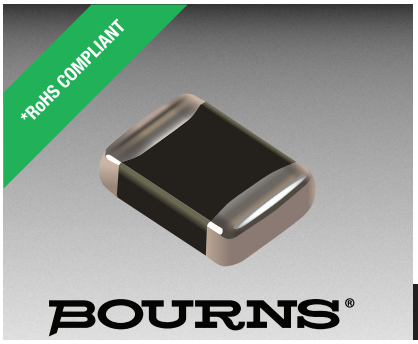


Features

- High surge capability
- Short response time
- Low clamping voltage - Vc
- Low sensitivity to mildly activated fluxe
- +125 °C maximum continuous operating temperature
- RoHS compliant*

ZV50S2220452NIR1 - SMD Low Voltage, High Surge Varistor

General Information

The Model ZV50S2220452NIR1 low voltage multilayered varistor is designed to protect sensitive electronic devices against high voltage surges in the low voltage region. This model offers excellent transient energy absorption due to improved energy volume distribution and power dissipation.

In addition, this ZV model exhibits independent suppression characteristics enabling stable protection over a wide temperature range of -55 to +125 °C.

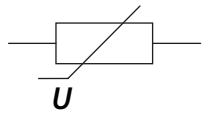
ZV varistors are typically applied to protect integrated circuits and other components at the circuit board level.

Additional Information

Click these links for more information:

PRODUCT SELECTOR | TECHNICAL LIBRARY | INVENTORY | SAMPLES | CONTACT

Multilayered Varistor Symbol



Absolute Maximum Ratings

Parameter	Value	Units
Continuous:		
Steady State Applied Voltage		
DC Voltage Range (V_{dc})	63	V
AC Voltage Range (V_{rms})	50	V
Transient:		
Peak Single Pulse Surge Current, 8/20 µs Waveform (I_{max})	4500	A
Operating Ambient Temperature	-55 to +125	°C
Storage Temperature Range	-55 to +150	°C
Threshold Voltage Temperature Coefficien	< +0.05	%/°C
Response Time	< 2	ns
Climatic Category	55 / 125 / 56	

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www.bourns.com

WARNING Cancer and Reproductive Harm - www.P65Warnings.ca.gov

*RoHS Directive 2015/863, Mar 31, 2015 and Annex.
Specifications are subject to change without notice
Users should verify actual device performance in their specific applications.

Applications

- Suppression of inductive switching or other transient events such as surge voltage at the circuit board level
- Replaces larger surface mount TVS Zener Diodes in many applications
- Electromagnetic compliance of end products
- On-board transient voltage protection of ICs and transistors

ZV50S2220452NIR1 - SMD Low Voltage, High Surge Varistor

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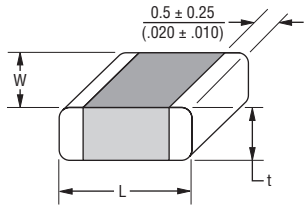
Device Ratings

Model	V_{rms}	V_{dc}	V_n @ 1 mA	ΔV_n	V_c	I_c 8/20 µs	P max.	I_{max} 8/20 µs	C_{typ} @ 1 kHz
	V	V	V	%	V	A	W	A	pF
ZV 50 S 2220 452 NIR1	50	63	77.5	±8.4	115	10	0.020	4500	8800

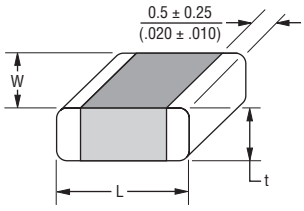
Product Dimensions

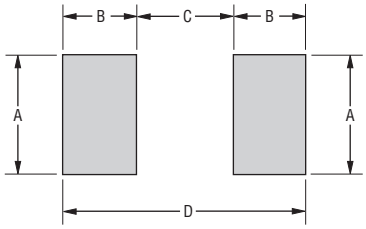
Model	Dimension		
	L	W	t (Max.)
ZV 50 S 2220 452 NIR1	5.7 ± 0.50 (.224 ± .020)	5.0 ± 0.40 (.197 ± .016)	3.3 (.130)

DIMENSIONS: MM (INCHES)



Soldering Pad Configuratio





DIMENSIONS: MM (INCHES)

Size	Dimension					
	L	W	A	B	C	D
2220	5.7 ± 0.50 (.224 ± .020)	5.00 ± 0.40 (.197 ± .016)	5.5 (.217)	1.5 (.060)	4.2 (.165)	7.2 (.283)

How to Order

ZV50S2220452NIR1

- Series Designator
  - ZV = ZV Series
- Maximum Continuous Working Voltage (V_{rms})
  - 50 = 50 Vrms
- V_n Tolerance
  - S = Special (see Device Rating Table)
- Model Size
  - • 2220
- Maximum Surge Current (8/20 µs)
  - • 452 = 4500 A
- End Terminations
  - • Ni = NiSn barrier type end terminations suitable for Pb and Pb-free reflow soldering (standard
- Packaging
  - R1 = Reel 180 mm

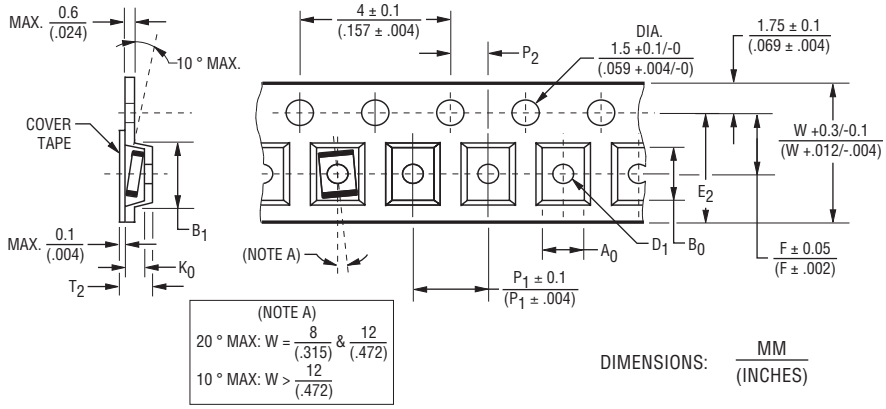
Typical Part Marking

No marking.

Packaging Specifications

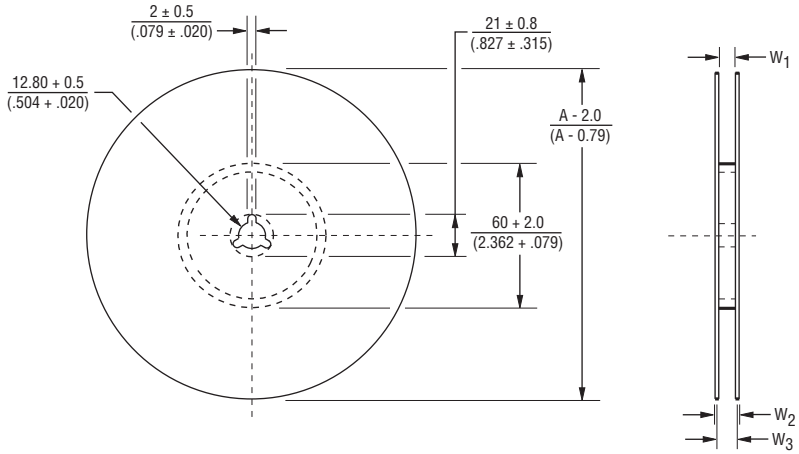
Complies with IEC 60286-3: 2022

Tape



Dimension	Model Size
	2220
A_0	5.72 (.225)
B_0	6.46 (.254)
K_0 MAX.	3.7 (.145)
B_1 MAX.	12.1 (.475)
D_1 DIA. MIN.	1.5 (.059)
E_2 MIN.	14.25 (.560)
P_1	8 (.315)

Reel



Dimension	Model Size
	2220
F	7.5 (.295)
W	16.0 (.629)
T_2 MAX.	9.5 (.373)
W_1	16.4 + 2.0 (.644 + .079)
W_2 MAX.	22.4 (.880)
W_3	15.9 (.625) to 19.4 (.764)
A DIA.	180 (7.087)

Packaging Quantities

Part Number	Voltage Rating (Vrms)	Quantity per Reel
ZV50S2220452NIR1	50	250

REEL SIZE: 180 MM

Terminology

Term	Symbol	Definitio
Rated AC Voltage	V_{rms}	Maximum continuous sinusoidal AC voltage (<5 % total harmonic distortion) which may be applied to the component under continuous operation conditions at +25 °C
Rated DC Voltage	V_{dc}	Maximum continuous DC voltage (<5 % ripple) which may be applied to the component under continuous operating conditions at +25 °C
Supply Voltage	V	The voltage by which the system is designated and to which certain operating characteristics of the system are referred; V_{rms} = 1.1 x V
Leakage Current	I_{dc}	The current passing through the varistor at V_{dc} and at +25 °C or at any other specified temperature
Varistor Voltage	V_n	Voltage across the varistor measured at a given reference current (I_n)
Reference Current	I_n	Reference current = 1 mA DC
Clamping Voltage Protection Level	V_c	The peak voltage developed across the varistor under standard atmospheric conditions, when passing an 8/20 µs class current pulse
Class Current	I_c	A peak value of current which is 1/10 of the maximum peak current for 100 pulses at two per minute for the 8/20 µs pulse
Voltage Clamping Ratio	V_c/V_{app}	A figure of merit measure of the varistor clamping e fectiveness as defined by the symbols V_c/V_{app}, where (V_{app} = V_{rms} or V_{dc})
Jump Start Transient	V_{jump}	The jump start transient results from the temporary application of an overvoltage in excess of the rated battery voltage. The circuit power supply may be subjected to a temporary overvoltage condition due to the voltage regulation failing or it may be deliberately generated when it becomes necessary to boost start the car.
Rated Single Pulse Transient Energy	W_{max}	Energy which may be dissipated for a single 10/1000 µs pulse of a maximum rated current, with rated AC voltage or rated DC voltage also applied, without causing device failure
Load Dump Transient	WLD	Load Dump is a transient which occurs in automotive environments. It is an exponentially decaying positive voltage which occurs in the event of a battery disconnect while the alternator is still generating charging current with other loads remaining on the alternator circuit at the time of battery disconnect.
Rated Peak Single Pulse Transient Current	I_{max}	Maximum peak current which may be applied for a single 8/20 µs pulse, with rated line voltage also applied, without causing device failure
Rated Transient Average Power Dissipation	P	Maximum average power which may be dissipated due to a group of pulses occurring within a specified isolated time period, without causing device failure at 25 °
Capacitance	C	Capacitance between two terminals of the varistor measured @ 1 kHz
Non-linearity Exponent	α	A measure of varistor nonlinearity between two given operating currents, I_n and I_1 as described by I = k V exp(a), where: - k is a device constant, - $I_1 < I < I_n$ and - a log $(I_1/I_n)/\log(V_1/V_n)$ = 1/log (V_1/V_n), where: - I_r is reference current (1 mA) and V_n is varistor voltage - I_1 = 10 I_n, V_1 is the voltage measured at I_1
Response Time	tr	The time lag between application of a surge and varistor's "turn-on" conduction action
Varistor Voltage Temperature Coefficien	TC	(V_n @ 85 °C - V_n @ 25 °C) / (V_n @ 25 °C) x 60 °C) x 100
Insulation Resistance	IR	Minimum resistance between shorted terminals and varistor surface
Isolation Voltage		The maximum peak voltage which may be applied under continuous operating conditions between the varistor terminations and any conducting mounting surface
Operating Temperature		The range of ambient temperature for which the varistor is designed to operate continuously as defined by the temperature limits of its climatic categor
Climatic Category	LCT/UCT/DHD	LCT & UCT = Lower and Upper Category Temperature - the minimum and maximum ambient temperatures for which a varistor has been designed to operate continuously. DHD = Dump Heat Test Duration
Storage Temperature		Storage temperature range without voltage applied
Current/Energy Derating		Derating of maximum values when operated above UCT

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