

# Metal Oxide Varistor SMD Load Dump Type AEC-Q200

MVS-L Series

MERITEK

## FEATURE

- Operating Temperature: -55°C ~ +125°C
- Large Withstand Surge Current Capability : 200~5000A (8/20μS)
- Large Load Dump Withstanding Capability: 1.5J~50J (10Times)
- Bidirectional and Symmetrical V/I Characteristics
- Multilayer Construction Provides Higher Power Dissipation
- Meet ISO7637-2 Pulse 5 Requirements
- AEC-Q200 Qualified



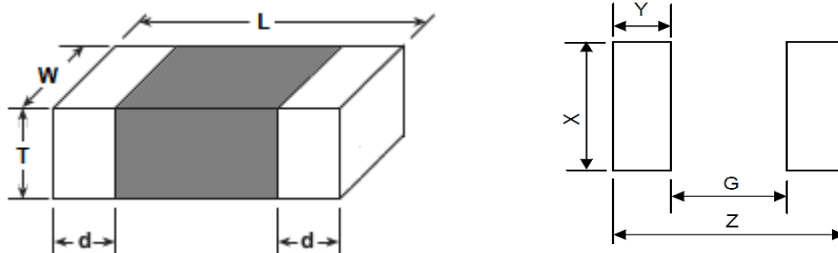
## PART NUMBERING SYSTEM



MVS (1)    1206 (2)    L (3)    240 (4)    K (5)    030 (6)

No	Item	Code	Description	Series Reference
(1)	Meritek Series	MVS	Metal Oxide Varistor	Surface Mount type
(2)	Size Code	1206	3.2x1.6x1.9mm	See Dimension Table below
(3)	Product Code	L	L: Load Dump Type	AEC-Q200, ISO7637-2 Pulse 5
(4)	Varistor Voltage	240	240: 24V	Breakdown Voltage at 1 mA Current.
(5)	Varistor Tolerance	K	±10%	L: ±15%, M: ±20%
(6)	Load Dump Energy	030	030: 3.0 Joules	ISO7637-2 Pulse 5

## DIMENSION AND SOLDERING PAD



Part Series	EIA	L	W	T max	d	G	X	Y	Unit: mm
MVS1206L	1206	3.2 +0.6/-0.2	1.6 +0.4/-0.2	1.90	0.50±0.2	1.8~2.5	1.5~2.0	1.2~1.8	
MVS1210L	1210	3.2 +0.6/-0.2	2.5 +0.4/-0.2	2.60	0.5±0.25	1.8~2.5	2.2~3.0	1.3~2.0	
MVS1812L	1812	4.5 +0.6/-0.2	3.2 +0.5/-0.2	3.50	0.5+0.35/-0.1	2.5~3.3	2.8~3.6	1.3~2.2	
MVS2220L	2220	6.0 +0.7/-0.3	5.3 +0.5/-0.3	3.60	0.5+0.35/-0.1	3.8~4.6	4.8~5.5	1.3~2.2	
MVS3220L	3220	8.1 +0.7/-0.3	5.3 +0.6/-0.3	3.70	0.8+0.5/-0.1	6.2~7.0	4.8~5.8	1.6~2.6	

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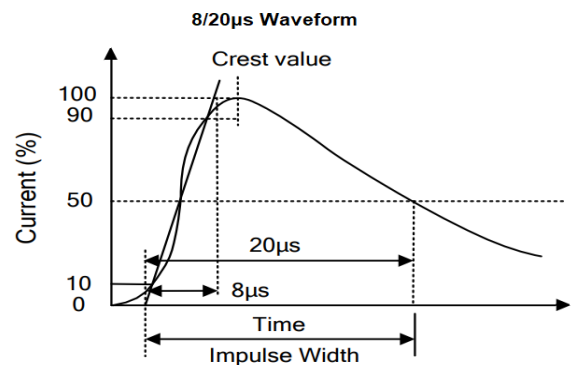
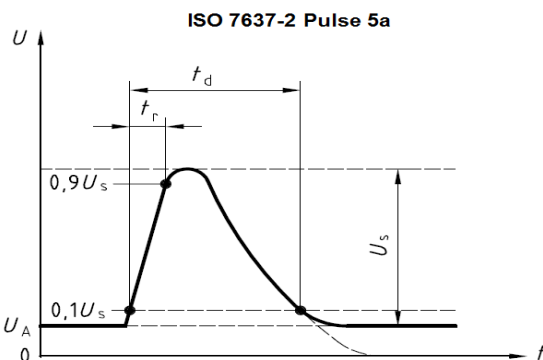
## ELECTRICAL CHARACTERISTICS

MVS-L Load Dump Series	Max Continuous Voltage	Varistor Voltage 1mA	Surge Current 1 times	Max Clamping Voltage		Load Dump Energy 10 times	Jump Start Voltage 5 min	Reference Capacitance 1KHz
	V <sub>DC</sub>	V <sub>B</sub>	I <sub>P</sub>	V <sub>C</sub>	I <sub>P</sub>	W <sub>LD</sub>	V <sub>JUMP</sub>	C <sub>Ref</sub>
	(V)DC	(V)	(A)	(V)	(A)	(J)	(V)	(pF)
MVS1206L240K1R5	16	24(±10%)	200	40	1	1.5	24.5	1800
MVS1206L240K030	16	24(±10%)	400	40	1	3.0	24.5	1800
MVS1206L240K060	16	24(±10%)	500	40	1	6.0	24.5	2100
MVS1210L240K030	16	24(±10%)	400	40	2.5	3.0	24.5	700
MVS1210L240K060	16	24(±10%)	800	40	2.5	6.0	24.5	2000
MVS1210L240K120	16	24(±10%)	1000	40	2.5	12	24.5	3500
MVS1812L240K060	16	24(±10%)	800	40	5	6.0	24.5	4500
MVS1812L240K120	16	24(±10%)	1600	40	5	12	24.5	5000
MVS1812L240K200	16	24(±10%)	2000	40	5	20	24.5	6900
MVS2220L240K120	16	24(±10%)	1200	40	10	12	24.5	5500
MVS2220L240K250	16	24(±10%)	3000	40	10	25	24.5	7000
MVS2220L240K500	16	24(±10%)	5000	40	10	50	24.5	18000
MVS3220L240K500	16	24(±10%)	5000	40	10	50	24.5	22000
MVS3220L240K800	16	24(±10%)	5500	40	10	80	24.5	31400
MVS1812L470K250	34	47(±10%)	2000	77	10	25	45	2200
MVS2220L470K250	34	47(±10%)	3000	77	10	25	45	8000
MVS2220L470K500	34	47(±10%)	4000	77	10	50	45	12800
MVS3220L470K500	34	47(±10%)	4000	77	10	>50	45	8000
MVS3220L470K800	34	47(±10%)	4500	77	10	>80	45	14600

Note:

1. Load dump meet ISO7637-2 Pulse 5 requirements. 2. The surge current was tested at 8/20 μs waveform. 3. Response time, T<sub>rise</sub>: <1ns

## LOAD DUMP AND SURGE WAVE FORM



Parameter	12V system	24V system
Us	65~87V	123~174V
Ri	0.5 to 4Ω	1 to 8Ω
td	40 to 400ms	100 to 350ms
tr	5 to 10ms	5 to 10ms

Severity Level	t1	t2
1	8μs	20μs

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## RELIABILITY SPECIFICATION

Test	Standard	Condition	Requirement
High Temperature Exposure (Storage)	MIL-STD-202 Method 108	Test temp. : 150 ±3°C Duration: 1000 h Unpowered	No visible damage $ \Delta V_{1mA}/V_{1mA}  \leq 10\%$ Measurement at 24±2 hours after test conclusion
Temperature Cycling	JESD22 Method JA-104	Lower test temp. : -40±3°C Upper test temp. : 125±3°C Number of cycles : 1000	
Moisture Resistance	MIL-STD-202 Method 106	Lower test temperature: 25±3°C Upper test temperature: 65±3°C Rel. humidity of air:90%~98% (During cooling phase: 80%~98%) Duration of 1 cycle: 24 h Number of cycles: 10 , Unpowered	No visible damage $ \Delta V_{1mA}/V_{1mA}  \leq 10\%$ Measurement at 24±2 hours after test conclusion
Biased Humidity	MIL-STD-202 Method 103	Test temp. : 85±3°C Rel. humidity of air : 85~90% Duration: 1000 h Bias at Working Voltage Vdc.	
Operational Life	MIL-STD-202 Method 108	Test temp.: 125±3°C Duration: 1000 h Bias at Working Voltage Vdc.	No visible damage $ \Delta V_{1mA}/V_{1mA}  \leq 10\%$ Measurement at 24±2 hours after test conclusion
Mechanical Shock	MIL-STD-202 Method 213	Test Condition F Peak value : 1500g's Half sine Waveform	
Vibration	MIL-STD-202 Method 204	Acceleration : 5 g's Sweep time: 20 min Frequency range: 10 to 2000 Hz 3×12 cycles	No visible damage $ \Delta V_{1mA}/V_{1mA}  \leq 10\%$ Measurement at 24±2 hours after test conclusion
Thermal Shock	MIL-STD-202 Method 107	Lower test temp. : -55±3°C Upper test temp. : 125±3°C Dwell time : 15 minutes. Air-Air. Number of cycles : 300	
Electrical Transient Conduction	ISO-7637-2	Test pulses 1 to 5	

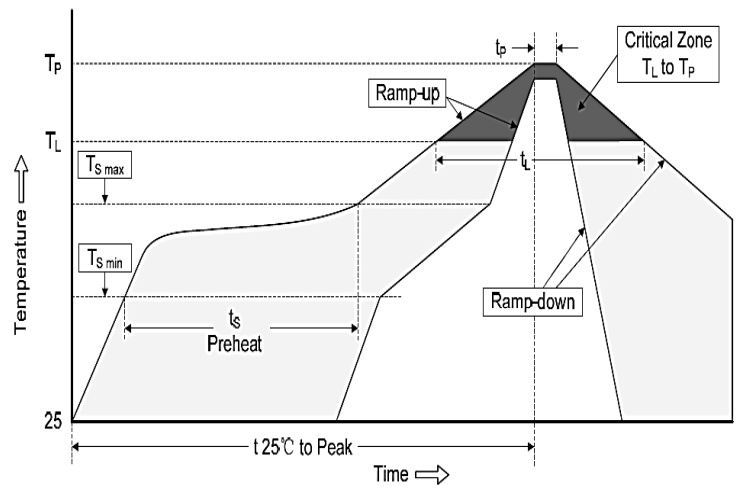
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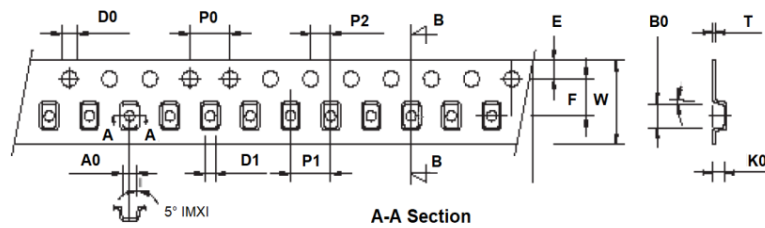
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## SOLDERING RECOMMENDATION

Reflow Condition		
Pre Heat	Temp. Min $T_{s(min)}$	150°C
	Temp. Max $T_{s(max)}$	200°C
	Time (min. to max.) ( $t_s$ )	60~180 seconds
Average ramp up rate (Liquidus Temperature) ( $T_L$ ) to peak		3°C/second max.
$T_{s(max)}$ to $T_L$ (Ramp-up rate)		3°C/second max.
Reflow	Temp. ( $T_L$ )	217°C
	Time ( $t_L$ ) (min. to max.)	60~150 seconds
Peak Temperature ( $T_P$ )		260°C
Time within 5°C of actual peak Temperature ( $t_p$ )		10 seconds
Ramp-down Rate		6°C/second max.



## TAPING SPECIFICATION



Unit: mm

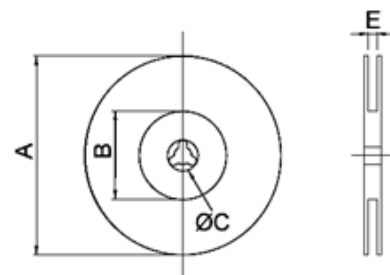
Symbol	$A_0$ ±0.10	$B_0$ ±0.10	$K_0$ ±0.10	$T$ ±0.05	$T_2$ ±0.05	$D_0$ +0.1	$D_1$ ±0.05	$P_1$ ±0.10	$P_2$ ±0.05	$P_0$ ±0.05	$W$ ±0.20	$E$ ±0.10	$F$ ±0.05
1206	2.10	3.90	2.10	0.22	2.32	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
1210	3.00	3.90	2.70	0.22	2.87	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
1812	3.80	5.25	3.60	0.25	3.40	1.50	1.50	8.00	2.00	4.00	12.00	1.75	5.50
2220	5.90	6.80	3.75	0.25	3.90	1.50	1.50	8.00	2.00	4.00	12.00	1.75	5.50
3220	6.05	8.90	3.90	0.25	4.95	0.10	1.50	8.00	2.00	4.00	16.0	1.75	7.50

## TAPE CARRIER SPECIFICATION AND QUANTITY

Unit: (mm)

Size	A ±1	B ±0.5	C ±0.2	E ±0.5	Pcs/ Reel
1206	178	60	13.0	9.0	2000
1210	178	60	13.0	9.0	1500
1812	178	60	13.0	13.2	500
2220	178	60	13.0	13.2	500
3220	178	60	13.0	13.2	500

CARRIER TAPE REELS



\*Specifications subject to change without notice.