

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

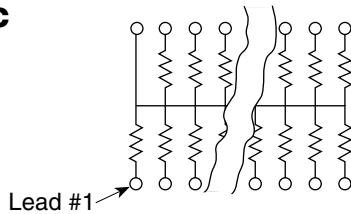


Vishay Thin Film resistor networks are designed to be used in either analog or digital circuits. The use of thin film resistive elements within the network allows you to achieve an infinite number of very low noise and high stability circuits for industrial, medical and scientific instrumentation. Vishay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

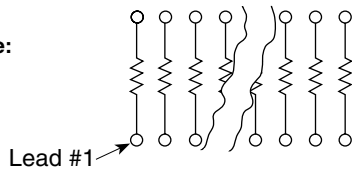
#### SCHEMATICS 01 SCHEMATIC

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

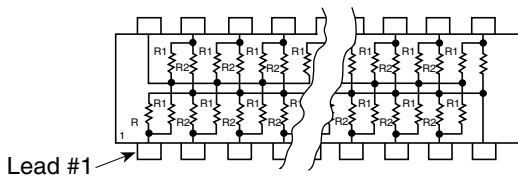


#### 03 SCHEMATICS

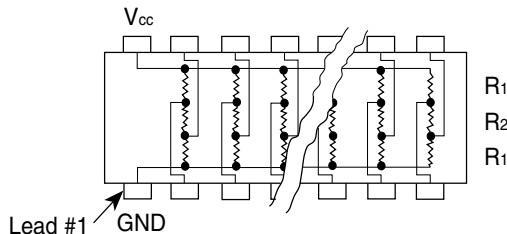
Resistance Range:  
10  $\Omega$  to 47 k $\Omega$



#### 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)



#### 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 -  $R_1 = 220 \Omega$ ,  $R_2 = 330 \Omega$

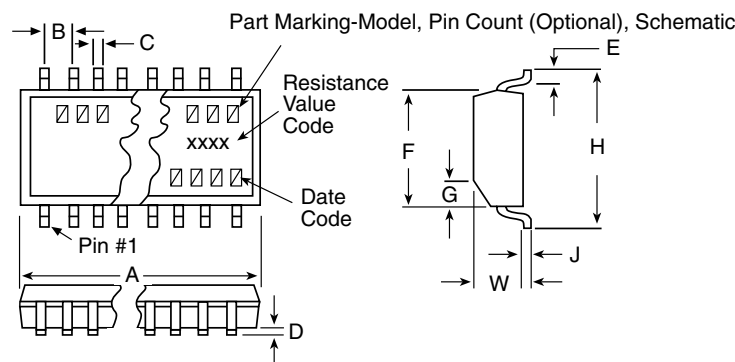
#### DIFFERENTIAL TERMINATOR

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 -  $R_1 = 330 \Omega$ ,  $R_2 = 220 \Omega$
- $R_1 = 330 \Omega$ ,  $R_2 = 150 \Omega$

STANDARD ELECTRICAL SPECIFICATIONS			
TEST	SPECIFICATIONS		CONDITION
<b>ELECTRICAL SPECIFICATIONS</b>			<b>16, 20, 24</b>
<b>Resistance Range</b>		10 Ω to 47 kΩ	per E - 24 table
<b>TCR:</b>	<b>Tracking</b>	NA	
	<b>Absolute</b>	± 100 ppm/°C	- 55 °C to + 125 °C
<b>Tolerance:</b>	<b>Ratio</b>	NA	
	<b>Absolute</b>	± 5 % standard (± 2 % available)/per E - 24 table ± 1 % standard (check factory)/per E - 96 table	per E - 24 table per E - 96 table
<b>Power Rating:</b>	<b>Resistor</b>	100 mW (Maximum)	at + 70 °C
	<b>Package</b>	16 = 1.0 W 20 = 1.2 W 24 = 1.4 W	0 °C to + 70 °C
<b>Voltage Coefficient</b>		5 ppm/V typical	
<b>Working Voltage</b>		50 VDC	
<b>Operating Temperature Range</b>		- 55 °C to + 125 °C	
<b>Storage Temperature Range</b>		- 55 °C to + 150 °C	
<b>Noise</b>		< - 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	0.206 ± 0.003	0.256 ± 0.003	0.306 ± 0.003	0.0256	0.0087	0.004	0.024	0.173 ± 0.003	0.015 × 45°	0.252 ± 0.005	0.005	0.043 ± 0.005
(millimeters)	5.23 ± 0.08	6.50	7.77	0.65	0.22	0.10	0.61	4.39 ± 0.08	0.38	6.40 ± 0.13	0.13	1.09 ± 0.13
VSSR-xxxx	0.193 ± 0.004	0.341 ± 0.003	0.341 ± 0.003	0.025	0.010	0.006	0.025	0.154 ± 0.003	0.015 × 45°	0.236 ± 0.008	0.010	0.064 ± 0.005
(millimeters)	4.90 ± 0.010	8.66 ± 0.08	8.66 ± 0.08	0.64	0.25	0.15	0.64	3.91 ± 0.08	0.38	5.99 ± 0.20	0.25	1.63 ± 0.13
VSOR-xxxx	0.390 ± 0.010	NA	NA	0.050	0.016	0.008	0.030	0.152 ± 0.003	0.015 × 45°	0.236 ± 0.005	0.008	0.064 ± 0.005
(millimeters)	9.91 ± 0.25	NA	NA	1.27	0.41	0.20	0.76	3.86 ± 0.08	0.38	5.99 ± 0.13	0.20	1.63 ± 0.13

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

# VTSR, VSSR, VSOR

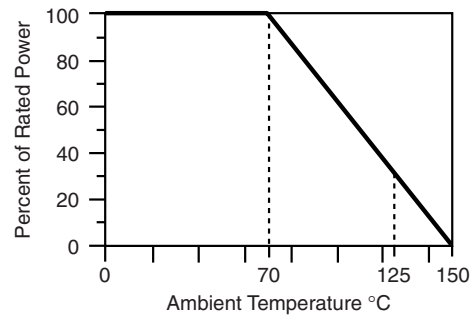
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MECHANICAL SPECIFICATIONS	
Resistive Element	Tantalum Nitride
Substrate Material	Silicon
Body	Molded epoxy
Terminals	Copper alloy
Plating	Tin lead
Lead Coplanarity	0.0005"
Marking Resistance to Solvents	Permanency testing per MIL-STD-202, Method 215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

PACKAGING INFORMATION			
MODEL	LEADS	TAPE AND REEL	TUBES
VTSR (TSSOP)	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: <b>VTSR1601103JT1</b> (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 7 digits)	TOLERANCE	PACKAGING						
VTSR VSSR VSOR Lead (Pb)-free (e3) date code > 2705	16 20 (not VSOR) 24 (not VSOR)	01 (Bussed) 03 (Isolated)	1 % > 100R & all 2 % & 5 % First 2 digits are significant figures. Last digit specifies number of zeroes to follow. < 100R 1 % First 3 digits are significant figures. Last digit specifies number of zeroes to follow. xxx/xxx First 2 digits are significant figures. Last digit specifies number of zeroes. Values separated by (/) slash	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 20 (not VSOR)	05 (Terminator) 47 (Terminator)		G = 2.0 % J = 5.0 %							
Historical Part Number example: <b>VSSR2001102GT/R</b> (will continue to be accepted)											
VSSR	20	01	102	G	T/R						
MODEL	PIN COUNT	SCHEMATIC	RESISTANCE	TOLERANCE	PACKAGING						



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