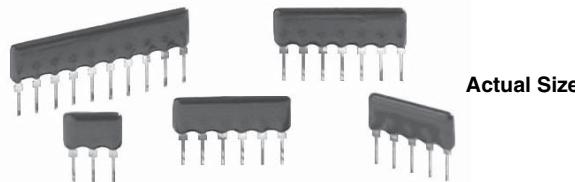


Conformal, Single In-Line Thin Film Resistor, Through Hole Network (Standard)



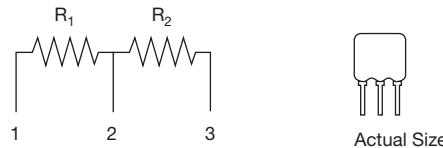
Vishay Dale Thin Film resistor networks are designed to be used in analog circuits in conjunction with operational amplifiers. Engineers can use these circuits to achieve an infinite number of very low noise and high stability circuits for industrial, medical and scientific instrumentation.

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

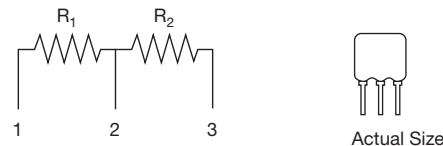
$$R_1 = R_2$$



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

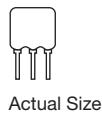
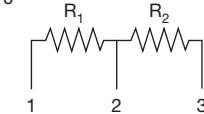
Lead (Pb)-free option add "S" after part number,
e.g: VTF209SBX

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

$R_1 = 100K, 1M$
 $\frac{R_1}{R_2} = 10$


Actual Size

L = Total length = 0.320" (8.13 mm) max.

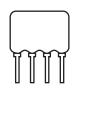
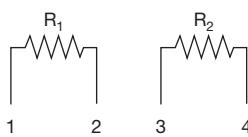
H = Seated height = 0.280" (7.11 mm) max.

Except PN 283 where seated height = 0.362" (9.19 mm) max.

DIVIDER NETWORK 10:1
ORDERING INFORMATION (R₁ =)

100K: VTF282BX

1M: VTF283BX

 $R_1 = R_2$


Actual Size

L = Total length = 0.420" (10.67 mm) max.

H = Seated height = 0.280" (7.11 mm) max.

TWO EQUAL RESISTORS - ISOLATED
ORDERING INFORMATION (R₁ =)

1K: VTF365BX 50K: VTF1000BX

2K: VTF997BX 100K: VTF348BX

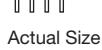
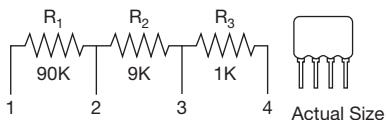
5K: VTF998BX 200K: VTF1105BX

10K: VTF363BX 500K: VTF1106BX

20K: VTF1104BX 1M: VTF1103BX

25K: VTF999BX

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

 $R_1 + R_2 + R_3 = 100K$
 $\frac{R_1 + R_2 + R_3}{R_3} = 100$
 $\frac{R_1 + R_2 + R_3}{R_2 + R_3} = 10$


Actual Size

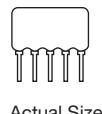
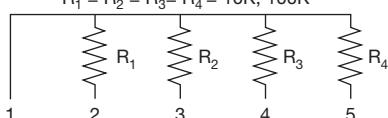
L = Total length = 0.420" (10.67 mm) max.

H = Seated height = 0.280" (7.11 mm) max.

RATIO DIVIDER 10:1 AND 100:1
ORDERING INFORMATION (R₁ + R₂ + R₃ =)

100K: VTF330BX

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

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


Actual Size

L = Total length = 0.520" (13.21 mm) max.

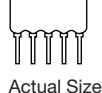
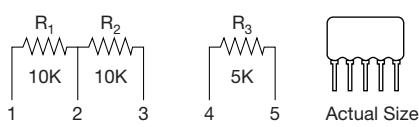
H = Seated height = 0.280" (7.11 mm) max.

FOUR EQUAL RESISTORS ONE COMMON
ORDERING INFORMATION (R₁ =)

10K: VTF366BX

100K: VTF367BX

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

 $R_1 = 10K$
 $\frac{R_2}{R_1} = 1$
 $R_3 = \frac{R_1 \times R_2}{R_1 + R_2}$


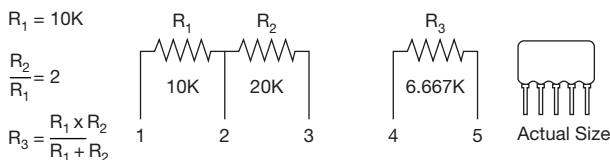
Actual Size

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

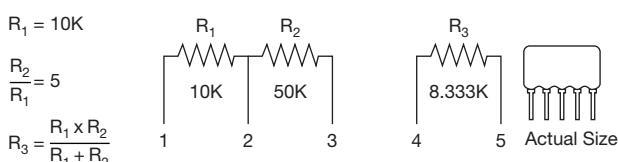
DIVIDER NETWORK 2:1
ORDERING INFORMATION

VTF1087BX

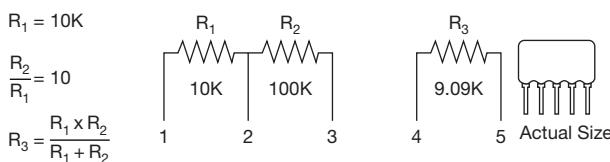
Lead (Pb)-free option add "S" after part number, e.g: VTF1087SBX



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

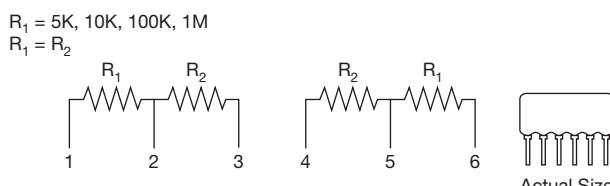


L = 0.520" (13.21 mm), H = 0.280" (7.11 mm) max.

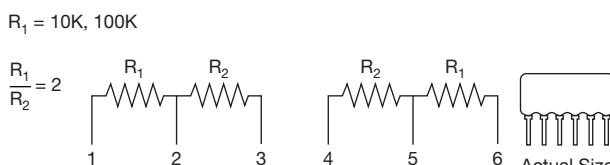


Note:
• R₂ TCR Tracking 3 ppm/°C

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



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.



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

DIVIDER NETWORK 5:1

ORDERING INFORMATION

VTF1089BX

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

DIVIDER NETWORK 10:1

ORDERING INFORMATION

VTF1090BX

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

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

DIVIDER NETWORK 2:1

ORDERING INFORMATION (R₁ =)

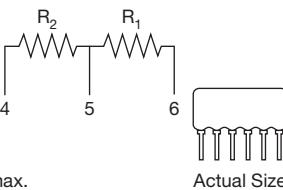
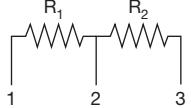
10K: VTF1009BX

100K: VTF1010BX

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

$R_1 = 10K, 100K$

$\frac{R_1}{R_2} = 5$



Actual Size

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

DIVIDER NETWORK 5:1

ORDERING INFORMATION ($R_1 =$)

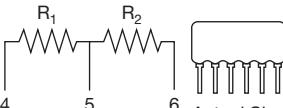
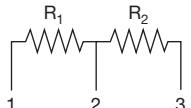
10K: VTF1007BX

100K: VTF1008BX

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

$R_1 = 10K$

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



Actual Size

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

DIVIDER NETWORK 10:1

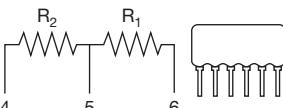
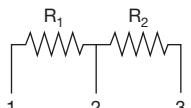
ORDERING INFORMATION ($R_1 =$)

10K: VTF220BX

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

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

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



Actual Size

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 ($R_1 =$)

10K: VTF328BX

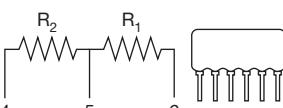
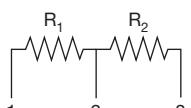
100K: VTF284BX

1M: VTF285BX

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

$R_1 = 10K, 50K, 200K, 1M$

$\frac{R_1}{R_2} = 20$



Actual Size

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

DIVIDER NETWORK 20:1

ORDERING INFORMATION ($R_1 =$)

10K: VTF1073BX

50K: VTF1074BX

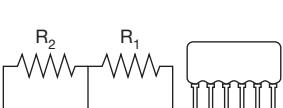
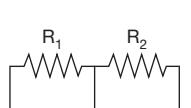
200K: VTF1107BX

1M: VTF1108BX

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

$R_1 = 1M$

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



Actual Size

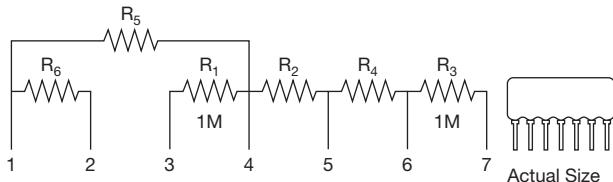
DIVIDER NETWORK 100:1

ORDERING INFORMATION ($R_1 =$)

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 (R₁/R₂ =)

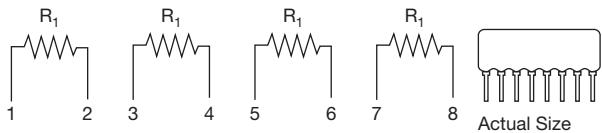
Devision Ratio = 250: VTF442BX

100: VTF443BX

50: VTF444BX

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

R₁ = 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 (R₁ =)

1K: VTF329BX

2K: VTF1001BX

5K: VTF1002BX

10K: VTF158BX

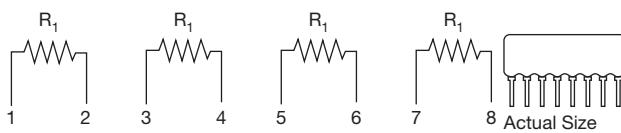
25K: VTF1003BX

50K: VTF1004BX

100K: VTF288BX

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

R₁ = 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

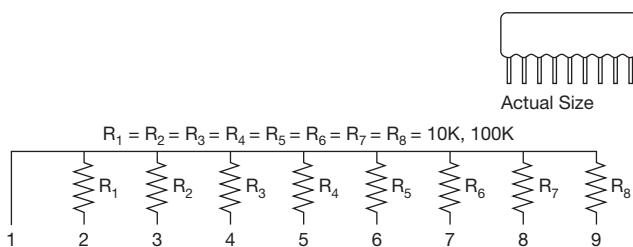
ORDERING INFORMATION (R₁ =)

1K: VTF1005BX

10K: VTF1006BX

100K: VTF1137BX

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



L = Total length = 0.920" (23.37 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

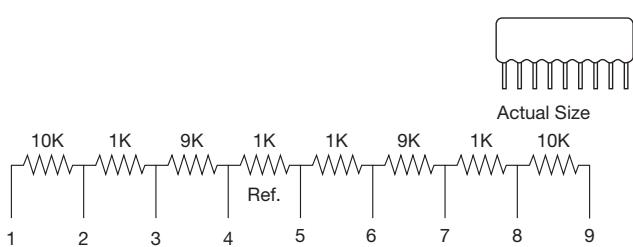
EIGHT EQUAL RESISTORS ONE COMMON

ORDERING INFORMATION (R₁ =)

10K: VTF368BX

100K: VTF369BX

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



L = Total length = 0.920" (23.37 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

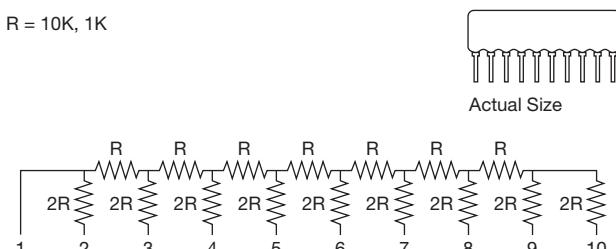
EIGHT RESISTOR NETWORK

(Designed for instrument amplifier with shield driver)

ORDERING INFORMATION

VTF272BX

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



L = Total length = 1.020" (25.91 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

EIGHT BIT R/2R LADDER NETWORK

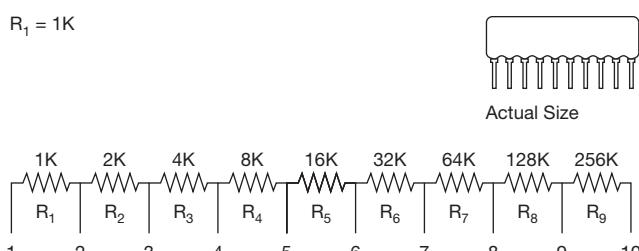
ORDERING INFORMATION (R =)

($\pm 1/2$ 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 = $\pm 0.1\%$

Ratio tolerance = $\pm 0.1\%$

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 M Ω total	-
TCR: Absolute	± 10 ppm/ $^{\circ}$ C ⁽¹⁾	0 $^{\circ}$ C to + 70 $^{\circ}$ C
TCR: Tracking	± 2 ppm/ $^{\circ}$ C ⁽¹⁾	0 $^{\circ}$ C to + 70 $^{\circ}$ C
Tolerance: Absolute	± 0.1 %	+ 25 $^{\circ}$ C
Tolerance: Ratio	± 0.02 %	+ 25 $^{\circ}$ C
Power Rating: Resistor	100 mW	-
Power Rating: Package	500 mW	-
Stability: Absolute	$\Delta R \pm 0.05$ %	2000 h at + 70 $^{\circ}$ C
Stability: Ratio	$\Delta R \pm 0.015$ %	2000 h at + 70 $^{\circ}$ C
Voltage Coefficient	± 0.01 ppm/V	-
Working Voltage	100 V	-
Operating Temperature Range	0 $^{\circ}$ C to + 70 $^{\circ}$ C	-
Storage Temperature Range	- 55 $^{\circ}$ C to + 125 $^{\circ}$ C	-
Noise	< - 35 dB	-
Thermal EMF	< 0.1 μ V/ $^{\circ}$ C	-
Shelf Life Stability: Absolute	$\Delta R \pm 0.01$ %	1 year at + 25 $^{\circ}$ C
Shelf Life Stability: Ratio	$\Delta R \pm 0.002$ %	1 year at + 25 $^{\circ}$ C

Note

⁽¹⁾ TCR over - 55 $^{\circ}$ C to + 125 $^{\circ}$ C ± 20 ppm/ $^{\circ}$ C absolute, ± 3 ppm/ $^{\circ}$ C tracking

DIMENSIONS AND IMPRINTING in inches and millimeters			
Part Number	Date Code	DIMENSION	INCHES
Pin 1		A	0.125 min.
Vishay Logo		B	0.010 min.
		C	0.100
		D	0.020 typ.
		E	0.100 max.
		F	0.010 typ.
			MILLIMETERS
			3.17
			0.25
			2.54 typ.
			0.48 \pm 0.15
			2.54
			0.25

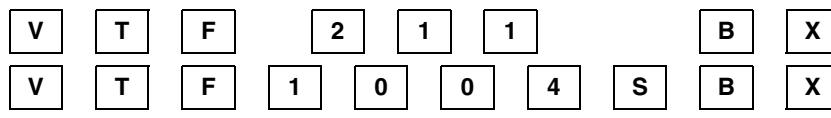
Note

- "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



GLOBAL MODEL

VTF

PART NUMBER
(3 or 4 digits)

xxx or xxxx

Example: 214
1004

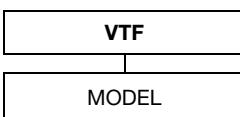
LEAD (Pb)-FREE
(0 or 1 digits)

S = Lead (Pb)-free (e1)
None = Tin lead

PACKAGING

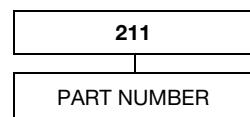
BX = Conductive foam box

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



VTF

MODEL



211

PART NUMBER

Disclaimer

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