



# JCS650

## 主要参数 MAIN CHARACTERISTICS

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

### 用途

- 高频开关电源
- 电子镇流器
- UPS 电源

### 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

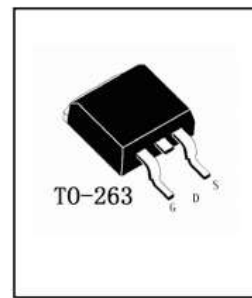
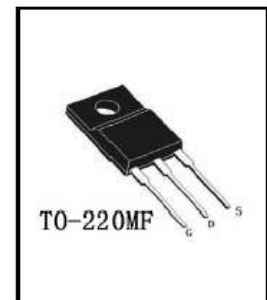
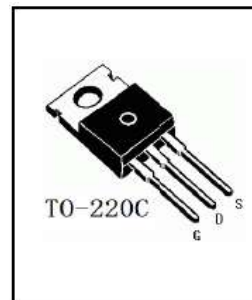
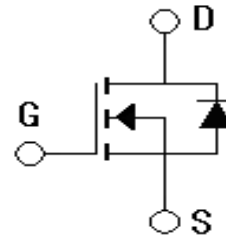
### APPLICATIONS

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

### FEATURES

- Low gate charge
- Low  $C_{RSS}$  (typical 81pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- RoHS product

## 封装 Package



## 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°C)

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 <sub>DSS</sub>	200		V
连续漏极电流 Drain Current -continuous	I <sub>D</sub> T=25°C T=100°C	28.0	28.0*	A
		17.7	17.7*	A
最大脉冲漏极电流 (注 1) Drain Current -pulse (note 1)	I <sub>DM</sub>	112	112*	A
最高栅源电压 Gate-Source Voltage	V <sub>GSS</sub>	±30		V
单脉冲雪崩能量 (注 2) Single Pulsed Avalanche Energy (note 2)	E <sub>AS</sub>	588		mJ
雪崩电流 (注 1) Avalanche Current (note 1)	I <sub>AR</sub>	28		A
重复雪崩能量 (注 1) Repetitive Avalanche Current (note 1)	E <sub>AR</sub>	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 <sub>D</sub> T <sub>C</sub> =25°C -Derate above 25°C	158	50	W
		1.265	0.40	W/°C
最高结温及存储温度 Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55~+150		°C
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T <sub>L</sub>	300		°C

\*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 Parameter	符 号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单 位 Units
<b>关态特性 Off –Characteristics</b>						
漏—源击穿电压 Drain-Source Voltage	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0V$	200	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_J$	$I_D=250\mu A$ , referenced to $25^\circ C$	-	0.19	-	V/ $^\circ C$
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=200V, V_{GS}=0V, T_C=25^\circ C$	-	-	1	$\mu A$
		$V_{DS}=160V, T_C=125^\circ C$	-	-	10	$\mu A$
正向栅极体漏电流 Gate-body leakage current, forward	$I_{GSSF}$	$V_{DS}=0V, V_{GS}=30V$	-	-	100	nA
反向栅极体漏电流 Gate-body leakage current, reverse	$I_{GSSR}$	$V_{DS}=0V, V_{GS}=-30V$	-	-	-100	nA
<b>通态特性 On-Characteristics</b>						
阈值电压 Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D=250\mu A$	2.0	-	4.0	V
静态导通电阻 Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D=14.0A$	-	68	85	m $\Omega$
正向跨导 Forward Transconductance	$g_{fs}$	$V_{DS} = 40V, I_D=14.0A$ (note 4)	-	24	-	S
<b>动态特性 Dynamic Characteristics</b>						
输入电容 Input capacitance	$C_{iss}$	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1.0MHz$	-	2879	3742	pF
输出电容 Output capacitance	$C_{oss}$		-	362	470	pF
反向传输电容 Reverse transfer capacitance	$C_{rss}$		-	81	105	pF





## 电特性 ELECTRICAL CHARACTERISTICS

项 目 Parameter	符 号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单位 Units
<b>开关特性 Switching –Characteristics</b>						
延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{DD}=100V, I_D=28A, R_G=25\Omega$ $V_{GS}=10V$ (note 4, 5)	-	28	69	ns
上升时间 Turn-On rise time	$t_r$		-	251	494	ns
延迟时间 Turn-Off delay time	$t_{d(off)}$		-	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	$Q_g$	$V_{DS}=160V,$ $I_D=28A$ $V_{GS}=10V$ (note 4, 5)	-	103	136	nC
栅—源电荷 Gate-Source charge	$Q_{gs}$		-	16	-	nC
栅—漏电荷 Gate-Drain charge	$Q_{gd}$		-	53	-	nC
<b>漏—源二极管特性及最大额定值 Drain-Source Diode Characteristics and Maximum Ratings</b>						
正向最大连续电流 Maximum Continuous Drain-Source Diode Forward Current		$I_S$	-	-	28	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current		$I_{SM}$	-	-	112	A
正向最大连续电流 Maximum Continuous Drain-Source Diode Forward Current	$V_{SD}$	$V_{GS}=0V, I_S=28A$	-		1.4	V
反向恢复时间 Reverse recovery time	$t_{rr}$	$V_{GS}=0V, I_S=28A$ $di_F/dt=100A/\mu s$ (note 4)		218		ns
反向恢复电荷 Reverse recovery charge	$Q_{rr}$			1.91		$\mu C$

## 热特性 THERMAL CHARACTERISTIC

项 目 Parameter	符 号 Symbol	最大值 Value		单 位 Unit
		JCS650C/S	JCS650F	
结到管壳的热阻 Thermal Resistance, Junction to Case	$R_{th(j-c)}$	0.79	2.48	$^{\circ}C/W$
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	62.5		$^{\circ}C/W$

注:

- 1: 脉冲宽度由最高结温限制
- 2:  $L=1.5mH, I_{AS}=28A, V_{DD}=50V, R_G=25\Omega$ , 起始结温  $T_J=25^{\circ}C$
- 3:  $I_{SD} \leq 28A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$ , 起始结温  $T_J=25^{\circ}C$
- 4: 脉冲测试: 脉冲宽度  $\leq 300\mu s$ , 占空比  $\leq 2\%$
- 5: 基本与工作温度无关

Notes:

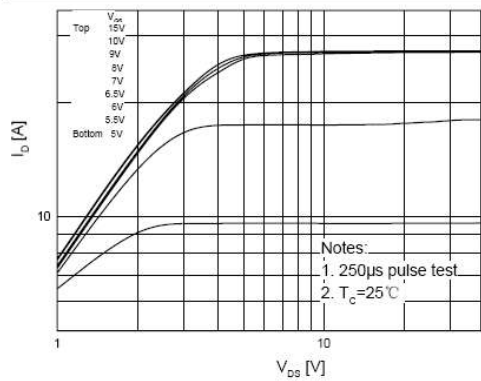
- 1: Pulse width limited by maximum junction temperature
- 2:  $L=1.5mH, I_{AS}=28A, V_{DD}=50V, R_G=25\Omega$ , Starting  $T_J=25^{\circ}C$
- 3:  $I_{SD} \leq 28A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^{\circ}C$
- 4: Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$
- 5: Essentially independent of operating temperature



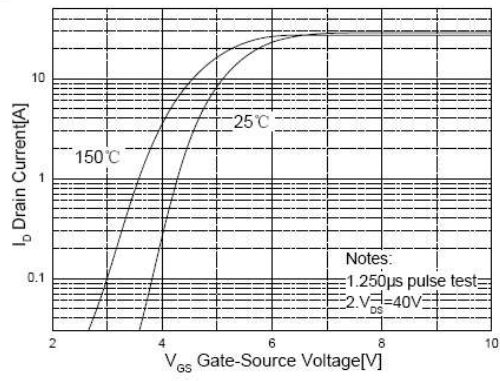


# 特征曲线 ELECTRICAL CHARACTERISTICS (curves)

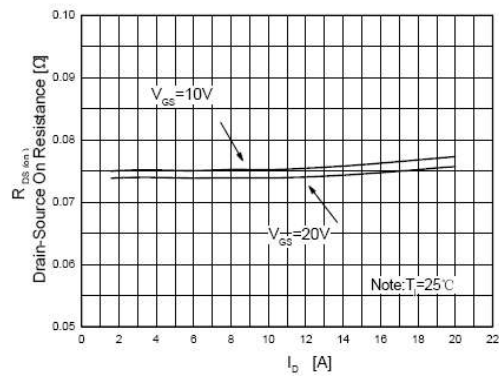
### On-Region Characteristics



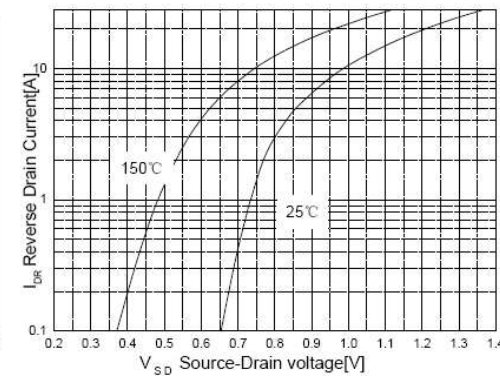
### Transfer Characteristics



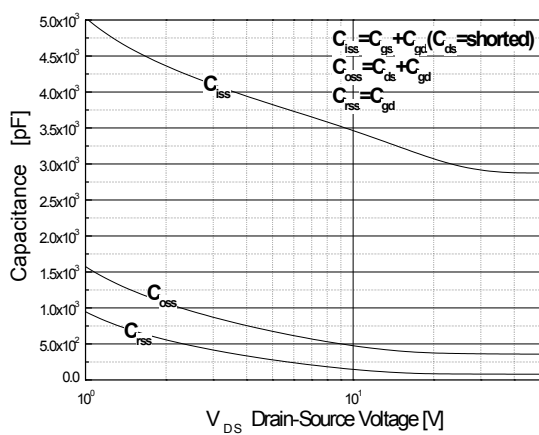
### On-Resistance Variation vs. Drain Current and Gate Voltage



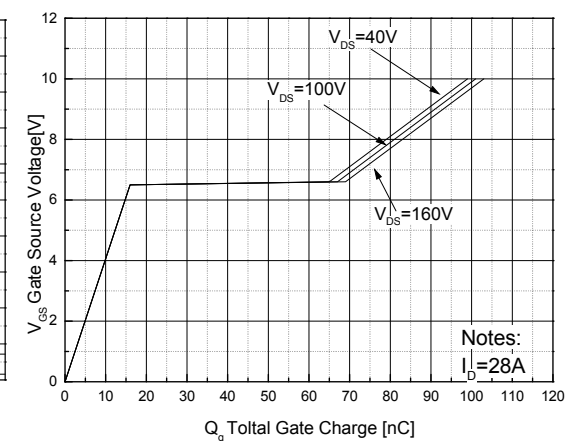
### Body Diode Forward Voltage Variation vs. Source Current and Temperature



### Capacitance Characteristics



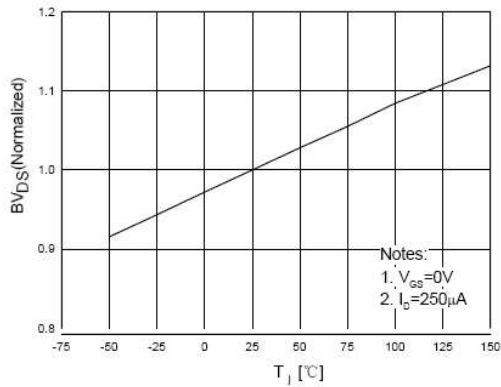
### Gate Charge Characteristics



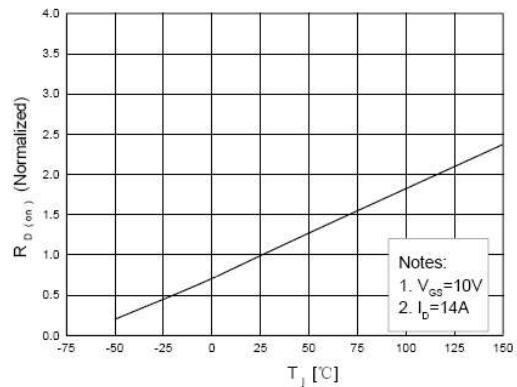


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

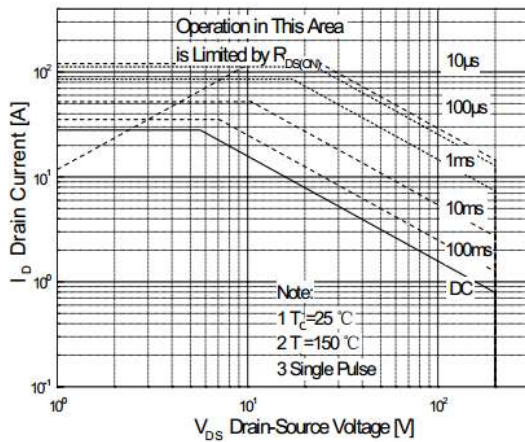
Breakdown Voltage Variation vs. Temperature



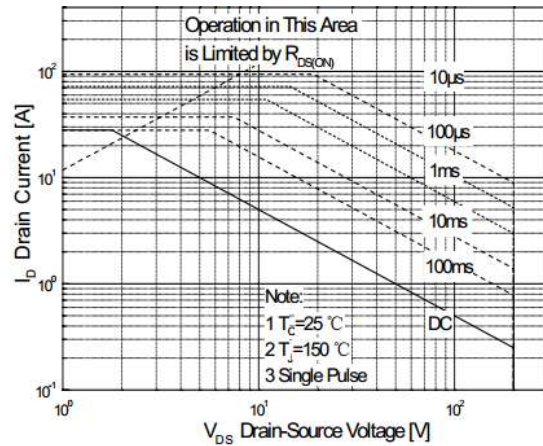
On-Resistance Variation vs. Temperature



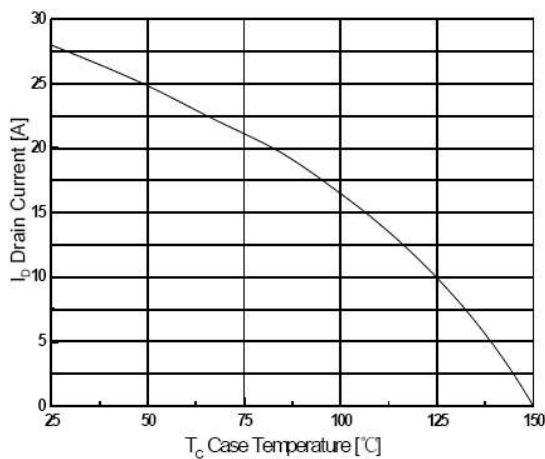
Maximum Safe Operating Area JCS650C/S



Maximum Safe Operating Area JCS650F

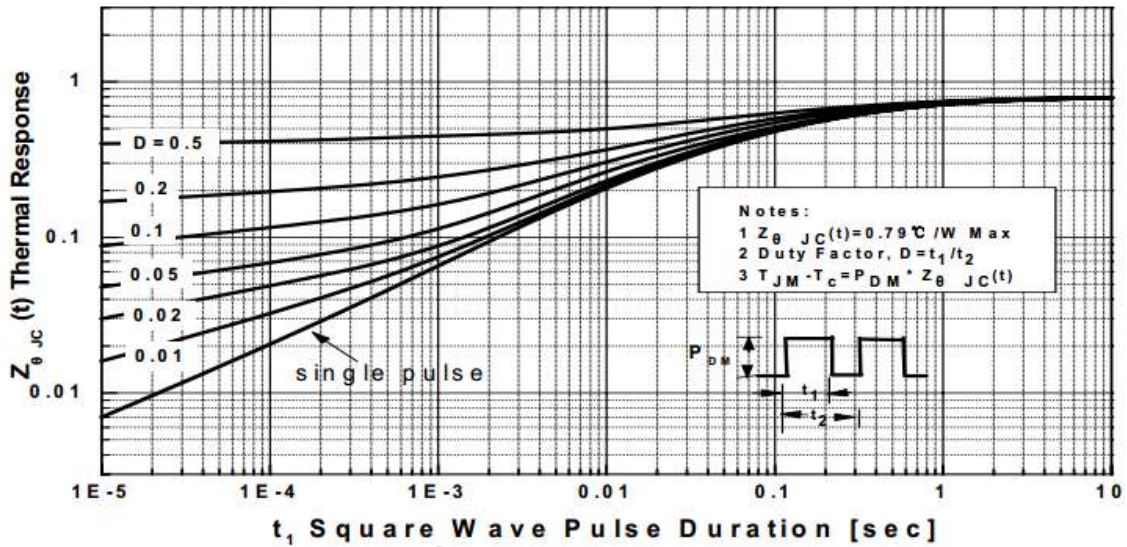


Maximum Drain Current vs. Case Temperature

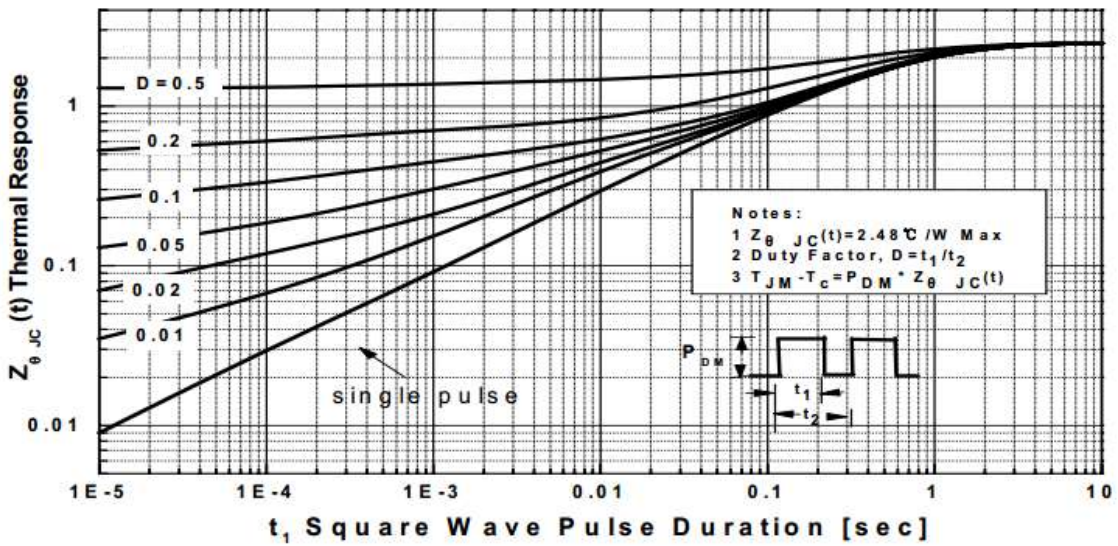




Transient Thermal Response Curve (Zthjc) For JCS650C/S



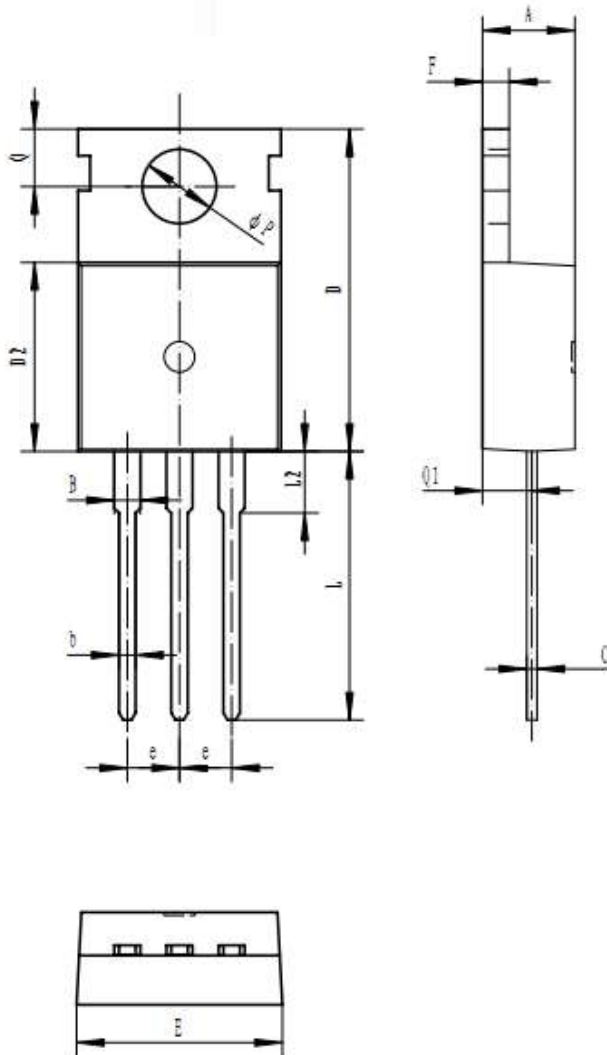
Transient Thermal Response Curve (Zthjc) For JCS650F





## 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
e	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

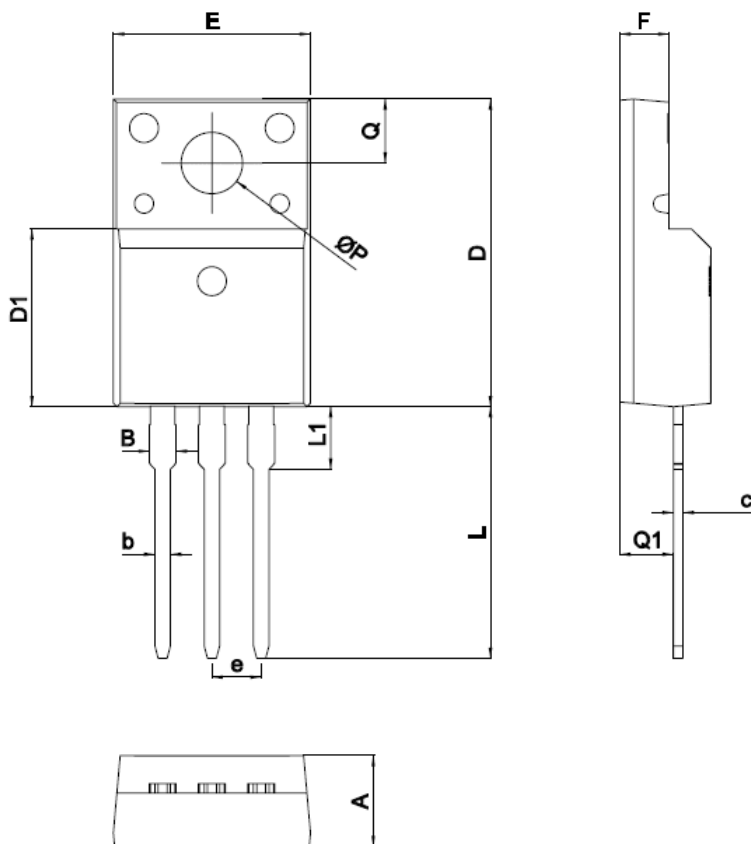






## TO-220MF

单位 Unit: mm



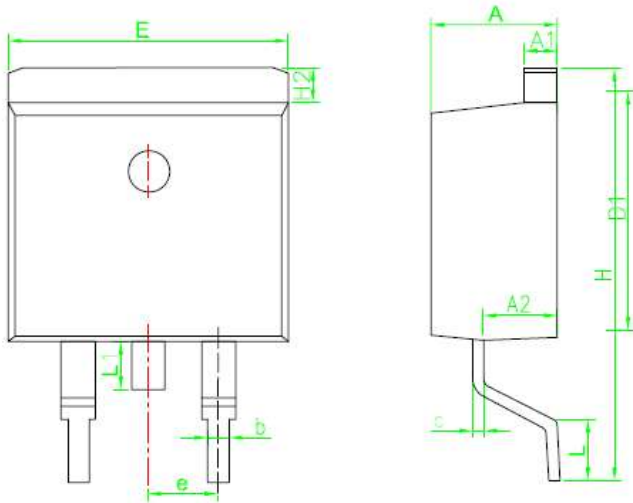
SYMBOL	mm	
	MIN	MAX
A	4.5	4.9
B		1.47
b	0.7	0.9
c	0.45	0.60
D	15.67	16.07
D1	9.04	9.20
e	2.54TYPE	
E	9.96	10.36
F	2.34	2.74
L	12.58	13.38
L1	3.13	3.33
Q	3.2	3.4
Q1	2.56	2.96
ΦP	3.08	3.28





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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