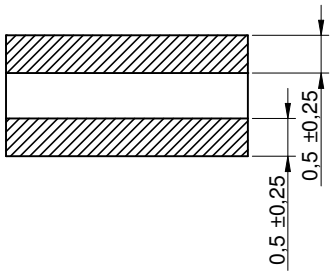
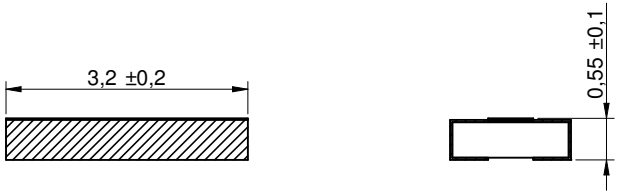
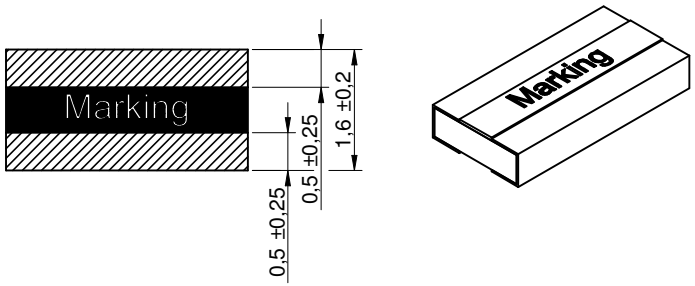
Dimensions: [mm]

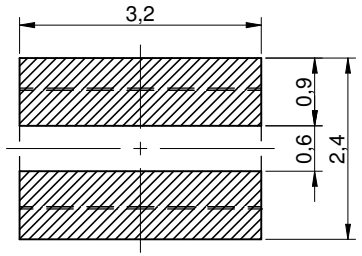






Scale - 10:1

Recommended Land Pattern: [mm]



Scale - 10:1

Schematic:



Electrical Properties:

Properties		Test conditions	Value	Unit	Tol.
Resistance	R		2200	Ω	±1%
Rated Power	P_{Rated}	@ 70 °C	0.75	W	
Temperature Coefficient of Resistance (min.)	TCR		200	ppm/ °C	max.
Temperature Coefficient of Resistance (max.)	TCR		200	ppm/ °C	max.
Rated Current	I_R		18.5	mA	max.
Rated Voltage	U_R		40.6	V	max.

General Information:

Operating Temperature	-55 up to +155 °C
Storage Conditions (in original packaging)	5 °C - 35 °C; 25 % up to 75 % RH
Test conditions of Electrical Properties: +20 °C, 35 % RH if not specified differently	
FIT according to separate documentation	
Component conform to REACh and RoHS requirements and standards	

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WÜRTH ELEKTRONIK

CREATED	CHECKED	GENERAL TOLERANCE	PROJECTION METHOD
KaS	PSL	DIN ISO 2768-1m	

DESCRIPTION: **WRIS-KWKB Thick Film Resistors**

TECHNICAL REFERENCE: KB06122201F304DAATP0000

ORDER CODE: **561020132034**

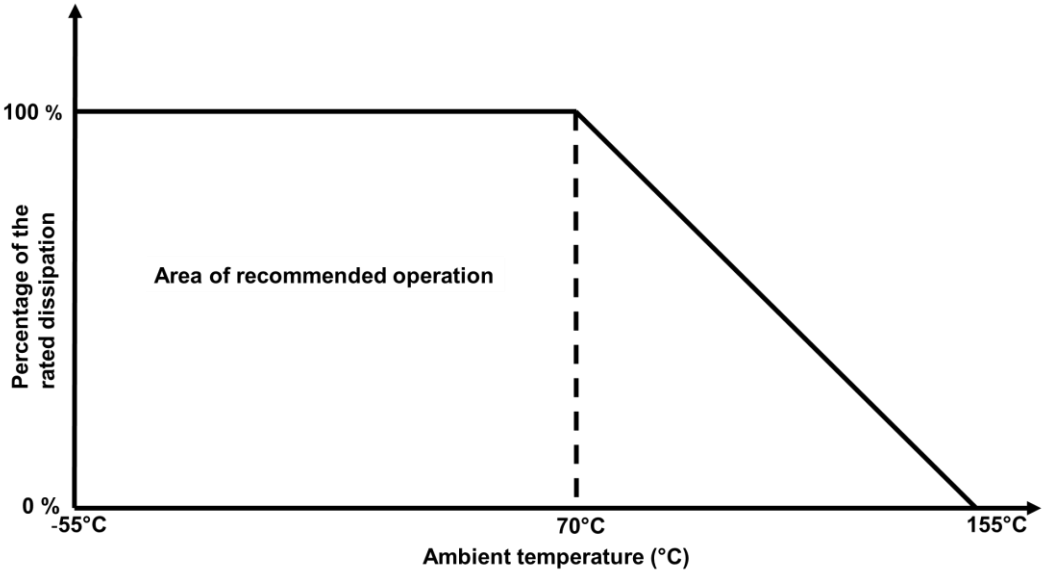
SIZE	REVISION	STATUS	DATE (YYYY-MM-DD)	BUSINESS UNIT	PAGE
0612	001.001	Valid	2018-11-14	eiSos	1/6

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Mechanical Properties:

Properties	Definition	
Termination	plating	Ni/Sn
Adhesive Strenght of Termination		60 ± 1 sec; 17.7N
Vibration Resistance		5 g for 20 minutes, 12cycles each of 3 orientations @ 10 - 2000 - 10 Hz
Resistance to Solder Heat	Solder Temperature	260°C ± 5°C
	Dipping Time	10 sec.
	Specific	Refer to Soldering Profile

Derating Curve:



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DESCRIPTION: **WRIS-KWKB Thick Film Resistors**

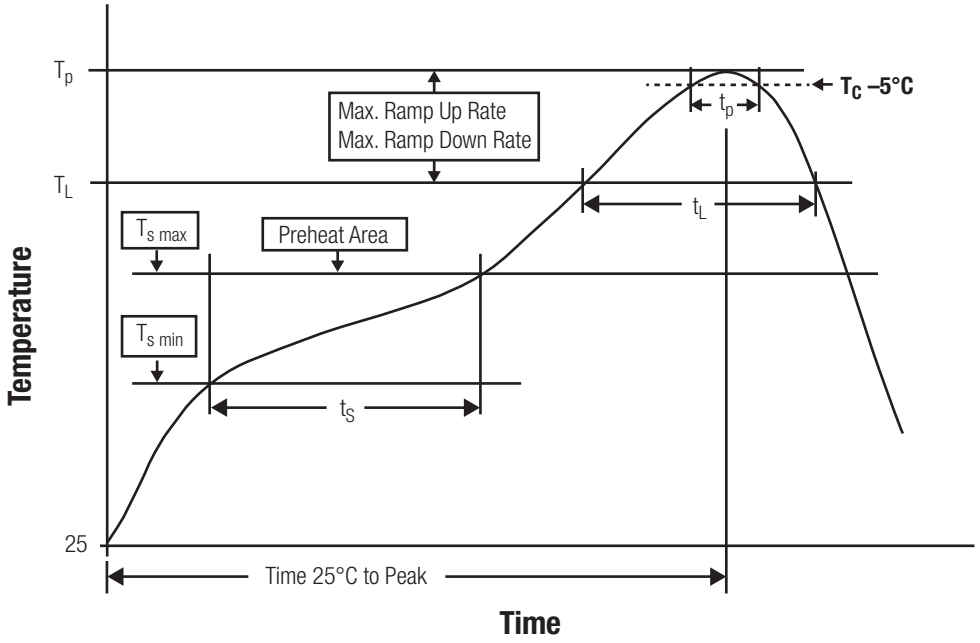
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Classification Reflow Profile for SMT components:



Classification Reflow Soldering Profile:

Profile Feature		Value
Preheat Temperature Min	$T_{s\ min}$	150 °C
Preheat Temperature Max	$T_{s\ max}$	200 °C
Preheat Time t_s from $T_{s\ min}$ to $T_{s\ max}$	t_s	60 - 120 seconds
Ramp-up Rate (T_L to T_P)		3 °C/ second max.
Liquidous Temperature	T_L	217 °C
Time t_L maintained above T_L	t_L	60 - 150 seconds
Peak package body temperature	T_p	see table below
Time within 5°C of actual peak temperaure	t_p	20 - 30 seconds
Ramp-down Rate (T_L to T_P)		6 °C/ second max.
Time 25°C to peak temperature		8 minutes max.

refer to IPC/ JEDEC J-STD-020E

Package Classification Reflow Temperature:

Properties	Volume mm³ <350	Volume mm³ 350-2000	Volume mm³ >2000
PB-Free Assembly I Package Thickness < 1.6 mm	260 °C	260 °C	260 °C
PB-Free Assembly I Package Thickness 1.6 mm - 2.5 mm	260 °C	250 °C	245 °C
PB-Free Assembly I Package Thickness ≥ 2.5 mm	250 °C	245 °C	245 °C

refer to IPC/ JEDEC J-STD-020E

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WÜRTH ELEKTRONIK

CREATED	CHECKED	GENERAL TOLERANCE	PROJECTION METHOD
KaS	PSL	DIN ISO 2768-1m	

DESCRIPTION: **WRIS-KWKB Thick Film Resistors**

TECHNICAL REFERENCE: KB06122201F304DAATP0000

ORDER CODE: **561020132034**

SIZE	REVISION	STATUS	DATE (YYYY-MM-DD)	BUSINESS UNIT	PAGE
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Cautions and Warnings:

The following conditions apply to all goods within the product series of Thick Film Resistors of Würth Elektronik eiSos GmbH & Co. KG:

General:

- This electronic component was designed and manufactured for use in general electronic equipment.
- Würth Elektronik must be asked for a written approval (following the certain PPAP level procedure) before incorporating the components into any equipment in the field such as military, aerospace, aviation, nuclear control, submarine, transportation (automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network etc. where higher safety and reliability are especially required and/or if there is the possibility of direct damage or human injury.
- Electronic components that will be used in safety-critical or high-reliability applications, should be pre-evaluated by the customer.
- Direct mechanical impact to the product shall be prevented as material of the body, pins or termination could flake or in the worst case it could break.
- Avoid any water or heavy dust on resistor s surface, which may cause electrical leakage, damage, overheating or corrosion.
- Würth Elektronik products are qualified according to international standards, which are listed in each product reliability report. Würth Elektronik does not warrant any customer qualified product characteristic, beyond Würth Elektronik specifications, for its validity and sustainability over time.
- The customer is responsible for the functionality of his or her own products. All technical specifications for standard products also apply to customer specific products.
- The component was designed and manufactured to be used within the datasheet specified values. If the usage and operation conditions specified in the datasheet are not met, the body, pins or termination may be damaged or dissolved.
- Do not apply any kind of flexural or compressive force onto soldered or unsoldered component.
- The resistance tolerance as specified within the datasheet is only valid on the date of delivery and according specified measurement criteria.

Product specific:

Storage conditions:

- A storage of Würth Elektronik products for longer than 24 months is not recommended. Within other effects, the terminals may suffer degradation, resulting in bad solderability. Therefore, all products shall be used within the period of 24 months based on the day of shipment.
- Do not expose the components into direct sunlight.
- These product must be stored in stable conditions within an ambient temperature between 5°C to 35°C with a relative humidity of 25 to 75%.
- The environment in which the resistors are operated and stored has to have atmospheric characteristics and must be free of dew condensation and toxic gases (e.g. chlorine, ammonia, sulfur, hydrogen sulphide and hydrogen sulfate).

Operating climatic conditions:

- Do not exceed the lower nor the upper specified temperature under no circumstances.
- Be aware that the specified resistance tolerance is only valid at the date of delivery.
- Do not use the resistors under high humidity, high temperature nor under high or low atmospheric pressure which may affect resistors reliability.
- Surface temperature including self-heating must be kept below the maximum operating temperature.
- Avoid any water or heavy dust on resistors surface, which may cause electrical leakage, damage, overheating or corrosion.

Operating load conditions:

- Do not use the resistor with any higher than specified rated dissipation, rated current or rated voltage.
- Violation of the technical product specifications such as exceeding the specified dissipation will void the warranty.
- When the resistors are operated in ambient temperature above the rated temperature, the power rating must be derated according to the derating curve.
- Verification and confirmation of performance characteristics of product, after on-board mounting, is advised.

Design of the PCB:

- The chip resistor shall be located to minimize any possible mechanical stress from deflection or board wrap.
- It is recommended to position the chip resistor in parallel to slits and perforations and as far away from slits, perforations, separation points, screw holes, frames and edges of the PCB to avoid mechanical stress.
- Determine the shape and size of the solder pads to have proper amount of solder on the terminations as the amount of solder at the terminations has a direct effect on resistance value and reliability of the resistor. The resistance value after soldering may change depending on the size of land pattern, the wiring pattern or solder amount, make sure the effect of the change of the resistance value before you use it.
- WE provide individual land patterns for each termination in the datasheet.
- Cracking of the solder fillet may occur with thermal cycling, because of mismatch of coefficients of thermal expansion between the board and the component. Pad size, amount of solder, and amount of heatradiating from the PCB must be designed carefully.
- The parasitic inductance of the chip resistor and the wiring pattern may influence current detection under high frequency usage, make sure the effect before you use it.
- The PCB design (e.g. land pattern design and grounding planes) must be evaluated for each individual circuit to achieve the optimal soldering results.

Mounting:

- Adjust the bottom dead center of the mounting head not to press on the PCB surface to avoid any punctual pressure on component at pick & place.
- When a highly active halogenous (chlorine,bromine, etc.) flux is used, the residues of flux may negatively affect resistor performance and reliability.

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WÜRTH ELEKTRONIK

CREATED	CHECKED	GENERAL TOLERANCE	PROJECTION METHOD
KaS	PSL	DIN ISO 2768-1m	

DESCRIPTION: **WRIS-KWKB Thick Film Resistors**

TECHNICAL REFERENCE: KB06122201F304DAATP0000

ORDER CODE: **561020132034**

SIZE	REVISION	STATUS	DATE (YYYY-MM-DD)	BUSINESS UNIT	PAGE
0612	001.001	Valid	2018-11-14	eiSos	4/6

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- The reflow soldering method must be used.
- Be careful when pick up the resistors with tweezers, there may be a case that the overcoat and / or the body can chip.
- Provide sufficient close up dimension, preventive maintenance and replacement of the centering jaw to avoid a crack when it is worn out.
- The resistor temperature could exceed 155°C depending on the wiring pattern, heat dissipation form surrounding, etc., which is not necessarily relevantly related to the rated dissipation. In advance, make sure that heat dissipation of resistor does not damage the pcb and any surrounding components.
- Provide support from the bottom side of the PCB by a support pin for minimizing the impact energy from the mounting head.
- In case of manuall soldering, soldering tip shall not touch the product when install manually.

Adhesive:

- The adhesive should have sufficient coating and viscosity and should harden rapidly.
- The adhesive should be strong enough to hold parts on the board during the mounting and solder process and should have sufficient strength at high temperatures.
- The adhesive should have corrosion resistance, excellent insulation characteristics and no emission of toxic gasses nor any effect on the human body.
- Do not use too much adhesive to avoid pollution of the soldering pads.

Anti-pulse Characteristics:

- If transient overloads such as power pulse or voltage / current surges are applied to resistor products, performance and reliability may be degraded.
- Pay attention to discharges between terminations (arc-over) when high voltages are applied.

Soldering:

- The solder profile must comply with the Würth Elektronik technical soldering specification. All other profiles will void the warranty.
- All other soldering methods are at the customer's own risk.
- Strong forces which may affect the coplanarity of the component's electrical connection with the PCB (i.e. pins), can damage the part, resulting in avoid of the warranty.
- Customer needs to ensure that the applied solder paste, the paste thickness and solder conditions are applicable to guarantee a sufficient solder result according to the relevant criteria of IPC-A-610.
- Excessive amount of solder may lead to higher tensile force and chip cracking. Insufficient amount of solder may detach the resistor due to defective contacts.
- Do not use excessive nor insufficient flux.
- Provide enough washing when water-soluble flux is used.
- For reflow soldering, two times limitation is recommended.

Cleaning and Washing:

- Washing agents used during the production to clean the customer's application, might damage or change the characteristics of the wire insulation body, the marking or the plating. Washing agent could have a negative effect on the long term functionality of the product.
- Avoid halogen in the flux or any contaminated flux as well as excessively high ultrasonic cleaning.

Coating, molding and potting of the PCB:

- If the product is potted in the costumer's application, the potting material might shrink or expand during and after hardening. Shrinking could lead to an incomplete seal, allowing contaminants into the body and termination. Expansion could damage the body or termination. We recommend a manual inspection after potting to avoid these effects.
- When coating and molding the PCB, verify the quality influence on the resistor.
- Verify the curing temperature and assure that there is no harmful decomposing or reaction gas emission during curing.
- Do not exceed the maximal temperature rise of 20°C.

Handling:

- After soldering, please pay attention not to bend, twist or distort the PCB in handling and storage.
- Avoid excessive pressure during the functional check of the PCB.
- Avoid bending stress while breaking the PCB.
- After mounting, avoid piling up PCBs to avoid hitting of chip resistor to another board.

Disposal:

- Observe appropriate laws and regulations for handling and disposal of products or packaging materials.

These cautions and warnings comply with the state of the scientific and technical knowledge and are believed to be accurate and reliable. However, no responsibility is assumed for inaccuracies or incompleteness.

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WÜRTH ELEKTRONIK

CREATED	CHECKED	GENERAL TOLERANCE	PROJECTION METHOD
KaS	PSL	DIN ISO 2768-1m	

DESCRIPTION: **WRIS-KWKB Thick Film Resistors**

TECHNICAL REFERENCE: KB06122201F304DAATP0000

ORDER CODE: **561020132034**

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Important Notes

The following conditions apply to all goods within the product range of Würth Elektronik eiSos GmbH & Co. KG:

1. General Customer Responsibility

Some goods within the product range of Würth Elektronik eiSos GmbH & Co. KG contain statements regarding general suitability for certain application areas. These statements about suitability are based on our knowledge and experience of typical requirements concerning the areas, serve as general guidance and cannot be estimated as binding statements about the suitability for a customer application. The responsibility for the applicability and use in a particular customer design is always solely within the authority of the customer. Due to this fact it is up to the customer to evaluate, where appropriate to investigate and decide whether the device with the specific product characteristics described in the product specification is valid and suitable for the respective customer application or not.

2. Customer Responsibility related to Specific, in particular Safety-Relevant Applications

It has to be clearly pointed out that the possibility of a malfunction of electronic components or failure before the end of the usual lifetime cannot be completely eliminated in the current state of the art, even if the products are operated within the range of the specifications.
In certain customer applications requiring a very high level of safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health it must be ensured by most advanced technological aid of suitable design of the customer application that no injury or damage is caused to third parties in the event of malfunction or failure of an electronic component. Therefore, customer is cautioned to verify that data sheets are current before placing orders. The current data sheets can be downloaded at www.we-online.com.

3. Best Care and Attention

Any product-specific notes, cautions and warnings must be strictly observed. Any disregard will result in the loss of warranty.

4. Customer Support for Product Specifications

Some products within the product range may contain substances which are subject to restrictions in certain jurisdictions in order to serve specific technical requirements. Necessary information is available on request. In this case the field sales engineer or the internal sales person in charge should be contacted who will be happy to support in this matter.

5. Product R&D

Due to constant product improvement product specifications may change from time to time. As a standard reporting procedure of the Product Change Notification (PCN) according to the JEDEC-Standard inform about minor and major changes. In case of further queries regarding the PCN, the field sales engineer or the internal sales person in charge should be contacted. The basic responsibility of the customer as per Section 1 and 2 remains unaffected.

6. Product Life Cycle

Due to technical progress and economical evaluation we also reserve the right to discontinue production and delivery of products. As a standard reporting procedure of the Product Termination Notification (PTN) according to the JEDEC-Standard we will inform at an early stage about inevitable product discontinuance. According to this we cannot guarantee that all products within our product range will always be available. Therefore it needs to be verified with the field sales engineer or the internal sales person in charge about the current product availability expectancy before or when the product for application design-in disposal is considered. The approach named above does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.

7. Property Rights

All the rights for contractual products produced by Würth Elektronik eiSos GmbH & Co. KG on the basis of ideas, development contracts as well as models or templates that are subject to copyright, patent or commercial protection supplied to the customer will remain with Würth Elektronik eiSos GmbH & Co. KG. Würth Elektronik eiSos GmbH & Co. KG does not warrant or represent that any license, either expressed or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, application, or process in which Würth Elektronik eiSos GmbH & Co. KG components or services are used.

8. General Terms and Conditions

Unless otherwise agreed in individual contracts, all orders are subject to the current version of the “General Terms and Conditions of Würth Elektronik eiSos Group”, last version available at www.we-online.com.

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