









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-05D180K	05D180K	11	14	18	16	20	40	1	0.4	100	0.01	1600	0.1	○
CNR-05D220K	05D220K	14	18	22	20	24	48	1	0.5	100	0.01	1500		○
CNR-05D270K	05D270K	17	22	27	24	30	60	1	0.6	100	0.01	1450		○
CNR-05D330K	05D330K	20	26	33	30	36	73	1	0.8	100	0.01	1400		○
CNR-05D390K	05D390K	25	31	39	35	43	86	1	0.9	100	0.01	700		○
CNR-05D470K	05D470K	30	38	47	42	52	104	1	1.1	100	0.01	650		○
CNR-05D560K	05D560K	35	45	56	50	62	123	1	1.3	100	0.01	600		○
CNR-05D680K	05D680K	40	56	68	61	75	150	1	1.6	100	0.01	580		○
CNR-05D820K	05D820K	50	65	82	74	90	145	5	2.5	400	0.10	310	0.25	□
CNR-05D101K	05D101K	60	85	100	90	110	175	5	3.0	400	0.10	290		□
CNR-05D121K	05D121K	75	100	120	108	132	210	5	4.0	400	0.10	270		□
CNR-05D151K	05D151K	95	125	150	135	165	260	5	4.8	400	0.10	240		□
CNR-05D181K	05D181K	115	150	180	162	198	315	5	5.9	400	0.10	140		□
CNR-05D201K	05D201K	130	170	200	180	220	355	5	6.5	400	0.10	120		◇
CNR-05D221K	05D221K	140	180	220	198	242	380	5	7.0	400	0.10	110		◇
CNR-05D241K	05D241K	150	200	240	216	264	415	5	8.0	400	0.10	110		◇
CNR-05D271K	05D271K	175	225	270	243	297	475	5	8.5	400	0.10	100		◇
CNR-05D301K	05D301K	195	250	300	270	330	505	5	9.0	400	0.10	100		◇
CNR-05D331K	05D331K	215	275	330	297	363	585	5	10.0	400	0.10	90		◇
CNR-05D361K	05D361K	230	300	360	324	396	620	5	10.0	400	0.10	80		◇
CNR-05D391K	05D391K	250	320	390	351	429	675	5	12.0	400	0.10	80		◇
CNR-05D431K	05D431K	275	350	430	387	473	745	5	13.0	400	0.10	70		◇
CNR-05D471K	05D471K	300	385	470	423	517	810	5	15.0	400	0.10	70		◇
CNR-05D511K	05D511K	320	410	510	459	561	878	5	16.0	400	0.10	65		◇
CNR-05D561K	05D561K	350	460	560	504	616	940	5	18.0	400	0.10	65	◇	
CNR-05D621K	05D621K	395	510	620	558	682	1050	5	18.0	400	0.10	65	◇	
CNR-05D681K	05D681K	420	560	680	612	748	1120	5	18.0	400	0.10	60	◇	
CNR-05D751K	05D751K	460	615	750	675	825	1240	5	18.0	400	0.10	60	◇	

Related Standards

Symbols	○	□	◇
Approval		  	   

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)	$\Delta V/V \leq \pm 10\%$ No visible damage
Solderability	IEC 60068-2-20 Test Ta (Method 1)	T = 235±5°C, d = 2±0.5s	Approximately ≥ 95%
Resistance to soldering heat	IEC 60068-2-20 Test Tb (Method 1A)	T = 260±5°C, d = 10±1s	$\Delta V/V \leq \pm 10\%$ No visible damage
Shock	IEC 60068-2-27 Test Ea	Pulse shape: half-sine. a = 490 m/s ² , d = 11ms. N = 6 x 3 shocks	$\Delta V/V \leq \pm 10\%$ 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/s ² (whichever is the less), d = 3x2 h	$\Delta V/V \leq \pm 10\%$ 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	$\Delta V/V \leq \pm 10\%$ No visible damage
Pulse current - 10/1000 μs	IEC 61051-2	10/1000 μs, 10 times, Ipeak = 0.0075* Imax	$\Delta V/V \leq \pm 10\%$ 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	$\Delta V/V \leq \pm 10\%$ 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	$\Delta V/V \leq \pm 10\%$ 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°C Damp heat, Test Db first cycle :24h, T = 55±2°C Cold, Test Aa :2h, T = -40±3°C Damp heat Test Ba remaining cycles:5 cycle	$\Delta V/V \leq \pm 10\%$ 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	$\Delta V/V \leq \pm 10\%$ No visible damage R ≥ 1000MΩ U ≤ 1,1 Uinitial

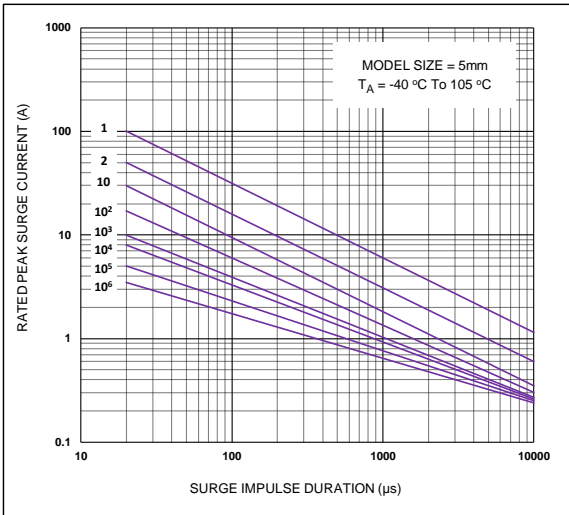
Reliability

Characteristics	Standard	Test Conditions	Specifications
Damp heat (Steady state)	IEC 60068-2-78 Test Ca	T = 40±2°C, RH = 93(+2/-3)%, 56d , 4 specimens:No voltage applied , Other 4 specimens:Applied voltage: 10% of the max. d.c. voltage	$\Delta V/V \leq \pm 10\%$ RISO $\geq 100M\Omega$
Maximum Peak Current	Specification Standard	I_{max} , 8/20 μ s, 1 time $\frac{V_{1mA \text{ at } 85^\circ C} - V_{1mA \text{ at } 25^\circ C}}{V_{1mA \text{ at } 25^\circ C}} \times \frac{1}{60} \times 100(\%/C)$	$-0.05 \leq TC \leq 0.05(\%/^\circ C)$
Nominal Discharge Current Test	UL1449 4th	Nominal Discharge Current (I_n), 8/20 μ s, 15 times	$\Delta V/V \leq \pm 10\%$ No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	V1mA at -40°C, 85°C, 25°C	$\Delta V/V \leq \pm 10\%$ No visible damage
High Temperature Storage	IEC60068-2-2	1000h, T = 85±2°C	$\Delta V/V \leq \pm 10\%$ No visible damage
Max. Energy	Specification Standard	10/1000 μ s, 1 times, Max. Energy	$\Delta V/V \leq \pm 10\%$ 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.	$\Delta V/V \leq \pm 10\%$ 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.	$\Delta V/V \leq \pm 10\%$ No visible damage

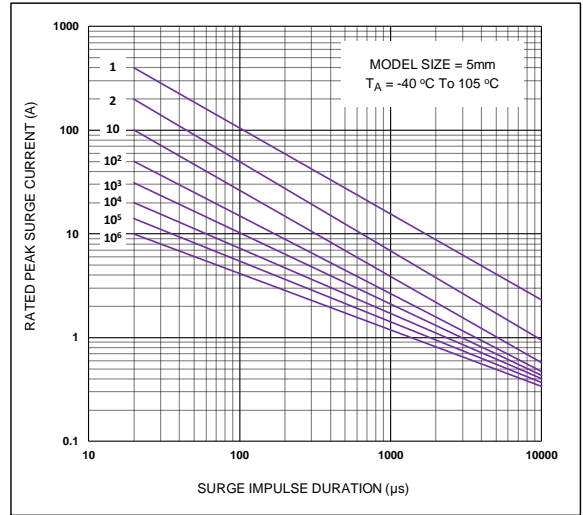
* (According to customer requirements to meet the test items)

Impulse Life Time Rating Curves

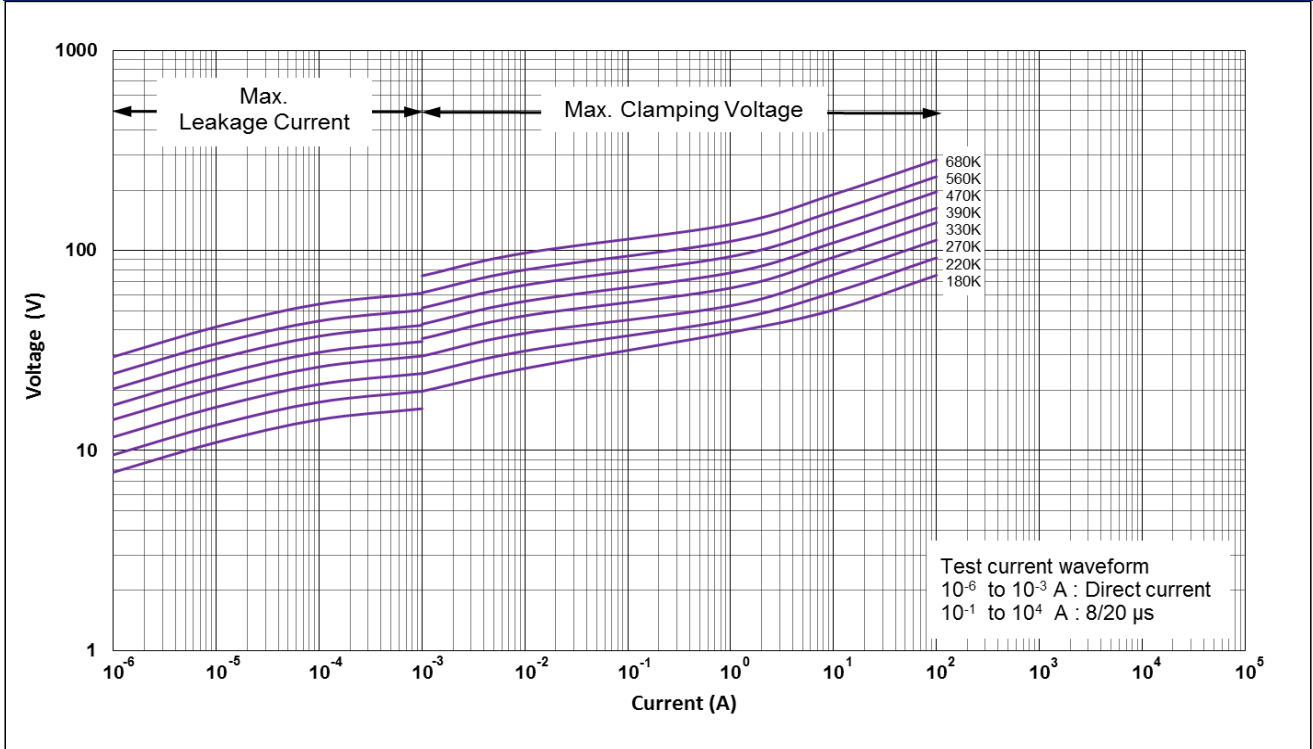
CNR-05D180K to CNR-05D680K



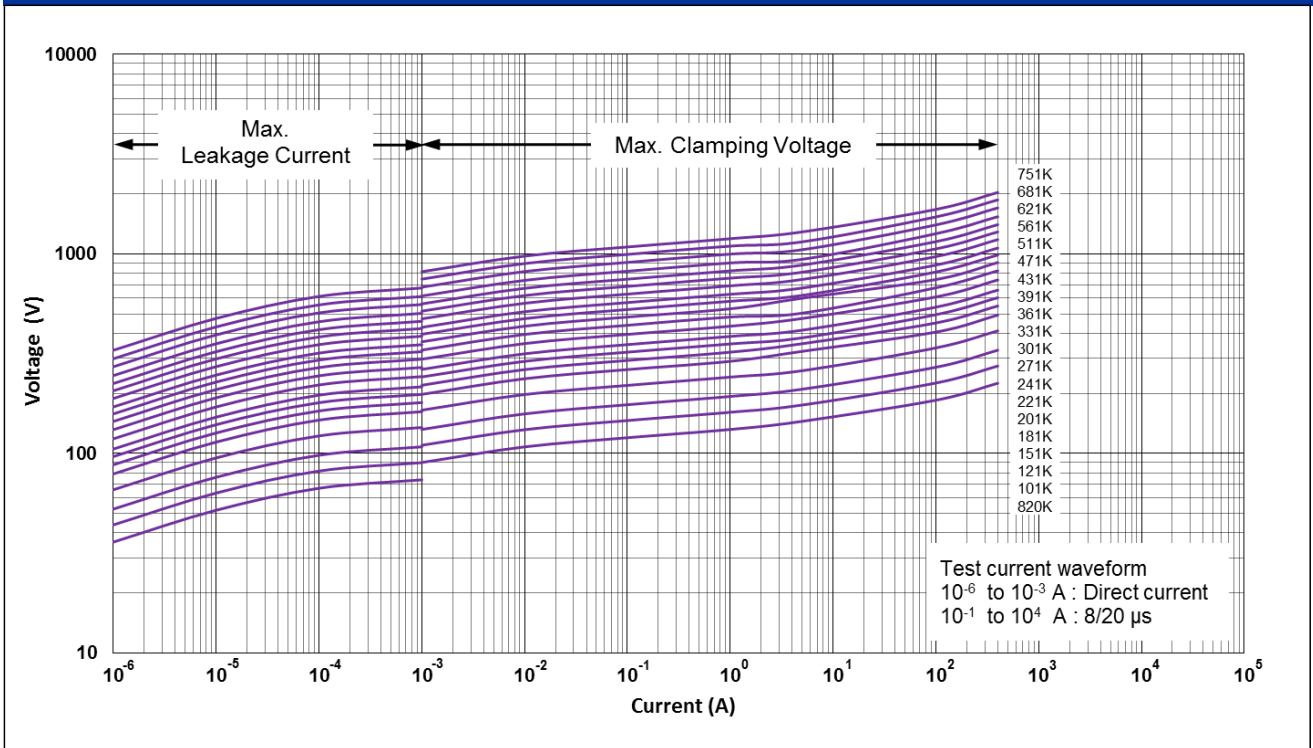
CNR-05D820K to CNR-05D751K



CNR-05D180K to CNR-05D680K V-I Curves

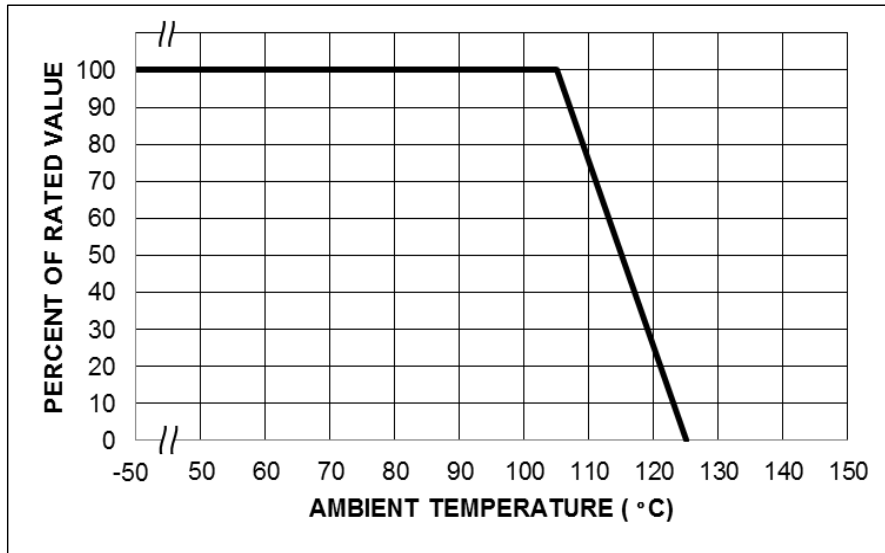


CNR-05D820K to CNR-05D751K V-I Curves

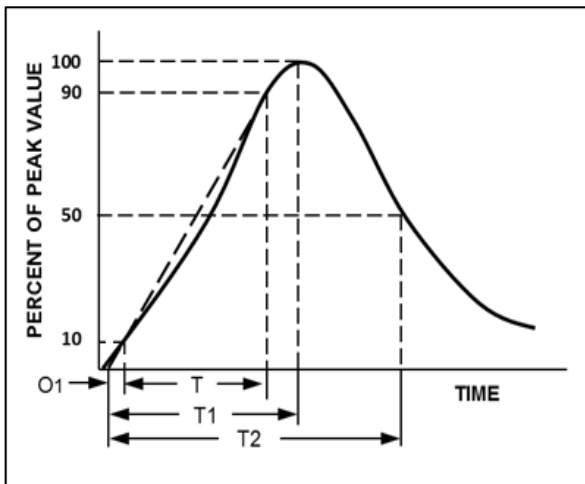


Power Derating Curve

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

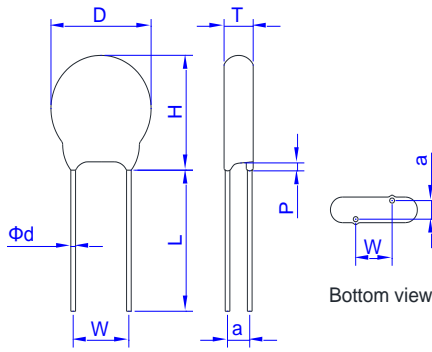


Fig 1. Straight Lead

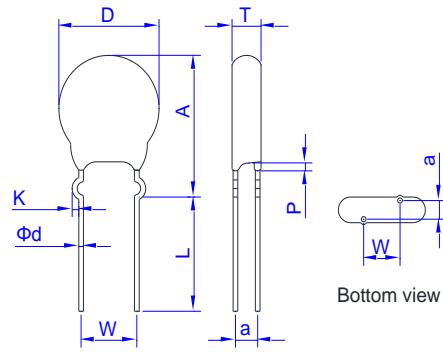


Fig 2. Outside Kink Lead

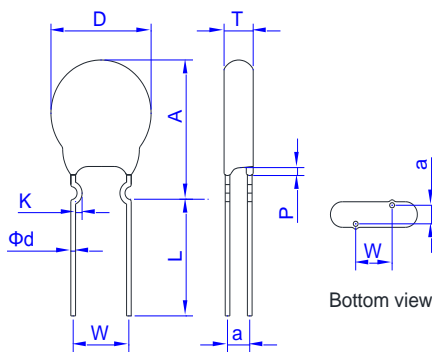


Fig 3. Inside Kink Lead

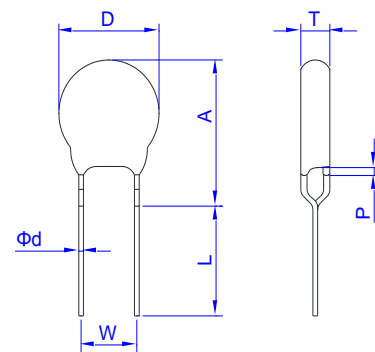


Fig 4. In Line Kink Lead

Dimension Table

Unit:mm

Symbol	Model size	05D		07D		10D		14D		18D		20D	
		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											

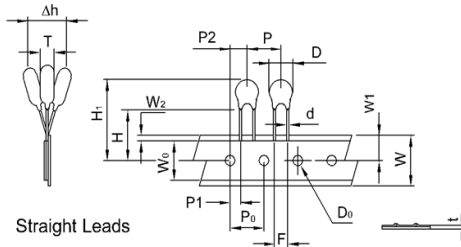
* Short Cut Lead type TTX the lead length (L) can 3.0~15mm (expect 20D dia <10mm), see Ordering Note.

** a value see T max. table

T max. Table								Unit:mm							
Model	05D	07D	10D	14D	18D	20D	a(±1.0)	Model	05D	07D	10D	14D	18D	20D	a(±1.0)
180K	3.3	3.5	3.9	4.0	4.2	4.3	1.5	301K	3.9	4.1	4.3	4.4	4.6	4.7	1.9
220K	3.6	3.8	4.2	4.3	4.5	4.6	1.6	331K	4.0	4.2	4.5	4.6	4.8	4.9	2.0
270K	3.8	4.0	4.4	4.5	4.7	4.8	1.7	361K	4.1	4.3	4.7	4.8	5.0	5.1	1.7
330K	3.3	3.5	3.9	4.0	4.2	4.3	1.6	391K	4.2	4.4	4.8	4.9	5.1	5.2	1.8
390K	3.5	3.7	4.1	4.2	4.4	4.5	1.8	431K	4.4	4.6	5.0	5.1	5.3	5.4	1.9
470K	3.7	3.9	4.3	4.4	4.6	4.7	1.9	471K	4.6	4.8	5.2	5.3	5.5	5.6	2.0
560K	4.0	4.2	4.6	4.7	4.9	5.0	2.0	511K	4.8	5.0	5.3	5.4	5.6	5.7	2.2
680K	4.3	4.5	4.9	5.0	5.2	5.3	2.2	561K	5.0	5.2	5.5	5.6	5.8	5.9	2.3
820K	3.3	3.5	3.9	4.0	4.2	4.3	1.5	621K	5.3	5.5	5.7	5.8	6.0	6.1	2.5
101K	3.6	3.8	4.2	4.3	4.5	4.6	1.5	681K	5.4	5.6	5.8	5.9	6.1	6.2	2.7
121K	3.8	4.0	4.4	4.5	4.7	4.8	1.6	751K	5.6	5.8	6.0	6.1	6.3	6.4	2.9
151K	4.1	4.3	4.7	4.8	5.0	5.1	1.8	781K	-	6.0	6.3	6.4	6.6	6.7	3.0
181K	3.2	3.4	3.8	3.9	4.1	4.2	1.5	821K	-	6.3	6.5	6.6	6.8	6.9	3.1
201K	3.3	3.5	3.9	4.0	4.2	4.3	1.5	911K	-	-	6.6	6.7	6.9	7.0	3.5
221K	3.4	3.6	4.0	4.1	4.3	4.4	1.6	102K	-	-	7.0	7.1	7.3	7.4	3.8
241K	3.5	3.7	4.1	4.2	4.4	4.5	1.7	112K	-	-	7.4	7.5	7.7	7.9	4.1
271K	3.7	3.9	4.2	4.3	4.5	4.6	1.8	182K	-	-	11.3	11.5	-	11.9	6.0

Tape and Reel Specifications

● Radial devices on tape are supplied with straight leads or inline kink leads.



Straight Leads

Figure: A

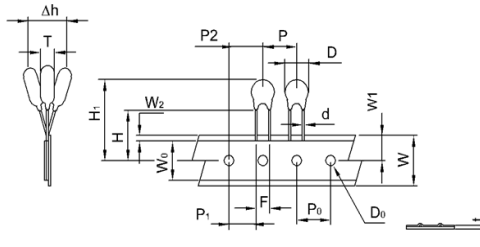


Figure: B

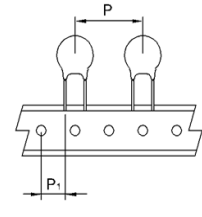
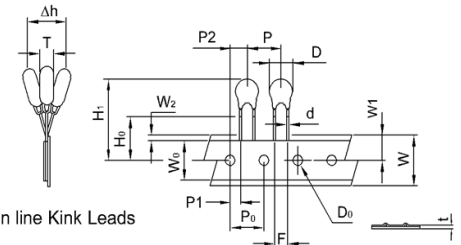


Figure: C



In line Kink Leads

Figure: D

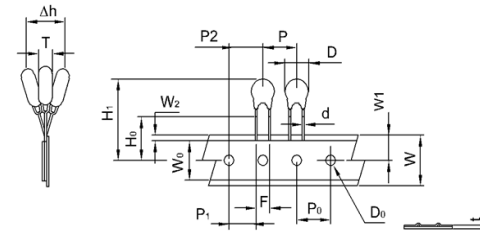


Figure: E

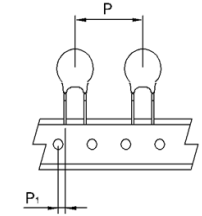


Figure: F

Symbol	Description	Model					
		05D	07D	10D	10D	14D	14D
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	3.85±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	6.35±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
Δh	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

Tape and Reel Specifications

● Radial devices on tape are supplied with inside kink leads or outside kink leads.

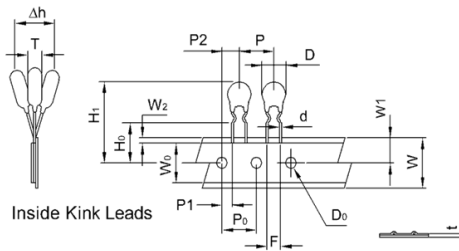


Figure: A

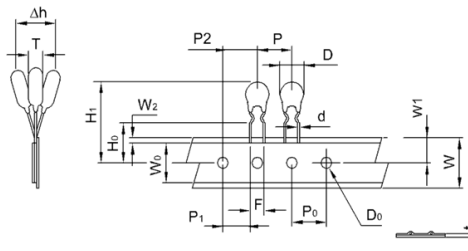


Figure: B

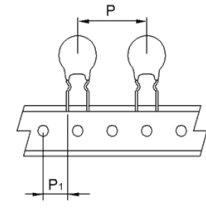


Figure: C

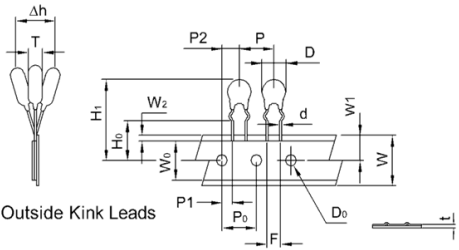


Figure: D

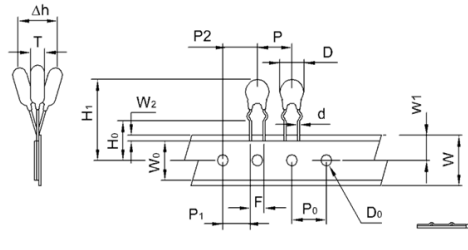


Figure: E

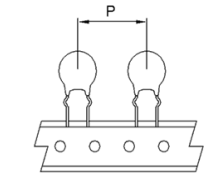


Figure: F

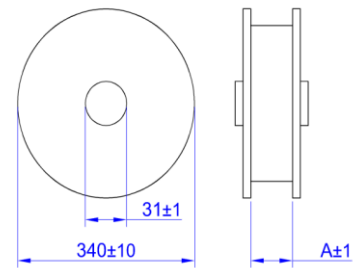
Symbol	Description	Model					
		05D	07D	10D	10D	14D	14D
P	Pitch of Component	12.7±1.0	12.7±1.0	12.7±1.0	15.0±1.0	25.4±1.0	30.0±1.0
P ₀	Feed Hole Pitch	12.7±0.2	12.7±0.2	12.7±0.2	15.0±0.2	12.7±0.2	15.0±0.2
P ₁	Feed Hole Center to Pitch	3.85±0.7	3.85±0.7	3.85±0.7	3.75±0.7	8.95±0.7	3.75±0.7
P ₂	Hole Center to Component Center	6.35±0.7	6.35±0.7	6.35±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
Δh	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

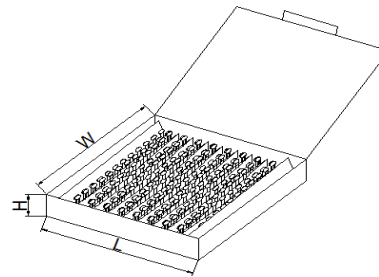
Series	Straight Lead Type Quantity(pcs/bag)	Cut Lead Type Quantity(pcs/bag)	Kink Type Quantity(pcs/bag)
CNR-05D	1000	1000	1000
CNR-07D	1000	1000	1000
CNR-10D	500	500	500
CNR-14D	500	500	500
CNR-18D	500	500	500
CNR-20D	250	250	250

Tape & Reel product packing

Series	A (mm)	Quantity (pcs/reel)
CNR-05D(180K~391K)-TRXX	43	2000
CNR-05D(431K~751K)-TRXX		1500
CNR-07D(180K~391K)-TRXX		2000
CNR-07D(431K~821K)-TRXX		1500
CNR-10D(180K~621K)-TRXX		1000
CNR-10D(681K~112K)-TRXX		800
CNR-14D(180K~391K)-TRXX	56	800
CNR-14(D431K~621K)-TRXX		700
CNR-14D(681K~112K)-TRXX		600

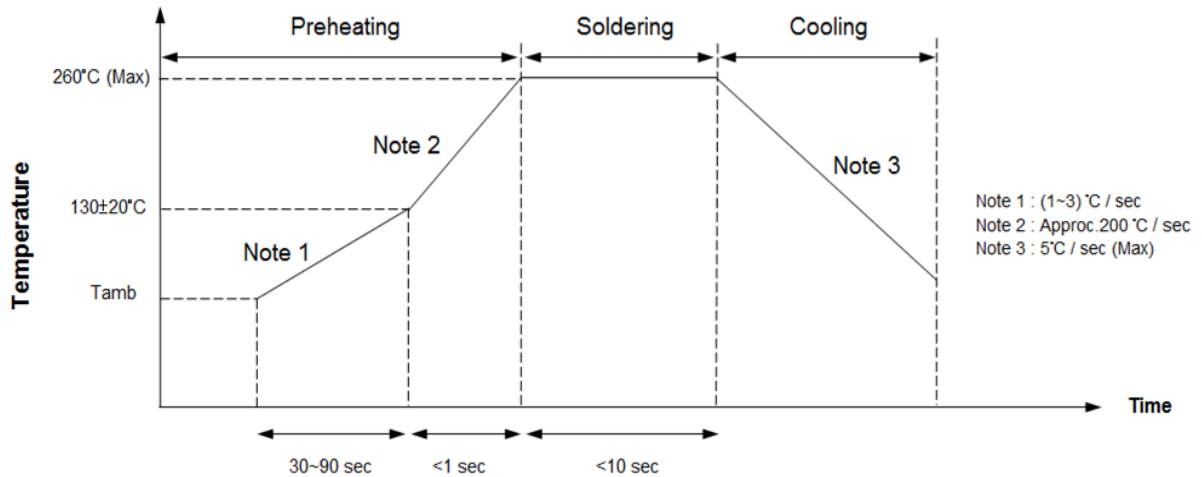

Box product packing

Series	Quantity (pcs/box)
CNR-05D(180K~621K)-BTXX	1000
CNR-05D(681K~751K)-BTXX	800
CNR-07D(180K~621K)-BTXX	1000
CNR-07D(681K~821K)-BTXX	800
CNR-10D(180K~621K)-BTXX	1000
CNR-10D(681K~112K)-BTXX	800
CNR-14D(180K~621K)-BTXX	500
CNR-14D(681K~112K)-BTXX	400



Series	L±5	W±5	H±5
CNR-05~07D	340	245	45
CNR-10~14D	340	245	50

Solder Recommendation



Recommendation Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of soldering Iron-tip	360°C (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

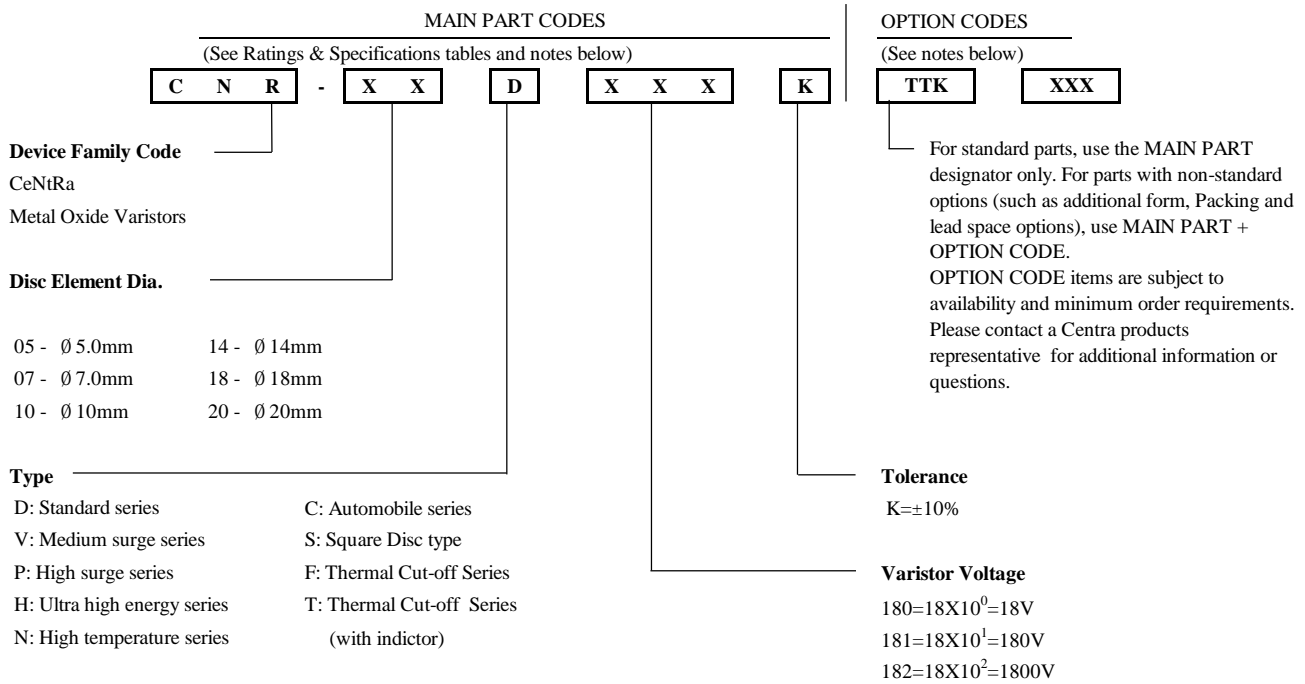
Storage Conditions of Products

(I) Storage Conditions:

- 1.Storage Temperature: -10°C ~+40°C
- 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-10D471K	CNR-10D471KTTSXXX	CNR-10D471KTRSX	CNR-10D471KBTSX

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-10D471SOK	CNR-10D471KTTKXXX	CNR-10D471KTRKX	CNR-10D471KBTkX

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-10D471KSIK	CNR-10D471KTTIXXX	CNR-10D471KTRIX	CNR-10D471KBTIX

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-10D471KSHK	CNR-10D471KTTHXXX	CNR-10D471KTRHX	CNR-10D471KBTHX

Option Code

+ XXX

Short Cut Lead Length 10mm±1.0mm
CNR-10D471KTTS10

Tape & Reel Pack Feed Hole Pitch
CNR-10D471KTRSA
CNR-10D471KTRSB

A: P₀ → 12.7mm±0.2mm
B: P₀ → 15.0mm±0.2mm