



# MS65R360

## 主要参数 MAIN CHARACTERISTICS

$I_D$	11A
$V_{DSS}$	650 V
$R_{dson-max}$ (@ $V_{gs}=10V$ )	0.38 $\Omega$
$Q_g-typ$	22 nC

### 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
- 开关速度快
- 产品全部经过雪崩测试
- 高抗 dv/dt 能力
- RoHS 产品
- 超结产品

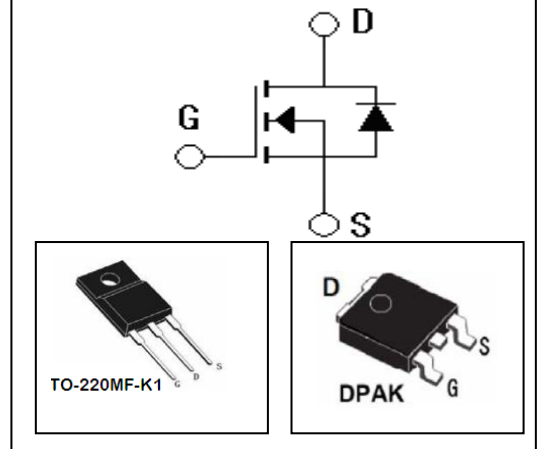
### APPLICATIONS

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

### FEATURES

- Low gate charge
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- RoHS product
- Super Junction MOS

## 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	无卤-条管	有卤-编带	无卤-编带		
Halogen-Tube	Halogen-Free-Tube	Halogen-reel	Halogen-Free-Reel		
MS65R360-F1-B	MS65R360-F1-BR	N/A	N/A	MS65R360	TO-220MF-K1
MS65R360-R-B	MS65R360-R-BR	MS65R360-R-A	MS65R360-R-AR	MS65R360	DPAK





## 绝对最大额定值 ABSOLUTE RATINGS (Tc=25°C)

项 目 Parameter	符 号 Symbol	数 值 Value		单 位 Unit
		MS65R360/DPAK	MS65R360/TO-220 MF-K1	
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°C	11*		A
	T=100°C	6.6*		A
最大脉冲漏极电流 (注1) Drain Current - pulse (note 1)	$I_{DM}$	33*		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)	$E_{AS}$	250		mJ
雪崩电流 (注1) Avalanche Current (note 1)	$I_{AR}$	1.8		A
重复雪崩能量 (注1) Repetitive Avalanche Energy (note 1)	$E_{AR}$	0.32		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	15		V/ns
耗散功率 Power Dissipation	$P_D$ T <sub>C</sub> =25°C	129	40	W
	-Derate above 25°C	1.03	0.32	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 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	$\mu A$
		$V_{DS}=650V, T_C=125^\circ C$	-	-	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	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D=250\mu A$	2.5	-	4.5	V
静态导通电阻 Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5.5A$	-	0.34	0.38	$\Omega$
正向跨导 Forward Transconductance	$g_{fs}$	$V_{DS}=10V, I_D=5A$ (note 4)	-	8	-	S
<b>动态特性 Dynamic Characteristics</b>						
输入电容 Input capacitance	$C_{iss}$	$V_{DS}=100V,$ $V_{GS}=0V,$ $f=1.0MHz$	-	850	-	pF
输出电容 Output capacitance	$C_{oss}$		-	40	-	pF
反向传输电容 Reverse transfer capacitance	$C_{rss}$		-	3	-	pF





## 电特性 ELECTRICAL CHARACTERISTICS

开关特性 Switching Characteristics						
延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{DD}=400V, I_D=11A, R_G=25\Omega,$ $V_{GS}=10V$ (note 4, 5)	-	30	-	ns
上升时间 Turn-On rise time	$t_r$		-	40	-	ns
延迟时间 Turn-Off delay time	$t_{d(off)}$		-	95	-	ns
下降时间 Turn-Off Fall time	$t_f$		-	31	-	ns
栅极电荷总量 Total Gate Charge	$Q_g$	$V_{DS}=520V,$ $I_D=11A$ $V_{GS}=10V$ (note 4, 5)	-	22	-	nC
栅-源电荷 Gate-Source charge	$Q_{gs}$		-	6	-	nC
栅-漏电荷 Gate-Drain charge	$Q_{gd}$		-	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		$I_S$	-	-	11	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current		$I_{SM}$	-	-	33	A
正向压降 Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V,$ $I_S=11A$	-	0.9	1.2	V
反向恢复时间 Reverse recovery time	$t_{rr}$	$V_r=400V, I_F=I_S$ $di_F/dt=100A/\mu s$ (note 4)	-	240	-	ns
反向恢复电荷 Reverse recovery charge	$Q_{rr}$		-	2.3	-	$\mu C$

## 热特性 THERMAL CHARACTERISTIC

项 目 Parameter	符 号 Symbol	最大 Max		单 位 Unit
		MS65R360/DPAK	MS65R360/TO-220MF-K1	
结到管壳的热阻 Thermal Resistance, Junction to Case	$R_{th(j-c)}$	1	4	$^{\circ}C/W$
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	150	68	$^{\circ}C/W$

注释:

- 1: 脉冲宽度由最高结温限制
- 2:  $I_{AS}=1.8A, V_{DD}=50V, R_G=25\Omega$ , 起始结温  $T_J=25^{\circ}C$
- 3:  $I_{SD}\leq 11A, di/dt\leq 300A/\mu s, V_{DD}\leq BV_{DSS}$ , 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:

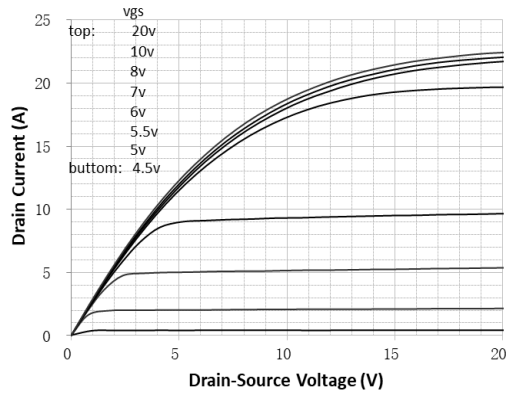
- 1: Pulse width limited by maximum junction temperature
- 2:  $I_{AS}=1.8A, V_{DD}=50V, R_G=25\Omega$ , Starting  $T_J=25^{\circ}C$
- 3:  $I_{SD}\leq 11A, di/dt\leq 300A/\mu s, V_{DD}\leq BV_{DSS}$ , Starting  $T_J=25^{\circ}C$
- 4: Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycles  $\leq 2\%$
- 5: Essentially independent of operating temperature



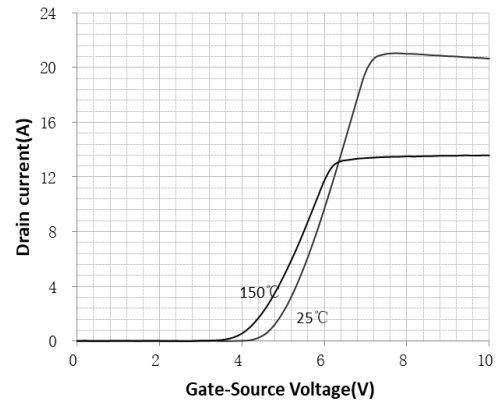


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

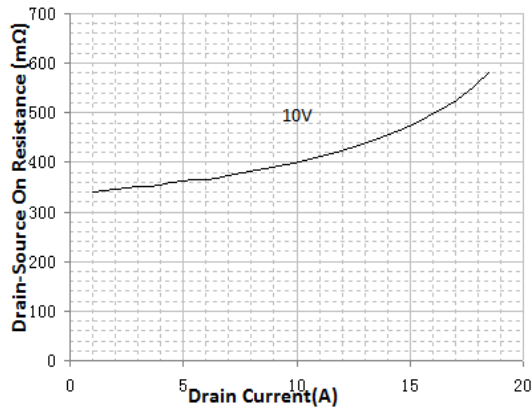
On-Region Characteristics



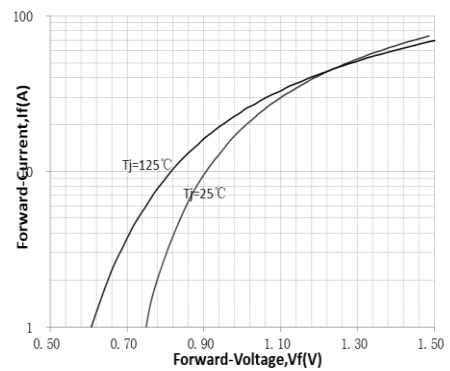
Transfer Characteristics



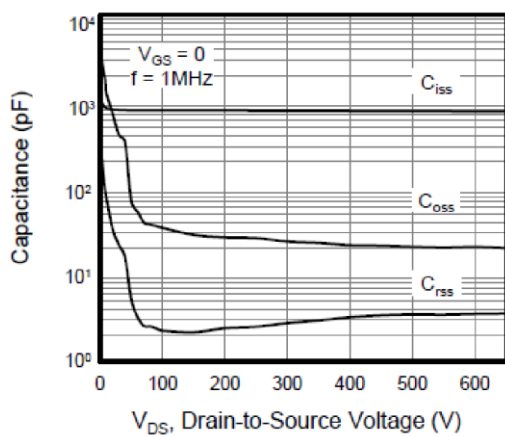
On-Resistance Variation vs. Drain Current and Gate Voltage



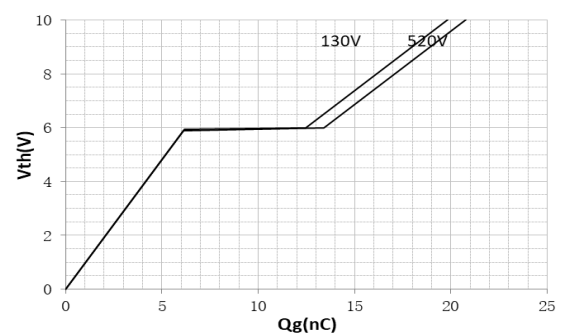
Body Diode Forward Voltage Variation vs. Source Current and Temperature



Gate Charge Characteristics



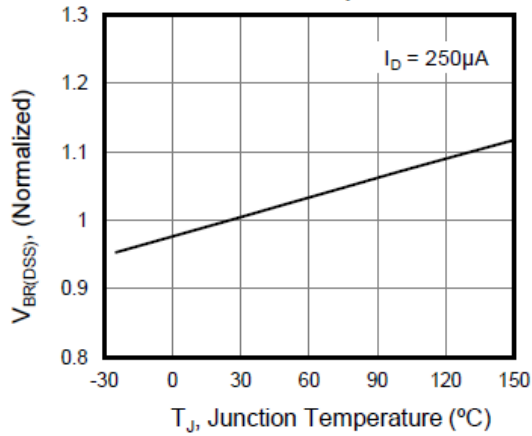
Capacitance Characteristics



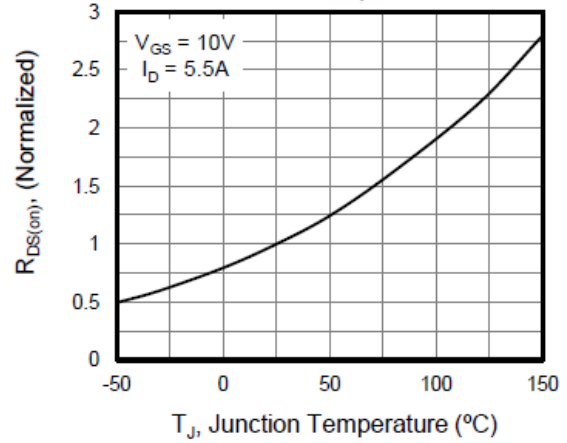


### 特征曲线 ELECTRICAL CHARACTERISTICS (curves)

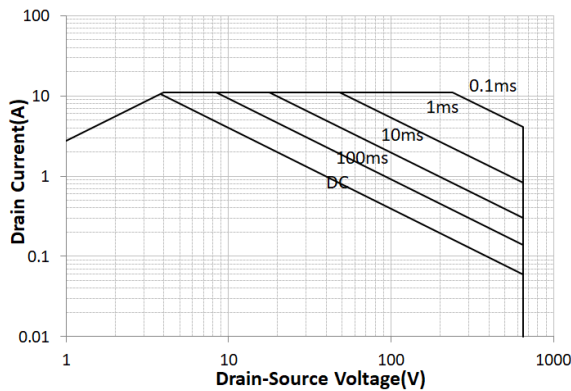
**Breakdown Voltage Variation vs. Temperature**



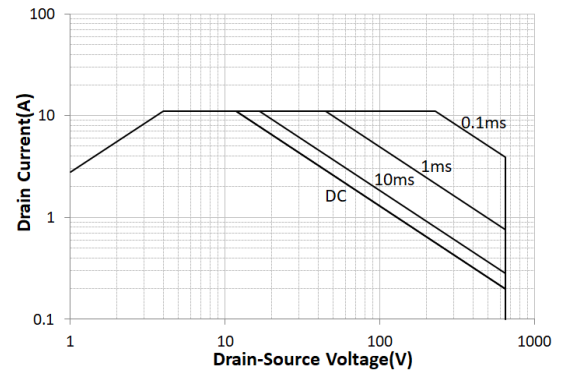
**On-Resistance Variation vs. Temperature**



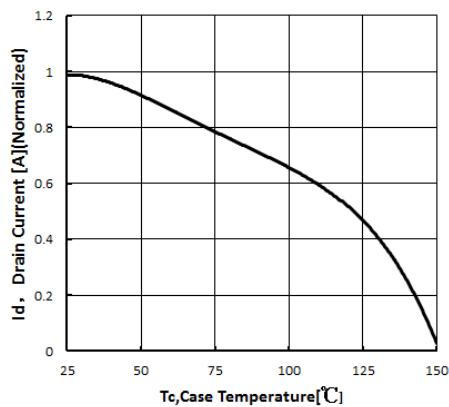
**Maximum Safe Operating Area For MS65R360/DPAK**



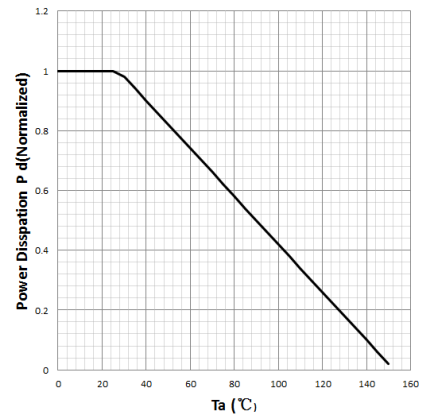
**Maximum Safe Operating Area For MS65R360/TO-220MF-K1**



**Maximum Drain Current vs. Case Temperature**



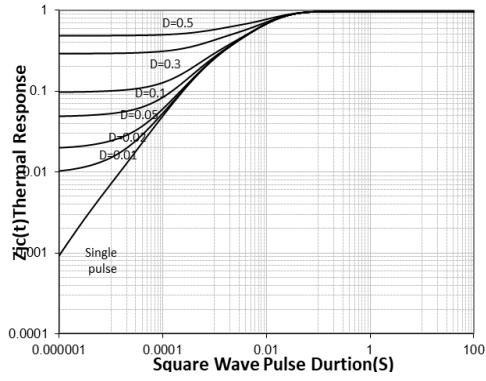
**Power Dissipation vs. Temperature**



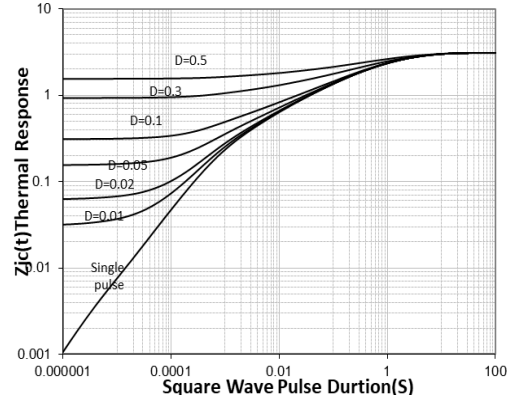


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

Transient Thermal Response Curve For MS65R360/DPAK



Transient Thermal Response Curve For MS65R360/TO-220MF-K1

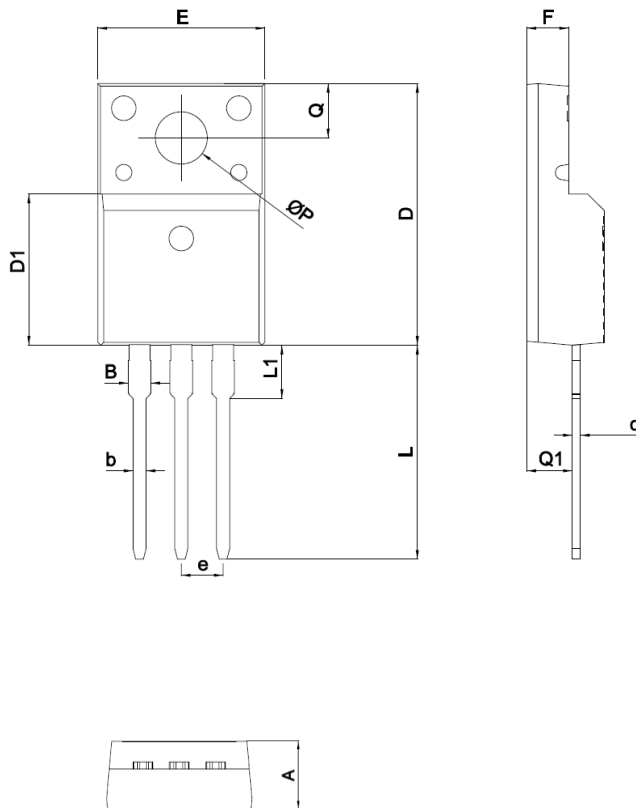




## 外形尺寸 PACKAGE MECHANICAL DATA

## TO-220MF-K1

单位 Unit: mm



SYMBOL	mm	
	MIN	MAX
A	4.5	4.9
B	1.22	1.47
b	0.7	0.9
c	0.45	0.60
D	15.6	16.1
D1	9.0	9.3
e	2.54TYPE	
E	9.9	10.4
F	2.3	2.8
L	12.6	13.3
L1	3.1	3.4
Q	3.2	3.4
Q1	2.6	2.9
$\Phi P$	3.0	3.5



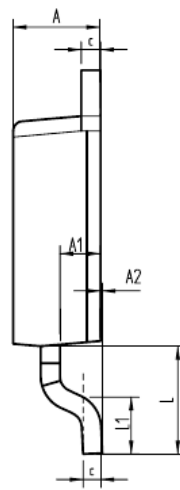
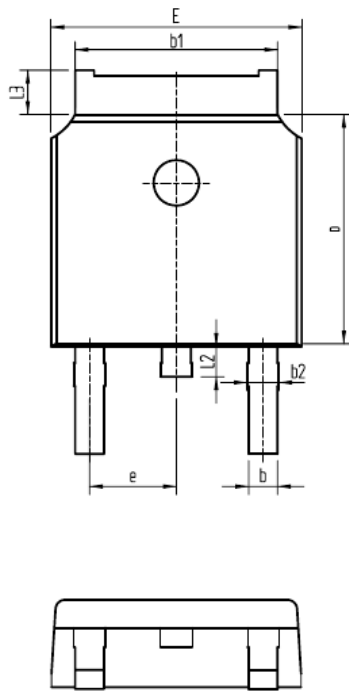




外形尺寸 PACKAGE MECHANICAL DATA

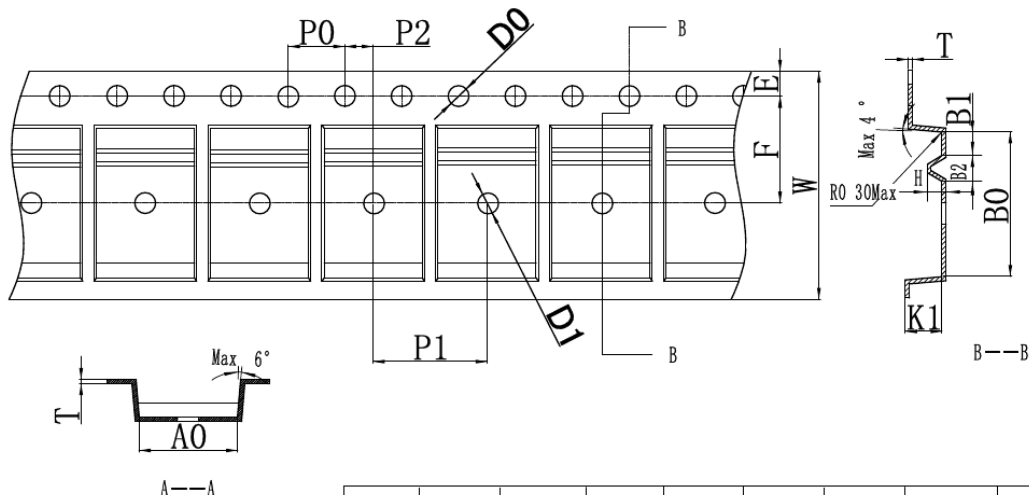
**DPAK**

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



SYMBOL	A0	B0	B1	B2	K1	P0	P1	P2
SPEC	6.96±0.10	10.49±0.1	1.65±0.05	1.44±0.05	2.79±0.10	4.00±0.10	8.00±0.10	2.00±0.10
SYMBOL	H	T	E	F	D0	D1	W	
SPEC	1.18±0.05	0.33±0.025	1.75±0.10	7.5±0.10	1.65±0.05	1.50 <sup>+0.25</sup> <sub>0</sub>	16.00 <sup>+0.3</sup> <sub>0.1</sub>	





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3. Please do not exceed the absolute maximum ratings of the device when circuit designing.
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