



# JCS4N65C

## 主要参数 MAIN CHARACTERISTICS

$I_D$		4.0 A
$V_{DSS}$		650 V
$R_{dson\_}$ ( $V_{gs}=1$ 0V)	Typ	2.1 $\Omega$
	Max	2.6 $\Omega$
$Q_g$ -typ		14nC

### 用途

- 高频开关电源
- 电子镇流器
- LED 电源

### 产品特性

- 低栅极电荷
- 低  $C_{rss}$  (典型值 3.5pF)
- 开关速度快
- 产品全部经过雪崩测试
- 高抗 dv/dt 能力
- RoHS 产品

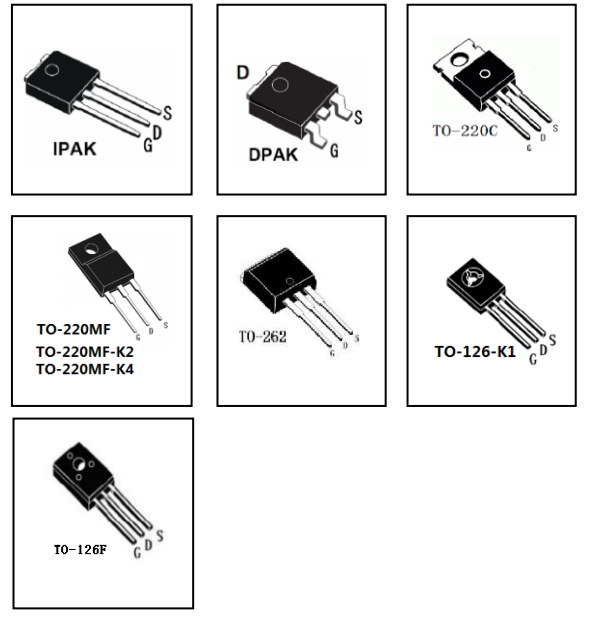
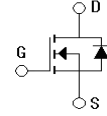
### APPLICATIONS

- High frequency switching mode power supply
- Electronic ballast
- LED power supply

### FEATURES

- Low gate charge
- Low  $C_{rss}$  (typical 3.5pF)
- 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		
N/A	JCS4N65VC-V-BR	N/A	N/A	JCS4N65V	IPAK
N/A	JCS4N65RC-R-BR	N/A	JCS4N65RC-R-AR	JCS4N65R	DPAK
JCS4N65CC-C-B	JCS4N65CC-C-BR	N/A	N/A	JCS4N65C	TO-220C
JCS4N65FC-F-B	JCS4N65FC-F-BR	N/A	N/A	JCS4N65F	TO-220MF
JCS4N65FC-F2-B	JCS4N65FC-F2-BR	N/A	N/A	JCS4N65F	TO-220MF-K2
JCS4N65FC-F4-B	JCS4N65FC-F4-BR	N/A	N/A	JCS4N65F	TO-220MF-K4
JCS4N65BC-B-B	JCS4N65BC-B-BR	N/A	N/A	JCS4N65B	TO-262
JCS4N65MC-M-B	JCS4N65MC-M-BR	N/A	N/A	JCS4N65M	TO-126-K1
JCS4N65MFC-MF-B	JCS4N65MFC-MF-BR	N/A	N/A	JCS4N65MF	TO-126F



绝对最大额定值 ABSOLUTE RATINGS ( $T_c=25^\circ\text{C}$ )

项 目 Parameter	符 号 Symbol	数 值 Value				单 位 Unit
		JCS4N65VC/ RC/MC/MFC	JCS4N6 5CC/BC	JCS4N6 5FC	JCS4N65F C-K2/K4	
最高漏极-源极直流电压 Drain-Source Voltage	$V_{DSS}$	650				V
连续漏极电流 Drain Current -continuous	$I_D$ $T=25^\circ\text{C}$ $T=100^\circ\text{C}$	4.0		4.0*		A
		3.2		2.5*		A
最大脉冲漏极电流 (注1) Drain Current - pulse (note 1)	$I_{DM}$	16		16*		A
最高栅源电压 Gate-Source Voltage	$V_{GSS}$	$\pm 30$				V
单脉冲雪崩能量 (注2) Single Pulsed Avalanche Energy note 2)	$E_{AS}$	256				mJ
雪崩电流 (注1) Avalanche Current (note 1)	$I_{AR}$	4.0				A
重复雪崩能量 (注1) Repetitive Avalanche Current (note 1)	$E_{AR}$	11.0				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	$P_D$ $T_c=25^\circ\text{C}$ -Derate above $25^\circ\text{C}$	122	100	33	30	W
		0.976	0.8	0.26	0.24	W/ $^\circ\text{C}$
最高结温及存储温度 Operating and Storage Temperature Range	$T_J, T_{STG}$	-55~+150				$^\circ\text{C}$
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	$T_L$	300				$^\circ\text{C}$

\*漏极电流由最高结温限制

\*Drain current limited by maximum junction temperature





## 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>关态特性 Off –Characteristics</b>						
漏—源击穿电压 Drain-Source Voltage	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0V$	650	-	-	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 $25^\circ C$	-	0.65	-	V/ $^\circ C$
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V,$ $T_C=25^\circ C$	-	-	1	$\mu A$
		$V_{DS}=520V, T_C=125^\circ C$	-	-	100	$\mu A$
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	$R_{DS(on)}$	$V_{GS}=10V, I_D=2.0A$ $25^\circ C$	-	2.1	2.6	$\Omega$
		$V_{GS}=10V, I_D=2.0A$ $100^\circ C$	-	3.68	4.2	$\Omega$
		$V_{GS}=10V, I_D=2.0A$ $150^\circ C$	-	5.46	6.2	$\Omega$
正向跨导 Forward Transconductance	$g_{fs}$	$V_{DS} = 40V, I_D=2.0A$ (note 4)	-	4.5	-	S
<b>动态特性 Dynamic Characteristics</b>						
栅极电阻 Gate resistance	$R_g$	F=1.0MHz open drain	0.8	-	5.5	$\Omega$
输入电容 Input capacitance	$C_{iss}$	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1.0MHz$	200	670	810	pF
输出电容 Output capacitance	$C_{oss}$		20	60	100	pF
反向传输电容 Reverse transfer capacitance	$C_{rss}$		1	3.5	10	pF





## 电特性 ELECTRICAL CHARACTERISTICS

开关特性 Switching Characteristics						
延迟时间 Turn-On delay time	$t_d(\text{on})$	$V_{\text{DD}}=325\text{V}, I_{\text{D}}=4.0\text{A}, R_{\text{G}}=25\Omega$ (note 4, 5)	-	49	100	ns
上升时间 Turn-On rise time	$t_r$		-	62	120	ns
延迟时间 Turn-Off delay time	$t_d(\text{off})$		-	81	160	ns
下降时间 Turn-Off Fall time	$t_f$		-	21	50	ns
栅极电荷总量 Total Gate Charge	$Q_g$	$V_{\text{DS}}=520\text{V},$ $I_{\text{D}}=4.0\text{A}$ $V_{\text{GS}}=10\text{V}$ (note 4, 5)	-	14	22	nC
栅-源电荷 Gate-Source charge	$Q_{\text{gs}}$		-	3	7.0	nC
栅-漏电荷 Gate-Drain charge	$Q_{\text{gd}}$		-	5	10.0	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 Maximum Continuous Drain -Source Diode Forward Current		$I_s$	-	-	4	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current		$I_{\text{SM}}$	-	-	16	A
正向压降 Drain-Source Diode Forward Voltage	$V_{\text{SD}}$	$V_{\text{GS}}=0\text{V},$ $I_s=4.0\text{A}$	-	-	1.4	V
反向恢复时间 Reverse recovery time	$t_{\text{rr}}$	$V_{\text{GS}}=0\text{V}, I_s=4.0\text{A}$ $di_{\text{F}}/dt=100\text{A}/\mu\text{s}$ (note 4)	-	280	-	ns
反向恢复电荷 Reverse recovery charge	$Q_{\text{rr}}$		-	2.0	6.8	$\mu\text{C}$

## 热特性 THERMAL CHARACTERISTIC

项 目 Parameter	符 号 Symbol	最大 Max				单 位 Unit
		JCS4N65 VC/RC/MC/MFC	JCS4N65 CC/BC	JCS4N65FC (TO-220MF)	JCS4N65FC (TO-220MF-K2/ K4)	
结到管壳的热阻 Thermal Resistance, Junction to Case	$R_{\text{th(j-c)}}$	1.02	1.25	3.79	4.18	$^{\circ}\text{C}/\text{W}$
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{\text{th(j-A)}}$	73.14	59.3	41.3	48.68	$^{\circ}\text{C}/\text{W}$

注释:

- 1: 脉冲宽度由最高结温限制
- 2:  $L=46\text{mH}, I_{\text{AS}}=4.0\text{A}, V_{\text{DD}}=50\text{V}, R_{\text{G}}=25\Omega$ , 起始结温  $T_{\text{J}}=25^{\circ}\text{C}$
- 3:  $I_{\text{SD}} \leq 4.0\text{A}, di/dt \leq 200\text{A}/\mu\text{s}, V_{\text{DD}} \leq BV_{\text{DSS}}$ , 起始结温  $T_{\text{J}}=25^{\circ}\text{C}$
- 4: 脉冲测试: 脉冲宽度  $\leq 300\mu\text{s}$ , 占空比  $\leq 2\%$
- 5: 基本与工作温度无关

Notes:

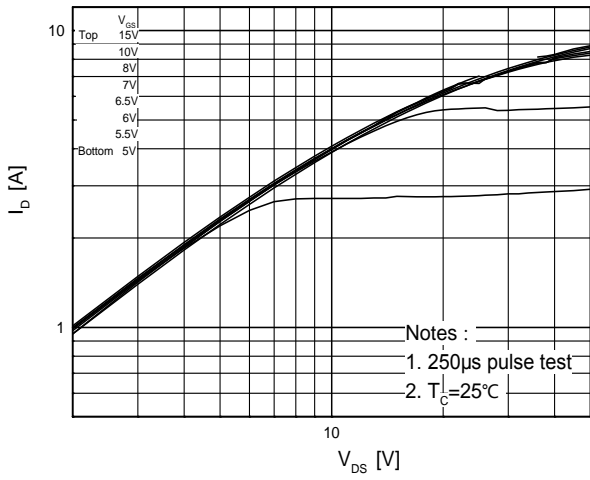
- 1: Pulse width limited by maximum junction temperature
- 2:  $L=46\text{mH}, I_{\text{AS}}=4.0\text{A}, V_{\text{DD}}=50\text{V}, R_{\text{G}}=25\Omega$ , Starting  $T_{\text{J}}=25^{\circ}\text{C}$
- 3:  $I_{\text{SD}} \leq 4.0\text{A}, di/dt \leq 200\text{A}/\mu\text{s}, V_{\text{DD}} \leq BV_{\text{DSS}}$ , Starting  $T_{\text{J}}=25^{\circ}\text{C}$
- 4: Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$
- 5: Essentially independent of operating temperature



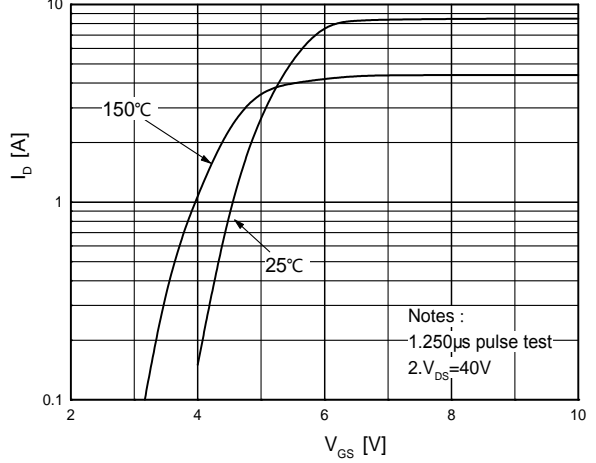


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

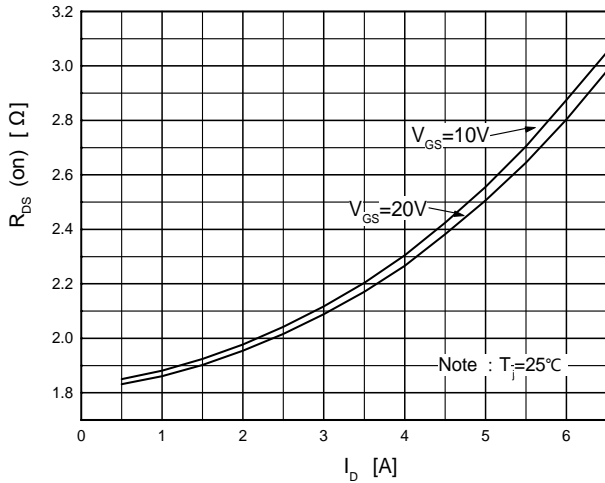
On-Region Characteristics



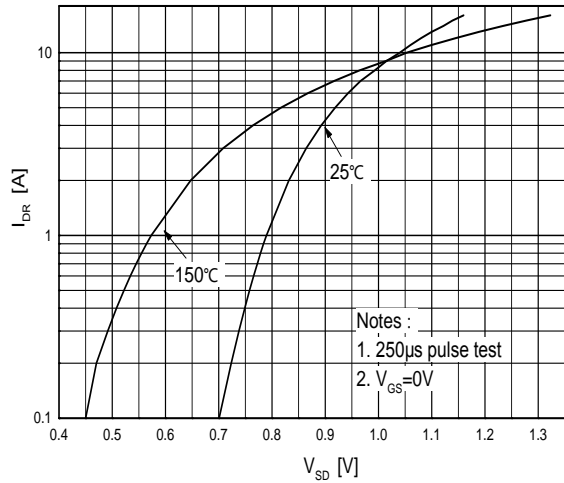
Transfer Characteristics



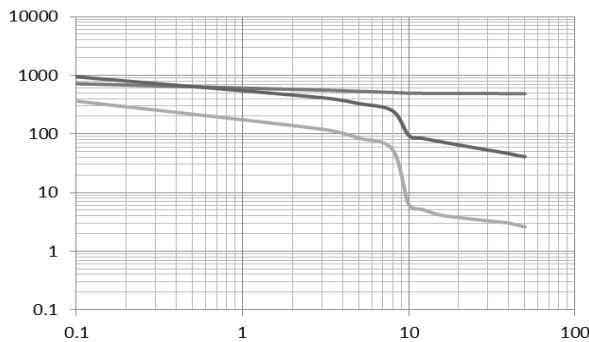
On-Resistance Variation vs. Drain Current and Gate Voltage



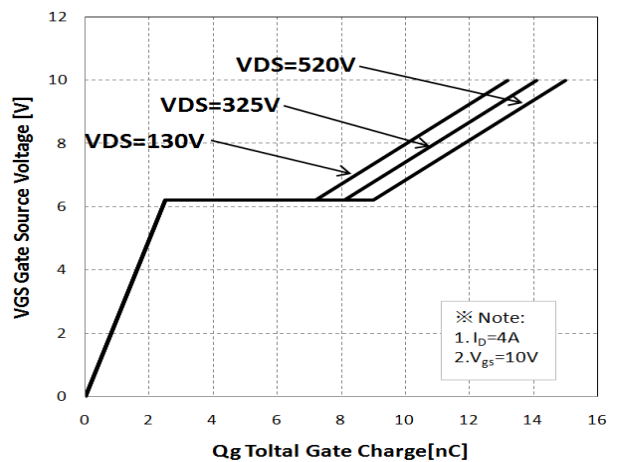
Body Diode Forward Voltage Variation vs. Source Current and Temperature



Capacitance Characteristics



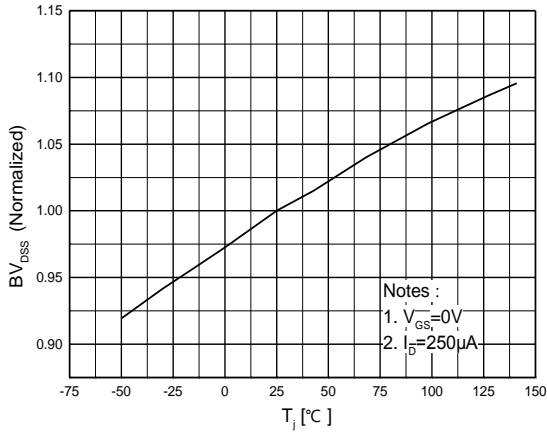
Gate Charge Characteristics



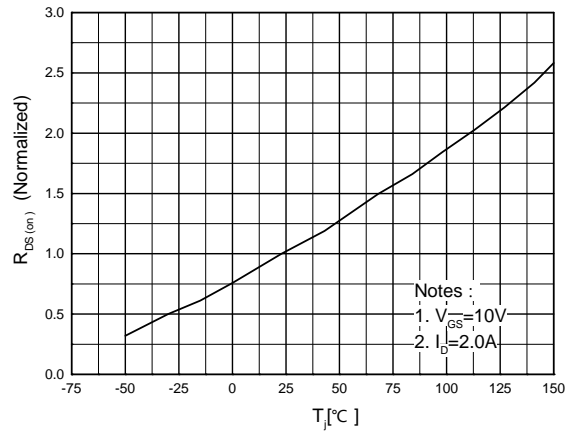


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

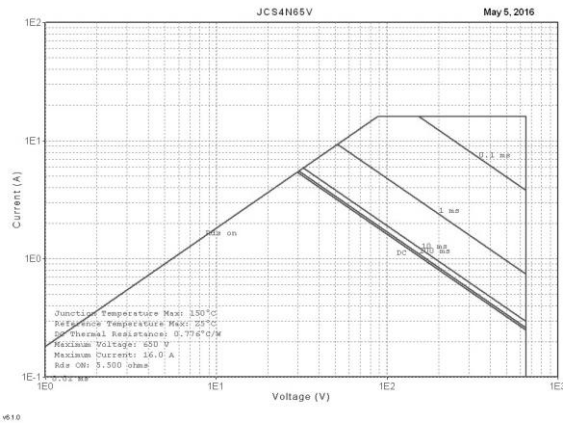
**Breakdown Voltage Variation vs. Temperature**



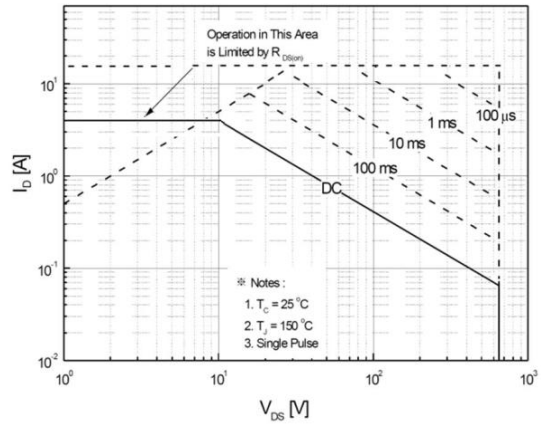
**On-Resistance Variation vs. Temperature**



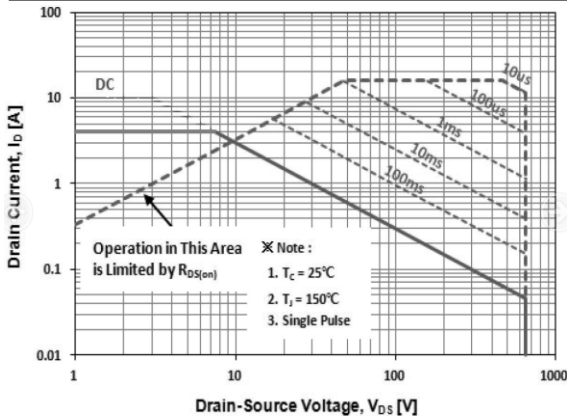
**Maximum Safe Operating Area For JCS4N65V/R/C/B/M/MFC**



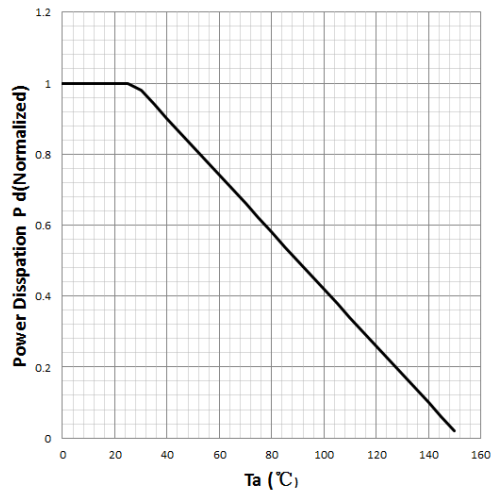
**Maximum Safe Operating Area For JCS4N65FC(TO-220MF)**



**Maximum Safe Operating Area For JCS4N65FC(TO-220MF-K2/K4)**



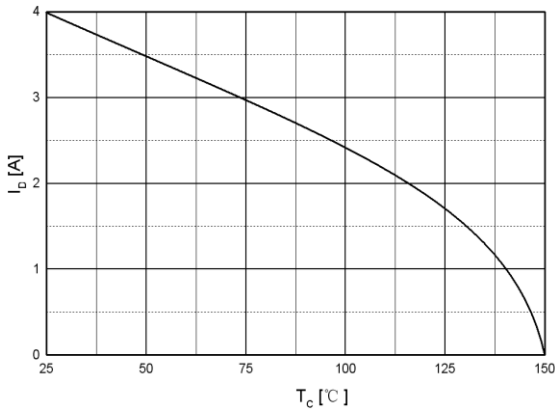
**Power Dissipation vs. Temperature**



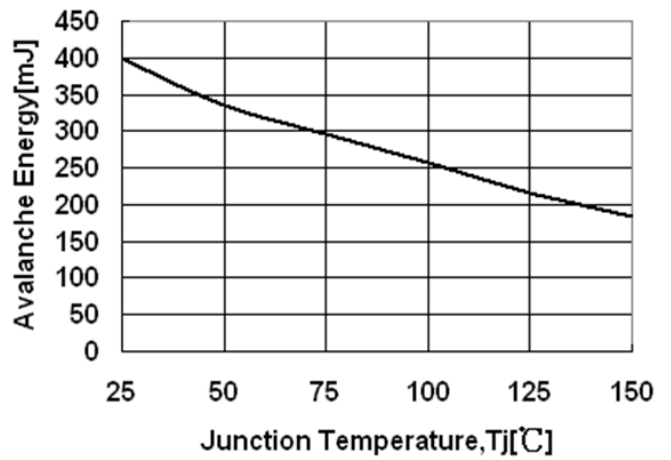


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

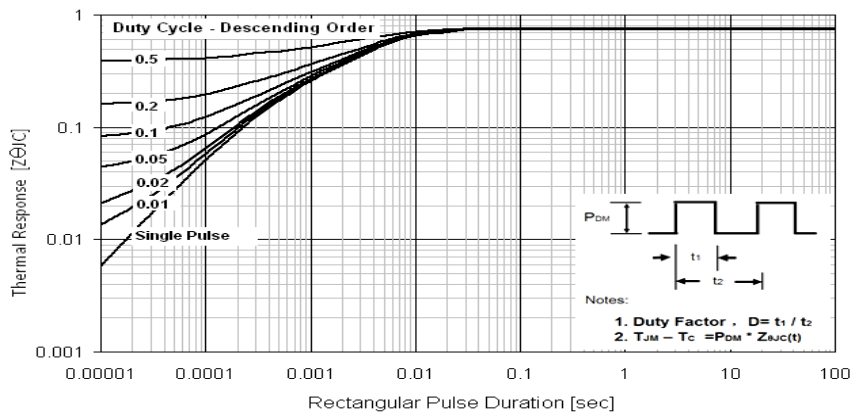
Maximum Drain Current vs. Case Temperature



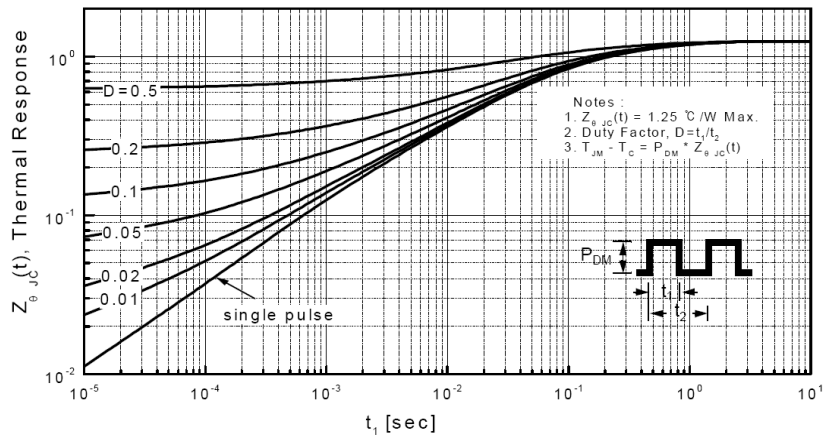
Avalanche Energy vs. Temperature



Transient Thermal Response Curve For JCS4N65VC/RC/MC/MFC



Transient Thermal Response Curve For JCS4N65CC/BC

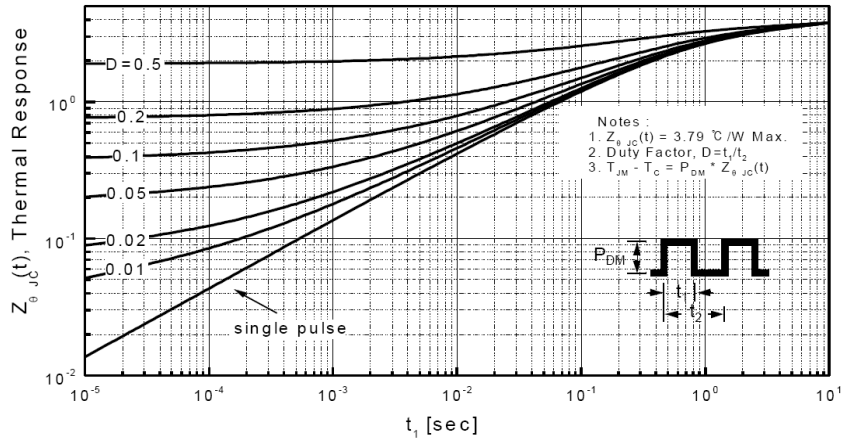




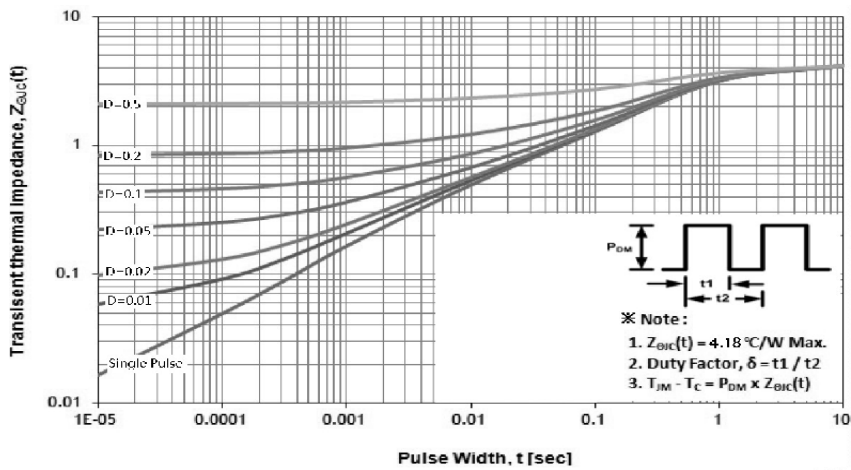


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

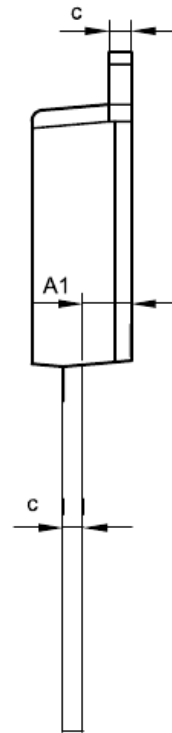
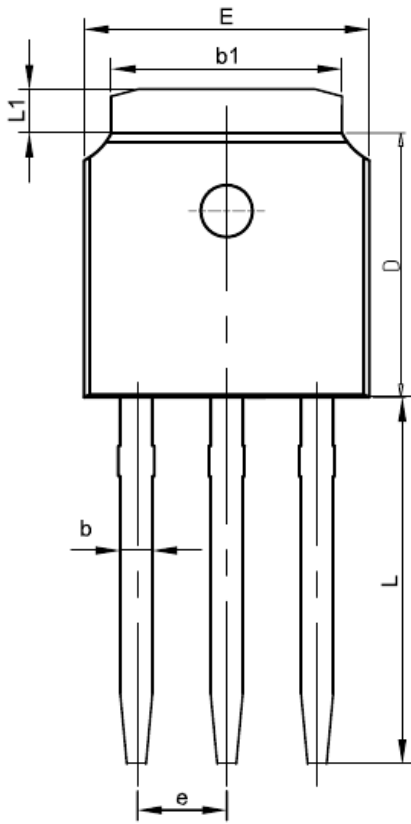
Transient Thermal Response Curve For JCS4N65FC(TO-220MF)



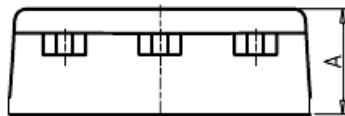
Transient Thermal Response Curve For JCS4N65FC(TO-220MF-K2/K4)







SYMBOL	MM	
	MIN	MAX
A	2.1	2.5
A1	0.87	1.27
b	0.63	0.93
b1	5.13	5.53
c	0.40	0.60
D	5.80	6.40
E	6.30	6.90
L	9.10	9.70
e	2.286BSC	
L1	0.82	1.22

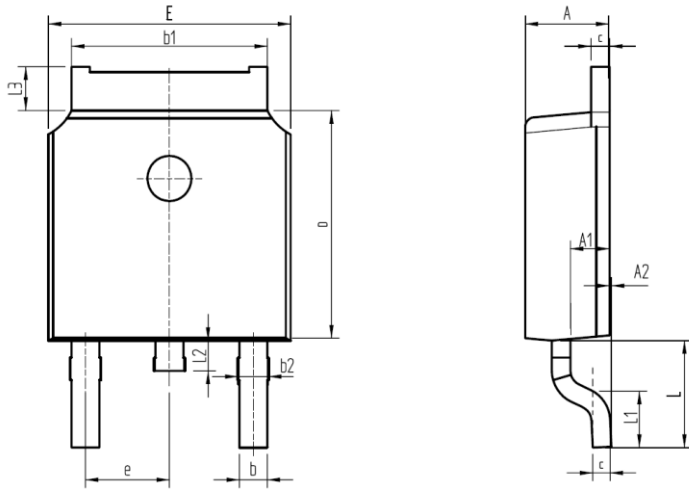




外形尺寸 PACKAGE MECHANICAL DATA

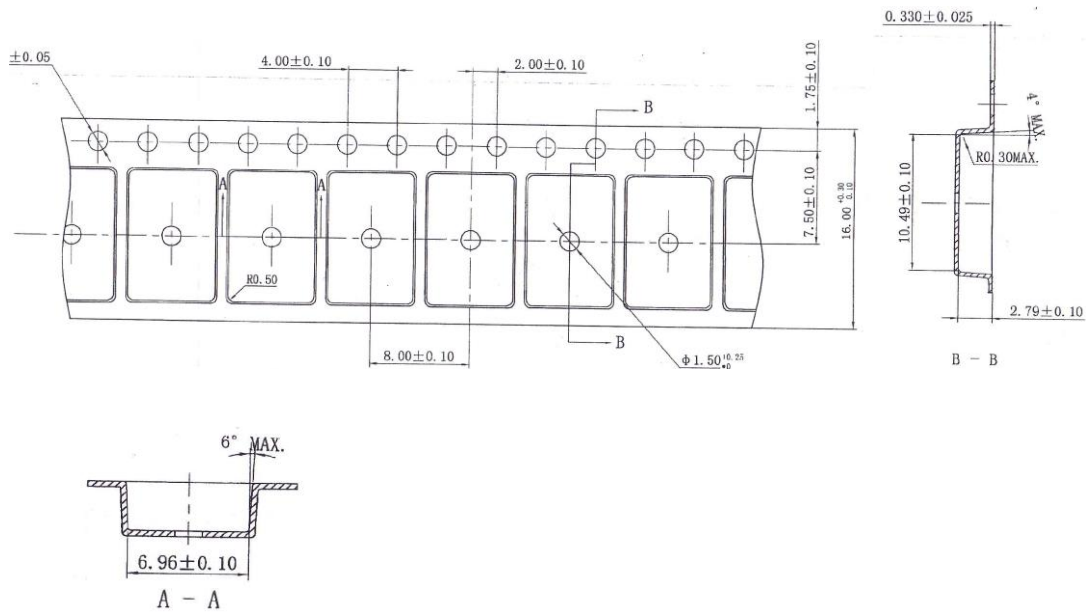
DPAK

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

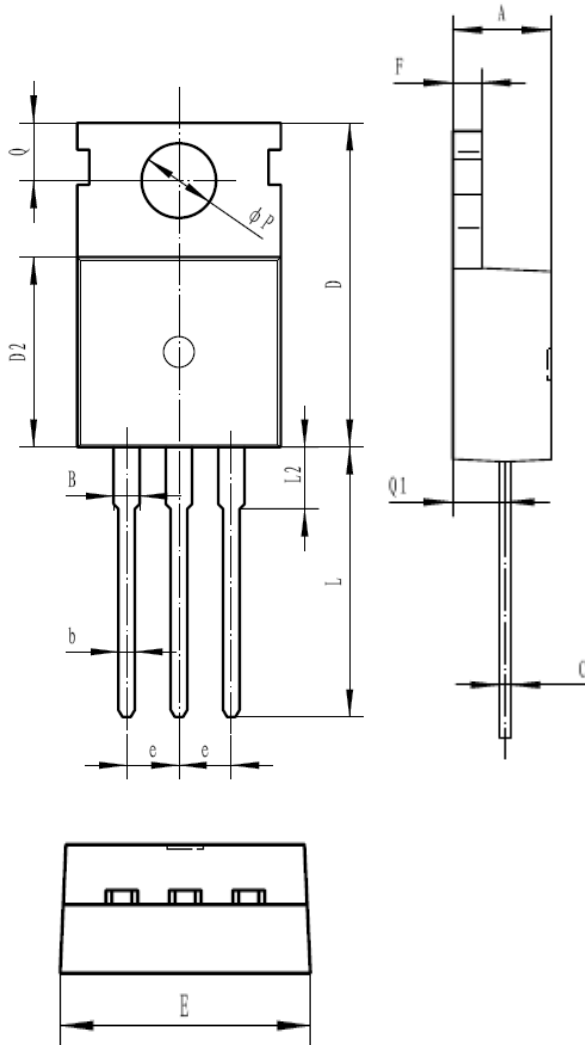
编带 REEL





TO-220C

单位 Unit: mm



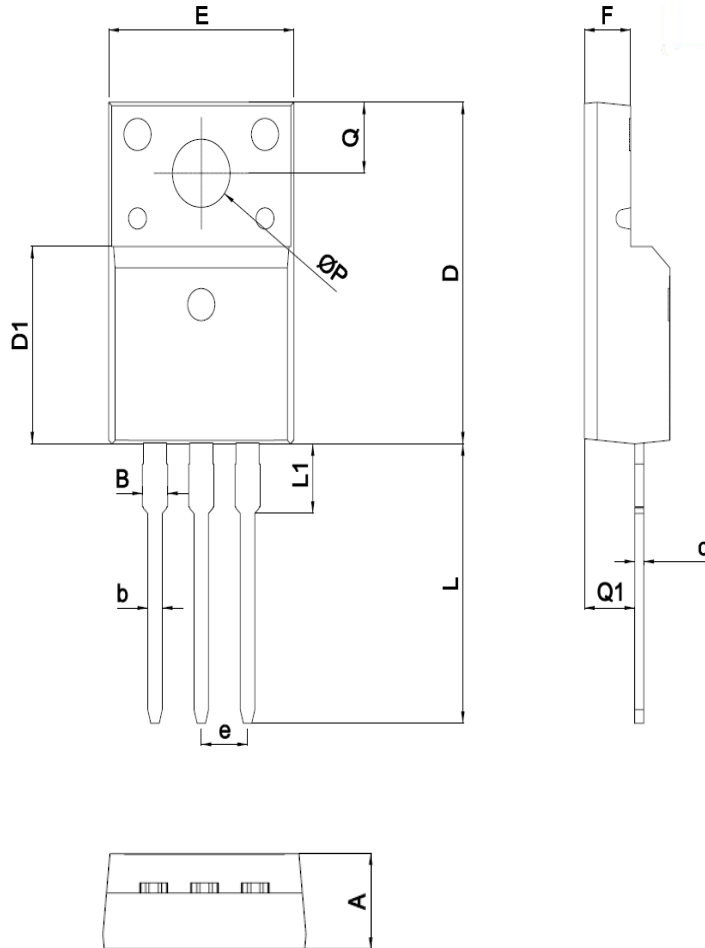
符号 symbol	MIN	MAX
A	4.30	4.70
B	1.22	1.40
b	0.70	0.95
c	0.40	0.65
D	15.20	16.20
D2	9.00	9.40
E	9.70	10.10
e	2.39	2.69
F	1.25	1.40
L	12.60	13.60
L2	2.80	3.20
Q	2.60	3.00
Q1	2.20	2.60
P	3.50	3.80





## TO-220MF

单位 Unit: mm



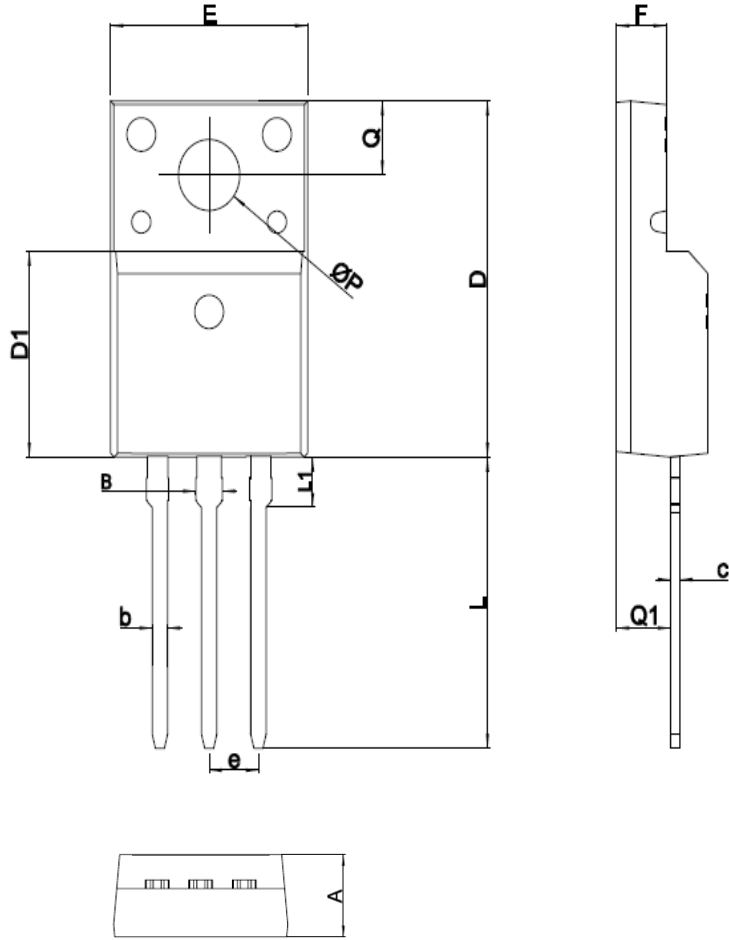
SYMBOL	mm	
	MIN	MAX
A	4.5	4.9
B		1.47
b	0.7	0.9
c	0.45	0.60
D	15.67	16.07
D1	9.04	9.20
e	2.54TYPE	
E	9.96	10.36
F	2.34	2.74
L	12.58	13.38
L1	3.13	3.33
Q	3.2	3.4
Q1	2.56	2.96
ΦP	3.08	3.28





TO-220MF-K2

单位 Unit: mm



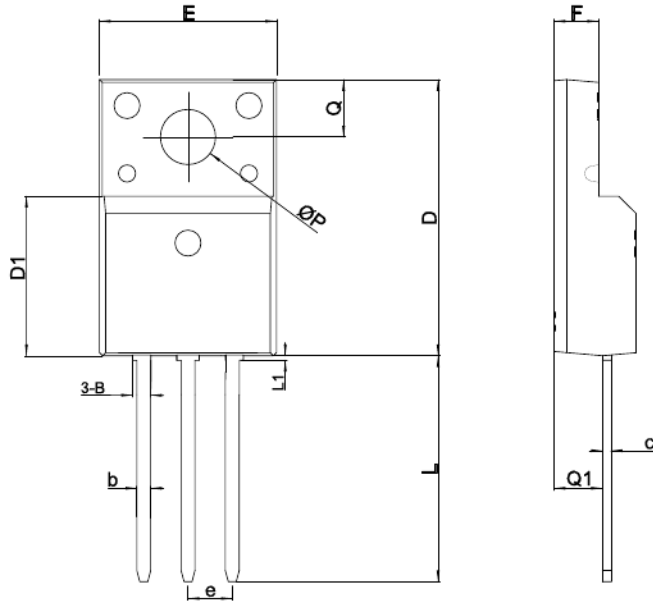
SYMBOL	mm	
	MIN	MAX
A	4.5	4.9
B		1.27
b	0.59	0.79
c	0.45	0.60
D	15.67	16.07
D1	8.97	9.37
e	2.54TYPE	
E	9.96	10.36
F	2.34	2.74
L	12.65	13.35
L1	1.80	2.20
Q	3.2	3.4
Q1	2.56	2.96
ΦP	3.08	3.28



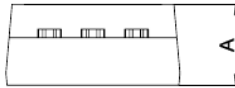


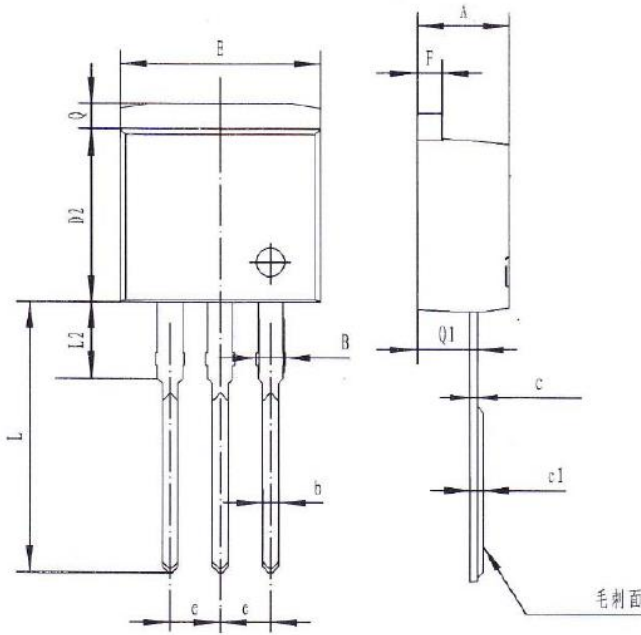
## TO-220MF-K4

单位 Unit: mm

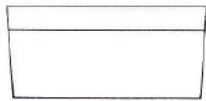


SYMBOL	mm	
	MIN	MAX
A	4.5	4.9
B	1.04	1.24
b	0.59	0.79
c	0.45	0.60
D	15.67	16.07
D1	8.97	9.37
e	2.54TYPE	
E	9.96	10.36
F	2.34	2.74
L	12.65	13.35
L1	MAX 0.95	
Q	3.2	3.4
Q1	2.56	2.96
ΦP	3.08	3.28





符号 symbol	MIN	MAX
A	4.40	4.90
B	1.10	1.40
b	0.70	0.95
c	0.30	0.60
c1	0.33	0.63
D2	8.20	9.20
E	9.60	10.50
e	2.39	2.69
F	1.20	1.35
L	13.11	14.61
L2	3.55	4.05
Q	1.10	1.40
Q1	2.65	2.85

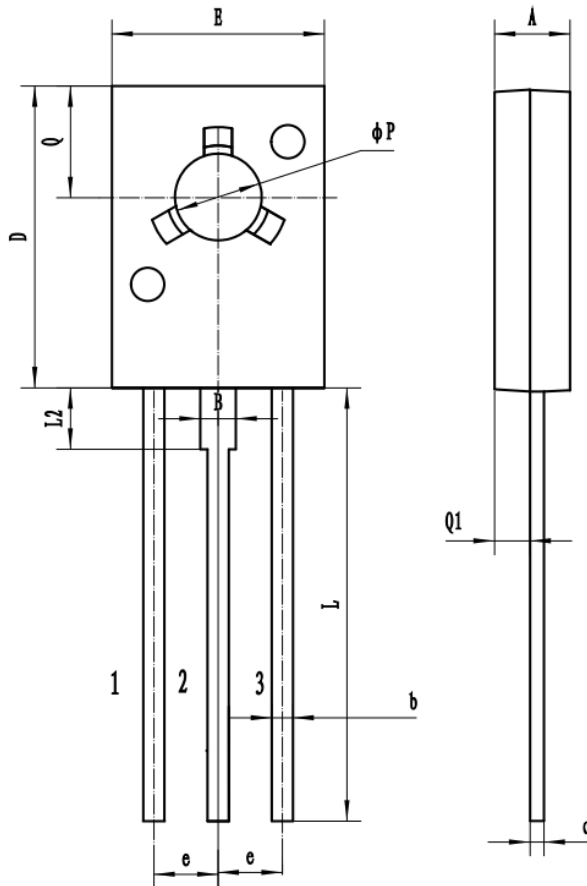






TO-126-K1

单位 Unit: mm



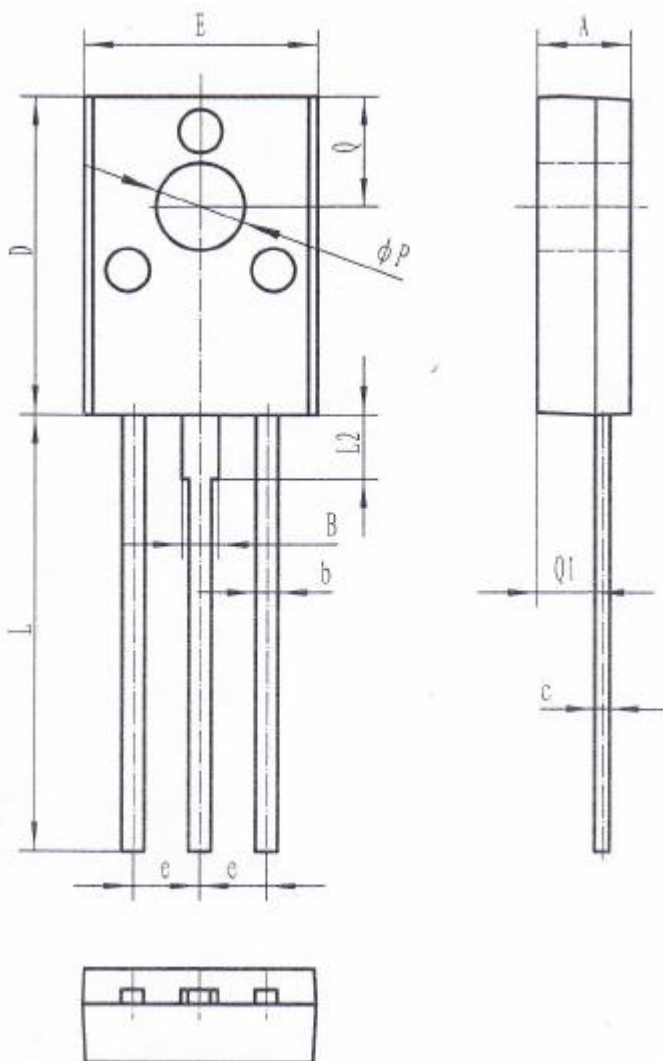
符号 symbol	MIN	MAX
A	2.50	2.90
B	1.22	1.47
b	0.60	0.90
c	0.30	0.70
D	10.50	11.10
E	7.10	8.10
e	2.19	2.39
L	15.30	15.70
L2	2.10	2.30
Q	3.80	4.20
Q1	1.07	1.47
P	3.00	3.20





TO-126F

单位 Unit: mm



符号 symbol	MIN	MAX
A	3.10	3.30
B	1.22	1.47
b	0.60	0.90
c	0.45	0.70
D	10.50	11.20
E	7.50	8.50
e	2.29 TYP	
L	15.00	16.00
L2	2.10	2.30
Q	3.60	4.00
Q1	1.80	2.20
P	2.95	3.15





### 注意事项

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3. 在电路设计时请不要超过器件的绝对最大额定值，否则会影响整机的可靠性。
4. 本说明书如有版本变更不另外告知。

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