MOV Varistor Device: FMOV05-H 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)
FMOV05180-H	11	14	18	16	20	36	1	0.9	300	0.02	1480
FMOV05220-H	14	18	22	20	24	43	1	1.1	300	0.02	1320
FMOV05270-H	17	22	27	24	30	53	1	1.4	300	0.02	1030
FMOV05330-H	20	26	33	30	36	65	1	1.7	300	0.02	760
FMOV05390-H	25	31	39	35	43	77	1	2.1	300	0.02	720
FMOV05470-H	30	38	47	42	52	93	1	2.5	300	0.02	620
FMOV05560-H	35	45	56	50	62	110	1	3.1	300	0.02	515
FMOV05680-H	40	56	68	61	75	135	1	3.6	300	0.02	450
FMOV05201-H	130	170	200	180	220	340	10	13	1200	0.05	100
FMOV05221-H	140	180	220	198	242	360	10	14	1200	0.25	100
FMOV05241-H	150	200	240	216	264	395	10	15	1200	0.25	95
FMOV05271-H	175	225	270	243	297	455	10	18	1200	0.25	95
FMOV05301-H	195	250	300	270	330	500	10	19	1200	0.25	90
FMOV05331-H	215	275	330	297	363	550	10	21	1200	0.25	90
FMOV05361-H	230	300	360	324	396	595	10	23	1200	0.25	85
FMOV05391-H	250	320	390	351	429	650	10	25	1200	0.25	80
FMOV05431-H	275	350	430	387	473	710	10	28	1200	0.25	75
FMOV05471-H	300	385	470	423	517	775	10	30	1200	0.25	70
FMOV05511-H	320	420	510	459	561	845	10	30	1200	0.25	65
FMOV05561-H	350	460	560	504	616	915	10	30	1200	0.25	60
FMOV05621-H	395	510	620	558	682	1020	10	30	1200	0.25	55
FMOV05681-H	420	560	680	612	748	1120	10	30	1200	0.25	50
FMOV05751-H	465	615	750	675	825	1235	10	33	1200	0.25	40

2. Agency Approvals

Agency	Agency Approvals	Certificate No.
c UL us	UL1449 4th & cUL	In Process
VDE	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

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)	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 5\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 5\%$ 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	$\triangle V/_{1mA}\ V_{1mA} \leqq \pm 5\%$ 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, Ipeak=0.25*Imax	$\triangle V/V \leqq \pm 10\%$ No visible damage
Pulse current - 10/1000 μs	IEC 61051-2	10/1000 μs, 10 times, Ipeak = 0.0075* Imax	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ No visible damage
Combination pulse	IEC 62368-1	Additional test: 10 pulses (combination pulse 6KV/3KA), in one direction, 1 per min	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ No visible damage $U \leq 1.1\ U_{initial}$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ No visible damage $R_{ISO} \geqq 100M\Omega$ 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	$\triangle V/V \leqq \pm 10\%$ No visible damage $R_{ISO} \geqq 1000M\Omega$ $U \leq 1{,}1\ U_{initial}$

NOTE : Specification subject to change without notice.

2022/7/8

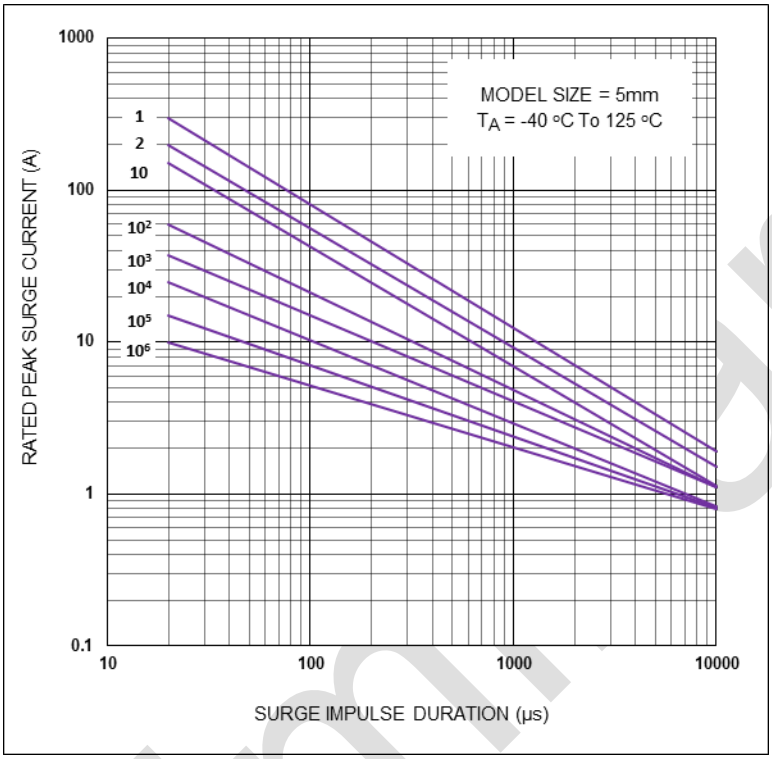
Characteristics	Standard	Test Conditions	Specifications
Damp heat (Steady state)	IEC 60068-2-78 Test Ca	T = 40±2°C, RH = 93(+2/-3)%, 56d , 4 specimens: No voltage applied ,Other 4 specimens: Applied voltage: 10% of the max. d. c. voltage	$\triangle V_{1mA}/V1_{mA} \leqq \pm 10\%$ $R_{ISO} \geqq 100M\Omega$
Maximum Peak Current	Specification Standard	Imax, 8/20 μs, 1 time.	$\triangle V_{1mA}/V1_{mA} \leqq \pm 10\%$ No visible damage
Nominal Discharge Current Test	UL1449 4th	In, 8/20 μs, 15 times, Interval 60s	△V/V≦±10% No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{1mA}\text{ at }85℃ - V_{1mA}\text{ at }25℃}{V_{1mA}\text{ at }25℃} \times \frac{1}{60} \times 100(\%/℃)$	0.05≦TC≦0.05(%/℃)
High Temperature Storage	IEC60068-2-2	1000h, T = 125±2°C	△V/V≦±5% No visible damage
Max. Energy	Specification Standard	10/1000 μs, 1 times, Max. Energy	△V/V≦±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.	△V/V≦±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.	△V/V≦±10% No visible damage

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

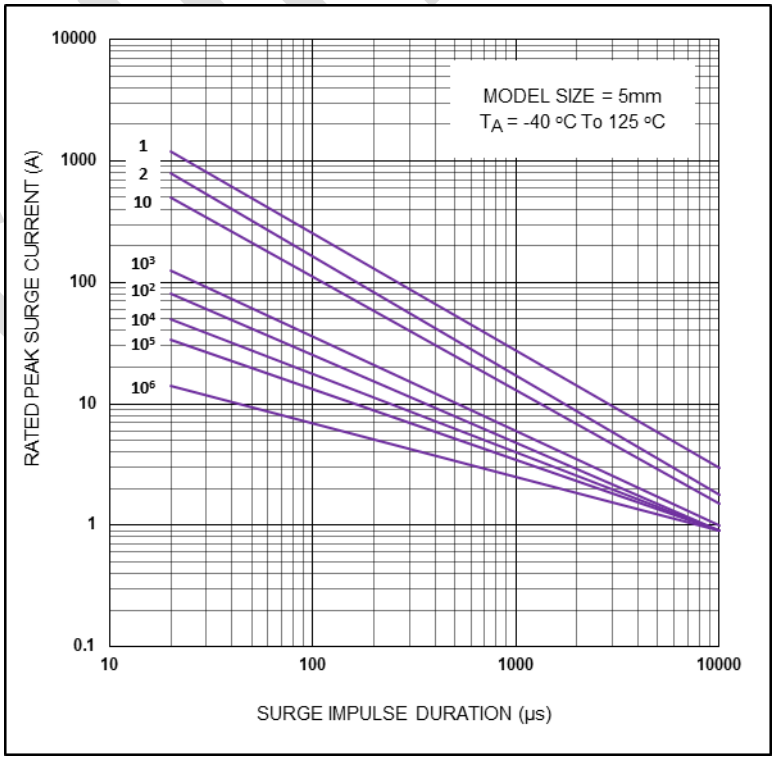
4. Impulse Life Time Rating Curves

FMOV05-H Series

FMOV05180-H to FMOV05680-H



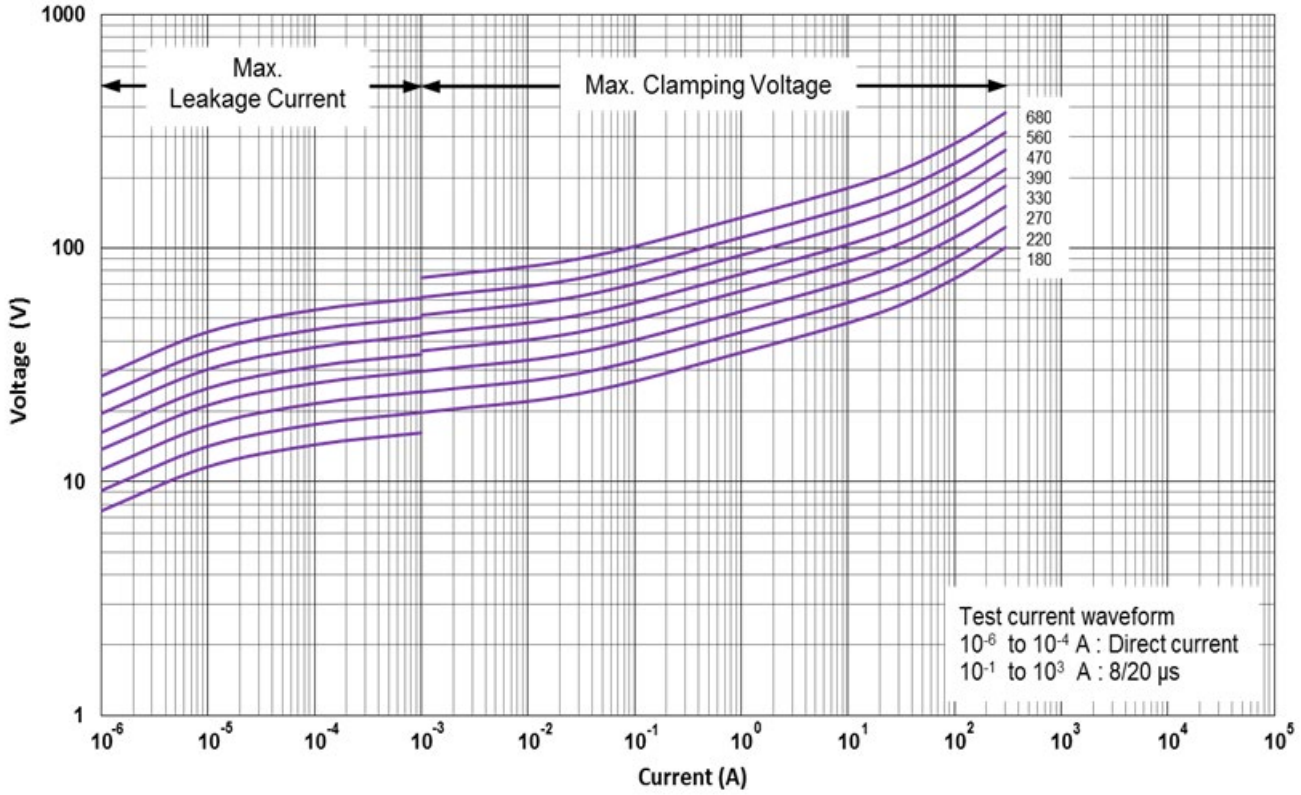
FMOV05201-H to FMOV05751-H



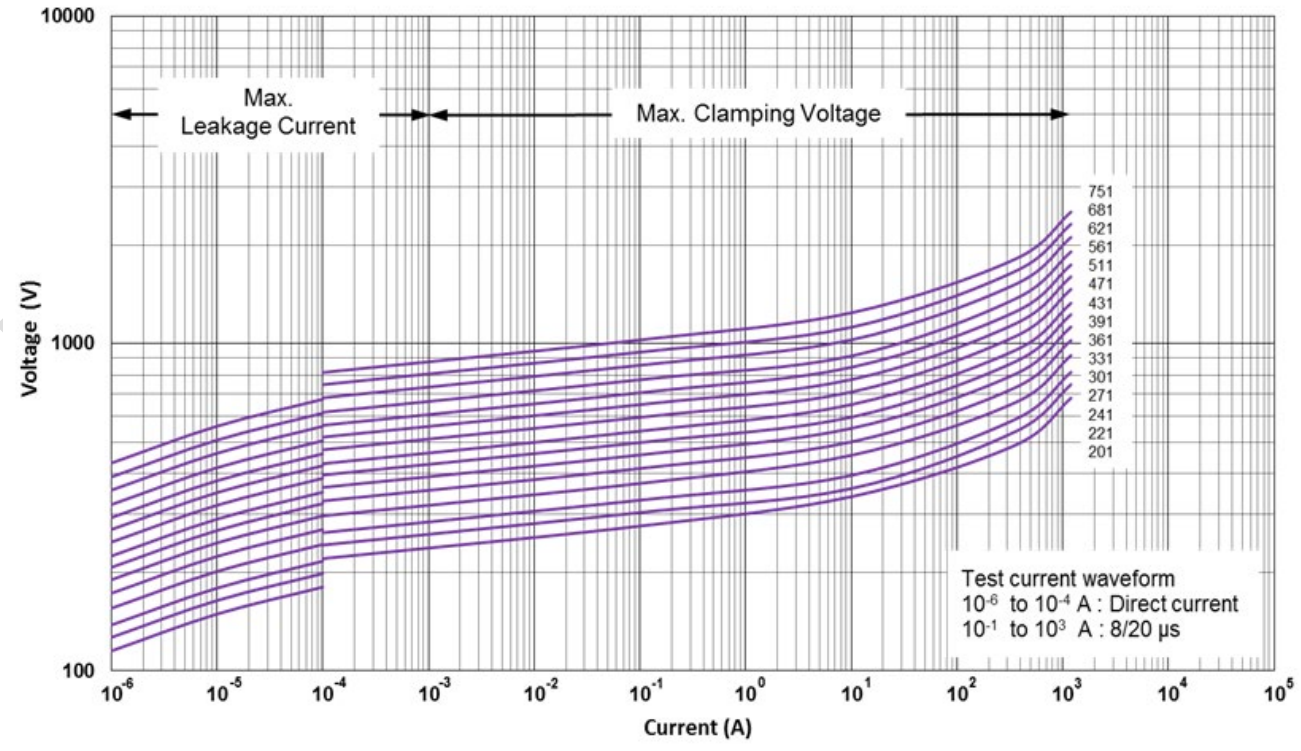
NOTE : Specification subject to change without notice.

5. V-I Curves

(FMOV05180-H to FMOV05680-H)



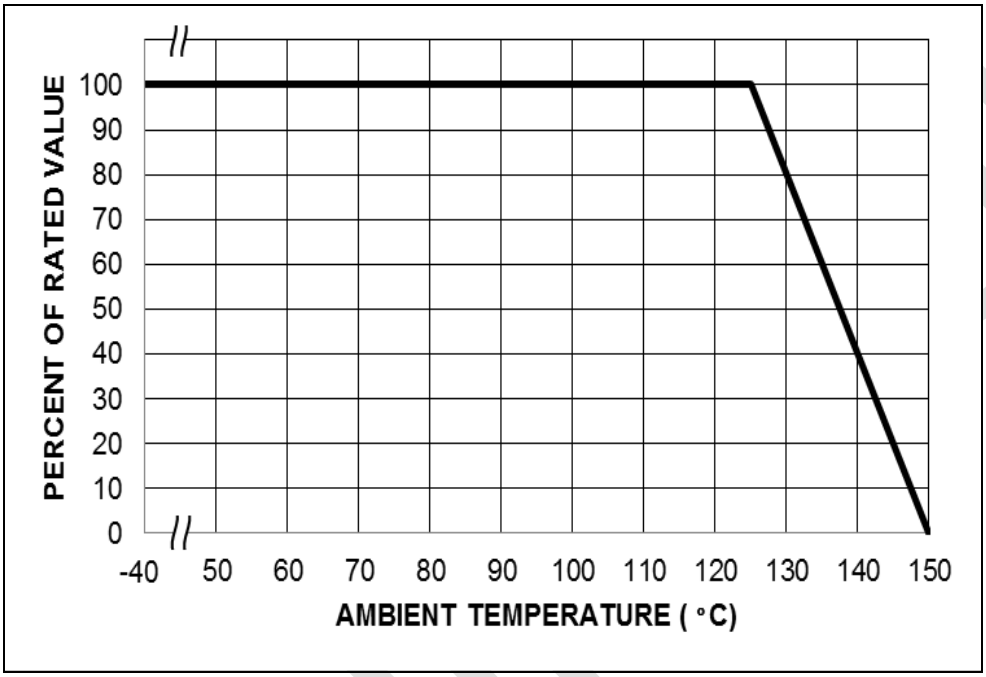
(FMOV05201-H to FMOV05751-H)



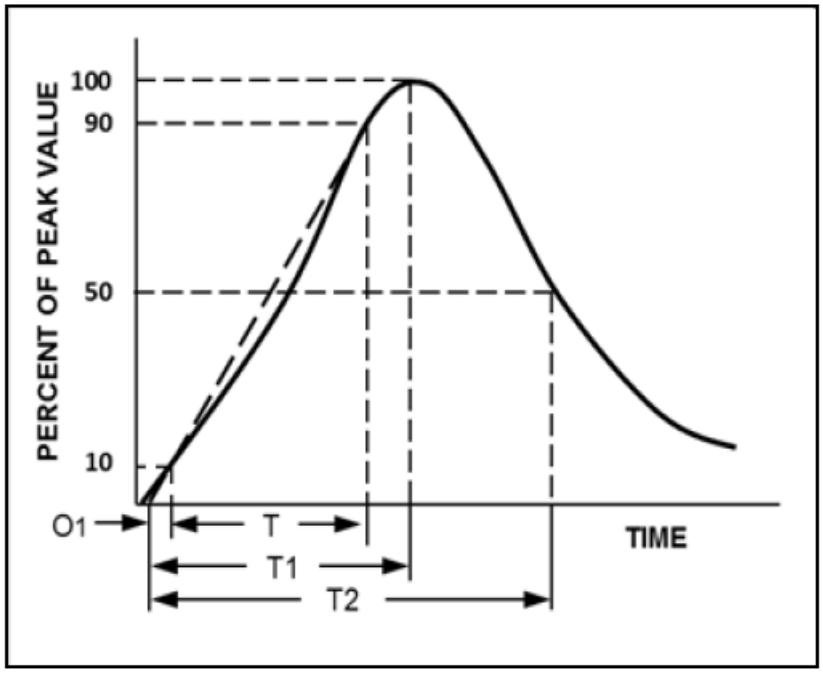
NOTE : Specification subject to change without notice.

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 x T

T2 = Decay Time

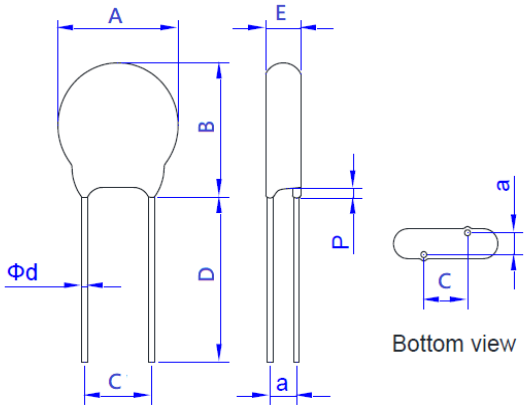
Example - For an 8/20 μs Current Waveform:

8μs = T1 = Rise Time

20μs = T2 = Decay Time

NOTE : Specification subject to change without notice.

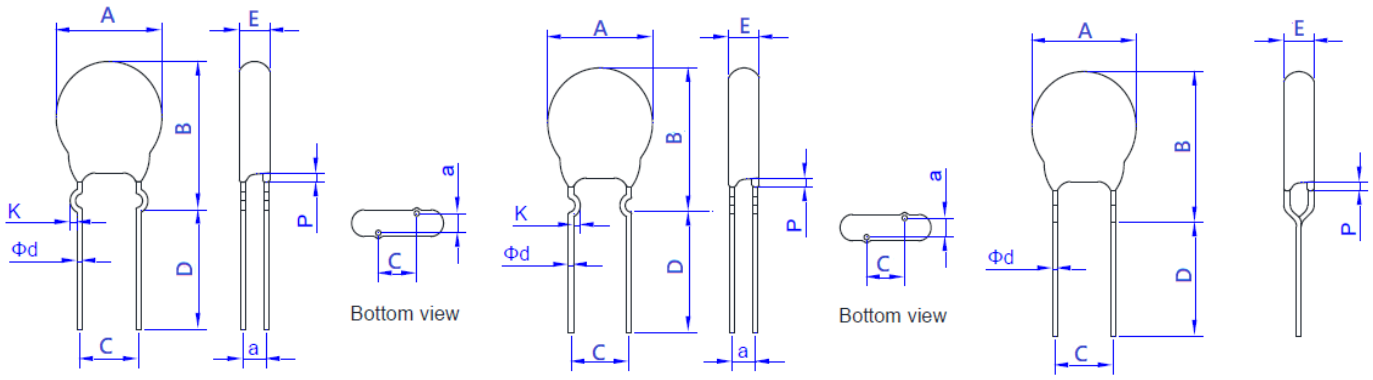
8. Dimension of Component for Standard Product



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
FMOV05180-H	5.5	7.5	10.0	5.0	25.0	4.7	3.0	1.5	0.60
FMOV05220-H	5.5	7.5	10.0	5.0	25.0	5.1	3.0	1.7	0.60
FMOV05270-H	5.5	7.5	10.0	5.0	25.0	5.3	3.0	1.8	0.60
FMOV05330-H	5.5	7.5	10.0	5.0	25.0	4.7	3.0	1.9	0.60
FMOV05390-H	5.5	7.5	10.0	5.0	25.0	4.9	3.0	1.9	0.60
FMOV05470-H	5.5	7.5	10.0	5.0	25.0	5.2	3.0	2.1	0.60
FMOV05560-H	5.5	7.5	10.0	5.0	25.0	5.6	3.0	2.3	0.60
FMOV05680-H	5.5	7.5	10.0	5.0	25.0	6.0	3.0	2.6	0.60
FMOV05201-H	5.5	7.5	10.0	5.0	25.0	5.1	3.0	2.0	0.60
FMOV05221-H	5.5	7.5	10.0	5.0	25.0	5.3	3.0	2.1	0.60
FMOV05241-H	5.5	7.5	10.0	5.0	25.0	5.4	3.0	2.2	0.60
FMOV05271-H	5.5	7.5	10.0	5.0	25.0	5.8	3.0	2.3	0.60
FMOV05301-H	5.5	7.5	10.0	5.0	25.0	6.2	3.0	2.5	0.60
FMOV05331-H	5.5	7.5	10.0	5.0	25.0	6.3	3.0	2.7	0.60
FMOV05361-H	5.5	7.5	10.0	5.0	25.0	6.5	3.0	2.8	0.60
FMOV05391-H	5.5	7.5	10.0	5.0	25.0	6.1	3.0	3.0	0.60
FMOV05431-H	5.5	7.5	10.0	5.0	25.0	6.2	3.0	3.2	0.60
FMOV05471-H	5.5	7.5	10.0	5.0	25.0	6.4	3.0	3.4	0.60
FMOV05511-H	5.5	7.5	10.0	5.0	25.0	6.5	3.0	3.7	0.60
FMOV05561-H	5.5	7.5	10.0	5.0	25.0	6.8	3.0	3.9	0.60
FMOV05621-H	5.5	7.5	10.0	5.0	25.0	7.1	3.0	4.3	0.60
FMOV05681-H	5.5	7.5	10.0	5.0	25.0	7.4	3.0	4.7	0.60
FMOV05751-H	5.5	7.5	10.0	5.0	25.0	7.8	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
FMOV05180-H	5.5	7.5	13.0	5.0	25.0	4.7	3.0	0.8	1.6	1.5	0.60
FMOV05220-H	5.5	7.5	13.0	5.0	25.0	5.1	3.0	0.8	1.6	1.7	0.60
FMOV05270-H	5.5	7.5	13.0	5.0	25.0	5.3	3.0	0.8	1.6	1.8	0.60
FMOV05330-H	5.5	7.5	13.0	5.0	25.0	4.7	3.0	0.8	1.6	1.9	0.60
FMOV05390-H	5.5	7.5	13.0	5.0	25.0	4.9	3.0	0.8	1.6	1.9	0.60
FMOV05470-H	5.5	7.5	13.0	5.0	25.0	5.2	3.0	0.8	1.6	2.1	0.60
FMOV05560-H	5.5	7.5	13.0	5.0	25.0	5.6	3.0	0.8	1.6	2.3	0.60
FMOV05680-H	5.5	7.5	13.0	5.0	25.0	6.0	3.0	0.8	1.6	2.6	0.60
FMOV05201-H	5.5	7.5	13.0	5.0	25.0	5.1	3.0	0.8	1.6	2.0	0.60
FMOV05221-H	5.5	7.5	13.0	5.0	25.0	5.3	3.0	0.8	1.6	2.1	0.60
FMOV05241-H	5.5	7.5	13.0	5.0	25.0	5.4	3.0	0.8	1.6	2.2	0.60
FMOV05271-H	5.5	7.5	13.0	5.0	25.0	5.8	3.0	0.8	1.6	2.3	0.60
FMOV05301-H	5.5	7.5	13.0	5.0	25.0	6.2	3.0	0.8	1.6	2.5	0.60
FMOV05331-H	5.5	7.5	13.0	5.0	25.0	6.3	3.0	0.8	1.6	2.7	0.60
FMOV05361-H	5.5	7.5	13.0	5.0	25.0	6.5	3.0	0.8	1.6	2.8	0.60
FMOV05391-H	5.5	7.5	13.0	5.0	25.0	6.1	3.0	0.8	1.6	3.0	0.60
FMOV05431-H	5.5	7.5	13.0	5.0	25.0	6.2	3.0	0.8	1.6	3.2	0.60
FMOV05471-H	5.5	7.5	13.0	5.0	25.0	6.4	3.0	0.8	1.6	3.4	0.60
FMOV05511-H	5.5	7.5	13.0	5.0	25.0	6.5	3.0	0.8	1.6	3.7	0.60
FMOV05561-H	5.5	7.5	13.0	5.0	25.0	6.8	3.0	0.8	1.6	3.9	0.60
FMOV05621-H	5.5	7.5	13.0	5.0	25.0	7.1	3.0	0.8	1.6	4.3	0.60
FMOV05681-H	5.5	7.5	13.0	5.0	25.0	7.4	3.0	0.8	1.6	4.7	0.60
FMOV05751-H	5.5	7.5	13.0	5.0	25.0	7.8	3.0	0.8	1.6	5.1	0.60

Unit: mm

NOTE : Specification subject to change without notice.

9. Tape and Reel Specifications

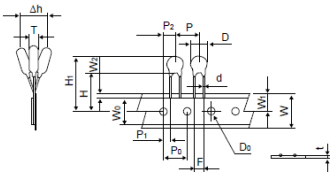


Figure: A

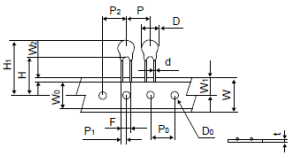


Figure: B

Straight Leads

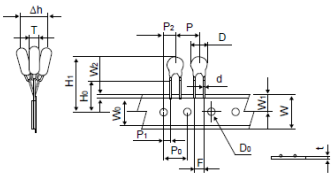


Figure: C

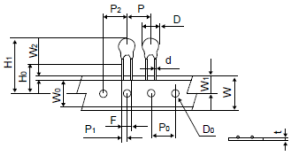


Figure: D

Inline Kink Leads

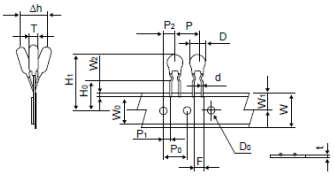


Figure: E

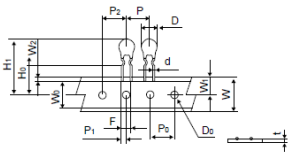


Figure: F

Inside Kink Leads

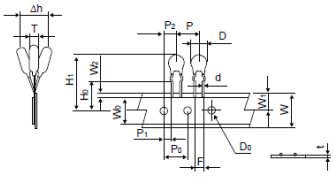


Figure: G

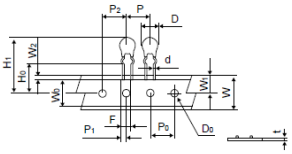


Figure: H

Outside Kink Leads

Symbol	Parameter	FMOV05-H 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
△h	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 Clopped Lead	11.0 Max
Figure		ACEG

Unit: mm

NOTE : Specification subject to change without notice.

2022/7/8

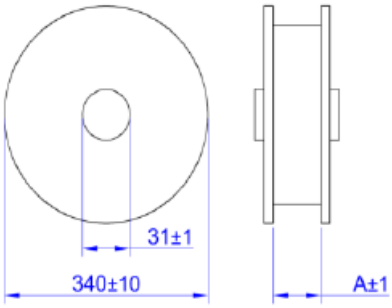
10. Packaging Specifications

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-H Series	1000	1000	1000	1000

Tape & Reel Product Packing

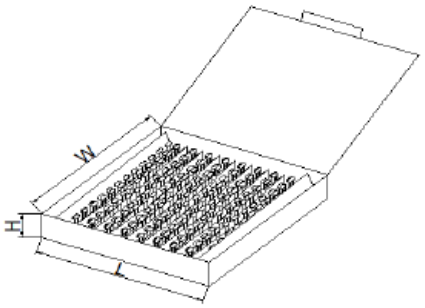
Series	A (mm)	Quantity (pcs/reel)
FMOV05(201~621)-H-T-	43	2000
FMOV05(681~751)-H-T-		1500



Box Product Packing

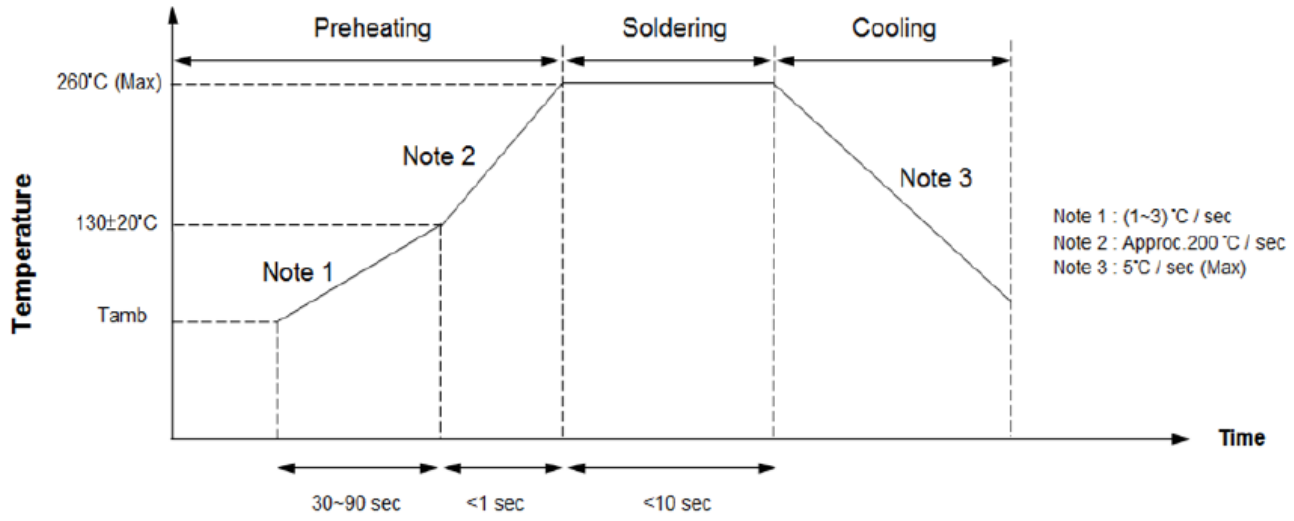
Series	Quantity (pcs/reel)
FMOV05(201~621)-H-T-	1000
FMOV05(681~751)-H-T-	800

Series	L±5	W±5	H±5
FMOV05-H 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℃ (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:

a. Storage Temperature: -10℃~+40℃

b. Relative Humidity: ≦75%RH

c. Keep away from corrosive atmosphere and sunlight

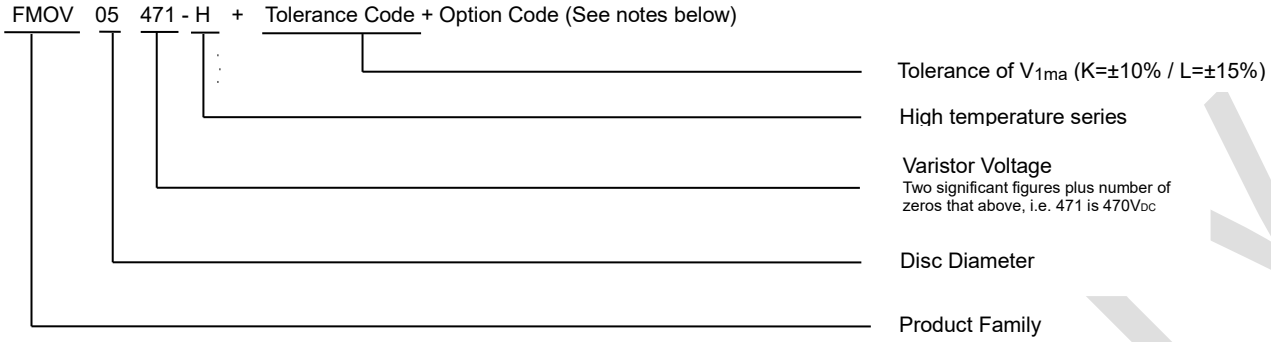
d. Solvent Resistance: MIL–STD–202, Method 215F

e. Moisture Sensitivity: Level 1, J-STD-020

(II) Period of Storage: 1 year

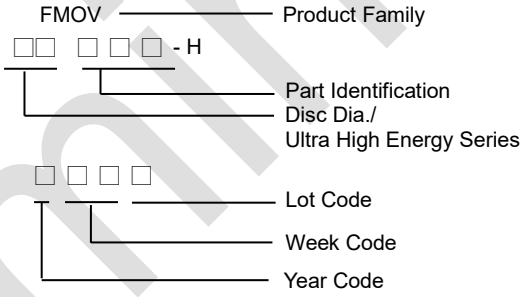
12. Part Numbering and Marking System

Part Numbering System



Marking System

Example



NOTE : Specification subject to change without notice.

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-H**KBS**	FMOV05471-H**KBSXXX**	FMOV05471-H**KTS**	FMOV05471-H**KAS**

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-H**KBO**	FMOV05471-H**KBOXXX**	FMOV05471-H**KTO**	FMOV05471-H**KAO**

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-H**KBK**	FMOV05471-H**KBKXXX**	FMOV05471-H**KTK**	FMOV05471-H**KAK**

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-H**KBI**	FMOV05471-H**KBIXXX**	FMOV05471-H**KTI**	FMOV05471-H**KAI**

MOV Varistor Device: FMOV07-H 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)
FMOV07180-H	11	14	18	16	20	36	2.5	2.1	750	0.05	3600
FMOV07220-H	14	18	22	20	24	43	2.5	2.5	750	0.05	3200
FMOV07270-H	17	22	27	24	30	53	2.5	3.0	750	0.05	2500
FMOV07330-H	20	26	33	30	36	65	2.5	4.0	750	0.05	1850
FMOV07390-H	25	31	39	35	43	77	2.5	4.6	750	0.05	1750
FMOV07470-H	30	38	47	42	52	93	2.5	5.5	750	0.05	1500
FMOV07560-H	35	45	56	50	62	110	2.5	7.0	750	0.05	1250
FMOV07680-H	40	56	68	61	75	135	2.5	8.2	750	0.05	1100
FMOV07201-H	130	170	200	180	220	340	25	26	2500	0.30	220
FMOV07221-H	140	180	220	198	242	360	25	30	2500	0.30	210
FMOV07241-H	150	200	240	216	264	395	25	33	2500	0.30	190
FMOV07271-H	175	225	270	243	297	455	25	39	2500	0.30	165
FMOV07301-H	195	250	300	270	330	500	25	42	2500	0.30	155
FMOV07331-H	215	275	330	297	363	550	25	44	2500	0.30	145
FMOV07361-H	230	300	360	324	396	595	25	50	2500	0.30	145
FMOV07391-H	250	320	390	351	429	650	25	53	2500	0.30	145
FMOV07431-H	275	350	430	387	473	710	25	60	2500	0.30	130
FMOV07471-H	300	385	470	423	517	775	25	65	2500	0.30	110
FMOV07511-H	320	420	510	459	561	845	25	70	2500	0.30	100
FMOV07561-H	350	460	560	504	616	915	25	75	2500	0.30	100
FMOV07621-H	395	510	620	558	682	1020	25	80	2500	0.30	100
FMOV07681-H	420	560	680	612	748	1120	25	85	2500	0.30	90
FMOV07751-H	465	615	750	675	825	1235	25	92	2500	0.30	90

NOTE : Specification subject to change without notice.

2. Agency Approvals

Agency	Agency Approvals	Certificate No.
c UL us	UL1449 4th & cUL	In Process
VDE	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

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)	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 5\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 5\%$ 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	$\triangle V/_{1mA}\ V_{1mA} \leqq \pm 5\%$ 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, Ipeak=0.25*Imax	$\triangle V/V \leqq \pm 10\%$ No visible damage
Pulse current - 10/1000 μs	IEC 61051-2	10/1000 μs, 10 times, Ipeak = 0.0075* Imax	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ No visible damage
Combination pulse	IEC 62368-1	Additional test: 10 pulses (combination pulse 6KV/3KA), in one direction, 1 per min	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ No visible damage $U \leq 1.1\ U_{initial}$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ No visible damage $R_{ISO} \geqq 100M\Omega$ 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	$\triangle V/V \leqq \pm 10\%$ No visible damage $R_{ISO} \geqq 1000M\Omega$ $U \leq 1{,}1\ U_{initial}$

NOTE : Specification subject to change without notice.

2022/7/8

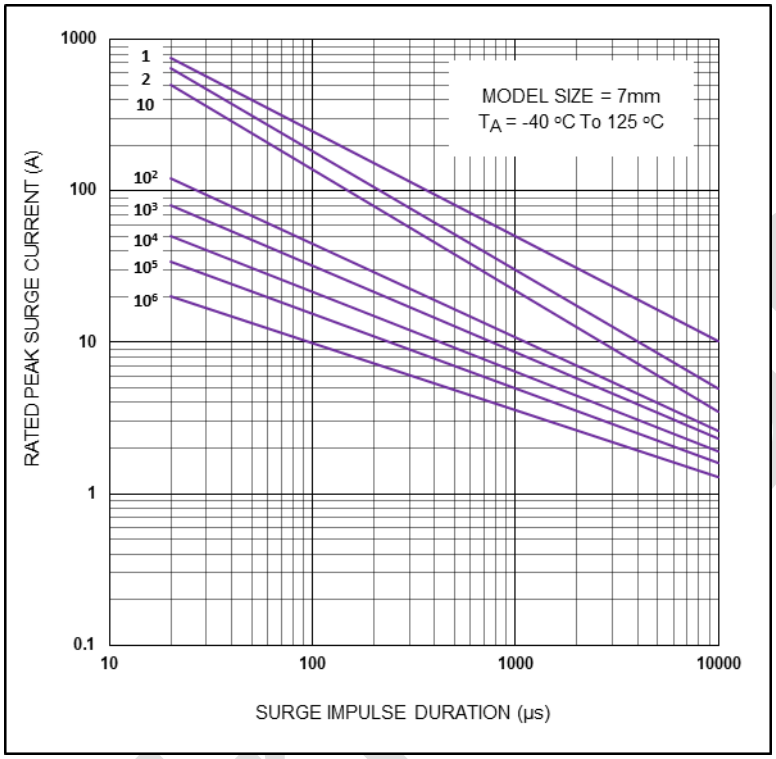
Characteristics	Standard	Test Conditions	Specifications
Damp heat (Steady state)	IEC 60068-2-78 Test Ca	T = 40±2°C, RH = 93(+2/-3)%, 56d , 4 specimens: No voltage applied ,Other 4 specimens: Applied voltage: 10% of the max. d. c. voltage	$\triangle V_{1mA}/V1_{mA} \leqq \pm 10\%$ $R_{ISO} \geqq 100M\Omega$
Maximum Peak Current	Specification Standard	Imax, 8/20 μs, 1 time.	$\triangle V_{1mA}/V1_{mA} \leqq \pm 10\%$ No visible damage
Nominal Discharge Current Test	UL1449 4th	In, 8/20 μs, 15 times, Interval 60s	△V/V≦±10% No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{1mA}\text{at } 85℃ - V_{1mA}\text{at } 25℃}{V_{1mA}\text{at } 25℃} \times \frac{1}{60} \times 100(\%/C)$	0.05≦TC≦0.05(%/℃)
High Temperature Storage	IEC60068-2-2	1000h, T = 125±2°C	△V/V≦±5% No visible damage
Max. Energy	Specification Standard	10/1000 μs, 1 times, Max. Energy	△V/V≦±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.	△V/V≦±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.	△V/V≦±10% No visible damage

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

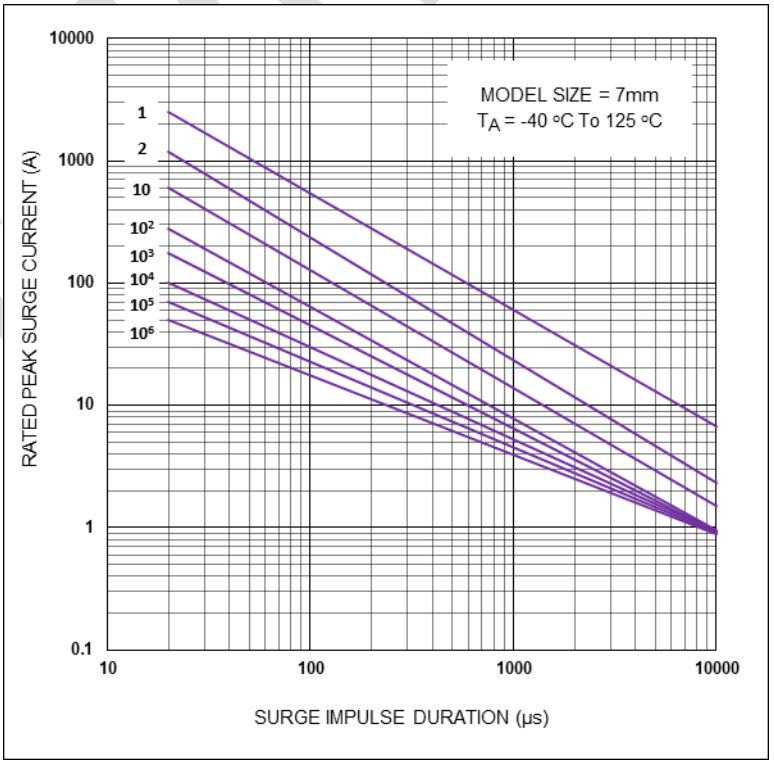
4. Impulse Life Time Rating Curves

FMOV07-H Series

FMOV07180-H to FMOV07680-H



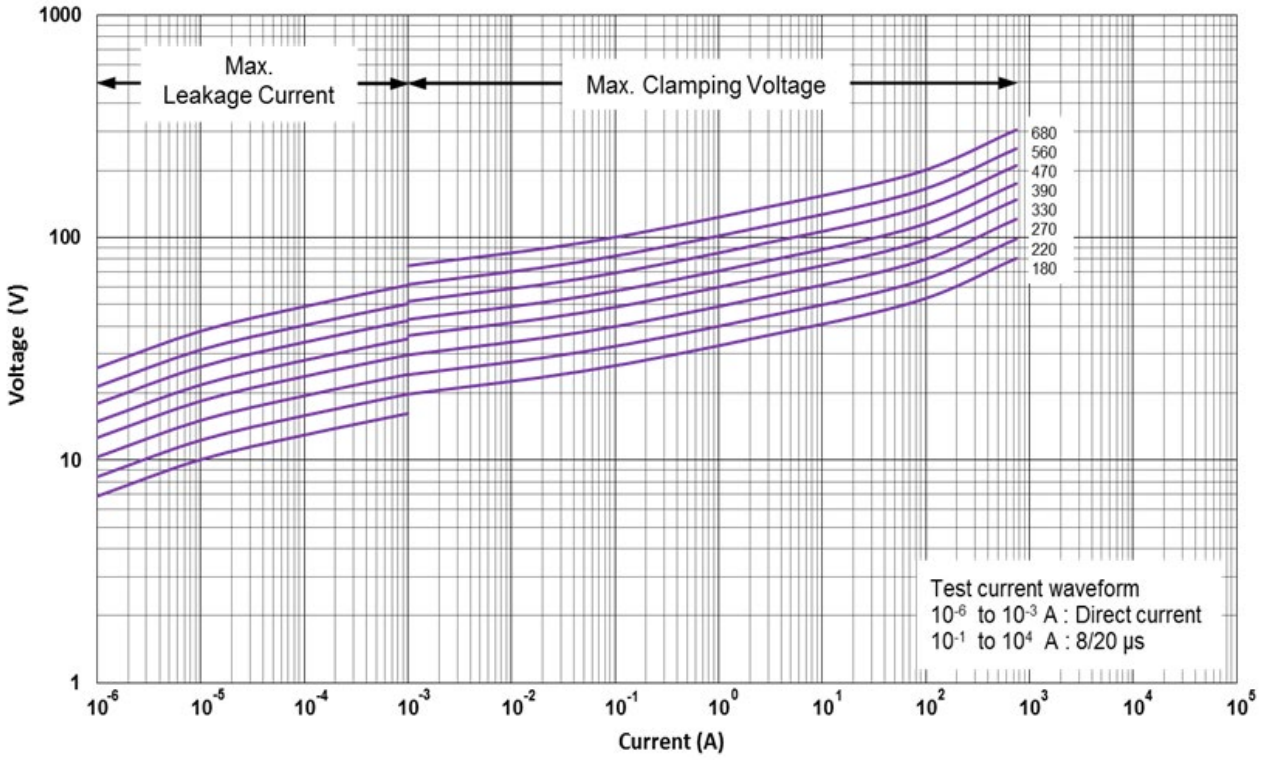
FMOV07201-H to FMOV07751-H



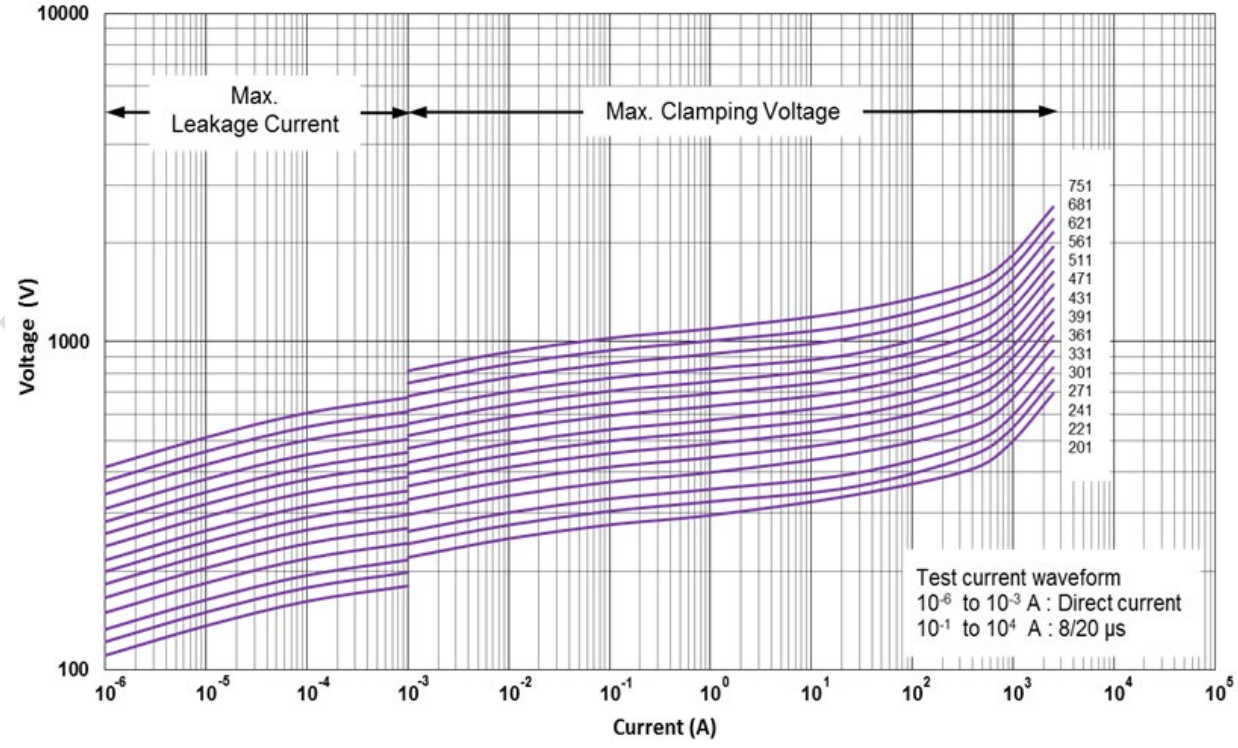
NOTE : Specification subject to change without notice.

5. V-I Curves

(FMOV07180-H to FMOV07680-H)



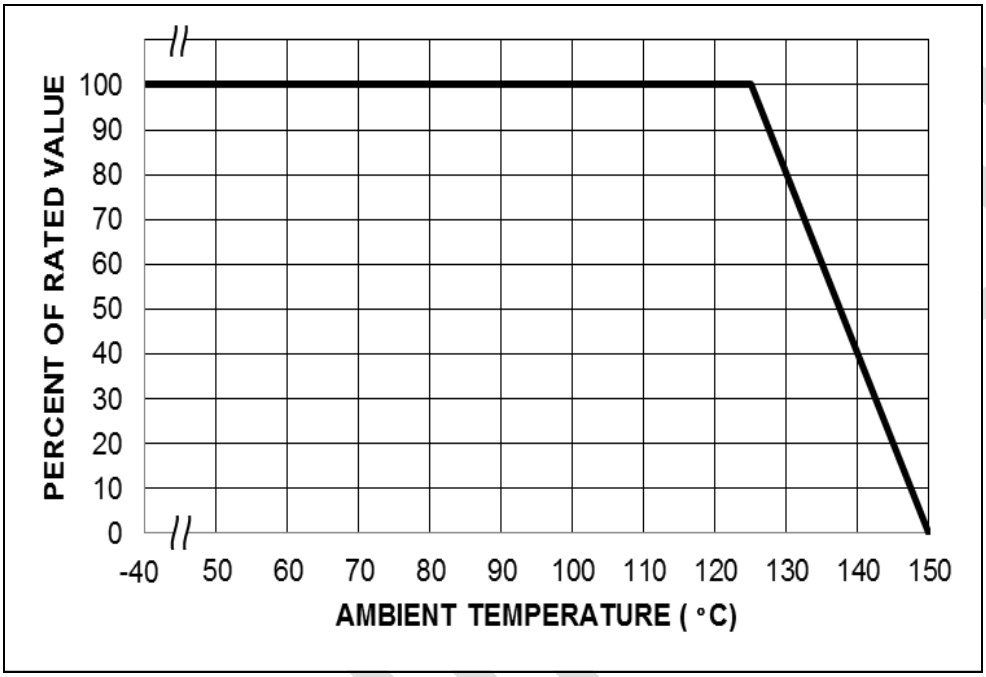
(FMOV07201-H to FMOV07751-H)



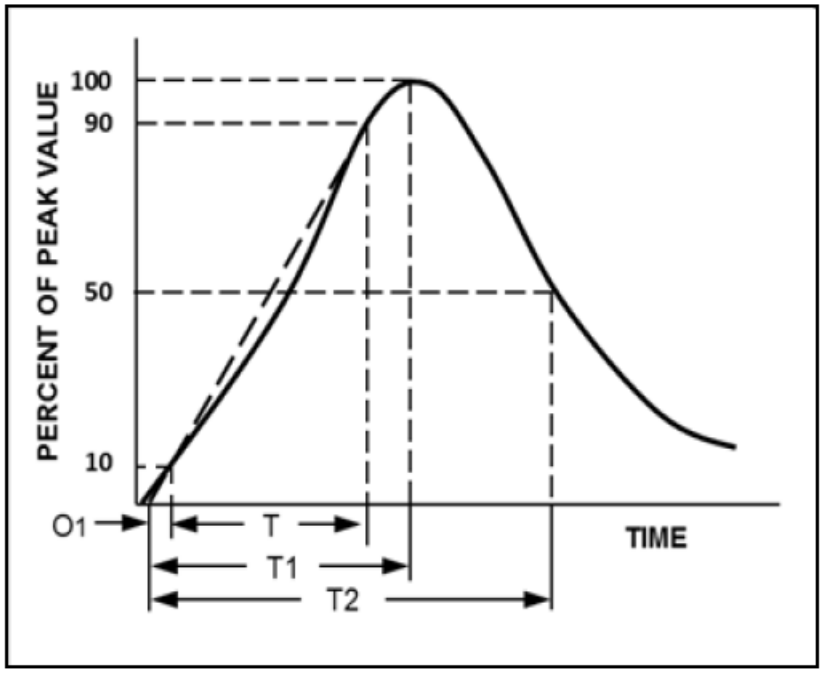
NOTE : Specification subject to change without notice.

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 x T

T2 = Decay Time

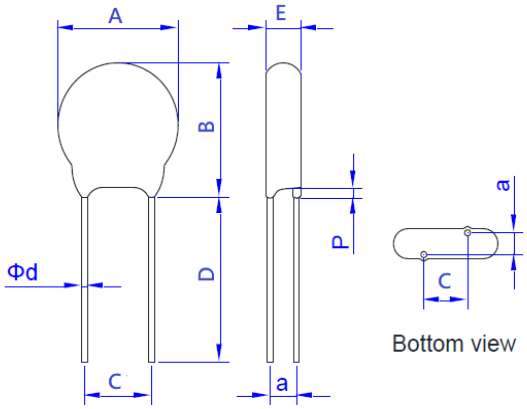
Example - For an 8/20 μs Current Waveform:

8μs = T1 = Rise Time

20μs = T2 = Decay Time

NOTE : Specification subject to change without notice.

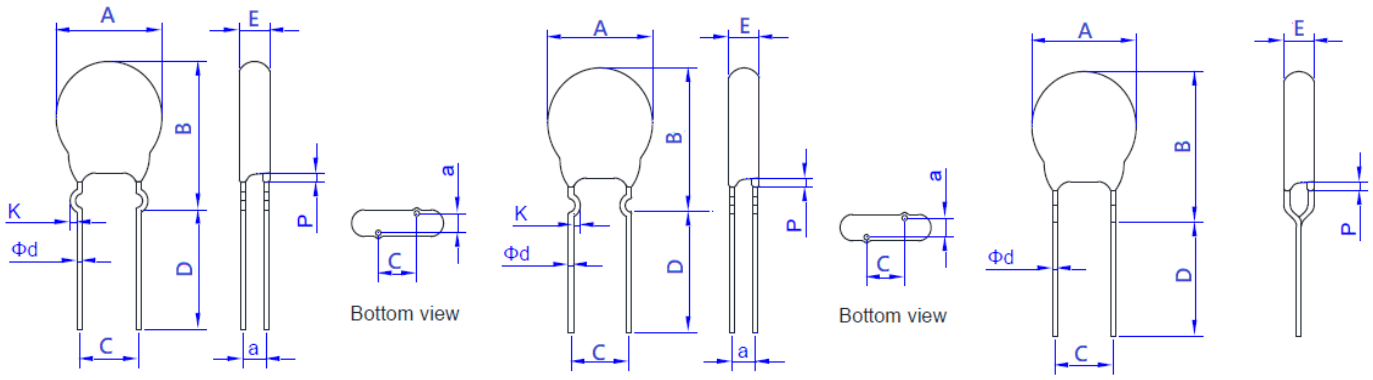
8. Dimension of Component for Standard Product



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
FMOV07180-H	7.5	9.0	12.0	5.0	25.0	4.7	3.0	1.5	0.60
FMOV07220-H	7.5	9.0	12.0	5.0	25.0	5.1	3.0	1.7	0.60
FMOV07270-H	7.5	9.0	12.0	5.0	25.0	5.3	3.0	1.8	0.60
FMOV07330-H	7.5	9.0	12.0	5.0	25.0	4.7	3.0	1.9	0.60
FMOV07390-H	7.5	9.0	12.0	5.0	25.0	4.9	3.0	1.9	0.60
FMOV07470-H	7.5	9.0	12.0	5.0	25.0	5.2	3.0	2.1	0.60
FMOV07560-H	7.5	9.0	12.0	5.0	25.0	5.6	3.0	2.3	0.60
FMOV07680-H	7.5	9.0	12.0	5.0	25.0	6.0	3.0	2.6	0.60
FMOV07201-H	7.5	9.0	12.0	5.0	25.0	6.2	3.0	2.0	0.60
FMOV07221-H	7.5	9.0	12.0	5.0	25.0	6.3	3.0	2.1	0.60
FMOV07241-H	7.5	9.0	12.0	5.0	25.0	6.5	3.0	2.2	0.60
FMOV07271-H	7.5	9.0	12.0	5.0	25.0	6.6	3.0	2.3	0.60
FMOV07301-H	7.5	9.0	12.0	5.0	25.0	6.8	3.0	2.5	0.60
FMOV07331-H	7.5	9.0	12.0	5.0	25.0	7.0	3.0	2.7	0.60
FMOV07361-H	7.5	9.0	12.0	5.0	25.0	7.3	3.0	2.8	0.60
FMOV07391-H	7.5	9.0	12.0	5.0	25.0	7.5	3.0	3.0	0.60
FMOV07431-H	7.5	9.0	12.0	5.0	25.0	7.8	3.0	3.2	0.60
FMOV07471-H	7.5	9.0	12.0	5.0	25.0	8.1	3.0	3.4	0.60
FMOV07511-H	7.5	9.0	12.0	5.0	25.0	8.2	3.0	3.7	0.60
FMOV07561-H	7.5	9.0	12.0	5.0	25.0	8.5	3.0	3.9	0.60
FMOV07621-H	7.5	9.0	12.0	5.0	25.0	8.8	3.0	4.3	0.60
FMOV07681-H	7.5	9.0	12.0	5.0	25.0	8.9	3.0	4.7	0.60
FMOV07751-H	7.5	9.0	12.0	5.0	25.0	9.2	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
FMOV07180-H	7.5	9.0	15.0	5.0	25.0	4.7	3.0	0.8	1.6	1.5	0.60
FMOV07220-H	7.5	9.0	15.0	5.0	25.0	5.1	3.0	0.8	1.6	1.7	0.60
FMOV07270-H	7.5	9.0	15.0	5.0	25.0	5.3	3.0	0.8	1.6	1.8	0.60
FMOV07330-H	7.5	9.0	15.0	5.0	25.0	4.7	3.0	0.8	1.6	1.9	0.60
FMOV07390-H	7.5	9.0	15.0	5.0	25.0	4.9	3.0	0.8	1.6	1.9	0.60
FMOV07470-H	7.5	9.0	15.0	5.0	25.0	5.2	3.0	0.8	1.6	2.1	0.60
FMOV07560-H	7.5	9.0	15.0	5.0	25.0	5.6	3.0	0.8	1.6	2.3	0.60
FMOV07680-H	7.5	9.0	15.0	5.0	25.0	6.0	3.0	0.8	1.6	2.6	0.60
FMOV07201-H	7.5	9.0	15.0	5.0	25.0	6.2	3.0	0.8	1.6	2.0	0.60
FMOV07221-H	7.5	9.0	15.0	5.0	25.0	6.3	3.0	0.8	1.6	2.1	0.60
FMOV07241-H	7.5	9.0	15.0	5.0	25.0	6.5	3.0	0.8	1.6	2.2	0.60
FMOV07271-H	7.5	9.0	15.0	5.0	25.0	6.6	3.0	0.8	1.6	2.3	0.60
FMOV07301-H	7.5	9.0	15.0	5.0	25.0	6.8	3.0	0.8	1.6	2.5	0.60
FMOV07331-H	7.5	9.0	15.0	5.0	25.0	7.0	3.0	0.8	1.6	2.7	0.60
FMOV07361-H	7.5	9.0	15.0	5.0	25.0	7.3	3.0	0.8	1.6	2.8	0.60
FMOV07391-H	7.5	9.0	15.0	5.0	25.0	7.5	3.0	0.8	1.6	3.0	0.60
FMOV07431-H	7.5	9.0	15.0	5.0	25.0	7.8	3.0	0.8	1.6	3.2	0.60
FMOV07471-H	7.5	9.0	15.0	5.0	25.0	8.1	3.0	0.8	1.6	3.4	0.60
FMOV07511-H	7.5	9.0	15.0	5.0	25.0	8.2	3.0	0.8	1.6	3.7	0.60
FMOV07561-H	7.5	9.0	15.0	5.0	25.0	8.5	3.0	0.8	1.6	3.9	0.60
FMOV07621-H	7.5	9.0	15.0	5.0	25.0	8.8	3.0	0.8	1.6	4.3	0.60
FMOV07681-H	7.5	9.0	15.0	5.0	25.0	8.9	3.0	0.8	1.6	4.7	0.60
FMOV07751-H	7.5	9.0	15.0	5.0	25.0	9.2	3.0	0.8	1.6	5.1	0.60

Unit: mm

NOTE : Specification subject to change without notice.

9. Tape and Reel Specifications

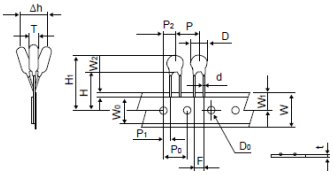


Figure: A

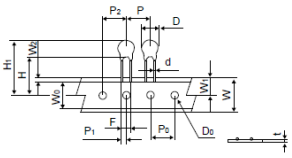


Figure: B

Straight Leads

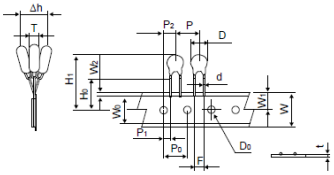


Figure: C

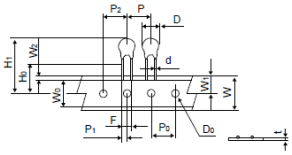


Figure: D

Inline Kink Leads

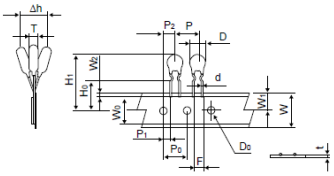


Figure: E

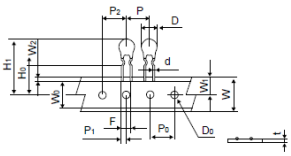


Figure: F

Inside Kink Leads

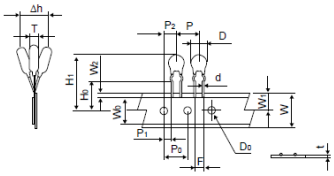


Figure: G

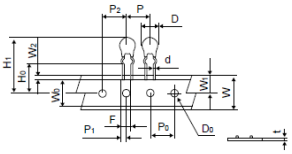


Figure: H

Outside Kink Leads

Symbol	Parameter	FMOV07-H 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
△h	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 Clopped Lead	11.0 Max
Figure		ACEG

Unit: mm

NOTE : Specification subject to change without notice.

2022/7/8

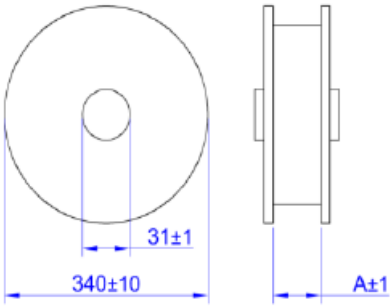
10. Packaging Specifications

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-H Series	1000	1000	1000	1000

Tape & Reel Product Packing

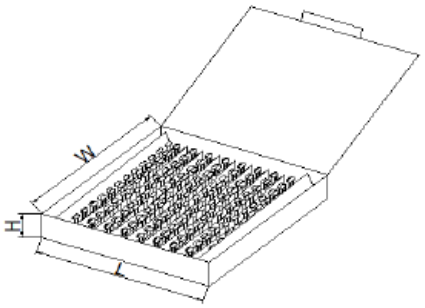
Series	A (mm)	Quantity (pcs/reel)
FMOV07(201~391)-H-T-	43	2000
FMOV07(431~751)-H-T-		1500



Box Product Packing

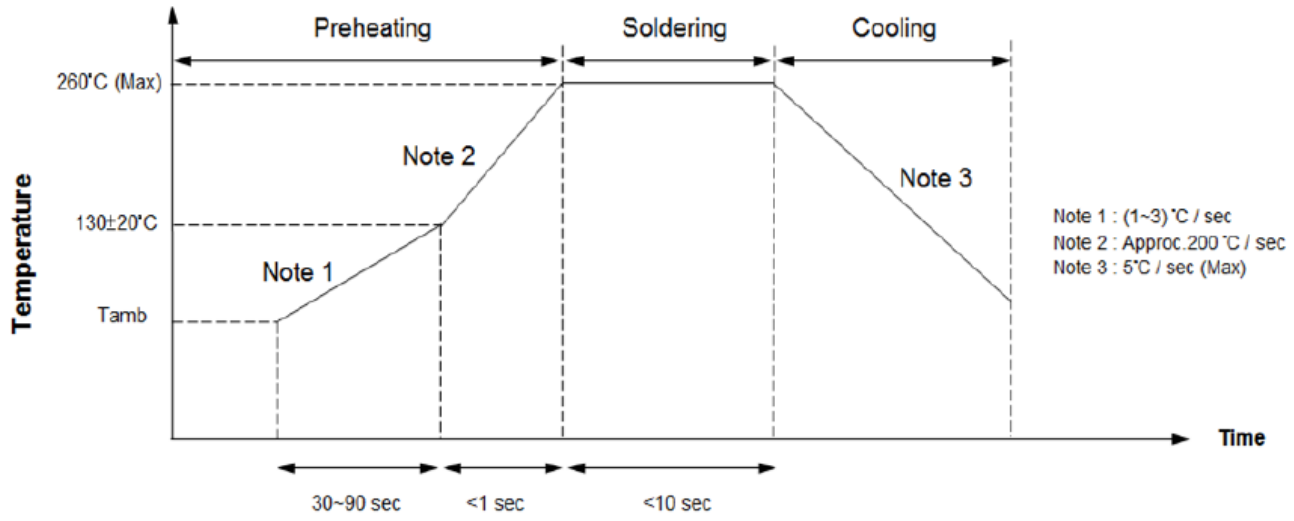
Series	Quantity (pcs/reel)
FMOV07(201~621)-H-T-	1000
FMOV07(681~751)-H-T-	800

Series	L±5	W±5	H±5
FMOV07-H 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℃ (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:

a. Storage Temperature: -10℃~+40℃

b. Relative Humidity: ≦75%RH

c. Keep away from corrosive atmosphere and sunlight

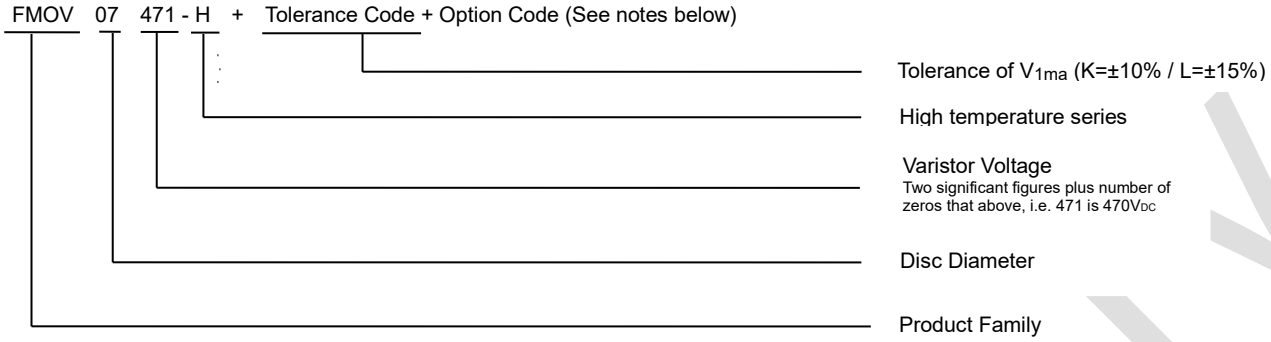
d. Solvent Resistance: MIL–STD–202, Method 215F

e. Moisture Sensitivity: Level 1, J-STD-020

(II) Period of Storage: 1 year

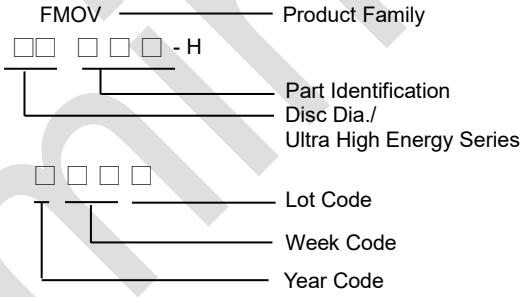
12. Part Numbering and Marking System

Part Numbering System



Marking System

Example



NOTE : Specification subject to change without notice.

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-H**KBS**	FMOV07471-H**KBSXXX**	FMOV07471-H**KTS**	FMOV07471-H**KAS**

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-H**KBO**	FMOV07471-H**KBOXXX**	FMOV07471-H**KTO**	FMOV07471-H**KAO**

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-H**KBK**	FMOV07471-H**KBKXXX**	FMOV07471-H**KTK**	FMOV07471-H**KAK**

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-H**KBI**	FMOV07471-H**KBIXXX**	FMOV07471-H**KTI**	FMOV07471-H**KAI**

MOV Varistor Device: FMOV10-H 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)
FMOV10180-H	11	14	18	16	20	36	5	4.0	1500	0.08	8000
FMOV10220-H	14	18	22	20	24	43	5	5.0	1500	0.08	7000
FMOV10270-H	17	22	27	24	30	53	5	6.0	1500	0.08	5500
FMOV10330-H	20	26	33	30	36	65	5	7.5	1500	0.08	4100
FMOV10390-H	25	31	39	35	43	77	5	8.6	1500	0.08	3900
FMOV10470-H	30	38	47	42	52	93	5	10	1500	0.08	3300
FMOV10560-H	35	45	56	50	62	110	5	11	1500	0.08	2800
FMOV10680-H	40	56	68	61	75	135	5	14	1500	0.08	2300
FMOV10201-H	130	170	200	180	220	340	50	52	4500	0.5	420
FMOV10221-H	140	180	220	198	242	360	50	58	4500	0.5	390
FMOV10241-H	150	200	240	216	264	395	50	64	4500	0.5	360
FMOV10271-H	175	225	270	243	297	455	50	67	4500	0.5	330
FMOV10301-H	195	250	300	270	330	500	50	70	4500	0.5	300
FMOV10331-H	215	275	330	297	363	550	50	78	4500	0.5	270
FMOV10361-H	230	300	360	324	396	595	50	84	4500	0.5	250
FMOV10391-H	250	320	390	351	429	650	50	91	4500	0.5	230
FMOV10431-H	275	350	430	387	473	710	50	99	4500	0.5	220
FMOV10471-H	300	385	470	423	517	775	50	107	4500	0.5	200
FMOV10511-H	320	420	510	459	561	845	50	117	4500	0.5	190
FMOV10561-H	350	460	560	504	616	915	50	125	4500	0.5	180
FMOV10621-H	395	510	620	558	682	1020	50	128	4500	0.5	160
FMOV10681-H	420	560	680	612	748	1120	50	134	4500	0.5	140
FMOV10751-H	465	615	750	675	825	1235	50	146	4500	0.5	130

NOTE : Specification subject to change without notice.

2. Agency Approvals

Agency	Agency Approvals	Certificate No.
c UL us	UL1449 4th & cUL	In Process
VDE	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

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)	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 5\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 5\%$ 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	$\triangle V/_{1mA}\ V_{1mA} \leqq \pm 5\%$ 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, Ipeak=0.25*Imax	$\triangle V/V \leqq \pm 10\%$ No visible damage
Pulse current - 10/1000 μs	IEC 61051-2	10/1000 μs, 10 times, Ipeak = 0.0075* Imax	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ No visible damage
Combination pulse	IEC 62368-1	Additional test: 10 pulses (combination pulse 6KV/3KA), in one direction, 1 per min	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ No visible damage $U \leq 1.1\ U_{initial}$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ No visible damage $R_{ISO} \geqq 100M\Omega$ 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	$\triangle V/V \leqq \pm 10\%$ No visible damage $R_{ISO} \geqq 1000M\Omega$ $U \leq 1{,}1\ U_{initial}$

NOTE : Specification subject to change without notice.

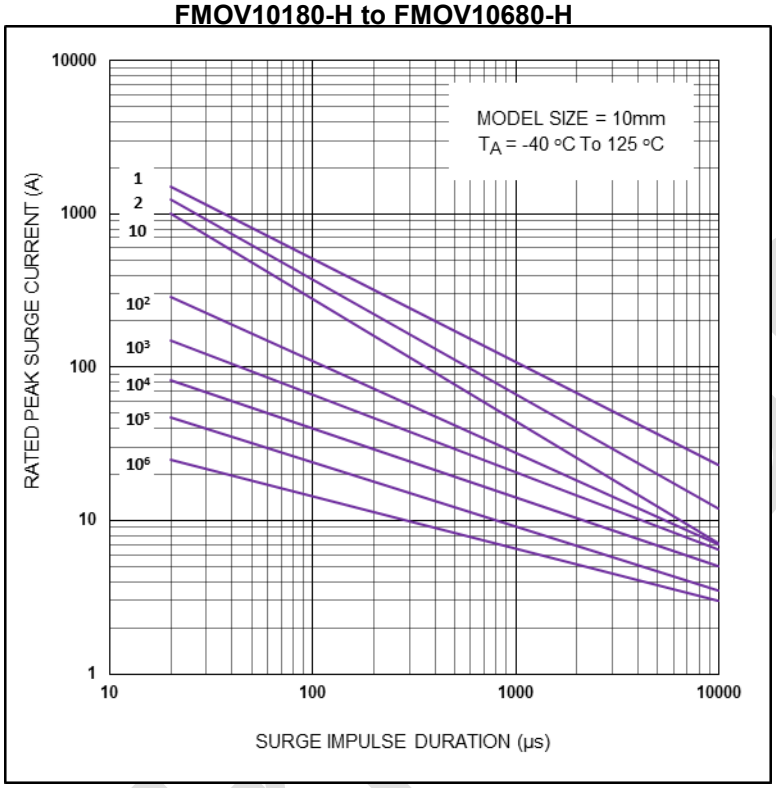
Characteristics	Standard	Test Conditions	Specifications
Damp heat (Steady state)	IEC 60068-2-78 Test Ca	T = 40±2°C, RH = 93(+2/-3)%, 56d , 4 specimens: No voltage applied ,Other 4 specimens: Applied voltage: 10% of the max. d. c. voltage	$\triangle V_{1mA}/V1_{mA} \leqq \pm 10\%$ $R_{ISO} \geqq 100M\Omega$
Maximum Peak Current	Specification Standard	Imax, 8/20 μs, 1 time.	$\triangle V_{1mA}/V1_{mA} \leqq \pm 10\%$ No visible damage
Nominal Discharge Current Test	UL1449 4th	In, 8/20 μs, 15 times, Interval 60s	△V/V≦±10% No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{1mA}\text{at } 85℃ - V_{1mA}\text{at } 25℃}{V_{1mA}\text{at } 25℃} \times \frac{1}{60} \times 100(\%/C)$	0.05≦TC≦0.05(%/℃)
High Temperature Storage	IEC60068-2-2	1000h, T = 125±2°C	△V/V≦±5% No visible damage
Max. Energy	Specification Standard	10/1000 μs, 1 times, Max. Energy	△V/V≦±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.	△V/V≦±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.	△V/V≦±10% No visible damage

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

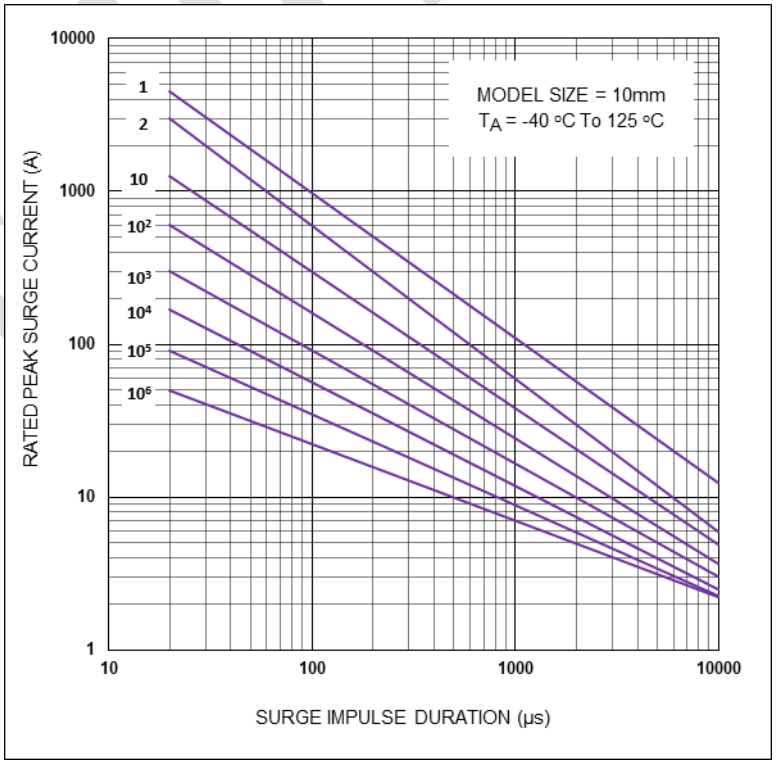
4. Impulse Life Time Rating Curves

FMOV10-H Series

FMOV10180-H to FMOV10680-H

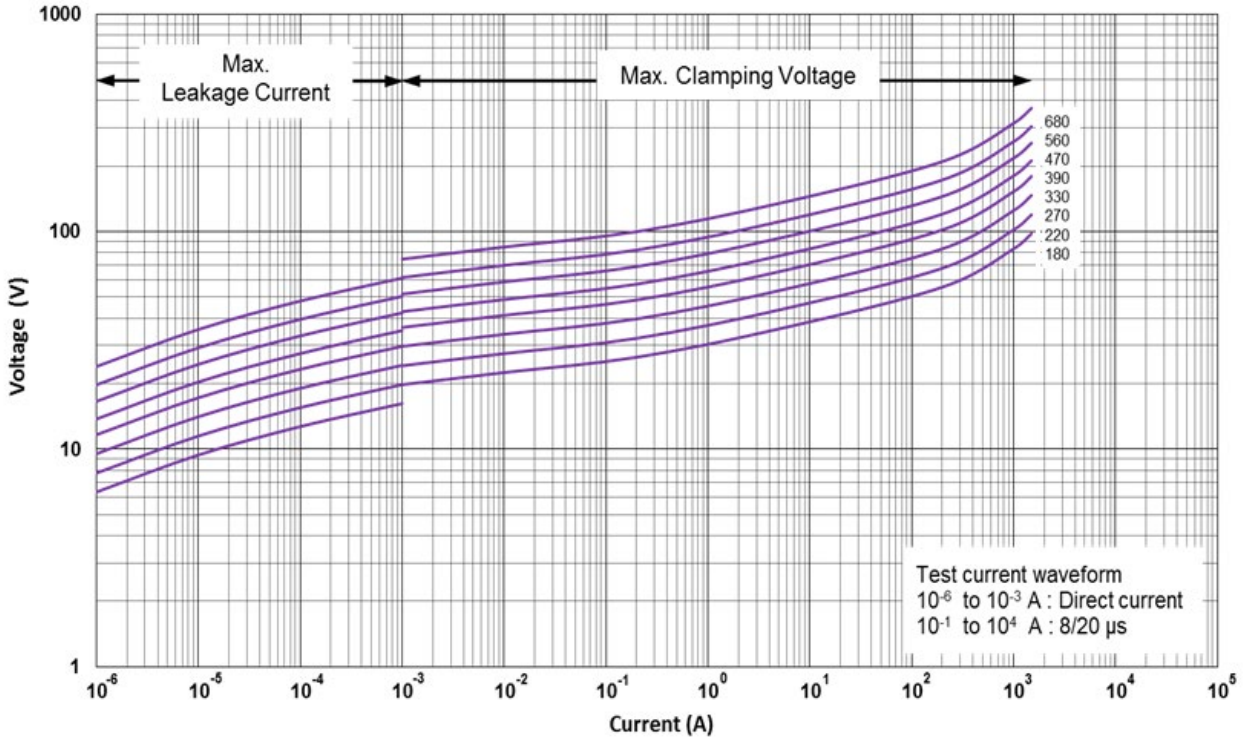


FMOV10201-H to FMOV10751-H

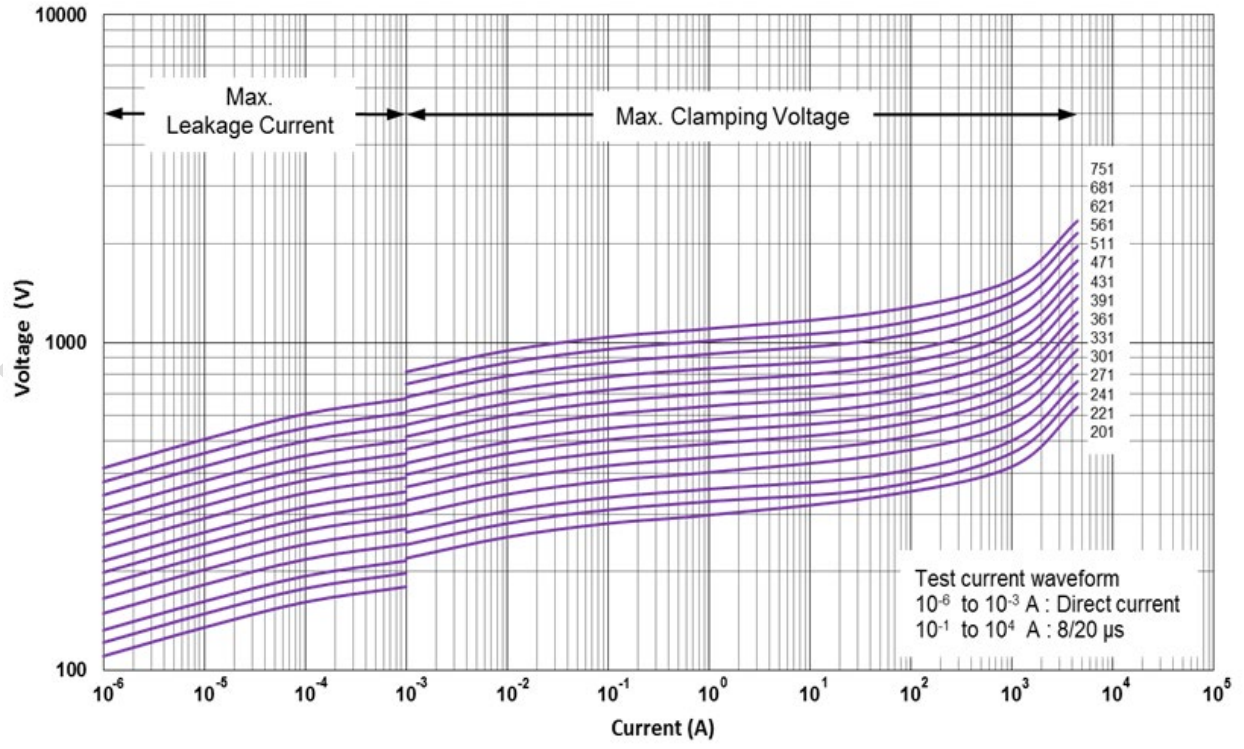


5. V-I Curves

(FMOV10180-H to FMOV10680-H)



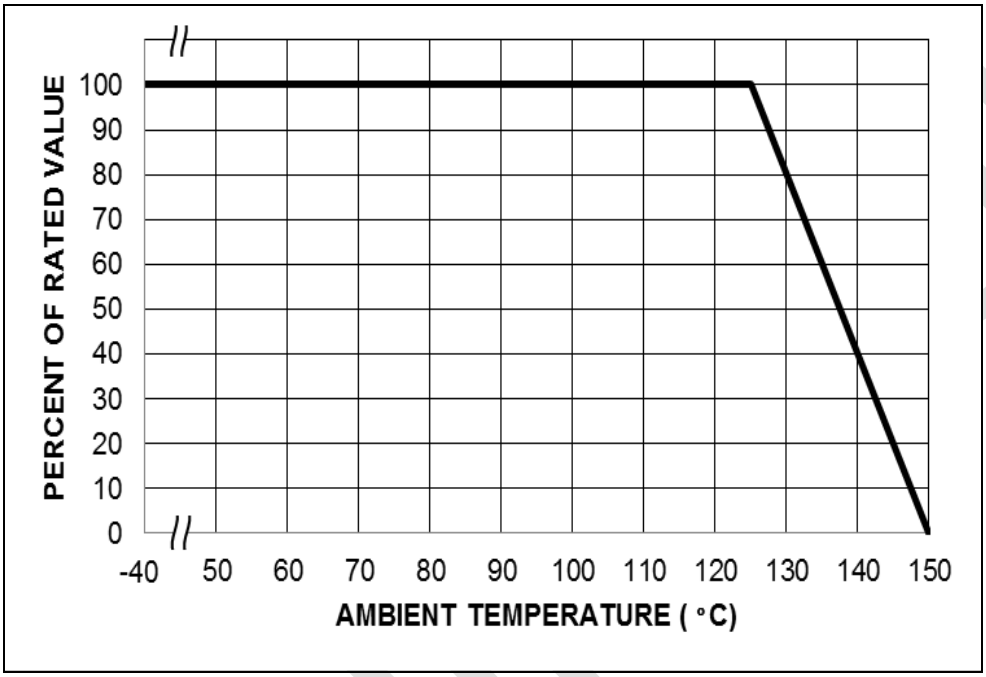
(FMOV10201-H to FMOV10751-H)



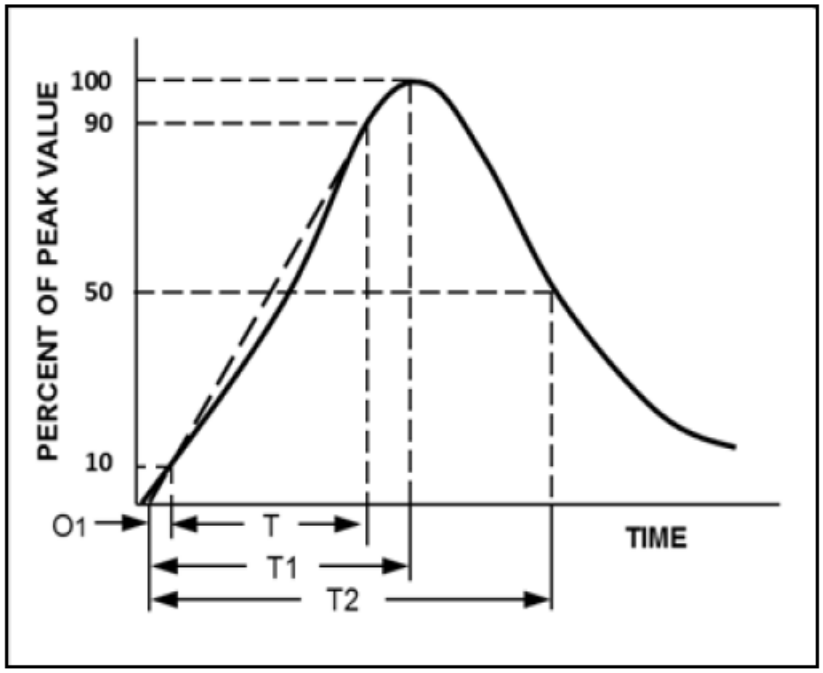
NOTE : Specification subject to change without notice.

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 x T

T2 = Decay Time

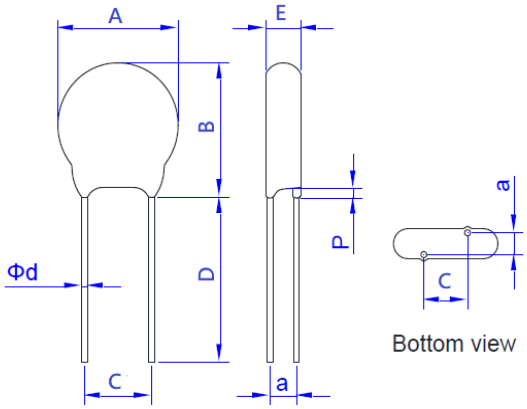
Example - For an 8/20 μs Current Waveform:

8μs = T1 = Rise Time

20μs = T2 = Decay Time

NOTE : Specification subject to change without notice.

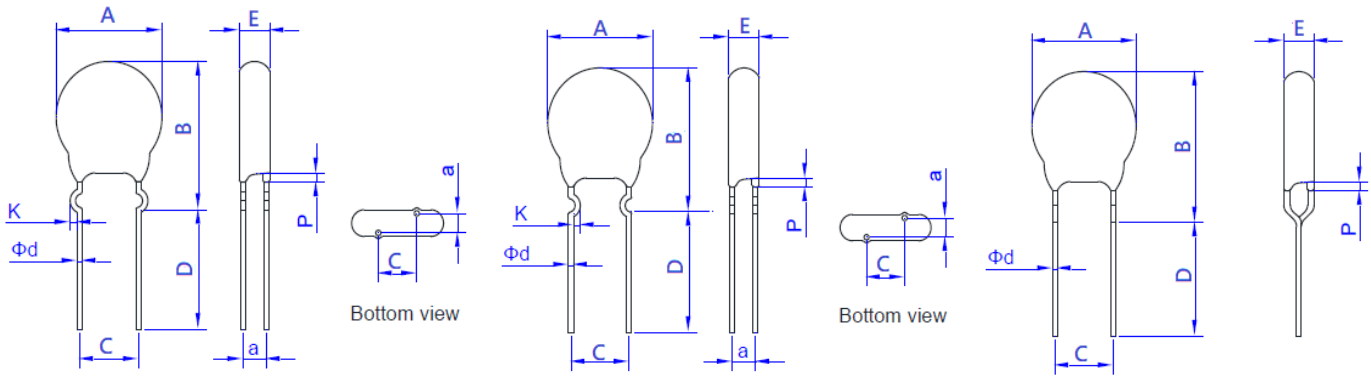
8. Dimension of Component for Standard Product



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
FMOV10180-H	10.5	14.0	17.0	7.5	25.0	5.3	3.0	1.5	0.80
FMOV10220-H	10.5	14.0	17.0	7.5	25.0	5.6	3.0	1.7	0.80
FMOV10270-H	10.5	14.0	17.0	7.5	25.0	5.9	3.0	1.8	0.80
FMOV10330-H	10.5	14.0	17.0	7.5	25.0	5.3	3.0	1.9	0.80
FMOV10390-H	10.5	14.0	17.0	7.5	25.0	5.5	3.0	1.9	0.80
FMOV10470-H	10.5	14.0	17.0	7.5	25.0	5.8	3.0	2.1	0.80
FMOV10560-H	10.5	14.0	17.0	7.5	25.0	6.1	3.0	2.3	0.80
FMOV10680-H	10.5	14.0	17.0	7.5	25.0	6.5	3.0	2.6	0.80
FMOV10201-H	10.5	14.0	17.0	7.5	25.0	6.2	3.0	2.0	0.80
FMOV10221-H	10.5	14.0	17.0	7.5	25.0	6.3	3.0	2.1	0.80
FMOV10241-H	10.5	14.0	17.0	7.5	25.0	6.5	3.0	2.2	0.80
FMOV10271-H	10.5	14.0	17.0	7.5	25.0	6.6	3.0	2.3	0.80
FMOV10301-H	10.5	14.0	17.0	7.5	25.0	6.8	3.0	2.5	0.80
FMOV10331-H	10.5	14.0	17.0	7.5	25.0	7.0	3.0	2.7	0.80
FMOV10361-H	10.5	14.0	17.0	7.5	25.0	7.3	3.0	2.8	0.80
FMOV10391-H	10.5	14.0	17.0	7.5	25.0	7.5	3.0	3.0	0.80
FMOV10431-H	10.5	14.0	17.0	7.5	25.0	7.8	3.0	3.2	0.80
FMOV10471-H	10.5	14.0	17.0	7.5	25.0	8.1	3.0	3.4	0.80
FMOV10511-H	10.5	14.0	17.0	7.5	25.0	8.2	3.0	3.7	0.80
FMOV10561-H	10.5	14.0	17.0	7.5	25.0	8.5	3.0	3.9	0.80
FMOV10621-H	10.5	14.0	17.0	7.5	25.0	8.8	3.0	4.3	0.80
FMOV10681-H	10.5	14.0	17.0	7.5	25.0	8.9	3.0	4.7	0.80
FMOV10751-H	10.5	14.0	17.0	7.5	25.0	9.2	3.0	5.1	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
FMOV10180-H	10.5	14.0	19.5	7.5	25.0	5.3	3.0	1.0	1.8	1.5	0.80
FMOV10220-H	10.5	14.0	19.5	7.5	25.0	5.6	3.0	1.0	1.8	1.7	0.80
FMOV10270-H	10.5	14.0	19.5	7.5	25.0	5.9	3.0	1.0	1.8	1.8	0.80
FMOV10330-H	10.5	14.0	19.5	7.5	25.0	5.3	3.0	1.0	1.8	1.9	0.80
FMOV10390-H	10.5	14.0	19.5	7.5	25.0	5.5	3.0	1.0	1.8	1.9	0.80
FMOV10470-H	10.5	14.0	19.5	7.5	25.0	5.8	3.0	1.0	1.8	2.1	0.80
FMOV10560-H	10.5	14.0	19.5	7.5	25.0	6.1	3.0	1.0	1.8	2.3	0.80
FMOV10680-H	10.5	14.0	19.5	7.5	25.0	6.5	3.0	1.0	1.8	2.6	0.80
FMOV10201-H	10.5	14.0	19.5	7.5	25.0	6.2	3.0	1.0	1.8	2.0	0.80
FMOV10221-H	10.5	14.0	19.5	7.5	25.0	6.3	3.0	1.0	1.8	2.1	0.80
FMOV10241-H	10.5	14.0	19.5	7.5	25.0	6.5	3.0	1.0	1.8	2.2	0.80
FMOV10271-H	10.5	14.0	19.5	7.5	25.0	6.6	3.0	1.0	1.8	2.3	0.80
FMOV10301-H	10.5	14.0	20.5	7.5	25.0	6.8	3.0	1.0	1.8	2.5	0.80
FMOV10331-H	10.5	14.0	20.5	7.5	25.0	7.0	3.0	1.0	1.8	2.7	0.80
FMOV10361-H	10.5	14.0	20.5	7.5	25.0	7.3	3.0	1.0	1.8	2.8	0.80
FMOV10391-H	10.5	14.0	20.5	7.5	25.0	7.5	3.0	1.0	1.8	3.0	0.80
FMOV10431-H	10.5	14.0	20.5	7.5	25.0	7.8	3.0	1.0	1.8	3.2	0.80
FMOV10471-H	10.5	14.0	20.5	7.5	25.0	8.1	3.0	1.0	1.8	3.4	0.80
FMOV10511-H	10.5	14.0	20.5	7.5	25.0	8.2	3.0	1.0	1.8	3.7	0.80
FMOV10561-H	10.5	14.0	20.5	7.5	25.0	8.5	3.0	1.0	1.8	3.9	0.80
FMOV10621-H	10.5	14.0	20.5	7.5	25.0	8.8	3.0	1.0	1.8	4.3	0.80
FMOV10681-H	10.5	14.0	20.5	7.5	25.0	8.9	3.0	1.0	1.8	4.7	0.80
FMOV10751-H	10.5	14.0	20.5	7.5	25.0	9.2	3.0	1.0	1.8	5.1	0.80

Unit: mm

NOTE : Specification subject to change without notice.

9. Tape and Reel Specifications

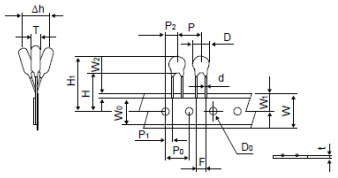


Figure: A

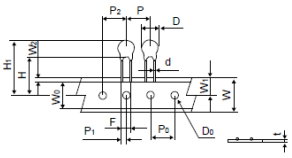


Figure: B

Straight Leads

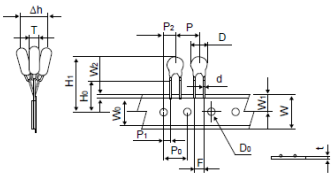


Figure: C

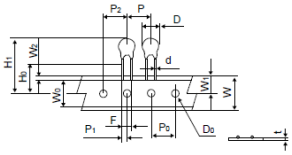


Figure: D

Inline Kink Leads

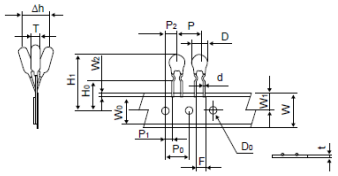


Figure: E

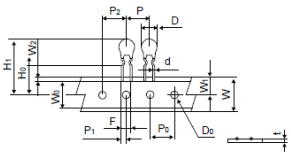


Figure: F

Inside Kink Leads

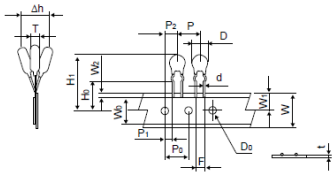


Figure: G

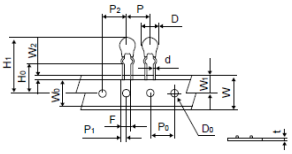


Figure: H

Outside Kink Leads

Symbol	Parameter	FMOV10-H Series
P	Pitch of Component	12.7±1.0
P0	Feed Hole Pitch	12.7±0.2
P1	Feed Hole Center Lead	8.95±0.7
P2	Hole center to Component Center	12.7±0.7
F	Lead to Lead Distance	7.5±0.8
△h	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 Clopped Lead	11.0 Max
Figure		ACEG

Unit: mm

NOTE : Specification subject to change without notice.

2022/7/8

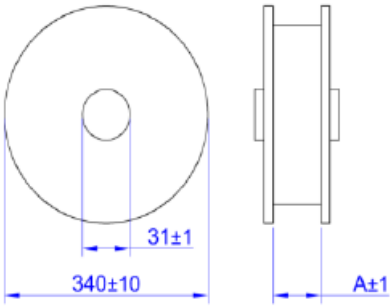
10. Packaging Specifications

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-H Series	500	500	500	500

Tape & Reel Product Packing

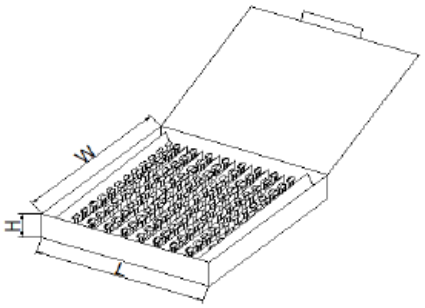
Series	A (mm)	Quantity (pcs/reel)
FMOV10(201~621)-H-T-	56	1000
FMOV10(681~751)-H-T-		800



Box Product Packing

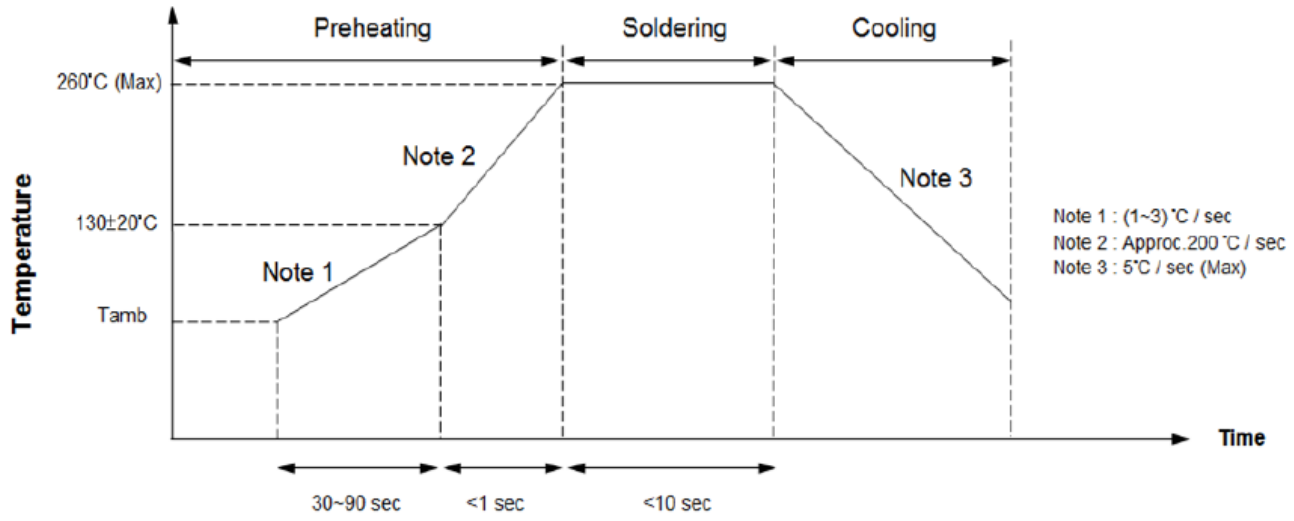
Series	Quantity (pcs/reel)
FMOV10(201~621)-H-T-	1000
FMOV10(681~751)-H-T-	800

Series	L±5	W±5	H±5
FMOV10-H 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℃ (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:

a. Storage Temperature: -10℃~+40℃

b. Relative Humidity: ≦75%RH

c. Keep away from corrosive atmosphere and sunlight

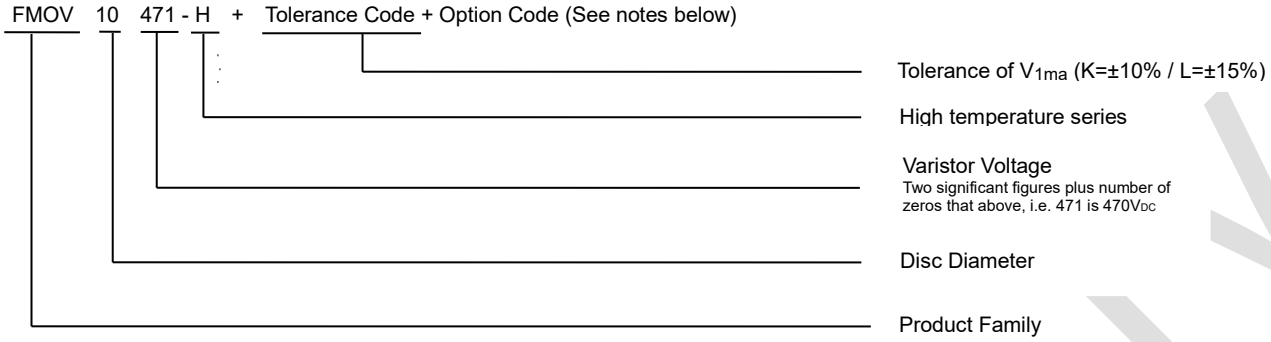
d. Solvent Resistance: MIL–STD–202, Method 215F

e. Moisture Sensitivity: Level 1, J-STD-020

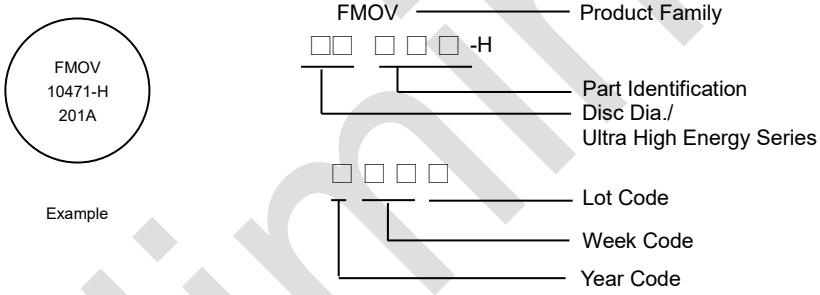
(II) Period of Storage: 1 year

12. Part Numbering and Marking System

Part Numbering System



Marking System



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-H**KBS**	FMOV10471-H**KBSXXX**	FMOV10471-H**KTS**	FMOV10471-H**KAS**

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-H**KBO**	FMOV10471-H**KBOXXX**	FMOV10471-H**KTO**	FMOV10471-H**KAO**

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-H**KBK**	FMOV10471-H**KBKXXX**	FMOV10471-H**KTK**	FMOV10471-H**KAK**

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-H**KBI**	FMOV10471-H**KBIXXX**	FMOV10471-H**KTI**	FMOV10471-H**KAI**

MOV Varistor Device: FMOV14-H 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)
FMOV14180-H	11	14	18	16	20	36	10	11	3000	0.15	18500
FMOV14220-H	14	18	22	20	24	43	10	14	3000	0.15	16400
FMOV14270-H	17	22	27	24	30	53	10	18	3000	0.15	13000
FMOV14330-H	20	26	33	30	36	65	10	23	3000	0.15	9500
FMOV14390-H	25	31	39	35	43	77	10	26	3000	0.15	8800
FMOV14470-H	30	38	47	42	52	93	10	33	3000	0.15	7700
FMOV14560-H	35	45	56	50	62	110	10	41	3000	0.15	6400
FMOV14680-H	40	56	68	61	75	135	10	46	3000	0.15	5600
FMOV14201-H	130	170	200	180	220	340	100	140	10000	1.0	860
FMOV14221-H	140	180	220	198	242	360	100	155	10000	1.0	810
FMOV14241-H	150	200	240	216	264	395	100	168	10000	1.0	860
FMOV14271-H	175	225	270	243	297	455	100	190	10000	1.0	700
FMOV14301-H	195	250	300	270	330	500	100	209	10000	1.0	640
FMOV14331-H	215	275	330	297	363	550	100	228	10000	1.0	580
FMOV14361-H	230	300	360	324	396	595	100	255	10000	1.0	530
FMOV14391-H	250	320	390	351	429	650	100	275	10000	1.0	480
FMOV14431-H	275	350	430	387	473	710	100	303	10000	1.0	430
FMOV14471-H	300	385	470	423	517	775	100	350	10000	1.0	380
FMOV14511-H	320	420	510	459	561	845	100	382	10000	1.0	350
FMOV14561-H	350	460	560	504	616	915	100	382	10000	1.0	320
FMOV14621-H	395	510	620	558	682	1020	100	382	7500	1.0	300
FMOV14681-H	420	560	680	612	748	1120	100	382	7500	1.0	270
FMOV14751-H	465	615	750	675	825	1235	100	420	7500	1.0	250

NOTE : Specification subject to change without notice.

2. Agency Approvals

Agency	Agency Approvals	Certificate No.
c UL us	UL1449 4th & cUL	In Process
VDE	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

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)	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 5\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 5\%$ 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	$\triangle V/_{1mA}\ V_{1mA} \leqq \pm 5\%$ 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, Ipeak=0.25*Imax	$\triangle V/V \leqq \pm 10\%$ No visible damage
Pulse current - 10/1000 μs	IEC 61051-2	10/1000 μs, 10 times, Ipeak = 0.0075* Imax	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ No visible damage
Combination pulse	IEC 62368-1	Additional test: 10 pulses (combination pulse 6KV/3KA), in one direction, 1 per min	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ No visible damage $R_{ISO} \geqq 100M\Omega$ 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	$\triangle V/V \leqq \pm 10\%$ No visible damage $R_{ISO} \geqq 1000M\Omega$ U ≤ 1,1 $U_{initial}$

NOTE : Specification subject to change without notice.

2022/7/8

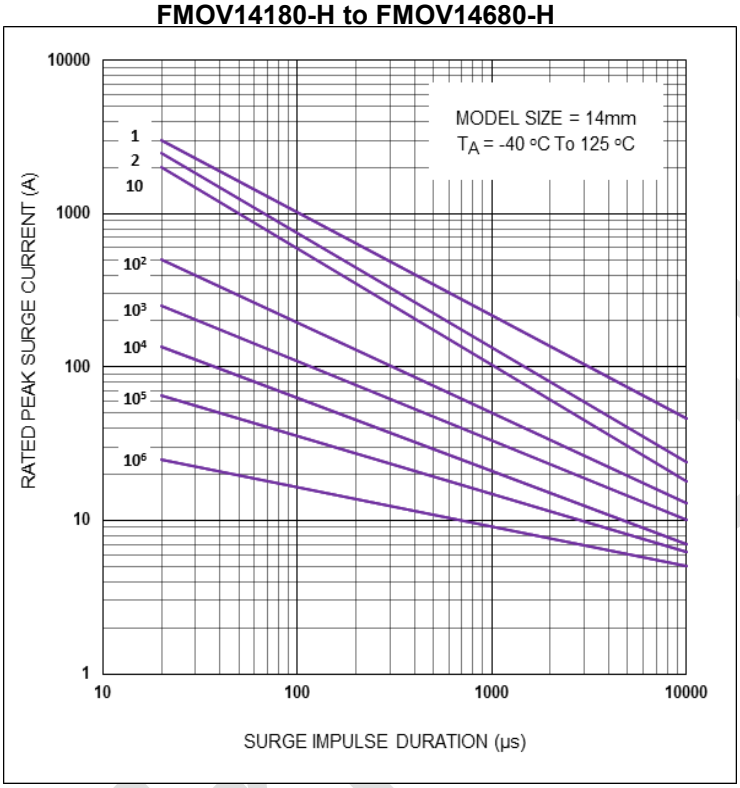
Characteristics	Standard	Test Conditions	Specifications
Damp heat (Steady state)	IEC 60068-2-78 Test Ca	T = 40±2°C, RH = 93(+2/-3)%, 56d , 4 specimens: No voltage applied ,Other 4 specimens: Applied voltage: 10% of the max. d. c. voltage	$\triangle V_{1mA}/V1_{mA} \leqq \pm 10\%$ $R_{ISO} \geqq 100M\Omega$
Maximum Peak Current	Specification Standard	Imax, 8/20 μs, 1 time.	$\triangle V_{1mA}/V1_{mA} \leqq \pm 10\%$ No visible damage
Nominal Discharge Current Test	UL1449 4th	In, 8/20 μs, 15 times, Interval 60s	△V/V≦±10% No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{1mA}\text{at } 85℃ - V_{1mA}\text{at } 25℃}{V_{1mA}\text{at } 25℃} \times \frac{1}{60} \times 100(\%/C)$	0.05≦TC≦0.05(%/℃)
High Temperature Storage	IEC60068-2-2	1000h, T = 125±2°C	△V/V≦±5% No visible damage
Max. Energy	Specification Standard	10/1000 μs, 1 times, Max. Energy	△V/V≦±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.	△V/V≦±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.	△V/V≦±10% No visible damage

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

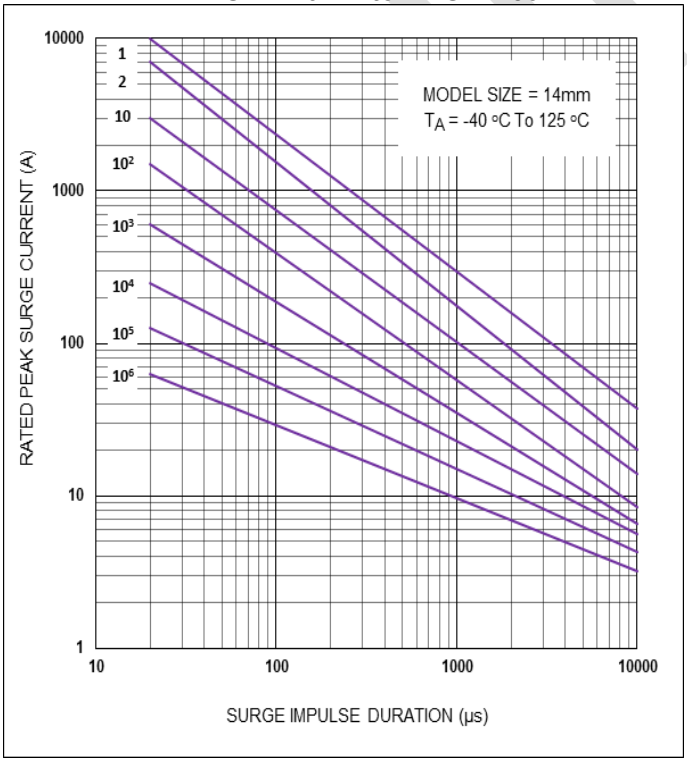
4. Impulse Life Time Rating Curves

FMOV14-H Series

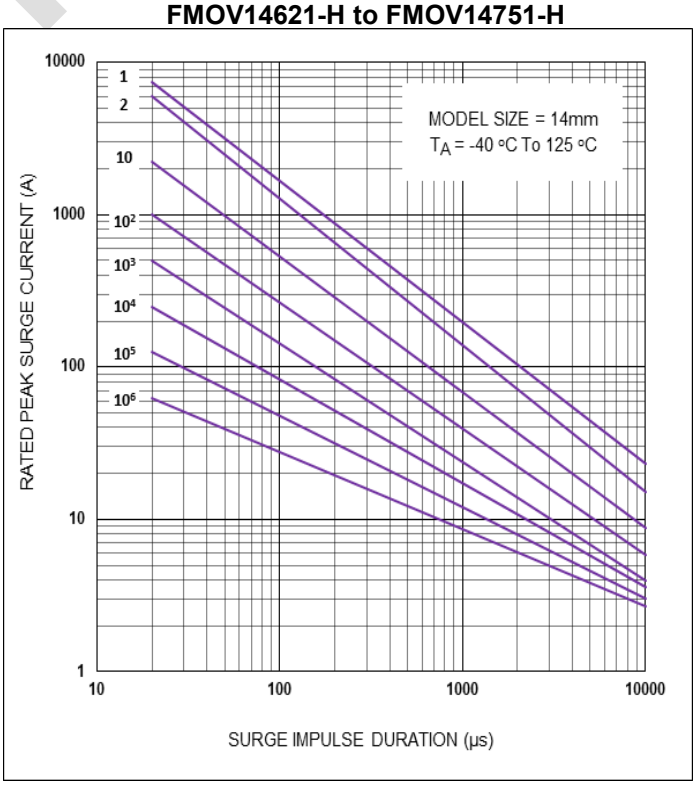
FMOV14180-H to FMOV14680-H



FMOV14201-H to FMOV14561-H



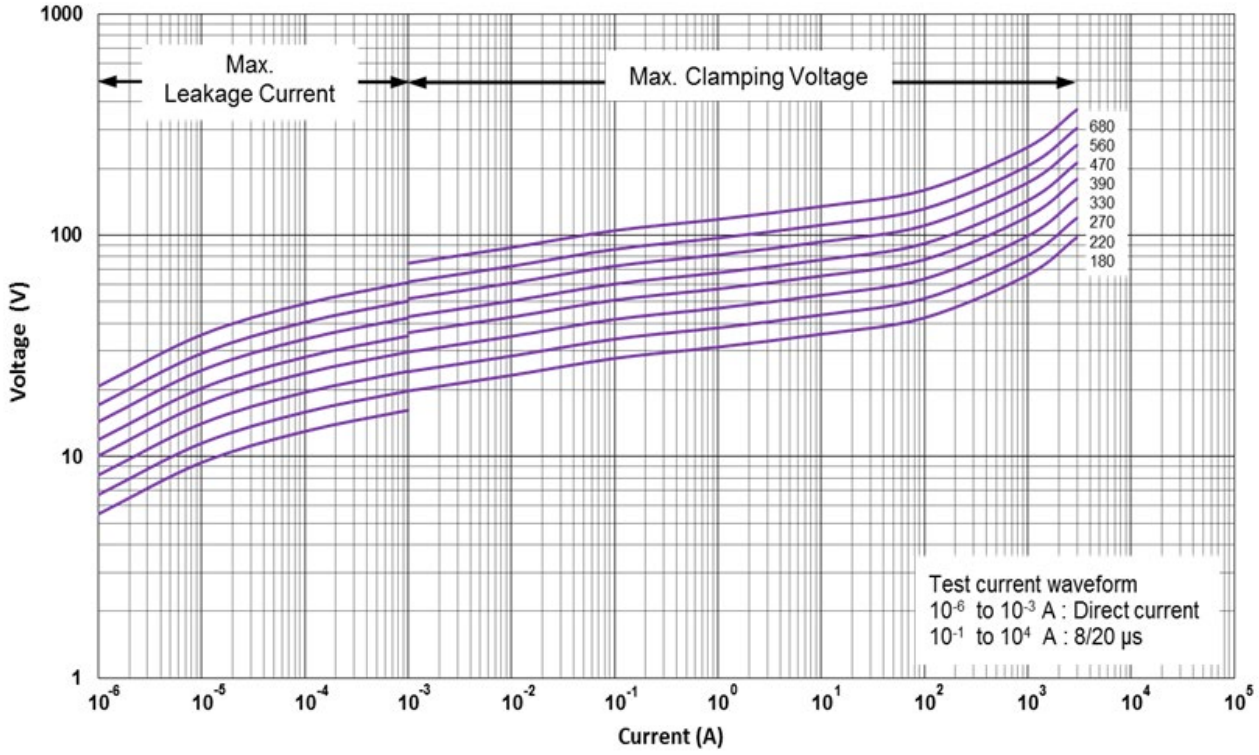
FMOV14621-H to FMOV14751-H



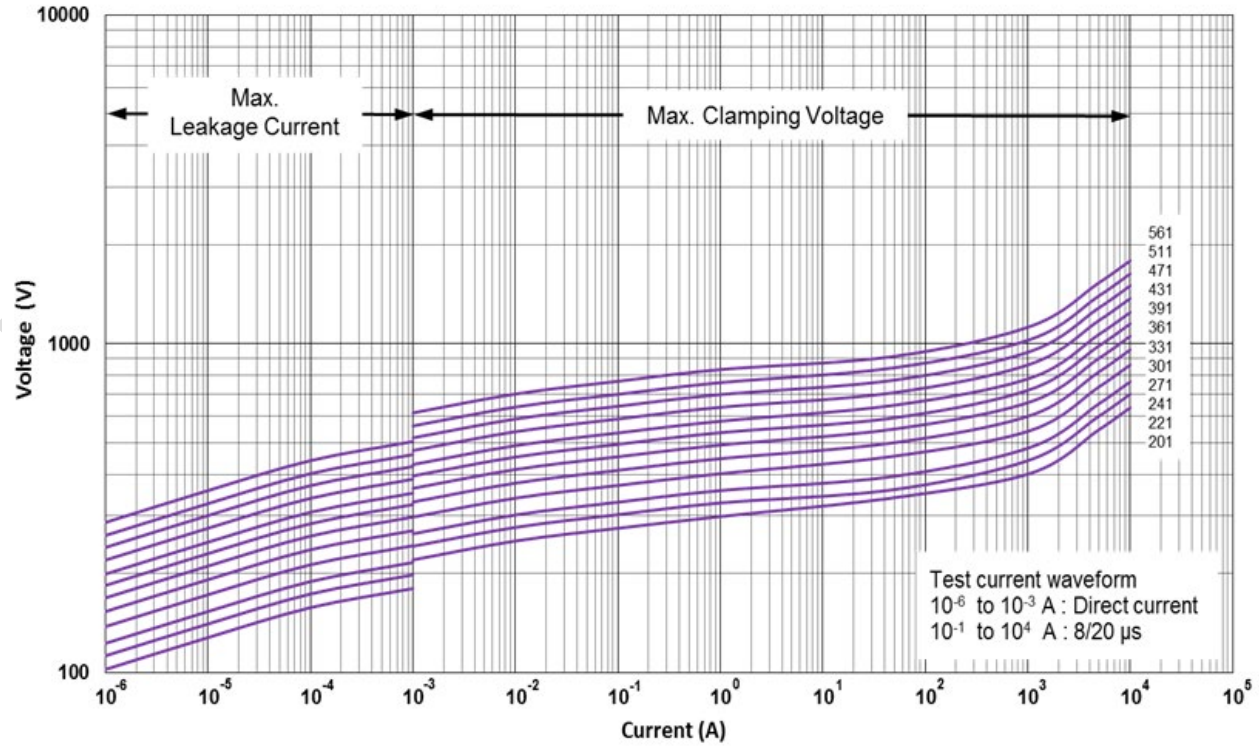
NOTE : Specification subject to change without notice.

5. V-I Curves

(FMOV14180-H to FMOV14680-H)

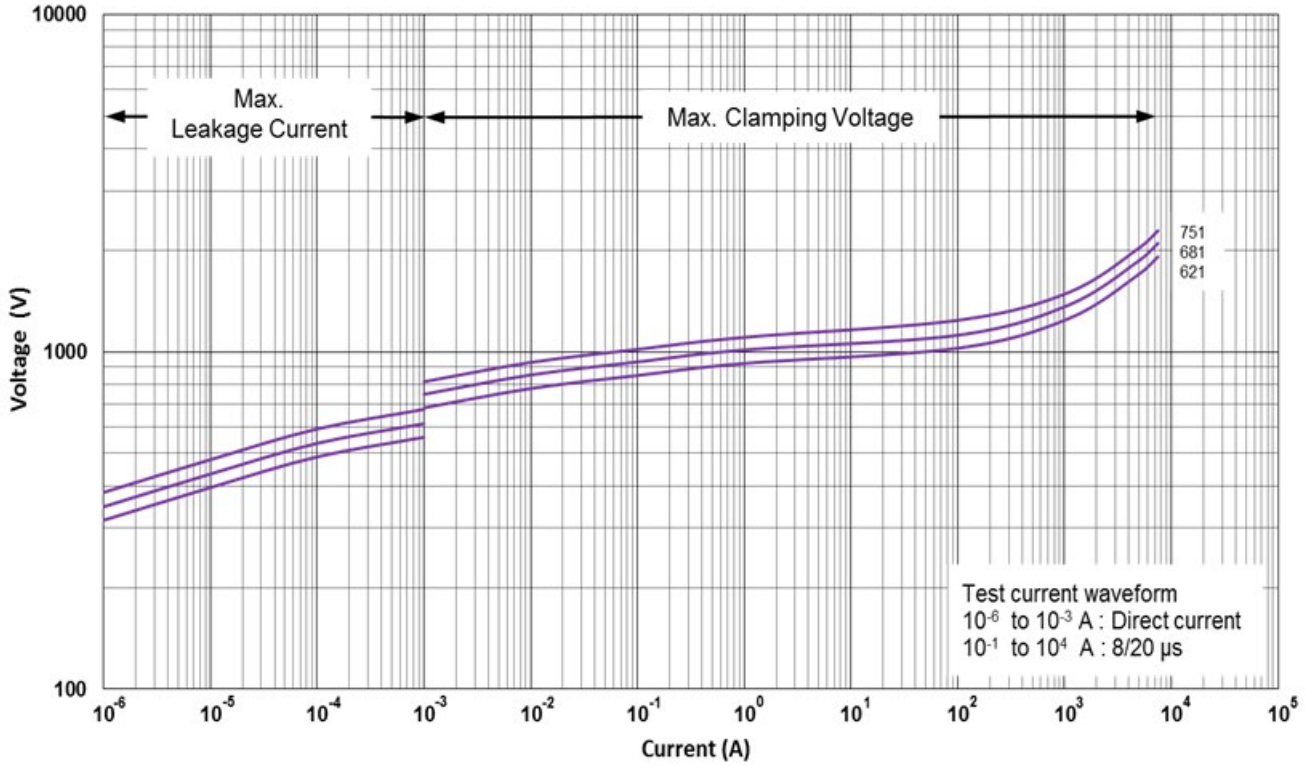


(FMOV14201-H to FMOV14561-H)



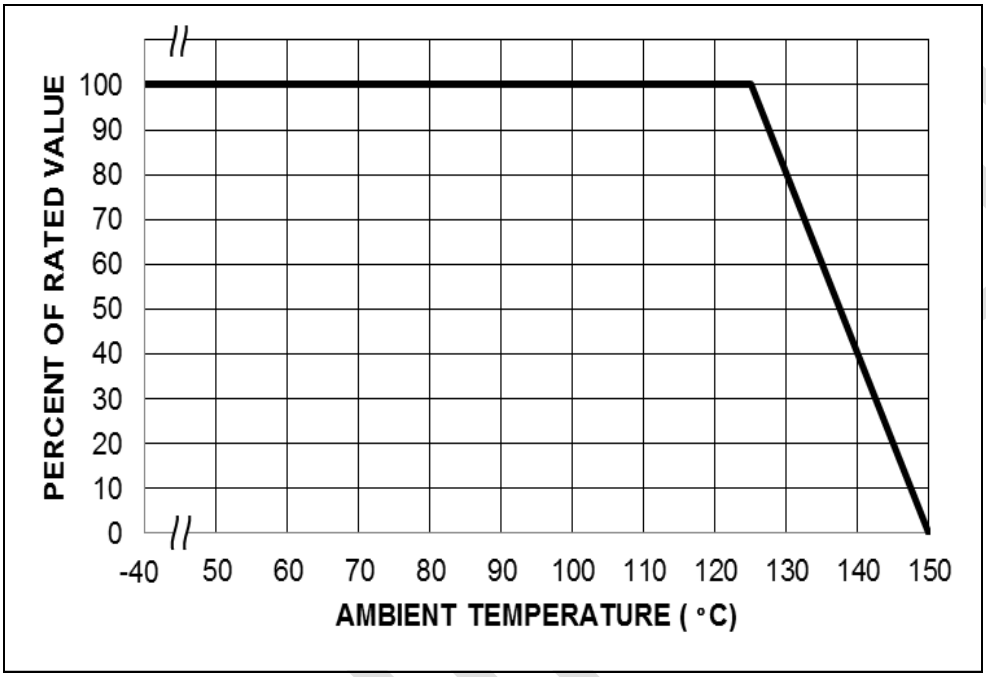
NOTE : Specification subject to change without notice.

(FMOV14621-H to FMOV14751-H)

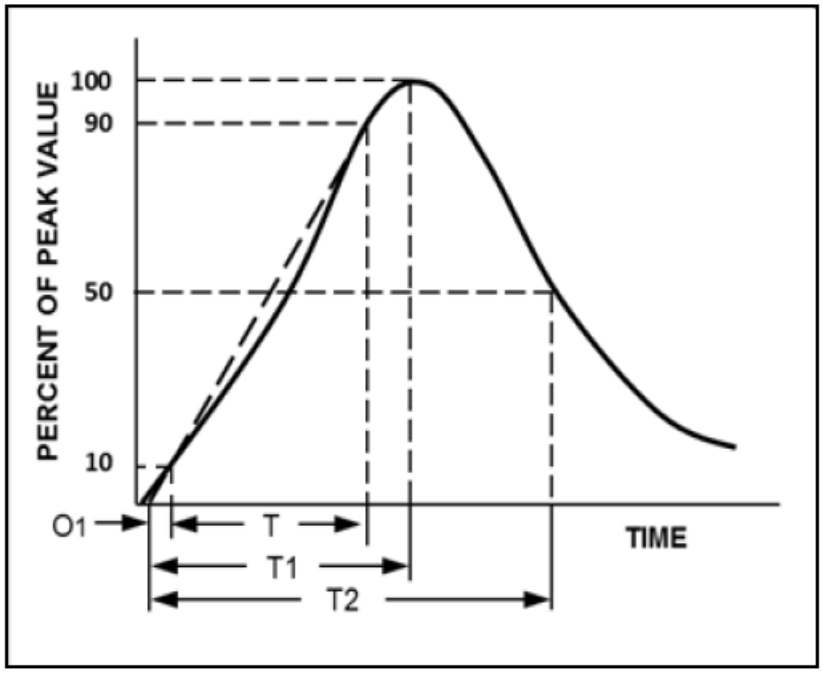


6. Power Derating Curve

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 x T

T2 = Decay Time

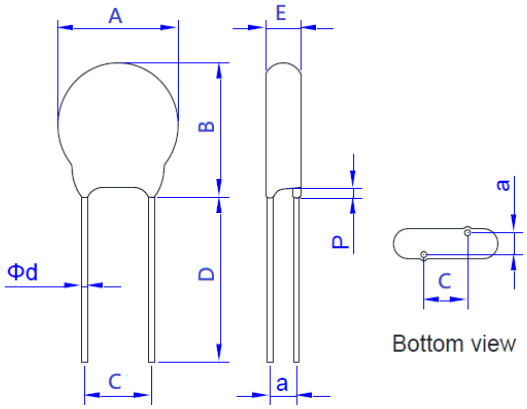
Example - For an 8/20 μs Current Waveform:

8μs = T1 = Rise Time

20μs = T2 = Decay Time

NOTE : Specification subject to change without notice.

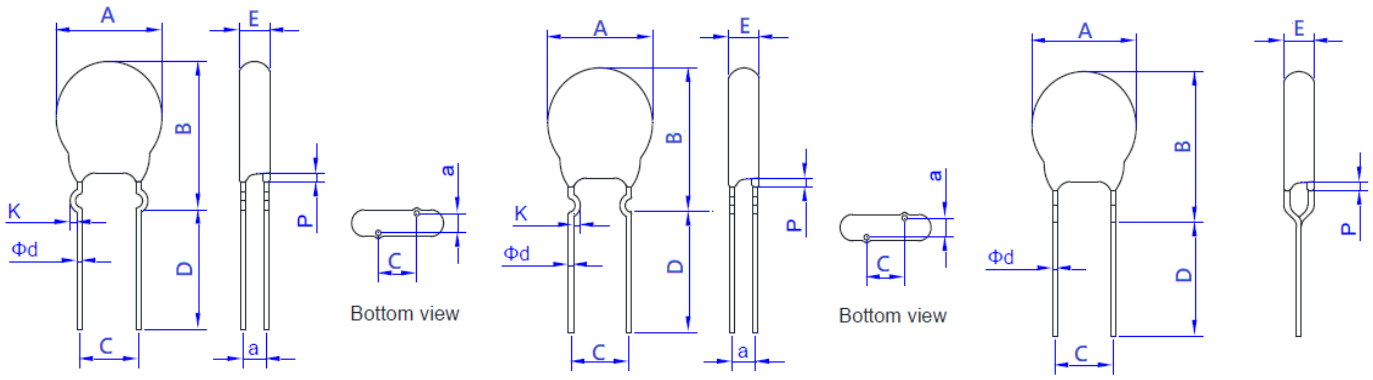
8. Dimension of Component for Standard Product



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
FMOV14180-H	13.5	17.5	20.5	7.5	25.0	5.3	3.0	1.5	0.80
FMOV14220-H	13.5	17.5	20.5	7.5	25.0	5.6	3.0	1.7	0.80
FMOV14270-H	13.5	17.5	20.5	7.5	25.0	5.9	3.0	1.8	0.80
FMOV14330-H	13.5	17.5	20.5	7.5	25.0	5.3	3.0	1.9	0.80
FMOV14390-H	13.5	17.5	20.5	7.5	25.0	5.5	3.0	1.9	0.80
FMOV14470-H	13.5	17.5	20.5	7.5	25.0	5.8	3.0	2.1	0.80
FMOV14560-H	13.5	17.5	20.5	7.5	25.0	6.1	3.0	2.3	0.80
FMOV14680-H	13.5	17.5	20.5	7.5	25.0	6.5	3.0	2.6	0.80
FMOV14201-H	13.5	17.5	20.5	7.5	25.0	6.2	3.0	2.0	0.80
FMOV14221-H	13.5	17.5	20.5	7.5	25.0	6.3	3.0	2.1	0.80
FMOV14241-H	13.5	17.5	20.5	7.5	25.0	6.5	3.0	2.2	0.80
FMOV14271-H	13.5	17.5	20.5	7.5	25.0	6.6	3.0	2.3	0.80
FMOV14301-H	13.5	17.5	20.5	7.5	25.0	6.8	3.0	2.5	0.80
FMOV14331-H	13.5	17.5	20.5	7.5	25.0	7.0	3.0	2.7	0.80
FMOV14361-H	13.5	17.5	20.5	7.5	25.0	7.3	3.0	2.8	0.80
FMOV14391-H	13.5	17.5	20.5	7.5	25.0	7.5	3.0	3.0	0.80
FMOV14431-H	13.5	17.5	20.5	7.5	25.0	7.8	3.0	3.2	0.80
FMOV14471-H	13.5	17.5	20.5	7.5	25.0	8.1	3.0	3.4	0.80
FMOV14511-H	13.5	17.5	20.5	7.5	25.0	8.2	3.0	3.7	0.80
FMOV14561-H	13.5	17.5	20.5	7.5	25.0	8.5	3.0	3.9	0.80
FMOV14621-H	13.5	17.5	20.5	7.5	25.0	8.8	3.0	4.3	0.80
FMOV14681-H	13.5	17.5	20.5	7.5	25.0	8.9	3.0	4.7	0.80
FMOV14751-H	13.5	17.5	20.5	7.5	25.0	9.2	3.0	5.1	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
FMOV14180-H	13.5	17.5	22.5	7.5	25.0	5.3	3.0	1.0	1.8	1.5	0.80
FMOV14220-H	13.5	17.5	22.5	7.5	25.0	5.6	3.0	1.0	1.8	1.7	0.80
FMOV14270-H	13.5	17.5	22.5	7.5	25.0	5.9	3.0	1.0	1.8	1.8	0.80
FMOV14330-H	13.5	17.5	22.5	7.5	25.0	5.3	3.0	1.0	1.8	1.9	0.80
FMOV14390-H	13.5	17.5	22.5	7.5	25.0	5.5	3.0	1.0	1.8	1.9	0.80
FMOV14470-H	13.5	17.5	22.5	7.5	25.0	5.8	3.0	1.0	1.8	2.1	0.80
FMOV14560-H	13.5	17.5	22.5	7.5	25.0	6.1	3.0	1.0	1.8	2.3	0.80
FMOV14680-H	13.5	17.5	22.5	7.5	25.0	6.5	3.0	1.0	1.8	2.6	0.80
FMOV14201-H	13.5	17.5	22.5	7.5	25.0	6.2	3.0	1.0	1.8	2.0	0.80
FMOV14221-H	13.5	17.5	22.5	7.5	25.0	6.3	3.0	1.0	1.8	2.1	0.80
FMOV14241-H	13.5	17.5	22.5	7.5	25.0	6.5	3.0	1.0	1.8	2.2	0.80
FMOV14271-H	13.5	17.5	22.5	7.5	25.0	6.6	3.0	1.0	1.8	2.3	0.80
FMOV14301-H	13.5	17.5	23.5	7.5	25.0	6.8	3.0	1.0	1.8	2.5	0.80
FMOV14331-H	13.5	17.5	23.5	7.5	25.0	7.0	3.0	1.0	1.8	2.7	0.80
FMOV14361-H	13.5	17.5	23.5	7.5	25.0	7.3	3.0	1.0	1.8	2.8	0.80
FMOV14391-H	13.5	17.5	23.5	7.5	25.0	7.5	3.0	1.0	1.8	3.0	0.80
FMOV14431-H	13.5	17.5	23.5	7.5	25.0	7.8	3.0	1.0	1.8	3.2	0.80
FMOV14471-H	13.5	17.5	23.5	7.5	25.0	8.1	3.0	1.0	1.8	3.4	0.80
FMOV14511-H	13.5	17.5	23.5	7.5	25.0	8.2	3.0	1.0	1.8	3.7	0.80
FMOV14561-H	13.5	17.5	23.5	7.5	25.0	8.5	3.0	1.0	1.8	3.9	0.80
FMOV14621-H	13.5	17.5	23.5	7.5	25.0	8.8	3.0	1.0	1.8	4.3	0.80
FMOV14681-H	13.5	17.5	23.5	7.5	25.0	8.9	3.0	1.0	1.8	4.7	0.80
FMOV14751-H	13.5	17.5	23.5	7.5	25.0	9.2	3.0	1.0	1.8	5.1	0.80

Unit: mm

NOTE : Specification subject to change without notice.

9. Tape and Reel Specifications

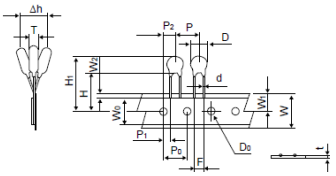


Figure: A

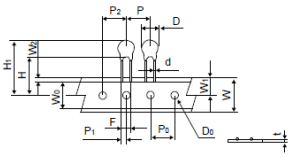


Figure: B

Straight Leads

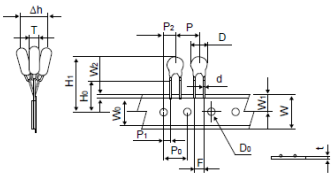


Figure: C

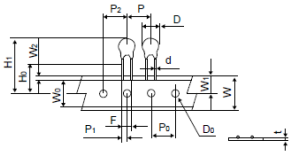


Figure: D

Inline Kink Leads

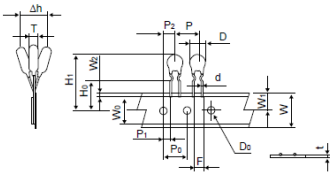


Figure: E

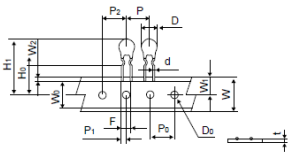


Figure: F

Inside Kink Leads

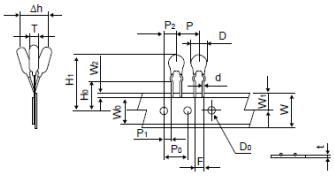


Figure: G

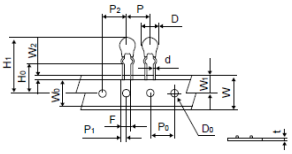


Figure: H

Outside Kink Leads

Symbol	Parameter	FMOV10-H Series
P	Pitch of Component	25.4±1.0
P0	Feed Hole Pitch	12.7±0.2
P1	Feed Hole Center Lead	8.95±0.7
P2	Hole center to Component Center	12.7±0.7
F	Lead to Lead Distance	7.5±0.8
△h	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	40.0 Max
D0	Feed Hole Diameter	4.0±0.2
t	Total Tape Thickness	0.7±0.2
L	Length of Clopped Lead	11.0 Max
Figure		ACEG

Unit: mm

NOTE : Specification subject to change without notice.

2022/7/8

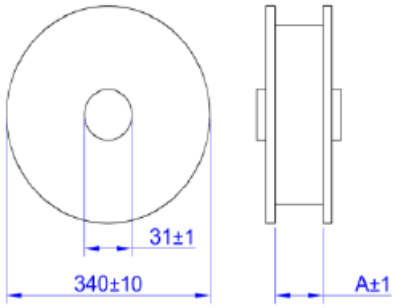
10. Packaging Specifications

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-H Series	500	500	500	500

Tape & Reel Product Packing

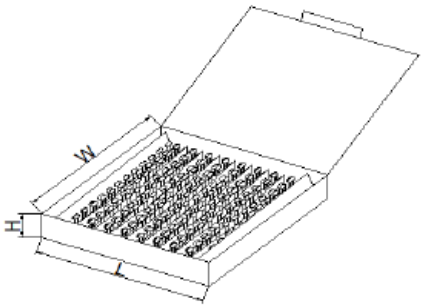
Series	A (mm)	Quantity (pcs/reel)
FMOV14(201~391)-H-T-	56	800
FMOV14(431~621)-H-T-		700
FMOV14(681~751)-H-T-		600



Box Product Packing

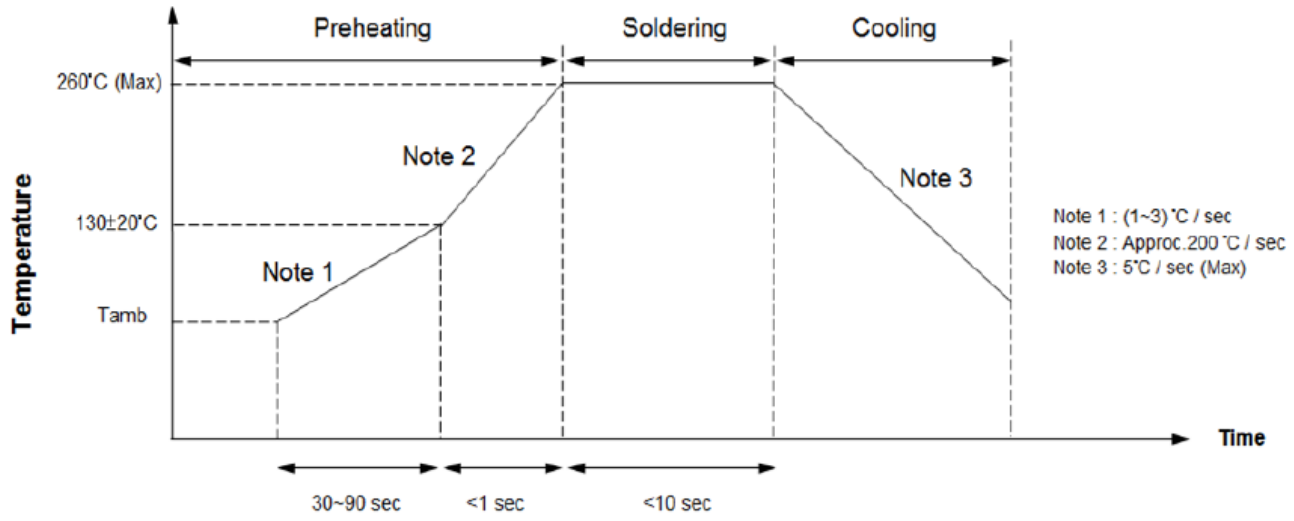
Series	Quantity (pcs/reel)
FMOV14(201~621)-H-T-	500
FMOV14(681~751)-H-T-	400

Series	L±5	W±5	H±5
FMOV14-H 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℃ (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:

a. Storage Temperature: -10℃~+40℃

b. Relative Humidity: ≦75%RH

c. Keep away from corrosive atmosphere and sunlight

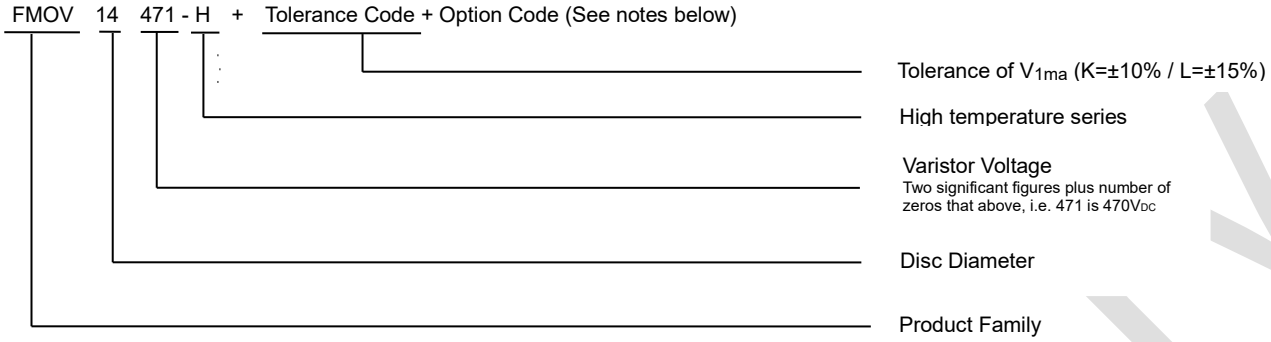
d. Solvent Resistance: MIL–STD–202, Method 215F

e. Moisture Sensitivity: Level 1, J-STD-020

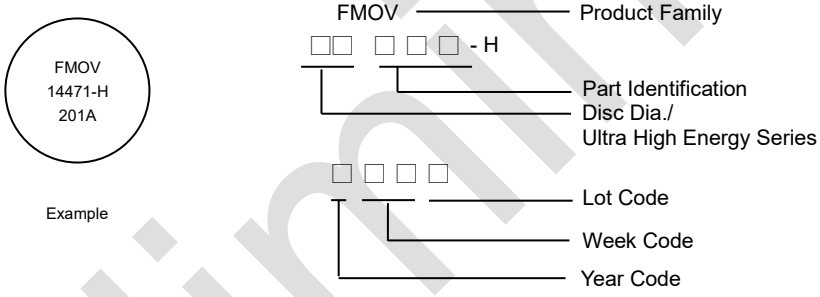
(II) Period of Storage: 1 year

12. Part Numbering and Marking System

Part Numbering System



Marking System



NOTE : Specification subject to change without notice.

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-H**KBS**	FMOV14471-H**KBSXXX**	FMOV14471-H**KTS**	FMOV14471-H**KAS**

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-H**KBO**	FMOV14471-H**KBOXXX**	FMOV14471-H**KTO**	FMOV14471-H**KAO**

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-H**KBK**	FMOV14471-H**KBKXXX**	FMOV14471-H**KTK**	FMOV14471-H**KAK**

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-H**KBI**	FMOV14471-H**KBIXXX**	FMOV14471-H**KTI**	FMOV14471-H**KAI**

MOV Varistor Device: FMOV20-H 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)
FMOV20180-H	11	14	18	16	20	36	20	28	6000	0.3	42000
FMOV20220-H	14	18	22	20	24	43	20	36	6000	0.3	37000
FMOV20270-H	17	22	27	24	30	53	20	46	6000	0.3	29200
FMOV20330-H	20	26	33	30	36	65	20	59	6000	0.3	21400
FMOV20390-H	25	31	39	35	43	77	20	67	6000	0.3	19800
FMOV20470-H	30	38	47	42	52	93	20	85	6000	0.3	17300
FMOV20560-H	35	45	56	50	62	110	20	106	6000	0.3	14400
FMOV20680-H	40	56	68	61	75	135	20	119	6000	0.3	12600
FMOV20201-H	130	170	200	180	220	340	200	200	20000	1.0	2125
FMOV20221-H	140	180	220	198	242	360	200	215	20000	1.0	2000
FMOV20241-H	150	200	240	216	264	395	200	235	20000	1.0	1875
FMOV20271-H	175	225	270	243	297	455	200	275	20000	1.0	1625
FMOV20301-H	195	250	300	270	330	500	200	295	20000	1.0	1500
FMOV20331-H	215	275	330	297	363	550	200	320	20000	1.0	1375
FMOV20361-H	230	300	360	324	396	595	200	350	20000	1.0	1375
FMOV20391-H	250	320	390	351	429	650	200	385	20000	1.0	1375
FMOV20431-H	275	350	430	387	473	710	200	425	20000	1.0	1250
FMOV20471-H	300	385	470	423	517	775	200	450	20000	1.0	1125
FMOV20511-H	320	420	510	459	561	845	200	500	20000	1.0	1000
FMOV20561-H	350	460	560	504	616	915	200	520	20000	1.0	938
FMOV20621-H	395	510	620	558	682	1020	200	590	15000	1.0	713
FMOV20681-H	420	560	680	612	748	1120	200	650	15000	1.0	688
FMOV20751-H	465	615	750	675	825	1235	200	725	15000	1.0	663

NOTE : Specification subject to change without notice.

2. Agency Approvals

Agency	Agency Approvals	Certificate No.
c UL us	UL1449 4th & cUL	In Process
VDE	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

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)	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 5\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 5\%$ 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	$\triangle V/_{1mA}\ V_{1mA} \leqq \pm 5\%$ 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, Ipeak=0.25*Imax	$\triangle V/V \leqq \pm 10\%$ No visible damage
Pulse current - 10/1000 μs	IEC 61051-2	10/1000 μs, 10 times, Ipeak = 0.0075* Imax	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ No visible damage
Combination pulse	IEC 62368-1	Additional test: 10 pulses (combination pulse 6KV/3KA), in one direction, 1 per min	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ No visible damage $U \leq 1.1\ U_{initial}$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ 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	$\triangle V_{1mA}/V_{1mA} \leqq \pm 10\%$ No visible damage $R_{ISO} \geqq 100M\Omega$ 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	$\triangle V/V \leqq \pm 10\%$ No visible damage $R_{ISO} \geqq 1000M\Omega$ $U \leq 1{,}1\ U_{initial}$

NOTE : Specification subject to change without notice.

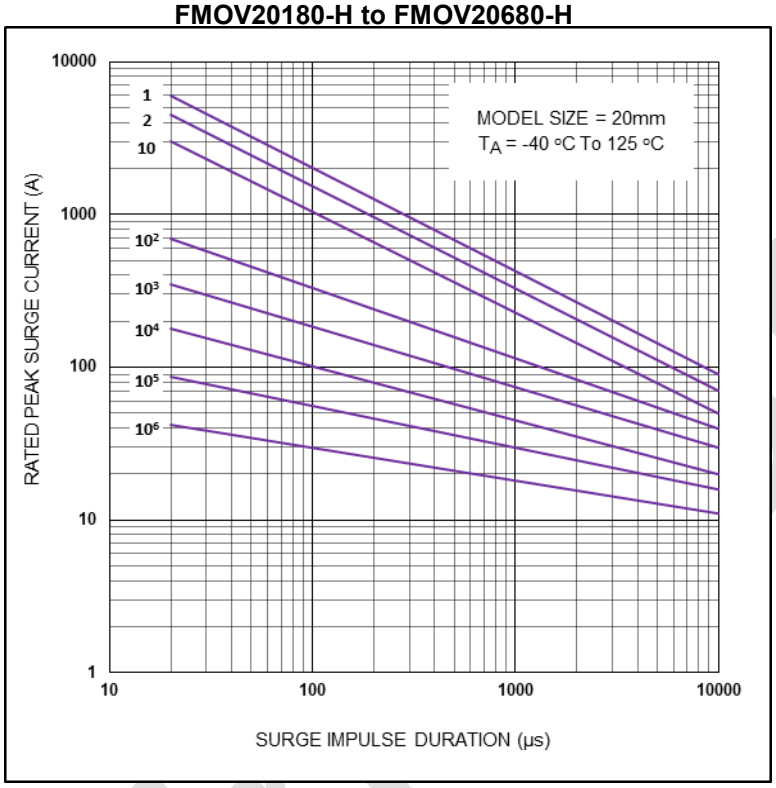
Characteristics	Standard	Test Conditions	Specifications
Damp heat (Steady state)	IEC 60068-2-78 Test Ca	T = 40±2°C, RH = 93(+2/-3)%, 56d , 4 specimens: No voltage applied ,Other 4 specimens: Applied voltage: 10% of the max. d. c. voltage	$\triangle V_{1mA}/V1_{mA} \leqq \pm 10\%$ $R_{ISO} \geqq 100M\Omega$
Maximum Peak Current	Specification Standard	Imax, 8/20 μs, 1 time.	$\triangle V_{1mA}/V1_{mA} \leqq \pm 10\%$ No visible damage
Nominal Discharge Current Test	UL1449 4th	In, 8/20 μs, 15 times, Interval 60s	△V/V≦±10% No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{1mA}\text{at } 85℃ - V_{1mA}\text{at } 25℃}{V_{1mA}\text{at } 25℃} \times \frac{1}{60} \times 100(\%/C)$	0.05≦TC≦0.05(%/℃)
High Temperature Storage	IEC60068-2-2	1000h, T = 125±2°C	△V/V≦±5% No visible damage
Max. Energy	Specification Standard	10/1000 μs, 1 times, Max. Energy	△V/V≦±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.	△V/V≦±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.	△V/V≦±10% No visible damage

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

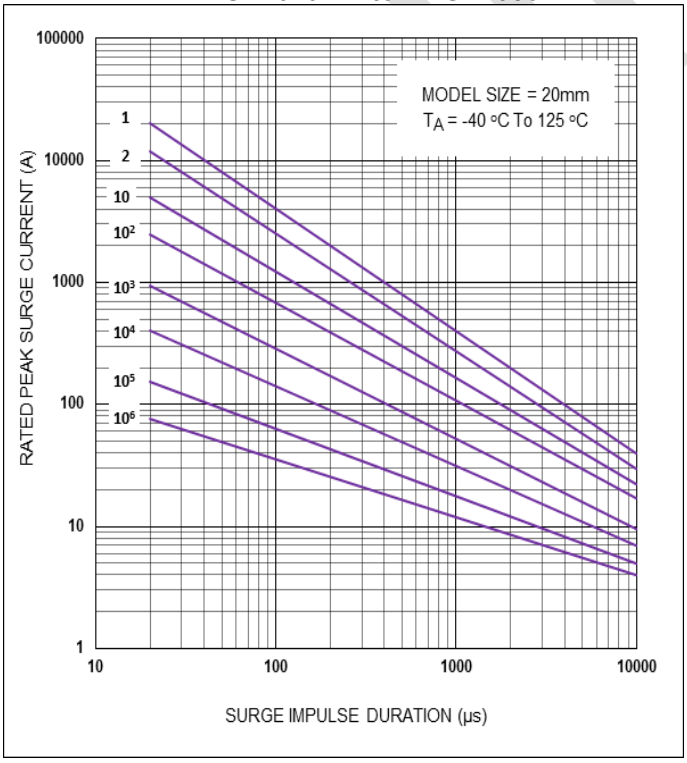
4. Impulse Life Time Rating Curves

FMOV20-H Series

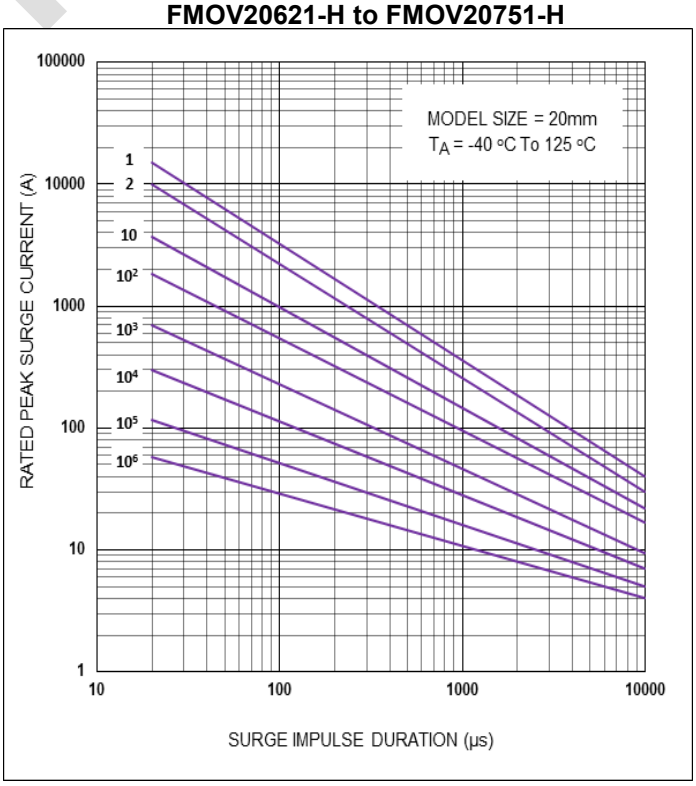
FMOV20180-H to FMOV20680-H



FMOV20201-H to FMOV20561-H



FMOV20621-H to FMOV20751-H

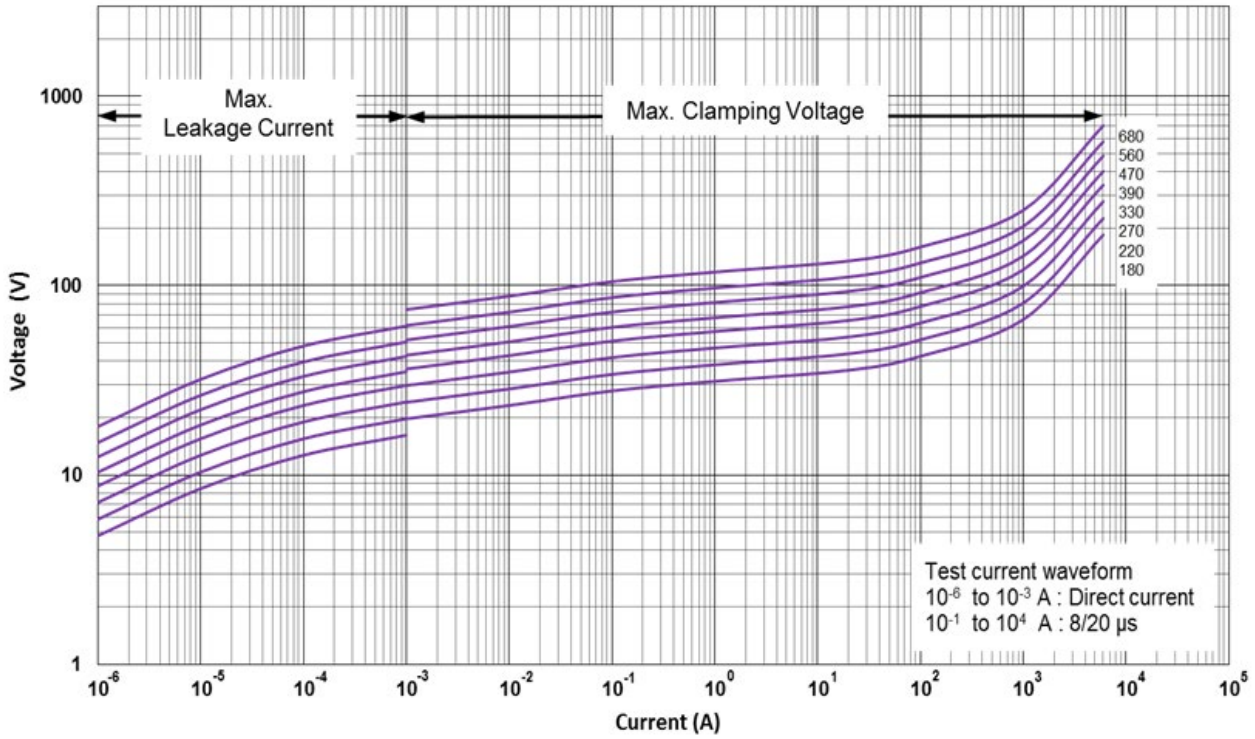


NOTE : Specification subject to change without notice.

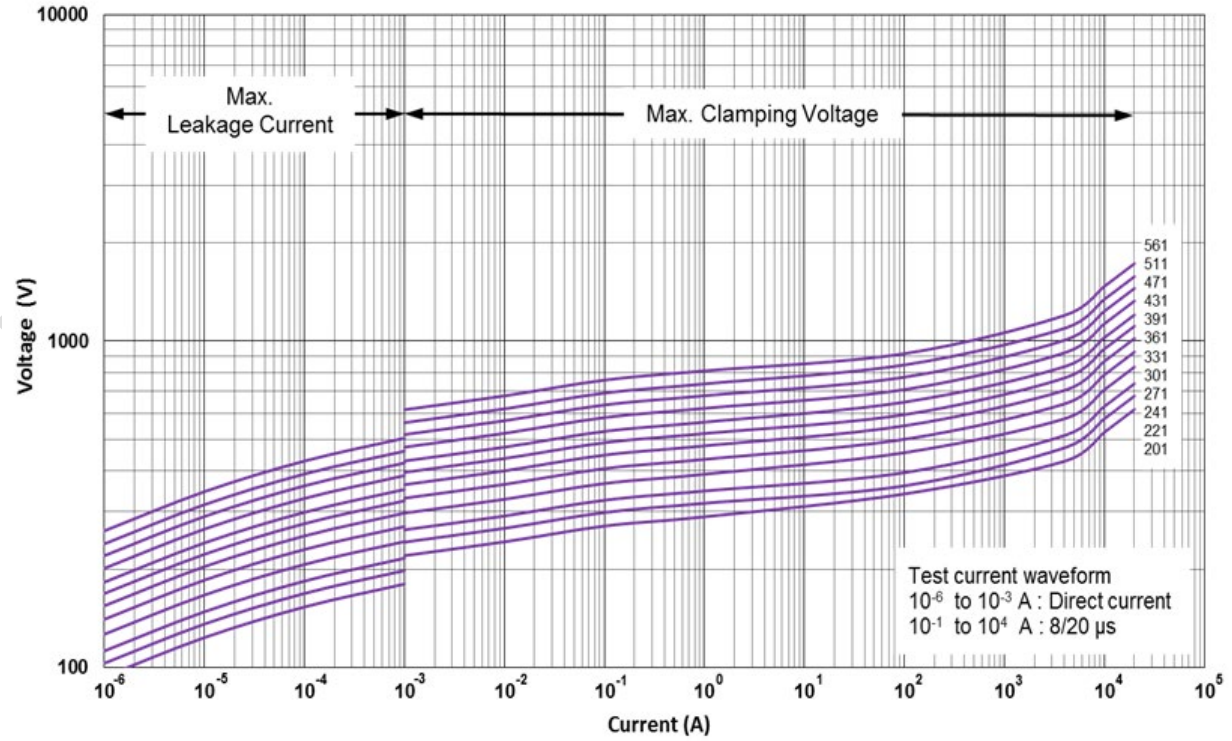
2022/7/8

5. V-I Curves

(FMOV20180-H to FMOV20680-H)

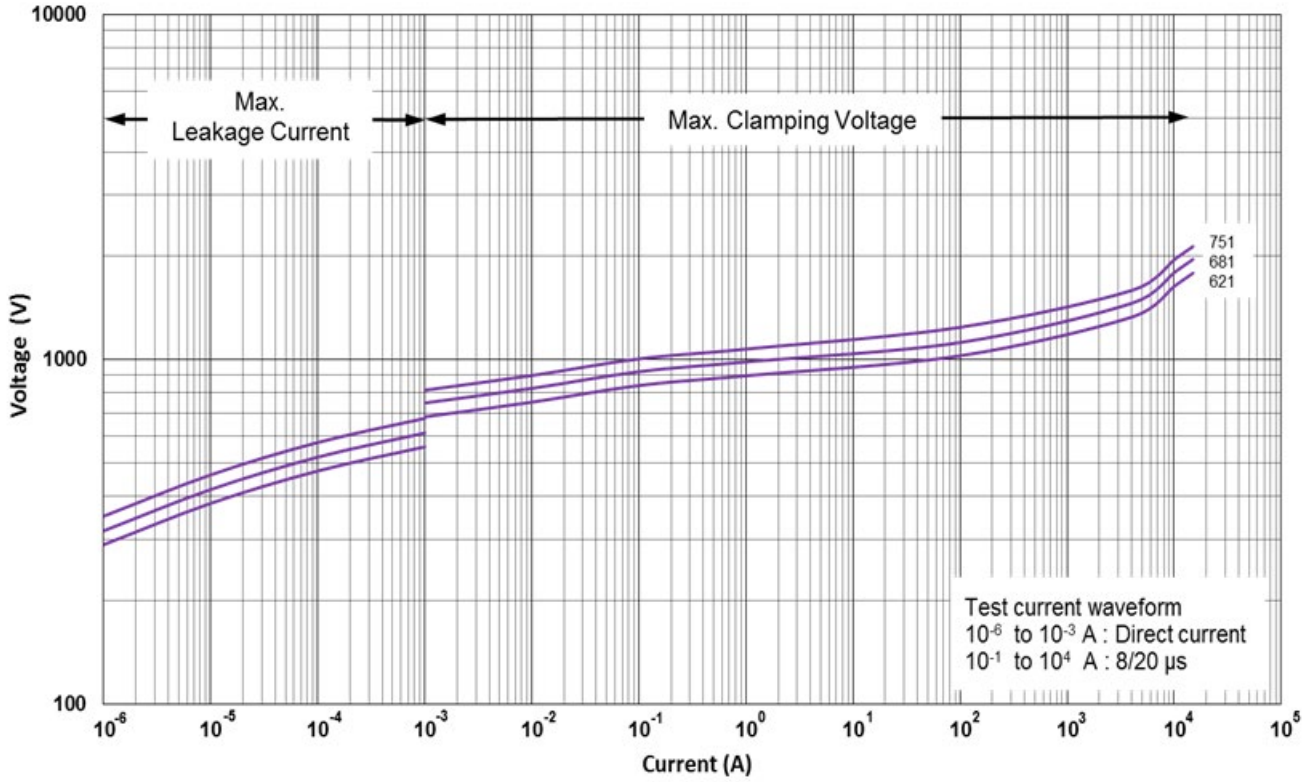


(FMOV20201-H to FMOV20561-H)



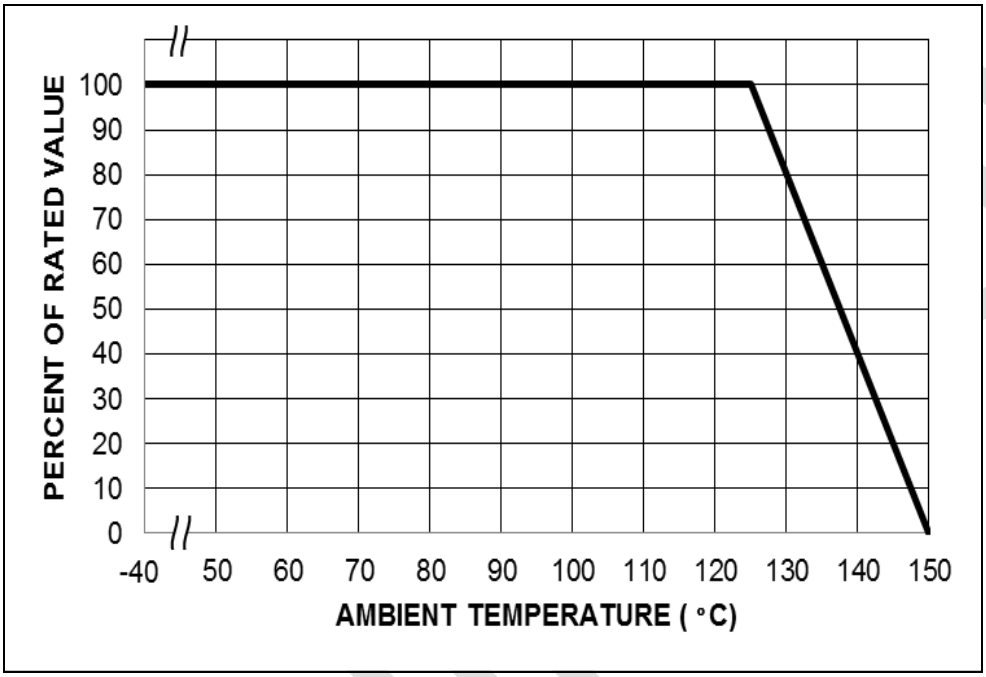
NOTE : Specification subject to change without notice.

(FMOV20621-H to FMOV20751-H)

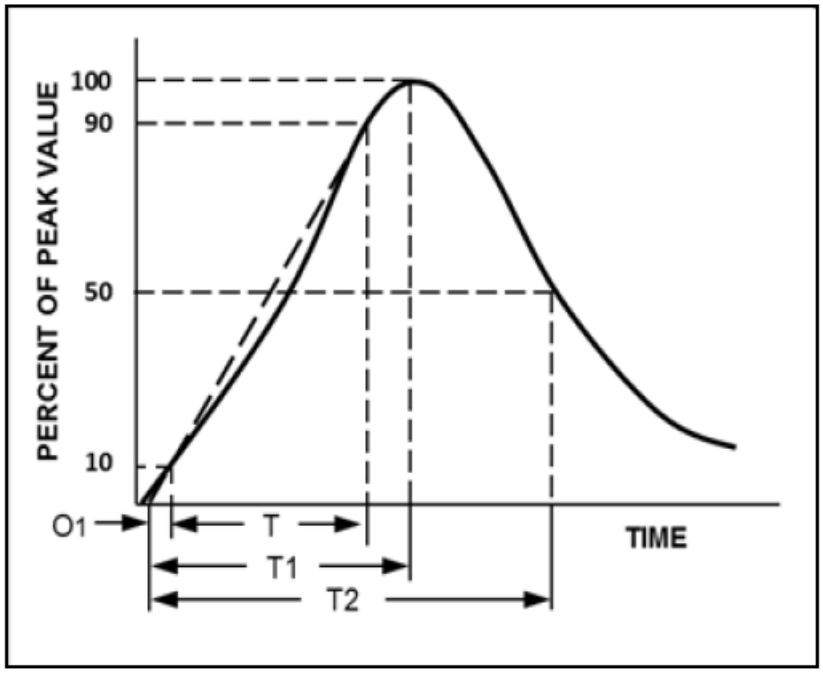


6. Power Derating Curve

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 x T

T2 = Decay Time

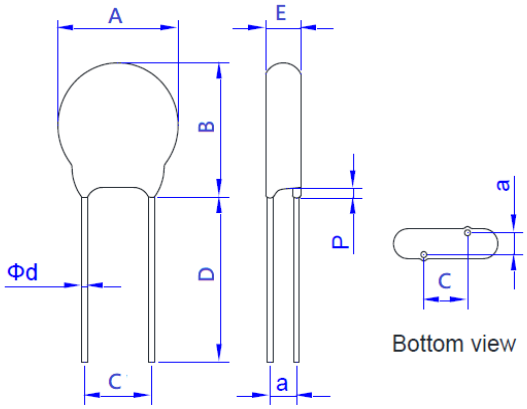
Example - For an 8/20 μs Current Waveform:

8μs = T1 = Rise Time

20μs = T2 = Decay Time

NOTE : Specification subject to change without notice.

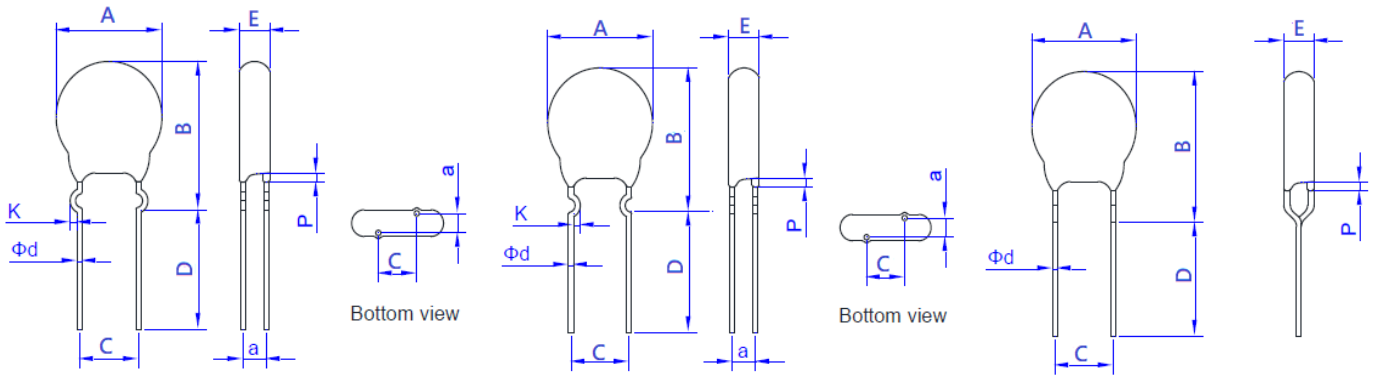
8. Dimension of Component for Standard Product



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
FMOV20180-H	19.5	25.0	28.0	10.0	25.0	5.3	3.0	1.5	1.00
FMOV20220-H	19.5	25.0	28.0	10.0	25.0	5.6	3.0	1.7	1.00
FMOV20270-H	19.5	25.0	28.0	10.0	25.0	5.9	3.0	1.8	1.00
FMOV20330-H	19.5	25.0	28.0	10.0	25.0	5.3	3.0	1.9	1.00
FMOV20390-H	19.5	25.0	28.0	10.0	25.0	5.5	3.0	1.9	1.00
FMOV20470-H	19.5	25.0	28.0	10.0	25.0	5.8	3.0	2.1	1.00
FMOV20560-H	19.5	25.0	28.0	10.0	25.0	6.1	3.0	2.3	1.00
FMOV20680-H	19.5	25.0	28.0	10.0	25.0	6.5	3.0	2.6	1.00
FMOV20201-H	19.5	25.0	28.0	10.0	25.0	6.2	3.0	2.0	1.00
FMOV20221-H	19.5	25.0	28.0	10.0	25.0	6.3	3.0	2.1	1.00
FMOV20241-H	19.5	25.0	28.0	10.0	25.0	6.5	3.0	2.2	1.00
FMOV20271-H	19.5	25.0	28.0	10.0	25.0	6.6	3.0	2.3	1.00
FMOV20301-H	19.5	25.0	28.0	10.0	25.0	6.8	3.0	2.5	1.00
FMOV20331-H	19.5	25.0	28.0	10.0	25.0	7.0	3.0	2.7	1.00
FMOV20361-H	19.5	25.0	28.0	10.0	25.0	7.3	3.0	2.8	1.00
FMOV20391-H	19.5	25.0	28.0	10.0	25.0	7.5	3.0	3.0	1.00
FMOV20431-H	19.5	25.0	28.0	10.0	25.0	7.8	3.0	3.2	1.00
FMOV20471-H	19.5	25.0	28.0	10.0	25.0	8.1	3.0	3.4	1.00
FMOV20511-H	19.5	25.0	28.0	10.0	25.0	8.2	3.0	3.7	1.00
FMOV20561-H	19.5	25.0	28.0	10.0	25.0	8.5	3.0	3.9	1.00
FMOV20621-H	19.5	25.0	28.0	10.0	25.0	8.8	3.0	4.3	1.00
FMOV20681-H	19.5	25.0	28.0	10.0	25.0	8.9	3.0	4.7	1.00
FMOV20751-H	19.5	25.0	28.0	10.0	25.0	9.2	3.0	5.1	1.00

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
FMOV20180-H	19.5	25.0	30.0	10.0	25.0	5.3	3.0	1.0	1.8	1.5	0.80
FMOV20220-H	19.5	25.0	30.0	10.0	25.0	5.6	3.0	1.0	1.8	1.7	0.80
FMOV20270-H	19.5	25.0	30.0	10.0	25.0	5.9	3.0	1.0	1.8	1.8	0.80
FMOV20330-H	19.5	25.0	30.0	10.0	25.0	5.3	3.0	1.0	1.8	1.9	0.80
FMOV20390-H	19.5	25.0	30.0	10.0	25.0	5.5	3.0	1.0	1.8	1.9	0.80
FMOV20470-H	19.5	25.0	30.0	10.0	25.0	5.8	3.0	1.0	1.8	2.1	0.80
FMOV20560-H	19.5	25.0	30.0	10.0	25.0	6.1	3.0	1.0	1.8	2.3	0.80
FMOV20680-H	19.5	25.0	30.0	10.0	25.0	6.5	3.0	1.0	1.8	2.6	0.80
FMOV20201-H	19.5	25.0	30.0	10.0	25.0	6.2	3.0	1.0	1.8	2.0	0.80
FMOV20221-H	19.5	25.0	30.0	10.0	25.0	6.3	3.0	1.0	1.8	2.1	0.80
FMOV20241-H	19.5	25.0	30.0	10.0	25.0	6.5	3.0	1.0	1.8	2.2	0.80
FMOV20271-H	19.5	25.0	30.0	10.0	25.0	6.6	3.0	1.0	1.8	2.3	0.80
FMOV20301-H	19.5	25.0	31.0	10.0	25.0	6.8	3.0	1.0	1.8	2.5	0.80
FMOV20331-H	19.5	25.0	31.0	10.0	25.0	7.0	3.0	1.0	1.8	2.7	0.80
FMOV20361-H	19.5	25.0	31.0	10.0	25.0	7.3	3.0	1.0	1.8	2.8	0.80
FMOV20391-H	19.5	25.0	31.0	10.0	25.0	7.5	3.0	1.0	1.8	3.0	0.80
FMOV20431-H	19.5	25.0	31.0	10.0	25.0	7.8	3.0	1.0	1.8	3.2	0.80
FMOV20471-H	19.5	25.0	31.0	10.0	25.0	8.1	3.0	1.0	1.8	3.4	0.80
FMOV20511-H	19.5	25.0	31.0	10.0	25.0	8.2	3.0	1.0	1.8	3.7	0.80
FMOV20561-H	19.5	25.0	31.0	10.0	25.0	8.5	3.0	1.0	1.8	3.9	0.80
FMOV20621-H	19.5	25.0	31.0	10.0	25.0	8.8	3.0	1.0	1.8	4.3	0.80
FMOV20681-H	19.5	25.0	31.0	10.0	25.0	8.9	3.0	1.0	1.8	4.7	0.80
FMOV20751-H	19.5	25.0	31.0	10.0	25.0	9.2	3.0	1.0	1.8	5.1	0.80

Unit: mm

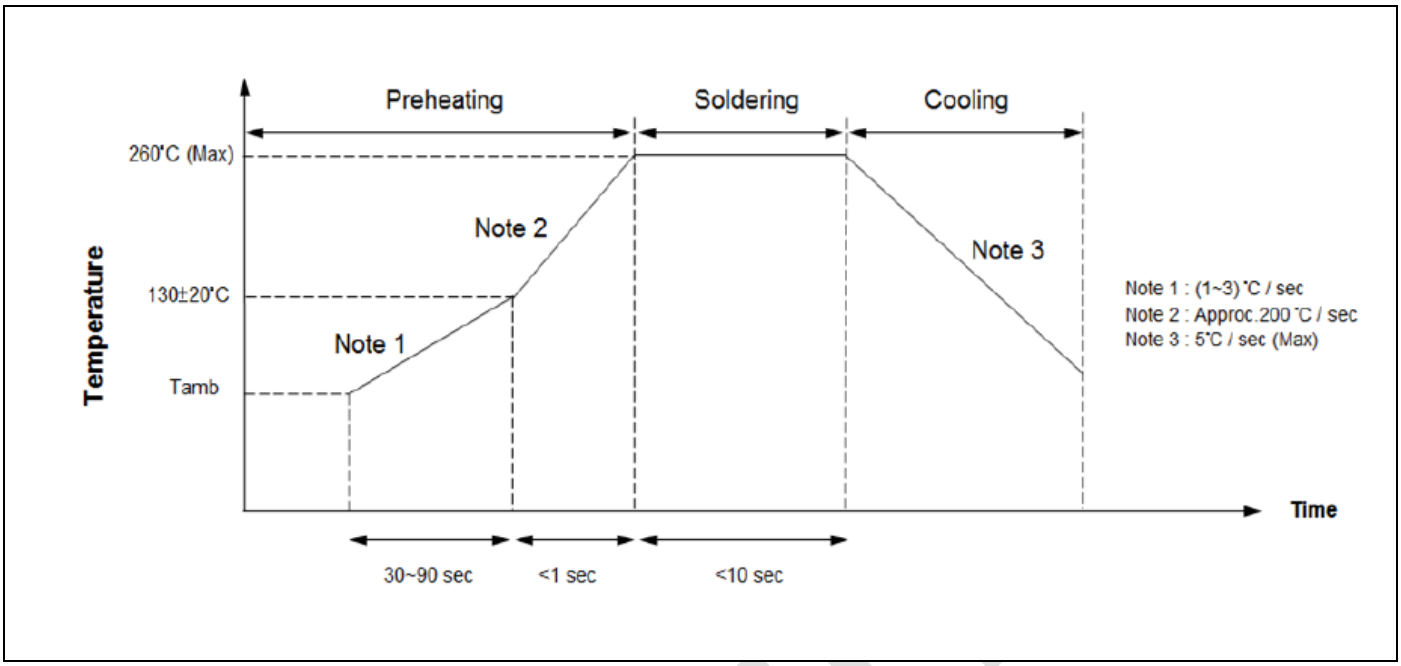
NOTE : Specification subject to change without notice.

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)
FMOV20-H Series	250	250	250	250

11. Solder Recommendation



Recommendation Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of soldering Iron-tip	360℃ (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:

a. Storage Temperature: -10℃~+40℃

b. Relative Humidity: ≦75%RH

c. Keep away from corrosive atmosphere and sunlight

d. Solvent Resistance: MIL–STD–202, Method 215F

e. Moisture Sensitivity: Level 1, J-STD-020

(II) Period of Storage: 1 year

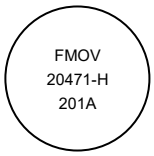
12. Part Numbering and Marking System

Part Numbering System

FMOV 20 471 - H + Tolerance Code + Option Code (See notes below)

- Tolerance of V_{1ma} (K=±10% / L=±15%)
- High temperature series
- Varistor Voltage
  Two significant figures plus number of zeros that above, i.e. 471 is 470V_{DC}
- Disc Diameter
- Product Family

Marking System



Example

FMOV — Product Family

□□ □ □ □ - H

- Part Identification
- Disc Dia./ Ultra High Energy Series

□ □ □ □

- Lot Code
- Week Code
- Year Code

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
FMOV20471-H**KBS**	FMOV20471-H**KBSXXX**	-	-

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-H**KBO**	FMOV20471-H**KBOXXX**	-	-

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-H**KBK**	FMOV20471-H**KBKXXX**	-	-

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-H**KBI**	FMOV20471-H**KBIXXX**	-	-