**TM120PES44A7**

**SiC MOSFET 芯片 SiC MOSFET Chip**

**初版 Preliminary**

## 关键参数 Key Parameters

| | | | |
|---|---|---|---|
| $V_{DSmax}$ | | 1200 | V |
| $R_{DS(on)}$ | Typ. | 40 | mΩ |
| $I_D$ | Max. | 69 | A |
| **Die Size** | | 4.45×4.45 | $mm^2$ |

## 特点 Features

- 高开关频率 High Switching Frequency
- 低开关损耗 Low Switching Loss
- 软、快速开关 Soft, fast Switching
- 易并联使用 Easy Paralleling

## 电路结构 Circuit Configuration

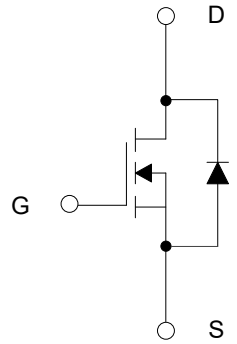



图 1. 电路结构

Fig. 1 Circuit configuration

## 最大额定值 Maximum Ratings

| 符号 Symbol | 参数名称 Parameter | 测试条件 Test Conditions | 数值 Value | 单位 Unit |
|---|---|---|---|---|
| $V_{DSmax}$ | 漏源极电压 Drain-source voltage | | 1200 | V |
| $V_{GSS}$ | 栅源峰值电压 Gate-source voltage | | -6/+18 | V |
| $I_D$ | 持续正向电流，由 $T_{vj\,max}$ 限制 Continuous forward current, limited by $T_{vj\,max}$ | | 69 | A |
| $I_{DM}$ | 最大重复正向电流，由 $T_{vj\,max}$ 限制 Maximum repetitive forward current, limited by $T_{vj\,max}$ | | 138 | A |
| $T_{vj\,max}$ | 最大允许结温 Max. Junction temperature | | 175 | °C |
| $T_{vj(op)}$ | 工作结温 Operation junction temperature | | -55...+175 | °C |
| $T_{Proc}$ (*1) | 最大加工温度 Maximum processing temperature | | 325 | °C |

## 电特性值 Electrical Characteristics

除非特别声明，否则 $T_{vj}$= 25 °C　　$T_{vj}$= 25 °C unless otherwise stated

| 符号 Symbol | 参数名称 Parameter | 测试条件 Test Conditions | 最小值 Min. | 典型值 Typ. | 最大值 Max. | 单位 Unit |
|---|---|---|---|---|---|---|
| $I_{DSS}$ | 零栅压漏极电流 Zero gate voltage drain current | $V_{GS}$ = 0V, $V_{DS}$ = $V_{DSS}$ | | | 50 | μA |
| $I_{GSS}$ | 栅极漏电流 Gate leakage current | $V_{GS}$ = $V_{GSS}$, $V_{DS}$ = 0V | | | 250 | nA |
| $V_{GS(th)}$ (*2) | 栅极-源极阈值电压 Gate threshold voltage | $I_D$ = 10 mA, $V_{GS}$ = $V_{DS}$ | 1.8 | 2.7 | 3.6 | V |
| $R_{DS(on)}$ | 漏极-源极通态电阻 Drain-source on-state resistance | $V_{GS}$ =15V, $I_D$ = 40A | | 40 | 54 | mΩ |
| | | $V_{GS}$ =15V, $I_D$ = 40A, $T_{vj}$ = 175 °C | | 52 | | mΩ |
| $g_{fs}$ | 跨导 Forward transconductance | $V_{DS}$ =20V, $I_D$ = 40A | | 21 | | S |
| $C_{iss}$ | 输入电容 Input capacitance | $V_{DS}$ = 1000V, $V_{GS}$ = 0V, $f$ = 100kHz, $V_{AC}$ = 30mV | | 2540 | | pF |
| $C_{oss}$ | 输出电容 Output capacitance | | | 147 | | pF |
| $C_{rss}$ | 反向传输电容 Reverse transfer capacitance | | | 10 | | pF |
| $E_{oss}$ | 电容存储能量 $C_{oss}$ Stored Energy | | | 175 | | μJ |
| $R_{Gint}$ | 内部栅极电阻 Internal gate resistor | $V_{GS}$ =0V | | 3 | | Ω |
| $Q_{gs}$ | 栅源电荷 Gate to source charge | $I_D$ =40A, $V_{DS}$ = 600V, $V_{GS}$ = -3/+15V | | 20 | | nC |
| $Q_{gd}$ | 栅漏电荷 Gate to drain charge | | | 68 | | nC |
| $Q_g$ | 总栅极电荷 Total gate charge | | | 97 | | nC |
| $V_{SD}$ | 二极管正向电压 Diode forward voltage | $I_{SD}$ =40A, $V_{GS}$ = -3V | | 6.0 | | V |
| | | $I_{SD}$ =40A, $V_{GS}$ = -3V, $T_{vj}$ = 175 °C | | 5.5 | | V |

**注意：** 1.(*1)表示最长持续时间 10min((*1) ) indicates 10min, maximum);

**Note:** 2.(*2)表示做过预处理后的测试值((*2) indicates $V_{GS(th)}$ is preprocessed).

**工艺参数值** **Mechanical Parameters**

| | | |
|---|---|---|
| 芯片尺寸<br>Chip size | 4.45×4.45 | $mm^2$ |
| 源极键合区尺寸(不包含开尔文源级)<br>Source pad size (excl. Kelvin Source pad) | 2×(1.75×2.70) | $mm^2$ |
| 栅极键合区尺寸<br>Gate pad size | 0.8×0.8 | $mm^2$ |
| 总面积<br>Area total | 19.80 | $mm^2$ |
| 厚度<br>Thickness | 360±25 | μm |
| 晶圆尺寸<br>Wafer size | 150 | mm |
| 每片晶圆上最大芯片数<br>Max. possible chips per wafer | 764 | |
| 正面金属<br>Frontside (Source and Gate) metal | Al(4μm) | |
| 背面金属<br>Backside (Drain) metal | Ti:Ni:Ag (0.05:0.5:1μm) | |
| 正面钝化<br>Passivation frontside | Polyimide | |
| 建议存储环境<br>Recommended storage environment | 存储在原始容器中，23°C 干燥氮气柜小于 6 个月<br>Store in original container, in dry nitrogen, <6 months at an ambient temperature of 23°C | |

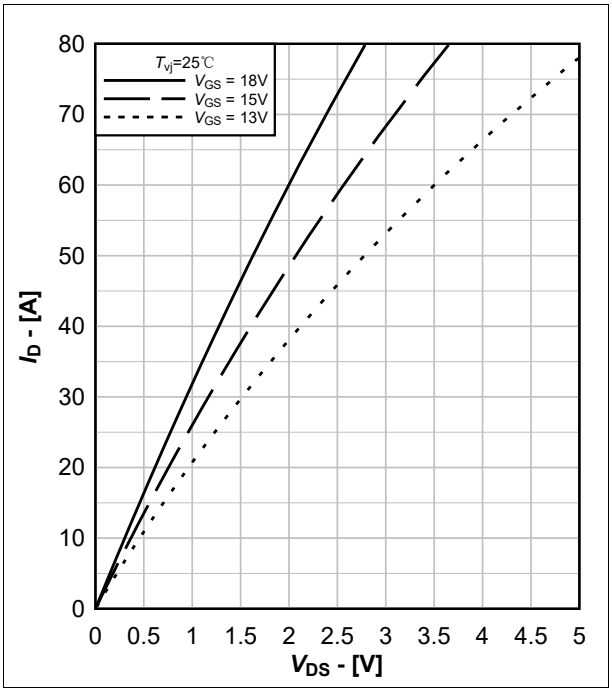



图 2. 输出特性典型曲线, $I_D$= f ($V_{DS}$), $T_{vj}$ = 25 °C

Fig.2 Typical output characteristics, $I_D$= f ($V_{DS}$), $T_{vj}$ = 25 °C

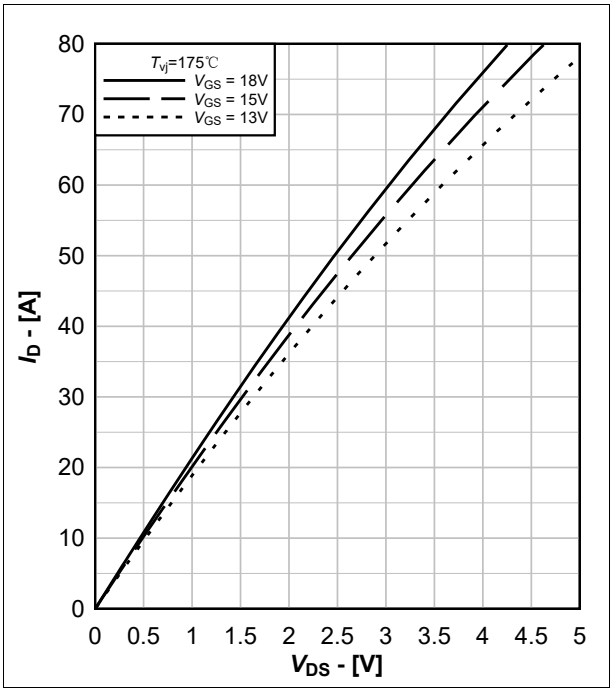



图 3. 输出特性典型曲线, $I_D$= f ($V_{DS}$), $T_{vj}$ = 175 °C

Fig.3 Typical output characteristics, $I_D$= f ($V_{DS}$), $T_{vj}$ = 175 °C

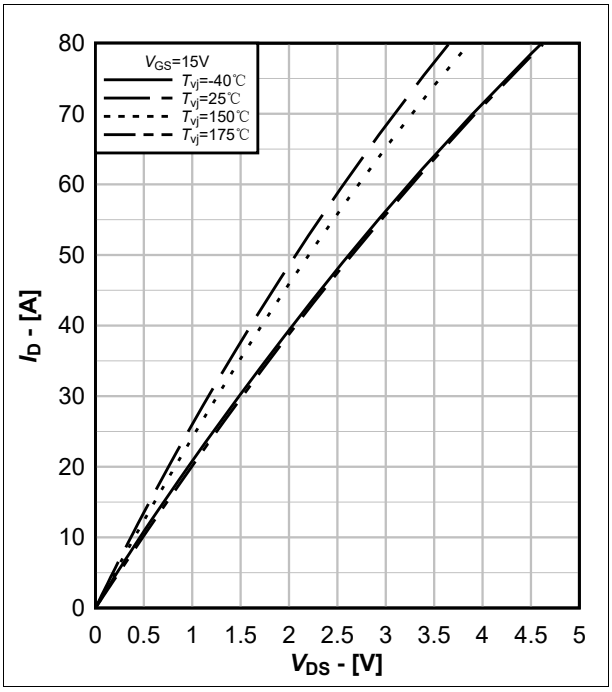



图 4. 输出特性典型曲线, $I_D$= f ($V_{DS}$)

Fig.4 Typical output characteristics, $I_D$= f ($V_{DS}$)

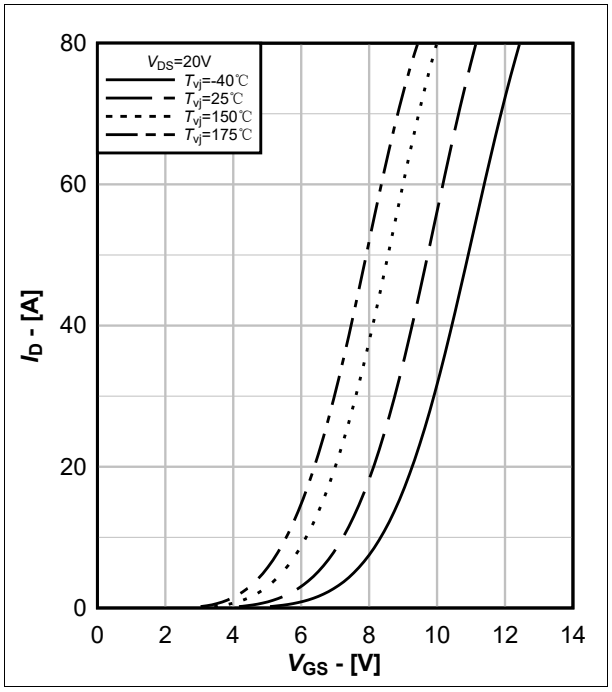



图 5.传输特性典型曲线,$I_D$= f ($V_{GS}$)

Fig.5 Typical transfer characteristics, $I_D$= f ($V_{GS}$)

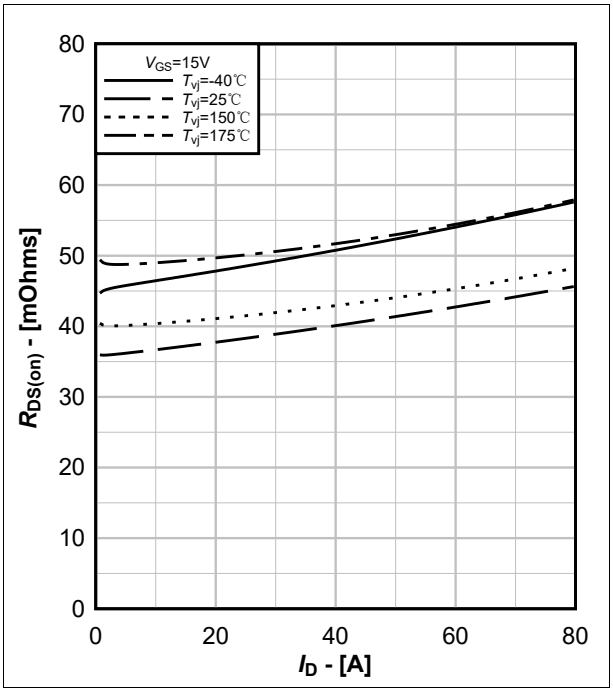



图 6. 导通电阻典型曲线, $R_{DS(on)}$ = f ($I_D$)

Fig.6 Typical On-Resistance characteristics, $R_{DS(on)}$ = f ($I_D$)

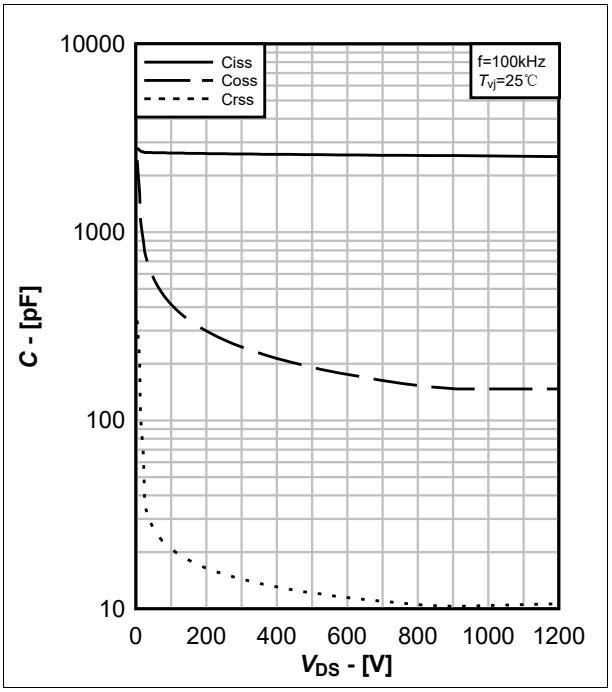



图 7. 电容特性典型曲线, $C$= f ($V_{DS}$)

Fig.7 Typical capacity characteristic, $C$= f ($V_{DS}$)

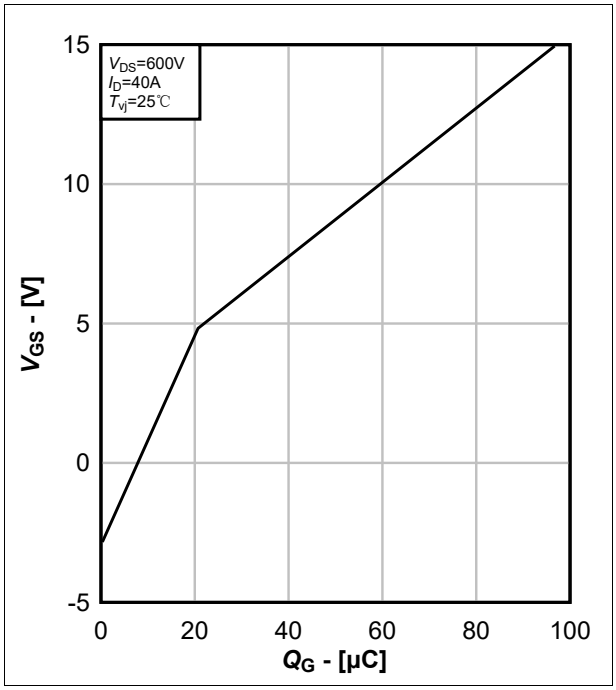



图 8. 栅极电荷特性典型曲线, $V_{GS}$ = f ($Q_G$)

Fig.8 Typical gate charge characteristic, $V_{GS}$= f ($Q_G$)

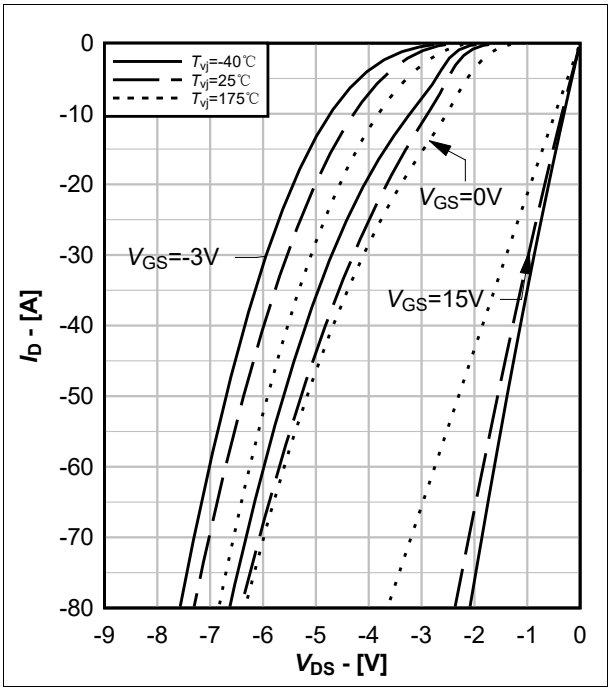
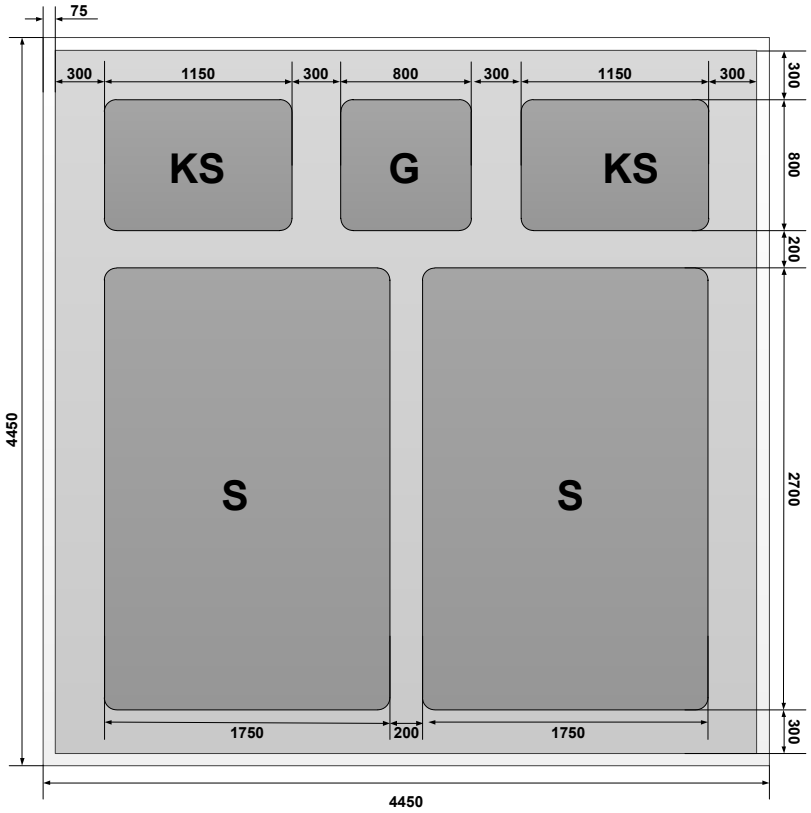



图 9. 体二极管及第三象限输出特性典型曲线, $I_D$ = f ($V_{DS}$)

Fig.9 Typical body diode output and 3rd quadrant characteristic, $I_D$ = f ($V_{DS}$)




S=源极 G=栅极 KS=开尔文源极 单位：微米 S=Source G=Gate KS=Kelvin Source Unit: μm

图 10. 芯片外观尺寸

Fig. 10 Chip drawing

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