chanhvinh.com

Clip Mount Power Resistor Thick Film Technology



FEATURES

- 150 W at 45 °C case temperature heatsink mounted
- Direct mounting ceramic on heatsink
- Broad resistance range: 1 Ω to 2.2 kΩ
- Non inductive
- TO-247 package: compact and easy to mount
- Designed for clip mounting
- UL 94 V-0 material used - compliant with EN 45545-2
- Higher pulse absorption, up to 75 J/0.1 s
- Bended option available
- **AEC-Q200 qualified**
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

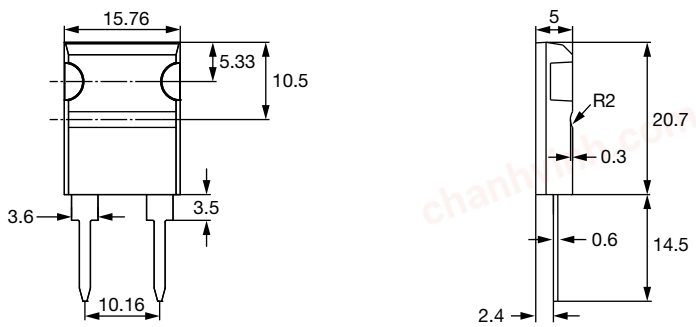
LINKS TO ADDITIONAL RESOURCES

3D Models

LTO 150H are the extension of LTO series. The component is used in direct contact with heatsink. Fixation done by clip.

This unique design is able to absorb 30 % more energy than standard LTO 150.

DIMENSIONS in millimeters



Note

- Tolerances unless stated: ± 0.3 mm

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	SIZE	RESISTANCE RANGE Ω	RATED POWER $P_{45\,°C}$ W	LIMITING ELEMENT VOLTAGE U_L V	TOLERANCE ± %	TEMPERATURE COEFFICIENT ± ppm/°C	CRITICAL RESISTANCE Ω
LTO 150H	TO-247	1 to 2.2K	150	500	2, 5, 10	200, 350, 900	1.66K

MECHANICAL SPECIFICATIONS

Mechanical Protection	Molded
Resistive Element	Thick film
Substrate	Alumina
Connections	Tinned copper
Weight	4.1 g max.
Clip Assembly Force	60 N to 110 N

ENVIRONMENTAL SPECIFICATIONS

Temperature Range	-55 °C to +175 °C
Climatic Category	55 / 175 / 56
Flammability	IEC 60695-11-5 Application time: t_a = 10 s Burning duration: t_b < 30 s

For technical questions, contact: sferfixedresistors@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

chanhvinh.com

TECHNICAL SPECIFICATIONS	
Dissipation and Associated	Onto a heatsink + clip
Power Rating and Thermal Resistance of the Component	150 W at +45 °C (case temp.) $R_{TH\ (j\ -\ c)}$: 0.87 °C/W Free air: 4.5 W at +25 °C
Temperature Coefficient	See Performance table ± 200 ppm/°C
Dielectric Strength **IEC 60115-1**	3000 V_{RMS} - 1 min 10 mA max.
Insulation Resistance	≥ 10^4 MΩ
Inductance	≤ 0.1 µH

PERFORMANCE		
TESTS	**CONDITIONS**	**REQUIREMENTS**
Momentary Overload	IEC 60115-1 1.5 Pr/5 s $U_S < 1.5\ U_L$	± (0.5 % + 0.005 Ω)
Load Life	IEC 60115-1 1000 h Pr (free air) at +25 °C 90/30	± (0.5 % + 0.005 Ω)
High Temperature Exposure	AEC-Q200 rev. D conditions: MIL-STD-202 method 108 1000 h, +175 °C, unpowered	0.25 % ± 0.005 Ω
Temperature Cycling	AEC-Q200 rev. D conditions: JESD22 method JA-104 1000 cycles, -55 °C to +125 °C dwell time -15 min	1 % ± 0.005 Ω
Biased Humidity	AEC-Q200 rev. D conditions: MIL-STD-202 method 103 1000 h, 85 °C, 85 % RH (10 % of free air power)	± (1 % + 0.005 Ω)
Operational Life	AEC-Q200 rev. D conditions: MIL-STD-202 method 108 1000 h, 90/30, powered (free air) at +125 °C	1 % ± 0.005 Ω
ESD Human Body Model	AEC-Q200 rev. D conditions: AEC-Q200-002 IEC 61000-4-2 25 kV_{AD}	± (0.5 % + 0.005 Ω)
Vibration	AEC-Q200 rev. D conditions: MIL-STD-202 method 204 5 *g*'s for 20 min, 12 cycles test from 10 Hz to 2000 Hz	0.5 % ± 0.005 Ω
Mechanical Shock	AEC-Q200 rev. D conditions: MIL-STD-202 method 213 100 *g*'s, 6 ms, 3.75 m/s 3 shocks/direction	0.5 % ± 0.005 Ω
Terminal Strength	AEC-Q200 rev. D conditions: AEC-Q200-006 2 kgf, 60 s	0.25 % ± 0.005 Ω

For technical questions, contact: sferfixedresistors@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

chanhvinh.com

SPECIAL FEATURES		
Resistance Values	≥ 1	≥ 20
Tolerances	2 %, 5 %, 10 %	
Typical Temperature Coefficient (-55 °C to +155 °C)	± 350 ppm/°C	± 200 ppm/°C

CHOICE OF THE HEATSINK

The user must choose according to the working conditions of the component (power, room temperature).
Maximum working temperature must not exceed 175 °C. The dissipated power is simply calculated by the following ratio:

$$P = \frac{\Delta T}{[R_{TH\ (j\ -\ c)}] + [R_{TH\ (c\ -\ h)}] + [R_{TH\ (h\ -\ a)}]} \quad (1)$$

P: expressed in W

ΔT: difference between maximum working temperature and room temperature

$R_{TH\ (j\ -\ c)}$: thermal resistance value measured between resistive layer and outer side of the resistor. It is the thermal resistance of the component

$R_{TH\ (c\ -\ h)}$: thermal resistance value measured between outer side of the resistor and upper side of the heatsink. This is the resistance of the interface (grease, thermal pad), and the quality of the fastening device

$R_{TH\ (h\ -\ a)}$: thermal resistance of the heatsink

Example:

$R_{TH\ (c\ -\ h)} + R_{TH\ (h\ -\ a)}$ for LTO 150 power rating 10 W at ambient temperature +25 °C

Thermal resistance $R_{TH\ (j\ -\ c)}$: 0.87 °C/W

Considering equation (1) we have:

$\Delta T = 175\ °C - 25\ °C = 150\ °C$

$R_{TH\ (j\ -\ c)} + R_{TH\ (c\ -\ h)} + R_{TH\ (h\ -\ a)} = \frac{\Delta T}{P} = \frac{150}{10} = 15\ °C/W$

$R_{TH\ (c\ -\ h)} + R_{TH\ (h\ -\ a)} = 15\ °C/W - 0.87\ °C/W = 14.13\ °C/W$

Example with a thermal grease $R_{TH\ (c\ -\ h)} = 0.5\ °C/W$, we need a heatsink with $R_{TH\ (h\ -\ a)} = 13.63\ °C/W$

	CONFIGURATION 1	CONFIGURATION 2	CONFIGURATION 3
Power Dissipation (W)	150	35	26
T° Resistive Element (°C)	175	175	175
$R_{TH\ (j\ -\ c)}$ Max. (°C/W)	0.87	0.87	0.87
$R_{TH\ (c\ -\ h)}$ Typ. (°C/W)	0.127	0.33	0.33
$R_{TH\ (h\ -\ a)}$ Max. (°C/W)	0.069	3.09	4.57
Fluid T° (°C)	15 (water)	25 (air)	25 (air)

CONFIGURATION 1: Water cooling heatsink CP15 from Lytron (304 mm x 95.3 mm x 8 mm) with water flow rate 4 LPM and thermal grease Bluesil Past 340 from BlueStar silicones. MAX08NG from AAVID screwed clip mounting.

CONFIGURATION 2: Air cooling heatsink 0S552 from AAVID (48 mm x 80 mm x 70 mm) and thermal grease Bluesil Past 340 from BlueStar silicones. MAX03HNG from AAVID clipped mounting.

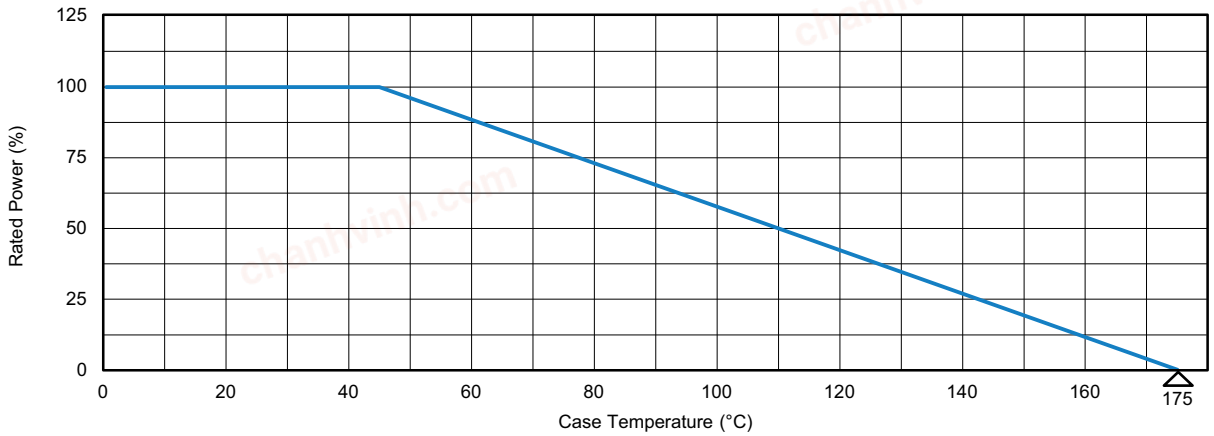
CONFIGURATION 3: Air cooling heatsink 0S550 from AAVID (31.75 mm x 58.7 mm x 70 mm) and thermal grease Bluesil Past 340 from BlueStar silicones. MAX03HNG from AAVID clipped mounting.

For technical questions, contact: sferfixedresistors@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

chanhvinh.com

POWER RATING

The temperature of the case should be maintained within the limits specified.



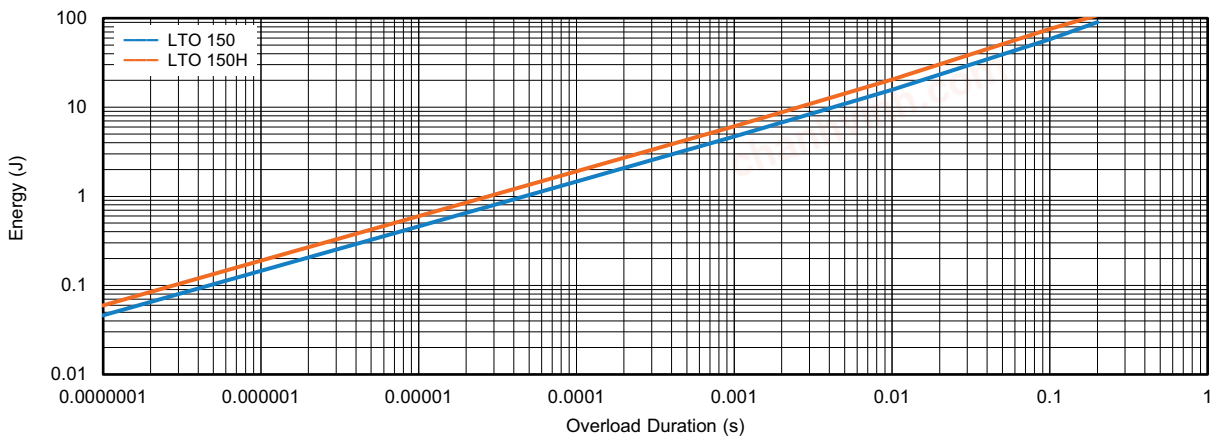
MOMENTARY OVERLOAD

In any case the applied voltage must be lower than the maximum overload voltage of 750 V during 5 s.

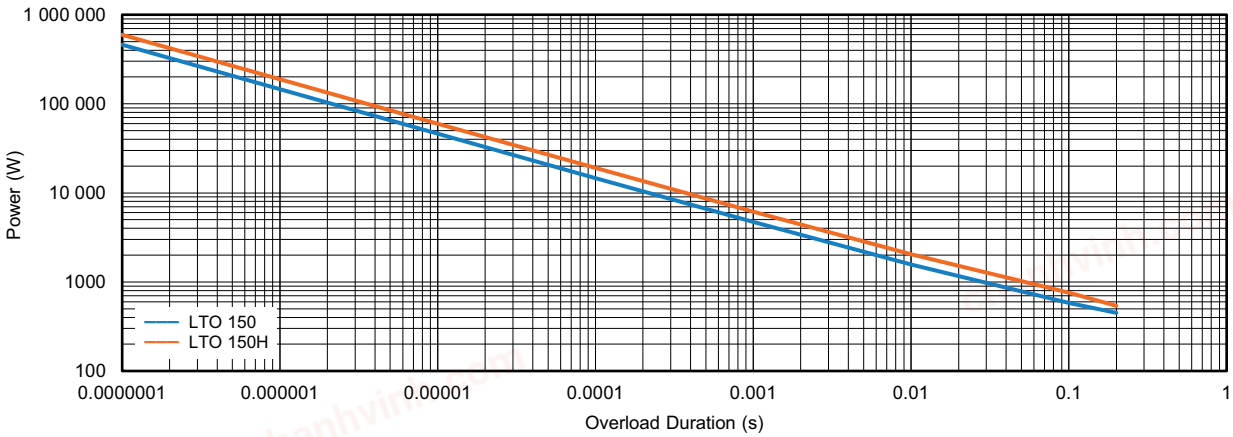
Accidental overload: the values indicated on the following graph are applicable to resistors in air or mounted onto a heatsink.

ENERGY CURVE

The values indicated on the graph below are applicable to resistors in air or mounted onto a heatsink.



POWER CURVE



For technical questions, contact: sferfixedresistors@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

chanhvinh.com

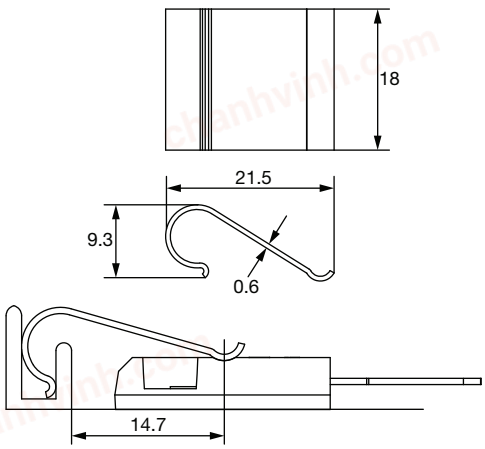
PACKAGING
Tube of 30 units

MARKING

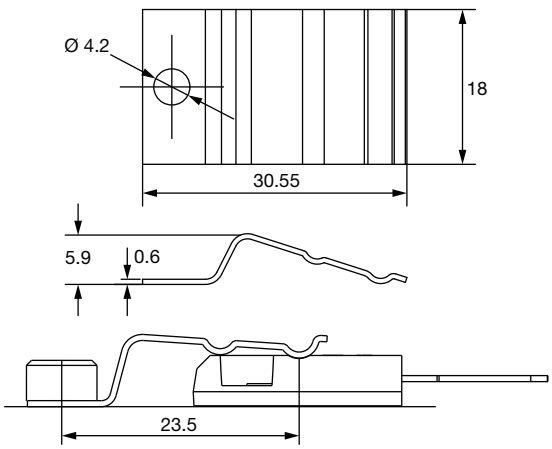
Model, style, resistance value (in Ω), tolerance (in %), manufacturing date, Vishay Sfernice trademark according IEC 60062.

CLIPS

ACCLLTO150CL (MAX03HNG)

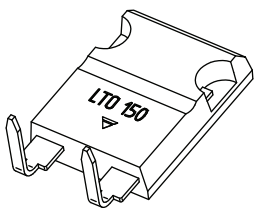
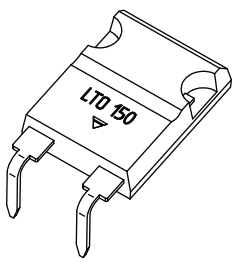
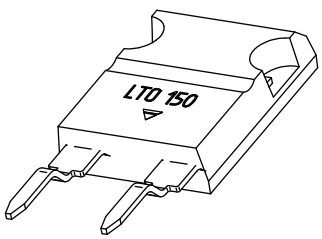


ACCLLTO150VS (MAX08NG)



CLIP MOUNTING RECOMMENDATION

To improve the thermal conductivity, all surface of ceramic has to be coated with a thermal silicon grease. If you not use our clipped or screwed clip, it is recommended that a mounting force of 60 N to 110 N be applied to the center of the molding case of the component. Tightening torque 2 Nm when mounting screwed clip MAX08NG on heatsink.

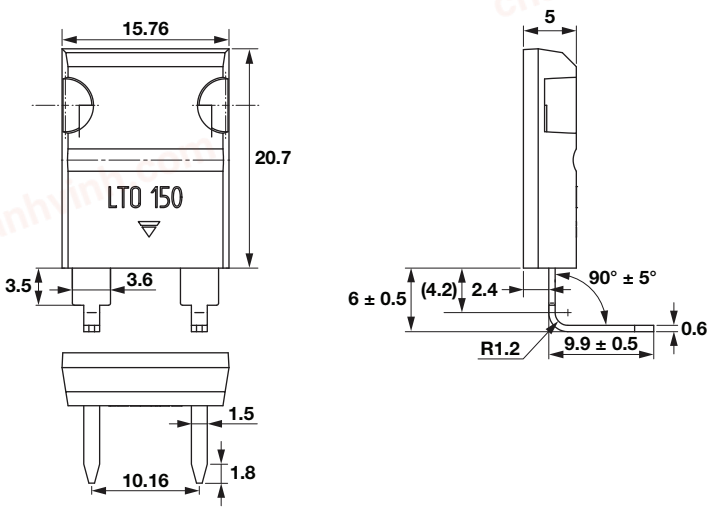
BENDING OPTIONS		
LTO 150 H TB7	LTO 150 H TB8	LTO 150 H TB9
		

For technical questions, contact: sferfixedresistors@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

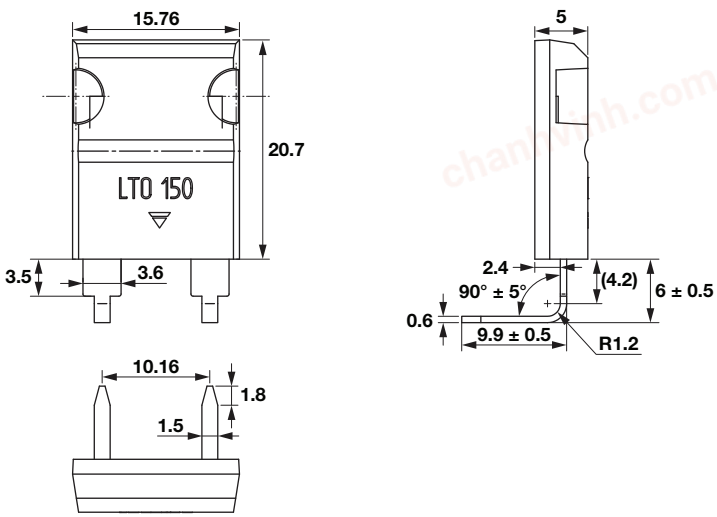
chanhvinh.com

BENDING OPTIONS DIMENSIONS in millimeters

LTO 150 H TB7



LTO 150 H TB8



Note

- Tolerances unless stated: ± 0.3 mm

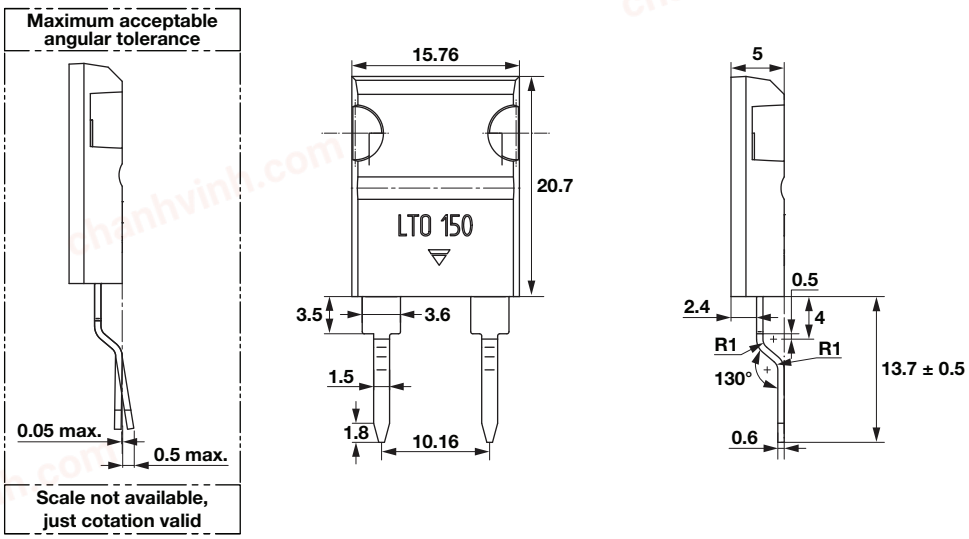
For technical questions, contact: sferfixedresistors@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

chanhvinh.com

BENDING OPTIONS DIMENSIONS in millimeters

LTO 150 H TB9



Note

- Tolerances unless stated: ± 0.3 mm

ORDERING INFORMATION

LTO	150	H	2.2 kΩ	± 5 %	xxx	TU30	e3
MODEL	STYLE	HIGH PULSE	RESISTANCE VALUE	TOLERANCE	CUSTOM DESIGN	PACKAGING	LEAD (Pb)-FREE
				± 2 % ± 5 % ± 10 %	Optional on request: special TCR, shape, bended, etc.		

GLOBAL PART NUMBER INFORMATION

L	T	O	1	5	0	H	2	2	0	0	0	J	T	E	3

GLOBAL MODEL	SIZE	ENERGY	OHMIC VALUE	TOLERANCE	PACKAGING	LEAD (Pb)-FREE
LTO	**150**	**H** = high pulse absorption	The first four digits are significant figures and the last digit specifies the number of zeros to follow. R designates decimal point. **48R70** = 48.7 Ω **22000** = 2200 Ω = 2.2 kΩ	**G** = 2 % **J** = 5 % **K** = 10 %	**T** = tube Tube 30 pieces	**E3** = pure tin

CLIP PART NUMBER INFORMATION

REFERENCE	PART NUMBER FOR ORDERING
Screwed clip MAX08NG	**ACCLLTO150VS**
Clipped clip MAX03HNG	**ACCLLTO150CL**

For technical questions, contact: sferfixedresistors@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

chanhvinh.com

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

© 2025 VISHAY INTERTECHNOLOGY, INC. ALL RIGHTS RESERVED

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000