



## Molded, 25 mil or 50 mil Pitch, Dual-In-Line Thin Film Resistor, Surface Mount Network



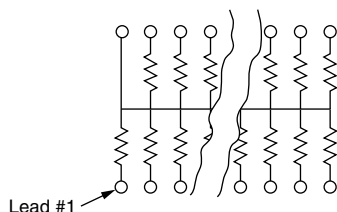
Actual Size

Vishay Dale Thin Film resistor networks are designed to be used in either analog or digital circuits. The use of thin film resistive elements within the network allows you to achieve an infinite number of very low noise and high stability circuits for industrial, medical and scientific instrumentation. Vishay Dale Thin Film resistor networks are packaged in molded plastic packages with sizes that are recognized throughout the world. The rugged packaging offers superior environmental protection and consistent dimensions for ease of placement with automatic SMT equipment. Vishay Dale Thin Film stocks many designs and values for off-the-shelf convenience. With Vishay Dale Thin Film you can depend on quality products delivered on time with service backing the product.

### SCHEMATICS

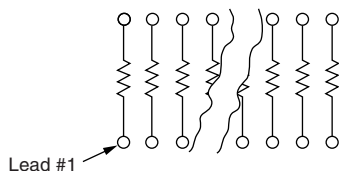
#### 01 SCHEMATIC

Resistance Range:  
10  $\Omega$  to 47 k $\Omega$

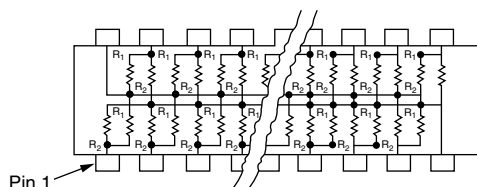


#### 03 SCHEMATIC

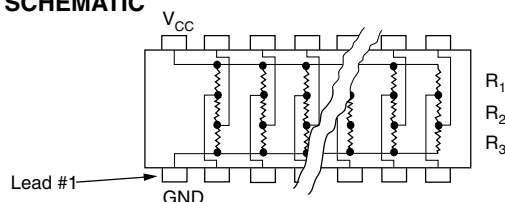
Resistance Range:  
10  $\Omega$  to 47 k $\Omega$



#### 05 SCHEMATIC



#### 47 SCHEMATIC



### FEATURES

- Reduces total assembly costs
- Compatible with automatic surface mounting equipment
- UL 94 V-0 flame resistant
- Thin film tantalum nitride on silicon
- Choice of package sizes: VTSR (TSSOP) JEDEC MC-153, VSSR (SSOP or QSOP) JEDEC MS-137, VSOR (SOIC narrow) JEDEC MS-012
- Moisture sensitivity level 1 (per IPC/JEDEC STD-20C)
- Isolated/bussed/dual terminator/differential terminator circuits
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### TYPICAL PERFORMANCE

	ABSOLUTE	TRACKING
TCR	100	NA
	ABSOLUTE	RATIO
TOL.	5, 2, 1	NA

### RESISTORS WITH ONE PIN COMMON

The 01 circuit provides nominally equal resistors connected between a common pin and a discrete PC board pin.

Commonly used in the following applications:

- MOS/ROM pull-up/-down
- Open collector pull-up
- "Wired OR" pull-up
- Power driven pull-up
- TTL input pull-down
- Digital pulse squaring
- TTL unused gate pull-up
- High speed parallels pull-up

Broad selection of standard values available

### ISOLATED RESISTORS

The 03 circuit provides nominally equal resistors isolated from all others and wired directly across.

Commonly used in the following applications:

- "Wired OR" pull-up
- Power driven pull-up
- Powergate pull-up
- Line termination
- Long-line impedance balancing
- LED current limiting
- ECL output pull-down
- TTL input pull-down

Broad selection of standard values available

### DUAL-LINE TERMINATOR; PULSE SQUARING

The 05 circuit contains pairs of resistors connected between ground and a common line. The junctions of these resistor pairs are connected to the input leads. The 05 circuits are designed for dual-line termination and pulse squaring.

Standard values are:

VSSR1605:  
 $R_1 = 220 \Omega$ ,  $R_2 = 330 \Omega$   
 $R_1 = 330 \Omega$ ,  $R_2 = 470 \Omega$

VSSR2005:  
 $R_1 = 220 \Omega$ ,  $R_2 = 330 \Omega$   
 $R_1 = 220 \Omega$ ,  $R_2 = 1.8 \text{ k}\Omega$   
 $R_1 = 1.5 \text{ k}\Omega$ ,  $R_2 = 3.3 \text{ k}\Omega$

### DIFFERENTIAL TERMINATOR

The 47 schematic consists of series resistor sections connected between  $V_{CC}$  and ground. Each contains 3 resistors of 2 different resistance values.

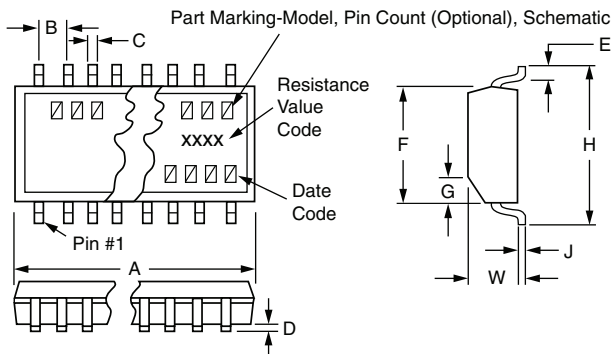
Standard values are:

VSSR20 and VTSR20:  
 $R_1 = 270 \Omega$ ,  $R_2 = 120 \Omega$

VSSR16 and VTSR16:  
 $R_1 = 330 \Omega$ ,  $R_2 = 150 \Omega$   
 $R_1 = 330 \Omega$ ,  $R_2 = 220 \Omega$

**STANDARD ELECTRICAL SPECIFICATIONS**

TEST	SPECIFICATIONS	CONDITIONS
Material	Tantalum nitride	-
Pin/Lead Number	16, 20, 24	-
Resistance Range	10 $\Omega$ to 47 k $\Omega$	Per E-24 table
TCR: Absolute	$\pm 100$ ppm/ $^{\circ}$ C	- 55 $^{\circ}$ C to + 125 $^{\circ}$ C
TCR: Tracking	n/a	-
Tolerance: Absolute	$\pm 5$ % standard ( $\pm 2$ % available) $\pm 1$ % standard (check factory)	Per E-24 table Per E-96 table
Tolerance: Ratio	NA	-
Power Rating: Resistor	100 mW max.	At + 70 $^{\circ}$ C
Power Rating: Package	16 = 1.0 W, 20 = 1.2 W, 24 = 1.4 W	0 $^{\circ}$ C to + 70 $^{\circ}$ C
Stability: Absolute	-	-
Stability: Ratio	-	-
Voltage Coefficient	5 ppm/V (typical)	-
Working Voltage	50 V <sub>DC</sub>	-
Operating Temperature Range	- 55 $^{\circ}$ C to + 125 $^{\circ}$ C	-
Storage Temperature Range	- 55 $^{\circ}$ C to + 150 $^{\circ}$ C	-
Noise	< - 35 dB	-
Thermal EMF	-	-
Shelf Life Stability: Absolute	-	-
Shelf Life Stability: Ratio	-	-

**DIMENSIONS AND IMPRINTING** in inches (millimeters)


DIMENSION	VTSR-xxxx	VSSR-xxxx	VSOR-xxxx
A - 16 PIN	0.206 $\pm$ 0.003 (5.23 $\pm$ 0.08)	0.193 $\pm$ 0.004 (4.90 $\pm$ 0.010)	0.390 $\pm$ 0.010 (9.91 $\pm$ 0.25)
A - 20 PIN	0.256 $\pm$ 0.003 (6.50 $\pm$ 0.08)	0.341 $\pm$ 0.003 (8.66 $\pm$ 0.08)	NA
A - 24 PIN	0.306 $\pm$ 0.003 (7.77 $\pm$ 0.08)	0.341 $\pm$ 0.003 (8.66 $\pm$ 0.08)	NA
B (Ref.)	0.0256 (0.65)	0.025 (0.64)	0.050 (1.27)
C (Ref.)	0.0087 (0.22)	0.010 (0.25)	0.016 (0.41)
D	0.004 (0.10)	0.006 (0.15)	0.008 (0.20)
E (Typ.)	0.024 (0.61)	0.025 (0.64)	0.030 (0.76)
F	0.173 $\pm$ 0.003 (4.39 $\pm$ 0.08)	0.154 $\pm$ 0.003 (3.91 $\pm$ 0.08)	0.152 $\pm$ 0.003 (3.86 $\pm$ 0.08)
G	0.015 $\times$ 45 $^{\circ}$ (0.38)	0.015 $\times$ 45 $^{\circ}$ (0.38)	0.015 $\times$ 45 $^{\circ}$ (0.38)
H	0.252 $\pm$ 0.005 (6.40 $\pm$ 0.13)	0.236 $\pm$ 0.008 (5.99 $\pm$ 0.20)	0.236 $\pm$ 0.005 (5.99 $\pm$ 0.13)
J (Ref.)	0.005 (0.13)	0.010 (0.25)	0.008 (0.20)
W	0.043 $\pm$ 0.005 (1.09 $\pm$ 0.13)	0.064 $\pm$ 0.005 (1.63 $\pm$ 0.13)	0.064 $\pm$ 0.005 (1.63 $\pm$ 0.13)

**MARKING**

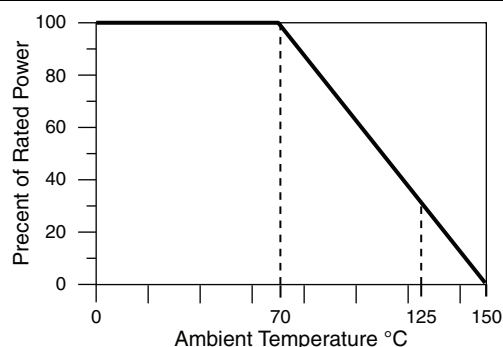
MODEL	PIN COUNT (Optional)	SCHEMATIC	RESISTANCE	RESISTANCE	DATE CODE
<b>VXXX</b>	<b>XX</b>	<b>XX</b>	<b>XXXX</b>	<b>XXX</b>	<b>XXXX</b>
VSOR	16	01, 03,	1 % RESISTANCE	1 %, 2 %, 5 % RESISTANCE	
VSSR	20	05 or 47	e.g.: 43R2	e.g.: 103 = 10K	
VTSR	24		4 digits are used to express ohmic values only less than 100 $\Omega$ . R is used to designate the decimal position	The first 2 digits are significant figures, the last digit specifies the number of zeros to follow.	

**MECHANICAL SPECIFICATIONS**

Resistive Element	Tantalum nitride
Substrate Material	Silicon
Body	Molded epoxy
Terminals	Copper alloy
Plating	100 % matte tin
Lead Coplanarity	0.0005"
Marking Resistance to Solvents	Permanency testing per MIL-STD-202, method 215

**PACKAGING INFORMATION**

MODEL	LEADS	TAPE AND REEL	TUBES
VTSR (TSSOP)	16	2500	94
	20	2500	74
	24	2500	62
VSSR (QSOP)	16	2500	98
	20	2500	55
	24	2500	55
VSOR (SOIC)	16	2500	48

**DERATING CURVE****GLOBAL PART NUMBER INFORMATION**

New Global Part Numbering: VTSR1601103JTF

V	T	S	R	1	6	0	1			1	0	3			J	T	F
V	S	O	R	1	6	0	5	3	3	1	4	7	1	G	T	F	

GLOBAL MODEL	PIN COUNT	SCHEMATIC	RESISTANCE (3, 4 or 6 digits)	TOLERANCE	PACKAGING
<b>VTSR</b> <b>VSSR</b> <b>VSOR</b> Lead (Pb)-free (e3) date code > 2705	<b>20</b> (not VSOR) <b>24</b> (not VSOR)	<b>01</b> (bussed) <b>03</b> (isolated)	XXX: ≥ 100R and all 1 %, 2 % and 5 % First 2 digits are significant figures. Last digit specifies number of zeros to follow. XXXX: < 100R 1 % First 3 digits are significant figures. Last digit specifies number of zeros to follow.	<b>F</b> = 1.0 % <b>G</b> = 2.0 % <b>J</b> = 5.0 %	<b>TAPE AND REEL</b> <b>TF</b> = Full reel 2500 <b>UF</b> = Tubed
	<b>16</b> (not VTSR) <b>20</b> (not VSOR)	<b>05</b> (terminator) <b>47</b> (terminator)	xxx xxx First 2 digits are significant figures. Last digit specifies number of zeros.	<b>G</b> = 2.0 % <b>J</b> = 5.0 %	

Historical Part Number example: VSSR2001102GT/R (for reference purposes only)

VSSR	20	01	102	G	T/R
MODEL	PIN COUNT	SCHEMATIC	RESISTANCE	TOLERANCE	PACKAGING



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