

# Data Sheet

- ITEM : Multilayer Chip Varistor

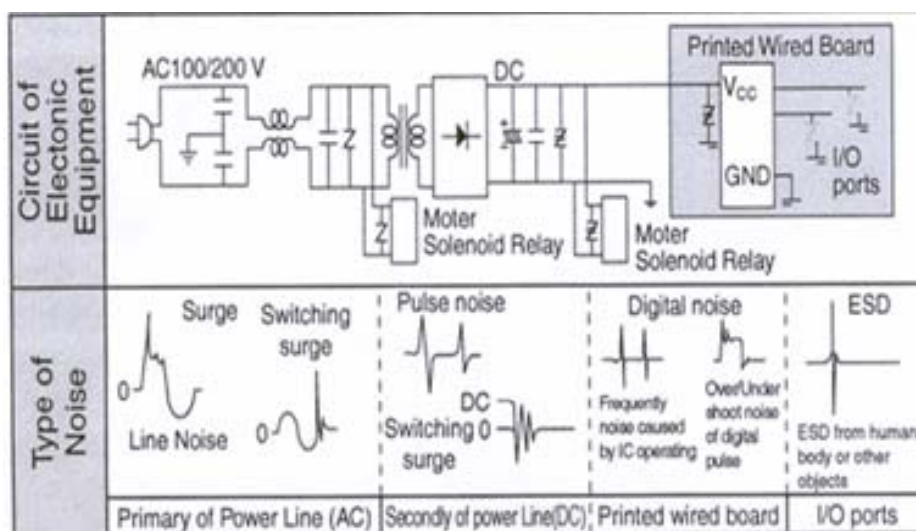
## 1. Scope

- 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

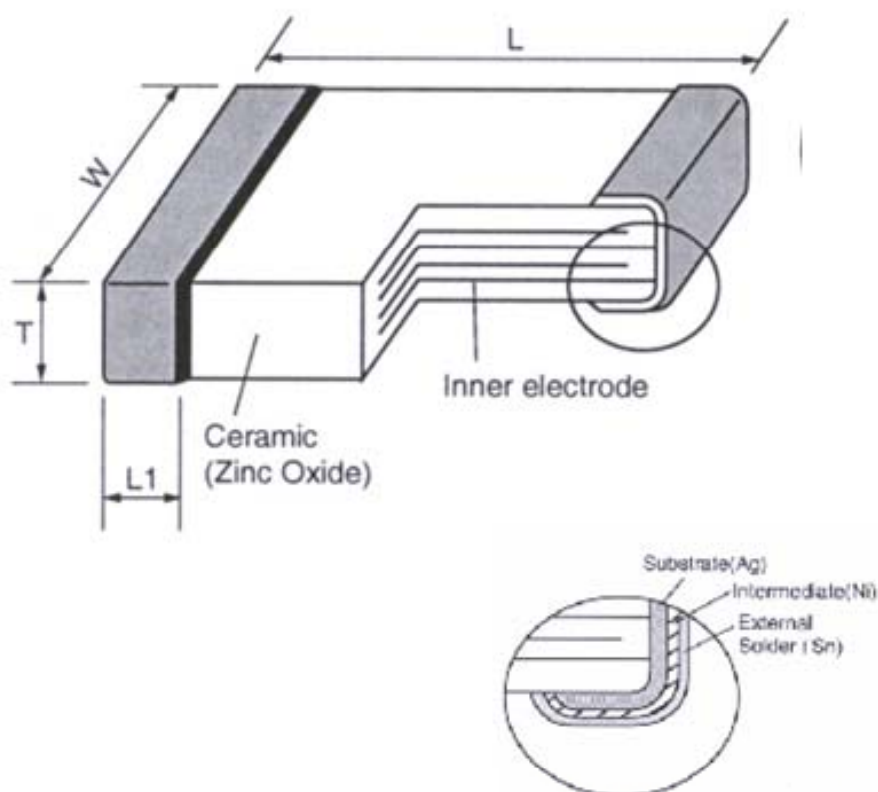
## 2. Features

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

## 3. Applications



## 4. Configuration and Dimensions



Unit : mm

CODE	DIMENSION			
	L	W	T	L1
03	0.6±0.05	0.3±0.03	0.3±0.03	0.15±0.05
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

## 5. Part Number Code

**ICVL 05 05 101 V 150 F R**

① ② ③ \* ④ ⑤ ⑥ ⑦

\*Capacitance: 101→10 ×10<sup>1</sup> pF →100pF  
600→60 ×10<sup>0</sup> pF→ 60pF

### ① SERIES NAME

CODE	PRODUCT NAME
ICVN	Normal type chip varistor
ICVS	Special type chip varistor
ICVL	High speed type chip varistor

### ② SIZE DESIGNATOR

CODE	SIZE(mm)
03	0.6 × 0.3
05	1.0 × 0.5
10	1.6 × 0.8
21	2.0 × 1.25

### 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

CODE	TYPE
F	Electroplate (Pb-free)

### ⑦ PACKING TYPE

CODE	TYPE
R	Tape & Reel pack

## 6. Nominal Specifications

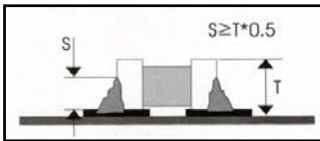
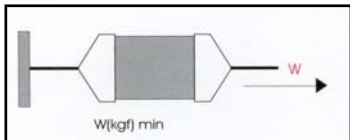
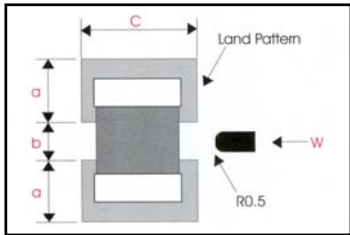
Chip Size	ICT Part Number	Leakage Current	Varistor Voltage	Clamping Voltage	Peak Current	Capacitance
	symbol	$I_L$	$V_B$	$V_C$	$I_{peak}$	C
	Units	$\mu A$	Volts	volts (typ.)	Amp (max.)	pF (typ.)
	Test Condition	Working Voltage	1mA DC	8/20 $\mu s$	8/20 $\mu s$	0.5Vrms @1MHz
0603	ICVS0305330	<20 $\mu A$	9~16	15	10	33 @1KHz
	ICVS0305500		9~16	50	10	50 @1KHz
	ICVS0305101		9~16	50	10	100 @1KHz
	ICVS0318100		24~36	20	10	10 @1KHz
	ICVS0318150		24~36	40	10	15 @1KHz
1005	ICVS0505481		6.8~10.2	15.5	20	480@1KHz
	ICVL0505101V150		7.2~10.8	15.5	15	100
	ICVN0505X150		7.2~10.8	15.5	20	360
	ICVS0505531		7.2~10.8	30	20	530@1KHz
	ICVS0505500		9~16	20	10	50@1KHz
	ICVL0505600V150		9~16	20	15	60
	ICVS0505201		9~16	20	20	200@1KHz
	ICVS0514X350		18~24	35	20	120
	ICVL0518100Y500		24~36	50	3	10
	ICVS0518150		24~36	50	3	15@1KHz
	ICVS0518270		24~36	50	15	27
	ICVS0518330		24~36	50	15	33
	ICVL0518400V500		24~36	50	15	40
	ICVN0518X400		24~36	40	20	90
	ICVS0518011		46~65	50	3	1.1
	ICVL0518030		100~160	300	3	3
	ICVL0518050Y500		100~160	300	3	5

Chip Size	ICT Part Number	Leakage Current	Varistor Voltage	Clamping Voltage	Peak Current	Capacitance
	symbol	$I_L$	$V_B$	$V_C$	$I_{peak}$	C
	Units	$\mu A$	Volts	volts (typ.)	Amp (max.)	pF (typ.)
	Test Condition	Working Voltage	1mA DC	8/20 $\mu s$	8/20 $\mu s$	0.5Vrms @1MHz
1608	ICVN1005A150	<20 $\mu A$	7.2~10.8	15.5	30	825
	ICVS1005330		9~16	20	10	33
	ICVN1009A200		9~16	20	30	550
	ICVN1014A300		16.8~25.2	30	30	424
	ICVL1018151A400		22.9~28	58	30	150
	ICVL1018100Y500		24~36	50	3	10
	ICVL1018750X500		24~36	50	20	75
	ICVL1018101A400		24~36	58	30	100
	ICVN1018A400		24~36	40	30	225
	ICVN1026A580		31~41	58	30	160
	ICVL1026900A580		33~41	58	30	90
	ICVN1030A650		37~46	65	30	150
	ICVS1018011		46~65	50	3	1.1
2012	ICVN2109A200		9~16	20	40	585
	ICVN2105A150		7.2~10.8	15.5	40	860

## ■ TERMINOLOGY

- $I_L$  : Maximum steady state DC operating voltage the varistor can maintain and not exceed 20 $\mu A$  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  
Pulse Current : 1A , Waveform : 8/20 $\mu s$
- $I_{peak}$  : Maximum peak current which may be applied with the specified waveform without device failure
- C : Device capacitance measured with zero volt bias 0.5Vrms and 1MHz

## 7. Reliability Test and Specification

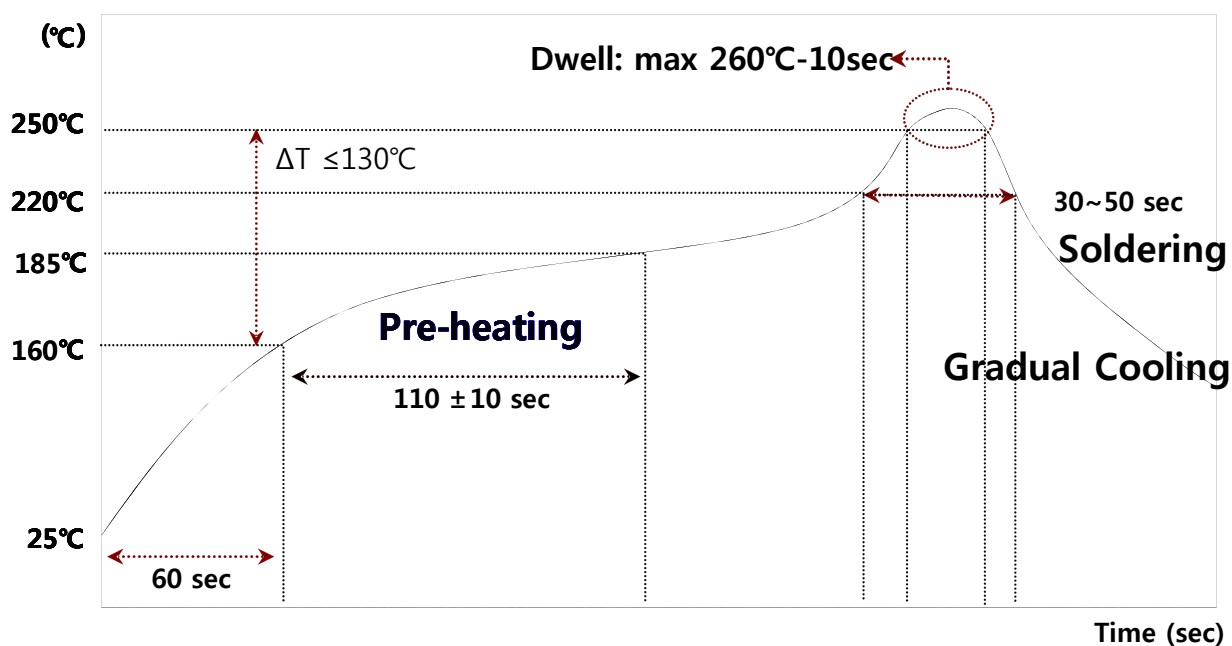
ITEM		REQUIREMENTS				TEST CONDITION
Operating temperature range		-45°C ~ +125°C				—
Storage temp. & humidity range		-10°C ~ +40°C max , 70% RH max.				At packing condition
Reflow soldering		1. More then 50% of the terminal electrode shall be covered with new solder. 2. Varistor voltage change : $\pm$ within 10% 				Preheat temperature : 165~185°C preheat time : 110±10s max. Solder temperature : 260°C soldering time : 10 sec.max (Reflow soldering profile)
Tensile strength		1. No mechanical damage				
	W	0603	1005	1608	2012	
		0.3 kgf	0.5 kgf	1.0 kgf	2.0 kgf	
Adhesion of terminal electrode		1. No mechanical damage				
		0603	1005	1608	2012	
	a	0.3 mm	0.5 mm	1.0 mm	1.0 mm	
	b	0.3 mm	0.5 mm	0.8 mm	1.0 mm	
	c	0.4 mm	0.6 mm	1.3 mm	1.3 mm	
	W	0.3 kgf	0.5 kgf	1.0 kgf	4.0 kgf	
Thermal shock (Temperature cycle)		1. No mechanical damage 2. Varistor voltage change : $\pm$ within 10%				Step 1. -40±2°C 30±3min. Step 2. 125±2°C 30±3min. Number of cycle : 200 times Measured at room ambient temperature after placing for 24 hours
Heat load resistance		1. No mechanical damage 2. Varistor voltage change : $\pm$ within 10%				Temperature : 85±2°C Applied Voltage : working voltage Time : 1,000 hours Measured at room ambient temperature after placing for 24 hours

ITEM	REQUIREMENTS	TEST CONDITION
Humidity load resistance	1. No mechanical damage 2. Varistor voltage change : $\pm$ within 10%	Temperature : $60 \pm 2^{\circ}\text{C}$ Humidity : 90~95%RH Applied voltage : Working Voltage Time : 500 hours Measured at room ambient temperature after placing for 24 hours
ESD test (contact discharge)	1. No mechanical damage 2. Varistor voltage change : $\pm$ within 15% ESD gun (IEC61000-4-2 standard) C=150pF R=330 $\Omega$	Discharge : contact discharge Voltage : 8,000V(level 4) Polarity : + , - Number : 10 times, interval 1 sec. Measured at room ambient temperature after placing for 24 hours
ESD test (air discharge)	1. No mechanical damage 2. Varistor voltage change : $\pm$ within 15% ESD gun (IEC61000-4-2 standard) C=150pF R=330 $\Omega$	Discharge : Air discharge Voltage : 15,000V (level 4) Polarity : + , - Number : 10 times, interval 1 sec Measured at room ambient temperature after placing for 24 hours

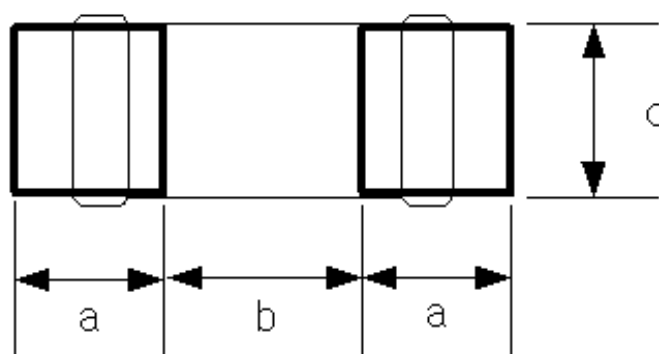


## 8. Reflow condition

### 8. 1 Recommended soldering profile (Lead-free condition)



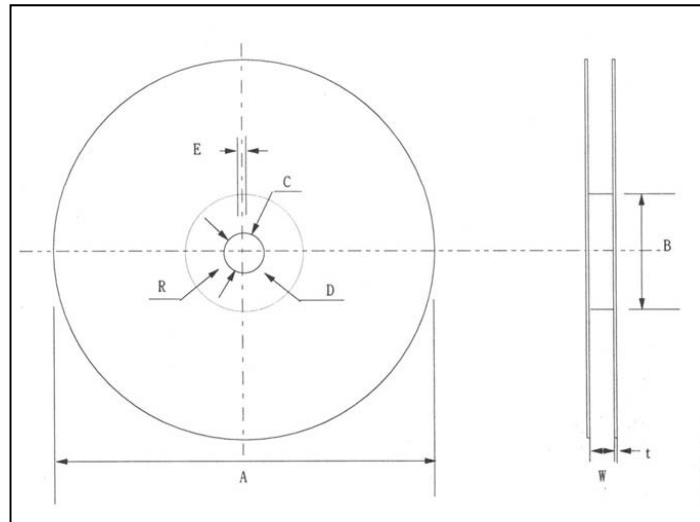
### 8. 2 Recommended foot print



Size	a	b	c
0603	0.28~0.32	0.28~0.32	0.38~0.42
1005	0.4~0.6	0.4~0.5	0.4~0.6
1608	0.7~0.9	0.7~0.8	0.6~0.8
2012	0.7~1.0	0.9~1.0	0.9~1.2

SYMBOL		A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	D	t
Dimension	0603	0.38 ±0.03	0.68 ±0.03	8.0 ±0.3	3.5 ±0.05	1.75 ±0.1	2.0 ±0.05	2.0 ±0.05	4.0 ±0.1	1.5 ±0.1	0.37 ±0.03
	1005	0.65 +0.05 -0.10	1.15 +0.05 -0.10								0.6 ±0.05
	1608	1.10 ±0.2	1.9 ±0.2								1.1 below
	2012										

### 9.3 Reel Dimensions



#### - Taping

- Standard Packing Quantity per Reel( $\phi 178$ )
- Paper Tape : 10,000 pcs /reel

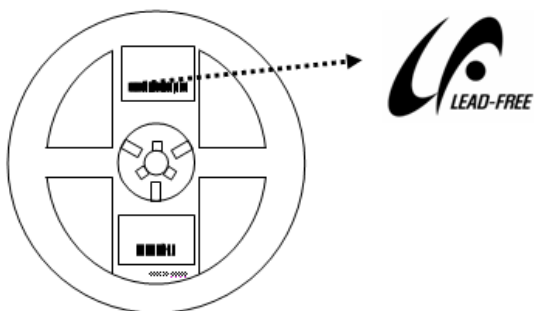
#### -Reel Dimensions

Unit : mm

CODE	A	B	C	D
DIMENSION	$\phi 178 \pm 2$	Min. $\phi 50$	$\phi 13 \pm 0.5$	$\phi 21 \pm 0.8$

CODE	E	W	t	R
DIMENSION	$2.0 \pm 0.5$	$10 \pm 1.5$	$0.8 \pm 0.2$	1.0

- (1) Reel material : Polystyrene
- (2) Label



#### INNOCHIPS TECHNOLOGY

P/N : ICVL0505101V150FR  
L/N : D01084GA DATE:070401  
C/N : Q'TY : 10,000  
SPEC : 1005, 5.6[Vdc], 100pF



MADE IN KOREA

P/N : Part Number

L/N : Lot Number

C/N : Company Number

SPEC : Size &amp; Working Voltage &amp; Capacitance &amp; Resistance

DATE : Date code

Q'TY : Quantity

## 9.4 Reel Packing



<SPQ Box>



<PQ Box>

- (1) Product box material : Card board
- (2) 5 Reels in each SPQ Box
- (3) PQ Box contains 10 SPQ Boxes (50 Reels)

### Packaging box + Product weight

Size			S-box + 5reel		M-box + 5S-box		L-box + 10S-box	
Product	L x W x H(mm)		185 x 70 x 185		370 x 190 x 200		380 x 370 x 200	
	Size	weight(g) /1 unit	Total(g)	Chip(g)	Total(g)	Chip(g)	Total(g)	Chip(g)
Varistor	0603	0.00008	426	4	2130	21	4260	42
	1005	0.00014	747	7	3735	35	6906	70
	1608	0.00490	884	98	4420	490	8714	980
	2012	0.00686	941	137	4705	686	9410	1372
	Array	0.00667	703	133	3515	667	7030	1334
ESD-Filter	1608	0.00513	646	103	3230	513	6460	1026
	2012	0.00704	715	141	3575	704	7150	1408
	3012	0.01025	794	205	3970	1025	7940	2051
	3212	0.01302	813	260	4158	1302	8316	2604
Feedthru	1608	0.00439	885	88	4425	439	8850	878
	2012	0.00837	834	167	4170	837	8340	1674