## VTSR, VSSR, VSOR



Vishay Dale Thin Film

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



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 board pin. **Resistance Range:** Commonly used in the following applications: 10 $\Omega$ to 47 k $\Omega$ • MOS/ROM TTL input pull-down Ş Š pull-up/-down Open collector pull-up TTL unused gate pull-up High speed parallels pull-up "Wired OR" pull-up Power driven pull-up Lead #1 **ISOLATED RESISTORS 03 SCHEMATIC** from all others and wired directly across. Commonly used in the following applications: Ş **Resistance Range:** • "Wired OR" pull-up • Long-line impedance 10 $\Omega$ to 47 k $\Omega$ Power driven pull-up balancing LED current limiting Power gate pull-up I ine termination Lead #1 Broad selection of standard values available **DUAL-LINE TERMINATOR; PULSE SQUARING 05 SCHEMATIC** squaring. Standard values are: $\begin{array}{l} \text{VSSR1605:} \\ \text{R}_1 = 220 \ \Omega, \ \text{R}_2 = 330 \ \Omega \\ \text{R}_1 = 330 \ \Omega, \ \text{R}_2 = 470 \ \Omega \end{array}$ VSSR2005: $R_1 = 220 \Omega$ , $R_2 = 330 \Omega$ $R_1 = 220 \Omega$ , $R_2 = 1.8 k\Omega$ Pin 1 Ri $= 1.5 \text{ k}\Omega, \text{R}_2$ **DIFFERENTIAL TERMINATOR 47 SCHEMATIC** Vcc R₁ Standard values are: $R_2$ VSSR20 and VTSR20: $R_1 = 270 \Omega, R_2 = 120 \Omega$ R<sub>3</sub> Lead #1 GND 1

FEATURES

- Reduces total assembly costs
- Compatible with automatic surface mounting equipment
- UL 94 V-0 flame resistant
- Thin film tantalum nitride on silicon



- RoHS COMPLIANT
- HALOGEN Choice of package sizes: VTSR (TSSOP) FREE JEDEC® MO-153, VSSR (SSOP or QSOP) JEDEC MO-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

### 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

- Digital pulse squaring

Broad selection of standard values available

The 03 circuit provides nominally equal resistors isolated

- ECL output pull-down
- TTL input pull-down

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

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

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

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For technical questions, contact: thinfilm@vishay.com

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3.3 kΩ =

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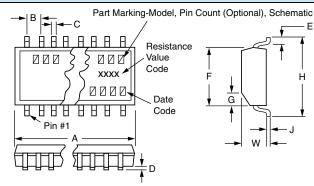
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STANDARD ELECTRICAL SPECIFICATIONS					
TEST	SPECIFICATIONS	CONDITIONS			
Material	Tantalum nitride	-			
Pin / Lead Number	16, 20, 24	-			
Resistance Range	10 Ω to 47 kΩ	Per E-24 table			
TCR: Absolute	± 100 ppm/°C	-55 °C to +125 °C			
TCR: Tracking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





DIMENSION	VTSR-xxxx	VSSR-xxxx	VSOR-xxxx	
A - 16 PIN	0.206 ± 0.003 (5.23 ± 0.08)	0.193 ± 0.004 (4.90 ± 0.010)	0.390 ± 0.010 (9.91 ± 0.25)	
A - 20 PIN	0.256 ± 0.003 (6.50 ± 0.08)	0.341 ± 0.003 (8.66 ± 0.08)	NA	
A - 24 PIN	0.306 ± 0.003 (7.77 ± 0.08)	0.341 ± 0.003 (8.66 ± 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 ± 0.003 (4.39 ± 0.08)	0.154 ± 0.003 (3.91 ± 0.08)	0.152 ± 0.003 (3.86 ± 0.08)	
G	0.015 × 45° (0.38)	0.015 × 45° (0.38)	0.015 × 45° (0.38)	
Н	0.252 ± 0.005 (6.40 ± 0.13)	0.236 ± 0.008 (5.99 ± 0.20)	0.236 ± 0.005 (5.99 ± 0.13)	
J (Ref.)	0.005 (0.13)	0.010 (0.25)	0.008 (0.20)	
W	0.043 ± 0.005 (1.09 ± 0.13)	0.064 ± 0.005 (1.63 ± 0.13)	0.064 ± 0.005 (1.63 ± 0.13)	

### MARKING

MODEL	PIN COUNT (Optional)	SCHEMATIC	RESISTANCE		RESISTANCE	DATE CODE
VXXX	xx	XX	XXXX		XXX	XXXX
VSOR VSSR VTSR	16 20 24	01, 03, 05 or 47	<ol> <li>% RESISTANCE         <ul> <li>e.g.: 43R2</li> <li>4 digits are used to express             ohmic values only less than             100 Ω. R is used to designate             the decimal position</li> </ul> </li> </ol>	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.	

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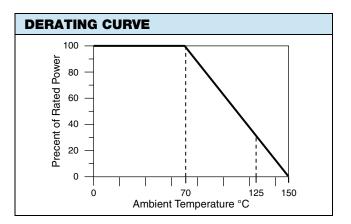
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MECHANICAL SPECIFICATIONS				
Resistive Element	Tantalum nitride			
Substrate Material	Silicon			
Body	Molded epoxy			
Terminals	Copper alloy			
Plating	100 % matte tin			
Lead Coplanarity	0.0005"			
Marking Resistance to Solvents	Permanency testing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

PACKAGING INFORMATION					
MODEL	LEADS	TUBES			
	16	2500	94		
VTSR (TSSOP)	20	2500	74		
	24	2500	62		
VSSR (QSOP)	16	2500	98		
	20	2500	55		
	24	2500	55		
VSOR (SOIC)	16	2500	48		
	20	1000	38		



GLOBAL PART NUMBER INFORMATION							
New Global Part N	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	SCHE	MATIC		RESISTANCE 8, 4 or 6 digits)	TOLERANCE	PACKAGING
VTSR VSSR VSOR Lead (Pb)-free (e3) date code > 2705	16 20 24 (not VSOR)	<b>03</b> (iso	Ussed)XXX: ≥ 100R and all 1 %, 2 % and 5 %plated)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 %	TAPE AND REEL TF = full reel 2500 UF = tubed	
	16 (not VTSR) 20						
Historical Part Number example: VSSR2001102GT/R (for reference purposes only)							
VSSR	20		0	1	102	G	T/R
MODEL	PIN COUN	Т	SCHEN	MATIC	RESISTANCE	TOLERANCE	PACKAGING

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