Unictron Technologies Corp. Metal-Oxide Varistors(MOVs) High temperature 20N series

Device Ratings and Characteristics

Part No.	Device Marking	Maximum Allowable Voltage		Varistor Voltage (@1mA)			Clamping Voltage @ Test Current (@8/20μs)		Maximum Energy (@10/1000μs)	Maximum Peak Current (@8/20μs)	Rated Power	Typical Capacitance (@1KHz)	UL 1449 4th ,In @8/20us	Related Standards Symbol
		ACrms(V)	DC(V)	Vn(Vdc)	Min.	Max.	Vc(V)	Ip(A)	(J)	(A)	(W)	(pF)	(KA)	
CNR-20N180K	20N180K	11	14	18	16	20	36	20	28	6000	0.3	42000	3	◎
CNR-20N220K	20N220K	14	18	22	20	24	43	20	36	6000	0.3	37000		◎
CNR-20N270K	20N270K	17	22	27	24	30	53	20	46	6000	0.3	29200		◎
CNR-20N330K	20N330K	20	26	33	30	36	65	20	59	6000	0.3	21400		◎
CNR-20N390K	20N390K	25	31	39	35	43	77	20	67	6000	0.3	19800		◎
CNR-20N470K	20N470K	30	38	47	42	52	93	20	85	6000	0.3	17300		◎
CNR-20N560K	20N560K	35	45	56	50	62	110	20	106	6000	0.3	14400		◎
CNR-20N680K	20N680K	40	56	68	61	75	135	20	119	6000	0.3	12600		◎
CNR-20N201K	20N201K	130	170	200	180	220	340	200	200	20000	1	2125	5	□
CNR-20N221K	20N221K	140	180	220	198	242	360	200	215	20000	1	2000		□
CNR-20N241K	20N241K	150	200	240	216	264	395	200	235	20000	1	1875		□
CNR-20N271K	20N271K	175	225	270	243	297	455	200	275	20000	1	1625		□
CNR-20N301K	20N301K	195	250	300	270	330	500	200	295	20000	1	1500		□
CNR-20N331K	20N331K	215	275	330	297	363	550	200	320	20000	1	1375		□
CNR-20N361K	20N361K	230	300	360	324	396	595	200	350	20000	1	1375		□
CNR-20N391K	20N391K	250	320	390	351	429	650	200	385	20000	1	1375		□
CNR-20N431K	20N431K	275	350	430	387	473	710	200	425	20000	1	1250		□
CNR-20N471K	20N471K	300	385	470	423	517	775	200	450	20000	1	1125		□
CNR-20N511K	20N511K	320	410	510	459	561	845	200	500	20000	1	1000		□
CNR-20N561K	20N561K	350	460	560	504	616	915	200	520	20000	1	938		□
CNR-20N621K	20N621K	395	510	620	558	682	1020	200	590	15000	1	713		□
CNR-20N681K	20N681K	420	560	680	612	748	1120	200	650	15000	1	688		□
CNR-20N751K	20N751K	465	615	750	675	825	1235	200	725	15000	1	663		□

Related Standards

Symbols	□			◎	
Approval	cULus	VDE	CQC	cULus	VDE

Note : VDE & CQC Certification are under appovaling

Specifications are subject to change without notice.

Revised: 17/03/07

Reliability

Characteristics	Standard	Test Conditions	Specifications
Robustness of terminations	IEC 60068-2-21 Test Ua1	F = 10 N (d ≤ 0.8 mm) ,F = 20 N (d = 1 mm)	△V/V≦±10% No visible damage
Solderability	IEC 60068-2-20 Test Ta (Method 1)	T = 235±5℃, d = 2±0.5s	Approximately≧95%
Resistance to soldering heat	IEC 60068-2-20 Test Tb (Method 1A)	T = 260±5℃, d = 10±1s	△V/V≦±10% No visible damage
Shock	IEC 60068-2-27 Test Ea	Pulse shape: half-sine. a = 490 m/s2 , d = 11ms. N = 6 x 3 shocks	△V/V≦±10% No visible damage
Vibration	IEC 60068-2-6 Test Fc Method B4	Frequency range: 10 Hz to 55 Hz ,a = 0.75 mm or 98 m/s2 (whichever is the less), d = 3x2 h	△V/V≦±10% No visible damage
Needle flame test	IEC 60695-11-5	Severity: Vertical 10 s	Duration of burning: 5 s max.
Voltage under pulse condition	IEC 61051-2	At class current	As specified in specification
Voltage proof	IEC 61051-2	Metal balls method (4.8.1.2) 2500 V, 60 s	As specified in specification
Pulse current - 8/20 μs	IEC 61051-2	8/20 μs, 10 times, I peak=0.25*Imax	△V/V≦±10% No visible damage
Pulse current - 10/1000 μs	IEC 61051-2	10/1000 μs, 10 times, Ipeak = 0.0075* Imax	△V/V≦±10% No visible damage
Combination pulse	IEC 60950-1:2013 Annex Q	Additional test: 10 pulses (combination pulse 6KV/3KA), in one direction, 1 per min	△V/V≦±10% No visible damage U ≤ 1.1 Uinitial Voltage proof:No breakdown or flashover
Rapid change of temperature	IEC 60068-2-14 Test Na	N = 5 cycles, d = 30 min , θA = -40±3°C, θB = 85±2°C	△V/V≦±10% No visible damage
Climatic sequence	IEC 60068-2-2 Test Ba IEC 60068-2-30 Test Db IEC 60068-2-1 Test Aa IEC 60068-2-30 Test Db	Dry heat, Test Ba:16±2h, T = 85±2℃ Damp heat, Test Db first cycle :24h, T = 55±2℃ Cold, Test Aa :2h, T = -40±3℃ Damp heat Test Ba remaining cycles:5 cycle	△V/V≦±10% No visible damage RISO≧100MΩ Voltage proof:No breakdown or flashover
Endurance at upper category temperature	IEC 61051-1 (4.21)	T:max temperature as specified , Duration: 1000 h, Voltage: max. a.c. voltage	△V/V≦±10% No visible damage R≧1000MΩ U ≤ 1,1 Uinitial

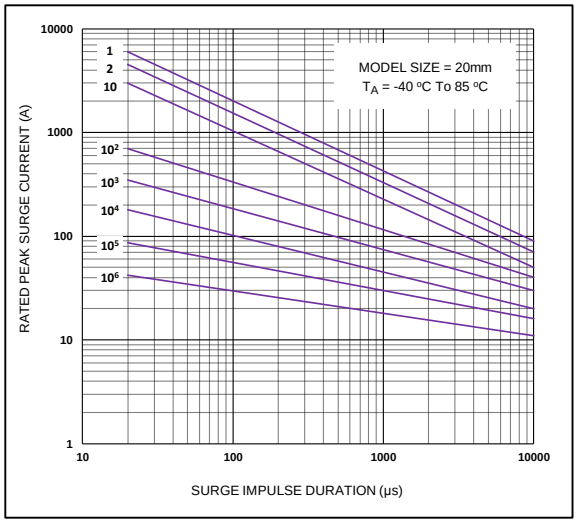
Reliability

Characteristics	Standard	Test Conditions	Specifications
Damp heat (Steady state)	IEC 60068-2-78 Test Ca	T = 40±2℃, RH = 93(+2/-3)%, 56d , 4 specimens:No voltage applied , Other 4 specimens:Applied voltage: 10% of the max. d.c. voltage	△V/V≦±10% RISO≧100MΩ
Maximum Peak Current	Specification Standard	Imax, 8/20 μs, 1 time $\frac{V_{1mA}\text{at }85℃ - V_{1mA}\text{at }25℃}{V_{1mA}\text{at }25℃} \times \frac{1}{60} \times 100(\%/℃)$	-0.05≦TC≦ 0.05(%/℃)
Nominal Discharge Current Test	UL1449 4th	Nominal Discharge Current (In), 8/20 μs, 15 times	△V/V≦±10% No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	V1mA at -40℃, 85℃, 25℃	△V/V≦±10% No visible damage
High Temperature Storage	IEC60068-2-2	1000h, T = 85±2℃	△V/V≦±10% No visible damage
Max. Energy	Specification Standard	10/1000 μs, 1 tmes, Max. Energy	△V/V≦±10% No visible damage
Operating duty cycle test *	UL 1449	6 kV/3 kA combination wave surges, phase angle of 90 (+0, -15) degrees, npositive polarity 8 times, negative polarity 7 times, interval of 60s.	△V/V≦±10% No visible damage
Surge Immunity Test*	IEC 61000-4-5	4kV/2kA combination wave surges, phase angle of 90 (+0, -15) degrees, npositive polarity 20times, negative polarity 20times, interval of 60s.	△V/V≦±10% No visible damage

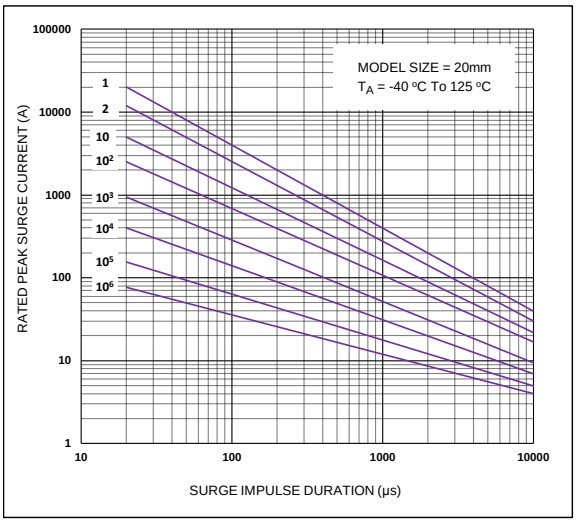
*(According to customer requirements to meet the test items)

Impulse Life Time Rating Curves

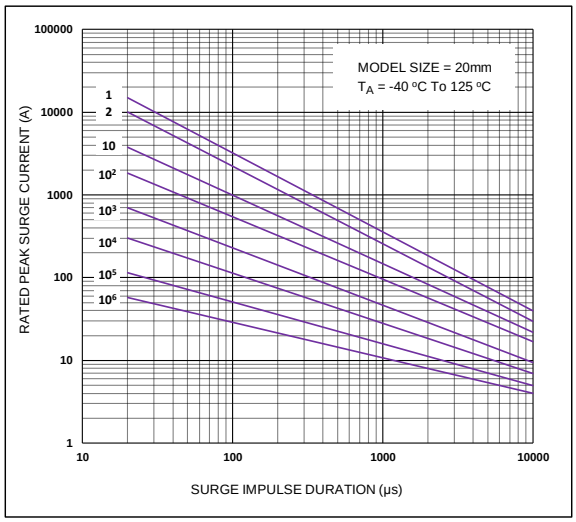
CNR-20N180K to CNR-20N680K



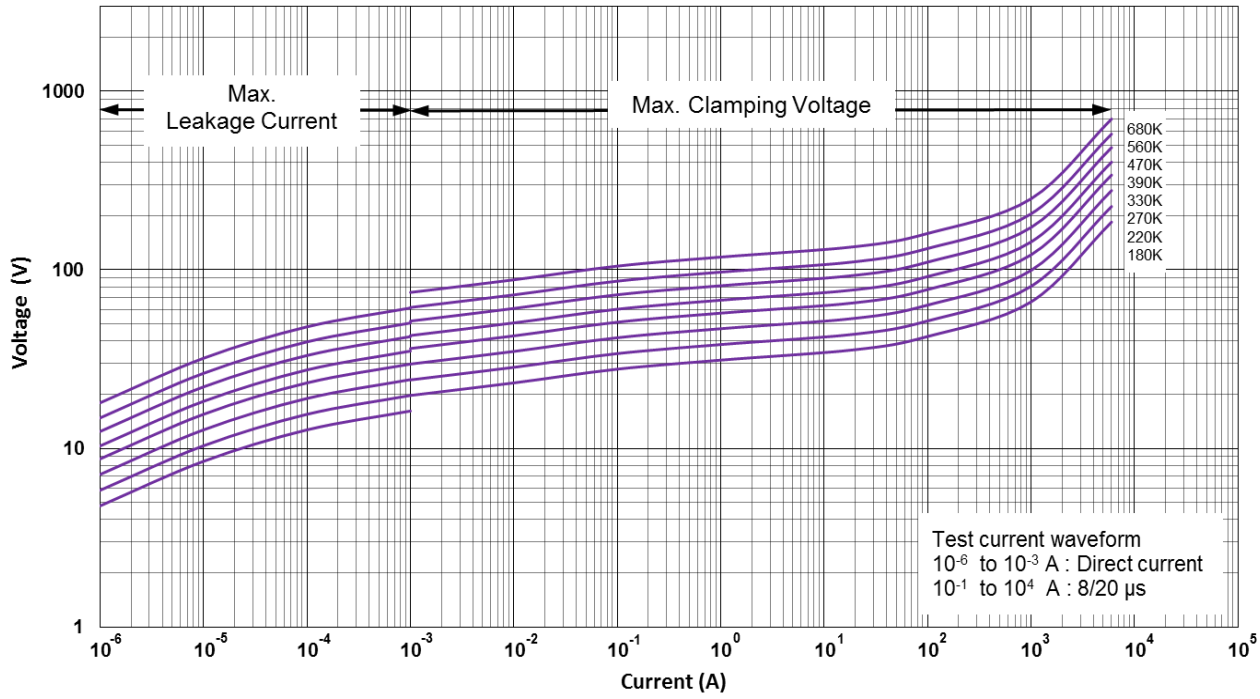
CNR-20N201K to CNR-20N561K



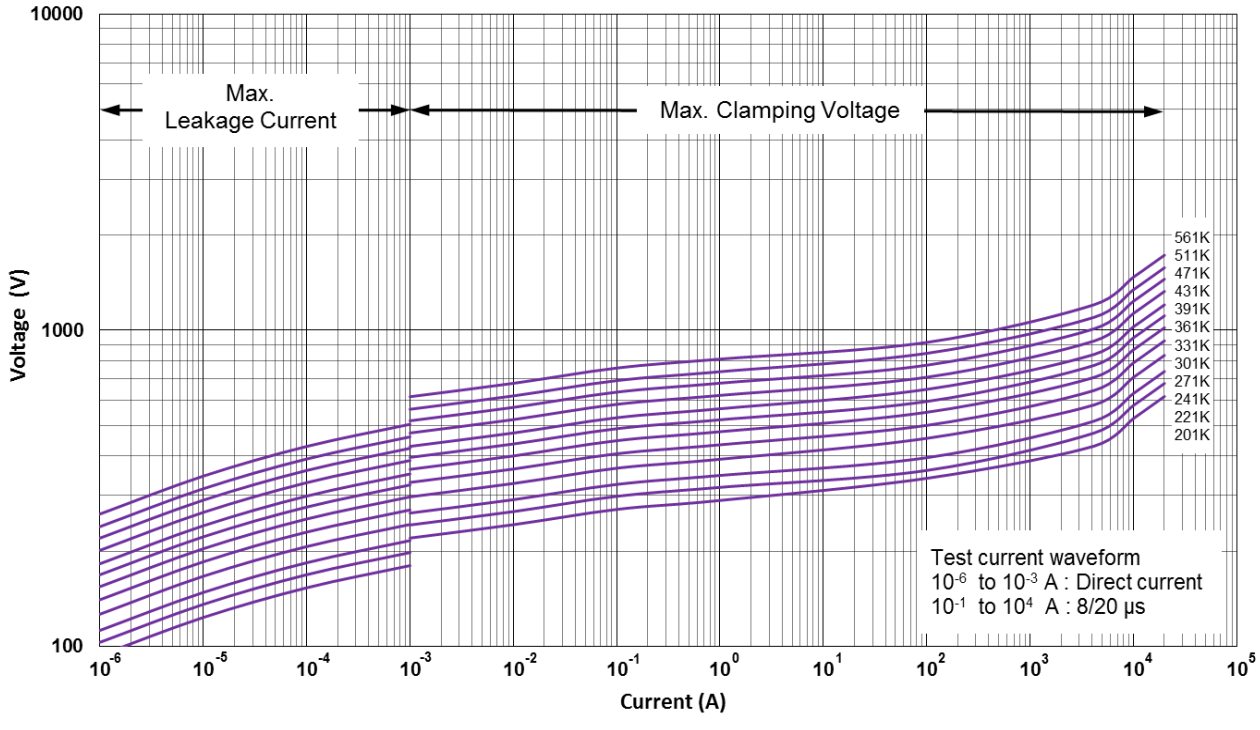
CNR-20N621K to CNR-20N112K



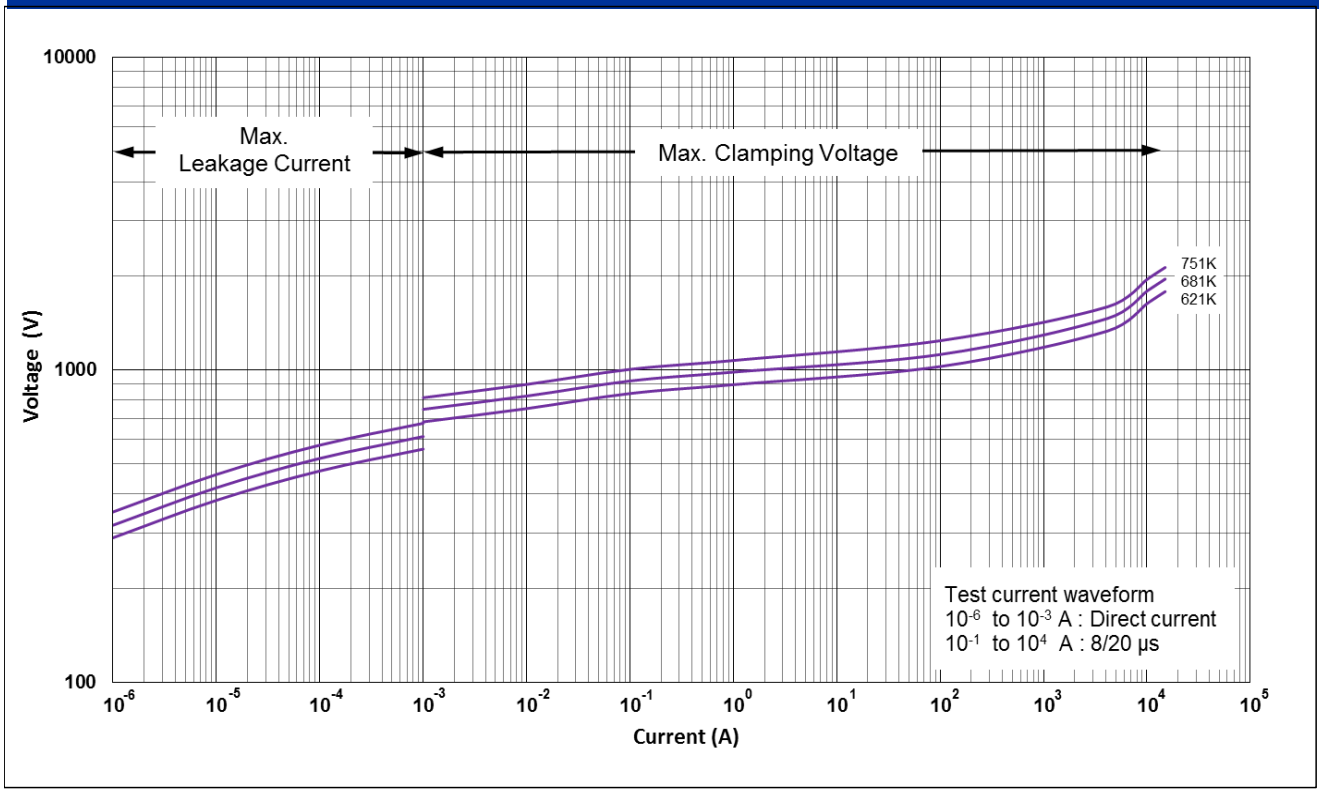
CNR-20N180K to CNR-20N680K V-I Curves



CNR-20N201K to CNR-20N561K V-I Curves

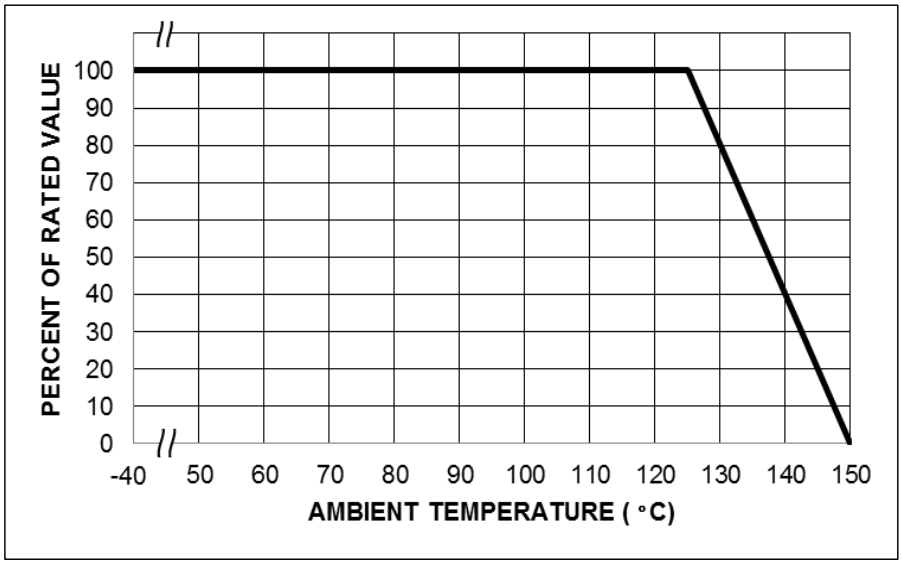


CNR-20N621K to CNR-20N751K V-I Curves

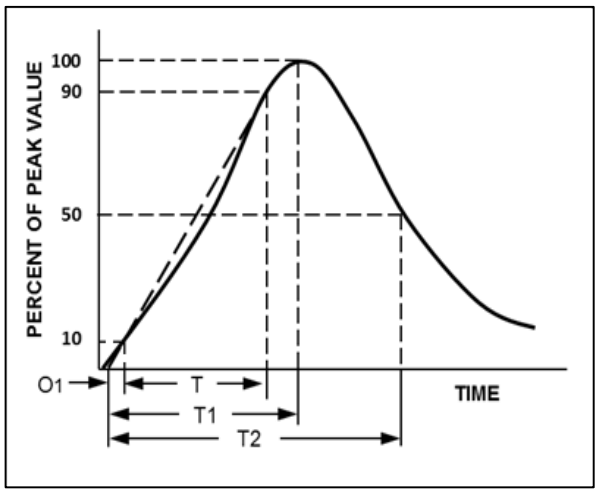


Power Derating Curve

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device.The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



Surge Current Standard Waveform



O1 = Virtual Origin of Wave
T = Time from 10% to 90% of Peak
T1 = Rise Time = 1.25 x T
T2 = Decay Time
Example - For an 8/20 μs Current Waveform:
8μs = T1 = Rise Time
20μs = T2 = Decay Time

Product Dimensions

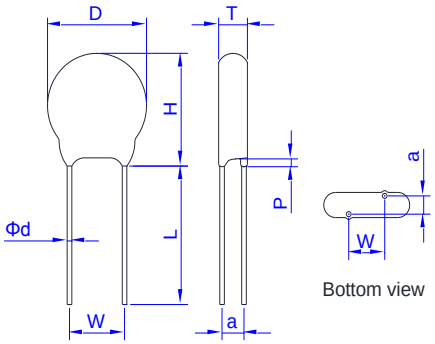


Fig 1. Straight Lead

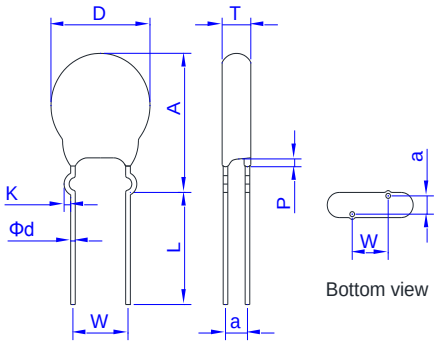


Fig 2. Outside Kink Lead

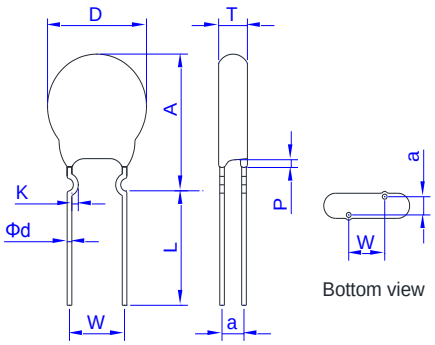


Fig 3. Inside Kink Lead

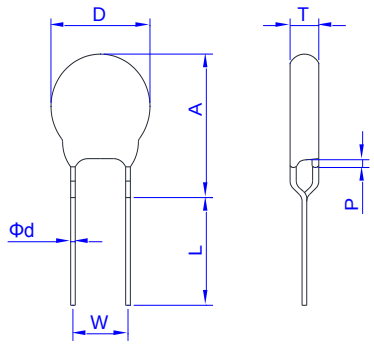


Fig 4. In Line Kink Lead

Dimension Table **Unit:mm**

Symbol \ Model		05N		07N		10N		14N		18N		20N	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
D		5.5	7.5	7.5	9.0	10.5	14.0	13.5	17.5	18.5	23.0	19.5	25.0
H		-	10.0	-	12.0	-	17.0	-	20.5	-	26.0	-	28.0
W		4.0	6.0	4.0	6.0	6.5	8.5	6.5	8.5	6.5	8.5	9.0	11.0
Φd		0.55	0.65	0.55	0.65	0.75	0.85	0.75	0.85	0.75	0.85	0.95	1.05
P(max.)		3.0											
L(min)		25.0											
K(Kink Lead)		0.8	1.6	0.8	1.6	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8
A(max.)	180K-271K	-	13.0	-	15.0	-	19.5	-	22.5	-	26.5	-	30.0
	>271K	-	13.0	-	15.0	-	20.5	-	23.5	-	27.0	-	31.0
T		See Tmax table											

＊Short Cut Lead type TTXX the lead length (L) can 3.0~15mm (expect 20N dia <10mm), see Ordering Note.

＊＊a value see T max. table

T max. Table Unit:mm

Model	05N	07N	10N	14N	18N	20N	a(±1.0)
180K	4.7	4.7	5.3	5.3	5.3	5.3	1.5
220K	5.1	5.1	5.6	5.6	5.6	5.6	1.7
270K	5.3	5.3	5.9	5.9	5.9	5.9	1.8
330K	4.7	4.7	5.3	5.3	5.3	5.3	1.9
390K	4.9	4.9	5.5	5.5	5.5	5.5	1.9
470K	5.2	5.2	5.8	5.8	5.8	5.8	2.1
560K	5.6	5.6	6.1	6.1	6.1	6.1	2.3
680K	6	6	6.5	6.5	6.5	6.5	2.6
201K	5.1	6.2	6.2	6.2	6.2	6.2	2
221K	5.3	6.3	6.3	6.3	6.3	6.3	2.1
241K	5.4	6.5	6.5	6.5	6.5	6.5	2.2

Model	05N	07N	10N	14N	18N	20N	a(±1.0)
271K	6.1	6.6	6.6	6.6	6.6	6.6	2.3
301K	6.2	6.8	6.8	6.8	6.8	6.8	2.5
331K	6.4	7	7	7	7	7	2.7
361K	6.5	7.3	7.3	7.3	7.3	7.3	2.8
391K	6.8	7.5	7.5	7.5	7.5	7.5	3
431K	7.1	7.8	7.8	7.8	7.8	7.8	3.2
471K	7.4	8.1	8.1	8.1	8.1	8.1	3.4
511K	7.8	8.2	8.2	8.2	8.2	8.2	3.7
561K	8.2	8.5	8.5	8.5	8.5	8.5	3.9
621K	8.4	8.8	8.8	8.8	8.8	8.8	4.3
681K	8.7	8.9	8.9	8.9	8.9	8.9	4.7
751K	9	9.2	9.2	9.2	9.2	9.2	5.1

Tape and Reel Specificstions

● Radial devices on tape are supplied with kinked leads,straight leads or in -line leads

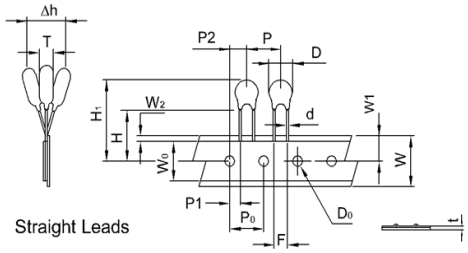


Figure: A

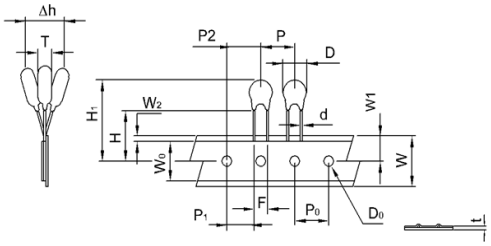


Figure: B

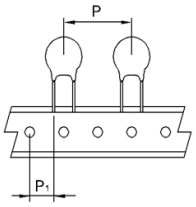


Figure: C

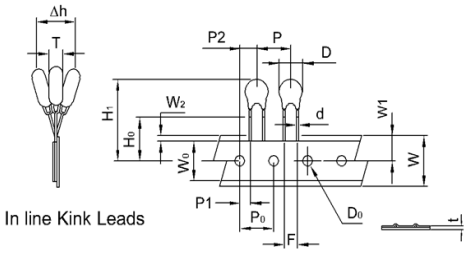


Figure: D

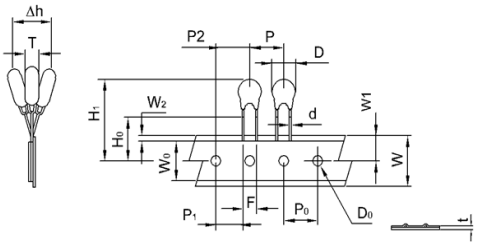


Figure: E

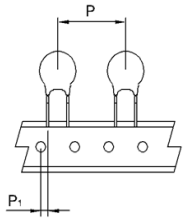


Figure: F

Symbol	Description	Model Size					
		05N	07N	10N	10N	14N	14N
P	Pitch of Component	12.7±1.0	12.7±1.0	12.7±1.0	15.0±1.0	25.4±1.0	30.0±1.0
P_0	Feed Hole Pitch	12.7±0.2	12.7±0.2	12.7±0.2	15.0±0.2	12.7±0.2	15.0±0.2
P_1	Feed Hole Center to Pitch	3.85±0.7	3.85±0.7	8.95±0.7	3.75±0.7	8.95±0.7	3.75±0.7
P_2	Hole Center to Component Center	6.35±0.7	6.35±0.7	12.7±0.7	7.5±0.7	12.7±0.7	7.5±0.7
F	Lead to Lead Distance	5.0±0.8	5.0±0.8	7.5±0.8	7.5±0.8	7.5±0.8	7.5±0.8
△h	Component Alignment	2.0max	2.0max	2.0max	2.0max	2.0max	2.0max
W	Tape Width	18.0+1.0	18.0+1.0	18.0+1.0	18.0+1.0	18.0+1.0	18.0+1.0
		18.0-0.5	18.0-0.5	18.0-0.5	18.0-0.5	18.0-0.5	18.0-0.5
W_0	Hold Down Tape Width	5.0 Min.	5.0 Min.	5.0 Min.	5.0 Min.	5.0 Min.	5.0 Min.
W_1	Hole Position	9.0+0.75	9.0+0.75	9.0+0.75	9.0+0.75	9.0+0.75	9.0+0.75
		9.0-0.5	9.0-0.5	9.0-0.5	9.0-0.5	9.0-0.5	9.0-0.5
W_2	Hold Down Tape Position	3.0 Max	3.0 Max	3.0 Max	3.0 Max	3.0 Max	3.0 Max
H	Height from Tape Center to Component Base	18.0+2.0	18.0+2.0	18.0+2.0	18.0+2.0	18.0+2.0	18.0+2.0
		18.0-0.0	18.0-0.0	18.0-0.0	18.0-0.0	18.0-0.0	18.0-0.0
H_0	Seating Plane Height	16.0±0.5	16.0±0.5	16.0±0.5	16.0±0.5	16.0±0.5	16.0±0.5
H_1	Component Height	32.0 Max.	32.0 Max.	36.0 Max.	36.0 Max.	40.0 Max.	40.0 Max.
D_0	Feed Hole Diameter	4.0±0.2	4.0±0.2	4.0±0.2	4.0±0.2	4.0±0.2	4.0±0.2
t	Total Tape Thickness	0.7±0.2	0.7±0.2	0.7±0.2	0.7±0.2	0.7±0.2	0.7±0.2
L	Leagth Clipped Lead	11.0 Max	11.0 Max	11.0 Max	11.0 Max	11.0 Max	11.0 Max
Figure		A, D	A, D	B, E	A, D	C	F

Tape and Reel Specificstions

● Radial devices on tape are supplied with kinked leads,straight leads or in -line leads

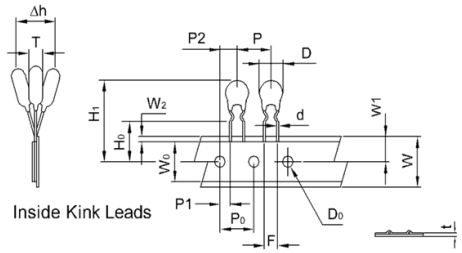


Figure: A

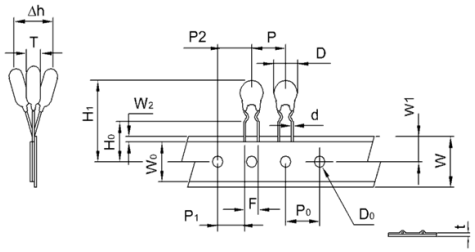


Figure: B

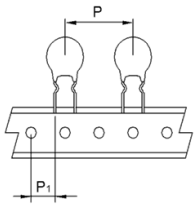


Figure: C

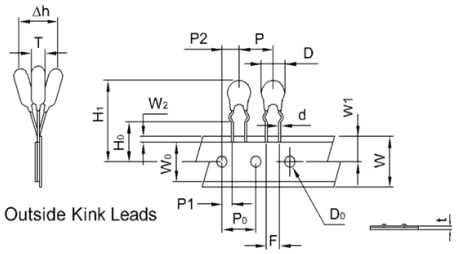


Figure: D

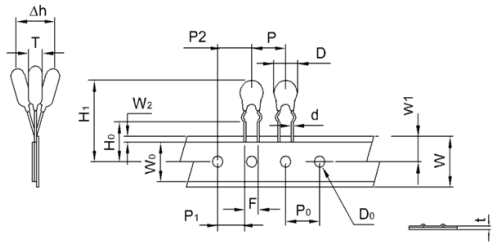


Figure: E

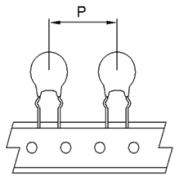


Figure: F

Symbol	Description	Model Size					
		05N	07N	10N	10N	14N	14N
P	Pitch of Component	12.7±1.0	12.7±1.0	12.7±1.0	15.0±1.0	25.4±1.0	30.0±1.0
P_0	Feed Hole Pitch	12.7±0.2	12.7±0.2	12.7±0.2	15.0±0.2	12.7±0.2	15.0±0.2
P_1	Feed Hole Center to Pitch	3.85±0.7	3.85±0.7	8.95±0.7	3.75±0.7	8.95±0.7	3.75±0.7
P_2	Hole Center to Component Center	6.35±0.7	6.35±0.7	12.7±0.7	7.5±0.7	12.7±0.7	7.5±0.7
F	Lead to Lead Distance	5.0±0.8	5.0±0.8	7.5±0.8	7.5±0.8	7.5±0.8	7.5±0.8
△h	Component Alignment	2.0max	2.0max	2.0max	2.0max	2.0max	2.0max
W	Tape Width	18.0+1.0	18.0+1.0	18.0+1.0	18.0+1.0	18.0+1.0	18.0+1.0
		18.0-0.5	18.0-0.5	18.0-0.5	18.0-0.5	18.0-0.5	18.0-0.5
W_0	Hold Down Tape Width	5.0 Min.	5.0 Min.	5.0 Min.	5.0 Min.	5.0 Min.	5.0 Min.
W_1	Hole Position	9.0+0.75	9.0+0.75	9.0+0.75	9.0+0.75	9.0+0.75	9.0+0.75
		9.0-0.5	9.0-0.5	9.0-0.5	9.0-0.5	9.0-0.5	9.0-0.5
W_2	Hold Down Tape Position	3.0 Max	3.0 Max	3.0 Max	3.0 Max	3.0 Max	3.0 Max
H	Height from Tape Center to Component Base	18.0+2.0	18.0+2.0	18.0+2.0	18.0+2.0	18.0+2.0	18.0+2.0
		18.0-0.0	18.0-0.0	18.0-0.0	18.0-0.0	18.0-0.0	18.0-0.0
H_0	Seating Plane Height	16.0±0.5	16.0±0.5	16.0±0.5	16.0±0.5	16.0±0.5	16.0±0.5
H_1	Component Height	29.0 Max.	32.0 Max.	36.0 Max.	36.0 Max.	40.0 Max.	40.0 Max.
D_0	Feed Hole Diameter	4.0±0.2	4.0±0.2	4.0±0.2	4.0±0.2	4.0±0.2	4.0±0.2
t	Total Tape Thickness	0.7±0.2	0.7±0.2	0.7±0.2	0.7±0.2	0.7±0.2	0.7±0.2
L	Leagth Clipped Lead	11.0 Max	11.0 Max	11.0 Max	11.0 Max	11.0 Max	11.0 Max
Figure		A, D	A, D	B, E	A, D	C	F

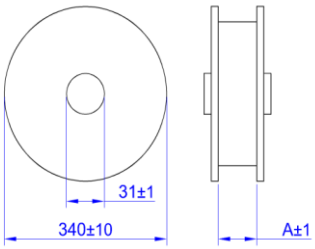
Packing information

Bulk packing

Series	Straight Lead Type Quantity(pcs/bag)	Cut Lead Type Quantity(pcs/bag)	Kink Type Quantity(pcs/bag)
CNR-05N	1000	1000	1000
CNR-07N	1000	1000	1000
CNR-10N	500	500	500
CNR-14N	500	500	500
CNR-18N	250	250	250
CNR-20N	250	250	250

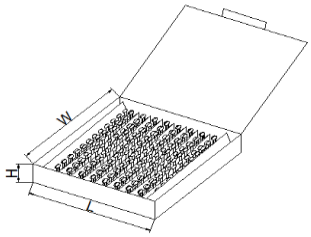
Tape & Reel product packing

Series	A (mm)	Quantity (pcs/reel)
CNR-05N(201K~621K)-TRXX	43	2000
CNR-05N(681K~781K)-TRXX		1500
CNR-07N(201K~391K)-TRXX		2000
CNR-07N(431K~821K)-TRXX		1500
CNR-07N(201K~391K)-TRXX		2000
CNR-07N(431K~821K)-TRXX		1500
CNR-10N(201K~621K)-TRXX	56	1000
CNR-10N(681K~112K)-TRXX		800
CNR-14N(201K~391K)-TRXX		800
CNR-14N(431K~621K)-TRXX		700
CNR-14N(681K~112K)-TRXX		600



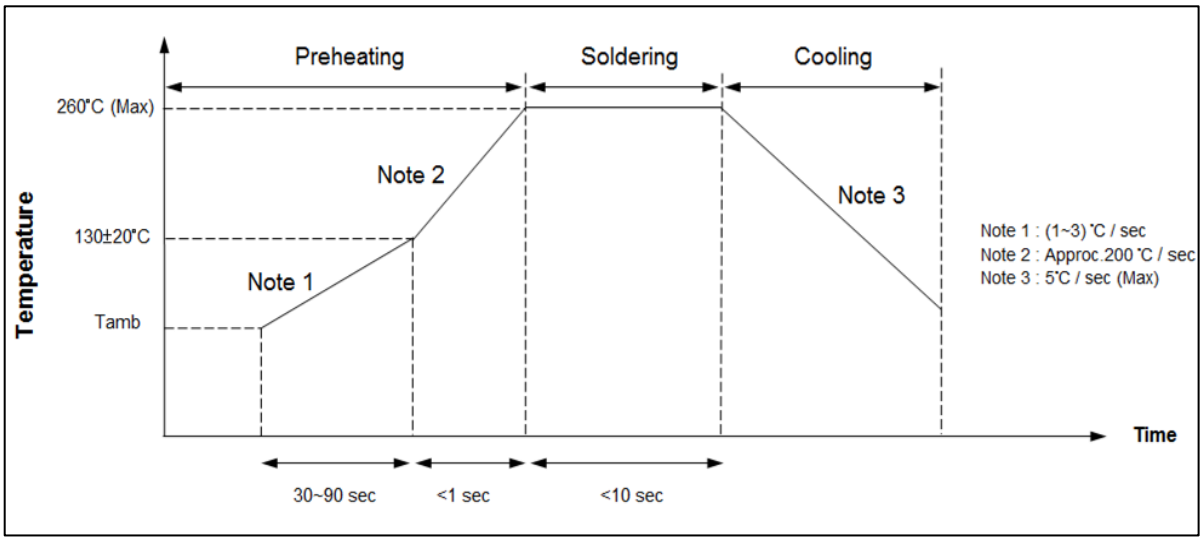
Flat Box product

Series	Quantity (pcs/box)
CNR-05N(201K~621K)-BTXX	1000
CNR-05N(681K~781K)-BTXX	800
CNR-07N(201K~621K)-BTXX	1000
CNR-07N(681K~781K)-BTXX	800
CNR-10N(201K~621K)-BTXX	1000
CNR-10N(681K~112K)-BTXX	800
CNR-14N(201K~621K)-BTXX	500
CNR-14N(681K~112K)-BTXX	400



Serise	L±5	W±5	N±5
CNR-05N~07N	340	245	45
CNR-10N~14N	340	245	50

Solder Recommendation



Recommendation Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of soldering Iron-tip	360℃(Max)
Soldering Time	3 sec(Max)
Distance from Varistor	2mm(Min)

RoHS Compliant Declaration

We hereby declare that the components delivered to your company are compliant with RoHS Directive 2002/95/EC

Storage Conditions of Products

(I) Storage Conditions:

1.Storage Temperature: -10℃~+40℃

2.Relative Humidity:≦75%RH

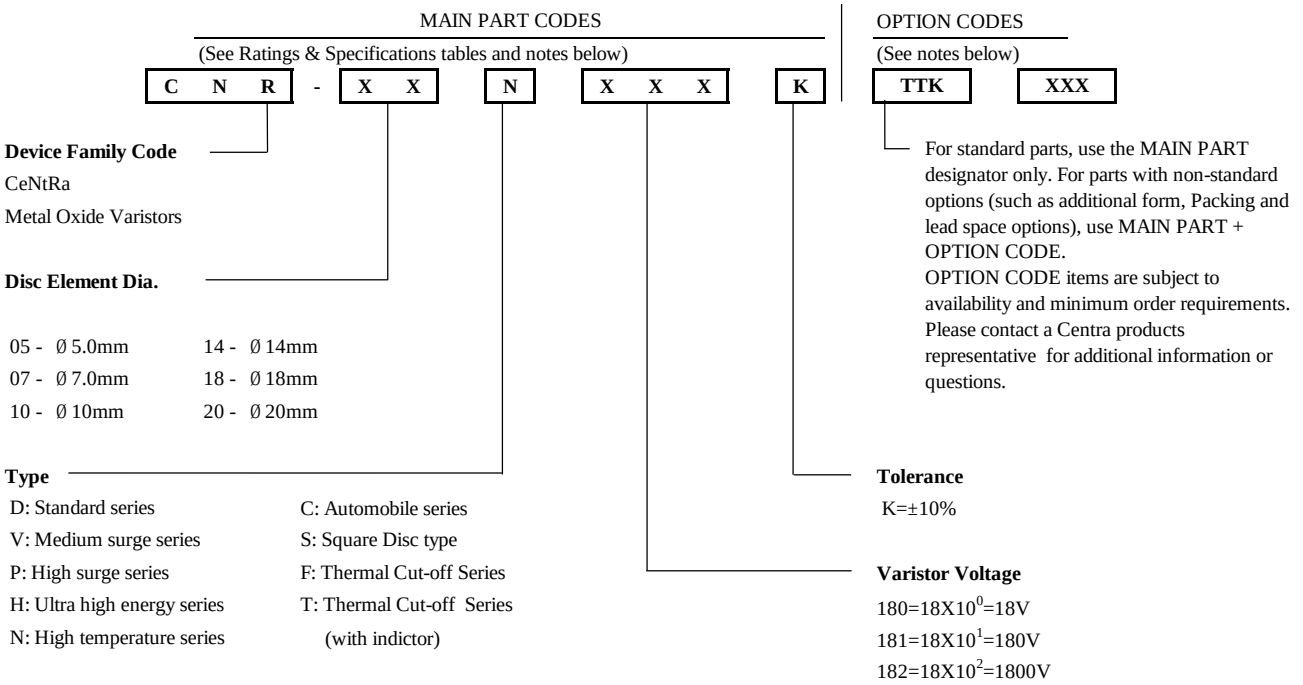
3.Keep away from corrosive atmosphere and sunlight

4.Solvent Resistance: MIL–STD–202, Method 215F

5.Moisture Sensitivity: Level 1, J-STD-020

(II) Period of Storage: 1 year

Explanation of Part Numbers



Ordering Notes:

MAIN PART CODES

Series + /Packaging/ Lead Style / Designators:

Ordering examples:

Straight Lead Bulk Pack (Standard)	Straight Lead (Short Cut) Bulk Pack	Straight Lead Tape & Reel Pack	Straight Lead Flat Box Pack
CNR-10N471K	CNR-10N471KTTSXXX	CNR-10N471KTRSX	CNR-10N471KBTSX

Outside Kink Lead Bulk Pack	Outside Kink Lead (Short Cut) Bulk Pack	Outside Kink Lead Tape & Reel Pack	Outside Kink Lead Flat Box Pack
CNR-10N471SOK	CNR-10N471KTTKXXX	CNR-10N471KTRKX	CNR-10N471KBTKX

Inside Kink Lead Bulk Pack	Inside Kink Lead (Short Cut) Bulk Pack	Inside Kink Lead Tape & Reel Pack	Inside Kink Lead Flat Box Pack
CNR-10N471KSIK	CNR-10N471KTTIXXX	CNR-10N471KTRIX	CNR-10N471KBTIX

In Line Kink Lead Bulk Pack	In Line Kink Lead (Short Cut) Bulk Pack	In Line Kink Lead Tape& Reel Pack	In Line Kink Lead Flat Box Pack
CNR-10N471KSHK	CNR-10N471KTTHXXX	CNR-10N471KTRHX	CNR-10N471KBTHX

Option Code + XXX

Short Cut Lead Length 10mm±1.0mm
CNR-10N471KTTS10

Tape & Reel Pack Feed Hole Pitch
CNR-10N471KTRSA
CNR-10N471KTRSB

A: P_0 → 12.7mm±0.2mm
B: P_0 → 15.0mm±0.2mm

CeNtRa N Series varistors are shipped standard in bulk pack with straight leads or Kink lead and lead spacing outlined in the Package Dimensions section of this data sheet. Contact your CeNtRa sales representative to discuss non-standard options.