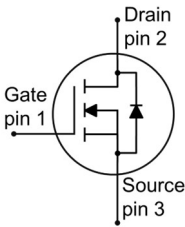
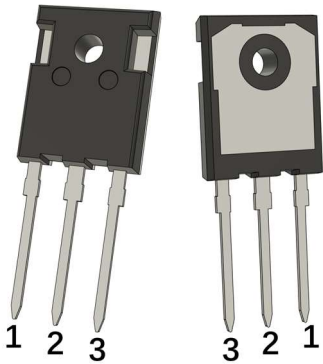


HC034N065B4R

650V N-Channel SiC MOSFET

产品特点/Product features

- Low specific on-resistance  
低导通电阻
- Optimized dynamic performance  
优化的动态性能
- Robust gate design  
可靠的栅极设计
- 0V turn-off  $V_{GS}$  for simple gate driving  
0V关断栅源电压，简化栅极驱动
- 100% UIS Tested  
100% UIS测试
- Easy to parallel  
易于并联



应用领域/Applications

- UPS & Energy storage system  
不间断电源（UPS）和储能系统
- PC/server/telecom power supplies  
计算机/服务器/通信电源
- Battery formation instrument  
电池化成设备
- PV MPPT and inverters  
光伏最大功率点追踪与逆变器
- EV Charger  
电动汽车充电桩
- Motor Drives  
电机驱动

关键性能参数/Key Performance Parameters

| Parameter        | Value | Unit       |
|------------------|-------|------------|
| $V_{DS}$         | 650   | V          |
| $R_{DS(on),typ}$ | 34    | m $\Omega$ |
| $I_{DM}$         | 163   | A          |



| Type/型号      | Package/封装 | Marking/标识 | Packaging method/包装方式 |
|--------------|------------|------------|-----------------------|
| HC034N065B4R | TO247-3L   | HC034N065R | Tube/管装               |

# 650V N-Channel SiC MOSFET

## HC034N065B4R



### 1. Maximum ratings at $T_j = 25^\circ\text{C}$ , unless otherwise specified.

**最大额定值** 默认  $T_j = 25^\circ\text{C}$  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                  | $V_{DSS}$    | $T_j \geq 25^\circ\text{C}$                                   | 650        | V          |
| Drain current <sup>1</sup><br>连续漏极电流             | $I_D$        | $T_C = 25^\circ\text{C}, V_{GS} = 18\text{V}$                 | 81         | A          |
|                                                  |              | $T_C = 100^\circ\text{C}, V_{GS} = 18\text{V}$                | 58         |            |
| Peak drain current <sup>2</sup><br>峰值漏极电流        | $I_{DM}$     | $T_C \leq 175^\circ\text{C}$                                  | 163        | A          |
| Continuous diode current <sup>1</sup><br>连续二极管电流 | $I_S$        | $T_C = 25^\circ\text{C}, V_{GS} = -4\text{V}$                 | 59         | A          |
| Peak diode current <sup>2</sup><br>峰值二极管电流       | $I_{SM}$     | $T_C = 25^\circ\text{C}, V_{GS} = -4\text{V}$                 | 163        | A          |
| Maximum gate source voltage<br>栅源最大电压            | $V_{GS,MAX}$ |                                                               | -10~22     | V          |
| Recommend gate source voltage<br>推荐的栅源电压         | $V_{GS,op}$  |                                                               | -4~18      | V          |
| Avalanche energy, single pulse<br>单脉冲雪崩能量        | $E_{AS}$     | $I_{AS} = 17.2\text{A}, V_{DD} = 100\text{V}, L = 1\text{mH}$ | 147        | mJ         |
| Power dissipation <sup>1</sup><br>总耗散功率          | $P_{tot}$    | $T_C = 25^\circ\text{C}$                                      | 326        | W          |
|                                                  |              | $T_C = 100^\circ\text{C}$                                     | 163        |            |
| Mounting torque<br>安装扭矩                          | $M_d$        | M3 and M3.5 screw<br>M3或者M3.5螺钉                               | 0.6        | Nm         |

1. Limited by  $T_j(\text{max})$ /受限于最大结温

2. Pulse width  $t_p$  limited by  $T_j(\text{max})$ /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>j</sub>       |                         | -55     |      | 175  | °C         |
| Thermal resistance, junction-case<br>结-壳热阻     | R <sub>th(j-c)</sub> |                         |         | 0.46 |      | K/W        |
| Thermal resistance, junction-ambient<br>结-环境热阻 | R <sub>th(j-a)</sub> |                         |         | 40   |      | K/W        |
| Soldering temperature<br>焊接温度                  | T <sub>sold</sub>    |                         |         |      | 260  | °C         |



### 3. Electrical characteristics at $T_j = 25^\circ\text{C}$ , unless otherwise specified.

电气特性 默认  $T_j = 25^\circ\text{C}$  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            | $V_{GS(th)}$  | $I_D = 6\text{mA}, V_{DS} = V_{GS}$                                | $T_j = 25^\circ\text{C}$  | 1.9     | 2.6  | 3.5  | V             |
|                                               |               |                                                                    | $T_j = 175^\circ\text{C}$ |         | 1.9  |      |               |
| Drain-source on-state resistance<br>漏极-源极导通电阻 | $R_{DS(on)}$  | $I_D = 25\text{A}, V_{GS(on)} = 15\text{V}$                        | $T_j = 25^\circ\text{C}$  |         | 43   |      | m $\Omega$    |
|                                               |               | $I_D = 25\text{A}, V_{GS(on)} = 18\text{V}$                        | $T_j = 25^\circ\text{C}$  |         | 34   | 45   |               |
|                                               |               |                                                                    | $T_j = 175^\circ\text{C}$ |         | 41   |      |               |
| Zero gate voltage drain current<br>集电极-发射极漏电  | $I_{DSS}$     | $V_{DS} = 650\text{V}, V_{GS} = 0\text{V}$                         | $T_j = 25^\circ\text{C}$  |         | 0.1  | 50   | $\mu\text{A}$ |
|                                               |               |                                                                    | $T_j = 175^\circ\text{C}$ |         | 5    |      |               |
| Gate to source Leakage current<br>门极-源极漏电流    | $I_{GSS}$     | $V_{DS} = 0\text{V}, V_{GS} = 22\text{V}, T_j = 25^\circ\text{C}$  |                           |         |      | 100  | nA            |
|                                               |               | $V_{DS} = 0\text{V}, V_{GS} = -10\text{V}, T_j = 25^\circ\text{C}$ |                           |         |      | 100  |               |
| Forward transconductance<br>正向跨导              | $g_{fs}$      | $I_D = 25\text{A}, V_{DS} = 20\text{V}$                            |                           |         | 18   |      | S             |
| Integrated gate resistor<br>内部门极电阻            | $R_G$         | $f = 1\text{MHz}$                                                  |                           |         | 1.15 |      | $\Omega$      |

# 650V N-Channel SiC MOSFET HC034N065B4R



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

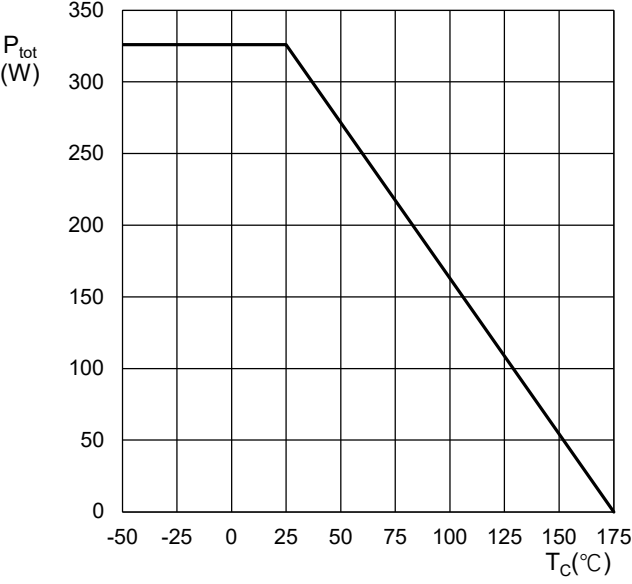
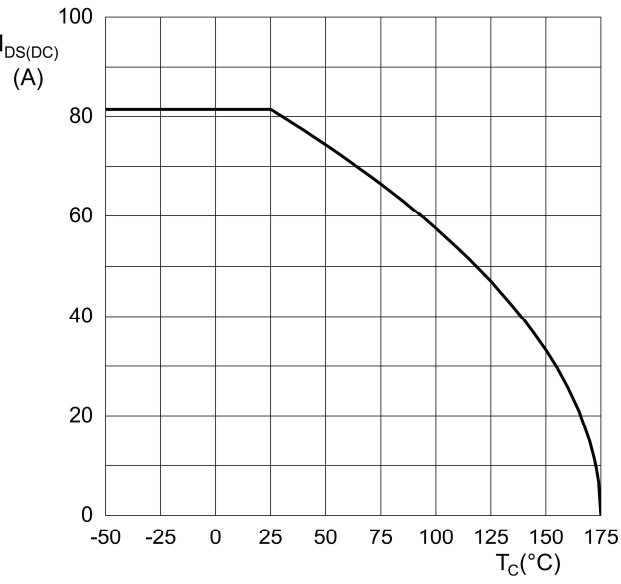
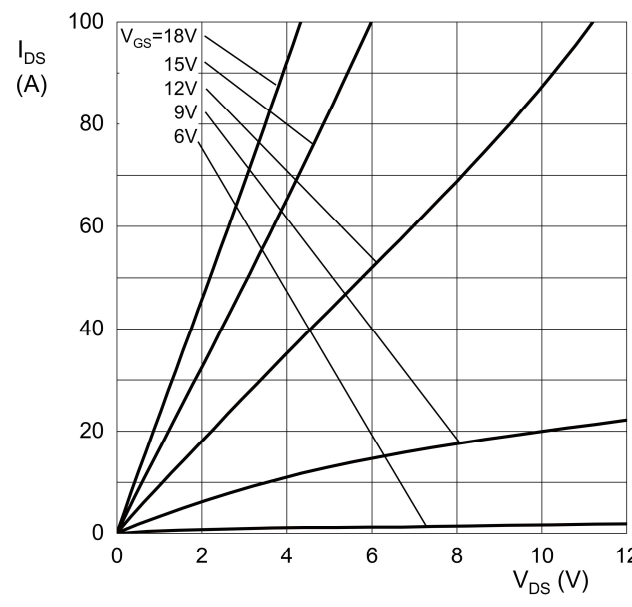
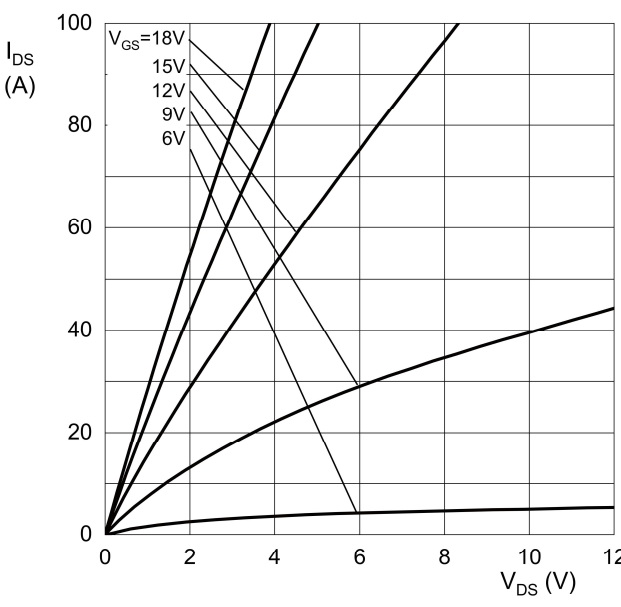
| Parameter<br>参数                        | Symbol<br>符号 | Test conditions<br>测试条件                                                                           | Value/值 |      |      | Unit<br>单位 |
|----------------------------------------|--------------|---------------------------------------------------------------------------------------------------|---------|------|------|------------|
|                                        |              |                                                                                                   | Min.    | Typ. | Max. |            |
| Total gate charge<br>总栅极电荷             | $Q_{G(tot)}$ | $V_{DD}=400V$ ,<br>$I_D=25A$ ,<br>$V_{GS}=-4/18V$                                                 |         | 73   |      | nC         |
| Gate source charge<br>栅-源极电荷           | $Q_{GS}$     |                                                                                                   |         | 30   |      |            |
| Gate-drain charge<br>栅-漏极电荷            | $Q_{GD}$     |                                                                                                   |         | 8.6  |      |            |
| Input capacitance<br>输入电容              | $C_{iss}$    | $V_{DS}=400V$ ,<br>$V_{GS}=0V$ ,<br>$f=1MHz$                                                      |         | 1745 |      | pF         |
| Output capacitance<br>输出电容             | $C_{oss}$    |                                                                                                   |         | 149  |      |            |
| Reverse transfer capacitance<br>反向传输电容 | $C_{rss}$    |                                                                                                   |         | 11   |      |            |
| Coss stored energy<br>输出电容存储能量         | $E_{oss}$    | Calculated based on $C_{oss}$                                                                     |         | 11.9 |      | $\mu J$    |
| Turn-On Delay Time<br>开启延迟时间           | $t_{d(on)}$  | $V_{DD}=400V$ ,<br>$I_D=12.5A$ ,<br>$V_{GS}=-4/18V$ ,<br>$R_{G(ext)}=5.1\Omega$ ,<br>$L=100\mu H$ |         | 13   |      | ns         |
| Rise time<br>上升时间                      | $t_r$        |                                                                                                   |         | 17   |      |            |
| Turn-Off Delay Time<br>关闭延迟时间          | $t_{d(off)}$ |                                                                                                   |         | 31   |      |            |
| Turn-Off Fall Time<br>下降时间             | $t_f$        |                                                                                                   |         | 13   |      |            |
| Turn-on switch loss<br>单次开启损耗          | $E_{on}$     |                                                                                                   |         | 82   |      | $\mu J$    |
| Turn-off switch loss<br>单次关闭损耗         | $E_{off}$    |                                                                                                   |         | 30   |      |            |

**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               | $V_{SD}$     | $I_S=25A, V_{GS}=0V, T_J=25^\circ C$                  |         | 3.7  |      | V          |
|                                                        |              | $I_S=25A, V_{GS}=-4V, T_J=25^\circ C$                 |         | 4.2  |      |            |
|                                                        |              | $I_S=25A, V_{GS}=-4V, T_J=175^\circ C$                |         | 3.7  |      |            |
| MOSFET forward recovery time<br>MOSFET正向恢复时间           | $t_{fr}$     | $V_{DS}=400V$ ,<br>$I_S=25A$ ,<br>$-di/dt=500A/\mu s$ |         | 27.7 |      | ns         |
| MOSFET forward recovery charge<br>MOSFET正向恢复电荷         | $Q_{fr}$     |                                                       |         | 77.4 |      | nC         |
| MOSFET peak forward recovery current<br>MOSFET正向恢复峰值电流 | $I_{frm}$    |                                                       |         | 5.6  |      | A          |

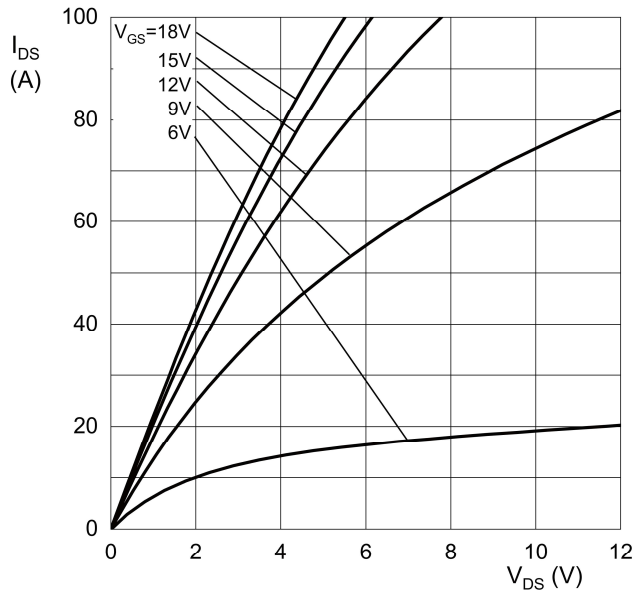


4. Electrical characteristics diagrams  
电气特性图表

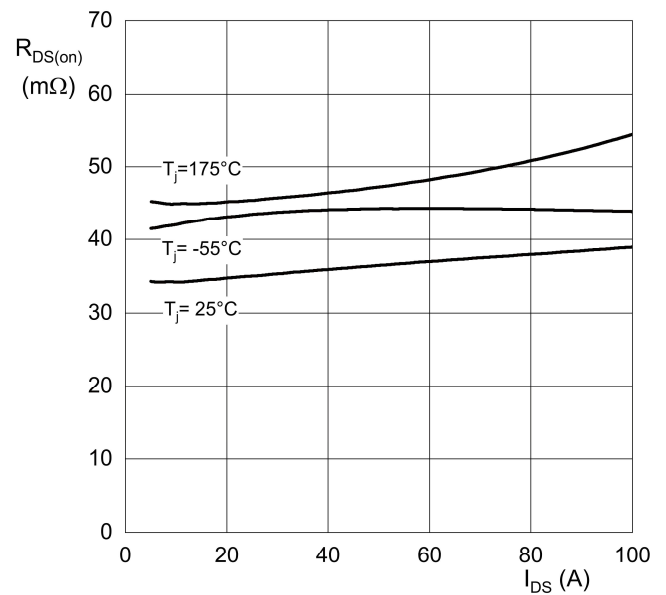
|                                                                                                                                                                                                |                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Power dissipation/耗散功率<br/><math>P_{tot}=f(T_c)</math>;</p>                                               | <p>Continuous drain current/连续漏电流与壳温<br/><math>I_{DS}=f(T_c)</math>; <math>V_{GS} \geq 18V</math></p>       |
| <p>Typ. Output characteristic/典型输出特性<br/><math>I_{DS}=f(V_{DS})</math>; <math>T_c = -55^\circ C</math></p>  | <p>Typ. Output characteristic/典型输出特性<br/><math>I_{DS}=f(V_{DS})</math>; <math>T_c = 25^\circ C</math></p>  |



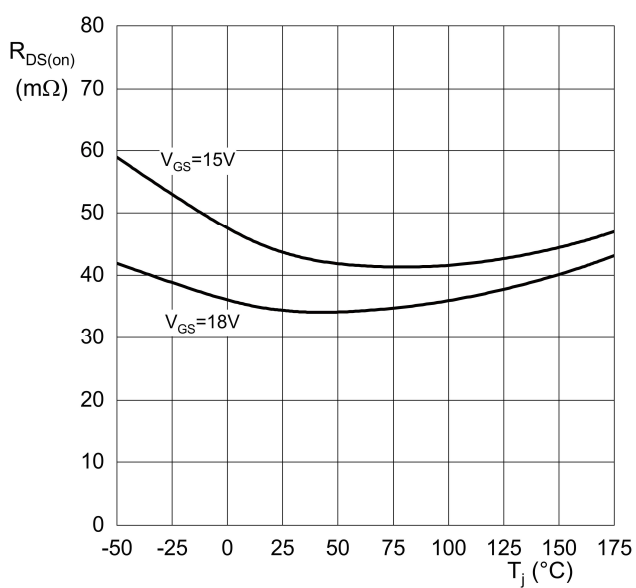
**Typ. Output characteristic/典型输出特性**  
 $I_{DS}=f(V_{DS}); T_C=175^{\circ}\text{C}$



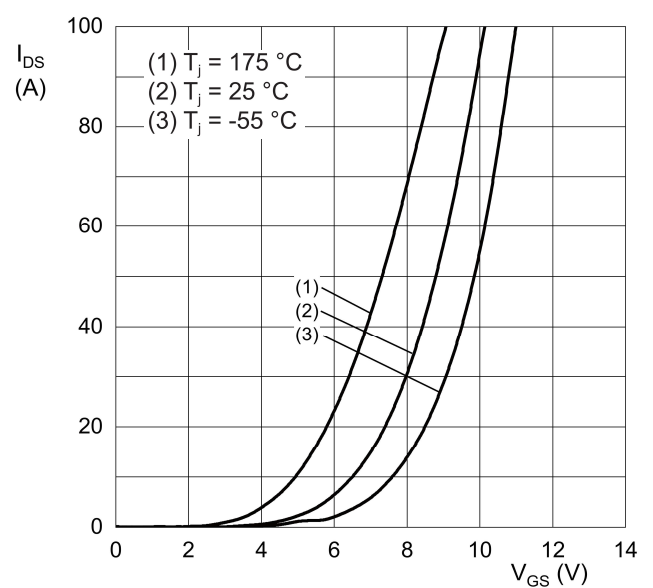
**Typ. Drain-source on-state resistance/典型漏源导通电阻**  
 $R_{DS(on)}=f(I_{DS}); V_{GS}=18\text{V}$



**Typ. Drain-source on-state resistance/漏源导通电阻**  
 $R_{DS(on)}=f(T_J); I_{DS}=25\text{A}$

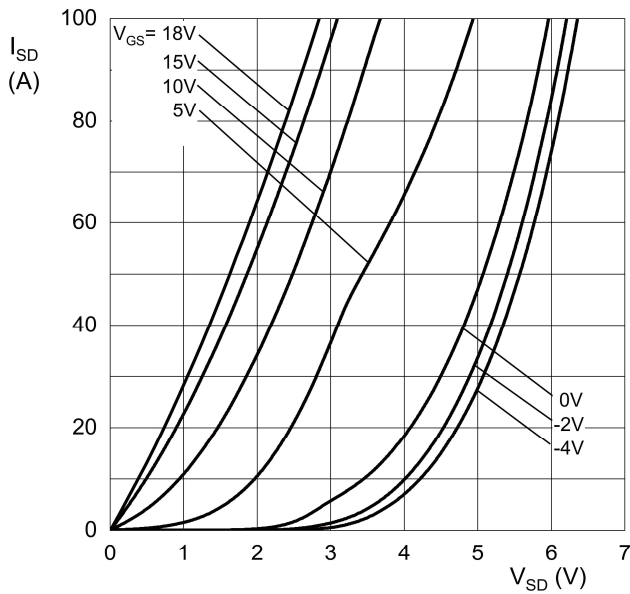


**Typ. Transfer characteristics/传输特性**  
 $I_{DS}=f(V_{GS}); V_{DS}=20\text{V}$

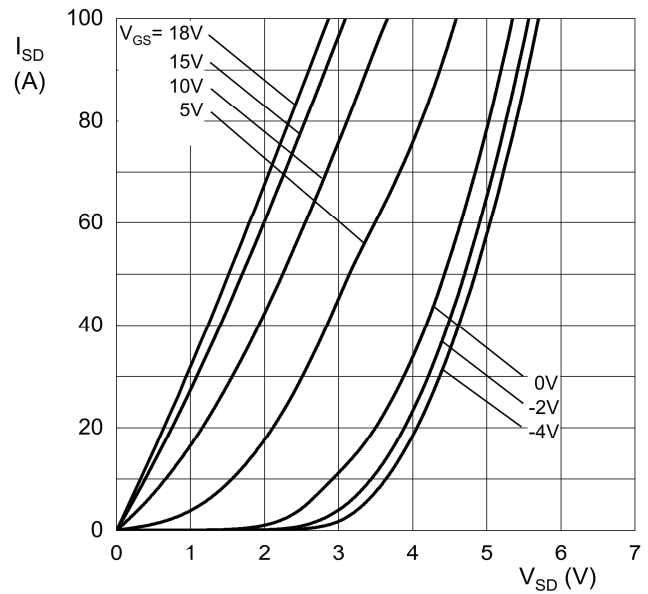




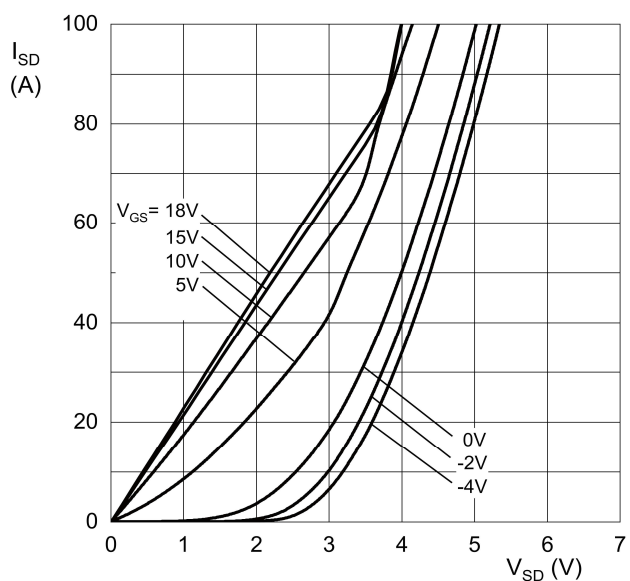
**Typ.Reverse drain current characteristics/典型二极管特性**  
 $I_{SD}=f(V_{SD})$ ;  $T_C=-55^{\circ}\text{C}$



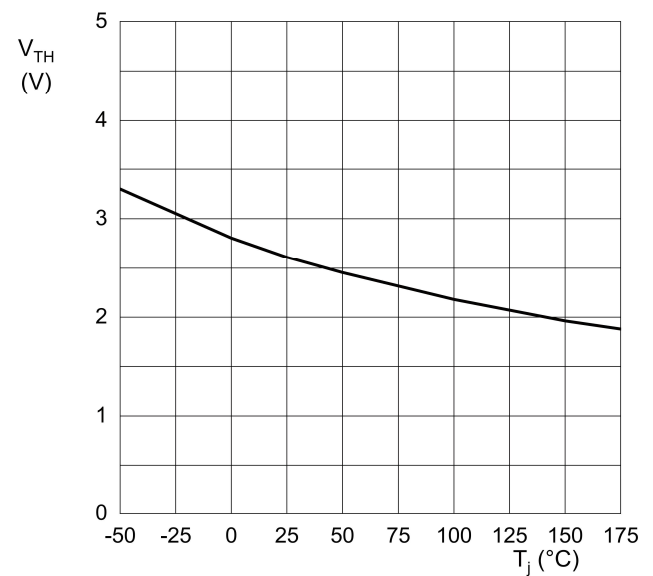
**Typ.Reverse drain current characteristics/典型二极管特性**  
 $I_{SD}=f(V_{SD})$ ;  $T_C=25^{\circ}\text{C}$



**Typ.Reverse drain current characteristics/典型二极管特性**  
 $I_{SD}=f(V_{SD})$ ;  $T_C=175^{\circ}\text{C}$



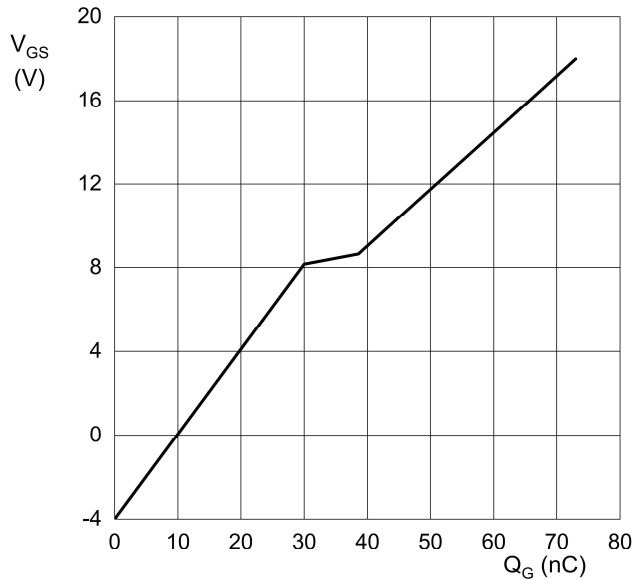
**Typ.Gate threshold voltage/门级阈值电压结温特性**  
 $V_{Gsth}=f(T_j)$ ;  $I_D=6\text{mA}$ ,  $V_{DS}=V_{GS}$





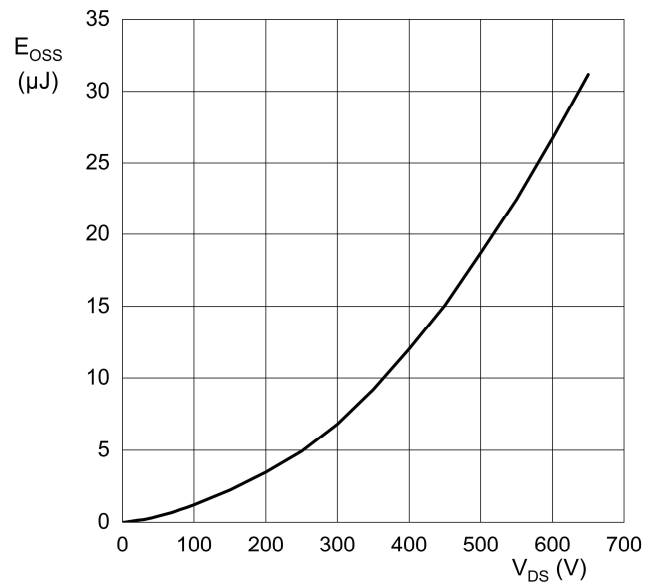
## Typ.Gate charge/典型门级电荷

$V_{GS}=f(Q_G)$ ;  $I_{DS}=25A$ ,  $I_{GS}=0.1mA$ ,  $V_{DS}=400V$



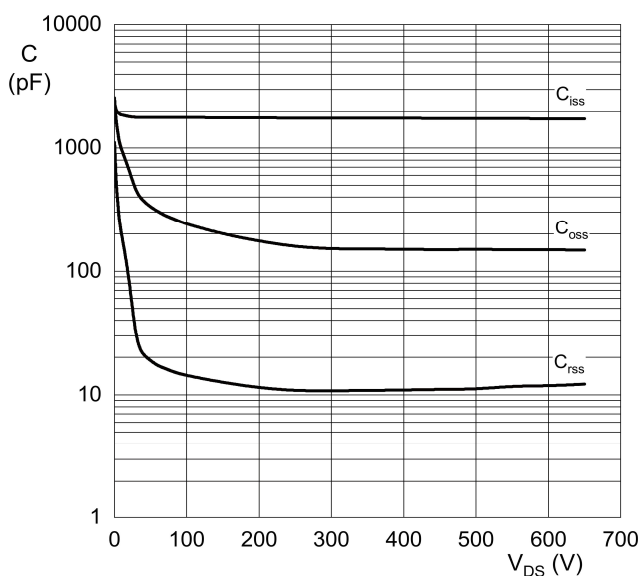
## Typ.Coss stored energy/典型Coss存储能量

$E_{OSS}=f(V_{DS})$ ;



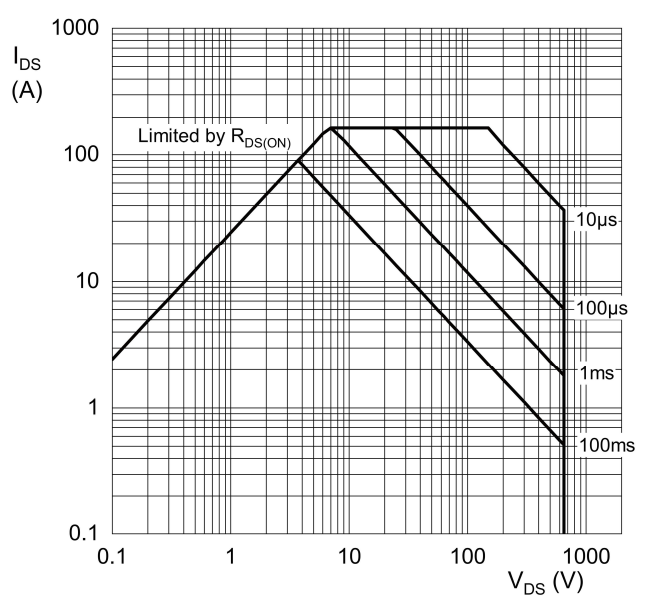
## Typ.Capacitances/典型电容特性

$C=f(V_{DS})$ ;  $V_{GS}=0V$



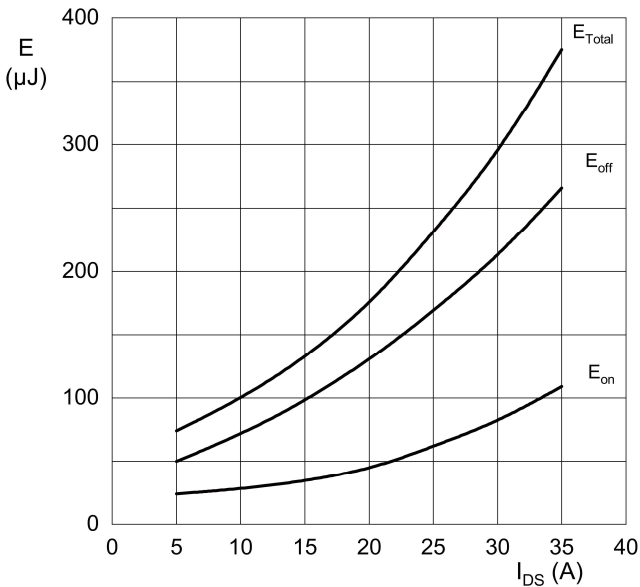
## Forward bias safe operating area/安全工作区

$I_D=f(V_{DS})$ ;  $T_C=25^\circ C$ ,  $D=0$

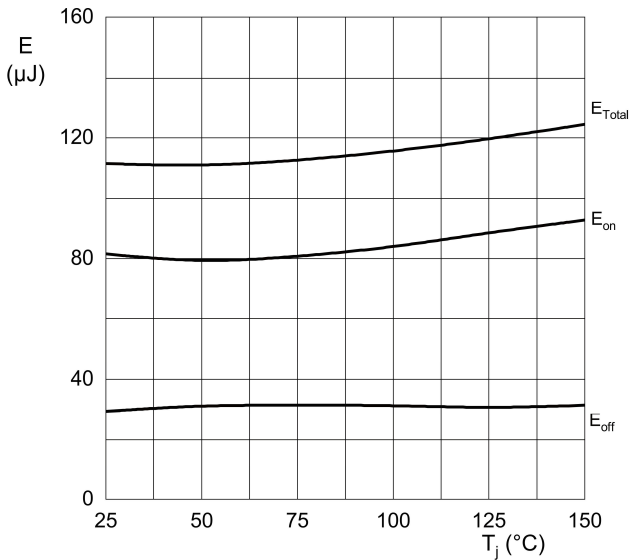




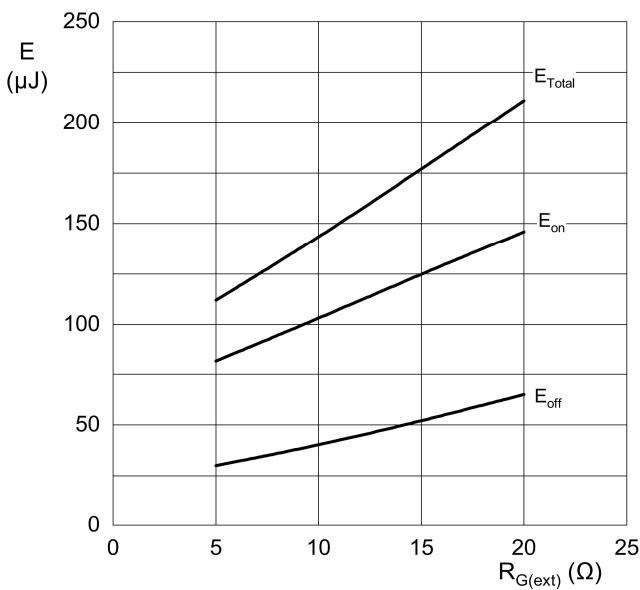
Typ.Switching losses vs current /动态损耗-电流特性  
 $E=f(I_D)$ ;  $V_{GS}=-4/18V$ ,  $R_G=5.1\Omega$ ,  $V_{DD}=400V$ ,  $T_J=25^\circ C$



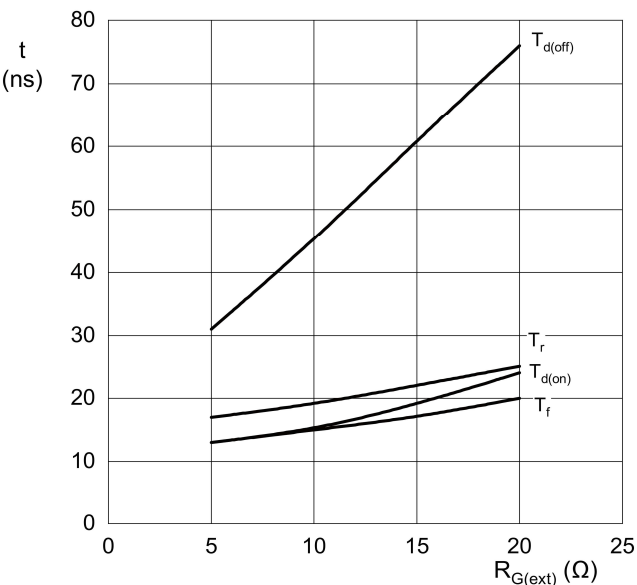
Typ.Switching losses vs temperature/动态损耗-结温特性  
 $E=f(T_J)$ ;  $V_{GS}=-4/18V$ ,  $R_G=5.1\Omega$ ,  $V_{DD}=400V$ ,  $I_D=12.5A$



Typ.Switching losses vs resistance/动态损耗-门级电阻特性  
 $E=f(R_G)$ ;  $V_{GS}=-4/18V$ ,  $V_{DD}=400V$ ,  $I_D=12.5A$ ,  $T_J=25^\circ C$



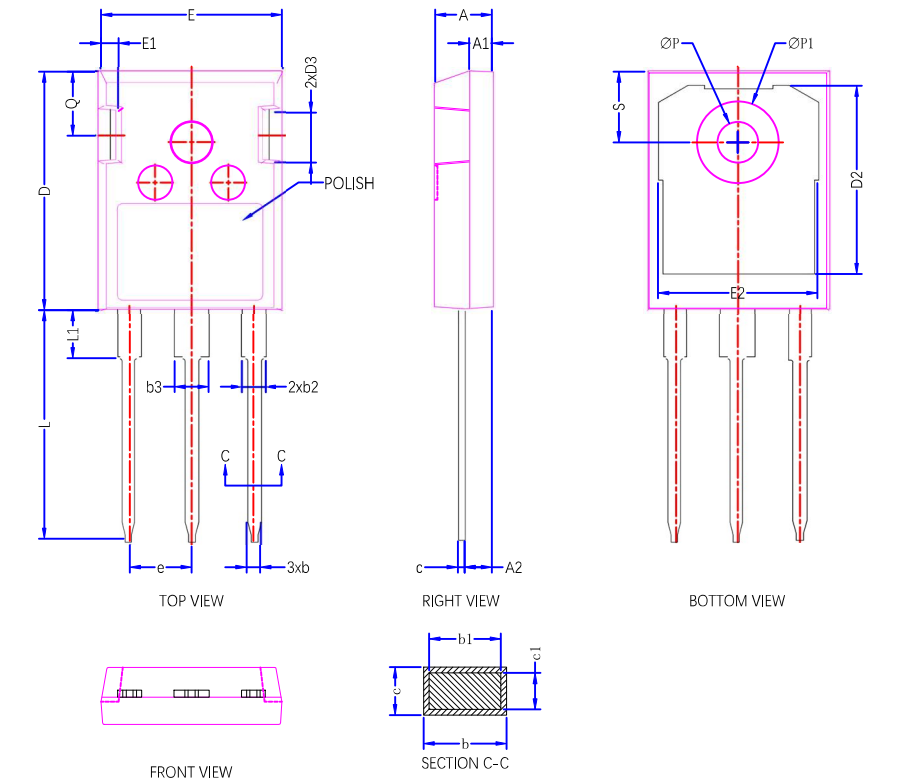
Typ.Switching times vs resistance/开关时间-门级电阻特性  
 $t=f(R_G)$ ;  $V_{GS}=-4/18V$ ,  $V_{DD}=400V$ ,  $I_D=12.5A$ ,  $T_J=25^\circ C$





5. Package outline  
封装外形

Figure 1. Outline TO247-3L, dimensions in mm/TO247-3L外形尺寸（毫米）



| SYMBOL | DIMENSIONS |       |       | SYMBOL | DIMENSIONS |       |       |
|--------|------------|-------|-------|--------|------------|-------|-------|
|        | MIN.       | NOM.  | MAX.  |        | MIN.       | NOM.  | MAX.  |
| A      | 4.90       | 5.00  | 5.10  | E      | 15.80      | 15.90 | 16.00 |
| A1     | 1.94       | 2.04  | 2.14  | E1     | 1.43       | 1.53  | 1.63  |
| A2     | 2.30       | 2.40  | 2.50  | E2     | 13.82      | 14.02 | 14.22 |
| b      | 1.14       | 1.24  | 1.34  | e      | 5.436 BSC  |       |       |
| b1     | 1.10       | 1.20  | 1.30  | L      | 19.90      | 20.10 | 20.30 |
| b2     | 1.94       | 2.04  | 2.14  | L1     | 4.02       | 4.22  | 4.42  |
| b3     | 2.94       | 3.04  | 3.14  | ΦP     | 3.50       | 3.60  | 3.70  |
| c      | 0.55       | 0.65  | 0.75  | ΦP1    | 7.19 REF   |       |       |
| c1     | 0.50       | 0.60  | 0.70  | Q      | 5.44       | 5.64  | 5.84  |
| D      | 20.85      | 20.95 | 21.05 | S      | 6.04       | 6.20  | 6.30  |
| D1     | 1.02       | 1.22  | 1.40  |        |            |       |       |
| D2     | 16.35      | 16.55 | 16.75 |        |            |       |       |
| D3     | 4.23       | 4.33  | 4.43  |        |            |       |       |

NOTES\注:

- Slot required, notch may be rounded
- 槽口是必需的，缺口（或凹槽）可以倒圆（或圆角化）
- Dimension D & E do not include mold flash, Mold flash shall not exceed 0.127mm per side, These dimensions are measured at the outermost extreme of the plastic body
- 尺寸 D 和 E 不包含溢边（模具飞边）。溢边每侧不得超过 0.127mm。这些尺寸测量于塑料本体的最外极限。
- Thermal pad contour optional within dimension D1 & E1.
- 散热焊盘的轮廓在尺寸 D1 和 E1 定义的范围内可选。
- Lead finish uncontrolled in L1
- 引脚镀层在 L1 区域不作控制。
- ΦP to have A draft angle of 1.5°(REF.) to the top of the part with hole diameter of 3.91mm(REF.)
- ΦP 孔具有一个 1.5°（参考值）的拔模斜度（至器件顶部），孔径为 3.91 mm（参考值）



6. Revision history

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

| Date日期     | Revision版本 | Changes更改内容             |
|------------|------------|-------------------------|
| 2025-09-15 | Rev. G 1.0 | Target Datasheet（目标规格书） |

7. Matters needing attention

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

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                               |
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