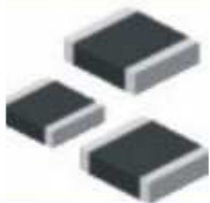




**NEW
PRODUCT**

Chip - SPD

**Chip
Surge Protect Device**



SFI

Electronics Technology Inc.

立昌先進科技股份有限公司

Chip-SPD 『BEST』 over voltage Protection Solution

Surge , Load Dump & ESD Protection Device



Introduction

『SFI Electronics Technology Inc.』 utilized professional powder materials and Production technology (with various patents) to develop the overvoltage suppressors with excellent functions to protect electric devices.



Our new products CSPD have the world highest technology and high products performance. They are the “Surface Mount Device” with the “High Voltage & High Current & High Load Dump ability & Low leakage current & Low breakdown voltage & Quickly respond time” characteristic. It's the best advantages and benefits from the excellence product protection performance for your valued circuit the best protection solution.



New product Content

Transient	Series	Main Application	Standard	Max. value parameter
Load Dump	SHA	Automotive power	ISO7637-2 Pulse 5	Load Dump 80J
	SEA	Automotive CAN	ISO10650	ESD 30KV
Surge	SHC	Industrial Control	IEC61000-4-5	I peak: 6500A
	SHN	Network Security		Surge Voltage: 6KV 10X700uS
	SHV	Power		BDV: 470V Surge: 1200A
ESD	SEM	Consumer & Communication	IEC61000-4-2	Clamping 12.5V
	SHE	Ultra high speed		BDV: 100v cap. 0.05pf
Dual Function (Load Dump+EMI)	SMM	Automotive	ISO7637-2 Pulse 5	
Dual Function (Surge+Fuse)	SMP	Power	IEC61000-4-5	



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The Benefits and advantages

1. **Micro Package Size (SMD) type:** to solve ‘large space’ and Height Limit
2. **High Surge Current:** stand 10X700uS 6KV Surge
3. **Low BDV:** 12V can provide the best solution for protective systems
4. **High reliability:** have low leakage after high reliability
5. **Low Clamping**
6. **Electric Distribution Concentricity**
7. **High Non-linear α Value:** over 25 and it will upgrade IV curve sensitivity
8. **Quick respond Time:** to solve the problem “extinguish” of GDT
9. **High performance:** many times surge sparks over 30 times on waveform 10/700us
10. **Good Temperature Features :** with operating range -55 °C~125 °C



The Compare table

Type					
	SFI SUPER	MLV	TVS	MOV	GDT
Electric Functions					
Operating Volt.	5V~680V	5V~100V	5V~100V	18V~1800V	75V~6KV
Clamping Volt.	Low	Low	Low	High	High
Surge Current	100A~8000A	20A~1200A	N.D.	250A~6000A	2KA~15KA
Operating Temp.	-55°C~160 °C	-45°C~125 °C	-45°C~125 °C	-45°C~125 °C	-45°C~125 °C
Load Dump (J)	12J~50J	12J~25J	N.D.	12J~50J	N.D.
Leakage Current	Low	Low	Low	High	Low
Inductance Effective	Low	Low	Low	High	Low
Applications Functions					
Response Time	<0.5ns	<0.5ns	<0.5ns	<10ns	<50ns
ESD Protection	Yes	Yes	Yes	No	No
Surge Protection	Yes	Yes	No	Yes	Yes
Design Position	Primary side/ Second	second	primary side/ second	primary	Primary
Polarity	Bi-Direction	Bi-Direction	Single Direction	Bi-Direction	Bi-Direction
Reliability					
Sparks	>10 Times	High	Low	High	High
Response Time	<0.5ns	<0.5ns	<0.5ns	<10ns	<50ns
Degradation	No	Yes	No	No	No
Potential Issues					
Extinguish	No	No	No	No	Yes
Explosion	No	No	No	Yes	No
Temperatue Derating	No	No	Yes	No	No



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SHA Series



Description

Surge is the voltage happen the abnormal rise or down in short time. Also in the automotive environment have more strictly request in the Load Dump ability. Our SHA series products have the world highest level load dump ability and also meet ISO7637 standard pulse 5a requirement. These series have the products for 12V and 24V systems for automotive Load Dump protection and requirement.



Features

1. Ultra high current handle ability , up to 3000A
2. Several Surge Voltage ability and Surge Current ability.
3. Breakdown Voltage Concentration ratio higher 99.5%
4. High nonlinear exponent α up to 50
5. Ultra low leakage current $< 5 \mu\text{A}$
6. Ultra high temperature up to 125 degree

Application

1. Telecom equipment RJ45/LAN connector
2. Outdoor/ Indoor AP/ IAD
3. Security system IP CAM
4. Base station
5. Low voltage power line

SHA Series Specification for 12V Automotive

Part Number	Working Voltage	Breakdown Voltage	Clamping Voltage	Peak Current	Load Dump	Jump Start Voltage (5min)
Symbol	DC	V (1mA)	V	A	$W_{LD}(J)$	$V_{JUMP}(V)$
SFI1206SA240-1R5J	12	24($\pm 10\%$)	< 40	400 (for +/- 1 time)	1.5 (for 10 times)	24.5
SFI1206SA240-030J	12	24($\pm 10\%$)	< 40	400 (for +/- 1 time)	3 (for 10 times)	24.5
SFI1206SA240-060J	12	24($\pm 10\%$)	< 40	500 (for +/- 1 time)	6 (for 10 times)	24.5
SFI1210SA240-030J	12	24($\pm 10\%$)	< 40	800 (for +/- 1 time)	3 (for 10 times)	24.5
SFI1210SA240-060J	12	24($\pm 10\%$)	< 40	800 (for +/- 1 time)	6 (for 10 times)	24.5
SFI1210SA240-120J	12	24($\pm 10\%$)	< 40	1000 (for +/- 1 time)	12 (for 10 times)	24.5
SFI1812SA240-060J	12	24($\pm 10\%$)	< 40	1600 (for +/- 1 time)	6 (for 10 times)	24.5
SFI1812SA240-120J	12	24($\pm 10\%$)	< 40	1600 (for +/- 1 time)	12 (for 10 times)	24.5
SFI1812SA240-250J	12	24($\pm 10\%$)	< 40	2000 (for +/- 1 time)	25 (for 10 times)	24.5
SFI2220SA240-120J	12	24($\pm 10\%$)	< 40	3000 (for +/- 1 time)	12 (for 10 times)	24.5
SFI2220SA240-250J	12	24($\pm 10\%$)	< 40	3000 (for +/- 1 time)	25 (for 10 times)	24.5
SFI2220SA240-500J	12	24($\pm 10\%$)	< 40	5000 (for +/- 1 time)	50 (for 10 times)	24.5
SFI3220SA240-500J	12	24($\pm 10\%$)	< 40	5000 (for +/- 1 time)	50 (for 10 times)	24.5
SFI3220SA240-800J	12	24($\pm 10\%$)	< 40	5000 (for +/- 1 time)	80 (for 10 times)	24.5
SFI2220SA470-250J	24	47($\pm 10\%$)	< 77	3000 (for +/- 1 time)	25 (for 10 times)	45.0
SFI2220SA470-500J	24	47($\pm 10\%$)	< 77	4000 (for +/- 1 time)	50 (for 10 times)	45.0
SFI3220SA470-500J	24	47($\pm 10\%$)	< 77	5000 (for +/- 1 time)	50 (for 10 times)	45.0
SFI3220SA470-800J	24	47($\pm 10\%$)	< 77	5000 (for +/- 1 time)	80 (for 10 times)	45.0



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SEA Series



Description

CAN Bus is automotive ESD requirement. It is one of the widely used international bus and it's smart electrical control equipment to transfer data between every electronic devices in automobile. It achieves a regional network control systems in whole vehicle and exchanges information between ECU electronic controls to become the automotive electronic control network. This series is design for this request.



Features

1. Ultra high current handle ability , up to 3000A
2. Several Surge Voltage ability and Surge Current ability.
3. Breakdown Voltage Concentration ratio higher 99.5%
4. High nonlinear exponent α up to 50
5. Ultra low leakage current $< 5 \mu\text{A}$
6. Ultra high temperature up to 125 degree

Application

1. Telecom equipment RJ45/LAN connector
2. Outdoor/ Indoor AP/ IAD
3. Security system IP CAM
4. Base station
5. Low voltage power line

SEA Series Specification for 12V Automotive CAN BUS

Part Number	Working Voltage	Breakdown Voltage	Clamping Voltage	Peak Current	Load Dump	Jump Start Voltage (5min)
Symbol	DC	V (1mA)	V	A	$W_{LD}(J)$	$V_{JUMP}(V)$
SFI0603EA240-LSP	12	24($\pm 10\%$)	<40	400 (for +/- 1 time)	1.5 (for 10 times)	24.5
SFI0603EA240-MSP	12	24($\pm 10\%$)	<40	400 (for +/- 1 time)	3 (for 10 times)	24.5
SFI0603EA240-HSP	12	24($\pm 10\%$)	<40	500 (for +/- 1 time)	6 (for 10 times)	24.5
SFI0603EA240-LSP	12	24($\pm 10\%$)	<40	800 (for +/- 1 time)	3 (for 10 times)	24.5
SFI0603EA240-MSP	12	24($\pm 10\%$)	<40	800 (for +/- 1 time)	6 (for 10 times)	24.5
SFI0603EA240-HSP	12	24($\pm 10\%$)	<40	1000 (for +/- 1 time)	12 (for 10 times)	24.5



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SHN Series

Description

Telecom systems are all connected by ethernet. The surge suppressors can pass the overvoltage to earth and clamping the voltage to a level acceptable to the systems. Since the standard of 100/1000M of ethernet speed, these precise devices and connectors can Be subject to voltage shocks. These series are design for this ethernet and telecom application and best surge protection for the circuit for these with the high performance.



Features

1. SMD type to save space (1206 & 1210)
2. Pass 10/700 us/ 40ohm surge 6KV test
3. Lower clamping voltage than GDT
4. Faster response time < 0.5 ns than GDT & Sidactor
5. No extinguish problem
6. Bi-directional
7. Surge strike ability over 30 times
8. Wide operation temperature - 55 ~ +125°C
9. Ultra low leakage current < 1 uA

Application

1. Telecom equipment RJ45/Lan connector / Ethernet
2. Outdoor/ Indoor AP/ IAD
3. Security system IP CAM
4. Low voltage power line DC 12V / AC24V/ PoE
5. ADSL/ XDSL telecom equipment
6. PoE Module
7. HUB Switch
8. VOIP Phone
9. Other Network

SHN Series Specification

SFI Part No.	Size	Application Voltage	Breakdown Voltage	Surge Current	Surge Voltage
SFI1206SN120-060K	1206	DC 3.3V	12V	150A	6KV
SFI1206SN120-040K	1206	DC 3.3V	12V	100A	4KV
SFI1210SN470-060K	1210	AC 24V	47V	150A	6KV
SFI1210SN470-040K	1210	AC 24V	47V	100A	4KV
SFI1210SN750-060K	1210	DC 57V	75V	150A	6KV
SFI1210SN750-040K	1210	DC 57V	75V	100A	4KV

* Surge wave form under 10x700 us / 40 ohm condition



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SHC Series

Description

This series has the Highest Transient Current and Energy Absorption The construction and technical makes the products to stand ultra high transient current and high energy absorption. **The size 0805 can stand over 250A in waveform 8/20us and the size 2220 can stand 6500A in some special size** . Therefore, under the same current and energy conditions, the size of SUPER Series is much smaller than other products. The sparks can be **over 10 times** in order to make sure the surge ability.



In the global market, the protection components reach such high current ability products only the disk type, we use the high professional technical ability for the multilayer technology to provide higher products at the small size. To compare the market MLV series products, new SHC Series upgrade the current ability and also to show the higher product characteristic than all the OVP products

Features

1. Ultra high current handle ability , up to 3000A
2. Several Surge Voltage ability and Surge Current ability.
3. Breakdown Voltage Concentration ratio higher 99.5%
4. High nonlinear exponent α up to 50
5. Ultra low leakage current < 5 μ A
6. Ultra high temperature up to 125 degree

Application

1. Telecom equipment RJ45/LAN connector
2. Outdoor/ Indoor AP/ IAD
3. Security system IP CAM
4. Base station
5. Low voltage power line

SHC Series Specification

Part No.	Size	Working Voltage	Breakdown Voltage	Clamping Voltage	Leakage Current	Surge Current
SFI1206SC120-501A	1206	DC 9V	12V	<25V	10 μ A	500A
SFI1206SC240-501A	1206	DC 18V	24V	<47V	10 μ A	500A
SFI1206SC470-501A	1206	DC 38V	47V	<75V	5 μ A	500A
SFI1206SC750-501A	1206	DC 60V	75V	<100V	10 μ A	500A
SFI1210SC120-102A	1210	DC 9V	12V	<25V	15 μ A	1000A
SFI1210SC240-102A	1210	DC 18V	24V	<47V	15 μ A	1000A
SFI1210SC470-102A	1210	DC 38V	47V	<75V	10 μ A	1000A
SFI1210SC750-102A	1210	DC 60V	75V	<100V	10 μ A	1000A
SFI1812SC240-202A	1812	DC 18V	24V	<47V	15 μ A	2000A
SFI1812SC470-202A	1812	DC 38V	47V	<75V	15 μ A	2000A
SFI1812SC750-202A	1812	DC 60V	75V	<100V	15 μ A	2000A
SFI2220SC240-302A	2220	DC 18V	24V	<47V	15 μ A	3000A
SFI2220SC470-302A	2220	DC 38V	47V	<75V	15 μ A	3000A
SFI2220SC560-302A	2220	DC 60V	56V	<90V	15 μ A	3000A
SFI2220SC750-302A	2220	DC 60V	75V	<100V	15 μ A	3000A
SFI2220SC820-302A	2220	DC 65V	82V	<135V	15 μ A	3000A



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SHV Series



Description

SHV series are intended for use in hybrid circuit applications in commercial and industrial equipment utilizing direct surface-mounting techniques. These devices, which have significantly small size than traditional radial-lead varistors, permit designers to reduce the size and weight, increase the reliability of their equipment designs for save production cost SHV Series cover wide DC operating voltage range from 14V to 460V and also have unique high technology in 1812 size up to 300V.



Features

- Operating voltage range V DC up to 460Vdc
- High voltage type up to 470V
- Easy to design with surface mount design without lead
- Save labor cost and easy mass production
- Space and weight savings on PC board
- No plastic coating guarantees better flammability rating
- Available in tape and reel for automatic production

Application

1. LED Lighting
2. Power Board
3. Base Station
4. AC power supply
5. Industrial equipment and controller

SHV Series Specification

Part Number	Size	AC Voltage (V)	Breakdown Voltage _c (V)	Clamping Voltage (V)	Surge Current (A)
SFI1812SV151	1812	95	150(±10%)	< 210	1000
SFI1812SV201	1812	130	200(±10%)	< 280	1000
SFI1812SV301	1812	190	300(±10%)	< 420	1000
SFI3220SV271	3220	175	270(±10%)	< 378	1200
SFI3220SV391	3220	250	390(±10%)	< 532	1200
SFI3220SV431	3220	275	430(±10%)	< 586	1200
SFI3220SV471	3220	300	470(±10%)	< 640	1200

* Surge wave form under 8x20 us / 2 ohm condition



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Application for IP Camera

Security control systems incorporate outdoor and indoor units. The outdoor equipment must incorporate protective components to prevent damage to the circuit and equipment by the lightning protection. It's essential to install suitable overvoltage protection components. Here have some recommend part for the IP camera ESD and Surge solution.



IP CAM ESD & Surge Solution

Interface	Noise	Test STD.	Type	Recommend Part	Package
RJ-45 Data (L-G)	Surge	10/700us / 40Ω / 6KV	SHN	SFI1210SN750-060K	1210
RJ-45 Data (L-L)	Surge	10/700us / 40Ω / 2KV	SHN	SED323-3R30D0R4-A-11-LF	SOD-323
RJ-45 POE	Surge	10/700us / 40Ω / 6KV	SHN	SFI1210SN750-060K	1210
DC12V (L-G)	Surge	1.2/50us / 2Ω / 4KV	SHC	SFI1812SC470-202A	1812
AC24V (L-G)	Surge	1.2/50us / 2Ω / 4KV	SHC	SFI1812SC470-202A	1812
AC24V (L-L)	Surge	1.2/50us / 12Ω / 2KV	SHC	SFI1210SC470-102A	1210
DC48V	Surge	1.2/50us / 2Ω / 4KV	SHC	SFI1812SC470-202A	1812
Line In	Surge	10/700us / 40Ω / 6KV	SHN	SFI1206SN120-060K	1206
Line In	ESD	IEC61000-4-2 / 8KV	MLE	SFI0402-050E101NP-LF	0402
Alarm In	Surge	10/700us / 40Ω / 6KV	SHN	SFI1206SN120-060K	1206
Alarm In	ESD	IEC61000-4-2 / 8KV	MLE	SFI0402-050E101NP-LF	0402
Speaker Output	Surge	1.2/50us / 42Ω / 2KV	SHC	SFI1206SC120-040K	1206
Speaker Output	ESD	IEC61000-4-2 / 8KV	MLE	SFI0402-050E101NP-LF	0402
Alarm Output	Surge	1.2/50us / 42Ω / 2KV	SHC	SFI1206SC120-040K	1206
Alarm Output	ESD	IEC61000-4-2 / 8KV	MLE	SFI0402-050E101NP-LF	0402
RS485	Power Contact	special Case	MOV	14D471K	14Φ
RS485	Surge	10/700us / 40Ω / 6KV	GDT		
RS485	ESD	IEC61000-4-2 / 8KV	MLE	SED323-150D100-B-10-LF	SOD-323
BNC	Surge	10/700us / 40Ω / 6KV	GDT		
BNC	ESD	IEC61000-4-2 / 8KV	MLE	SFI0402-050E050PP-LF	0402
Reset Pin	ESD	IEC61000-4-2 / 8KV	MLE	SFI0402-050E101NP-LF	0402
SD Card	ESD	IEC61000-4-2 / 8KV	MLE	SFI0402-240E0R8PP-LF	0402
USB	ESD	IEC61000-4-2 / 8KV	MLE	SUC0402-240E0R2PP-LF	0402
HDMI	ESD	IEC61000-4-2 / 8KV	MLE	SUCTD1004-050S0R4P-LF	Array

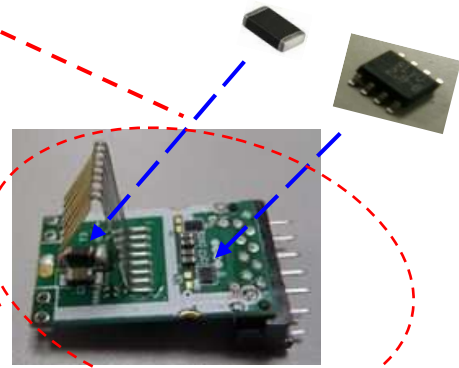


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Application for RJ 45 connector

With highly developed information technology, networking applications are now used in indoor and outdoor systems. The ethernet connector are now have more surge requirement. The standard RJ45 interface contains four protective wires(1,2/3,6) and eight protective wire for full protection against surges problem. These products have the micro size and high performance for the circuit protection.



Ethernet (RJ45) surge protection

Test Mode	Test Standard	Series	Part No.	Package	capacitance
L-G	10x700 μ s/40 ohm /6KV	SHN	SF11206SN120-060K	1206	--
L-G	10x700 μ s/40 ohm/4KV	SHN	SF11206SN120-040K	1206	---
L-L	10x700 μ s/40 ohm/4KV	TVS(A)	SEDSO8-2R8S050-A-11	SO8	5 pF
L-L	10x700 μ s/40 ohm/2KV	TVS (B)	SEDSO8-2R8S050-B-11	SO8	5 pF
L-L	10x700 μ s/40 ohm/2KV	TVS(F)	SEDSO8-2R8S020-F-11	SO8	2pF
L-L	10x700 μ s/40 ohm/2KV	TVS	SED1006-3R30D7R0-D-11	0402	7pF
L-L	10x700 μ s/40 ohm/2KV	TVS	SED323-3R30R0R4-A-11-LF	SOD323	0.4pF

**Total Solution = SHN + Lan Transformer + TVS or TVS Array
(Line to ground) (Line to line)**



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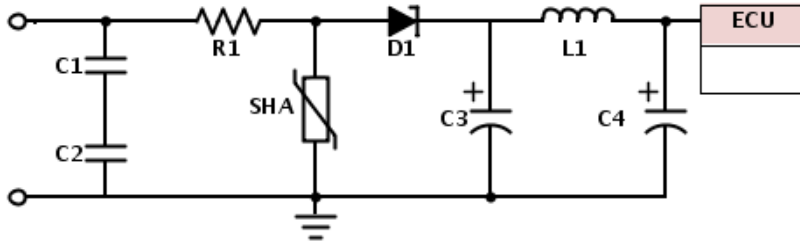
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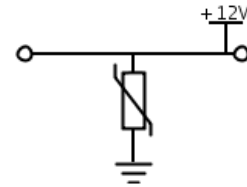


Reference Application Circuit

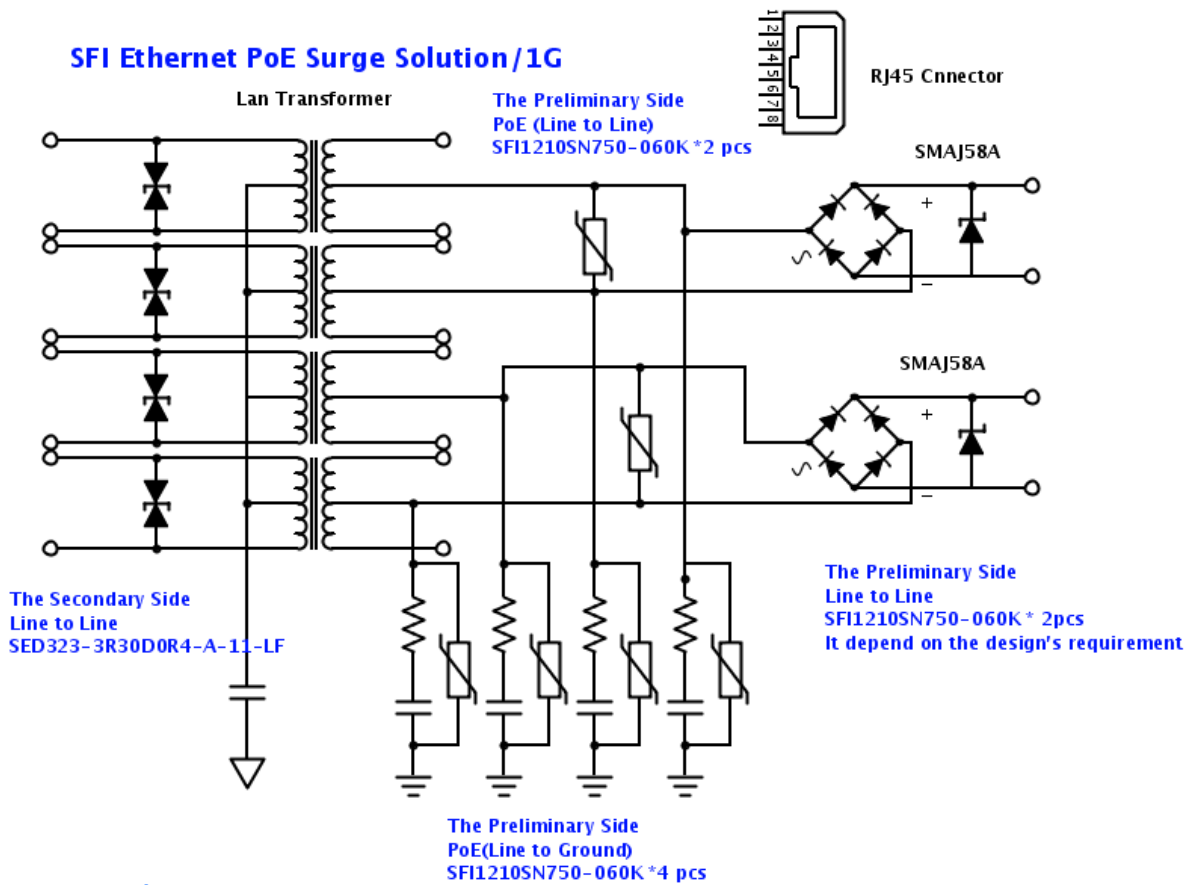
SFI Automotive Load Dump Solution



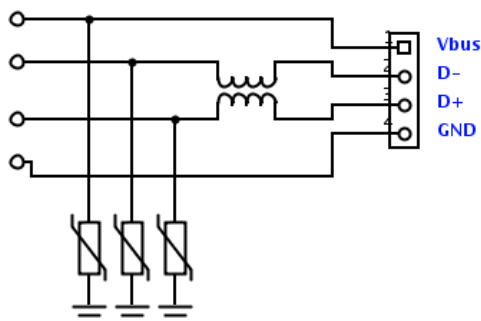
SFI DC Power Solution



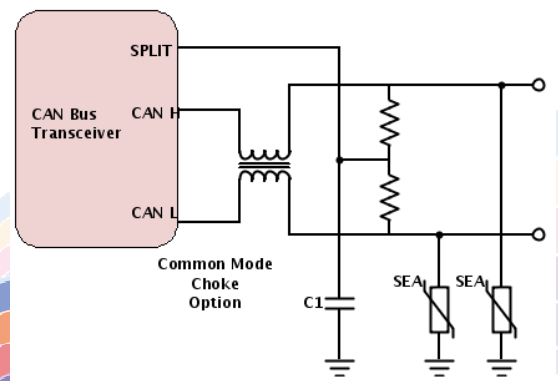
SFI Ethernet PoE Surge Solution/1G



SFI USB ESD Solution



SFI Auto CAN BUS ESD Solution



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