



# MP4N50FR

## 主要参数 MAIN CHARACTERISTICS

$I_D$	4A
$V_{DSS}$	500V
$R_{dson-max}$ ( $V_{gs}=10V$ )	2.8 $\Omega$
$Q_g-Typ$	7.4nC

### 用途

- 高频开关电源
- 变频家电
- LED 电源

### 产品特性

- 低栅极电荷
- 低  $C_{rss}$ (2.5pF typ)
- 开关速度快
- 产品全部经过雪崩测试
- RoHS 产品

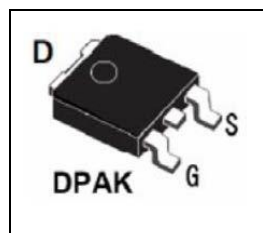
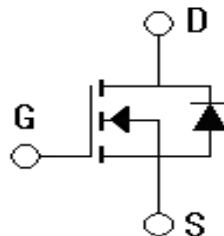
### APPLICATIONS

- High efficiency switch mode power supplies
- Variable frequency household appliance
- LED power supplies

### FEATURES

- Low gate charge
- Low  $C_{rss}$ (2.5pF typ)
- Fast switching
- 100% avalanche tested
- 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	MP4N50FR-R-BR	N/A	MP4N50FR-R-AR	MP4N50FR	DPAK



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
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	$I_D$ $T=25^\circ\text{C}$ $T=100^\circ\text{C}$	4	A
		2.4	A
最大脉冲漏极电流 (注1) Drain Current – pulse (note 1)	$I_{DM}$	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)	$E_{AS}$	116	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	0.55	V/ns
耗散功率 Power Dissipation	$P_D$ $T_c=25^\circ\text{C}$ -Derate above $25^\circ\text{C}$	75	W
		0.6	W/ $^\circ\text{C}$
最高结温及存储温度 Operating and Storage Temperature Range	$T_J, T_{STG}$	150; $-55\sim+150$	$^\circ\text{C}$
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	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0V$	500	-	-	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°C	-	0.5	-	V/°C
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=500V, V_{GS}=0V, T_C=25^\circ C$	-	-	1	$\mu A$
		$V_{DS}=400V, V_{GS}=0V, T_C=125^\circ C$	-	-	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	-	4	V
静态导通电阻 Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2A$ 25°C	-	2.4	2.8	$\Omega$
		$V_{GS}=10V, I_D=2A$ 100°C	-	4.1	4.9	$\Omega$
		$V_{GS}=10V, I_D=2A$ 150°C	-	5.3	6.4	$\Omega$
正向跨导 Forward Transconductance	$g_{fs}$	$V_{DS} = 40V, I_D=2A$ (note 4)	-	2.8	-	S
<b>动态特性 Dynamic Characteristics</b>						
栅极电阻 Gate resistance	$R_g$	F=1.0MHz open drain	2	3.7	5.5	$\Omega$
输入电容 Input capacitance	$C_{iss}$	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1.0MHz$	-	280	-	pF
输出电容 Output capacitance	$C_{oss}$		-	35	-	pF
反向传输电容 Reverse transfer capacitance	$C_{rss}$		-	2.5	-	pF





## 电特性 ELECTRICAL CHARACTERISTICS

开关特性 Switching Characteristics						
延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{DD}=250V, I_D=4A, R_G=25\Omega$ (note 4, 5)	-	4	-	ns
上升时间 Turn-On rise time	$t_r$		-	22	-	ns
延迟时间 Turn-Off delay time	$t_{d(off)}$		-	15.6	-	ns
下降时间 Turn-Off Fall time	$t_f$		-	23.8	-	ns
栅极电荷总量 Total Gate Charge	$Q_g$	$V_{DS}=400V,$ $I_D=4A$ $V_{GS}=10V$ (note 4, 5)	-	7.4	-	nC
栅-源电荷 Gate-Source charge	$Q_{gs}$		-	1.9	-	nC
栅-漏电荷 Gate-Drain charge	$Q_{gd}$		-	3.7	-	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		$I_{SM}$	-	-	16	A
正向压降 Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V,$ $I_S=4A$	-	-	1.40	V
反向恢复时间 Reverse recovery time	$t_{rr}$	$V_{GS}=0V, I_S=4A$ $di/dt=100A/\mu s$ (note 4)	-	63	-	ns
反向恢复电荷 Reverse recovery charge	$Q_{rr}$		-	0.1	-	$\mu C$

## 热特性 THERMAL CHARACTERISTIC

项目 Parameter	符号 Symbol	数值 Value	单位 Unit
结到管壳的热阻 Thermal Resistance, Junction to Case	$R_{th(j-c)}$	1.66	$^{\circ}C/W$
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th(j-a)}$	95.2	$^{\circ}C/W$

注释:

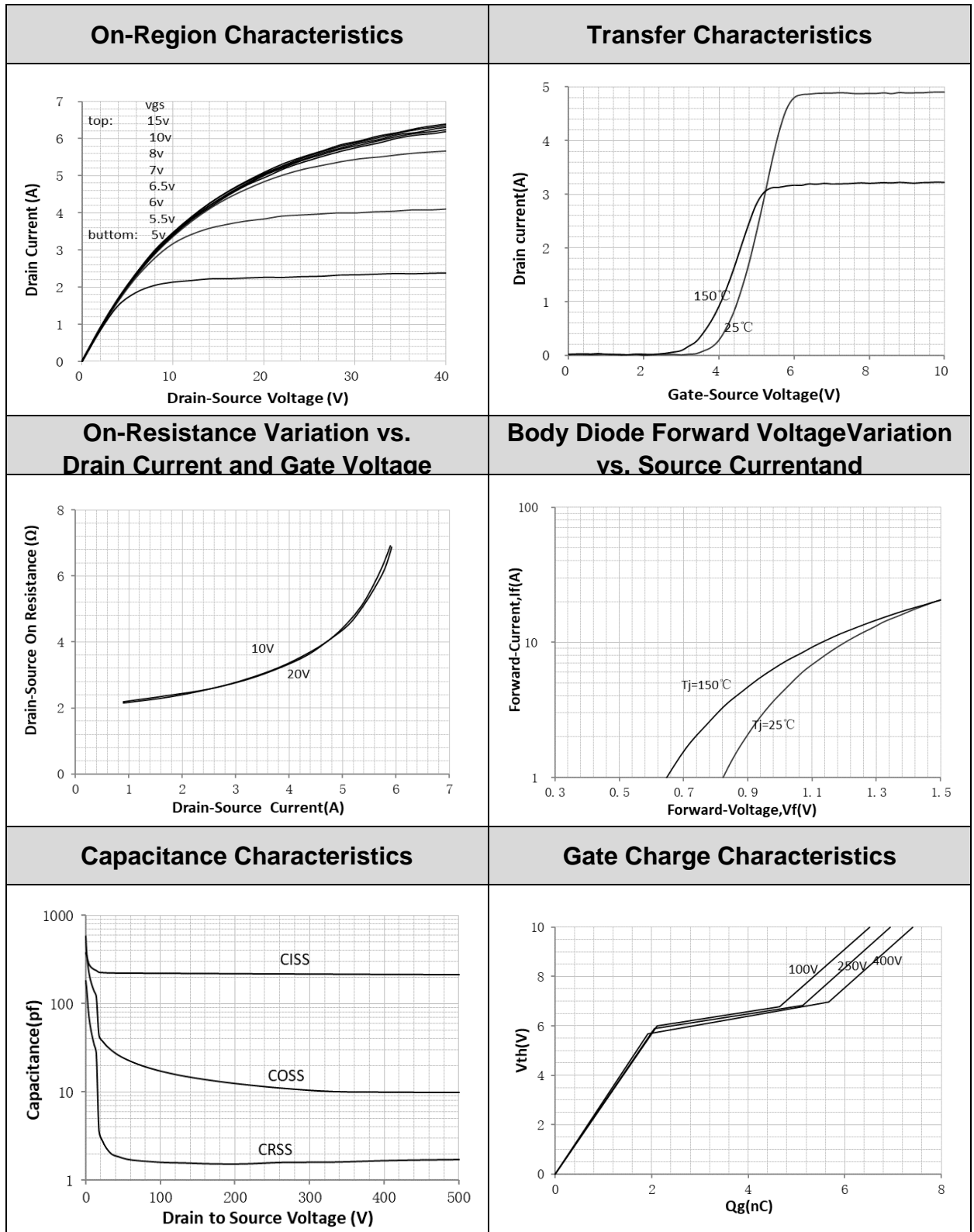
- 1: 脉冲宽度由最高结温限制
- 2:  $L=14.5mH, I_{AS}=4A, V_{DD}=50V, R_G=25\Omega$ , 起始结温  $T_J=25^{\circ}C$
- 3:  $I_{SD} \leq 4A, di/dt \leq 300A/\mu s, V_{DD} \leq BV_{DSS}$ , 起始结温  $T_J=25^{\circ}C$
- 4: 脉冲测试: 脉冲宽度 $\leq 300\mu s$ , 占空比 $\leq 2\%$
- 5: 基本与工作温度无关

Notes:

- 1: Pulse width limited by maximum junction temperature
- 2:  $L=14.5mH, I_{AS}=4A, V_{DD}=50V, R_G=25\Omega$ , Starting  $T_J=25^{\circ}C$
- 3:  $I_{SD} \leq 4A, di/dt \leq 300A/\mu s, V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^{\circ}C$
- 4: Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycles  $\leq 2\%$
- 5: Essentially independent of operating temperature

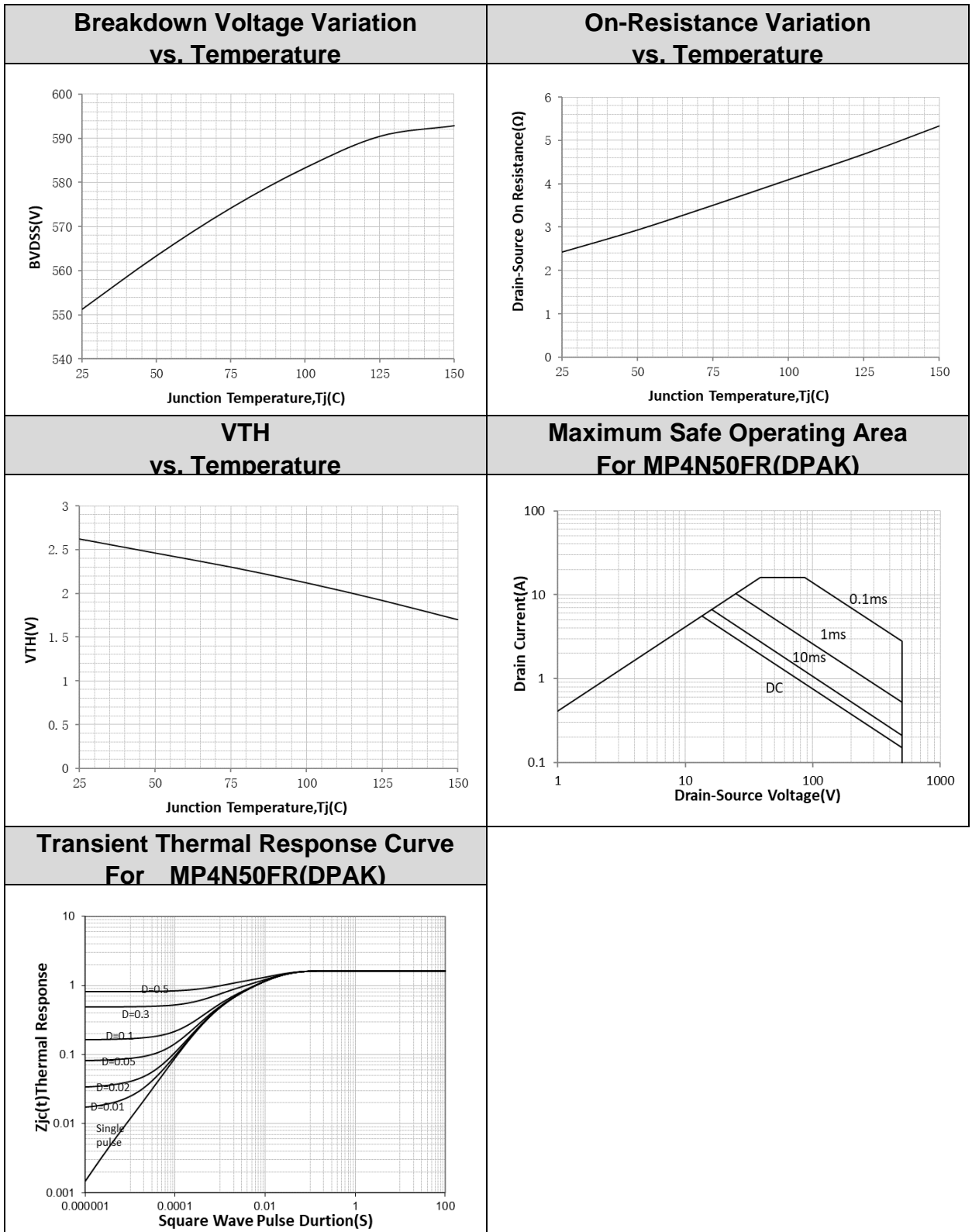


特征曲线ELECTRICAL CHARACTERISTICS (curves)





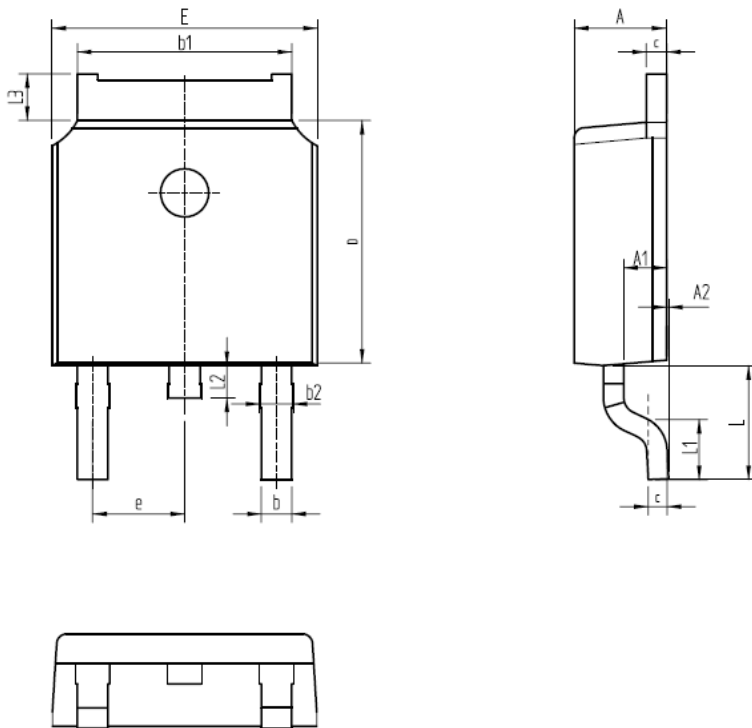
特征曲线ELECTRICAL CHARACTERISTICS (curves)





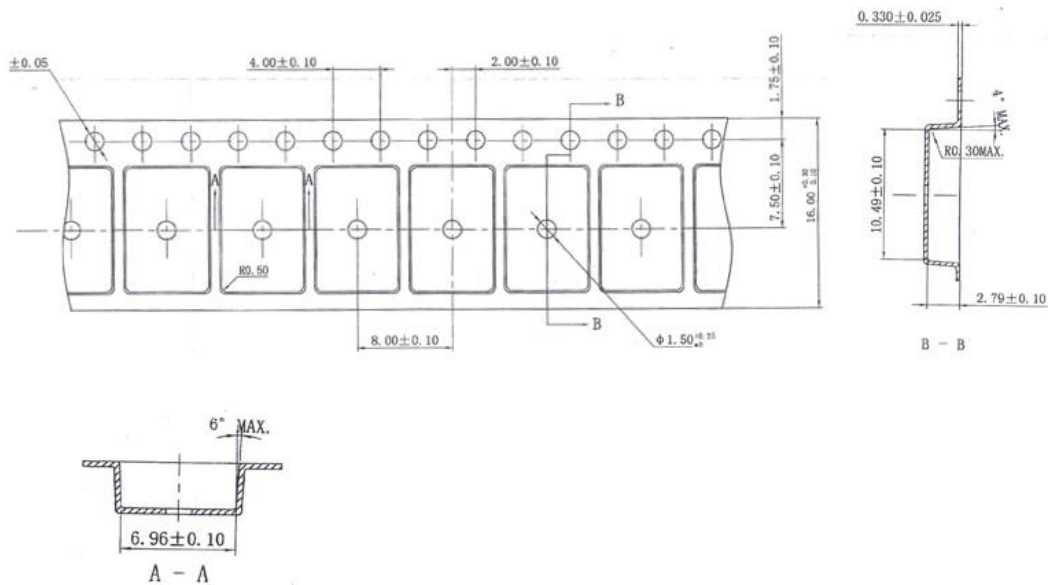
外形尺寸 PACKAGE MECHANICAL DATA  
DPAK

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





## 注意事项

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