

WWAB7.3-05

SPECIFICATION FOR APPROVAL

承认书

Spec. No.: TR-SMD-200110

Issued Date: Jan 10th, 2020

CUSTOMER:

客户

PART NAME: SMD Disk Varistors

名称 SMD 压敏电阻器

APPLICATION: Absorb the surge voltage

用途 吸收浪涌电压

PART NO.:

料号 **TR-SMD series**

CUSTOMER PART NO.:

客户料号

FOR CUSTOMER APPROVAL

客户承认栏

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批准

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1.Part Numbering

TR SMD - 07D 471 K H
 ① ② ③ ④ ⑤ ⑥

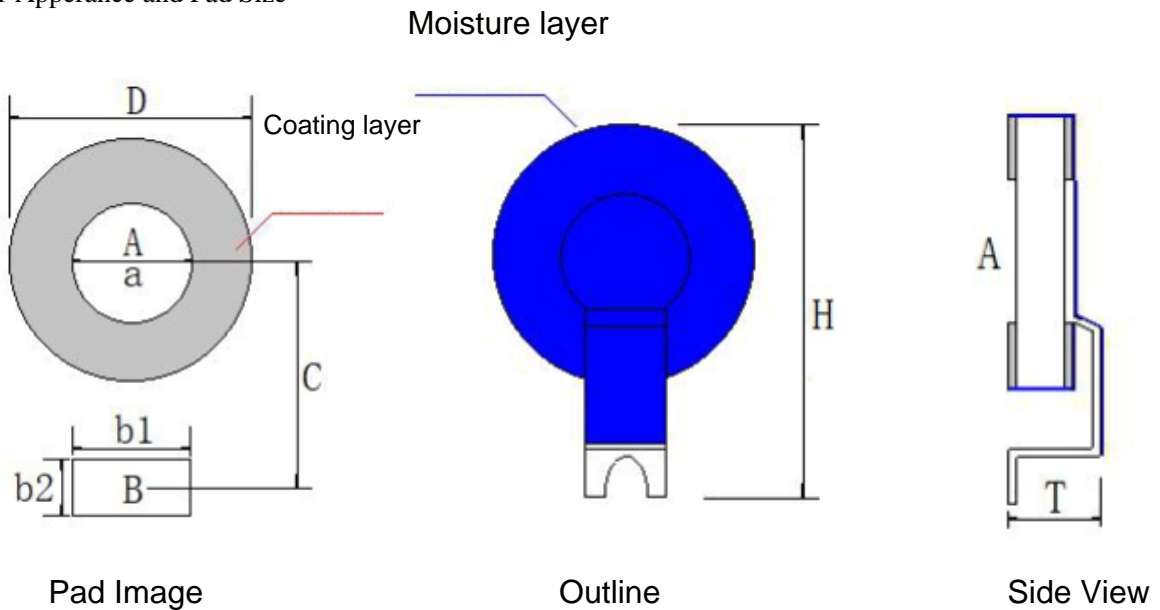
①	②	③		④		⑤		⑥	
Tianrui	Product Type	Chip Size		Volage		Tolerance		Level	
	SMD 贴片	07	Φ7	271	270V	K	±10%	H	High temp
	BSMD 涂装贴片	10	Φ10	471	470V			J	High Surge

2.Specification(Size:mm)

Spec	Dmax	H	Tmax	Pad centre distance C	Pad A	Pad B	
					Φa	b1	b2
07D271K	7.8	11.1	3.5	6.75	3.3	3.8	2.5
07D471K							
07D511K							
07D561K							
10D271K	11.5	14.2	3.5	8.25	4.0	4.0	2.5
10D471K							
10D511K							
10D561K							

3.Apperance and Pad size

3.1 Apperance and Pad Size



Note : We advise L wire for Pad A and N wire for Pad B when design PCB; also, varistor chip must be bypassed when laying out copper (Chip diameter D).

3.2 Marking

7D471K --Φ7, 470V±10%

3.3 Product structure and materials

S. NO	Components	Name
1	Varistor Chip	Zinc oxide ceramics
2	Electrode	Silver paste
3	Lead wire	Tinned metal bracket
4	Solder material	Lead-free solder
5	Coating	Lightning protection glaze/epoxy resin
6	Moisture barrier	Epoxy Resin

4. Product Manual

4.1 Features

TR-SMD SMD Varistor series is a patented product specially developed for surface mounting. Because of its good heat dissipation, it has the advantages of other types of SMD products, and also has high combined wave resistance, high working voltage capability, low residual voltage, and insulation High voltage, BSMD series are not prone to oxygen

The specific features are as follows:

- 1) Suitable for reflow soldering with surface mounting technology, and the metal pins will not drop out;
- 2) High anti-combined wave ability, and the impact time interval can be shortened to 10 seconds;
- 3) High working voltage, which is more than 30V higher than other types of varistor working voltage;
- 4) Low residual voltage;
- 5) High insulation voltage and good resistance to hot flashes;
- 6) The structure is small and exquisite, the top is high and low;
- 7) Small inductance structure with fast response;
- 8) High working temperature: -40°C~+125°C.

4.2 Application

- LED lights;
- Power supply: switching power supply;
- Communication equipment
- Household appliances;
- Industrial equipment;

4.3 Choose Advices

For different application voltage environments, the following pressure-sensitive combinations are recommended to provide transient overvoltage, surge, and lightning protection for AC LED lights:

Combination wave requirements	Working Voltage	Pre-stage varistor parameters	Post-level varistor parameters	Series resistor	Light type	Remark
2KV/1KA	110Vrms±20%	07D271K	-	add resistor or not	indoor high power	
	220~230Vrms±20%	07D471K	-	add resistor or not	indoor high power	
	240Vrms±20%	07D511K	-	add resistor or not	indoor high power	India, Brazil
4KV/2KA	110Vrms±20%	10D271K	-	add resistor or not	outdoor	
	220~230Vrms±20%	10D471K		add resistor	Outdoor	
		10D511K	7D471K	add resistor	Outdoor	
		10D561K	-	add resistor	Outdoor	
240Vrms±20%	10D561K	7D471K	add resistor	Outdoor	India, Brazil	
Remark	1. A series resistor before the varistor can improve the safety performance of the varistor while effectively reducing the residual voltage; 2. For 4KV/2KA combined wave requirements, the "resistor + varistor" scheme can be adopted for low power, and the two-level design scheme "varistor + resistance + varistor" can be adopted for high power, which can improve the ability to resist combined waves. At the same time, the residual pressure is effectively reduced. 3. If there are special requirements for the residual voltage, in addition to the series resistor can effectively reduce the residual voltage, the pressure-sensitive lower limit product can also be customized.					

5. Main Electrical Properties

P/N	Varistor Voltage V1mA (V)	Max. Continuous working voltage		Max limit voltage (8/20μs)		Max flow energy (8/20μs) 40time (A)	Max Static power (W)	Energy (J)		Typical Capacitance (Ref.) @1KHZ (pF)
		AC (Vrms)	DC (V)	Vc (V)	IP (A)			2ms	10/1000 μs	
07D271K	270±10%	175	225	460	10	1000 (@2KV)	0.25	12.6	24	170
07D471K	470±10%	300	385	780				26.8	42	100
07D511K	510±10%	320	418	840				28.0	45	90
07D561K	560±10%	350	460	925				28.0	45	90
10D271K	270±10%	175	225	460	25	2000 (@4KV)	0.40	30	49	350
10D471K	470±10%	300	385	780				52	85	230
10D511K	510±10%	320	418	840				52	92	210
10D561K	560±10%	350	460	925				52	92	190

6. Electrical Performance Testing

NO.	Item	Condition	Performances
6.1	Appearance	Visual inspection	No visual damage
6.2	Marking	Visual inspection	Clear marking
6.3	Size	Use calipers to measure	Meet 2. Specification
6.4	Solderability	Immerse the metal pins of the varistor in the soldering solution at 245°C±5°C for 3±0.5s, and then observe the appearance.	Meet 7.1
6.4	Voltage	Add 1mA current to test the voltage at both ends	Meet 5.
6.5	Max.continuous VAC	max value of AC voltage that can be continuously applied to the varistor at an ambient temperature of 25°C.	Meet 5.
	Max.continuous VDC	Max value of the DC voltage that can be continuously applied to the varistor at an ambient temperature of 25°C.	
6.6	Energy	With a specific pulse current (2ms waveform, 10/1000μs can also be taken) applied to the varistor, the change rate of the varistor voltage is within 10% of max energy.	Meet 5.
6.7	Max.flow energy	Apply a specific combination wave (8/20μs waveform) to the varistor, the varistor The maximum peak current with a rate of change of pressure within 10%.	Meet 5.
6.8	Capacitance	f=1KHz; Test Level ≤1Vrms.	Meet 5.

7. Reliability Testing

NO.	Item	Requirements	Conditions
7.1	Solderability	The tin is evenly applied to the immersion tin part, and the tin area is ≥90%.	Immerse the metal pins of the varistor in the soldering liquid at 245°C±5°C Take it out in 3±0.5s and observe the appearance.
7.2	Resistance to welding heat	No visible damage. Varistor voltage change rate before and after the test $ \Delta V/V1mA \leq 5\%$.	265±3°C 5±1 second for 05D series 10±1 second applies to 07D/10D series
7.3	High temperature load	Varistor voltage change rate before and after the test $ \Delta V/V1mA \leq 10\%$, Limit voltage change rate ≤±20%	125±2°C, 1000±24 hours, apply VDC or Vrms (maximum continuous working voltage) for 90 minutes.
7.4	Lead terminal strength	Varistor voltage change rate before and after the test $ \Delta V/V1mA \leq 5\%$.	Apply a tensile force to the axial direction of the lead-out end and in the direction away from the main body of the sample, and apply a load of 10N for 10 seconds.

8. Delivery inspection

Sampling method IEC410 / DIN ISO 2859-1 (GB/T2828.1-2003) ;

S. NO	Item	IL	AQL
8.1	Physical dimension	II	0.65
8.2	Marking	II	0.65
8.3	Solderability	S-3	2.5
8.4	Variator voltage	II	0.65

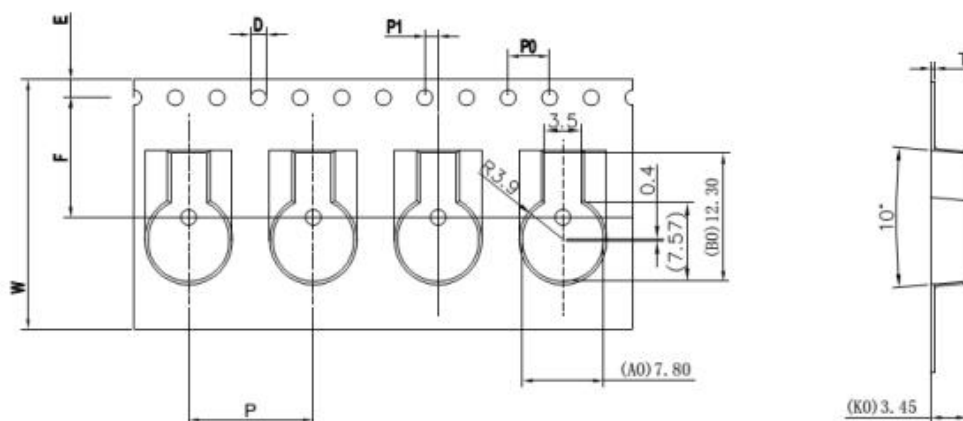
9. Use environmental conditions

Ambient temperature	-40°C~+125°C
Relative humidity	≤95%
Atmospheric pressure	86~106Kpa
Vibration frequency	10~50HZ
Acceleration	98m/S ²
Storage temperature	-40°C~+85°C

10. Package Method

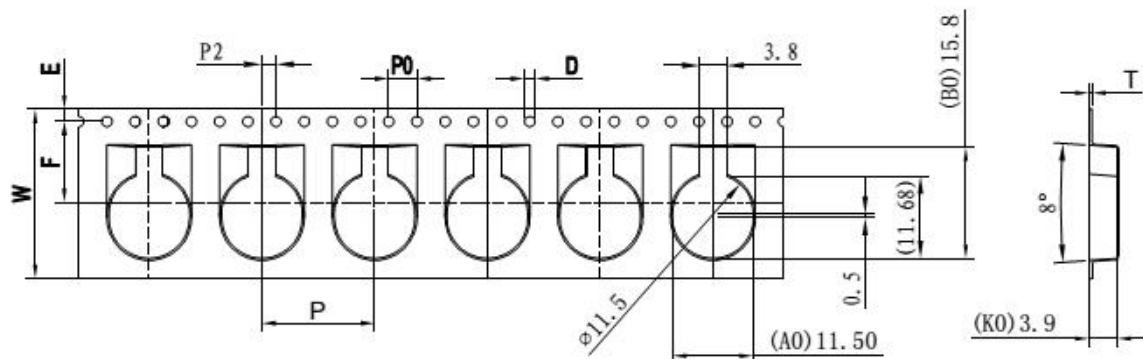
1) 7D: 24 Feeder, 15 inch reel, 5 reels*2K/reel=10K/carton

W	A ₀	B ₀	K ₀	P	P ₀	P ₂	F	E	T	D ₀
24.00 ^{±0.10}	7.50 ^{±0.10}	12.30 ^{±0.10}	3.45 ^{±0.10}	12.00 ^{±0.10}	4.00 ^{±0.10}	2.00 ^{±0.10}	11.50 ^{±0.10}	1.75 ^{±0.10}	0.35 ^{±0.05}	1.50 ^{±0.10}



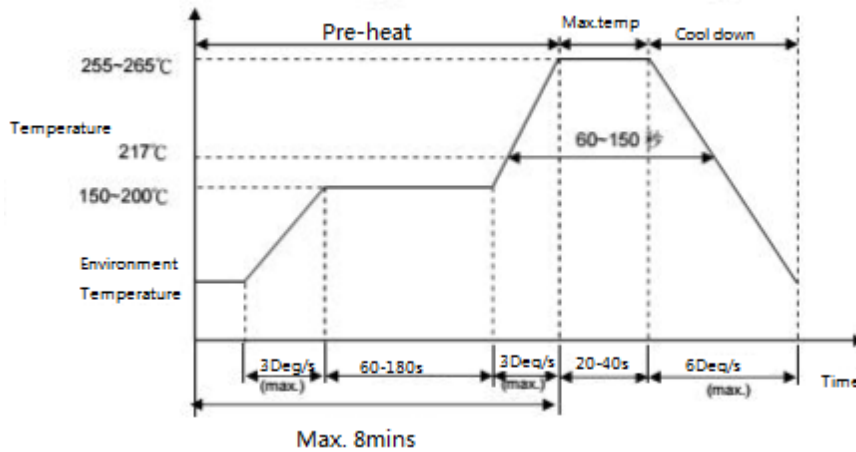
2) 10D: 24 feeder, 15 inch reel, 5 reels*1.4K/reel=7K/carton

W	A ₀	B ₀	K ₀	P	P ₀	P ₂	F	E	T	D ₀
24.00 ^{±0.10}	11.50 ^{±0.10}	15.80 ^{±0.10}	3.90 ^{±0.10}	16.00 ^{±0.10}	4.00 ^{±0.10}	2.00 ^{±0.10}	11.50 ^{±0.10}	1.75 ^{±0.10}	0.35 ^{±0.05}	1.50 ^{±0.10}



11. Welding condition

11.1 Reflow soldering curve



SMD varistor is soldered with lead-free solder, and the silver side of the chip is used as one of the soldering surfaces. Therefore, the above reflow soldering curve is recommended for soldering. If the above conditions (265°C/20S-40S, in and out time 8~10 minutes) are exceeded, soldering, Please pay attention to the problem of tin melting and the virtual silver electrode on the bonding surface.

Welding problem.

11.2 Soldering iron heavy industry welding conditions

Item	Condition
Soldering iron tip temperature	350°C (max)
Welding time	3s(max)
Diameter of soldering iron tip	Φ3mm(max)

12.V-I Characteristic Table

Part Number	Current Voltage						
	10 ⁻³	10 ⁻²	10 ⁻¹	10 ⁰	10 ¹	10 ²	10 ³
7D271	270	320	370	390	440	520	750
7D471	470	560	600	670	760	900	1170
7D511	510	620	670	720	840	990	1300
10D271	270	310	360	380	430	500	640
10D471	470	560	610	650	740	820	1100
10D511	510	620	670	710	800	880	1280
10D561	560						