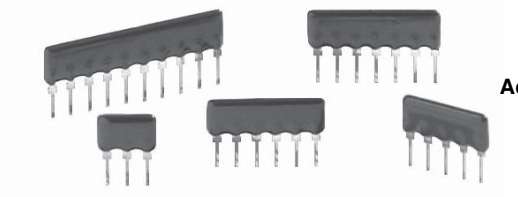
Conformal, Single In-Line Thin Film Resistor, Through Hole Network (Standard)



Actual Size

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.

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

Pb-free Available

RoHS* COMPLIANT

HALOGEN FREE

Note

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

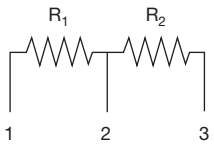
TYPICAL PERFORMANCE

	ABSOLUTE	TRACKING
TCR	10	2
	ABSOLUTE	RATIO
TOL.	0.1	0.02

Complete electrical specifications at the end of schematics.

SCHEMATIC

$R_1 = R_2$



Actual Size

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.

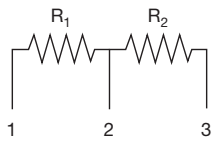
TWO EQUAL RESISTORS

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: VTF209**S**BX

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

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



Actual Size

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

RATIO DIVIDER 10:1

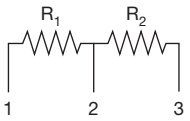
ORDERING INFORMATION ($R_1 + R_2$ =)
9K + 1K = 10K: VTF280BX
90K + 10K = 100K: VTF193BX
900K + 100K = 1M: VTF281BX

Lead (Pb)-free option add “S” after part number, e.g: VTF280**S**BX

DIVIDER NETWORK 10:1

R_1 = 100K, 1M

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



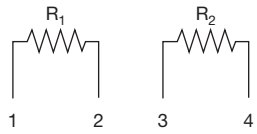
Actual Size

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.

ORDERING INFORMATION (R_1 =)
100K: VTF282BX
1M: VTF283BX

TWO EQUAL RESISTORS - ISOLATED

$R_1 = R_2$



Actual Size

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

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	

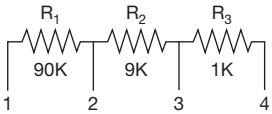
Lead (Pb)-free option add “S” after part number, e.g: VTF209**S**BX

RATIO DIVIDER 10:1 AND 100:1

$R_1 + R_2 + R_3 = 100K$

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

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



Actual Size

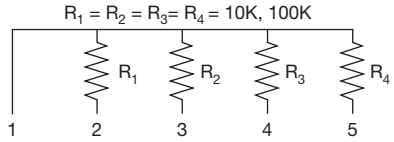
L = Total length = 0.420" (10.67 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

ORDERING INFORMATION (R1 + R2 + R3 =)
100K: VTF330BX

Lead (Pb)-free option add “S” after part number, e.g: VTF330**S**BX

FOUR EQUAL RESISTORS ONE COMMON

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



Actual Size

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

ORDERING INFORMATION (R_1 =)
10K: VTF366BX
100K: VTF367BX

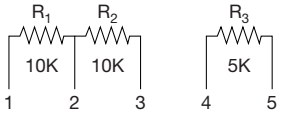
Lead (Pb)-free option add “S” after part number, e.g: VTF366**S**BX

DIVIDER NETWORK 2:1

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.

ORDERING INFORMATION
VTF1087BX

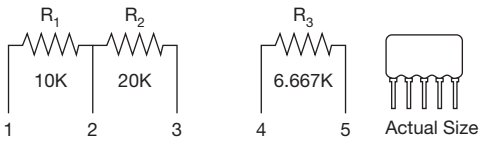
Lead (Pb)-free option add “S” after part number, e.g: VTF1087**S**BX

DIVIDER NETWORK 2:1

R_1 = 10K

$\frac{R_2}{R_1} = 2$

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



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

ORDERING INFORMATION
VTF1088BX

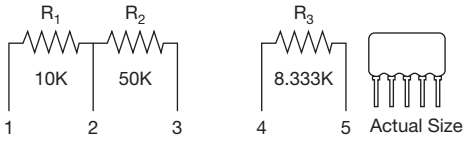
Lead (Pb)-free option add "S" after part number, e.g: VTF1088**S**BX

DIVIDER NETWORK 5:1

R_1 = 10K

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

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



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

ORDERING INFORMATION
VTF1089BX

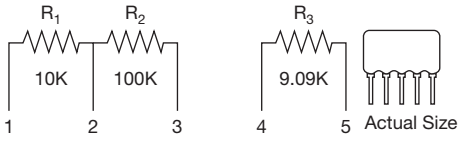
Lead (Pb)-free option add "S" after part number, e.g: VTF1089**S**BX

DIVIDER NETWORK 10:1

R_1 = 10K

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

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



Note:
• R_2 TCR Tracking 3 ppm/°C

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

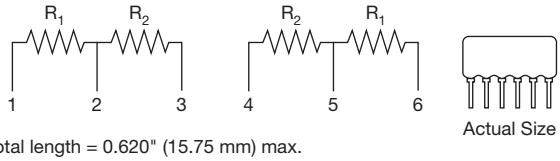
ORDERING INFORMATION
VTF1090BX

Lead (Pb)-free option add "S" after part number, e.g: VTF1090**S**BX

DIVIDER NETWORK 1:1

R_1 = 5K, 10K, 100K, 1M

$R_1 = R_2$



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.

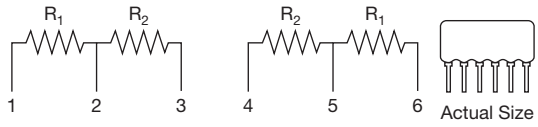
ORDERING INFORMATION (R_1 =)	
5K:	VTF225BX
10K:	VTF286BX
100K:	VTF219BX
1M:	VTF287BX

Lead (Pb)-free option add "S" after part number, e.g: VTF225**S**BX

DIVIDER NETWORK 2:1

R_1 = 10K, 100K

$\frac{R_1}{R_2} = 2$

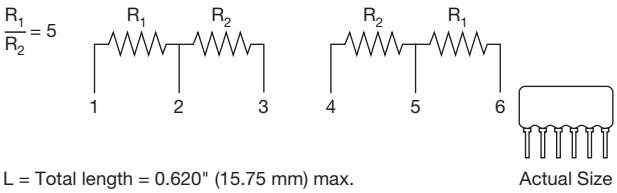


L = Total length = 0.620" (15.75 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

ORDERING INFORMATION (R_1 =)	
10K:	VTF1009BX
100K:	VTF1010BX

Lead (Pb)-free option add "S" after part number, e.g: VTF1009**S**BX

R_1 = 10K, 100K



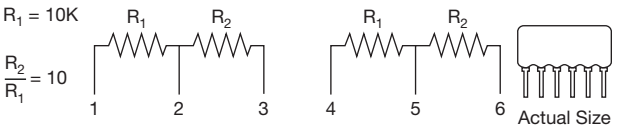
L = Total length = 0.620" (15.75 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

DIVIDER NETWORK 5:1

ORDERING INFORMATION (R_1 =)
10K: VTF1007BX
100K: VTF1008BX

Lead (Pb)-free option add "S" after part number, e.g: VTF1007**S**BX

R_1 = 10K



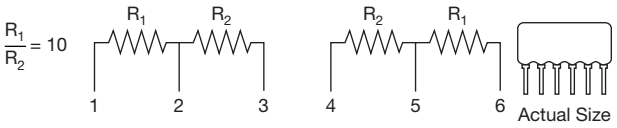
L = Total length = 0.620" (15.75 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

DIVIDER NETWORK 10:1

ORDERING INFORMATION (R_1 =)
10K: VTF220BX

Lead (Pb)-free option add "S" after part number, e.g: VTF220**S**BX

R_1 = 10K, 100K, 1M



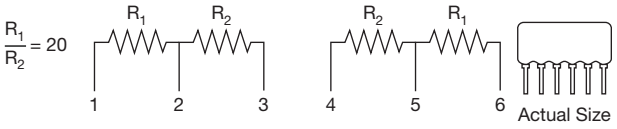
L = Total length = 0.620" (15.75 mm) max.
H = Seated height = 0.280" (7.11 mm) max.
Except PN 285 seated height = 0.320" (8.13 mm) max.

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: VTF328**S**BX

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



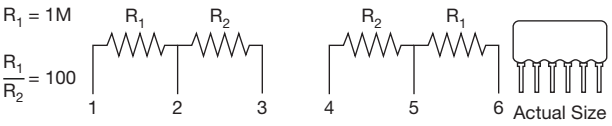
L = Total length = 0.620" (15.75 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

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: VTF1073**S**BX

R_1 = 1M



DIVIDER NETWORK 100:1

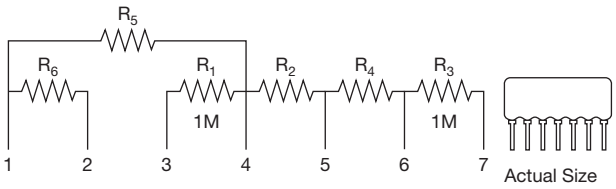
ORDERING INFORMATION (R_1 =)
1M: VTF1109BX

Lead (Pb)-free option add "S" after part number, e.g: VTF1109**S**BX

SIX RESISTOR NETWORK

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

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



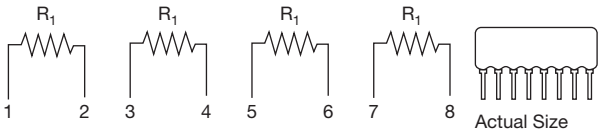
L = Total length = 0.720" (18.29 mm) max.
H = Seated height = 0.360" (9.14 mm) max.
Maximum voltage to pins 3 and 7 is 300 V

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: VTF442**S**BX

FOUR EQUAL RESISTORS ISOLATED

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



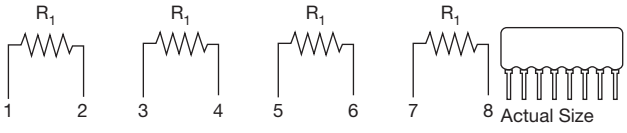
L = Total length = 0.820" (20.83 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

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: VTF329**S**BX

FOUR EQUAL RESISTORS ISOLATED

R_1 = 1K, 10K, 100K

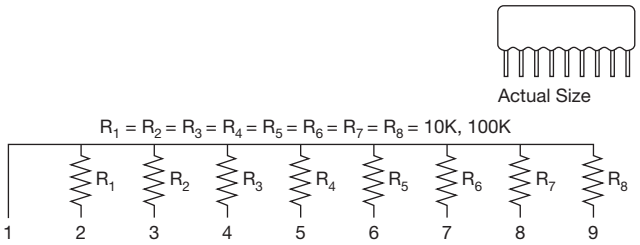


Absolute tolerance = 0.1 %
Ratio tolerance = 0.1 %
L = Total length = 0.820" (20.83 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

ORDERING INFORMATION (R_1 =)	
1K:	VTF1005BX
10K:	VTF1006BX
100K:	VTF1137BX

Lead (Pb)-free option add "S" after part number, e.g: VTF1005**S**BX

EIGHT EQUAL RESISTORS ONE COMMON



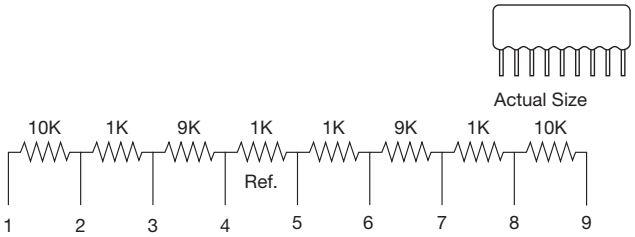
L = Total length = 0.920" (23.37 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

ORDERING INFORMATION (R_1 =)
10K: VTF368BX
100K: VTF369BX

Lead (Pb)-free option add "S" after part number, e.g: VTF368**S**BX

EIGHT RESISTOR NETWORK

(Designed for instrument amplifier with shield driver)



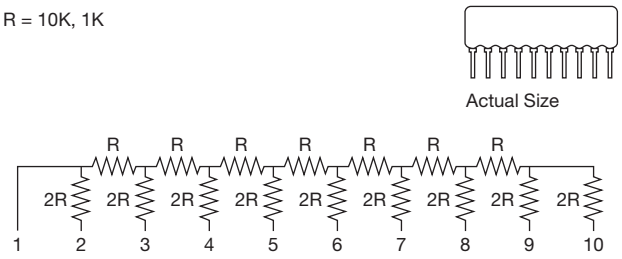
L = Total length = 0.920" (23.37 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

ORDERING INFORMATION
VTF272BX

Lead (Pb)-free option add "S" after part number, e.g: VTF272**S**BX

EIGHT BIT R/2R LADDER NETWORK

R = 10K, 1K



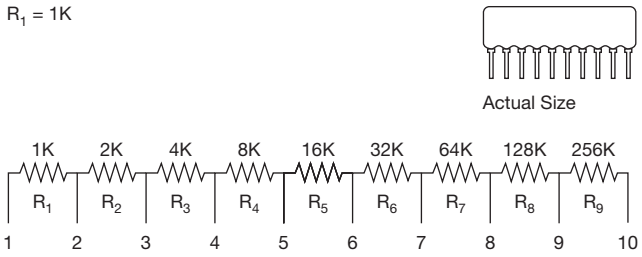
L = Total length = 1.020" (25.91 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

ORDERING INFORMATION (R =)
(± 1/2 LSB)
10K: VTF1072BX
100K: VTF267BX

Lead (Pb)-free option add "S" after part number, e.g: VTF1072**S**BX

RESISTANCE DOUBLER

R_1 = 1K



ORDERING INFORMATION
VTF1011BX

Lead (Pb)-free option add "S" after part number, e.g: VTF1011**S**BX

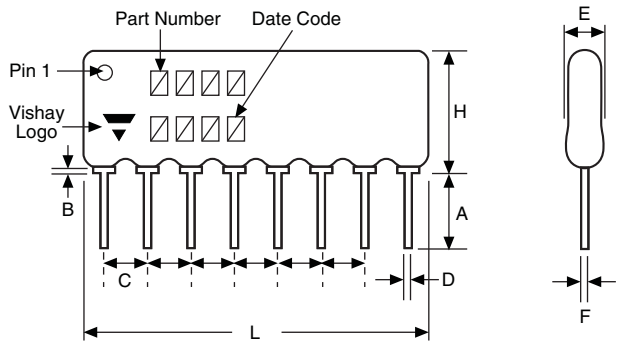
Absolute tolerance = ± 0.1 %
Ratio tolerance = ± 0.1 %
TCR tracking = ± 3 ppm/°C
L = Total length = 1.02" (25.91 mm) max.
H = Seated height = 0.280" (7.11 mm) max.

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	Δ*R* ± 0.05 %	2000 h at + 70 °C
Stability: Ratio	Δ*R* ± 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	Δ*R* ± 0.01 %	1 year at + 25 °C
Shelf Life Stability: Ratio	Δ*R* ± 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

V	T	F	2	1	1		B	X
V	T	F	1	0	0	4	S	B	X

GLOBAL MODEL	PART NUMBER (3 or 4 digits)	LEAD (Pb)-FREE (0 or 1 digits)	PACKAGING
VTF	**xxx** or **xxxx** Example: 214 1004	**S** = Lead (Pb)-free (e1) None = Tin lead	**BX** = Conductive foam box

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

VTF	211
MODEL	PART NUMBER

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