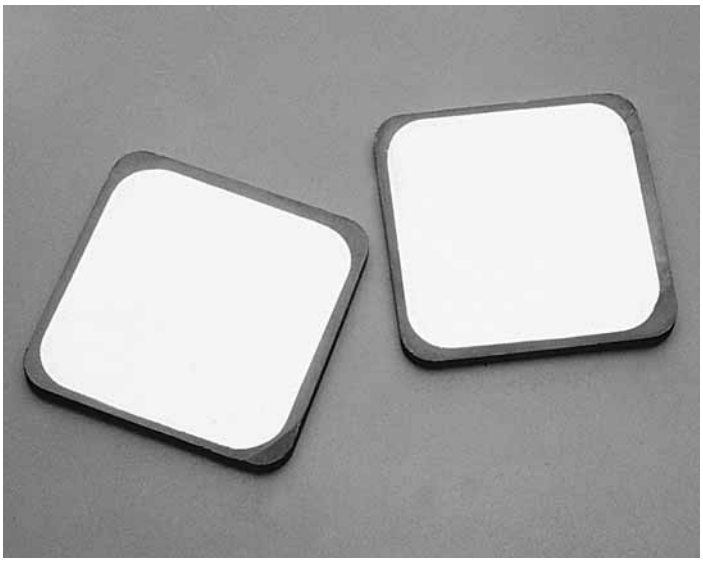
NA Varistor Series

The NA Series of transient surge suppressors are varistors (MOVs) in square disc form, intended for special industrial high-energy applications requiring unique electrical contact or packaging methods provided by the customer. The electrode finish of these devices is solderable and can also be used with pressure contacts. Discs may also be stacked.

The NA Series varistor is a square 34mm device, with thicknesses ranging from 1.7mm minimum for the 250V device to 7.5mm maximum for the 750V device. For information on mounting considerations refer to Application Note AN8820.

This disc is also available with encapsulation and PCB leads. See Littelfuse HB34 Sales.



Features

- Provided in Disc Form for Unique Packaging by Customer
- Solderable Electrode Finish.
- Pressure Contacts and/or Disc Stacking may be Utilized
- Wide Operating Voltage Range
  $V_{M(AC)RMS}$ . . . . . .250V to 750V
- Peak Pulse Current Capability (I_{TM}). 40,000A
- High Energy Capability (W_{TM}). . . . . .370J to 1050J
- No Derating Up to 8°C Ambient

ALSO SEE HB34 SERIES

NA Varistor Series

Absolute Maximum Ratings For ratings of individual members of a series, see Device Ratings and Specifications chart

	NA SERIES	UNITS
Continuous:		
Steady State Applied Voltage:		
AC Voltage Range ($V_{M(AC)RMS}$)	250 to 750	V
DC Voltage Range ($V_{M(DC)}$)	330 to 970	V
Transient:		
Peak Pulse Current (I_{TM})		
For 8/20µs Current Wave (See Figure 2)	40,000	A
Single Pulse Energy Range		
For 2ms Current Square Wave (W_{TM})	370 to1050	J
Operating Ambient Temperature Range (T_A)	-55 to 85	°C
Storage Temperature Range (T_{STG})	-55 to 125	°C
Temperature Coefficient (αV) of Clamping Voltage (V_C) at Specified Test Current	<0.01	%/°C

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Device Ratings and Specifications

MODEL NUMBER	SIZE	MAXIMUM RATINGS (85°C)				SPECIFICATIONS (25°C)				
		CONTINUOUS		TRANSIENT		VARISTOR VOLTAGE AT 1mA DC TEST CURRENT			MAXIMUM CLAMPING VOLTAGE (V_C) AT 200A (8/20µs)	TYPICAL CAPACITANCE
		V_{RMS}	V_{DC}	ENERGY (2ms)	PEAK CURRENT (8/20µs)	MIN	$V_{N(DC)}$	MAX	V_C	f = 1MHz
		$V_{M(AC)}$	$V_{M(DC)}$	W_{TM}	I_{TM}					
	(mm)	(V)	(V)	(J)	(A)	(V)	(V)	(V)	(V)	(pF)
V131NA34	34	130	175	270	40,000[1]	184	200	228	345	10,000
V141NA34	34	140	188	291	40,000[3]	198	220	248	375	9,000
V151NA34	34	150	200	300	40,000[2]	212	240	268	405	8,000
V251NA34	34	250	330	370	40,000	354	390	429	650	5,000
V271NA34	34	275	369	400	40,000	389	430	473	730	4,500
V321NA34	34	320	420	460	40,000	462	510	561	830	3,800
V421NA34	34	420	560	600	40,000	610	680	748	1,130	3,000
V481NA34	34	480	640	650	40,000	670	750	825	1,240	2,700
V511NA34	34	510	675	700	40,000	735	820	910	1,350	2,500
V571NA34	34	575	730	770	40,000	805	910	1000	1,480	2,200
V661NA34	34	660	850	900	40,000	940	1050	1160	1,720	2,000
V751NA34	34	750	970	1050	40,000	1080	1200	1320	2,000	1,800

NOTE: Average power dissipation of transients not to exceed 2.0W.
1. Peak current applies to applications rated up to $115V_{RMS}$. Peak current is 30kA for applications greater than $115V_{RMS}$.
2. Peak current applies to applications rated up to $132V_{RMS}$. Peak current is 30kA for applications greater than $132V_{RMS}$.
3. Peak current applies to applications rated up to $123V_{RMS}$. Peak current is 30kA for applications greater than $123V_{RMS}$.

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Power Dissipation Ratings

Should transients occur in rapid succession, the average power dissipation required is simply the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be within the specifications shown on the Device Ratings and Specifications table for the specific device. The operating values must be derated as shown in Figure 1.

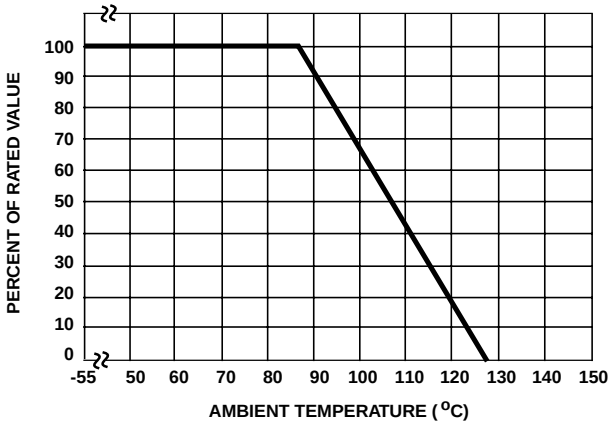
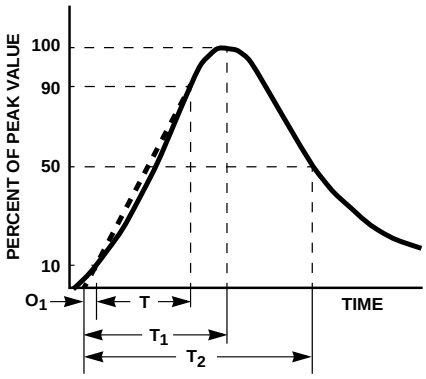


FIGURE 1. CURRENT, ENERGY AND POWER DERATING CURVE



O_1 = Virtual Origin of Wave
T = Time From 10% to 90% of Peak
T_1 = Virtual Front time = 1.25 • t
T_2 = Virtual Time to Half Value (Impulse Duration)
Example: For an 8/20μs Current Waveform:
8μs = T_1 = Virtual Front Time
20μs = T_2 = Virtual Time to Half Value

FIGURE 2. PEAK PULSE CURRENT TEST WAVEFORM

Transient V-I Characteristics Curves

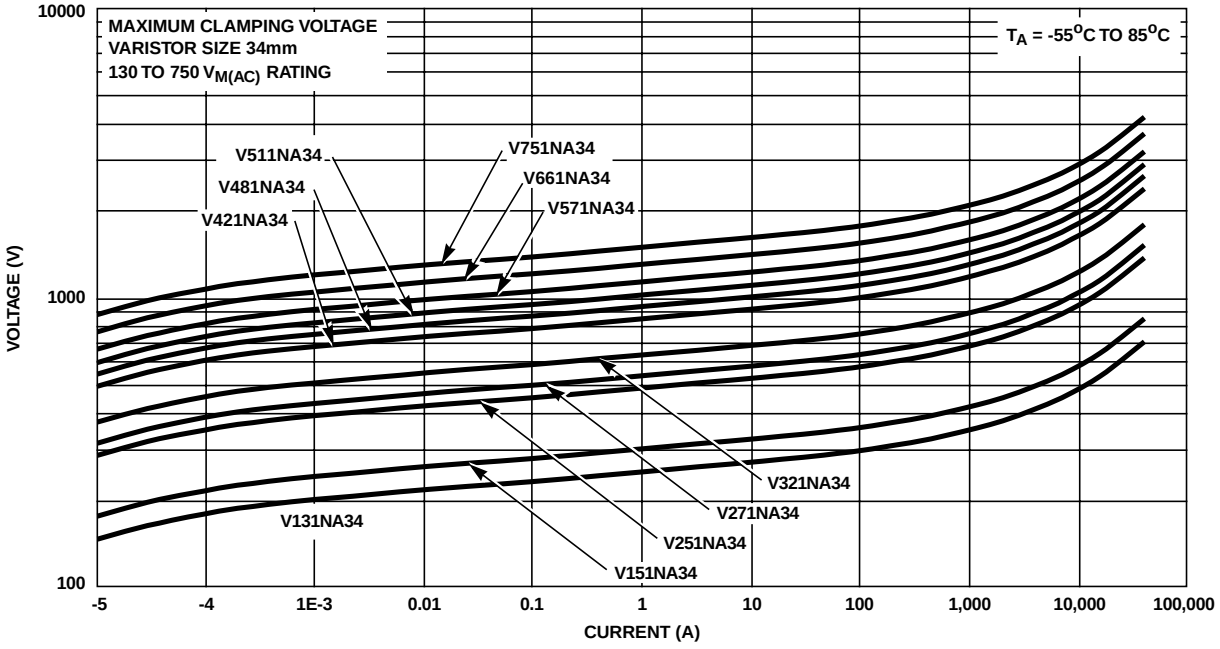


FIGURE 3. CLAMPING VOLTAGE FOR V131NA34 - V751NA34

NA Varistor Series

Pulse Rating Curves

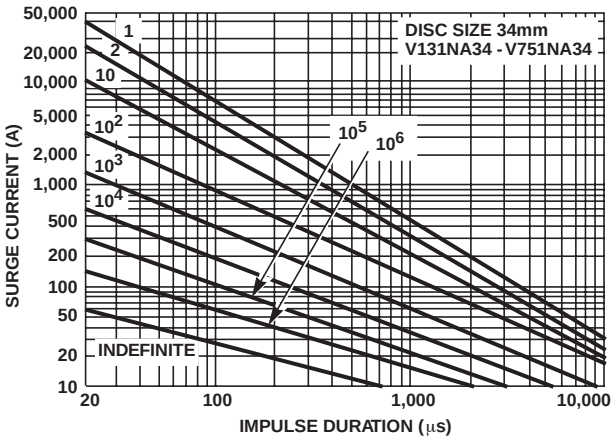
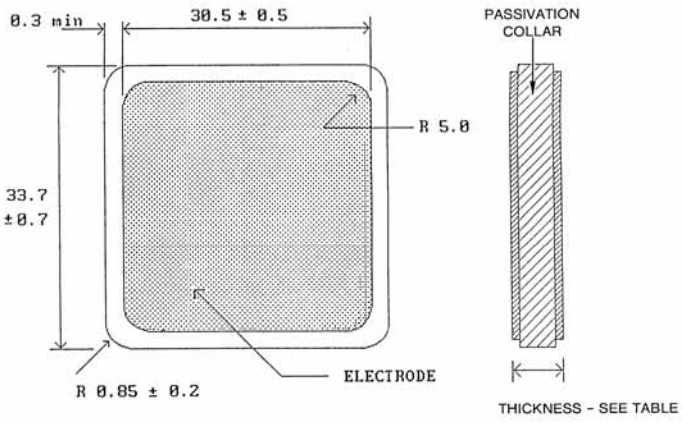


FIGURE 4. SURGE CURRENT RATING CURVES FOR V131NA34 - V751NA34

NOTE:If pulse ratings are exceeded, a shift of $V_{N(DC)}$ (at specified current) of more than ±10% could result. This type of shift, which normally results in a decrease of $V_{N(DC)}$, may result in the device not meeting the original published specifications, but it does not prevent the device from continuing to function, and to provide ample protection.

Mechanical Dimensions

(MILLIMETERS)



MODEL NUMBER	NA SERIES VARISTOR THICKNESS			
	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
V131NA34	1.40	2.30	0.055	0.090
V141NA34	1.45	2.55	0.057	0.100
V151NA34	1.50	2.80	0.059	0.011
V251NA34	1.70	2.30	0.066	0.090
V271NA34	1.80	2.70	0.070	0.106
V321NA34	2.10	3.00	0.082	0.118
V421NA34	3.00	4.00	0.118	0.157
V481NA34	3.20	4.40	0.125	0.173
V511NA34	3.60	4.90	0.141	0.192
V571NA34	4.00	5.60	0.118	0.220
V661NA34	4.50	6.80	0.176	0.267
V751NA34	5.20	7.50	0.204	0.294

NOTE: Parts available encapsulated with soldered tabs, to standard design or customer specific requirements. Also see HB34 Series.

NA Varistor Series

Passivation Layer

The standard NA Series is supplied with passivation layer around the outside perimeter of the disc forming an electrical insulator as detailed in the dimensional drawing.

Encapsulated Recommendations

After lead attachment, the disc/lead assembly may be coated or encapsulated in a package to provide electrical insulation and isolation from environmental contamination as required by the application. Coating/Filler materials for containers may include silicones, polyurethanes, and some epoxy resins. Two examples of acceptable polyurethanes are Dexter Hysol (US7013, parts A and B) and Rhenatech (resin 4714, hardener 4900), or their equivalents. Materials containing halogens, sulfides, or alkalines are not recommended.

Electrode Metallization

The NA Series is supplied with a sintered silver metallization for the electrode finish. The silver metallization is typically used for solder reflow lead attach operations (I-R, Vapour-Phase).

The recommended temperature profile of a belt-fed convection oven is shown in Figure 6.

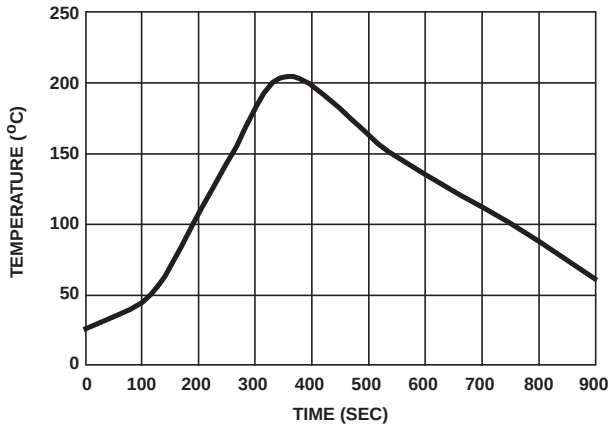


FIGURE 6. TYPICAL BELT OVEN TEMPERATURE PROFILE

Stacking and Contact Pressure Recommendations

When applications require the stacking of Littelfuse NA discs or when electrical connection is made by pressure contacts, the minimum pressure applied to the disc electrode surface should be 2.2kGs (5 pounds). The maximum recommended pressure applied to the disc electrode is 16N/CM^2 (23LBs/IN^2).

Packaging and Shipping

The NA Series is supplied in bulk for shipment. Discs are packaged in compartmentalized cartons to protect from scratching or edge-chipping during shipment.

Ordering Information