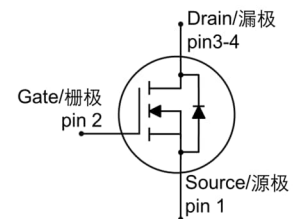
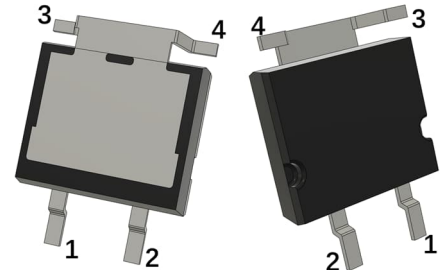


## HC120N065H6P

650V N-Channel SiC MOSFET

### Product features/产品特点

- Top side cooling technology  
顶部散热技术
- Low specific on-resistance  
低导通电阻
- High Speed Switching with Low Capacitance  
低电容高速切换
- 0V turn-off  $V_{GS}$  for simple gate driving  
0V关断栅源电压, 简化栅极驱动
- Avalanche Ruggedness  
雪崩鲁棒性
- Easy to Parallel and Simple to Drive  
易于并联且操作简单
- Halogen free, RoHS compliant  
无卤, 符合RoHS



### Applications/应用领域

- High Voltage DC/DC Converters  
高压DC/DC转换器
- Switching Mode Power Supply  
开关模式电源 (SMPS)
- Industrial Power Supplies  
工业电源
- Lighting Power Supplies  
照明电源



### Key performance parameters/关键性能参数

| Parameter         | Value | Unit       |
|-------------------|-------|------------|
| $V_{DSS}$         | 650   | V          |
| $R_{DS(on), typ}$ | 120   | m $\Omega$ |
| $I_{DM}$          | 58    | A          |

### Package parameters/封装信息

| Type/型号      | Package/封装 | Marking/标识 | Packaging method/包装方式 |
|--------------|------------|------------|-----------------------|
| HC120N065H6P | TSC263-4L  | HC120N065P | Tape and Reel/卷带包装    |



1. **Maximum ratings** at  $T_{vj}=25^{\circ}\text{C}$ , unless otherwise specified.

**最大额定值** 默认  $T_{vj}=25^{\circ}\text{C}$  除非另有说明

**Table 1 Maximum ratings/最大额定值**

| Parameter<br>参数                                  | Symbol<br>符号 | Test conditions<br>测试条件                      | Value<br>值 | Unit<br>单位 |
|--|--------------|--|------------|------------|
| Drain-source voltage<br>漏极-源极电压                  | $V_{DSS}$    | $T_{vj}\geq 25^{\circ}\text{C}$              | 650        | V          |
| Drain current <sup>1</sup><br>连续漏极电流             | $I_D$        | $T_C=25^{\circ}\text{C}, V_{GS}=18\text{V}$  | 29         | A          |
|  |              | $T_C=100^{\circ}\text{C}, V_{GS}=18\text{V}$ | 21         |            |
| Peak drain current <sup>2</sup><br>峰值漏极电流        | $I_{DM}$     | $T_C=25^{\circ}\text{C}$                     | 58         | A          |
| Continuous diode current <sup>1</sup><br>连续二极管电流 | $I_S$        | $T_C=25^{\circ}\text{C}, V_{GS}=-5\text{V}$  | 18         | A          |
| Peak diode current <sup>2</sup><br>峰值二极管电流       | $I_{SM}$     | $T_C=25^{\circ}\text{C}, V_{GS}=-5\text{V}$  | 58         | A          |
| Maximum gate source voltage<br>栅源最大电压            | $V_{GS,MAX}$ |  | -8~22      | V          |
| Recommend gate source voltage<br>推荐的栅源电压         | $V_{GS,op}$  |  | 0~18       | V          |
| Avalanche energy, single pulse<br>单脉冲雪崩能量        | $E_{AS}$     | $I_{AS}=5\text{A}, V_{DD}=50\text{V}$        | 13         | mJ         |
| Power dissipation<br>总耗散功率                       | $P_{tot}$    | $T_C=25^{\circ}\text{C}$                     | 50         | W          |
|  |              | $T_C=100^{\circ}\text{C}$                    | 25         |            |

1. Limited by  $T_{vj}(\text{max})$ /受限于最大结温
2. Pulse width  $t_p$  limited by  $T_{vj}(\text{max})$  /脉宽受限于最大结温



## 2. Thermal characteristics

### 热特性

Table 2 Thermal characteristics/热特性

| Parameter<br>参数                                     | Symbol<br>符号         | Test conditions<br>测试条件 | Value/值 |      |      | Unit<br>单位 |
|---|----------------------|-------------------------|---------|------|------|------------|
|   |                      |                         | Min.    | Typ. | Max. |            |
| Storage Temperature<br>存储温度                         | T <sub>stg</sub>     |                         | -55     |      | 175  | °C         |
| Operating junction Temperature<br>工作结温              | T <sub>vj</sub>      |                         | -55     |      | 175  | °C         |
| Thermal resistance, junction-case<br>结-壳热阻          | R <sub>th(j-c)</sub> |                         |         | 2.73 | 3.02 | K/W        |
| Thermal resistance, junction-ambient<br>结-环境热阻      | R <sub>th(j-a)</sub> |                         |         | 40   |      | K/W        |
| Soldering temperature, reflow solderin<br>焊接温度, 回流焊 | T <sub>sold</sub>    | reflow MSL1             |         |      | 260  | °C         |



**3. Electrical characteristics** at  $T_{vj}=25^{\circ}\text{C}$ , unless otherwise specified.

电气特性 默认 $T_{vj}=25^{\circ}\text{C}$ 除非另有说明

**Table 3 Static characteristics/静态特性**

| Parameter<br>参数                               | Symbol<br>符号  | Test conditions<br>测试条件  | Value/值  |                              |      | Unit<br>单位    |     |
|---|---------------|--|--|------------------------------|------|---------------|-----|
|   |               |  | Min.   | Typ.                         | Max. |               |     |
| Drain-source breakdown voltage<br>漏源击穿电压      | $V_{(BR)DSS}$ | $I_D=100\mu\text{A}, V_{GS}=0\text{V}$                           | 650  |                              |      | V             |     |
| Gate threshold voltage<br>门极开启阈值电压            | $V_{GS(th)}$  | $I_D=2\text{mA}, V_{DS}=V_{GS}$                                  | $T_{vj}=25^{\circ}\text{C}$                                      | 3.0                          | 3.8  | 5.0           | V   |
|   |               |  | $T_{vj}=175^{\circ}\text{C}$                                     |                              | 2.7  |               |     |
| Drain-source on-state resistance<br>漏极-源极导通电阻 | $R_{DS(on)}$  | $I_D=10\text{A}, V_{GS(on)}=15\text{V}$                          |  | 155                          |      | m $\Omega$    |     |
|   |               |  | $I_D=10\text{A}, V_{GS(on)}=18\text{V}$                          | $T_{vj}=25^{\circ}\text{C}$  | 120  |               | 130 |
|   |               |  |  | $T_{vj}=175^{\circ}\text{C}$ |      |               | 121 |
| Zero gate voltage drain current<br>集电极-发射极漏电  | $I_{DSS}$     | $V_{DS}=650\text{V}, V_{GS}=0\text{V}$                           |  |                              | 20   | $\mu\text{A}$ |     |
| Gate to source Leakage current<br>门极-源极漏电流    | $I_{GSS}$     | $V_{DS}=0\text{V}, V_{GS}=22\text{V}, T_{vj}=25^{\circ}\text{C}$ |  |                              | 200  | nA            |     |
|   |               |  | $V_{DS}=0\text{V}, V_{GS}=-8\text{V}, T_{vj}=25^{\circ}\text{C}$ |                              |      |               | 200 |
| Forward transconductance<br>正向跨导              | $g_{fs}$      | $I_D=10\text{A}, V_{DS}=20\text{V}$                              |  | 6                            |      | S             |     |
| Integrated gate resistor<br>内部门极电阻            | $R_G$         | $f=1\text{MHz}$  |  | 14.3                         |      | $\Omega$      |     |

# 650V N-Channel SiC MOSFET HC120N065H6P



**Table 4 Dynamic characteristics/动态特性**

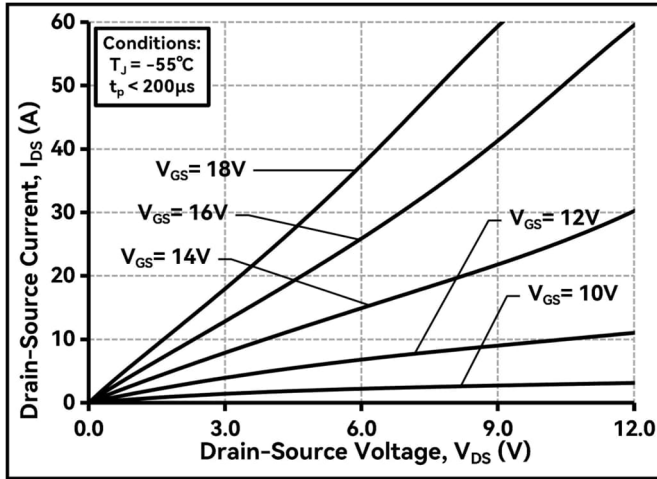
| Parameter<br>参数                        | Symbol<br>符号 | Test conditions<br>测试条件                        | Value/值 |      |      | Unit<br>单位 |
|--|--------------|--|---------|------|------|------------|
|  |              |  | Min.    | Typ. | Max. |            |
| Input capacitance<br>输入电容              | $C_{iss}$    | $V_{DS}=400V,$<br>$V_{GS}=0V,$<br>$f=1MHz$     |         | 643  |      | pF         |
| Output capacitance<br>输出电容             | $C_{oss}$    |  |         | 57   |      |            |
| Reverse transfer capacitance<br>反向传输电容 | $C_{rss}$    |  |         | 5    |      |            |
| Coss stored energy<br>输出电容存储能量         | $E_{oss}$    | Calculated based on $C_{oss}$                  |         | 5.6  |      | $\mu J$    |
| Total gate charge<br>总栅极电荷             | $Q_{G(tot)}$ | $V_{DD}=400V,$<br>$I_D=10A,$<br>$V_{GS}=0/18V$ |         | 22.2 |      | nC         |
| Gate source charge<br>栅-源极电荷           | $Q_{GS}$     |  |         | 5.9  |      |            |
| Gate-drain charge<br>栅-漏极电荷            | $Q_{GD}$     |  |         | 10.1 |      |            |

**Table 5 Reverse diode characteristics/体二极管反向特性**

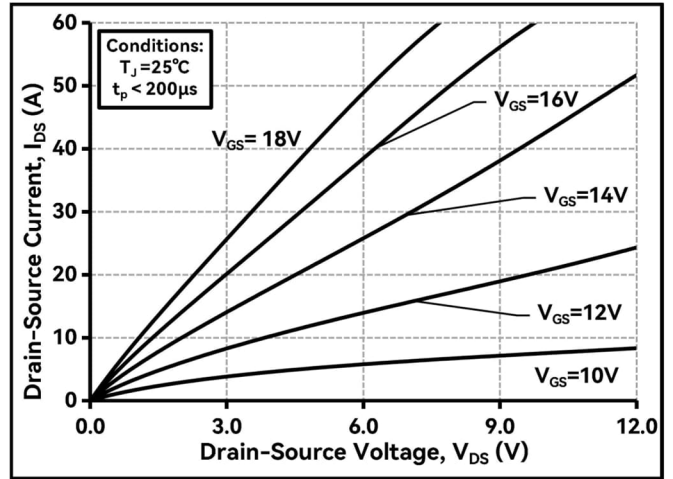
| Parameter<br>参数  | Symbol<br>符号 | Test conditions<br>测试条件                               | Value/值              |      |      | Unit<br>单位 |
|--|--------------|---|----------------------|------|------|------------|
|  |              |   | Min.                 | Typ. | Max. |            |
| Drain-source reverse voltage<br>体二极管正向压降               | $V_{SD}$     | $I_S=5A, V_{GS}=0V$                                   | $T_{vj}=25^\circ C$  | 3.5  |      | V          |
|  |              |   | $T_{vj}=175^\circ C$ | 3.0  |      |            |
| MOSFET forward recovery time<br>MOSFET正向恢复时间           | $t_{fr}$     | $V_{DS}=400V,$<br>$I_S=10A,$<br>$dis/dt=-1350A/\mu s$ |                      | 15.4 |      | ns         |
| MOSFET forward recovery charge<br>MOSFET正向恢复电荷         | $Q_{fr}$     |   |                      | 81.1 |      | nC         |
| MOSFET peak forward recovery current<br>MOSFET正向恢复峰值电流 | $I_{frm}$    |   |                      | 9    |      | A          |

## 4. Electrical characteristics diagrams 电气特性图表

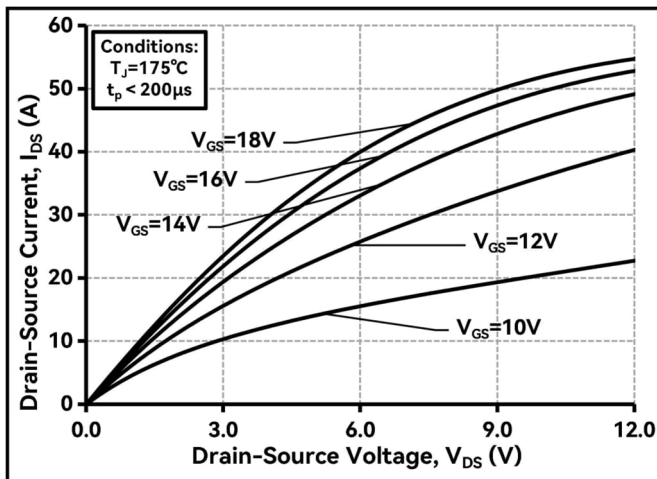
Typ. Output characteristic/输出特性



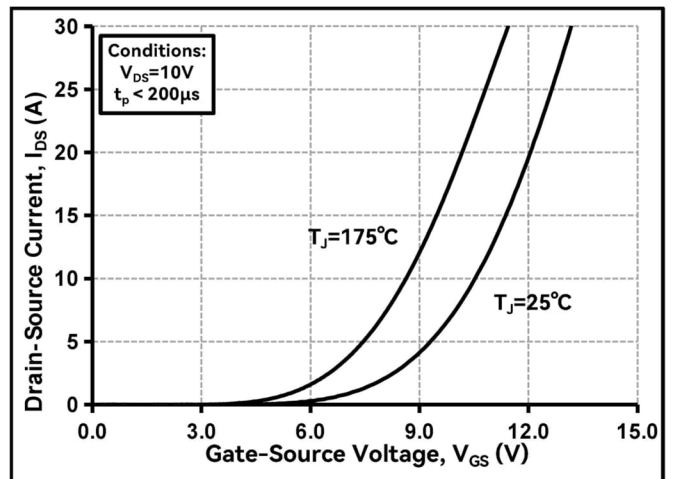
Typ. Output characteristic/输出特性



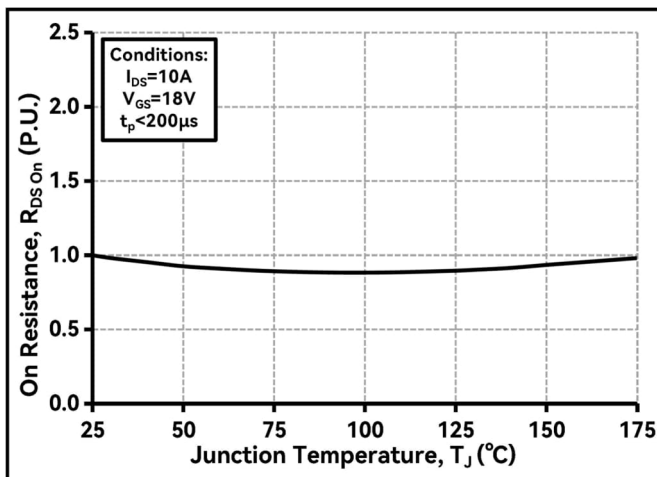
Typ. Output characteristic/输出特性



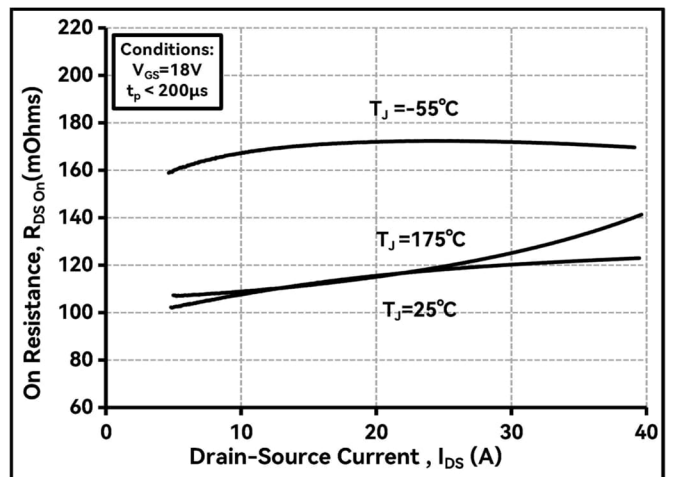
Typ. Transfer characteristic/典型传输特性



Typ. Drain-source on-state resistance/典型漏源导通电阻

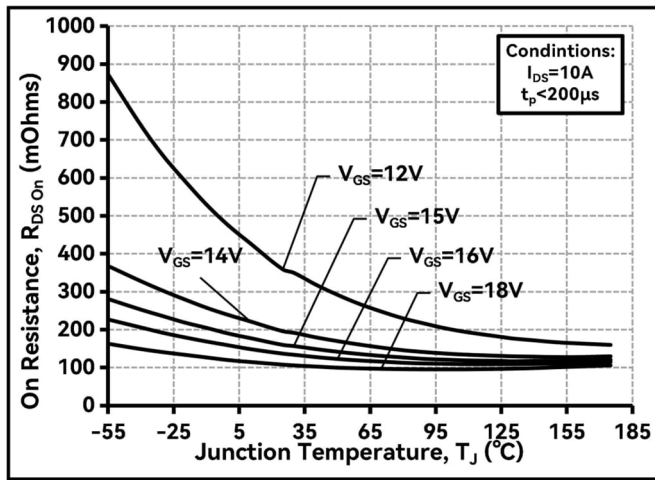


Typ. Drain-source on-state resistance/典型漏源导通电阻

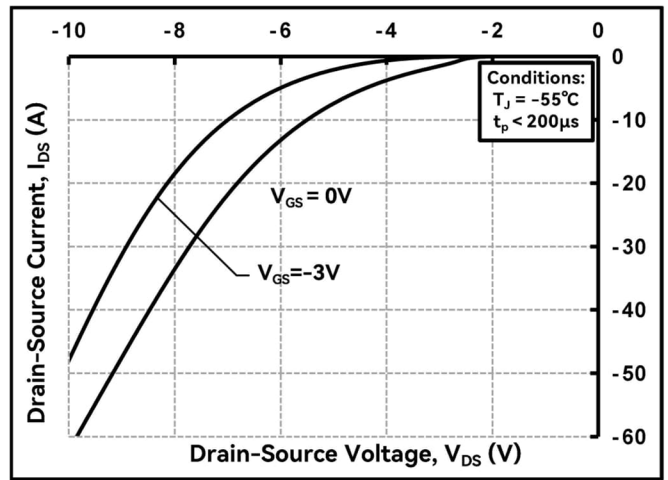




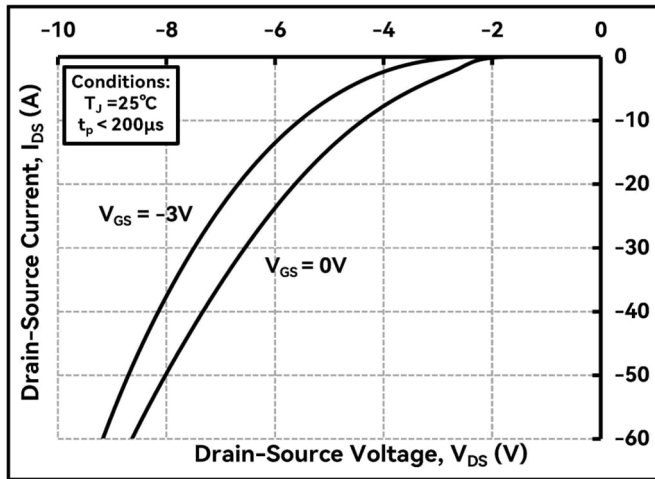
Typ.Drain-source on-state resistance/典型漏源导通电阻



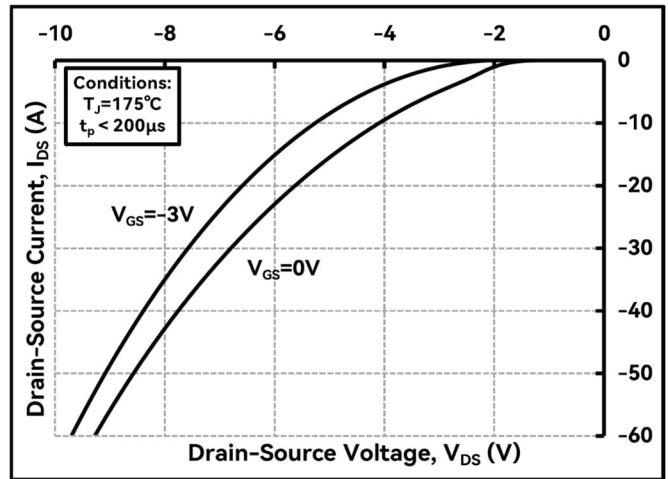
Typ.Reverse drain current characteristics/典型二极管特性



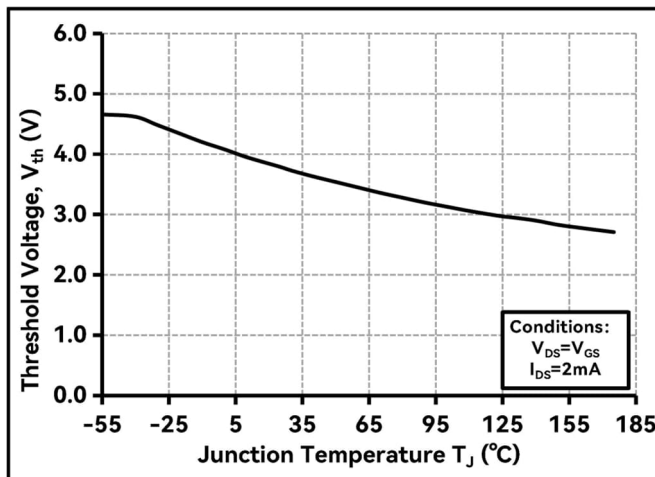
Typ.Reverse drain current characteristics/典型二极管特性



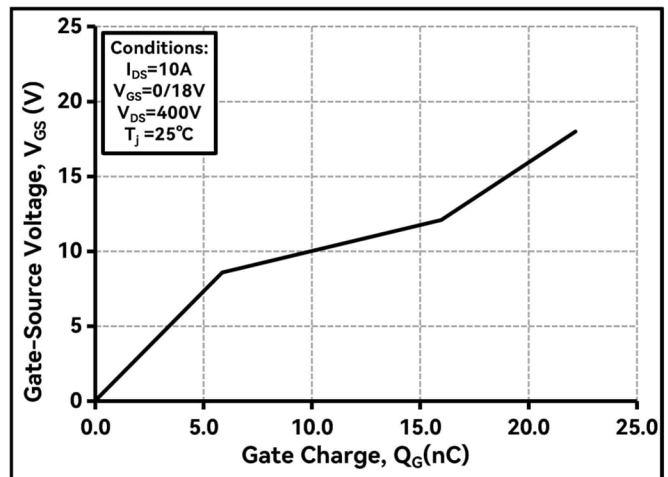
Typ.Reverse drain current characteristics/典型二极管特性



Typ.Gate threshold voltage/门级阈值电压结温特性

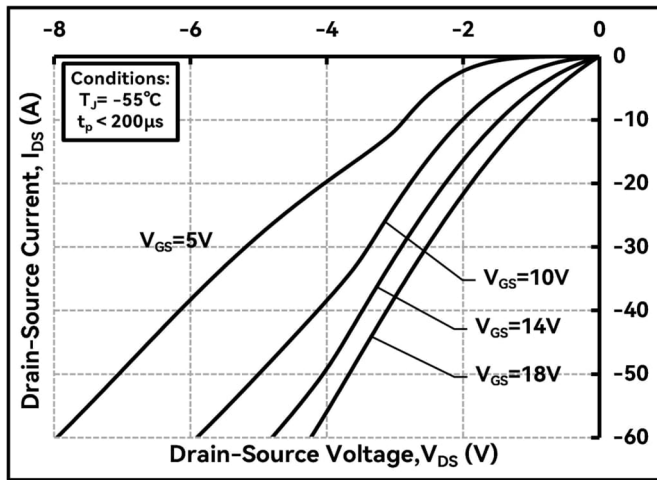


Typ.Gate charge/典型门级电荷

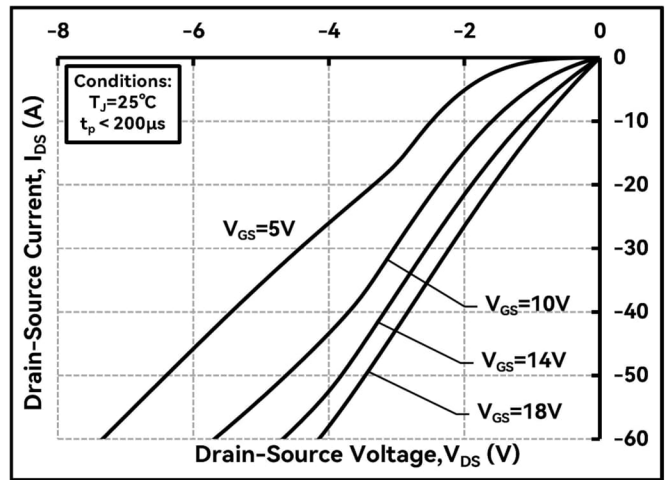




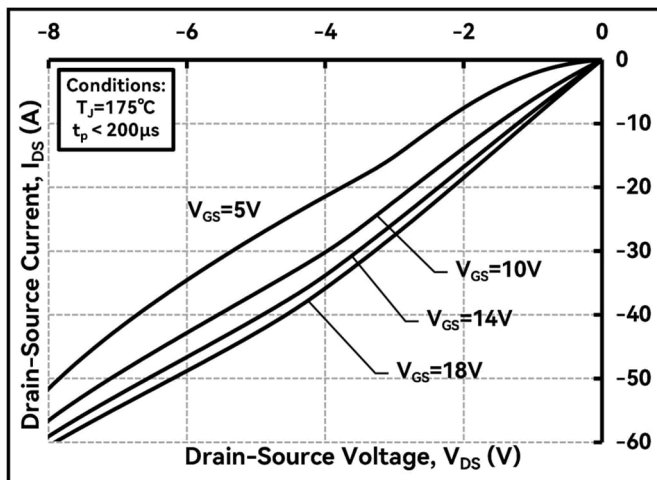
Typ.3rd Quadrant Characteristics/典型第三象限特性



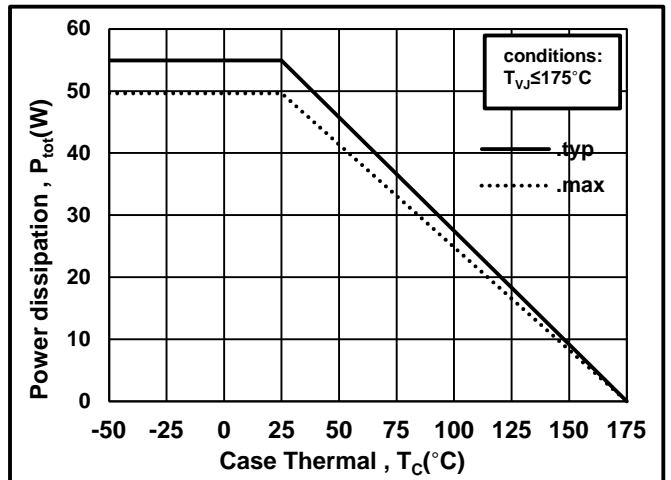
Typ.3rd Quadrant Characteristics/典型第三象限特性



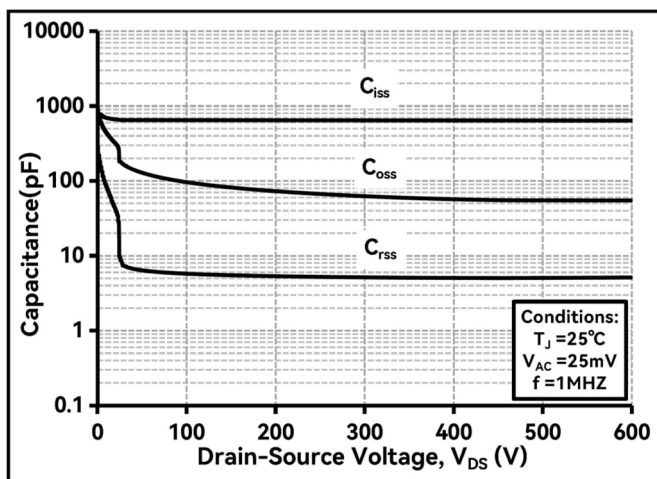
Typ.3rd Quadrant Characteristics/典型第三象限特性



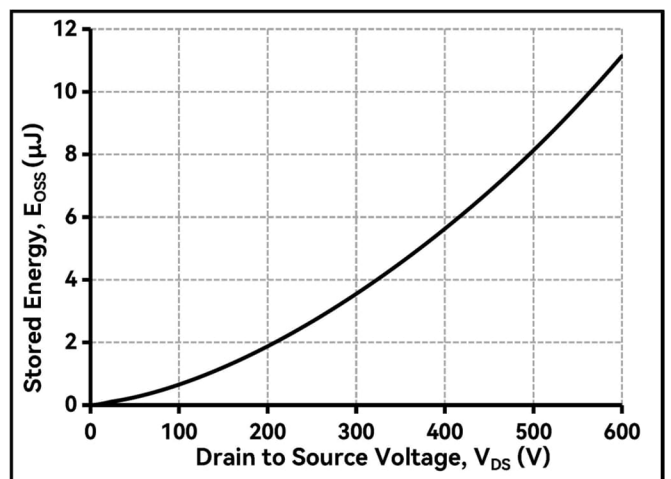
Power dissipation/耗散功率



Typ.Capacitances/典型电容特性



Typ.Coss stored energy/典型Coss存储能量

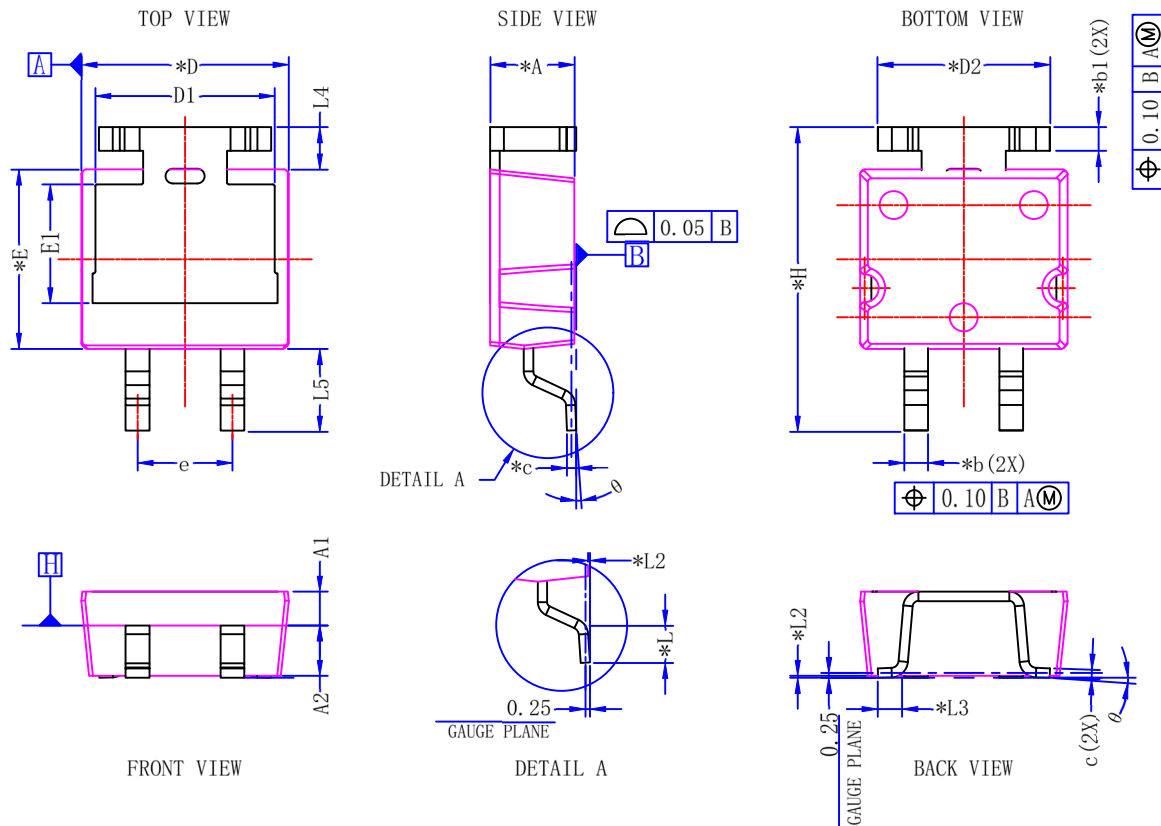




## 5. Package outline

### 封装外形

Figure 1. Outline TSC263-4L, dimensions in mm/TSC263-4L外形尺寸 (毫米)



| DIM SYMBOL | MIN.  | TYP.  | MAX.  | DIM SYMBOL | MIN.     | TYP.  | MAX.  |
|------------|-------|-------|-------|------------|----------|-------|-------|
| *A         | 4.40  | 4.50  | 4.60  | *E         | 9.45     | 9.60  | 9.75  |
| A1         | 1.75  | 1.80  | 1.85  | E1         | 6.15     | 6.35  | 6.55  |
| A2         | 2.65  | 2.70  | 2.75  | e          | 5.08 BSC |       |       |
| *b         | 1.22  | 1.27  | 1.32  | *H         | 16.02    | 16.22 | 16.42 |
| *b1        | 1.22  | 1.27  | 1.32  | *L         | 1.70     | 1.90  | 2.10  |
| *c         | 0.45  | 0.50  | 0.55  | *L2        | 0.05     | 0.10  | 0.15  |
| *D         | 10.95 | 11.10 | 11.25 | *L3        | 1.10     | 1.30  | 1.50  |
| D1         | 9.50  | 9.60  | 9.70  | L4         | 2.27 REF |       |       |
| *D2        | 9.00  | 9.20  | 9.40  | L5         | 4.15     | 4.35  | 4.55  |
|            |       |       |       | Θ          | 0°       | -     | 8°    |

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETER. ANGLES ARE IN DEGREE.
- DIMENSION "D" DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSIONS. INTERLEAD FLASH SHALL NOT EXCEED 0.150 MM PER SIDE. DIMENSION "E" DOES NOT INCLUDE MOLD FLASH, GATE BURRS, THE GATE BURRS SHALL NOT EXCEED 0.15MM.
- DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.

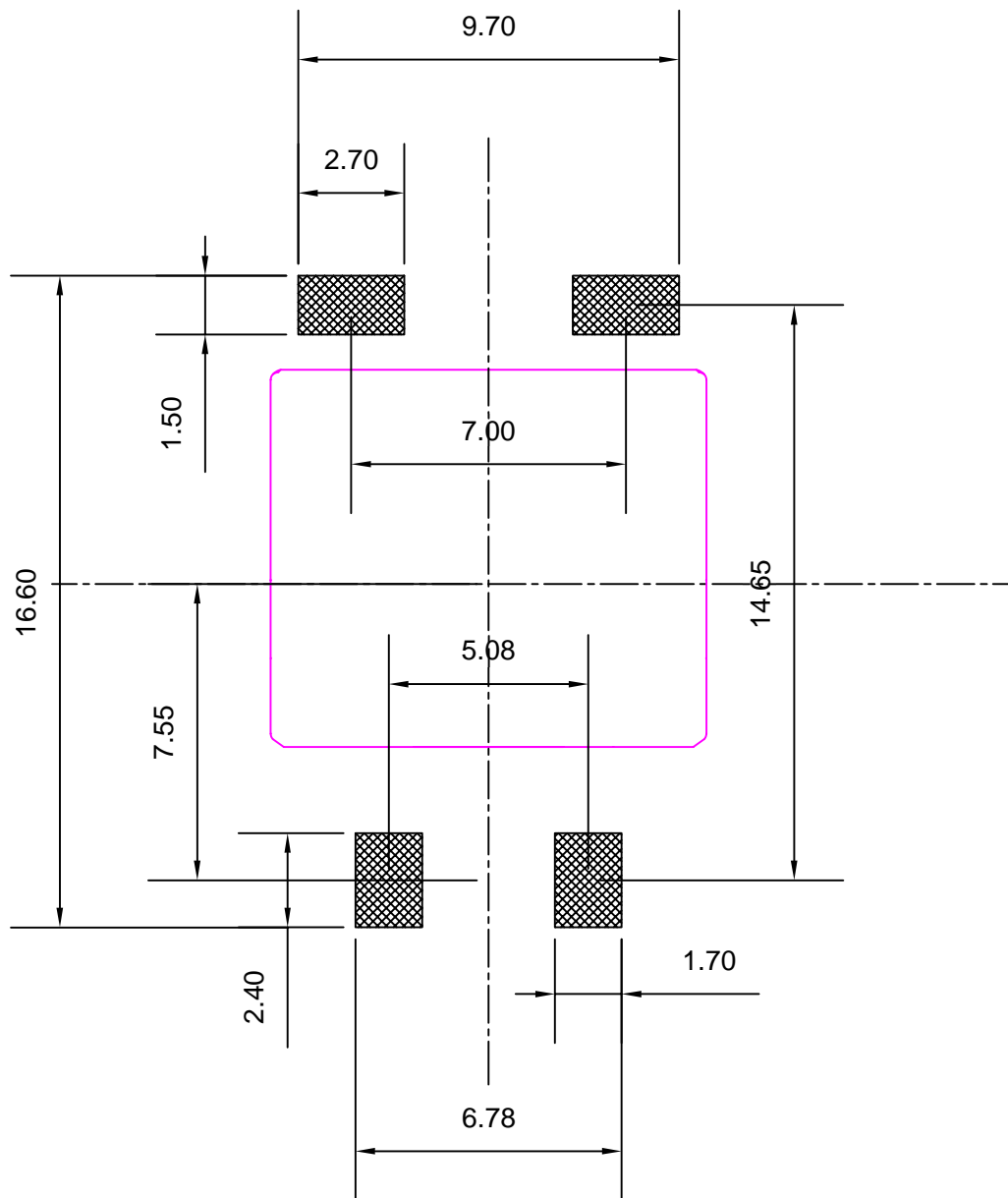
注:

- 所有尺寸均以毫米为单位。角度以度为单位。
- 尺寸 D 不包括引脚间飞边或突出物。引脚间飞边在每侧不得超过0.15mm。尺寸 E 不包括模具飞边、浇口残余物，浇口残余物不得超过 0.15mm。
- 尺寸 D、E 是在塑胶本体的最外极限确定的，不包括模具飞边、连接条残余、浇口残余和引脚间飞边，但包括塑胶本体顶部和底部之间可能存在的任何不匹配或错位。

## 6. Recommended Land Pattern

### 推荐焊盘尺寸

Figure 2. TSC263-4L Effective Solderable Area for Reflow Soldering/ TSC263-4L 回流焊接有效可焊面积



solder land/焊盘区域

----- Package Reference Centerline/封装参考中心线

dimensions in mm/单位为毫米

注:

所示焊盘尺寸仅供参考。为确保最佳散热性能及焊接质量，建议根据实际应用中的 PCB 板材、层数及散热设计对焊盘进行优化调整  
The land pattern dimensions provided are for reference only. To achieve optimal thermal performance, actual design adjustments should be considered based on the specific PCB materials, layer stack-up, and thermal dissipation requirements.



## 7. Revision history

### 修订历史

Table 6 Date and version number/日期与版本号

| Date日期     | Revision版本 | Changes更改内容              |
|------------|------------|--------------------------|
| 2026-04-02 | Rev.G1.0   | Target Datasheet (目标规格书) |

## 8. Matters needing attention

### 注意事项

#### Appendix 1. Important Technical Guidance, Application Policy, and Copyright Notice/重要技术指南、应用规范与版权声明

##### [Data and Design Guidance]

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