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Product Specification

Multilayer Chip Varistor

ITEM
ICVL0505101V150FR

Innochips Technology CO., LTD.

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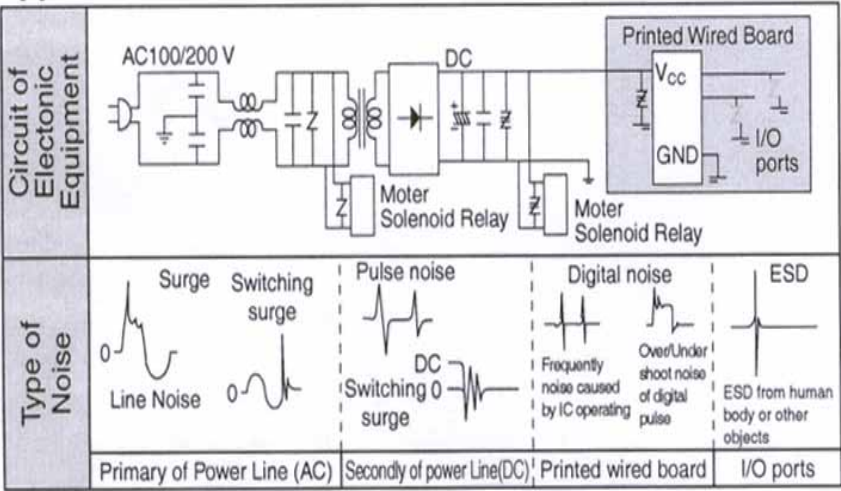
SCOPE

- ☆ This specification applies to chip varistors for use in electric equipment.
It can be possible to change the specification under document agreement between design engineers of each party.

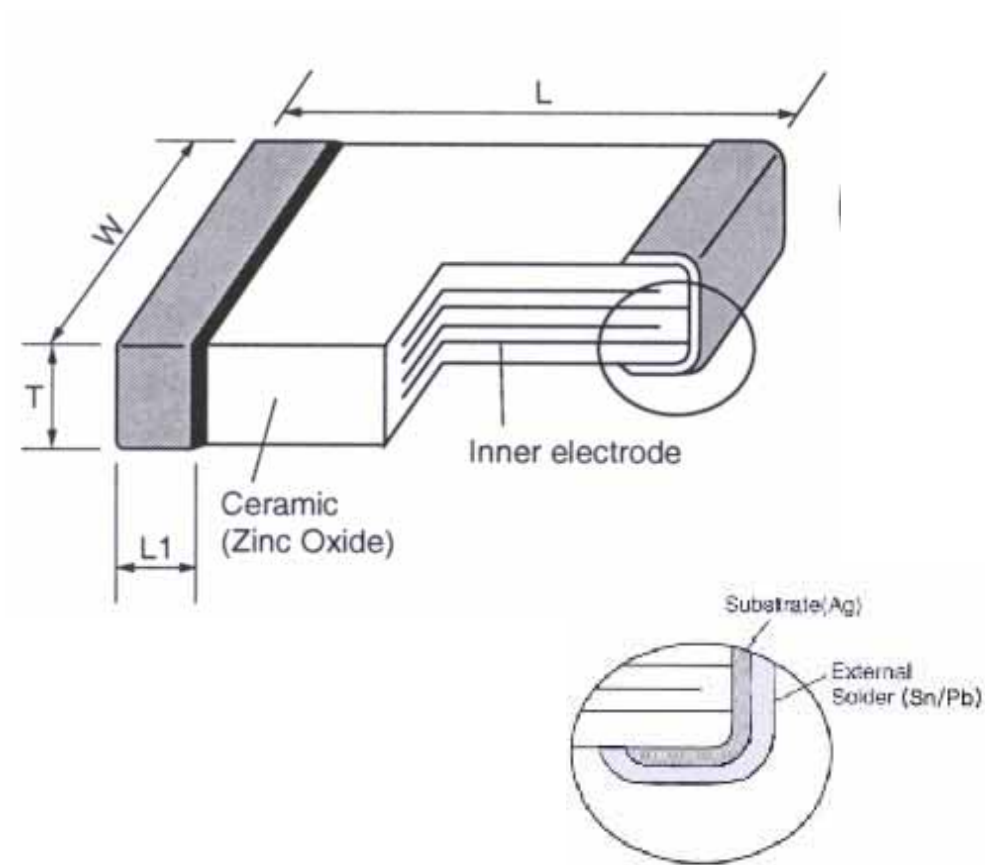
FEATURES

- ☆ The ICT chip varistors provide excellent application reliability as a result of their Ag /Pt base terminal electrodes with Ni-Sn electroplating

Application



CONFIGURATION and
DIMENSIONS



CODE	DIMENSION (mm)			
	L	W	T	L1
05	1.0 ±0.05	0.5 ±0.05	0.5±0.05	0.2 +0.15/-0.1
10	1.6 ±0.1	0.8 ±0.1	0.8 ±0.1	0.3 ± 0.2
21	2.0 ±0.1	1.25 ±0.1	1.35 MAX	0.5 +0.2/-0.3
31	3.2 ±0.15	1.6 ±0.15	1.45 MAX	0.5 +0.2/-0.3

PART NUMBER CODE

ICVL 05 05 101 V 150 F R
 ① ② ③ * ④ ⑤ ⑥ ⑦

*Capacitance: 101→10×10¹ pF→100pF
 600→60×10⁰ pF→60pF

① SERIES NAME

CODE	PRODUCT NAME
ICVN	Normal type chip varistor
ICVL	Low Capacitance type chip varistor

② SIZE DESIGNATOR

CODE	SIZE(mm)
05	1.0 × 0.5
10	1.6 × 0.8
21	2.0 × 1.25
31	3.2 × 1.6

③ WORKING VOLTAGE

CODE	VOLTAGE (VDC)	CODE	VOLTAGE (VDC)
03	3.3	18	18.0
05	5.6	26	26.0
09	9.0	30	30.0
12	12.0	48	48.0
14	14.0	60	60.0

④ ENERGY

CODE	ENERGY (J)	CODE	ENERGY (J)
A	0.1	H	1.2
C	0.3	J	1.5
D	0.4	V	0.02
F	0.7	X	0.05
G	0.9	Y	0.005

⑤ CLAMPING VOLTAGE

CODE	VOLTAGE (V)	CODE	VOLTAGE (V)
100	10.0	500	50.0
150	15.5	560	56.0
200	20.0	580	58.0
250	25.0	620	62.0
300	30.0	650	65.0
350	35.0	101	100.0
400	40.0	121	120.0

⑥ TERMINATION TYPE

CODE	TYPE
S	Solderable (Ag/Pd/Pt)
P	Electroplate (Sn/Pb)
F (Pb-free)	Electroplate (Ni-Sn)

⑦ PACKAGING TYPE

CODE	TYPE
B	Bulk pack
R	Tape & Reel pack
E	Embossed tape pack

NOMINAL SPECIFICATIONS

■ HIGH SPEED TYPE (ICVL)

- Typical ESD failure voltage for CMOS and/or Bi Polar is $\geq 200V$.
- 15kV ESD pulse (air discharge) per IEC 61000-4-2.Level 4, generates <20mJ of energy.
- Low capacitance(<200pF) is required for high-speed data transmission.
- Low leakage current(I_L) is necessary for battery operated equipment

Chip Size	ICT Part Number	Leakage Current	Varistor Voltage	Clamping Voltage	Peak Current	Transient Energy	Capacitance
	symbol	I_L	V_b	V_C	I_{peak}	E_{trans}	C
	Units	Amp (max.)	Volts	volts (typ.)	Amp (max.)	Joules (max.)	pF (typ.)
	Test Condition	5.6V	1mA DC	8/20 μ s	8/20 μ s	10/1000 μ s	0.5Vrms @1MHz
1005	ICVL0505101V150	<10 μ A	7.2~10.8	15.5	15	0.02	80~120

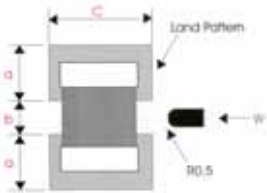
■ TERMINOLOGY

- V_{wm} : Maximum steady state DC operating voltage the varistor can maintain and not exceed 10 μ A leakage current.
- V_B : Voltage across the device measured at 1mA DC current
- V_C : Maximum peak voltage across the varistor measured at a specified pulse and waveform

Transient energy Rating
<0.05 jule

Pulse Current & Waveform
1A 8/20
- I_{peak} : Maximum peak current which may be applied with the specified waveform without device failure
- E_{trans} : Maximum peak current which may be dissipated with the specified waveform Without device failure
- C : Device capacitance measured with zero volt bias 0.5Vrms and 1MHz

PERFORMANCE

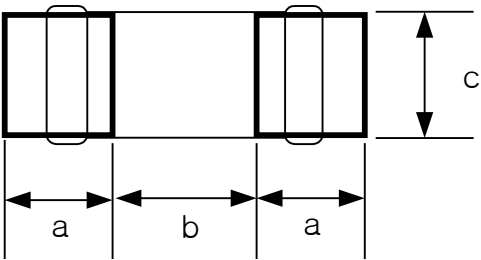
ITEM	REQUIREMENTS	TEST CONDITION
Operating temperature range	-55℃ ~ +125℃	—
Storage temp. & humidity range	40℃ max , 70% RH max.	At packing condition
Resistance to solder heat	1. No damage such as cracks should be caused in chip element. 2. More then 75% of the terminal electrode shall be covered with new solder	Preheat temperature : 100 to 150℃ preheat time : 1 min. Solder temperature : 260 ±10℃ dipping time : 10± 0.5sec
Solderability	1. More than 90% of the terminal shall be covered with new solder.	Preheat temperature : 100 to 150℃ preheat time : 1 min. Solder temperature : 260 ±10℃ dipping time : 3± 1sec.
Reflow soldering	1. More then 50% of the terminal electrode shall be covered with new solder. 2. Varistor voltage change : ±within 10% 	Preheat temperature : 150℃ preheat time : 1 min. Solder temperature : 260℃ soldering time : 10 sec.max (Reflow soldering profile)
Tensile strength (terminal strength)	1. No mechanical damage	
	W	
Adhesion of terminal electrode (Flexure strength)	1. No mechanical damage	
	a	
	b	
	c	
	W	

ITEM	REQUIREMENTS	TEST CONDITION
Drop	1. No mechanical damage	Drop 10 times on a concrete floor from a height of 91cm
Vibration	1. No mechanical damage	Frequency : 10 ~ 55 ~ 10Hz Amplitude : 1.52 mm Direction and time X,Y,X directions for 2 hours
Thermal shock (Temperature cycle)	1. No mechanical damage 2. Varistor voltage change : $\pm$ within 10%	Step 1. $-40\pm 3^{\circ}\text{C}$ 30 $\pm$ 3min. Step 2. $85\pm 3^{\circ}\text{C}$ 30 $\pm$ 3min. Number of cycle : 100 times
Heat load resistance	1. No mechanical damage 2. Varistor voltage change : $\pm$ within 10%	Temperature : $85\pm 2^{\circ}\text{C}$ Applied Voltage : working voltage Time : 1,000 hours Measured at room ambient temperature after placing for 24 hours
Low temp. resistance	1. No mechanical damage 2. Varistor voltage change : $\pm$ within 10%	Temperature : $-40\pm 5^{\circ}\text{C}$ Time : 1,000 hours Measured at room ambient temperature after placing for 24 hours
Humidity resistance	1. No mechanical damage 2. Varistor voltage change : $\pm$ within 10%	Temperature : $40\pm 2^{\circ}\text{C}$ Humidity : 90 ~ 95%RH Time : 500 hours Measured at room ambient temperature after placing for 24 hours
Humidity load resistance	1. No mechanical damage 2. Varistor voltage change : $\pm$ within 10%	Temperature : $40\pm 2^{\circ}\text{C}$ Humidity : 90 ~ 95%RH Applied voltage : Working Voltage Time : 500 hours Measured at room ambient temperature after placing for 24 hours

ITEM	REQUIREMENTS	TEST CONDITION
Maximum surge current	1. Varistor voltage change : $\pm$ within 10% IEC61000-4-5 standard 1.2/50 μ s - 8/20 μ s voltage-current combination pulse	Temperature : 25 $\pm$ 5℃ Humidity : 30 ~ 65% RH Polarity : + , - Number of hit : each 1 time Surge pulse : 8/20 μ s pulse Applied current : maximum surge current(Is)
Maximum surge energy	1. Varistor voltage change : $\pm$ within 10% IEC61000-4-5 standard 10/1000 μ s current pulse	Temperature : 25 $\pm$ 5℃ Humidity : 30 ~ 65% RH Number of hit : 1 time Surge pulse : 10/1000 μ s pulse Applied current : maximum surge energy(Ws)
ESD life	1. No mechanical damage 2. Varistor voltage change : $\pm$ within 15% ESD gun (IEC61000-4-2 standard) C=150pF R=330 Ω	Discharge : contact discharge Voltage : 8,000V(level 4) Polarity : + , - Number : 10 times, interval 1 sec.
ESD test	1. No mechanical damage 2. Varistor voltage change : $\pm$ within 15% ESD gun (IEC61000-4-2 standard) C=150pF R=330 Ω	Discharge : Air discharge Voltage : 15,000V(level 4) Polarity : + , - Number : 10 times, interval 1 sec

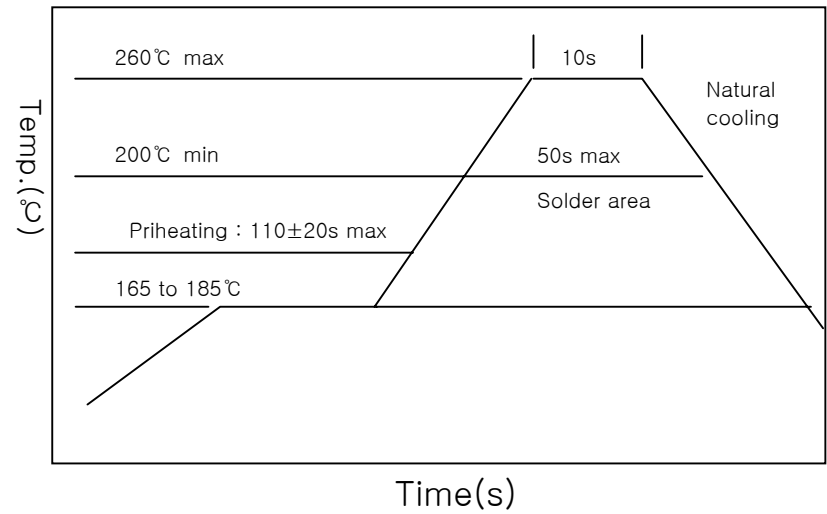
LAND PATTERN & REFLOW SOLDERING

■ Land Pattern



Size	a	b	c
1005	0.4~0.6	0.4~0.5	0.4~0.6

■ Reflow Soldering Profile



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