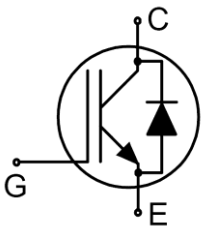
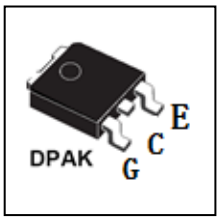
# JT05N065RED

## 主要参数 MAIN CHARACTERISTICS

| | |
|---|---|
| $I_C$ | 6 A |
| $V_{CES}$ | 650V |
| $V_{cesat-typ}(V_{ge}=15V)$ | 1.6V |

封装 **Package**




## 用途

- 逆变器
- UPS 电源
- 电机控制

## APPLICATIONS

- General purpose inverters
- UPS
- Motor control

## 产品特性

- 低栅极电荷
- Trench FS 技术,
- RoHS 产品

## FEATURES

- Low gate charge
- Trench FS Technology
- RoHS product

## 订货信息 ORDER MESSAGE

| 订 货 型 号 Order codes | | | | 印 记 Marking | 封 装 Package |
|---|---|---|---|---|---|
| 有卤-条管 Halogen-Tube | 无卤-条管 Non halogen-Tube | 有卤-编带 Halogen-Reel | 无卤-编带 Non halogen-Reel | | |
| JT05N065RED-R-B | JT05N065RED-R-BR | JT05N065RED-R-A | JT05N065RED-R-AR | JT05N065RED | DPAK |

## 绝对最大额定值 ABSOLUTE RATINGS (Tc=25℃)

| 项 目<br>Parameter | 符 号<br>Symbol | 数 值 Value<br>JT05N065RED | 单 位<br>Unit |
|---|---|---|---|
| 最高集电极－发射极直流电压<br>Collector-Emmiter Voltage | $V_{CES}$ | 650 | V |
| *连续集电极电流<br>Collector Current-continuous | $I_C$ T=25℃ | 12 | A |
| | $I_C$ T=100℃ | 6 | A |
| 最大脉冲集电极极电流（注 1）<br>Collector Current – pulse（note 1） | $I_{CM}$ | 20 | A |
| 二极管正向测试电流<br>Diode RMS forward current | $I_C$ T=25℃ | 12 | A |
| | $I_C$ T=100℃ | 6 | A |
| 最高栅极发射极电压<br>Gate-Emmiter Voltage | $V_{GES}$ | ±30 | V |
| 安全工作区<br>Turn-off safe area | - | 20 | A |
| 耗散功率<br>Power Dissipation | $P_D$ $T_C$=25℃ | 56.8 | W |
| 最高结温及存储温度<br>Operating and Storage<br>Temperature Range | $T_J$，$T_{STG}$ | -55～+150 | ℃ |
| 引线最高焊接温度<br>Maximum Lead<br>Temperature for Soldering Purposes | $T_L$ | 300 | ℃ |

*连续集电极电流由最高结温限制

*Collector current limited by maximum junction temperature

## 电特性 ELECTRICAL CHARACTERISTICS

| 项　　目<br>Parameter | 符　号<br>Symbol | 测试条件<br>Tests conditions | 最小<br>Min | 典型<br>Typ | 最 大<br>Max | 单　位<br>Units |
|---|---|---|---|---|---|---|
| **关态特性 Off –Characteristics** | | | | | | |
| 集电极－发射极击穿电压<br>Collector-Emmiter Voltage | $BV_{CES}$ | $I_C$=250μA, $V_{GE}$=0V | 650 | - | - | V |
| 击穿电压温度特性<br>Breakdown Voltage Temperature Coefficient | $\Delta BV_{CES}/\Delta T_J$ | $I_C$=1mA, referenced to 25℃ | - | 0.5 | - | V/℃ |
| 零栅压下集电极漏电流<br>Zero Gate Voltage Collector Current | $I_{CES}$ | $V_{CE}$=650V,　$V_{GE}$=0V, $T_C$=25℃ | - | - | 10 | uA |
| 正向栅极体漏电流<br>Gate-body leakage current, forward | $I_{GESF}$ | $V_{CE}$=0V,　$V_{GE}$ =20V | - | - | 200 | nA |
| 反向栅极体漏电流<br>Gate-body leakage current, reverse | $I_{GESR}$ | $V_{CE}$=0V,　$V_{GE}$ =-20V | - | - | -200 | nA |
| **通态特性 On-Characteristics** | | | | | | |
| 阈值电压<br>Gate Threshold Voltage | $V_{GE(th)}$ | $V_{CE}$ = $V_{GE}$ ,　$I_C$=250μA | 4.5 | - | 6.5 | V |
| 饱和压降<br>Collector-Emmiter saturation Voltage | $V_{CESAT}$ | $V_{GE}$=15V　$I_C$=5A　Tc=25℃ | - | 1.5 | 1.8 | V |
| | | $V_{GE}$=15V　$I_C$=5A　Tc=150℃ | - | 1.8 | - | V |
| **动态特性 Dynamic Characteristics** | | | | | | |
| 输入电容<br>Input capacitance | $C_{ies}$ | $V_{CE}$=25V,<br>$V_{GE}$=0V,<br>f=1.0MHz | - | 259 | - | pF |
| 输出电容<br>Output capacitance | $C_{oes}$ | | - | 31.3 | - | pF |
| 反向传输电容<br>Reverse transfer capacitance | $C_{res}$ | | - | 10.3 | - | pF |
| 栅极电荷总量 Total Gate Charge | Qg | $V_{CC}$=480V,$I_c$=5A, $V_{GE}$=15 V<br>$T_C$=25℃（note 2） | - | 13.7 | - | nC |
| 栅极-发射极电荷 Gate to emitter charge | Qge | | - | 5.8 | - | |
| 栅极-集电极电荷 Gate to collector charge | Qgc | | - | 2.3 | - | |
| 栅极电荷总量 Total Gate Charge | Qg | $V_{CC}$=480V,$I_c$=6A, $V_{GE}$=15 V<br>$T_C$=25℃（note 2） | - | 16.8 | - | nC |
| 栅极-发射极电荷 Gate to emitter charge | Qge | | - | 6.3 | - | |
| 栅极-集电极电荷 Gate to collector charge | Qgc | | - | 2.8 | - | |
| 栅极电阻-Gate resistance | Rg | f=1 MHz, open collector | - | 2.0 | - | Ω |
| 短路电流-short current | Isc | $V_{GE}$=15V $V_{CE}$=400V<br>TJstart≤150° C t≤10μs | - | 40 | - | A |

## 电特性 ELECTRICAL CHARACTERISTICS

| 开关特性 Switching Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| 项　　目<br>Parameter | 符　号<br>Symbol | 测试条件<br>Tests conditions | 最小<br>Min | 典型<br>Typ | 最大<br>Max | 单位<br>Units |
| 开启延迟时间 Turn-On delay time | $t_d$(on) | $V_{CC}$=400V,$I_c$=5A,$R_G$=60Ω<br>$V_{GE}$=15 V<br>$T_C$=25℃<br>(note 3) | - | 22 | - | ns |
| 上升时间 Turn-On rise time | $t_r$ | | - | 15 | - | ns |
| 关断延迟时间 Turn-Off delay time | $t_d$(off) | | - | 104 | - | ns |
| 下降时间 Turn-Off Fall time | $t_f$ | | - | 32 | - | ns |
| 开通损耗 Turn-On energy | Eon | | - | 132 | - | μJ |
| 关断损耗 Turn-off energy | Eoff | | - | 65 | - | μJ |
| 总开关损耗 Total switching energy | Etot | | - | 197 | - | μJ |
| 开启延迟时间 Turn-On delay time | $t_d$(on) | $V_{CC}$=400V,$I_c$=6A,$R_G$=60Ω<br>$V_{GE}$=15 V<br>$T_C$=25℃<br>(note 3) | - | 23 | - | ns |
| 上升时间 Turn-On rise time | $t_r$ | | - | 17 | - | ns |
| 关断延迟时间 Turn-Off delay time | $t_d$(off) | | - | 101 | - | ns |
| 下降时间 Turn-Off Fall time | $t_f$ | | - | 31 | - | ns |
| 开通损耗 Turn-On energy | Eon | | - | 140 | - | μJ |
| 关断损耗 Turn-off energy | Eoff | | - | 69 | - | μJ |
| 总开关损耗 Total switching energy | Etot | | - | 209 | - | μJ |
| 开启延迟时间 Turn-On delay time | td(on) | $V_{CC}$=400V,$I_c$=5A,$R_G$=60Ω<br>$V_{GE}$=15 V<br>$T_C$=150℃<br>(note 3) | - | 25 | - | ns |
| 上升时间 Turn-On rise time | tr | | - | 19 | - | ns |
| 关断延迟时间 Turn-Off delay time | td(off) | | - | 110 | - | ns |
| 下降时间 Turn-Off Fall time | tf | | - | 35 | - | ns |
| 开通损耗 Turn-On energy | Eon | | - | 145 | - | μJ |
| 关断损耗 Turn-off energy | Eoff | | - | 73 | - | μJ |
| 总开关损耗 Total switching energy | Etot | | - | 218 | - | μJ |
| 开启延迟时间 Turn-On delay time | td(on) | $V_{CC}$=400V,$I_c$=6A,$R_G$=60Ω<br>$V_{GE}$=15 V<br>$T_C$=150℃<br>(note 3) | - | 27 | - | ns |
| 上升时间 Turn-On rise time | tr | | - | 23 | - | ns |
| 关断延迟时间 Turn-Off delay time | td(off) | | - | 107 | - | ns |
| 下降时间 Turn-Off Fall time | tf | | - | 34 | - | ns |
| 开通损耗 Turn-On energy | Eon | | - | 149 | - | μJ |
| 关断损耗 Turn-off energy | Eoff | | - | 78 | - | μJ |
| 总开关损耗 Total switching energy | Etot | | - | 227 | - | μJ |
| 反并联二极管特性及最大额定值 **Anti-Parallel Diode Characteristics and Maximum Ratings** | | | | | | |
| 正向压降<br>Drain-Source Diode Forward Voltage | $V_F$ | $V_{GE}$=0V, $I_F$=5A, Tc=25℃ | - | 1.7 | 2.0 | V |
| | | $V_{GE}$=0V, $I_F$=5A, Tc=150℃ | - | 1.5 | - | V |
| 反向恢复时间<br>Diode Reverse recovery time | $t_{rr}$ | $V_{GE}$=0V, $V_R$=400V $I_F$=5A<br>$dI_F/dt$=200A/μs | - | 70 | - | ns |

| | | | | | | |
|---|---|---|---|---|---|---|
| 反向恢复电荷<br>Diode Reverse recovery charge | Qrr | | - | 145 | - | nC |
| 反向恢复电流<br>Diode Reverse recovery Current | $I_{RRM}$ | | - | 4.0 | - | A |
| 反向恢复时间<br>Diode Reverse recovery time | $t_{rr}$ | $V_{GE}$=0V, $V_R$=400V $I_F$=6A<br>$dI_F/dt$=200A/μs | - | 76 | - | ns |
| 反向恢复电荷<br>Diode Reverse recovery charge | Qrr | | - | 156 | - | nC |
| 反向恢复电流<br>Diode Reverse recovery Current | $I_{RRM}$ | | - | 4.4 | - | A |

| 项　　目<br>**Parameter** | 符　号<br>**Symbol** | **典型 Typ**<br>JT05N065RED | 单 位<br>**Unit** |
|---|---|---|---|
| 结到管壳的热阻<br>Thermal Resistance, Junction to Case | $R_{th(j-c)}$ | 2.2 | ℃/W |
| 结到环境的热阻<br>Thermal Resistance, Junction to Ambient | $R_{th(j-A)}$ | 110 | ℃/W |

注释：

1：脉冲宽度由最高结温限制

2：基本与工作温度无关

3：脉冲测试：脉冲宽度≤300μs,占空比≤2％

Notes:

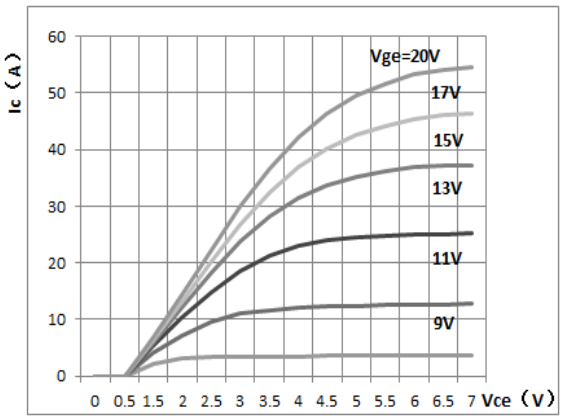
1：Pulse width limited by maximum junction temperature

2：Essentially independent of operating temperature

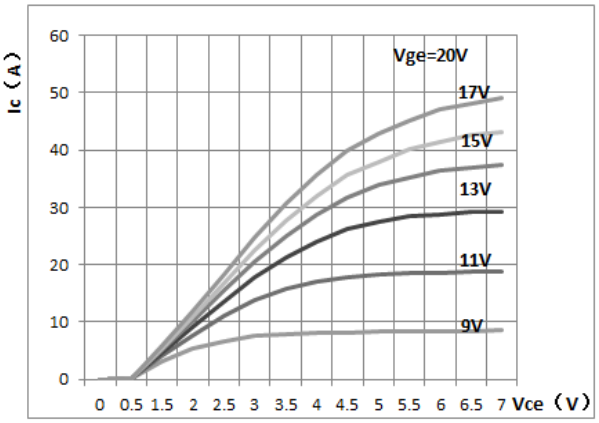
3：Pulse Test：Pulse Width ≤300μs,Duty Cycle≤2％

## 特征曲线 ELECTRICAL CHARACTERISTICS (curves)

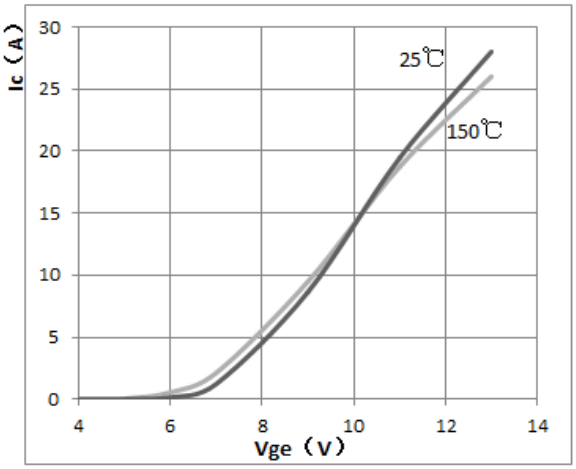
### Output Characteristics Tj=25℃



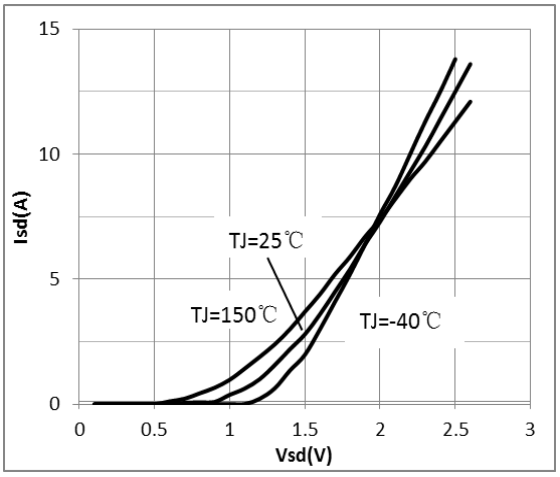

### Output Characteristics 150℃



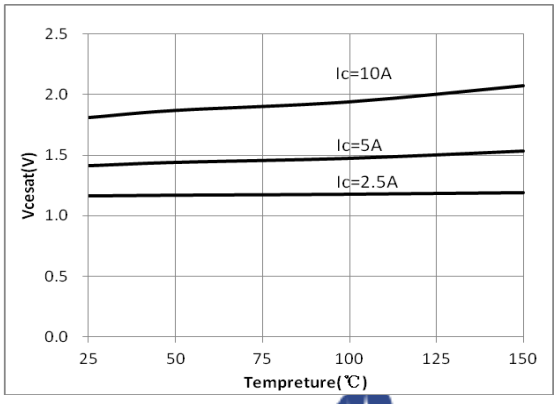

### Transfer Characteristics



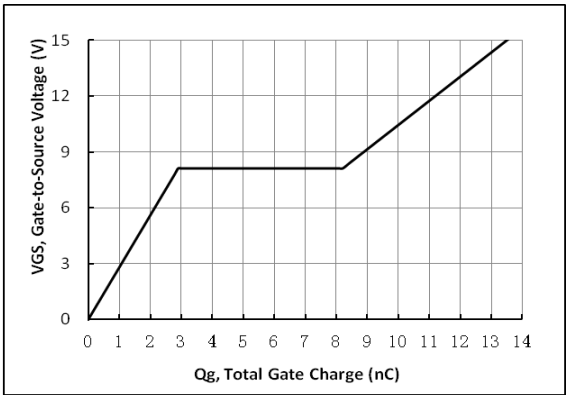

### Diode Characteristic




### Collector-Emitter Saturation Voltage vs Tj

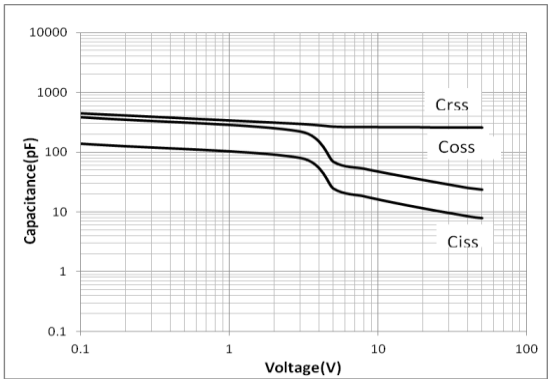



### Gate-charge Characteristics



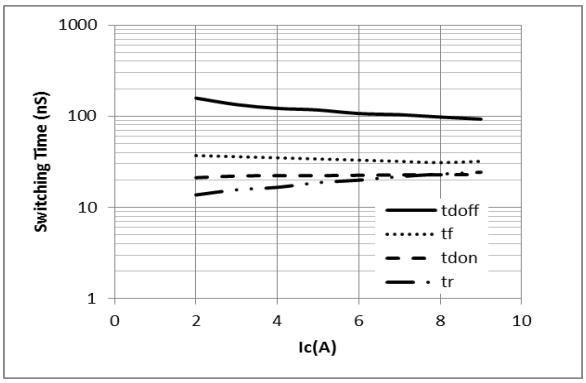
## Capacitance Characteristic

$V_{GE}$ =0V,f=1.0MHz

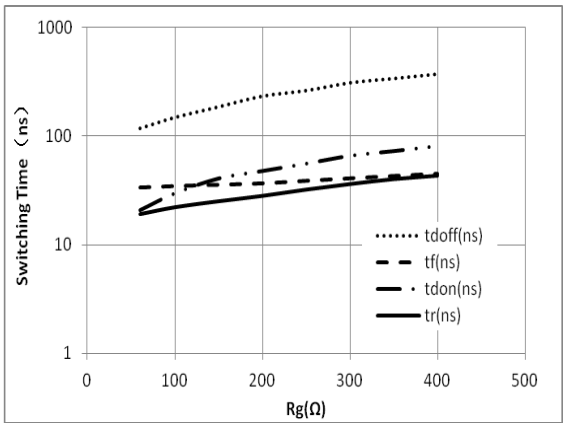



## Switching Time vs. Ic（Tj=150℃）

VGE=15V,VCE=400V,Rg=60Ω

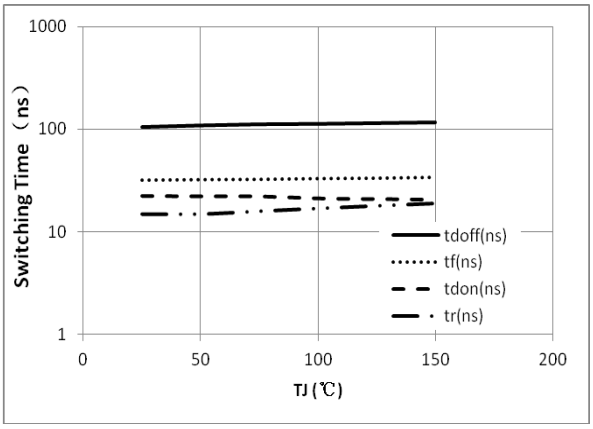



## Switching Time vs.Rg(Tj=150℃)



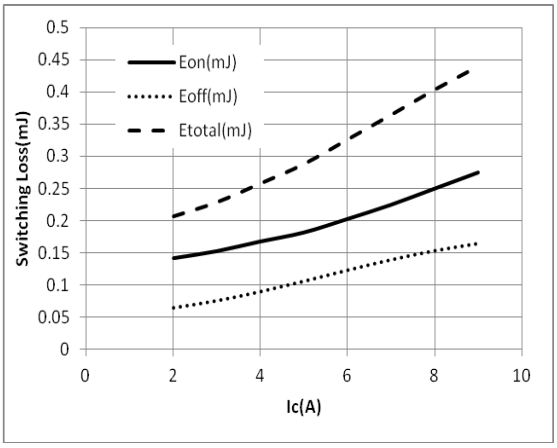

## Switching Time vs.Tj

VGE=15V,VCE=400V,Ic =5A,Rg=60Ω



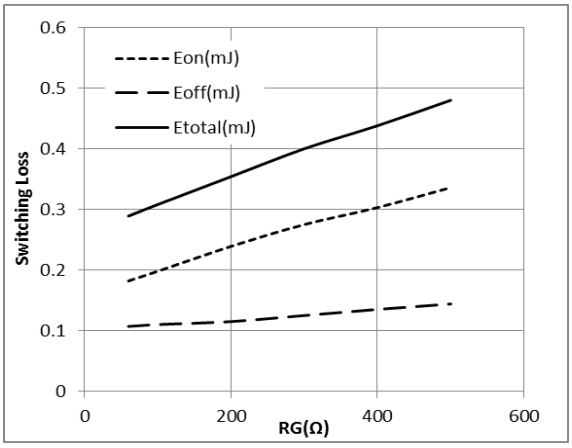

## Switching Loss vs. Ic （Tj=150℃）

VGE=15V,VCE=400V,Rg=60Ω



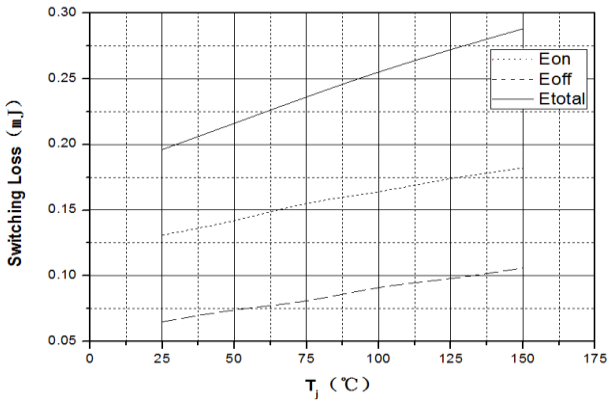

## Switching Loss vs. Rg（Tj=150℃）

VGE=15V,VCE=400V, Ic =5A



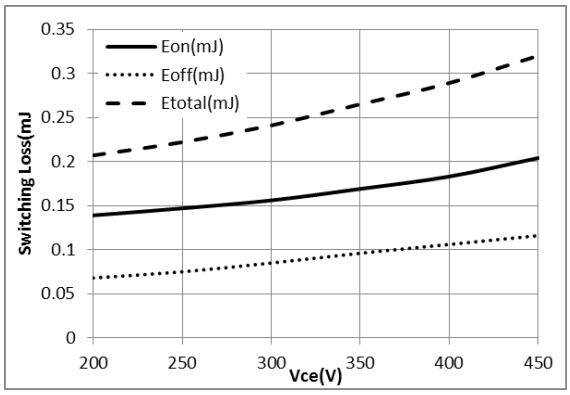
## Switching Loss vs. Tj

VGE=15V,VCE=400V,Ic =5A,Rg=60Ω

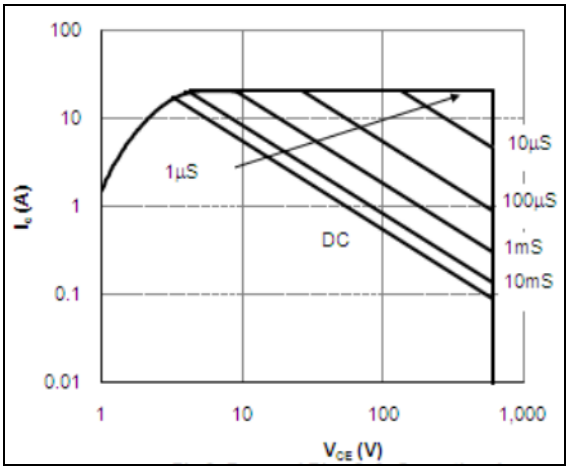



## Switching Loss vs. Vce （Tj=150℃）

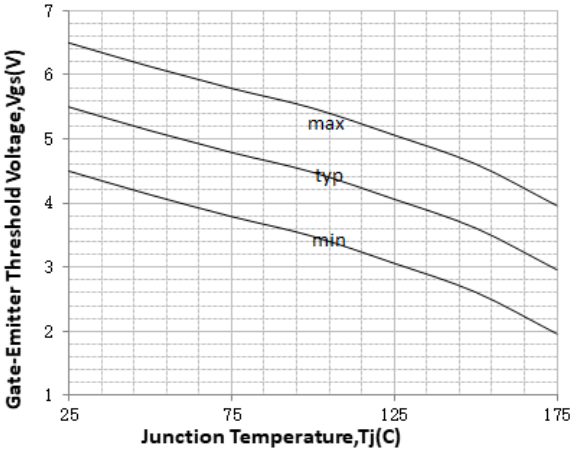
VGE=15V,Ic=5A,Rg=60Ω



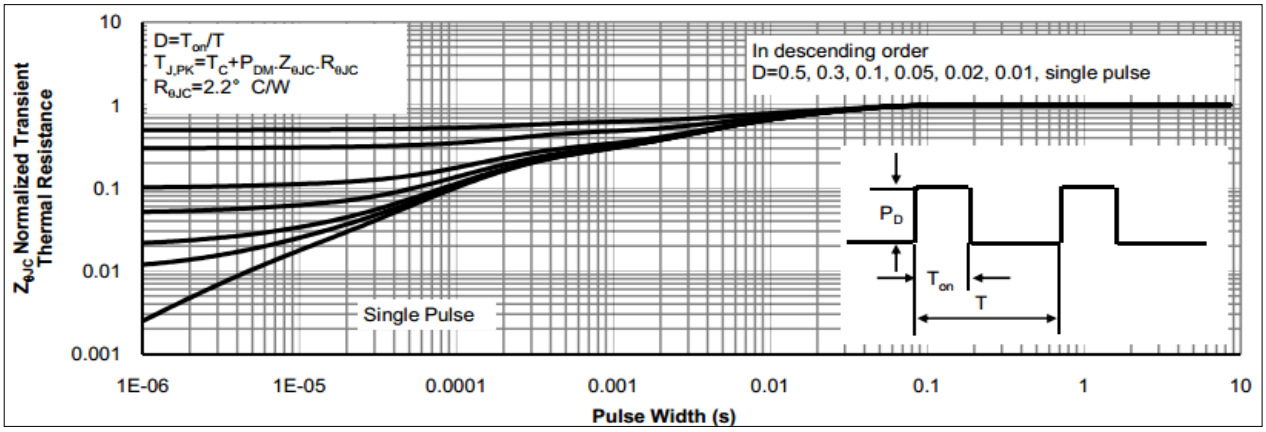

## Safe Operating Area For DPAK




## VTH vs. Tj

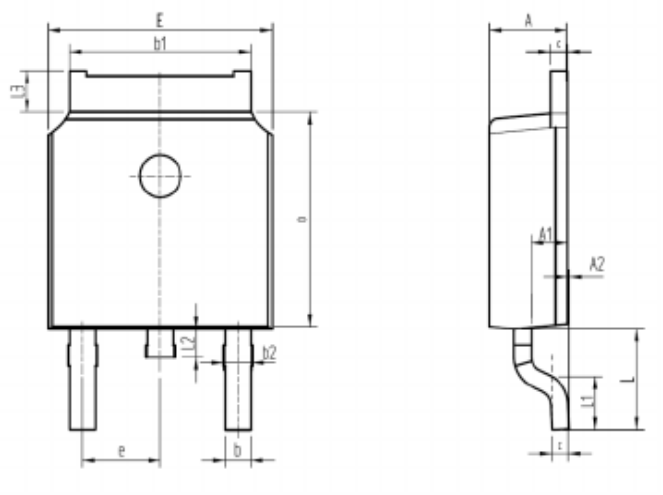



## Normalized Maximum Transient Thermal Impedance for DPAK



## 外形尺寸 PACKAGE MECHANICAL DATA

**DPAK**




**单位 Unit：mm**

| SYMBOL | mm | |
|---|---|---|
| | MIN | MAX |
| A | 2.16 | 2.41 |
| A1 | 0.97 | 1.17 |
| A2 | 0.00 | 0.15 |
| b | 0.63 | 0.93 |
| b1 | 5.13 | 5.53 |
| b2 | 0.66 | 0.96 |
| c | 0.40 | 0.60 |
| D | 5.80 | 6.40 |
| E | 6.30 | 6.90 |
| e | 2.286BSC | |
| L | 2.50 | 3.30 |
| L1 | 1.20 | 1.80 |
| L2 | 0.60 | 1.00 |
| L3 | 0.85 | 1.30 |

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