

 FUZETEC TECHNOLOGY CO., LTD.	NO.	FMOV05-U Series		
Product Specification and Approval Sheet	Version	P1	Page	1/12

MOV Varistor Device: FMOV05-U Series (Preliminary)

1. Device Ratings and Characteristics

Part Number	Maximum Continuous Voltage		Varistor Voltage (@1mA)			Maximum Clamping Voltage @Test Current (@8/20μs)		Maximum Energy (@10/1000μs)	Maximum Peak Current (@8/20μs)	Rated Power	Typical Capacitance (@1KHz)
	ACrms(V)	DC(V)	Vn(Vdc)	Min.	Max.	Vc(V)	Ip(A)	(J)	(A)	(W)	(pF)
FMOV05201-U	130	170	200	180	220	340	10	13	1200	0.25	100
FMOV05221-U	140	180	220	198	242	360	10	14	1200	0.25	100
FMOV05241-U	150	200	240	216	264	395	10	15	1200	0.25	95
FMOV05271-U	175	225	270	243	297	455	10	18	1200	0.25	95
FMOV05301-U	195	250	300	270	330	500	10	19	1200	0.25	90
FMOV05331-U	215	275	330	297	363	550	10	21	1200	0.25	90
FMOV05361-U	230	300	360	324	396	595	10	23	1200	0.25	85
FMOV05391-U	250	320	390	351	429	650	10	25	1200	0.25	80
FMOV05431-U	275	350	430	387	473	710	10	28	1200	0.25	75
FMOV05471-U	300	385	470	423	517	775	10	30	1200	0.25	70
FMOV05511-U	320	420	510	459	561	845	10	30	1200	0.25	65
FMOV05561-U	350	460	560	504	616	915	10	30	1200	0.25	60
FMOV05621-U	395	510	620	558	682	1020	10	30	1200	0.25	55
FMOV05681-U	420	560	680	612	748	1120	10	30	1200	0.25	50
FMOV05751-U	465	615	750	675	825	1235	10	33	1200	0.25	40

2. Agency Approvals

Agency	Agency Approvals	Certificate No.
	UL1449 4 th & cUL	In Process
	IEC 61051-1:2007 IEC 61051-2:1991 IEC 61051-2:1991/AMD1:2009 IEC 61051-2-2:1991 IEC 62368-1:2018/G.8.1 IEC 60950-1:2005/AMD1:2009/AMD2:2013, Annex Q	In Process

NOTE : Specification subject to change without notice.

2022/7/8

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3. Reliability

Characteristics	Standard	Test Conditions	Specifications
Robustness of terminations	IEC 60068-2-21 Test Ua1	F = 10 N (d ≤ 0.8 mm) , F = 20 N (d = 1 mm)	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage
Solderability	IEC 60068-2-20 Test Ta (Method 1)	T = 235±5°C, d = 2±0.5s	Approximately ≥ 95%
Resistance to soldering heat	IEC 60068-2-20 Test Tb (Method 1A)	T = 260±5°C, d = 10±1s	$\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Shock	IEC 60068-2-27 Test Ea	Pulse shape: half-sine. a = 490 m/s ² , d = 11ms. N = 6 x 3 shocks	$\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Vibration	IEC 60068-2-6 Test Fc Method B4	Frequency range: 10 Hz to 55 Hz ,a = 0.75 mm or 98 m/s ² (whichever is the less), d = 3x2 h	$\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Needle flame test	IEC 60695-11-5	Severity: Vertical 10 s	Duration of burning: 5 s max.
Voltage under pulse condition	IEC 61051-2	At class current, 8/20 μs,	As specified in specification
Voltage proof	IEC 61051-2	Metal balls method (4.8.1.2) 2500 V, 60 s	No breakdown or flashover
Pulse current - 8/20 μs	IEC 61051-2	8/20 μs, 10 times, I _{peak} =0.25*I _{max}	$\Delta V/V \leq \pm 10\%$ No visible damage
Pulse current - 10/1000 μs	IEC 61051-2	10/1000 μs, 10 times, I _{peak} = 0.0075* I _{max}	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage
Combination pulse	IEC 62368-1	Additional test: 10 pulses (combination pulse 6KV/3KA), in one direction, 1 per min	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage U ≤ 1.1 U _{initial} Voltage proof: No breakdown or flashover
Rapid change of temperature	IEC 60068-2-14 Test Na	N = 5 cycles, d = 30 min , θA = -40±3°C, θB = 85±2°C	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage
Climatic sequence	IEC 60068-2-2 Test Ba IEC 60068-2-30 Test Db IEC 60068-2-1 Test Aa IEC 60068-2-30 Test Db	Dry heat, Test Ba:16±2h, T = 85±2°C Damp heat, Test Db first cycle :24h, T = 55±2°C Cold, Test Aa :2h, T = -40±3°C Damp heat Test Ba remaining cycles:5 cycle	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage R _{ISO} ≥ 100MΩ Voltage proof: No breakdown or flashover
Endurance at upper category temperature	IEC 61051-1 (4.21)	T: max temperature as specified , Duration: 1000 h, Voltage: max. a. c. voltage	$\Delta V/V \leq \pm 10\%$ No visible damage R _{ISO} ≥ 1000MΩ U ≤ 1,1 U _{initial}

NOTE : Specification subject to change without notice.

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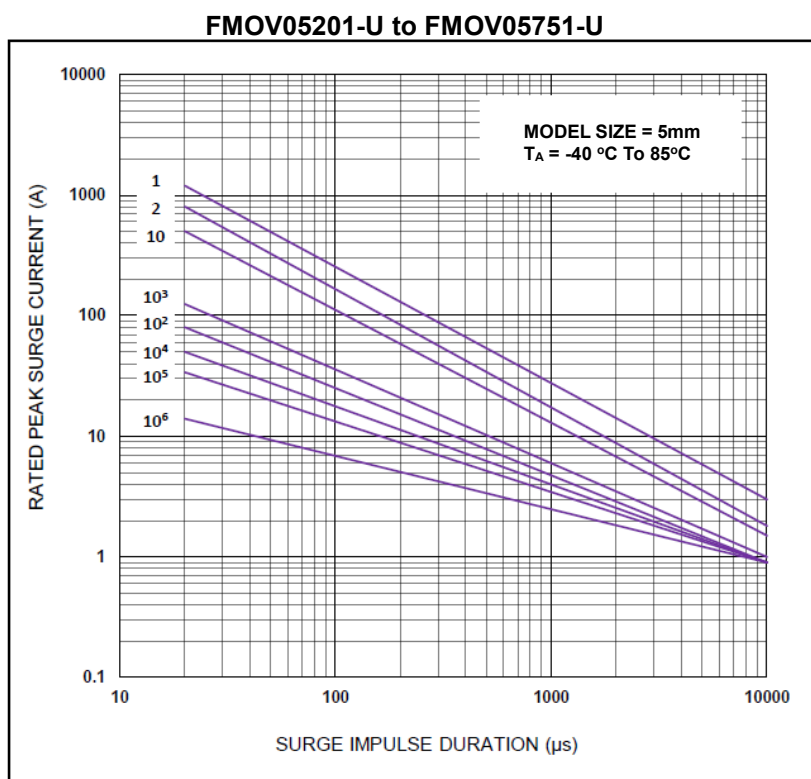
Characteristics	Standard	Test Conditions	Specifications
Damp heat (Steady state)	IEC 60068-2-78 Test Ca	T = 40±2°C, RH = 93(+2/-3)%, 56d , 4 specimens: No voltage applied ,Other 4 specimens: Applied voltage: 10% of the max. d. c. voltage	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$ $R_{iso} \geq 100M\Omega$
Maximum Peak Current	Specification Standard	I _{max} , 8/20 μs, 1 time.	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$ No visible damage
Nominal Discharge Current Test	UL1449 4th	I _n , 8/20 μs, 15 times, Interval 60s	$\Delta V/V \leq \pm 10\%$ No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{mAat\ 85^{\circ}C} - V_{mAat\ 25^{\circ}C}}{V_{mAat\ 25^{\circ}C}} \times \frac{1}{60} \times 100(\%/^{\circ}C)$	$0.05 \leq TC \leq 0.05(\%/^{\circ}C)$
High Temperature Storage	IEC60068-2-2	1000h, T = 125±2°C	$\Delta V/V \leq \pm 5\%$ No visible damage
Max. Energy	Specification Standard	10/1000 μs, 1 times, Max. Energy	$\Delta V/V \leq \pm 10\%$ No visible damage
Operating duty cycle test *	UL1449	6 kV/3 kA combination wave surges, phase angle of 90 (+0, -15) degrees, positive polarity 8times, negative polarity 7 times, interval of 60s.	$\Delta V/V \leq \pm 10\%$ No visible damage
Surge Immunity Test *	IEC 61000-4-5	4kV/2kA combination wave surges, phase angle of 90 (+0, -15) degrees, positive polarity 20times, negative polarity 20times, interval of 60s.	$\Delta V/V \leq \pm 10\%$ No visible damage

* (According to customer requirements to meet the test items)



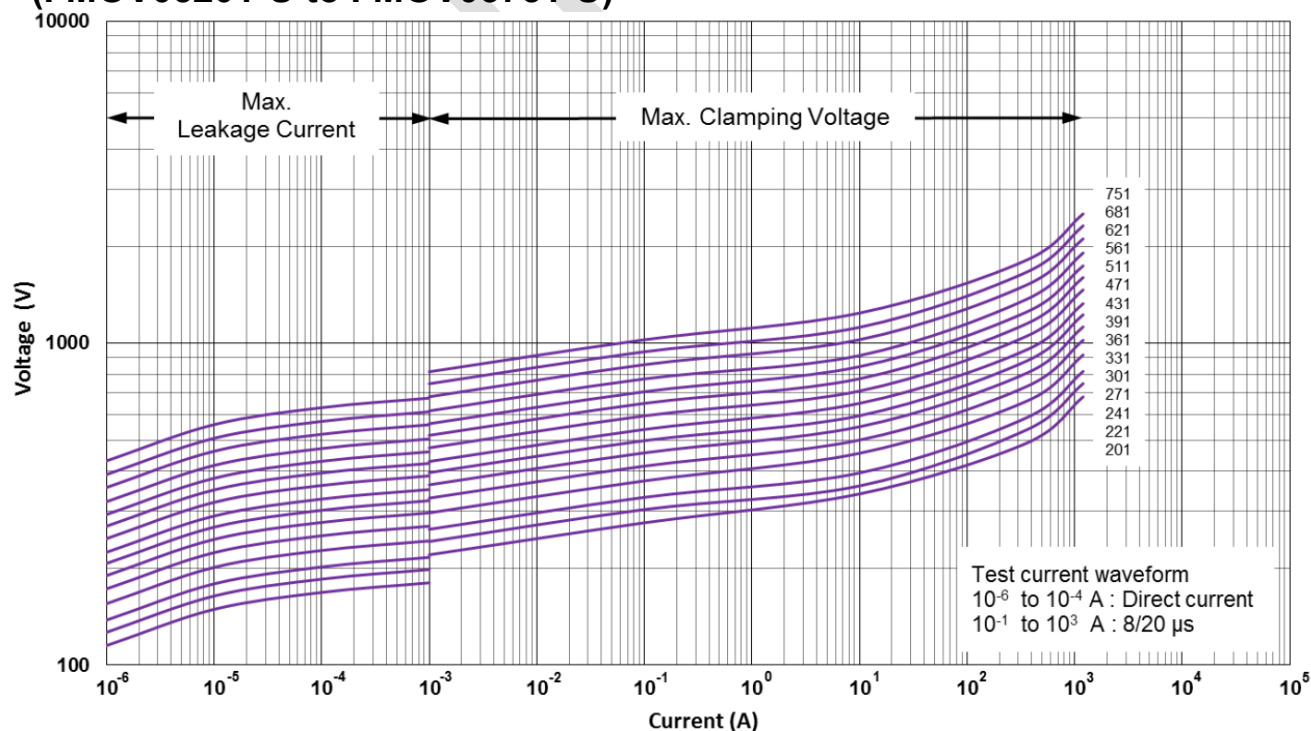
4. Impulse Life Time Rating Curves

FMOV05-U Series



5. V-I Curves

(FMOV05201-U to FMOV05751-U)

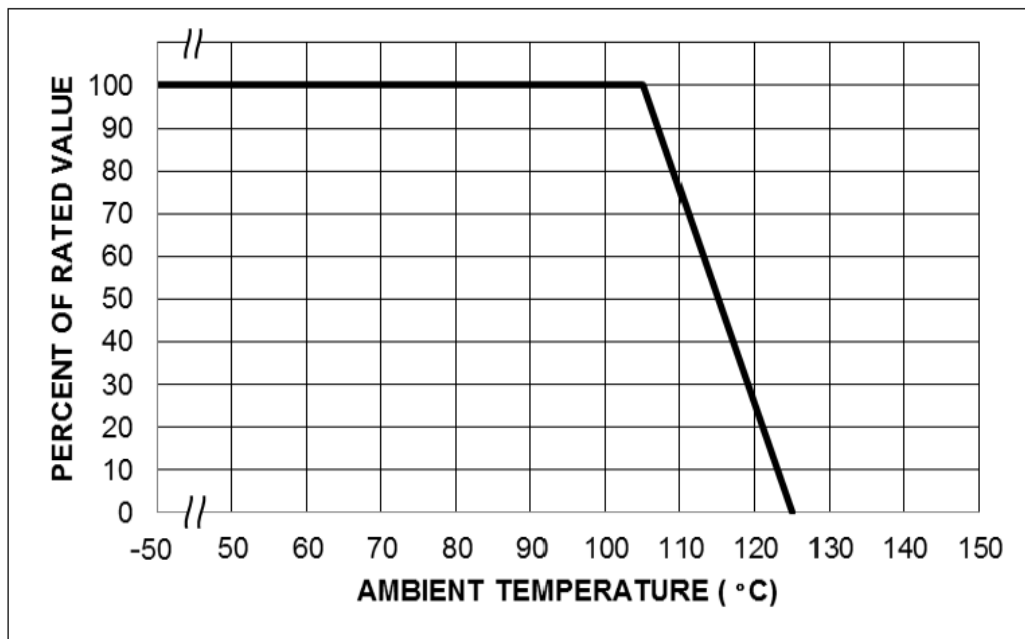


NOTE : Specification subject to change without notice.

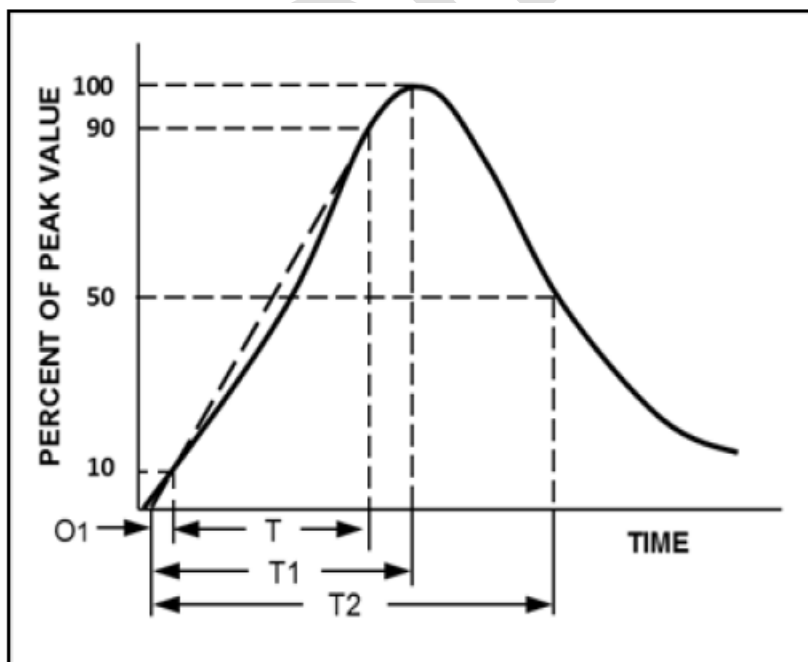


6. Power Derating Curve

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



7. Surge Current Standard Waveform



O1 = Virtual Origin of Wave

T = Time from 10% to 90% of Peak

T1 = Rise Time = $1.25 \times T$

T2 = Decay Time

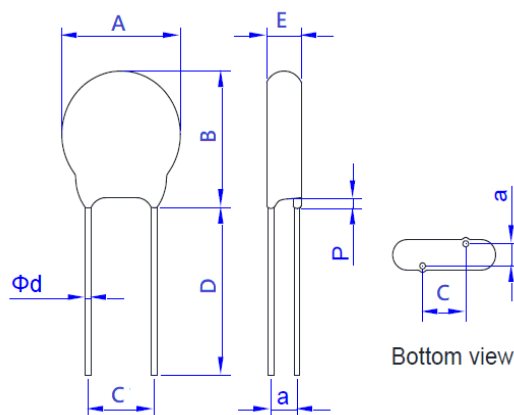
Example - For an 8/20 μ s Current Waveform:

8μ s = T1 = Rise Time

20μ s = T2 = Decay Time

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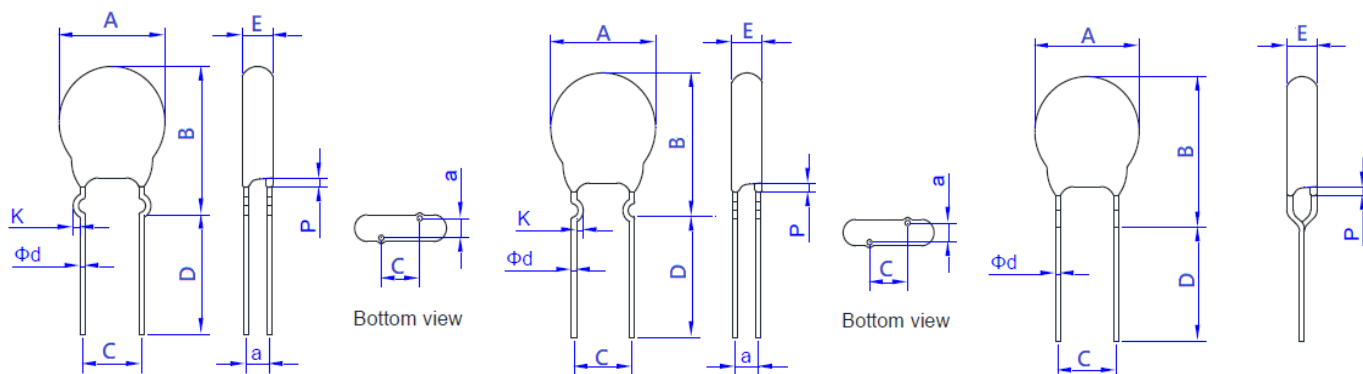
8. Dimension of Component for Standard Product



Straight Lead Type (S)

Part Number	A		B	C	D	E	P	a	Φd
	Min.	Max.	Max.	±1.0	Typ.	Max.	Max.	±1.0	±0.05
FMOV05201-U	5.5	7.5	10.0	5.0	25.0	3.9	3.0	2.0	0.60
FMOV05221-U	5.5	7.5	10.0	5.0	25.0	4.0	3.0	2.1	0.60
FMOV05241-U	5.5	7.5	10.0	5.0	25.0	4.1	3.0	2.2	0.60
FMOV05271-U	5.5	7.5	10.0	5.0	25.0	4.4	3.0	2.3	0.60
FMOV05301-U	5.5	7.5	10.0	5.0	25.0	4.6	3.0	2.5	0.60
FMOV05331-U	5.5	7.5	10.0	5.0	25.0	4.7	3.0	2.7	0.60
FMOV05361-U	5.5	7.5	10.0	5.0	25.0	4.8	3.0	2.8	0.60
FMOV05391-U	5.5	7.5	10.0	5.0	25.0	4.9	3.0	3.0	0.60
FMOV05431-U	5.5	7.5	10.0	5.0	25.0	5.2	3.0	3.2	0.60
FMOV05471-U	5.5	7.5	10.0	5.0	25.0	5.4	3.0	3.4	0.60
FMOV05511-U	5.5	7.5	10.0	5.0	25.0	5.6	3.0	3.7	0.60
FMOV05561-U	5.5	7.5	10.0	5.0	25.0	5.8	3.0	3.9	0.60
FMOV05621-U	5.5	7.5	10.0	5.0	25.0	6.2	3.0	4.3	0.60
FMOV05681-U	5.5	7.5	10.0	5.0	25.0	6.3	3.0	4.7	0.60
FMOV05751-U	5.5	7.5	10.0	5.0	25.0	6.5	3.0	5.1	0.60

Unit: mm



Outside Kink Lead (O)

Inside Kink Lead (K)

In Line Kink Lead (I)

Part Number	A		B	C	D	E	P	K		a	Φd
	Min.	Max.	Max.	±1.0	Typ.	Max.	Max.	Min.	Max.	±1.0	±0.05
FMOV05201-U	5.5	7.5	13.0	5.0	25.0	3.9	3.0	0.8	1.6	2.0	0.60
FMOV05221-U	5.5	7.5	13.0	5.0	25.0	4.0	3.0	0.8	1.6	2.1	0.60
FMOV05241-U	5.5	7.5	13.0	5.0	25.0	4.1	3.0	0.8	1.6	2.2	0.60
FMOV05271-U	5.5	7.5	13.0	5.0	25.0	4.4	3.0	0.8	1.6	2.3	0.60
FMOV05301-U	5.5	7.5	13.0	5.0	25.0	4.6	3.0	0.8	1.6	2.5	0.60
FMOV05331-U	5.5	7.5	13.0	5.0	25.0	4.7	3.0	0.8	1.6	2.7	0.60
FMOV05361-U	5.5	7.5	13.0	5.0	25.0	4.8	3.0	0.8	1.6	2.8	0.60
FMOV05391-U	5.5	7.5	13.0	5.0	25.0	4.9	3.0	0.8	1.6	3.0	0.60
FMOV05431-U	5.5	7.5	13.0	5.0	25.0	5.2	3.0	0.8	1.6	3.2	0.60
FMOV05471-U	5.5	7.5	13.0	5.0	25.0	5.4	3.0	0.8	1.6	3.4	0.60
FMOV05511-U	5.5	7.5	13.0	5.0	25.0	5.6	3.0	0.8	1.6	5.6	0.60
FMOV05561-U	5.5	7.5	13.0	5.0	25.0	5.8	3.0	0.8	1.6	5.8	0.60
FMOV05621-U	5.5	7.5	13.0	5.0	25.0	6.2	3.0	0.8	1.6	6.2	0.60
FMOV05681-U	5.5	7.5	13.0	5.0	25.0	6.3	3.0	0.8	1.6	6.3	0.60
FMOV05751-U	5.5	7.5	13.0	5.0	25.0	6.5	3.0	0.8	1.6	6.5	0.60

Unit: mm



9. Tape and Reel Specifications

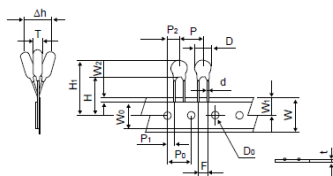


Figure: A

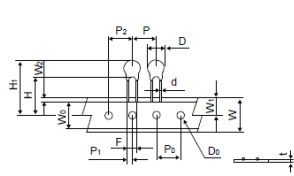


Figure: B

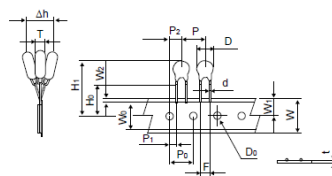


Figure: C

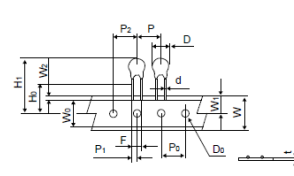


Figure: D

Straight Leads

Inline Kink Leads

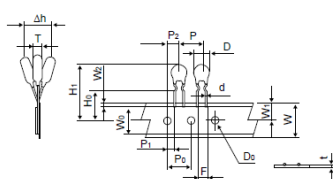


Figure: E

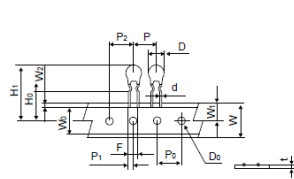


Figure: F

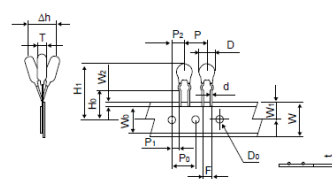


Figure: G

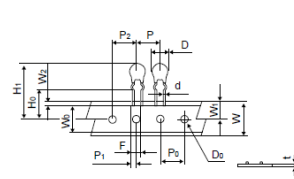


Figure: H

Inside Kink Leads

Outside Kink Leads

Symbol	Parameter	FMOV05-U Series
P	Pitch of Component	12.7±1.0
P0	Feed Hole Pitch	12.7±0.2
P1	Feed Hole Center Lead	3.85±0.7
P2	Hole center to Component Center	6.35±0.7
F	Lead to Lead Distance	5.0±0.8
Δh	Component Alignment	2.0 Max
W	Tape Width	18.0+1.0 -0.5
W0	Hold Down Tape Width	5.0 Min
W1	Hole Position	9.0+0.75 -0.50
W2	Hold Down Tape Position	3.0 Max
H	Height from Tape Center to Component Base	18.0+2.0 -0
H0	Seating Plane Height	16.0±0.5
H1	Component Height	29.0 Max
D0	Feed Hole Diameter	4.0±0.2
t	Total Tape Thickness	0.7±0.2
L	Length of Clipped Lead	11.0 Max
Figure		ACEG

Unit: mm

NOTE : Specification subject to change without notice.

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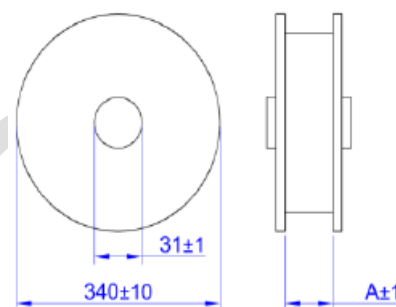
10. Packaging Specifications

Bulk Product Packing

Series	Straight Lead Type Quantity (pcs/bag)	Outside Kink Lead Type Quantity (pcs/bag)	Inside Kink Lead Type Quantity (pcs/bag)	In Line Kink Lead Type Quantity (pcs/bag)
FMOV05-U Series	1000	1000	1000	1000

Tape & Reel Product Packing

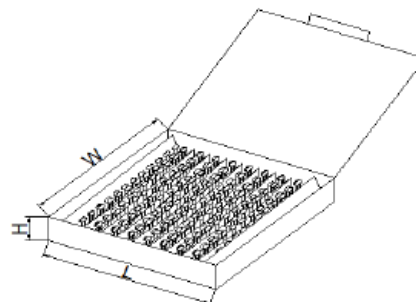
Series	A (mm)	Quantity (pcs/reel)
FMOV05(180~391)-U-T-	43	2000
FMOV05(431~751)-U-T-		1500



Box Product Packing

Series	Quantity (pcs/reel)
FMOV05(180~621)-U-A-	1000
FMOV05(681~751)-U-A-	800

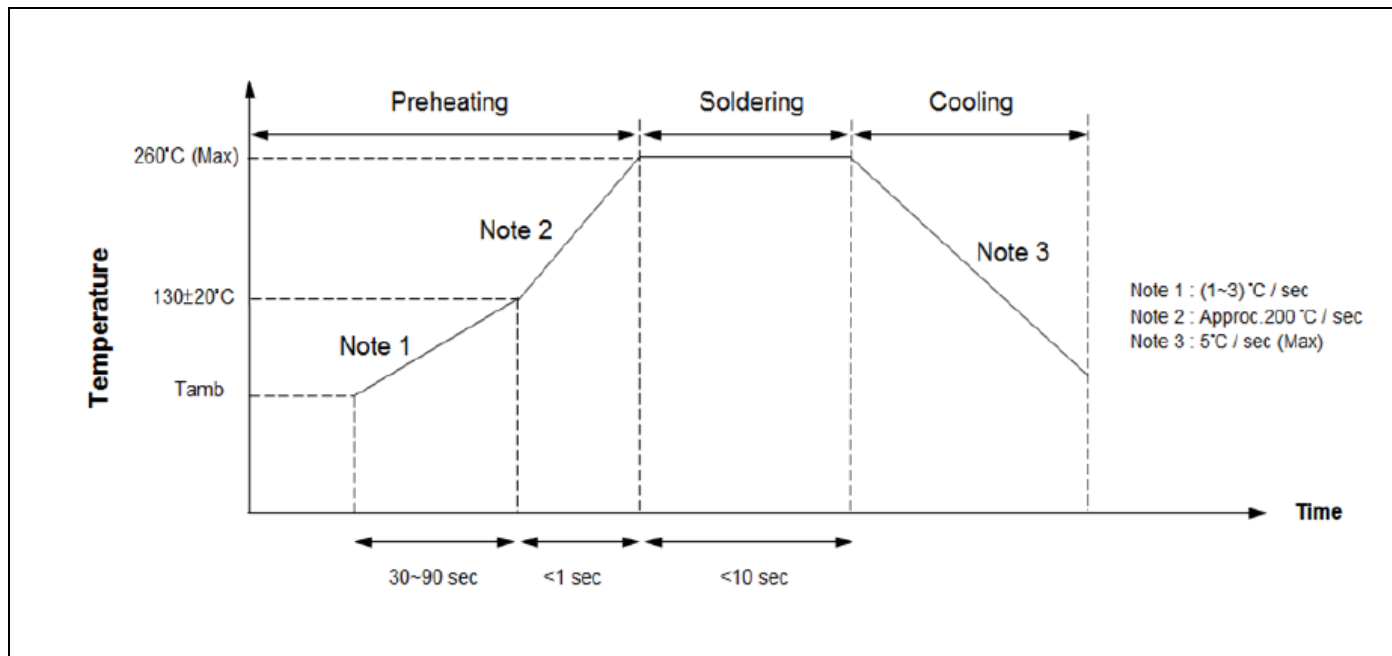
Series	L±5	W±5	H±5
FMOV05-U Series	340	245	45



NOTE : Specification subject to change without notice.



11. Solder Recommendation



Recommendation Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of soldering Iron-tip	360°C (Max)
Soldering Time	3 sec (Max)
Distance from Varistor	2mm (Min)

RoHS Compliant Declaration

We hereby declare that the components delivered to your company are compliant with RoHS Directive 2002/95/EC

Storage Conditions of Products

(I) Storage Conditions:

- Storage Temperature: -10°C ~ +40°C
- Relative Humidity: ≤ 75%RH
- Keep away from corrosive atmosphere and sunlight
- Solvent Resistance: MIL-STD-202, Method 215F
- Moisture Sensitivity: Level 1, J-STD-020

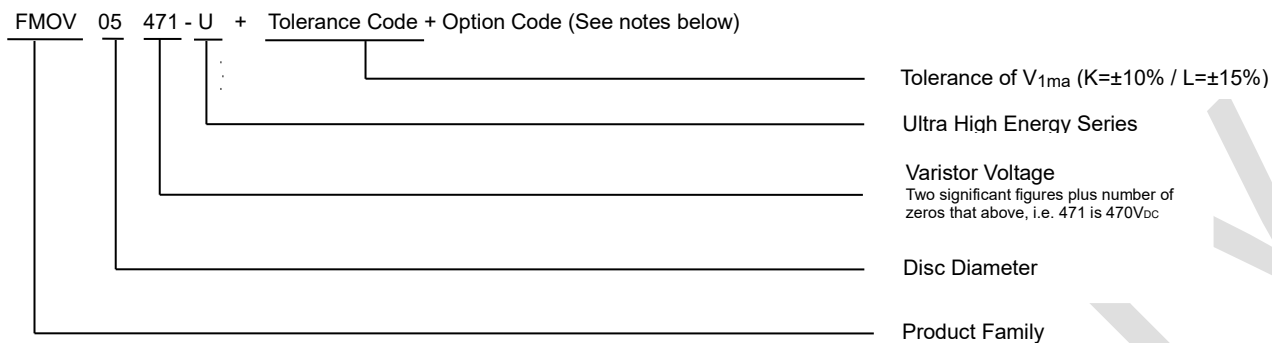
(II) Period of Storage: 1 year

NOTE : Specification subject to change without notice.

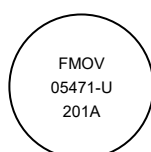


12. Part Numbering and Marking System

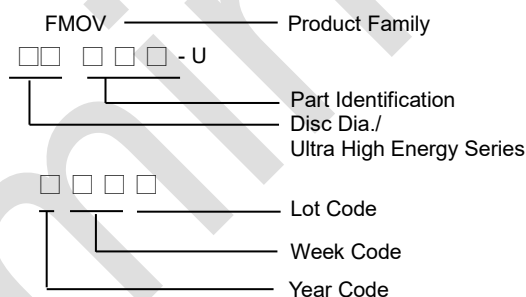
Part Numbering System



Marking System



Example



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13. Order Notes:

Main Part Code:

Part No + Tolerance Code + Packaging + Lead Type Designators + Option Code

Ordering examples:

Straight Lead Bulk Pack (Standard)	Straight Lead (Short Cut) Bulk Pack	Straight Lead Tape & Reel Pack	Straight Lead Flat Box Pack
FMOV05471-UKBS	FMOV05471-UKBSXXX	FMOV05471-UKTS	FMOV05471-UKAS

Outside Kink Lead Bulk Pack	Outside Kink Lead (Short Cut) Bulk Pack	Outside Kink Lead Tape & Reel Pack	Outside Kink Lead Flat Box Pack
FMOV05471-UKBO	FMOV05471-UKBOXXX	FMOV05471-UKTO	FMOV05471-UKAO

Inside Kink Lead Bulk Pack	Inside Kink Lead (Short Cut) Bulk Pack	Inside Kink Lead Tape & Reel Pack	Inside Kink Lead Flat Box Pack
FMOV05471-UKBK	FMOV05471-UKBKXXX	FMOV05471-UKTK	FMOV05471-UKAK

In Line Kink Lead Bulk Pack	In Line Kink Lead (Short Cut) Bulk Pack	In Line Kink Lead Tape& Reel Pack	In Line Kink Lead Flat Box Pack
FMOV05471-UKBI	FMOV05471-UKBIXXX	FMOV05471-UKTI	FMOV05471-UKAI

 FUZETEC TECHNOLOGY CO., LTD.	NO.	FMOV07-U Series		
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MOV Varistor Device: FMOV07-U Series (Preliminary)

1. Device Ratings and Characteristics

Part Number	Maximum Continuous Voltage		Varistor Voltage (@1mA)			Maximum Clamping Voltage @Test Current (@8/20μs)		Maximum Energy (@10/1000μs)	Maximum Peak Current (@8/20μs)	Rated Power	Typical Capacitance (@1KHz)
	ACrms(V)	DC(V)	Vn(Vdc)	Min.	Max.	Vc(V)	Ip(A)	(J)	(A)	(W)	(pF)
FMOV07201-U	130	170	200	180	220	340	25	26	2500	0.3	220
FMOV07221-U	140	180	220	198	242	360	25	30	2500	0.3	210
FMOV07241-U	150	200	240	216	264	395	25	33	2500	0.3	190
FMOV07271-U	175	225	270	243	297	455	25	39	2500	0.3	165
FMOV07301-U	195	250	300	270	330	500	25	42	2500	0.3	155
FMOV07331-U	215	275	330	297	363	550	25	44	2500	0.3	145
FMOV07361-U	230	300	360	324	396	595	25	50	2500	0.3	145
FMOV07391-U	250	320	390	351	429	650	25	53	2500	0.3	145
FMOV07431-U	275	350	430	387	473	710	25	60	2500	0.3	130
FMOV07471-U	300	385	470	423	517	775	25	65	2500	0.3	110
FMOV07511-U	320	420	510	459	561	845	25	70	2500	0.3	100
FMOV07561-U	350	460	560	504	616	915	25	75	2500	0.3	100
FMOV07621-U	395	510	620	558	682	1020	25	80	2500	0.3	100
FMOV07681-U	420	560	680	612	748	1120	25	85	2500	0.3	90
FMOV07751-U	465	615	750	675	825	1235	25	92	2500	0.3	90
FMOV07781-U	485	640	780	702	858	1290	25	102	2500	0.3	90
FMOV07821-U	510	670	820	738	902	1355	25	115	2500	0.3	80

2. Agency Approvals

Agency	Agency Approvals	Certificate No.
	UL1449 4 th & cUL	In Process
	IEC 61051-1:2007 IEC 61051-2:1991 IEC 61051-2:1991/AMD1:2009 IEC 61051-2-2:1991 IEC 62368-1:2018/G.8.1 IEC 60950-1:2005/AMD1:2009/AMD2:2013, Annex Q	In Process

NOTE : Specification subject to change without notice.

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 FUZETEC TECHNOLOGY CO., LTD.	NO.	FMOV07-U Series		
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3. Reliability

Characteristics	Standard	Test Conditions	Specifications
Robustness of terminations	IEC 60068-2-21 Test Ua1	F = 10 N (d ≤ 0.8 mm) , F = 20 N (d = 1 mm)	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage
Solderability	IEC 60068-2-20 Test Ta (Method 1)	T = 235±5°C, d = 2±0.5s	Approximately ≥ 95%
Resistance to soldering heat	IEC 60068-2-20 Test Tb (Method 1A)	T = 260±5°C, d = 10±1s	$\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Shock	IEC 60068-2-27 Test Ea	Pulse shape: half-sine. a = 490 m/s ² , d = 11ms. N = 6 x 3 shocks	$\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Vibration	IEC 60068-2-6 Test Fc Method B4	Frequency range: 10 Hz to 55 Hz ,a = 0.75 mm or 98 m/s ² (whichever is the less), d = 3x2 h	$\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Needle flame test	IEC 60695-11-5	Severity: Vertical 10 s	Duration of burning: 5 s max.
Voltage under pulse condition	IEC 61051-2	At class current, 8/20 μs,	As specified in specification
Voltage proof	IEC 61051-2	Metal balls method (4.8.1.2) 2500 V, 60 s	No breakdown or flashover
Pulse current - 8/20 μs	IEC 61051-2	8/20 μs, 10 times, I _{peak} =0.25*I _{max}	$\Delta V/V \leq \pm 10\%$ No visible damage
Pulse current - 10/1000 μs	IEC 61051-2	10/1000 μs, 10 times, I _{peak} = 0.0075* I _{max}	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage
Combination pulse	IEC 62368-1	Additional test: 10 pulses (combination pulse 6KV/3KA), in one direction, 1 per min	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage U ≤ 1.1 U _{initial} Voltage proof: No breakdown or flashover
Rapid change of temperature	IEC 60068-2-14 Test Na	N = 5 cycles, d = 30 min , θA = -40±3°C, θB = 85±2°C	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage
Climatic sequence	IEC 60068-2-2 Test Ba IEC 60068-2-30 Test Db IEC 60068-2-1 Test Aa IEC 60068-2-30 Test Db	Dry heat, Test Ba:16±2h, T = 85±2°C Damp heat, Test Db first cycle :24h, T = 55±2°C Cold, Test Aa :2h, T = -40±3°C Damp heat Test Ba remaining cycles:5 cycle	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage R _{ISO} ≥ 100MΩ Voltage proof: No breakdown or flashover
Endurance at upper category temperature	IEC 61051-1 (4.21)	T: max temperature as specified , Duration: 1000 h, Voltage: max. a. c. voltage	$\Delta V/V \leq \pm 10\%$ No visible damage R _{ISO} ≥ 1000MΩ U ≤ 1,1 U _{initial}

NOTE : Specification subject to change without notice.



Characteristics	Standard	Test Conditions	Specifications
Damp heat (Steady state)	IEC 60068-2-78 Test Ca	T = 40±2°C, RH = 93(+2/-3)%, 56d , 4 specimens: No voltage applied ,Other 4 specimens: Applied voltage: 10% of the max. d. c. voltage	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$ $R_{iso} \geq 100M\Omega$
Maximum Peak Current	Specification Standard	I _{max} , 8/20 μs, 1 time.	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$ No visible damage
Nominal Discharge Current Test	UL1449 4th	I _n , 8/20 μs, 15 times, Interval 60s	$\Delta V/V \leq \pm 10\%$ No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{mAat\ 85^{\circ}C} - V_{mAat\ 25^{\circ}C}}{V_{mAat\ 25^{\circ}C}} \times \frac{1}{60} \times 100(\%/^{\circ}C)$	$0.05 \leq TC \leq 0.05(\%/^{\circ}C)$
High Temperature Storage	IEC60068-2-2	1000h, T = 125±2°C	$\Delta V/V \leq \pm 5\%$ No visible damage
Max. Energy	Specification Standard	10/1000 μs, 1 times, Max. Energy	$\Delta V/V \leq \pm 10\%$ No visible damage
Operating duty cycle test *	UL1449	6 kV/3 kA combination wave surges, phase angle of 90 (+0, -15) degrees, positive polarity 8times, negative polarity 7 times, interval of 60s.	$\Delta V/V \leq \pm 10\%$ No visible damage
Surge Immunity Test *	IEC 61000-4-5	4kV/2kA combination wave surges, phase angle of 90 (+0, -15) degrees, positive polarity 20times, negative polarity 20times, interval of 60s.	$\Delta V/V \leq \pm 10\%$ No visible damage

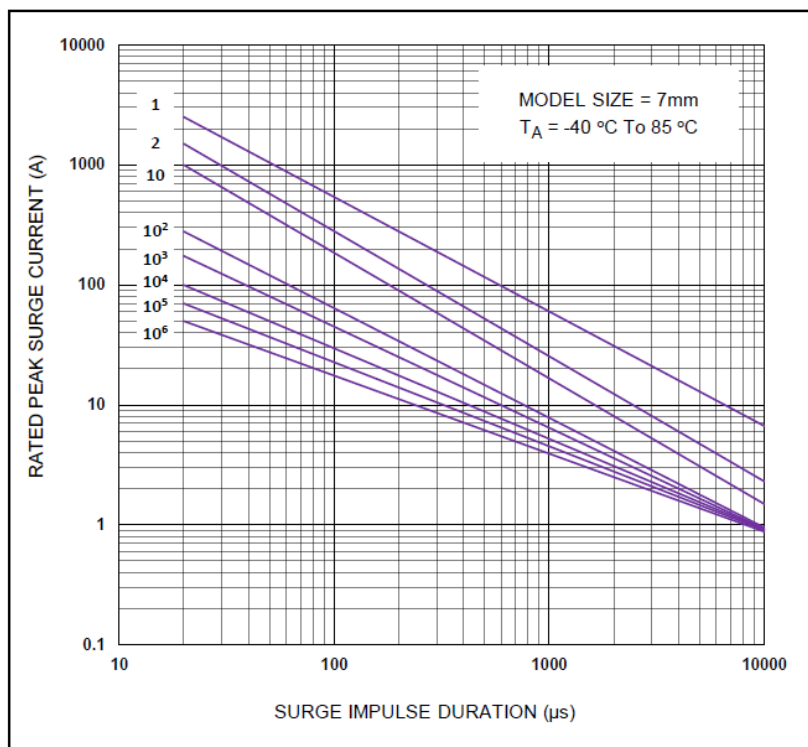
* (According to customer requirements to meet the test items)



4. Impulse Life Time Rating Curves

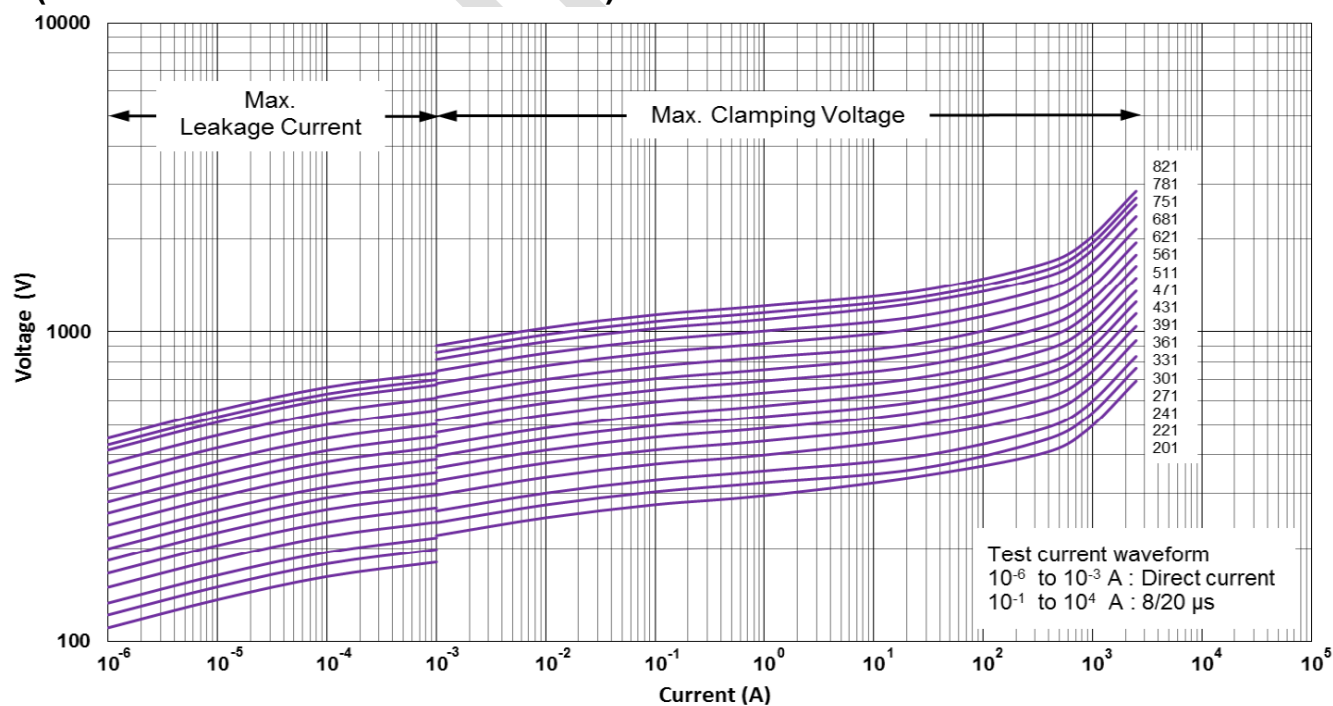
FMOV07-U Series

FMOV07201-U to FMOV07821-U



5. V-I Curves

(FMOV07201-U to FMOV07821-U)

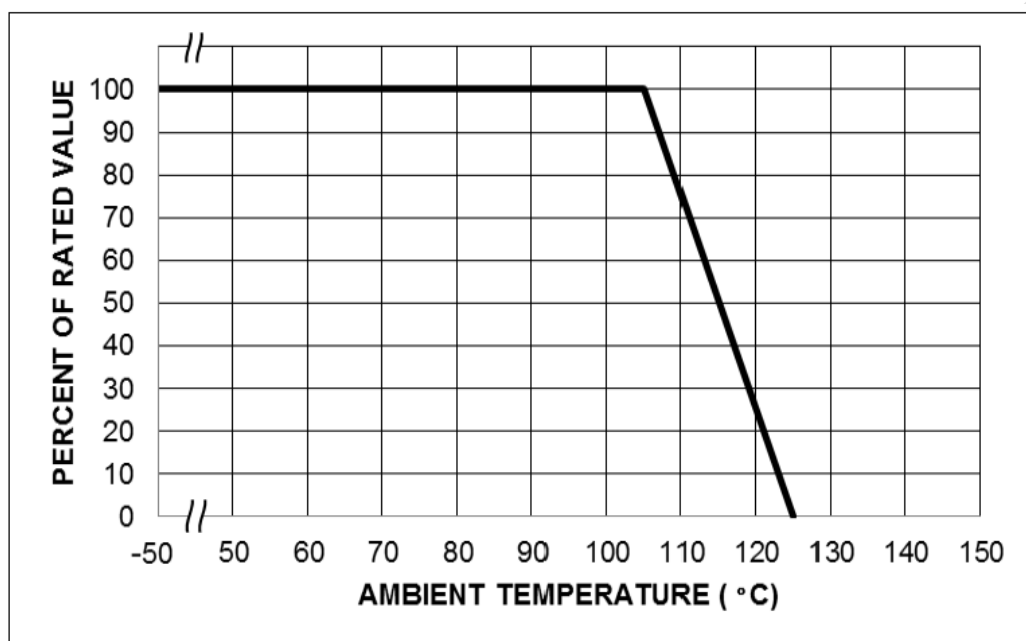


NOTE : Specification subject to change without notice.

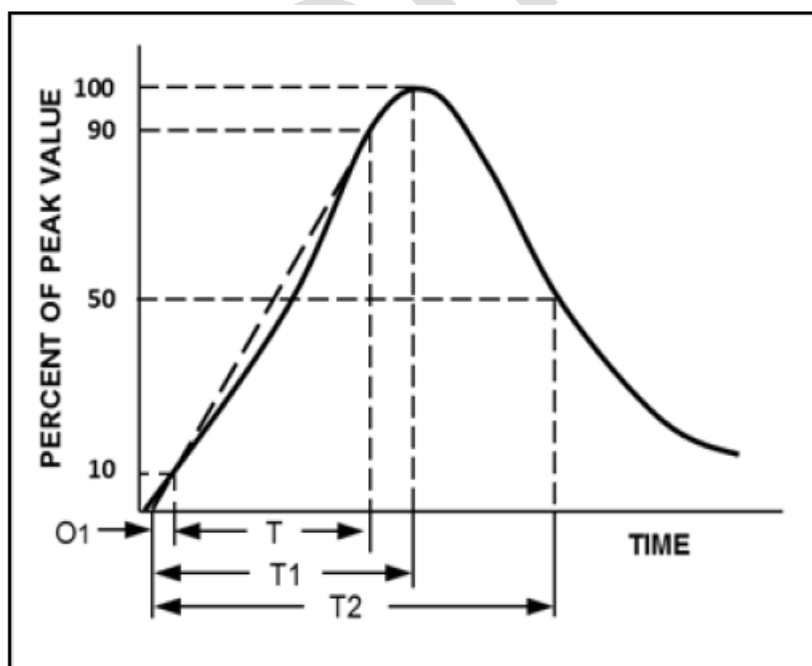


6. Power Derating Curve

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



7. Surge Current Standard Waveform



O1 = Virtual Origin of Wave

T = Time from 10% to 90% of Peak

T1 = Rise Time = $1.25 \times T$

T2 = Decay Time

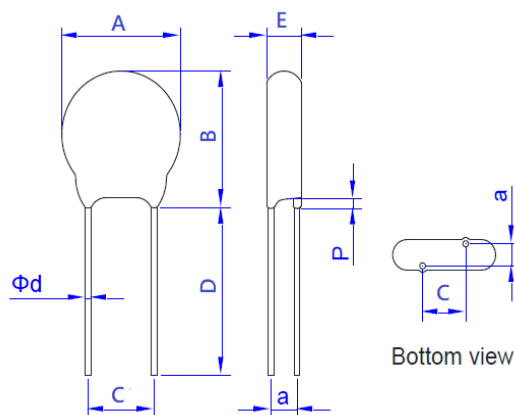
Example - For an 8/20 μ s Current Waveform:

8μ s = T1 = Rise Time

20μ s = T2 = Decay Time

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8. Dimension of Component for Standard Product

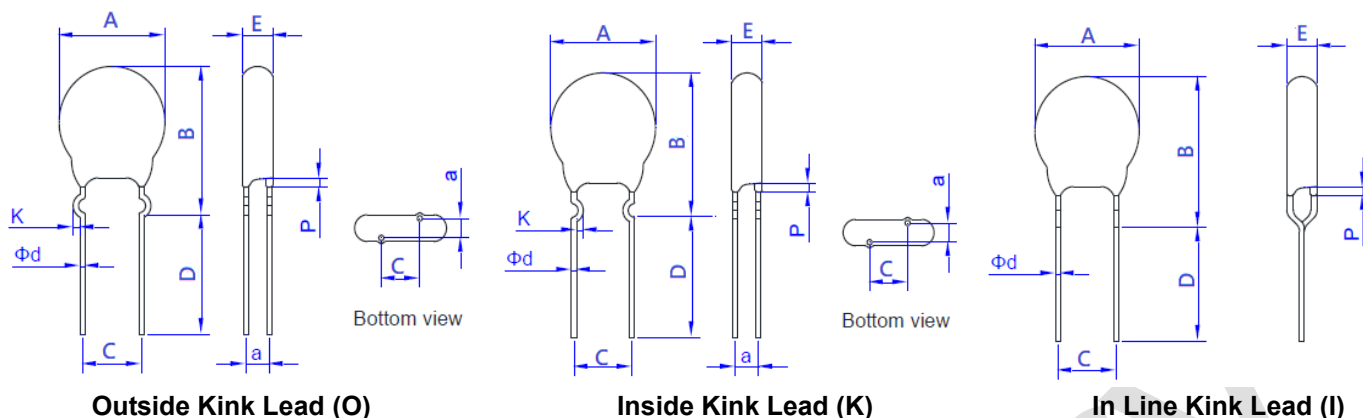


Straight Lead Type (S)

Part Number	A		B	C	D	E	P	a	Φd
	Min.	Max.	Max.	±1.0	Typ.	Max.	Max.	±1.0	±0.05
FMOV07201-U	7.5	9.0	12.0	5.0	25.0	4.0	3.0	2.0	0.60
FMOV07221-U	7.5	9.0	12.0	5.0	25.0	4.1	3.0	2.1	0.60
FMOV07241-U	7.5	9.0	12.0	5.0	25.0	4.2	3.0	2.2	0.60
FMOV07271-U	7.5	9.0	12.0	5.0	25.0	4.5	3.0	2.3	0.60
FMOV07301-U	7.5	9.0	12.0	5.0	25.0	4.7	3.0	2.5	0.60
FMOV07331-U	7.5	9.0	12.0	5.0	25.0	4.8	3.0	2.7	0.60
FMOV07361-U	7.5	9.0	12.0	5.0	25.0	4.9	3.0	2.8	0.60
FMOV07391-U	7.5	9.0	12.0	5.0	25.0	5.1	3.0	3.0	0.60
FMOV07431-U	7.5	9.0	12.0	5.0	25.0	5.4	3.0	3.2	0.60
FMOV07471-U	7.5	9.0	12.0	5.0	25.0	5.5	3.0	3.4	0.60
FMOV07511-U	7.5	9.0	12.0	5.0	25.0	5.7	3.0	3.7	0.60
FMOV07561-U	7.5	9.0	12.0	5.0	25.0	5.9	3.0	3.9	0.60
FMOV07621-U	7.5	9.0	12.0	5.0	25.0	6.3	3.0	4.3	0.60
FMOV07681-U	7.5	9.0	12.0	5.0	25.0	6.4	3.0	4.7	0.60
FMOV07751-U	7.5	9.0	12.0	5.0	25.0	6.6	3.0	5.1	0.60
FMOV07781-U	7.5	9.0	12.0	5.0	25.0	6.9	3.0	5.2	0.60
FMOV07821-U	7.5	9.0	12.0	5.0	25.0	7.2	3.0	5.4	0.60

Unit: mm

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Part Number	A		B	C	D	E	P	K		a	Φd
	Min.	Max.	Max.	±1.0	Typ.	Max.	Max.	Min.	Max.	±1.0	±0.05
FMOV07201-U	7.5	9.0	15.0	5.0	25.0	4.0	3.0	0.8	1.6	2.0	0.60
FMOV07221-U	7.5	9.0	15.0	5.0	25.0	4.1	3.0	0.8	1.6	2.1	0.60
FMOV07241-U	7.5	9.0	15.0	5.0	25.0	4.2	3.0	0.8	1.6	2.2	0.60
FMOV07271-U	7.5	9.0	15.0	5.0	25.0	4.5	3.0	0.8	1.6	2.3	0.60
FMOV07301-U	7.5	9.0	15.0	5.0	25.0	4.7	3.0	0.8	1.6	2.5	0.60
FMOV07331-U	7.5	9.0	15.0	5.0	25.0	4.8	3.0	0.8	1.6	2.7	0.60
FMOV07361-U	7.5	9.0	15.0	5.0	25.0	4.9	3.0	0.8	1.6	2.8	0.60
FMOV07391-U	7.5	9.0	15.0	5.0	25.0	5.1	3.0	0.8	1.6	3.0	0.60
FMOV07431-U	7.5	9.0	15.0	5.0	25.0	5.4	3.0	0.8	1.6	3.2	0.60
FMOV07471-U	7.5	9.0	15.0	5.0	25.0	5.5	3.0	0.8	1.6	3.4	0.60
FMOV07511-U	7.5	9.0	15.0	5.0	25.0	5.7	3.0	0.8	1.6	3.7	0.60
FMOV07561-U	7.5	9.0	15.0	5.0	25.0	5.9	3.0	0.8	1.6	3.9	0.60
FMOV07621-U	7.5	9.0	15.0	5.0	25.0	6.3	3.0	0.8	1.6	4.3	0.60
FMOV07681-U	7.5	9.0	15.0	5.0	25.0	6.4	3.0	0.8	1.6	4.7	0.60
FMOV07751-U	7.5	9.0	15.0	5.0	25.0	6.6	3.0	0.8	1.6	5.1	0.60
FMOV07781-U	7.5	9.0	15.0	5.0	25.0	6.9	3.0	0.8	1.6	5.2	0.60
FMOV07821-U	7.5	9.0	15.0	5.0	25.0	7.2	3.0	0.8	1.6	5.4	0.60

Unit: mm

NOTE : Specification subject to change without notice.

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9. Tape and Reel Specifications

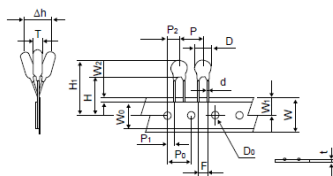


Figure: A

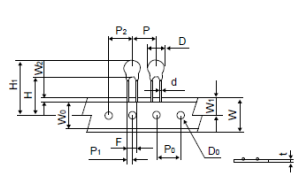


Figure: B

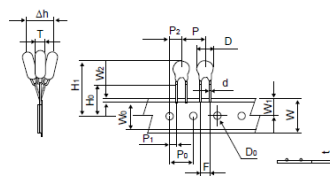


Figure: C

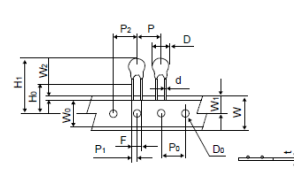


Figure: D

Straight Leads

Inline Kink Leads

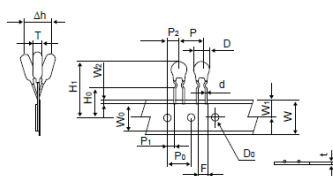


Figure: E

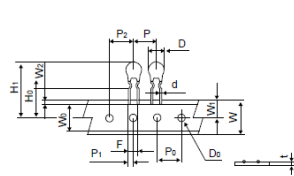


Figure: F

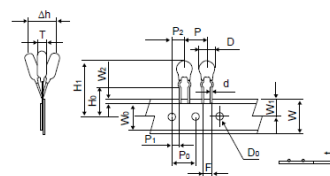


Figure: G

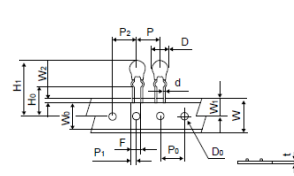


Figure: H

Inside Kink Leads

Outside Kink Leads

Symbol	Parameter	FMOV07-U Series
P	Pitch of Component	12.7±1.0
P0	Feed Hole Pitch	12.7±0.2
P1	Feed Hole Center Lead	3.85±0.7
P2	Hole center to Component Center	6.35±0.7
F	Lead to Lead Distance	5.0±0.8
Δh	Component Alignment	2.0 Max
W	Tape Width	18.0+1.0 -0.5
W0	Hold Down Tape Width	5.0 Min
W1	Hole Position	9.0+0.75 -0.50
W2	Hold Down Tape Position	3.0 Max
H	Height from Tape Center to Component Base	18.0+2.0 -0
H0	Seating Plane Height	16.0±0.5
H1	Component Height	32.0 Max
D0	Feed Hole Diameter	4.0±0.2
t	Total Tape Thickness	0.7±0.2
L	Length of Clipped Lead	11.0 Max
Figure		ACEG

Unit: mm

NOTE : Specification subject to change without notice.

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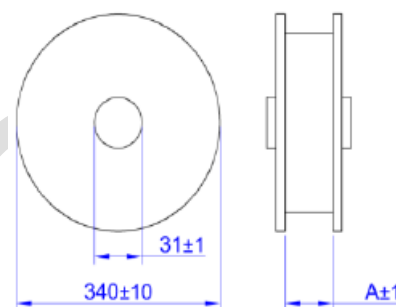
10. Packaging Specifications

Bulk Product Packing

Series	Straight Lead Type Quantity (pcs/bag)	Outside Kink Lead Type Quantity (pcs/bag)	Inside Kink Lead Type Quantity (pcs/bag)	In Line Kink Lead Type Quantity (pcs/bag)
FMOV07-U Series	1000	1000	1000	1000

Tape & Reel Product Packing

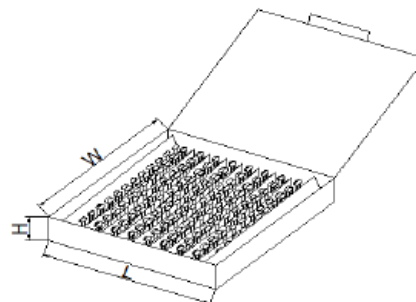
Series	A (mm)	Quantity (pcs/reel)
FMOV07(180~391)-U-T-	43	2000
FMOV07(431~821)-U-T-		1500



Box Product Packing

Series	Quantity (pcs/reel)
FMOV07(180~621)-U-A-	1000
FMOV07(681~821)-U-A-	800

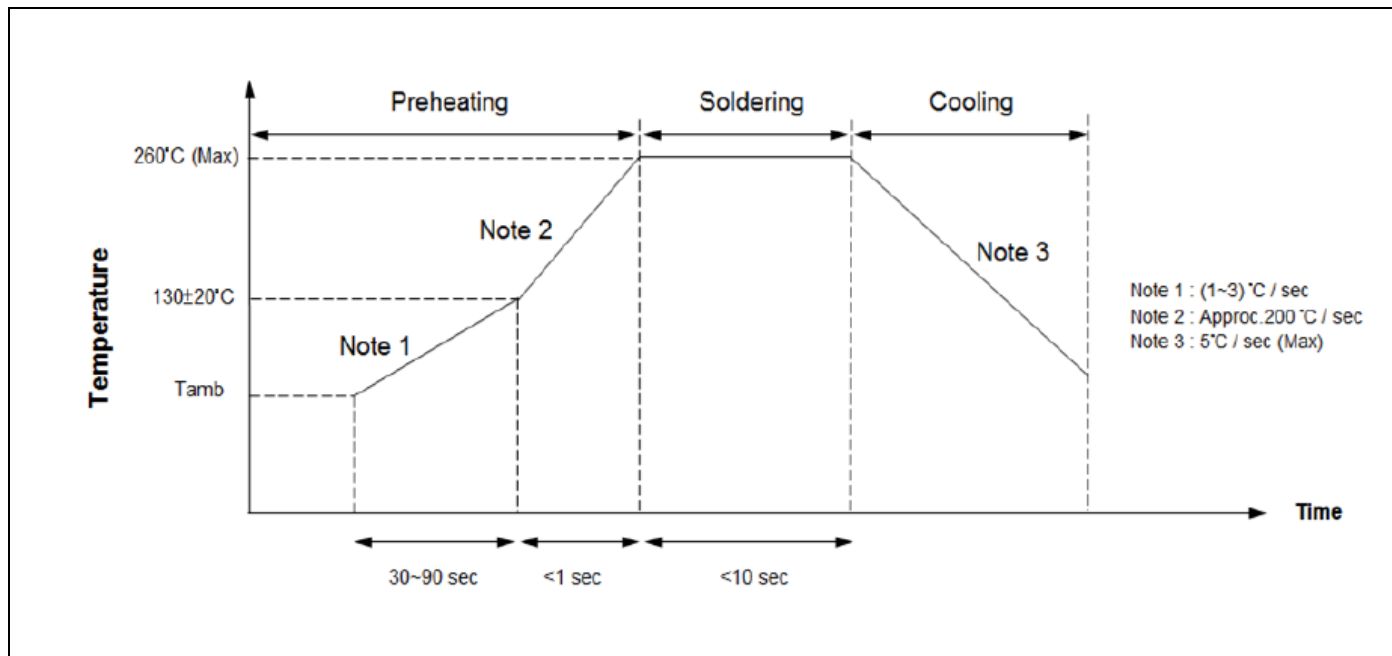
Series	L±5	W±5	H±5
FMOV07-U Series	340	245	45



NOTE : Specification subject to change without notice.



11. Solder Recommendation



Recommendation Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of soldering Iron-tip	360°C (Max)
Soldering Time	3 sec (Max)
Distance from Varistor	2mm (Min)

RoHS Compliant Declaration

We hereby declare that the components delivered to your company are compliant with RoHS Directive 2002/95/EC

Storage Conditions of Products

(I) Storage Conditions:

- Storage Temperature: -10°C ~ +40°C
- Relative Humidity: ≤ 75%RH
- Keep away from corrosive atmosphere and sunlight
- Solvent Resistance: MIL-STD-202, Method 215F
- Moisture Sensitivity: Level 1, J-STD-020

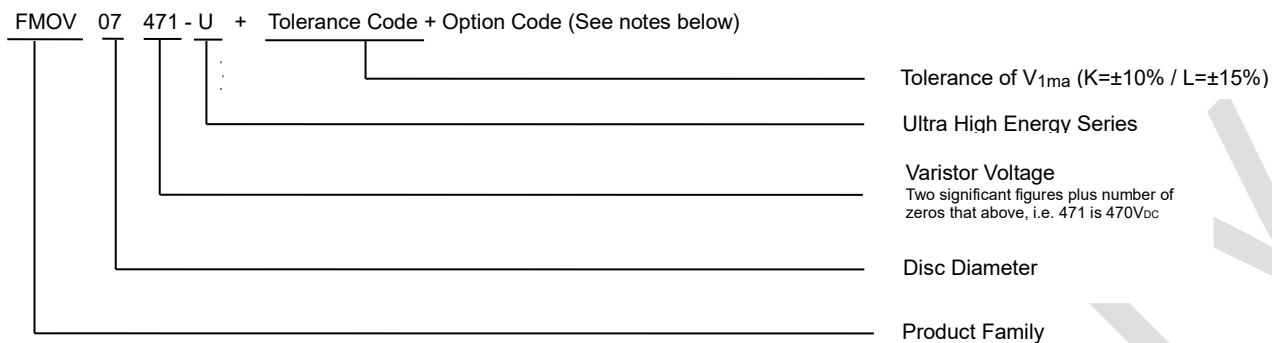
(II) Period of Storage: 1 year

NOTE : Specification subject to change without notice.

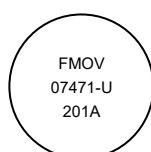


12. Part Numbering and Marking System

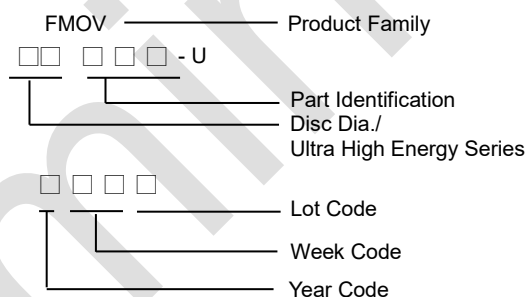
Part Numbering System



Marking System



Example



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13. Order Notes:

Main Part Code:

Part No + Tolerance Code + Packaging + Lead Type Designators + Option Code

Ordering examples:

Straight Lead Bulk Pack (Standard)	Straight Lead (Short Cut) Bulk Pack	Straight Lead Tape & Reel Pack	Straight Lead Flat Box Pack
FMOV07471-UKBS	FMOV07471-UKBSXXX	FMOV07471-UKTS	FMOV07471-UKAS

Outside Kink Lead Bulk Pack	Outside Kink Lead (Short Cut) Bulk Pack	Outside Kink Lead Tape & Reel Pack	Outside Kink Lead Flat Box Pack
FMOV07471-UKBO	FMOV07471-UKBOXXX	FMOV07471-UKTO	FMOV07471-UKAO

Inside Kink Lead Bulk Pack	Inside Kink Lead (Short Cut) Bulk Pack	Inside Kink Lead Tape & Reel Pack	Inside Kink Lead Flat Box Pack
FMOV07471-UKBK	FMOV07471-UKBKXXX	FMOV07471-UKTK	FMOV07471-UKAK

In Line Kink Lead Bulk Pack	In Line Kink Lead (Short Cut) Bulk Pack	In Line Kink Lead Tape& Reel Pack	In Line Kink Lead Flat Box Pack
FMOV07471-UKBI	FMOV07471-UKBIXXX	FMOV07471-UKTI	FMOV07471-UKAI

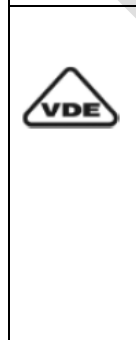
 FUZETEC TECHNOLOGY CO., LTD.	NO.	FMOV10-U Series		
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MOV Varistor Device: FMOV10-U Series (Preliminary)

1. Device Ratings and Characteristics

Part Number	Maximum Continuous Voltage		Varistor Voltage (@1mA)			Maximum Clamping Voltage @Test Current (@8/20μs)		Maximum Energy (@10/1000μs)	Maximum Peak Current (@8/20μs)	Rated Power	Typical Capacitance (@1KHz)
	ACrms(V)	DC(V)	Vn(Vdc)	Min.	Max.	Vc(V)	Ip(A)	(J)	(A)	(W)	(pF)
FMOV10201-U	130	170	200	180	220	340	50	52	4500	0.5	420
FMOV10221-U	140	180	220	198	242	360	50	58	4500	0.5	390
FMOV10241-U	150	200	240	216	264	395	50	64	4500	0.5	360
FMOV10271-U	175	225	270	243	297	455	50	67	4500	0.5	330
FMOV10301-U	195	250	300	270	330	500	50	70	4500	0.5	300
FMOV10331-U	215	275	330	297	363	550	50	78	4500	0.5	270
FMOV10361-U	230	300	360	324	396	595	50	84	4500	0.5	250
FMOV10391-U	250	320	390	351	429	650	50	91	4500	0.5	230
FMOV10431-U	275	350	430	387	473	710	50	99	4500	0.5	220
FMOV10471-U	300	385	470	423	517	775	50	107	4500	0.5	200
FMOV10511-U	320	420	510	459	561	845	50	117	4500	0.5	190
FMOV10561-U	350	460	560	504	616	915	50	125	4500	0.5	180
FMOV10621-U	395	510	620	558	682	1020	50	128	4500	0.5	160
FMOV10681-U	420	560	680	612	748	1120	50	134	4500	0.5	140
FMOV10751-U	465	615	750	675	825	1235	50	146	4500	0.5	130
FMOV10781-U	485	640	780	702	858	1290	50	154	4500	0.5	120
FMOV10821-U	510	670	820	738	902	1355	50	161	4500	0.5	110
FMOV10911-U	550	745	910	819	1001	1500	50	168	4500	0.5	80
FMOV10102-U	625	825	1000	900	1100	1650	50	182	4500	0.5	60
FMOV10112-U	680	895	1100	990	1210	1815	50	196	4500	0.5	50

2. Agency Approvals

Agency	Agency Approvals	Certificate No.
	UL1449 4 th & cUL	In Process
	IEC 61051-1:2007 IEC 61051-2:1991 IEC 61051-2:1991/AMD1:2009 IEC 61051-2-2:1991 IEC 62368-1:2018/G.8.1 IEC 60950-1:2005/AMD1:2009/AMD2:2013, Annex Q	In Process

NOTE : Specification subject to change without notice.

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3. Reliability

Characteristics	Standard	Test Conditions	Specifications
Robustness of terminations	IEC 60068-2-21 Test Ua1	F = 10 N (d ≤ 0.8 mm) , F = 20 N (d = 1 mm)	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage
Solderability	IEC 60068-2-20 Test Ta (Method 1)	T = 235±5°C, d = 2±0.5s	Approximately ≥ 95%
Resistance to soldering heat	IEC 60068-2-20 Test Tb (Method 1A)	T = 260±5°C, d = 10±1s	$\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Shock	IEC 60068-2-27 Test Ea	Pulse shape: half-sine. a = 490 m/s ² , d = 11ms. N = 6 x 3 shocks	$\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Vibration	IEC 60068-2-6 Test Fc Method B4	Frequency range: 10 Hz to 55 Hz ,a = 0.75 mm or 98 m/s ² (whichever is the less), d = 3x2 h	$\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Needle flame test	IEC 60695-11-5	Severity: Vertical 10 s	Duration of burning: 5 s max.
Voltage under pulse condition	IEC 61051-2	At class current, 8/20 μs,	As specified in specification
Voltage proof	IEC 61051-2	Metal balls method (4.8.1.2) 2500 V, 60 s	No breakdown or flashover
Pulse current - 8/20 μs	IEC 61051-2	8/20 μs, 10 times, I _{peak} =0.25*I _{max}	$\Delta V/V \leq \pm 10\%$ No visible damage
Pulse current - 10/1000 μs	IEC 61051-2	10/1000 μs, 10 times, I _{peak} = 0.0075* I _{max}	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage
Combination pulse	IEC 62368-1	Additional test: 10 pulses (combination pulse 6KV/3KA), in one direction, 1 per min	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage U ≤ 1.1 U _{initial} Voltage proof: No breakdown or flashover
Rapid change of temperature	IEC 60068-2-14 Test Na	N = 5 cycles, d = 30 min , θA = -40±3°C, θB = 85±2°C	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage
Climatic sequence	IEC 60068-2-2 Test Ba IEC 60068-2-30 Test Db IEC 60068-2-1 Test Aa IEC 60068-2-30 Test Db	Dry heat, Test Ba:16±2h, T = 85±2°C Damp heat, Test Db first cycle :24h, T = 55±2°C Cold, Test Aa :2h, T = -40±3°C Damp heat Test Ba remaining cycles:5 cycle	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage R _{ISO} ≥ 100MΩ Voltage proof: No breakdown or flashover
Endurance at upper category temperature	IEC 61051-1 (4.21)	T: max temperature as specified , Duration: 1000 h, Voltage: max. a. c. voltage	$\Delta V/V \leq \pm 10\%$ No visible damage R _{ISO} ≥ 1000MΩ U ≤ 1,1 U _{initial}

NOTE : Specification subject to change without notice.

 FUZETEC TECHNOLOGY CO., LTD.	NO.	FMOV10-U Series		
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Characteristics	Standard	Test Conditions	Specifications
Damp heat (Steady state)	IEC 60068-2-78 Test Ca	T = 40±2°C, RH = 93(+2/-3)%, 56d , 4 specimens: No voltage applied ,Other 4 specimens: Applied voltage: 10% of the max. d. c. voltage	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$ $R_{iso} \geq 100M\Omega$
Maximum Peak Current	Specification Standard	I _{max} , 8/20 μs, 1 time.	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$ No visible damage
Nominal Discharge Current Test	UL1449 4th	I _n , 8/20 μs, 15 times, Interval 60s	$\Delta V/V \leq \pm 10\%$ No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{mAat\ 85^{\circ}C} - V_{mAat\ 25^{\circ}C}}{V_{mAat\ 25^{\circ}C}} \times \frac{1}{60} \times 100(\%/^{\circ}C)$	$0.05 \leq TC \leq 0.05(\%/^{\circ}C)$
High Temperature Storage	IEC60068-2-2	1000h, T = 125±2°C	$\Delta V/V \leq \pm 5\%$ No visible damage
Max. Energy	Specification Standard	10/1000 μs, 1 times, Max. Energy	$\Delta V/V \leq \pm 10\%$ No visible damage
Operating duty cycle test *	UL1449	6 kV/3 kA combination wave surges, phase angle of 90 (+0, -15) degrees, positive polarity 8times, negative polarity 7 times, interval of 60s.	$\Delta V/V \leq \pm 10\%$ No visible damage
Surge Immunity Test *	IEC 61000-4-5	4kV/2kA combination wave surges, phase angle of 90 (+0, -15) degrees, positive polarity 20times, negative polarity 20times, interval of 60s.	$\Delta V/V \leq \pm 10\%$ No visible damage

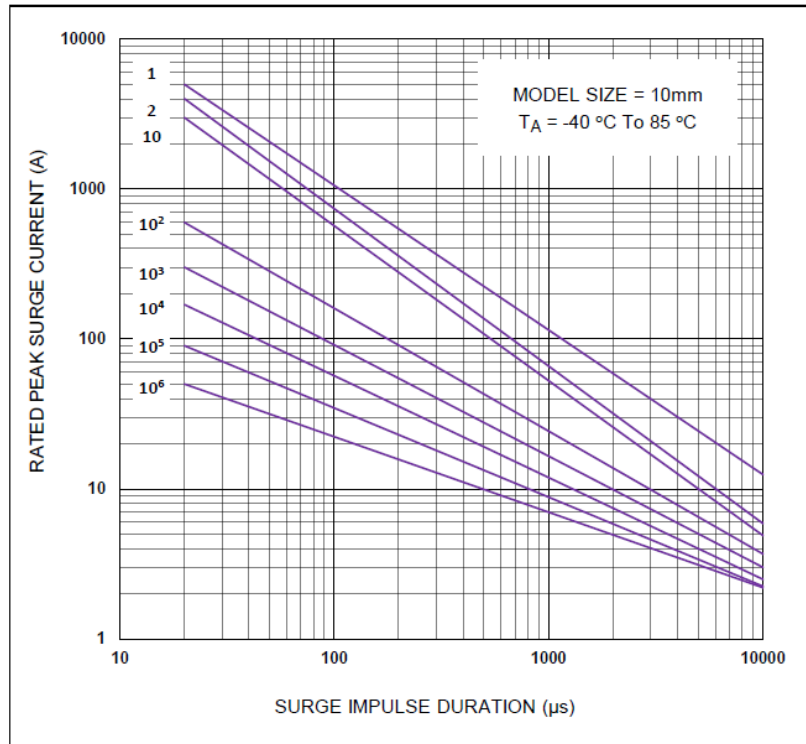
* (According to customer requirements to meet the test items)



4. Impulse Life Time Rating Curves

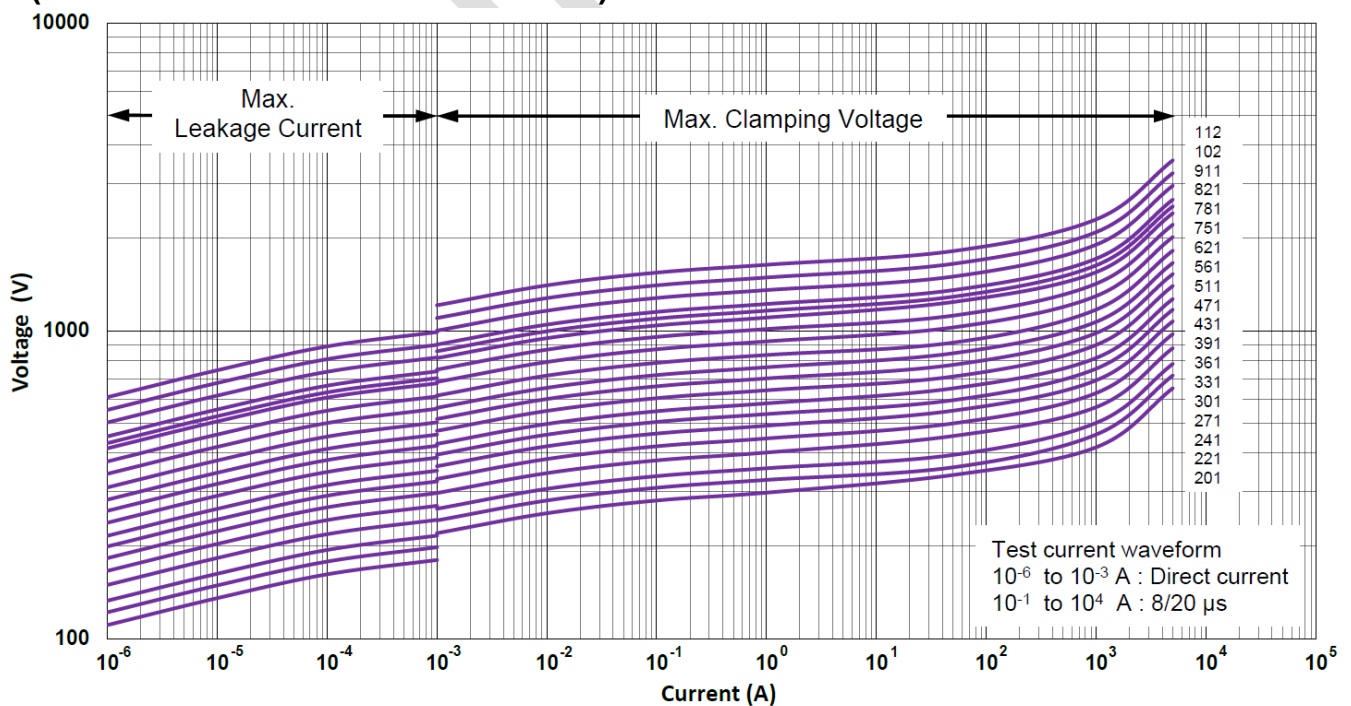
FMOV10-U Series

FMOV10201-U to FMOV10112-U



5. V-I Curves

(FMOV10201-U to FMOV10112-U)

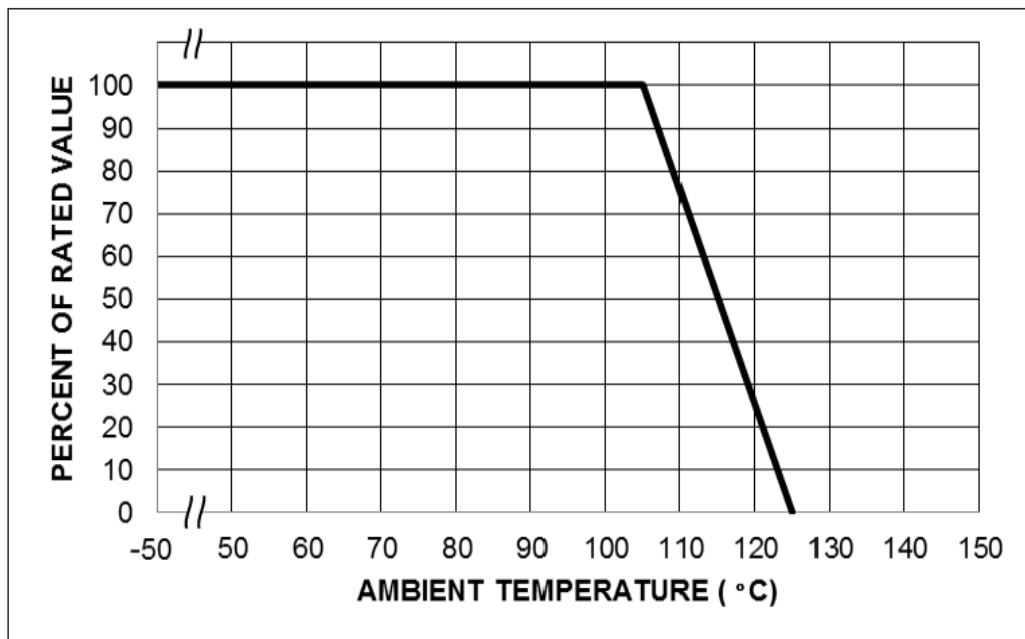


NOTE : Specification subject to change without notice.

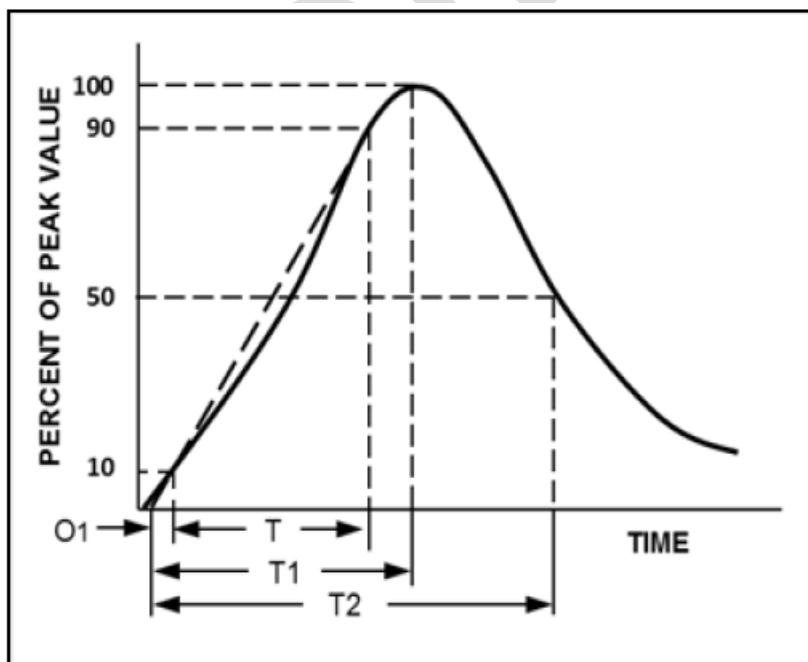


6. Power Derating Curve

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



7. Surge Current Standard Waveform



O1 = Virtual Origin of Wave

T = Time from 10% to 90% of Peak

T1 = Rise Time = $1.25 \times T$

T2 = Decay Time

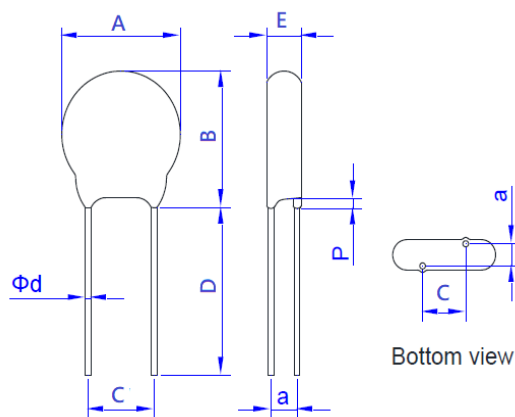
Example - For an 8/20 μ s Current Waveform:

8μ s = T1 = Rise Time

20μ s = T2 = Decay Time

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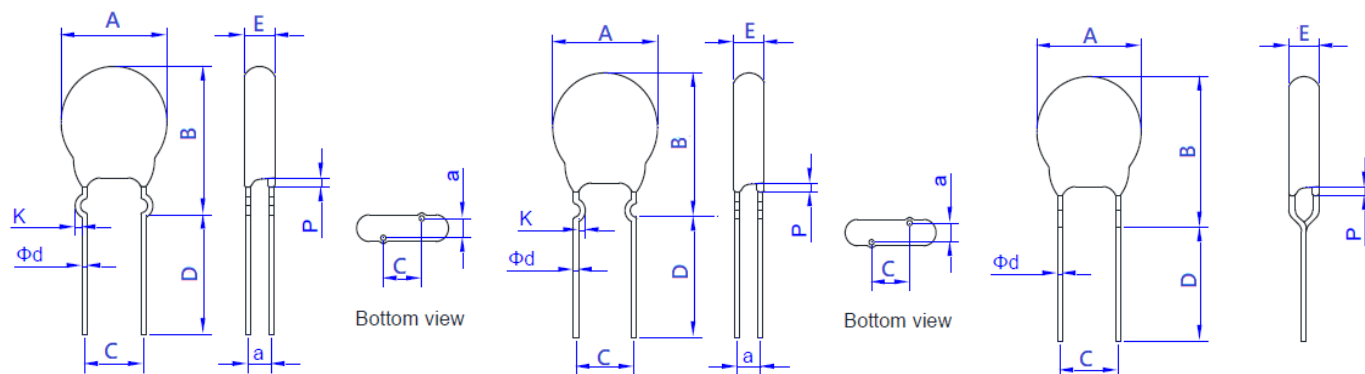
8. Dimension of Component for Standard Product



Straight Lead Type (S)

Part Number	A		B	C	D	E	P	a	Φd
	Min.	Max.	Max.	±1.0	Typ.	Max.	Max.	±1.0	±0.05
FMOV10201-U	10.5	14.0	17.0	7.5	25.0	4.5	3.0	2.0	0.80
FMOV10221-U	10.5	14.0	17.0	7.5	25.0	4.6	3.0	2.1	0.80
FMOV10241-U	10.5	14.0	17.0	7.5	25.0	4.7	3.0	2.2	0.80
FMOV10271-U	10.5	14.0	17.0	7.5	25.0	4.8	3.0	2.3	0.80
FMOV10301-U	10.5	14.0	17.0	7.5	25.0	4.9	3.0	2.5	0.80
FMOV10331-U	10.5	14.0	17.0	7.5	25.0	5.1	3.0	2.7	0.80
FMOV10361-U	10.5	14.0	17.0	7.5	25.0	5.4	3.0	2.8	0.80
FMOV10391-U	10.5	14.0	17.0	7.5	25.0	5.5	3.0	3.0	0.80
FMOV10431-U	10.5	14.0	17.0	7.5	25.0	5.7	3.0	3.2	0.80
FMOV10471-U	10.5	14.0	17.0	7.5	25.0	5.9	3.0	3.4	0.80
FMOV10511-U	10.5	14.0	17.0	7.5	25.0	6.1	3.0	3.7	0.80
FMOV10561-U	10.5	14.0	17.0	7.5	25.0	6.3	3.0	3.9	0.80
FMOV10621-U	10.5	14.0	17.0	7.5	25.0	6.5	3.0	4.3	0.80
FMOV10681-U	10.5	14.0	17.0	7.5	25.0	6.6	3.0	4.7	0.80
FMOV10751-U	10.5	14.0	17.0	7.5	25.0	6.8	3.0	5.1	0.80
FMOV10781-U	10.5	14.0	17.0	7.5	25.0	7.2	3.0	5.2	0.80
FMOV10821-U	10.5	14.0	17.0	7.5	25.0	7.4	3.0	5.4	0.80
FMOV10911-U	10.5	14.0	17.0	7.5	25.0	7.5	3.0	5.9	0.80
FMOV10102-U	10.5	14.0	17.0	7.5	25.0	8.0	3.0	6.5	0.80
FMOV10112-U	10.5	14.0	17.0	7.5	25.0	8.9	3.0	7.1	0.80

Unit: mm



Outside Kink Lead (O)

Inside Kink Lead (K)

In Line Kink Lead (I)

Part Number	A		B	C	D	E	P	K		a	Φd
	Min.	Max.	Max.	±1.0	Typ.	Max.	Max.	Min.	Max.	±1.0	±0.05
FMOV10201-U	10.5	14.0	19.5	7.5	25.0	4.5	3.0	1.0	1.8	2.0	0.80
FMOV10221-U	10.5	14.0	19.5	7.5	25.0	4.6	3.0	1.0	1.8	2.1	0.80
FMOV10241-U	10.5	14.0	19.5	7.5	25.0	4.7	3.0	1.0	1.8	2.2	0.80
FMOV10271-U	10.5	14.0	19.5	7.5	25.0	4.8	3.0	1.0	1.8	2.3	0.80
FMOV10301-U	10.5	14.0	20.5	7.5	25.0	4.9	3.0	1.0	1.8	2.5	0.80
FMOV10331-U	10.5	14.0	20.5	7.5	25.0	5.1	3.0	1.0	1.8	2.7	0.80
FMOV10361-U	10.5	14.0	20.5	7.5	25.0	5.4	3.0	1.0	1.8	2.8	0.80
FMOV10391-U	10.5	14.0	20.5	7.5	25.0	5.5	3.0	1.0	1.8	3.0	0.80
FMOV10431-U	10.5	14.0	20.5	7.5	25.0	5.7	3.0	1.0	1.8	3.2	0.80
FMOV10471-U	10.5	14.0	20.5	7.5	25.0	5.9	3.0	1.0	1.8	3.4	0.80
FMOV10511-U	10.5	14.0	20.5	7.5	25.0	6.1	3.0	1.0	1.8	3.7	0.80
FMOV10561-U	10.5	14.0	20.5	7.5	25.0	6.3	3.0	1.0	1.8	3.9	0.80
FMOV10621-U	10.5	14.0	20.5	7.5	25.0	6.5	3.0	1.0	1.8	4.3	0.80
FMOV10681-U	10.5	14.0	20.5	7.5	25.0	6.6	3.0	1.0	1.8	4.7	0.80
FMOV10751-U	10.5	14.0	20.5	7.5	25.0	6.8	3.0	1.0	1.8	5.1	0.80
FMOV10781-U	10.5	14.0	20.5	7.5	25.0	7.2	3.0	1.0	1.8	5.2	0.80
FMOV10821-U	10.5	14.0	20.5	7.5	25.0	7.4	3.0	1.0	1.8	5.4	0.80
FMOV10911-U	10.5	14.0	20.5	7.5	25.0	7.5	3.0	1.0	1.8	5.9	0.80
FMOV10102-U	10.5	14.0	20.5	7.5	25.0	8.0	3.0	1.0	1.8	6.5	0.80
FMOV10112-U	10.5	14.0	20.5	7.5	25.0	8.9	3.0	1.0	1.8	7.1	0.80

Unit: mm



9. Tape and Reel Specifications

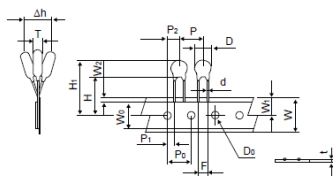


Figure: A

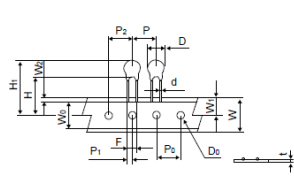


Figure: B

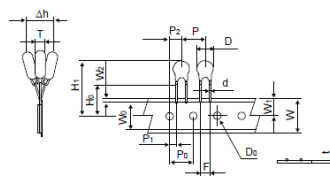


Figure: C

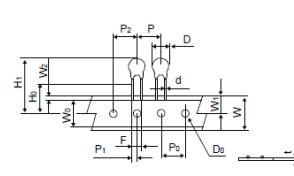


Figure: D

Straight Leads

Inline Kink Leads

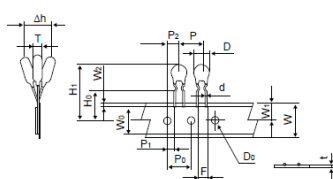


Figure: E

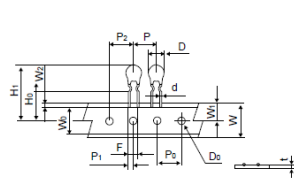


Figure: F

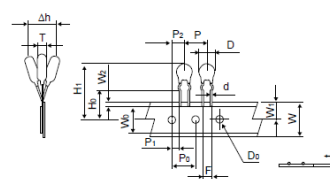


Figure: G

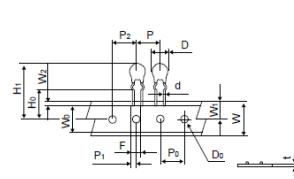


Figure: H

Inside Kink Leads

Outside Kink Leads

Symbol	Parameter	FMOV10-U Series
P	Pitch of Component	12.7±1.0
P0	Feed Hole Pitch	12.7±0.2
P1	Feed Hole Center Lead	3.85±0.7
P2	Hole center to Component Center	6.35±0.7
F	Lead to Lead Distance	7.5±0.8
Δh	Component Alignment	2.0 Max
W	Tape Width	18.0+1.0 -0.5
W0	Hold Down Tape Width	5.0 Min
W1	Hole Position	9.0+0.75 -0.50
W2	Hold Down Tape Position	3.0 Max
H	Height from Tape Center to Component Base	18.0+2.0 -0
H0	Seating Plane Height	16.0±0.5
H1	Component Height	36.0 Max
D0	Feed Hole Diameter	4.0±0.2
t	Total Tape Thickness	0.7±0.2
L	Length of Clipped Lead	11.0 Max
Figure		ACEG

Unit: mm

NOTE : Specification subject to change without notice.

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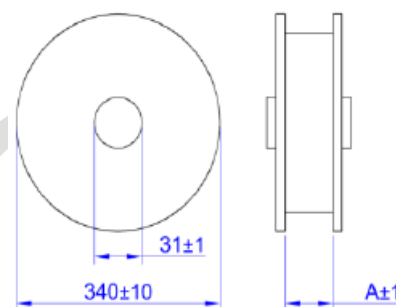
10. Packaging Specifications

Bulk Product Packing

Series	Straight Lead Type Quantity (pcs/bag)	Outside Kink Lead Type Quantity (pcs/bag)	Inside Kink Lead Type Quantity (pcs/bag)	In Line Kink Lead Type Quantity (pcs/bag)
FMOV10-U Series	500	500	500	500

Tape & Reel Product Packing

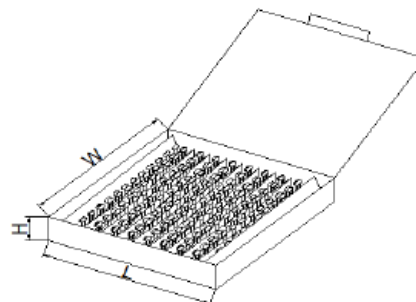
Series	A (mm)	Quantity (pcs/reel)
FMOV10(180~621)-U-T-	43	1000
FMOV10(681~112)-U-T-		800



Box Product Packing

Series	Quantity (pcs/reel)
FMOV10(180~621)-U-A-	1000
FMOV10(681~112)-U-A	800

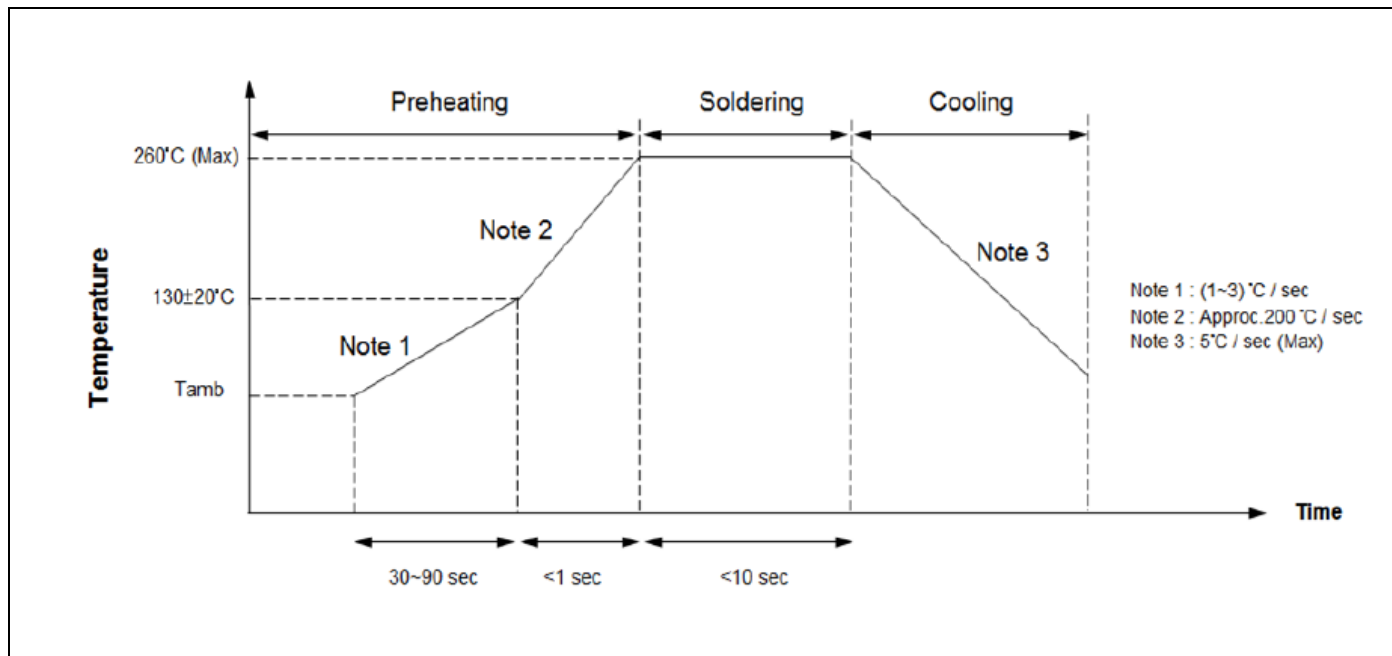
Series	L±5	W±5	H±5
FMOV10-U Series	340	245	50



NOTE : Specification subject to change without notice.



11. Solder Recommendation



Recommendation Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of soldering Iron-tip	360°C (Max)
Soldering Time	3 sec (Max)
Distance from Varistor	2mm (Min)

RoHS Compliant Declaration

We hereby declare that the components delivered to your company are compliant with RoHS Directive 2002/95/EC

Storage Conditions of Products

(I) Storage Conditions:

- Storage Temperature: -10°C ~ +40°C
- Relative Humidity: ≤ 75%RH
- Keep away from corrosive atmosphere and sunlight
- Solvent Resistance: MIL-STD-202, Method 215F
- Moisture Sensitivity: Level 1, J-STD-020

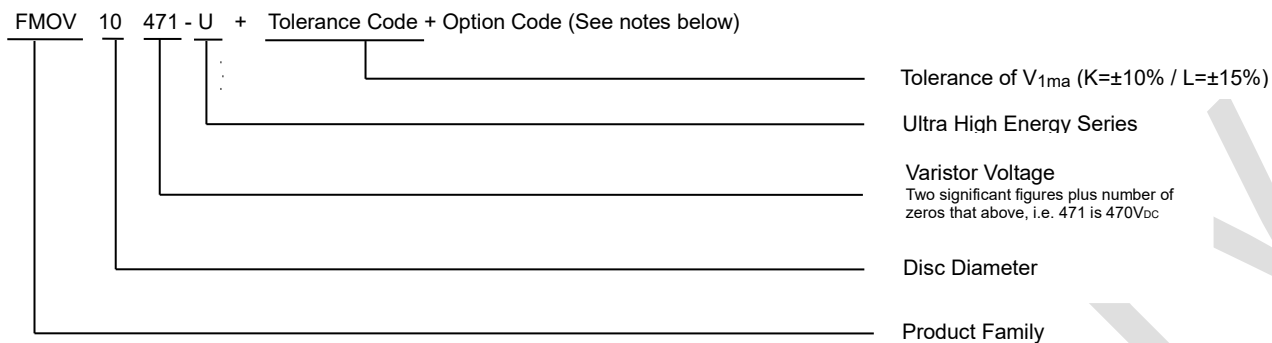
(II) Period of Storage: 1 year

NOTE : Specification subject to change without notice.

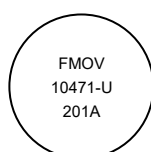


12. Part Numbering and Marking System

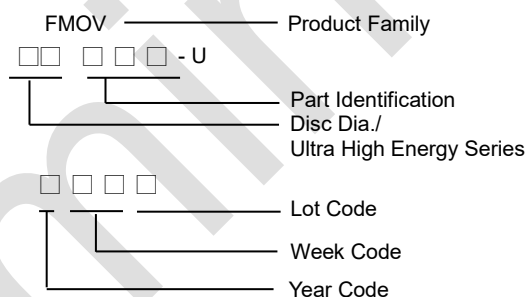
Part Numbering System



Marking System



Example



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13. Order Notes:

Main Part Code:

Part No + Tolerance Code + Packaging + Lead Type Designators + Option Code

Ordering examples:

Straight Lead Bulk Pack (Standard)	Straight Lead (Short Cut) Bulk Pack	Straight Lead Tape & Reel Pack	Straight Lead Flat Box Pack
FMOV10471-UKBS	FMOV10471-UKBSXXX	FMOV10471-UKTS	FMOV10471-UKAS

Outside Kink Lead Bulk Pack	Outside Kink Lead (Short Cut) Bulk Pack	Outside Kink Lead Tape & Reel Pack	Outside Kink Lead Flat Box Pack
FMOV10471-UKBO	FMOV10471-UKBOXXX	FMOV10471-UKTO	FMOV10471-UKAO

Inside Kink Lead Bulk Pack	Inside Kink Lead (Short Cut) Bulk Pack	Inside Kink Lead Tape & Reel Pack	Inside Kink Lead Flat Box Pack
FMOV10471-UKBK	FMOV10471-UKBKXXX	FMOV10471-UKTK	FMOV10471-UKAK

In Line Kink Lead Bulk Pack	In Line Kink Lead (Short Cut) Bulk Pack	In Line Kink Lead Tape& Reel Pack	In Line Kink Lead Flat Box Pack
FMOV10471-UKBI	FMOV10471-UKBIXXX	FMOV10471-UKTI	FMOV10471-UKAI

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MOV Varistor Device: FMOV14-U Series (Preliminary)

1. Device Ratings and Characteristics

Part Number	Maximum Continuous Voltage		Varistor Voltage (@1mA)			Maximum Clamping Voltage @Test Current (@8/20μs)		Maximum Energy (@10/1000μs)	Maximum Peak Current (@8/20μs)	Rated Power	Typical Capacitance (@1KHz)
	ACrms(V)	DC(V)	Vn(Vdc)	Min.	Max.	Vc(V)	Ip(A)	(J)	(A)	(W)	(pF)
FMOV14201-U	130	170	200	180	220	340	100	140	10000	1	860
FMOV14221-U	140	180	220	198	242	360	100	155	10000	1	810
FMOV14241-U	150	200	240	216	264	395	100	168	10000	1	860
FMOV14271-U	175	225	270	243	297	455	100	190	10000	1	700
FMOV14301-U	195	250	300	270	330	500	100	209	10000	1	640
FMOV14331-U	215	275	330	297	363	550	100	228	10000	1	580
FMOV14361-U	230	300	360	324	396	595	100	255	10000	1	530
FMOV14391-U	250	320	390	351	429	650	100	275	10000	1	480
FMOV14431-U	275	350	430	387	473	710	100	303	10000	1	430
FMOV14471-U	300	385	470	423	517	775	100	350	10000	1	380
FMOV14511-U	320	410	510	459	561	845	100	382	10000	1	350
FMOV14561-U	350	460	560	504	616	915	100	382	10000	1	320
FMOV14621-U	395	510	620	558	682	1020	100	382	10000	1	300
FMOV14681-U	420	560	680	612	748	1120	100	382	10000	1	270
FMOV14751-U	465	615	750	675	825	1235	100	420	10000	1	250
FMOV14781-U	485	640	780	702	858	1290	100	460	10000	1	240
FMOV14821-U	510	670	820	738	901	1355	100	485	10000	1	220
FMOV14911-U	550	745	910	819	1001	1500	100	510	10000	1	180
FMOV14102-U	625	825	1000	900	1100	1650	100	565	10000	1	150
FMOV14112-U	680	895	1100	990	1210	1815	100	620	10000	1	110

2. Agency Approvals

Agency	Agency Approvals	Certificate No.
	UL1449 4 th & cUL	In Process
	IEC 61051-1:2007 IEC 61051-2:1991 IEC 61051-2:1991/AMD1:2009 IEC 61051-2-2:1991 IEC 62368-1:2018/G.8.1 IEC 60950-1:2005/AMD1:2009/AMD2:2013, Annex Q	In Process

NOTE : Specification subject to change without notice.

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3. Reliability

Characteristics	Standard	Test Conditions	Specifications
Robustness of terminations	IEC 60068-2-21 Test Ua1	F = 10 N (d ≤ 0.8 mm) , F = 20 N (d = 1 mm)	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage
Solderability	IEC 60068-2-20 Test Ta (Method 1)	T = 235±5°C, d = 2±0.5s	Approximately ≥ 95%
Resistance to soldering heat	IEC 60068-2-20 Test Tb (Method 1A)	T = 260±5°C, d = 10±1s	$\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Shock	IEC 60068-2-27 Test Ea	Pulse shape: half-sine. a = 490 m/s ² , d = 11ms. N = 6 x 3 shocks	$\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Vibration	IEC 60068-2-6 Test Fc Method B4	Frequency range: 10 Hz to 55 Hz ,a = 0.75 mm or 98 m/s ² (whichever is the less), d = 3x2 h	$\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Needle flame test	IEC 60695-11-5	Severity: Vertical 10 s	Duration of burning: 5 s max.
Voltage under pulse condition	IEC 61051-2	At class current, 8/20 μs,	As specified in specification
Voltage proof	IEC 61051-2	Metal balls method (4.8.1.2) 2500 V, 60 s	No breakdown or flashover
Pulse current - 8/20 μs	IEC 61051-2	8/20 μs, 10 times, I _{peak} =0.25*I _{max}	$\Delta V/V \leq \pm 10\%$ No visible damage
Pulse current - 10/1000 μs	IEC 61051-2	10/1000 μs, 10 times, I _{peak} = 0.0075* I _{max}	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage
Combination pulse	IEC 62368-1	Additional test: 10 pulses (combination pulse 6KV/3KA), in one direction, 1 per min	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage U ≤ 1.1 U _{initial} Voltage proof: No breakdown or flashover
Rapid change of temperature	IEC 60068-2-14 Test Na	N = 5 cycles, d = 30 min , θA = -40±3°C, θB = 85±2°C	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage
Climatic sequence	IEC 60068-2-2 Test Ba IEC 60068-2-30 Test Db IEC 60068-2-1 Test Aa IEC 60068-2-30 Test Db	Dry heat, Test Ba:16±2h, T = 85±2°C Damp heat, Test Db first cycle :24h, T = 55±2°C Cold, Test Aa :2h, T = -40±3°C Damp heat Test Ba remaining cycles:5 cycle	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage R _{ISO} ≥ 100MΩ Voltage proof: No breakdown or flashover
Endurance at upper category temperature	IEC 61051-1 (4.21)	T: max temperature as specified , Duration: 1000 h, Voltage: max. a. c. voltage	$\Delta V/V \leq \pm 10\%$ No visible damage R _{ISO} ≥ 1000MΩ U ≤ 1,1 U _{initial}

NOTE : Specification subject to change without notice.

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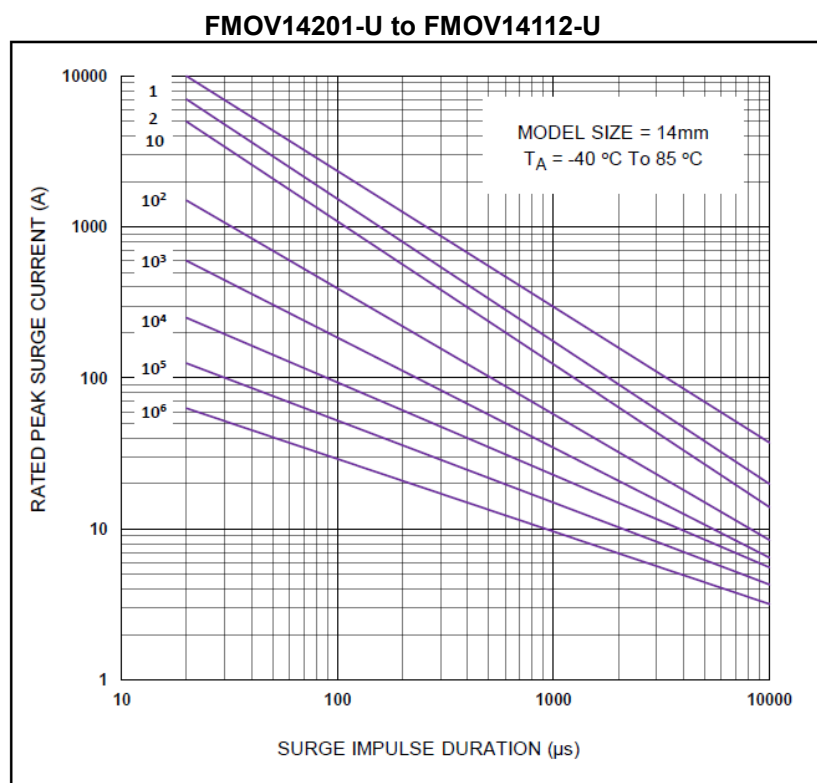
Characteristics	Standard	Test Conditions	Specifications
Damp heat (Steady state)	IEC 60068-2-78 Test Ca	T = 40±2°C, RH = 93(+2/-3)%, 56d , 4 specimens: No voltage applied ,Other 4 specimens: Applied voltage: 10% of the max. d. c. voltage	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$ $R_{iso} \geq 100M\Omega$
Maximum Peak Current	Specification Standard	I _{max} , 8/20 μs, 1 time.	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$ No visible damage
Nominal Discharge Current Test	UL1449 4th	I _n , 8/20 μs, 15 times, Interval 60s	$\Delta V/V \leq \pm 10\%$ No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{mAat\ 85^{\circ}C} - V_{mAat\ 25^{\circ}C}}{V_{mAat\ 25^{\circ}C}} \times \frac{1}{60} \times 100(\%/^{\circ}C)$	$0.05 \leq TC \leq 0.05(\%/^{\circ}C)$
High Temperature Storage	IEC60068-2-2	1000h, T = 125±2°C	$\Delta V/V \leq \pm 5\%$ No visible damage
Max. Energy	Specification Standard	10/1000 μs, 1 times, Max. Energy	$\Delta V/V \leq \pm 10\%$ No visible damage
Operating duty cycle test *	UL1449	6 kV/3 kA combination wave surges, phase angle of 90 (+0, -15) degrees, positive polarity 8times, negative polarity 7 times, interval of 60s.	$\Delta V/V \leq \pm 10\%$ No visible damage
Surge Immunity Test *	IEC 61000-4-5	4kV/2kA combination wave surges, phase angle of 90 (+0, -15) degrees, positive polarity 20times, negative polarity 20times, interval of 60s.	$\Delta V/V \leq \pm 10\%$ No visible damage

* (According to customer requirements to meet the test items)



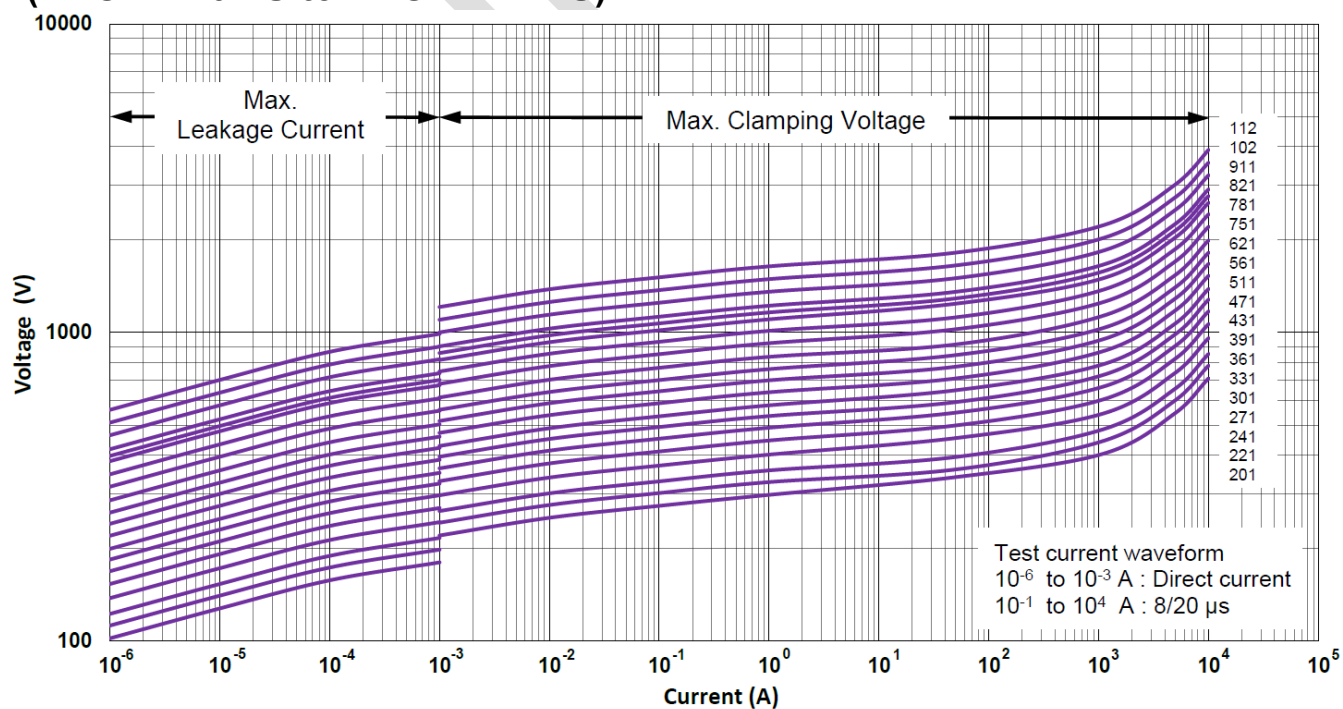
4. Impulse Life Time Rating Curves

FMOV14-U Series



5. V-I Curves

(FMOV14201-U to FMOV14112-U)

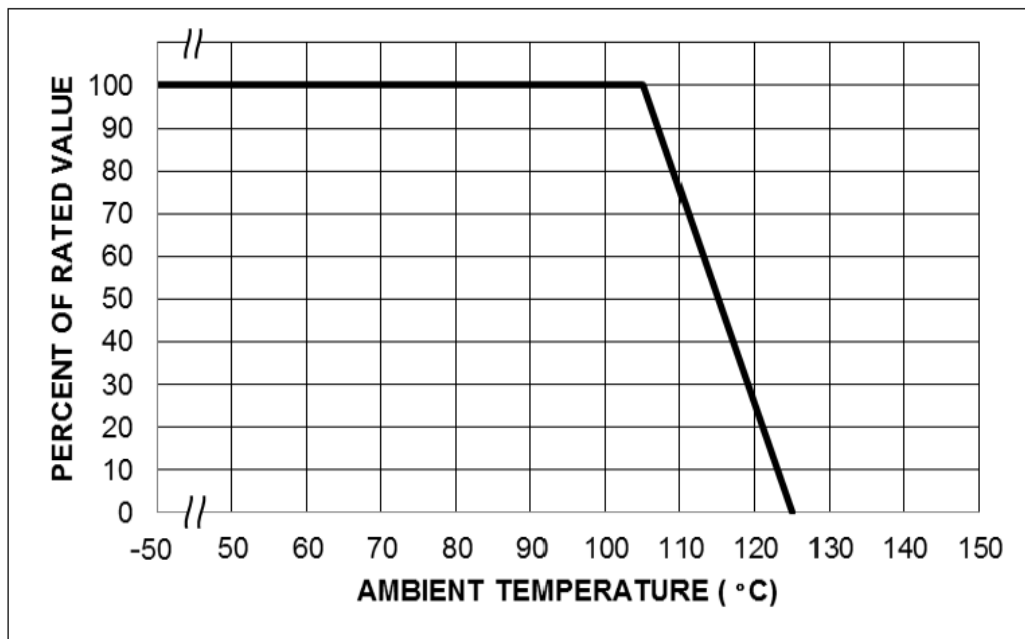


NOTE : Specification subject to change without notice.

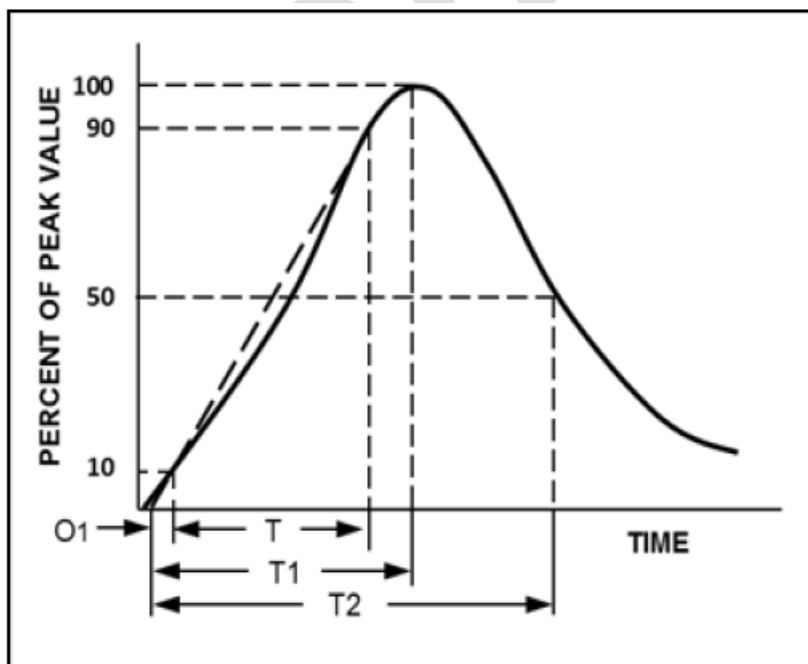


6. Power Derating Curve

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



7. Surge Current Standard Waveform



O1 = Virtual Origin of Wave

T = Time from 10% to 90% of Peak

T1 = Rise Time = $1.25 \times T$

T2 = Decay Time

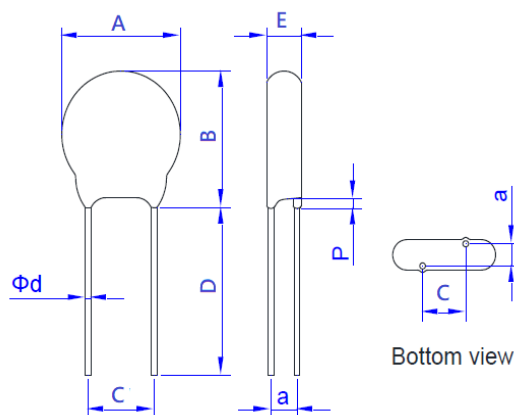
Example - For an 8/20 μ s Current Waveform:

8μ s = T1 = Rise Time

20μ s = T2 = Decay Time

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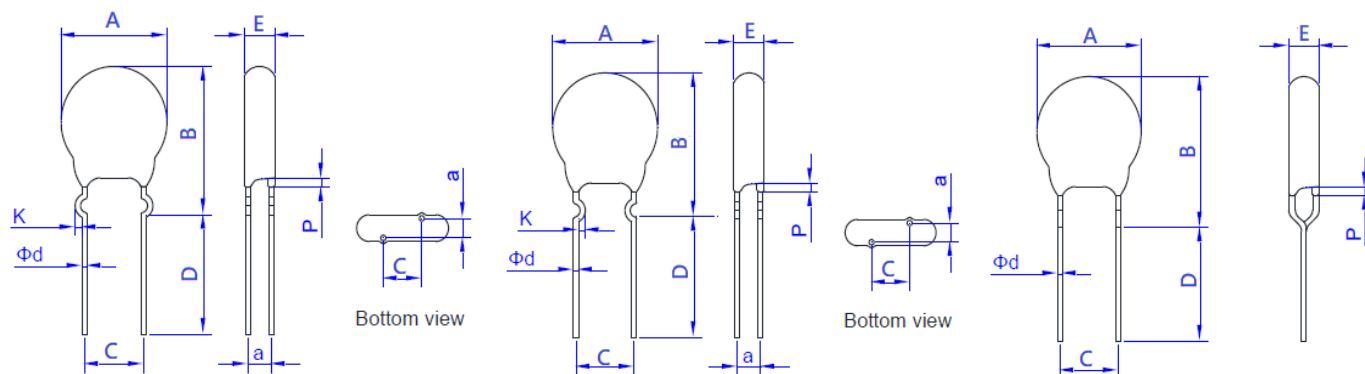
8. Dimension of Component for Standard Product



Straight Lead Type (S)

Part Number	A		B	C	D	E	P	a	Φd
	Min.	Max.	Max.	±1.0	Typ.	Max.	Max.	±1.0	±0.05
FMOV14201-U	13.5	17.5	20.5	7.5	25.0	4.6	3.0	2.0	0.80
FMOV14221-U	13.5	17.5	20.5	7.5	25.0	4.7	3.0	2.1	0.80
FMOV14241-U	13.5	17.5	20.5	7.5	25.0	4.8	3.0	2.2	0.80
FMOV14271-U	13.5	17.5	20.5	7.5	25.0	4.9	3.0	2.3	0.80
FMOV14301-U	13.5	17.5	20.5	7.5	25.0	5.0	3.0	2.5	0.80
FMOV14331-U	13.5	17.5	20.5	7.5	25.0	5.2	3.0	2.7	0.80
FMOV14361-U	13.5	17.5	20.5	7.5	25.0	5.5	3.0	2.8	0.80
FMOV14391-U	13.5	17.5	20.5	7.5	25.0	5.6	3.0	3.0	0.80
FMOV14431-U	13.5	17.5	20.5	7.5	25.0	5.8	3.0	3.2	0.80
FMOV14471-U	13.5	17.5	20.5	7.5	25.0	6.0	3.0	3.4	0.80
FMOV14511-U	13.5	17.5	20.5	7.5	25.0	6.2	3.0	3.7	0.80
FMOV14561-U	13.5	17.5	20.5	7.5	25.0	6.4	3.0	3.9	0.80
FMOV14621-U	13.5	17.5	20.5	7.5	25.0	6.6	3.0	4.3	0.80
FMOV14681-U	13.5	17.5	20.5	7.5	25.0	6.7	3.0	4.7	0.80
FMOV14751-U	13.5	17.5	20.5	7.5	25.0	6.9	3.0	5.1	0.80
FMOV14781-U	13.5	17.5	20.5	7.5	25.0	7.3	3.0	5.2	0.80
FMOV14821-U	13.5	17.5	20.5	7.5	25.0	7.5	3.0	5.4	0.80
FMOV14911-U	13.5	17.5	20.5	7.5	25.0	7.6	3.0	5.9	0.80
FMOV14102-U	13.5	17.5	20.5	7.5	25.0	8.1	3.0	6.5	0.80
FMOV14112-U	13.5	17.5	20.5	7.5	25.0	9.0	3.0	7.1	0.80

Unit: mm



Outside Kink Lead (O)

Inside Kink Lead (K)

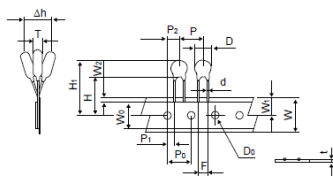
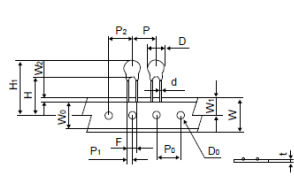
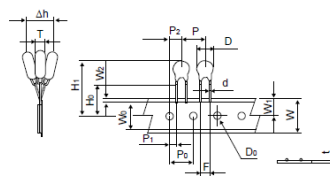
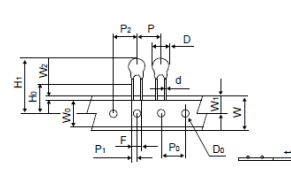
In Line Kink Lead (I)

Part Number	A		B	C	D	E	P	K		a	Φd
	Min.	Max.	Max.	±1.0	Typ.	Max.	Max.	Min.	Max.	±1.0	±0.05
FMOV14201-U	13.5	17.5	22.5	7.5	25.0	4.6	3.0	1.0	1.8	2.0	0.80
FMOV14221-U	13.5	17.5	22.5	7.5	25.0	4.7	3.0	1.0	1.8	2.1	0.80
FMOV14241-U	13.5	17.5	22.5	7.5	25.0	4.8	3.0	1.0	1.8	2.2	0.80
FMOV14271-U	13.5	17.5	22.5	7.5	25.0	4.9	3.0	1.0	1.8	2.3	0.80
FMOV14301-U	13.5	17.5	23.5	7.5	25.0	5.0	3.0	1.0	1.8	2.5	0.80
FMOV14331-U	13.5	17.5	23.5	7.5	25.0	5.2	3.0	1.0	1.8	2.7	0.80
FMOV14361-U	13.5	17.5	23.5	7.5	25.0	5.5	3.0	1.0	1.8	2.8	0.80
FMOV14391-U	13.5	17.5	23.5	7.5	25.0	5.6	3.0	1.0	1.8	3.0	0.80
FMOV14431-U	13.5	17.5	23.5	7.5	25.0	5.8	3.0	1.0	1.8	3.2	0.80
FMOV14471-U	13.5	17.5	23.5	7.5	25.0	6.0	3.0	1.0	1.8	3.4	0.80
FMOV14511-U	13.5	17.5	23.5	7.5	25.0	6.2	3.0	1.0	1.8	3.7	0.80
FMOV14561-U	13.5	17.5	23.5	7.5	25.0	6.4	3.0	1.0	1.8	3.9	0.80
FMOV14621-U	13.5	17.5	23.5	7.5	25.0	6.6	3.0	1.0	1.8	4.3	0.80
FMOV14681-U	13.5	17.5	23.5	7.5	25.0	6.7	3.0	1.0	1.8	4.7	0.80
FMOV14751-U	13.5	17.5	23.5	7.5	25.0	6.9	3.0	1.0	1.8	5.1	0.80
FMOV14781-U	13.5	17.5	23.5	7.5	25.0	7.3	3.0	1.0	1.8	5.2	0.80
FMOV14821-U	13.5	17.5	23.5	7.5	25.0	7.5	3.0	1.0	1.8	5.4	0.80
FMOV14911-U	13.5	17.5	23.5	7.5	25.0	7.6	3.0	1.0	1.8	5.9	0.80
FMOV14102-U	13.5	17.5	23.5	7.5	25.0	8.1	3.0	1.0	1.8	6.5	0.80
FMOV14112-U	13.5	17.5	23.5	7.5	25.0	9.0	3.0	1.0	1.8	7.1	0.80

Unit: mm

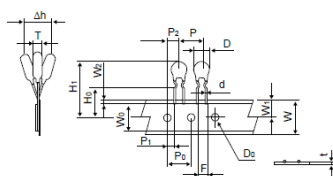
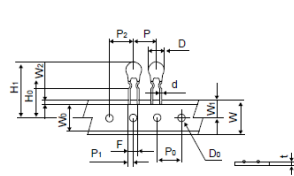
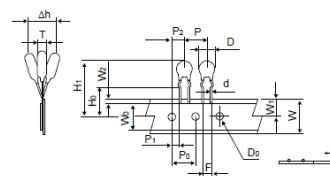
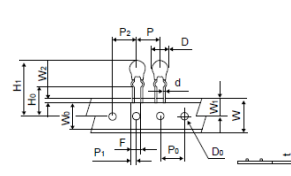


9. Tape and Reel Specifications


Figure: A

Figure: B

Figure: C

Figure: D

Straight Leads

Inline Kink Leads


Figure: E

Figure: F

Figure: G

Figure: H

Inside Kink Leads

Outside Kink Leads

Symbol	Parameter	FMOV14-U Series
P	Pitch of Component	12.7±1.0
P0	Feed Hole Pitch	12.7±0.2
P1	Feed Hole Center Lead	3.85±0.7
P2	Hole center to Component Center	6.35±0.7
F	Lead to Lead Distance	7.5±0.8
Δh	Component Alignment	2.0 Max
W	Tape Width	18.0+1.0 -0.5
W0	Hold Down Tape Width	5.0 Min
W1	Hole Position	9.0+0.75 -0.50
W2	Hold Down Tape Position	3.0 Max
H	Height from Tape Center to Component Base	18.0+2.0 -0
H0	Seating Plane Height	16.0±0.5
H1	Component Height	36.0 Max
D0	Feed Hole Diameter	4.0±0.2
t	Total Tape Thickness	0.7±0.2
L	Length of Clipped Lead	11.0 Max
Figure		ACEG

Unit: mm
NOTE : Specification subject to change without notice.

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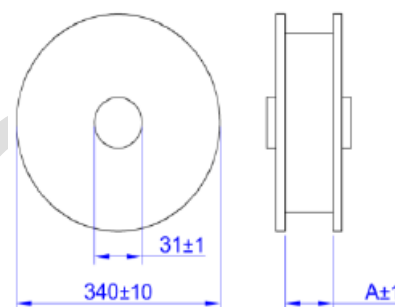
10. Packaging Specifications

Bulk Product Packing

Series	Straight Lead Type Quantity (pcs/bag)	Outside Kink Lead Type Quantity (pcs/bag)	Inside Kink Lead Type Quantity (pcs/bag)	In Line Kink Lead Type Quantity (pcs/bag)
FMOV14-U Series	500	500	500	500

Tape & Reel Product Packing

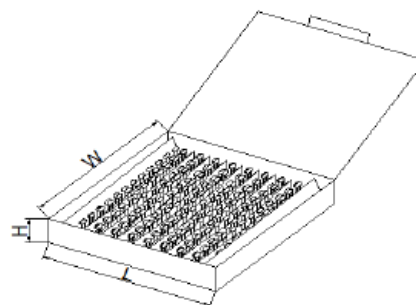
Series	A (mm)	Quantity (pcs/reel)
FMOV14(180~391)-U-T-	56	800
FMOV14(431~621)-U-T-		700
FMOV14(681~112)-U-T-		600



Box Product Packing

Series	Quantity (pcs/reel)
FMOV14(180~621)-U-A-	500
FMOV14(681~112)-U-A	400

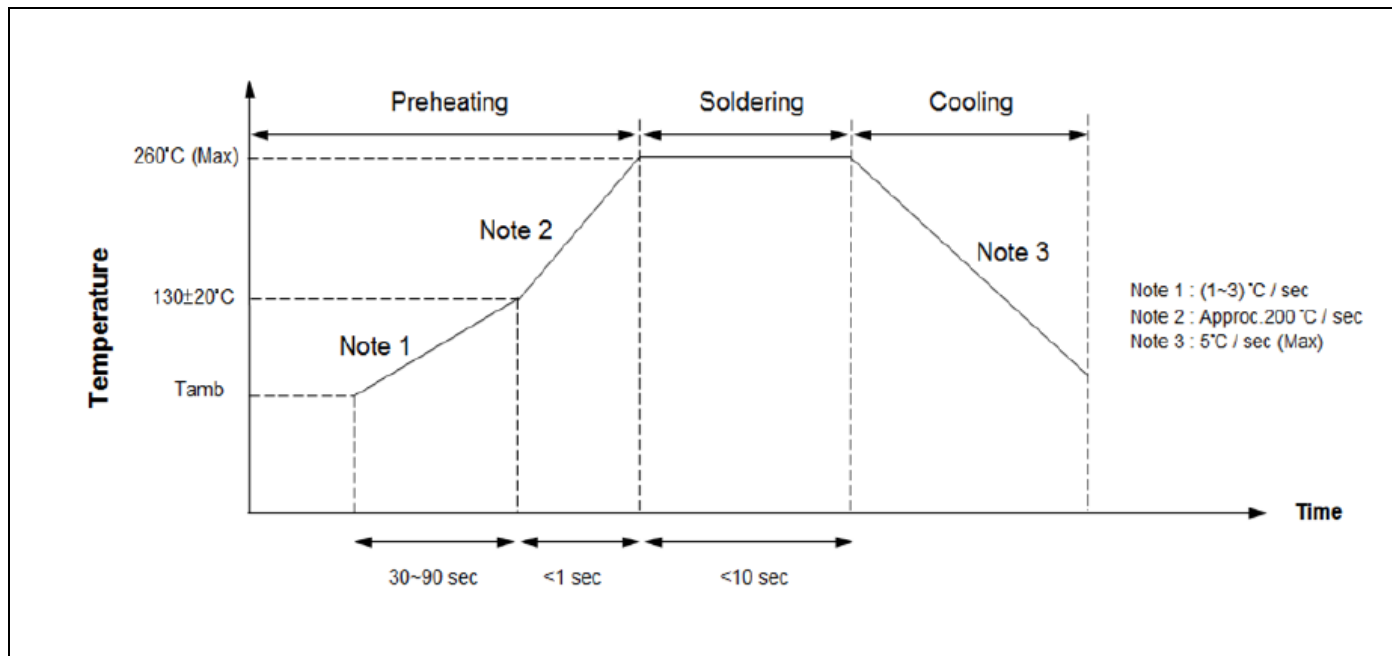
Series	L±5	W±5	H±5
FMOV14-U Series	340	245	50



NOTE : Specification subject to change without notice.



11. Solder Recommendation



Recommendation Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of soldering Iron-tip	360 $^{\circ}\text{C}$ (Max)
Soldering Time	3 sec (Max)
Distance from Varistor	2mm (Min)

RoHS Compliant Declaration

We hereby declare that the components delivered to your company are compliant with RoHS Directive 2002/95/EC

Storage Conditions of Products

(I) Storage Conditions:

- Storage Temperature: -10 $^{\circ}\text{C}$ ~ +40 $^{\circ}\text{C}$
- Relative Humidity: $\leq 75\% \text{RH}$
- Keep away from corrosive atmosphere and sunlight
- Solvent Resistance: MIL-STD-202, Method 215F
- Moisture Sensitivity: Level 1, J-STD-020

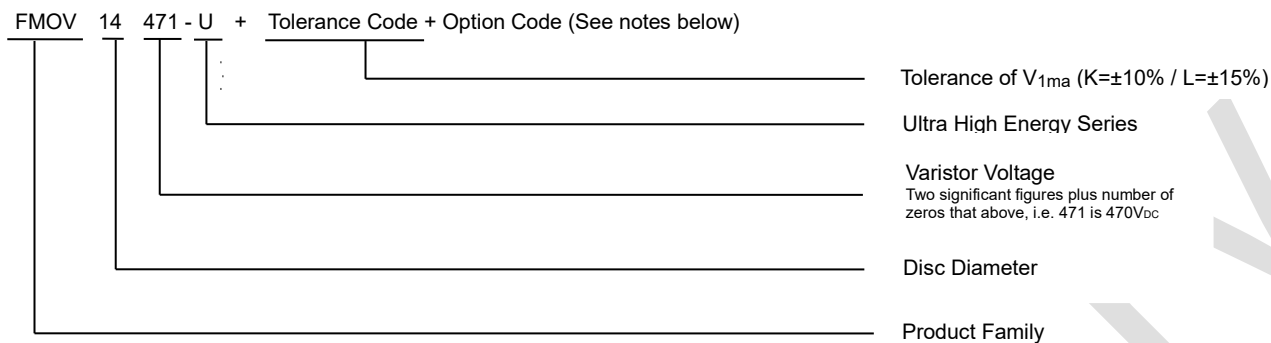
(II) Period of Storage: 1 year

NOTE : Specification subject to change without notice.

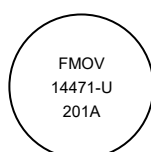


12. Part Numbering and Marking System

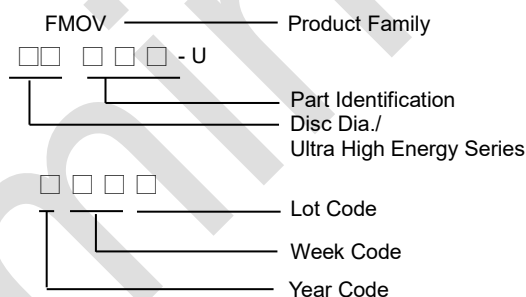
Part Numbering System



Marking System



Example



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13. Order Notes:

Main Part Code:

Part No + Tolerance Code + Packaging + Lead Type Designators + Option Code

Ordering examples:

Straight Lead Bulk Pack (Standard)	Straight Lead (Short Cut) Bulk Pack	Straight Lead Tape & Reel Pack	Straight Lead Flat Box Pack
FMOV14471-UKBS	FMOV14471-UKBSXXX	FMOV14471-UKTS	FMOV14471-UKAS

Outside Kink Lead Bulk Pack	Outside Kink Lead (Short Cut) Bulk Pack	Outside Kink Lead Tape & Reel Pack	Outside Kink Lead Flat Box Pack
FMOV14471-UKBO	FMOV14471-UKBOXXX	FMOV14471-UKTO	FMOV14471-UKAO

Inside Kink Lead Bulk Pack	Inside Kink Lead (Short Cut) Bulk Pack	Inside Kink Lead Tape & Reel Pack	Inside Kink Lead Flat Box Pack
FMOV14471-UKBK	FMOV14471-UKBKXXX	FMOV14471-UKTK	FMOV14471-UKAK

In Line Kink Lead Bulk Pack	In Line Kink Lead (Short Cut) Bulk Pack	In Line Kink Lead Tape& Reel Pack	In Line Kink Lead Flat Box Pack
FMOV14471-UKBI	FMOV14471-UKBIXXX	FMOV14471-UKTI	FMOV14471-UKAI

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MOV Varistor Device: FMOV20-U Series (Preliminary)

1. Device Ratings and Characteristics

Part Number	Maximum Continuous Voltage		Varistor Voltage (@1mA)			Maximum Clamping Voltage @Test Current (@8/20µs)		Maximum Energy (@10/1000µs)	Maximum Peak Current (@8/20µs)	Rated Power	Typical Capacitance (@1KHz)
	ACrms(V)	DC(V)	Vn(Vdc)	Min.	Max.	Vc(V)	Ip(A)	(J)	(A)	(W)	(pF)
FMOV20201-U	130	170	200	180	220	340	200	200	20000	1	2125
FMOV20221-U	140	180	220	198	242	360	200	215	20000	1	2000
FMOV20241-U	150	200	240	216	264	395	200	235	20000	1	1875
FMOV20271-U	175	225	270	243	297	455	200	275	20000	1	1625
FMOV20301-U	195	250	300	270	330	500	200	295	20000	1	1500
FMOV20331-U	215	275	330	297	363	550	200	320	20000	1	1375
FMOV20361-U	230	300	360	324	396	595	200	350	20000	1	1375
FMOV20391-U	250	320	390	351	429	650	200	385	20000	1	1375
FMOV20431-U	275	350	430	387	473	710	200	425	20000	1	1250
FMOV20471-U	300	385	470	423	517	775	200	450	20000	1	1125
FMOV20511-U	320	410	510	459	561	845	200	500	20000	1	1000
FMOV20561-U	350	460	560	504	616	915	200	520	20000	1	938
FMOV20621-U	395	510	620	558	682	1020	200	590	20000	1	713
FMOV20681-U	420	560	680	612	748	1120	200	650	20000	1	688
FMOV20751-U	465	615	750	675	825	1235	200	725	20000	1	662
FMOV20781-U	485	640	780	702	858	1290	200	725	20000	1	625
FMOV20821-U	510	670	820	738	901	1355	200	750	20000	1	625
FMOV20911-U	550	745	910	819	1001	1500	200	815	20000	1	600
FMOV20102-U	625	825	1000	900	1100	1650	200	900	20000	1	575
FMOV20112-U	680	895	1100	990	1210	1815	200	950	20000	1	500

2. Agency Approvals

Agency	Agency Approvals	Certificate No.
	UL1449 4 th & cUL	In Process
	IEC 61051-1:2007 IEC 61051-2:1991 IEC 61051-2:1991/AMD1:2009 IEC 61051-2-2:1991 IEC 62368-1:2018/G.8.1 IEC 60950-1:2005/AMD1:2009/AMD2:2013, Annex Q	In Process

NOTE : Specification subject to change without notice.

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3. Reliability

Characteristics	Standard	Test Conditions	Specifications
Robustness of terminations	IEC 60068-2-21 Test Ua1	F = 10 N (d ≤ 0.8 mm) , F = 20 N (d = 1 mm)	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage
Solderability	IEC 60068-2-20 Test Ta (Method 1)	T = 235±5°C, d = 2±0.5s	Approximately ≥ 95%
Resistance to soldering heat	IEC 60068-2-20 Test Tb (Method 1A)	T = 260±5°C, d = 10±1s	$\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Shock	IEC 60068-2-27 Test Ea	Pulse shape: half-sine. a = 490 m/s ² , d = 11ms. N = 6 x 3 shocks	$\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Vibration	IEC 60068-2-6 Test Fc Method B4	Frequency range: 10 Hz to 55 Hz ,a = 0.75 mm or 98 m/s ² (whichever is the less), d = 3x2 h	$\Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Needle flame test	IEC 60695-11-5	Severity: Vertical 10 s	Duration of burning: 5 s max.
Voltage under pulse condition	IEC 61051-2	At class current, 8/20 μs,	As specified in specification
Voltage proof	IEC 61051-2	Metal balls method (4.8.1.2) 2500 V, 60 s	No breakdown or flashover
Pulse current - 8/20 μs	IEC 61051-2	8/20 μs, 10 times, I _{peak} =0.25*I _{max}	$\Delta V/V \leq \pm 10\%$ No visible damage
Pulse current - 10/1000 μs	IEC 61051-2	10/1000 μs, 10 times, I _{peak} = 0.0075* I _{max}	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage
Combination pulse	IEC 62368-1	Additional test: 10 pulses (combination pulse 6KV/3KA), in one direction, 1 per min	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage U ≤ 1.1 U _{initial} Voltage proof: No breakdown or flashover
Rapid change of temperature	IEC 60068-2-14 Test Na	N = 5 cycles, d = 30 min , θA = -40±3°C, θB = 85±2°C	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage
Climatic sequence	IEC 60068-2-2 Test Ba IEC 60068-2-30 Test Db IEC 60068-2-1 Test Aa IEC 60068-2-30 Test Db	Dry heat, Test Ba:16±2h, T = 85±2°C Damp heat, Test Db first cycle :24h, T = 55±2°C Cold, Test Aa :2h, T = -40±3°C Damp heat Test Ba remaining cycles:5 cycle	$\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage R _{ISO} ≥ 100MΩ Voltage proof: No breakdown or flashover
Endurance at upper category temperature	IEC 61051-1 (4.21)	T: max temperature as specified , Duration: 1000 h, Voltage: max. a. c. voltage	$\Delta V/V \leq \pm 10\%$ No visible damage R _{ISO} ≥ 1000MΩ U ≤ 1,1 U _{initial}

NOTE : Specification subject to change without notice.

 FUZETEC TECHNOLOGY CO., LTD.	NO.	FMOV20-U Series		
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Characteristics	Standard	Test Conditions	Specifications
Damp heat (Steady state)	IEC 60068-2-78 Test Ca	T = 40±2°C, RH = 93(+2/-3)%, 56d , 4 specimens: No voltage applied ,Other 4 specimens: Applied voltage: 10% of the max. d. c. voltage	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$ $R_{iso} \geq 100M\Omega$
Maximum Peak Current	Specification Standard	I _{max} , 8/20 μs, 1 time.	$\Delta V_{1mA}/V_{1mA} \leq \pm 10\%$ No visible damage
Nominal Discharge Current Test	UL1449 4th	I _n , 8/20 μs, 15 times, Interval 60s	$\Delta V/V \leq \pm 10\%$ No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{mAat\ 85^{\circ}C} - V_{mAat\ 25^{\circ}C}}{V_{mAat\ 25^{\circ}C}} \times \frac{1}{60} \times 100(\%/^{\circ}C)$	$0.05 \leq TC \leq 0.05(\%/^{\circ}C)$
High Temperature Storage	IEC60068-2-2	1000h, T = 125±2°C	$\Delta V/V \leq \pm 5\%$ No visible damage
Max. Energy	Specification Standard	10/1000 μs, 1 times, Max. Energy	$\Delta V/V \leq \pm 10\%$ No visible damage
Operating duty cycle test *	UL1449	6 kV/3 kA combination wave surges, phase angle of 90 (+0, -15) degrees, positive polarity 8times, negative polarity 7 times, interval of 60s.	$\Delta V/V \leq \pm 10\%$ No visible damage
Surge Immunity Test *	IEC 61000-4-5	4kV/2kA combination wave surges, phase angle of 90 (+0, -15) degrees, positive polarity 20times, negative polarity 20times, interval of 60s.	$\Delta V/V \leq \pm 10\%$ No visible damage

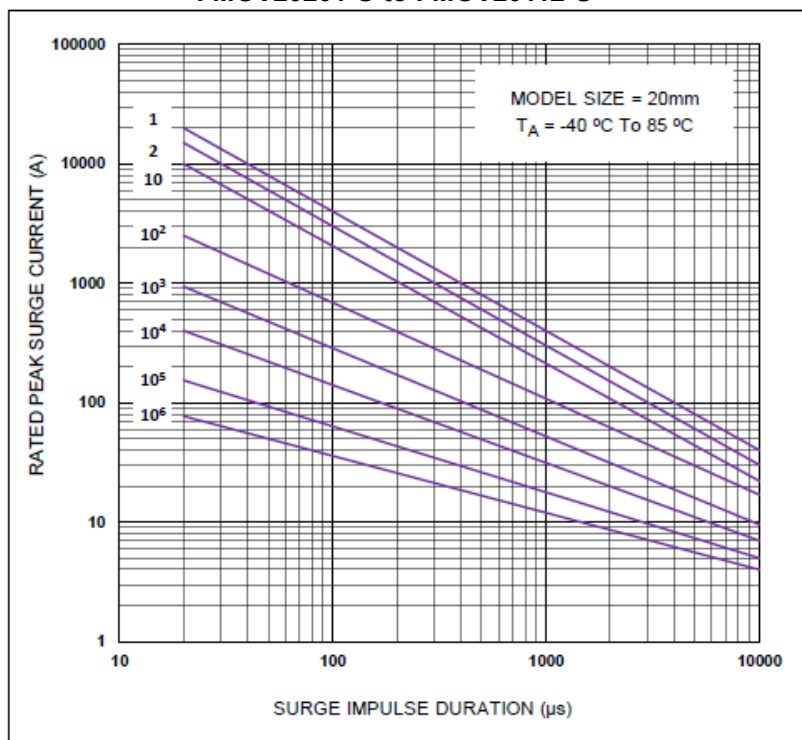
* (According to customer requirements to meet the test items)



4. Impulse Life Time Rating Curves

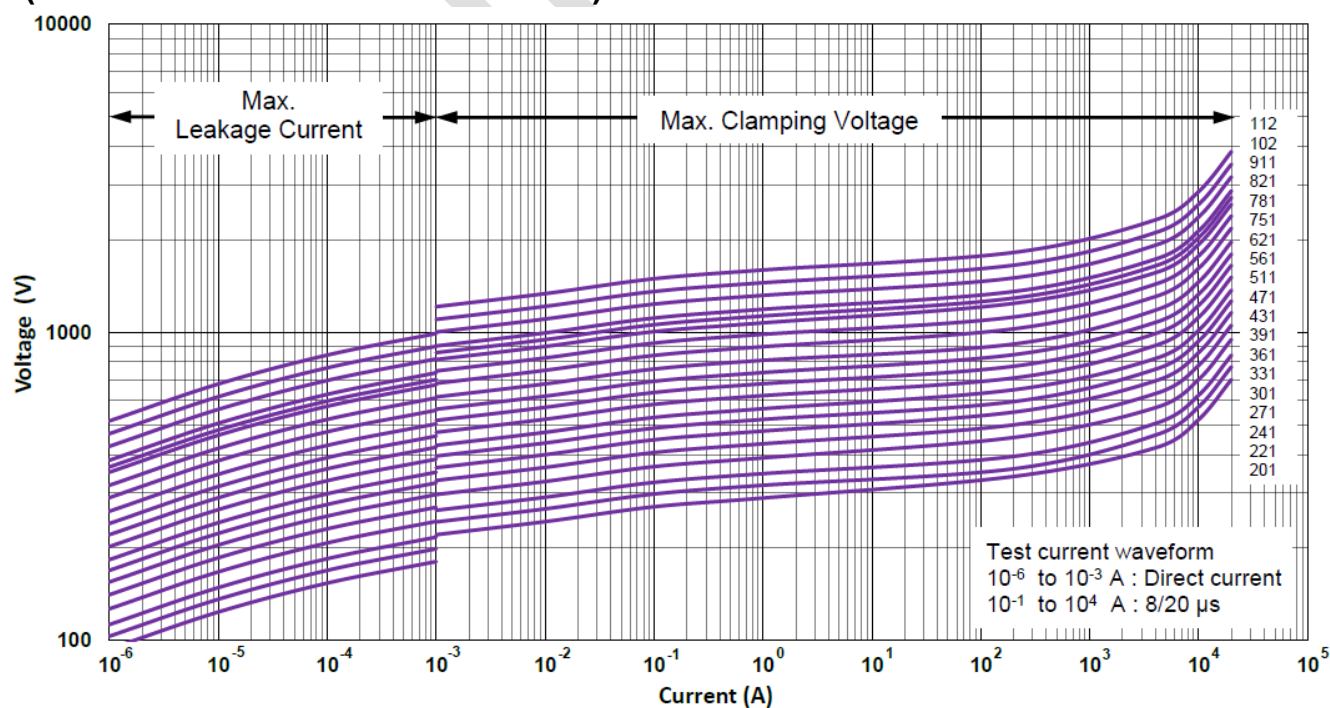
FMOV20-U Series

FMOV20201-U to FMOV20112-U



5. V-I Curves

(FMOV20201-U to FMOV20112-U)

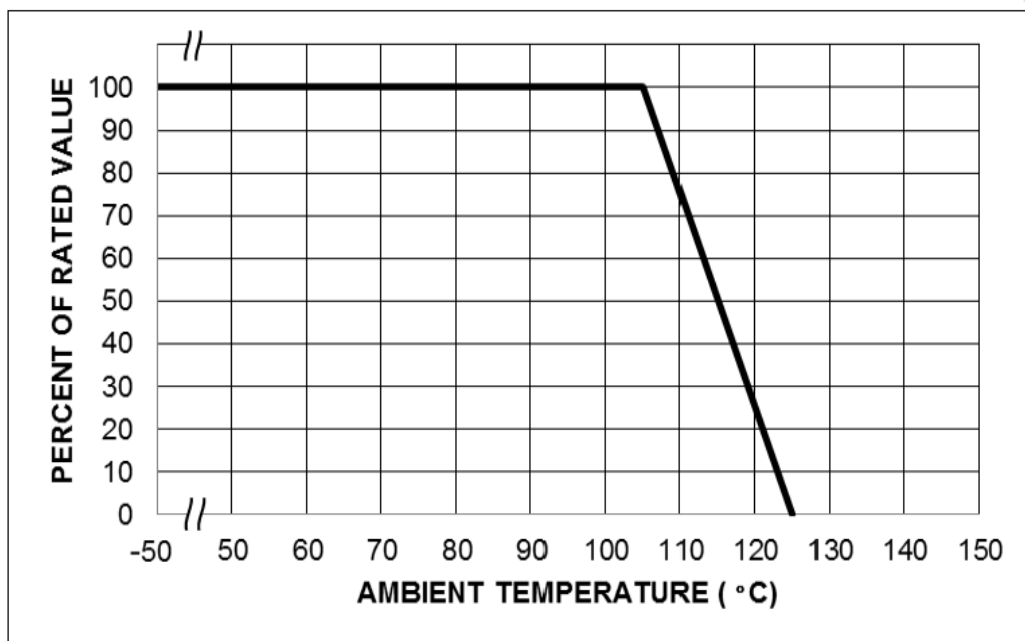


NOTE : Specification subject to change without notice.

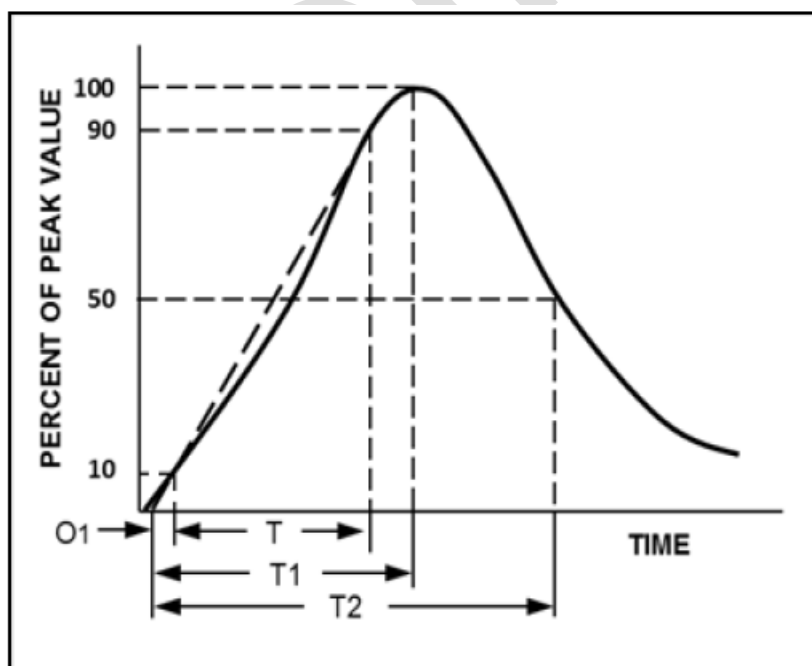


6. Power Derating Curve

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



7. Surge Current Standard Waveform



O1 = Virtual Origin of Wave

T = Time from 10% to 90% of Peak

T1 = Rise Time = $1.25 \times T$

T2 = Decay Time

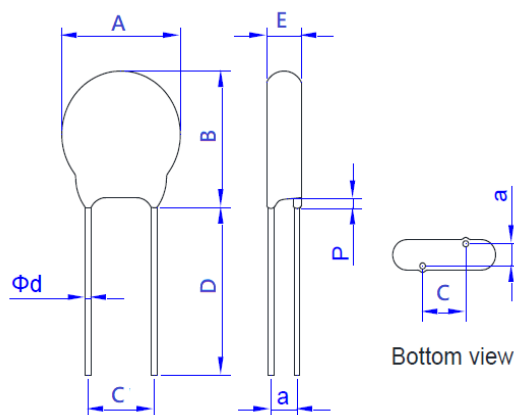
Example - For an 8/20 μ s Current Waveform:

8μ s = T1 = Rise Time

20μ s = T2 = Decay Time

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8. Dimension of Component for Standard Product

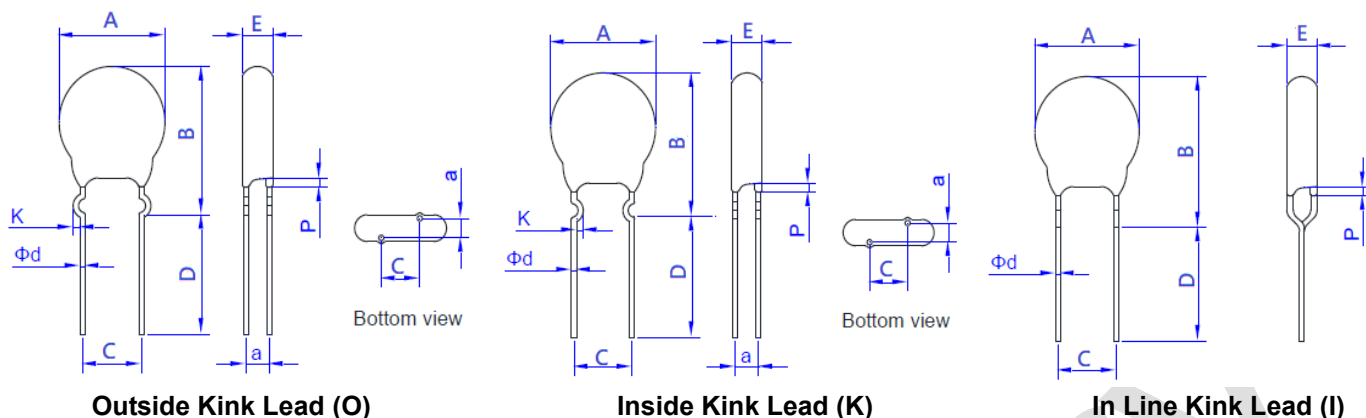


Straight Lead Type (S)

Part Number	A		B	C	D	E	P	a	Φd
	Min.	Max.	Max.	±1.0	Typ.	Max.	Max.	±1.0	±0.05
FMOV20201-U	19.5	25.0	28.0	10.0	25.0	5.1	3.0	2.0	1.00
FMOV20221-U	19.5	25.0	28.0	10.0	25.0	5.2	3.0	2.1	1.00
FMOV20241-U	19.5	25.0	28.0	10.0	25.0	5.3	3.0	2.2	1.00
FMOV20271-U	19.5	25.0	28.0	10.0	25.0	5.4	3.0	2.3	1.00
FMOV20301-U	19.5	25.0	28.0	10.0	25.0	5.5	3.0	2.5	1.00
FMOV20331-U	19.5	25.0	28.0	10.0	25.0	5.8	3.0	2.7	1.00
FMOV20361-U	19.5	25.0	28.0	10.0	25.0	6.0	3.0	2.8	1.00
FMOV20391-U	19.5	25.0	28.0	10.0	25.0	6.1	3.0	3.0	1.00
FMOV20431-U	19.5	25.0	28.0	10.0	25.0	6.4	3.0	3.2	1.00
FMOV20471-U	19.5	25.0	28.0	10.0	25.0	6.6	3.0	3.4	1.00
FMOV20511-U	19.5	25.0	28.0	10.0	25.0	6.7	3.0	3.7	1.00
FMOV20561-U	19.5	25.0	28.0	10.0	25.0	6.9	3.0	3.9	1.00
FMOV20621-U	19.5	25.0	28.0	10.0	25.0	7.2	3.0	4.3	1.00
FMOV20681-U	19.5	25.0	28.0	10.0	25.0	7.3	3.0	4.7	1.00
FMOV20751-U	19.5	25.0	28.0	10.0	25.0	7.5	3.0	5.1	1.00
FMOV20781-U	19.5	25.0	28.0	10.0	25.0	7.9	3.0	5.2	1.00
FMOV20821-U	19.5	25.0	28.0	10.0	25.0	8.1	3.0	5.4	1.00
FMOV20911-U	19.5	25.0	28.0	10.0	25.0	8.2	3.0	5.9	1.00
FMOV20102-U	19.5	25.0	28.0	10.0	25.0	8.7	3.0	6.5	1.00
FMOV20112-U	19.5	25.0	28.0	10.0	25.0	9.3	3.0	7.1	1.00

Unit: mm

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Part Number	A		B	C	D	E	P	K		a	Φd
	Min.	Max.	Max.	±1.0	Typ.	Max.	Max.	Min.	Max.	±1.0	±0.05
FMOV20201-U	19.5	25.0	30.0	10.0	25.0	5.1	3.0	1.0	1.8	2.0	1.00
FMOV20221-U	19.5	25.0	30.0	10.0	25.0	5.2	3.0	1.0	1.8	2.1	1.00
FMOV20241-U	19.5	25.0	30.0	10.0	25.0	5.3	3.0	1.0	1.8	2.2	1.00
FMOV20271-U	19.5	25.0	30.0	10.0	25.0	5.4	3.0	1.0	1.8	2.3	1.00
FMOV20301-U	19.5	25.0	31.0	10.0	25.0	5.5	3.0	1.0	1.8	2.5	1.00
FMOV20331-U	19.5	25.0	31.0	10.0	25.0	5.8	3.0	1.0	1.8	2.7	1.00
FMOV20361-U	19.5	25.0	31.0	10.0	25.0	6.0	3.0	1.0	1.8	2.8	1.00
FMOV20391-U	19.5	25.0	31.0	10.0	25.0	6.1	3.0	1.0	1.8	3.0	1.00
FMOV20431-U	19.5	25.0	31.0	10.0	25.0	6.4	3.0	1.0	1.8	3.2	1.00
FMOV20471-U	19.5	25.0	31.0	10.0	25.0	6.6	3.0	1.0	1.8	3.4	1.00
FMOV20511-U	19.5	25.0	31.0	10.0	25.0	6.7	3.0	1.0	1.8	3.7	1.00
FMOV20561-U	19.5	25.0	31.0	10.0	25.0	6.9	3.0	1.0	1.8	3.9	1.00
FMOV20621-U	19.5	25.0	31.0	10.0	25.0	7.2	3.0	1.0	1.8	4.3	1.00
FMOV20681-U	19.5	25.0	31.0	10.0	25.0	7.3	3.0	1.0	1.8	4.7	1.00
FMOV20751-U	19.5	25.0	31.0	10.0	25.0	7.5	3.0	1.0	1.8	5.1	1.00
FMOV20781-U	19.5	25.0	31.0	10.0	25.0	7.9	3.0	1.0	1.8	5.2	1.00
FMOV20821-U	19.5	25.0	31.0	10.0	25.0	8.1	3.0	1.0	1.8	5.4	1.00
FMOV20911-U	19.5	25.0	31.0	10.0	25.0	8.2	3.0	1.0	1.8	5.9	1.00
FMOV20102-U	19.5	25.0	31.0	10.0	25.0	8.7	3.0	1.0	1.8	6.5	1.00
FMOV20112-U	19.5	25.0	31.0	10.0	25.0	9.3	3.0	1.0	1.8	7.1	1.00

Unit: mm

NOTE : Specification subject to change without notice.

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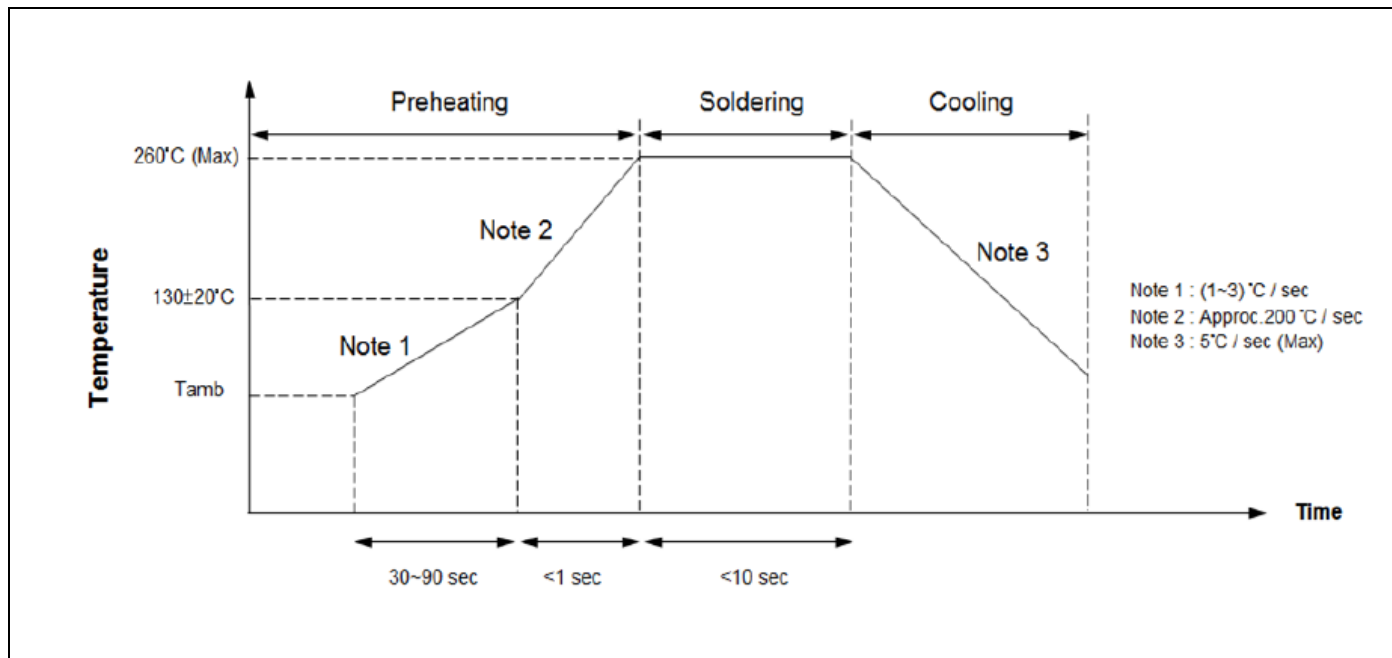
9. Packaging Specifications

Bulk Product Packing

Series	Straight Lead Type Quantity (pcs/bag)	Outside Kink Lead Type Quantity (pcs/bag)	Inside Kink Lead Type Quantity (pcs/bag)	In Line Kink Lead Type Quantity (pcs/bag)
FMOV20-U Series	250	250	250	250



10. Solder Recommendation



Recommendation Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of soldering Iron-tip	360°C (Max)
Soldering Time	3 sec (Max)
Distance from Varistor	2mm (Min)

RoHS Compliant Declaration

We hereby declare that the components delivered to your company are compliant with RoHS Directive 2002/95/EC

Storage Conditions of Products

(I) Storage Conditions:

- Storage Temperature: -10°C ~ +40°C
- Relative Humidity: ≤ 75%RH
- Keep away from corrosive atmosphere and sunlight
- Solvent Resistance: MIL-STD-202, Method 215F
- Moisture Sensitivity: Level 1, J-STD-020

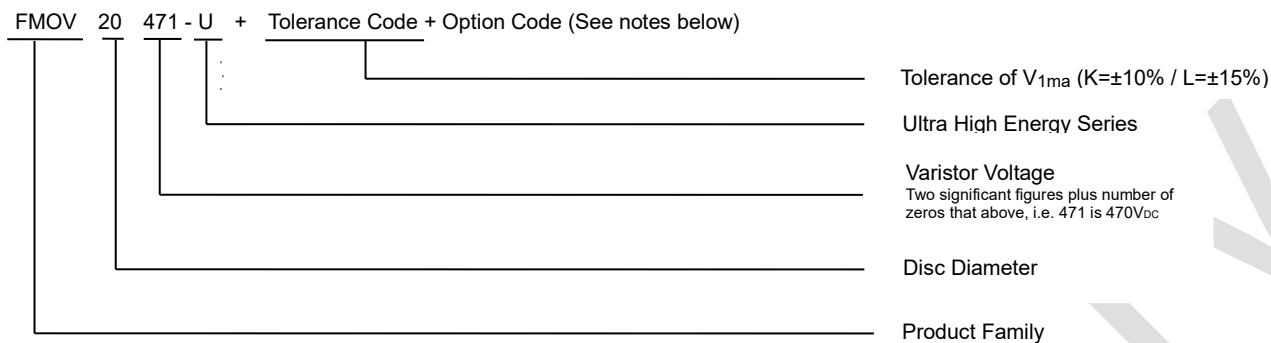
(II) Period of Storage: 1 year

NOTE : Specification subject to change without notice.

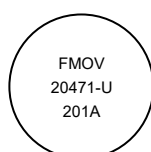


11. Part Numbering and Marking System

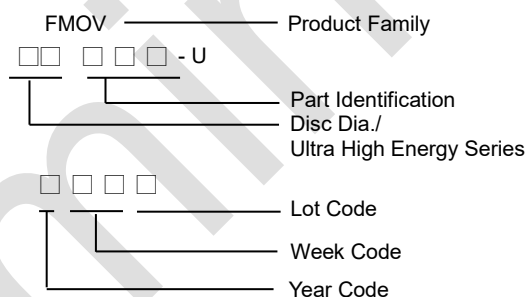
Part Numbering System



Marking System



Example



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12. Order Notes:

Main Part Code:

Part No + Tolerance Code + Packaging + Lead Type Designators + Option Code

Ordering examples:

Straight Lead Bulk Pack (Standard)	Straight Lead (Short Cut) Bulk Pack	Straight Lead Tape & Reel Pack	Straight Lead Flat Box Pack
FMOV20471-UKBS	FMOV20471-UKBSXXX	-	-

Outside Kink Lead Bulk Pack	Outside Kink Lead (Short Cut) Bulk Pack	Outside Kink Lead Tape & Reel Pack	Outside Kink Lead Flat Box Pack
FMOV20471-UKBO	FMOV20471-UKBOXXX	-	-

Inside Kink Lead Bulk Pack	Inside Kink Lead (Short Cut) Bulk Pack	Inside Kink Lead Tape & Reel Pack	Inside Kink Lead Flat Box Pack
FMOV20471-UKBK	FMOV20471-UKBKXXX	-	-

In Line Kink Lead Bulk Pack	In Line Kink Lead (Short Cut) Bulk Pack	In Line Kink Lead Tape& Reel Pack	In Line Kink Lead Flat Box Pack
FMOV20471-UKBI	FMOV20471-UKBIXXX	-	-