



CIRCUIT

PROTECTION

CONTENTS



AEC-Q200 Compliance

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ESD TVS SERIES



INPAQ TVS Series is the best solution for suppressing ESD and other electrical transients. The product line offers a wide range of devices to suit the most of applications in the market with ESD level up to 30kV and parasitic capacitances as low as 0.2pF.

FEATURES

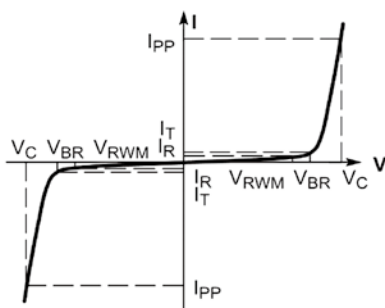
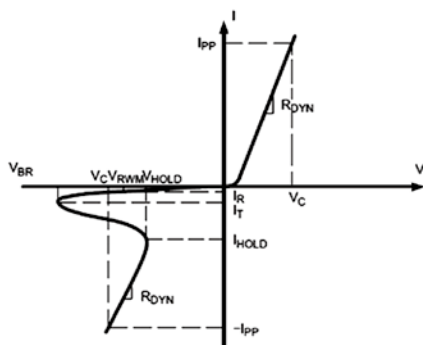
- SMD Type Silicon base Chip
- Quick Response Time(<1nS)
- Low Leakage Current and Clamping Voltage
- Meet IEC 61000-4-2 Standard Level 4 (Air : 15KV, Contact: 8KV)

APPLICATIONS

- Applications for Key, Audio and Power line on Smart Phone, Wearing Equipment, MB, NB, TV and Network Equipment.
- Low Capacitance Product Applications for High-speed Signal Lines Such As TYPE C, USB2.0/3.0/3.1, HDMI, DVI etc.

ELECTRICAL CHARACTERISTICS

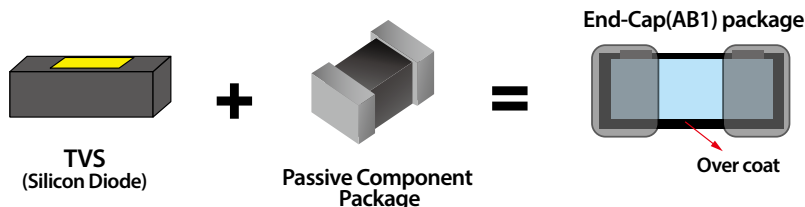
($T_A = 25^\circ\text{C}$ unless otherwise noted)



Symbol	Parameter
V_{RWM}	Nominal Reverse Working Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{BR}	Breakdown Voltage @ I_T
I_T	Test Current
V_{HOLD}	Holding Reverse Voltage
I_{HOLD}	Holding Reverse Current
R_{DYN}	Dynamic Resistance
I_{PP}	Peak Pulse Current
V_C	Clamping Voltage @ I_{PP}

Symbol	Parameter
V_{RWM}	Nominal Reverse Working Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{BR}	Reverse Breakdown Voltage @ I_T
I_T	Test Current of Reverse Breakdown
V_C	Clamping Voltage @ I_{PP}
I_{PP}	Maximum Peak Pulse Current
V_R	Reverse Voltage
V_f	Forward Voltage

CSP (Chip Scale Package) with Overcoating & Terminal Electrode



FEATURES

- Reduce the Dimension to 01005 (0.4mmx0.2mmx0.2mm)
- Excellent Solderability

EXPLANATION OF PART NUMBER

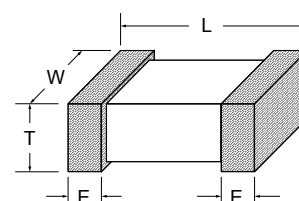
TV	L	0201	01	AB
1	2	3	4	5

- 1: TVS Series
- 2: Capacitance
- 3: Chip size
- 4: Element
- 5: Model Code

DIMENSION

Unit: mm

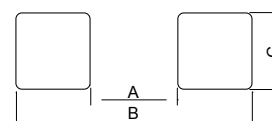
EIA	01005	0201	0402
L	0.40	0.60	1.00
W	0.20	0.30	0.50
T	0.20	0.30	0.50
E	0.11	0.20	0.25



SOLDER LAND INFORMATION

Unit: mm

EIA	01005	0201	0402
A	0.20	0.30	0.50
B	0.50	0.80	1.70
C	0.20	0.30	0.50



SPECIFICATIONS

APPLICATION

Single TVS Die	Direction	V_{RWM} (V)	C_p (pF)	I_{pp} (A)	Package	Power	Key pad	Low Speed Signal	High Speed Signal	RF
TVC 01005 01 AB*	Bi	5	0.28	2	01005				•	•
TVL 0201 01 AB	Bi	5	3	2	0201		•	•		
TVN 0201 01 AB	Bi	5	20	4	0201	•	•			
TVL 0402 01 AB	Bi	5	6	4	0402		•			
TVH 0402 01 AB	Bi	5	35	4	0402	•	•			
TVN 0402 01 AB	Bi	5	50	4	0402	•	•			

- *Coming soon

ESD TVS Series



TVS FOR SURGE PROTECT

TV	U	5V	U	4	DFN2510	10L
1	2	3	4	5	6	7

- 1: TVS series
 2: Capacitance
 3: V_{RWM}
 4: Direction: U: Uni, B: Bi
 5: Channel
 6: Package
 7: PIN
- H/M : High Capacitance
 N : Middle Capacitance
 L : Low Capacitance
 U/W : Ultra Low Capacitance
 C/UC : Supper low Capacitance

Single TVS

SPECIFICATIONS

APPLICATION

Single TVS Die	Direction	V_{RWM} (V)	Pin Config	Cp (pF)	Ipp (A)	Package	power	Key pad	Low Speed Signal	High Speed Signal	RF
TVC 5V B1-DFN0603-2L	Bi	5		0.28	3.5	DFN0603				•	•
TVL 5V B1-DFN0603-2L	Bi	5		10	5	DFN0603	•	•	•		
TVL 3V3 B1-DFN0603-2L	Bi	3.3		10	7	DFN0603	•	•	•		
TVW 3V3 B1-DFN0603-2L	Bi	3.3		1	12	DFN0603	•	•	•		
TVL 12V B1-DFN0603-2L	Bi	12		4	4	DFN0603	•	•	•		
TVW 5V B1-DFN1006-2L	Bi	5		0.3	3.5	DFN1006				•	•
TVU 5V U1-FBP1006-2L	Uni	5		0.5	5	DFN1006				•	•
TVL 5V B1S-DFN1006-2L	Bi	5		1	12	DFN1006	•	•	•		
TVL 3V3 B1-FBP1006-2L	Bi	3.3		15	7	FBP1006	•	•	•		
TVL 5V B1-FBP1006-2L	Bi	5		15	4	FBP1006	•	•	•		
TVL 5V B1A-FBP1006-2L	Bi	5		15	4	FBP1006	•	•	•		
TVM 5V U1-FBP1006-2L	Uni	5		95	13	FBP1006	•	•			
TVM 7V U1-FBP1006-2L	Uni	7		70	10	FBP1006	•	•			
TVM 12V U1-FBP1006-2L	Uni	12		48	9	FBP1006	•	•			
TVM 5V U1-DFN1610-2L	Uni	5		600	80	DFN1610	•	•			
TVM 12V U1-DFN1610-2L	Uni	12		380	45	DFN1610	•	•			
TVM 20V U1-DFN1610-2L	Uni	20		165	25	DFN1610	•	•			
TVM 3V3 U1-SOD523-2L	Uni	3.3		120	16	SOD523	•	•			
TVM 5V U1-SOD523-2L	Uni	5		95	13	SOD523	•	•			
TVM 7V U1-SOD523-2L	Uni	7		70	10	SOD523	•	•			
TVN 12V U1-SOD523-2L	Uni	12		45	9	SOD523	•	•			
TVH 15V U1-SOD523-2L	Uni	15		48	9.5	SOD523	•	•			
TVH 24V U1-SOD523-2L	Uni	24		36	7.5	SOD523	•	•			
TVH 36V U1-SOD523-2L	Uni	36		30	3	SOD523	•	•			
TVL 3V3 B1-SOD523-2L	Bi	3.3		15	7	SOD523	•	•	•		
TVN S523 01 AB0	Bi	5		15	5	SOD523	•	•	•		

- For details specification, please contact us or download from INPAQ website.
- Specifications are subject to change without notice.

ESD TVS Series

Single TVS



SPECIFICATIONS

Single TVS Die	Direction	V_{RWM} (V)	Pin Config	C_p (pF)	I_{pp} (A)	Package	APPLICATION				
							power	Key pad	Low Speed Signal	High Speed Signal	RF
TVM 3V3 U1-SOD323-2L	Uni	3.3		120	16	SOD323	•	•			
TVM 5V U1-SOD323-2L	Uni	5		95	13	SOD323	•	•			
TVH 12V U1-SOD323-2L	Uni	12		45	9	SOD323	•	•			
TVM 12V U1-SOD323-2L	Uni	12		100	30	SOD323	•	•			
TVL 3V3 B1-SOD323-2L	Bi	3.3		2	18	SOD323	•	•	•		
TVN 5V B1-SOD323-2L	Bi	5		15	5	SOD323	•	•	•		
TVL 5V B1-SOD323-2L	Bi	5		2	30	SOD323	•	•	•		

- For details specification, please contact us or download from INPAQ website.
- Specifications are subject to change without notice.

Array TVS

SPECIFICATIONS

Array TVS Die	Direction	V_{RWM} (V)	Pin Config	Chanel	C_p (pF)	I_{pp} (A)	Package	APPLICATION	
								Low Speed Signal	High Speed Signal
TVU 5V U2-DFN1006-3L	Uni	5		2	0.4	4	DFN1006-3L		•
*TVU DF10 04S AD0	Uni	5	*1	4	0.5	4.5	DFN2510-10L		•
*TVU 5V U4S-DFN2510-10L	Uni	5		4	0.48	5	DFN2510-10L		•
*TVU 3V3 U4S-DFN2510-10L	Uni	3.3		4	0.44	6	DFN2510-10L		•
*TVU 3V3 U4SA-DFN2510-10L	Uni	3.3		4	0.25	3	DFN2510-10L		•
*TVU 1V8 U4S-DFN2510-10L	Uni	1.8		4	0.28	6	DFN2510-10L		•

- For details specification, please contact us or download from INPAQ website.
- Specifications are subject to change without notice.

*1: Denote that this TVS Diode is characteristics of both Lower Clamping Voltage and Snap-back.



ESD TVS Series

Array TVS



SPECIFICATIONS

APPLICATION

Array TVS Die	Direction	V_{RWM} (V)	Pin Config	Chanel	C_p (pF)	I_{pp} (A)	Package	Low Speed Signal	High Speed Signal
TVU 5VB6-DFN4120-10L	Bi	5		6	0.3	5	DFN4120-10L		•
TVU 5VU4-SOT23-6L	Uni	5		4	0.6	3	SOT23-6L	•	•
TVC 5VU4D-SOT23-6L	Uni	5		4	1.2	8	SOT23-6L	•	
TVU 5VU2-SOT23-3L	Uni	5		2	0.6	5	SOT23-3L	•	•
TVL S143 02 AC0	Uni	5		2	1.2	5	SOT143-4L	•	
TVN ST523 02 AB0	Uni	5		2	10.5	5	SOT523-3L	•	

- For details specification, please contact us or download from INPAQ website.
- Specifications are subject to change without notice.

TVS FOR V_{BUS} / V_{BAT}

TVSS	4V5	U	1	DFN2020	3L
1	2	3	4	5	6

- 1: TVSS: TVS for Vbus/VBat
- 2: V_{RWM}
- 3: Direction: U: Uni, B: Bi
- 4: Element
- 5: Package
- 6: PIN

SPECIFICATIONS

APPLICATION

TVS for V_{BUS} / V_{BAT}	Direction	V_{RWM} (V)	C_p (pF)	I_{pp} (A)	Package / Pin Config	Vbus	Vbat
TVSS 4V5 U1-DFN2020-3L	uni	4.5	2400	290		•	•
TVSS 12V U1-DFN2020-3L	uni	12	900	150		•	
TVSS 15V U1-DFN2020-3L	uni	15	11000	150		•	•
TVSS 22V U1-DFN2020-3L	uni	22	900	110		•	
TVSS4V5U1-SOD323F-2L	uni	4.5	700	100		•	•
TVSS 7V U1-SOD323F-2L	uni	7	485	100		•	
TVSS 12V U1-SOD323F-2L	uni	12	265	50		•	
TVSS 24V U1-SOD323F-2L	uni	24	500	130		•	

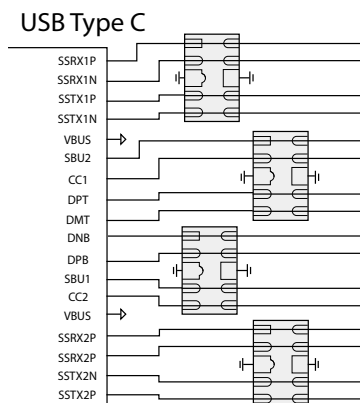
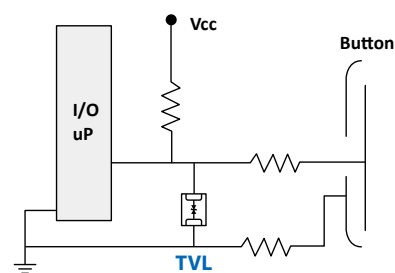
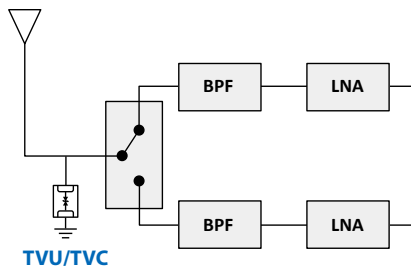
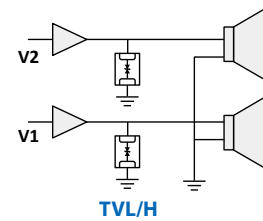
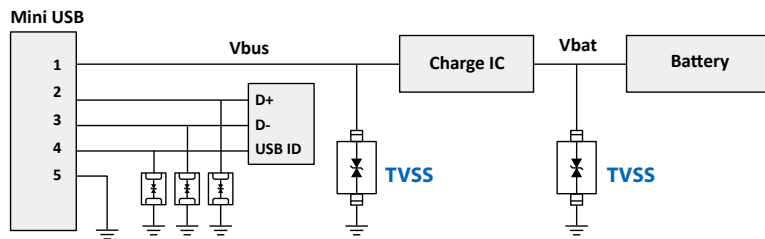
- For details specification, please contact us or download from INPAQ website.
- Specifications are subject to change without notice

ESD TVS Series

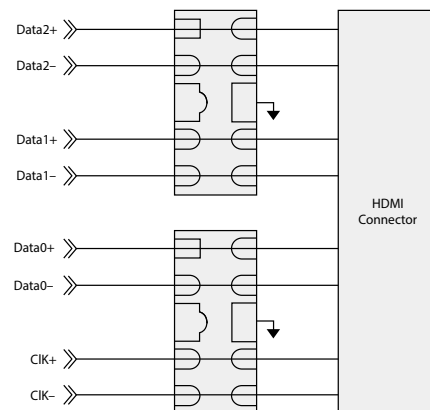
HF
Halogen FreePb
lead-free

RoHS

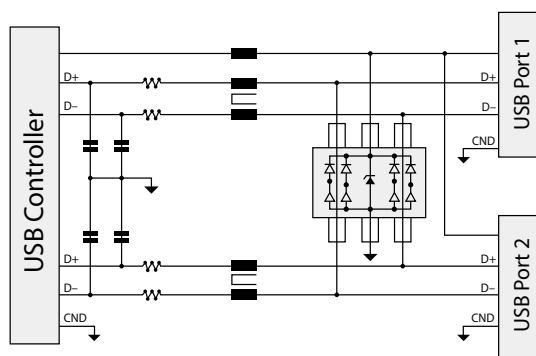
APPLICATIONS



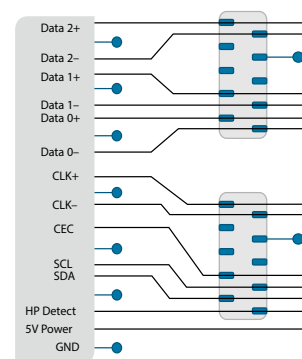
TVU DF1004SAD0



TVU DF1004SAD0



TVU 5V U4-SOT23-6L


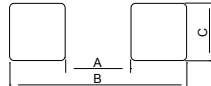







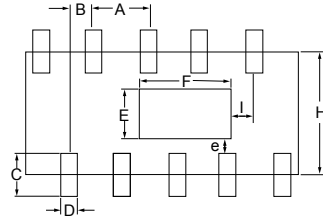

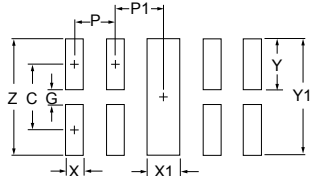

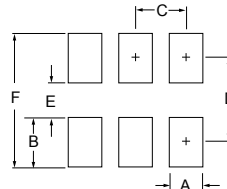


TVU 5VB6DFN4120-10L

ESD TVS Series



DIMENSION & APPEARANCE

Package	Appearance	Dimension (mm)	Land Layout (mm)																																
01005		0.4x0.2x0.2	 <table><thead><tr><th>EIA</th><th>A</th><th>B</th><th>C</th></tr></thead><tbody><tr><td>01005</td><td>0.2</td><td>0.6</td><td>0.2</td></tr><tr><td>0201</td><td>0.3</td><td>0.8</td><td>0.3</td></tr><tr><td>0402</td><td>0.5</td><td>1.7</td><td>0.5</td></tr><tr><td>DFN0603</td><td>0.2</td><td>0.62</td><td>0.36</td></tr><tr><td>DFN/FPB1006</td><td>0.3</td><td>1.4</td><td>0.55</td></tr><tr><td>SOD523</td><td>0.8</td><td>2.0</td><td>0.7</td></tr><tr><td>SOD323</td><td>1.45</td><td>2.85</td><td>0.7</td></tr></tbody></table>	EIA	A	B	C	01005	0.2	0.6	0.2	0201	0.3	0.8	0.3	0402	0.5	1.7	0.5	DFN0603	0.2	0.62	0.36	DFN/FPB1006	0.3	1.4	0.55	SOD523	0.8	2.0	0.7	SOD323	1.45	2.85	0.7
EIA	A	B		C																															
01005	0.2	0.6		0.2																															
0201	0.3	0.8		0.3																															
0402	0.5	1.7		0.5																															
DFN0603	0.2	0.62		0.36																															
DFN/FPB1006	0.3	1.4		0.55																															
SOD523	0.8	2.0	0.7																																
SOD323	1.45	2.85	0.7																																
0201		0.6x0.3x0.3																																	
0402		1.0x0.5x0.5																																	
DFN0603		0.6x0.3x0.3																																	
DFN/FPB1006		1.0x0.6x0.5																																	
SOD523		1.6x0.8x0.6																																	
SOD323		2.5x1.2x1.0																																	
DFN4120(DFN14)		4.1x2.0x0.5	 <table><thead><tr><th>A</th><td>0.8</td></tr><tr><th>B</th><td>0.4</td></tr><tr><th>C</th><td>0.6</td></tr><tr><th>D</th><td>0.2</td></tr><tr><th>E</th><td>0.8</td></tr><tr><th>F</th><td>1.4</td></tr><tr><th>H</th><td>2.0</td></tr><tr><th>I</th><td>0.3</td></tr><tr><th>e</th><td>0.2</td></tr></thead></table>	A	0.8	B	0.4	C	0.6	D	0.2	E	0.8	F	1.4	H	2.0	I	0.3	e	0.2														
A	0.8																																		
B	0.4																																		
C	0.6																																		
D	0.2																																		
E	0.8																																		
F	1.4																																		
H	2.0																																		
I	0.3																																		
e	0.2																																		
DFN2510(DF10)		2.5x1.0x0.5	 <table><thead><tr><th>C</th><td>0.875</td></tr><tr><th>G</th><td>0.2</td></tr><tr><th>P</th><td>0.5</td></tr><tr><th>P1</th><td>0.5</td></tr><tr><th>X</th><td>0.5</td></tr><tr><th>X1</th><td>0.4</td></tr><tr><th>Y</th><td>0.675</td></tr><tr><th>Y1</th><td>1.55</td></tr><tr><th>Z</th><td>1.55</td></tr></thead></table>	C	0.875	G	0.2	P	0.5	P1	0.5	X	0.5	X1	0.4	Y	0.675	Y1	1.55	Z	1.55														
C	0.875																																		
G	0.2																																		
P	0.5																																		
P1	0.5																																		
X	0.5																																		
X1	0.4																																		
Y	0.675																																		
Y1	1.55																																		
Z	1.55																																		
SOT23-6L		2.8x2.8x1.3	 <table><thead><tr><th>A</th><td>0.6</td></tr><tr><th>B</th><td>1.1</td></tr><tr><th>C</th><td>0.95</td></tr><tr><th>D</th><td>2.5</td></tr><tr><th>E</th><td>1.4</td></tr><tr><th>F</th><td>3.6</td></tr></thead></table>	A	0.6	B	1.1	C	0.95	D	2.5	E	1.4	F	3.6																				
A	0.6																																		
B	1.1																																		
C	0.95																																		
D	2.5																																		
E	1.4																																		
F	3.6																																		

STANDARD PACKING

Package Size	01005	0201	0402	DFN1006 FBP-1006	SOD523	SOD323	SOT523
Standard Packing Quantity (pcs /reel)	20,000	15,000	10,000	12,000/10,000	3,000/8,000	3,000	3,000

Package Size	DFN2020	DFN2510	DFN4120	SOT23
Standard Packing Quantity (pcs /reel)	3,000	3,000	3,000	3,000

- Please refer per product's specification or refer "Moisture sensitivity Carton label" on the package pack Product Storage and humidity Please refer to J-STD 033

POWER TVS SERIES



The Power Transient Voltage Suppressor diode (also known as a Power TVS Diode) is a protection diode designed to protect electronic circuits against transients and overvoltage threats such as EFT (Electrically Fast Transients) and ESD (Electro-Static Discharge). Power TVS diodes are available in both uni-directional (uni-polar) or bi-directional (bi-polar) diode circuit configurations.

FEATURES

- For surface mounted applications
- Reliable low cost construction utilizing molded plastic technique
- Power dissipation from 200W to 5,000W
- Typical IR (Revers standoff Current) less than 1uA above 10V
- Fast response time: typically less than 1.0ns for Uni-direction, less than 5.0ns for Bi-direction, from 0 Volts to Vb (Breakdown Voltage)
- RoHS compliant

APPLICATIONS

- AC-DC Power for PC/NB/TV/Adaptor/Charger, DC Power, POE, STB, AP Router, Modem etc.

MECHANICAL DATA

- Case: Molded plastic
- Case Material: Molding compound, UL Flammability classification 94V-0, (No Br. Sb. Cl.) "Halogen-free".

TVS DIODE SELECTION GUIDE

- Normal operating voltage type in DC or AC:
- Device Type Required: Uni-directional / Bi-directional
- Normal operating voltage in volts: _____V
or Break down Voltage in _____V, in this case, please choose the PSMxJ Series Product
- Maximum transient current (Ipp): _____A
- Maximum clamping voltage (Vc): _____V
- Required peak reverse surge power rating: _____W
- Product mounting type (package): SMA? SMB?.....

Power TVS Series



HOW TO ORDER

SMAJ**5.0****CA**

Series No	Peak Plus Power	Package
SMAJ	400W	SMA
SMBJ	600W	SMB
SMCJ	1,500W	SMC

Stand off Voltage:
5.0 = 5.0V

A	Uni-direction, $V_{BR} \pm 5\%$
CA	Bi-direction, $V_{BR} \pm 5\%$

P**SMAJ****6.8****CA**

Series No	Peak Plus Power	Package
PSMAJ	400W	SMA
PSMBJ	600W	SMB
PSMCJ	1,500W	SMC

Break Down Voltage:
6.8 = 6.8V

A	Uni-direction, $V_{BR} \pm 5\%$
CA	Bi-direction, $V_{BR} \pm 5\%$

DIMENSION

Unit: mm

DO214-AC (SMA)

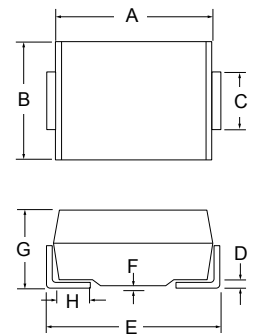
DIM	MIN	MAX
A	4.06	4.57
B	2.29	2.92
C	1.27	1.63
D	0.15	0.31
E	4.83	5.59
F	0.05	0.2
G	1.96	2.4
H	0.76	1.52

DO214-AA (SMB)

DIM	MIN	MAX
A	4.06	4.57
B	3.3	3.94
C	1.96	2.21
D	0.15	0.31
E	5.21	5.59
F	0.05	0.2
G	2.01	2.5
H	0.76	1.52

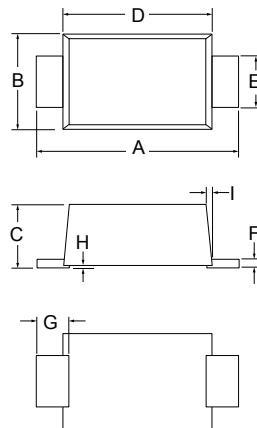
DO214-AB (SMC)

DIM	MIN	MAX
A	6.6	7.11
B	5.59	6.22
C	2.92	3.18
D	0.15	0.31
E	7.75	8.13
F	0.05	0.2
G	2.01	2.4
H	0.76	1.52



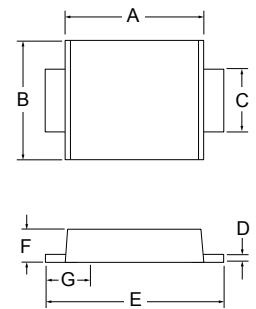
DO219 (SOD123FL)

DIM	MIN	TYP	MAX
A	3.50	3.80	3.90
B	1.70	1.90	2.00
C	0.81	1.18	1.20
D	2.70	2.80	2.90
E	0.80	1.00	1.35
F	0.05	0.15	0.30
G	0.35	0.60	0.85
H	0.03	0.07	0.10
I	0°	5°	8°



DO221-AA (SMB FL)

DIM	MIN	MAX
A	4.06	4.57
B	3.3	3.94
C	1.96	2.21
D	0.15	0.31
E	5.21	5.59
F	0.9	1.05
G	0.76	1.52

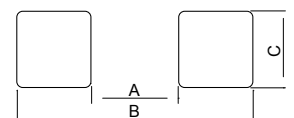


SOLDER LAND INFORMATION

Unit: mm

Size (EIA)	DO214-AC (SMA)	DO214-AA (SMB)	DO214-AB (SMC)	DO219 (SOD123FL)
A	2.9	2.9	5.6	2.2
B	7.5	7.5	10.2	4.2
C	2.4	4.0	4.0	1.5

LAND PATTERN



STANDARD PACKING

Size (EIA)	O214-AC (SMA)	DO214-AA (SMB)	DO214-AB (SMC)	DO219 (SOD123FL)
Quantity (pcs/reel)	5000/13"	3000/13"	3000/13"	3000/7"

Power TVS Series



SPECIFICATIONS

Series			SMAJ Series	SMA6J Series	SMBJ Series	1.5SMBJ Series	SMBF Series	SMF4J Series
Package			DO214-AC (SMA)		DO214-AA (SMB)		DO221-AA (SMB Flat)	DO219 SOD123FL
Reverse Standoff Voltage	V _R	Uni (A)	5V~200V	5.0V~188V	5V~200V	5.0V~20V	5.0~24V	5V~200V
		Bi (CA)	5V~200V	5.0V~188V	5V~200V	-----	-----	5V~200V
Peak Power Dissipation @ T _J =25°C, T _p =1mS (Note1)	P _{PK}		400W	600W	600W	1500W	600W	200W
Peak Forward Surge Current 8.3ms single half sine-wave@T _J =25°C (Note2)	I _{FSM}		40A	60A	100A	150A	100A	40A
Steady State Power Dissipation @ T _L =120°C	P _{M(AV)}		1.0W	1.5W	1.5W	2.0W	5.0W	1.0W
Maximum Instantaneous Forward Voltage @ 16A (Note 2,3)	V _F		3.0V	2.5V	2.5V	2.0V	2.5V	3.0V

1. Non-repetitive current pulse, per Fig. 1 and derated above T_A= 25°C per Fig.2

2. For unidirectional units only

3. V_F at I_F=16A 300us square wave pulse

Series			SMCJ Series	3.0SMCJ Series	4.0SMCJ Series	5.0SMDJ Series
Package			DO214-AB (SMC)			
Reverse Standoff Voltage	V _R	Uni (A)	5.0V~220V	5.0V~220V	5.0V~51V	12V~100V
		Bi (CA)	5.0V~220V	5.0V~220V	5.0V~51V	12V~100V
Peak Power Dissipation @ T _J =25°C, T _p =1mS (Note1)	P _{PK}		1500W	3000W	4000W	5000W
Peak Forward Surge Current 8.3ms single half sine-wave@T _J =25°C (Note2)	I _{FSM}		200A	300A	300A	300A
Steady State Power Dissipation @ T _L =120°C	P _{M(AV)}		2W	2.0W	2.0W	6.5W
Maximum Instantaneous Forward Voltage @ 16A (Note 2,3)	V _F		2.0V	3.5V @100A	3.5V @100A	3.5V @100A

1. Non-repetitive current pulse, per Fig. 1 and derated above T_A= 25°C per Fig.2

2. For unidirectional units only

3. V_F at I_F=16A 300us square wave pulse

Power TVS Series

HF
Halogen Free

RoHS

SPECIFICATIONS

Series			PSMAJ Series	PSMBJ Series	PSMCJ Series
Package			DO214-AC (SMA)	DO214-AA (SMB)	DO214-AB (SMC)
Breakdown Voltage	V_R	Uni (A)	6.8V~200V	6.8V~200V	6.8V~200V
		Bi (CA)	6.8V~200V	6.8V~200V	6.8V~200V
Peak Power Dissipation @ $T_J=25^{\circ}\text{C}$, $T_p=1\text{ms}$ (Note1)	P_{PK}		400W	600W	1500W
Peak Forward Surge Current 8.3ms single half sine-wave @ $T_J=25^{\circ}\text{C}$ (Note2)	I_{FSM}		40A	100A	200A
Steady State Power Dissipation @ $T_L=120^{\circ}\text{C}$	$P_{M(AV)}$		1.0W	1.5W	2.0W
Maximum Instantaneous Forward Voltage @ 16A (Note 2,3)	V_F		3.0V	3.0V	2.0V

1. Non-repetitive current pulse, per Fig. 1 and derated above $T_A=25^{\circ}\text{C}$ per Fig.2

2. For unidirectional units only

3. V_F at $I_F=16\text{A}$ 300us square wave pulse

Fig1. PULSE WAVEFORM

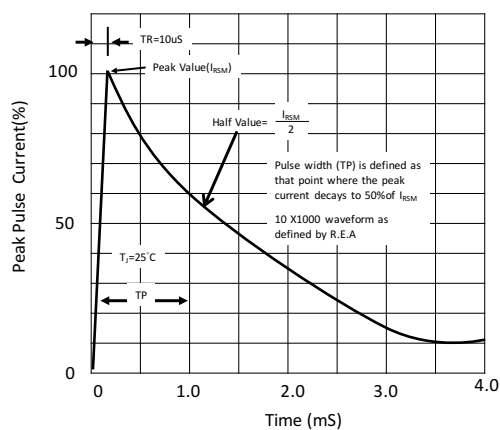
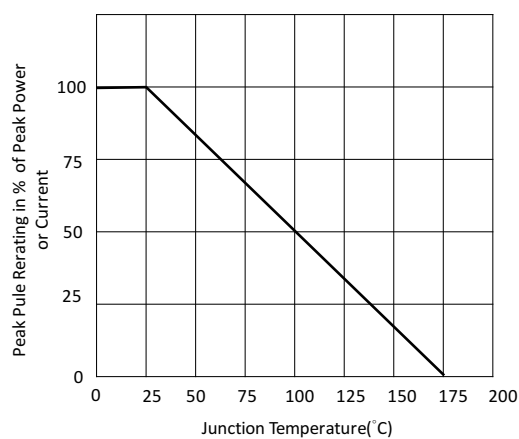


Fig.2 PULSE DERATING CURVE



- For details specification, please contact us or download from INPAQ website.
- Specifications are subject to change without notice.

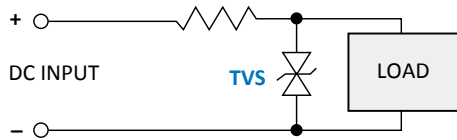
Power TVS Series

HF
Halogen Free

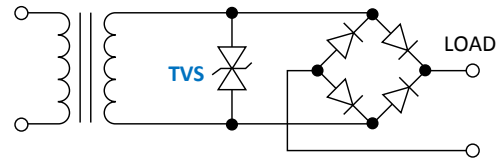
RoHS

TVS DIODE DEVICE TYPICAL APPLICATIONS

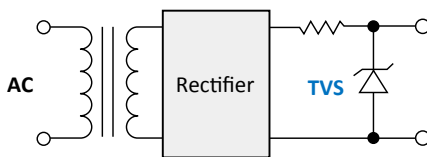
DC Supply Protection



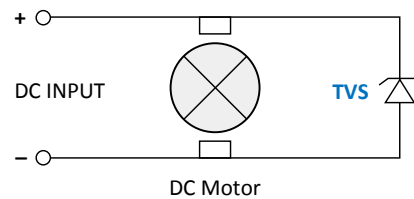
AC Supply Protection



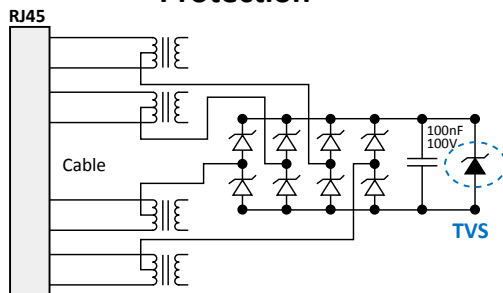
DC Load Protection



Electro-Magnetic Interference Limiting



Power Over Ethernet (PoE) Protection

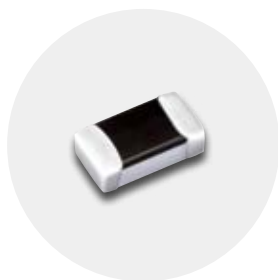


DISCLAIMER

Specifications, descriptions and data contained in this document are believed to be accurate. However, users should independently evaluate each product for the particular application. INPAQ reserves the right to change any information contained herein without notice and may, at its sole discretion, change the design, manufacture or construction of any product.

Visit www.INPAQ.com for the last version specification and information.

EGA Series



FEATURES

- Protection against ESD voltages and currents (IEC61000-4-2 Level 4)
- Extremely quick response time (<1ns) present ideal ESD protection
- Extremely low capacitance (0.2pF typical)
- Extremely low leakage current
- Bi-directional device
- SMD (Surface Mount Device)
- Zero signal distortion
- Compact size for EIA 0201/0402/0603

APPLICATIONS

- Antenna circuit, USB2.0/3.0, IEEE-1394, DVI, HDMI

EXPLANATION OF PART NUMBER

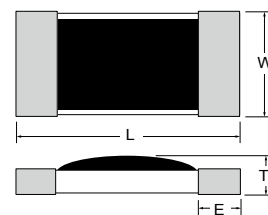
EGA	1	0201	V05	B0
1	2	3	4	5

- 1: ESDGUARD Series
 2: Element:1 element
 3: Chip size
 4: Rated voltage
 5: B0: Model code

DIMENSION

Unit: mm

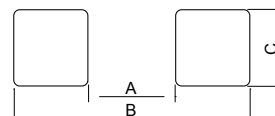
EIA	L	W	T	E
0201	0.63±0.05	0.30±0.03	0.23±0.05	0.165±0.05
0402	1.00±0.10	0.50±0.10	0.34±0.10	0.20±0.15
0603	1.60±0.10	0.85±0.15	0.51±0.05	0.30±0.20



SOLDER LAND INFORMATION

Unit: mm

Size (EIA)	A	B	C
0201	0.35	1.05	0.35
0402	0.50	1.50	0.50
0603	0.75	2.25	0.75



STANDARD PACKING

Size (EIA)	0201	0402	0603
Quantity (pcs/reel)	15,000	10,000	4,000

SPECIFICATIONS

			EGA10201V05B0
Characteristic	Symbol	Unit	Typical.
Rated voltage	VDC	V	5
Leakage current	IL	μA	0.01
Trigger voltage	Vt	V	250
Clamping voltage	Vc	V	30
Capacitance, @1MHz	Cp	pF	0.2
Response time		ns	<1
ESD voltage capability, Contact discharge mode		kV	8
ESD voltage capability, Air discharge mode		kV	15
ESD pulse withstand		Pulses	1000

Rated voltage - IL measurement rated voltage

Vt - Measurement by using Transmission Line Pulse (TLP)

Vc - Measurement by using Transmission Line Pulse (TLP)

Cp - Device capacitance measured with 1Vrms

EGA Series



SPECIFICATIONS

			EGA10402V05B0	EGA10402V12B0	EGA10402V24B0	EGA10402V30B0
Characteristic	Symbol	Unit	Typical.	Typical.	Typical.	Typical.
Rated voltage	VDC	V	5	12	24	30
Leakage current	IL	μA	0.01	0.01	0.01	0.01
Trigger voltage	Vt	V	300	300	300	300
Clamping voltage	Vc	V	30	30	30	30
Capacitance, @1MHz	Cp	pF	0.2	0.2	0.2	0.2
Response time		ns	<1	<1	<1	<1
ESD voltage capability, Contact discharge mode		kV	8	8	8	8
ESD voltage capability, Air discharge mode		kV	15	15	15	15
ESD pulse withstand		Pulses	1000	1000	1000	1000

			EGA10603V05B0	EGA10603V12B0	EGA10603V24B0	A10603V30B0
Characteristic	Symbol	Unit	Typical.	Typical.	Typical.	Typical.
Rated voltage	VDC	V	5	12	24	30
Leakage current	IL	μA	0.01	0.01	0.01	0.01
Trigger voltage	Vt	V	300	300	300	300
Clamping voltage	Vc	V	30	30	30	30
Capacitance, @1MHz	Cp	pF	0.2pF	0.2pF	0.2pF	0.2pF
Response time		ns	<1	<1	<1	<1
ESD voltage capability, Contact discharge mode		kV	8	8	8	8
ESD voltage capability, Air discharge mode		kV	15	15	15	15
ESD pulse withstand		Pulses	1000	1000	1000	1000

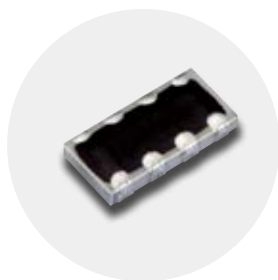
Rated voltage - IL measurement rated voltage

Vt – Measurement by using Transmission Line Pulse (TLP)

Vc – Measurement by using Transmission Line Pulse (TLP)

Cp – Device capacitance measured with 1Vrms

EGA Array Series



FEATURES

- Protection against ESD voltages and currents (IEC61000-4-2 Level 4)
- Extremely quick response time (<1ns) present ideal ESD protection
- Extremely low capacitance (0.25pF typical)
- Extremely low leakage current
- Bi-directional device
- SMD (Surface Mount Device)
- Zero signal distortion
- Compact size for EIA 1206

APPLICATIONS

- Antenna circuit, USB2.0/3.0, IEEE-1394, DVI, HDMI

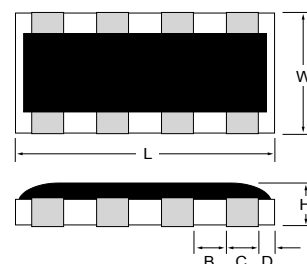
EXPLANATION OF PART NUMBER

EGA	4	1206	V12	B0
1	2	3	4	5

- 1: ESDGUARD Series
 2: Elements: 4 elements
 3: Chip size
 4: Rated voltage
 5: B0: Model code

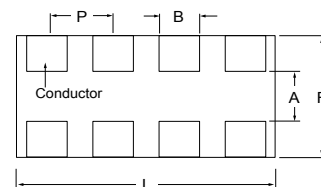
DIMENSION Unit: mm

EIA	L	W	H	B	C	D
1206	3.20±0.10	1.60±0.10	0.50±0.10	0.40±0.20	0.40±0.20	0.20±0.10



SOLDER LAND INFORMATION Unit: mm

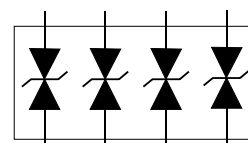
EIA	L	F	P	A	B
1206	3.20	2.20	0.80 typ.	1.00	0.50



STANDARD PACKING

Size (EIA)	1206
Quantity (pcs/reel)	5,000

Equivalent Circuit



SPECIFICATIONS

			EGA41206V12B0
Characteristic	Symbol	Unit	Typical.
Rated voltage	VDC	V	12
Leakage current	IL	μA	0.01
Trigger voltage	Vt	V	300
Clamping voltage	Vc	V	30
Capacitance, @1MHz	Cp	pF	0.25
Response time		ns	<1
ESD voltage capability, Contact discharge mode		kV	8
ESD voltage capability, Air discharge mode		kV	15
ESD pulse withstand		Pulses	1000

Rated voltage - IL measurement rated voltage

Vt - Measurement by using Transmission Line Pulse (TLP)

Vc - Measurement by using Transmission Line Pulse (TLP)

Cp - Device capacitance measured with 1Vrms

EGA Array Series



FEATURES

- Protection against ESD voltages and currents (IEC61000-4-2 Level 4)
- Extremely quick response time (<1ns) present ideal ESD protection
- Extremely low capacitance (0.1pF typical)
- Extremely low leakage current
- SMD (Surface Mount Device)
- Zero signal distortion
- Lead Free, RoHS Compliance

APPLICATIONS

- Antenna circuit, USB2.0/3.0, IEEE-1394, DVI, HDMI

EXPLANATION OF PART NUMBER

TVU	12	4	0R1	A
1	2	3	4	5

- 1: TVU
 2: Rated voltage
 3: Channel: 4 channels
 4: Capacitance
 5: Chipsize Chip size

DIMENSION

Unit: mm

L	W	T	B	C	D	E
2.50±0.10	1.00±0.10	0.50±0.10	0.20±0.10	0.30±0.05	0.20±0.05	0.50±0.05

SOLDER LAND INFORMATION

Unit: mm

Y	G	Z	X	X1	P	P1	C
0.60	0.20	1.40	0.20	0.30	0.50	1.00	0.80

EQUIVALENT CIRCUIT

Pin	Identification
1, 2, 4, 5	Data Lines
6, 7, 9, 10	Data Lines (No Internal Connection)
3, 8 (GND)	Ground

STANDARD PACKING

Size (mm)	2510
Quantity (pcs/reel)	5,000

SPECIFICATIONS

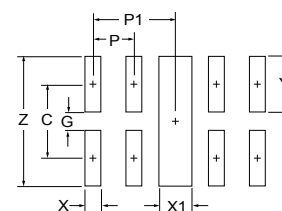
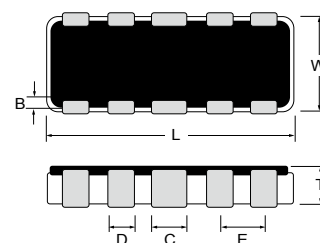
			TVU1240R1A
Characteristic	Symbol	Unit	Typical.
Rated voltage	VDC	V	12
Leakage current	IL	μA	0.01
Trigger voltage	Vt	V	300
Clamping voltage	Vc	V	30
Capacitance, @1MHz	Cp	pF	0.1
Response time		ns	<1
ESD voltage capability, Contact discharge mode		kV	10
ESD voltage capability, Air discharge mode		kV	15
ESD pulse withstand		Pulses	1000

Rated voltage - IL measurement rated voltage

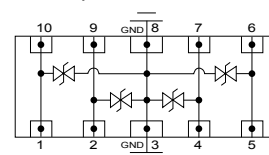
Vt – Measurement by using Transmission Line Pulse (TLP)

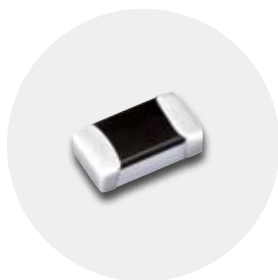
Vc – Measurement by using Transmission Line Pulse (TLP)

Cp – Device capacitance measured with 1Vrms



Equivalent Circuit





FEATURES

- Qualified based on AEC-Q200
- For RoHS Compliance.
- Meet IEC61000-4-2 Level 4 standard
- Extremely quick response time (<1ns)
- Extremely low capacitance (0.2pF typical)
- Extremely low leakage current
- Bi-directional device
- More than 1000 pulses ESD withstand capability
- Compact size for EIA 0402/0603

APPLICATIONS

- USB 3.0, HDMI, Displayport, MIPI, LVDS, MDDI, DVI, RGB

EXPLANATION OF PART NUMBER

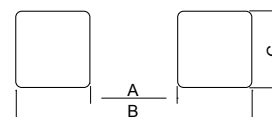
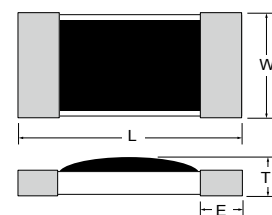
EGA	1	0603	V24	AM
1	2	3	4	5

- 1: ESDGUARD Series
 2: Element: 4 element
 3: Chip size
 4: Rated voltage
 5: AM: Automotive series

DIMENSION

Unit: mm

EIA	L	W	T	E
0402	1.00±0.10	0.50±0.10	0.34±0.10	0.20±0.15
0603	1.60±0.10	0.85±0.15	0.51±0.05	0.30±0.20



SOLDER LAND INFORMATION

Unit: mm

Size (EIA)	A	B	C
0402	0.50	1.50	0.50
0603	0.75	2.25	0.75

STANDARD PACKING

Size (EIA)	0402	0603
Quantity (pcs/reel)	10,000	5,000

SPECIFICATIONS

Characteristic	Symbol	Unit	EGA10402			EGA10603		
			V05	V12	V24	V05	V12	V24
Rated voltage (max)	VDC	V	5	12	24	5	12	24
Leakage current	IL	μA	0.01					
Trigger voltage	Vt	V	300V typ.					
Clamping voltage	Vc	V	30V typ.					
Capacitance, @1MHz	Cp	pF	0.2 typ.					
Response time		ns	<1					
ESD voltage capability, IEC 61000-4-2 Contact discharge mode		Kv	8					
ESD voltage capability, IEC 61000-4-2 Air discharge mode		Kv	15KV					
ESD withstand pulses		Pulses	1000 typ.					

Rated voltage - IL measurement rated voltage

Vt - Measurement by using Transmission Line Pulse (TLP)

Vc - Measurement by using Transmission Line Pulse (TLP)

Cp - Device capacitance measured with 1Vrms

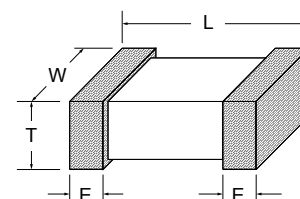
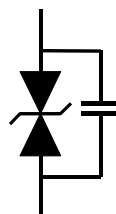
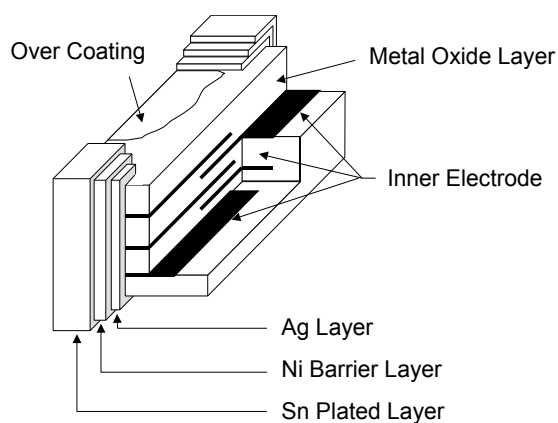
MULTILAYER VARISTOR



ADVANTAGE

- Lead free plating termination provided good solderability characteristic
- Insulator over coat keeps excellent low and stable leakage current

CONSTRUCTION



PRODUCT SERIES

PN series	Size								Vdc (V)								Varistor voltage (V)															
	0201	0402	0603	0805	1206	1210	1812	2220	5.5	12	18	26	42	65	85	7.6	8	9	11	12	15	18	21	22	25	75	92	120				
MLVS series																																
MLVG series																																
VPORT series																																

PN series	Size				Vdc (V)								Varistor voltage (V)															
	0402	0603	0805	1206	3.3	5.5	12	26	42	65	85	4	7.6	8	9	11	12	15	18	21	22	25	75	92	120			
MLVS AM series																												

MLVS Series



FEATURES

- SMD type zinc oxide based ceramic chip
- Quick response time (<1ns)
- High transient current capability
- Meet IEC 61000-4-2 standard
- Meet IEC 61000-4-5 standard
- Compact size for EIA 0201/0402/0603/0805/1206/1210/1812/2220

APPLICATIONS

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

EXPLANATION OF PART NUMBER

MLV	S	0201	V05	330
1	2	3	4	5

- 1: Multilayer Varistor
 2: Type: S=single
 3: Chip size
 0201
 4: V05: Max DC working voltage 5V
 5: Typical capacitance: "330" means $33 \times 10^0 = 33$
 "2R5" means 2.5

EXPLANATION OF PART NUMBER

MLV	S	0402	L	04
1	2	3	4	5

- 1: Multilayer Varistor
 2: Type: S=single
 3: Chip size
 0402/0603/0805/1206/1210/1812
 4: L: Lead free
 K: +/-10% Varistor Voltage
 P: Particular range Varistor Voltage
 5: Max. AC voltage

EXPLANATION OF PART NUMBER

MLV	S	0603	L	E	08
1	2	3	4	5	6

- 1: Multilayer Varistor
 2: Type: S=single
 3: Chip size
 0402/0603
 4: L: Lead free
 5: For ESD protection
 6: Series No

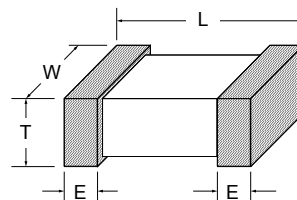
MLVS Series



DIMENSION

Unit: mm

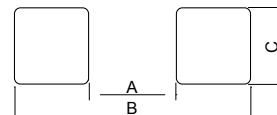
EIA	L	W	T	E
0201	0.60±0.05	0.30±0.05	0.30±0.05	0.20±0.10
0402	0.96±0.12	0.48±0.07	0.50±0.10	0.25±0.15
0603	1.60±0.15	0.80±0.10	0.80±0.10	0.30±0.20
0805	2.00±0.20	1.25±0.15	0.90±0.10	0.50±0.25
1206	3.20±0.30	1.60±0.20	1.7 max	0.50±0.25
1210	3.20±0.30	2.50±0.25	1.7 max	0.50±0.25
1812	4.50±0.40	3.20±0.30	2.5 max	0.60±0.30
2220	5.70±0.40	5.20±0.40	4.0 max	1.4 max



SOLDER LAND INFORMATION

Unit: mm

Size (EIA)	A	B	C
0201	0.30	0.80	0.30
0402	0.50	1.70	0.50
0603	0.50	2.50	0.76
0805	1.10	3.50	1.20
1206	2.20	4.24	1.65
1210	2.20	4.50	2.80
1812	3.00	6.00	3.60
2220	4.20	7.20	5.50



STANDARD PACKING

Size (EIA)	0201	0402	0603	0805	1206	1210	1812	2220
Quantity (pcs/reel)	15,000	10,000	4,000	4,000	4,000	2,000	1,000	1,500

SPECIFICATIONS

	Working Voltage		Varistor Voltage		Clamping Voltage	Capacitance
Symbol	V_{RMS}	V_{DC}	V_V	V_V	V_C	C_P
Units	Volts	Volts	Volts		Volts	pF
		(Max.)			(Max.)	(Typical)
Test Condition		< 10 μA	1mA DC		1A @ 8/20 μs	1MHz
MLVS0201V05100	4	5.5	11	±3	31	10
MLVS0201V05330	4	5.5	11	±3	28	33
MLVS0201V05470	4	5.5	11	±3	26	47
MLVS0201V05640	4	5.5	11	±3	26	64
MLVS0201V072R5	5	7	40	±10	90	2.5
MLVS0201V122R5	8	12	40	±10	90	2.5

	Working Voltage		Varistor Voltage	Clamping Voltage	Capacitance	Peak Current	Transient Energy
Symbol	V_{RMS}	V_{DC}	V_V	V_C	C_P	i_{max}	W_{max}
Units	Volts	Volts	Volts	Volts	pF	Amps	Joules
		(Max.)		(Max.)	(Typical)	(Max.)	(Max.)
Test Condition		< 10 μA	1mA DC	1A @ 8/20 μs	1MHz	8/20 μs	10/1000 μs
MLVS 0402 L04	4	5.5	8 ~ 18	24	270	20	0.05
MLVS 0402 L07	7	9	11.5 ~ 21.5	41	130	20	0.05
MLVS 0402 L14	14	18	23 ~ 33	54	85	20	0.05
MLVS 0402 L17	17	20	32 ~ 42	70	35	20	0.05
MLVS 0603 L04	4	5.5	8 ~ 18	24	270	30	0.1
MLVS 0603 L06	6	9	11.5 ~ 21.5	41	210	30	0.1
MLVS 0603 L14	14	18	23 ~ 33	54	150	30	0.1
MLVS 0603 L20	20	26	32 ~ 42	70	100	30	0.1

MLVS Series



SPECIFICATIONS

	Working Voltage	Varistor Voltage	Clamping Voltage	Capacitance
Symbol	V_{DC}	V_V	V_C	C_P
Units	Volts	Volts	Volts	pF
	(Max.)		(Max.)	(Typical)
Test Condition	$< 10 \mu A$	1mA DC	1A @ 8/20 μs	1MHz
MLVS 0402 LE08	12	25 ~ 40	110	7
MLVS 0402 LE10	12	45 ~ 65	150	3.5
MLVS 0402 LE11	18	45 ~ 65	150	3.5
MLVS 0402 LE12	26	45 ~ 65	145	4
MLVS 0603 LE08	12	25 ~ 40	110	40
MLVS 0603 LE10	12	45 ~ 65	150	3.5
MLVS 0603 LE12	26	45 ~ 65	145	4

	Working Voltage		Varistor Voltage	Clamping Voltage	Capacitance	Peak Current	Transient Energy
Symbol	V_{RMS}	V_{DC}	V_V	V_C	C_P	i_{max}	W_{max}
Units	Volts	Volts	Volts	Volts	pF	Amps	Joules
		(Max.)		(Max.)	(Typical)	(Max.)	(Max.)
Test Condition		$< 10 \mu A$	1mA DC	1A @ 8/20 μs	1KHz	8/20 μs	10/1000 μs
MLVS0805P04501	4	5.5	7.8~12	22	500	80	0.1
MLVS0805P06421	6	9	10.8~18	30	420	80	0.2
MLVS0805P08361	8	11	14~20	32	360	100	0.3
MLVS0805P11401	11	14	17.2~21	38	400	100	0.1
MLVS0805P14401	14	16	22~28	46	400	120	0.3
MLVS0805P14351	14	18	19.8~25.2	44	350	120	0.3
MLVS0805P17101	17	22	25~34	54	100	30	0.1
MLVS0805P17401	17	22	24.3~30.7	50	400	120	0.3
MLVS0805P20221	20	26	29.7~37.3	56	220	100	0.4
MLVS0805P25251	25	31	35.1~43.9	71	250	100	0.3
MLVS0805P30201	30	38	42.3~52.7	81	200	100	0.3
MLVS0805P35171	35	45	55~61	93	170	80	0.1
MLVS1206P04-152	4	5.5	8~13	23	1500	200	0.3
MLVS1206P11-641	11	14	18~21.6	36	640	200	0.5
MLVS1206P17-651	17	22	24.3~30.7	48	650	200	0.3
MLVS1206P25-551	25	31	35.1~43.9	69	550	200	1.0
MLVS1206P30-501	30	38	42.3~52.7	81	500	200	1.1
MLVS1206P40-181	40	56	63~77	110	180	200	1.0
MLVS1206P50-251	50	65	76~92	138	250	100	0.5
MLVS1206K14-182	14	18	19.8~24.2	40	1800	150	0.4
MLVS1206K14-651	14	18	19.8~24.2	40	650	200	0.4

MLVS Series



SPECIFICATIONS

	Working Voltage		Varistor Voltage	Clamping Voltage	Capacitance	Peak Current
Symbol	V_{RMS}	V_{DC}	V_V	V_C	C_P	i_{max}
Units	Volts	Volts	Volts	Volts	pF	Amps
	(Max.)	(Max.)		(Max.)	(Typical)	(Max.)
Test Condition		$< 10 \mu A$	1mA DC	2.5A @ 8/20 μs	1KHz	8/20 μs
MLVS1210P04212	4	5.5	9~14	28	2100	400
MLVS1210P14112	14	18	22~29	45	1100	500
MLVS1210P18601	18	26	31~38	60	600	400
MLVS1210P34351	34	48	54~67	100	350	300
MLVS1210P46301	46	60	69~83	125	300	450
MLVS1210P50211	50	65	73~91	135	210	300
MLVS1210P60231	60	85	90~110	165	230	400
MLVS1210P75111	75	100	108~132	190	110	200

	Working Voltage		Varistor Voltage	Clamping Voltage	Capacitance	Peak Current
Symbol	V_{RMS}	V_{DC}	V_V	V_C	C_P	i_{max}
Units	Volts	Volts	Volts	Volts	pF	Amps
	(Max.)	(Max.)		(Max.)	(Typical)	(Max.)
Test Condition		$< 10 \mu A$	1mA DC	5A @ 8/20 μs	1KHz	8/20 μs
MLVS1812P04542	4	5.5	9~14	30	5400	800
MLVS1812P10382	10	14	16~22	42	3800	800
MLVS1812P18232	18	26	31~38	62	2300	800
MLVS1812P21192	21	30	37~46	70	1900	800
MLVS1812P35112	35	45	50~62	90	1100	500
MLVS1812P50571	50	65	77~95	140	570	500
MLVS1812P50721	50	65	77~95	140	720	600
MLVS1812P75541	75	100	108~132	200	540	500

	Working Voltage		Varistor Voltage	Clamping Voltage	Capacitance	Peak Current
Symbol	V_{RMS}	V_{DC}	V_V	V_C	C_P	i_{max}
Units	Volts	Volts	Volts	Volts	pF	Amps
	(Max.)	(Max.)		(Max.)	(Typical)	(Max.)
Test Condition		$< 80 \mu A$	1mA DC	10A @ 8/20 μs	1KHz	8/20 μs
MLVS2220P14832	14	16	21.4~27.8	55	8300	1500
MLVS2220P50652	50	65	71.4~92.7	135	6500	4500

MLVG Series



FEATURES

- Lead free type
- SMD type zinc oxide based ceramic chip
- Quick response time (<1ns)
- Low clamping voltage
- Meet IEC 61000-4-2 standard
- Low capacitance can meet high speed signal transient voltage protection
- Compact size for EIA 0402 / 0603

APPLICATIONS

- Low Capacitance Product Applications for High Speed I/O port such as HDMI, DVI, USB, and IEEE1394 etc. Normal capacitance product applications for I/O Port such as RS232, USB, PS2, VGA, Audio on Mother Board and Notebook, Set-Top Box, MP3 Players, DVD Players, and Docking System etc.

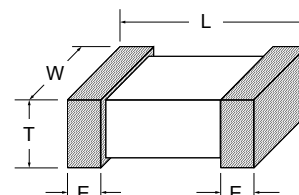
EXPLANATION OF PART NUMBER

MLV	G	0603	3R0	T	V18
1	2	3	4	5	6

- 1: Series type: Multilayer Varistor
- 2: Model code
- 3: Chip size
- 4: Capacitance value: XRX=X.XpF, Ex:3R0=3.0pF; XXx10^N → XXN
Ex:10pF=10x10⁰ → 100
- 5: Capacitance Tolerance: I=±0.3pF, T=±1.4pF Q (or L) - ±2.0pF, N=±30% and U=±0.9pF
- 6: Max Working voltage

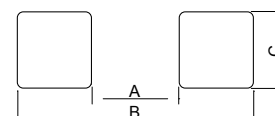
DIMENSION Unit: mm

EIA	L	W	T	E
0402	0.96±0.12	0.48±0.07	0.50±0.10	0.25±0.15
0603	1.60±0.15	0.80±0.10	0.80±0.10	0.30±0.20



SOLDER LAND INFORMATION Unit: mm

Size (EIA)	A	B	C
0402	0.50	1.70	0.50
0603	0.50	2.50	0.76



STANDARD PACKING

Size (EIA)	0402	0603
Quantity (pcs/reel)	10,000	4,000

MLVG Series



SPECIFICATIONS

	Working Voltage	Varistor Voltage	Clamping Voltage	Capacitance
Symbol	V_{DC}	V_V	V_C	C_p
Units	Volts	Volts	Volts	pF
	(Max.)		(Max.)	—
Test Condition	$< 10\mu A$	1mA DC	1A @ 8/20us	1MHz
MLVG 0402 0R5 I V18BP	18	90~120	250*	0.5
MLVG 0402 1R0 U V18BP	18	46~60	110*	1.0
MLVG 0402 3R0 T V18BP	18	22~34	58	3.0
MLVG 0402 100 N V18BP	18	22~34	58	10
MLVG 0402 220 N V18BP	18	22~34	58	22
MLVG 0402 900 N V18BP	18	22~34	58	90
MLVG 0402 3R0 Q V05BP	5.5	46~60	105	3.0
MLVG 0402 5R0 Q V05BP	5.5	7.6~12	25	5.0
MLVG 0402 220 N V05BP	5.5	7.6~12	25	22
MLVG 0402 101 N V05BP	5.5	7.6~12	25	100
MLVG 0402 221 N V05BP	5.5	7.6~12	25	220
MLVG 0402 5R0 Q V09BP	9	11~17	35	5.0
MLVG 0402 220 N V09BP	9	11~17	35	22
MLVG 0402 5R0 Q V26BP	26	46~60	110	5.0
MLVG 0402 3R0 L V42BP	42	46~75	135	3.0

	Working Voltage	Varistor Voltage	Clamping Voltage	Capacitance
Symbol	V_{DC}	V_V	V_C	C_p
Units	Volts	Volts	Volts	pF
	(Max.)		(Max.)	—
Test Condition	$< 10\mu A$	1mA DC	1A @ 8/20us	1MHz
MLVG 0603 0R5 I V18BP	18	90~120	250*	0.5
MLVG 0603 1R0 U V18BP	18	46~60	110*	1.0
MLVG 0603 3R0 T V18BP	18	22~34	58	3.0
MLVG 0603 3R0 Q V18BP	18	46~60	110	3.0
MLVG 0603 101 N V18BP	18	22~34	58	100
MLVG 0603 221 N V18BP	18	22~34	58	220
MLVG 0603 5R0 Q V05BP	5.5	7.6~12	25	5.0
MLVG 0603 220 N V05BP	5.5	7.6~12	25	22
MLVG 0603 5R0 Q V09BP	9	11~17	35	5.0
MLVG 0603 220 N V09BP	9	11~17	35	22
MLVG 0603 3R0 L V42BP	42	46~75	135	3.0

VPORT Series



FEATURES

- Dual function for EMI and ESD
- Compact size EIA 0402 / EIA 0603
- ESD protection for IEC61000-4-2 Level 4
- Fixed capacitance suitable for high-speed I/O port transient voltage protection
- Compact size EIA 0402 / 0603

APPLICATIONS

- Motherboard, notebook (RS232, USB, PS2, VGA and Audio), Set-Top Box, MP3 Players, DVD Players, and docking system, etc.

EXPLANATION OF PART NUMBER

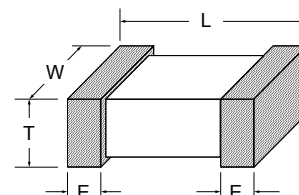
V	PORT	0402	L	100	V05
1	2	3	4	5	6

- 1: Series Type: V=Over voltage protection
- 2: Series Type: PORT=EMI Protection for I/O port
- 3: Chip size
- 4: L= Lead free
- 5: Capacitance value: $XX \times 10^N \rightarrow XXN$, Ex: $10pF = 10 \times 10^0 \rightarrow 100$
- 6: Max Working voltage

DIMENSION

Unit: mm

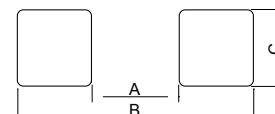
EIA	L	W	T	E
0402	0.96 ± 0.12	0.48 ± 0.07	0.50 ± 0.10	0.25 ± 0.15
0603	1.60 ± 0.15	0.80 ± 0.10	0.80 ± 0.10	0.30 ± 0.20



SOLDER LAND INFORMATION

Unit: mm

Size (EIA)	A	B	C
0402	0.50	1.70	0.50
0603	0.50	2.50	0.76



STANDARD PACKING

Size (EIA)	0402	0603
Quantity (pcs/reel)	10,000	4,000

VPORT Series



SPECIFICATIONS

	Working Voltage	Varistor Voltage	Clamping Voltage	Capacitance
Symbol	V_{DC}	V_V	V_C	C_P
Units	Volts	Volts	Volts	pF
	(Max.)		(Max.)	Tolerance
Test Condition	< 10 μ A	1mA DC	1A	1MHz
			8/20 μ s	
VPORT 0402 L 100 V05	5.5	11 ~ 21	40	10 \pm 30%
VPORT 0402 L 330 V05		11 ~ 21	38	33 \pm 30%
VPORT 0402 L 470 V05		9 ~ 19	36	47 \pm 30%
VPORT 0402 L 101 V05		9 ~ 19	35	100 \pm 30%
VPORT 0402 L 181 V05		8 ~ 18	34	180 \pm 30%
VPORT 0402 L 331 V05		8 ~ 18	32	330 \pm 30%

	Working Voltage	Varistor Voltage	Clamping Voltage	Capacitance
Symbol	V_{DC}	V_V	V_C	C_P
Units	Volts	Volts	Volts	pF
	(Max.)		(Max.)	Tolerance
Test Condition	< 10 μ A	1mA DC	1A	1MHz
			8/20 μ s	
VPORT 0603 L 100 V05	5.5	11 ~ 21	40	10 \pm 30%
VPORT 0603 L 330 V05		11 ~ 21	38	33 \pm 30%
VPORT 0603 L 470 V05		9 ~ 19	37	47 \pm 30%
VPORT 0603 L 101 V05		9 ~ 19	36	100 \pm 30%
VPORT 0603 L 331 V05		8 ~ 18	32	330 \pm 30%
VPORT 0603 L 102 V05		8 ~ 18	30	1000 \pm 30%
VPORT 0603 L 220 V12	12	15 ~ 25	46	22 \pm 30%
VPORT 0603 L 151 V12		15 ~ 25	44	150 \pm 30%
VPORT 0603 L 331 V12		15 ~ 25	42	330 \pm 30%

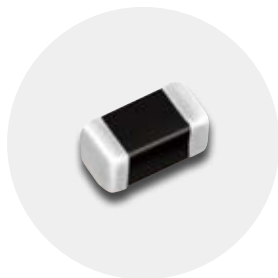
MLVS AM Series



AEC-Q200 Compliance

HF
Halogen Free

RoHS



FEATURES

- Qualified based on AEC-Q200
- RoHS compliant
- Meet IEC 61000-4-2 standard
- Meet IEC 61000-4-5 standard
- SMD type zinc oxide based ceramic chip
- Quick response time (<0.5ns)
- High transient current capability
- High reliability
- Compact size for EIA 0402 / 0603 / 0805 / 1206

APPLICATIONS

- Protection against automotive related transient overvoltage.

EXPLANATION OF PART NUMBER

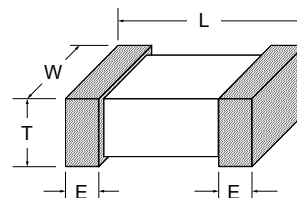
MLV	S	0402	AM	04	150
1	2	3	4	5	6

- 1: Multilayer Varistor
 2: Type: S=single
 3: Chip size
 4: Automotive series
 5: Max. AC voltage
 6: Typical capacitance: "150" means $15 \times 10^0 = 15$

DIMENSION

Unit: mm

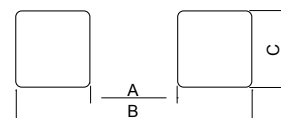
EIA	L	W	T	E
0402	0.96 ± 0.12	0.48 ± 0.07	0.50 ± 0.10	0.25 ± 0.15
0603	1.60 ± 0.15	0.80 ± 0.10	0.80 ± 0.10	0.30 ± 0.20
0805	2.00 ± 0.20	1.25 ± 0.20	0.90 ± 0.10	0.50 ± 0.25
1206	3.20 ± 0.30	1.60 ± 0.20	1.7 max	0.50 ± 0.25



SOLDER LAND INFORMATION

Unit: mm

Size (EIA)	A	B	C
0402	0.50	1.70	0.50
0603	0.50	2.50	0.76
0805	1.10	3.50	1.20
1206	2.20	4.24	1.65



STANDARD PACKING

Size (EIA)	0402	0603	0805	1206
Quantity (pcs/reel)	10,000	4,000	4,000	4,000



SPECIFICATIONS

	Working Voltage		Varistor Voltage	Clamping Voltage	Capacitance	Peak Current	Transient Energy
Symbol	V_{RMS}	V_{DC}	V_V	V_C	C_P	i_{max}	W_{max}
Units	Volts	Volts	Volts	Volts	pF	Amps	Joules
	(Max.)	(Max.)		(Max.)	(Typical)	(Max.)	(Max.)
Test Condition		$< 10 \mu A$	1mA DC	1A 8/20 μs	1MHz	8/20 μs	10/1000 μs
MLVS 0402AM02601	2.5	3.3	4 ~ 6.5	17	600	8	0.04
MLVS 0402AM04241	4	5.5	6.5 ~ 9.4	22	240	20	0.04
MLVS 0402AM06121	6	9	11 ~ 16.5	32	120	20	0.05
MLVS 0402AM07121	7	9	11 ~ 16.5	33	120	20	0.05
MLVS 0402AM08850	8	11	14 ~ 17.5	35	85	20	0.05
MLVS 0402AM10101	11	14	18 ~ 22.5	44	100	10	0.02
MLVS 0402AM14750	14	18	20 ~ 26.5	45	75	20	0.05

	Working Voltage		Varistor Voltage	Clamping Voltage	Capacitance	Peak Current	Transient Energy
Symbol	V_{RMS}	V_{DC}	V_V	V_C	C_P	i_{max}	W_{max}
Units	Volts	Volts	Volts	Volts	pF	Amps	Joules
	(Max.)	(Max.)		(Max.)	(Typical)	(Max.)	(Max.)
Test Condition		$< 10 \mu A$	1mA DC	1A 8/20 μs	1KHz	8/20 μs	10/1000 μs
MLVS 0603AM02481	2.5	3.3	4 ~ 6.5	17	480[1MHz]	20	0.04
MLVS 0603AM04301	4	5.5	6.4 ~ 9.7	21	300	30	0.1
MLVS 0603AM06241	6	9	11 ~ 15.5	30	240[1MHz]	30	0.1
MLVS 0603AM07241	7	9	11 ~ 15.5	30	240[1MHz]	30	0.1
MLVS 0603AM11500	11	14	16.5 ~ 22	40	50[1MHz]	30	0.1
MLVS 0603AM14150	14	16	23 ~ 34.2	70	15[1MHz]	5	0.03
MLVS 0603AM14121	14	16	22 ~ 28	46	120	30	0.2
MLVS 0603AM14300	14	17	21.6 ~ 34.4	70[2A]	30	2	0.05
MLVS 0603AM14101	14	18	19.8 ~ 25.2	44	100	30	0.2
MLVS 0603AM14111	14	18	19.8 ~ 24.2	40	110	30	0.2
MLVS 0603AM14161	14	19	24 ~ 32	64[2A]	160	20	0.1
MLVS 0603AM17750	17	22	25 ~ 41	54	75[1MHz]	30	0.075
MLVS 0603AM17500	17	22	24.3 ~ 30.7	54	50[1MHz]	10	0.1
MLVS 0603AM17101	17	22	24.3 ~ 30.7	50	100	30	0.2
MLVS 0603AM17161	17	22	24.3 ~ 30.7	50	160	30	0.2
MLVS 0603AM20800	20	26	30 ~ 43	67	80[1MHz]	30	0.1
MLVS 0603AM25900	25	31	35 ~ 43.9	71	90	30	0.2
MLVS 0603AM25120	25	32	51.9 ~ 71	124	12[1MHz]	5	0.1
MLVS 0603AM30350	30	38	42 ~ 51	80	35[1MHz]	30	0.1



SPECIFICATIONS

	Working Voltage		Varistor Voltage	Clamping Voltage	Capacitance	Peak Current	Transient Energy
Symbol	V_{RMS}	V_{DC}	V_V	V_C	C_P	i_{max}	W_{max}
Units	Volts	Volts	Volts	Volts	pF	Amps	Joules
	(Max.)	(Max.)		(Max.)	(Typical)	(Max.)	(Max.)
Test Condition		$< 10 \mu A$	1mA DC	1A 8/20 μs	1MHz	8/20 μs	10/1000 μs
MLVS 0805AM04501	4	5.5	7.8 ~ 12	22	500	80	0.1
MLVS 0805AM06421	6	9	10.8 ~ 18	30	420	80	0.2
MLVS 0805AM08361	8	11	14 ~ 20	32	360	100	0.3
MLVS 0805AM11401	11	14	17.2 ~ 21	38	400	100	0.1
MLVS 0805AM14401	14	16	22 ~ 28	46	400	120	0.3
MLVS 0805AM14351	14	18	19.8 ~ 25.2	44	350	120	0.3
MLVS 0805AM17101	17	22	25 ~ 34	54	100	30	0.1
MLVS 0805AM17401	17	22	24.3 ~ 30.7	50	400	120	0.3
MLVS 0805AM20221	20	26	29.7 ~ 37.3	56	220	100	0.4
MLVS 0805AM25251	25	31	35.1 ~ 43.9	71	250	100	0.3
MLVS 0805AM30201	30	38	42.3 ~ 52.7	81	200	100	0.3
MLVS 0805AM35171	35	45	55 ~ 61	93	170	80	0.1

	Working Voltage		Varistor Voltage	Clamping Voltage	Capacitance	Peak Current	Transient Energy
Symbol	V_{RMS}	V_{DC}	V_V	V_C	C_P	i_{max}	W_{max}
Units	Volts	Volts	Volts	Volts	pF	Amps	Joules
	(Max.)	(Max.)		(Max.)	(Typical)	(Max.)	(Max.)
Test Condition		$< 10 \mu A$	1mA DC	1A 8/20 μs	1KHz	8/20 μs	10/1000 μs
MLVS 1206AM04152	4	5.5	8 ~ 13	23	1500	200	0.3
MLVS 1206AM11461	11	14	18 ~ 21.6	38	460	100	0.3
MLVS 1206AM11641	11	14	18 ~ 21.6	36	640	200	0.5
MLVS 1206AM14801	14	16	22 ~ 28	44	800	200	0.6
MLVS 1206AM14701	14	16	19.8 ~ 25.2	42	700	200	0.5
MLVS 1206AM17651	17	22	24.3 ~ 30.7	48	650	200	0.3
MLVS 1206AM17841	17	22	24.3 ~ 29.7	50	840	100	0.4
MLVS 1206AM20601	20	26	29.7 ~ 37.3	58	600	200	0.7
MLVS 1206AM25551	25	31	35.1 ~ 43.9	69	550	200	1
MLVS 1206AM30501	30	38	42.3 ~ 52.7	81	500	200	1.1
MLVS 1206AM35201	35	45	54 ~ 62	108	200	200	1.1
MLVS 1206AM40181	40	56	63 ~ 77	110	180	200	1
MLVS 1206AM50251	50	65	76 ~ 92	138	250	100	0.5
MLVS 1206AM60121	60	85	100 ~ 120	168	120	100	0.7



FEATURES

- Meet 61000-4-5 standard
- SMD type zinc oxide based ceramic chip
- Insulator over coat keeps excellent low and stable leakage current
- Quick response time (<0.5ns)
- High transient current capability
- High reliability
- Meet UL1449 4th standard
- Compact size for EIA 0604 / 0806 / 1206

APPLICATIONS

- Protection against high working voltage applications related transient overvoltage

EXPLANATION OF PART NUMBER

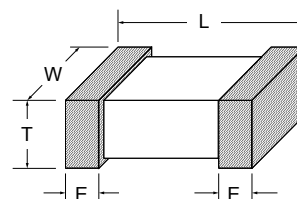
MLV	S	0806	HV	241
1	2	3	4	5

- 1: Multilayer Varistor
 2: Type: S=single
 3: Size
 4: High Varistor Voltage
 5: Varistor voltage: "241" means $24 \times 10^1 = 240$

DIMENSION

Unit: mm

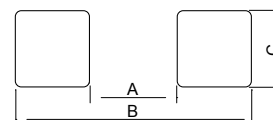
EIA	L	W	T	E
0604	1.60±0.15	1.05±0.10	1.15 max	0.25±0.10
0806	2.00±0.20	1.70±0.20	1.8 max	0.50±0.25
1206	3.20±0.30	1.60±0.20	1.9 max	0.50±0.25



SOLDER LAND INFORMATION

Unit: mm

Size (EIA)	A	B	C
0604	0.7	2.54	1.07
0806	1.10	3.50	1.75
1206	2.20	4.06	1.75



STANDARD PACKING

Size (EIA)	0604	0806	1206
Quantity (pcs/reel)	3,000	2,000	2,500

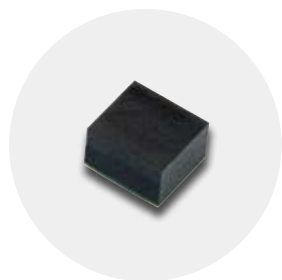
SPECIFICATIONS

	Working Voltage		Varistor Voltage	Leakage current	Clamping Voltage	Capacitance	Peak Current	
Symbol	V_{RMS}	V_{DC}	V_V	I_L	V_C	C_P	i_{max}	i_{max}
Units	Volts	Volts	Volts	uA	Volts	pF	Amps	Amps
	(Max.)	(Max.)		(Max.)	(Max.)	(Typical)	(Max.)	(Max.)
Test Condition		< 30 μ A	1mA DC	V_{DC}	1A	1KHz	8/20 μ s (1 Time)	8/20 μ s (15 Times)
					8/20 μ s			
MLVS0604HV271	180	225	270±10%	50	450	20	20	10
MLVS0806HV241	150	200	240±10%	50	340	140	100	50
MLVS0806HV271	180	230	270±10%	50	390	100	100	50
MLVS0806HV391	250	320	390±15%	50	570	50	50	30

- New released product, please contact INPAQ for detail information.

MOVS Series

New Release



FEATURES

- SMD package
- High transient current capability
- RoHS compliant
- Meet UL1449 4th /cUL standard
- Compact size for EIA 2825 / 4032

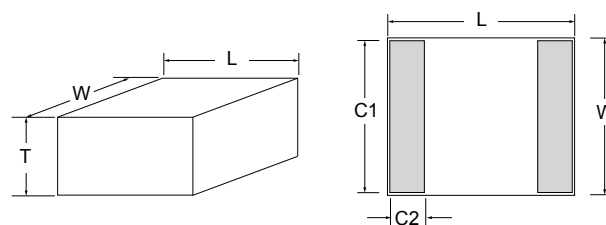
APPLICATIONS

- Power supply
- Home appliance
- Industrial equipment
- Telecommunication or telephone system
- LED Lighting

EXPLANATION OF PART NUMBER

MOV	S	2825	471
1	2	3	4

- 1: Metal Oxide Varistor
 2: Type: S=SMD
 3: Chip size
 4: Varistor Voltage



DIMENSION

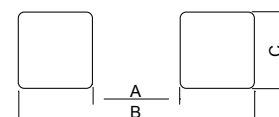
Unit: mm

EIA	L	W	C1	C2	T		
2825	7.10±0.30	6.30±0.30	5.30±0.30	1.10±0.30	5.80±0.30	4.30±0.30	3.20±0.30
4032	10.20±0.30	8.00±0.30	7.60±0.30	1.60±0.30	5.60±0.30	4.30±0.30	3.20±0.30

SOLDER LAND INFORMATION

Unit: mm

Size (EIA)	A	B	C
2825	4.50	7.50	6.70
4032	6.20	10.60	8.40



STANDARD PACKING

Size (EIA)	2825	4032
Quantity (pcs/reel)	1000	500

SPECIFICATIONS

	Working Voltage		Varistor Voltage	Clamping Voltage	Capacitance	Peak Current
Symbol	V_{RMS}	V_{DC}	V_V	V_C	C_p	i_{max}
Units	Volts	Volts (Max.)	Volts	Volts (Max.)	pF (Typical)	Amps (Max.)
Test Condition		< 50 μA	1mA DC	8/20 μs	1KHz	8/20 μs
MOVS2825471	300	385	413 ~ 526	510 (5A)	45	800
MOVS4032781	485	640	711 ~ 837	1290 (10A)	70	1750

- New released product, please contact INPAQ for detail information.

Reliability and Test Condition



For General Products

Test item	Test condition	Reference
Resistance to Solder Heat	1. Solder temperature : $260 \pm 5^{\circ}\text{C}$. 2. Flux : Rosin. 3. DIP time : 10 ± 1 sec.	MIL-STD-202 Method 210F
Temperature Cycle	1. Temperature: $-40^{\circ}\text{C}/85^{\circ}\text{C}$ For 30 minutes each temperature. 2. Cycle: 100 cycles. 3. Measurement: At room temperature 24 hours after test completion.	JESD22 Method JA-104
High Temperature Life	1. Temperature: $85 \pm 2^{\circ}\text{C}$. 2. Testing time: 1000 hrs. 3. Applied rated source. 4. Measurement: At room temperature 24 hours after test completion.	MIL-STD-202 Method 108
Bias Humidity Test	1. Temperature: $40 \pm 2^{\circ}\text{C}$. 2. Humidity: 90% RH. 3. Applied rated source. 4. Testing time: 1000 hrs. 5. Measurement: At room temperature 24 hours after test completion.	MIL-STD-202 Method 103
Solderability	1. 8 hours \pm 15 min. steam conditioning 2. Solder temperature : $245 \pm 5^{\circ}\text{C}$. 3. Flux : Rosin. 4. DIP time : 5 ± 1 sec.	J-STD-002
Resistance to Solvent	1. Immerse the chips in the IPA solution with ultrasonic. 2. Testing time: 5 min. 3. Measurement: At room temperature 1 hours after test completion.	MIL-STD-202 Method 215
Moisture Sensitivity	1. Temperature: $85 \pm 2^{\circ}\text{C}$. 2. Humidity: 85% RH. 3. Testing time: 168 hrs.	J-STD-020

Reliability and Test Condition (AEC-Q200)



For Automotive Product (Passive Component)

Test item	Test condition	Reference
Resistance to Solder Heat	1. Solder temperature : $260 \pm 5^{\circ}\text{C}$. 2. Flux : Rosin. 3. DIP time : 10 ± 1 sec.	MIL-STD-202 Method 210F
Temperature Cycle	1. Temperature: $-40^{\circ}\text{C}/125^{\circ}\text{C}$ For 30 minutes each temperature. 2. Cycle: 1000 cycles. 3. Measurement: At room temperature 24 hours after test completion.	JESD22 Method JA-104
High Temperature Life	1. Temperature: $125 \pm 2^{\circ}\text{C}$. 2. Testing time: 1000 hrs. 3. Applied rated source. 4. Measurement: At room temperature 24 hours after test completion.	MIL-STD-202 Method 108
Bias Humidity Test	1. Temperature: $85 \pm 2^{\circ}\text{C}$. 2. Humidity: 85% RH. 3. Applied rated source. 4. Testing time: 1000 hrs. 5. Measurement: At room temperature 24 hours after test completion.	MIL-STD-202 Method 103
Solderability	1. 8 hours \pm 15 min. steam conditioning 2. Solder temperature : $260 \pm 5^{\circ}\text{C}$. 3. Flux : Rosin. 4. DIP time : 10 ± 1 sec.	J-STD-002
Resistance to Solvent	1. Immerse the chips in the IPA solution with ultrasonic. 2. Testing time: 5 min. 3. Measurement: At room temperature 1 hours after test completion.	MIL-STD-202 Method 215
Moisture Sensitivity	1. Temperature: $85 \pm 2^{\circ}\text{C}$. 2. Humidity: 85% RH. 3. Testing time: 168 hrs.	J-STD-020

Reliability and Test Condition (AEC-Q101)



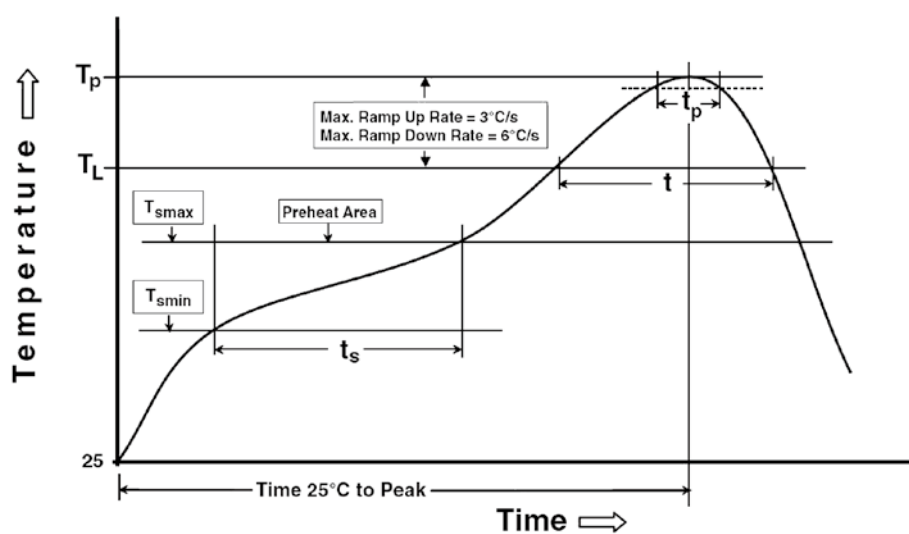
For Automotive Product (Discrete Component)

Test item	Test condition	Reference
Resistance to Solder Heat	1. Solder temperature : $260 \pm 5^{\circ}\text{C}$. 2. Flux : Rosin. 3. DIP time : 10 ± 1 sec.	JESD22 B-106
Temperature Cycle	1. Temperature: $-55^{\circ}\text{C}/150^{\circ}\text{C}$ For 30 minutes each temperature. 2. Cycle: 1000 cycles. 3. Measurement: At room temperature 24 hours after test completion.	JESD22 Method JA-104
High Temperature Life	1. Temperature: $150 \pm 2^{\circ}\text{C}$. 2. Testing time: 1000 hrs. 3. Applied rated source. 4. Measurement: At room temperature 24 hours after test completion.	MIL-STD-202 Method 108
Bias Humidity Test	1. Temperature: $85 \pm 2^{\circ}\text{C}$. 2. Humidity: 85% RH. 3. Applied rated source. 4. Testing time: 1000 hrs. 5. Measurement: At room temperature 24 hours after test completion.	MIL-STD-202 Method 103
Solderability	1. 8 hours \pm 15 min. steam conditioning 2. Solder temperature : $245 \pm 5^{\circ}\text{C}$. 3. Flux : Rosin. 4. DIP time : 5 ± 1 sec.	J-STD-002
Resistance to Solvent	1. Immerse the chips in the IPA solution with ultrasonic. 2. Testing time: 1000 hrs. 3. Measurement: At room temperature 1 hours after test completion.	JESD22 B-107
Moisture Sensitivity	1. Temperature: $85 \pm 2^{\circ}\text{C}$. 2. Humidity: 85% RH. 3. Testing time: 168 hrs.	J-STD-020

Recommended Soldering Conditions



Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (T _{smax} to T _p)	3°C /second max.
Preheat	
– Temperature Min (T _{smin})	150°C
– Temperature Max (T _{smax})	200°C
– Time (t _{smin} to t _{smax})	60-180 seconds
Time maintained above:	
– Temperature (T _L)	217°C
– Time (t _L)	60-150 seconds
Peak/Classification Temperature (T _p)	260°C
Time within 5°C of actual Peak Temperature (t _p)	20-40 seconds
Ramp-Down Rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.



*According to J-STD-020C

Moisture Sensitivity Level (MSL)

For moisture-sensitive packages, it is necessary to control the humidity content of the component. Penetration of moisture into the package molding compound is generally caused by exposure to ambient air. Component sites with increased concentrations of moisture can cause damages to the package during the reflow process. The most commonly applied standard J-STD-033* defines eight different MSLs (**Table 1**). Please refer to per product specifications definitions and the relevant "moisture sensitivity caution label" on the packing material.

Table 1 Moisture sensitivity levels according to J-STD-033* depending on the Room Humidity

Level	Floor Life (out of bag)	
	Time	Conditions
1	unlimited	≤ 30 °C / 85 % RH
2	1year	≤ 30 °C / 60 % RH
2a	4weeks	≤ 30 °C / 60 % RH
3	168hours	≤ 30 °C / 60 % RH
4	72hours	≤ 30 °C / 60 % RH
5	48hours	≤ 30 °C / 60 % RH
5a	24hours	≤ 30 °C / 60 % RH
6	Mandatory bake before use. After bake, the component must be reflowed within the time limit specified on the label	
		≤ 30 °C / 60 % RH

DRYING

Component drying options for various moisture sensitivity levels and ambient humidity exposures of ≤ 60% RH are given in the following two tables. Drying per an allowable option resets the floor life clock. If dried and sealed in an MBB with fresh desiccant, the shelf life is reset. **Tables 2 and 3** give reference conditions for drying SMD packages.

Table 2 Reference Conditions for Drying Mounted or Unmounted SMD Packages (User Bake: Floor life begins counting at time = 0 after bake)

Package Body Thickness	Level	Bake @ 125°C		Bake @ 90°C ≤ 5% RH		Bake @ 40°C ≤ 5% RH	
		Saturated @30°C/85% RH	At Limit of Floor Life + 72 hr @30°C/60% RH	Saturated @30°C/85% RH	At Limit of Floor Life + 72 hr @30°C/60% RH	Saturated @30°C/85% RH	At Limit of Floor Life + 72 hr @30°C/60% RH
≤ 1.4mm	2a	5 hours	3 hours	17 hours	11 hours	8 days	5 days
	3	9 hours	7 hours	33 hours	23 hours	13 days	9 days
	4	11 hours	7 hours	37 hours	23 hours	15 days	9 days
	5	12 hours	7 hours	41 hours	24 hours	17 days	10 days
	5a	16 hours	10 hours	54 hours	24 hours	22 days	10 days
≤ 2.0mm	2a	21 hours	16 hours	3 days	2 days	29 days	22 days
	3	27 hours	17 hours	4 days	2 days	37 days	23 days
	4	34 hours	20 hours	5 days	3 days	47 days	28 days
	5	40 hours	25 hours	6 days	4 days	57 days	35 days
	5a	48 hours	40 hours	8 days	6 days	79 days	56 days
≤ 4.5mm	2a	48 hours	48 hours	10 days	7 days	79 days	67 days
	3	48 hours	48 hours	10 days	8 days	79 days	67 days
	4	48 hours	48 hours	10 days	10 days	79 days	67 days
	5	48 hours	48 hours	10 days	10 days	79 days	67 days
	5a	48 hours	48 hours	10 days	10 days	79 days	67 days

Table 3 Default Baking Times Used Prior to Dry-Pack that were Exposed to Conditions ≤ 60% RH (Supplier Bake: "MET" = 24 hrs)

Level	Floor Life (out of bag)	
	Time	Conditions
1	unlimited	≤ 30 °C / 85 % RH
2	1year	≤ 30 °C / 60 % RH
2a	4weeks	≤ 30 °C / 60 % RH
3	168hours	≤ 30 °C / 60 % RH
4	72hours	≤ 30 °C / 60 % RH
5	48hours	≤ 30 °C / 60 % RH
5a	24hours	≤ 30 °C / 60 % RH
6	Mandatory bake before use. After bake, the component must be reflowed within the time limit specified on the label	
		≤ 30 °C / 60 % RH



佳邦科技股份有限公司

INPAQ TECHNOLOGY CO., LTD.

E-Mail: info@inpaq.com.tw

<http://www.inpaq.com.tw>

<http://www.inpaqgp.com>

業務據點 / SALES SITE

Taiwan

Headquarters/Chunan Plant INPAQ TECHNOLOGY CO., LTD.

35059 苗栗縣竹南鎮科義街 11 鄰科義街 11 號
No.11, Ke-Yi Street, Chunan, Miaoli 35059,
Taiwan (R.O.C.)
TEL: +886-37-585-555
FAX: +886-37-585-511

Taiwan INPAQ Office

TAIWAN INPAQ ELECTRONIC CO., LTD.

35059 苗栗縣竹南鎮科義街38號1樓
1F, No.38, Ke-Yi Street, Chunan, Miaoli 35059,
Taiwan (R.O.C.)
TEL: +886-37-585-555
FAX: +886-37-585-511

Taipei Office

11261 台北市北投區立功街 135 號 2 樓
2F, No.135, Ligong Street, Beitou District,
Taipei City 11261, Taiwan (R.O.C.)
TEL: +886-2-7729-4296
FAX: +886-2-2858-5654

Yangmei Office

32668 桃園市楊梅區高獅路566-1號
No.566-1, Kao-Shi Road, Yang-Mei, Taoyuan 32668,
Taiwan (R.O.C.)
TEL: +886-3-475-6600
FAX: +886-3-488-3728

China

Shanghai Office

200235 上海市徐匯區中山西路 1800 號
兆豐環球大廈 14 樓 J2 座
J2, 14F, Zhao Feng Universe Building Block, No.1800,
Zhongshan West Road, Xuhui District, Shanghai City 200235,
China
TEL: +86-21-6440-3187
FAX: +86-21-6440-0138

Shenzhen Office

518057 廣東省深圳市南山區科技園中區科苑路15 號
科興科學園 A 棟 2 單元 802 室
Room 802, Unit 2, Building A, Kexing Science Park, No.15,
Keyuan Avenue, Central Zone, High-tech Zone, Nanshan
District, Shenzhen City, Guangdong Province 518057, China
TEL: +86-755-8279-4585
FAX: +86-755-8279-4565

Shenzhen Baoan Office

518100 廣東省深圳市寶安區創業二路
新一代資訊技術產業園C座515室
Room 515, Building C, Next Generation Information
Technology Industrial Park, Chuangye 2nd Road, Baoan
District, Shenzhen City, Guangdong Province 518100, China
TEL: +86-755-2772-5162

Xian Office

710065 陝西省西安市高新區丈八一路
綠地SOHO同盟 B 座 608 室
Room 608, Plaza B, GreenLand SOHO Association, Zhangbayi
Road, Gaoxin Area, Xian City, Shaanxi Province 710065, China
TEL: +86-29-6569-1168
FAX: +86-29-6569-1158

Overseas

USA Office

California

2055 Junction Ave, Suite 100, San Jose,
CA 95131, U.S.A
TEL: +1-669-268-5804

New Hampshire

21 Echo Brook Road, Rochester, NH 03839, U.S.A.
TEL: +1-603-332-6222
FAX: +1-603-509-2900

Korea Office

221 Raemian Seocho Univill, 1445-4, Seocho-Dong,
Seocho_Gu, Seoul 130-070, Korea
TEL: +82-2-584-8959
FAX: +82-2-584-8951

Authorized Agent

Russia: Saint Petersburg, Moscow

USA: Seattle, Minnesota

Germany: Nagold

India: Bangalore

Japan: Tokyo, Osaka

Malaysia: Perak

工廠據點 / PLANT SITE

Taiwan

Taichung Plant

INPAQ TECHNOLOGY (TAICHUNG) CO., LTD.

42881 台中市大雅區秀山村科雅路27號4樓
(中科第一期標準廠房四樓)
4F, No.27, Keya Road, Daya District,
Taichung City 42881, Taiwan (R.O.C.)
TEL: +886-4-2560-6555
FAX: +886-4-2560-5151

China

Suzhou Plant

INPAQ TECHNOLOGY (SUZHOU) CO., LTD.

21543 江蘇省蘇州相城區黃埭鎮潘陽工業園春秋路5號
No.5, Chunqiu Road, Panyang Industrial Park,
Huangdai Town, Xiangcheng Zone, Suzhou City, 215143
Jiangsu Province, China
TEL: +86-512-6571-9988
FAX: +86-512-6571-6988

Suzhou II Plant

215126 中國江蘇省蘇州工業園區長陽街369號
No.369 Changyang Street, Suzhou Industrial Park,
Jiangsu Province 215126, China
TEL: +86-510-6283-6888
FAX: +86-510-6283-7888

China

Wuxi Plant

INPAQ TECHNOLOGY (China) CO., LTD.

214105 江蘇省無錫市錫山經濟開發區
安鎮安泰一路81號
No.81, Antai First Road, Anzheng Town,
Xishan Economic Development Zone, Wuxi City,
Jiangsu Province 214105, China
TEL: +86-510-8878-5968
FAX: +86-510-8878-9918