

# SFI Presentation

Looks similar, but exactly different!!  
Save and Safe from SFI



- **1. SFI Company Profile**
- **2. Products**
- **3. Advantages**

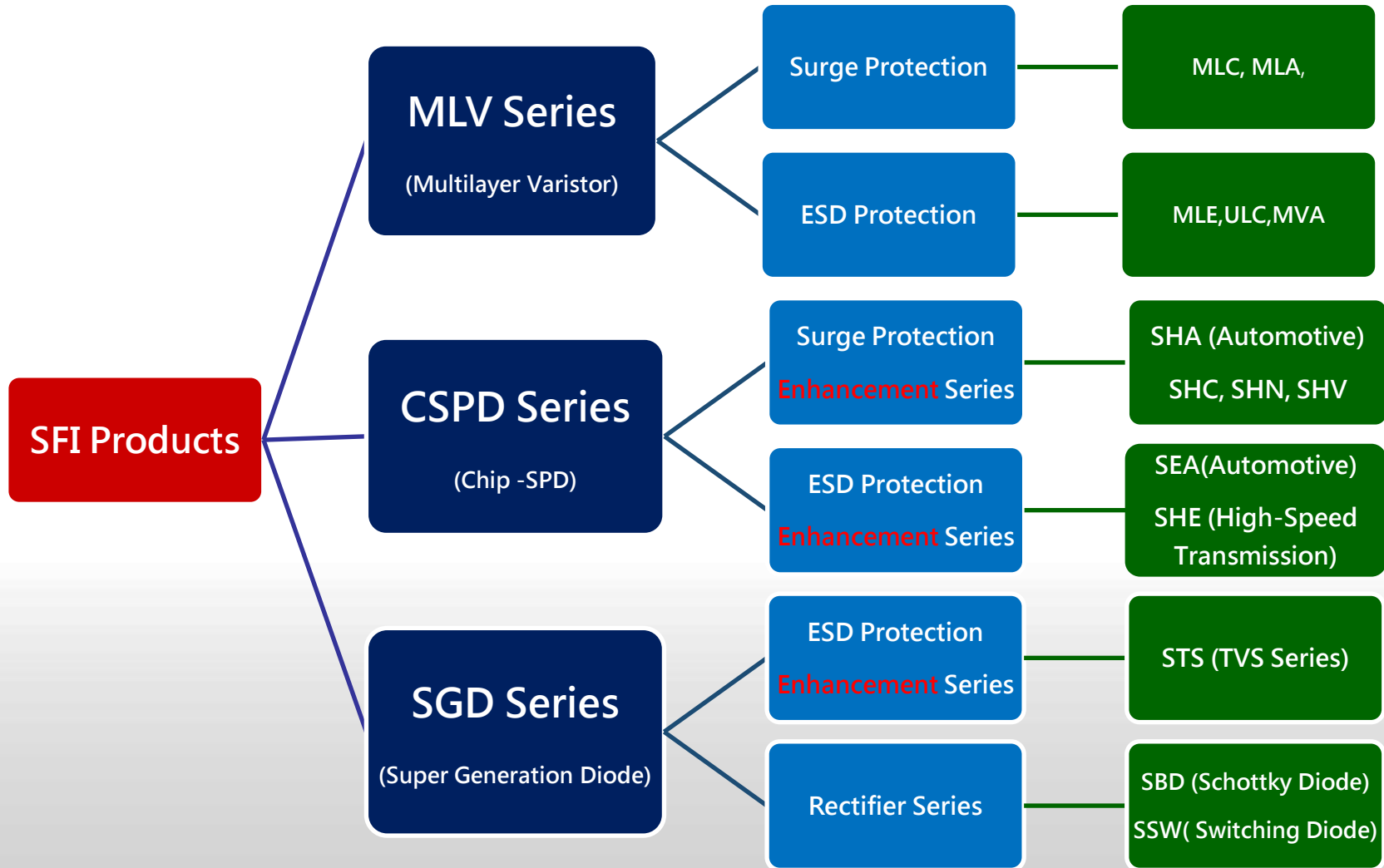


# Company Profile

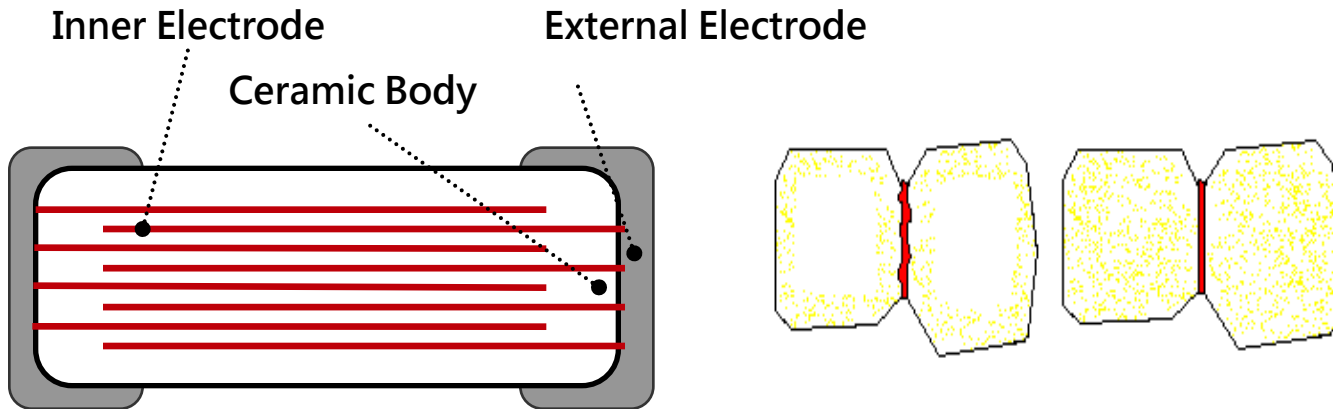
<b>Company</b>	SFI Electronics Technology Inc.
<b>Products</b>	Overvoltage Protection Components
<b>Marketing</b>	Direct Sales, Indirect Sales (Agents)
<b>Establishment</b>	1999
<b>Headquarter</b>	Taoyuan, Taiwan
<b>Branch Offices</b>	Shenzhen/ Shanghai / /Changchun/Wuhan/Changzhou
<b>Employee</b>	150
<b>Certificates</b>	ISO9001, TS16949, ISO14001
<b>Factory Location</b>	Taoyuan (2 Plants)
<b>Main Market</b>	Global Market



# Products Types

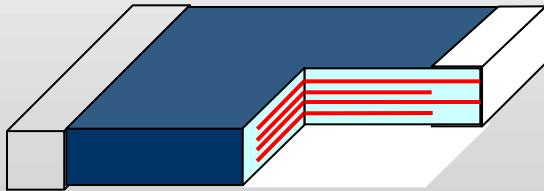


# Multilayers Construction



## Features:

- The nano technology makes the function of various resistance more better.
- To add elements of PTC, it makes the operation temperature more high.
- Grain size distribution at grain boundary



Non-linear coefficient of ceramic comes from double Schottky barriers between two ZnO grain boundaries. And during the sintering process, the ZnO grain become semiconducting and form solid bonding between ZnO grain and grain boundary segregation.

# CSPD-Innovation and Advanced Technology

1. Smallest size than GDT
2. High surge ability and low clamping voltage
3. One replace Two and no extinguish problem

Ex :  
1206/ 12V **6KV(10x700us)**

**Networking**  
For Surge  
10x700us  
**SHN**

**Automotive**  
For Load Dump  
**SHA**

1. Smallest smd size with high performance replace TVS SMBJ and SMCJ products
2. High load dump ability meet ISO7637 highest level pulse 5a/5b 87V 0.5ohm 400ms requirement
3. High load dump ability up to 80 joule
4. High temperature strike ability
5. High reliable performance under 125 degree temperature

## CSPD

**SHC**  
Low -Voltage  
For Surge 8x20us

**SHV**  
Power Related Applications

General MLV with less of energy, ex. for size 2220 , Surge is **1200A**

SFI -SHN with High Surge :  
Size 2220 can achieve **12000A**  
(8x20us)

General 08CH surge ability 500A (max)

SFI -SHV (**High Voltage Series**) can stand :  
3220 / 470V/**3000A**  
2220 / 470V/**1200A**  
1812/ 300V/ **1000A**  
1210/ 150V~220V/ **500A**

# CSPD Innovation and Advanced Technology

## ■ Innovation development and technology in CSPD Series

1. Small size advantage
2. Surface Mount Design (SMD type) (replacement with DIP type)



3. Dual Function (replacement two parts)



## ■ High reliable performance products characteristic

1. Meet AECQ200 request
2. Meet 125 high temperature reliable performance
3. High products characteristic more than competitor

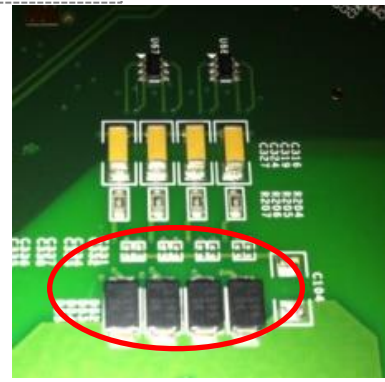
# CSPD-Innovation and Advanced Technology

## 2. Dual Function (one replacement two parts)

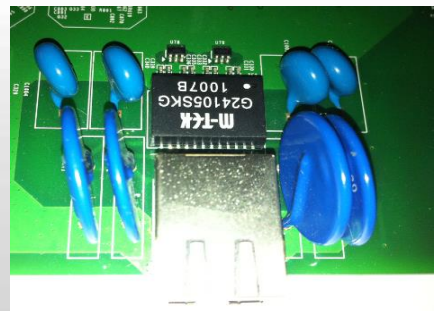
**Traditional Design:**



+

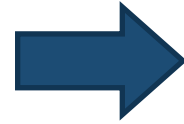


or



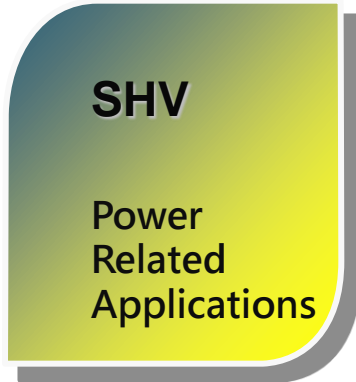
**NEW**

**1PCS**





# CSPD-Innovation and Advanced Technology



SFI MLV solution of SMD varistor with displaced electrodes  
– 08CH/SHV

1. High Technology and we design smaller size 1210 type
2. All internal electrodes to be surrounded by ceramics
3. Surface of the whole chip is passivated and Ni-barrier end terminations with excellent solderability
4. High reliable performance in high temperature and humidity reliable

## The other solution disadvantages

- Ag end terminations are being oxidised or covered with AgS in time, so that solderability gets worse with stocking time
- Plastic cover and not good reliable in humidity and high temperature test
- Lateral sides of such solution are not passivated. In case activated flux is used for soldering, wetting of later sides can occur resulting in increase of leakage current, which present one of the failure mechanisms.

# CSPD-Innovation and Advanced Technology

	SFI	Littelfuse	EPCOS	Panasonic	Maida	Thinking
Displaced electrodes		X			X	
Plastic Housing			X	X		X
SIZE						
1210	X					
1812	X					
2220	X					
3225	X		X	X		X
4532			X			X

**Only SFI technology is available in 1210/1812/2220 size  
Save pcb board spec.**



# CSPD-Innovation and Advanced Technology

## SHV High surge ability test

#	Brand	ITEM	BDV	Surge ability	Times	BDV V	Change	Result (change <10%)
1	Exxxx	3225K250G2	395V	400A	1	397	0.5%	PASS
			395V	400A	3	399	1%	PASS
			395V	400A	5	327	-17.2%	FAIL
2	<b>SFI</b>	2220SV391-501A	397V	400A	<b>5</b>	400	0.7%	<b>PASS</b>
			397V	400A	<b>20</b>	402	+1.2%	<b>PASS</b>
			397V	400A	<b>50</b>	403	+1.5%	<b>PASS</b>
1	Lxxxxxxxx	V430CH8	439V	200A	20	393	-10.4%	FAIL
			436V	400A	9	390	-10.5%	FAIL
2	<b>SFI</b>	1812SV431-501A	426V	200A	<b>200</b>	426	0%	<b>PASS</b>
			431V	400A	<b>50</b>	437	+1.4%	<b>PASS</b>
			425V	500A	<b>20</b>	430	+1.2%	<b>PASS</b>

**SFI have high surge ability. 5~10 times strike withstand ability**



# CSPD-Innovation and Advanced Technology

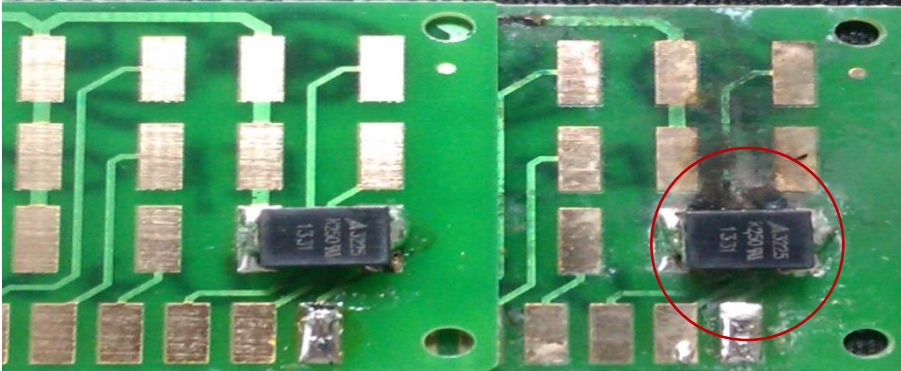


	<b>SFI</b>	<b>Exxxx</b>	<b>Lxxxxxx</b>
Type	Multilayer	plastic encapsulated	with displaced electrodes
Material	Ceramic	assembling of silvered disc varistor of size $\phi = 5$ or 7 mm into plastic housing	Ag electrodes on the surface of the plates, each of them was connected with only one of the Ag end terminations. Bottom and upper side were then passivated with glass lacquer.
High temperature ability	Excellent	maximum is 85°C (Not good)	NOT GOOD
Surge condition	Excellent	Derating	Derating
Humidity ability	Excellent	NOT good	NOT good
End termination (electrode)	Nickle Barrier	tinned copper	Ag/pt
Solderability	Excellent	NOT Good	Not good

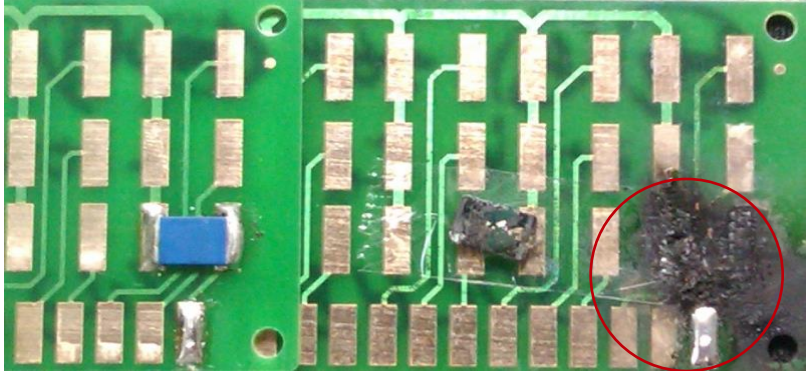
# CSPD-Innovation and Advanced Technology

SHV reliable test –High temperature 85°C & 40°C 95%RH humidity load test

E brand

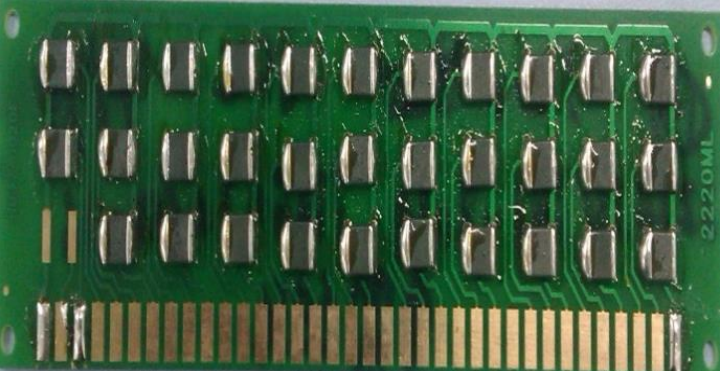


L brand



**Fail and burn**

**SFI**



**PASS  
Excellence**

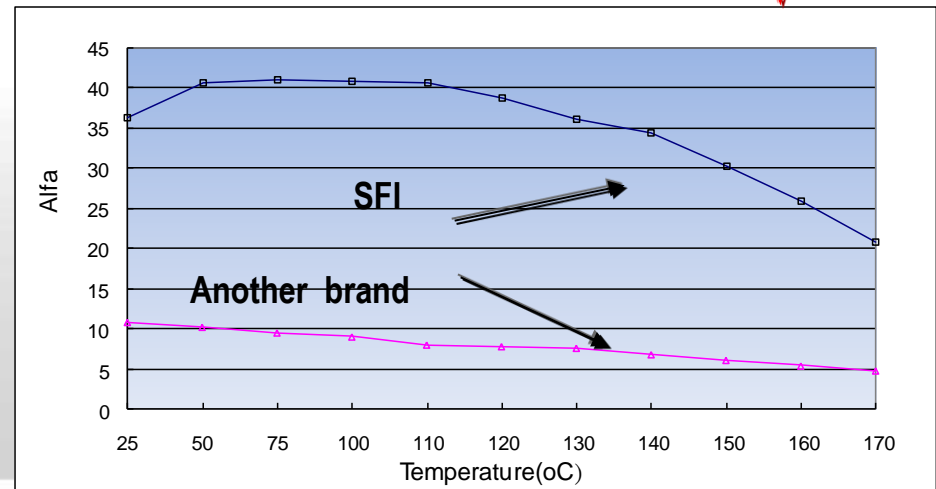
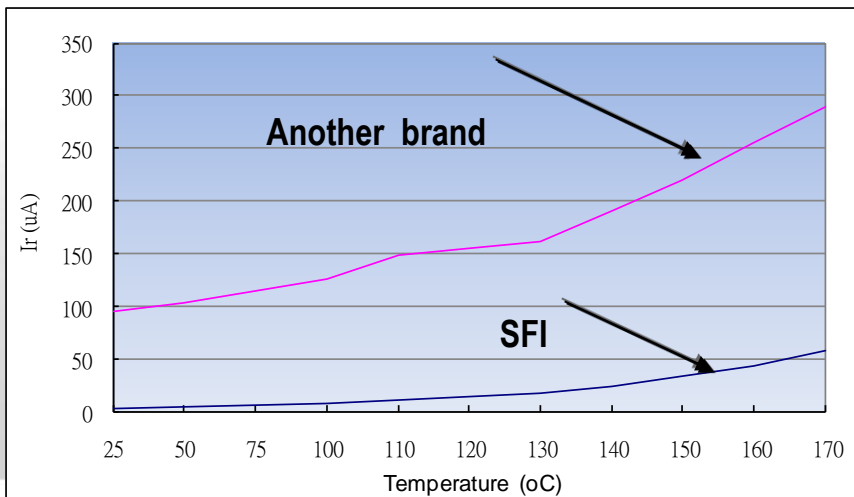
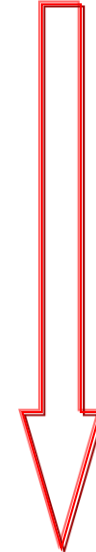
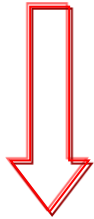
# CSPD-SHV series-High product performance Technology

SFI

Another Brand(EPXXX)

Temp. (°C)	Breakdown Voltage(V)	$\alpha$	Leakage Current( $\mu$ A)
25	26.29	36.29	3.1
50	26.53	40.7	3.7
75	26.58	41.05	5.2
100	26.67	40.91	7.5
110	26.77	40.56	10.6
120	26.78	38.75	13.2
130	26.85	36.19	17.4
140	26.88	34.41	23.5
150	26.93	30.28	33.3
160	26.96	25.94	43.7
170	26.96	20.83	57.8

Temp. (°C)	Breakdown Voltage(V)	$\alpha$	Leakage Current( $\mu$ A)
25	24.8	10.8	95
50	24.3	10.2	103
75	24.2	9.5	114
100	24.1	9	125
110	23.8	8	149
120	23.8	7.8	155
130	23.7	7.6	161
140	23.3	6.8	191
150	22.9	6.1	220
160	22.3	5.4	256
170	21.7	4.8	289



# CSPD-SHV series-High product performance Technology

1206SA360-090J (New SHT)

Temp. (°C)	Breakdown Voltage(V)	$\alpha$	Leakage Current(uA)
25	33.1	43	0.3
85	33.1	44	0.6
125	33.2	42.3	1.6
150	33.2	38.6	3.4

1206SA360-090J (General)

Temp. (°C)	Breakdown Voltage(V)	$\alpha$	Leakage Current(uA)
25	46.2	38.5	2.4
85	46	29.4	19
125	45.7	20.2	48
150	45.3	13.9	77

2220SA240-500J (New SHT)

Temp. (°C)	Breakdown Voltage(V)	$\alpha$	Leakage Current(uA)
25	35.3	35.8	1.4
85	35.6	40	1.6
125	36	41.7	3.9
150	36.5	39	8.5

2220SA240-500J (General)

Temp. (°C)	Breakdown Voltage(V)	$\alpha$	Leakage Current(uA)
25	28.7	40.2	4.4
85	28.6	33.5	13
125	28.4	21.3	37
150	28	12.7	75

All meet Standard <200uA

0805SA240-060J (New SHT)

Temp. (°C)	Breakdown Voltage(V)	$\alpha$	Leakage Current(uA)
25	31.9	29.3	0.5
85	31.8	33	0.6
125	32	31.3	1.3
150	32	30.5	2.4

**New SHT have High performance in high temperature ability**

# CSPD-Innovation and Advanced Technology

- Small size for application requirement
- High temperature sensitivity level for LED application
- Moisture sensitivity level for ceramic material
- High electronics characteristic and product performance
- Plating material for good solderability
- Lifetime / Long-term reliability

**Looks similar, but exactly different!!  
Sfi products superb performance is your best  
choice. Save and Safe in SFI products**





# CSPD-Innovation and Advanced Technology



- 1. Smallest smd size with high performance replace TVS SMBJ and SMCJ products**
- 2. High load dump ability meet ISO7637 highest level pulse 5a/5b 87V 0.5ohm 400ms requirement**
- 3. High load dump ability up to 80 joule smd size**
- 4. High temperature strike ability**
- 5. High reliable performance under 125 degree temperature**

# CSPD-Innovation and Advanced Technology

SHA-(1) Smallest Size with high performance



(2) High load dump ability  
up to 80 joule (competitor only 25 joule)

# CSPD-Innovation and Advanced Technology

SHA-(3) High Load dump ability meet ISO7637-2 pulse 5a request

Ex. Item: SFI 2220SA240-250J vs KEC Z5W27V

## Result

#	Item	LOAD DUMP ability	Times	Result	Result
1	KEC Z5W27V	87V / 0.5Ω / 400ms (50J)	2 TIMES	Fail	NOT GOOD and derating and fail after several times strike
		80V / 0.5Ω / 400ms (50J)	4 TIMES	FAIL	
		70V / 0.5Ω / 400ms (30J)	10 TIMES	PASS	
2	SFI SFI2220SA240-500J	87V / 0.5Ω / 400ms (50J)	10 TIMES	PASS	SHA have good heat ability and could withstand several times
3	SFI SFI2220SA240-250J	65V / 0.5Ω / 400ms (25J)	10 TIMES	PASS	



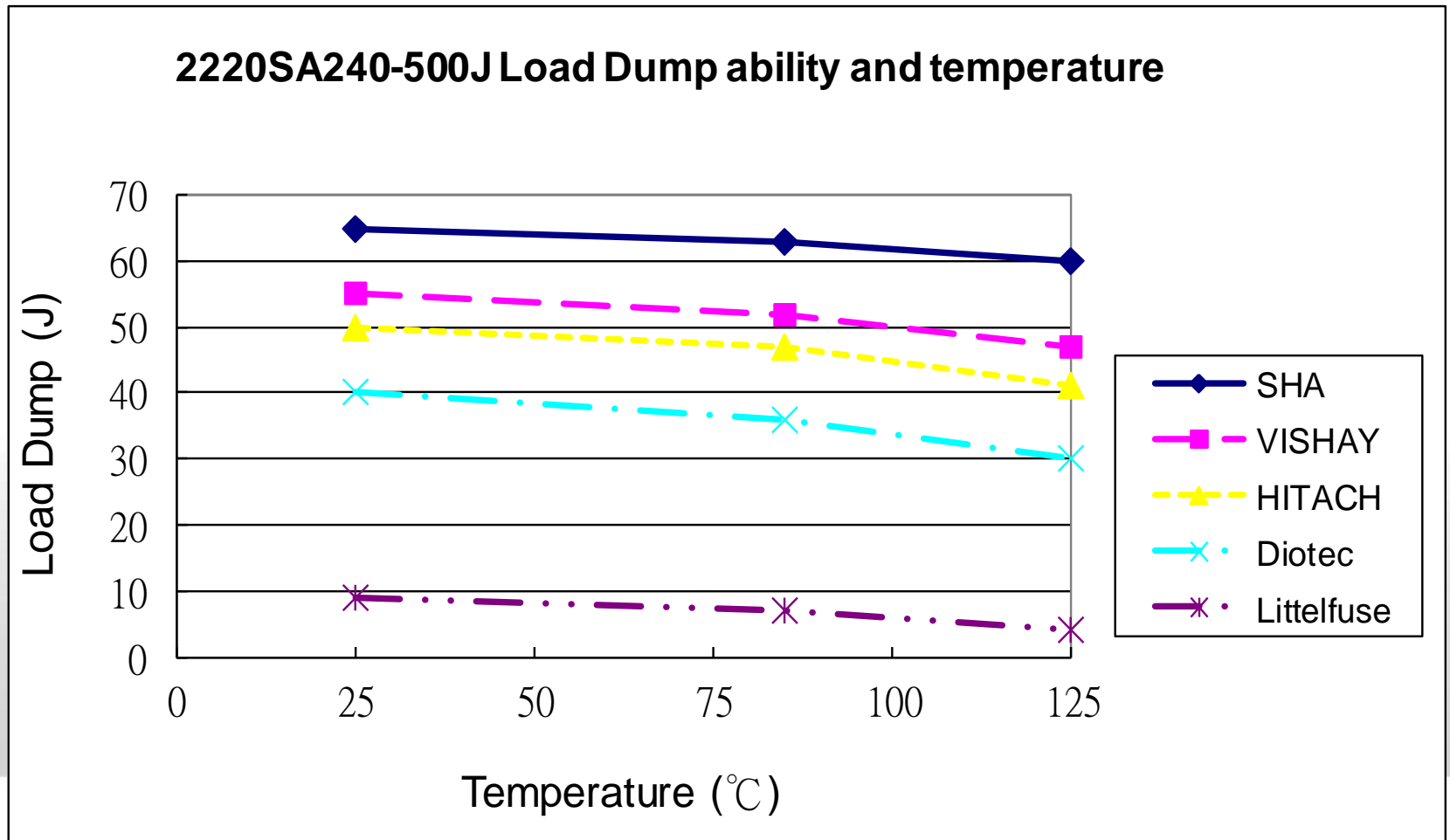
1. SFI can pass ISO7637-2 Pulse 5a strictly condition (87V, 0.5ohm, 400ms)10 times, but KEC Z5W27V can't pass this request. °
2. SFI2220SA240-500J have good heat ability, for more times strike and could meet Load Dump ability.

# CSPD-Innovation and Advanced Technology

## SHA-(4) High reliable performance under 125 degree

After high Temperature, SFI still maintains in stable energy joule

→ good for customer the good reliable performance

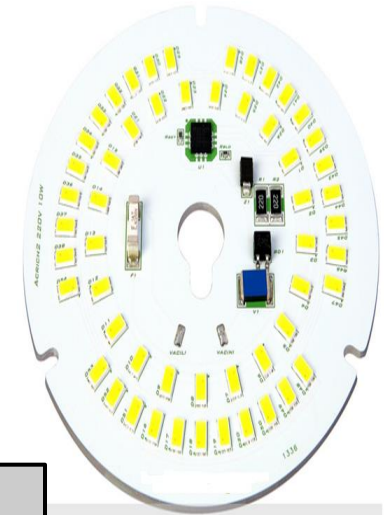
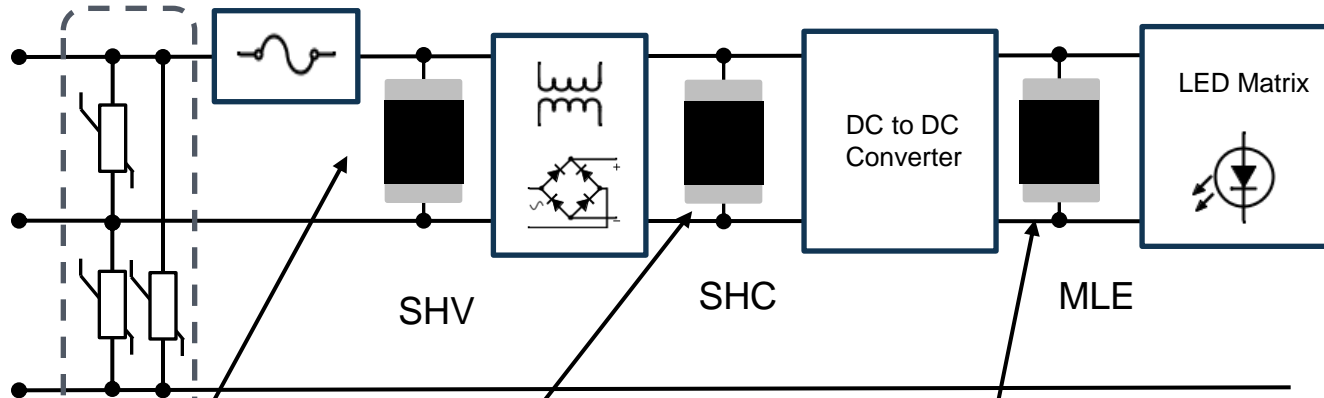


# High product performance Technology

	SFI	Others
1. Size	SMD	Disc and big
2. High Current	12000A	1200A
3. High Voltage	470V	Dip type
4. High Temperature ability	125 degree	85 degree
5. High Load Dump ability	80 Joule	25 Joule
6. Low leakage (before reliable test)	Under 10uA	Under 50uA
7. Low leakage (after reliable test)	Under 50uA	Under 200uA
8. Low clamping voltage (similar TVS function)	6V	20V
9. Dual function	One	Need two device

**Best products performance and reliable to save cost and upgrade your product value and different in the market**

# SFI SHV Application for AC LED protection



**Surge Protection device with AC High voltage**

**Surge Protection device with DC voltage**

**ESD Protection device with DC voltage**

# SFI values and advantages for you

- **Small package to save space- SMD package(0805~3220)**
- **High Temperature withstands up to 125 °C**
- **High Surge Energy (3220 size can reach 12000A)**
- **From low voltage to high voltage (12V~470V)**
- **Stable reliability**
- **Non-flammable package**
- **Meet AECQ200; Comply with RoHS, Lead Free and REACH**



**„Your support is our best driver“  
Thanks for your time !!**

**Thank You !**

