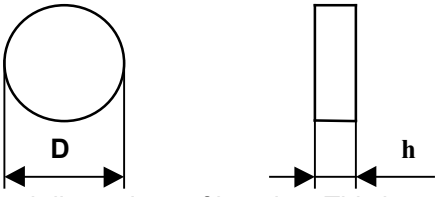
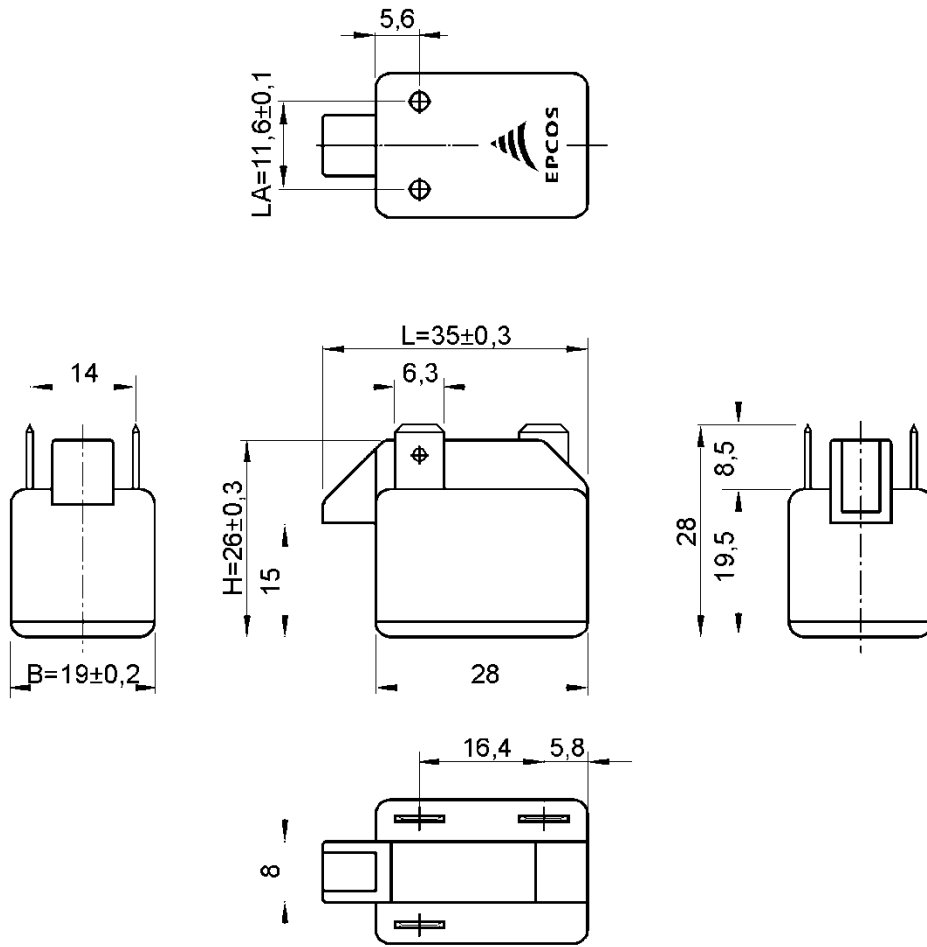


<p>Specification available from:</p> <p>Österreichischer Verband für Elektrotechnik (OVE) Eschenbachgasse 9 A-1010 VIENNA</p>	<p>IEC 60738-1-3 AT0002 <a href="#">Issue 7 / 2021-12</a></p> <p>QC440003 AT0002</p>
<p>Electronic Components of assessed quality in accordance with:</p> <p>IEC 60738-1: 2009-07</p> <p>QC 440000</p>	<p>IEC 60738-1-3: 2008-02</p> <p>QC 440003</p> <p>Directly heated positive step-function temperature coefficient Thermistors – Inrush current application Motorstart PTC Thermistors</p>
<p>Assessment level: EZ</p>	<p>Modified ferroelectric ceramic material</p> <p>PTC disk PTC disk assembled in housing</p>
<p>All Thermistors of this specification are available as ceramic disks or assembled in housing</p> <p>Outline of the disks: D, h from tables 1 - 4</p> <div style="text-align: center;">  </div> <p>Assemble and dimensions of housing: This is outlined on pages 2 - 3</p>	

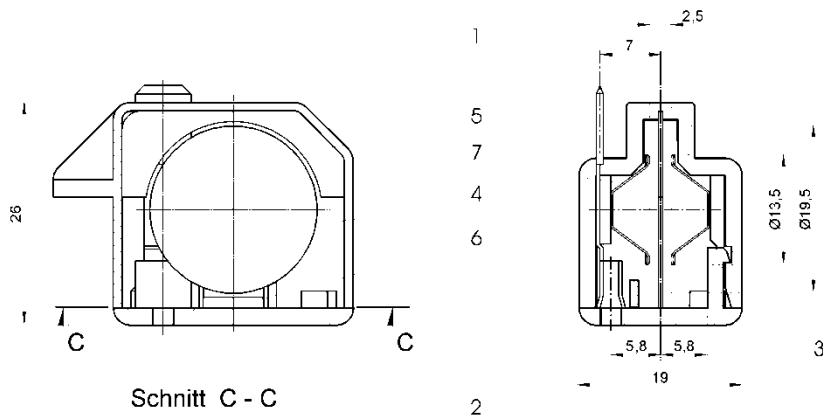
Information on the availability of components qualified to this detail specification is given in the Register of Approvals

This housing is used for electrical tests for all standard types ( EPCOS Motorstart-PTC housing), part numbers: C61064A0930C008, C61064A0930C010, C61064A0930C014.

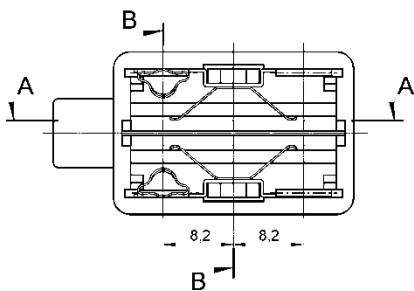


Schnitt A - A

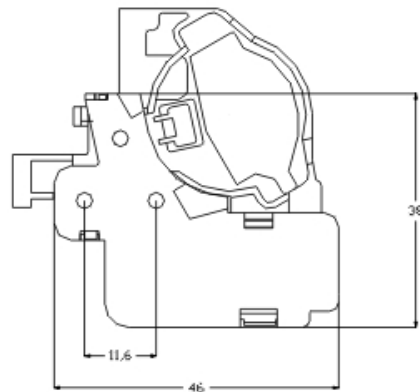
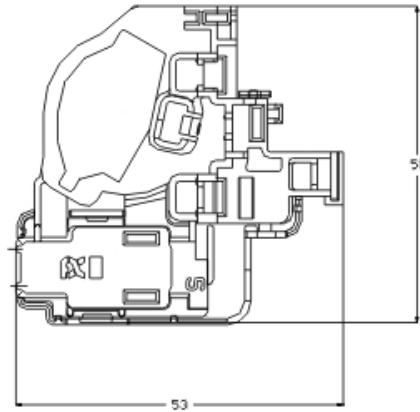
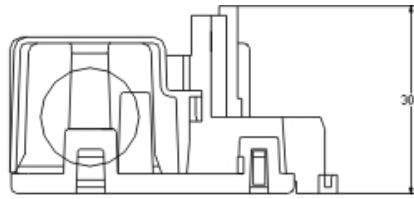
Schnitt B - B



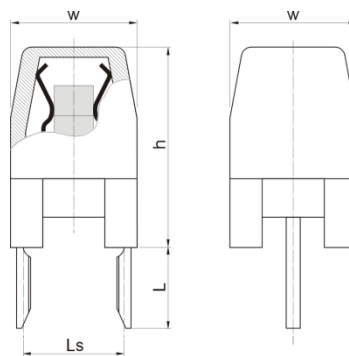
Schnitt C - C



This housing is used only for electrical tests of the types A590.  
(Provided by customer; ITW Fastex Part No. 60-4875-8900 (17.12.1999))



This housing is used for TDK type B59339A1202P020  
(type designation: J0289P0120A020)



## **1. GENERAL DATA**

### **1.1 Method of mounting**

Disk types are mounted in their housing.  
The housing is mounted on compressor by clamping on pins.

### **1.2 Dimensions**

Disk dimensions: see tables 1 – 4  
Assembly and dimensions of housing: see pages 2 and 3

### **1.3 Coating**

Motorstart PTC thermistors are not coated.

### **1.4 Terminations**

Motorstart PTC thermistors are terminated by clamping.  
Exception J289\* termination are suitable for soldering.

### **1.5 Flammability**

Not specified.

### **1.6 Resistance to solvents**

The housing of the thermistors is resistant to solvents like propyl, toluol or ethanol.

### **1.7 Packaging**

Disk types are packed in carton trays. These trays are stapled on each other and packed into an outer carton. Alternating: "money" roll packaged in styrofoam trays.

Housing types are in carton boxes packaged.

## 1.8 Electrical data

### Applicable parameters

1. Upper/lower category temperature (LCT/UCT): -25/125°C
2. Operating temperature range at maximum voltage ( $T_{op\_min}/T_{op\_max} @V_{max}$ ): -10/80°C Exceptions: J289: -10/60°C; A570: -10/100°C
3. Maximum operating voltage ( $V_{max}$ )
4. Nominal zero-power resistance ( $R_{25}$ )
5. Maximum current ( $I_{max}$ )
6. Residual current at  $V_{max}$  ( $I_{res}$ )
7. Insulation resistance ( $R_{is}$ ) (for types in housing only)

For corresponding ratings see tables 1 - 4

The values for the residual current are maximum ratings. For the measurement the PTC has to be assembled in the EPCOS motor start housing (exception A595, A590, J289: special housing see page 3). The PTC is supplied with ac-voltage which has to be regulated from zero to  $V_{max}$ . The regulation rate must ensure that the current does not exceed the maximum current  $I_{max}$ . After a stabilization time of 10 minutes the residual current  $I_{res}$  has to be measured.

The isolation resistance is  $R_{is} \geq 500M\Omega$  according to clause 7.7 of the generic specification. Method 1 of clause 7.7.1 (metal ball method) should be for measurement.

Table 1:

Motor start PTC with reference temperature  $T_{ref} = 120^{\circ}\text{C}$ 

Ordering Code	$V_{max}$	$R_{25}$	Tolerance	$I_{max}$	$I_{res\_max}$	h	D
	V	$\Omega$	%	A	mA	mm	mm
B59199A*120Avzz+	175	3	$\pm 33$	16	20,6	$3,2\pm 0,2$	$19,5\pm 0,2$
B59506X*120Avzz+	180	4,7	$\pm 20$	12	15	$2,5\pm 0,2$	$17,5\pm 0,5$
B59196A*120Yvzz+	350	15	$\pm 27^{1)}$	8	$10^{2)}$	$3,2\pm 0,2$	$19,5\pm 0,5$
B59544A*120Yvzz+	320	20	$\pm 20$	8	15	$2,5\pm 0,2$	$17,5\pm 0,5$
B59192A*120Bvzz+	320	22	$\pm 20$	8	10	$2,5\pm 0,2$	$19,5\pm 0,5$
B59197A*120Bvzz+	350	33	$\pm 30$	9	18	$3,2\pm 0,2$	$19,5\pm 0,5$

1) Only for B59196A0120A020V1:  $R_{25}$ -tolerance =  $\pm 25\%$ 2) Only for B59196A0120B020:  $I_{res\_max} = 8.5\text{mA}$ 

Table 2:

Motor start PTC with reference temperature  $T_{ref} = 135^{\circ}\text{C}$ 

Ordering Code	$V_{max}$	$R_{25}$	Tolerance	$I_{max}$	$I_{res\_max}$	h	D
	V	$\Omega$	%	A	mA	mm	mm
B59545A*135Avzz+	180	3,9	$\pm 20$	12	19,7	$2,5\pm 0,2$	$16\pm 0,6$
B59546A*135Yvzz+	180	4,7	$\pm 20$	12	15	$2,5\pm 0,2$	$16+0,5/-1$
B59507A*135Avzz+	180	4,7	$\pm 20$	12	23,4	$2,5\pm 0,2$	$19,5\pm 0,5$
B59548A*135Avzz+	200	6,8	$\pm 20$	10	18	$2,5\pm 0,2$	$16\pm 0,6$
B59570A*135Avzz+	280	6,8	$\pm 25$	7	12	$3,2\pm 0,2$	$19,5\pm 0,5$
B59556A*135Yvzz+	350	15	$\pm 20$	8	7,1	$2,5\pm 0,2$	$15,5\pm 0,5$
B59549A*135Avzz+	355	22	$\pm 20$	8	8,5	$2,5\pm 0,2$	$16\pm 0,6$
B59550A*135Yvzz+	355	33	$\pm 20$	6	7	$2,5\pm 0,2$	$16+0,5/-1$
B59501A*135Avzz+	355	33	$\pm 20$	6	9,3	$2,5\pm 0,2$	$19,5\pm 0,5$

Table 3:

Motor start PTC with reference temperature  $T_{ref} = 90^{\circ}/100^{\circ}\text{C}$ 

Ordering Code	$T_{ref}$	$V_{max}$	$R_{25}$	Tolerance	$I_{max}$	$I_{res\_max}$	h	D
	$^{\circ}\text{C}$	V	$\Omega$	%	A	mA	mm	mm
B59598A*90Avzz+	90	350	44	$\pm 25$	5	5,5	$2,5\pm 0,2$	$16\pm 0,5$
B59590A*100Avzz+	100	350	24	$\pm 20$	6	7	$3,2\pm 0,2$	$16\pm 0,5$

Table 4:

J289 with reference temperature  $T_{ref} = 120^{\circ}\text{C}$ 

Ordering Code	$V_{max}$	$R_{25}$	Tolerance	$I_{max}$	$I_{res\_max}$	W	L	h	Ls
	V	$\Omega$	%	A	mA	mm	mm	mm	mm
B59339A1202P020	320	2000	$\pm 25$	0.2	3	6,3max	$4\pm 0,5$	9 max	$2,5\pm 0,5$

## 1.9 Related documents

Generic specification:

IEC 60738-1: 2009, Thermistors – Directly heated positive step-function temperature coefficient thermistors – Part 1: Generic specification

## 1.10 Marking and type coding

On disk: TDK logo, type designation, date code

On housing: EPCOS logo, type designation, disk diameter, resistance  $R_{25}$ , max. operating voltage  $V_{max}$ , date code

On label of the package: TDK logo, type designation, disk dimension, ordering code, lot number, date code, quantity and internal information

Except J289: Disk not marked  
On housing: EPCOS logo, type designation

## 1.11 Ordering information

Ordering code (except J289):

B59xxxX*yyyYvzz+
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B59xxxX	Type designation	B59... PTC Thermistor  xxx... type family code (released types according Table 1- Table 3).  X... A or J (A disk type, J housing type)
*	Supplement digit (optional)	"0" or place holder " "
yyy	Switching temperature	$T_{sw}$ [°C]
Y	Version	A... Standard type B... Customer specific type
v		v... Additional number not affecting the IEC specifications
zz	Packaging code	
+	Customer specific/ Processing information (optional)	Can be followed by additional numbers and letters (3 digits) not affecting IEC specifications.

## **2. INSPECTION REQUIREMENTS**

2.1 For qualification approval, the procedures based on fixed sample size in accordance with the generic specification IEC 60738-1, 6.5.4.

2.2 For quality conformance inspection has been used the test schedules (tables) include sampling, periodicity severity's and requirements. The formation of inspection lots is covered by 6.5.7 of the generic specification.

In the following tables (item nos. according to the blank detail specification):

1) The subclause numbers of tests refer to the generic specification IEC 60738-1 and to the data of this specification.

2) Number to be tested: sample size as directly allotted to the code letter for IL in table IIA of IEC 60410, alternatively IEC 61193-2 (Single sampling plan for normal inspection).

3) In these tables:        p = periodicity in months  
                              n = number of devices in the samples  
                              c = the acceptance criterion (permitted number of non-conforming items)  
                              D = indicates a destructive test  
                              ND = indicates a non destructive test  
                              IL = the inspection level

4) The temperature at which the zero-power resistance shall be measured is the temperature specified in the detail specification. This temperature shall be stated, where required, in the test schedule.

5) The specimens used for this group may, at the discretion of the manufacturer, be used for any subsequent group which is identified as being „destructive“.

6) The soldering – solderability and soldering – resistance to heat tests shall only be applied where the thermistor has terminations which are appropriate for soldering.

7) Where the terminations are stated to be suitable for printed wiring applications, the appropriate test conditions in IEC 60068 shall apply.

8) The thermistors shall be mounted by their normal means.

9) The bump test and the shock test are alternatives. The test selected in the detail specification shall be used.

10) The detail specification shall specify which of the endurance tests in groups C4, C5 and D1 respectively are appropriate to the construction and application of the thermistor.

11) Mounting for electrical testing

- All Azzz types (without housing) are mounted for electrical testing in the following housing (EPCOS Motorstart-PTC housing): C61064A0930C008, C61064A0930C010, C61064A0930C014.

Exception: For Thermal runaway test the contact is done with coronal contact.

- The types A590 and A595 are mounted for all electrical testing in a customer specific housing.

- The types J501, J506 and J289 are measured and tested in their own specific housing.

General description for housing see page 2-3.

12) 100% testing shall be followed by re-inspection by sampling in order to monitor outgoing quality level by non-conforming items per million ( $\times 10^{-6}$ ). The sampling level shall be established by the manufacturer. For the calculation of  $\times 10^{-6}$  values any parametric failure shall be counted as non-conforming item. In case one or more non-conforming items occur in a sample, this lot shall be rejected.



**TEST SCHEDULE** for quality conformance inspection: lot-by-lot

Subclause number and test (see list item 1)	D or ND	Conditions of test (see list item 1)	IL	n	c	Performance requirements (see list item 1)
			(see list item 3)			
<b>GROUP A INSPECTION</b> (lot by lot) <b>Subgroup A0</b> 7.5 Zero-power resistance $R_T$	ND	@25°C ±1°C, <1.5V DC	100 % (see list item 12)			According par. 1.8
<b>Subgroup A1</b> 7.4.1 Visual examination	ND		S-4	2)	0	As in 7.4.1
<b>Subgroup A2</b> 7.4.2 Marking  7.4.3 Dimensions (gauging)	ND	Not applicable	S-3	2)	0	As in 7.4.2
<b>GROUP B INSPECTION</b> (lot by lot) <b>Subgroup B1</b> 7.27 Residual current 7.29 Inrush current	ND	At $V_{max}$ ; t = 600s Not applicable	S-2	2)	0	According par. 1.8
<b>Subgroup B2</b> 7.8 Voltage proof  7.16 Soldering - Solderability	ND	For housing types only Metal ball method (method 1a) $U_{AC} = 1250V$ ; $dU/dt < 100V/s$ Not applicable Exception J289: IEC 60068-2-20 Test Ta: soldering bath 245±5°C soldering time: 3s	S-2	2)	0	As in 7.8  The terminations shall be uniformly tinned

**TEST SCHEDULE** for quality conformance inspection: periodic

Subclause number and test (see list item 1)	D or ND	Conditions of test (see list item 1)	Sample size and acceptance criterion (see list item 3)			Performance Requirements (see list item 1)
			p	n	c	
<b>GROUP C INSPECTION</b> (periodic) <b>Subgroup C1A</b>	D	See list item 6 and 7.	6	5	0	As in 7.17 $\Delta R/R: \pm 20\%$
<b>Part of sample</b>  7.17 Soldering – resistance to soldering heat  7.15 Robustness of terminations		Not applicable Exception J289: IEC 60068-2-20 Test Tb: soldering bath 260°C soldering time: 10s  For housing types only IEC 60068-21 Ua U <sub>A</sub> = 20N; 10s  Visual examination Zero-power resistance @25°C $\pm 1^\circ\text{C}$ , <1.5V DC				
<b>Subgroup C1B</b>  <b>Other part of sample</b> 7.18 Rapid change of temperature	D	IEC 60068-2-14 Na $\theta_A = -25^\circ\text{C}$ $\theta_B = 125^\circ\text{C}$ t = 30 min; 5 cycles  Visual examination Zero-power resistance @25°C $\pm 1^\circ\text{C}$ , <1.5V DC	6	5		As in 7.18 $\Delta R/R: \pm 20\%$

Subclause number and test (see list item 1)	D or ND	Conditions of test (see list item 1)	Sample size and acceptance criterion (see list item 3)			Performance Requirements (see list item 1)
			p	n	c	
7.19 Vibration		<p>For housing types only See list item 8. IEC 60068-2-6 Fc Frequency range: 10-55Hz Amplitude: 0.75 mm Acceleration: 98 m/s<sup>2</sup> Sweep endurance: Total duration 6h (2h in x,y,z)</p> <p>Final measurements: Visual examination Zero-power resistance @25°C ±1°C, &lt;1.5V DC</p>				<p>As in 7.19 <math>\Delta R/R: \pm 20\%</math></p>
7.20 Bump (or shock, see list item 9)		<p>For housing types only See list item 8. IEC 60068-2-27 Acceleration: 400m/s<sup>2</sup>; t = 6ms Number of bumps: 6 x 5000</p> <p>Visual examination Zero-power resistance @25°C ±1°C, &lt;1.5V DC</p>				<p>As in 7.20 <math>\Delta R/R: \pm 20\%</math></p>
7.21 Shock (or bump, see list item 9)		Not applicable				

Subclause number and test (see list item 1)	D or N D	Conditions of test (see list item 1)	Sample size and acceptance criterion (see list item 3)			Performance Requirements (see list item 1)
			p	n	c	
<b>Subgroup C1</b>  <b>Combined sample of specimens of subgroups C1A and C1B</b>  7.22 Climatic sequence	D	IEC 60068-2-30 Db, IEC60068-2-1 A, IEC 60068-2-2 B (low air pressure test not applicable) Category: -25/125/56 - Dry heat: T = 125±2°C, t = 16h - Damp heat, cyclic, first cycle (T =55°C). - Cold: T = -25±2°C, t = 2h - Damp heat, cyclic, remaining 5 cycles (T =55°C).  Visual examination Zero-power resistance @25°C ±1°C, <1.5V DC Insulation resistance (for housing types only) U=100V; t=60s Voltage proof (for housing types only) U=1250V; dU/dt < 100V/s	6	10		As in 7.22 $\Delta R/R: \leq 25\%$  $R \geq 500M\Omega$  As in 7.8.4
<b>Subgroup C2</b>  7.4.4 Dimensions (detail)	ND	See list item 5. Disk: D and h (see table 1 and 2) Housing type: B, H, L and LA (see page 3) Exception J289: W, L, h, Ls (see page 6 and table 4)	6	10	0	According par. 1.8

Subclause number and test (see list item 1)	D or ND	Conditions of test (see list item 1)	Sample size and acceptance criterion (see list item 3)			Performance Requirements (see list item 1)
			p	n	c	
<b>Subgroup C3</b>  7.24.3 Endurance at maximum operating temperature and maximum voltage	ND	Mounting according note 11. T = Top_max, V <sub>max</sub> acc. specification, Duration: 1000h  Examination after 168h, 500 h, 1000h Visual examination Zero-power resistance @25°C ±1°C, <1.5V DC  Final measurements: Visual examination Zero-power resistance @25°C ±1°C, <1.5V DC  Residual current Temperature: 25°C ±2°C, V <sub>max</sub> ; t = 600s  Insulation resistance (for housing types only) 100V; 60s	6	10	0	ΔR/R: ±25%  As in 7.24.3 ΔR/R: ±25%  According par. 1.8  R ≥ 500MΩ
<b>GROUP D INSPECTION</b> <b>Subgroup D1</b>  7.24.1 Endurance at room temperature (cycling)	D	See list items 10, 11.  Duration: 100.000 cycles (forced cooling permissible): Applied voltage: V <sub>max</sub> and I <sub>max</sub>  Final measurements: Visual examination Zero-power resistance: @25°C ±1°C, <1.5V DC  Residual current at Temperature: 25°C ±2°C, V <sub>max</sub> ; t = 600s  Insulation resistance (for housing types only) 100V; 60s	12	10	0	As in 7.24.1  ΔR/R: ±25% According par. 1.8  R ≥ 500MΩ

Subclause number and test (see list item 1)	D or ND	Conditions of test (see list item 1)	Sample size and acceptance criterion (see list item 3)			Performance Requirements (see list item 1)
			p	n	c	
Subgroup D2 7.24.4 Cold environmental electrical cycling	D	Mounting according item 11. Duration: 1000 cycles Applied voltage: $V_{max}$ and $I_{max}$ $T = T_{op\_min} \pm 2^{\circ}C$ Final measurements: Visual examination Zero-power resistance at Temperature: @ $25^{\circ}C \pm 1^{\circ}C$ , <1.5V DC	12	10	0	As in 7.24.4 $\Delta R/R: \pm 25\%$
Subgroup D3 7.24.5 Thermal runaway	D	Mounting according item 11. Applied voltage: 200% $V_{max}$ Starting with $V_{max}$ and increase 10% $V_{max}$ , $d = 2min/step$ Final measurements: Visual examination	12	10	0	As in 7.24.5
Subgroup D4 7.23 Damp heat, steady state	D	IEC60068-2-78 test Cab Temperature: $40 \pm 2^{\circ}C$ Humidity: $93 \pm 3\%$ r.H. Duration: 56d  Visual examination Zero-power resistance @ $25^{\circ}C \pm 1^{\circ}C$ , <1.5V DC  Insulation resistance (for housing types only) 100V; 60s  Voltage proof (for housing types only) 1250V; $dU/dt < 100V/s$	12	10	0	As in 7.23 $\Delta R/R: \pm 20\%$  $R \geq 500M\Omega$  As in 7.8.4