MTC Multilayer Chip varistors

Introduction

Varistors are voltage dependent, nonlinear devices, which have an electrical behavior similar to back-to-back zener diodes. The symmetrical, sharp breakdown characteristics shown in Figure 1 enable the varistor to provide excellent transient suppression performance. The potentially destructive energy of the incoming transient pulse is absorbed by the varistor, thereby protecting vulnerable circuit components.

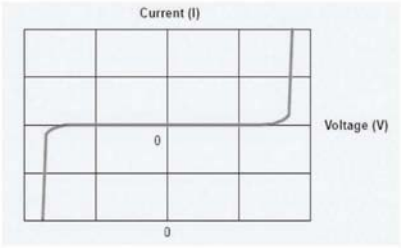


Figure 1. Typical V-I characteristic curve of varistor on a linear scale.

Varistor electrical characteristics are conveniently displayed using log-log format in order to show the wide range of the V-I curve. The log format also is clearer than a linear representation, which tends to exaggerate the nonlinearity in proportion to the current scale chosen. A typical V-I characteristic curve is shown in Figure 2. This plot shows a wider range of current than is normally provided on varistor data sheets in order to illustrate three distinct regions of electrical operation.

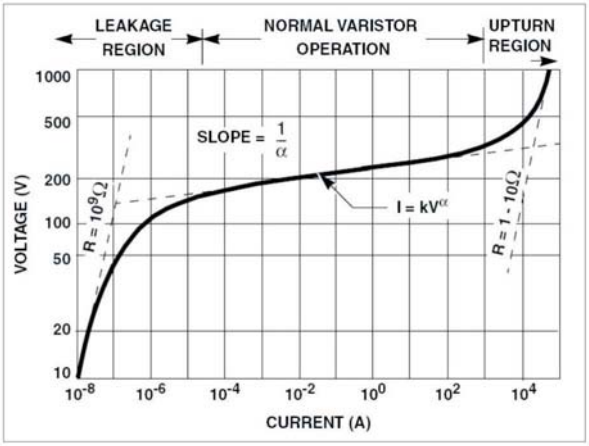


Figure 2. Typical varistor V-I curve plotted on log-log scale.

MTC Multilayer Chip varistors

ESD Series Product Description

ETC'S Multilayer Chip Varistors are zinc oxide (ZnO) based ceramic components designed for protection of electrical appliances at low and medium voltage regions. The Multilayer structure provides component with low clamping voltage and high surge current / energy handling capabilities. Leadless chip has low terminal inductance which resulting a fast response to transient voltage. The response time of MLV is less than 1 nanosecond. Thus, MLV are very suitable to be used to solve the transient overvoltage problems arising from ElectroStatic Discharge (ESD), Electrical Fast Transient (EFT), arcing and inductive loading switch.

Features

◎ Leadless chip-Green parts
◎ Low clamping voltage
◎ Quick response time (>1 n Sec.)
◎ High surge current / energy handling capabilities
◎ Wide operating voltage range, Vdc: 3.3V to 48V
◎ Meet IEC 61000-4-2, 61000-4-4, and 61000-4-5 standard

Applications

1.Cordless phone、LCD display、Programming port、Charger、Key pads、Speaker & Microphone、ASIC protection、Laser diode protection、FETs protection Secondary phone line、Data line connection、Line card、Fax machine
2.Computer & Peripheral：Personal computer、Hard disc drive、Vcc protection、Fax / Modem、Note book computer、LCD display、Audio card、Keyboard、I/O ports、Charger、PCMCIA cards
3.Product：Security system、Sensor protection、Key pads、Microprocessor reset & I/O protection、LCD display、CATV、LNA FETs protection、Logic box protection、Portable equipment、Camcorder、Cassette player、CD player、MD player、Digital camera、PDAs

Part Number Code

MLV	1005	E	05	N	331	A
①	②	③	④	⑤	⑥	⑦

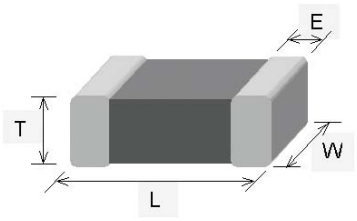
1. Series Type : Multilayer varistor
2. Size Code : The first two digits: length (mm), the last two digits: width (mm)
3. Material Code : E: ESD Series
4. Maximum Continuous Working Voltage-VDC

   03=3.3 VDC 05=5.6 VDC 09=9.0 VDC 12=12 VDC 14=14 VDC

   18=18 VDC 26=26 VDC 30=30 VDC 48=48 VDC
5. Termination Code : T: Ag/Pd; N: Nickel Barrier
6. Capacitance Value : The first two digits are significant figures and the third one denotes the number of zeros following.
7. Soldering : A : lead free

Shape and Dimensions

Size	1005	1608	2012
L	1.00±0.15	1.60±0.20	2.00±0.20
W	0.50±0.10	0.80±0.20	1.25±0.20
T	0.50±0.10	0.80±0.20	0.90±0.20
E	0.25±0.15	0.30±0.20	0.50±0.30



MTC Multilayer Chip varistors

Specifications

	Working Voltage	Varistor Voltage	**Clamping Voltage**	Capacitance		Leakage current
Symbol	V_{DC}	V_V	V_C	C_P	ΔC_P	I_L
Units	Volts (Max.)	Volts	Volts (Max.)	pF		μA (Max.)
Test Condition		1mA DC	8/20μs at 1A	1 Vrms at 1MHz		V_{DC}
MLV1005 Series						
MLV1005E05N220	5.5	7.6 ~ 12	25	22	± 30%	< 10
MLV1005E09N220	9	11 ~ 17	35	22	± 30%	< 10
MLV1005E18N1R0	5.5 ~ 18	46 ~ 60	110	1.0	± 0.9 pF	< 10
MLV1005E18N1R5	5.5 ~ 18	46 ~ 60	110	1.5	± 1.4 pF	< 10
MLV1005E18N3R0	5.5 ~ 18	46 ~ 60	110	3.0	± 2.0 pF	< 10
MLV1005E18N5R0	18	22 ~ 34	58	5.0	± 2.0 pF	< 10
MLV1005E18N100	18	22 ~ 34	58	10	± 30%	< 10
MLV1005E18N120	18	22 ~ 34	58	12	± 30%	< 10
MLV1005E18N150	18	22 ~ 34	58	15	± 30%	< 10
MLV1005E18N220	18	22 ~ 34	58	22	± 30%	< 10
MLV1005E26N5R0	5.5 ~ 26	46 ~ 60	110	5.0	± 2.0 pF	< 10
MLV1608 Series						
MLV1608E05N100	5.5	7.6 ~ 12	25	10	± 30%	< 10
MLV1608E05N220	5.5	7.6 ~ 12	25	22	± 30%	< 10
MLV1608E09N5R0	9	11 ~ 17	35	5.0	± 2.0 pF	< 10
MLV1608E09N220	9	11 ~ 17	35	22	± 30%	< 10
MLV1608E18N1R0	5.5 ~ 18	46 ~ 60	110	1.0	± 0.9 pF	< 10
MLV1608E18N1R5	5.5 ~ 18	46 ~ 60	110	1.5	± 1.4 pF	< 10
MLV1608E18N3R0	5.5 ~ 18	46 ~ 60	110	3.0	± 2.0 pF	< 10
MLV1608E18N5R0	18	22 ~ 34	58	5.0	± 2.0 pF	< 10
MLV1608E18N120	18	22 ~ 34	58	12	± 30%	< 10
MLV1608E18N150	18	22 ~ 34	58	15	± 30%	< 10
MLV1608E18N220	18	22 ~ 34	58	22	± 30%	< 10
MLV1608E26N5R0	5.5 ~ 26	46 ~ 60	110	5.0	± 2.0 pF	< 10
MLV1608E26N220	26	31 ~ 45	65	22	± 30%	< 10
MLV1608E42N150	42	51 ~ 68	106	15	± 30%	< 10
MLV2012 Series						
MLV2012E18N101	18	22-34	58	100	± 30%	< 10
MLV2012E18N331	18	22-34	58	330	± 30%	< 10
MLV2012E26N221	26	31-45	65	220	± 30%	< 10
MLV2012E26N331	26	31-45	65	330	± 30%	< 10

Environmental Performance

Characteristics	Specifications	Test condition
Bias humidity	ΔVv/Vv ≦±10%	90%RH, 40℃, Working voltage, 1000 hours
Thermal shock	ΔVv/Vv ≦±10%	-40℃ to 85℃, 30 min per cycle, 5 cycles
Full load voltage	ΔVv/Vv ≦±10%	Working voltage, 85℃, 1000 hours
Resistance of Soldering Heat	1.ΔVv/Vv ≦±10% 2.I_L≦10uA at working Voltage 3.Solder Wetting area≧95%	260 ± 5 ℃, 10 ± 1 sec

General Technical Data

Operating temperature	-40℃～+85℃
Storage temperature (on board)	-40℃～+85℃
Response time	<1 ns
Solderability	230 ± 5 ℃, 3 ± 1 sec
Resistance to soldering heat	260 ± 5 ℃, 10 ± 1 sec

Package

Standard packing quantity:

Size	1005 (0402)	1608 (0603)	2012 (0805)
Standard packing quantity (pcs /reel)	10,000	4,000	4,000

MTC Multilayer Chip varistors

Surge Series Product Description

This specification is applicable to Chip Metal Oxide Varistor in multilayer technology. The MLVS 0402, 0603 and 1206 Series provide protection from Surge and ESD. The customer designed part number drawing take precedence over this specification.

Features

1. Insulator over coat keeps excellent low and stable leakage current
2. Solder layer plating for terminal electrode keep excellent assembly Solderability even after long term storage
3. Low clamping Voltage
4. Compact size for EIA 0402/0603/1206
5. Quick response time (<1ns)
6. High transient current capability
7. Meet IEC 61000-4-2, 61000-4-4, and 61000-4-5 standard

Applications

Applications for Mother Board, Notebook, Cellular Phone, PDA, handheld device, DSC, DV, Scanner, and Set-Top Box etc.

Part Number Code

MLV	S	0402	M	04	_	221
①	②	③	④	⑤		⑥

1.Series Type : MLV — Multilayer VaristorElements :

2. S — Single

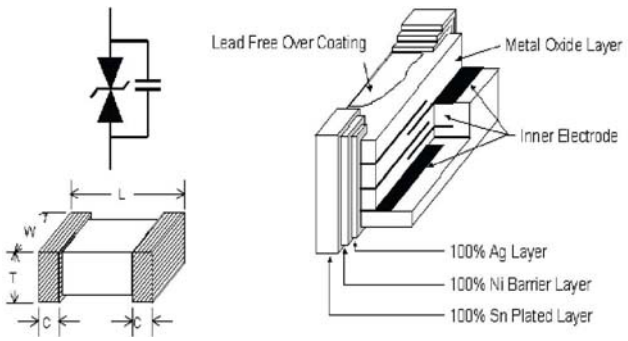
3. Chip Size : 0402 / 0603 / 1206

4.Varistor Voltage Tolerance : M — ±20%；L — ±15%；K— ±10%

5. VRMS :AC Working Voltage VRMS

6. Capacitance : Value — XX x 10N→XXN　ex.220pF=22x101→221

Shape and Dimensions



Size	0402	0603	1206
L	1.00±0.15	1.60±0.20	3.20±0.20
W	0.50±0.10	0.80±0.20	1.60±0.20
T	0.50±0.10	0.80±0.20	1.7 max.
C	0.25±0.15	0.30±0.20	0.50±0.25

MTC Multilayer Chip varistors

Specifications

	Working Voltage		Varistor Voltage		Clamping Voltage	Capacitance	Peak Current	Transient Energy
Symbol*	V_{RMS}	V_{DC}	V_V	ΔV_V	Vc	Cp	i_{max}	W_{max}
Units	Volts	Volts (Max.)	Volts	%	Volts (Max.)	pF(typ.)	Amps (Max.)	Joules (Max.)
Test Condition		<10μA	1mA DC		1A 8/20μs	1MHz	8/20μs	10/1000μs
MLVS 0402								
MLVS0402M04	4	5.5	8	±20	19	270	20	0.05
MLVS0402M07	7	9	12.5	±20	32	130	20	0.05
MLVS0402K11	11	14	18	±10	38	90	20	0.05
MLVS0402K14	14	18	22	±10	45	85	20	0.05
MLVS 0603								
MLVS0603M04	4	5.5	8	±20	19	270	30	0.1
MLVS0603M07	7	9	12.5	±20	27	210	30	0.1
MLVS0603K11	11	14	18	±10	35	150	30	0.1
MLVS0603K14	14	18	22	±10	40	130	30	0.1
MLVS0603K20	20	26	31	±10	58	100	30	0.1
MLVS1206								
MLVS-1206-M04-362	4	5.5	8	±20	19	3600	150	0.4
MLVS-1206-K14-182	14	18	22	±10	40	1800	150	0.4
MLVS-1206-K14-651*	14	18	22	±10	40	650	200	0.4
MLVS-1206-K25-501	25	31	41	±10	70	500	200	1.0
MLVS-1206-K40-181	40	56	70	±10	110	180	200	1.0

Environmental Performance

Item	Specifications	Test Condition
Bias Humidity	△V_V/ V_V≦ 10 %	90%RH, 40℃, Working Voltage, 1000 hrs
Thermal Shock		0402 & 0603:-40℃ to 85℃, 30 min. cycle, 5 cycles 1206: -55℃ to 125℃, , 30 min. cycle, 5 cycles
Full Load Voltage		0402 & 0603: Working Voltage, 85℃, 1000 hrs 1206: Working Voltage, 125℃, 1000 hrs
Solder Leach Resistance	1.△V_V/ V_V≦ ± 10 % 2.I_L≦ 10μA at Working Voltage 3.Solder Wetting Area≦95%	260℃, 10sec.

General Technical Data

Operating Temperature	-40 … +85℃
Storage Temperature	-40 … +85℃
Response Time	<1 ns
Solderability	230℃, 3sec.
Solder Leach Resistance	260℃, 10sec.

Package

Size	0402	0603	1206
Standard Packing Quantity (pcs / Reel)	10,000pcs	4,000pcs	4,000pcs