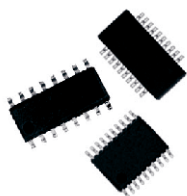




Molded, 25 or 50 Mil Pitch, Dual-In-Line Resistor Networks



Actual Size

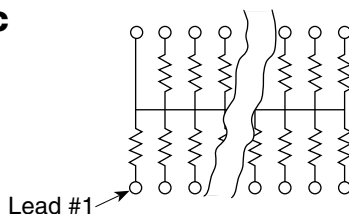
Vishay Thin Film resistor networks are designed to be used in either analog or digital circuits. The use of thin film resistive elements within the network allows you to achieve an infinite number of very low noise and high stability circuits for industrial, medical and scientific instrumentation. Vishay 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 Thin Film stocks many designs and values for off-the-shelf convenience.

With Vishay Thin Film you can depend on quality products delivered on time with service backing the product.

SCHEMATICS

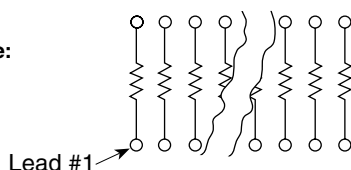
01 SCHEMATIC

Resistance Range:

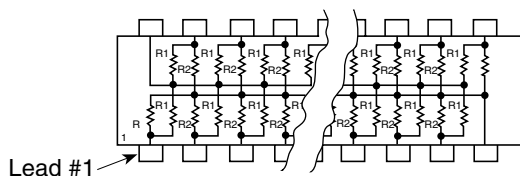
10 Ω to 47 k Ω 

03 SCHEMATICS

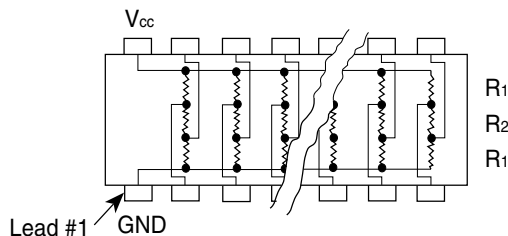
Resistance Range:

10 Ω to 47 k Ω 

05 SCHEMATICS



47 SCHEMATICS



* Pb containing terminations are not RoHS compliant, exemptions may apply

FEATURES

- Lead (Pb)-free available
- Reduces total assembly costs
- Compatible with automatic surface mounting equipment
- UL 94V-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)

RoHS*
COMPLIANT

TYPICAL PERFORMANCE

| | ABS | TRACKING |
|-----|---------|----------|
| TCR | 100 | NA |
| | ABS | 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/Pull-down
- TTL Input Pull-down
- Open Collector Pull-up
- Digital Pulse Squaring
- "Wired OR" Pull-up
- TTL Unused Gate Pull-up
- Power Driven 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
- Long-line Impedance Balancing
- Power Driven Pull-up
- LED Current Limiting
- Powergate Pull-up
- ECL Output Pull-down
- Line Termination
- 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 - $R_1 = 220 \Omega$, $R_2 = 330 \Omega$ $R_1 = 220 \Omega$, $R_2 = 1.8 \text{ k}\Omega$
 $R_1 = 330 \Omega$, $R_2 = 470 \Omega$ $R_1 = 1.5 \text{ k}\Omega$, $R_2 = 3.3 \text{ k}\Omega$
VSSR2005 - $R_1 = 220 \Omega$, $R_2 = 330 \Omega$

DIFFERENTIAL TERMINATOR

The 47 schematic consists of series resistor sections connected between Vcc 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 - $R_1 = 330 \Omega$, $R_2 = 220 \Omega$
 $R_1 = 330 \Omega$, $R_2 = 150 \Omega$

VTSR, VSSR, VSOR

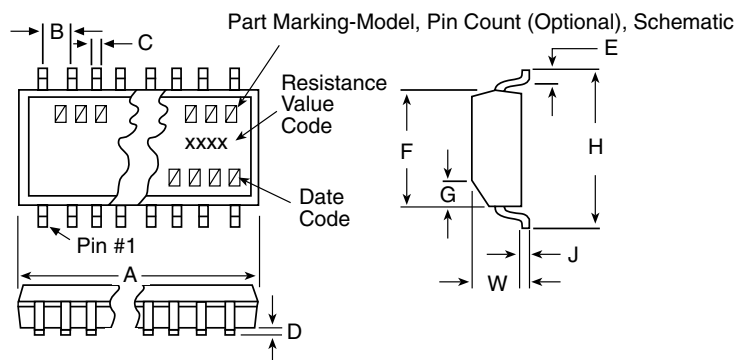
Vishay Thin Film Molded, 25 or 50 Mil Pitch, Dual-In-Line Resistor Networks



STANDARD ELECTRICAL SPECIFICATIONS

| TEST | SPECIFICATIONS | CONDITIONS |
|-----------------------------|---|---|
| Electrical Specifications | 16, 20, 24 | |
| Resistance Range | 10 Ω to 47 k Ω | per E - 24 table |
| TCR: | Tracking | NA |
| | Absolute | ± 100 ppm/ $^{\circ}$ C |
| Tolerance: | Ratio | NA |
| | Absolute | ± 5 % standard (± 2 % available)/per E - 24 table ± 1 % standard (check factory)/per E - 96 table |
| Power Rating: | Resistor | 100 mW (Maximum) |
| | Package | 16 = 1.0 W 20 = 1.2 W 24 = 1.4 W |
| Voltage Coefficient | 5 ppm/V typical | at + 70 $^{\circ}$ C |
| Working Voltage | 50 VDC | 0 $^{\circ}$ C to + 70 $^{\circ}$ C |
| Operating Temperature Range | - 55 $^{\circ}$ C to + 125 $^{\circ}$ C | |
| Storage Temperature Range | - 55 $^{\circ}$ C to + 150 $^{\circ}$ C | |
| Noise | < - 35 dB | |

DIMENSIONS AND IMPRINTING in inches and millimeters



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

MARKING

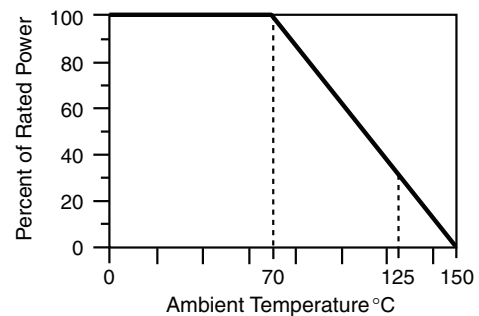
| MODEL | PIN COUNT (optional) | SCHEMATIC | RESISTANCE | RESISTANCE | DATE CODE |
|-------|-------------------------|-----------|---|---|-----------|
| VXXX | XX | XX | XXXX | XXX | XXXX |
| VSOR | 16 | 01, 03, | 1 % RESISTANCE e.g.: 43R2 | OR 1 %, 2 %, 5 % RESISTANCE e.g.: 103 = 10K | |
| VSSR | 20 | 05 or 47 | 4 digits are used to express ohmic values only less than 100 Ω . 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. | |
| VTSR | 24 | | | | |

**MECHANICAL SPECIFICATIONS**

| | |
|--------------------------------|--|
| Resistive Element | Tantalum Nitride |
| Substrate Material | Silicon |
| Body | Molded epoxy |
| Terminals | Copper alloy |
| Plating | Tin lead |
| Lead Coplanarity | 0.0005" |
| Marking Resistance to Solvents | Permanency testing per MIL-STD-202, Method 215 |
| Lead (Pb)-free Option | 100 % Sn Matte |
| Lead (Pb)-free Finish | Plated |

PACKAGING INFORMATION

| MODEL | LEADS | TAPE AND REEL | TUBES |
|--------------|-------|---------------|-------|
| VTSR (TSSOP) | 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: VTSR1601103JT1 (preferred part number format)

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

| GLOBAL MODEL | PIN COUNT | SCHEMATIC | RESISTANCE (3, 4 or 6 digits) | TOLERANCE | PACKAGING |
|--|--|--|---|--|---|
| VTSR VSSR VSOR Lead (Pb)-free (e3) date code > 2705 | 16 (not VTSR) 20 (not VSOR) 24 (not VSOR) | 01 (Bussed) 03 (Isolated) | XXX: $\geq 100R$ & all 1 %, 2 % & 5 % First 2 digits are significant figures. Last digit specifies number of zeroes to follow. XXXX: $< 100R$ 1 % First 3 digits are significant figures. Last digit specifies number of zeroes to follow. | F = 1.0 % G = 2.0 % J = 5.0 % | TAPE AND REEL T0 = 100 Min 100 Mult T1 = 1000 Min 1000 Mult T3 = 300 Min 300 Mult T5 = 500 Min 500 Mult TF = Full Reel 2500 TS = 100 Min 1 Mult UF = TUBED |
| | 16 (not VTSR) 20 (not VSOR) | 05 (Terminator) 47 (Terminator) | xxx xxx First 2 digits are significant figures. Last digit specifies number of zeroes. | G = 2.0 % J = 5.0 % | |

Historical Part Number example: VSSR2001102GT/R (will continue to be accepted)

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



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