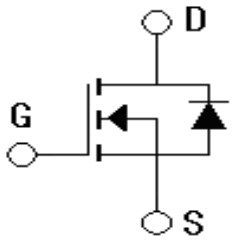
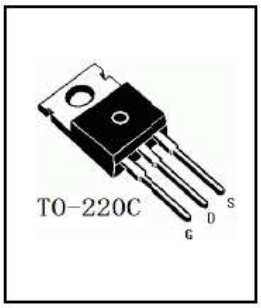
# JCS650

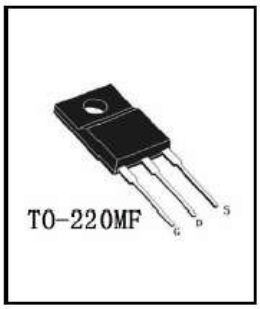
## 主要参数 MAIN CHARACTERISTICS

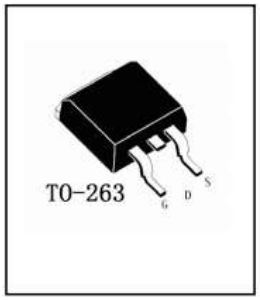
| | |
|---|---|
| ID | 28.0A |
| VDSS | 200 V |
| Rdson-max （@Vgs=10V） | 85mΩ |
| Qg-typ | 103nC |

封装 Package




## 用途

- 高频开关电源
- 电子镇流器
- UPS 电源

## APPLICATIONS

- High efficiency switch mode power supplies
- Electronic lamp ballasts based on half bridge
- UPS

## 产品特性

- 低栅极电荷
- 低 $C_{rss}$ (典型值 81pF)
- 开关速度快
- 产品全部经过雪崩测试
- 高抗 dv/dt 能力
- RoHS 产品

## FEATURES

- Low gate charge
- Low $C_{rss}$ (typical 81pF )
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- 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 Halogen-Free-Tube | 有卤-编带 Halogen-Reel | 无卤-编带 Halogen-Free-Reel | | |
| JCS650C-C-B | JCS650C-C-BR | N/A | N/A | JCS650C | TO-220C |
| JCS650F-F-B | JCS650F-F-BR | N/A | N/A | JCS650F | TO-220MF |
| JCS650S-S-B | JCS650S-S-BR | JCS650S-S-A | JCS650S-S-AR | JCS650S | TO-263 |

## 绝对最大额定值 ABSOLUTE RATINGS (Tc=25℃)

| 项 目 Parameter | 符 号 Symbol | 数 值 Value | | 单 位 Unit |
|---|---|---|---|---|
| | | JCS650C JCS650S | JCS650F | |
| 最高漏极—源极直流电压 Drain-Source Voltage | $V_{DSS}$ | 200 | | V |
| 连续漏极电流 Drain Current -continuous | $I_D$ T=25℃ | 28.0 | 28.0* | A |
| | T=100℃ | 17.7 | 17.7* | A |
| 最大脉冲漏极电流（注 1） Drain Current -pulse （note 1） | $I_{DM}$ | 112 | 112* | A |
| 最高栅源电压 Gate-Source Voltage | $V_{GSS}$ | ±30 | | V |
| 单脉冲雪崩能量（注 2） Single Pulsed Avalanche Energy（note 2） | $E_{AS}$ | 588 | | mJ |
| 雪崩电流（注 1） Avalanche Current （note 1） | $I_{AR}$ | 28 | | A |
| 重复雪崩能量（注 1） Repetitive Avalanche Current （note 1） | $E_{AR}$ | 15.8 | 5.0 | mJ |
| 二极管反向恢复最大电压变化速率（注 3） Peak Diode Recovery dv/dt （note 3） | dv/dt | 5.5 | | V/ns |
| 耗散功率 Power Dissipation | $P_D$ $T_C$=25℃ | 158 | 50 | W |
| | -Derate above 25℃ | 1.265 | 0.40 | W/℃ |
| 最高结温及存储温度 Operating and Storage Temperature Range | $T_J$，$T_{STG}$ | -55～+150 | | ℃ |
| 引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes | $T_L$ | 300 | | ℃ |

*漏极电流由最高结温限制

*Drain current limited by maximum junction temperature

## 电特性 ELECTRICAL CHARACTERISTIC

| 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** | | | | | | |
| 漏一源击穿电压<br>Drain-Source Voltage | $BV_{DSS}$ | $I_D$=250μA, $V_{GS}$=0V | 200 | - | - | V |
| 击穿电压温度特性<br>Breakdown Voltage Temperature Coefficient | $\Delta BV_{DSS}/\Delta T_J$ | $I_D$=250μA, referenced to 25℃ | - | 0.19 | - | V/℃ |
| 零栅压下漏极漏电流<br>Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=200V, $V_{GS}$=0V, $T_C$=25℃ | - | - | 1 | μA |
| | | $V_{DS}$=160V, $T_C$=125℃ | - | - | 10 | μA |
| 正向栅极体漏电流<br>Gate-body leakage current, forward | $I_{GSSF}$ | $V_{DS}$=0V, $V_{GS}$ =30V | - | - | 100 | nA |
| 反向栅极体漏电流<br>Gate-body leakage current, reverse | $I_{GSSR}$ | $V_{DS}$=0V, $V_{GS}$ =-30V | - | - | -100 | nA |
| **通态特性 On-Characteristics** | | | | | | |
| 阈值电压<br>Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$ , $I_D$=250μA | 2.0 | - | 4.0 | V |
| 静态导通电阻<br>Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$ =10V , $I_D$=14.0A | - | 68 | 85 | mΩ |
| 正向跨导<br>Forward Transconductance | $g_{fs}$ | $V_{DS}$ = 40V , $I_D$=14.0A（note 4） | - | 24 | - | S |
| **动态特性 Dynamic Characteristics** | | | | | | |
| 输入电容<br>Input capacitance | $C_{iss}$ | $V_{DS}$=25V,<br>$V_{GS}$ =0V,<br>f=1.0MHz | - | 2879 | 3742 | pF |
| 输出电容<br>Output capacitance | $C_{oss}$ | | - | 362 | 470 | pF |
| 反向传输电容<br>Reverse transfer capacitance | $C_{rss}$ | | - | 81 | 105 | pF |

## 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 |
|---|---|---|---|---|---|---|
| **开关特性 Switching –Characteristics** | | | | | | |
| 延迟时间 Turn-On delay time | $t_d$(on) | $V_{DD}$=100V,$I_D$=28A,$R_G$=25Ω | - | 28 | 69 | ns |
| 上升时间 Turn-On rise time | $t_r$ | $V_{GS}$ =10V | - | 251 | 494 | ns |
| 延迟时间 Turn-Off delay time | $t_d$(off) | （note 4，5） | - | 309 | 617 | ns |
| 下降时间 Turn-Off Fall time | $t_f$ | | - | 220 | 412 | ns |
| 栅极电荷总量 Total Gate Charge | $Q_g$ | $V_{DS}$ =160V , | - | 103 | 136 | nC |
| 栅—源电荷 Gate-Source charge | $Q_{gs}$ | $I_D$=28A | - | 16 | - | nC |
| 栅—漏电荷 Gate-Drain charge | $Q_{gd}$ | $V_{GS}$ =10V（note 4，5） | - | 53 | - | nC |
| 漏—源二极管特性及最大额定值 **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| 正向最大连续电流<br>Maximum Continuous Drain-Source Diode Forward Current | $I_S$ | | - | - | 28 | A |
| 正向最大脉冲电流<br>Maximum Pulsed Drain-Source Diode Forward Current | $I_{SM}$ | | - | - | 112 | A |
| 正向最大连续电流<br>Maximum Continuous Drain-Source Diode Forward Current | $V_{SD}$ | $V_{GS}$=0V, $I_S$=28A | - | | 1.4 | V |
| 反向恢复时间<br>Reverse recovery time | $t_{rr}$ | $V_{GS}$=0V, $I_S$=28A | | 218 | | ns |
| 反向恢复电荷<br>Reverse recovery charge | $Q_{rr}$ | $dI_F/dt$=100A/μs (note 4) | | 1.91 | | μC |

## 热特性 THERMAL CHARACTERISTIC

| 项　目<br>Parameter | 符　号<br>Symbol | 最大值<br>Value | | 单　位<br>Unit |
|---|---|---|---|---|
| | | JCS650C/S | JCS650F | |
| 结到管壳的热阻<br>Thermal Resistance, Junction to Case | Rth(j-c) | 0.79 | 2.48 | ℃/W |
| 结到环境的热阻<br>Thermal Resistance, Junction to Ambient | Rth(j-A) | 62.5 | | ℃/W |

注：

1：脉冲宽度由最高结温限制

2：L=1.5mH, $I_{AS}$=28A, $V_{DD}$=50V,　$R_G$=25 Ω,起始结温 $T_J$=25℃

3：$I_{SD}$ ≤28A,di/dt ≤200A/μs, VDD≤$BV_{DSS}$,起始结温 $T_J$=25℃

4：脉冲测试：脉冲宽度≤300μs,占空比≤2%

5：基本与工作温度无关

Notes:

1：Pulse width limited by maximum junction temperature

2：L=1.5mH, $I_{AS}$=28A, $V_{DD}$=50V, $R_G$=25 Ω,Starting $T_J$=25℃

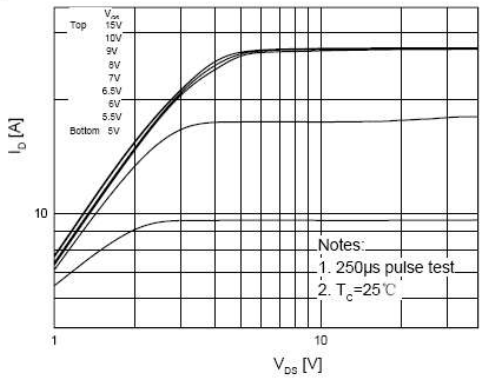
3：$I_{SD}$ ≤28A,di/dt ≤200A/μs, VDD≤$BV_{DSS}$, Starting $T_J$=25℃

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

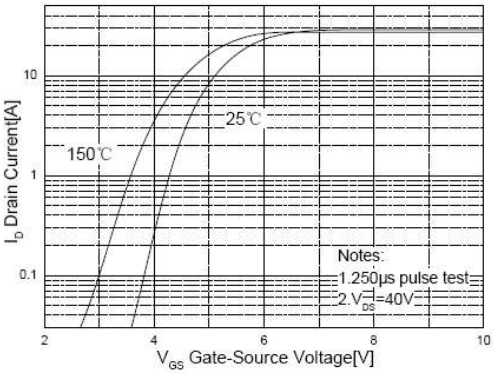
5：Essentially independent of operating temperature

# 特征曲线 ELECTRICAL CHARACTERISTICS (curves)

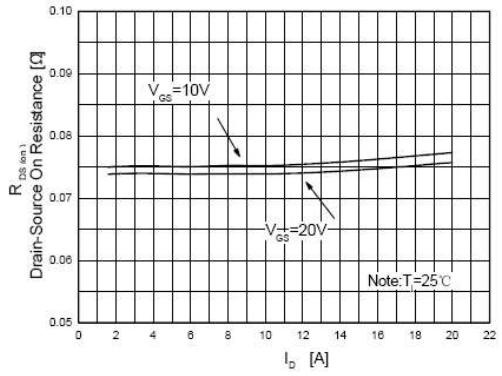
## On-Region Characteristics



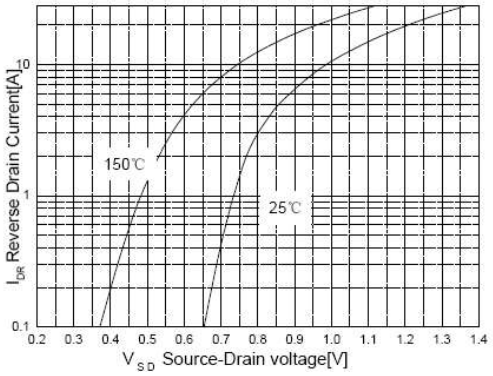

## Transfer Characteristics



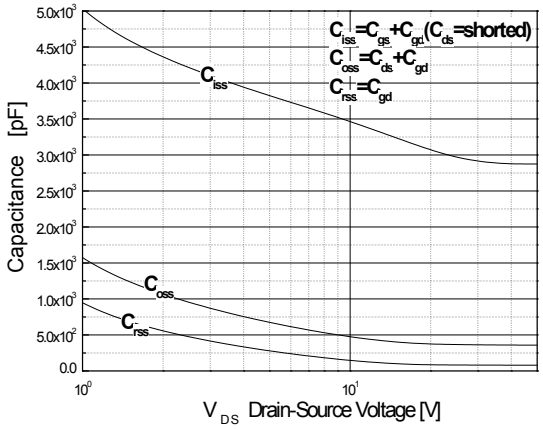

## On-Resistance Variation vs. Drain Current and Gate Voltage



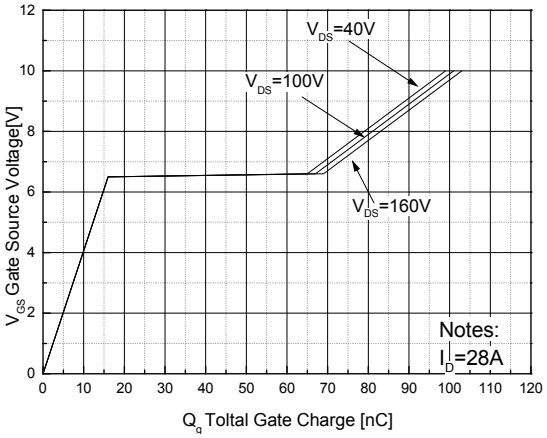

## Body Diode Forward Voltage Variation vs. Source Current and Temperature




## Capacitance Characteristics

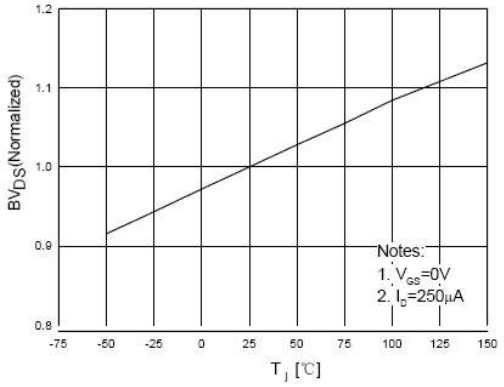



## Gate Charge Characteristics

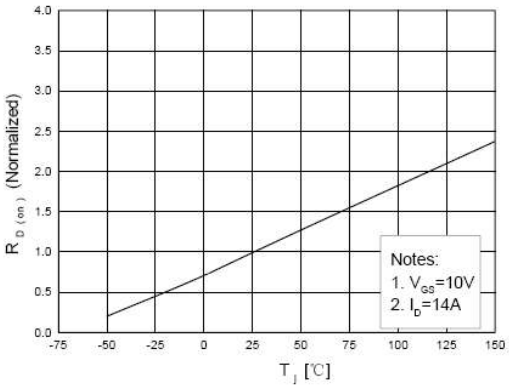


## 特征曲线 ELECTRICAL CHARACTERISTICS (curves)

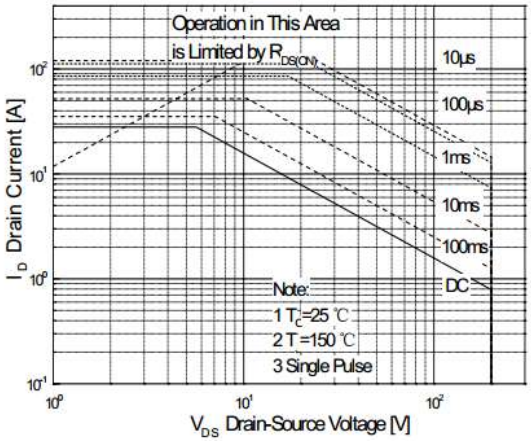
### Breakdown Voltage Variation vs. Temperature



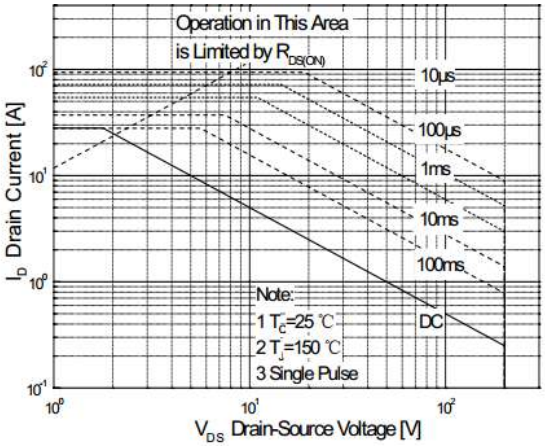

### On-Resistance Variation vs. Temperature



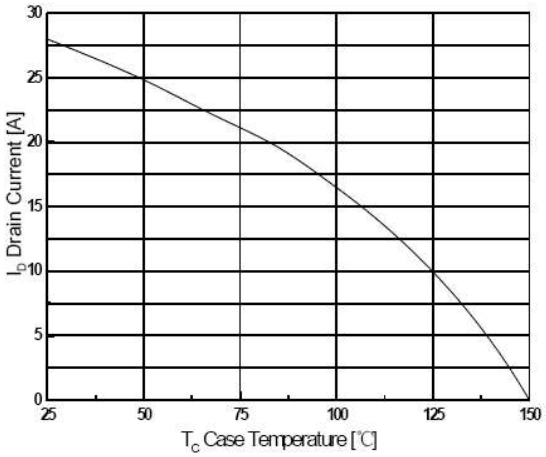

### Maximum Safe Operating Area JCS650C/S




### Maximum Safe Operating Area JCS650F

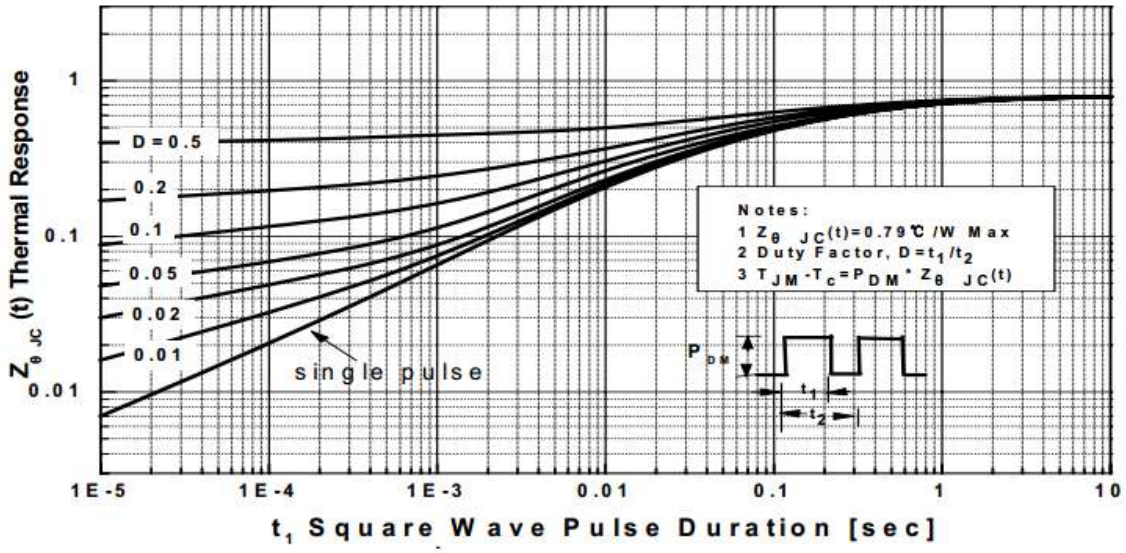



### Maximum Drain Current vs. Case Temperature

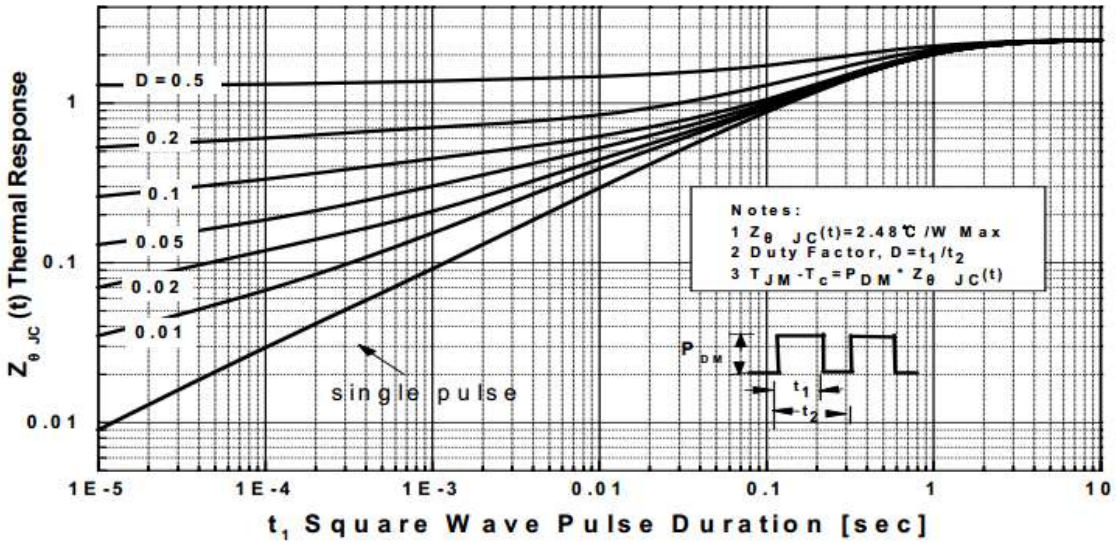


## 特征曲线 ELECTRICAL CHARACTERISTICS (curves)

**Transient Thermal Response Curve (Zthjc) For JCS650C/S**



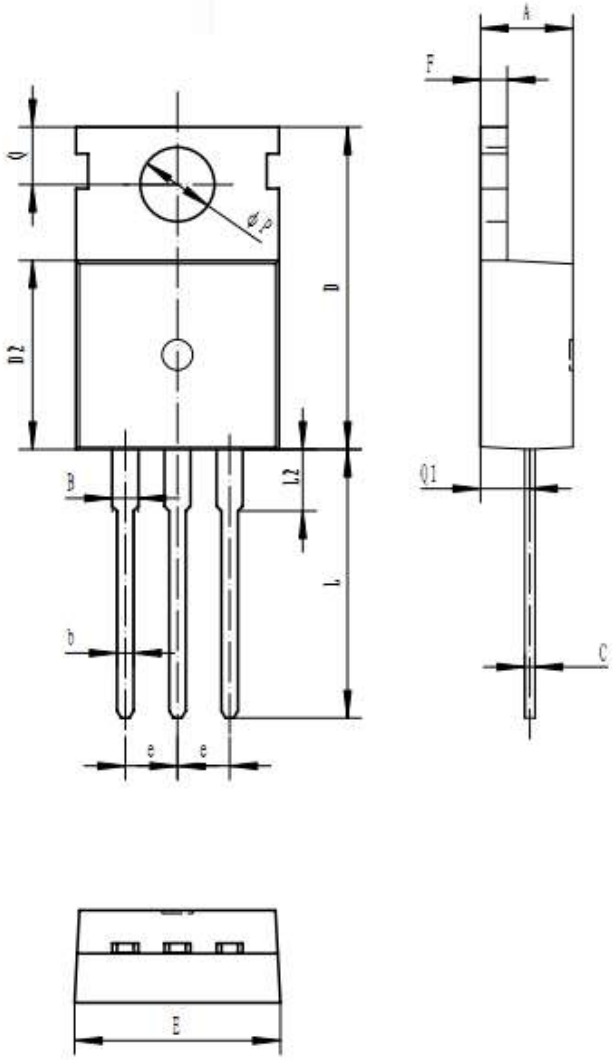

**Transient Thermal Response Curve (Zthjc) For JCS650F**



## 外形尺寸 PACKAGE MECHANICAL DATA

**TO-220C**

**单位 Unit：mm**

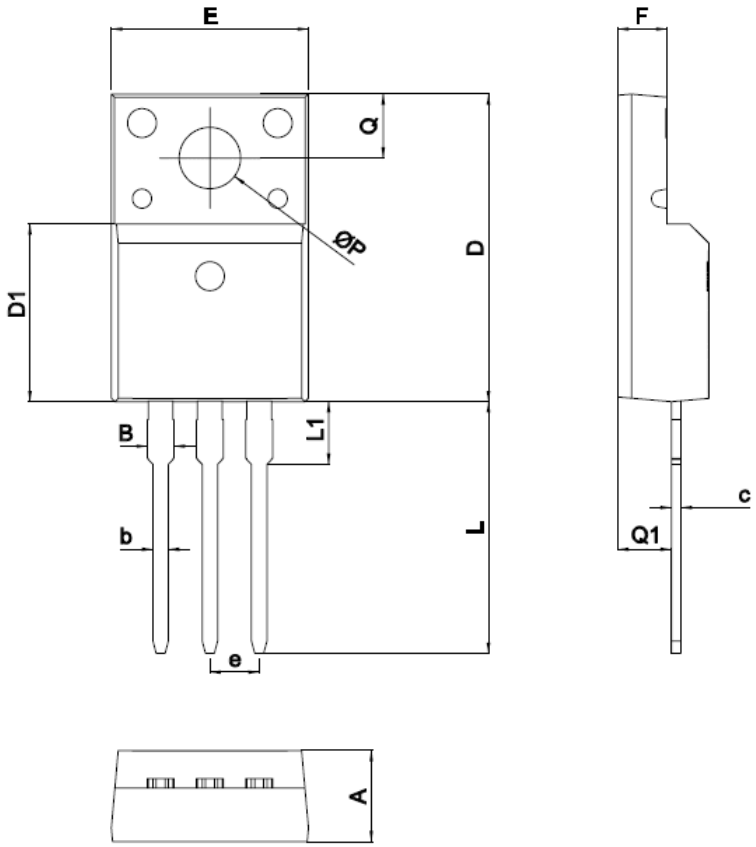



| 符号 symbol | MIN | MAX |
|---|---|---|
| A | 4.30 | 4.70 |
| B | 1.22 | 1.40 |
| b | 0.70 | 0.95 |
| c | 0.40 | 0.65 |
| D | 15.20 | 16.20 |
| D2 | 9.00 | 9.40 |
| E | 9.70 | 10.10 |
| e | 2.39 | 2.69 |
| F | 1.25 | 1.40 |
| L | 12.60 | 13.60 |
| L2 | 2.80 | 3.20 |
| Q | 2.60 | 3.00 |
| Q1 | 2.20 | 2.60 |
| P | 3.50 | 3.80 |

外形尺寸 **PACKAGE MECHANICAL DATA**

**TO-220MF**

**单位 Unit：mm**

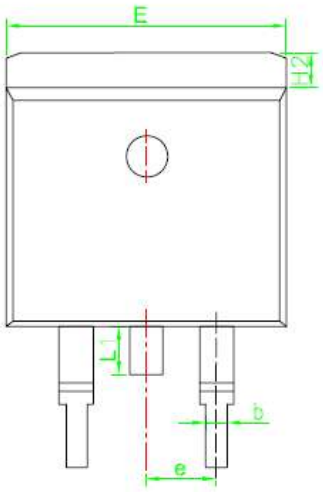


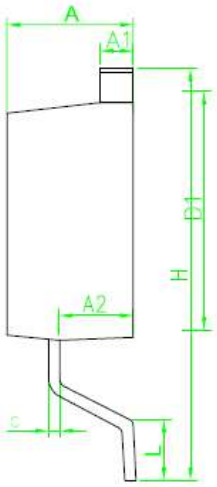

| SYMBOL | mm | |
|---|---|---|
| | MIN | MAX |
| A | 4.5 | 4.9 |
| B | | 1.47 |
| b | 0.7 | 0.9 |
| c | 0.45 | 0.60 |
| D | 15.67 | 16.07 |
| D1 | 9.04 | 9.20 |
| e | 2.54TYPE | |
| E | 9.96 | 10.36 |
| F | 2.34 | 2.74 |
| L | 12.58 | 13.38 |
| L1 | 3.13 | 3.33 |
| Q | 3.2 | 3.4 |
| Q1 | 2.56 | 2.96 |
| ΦP | 3.08 | 3.28 |

## 外形尺寸 PACKAGE MECHANICAL DATA

**TO-263**

**单位 Unit：mm**




| SYMBOL | MM | |
|---|---|---|
| | MIN | MAX |
| A | 4.30 | 4.80 |
| A1 | 1.12 | 1.42 |
| A2 | 2.54 | 2.84 |
| b | 0.67 | 1.00 |
| c | 0.29 | 0.52 |
| D1 | 8.40 | 9.00 |
| E | 9.80 | 10.46 |
| e | 2.54BSC | |
| H | 14.00 | 16.00 |
| H2 | 1.12 | 1.45 |
| L | 1.50 | 3.10 |
| L1 | 1.45 | 1.70 |

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