PTC thermistors for overcurrent protection

SMDs, EIA size 1210,
24 V, 63 V and 230 V

Series/Type:	**B5960*, B59707, B59807, B59907**
Date:	April 2007

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Applications

- Overcurrent protection
- Short-circuit protection

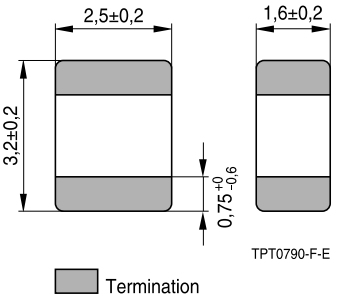
Features

- Thermistor chip with lead-free tinned terminations
- Small size
- Short response times
- Suitable for reflow soldering only
- Suitable for automatic placement
- RoHS-compatible

Delivery mode

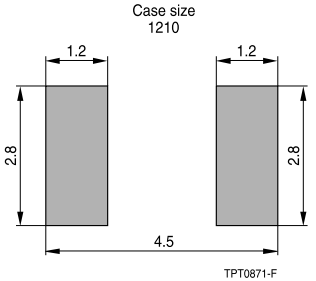
- Blister tape, 180-mm reel

Dimensional drawing



Dimensions in mm

Geometry of solder pad



Recommended maximum dimensions (mm)

General technical data

Switching cycles		N	100	
Tolerance of R_R	(for A606, A607, A707, A807)	ΔR_R	±25	%
Tolerance of R_R	(for A907)	ΔR_R	±35	%
Operating temperature range	(V = 0)	T_{op}	−40/+125	°C
Operating temperature range	(V = V_{max}, for A606/607, A707/807)	T_{op}	0/+60	°C
Operating temperature range	(V = V_{max}, for A907)	T_{op}	−40/+85	°C

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Electrical specifications and ordering codes

Type	I_R [1]	I_S [1]	I_{Smax} ($V = V_{max}$)	T_{ref}	R_R	R_{min}	Ordering code
	mA	mA	A	°C	Ω	Ω	
V_{max} = 30 VDC or VAC , V_R = 24 VDC or VAC							
A606	90	180	0.5	110	27	17	B59606A0110A062
A607	70	130	0.4	120	55	30	B59607A0120A062
V_{max} = 80 VDC or VAC , V_R = 63 VDC or VAC							
A707	50	90	0.3	120	125	75	B59707A0120A062
V_{max} = 265 VDC or VAC , V_R = 230 VDC or VAC							
A807	15	40	0.2	90	400	200	B59807A0090A062
V_{max} = 400 VDC or VAC , V_R = 230 VDC or VAC							
A907	12	22	0.15	125	1500	640	B59907A0120A062

1) Measured on component soldered to standardized PCB

Reliability data

Test	Standard	Test conditions	$\lvert\Delta R_{25}/R_{25}\rvert$
Electrical endurance, cycling	IEC 60738-1	Room temperature, $I_{Smax;}$ V_{max} Number of cycles: 100	< 25%
Electrical endurance, constant	IEC 60738-1	Storage at V_{max} /T_{op} Test duration : 1000 h	< 25%
Damp heat	IEC 60738-1	Temperature of air: 40 °C Relative humidity of air: 93% Duration: 56 days Test according to IEC 60068-2-78	< 10%
Rapid change of temperature	IEC 60738-1	T = T_{LCT}, T = T_{UCT} Number of cycles: 5 Test duration: 30 min Test according to IEC 60068-2-14, Test Na	< 10%
Vibration	IEC 60738-1	Frequency range: 10 to 55 Hz Displacement amplitude: 0.75 mm Test duration: 3 · 2 h Test according to IEC 60028-2-6, Test Fc	< 5%
Bump	IEC 60738-1	Pulse shape: half-sine Acceleration: 50 g Pulse duration: 1 ms; 6 · 3 pulses Test according to IEC 60068-2-29	< 5%
Climatic sequence	IEC 60738-1	Dry heat: T = T_{UCT} Test duration: 16 h Damp heat first cycle Cold: T = T_{LCT} Test duration: 2 h Damp heat 5 cycles Tests performed according to IEC 60068-2-30	< 10%
Bending test	EN 130000/4.35	Components reflow-soldered to test board Maximum bending: 2 mm	< 10%

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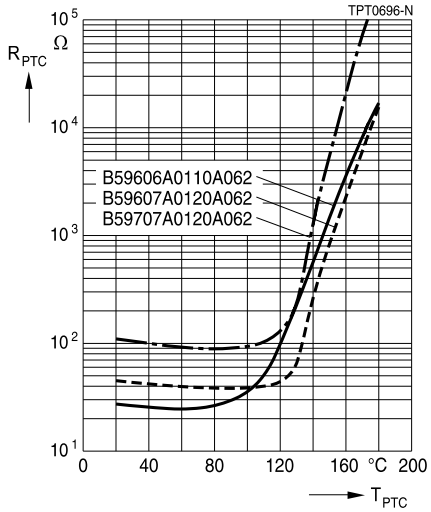
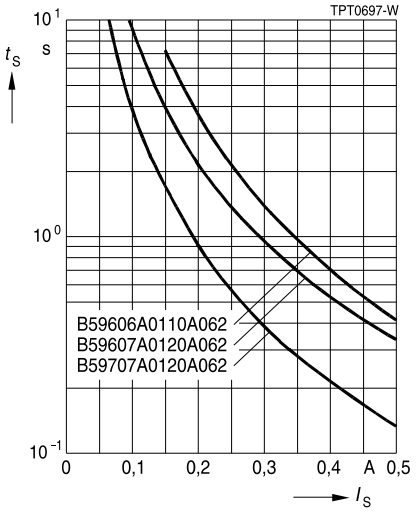
Characteristics (typical) for A606, A607 and A707

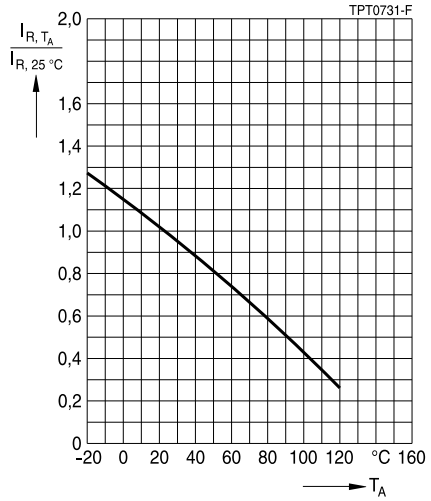
PTC resistance R_{PTC} versus
PTC temperature T_{PTC}
(measured at low signal voltage)



Switching time t_S versus switching current I_S
(measured at 25 °C in still air)



Rated current I_R versus ambient temperature T_A
(measured in still air)



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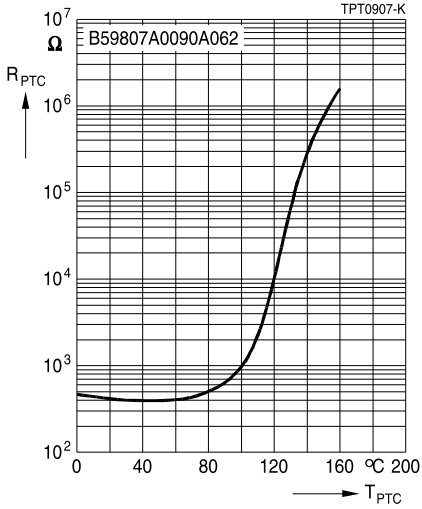
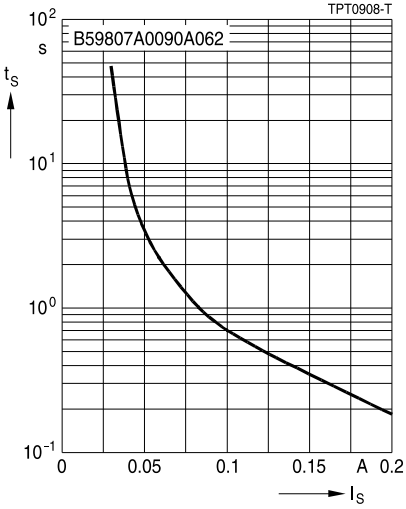
Characteristics (typical) for A807

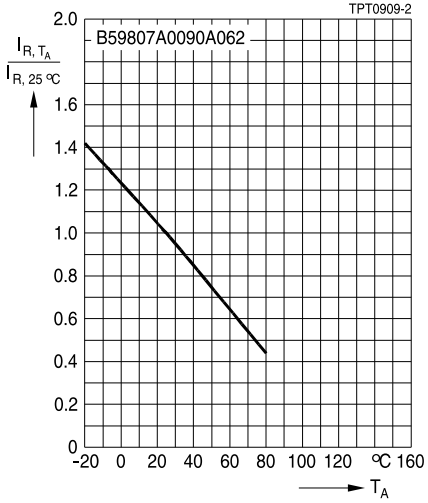
PTC resistance R_{PTC} versus PTC temperature T_{PTC} (measured at low signal voltage)



Switching time t_S versus switching current I_S (measured at 25 °C in still air)



Rated current I_R versus ambient temperature T_A (measured in still air)



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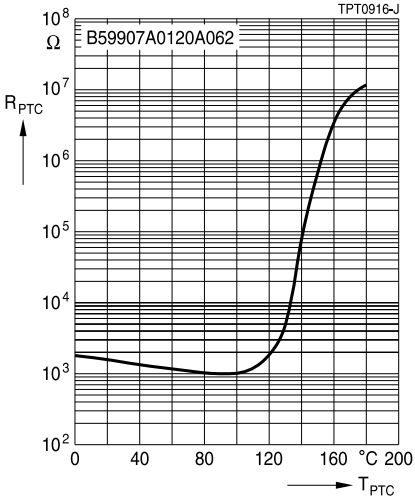
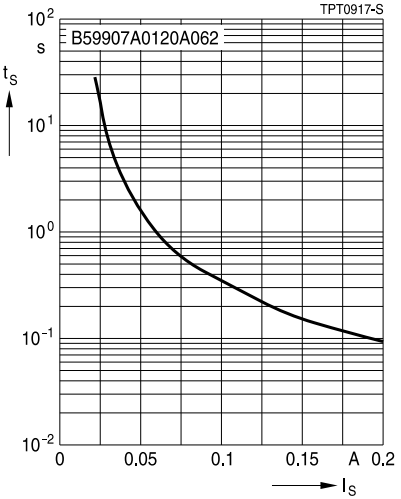
Characteristics (typical) for A907

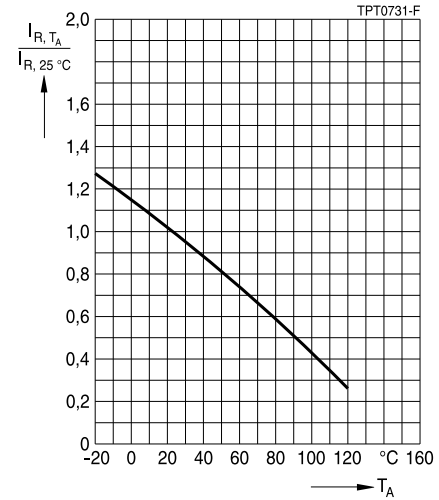
PTC resistance R_{PTC} versus PTC temperature T_{PTC} (measured at low signal voltage)



Switching time t_S versus switching current I_S (measured at 25 °C in still air)



Rated current I_R versus ambient temperature T_A (measured in still air)



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Cautions and warnings

General

- EPCOS thermistors 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 EPCOS 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 ... +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 thermistor within 6 months after delivery.

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 (where applicable)

- 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

- Electrode must not be scratched before/during/after 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 temperatures 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.

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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 should 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 overvoltage condition).

Important notes

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