PTC thermistors

Inrush current limiters

Series/Type:	**C1051-A 155-A770**
Ordering code:	**B59051C1155A770**
Date:	2025-04-02
Version:	b

Applications

- Inrush current limiter (charging resistor) for smoothing and DC link capacitors
- To replace high-power fixed resistors for capacitor charging

Features

- Self-protecting in case of malfunction of short-circuit relay or internal short circuit of capacitor
- Inrush current limiters are not damaged when directly connected to V_{max}, even without additional current limitation
- Marking: Type, manufacturer's logo, reference temperature in °C and date code YYWW
- Qualification based on AEC-Q200
- RoHS compatible

Delivery mode

- Cardboard strips with hot-melt adhesive tape
- Packing unit: 16 pcs. per strip

Ordering code

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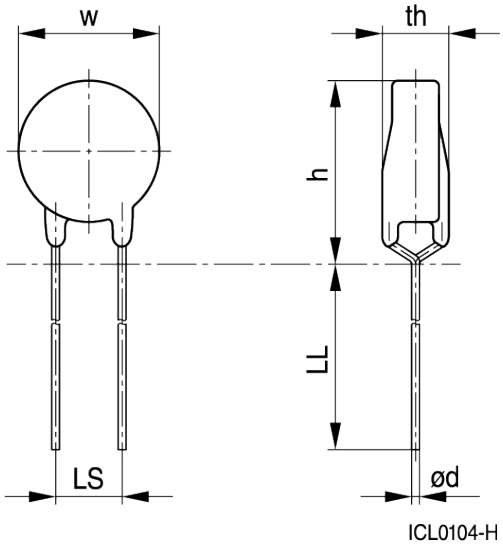
Dimensions and drawings



w_{max}	11.5	mm
th_{max}	7.0	mm
h_{max}	15.0	mm
d	0.8 ±0.05	mm
LS	5.0 +0.6/-0.1	mm
LL_{min}	25.0	mm

General technical data

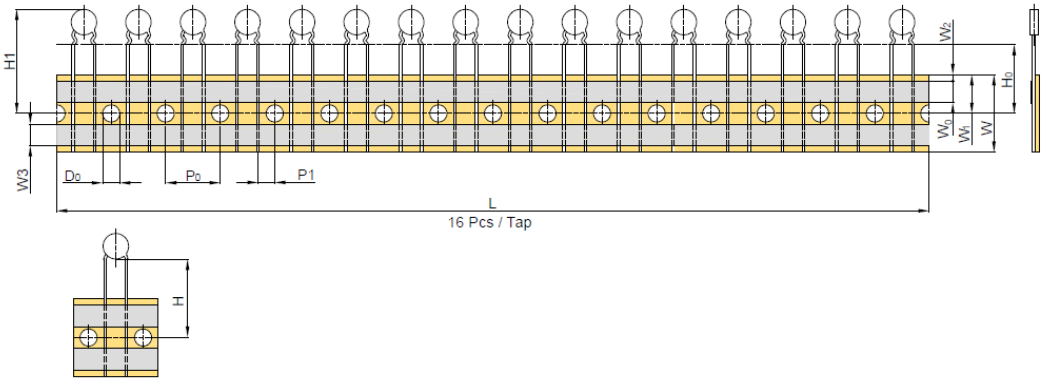
Maximum operating voltage	V_{max}	280	V AC
Max. DC link voltage	$V_{link, max}$	400	V DC
Rated resistance	R_{25}	50	Ω
Resistance tolerance	ΔR_{25}	±25	%
Reference temperature (typical)	T_{ref}	+155	°C
Thermal capacity (typical)	C_{th}	0.9	J/K
Thermal time constant (typical)	τ_{th}	100	s
Operating temperature range (V = 0 V)	T_{op}	-40 … +125	°C
Operating temperature range (V = V_{max})	T_{op}	-20 … +85	°C

Specification for T_{amb} = 25 ±0.1 °C

Reliability data

Test item	Standard	Testing method / description	$I\Delta R_{25}/R_{25}I$
Electrical endurance, cycling		Room temperature, $V_{link, max}$ Applied energy < C_{th} x (T_{ref} - T_{amb}) Number of cycles: 100,000	≤ 25%
Electrical endurance, cycling (failure mode)	IEC 60738-1	Room temperature, Vmax, Rs: 0 Ω Number of cycles: 100	≤ 25%
High temperature exposure	AEC-Q200	MIL-STD-202, Method 108, 1000 h at max. operating temperature +125 °C (V = 0) Measurement at 24 ±2 h after test	≤ 20%
Temperature cycling	AEC-Q200	JESD22, Method JA-104 1000 Cycles, -55 °C … +125 °C, Dwell time = 30 min at each temperature extreme, 1 min max. transition time Measurement at 24 ±2 h after test conclusion	≤ 25%
Biased humidity	AEC-Q200	Mil-STD-202, Method 103, 1000 h 85 °C / 85% RH, V = 0.05 * V_{max} (no relevant self-heating of the PTC) Measurement at 24 ±2 h after test conclusion	≤ 20%
Operational life	AEC-Q200	MIL-STD-202, Method 108 1000 h at max. operating temperature +85 °C V = V_{max} Measurement at 24 ±2 h after test conclusion	≤ 25%
Terminal strength	AEC-Q200	MIL-STD-202, Method 211 After gradually applying the force 22.2 N (27 kg) and keeping the unit fixed for 10 s.	≤ 5%
Mechanical shock	AEC-Q200	MIL-STD-202-213, Condition C Amplitude = 1000 m/s^2, duration = 6 ms, 3 pulses per axis (6 directions)	≤ 5%
Vibration	AEC-Q200	MIL-STD-202, Method 204 f = 10 – 2000 – 10 Hz h = 0.75 mm respective a = 50 m/s^2 d = 3 * 4 h (3 directions, 4 h/direction)	≤ 5%
Resistance to soldering heat	AEC-Q200	MIL-STD-202, Method 210, Condition B No pre-heat of samples. T = 260 ±3 °C, duration = 10 s	≤ 20 %
ESD	AEC-Q200	AEC-Q200-002 or ISO/DIS10605 150 pF / 330 Ω; 8 kV contact discharge, polarity +/- , 10 pulses in each polarity	≤ 5 %
Solderability	AEC-Q200	J-STD-002 electrical test not required Magnification 50 X. Conditions Solder material: Sn96.5Ag3Cu0.5 Solder bath, T = 245 ±3 °C, duration 3 s	Continuous solder coating with coverage ≥ 95%

Packing specification:



Designation	Symbol	Nominal size [mm]	Tolerance [mm]	Remarks
Hole diameter	D_0	4.0	± 0.5	
Pitch of holes	P_0	12.7	± 0.5	
Hot adhesive tape width	W0	5.0	± 0.5	peel-off force ≤ 10 N
Position of holes	W1	9.0	+0.75/-0.5	
Position of adhesive tape	W2	3.0	max.	
Hot adhesive tape width	W_3	5.0	± 0.5	peel-off force ≤ 10 N
Spacing hole center / bottom edge of component	H	16.0	min.	non-kinked lead version only
Spacing hole center / kink level	H_0	16.0	min.	kinked lead version only
Spacing hole center / upper edge of component	H_1	32.2	max.	
Length of cardboard strip	L	203.0	± 2	
Cardboard strip width	W	18.0	± 0.5	
Spacing hole center / leads	P1	3.85	± 0.7	

Cautions and warnings

General

- TDK thermistors are designed for specific applications and may not be used for purposes not identified in our specifications, application notes and data books unless otherwise agreed with TDK during the design-in-phase.
- Ensure suitability of thermistor through reliability testing during the design-in phase. The thermistors should be evaluated taking into consideration worst-case conditions.

Storage

- Store thermistors only in original packaging. Do not open the package before storage.
- Storage conditions in original packaging: storage temperature -25 °C to +45 °C, relative humidity < 75% annual mean, maximum 95%, dew precipitation is inadmissible.
- Avoid contamination of thermistors surface during storage, handling and processing.
- Avoid storage of thermistor in harmful environment with effect on function on long-term operation (examples given under operation precautions).
- Use thermistors within the following period after delivery:
  - Through-hole devices (housed and leaded PTCs): 24 months
  - Motor protection sensors, glass-encapsulated sensors and probe assemblies: 24 months
  - Telecom pair and quattro protectors (TPP, TQP): 24 months
  - Leadless PTC thermistors for pressure contacting: 12 months
  - Leadless PTC thermistors for soldering: 6 months
  - SMDs in EIA sizes 3225 and 4032, and for PTCs with metal tags: 24 months
  - SMDs in EIA sizes 0402, 0603, 0805 and 1210: 12 months

Handling

- PTCs must not be dropped. Chip-offs must not be caused during handling of PTCs.
- Components must not be touched with bare hands. Gloves are recommended.
- Avoid contamination of thermistor surface during handling.

Soldering

- Use rosin-type flux or non-activated flux.
- Insufficient preheating may cause ceramic cracks.
- Rapid cooling by dipping in solvent is not recommended.
- Complete removal of flux is recommended.
- Standard PTC heaters are not suitable for soldering.

Mounting

- Electrodes must not be scratched before/during/after in the mounting process.
- Contacts and housing used for assembly with thermistor have to be clean before mounting. Especially grease or oil must be removed.
- When PTC thermistors are encapsulated with sealing material, the precautions given in chapter “Mounting instructions”, “Sealing and potting” must be observed.
- When the thermistor is mounted, there must not be any foreign body between the electrode of the thermistor and the clamping contact.
- The minimum force of the clamping contacts pressing against the PTC must be 10 N.

- During operation, the thermistor's surface temperature can be very high. Ensure that adjacent components are placed at a sufficient distance from the thermistor to allow for proper cooling at the thermistors.
- Ensure that adjacent materials are designed for operation at temperature comparable to the surface temperature of thermistor. Be sure that surrounding parts and materials can withstand this temperature.
- Avoid contamination of thermistor surface during processing.

Operation

- Use thermistors only within the specified temperature operating range.
- Use thermistors only within the specified voltage and current ranges.
- Environmental conditions must not harm the thermistors. Use thermistors 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 must be prevented.
- Be sure to provide an appropriate fail-safe function to prevent secondary product damage caused by abnormal function (e.g. use VDR for limitation of over voltage condition)

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Important notes

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