

### Metal Oxide Varistors Data Sheet

#### Features

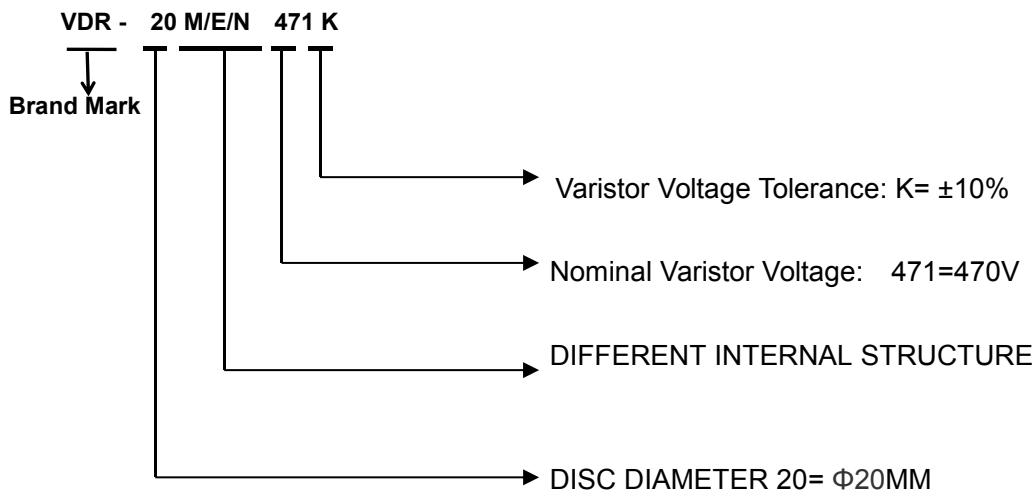
- TMOV integrated thermal protection device
- High peak surge current rating up to 10KA
- Designed to facilitate compliance to UL1449 for TVSS products
- Wide operating voltage (V1mA) range from 18V to 1200V
- Rated current: 15A
- Rated Functioning Temperature:136(°C)
- Fast responding to transient over-voltage and limited current
- Large absorbing transient energy capability
- Low clamping ratio and no follow-on current
- Meets MSL level 1, per J-STD-020
- Operating Temperature : -40°C ~ +85°C
- Storage Temperature : -40°C ~ +85°C



#### Applications

- AC power line or AC/DC supplies
- Transistor, diode, IC, thyristor or triac semiconductor protection
- Surge protection in consumer electronics
- Surge protection in industrial electronics
- Surge protection in electronic home appliances, gas and petroleum appliances
- AC panel protection Modules

#### Description of Part Number



#### Delivery Time

TMOV Part number	Delivery Time	Packing Quantity
VDR-20M/E/N180K ~ VDR-20M/E/N122K	24days	100PCS

Specifications are subject to change without notice

1

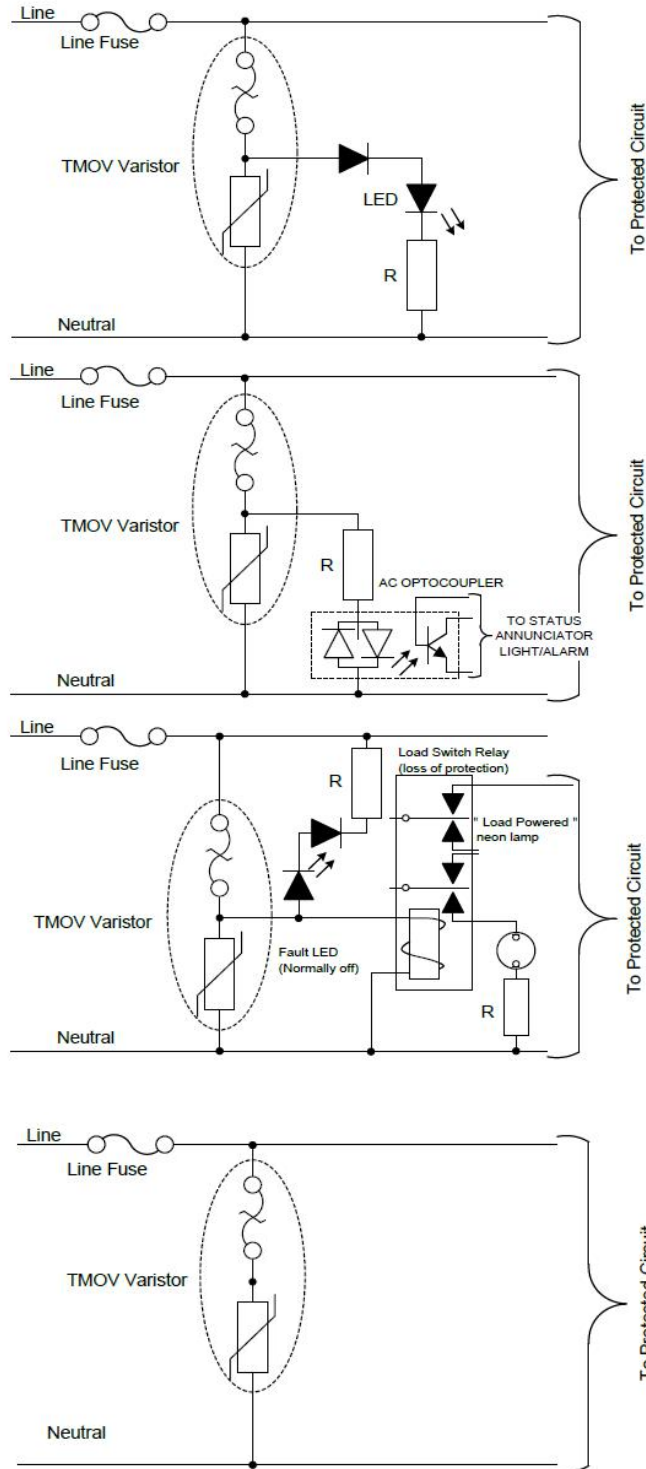
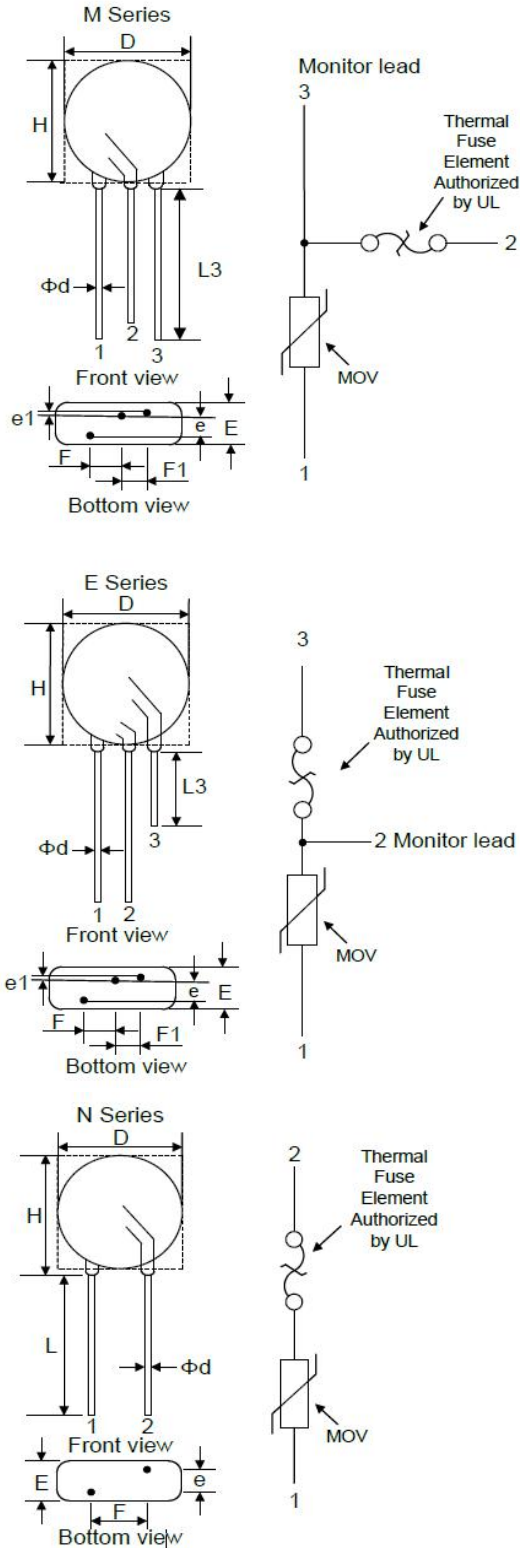
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### Lead configurations and application examples



Dimension

Symbol		HUAAN'S M / E/ N Varistor			Unit: mm
		20M	20E	20N	
D(Max)		24.0mm	24.0mm	24.0mm	
H(Max)		26.0mm	26.0mm	26.0mm	
F(±1.0)		7.5mm	7.5mm	12.5mm / 7.5mm	
F1(±1.0)		5.0mm	5.0mm	--	
e(Max)	180K ~ 121K	3.0mm	3.0mm	3.0mm	
	151K ~ 391K	3.8mm	3.8mm	3.8mm	
	431K ~ 621K	5.5mm	5.5mm	5.5mm	
	681K ~ 911K	7.8mm	7.8mm	7.8mm	
	102K ~ 122K	10.0mm	10.0mm	10.0mm	
e1(Max)	180K ~ 121K	1.5±1.0mm	1.5±1.0mm	--	
	151K ~ 391K				
	431K ~ 621K				
	681K ~ 911K				
	102K ~ 122K				
E(Max)	180K ~ 121K	9.0mm	9.0mm	9.0mm	
	151K ~ 391K	9.8mm	9.8mm	9.8mm	
	431K ~ 621K	11.5mm	11.5mm	11.5mm	
	681K ~ 911K	13.8mm	13.8mm	13.8mm	
	102K ~ 122K	16.0mm	16.0mm	16.0mm	
L(Min)		20.0mm	20.0mm	20.0mm	
L3(Min)		10.0mm	10.0mm	--	
Φd		1.0mm			

### Electrical Characteristics

Part Number	Maximum Allowable Voltage		Varistor Voltage V <sub>1mA</sub> (V)	Maximum Clamping Voltage V <sub>c</sub> (V) AT 100A	Max Surge Current I <sub>8/20μs</sub>		Maximum Energy E <sub>10/1000μs</sub>		Rated Power W	Typical Capacitance (Reference) @1KHz(pf)
	V <sub>AC</sub> (V)	V <sub>DC</sub> (V)			1time	2times	10/1000μs	2ms		
	20M/E/N180K	11	14	18(15.3~20.7)	36	3000A	2000A	13J	10J	0.2
20M/E/N220K	14	18	22(19.8~24.2)	43	3000A	2000A	16J	12J	0.2	18500
20M/E/N270K	17	22	27(24.3~29.7)	53	3000A	2000A	19J	14J	0.2	13000
20M/E/N330K	20	26	33(29.7~36.3)	65	3000A	2000A	24J	18J	0.2	11500
20M/E/N390K	25	31	39(35.1~42.9)	77	3000A	2000A	28J	21J	0.2	8500
20M/E/N470K	30	38	47(42.3~51.7)	93	5000A	3000A	34J	25J	0.2	7400
20M/E/N560K	35	45	56(50.4~61.6)	100	5000A	3000A	41J	30J	0.2	6500
20M/E/N680K	40	56	68(61.2~74.8)	135	5000A	3000A	49J	37J	0.2	5800
20M/E/N820K	50	65	82(73.8~90.2)	135	6500A	4500A	56J	42J	1.0	2400
20M/E/N101K	60	85	100(90~110)	165	6500A	4500A	70J	52J	1.0	2000
20M/E/N121K	75	100	120(108~132)	200	6500A	4500A	85J	63J	1.0	1700
20M/E/N151K	95	125	150(135~165)	250	10000A	8000A	100J	70J	1.0	1300
20M/E/N181K	115	150	180(162~198)	300	10000A	8000A	110J	80J	1.0	1100
20M/E/N201K	130	170	200(180~220)	340	10000A	8000A	140J	100J	1.0	1000
20M/E/N221K	140	180	220(198~242)	360	10000A	8000A	155J	110J	1.0	900
20M/E/N241K	150	200	240(216~264)	395	10000A	8000A	170J	120J	1.0	830
20M/E/N271K	175	225	270(243~297)	455	10000A	8000A	190J	135J	1.0	740
20M/E/N301K	190	250	300(270~330)	500	10000A	8000A	205J	145J	1.0	670
20M/E/N331K	210	275	330(297~363)	550	10000A	8000A	215J	150J	1.0	610
20M/E/N361K	230	300	360(324~396)	595	10000A	8000A	225J	160J	1.0	560
20M/E/N391K	250	320	390(351~429)	650	10000A	8000A	240J	170J	1.0	510
20M/E/N431K	275	350	430(387~473)	710	10000A	8000A	270J	190J	1.0	460
20M/E/N471K	300	385	470(423~517)	775	10000A	8000A	350J	250J	1.0	430
20M/E/N511K	320	415	510(459~561)	845	10000A	8000A	380J	270J	1.0	390
20M/E/N561K	350	460	560(504~616)	925	10000A	8000A	400J	280J	1.0	360
20M/E/N621K	385	505	620(558~682)	1025	10000A	8000A	425J	300J	1.0	320
20M/E/N681K	420	560	680(612~748)	1120	10000A	8000A	435J	310J	1.0	290
20M/E/N751K	460	615	750(675~825)	1240	10000A	8000A	455J	327J	1.0	270
20M/E/N781K	485	640	780(702~858)	1290	10000A	8000A	461J	335J	1.0	260
20M/E/N821K	510	670	820(738~902)	1355	10000A	8000A	475J	344J	1.0	240
20M/E/N911K	550	745	910(819~1001)	1500	10000A	8000A	500J	350J	1.0	220
20M/E/N102K	625	825	1000(900~1100)	1650	10000A	8000A	560J	400J	1.0	200
20M/E/N112K	680	895	1100(990~1210)	1815	10000A	8000A	610J	430J	1.0	180
20M/E/N122K	750	990	1200(1080~1320)	1980	10000A	8000A	650J	460J	1.0	150

**Mechanical Characteristics**

Items	Test conditions / Methods	Specifications								
Tensile Strength of Terminals	Gradually applying the force specified and keeping the unit fixed for 10±1 sec.  <table border="1"> <thead> <tr> <th>Terminal diameter (mm)</th> <th>Force(kg)</th> </tr> </thead> <tbody> <tr> <td>0.5 &lt; d ≤ 0.8</td> <td>1.0</td> </tr> <tr> <td>0.8 &lt; d ≤ 1.25</td> <td>2.0</td> </tr> <tr> <td>1.25 &lt; d</td> <td>4.0</td> </tr> </tbody> </table>	Terminal diameter (mm)	Force(kg)	0.5 < d ≤ 0.8	1.0	0.8 < d ≤ 1.25	2.0	1.25 < d	4.0	No visible damage  ΔV1mA/V1mA  ≤ 5%
Terminal diameter (mm)	Force(kg)									
0.5 < d ≤ 0.8	1.0									
0.8 < d ≤ 1.25	2.0									
1.25 < d	4.0									
Bending Strength of Terminals	Hold specimen and apply the force specified below to each lead. Bend the specimen to 90°, then return to the original position. Repeat the procedure in the opposite direction.  <table border="1"> <thead> <tr> <th>Terminal diameter (mm)</th> <th>Force(kg)</th> </tr> </thead> <tbody> <tr> <td>0.5 &lt; d ≤ 0.8</td> <td>1.0</td> </tr> <tr> <td>0.8 &lt; d ≤ 1.25</td> <td>2.0</td> </tr> <tr> <td>1.25 &lt; d</td> <td>4.0</td> </tr> </tbody> </table>	Terminal diameter (mm)	Force(kg)	0.5 < d ≤ 0.8	1.0	0.8 < d ≤ 1.25	2.0	1.25 < d	4.0	No visible damage  ΔV1mA/V1mA  ≤ 5%
Terminal diameter (mm)	Force(kg)									
0.5 < d ≤ 0.8	1.0									
0.8 < d ≤ 1.25	2.0									
1.25 < d	4.0									
Vibration	Frequency range: 10~55 Hz Amplitude: 0.75mm or 98m/s <sup>2</sup> Direction: 3 mutually perpendicular directions, 2hrs each.	No visible damage  ΔV1mA/V1mA  ≤ 5%								
Solder ability	Solder Temp: 245±5°C Dipping Time: 2±0.5 sec	At least 95% of terminal electrode is covered by new solder								
Resistance to Soldering Heat	Solder Temp: 260±5°C Dipping Time: ≤ 5 sec	No visible damage  ΔV1mA/V1mA  ≤ 10%								

**Reliability**

Items	Test conditions / Methods	Specifications															
High Temperature Storage	Ambient Temp: 85±2°C Duration: 1000hrs	ΔV1mA/V1mA  ≤ 5%															
Low Temperature Storage	Ambient Temp: -40±2°C Duration: 1000hrs	ΔV1mA/V1mA  ≤ 5%															
Humidity	Ambient Temp: 40±2°C, 90~95% R.H. Duration: 1000hrs	ΔV1mA/V1mA  ≤ 5%															
Temperature Cycle	The conditions shown below shall be repeated 5 cycles  <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40±3</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>15±3</td> </tr> <tr> <td>3</td> <td>85±3</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>15±3</td> </tr> </tbody> </table>	Step	Temperature (°C)	Period (minutes)	1	-40±3	30±3	2	Room temperature	15±3	3	85±3	30±3	4	Room temperature	15±3	No visible damage  ΔV1mA/V1mA  ≤ 5%
Step	Temperature (°C)	Period (minutes)															
1	-40±3	30±3															
2	Room temperature	15±3															
3	85±3	30±3															
4	Room temperature	15±3															
High Temperature Load	Ambient Temp: 85±2°C Duration: 1000hrs Load: Max. Allowable Voltage In AC eara.	ΔV1mA/V1mA  ≤ 10%															
Damp Heat Load	Ambient Temp: 40±2°C, 90~95% R.H. Duration: 1000hrs Load: Max. Allowable Voltage	No visible damage  ΔV1mA/V1mA  ≤ 10%															
Voltage Proof	Metal balls method, 2500Vac 1 min.	No visible damage															