

Conformal, Single In-Line Thin Film Resistor, Through Hole Network (Standard)



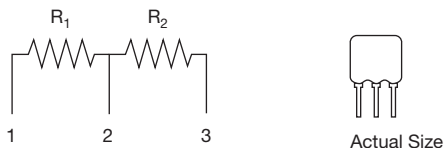
Vishay Dale Thin Film resistor networks are designed to be used in analog circuits in conjunction with operational amplifiers. Engineers can use these circuits to achieve an infinite number of very low noise and high stability circuits for industrial, medical and scientific instrumentation.

This family of standard resistor networks will continually be expanded with new and innovative designs, and Vishay Dale Thin Film stocks most designs in house for off-the-shelf convenience. However, if you can not find the standard network you need, call applications engineering at (716) 283-4025, as we may be able to meet your requirements with a semicustom “match” for a quick delivery.

For standard networks with tighter specifications, or for custom networks, contact Applications Engineering at the above number. For a quick review of typical applications, request Vishay’s guide to understanding and using thin film precision networks.

SCHEMATIC

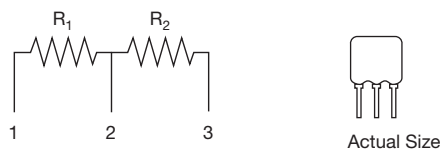
$$R_1 = R_2$$



L = Total length = 0.320" (8.13 mm) max.
 H = Seated height = 0.280" (7.11 mm) max.
 Except PN 218 where seated height = 0.342" (8.69 mm) max.

$$R_1 + R_2 = 10K, 100K, 1M$$

$$\frac{R_1 + R_2}{R_2} = 10$$



L = Total length = 0.320" (8.13 mm) max.
 H = Seated height = 0.280" (7.11 mm) max.
 Except PN 281 where seated height = 0.362" (9.19 mm) max.

FEATURES

- Off-the-shelf delivery
- Wide variety of standards
- Small size (SIP)
- Standard designs - no NRE
- Low capacitance < 0.1 pF/PIN
- Flame resistant (UL 94 V-0 rating)
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912



RoHS*
 COMPLIANT
 HALOGEN
FREE

Note

* Lead (Pb)-containing terminations are not RoHS-compliant. Exemptions may apply.

TYPICAL PERFORMANCE

| | ABSOLUTE | TRACKING |
|------|----------|----------|
| TCR | 10 | 2 |
| | ABSOLUTE | RATIO |
| TOL. | 0.1 | 0.02 |

Complete electrical specifications at the end of schematics.

TWO EQUAL RESISTORS

ORDERING INFORMATION ($R_1 =$)

| | |
|---------------|----------------|
| 1K: VTF209BX | 50K: VTF214BX |
| 2K: VTF210BX | 100K: VTF215BX |
| 5K: VTF211BX | 200K: VTF216BX |
| 10K: VTF212BX | 500K: VTF217BX |
| 20K: VTF213BX | 1M: VTF218BX |

Lead (Pb)-free option add “S” after part number, e.g: VTF209SBX

RATIO DIVIDER 10:1

ORDERING INFORMATION ($R_1 + R_2 =$)

| |
|----------------------------|
| 9K + 1K = 10K: VTF280BX |
| 90K + 10K = 100K: VTF193BX |
| 900K + 100K = 1M: VTF281BX |

Lead (Pb)-free option add “S” after part number, e.g: VTF280SBX



$R_1 = 100K, 1M$

$$\frac{R_1}{R_2} = 10$$



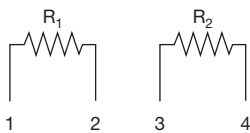
L = Total length = 0.320" (8.13 mm) max.
 H = Seated height = 0.280" (7.11 mm) max.
 Except PN 283 where seated height = 0.362" (9.19 mm) max.

DIVIDER NETWORK 10:1

ORDERING INFORMATION ($R_1 =$)

| |
|----------------|
| 100K: VTF282BX |
| 1M: VTF283BX |

$R_1 = R_2$



L = Total length = 0.420" (10.67 mm) max.
 H = Seated height = 0.280" (7.11 mm) max.

TWO EQUAL RESISTORS - ISOLATED

ORDERING INFORMATION ($R_1 =$)

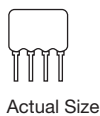
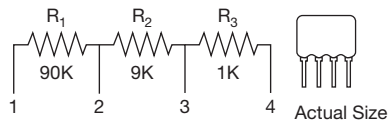
| | |
|----------------|-----------------|
| 1K: VTF365BX | 50K: VTF1000BX |
| 2K: VTF997BX | 100K: VTF348BX |
| 5K: VTF998BX | 200K: VTF1105BX |
| 10K: VTF363BX | 500K: VTF1106BX |
| 20K: VTF1104BX | 1M: VTF1103BX |
| 25K: VTF999BX | |

Lead (Pb)-free option add "S" after part number, e.g: VTF209SBX

$R_1 + R_2 + R_3 = 100K$

$$\frac{R_1 + R_2 + R_3}{R_3} = 100$$

$$\frac{R_1 + R_2 + R_3}{R_2 + R_3} = 10$$



L = Total length = 0.420" (10.67 mm) max.
 H = Seated height = 0.280" (7.11 mm) max.

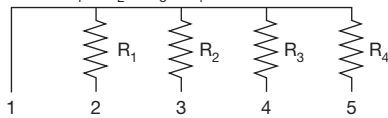
RATIO DIVIDER 10:1 AND 100:1

ORDERING INFORMATION ($R_1 + R_2 + R_3 =$)

| |
|----------------|
| 100K: VTF330BX |
|----------------|

Lead (Pb)-free option add "S" after part number, e.g: VTF330SBX

$R_1 = R_2 = R_3 = R_4 = 10K, 100K$



L = Total length = 0.520" (13.21 mm) max.
 H = Seated height = 0.280" (7.11 mm) max.

FOUR EQUAL RESISTORS ONE COMMON

ORDERING INFORMATION ($R_1 =$)

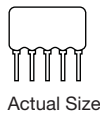
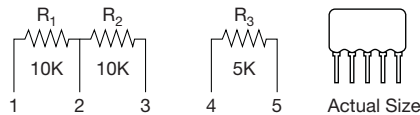
| |
|----------------|
| 10K: VTF366BX |
| 100K: VTF367BX |

Lead (Pb)-free option add "S" after part number, e.g: VTF366SBX

$R_1 = 10K$

$$\frac{R_2}{R_1} = 1$$

$$R_3 = \frac{R_1 \times R_2}{R_1 + R_2}$$



L = 0.520 (13.21 mm), H = 0.280 (7.11 mm) max.

DIVIDER NETWORK 2:1

ORDERING INFORMATION

| |
|-----------|
| VTF1087BX |
|-----------|

Lead (Pb)-free option add "S" after part number, e.g: VTF1087SBX



L = 0.520" (13.21 mm), H = 0.280" (7.11 mm) max.

DIVIDER NETWORK 2:1

ORDERING INFORMATION

VTF1088BX

Lead (Pb)-free option add "S" after part number, e.g: VTF1088SBX



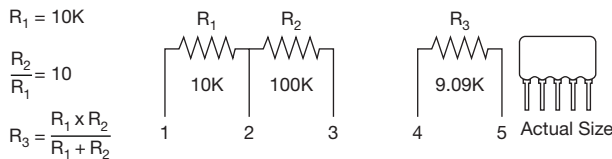
L = 0.520" (13.21 mm), H = 0.280" (7.11 mm) max.

DIVIDER NETWORK 5:1

ORDERING INFORMATION

VTF1089BX

Lead (Pb)-free option add "S" after part number, e.g: VTF1089SBX



Note:
• R₂ TCR Tracking 3 ppm/°C

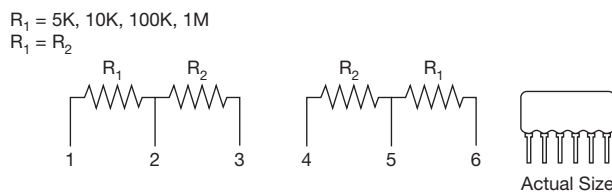
L = 0.520" (13.21 mm), H = 0.280" (7.11 mm) max.

DIVIDER NETWORK 10:1

ORDERING INFORMATION

VTF1090BX

Lead (Pb)-free option add "S" after part number, e.g: VTF1090SBX



L = Total length = 0.620" (15.75 mm) max.
H = Seated height = 0.280" (7.11 mm) max.
Except PN 287 seated height = 0.362" (9.19 mm) max.

DIVIDER NETWORK 1:1

ORDERING INFORMATION (R₁ =)

| |
|----------------|
| 5K: VTF225BX |
| 10K: VTF286BX |
| 100K: VTF219BX |
| 1M: VTF287BX |

Lead (Pb)-free option add "S" after part number, e.g: VTF225SBX



L = Total length = 0.620" (15.75 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

DIVIDER NETWORK 2:1

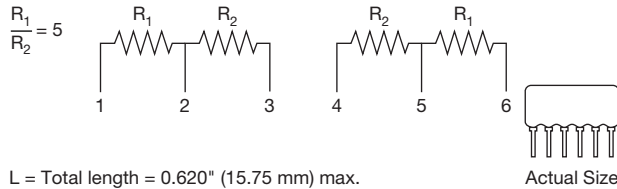
ORDERING INFORMATION (R₁ =)

| |
|-----------------|
| 10K: VTF1009BX |
| 100K: VTF1010BX |

Lead (Pb)-free option add "S" after part number, e.g: VTF1009SBX



R₁ = 10K, 100K



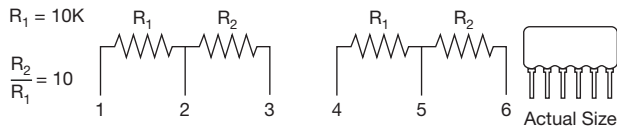
L = Total length = 0.620" (15.75 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

DIVIDER NETWORK 5:1

ORDERING INFORMATION (R₁ =)

| |
|-----------------|
| 10K: VTF1007BX |
| 100K: VTF1008BX |

Lead (Pb)-free option add "S" after part number, e.g: VTF1007SBX



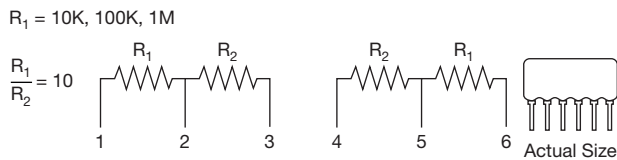
L = Total length = 0.620" (15.75 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

DIVIDER NETWORK 10:1

ORDERING INFORMATION (R₁ =)

| |
|---------------|
| 10K: VTF220BX |
|---------------|

Lead (Pb)-free option add "S" after part number, e.g: VTF220SBX



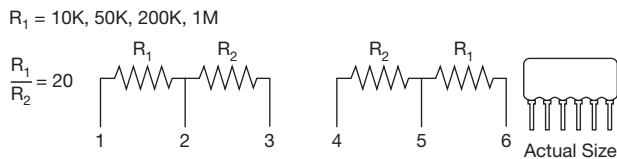
L = Total length = 0.620" (15.75 mm) max.
H = Seated height = 0.280" (7.11 mm) max.
Except PN 285 seated height = 0.320" (8.13 mm) max.

DIVIDER NETWORK 10:1

ORDERING INFORMATION (R₁ =)

| |
|----------------|
| 10K: VTF328BX |
| 100K: VTF284BX |
| 1M: VTF285BX |

Lead (Pb)-free option add "S" after part number, e.g: VTF328SBX



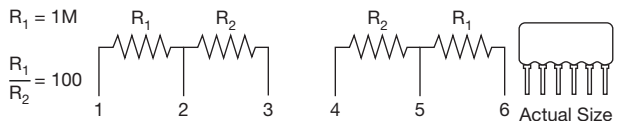
L = Total length = 0.620" (15.75 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

DIVIDER NETWORK 20:1

ORDERING INFORMATION (R₁ =)

| |
|-----------------|
| 10K: VTF1073BX |
| 50K: VTF1074BX |
| 200K: VTF1107BX |
| 1M: VTF1108BX |

Lead (Pb)-free option add "S" after part number, e.g: VTF1073SBX



L = Total length = 0.620" (15.75 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

DIVIDER NETWORK 100:1

ORDERING INFORMATION (R₁ =)

| |
|---------------|
| 1M: VTF1109BX |
|---------------|

Lead (Pb)-free option add "S" after part number, e.g: VTF1109SBX



Common mode
 Division ratio 250, 100, 50
 $R_1 = R_3 = 1M$
 $R_2 = 4K, 10K, 20K$
 $R_4 = 3.984K, 9.901K, 19.608K$
 $R_5 = 900K, 950K, 975K$
 $R_6 = 100K, 50K, 25K$



L = Total length = 0.720" (18.29 mm) max.
 H = Seated height = 0.360" (9.14 mm) max.
 Maximum voltage to pins 3 and 7 is 300 V

SIX RESISTOR NETWORK

(Designed for unity gain/high common mode voltage rejection differential amplifier)

ORDERING INFORMATION ($R_1/R_2 =$)

| |
|--------------------------------|
| Devision Ratio = 250: VTF442BX |
| 100: VTF443BX |
| 50: VTF444BX |

Lead (Pb)-free option add "S" after part number, e.g: VTF442SBX

$R_1 = 1K, 10K, 25K, 50K, 100K$



L = Total length = 0.820" (20.83 mm) max.
 H = Seated height = 0.280" (7.11 mm) max.

FOUR EQUAL RESISTORS ISOLATED

ORDERING INFORMATION ($R_1 =$)

| |
|----------------|
| 1K: VTF329BX |
| 2K: VTF1001BX |
| 5K: VTF1002BX |
| 10K: VTF158BX |
| 25K: VTF1003BX |
| 50K: VTF1004BX |
| 100K: VTF288BX |

Lead (Pb)-free option add "S" after part number, e.g: VTF329SBX

$R_1 = 1K, 10K, 100K$



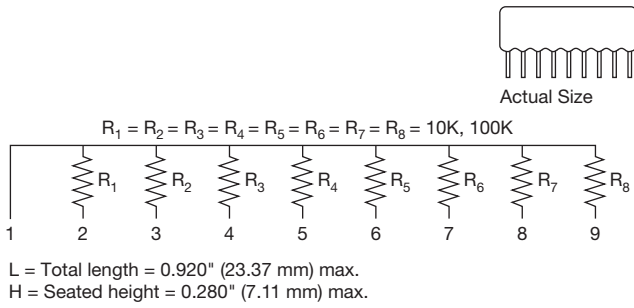
Absolute tolerance = 0.1 %
 Ratio tolerance = 0.1 %
 L = Total length = 0.820" (20.83 mm) max.
 H = Seated height = 0.280" (7.11 mm) max.

FOUR EQUAL RESISTORS ISOLATED

ORDERING INFORMATION ($R_1 =$)

| |
|-----------------|
| 1K: VTF1005BX |
| 10K: VTF1006BX |
| 100K: VTF1137BX |

Lead (Pb)-free option add "S" after part number, e.g: VTF1005SBX

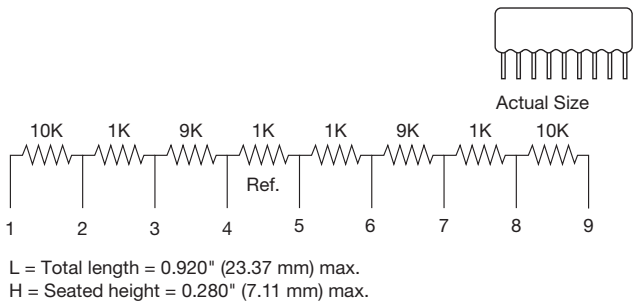


EIGHT EQUAL RESISTORS ONE COMMON

ORDERING INFORMATION ($R_1 =$)

| |
|----------------|
| 10K: VTF368BX |
| 100K: VTF369BX |

Lead (Pb)-free option add "S" after part number, e.g: VTF368SBX



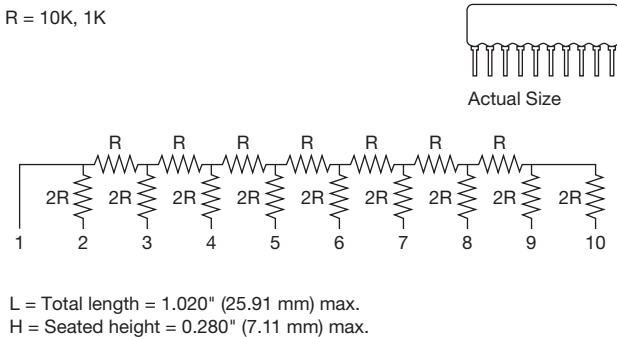
EIGHT RESISTOR NETWORK

(Designed for instrument amplifier with shield driver)

ORDERING INFORMATION

| |
|----------|
| VTF272BX |
|----------|

Lead (Pb)-free option add "S" after part number, e.g: VTF272SBX

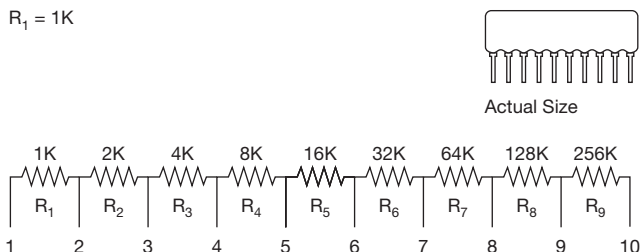


EIGHT BIT R/2R LADDER NETWORK

ORDERING INFORMATION ($R =$)

| |
|------------------|
| ($\pm 1/2$ LSB) |
| 10K: VTF1072BX |
| 100K: VTF267BX |

Lead (Pb)-free option add "S" after part number, e.g: VTF1072SBX



RESISTANCE DOUBLER

ORDERING INFORMATION

| |
|-----------|
| VTF1011BX |
|-----------|

Lead (Pb)-free option add "S" after part number, e.g: VTF1011SBX

Absolute tolerance = ± 0.1 %
Ratio tolerance = ± 0.1 %
TCR tracking = ± 3 ppm/ $^{\circ}C$
L = Total length = 1.02" (25.91 mm) max.
H = Seated height = 0.280" (7.11 mm) max.



| STANDARD ELECTRICAL SPECIFICATIONS | | |
|------------------------------------|----------------------------|-------------------|
| TEST | SPECIFICATIONS | CONDITIONS |
| Material | Passivated nichrome | - |
| Pin/Lead Number | 3 to 10 | - |
| Resistance Range | 100 Ω to 2 MΩ total | - |
| TCR: Absolute | ± 10 ppm/°C ⁽¹⁾ | 0 °C to + 70 °C |
| TCR: Tracking | ± 2 ppm/°C ⁽¹⁾ | 0 °C to + 70 °C |
| Tolerance: Absolute | ± 0.1 % | + 25 °C |
| Tolerance: Ratio | ± 0.02 % | + 25 °C |
| Power Rating: Resistor | 100 mW | - |
| Power Rating: Package | 500 mW | - |
| Stability: Absolute | ΔR ± 0.05 % | 2000 h at + 70 °C |
| Stability: Ratio | ΔR ± 0.015 % | 2000 h at + 70 °C |
| Voltage Coefficient | ± 0.01 ppm/V | - |
| Working Voltage | 100 V | - |
| Operating Temperature Range | 0 °C to + 70 °C | - |
| Storage Temperature Range | - 55 °C to + 125 °C | - |
| Noise | < - 35 dB | - |
| Thermal EMF | < 0.1 μV/°C | - |
| Shelf Life Stability: Absolute | ΔR ± 0.01 % | 1 year at + 25 °C |
| Shelf Life Stability: Ratio | ΔR ± 0.002 % | 1 year at + 25 °C |

Note

⁽¹⁾ TCR over - 55 °C to + 125 °C ± 20 ppm/°C absolute, ± 3 ppm/°C tracking

| DIMENSIONS AND IMPRINTING in inches and millimeters | | | |
|---|------------|-------------|-------------|
| | DIMENSION | INCHES | MILLIMETERS |
| | A | 0.125 min. | 3.17 |
| B | 0.010 min. | 0.25 | |
| C | 0.100 | 2.54 typ. | |
| D | 0.020 typ. | 0.48 ± 0.15 | |
| E | 0.100 max. | 2.54 | |
| F | 0.010 typ. | 0.25 | |

Note

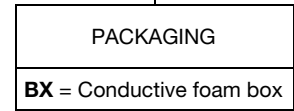
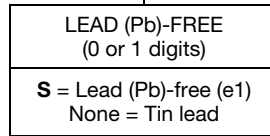
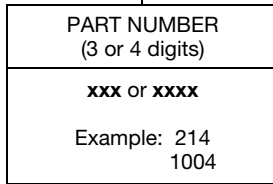
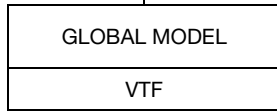
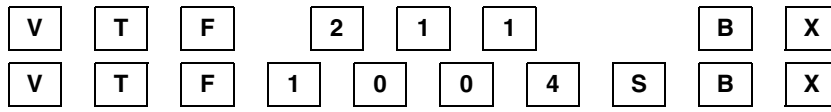
• “L” and “H” (length and height) dimensions for each model are found alongside the schematic drawing

| MECHANICAL SPECIFICATIONS | |
|------------------------------------|----------------------|
| Resistive Element | Passivated nichrome |
| Substrate Material | Alumina |
| Body | Epoxy coated |
| Terminals | Copper alloy |
| Tin/Lead Option | Sn60 - Sn63 |
| Lead (Pb)-free Option | Sn96.5, Ag3.0, Cu0.5 |
| Tin/Lead and Lead (Pb)-free Finish | Hot solder dip |

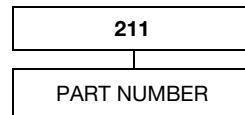
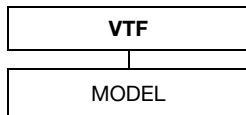


GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: VTF211BX



Historical Part Number example: VTF 211 (for reference purposes only)





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.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. 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.

Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9