

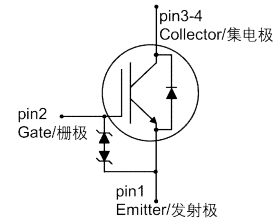
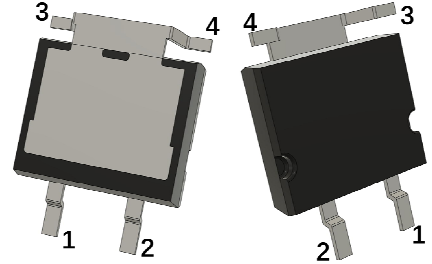


## HE10R065H6DEHW

High performance field stop IGBT power transistor

### Product features/产品特点

- Top side cooling technology  
顶部散热技术
- Advanced Trench+FS IGBT technology  
先进的沟槽栅+场截止技术
- High ruggedness performance  
高可靠性表现
- Short-Circuit withstand time,  $t_{sc} \leq 10\mu s$   
短路承受时间  $t_{sc} \leq 10\mu s$
- Excellent current sharing in parallel operation  
并联工作时优异的均流特性
- $V_{CE(sat)}$  with Positive Temperature Coefficient (PTC)  
具有正温度系数的  $V_{CEsat}$
- ESD HBM  $\geq \pm 2000V$   
ESD人体模型  $\geq \pm 2000V$
- Halogen free, RoHS compliant  
无卤, 符合RoHS



### Applications/应用领域

- General purpose inverters  
通用变频器
- Home appliances  
家用电器
- Motor Drives  
电机驱动



### Key performance parameters/关键性能参数

| Parameter/参数    | Value/值 | Unit/单位 |
|-----------------|---------|---------|
| $V_{CE}$        | 650     | V       |
| $I_c$           | 10      | A       |
| $V_{CEsat,typ}$ | 1.8     | V       |

### Package parameters/封装信息

| Type/型号        | Package/封装 | Marking/标识   | Packaging method/包装方式 |
|----------------|------------|--------------|-----------------------|
| HE10R065H6DEHW | TSC263-4L  | HE10R065DEHW | Tape and reel/卷带包装    |

# HE10R065H6DEHW

## High performance field stop IGBT power transistor



### 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 Characteristic values/特征值

| Parameter<br>参数                               | Symbol<br>符号   | Test condition<br>测试条件                                     | Value<br>值 | Unit<br>单位    |
|---|----------------|--|------------|---------------|
| Collector-to-emitter voltage<br>集电极-发射极电压     | $V_{CE}$       | $T_{vj} \geq 25^{\circ}\text{C}$                           | 650        | V             |
| DC collector current<br>集电极连续直流电流             | $I_C^1$        | $T_C = 25^{\circ}\text{C}$                                 | 20         | A             |
|   |                | $T_C = 100^{\circ}\text{C}$                                | 10         |               |
| Pulsed collector current<br>集电极脉冲电流           | $I_{Cpuls}^2$  |  | 40         | A             |
| Turn off safe operating area<br>关断安全工作区       | — <sup>2</sup> | $V_{CE} \leq 650\text{V}, T_{vj} \leq 175^{\circ}\text{C}$ | 40         | A             |
| Diode continuous forward current<br>二极管连续直流电流 | $I_F^1$        | $T_C = 25^{\circ}\text{C}$                                 | 20         | A             |
|   |                | $T_C = 100^{\circ}\text{C}$                                | 10         |               |
| Diode pulsed current<br>二极管脉冲电流               | $I_{Fpuls}^2$  |  | 40         | A             |
| Gate-emitter voltage<br>栅极-发射极峰值电压            | $V_{GE}$       |  | $\pm 20$   | V             |
| Transient gate-emitter voltage<br>瞬态栅极-发射极电压  | $V_{GE}$       | $t_p \leq 10\mu\text{s}, D < 0.01$                         | $\pm 30$   | V             |
| Short circuit withstand time<br>短路耐量          | $t_{sc}$       | $V_{GE} = 15\text{V}, V_{CC} \leq 400\text{V}$             | 10         | $\mu\text{s}$ |
| Power dissipation<br>总耗散功率                    | $P_{tot}$      | $T_C = 25^{\circ}\text{C}$                                 | 188        | W             |
|   |                | $T_C = 100^{\circ}\text{C}$                                | 94         |               |

1. Limited by  $T_{vj,max}$ /受限于最高结温

2. Pulse width  $t_p$  limited by  $T_{vj,max}$ /脉宽受限于最大结温



## 2. Package 封装

Table 2 Characteristic values/特征值

| Parameter<br>参数  | Symbol<br>符号  | Test condition<br>测试条件 | Value/值 |      |      | Unit<br>单位 |
|--|---------------|------------------------|---------|------|------|------------|
|  |               |                        | Min.    | Typ. | Max. |            |
| Operating junction temperature<br>可工作结温                  | $T_{vj}$      |                        | -40     |      | 175  | °C         |
| Storage temperature range<br>储存温度                        | $T_{stg}$     |                        | -55     |      | 150  | °C         |
| Soldering temperature, reflow solderin<br>焊接温度, 回流焊      | $T_{sold}$    | Reflow MSL1            |         |      | 260  | °C         |
| IGBT thermal resistance, junction-to-case<br>IGBT 芯片到壳热阻 | $R_{th(j-C)}$ |                        |         |      | 0.8  | K/W        |
| Diode thermal resistance, junction-to-case<br>二极管芯片到壳热阻  | $R_{th(j-C)}$ |                        |         |      | 2.73 | K/W        |
| Thermal resistance, junction-to-ambient<br>结到环境热阻        | $R_{th(j-A)}$ |                        |         |      | 61   | K/W        |

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### 3. Static electrical characteristic at $T_{vj}=25^{\circ}\text{C}$ , unless otherwise specified.

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

Table 3 Characteristic values/特征值

| Parameter<br>参数                                      | Symbol<br>符号  | Test condition<br>测试条件   | Value/值                      |      |      | Units<br>单位   |
|--|---------------|--------------------------|------------------------------|------|------|---------------|
|  |               |                          | Min.                         | Typ. | Max. |               |
| Collector - Emitter breakdown voltage<br>集电极-发射极击穿电压 | $V_{(BR)CES}$ | $V_{GE}=0V, I_C=0.25mA$  | 650                          |      |      | V             |
| Collector-Emitter saturation voltage<br>集电极-发射极饱和压降  | $V_{CEsat}$   | $V_{GE}=15V, I_C=10A$    | $T_{vj}=25^{\circ}\text{C}$  | 1.8  |      | V             |
|  |               |                          | $T_{vj}=175^{\circ}\text{C}$ | 2.3  |      |               |
| Gate threshold voltage<br>门极开启阈值电压                   | $V_{GETh}$    | $V_{GE}=V_{CE}, I_C=1mA$ | 5.5                          | 5.8  | 6.2  | V             |
| Diode forward voltage<br>二极管正向导通压降                   | $V_F$         | $V_{GE}=0V, I_F=10A$     | $T_{vj}=25^{\circ}\text{C}$  | 1.4  |      | V             |
|  |               |                          | $T_{vj}=175^{\circ}\text{C}$ | 1.2  |      |               |
| Gate to emitter leakage current<br>门极-发射极漏电流         | $I_{GES}$     | $V_{GE}=20V, V_{CE}=0V$  |                              |      | 100  | nA            |
|  |               | $V_{GE}=-20V, V_{CE}=0V$ |                              |      | -100 |               |
| Zero gate voltage collector current<br>集电极-发射极漏电流    | $I_{CES}$     | $V_{CE}=650V, V_{GE}=0V$ |                              |      | 10   | $\mu\text{A}$ |

### 4. Dynamic electrical characteristic at $T_{vj}=25^{\circ}\text{C}$ , unless otherwise specified.

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

Table 4 Characteristic values/特征值

| Parameter<br>参数                        | Symbol<br>符号 | Test condition<br>测试条件                  | Value/值 |      |      | Units<br>单位 |
|--|--------------|---|---------|------|------|-------------|
|  |              |   | Min.    | Typ. | Max. |             |
| Input capacitance<br>输入电容              | $C_{ies}$    | $V_{GE}=0V, V_{CE}=30V,$<br>$f=1MHz$    |         | 670  |      | pF          |
| Output capacitance<br>输出电容             | $C_{oes}$    |   |         | 37   |      |             |
| Reverse transfer capacitance<br>反向传输电容 | $C_{res}$    |   |         | 10   |      |             |
| Total gate charge<br>门极电荷              | $Q_g$        | $V_{GE}=15V,$<br>$I_C=10A, V_{CC}=520V$ |         | 28   |      | nC          |



**5. Switching characteristic inductive load** at  $T_{vj}=25^{\circ}\text{C}$ , unless otherwise specified.

**开关特性感性负载** 默认 $T_{vj}=25^{\circ}\text{C}$ 除非另有说明

**Table 5 IGBT Characteristic values/IGBT特征值**

| Parameter<br>参数                 | Symbol<br>符号 | Test condition<br>测试条件   | Value/值                      |      |      | Units<br>单位 |
|---------------------------------|--------------|--|------------------------------|------|------|-------------|
|                                 |              |  | Min.                         | Typ. | Max. |             |
| Turn-on delay time<br>开启延迟时间    | $t_{d(on)}$  | $V_{GE}=0/15\text{V}$<br>$V_{CC}=400\text{V}$<br>$I_C=10\text{A}$<br>$R_{G(on)}=10\Omega$<br>$R_{G(off)}=10\Omega$ | $T_{vj}=25^{\circ}\text{C}$  |      | 10   | ns          |
|                                 |              |  | $T_{vj}=175^{\circ}\text{C}$ |      | 9    |             |
| Rise time<br>上升时间               | $t_r$        |  | $T_{vj}=25^{\circ}\text{C}$  |      | 112  | ns          |
|                                 |              |  | $T_{vj}=175^{\circ}\text{C}$ |      | 119  |             |
| Turn-off delay time<br>关闭延迟时间   | $t_{d(off)}$ |  | $T_{vj}=25^{\circ}\text{C}$  |      | 32   | ns          |
|                                 |              |  | $T_{vj}=175^{\circ}\text{C}$ |      | 105  |             |
| Fall time<br>下降时间               | $t_f$        |  | $T_{vj}=25^{\circ}\text{C}$  |      | 96   | ns          |
|                                 |              |  | $T_{vj}=175^{\circ}\text{C}$ |      | 120  |             |
| Turn-on switch loss<br>单次开启损耗   | $E_{on}$     |  | $T_{vj}=25^{\circ}\text{C}$  |      | 0.30 | mJ          |
|                                 |              |  | $T_{vj}=175^{\circ}\text{C}$ |      | 0.36 |             |
| Turn-off switch loss<br>单次关闭损耗  | $E_{off}$    | $T_{vj}=25^{\circ}\text{C}$  |                              | 0.17 | mJ   |             |
|                                 |              | $T_{vj}=175^{\circ}\text{C}$   |                              | 0.25 |      |             |
| Total switching energy<br>总开关损耗 | $E_{ts}$     | $T_{vj}=25^{\circ}\text{C}$  |                              | 0.47 | mJ   |             |
|                                 |              | $T_{vj}=175^{\circ}\text{C}$   |                              | 0.61 |      |             |

**Table 6 Diode Characteristic values/二极管特征值**

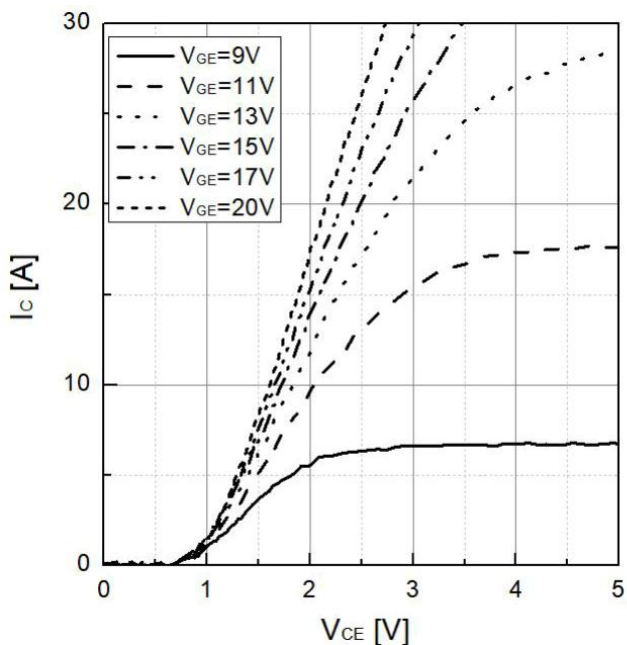
| Parameter<br>参数                            | Symbol<br>符号 | Test condition<br>测试条件  | Value/值                      |      |      | Units<br>单位 |
|--|--------------|---|------------------------------|------|------|-------------|
|  |              |   | Min.                         | Typ. | Max. |             |
| Diode reverse recovery time<br>二极管反向恢复时间   | $t_{rr}$     | $I_F=10\text{A}$<br>$V_R=400\text{V}$<br>$di_F/dt=-750\text{A}/\mu\text{s}$ | $T_{vj}=25^{\circ}\text{C}$  |      | 57   | ns          |
|  |              |   | $T_{vj}=175^{\circ}\text{C}$ |      | 122  |             |
| Diode reverse recovery charge<br>二极管反向恢复电量 | $Q_{rr}$     |   | $T_{vj}=25^{\circ}\text{C}$  |      | 411  | nC          |
|  |              |   | $T_{vj}=175^{\circ}\text{C}$ |      | 741  |             |
| Peak reverse recovery current<br>反向恢复峰值电流  | $I_{rrm}$    |   | $T_{vj}=25^{\circ}\text{C}$  |      | 12   | A           |
|  |              |   | $T_{vj}=175^{\circ}\text{C}$ |      | 14   |             |



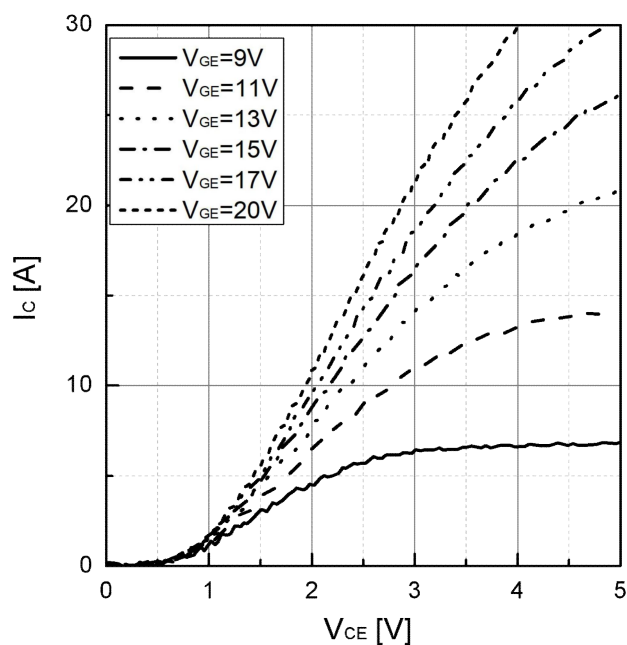
**6. Characteristics diagrams**

**特性曲线**

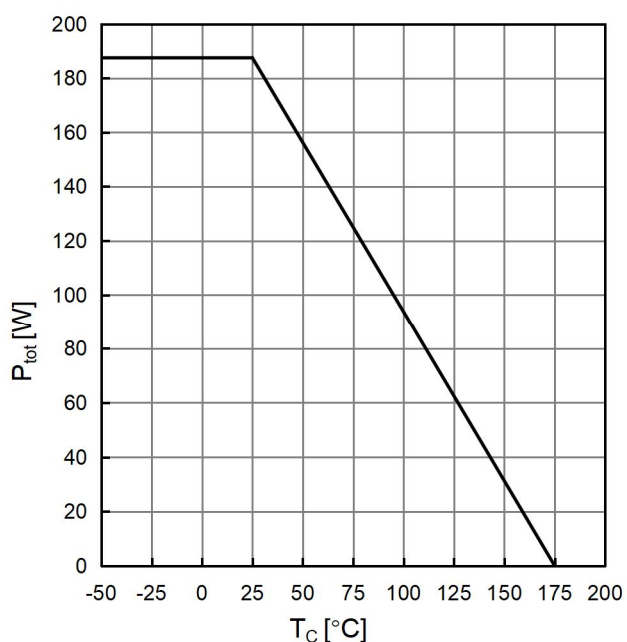
**Typ. Output characteristic/输出特性**  
 $I_c=f(V_{CE}); T_{vj}=25^{\circ}\text{C}$



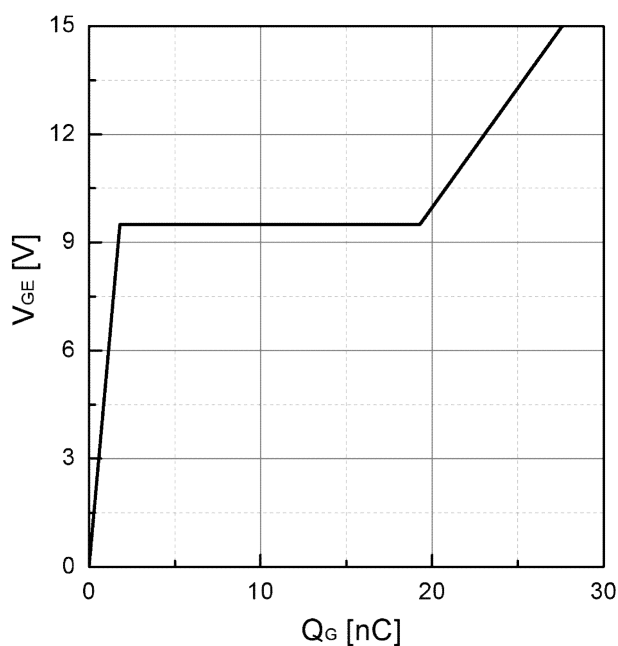
**Typ. Output characteristic/输出特性**  
 $I_c=f(V_{CE}); T_{vj}=175^{\circ}\text{C}$



**Power dissipation/耗散功率**  
 $P_{tot}=f(T_c); @ R_{th(j-c).MAX}$



**Typ. Gate charge/门级电荷**  
 $V_{GE}=f(Q_G); I_c=10A, V_{CC}=520V$

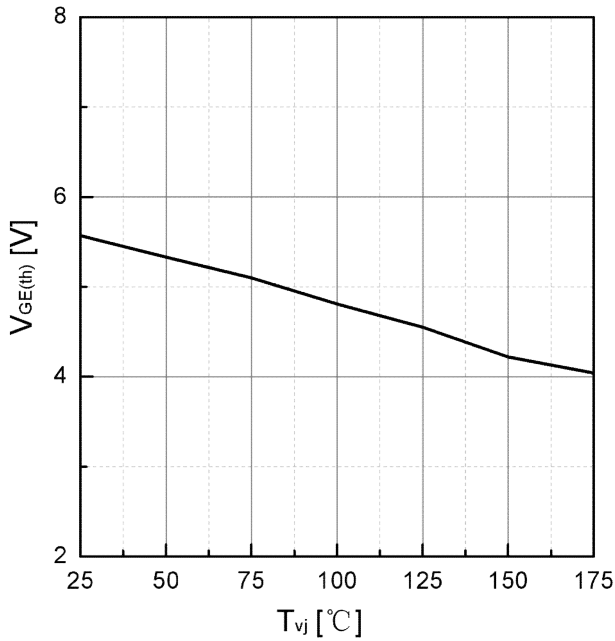


# HE10R065H6DEHW

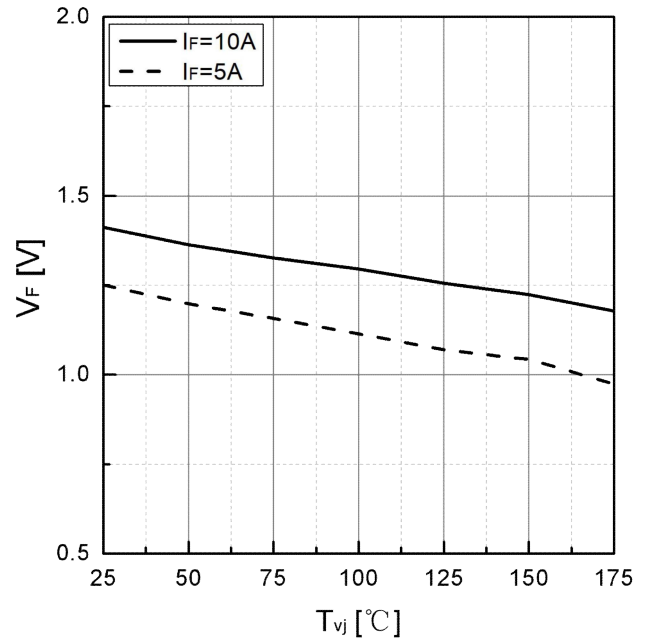
## High performance field stop IGBT power transistor



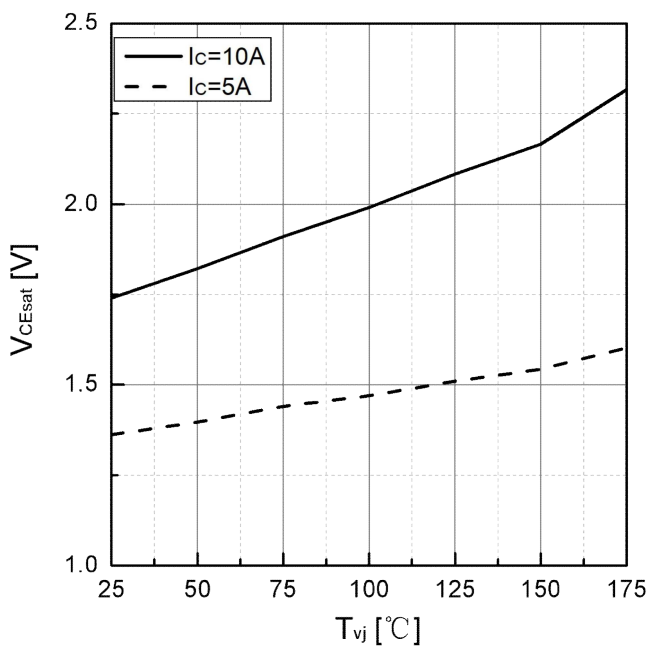
Typ. Gate threshold voltage/门级阈值电压结温特性  
 $V_{GEth}=f(T_{vj}); I_c=1.0mA, V_{GE}=V_{CE}$



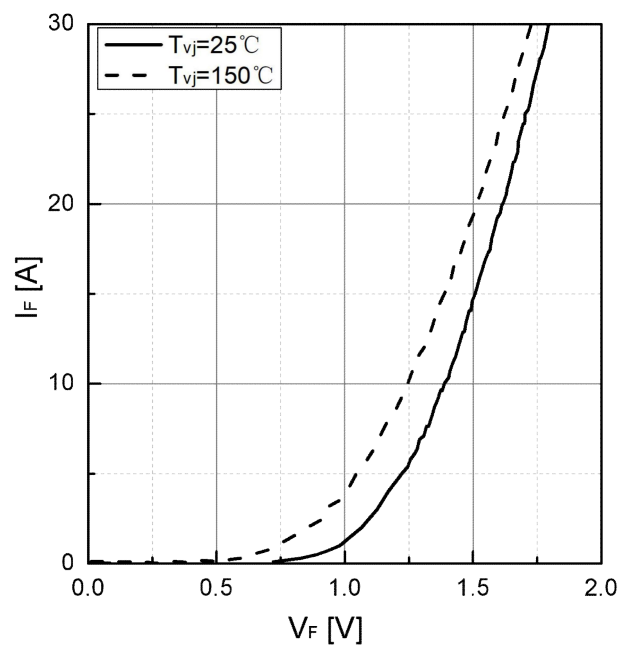
Typ. Temperature dependence of  $V_F$ /二极管压降与结温特性  
 $V_F=f(T_{vj});$



Typ. Temperature dependence of  $V_{CEsat}$ /饱和压降与结温特性  
 $V_{CEsat}=f(T_{vj}); V_{GE}=15V$



Typ. Diode forward characteristic curve/二极管正向特性  
 $I_F=f(V_F);$

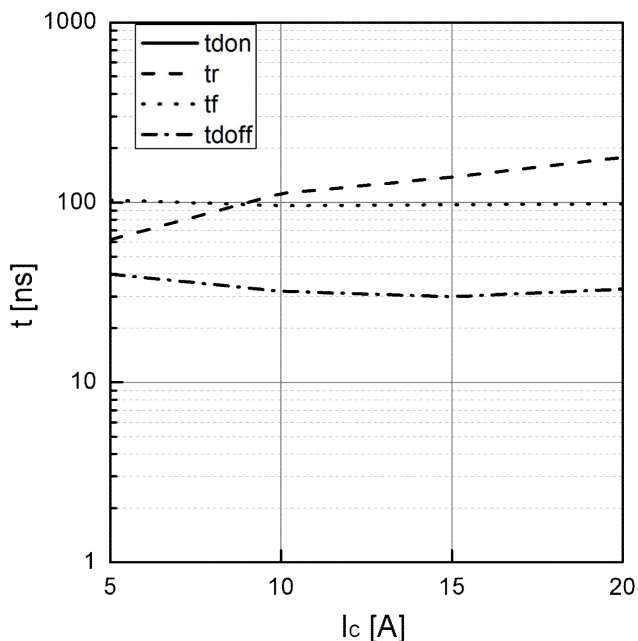


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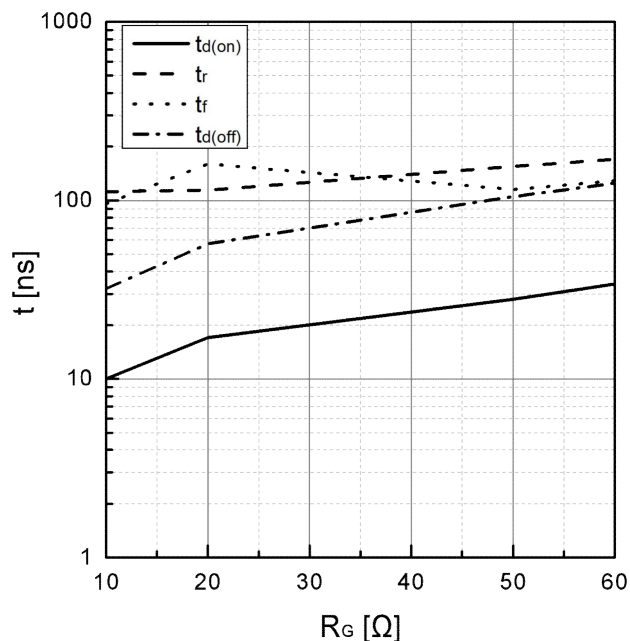
## High performance field stop IGBT power transistor



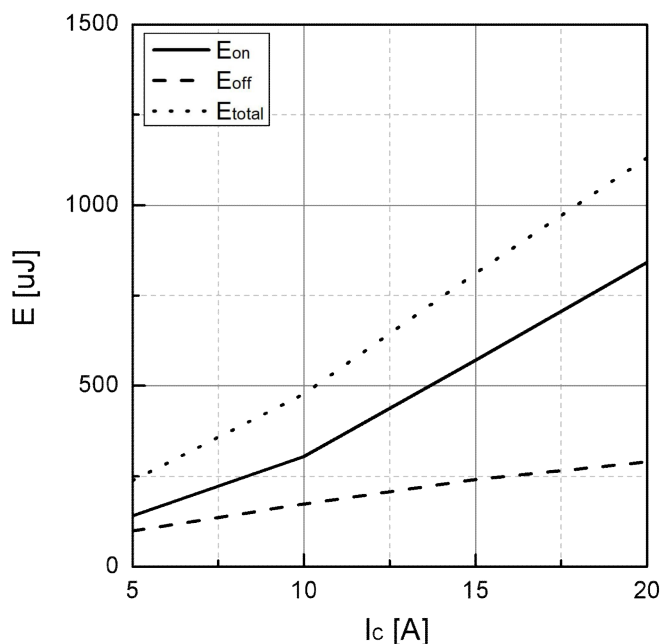
**Typ.Switching times vs current/开关时间与电流特性**  
 $t=f(I_c)$ ;  $V_{GE}=0/15V, V_{CC}=400V, R_G=10\Omega, T_{vj}=25^\circ C$



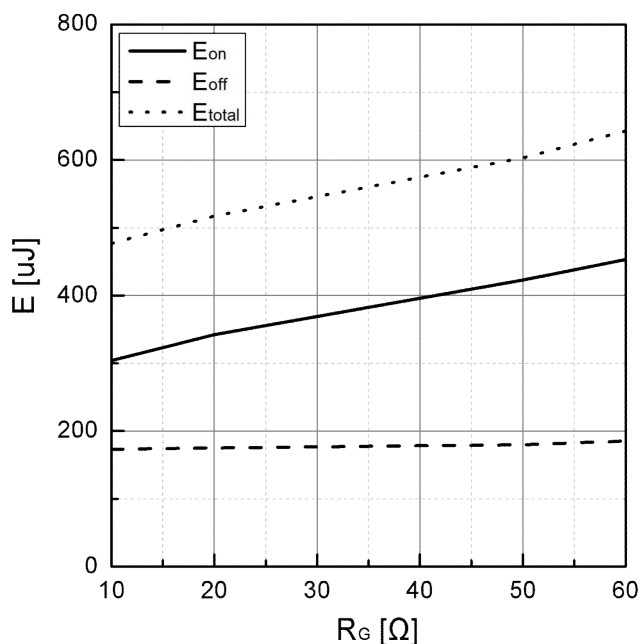
**Typ.Switching times vs resistance/开关时间与门级电阻特性**  
 $t=f(R_G)$ ;  $V_{GE}=0/15V, V_{CC}=400V, I_c=10A, T_{vj}=25^\circ C$



**Typ.Switching losses vs current /动态损耗与电流特性**  
 $E=f(I_c)$ ;  $V_{GE}=0/15V, R_G=10\Omega, V_{CC}=400V, T_{vj}=25^\circ C$



**Typ.Switching losses vs resistance/动态损耗与门级电阻特性**  
 $E=f(R_G)$ ;  $V_{GE}=0/15V, V_{CC}=400V, I_c=10A, T_{vj}=25^\circ C$



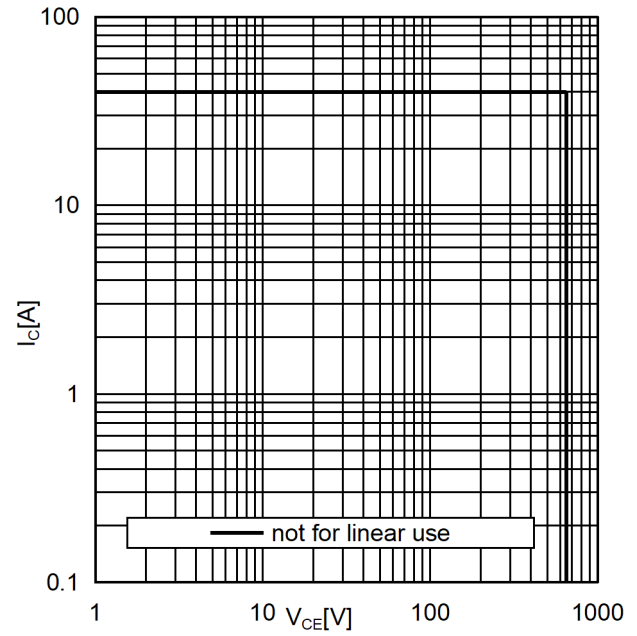
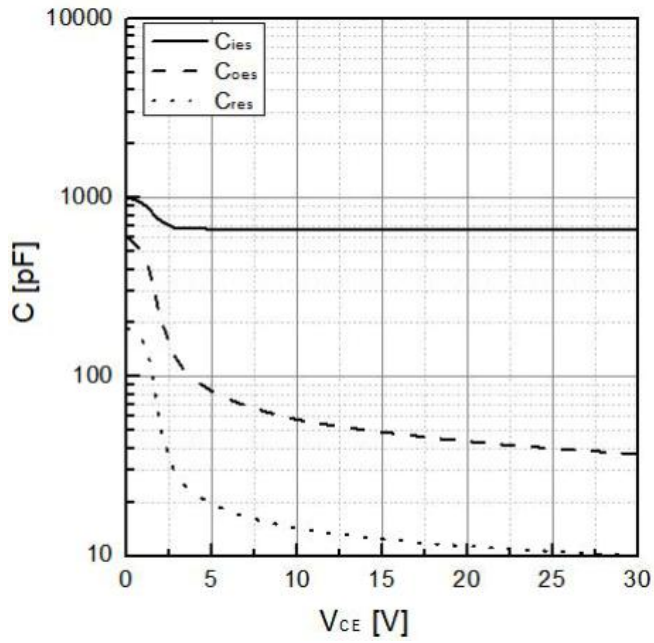
# HE10R065H6DEHW

## High performance field stop IGBT power transistor



Typ.Capacitances/电容特性  
 $C=f(V_{CE}); f=1\text{MHz}, V_{GE}=0\text{V}$

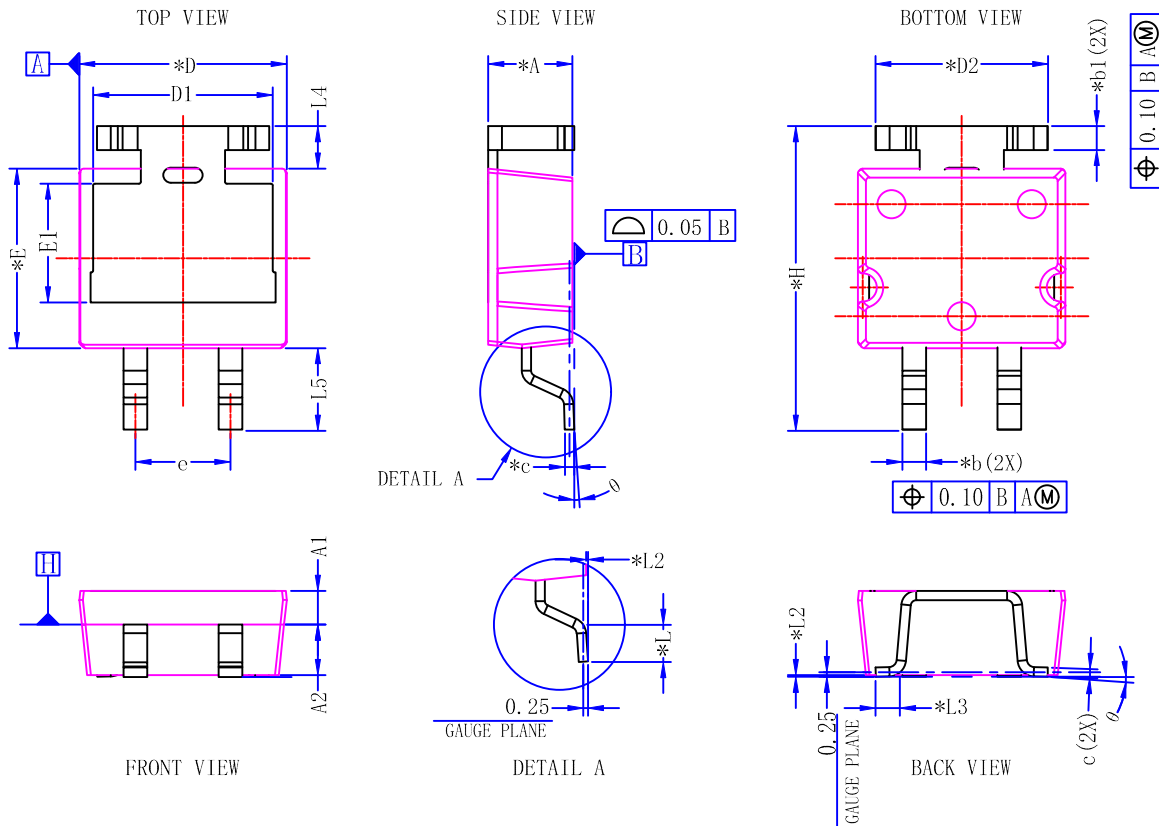
Reverse bias safe operating area/反偏安全工作区  
 $I_C=f(V_{CE}); V_{GE}=15\text{V}, T_C=25^\circ\text{C}, T_{vj}\leq 175^\circ\text{C}$





## 7. 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。



## 8. Revision history 修订历史

Table 7 Date and version number/日期与版本号

| Date日期     | Revision版本 | Changes更改内容              |
|------------|------------|--------------------------|
| 2025-12-15 | Rev.G1.0   | Target datasheet (目标规格书) |

## 9. Matters needing attention 注意事项

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重要技术指南、应用规范与版权声明

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