Approval Sheet

Customer Information

Customer	
Part Name	
Part No.	
Model No.	

COMPANY	PURCHASE	R&D

Vendor Information

Name	SFI Electronics Technology Inc.
Part Name	Chip Surge Protection Device (CSPD) Series
Part No.	Super High Voltage (Ring Wave) Device – SFI0604SR271-2R5K
Lot No.	

SFI Electronics Technology Inc.

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Quality Control	Document Control	Business Issue	
TÜVRheinland CERTIFIED ISO 9001:2008 ISO 14001:2004 ISO/TS 16949:2009 Management System www.tuv.com ID 1100008833	REV : B	Prepared	Check
	SFI Electronics Technology INC. 2018 11. 06 Issue Date Document Control Center		

PART NO. SFI0604SR271-2R5K

1.1 Technology Data	Symbol		Value	Unit
Maximum allowable continuous AC voltage at 50-60Hz	V_{RMS}		175	V
Maximum allowable continuous DC voltage	V_{DC}		225	V
Breakdown voltage	V_B		270(±10%)	V
Maximum allowable clamping voltage	V_C		450	V
Maximum ring wave voltage (@30Ω)	$V_{Ring\ wave}$		2.5	KV
1.2 Reference Data				
Typical capacitance value measured at 1KHz	C		20	pF
Response time	T_{rise}	<	1	ns
Non-linear coefficient	α	>	15	
Leakage current at V_B × 80% (at initial state)	I_{VB}	<	50	μA
Leakage current at V_B × 80% (after surge test)	I_{VBA}	<	200	μA
Operation ambient temperature	T_{OPT}		-40~+125	℃
Storage temperature range	T_{STG}		-40~+150	℃
1.3 Other Data				
Body			Nano special ceramic	
End termination			Ag/Ni/Sn	
Packaging			Reel	
Complies with standard			IEC61000-4-12 UL 1449, File No. E334409-VZCA2	
Complies with RoHs standard			Yes	
Lead content		<	1000	ppm
Marking			None	

Notes :

＊1 The breakdown voltage was measured at 1mA.

＊2 The clamping voltage was measured at 8/20μs standard current, 0603(1A).

＊3 The capacitance value only for customer reference, it's not formal specification.

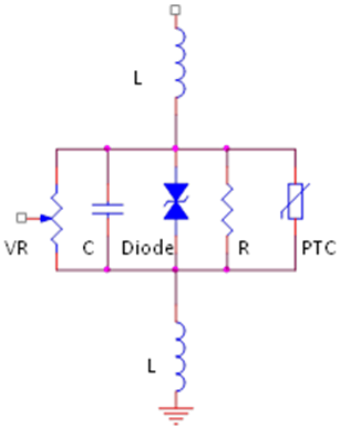
＊4 The components shall be employed within 1 year, in the nitrogen condition.

1.4 Features of SHR Series

1. RoHS compliant
2. SMD type body size 0604
3. Meet IEC61000-4-12 and UL1449 standards
4. Bidirectional and symmetrical V/I characteristics
5. Large withstanding ring wave voltage capability : 2.5KV (@30Ω)
6. Operating temperature range : -40~+125℃
7. Multi-Layers construction provides higher power dissipation

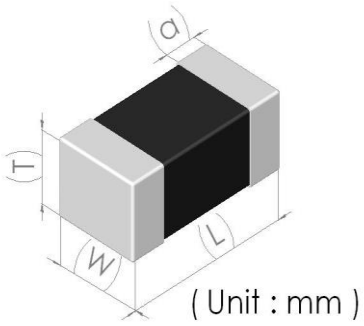
Equivalent Circuit

☆L Body Inductance
☆C Device Capacitance
☆VR Voltage Variable Resistor
☆R Insulation Resistor
☆Diode Voltage Clamped
☆PTC for Low Leakage Current

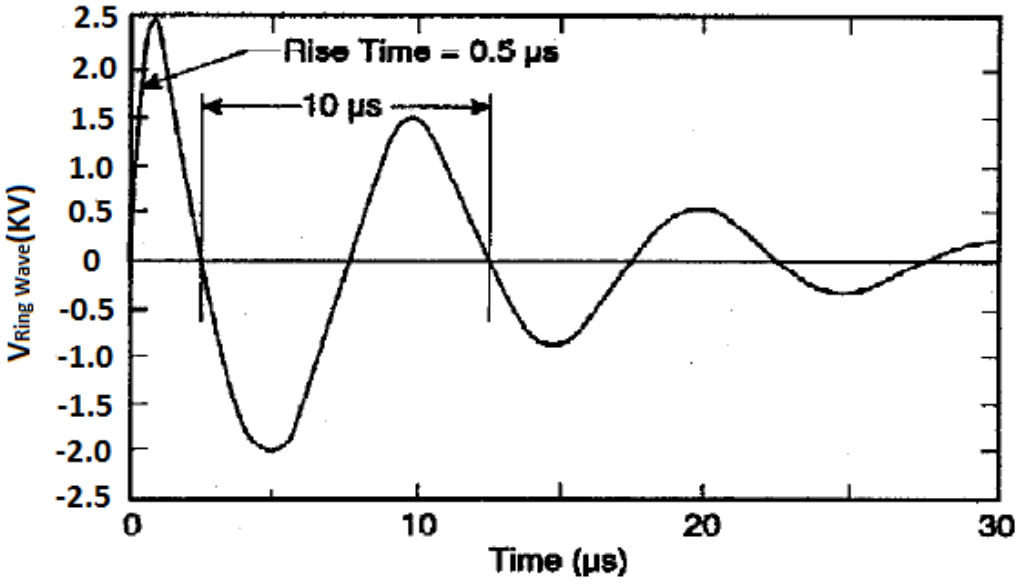


2. Size

Model	0604 Series
Length(L)	1.60±0.15
Width(W)	1.05±0.10
Thickness(T)	1.15 max.
Termination(a)	0.25±0.10



3. Ring Wave Waveform



4. Enviromental Reliability Test

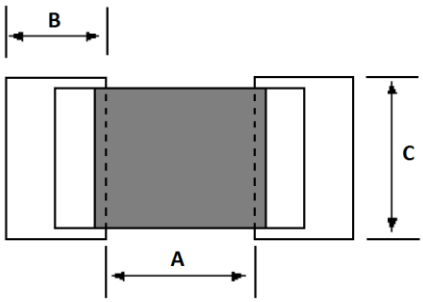
Item	Requirement	Test condition
High Temperature Storage	1.Breakdown voltage change : within ±10% 2.No mechanical damage	1.Temperature : 150±2℃ 2.Time : 1000±2 hours 3.Test after placing in ambient temperature for 24 hours.
Low Temperature Storage	1.Breakdown voltage change : within ±10% 2.No mechanical damage	1.Temperature : -40±2℃ 2.Time : 1000±2 hours 3.Test after placing in ambient temperature for 24 hours.
Temperature Cycle	1.Breakdown voltage change : within ±10% 2.No mechanical damage	1.Step 1 : -40±3℃; time : 30±3min 2.Step 2 : 25℃; time : 1 hour 3.Step 3 : 125±3℃; time : 30±3min 4.Step 4 : 25℃; time : 1 hour 5.Number of cycle : 5 times 6.Test after placing in ambient temperature for 24 hours.
High Temperature Load	1.Breakdown voltage change : within ±10% 2.No mechanical damage	1.Temperature : 125±2℃ 2.Rated working voltage applied 3.Time : 1000±2 hours 4.Test after placing in ambient temperature for 24 hours.
Damp Heat Load/ Humidity Load	1.Breakdown voltage change : within ±10% 2.No mechanical damage	1.Temperature : 40±2℃ 2.Humidity : 90~95% RH 3.Rated working voltage applied 4.Time : 500±2 hours 5.Test after placing in ambient temperature for 24 hours.

5. Soldering Recommendations

5.1 Recommended solder pad layout

(Unit : mm)

	A	B	C
0604	1.0~1.2	0.9~1.2	1.1~1.3

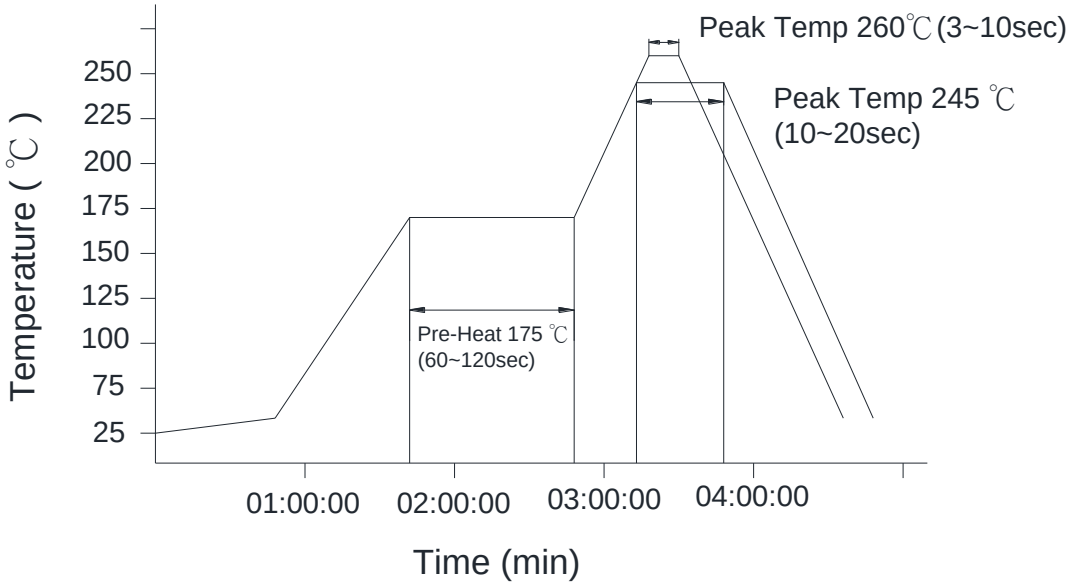


5.2 The SIR test of the solder paste shall be done (Based on JIS-Z-3284)

5.3 Steel plate and foot distance printing

Foot distance printing (mm)	Steel plate thickness (mm)
≧0.65mm	0.18mm
0.50~0.65mm	0.15mm
0.40~0.50mm	0.12mm
≦0.40mm	0.10mm

5.4 The IR reflow and temperature of soldering for Pb free process



☆ **IR reflow Pb free process suggestion profile**

(1) The solder recommend is Sn96.5/Ag3.5, and thickness recommend as shown in table 5.3

(2) Ramp-up rate (217℃ to peak) +3℃/second max.

(3) Temp. maintain at 175±25℃ 180 seconds max.

(4) Temp. maintain above 217℃ 60~150 seconds
(5) Peak temperature range 245 +20℃/-10℃ within 5℃ of actually peak temperature (t_p) 10~20 seconds
(6) Ramp down rate -6℃/second max.
※Perform adequate test in advance as the reflow temperature profile will vary according to the conditions of the manufacturing process and the specification of the reflow furnace.

5.5 Resistance to soldering heat and high temperature resistance : 260℃, 10sec 3 times

5.6 Hand soldering

In hand soldering of the SHR devices, large temperature gradient between preheated the SHR devices and the tip of soldering iron may cause electrical failures and mechanical damages such as cracking or breaking of the devices. The soldering shall be carefully controlled and carried out, so that the temperature gradient is kept minimum with following recommended conditions for hand soldering.

5.6.1 Recommended soldering condition 1 (with preheating)

(1) Solder
0.12~0.18mm thread solder (Sn96.5:Ag3.5) with soldering flux in the core, and rosin-based non-activated flux is recommended.

(2) Preheating
The SHR devices shall be preheated so that temperature gradient between the devices and the tip of soldering iron is 150℃ or below.

(3) Soldering iron
Rated power of 20W max. with 3mm soldering tip in diameter.
Temperature of soldering iron tip 380℃max., 3~5sec (The required amount of solder shall be melted in advance on the soldering tip.)

(4) Cooling
After soldering, the SHR devices shall be cooled gradually at room ambient temperature.

5.6.2 Recommended soldering condition 2 (without preheating)

(1) Solder iron tip shall not directly touch to ceramic dielectrics.
(2) Solder iron tip shall be fully preheated before soldering while soldering iron tip to the external electrode of SHR devices.

5.7 Post soldering cleaning

5.7.1 Residues of corrosive soldering fluxes on the PC board after cleaning may greatly have influences on the electrical characteristic and the reliability (such as humidity resistance) of the SHR devices which have been mounted on the board. It shall be confirmed that the characteristic and the reliability of the devices are not affected by the applied cleaning conditions.

5.7.2 When an ultrasonic cleaning is applied to the mounted SHR devices on PC boards. Following conditions are recommended for preventing failures or damages of the devices due to the large vibration energy and the resonance conditions caused by the ultrasonic waves.

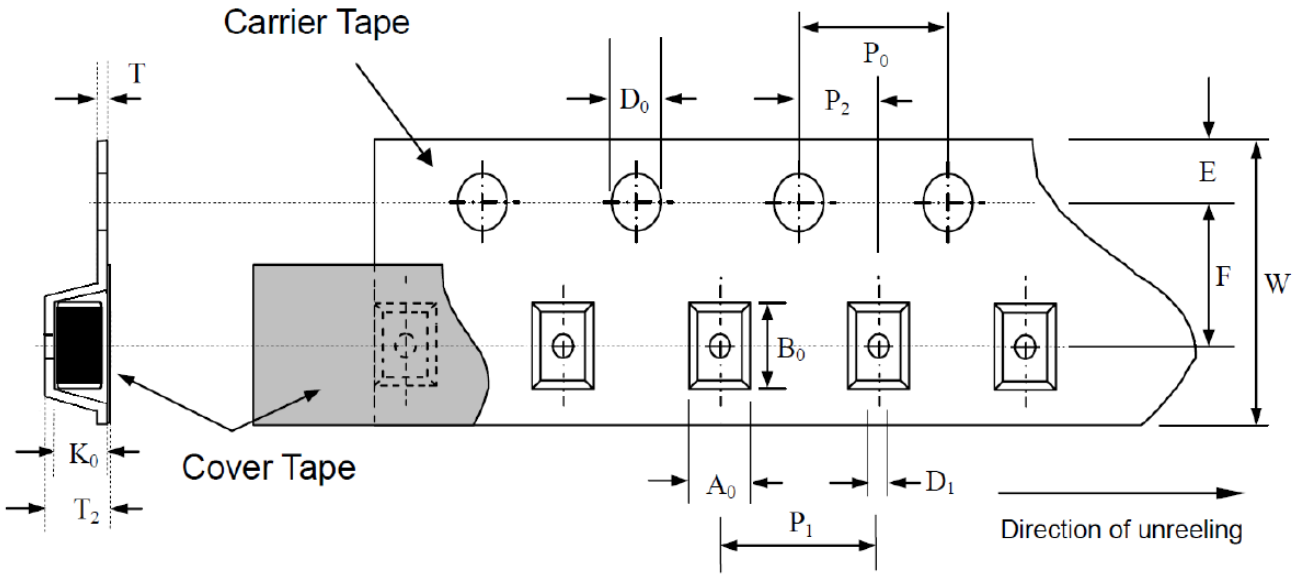
(1) Frequency 29MHz max.
(2) Radiated power 20W/liter max.
(3) Period 5minuets max.

6. Packaging Specification

6.1 Carrier tape and transparent cover tape should be heat-sealed to carry the products, and the reel should be used to reel the carrier tape.

6.2 The adhesion of the heat-sealed cover tape shall be 40 +20/-15 grams.

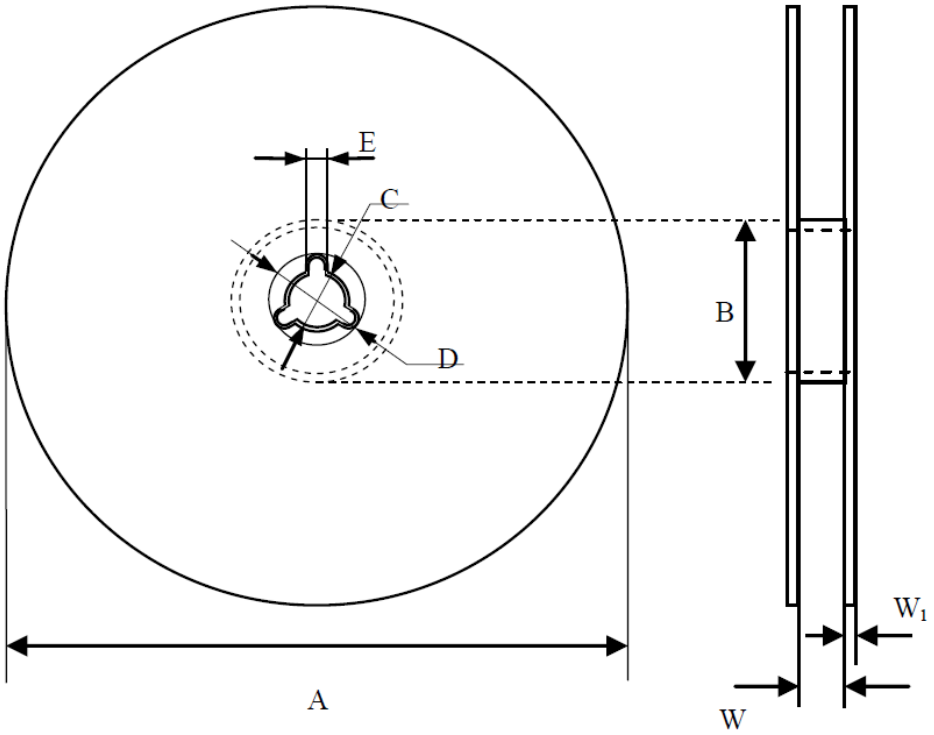
6.3 Both the head and the end portion of the taping shall be empty for reel package and SMT auto-pickup machine. And a normal paper tape shall be connected in the head of taping for the operator to handle.



(Unit : mm)

Symbol	A_0 ±0.10	B_0 ±0.10	K_0 ±0.10	T ±0.05	T_2 ±0.05	D_0 +0.10 -0.00	D_1 ±0.05	P_1 ±0.10	P_2 ±0.05	P_0 ±0.05	W ±0.20	E ±0.10	F ±0.05
0604	1.30	1.80	1.30	0.22	2.02	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50

7. Reel Dimension



(Unit : mm)

Symbol	A	B	C	D	E	W	W_1
0604	178.0±1.0	60.0±0.5	13.0±0.2	21.0±0.2	2.0±0.5	9.0±0.5	1.5±0.1

8. Standard Packaging

Size	0604
Pcs	3000

单击下面可查看定价，库存，交付和生命周期等信息

>>SFI(台湾立昌)