



features

- Multilayer structure
- High surge current
- Protector against static electricity, switching and incoming surges
- Suitable for both flow and reflow soldering
- Products with lead-free terminations meet EU RoHS requirements. Pb located in glass material, electrode and varistor element is exempt per Annex 1, exemption 5 of EU directive 2005/95/EC

dimensions and construction



Type (Inch Size Code)	Dimensions inches (mm)			
	L	W	t	d
1H (0201)	.024±.001 (0.6±0.03)	.012±.001 (0.3±0.03)	.012±.001 (0.3±0.03)	.004 min. (0.1 min.)
1E (0402)	.023±.004 (1.0±0.1)	.02±.004 (0.5±0.1)	.023 max. (0.6 max.)	.01±.006 (0.25±0.15)
1J (0603)	.063±.006 (1.6±0.15)	.031±.006 (0.8±0.15)	.031±.006 (0.8±0.15)	.016 ^{+0.006} _{-0.008} (0.4 ^{+0.15} _{-0.2})
2A (0805)	.079±.008 (2.0±0.2)	.049±.008 (1.25±0.2)	.051 max. (1.3 max.)	.02±.010 (0.5±0.25)
2B (1206)	.126±.008 (3.2±0.2)	.063±.008 (1.6±0.2)	.065 max. (1.65 max.)	.02 ^{+0.014} _{-0.010} (0.5 ^{+0.35} _{-0.25})
2E (1210)	.126±.008 (3.2±0.2)	.098±.008 (2.5±0.2)	.059 max. (1.5 max.)	.020±.008 (0.5±0.2)
2J (1812)	.177±.008 (4.5±0.2)	.126±.008 (3.2±0.2)	.079 max. (2.0 max.)	.020 ^{+0.012} _{-0.004} (0.5 ^{+0.3} _{-0.1})
2L (2220)	.224±.008 (5.7±0.2)	.197±.008 (5.0±0.2)	.098 max. (2.5 max.)	.020 ^{+0.001} _{-0.004} (0.5 ^{+0.3} _{-0.1})
C2L (2220)	.232±.008 (5.9±0.2)	.201±.008 (5.1±0.2)	.106 max. (2.7 max.)	.028 ^{+0.016} _{-0.012} (0.7 ^{+0.4} _{-0.3})

ordering information

NV73	A	L	1J	T	TE	8.2
Type	Energy Code	Capacitance Type	Size	Termination Material	Packaging	Varistor Voltage
	A B C	Blank: Standard L: Low Capacitance (1E only)	1H: 0201 1E: 0402 1J: 0603 2A: 0805 2B: 1206 2E: 1210 2J: 1812 2L: 2220	T: Sn	TBM: 2mm press paper (1H: 15,000 pieces/reel) TP: 2mm pitch paper (1E: 10,000 pieces/reel) TE: 7" embossed plastic (1J, 2A, 2B: 2,500 pieces/reel; 2J, 2L: 1,000 pieces/reel; 2E: 2,000 pieces/reel)	8.2V 8.2 18V 18

For further information on packaging, please refer to Appendix A.

applications and ratings

Part Designation	Varistor Voltage V _{1mA} (V)	Varistor Voltage Tolerance (V)	Maximum Allowable Voltage d.c. (V)	Clamping Voltage I _c =1A (V) 8/20μs	Maximum Energy (J) 10/1000μs	Maximum Peak Current (A) 2 times 8/20μs	Capacitance (Typ) 1kHz (pF)	Operating Temp. (°C)	Storage Temp. (°C)
NV73A1HTTBM12	12	10 - 15.6	6.5	35	0.01	1	33	-40°C to +85°C	-40°C to +125°C
NV73A1ETTP8	8	6.4 - 9.6	5.5	20	0.05	20	480		
NV73A1ETTP18	18	16.2 - 19.8	14.0	35			160		
NV73AL1ETTP12	12	10 - 14	5.5	30	0.03	5	50		
NV73AL1ETTP21	21	18 - 24	14.0	50			50		
NV73AL1ETTP28	28	24 - 32	18.0	65	0.005	2	15		
NV73AL1ETTP120	120	90 - 150		350 (1C=0.5A)			0.5		

Part Designation	Varistor Voltage V _c	Maximum Allowable Voltage		Clamping Voltage		Maximum Energy E (J)	Maximum Peak Current I _p (A) (2 times)	Operating Temp. T _{opt} (°C)	Storage Temp. T _{stg} (°C)
	I _c = 1mA (V)	a.c rms (V)	d.c (V)	V _{1A}	V _{2A}				
NV73A1JTTE8.2	6.8 - 9.8	4.2	6.0	—	21	0.1	30	-40°C to +85°C	-40°C to +125°C
NV73A1JTTE12	10 - 14.4	6.1	8.6	—	29				
NV73A1JTTE15	12.5 - 18	7.6	10.8	—	35				
NV73A1JTTE18	16 - 20	9.1	12.8	—	37				
NV73A1JTTE20	18 - 22	10.6	15.0	—	40				
NV73A1JTTE22	19 - 24	12.0	16.5	—	42				
NV73A1JTTE24	21.8 - 26.5	14.0	18.0	—	46				
NV73A1JTTE27	25 - 32	17.0	22.0	—	49				
NV73A2ATTE8.2	6.8 - 9.8	4.2	6.0	18	—	0.01	10		
NV73A2ATTE12	10 - 14.4	6.1	8.6	24	—	0.03	20		
NV73A2ATTE15	12.5 - 18	7.6	10.8	29	—	0.04			
NV73A2ATTE18	16 - 20	9.1	12.8	29	—				
NV73A2ATTE20	18 - 22	10.6	15.0	33	—	0.05			
NV73A2ATTE22	19 - 24	12.0	16.5	39	—				
NV73A2ATTE24	21.8 - 26.5	14.0	18.0	42	—	0.06			
NV73A2ATTE27	25 - 32	17.0	22.0	50	—	0.07			
NV73A2ATTE33	30 - 39	20.0	26.0	60	—	0.12			
NV73A2ATTE39	37 - 47	25.0	31.0	72	—	0.14	25		
NV73A2ATTE47	45 - 54	30.0	38.0	86	—	0.16			
NV73B2ATTE8.2	6.8 - 9.8	4.2	6.0	—	18	0.03	35		
NV73B2ATTE12	10 - 14.4	6.1	8.6	—	24	0.05			
NV73B2ATTE15	12.5 - 18	7.6	10.8	—	30	0.07			
NV73B2ATTE18	16 - 20	9.1	12.8	—	32	0.08			
NV73B2ATTE20	18 - 22	10.6	15.0	—	36	0.09			
NV73B2ATTE22	19 - 24	12.0	16.5	—	40	0.11			
NV73B2ATTE24	21.8 - 26.5	14.0	18.0	—	42	0.12			
NV73B2ATTE27	25 - 32	17.0	22.0	—	58	0.24			
NV73B2ATTE33	30 - 39	20.0	26.0	—	66	0.25	50		
NV73C2ATTE8.2	6.8 - 9.8	4.2	6.0	—	18	0.04	25		
NV73C2ATTE12	10 - 14.4	6.1	8.6	—	24	0.09			
NV73C2ATTE15	12.5 - 18	7.6	10.8	—	29	0.11			
NV73C2ATTE18	16 - 20	9.1	12.8	—	32	0.13			
NV73C2ATTE20	18 - 22	10.6	15.0	—	35	0.14			
NV73C2ATTE22	19 - 24	12.0	16.5	—	40	0.17			
NV73C2ATTE24	21.8 - 26.5	14.0	18.0	—	42	0.18			
NV73A2BTTE27	25 - 32	17.0	22.0	—	55	0.13		40	
NV73A2BTTE33	30 - 39	20.0	26.0	—	60	0.15			
NV73A2BTTE39	37 - 47	25.0	31.0	—	72	0.18			
NV73A2BTTE47	45 - 54	30.0	38.0	—	85	0.22			
NV73A2BTTE56	52 - 62	35.0	45.0	—	100	0.26			

circuit protection

Specifications given herein may be changed at any time without prior notice. Please confirm technical specifications before you order and/or use.

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KOA SPEER ELECTRONICS, INC.

NV73

metal oxide varistor

applications and ratings (continued)

Part Designation	Varistor Voltage Vc	Maximum Allowable Voltage		Clamping Voltage		Maximum Energy E (J)	Maximum Peak Current Ip (A) (2 times)	Operating Temp. T _{opt} (°C)	Storage Temp. T _{stg} (°C)		
	Ic = 1mA (V)	a.c rms (V)	d.c (V)	V _{1A}	V _{2A}						
NV73B2BTTE8.2	6.8 - 9.8	4.2	6.0	—	18	0.03	50	-40°C to +85°C	-40°C to +125°C		
NV73B2BTTE12	10 - 14.4	6.1	8.6	—	24	0.07					
NV73B2BTTE15	12.5 - 18	7.6	10.8	—	29	0.09					
NV73B2BTTE18	16 - 20	9.1	12.8	—	32	0.1					
NV73B2BTTE20	18 - 22	10.6	15.0	—	35	0.11					
NV73B2BTTE22	19 - 24	12.0	16.5	—	40	0.12					
NV73B2BTTE24	21.8 - 26.5	14.0	18.0	—	42	0.14					
NV73B2BTTE27	25 - 32	17.0	22.0	—	52	0.16					
NV73C2BTTE8.2	6.8 - 9.8	4.2	6.0	—	18	0.06	40			-40°C to +85°C	-40°C to +125°C
NV73C2BTTE12	10 - 14.4	6.1	8.6	—	24	0.1	70				
NV73C2BTTE15	12.5 - 18	7.6	10.8	—	29	0.13					
NV73C2BTTE18	16 - 20	9.1	12.8	—	29	0.15					
NV73C2BTTE20	18 - 22	10.6	15.0	—	31	0.17					
NV73C2BTTE22	19 - 24	12.0	16.5	—	35	0.19					
NV73C2BTTE24	21.8 - 26.5	14.0	18.0	—	38	0.2					
NV73C2BTTE27	25 - 32	17.0	22.0	—	48	0.24					

Part Designation	Varistor Voltage Vc	Maximum Allowable Voltage		Clamping Voltage			Maximum Energy E (J)	Maximum Peak Current Ip (A) (2 times)	Operating Temp. T _{opt} (°C)	Storage Temp. T _{stg} (°C)
	Ic = 1mA (V)	a.c rms (V)	d.c (V)	V _{2.5A}	V _{5A}	V _{10A}				
NV73A2ETTE15	12.8 - 17.3	8.0	11.0	30	—	—	1.0	400	-50°C to +125°C	-50°C to +150°C
NV73A2ETTE18	15.3 - 20.7	11.0	14.0	34	—	—	1.2			
NV73A2ETTE22	19.8 - 24.2	12.0	16.5	39	—	—	1.4			
NV73A2ETTE24	21.6 - 26.4	14.0	18.0	39	—	—	1.4			
NV73A2ETTE27	24.3 - 29.7	17.0	22.0	44	—	—	1.7			
NV73A2ETTE33	29.7 - 36.3	20.0	26.0	54	—	—	1.9			
NV73A2ETTE39	35.1 - 42.9	25.0	30.0	65	—	—	1.7			
NV73A2ETTE47	42.3 - 51.7	30.0	38.0	77	—	—	2.0			
NV73A2ETTE56	50.4 - 61.6	35.0	45.0	90	—	—	2.0			
NV73A2ETTE82	73.8 - 90.2	50.0	65.0	135	—	—	1.2	250		
NV73A2ETTE100	90.0 - 110.0	60.0	85.0	165	—	—	1.4	200		
NV73A2ETTE110	99.0 - 121.0	70.0	90.0	180	—	—	1.4			
NV73A2JTTE12	10.2 - 13.8	6.0	9.0	—	27	—	0.9	500		
NV73A2JTTE15	12.8 - 17.3	8.0	11.0	—	32	—	1.2			
NV73A2JTTE18	16.2 - 19.8	11.0	14.0	—	35	—	1.4			
NV73A2JTTE22	19.8 - 24.2	12.0	16.5	—	41	—	1.6			
NV73A2JTTE24	21.6 - 26.4	14.0	18.0	—	44	—	1.7			
NV73A2JTTE27	24.3 - 29.7	17.0	22.0	—	49	—	2.0			
NV73A2JTTE33	29.7 - 36.3	20.0	26.0	—	54	—	2.5			
NV73A2JTTE39	35.1 - 42.9	25.0	30.0	—	65	—	2.9			
NV73A2JTTE47	42.3 - 51.7	30.0	38.0	—	77	—	3.5			
NV73A2JTTE56	50.4 - 61.6	35.0	45.0	—	90	—	4.2			
NV73A2JTTE68	61.2 - 74.8	40.0	56.0	—	110	—	4.8			
NV73A2JTTE82	73.8 - 90.2	50.0	65.0	—	135	—	4.5			
NV73A2JTTE100	90 - 110	60.0	85.0	—	165	—	5.8		400	
NV73A2JTTE110	99 - 121	70.0	90.0	—	180	—	5.8			
NV73A2JTTE150	135 - 165	95.0	127.0	—	248	—	5.8		300	
NV73B2JTTE15	12.8 - 17.3	8.0	11.0	—	32	—	1.8	800		
NV73B2JTTE18	15.3 - 20.7	11.0	14.0	—	35	—	1.9			
NV73B2JTTE22	19.8 - 24.2	12.0	16.5	—	41	—	2.3			
NV73B2JTTE24	21.6 - 26.4	14.0	18.0	—	44	—	2.3			
NV73B2JTTE27	24.3 - 29.7	17.0	22.0	—	49	—	2.7			
NV73B2JTTE33	29.7 - 36.3	20.0	26.0	—	54	—	3.0			

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applications and ratings (continued)

Part Designation	Varistor Voltage Vc	Maximum Allowable Voltage		Clamping Voltage			Maximum Energy E (J)	Maximum Peak Current I _P (A) (2 times)	Operating Temp. T _{opt} (°C)	Storage Temp. T _{stg} (°C)	
		I _c = 1mA (V)	a.c rms (V)	d.c (V)	V _{2.5A}	V _{5A}					V _{10A}
NV73B2JTTE39	35.1 - 42.9	25.0	30.0	—	65	—	3.7	800	-50°C to +125°C	-50°C to +150°C	
NV73B2JTTE47	42.3 - 51.7	30.0	38.0	—	77	—	4.2				
NV73B2JTTE56	50.4 - 61.6	35.0	45.0	—	90	—	4.2				
NV73A2LTTE12	10.2 - 13.8	6.0	9.0	—	—	28	1.9	1000			
NV73A2LTTE15	12.8 - 17.3	8.0	11.0	—	—	33	2.3				
NV73A2LTTE18	16.2 - 19.8	11.0	14.0	—	—	36	2.7				
NV73A2LTTE22	19.8 - 24.2	12.0	16.5	—	—	41	2.9				
NV73A2LTTE24	21.6 - 26.4	14.0	18.0	—	—	45	3.1				
NV73A2LTTE27	24.3 - 29.7	17.0	22.0	—	—	48	3.8				
NV73A2LTTE33	29.7 - 36.3	20.0	26.0	—	—	57	4.3				
NV73A2LTTE39	35.1 - 42.9	25.0	30.0	—	—	65	5.5				
NV73A2LTTE47	42.3 - 51.7	30.0	38.0	—	—	77	6.3				
NV73A2LTTE56	50.4 - 61.6	35.0	45.0	—	—	90	7.7				
NV73A2LTTE68	61.2 - 74.8	40.0	56.0	—	—	110	8.8				
NV73A2LTTE100	90 - 110	60.0	85.0	—	—	165	6.8				
NV73A2LTTE110	99 - 121	70.0	90.0	—	—	180	6.8				
NV73B2LTTE15	12.8 - 17.3	8.0	11.0	—	—	33	4.2				1200
NV73B2LTTE18	15.3 - 20.7	11.0	14.0	—	—	36	5.4				
NV73B2LTTE22	19.8 - 24.2	12.0	16.5	—	—	41	5.8				
NV73B2LTTE24	21.6 - 26.4	14.0	18.0	—	—	45	5.8				
NV73B2LTTE27	24.3 - 29.7	17.0	22.0	—	—	48	7.2				
NV73B2LTTE33	29.7 - 36.3	20.0	26.0	—	—	57	7.8				
NV73B2LTTE39	35.1 - 42.9	25.0	30.0	—	—	65	9.6				
NV73B2LTTE47	42.3 - 51.7	30.0	38.0	—	—	77	12.0				
NV73B2LTTE56	50.4 - 61.6	35.0	45.0	—	—	90	7.7				
NV73B2LTTE82	73.8 - 90.2	50.0	65.0	—	—	135	5.6	1000			
NV73C2LTTE39	35.1 - 42.9	25.0	30.0	—	—	65	5.6 (1 time)	2500 (1 time)			
NV73C2LTTE82	73.8 - 90.2	50.0	65.0	—	—	135	14 (1 time)	4500 (1 time)			

Maximum allowable voltage - the maximum sinusoidal RMS voltage or maximum DC voltage which can be applied continuously
 E: Maximum energy - the maximum energy within the varistor voltage change of ±10% when a single impulse of 2m sec. is applied
 I_P: Maximum peak current - the maximum peak current within the varistor voltage change of ±10% when a single standard impulse of 8/20μ sec. is applied two times with an interval of 5 min.
 T_{opt}: Operating temperature - Ambient temperature range when the device is operating
 T_{stg}: Storage temperature - Temperature range without causing the device any failure

environmental applications
Performance Characteristics

Parameter	Requirement Δ V±%	Test Method
Varistor Voltage	Within specified tolerance	Voltage between terminals when 1mA is flowed
Solderability	95% coverage minimum	230°C ± 5°C, 4 seconds ± 1 second; 235°C ± 5°C, 4 seconds ± 1 second***
Resistance to Solder Heat	±10%	260°C ± 5°C, 10 seconds ± 0.5 second*; 270°C ± 5°C, 3 seconds ± 0.5 second***; 260°C ± 5°C, 4 seconds ± 1 second***
Rapid Change of Temperature	±10%	-40°C (30 minutes), +125°C (30 minutes), 30 cycles; 5 cycles***
Maximum Peak Current	±10%	A single standard impulse of 8/20μ seconds, positive/negative applied once each; A single standard impulse of 8/20μ seconds, 100 pulse, 30 second interval***
Maximum Energy	±10%	A single standard impulse of 10/1000μs, once*; A single standard impulse of 2ms, once**; A single standard impulse of 10/1000μs, 100pulse, 90 second interval***
High Temperature Life with d.c. Bias	±10%	85°C ± 5°C, 1000h, Load: Maximum allowable circuit voltage (d.c.); 125°C ± 5°C, 1000h, Load: Maximum allowable circuit voltage (d.c.)***
Low Temperature Life with d.c. Bias***	±10%	-50°C ± 5°C, 1000h, Load: Maximum allowable circuit voltage (d.c.)
High Temperature Life with a.c. Bias**	±10%	85°C ± 5°C, 1000h, Load: Maximum allowable circuit voltage (V _{a.c.r.m.s.})
High Temperature & High Humidity Life with d.c. Bias	±10%	40°C ± 5°C, 95% RH, 500h, Load: Maximum allowable voltage (d.c.)
Capacitance*	Typical	1kHz: Others, 1MHz: Varistor voltage 120V
High Temperature Storage Life	±10%	125°C ± 5°C, 1000h; 150°C ± 5°C, 1000h***
Low Temperature Storage Life	±10%	-40°C ± 5°C, 1000h; -50°C ± 5°C, 1000h***

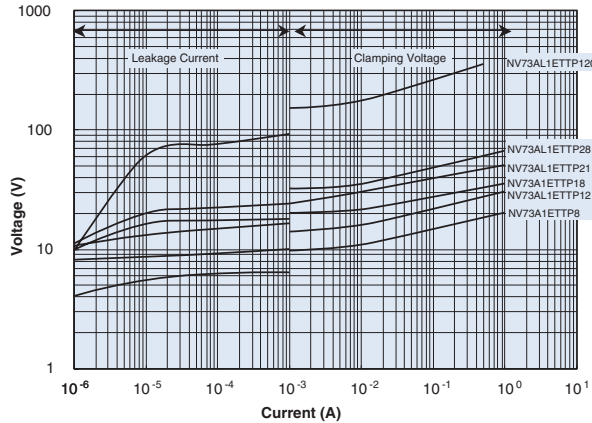
* 1H, 1E ** 1J, 2A, 2B *** 2E, 2J, 2L

For Voltage Current Curves Graphs see Environmental Applications. Additional environmental applications can also be found at www.koaspeer.com
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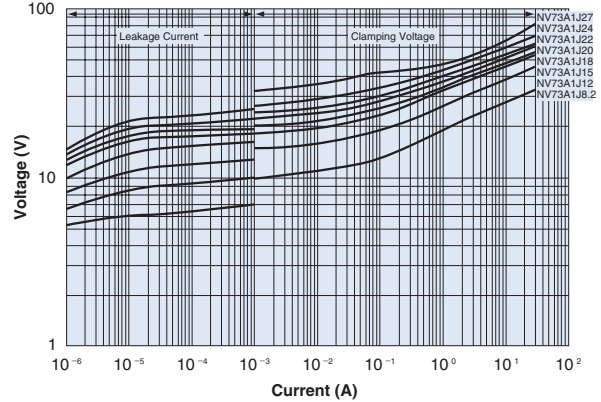
environmental applications (continued)

Voltage-Current Curves (Ta = 25°C)

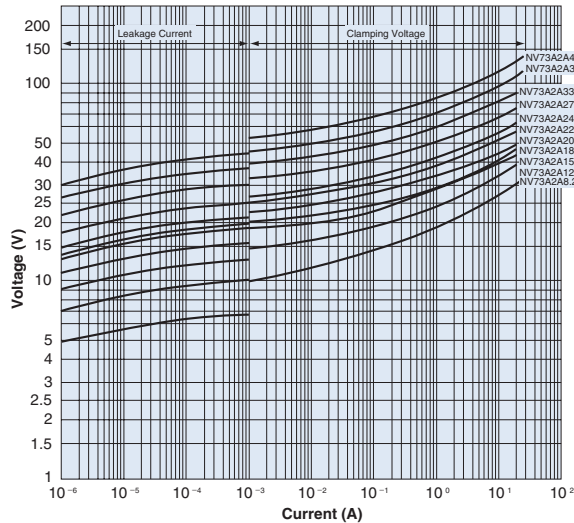
NV73A 1E



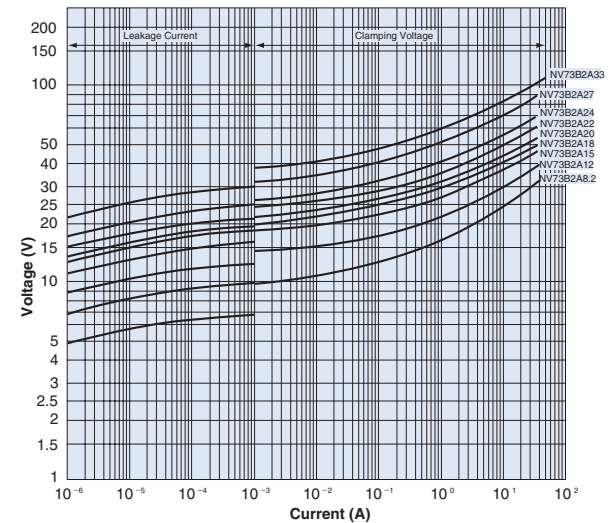
NV73A 1J



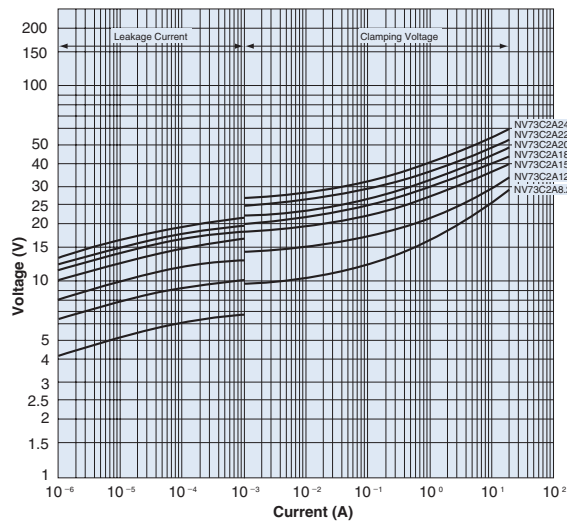
NV73A 2A



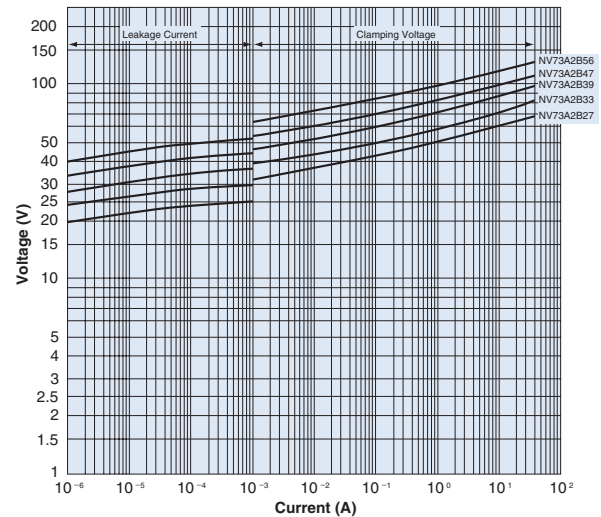
NV73B 2A



NV73C 2A



NV73A 2B



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