

THERMO-FUSE VARISTOR (FSR)

How to Order

FSR	241	K	20	E	S	
Type code	Varistor Voltage	Tolerance	Disk Size Code	Type	Pack and Lead Type	Special Request
FSR: SINCERA* VARISTOR with thermofuse attached	(DC volt) (From 180 to 112) Two significant digits Followed by no. of zeros 180=18volt 101=100volt 102=1000volt	K : +/-10% J : +/-5%	18 : 18mm 20 : 20mm 25 : 25mm 32 : 32mm	D : Standard disk Series E : High energy disk series	Bulk packing : S : Straight lead L : In line crimped Tape packing : T : Reel packing	Lead spacing

* SINCERA is a brand name of Varistor and Ceramic PTC of Walsin Technology Corp.

Description

Walsin Thermo-Fuse Varistor (FSR) is a family of Transient Voltage Surge Suppression products. FSR is a three-lead Thermally Protected Metal Oxide Varistor. One lead of the FSR varistor is connected to a thermal fuse, it will automatically open-circuit when the varistor is under sustained abnormal over-voltage condition. The FSR series is designed to meet the abnormal over-voltage requirements of UL 1449, Section 37.

Traditional Metal Oxide Varistor (MOV) withstands 150% of its rated voltage for a given duration. But MOV may fail to a short-circuit condition or fail open when subjected to sustained steady-state over-voltage above its rated specifications.

Walsin's FSR has a thermal fuse incorporated with its MOV disk that responds to the MOV temperature and disconnects the MOV from power should the temperature exceed a certain level.

Therefore, Walsin's FSR provides a real "Fail Safe" protection to sensitive downstream electric components.

Features

- Low Leakage Current under normal operating voltage. Meets UL 1449 abnormal over-voltage test (5A, 2.5A, 0.5A and 0.125A).
- UL1449 recognized which includes selected test from UL1020 regarding thermal cutoff. (UL file #E172311)
- UL1414 recognized (UL file #E182369). No voltage type recognized below 120 VAC.

Ratings

- -55°C to 85°C Operating Temperature Range
- -55°C to 125°C Storage Temperature Range
- Maximum Voltage-Temperature Coefficient: < 0.01 % / °C
- Hi-Pot Encapsulation: 2500 Vdc
- Insulation Resistance: >1000 MW
- Typical Response Time: <15 n seconds
- Continuous RMS Current: 100 mA
- Isolation Capability: 600 Vac
- (When thermal element is open)

Dimensions

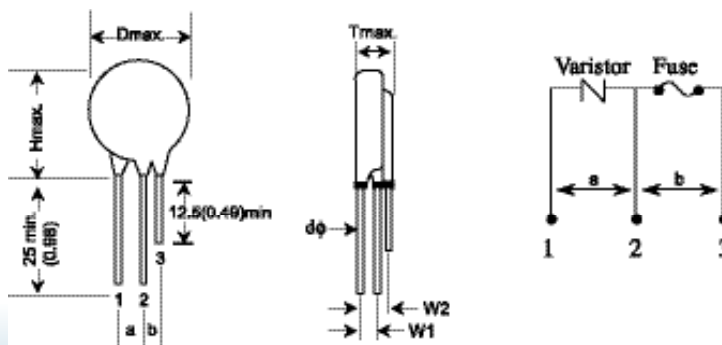
FSR Series	Dmax	Hmax	dø(NOM.)	a	b
FSR18	21.0 (0.83)	24.0 (0.94)	0.8 (0.031)	7.5 (0.30)	6.5 (0.26)
FSR20	24.0 (0.94)	29.0 (1.14)	1.0 (0.039)	10.0 (0.39)	6.5 (0.26)
FSR25	28.5 (1.12)	33.0 (1.30)	1.0 (0.039)	12.7 (0.50)	6.5 (0.26)
FSR32	40.0 (1.57)	45.0 (1.77)	1.5 (0.059)	17.0 (0.67)	8.0 (0.31)

(1) Unit: mm (inch)

(2) a ± 1.0 (0.039), b ± 1.2 (0.047)

(3) 1mm lead diameter is available upon special request for 18mm. Please add suffix "R" after part number

(4) For 25mm min. fuse lead (lead #3), please add suffix "FL" after part number



THERMO-FUSE VARISTOR (FSR)

Dimension (Continued)

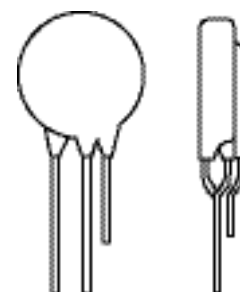
Varistor Type	FSR18 Series			FSR20 Series			FSR25 Series			FSR32 Series		
	Tmax	W1	W2	Tmax	W1	W2	Tmax	W1	W2	Tmax	W1	W2
180K	--	--	--	7.0 (0.28)	1.7 (0.07)	3.3 (0.13)	--	--	--	--	--	--
220K	--	--	--	7.2 (0.28)	1.8 (0.07)	3.4 (0.13)	--	--	--	--	--	--
270K	--	--	--	7.2 (0.28)	2.0 (0.08)	3.6 (0.14)	--	--	--	--	--	--
330K	--	--	--	7.4 (0.29)	2.1 (0.08)	3.7 (0.15)	--	--	--	--	--	--
390K	--	--	--	7.4 (0.29)	2.4 (0.09)	4.0 (0.16)	--	--	--	--	--	--
470K	--	--	--	7.4 (0.29)	2.7 (0.11)	4.3 (0.17)	--	--	--	--	--	--
560K	--	--	--	7.5 (0.30)	3.0 (0.12)	4.6 (0.18)	--	--	--	--	--	--
680K	--	--	--	7.6 (0.30)	3.1 (0.12)	4.7 (0.19)	--	--	--	--	--	--
820K	7.4 (0.29)	1.8 (0.07)	3.3 (0.13)	7.6 (0.30)	1.8 (0.07)	3.3 (0.13)	--	--	--	--	--	--
181K	7.4 (0.29)	1.9 (0.07)	3.4 (0.13)	7.6 (0.30)	1.9 (0.07)	3.4 (0.13)	--	--	--	--	--	--
201K	7.8 (0.31)	2.0 (0.08)	3.5 (0.14)	7.9 (0.31)	2.0 (0.08)	3.6 (0.14)	7.9 (0.31)	2.1 (0.08)	3.7 (0.15)	7.5 (0.30)	2.6 (1.02)	4.1 (1.61)
221K	8.0 (0.31)	2.0 (0.08)	3.6 (0.14)	8.1 (0.32)	2.1 (0.08)	3.7 (0.15)	8.2 (0.32)	2.2 (0.09)	3.8 (0.15)	7.8 (3.07)	2.7 (1.06)	4.2 (1.65)
241K	8.1 (0.32)	2.1 (0.08)	3.7 (0.15)	8.2 (0.32)	2.2 (0.09)	3.8 (0.15)	8.3 (0.33)	2.3 (0.09)	3.9 (0.15)	7.8 (3.07)	2.8 (1.10)	4.3 (1.69)
271K	8.2 (0.32)	2.2 (0.09)	3.8 (0.15)	8.3 (0.33)	2.3 (0.09)	3.9 (0.15)	8.4 (0.33)	2.4 (0.09)	4.0 (0.16)	8.1 (3.19)	2.9 (1.14)	4.4 (1.73)
301K	8.4 (0.33)	2.4 (0.09)	4.0 (0.16)	8.4 (0.33)	2.5 (0.10)	4.1 (0.16)	8.6 (0.34)	2.6 (0.10)	4.2 (0.17)			
331K	8.5 (0.33)	2.6 (0.10)	4.2 (0.17)	8.5 (0.33)	2.7 (0.11)	4.3 (0.17)	8.8 (0.35)	2.8 (0.11)	4.4 (0.17)	8.1 (3.19)	3.0 (1.18)	4.6 (1.81)
361K	8.5 (0.33)	2.7 (0.11)	4.3 (0.17)	8.6 (0.34)	2.8 (0.11)	4.4 (0.17)	8.9 (0.35)	2.9 (0.11)	4.5 (0.18)	8.3 (3.27)	3.1 (1.22)	4.9 (1.93)
391K	8.6 (0.34)	2.9 (0.11)	4.5 (0.18)	8.7 (0.34)	3.0 (0.12)	4.6 (0.18)	9.0 (0.35)	3.1 (0.12)	4.7 (0.19)	8.3 (3.27)	3.4 (1.34)	5.2 (2.05)
431K	8.7 (0.34)	3.0 (0.12)	4.7 (0.19)	8.8 (0.35)	3.2 (0.13)	4.8 (0.19)	9.2 (0.36)	3.3 (0.13)	4.9 (0.19)	8.5 (0.33)	3.7 (1.46)	5.4 (2.13)
471K	9.0 (0.35)	3.2 (0.13)	4.9 (0.19)	9.1 (0.36)	3.4 (0.13)	5.1 (0.20)	9.5 (0.37)	3.5 (0.14)	5.2 (0.20)	9.0 (3.54)	4.0 (1.57)	5.7 (2.24)
511K	9.4 (0.37)	3.4 (0.13)	5.2 (0.20)	9.5 (0.37)	3.6 (0.14)	5.4 (0.21)	9.9 (0.39)	3.7 (0.15)	5.5 (0.22)	9.4 (3.70)	4.3 (1.69)	6.0 (2.36)
561K	9.6 (0.38)	3.7 (0.15)	5.4 (0.21)	9.7 (0.38)	3.8 (0.15)	5.6 (0.22)	10.1 (0.40)	3.9 (0.15)	5.7 (0.22)	9.7 (0.38)	4.9 (1.93)	6.4 (2.52)
621K	10.0 (0.39)	3.9 (0.15)	5.7 (0.22)	10.1 (0.40)	4.1 (0.16)	5.9 (0.23)	10.4 (0.41)	4.2 (0.17)	6.0 (0.24)	9.7 (0.38)	5.1 (2.01)	6.6 (2.60)
681K	10.3 (0.41)	4.2 (0.17)	6.0 (0.24)	10.4 (0.41)	4.4 (0.17)	6.2 (0.24)	10.7 (0.42)	4.5 (0.18)	6.3 (0.25)	10.5 (0.41)	5.5 (2.17)	7.0 (2.76)
751K	10.4 (0.41)	4.5 (0.18)	6.4 (0.25)	10.7 (0.42)	4.7 (0.19)	6.6 (0.26)	11.1 (0.44)	4.8 (0.19)	6.7 (0.26)	10.5 (0.41)	5.7 (2.24)	7.2 (2.83)
781K	10.6 (0.42)	4.7 (0.19)	6.6 (0.26)	10.9 (0.43)	4.9 (0.19)	6.8 (0.27)	11.3 (0.44)	5.0 (0.20)	6.9 (0.27)	10.5 (0.41)	6.0 (2.36)	7.5 (2.95)
821K	10.8 (0.43)	4.9 (0.19)	6.8 (0.27)	11.0 (0.43)	5.1 (0.20)	7.0 (0.28)	11.4 (0.45)	5.2 (0.20)	7.1 (0.28)	11.5 (0.45)	6.2 (2.44)	8.0 (3.15)
911K	11.3 (0.44)	5.3 (0.21)	7.2 (0.28)	11.5 (0.45)	5.5 (0.22)	7.5 (0.30)	11.8 (0.46)	5.6 (0.22)	7.6 (0.30)	11.5 (0.45)	6.3 (2.48)	8.0 (3.15)
951K										11.5 (0.45)	6.6 (2.60)	8.1 (3.19)
102K	11.8 (0.46)	5.7 (0.22)	7.8 (0.31)	12.0 (0.47)	6.0 (0.24)	8.0 (0.31)	12.4 (0.49)	6.1 (0.24)	8.1 (0.32)	12.0 (0.47)	7.0 (2.76)	8.5 (3.35)
112K	12.0 (0.47)	6.3 (0.25)	8.3 (0.33)	12.2 (0.48)	6.5 (0.26)	8.6 (0.34)	12.6 (0.50)	6.6 (0.26)	8.7 (0.34)	12.0 (0.47)	7.5 (2.95)	9.0 (3.54)

(1) W1 and W2 is maximum dimension.

(2) Unit: mm (inch)

Remark :

Bulk parts for 511K (320Vac) and above come standard with in-line crimped leads (see illustration to the right) for straight disk seating on PC boards. The suffix after part number automatically transfers to "L". Therefore, W1 and W2 dimensions are not applicable. If 511K (320Vac) and above are required with straight leads, please reference "How to order" and add "S" and reference W1 and W2 above.



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■ Ratings and Specifications

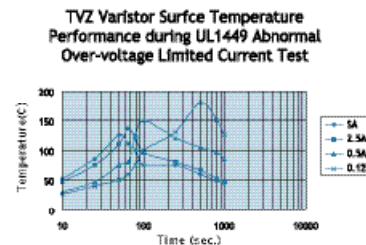
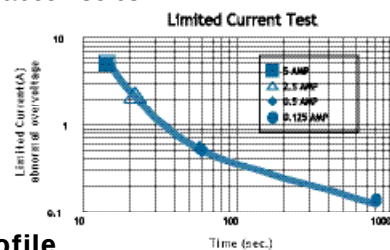
PART NUMBER	Maximum Ratings					Specifications		
	Maximum Continuous Working Voltage		Maximum Non-Repetitive Surge Current (8/20μs)	Maximum Non-Repetitive Surge Energy (10/1000μs)	Maximum Clamping Voltage at Specified Current (8/20μs)	Nominal Voltage at 1mA (DC) Current		Typical Capacitance @1KHZ
	V _{M(AC)}	V _{M(DC)}	I _{TM}	W _{TM}	V _c	V _{N(DC)} min.	V _{N(DC)} max.	C
	(V)	(V)	(A)	(J)	(V)	(V)	(V)	(pF)
FSR820K18ES	50	66	6500	46	135 / 80A	74	90	3500
FSR181K18ES	120	160	9000	70	320 / 80A	170	207	1600
FSR201K18ES	130	175	9000	130	340 / 80A	185	225	1270
FSR221K18ES	140	180	9000	135	360 / 80A	198	242	1220
FSR241K18ES	150	200	9000	140	395 / 80A	216	264	1200
FSR271K18ES	180	230	9000	150	455 / 80A	255	311	1050
FSR301K18ES	195	250	9000	170	505 / 80A	270	330	1010
FSR331K18ES	210	275	9000	190	545 / 80A	297	363	950
FSR361K18ES	230	300	9000	215	595 / 80A	324	396	870
FSR391K18ES	250	330	9000	240	650 / 80A	351	429	800
FSR431K18ES	275	370	9000	260	710 / 80A	387	473	730
FSR471K18ES	300	.385	9000	290	775 / 80A	423	517	660
FSR511K18ES	320	420	9000	314	840 / 80A	459	561	570
FSR561K18ES	360	470	9000	320	910 / 80A	522	638	560
FSR621K18ES	390	505	9000	330	1025 / 80A	558	682	540
FSR681K18ES	420	560	9000	340	1120 / 80A	612	748	500
FSR751K18ES	460	615	9000	360	1240 / 80A	675	825	460
FSR781K18ES	485	640	9000	365	1250 / 80A	702	858	400
FSR821K18ES	510	675	9000	388	1350 / 80A	738	902	310
FSR911K18ES	550	745	9000	405	1400 / 80A	819	1001	300
FSR102K18ES	625	825	9000	430	1620 / 80A	900	1100	285
FSR112K18ES	680	895	9000	440	1800 / 80A	962	1175	260
FSR180K20DS	11	14	2000	12	36 / 20A	16	20	27000
FSR220K20DS	14	18	2000	15	43 / 20A	20	24	20000
FSR270K20DS	17	22	2000	17	53 / 20A	24	30	15000
FSR330K20DS	20	26	2000	22	65 / 20A	30	36	12200
FSR390K20DS	25	31	2000	26	77 / 20A	35	43	10000
FSR470K20DS	30	38	2000	33	93 / 20A	42	52	9350
FSR560K20DS	35	45	2000	38	110 / 20A	50	62	8000
FSR680K20DS	40	56	2000	43	135 / 20A	61	75	6800
FSR820K20ES	50	66	8000	56	135 / 100A	74	90	5300
FSR181K20ES	120	160	12000	135	320 / 100A	170	207	1800
FSR201K20ES	130	175	12000	140	340 / 100A	185	225	1700
FSR221K20ES	140	180	12000	155	360 / 100A	198	242	1600
FSR241K20ES	150	200	12000	170	395 / 100A	216	264	1500
FSR271K20ES	180	230	12000	190	455 / 100A	255	311	1300
FSR301K20ES	195	250	12000	210	505 / 100A	270	330	1200
FSR331K20ES	210	275	12000	228	545 / 100A	297	363	1100
FSR361K20ES	230	300	12000	275	595 / 100A	324	396	1050
FSR391K20ES	250	330	12000	305	650 / 100A	351	429	1000
FSR431K20ES	275	370	12000	330	710 / 100A	387	473	950
FSR471K20ES	300	.385	12000	350	775 / 100A	423	517	900
FSR511K20ES	320	420	12000	382	840 / 100A	459	561	800
FSR561K20ES	360	470	12000	395	910 / 100A	522	638	760
FSR621K20ES	390	505	12000	410	1025 / 100A	558	682	710
FSR681K20ES	420	560	12000	423	1120 / 100A	612	748	680
FSR751K20ES	460	615	12000	435	1240 / 100A	675	825	620
FSR781K20ES	485	640	12000	450	1250 / 100A	702	858	580
FSR821K20ES	510	675	12000	460	1350 / 100A	738	902	530
FSR911K20ES	550	745	12000	510	1400 / 100A	819	1001	470
FSR102K20ES	625	825	12000	560	1620 / 100A	900	1100	425
FSR112K20ES	680	895	12000	620	1800 / 100A	962	1175	380
FSR201K25DS	130	175	18000	200	340 / 100A	185	225	3600
FSR221K25DS	140	180	18000	225	360 / 100A	198	242	3300
FSR241K25DS	150	200	18000	235	395 / 100A	216	264	3050
FSR271K25DS	180	230	18000	245	465 / 100A	255	311	2600

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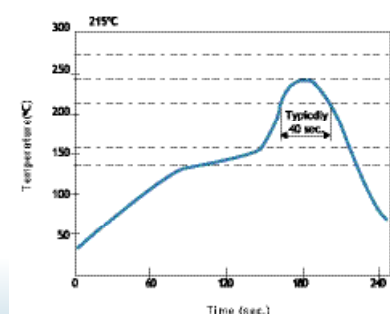
Ratings and Specifications

PART NUMBER	Maximum Tatings					Specifications		
	Maximum Continuous Working Voltage		Maximum Non-Repetitive Surge Current (8/20μs)	Maximum Non-Repetitive Surge Energy (10/1000μs)	Maximum Clamping Voltage at Specified Current (8/20μs)	Nominal Voltage at 1mA (DC) Current		Typical Capacitance @1KHZ
	V _M (AC)	V _M (DC)	I _{TM}	W _{TM}	V _c	V _N (DC) min.	V _N (DC) max.	C
	(V)	(V)	(A)	(J)	(V)	(V)	(V)	(pF)
FSR301K25DS	195	250	18000	255	505 / 100A	270	330	2400
FSR331K25DS	210	275	18000	270	540 / 100A	297	363	2200
FSR361K25DS	230	300	18000	315	595 / 100A	324	396	2050
FSR391K25DS	250	330	18000	342	650 / 100A	351	429	1900
FSR431K25DS	275	370	18000	370	710 / 100A	387	473	1700
FSR471K25DS	300	385	18000	390	775 / 100A	423	517	1600
FSR511K25DS	320	420	18000	422	840 / 100A	459	561	1400
FSR561K25DS	360	470	18000	460	910 / 100A	522	638	1200
FSR621K25DS	390	505	18000	495	1025 / 100A	558	682	1180
FSR681K25DS	420	560	18000	515	1120 / 100A	612	748	1100
FSR751K25DS	460	615	18000	530	1240 / 100A	675	825	1000
FSR781K25DS	485	640	18000	540	1240 / 100A	702	858	980
FSR821K25DS	510	675	18000	550	1350 / 100A	738	902	920
FSR911K25DS	550	745	18000	600	1400 / 100A	819	1001	880
FSR102K25DS	625	825	18000	630	1620 / 100A	900	1100	760
FSR112K25DS	680	895	18000	700	1800 / 100A	962	1175	650
FSR201K32DS	130	175	25000	210	340 / 200A	184	224	4700
FSR221K32DS	140	180	25000	225	360 / 200A	198	242	4300
FSR241K32DS	150	200	25000	240	395 / 200A	216	264	4000
FSR271K32DS	180	230	25000	255	455 / 200A	255	311	3500
FSR331K32DS	210	275	25000	300	550 / 200A	297	363	3000
FSR361K32DS	230	300	25000	315	595 / 200A	324	396	2800
FSR391K32DS	250	330	25000	330	650 / 200A	351	429	2500
FSR431K32DS	275	370	25000	360	710 / 200A	387	473	2200
FSR471K32DS	300	385	25000	380	775 / 200A	423	517	2000
FSR511K32DS	320	420	25000	430	840 / 200A	459	561	1900
FSR621K32DS	390	505	25000	470	1025 / 200A	558	682	1600
FSR681K32DS	420	560	25000	495	1120 / 200A	612	748	1500
FSR751K32DS	460	615	25000	520	1240 / 200A	675	825	1400
FSR781K32DS	485	640	25000	550	1290 / 200A	702	858	1300
FSR821K32DS	510	675	25000	580	1355 / 200A	738	902	1200
FSR911K32DS	550	745	25000	620	1500 / 200A	819	1001	1150
FSR951K32DS	575	765	25000	650	1570 / 200A	855	1043	1100
FSR102K32DS	625	825	25000	680	1650 / 200A	900	1100	1000
FSR112K32DS	680	859	25000	760	1815 / 200A	962	1175	900

Thermo Characteristics :



Soldering Profile



Application

- Replace standard MOV plus protection element (fuse)
- Transient voltage surge suppressor products
- AC power meters
- AC line power suppliers