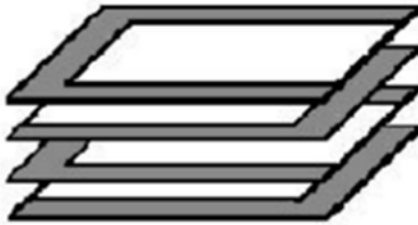


## **■ 多层片式压敏电阻器 (MLV)** **Multilayer chip varistors (MLV)**

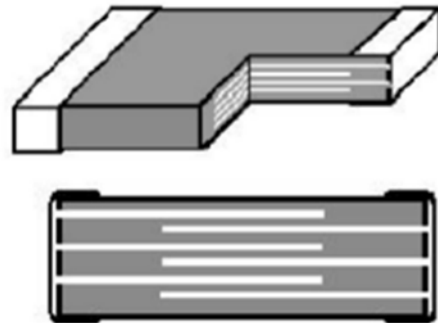
多层片式压敏电阻器 (MLV) 是一种浪涌电压抑制器。它是采用先进的叠层片式化技术制造的半导体陶瓷元件, 它能为被保护元件 (电路) 提供强有力的保护, 同时具有优良的浪涌能量吸收能力及内部散热能力。该元件是一种无引线的片式结构, 其寄生电感非常小、响应速度非常快 (响应时间 $<0.5\text{ns}$ ), 因此它具有优良的ESD及各种浪涌噪声的抑制能力。与传统的齐纳二极管和圆片压敏电阻器相似, 具有体积小、重量轻、响应速度快的特点。



Multilayer chip varistors (MLV) are transient voltage suppressors (TVS) which manufactured from semiconducting ceramics by the highly advanced multilayer formation technologies, which can offer rugged protection, excellent transient energy absorption and internal heat dissipation. The devices are leadless chip form, eliminating lead inductance and guaranteeing a faster speed of response time of less than  $0.5\text{ns}$ , which makes them fast enough to ensure reliable protection against ESD pulse and other specific transient events. These transient suppression devices are significantly smaller footprints and lower profiles than traditional zener diodes or radial MOVs.



Multilayer formation technologies



Section of the chip

### **◆ 特征**

#### **Feature**

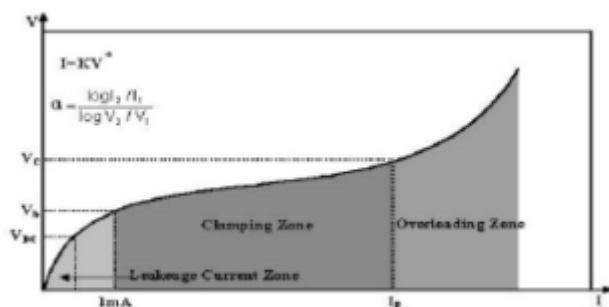
- \* 叠层片式陶瓷结构  
Multilayer ceramic construction technology.
- \* 无引线  
Leadless
- \* 温度范围:  $-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$   
Operating temperature:  $-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$
- \* 具有双向限制特性  
Inherent bi-directional clamping
- \* 漏电流非常小  
Very low leakage current
- \* 寄生电感小、响应速度快 (响应时间 $<0.5\text{ns}$ )  
Low Inductance, Fast response (Response time $<0.5\text{ns}$ )
- \* 优良的温度系数  
Excellent temperature coefficient
- \* 良好的焊接性能 (端电极为三层电镀)  
Good solderability (The electrode termination is selectable in plated )

## ◆压敏特性

### Voltage dependent characteristic

叠层片式压敏电阻器是一种对电压敏感的电阻器，具有对称的伏安特性，其阻值随着电压上升呈非线性下降，当电压在一定范围内进一步上升时，这种短路现象更加剧烈。

Transient voltage suppressors (varistors) are voltage-dependent electrical resistors with symmetrical V/I characteristic. Their resistance value decrease with increasing voltage, thus "short-circuiting" further rises in overvoltage.



## ◆术语解释

### Terms and descriptions

#### \* 直流工作电压

Working DC voltage ( $V_{W(DC)}$ )

在规定的环境条件下，保证压敏电阻器正常工作所允许连续施加的最大直流电压值，它也作为测量漏电流的参考点，在此电压通常小于元件的压敏电压。

This is the maximum continuous DC voltage, which may be applied up to the maximum operating temperature of the device. The rated DC operating voltage (working voltage) is also used as the reference point for leakage current. This voltage is always less than the breakdown voltage of the device.

#### \*交流工作电压

Working AC voltage ( $V_{W(AC)}$ )

在规定的环境条件下，保证压敏电阻器正常工作所允许连续施加的最大交流电压值。

This is the maximum continuous sinusoidal rms voltage, which maybe applied at any temperature up to the maximum operating temperature of the device.

#### \*最大浪涌电流

Maximum Surge current (Peak current  $I_P$ )

在规定的脉冲波形 (8/20  $\mu s$ ) 和相应的电压下，保证压敏电阻器正常工作所允许施加最大电流。这个脉冲可以施加在元件任意一端。

This is the maximum peak current, which may be applied for an 8/20  $\mu s$  impulse, with rated line voltage also applied, without causing device failure. The pulse can be applied to the device in either polarity with the same confidence factor.

#### \*最大的浪涌能量 (能量耐量 $E_s$ )

Maximum surge energy ( $E_s$ )

在单个规定的脉冲波形 (10/1000  $\mu s$ ) 下，保证压敏电阻器正常工作时，其所能承受的最大的脉冲能量。

This is the maximum rated transient energy which may be dissipated for a single current pulse at a specified impulse duration (10/1000 $\mu s$ ), with the rated DC or RMS voltage applied, without causing device failure.

#### \*漏电流 ( $I_L$ )

Leakage ( $I_L$ ) at rated DC voltage

在非传导模式下，该元件具有非常高的阻抗（接近  $10^9 \Omega$ ）在系统中呈开路状态，此时漏电流非常低（室温下  $<20 \mu A$ ）。与齐纳二极管不同，

叠层片式压敏电阻器具有低漏电流特性，在最高工作温度下，漏电流不超过 500  $\mu$  A。

In the no conducting mode, the device is at a very high impedance (approaching  $10^9$  ohms) and appears as an almost open circuit in the system. The leakage current drawn at this level is very low (<50  $\mu$ A at ambient temperature) and, unlike the zener diode, the multilayer varistors have the added advantage that, when operated up to its maximum temperature, its leakage current will not increase above 500  $\mu$ A.

#### \*压敏电压

Varistor voltage ( $V_{b(DC)}$ )

该电压是压敏电阻器从开路状态进入导通状态的电压值，标称压敏电压通常为 1mA 直流电流所对应的电压。

This is the voltage at which the device changes from the off state to the on state and enters its conduction mode of operation. The voltage is usually characterized at the 1mA point.

#### \*限制电压

Clamping voltage ( $V_c$ )

在规定脉冲波形 (8/20  $\mu$  s) 和电流下，元件两端产生的峰值电压，需要指出的是峰值电压和峰值电流的产生在时间上不一定要一致。

This is the peak voltage appearing across the suppressor when measured at conditions of specified pulse current and specified waveform (8/20  $\mu$  s). It is important to note that the peak current and peak voltage may not necessarily be coincidental in time.

#### \*电容量

Capacitance ( $C_p$ )

这是元件在规定频率 (1MHz) 和偏置电压 (0.5V) 下的电容量。

This is the capacitance of the device at a specified frequency 1MHz and bias 0.5V

### ◆应用

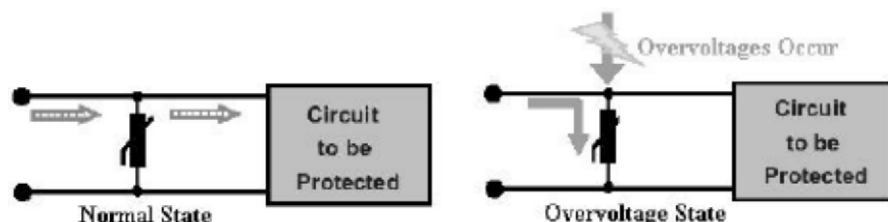
#### Application

##### 防止过电压

The prevention of overvoltage

当施加的电压升高到压敏电压时，压敏电阻器的电流急剧上升，被保护设备的浪涌电压迅速减小，从而使装有压敏电阻器的设备抗浪涌噪声能力达到相应要求。压敏电阻器可以抑制各种各样的浪涌电压，使电子设备免受干扰和破坏

When the voltage increases above the threshold of MLV, the suppressor will draw a rapidly increasing current, and then the overvoltage is considerably attenuated away from the protection of the equipments should be supplemented by including specific components that will raise the withstand capabilities to the required level. Varistors provide protection against all kind of overvoltage and prevent electronic equipment from being damaged by transient events.



#### 具体应用

Specific application

\*抑制各种感性负载切换或各种瞬间噪声在电路板中产生的 EFT 和浪涌电压。

Suppression of Inductive switching or other transient events such as EFT and surge voltage at the circuit board level

\*保护元件和电路，防止在电源供应、控制和信号线产生的 ESD。

Protection of components and circuits sensitive to ESD transients occurring on power supplies, control and signal lines.

\*为 IC、CMOS 和 MOSFET 提供在线过压保护。

Provides on-board transient voltage protection for ICs, CMOS and MOSFET.

\*在许多领域中可替换较大的表面贴装 TVS 齐纳二极管。

Replace larger surface mount TVS zeners in many applications

\*用于协助各种终端产品实现电磁兼容性。

Used to help achieve electromagnetic compliance of end products

### ◆ 产品规格型号表示方法

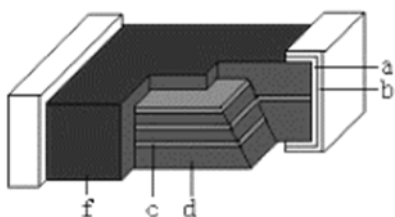
#### Part number identification

**FPV      3225      U      850      P      K      T      122**  
①          ②          ③          ④          ⑤          ⑥          ⑦          ⑧

① 产品代号 Product code		② 规格尺寸(L×W×T) (mm) Dimensions		③ 产品系列 Product Series		④ 直流工作电压 Working DC Voltage		⑤ 端头 Termination		⑥ 公差 Toleranc		⑦ 包装方式 Packaging Style	
FPV	叠层片式 压敏电阻 器	322513	3.2×2.5×1.3	U	高通流型 High surge current	850	85V	P	电镀 Plated	K	±10%	T	编带包装 Tape & Reel
	Multilayer chip varistor	453215	4.5×3.2×1.5			L	±15%						
		5750	5.7×5.0			M	±20%						
⑧ 浪涌电流 High surge current type													
122	1200A												

### ◆ 产品结构

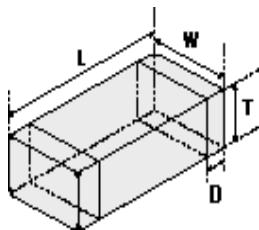
#### Product structure



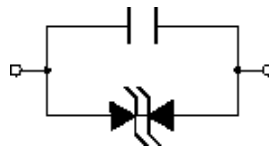
- a. 银层 Ag layer
- b. Ni/Sn 镀层 Ni/Sn plating
- c. 内电极 Inner electrode
- d. 瓷体 Body
- f. 玻璃层 Glass layer

### ◆规格尺寸及等效电路

#### Dimension & Equivalent circuit



Dimension



Equivalent circuit

单位(Unit): mm/inch

型号 Size	L	W	T	D
1608[0603]	1.6±0.15 [0.063±0.006]	0.8±0.15 [0.031±0.006]	1.0Max [0.039]	0.1~0.5 [0.004~0.020]
2012[0805]	2.0±0.20 [0.080±0.008]	1.2±0.20 [0.047±0.008]	1.2Max [0.047]	0.25~0.75 [0.010±0.03]
3216[1206]	3.2±0.20 [0.126±0.008]	1.6±0.2 [0.063±0.008]	2.0Max [0.079]	0.25~0.75 [0.010±0.03]
3225[1210]	3.2±0.30 [0.126±0.012]	2.5±0.25 [0.100±0.010]	2.6Max [0.104]	0.25~0.75 [0.010±0.03]
4532[1812]	4.5±0.30 [0.182±0.012]	3.2±0.30 [0.126±0.012]	3.2Max [0.126]	0.25~1.0 [0.010±0.039]
5750[2220]	5.90±0.20 [0.232±0.008]	5.10±0.20 [0.200±0.008]	3.2Max [0.126]	0.25~1.3 [0.010±0.051]

### ◆性能参数

#### Specification

##### \*片式压敏电阻器高通流系列

##### Multilayer chip varistor High surge current series

高耐能系列专为吸收电路中存在的能量较大的瞬态电压噪声而设计的，其通流量大，吸收功率大、响应速度快。

High surge current series is design to absorb the high energy transient voltage in circuit, which provide high rate current, highly energy absorb ability and fast response speed

##### \*应用

##### Application

. 抑制各种感性负载切换或各种瞬间噪声在电路板中产生的EFT和浪涌电压。

Suppression of Inductive switching or other transient events such as EFT and surge voltage at the circuit board level.

. 保护元件和电路，防止在电源供应、控制和信号线产生的ESD。

Protection of components and circuits sensitive to ESD transients occurring on power supplies, control and signal lines.

. 在许多领域中可替换较大的表面贴装TVS齐纳二极管。

Replace larger surface mount TVS zeners in many applications

1608 (0603) Type

规格型号 Part NO	工作电压 Working voltage		压敏电压 Varistor voltage @1mA DC	最大限制电 Maximum Clamping Voltage 8/20s		能量耐量 Energy absorb 10/1000s	峰值电流 Peak current 8/20s
	DC	AC	VB	Volts	Amps	Joules	Amps
	Volts	Volts	Volts				
FPV1608U180PKT101	18	12.7	25.0[22.0-28.0]	45	1.0	0.10	100
FPV1608U220PKT101	22	15.6	30.0[26.0-34.0]	50	1.0	0.10	100
FPV1608U260PKT101	26	18.4	36.0[32.0-40.0]	60	1.0	0.1	100
FPV1608U300PKT101	30	21.3	42.0[37.0-46.0]	70	1.0	0.10	100
FPV1608U380PKT800	38	30.0	50.0[46.0-54.0]	80	1.0	0.08	80
FPV1608U480PKT600	48	34.1	60.0[54.0-67.0]	110	1.0	0.08	60
FPV1608U560PKT600	56	40.0	68.0[61.0-75.0]	125	1.0	0.08	60
FPV1608U600PKT300	60	46.0	76.0[69.0-83.0]	130	1.0	0.05	30
FPV1608U650PKT300	65	50.0	82.0[73.0-91.0]	135	1.0	0.05	30
FPV1608U850PKT300	85	60	100.0[90.0-110.0]	165	1.0	0.05	30
FPV1608U101PKT300	100	75.0	120.0[108.0-132.0]	200	1.0	0.05	30

2012 (0805) Type

规格型号 Part NO	工作电压 Working voltage		压敏电压 Varistor voltage @1mA DC	最大限制电 Maximum Clamping Voltage 8/20s		能量耐量 Energy absorb 10/1000s	峰值电流 Peak current 8/20s
	DC	AC	VB	Volts	Amps	Joules	Amps
	Volts	Volts	Volts				
FPV2012U180PKT151	18	12.7	25.0[22.0-28.0]	45	5.0	0.3	150
FPV2012U220PKT151	22	15.6	30.0[26.0-34.0]	50	5.0	0.3	150
FPV2012U260PKT151	26	18.4	36.0[32.0-40.0]	60	5.0	0.3	150
FPV2012U300PKT151	30	21.3	42.0[37.0-46.0]	70	5.0	0.3	150
FPV2012U380PKT151	38	30.0	50.0[46.0-54.0]	80	5.0	0.3	150
FPV2012U480PKT151	48	34.1	60.0[54.0-67.0]	110	5.0	0.3	150
FPV2012U560PKT151	56	40.0	68.0[61.0-75.0]	125	5.0	0.3	150
FPV2012U600PKT101	60	46.0	76.0[69.0-83.0]	130	5.0	0.3	100
FPV2012U650PKT800	65	50.0	82.0[73.0-91.0]	135	5.0	0.3	80
FPV2012U850PKT800	85	60	100.0[90.0-110.0]	165	5.0	0.3	80
FPV2012U101PKT500	100	75.0	120.0[108.0-132.0]	200	5.0	0.3	50

3216 (1206) Type

规格型号 Part NO	工作电压 Working voltage		压敏电压 Varistor voltage @1mA DC	最大限制电 Maximum Clamping Voltage 8/20s		能量耐量 Energy absorb 10/1000s	峰值电流 Peak current 8/20s
	DC	AC	VB	Volts	Amps	Joules	Amps
	Volts	Volts	Volts				
FPV3216U180PKT501	18	12.7	25.0[22.0-28.0]	45	5.0	0.5	500
FPV3216U180PKT201	18	12.7	25.0[22.0-28.0]	45	5.0	0.3	200

FPV3216U220PKT501	22	15.6	30.0[26.0-34.0]	50	5.0	0.5	500
FPV3216U220PKT201	22	15.6	30.0[26.0-34.0]	50	5.0	0.3	200
FPV3216U260PKT501	26	18.4	36.0[32.0-40.0]	60	5.0	0.5	500
FPV3216U260PKT201	26	18.4	36.0[32.0-40.0]	60	5.0	0.3	200
FPV3216U300PKT501	30	21.3	42.0[37.0-46.0]	70	5.0	0.5	500
FPV3216U300PKT201	30	21.3	42.0[37.0-46.0]	70	5.0	0.3	200
FPV3216U380PKT501	38	30.0	50.0[46.0-54.0]	80	5.0	0.7	500
FPV3216U380PKT201	38	30.0	50.0[46.0-54.0]	80	5.0	0.4	200
FPV3216U480PKT501	48	34.1	60.0[54.0-67.0]	110	5.0	0.7	500
FPV3216U480PKT201	48	34.1	60.0[54.0-67.0]	110	5.0	0.4	200
FPV3216U560PKT201	56	40.0	68.0[61.0-75.0]	125	5.0	0.7	200
FPV3216U560PKT301	56	40.0	68.0[61.0-75.0]	125	5.0	0.7	300
FPV3216U560PKT151	56	40.0	68.0[61.0-75.0]	125	5.0	0.4	150
FPV3216U600PKT301	60	46.0	76.0[69.0-83.0]	130	5.0	0.7	300
FPV3216U600PKT151	60	46.0	76.0[69.0-83.0]	130	5.0	0.4	150
FPV3216U650PKT301	65	50.0	82.0[73.0-91.0]	135	5.0	0.7	300
FPV3216U650PKT151	65	50.0	82.0[73.0-91.0]	135	5.0	0.4	150
FPV3216U850PKT301	85	60	100.0[90.0-110.0]	165	5.0	0.7	300
FPV3216U850PKT151	85	60	100.0[90.0-110.0]	165	5.0	0.4	150
FPV3216U101PKT151	100	75.0	120.0[108.0-132.0]	200	5.0	0.7	150

3225 (1210) Type

规格型号 Part NO	工作电压 Working voltage		压敏电压 Varistor voltage @1mA DC	最大限制电 Maximum Clamping Voltage 8/20s		能量耐量 Energy absorb 10/1000s	峰值电流 Peak current 8/20s
	DC	AC	VB	Volts	Amps	Joules	Amps
	Volts	Volts	Volts				
FPV3225U180PKT601	18	12.7	25.0[22.0-28.0]	45	5.0	0.5	600
FPV3225U220PKT601	22	15.6	30.0[26.0-34.0]	50	5.0	0.5	600
FPV3225U260PKT601	26	18.4	36.0[32.0-40.0]	60	5.0	0.7	600
FPV3225U300PKT601	30	21.3	42.0[37.0-46.0]	70	5.0	0.7	600
FPV3225U380PKT601	38	30.0	50.0[46.0-54.0]	80	5.0	0.7	600
FPV3225U480PKT601	48	34.1	60.0[54.0-67.0]	110	5.0	1.0	600
FPV3225U560PKT601	56	40.0	68.0[61.0-75.0]	125	5.0	1.0	600
FPV3225U600PKT601	60	46.0	76.0[69.0-83.0]	130	5.0	1.0	600
FPV3225U600PKT102	60	46.0	76.0[69.0-83.0]	130	5.0	4.0	1000
FPV3225U600PKT122	60	46.0	76.0[69.0-83.0]	130	5.0	4.0	1200
FPV3225U650PKT601	65	50.0	82.0[73.0-91.0]	135	5.0	2.0	600
FPV3225U650PKT102	65	50.0	82.0[73.0-91.0]	135	5.0	4.0	1000
FPV3225U850PKT601	85	60	100.0[90.0-110.0]	165	5.0	2.0	600
FPV3225U850PKT122	85	60	100.0[90.0-110.0]	165	5.0	4.0	1200
FPV3225U101PKT501	100	75.0	120.0[108.0-132.0]	200	5.0	2.0	500

4532 (1812) Type

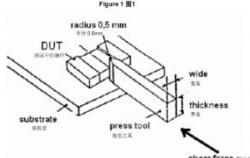
规格型号 Part NO	工作电压 Working voltage		压敏电压 Varistor voltage @1mA DC		最大限制电 Maximum Clamping Voltage 8/20s		能量耐量 Energy absorb 10/1000s	峰值电流 Peak current 8/20s
	DC	AC	VB					
	Volts	Volts	Volts	Δ VB	Volts	Amps	Joules	Amps
FPV4532U180PKT801	18	12.7	25.0[22.0-28.0]		45	5.0	0.7	800
FPV4532U220PKT801	22	15.6	30.0[26.0-34.0]		50	5.0	0.7	800
FPV4532U260PKT801	26	18.4	36.0[32.0-40.0]		60	5.0	0.7	800
FPV4532U300PKT801	30	21.3	42.0[37.0-46.0]		70	5.0	1.2	800
FPV4532U380PKT801	38	30.0	50.0[46.0-54.0]		80	5.0	1.2	800
FPV4532U380PKT102	38	30.0	50.0[46.0-54.0]		80	5.0	4.0	1000
FPV4532U480PKT801	48	34.1	60.0[54.0-67.0]		110	5.0	1.2	800
FPV4532U560PKT801	56	40.0	68.0[61.0-75.0]		125	5.0	1.5	800
FPV4532U600PKT801	60	46.0	76.0[69.0-83.0]		130	5.0	1.5	800
FPV4532U650PKT801	65	50.0	82.0[73.0-91.0]		135	5.0	2.0	800
FPV4532U650PKT122	65	50.0	82.0[73.0-91.0]		135	5.0	4.0	1200
FPV4532U850PKT801	85	60	100.0[90.0-110.0]		165	5.0	2.0	800
FPV4532U101PKT801	100	75.0	120.0[108.0-132.0]		200	5.0	2.0	800

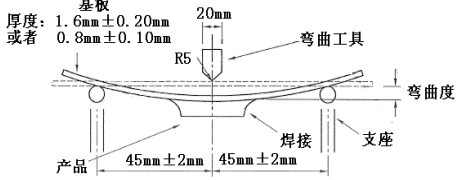
5750 (2220) Type

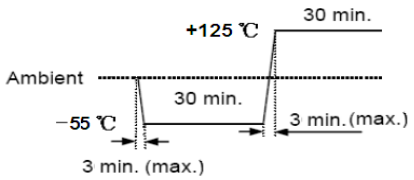
规格型号 Part NO	工作电压 Working voltage		压敏电压 Varistor voltage @1mA DC		最大限制电 Maximum Clamping Voltage 8/20s		能量耐量 Energy absorb 10/1000s	峰值电流 Peak current 8/20s
	DC	AC	VB					
	Volts	Volts	Volts	Δ VB	Volts	Amps	Joules	Amps
FPV5750U180PKT152	18	12.7	25.0[22.0-28.0]		45	10.0	1.8	1500
FPV5750U220PKT152	22	15.6	30.0[26.0-34.0]		50	10.0	1.8	1500
FPV5750U260PKT152	26	18.4	36.0[32.0-40.0]		60	10.0	2.0	1500
FPV5750U300PKT152	30	21.3	42.0[37.0-46.0]		70	10.0	2.0	1500
FPV5750U380PKT302	38	30.0	50.0[46.0-54.0]		79	10.0	12.0	3000
FPV5750U380PKT152	38	30.0	50.0[46.0-54.0]		80	10.0	3.0	1500
FPV5750U480PKT152	48	34.1	60.0[54.0-67.0]		110	10.0	4.0	1500
FPV5750U560PKT152	56	40.0	68.0[61.0-75.0]		125	10.0	4.0	1500
FPV5750U650PKT152	65	50.0	82.0[73.0-91.0]		135	10.0	4.0	1500
FPV5750U650PKT302	65	50.0	82.0[73.0-91.0]		135	10.0	10	3000
FPV5750U650PKT452	65	50.0	82.0[73.0-91.0]		135	10.0	18	4500
FPV5750U850PKT152	85	60	100.0[90.0-110.0]		165	10.0	4.0	1500
FPV5750U101PKT152	100	75.0	120.0[108.0-132.0]		200	10.0	4.0	1500



◆可靠性测试方法  
Reliability Test Method

序号 No.	项目 Items	要求 Requirements	试验方法及备注 Test Methods and Remarks
1	工作温度范围 Operating temperature range	-55 to +125℃	
2	可焊性 Solder ability	无可见机械损伤； 电极面 95%以上覆盖新的焊料。 No mechanical damage. 95% or more of electrode area shall be coated by new solder.	预热温度: 120℃ ~ 150℃ 预热时间: 60s 焊料: (96.5%Sn/3.0%Ag/0.5%Cu) 焊锡 焊锡温度: 245℃±3℃ 浸锡深度: 10mm 浸锡时间: 3±0.3s 浸渍到助焊剂约: 3 ~ 5 s Preheating temperature: 120℃ to 150℃ Preheating time: 60s Solder 96.5%Sn/3.0%Ag/0.5%Cu of the Sn solder. Solder temperature: 245±3℃ Immersion tin depth: 10mm Duration: 3±0.3s Dip performance to a flux of about: 3 ~ 5 s
3	耐焊接热 Resistance to soldering	无可见损伤； 压敏电压变化在±10%之内。 No Visible damage; Varistor voltage change within ± 10%.	预热温度: 120℃~150℃ 预热时间: 60s 焊料: (96.5%Sn/3.0%Ag/0.5%Cu) 焊锡 浸锡温度: 260℃±5℃ 浸锡深度: 10mm 浸锡时间: 10±1s 浸渍到助焊剂约: 3~5 s Preheating temperature: 120℃ to 150℃ Preheating time: 60s Solder 96.5%Sn/3.0%Ag/0.5%Cu of the Sn solder. Solder temperature: 260℃±5℃ Immersion tin depth: 10mm Duration: 10±1s Dip performance to a flux of about: 3~5 s
4	端子强度 Terminal Strength (SMD)	端电极没有破裂, 也不会脱离瓷体 The terminal electrode shall not be broken off nor the chip element.	速度 Speed: 1.0mm/S 保持时间 Keep time: 10S±1S 施加力 Applied force: 1608: 5N; 2012: 6N; 3216, 3225, 4532: 10N; 5750, 15N 

序号 No.	项目 Items	要求 Requirements	试验方法及备注 Test Methods and Remarks
5	抗弯强度 Flextrue strength	无可见损伤; 压敏电压变化在 $\pm 10\%$ 之内。 No Visible damage; Varistor voltage change within $\pm 10\%$ .	测试基板:玻璃环氧树脂基板 加压速度为 $(1 \pm 0.5)$ mm/s, 弯度: 2mm, 保持时间 $30s \pm 1s$ Testing board: glass epoxy-resin substrate For $(1 \pm 0.5)$ mm/s compression speed, curvature: 2mm, hold time $30s \pm 1s$ 。 
6	耐高温 High temperature resistance	无可见损伤; 压敏电压变化在 $\pm 10\%$ 之内。 No Visible damage; Varistor voltage change within $\pm 10\%$ .	测试温度: $125 \pm 2^\circ\text{C}$ Temperature: $125 \pm 2^\circ\text{C}$ 测试时间: $1000^{+24}_{-0}$ 小时 Duration: $1000^{+24}_{-0}$ hrs
7	耐低温 Loading at low temperature	无可见损伤; 压敏电压变化在 $\pm 10\%$ 之内。 No Visible damage; Varistor voltage change within $\pm 10\%$ .	温度: $-55 \pm 2^\circ\text{C}$ Temperature: $-55 \pm 2^\circ\text{C}$ 测试时间: $1000^{+24}_{-0}$ 小时 Testing time: $1000^{+24}_{-0}$ hrs
8	高温负载 High temperature load	无可见损伤; 压敏电压变化在 $\pm 10\%$ 之内。 No Visible damage; Varistor voltage change within $\pm 10\%$ .	测试温度: $125 \pm 2^\circ\text{C}$ Temperature: $125 \pm 2^\circ\text{C}$ 测试时间: $1000^{+24}_{-0}$ 小时 Testing time: $1000^{+24}_{-0}$ hrs 施加直流工作电压 Bias at Working Voltage Vdc.
9	高湿负荷(高温高湿) Biased Humidity load	无可见损伤; 压敏电压变化在 $\pm 10\%$ 之内。 No Visible damage; Varistor voltage change within $\pm 10\%$ .	温度: $60 \pm 2^\circ\text{C}$ Temperature: $60 \pm 2^\circ\text{C}$ ; 湿度: 90~95% RH Relative humidity: 90~95% RH 施加直流工作电压 Bias at Working Voltage Vdc. 测试时间: $1000^{+24}_{-0}$ 小时 Testing time: $1000^{+24}_{-0}$ hrs
10	振动 Vibration	无可见损伤; 压敏电压变化在 $\pm 10\%$ 之内。 No Visible damage; Varistor voltage change within $\pm 10\%$ .	频率: 10~55~10Hz Frequency 10 to 55 to 10Hz 振幅: 0.75mm Amplitude: 0.75mm X、Y、Z 方向的时间: 每方向 2 小时 Directions: 2hrs each in X,Y,Z direction

序号 No.	项目 Items	要求 Requirements	试验方法及备注 Test Methods and Remarks
11	温度冲击 Thermal shock	无可见损伤; 压敏电压变化在 $\pm 10\%$ 之内。 No Visible damage; Varistor voltage change within $\pm 10\%$ .	温度: $-55^{\circ}\text{C}$ , $30\pm 3$ 分钟 $+125^{\circ}\text{C}$ , $30\pm 3$ 分钟 Temperature: $-55^{\circ}\text{C}$ for $30\pm 3\text{min}$ $+125^{\circ}\text{C}$ for $30\pm 3\text{min}$ 转换时间: $\leq 3$ min Transforming interval : $\leq 3$ min 循环次数: 32 Number of cycles: 32 

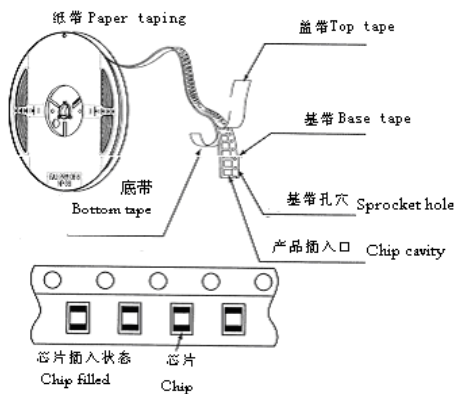
注: 以上要求测试电性能的项目, 应试验后在标准条件下放置 24 小时后测试。

Note: When there are questions concerning, measurement shall be made after  $24\pm 2\text{hrs}$  of recovery under the standard condition 注:

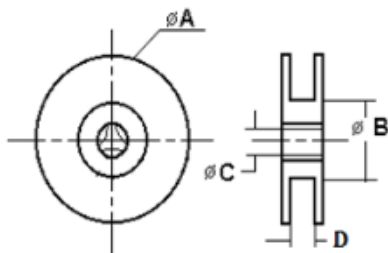
## ◆包装

### Packaging

#### ● 编带图 Taping drawings



#### ● 卷盘尺寸 Reel dimensions (Unit: mm)

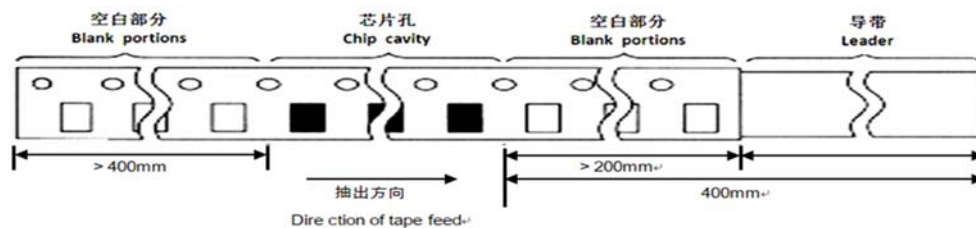


型号 Size	A	B	C	D
7 inch	$178\pm 2.0$	$60\pm 2.0$	$13.0\pm 1.0$	$9.5\pm 2.0$
13 inch	$330\pm 2.0$	$100\pm 2.0$	$13.5\pm 1.0$	$12.4\pm 2.0$

说明: 7 inch 适用 1608、2012、3216、3225 尺寸, 13 inch 适用 4532、5750 尺寸。

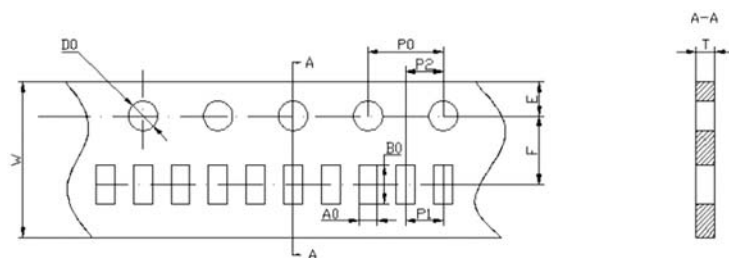
Note: 7 inch is available in 1608, 2012, 3216, 3225 sizes, 13 inch is available in 4532, 5750 sizes

● 导带及空格部分 Leader and blank portion



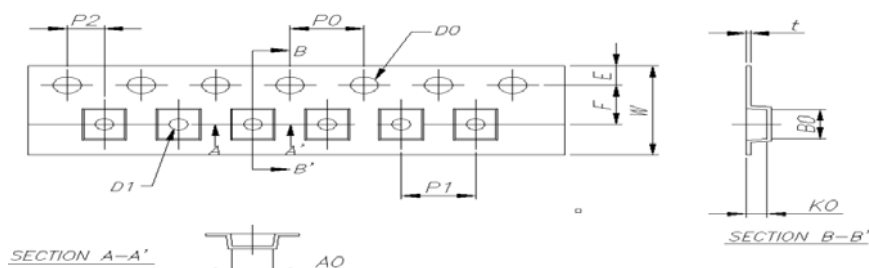
● 编带尺寸 Taping dimensions (Unit: mm)

\* 纸带 Paper tape



Part NO.	A0	B0	W	F	E	P1	P2	P0	D0	T
1608	1.05±0.20	1.85±0.20	8.00±0.20	3.50±0.10	1.75±0.20	2.00±0.20	2.00±0.10	4.00±0.20	1.55±0.10	0.95±0.10
2012	1.45±0.20	2.35±0.20	8.00±0.20	3.50±0.10	1.75±0.20	2.00±0.20	2.00±0.10	4.00±0.20	1.55±0.10	0.95±0.10

\* 塑料胶带 Embossed tape

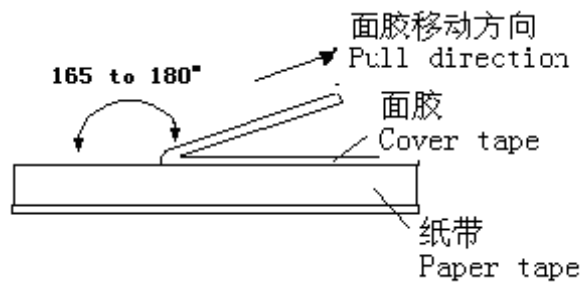


型号 Size	5750	4532	3225	3216	2012(12)
W	12.0+/-0.2	12.00+/-0.20	8.00+/-0.20	8.00+/-0.20	8.00+/-0.2
E	1.75+/-0.10	1.75+/-0.10	1.75+/-0.10	1.75+/-0.10	1.75+/-0.10
F	5.50+/-0.10	5.50+/-0.10	3.50+/-0.10	3.50+/-0.10	3.50+/-0.10
D0	1.50 +0.1	1.50+/-0.10	1.50+/-0.10	1.50+/-0.10	1.50+/-0.10
D1	1.50 +0.1	1.50+/-0.10	1.00+/-0.10	1.00+/-0.10	1.00+/-0.10
P0	4.00+/-0.10	4.00+/-0.10	4.00+/-0.10	4.00+/-0.10	4.00+/-0.10
P010	40.0+/-0.20	40.0+/-0.20	40.0+/-0.20	40.0+/-0.20	40.0+/-0.20
P1	8.0+/-0.10	8.00+/-0.10	4.00+/-0.10	4.00+/-0.10	4.00+/-0.10
P2	2.0+/-0.1	2.00+/-0.10	2.0+/-0.05	2.0+/-0.05	2.00+/-0.10
A0	5.1+/-0.20	3.66+/-0.10	2.77+/-0.10	1.88+/-0.10	1.52+/-0.10
B0	6.0+/-0.20	4.95+/-0.10	3.42+/-0.10	3.50+/-0.10	2.41+/-0.10
K0	2.0+/-0.1	1.85+/-0.10	1.55+/-0.10	1.27+/-0.10	1.35+/-0.10
t	0.3+/-0.05	0.24+/-0.10	0.22+/-0.10	0.22+/-0.10	0.23+/-0.10

厚型产品 thick products

型号 Size	5750	4532 (26)	3225 (26)	3216 (20)	2012(12)
W	12.0+/-0.2	12.00+/-0.20	8.00+/-0.20	8.00+/-0.20	8.00+/-0.2
E	1.75+/-0.10	1.75+/-0.10	1.75+/-0.10	1.75+/-0.10	1.75+/-0.10
F	5.50+/-0.10	5.50+/-0.10	3.50+/-0.10	3.50+/-0.10	3.50+/-0.10
D0	1.50 +0.1	1.50+/-0.10	1.50+/-0.10	1.50+/-0.10	1.50+/-0.10
D1	1.50 +0.1	1.50+/-0.10	1.00+/-0.10	1.00+/-0.10	1.00+/-0.10
P0	4.00+/-0.10	4.00+/-0.10	4.00+/-0.10	4.00+/-0.10	4.00+/-0.10
P010	40.0+/-0.20	40.0+/-0.20	40.0+/-0.20	40.0+/-0.20	40.0+/-0.20
P1	8.0+/-0.10	8.00+/-0.10	4.00+/-0.10	4.00+/-0.10	4.00+/-0.10
P2	2.0+/-0.1	2.00+/-0.10	2.0+/-0.05	2.0+/-0.05	2.00+/-0.10
A0	5.1+/-0.20	3.66+/-0.20	3.0+/-0.20	2.1+/-0.20	1.52+/-0.10
B0	6.0+/-0.20	4.95+/-0.10	3.9+/-0.10	3.9+/-0.10	2.41+/-0.10
K0	3.0+/-0.1	3.0+/-0.1	2.55+/-0.1	2.0+/-0.1	1.35+/-0.10
t	0.3+/-0.05	0.23+/-0.10	0.23+/-0.10	0.23+/-0.10	0.23+/-0.10

\* 剥离力检验 Peeling off force



(1) 盖带的剥离力：沿面胶移动方向拉时要求剥离力为 0.1N~0.7N。

Peeling force should be 0.1~0.7N pulling in the direction of arrow.

(2) 剥离速度：300mm/min。

Speed of peeling off: 300mm/min.

(3) 在纸带剥落时，面胶不能有破损，不能粘纸带。

The cover bond should not be damaged and bond the tape when it peeled off.

● 包装数量（单位：粒）Packaging number (Unit: Pcs )

型号 Size	5750	4532	3225	3216	2012	1608
每卷数量 REEL	3000	3000	3000	3000	4000	4000
每盒数量 BOX	12000	12000	30000	30000	40000	40000
每箱数量 CASE	36000	36000	180000	180000	240000	240000

型号 Size	5750 (32)	4532 (32)	3225 (26)	3216 (20)	2012 (12)
每卷数量 REEL	2500	2500	1500	1500	3000
每盒数量 BOX	10000	10000	15000	15000	30000
每箱数量 CASE	30000	30000	90000	90000	180000

● 标签粘贴位置 Label stick station

卷盘标签 Reel label	纸盒标签 Carton label	纸盒标签 Carton label	外箱标签 Outer box label
			

◆ 推荐焊接条件 Recommend Soldering Conditions

● 焊接条件 Soldering Conditions

- \* 产品适用于回流焊 Products can be applied to reflow soldering.
- \* 焊接要求

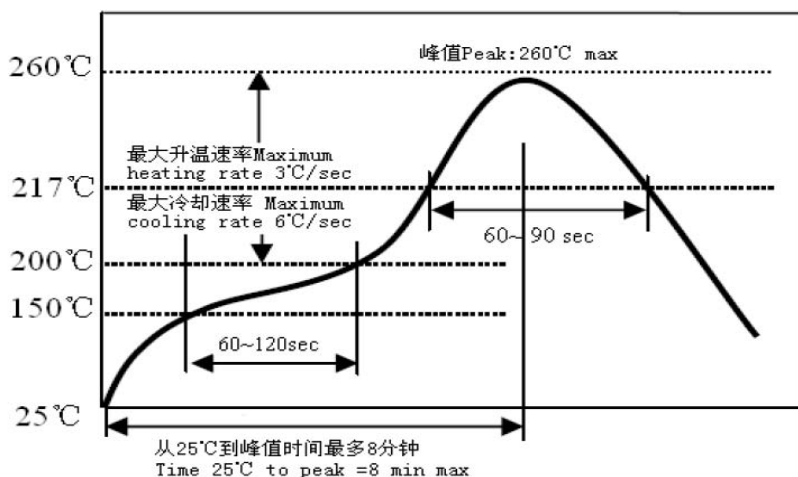
(1) 预热时, 产品表温与焊料温度的温差最大不允许超出 150℃, 焊接完冷却时, 产品表温与溶剂温度之间的温差最大不超过 100℃。预热不足有可能引发产品表面裂纹, 从而导致产品品质下降。

Pre-heating should be in such a way that the temperature difference between solder and ferrite surface is limited to 150℃ max. Also cooling into solvent after soldering should be in such way that the temperature difference is limited to 100℃ max. Un-enough pre-heating may cause cracks on the ferrite, resulting in the deterioration of product quality.

(2) 产品要在以下画出的曲线允许的范围内进行焊接。其它焊接条件可能引起产品电极的腐蚀。当焊接重复时, 允许的时间为第一次做的累计时间。

Products should be soldered within the following allowable range indicated by the slanted line. The excessive soldering conditions may cause the corrosion of the electrode. When soldering is repeated, allowable time is the accumulated time.

● 回流焊曲线 Reflow soldering profile



- (1) 预热条件: 150 ~ 200℃ / 60 ~ 120 秒; Preheat condition: 150 ~ 200℃ / 60~120sec
- (2) 允许大于 217℃ 时间: 60—90 秒; Allowed time above 217℃: 60~90sec
- (3) 最大温度: 260 ℃; max temp: 260 ℃
- (4) 最高温的最大时间: 10 秒; max time at max temp: 10 sec
- (5) 焊膏: Sn/3.0Ag/0.5Cu; Solder paste: Sn/3.0Ag/0.5Cu
- (6) 回流焊次数: 最多 2 次; Allowed Reflow time: 2x max

### ● 手工焊接 Iron soldering

烙铁温度：350℃ Perform soldering at 350℃ on 30W max

功率：最大为 30W Time: < 5S

烙铁停留时间：< 5S（注意不要将烙铁碰到产品端电极）Take care not to apply the tip of the soldering iron to the terminal electrodes



## ◆清洗 Cleaning

### ● 清洗条件 Cleaning Conditions

(1) 清洗温度：60℃（最高） Cleaning temperature : 60℃ max

(2) 清洗时间：1 分钟（最少） Cleaning time: 1 minute min.

(3) 超声波功率：最大为 200W Ultrasonic output power: 200W max

## ◆存储要求 Storage Requirements

### ● 存储期限 Storage period

距电感公司出厂检验时间 1 年内，产品可以使用检验时间可以通过包装外侧标记的检验号确认。若时间超过 1 年，应检查焊接性能后方可使用。

Products which inspected inductor company over 1 year ago should be examined and used, which can be Confirmed with inspection No. marked on the container. Solder ability should be checked if this period is exceeded.

### ● 存储条件 Storage conditions

(1) 存放货物的库房应满足以下条件：温度：-10 ~ +40℃，相对湿度：30 ~ 70%。

(2) 禁止将产品保管在腐蚀性物质中，如硫磺、氯气或酸，否则将引起端头氧化，导致降低焊接性。

(3) 为了避免受潮气、灰尘等物质的影响，产品应保管于货架上。

(4) 产品保管在库房中，应避免热冲击、振动以及直接光照等等。

(5) 产品应密封包装。

(1) Products should be storage in the warehouse on the following conditions:

Temperature : -10~+40℃ Humidity: 30~70% relative humidity

(2) Don't keep products in corrosive gases such as sulfur, chlorine gas or acid , or it may case oxidization of Electrodes resulting in poor solder ability.

(3) Products should be stored on the palette for the prevention of the influence from humidity, dust and so on.

(4) Products should be stored in the warehouse without heat shock, vibration, direct sunlight and so on.

(5) Products should be stored under the airtight packaged condition.

## ◆ODS（消耗臭氧层物质）的使用情况 Usage Of ODS

对于以下所列物质，我公司在生产过程中绝不使用。

ODS: CCl<sub>4</sub>（四氯化碳）、HCFC 等。

For ODS listed below , we don't use in process.

ODS: CCl<sub>4</sub>, HCFC, etc.

## ◆注意事项 Notes

(1) 若本次承认的为“整体无铅”产品，则表明该产品符合 RoHS 指令的要求。

(2) 本承认书保证我司产品作为一个单体时的质量情况，当我司产品被安装到贵司产品上时请保证贵司的产品已根据贵司的规范进行了有效评价和确认。

(3) 如果贵司对我司产品的试用已超过了本测试规范所界定的产品功能，对于此所引发的失效我司将不予保证。

(1) If the parcel label on product is "Unitary lead free" that indicate the products in accord with ROHS

appointed requests.

(2) This product specification guarantees the quality of our product as a single unit, Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.

(3) We can't warrant against failure caused by any use of our product that deviates from the intended use as described in this product specification.



## ■修订履历 Revision of resume

[illegible]

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