Metal Oxide Varistor

G-series varistor

Series/Type:	**G20 series**
Ordering code:	**B72220G*K101**
Date:	2025-04-07
Version:	b

Applications

- Power supplies
- Chargers
- Surge protection devices
- White goods
- Communications

Design

- Round varistor in series with arrester, leaded
- Coating: epoxy, flame-retardant according to UL 94 V-0
- Terminals: tinned copper wire, metal compound wire

Features

- Hybrid design
- Low leakage

General technical data

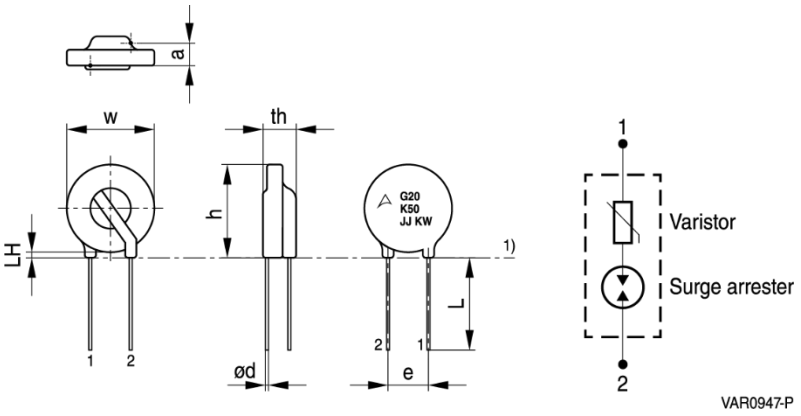
Climatic category to IEC 60068-1	40 / 105 / 56
Operating temperature	–40 … +105 °C
Storage temperature	–40 … +105 °C
Coating material	UL94-V0
Application altitude	< 2000 m

Nomenclature

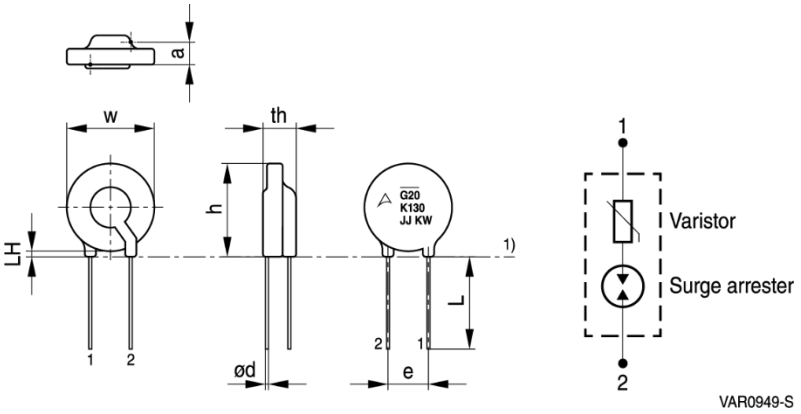
G	=	Disk type with gas tube
20	=	Rated disk diameter (mm)
K	=	Tolerance of V_V at 1 mA: ±10%
50…750	=	Max. operating AC voltage
E3	=	Energy absorption characteristics, AdvanceD series
K4	=	2-pin version

Dimensional drawing in mm

G20K…K4



G20K…E3K4



1) Seating plane in accordance with IEC 60717

Type	h_{max} (mm)	w_{max} (mm)	L_{min} (mm)	LH_{max} (mm)	ød ±0.05 (mm)	e ±1 (mm)	a (typical) (mm)	th_{max} (mm)
G20K50K4	27	22.5	25	4	1	10	5.0	9.0
G20K65K4	27	22.5	25	4	1	10	5.0	9.0
G20K95K4	27	22.5	25	4	1	10	4.1	8.0
G20K115K4	27	22.5	25	4	1	10	4.3	8.5
G20K130E3K4	27	22.5	25	4	1	10	4.0	8.5
G20K140E3K4	27	22.5	25	4	1	10	4.0	8.5
G20K150E3K4	27	22.5	25	4	1	10	4.0	8.5
G20K175E3K4	27	22.5	25	4	1	10	4.2	8.5
G20K210E3K4	27	22.5	25	4	1	10	4.4	9.0
G20K230E3K4	27	22.5	25	4	1	10	4.4	9.0
G20K250E3K4	27	22.5	25	4	1	10	4.6	9.0
G20K275E3K4	27	22.5	25	4	1	10	4.6	9.0
G20K300E3K4	27	22.5	25	4	1	10	5.0	9.5
G20K320E3K4	27	22.5	25	4	1	10	5.0	9.5
G20K350E3K4	27	22.5	25	4	1	10	7.0	11.5
G20K385E3K4	27	22.5	25	4	1	10	7.3	11.5
G20K420E3K4	27	22.5	25	4	1	10	7.5	12.0
G20K460E3K4	27	22.5	25	4	1	10	8.0	12.5
G20K510E3K4	27	22.5	25	4	1	10	8.3	12.5
G20K550E3K4	27	22.5	25	4	1	10	8.7	13.0
G20K625E3K4	27	22.5	25	4	1	10	9.0	13.5
G20K680E3K4	27	22.5	25	4	1	10	9.4	14.0
G20K750E3K4	27	22.5	25	4	1	10	9.9	14.5

Electrical data

Type	Ordering code[2)]	TA = 105 °C		
		Max. operating voltage	MOV voltage	DC spark-over voltage of GDT
		V_{RMS}	1 mA	100 V/s
SIOV		V	V	V
G20K50K4	B72220G0500K101*	50	68 (61 ~ 75)	300 (240 ... 360)
G20K65K4	B72220G0650K101*	65	68 (61 ~ 75)	300 (240 ... 360)
G20K95K4	B72220G0950K101*	95	120 (108 ~ 132)	470 (376 ... 564)
G20K115K4	B72220G0111K101*	115	150 (135 ~ 165)	600 (480 ... 720)
G20K130E3K4	B72220G3131K101*	130	150 (135 ~ 165)	600 (480 ... 720)
G20K140E3K4	B72220G3141K101*	140	150 (135 ~ 165)	600 (480 ... 720)
G20K150E3K4	B72220G3151K101*	150	180 (162 ~ 198)	600 (480 ... 720)
G20K175E3K4	B72220G3171K101*	175	205 (184 ~ 226)	600 (480 ... 720)
G20K210E3K4	B72220G3211K101*	210	240 (216 ~ 264)	600 (480 ... 720)
G20K230E3K4	B72220G3231K101*	230	270 (243 ~ 297)	1000 (800 ... 1200)
G20K250E3K4	B72220G3251K101*	250	330 (297 ~ 363)	1000 (800 ... 1200)
G20K275E3K4	B72220G3271K101*	275	330 (297 ~ 363)	1000 (800 ... 1200)
G20K300E3K4	B72220G3301K101*	300	360 (324 ~ 396)	1000 (800 ... 1200)
G20K320E3K4	B72220G3321K101*	320	360 (324 ~ 396)	1000 (800 ... 1200)
G20K350E3K4	B72220G3351K101*	350	390 (351 ~ 429)	1200 (960 ... 1440)
G20K385E3K4	B72220G3381K101*	385	470 (423 ~ 517)	1200 (960 ... 1440)
G20K420E3K4	B72220G3421K101*	420	510 (459 ~ 561)	1600 (1280 ... 1920)
G20K460E3K4	B72220G3461K101*	460	560 (504 ~ 616)	1600 (1280 ... 1920)
G20K510E3K4	B72220G3511K101*	510	620 (558~ 682)	2000 (1600 ... 2400)
G20K550E3K4	B72220G3551K101*	550	680 (612 ~ 748)	2000 (1600 ... 2400)
G20K625E3K4	B72220G3621K101*	625	750 (675 ~ 825)	2000 (1600 ... 2400)
G20K680E3K4	B72220G3681K101*	680	820 (738 ~ 902)	2000 (1600 ... 2400)
G20K750E3K4	B72220G3751K101*	750	910 (819 ~ 1001)	2000 (1600 ... 2400)

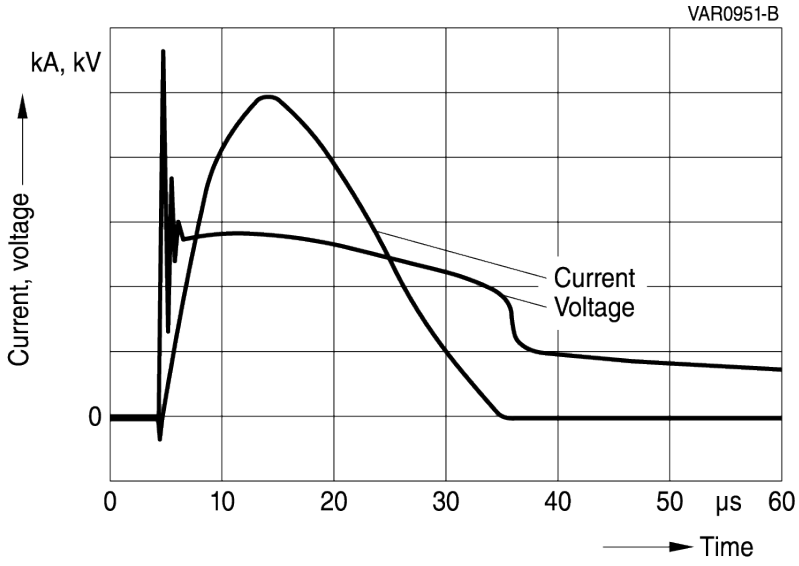
* suffix
2) Example: suffix -V87 stands for CCS wire for leads

Electrical data

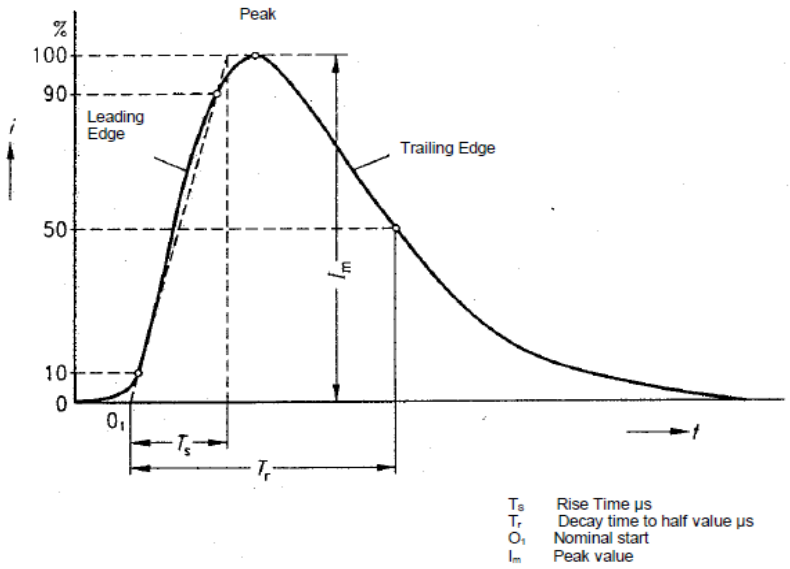
Type	Ordering code[2)]	TA = 25 °C					
		I_n	I_{max}	Front of wave spark-over voltage (typical)	Clamping votage of MOV (Max)	W_{max}	P_{max}
		8/20 µs[3)]	8/20 µs	at 1.2/50 µs, 6 kV	at 3 kA	2 ms	
SIOV		kA	kA	V	V	J	W
G20K50K4	B72220G0500K101*	1	2	1300	405	37	0.2
G20K65K4	B72220G0650K101*	1	2	1300	405	37	0.2
G20K95K4	B72220G0950K101*	3	6.5	1500	355	40	1
G20K115K4	B72220G0111K101*	3	10	1700	450	50	1
G20K130E3K4	B72220G3131K101*	5	10	1700	450	50	1
G20K140E3K4	B72220G3141K101*	5	10	1700	450	50	1
G20K150E3K4	B72220G3151K101*	5	10	1700	485	60	1
G20K175E3K4	B72220G3171K101*	5	10	1700	530	135	1
G20K210E3K4	B72220G3211K101*	5	10	1700	610	155	1
G20K230E3K4	B72220G3231K101*	5	10	2200	690	180	1
G20K250E3K4	B72220G3251K101*	5	10	2200	820	215	1
G20K275E3K4	B72220G3271K101*	5	10	2200	820	215	1
G20K300E3K4	B72220G3301K101*	5	10	2200	890	235	1
G20K320E3K4	B72220G3321K101*	5	10	2200	890	235	1
G20K350E3K4	B72220G3351K101*	5	10	2000	1000	255	1
G20K385E3K4	B72220G3381K101*	5	10	2000	1185	305	1
G20K420E3K4	B72220G3421K101*	5	10	2500	1295	330	1
G20K460E3K4	B72220G3461K101*	5	10	2500	1440	335	1
G20K510E3K4	B72220G3511K101*	5	10	2900	1600	370	1
G20K550E3K4	B72220G3551K101*	5	10	2900	1735	405	1
G20K625E3K4	B72220G3621K101*	5	10	2900	1875	445	1
G20K680E3K4	B72220G3681K101*	5	10	2900	1980	445	1
G20K750E3K4	B72220G3751K101*	5	10	2900	2190	490	1

* suffix
[2)] Example: suffix -V87 stands for CCS wire for leads
[3)] Note: Nominal discharge current In according to UL1449.

Typical oscilloscope waveform diagram at 1.2/50 µs, 6 kV



Reliability data electrical

Characteristics	Test methods/description	Specifications
Clamping voltage	The maximum voltage between two terminals with the specified standard impulse current (8/20 µs) illustrated below applied. 	To meet the specified value. It tested between pin1 and pin2, but spark-overvoltage of surge arrester is not included.
Surge current derating, 8/20 µs	10 surge currents (8/20 µs), unipolar, interval 30 s, amplitude corresponding to derating curve for 10 impulses at 20 µs	No visibile damage
Electric strength	IEC 61051-1, test 4.9.2 Metal balls method, 2500 V_{RMS}, 60 s The varistor is placed in a container holding 1.6 ±0.2 mm diameter metal balls such that only the terminations of the varistor are protruding. The specified voltage shall be applied between both terminals of the specimen connected together and the electrode inserted between the metal balls.	No breakdown

Reliability data mechanical

Characteristics	Test methods/description	Specifications
Solderability	IEC 60068-2-20, test Ta, method 1 with modified conditions for lead-free solder alloys: 245 °C, 3 s: After dipping the terminals to a depth of approximately 3 mm from the body in a soldering bath of 245 °C for 3 s, the terminals shall be visually examined.	The inspection shall be carried out under adequate light with normal eyesight or with the assistance of a magnifier capable of giving a magnification of 4 to 10 times. The dipped surface shall be covered with a smooth and bright solder coating with no more than small amounts of scattered imperfections such as pinholes or unwetted or wetted areas. These imperfections shall not be concentrated in one area.
Resistance to soldering heat	IEC 60068-2-20, test Tb, method 1A, 260 °C, 10 s: Each lead shall be dipped into a solder bath having a temperature of 260 ±5 °C to a point 2.0 to 2.5 mm from the body of the unit, be held there for 10 ±1 s and then be stored at room temperature and normal humidity for 1 to 2 h. The part shall be visually examined.	No visible damage

Reliability data environmental

Characteristics	Test methods/description	Specifications
Endurance at upper category temperature	IEC61051-2-2, 1000 h at UCT After having continuously applied the maximum allowable voltage at UCT ±2 °C for 1000 h, the specimen shall be stored at room temperature and normal humidity for 1 to 2 h.	No visible damage
Damp heat, steady state	IEC 60068-2-78, test Ca The specimen shall be subjected to 40 ±2 °C, 90 to 95% RH for 56 days without load / with 10% of the maximum continuous DC operating voltage V_{DC}. Then stored at room temperature and normal humidity for 1 to 2 h. Thereafter, insulation resistance R_{ins} shall be measured at V = 500 V (insulated varistors only).	No visible damage R_{ins} ≥ 100 MΩ

Note:

UCT = Upper category temperature

LCT = Lower category temperature

R_{ins} = Insulation resistance

Cautions and warnings

General

1. TDK Electronics metal oxide varistors are designed for specific applications and should not be used for purposes not identified in our specifications, application notes and data books unless otherwise agreed with TDK Electronics during the design-in-phase.
2. Ensure suitability of SIOVs through reliability testing during the design-in phase. SIOVs should be evaluated taking into consideration worst-case conditions.
3. For applications of SIOVs in line-to ground circuits based on various international and local standards there are restrictions existing or additional safety measures required.

Storage

After shipment from TDK Electronics the SIOV type series should be soldered within the following time periods:

SIOV-S,-Q,L(S),-SNF,-ICL,-B,-E	24 months
SIOV-ETFV,-T,-SMD,-MT-EM,-NT,-G,-GNF	12 months
SIOV-D	6 months
SIOV-D(Cu)	3 months

The parts are to be left in the original packing to prevent oxidized terminals which can cause soldering problems.

Storage temperature:	–25 to 45 °C
Max. relative humidity (without condensation):	< 75% annual average, < 95% on max. 30 days per annum

Handling

1. SIOVs must not be dropped.
2. Components must not be touched with bare hands. Gloves are recommended.
3. Avoid contamination of the surface of SIOV electrodes during handling, be careful of the sharp edge of SIOV electrodes.

Soldering (where applicable)

1. Use rosin-type flux or non-activated flux.
2. Insufficient preheating may cause ceramic cracks.
3. Rapid cooling by dipping in solvent is not recommended.
4. Complete removal of flux is recommended.
5. Temperature of all preheat stages and the solder bath must be strictly controlled especially for T series (T14 and T20).

Mounting

1. Potting, sealing or adhesive compounds can produce chemical reactions in the SIOV ceramic that will degrade the component’s electrical characteristics.
2. Overloading SIOVs may result in ruptured packages and expulsion of hot materials. For this reason, SIOVs should be physically shielded from adjacent components.

Operation

1. Use SIOVs only within the specified temperature operating range
2. Use SIOVs only within the specified voltage and current ranges.
3. Environmental conditions must not harm the SIOVs. Use SIOVs only in normal atmospheric conditions. Avoid use in deoxidizing gases (chlorine gas, hydrogen sulfide gas, ammonia gas, sulfuric acid gas, etc.), corrosive agents, humid or salty conditions. Contact with any liquids and solvents should be prevented.

This listing does not claim to be complete, but merely reflects the experience of TDK Electronics.

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