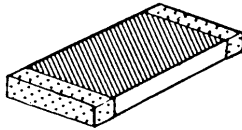


March 1995

Surface Mount Metal-Oxide Varistors



CH SERIES

Features

- Recognized as “Transient Voltage Surge Suppressors”, UL File #E75961 to Std. 1449
- Recognized as “Protectors for Data Communication and Fire Alarm Circuits”, UL File #E135010 to Std. 497B
- Surface Mount Chip Intended for Hybrid-Circuit Applications
- Voltage Ratings $V_{M(AC)RMS}$ 10V to 275V
- Available in Tape and Reel for use with Automatic Pick and Place Equipment
- Compatible with Most Surface-Mounting Assembly Equipment and Techniques

Description

CH series transient surge suppressors are small, very compact metal-oxide varistors. They are intended for use in hybrid circuit applications in commercial and industrial equipment utilizing direct surface-mounting techniques.

These devices, which have significantly lower profiles than traditional radial-lead varistors, permit designers to reduce

the size and weight and increase the reliability of their equipment designs.

CH series varistors are available in a voltage range from 10V to 275V $V_{M(AC)RMS}$, and energy ratings up to 23J.

Absolute Maximum Ratings

For ratings of individual members of a series, see Device Ratings and Characteristics chart

	CH SERIES	UNITS
Continuous:		
Steady State Applied Voltage:		V
AC Voltage Range ($V_{M(AC)RMS}$)	10 to 275	V
DC Voltage Range ($V_{M(DC)}$)	14 to 369	
Transient:		
Peak Pulse Current (I_{TM})		A
For 8/20 μ s Current Wave (See Figure 2)	250 to 500	
Single Pulse Energy Range		J
For 10/1000 μ s Current Wave (W_{TM})	0.8 to 23	
Operating Ambient Temperature Range (T_A)	-55 to +125	$^{\circ}$ C
Storage Temperature Range (T_{STG})	-55 to +150	$^{\circ}$ C
Temperature Coefficient (αV) of Clamping Voltage (V_C) at Specified Test Current	<0.01	%/ $^{\circ}$ C

Specifications CH Series

Device Ratings and Specifications

V82 - V240 CH Varistors are listed under UL file #E75961 as a recognized component.
Series CH Varistors are listed under UL file #E135010 as a recognized component.

MODEL NUMBER	MAXIMUM RATINGS (+125°C)				SPECIFICATIONS (+25°C)					
	CONTINUOUS		TRANSIENT		VARISTOR VOLTAGE AT 1mA DC TEST CURRENT			MAX CLAMPING VOLT V_C AT TEST CURRENT (8/20 μ s)		TYPICAL CAPACITANCE $f = 1\text{MHz}$
	V_{RMS}	V_{DC}	ENERGY (10/1000 μ s)	PEAK CURRENT (8/20 μ s)						
	$V_{M(AC)}$	$V_{M(DC)}$	W_{TM}	I_{TM}	MIN	$V_{N(DC)}$	MAX	V_C	I_P	
	(V)	(V)	(J)	(A)	(V)	(V)	(V)	(V)	(A)	(pF)
V22CH8	14	18 (Note 3)	10.0 (Note 2)	250	18.7	22.0	26.0	47	5	1600
V27CH8	17	22	1.0	250	23.0	27.0	31.1	57	5	1300
V33CH8	20	26	1.2	250	29.5	33.0	36.5	68	5	1100
V39CH8	25	31	1.5	250	35.0	39.0	43.0	79	5	900
V47CH8	30	38	1.8	250	42.0	47.0	52.0	92	5	800
V56CH8	35	45	2.3	250	50.0	56.0	62.0	107	5	700
V120CH8	75	102	6.0	500	108.0	120.0	132.0	200	10	300
V150CH8	95	127	8.0	500	135.0	150.0	165.0	250	10	250
V180CH8	115	153	10.0	500	162.0	180.0	198.0	295	10	200
V200CH8	130	175	11.0	500	184.0	200.0	228.0	340	10	180
V220CH8	140	180	12.0	500	198.0	220.0	242.0	360	10	160
V240CH8	150	200	13.0	500	212.0	240.0	268.0	395	10	150
V360CH8	230	300	20.0	500	324.0	360.0	396.0	595	10	100
V390CH8	250	330	21.0	500	354.0	390.0	429.0	650	10	90
V430CH8	275	369	23.0	500	389.0	430.0	473.0	710	10	80

NOTES:

1. Power dissipation of transients not to exceed 0.25W.
2. Energy rating for impulse duration of 30ms minimum to one half of peak current value.
3. Also rated to withstand 24V for 5 minutes.

Power Dissipation Ratings

Continuous power dissipation capability is not an applicable design requirement for a suppressor, unless transients occur in rapid succession. Under this condition, 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 Characteristics table for the specific device. Furthermore, the operating values need to be derated at high temperatures as shown in Figure 1. Because varistors can only dissipate a relatively small amount of average power they are, therefore, not suitable for repetitive applications that involve substantial amounts of average power dissipation.

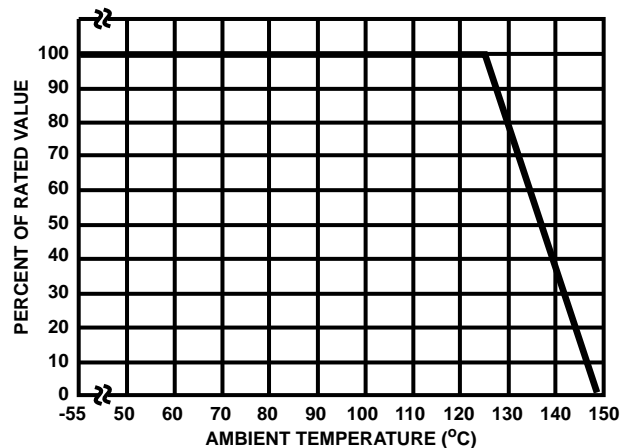
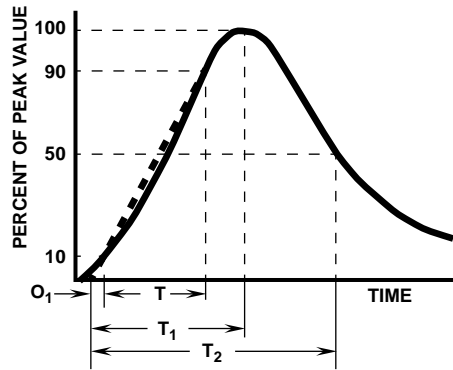


FIGURE 1. CURRENT, ENERGY AND POWER DERATING CURVE



O_1 = Virtual Origin of Wave
 T = Time From 10% to 90% of Peak
 T_1 = Virtual Front Time = $1.25 \cdot t$
 T_2 = Virtual Time to Half Value (Impulse Duration)

Example: For an 8/20 μ s Current Waveform:
 8μ s = T_1 = Virtual Front Time
 20μ s = T_2 = Virtual Time to Half Value

FIGURE 2. PEAK PULSE CURRENT TEST WAVEFORM

Transient V-I Characteristics Curves

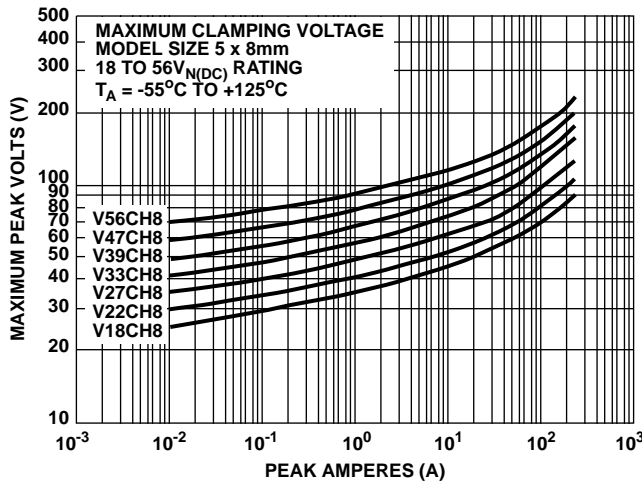


FIGURE 3. CLAMPING VOLTAGE FOR V18CH8 - V68CH8

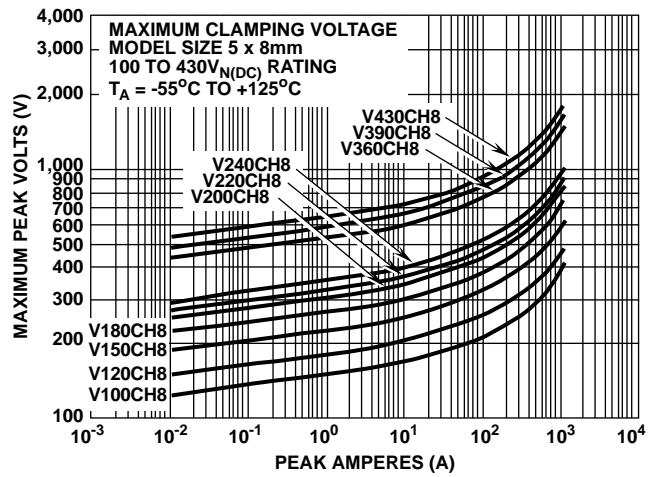


FIGURE 4. CLAMPING VOLTAGE FOR V82CH8 - V430CH8

Pulse Rating Curves

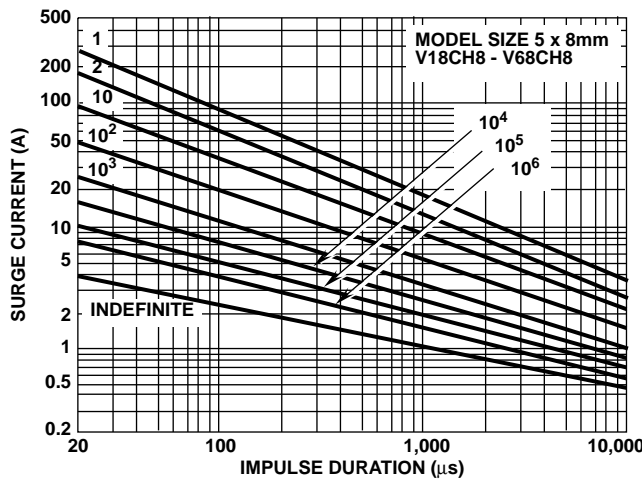


FIGURE 5. SURGE CURRENT RATING CURVES FOR V18CH8 - V68CH8

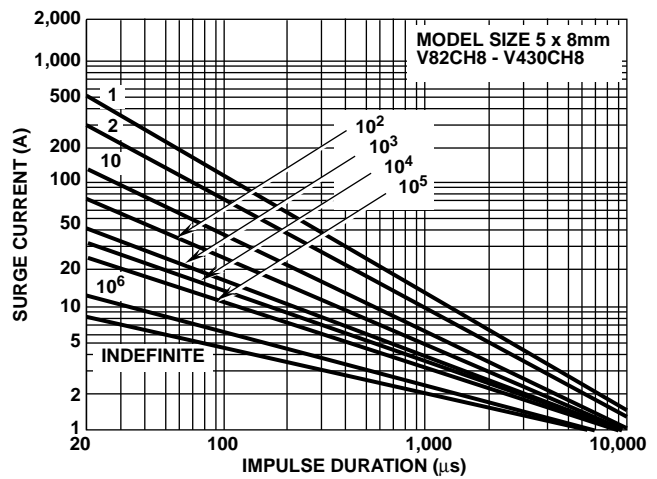
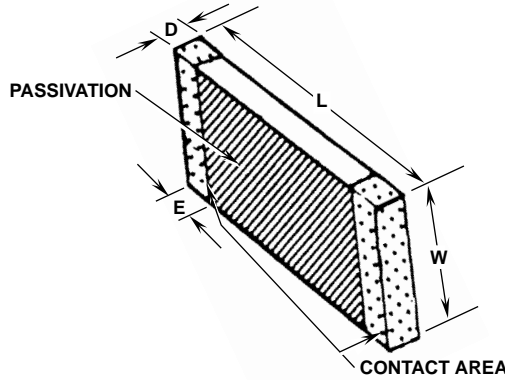


FIGURE 6. SURGE CURRENT RATING CURVES FOR V82CH8 - V430CH8

NOTE: If pulse ratings are exceeded, a shift of $V_{N(DC)}$ (at specified current) of more than $\pm 10\%$ 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.

Series Dimensions



SYMBOL	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
D	-	0.080	-	2.03
E	0.016	0.050	0.41	1.27
L	0.311	0.335	7.90	8.51
W	0.185	0.207	4.70	5.26

Ordering Information

Standard Packaging:

CH Series varistors are always shipped in tape and reel. The standard 13-inch reel utilized contains 4000 pieces.

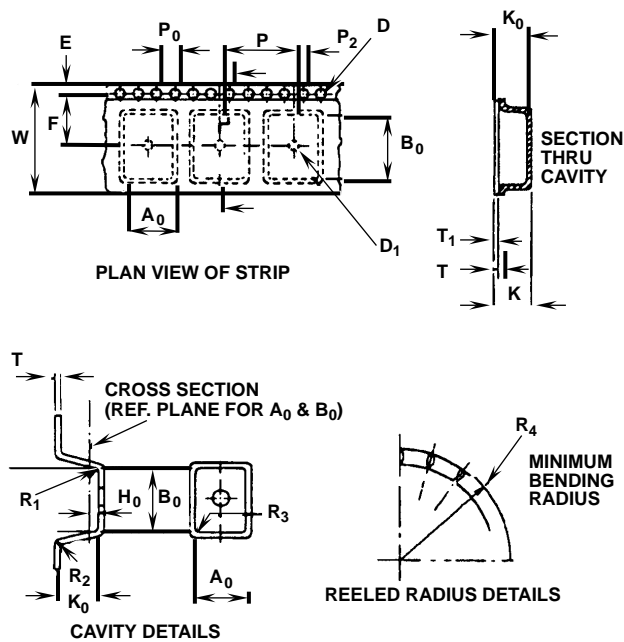
Special Packaging:

Option 1 -7-inch reels containing 1000 pieces are available. To order 7-inch reels add a T suffix to the part number; e.g., V47CH8T.

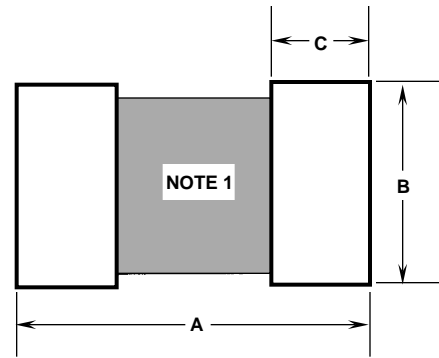
Option 2 -For small quantities (less than 100 pieces) the units are shipped bulk pack. To order, add a S suffix to the part number; e.g., V47CH8S.

Tape and Reel Specifications

- Conforms to EIA-481, Revision A
- Can be Supplied to IEG Publication 286-3



Recommended Pad Outline



SYMBOL	INCHES	MILLIMETERS
A	0.402	10.21
B	0.216	5.50
C	0.087	2.21

NOTE: Avoid metal runs in this area. Soldering recommendations: Material - 62/36/2 Sn/Pb/Ag or equivalent. Temperature - 230°C max., 5 sec. max. Flux - R.M.A.

SYMBOL	PARAMETER	SIZE (mm)
B ₀	Cavity Length	8.5 ± 0.1
A ₀	Cavity Width	5.5 ± 0.1
K ₀	Cavity Depth	2.0 Min.
H ₀	Ref. Plane for A ₀ and B ₀	+0.10 0.3 -0.05
R ₁ , R ₂ , R ₃	Tape Cavity Radii	0.5 Max.
T	Carrier Tape Thickness	1.0 Max.
T ₁	Cover Tape Thickness	0.1 Max.
E	Sprocket Hole from Edge	1.75 ± 0.1
P ₀	Sprocket Hole Pitch	4.0 ± 0.1
D	Sprocket Hole Diameter	+0.1 1.5 -0.0
P ₂	Hole Centre to Component Centre	2.0 ± 0.15
R ₄	Min. Bending Radius	40.0 Min.
D ₁	Ejection Hole Dia.	1.5 Min.
K	Overall Thickness	3.0 Min.
P	Pitch Of Component	8.0 ± 0.1
F	Sprocket Hole to Ejection Hole	7.5 ± 0.1
W	Carrier Tape Width	16.0 ± 0.3