Turn-Off Delay Time                | $t_{d(off)}$  |                                                                |            | 18.5       |            |            |
| Turn-Off Fall Time                 | $t_f$         |                                                                |            | 15.5       |            |            |

电参数曲线图 / Electrical Characteristic Curve

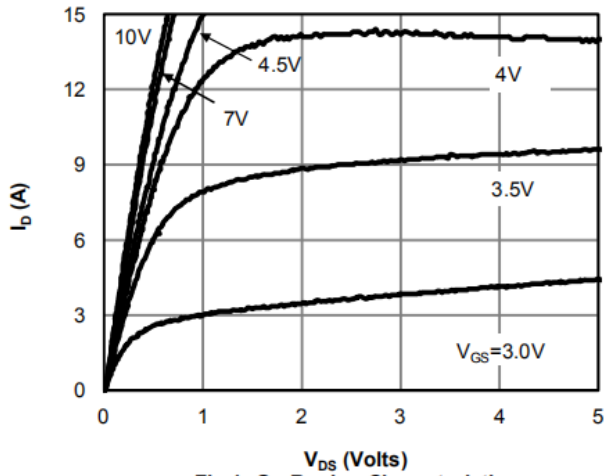


Fig 1: On-Region Characteristics

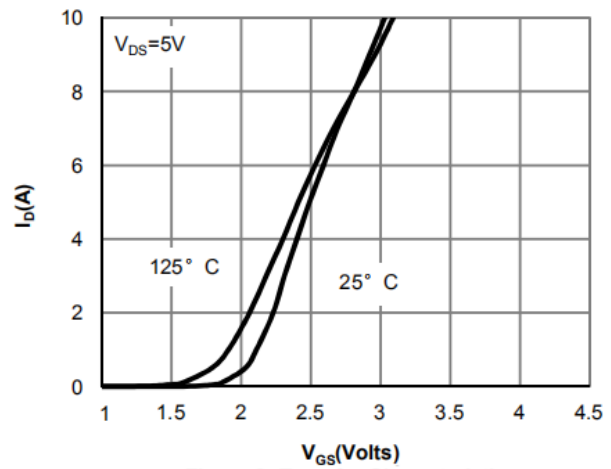


Figure 2: Transfer Characteristics

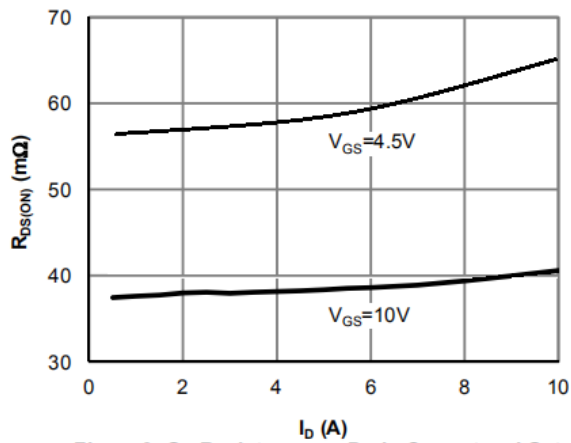


Figure 3: On-Resistance vs. Drain Current and Gate

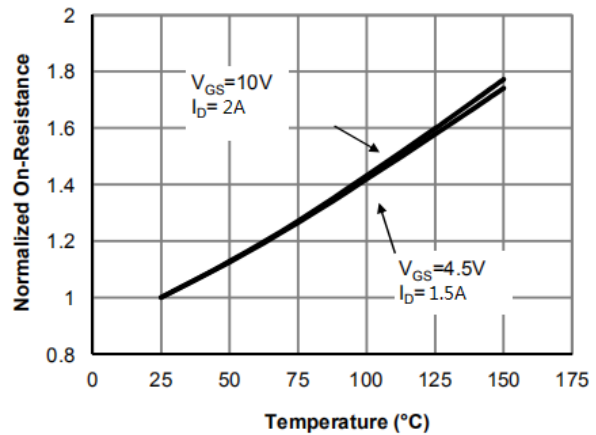


Figure 4: On-Resistance vs. Junction Temperature

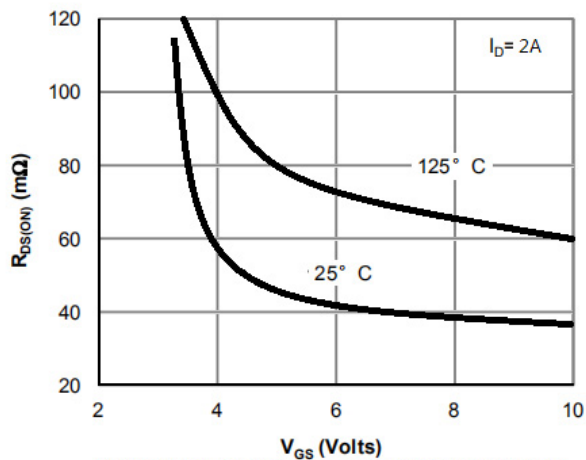


Figure 5: On-Resistance vs. Gate-Source Voltage

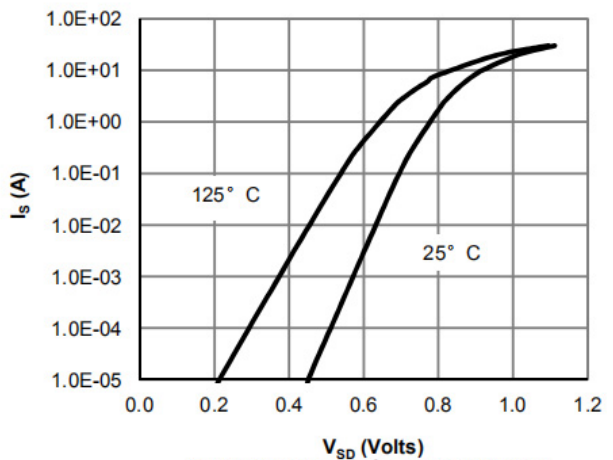
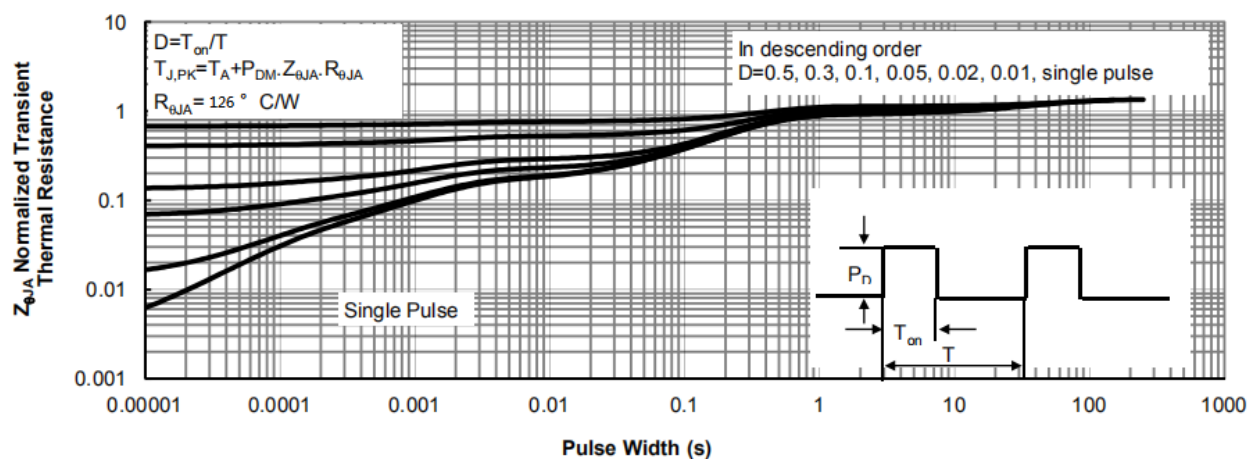
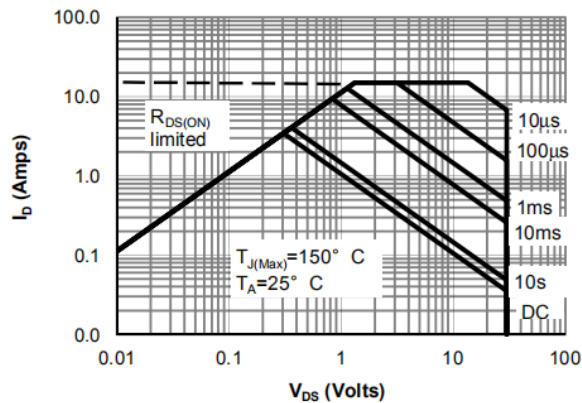
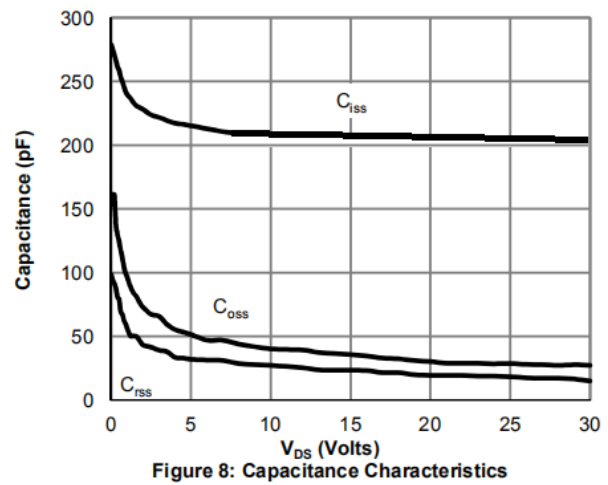
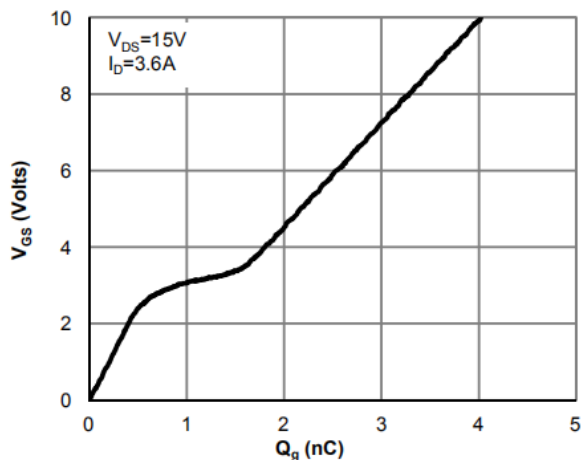


Figure 6: Body-Diode Characteristics

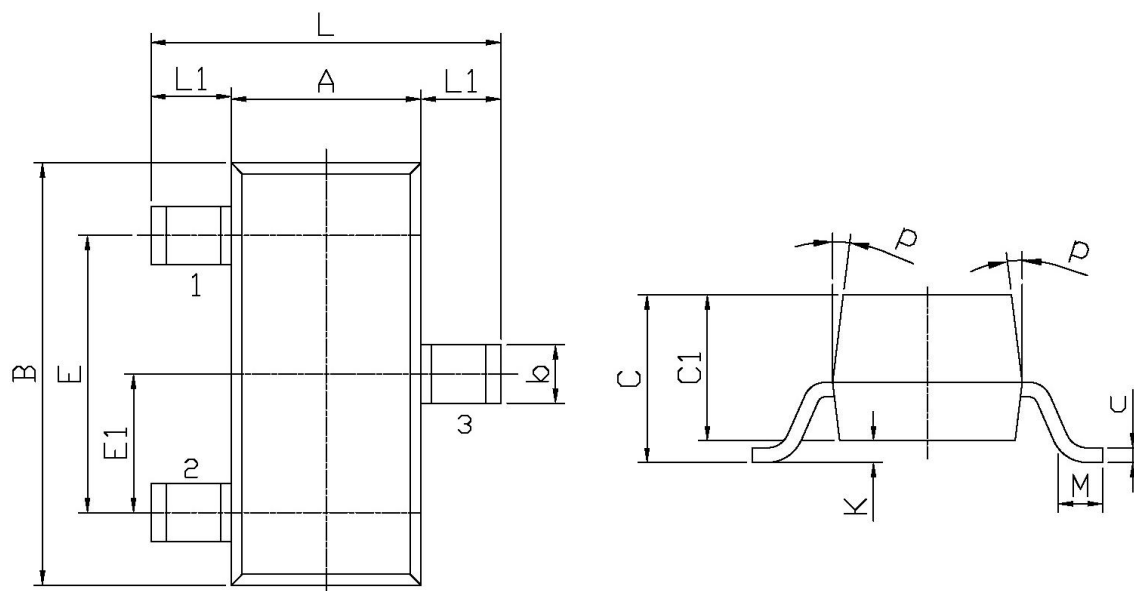
## 电参数曲线图 / Electrical Characteristic Curve



**外形尺寸图 / Package Dimensions**

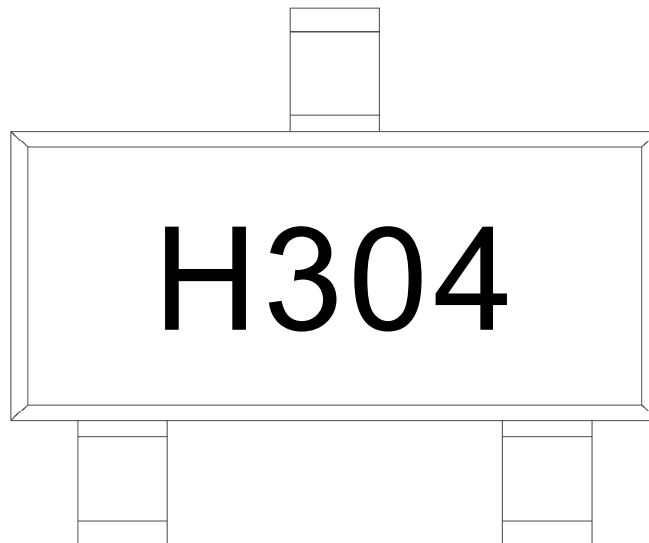
SOT-23

单位; mm



| Symbol | Dimensions In Millimeters |      | Symbol | Dimensions In Millimeters |      |
|--------|---------------------------|------|--------|---------------------------|------|
|        | Min                       | Max  |        | Min                       | Max  |
| L      | 2.2                       | 2.7  | C      | 1.30Max                   |      |
| L1     | 0.45                      | 0.65 | C1     | 0.90                      | 1.20 |
| A      | 1.15                      | 1.50 | c      | 0.05                      | 0.20 |
| B      | 2.70                      | 3.10 | K      | 0                         | 0.10 |
| E      | 1.70                      | 2.10 | M      | 0.20MIN                   |      |
| E1     | 0.85                      | 1.05 | P      | 7°                        |      |
| b      | 0.35                      | 0.55 |        |                           |      |

**印章说明 / Marking Instructions**



说明：

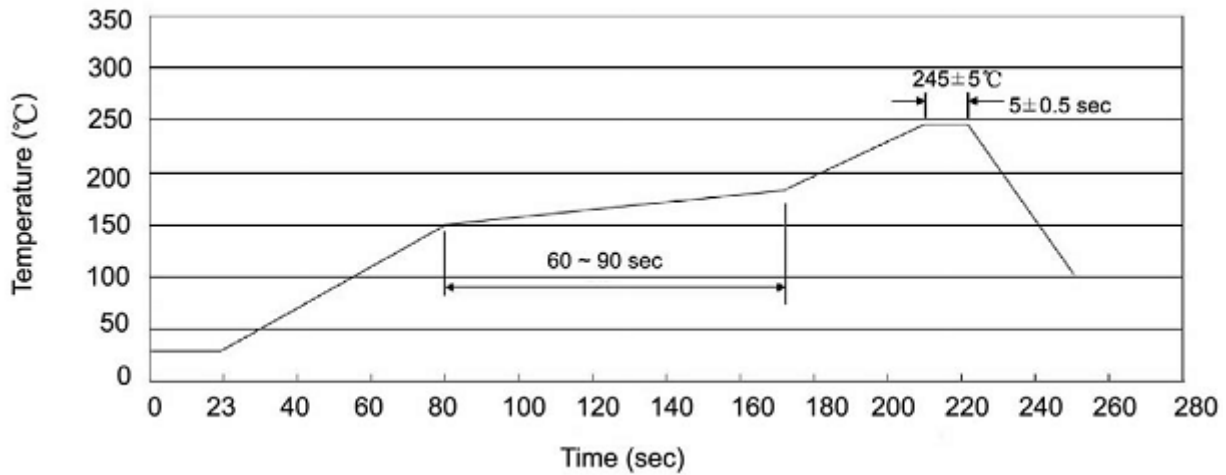
304: 为型号代码

H: 为公司代码

Note:

304 : Product Type Code

H: Company Code.

**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 25 ~ 150°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:25~150°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 |
| SOT-23               | 3,000              | 10                      | 30,000                 | 6                            | 180,000                | 7" ×8                                   | 180×120×180 | 390×385×205 |

**使用说明 / Notices**