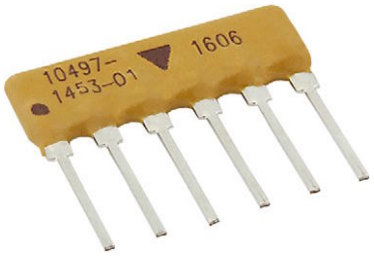
Conformal, Single In-Line Thin Film Resistor, Through Hole Network (Standard)



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.

FEATURES

Pb-free Available

RoHS* Available

- 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

Note

* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

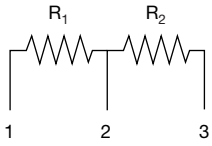
TYPICAL PERFORMANCE

	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.

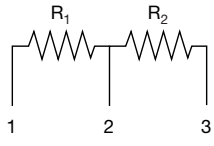
TWO EQUAL RESISTORS

ORDERING INFORMATION (R_1 =)	
1K: VTF209UF	50K: VTF214UF
2K: VTF210UF	100K: VTF215UF
5K: VTF211UF	200K: VTF216UF
10K: VTF212UF	500K: VTF217UF
20K: VTF213UF	1M: VTF218UF

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

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

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



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: VTF280UF
90K + 10K = 100K: VTF193UF
900K + 100K = 1M: VTF281UF

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

For technical questions, contact: thinfilm@vishay.com

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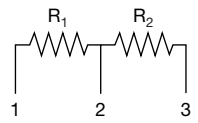
R_1 = 100K, 1M

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



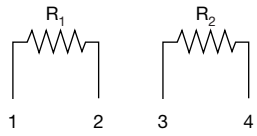

Actual Size

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 (R_1 =)
100K: VTF282UF
1M: VTF283UF

$R_1 = R_2$




Actual Size

L = total length = 0.420" (10.67 mm) max.
H = seated height = 0.280" (7.11 mm) max.

TWO EQUAL RESISTORS - ISOLATED

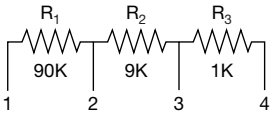
ORDERING INFORMATION (R_1 =)	
1K: VTF365UF	50K: VTF1000UF
2K: VTF997UF	100K: VTF348UF
5K: VTF998UF	200K: VTF1105UF
10K: VTF363UF	500K: VTF1106UF
20K: VTF1104UF	1M: VTF1103UF
25K: VTF999UF	

Lead (Pb)-free option add "S" after part number, e.g: VTF209**S**UF

$R_1 + R_2 + R_3 = 100K$

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

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




Actual Size

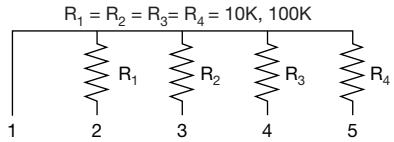
L = total length = 0.420" (10.67 mm) max.
H = seated height = 0.280" (7.11 mm) max.

RATIO DIVIDER 10:1 AND 100:1

ORDERING INFORMATION ($R_1 + R_2 + R_3$ =)
100K: VTF330UF

Lead (Pb)-free option add "S" after part number, e.g: VTF330**S**UF

$R_1 = R_2 = R_3 = R_4$ = 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

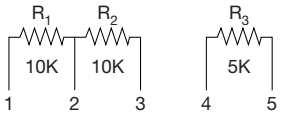
ORDERING INFORMATION (R_1 =)
10K: VTF366UF
100K: VTF367UF

Lead (Pb)-free option add "S" after part number, e.g: VTF366**S**UF

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
VTF1087UF

Lead (Pb)-free option add "S" after part number, e.g: VTF1087**S**UF

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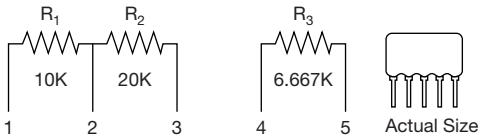
DIVIDER NETWORK 2:1

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
VTF1088UF

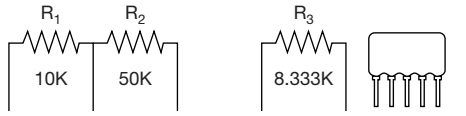
Lead (Pb)-free option add "S" after part number, e.g: VTF1088**S**UF

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
VTF1089UF

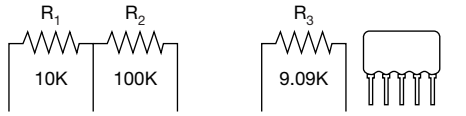
Lead (Pb)-free option add "S" after part number, e.g: VTF1089**S**UF

DIVIDER NETWORK 10:1

R_1 = 10K

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

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



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

Note
- R_2 TCR tracking 3 ppm/°C

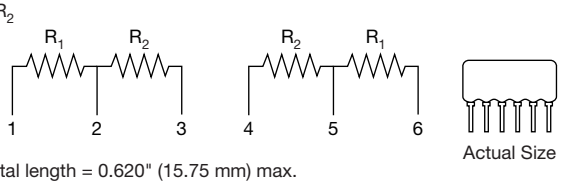
ORDERING INFORMATION
VTF1090UF

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

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.

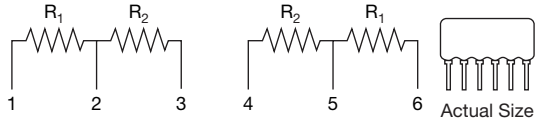
ORDERING INFORMATION (R_1 =)	
5K:	VTF225UF
10K:	VTF286UF
100K:	VTF219UF
1M:	VTF287UF

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

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:	VTF1009UF
100K:	VTF1010UF

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

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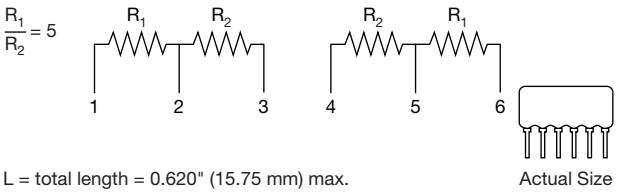
R_1 = 10K, 100K



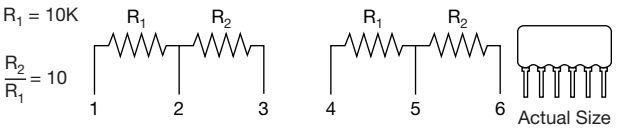
L = total length = 0.620" (15.75 mm) max.
H = seated height = 0.280" (7.11 mm) max.

DIVIDER NETWORK 5:1

ORDERING INFORMATION (R_1 =)	
10K:	VTF1007UF
100K:	VTF1008UF

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

R_1 = 10K



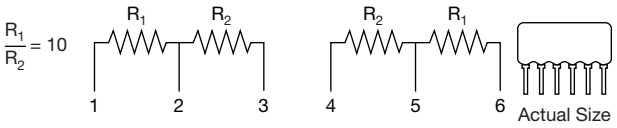
L = total length = 0.620" (15.75 mm) max.
H = seated height = 0.280" (7.11 mm) max.

DIVIDER NETWORK 10:1

ORDERING INFORMATION (R_1 =)	
10K:	VTF220UF

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

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:	VTF328UF
100K:	VTF284UF
1M:	VTF285UF

Lead (Pb)-free option add "S" after part number, e.g: VTF328**S**UF

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

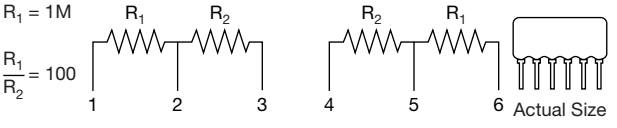
L = total length = 0.620" (15.75 mm) max.
H = seated height = 0.280" (7.11 mm) max.

DIVIDER NETWORK 20:1

ORDERING INFORMATION (R_1 =)	
10K:	VTF1073UF
50K:	VTF1074UF
200K:	VTF1107UF
1M:	VTF1108UF

Lead (Pb)-free option add "S" after part number, e.g: VTF1073**S**UF

R_1 = 1M



L = total length = 0.620" (15.75 mm) max.
H = seated height = 0.280" (7.11 mm) max.

DIVIDER NETWORK 100:1

ORDERING INFORMATION (R_1 =)	
1M:	VTF1109UF

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

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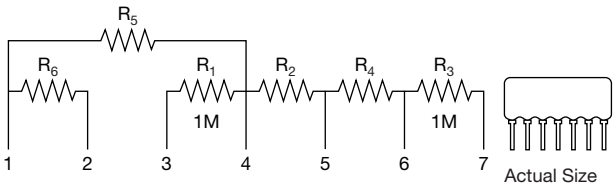
SIX RESISTOR NETWORK

(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



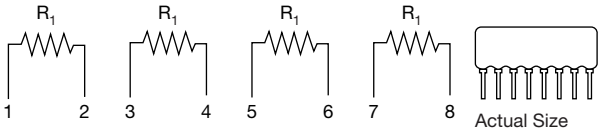
L = total length = 0.720" (18.29 mm) max.
H = seated height = 0.360" (9.14 mm) max.
Maximum voltage to pins 3 and 7 is 300 V

ORDERING INFORMATION (R_1/R_2 =)	
Devision Ratio = 250:	VTF442UF
100:	VTF443UF
50:	VTF444UF

Lead (Pb)-free option add “S” after part number, e.g: VTF442**S**UF

FOUR EQUAL RESISTORS ISOLATED

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



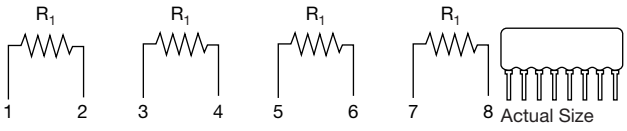
L = total length = 0.820" (20.83 mm) max.
H = seated height = 0.280" (7.11 mm) max.

ORDERING INFORMATION (R_1 =)	
1K:	VTF329UF
2K:	VTF1001UF
5K:	VTF1002UF
10K:	VTF158UF
25K:	VTF1003UF
50K:	VTF1004UF
100K:	VTF288UF

Lead (Pb)-free option add “S” after part number, e.g: VTF329**S**UF

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:	VTF1005UF
10K:	VTF1006UF
100K:	VTF1137UF

Lead (Pb)-free option add “S” after part number, e.g: VTF1005**S**UF

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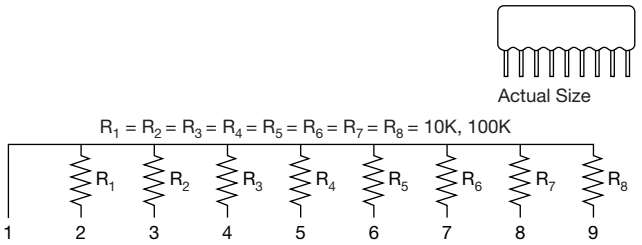
EIGHT EQUAL RESISTORS ONE COMMON



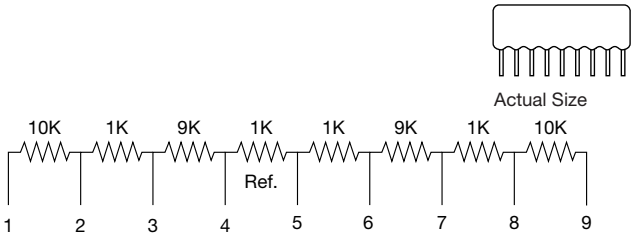
L = total length = 0.920" (23.37 mm) max.
H = seated height = 0.280" (7.11 mm) max.

ORDERING INFORMATION (R_1 =)
10K: VTF368UF
100K: VTF369UF

Lead (Pb)-free option add “S” after part number, e.g: VTF368**S**UF

EIGHT RESISTOR NETWORK

(Designed for instrument amplifier with shield driver)



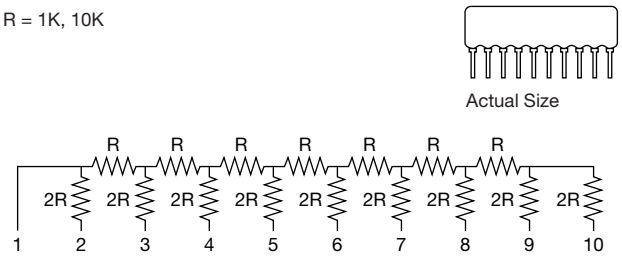
L = total length = 0.920" (23.37 mm) max.
H = seated height = 0.280" (7.11 mm) max.

ORDERING INFORMATION
VTF272UF

Lead (Pb)-free option add “S” after part number, e.g: VTF272**S**UF

EIGHT BIT R/2R LADDER NETWORK

R = 1K, 10K



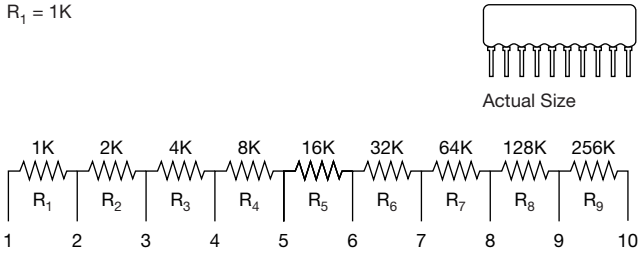
L = total length = 1.020" (25.91 mm) max.
H = seated height = 0.280" (7.11 mm) max.

ORDERING INFORMATION (R =)
(± 1/2 LSB)
1K: VTF1072UF
10K: VTF267UF

Lead (Pb)-free option add “S” after part number, e.g: VTF1072**S**UF

RESISTANCE DOUBLER

R_1 = 1K



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.

ORDERING INFORMATION
VTF1011UF

Lead (Pb)-free option add “S” after part number, e.g: VTF1011**S**UF

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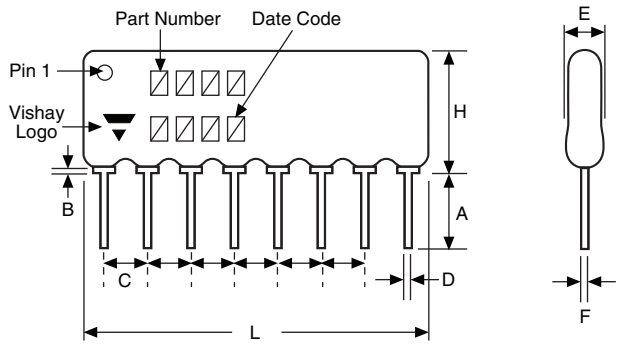
STANDARD ELECTRICAL SPECIFICATIONS		
TEST	**SPECIFICATIONS**	**CONDITIONS**
Material	Passivated nichrome	-
Pin/Lead Number	3 to 10	-
Resistance Range	100 Ω to 2 MΩ total	-
TCR: Absolute	± 10 ppm/°C (1)	0 °C to +70 °C
TCR: Tracking	± 2 ppm/°C (1)	0 °C to +70 °C
Tolerance: Absolute	± 0.1 %	+25 °C
Tolerance: 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

For technical questions, contact: thinfilm@vishay.com

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GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: VTF211UF

V	T	F	2	1	1		U	F
V	T	F	1	0	0	4	S	U	F

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	**UF** = tubed

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

VTF	211
MODEL	PART NUMBER

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