



5N50R

主要参数

Main Characteristics

I_D	5 A
V_{DS}	500 V
$R_{DS(on)}$ (@ $V_{GS}=10V$)	1.45Ω
Q_g	14nC

用途

高频开关电源
电子镇流器
UPS 电源

Applications

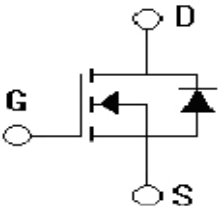
High efficiency switch mode power supplies
Electronic lamp ballasts
UPS Power

产品特性

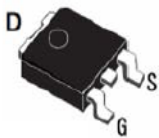
低栅极电荷
低 C_{rss} (典型值 14pF)
开关速度快
产品全部经过雪崩测试
高抗 dv/dt 能力
RoHS 产品

Features

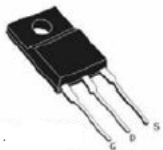
Low gate charge
Low C_{rss} (typical 14pF)
Fast switching
100% avalanche tested
Improved dv/dt capability
RoHS product



T0-252



T0-220F



绝对最大额定值 **Absolute Ratings** (Tc=25℃)

项 目 Parameter	符 号 Symbol	数 值 Value	单位 Unit
最高漏极—源极直流电压 Drain-Source Voltage	V _{DSS}	500	V
连续漏极电流 Drain Current -continuous	I _D T=25℃ T=100℃	5	A
		3.16	
最大脉冲漏极电流 (注 1) Drain Current – pulse (note 1)	I _{DM}	20	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}	145.8	mJ
雪崩电流 (注 1) Avalanche Current (note 1)	I _{AR}	5	A
重复雪崩能量 (注 1) Repetitive Avalanche Current (note 1)	E _{AR}	10.1	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	4.5	V/ns
耗散功率 (T ₀ -252) Power Dissipation	P _D T=25℃ -Derate above T=125℃	91	W
		0.73	
耗散功率 (T ₀ -220F) Power Dissipation	P _D T=25℃ -Derate above T=125℃	41	W
		0.33	
最高结温 Operating Junction Temperature	T _J	+150	℃
存储温度 Storage Temperature Range	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 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
关态特性 Off –Characteristics						
漏—源击穿电压 Drain-Source Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	500	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} / ΔT _J	I _D =250μA, referenced to 25℃	-	0.5	-	V/℃
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =500V, V _{GS} =0V, T _C =25℃	—	-	10	μA
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =400V, T _C =125℃	—	-	100	μA
正向栅极体漏电流 Forward Gate-body leakage current	I _{GSSF}	V _{DS} =0V, V _{GS} =+30V	-	-	100	nA
反向栅极体漏电流 Reverse Gate-body leakage current	I _{GSSR}	V _{DS} =0V, V _{GS} =-30V	-	-	-100	nA
通态特性 On-Characteristics						
阈值电压 Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D =250μA	2.0	-	4.0	V
静态导通电阻 Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =10V , I _D =2.5A	-	1.15	1.45	Ω
正向跨导 Forward Transconductance	g _{fs}	V _{DS} = 40V, I _D =2.5A(note 4)	-	5.5	-	S
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V f=1.0MHz	-	473	613	pF
输出电容 Output capacitance	C _{oss}		-	53	102	pF
反向传输电容 Reverse transfer capacitance	C _{rss}		-	14	19	pF
开关特性 Switching Characteristics						
延迟时间 Turn-On delay time	t _{d(on)}	V _{DD} =250V I _D =5A R _G =25Ω(note4,5)	-	45	60	ns
上升时间 Turn-On rise time	t _r		-	26	34	ns
延迟时间 Turn-Off delay time	t _{d(off)}		-	133	170	ns
下降时间 Turn-Off Fall time	t _f		-	214	270	ns

栅极电荷总量 Total Gate Charge	Q _g	V _{DS} =400V ,I _D =5A V _{GS} =10V(note4,5)	11.5	14	20	nC
栅—源电荷 Gate-Source charge	Q _{gs}		2.9	3.5	5.1	nC
栅—漏电荷 Gate-Drain charge	Q _{gd}		5.1	6.0	6.4	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	I _S		-	-	5	A
正向最大脉冲电流 Maximum Pulsed Drain-Source	I _{SM}		-	-	20	A
正向压降 Drain-Source Diode Forward	V _{FSD}	V _{GS} =0V,I _S =5A	-	-	1.4	V
反向恢复时间 Reverse recovery time	trr	V _{GS} =0V, I _S =5A dI _F /d _t =100A/μs(note 4)	-	268	-	ns
反向恢复电荷 Reverse recovery charge	Q _{rr}		-	2.1	-	μC

热特性 Thermal Characteristics

项 目 Parameter		符 号 Symbol	最大 Max	单 位 Unit
结到管壳的热阻 Thermal Resistance, Junction to Case	TO-252	$R_{th(j-c)}$	1.38	$^{\circ}C/W$
	TO-220F		3.08	
结到环境的热阻 Thermal Resistance, Junction to Ambient	TO-252	$R_{th(j-A)}$	110	$^{\circ}C/W$
	TO-220F		62.5	

注释:

1: 脉冲宽度由最高结温限制

Pulse width limited by maximum junction temperature

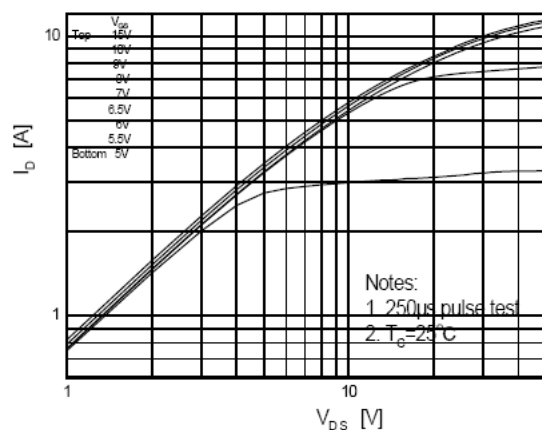
2: $L=10.5mH, I_{AS}=5A, V_{DD}=50V, R_G=25\Omega$, $L=10.5mH, I_{AS}=5A, V_{DD}=50V, R_G=25\Omega$, Starting $T_J=25^{\circ}C$ 起始结温 $T_J=25^{\circ}C$ 3: $I_{SD} \leq 5A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$, $I_{SD} \leq 5A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$, Starting $T_J=25^{\circ}C$ 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 $\leq 2\%$ Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

5: 基本与工作温度无关

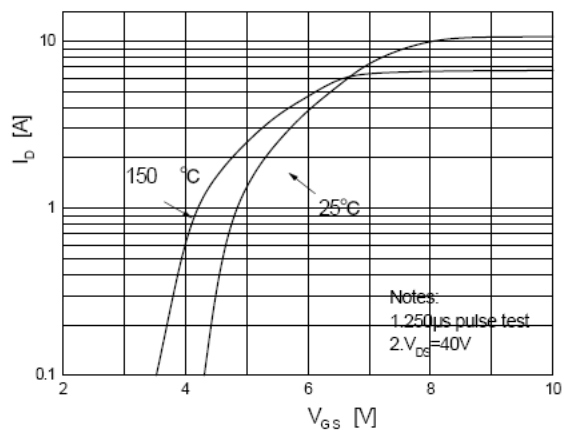
Essentially independent of operating temperature

特性曲线 Typical Characteristics

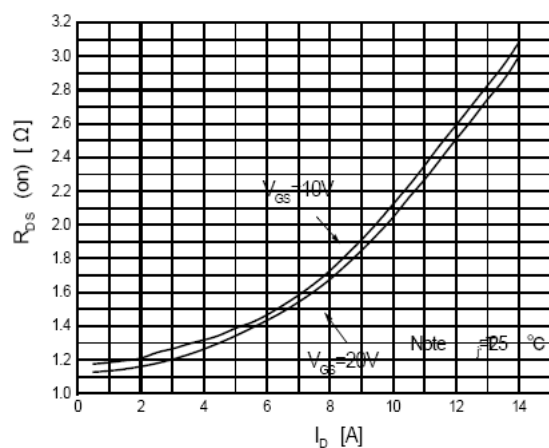
On-Region Characteristics



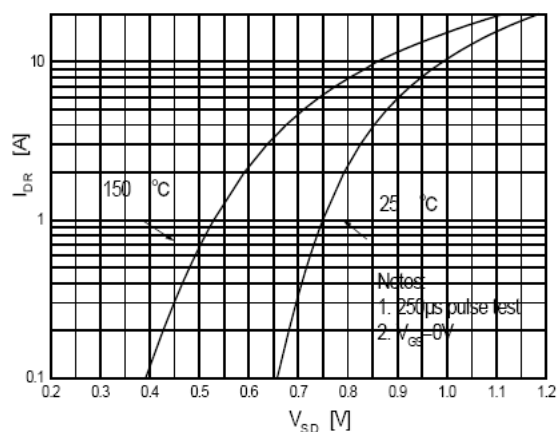
Transfer Characteristics



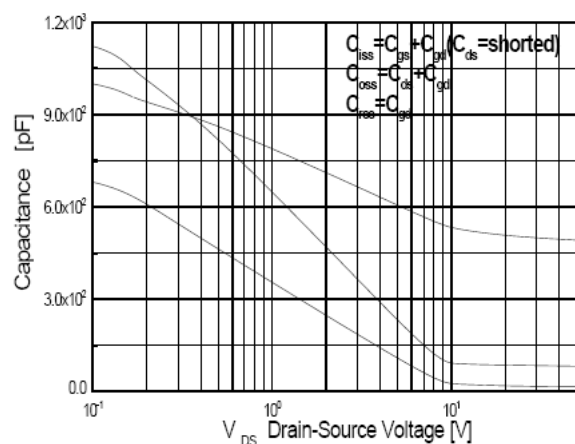
On-Resistance Variation vs. Drain Current and Gate Voltage



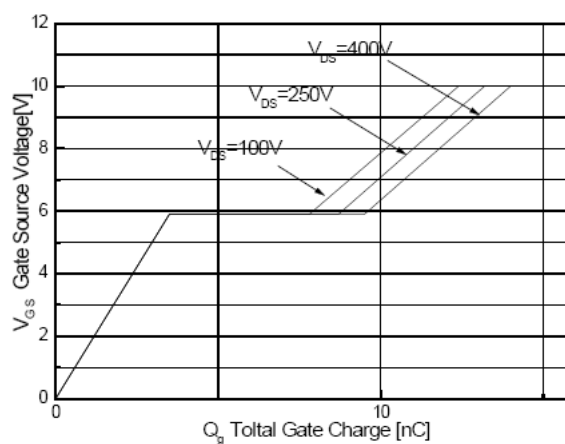
Body Diode Forward Voltage Variation vs. Source Current and Temperature



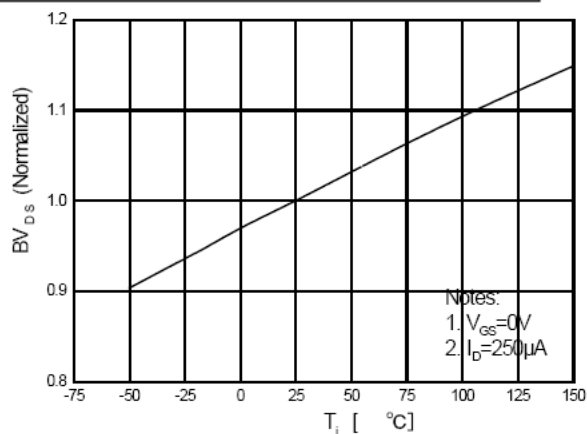
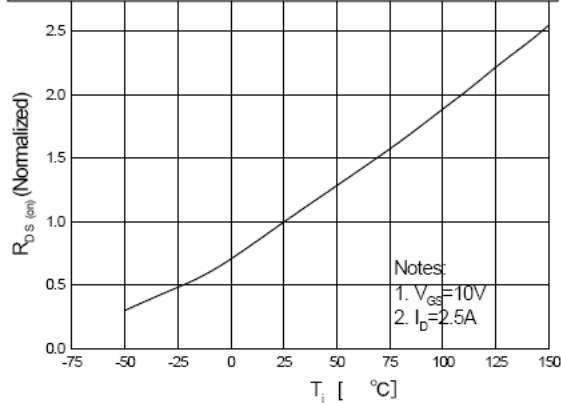
Capacitance Characteristics



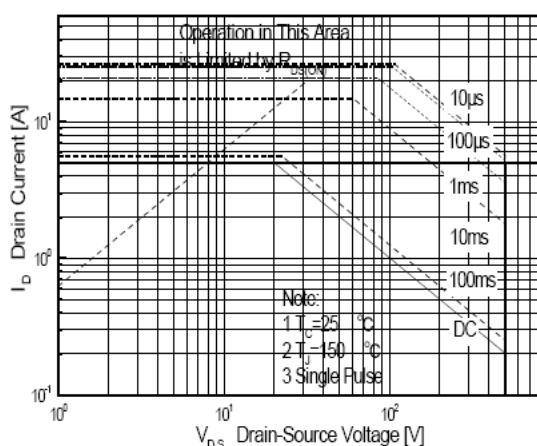
Gate Charge Characteristics



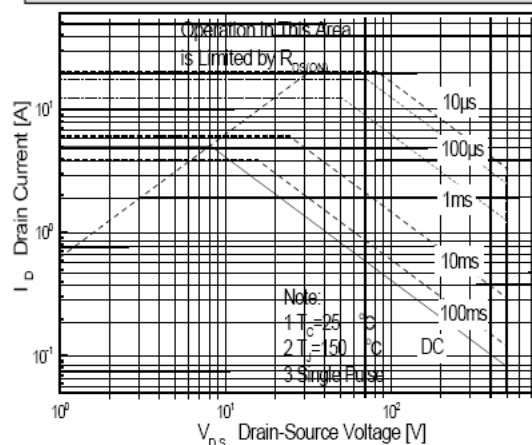
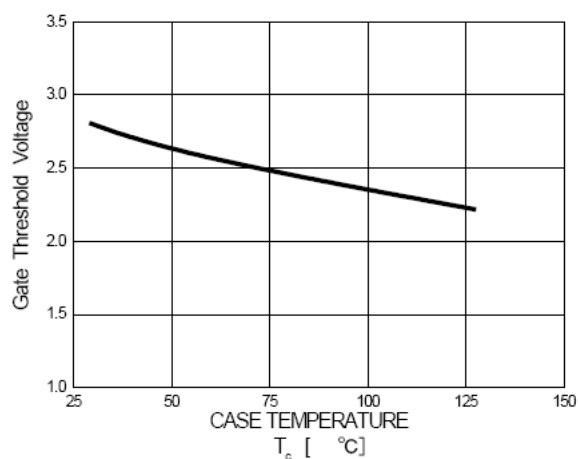
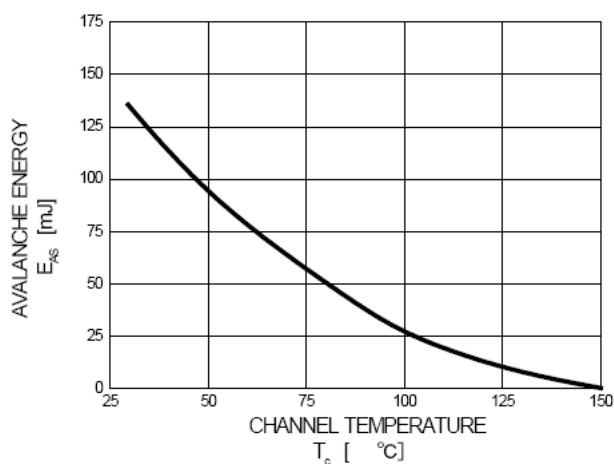
特性曲线 Typical Characteristics

Breakdown Voltage Variation
vs. TemperatureOn-Resistance Variation
vs. Temperature

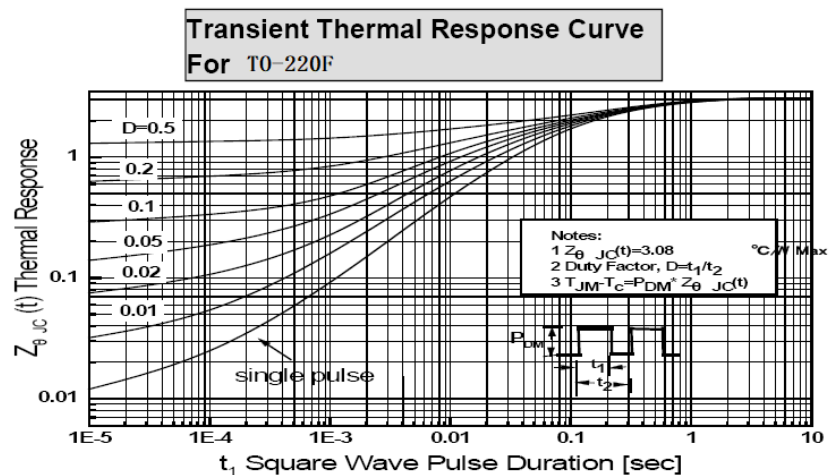
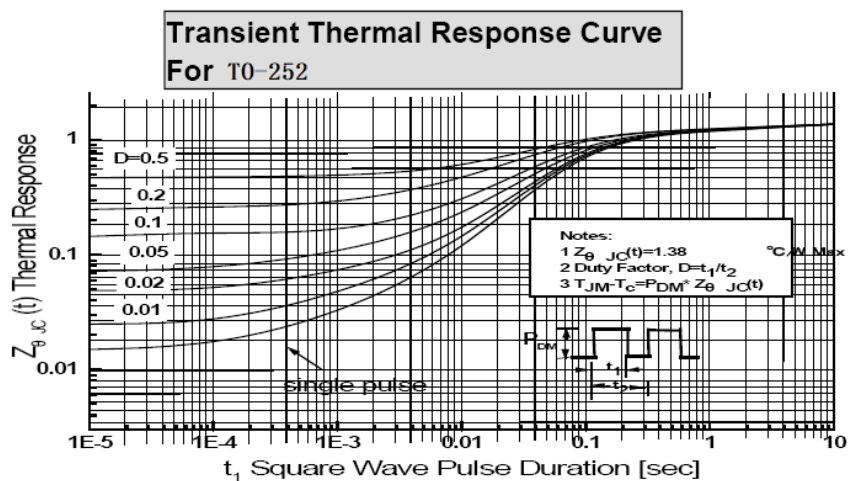
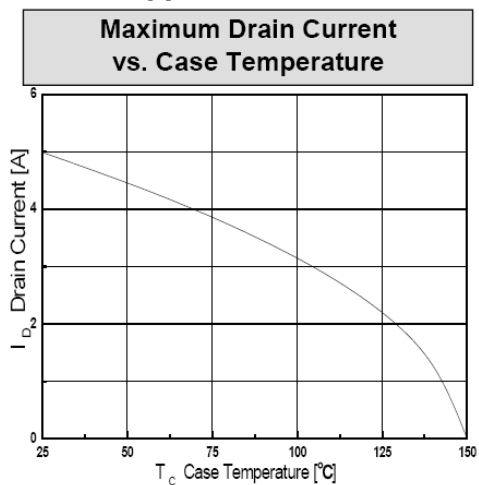
Maximum Safe Operating Area



Maximum Safe Operating Area

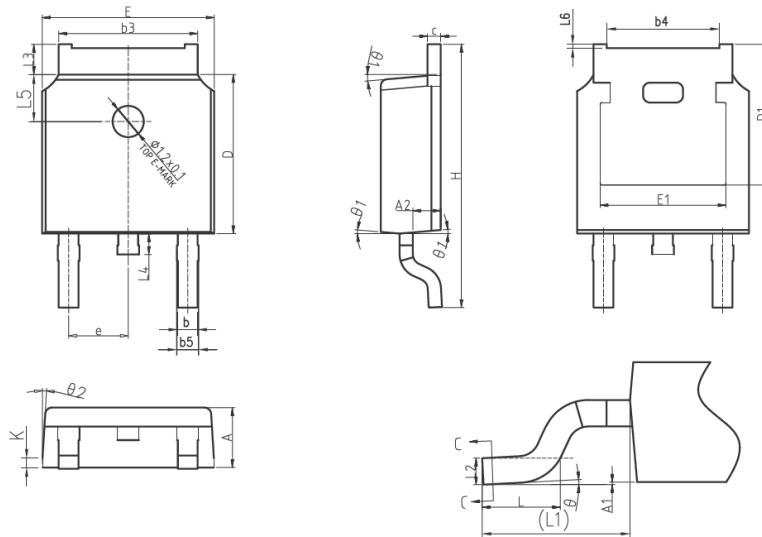
Gate Threshold Voltage
vs. Case TemperatureAvalanche Energy
vs. Channel Temperature

特性曲线 Typical Characteristics



外形尺寸 PACKAGE MECHANICAL DATA

TO-252

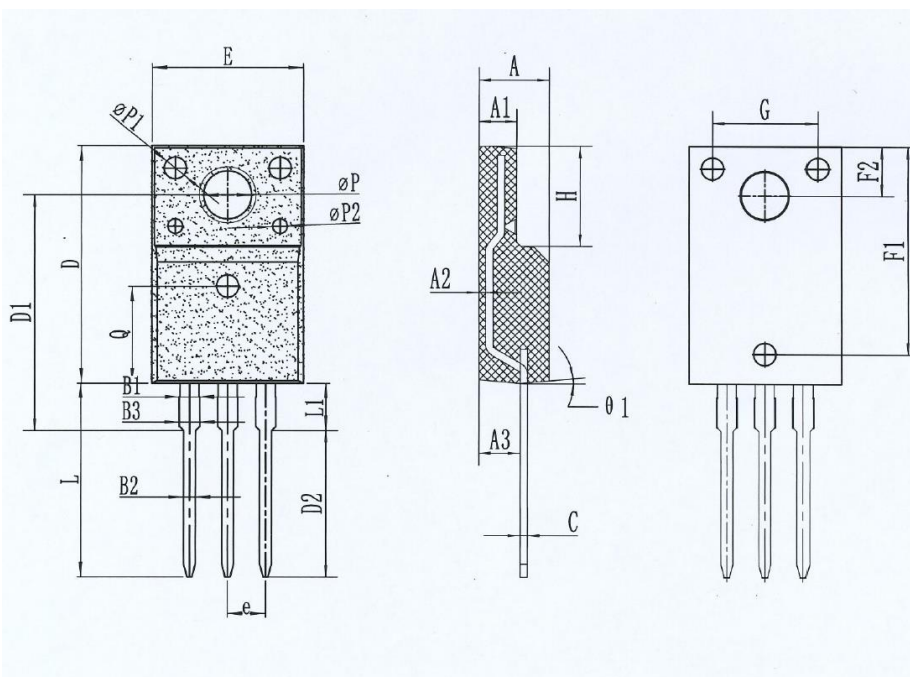


SYMBOL	mm		
	MIN	NOM	MAX
*A	2.20	2.30	2.38
*A1	0.00	-	0.10
A2	0.97	1.07	1.17
*b	0.72	0.78	0.85
b1	0.71	0.76	0.81
*b3	5.23	5.33	5.46
b4	4.27	4.32	4.37
b5	0.72	0.88	0.93
*c	0.47	0.53	0.58
c1	0.46	0.51	0.56
*D	6.00	6.10	6.20
D1	5.30REF		
*E	6.50	6.60	6.70
E1	4.70	4.83	4.92
*e	2.286BSC		
*H	9.90	10.10	10.30
L	1.40	1.50	1.70
L1	2.90REF		
L2	0.51BSC		
*L3	0.90	-	1.25
*L4	0.60	0.80	1.00
L5	1.70	1.80	1.90
L6	0	0.047	0.123
θ	0°	-	8°
* $\theta 1$	5°	7°	9°
$\theta 2$	5°	7°	9°
K	0.40REF		

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外形尺寸 PACKAGE MECHANICAL DATA

TO-220F



COMMON DIMENSIONS			
SYMBOL	MM		
	MIN	NOM	MAX
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	0.38	0.43	0.48
A3	2.66	2.76	2.86
B1	1.24	1.29	1.34
B2	0.75	0.80	0.85
B3	1.28	1.36	1.43
C	0.45	0.50	0.60
D	15.67	15.87	16.07
D1	15.55	15.75	15.95
D2	9.60	9.80	10.00
e	2.54BSC		
H	6.48	6.68	6.88
E	9.96	10.16	10.36
E1	9.92	10.02	10.12
E2	9.36	9.46	9.56
F1	13.80	13.90	14.00
F2	3.20	3.30	3.40
G	6.90	7.00	7.10
K	0.65	0.70	0.75
L	12.76	12.96	13.16
L1	-	-	3.33
Q	6.47REF		
ϕP	3.00	3.18	3.38
$\phi P1$	1.40	1.50	1.60
$\phi P2$	0.95	1.00	1.05
$\theta 1$	3°	5°	7°