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PRODUCT SPECIFICATION

产品类型（Product Type）： Varistor
产品系列（Product Series）: TMRSS01
发布日期（Release Date）： May, 2020

Checked	Prepared
Customer Approve	

Varistor

Product Specification For Approval

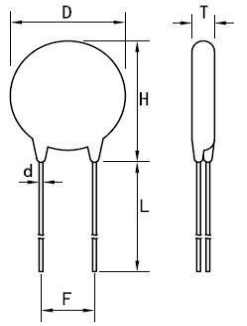
CUSTOMER		
Approved Item	10D220K	
Customer P/N		
Lead form	■ Straight ☐ Crimped (mm) ☐ Y Kink ☐ Inner Crimped	
Operating temperature	■ -40~125℃ □ -40~85℃	
Surge type	■Standard ☐ High energy ☐ Combined wave	
Packing	■ Bulk □Ammo □Reel	
Approval Standard And File Number	40028836 E317616 12001076476 ISO9001/2008	
STANDARD	GB/T10193-1997 GB/T10194-1997 / UL1449 TYPE5 IEC61051	
ISSUE DATE / REV	2020/5/21	A1
Special description		

DRAWN BY	CHECKED BY	APPROVAL BY
Jiang	*Huang*	Jian

SPECIFICATION	**10D220K**

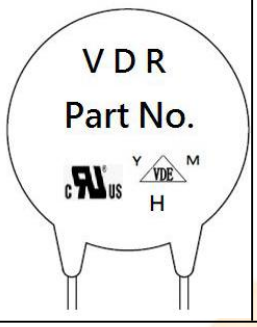
1 . OUTLINE

1.1	APPEARANCE WITHOUT DIRT&CRACK,MARKING SHOULD BE CLEAR
1.2	Marking & Dimensions



D(max)	12.0mm
T(max)	4.6mm
F(±0.8)	7.5mm
H(max)	15.0mm
L(min)	15.0mm
d(±0.05)	0.8mm

Marking



Trademark : VDR
Part No. : 10D220K

Standard for Safety: UL+CUL /VDE

Date Code: Y:Year M:Month

H: 125℃

2 . ELECTRICAL PARAMETER

	Electrical specifications 電性規格項目	Performance requirements 性能要求	Unit 單位	Description and test method 说明及测试方法
2.1	MAX ALLOWABLE VOLTAGE 可容許之最大電壓	14	VAC 交流	Maximum duration that the varistor can withstand for a long time
		18	VDC 直流	Sine AC voltage rms or maximum DC voltage. 压敏电阻能够长期承受的最大持续 正弦交流电压有效值或最大直流电压。
2.2	VARISTOR VOLTAGE 壓敏電壓	19.8-24.2	(V)	At 1mA DC current in the varistor, Voltage drop between two electrodes of a varistor. 压敏电阻中電流 **1mA** 直流电流时， 压敏电阻两电极间的电压降。
2.3	RATED WATTAGE 额定功率及脉冲电流稳定性	0.05	(W) 及 10^4 times 10^4次	Under the action of a current pulse group with a waveform of 8/20 μs, a time interval of 6.3 sec, and a number of 10^4, the varistor can withstand the maximum average power. "Able to withstand" means that the varistor voltage U1mA after impact is not greater than ± 10 compared with that before impact, and no mechanical damage can be seen visually. 在波形为8/20μs、时间间隔为 6.3sec、次数为 10^4 的电流脉冲群作用下，压敏电阻器能承受最大平均功率。“能够承受”指：冲击后的压敏电压U1mA与冲击前的相比不大于±10%，且不能发生目视可见的机械损伤。
2.4	MAX CLAMPING VOLTAGE 最大抑制電壓	43	(V)	When a surge current with a waveform of 8 / 20μs and a peak value of 100A flows into the varistor, the voltage peak between the two electrodes. 波形为8/20μs、峰值为100**A**的浪涌电流流入压敏电阻器时，两电极间的电压峰值。
2.5	WITHSTANDING SURGE CURRENT 突波電流耐量 最大峰值电流	500	(A) 1 TIME	The varistor can withstand a waveform of 8 / 20μs Peak inrush current. "Affordable" means: The varistor voltage U1mA after impact is not greater than ± 10 compared with that before impact, and no mechanical damage can be seen visually. 压敏电阻能够承受的波形为8/20μs
		250	(A) 2 TIMES	

				的最大浪涌电流峰值。“能够承受”指： 冲击后的压敏电压U1mA与冲击前的相比不大于±10%，且不能发生目视可见的机械损伤。
2.6	MAX ENERGY 最大能量	2.5	JOULE	When a square wave current of 10/100 μs is applied to the varistor, it can withstand the maximum surge energy. "Able to withstand" means that the varistor voltage U1mA after impact is not greater than ± 10 compared with that before impact, and no mechanical damage can be seen visually. 对压敏电阻施加一次10/1000μs方波电流时，它能够承受最大浪涌能量。“能够承受”指： 冲击后的压敏电压U1mA与冲击前的相比不大于±10%，且不能发生目视可见的机械损伤。
2.7	TEMPFRATURE COEFFICIENT 电压温度系数	0~0.05	%/℃	$\frac{U_{1mA}(25^{\circ}C)-U_{1mA}(85^{\circ}C)}{U_{1mA}(25^{\circ}C)}\times\frac{1}{60}\times 100\ \%$
2.8	TYPICAI CAPACITNACE TANCE 电容量 (参考值) (reference)	4500	PF	Frequency: 1kHz ± 10, signal level ≤1VRMS, zero bias. 频率：1kHz±10%、信号电平≤1VRMS 、零偏压。
2.9	LEAKAGE CURRENT 漏电流	≤40	μA	When the maximum continuous DC working voltage is applied to both ends, the current flowing through the varistor. 两端被施加最大持续直流工作电压时，流过压敏电阻的电流。
2.10	Impulse Response Time 响应时间	< 25		nSec
2.11	Packing material包封材料	Blue flame retardant epoxy resin (in compliance with UL 94 V-0) 蓝色阻燃型环氧树脂（符合UL 94 V-0标准要求）		
2.12	Main material 主要材料	Zinc oxide 氧化锌		
2.13	Apperance 外观	No smudges, no cracks, clear signs 无污迹、无裂纹、标志清晰		
2.14	Standard test environmental conditions 标准测试环境条件	Unless otherwise specified, testing of all items should be performed under the following environmental conditions: Temperature: 5 ~ 35 ℃, relative humidity: 45 ~ 85RH 除非另有规定，所有项目的测试应在以下环境条件下进行： 温度： 5 ~ 35℃，相对湿度：45 ~ 85%RH		

3. MECHANICAL REQUIREMENTS & ENVIRONMENTAL REQUIREMENTS

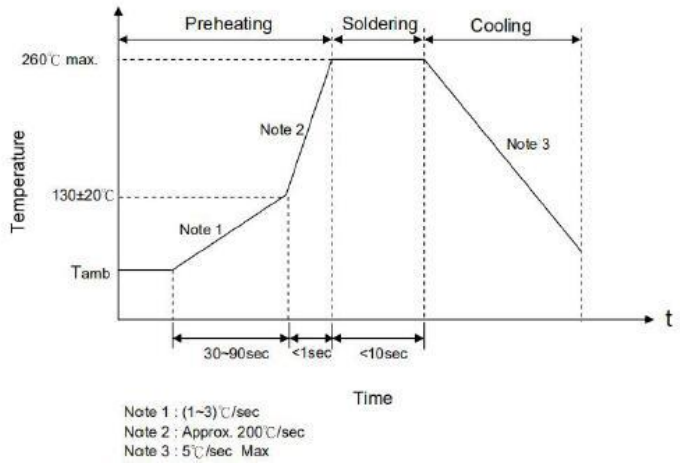
No. 编号		Item 项目	Performance requirements 性能要求	Description and test method 说明及测试方法
Environmental characteristics 环境特性	3.1	Climatic sequence 气候顺序	$\frac{\Delta U_{1m4}}{U_{1m4}} \leq \pm 5\%$ —— No obvious mechanical damage 无明显机械损伤	IEC 68-2-4, test Db Dry heat: (125 ± 2 ℃) × 16hrs, Damp heat cycle: one cycle (55 ± 2 ℃) × 24hrs, 95 ~ 100% RH Cold: (-40 ± 2 ℃) × 2hrs, Damp heat cycle: once (55 ± 2 ℃) × 24hrs, 95 ~ 100% RH, The remaining cycle is 5 times, 24hrs / cycle. IEC 68-2-4，试验 Db 干热： (125±2℃)×16hrs, 循环湿热：一个循环(55±2℃)×24hrs、 95~100%RH 寒冷：(-40±2℃)×2hrs, 循环湿热：一次(55±2℃) ×24hrs,、95~100%RH、 剩余的循环5 次， 24hrs/循环。
	3.2	Steady-state damp heat 稳态湿热	$\frac{\Delta U_{1m4}}{U_{1m4}} \leq \pm 5\%$ No obvious mechanical damage 无明显机械损伤	IEC68-2-3 Temperature / time: (40 ± 2 ℃) / 500hrs, humidity: 90 ~ 95% RH. 温度/时间：(40±2℃)/500hrs、湿度：90~95%RH。
	3.3	Rapid temperature change 温度快速变化	$\frac{\Delta U_{1m4}}{U_{1m4}} \leq \pm 5\%$ No obvious mechanical damage 无明显机械损伤	IEC 68-2-14, test Na TA = -40 ° C, TB = + 125 ° C; a total of five cycles, 30 minutes at each limit temperature. IEC 68-2-14，试验Na TA=- 40℃， TB= +125℃ ；共五个循环，每个极限温度下放置30分钟。
	3.4	Upper category temperature durability 上限类别温度耐久性	$\frac{\Delta U_{1m4}}{U_{1m4}} \leq \pm 10\%$ No obvious mechanical damage 无明显机械损伤	IEC 68-2-2 Temperature: 125 ° C ± 2 ° C, time: 1000hrs. Voltage: Maximum continuous operating voltage (AC). 温度：125℃±2℃、时间：1000hrs。 电压：最大持续工作电压（交流）。
	3.5	Damp heat environment durability 湿热环境耐久性	$\frac{\Delta U_{1m4}}{U_{1m4}} \leq \pm 10\%$ No obvious mechanical damage 无明显机械损伤	IEC68-2-3 Temperature: 125 ℃ ± 2 ℃, time: 500hrs, humidity: 90 ~ 95% RH. Voltage: Maximum continuous operating voltage (AC). 温 度 ： 125℃±2℃ 、 时 间 ： 500hrs 、 湿 度 ： 90~95%RH。电压：最大持续工作电压（交流）。

Mechanical properties 机械特性	3.6	Vibration 振动	$\frac{\Delta U_{1m4}}{U_{1m4}} \le \pm 5\%$ No obvious mechanical damage 无明显机械损伤	IEC68-2-6, Test Fc method B4 Total duration: 6hrs (three directions, 2hrs in each direction). Frequency range: 10 Hz to 55 Hz, amplitude: 0.75 mm or acceleration of 98 m / s2 IEC68-2-6，试验Fc方法 B4 总持续时间：6hrs(三个方向，每方向各2hrs)。 频率范围：10 Hz～55 Hz、振幅：0.75mm或加速度 98 m/s2
	3.7	Shock 冲击	$\frac{\Delta U_{1m4}}{U_{1m4}} \le \pm 5\%$ No obvious mechanical damage 无明显机械损伤	IEC 68-2-27, Test Ea Pulse waveform: half sine wave, acceleration: 490m / s2 Pulse width: 11ms, three directions, 6 times in each direction. 脉冲波形：半正弦波、加速度：490m/s^2 脉冲宽度：11ms，三个方向，每方向各6次。
	3.8	Solderability 可焊性	95% of the impregnated part is covered with solder 浸渍部分的95% 被焊锡覆盖	IEC 68-2-20, Test Ta Method 1 Tank temperature: 235 ± 5 ℃ Dipping time: 2 ± 0.5sec IEC 68-2-20，试验Ta 方法1 槽温：235±5℃ 浸渍时间：2±0.5sec
	3.9	Resistance to welding heat 耐焊接热	No obvious mechanical damage 无明显机械损伤	IEC 68-2-20, Test Tb method 1A Tin temperature: 260 ° C, Duration: 5sec IEC 68-2-20，试验Tb 方法1A 锡温： 260℃、持续时间：5sec
	3.10	Terminal strength 引出端强度	$\frac{\Delta U_{1m4}}{U_{1m4}} \le \pm 5\%$ - 无明显机械损伤	IEC68-2-21, Test Ua Tension-Strength: 10 N (ø 0.6 and 0.8 mm lead) 20N (ø 1.0mm lead) Duration: 10 sec. Bending-Force: 5 N (ø 0.6 and ø 0.8 mm lead), 10N (ø 1.0 mm lead) Bend times: 2 times IEC68-2-21，试验Ua 拉伸一力量： 10 N (ø 0.6和ø 0.8mm引线) 、20N(ø 1.0mm引线)持续时间:10 sec. 弯折一力量：5 N (ø 0.6和ø 0.8mm引线)、 10N(ø 1.0mm引线)弯折次数：2次
General 总体特性	3.11	Operating temperature range 使用温度范围	(-40℃ ～+ 125℃)	Temperature range for varistor without derating 压敏电阻无须降额使用的温度范围
	3.12	Storage temperature range 贮存温度范围	(-40℃ ～+150℃)	Under no load condition 压敏电阻无负载情况下
	3.13	Withstand voltage 绝缘耐压	≥2500VAC	Between the electrode lead of the varistor and the surface of its encapsulation layer, 1 min. 压敏电阻的电极引线与其包封层表面之间，1 min。

4. Maximum Clamping Voltage

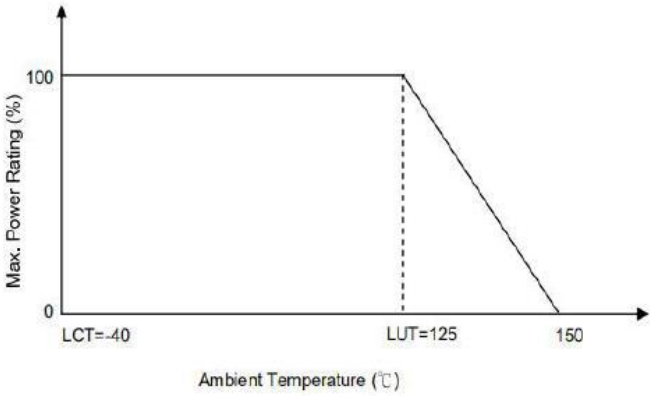
Soldering Recommendation 焊接建议 & Power Derating Curve 功率降额曲线曲线

■ **Wave Soldering Profile**



Note 1 : (1~3)℃/sec
Note 2 : Approx. 200℃/sec
Note 3 : 5℃/sec Max

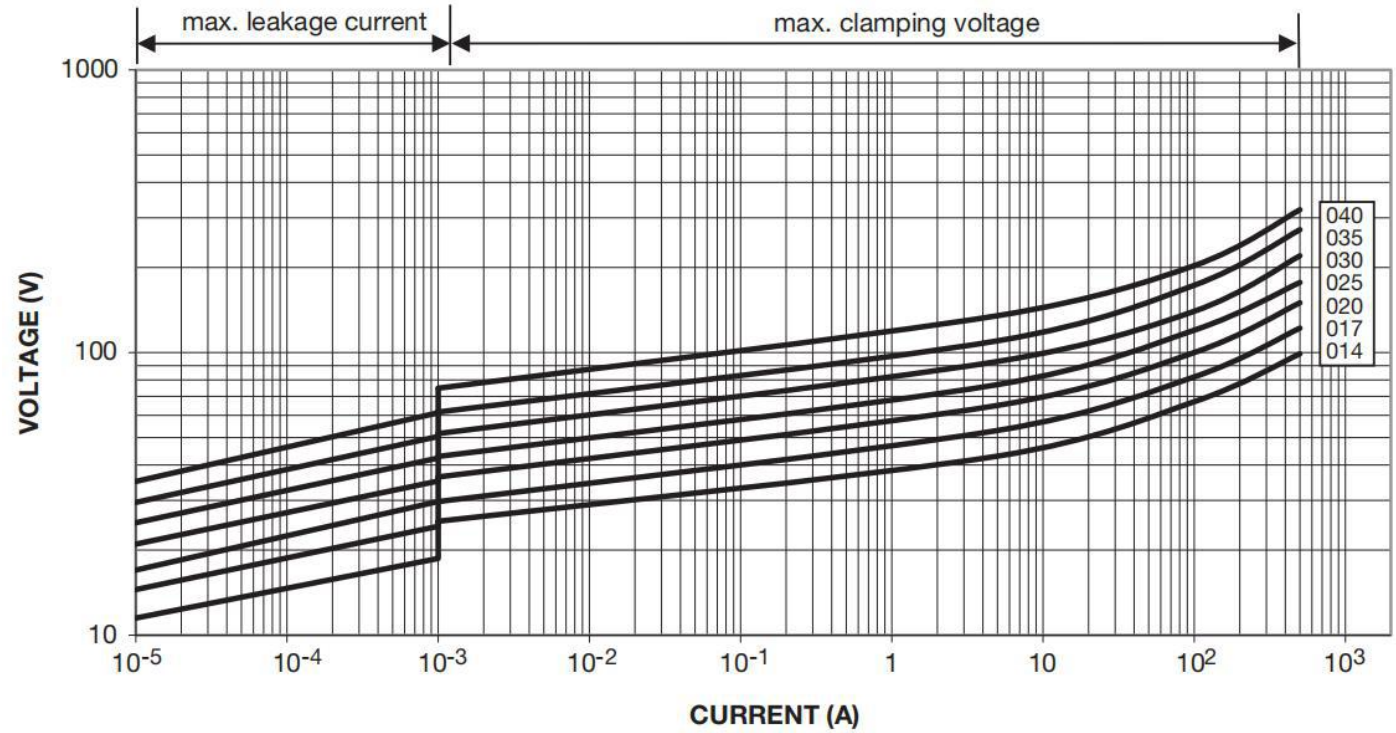
When operating temperature exceeds125 , the power, the Max. continuous operation Voltage, the Max. Surge Current and the Max. Energy should be derated as below figure, the derated coefficient is -4%



V/I CHARACTERISTICS V-I 特性曲線

14 V_{RMS} to 40 V_{RMS}

VDR-10D220K to VDR-10D680K



MAXIMUM APPLICABLE TRANSIENT CURRENT AS A FUNCTION OF PULSE DURATION

14 V_{RMS} to 40 V_{RMS}

VDR-10D220K to VDR-10D680K